

Mechanical Systems Design Group
Procedure C-A-MSD-001
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Revision 00

**Note: Access to the 'dwg-server' is
required to view links in this procedure.**

COLLIDER – ACCELERATOR DEPARTMENT DESIGN ROOM WORK PROCEDURES

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(See Group System Administrator)

2.2.9 Printing drawings (See 19.0)

3.0 DRAWING NUMBER INDEX SHEETS AND DIRECTORIES

All numbers are taken out through [Documentation Control Center](#)

Index sheets are located on ENG-ARCH on 'server' (Q:)

Links: [AGS, Booster, Tandem](#) (ags_job_index.xls)
[EBIS](#) (ebis_job_index.xls)
[NSRL](#) (nsrl_job_index.xls)
[RHIC](#) (rhic_job_index.xls)

3.1 Drawing Number Log Sheets

3.1.1 Designer assigns assembly number (see Document Control Room staff). Numbers are taken from log sheets found in each working directory. (From Document Control Room staff)

3.1.2 Designer assigns drawing numbers. Numbers are taken from log sheets (e Document Control Room staff)

EBIS DRAWING NUMBER LOG SHEET					
STRUCTURAL COMPONENTS - LEBT & EXTERNAL ION INJECTION					
1120	TITLE			DATE	DRAWN BY
1120001	LEBT DEFLECTOR #1			Aug-06	J. ZEBUDA
1120002	GUARD PLATE			Aug-06	J. ZEBUDA
1120003	DEFLECTOR SUPPORT PLATE			Aug-06	J. ZEBUDA
1120004	MOUNTING SUPPORT			Aug-06	J. ZEBUDA
1120005	ANGLE BRACKET			Aug-06	J. ZEBUDA
1120006	LEBT DEFLECTOR #2			Aug-06	J. ZEBUDA
1120007	DEFLECTOR SUPPORT PLATE #2			Aug-06	J. ZEBUDA
1120008	SPHERICAL BENDER ASSEMBLY			Aug-06	J. ZEBUDA
1120009	INNER SPHERICAL ELECTRODE			Aug-06	J. ZEBUDA
1120010	OUTER SPHERICAL ELECTRODE			Aug-06	J. ZEBUDA
1120011	INNER GUARD PLATE			Aug-06	J. ZEBUDA
1120012	OUTER GUARD PLATE			Aug-06	J. ZEBUDA
1120013	INNER STANDOFF			Aug-06	J. ZEBUDA

3.2 B/M Sheets - Bill of Material (List of drawings for a project)

3.2.1 B/M (drawing list) is created using (xxx_bm.xls) for each project
Fill in information and use command "**SAVE AS**" to: ASSEMBLY NO.bm Example:
71015570_bm.xls.

Note: B/M should include all drawings needed to fabricate and assemble the component

Links: [AGS, Booster, Tandem](#) (ags_bm.xls)
[EBIS](#) (ebis_bm.xls)
[NSRL](#) (nsrl_bm.xls)
[RHIC, ERL](#) (rhic_bm.xls)

5.0 DIRECTORY INDEX

The Directory Index is a working Excel Sheet that is linked to all of the directories described in the **Design Room Work Procedures**.

The file can be found in the following directory:

- [Open Active Worksheet](#) ENG-ARCH on 'dwg-server' (Q:) directory_index.xls

CAD GROUP MECHANICAL/ELECTRICAL DIRECTORY INDEX					
WORKING DIR'S	FORMAT DIR'S	RELEASED DIR'S	BASELINED DIR'S	RELEASED TIFS	LIBRARY DIR'S
AGS ags on 'desigserver' (I:)	AGS lags_format	AGS MECH agsmech on 'Desigserver' (R:) All Released Dwgs * (ECN needed)	RESTORE DWGS Archived in CCD	Mechanical Index Electrical Index AGS Tifs cag-arch on 'server' (R:)	2D LIBRARY dwgs 'desigserver' (F:)
* Dwg No Index Valve Index * Numbers given out by DCC					
BOOSTER ags on 'desigserver' (I:)	AGS lags_format	AGS MECH agsmech on 'desigserver' (R:) * (ECN needed)		BOOSTER Tifs cag-arch on 'server' (R:)	COOLING SYSTEM AGS & RHIC ags on 'desigserver' (I:) lags&rhic cooling systems
* Dwg No Index					
BRAHMS	BRAHMS lbrahms_format		CCB1BRAHMS ccb1 on 'desigserver' (O:) Baselined Dwgs (ECN needed)	BRAHMS Tif cag-arch on 'server' (R:)	CHAS T MAIN ags on 'desigserver' (I:) lchas_t_main_dwgs
* Dwg No Index					
EBIS					CONSTRUCTION ARTICLE 12 DWGS ags on 'desigserver' (I:) larticle12_dwgs
Dwg No Index					
NSBL baf on 'desigserver' (T:)	BAF lbaf_format	RELEASED baf on 'desigserver' (T:) All Released Dwgs * (ECN needed)		NSBL cag-arch on 'server' (R:)	
* Dwg No Index					
RHIC dwgs on 'desigserver' (R:)	RHIC lrhic_format	CCB1 dwgs on 'desigserver' (O:) Released 'RD' Dwgs	CCB1RHIC ccb1 on 'desigserver' (O:) Baselined Dwgs (ECN needed)	RHIC Tifs cag-arch on 'server' (R:)	
INJECTION LINE		AGS MECH agsmech on 'desigserver' (R:) All Released 'RD' Dwgs			
* Dwg No Index Valve Index					
TANDEM home on 'workol' (I:) subdir\tandem	AGS lags_format	AGS MECH agsmech on 'desigserver' (R:) Released Dwgs * (ECN needed)		TANDEM cag-arch on 'server' (R:)	
* Dwg No Index * Electrical Dwg No Index					

6.0 WORKING DIRECTORIES

6.1 Figures showing Working Directories

6.1.1 [AGS, Booster, Tandem](#)

- [-] ags on 'designserver' (I:)
 - [+] ags&rhic cooling_systems
 - article12_dwgs
 - [+] d00
 - [+] d01
 - [+] d02
 - [+] d03
 - [+] d04
 - [+] d05
 - [+] d06
 - [+] d07

6.1.2 [RHIC, ERL \(0106\), RHIC 2 \(0107\)](#)

- [-] rhic on 'designserver' (W:)
 - [+] 8 O CLOCK VALVE BOX
 - [+] 0103
 - [+] 0104_Collider_Installation_Cold_To_Warm_Transitions
 - [+] 0105_Space_allotment
 - [+] 0105TripletAntiRoll
 - [+] 0106
 - [+] 0107_E-Cooling
 - [+] 0501
 - [+] 0509

6.1.3 [NSRL](#)

- [-] nsrl on 'designserver' (T:)
 - [+] 2000_misc
 - [+] 2001_illustrations
 - [+] 2101_thin_septum_magnet
 - [+] 2102_thick_septum_magnet
 - [+] 2103_foil_stripper
 - [+] 2201_bussbar_cable_trays
 - [+] 2301_d4&d6
 - [+] 2302_d6_beam_dump¤t_monitor
 - [+] 2303_d3ipm&dump_kicker
 - [+] 2304_vacuum_system_modifications
 - [+] 3101_dipoles
 - [+] 3102_quadrapoles
 - [+] 3103_octupoles

6.2 SUB-DIRECTORIES

A sub-directory will be created for each component worked on. It will be created under the major system directory as shown below. Example: 3301_beam_tubes_bellows_valves then sub-directories. The sub-directory name should be the name of the component being worked on.

- [+] nsrl on 'designserver' (T:)
 - [-] 3301_beam_tubes_bellows_valves
 - [+] beam_plug_6
 - [+] BEAM_TUBE_SUPPORT
 - [+] BELLOWS SUPPORT
 - [+] Pump Tees
 - [+] 3302_pumps_power_supplies

7.0 DRAWING NUMBERING CONVENTIONS

7.1 AGS, Booster and Tandem Drawings are numbered as follows: [Index Link](#)

7.1.1 On Drawing Format

Example: D16-M-2500 (This is how the number appears in the drawing title block)

D16 Vacuum Systems (from AGS Drawing Number Index)

M Mechanical

2500 Sequential Drawing Number

7.1.2 Electronic File:

Becomes: d16-m-2500.dwg

Filed in **D16** Directory

7.2 RHIC Drawings are numbered as follows: [Index Link](#)

7.2.1 On Drawing Format

Example: 32035135 (This is how the number appears in the drawing title block)

3203 Ambient Temp Piping Systems (from RHIC Drawing Number Index)

5135 Sequential Drawing Number

7.2.2 Electronic File:

Becomes: 32035135.dwg

Filed in **3203** Directory

7.3 ERL and RHIC 2 Drawings are numbered as follows: [Index Link](#)

7.3.1 ON Drawing Format

Example: 010601160 (This is how the number appears in the drawing title block)

010601 Superconducting R.F. Cavity (from RHIC Drawing Number Index)

a. Sequential drawing number

7.3.2 Electronic File:

Becomes: 010601160.dwg

Filed in **0106** Directory

7.4 NSRL Drawings are numbered as follows: [Index Link](#)

7.4.1 On Drawing Format

Example: 2103001 (This is how the number appears in the drawing title block)

2103 RF CAVITY (from NSRL Drawing Number Index)

001 Sequential Number

7.4.2 Electronic File:

Becomes: 010601160.dwg

Filed in **r2103** Directory

8.0 “RD” DRAWING NUMBERING and SIGNATURES

8.1 “RD” Numbers

- RD numbers are for drawings that are in the prototype stage of design
- RD numbers do not need a formal checking procedure
- RD drawings cannot be used for final installation of components.
 - Drawings must be checked and approved and “RD” removed before baselining.
 - **After removing “RD” drawing goes back to REV “A”**
 - **REV box says: Drawing was “RD” REV A, B, C etc.**

8.2 SIGNATURES

RD Drawings need the following signatures only:

- Drawn by
- Design Approval
- Engineer Approval

Signatures on revised "RD" Drawings Follow non – "RD" Process (See Sheet 16)

8.3 NUMBERING

8.3.1 **AGS, Booster and Tandem Drawings are numbered as follows:**
(Same as Sheet 8)

8.3.1.1 **On Drawing Format**

Example: D16-M-RD2500 (This is how the number appears in the drawing title block)

8.3.1.2 **Electronic File:**

Becomes: d16-m-2500.dwg

8.3.2 **RHIC drawings are numbered as follows:** (Same as Sheet 8)

8.3.2.1 **On Drawing Format**

Example: RD32035135 (This is how the number appears in the drawing title block)

8.3.2.2 **Electronic File:** 32035135.dwg

8.3.3 **ERL and RHIC 2 drawings are numbered as follows:** (Same as Sheet 8)

8.3.3.1 **On Drawing Format**

Example: RD010601160 (This is how the number appears in the drawing title block)

8.3.3.2 **Electronic File:**

Becomes: 0106011160.dwg

8.3.4 **NSRL drawings are numbered as follows:** (Same as Sheet 8)

8.3.4.1 **On Drawing Format**

Example: RD2103001 (This is how the number appears in the drawing title block)

8.3.4.2 **Electronic File:** 2103001.dwg

9.0 DRAWING FORMATS

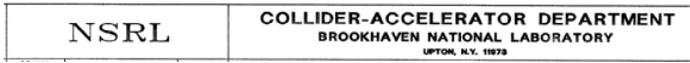
Formats are inserted into drawing as a block – **DO NOT EXPLODE THEM!**

9.1 Drawing Formats

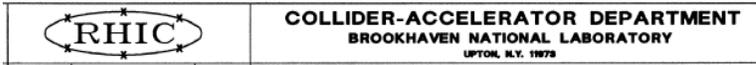
AGS, Booster, Tandem

AGS	COLLIDER—ACCELERATOR DEPARTMENT BROOKHAVEN NATIONAL LABORATORY <small>UPTON, N.Y. 11973</small>
<small>JOB NO.</small>	

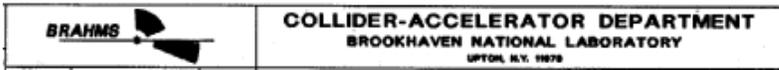
NSRL



RHIC, ERL, RHIC 2



BRAHMS



9.2 Listed below are the format names and the project directory where formats can be found

AGS Formats: They can be found in Directory: ags on 'Designserver' (I:)

- format2.dwg
format3.dwg
format4.dwg
format5.dwg

NSRL Formats: They can be found in Directory: nsrl on 'Designserver' (T:)

- nsrl_form2.dwg
nsrl_form3.dwg
nsrl_form4.dwg
nsrl_form5.dwg

BRAHMS Formats: They can be found in Directory: dwgs on 'Designserver' (F:)

- bform-2.dwg
bform-3.dwg
bform-4.dwg
bform-5.dwg

RHIC (2), ERL Formats: They can be found in Directory: Rhic on 'Designserver' (W:)

- rform-2.dwg
rform-3.dwg
rform-4.dwg
rform-5.dwg

10.0 SAMPLE DRAWINGS, WATER FITTINGS, REFERENCE CHARTS, O-RING GROVE DETAILS

10.1 Sample Drawings

10.1.1 Assembly Drawing

10.1.2 Detail Drawing

- 10.1.3 [Weldment Drawing](#)
- 10.1.4 [Vacuum Tube Weldment](#)
- 10.1.5 Multi Sheet Drawing
 - 10.1.5.1 [Sheet 1](#)
 - 10.1.5.2 [Sheet 2](#)
 - 10.1.5.3 [Sheet 3](#)

10.2 WATER FITTINGS / BUSS BAR

10.2.1 Note for brazing stainless steel fittings on magnet coils

1. For brazing stainless steel fittings use, "Handy Harment 630 filler with Handy Flux Type B-1"
2. Prior to hydrostatic testing, test torque all fittings to XX-FT-LBS
(We will get torque values for each size fitting)

10.2.1 Torque Values

4-FTX-SS	19 FT-LBS
5-FTX-SS	20 FT-LBS
8-FTX-SS	55 FT-LBS
10-6FTX-SS	75 FT-LBS

10.2.2 Sample Details

- [5 FT-SS .500-20 UNF 37 DEG. Flare Fitting](#)
- [8-4 FTX-SS .750-16 UNF 37 DEG. Flare Fitting](#)

10.3 REFERENCE CHARTS

Bolt patterns, C'Bore Sizes, Bend Radii, etc.
Clearance hole tolerances

[Chart](#)
[Fixed Fastener](#)
[Floating Fastener](#)
[Chart](#)

Conflat Flange Machining

10.4 O-RING GROOVE DETAILS

- [Groove Widths and Depths](#)
- [Groove Detail](#)

11.0 CONTENTS OF DRAWINGS

11.1 Drawings will contain the following:

- 11.1.1 Parts list
- 11.1.2 Used on drawing number
- 11.1.3 Notes: IN Upper left corner of format
(See 11.3.3)
- 11.1.4 Signatures
Signatures will be signed on full size plotted original (See 15.2)
Names **will not** be typed into title block on Rev A (See 15.3)

- 11.1.5 Signatures (See Sheet X)
 Names **will** be typed into title block on REV B (See 15.4)
 and signatures will be signed in REV box

11.2 Drawing Titles:

COLLIDER-ACCELERATOR DEPARTMENT BROOKHAVEN NATIONAL LABORATORY <small>UPTON, N.Y. 11973</small>	
TITLE:	PROJECT-NAME SYSTEM-NAME DRAWING-NAME

11.2.1 Example 1

- Top Line: Project Name (this is the project being worked on)
AGS HEBT A Upgrade
- Middle Line: System Name (this is the component being worked on)
Bending Magnet 7.5 DEG
- Bottom Line: Drawing Name (this is the specific drawing name)
Vacuum Chamber

11.2.2 Example 2

- Top Line: Project Name (this is the project being worked on)
AGS HEBT A Upgrade
- Middle Line: System Name this is the component being worked on)
Bending Magnet 7.5 DEG
- Bottom Line: Drawing Name (this is the specific drawing name)
Assembly

11.3 Standard Notes:

11.3.1 Material Call Out

11.3.2 Marking Parts: [MIL STD 130.pdf](#)

Large parts and assemblies: "Mark Part No. in accordance with MIL STD 130" small parts: "Bag and Tag with Part No. in accordance with MIL STD 130"

11.3.3 Cleaning, Machining and Welding Specification for Vacuum Parts

Notes: If no spec is available (See 13.0)

11.3.4 Painting Notes:

Steel Support Stands - "Paint all steel surfaces, one primer coat, and one finish coat. Use oil based enamel paint, dark green, FED-STD-595 color #14120"

11.4 Specification for: Stainless Steel / Inconel Vacuum Chambers

11.4.1 C-A Department Components: [Fabricate in accordance with BNL SPEC. CAD-1119](#)

11.5 **Cleaning and Welding Notes: For other than stainless steel chambers**

11.5.1 **Notes for Welded Vacuum Vessels / Parts** (Aluminum, Copper, Steel, etc.): If no spec is available

11.5.1.1 Use water soluble machining lubricants only.

11.5.1.2 Prior to welding clean parts in accordance with BNL Central Shops SOP #6.3.0. Weld Parts in a clean area. If they become dirty or contaminated after welding, clean them again.

11.5.1.3 Vacuum leak check in accordance with BNL Spec. (applicable spec). Do not clean parts between leak checking and welding.

11.6 **Notes for Internal Vacuum Components and Machined parts (stainless steel, aluminum, copper, steel, inconnel, etc):**

11.6.1 Use water soluble machining lubricants only.

11.6.2 Prior to assembly clean parts in accordance with BNL Central Shops SOP # 6.3.0. Assemble Parts in a clean area.

11.6.3 For booster components and vacuum chambers purchased commercially, the requirements may be more stringent. If in doubt, discuss it with Vacuum Group Leader.

12.0 **VACUUM HARDWARE REQUIREMENTS**

12.1 As a general rule – nuts and bolts used on components that are **inside UHV or HV Vacuum** (LINAC, Booster, AGS, RHIC Beam line Vacuum Systems, etc.) should be specified on the drawings and procured with silver plating or molybdenum disulfide coating from UC Components.

12.1.1 UC provides the hardware clean and ready to use in a UHV or HV Vacuum System.

12.1.2 The coating will help prevent galling that could occur when components that have been cleaned to vacuum standards are bolted together.

12.2 The screws and washers should be vented when necessary.

12.3 For testing equipment before final cleaning and assembly, regular hardware can and should be used; but, the drawing should specify the UC part number.

12.4 Vacuum hardware is to be either silver plated or “Dicronite” coated. Do not specify the molybdenum disulfide bolts from UC components. A source for Dicronite coating is:

12.4.1 Dicronite, Northeast, 66 Mainline Drive, Westfield, MA 01085
The phone number is 1-413-562-5019. The contact is Tom Cullen.

12.4.2 Accurate Screw provides silver plating as an option. An advantage is that Accurate Screw provides a much greater range of fastener types. The concern with using them is that the hardware may not be cleaned to vacuum specifications after plating. That hardware should be cleaned before final assembly.

13.0 CHECKING PROCEDURE

13.1 After Engineering Approval, drawings will be submitted to design room supervisor for checking.

13.1.1 Checking package will include the following:

13.1.1.1 Engineer's comments

13.1.1.2 All assemblies, sub-assemblies and detail drawings

13.1.1.3 Layouts and sketches provided by engineer

13.1.1.4 Catalog cuts of vendors items

13.1.1.5 Photo copies of ASTM number sheets called out on drawings (if used)

13.1.1.6 Photo copies of MS Pages called out for hardware (if used)

13.1.1.7 EXCELL B/M (Drawing/Parts List)

13.1.2 Drawings are checked for the Technical Accuracy and compliance to standards.

13.1.3 Redlined prints are returned to Design Room Supervisor.

13.1.4 Corrections are made to drawings by Designer.

13.1.5 After all corrections are made, full size plots are made and submitted to checker for back-checking and signature.

13.1.6 Prints are returned to design room supervisor for additional signatures.

13.1.7 Additional signatures (See 14.1.2 and 14.1.3)

14.0 DRAWING SIGNATURE PROCEDURE BASED ON QA LEVELS

14.1 QA Levels

14.1.1 QA Level A3

A. Designer (name typed in electronic file)

B. Checker (signature signed on full size original)

C. Design Approval (signature signed by Design Room Supervisor on original)

D. Engineer Approval (signature signed by Engineer on original)

E. Supervisor Approval (signature signed by Chief Mechanical Engineer or designee on original)

F. The two open boxes are for signatures determined by the Chief M.E.

Example: Safety Approval
Vacuum Approval

14.1.2 QA Level A2

- A. Designer (name typed in electronic file)
- B. Checker (signature signed on full size original)
- C. Design Approval (signature signed by Design Room Supervisor on original)
- D. Engineer Approval (signature signed by Engineer on original)
- E. Supervisor Approval (signature signed by Chief Mechanical Engineer or designee on original)
- F. Division Head / Deputy Division Head (see **“APP_BOX”** below – signature signed on original)
- G. The two open boxes are for signatures determined by Chief M.E.
 Example: Safety Approval
 Vacuum Approval

14.1.3 QA Level A1

- A. Designer (name typed in electronic file)
- B. Checker (signature signed on full size original)
- C. Design Approval (signature signed by Design Room Supervisor on original)
- D. Engineer Approval (signature signed by Engineer on original)
- E. Supervisor Approval (signature signed by Chief Mechanical Engineer or designee on original)
- F. QA Approval (signature signed by Quality Assurance Rep on original)
- G. Safety Approval (determined by **ES&H/QA** division head)
- H. DIV Head/Deputy DIV Head (see **“APP_BOX”** below – signature signed on original)
- I. DEPT HEAD/DEPUTY DEPT HEAD (see **“APP_BOX”** below – signature signed on original)

This is an add-on box to be inserted as a block next to **“USED ON”** box for QA1 and QA2 only. It can be found in the same directory as the standard formats file names:

qa3.dwg
qa5.dwg

QA LEVEL 1&2 APPROVALS		DATE
 APPROVAL	D.PASSARELLO	5/01/01
DIV.HEAD APPROVAL		
DEPT.HEAD APPROVAL	D.LOWENSTEIN	10/22/98

14.2 Revision Signature Approvals

- 14.2.1 REV A Designers name typed into title block (electronic file)
 All other signatures signed on full size original only
- 14.2.2 REV B, C, D etc REV A Names typed into title block (electronic file)
 REV B Signatures signed in rev box on original

15.0 **DRAWING SIGNATURE PROCEDURE**

15.1 **REV A** Electronic File: No names type in title block

RHIC			COLLIDER-ACCELERATOR DEPARTMENT BROOKHAVEN NATIONAL LABORATORY UPTON, N.Y. 11973						
DRAWN BY	C. LONGO	22-Mar-06	TITLE: E.R.L. VACUUM SYSTEM CHAMBER ASSY, DIPOLE						
CHECKED BY									
DESIGN APPROVAL									
ENGINEER APPROVAL									
SUPERVISOR APPROVAL									
			SIZE	DRAWING NUMBER:	REV.				
			E	010605011	B				
			Q.A. CATEGORY	A-3	SCALE:	1/2	WEIGHT:	SHEET	OF

15.2 **REV A** Plotted Original: Signed Signatures

RHIC			COLLIDER-ACCELERATOR DEPARTMENT BROOKHAVEN NATIONAL LABORATORY UPTON, N.Y. 11973						
DRAWN BY	C. LONGO	22-Mar-06	TITLE: E.R.L. VACUUM SYSTEM CHAMBER ASSY, DIPOLE						
CHECKED BY	<i>J. Aldu</i>	<i>5/06</i>							
DESIGN APPROVAL	<i>J. TUZZINO</i>	<i>5/06</i>							
ENGINEER APPROVAL	<i>Dan Weiss</i>	<i>05.06</i>							
SUPERVISOR APPROVAL	<i>J. Longo</i>	<i>5/06</i>							
			SIZE	DRAWING NUMBER:	REV.				
			E	010605011	A				
			Q.A. CATEGORY	A-3	SCALE:	1/2	WEIGHT:	SHEET	OF

15.3 **REV B** Electronic File: Typed in title block

RHIC			COLLIDER-ACCELERATOR DEPARTMENT BROOKHAVEN NATIONAL LABORATORY UPTON, N.Y. 11973						
DRAWN BY	C. LONGO	22-Mar-06	TITLE: E.R.L. VACUUM SYSTEM CHAMBER ASSY, DIPOLE						
CHECKED BY	J. A. /D. W.	5/06							
DESIGN APPROVAL	J. ALDUINO	5/06							
ENGINEER APPROVAL	DAN WEISS	5/06							
SUPERVISOR APPROVAL	J. TUZZOLO	5/06							
			SIZE	DRAWING NUMBER:	REV.				
			E	010605011	B				
			Q.A. CATEGORY	A-3	SCALE:	1/2	WEIGHT:	SHEET	OF

15.4 **REV B** Plotted Original: Signed in REV box

REVISION APPROVALS								
REV	ECN NO.	DESCRIPTION	DATE	BY	CHK	DES	ENG	SUPV
A	-	WAS RD REV A	-	-	-	-	-	-
B	CAD1097	REVISED PER ECN	5/30/06	C.L.	<i>JA</i>	<i>JA</i>	<i>dw</i>	<i>J.V.</i>

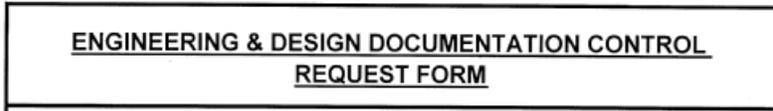
16.0 DRAWING RELEASE PROCEDURE

These are the final approved copies of drawings that will be printed and sent out to engineers, shops, vendors, etc.

[Link to Released Drawings Index Sheet](#)

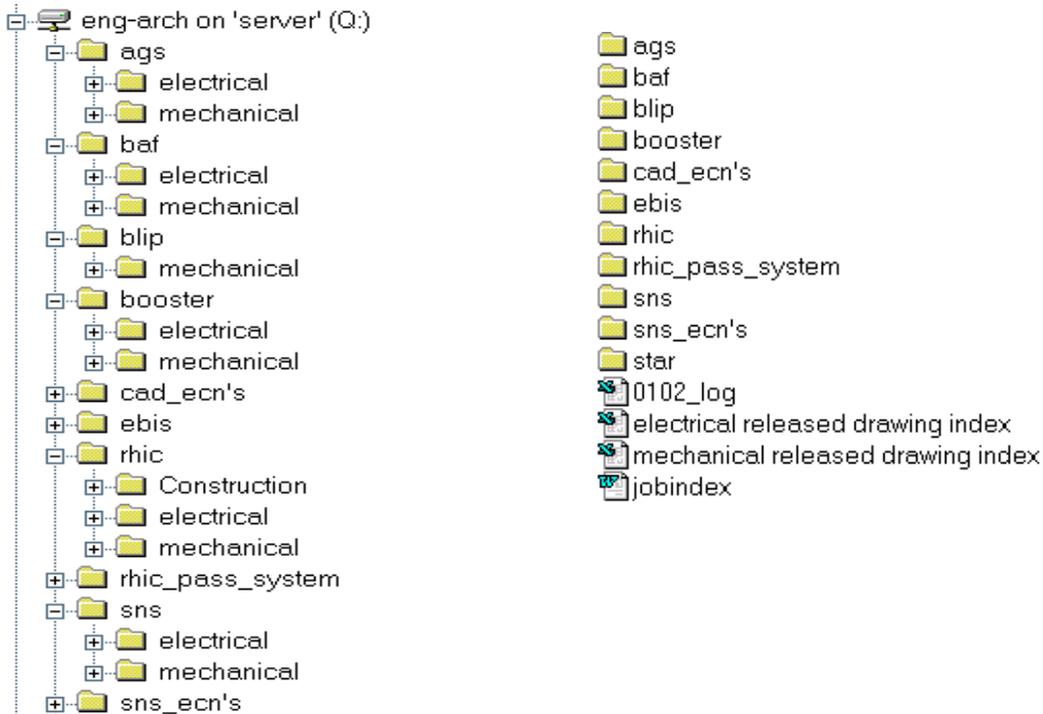
16.1 After drawings, have all final signatures, paper drawings, ECN and B/M will be submitted by Designer for scanning to TIF Format. (Submit to Document Control)

16.1.1. If copies are needed, fill in appropriate areas on form - [FORM LINK](#)



Use link below to search for released TIF images
The "[Mechanical Released Drawing Index](#)"

16.1.2 Drawings will be scanned and filed in the following directories:



17.0 RELEASED DIRECTORIES

17.1 **Electronic drawing files will be moved to released area**
(See Group System Administrator)

17.2 B/M (Drawing List) Electronic file will be moved with drawings

17.3 Drawing Release Directories

Links:

[AGS D00 thru D28](#)

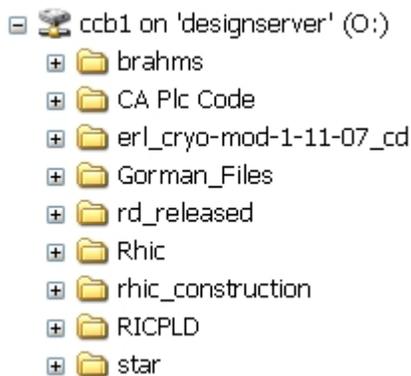
Booster is D34 thru D37



[NSRL](#)



[RHIC, ERL, RHIC 2](#)



[FACILITY EXP SUPPORT](#)

18.0 RHIC DRAWING RELEASE DIRECTORIES (Includes Brahms, Star, Phenix, RHIC 2, ERL)

RHIC Injection line - RHIC Ring - RHIC "RD" Drawings - [LINK "CCB1"](#)

ccb1 on 'Designserver' (0)

- brahms
- magelc
- rd_released
- Rhic
 - 0102_Collider_Installation_IR_FODO_Cell Install
 - 0103_Collider_Installation_IR_Tripole_Dipole Install
 - 0104_Collider_Installation_Cold_To_Warm_Transitions
 - 0105_Collider_Installation_Ring_Equipment_Installation_Support
 - 0115
 - 0201_Magnet_Elec_Sys_Installation_Cabling_&_Trays
 - 0206
 - 0504
 - 0508
 - 0509_special_magnets
 - 050d
 - 0602
 - 0603
 - 1201_Magnet_Sys_Dipole_Cold_Mass
 - 1206_Magnet_Sys_Dipole_Magnet_Assembly
 - 1210_Magnet_Sys_CQS_Magnet_Assembly
 - 1213_Magnet_Sys_Independent_Interconnections
 - 1214_Magnet_Sys_Installation_Components
 - 2101
 - 2103_Magnet_Elec_Sys_Dipole_Power_Supply_System
 - 2203_Magnet_Elec_Sys_Trim_Quadrupole_Power_Supply
 - 2301_Magnet_Elec_Sys_SCR_Assembly
 - 2303_Magnet_Elec_Sys_Aux_Quench_Protection_Electronics
 - 2406
 - 2601_Magnet_Elec_Sys_Sextupole_Power_Supply
 - 2602_Magnet_Elec_Sys_A0_B0_Corrector_Power_Supply
 - 2604_Gamma_Pulsar
 - 2605_Magnet_Elec_Sys_Corrector_Power_Supply
 - 2607_Magnet_Elec_Sys_Snake_Power_Supplies
 - 3101_Cryogenic_System_Main_Refrigerator_Modification
 - 3102_Cryogenic_System
 - 3201_Cryogenic_System_VACJAC_Ring_Piping
 - 3202_Cryogenic_System_Refrigerator_Ring_VJ_Conn
 - 3203_Cryogenic_System_Ambient_Temp_Piping_Systems
 - 3301_Cryogenic_Sys_Ring_Resident_Control_Sys
 - 3401_Cryogenic_Sys_Recoolers
 - 3402_Cryogenic_Sys_Circulating_Compressors
 - 3404_Cryogenic_Sys_Magnet_Power_Leads_System
 - 3501_Cryogenic_Sys
 - 3a98_Cryogenic_Sys_Electrical_Schematics
 - 3a99_Cryogenic_Sys_Mechanical_Schematics
 - 3d_graphs
 - 4101_Vacuum_Sys_Insulating_Vac_Sys_Pumping_Sys_Penetration
 - 4103_Vacuum_Sys_Insulating_Vac_Sys_Gauging_&_Instrumentation
 - 4201_Vacuum_Sys_Cold_Ultra_High_Vac_Sys_Pumping_&_Gauging
 - 4203_Vacuum_Sys_Cold_Ultra_High_Pipe_Interconnects_&_Bellows
 - 4300
 - 4301_Vacuum_Sys_Warm_Ultra_High_Vac_Sys_Pumping_Bakeout_&_Gauging
 - 4303_Vacuum_Sys_Beam_Pipe_and_Valves
 - 4403_Vacuum_Sys_Experimental_Regions_Low_Z_Beam_Pipe
 - 4503_Vacuum_Sys_Controls_System_Integration
 - 5201_Injection_Area_Magnet_Fast_Kicker_Magnets
 - 5202_Lambertson_Septum_Magnet
 - 5301_Transfer_Line_Quadrupole_Magnets
 - 5302_Transfer_Line_Switcher_Magnets
 - 5305_Transfer_Line_Trim_Magnets
 - 5501_Transfer_Line_PS_Quadrupole_Magnets
 - 5502_Transfer_Line_Quadrupole_Magnet_Type_C
 - 5503_Transfer_Line_Q-Line_Dipole_Magnet_20_Degree_Bend
 - 5504_Transfer_Line_Big_Bend_Dipole_Magnet
 - 5505_Transfer_Line_Matching_Section_Dipole_Magnet
 - 5506_Transfer_Line_Switching_Magnet
 - 5507_Transfer_Line_Pitching_Magnets
 - 5508_Transfer_Line_Pitching_Magnets
 - 5601_Adjustable_Collimator
 - 5701_Vacuum_System_Inline_Components
 - 5702_Vacuum_System_Ion_Pumps_and_PS
 - 5703_Vacuum_System_Roughing_Stations
 - 5705_Vacuum_System_Installation_W-Line
 - 5706_Vacuum_System_Installation_X-Line
 - 5707_Vacuum_System_Installation_Y-Line
 - 5708_Vacuum_System_Installation_U-Line
 - 5802_Control_&_Instrumentation_Beam_Monitors
 - 5803_Controls_&_Instrumentation_Miscellaneous_Electronics
 - 5901_Uilities_&_Services_Electrical_Power_Distribution
 - 5903_Uilities_and_Service_Buss_Work
 - 5b01_Shielding_Injection_Line_Shielding
 - 6201_Beam_Dump_Fast_Kicker
 - 6301_Beam_Dump_Kicker_Power_Supply
 - 6401
 - 6402
 - 6501
 - 7101
 - 7102_RF_Acceleration_Electrical
 - 7202_RF_Storage_160_MHZ_Electrical
 - 7302_RF_Wide_Band_Cavity_Electrical
 - 7401_Other_RF_Equip_Assembly_Area_High_Pwr_Test_Stand
 - 7501_Other_RF_Low_Pwr_Driver-Beam_Feedback_Control
 - 8101_Beam_Instrumentation_Sys_Position_Monitor
 - 8102_Beam_Instrumentation_Sys_Position_Monitor_Electronic
 - 8201_Beam_Instrumentation_Sys_Wide_Band_Wall_Current_Monitor_Sys
 - 8202_Beam_Instrumentation_Sys_DC_Current_Transformer_Sys
 - 8203_Beam_Instrumentation_Sys_Transverse_Profile_Monitor_Sys
 - 8204_Beam_Instrumentation_Sys_Transverse_Damper_Tune_Measurement_Sys
 - 8205_Beam_Instrumentation_Polarimeters
 - 9101_Control_Sys_Consoles_&_Equip
 - 9102_Control_Sys_Computer_Server
 - 9201_Control_Sys_Pwr_Supply_Controls
 - 9202_Control_Sys_I-O_Modules
 - 9300
 - 9401_Control_Sys_Lan_Stations
 - 9402_Control_Sys_Timing_&_Links
 - 9501_Control_Sys_Integration_Racks_Enclosures
 - 9502_Control_Sys_Cables
 - 9503_Control_Sys_Uninterruptable_Power_Supply
 - 9901_Control_Sys_Engineering_Support
 - a203
 - a3001
 - am_whitny
 - c100
 - c101
 - c102
 - c102erc
 - c10f
 - cvi
 - dda
 - gardner
 - inverpwr
 - old
 - pass
 - phenix-908
 - phobos
 - star-906
 - rhic_construction
 - Ricpld

19.0 PRINTING RELEASED DRAWINGS

DO NOT PLOT DRAWINGS FROM ELECTRONIC AUTOCAD FILE!!!

- 19.1 Final released drawings with signatures are printed from the “ENG-ARCH” Directory. See Figure 19.1.1.
- 19.2 Copy requests should be given to Document Control Personnel – [Request Form](#)
- 19.2.1 If you need to run copies yourself, the [“Mechanical Released Drawing Index”](#) shown below can be used to search for the assembly you are looking for.
- 19.2.2 Once the assembly is found the B/M corresponding to the job number will list all drawings needed to print an entire set.

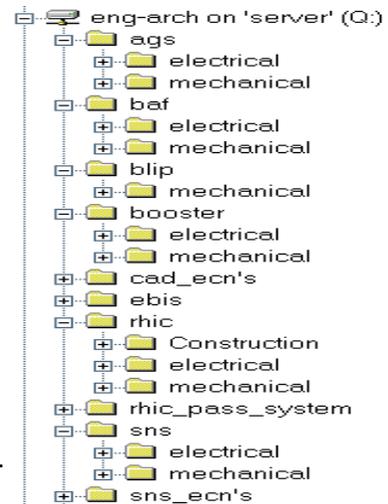


Figure 19.1.1

MECHANICAL RELEASED DOCUMENT INDEX SHEET		
AGS		
d25-m-3026-4	hebt-a 7.5deg bend magnet vac chamber assy	ags\mechanical\d25\
d14-m-1636-6	east experimental area 3rd/4th quarter 1996	ags\mechanical\d14
d14-m-1650-6	east experimental area 1st/2nd quarter 1996	ags\mechanical\d14
do4-m-1698-5	vestinghouse upgrade rotary screw pump	ags\mechanical\do4\
do4-m-1791-4	mods to tandem di water system	ags\mechanical\do4
BOOSTER		
d36-m-1256-5	ejection septum vac chamber & pipe weldment	booster\mechanical\d36\012565a2.tif
d36-2m-46	booster heating blankets	booster\mechanical\d36-2m-46\
d36-m-2970-5	booster d6/b6 dump relocation	booster\mechanical\d36
RHC		
O105559	allotments, space IP12, sector 12	rhc\mechanical\0105
3A995078	helium gas storage	rhc\mechanical\3a99
3A995110	helium gas storage future tanks	rhc\mechanical\3a99
62010001	RHC beam dump kicker magnet 10:05 blue	rhc\mechanical\6201\
62010003	RHC beam dump kicker magnet 10:05 yellow	rhc\mechanical\6201\
3a995032	hcs block diagram	rhc\mechanical\3a99\5032a1.tif
63010002	RHC beam dump pulse forming network	rhc\mechanical\6301
RHC Construction		
a3001500	sextant 5 topographical plan	rhc\Construction\A3001500
a3001501	5 o'clock injection hall	rhc\Construction\A3001501
a3001505	alcove 5a	rhc\Construction\A3001505
a3001508	4 O'clock triplet area south	rhc\Construction\A3001508
a3001504	1005S entry maze	rhc\Construction\A3001504
a3001503	alcove 5b	rhc\Construction\ A3001503
a3001506	1005R	rhc\Construction\ A3001506
a3001507	ags expansion loop area	rhc\Construction\A3001507
906-02-01-t-a1	star cooling system	rhc\Construction\906-02-01-t-a1
908-01-03-c0t-a1	8:00 outbuilding shielding-south	rhc\Construction\908s
908-01-02-c0t-a1	8:00 outbuilding shielding	rhc\Construction\908
910-07-01-t01	steel frame for pth cabinets	rhc\Construction\910
9rc-06-01-ta1	RHC site fences 2, 4, 6,8,10,12	rhc\Construction\9rc
904-06-01-c01-a1	sextant test 4:00 site plan	rhc\Construction\904
904-01-02-t00-a1	phase 1- 4:00 shielding	rhc\Construction\904
904-01-03-t	phase 2- 4:00 shielding	rhc\Construction\904-01-03.ta1
904-01-04-t-a1	phase 3- 4:00 shielding	rhc\Construction\904-01-04-t-a1
902-01-01-t-a1	2:00 building shielding	rhc\Construction\902
910-01-01-co1-a1	cover wall & labyrinth	rhc\Construction\901-01-01-co1-a1
912-01-01-t-a1	12:00 shielding	rhc\Construction\912-01-01-t-a1

Figure 19.2.1.1

20.0 DRAWING REVISIONS and ECN's

Drawings are **copied** out of the released directory of the released directory into working director to incorporate an ECN.

- 20.1 All baselined drawings require an ECN to make revisions.
- 20.2 "RD" drawings **DO NOT** require an ECN to make revisions
signatures on revised "RD" drawings - follow non-"RD" Procedure (See 8.0)
- 20.3 ECN's sheets can be found in the Documentation Control Center (see Personnel)
Electronic ECN forms: ECN – [Sheet 1](#) and [Sheet 2](#) in Excel.
- 20.4 ECN numbers will be given out by Documentation Control Center (DCC) Personnel [C-A ECN's](#)
- 20.5 ECN will be filled in, brought to DCC for a number, and then signatures will be obtained. Signatures will be as per ECN form. (Signatures are not typed in)
 - 20.5.1 **Information Required on ECN:**
 - 20.5.1.1 Change from: To: (be as specific as possible)
 - 20.5.1.2 Zone of change or changes
 - 20.5.1.3 Optional: add marked up copy of changes to be made, as sheet 2. etc.
 - 20.5.2 Return ECN to Document Control Center for scanning
- 20.6 TIF image of drawing(s) will be annotated with outstanding ECN number and ECN will be scanned
- 20.7 After 20.3 through 20.6, the drawing(s) can be revised – ECN rev letter is changed to the next letter
 - 20.7.1 Information required on drawing.
A triangle indicating revision letter placed at zone or changes.
 - 20.7.2 After ECN changes are incorporated on drawing(s), the drawings are checked and circulated for signatures. A copy of the ECN should be circulated with the drawing(s).
- 20.8 Drawings will be submitted for scanning after signatures.
- 20.9 Completed ECN's can be viewed from the "ENG-ARCH" area.
- 20.10 Multi-sheet drawings

Sheet one of a multi-sheet drawing will have the current rev letter indicating how many revisions have been made to the document. Sheet One will have a "rev block" indicating the rev level of each sheet. Only Sheet 1 and the sheet(s) being revised will advance to the rev letter on sheet 1. **(This may mean a rev letter is skipped on a sheet)**. All other sheets will remain at their current rev letter. The revision block on the format of sheet 1 will indicate which sheets are affected by the ECN in the description column.

21.0 BNL STANDARDS BASED MANAGEMENT SYSTEM (SBMS)

Engineering Design

- 21.1 [Preparing Engineering Design Plans](#)
 - 21.1.1 [Engineering Design Plan](#)
- 21.2 [Preparing and Revising Engineering Calculations and Analyses](#)
- 21.3 [Preparing and Revising Specifications and Drawings](#)
 - 21.3.1 [Graded Approach for Quality Requirement](#)
 - 21.3.2 [Design Review](#)
 - 21.3.3 [Approval Requirements](#)
 - 21.3.4 [Drawing and Specification Distribution](#)
 - 21.3.4.1 [Records Management](#)
 - 21.3.5 [Engineering Change Request Notice](#)