



SDC
SOLENOIDAL DETECTOR NOTES

SDC MUON BARREL TOROID SPECIFICATION

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1. Introduction

The Solenoidal Detector Collaboration (SDC) is seeking a fabricator for a large steel toroidal magnet. The SDC must be sure that the fabricator selected has the capacity and technical skills to deliver a quality magnet on time. Cost is also a critical factor. This document presents the technical details of the Muon Barrel Toroid (MBT) with text and drawings. The intent is to provide enough information to allow potential fabricators to prepare a cost quotation and schedule for the manufacture of the MBT. A cost work sheet and a schedule milestone work sheet have been included in this document to facilitate gathering information from competing fabricators. The SDC will require additional steel for the detector, but this document only refers to the fabrication of the MBT.

2. Background

The Superconducting Super Collider Laboratory (SSCL) is building a large particle accelerator near Dallas, Texas, USA. The SSCL is planning to build two large detectors to study the proton-proton collisions produced by this accelerator. The Solenoidal Detector Collaboration (SDC) has developed a detector design that is expected to be approved in September 1992. The SDC design is made up of many complicated subsystems that are layered like the skins of an onion around the interaction point. The outermost layers of the detector form the muon system. Wire chambers and scintillation counters are used to measure the bending of the charged muons as they pass through the magnetic field in the magnet. The bending is inversely proportional to the momentum of the muon. The field required to make this measurement accurately is large. The 1.5 meter thick Muon Barrel Toroid (MBT) is magnetized to 1.8 Tesla. Since the muon system is the outer layer of the detector, its volume and weight (16,400 metric tons) are large. The MBT is the first part of the detector to be installed in the underground experiment hall. The rest of the detector will be supported by the structure of the MBT.

3. Drawings

The following drawings are part of this package. These drawings are part of the preliminary design and are not final. The final drawings will be made by the fabricator and approved by the SSCL. There are some holes, slots, and other details that are described in the text but are not called out on the drawings.

SDD000319A	Short Block
SDD000323A	Long Upper Block
SDD000324A	Long Upper Edge Plate
SDD000325A	Long Upper Center Plate
SDD000326A	Long Bottom Center Plate
SDD000327A	Short Edge Plate
SDD000328A	Short Center Plate
SDD000329A	Key Pieces
SDD000331A	Bolt List
SDD000332A	Long Bottom Block
SDD000420	MBT Assembly with Support
SDD000421	MBT Assembly
SDD000422	Full Upper Side Plate
SDD000423	One-Third Upper Side Plate
SDD000424	Two-Thirds Upper Side Plate
SDD000425	Full Bottom Side Plate
SDD000426	One-Third Bottom Side Plate
SDD000427	Two-Thirds Bottom Side Plate
SDD000428	Pin Detail
SDD000429	Vertical Ring Layout
SDD000430	Long Bottom Edge Plate
SDD000435	Muon Barrel Block Assembly

4. Parts List

The complete toroid consists of the following parts. The bolts will be supplied to the fabricator by the SSCL. All the other parts of the MBT will be provided by the fabricator. Fixtures and tooling are not listed, but they are to be provided by the fabricator as needed.

a) 96 Long Upper Blocks (Drawing SDD000323)

- 192 Long Upper Edge Plates (Drawing SDD000324)
- 384 Long Upper Center Plates (Drawing SDD000325)
- 1344 Long Block Bolts (Drawing SDD000331)
(M56 X 805mm bolt with one nut and two washers)
- 384 Short Pins (Drawing SDD000428)

b) 32 Long Bottom Blocks (Drawing SDD000332)

- 64 Long Bottom Edge Plates (Drawing SDD000430)
- 128 Long Bottom Center Plates (Drawing SDD000326)
- 448 Long Block Bolts (Drawing SDD000331)
(M56 X 805mm bolt with one nut and two washers)
- 128 Short Pins (Drawing SDD000428)

c) 64 Short Blocks (Drawing SDD000319)

- 128 Short Block Edge Plates (Drawing SDD000327)
- 640 Short Block Center Plates (Drawing SDD000328)
- 512 Short Block Bolts (Drawing SDD000331)
(M56 X 1680mm bolt with one nut and two washers)
- 256 Long Pins (Drawing SDD000428)

d) Side Plates

- 21 Full Upper Side Plates (Drawing SDD000422)
- 6 Two-Thirds Upper Side Plates (Drawing SDD000424)
- 6 One-Third Upper Side Plates (Drawing SDD000423)
- 21 Full Bottom Side Plates (Drawing SDD000425)
- 6 Two-Thirds Bottom Side Plates (Drawing SDD000427)
- 6 One-Third Bottom Side Plates (Drawing SDD000426)

e) Corner Bolts

- 3072 Bolts (Drawing SDD000331)
(M56 X 400mm bolt with one washer)

f) Corner Keys

- 256 Three Piece Key Assemblies (Drawing SDD000329)

5. Operations List

The following is the operations list for fabrication of a complete toroid. The function of this list is to define the scope of the fabrication work. This list contains some details that are not represented on the preliminary drawings, but will be required on the final MBT.

a) Long Upper Blocks (operations per block)

- Prepare 6 plates for block
 - Cut plates to shape
 - Pre-drill 14 block bolt holes per plate
 - (56 thru holes and 28 thru holes with counterbores per block)
 - Rough drill 4 pin holes per plate
 - Inspect plate for flatness and thickness
- Stack plates and install 14 Bolts
- Bore 4 pin holes [150 mm diameter x 876 mm deep]
- Install 4 pins with thermal shrink fit
- Machine Surface A [9835mm x 1475mm]
- Machine Surface B [9835mm x 876mm]
- Machine Surface D [9835mm x 1475mm]
- Machine Surface F [2086mm x 876mm]
- Machine Surface G [2086mm x 876mm]
- Machine Surface H [6885mm x 876mm]
- Machine Two Keyways [100mm x 50mm x 876mm]
- Drill and counterbore 12 corner bolt holes
- Drill and tap 12 corner bolt holes
- Drill and tap 60 holes for track mounting bolts (M20 x 40mm deep)
 - **not shown on drawings**
- Drill and ream 24 holes for track mounting pins (25 x 60mm deep)
 - **not shown on drawings**
- Drill and tap 16 holes for coil mounting bolts (M20 x 40mm deep)
 - **not shown on drawings**

b) Long Bottom Blocks (operations per block)

- Prepare 6 plates for block
 - Cut plates to shape
 - Pre-drill 14 block bolt holes per plate
 - (56 thru holes and 28 thru holes with counterbores per block)
 - Rough drill 4 pin holes per plate
 - Inspect plate for flatness and thickness
- Stack plates and install 14 Bolts
- Bore 4 pin holes [150 mm diameter x 876 mm deep]
- Install 4 pins with thermal shrink fit
- Machine Surface A [9835mm x 1475mm]
- Machine Surface B 2 x [2121mm x 876mm]
- Machine Surface D [9835mm x 1475mm]
- Machine Surface F [2086mm x 876mm]
- Machine Surface G [2086mm x 876mm]
- Machine Surface H [6885mm x 876mm]
- Machine Surface I [5592mm x 876mm]

- Machine Two Keyways [100mm x 50mm x 876mm]
- Drill and counterbore 12 corner bolt holes
- Drill and tap 12 corner bolt holes
- Drill and tap 60 holes for track mounting bolts (M20 x 40mm deep)
not shown on drawings
- Drill and ream 24 holes for track mounting pins (25 x 60mm deep)
not shown on drawings
- Drill and tap 16 holes for coil mounting bolts (M20 x 40mm deep)
not shown on drawings

c) Short Thick Block (operations per block)

- Prepare 12 plates for block
 - Cut plates to shape
 - Predrill 8 block bolt holes per plate
(80 thru holes and 16 thru holes with counterbores per block)
 - Rough drill 4 pin holes per plate
 - Inspect plate for flatness and thickness
- Stack plates and install 8 Bolts
- Bore 4 pin holes [150mm diameter x 1752mm deep]
- Install 4 pins with thermal shrink fit
- Machine Surface A [5592mm x 1500mm]
- Machine Surface B [2121mm x 1752mm]
- Machine Surface D [5592mm x 1500mm]
- Machine Surface E [2121mm x 1752mm]
- Machine Surface F [5592mm x 1752mm]
- Machine Surface H [2592mm x 1752mm]
- Machine Two Keyways [100mm x 50mm x 1752mm]
- Drill and counterbore 24 corner bolt holes
- Drill and tap 24 corner bolt holes
- Drill and tap 40 holes for track mounting bolts (M20 x 40mm deep)
not shown on drawings
- Drill and ream 16 holes for track mounting pins (25 x 60mm deep)
not shown on drawings
- Drill and tap 32 holes for coil mounting bolts (M20 x 40mm deep)
not shown on drawings

d) Assemble Blocks

Assemble each set of 8 long blocks and 4 short blocks into a rings 1752mm thick for inspection. The first ring assembled must be vertical but others may be horizontal. (See Test Assembly later in text)

e) Other machining that is not on every block

- Plates for the central ring (8 long blocks and 4 short blocks) may need to be machined to keep the gap between the plates to 1mm or less. This requires machining two surfaces on 80 plates to a flatness of +/- 0.5 mm. On the other 15 rings the allowable gap of 3mm should be attainable without machining.
not shown on drawings
- The blocks on the bottom (32 long blocks) must mate with the calorimeter support legs and the support base inclined plate. Bolt holes may be needed to secure the legs. There may be 16 - M20 x 40mm deep holes per block for holding the calorimeter legs, and 16 - M20 x 40mm deep holes per block for holding the

support legs in place.

****not shown on drawings****

- There will be two special long blocks at the top that have notches to allow the cryogenic line to pass through the steel. The cryogenic notch in each of the two blocks is 230 mm x 910 mm. This does not work out well with the 147 mm plates. In this location two 147 mm x 1500 mm x 9735 mm plates should be replaced with two 230 mm x 1500 mm x 4413 mm plates and one 64 mm x 1500 mm x 9735 mm plate. Some additional bolting will be required.

****not shown on drawings****

f) Block identification

All blocks shall be stamped and marked with an identification number on each of the six main surfaces. All the ring sections which are bolted together in the test assembly shall be cataloged, clearly documented and documents supplied to the SSCL.

g) Design and construct handling and lifting fixtures

The design and construction of the fixtures required for manufacturing, handling, and lifting are the responsibility of the fabricator. The handling and lifting fixtures will be delivered with the blocks so they can be used for assembly.

h) Packing

All materials shall be painted (corrosion resistant), wrapped and packed to protect the steel from the elements during transportation. The corner contact surfaces shall be taped and surface coated, and not painted.

i) Storage

Assembled plates shall be stored so they are protected from weather and damage. Corner contact surfaces, machined holes, tapped holes and special surfaces shall be protected against damage.

j) Shipping

For foreign fabricator, the quotation shall include all shipping to Port of Entry, storage and transportation from Port of Entry to SSCL site. Detailed information on port of exit, duties, fees, restrictions and shipping times shall be included. Port of Entry shall be Houston or Galveston, Texas. For domestic fabricator, the quotation shall include storage and all transportation cost to SSCL site.

6. Quality Assurance / Quality Control

The fabricator shall include QA/QC procedures for all phases of the work with the proposal. Specific concerns shall be identified. Material documentation and certification for all materials used shall be submitted to SSCL for review and approval.

7. Test Assembly

All sections of the individual ring assemblies shall be bolted together for a test fit prior to shipping. The initial test assembly shall be vertical and witnessed by the SSCL. All other test assemblies may be horizontal or vertical. The sections of the ring which are bolted together shall be cataloged and clearly documented. Dimension and functional checks are to be performed and documented. This documentation shall be supplied to the SSCL.

8. Metallurgical Specification

The material for the steel plates will be A-87 which is similar to AISI 1010. **The metallurgical specification and material requirements are being developed and will be provided at a later date.**

9. Schedule Work Sheet

The MBT is the first item on the critical path of the SDC installation schedule. Timely delivery is essential. Please verify the following schedule. If any parts of the schedule can be accelerated please indicate this by filling in dates in the Early column. If any part of the schedule must be slowed please indicate this by filling in dates in the Late column. The Scheduled Completion is the duration following the starting date of the prototype block contract being signed.

Event Description	Scheduled Completion (weeks)	Early Completion (weeks)	Late Completion (weeks)
Prototype Block Contract Signed	<u>0</u>	_____	_____
Prototype Long and Short Block Complete	<u>12</u>	_____	_____
Full MBT Fabrication Contract Signed	<u>16</u>	_____	_____
Fabricator Complete Final Shop Drawings	<u>28</u>	_____	_____
Final Design Approved	<u>31</u>	_____	_____
Completion/Delivery of First Steel Plate	<u>33</u>	_____	_____
Completion of First Vertical Ring Assembly	<u>57</u>	_____	_____
Delivery of First Block to Texas Port or SSCL	<u>108</u>	_____	_____
Completion/Delivery of Last Steel Plate	<u>141</u>	_____	_____
Completion of Last Ring Assembly	<u>152</u>	_____	_____
Delivery of Last Block to Texas Port or SSCL	<u>158</u>	_____	_____
Start of MBT Assembly (separate contract)	<u>166</u>	_____	_____

10. Cost Work Sheet

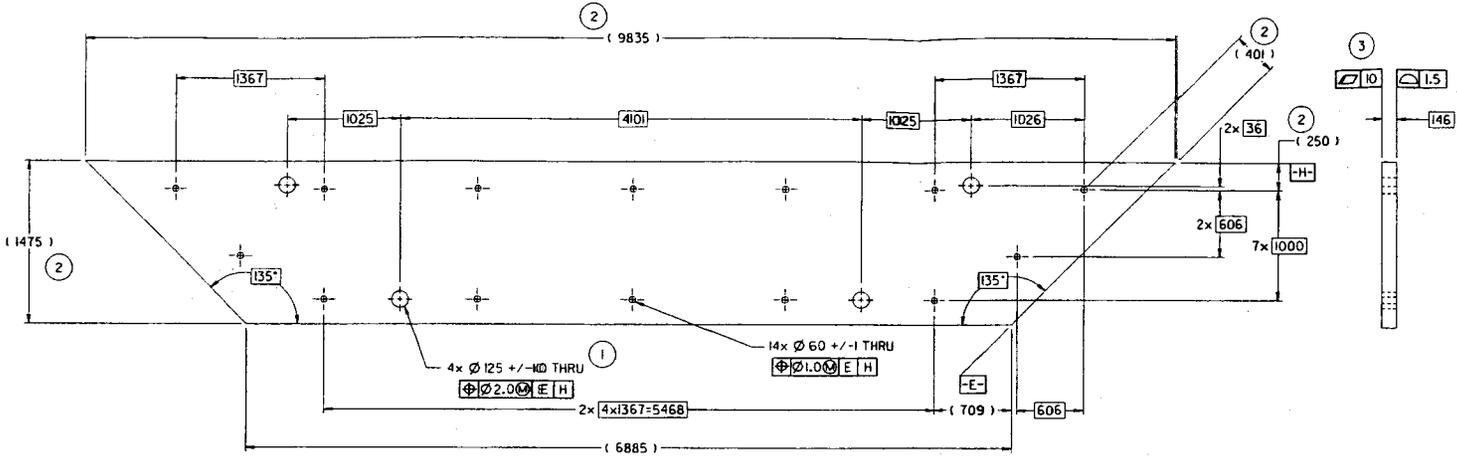
The cost of fabrication is an important factor in selecting a fabricator. The SDC requires more than just a bottom line. Please fill out this cost work sheet. All cost numbers should be in 1992 US dollars. The payment schedule is also important for the fiscal planning by the SDC. Please include a proposed payment schedule.

Item Description		Cost US Dollars	Cost Other Denomi.
Prototype Block Contract (1 Long and 1 Short Block delivered to SSCL site)	TOTAL	\$ _____	_____
Full MBT Fabrication Contract (All pieces for MBT delivered to SSCL site)	TOTAL	\$ _____	_____
Material		\$ _____	_____
Plate Preparation (Cutting and Drilling)		\$ _____	_____
Block Assembly		\$ _____	_____
Block Machining		\$ _____	_____
Keys		\$ _____	_____
Pins		\$ _____	_____
Side Plates		\$ _____	_____
Ring Test Assembly		\$ _____	_____
Handling and Lifting Fixtures		\$ _____	_____
Tooling and Other Fixtures		\$ _____	_____
Painting, Packaging, and Cribbing		\$ _____	_____
Storage		\$ _____	_____
Shipping			
From foreign fabricator to US Port of Entry		\$ _____	_____
From US Port of Entry to SSCL site		\$ _____	_____
From domestic fabricator to SSCL site		\$ _____	_____
Taxes and Duty		\$ _____	_____

NOTES:

- ① LINE BORE TO 150 ± 0.05 AFTER ASSEMBLY.
- ② DIMENSIONS ARE FINISHED DIMENSIONS - REFERENCE ONLY AND SUFFICIENT STOCK SHOULD BE ADDED TO THESE DIMENSIONS TO ALLOW MACHINING TO THE BLOCK PROFILES AFTER ASSEMBLY.
- ③ ALLOWABLE FLATNESS DEVIATION 1.5mm/m.

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384							

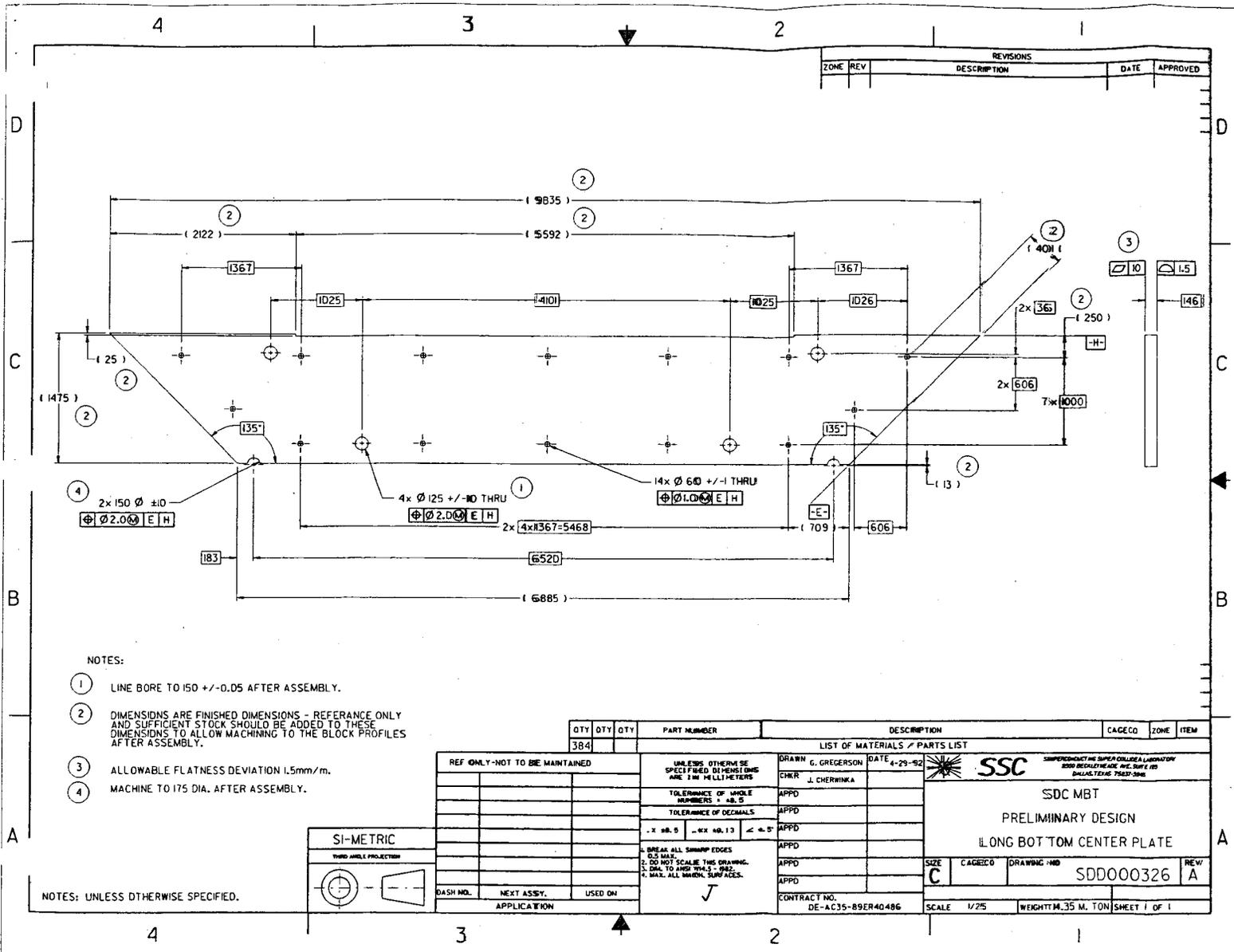
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	TOLERANCE OF DECIMALS	J. CHERWINKA	
	.X 48.5 .XX 48.13 < 48.5	APPD	
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	3. DIM. TO ANG. TYP. - 99.2	APPD	
	4. MAX. ALL MACH. SURFACES.	APPD	

SI-METRIC		THIRD ANGLE PROJECTION	

DASH NO.	NEXT ASSY.	USED ON

LIST OF MATERIALS / PARTS LIST			
		SUPERCONDUCTING SUPERTECHNOLOGY LABORATORY 2550 ROCKLEIGH AVE. SUITE 205 DALLAS, TEXAS 75246-3946	
		SDC MBT	
		PRELIMINARY DESIGN	
		LONG UPPER CENTER PLATE	
SIZE	EAGE/CO	DRAWING NO	REV
C		SDD000325	A
SCALE	1/25	WEIGHT	14.35 M. TON
			SHEET 1 OF 1

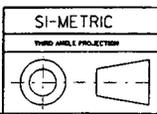
NOTES: UNLESS OTHERWISE SPECIFIED.



NOTES:

- ① LINE BORE TO 150 +/- 0.05 AFTER ASSEMBLY.
- ② DIMENSIONS ARE FINISHED DIMENSIONS - REFERENCE ONLY AND SUFFICIENT STOCK SHOULD BE ADDED TO THESE DIMENSIONS TO ALLOW MACHINING TO THE BLOCK PROFILES AFTER ASSEMBLY.
- ③ ALLOWABLE FLATNESS DEVIATION 1.5mm/m.
- ④ MACHINE TO 175 DIA. AFTER ASSEMBLY.

NOTES: UNLESS OTHERWISE SPECIFIED.



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384							

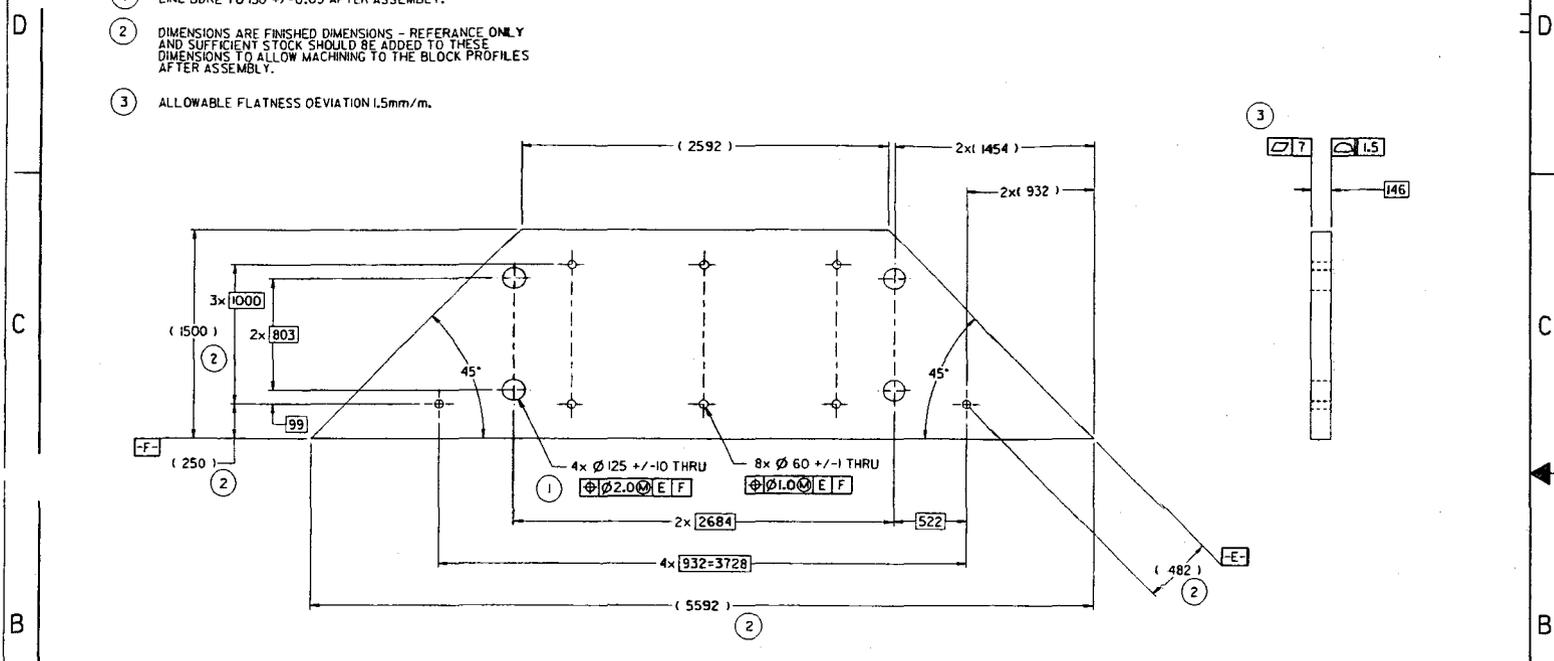
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		TOLERANCE OF DECIMALS	APPD
		.X 00.5 ... X 00.13 < 0.5	APPD
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		DIAL TO AND FROM 1-982	APPD
		WAL. ALL MACH. SURFACES.	
DASH NO.	NEXT ASSY.	USED ON	CONTRACT NO.
			DE-AC35-89ER40486
APPLICATION			SCALE 1/25

SSC SUPERCONDUCTING TECHNOLOGY LABORATORY 2000 RESEARCH TRIANGLE PARK, NORTH CAROLINA 27709	
SDC MBT	
PRELIMINARY DESIGN	
LONG BOTTOM CENTER PLATE	
SIZE C	CAGECO DRAWING NO. SDD000326
REW A	
	WEIGHT 11.35 M. TON SHEET 1 OF 1

NOTES:

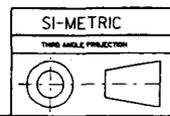
- ① LINE BDR TO ISO +/-0.05 AFTER ASSEMBLY.
- ② DIMENSIONS ARE FINISHED DIMENSIONS - REFERENCE ONLY AND SUFFICIENT STOCK SHOULD BE ADDED TO THESE DIMENSIONS TO ALLOW MACHINING TO THE BLOCK PROFILES AFTER ASSEMBLY.
- ③ ALLOWABLE FLATNESS DEVIATION 1.5mm/m.

ZONE		REV	DESCRIPTION	DATE	APPROVED



DTY		PART NUMBER		DESCRIPTION		CAGECD	ZONE	ITEM
640								
REF ONLY-NOT TO BE MAINTAINED				LIST OF MATERIALS / PARTS LIST				
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TOLERANCE OF WHOLE NUMBERS +/- 0.5				CHKD	J. CHERWINKA			
TOLERANCE OF DECIMALS +/- 0.1				APPD				
.X +/- 0.5 .XX +/- 0.13 < 0.9				APPD				
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2. DO NOT SCALE THIS DRAWING.				APPD				
3. DIM TO ANGLE THIS - PREC.				APPD				
4. MAX. ALL MACH. SURFACES				APPD				
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APPLICATION				CONTRACT NO.		SCALE		
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NOTES: UNLESS OTHERWISE SPECIFIED.

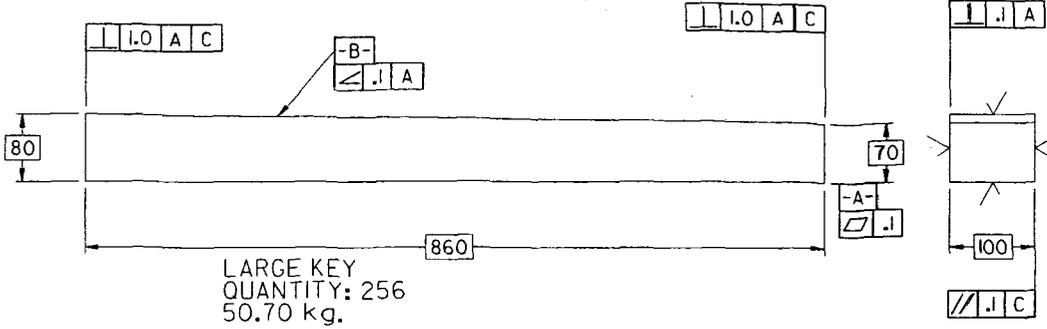


SSC SUPERCONDUCTING SUPER COLLIDER LABORATORY
2500 BRIDGEMAN AVE. SUITE 403
DALLAS, TEXAS 75276-3904

SDC MBT
PRELIMINARY DESIGN
SHORT CENTER PLATE

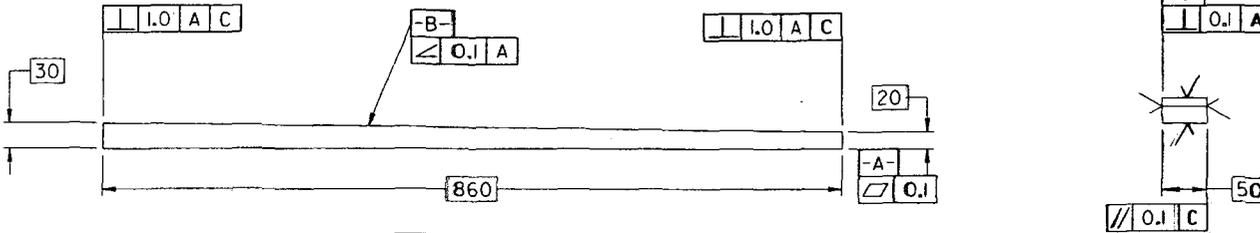
SIZE C CAGECD DRAWING NO. SDD000328 REV A

MAT'L: ASTM A83-85 GRADE ASE 1010.



LARGE KEY
QUANTITY: 256
50.70 kg.

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED



MAT'L: ASTM A83-85 GRADE ASE 1010.

SMALL KEY
QUANTITY: 512
8.45 kg.

QTY	QTY	QTY	PART NUMBER	DESCRIPTION	CAGECO	ZONE	ITEM
				LIST OF MATERIALS / PARTS LIST			

REF ONLY-NOT TO BE MAINTAINED			UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETERS	DRAWN G. GREGERSON	DATE 4-29-92
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				APPD	
				APPD	
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			TOLERANCE OF DECIMALS	APPD	
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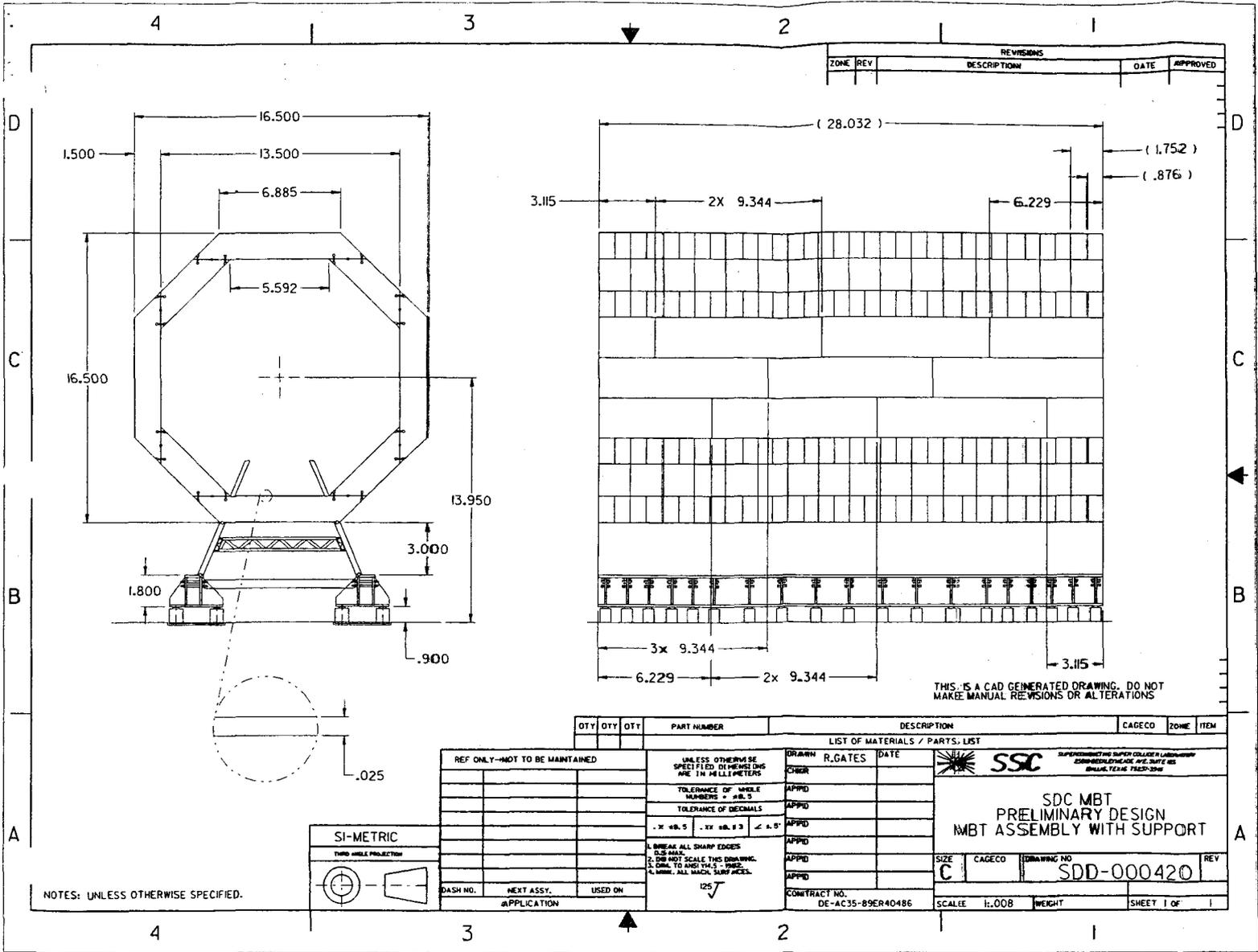
SI-METRIC
THIRD ANGLE PROJECTION

SSC
SUPERCONDUCTING SUPER COLLIDER LABORATORY
2550 BECKMEYER AVE. W.E. SUITE 125
DALLAS, TEXAS 75227-3546

SDC MBT
PRELIMINARY DESIGN
KEY PIECES

SIZE B	CAGECO	DRAWING NO. SDD000329	REV A
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SCALE 1/5 WEIGHT SHEET 1 OF 1



ZONE		REV	DESCRIPTION	DATE	APPROVED

QTY	QTY	QTY	PART NUMBER	DESCRIPTION	CAGECO	ZONE	ITEM

LIST OF MATERIALS / PARTS LIST

DRAWN	R.GATES	DATE

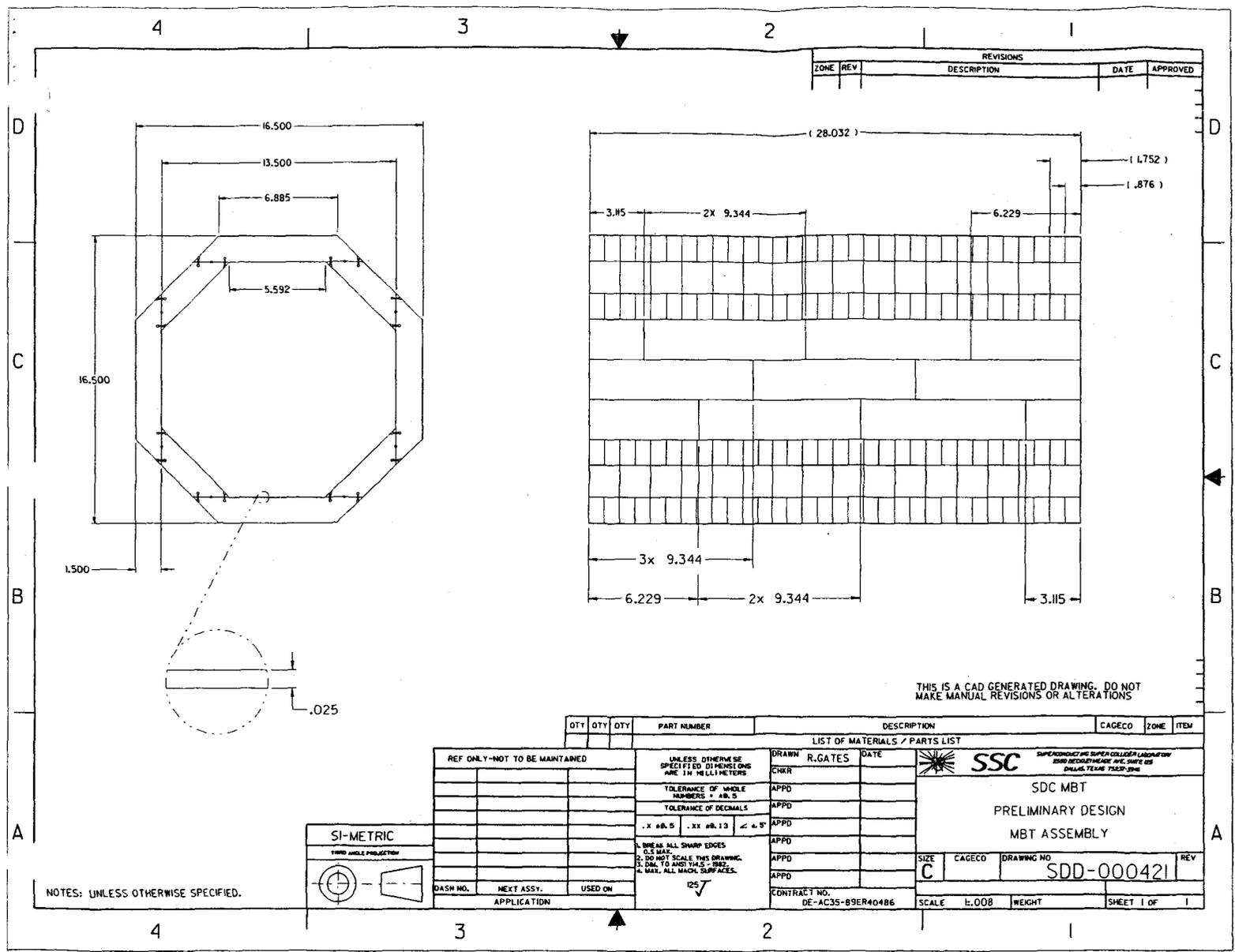
SSC SUPERMACHINE SUPPLY CORP. 10000 W. 10TH AVE. SUITE 800 BLDG. 1000 10000 W. 10TH AVE. SUITE 800 BLDG. 1000

SDC MBT PRELIMINARY DESIGN MBT ASSEMBLY WITH SUPPORT

SIZE	CAGECO	DRAWING NO.	REV
C		SDD-000420	

CONTRACT NO. DE-AC35-89ER40486

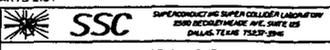
SCALE: 1:008 WEIGHT SHEET 1 OF 1



REVISIONS				
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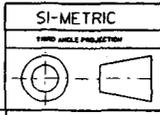
THIS IS A CAD GENERATED DRAWING. DO NOT MAKE MANUAL REVISIONS OR ALTERATIONS

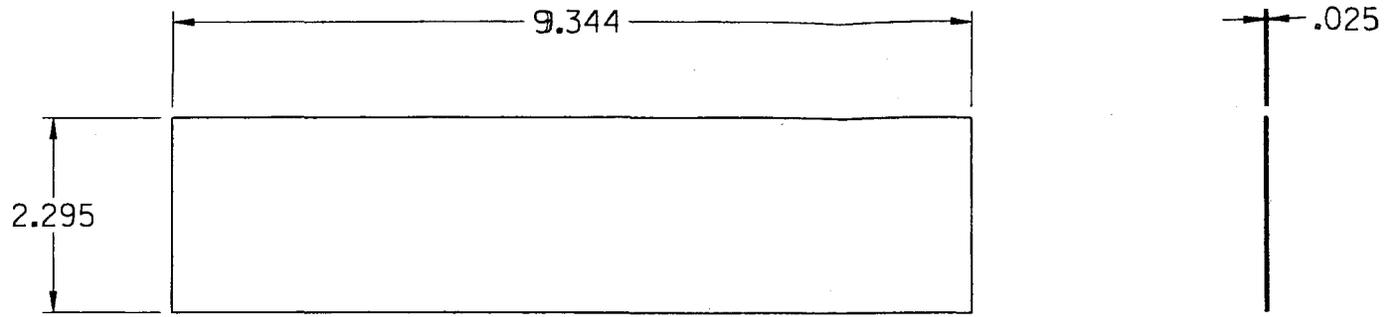
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LIST OF MATERIALS / PARTS LIST							
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				TOLERANCE OF DECIMALS	APPD		
				.X ±.5 .XX ±.13 < .5	APPD		
				BREAK ALL SHARP EDGES	APPD		
				0.5 MAX.	APPD		
				DO NOT SCALE THIS DRAWING	APPD		
				3 DIM. TO ANGLE THIS - 1982.	APPD		
				4 MAX. ALL MACH SURFACES.	APPD		
DASH NO. NEXT ASSY. USED ON				125	SIZE	CAGECO	DRAWING NO.
APPLICATION				DE-AC35-B9ER40486	C		SDD-000421
				CONTRACT NO.	SCALE	WEIGHT	REV
					1:008		
							SHEET 1 OF 1



SDC MBT
PRELIMINARY DESIGN
MBT ASSEMBLY

NOTES: UNLESS OTHERWISE SPECIFIED.





REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED

NOTE: I. WEIGHT= 4.2 METRIC TONS

THIS IS A CAD GENERATED DRAWING. DO NOT MAKE MANUAL REVISIONS OR ALTERATIONS

SI-METRIC

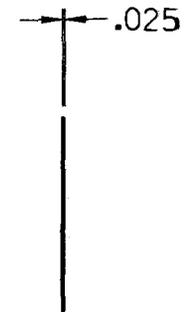
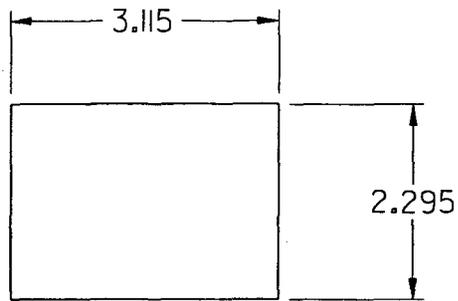
THIRD ANGLE PROJECTION

QTY	QTY	QTY	PART NUMBER	DESCRIPTION	CAGECO	ZONE	ITEM
LIST OF MATERIALS / PARTS LIST							
REF ONLY-NOT TO BE MAINTAINED			UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETERS		DRAWN R. GATES	DATE	
			TOLERANCE OF WHOLE NUMBERS = ±0.5		CHKR		
			TOLERANCE OF DECIMALS		APPD		
			.X ±0.5 .XX ±0.13 < ±.5		APPD		
			1. BREAK ALL SHARP EDGES 0.5 MAX.		APPD		
			2. DO NOT SCALE THIS DRAWING.		APPD		
			3. DIM. TO ANSI Y14.5 - 1982.		APPD		
			4. MAX. ALL MACH. SURFACES.		APPD		
DASH NO.	NEXT ASSY.	USED ON	125 ✓		CONTRACT NO.	DE-AC35-89ER40486	
APPLICATION					SIZE B	CAGECO	DRAWING NO SDD-000422
					SCALE	WEIGHT 4.2 MT	SHEET 1 OF 1

SSC SUPERCONDUCTING SUPER COLLIDER LABORATORY
2550 BECKLEY MEADE AVE, SUITE 125
DALLAS, TEXAS 75237-3946

SDC MBT
PRELIMINARY DESIGN
FULL UPPER SIDE PLATE

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED



SI-METRIC
THIRD ANGLE PROJECTION

NOTE: 1. WEIGHT= 1.4 METRIC TONS

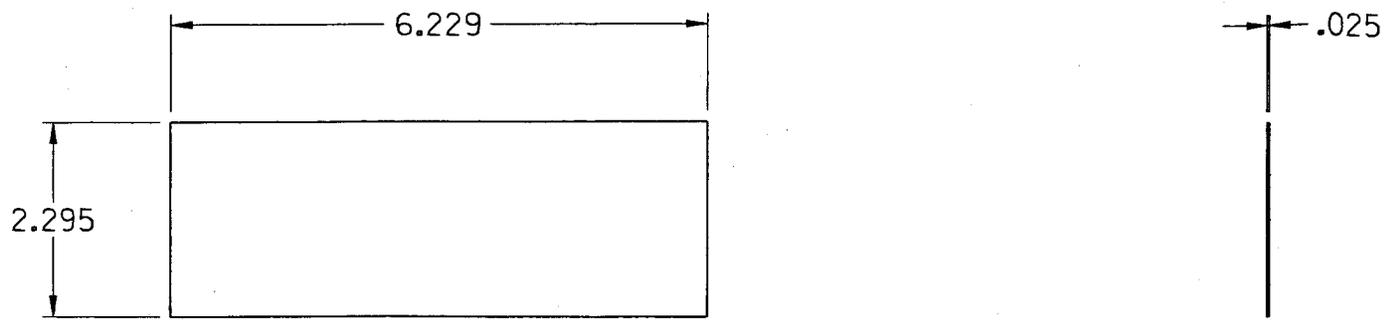
THIS IS A CAD GENERATED DRAWING. DO NOT MAKE MANUAL REVISIONS OR ALTERATIONS

QTY	QTY	QTY	PART NUMBER	DESCRIPTION	CAGECO	ZONE	ITEM

LIST OF MATERIALS / PARTS LIST

REF ONLY-NOT TO BE MAINTAINED			UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETERS	DRAWN	R. GATES	DATE	 <small>SUPERCONDUCTING SUPER COLLIDER LABORATORY 2550 BECKLEY MEADE AVE. SUITE 125 DALLAS, TEXAS 75237-3946</small>			
				CHKR						
			TOLERANCE OF WHOLE NUMBERS = ±0.5	APPD			SDC MBT PRELIMINARY DESIGN ONE-THIRD UPPER SIDE PLATE			
			TOLERANCE OF DECIMALS	APPD						
			. X ±0.5 . XX ±0.13 < ±.5	APPD						
			1. BREAK ALL SHARP EDGES 0.5 MAX. 2. DO NOT SCALE THIS DRAWING. 3. DIM. TO ANSI Y14.5 - 1982. 4. MAX. ALL MACH. SURFACES.	APPD						
DASH NO.	NEXT ASSY.	USED ON	125 ✓	APPD			SIZE	CAGECO	DRAWING NO	REV
APPLICATION				CONTRACT NO.				B		SDD-000423
			DE-AC35-89ER40486	SCALE			WEIGHT		SHEET 1 OF	1

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED



NOTE:
1. WEIGHT= 2.8 METRIC TONS

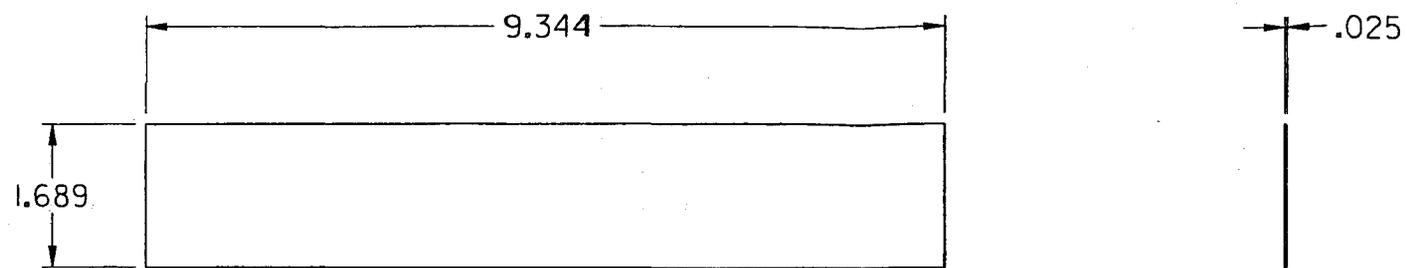
THIS IS A CAD GENERATED DRAWING. DO NOT
MAKE MANUAL REVISIONS OR ALTERATIONS

SI-METRIC
THIRD ANGLE PROJECTION

QTY	QTY	QTY	PART NUMBER	DESCRIPTION	CAGECO	ZONE	ITEM

REF ONLY-NOT TO BE MAINTAINED			UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETERS			DRAWN R. GATES	DATE	<p>SSC SUPERCONDUCTING SUPER COLLIDER LABORATORY 2550 BECKLEY MEADE AVE. SUITE 125 DALLAS, TEXAS 75237-3946</p>				
			TOLERANCE OF WHOLE NUMBERS = ±0.5			CHKR						
			TOLERANCE OF DECIMALS			APPD						
			.X ±0.5 .XX ±0.13 < ±.5'			APPD						
			1. BREAK ALL SHARP EDGES 0.5 MAX. 2. DO NOT SCALE THIS DRAWING. 3. DIM. TO ANSI Y14.5 - 1982. 4. MAX. ALL MACH. SURFACES.			APPD		<p>SDC MBT PRELIMINARY DESIGN TWO-THIRDS UPPER SIDE PLATE</p>				
DASH NO.	NEXT ASSY.	USED ON	125 ✓			APPD			SIZE B	CAGECO	DRAWING NO SDD-000424	REV
APPLICATION						CONTRACT NO. DE-AC35-89ER40486	SCALE		WEIGHT	SHEET 1 OF 1		

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED



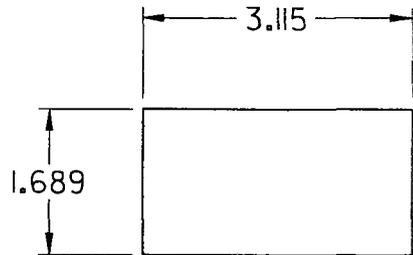
SI-METRIC
THIRD ANGLE PROJECTION

NOTE: 1. WEIGHT= 3.09 METRIC TONS

THIS IS A CAD GENERATED DRAWING. DO NOT MAKE MANUAL REVISIONS OR ALTERATIONS

QTY	QTY	QTY	PART NUMBER	DESCRIPTION	CAGECØ	ZONE	ITEM	
LIST OF MATERIALS / PARTS LIST								
REF ONLY-NOT TO BE MAINTAINED			UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETERS		DRAWN R. GATES DATE			<p>SUPERCONDUCTING SUPER COLLIDER LABORATORY 2550 BECKLEY MEADE AVE, SUITE 125 DALLAS, TEXAS 75237-3946</p>
			TOLERANCE OF WHOLE NUMBERS = ±0.5		CHKR			
			TOLERANCE OF DECIMALS		APPD			
			.X ±0.5 .XX ±0.13 < ±.5		APPD			
			1. BREAK ALL SHARP EDGES 0.5 MAX. 2. DO NOT SCALE THIS DRAWING. 3. DIM. TO ANSI Y14.5 - 1982. 4. MAX. ALL MACH. SURFACES.		APPD			
					APPD			
					APPD			
					APPD			
DASH NO.	NEXT ASSY.	USED ON	125 √		CONTRACT NO.			SIZE B CAGECØ DRAWING NO SDD-000425 REV
APPLICATION					DE-AC35-89ER40486			
					SCALE	WEIGHT	SHEET 1 OF 1	

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED



SI-METRIC
THIRD ANGLE PROJECTION

NOTE: 1. WEIGHT = 1.03 METRIC TONS

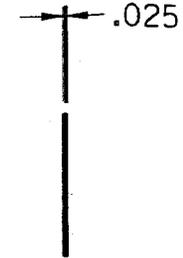
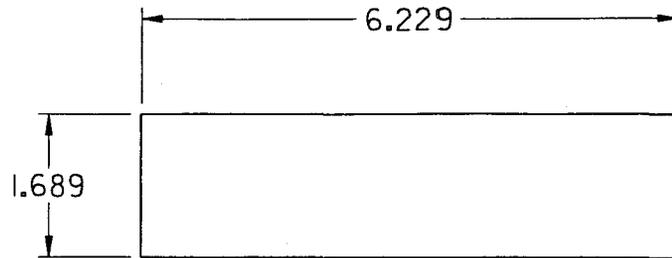
THIS IS A CAD GENERATED DRAWING. DO NOT MAKE MANUAL REVISIONS OR ALTERATIONS

QTY	QTY	QTY	PART NUMBER	DESCRIPTION	CAGECO	ZONE	ITEM

LIST OF MATERIALS / PARTS LIST

REF ONLY - NOT TO BE MAINTAINED			UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETERS TOLERANCE OF WHOLE NUMBERS = ±0.5 TOLERANCE OF DECIMALS .X ±0.5 .XX ±0.13 < ±.5	DRAWN	R. GATES	DATE	SUPERCONDUCTING SUPER COLLIDER LABORATORY 2550 BECKLEY MEADE AVE. SUITE 125 DALLAS, TEXAS 75227-3946
				CHKR			
				APPD			
				APPD			
				APPD			
DASH NO.			1. BREAK ALL SHARP EDGES 0.5 MAX. 2. DO NOT SCALE THIS DRAWING. 3. DIM. TO ANSI Y14.5 - 1982. 4. MAX. ALL MACH. SURFACES. 125 ✓	SIZE	CAGECO	DRAWING NO	REV
APPLICATION				B		SDD-000426	
				CONTRACT NO.	SCALE	WEIGHT	SHEET 1 OF 1
				DE-AC35-89ER40486			

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED

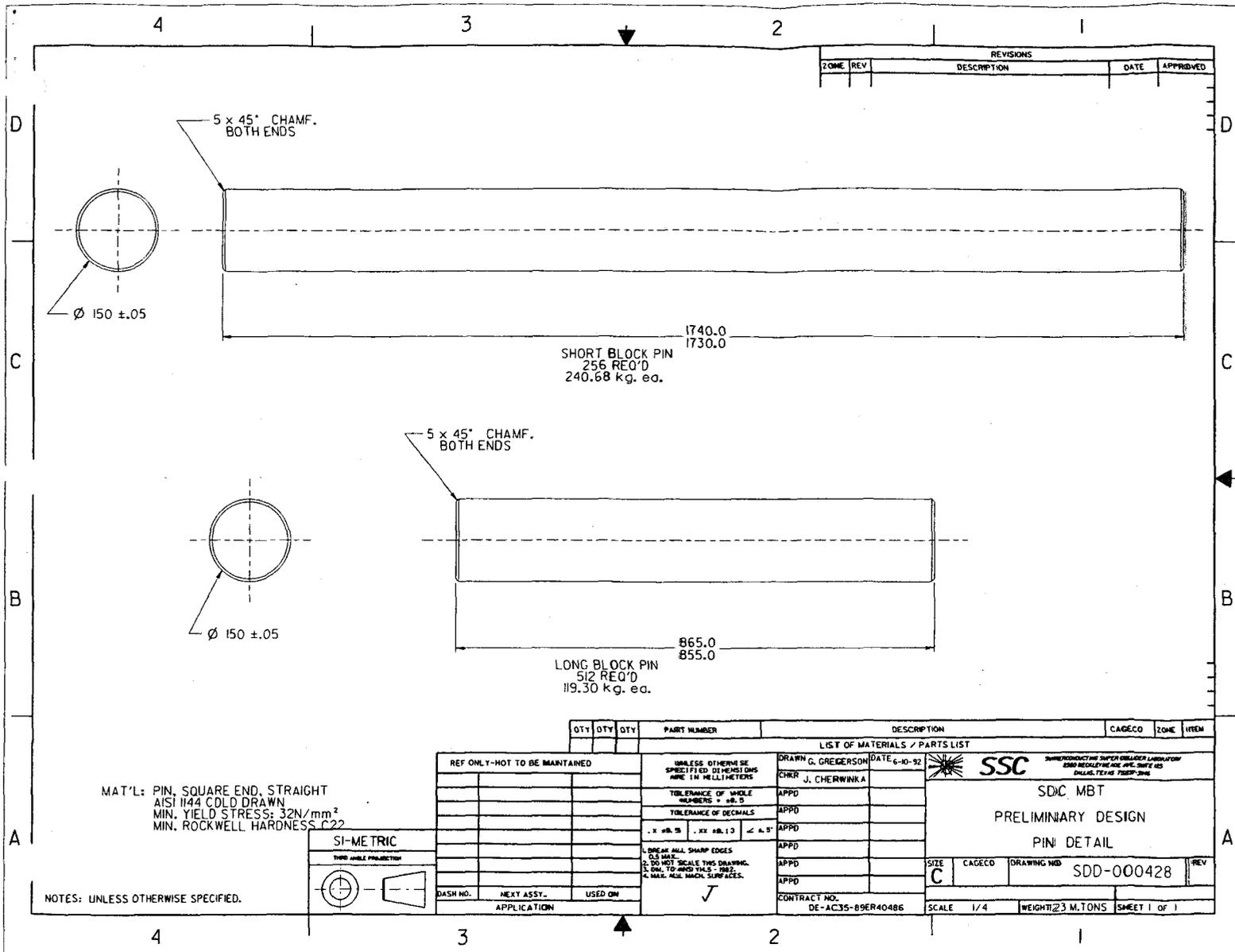


SI-METRIC
THIRD ANGLE PROJECTION

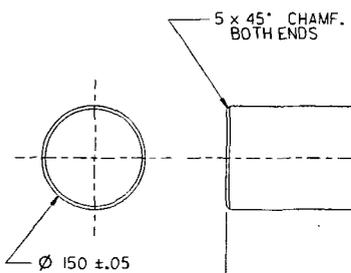
NOTE: 1. WEIGHT = 2.06 METRIC TONS

THIS IS A CAD GENERATED DRAWING. DO NOT MAKE MANUAL REVISIONS OR ALTERATIONS

QTY	QTY	QTY	PART NUMBER	DESCRIPTION	CAGECO	ZONE	ITEM		
LIST OF MATERIALS / PARTS LIST									
REF ONLY-NDT TO BE MAINTAINED			UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETERS		DRAWN R. GATES DATE			<p>SSC SUPERCONDUCTING SUPER COLLIDER LABORATORY 2550 BECKLEYMEADE AVE, SUITE 125 DALLAS, TEXAS 75227-3946</p> <p>SDC MBT PRELIMINARY DESIGN TWO-THIRDS BOTTOM SIDE PLATE</p>	
			TOLERANCE OF WHOLE NUMBERS = ±0.5		CHKR				
			TOLERANCE OF DECIMALS		APPD				
			.X ±0.5 .XX ±0.13 < ±.5		APPD				
			1. BREAK ALL SHARP EDGES 0.5 MAX.		APPD				
			2. DO NOT SCALE THIS DRAWING.		APPD				
			3. DIM. TO ANSI Y14.5 - 1982.		APPD				
			4. MAX. ALL MACH. SURFACES.		APPD				
DASH NO.	NEXT ASSY.	USED ON	125 ✓		SIZE	CAGECO	DRAWING NO		REV
APPLICATION					CONTRACT NO.	B			SDD-000427
				DE-AC35-89ER40486	SCALE	WEIGHT	SHEET 1 OF 1		

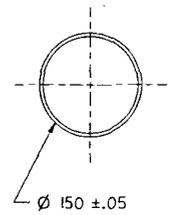


REVISIONS			
ZONE	REV	DESCRIPTION	DATE



SHORT BLOCK PIN
256 REQ'D
240.68 kg. ea.

1740.0
1730.0

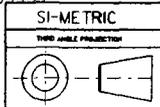


LONG BLOCK PIN
512 REQ'D
119.30 kg. ea.

865.0
855.0

MAT'L: PIN, SQUARE END, STRAIGHT
AISI 1144 COLD DRAWN
MIN. YIELD STRESS: 32N/mm²
MIN. ROCKWELL HARDNESS C22

NOTES: UNLESS OTHERWISE SPECIFIED.

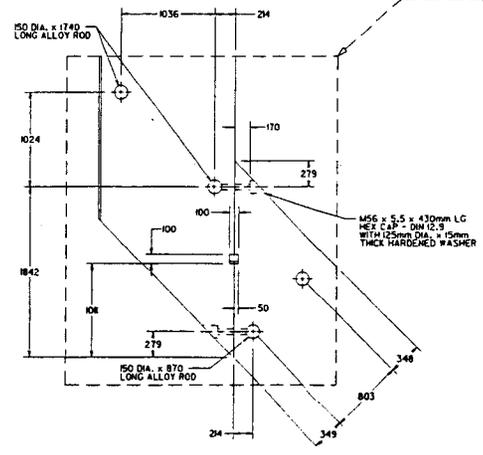
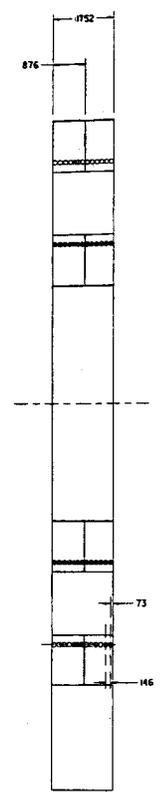
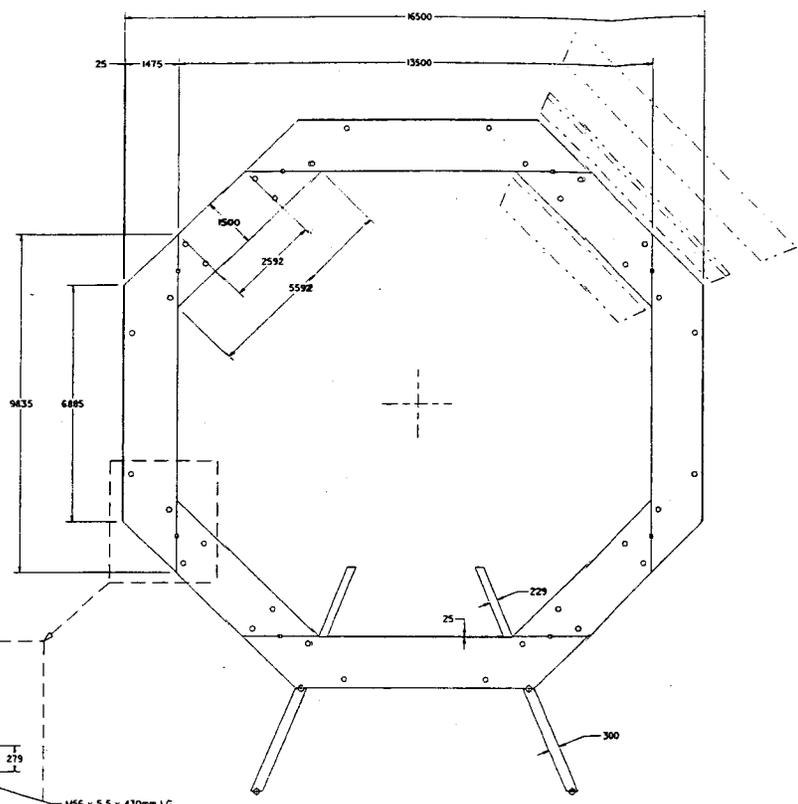
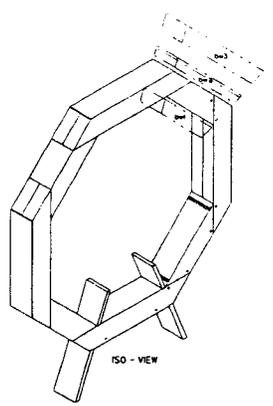


QTY	QTY	QTY	PART NUMBER	DESCRIPTION	CAGECO	ZONE	ITEM

LIST OF MATERIALS / PARTS LIST	
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETERS	DRAWN G. GREGERSON DATE 6-10-92
TOLERANCE OF WHOLE NUMBERS = ±0.5	CHKR J. CHERWINKA
TOLERANCE OF DECIMALS	APPD
.X ±0.15 .XX ±0.13 < .1	APPD
BREAK ALL SHARP EDGES 0.5 MAX.	APPD
2. DO NOT SCALE THIS DRAWING.	APPD
3. DIM. TO HOLE YLS - 100.	APPD
4. MAX. MSL MACH. SURFACES.	APPD

SSC	SDIC MBT
PRELIMINARY DESIGN	
PIN DETAIL	
SIZE C	DRAWING NO. SDD-000428
CAGECO	REV

CONTRACT NO. DE-AC35-89ER40486	SCALE 1/4	WEIGHT 23 M. TONS	SHEET 1 OF 1
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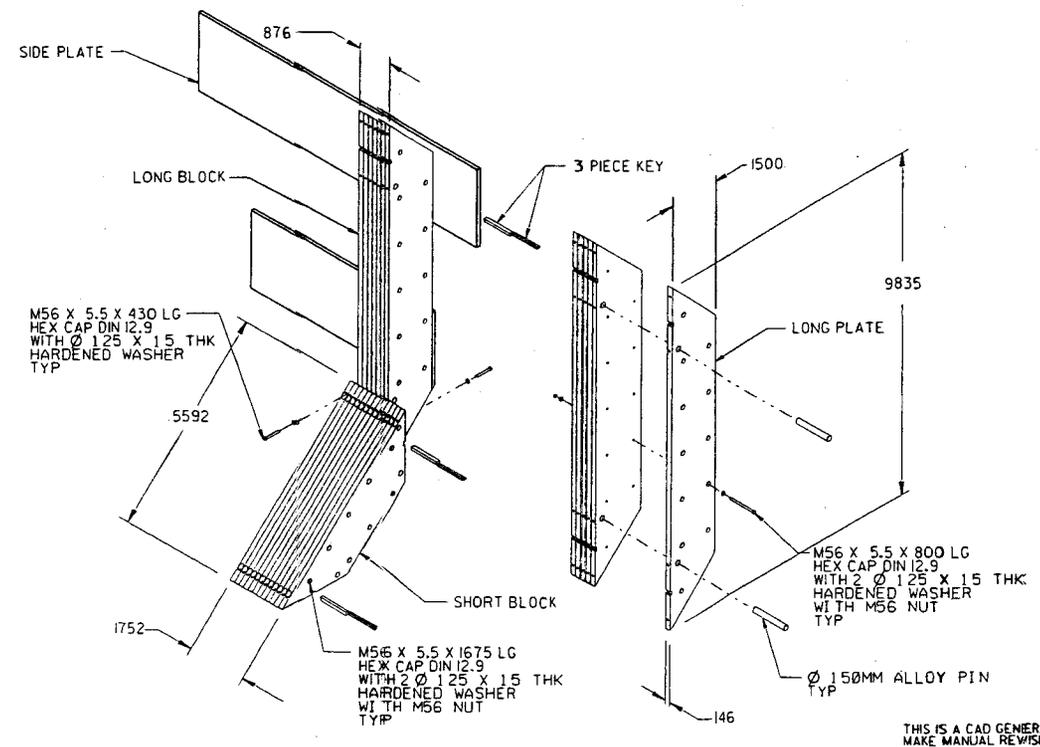
NOTES: UNLESS OTHERWISE SPECIFIED.

	SHEET NO. 7 SHEET TITLE: VERTICAL RING LAYOUT	PROJECT NO. SDC-000429 PROJECT TITLE: SDC MBT PRELIMINARY DESIGN	DATE: 1/1/00 DRAWN BY: [Name] CHECKED BY: [Name]
	SCALE: 1:1 UNIT: METRIC	DESIGNED BY: [Name] APPROVED BY: [Name]	REVISIONS:

4 3 2 1

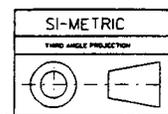
REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED

D
C
B
A



THIS IS A CAD GENERATED DRAWING. DO NOT MAKE MANUAL REVISIONS OR ALTERATIONS

2. BLOCK ASSEMBLY AT MANUFACTURER
1. FINAL ASSEMBLY IN HALL
NOTES: UNLESS OTHERWISE SPECIFIED.



QTY	QTY	QTY	PART NUMBER	DESCRIPTION	CAGECO	ZONE	ITEM
REF ONLY - NOT TO BE MAINTAINED							
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETERS				LIST OF MATERIALS / PARTS LIST			
TOLERANCE OF WHOLE NUMBERS ± .5				DRAWN BY: GREGERSON DATE: 6-5-92			
TOLERANCE OF DECIMALS .X .XX .3 < .5				CHKD BY: CHERWINKA			
BREAK ALL SHARP EDGES 0.5 MAX.				SSC SUPERCONDUCTING SUPER COLLIDER LABORATORY			
DO NOT SCALE THIS DRAWING. DIM TO ANGLES ± .002. MAX. ALL MACH SURFACES.				1300 BEDFORD AVE. SUITE 403 DALLAS TEXAS 75207-3942			
DASH NO.				NEXT ASSY.		USED ON	
APPLICATION				3.27		MUON BARREL BLOCK ASSEMBLY	
CONTRACT NO. DE-AC35-89ER40486				SIZE C		CAGECO SDD-000435	
SCALE				WEIGHT		DRAWING NO. SDD-000435	
SHEET 1 OF 1				REV		REV	

4 3 2 1