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| Traveler Title | LCLS II Production Cryomodule Acceptance Testing | | | |
| Traveler Abstract | LCLS II production cryomodule acceptance testing. This traveler covers low power and high power testing once the cryomodule is at 2K. Traveler also covers the warm up and removal. | | | |
| Traveler ID | L2PRD-CM-ACTS | | | |
| Traveler Revision | R4 | | | |
| Traveler Author | M. Drury | | | |
| Traveler Date | 23-Apr-2018 | | | |
| NCR Emails |  | | | |
| Approval Names | M. Drury | L. King | E. Daly |  |
| Approval Signatures |  |  |  |  |
| Approval Dates |  |  |  |  |
| Approval Title | Author | Reviewer | Project Manager |  |

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| References | List and Hyperlink all documents related to this traveler. This includes, but is not limited to: safety (THAs, SOPs, etc), drawings, procedures, and facility related documents. | | | |
| [CMTF Operational Safety Procedure](https://jlabdoc.jlab.org/docushare/dsweb/Get/Document-137200/CMTF-OSP%202015e.doc) | [CMTF Conduct of Operations](https://jlabdoc.jlab.org/docushare/dsweb/Get/Document-7460/CMTF%20COO%202008.doc) |  |  |  |
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| Revision Note |  |
| R1 | Initial release of this Traveler. |
| R2 | Added CMTF Summary Upload on step 1 and removed Holdpoints for automation –Megan McDonald |
| R3 | Added area for final notes and additional information for SLAC; added step 9b FPC Qext range table; added heaters after step 35 – VDB |
| R4 | Step 31 replace 6.0MV/m column with cooldown rate; added after step 36 heaters a section for checking sensors and noting problems. |

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| **Part Description** | | LCLS II 1.3 GHz Prototype Cryomodule |
| **Step No** | **Instructions** | **Data Inputs** |
| 1 | Record the Cavity SN's for each cavity position. (Note: Cavity 1-Supply side, Cavity 8-Return side) | [[CMSN]] <<CMSN>>  [[Cav1SN]] <<CAVSN>>  [[Cav2SN]] <<CAVSN>>  [[Cav3SN]] <<CAVSN>>  [[Cav4SN]] <<CAVSN>>  [[Cav5SN]] <<CAVSN>>  [[Cav6SN]] <<CAVSN>>  [[Cav7SN]] <<CAVSN>>  [[Cav8SN]] <<CAVSN>>  [[IDsRecordedBy]] <<USERNAME>>  [[TimeIDsRecorded]] <<TIMESTAMP>>  [[TravOpenDate]] <<TIMESTAMP>>  [[TravOpenWho]] <<TEXT>>  [[CMTFSummary]] <<FILEUPLOAD>> |

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| **Step No** | **Instructions** | **Data Inputs** |
| 2 | **Begin the integrated insulating vacuum leak check:**  Isolate the insulating vacuum from the pumping station after the cool down is complete and the cryomodule is stable in terms of pressure and liquid level. Monitor the insulating vacuum pressure for at least 1 week. Record start time, completion time and the vacuum pressure (in torr) at start and finish. | [[VacTech1]] <<SRF>>  [[InsVacLeakTstStrtTime]] <<TIMESTAMP>>  [[InsVacLeakTstSartPress]] <<SCINOT>> (torr)  [[VacTech2]] <<USERNAME>>  [[InsVacLeakTstStpTime]] <<TIMESTAMP>>  [[InsVacLeakTstFnlPress]] <<SCINOT>> (torr)  [[Subtract InsVacLeakTestStartTime from InsVacLeakTestStopTime and enter in ElapsedTimeInsVacLeakTest in units of days]] <<NOTE>>  [[Subtract InsVacLeakTestStartPressure from InsVacLeakTestFinalPressure and enter result in InsVacDelta]] <<NOTE>>  [[ElapseTimeInsVacLeakTst]] <<FLOAT>> (days)  [[InsVacDelta]] <<SCINOT>>  [[InsVacLeakTestComments]] <<COMMENT>> |

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| **Step No** | **Instructions** | **Data Inputs** |
| 3 | Measure the **Cold Cavity Passband Frequencies.** Use the [Cold Frequencies](https://jlabdoc.jlab.org/docushare/dsweb/Get/Document-137336/LCLSII%20CMxx%20Frequencies.xlsx) link to open a blank spreadsheet. Fill in the spreadsheet as measurements are taken. Use the file upload to save a copy of the spreadsheet. Save the file to the location [M:\asd\asddata\CMTF\LCLS II\pCM\](file:///M:\asd\asddata\CMTF\LCLS%20II\pCM\) including cryomodule ID and date in the title.  Fill in the information to the left and use the Comment block to list any problems or other observations | [[ACTTech1]] <<USERNAME>>  [[ColdFreqTimeComplete]] <<TIMESTAMP>>  [[ColdFreqComment]] <<COMMENT>> |
| 4 | **Test the Stepper Motor Temperature Interlocks** for Cavities 1-8. . Insure that each temperature sensor is functioning correctly. Verify that each interlock will generate a fault and disables tuner operation. Check off each working coupler temp interlock. Note any problems in the comment block.  **If any RTD is determined to be non functional, generate an NCR.**  **\*\*Do Not Attempt to operate a mechanical tuner if its temperature sensor and Interlock are not functioning correctly!\*\*** | [[ACTTech2]] <<USERNAME>>  [[ArcDetectorIntlkChkCompl1]] <<TIMESTAMP>>  [[ArcDetectorIntlkComments1]] <<COMMENT>>  [[C1ArcDetectorIntlkPassed1]] <<CHECKBOX>>  [[C2ArcDetectorIntlkPassed1]] <<CHECKBOX>>  [[C3ArcDetectorIntlkPassed1]] <<CHECKBOX>>  [[C4ArcDetectorIntlkPassed1]] <<CHECKBOX>>  [[C5ArcDetectorIntlkPassed1]] <<CHECKBOX>>  [[C6ArcDetectorIntlkPassed1]] <<CHECKBOX>>  [[C7ArcDetectorIntlkPassed1]] <<CHECKBOX>>  [[C8ArcDetectorIntlkPassed1]] <<CHECKBOX>> |

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| **Step No** | **Instructions** | **Data Inputs** |
| 5 | Complete the **Mechanical Tuner Range and Hysteresis** test for Cavities 1-8. Note any problems in the comment blocks.  Use the [Mech Tuner Range and Hysteresis Spreadsheet](https://jlabdoc.jlab.org/docushare/dsweb/Get/Document-137423/pCM-x%20Tuner%20Test.xlsx) link to open a blank spreadsheet for each cavity. Copy the data from the computer generated text files for both the Range and Hysteresis tests into the spreadsheet. Process the spreadsheet as necessary. Save the spreadsheet file to the location, [M:\asd\asddata\CMTF\LCLS II\pCM\L2\_JLab\_\_pCM tuner data\](file:///M:\asd\asddata\CMTF\LCLS%20II\pCM\L2_JLab__pCM%20tuner%20data) and then upload below.  Cavities must be tuned to 1.3 GHZ ± 1 kHz at the end of this procedure.  Record the requested information in the tables on the following pages.  **If any cavity cannot be tuned to 1.300 000 GHz and maintain a tuning range of ± 20kHz, an NCR must be generated**. | [[C1StepperTestTech]] <<USERNAME>>  [[C1StepperTestCompTime]] <<TIMESTAMP>>  [[C1StepperTestComments]] <<COMMENT>>  [[C2StepperTestTech]] <<USERNAME>>  [[C2StepperTestCompTime]] <<TIMESTAMP>>  [[C2StepperTestComments]] <<COMMENT>>  [[C3StepperTestTech]] <<USERNAME>>  [[C3StepperTestCompTime]] <<TIMESTAMP>>  [[C3StepperTestComments]] <<COMMENT>>  [[C4StepperTestTech]] <<USERNAME>>  [[C4StepperTestCompTime]] <<TIMESTAMP>>  [[C4StepperTestComments]] <<COMMENT>>  [[C5StepperTestTech]] <<USERNAME>>  [[C5StepperTestCompTime]] <<TIMESTAMP>>  [[C5StepperTestComments]] <<COMMENT>>  [[C6StepperTestTech]] <<USERNAME>>  [[C6StepperTestCompTime]] <<TIMESTAMP>>  [[C6StepperTestComments]] <<COMMENT>>  [[C7StepperTestTech]] <<USERNAME>>  [[C7StepperTestCompTime]] <<TIMESTAMP>>  [[C7StepperTestComments]] <<COMMENT>>  [[C8StepperTestTech]] <<USERNAME>>  [[C8StepperTestCompTime]] <<TIMESTAMP>>  [[C8StepperTestComments]] <<COMMENT>> |

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| **Step No** | | **Instructions** | | | | **Data Inputs** | | |
| 6 | | Record the requested information from the **Mechanical Tuner Range Test** in the table below.This data must also be recorded in the paper logbook. Use comment blocks on preceding pages for details.  **Note:** | | | |  | | |
| **Cavity** | **Initial Frequency**  **(MHz)** | | **Min Frequency**  **(MHz)** | **Low Limit Switch**  **Activated?** | **Max Frequency**  **(MHz)** | | **High Limit Switch**  **Activated?** | **Tuner Range**  **(kHz)** |
| **1** | [[C1InitFreq]] <<FLOAT>> | | [[C1StepMinFreq]] <<FLOAT>> | [[C1StepLoLimit]] <<YESNO>> | [[C1StepMaxFreq]] <<FLOAT>> | | [[C1StepHiLimit]] <<YESNO>> | [[C1StepRange]] <<FLOAT>> |
| **2** | [[C2InitFreq]] <<FLOAT>> | | [[C2StepMinFreq]] <<FLOAT>> | [[C2StepLoLimit]] <<YESNO>> | [[C2StepMaxFreq]] <<FLOAT>> | | [[C2StepHiLimit]] <<YESNO>> | [[C2StepRange]] <<FLOAT>> |
| **3** | [[C3InitFreq]] <<FLOAT>> | | [[C3StepMinFreq]] <<FLOAT>> | [[C3StepLoLimit]] <<YESNO>> | [[C3StepMaxFreq]] <<FLOAT>> | | [[C3StepHiLimit]] <<YESNO>> | [[C3StepRange]] <<FLOAT>> |
| **4** | [[C4InitFreq]] <<FLOAT>> | | [[C4StepMinFreq]] <<FLOAT>> | [[C4StepLoLimit]] <<YESNO>> | [[C4StepMaxFreq]] <<FLOAT>> | | [[C4StepHiLimit]] <<YESNO>> | [[C4StepRange]] <<FLOAT>> |
| **5** | [[C5InitFreq]] <<FLOAT>> | | [[C5StepMinFreq]] <<FLOAT>> | [[C5StepLoLimit]] <<YESNO>> | [[C5StepMaxFreq]] <<FLOAT>> | | [[C5StepHiLimit]] <<YESNO>> | [[C5StepRange]] <<FLOAT>> |
| **6** | [[C6InitFreq]] <<FLOAT>> | | [[C6StepMinFreq]] <<FLOAT>> | [[C6StepLoLimit]] <<YESNO>> | [[C6StepMaxFreq]] <<FLOAT>> | | [[C6StepHiLimit]] <<YESNO>> | [[C6StepRange]] <<FLOAT>> |
| **7** | [[C7InitFreq]] <<FLOAT>> | | [[C7StepMinFreq]] <<FLOAT>> | [[C7StepLoLimit]] <<YESNO>> | [[C7StepMaxFreq]] <<FLOAT>> | | [[C7StepHiLimit]] <<YESNO>> | [[C7StepRange]] <<FLOAT>> |
| **8** | [[C8InitFreq]] <<FLOAT>> | | [[C8StepMinFreq]] <<FLOAT>> | [[C8StepLoLimit]] <<YESNO>> | [[C8StepMaxFreq]] <<FLOAT>> | | [[C8StepHiLimit]] <<YESNO>> | [[C8StepRange]] <<FLOAT>> |

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| **Step No** | | **Instructions** | | | **Data Inputs** | |
| 7 | | Record the requested information from the **Mechanical Tuner Hysteresis Test** in the table below.  Use comment blocks for details.  **Note:** The spreadsheets cannot be finalized and should not be uploaded until the **Pressure Sensitivity Measurements** are complete. See Step xx. | | |  | |
| **Cavity** | **Average dFreq / dSteps**  **(Hz/usteps)** | | **Max Hysteresis**  **(Hz)** | **Final Frequency (MHz)** | | **File Upload** |
| **1** | [[C1Step\_dFdStep]] <<FLOAT>> | | [[C1StepHyst]] <<FLOAT>> | [[C1StepFinalFreq]] <<FLOAT>> | | [[C1StepFile]] <<FILEUPLOAD>> |
| **2** | [[C2Step\_dFdStep]] <<FLOAT>> | | [[C2StepHyst]] <<FLOAT>> | [[C2StepFinalFreq]] <<FLOAT>> | | [[C2StepFile]] <<FILEUPLOAD>> |
| **3** | [[C3Step\_dFdStep]] <<FLOAT>> | | [[C3StepHyst]] <<FLOAT>> | [[C3StepFinalFreq]] <<FLOAT>> | | [[C3StepFile]] <<FILEUPLOAD>> |
| **4** | [[C4Step\_dFdStep]] <<FLOAT>> | | [[C4StepHyst]] <<FLOAT>> | [[C4StepFinalFreq]] <<FLOAT>> | | [[C4StepFile]] <<FILEUPLOAD>> |
| **5** | [[C5Step\_dFdStep]] <<FLOAT>> | | [[C5StepHyst]] <<FLOAT>> | [[C5StepFinalFreq]] <<FLOAT>> | | [[C5StepFile]] <<FILEUPLOAD>> |
| **6** | [[C6Step\_dFdStep]] <<FLOAT>> | | [[C6StepHyst]] <<FLOAT>> | [[C6StepFinalFreq]] <<FLOAT>> | | [[C6StepFile]] <<FILEUPLOAD>> |
| **7** | [[C7Step\_dFdStep]] <<FLOAT>> | | [[C7StepHyst]] <<FLOAT>> | [[C7StepFinalFreq]] <<FLOAT>> | | [[C7StepFile]] <<FILEUPLOAD>> |
| **8** | [[C8Step\_dFdStep]] <<FLOAT>> | | [[C8StepHyst]] <<FLOAT>> | [[C8StepFinalFreq]] <<FLOAT>> | | [[C8StepFile]] <<FILEUPLOAD>> |

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| **Step No** | **Instructions** | **Data Inputs** |
| 8 | Measure the **Cold Cavity Passband Frequencies** (in MHz). Measure the frequencies and Qext’s for all nine passbands.  Open the spreadsheet file that was created in Step X. This file should be located at [M:\asd\asddata\CMTF\LCLS II\pCM\L2\_Jlab\_\_pCM tuner data\](file:///M:\asd\asddata\CMTF\LCLS%20II\pCM\L2_JLab__pCM%20tuner%20data). Record the frequency and Qext data in the appropriate locations in the spreadsheet and save.  **This measurement must be completed only after the Mechanical Tuner Range and Hysteresis Test is complete.** | [[ACTTech3]] <<USERNAME>>  [[ColdTunedPassbandComp]] <<TIMESTAMP>>  [[ColdTunedPassbandComm]] <<COMMENT>> |
| 9 | **Tune each of the Fundamental Power Qext’s to 4x107.** Remeasure the Qext’s of all nine passbands for each cavity. Open the spreadsheet file that was created in Step X. This file should be located at [M:\asd\asddata\CMTF\LCLS II\pCM\L2\_Jlab\_\_pCM tuner data\](file:///M:\asd\asddata\CMTF\LCLS%20II\pCM\L2_JLab__pCM%20tuner%20data). Record the Qext data in the appropriate locations in the spreadsheet and save.  Upload the completed spreadsheet.  **If any FPC cannot be tuned to 4x107, an NCR must be generated.** | [[FPCTuneTech]] <<USERNAME>>  [[FPCTuneComplete]] <<TIMESTAMP>>  [[FPCTuneComments]] <<COMMENT>>  [[ACTTech4]] <<USERNAME>>  [[TunedQextComplete]] <<TIMESTAMP>>  [[TunedQextComments]] <<COMMENT>>  [[FrequencyFile]] <<FILEUPLOAD>> |
| 9b | |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | CAV1 | CAV2 | CAV3 | CAV4 | CAV5 | CAV6 | CAV7 | CAV8 | REMARKS | | FPC Qext Range Lower NA | [[FPCQEXT1L]] <<SCINOT>> | [[FPCQEXT2L]] <<SCINOT>> | [[FPCQEXT3L]] <<SCINOT>> | [[FPCQEXT4L]] <<SCINOT>> | [[FPCQEXT5L]] <<SCINOT>> | [[FPCQEXT6L]] <<SCINOT>> | [[FPCQEXT7L]] <<SCINOT>> | [[FPCQEXT8L]] <<SCINOT>> | [[FPCQEXTLCOMMENT]] <<COMMENT>> | | FPC Qext Range Upper NA | [[FPCQEXT1U]] <<SCINOT>> | [[FPCQEXT2U]] <<SCINOT>> | [[FPCQEXT3U]] <<SCINOT>> | [[FPCQEXT4U]] <<SCINOT>> | [[FPCQEXT5U]] <<SCINOT>> | [[FPCQEXT6U]] <<SCINOT>> | [[FPCQEXT7U]] <<SCINOT>> | [[FPCQEXT8U]] <<SCINOT>> | [[FPCQEXTUCOMMENT]] <<COMMENT>> | | FPC Qext Final Tuned Value | [[FPCQEXT1F]] <<SCINOT>> | [[FPCQEXT2F]] <<SCINOT>> | [[FPCQEXT3F]] <<SCINOT>> | [[FPCQEXT4F]] <<SCINOT>> | [[FPCQEXT5F]] <<SCINOT>> | [[FPCQEXT6F]] <<SCINOT>> | [[FPCQEXT7F]] <<SCINOT>> | [[FPCQEXT8F]] <<SCINOT>> | [[FPCQEXTFCOMMENT]] <<COMMENT>> | | |

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| **Step No** | **Instructions** | **Data Inputs** |
| 10 | Complete the **Piezo Tuner Range and Hysteresis Test.**  Use the [Piezo Tuner Range and Hysteresis Spreadsheet](https://jlabdoc.jlab.org/docushare/dsweb/Get/Document-137429/PZT%20Tuner%20pCM-X.xlsx) link to open a blank spreadsheet. Copy the data from the computer generated text files into the spreadsheet. Process the spreadsheet as necessary and then upload below.  **Note:** The spreadsheets cannot be finalized and should not be uploaded until the **Pressure Sensitivity Measurements** are complete. See Step xx.  **If any piezo tuner is demonstrated to have a tuning range of less than 500 Hz, an NCR must be generated.** | [[C1PztTestTech]] <<USERNAME>>  [[C1PztTestCompleteTime]] <<TIMESTAMP>>  [[C1PztTestComments]] <<COMMENT>>  [[C2PztTestTech]] <<USERNAME>>  [[C2PztTestCompleteTime]] <<TIMESTAMP>>  [[C2PztTestComments]] <<COMMENT>>  [[C3PztTestTech]] <<USERNAME>>  [[C3PztTestCompleteTime]] <<TIMESTAMP>>  [[C3PztTestComments]] <<COMMENT>>  [[C4PztTestTech]] <<USERNAME>>  [[C4PztTestCompleteTime]] <<TIMESTAMP>>  [[C4PztTestComments]] <<COMMENT>>  [[C5PztTestTech]] <<USERNAME>>  [[C5PztTestCompleteTime]] <<TIMESTAMP>>  [[C5PztTestComments]] <<COMMENT>>  [[C6PztTestTech]] <<USERNAME>>  [[C6PztTestCompleteTime]] <<TIMESTAMP>>  [[C6PztTestComments]] <<COMMENT>>  [[C7PztTestTech]] <<USERNAME>>  [[C7PztTestCompleteTime]] <<TIMESTAMP>>  [[C7PztTestComments]] <<COMMENT>>  [[C8PztTestTech]] <<USERNAME>>  [[C8PztTestCompleteTime]] <<TIMESTAMP>>  [[C8PztTestComments]] <<COMMENT>> |

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| **Step No** | **Instructions** | **Data Inputs** |
| 11 | **Upload the Piezo tuner spreadsheet files.** | [[C1PztTestFile]] <<FILEUPLOAD>>  [[C2PztTestFile]] <<FILEUPLOAD>>  [[C3PztTestFile]] <<FILEUPLOAD>>  [[C4PztTestFile]] <<FILEUPLOAD>>  [[C5PztTestFile]] <<FILEUPLOAD>>  [[C6PztTestFile]] <<FILEUPLOAD>>  [[C7PztTestFile]] <<FILEUPLOAD>>  [[C8PztTestFile]] <<FILEUPLOAD>> |

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| **Step No** | **Instructions** | **Data Inputs** |
| 12 | **Complete the Electrical Verification of the Beam Position Monitor (BPM)**  Check off each step as completed.  Create a file containing test results and upload the file.  **If any shorts or opens are detected, an NCR must be generated.**  **If any S21 measurement**  **If the difference in S21 between electrodes is > 1dB, an NCR must be generated.** | [[BPMTestTech1]] <<USERNAME>>  [[BPMTestHiPot1]] <<CHECKBOX>>  [[BPMTestTDR1]] <<CHECKBOX>>  [[S21TopBottom]] <<CHECKBOX>>  [[S21TopRight]] <<CHECKBOX>>  [[S21TopLeft]] <<CHECKBOX>>  [[S21RightLeft]] <<CHECKBOX>>  [[S21RightBottom]] <<CHECKBOX>>  [[S21BottomLeft]] <<CHECKBOX>>  [[BPMTestComplete1]] <<TIMESTAMP>>  [[BPMTestFile1]] <<FILEUPLOAD>> |

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| **Step No** | **Instructions** | **Data Inputs** |
| 13 | **Verify that the Magnets are without Shorts or Opens**.  Hipot at 500V with < 1uA under insulating vacuum, <5uA in ambient  pressure.  **An NCR must be generated for any magnet that does not pass this test.** | [[BPMTestTech2]] <<USERNAME>>  [[BPMTestHiPot2]] <<CHECKBOX>>  [[BPMTestTDR2]] <<CHECKBOX>> |
| 14 | **Complete the Magnet Test Procedure for the Quad, XCOR and YCOR magnets.** See the [Magnet Powering Procedure](https://jlabdoc.jlab.org/docushare/dsweb/Get/Document-137524/Quad%20Testing%20Procedure.docx) for details.  Check off each step as completed. Record the elapsed time for ther 20A soak. Note any problems or in the comment block. Create a file containing test results using the [Magnet Test Template](https://jlabdoc.jlab.org/docushare/dsweb/Get/Document-137525/pCMMag_2017mmdd.xlsx) and upload the resulting file.  **An NCR must be generated for any magnet that does not complete a one hour soak at 20A.** | [[MagnetTestTech]] <<USERNAME>>  [[QuadMagSoak20AOneHr]] <<CHECKBOX>>  [[XCorMagSoak20AOneHr]] <<CHECKBOX>>  [[YCorMagSoak20AOneHr]] <<CHECKBOX>>  [[QuadMagSoak20AExtended]] <<CHECKBOX>>  [[XCorMagSoak20AExtended]] <<CHECKBOX>>  [[YCorMagSoak20AExtended]] <<CHECKBOX>>  [[QuadSoakTime20A]] <<FLOAT>> (hrs)  [[XCorSoakTime20A]] <<FLOAT>> (hrs)  [[YCorSoakTime20A]] <<FLOAT>> (hrs)  [[BPMTestComplete2]] <<TIMESTAMP>>  [[BPMTestFile2]] <<FILEUPLOAD>> |

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| **Step No** | **Instructions** | **Data Inputs** |
|  | **High Power Checklist** |  |
| 15 | Complete the **RF Cable Calibration Measurements** for the cryomodule under test using the [L2\_pCM\_CableCal\_Worksheet.](https://jlabdoc.jlab.org/docushare/dsweb/Get/Document-137528/L2_pCM_CableCal_yyMyyyy.xlsx)  Upload the completed spreadsheet. Note any problems in comments. | [[RFCableCalTech]] <<SRF>>  [[RFCableCalComplete]] <<TIMESTAMP>>  [[RFCableCalComments]] <<COMMENT>>  [[RFCableCalibrationFile]] <<FILEUPLOAD>> |
| 16 | **Test Arc Detectors** for Cavities 1-8. Verify that each detector generates a fault and disables RF. Check off each working arc detector interlock. Note any problems in the comment block.  **\*\*Do Not Attempt to Supply High Power RF to a cavity if its Arc Detector and Interlock are not functioning correctly!\*\*** | [[ACTTech5]] <<USERNAME>>  [[ArcDetectIntlkChkComp2]] <<TIMESTAMP>>  [[ArcDetectIntlkComm2]] <<COMMENT>>  [[C1ArcDetectIntlkPassed2]] <<CHECKBOX>>  [[C2ArcDetectIntlkPassed2]] <<CHECKBOX>>  [[C3ArcDetectIntlkPassed2]] <<CHECKBOX>>  [[C4ArcDetectIntlkPassed2]] <<CHECKBOX>>  [[C5ArcDetectIntlkPassed2]] <<CHECKBOX>>  [[C6ArcDetectIntlkPassed2]] <<CHECKBOX>>  [[C7ArcDetectIntlkPassed2]] <<CHECKBOX>>  [[C8ArcDetectIntlkPassed2]] <<CHECKBOX>> |

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| **Step No** | **Instructions** | **Data Inputs** |
| 17 | **Test the Fundamental Power Coupler Temperature Interlocks** for Cavities 1-8. Insure that each temperature sensor is functioning correctly. Verify that each of the two interlock channels will generate a fault and disables RF. Check off each working coupler temp interlock. Note any problems in the comment block.  **If any RTD is determined to be non functional, generate an NCR.**  **\*\*Do Not Attempt to Supply High Power RF to a cavity unless at least one of the Temperature Interlocks are functioning correctly!\*\*** | [[ACTTech6]] <<USERNAME>>  [[CplrTempIntlkChkComp]] <<TIMESTAMP>>  [[CplrTempIntlkComments]] <<COMMENT>>  [[C1CplrTemp1IntlkPassed1]] <<CHECKBOX>>  [[C1CplrTemp1IntlkPassed2]] <<CHECKBOX>>  [[C2CplrTemp1IntlkPassed1]] <<CHECKBOX>>  [[C2CplrTemp1IntlkPassed2]] <<CHECKBOX>>  [[C3CplrTemp1IntlkPassed1]] <<CHECKBOX>>  [[C3CplrTemp1IntlkPassed2]] <<CHECKBOX>>  [[C4CplrTemp1IntlkPassed1]] <<CHECKBOX>>  [[C4CplrTemp1IntlkPassed2]] <<CHECKBOX>>  [[C5CplrTemp1IntlkPassed1]] <<CHECKBOX>>  [[C5CplrTemp1IntlkPassed2]] <<CHECKBOX>>  [[C6CplrTemp1IntlkPassed1]] <<CHECKBOX>>  [[C6CplrTemp1IntlkPassed2]] <<CHECKBOX>>  [[C7CplrTemp1IntlkPassed1]] <<CHECKBOX>>  [[C7CplrTemp1IntlkPassed2]] <<CHECKBOX>>  [[C8CplrTemp1IntlkPassed1]] <<CHECKBOX>>  [[C8CplrTemp1IntlkPassed2]] <<CHECKBOX>> |

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| **Step No** | **Instructions** | **Data Inputs** |
| 18 | **Test the Fundamental Power Coupler Vacuum Interlock**. Insure that the vacuum signal is reading correctly. Verify that the interlock will generate a fault and **disable RF to all eight cavities**. Note any problems in the comment block.  **If the Coupler Vacuum is higher than 1x109 torr at 2K with no High Power RF, generate an NCR.**  **\*\*Do Not Attempt to Supply High Power RF to any cavity if the Coupler Vacuum interlock is not functioning correctly are functioning correctly!\*\*** | [[ACTTech7]] <<USERNAME>>  [[CplrVacIntlkChkComp]] <<TIMESTAMP>>  [[CplrVacIntlkComments]] <<COMMENT>>  [[CplrVacIntlkPassed]] <<CHECKBOX>> |
| 19 | **Test the Beamline Vacuum Interlock**. Insure that the vacuum signal is reading correctly. Verify that the interlock will generate a fault and **disable RF to all eight cavities**. Note any problems in the comment block.  **If the Beamline Vacuum is higher than 1x10-10 torr at 2K with no High Power RF, generate an NCR.**  **\*\*Do Not Attempt to Supply High Power RF to any cavity if the Beamline Vacuum interlock is not functioning correctly are functioning correctly!\*\*** | [[ACTTech8]] <<USERNAME>>  [[BLVacIntlkChkComp]] <<TIMESTAMP>>  [[BLVacIntlkComments]] <<COMMENT>>  [[BLVacIntlkPassed]] <<CHECKBOX>> |

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| **Step No** | **Instructions** | **Data Inputs** |
| 20 | **Verify that Geiger-Mueller tubes associated with the Decarad system are connected and correctly positioned around cryomodule. Insure that the decarad chassis and all ten channels are functioning correctly.**  Typical setup is as follows:   * Channel 1 at FPC for Cavity 1 * Channel 2 at FPC for Cavity 2 * Channel 3 at FPC for Cavity 3 * Channel 4 at FPC for Cavity 4 * Channel 5 at FPC for Cavity 5 * Channel 6 at FPC for Cavity 6 * Channel 7 at FPC for Cavity 7 * Channel 8 at FPC for Cavity 8 * Channel 9 on supply side beamline. * Channel 10 on return side beamline.   Note any deviations from this scheme in the comment box.  **\*\*Do Not Attempt to Supply High Power RF to any cavity until the the functioning of the Decarad system has been verified. Any deviations from normal functionality must be recorded in the comments and in the elog. \*\*** | [[ActTech9]] <<USERNAME>>  [[GMTubeInspectComp]] <<TIMESTAMP>>  [[GMTubeComments]] <<COMMENT>> |

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| **Step No** | **Instructions** | **Data Inputs** |
| 21 | **Inspect all waveguide connections in the test cave.** All waveguide / hardline sections must be in place with all connections secured. All boltholes on waveguide flanges must be secured. Each leg of the 1300 MHz system must be connected to an SSA output on the upstream end and to a FPC on the downstream end.  Note any problems in the comment box.  **\*\*No waveguide that is capable of delivering RF power into the cave may be open. Waveguide must be terminated either by connection to cryomodule or by shorting plate or an appropriate load.**  **The cave must not be swept unless this step has been completed.\*\*** | [[ActTech10]] <<USERNAME>>  [[WGInspectComp]] <<TIMESTAMP>>  [[WGComments]] <<COMMENT>>  [[WaveguideInspectPassed]] <<CHECKBOX>> |
| 22 | **Inspect all RF heliax cable connections.** A proper connection means at least hand tightened and connected to the appropriate connector. Note any problems in the comment block.   * All eight Ptrans cables are properly connected to the appropriate field probe connectors. * All RF Heliax cables hanging from RF patch panels 1A, 2A, 3A, 4A are properly connected. * All eight pairs of cable coming from the directional couplers are properly connected.   **\*\* The cave must not be swept until this inspection has been successfully completed.\*\*** | [[ACTTech11]] <<USERNAME>>  [[RFCableInspectComp]] <<TIMESTAMP>>  [[RFCableComments]] <<COMMENT>>  [[RFCableInspectPassed]] <<CHECKBOX>> |

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| **Step No** | **Instructions** | **Data Inputs** |
| 23 | **PSS function check:**  After completing a sweep of the cave, bring the eight SSA’s into the High Voltage state (480 VAC turned on). Drop the PSS state from “Run” to “Open Access” using the key and verify that the 480 VAC has been disabled for each SSA. Note any problems in comment block.  If PSS fails test, contact PSS on-call personnel immediately.  **Note: If there is a cryomodule in the Cave with u-tubes stabbed, then ODH2 certification is required to participate in the PSS sweep.**  **\*\* RF must not be supplied to cavities until this test is completed successfully.\*\*** | [[ACTTech12]] <<USERNAME>>  [[PSSFunctionChkComp]] <<TIMESTAMP>>  [[PSSFunctionChkComm]] <<COMMENT>>  [[PSSFunctionChkPassed]] <<CHECKBOX>> |

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| **Step No** | **Instructions** | **Data Inputs** |
| 25 | Determine the **Maximum Gradient and Maximum Operating Gradient** (Emax and Emaxop) for each cavity.  After initial tuning of RF to the Cavity Under Test, measure the **Qext’s** of the **Fundamental Power Coupler, Field Probe and HOM couplers, A and B.** Configure Power meters for a high resolution wavefrom measurement. Save the FPC and field probe Qext’s. Log the waveform data from the power meters  Record the requested values and upload the waveform files in the table below. Use the comment block for any other important details. | [[C1QextMeasTech]] <<USERNAME>>  [[C1QextMeasComplete]] <<TIMESTAMP>>  [[C2QextMeasTech]] <<USERNAME>>  [[C2QextMeasComplete]] <<TIMESTAMP>>  [[C3QextMeasTech]] <<USERNAME>>  [[C3QextMeasComplete]] <<TIMESTAMP>>  [[C4QextMeasTech]] <<USERNAME>>  [[C4QextMeasComplete]] <<TIMESTAMP>>  [[C5QextMeasTech]] <<USERNAME>>  [[C5QextMeasComplete]] <<TIMESTAMP>>  [[C6QextMeasTech]] <<USERNAME>>  [[C6QextMeasComplete]] <<TIMESTAMP>>  [[C7QextMeasTech]] <<USERNAME>>  [[C7QextMeasComplete]] <<TIMESTAMP>>  [[C8QextMeasTech]] <<USERNAME>>  [[C8QextMeasComplete]] <<TIMESTAMP>> |

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| **Step No** | **Instructions** | | | | **Data Inputs** | | |
| 26 | **Qext Measurements:** Record or upload requested information each coupler on each cavity in the table below. | | | |  | | |
| **Cavity** | **QextFPC** | **QextFieldProbe** | **QextHOMA** | **QextHOMB** | | **Screenshots** | **Comments** |
| **1** | [[C1QextFPC]] <<SCINOT>> | [[C1QextFP]] <<SCINOT>> | [[C1QextHOMA]] <<SCINOT>> | [[C1QextHOMB]] <<SCINOT>> | | [[C1PulsedWaveforms]] <<FILEUPLOAD>> | [[C1QextComments]] <<COMMENT>> |
| **2** | [[C2QextFPC]] <<SCINOT>> | [[C2QextFP]] <<SCINOT>> | [[C2QextHOMA]] <<SCINOT>> | [[C2QextHOMB]] <<SCINOT>> | | [[C2PulsedWaveforms]] <<FILEUPLOAD>> | [[C2QextComments]] <<COMMENT>> |
| **3** | [[C3QextFPC]] <<SCINOT>> | [[C3QextFP]] <<SCINOT>> | [[C3QextHOMA]] <<SCINOT>> | [[C3QextHOMB]] <<SCINOT>> | | [[C3PulsedWaveforms]] <<FILEUPLOAD>> | [[C3QextComments]] <<COMMENT>> |
| **4** | [[C4QextFPC]] <<SCINOT>> | [[C4QextFP]] <<SCINOT>> | [[C4QextHOMA]] <<SCINOT>> | [[C4QextHOMB]] <<SCINOT>> | | [[C4PulsedWaveforms]] <<FILEUPLOAD>> | [[C4QextComments]] <<COMMENT>> |
| **5** | [[C5QextFPC]] <<SCINOT>> | [[C5QextFP]] <<SCINOT>> | [[C5QextHOMA]] <<SCINOT>> | [[C5QextHOMB]] <<SCINOT>> | | [[C5PulsedWaveforms]] <<FILEUPLOAD>> | [[C5QextComments]] <<COMMENT>> |
| **6** | [[C6QextFPC]] <<SCINOT>> | [[C6QextFP]] <<SCINOT>> | [[C6QextHOMA]] <<SCINOT>> | [[C6QextHOMB]] <<SCINOT>> | | [[C6PulsedWaveforms]] <<FILEUPLOAD>> | [[C6QextComments]] <<COMMENT>> |
| **7** | [[C7QextFPC]] <<SCINOT>> | [[C7QextFP]] <<SCINOT>> | [[C7QextHOMA]] <<SCINOT>> | [[C7QextHOMB]] <<SCINOT>> | | [[C7PulsedWaveforms]] <<FILEUPLOAD>> | [[C7QextComments]] <<COMMENT>> |
| **8** | [[C8QextFPC]] <<SCINOT>> | [[C8QextFP]] <<SCINOT>> | [[C8QextHOMA]] <<SCINOT>> | [[C8QextHOMB]] <<SCINOT>> | | [[C8PulsedWaveforms]] <<FILEUPLOAD>> | [[C8QextComments]] <<COMMENT>> |

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| **Step No** | **Instructions** | | | | **Data Inputs** | | |
| 27 | **Maximum Gradient Determination:** Record the Maximum Gradient (Emax) for each cavity and select a limiting condition. Use the File Upload to document any interesting conditions or behaviors encountered during this procedure  **If cavity reaches a gradient of 21 MV/m, invoke the Admin Limit.** | | | |  | | |
| **Cavity** | **Operator** | **Time of Completion** | **Emax (MV/m)** | **Limiting Condition** | | **File Upload** | **Comments** |
| **1** | [[C1EmaxTech]] <<USERNAME>> | [[C1EmaxComplete]] <<TIMESTAMP>> | [[C1Emax]] <<FLOAT>> | [[C1EmaxLimit]] {{ArcFault,IR Fault,Cavity quench,End Group Quench,BLVac Fault,Coupler Vac Fault,RF Power Limit,Heat Load Limit,Admin Limit (21 MV/m),Other}} <<SELECT>> | | [[C1EmaxFiles]] <<FILEUPLOAD>> | [[C1EmaxComments]] <<COMMENT>> |
| **2** | [[C2EmaxTech]] <<USERNAME>> | [[C2EmaxComplete]] <<TIMESTAMP>> | [[C2Emax]] <<FLOAT>> | [[C2EmaxLimit]] {{ArcFault,IR Fault,Cavity quench,End Group Quench,BLVac Fault,Coupler Vac Fault,RF Power Limit,Heat Load Limit,Admin Limit (21 MV/m),Other}} <<SELECT>> | | [[C2EmaxFiles]] <<FILEUPLOAD>> | [[C2EmaxComments]] <<COMMENT>> |
| **3** | [[C3EmaxTech]] <<USERNAME>> | [[C3EmaxComplete]] <<TIMESTAMP>> | [[C3Emax]] <<FLOAT>> | [[C3EmaxLimit]] {{ArcFault,IR Fault,Cavity quench,End Group Quench,BLVac Fault,Coupler Vac Fault,RF Power Limit,Heat Load Limit,Admin Limit (21 MV/m),Other}} <<SELECT>> | | [[C3EmaxFiles]] <<FILEUPLOAD>> | [[C3EmaxComments]] <<COMMENT>> |
| **4** | [[C4EmaxTech]] <<USERNAME>> | [[C4EmaxComplete]] <<TIMESTAMP>> | [[C4Emax]] <<FLOAT>> | [[C4EmaxLimit]] {{ArcFault,IR Fault,Cavity quench,End Group Quench,BLVac Fault,Coupler Vac Fault,RF Power Limit,Heat Load Limit,Admin Limit (21 MV/m),Other}} <<SELECT>> | | [[C4EmaxFiles]] <<FILEUPLOAD>> | [[C4EmaxComments]] <<COMMENT>> |
| **5** | [[C5EmaxTech]] <<USERNAME>> | [[C5EmaxComplete]] <<TIMESTAMP>> | [[C5Emax]] <<FLOAT>> | [[C5EmaxLimit]] {{ArcFault,IR Fault,Cavity quench,End Group Quench,BLVac Fault,Coupler Vac Fault,RF Power Limit,Heat Load Limit,Admin Limit (21 MV/m),Other}} <<SELECT>> | | [[C5EmaxFiles]] <<FILEUPLOAD>> | [[C5EmaxComments]] <<COMMENT>> |
| **6** | [[C6EmaxTech]] <<USERNAME>> | [[C6EmaxComplete]] <<TIMESTAMP>> | [[C6Emax]] <<FLOAT>> | [[C6EmaxLimit]] {{ArcFault,IR Fault,Cavity quench,End Group Quench,BLVac Fault,Coupler Vac Fault,RF Power Limit,Heat Load Limit,Admin Limit (21 MV/m),Other}} <<SELECT>> | | [[C6EmaxFiles]] <<FILEUPLOAD>> | [[C6EmaxComments]] <<COMMENT>> |
| **7** | [[C7EmaxTech]] <<USERNAME>> | [[C7EmaxComplete]] <<TIMESTAMP>> | [[C7Emax]] <<FLOAT>> | [[C7EmaxLimit]] {{ArcFault,IR Fault,Cavity quench,End Group Quench,BLVac Fault,Coupler Vac Fault,RF Power Limit,Heat Load Limit,Admin Limit (21 MV/m),Other}} <<SELECT>> | | [[C7EmaxFiles]] <<FILEUPLOAD>> | [[C7EmaxComments]] <<COMMENT>> |
| **8** | [[C8EmaxTech]] <<USERNAME>> | [[C8EmaxComplete]] <<TIMESTAMP>> | [[C8Emax]] <<FLOAT>> | [[C8EmaxLimit]] {{ArcFault,IR Fault,Cavity quench,End Group Quench,BLVac Fault,Coupler Vac Fault,RF Power Limit,Heat Load Limit,Admin Limit (21 MV/m),Other}} <<SELECT>> | | [[C8EmaxFiles]] <<FILEUPLOAD>> | [[C8EmaxComments]] <<COMMENT>> |

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| **Step No** | **Instructions** | | | **Data Inputs** | | |
| 28 | **Maximum Operating Gradient Determination** **(1 Hour Run):** After completing each 1 Hour Run, record the requested information in the table below. Copy data from logfiles to a template that will be provided. and process as necessary. Upload the completed spreadsheet.  **Generate an NCR for any cavity with an Emaxp of less than 16.0 MV/m an NCR.** | | |  | | |
| **Cavity** | **Operator** | **Time Completed** | **Emaxop**  **(MV/m)** | | **File Upload** | **Comments** |
| **1** | [[C1EmaxopTech]] <<USERNAME>> | [[C1EmaxopComplete]] <<TIMESTAMP>> | [[C1Emaxop]] <<FLOAT>> | | [[C1EmaxopFile]] <<FILEUPLOAD>> | [[C1EmaxopComments]] <<COMMENT>> |
| **2** | [[C2EmaxopTech]] <<USERNAME>> | [[C2EmaxopComplete]] <<TIMESTAMP>> | [[C2Emaxop]] <<FLOAT>> | | [[C2EmaxopFile]] <<FILEUPLOAD>> | [[C2EmaxopComments]] <<COMMENT>> |
| **3** | [[C3EmaxopTech]] <<USERNAME>> | [[C3EmaxopComplete]] <<TIMESTAMP>> | [[C3Emaxop]] <<FLOAT>> | | [[C3EmaxopFile]] <<FILEUPLOAD>> | [[C3EmaxopComments]] <<COMMENT>> |
| **4** | [[C4EmaxopTech]] <<USERNAME>> | [[C4EmaxopComplete]] <<TIMESTAMP>> | [[C4Emaxop]] <<FLOAT>> | | [[C4EmaxopFile]] <<FILEUPLOAD>> | [[C4EmaxopComments]] <<COMMENT>> |
| **5** | [[C5EmaxopTech]] <<USERNAME>> | [[C5EmaxopComplete]] <<TIMESTAMP>> | [[C5Emaxop]] <<FLOAT>> | | [[C5EmaxopFile]] <<FILEUPLOAD>> | [[C5EmaxopComments]] <<COMMENT>> |
| **6** | [[C6EmaxopTech]] <<USERNAME>> | [[C6EmaxopComplete]] <<TIMESTAMP>> | [[C6Emaxop]] <<FLOAT>> | | [[C6EmaxopFile]] <<FILEUPLOAD>> | [[C6EmaxopComments]] <<COMMENT>> |
| **7** | [[C7EmaxopTech]] <<USERNAME>> | [[C7EmaxopComplete]] <<TIMESTAMP>> | [[C7Emaxop]] <<FLOAT>> | | [[C7EmaxopFile]] <<FILEUPLOAD>> | [[C7EmaxopComments]] <<COMMENT>> |
| **8** | [[C8EmaxopTech]] <<USERNAME>> | [[C8EmaxopComplete]] <<TIMESTAMP>> | [[C8Emaxop]] <<FLOAT>> | | [[C8EmaxopFile]] <<FILEUPLOAD>> | [[C8EmaxopComments]] <<COMMENT>> |

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| **Step No** | **Instructions** | | | | **Data Inputs** | | |
| 29 | **Maximum Operating Gradient Determination** **(Extended Run):** If time allows, continue to operate cavity at Emaxop until FPC temperatures stabilize. Record the requested information in the table below. Record the maximum temperature indicated by either of the two RTD’s, **TE-CA-1x12** or **TE-CB 1x13**. Copy data from logfiles to a template that will be provided. and process as necessary. Upload the completed spreadsheet. | | | |  | | |
| **Cavity** | **Operator** | **Timestamp** | **Length of Run (Hrs)** | **Max Cplr Temp (K)** | | **File Upload** | **Comments** |
| **1** | [[C1ExtRunTech]] <<USERNAME>> | [[C1ExtRunComplete]] <<TIMESTAMP>> | [[C1ExtRunTime]] <<FLOAT>> | [[C1CplrTemp]] <<FLOAT>> | | [[C1ExtRunFile]] <<FILEUPLOAD>> | [[C1ExtRunComments]] <<COMMENT>> |
| **2** | [[C2ExtRunTech]] <<USERNAME>> | [[C2ExtRunComplete]] <<TIMESTAMP>> | [[C2ExtRunTime]] <<FLOAT>> | [[C2CplrTemp]] <<FLOAT>> | | [[C2ExtRunFile]] <<FILEUPLOAD>> | [[C2ExtRunComments]] <<COMMENT>> |
| **3** | [[C3ExtRunTech]] <<USERNAME>> | [[C3ExtRunComplete]] <<TIMESTAMP>> | [[C3ExtRunTime]] <<FLOAT>> | [[C3CplrTemp]] <<FLOAT>> | | [[C3ExtRunFile]] <<FILEUPLOAD>> | [[C3ExtRunComments]] <<COMMENT>> |
| **4** | [[C4ExtRunTech]] <<USERNAME>> | [[C4ExtRunComplete]] <<TIMESTAMP>> | [[C4ExtRunTime]] <<FLOAT>> | [[C4CplrTemp]] <<FLOAT>> | | [[C4ExtRunFile]] <<FILEUPLOAD>> | [[C4ExtRunComments]] <<COMMENT>> |
| **5** | [[C5ExtRunTech]] <<USERNAME>> | [[C5ExtRunComplete]] <<TIMESTAMP>> | [[C5ExtRunTime]] <<FLOAT>> | [[C5CplrTemp]] <<FLOAT>> | | [[C5ExtRunFile]] <<FILEUPLOAD>> | [[C5ExtRunComments]] <<COMMENT>> |
| **6** | [[C6ExtRunTech]] <<USERNAME>> | [[C6ExtRunComplete]] <<TIMESTAMP>> | [[C6ExtRunTime]] <<FLOAT>> | [[C6CplrTemp]] <<FLOAT>> | | [[C6ExtRunFile]] <<FILEUPLOAD>> | [[C6ExtRunComments]] <<COMMENT>> |
| **7** | [[C7ExtRunTech]] <<USERNAME>> | [[C7ExtRunComplete]] <<TIMESTAMP>> | [[C7ExtRunTime]] <<FLOAT>> | [[C7CplrTemp]] <<FLOAT>> | | [[C7ExtRunFile]] <<FILEUPLOAD>> | [[C7ExtRunComments]] <<COMMENT>> |
| **8** | [[C8ExtRunTech]] <<USERNAME>> | [[C8ExtRunComplete]] <<TIMESTAMP>> | [[C8ExtRunTime]] <<FLOAT>> | [[C8CplrTemp]] <<FLOAT>> | | [[C8ExtRunFile]] <<FILEUPLOAD>> | [[C8ExtRunComments]] <<COMMENT>> |

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| **Step No** | **Instructions** | | | **Data Inputs** | | |
| 30 | Complete the **Field Emission vs. Gradient Measurement.** Use the Field Emission vi to control the gradient and record field emission data. Record the requested information in the table below. Copy data from the logfiles into the [**Field Emission Spreadsheet Template**](https://jlabdoc.jlab.org/docushare/dsweb/Get/Document-137557/field_emission_LCLS%20II%20pCM_x.xlsx)**.** Process as necessary and upload below.  **Generate an NCR for any cavity with a Field Emission Onset < 14.0 MV/m.** | | |  | | |
| **Cavity** | **Operator** | **Time Completed** | **Field Emission Onset**  **(MV/m)** | | **File Upload** | **Comments** |
| **1** | [[C1FETech]] <<USERNAME>> | [[C1FEComplete]] <<TIMESTAMP>> | [[C1FEOnset]] <<FLOAT>> | | [[C1FEFile]] <<FILEUPLOAD>> | [[C1FEComments]] <<COMMENT>> |
| **2** | [[C2FETech]] <<USERNAME>> | [[C2FEComplete]] <<TIMESTAMP>> | [[C2FEOnset]] <<FLOAT>> | | [[C2FEFile]] <<FILEUPLOAD>> | [[C2FEComments]] <<COMMENT>> |
| **3** | [[C3FETech]] <<USERNAME>> | [[C3FEComplete]] <<TIMESTAMP>> | [[C3FEOnset]] <<FLOAT>> | | [[C3FEFile]] <<FILEUPLOAD>> | [[C3FEComments]] <<COMMENT>> |
| **4** | [[C4FETech]] <<USERNAME>> | [[C4FEComplete]] <<TIMESTAMP>> | [[C4FEOnset]] <<FLOAT>> | | [[C4FEFile]] <<FILEUPLOAD>> | [[C4FEComments]] <<COMMENT>> |
| **5** | [[C5FETech]] <<USERNAME>> | [[C5FEComplete]] <<TIMESTAMP>> | [[C5FEOnset]] <<FLOAT>> | | [[C5FEFile]] <<FILEUPLOAD>> | [[C5FEComments]] <<COMMENT>> |
| **6** | [[C6FETech]] <<USERNAME>> | [[C6FEComplete]] <<TIMESTAMP>> | [[C6FEOnset]] <<FLOAT>> | | [[C6FEFile]] <<FILEUPLOAD>> | [[C6FEComments]] <<COMMENT>> |
| **7** | [[C7FEOTech]] <<USERNAME>> | [[C7FEComplete]] <<TIMESTAMP>> | [[C7FEOnset]] <<FLOAT>> | | [[C7FEFile]] <<FILEUPLOAD>> | [[C7FEComments]] <<COMMENT>> |
| **8** | [[C8FETech]] <<USERNAME>> | [[C8FEComplete]] <<TIMESTAMP>> | [[C8FEOnset]] <<FLOAT>> | | [[C8FEFile]] <<FILEUPLOAD>> | [[C8FEComments]] <<COMMENT>> |

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| **Step No** | **Instructions** | | | | **Data Inputs** | | |
| 31 | Complete the **Qo measurement sequence** for each cavity  In the table below, record the value of Qo at 6.0 MV/m, 16.0 MV/m and at Emaxop. Record the dynamic heat load at Emaxop.  **Generate an NCR for any cavity with a Qo (@ 2.0K) of < 2.5x1010** | | | |  | | |
| **Cavity** | **Operator** | **Time Completed** | **Cooldown Rate** | **Qo @ 16.0 MV/m** | | **Qo @ Emaxop** | **RF Heat Load @ Emaxop (W)** |
| **1** | [[C1QoTech]] <<USERNAME>> | [[C1QoComplete]] <<TIMESTAMP>> | [[C1Cooldown]] <<FLOAT>> grams/sec | [[C1QoAtSixteen]] <<SCINOT>> | | [[C1QoAtEmaxop]] <<SCINOT>> | [[C1RFHeatLoad]] <<FLOAT>> |
| **2** | [[C2QoTech]] <<USERNAME>> | [[C2QoComplete]] <<TIMESTAMP>> | [[C2Cooldown]] <<FLOAT>> grams/sec | [[C2QoAtSixteen]] <<SCINOT>> | | [[C2QoAtEmaxop]] <<SCINOT>> | [[C2RFHeatLoad]] <<FLOAT>> |
| **3** | [[C3QoTech]] <<USERNAME>> | [[C3QoComplete]] <<TIMESTAMP>> | [[C3Cooldown]] <<FLOAT>> grams/sec | [[C3QoAtSixteen]] <<SCINOT>> | | [[C3QoAtEmaxop]] <<SCINOT>> | [[C3RFHeatLoad]] <<FLOAT>> |
| **4** | [[C4QoOTech]] <<USERNAME>> | [[C4QoComplete]] <<TIMESTAMP>> | [[C4Cooldown]] <<FLOAT>> grams/sec | [[C4QoAtSixteen]] <<SCINOT>> | | [[C4QoAtEmaxop]] <<SCINOT>> | [[C4RFHeatLoad]] <<FLOAT>> |
| **5** | [[C5QoOTech]] <<USERNAME>> | [[C5QoComplete]] <<TIMESTAMP>> | [[C5Cooldown]] <<FLOAT>> grams/sec | [[C5QoAtSixteen]] <<SCINOT>> | | [[C5QoAtEmaxop]] <<SCINOT>> | [[C5RFHeatLoad]] <<FLOAT>> |
| **6** | [[C6QoOTech]] <<USERNAME>> | [[C6QoComplete]] <<TIMESTAMP>> | [[C6Cooldown]] <<FLOAT>> grams/sec | [[C6QoAtSixteen]] <<SCINOT>> | | [[C6QoAtEmaxop]] <<SCINOT>> | [[C6RFHeatLoad]] <<FLOAT>> |
| **7** | [[C7QoOTech]] <<USERNAME>> | [[C7QoComplete]] <<TIMESTAMP>> | [[C7Cooldown]] <<FLOAT>> grams/sec | [[C7QoAtSixteen]] <<SCINOT>> | | [[C7QoAtEmaxop]] <<SCINOT>> | [[C7RFHeatLoad]] <<FLOAT>> |
| **8** | [[C8QoTech]] <<USERNAME>> | [[C8QoComplete]] <<TIMESTAMP>> | [[C8Cooldown]] <<FLOAT>> grams/sec | [[C8QoAtSixteen]] <<SCINOT>> | | [[C8QoAtEmaxop]] <<SCINOT>> | [[C8RFHeatLoad]] <<FLOAT>> |
|  | Total RF Heat Load with all Cavities Running at Emaxop:  [[Sum C1RFHeatLoad through C8RFHeatLoad and Enter Result in CMRFHeatLoad]] <<NOTE>> | | | | [[CMRFHeatLoad]] <<FLOAT>> | | |

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| **Step No** | **Instructions** | | **Data Inputs** | |
| 32 | **Qo Measurements:** Record the highest gradient (MV/m) at which the cavity still meets the specification for dynamic heat load to the primary circuit: **(≤ 11.5 Watts)**.  Copy data from logfile into [Qo Measurement Spreadsheet Template](https://jlabdoc.jlab.org/docushare/dsweb/Get/Document-137558/Qo_Results_pCM-x.xlsx). Process as necessary and upload the completed file.  Use the comment box to note any problems, etc. | |  | |
| **Cavity** | **Maximum Gradient for Heat Specification (MV/m)** | **File Upload** | | **Comments** |
| **1** | [[C1EmaxHeatSpec]] <<FLOAT>> | [[C1QoFile]] <<FILEUPLOAD>> | | [[C1QoComments]] <<COMMENT>> |
| **2** | [[C2EmaxHeatSpec]] <<FLOAT>> | [[C2QoFile]] <<FILEUPLOAD>> | | [[C2QoComments]] <<COMMENT>> |
| **3** | [[C3EmaxHeatSpec]] <<FLOAT>> | [[C3QoFile]] <<FILEUPLOAD>> | | [[C3QoComments]] <<COMMENT>> |
| **4** | [[C4EmaxHeatSpec]] <<FLOAT>> | [[C4QoFile]] <<FILEUPLOAD>> | | [[C4QoComments]] <<COMMENT>> |
| **5** | [[C5EmaxHeatSpec]] <<FLOAT>> | [[C5QoFile]] <<FILEUPLOAD>> | | [[C5QoComments]] <<COMMENT>> |
| **6** | [[C6EmaxHeatSpec]] <<FLOAT>> | [[C6QoFile]] <<FILEUPLOAD>> | | [[C6QoComments]] <<COMMENT>> |
| **7** | [[C7EmaxHeatSpec]] <<FLOAT>> | [[C7QoFile]] <<FILEUPLOAD>> | | [[C7QoComments]] <<COMMENT>> |
| **8** | [[C8EmaxHeatSpec]] <<FLOAT>> | [[C8QoFile]] <<FILEUPLOAD>> | | [[C8QoComments]] <<COMMENT>> |
| 33 | Record the **Average Static Heat Load** (in Watts) to the primary (2K) helium circuit. The average heat load is calculated across all of the measurents made during the Qo measurement procedure. Upload the data in a spreadsheet file. Enter any requested information to the right.  **Specification: 7 Watts Nominal** | | [[ACTTech13]] <<USERNAME>>  [[StaticHeatLoadCalcComp]] <<TIMESTAMP>>  [[StaticHeatLoadComments]] <<COMMENT>>  [[StaticHeatLoad]] <<FLOAT>> (W)  [[StaticHeatLoadFile]] <<FILEUPLOAD>> | |

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| **Step No** | **Instructions** | | | **Data Inputs** | | |
| 34 | Complete the **Pressure Sensitivity Measurement** for all cavities. This can be completed in parallel with Qo measurements. Record the requested data in the table below. | | |  | | |
| **Cavity** | **Operator** | **Time Completed** | **Pressure Sensitivity**  **(Hz / torr)** | | **File Upload** | **Comments** |
| **1** | [[C1PresSensTech]] <<USERNAME>> | [[C1PresSensComplete]] <<TIMESTAMP>> | [[C1PresSens]] <<FLOAT>> | | [[C1PresSensFile]] <<FILEUPLOAD>> | [[C1PresSensComments]] <<COMMENT>> |
| **2** | [[C2PresSensTech]] <<USERNAME>> | [[C2PresSensComplete]] <<TIMESTAMP>> | [[C2PresSens]] <<FLOAT>> | | [[C2PresSensFile]] <<FILEUPLOAD>> | [[C2PresSensComments]] <<COMMENT>> |
| **3** | [[C3PresSensTech]] <<USERNAME>> | [[C3PresSensComplete]] <<TIMESTAMP>> | [[C3PresSens]] <<FLOAT>> | | [[C3PresSensFile]] <<FILEUPLOAD>> | [[C3PresSensComments]] <<COMMENT>> |
| **4** | [[C4PresSensTech]] <<USERNAME>> | [[C4PresSensComplete]] <<TIMESTAMP>> | [[C4PresSens]] <<FLOAT>> | | [[C4PresSensFile]] <<FILEUPLOAD>> | [[C4PresSensComments]] <<COMMENT>> |
| **5** | [[C5PresSensTech]] <<USERNAME>> | [[C5PresSensComplete]] <<TIMESTAMP>> | [[C5PresSens]] <<FLOAT>> | | [[C5PresSensFile]] <<FILEUPLOAD>> | [[C5PresSensComments]] <<COMMENT>> |
| **6** | [[C6PresSensTech]] <<USERNAME>> | [[C6PresSensComplete]] <<TIMESTAMP>> | [[C6PresSens]] <<FLOAT>> | | [[C6PresSensFile]] <<FILEUPLOAD>> | [[C6PresSensComments]] <<COMMENT>> |
| **7** | [[C7PresSensTech]] <<USERNAME>> | [[C7PresSensComplete]] <<TIMESTAMP>> | [[C7PresSens]] <<FLOAT>> | | [[C7PresSensFile]] <<FILEUPLOAD>> | [[C7PresSensComments]] <<COMMENT>> |
| **8** | [[C8PresSensTech]] <<USERNAME>> | [[C8PresSensComplete]] <<TIMESTAMP>> | [[C8PresSens]] <<FLOAT>> | | [[C8PresSensFile]] <<FILEUPLOAD>> | [[C8PresSensComments]] <<COMMENT>> |

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| **Step No** | **Instructions** | **Data Inputs** |
| 35 | Measure the **Shield (45 K circuit) Static Heat Load**. Complete at least 1 week after pump down to 2K is completed.  Enter the Static Heat Load (in Watts) in the appropriate box.  **Nominal Heat Load = 123 Watts** | [[StaticShldHeatLoadUser]] <<USERNAME>>  [[StaticShldHeatLoadComp]] <<TIMESTAMP>>  [[StaticShldHeatLoadComm]] <<COMMENT>>  [[StaticShldHeatLoad]] <<FLOAT>>  [[StaticShldHeatLoadFile]] <<FILEUPLOAD>> |
| 36 | Verify heaters are working | [[Heater1]] <<CHECKBOX>>  [[Heater2]] <<CHECKBOX>>  [[Heater3]] <<CHECKBOX>>  [[Heater4]] <<CHECKBOX>>  [[Heater5]] <<CHECKBOX>>  [[Heater6]] <<CHECKBOX>>  [[Heater7]] <<CHECKBOX>>  [[Heater8]] <<CHECKBOX>> |
| 36b | Do all sensors work? If No, then notate those that do not work. | [[SensorsWork]] <<CHECKBOX>> YES  [[Sensor1]] <<COMMENT>>  [[Sensor2]] <<COMMENT>>  [[Sensor3]] <<COMMENT>>  [[Sensor4]] <<COMMENT>>  [[Sensor5]] <<COMMENT>>  [[Sensor6]] <<COMMENT>>  [[Sensor7]] <<COMMENT>>  [[Sensor8]] <<COMMENT>>  [[Sensor9]] <<COMMENT>>  [[Sensor10]] <<COMMENT>> |

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| **Step No** | **Instructions** | **Data Inputs** |
|  | **Cryomodule Warm Up** |  |
| 37 | Record the **beamline vacuum**, all **coupler vacuums,** and the **insulating vacuum** (in torr) prior to beginning warm up. Note any problems in comment block | [[ActTECH14]] <<USERNAME>>  [[FinalVacCheckComplete]] <<TIMESTAMP>>  [[FinalVacCheckComments]] <<COMMENT>>  [[FinalInsVac]] <<SCINOT>> (torr)  [[FinalBeamLineVac]] <<SCINOT>> (torr)  [[FinalCplrVac]] <<SCINOT>> (torr) |
| 38 | Detune all cavities using the mechanical tuners. Detune to approximate initial untuned frequencies. Check off each cavity that has been detuned. Enter requested information. | [[ActTECH15]] <<USERNAME>>  [[DetuneComplete]] <<TIMESTAMP>>  [[DetuneComments]] <<COMMENT>>  [[C1Detuned]] <<CHECKBOX>>  [[C2Detuned]] <<CHECKBOX>>  [[C3Detuned]] <<CHECKBOX>>  [[C4Detuned]] <<CHECKBOX>>  [[C5Detuned]] <<CHECKBOX>>  [[C6Detuned]] <<CHECKBOX>>  [[C7Detuned]] <<CHECKBOX>>  [[C8Detuned]] <<CHECKBOX>> |

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| **Step No** | **Instructions** | **Data Inputs** |
| 39 | Begin the cryomodule warm up procedure. Record thestart time for the warm up to the right. | [[ACTTech16]] <<USERNAME>>  [[WarmStartTime]] <<TIMESTAMP>>  [[WarmUpComments]] <<COMMENT>> |
| 40 | Complete the U-tube removal procedure. | [[ACTTech17]] <<USERNAME>>  [[UTubeRemovalComplete]] <<TIMESTAMP>>  [[UTubeRemovalComments]] <<COMMENT>> |
| 41 | Upload the logfiles containing data on the cryomodule warm up. | [[CMWarmUpFiles]] <<FILEUPLOAD>> |
| 42 | Record the time of completion of the cryomodule removal procedure | [[ACTTech18]] <<USERNAME>>  [[CMRemovalComplete]] <<TIMESTAMP>>  [[CMRemovalComments]] <<COMMENT>> |
| 43 | Record any additional information and notes from cryomodule testing. | [[ReportTech]] <<USERNAME>>  [[ReportDate]] <<TIMESTAMP>>  [[ReportFiles]] <<FILEUPLOAD>>  [[ReportComments]] <<COMMENT>> |