CERN
CH-1211 Geneva 23
Switzerland

CERN Div./Group or Supplier/Contractor Document No.
EN/STI

EDMS Document No.
xxxxxxx

Date: 2010.06.04

Point 8 – Equipment inventory

Abstract

This document describes the equipments installed in the area UX85, US85 and UW85. The collected information will be used for the preparation of relocation studies of these LHC critical areas.

Prepared by :	***Verified By***	***Approved By***
G. Spiezia, EN/STI **M. Spiezia,** EN/STI	**D. Kramer,** EN/STI **A. L. Perrot,** EN/MEF **M. Pojer,** BE/OP **M. Solfaroli,** BE/OP	**J.F. Bel, G. Burdet, R. Chery, F. Chapron, M. Codoceo, A. Day, C. Dehavay, P. Dahlen, S. Grau, H. Jena, A. Marin, R. Nunes, J. Palluel, M. Pezzetti, D. Ricci, E. Sallaz, A. Suraci**

History of Changes

Rev. No.	*Date*	*Pages*	*Description of Changes*

Contents

1. LAYOUT & RACK LOCATIONS

Figures 1-3 indicate the exact location of the racks listed in the previous table.

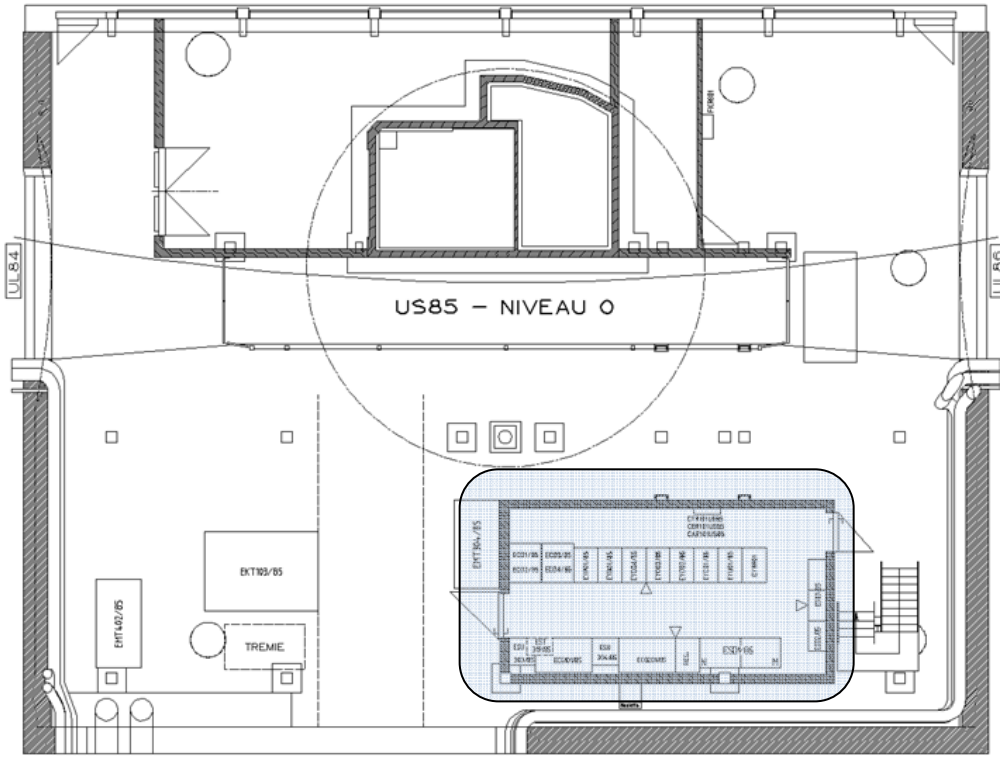


Figure 1. Rack locations in the US85 – Level 0.

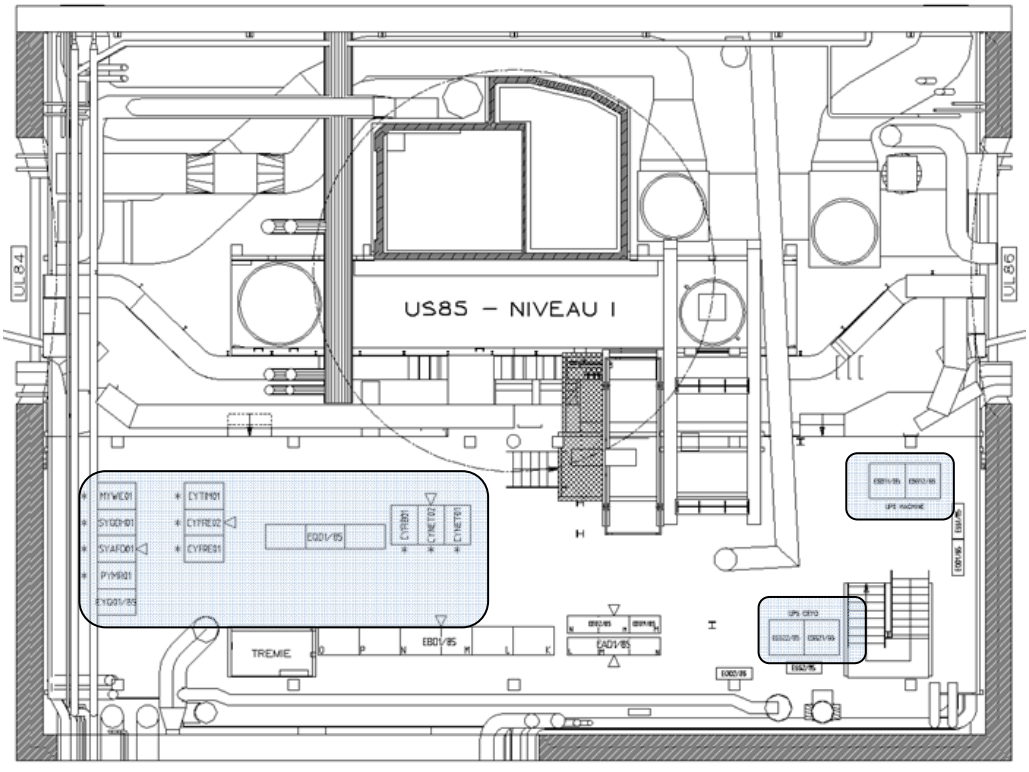


Figure 2. Rack locations in the US85 – Level 1.

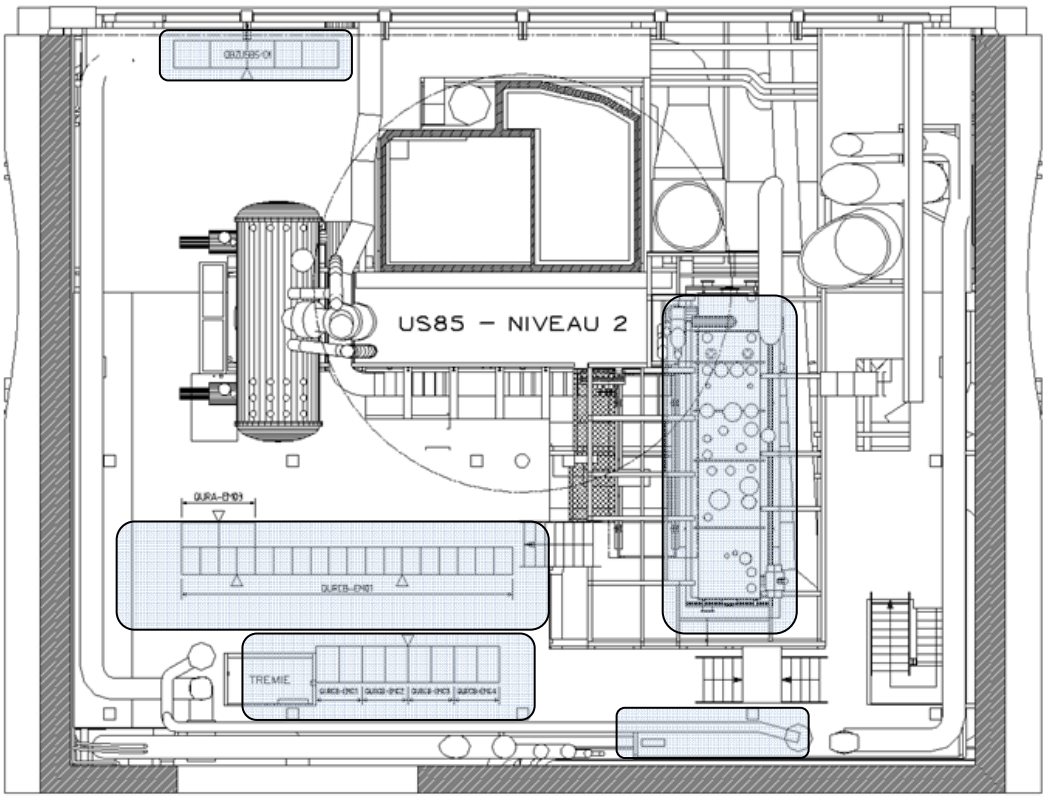
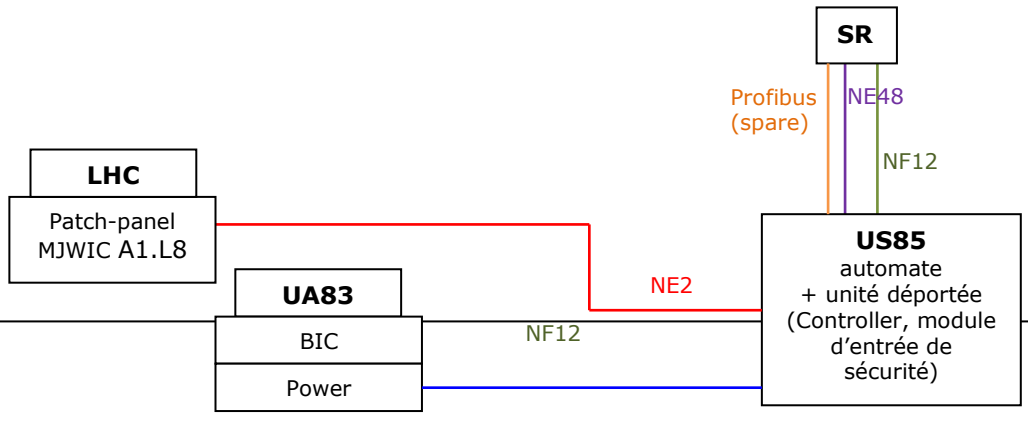


Figure 3 Rack locations in the US85 – Level 2.

2. TIMING AND REMOTE RESET [R. CHERY, C. DEHAVAY]

The timing and the remote reset systems are installed at US85, level 1, in the racks CYTIM01 and CYFRE01 respectively. They manage the timing and the remote reset distribution for the front-end controls.
The timing rack is supplied by the UPS system (200 W) and the distribution is based on a RS485 serial port. It is strongly coupled with other LHC beam equipments. In particular, its functioning depends on the beam interlocks, BDI, and BT. The main users of the timing are the beam instrumentation equipment, the power interlock equipment, and the LHCb experiment. The logical connection chart is shown in Fig. 1. The users of the remote reset system are indicated in Fig. 4. It is interesting to note that the 'clients' of the remote reset are mostly (except Timing) located in the UAs where radiation levels can be considered as significantly better than in the US.



NE1

Figure 1. Connection flow-chart for timing and remote reset.

REMOTE RESET

US85 sous sol LHC

Câbles demandés à TS/EL
Câbles contrôlés **Reset en opération**

Total Resets = 33
Type de câble : COAX 50 OHM C-50-3-1
Type de connecteur à chaque extrémité : BNC 50

CFP-US85-CRR1

SOURCE RACK	Nb de câbles	DESTINATION RACK	RESET SYSTEM	TIME	OUT	No Câble
US85 CYFRE01	1	UA83 GYPOS01	Reserve for SURVEY	5	1	1813896
US85 CYFRE01	1	UA87 GYPOS01	Reserve for SURVEY	5	2	1813897
US85 CYFRE01	1	UW85 UIAO 820	PLC VENTIL	5	3	1813898
US85 CYFRE01	1	UW85 UIAO 820	PLC VENTIL	5	4	1813899
US85 CYFRE01	1	UA83 CYCIP01	CFP-UA83-CIPXL8	5	5	1813900
US85 CYFRE01	1	UA83 CYCIP02	CFP-UA83-CIPML8	5	6	1813901
US85 CYFRE01	1	UA83 CYCIP03	CFP-UA83-CIPAL8	5	7	1813903
US85 CYFRE01	1	UA87 CYCIP01	CFP-UA87-CIPXR8	5	8	1813904
US85 CYFRE01	1	UA87 CYCIP02	CFP-UA87-CIPMR8	5	9	1813905
US85 CYFRE01	1	UA87 CYCIP03	CFP-UA87-CIPAR8	5	10	1813906
US85 CYFRE01	1	US85 MYWCI01	CFP-US851-CIWLR8	5	11	1813908
					12	
US85 CYFRE01	1	UA87 VY10	PLCVACLHCUA87	5	13	1813915
US85 CYFRE01	1	UA83 VY10	PLCVACLHCUA83	5	14	1813914
					15	
					16	
US85 CYFRE01	1	EYC01/85	EFELUS85-1	5	17	1822528
US85 CYFRE01	1	EYC01/85	EFELUS85-2	5	18	1822587
US85 CYFRE01	1	C1A11/85X	EFELUX85	5	19	1822529
US85 CYFRE01	1	UA87 BY07	BLMI87T	1	20	1813921
US85 CYFRE01	1	UA87 BY07	BSMN87T	1	21	1813922
					22	
US85 CYFRE01	1	UA83 RYCA01	CFC-UA83-RCAL1	1	23	1818332
US85 CYFRE01	1	UA83 RYCA03	CFC-UA83-RCAL2	1	24	1818333
US85 CYFRE01	1	UA87 RYCA01	CFC-UA87-RCAL15	1	25	1818334
US85 CYFRE01	1	UA87 RYCA03	CFC-UA87-RCAL16	1	26	1818335
					27	
					28	
US85 CYFRE01	1	UA83 QYC02	CRYO_PA_LSS8L	5	29	1819857
US85 CYFRE01	1	UA83 QYC02	CRYO_ET_LSS8L	5	30	1819858
US85 CYFRE01	1	UA87 QYC02	CRYO_PA_LSS8R	5	31	1819859
US85 CYFRE01	1	UA87 QYC02	CRYO_ET_LSS8R	5	32	1819860
TOTAL	26					

Figure 4. Remote reset users

A failure of the two systems creates a lack of the timing distribution for the equipments related to the beam control and the lack of the remote reset signals. Therefore, the beam must be dumped. The equipments are based on commercial devices and radiation tests were not performed. The crate can be relocated in another location and the maximum distance allowed is 100 m.
This system should be relocated.

2.1 MISSING INFORMATION

Do you have any electronics in the rack CYFRE02 at US85, level1?
Point out the difference between the timing and the remoter reset users.
Type and number of cables for timing and remote reset.
Type of power line.

3. WORLDFIP EQUIPMENT [J. PALLUEL]

The WorldFIP equipment is installed in the racks CYFRE01 at US85 and in the rack 7Y-LHCB-MSS=UX85 at UX85. There are end-line FipDiag and Cu/Cu (Copper copper) repeaters. The power is supplied from the rack EOK 113/85 in US85 and form the rack EBD3/85X, LHCB-rack4-Q8, in UX85. The repeaters normally use the UPS. The user fo the repeater in US85 is Power converter euipment (2.5 Mbit/s); the user of the repeater in UX85 are the RADMON and experiment equipement.

In case of failure of the WorldFIp repeaters, the next user agent cannot respond anymore. Therefore, the impact on the machine safety and operation depends on the criticality of the users. In case of failure of the FipDiag, the proper working of the network cannot be checked. Radiation tests were performed on the repeaters. A ^{60}Co source at CEA (Centre d'Energie Atomique) was used to irradiate the device under test (1MB/s) which stood up to 300 Gy.
No major failure was observed. Two repeaters (2.5 MB/s) were tested by using a 60 MeV proton beam at Louvain. The samples received a total dose of 215 and 500 Gy respectively. The hadron fluence is not specified.
The repeaters are under test in the CNGS radiation facility. According to the preliminary results, a repeater failed at a total dose of about 160 Gy when the hadrons fluence (> 20 MeV) and the neutron fluence (1 MeV_{eq}) were about of 1.1 x 10^{12} cm^{-2} and 1.7 x 10^{12} cm^{-2} respectively. Single Event Upsets were not observed till the device failed. A second repeater was tested and did not show any failure up to a total dose of 250 Gy.
1 and 2 VE2R cables are needed for each FipDiag and each repeater respectively. The relocation can be done and the maximum distance varies from 500m to 1000m depending on the system. However, performed radiation tests suggest that a relocation is not required from the P8 areas.

3.1 MISSING INFORMATION

Is PO the only user of your repeaters in US85?
Do you have references/documents for the radiation tests carried out at CEA and Louvain?
Do you have already some documentation/summary for the CNGS tests and conclusions?

4. WARM INTERLOCK CONTROL (WIC)[P. DAHLEN]

The Warm Interlock Controller (WIC), located at US85 in the rack MYWIC01 protects the warm magnets at Point 8. The control system is based on the PLC type F from Siemens. It requires an AC 230 V supply (500 W) and its remote communication relies on the Ethernet connection and on the ProfiBus for the connection to the remote I/O. It depends on the Beam Interlock Controller (BIC). Following a failure of the WIC system the beam must be dumped because the warm magnets are not controlled. Fig. 5 shows the location and logical connections between the various parts.

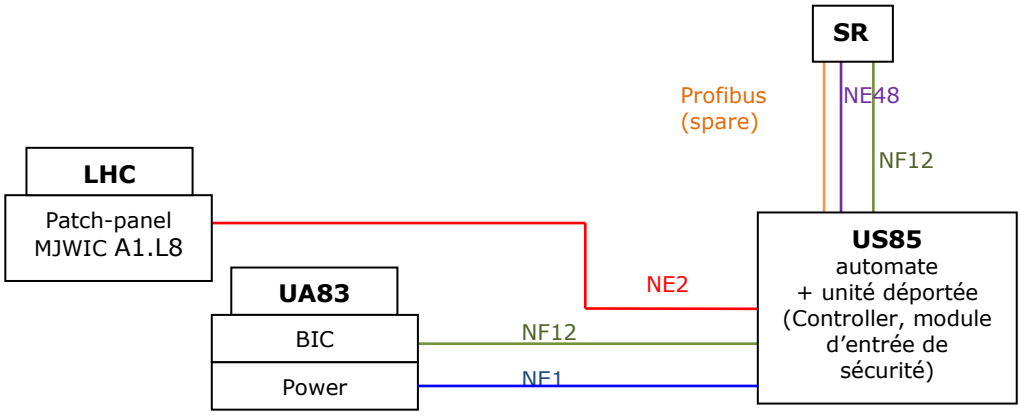


Figure 5. Connection flow-chart for WIC equipment.

Although specific tests were not carried out or conclusive data exists, PLCs are known to be very sensitive to radiation.
The system should be relocated and the maximum possible distance is 500 m.

4.1 MISSING INFORMATION

Provide more information on the type and the numer fo cables required for the relocation.

5. EQUIPMENT FOR SURVEY [A. MARIN]

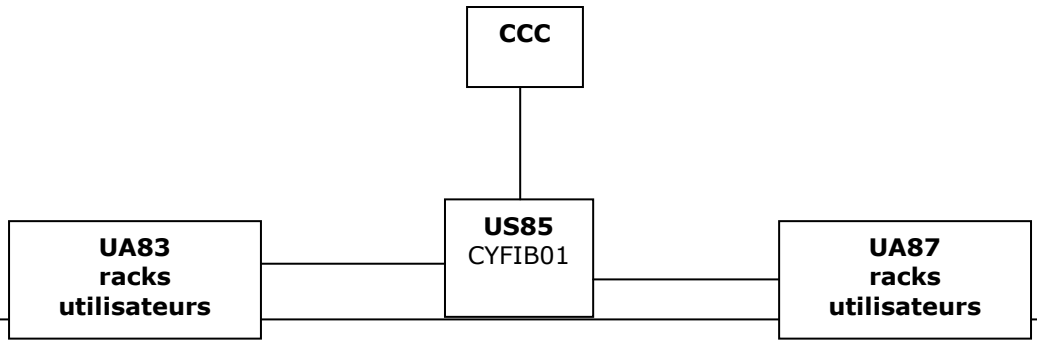
Hydrostatic and temperature sensors for the Survey LOWbeta system are located at UX85b and US85 on the walls. There are sensors with a built-in signal conditioning electronics and sensor that use a deported amplifier. They do not depend on power supply, neither on remote communication. The control panels of this equipment are placed in the UA locals. The sensors provide the alignment of the low beta magnets. In case of failure, the LHC beam must not be dumped but it will pose an issue for operations.
The sensors cannot be relocated. Radiation tests with high-energy gamma-ray from a 60Co source (SACLAY) at different dose rate and in TCC2 were carried out on both the sensors and the associated electronics. The sensors and the associated electronics can stand up to 60000 Gy and 250 Gy, respectively.
(see also http://www.slac.stanford.edu/econf/C06092511/papers/WEPO16.PDF)
The relocation is not possible for the sensors and the electronic conditioners placed in the tunnel.

5.1 MISSING INFORMATION

Confirm that you can stay as is.
Provide a more detailed description of your location.

6. OPTICAL FIBERS [D. RICCI]

Patch panels for optical fibres are installed in the rack CYFIB01 at US85, level 1. It consists of passive elements such as optic fibres and connectors. The system does not need any power supply.
The fibres are used by IT network, GSM, Cryogenics, Quench protection system, power converter (worldfip and profibus), and other users not specified. A logical sketch is shown in Fig. 6.



'Start point' pour le Point 8 coté machine – 'dispatch' vers les UAs

Figure 6. Connection flow-chart for optical fibers.

The multimode fibres used by IT network are sensible to the Total Ionising Dose but do not suffer of SEE. Thus, the low dose expected in the considered areas should not pose any problem for the operation. The system uses about 20 cables and the relocation would require a high cost.
Therefore, the system itself can stay in place. A relocation can be required if it can make easier the relocation of the related network equipments (switches).

6.1 MISSING INFORMATION

Verify the list of the users.
Do you have optical fibers installed in UX85?

7. NETWORK EQUIPMENT [E. SALLAZ]

The network infrastructure in US 85 is located in the racks CYNET01 and CYNET02 at level 1. The racks CYNET01, CYNET02, and CYFIB01 include optical fibres, UTP (Unshielded Twisted Cable) cables, and switches. To date, the number of UTP cables is 170. The number of cables for optical fibres is 20 (see above).
The system requires a power of 600 W for 3 network devices in place. It depends on the optical fibres and on other network equipments topologically before it.
The network infrastructure in UX85 is located at UX85, level 1. The rack CYNET01 includes optical fibres, UTP (Unshielded Twisted Cable) cables, and switches. To date, the number of UTP cables is 106. The number of cables for optical fibres is not provided yet. The actual power consumption is around 1 kW at the star-point. It depends on the optical fibres and on other network equipments topologically before it.
A failure of the network system will affect all the users in the area. The systems using the network can change at any time. The list can be checked on the netops website. The system can be moved as long as it can be re-installed in such a way to cover all the area. The main point concerns maximum length of the structured cabling infrastructure which is 90 meters from the star-point.
It is suggested to relocate the network equipment since many users depend on it.

7.1 MISSING INFORMATION

Please, verify the numbr and the type of cables.
Give the current list of the users for the network in US85 and UX85.

8. CRYOGENICS REFRIGERATORS AND VALVE POSITIONERS [M. PEZZETTI, J.F. BEL, A. SURACI]

The control equipment of the cryogenic refrigerators and valve positioners are located in US85. The main functions of the control system are controlled by relay circuits. The

CPU and I/O cards are only used for remote supervision and alarm transmission. The equipment is fed by a 230 AC/24 V DC power supply. The electrical cubicle is supplied from a 32 A 3 phased+N power supply. The supply is coming from the EN/EL equipment EBD2/85. It is foreseen to switch to a supply from a cryogenics electrical board at a later time. The supply for the PLC and the I/O cards is coming from a Siemens 24VDC UPS system. This 24VDC supply is also used for the relay circuits controlling the two pumps.
At level 2 in the racks QURA-EM02=US85, QURA-EM03=US85, QURCB-US85=US85, QURCB-EMC1 to EMC4=US85 (4 Elec Cabinets). QURA is a Lower Cold Box 4.5K, QURCB is a Cold Box 1.8K & Cold compressors. The equipment consists of the *rack turbines Cold Box 4.5K*, *PLC Cold Box 4.5K*, *PLC Cold Box 1.8K*, *Electronics cabinet Cold Compressors system*, *OLM Return modules*. The equipment requires the power line 400VAC from EQD1/US85 Cabinet, 24VDC from Rack 230/24VDC in US85 1st floor, and 230VAC UPS from EOD Cabinet in US85 1st floor. The water cooling is required for the proper functioning of the unit. The remote communication is based on Ethernet and on the Profibus.
In case of failure the beam must be dumped since the tunnel cryogenic transfer Line is not supplied correctly. No hardwired interlock is foreseen.
The relocation of some parts has been already approved by the integration team (Floor 0 & UL86). The QURC-EMC1 to 4 could be moved to US85 level 0 (with additional shielding) and the Electrical Cabinets QURA & QURCB-EM01 to the UL84. The system requires about 100 cables.

8.1 MISSING INFORMATION

Do you have any electronics in the rack CYFRE02 at US85, level1?
Information on the equipment at second floor have been given later. Could you verify the consistency with respect to the descritpion of the control part equipment?
You already moved some racks. Please, specify the number and the type of cables required in case of relocation of other equipments.
Could you, please, add details on the equipment resumed in Table 1.

Rack	Class	Comment
QURCB-EM01	to be confirmed: Cryo?	
QBZUS85/01	not specified	It is on the layout document but not found in the US85

Table 1. Cryogenics refrigerators equipment.

9. GSM EQUIPMENT [F. CHAPRON]

GSM equipment is located at US85 level 0 in the safe-room. It consists of a GSM probe that monitors the availability of GSM services over time in this part of LHC tunnel. It needs a 220V, (50 W) power supply and the availability of the GSM services (provided by a GSM emitter located in ? and a leaky feeder cable infrastructure). The GSM emitter is located in ? and maintained by Sunrise.
The device is suspected to be sensitive to radiations but specific tests have not been carried out. In case of failure, the IT/CS group will loose the monitoring of the GSM service.

The relocation depends on the GSM signals propagation. Then, a site survey shall be made to determine the possibilities. The drawing of the leaky feeder cable infrastructure can be provided later.
Since the system is understood as not critical, the relocation could be avoided.

9.1 MISSING INFORMATION

Information was derived form point 5, UJ56. Verify the consistency and possibly specifyb the rack number and the location of the GSM emitter.

10. FIRE DETECTION AND ODH [S. GRAU, R. NUNES]

The control panel for the fire and the ODH detection are located at US85 at level 1. The racks are almost full and their respective names are SYAFD01 and SYODH01 for the fire detection and ODH system respectively. Detectors for the fire detection and the alarm transmission are located at level 0, 1, and 2. The equipment needs a 230 VAC power supply and the remote communication is based on the Ethernet network and CERN Safety Alarm Monitoring (CSAM) network cables. The evacuation system depends on the fire and ODH detection systems. In fact, the signals of the fire and the ODH detection system are used to trigger the evacuation system, to alert the fire brigade by means of the CSAM network, and to warn the CERN control room as well as the experiment control room.
A failure of the control system leads to the incapability of detection for fire and ODH.
The control system for the fire detection, as well as all detectors were already relocated to the ULs gallery. The ODH control system was relocated too, with the respective detectors remaining at their current location.

10.1 MISSING INFORMATION

11. RAMSES [A. DAY]

The rack PYMR01=US85 is an empty rack that was provisioned at the beginning of RAMSES when the installation structure was being defined, though has been kept in the event of additional equipment being added to Pt8.
Nothing is needed.

11.1 MISSING INFORMATION

12. UPS, ELECTRICAL SUPPLY AND DISTRIBUTION [G. BURDET, M. CODOCEO]

The UPS system for critical equipment is located in the racks ESS11/85, ESS12/85 at US85 and in the racks ESS21/85, ESS22/85 at UX85a. In particular, two 20 kVA UPS are used for the cryogenic system and the machine systems at US851, a 160 kVA UPS and a 10 kVA UPS are used for LHCb at UX85a. The number of cables depends on the type of UPS. In general, there are input and output external power and control cables (~30), internal-to-the-system cables (~5), and battery cabling. A failure of the UPS system will cause the loss of the cryogenics, vacuum system, quench detection, Radio Frequency (RF) equipments, beam monitoring, and supervision system. The consequences of the UPS for LHCb are not provided.

It was stated that the UPS system cannot be relocated, the latter however to be re-iterated as a removal was possible at Point 7 (relocation from UJ76 to TZ76).

The Transformer EKT103/85 and EMT402/85 are located at US85, level 0

The EL equipment is located in the safe room at US85. The list of the rack is reported in table 2 and a brief description is given of all the kinds of racks.

Rack	Class
ESD1/85	Distribution table
ESD2/85	Distribution table
ESD3/85	Distribution table
EYU01	Urgency stop
EYC01	Distribution communication
EYC02	Distribution communication
EYC03	Distribution communication
ECJ04	Distribution communication
EYB01	Antipanic light Electrical system control
EYP01	Antipanic light Electrical system control
ECD1	48V dc communication
ECD2	48V dc communication
ECD3	48V dc distribution
ECD4	48V dc distr.
EYQ01/85	Cryogenic 24VDC
EAD01/85	Switch board
EBD1/85	Switch board
EBD2/85	Switch board
EBD9/85	Switch board
EQD1/85	Switch board

Table 2. EL equipment.

- **EYU** AU Racks. These racks contain PCBs with the logic for the AU safety functions. There are some electronic components such as capacitors, diodes and integrated circuits. The safety logic is done via contacts and relays that in principle should not be affected by radiation.
- **EYP/ECU** racks (EYP) which contain the chargers (ECU) that power the safety lighting and that are placed either in the US safe rooms except US15, in the UJ56, UJ33 and UJ67 and RE zones. There are two type of brands, Victron and PROMEC (US85). They have sensible components as zener diodes (DZ18VAA0, DZ15VAA0), transistors (BC237, BD786), PCBs with integrated logics (74HC132), CMOS, thyristors.
- **EYC** These racks contain all of the equipment necessary to control and monitor the electrical equipment: DAUs, microcontrollers, switches, Ethernet…They are vital for our monitoring systems. These racks could be very sensible to radiation.
- **EYQ** Cryogenics 24VDC generation. These racks contain 24VDC PROMEC modules with electronic components sensible to radiation (EPROMs, diodes, MOS, microprocessors, transistors…).
- **EBS/ESS** UPS units (machine and cryogenics) which are very sensible to radiation since their logic depends on, transistors, CMOS, IGBTs, microprocessors and other electronics.

- **ESU/EAU** 48VDC generation and battery chargers. This equipment is mainly installed in the US (safe room) and RE. The chargers are manufactured by Ackermann and they have power electronics and sensible components such as zener diodes (Motorola 1N823, 1N754A1, IN747 A1, IN968 B1, 1N978A), diodes (Unitrode 1N4148, 1N5614, 1N5624, 1N4148), transistors (Motorola 2N3019, 2N3716), PCBs with integrated circuits (AXA 279.109, PMI IOP27CZ1), thyristor bridge (U5043/147, U5043/160).
- **EAD/EBD/ERD/ESD/EOD/EQD** They contain low voltage switchboards with fuses, bornes, switch breakers, which normally do not have electronics in their inside. Some of these racks contain voltage monitoring relays. We have not been able to find out which are the exact components in their inside. Anyhow, these relays do not realize any safety functions; they just enable our control system to detect the mains supply. In case they do not work properly our monitoring system will either have no alarm or a false alarm. We have as well monitoring equipment and displays (DIRIS) which do not realize any safety function, if they do not work properly our monitoring system would not get the right measurements of the switchboard and we would lose the supervision of the switchboards.
- **EMD** medium voltage switchboards that do not contain equipment sensible to radiation.
- **EMT** medium voltage transformers whose "resine" isolation might decompose in the long term with radiation.
- **EYB** safety lighting chosen to stand radiation. This equipment does not contain any electronic components.
- **EJG** stands for battery racks for the UPS systems in the US15, RE, UAs of the LHC even points. Not affected by SEE.
- **ECJ/ECD** 48VDC distribution crates installed in the US, UW, UX, UJ and RE. Normally the distribution crates are made up of fuses or switch-breakers.
- **AU buttons** are all over the LHC underground and surface areas. These are mechanical buttons, with no electronics in their inside. The only problem presented so far, with the new technology AU buttons, is that they have a plastic component that is deteriorated by radiation. When this happens the button might set an AU safety function off. In any case, the safety of people is ensured. EN-EL is well aware of the problem. Annual tests of the AU system are carried out and campaigns of replacement of these AU buttons are foreseen.

The 48 V system generator is based on a technology presenting tirystor and ondulators for the anti panic light. This technology will be studied to understand his behaviour in presence of radiation.
The relocation of the most critical racks should be done.

12.1 MISSING INFORMATION

Could you specify the failure consequences of the UPS at UX85?
Would it be possible to relocate only some racks (EYU, EYP, EYC, EYQ, EBS, ESS, ESU EAU)?
Or, do strong interdependencies exist with the distribution racks (**EAD/EBD/ERD/ESD/EOD/EQD**)?
Can the lost of monitoring (see **EAD/EBD/ERD/ESD/EOD/EQD**) be tolerated for long periods (~time between two technical shutdown)?

13. COOLING AND VENTILATION [H. JENA]

The system control for the UW pumping station is located at UW85. It consists of CPU, Ethernet and I/O modules, which control the cooling water circuit and the ventilation of all the Point 8 sectors. The system depends on the power supply distribution, a 400V AC power supply (about 100 kW), and the Ethernet connection for the remote communication. A failure of the UW pumping station causes the stop of the cooling water for all the sectors of Point 8 and the LHCb detector by affecting the proper working of the detector itself, the cryogenic system, and the power converters. It further depends on the primary water and chilled water supply from the surface (SF8, SU8). The system cannot be relocated and PLCs are known to be very sensitive to radiations.

UX raising pump control (Cooling and Ventilation I/O Control in the UW)

An I/O module (TSX Momentum for about 20 digital lines) of the raising pump control for evacuating water in the underground is located at UX85A, where radiation effects on electronics are not expected. It requires a 24V power UPS and the remote communication is based on the FIPIO bus. The system depends on the main pumping control system located in the UW85. Following a failure, the proper working of the water evacuation is not assured anymore. The system can be relocated up to a maximum distance of 50-100m.

Process Control and alarm transmission for UA and UJ ventilation system

The main control equipment of the ventilations system for the UA and UJ locations is located in UW85. It consists of PLCs, CPUs, and Inputs/outputs cards. It requires a 24V DC UPS power supply and the remote communication is based on the Ethernet connection and the PROFIBUS. A part of the system control is located in UJ83, UA83, UJ84, UJ86, UJ87, and UA 87. There are various PLCs, CPU, and I/O cards. It also need a 24 V DC power supply and the remote communication to the main control system of UW85 is made via PROFIBUS. Therefore, the equipment of the UJ and UA locals strongly depends on the main control system of UW 85. Following a failure of the main control system in UW85 or of the equipment placed in UJ and UA, the ventilation system for the UA and UJ as well as the alarm notification system may not work properly. Therefore, that implies consequences on all the equipments that need ventilation, such as the power converter. The control equipment in UW85 can be possibly shielded, or relocated at the surface or in the adjacent UAs.

Process Control and alarm transmission for RE82 and RE88 ventilation system

In RE82 and RE88, the control equipment of the ventilation system of the area is installed. It consists of PLCs, CPUs, and Inputs/Outputs cards. It needs a 24 V DC UPS power supply and the remote communication is based on the Ethernet connection. Therefore, the system depends on the electricity and on the availability of the Ethernet. Following a failure of the control system in RE82 or RE88, the ventilation system of the respective areas may not work properly. This implies consequences on all the equipments that need ventilation, such as the UPS system. The system cannot be relocated.

13.1 MISSING INFORMATION

Could you, please, add the rack names?
Could you, please, confirm the equipment that cannot be moved?
Filter and cooler Are you responsible for the equipment UQCAM0101851, UFFMM0201851, UQCUM0401851, UQCAM0701851, UEGZM0301851?
Could you, please, provide a description of this equipment?

14. SUMMARY TABLES US85, UX85

Equipment	Rack	Radiation test	Failure consequences	Option	Priority	Contact
Fire/ODH control	US85, SYAFD01 SYODH	Not tested Supposed very sensitive	No fire detection, no ODH detection Failure affects also the areas UJ US UX RE	Relocation	1 (Safety issue)	R. Nunes S. Grau
Fire/ODH detectors	UJ87, SSFDEI – xxxx	CNGS experience ~10^7 h/cm^2	No fire detection; if two more detectors are in fail mode, an evacuation is triggered	Relocation	1 (Safety issue)	R. Nunes S. Grau
AUG control	US85, AU	Not tested	Loss of the AUG logic	Relocation	1 (safety) ?	A.Burdairon M. Codoceo
UPS	US85, EBS/ESS	Not tested	Loss of Cryogenics, vacuum, QPS, Beam monitoring.	Relocation	1(many system depend on it)	A.Burdairon M. Codoceo
Electrical equipment	US85, See text	Not tested Control part supposed to be sensitive	Loss of power supply and possible loss of the safety lighting	Shielding Relocation of the digital control parts	1	A.Burdairon M. Codoceo
Remote-Reset & Timing	US85, CYTIM01 CYFRE01	Not tested Supposed very sensitive	Loss of timing Beam dump	Relocation Most of clients in safer areas such as USC(P5)	2 (many systems depend on it)	R. Chery
Ethernet	US85, CYNET01 CYNET02 CYFIB01	Tested in the past	Loss of the Ethernet connection for the clients	Relocation of the switches (max length structured cable 90 m)	2 (Many systems depend on it)	E. Sallaz
Cooling and Ventilation	UW85, UA87	Sensitive (failure at CNGS)	No CV for Equipment Possible operational stop	Relocation	2 (Downtime)	H. Jena B. Jensen
Cryogenics refrigerators and valve positioners	US,85, UX85, see text	Tested at TCC2 Sensitive	No input for Cryogenic system that could drive a beam dump	Relocation	2 (down time)	M. Pezzetti JF. Bel A Suraci
Warm Magnet Interlock	US85, MYWIC01	sensitive	No control for warm magnets Beam dump	Relocate upt to 500 m	2 (machine safety)	P. Dahlen
Survey	US85, UX85B	Electronics tested	No alignment for low beta magnets. Issue for operation	It can stay/relocation?	4	A.Marin
GSM Repeaters	US85, CYRR01	Not tested. Supposed to be sensitive	Loss of the GSM service in the tunnel	Relocation	4 (not intended for safety)	F. Chapron
Optical Fiber	US85, CYFIB01	Insensitive to SEU Tested with 60Co	Radiation induces attenuation of light	Depend on the Ethernet switches		D. Ricci
WorldFip	US85, CYFRE01 UX85	Repeaters tested CNGS	Repeater: loss of the network for the next users FipDiag: Loss of the network diagnostic	It can stay Depend on the clients Power converter, Radmon, Experiment Survey, Cryogenics QPS		J. Palluel D. Caretti

Table 3. Equipments in US85 and UX85.