

Clay Wynn

**Design Engineer
Scintillating Barrel Calorimeter**

SSC GEM Detector

**Central Engineering Services Division
Oak Ridge National Laboratory**

MARTIN MARIETTA ENERGY SYSTEMS INC.

**SSC GEM DETECTOR
SCINTILLATOR BARREL CALORIMETER**

0 MAJOR ASSUMPTIONS

- TIMELY M.O.U. WITH COLLABORATORS FOR FABRICATION - BY FALL OF 1993
- SSC STARTUP - 1999

0 OTHER ASSUMPTIONS

- MODULE & STRUCTURE FABRICATION ABROAD
- SCINT TILE TRAY ASSEMBLY IN US
- FINAL ASSEMBLY AT SSCL
 - * MODULE ASSEMBLY
 - * MODULES INTO BARREL
 - * BARREL STRUCTURE ASSEMBLY

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OVERALL GEM SCHEDULE MILESTONES

- Complete GEM Baseline II Concept and TDR - April 1993
- Complete DOE and SSCL Reviews of GEM Detector - October 1993
- Receive DOE Approval to Begin Fabrication - May 1994
- Begin Installation of GEM in Experimental Hall - April 1996
- GEM Detector Commissioning - September 1999
- SSC Beam Line Commissioning - March 1999

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Scintillating Barrel Production Milestones:

- Discuss Production Plans with Collaborators - January-June 1993
- Complete Final Production Plans with Collaborators - June-December 1993
- Complete Manufacturing Pre-Prod. Module - March 1994
- Install Module Prototype for Fermi test - September 1994
- Complete Manufacturing Design - March 1994
- Begin Full Scale Manufacturing - March 1994
- Begin Barrel Structure Assembly @ SSCL - March 1995
- Complete Scintillating Modules and Barrel Fabrication - July 1995
- Begin Module Installation - July 1995
- Complete Scintillating Barrel Assembly (at SSCL) - January 1996
- Install Barrel in Experimental Hall - June 1996

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GEM External Calorimeter Project Schedule

External Calorimeter		
7	867d	8/1/86

Complete GEM Baseline II Concept & TDR		
1	0d	4/2/83

Complete DOE and SSCL Reviews of GEM detector		
2	0d	10/1/83

Receive DOE prelim approval to begin fab. of		
3	0d	1/1/84

Begin installation of GEM in experimental hall		
4	0d	4/1/86

GEM detector commissioning		
5	0d	9/1/89

Startup of SSCL Beam Line		
6	0d	3/1/89

Complete Barrel & Sckt. Cal. Mfg. Design		
10	0d	4/1/84

Complete first article(s)		
14	0d	4/1/84

Complete Production Plans w/ Collaborators		
8	225d	12/1/83

Build first article(s)		
13	81d	3/29/84

Deliver first article(s) to FNAL		
15	131d	9/28/84

Beamline Testing at FNAL		
16	260d	9/27/85

Full scale manufacturing of modules		
12	349d	7/20/85

Install All Modules in Barrels at SSCL		
18	139d	1/30/86

Topside testing of Barrel Sckt. Calorimeter		
19	86d	5/1/86

Start Installation of Barrel in Exp. Hall		
20	0d	6/1/86

Barrel and Sckt. Cal. Manufacturing Design		
9	241d	3/20/84

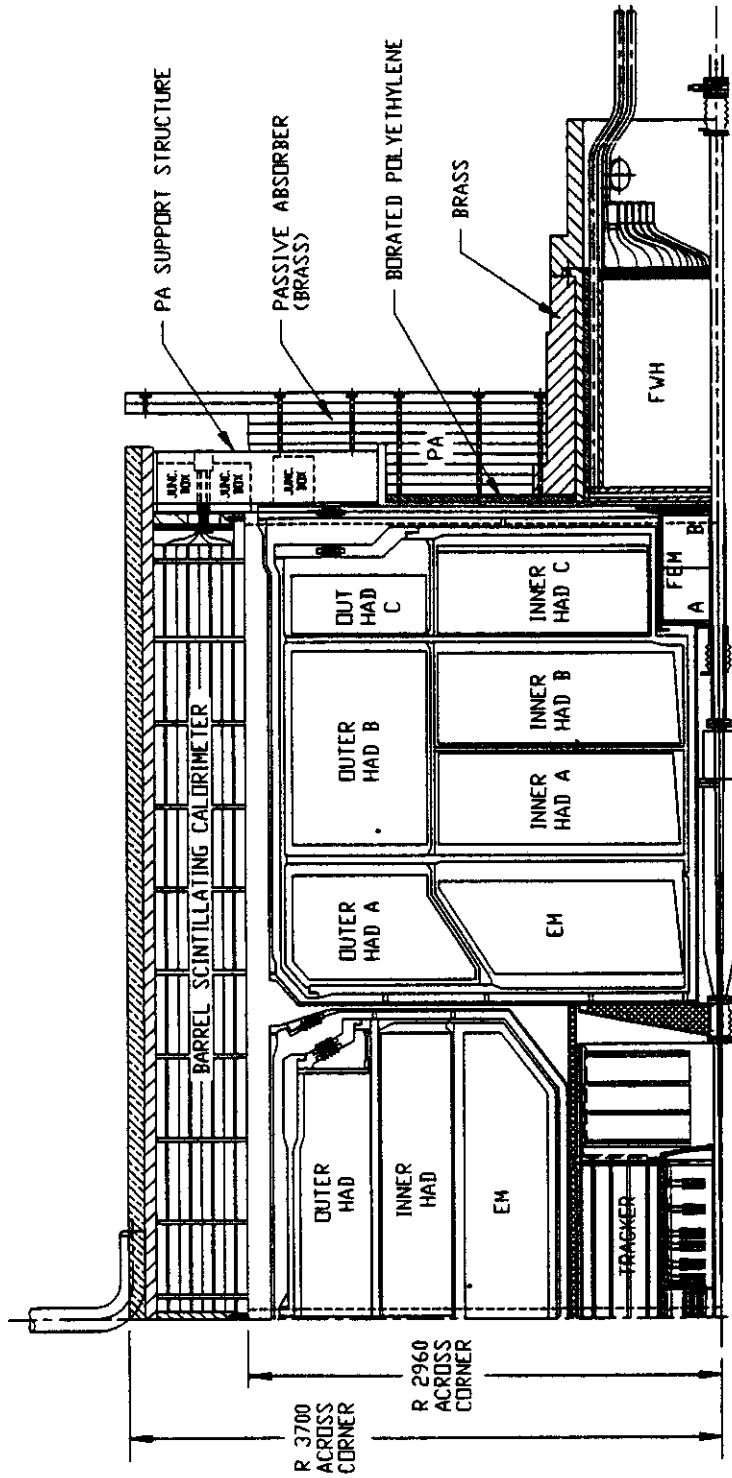
Manufacture barrel structure		
11	250d	3/3/85

Barrel Structure Assembly at SSCL		
17	85d	8/2/85

Name	
ID	Duration
Scheduled Start	Scheduled Finish

Critical	Milestone	Subproject
Noncritical	Summary	Marked

Project: External Calorim
Date: 4/8/93

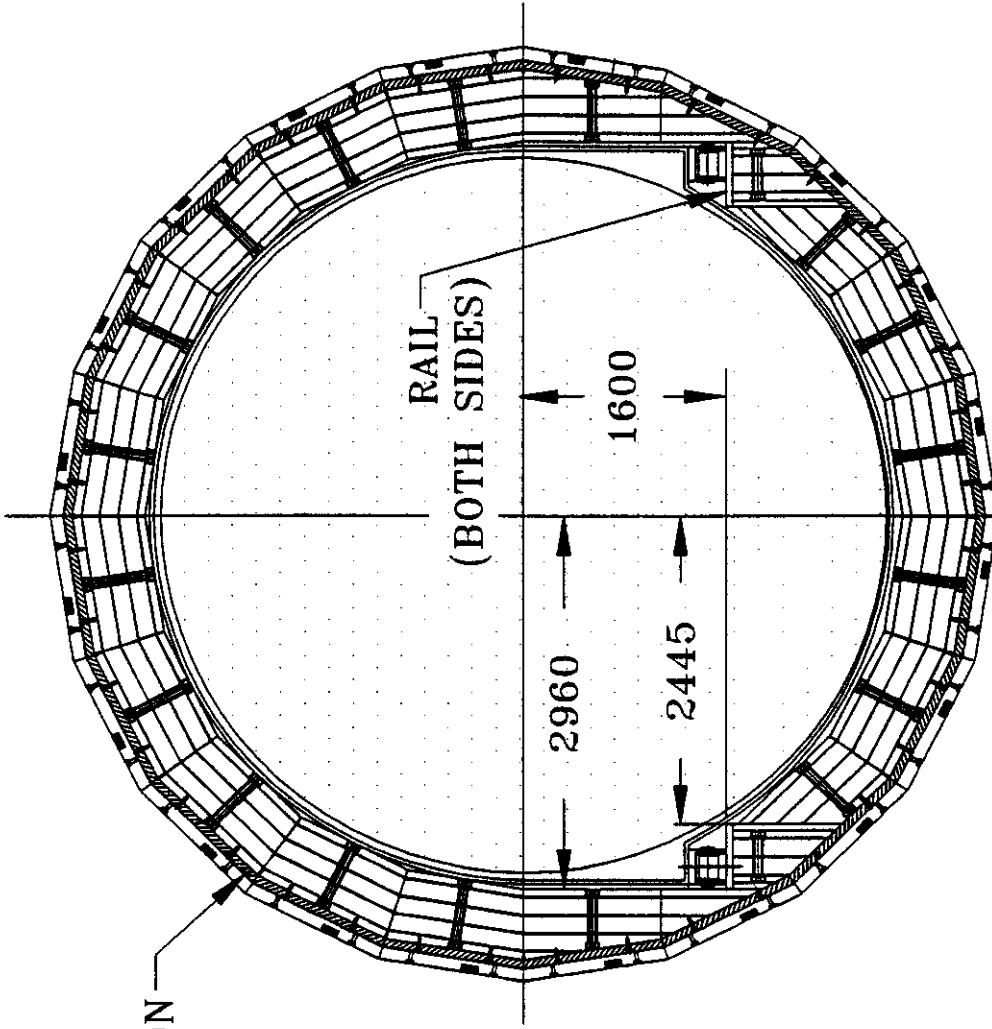


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SBC Design Parameters

Number of modules (total)	44
Number of absorber brass plates per module	8 or more
Number of scintillation layers per module	4
Scintillation material	6 mm Polystyrene
Number of scintillation tiles per module	384
Number of fibers per tile	2
Number of tiles per pseudo-tower	24
Pseudo-tower segmentation	0.16 rad. ϕ x 0.16 rad. η
Total scintillation layer area	672 square meters
Total wave length shifting fiber length	18816 meters
Total transmission fiber length	65856 meters
Fiber diameter	1 mm
Number of fibers per pseudo-tower	48
Total number of channels (1 per tower)	640
Coverage in eta	0-1.28 rad.
Effective absorption length	4.5λ

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STEEL
POLYGON
TUBE

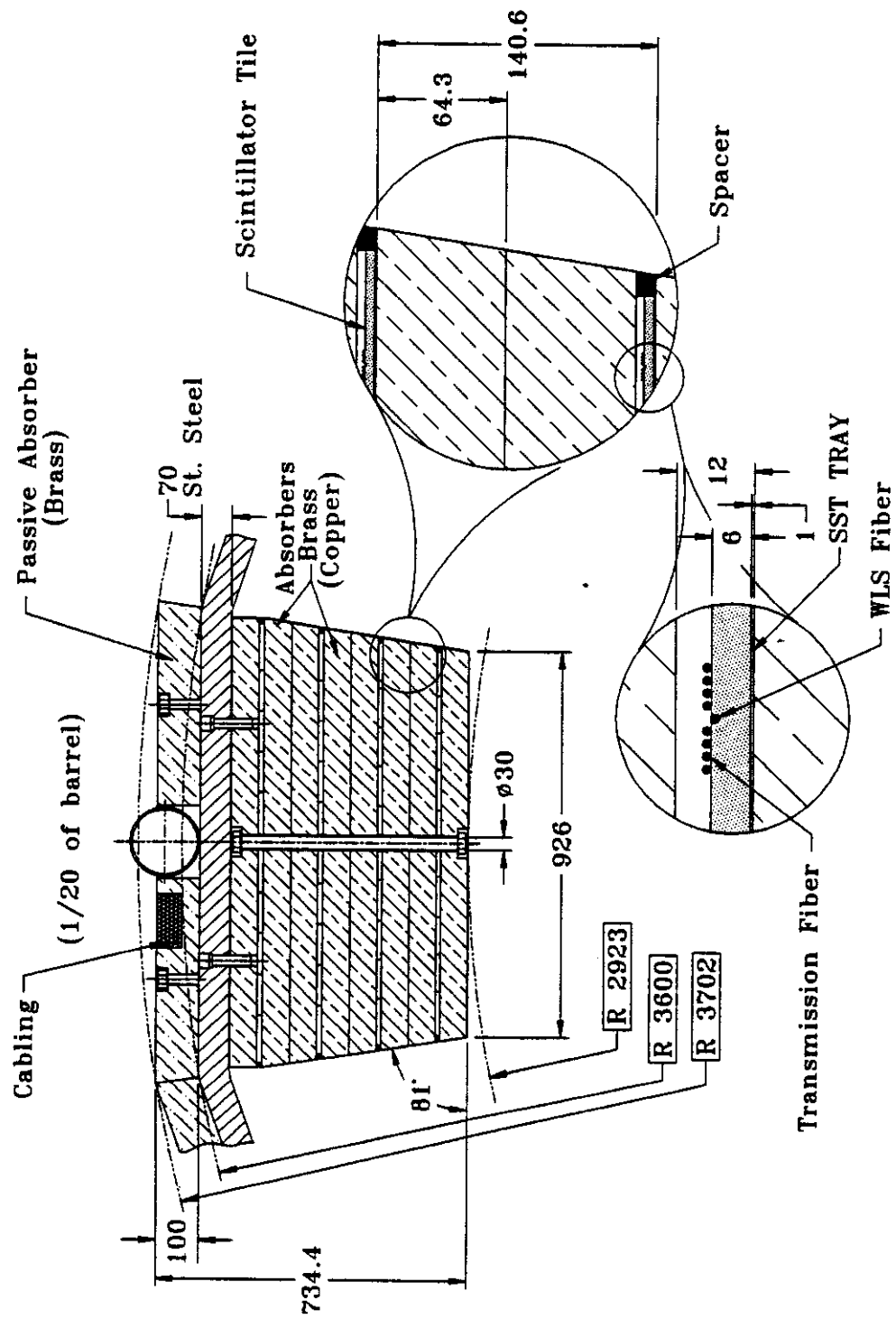
RAIL
(BOTH SIDES)

2960

1600

2445

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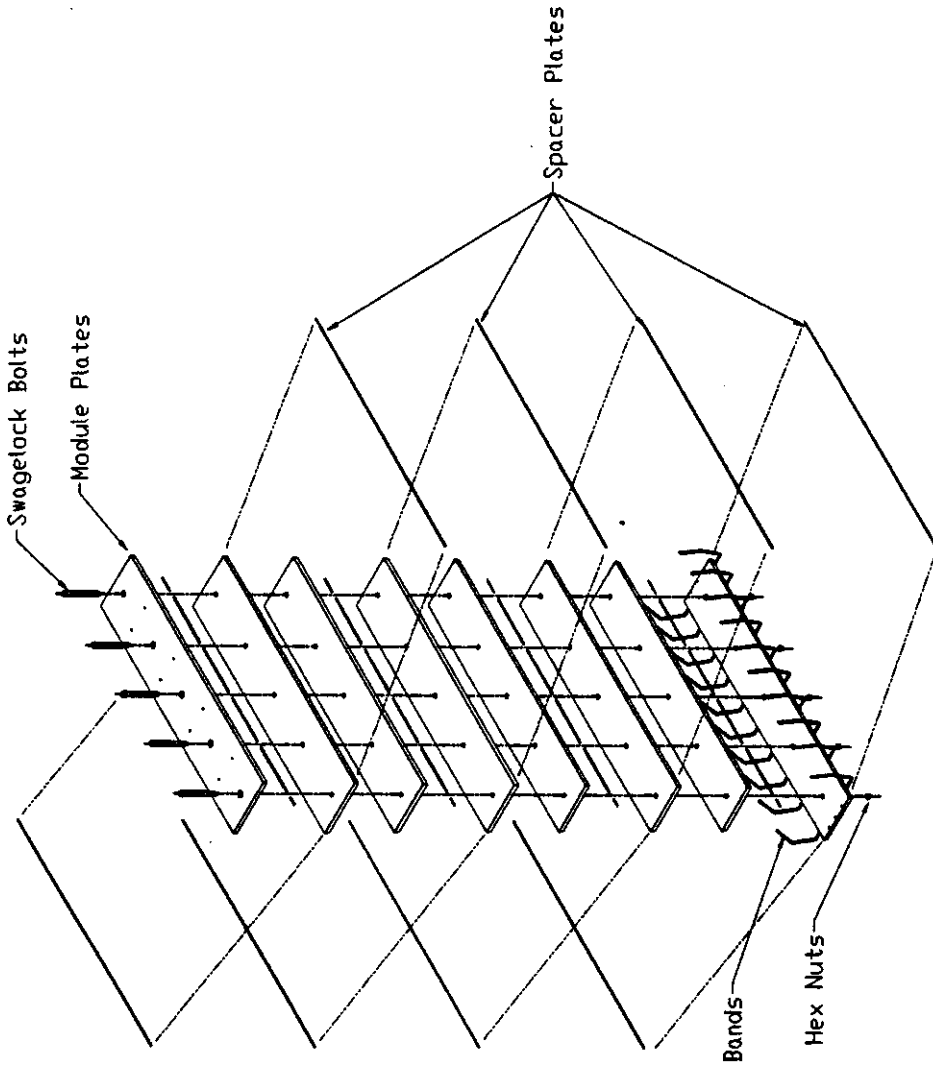


MARTIN MARIETTA ENERGY SYSTEMS INC.

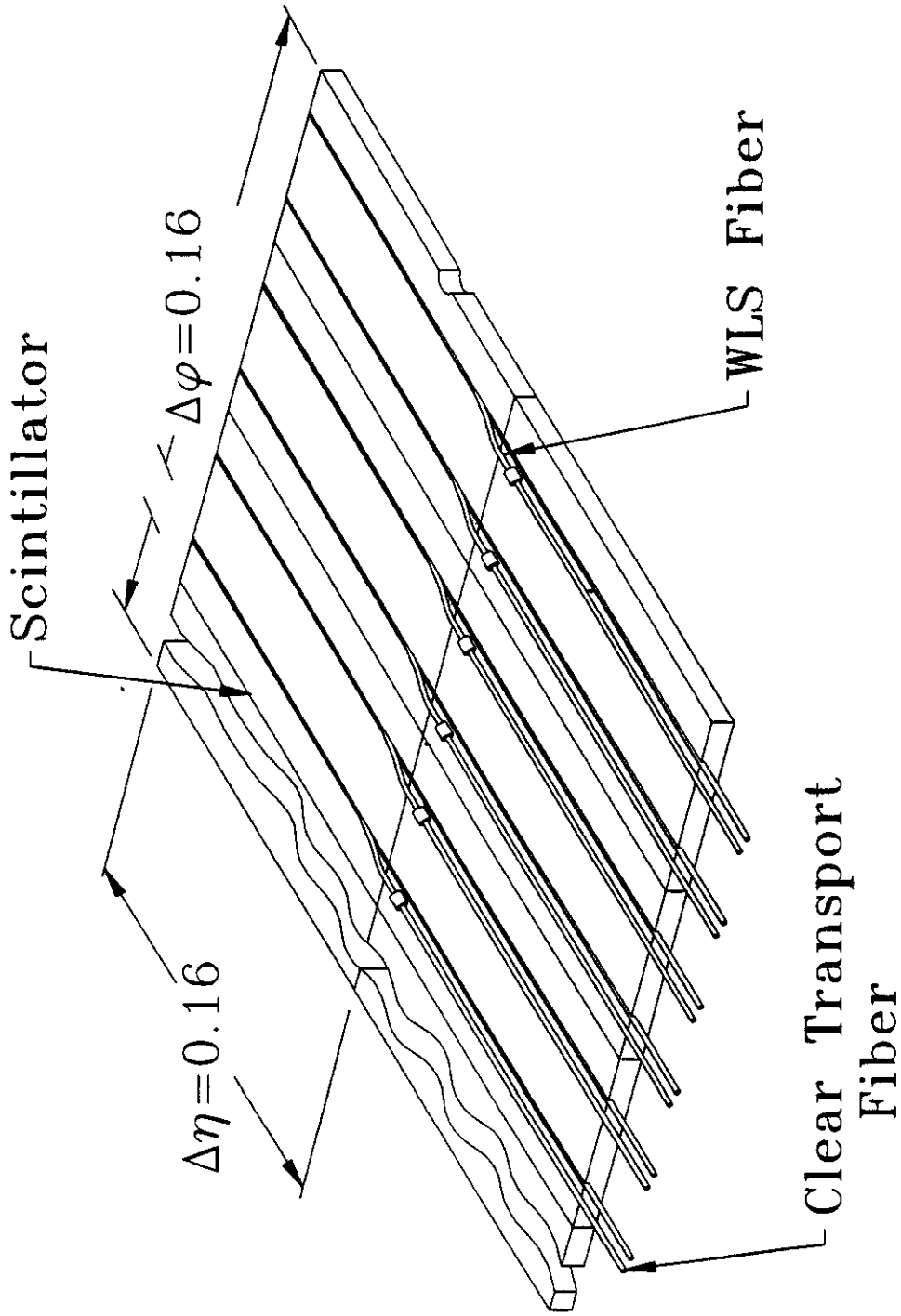
SBC Module Construction (Cont'd)

- Tiles 6mm thick Bicon Corp. Type BC-404 or equivalent.
- Tiles arranged in 8 stainless steel trays per module, 48 tiles per tray.
- Tiles grooved to accept wave length shifting fibers, 1mm diameter.
- Light input quartz fibers added for dynamic calibration .
- WLS fibers glued or mechanically held in tile grooves, tiles wrapped in Tyvex, taped and seated.
- Free ends of WLS fibers thermally bonded to 1mm dia. clear transmission fibers.
- Fibers sheathed, taped, and dressed along length of tray.

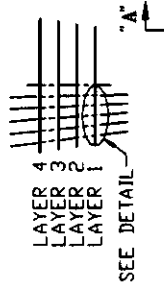
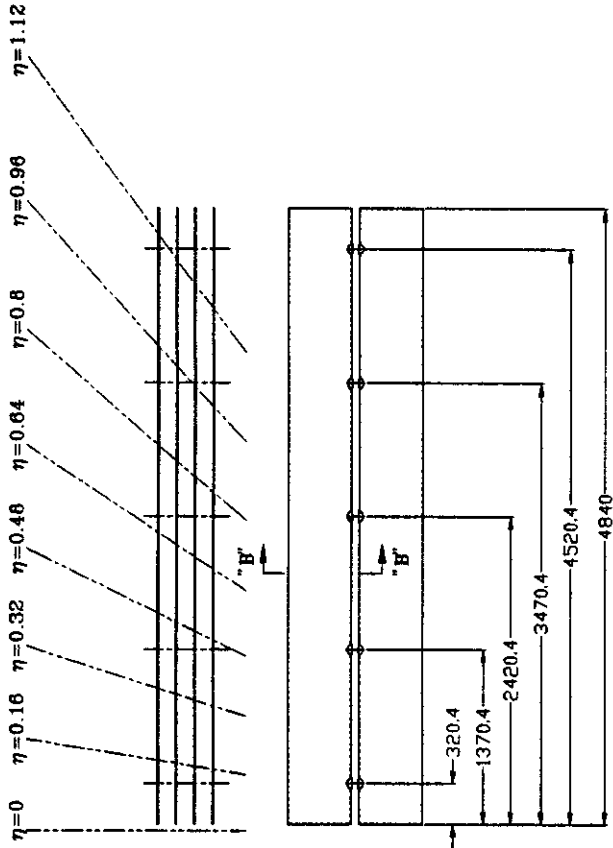
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MARTIN MARIETTA ENERGY SYSTEMS INC.

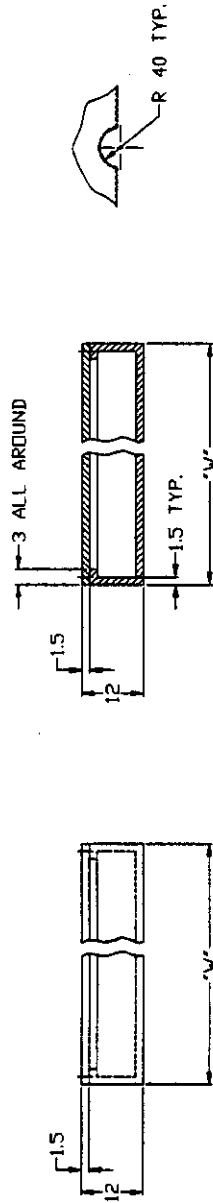


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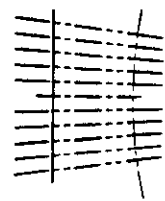
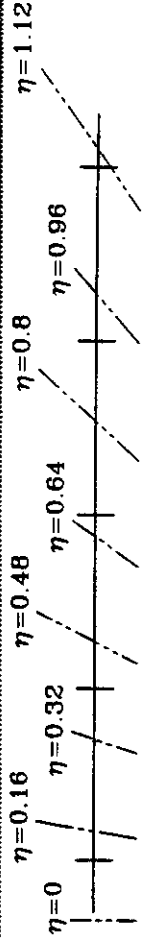


	"V"
LAYER 1	454.33
LAYER 2	476.60
LAYER 3	498.87
LAYER 4	521.14

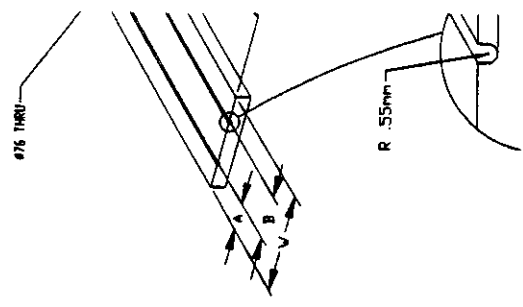
NOTE: (2) TRAYS PER LAYER
 (1) LEFT HAND, (1) RIGHT HAND



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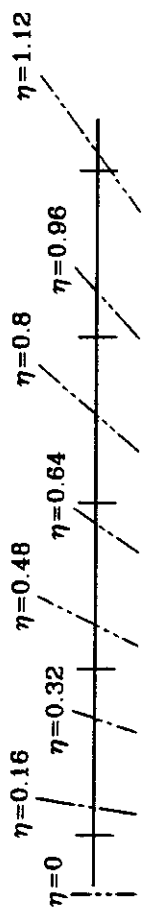
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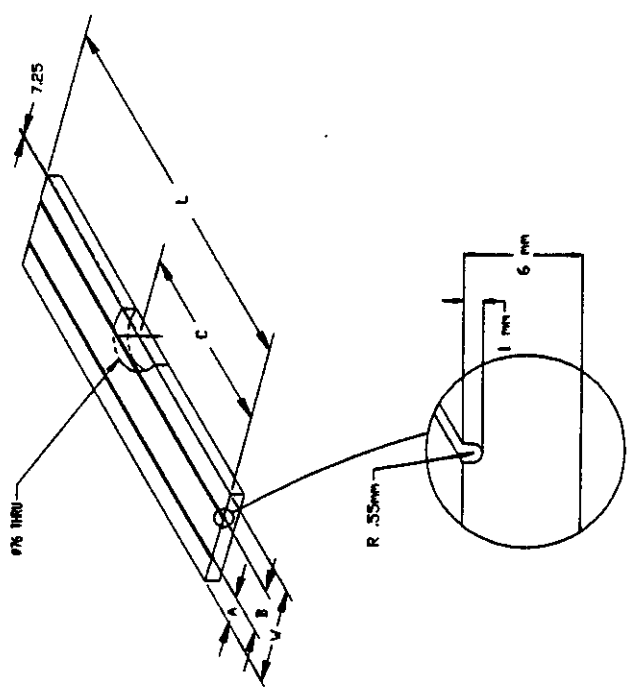
TILE NO.	L	V	A	B	C
25	692.5	741	19	38	X
26	692.5	901	22.5	45	X
27	692.5	89.6	22.4	44.8	X
28	692.5	89.2	22.3	44.6	X
29	692.5	88.9	22.2	44.4	X
30	692.5	81.3	20.3	40.6	134.5
31	717.7	761	19	38	X
32	717.7	901	22.5	45	X
33	717.7	89.6	22.4	44.8	X
34	717.7	89.2	22.3	44.6	X
35	717.7	88.9	22.2	44.4	X
36	717.7	81.3	20.3	40.6	X
37	868.7	761	19	38	X
38	868.7	901	22.5	45	X
39	868.7	89.6	22.4	44.8	X
40	868.7	89.2	22.3	44.6	X
41	868.7	88.9	22.2	44.4	X
42	868.7	81.3	20.3	40.6	768.4
43	817.1	761	19	38	X
44	817.1	901	22.5	45	X
45	817.1	89.6	22.4	44.8	X
46	817.1	89.2	22.3	44.6	X
47	817.1	88.9	22.2	44.4	X
48	817.1	81.3	20.3	40.6	X

TILE NO.	L	V	A	B	C
1	496.2	761	19	38	X
2	496.2	901	22.5	45	X
3	496.2	89.6	22.4	44.8	X
4	496.2	89.2	22.3	44.6	X
5	496.2	88.9	22.2	44.4	X
6	496.2	81.3	20.3	40.6	318.6
7	561.6	761	19	38	X
8	561.6	901	22.5	45	X
9	561.6	89.6	22.4	44.8	X
10	561.6	89.2	22.3	44.6	X
11	561.6	88.9	22.2	44.4	X
12	561.6	81.3	20.3	40.6	X
13	589.9	761	19	38	X
14	589.9	901	22.5	45	X
15	589.9	89.6	22.4	44.8	X
16	589.9	89.2	22.3	44.6	X
17	589.9	88.9	22.2	44.4	X
18	589.9	81.3	20.3	40.6	369.8
19	634.4	761	19	38	X
20	634.4	901	22.5	45	X
21	634.4	89.6	22.4	44.8	X
22	634.4	89.2	22.3	44.6	X
23	634.4	88.9	22.2	44.4	X
24	634.4	81.3	20.3	40.6	X

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1	6	14	19	25	31	37	41
2	7	15	20	26	32	38	42
3	8	16	21	27	33	39	43
4	9	17	22	28	34	40	44
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8	13	21	26	32	38	44	48
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10	15	23	28	34	40	46	50
11	16	24	29	35	41	47	51
12	17	25	30	36	42	48	52
13	18	26	31	37	43	49	53
14	19	27	32	38	44	50	54
15	20	28	33	39	45	51	55
16	21	29	34	40	46	52	56
17	22	30	35	41	47	53	57
18	23	31	36	42	48	54	58
19	24	32	37	43	49	55	59
20	25	33	38	44	50	56	60
21	26	34	39	45	51	57	61
22	27	35	40	46	52	58	62
23	28	36	41	47	53	59	63
24	29	37	42	48	54	60	64



TILE NO.	L	W	H	A	B	C
25	693.5	76.1	19	22.5	45	X
26	693.5	96.1	22.5	44.8	X	X
27	693.5	89.6	22.4	44.6	X	X
28	693.5	89.2	22.3	44.6	X	X
29	693.5	88.9	22.2	44.4	X	X
30	693.5	81.3	20.3	40.6	34.5	X
31	717.7	76.1	19	22.5	45	X
32	717.7	96.1	22.5	44.8	X	X
33	717.7	89.6	22.4	44.6	X	X
34	717.7	89.2	22.3	44.6	X	X
35	717.7	88.9	22.2	44.4	X	X
36	717.7	81.3	20.3	40.6	49.5	X
37	668.7	76.1	19	22.5	45	X
38	668.7	96.1	22.5	44.8	X	X
39	668.7	89.6	22.4	44.6	X	X
40	668.7	89.2	22.3	44.6	X	X
41	668.7	88.9	22.2	44.4	X	X
42	668.7	81.3	20.3	40.6	74.4	X
43	217.1	76.1	19	22.5	45	X
44	217.1	96.1	22.5	44.8	X	X
45	217.1	89.6	22.4	44.6	X	X
46	217.1	89.2	22.3	44.6	X	X
47	217.1	88.9	22.2	44.4	X	X
48	217.1	81.3	20.3	40.6	40.6	X

TILE NO.	L	W	H	A	B	C
1	496.2	76.1	19	22.5	45	X
2	496.2	96.1	22.5	44.8	X	X
3	496.2	89.6	22.4	44.6	X	X
4	496.2	89.2	22.3	44.6	X	X
5	496.2	88.9	22.2	44.4	X	X
6	496.2	81.3	20.3	40.6	38.6	X
7	561.6	76.1	19	22.5	45	X
8	561.6	96.1	22.5	44.8	X	X
9	561.6	89.6	22.4	44.6	X	X
10	561.6	89.2	22.3	44.6	X	X
11	561.6	88.9	22.2	44.4	X	X
12	561.6	81.3	20.3	40.6	44.4	X
13	589.9	76.1	19	22.5	45	X
14	589.9	96.1	22.5	44.8	X	X
15	589.9	89.6	22.4	44.6	X	X
16	589.9	89.2	22.3	44.6	X	X
17	589.9	88.9	22.2	44.4	X	X
18	589.9	81.3	20.3	40.6	39.8	X
19	634.4	76.1	19	22.5	45	X
20	634.4	96.1	22.5	44.8	X	X
21	634.4	89.6	22.4	44.6	X	X
22	634.4	89.2	22.3	44.6	X	X
23	634.4	88.9	22.2	44.4	X	X
24	634.4	81.3	20.3	40.6	48.6	X

PROCESSING ARE IN PALLIATIVES UNLESS OTHERWISE SPECIFIED

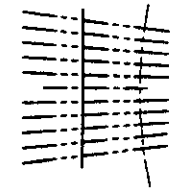
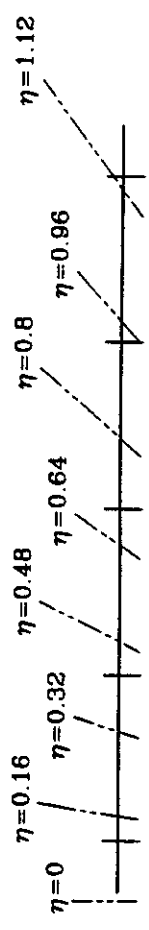
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BARREL SCINTILLATING CALORIMETER MOBILE TILE LAYER I DETAIL

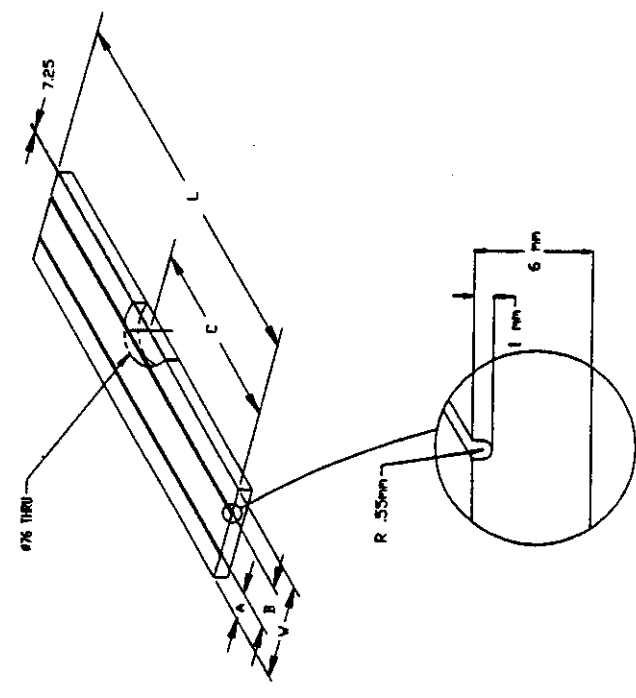
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16	1				
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18	1				
19	1				
20	1				
21	1				
22	1				
23	1				
24	1				

PLAT SCALE: 3/4"

DO NOT REVERSE PANELS



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
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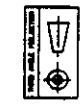


TILE NO.	L'	V'	A'	B'	C'
1	4736	723	181	342	X
2	4736	864	215	412	X
3	4736	858	215	425	X
4	4736	853	214	428	X
5	4736	853	213	424	X
6	4736	853	213	424	X
7	4736	777	194	388	318.6
8	5384	723	181	342	X
9	5384	864	215	412	X
10	5384	858	215	425	X
11	5384	853	214	428	X
12	5384	853	213	424	X
13	5656	723	181	342	X
14	5656	864	215	412	X
15	5656	858	215	425	X
16	5656	853	214	428	X
17	5656	853	213	424	X
18	5656	777	194	388	303.6
19	6882	723	181	342	X
20	6882	864	215	412	X
21	6882	858	215	425	X
22	6882	853	214	428	X
23	6882	853	213	424	X
24	6882	777	194	388	31.7

TILE NO.	L'	V'	A'	B'	C'
1	4736	723	181	342	X
2	4736	864	215	412	X
3	4736	858	215	425	X
4	4736	853	214	428	X
5	4736	853	213	424	X
6	4736	853	213	424	X
7	4736	777	194	388	318.6
8	5384	723	181	342	X
9	5384	864	215	412	X
10	5384	858	215	425	X
11	5384	853	214	428	X
12	5384	853	213	424	X
13	5656	723	181	342	X
14	5656	864	215	412	X
15	5656	858	215	425	X
16	5656	853	214	428	X
17	5656	853	213	424	X
18	5656	777	194	388	303.6
19	6882	723	181	342	X
20	6882	864	215	412	X
21	6882	858	215	425	X
22	6882	853	214	428	X
23	6882	853	213	424	X
24	6882	777	194	388	31.7

PROCEEDING USE IN MILLIMETER
 UNLESS OTHERWISE SPECIFIED
 DIMENSIONS GIVEN IN BRACKETED
 QUANTITIES ARE IN INCHES

1	1/8"	3.175
2	1/4"	6.350
3	3/8"	9.525
4	1/2"	12.700
5	5/8"	15.875
6	3/4"	19.050
7	7/8"	22.225
8	1"	25.400
9	1 1/8"	28.575
10	1 1/4"	31.750
11	1 3/8"	34.925
12	1 1/2"	38.100
13	1 5/8"	41.275
14	1 3/4"	44.450
15	1 7/8"	47.625
16	2"	50.800
17	2 1/8"	53.975
18	2 1/4"	57.150
19	2 3/8"	60.325
20	2 1/2"	63.500
21	2 5/8"	66.675
22	2 3/4"	69.850
23	2 7/8"	73.025
24	3"	76.200

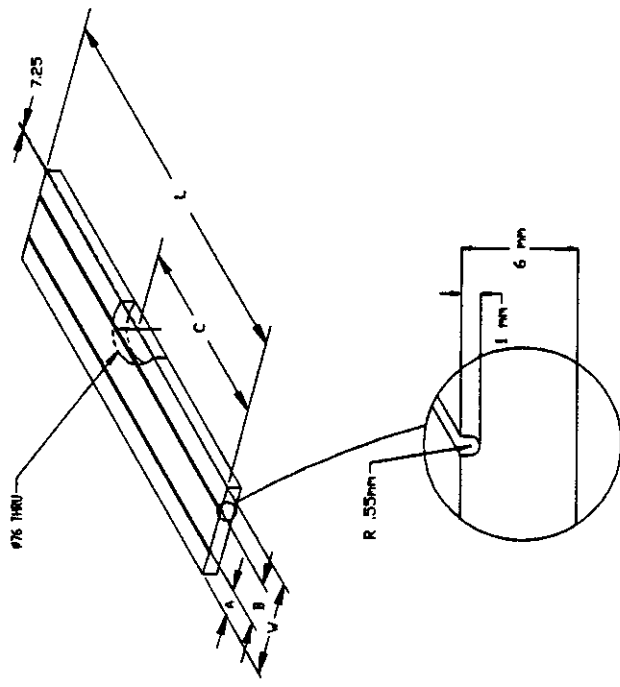
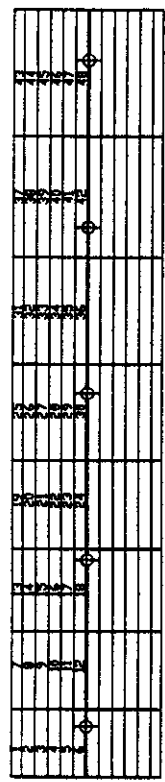
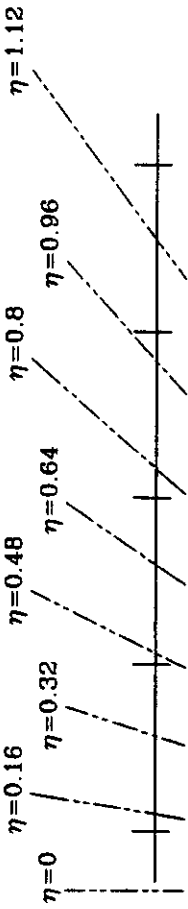


DO NOT REVERSE IN THIS
 PLANT SCALE: 1/8" = 1"

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
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1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

GEN DETECTOR
 MODEL SCHEMATIC CALIBRATION
 MODEL TILL LATER & DETAIL

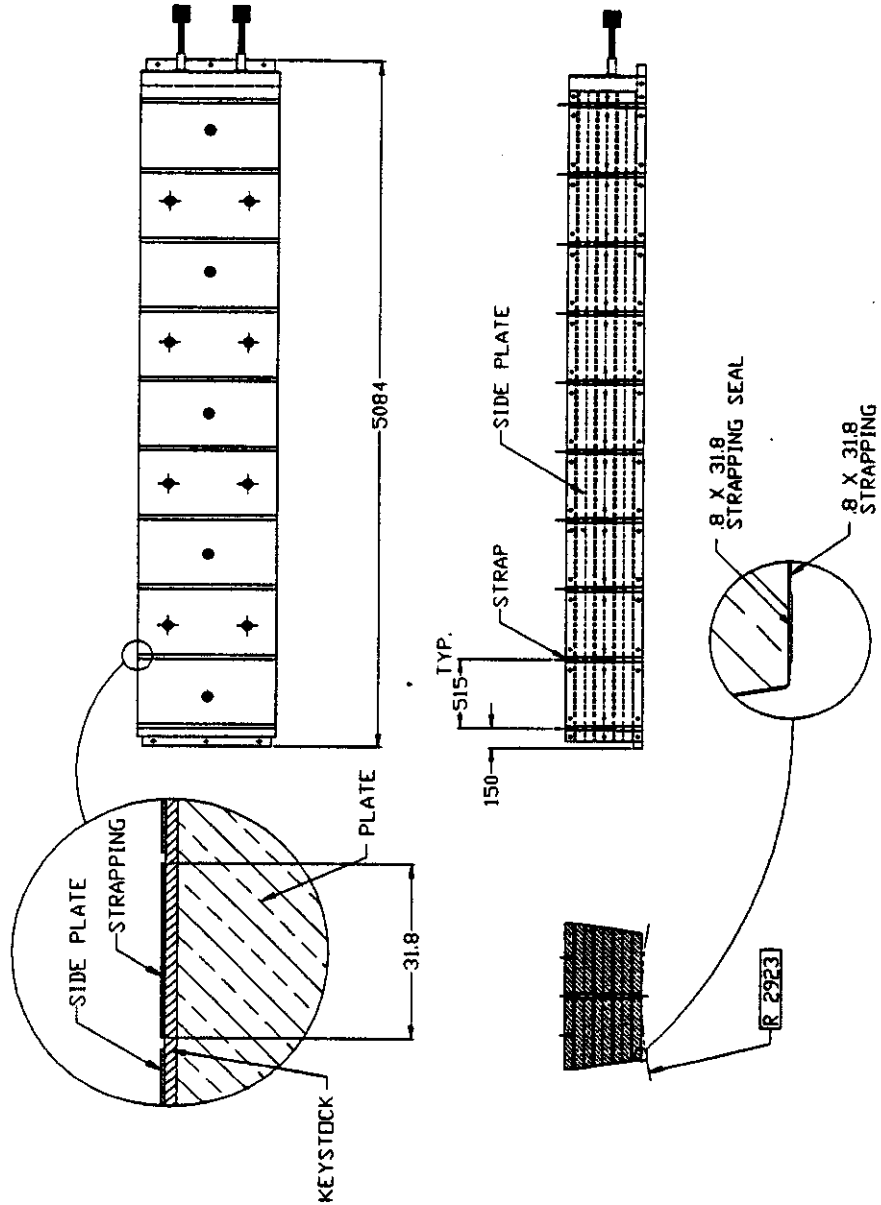
PLANT SCALE: 1/8" = 1"



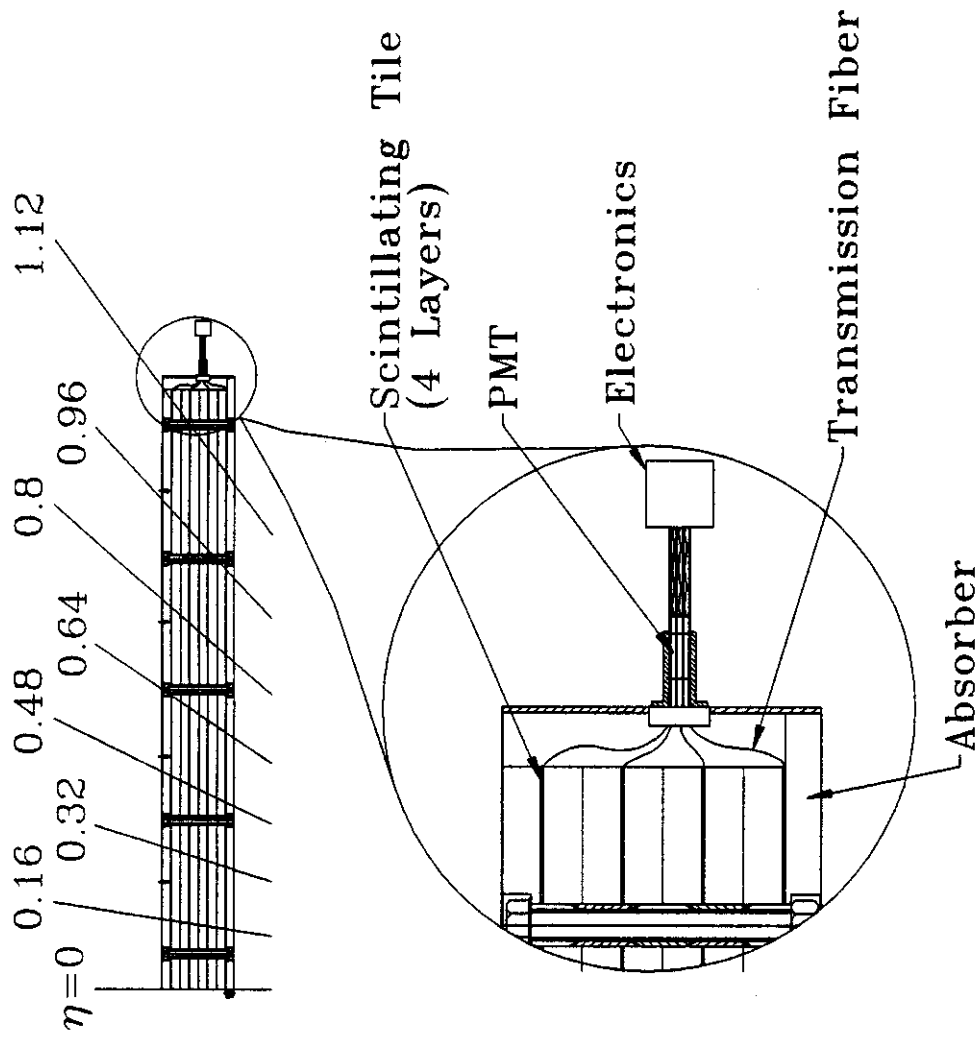
TILE NO.	L	W	A	B	C
1	25	64.8	16.2	32.4	X
2	32	76.8	19.2	38.4	X
3	37	88.8	22.2	44.4	X
4	43	100.8	25.2	50.4	X
5	50	112.8	28.2	56.4	X
6	57	124.8	31.2	62.4	X
7	64	136.8	34.2	68.4	X
8	72	148.8	37.2	74.4	X
9	80	160.8	40.2	80.4	X
10	87	172.8	43.2	86.4	X
11	94	184.8	46.2	92.4	X
12	101	196.8	49.2	98.4	X
13	108	208.8	52.2	104.4	X
14	115	220.8	55.2	110.4	X
15	122	232.8	58.2	116.4	X
16	129	244.8	61.2	122.4	X
17	136	256.8	64.2	128.4	X
18	143	268.8	67.2	134.4	X
19	150	280.8	70.2	140.4	X
20	157	292.8	73.2	146.4	X
21	164	304.8	76.2	152.4	X
22	171	316.8	79.2	158.4	X
23	178	328.8	82.2	164.4	X
24	185	340.8	85.2	170.4	X
25	192	352.8	88.2	176.4	X
26	199	364.8	91.2	182.4	X
27	206	376.8	94.2	188.4	X
28	213	388.8	97.2	194.4	X
29	220	400.8	100.2	200.4	X
30	227	412.8	103.2	206.4	X
31	234	424.8	106.2	212.4	X
32	241	436.8	109.2	218.4	X
33	248	448.8	112.2	224.4	X
34	255	460.8	115.2	230.4	X
35	262	472.8	118.2	236.4	X
36	269	484.8	121.2	242.4	X
37	276	496.8	124.2	248.4	X
38	283	508.8	127.2	254.4	X
39	290	520.8	130.2	260.4	X
40	297	532.8	133.2	266.4	X
41	304	544.8	136.2	272.4	X
42	311	556.8	139.2	278.4	X
43	318	568.8	142.2	284.4	X
44	325	580.8	145.2	290.4	X
45	332	592.8	148.2	296.4	X
46	339	604.8	151.2	302.4	X
47	346	616.8	154.2	308.4	X
48	353	628.8	157.2	314.4	X
49	360	640.8	160.2	320.4	X
50	367	652.8	163.2	326.4	X
51	374	664.8	166.2	332.4	X
52	381	676.8	169.2	338.4	X
53	388	688.8	172.2	344.4	X
54	395	700.8	175.2	350.4	X
55	402	712.8	178.2	356.4	X
56	409	724.8	181.2	362.4	X
57	416	736.8	184.2	368.4	X
58	423	748.8	187.2	374.4	X
59	430	760.8	190.2	380.4	X
60	437	772.8	193.2	386.4	X
61	444	784.8	196.2	392.4	X
62	451	796.8	199.2	398.4	X
63	458	808.8	202.2	404.4	X
64	465	820.8	205.2	410.4	X
65	472	832.8	208.2	416.4	X
66	479	844.8	211.2	422.4	X
67	486	856.8	214.2	428.4	X
68	493	868.8	217.2	434.4	X
69	500	880.8	220.2	440.4	X
70	507	892.8	223.2	446.4	X
71	514	904.8	226.2	452.4	X
72	521	916.8	229.2	458.4	X
73	528	928.8	232.2	464.4	X
74	535	940.8	235.2	470.4	X
75	542	952.8	238.2	476.4	X
76	549	964.8	241.2	482.4	X
77	556	976.8	244.2	488.4	X
78	563	988.8	247.2	494.4	X
79	570	1000.8	250.2	500.4	X
80	577	1012.8	253.2	506.4	X
81	584	1024.8	256.2	512.4	X
82	591	1036.8	259.2	518.4	X
83	598	1048.8	262.2	524.4	X
84	605	1060.8	265.2	530.4	X
85	612	1072.8	268.2	536.4	X
86	619	1084.8	271.2	542.4	X
87	626	1096.8	274.2	548.4	X
88	633	1108.8	277.2	554.4	X
89	640	1120.8	280.2	560.4	X
90	647	1132.8	283.2	566.4	X
91	654	1144.8	286.2	572.4	X
92	661	1156.8	289.2	578.4	X
93	668	1168.8	292.2	584.4	X
94	675	1180.8	295.2	590.4	X
95	682	1192.8	298.2	596.4	X
96	689	1204.8	301.2	602.4	X
97	696	1216.8	304.2	608.4	X
98	703	1228.8	307.2	614.4	X
99	710	1240.8	310.2	620.4	X
100	717	1252.8	313.2	626.4	X

TILE NO.	L	W	A	B	C
1	428.4	64.8	16.2	32.4	X
2	434.4	76.8	19.2	38.4	X
3	440.4	88.8	22.2	44.4	X
4	446.4	100.8	25.2	50.4	X
5	452.4	112.8	28.2	56.4	X
6	458.4	124.8	31.2	62.4	X
7	464.4	136.8	34.2	68.4	X
8	470.4	148.8	37.2	74.4	X
9	476.4	160.8	40.2	80.4	X
10	482.4	172.8	43.2	86.4	X
11	488.4	184.8	46.2	92.4	X
12	494.4	196.8	49.2	98.4	X
13	500.4	208.8	52.2	104.4	X
14	506.4	220.8	55.2	110.4	X
15	512.4	232.8	58.2	116.4	X
16	518.4	244.8	61.2	122.4	X
17	524.4	256.8	64.2	128.4	X
18	530.4	268.8	67.2	134.4	X
19	536.4	280.8	70.2	140.4	X
20	542.4	292.8	73.2	146.4	X
21	548.4	304.8	76.2	152.4	X
22	554.4	316.8	79.2	158.4	X
23	560.4	328.8	82.2	164.4	X
24	566.4	340.8	85.2	170.4	X
25	572.4	352.8	88.2	176.4	X
26	578.4	364.8	91.2	182.4	X
27	584.4	376.8	94.2	188.4	X
28	590.4	388.8	97.2	194.4	X
29	596.4	400.8	100.2	200.4	X
30	602.4	412.8	103.2	206.4	X
31	608.4	424.8	106.2	212.4	X
32	614.4	436.8	109.2	218.4	X
33	620.4	448.8	112.2	224.4	X
34	626.4	460.8	115.2	230.4	X
35	632.4	472.8	118.2	236.4	X
36	638.4	484.8	121.2	242.4	X
37	644.4	496.8	124.2	248.4	X
38	650.4	508.8	127.2	254.4	X
39	656.4	520.8	130.2	260.4	X
40	662.4	532.8	133.2	266.4	X
41	668.4	544.8	136.2	272.4	X
42	674.4	556.8	139.2	278.4	X
43	680.4	568.8	142.2	284.4	X
44	686.4	580.8	145.2	290.4	X
45	692.4	592.8	148.2	296.4	X
46	698.4	604.8	151.2	302.4	X
47	704.4	616.8	154.2	308.4	X
48	710.4	628.8	157.2	314.4	X
49	716.4	640.8	160.2	320.4	X
50	722.4	652.8	163.2	326.4	X
51	728.4	664.8	166.2	332.4	X
52	734.4	676.8	169.2	338.4	X
53	740.4	688.8	172.2	344.4	X
54	746.4	700.8	175.2	350.4	X
55	752.4	712.8	178.2	356.4	X
56	758.4	724.8	181.2	362.4	X
57	764.4	736.8	184.2	368.4	X
58	770.4	748.8	187.2	374.4	X
59	776.4	760.8	190.2	380.4	X
60	782.4	772.8	193.2	386.4	X
61	788.4	784.8	196.2	392.4	X
62	794.4	796.8	199.2	398.4	X
63	800.4	808.8	202.2	404.4	X
64	806.4	820.8	205.2	410.4	X
65	812.4	832.8	208.2	416.4	X
66	818.4	844.8	211.2	422.4	X
67	824.4	856.8	214.2	428.4	X
68	830.4	868.8	217.2	434.4	X
69	836.4	880.8	220.2	440.4	X
70	842.4	892.8	223.2	446.4	X
71	848.4	904.8	226.2	452.4	X
72	854.4	916.8	229.2	458.4	X
73	860.4	928.8	232.2	464.4	X
74	866.4	940.8	235.2	470.4	X
75	872.4	952.8	238.2	476.4	X
76	878.4	964.8	241.2	482.4	X
77	884.4	976.8	244.2	488.4	X
78	890.4	988.8	247.2	494.4	X
79	896.4	1000.8	250.2	500.4	X
80	902.4	1012.8	253.2	506.4	X
81	908.4	1024.8	256.2	512.4	X
82	914.4	1036.8	259.2	518.4	X
83	920.4	1048.8	262.2	524.4	X
84	926.4	1060.8	265.2	530.4	X
85	932.4	1072.8	268.2	536.4	X
86	938.4	1084.8	271.2	542.4	X
87	944.4	1096.8	274.2	548.4	X
88	950.4	1108.8	277.2	554.4	X
89	956.4	1120.8	280.2	560.4	X
90	962.4	1132.8	283.2	566.4	X
91	968.4	1144.8	286.2	572.4	X
92	974.4	1156.8	289.2	578.4	X
93	980.4	1168.8	292.2	584.4	X
94	986.4	1180.8	295.2	590.4	X
95	992.4	1192.8	298.2	596.4	X
96	998.4	1204.8	301.2	602.4	X
97	1004.4	1216.8	304.2	608.4	X
98	1010.4	1228.8	307.2	614.4	X
99	1016.4	1240.8	310.2	620.4	X
100	1022.4	1252.8	313.2	626.4	X

FACE	NO.	REVISION
1	1	INITIAL
2	2	REVISED
3	3	REVISED
4	4	REVISED
5	5	REVISED
6	6	REVISED
7	7	REVISED
8	8	REVISED
9	9	REVISED
10	10	REVISED
11	11	REVISED
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27		

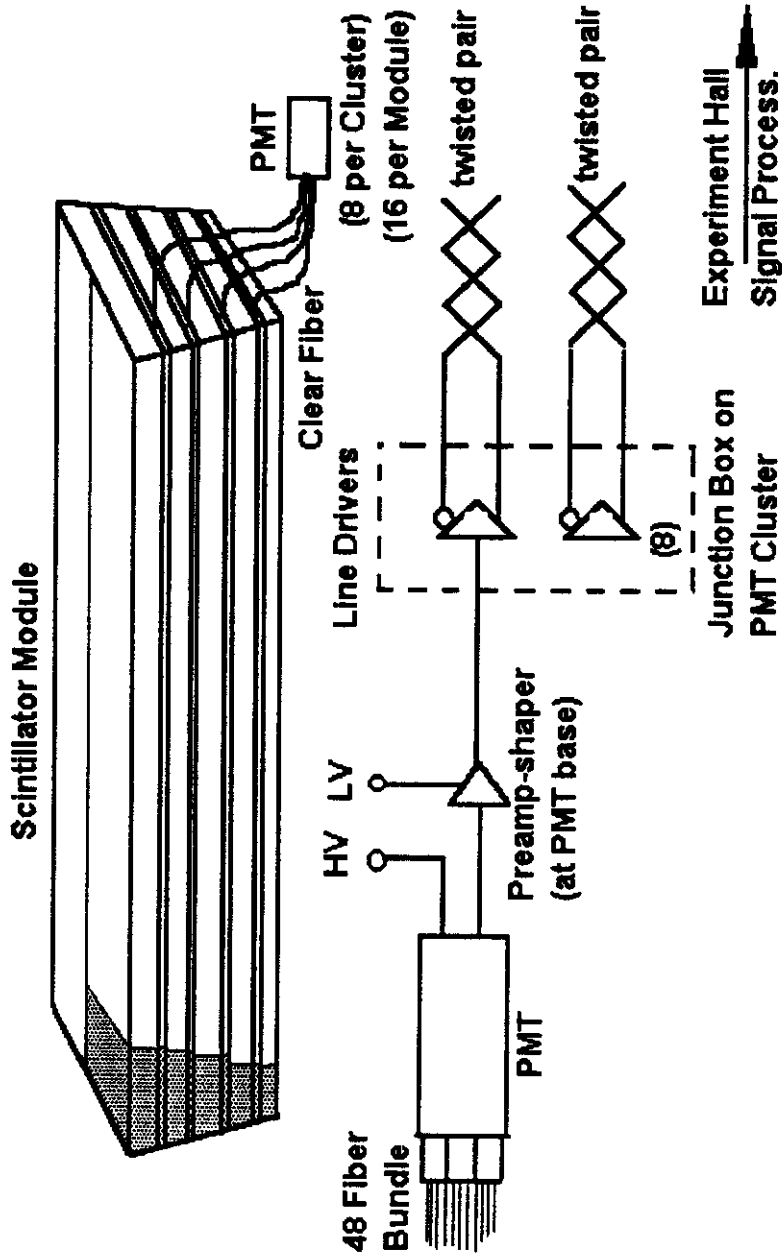


MARTIN MARJETTA ENERGY SYSTEMS INC.



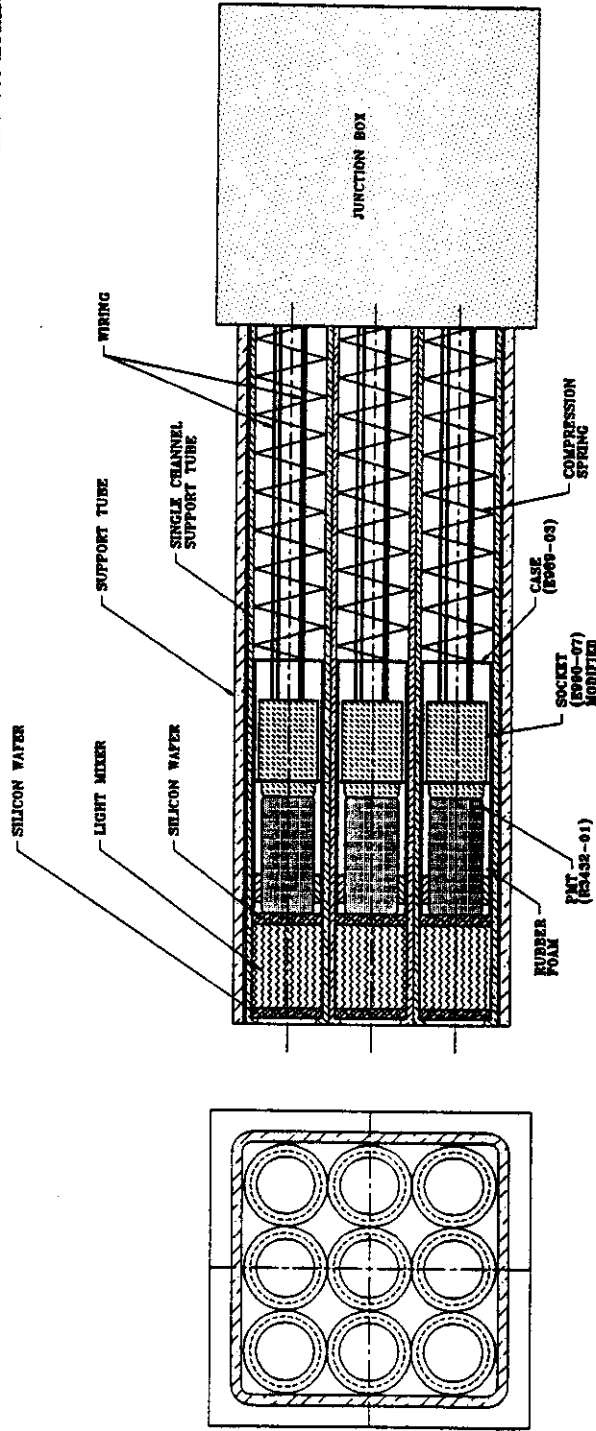
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Module Readout Electronics



MARTIN MARIETTA ENERGY SYSTEMS INC.

NOTE:
 FOAM RUBBER OR A SIMILAR MATERIAL HAVING GOOD INSULATING PROPERTIES AND ELASTICITY CAN BE USED TO SECURELY HOLD THE TUBE IN THE CENTER AND AN APPROPRIATE HOLDER SHOULD BE USED TO MOUNT THE SHIELD CASE TO THE MEASUREMENT SYSTEM. WHEN TIGHTENING THE SHIELD CASE USING BANDS OR SCREWS, SUFFICIENT CARE SHOULD BE TAKEN THAT A FORCE SUFFICIENT TO DEFORM THE SHIELD CASE IS NOT APPLIED.

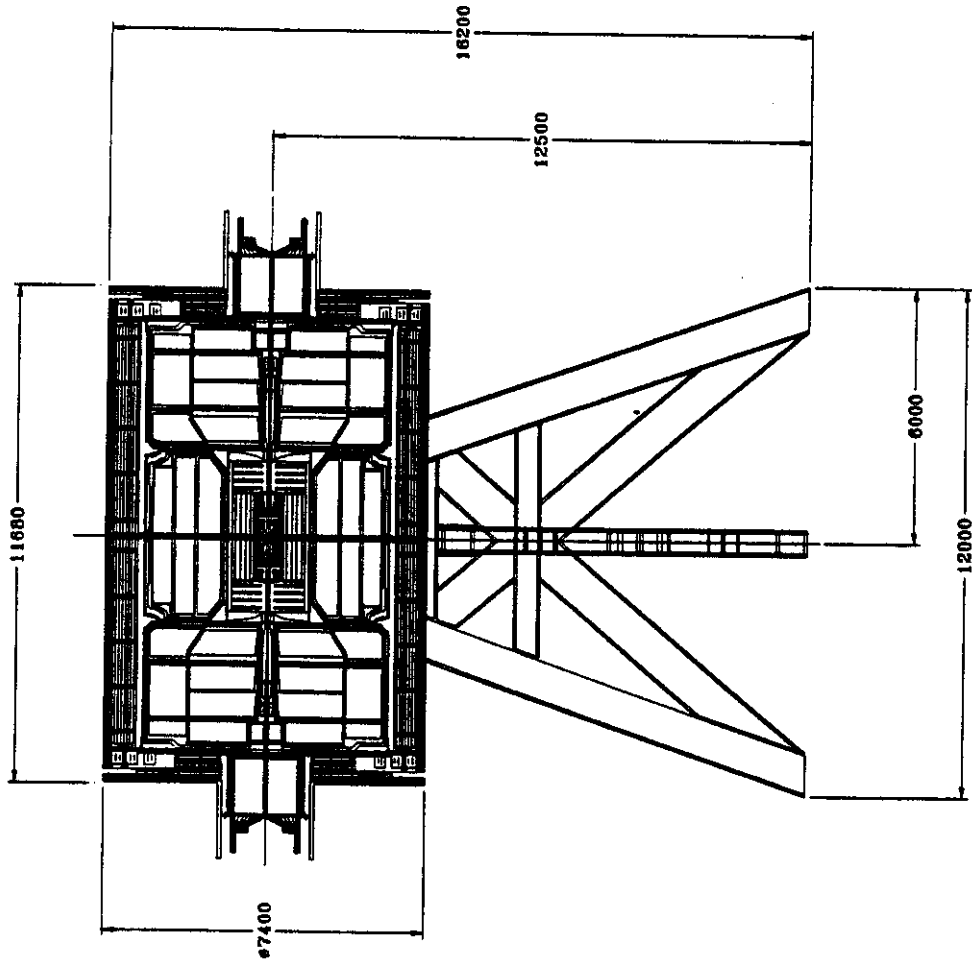


MARTIN MARJETTA ENERGY SYSTEMS INC.

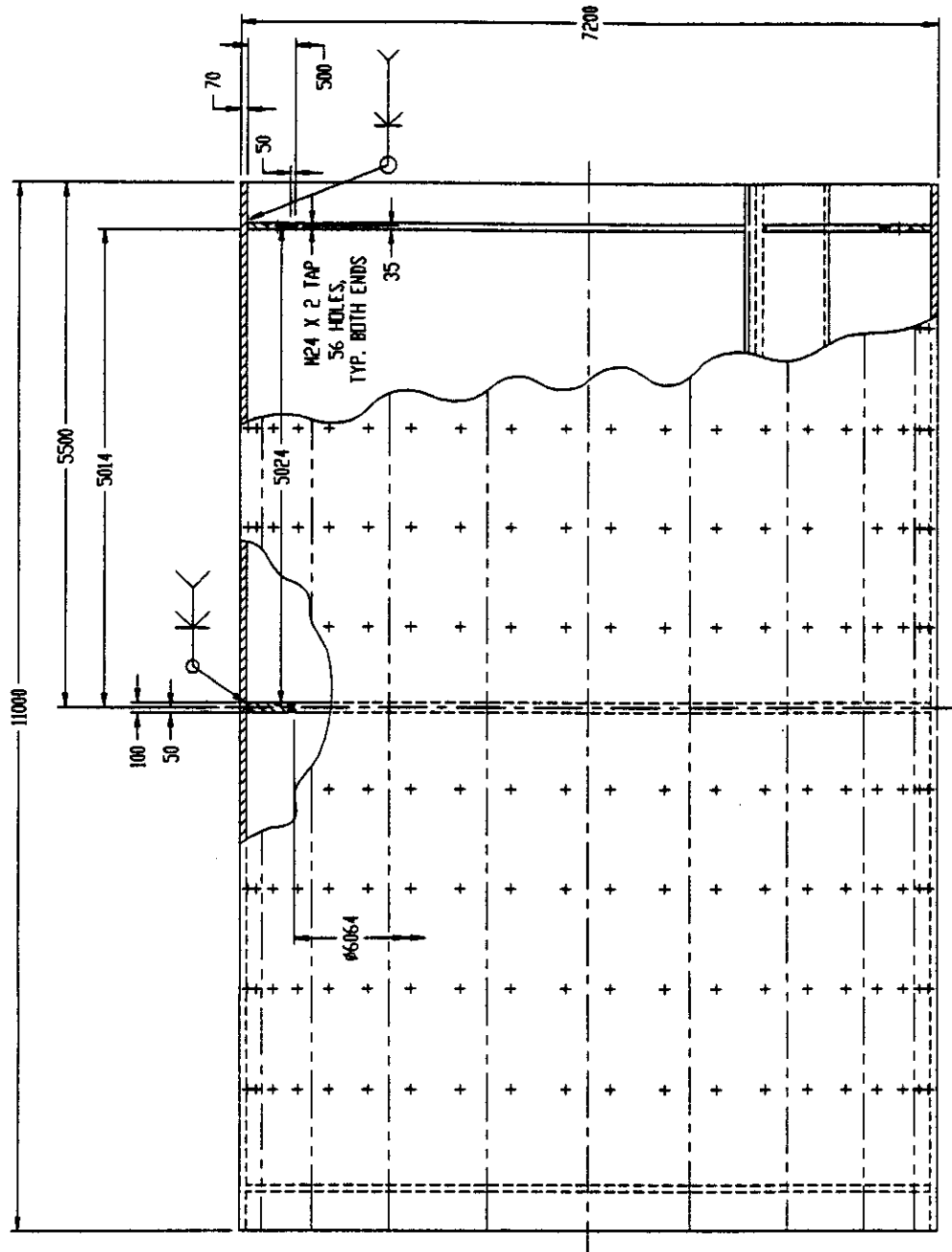
SBC Structural Shell

- **Material: 304L Stainless Steel (UNS 30403), ~195 Mg.**
- **Struc. Shell & Central Detector Support performed interrelated.**
- **Critical welds shop fabricated using submerged arc.**
- **Machining, shaping, & tack-up at shop before shipping.**
- **Final fabrication & erection at IR-5 site.**
- **Nominal material thickness, 70mm or 2 3/4 inches.**
- **Scintillator Modules added to shell & tested at ground level.**
- **Assembly lowered into experiment hall for further assembly.**

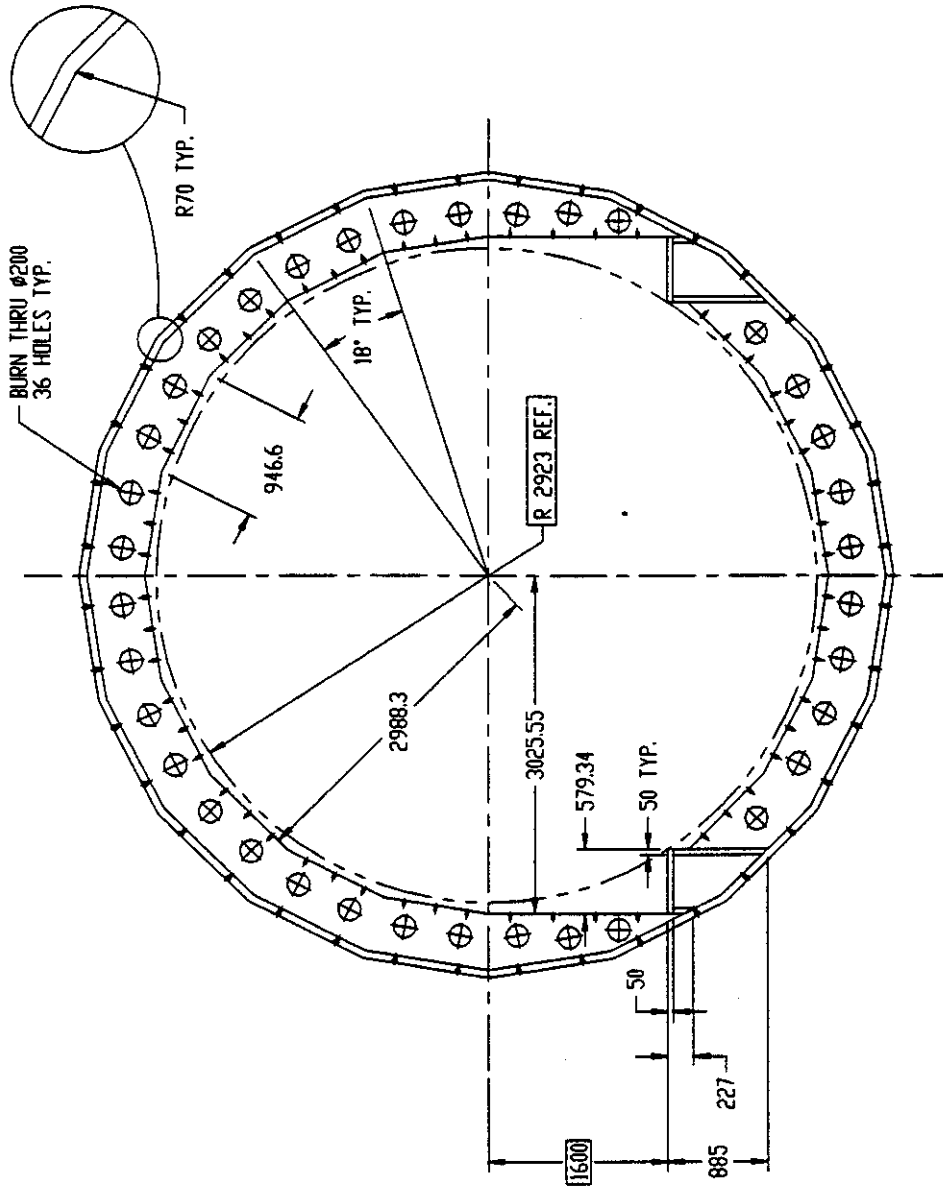
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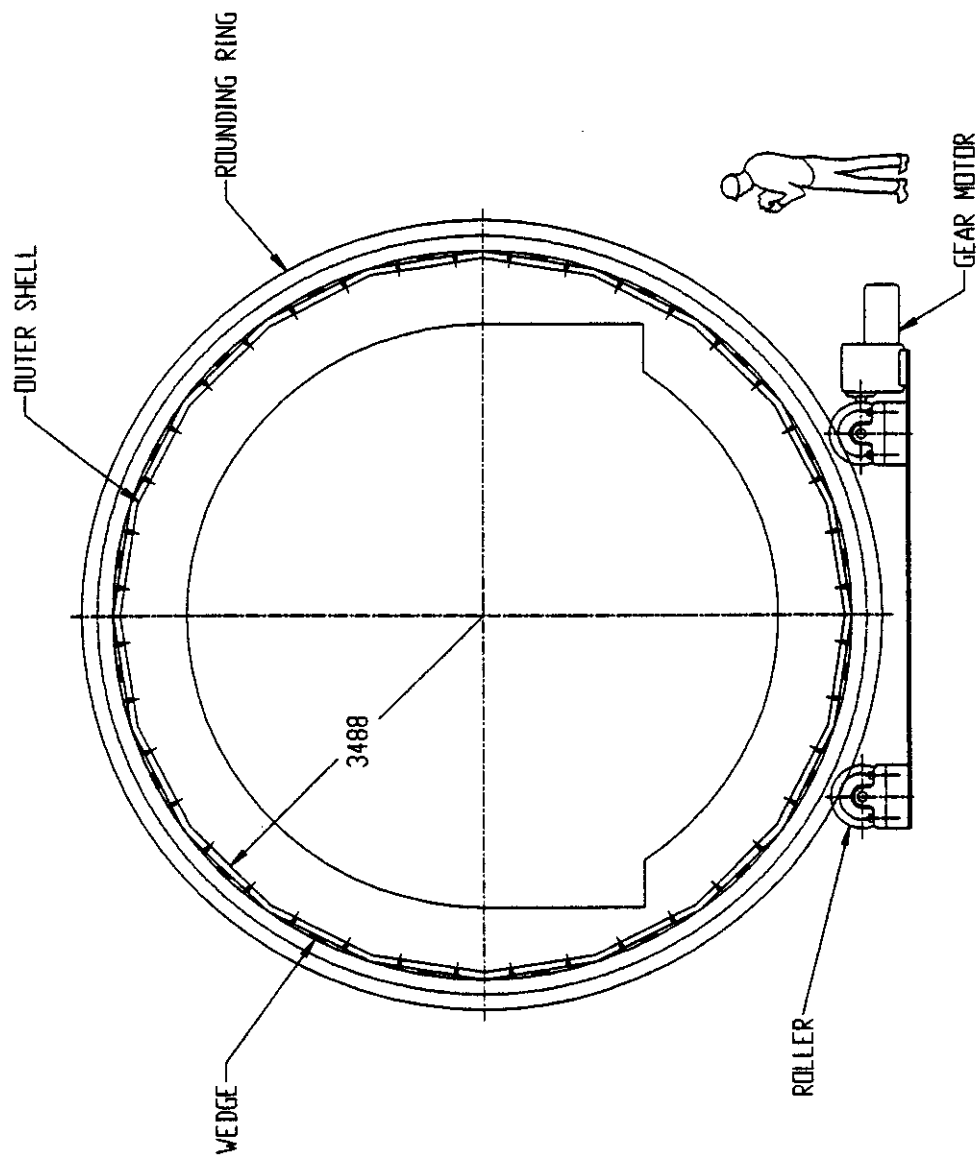
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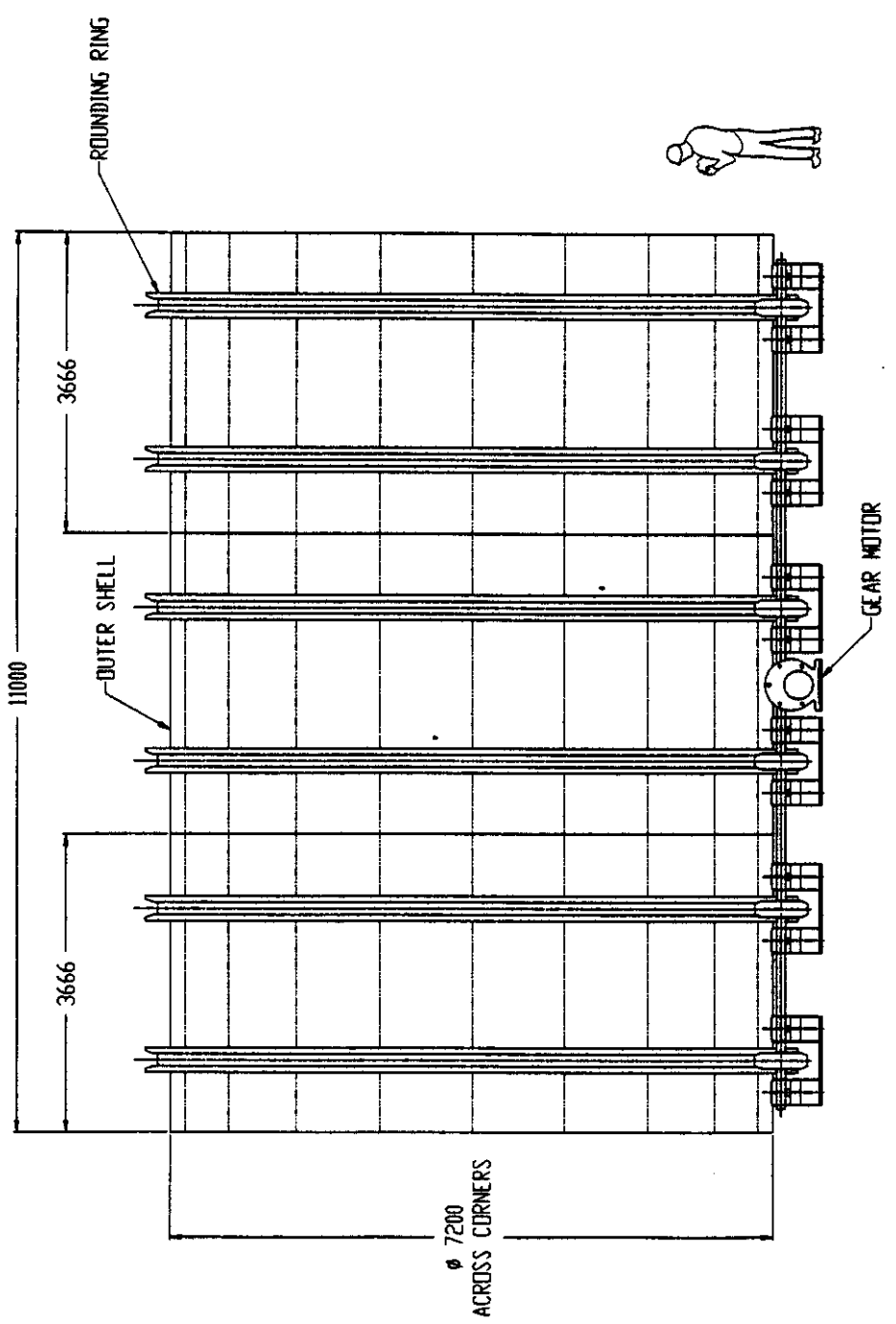
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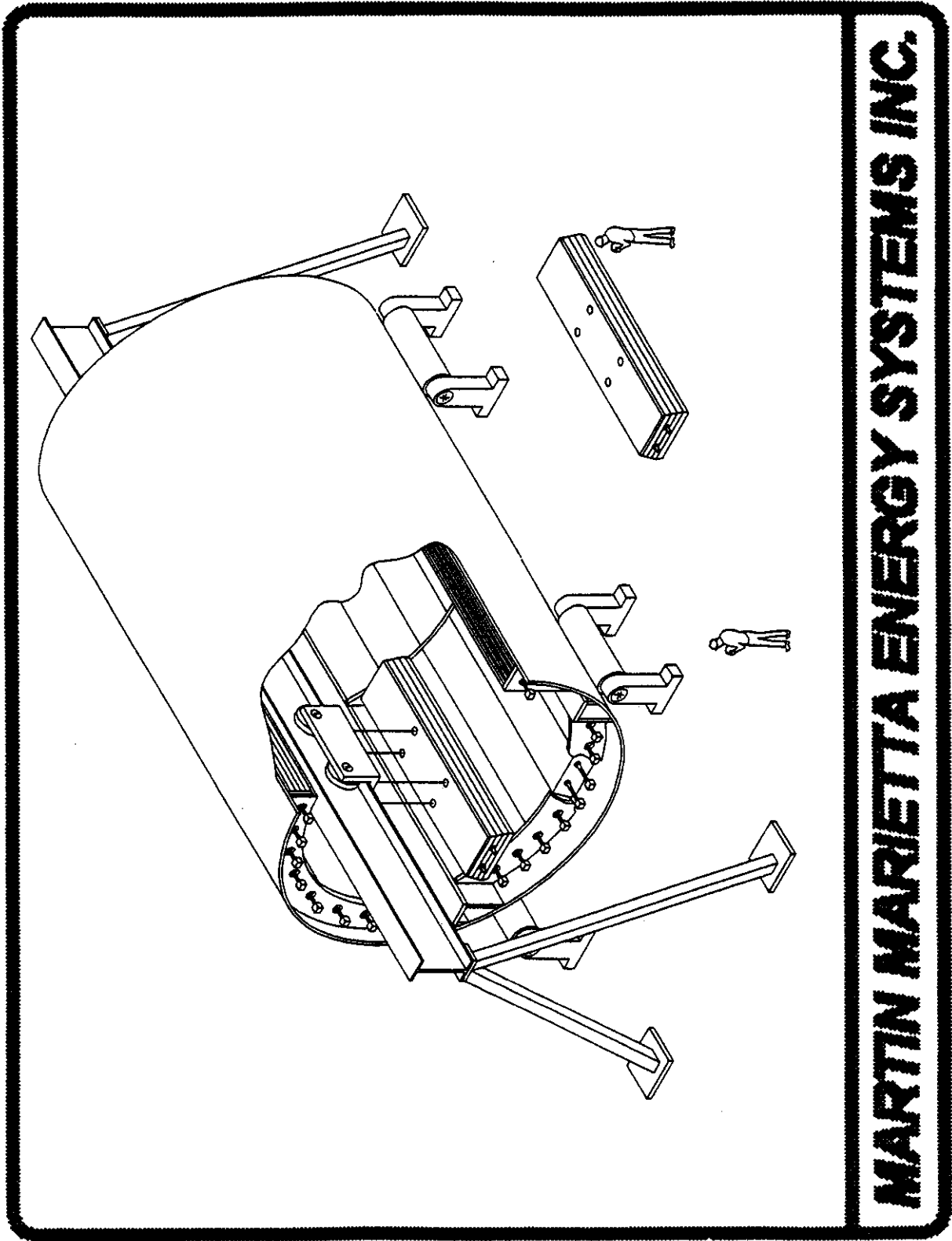
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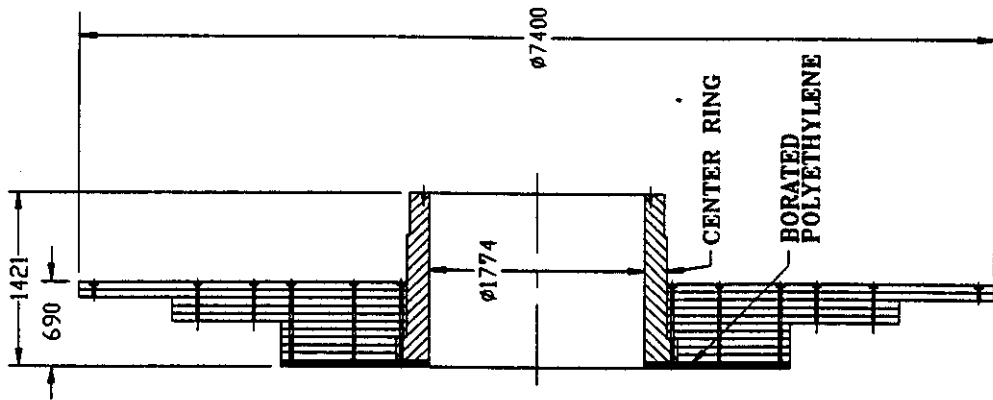
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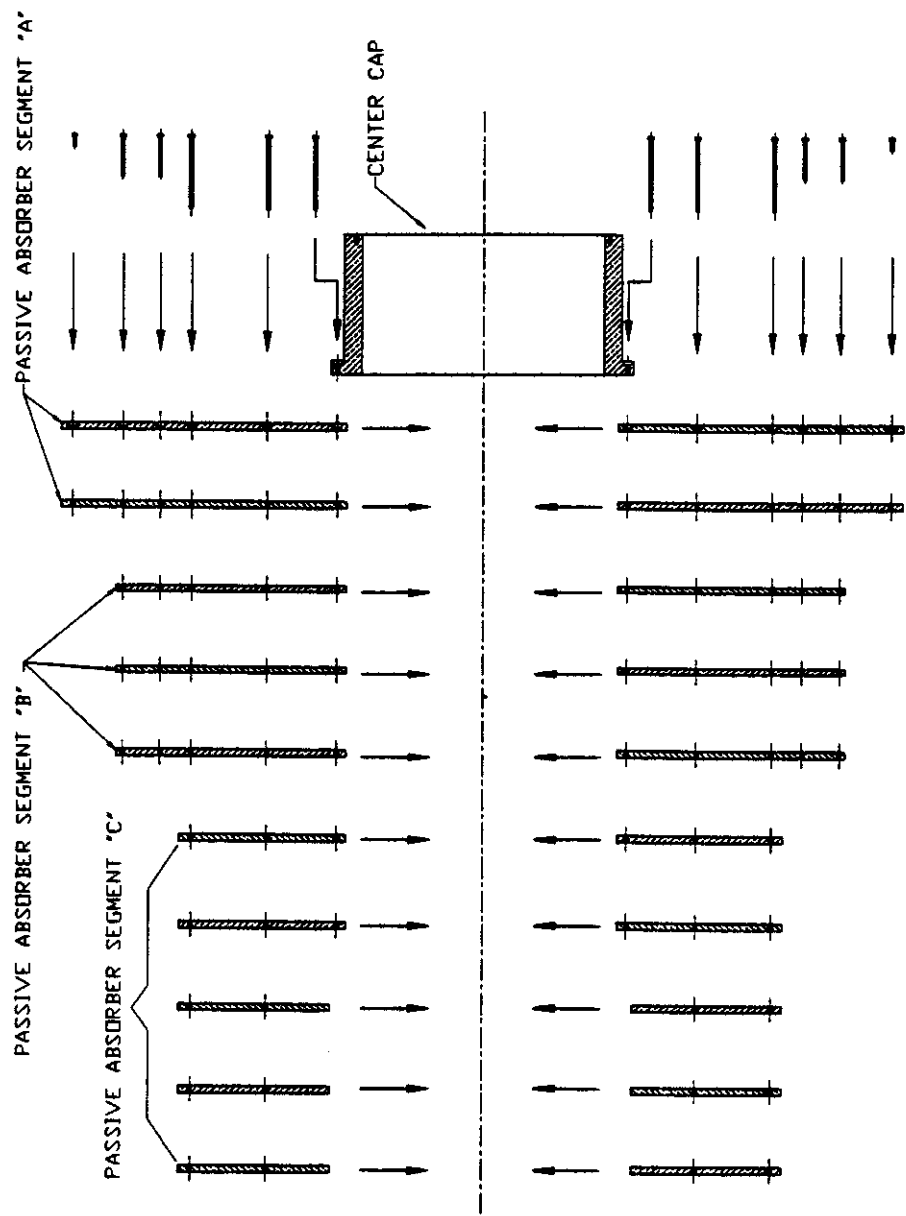
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MARTIN MARIETTA ENERGY SYSTEMS INC.

Scintillating Barrel Calorimeter

Forty-four 4.8 Meter Scintillation Modules

Structure Design

Single Wall Shell & Track, Supported on CDS

SST. Weight (Shell & Flanges) 195 Mg

Scintillation Module Design

Weight per Std. Module(5m) 24 Mg

No. of Std. Modules 25

No. of Special Modules 19

Total Scint Cal. Module Weight 934 Mg

Four Layers in pseudo-towers

No. of Channels 640 total Grow to 3840

Tile	Const.	η	0.16 rad.		
Seg.	Const.	ϕ	0.16 rad.	Grow to	0.03 rad.

Total Tile Area 672 square meters

Total Scint. Fiber Length 18816 meters

Total Transmission Fiber Lgth. 65856 meters

Coverage in η 0-1.28 rad.

End Cap PA with J-Box Clearance

Mat'l: Brass

Single End Cap Weight 167 Mg

Total End Cap Weight 334 Mg

Endcap Neutron Absorber

Total Volume of BPE 4.58 cu. meters

Total Weight of BPE 4.26 Mg

Add'l Barrel Passive Absorber

Mat'l: Brass

Brass Thickness 100 mm

Barrel PA Weight 223 Mg