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| Traveler Title | C20 Cryounit Disassembly |
| Traveler Abstract | This Traveler outlines the steps necessary to disassemble a C20 Cryounit, including removing the Waveguides, Helium Vessel, and Cavity Pair. Work within this Traveler is to be performed by trained and authorized Assembly Technicians ONLY. All Cryomodule materials shall be kept inside the established RADCON barrier until they have been surveyed and released. **\*\* Radiation surveys shall be performed and information recorded at traveler hold points.\*\******\*\* Radiological controls are a critical component of the cryomodule rework disassembly and assembly process. Dose rate, as well as contamination surveys (where indium gaskets or seals are present) shall be performed and analyzed, with information communicated to all involved personnel. Results will be recorded at traveler hold points. RW-II training will be required where contamination is identified\*\**** |
| Traveler ID | ER5C-CMA-CU-DISA-C20 |
| Traveler Revision  | R2 |
| Traveler Author | John Fischer |
| Traveler Date | 11-Jun-24 |
| NCR Informative Emails | areilly |
| NCR Dispositioners | areilly,fischer,weaksmc |
| D3 Emails | areilly,fischer |
| Approval Names | John Fischer | Jeff Campbell | John Fischer | Tony Reilly |
| Approval Signatures |  |  |  |  |
| Approval Dates |  |  |  |  |
| Approval Title | Author | Reviewer | CMA Group Lead | Project Representative |

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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.**All materials linked below and throughout this traveler are for reference only and should be verified for latest version at time of use.** |
| [Cryounit Helium Vessel dwg](https://jlabdoc.jlab.org/docushare/dsweb/Get/Document-71970/CU-HVESSEL.pdf) | [Cryounit HV MLI dwg](https://jlabdoc.jlab.org/docushare/dsweb/Get/Document-71969/CU-HV%20MLI.pdf) | [Cryounit Nitronic Rod Seat MLI dwg](https://jlabdoc.jlab.org/docushare/dsweb/Get/Document-71971/CU-ROD%20SEAT%20MLI.pdf) | [Cryounit Tuner Assy dwg](https://jlabdoc.jlab.org/docushare/dsweb/Get/Document-71972/CU-TUNER%20ASSY.pdf) | [Cryounit VV End View dwg](https://jlabdoc.jlab.org/docushare/dsweb/Get/Document-71973/CU-VV%20END%20VIEW.pdf) |
| [Cryounit Waveguide Front View dwg](https://jlabdoc.jlab.org/docushare/dsweb/Get/Document-71974/CU-WG%20FRONT-SIDE.pdf) | [Cryounit Waveguide Top View dwg](https://jlabdoc.jlab.org/docushare/dsweb/Get/Document-71975/CU-WG%20TOP%20VIEW.pdf) | [RADCON Control Document](https://jlabdoc.jlab.org/docushare/dsweb/Get/Document-143637/C50_Radcon%20RAM%20Control%20Doc%20JF2017.docx) | [RADCON Briefing Slides](https://jlabdoc.jlab.org/docushare/dsweb/Get/Document-143638/C50_reworkbrief.pptx) | [C20-C50 Indium Joint Locations](https://jlabdoc.jlab.org/docushare/dsweb/Get/Document-205790/C20-C50%20Indium%20Joint%20Locations.pptx) |
| [Wach's Cutter Noise Survey Ex.](https://jlabdoc.jlab.org/docushare/dsweb/Get/Document-205782/Noise%20Survey%20%E2%80%93%20Cryomodule%20Assembly%20High%20Bay%2C%20Test%20Lab%20Bldg%2058-Sept%2025%2C%202014%20End%20Can%20Cutting%20Cone%20Placement%20Hearing%20Protection%20Required%202-1.doc) |  |  |  |  |

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| Revision Note |  |
| R1 | Initial release of this Traveler. Taken from C75-CU-DISA-R2 |
| R2 | Removed serial number column, modified step 8- “Discard removed 8 pin feedthrus”, and changed Doc approvers to match WCD Register |

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| Step No. | Instructions | Data Input |
| 1 | Disassemble CEBAF style cryounits. | [[CUSN]] <<CUSN>> |
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| **Part** | **Original Serial No** | **Part RAM?** |
| Tophat | [[THTSSN]] <<SN>> | [[THTSSN\_RAM]] <<CHECKBOX>> |
| Manifold Assembly | [[MANFSN]] <<SN>> | [[MANFSN\_RAM]] <<CHECKBOX>> |
| Feed Thru Plate | [[INFFSN]] <<SN>> | [[INFFSN\_RAM]] <<CHECKBOX>> |
| Warm Window Assy Left | [[LeftWINSN]] <<SN>> | [[LeftWINSN\_RAM]] <<CHECKBOX>> |
| Warm Window Assy Right | [[RightWINSN]] <<SN>> | [[RightWINSN\_RAM]] <<CHECKBOX>> |
| Waveguide Extension Left | [[LeftWGDXSN]] <<SN>> | [[LeftWGDXSN\_RAM]] <<CHECKBOX>> |
| Waveguide Extension Right | [[RightWGDXSN]] <<SN>> | [[RightWGDXSN\_RAM]] <<CHECKBOX>> |
| Warm Window Left | [[LeftWINWSN]] <<SN>> | [[LeftWINWSN\_RAM]] <<CHECKBOX>> |
| Warm Window Right | [[RightWINWSN]] <<SN>> | [[RightWINWSN\_RAM]] <<CHECKBOX>> |
| Vacuum Vessel | [[VVSN]] <<SN>> | [[VVSN\_RAM]] <<CHECKBOX>> |
| Helium Vessel | [[HELVSN]] <<SN>> | [[HELVSN\_RAM]] <<CHECKBOX>> |
| Tuner Left | [[LeftTUNCSN]] <<SN>> | [[LeftTUNCSN\_RAM]] <<CHECKBOX>> |
| Tuner Right | [[RightTUNCSN]] <<SN>> | [[RightTUNCSN\_RAM]] <<CHECKBOX>> |
| Cavity Left | [[LeftCAVSN]] <<CAVSN>> | [[LeftCAVSN\_RAM]] <<CHECKBOX>> |
| Cavity Right | [[RightCAVSN]] <<CAVSN>> | [[RightCAVSN\_RAM]] <<CHECKBOX>> |
| Liquid Level Probe | [[LiquidLevelProbe]] <<YESNO>> | [[LLP\_RAM]] <<CHECKBOX>> |

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| 3 | Verify the Cryomodule Disassembly Traveler is complete. \*\* **LABEL ALL PARTS, AND RECORD SERIAL NUMBERS AS THEY ARE REMOVED.\*\*****\*\*\*\*ALL CRYOMODULE COMPONENTS ARE TO BE SURVEYED BY RADCON\*\*\*\*** | [[Date3]] <<TIMESTAMP>>[[Technician3]] <<SRF>>[[CM\_DISA\_TravelerID]] <<SN>> |

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| Step No | Instructions | Data Input |
| 4 | **Radcon survey of cryounit prior to start of work. This step is to identify RAM that is being uncovered as the disassembly progresses. Items are to be tagged by Radcon as required. Add notes in comment box provided describing RAM.** | [[Date4]] <<TIMESTAMP>>[[Technician4]] <<SRF>>[[Comment4]] <<COMMENT>> |
| 5 | **Waveguide Disassembly:** |  |
|
| 1. Remove the manifold assembly. \***Protect the burst disc**\*
 | [[RemoveManifold]] <<CHECKBOX>> |
| 1. Remove the tophat, Mu metal, MLI, and G-10 spacers.
 | [[RemoveTophat]] <<CHECKBOX>> |
| 1. Carefully un-insulate the waveguide assembly, preserving the MLI for re-use.
 | [[RemoveMLI]] <<CHECKBOX>> |
| 1. Remove the wiring harness, feedthrus, and diodes pertaining to the waveguide only.
 | [[RemoveInstrumentation]] <<CHECKBOX>> |
| 1. Support the waveguide, protecting the bellows.
 | [[SupprtWaveguide]] <<CHECKBOX>> |
| 1. Disconnect the G-10 drive assemblies using the spring pin extraction tool. (x2)
 | [[FreeDriveAssy]] <<CHECKBOX>> |
| 1. Carefully remove the coaxial cables.\*DO NOT BEND\*
 | [[RemoveCoaxials]] <<CHECKBOX>> |
| 1. Remove the shield to waveguide extension intercept straps.
 | [[Remove50kIntercepts]] <<CHECKBOX>> |
| 1. Remove the waveguide assembly and place in stand.
 | [[RemoveWaveguide]] <<CHECKBOX>> |
| 1. Record all necessary component serial numbers.
 | [[RecordSNs]] <<CHECKBOX>> |
| 1. RADCON survey parts and identify RAM items
 | [[RAMTech]] <<SRF>> [[Comment11]] <<COMMENT>> |
| NOTES:\*\*Cover all openings with foil \*\*Store all components in a safe place\*\* | [[CoverOpenings]] <<CHECKBOX>> |
| Note summary of findings. | [[Technician5B]] <<SRF>> [[Comment5]] <<COMMENT>> |

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| Step No | Instructions | Data Input |
| 6 | **Radcon survey of cryounit prior to next phase of work. This step is to identify RAM that is being uncovered as the disassembly progresses. Items are to be tagged by Radcon as required. Add notes in comment box provided describing RAM.** | [[Date6]] <<TIMESTAMP>>[[Technician6]] <<SRF>>[[Comment6]] <<COMMENT>> |
| 7 | **Remove Helium Vessel:** |  |
| Remove MLI from the nitronic rod seats.  | [[RemoveMLI2]] <<CHECKBOX>> |
| Remove nitronic rod thermal stationing clamps and G-10 sleeves.(Do not bend strapping excessively it may break)  | [[Remove50kStraps]] <<CHECKBOX>> |
| Remove the axial restraint rods  | [[RemoveAxialRods]] <<CHECKBOX>> |
| Remove the lower nitronic rods on both ends.(The weight of the helium vessel is now supported on the top nitronic rods only.)  | [[RemoveLowerRods]] <<CHECKBOX>> |
| Install the helium vessel support tooling and secure. Install rail locks.  | [[InstallTooling]] <<CHECKBOX>> |
| Remove the remaining nitronic rods (upper) and monitor load transfer to ensure gradual solid contact with support tooling.  | [[RemoveUpperRods]] <<CHECKBOX>> |
| Roll the vacuum vessel back, separating it from the helium vessel.  | [[RemoveVV]] <<CHECKBOX>> |
| Remove the helium vessel MLI and Mu metal.  | [[RemoveMLIandMu]] <<CHECKBOX>> |
| Remove the MLI on the helium vessel ends.  | [[RemoveHVMLI]] <<CHECKBOX>> |
| Transfer the helium vessel load to the scissors table.  | [[TransferHV]] <<CHECKBOX>> |
| Remove vacuum vessel & tooling.  | [[RemoveTooling]] <<CHECKBOX>> |
| RADCON to survey removed items and designate RAM. Note summary of findings. | [[RADTech7]] <<SRF>>[[Comment7]] <<COMMENT>> |

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| Step No | Instructions | Data Input |
| 8 | **Remove Cavity Pair:** | [[Date8]] <<TIMESTAMP>>[[Technician8]] <<SRF>> |
| Remove beam line cold valves  | [[RemoveColdValves]] <<CHECKBOX>> |
| Setup the helium vessel into the cutting fixture.  | [[HVinCuttingFixture]] <<CHECKBOX>> |
| Grind the end dish welds on both ends.  | [[GrindEndDishes]] <<CHECKBOX>> |
| Using the Wach’s cutter, cut the welds at the helium vessel head to shell interface | [[WachsCuttingComplete]] <<CHECKBOX>> |
| \*\***NOTE**: Beware of sharp edges and liquid level probes.\*\* |  |
| Tape or deburr all sharp edges.  | [[DeburrEdges]] <<CHECKBOX>> |
| Transfer the helium vessel to the scissors table.  | [[HVtoScissorsTable]] <<CHECKBOX>> |
| Disconnect the drive assemblies, helium vessel feedthrus, and instrumentation. **\*\*8 pin Cryogenic feedthrus should be discarded and not reused. New qualified versions will be used when re-assembly occurs.\*\*** | [[RemoveInstrumentation2]] <<CHECKBOX>> |
| Remove the coaxial cables, \*Do not bend\*  | [[RemoveCoaxialCables]] <<CHECKBOX>> |
| Install the cavity pair assembly fixture and transfer rails into the helium vessel, Ensure proper orientation of all pillow blocks.  | [[InstallCavityFixture]] <<CHECKBOX>> |
| Raise the assembly fixture, tighten the thumb screws, grabbing the cavity.  | [[RaiseFixture]] <<CHECKBOX>> |
| Remove the four cavity hangers and hardware from the helium vessel feedthru plate.\*\*May be necessary to use the jacking screws to break the indium seal at the fpc to helium vessel joint.\*\* **CALL RADCON TO SURVEY AND SAMPLE THE HELIUM VESSEL TO DOGLEG INDIUM JOINT AREA** | [[RemoveTiHangers]] <<CHECKBOX>>[[RADSurvey4]] <<RAD>>[[RADCONComment]] <<COMMENT>> |
| Slowly lower the cavity pair assembly fixture, watch for interferences.  | [[LowerCavity]] <<CHECKBOX>> |
| Transfer the cavity out of the helium vessel once sufficient clearance is obtained at the fpc flange.  | [[PullCavity]] <<CHECKBOX>> |
| Remove all tuners and instrumentation.  | [[RemoveTuners]] <<CHECKBOX>> |
| Record serial numbers and note any discrepancies.  | [[RecordSNs2]] <<CHECKBOX>> |
| Store components in respective areas. | [[StoreComponents]] <<CHECKBOX>> |
| Turn the cavity pair over to the cavity group. | [[TurnOverCavityPair]] <<CHECKBOX>> |
| Note summary of findings. | [[Comment8]] <<COMMENT>> |
| 9 | **Radcon survey of cavity assembly prior to turnover. This step is to identify RAM that is being uncovered as the disassembly progresses. Items are to be tagged by Radcon as required. Add notes in comment box provided describing RAM.** | [[Date9]] <<TIMESTAMP>>[[Technician9]] <<SRF>>[[Comment9]] <<COMMENT>> |
| 10 | Verify the above steps are completed. Use the comment box to note variances.Upload the inventory tracking form.Supervisor to clear holdpoint and close once traveler work is complete. | [[TECHNICIAN10]] <<SRF>>[[TIMESTAMP10]] <<TIMESTAMP>>[[COMMENT10]] <<COMMENT>>[[INVENTORYFORM]] <<FILEUPLOAD>>[[SUPERVISORHOLDPOINT]] {{fischer,jjcamp,jared}} <<HOLDPOINT>>[[CMASUPERVISOR]] <<SRFCMP>> |