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# RF Schedule UK

*Alan Grant*

# Assumptions

- **Expedite RF system tests by carrying out off line RF cavity tests in the Hall against the North Wall**
  - **Needs an additional Control Rack to allow simultaneous testing in the Hall……system#1 and at Daresbury for system # 2 amplifiers**
- **Plan to commission sequentially system 1 & 2 racks as far as timing will allow…… auxilary & controls racks**
- **System #1 4616 amplifier will be used to drive system # 2 TH116, before being shipped to RAL.**
- **Step IV data taking up to 1st June 16.**
  - **Needs to be confirmed – might be beneficial to run a little longer if beam time in June 16.**
- **Installation of RF components starts June 16**
  - **Racks for system #1 used for commissioning system #2 amplifiers, but will be delivered before June 16.**
  - **Will aim to install some equipment and service earlier if access to the hall can be agreed.**
- **Electrically commission 4616 and TH116 Aux and PSU racks using dummy loads for systems #1 for off line testing**
  - **10 days for each amplifier. Highlight any potential issues before going to off line cavity testing.**
  - **This means fully commissioned racks for system #1 not available until 20th Sept.**

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# Assumptions

- **Cavity #1 moved directly on to cooling channel into downstream position after off line testing is complete, then pumped down.**
  - **Cavity #1 operated with RF system #2 racks in on line position.**
  - **RF system #2 online racks 4616 and TH116 commissioned into dummy loads**
  - **Fully commissioned system #2 racks not available until 22nd Feb 17.**
  - **Delivery of system #2 racks may be delayed as effort and key staff are directed to running and commissioning system #1. Delivery / Installation and commissioning is being re-assessed but could be as much as 3mths delay for system # 2.**

- **Cavity #2 off line and on line testing carried out with system #1 racks.**
  - **Cavity #2 installed in upstream position**

- **Installation of South side PRY complete 2nd Jan 17**
  - **Decommissioning and installation of all floor plates and sliding platforms before south PRY can be installed**

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# RF Testing & Commissioning at DL

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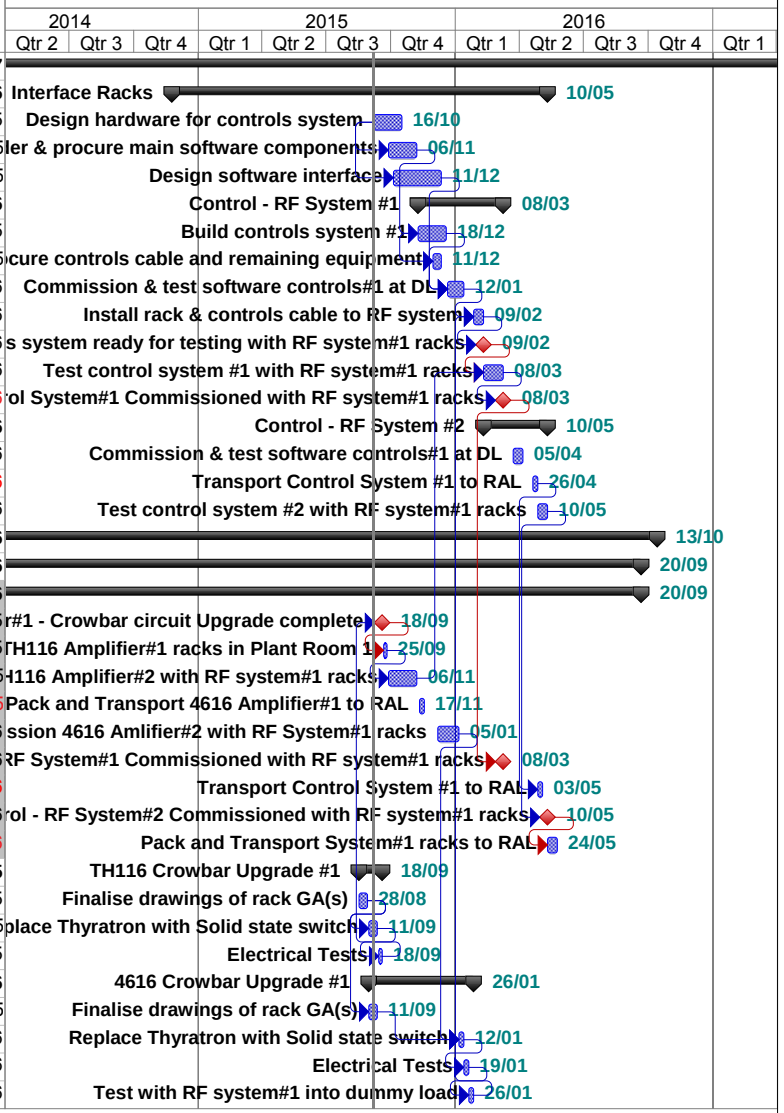
Additional Control rack for system #2 to allow simultaneous commissioning at RAL for the cavity and DL for amplifier 2

Control system #2 swapped into system #1 for commissioning & testing

System #1 upgrades and tests at DL

| ID | Task Name | Duration | Start | Finish |
|---|---|---|---|---|
| 1 | **MICE RF Work Package** | **2198 days** | **01/09/08** | **26/05/17** |
| 18 | **RF Control Interface Racks** | **375 days** | **24/11/14** | **10/05/16** |
| 20 | Design hardware for controls system | 30 days | 07/09/15 | 16/10/15 |
| 21 | Order & procure main software components | 6 wks | 28/09/15 | 06/11/15 |
| 22 | Design software interface | 10 wks | 05/10/15 | 11/12/15 |
| 23 | **Control - RF System #1** | **80 days** | **09/11/15** | **08/03/16** |
| 24 | Build controls system #1 | 6 wks | 09/11/15 | 18/12/15 |
| 25 | Procure controls cable and remaining equipment | 10 days | 30/11/15 | 11/12/15 |
| 26 | Commission & test software controls#1 at DL | 2 wks | 21/12/15 | 12/01/16 |
| | Install rack & controls cable to RF system | 2 wks | 27/01/16 | 09/02/16 |
| | Controls system ready for testing with RF system#1 racks | 0 days | 09/02/16 | 09/02/16 |
| | Test control system #1 with RF system#1 racks | 20 days | 10/02/16 | 08/03/16 |
| | Control System#1 Commissioned with RF system#1 racks | 0 days | 08/03/16 | 08/03/16 |
| | **Control - RF System #2** | **65 days** | **10/02/16** | **10/05/16** |
| | Commission & test software controls#1 at DL | 2 wks | 23/03/16 | 05/04/16 |
| | Transport Control System #1 to RAL | 5 days | 20/04/16 | 26/04/16 |
| | Test control system #2 with RF system#1 racks | 10 days | 27/04/16 | 10/05/16 |
| 38 | **RF Amplifiers Testing** | **2048 days** | **01/09/08** | **13/10/16** |
| 39 | **RF System #1** | **2031 days** | **01/09/08** | **20/09/16** |
| 127 | **RF System#1 - further testing at DL** | **684 days** | **28/01/14** | **20/09/16** |
| 135 | TH116 Amplifier#1 - Crowbar circuit Upgrade complete | 0 days | 18/09/15 | 18/09/15 |
| 136 | Re-connect TH116 Amplifier#1 racks in Plant Room 1 | 5 days | 21/09/15 | 25/09/15 |
| 137 | Commission TH116 Amplifier#2 with RF system#1 racks | 30 days | 28/09/15 | 06/11/15 |
| 138 | Pack and Transport 4616 Amplifier#1 to RAL | 5 days | 11/11/15 | 17/11/15 |
| | Commission 4616 Amlifier#2 with RF System#1 racks | 15 days | 07/12/15 | 05/01/16 |
| | Control - RF System#1 Commissioned with RF system#1 racks | 0 days | 08/03/16 | 08/03/16 |
| | Transport Control System #1 to RAL | 5 days | 27/04/16 | 03/05/16 |
| | Control - RF System#2 Commissioned with RF system#1 racks | 0 days | 10/05/16 | 10/05/16 |
| | Pack and Transport System#1 racks to RAL | 10 days | 11/05/16 | 24/05/16 |
| 146 | **TH116 Crowbar Upgrade #1** | **25 days** | **17/08/15** | **18/09/15** |
| 147 | Finalise drawings of rack GA(s) | 2 wks | 17/08/15 | 28/08/15 |
| 148 | Replace Thyratron with Solid state switch | 2 wks | 31/08/15 | 11/09/15 |
| 149 | Electrical Tests | 1 wk | 14/09/15 | 18/09/15 |
| 150 | **4616 Crowbar Upgrade #1** | **100 days** | **31/08/15** | **26/01/16** |
| 151 | Finalise drawings of rack GA(s) | 2 wks | 31/08/15 | 11/09/15 |
| 152 | Replace Thyratron with Solid state switch | 1 wk | 06/01/16 | 12/01/16 |
| 153 | Electrical Tests | 1 wk | 13/01/16 | 19/01/16 |
| 154 | Test with RF system#1 into dummy load | 1 wk | 20/01/16 | 26/01/16 |



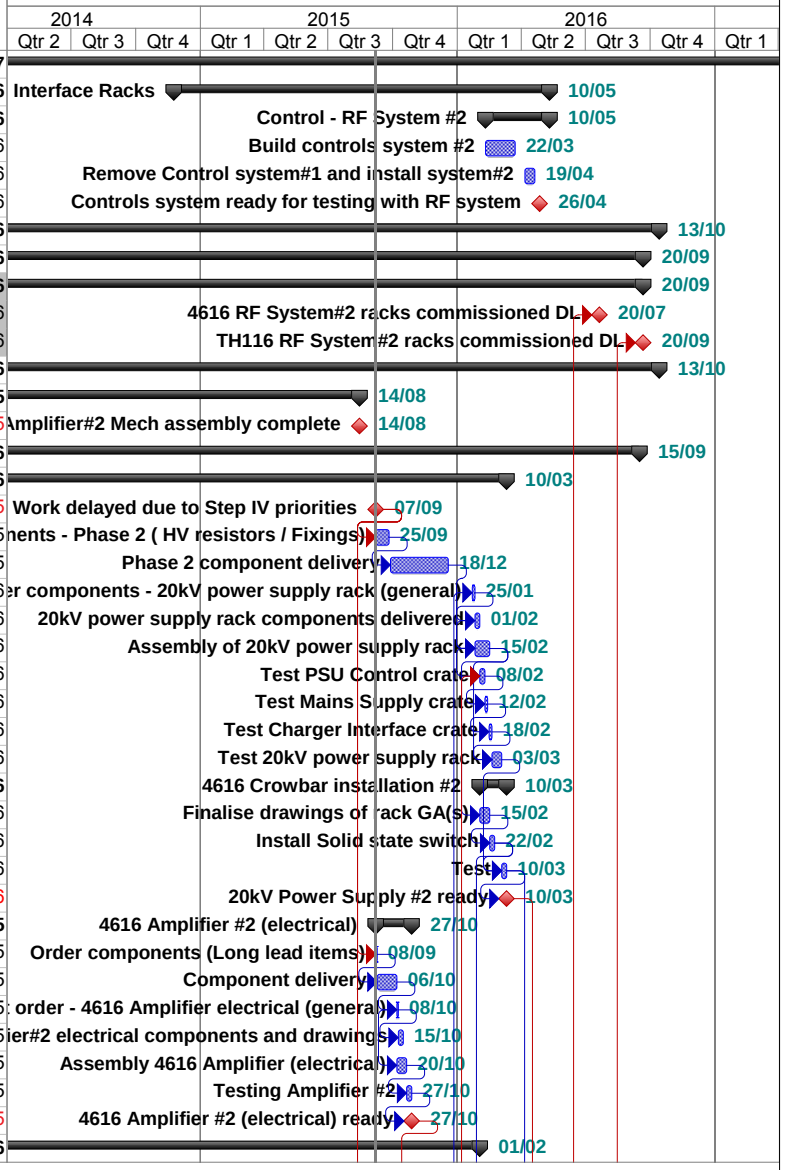

Project: MICE HALL INSTALLATION S
Date: 07/09/15

Inactive Task
Inactive Milestone
Inactive Summary
Manual Task
Duration-only
Manual Summary Rollup
Manual Summary
Start-only
Finish-only

## *Complete new system required for system # 2*

- Control Rack
- Power Supply Racks
- Auxiliary Racks
- Crowbar
- Testing & commissioning of 4616
- Testing & commissioning of TH116

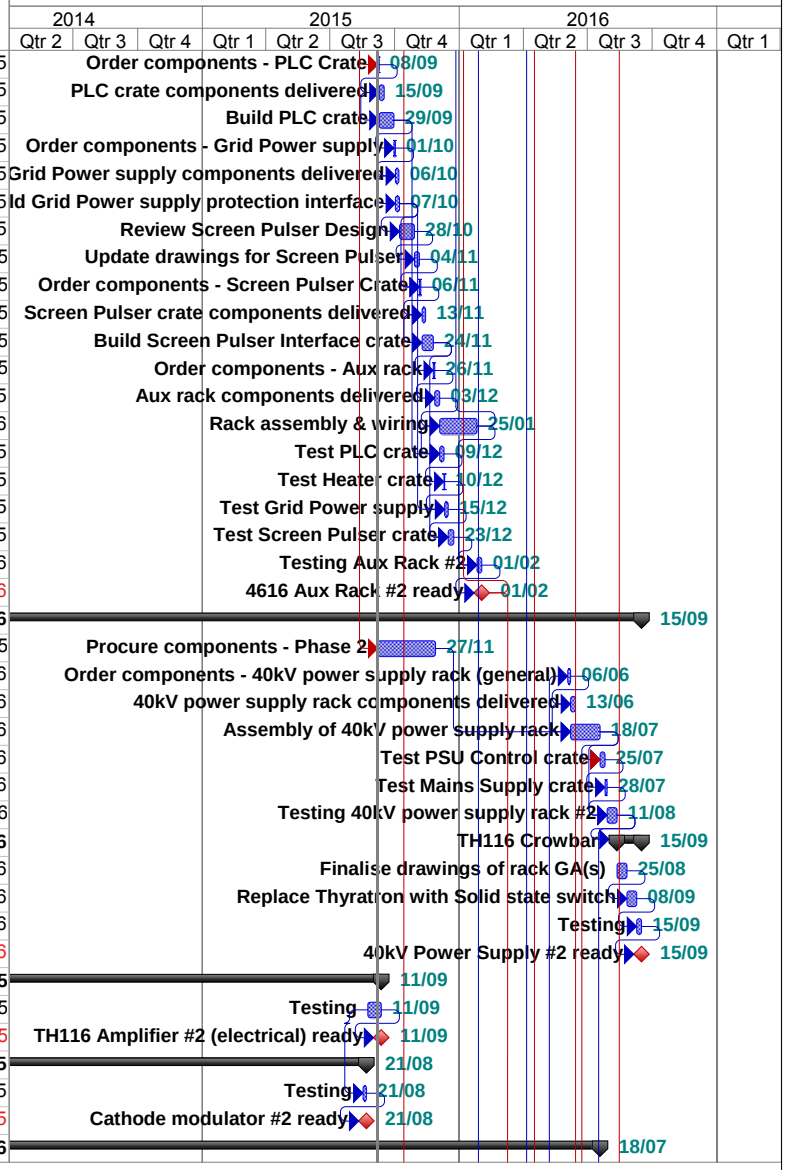
| ID | Task Name | Duration | Start | Finish |
|---|---|---|---|---|
| 1 | **MICE RF Work Package** | | | **26/05/17** |
| 18 | **RF Control Interface Racks** | | | **10/05/16** |
| 31 | **Control - RF System #2** | | | **10/05/16** |
| 32 | Build controls system #2 | | | 22/03/16 |
| 34 | Remove Control system | | | 19/04/16 |
| 36 | Controls system ready fo | | | 26/04/16 |
| 38 | **RF Amplifiers Testing** | | | **13/10/16** |
| 39 | **RF System #1** | | | **20/09/16** |
| 127 | **RF System#1 - further testing at DL** | **684 days** | **28/01/14** | **20/09/16** |
| 144 | 4616 RF System#2 racks commissioned DL | 0 days | 20/07/16 | 20/07/16 |
| 145 | TH116 RF System#2 racks commissioned DL | 0 days | 20/09/16 | 20/09/16 |
| 155 | **RF System #2** | **1507 days** | **28/09/10** | **13/10/16** |
| 156 | **TH116 Amplifier system #2 (2MW) - Mechanical** | **1210 days** | **28/09/10** | **14/08/15** |
| 165 | TH116 Amplifier#2 Mech assembly complete | 0 days | 14/08/15 | 14/08/15 |
| 172 | **RF System #2 - Electrical Construction** | **1150 days** | **02/04/12** | **15/09/16** |
| 173 | **20kV Power Supply #2** | **1015 days** | **02/04/12** | **10/03/16** |
| 177 | Work delayed due to Step IV priorities | 0 days | 07/09/15 | 07/09/15 |
| 178 | Order components - Phase 2 ( HV resistors / Fixings) | 15 days | 07/09/15 | 25/09/15 |
| 179 | Phase 2 component delivery | 12 wks | 28/09/15 | 18/12/15 |
| 189 | Order components - 20kV power supply rack (general) | 2 days | 22/01/16 | 25/01/16 |
| 190 | 20kV power supply rack components delivered | 5 days | 26/01/16 | 01/02/16 |
| 191 | Assembly of 20kV power supply rack | 3 wks | 26/01/16 | 15/02/16 |
| 192 | Test PSU Control crate | 5 days | 02/02/16 | 08/02/16 |
| 193 | Test Mains Supply crate | 4 days | 09/02/16 | 12/02/16 |
| 194 | Test Charger Interface crate | 4 days | 15/02/16 | 18/02/16 |
| 195 | Test 20kV power supply rack | 2 wks | 19/02/16 | 03/03/16 |
| 196 | **4616 Crowbar installation #2** | **28 days** | **02/02/16** | **10/03/16** |
| 197 | Finalise drawings of rack GA(s) | 2 wks | 02/02/16 | 15/02/16 |
| 198 | Install Solid state switch | 1 wk | 16/02/16 | 22/02/16 |
| 199 | Test | 1 wk | 04/03/16 | 10/03/16 |
| 200 | 20kV Power Supply #2 ready | 0 days | 10/03/16 | 10/03/16 |
| 201 | **4616 Amplifier #2 (electrical)** | **37 days** | **07/09/15** | **27/10/15** |
| 202 | Order components (Long lead items) | 2 days | 07/09/15 | 08/09/15 |
| 203 | Component delivery | 4 wks | 09/09/15 | 06/10/15 |
| 204 | Component order - 4616 Amplifier electrical (general) | 2 days | 07/10/15 | 08/10/15 |
| 205 | Prepare 4616 Amplifier#2 electrical components and drawings | 5 days | 09/10/15 | 15/10/15 |
| 206 | Assembly 4616 Amplifier (electrical) | 2 wks | 07/10/15 | 20/10/15 |
| 207 | Testing Amplifier #2 | 1 wk | 21/10/15 | 27/10/15 |
| 208 | 4616 Amplifier #2 (electrical) ready | 0 days | 27/10/15 | 27/10/15 |
| 209 | **4616 Aux rack #2** | **776 days** | **22/01/13** | **01/02/16** |




Project: MICE HALL INSTALLATION S
Date: 07/09/15

Inactive Task
Inactive Milestone
Inactive Summary
Manual Task
Duration-only
Manual Summary Rollup
Manual Summary
Start-only
Finish-only

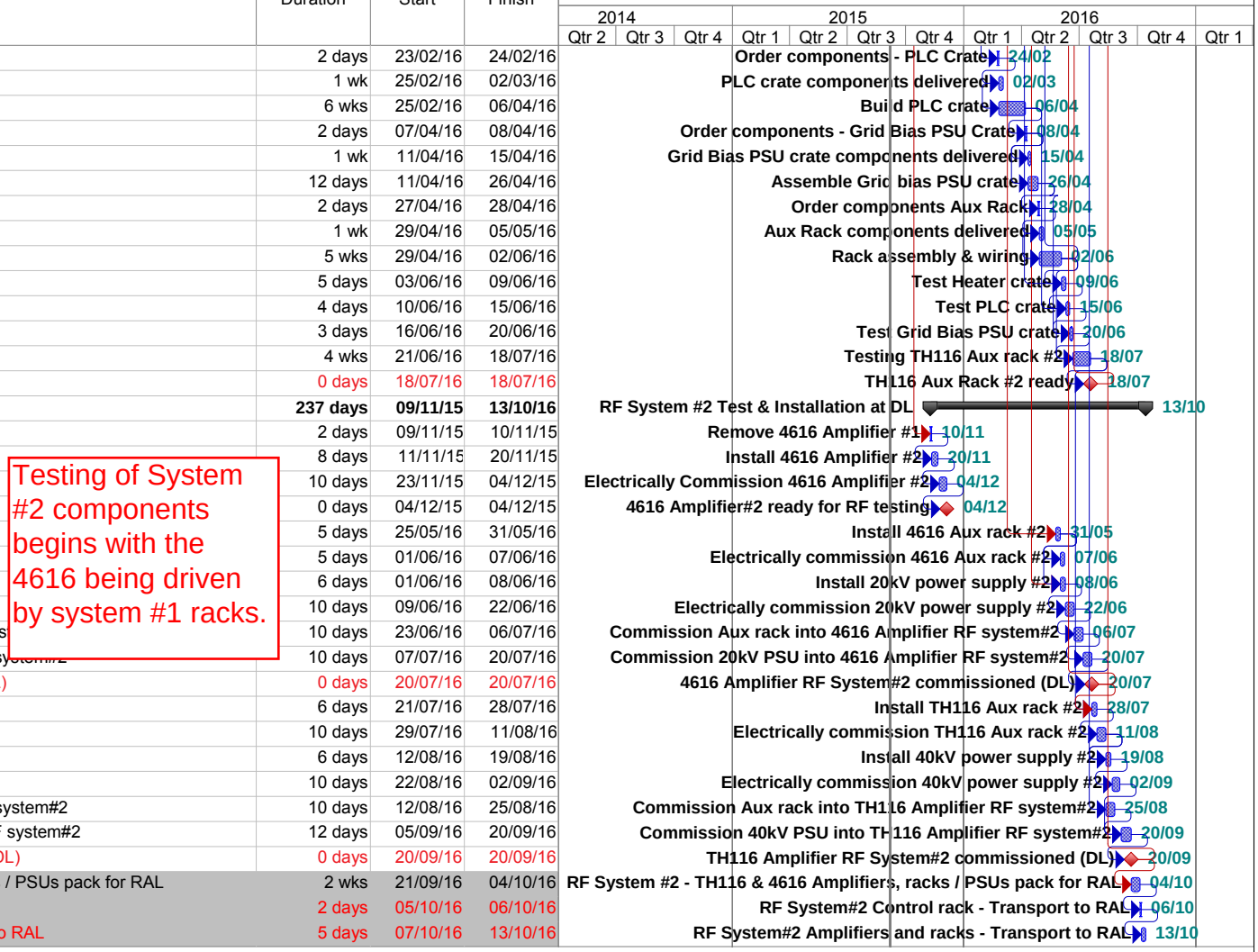
| ID | Task Name | Duration | Start | Finish |
|---|---|---|---|---|
| 213 | Order components - PLC Crate | 2 days | 07/09/15 | 08/09/15 |
| 214 | PLC crate components delivered | 1 wk | 09/09/15 | 15/09/15 |
| 215 | Build PLC crate | 3 wks | 09/09/15 | 29/09/15 |
| 216 | Order components - Grid Power supply | 2 days | 30/09/15 | 01/10/15 |
| 217 | Grid Power supply components delivered | 3 days | 02/10/15 | 06/10/15 |
| 218 | Build Grid Power supply protection interface | 4 days | 02/10/15 | 07/10/15 |
| 219 | Review Screen Pulser Design | 15 days | 08/10/15 | 28/10/15 |
| 220 | Update drawings for Screen Pulser | 5 days | 29/10/15 | 04/11/15 |
| 221 | Order components - Screen Pulser Crate | 2 days | 05/11/15 | 06/11/15 |
| 222 | Screen Pulser crate components delivered | 1 wk | 09/11/15 | 13/11/15 |
| 223 | Build Screen Pulser Interface crate | 12 days | 09/11/15 | 24/11/15 |
| 224 | Order components - Aux rack | 2 days | 25/11/15 | 26/11/15 |
| 225 | Aux rack components delivered | 1 wk | 27/11/15 | 03/12/15 |
| 226 | Rack assembly & wiring | 6 wks | 04/12/15 | 25/01/16 |
| 227 | Test PLC crate | 4 days | 04/12/15 | 09/12/15 |
| 228 | Test Heater crate | 1 day | 10/12/15 | 10/12/15 |
| 229 | Test Grid Power supply | 3 days | 11/12/15 | 15/12/15 |
| 230 | Test Screen Pulser crate | 6 days | 16/12/15 | 23/12/15 |
| 231 | Testing Aux Rack #2 | 5 days | 26/01/16 | 01/02/16 |
| 232 | 4616 Aux Rack #2 ready | 0 days | 01/02/16 | 01/02/16 |
| 233 | **40kV Power Supply #2** | **1150 days** | **02/04/12** | **15/09/16** |
| 236 | Procure components - Phase 2 | 12 wks | 07/09/15 | 27/11/15 |
| 243 | Order components - 40kV power supply rack (general) | 2 days | 03/06/16 | 06/06/16 |
| 244 | 40kV power supply rack components delivered | 5 days | 07/06/16 | 13/06/16 |
| 245 | Assembly of 40kV power supply rack | 6 wks | 07/06/16 | 18/07/16 |
| 246 | Test PSU Control crate | 5 days | 19/07/16 | 25/07/16 |
| 247 | Test Mains Supply crate | 3 days | 26/07/16 | 28/07/16 |
| 248 | Testing 40kV power supply rack #2 | 2 wks | 29/07/16 | 11/08/16 |
| 249 | **TH116 Crowbar** | **25 days** | **12/08/16** | **15/09/16** |
| 250 | Finalise drawings of rack GA(s) | 2 wks | 12/08/16 | 25/08/16 |
| 251 | Replace Thyratron with Solid state switch | 2 wks | 26/08/16 | 08/09/16 |
| 252 | Testing | 1 wk | 09/09/16 | 15/09/16 |
| 253 | 40kV Power Supply #2 ready | 0 days | 15/09/16 | 15/09/16 |
| 254 | **TH116 Amplifier #2 (electrical)** | **893 days** | **02/04/12** | **11/09/15** |
| 259 | Testing | 3 wks | 24/08/15 | 11/09/15 |
| 260 | TH116 Amplifier #2 (electrical) ready | 0 days | 11/09/15 | 11/09/15 |
| 261 | **Cathode modulator #2** | **878 days** | **02/04/12** | **21/08/15** |
| 264 | Testing | 5 days | 17/08/15 | 21/08/15 |
| 265 | Cathode modulator #2 ready | 0 days | 21/08/15 | 21/08/15 |
| 266 | **TH116 Aux Rack #2** | **933 days** | **30/11/12** | **18/07/16** |




Project: MICE HALL INSTALLATION S
Date: 07/09/15

Inactive Task
Inactive Milestone
Inactive Summary
Manual Task
Duration-only
Manual Summary Rollup
Manual Summary
Start-only
Finish-only

| ID | Task Name | Duration | Start | Finish |
|---|---|---|---|---|
| 270 | Order components - PLC Crate | 2 days | 23/02/16 | 24/02/16 |
| 271 | PLC crate components delivered | 1 wk | 25/02/16 | 02/03/16 |
| 272 | Build PLC crate | 6 wks | 25/02/16 | 06/04/16 |
| 273 | Order components - Grid Bias PSU Crate | 2 days | 07/04/16 | 08/04/16 |
| 274 | Grid Bias PSU crate components delivered | 1 wk | 11/04/16 | 15/04/16 |
| 275 | Assemble Grid bias PSU crate | 12 days | 11/04/16 | 26/04/16 |
| 276 | Order components Aux Rack | 2 days | 27/04/16 | 28/04/16 |
| 277 | Aux Rack components delivered | 1 wk | 29/04/16 | 05/05/16 |
| 278 | Rack assembly & wiring | 5 wks | 29/04/16 | 02/06/16 |
| 279 | Test Heater crate | 5 days | 03/06/16 | 09/06/16 |
| 280 | Test PLC crate | 4 days | 10/06/16 | 15/06/16 |
| 281 | Test Grid Bias PSU crate | 3 days | 16/06/16 | 20/06/16 |
| 282 | Testing TH116 Aux rack #2 | 4 wks | 21/06/16 | 18/07/16 |
| 283 | TH116 Aux Rack #2 ready | 0 days | 18/07/16 | 18/07/16 |
| 284 | **RF System #2 Test & Installation at DL** | **237 days** | **09/11/15** | **13/10/16** |
| 285 | Remove 4616 Amplifier #1 | 2 days | 09/11/15 | 10/11/15 |
| 286 | Install 4616 Amplifier #2 | 8 days | 11/11/15 | 20/11/15 |
| 287 | Electrically Commission 4616 Amplifier #2 | 10 days | 23/11/15 | 04/12/15 |
| 288 | 4616 Amplifier#2 ready for RF testing | 0 days | 04/12/15 | 04/12/15 |
| 289 | Install 4616 Aux rack #2 | 5 days | 25/05/16 | 31/05/16 |
| 290 | Electrically commission 4616 Aux rack #2 | 5 days | 01/06/16 | 07/06/16 |
| 291 | Install 20kV power supply #2 | 6 days | 01/06/16 | 08/06/16 |
| 292 | Electrically commission 20kV power supply #2 | 10 days | 09/06/16 | 22/06/16 |
| 293 | Commission Aux rack into 4616 Amplifier RF sys | 10 days | 23/06/16 | 06/07/16 |
| 294 | Commission 20kV PSU into 4616 Amplifier RF sy | 10 days | 07/07/16 | 20/07/16 |
| 295 | 4616 Amplifier RF System#2 commissioned (DL) | 0 days | 20/07/16 | 20/07/16 |
| 296 | Install TH116 Aux rack #2 | 6 days | 21/07/16 | 28/07/16 |
| 297 | Electrically commission TH116 Aux rack #2 | 10 days | 29/07/16 | 11/08/16 |
| 298 | Install 40kV power supply #2 | 6 days | 12/08/16 | 19/08/16 |
| 299 | Electrically commission 40kV power supply #2 | 10 days | 22/08/16 | 02/09/16 |
| 300 | Commission Aux rack into TH116 Amplifier RF system#2 | 10 days | 12/08/16 | 25/08/16 |
| 301 | Commission 40kV PSU into TH116 Amplifier RF system#2 | 12 days | 05/09/16 | 20/09/16 |
| 302 | TH116 Amplifier RF System#2 commissioned (DL) | 0 days | 20/09/16 | 20/09/16 |
| 303 | RF System #2 - TH116 & 4616 Amplifiers, racks / PSUs pack for RAL | 2 wks | 21/09/16 | 04/10/16 |
| 304 | RF System#2 Control rack - Transport to RAL | 2 days | 05/10/16 | 06/10/16 |
| 305 | RF System#2 Amplifiers and racks - Transport to RAL | 5 days | 07/10/16 | 13/10/16 |




Testing of System #2 components begins with the 4616 being driven by system #1 racks.

Project: MICE HALL INSTALLATION S
Date: 07/09/15

Inactive Task
Inactive Milestone
Inactive Summary
Manual Task
Duration-only
Manual Summary Rollup
Manual Summary
Start-only
Finish-only

# RF System #1 Installation

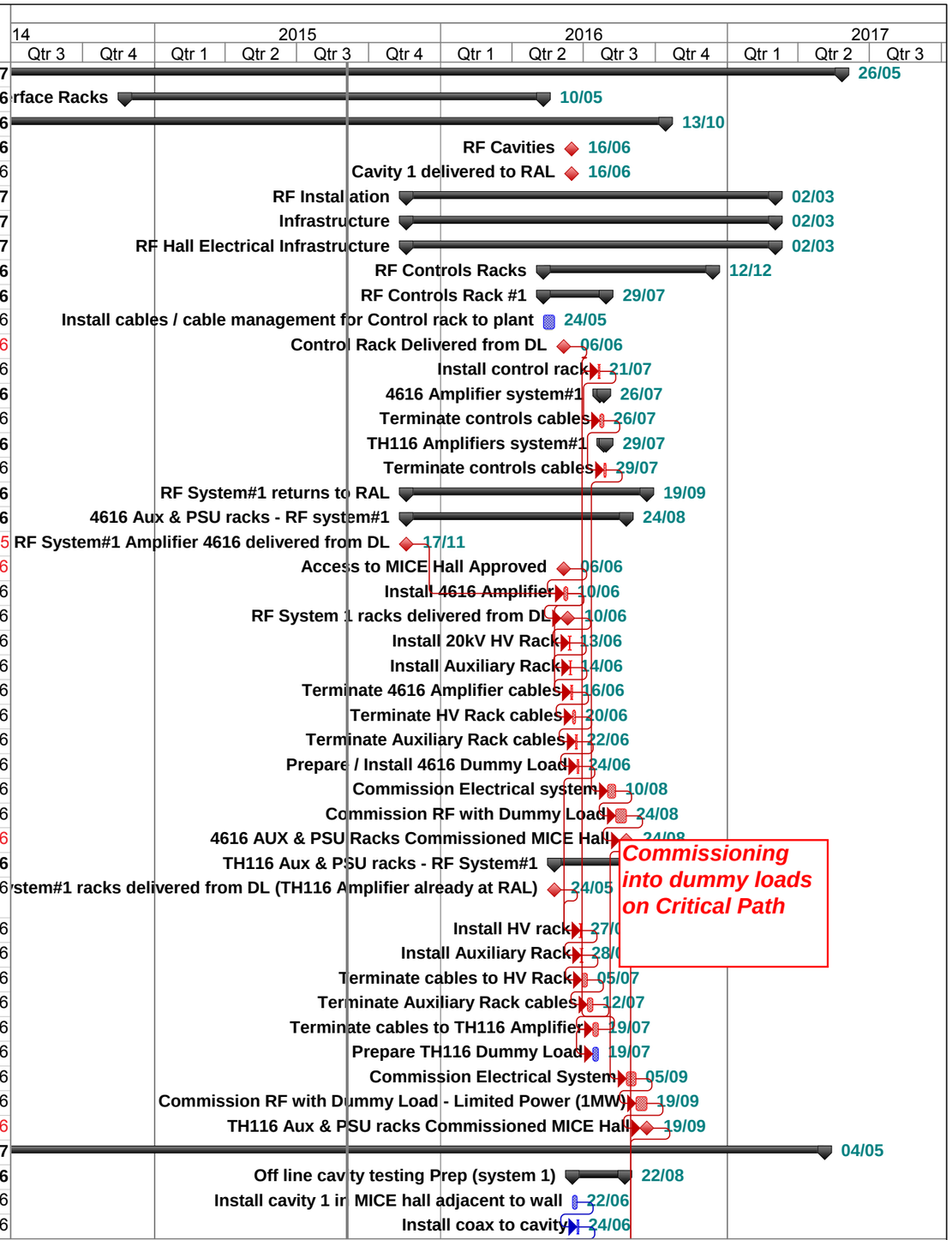
Science & Technology Facilities Council

| ID | Task Name | Duration | Start | Finish |
|---|---|---|---|---|
| 1 | **MICE RF Work Package** | **2198 days** | **01/09/08** | **26/05/17** |
| 18 | **RF Control Interface Racks** | **375 days** | **24/11/14** | **10/05/16** |
| 38 | **RF Amplifiers Testing** | **2048 days** | **01/09/08** | **13/10/16** |
| 306 | **RF Cavities** | **0 days** | **16/06/16** | **16/06/16** |
| 307 | Cavity 1 delivered to RAL | 0 days | 16/06/16 | 16/06/16 |
| 309 | **RF Installation** | **319 days** | **17/11/15** | **02/03/17** |
| 310 | **Infrastructure** | **319 days** | **17/11/15** | **02/03/17** |
| 311 | **RF Hall Electrical Infrastructure** | **319 days** | **17/11/15** | **02/03/17** |
| 312 | **RF Controls Racks** | **154 days** | **11/05/16** | **12/12/16** |
| 313 | **RF Controls Rack #1** | **58 days** | **11/05/16** | **29/07/16** |
| 314 | Install cables / cable management for Control rack to plant | 10 days | 11/05/16 | 24/05/16 |
| 315 | Control Rack Delivered from DL | 0 days | 06/06/16 | 06/06/16 |
| 316 | Install control rack | 2 days | 20/07/16 | 21/07/16 |
| 317 | **4616 Amplifier system#1** | **3 days** | **22/07/16** | **26/07/16** |
| 318 | Terminate controls cables | 3 days | 22/07/16 | 26/07/16 |
| 319 | **TH116 Amplifiers system#1** | **3 days** | **27/07/16** | **29/07/16** |
| 320 | Terminate controls cables | 3 days | 27/07/16 | 29/07/16 |
| 329 | **RF System#1 returns to RAL** | **212 days** | **17/11/15** | **19/09/16** |
| 330 | **4616 Aux & PSU racks - RF system#1** | **194 days** | **17/11/15** | **24/08/16** |
| 331 | RF System#1 Amplifier 4616 delivered from DL | 0 days | 17/11/15 | 17/11/15 |
| 332 | Access to MICE Hall Approved | 0 days | 06/06/16 | 06/06/16 |
| 333 | Install 4616 Amplifier | 5 days | 06/06/16 | 10/06/16 |
| 334 | RF System 1 racks delivered from DL | 0 days | 10/06/16 | 10/06/16 |
| 335 | Install 20kV HV Rack | 1 day | 13/06/16 | 13/06/16 |
| 336 | Install Auxiliary Rack | 1 day | 14/06/16 | 14/06/16 |
| 337 | Terminate 4616 Amplifier cables | 2 days | 15/06/16 | 16/06/16 |
| 338 | Terminate HV Rack cables | 2 days | 17/06/16 | 20/06/16 |
| 339 | Terminate Auxiliary Rack cables | 2 days | 21/06/16 | 22/06/16 |
| 340 | Prepare / Install 4616 Dummy Load | 2 days | 23/06/16 | 24/06/16 |
| 341 | Commission Electrical system | 8 days | 01/08/16 | 10/08/16 |
| 342 | Commission RF with Dummy Load | 10 days | 11/08/16 | 24/08/16 |
| 343 | 4616 AUX & PSU Racks Commissioned MICE Hall | 0 days | 24/08/16 | 24/08/16 |
| 344 | **TH116 Aux & PSU racks - RF System#1** | **84 days** | **24/05/16** | **19/09/16** |
| 345 | RF System#1 racks delivered from DL (TH116 Amplifier already at RAL) | 0 days | 24/05/16 | 24/05/16 |
| 346 | Install HV rack | 1 day | 27/06/16 | 27/06/16 |
| 347 | Install Auxiliary Rack | 1 day | 28/06/16 | 28/06/16 |
| 348 | Terminate cables to HV Rack | 5 days | 29/06/16 | 05/07/16 |
| 349 | Terminate Auxiliary Rack cables | 5 days | 06/07/16 | 12/07/16 |
| 350 | Terminate cables to TH116 Amplifier | 5 days | 13/07/16 | 19/07/16 |
| 351 | Prepare TH116 Dummy Load | 5 days | 13/07/16 | 19/07/16 |
| 352 | Commission Electrical System | 8 days | 25/08/16 | 05/09/16 |
| 353 | Commission RF with Dummy Load - Limited Power (1MW) | 10 days | 06/09/16 | 19/09/16 |
| 354 | TH116 Aux & PSU racks Commissioned MICE Hall | 0 days | 19/09/16 | 19/09/16 |
| 412 | **Cavities** | **744 days** | **04/06/14** | **04/05/17** |
| 419 | **Off line cavity testing Prep (system 1)** | **47 days** | **17/06/16** | **22/08/16** |
| 420 | Install cavity 1 in MICE hall adjacent to wall | 4 days | 17/06/16 | 22/06/16 |
| 421 | Install coax to cavity | 2 days | 23/06/16 | 24/06/16 |

**4616 Installation & test into dummy load**

**TH116 Installation & test into dummy load**

***Commissioning into dummy loads on Critical Path***




Project: MICE HALL INSTALLATION S
Date: 04/09/15

Inactive Task
Inactive Milestone
Inactive Summary
Manual Task
Duration-only
Manual Summary Rollup
Manual Summary
Start-only
Finish-only

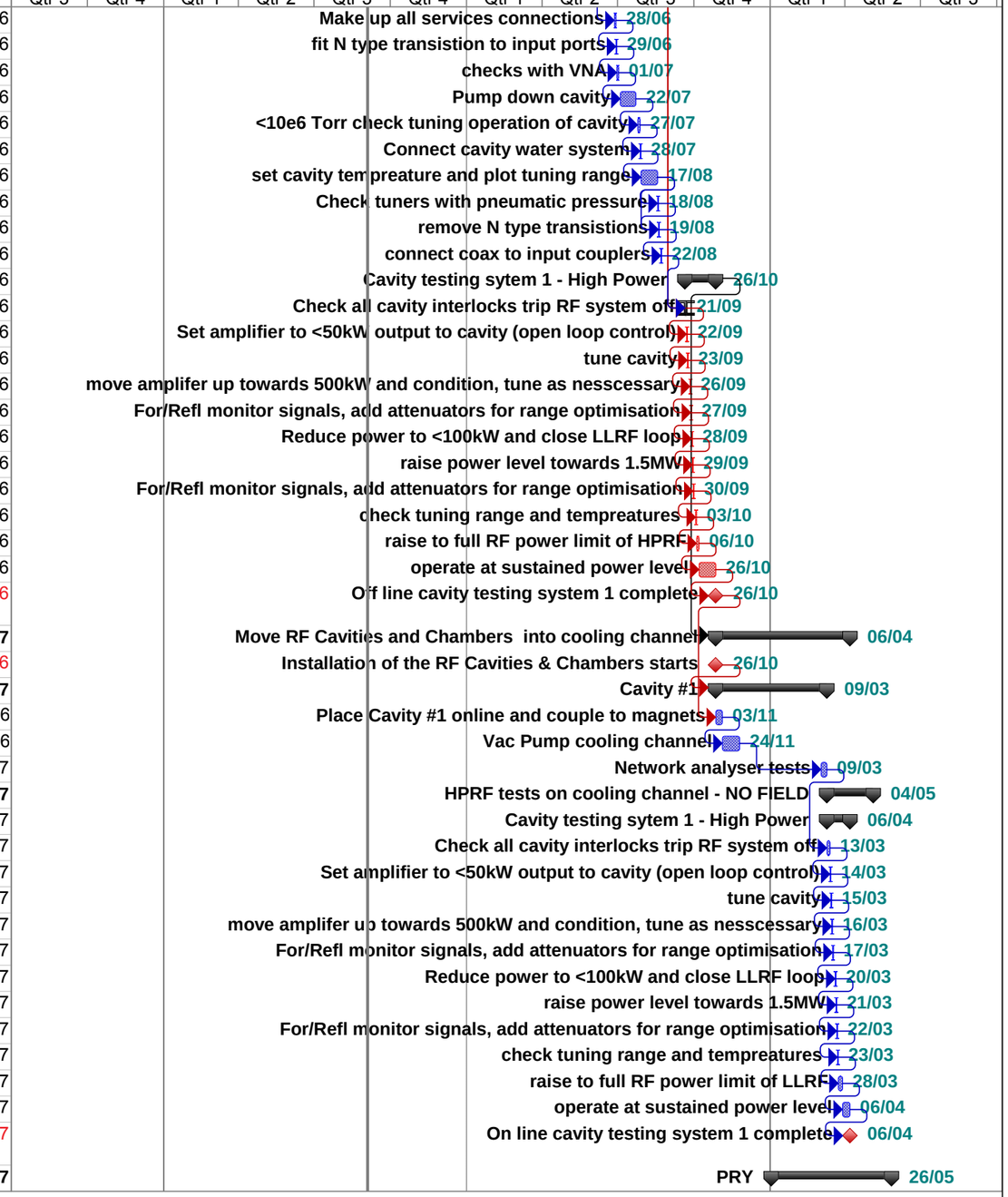
| ID | Task Name | Duration | Start | Finish |
|---|---|---|---|---|
| 422 | Make up all services connections | 2 days | 27/06/16 | 28/06/16 |
| 423 | fit N type transistion to input ports | 1 day | 29/06/16 | 29/06/16 |
| 424 | checks with VNA | 2 days | 30/06/16 | 01/07/16 |
| 425 | Pump down cavity | 3 wks | 04/07/16 | 22/07/16 |
| 426 | <10e6 Torr check tuning operation of cavity | 3 days | 25/07/16 | 27/07/16 |
| 427 | Connect cavity water system | 1 day | 28/07/16 | 28/07/16 |
| 428 | set cavity tempreature and plot tuning range | 14 days | 29/07/16 | 17/08/16 |
| 429 | Check tuners with pneumatic pressure | 1 day | 18/08/16 | 18/08/16 |
| 430 | remove N type transistions | 1 day | 19/08/16 | 19/08/16 |
| 431 | connect coax to input couplers | 1 day | 22/08/16 | 22/08/16 |
| 432 | **Cavity testing sytem 1 - High Power** | 27 days | 20/09/16 | 26/10/16 |
| 433 | Check all cavity interlocks trip RF system off | 2 days | 20/09/16 | 21/09/16 |
| 434 | Set amplifier to <50kW output to cavity (open loop control) | 1 day | 22/09/16 | 22/09/16 |
| 435 | tune cavity | 1 day | 23/09/16 | 23/09/16 |
| 436 | move amplifer up towards 500kW and condition, tune as nesso | 1 day | 26/09/16 | 26/09/16 |
| 437 | For/Refl monitor signals, add attenuators for range optimisatio | 1 day | 27/09/16 | 27/09/16 |
| 438 | Reduce power to <100kW and close LLRF loop | 1 day | 28/09/16 | 28/09/16 |
| 439 | raise power level towards 1.5MW | 1 day | 29/09/16 | 29/09/16 |
| 440 | For/Refl monitor signals, add attenuators for range optimisation | 1 day | 30/09/16 | 30/09/16 |
| 441 | check tuning range and tempreatures | 1 day | 03/10/16 | 03/10/16 |
| 442 | raise to full RF power limit of HPRF | 3 days | 04/10/16 | 06/10/16 |
| 443 | operate at sustained power level | 14 days | 07/10/16 | 26/10/16 |
| 444 | Off line cavity testing system 1 complete | 0 days | 26/10/16 | 26/10/16 |
| 471 | **Move RF Cavities and Chambers into cooling channel** | **105 days** | **26/10/16** | **06/04/17** |
| 472 | Installation of the RF Cavities & Chambers starts | 0 days | 26/10/16 | 26/10/16 |
| 473 | **Cavity #1** | **85 days** | **27/10/16** | **09/03/17** |
| 474 | Place Cavity #1 online and couple to magnets | 6 days | 27/10/16 | 03/11/16 |
| 475 | Vac Pump cooling channel | 3 wks | 04/11/16 | 24/11/16 |
| 476 | Network analyser tests | 1 wk | 03/03/17 | 09/03/17 |
| 482 | **HPRF tests on cooling channel - NO FIELD** | **40 days** | **10/03/17** | **04/05/17** |
| 483 | **Cavity testing sytem 1 - High Power** | 20 days | 10/03/17 | 06/04/17 |
| | Check all cavity interlocks trip RF system off | 2 days | 10/03/17 | 13/03/17 |
| | Set amplifier to <50kW output to cavity (open loop control) | 1 day | 14/03/17 | 14/03/17 |
| | tune cavity | 1 day | 15/03/17 | 15/03/17 |
| | move amplifer up towards 500kW and condition, tune as nesscessary | 1 day | 16/03/17 | 16/03/17 |
| | For/Refl monitor signals, add attenuators for range optimisation | 1 day | 17/03/17 | 17/03/17 |
| | Reduce power to <100kW and close LLRF loop | 1 day | 20/03/17 | 20/03/17 |
| | raise power level towards 1.5MW | 1 day | 21/03/17 | 21/03/17 |
| | For/Refl monitor signals, add attenuators for range optimisation | 1 day | 22/03/17 | 22/03/17 |
| | check tuning range and tempreatures | 1 day | 23/03/17 | 23/03/17 |
| | raise to full RF power limit of LLRF | 3 days | 24/03/17 | 28/03/17 |
| | operate at sustained power level | 7 days | 29/03/17 | 06/04/17 |
| | On line cavity testing system 1 complete | 0 days | 06/04/17 | 06/04/17 |
| | | **102 days** | **02/01/17** | **26/05/17** |

**Off line High Power Tests against North shield wall**

**North PRY plates not installed at this point**

**Cavity#1 installed in downstream position. Will be driven using system#2 amplifier and racks**

**High Power Tests repeated in cooling channel final position with access from north side.**




TALLATION S
Date: 04/09/15

Inactive Task
Inactive Milestone
Inactive Summary
Manual Task
Duration-only
Manual Summary Rollup
Manual Summary
Start-only
Finish-only

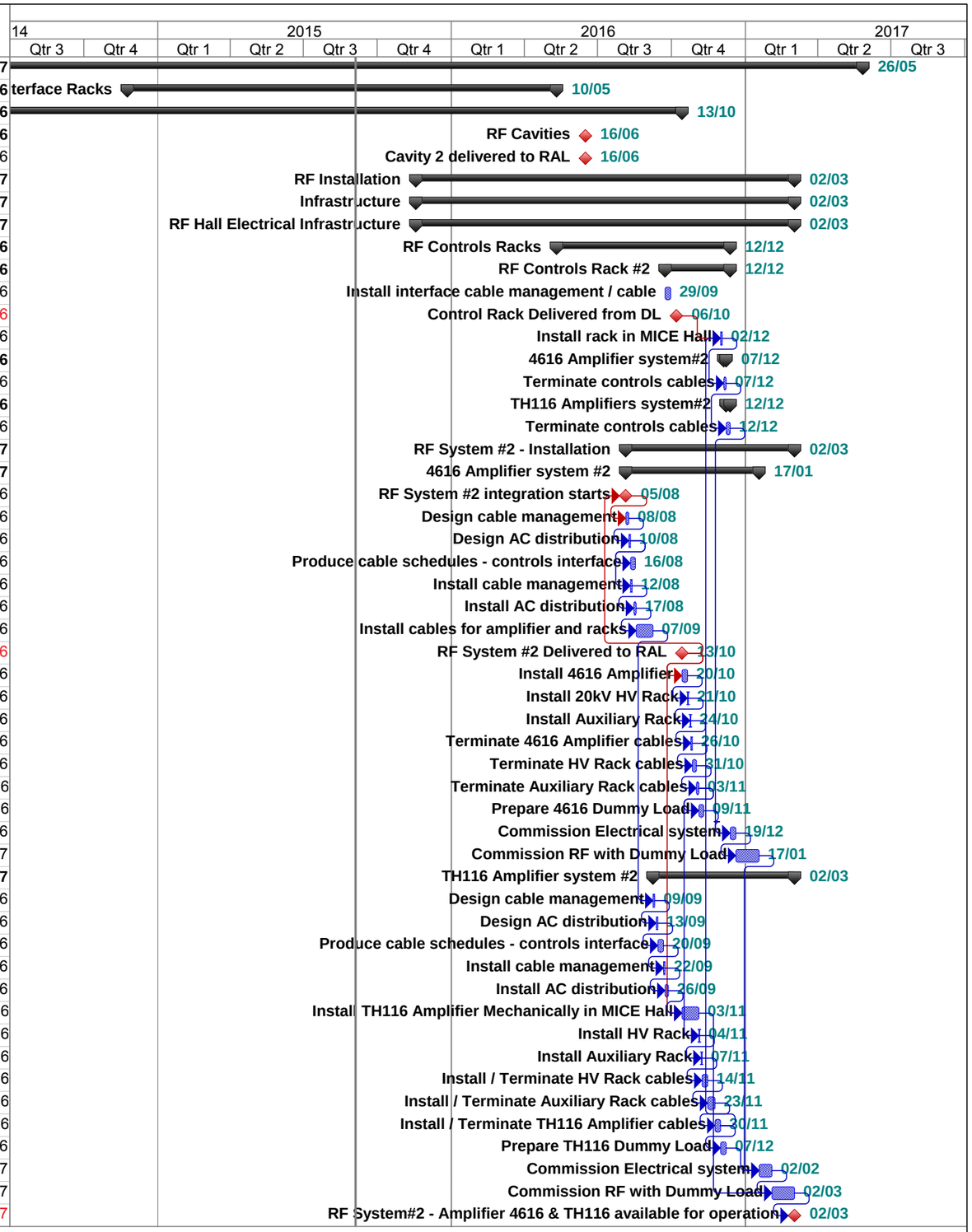
# RF System #2 Installation

Science & Technology
Facilities Council

| ID | Task Name | Duration | Start | Finish |
|---|---|---|---|---|
| 1 | **MICE RF Work Package** | **2198 days** | **01/09/08** | **26/05/17** |
| 18 | **RF Control Interface Racks** | **375 days** | **24/11/14** | **10/05/16** |
| 38 | **RF Amplifiers Testing** | **2048 days** | **01/09/08** | **13/10/16** |
| 306 | **RF Cavities** | **0 days** | **16/06/16** | **16/06/16** |
| 308 | Cavity 2 delivered to RAL | 0 days | 16/06/16 | 16/06/16 |
| 309 | **RF Installation** | **319 days** | **17/11/15** | **02/03/17** |
| 310 | **Infrastructure** | **319 days** | **17/11/15** | **02/03/17** |
| 311 | **RF Hall Electrical Infrastructure** | **319 days** | **17/11/15** | **02/03/17** |
| 312 | **RF Controls Racks** | **154 days** | **11/05/16** | **12/12/16** |
| 321 | **RF Controls Rack #2** | **57 days** | **23/09/16** | **12/12/16** |
| 322 | Install interface cable management / cable | 5 days | 23/09/16 | 29/09/16 |
| 323 | Control Rack Delivered from DL | 0 days | 06/10/16 | 06/10/16 |
| 324 | Install rack in MICE Hall | 2 days | 01/12/16 | 02/12/16 |
| 325 | **4616 Amplifier system#2** | **3 days** | **05/12/16** | **07/12/16** |
| 326 | Terminate controls cables | 3 days | 05/12/16 | 07/12/16 |
| 327 | **TH116 Amplifiers system#2** | **3 days** | **08/12/16** | **12/12/16** |
| 328 | Terminate controls cables | 3 days | 08/12/16 | 12/12/16 |
| 355 | **RF System #2 - Installation** | **139 days** | **05/08/16** | **02/03/17** |
| 356 | **4616 Amplifier system #2** | **107 days** | **05/08/16** | **17/01/17** |
| 357 | RF System #2 integration starts | 0 days | 05/08/16 | 05/08/16 |
| 358 | Design cable management | 2 days | 05/08/16 | 08/08/16 |
| 359 | Design AC distribution | 2 days | 09/08/16 | 10/08/16 |
| 360 | Produce cable schedules - controls interface | 4 days | 11/08/16 | 16/08/16 |
| 361 | Install cable management | 2 days | 11/08/16 | 12/08/16 |
| 362 | Install AC distribution | 3 days | 15/08/16 | 17/08/16 |
| 363 | Install cables for amplifier and racks | 15 days | 18/08/16 | 07/09/16 |
| 364 | RF System #2 Delivered to RAL | 0 days | 13/10/16 | 13/10/16 |
| 365 | Install 4616 Amplifier | 5 days | 14/10/16 | 20/10/16 |
| 366 | Install 20kV HV Rack | 1 day | 21/10/16 | 21/10/16 |
| 367 | Install Auxiliary Rack | 1 day | 24/10/16 | 24/10/16 |
| 368 | Terminate 4616 Amplifier cables | 2 days | 25/10/16 | 26/10/16 |
| 369 | Terminate HV Rack cables | 3 days | 27/10/16 | 31/10/16 |
| 370 | Terminate Auxiliary Rack cables | 3 days | 01/11/16 | 03/11/16 |
| 371 | Prepare 4616 Dummy Load | 4 days | 04/11/16 | 09/11/16 |
| 372 | Commission Electrical system | 5 days | 13/12/16 | 19/12/16 |
| 373 | Commission RF with Dummy Load | 10 days | 20/12/16 | 17/01/17 |
| 374 | **TH116 Amplifier system #2** | **115 days** | **08/09/16** | **02/03/17** |
| 375 | **Design cable management** | 2 days | 08/09/16 | 09/09/16 |
| 376 | Design AC distribution | 2 days | 12/09/16 | 13/09/16 |
| 377 | Produce cable schedules - controls interface | 5 days | 14/09/16 | 20/09/16 |
| 378 | Install cable management | 2 days | 21/09/16 | 22/09/16 |
| 379 | Install AC distribution | 2 days | 23/09/16 | 26/09/16 |
| 380 | Install TH116 Amplifier Mechanically in MICE Hall | 15 days | 14/10/16 | 03/11/16 |
| 381 | Install HV Rack | 1 day | 04/11/16 | 04/11/16 |
| 382 | Install Auxiliary Rack | 1 day | 07/11/16 | 07/11/16 |
| 383 | Install / Terminate HV Rack cables | 5 days | 08/11/16 | 14/11/16 |
| 384 | Install / Terminate Auxiliary Rack cables | 7 days | 15/11/16 | 23/11/16 |
| 385 | Install / Terminate TH116 Amplifier cables | 5 days | 24/11/16 | 30/11/16 |
| 386 | Prepare TH116 Dummy Load | 5 days | 01/12/16 | 07/12/16 |
| 387 | Commission Electrical system | 12 days | 18/01/17 | 02/02/17 |
| 388 | Commission RF with Dummy Load | 20 days | 03/02/17 | 02/03/17 |
| 389 | RF System#2 - Amplifier 4616 & TH116 available for operation | 0 days | 02/03/17 | 02/03/17 |

**4616 Installation & test into dummy load**

**TH116 Installation & test into dummy load**




Project: MICE HALL INSTALLATION S
Date: 04/09/15

Inactive Summary
Manual Summary Rollup
Finish-only
Inactive Task
Manual Task
Manual Summary
Inactive Milestone
Duration-only
Start-only

| ID | Task Name | Duration | Start | Finish |
|---|---|---|---|---|
| 412 | **Cavities** | **744 days** | **04/06/14** | **04/05/17** |
| 445 | **Off line cavity testing Prep (system 2)** | **47 days** | **03/11/16** | **23/01/17** |
| 446 | Install cavity 2 in MICE hall adjacent to wall | 4 days | 03/11/16 | 08/11/16 |
| 447 | Install coax to cavity | 2 days | 09/11/16 | 10/11/16 |
| 448 | Make up all services connections | 2 days | 11/11/16 | 14/11/16 |
| 449 | fit N type transistion to input ports | 1 day | 15/11/16 | 15/11/16 |
| 450 | checks with VNA | 2 days | 16/11/16 | 17/11/16 |
| 451 | Pump down cavity | 3 wks | 18/11/16 | 08/12/16 |
| 452 | <10e6 Torr check tuning operation of cavity | 3 days | 09/12/16 | 13/12/16 |
| 453 | Connect cavity water system | 1 day | 14/12/16 | 14/12/16 |
| 454 | set cavity tempreature and plot tuning range | 14 days | 15/12/16 | 18/01/17 |
| 455 | Check tuners with pneumatic pressure | 1 day | 19/01/17 | 19/01/17 |
| 456 | remove N type transistions | 1 day | 20/01/17 | 20/01/17 |
| 457 | connect coax to input couplers | 1 day | 23/01/17 | 23/01/17 |
| 458 | **Cavity testing sytem 2 - High Power** | **27 days** | **24/01/17** | **01/03/17** |
| 459 | Check all cavity interlocks trip RF system off | 2 days | 24/01/17 | 25/01/17 |
| 460 | Set amplifier to <50kW output to cavity (open loop control) | 1 day | 26/01/17 | 26/01/17 |
| 461 | tune cavity | 1 day | 27/01/17 | 27/01/17 |
| 462 | move amplifer up towards 500kW and condition, tune as n | 1 day | 30/01/17 | 30/01/17 |
| 463 | For/Refl monitor signals, add attenuators for range optimis | 1 day | 31/01/17 | 31/01/17 |
| 464 | Reduce power to <100kW and close LLRF loop | 1 day | 01/02/17 | 01/02/17 |
| 465 | raise power level towards 1.5MW | 1 day | 02/02/17 | 02/02/17 |
| 466 | For/Refl monitor signals, add attenuators for range optimis | 1 day | 03/02/17 | 03/02/17 |
| 467 | check tuning range and tempreatures | 1 day | 06/02/17 | 06/02/17 |
| 468 | raise to full RF power limit of LLRF | 3 days | 07/02/17 | 09/02/17 |
| 469 | operate at sustained power level | 14 days | 10/02/17 | 01/03/17 |
| 470 | Off line cavity testing system 2 complete | 0 days | 01/03/17 | 01/03/17 |
| 471 | **Move RF Cavities and Chambers into cooling channel** | **105 days** | **26/10/16** | **06/04/17** |
| 477 | **Cavity #2** | **26 days** | **02/03/17** | **06/04/17** |
| 478 | Place Cavity #2 online and couple to magnets | 6 days | 02/03/17 | 09/03/17 |
| 479 | Vac Pump cooling channel | 3 wks | 10/03/17 | 30/03/17 |
| 480 | Network analyser tests | 1 wk | 31/03/17 | 06/04/17 |
| 482 | **HPRF tests on cooling channel - NO FIELD** | **40 days** | **10/03/17** | **04/05/17** |
| 496 | **Cavity testing sytem 2 - High Power** | **20 days** | **07/04/17** | **04/05/17** |
| | Check all cavity interlocks trip RF system off | 2 days | 07/04/17 | 10/04/17 |
| | Set amplifier to <50kW output to cavity (open loop control) | 1 day | 11/04/17 | 11/04/17 |
| | tune cavity | 1 day | 12/04/17 | 12/04/17 |
| | move amplifer up towards 500kW and condition, tune as nesscessary | 1 day | 13/04/17 | 13/04/17 |
| | For/Refl monitor signals, add attenuators for range optimisation | 1 day | 14/04/17 | 14/04/17 |
| | Reduce power to <100kW and close LLRF loop | 1 day | 17/04/17 | 17/04/17 |
| | raise power level towards 1.5MW | 1 day | 18/04/17 | 18/04/17 |
| | For/Refl monitor signals, add attenuators for range optimisation | 1 day | 19/04/17 | 19/04/17 |
| | check tuning range and tempreatures | 1 day | 20/04/17 | 20/04/17 |
| | raise to full RF power limit of LLRF | 3 days | 21/04/17 | 25/04/17 |
| | operate at sustained power level | 7 days | 26/04/17 | 04/05/17 |
| | On line cavity testing system 2 complete | 0 days | 04/05/17 | 04/05/17 |

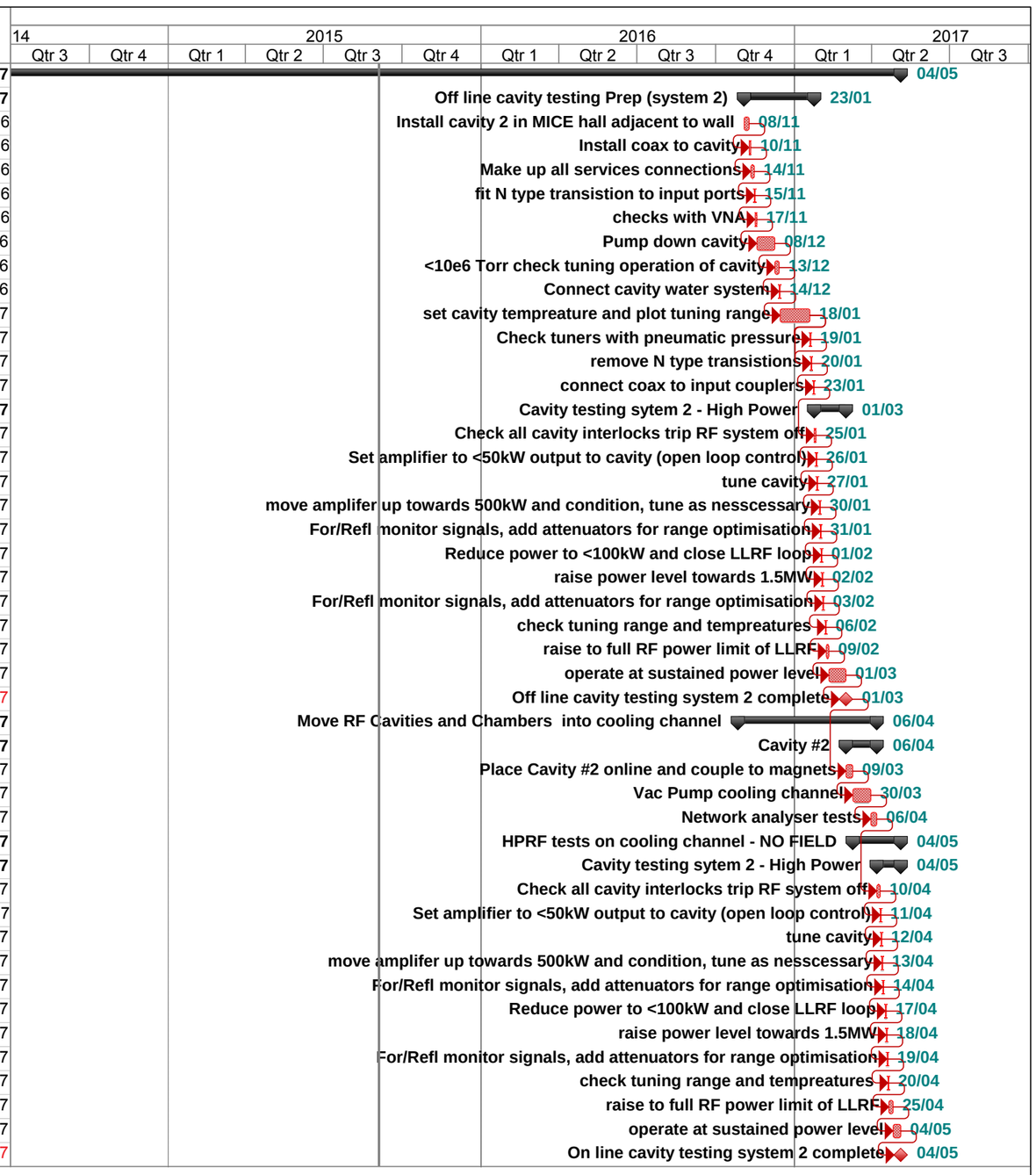
**Off line High Power Tests against North shield wall.**

**High power tests carried out with system#1 amplifiers & racks**

**North PRY plates not installed at this point.**

**Cavity#2 installed in upstream position**

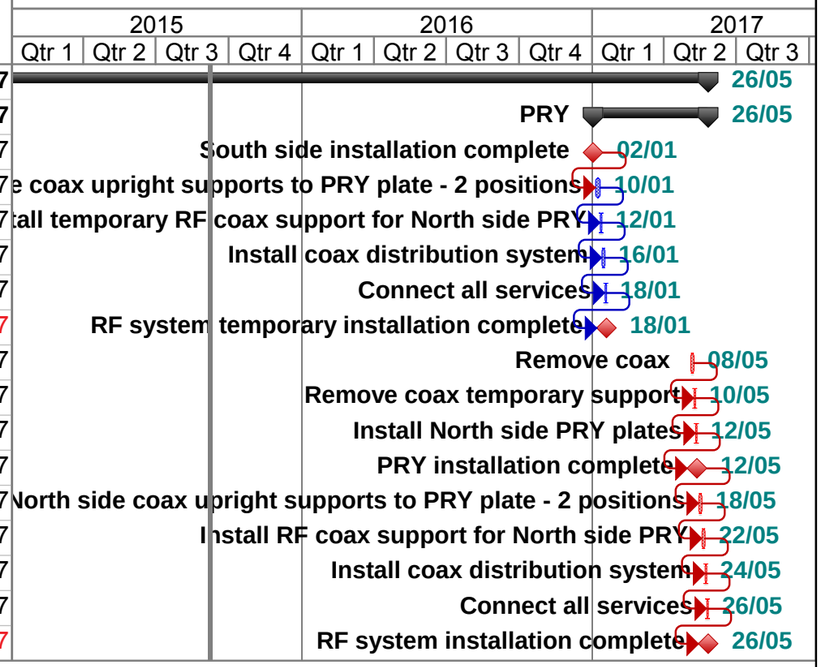
**High Power Tests repeated in cooling channel final position with access from north side.**




Project: MICE HALL INSTALLATION S
Date: 04/09/15

Inactive Summary
Inactive Task
Inactive Milestone
Manual Task
Duration-only
Manual Summary Rollup
Manual Summary
Start-only
Finish-only

| ID | Task Name | Duration | Start | Finish |
|---|---|---|---|---|
| 1 | **MICE RF Work Package** | **2198 days** | **01/09/08** | **26/05/17** |
| 511 | **PRY** | **102 days** | **02/01/17** | **26/05/17** |
| 512 | South side installation complete | 0 days | 02/01/17 | 02/01/17 |
| 513 | Install South side coax upright supports to PRY plate - 2 positions | 4 days | 05/01/17 | 10/01/17 |
| 514 | Install temporary RF coax support for North side PRY | 2 days | 11/01/17 | 12/01/17 |
| 515 | Install coax distribution system | 2 days | 13/01/17 | 16/01/17 |
| 516 | Connect all services | 2 days | 17/01/17 | 18/01/17 |
| 517 | RF system temporary installation complete | 0 days | 18/01/17 | 18/01/17 |
| 518 | Remove coax | 2 days | 05/05/17 | 08/05/17 |
| 519 | Remove coax temporary support | 2 days | 09/05/17 | 10/05/17 |
| 520 | Install North side PRY plates | 2 days | 11/05/17 | 12/05/17 |
| 521 | PRY installation complete | 0 days | 12/05/17 | 12/05/17 |
| 522 | Install North side coax upright supports to PRY plate - 2 positions | 4 days | 15/05/17 | 18/05/17 |
| 523 | Install RF coax support for North side PRY | 2 days | 19/05/17 | 22/05/17 |
| 524 | Install coax distribution system | 2 days | 23/05/17 | 24/05/17 |
| 525 | Connect all services | 2 days | 25/05/17 | 26/05/17 |
| 526 | RF system installation complete | 0 days | 26/05/17 | 26/05/17 |




Project: MICE HALL INSTALLATION S
Date: 08/09/15

Inactive Milestone
Inactive Summary
Manual Task
Duration-only
Inactive Task
Manual Summary Rollup
Manual Summary
Start-only
Finish-only

# RF Schedule Summary

| Task Name | Date |
|---|---|
| Control Rack Delivered from DL system#1 | 06/06/2016 |
| Cavities delivered to RAL (2 off) | 16/06/2016 |
| System #1 amplifier racks commissioned into dummy loads | 24/08/2016 |
| Control Rack Delivered from DL system#2 | 06/10/2016 |
| Off line cavity testing system # 1 complete | 26/10/2016 |
| Installation of the RF Cavities & Chambers starts | 26/10/2016 |
| Off line cavity testing system # 2 complete | 01/03/2017 |
| System #2 amplifier racks commissioned into dummy loads | 02/03/2017 |
| On line cavity testing system #1 complete | 06/04/2017 |
| On line cavity testing system #2 complete | 04/05/2017 |
| North PRY Installation complete | 17/05/2017 |
| RF system Installation complete | 31/05/2017 |

# Back Up Slides

# RF Deployment Summary

## Off Line Tests – *Carried Out Using System # 1 Amplifier & Racks*

| Cavity 1 | Date |
|---|---|
| Control Rack Delivered from DL system#1 | 06/06/2016 |
| Cavities delivered to RAL (2 off) – Stored in R9 until required | 16/06/2016 |
| Install cavity # 1 in off line test position | 17/06/2016 |
| Cavity # 1 test prep complete | 22/08/2016 |
| System #1 amplifier racks commissioned into dummy loads | 24/08/2016 |
| High power tests begin | 20/09/2016 |
| Off line cavity testing system # 1 complete | 26/10/2016 |
| Cavity 2 | |
| Install cavity # 2 in off line test position | 3/11/2016 |
| Cavity # 2 test prep complete | 23/01/2017 |
| High power tests begin | 24/01/2017 |
| Off line cavity testing system # 2 complete | 1/03/2017 |

# RF Deployment Summary

**On Line Downstream Position – *Uses System # 2 Amplifiers & Racks***

| Cavity 1 | Date |
|---|---|
| Installation of the RF Cavities & Chambers starts | 27/10/2016 |
| RF system # 2 delivered from DL – racks and amplifiers | 13/10/2016 |
| System # 2 amplifier racks commissioned into dummy loads | 2/03/2017 |
| High power tests begin | 10/03/2017 |
| On line cavity 1 high power testing complete | 6/04/2017 |

- Commissioning into dummy loads allowed 10days for each amplifier ~ total approx 1mth
- Delivery of RF system # 2 may be delayed possibly upto 2-3mths…effort driven
- Assumes same test procedure and time frame as off line testing
- On line high power tests carried out with access to north side of the cooling channel ….. north pry plates not installed.

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# RF Deployment Summary

**On Line Upstream Position – *Uses System # 1 Amplifiers & Racks***

| Cavity 2 | Date |
|---|---|
| Installation of the RF Cavities & Chambers starts | 2/03/2017 |
| High power tests begin | 7/04/2017 |
| On line cavity 2 high power testing complete | 4/05/2017 |

- Assumes same test procedure and time frame as off line testing
- On line high power tests carried out with access to north side of the cooling channel ….. north pry plates not installed.