

# The APS Upgrade Component Database + Tools



#### **EPICS Collaboration Meeting - April 2023**

Ned Arnold et. al. Advanced Photon Source Argonne National Laboratory

# Abstract

The Component Database (CDB) (developed for the Advanced Photon Source Upgrade) and a tightly coupled version of the eTraveler (originally developed at FRIB) have been in use for over 5 years to support the design, fabrication, and installation of thousands of components. This talk will provide a brief introduction to the applications and then describe the numerous ways the captured data has been used ... many of which are beyond what was originally envisioned. A summary will include important "lessons learned" for future users of the tools.

EPICS Collaboration Meeting – June 2018: Database Applications for the APS-U



# Agenda

- Brief overview of CDB & eTraveler
- How it is being used at APS-U
  - Provides a common repository to capture & track component information (model #, specs, drawings, pictures, ...)
  - Tracks inventory of individual components and APS-U warehouse. Tracks status, location, and eTravelers
  - QA incoming inspection/non-conformance logging
  - Captures a machine design a simple hierarchical model of accelerator components and support equipment
  - Captures cables that connect machine elements together (17000+ cables)
    - Supports the creation of a cable "pull-book" for contractors (API)
  - Captures "Control Flow" between machine elements
  - Tracks measurements by linking to archives of thousands of files of measurement, calibration, and analysis
  - Captures IOC development areas in a searchable index
  - Captures "software applications" in a searchable index
  - Defines & tracks assemblies consisting of numerous components
    - Tracks which specific components (serial # or QR code) go into specific locations in the machine
  - Defines "Installation kits" and captures inventory items that go in each kit
  - Automates update of CDB entries based on an entry into a field in an eTraveler
  - Provides an index to thousands of eTravelers
  - Tracks calibration of equipment (API)
  - Supports custom web-based displays (API)



# **Motivations**

- Uninstall / Install / Test / Commission APS-U accelerator in 12 months
  - "Do we have all the parts? Do you know where they are?" [Project]
- Engineers of all disciplines "manage" components ... wouldn't it be convenient if they all use the same tool (and the tool was helpful)? [Staff]
  - specify, design, buy, build, test, repair, install, track spares, calibrate, find manuals, troubleshoot, swap, revise, update firmware, replace batteries, ...
- Allows for "Project-wide" processes to be applied. [Project]
  - Naming conventions
  - QA Processes and work-flow
  - Organizing of eTravelers
  - Warehouse
- Controls can take advantage of a global capture of components and develop "endto-end" tools [Controls]



# **Component Database (CDB) - Domains**

#### **Component Catalog**

A listing of each unique **type of component** or component design or COTS item + properties, drawings, specifications, ...



#### **Component Inventory**

Tracks each unique *instance of component* procured or fabricated + properties such as serial #, QR code, eTravelers, pictures, ...



#### MAARC

Links to external files, associated with CDB elements, where measurements and analysis results are archived.

#### **Cable Inventory**

Tracks each unique *instance of a cable,* whether procured or fabricated,

+ properties such as length\*, ...



#### **Machine Design**

A simple hierarchical model of the *components to be installed* to perform a particular function (e.g. APS-U) + inventory items installed + properties, pictures, locations, ...



#### **Cable Design**

Defines each required cable and properties; including cable type (from the catalog), two endpoints (machine design elements), length\*, ...

#### **Control Hierarchy**

Defines a different relationship between machine elements representing "control flow"

#### **Cable Catalog**



Argonne

A listing of each unique *type of cable* + properties, drawings, specifications, ... Cables that use the same raw cable with different connectors are different cable types (but specifying connectors is optional)



# **Component Database (CDB) - Domains**

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#### MAARC

## What we have ... Where it is ...

# Cable Catalogue

A listing of each unique *type of cable* + properties, drawings, specifications, ... Cables that use the same raw cable with different connectors are different cable types (but specifying connectors is optional)

**Cable Catalog** 

CDB elements, where measurements and analysis results are archived.

#### **Cable Inventory**

Tracks each unique *instance of a cable,* whether procured or fabricated,

+ properties such as length\*, ...



#### Machine Design

A simple hierarchical model of the *components to be installed* to perform a particular function (e.g. APS-U) + inventory items installed + properties, pictures, locations, ...

### What we need ... Where it goes ... (not just a location change) ...

#### How is connected How is it controlled

#### **Cable Design**

Defines each required cable and properties; including cable type (from the catalog), two endpoints (machine design elements), length\*, ...

#### **Control Hierarchy**

Defines a different relationship between machine elements representing "control flow"



## **Component Catalog**

Login ? About

Search

Choose a Technical System					14		
Controls/Instrumentation Diagnostics	Assy	Primary Image	Name	Model Number	Alternate Name	Description	Inventory
Experimental Facilities Ops Front Ends Generic Functions/Placeholders Insertion Devices	0		CUFE B1 US GRID MASK ASSEMBLY	A099-B10300		B1 US GRID MASK ASSEMBLY	2709 2710 2711 2712 2713
Lattice Elements Magnets Mechanical/Beamlines Functions	0		CUFE B2 DS GRID MASK ASSEMBLY	A099-B20300		B2 DS GRID MASK ASSEMBLY	2726 2727 2728 2729 2730
Ali Absorber			CUFE BURN THROUGH MONITOR FIRST FIXED MASK ASSEMBLY	A099-M60100	CUFE BTFM1	BURN THROUGH FIXED MASK 1 ASSEMBLY	
Bellows Beryllium Window Cable Calibrated M&TE Collimator	0	*	CUFE EXIT MASK AND SUPPORT ASSEMBLY	A099-M40100	CUFE EM	FRONT ENDS & INSERTION DEVICES; FRONT ENDS; CANTED FRONT ENDS (CFE); CFE PHOTON COMPONENTS	3981 3982 3983 3984 3985
Diagnostic Frontend Component		<b>**</b>	CUFE EXIT MASK BRA CUFE EXIT MASK AND	SUPPORT ASSEMBLY		X MASK BRAZED ASSEMBLY	
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# **Component Catalog**

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>	>	28-ID CHEX Photon Mask Body	A328-PM0211		Beamline Compone Mask	Beamlines	Photon Mask Body, Soli	id Cu-Cr-Zr, for 28-ID CHEX		i @*
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>	>	33-ID PTYCHO 4th Photon Mask	A333-PM0400		Beamline Compone Mask	ent Vacuum Beamlines	Fourth photon mask us	ed at the 33-ID PTYCHO beamline.		i 🗠 🕇
	>	Beamline Photon Mask, PB	A308-PM0200		Mask	Beamlines	Photon Mask for 8ID an	nd 9ID		i @*
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>	>	<u>Bending Magnet Front End Fixed Mask 2 / Photon Shutter 1 / Storage</u> <u>Ring Valve / Fixed Mask 1 Table Assembly</u>	A100-T10000		Frontend Componer Mask Photon Shutter Table Assembly	Front Ends			Specify "Favorites	5
>	>	Bending Magnet Front End FM3 / PS2 / Collimator 2 Table Assembly	410202-280000		Mask Collimator Photon Shutter Table Assembly	Front Ends				i @*
		Bending Magnet Front End Second Fixed Mask Assembly	4102020101-220000		Mask	Front Ends				i @*
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>	>	Canted Undulator Front End K1/FM3 Table Assembly	A099-T51000	<b>A</b>	Mask Collimator Table Assembly	Front Ends	Lead collimator 1 and fi	ixed mask 3 for CUFE		i @*
>	>	Canted Undulator Front End Windowed Exit Table Assembly (6" - 6" window)	A099-T90000	đ	Vacuum Gate Valve Mask Collimator Table Beryllium Window Table Assembly	e Front Ends	This exit table version h	has a Be window and no beamline isolation valve.		i @★



## **Component Catalog Entry**

**Common Properties** 

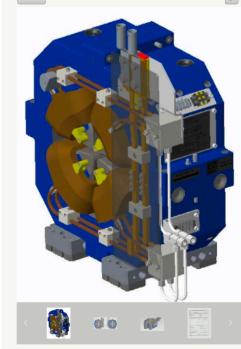
**Catalog Item Details** 

Name	Q1 Production Magnet
Model Number	
Alternate Name	1
Project	APS-U Production
Description	Q1 250mm Quadrupole Magnet with vanadium permendur pole tips
Technical System	& Magnets
Function	🖋 Quadrupole
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Document (Upload)		Q1 Magnetic Field Analysis	document.6197652256565908684.pptx	Q1 Magnetic Field Analysis	D #
Document (ICMS)		ICD	APSU_1708377		D #
Document (ICMS)		SOW	APSU_1702775	STATEMENT OF WORK FOR Q1 QUADRUPOLE MAGNET	D #
Document (ICMS)		ESD	APS_1702778	APS-U Q1 Quadrupole Magnet Engineering Specifications	D #
Inventory Quantity Pl	lanned	Magnet Group	82	Total Required by APS-U	D #
Document (Upload)					D #
MAARC File		Survey Fiducials for All Magnets	▲ APS_U_MagnetFiducials_All.xlsx		D #

#### eTraveler Templates eTraveler Templates

	nplates					
Title	Preferred Version 💩	Created By	Created On	Updated By	Updated On	Actions
Component Discrepancy Traveler		tbarsz	Tue Feb 06 14:09:12 CST 2018	tbarsz	Fri Jul 12 13:05:51 CDT 2019	û 🗐
Quadrupole Magnet Q1 Incoming Inspection Traveler		dwilkin	Tue Feb 12 11:42:54 CST 2019	dwilkin	Mon Sep 16 09:22:24 CDT 2019	û 🗐
Thermocouple and Thermal Switch HI-POT Traveler Supplement	ø latest	adonnelly	Tue Jul 02 14:10:14 CDT 2019	adonnelly	Tue Jul 02 14:27:44 CDT 2019	<b>û</b> 🗐
Magnet Rotating Coil and Hall Probe Map Measurements		dwilkin	Fri Jul 19 08:33:31 CDT 2019	dwilkin	Wed Jun 22 15:06:30 CDT 2022	<b>ů</b> 🗐
Magnet Rotating Wire and Survey Measurements for Q1	<i>d</i> latest	dwilkin	Fri Jul 19 10:59:28 CDT 2019	dwilkin	Wed Feb 26 15:31:40 CST 2020	<b>û</b> 📰
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+ Add + Create

Inventory

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				✓

#### **Inventory Items**

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>	<u>DQ101</u>	100 011 001	DQ101		Q1 250mm Quadrupole Magnet - First Article	981-S6-E-102	DLMA Magnet Module - [DLMA-1250]	Installed	i.*
>	DQ102	100 011 002	DQ102		Q1 250mm Quadrupole Magnet	関 981-S6-D-102	DLMB Magnet Module - [DLMB-1120]	Installed	i.*
>	DQ103	100 011 003	DQ103		Q1 250mm Quadrupole Magnet	関 981-S6-B-101	DLMA Magnet Module - [DLMA-1410]	Installed	i *
>	DQ104	100 011 004	DQ104		Q1 250mm Quadrupole Magnet	関 981-S6-E-106	DLMB Magnet Module - [DLMB-1350]	Installed	i*
>	<u>DQ105</u>	100 011 005	DQ105		Q1 250mm Quadrupole Magnet	関 981-S6-B-105	DLMA Magnet Module - [DLMA-1160]	Installed	i *

**Component Database Portal** 

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Vendor ↑↓

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# **Component Inventory Detail**

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Description 🖉 Q1 250mm Quadrupole Magnet	Image				×	•	133.30	674			51
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EPICS Collaboration Meeting - April 2023

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Log Entries

Related MAARC Items

+

## **CDB Integration with eTraveler**

LMA Magnet Module - [DLMA-1020]	Properties								A web applic	cation to design, carry out and organize p
g DLMA-1020									You might find the prev	vious version document at github is still helpful before I have all the sections finished
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talog Item DLMA Magnet Module	Type ↑↓ Document (Upload)	DLMA-1020_X_module_sh	Tag Î↓			Value 1↓ 14968014019551611707.x		Descrip	tion	
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ation 🔊 > 🗏 981-S6-B-102	Image								How to use this	document
ation Details	Image								There is an Audience statement on the	top of each section. If you are not the target audience, then you can skip the section.
ising	inago								_	
tus D Acceptance In Progress	eTraveler Instances								Decise of the two	weley employed
										veler application
More Info									Audience: all users	
lery	_	Title	Descriptio	n Created By Upd	dated By	Created From Te	mplate	Estimated Progress	The traveler application is a Web applic provides a Web interface for edit and m	cation for design, carry out, and organize electrical process documents, which we call travelers. It nanage forms. Furthermore, users can organize travelers by binder. The application provides a
	DLMA-1020 Magn	ets Installation/Assembly		bechtold dwi	-	DLMA Magnets Installation/		100%	limited HTTP API to read the traveler in	
	JLMA-1020 Groun			bechtold dwi		Ground Bar Installation		100%		_
	DLMA-1020 Cable	Tray Installation		bechtold dwi	lkin	Cable Tray Installation		100%	What is a travelar?	
		et Alignment Verification		bechtold dwi		DLMA Magnet Alignment Ve	erification	100%	What is a traveler?	
and a second and a second and a second and a second a sec	DLMA-1020 Water	Manifold Installation		bechtold bec	htold	Water Manifold Installation		0.00/4.00	A traveler is an electrical document that	is designed to support the execution of a predefined process and to collect user input data and user case is to implement a work instruction that specifies all the steps to accomplish a work.
	Assembly Listing									ription, deadline, locations, and tags. The user can add/remove a tag into the tag list. The tag can
log Item Details							_		a device name defined in CCDB or any	string. A traveler is initialized when it is created. Its state can be changed to active, submitted for
log tem Details	Properties						-			A traveler can be archived. Only the traveler owner can access the traveler when it is archived. A er with other users/groups. A user can also transfer the ownership of a traveler to other user.
DLMA Magnet Module						F	₽ 🕅			defined in a form. The users with written permission can input values into an active traveler. The
I Number A420-000001 nate Name	Type Î↓ Tag Î↓	Valu	ie î↓		Descr	iption 1↓	Actions		input history is kept in the traveler, and considered as the composition of a form	shown under each input. Each input can also have user notes attached to it. A traveler can be
t APS-U Production	Inventory Quantity Planned	41						Assigned Item	traveler = form + data + notes	m, the input data, and the notes:
iption This DLMA Magnet Module has two build variants:	Documentation (WEB) PDMLink Drawing	Magnet Module Bill of Mater	al (BOM) Spread		mbly for DLMA		ວ ວ <b>ດ</b>		Seria	tailed information about how to use and manage travelers.
"DLMA Magnet Modulde - S40" and "DLMA Magnet Module - S01,S37,S38,S39"	Document (ICMS)	A420-000003.DRW		Vacuum Asse	,		5			
ical System Supports ion Magnet Module Assembly	Image	Sec. 2					3	ſ	DQ16	
ed from N/A	Image	21.55						t - [MFC122]	MFC What is a form?	
ate	Documentation (WEB) Document (ICMS) Build Variant Docum	entation <u>APSU_2188403</u>	<u>je</u>	Special Modu	lee Addendum I	o Module Assembly ESD	5	ş	Q22 A form is a user-designed template in c	der to create travelers. We implement it with HTML form elements as the name suggests. A user
ere Info Permalink 🛛 🛛 Return	Document (Upload)			Special Modu	lea Audendum	o module Assenibly 255	5			copies. A user can share her/his forms with other users with read or write permission. A user can hared with her/him. The traveler application provides a WYSIWYG (what you see is what you get)
ry -									editor for form design. A form can be a	rchived. An archived form can only accessed by its owner. The forms section describes the details
	eTraveler Templates						-		of how to work with forms.	
7	i i					Ð				
	Title	Preferred Versio	n Created By	Created On	Updated By	Updated On	Actions		What is a binder?	
	DLMA Magnets Installation/Assembly	latest	dwilkin	Thu Aug 27 11:39:25 CDT	nbechtol	Fri Jun 17 09:11:09 CDT 2022				t a user put together to manage or present them together. For example, an engineer can put all the
	Ground Bar Installation	latest	dwilkin	2020 Fri Jul 16 15:52:10 CDT 2021	d dwilkin	Thu Oct 27 09:21:29 CDT			travelers related to a specific device int traveler can be put into different binder	to one binder. A workshop manager can put all the traveler involving the workshop into one binder.
		latest	dwilkin	Fri Jul 16 16:03:59 CDT 2021	dwilkin	2022 Tue Feb 28 08:17:14 CST	-			it has properties like sequence, priority, value, and color. The sequence and priority help to sort th
	Cable Tray Installation	latest	dwilkin	Tue Jul 13 10:19:17 CDT 2021		2023 Mon Feb 27 19:20:56 CST			travelers. The value can be used to esti	imate the binder's progress. The color defines a flag for attention. It is possible to add a binder intr management to oversee the progress of sub teams. For more details, see the binders section,
	Cable Tray Installation DLMA Magnet Alignment Verification			Wed Oct 12 10:07:59 ODT	GWIRIT	2023			another binder. This is useful for higher	management to oversee the progress of sub teams. For more details, see the binders section.
	Cable Tray Installation DLMA Magnet Alignment Verification Hate manipus installation	181551	GWINIT	2021	dwilkin	Fri Jan 13 08:39:46 CST 2023				
		latest	dwilkin	Mon Dec 06 14:39:35 CST					Log in and out	
	DLMA Magnet Alignment Verification Water mannow manatum BPM Feedthrough/Cable Testing	101051	dwilkin nbechtol	Mon Dec 06 14:39:35 CST 2021 Fri Feb 04 10:11:33 CST 2022	dwilkin	Fri Feb 17 08:12:14 CST 2023			1	
	DLMA Magnet Alignment Verification	latest		2021	dwilkin dwilkin	Fri Feb 17 08:12:14 CST 2023 Mon Sep 12 08:36:35 CDT	-			age, all other resources are only accessible to authenticated users. Users can use their lab compu
	DLMA Magnet Alignment Verification           Marce memory instantation           BPM Feedthrough/Cable Testing           DLM-A Magnet Reassembly Travelar           SPECIAL DLMA-540 Magnets Installation/Assembly	latest latest	nbechtol d	2021 Fri Feb 04 10:11:33 CST 2022	dwilkin	Mon Sep 12 08:36:35 CDT 2022 Tue Apr 04 09:16:39 CDT			user name and password to log in. Use	ers are encouraged to log out when they do not work with the application. If not log out, a user's
	DLMA Magnet Alignment Verification 2020 Manual Instantion BPM Feedthrough/Cable Testing DLM-A Magnet Reassembly Traveler	latest latest latest latest	nbechtol d dwilkin	2021 Fri Feb 04 10:11:33 CST 2022 Mon Sep 12 08:28:23 CDT 2022	dwilkin 2 dwilkin	Mon Sep 12 08:36:35 CDT 2022 Tue Apr 04 09:16:39 CDT 2023 Tue Jan 31 09:23:51 CST			user name and password to log in. Use session will expire after a period. When	
	DLMA Magnet Alignment Verification           Maxie: nonnovo insemition           BPM Feedthrough/Cable Testing           DLM-A Magnet Reassembly Traveler           SPECIAL DLMA-540 Magnets Installation/Assembly           DLMA Vacuum Staging Traveler	intest latest latest latest latest latest	nbechtol d dwilkin nbechtol d	2021 Fri Feb 04 10:11:33 CST 2022 Mon Sep 12 08:28:23 CDT 2022 Fri Oct 28 07:46:22 CDT 202	dwilkin 2 dwilkin	Mon Sep 12 08:36:35 CDT 2022 Tue Apr 04 09:16:39 CDT 2023			user name and password to log in. Use session will expire after a period. When	ers are encouraged to log out when they do not work with the application. If not log out, a user's a a user tries to access a resource URL on a browser with no live session, the user will be directed

# Machine Design Example (Magnet Module)

Machine Ele S02A:DLMA	ement Name	Q <	Machine Element Description	Assigned Catalog & Inventory Item	Location ↑↓
APS-U Facility Design - April 2023			APS-U equipment - as planned	Catalog Item to be	
V 🖸 APS-U: SR Tunnel				Installed at This	400_SR_Tunnel
V Ö Sector-02				Location	SR_Tunnel_S02
🗸 💆 S02 DLMA Area				2	SR_Tunnel_02_DLMA
V 🕫 S02A:DLMA			DLMA Magnet Module Assembly	ອ 🕮 DLMA Magnet Module	SR_Tunnel_02_DLMA
💯 🔂 S02A:DLMA:SUPP			DLMA Support assembly	🤊 🕮 DLMA Support Assembly	SR_Tunnel_02_DLMA
00 S02A:GV1			Gate Valve	🤊 🕮 Gate Valve - 4.5" All Metal with RF-Liner	SR_Tunnel_02_DLMA
00 S02A:VC1		<b></b>	Vacuum Chamber	🤊 🕮A:VC1 NEG-Coated Aluminum Vacuum C	I SR_Tunnel_02_DLMA
✓ Ü <sup>⊕</sup> S02A:Q1			Quadrupole	🔊 🕮Q1 Production Magnet	SR_Tunnel_02_DLMA
00 S02A:Q1:TS1			Thermal Switch	ా	SR_Tunnel_02_DLMA
00 S02A:Q1:TC1			Thermocouple	ত	SR_Tunnel_02_DLMA
00 S02A:P1			врм	🔊 🕮 Standard Beam Position Monitor with RF	SR_Tunnel_02_DLMA
CO SO2A:P1:BPP			BPM SMA Patch Panel	🔊 🕮 BPM SMA Patch Panel (P1-P11)	SR_Tunnel_02_DLMA
✓ 🖉 🔂 S02A:FC1			Fast Corrector	🔊 🕮 8-Pole Fast Corrector Production Magne	SR_Tunnel_02_DLMA
00 S02A:FH1			Fast Horizontal Corrector	5	SR_Tunnel_02_DLMA
00 S02A:FV1	I				SR_Tunnel_02_DLMA
00 S02A:SQ1		1	and a state of the		SR_Tunnel_02_DLMA
00 S02A:FC1:TC1					SR_Tunnel_02_DLMA
00 S02A:FC1:TC2		al dia	In the second second second	The second s	SR_Tunnel_02_DLMA
S02A:VC2				Inconel Vacuum Cha	I 📕 SR_Tunnel_02_DLMA
Argonne		EPIC	S Collaboration Meeting - April 2023		12

# Machine <a href="mailto:Design">Design (Power Supply Rack)</a>

Machine Element Name	Machine	e Designs	escription	Assigned Catalog & Inventory Item
✓ ⑦ APS-U Facility Design		hical model of the		ື
▼ ② APS-U: SR Mezzanine		e installed to perform		5
- Ö Area-01		ion (e.g. APS-U) +		<u>ත</u>
O sr leak detection system			tenance	⑦ Generic: Enclosure
OPS-SR-T1-S40&01	properties, pictu	ires, locations,		ຳ 🕮 T1-T4 SR Raw Supply
ORF1 Rack 11		RF RF		Conversion Dearly
ORF1 Rack 12			Catalog Item to be	
▶ O SR-RR 40&01	PS CAB1 PS CAB 1A	Power Systems		Installed at This
0 PS-SR-T2-S40&01	PS Ext Mes 8 PS	Power Systems		Location
	roller Device Controller	Power Systems		Generic: Rack
▼ 1010 PS-SR-S01-CAB1A Template	S2 AS1 AFH1	Template of cabinet 1A contents	S	⑦ Generic: Rack
	-100 DCU-100 AFV1	PS Controller in Slot A		D Bipolar Power Supply Controller
00 S01A:FH1:PS	ASQ1	Power Supply in Slot 1		つ CAPS-U FAST CORRECTOR POWER SUPPLY
S01A:FV1:PS A	Q3 AQ2 AH1	Power Supply in Slot 2		つ CAPS-U FAST CORRECTOR POWER SUPPLY
DCL DCL	-200 DCU-200 AV1	Power Supply in Slot 3		つ CAPS-U DC BIPOLAR POWER SUPPLY
රීම් S01A:H1:PS	AQ4T	Power Supply in Slot 4		③ <sup>①</sup> APS-U DC BIPOLAR POWER SUPPLY
00 S01A:V1:PS	CM2	Power Supply in Slot 5		シ ゴAPS-U DC BIPOLAR POWER SUPPLY
රීම් S01A:Q4T:PS		Power Supply in Slot 6		つ CAPS-U DC BIPOLAR POWER SUPPLY
රීම් S01:vacant	Q4 AQ1			୭
	D-300 DCU-300 DCCT's			っ
びつ S01-PS:BPSECM1A		DCCT chassis in Slot B		D BPS Ext. Meas System
	EPICS Collabora	ation Meeting - April 2023		13

		Ν	<b>lachin</b>	e Design -	- Vacuum Ra	ck	
https://ctlnaming.aps.a	anl.g		Naming	Convention for ne Elements			ODD SECTOR XX-02 RACK
Machine Element Name :RM	Q		Installed Qrid	Machine Element Description	Assigned Catalog & Inventory Item	Location ↑↓	
🗸 🖸 APS-U Facility Design - April 2023		2010 2010 2010 2010		Hit icon image for search help	Catalog Item to be		
V O APS-U: SR Mezzanine					Installed at This	🗒 400_SR_Mezz	
> O Area-01					Location	📕 SR_Mezz_Area-01 [C58-61	
V Ö Area-02			-			SR_Mezz_Area-02 [C61-64	•1 1•
V Ö 01-02			-	Mechanical Operations & Maintenance	ອ 🕮 Generic: Rack	01-02	TURBO PUMP
> 🖄 S01:RR0102:LP1		Read P	-	Light Panel	ອ ີ Commscope Fixed Light Panel	01-02	CONTROLLER
0 S01:SDS1			000 030 617 (Planned)	Моха	🔊 🛍 Moxa 6650-32 - [Unit: 0002]	1-02	
O so1:vvc1			-	Valve Controller	<sup>1</sup> ອີ ິ ໂ/VC210	01-02	
O S01-TPS:TSC1			-	Turbo PumpSystem Controller	🔊 🎬 Turbo Pump System Controller	01-02	
O s01:VGC1			-	Televac	🔊 🖺 vacuum Gauge Controller- Televac MX200	1-02	
0 S01:IPC1			-	QPC	🔊 🛍 lon Pump Controller - QPC	01-02	
0 S01:IPC2			-	QPC	🔊 🛍 Ion Pump Controller - QPC	1-02	i i i
O S01:IPC3			-	MPCQ	🔊 🕮 Ion Pump Controller- MPC	01-02	MPCQ
0 S01:IPC4			-	MPCQ	🔊 🛍 Ion Pump Controller- MPC	01-02	н
O S01-TPS:VGC1			-	Televac	🔊 🕮 Vacuum Gauge Controller- Televac MX200	01-02	a n
O S01-TPS:TPC1				Turbo Pump Control	อ	01-02	MPCQ
O S02-TPS:TPC1				Turbo Pump Control	อ	01-02	. B.
O S01:RM1			-		つ  MADM610 Rad Monitor	1-02	
> 00 01-03			-	Controls	න 10 Generic: Rack	<b>I</b> 01-03	
> 001-04			-	Diagnostics	න 10 Generic: Rack	🗒 01-04	
02-04			-	Diagnostics	න û Generic: Rack	02-04	



## Machine Cables (Cable Type, Endpoints)

Browse - Catalog 😥 Inventory 🕐 Machine Design - Housing 🔠 MAARC					· · ·					
▼ ひむ ps-sr-s25-CAB1 ▼ ひむ s25 0	DLMA Area			L	ist of Required	Cables (Design)				
0 to \$25	:P0	PS-625101	A P	Power Syste	ms	S25A:FH1:PS   S25A:FH1	#14/2c (corrector)			
Toto s25 Cables are defined as	:P0:BPP	PS-625102	A P	Power Syste	ms	S25A:FV1:PS   S25A:FV1	#14/2c (corrector)			
having endpoints	:DLMA:PLTH	PS-625103	A P	Power Syste	ms	S25A:SQ1:PS   S25A:SQ1	#14/2c (corrector)			
between two machine	A Girder Casting A Plinth	PS-625104	P	Power Syste	ms	S25A:H1:PS   S25A:H1	#14/2c (corrector)			
10.00	5A:GV1	PS-625105	P	Power Syste	ms	S25A:V1:PS   S25A:V1 #14/2c (corr				
elements	5A:VC1	PS-625106	P	Power Syste	ms	S25A:Q4T:PS   S25A:Q4T	#14/2c (corrector)			
- 00 S25A:Q4:PS	S25A:Q1	PS-625111	A P	Power Syste	ms	S25A:S2:PS   S25A:S2	DLO #2 (pair)			
	D S25A:Q1:TS1	PS-625112		Power Syste		S25A:Q3:PS   S25A:Q3	DLO 4/0 (pair)			
<ul> <li>● ⑦ \$ \$25A:\$1:P\$</li> <li>● ⑦ \$ \$25A:\$1:P\$:DCCT1</li> <li>P \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$</li></ul>	0 S25A:Q1:TC1	PS-625114		Power Syste		S25A:Q4:PS   S25A:Q4	DLO 444 (pair)			
	S25A:P1 S25A:P1:BPP					S25A:S1:PS   S25A:S1	DLO #2 (pair)			
	S25A:FC1 Mach	ine elements are "perma	anen	t" Syste		S25A:Q2:PS   S25A:Q2	DLO 4/0 (pair)			
00 S25:vacant		nolders, they continue to		ot						
▼ 101 S25A:Q1:PS	D S25A:FV1	en if you swap the invent		0,000		S25A:Q1:PS   S25A:Q1	DLO 444 (pair)			
0 5 S25A:Q1:PS:DCCT1 DS-6231 01			lory	Syste		S25A:S2:PS   S25A:S2:TS1	#18/2c (klixon)			
	0 S25A:FC1:TS1	item.		Syste	ms	S25A:Q3:PS   S25A:Q3:TS1	#18/2c (klixon)			
	© S25A:FC1:TC1 S25A:VC2			Syste	ms	S25A:Q4:PS   S25A:Q4:TS1	#18/2c (klixon)			
00 \$25A:FH1:PS		<u>PS-625125</u>	A P	Power Syste	ms	S25A:S1:PS   S25A:S1:TS1	#18/2c (klixon)			
	025A:Q2:TS1	<u>PS-625126</u>	A P	Power Syste	ms	S25A:Q2:PS   S25A:Q2:TS1	#18/2c (klixon)			
	D S25A:Q2:TC1	PS-625128	A P	Power Syste	ms	S25A:Q1:PS   S25A:Q1:TS1	#18/2c (klixon)			
	S25A:VC3									
525A:Q41:F5	S25A:M1									
525A-F5.CM2	D S25A:M1:TS1	Cable Catalog Item List		List	of Cable Type	s (Catalog)				
00 \$25:vacant	D S25A:M1:TC1	★ Display Mode: All				(000003)				
SECTION 1		Export								
6 F5 Ext Mes Controller Device Controller AS1 AFH1	- in - in - it Ha- in					« < <b>1</b> > »				
ASZ DCU-100 DCU-100 AFV1		Name <sup>†</sup> ₹			Project ↑↓	Function Î↓	Technical System  ↑↓			
AQ3 AQ2 AH1	and the reason of the reason of the local division of the local di	4		Primary Image			Power Systems V			
	THE REPORT OF THE PARTY OF THE				ADC 11 Droduction	-				
AQ4T		<u>#14/2c (corrector)</u> 4/0 DLO (Black)			APS-U Production APS-U Production	Bulk	Power Systems Power Systems			
CM2		444 MCM DLO (Black)			APS-U Production	Bulk	Power Systems Power Systems			
AQ4 AQ1		DLO 4/0 (pair)			APS-U Production		Power Systems			
DCU-300 DCU-300 DCCT's		DLO 4/0 (red)			APS-U Production		Power Systems			
		DLO 444 (pair)			APS-U Production		Power Systems			

DLO 444 (red) THHN 4/0 (green EPICS Collaboration Meeting APS-U Production APS-U Production

Power Systems

Power Systems

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## Usage

#### How it is being used at APS-U

- Provides a common repository to capture & track component information (model #, specs, drawings, pictures, ...)
- Tracks inventory of individual components and APS-U warehouse. Tracks status, location, and eTravelers
- QA incoming inspection/non-conformance logging
- Captures a machine design a simple hierarchical model of accelerator components and support equipment
- Captures cables that connect machine elements together (17000+ cables)
  - Supports the creation of a cable "pull-book" for contractors (API)
- Captures "Control Flow" between machine elements
- Tracks measurements by linking to archives of thousands of files of measurement, calibration, and analysis
- Captures IOC development areas in a searchable index
- Captures "software applications" in a searchable index
- Defines & tracks assemblies consisting of numerous components
  - Tracks which specific components (serial # or QR code) go into specific locations in the machine
- Defines "Installation kits" and captures inventory items that go in each kit
- Automates update of CDB entries based on an entry into a field in an eTraveler
- Provides an index to thousands of eTravelers
- Tracks calibration of equipment (API)
- Supports custom web-based displays (API)



## **Common Repository to Document Components**

Login ? About

Search

Q Browse ▼ Catalog ▼ Catalog ▼ Catalog ▼ Catalog ▼ Catalog ▼

Choose a Technical System	ł										
Controls/Instrumentation Diagnostics		Assy	Primary Image	Name	Model Number	Alternate Name	Description	Inventory			
Experimental Facilities Ops Front Ends Generic Functions/Placeholders Insertion Devices		0	<b></b>	CUFE B1 US GRID MASK ASSEMBLY	A099-B10300		B1 US GRID MASK ASSEMBLY	2709 2710 2711 2712 2713			
Lattice Elements Magnets Mechanical/Beamlines		0		CUFE B2 DS GRID MASK ASSEMBLY	A099-B20300		B2 DS GRID MASK ASSEMBLY	2726 2727 2728 2729 2730			
All Absorber				CUFE BURN THROUGH MONITOR FIRST FIXED MASK ASSEMBLY	A099-M60100	CUFE BTFM1	BURN THROUGH FIXED MASK 1 ASSEMBLY				
Bellows Beryllium Window Cable Calibrated M&TE Collimator		0	*	CUFE EXIT MASK AND SUPPORT ASSEMBLY	A099-M40100	CUFE EM	FRONT ENDS & INSERTION DEVICES; FRONT ENDS; CANTED FRONT ENDS (CFE); CFE PHOTON COMPONENTS	3981           3982           3983           3984           3985			
Diagnostic Frontend Component			<b>***</b>	CUFE EXIT MASK BRA CUFE EXIT MASK AND	SUPPORT ASSEMBLY	11	X MASK BRAZED ASSEMBLY				
Mask Mirror	1			CUFE EXIT MASK SUP			ENTAL FACILITIES; CANTED UNDULATOR 2.0 FRONT END; EXIT MASK AND ; -; SUPPORT ASSEMBLY				
			P	CUFE FIRST AND SEC	(Bran	2003	EST AND SECOND FIXED MASK SUPPORT TABLE	4322			
		0	<b></b>	CUFE FIRST FIXED MA	lies	20	CUFE B2 DS GRID MASK ASSEMBLY	<u>2641</u>			
			<b></b>	CUFE FIRST FIXED MA		S STO	DNENT				
				CUFE FIRST/SECOND ASSEMBLY	1966 G	T	FIXED MASK				
				CUFE GRID MASK BOI							
	į			CUFE GRID MASK BOI	÷		A CO				
				CUFE PRE-MASK ASS			E-MASK	<u>Unit: 1</u>			
		0	<b>S</b>	CUFE SECOND FIXED MASK AND SUPPORT	A099 M28100 EPICS Collat Dictionary	oration Meet	ing - April 2023	2772 2773 2774 2775 17 2776			

## **Inventory Tracking**

## Bldg 981 – 100,000+ sq Ft of Upgrade! > 26,000 items

	MILITAR REAL PROPERTY AND	Serial Number Î↓ Description Î↓	Location ↓		Status ↑↓
		Primary Image	Immediate location only (e.g. Cabine	Housing	
			📃 981-S6-C-104		Acceptance In Progress
			981-S6-F-101		Acceptance In Progress
DLMB-1340	000 032 261		981-S6-E-106		Acceptance In Progress
DLMB-1150	000 032 241	and 1 3	981 Highbay Section 1		Acceptance In Progress
DLMB-1030	000 032 236		<b>981-S6-A-107</b>		Acceptance In Progress
DLMB-1220	000 032 248	51° 8	<b>981-S6-C-101</b>		Acceptance In Progress
DLMB-1280	000 032 255		📃 981-S6-F-101		Acceptance In Progress
DLMB-1260	000 032 253	STARS	981-S6-E-103		Acceptance In Progress
DLMB-1350	000 032 262 DLM	Magnet Module - [DLMB-1280] ×			Acceptance In Progress
DLMB-1180	000 032 2	THE OWNER OF THE OWNER OWNER OF THE OWNER OWNE	<b>981-S6-A-107</b>		Acceptance In Progress
DLMB-1040	000 03		981-S6-C-104		Acceptance In Progress
DLMB-1230	000 032		<b>981-S6-C-101</b>		Acceptance In Progress
<u>DLMB-1130</u>	000 04		981-S6-E-106		Acceptance In Progress
DLMB-1360	000 032	The August	<b>981-S6-A-107</b>		Acceptance In Progress
DLMB-1200	000 032		<b>981-S6-D-105</b>		Acceptance In Progress
DLMB-1050	000 032		関 981-S6-B-103		Acceptance In Progress
DLMB-1210	000 0322		981-S6-E-103		Acceptance In Progress
DLMB-1120	000 03		981-S6-D-102		Acceptance In Progress
DLMB-1290	000 032 256	EPICS Collaboration Meet	ting - April 2023		Acceptance In Progress

#### Bldg 981 Locations

> <u>401</u>
✓ <u>981</u>
V 981-FloorSpace
> 981 Highbay Section 1
> 981 Highbay Section 2
981 Highbay Section 3         981 Highbay Section 4
> 981 Highbay Section 4
> 981 Highbay Section 5
> 981 Highbay Section 6
✓ <u>981-Racks</u>
✓ <u>981-S1-A</u>
✓ <u>981-S1-A-01</u>
✓ <u>981-S1-A-01-A</u>
> <u>981-S1-A-01-A1</u>
<u>981-S1-A-01-A2</u>
> <u>981-S1-A-01-A3</u>
<u>981-S1-A-01-A4</u>
> <u>981-S1-A-01-B</u>
> <u>981-S1-A-01-C</u>
> <u>981-S1-A-01-D</u>
<u>981-S1-А-01-Е</u>
> <u>981-S1-A-02</u>
> <u>981-S1-A-03</u>
> <u>981-S1-A-04</u>
> 981-S1-A-03         > 981-S1-A-04         > 981-S1-A-05         > 981-S1-A-06         > 981-S1-A-07         > 981-S1-A-08
> <u>981-S1-A-06</u>
> <u>981-S1-A-07</u>
> <u>981-S1-A-08</u> 18

# **Inventory Tracking**

Q Browse ∨ (m) Catalog ∨ (m) Inventory ∨ (m) Design ∨ (m) MAARC		21482		Search Ø Adminis	strative 🗸 🌣 Settings	🕒 🕒 Logout ? About			
Location Details	Properties					+			
Name Pallet-00876	Item Membership					_			
QR Id Ø 000 021 482									
Description Movable Location for Storage: Pallet-00876					1	× <del>D</del> X			
Type A Movable Crate/Pallet	Part Of ↑↓ Domain ↑↓	Description ↑↓			Owner	Group			
Location D / 981-S5-E-10-C2	981-S5-E-10-C2 Location	Level C Position 2 (Right Front) for Bay 981-S5-E-10 in Building 981			process-bot	CDB_ADMIN			
	Locations Located Here								
Edit Delete      More Info     Permalink      Return		« <							
Gallery +	Item			Qrld	î↓				
Log Entries +									
	No records found.	1							
		$\langle \langle \rangle \rangle$							
A Pallet becomes a	Inventory Located Here								
	Inventory Located Here								
"movable" location		« < <b>1</b> > »							
only the Pallet	Item ↑↓				Qrld	t↓			
		Location ↑↓	Housing	Domain					
needs a change in	lon Pump- 200L Gamma Sec. 38 - [Unit: 0002]	Pallet-00876	1	Inventory (	000 050 048				
location	<u>35 Ion Pump Sec. 38 - [Unit: 0001]</u>	Pallet-00876	I		000 050 212				
location	<u>45s Ion Pump Sec. 38 - [Unit: 0001]</u>	Pallet-00876		Inventory	000 050 211				
		« < <b>1</b> > »							

		APS/APS-U Warehouse Operations	Pallet-0087
63972	Pallet-00876	Description	QR Id Item Code
		35 Ion Pump Sec. 38 - Unit: 0001	000 050 212 [299073]
LEIZARSCHA		45s Ion Pump Sec. 38 - Unit: 0001	000 050 211 299064
		Ion Pump- 200L Gamma Sec. 38 - Unit: 0002	000 050 048 299047
000 021 482	EPICS Co	laboration Meeting - April 2023	



Q

## **QA Non-conformance**

	Devices: C	ompleted; <i>41</i> inputs Q7 Production Mag version: 9:0 lide validation Show		: 1000 <sup>-</sup>					DQ7-	001	
	sequence	Description Accept	Rework Reinspect	Scrap	Return	Other_actions	Other_details	Justification	Supplier_problem	Documented by	On
Every eTrav Discrepancy for any no	Log that	is filled out	on					There is quite a bit of damage to the crate. This damage was cause during shipping. Shock sensor was triggered. There was no damage to the magnet. Pictures in the gallery document the damage. The crate will be fix and suitable	Check here if the discrepancy was caused by the supplier. (The Project QA Coordinator will use the checkbox below to monitor supplier performance)	Μ	2 years ago

## **QA Non-conformance**

	Chatter	
Index	Status	

Data Current As Of 2023-04-17 04:23:01 Number of Log Entries 1192

Display S	tatus
Last Updated	2023-04-17 14:04:17
Email Contact	Diane Wilkinson
CDB Engineering Display	Index

					eTrav	eler Discrepancy Log			
REJECT TAG	ETRAVELER LAST UPDATE	ETRAVELER LINK	CDB INVENTORY ITEM	ITEM STATUS	LOG COUNT	LAST DISCREPANCY DESCRIPTION	LAST DISCREPANCY DISPOSITION	LAST DISCREPANCY JUSTIFICATION	LAST DISCREPANCY SUPPLIER CAUSED
<u>REJECT</u> TAG	2023-04-13T15:46:19.590	APS-U SCU Cryostat Components Receipt Inspection	<u>CANTED SCU Liquid Helium</u> Tank - UNIT <u>1</u>	Rejected	2	Close-out of non-conformance in sequence 1.		Confirmed with EIC (Ethan Anliker) that the non-conforming item was returned to the vendor. repaired/replaced item from the vendor will be reinspected under a new instance of this eTraveler. See ANL-626A-1532 for Lab level reporting.	No
<u>REJECT</u> <u>TAG</u>	2023-04-13T14:42:32.979	<u>Q8-68 Magnet Rotating Wire and</u> Survey Data	<u>Q8 Production Magnet -</u> <u>EQ868</u>	Ready For Use	2	Close-out of non-conformance in sequence 1.		SME Animesh Jain has provided a disposition of Use As Is. Offset will be corrected later with shimming. See ANL-626A-1504 for Lab level reporting.	No
<u>REJECT</u> TAG	2023-04-13T14:42:21.193	<u>Q8-67 Magnet Rotating Wire and Survey Data</u>	<u>Q8 Production Magnet -</u> EQ867	Ready For Use	2	Close-out of non-conformance in sequence 1.		SME Animesh Jain has provided a disposition of Use As Is. Offset will be corrected later with shimming. See ANL-626A-1504 for Lab level reporting.	No
REJECT TAG	2022-10-24T18:32:56.927	M4-18 Magnet Rotating Wire and Survey Measurements Data	M4 Production Magnet - TM418	Installed	2	Close-out of non-conformance in sequence 1.	Accept	SME Animesh Jain has provided a disposition of Use As Is. Offset will be corrected later with shimming. See ANL-626A-1382 for Lab level reporting.	No
<u>REJECT</u> TAG	2022-10-24T14:59:05.165	<u>DQ7-001</u>	Q7 Production Magnet - DQ701	Installed	1	Crate damage	Rework	There is quite a bit of damage to the crate. This damage was cause during shipping. Shock sensor was triggered. There was no damage to the magnet. Pictures in the gallery document the damage. The crate will be fix and suitable for use.	Yes
<u>REJECT</u> TAG	2022-10-18T15:55:40.993	QR Code: 33686 Front End Vacuum Assembly for CDB Catalog ID 124325	High Heat Load Front End GRID XBPM1 Table Assembly - 33686	Post- Acceptance/Test /Certification in Progress	1	Final testing - right angle gearbox failed to move granite to specified limits.	Other_actions	A gearbox from a Grid that had a full range of motion was swapped with a grid gearbox that failed to move properly. The failed grid worked properly with the new gearbox. Subsequently the good grid failed with the rejected gearbox.	No
REJECT TAG	2022-10-14T16:47:08.896	Hydro Test	Pencils - Unit: 0005	Planned	1	Test of new traveler discrepancy		Rework at ANL by mechanical techs	Yes
<u>REJECT</u> <u>TAG</u>		Hydrostatic Leveling System Sensor and Reservoir Assembly Acceptance - Unit #101	HLS Sensor/Reservoir Assembly - Unit: 0101	Rejected	2	Close-out of non-conformance in sequence 1.		Patricia Weghorn (Technician Sr - Electronics) identified the non- conformance in sequence 1 and dispositioned Return to Supplier. See ANL-626A-1356 for Lab Level reporting.	No
<u>REJECT</u> <u>TAG</u>	2022-10-12T14:01:01.423	Hydrostatic Leveling System Sensor and Reservoir Assembly Acceptance - Unit #13	HLS Sensor/Reservoir Assembly - Unit: 0013	Rejected	2	Close-out of non-conformance in sequence 1.	Return	Patricia Weghorn (Technician Sr - Electronics) identified the non- conformance in sequence 1 and dispositioned Return to Supplier. See ANL-626A-1355 for Lab Level reporting.	No
REJECT TAG	2022-09-30T13:53:36.048	<u>EQ8-033</u>	Q8 Production Magnet - EQ833	Installed	3	Close-out of non-conformance in sequence 1.		Sequence 1 Lab Level reporting in ANL-626A-1359	No
								SME Animach Jain has provided a dispesition of Lise As Is. Offset	

• Other tools track the Discrepancy entries in the eTravelers



# **Captures "Machine Design"**

Provide the second state of the sec										
+ Add + Import 🔀 Export										
Machine Element Name	Q	Installed Qrid	Machine Element Description	Assigned Catalog & Inventory Item		Location 1↓				
APS-U Facility Design - April 2023			Hit icon image for search help	3						
V Ö APS-U: SR Mezzanine				৩	400_	SR_Mezz		·		
> 🕐 Area-01				ত	SR_N	lezz_Area-01 [	C58-61]			
✓ ♥ Area-02		-		ອ 🛍 USID Control System - Legacy	SR_	Evory	olom	nent has a "mini-l	og h	ook"
> 🕐 01-02		-	Mechanical Operations & Maintena	ອ 🕮Generic: Rack	01-0	-	CICII		uy r	JOOK
V 0 01-03		-	Controls	ව 🕮 Generic: Rack	01-0	Log Entries				-
> 0 S01:RR0103:LP1		-	Light Panel	ອ ີີ Commscope Sliding Light Panel	01-0	+ Add			2	▶ 🖶 🕱
> 0 S01:RR0103:LP2		-	Light Panel	ອ ີີ່ Commscope Sliding Light Panel	01-0		User	1		
O S01:RR0103:CME1		-	Cable Management	ອ 🕮Cable Mgmt Enclosure - Type 1	01-0	Date Î↓	î↓	Log Entry Î↓	Ŵ	Actions
> 🕐 S01:RR0103:LP3		-	Light Panel	ອ ີີ Commscope Sliding Light Panel	01-0	09-29-20 22	proce ss-	Item ID: 14515, Old QRId: None, New QRId: 22044		0 <b>1</b>
O S01:RR0103:PP1		-	SMA Patch Panel	ອ 🕮12 Port SMA F-F Bulkhead Panel	01-0	01-05-20	bot proce ss-	Updating MTE Calibration Due		0 ±
O S01:RR0103:PP2		-	SMA Patch Panel	ອ 🕮12 Port SMA F-F Bulkhead Panel	🔲 01-0	21 01-05-20	bot proce	Date to 04/14/2018 Updating Calibration Status Tag		0 / 1
S01-CTL:VME1		-	VME 64x crate	ອ ີີ VME 64x Crate - Dawn 21 slot	01-0	21	ss- bot	to Expired		Û
> OS01-CTL:VME1:CPU1		-	VME CPU	Э Смуме2500 СРО	01-0	3				
> OS01-CTL:VME1:CPU1:VMENI1		-	VTM200 Transition Module	э 🛍 vтм200	01-0	History	v of v	vhat has been in	stall	ed he
S01-MT:VME1:EVM1		000 032 780 (Planned)	Event generator	🔊 🛍 MRF Event Generator - [Unit: 0008]	01-0		,			
> OS01-MT:VME1:EVR1		000 032 933 (Planned)	Event receiver	つ  い は MRF Event Receiver - [Unit: 0048]	01-0			Assigned item history		
S01-MT:VME1:EVR2		000 033 070 (Planned)	Event receiver	TAMMRF Event Receiver - [Unit: 0037]	01-0	Assigned It		tall State Parent Item Entered By Planned S01-CTL:VME1 nda		Entered On ↑↓ 13 11:23:42 CS
O S01-MT:VME1:EVR2:IO4		000 032 810 (Planned)	UNIV-NIM	TAMMRF Universal I/O NIM Output - [Unit: 0012]	0	Unit: 003 MRF Event Rec		Planned <u>S01-CTL:VME1</u> nda nstalled <u>S01-CTL:VME1</u> benes		13 11:23:42 CS
O S01-MT:VME1:EVR2:IO1		000 033 024 (Planned)	UNIV-TTL-DLY	ອ 🕮 MRF Universal I/O TTL Output w/ Delay Tuning - [Unit: 0162]	01-0			Close		
S01-MT:VME1:EVR2:IO2		000 033 025 (Planned)	UNIV-TTL-DLY	ອ 🗂ເລີMRF Universal I/O TTL Output 🗤 Đelay Tuning - [Unit: 0163]	01-0	3		:		
O S01-MT:VME1:EVR2:IO3		000 033 026 (Planned)	UNIV-TTL-DLY	ອ 🕮 MRF Universal 1/0 TTL Output w/ Delay Tuning - [Unit: 0164]	🔲 01-03	3		1		
> O S01-MT:VME1:EVR3		000 033 072 (Planned)	Event receiver	つ ビデーMRF Event Receiver - [Unit: 0039]	01-03	3				



# **Machine Design – Navigation**

- Browse the hierarchy
  - Expand hierarchy to drill down
  - CTL E Expands/Collapse all children if selected tree node.

Machine Element Na	me
V O APS-U Facility Design - April 2023	
V O APS-U: SR Mezzanine	
> 🖄 Area-01	
V Area-02	
<b>&gt;</b> 01-02	
<b>&gt; 10</b> 01-03	
> 01-04	
02-04	
02-03	
V 02-02	
> 🕐 S02:RR0202:LP1	
🕐 S02:SDS1	
0 S02:VVC1	
O S02:IPC1	
O \$02:IPC2	
O S02:IPC3	
O S02:IPC4	
🕐 S02:VGC1	
🕐 01-ID-AR-RR01	
01-ID-AR-RR02	
> Ö 02-00	
V 💯 ps-sr-s02-cabia	
🗵 🔂 S02-PS:BPSC1A	
00 S02A:FH1:PS	Scr

- "Filter" on the element name
  - Expands hierarchy to display all elements that contain the filter string

Argonne

Choose a Technical Syste

APS-U Test Stands

Beamline

Rowse 🗸 🗂 Catalog 🗸 🏦 Inventory

🖗 Design 🗸 📰 MAARC

Model Numb

**1** Machine

Control

Q Cable

- E.g. 01-02, S01A:Q, VGC
- Using '\*' (0 or more) or '?' (single) allows for more specific filtering
- S0?-\*:\*NSW?
- If too many matches are found it will prompt you to narrow your search.

	Machine Element Name S0?-*:*NSW?	Q	Machine Element Descriptio
Machine: Housing Hierarchy	V O APS-U Facility Design - April 2023		APS-U equipment - as planned
	V Ö APS-U: SR Mezzanine	al states of a second s	
	V Ö Area-01		
Export	V DO PS-SR-S01-CAB1		Power Systems
Machine Element Name	00 S01-PS:T4NSW1		PS Ethernet Switch
01-02	✓ <sup>™</sup> <sup>™</sup> PS-SR-S01-CAB2		Power Systems
	00 s01-ps:T4NSW2		PS Ethernet Switch
V Ø APS-U Facility Design - April 2023	V OO PS-SR-S01-CAB3		Power Systems
APS-U: SR Mezzanine	200 S01-PS:T4NSW3		PS Ethernet Switch
V O Area-02	✓ Ӧ҄ PS-SR-S01-CAB4		Power Systems
	00 S01-PS:T4NSW4		PS Ethernet Switch
> 0001-02	✓ Ӧ҄ PS-SR-S01-CAB5		Power Systems
S01-02-AF-Cabinet	00 s01-ps:T4NSW5		PS Ethernet Switch
	V 🗘 Area-02		
	V Ö 01-04		Diagnostics
EPICS Collaboration Meeting - April 2023	O S01-FOFB:CTNSW1		Cut-through network3witch f

#### Cable Design List

🖈 Display Mode: All

## **Captures Cables**

+ Add + Import Export

Alternate Name 1↓ ID-AR- >>S02_FODO>:DG- 74 ID-AR- ID-AR	Primary Image	Technical System 1↓         Select         Diagnostics         Diagnostics         Diagnostics	Description 1↓ S02:LB1 / A:P6 / BO_D S20:LB4 / A:P3 / BO_D	1 2 3 4 5 Endpoints S02-DIAG:RR00:PP1 S02A:P6:BPP S20-DIAG:RR00:PP1 S21A:P3:BPP	SPF-250	-	End2 Primary Device Port Î↓ BO_D	Import Cable ID ↑↓	Total Required Cable Length (ft) ↑↓ 90.2231	Actions	
ID-AR- > <s02_fodo>:DG- 74 ID-AR- &gt;<s21_dlma>:DG- 44 ID-AR- &gt;<s02_dlma>:DG- 32 ID-AR- &gt;<g05_dlma>:DG- 32 ID-AR-</g05_dlma></s02_dlma></s21_dlma></s02_fodo>	Image Image	Select  Diagnostics Diagnostics	S02:LB1 / A:P6 / BO_D S20:LB4 / A:P3 / BO_D	S02-DIAG:RR00:PP1 S02A:P6:BPP S20-DIAG:RR00:PP1	1 SPF-250	Port Î↓	Port Î↓		Length (ft) ↑↓	i / @	
)><\$02_F0DO>:DG- 74 ID-AR- >><\$21_DLMA>:DG- 44 ID-AR- ><\$05_DLMA>:DG- 32 ID-AR- ><\$05_DLMA>:DG- 32 ID-AR-		Diagnostics	BO_D \$20:LB4 / A:P3 / BO_D	S02A:P6:BPP S20-DIAG:RR00:PP1	SPF-250	LB12_BO_D	BO_D	100105	90.2231		
)><\$21_DLMA>:DG- 44 ID-AR- >><\$29_DLMA>:DG- 32 ID-AR- )><\$05_DLMA>:DG- 32 ID-AR-		-	BO_D		005.050					<u>ش</u> *	
)> <s29_dlma>:DG- 32 ID-AR- )&gt;<s05_dlma>:DG- 32 ID-AR-</s05_dlma></s29_dlma>		Diagnostics	\$291 B2 / A-D2 / TL B		SPF-250	LB41_BO_D	BO_D	101176	44.29134	i∥2 @★	
)> <s05_dlma>:DG- 32 ID-AR-</s05_dlma>			S28:LB3 / A:P2 / TI_B	S28-DIAG:RR00:PP1 S29A:P2:BPP	SPF-250	LB34_TI_B	TI_B	101626	44.29134	i∥2 @★	
		Diagnostics	S04:LB3 / A:P2 / TI_B	S04-DIAG:RR00:PP1 S05A:P2:BPP	SPF-250	LB34_TI_B	TI_B	100258	44.29134	i∥2 @★	
53		Diagnostics	S34:LB4 / A:P4 / BI_C	S34-DIAG:RR00:PP1 S35A:P4:BPP	SPF-250	LB42_BI_C	BI_C	101977	49.2126	i∥2 @★	
	🔚 Mecha	nical Operations & Maintena	න û Generic: Rack		01-02						
	Contro	bls	න 🕮 Generic: Rack		Curr						
> 🕐 S01:RR0103:LP1			ອ ີ Commscope Sliding Ligh	ht Panel	Sup	ports the	creation	of a cap	od-IIIq ai	OK T	or
Image: book solis RR0103:LP2     Image: book solis RR0103:CME1       Image: book solis RR0103:CME1     Image: book solis RR0103:CME1			ອ 🛍Commscope Sliding Ligh	ht Panel	1		contrac	ctors (AP	21)		
			ອ 🕮Cable Mgmt Enclosure -	Type 1							
	Light F	Panel	ວ 🕮Commscope Sliding Ligh	ht Panel	Referencing the f	ollowing sample pu	ill-card:				
	SMA F	Patch Panel	ອ 🕮 12 Port SMA F-F Bulkhea	ad Panel							
			ว		Cable ID	<b>PS-601128</b>			End1 Leng	gth (ft)	
	SR_Inj	ect - S01B:P5 (LS1)	<b>9</b> CT-010116							, ( ,	
			๖		01 / 0 0	. , 、	,		,		
	P0 - S	01B:P5 (LS1)	ອ CT-010115					/IA>:PS-601128		, ,	
			ข			1					
	Bunch	Select - S01B:P5 (RFSW1)	ວ ອັCT-010117		Kabel Name	SIL-W_A01_C3e	_01_1 5-510-501-	CADI[0]   SIL	1_501_501_DLMA	[A.Q1.1	51
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Image: Cable Sect - S01B:P5 (LS1)       D CT-010116       Type / Laying       Cable Info         Image: Cable Sect - S01B:P5 (LS1)       D CT-010117       Route       Kabel Name         Image: Cable Sect - S01B:P5 (RFSW1)       D CT-010117       Cable ID is hype       End1   End2 in fill         Image: Cable Image: Cable Sect - S01B:P5 (RFSW1)       D CT-010117       Image: Cable Image: Cabl	Image: Controls       Controls       Commscope Sliding Light Panel         Image: Light Panel       Commscope Sliding Light Panel       Referencing the following sample put         Image: Light Panel       Commscope Sliding Light Panel       Referencing the following sample put         Image: Light Panel       Commscope Sliding Light Panel       Referencing the following sample put         Image: Light Panel       Commscope Sliding Light Panel       Referencing the following sample put         Image: Light Panel       Commscope Sliding Light Panel       Referencing the following sample put         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Control Management         Image: Color Management       Image: Color Management	Image: Controls       Contolic



EPICS Collaboration Regimentation End2 Length (ft) indicates to leave 10.0 feet of cable from mezzanine floor End2 Length (ft) indicates to leave 2.0 feet of cable at in-tunnel drop location

24

0 i C / A 🖹

## **Captures Control Flow Between Machine Elements**

Machine: Control Hierarchy												
?			_									
+ Add Show an		ising two "serial										
device serve	rs" to	communicate with	Description Assigned Catalog 8	& Inventory Item	Locatio	n ↓ <del>/</del>						
	compo	onents										
✓ > SF ✓ Ø sioc2s01vac	_		୭ ଅ ିPICS IOC		RR6M							
V SI01:SDS1		10.54.0.0/23 [1600] ioctag:SR Vacuum			RKOW							
> Ø so1:vvc1	F	Maghiner Control Hierorch		41 "								
✓ Ø S01:IPC1			is three "control pa									
00 so1:IP1		back to t	he Control System	1								
OD S01:IP2		Machine Element Name	Q									
00 S01:IP3	<b>1</b>	S01A:P3	Interface to parent	Machine Element	Description A	Assigned Catalog & Inventory Item	Location 1 <sup></sup> ₹					
00 S01:IP4		SR RF BPM			5							
> 0 S01:IPC2	F	↓ O ioc2s40bpm4	Machine: Control Hierarch	ıy			_					
> Ø S01:IPC3	F F	✓ Ö S40:LB4	<sup>?</sup> This	"serial d	evice ser	ver" is used hv						
> 0 S01:IPC4	F	S40-SB:RFSW6	This "serial device server" is used by									
V 0 S01:VGC1	F	00 S01A:P3	+ Add 🔀 Export		two IOC:	S						
20 S01:CVG1		✓  DAQTBT	S01:SDS1	Q 	Interface to parent	Machine Element Description	Assigned Catalog & Inventory Item	Lo	ocation <sup>↑</sup> ₹			
00 so1:CCG1	( <u></u>	v Öioc2s01daqtbt	V <> SR Vacuum				ా					
00 S02:CVG1		v <sup>™</sup> so2-daQ:SERV1 v <sup>™</sup> so1-daQtBT:AGG1	♥ vioc2s01vac		10.54.0.0/23 [1600]	ioctag:SR Vacuum	ာ ိံEPICS IOC	RR6M				
00 S02:CCG1		S40:LB4	V 0 S01:SDS1	<b>E</b>	10.6.47.0/24 [1647]	Моха	ອ 🕮 Moxa 6650-32 - [Unit: 0002]	01-02				
√ <sup>10</sup> so2:sDS1		0 S40-SB:RFSW6	> O S01:VVC1		RS232	Valve Controller	ອ 🕮vvc210	01-02				
> <sup>10</sup> so2:VVC1		0 540-5B.KF3W6	> Ø S01:IPC1	1	RS232	QPC	🤊 🛍 Ion Pump Controller - QPC	01-02				
> 0 S02:IPC1	F		> Ø S01:IPC2	1	RS232	QPC	න 🗂 lon Pump Controller - QPC	01-02				
> Ø S02:IPC2	F	SR Single Bunch BPM	> Ø S01:IPC3	<b>I</b>	RS232	MPCQ	🤊 🗂lon Pump Controller- MPC	01-02				
> 0 S02:IPC3	F	v Öioc2s01bpmap3	> Ø S01:IPC4	<b>L</b>	RS232	MPCQ	ອ 🗂 lon Pump Controller- MPC	01-02				
> <sup>10</sup> so2:IPC4	F	✓ ♡ S40-SB:LS6	> Ø so1:vgc1		RS232	Televac	ອ 🗂 Vacuum Gauge Controller- Televac MX200	01-02				
> <sup>10</sup> s02:VGC1		✓ <sup>™</sup> S40-SB:RFSW6	✓ Ø sioc2s01turbo	<u> </u>	10.54.0.0/23 [1600]	ioctag:SR Vacuum	න 🎬 EPICS IOC	RR6M				
- 302.VOC1	F	00 so1a:p3	V 0 S01:SDS1		10.6.47.0/24 [1647]	Моха	🤊 🛍 Moxa 6650-32 - [Unit: 0002]	01-02				
	I		> Ø S01-TPS:TSC1		RS232	Turbo PumpSystem Controller	ອ 🗂 Turbo Pump System Controller	01-02				
Argonne			> <sup>10</sup> EPICS@Collabor	ation Meeting	<sup>RS2</sup> A2pril 2023	Televac	ອ ີີ Vacuum Gauge Controller- Televac MX200	01-02	25			

# **Tracking Measurements (MAARC Domain)**

- MAARC Domain: used for archiving measurement and analysis results
- Entries are associated with items from other domains (e.g., component instances)
- MAARC is being populated automatically using the APS Data Management system:
  - Magnetic Measurements
  - Magnetic Module Assemblies

#### **About CDB**

A major effort in the conceptual design p on the thoroughness and accuracy of suc

You can browse system pages without an

#### System At A Glance

Registered Users	372
Catalog Items	3581
Inventory Items	42729
Machine Elements	34553
MAARC Items	185687
Cable Catalog Items	387
Cable Inventory Items	8560
Cable Design Items	17522
Software Version	<u>3.15.4 (2023.03.14)</u>

Name		Files
Name Entity Type	APSU_MM_Q4_001 Measurement Data	
Description	APSU MM Data: Q4/001	
Description		
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iles		Files can be downloaded from the APS Data Management system				
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Assigned Identifier 1↓	Item Î↓		File Reference	Actions		
File-0366	APSU_Q4_100014001_Rotaffi 00.tdms	bration_0000_000_rawFld_	APSU_Q4_100014001_RotWireCalibration_0000_000_rawFld_00. tdms			
File-0385	APSU_Q4_100014601_RotWireCalif 00.txt	bration_0006_004_rawFld_	▲ APSU_Q4_100014001_RotWireCalibration_0006_004_rawFld_00     txt			
File-0386	APSU_Q4_100014001_RotWireCalil 00.tdms	bration_0006_001_rawFld_	APSU_Q4_100014001_RotWireCalibration_0006_001_rawFld_00. tdms			
File-0387	APSU_Q4_100014001_RotWireTest txt	_0000_001_rawFld_00_log.				
File-0388	APSU_Q4_100014001_RotWireCalif 00_log.txt	bration_0005_000_rawFld_	▲ APSU_Q4_100014001_RotWireCalibration_0005_000_rawFld_00			
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Related Ite	ms			-
Primary Image	Name	Domain	Qrld	Actions
	Q4 Reverse Bend Quadrupole Magnet - [DQ401]	Inventory	100 014 001	

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the moment there are	
ver 185K MAARC	
ntries in production DB	

Metadata from

entries

measurement files are

automatically added to file

0

CoilLengthForHigherTerms 0.480718 NAva 22 SagAtMagnetMicror 0.0 Comments Production excitation up measurement on RC1 with magnet Q1 026 InclinometerName phiStage phiPlate -1.0 WireFrequency Bundle2CentroidA 2.31451 3.48513 6.38936 58.68506 171.73154 176.23672 cdbltemProjec APS-U Production NumStage ISW39 SignalName Ubuck DB2 DQB1 ISW37 ISW36 ISW35 02-AUG-2019 12:47:01 ProcessDateAndTim SW33 0 ISW32 ISW31 ISW30 X2 Y2 Z2 StageNam NLoops SignalsDefFile N:\Definitions\BlueRotatingCoil402\Coil 4021 000 sdf.sdds FPGALoopTime 2.5e-08 md5Sum fd10255608eaf14cd91aff79d9d54e03 NumCurrents 3 AmbientFieldFile

Parent CDB items are linked to MAARC entries

#### EPICS Collaboration Meeting - April 2023

Key

#### **Item App List**

Name

Туре

🖋 Edit

Gallery

+ Add

Description

**Technical System** 

🛍 Delete

+ Add Load Property Filters

Item App Details

SR Vacuum

/ IOC Top App

prove distances from 1 CC-40 PLANT SERVICE MODELS STORAGE SERVICE FOR BOTTLENE LOSS AND A STORAGE STORAGE

ВОРАЛИ (1997), на во село (1997) рекусти са село (1997)

PC00 SOCTON 38

All storage ring vacuum controls & gauges; 20 soft IOCs based on double sectors

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Martine America

Vacuum | Controls/Instrumentation

# **IOC Apps in a Searchable Index**

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More	Name ↑↓	Primary Type ↑↓		Technical System ↑↓	Description ↑↓		0
Info		Image	ioc	Select v		Property: Personnel/Staff	Actions
>	SR Vacuum		ЮС Тор Арр	Vacuum Controls/Instrumentation	All storage ring vacuum controls & gauges; 20 soft IOCs based on double sectors	Scott	i∥@@*
>	SR Magnet Power Supplies		ЮС Тор Арр	Power Systems Controls/Instrumentation	Includes both unipolar supplies & bipolar supplies, but not M1,M2,IS1 & kickers	Brendan	i 🖋 🗠 🛍 🗮

	Properties									_				
	+ Add								JE					
0	Тур	be î↓	Tag Î↓			Value	Value ↑↓ Description ↑↓			Actions				
	Personnel/Staff		Controls POC			Scott				5 /				
	Document (Uploa	d)	Zone F Vacuum Diagram			(				"D /				
	Document (Uploa	d)	Typical Odd Sector Vacu	um Diagrar	n					50				
	Document (Uploa	d)	Typical Even Sector Vacu	um Diagra	m					9 /				
	Document (Uploa	d)	Vacuum Turbo Pump Cor	ntrol Syster	n					50				
_	Documentation (V	VEB)	Control Hierarchy			SR Vacuum IOC				9 ø				
F	Software/Firmware	e Code	Code Base - IOCs			<u>git repo</u>				9 ø				
	Software/Firmware		Code Base - PLCs							D #				
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Sec. Sec.	App Listing	App Listing +												
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	Item Membership	Item Membership												
1. Exercised and the second se		🗸 > SR Vac	uum 🔽			୭								
n n		🗸 🕐 sioc	2s01vac 🔺		10.54.0.0/23 [160	0] ල 🕻	EPICS IO	С	RR6M		Osr_softioc			
		🗸 🗸	01:SDS1	DS1 10.6.47.		7] 🤊 🛍 Moxa 6650-32 - [Unit: 0002]		6650-32 - [Unit: 0002]	01-02		01-02			
SECTOR JC		> ए	) S01:VVC1		RS232	ື ອ	VVC210		01-02		01-02			
			S01:IPC1		RS232	ອ 🗍	lon Pump	o Controller - QPC	01-02		01-02			
			00 S01:IP1		Direct Connection	า 🤊 🖡	lon Pump	o- 45L w/ NEG Gamma	SR_Tu	unnel_01_DLMA	OS01A:DLMA			
+			00 S01:IP2		Direct Connectior	า ๖ 🕻	lon Pump	o- 45L w/ NEG Gamma	SR_Tu	unnel_01_DLMA	OS01A:DLMA			
			00 S01:IP3		Direct Connectior	า ๖ 🕻	lon Pump	o- 45L w/ NEG Gamma	SR_Tu	unnel_01_DLMA	OS01A:DLMA			
			00 S01:IP4		Direct Connectior	า ๖ 🕻	lon Pump	o- 45L w/ NEG Gamma	🖪 SR_Tu	unnel_01_QMQA	OS01A:QMQA:VC:ASSY			
		> ए	\$ \$01:IPC2		RS232	න 🕻	lon Pump	o Controller - QPC	01-02		01-02			



Log Entries

## **High Level Apps in a Searchable Index**

#### **Item App List**

+ Add	Load Property Filters							Øii	<b>2 / Ð</b> 🖹
More	Name Î↓	Primary	Туре ↑↓	Technical System ↑↓			Description ↑↓		
Info		Image		Select	~			Property: Personnel/Stat	ff Actions
>	C2 Deployment Intrastructure		Script	Controls/Instrumentation		Collection of tools and cor	nventions to define IOC and HLA deployment infrastructure	Andrew	i ∥ 42 m ★
>	Infrastructure Monitoring System (IMS)		Service - Continuous Web-based Application	Controls/Instrumentation		System for monitoring C2	health.	Dariusz	i 🖋 🖄 🏛 🗮
	C2 Log Monitoring		Service - Continuous Web-based Application	Controls/Instrumentation					i 🖋 🖄 🛍 🗮
>	Component Database		Web-based Application	Controls/Instrumentation		Tool designed to documer	nt, organize, track, and manage components over their life cycle	Dariusz	i 🖉 🖄 🛍 🗮
>	DAQ System Infrastructure		Service - Continuous	Controls/Instrumentation				Elaine/Sinisa	i∥2b m *
>	DAQ tools		Service - On demand Service - Continuous Application - On Demand Script	Controls/Instrumentation		Tools for developing and c	lebugging in the DAQ environment.	Elaine/Sinisa	i∥@ @ ₩*
>	eTraveler		Web-based Application	Controls/Instrumentation				Dariusz	i 🖋 🖆 🛍 🗮
>	GUI tools		Application - On Demand	Controls/Instrumentation		GUI tools deployed in C2 s	such as CS Studio and C2 Data Viewer	Elaine	i∥@ @ *
>	IOC tools		Script	Controls/Instrumentation		Command-line utilities that	t assist with IOC debugging and development.	Dariusz/Andrew	i∥@ @ *
>	IRMIS		Application - On Demand Web-based Application	Controls/Instrumentation		Integrated Relational Mode	el of Installed Systems - component and IOC tracking	Dariusz	i 🖋 🖒 🖬 🗮
>	Naming Portal	Surrow,	Web-based Application	Controls/Instrumentation		Tool to track abbreviations	s used in the naming convention	Dariusz	i 🖉 🖓 🏛 🕇
>	Olog	200 At 12	Web-based Application	e) nda@gaea 13> cdbInfoid 1	82824=	11	🛅 nda — nda@gaea:~ — ssh gaea — 166×45		
>	PV Gateways/Nameservers		Service - Continuous				Item Details		
>	<u>SR Vacuum</u>		ІОС Тор Арр						
>	SR Magnet Power Supplies		IOC Top App	DD 068388 roject APS-U	04370c49f Productic e Design	fcb35fba1ff762d53d on			
			De	escription Gate V	//odb_aps	anl gov/odb/views/ite			
	Originally developed	@ FR				0.54.0.0/23 [1600]) → s: .5" All Metal with RF-L.	ioc2s01vac → (10.6.47.0/24 [1647]) → S01:SDS1 → (RS232) →	S01:VVC1 → (Direct Connect	tion) → S01A:GV1
		0		signed Item Id 20083					
							Cable Connections		
	Olog – NSLS II, FRI	3, SN	Ca	ble	Cable 1	[d	Connected Machine(s)	Port Name	
			VA	-011403	264462		S01:MPSL1   S01A:GV1		
			VA	-011401	264270		S01:VVC1   S01A:GV1		
Arc	zonne 🔼						***************************************		



## **Managing Assemblies**

Catalog Item Details	Properties +									
Name 🕜 DLMA Magnet Module	eTraveler Template	S					+			
Model Number @ A420-000001	Assembly Listing						_			
Alternate Name 🕜		A catalog item can be an "assembly"								
Project & APS-U Production	+ Add		of other catalog iten	ns		₽ ₽	\$			
Description & This DLMA Magnet Module has two build variants: "DLMA Magnet Modulde - S40" and										
"DLMA Magnet Module - S01,S37,S38,S39"			Assembly		Assigned Item					
Technical System & Supports		A:SUPP	Part Description DLM-A Support Assembly	Required Yes	Name DLMA Support Assembly	Model Number	(analista			
Function Agent Module Assembly		A.SUPP								
Created from N/A template	> A:Q1		Quadrupole	Yes	Q1 Production Magnet	U2330101-100000				
	> A:FC1		Fast Corrector	Yes	8-Pole Fast Corrector Production Magnet	APS-MG-CRR-3000				
🖋 Edit 🗴 🛍 Delete 🛛 More Info 🔹 Permalink 💿 Return	> A:Q2		Quadrupole	Yes	Q2 Production Magnet	U2330101-200000				
Gallery —	> A:M1		Dipole Magnet	Yes	M1 Production Magnet	A174-100000				
	> A:Q3		Quadrupole	Yes	Q3 Production Magnet	U2330101-300000				
+ Add	> A:S1		Sextupole magnet	Yes	S1/S3 Production Magnet	A172-100000				
	> A:Q4		Quadrupole	Yes	Q4 Reverse Bend Quadrupole Magnet	U2330101-400000				
	> A:S2		Sextupole magnet	Yes	S2 Sextupole Magnet	A173-200000				
	> A:Q5		Quadrupole	Yes	Q5 Production Magnet	U2330101-500000				
	> A:FC2		Fast Corrector	Yes	8-Pole Fast Corrector Production Magnet	APS-MG-CRR-3000				
	> A:S3		Sextupole magnet	Yes	S1/S3 Production Magnet	A172-100000				
	> A:VC1		A:VC1	Yes	A:VC1 NEG-Coated Aluminum Vacuum Chamber	A043-010000				
	> A:P1:B	CS	Set of 4 BPM cables	Yes	BPM PEEK Kit cables	X12J105319-00				
	> A:M1:S	TND_US	M1 L-bend US support	Yes	A:M1 L-bend Chamber US End Support Stand	A048-174000				
	> A:M1:S	TND_MS	M1 L-bend mid support	Yes	M1 L-bend Chamber Mid Support Stand	A048-180000	I			
	> A:M1:S	TND_DS	M1 L-bend DS support	Yes	A:M1 L-bend Chamber DS End Support Stand	A048-170000				
	> A:VC3		Vacuum Chamber - A:VC3 L-bend	Yes	A:VC3 (A:M1) L-bend Vacuum Chamber	A044-100000				
	> A:IP1		Ion Pump	Yes	lon Pump- 45L w/ NEG Gamma	45SDI4DSC1N2				
	> A:P2		A:VC4 / A:P2 / A:VC5 / A:P2 keyhole support	Yes	A:P2 Keyhole Beam Position Monitor without RF Liners	A046-310000				
	> A:P2:B	PP	BPM SMA Patch Panel	Yes	BPM SMA Patch Panel for DLMA/DLMB	A241-109010				
Log Entries +	> A:P1:B	PP	BPM SMA Patch Panel	Yes	BPM SMA Patch Panel for DLMA/DLMB	A241-109010				
Ports +	> A:P2:B	cs	Set of 4 BPM cables	Yes	BPM PEEK Kit cables	X12J105319-00				
	> A:IP2		Ion Pump	Yes	Ion Pump- 45L w/ NEG Gamma	45SDI4DSC1N2				
	> A:VC7		Vacuum Chamber - A:VC7 NEG-coated Aluminum	Yes	A:VC7 NEG-Coated Aluminum Vacuum Chamber	A043-060000				



# **Managing Assemblies**

Tag 🕜 DLMA-1170	+ Add									▶ 🖶 🖹	
QR Id 🖉 000 031 908		Туре ↑↓		Tag Î↓			Value ↑↓		Description	↑↓ Actions	
Catalog Item DLMA Magnet Module	Documen				ument.125695594102398652.xlsx		Decomption 10				
Serial Number 🥜		nt (Upload)	DLMA-1170_Y_module_	-			ument.14179070794570592166.xlsx		5 1		
Project APS-U Production	Documen	nt (Upload)	DA17 X SHIM CHANGE			doc	ument.15287097582387438094.xlsx			"D #	
Description /	Documen	nt (Upload)	DA17 Y SHIM CHANGE	01		doc	ument.12934298797760775345.xlsx			"D #	
Location "ງ 🖉 > 📕 981-S6-D-101	eTraveler In	istances								_	
Location Details	+ Add										
Status 🔊 🥒 Acceptance In Progress		Title		Description	Created By	Updated By	Created From Template	Estimated Progress	Version	Action	
	DLM	A-1170 Magnets Installat	tion/Assembly		bechtold	dwilkin	DLMA Magnets Installation/Assembly	100%	13:0	0 ≡ ∎ + ■	
🖋 Edit 🛍 Delete 🚯 More Info 🗈 Permalink 💿 Return		MA-1170 Magnet Alignmer			mmendez	dwilkin	DLMA Magnet Alignment Verification	100%	11:0	0 ≣ 🛍 🕂 🖬	
	DLN	AA-1170 Ground Bar Insta	Illation		mmendez	dwilkin	Ground Bar Installation	100%	8	0 🗏 🛍 🕂 🖬	
Gallery +	DLN	AA-1170 Cable Tray Instal	llation		mmendez	dwilkin	Cable Tray Installation	100%	3:0	0 🗏 🛍 🕂 🖬	
Log Entries +		AA-1170 Water Manifold Ir	nstallation		mmendez	mmendez	An assembly inve	n cap	tures 🖿		
	Assembly L	Accomply Licting					the exact par				
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			Ass	embly		« ‹ 1		embly Assigned Item			
		Part Name		Part Descrip	otion	« ( <b>1</b>	Name	-		rial Number	
	>	A:DLMA:SUPP	DLM-A Support Asse	Part Descrip	otion	« (1	Name           DLMA Support Assembly - [017]	-	017	rial Number	
	>			Part Descrip	otion	« (1	Name	-		rial Number 143	
		A:DLMA:SUPP	DLM-A Support Asse	Part Descrip	otion	« ‹ 1	Name           DLMA Support Assembly - [017]	Assigned Item	017	Image: Second	
	>	A:DLMA:SUPP A:Q1	DLM-A Support Asse Quadrupole	Part Descrip	otion	« < 1	Name          Vame         Image: DLMA Support Assembly - [017]         Image: Q1 Production Magnet - [DQ143]	Assigned Item	017 DQ1	Image: Second	
	>	A:DLMA:SUPP A:Q1 A:FC1	DLM-A Support Asso Quadrupole Fast Corrector	Part Descrip	otion	« < 1	Name          DLMA Support Assembly - [017] <u>Q1 Production Magnet - [DQ143]</u> <u>8-Pole Fast Corrector Production Magnet</u>	Assigned Item	017 DQ1 MFC	Image: Second	
	>	A:DLMA:SUPP A:Q1 A:FC1 A:Q2	DLM-A Support Asse Quadrupole Fast Corrector Quadrupole	Part Descrip	otion	« < 1	Name          DLMA Support Assembly - [017]         Q1 Production Magnet - [DQ143]         8-Pole Fast Corrector Production Magnet         Q2 Production Magnet - [SQ271]	Assigned Item	017 DQ1 MFC SQ2	Image: Second	
	> > > >	A:DLMA:SUPP A:Q1 A:FC1 A:Q2 A:M1	DLM-A Support Asse Quadrupole Fast Corrector Quadrupole Dipole Magnet	Part Descrip	otion	« ( 1	Name              DLMA Support Assembly - [017]          Q1 Production Magnet - [0Q143]           8-Pole Fast Corrector Production Magnet          Q2 Production Magnet - [SQ271]          M1 Production Magnet - [DM131]	Assigned Item	017 DQ1 MFC SQ2	Image: Second	
	> > > >	A:DLMA:SUPP A:Q1 A:FC1 A:Q2 A:M1 A:Q3	DLM-A Support Asse Quadrupole Fast Corrector Quadrupole Dipole Magnet Quadrupole	Part Descrip	otion	« ( 1	Name DLMA Support Assembly - [017] Q1 Production Magnet - [DQ143] B-Pole Fast Corrector Production Magnet Q2 Production Magnet - [SQ271] M1 Production Magnet - [DM131] Q3 Production Magnet - [SQ343]	Assigned Item t - [MFC118]	017 DQ1 MFC SQ2	Image: Second	
	> > > > >	A:DLMA:SUPP         A:Q1         A:FC1         A:Q2         A:M1         A:Q3         A:S1	DLM-A Support Asse Quadrupole Fast Corrector Quadrupole Dipole Magnet Quadrupole Sextupole magnet	Part Descrip	otion	« < 1	Name DLMA Support Assembly - [017] Q1 Production Magnet - [DQ143] B-Pole Fast Corrector Production Magnet Q2 Production Magnet - [SQ271] M1 Production Magnet - [DM131] Q3 Production Magnet - [SQ343] S1/S3 Production Magnet - [DS1142]	Assigned Item t - [MFC118]	017 DQ1 MFC SQ2 DM1	Image: Second	
	> > > > > >	A:DLMA:SUPP         A:Q1         A:FC1         A:Q2         A:M1         A:Q3         A:S1         A:Q4	DLM-A Support Asse Quadrupole Fast Corrector Quadrupole Dipole Magnet Quadrupole Sextupole magnet Quadrupole	Part Descrip	ption	« < 1	Name DLMA Support Assembly - [017] Q1 Production Magnet - [DQ143] B-Pole Fast Corrector Production Magnet Q2 Production Magnet - [SQ271] M1 Production Magnet - [DM131] Q3 Production Magnet - [SQ343] S1/S3 Production Magnet - [DS1142] Q4 Reverse Bend Quadrupole Magnet - [I	Assigned Item t - [MFC118]	017 DQ1 MFC SQ2 DM1	Image: Second	
	> > > > > > > > >	A:DLMA:SUPP         A:Q1         A:FC1         A:Q2         A:M1         A:Q3         A:S1         A:Q2	DLM-A Support Asset       Quadrupole       Fast Corrector       Quadrupole       Dipole Magnet       Quadrupole       Sextupole magnet       Quadrupole	Part Descrip	ption	« < 1	Name            • DLMA Support Assembly - [017]             • Q1 Production Magnet - [DQ143]             • B-Pole Fast Corrector Production Magnet             • Q2 Production Magnet - [SQ271]             • M1 Production Magnet - [DM131]             • Q3 Production Magnet - [SQ343]             • S1/S3 Production Magnet - [DS1142]             • Q4 Reverse Bend Quadrupole Magnet - [I]             • S2 Sextupole Magnet - [ES2017]	Assigned Item <u>t - [MFC118]</u>	017 DQ1 MFC SQ2 DM1 C DQ4 ES2	Image: constraint of the sector of	
	> > > > > > > > >	A:DLMA:SUPP         A:Q1         A:FC1         A:Q2         A:M1         A:Q3         A:S1         A:Q4         A:Q5	DLM-A Support Asse       Quadrupole       Fast Corrector       Quadrupole       Dipole Magnet       Quadrupole       Sextupole magnet       Quadrupole       Sextupole magnet       Quadrupole       Quadrupole	Part Descrip	ption	« < 1	Name              DLMA Support Assembly - [017]              Q1 Production Magnet - [DQ143]              8-Pole Fast Corrector Production Magnet             Q2 Production Magnet - [SQ271]             M1 Production Magnet - [DM131]             Q3 Production Magnet - [DM131]             Q3 Production Magnet - [DS1142]             Q4 Reverse Bend Quadrupole Magnet - [II             S2 Sextupole Magnet - [ES2017]             Q5 Production Magnet - [DQ523]	Assigned Item <u>t - [MFC118]</u>	017 DQ1 MFC SQ2 DM1 CM1 CM1 ES2 DQ4 ES2 DQ5	Image: Constraint of the sector of	
	> > > > > > > > > > >	A:DLMA:SUPP         A:Q1         A:FC1         A:Q2         A:M1         A:Q3         A:S1         A:Q4         A:S2         A:Q5         A:FC2	DLM-A Support Asset       Quadrupole       Fast Corrector       Quadrupole       Dipole Magnet       Quadrupole       Sextupole magnet       Quadrupole       Sextupole magnet       Quadrupole       Fast Corrector	Part Descrip	ption	<< 1	Name <ul> <li>DLMA Support Assembly - [017]</li> <li>Q1 Production Magnet - [DQ143]</li> </ul> % <u>9-Pole Fast Corrector Production Magnet</u> <ul> <li>Q2 Production Magnet - [SQ271]</li> <li>M1 Production Magnet - [DM131]</li> <li>Q3 Production Magnet - [DM131]</li> <li>Q3 Production Magnet - [DS1142]</li> <li>Q4 Reverse Bend Quadrupole Magnet - [U</li> <li>S2 Sextupole Magnet - [ES2017]</li> <li>Q5 Production Magnet - [DQ523]</li> <li>8-Pole Fast Corrector Production Magnet</li> </ul>	Assigned Item <u>t - [MFC118]</u> DQ473] <u>t - [MFC116]</u>	017 DQ1 MFC SQ2 DM1 CM1 CM1 ES2 DQ4 ES2 DQ5	Image: select	
	> > > > > > > > > > >	A:DLMA:SUPP         A:Q1         A:FC1         A:Q2         A:M1         A:Q3         A:S1         A:Q4         A:S2         A:Q5         A:FC2         A:S3	DLM-A Support Asset       Quadrupole       Fast Corrector       Quadrupole       Dipole Magnet       Quadrupole       Sextupole magnet       Quadrupole       Sextupole       Quadrupole       Fast Corrector       Quadrupole       Sextupole magnet       Quadrupole       Sextupole magnet       Quadrupole       Sextupole magnet       Quadrupole       Sextupole magnet	Part Descrip	ption	« < 1	Name              DLMA Support Assembly - [017]              Q1 Production Magnet - [DQ143]             B-Pole Fast Corrector Production Magnet             Q2 Production Magnet - [SQ271]             M1 Production Magnet - [SQ343]             Q3 Production Magnet - [DS1142]             Q4 Reverse Bend Quadrupole Magnet - [I]             S2 Sextupole Magnet - [ES2017]             Q5 Production Magnet - [DQ523]             B-Pole Fast Corrector Production Magnet             S1/S3 Production Magnet - [DQ523]	Assigned Item <u>t - [MFC118]</u> DQ473] <u>t - [MFC116]</u>	017 DQ1 MFC SQ2 DM1 CM1 CM1 ES2 DQ4 ES2 DQ5	Image: select	
	> > > > > > > > > >	A:DLMA:SUPP         A:Q1         A:FC1         A:Q2         A:M1         A:Q3         A:S1         A:Q4         A:S2         A:Q5         A:FC2         A:S3         A:VC1	DLM-A Support Asset       Quadrupole       Fast Corrector       Quadrupole       Dipole Magnet       Quadrupole       Sextupole magnet       Quadrupole       Sextupole magnet       Quadrupole       Fast Corrector       Sextupole magnet       Quadrupole       Sextupole magnet       Quadrupole       Sextupole magnet       A:VC1	Part Descrip	ption		Name <ul> <li>DLMA Support Assembly - [017]</li> <li>Q1 Production Magnet - [DQ143]</li> <li>8-Pole Fast Corrector Production Magnet</li> <li>Q2 Production Magnet - [SQ271]</li> <li>M1 Production Magnet - [DM131]</li> <li>Q3 Production Magnet - [DM131]</li> <li>Q3 Production Magnet - [DS1142]</li> <li>Q4 Reverse Bend Quadrupole Magnet - [Q</li> <li>S2 Sextupole Magnet - [ES2017]</li> <li>Q5 Production Magnet - [DQ523]</li> <li>8-Pole Fast Corrector Production Magnet</li> <li>S1/S3 Production Magnet - [DS1141]</li> <li>A:VC1 NEG-Coated Aluminum Vacuum Char</li> </ul>	Assigned Item <u>t - [MFC118]</u> DQ473] <u>t - [MFC116]</u> mber- []	017 DQ1 MFC SQ2 DM1 CM1 CM1 ES2 DQ4 ES2 DQ5	Image: state stat	



## **Defines & Captures "Installation Kit" Inventory**

Name	Mezzanine Rack Kit BMFE (BM-AR-RR03/04)
Model Number	NA
Alternate Name	APSU Bending Magnet Front End Mezzanine Box
Project	APS-U Production
Description	Crate used to store al cabinet hardware and cables need on the mezzanine for BMFE
Technical System	Controls/Instrumentation   Front Ends
Function	Controller - Generic   Kit
Created from template	N/A

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**Catalog Item Details** 

More Info

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CUSTOWERS

PAK28481 BM SPECIALTY

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Log Entries

Ports

Gallery

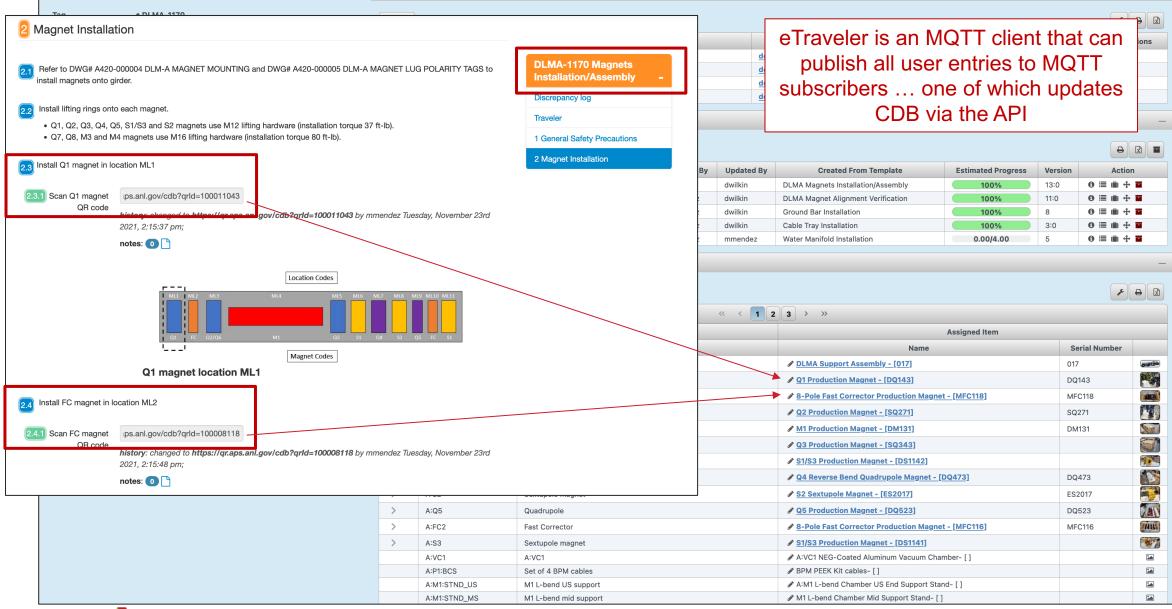
#### 

« < 1 2 > » Assembly **Assigned Item** Part Name Part Description Required Name Model Number > IP Cable 7 No SCPSC20SC (ion pump FE) SCPSC20SC > SCPSC20SC (ion pump FE) IP Cable 6 Yes SCPSC20SC > IP Cable 5 Yes SCPSC20SC (ion pump FE) SCPSC20SC > IP Cable 4 Yes SCPSC20SC (ion pump FE) SCPSC20SC > IP Cable 3 Yes SCPSC20SC SCPSC20SC (ion pump FE) > IP Cable 2 Yes SCPSC20SC (ion pump FE) SCPSC20SC > IP Cable 1 Yes SCPSC20SC (ion pump FE) SCPSC20SC > QPC shelf Yes KIT, SHELF, QPC, 19" RACK 310116 > Ion Pump Controller 2 QPC-4-P-S-1-US110-S-S-N Yes Ion Pump Controller - QPC > Ion Pump Controller 1 Yes Ion Pump Controller - QPC QPC-4-P-S-1-US110-S-S-N > 100 Vacuum Gauge System Yes Vacuum Gauge Controller- Televac MX200 2-7900-034 > Picoammeter Yes Picoammeter - 4 channel; ±60µA range WTETRAMMCAPS FE Vacuum cat5 (1) Yes **FE Vacuum cat5** cat5 FE Vacuum cat5 (2) Yes **FE Vacuum cat5** cat5 FE Vacuum cat5 (3) Yes **FE Vacuum cat5** cat5 DB9 to RJ45 Adaptor (1) Televac Yes **DB9 to RJ45 Adaptor** PN 02947 DB9 to RJ45 Adaptor (2) QPC Yes DB9 to RJ45 Adaptor PN 02947 DB9 to RJ45 Adaptor (3) QPC Yes **DB9 to RJ45 Adaptor** PN 02947 5 Yes BM Patch Panel **FE XBPM Patch Pane** R1280/1UK/16 FE-BM motor/limit switch (long) Yes FE-BM motor/limit switch (long) FE-BM motor/limit switch (short) Yes FE-BM motor/limit switch (short) Pot (long) Yes FE-BM potentiometer (long) -Pot (short) Yes FE-BM potentiometer (short) Diag BMFE Ethernet interface panel Yes **Generic: Interface Adapter** > Moxa 6650-16 NPort 6650-16 Yes Moxa 6650-16



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## **CDB Update upon eTraveler Entry**





## **CDB Holds Links to eTravelers**

Tag

QR Id

Project

Catalog Item

Description

Location 🔊

Status 🔊

Gallery Log Entries

Location Details Housing

Serial Number

/ DLMA-1170

/ 000 031 908

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1

🖋 Edit 🛍 Delete 🛛 More Info 🛛 🖺 Permalink

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**DLMA Magnet Module** 

APS-U Production

/ > 🖩 981-S6-D-101

Acceptance In Progress

#### CDB links to the eTravelers has been used extensively

Properties

**BPM Feedthrough/Cable Testing** 

**DLMA Vacuum Staging Traveler** 

**DLM-A/B Magnet Splitting Traveler** 

DLMA Vacuum Assembly Traveler

Module Checkout Traveler

Vacuum Alignment Traveler

**DLMA Module Hipot Traveler** 

**DLMA Module Hydrostatic Test** 

DI MA VBO Installation Tr

Final Magnet Alignment Traveler

**DLM-A Magnet Reassembly Traveler** 

SPECIAL DLMA-S40 Magnets Installation/Assembly

Diagnostics TMI Installation eTraveler for Girder Magnet Module Assembly

DLMA Keyhole BPM and Chamber Trio Staging, Assembly and Leak Check Traveler

DLM-A Vacuum Module Leak Check eTraveler

**DLM-A Vacuum Water Installation Traveler** 

	+	Add							<u>۶</u> 8 6
		Type Î↓	Tag Î↓			Value Î↓		Description	1↓ Actions
	Document (Upload) DLMA-1170_X_module			D	doc	ument.125695594102398652.xlsx			D #
	D	ocument (Upload)	DLMA-1170_Y_module_shim_change_0	)	doc	ument.14179070794570592166.xlsx			51
	D	ocument (Upload)	DA17 X SHIM CHANGE 01		doc	ument.15287097582387438094.xlsx			51
	D	Document (Upload) DA17 Y SHIM CHANGE 01			doc	ument.12934298797760775345.xlsx			D &
	+	Add + Create Binder	Instand	ces					
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	+	Title	Description	Created By	Updated By	Created From Template	Estimated Progress	Version	Action
m	+		Description		Updated By dwilkin dwilkin	Created From Template DLMA Magnets Installation/Assembly DLMA Magnet Alignment Verification	Estimated Progress	Version 13:0 11:0	
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#### **Catalog Item Details**

Name	/ DLMA Magnet Module	+ Add							P 🖶 🕅	Assembly	Assigned Item		
Model Number		Type ↑↓	Type î↓ Tag î↓ Value î↓				Descript	ion Î↓	Actions	Part Description	Name	Serial Number	
Alternate Name	1	Inventory Quantity Planned		41					31	pport Assembly	DLMA Support Assembly - [017]	017	and the
Project	APS-U Production	Documentation (WEB)		Magnet Module Bi	ill of Material (BOM) Spreadshe	et			30	e	Q1 Production Magnet - [DQ143]	DQ143	
Description		PDMLink Drawing		A420-000003.DR	RW	Vacuum As	sembly for DLMA		001	ctor	8-Pole Fast Corrector Production Magnet - [MFC118]	MFC118	SHI2
	variants: "DLMA Magnet Modulde - S40" and "DLMA Magnet Module - S01,S37,S38,S39"	Document (ICMS)		A420-000003.DR	RW	Vacuum As	sembly for DLMA		31	e	A Q2 Production Magnet - [SQ271]	SQ271	
Tabalasto		Image		× 🐳 🃎					50	gnet	M1 Production Magnet - [DM131]	DM131	
Technical System	& Supports	1							31	e			
Function		Image								magnet			
Created from	N/A	Documentation (WEB)		Module Assembly	<u>/ Status Page</u>				30	e	Q4 Reverse Bend Quadrupole Magnet - [DQ473]	DQ473	
template		Document (ICMS)	Build Variant Documentation	APSU_2188403		Special Mo	dules Addendum to Mo	dule Assembly ESD	50	magnet		ES2017	
🖋 Edit 🛍 Delete	🖲 More Info 🗈 Permalink 🐵 Return	Document (Opioad)							38	e		DQ523	
		eTraveler Templates							_	cto	8-Pole Fast Corrector Production Magnet - [MFC116]	MFC116	(ALL)
Gallery	—	Te	emplates							magnet	S1/S3 Production Magnet - [DS1141]		1
		+ Add	mplates						₽ 🛛 🖬		A:VC1 NEG-Coated Aluminum Vacuum Chamber- []		<b>EA</b>
+ Add	F								لعالعاتها	PMcables	& BPM PEEK Kit cables- []		54 C
			Title	Pref	ferred Version 🚯 Created By	Created On	Updated B	y Updated On	Actions	U: support	A:M1 L-bend Chamber US End Support Stand- []		<b>EA</b>
	the second se	DLMA Magnets Installation/Asse	mbly	di t	latest dwilkin	Thu Aug 27 11:39:25 CD1	2020 nbechtold	Fri Jun 17 09:11:09 CDT 2022	2 🛍 🔳	misupport	& M1 L-bend Chamber Mid Support Stand- [ ]		14
		Ground Bar Installation		ø	latest dwilkin	Fri Jul 16 15:52:10 CDT 2	021 dwilkin	Thu Oct 27 09:21:29 CDT 20	22 🛍 🔳				
		Cable Tray Installation		1	latest dwilkin	Fri Jul 16 16:03:59 CDT 2	021 dwilkin	Tue Feb 28 08:17:14 CST 202	23 🛍 🔳				
		DLMA Magnet Alignment Verifica	ation		latest dwilkin	Tue Jul 13 10:19:17 CDT 2	021 dwilkin	Mon Feb 27 19:20:56 CST 20	023 🏛 🔳				
V BROWN	一 一 一 一 一 一 一 一 一 一 一 一 一 一 一 一 一 一 一	Water Manifold Installation			latest dwilkin	Wed Oct 13 10:07:58 CD	2021 dwilkin	Fri Feb 17 12:10:09 CST 2023	3 🛍 🔳				

Mon Dec 06 14:39:35 CST 2021 dwilkin

Mon Sep 12 08:28:23 CDT 2022 dwilkin

Wed Nov 09 09:30:22 CST 2022 dwilkin

Wed Dec 07 08:20:19 CST 2022 dwilkin

Wed Mar 09 06:56:53 CST 2022 dwilkin

Wed Dec 21 12:30:31 CST 2022 dwilkin

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Fri Feb 04 10:11:33 CST 2022

Fri Oct 28 07:46:22 CDT 2022

Fri Dec 17 08:23:26 CST 2021

Wed Nov 09 10:19:24 CST 2022

Tue Jan 17 10:17:03 CST 2023

Tue Jan 24 11:00:32 CST 2023

Wed Feb 08 10:45:20 CST 2023

Eeb 02 06:34:07 CST 202

Mon Nov 14 08:17:53 CST 2022

Fri Jan 13 08:39:46 CST 2023

Fri Feb 17 08:12:14 CST 2023

Mon Sep 12 08:36:35 CDT 2022

Tue Apr 04 09:16:39 CDT 2023

Tue Jan 31 09:23:51 CST 2023

Mon Feb 27 19:36:33 CST 2023

Mon Feb 27 19:35:38 CST 2023

Wed Mar 08 13:55:39 CST 2023

Tue Mar 28 09:07:47 CDT 2023

Tue Mar 28 09:08:01 CDT 2023

Mon Feb 27 19:37:21 CST 2023

Tue Feb 07 08:12:33 CST 2023

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NATIONAL LABORATORY

EPICS Collaboration Meeting - April 2023

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## **Equipment Calibration Tracking**

Q Browse ~ 🗂 Catalog ~ 🔝 Inventory ~ 🖗	Design 🗸 📰 MAARC	Γ	A " I'I (' I'		Qrld Search 🖉 Administrative - 🤻 Se				
POWER SENSOR (Model 8482A) - [Ur	iit: 2]	Properties	A "calibration" defined and a inventory item	pplied to any		Property Value Metadata ×			
Tag 🥜 Unit: 2		+ Add	calibratior			Кеу	Value		
QR Id 🕜 000 022 044					Comment	Value			
Catalog Item POWER SENSOR (Model 8482A)		Type Î↓	Tag I↓	Value	l ↓	Optional Email Subject Ending			
Serial Number / 3318A28752		Custodian		Kotsiopoulos, George J. Calibration last performed:0	A/1A/2017 B	Calibration Method	Outside Vendor		
		Calibration M&TE (DEPREC		04/14/17 •	4/14/2017	Calibration Expiration Date	04/14/2018		
Project / APS-OPS		Calibration Status/Perform	ned Expired	04/14/17		Primary Email Address	gkotsiopoulos@anl.gov		
Description 🕜		eTraveler Instances				Expiration Warning Level (days)	60		
Location 🔊 🕜						Calibration Frequency	1 Year		
Location Details 🕢 412 RF Spares		Assembly Listing			-	Primary Calibration Contact	George Kotsiopoulos		
Housing		Item Membership							
Status 🤊 🥜 Planned		Catalog Item Properties				× Done			
<ul> <li>Æ Edit To Delete</li> <li>More Info</li> <li>Permalink</li> <li>Gallery</li> </ul>	Return +		Tune Îl	Tor 1		Volue 1	Description		
Log Entries	_	Q Browse Y 🛱 Catal	og 🗡 🔝 Inventory 🗡 🖗 Desi	gn 🗸 🖽 MAARC			Qric		
+ Add		Property Type Det	tails		✓ Allowed Property Values				
Date ↑↓         User ↑↓         Log Entry ↑↓	Actions	Description Value i							
09-29-20 proce Item ID: 14515, Old QRId: None,		Descent Description	is the last performed calibration date, 1	Tag is the calibration status.					
	l ±	Prompt Description		Fag is the calibration status.	Value ↑↓	Units 1↓	Sort Order		
22 SS- bot New QRId: 22044	<i>∕∕</i> ± ™	Invento Allowed Domain Cable	ory ne Design Catalog	fag is the calibration status.	No allowed property values h				
22         SS- bot         New QRId: 22044           01-05-20         proce SS- Date to 04/14/2018         Updating MTE Calibration Due Calibration Due	ů / ±	Invento Allowed Domain Cable	ory ne Design	ag is the calibration status.					
22     SS- bot     New QRId: 22044       01-05-20 21     proce ss- bot     Updating MTE Calibration Due Date to 04/14/2018	₩ // ± ₩	Allowed Domain Machin Cable Cable	ory ne Design Catalog Inventory	fag is the calibration status.	No allowed property values h				
22     SS- bot     New QRId: 22044       01-05-20 21     proce ss- bot     Updating MTE Calibration Due Date to 04/14/2018       01-05-20     proce ss- bot     Updating Calibration Status Tag to Expired		Allowed Domain Invent Machir Cable Id 127 Category Mainte Handler Date	ory ne Design Catalog Inventory	fag is the calibration status.	No allowed property values h	ave been specified.	Sort Order ↑↓		
22     SS- bot     New QRId: 22044       01-05-20     proce SS- bot     Updating MTE Calibration Due Date to 04/14/2018       01-05-20     proce SS- sS-     Updating Calibration Status Tag	₩ // ± ₩	Allowed Domain Invento Machin Cable - Cable - Id 127 Category Mainte Handler Date Default Value	ory ne Design Catalog Inventory	fag is the calibration status.	No allowed property values h	ave been specified.	Sort Order ↑↓ Description		
22     SS- bot     New QRId: 22044       01-05-20 21     proce ss- bot     Updating MTE Calibration Due Date to 04/14/2018       01-05-20     proce ss- bot     Updating Calibration Status Tag to Expired		Allowed Domain Invent Machir Cable Id 127 Category Mainte Handler Date	ory ne Design Catalog Inventory	fag is the calibration status.	No allowed property values h  Property Metadata Keys  Key	ave been specified.	Sort Order ↑↓ Description		
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22     SS- bot     New QRId: 22044       01-05-20 21     proce ss- bot     Updating MTE Calibration Due Date to 04/14/2018       01-05-20     proce ss- bot     Updating Calibration Status Tag to Expired		Allowed Domain Invent Machin Cable Id 127 Category Mainte Handler Date Default Value Default Units	ory ne Design Catalog Inventory enance	fag is the calibration status.	No allowed property values h         Property Metadata Keys         Key         Calibration Method         Calibration Frequence	ave been specified.	Sort Order 1↓		
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22     SS- bot     New QRId: 22044       01-05-20 21     proce ss- bot     Updating MTE Calibration Due Date to 04/14/2018       01-05-20     proce ss- bot     Updating Calibration Status Tag to Expired		Allowed Domain Allowed Domain Allowed Domain Allowed Domain Allowed Cable Cabl	ory ne Design Catalog Inventory enance		No allowed property values in	ave been specified.	Sort Order 1↓		

# **Equipment Calibration Tracking**

Index Status
Data Current As Of 2023-04-17 04:23:43
Number of Log Entries 347
Download Report Excel File

## **Semi-Custom Web Page – Data From CDB**

 Display Status

 Last Updated
 2023-04-17 13:57:17

 Email Contact
 Diane Wilkinson

 CDB Engineering Display Index

Calibration Status for MT&E											
ITEM	STATUS	DUE DATE	CUSTODIAN	CUSTODIAN EMAIL	CALIBRATION FREQUENCY	CALIBRATION METHOD	CALIBRATION LAST PERFORMED	COMMENT			
PCMM Arm (Model 87) - Unit: 1 - S/N: 8725-6-10153-UC	Expired	04/30/2022	Bill Jansma	jansma@anl.gov	1 Year	In House	4/30/2021	Certification document: https://anl.app.box.com/folder /125155345309			
HIGH-VOLTAGE VOLTMETER (Model VMDP60E-GJYB-KV-ANB) - Unit: 1 - S/N: 171107-31	Expired	06/07/2022	George Kotsiopoulos	gkotsiopoulos@anl.gov	1 Year	Outside Vendor	6/7/2021				
ISOTROPIC PROBE (Model 8760D) - Unit: 1 - S/N: 01013	Expired	10/27/2022	George Kotsiopoulos	gkotsiopoulos@anl.gov	1 Year	Outside Vendor	10/27/2021				
POWER METER (Model N1914A) - Unit: 1 - S/N: MY50001045	Expired	05/08/2018	George Kotsiopoulos	gkotsiopoulos@anl.gov	1 Year	Outside Vendor	5/8/2017				
Pulse Generator (Model 81110A) - Unit: 1 - S/N: DE41B05278	Expiration Warning	04/19/2023	Pat Weghorn	pweghorn@anl.gov	1 Year	Outside Vendor	4/19/2022				
DLI vibration analyzer (Model TRIO CX10) - Unit: 1 - S/N: ** NONE **	Expiration Warning	06/11/2023	Rick Putnam	ccp@anl.gov	2 Years	Vendor	6/11/2021				
Laser Tracker (Model AT403) - Unit: 4 - S/N: 395034	Expiration Warning	04/22/2023	Thomas Parchem	tparchem@anl.gov	1 Year	Manufacturer	4/22/2022				
Transducer Electronics (Model 860R) - Unit: 3 - S/N: 9111107	Expiration Warning	05/09/2023	Tony Puttkammer	puttkamm@anl.gov	1 Year	Manufacturer	5/9/2022				
Transducer Electronics (Model 860R) - Unit: 4 - S/N: 9711219	Expiration Warning	05/09/2023	Tony Puttkammer	puttkamm@anl.gov	1 Year	PSG	5/9/2022				
HIGH-VOLTAGE VOLTMETER (Model VM50DE-BLD-6L-T) - Unit: 2 - S/N: 010226-46	Current	09/19/2025			3 Years		9/19/2022				
Laser Interferometer System Std. (Model 5508A display) - Unit: 1 - S/N: 3124A02811	Current	07/29/2024	Bill Jansma	jansma@anl.gov	5 Years	Outside Vendor (Agilent)	7/29/2019				
Laser Tracker (Model AT403) - Unit: 2 - S/N: 394890	Current	10/07/2023	Rill Jansma	iansma@anl.dov	1 Year	Manufacturer	10/7/2022	Certification document: https://anl.app.box.com/folder			

A web page pulls all items that have a "calibration" property



## **Supports Customized Web Pages (API)**

DLMB - S								1	Display ast Updated	Status 2023-04-17 14:30:19
Quantity Ava								_	Email Contact	Diane Wilkinson
Quantity Ava									CDB Engineering display	
								C	JDB Engineering display	Index
		CDB		DLI	MB - Bill of Mate	erials				
ITEM NUMBER	ITEM No be	From DESCRIPTION DLM-B SUPPORT ASSEMBLY Sextupole magnet	CDB CATALOG NAME	CDB CATALOG ID	QUANTITY NEEDED PER UNIT	QUANTITY NEEDED FOR REMAINING UNITS	QUANTITY READY FOR USE	QUANTITY ON SITE I NOT READY	BUT LO	CATION
	to fetchie	DLM-B SUPPORT ASSEMBLY	DLMB Plinth	8131	1 of 1	41	0	41		
D	ata	Sextupole magnet	S1/S3 Production Magnet	8122	1 of 2	41	2	0	1 (2);	
3	B:FC2	Fast Corrector	8-Pole Fast Corrector Production Magnet	8152	1 of 2	41	2	0	1 (2);	
1	B:Q5	Quadrupole	Q5 Production Magnet	6711	1 of 1	41	1	0	1 (1);	
5	B:S2	Sextupole magnet	S2 Sextupole Magnet	6132	1 of 1	41	0	1		
6	B:Q4	Quadrupole	Q4 Reverse Bend Quadrupole Magnet	6575	1 of 1	41	1	0	1 (1);	
7	B:S1	Sextupole magnet	S1/S3 Production Magnet	8122	1 of 2	41	2	0	1 (2);	
3	B:Q3	Quadrupole	Q3 Production Magnet	17194	1 of 1	41	1	0	1 (1);	
)	B:M1	Dipole Magnet	M1 Production Magnet	18334	1 of 1	41	1	0	40] (1);	
0	B:Q2	Quadrupole	Q2 Production Magnet	2108	1 of 1	41	0	0		
11	B:FC1	Fast Corrector	8-Pole Fast Corrector Production Magnet	8152	1 of 2	41	2	0	1 (2);	
12	B:Q1	Quadrupole	Q1 Production Magnet	2090	1 of 1	41	1	0	1 (1);	
13	B:DLMB:TRAY	Cable tray	DLM B BPM CABLE TRAY ASSEMBLY	42289	1 of 1	41	0	0		
14	B:DLMB:BUSBAR	Busbar assembly	DLM B BUS BAR ASSEMBLY	42294	1 of 1	41	6	0	981-S1-A-05-B1 (	6);
15	B:P4:STND	Standard BPM-B Support	STANDARD BPM-B SUPPORT	224865	1 of 2	41	72	0	981-S4-D-07-B1 ( (24);	48); 981-S4-D-07-B2
16	B:VC7	Vacuum Chamber - B:VC7 NEG- coated Inconel	B:VC7 NEG-Coated Inconel Vacuum Chamber	6958	1 of 1	41	23	10	Pallet-00636 (10); Pallet-00479 (6);	Pallet-00469 (7);
17		Copper Gasket - DN40 RF Gasket #1	DN40 RF-sealing Copper Gasket	41574	1 of 10	41	32	0	Pallet-00706 (16);	Cart (5); Cart (5);
18		QCF Chain Clamp #1	DN40 QCF Chain Clamp	41573	1 of 10	41	41	0	Cart (14); Cart (8)	; Cart (6);
19	B:VC6	Vacuum Chamber - B:VC6 NEG- coated Aluminum	B:VC6 NEG-Coated Aluminum Vacuum Cross Chamber	7156	1 of 1	41	21	0	Pallet-00701 (13);	Pallet-00565 (8);
20	B:VC6:STND	Vacuum Support Stand	B:VC6 Cross Support Stand	81872	1 of 1	41	43	0	981-S4-D-05-B1 ( (20);	23); 981-S4-D-05-B2



## CDB + eTraveler + External Tools



#### Application Programming Interface (API)

#### **Catalog**

Each unique type of component or component design or COTS item + properties /drawings/specification/..

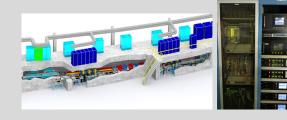
#### Inventory

Each unique *instance of component* procured or fabricated) + properties/serial # QR code/travelers/pictures/...



#### **Machine Design**

A simple hierarchical model of the components to be installed. "What & Where" for installation + Properties/pictures/locations/...



#### **Component Database (CDB)**

#### **Cables**

Cables are defined by Cable Type + 2 endpoints. Endpoints are referenced to the Machine Design components



#### <u>eTravelers</u>

(Electronic forms to capture inspection, measurement, test results of components. Accessed through CDB)





## **CDB + eTraveler + External Tools**

		Item	Quantity	tion Coordination
Work Processes with Real-time U		Registered Users	372	<pre><planned></planned></pre>
<ul><li>CDB Auto-update</li><li>Cue sheets</li></ul>	Pool t	CDB Catalog Items	3,581	Process/Flow Dry User Support
• Trello Ir	<u>Real-ti</u> nventory	CDB Inventory Items	42,739	<ul><li>ss/Status</li><li>Training</li><li>Assistance</li></ul>
	Displa In work are	CDB Cable Types	387	• Bug reports/fixes • New features
	inventory n	CDB Cable Inventory	8,560	
		CDB Machine Elements	34,553	
<b>Catalog</b> Each unique <i>type of</i>	Each uniqu	CDB Cable Design Elements	17,582	Cable Type         Electronic forms to capture
<ul> <li>component or component</li> <li>design or COTS item +</li> <li>properties</li> </ul>	<i>componen</i> fabric properties	MAARC Items	185,615	boints are inspection, measurement, test hine Design results of components. Accessed through CDB)
/drawings/specification/		eTraveler Forms	1,370	S ACCESSED (INFOUGHTODD)
		eTraveler Instances	42,414	
		Semi-custom Web Pages	34+	
		Custom scripts to manipulate data	numerous	
		EPICS Collaboration Meeting - A	pril 2023	38



## **Lessons Learned**

- Get management & QA backing (the fact that it benefits "Controls" is not sufficient motivation for other groups)
- It is a lot of work to track tens of thousands of components
  - Decide what the general staff will do vs. what the "CDB Team" will do
- Critical Step: Mapping "site domain knowledge" into CDB domains
- Have the database ready \*early\* ... if it is not available staff will use other options
- Train the staff on how to use it
- Set up conventions of how to do standard things
  - eTraveler format, properties, naming of machine elements, ...
- Be prepared for entering / editing / deleting \*large quantities\* of items ...
- It is hard to beat Excel for mass changes & entries
  - export -> modify -> import
- Don't do "customized views" for users in CDB ... have them use an external tool



# Acknowledgements

- Sinisa Veseli original developer/code architecture
- Dariusz Jarosz prime developer
- John Quintana developed numerous use cases and tools to make them happen
- Craig McChesney (Osprey DCS) CDB Cable domains + external cable tools
- Dong Liu original developer of eTraveler (while at FRIB)
- Diane Wilkinson eTraveler Coordinator / CDB "Help Desk"
- Guobao Shen CAM (interface to Project), supported ongoing development

