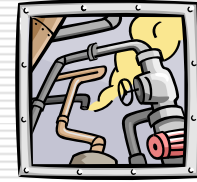# AB-PO Controls Requirements

Machines containing power converter controls:

- **PS Complex**
  - Linacs, PSB, PS, AD, CTF3, LEIR, ISOLDE, REX-ISOLDE, Transfer lines, East Area
- **SPS Complex**
  - Main Ring, North Area, Transfer lines to LHC, CNGS
- **LHC**

PS Complex - now

- [ ] There is a great diversity of power converter controls hardware, many very old, including
  - G64 based systems (~800)
  - PLC based systems (~300)
  - Systems using Danfysik command protocol (~100)
- [ ] Communications use four different methods:
  - MIL1553
  - CAMAC serial bus
  - Profibus
 - RS422

PS Complex - now
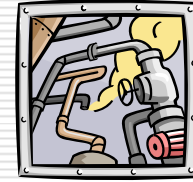
- ☐ Services from CO that must be maintained:
  - ■ Communications gateways for:
    - ☐ MIL1553 fieldbus – until all systems are renovated - not before 2012
    - ☐ CAMAC fieldbus – until systems are renovated – hopefully before 2012!
    - ☐ Profibus - indefinitely
    - ☐ RS422 – indefinitely
  - ■ Timing
  - ■ Function generation:
    - ☐ GFA
   - ☐ GFAS
  - ■ Alarms and control applications

MIL1553/G64

- The majority of the PS complex converters are controlled using G64 crates linked by MIL1553 to a gateway system running under GM

- AB-CO must maintain these gateways and ideally port them to FESA

- From 2006, operation of the PS will be from the CCC, so improved remote diagnostics and reset are very desirable – this will need some modifications in the gateway (GM or FESA)

- AB-PO accepts to maintain the MIL1553 gateway software (under FESA) from 2007

- We need AB-CO to provide and maintain the gateway infrastructure

CAMAC serial bus/G64
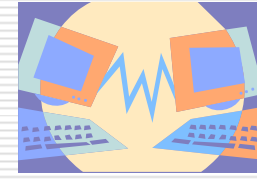
- Some G64 crates are still linked to CAMAC based gateways using the CAMAC STE interface

- The G64 software is compatible with MIL1553 and CAMAC STE, so switching to MIL1553 requires no software effort

- AB-CO must maintain these gateways until they are replaced, either by MIL1553 or by WorldFIP if the power converters are renovated after 2008 when a new controls solution will be available

Profibus/PLCs
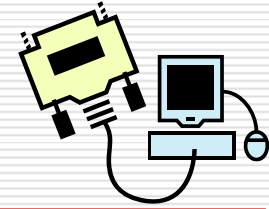
- Around 300 Simatic PLCs are used to control power converters, mostly in ISOLDE, but also in LEIR electron cooling and elsewhere in the PS complex.

- AB-PO accepts to maintain the PLC software once suitable people have been trained, however, from time to time we may need help from AB-CO PLC specialists if new software or major modifications are required

- AB-PO accepts to maintain the PLC gateway software (under FESA) from 2007

- We need AB-CO to provide and maintain the PLC gateway infrastructure

RS422

- ☐ LEIR in particular will use Danfysik power converters that include their own control system interfaced via RS422 serial links

- ☐ A couple of SPS type power converters have been used that emulate the commercial power converters and are also controlled via RS422

- ☐ AB-CO has provided an RS422 gateway that will be needed for as long as the Danfysik converters are in use

- ☐ AB-PO accepts to maintain this gateway (under FESA) from 2007

- ☐ We need AB-CO to provide and maintain the RS422 gateway infrastructure

PS Complex - future

- A new controls solution for the PS and SPS North Area will be developed from next year for progressive deployment from 2008 in the PS complex (as power converters get renovated)

- Renovation of the SPS North Area has not been approved but the same solution would be used

- Realistically in the time available, this solution can only be a relatively minor modification of the LHC FGC system (FGC3), so the same controls services provided for LHC will be needed in the PS (and SPS North Area if approved):
  - WorldFIP field buses (PS: ~40, SPS Zones: ~10)
  - Rack mounted PC WorldFIP gateways including CTRI timing interface and remote console/reset services

SPS Main Ring - CIS
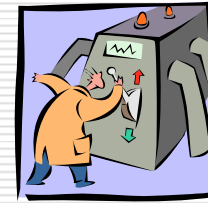
- The SPS main power converters have a Central Interlock System based on Siemens PLCs
- This was installed in 1996 and is maintained by the Spanish company GTD
- The GUI for the CIS is based on HPUX/C/MOTIF and is obsolete (along with the HP hardware it runs on)
- AB-CO must provide enough old HP workstations to cover the period until a new GUI can be developed
- The best solution will be to use PVSS, and we would like AB-CO to provide and maintain this interface for operation from 2008 onwards

SPS – ROCS MUGEF

- ☐ The SPS main ring, transfer lines to the LHC and CNGS use ROCS MUGEF systems for power converter controls
- ☐ There are no plans to replace these systems, though progressive renovations are foreseen to improve their performance and reliability
- ☐ AB-CO is currently responsible for the ROCS software
- ☐ AB-PO agrees to take back the responsibility for the software once it has been ported under FESA (2007 at the earliest)
- ☐ We need AB-CO to maintain the MUGEF PPC processor cards and timing interfaces and associated services (remote console/reboot)
- ☐ MUGEF generates alarms and will need SL-EQUIP until the FESA version takes over

SPS North Area - now
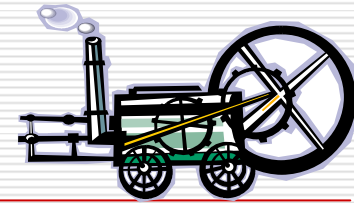
- ☐ The SPS north area remains in operation with about 350 power converters controlled by very old and increasingly unreliable controls infrastructure

- ☐ The existing systems use a chain of three elements (ancient PC, CAMAC crate, G64 Junction Crate)

- ☐ AB-PO is starting a renovation program that will replace all three by a VME based Junction Crate under FESA. This may be available for the start of operation in 2006, but it is too soon to say definitely.

- ☐ The old systems must be maintained until the new ones are ready to take over

- ☐ AB-CO will be responsible for the usual hardware and services for the VME Junction Crates (6 units)

SPS North Area - future

- ☐ In the long term, if the power converters in the North Area are renovated, the new ones will be controlled by the same FGC3 controllers that will be used to renovate the PS complex

- ☐ If this happens, the VME junction crate will be replaced by standard WorldFIP gateways and AB-CO will be asked to provide the same infrastructure and support as for the LHC and the PS

LHC

- ☐ Stephen Page has already provided the list of controls requirements associated with LHC commissioning
- ☐ In summary:
  - ■ WorldFIP gateways including CTRI timing interfaces and the usual support services (remote console/reset)
  - ■ LynxOS, Timing and WorldFIP drivers and libraries
  - ■ Controls middleware
  - ■ Database (LHC layout and assets management)
  - ■ Alarms
  - ■ Post Mortem
  - ■ Logging