Report No. 40

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THE DESIGN OF THE PANEL STRUCTURES

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1. General Description

The dish structure of the 64-m telescope provides 60 homologous surface points, located 25-35 feet from each other in a radial pattern, see Figure 1. These points support the corners of 44 panels; each panel is a space structure of steel pipes, giving support to an average of 70 surface plates per panel (see Report 38). The 44 panels come in 4 groups (rings), with 4-16 identical panels in each group.

When the telescope is tilted, or exposed to wind or snow, the holding points exert forces on the panel corners. In addition, we have the dead loads of the panels, the weight of the plates, and wind and snow on the plates. Each panel then must be stable under the sum of all survival loads.

Furthermore, each panel must deform in a homologous way when the telescope is tilted. Calling ΔZ the deformation of a structure and ΔH its deviation from homology, we define a homology ratio $R = \Delta Z/\Delta H$. For the telescope as a whole, we need $R \approx 200$, which is so large that an efficient mathematical method must be used for finding a solution. But for the panels we need only $R \approx 10$, thus a trial-and-error procedure was used. The demand of homology was split up in two parts: (a) the dead-load sag shall move all surface points by the same amounts in Z-direction, which results in a parallel translation of the telescope surface; (b) the telescope forces exerted on the panel corners shall not move the surface points in Z-direction, meaning no surface deformation.

The panel design then is based on two basic concepts (S. von Hoerner, Astron. Journal, Vol. 72, p. 35, 1967) called "equal softness", fulfilling the first demand; and "pressure-stable cells", fulfilling the second demand.

Figures 2, 3, 4, and 5 show the resulting design. The crossing diagonals above the holding points provide enough softness for the surface corners; their crossing point is always braced sideways by a pipe not shown in the drawings.

Table 1 shows the number of identical panels in each ring; the number per panel of supports, joints, members and plates; weight and area; finally the minimum angle between any two bars at a common joint, within each panel as well as between panel bars and telescope bars, see Figure 6. The panel weight is

$$44 \text{ panels total} = 135.8 \text{ tons}, \tag{1}$$

or on the average

$$3.1 \text{ tons/panel} \tag{2}$$

The total surface area is

$$38{,}587 \text{ ft}^2. \tag{3}$$

(See Table 1, page 3)

TABLE 1

NUMBERS, AREA, WEIGHT AND ANGLES

Panel	Number Of Panels	Supporting Points	Number Per Panel			Unit Weight lb/ft^2	Area ft^2	Min. Angle Between Bars	
			Joints	Members	Plates			Internal	To Dish
A	16	4	55	199	80	6.41	1144	13 °	17°
B	16	4	54	185	64	6.93	671	10.5°	10°
C	8	5	56	194	64	8.45	844	13 °	10°
D	4	5	59	218	64	8.13	699	12 °	9°

2. Coordinates

Table 2 gives the distances h between telescope surface and homologous holding points as shown in Figure 1. They result from the trial-and-error procedure of making the deformations homolgous.

TABLE 2

DISTANCES h OF HOLDING POINTS BELOW SURFACE

Panel	SA2L h_1 in.	SA2R h_2 in.	SE2L h_3 in.	SE2R h_4 in.	SE00 h_5 in.
A	64.60	64.60	90.00	90.00	--
B	34.90	34.90	64.60	64.60	--
C	47.68	47.68	34.90	34.90	34.90
D	52.59	52.59	47.68	47.68	47.68

Table 3 shows the joint coordinates for all panels. The zero point is about at the center of each panel; +z is down, +x is radial to telescope center, and +y is tangential clockwise. Panel C provides at its side a hole for the feed support leg (point UD2L in Figure 4); but 4 of the 8 panels C are a mirror image, where the y-direction must have the opposite sign.

3. Members

Table 4 gives all bars in each panel, with incidences, bar area, length, outer diameter, and wall thickness. The lengths range from 17.7 to 355.6 inch, the area from 0.26 to 3.11 inch^2, diameters from 0.63 to 6.63 inch, and wall thickness from 0.109 to 0.344 inch.

All members are Cor-ten steel tubing, and all members except the tangential surface bars are round. The tangential surface bars give support for the surface plates; and for better beam action, they are of rectangular tubing, 4x2 inch, the longer side vertical.

4. Fabrication and Erection

For each joint, the pipes should be pre-cut with a saddle cutter, bevelled, and then welded together; first the heavier pipes, then the lighter ones.

The fabrication should be done with a specified tolerance of

$$\pm\, 1/4 \text{ inch maximum} \tag{4}$$

for all joint coordinates. The maximum eccentricities of the pipe axes at a joint should be

$$\left.\begin{array}{l} \pm\, 1/8 \text{ pipe diameter} \\ \\ \pm\, 1/4 \text{ inch} \end{array}\right\} \text{whichever is smaller} \tag{5}$$

Figure 6 shows how the panel corners are attached to the supporting joints of the dish structure. These points are hollow steel spheres of 16 inch outer diameter. All joining bars of a panel corner are welded by the manufacturer onto a shell section of 16 inch inner diameter. In between the joining bars, these sections have many drilled holes of about 1/2 inch diameter. In the telescope erection, each panel is lifted and brought into its proper place, with its shell sections fitting on the joint spheres. Then, section and sphere are welded together along the section rim and through the holes.

2 xtra not used

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TABLE 3

JOINT COORDINATES

PANEL A UNIT = IN.

JOINT	X	Y	Z
'UA2L'	-128.3	-185.0	-60.0
'UA1L'	-112.4	-93.3	-53.6
'UA00'	-108.3	0.0	-51.5
'UA1R'	-112.4	93.3	-53.6
'UA2R'	-128.3	185.0	-60.0
'UB2L'	-54.8	-195.8	-57.0
'UB1L'	-42.1	-99.6	-50.6
'UB00'	-37.8	0.0	-48.4
'UB1R'	-42.1	99.6	-50.6
'UB2R'	-54.8	195.8	-57.0
'UC2L'	18.4	-208.8	-56.1
'UC1L'	31.9	-106.1	-49.3
'UC00'	36.5	0.0	-46.9
'UC1R'	31.9	106.1	-49.3
'UC2R'	18.4	208.8	-56.1
'UD2L'	91.6	-221.8	-57.0
'UD1L'	106.0	-112.6	-49.8
'UD00'	110.9	0.0	-47.3
'UD1R'	106.0	112.6	-49.8
'UD2R'	91.6	221.8	-57.0
'UE2L'	164.4	-237.0	-60.0
'UE1L'	180.0	-119.0	-52.1
'UE00'	185.2	0.0	-49.4
'UE1R'	180.0	119.0	-52.1
'UE2R'	164.4	237.0	-60.0
'SA2L'	-132.6	-190.0	4.6
'MA1L'	-113.9	-94.3	-26.9
'MA00'	-113.2	0.0	35.2
'MA1R'	-113.9	94.3	-26.9
'SA2R'	-132.6	190.0	4.6
'L2AB'	-81.	-137.5	-22.
'MB2L'	-56.2	-198.8	-19.9
'MB1L'	-44.5	-102.5	19.8
'MB1R'	-44.5	102.5	19.8
'MB2R'	-56.2	198.8	-19.9
'R2AB'	-81.	137.5	-22.
'MC2L'	16.7	-218.9	60.1
'MC00'	35.2	0.0	134.9
'MC2R'	16.7	218.9	60.1
'MD2L'	92.1	-226.5	-4.3
'MD1L'	106.8	-115.1	4.9
'MD1R'	106.8	115.1	4.9
'MD2R'	92.1	226.5	-4.3
'L2DE'	132.5	170.	-23.
'SE2L'	167.3	-245.5	29.5
'ME1L'	182.0	-121.5	-0.0
'ME00'	193.2	0.0	149.8
'ME1R'	182.0	121.5	-0.0
'SE2R'	167.3	245.5	29.5
'R2DE'	132.5	-170.	-23.
'UF2L'	238.0	-247.1	-64.1
'UF1L'	254.0	-125.4	-56.0
'UF00'	259.5	0.0	-53.2
'UF1R'	254.0	125.4	-56.0
'UF2R'	238.0	247.1	-64.1

PANEL B UNIT = IN.

JOINT	X	Y	Z
'UA2L'	-120.9	-130.6	-60.0
'UA1L'	-108.	-66.	-56.5
'UA00'	-104.9	0.0	-55.4
'UA1R'	-108.	66.	-56.5
'UA2R'	-120.9	130.6	-60.0
'UB2L'	-47.4	-140.5	-56.8
'UB1L'	-38.0	-72.5	-53.0
'UB00'	-34.6	0.0	-51.8
'UB1R'	-38.0	72.5	-53.0
'UB2R'	-47.4	140.5	-56.8
'UC2L'	25.7	-154.1	-55.8
'UC1L'	36.0	-79.4	-51.7
'UC00'	39.7	0.0	-50.3
'UC1R'	36.0	79.4	-51.7
'UC2R'	25.7	154.1	-55.8
'UD2L'	98.7	-167.7	-56.9
'UD1L'	110.1	-86.2	-52.4
'UD00'	114.0	0.0	-50.9
'UD1R'	110.1	86.2	-52.4
'UD2R'	98.7	167.7	-56.9
'UE2L'	171.3	-185.0	-60.0
'UE1L'	180.1	-92.5	-55.1
'UE00'	184.4	0.0	-53.5
'UE1R'	180.1	92.5	-55.1
'UE2R'	171.3	185.0	-60.0
'HLAB'	-82.7	-133.9	-33.7
'HALL'	-113.0	-96.7	-42.9
'SA2L'	-123.0	-132.3	-25.1
'MA1L'	-108.	-66.	-30.0
'MA00'	-108.4	0.0	-10.0
'MA1R'	-108.	66.	-30.0
'SA2R'	-123.0	132.3	-25.1
'HARR'	-113.0	96.7	-42.9
'HRAB'	-82.7	133.9	-33.7
'MB2L'	-47.4	-140.5	7.
'MB1L'	-38.0	-72.5	-20.
'MB1R'	-38.0	72.5	-20.
'MB2R'	-47.4	140.5	7.
'MC2L'	25.7	-154.1	9.7
'MC00'	38.9	0.0	140.
'MC2R'	25.7	154.1	9.7
'MD2L'	98.7	-167.7	-20.
'MD1L'	110.1	-86.2	-5.
'MD1R'	110.1	86.2	-5.
'MD2R'	98.7	167.7	-20.
'HLDE'	134.6	-176.5	-33.0
'HELL'	174.4	-137.9	-27.6
'SE2L'	173.8	-189.7	4.7
'ME1L'	180.1	-92.5	0.0
'ME00'	190.3	0.0	67.9
'ME1R'	180.1	92.5	0.0
'SE2R'	173.8	189.7	4.7
'HERR'	174.4	137.9	-27.6
'HRDE'	134.6	176.5	-33.0

PANEL C UNIT = IN.

JOINT	X	Y	Z
'LA2L'	-100.0	-145.6	-60.0
'LA1L'	-75.	-75.	-54.5
'LA00'	-67.9	0.0	-52.6
'LA1R'	-75.	75.	-54.5
'LA2R'	-100.0	145.6	-60.0
'UB2L'	-29.6	-169.7	-56.4
'UB1L'	-6.1	-88.4	-49.9
'UB00'	2.2	0.0	-47.7
'UB1R'	-6.1	88.4	-49.9
'UB2R'	-29.6	169.7	-56.4
'UC2L'	38.8	-197.4	-55.3
'UC1L'	66.8	-102.6	-47.8
'UC00'	76.5	0.0	-45.2
'UC1R'	66.8	102.6	-47.8
'UC2R'	38.8	197.4	-55.3
'UD2L'	108.5	-223.1	-56.5
'UD1L'	139.8	-116.6	-47.9
'UD00'	150.9	0.0	-45.0
'UD1R'	139.8	116.6	-47.9
'UD2R'	108.2	225.0	-56.5
'UE2L'	176.0	-256.2	-60.0
'UE1L'	208.9	-129.9	-50.3
'UE00'	221.3	0.0	-47.1
'UE1R'	208.9	129.9	-50.3
'UE2R'	176.0	256.2	-60.0
'HLAB'	-65.9	-158.4	-37.2
'HALL'	-88.6	-111.0	-34.2
'SA2L'	-104.5	-148.7	-12.3
'MA1L'	-75.0	-75.0	-10.0
'MA00'	-67.9	0.0	26.0
'MA1R'	-75.0	75.0	-10.0
'SA2R'	-104.5	148.7	-12.3
'HARR'	-88.6	111.0	-34.2
'HRAB'	-65.9	158.4	-37.2
'MB2L'	-29.6	-169.7	-20.
'MB1L'	-6.1	-88.4	10.
'MB1R'	-6.1	88.4	10.
'MB2R'	-29.6	169.7	-20.
'MC2L'	38.5	-197.4	20.
'MC00'	73.9	0.0	195.
'MC2R'	38.8	197.4	20.
'MD2L'	108.5	-223.1	-20.
'MD1L'	139.8	-116.6	35.
'MD1R'	139.8	116.6	35.
'MD2R'	108.2	225.	-20.
'HLDE'	142.4	-240.5	-40.4
'HFLL'	192.6	-193.9	-32.8
'HF1L'	216.4	-64.9	-26.4
'SE2L'	176.6	-259.6	-25.1
'ME1L'	208.9	-129.9	4.
'SF00'	226.6	0.0	-12.1
'MF1R'	208.9	129.9	4.
'SE2R'	176.6	259.6	-25.1
'HE1R'	216.4	64.9	-26.4
'HERR'	192.6	193.9	-32.8
'HRDE'	142.4	240.5	-40.4

PANEL D UNIT = IN.

JOINT	X	Y	Z
'UA2L'	-45.7	-91.9	-60.0
'UA1L'	-17.9	-49.7	-55.4
'UA00'	-8.1	0.0	-53.7
'UA1R'	-17.9	49.7	-55.4
'UA2R'	-45.7	91.9	-60.0
'UB2L'	1.2	-133.	-57.3
'UB1L'	40.1	-73.8	-50.5
'UB00'	54.6	0.0	-48.1
'UB1R'	40.1	73.8	-50.5
'UB2R'	1.2	133.	-57.3
'UC2L'	46.	-177.2	-56.4
'UC1L'	98.4	-97.8	-47.4
'UC00'	117.6	0.0	-44.2
'UC1R'	98.4	97.8	-47.4
'UC2R'	46.	177.2	-56.4
'UD2L'	91.	-221.5	-57.3
'UD1L'	156.7	-121.7	-46.0
'UD00'	180.6	0.0	-42.1
'UD1R'	156.7	121.7	-46.0
'UD2R'	91.	221.5	-57.3
'UF2L'	133.8	-269.0	-60.0
'UF1L'	211.4	-144.0	-46.5
'UF00'	239.7	0.0	-41.8
'UF1R'	211.4	144.0	-46.5
'UF2R'	133.8	269.0	-60.0
'L2AB'	6.	-81.5	-34.
'SA2L'	-52.1	-94.1	-7.4
'MA1L'	-17.9	-49.7	-16.5
'MA00'	-14.0	0.0	2.2
'MA1R'	-17.9	49.7	-16.5
'SA2R'	-52.1	94.1	-7.4
'R2AB'	6.	81.5	-34.
'HLBC'	8.5	-147.	-38.
'MB2L'	1.2	-133.	-30.
'MB1L'	40.1	-73.8	-15.0
'MB1R'	40.1	73.8	-15.0
'MB2R'	1.2	133.	-30.
'HRBC'	8.5	147.	-38.
'MC2L'	46.	-177.2	15.1
'MC00'	113.1	0.0	50.5
'MC2R'	46.	177.2	15.1
'L2DE'	147.	-182.7	-32.
'MD2L'	91.	-221.5	-15.
'MD1L'	156.7	-121.7	-12.0
'MD00'	180.6	0.0	-4.5
'MD1R'	156.7	121.7	-12.0
'MD2R'	91.	221.5	-15.
'R2DE'	147.	182.7	-32.
'HLDE'	109.	-247.5	-36.
'HFLL'	164.	-223.	-26.
'HF1L'	232.7	-56.1	-13.4
'SE2L'	131.8	-274.8	-12.3
'MF1L'	211.4	-144.0	32.
'SF00'	244.1	0.0	6.1
'ME1R'	211.4	144.0	32.
'SE2R'	131.8	274.8	-12.3
'HE1R'	232.7	56.1	-13.4
'HERR'	164.	223.	-26.
'HRDE'	109.	247.5	-36.

TABLE 4 PANEL MEMBERS

PANEL A

NO	INCIDENCIES		AREA SQR. IN.	LENTH IN.	DIAMETER IN.	THICKNESS IN.
1	UA2L	UA1L	2.019	93.326	4 BY 2	0.188
2	UA1L	UA00	2.019	93.419	4 BY 2	0.188
3	UA00	UA1R	2.019	93.419	4 BY 2	0.188
4	UA1R	UA2R	2.019	93.326	4 BY 2	0.188
5	UB2L	UB1L	2.019	97.235	4 BY 2	0.188
6	UB1L	UB00	2.019	99.732	4 BY 2	0.188
7	UB00	UB1R	2.019	99.732	4 BY 2	0.188
8	UB1R	UB2R	2.019	97.235	4 BY 2	0.188
9	UC2L	UC1L	2.019	103.814	4 BY 2	0.188
10	UC1L	UC00	2.019	106.310	4 BY 2	0.188
11	UC00	UC1R	2.019	106.310	4 BY 2	0.188
12	UC1R	UC2R	2.019	103.814	4 BY 2	0.188
13	UD2L	UD1L	2.019	110.311	4 BY 2	0.188
14	UD1L	UD00	2.019	112.809	4 BY 2	0.188
15	UD00	UD1R	2.019	112.809	4 BY 2	0.188
16	UD1R	UD2R	2.019	110.311	4 BY 2	0.188
17	UE2L	UE1L	2.019	119.226	4 BY 2	0.188
18	UE1L	UE00	2.019	119.227	4 BY 2	0.188
19	UE00	UE1R	2.019	119.227	4 BY 2	0.188
20	UE1R	UE2R	2.019	119.226	4 BY 2	0.188
21	UA2L	UB2L	0.496	74.428	1.313	0.134
22	UB2L	UC2L	0.496	74.387	1.313	0.134
23	UC2L	UD2L	0.496	74.385	1.313	0.134
24	UD2L	UE2L	0.496	74.427	1.313	0.134
174	R2DE	MD1L	0.667	66.674	1.188	0.219
25	UA1L	UB1L	0.496	70.569	1.313	0.134
26	UB1L	UC1L	0.496	74.386	1.313	0.134
27	UC1L	UD1L	0.496	74.385	1.313	0.134
28	UD1L	UE1L	0.496	74.385	1.313	0.134
29	UA00	UB00	0.496	70.569	1.313	0.134
30	UB00	UC00	0.496	74.385	1.313	0.134
31	UC00	UD00	0.496	74.386	1.313	0.134
32	UD00	UE00	0.496	74.385	1.313	0.134
33	UA1R	UB1R	0.496	70.569	1.313	0.134
34	UB1R	UC1R	0.496	74.386	1.313	0.134
35	UC1R	UD1R	0.496	74.385	1.313	0.134
36	UD1R	UE1R	0.496	74.385	1.313	0.134
37	UA2R	UB2R	0.496	74.428	1.313	0.134
38	UB2R	UC2R	0.496	74.387	1.313	0.134
39	UC2R	UD2R	0.496	74.385	1.313	0.134
40	UD2R	UE2R	0.496	74.427	1.313	0.134
41	UE2L	UF2L	0.496	74.429	1.313	0.134
42	UE1L	UF1L	0.496	74.386	1.313	0.134
43	UE00	UF00	0.496	74.387	1.313	0.134
44	UF1R	UF1R	0.496	74.386	1.313	0.134
45	UE2R	UF2R	0.496	74.429	1.313	0.134
47	ME1L	UF1L	0.496	91.299	1.313	0.134
48	ME1R	UF1R	0.496	91.299	1.313	0.134
50	UA1L	MA1L	0.745	26.704	1.125	0.281
51	UA1R	MA1R	0.745	26.704	1.125	0.281
53	UB00	MB1L	0.498	123.405	1.563	0.109
54	UB00	MB1R	0.498	123.405	1.563	0.109
55	UD00	MD1L	0.626	126.556	1.938	0.109
56	UD00	MD1R	0.626	126.556	1.938	0.109
57	UC1L	MB1L	0.496	103.225	1.313	0.134
58	UC1L	MD1L	0.496	92.943	1.313	0.134
59	UC1R	MB1R	0.496	103.225	1.313	0.134

NO	INCIDENCIES		AREA SQR. IN.	LENTH IN.	DIAMETER IN.	THICKNESS IN.
60	UC1R	MD1R	0.496	92.943	1.313	0.134
61	MB2L	MB1L	0.602	104.879	1.563	0.134
62	MB1R	MB2R	0.602	104.879	1.563	0.134
63	MD2L	MC1L	0.455	112.738	1.438	0.109
64	MD1R	MC2R	0.455	112.738	1.438	0.109
65	MA1L	MB1L	0.496	84.140	1.313	0.134
66	MD1L	ME1L	0.496	75.674	1.313	0.134
67	MA1R	MB1R	0.496	84.140	1.313	0.134
68	MD1R	ME1R	0.496	75.674	1.313	0.134
69	SA2L	MA1L	1.700	102.540	3.625	0.156
72	SA2R	MA1R	1.700	102.540	3.625	0.156
73	SE2L	ME1L	0.812	128.337	1.813	0.156
74	ME1L	ME00	1.087	193.355	2.375	0.156
75	ME1R	ME00	1.087	193.355	2.375	0.156
76	SE2R	ME1R	0.812	128.337	1.813	0.156
77	SA2L	MB2L	0.982	80.684	1.500	0.250
78	MB2L	MC2L	0.602	110.192	1.563	0.134
79	MC2L	MD2L	0.498	99.548	1.563	0.109
80	SE2L	MD2L	0.496	84.624	1.313	0.134
81	SA2R	MB2R	0.982	80.684	1.500	0.250
82	MB2R	MC2R	0.602	110.192	1.563	0.134
83	MC2R	MD2R	0.498	99.548	1.563	0.109
84	SE2R	MD2R	0.496	84.624	1.313	0.134
85	UF1L	ME00	1.700	248.637	3.625	0.156
86	UF1R	ME00	1.700	248.637	3.625	0.156
87	UB2L	MB2L	0.258	37.224	0.625	0.188
88	UB1L	MB1L	0.496	70.642	1.313	0.134
89	UB1R	MB1R	0.496	70.642	1.313	0.134
90	UB2R	MB2R	0.258	37.224	0.625	0.188
92	UD1L	MD1L	0.982	54.841	1.500	0.250
93	UD1R	MD1R	0.982	54.841	1.500	0.250
95	UE1L	ME1L	0.745	52.107	1.125	0.281
96	UE1R	ME1R	0.745	52.107	1.125	0.281
97	UA00	MA00	0.667	86.997	1.188	0.219
98	UE00	ME00	1.700	199.468	3.625	0.156
99	UC2L	MC2L	0.602	116.733	1.563	0.134
100	UC2R	MC2R	0.602	116.733	1.563	0.134
105	UB00	MA00	0.602	112.694	1.563	0.134
106	UC1L	MC2L	0.626	157.862	1.938	0.109
107	UC1R	MC2R	0.626	157.862	1.938	0.109
108	UD00	ME00	1.700	213.687	3.625	0.156
109	UA2L	UB1L	0.626	121.721	1.938	0.109
110	UB1L	UC00	0.626	127.027	1.938	0.109
111	UC00	UD1R	0.626	132.386	1.938	0.109
112	UD1R	UE2R	0.812	137.779	1.813	0.156
113	UA2R	UB1R	0.626	121.721	1.938	0.109
114	UB1R	UC00	0.626	127.027	1.938	0.109
115	UC00	UD1L	0.626	132.386	1.938	0.109
116	UD1L	UE2L	0.812	137.779	1.813	0.156
117	UA00	UB1R	0.626	119.569	1.938	0.109
118	UB1R	UC2R	0.626	125.077	1.938	0.109
119	UC2L	UD1L	0.626	130.264	1.938	0.109
120	UD1L	UE00	0.812	137.779	1.813	0.156
121	UA00	UB1L	0.626	119.569	1.938	0.109
122	UB1L	UC2L	0.626	125.077	1.938	0.109
123	UC2R	UD1R	0.626	130.264	1.938	0.109
124	UD1R	UE00	0.812	137.779	1.813	0.156

NC	INCIDENCIES		AREA SQR. IN.	LENTH IN.	DIAMETER IN.	THICKNESS IN.
125	SA2L	MC0C	2.206	285.120	5.375	C.134
126	MC00	SE2R	2.452	298.C95	6.625	0.120
127	SA2R	MC0C	2.206	285.120	5.375	0.134
128	MC00	SE2L	2.452	298.095	6.625	0.120
129	UC00	MC00	1.C87	181.978	2.375	0.156
130	SA2L	MA00	2.206	193.512	5.375	0.134
131	MA00	SA2R	2.206	193.512	5.375	0.134
132	SE2L	ME0C	2.452	274.673	6.625	C.120
133	ME00	SE2R	2.452	274.673	6.625	0.120
134	SA2L	MC2L	1.C87	161.867	2.375	0.156
135	MC2L	SE2L	1.C70	155.978	2.000	0.188
136	SA2R	MC2R	1.C87	161.867	2.375	0.156
137	MC2R	SE2R	1.070	155.978	2.000	0.188
138	MC2L	MC0C	1.700	232.C88	3.625	0.156
139	MC00	MC2R	1.700	232.C88	3.625	0.156
140	MA00	MC0C	1.C87	178.853	2.375	0.156
141	MCCC	ME00	2.452	158.729	6.625	0.120
142	SA2L	MB1L	C.812	125.081	1.813	0.156
143	UC0C	MB1L	C.812	146.864	1.813	0.156
144	UCCC	MD1R	C.812	144.561	1.813	0.156
145	SE2R	MD1R	1.C7C	145.827	2.000	0.188
146	SE2L	MD1L	1.C70	145.827	2.000	0.188
147	UCC0	MD1L	C.812	144.561	1.813	0.156
148	UC0C	MB1R	C.812	146.864	1.813	0.156
149	SA2R	MB1R	C.812	125.C81	1.813	0.156
150	UB00	MC00	1.C87	197.446	2.375	0.156
151	UC1L	MC0C	1.700	212.749	3.625	0.156
152	UC1R	MC00	1.700	212.749	3.625	0.156
153	UD00	MC00	1.C87	197.426	2.375	C.156
155	UA2L	MA1L	C.982	97.573	1.500	0.250
157	UA2R	MA1R	C.982	97.573	1.500	0.250
162	UA2L	MB2L	C.327	83.645	1.063	0.1C9
164	UE2L	MD2L	C.496	91.840	1.313	0.134
166	UA2R	MB2R	C.327	83.645	1.063	0.1C9
168	UE2R	MD2R	C.496	91.840	1.313	0.134
169	UA2L	L2AB	C.667	77.131	1.188	0.219
170	L2AB	MB1L	0.667	65.609	1.188	0.219
171	MB1R	R2AB	C.667	65.609	1.188	C.219
172	R2AB	UA2R	C.667	77.131	1.188	C.219
173	UE2L	R2DE	C.667	82.959	1.188	C.219
175	MD1R	L2DE	C.667	66.674	1.188	C.219
176	L2DE	UE2R	C.667	82.959	1.188	C.219
177	UD1R	L2DE	0.667	68.623	1.188	C.219
178	L2DE	SE2R	C.664	98.403	1.313	0.188
179	SE2L	R2DE	C.664	98.403	1.313	0.188
180	R2DE	UD1L	C.667	68.623	1.188	C.219
181	SA2L	L2AB	C.738	78.353	1.438	0.188
182	L2AB	UB1L	C.667	61.340	1.188	C.219
183	UB1R	R2AB	C.667	61.340	1.188	C.219
184	R2AB	SA2R	C.738	78.353	1.438	0.188
186	SE2L	UF1L	1.7C0	171.154	3.625	C.156
187	ME1L	UF0C	C.759	153.683	1.938	0.134
188	ME1R	UF00	C.759	153.683	1.938	C.134
189	SE2R	UF1R	1.700	171.154	3.625	0.156
190	ME00	UF00	1.7CC	213.668	3.625	0.156
191	UE2L	UF1L	C.626	143.191	1.938	0.1C9
192	UE0C	UF1L	C.626	143.192	1.938	C.1C9

NC	INCIDENCIES		AREA SQR. IN.	LENTH IN.	DIAMETER IN.	THICKNESS IN.
193	UE00	UF1R	0.626	143.192	1.938	0.109
194	UE2R	UF1R	0.626	143.191	1.938	0.109
195	UF2L	UF1L	2.019	123.067	4 BY 2	0.188
196	UF1L	UF0C	2.019	125.564	4 BY 2	0.188
197	UF00	LF1R	2.019	125.564	4 BY 2	0.188
198	UF1R	UF2R	2.019	123.067	4 BY 2	0.188
199	ME1L	UF2L	1.070	151.714	2.000	0.188
200	ME1R	UF2R	1.070	151.714	2.000	0.188
204	MB2L	MD2L	1.087	151.781	2.375	0.156
205	UD2L	MD2L	0.237	52.946	0.750	0.120
206	MB2R	MD2R	1.087	151.781	2.375	0.156
207	UD2R	MD2R	0.237	52.946	0.750	0.120
208	UC2L	MB2L	0.496	83.597	1.313	0.134
209	UC2L	MD2L	0.455	91.819	1.438	0.109
210	UC2R	MB2R	0.496	83.597	1.313	0.134
211	UC2R	MD2R	0.455	91.819	1.438	0.109
216	MA1L	MA00	1.011	113.062	1.688	0.219
217	MA1R	MA00	1.011	113.062	1.688	0.219
218	UA0C	MA1L	0.812	97.664	1.813	0.156
219	UA00	MA1R	0.812	97.664	1.813	0.156
222	UE2L	ME1L	0.626	131.251	1.938	0.109
223	UE2R	ME1R	0.626	131.251	1.938	0.109
224	UE0C	ME1L	0.626	131.251	1.938	0.109
225	UE0C	ME1R	0.626	131.251	1.938	0.109
226	L2AB	MA1L	0.541	54.525	1.688	0.109
227	R2AB	MA1R	0.541	54.525	1.688	0.109
228	L2DE	ME1R	0.541	72.977	1.688	0.109
229	R2DE	ME1L	0.541	72.977	1.688	0.109

PANEL B

NO	INCIDENCIES		AREA SQR. IN.	LENTH IN.	DIAMETER IN.	THICKNESS IN.
1	UA2L	UA1L	2.019	66.015	4 BY 2	0.188
4	UA1R	UA2R	2.019	66.015	4 BY 2	0.188
2	UA1L	UA00	2.019	66.080	4 BY 2	0.188
3	UA00	UA1R	2.019	66.080	4 BY 2	0.188
5	UB2L	UB1L	2.019	68.680	4 BY 2	0.188
8	UB1R	UB2R	2.019	68.680	4 BY 2	0.188
6	UB1L	UB00	2.019	72.659	4 BY 2	0.188
7	UB00	UB1R	2.019	72.659	4 BY 2	0.188
9	UC2L	UC1L	2.019	75.487	4 BY 2	0.188
12	UC1R	UC2R	2.019	75.487	4 BY 2	0.188
10	UC1L	UC00	2.019	79.537	4 BY 2	0.188
11	UC00	UC1R	2.019	79.537	4 BY 2	0.188
13	UD2L	UD1L	2.019	82.381	4 BY 2	0.188
16	UD1R	UD2R	2.019	82.381	4 BY 2	0.188
14	UD1L	UD00	2.019	86.343	4 BY 2	0.188
15	UD00	UD1R	2.019	86.343	4 BY 2	0.188
17	UE2L	UE1L	2.019	92.979	4 BY 2	0.188
18	UE1L	UE00	2.019	92.709	4 BY 2	0.188
19	UE00	UE1R	2.019	92.709	4 BY 2	0.188
20	UE1R	UE2R	2.019	92.979	4 BY 2	0.188
21	UA2L	UB2L	0.496	74.323	1.313	0.134
37	UA2R	UB2R	0.496	74.323	1.313	0.134
22	UB2L	UC2L	0.496	74.361	1.313	0.134
38	UB2R	UC2R	0.496	74.361	1.313	0.134
23	UC2L	UD2L	0.496	74.264	1.313	0.134
39	UC2R	UD2R	0.496	74.264	1.313	0.134
24	UD2L	UE2L	0.496	74.786	1.313	0.134
40	UD2R	UE2R	0.496	74.786	1.313	0.134
25	UA1L	UB1L	0.496	70.396	1.313	0.134
33	UA1R	UB1R	0.496	70.396	1.313	0.134
26	UB1L	UC1L	0.496	74.386	1.313	0.134
34	UB1R	UC1R	0.496	74.386	1.313	0.134
27	UC1L	UD1L	0.496	74.387	1.313	0.134
35	UC1R	UD1R	0.496	74.387	1.313	0.134
28	UD1L	UE1L	0.496	70.393	1.313	0.134
36	UD1R	UE1R	0.496	70.393	1.313	0.134
29	UA00	UB00	0.496	70.391	1.313	0.134
30	UB00	UC00	0.496	74.387	1.313	0.134
31	UC00	UD00	0.496	74.386	1.313	0.134
32	UD00	UE00	0.496	70.388	1.313	0.134
109	UA2L	UB1L	0.602	101.527	1.563	0.134
113	UA2R	UB1R	0.602	101.527	1.563	0.134
121	UA00	UB1L	0.664	98.773	1.313	0.188
117	UA00	UB1R	0.664	98.773	1.313	0.188
122	UB1L	UC2L	0.602	103.500	1.563	0.134
118	UB1R	UC2R	0.602	103.500	1.563	0.134
110	UB1L	UC00	0.812	106.360	1.813	0.156
114	UB1R	UC00	0.812	106.360	1.813	0.156
119	UC2L	UD1L	0.602	108.373	1.563	0.134
123	UC2R	UD1R	0.602	108.373	1.563	0.134
115	UC00	UD1L	0.812	111.358	1.813	0.156
111	UC00	UD1R	0.812	111.358	1.813	0.156
116	UD1L	UE2L	0.602	116.490	1.563	0.134
112	UD1R	UE2R	0.602	116.490	1.563	0.134
120	UD1L	UE00	0.602	113.839	1.563	0.134
124	UD1R	UE00	0.602	113.839	1.563	0.134
69	SA2L	MA1L	0.496	68.214	1.313	0.134

NO	INCIDENCIES		AREA SQR. IN.	LENTH IN.	DIAMETER IN.	THICKNESS IN.
72	SA2R	MA1R	0.496	68.214	1.313	0.134
130	SA2L	MA00	1.070	134.003	2.000	0.188
131	MA00	SA2R	1.070	134.003	2.000	0.188
61	MB2L	MB1L	0.496	73.700	1.313	0.134
62	MB1R	MB2R	0.496	73.700	1.313	0.134
138	MC2L	MC00	1.700	202.222	3.625	0.156
139	MC00	MC2R	1.700	202.222	3.625	0.156
63	MD2L	MD1L	0.496	83.615	1.313	0.134
64	MD1R	MD2R	0.496	83.615	1.313	0.134
65	MA1L	MB1L	0.496	71.015	1.313	0.134
67	MA1R	MB1R	0.496	71.015	1.313	0.134
134	SA2L	MC2L	1.070	154.332	2.000	0.188
136	SA2R	MC2R	1.070	154.332	2.000	0.188
135	MC2L	SE2L	1.070	152.466	2.000	0.188
137	MC2R	SE2R	1.070	152.466	2.000	0.188
66	MD1L	ME1L	0.496	70.517	1.313	0.134
68	MD1R	ME1R	0.496	70.517	1.313	0.134
125	SA2L	MC00	2.251	266.534	4.000	0.188
127	SA2R	MC00	2.251	266.534	4.000	0.188
132	SE2L	ME00	1.700	200.615	3.625	0.156
133	ME00	SE2R	1.700	200.615	3.625	0.156
128	MC00	SE2L	2.251	269.200	4.000	0.188
126	MC00	SE2R	2.251	269.200	4.000	0.188
140	MA00	MC00	1.087	210.378	2.375	0.156
141	MC00	ME00	1.070	167.641	2.000	0.188
85	UA1L	MA1L	0.258	26.590	0.625	0.188
86	UA1R	MA1R	0.258	26.590	0.625	0.188
87	UB2L	MB2L	0.261	63.843	0.813	0.120
90	UB2R	MB2R	0.261	63.843	0.813	0.120
88	UB1L	MB1L	0.258	33.072	0.625	0.188
89	UB1R	MB1R	0.258	33.072	0.625	0.188
99	UC2L	MC2L	0.667	65.562	1.188	0.219
100	UC2R	MC2R	0.667	65.562	1.188	0.219
91	UD2L	MD2L	0.258	36.908	0.625	0.188
94	UD2R	MD2R	0.258	36.908	0.625	0.188
92	UD1L	MD1L	0.495	47.427	0.938	0.219
93	UD1R	MD1R	0.495	47.427	0.938	0.219
95	UE1L	ME1L	0.495	55.170	0.938	0.219
96	UE1R	ME1R	0.495	55.170	0.938	0.219
57	UC1L	MB1L	0.496	80.850	1.313	0.134
59	UC1R	MB1R	0.496	80.850	1.313	0.134
58	UC1L	MD1L	0.496	87.831	1.313	0.134
60	UC1R	MD1R	0.496	87.831	1.313	0.134
78	UC2L	MB2L	1.700	97.348	3.625	0.156
82	UC2R	MB2R	1.700	97.348	3.625	0.156
79	UC2L	MD2L	1.588	82.450	1.813	0.344
83	UC2R	MD2R	1.588	82.450	1.813	0.344
98	UE00	ME00	0.812	121.626	1.813	0.156
70	UA00	MA1L	1.700	70.802	3.625	0.156
71	UA00	MA1R	1.700	70.802	3.625	0.156
53	UB00	MB1L	0.496	79.307	1.313	0.134
54	UB00	MB1R	0.496	79.307	1.313	0.134
55	UD00	MD1L	0.664	97.787	1.313	0.188
56	UD00	MD1R	0.664	97.787	1.313	0.188
74	UE00	ME1L	1.700	107.053	3.625	0.156
75	UE00	ME1R	1.700	107.053	3.625	0.156
106	UC1L	MC2L	0.664	97.239	1.313	0.188

NO	INCIDENCIES		AREA SQR. IN.	LENTH IN.	DIAMETER IN.	THICKNESS IN.
107	UC1R	MC2R	0.664	97.239	1.313	0.188
151	UC1L	MC00	1.700	207.535	3.625	0.156
152	UC1R	MC00	1.700	207.535	3.625	0.156
129	UC00	MC00	1.087	190.327	2.375	0.156
97	UA00	MA00	0.737	45.557	1.188	0.250
101	UB1L	SA2L	1.070	107.661	2.000	0.188
102	UB1R	SA2R	1.070	107.661	2.000	0.188
103	UD1L	SE2L	1.700	134.307	3.625	0.156
104	UD1R	SE2R	1.700	134.307	3.625	0.156
147	UC00	MD1L	0.812	120.211	1.813	0.156
144	UC00	MD1R	0.812	120.211	1.813	0.156
105	UB00	MA00	0.667	84.834	1.188	0.219
150	UB00	MC00	1.700	205.464	3.625	0.156
153	UD00	MC00	1.700	205.171	3.625	0.156
108	UD00	ME00	0.812	141.211	1.813	0.156
73	SE2L	ME1L	0.738	97.425	1.438	0.188
76	SE2R	ME1R	0.738	97.425	1.438	0.188
77	SA2L	MB2L	0.496	82.603	1.313	0.134
81	SA2R	MB2R	0.496	82.603	1.313	0.134
80	SE2L	MD2L	0.667	82.145	1.188	0.219
84	SE2R	MD2R	0.667	82.145	1.188	0.219
142	SA2L	MB1L	0.812	104.095	1.813	0.156
149	SA2R	MB1R	0.812	104.095	1.813	0.156
143	UC00	MB1L	0.812	110.565	1.813	0.156
148	UC00	MB1R	0.812	110.565	1.813	0.156
146	SE2L	MC1L	1.070	121.912	2.000	0.188
145	SE2R	MC1R	1.070	121.912	2.000	0.188
170	UB1L	MB2L	0.664	91.167	1.313	0.188
171	UB1R	MB2R	0.664	91.167	1.313	0.188
172	ME00	ME1L	0.455	115.289	1.438	0.109
173	ME00	ME1R	0.455	115.289	1.438	0.109
181	UA2L	HALL	0.258	38.775	0.625	0.188
182	UA2R	HARR	0.258	38.775	0.625	0.188
183	MA1L	HALL	0.258	33.728	0.625	0.188
184	MA1R	HARR	0.258	33.728	0.625	0.188
185	UE2L	HELL	0.241	57.207	0.813	0.109
186	UE2R	HERR	0.241	57.207	0.813	0.109
187	ME1L	HELL	0.237	53.432	0.750	0.120
188	ME1R	HERR	0.237	53.432	0.750	0.120
189	UA2L	HLAB	0.258	46.544	0.625	0.188
190	UA2R	HRAB	0.305	46.544	1.000	0.109
191	MB2L	HLAB	0.305	54.307	1.000	0.109
192	MB2R	HRAB	0.305	54.307	1.000	0.109
193	UE2L	HLDE	0.237	46.344	0.750	0.120
194	UE2R	HRDE	0.237	46.344	0.750	0.120
195	MD2L	HLDE	0.258	39.259	0.625	0.188
196	MD2R	HRDE	0.258	39.259	0.625	0.188
197	SA2L	HALL	0.495	41.058	0.938	0.219
198	SA2R	HARR	0.495	41.058	0.938	0.219
199	UA1L	HALL	0.495	34.016	0.938	0.219
200	UA1R	HARR	0.495	34.016	0.938	0.219
201	SE2L	HELL	0.667	61.014	1.188	0.219
202	SE2R	HERR	0.667	61.014	1.188	0.219
203	UE1L	HELL	0.495	53.416	0.938	0.219
204	UE1R	HERR	0.495	53.416	0.938	0.219
205	SA2L	HLAB	0.495	41.292	0.938	0.219
206	SA2R	HRAB	0.495	41.292	0.938	0.219

NO	INCIDENCIES		AREA SQR. IN.	LENTH IN.	DIAMETER IN.	THICKNESS IN.
207	UB2L	HLAB	0.495	42.698	0.938	0.219
208	UB2R	HRAB	0.495	42.698	0.938	0.219
209	SE2L	HLDE	0.495	56.031	0.938	0.219
210	SE2R	HRDE	0.495	56.031	0.938	0.219
211	UD2L	HLDE	0.495	44.060	0.938	0.219
212	UD2R	HRDE	0.495	44.060	0.938	0.219
311	HALL	MB2L	0.541	93.341	1.688	0.109
312	HARR	MB2R	0.541	93.341	1.688	0.109
313	HELL	MC2L	0.541	81.682	1.688	0.109
314	HERR	MD2R	0.541	81.682	1.688	0.109
315	HLAB	MA1L	0.541	72.641	1.688	0.109
316	HRAB	MA1R	0.541	72.641	1.688	0.109
317	HLDE	MD1L	0.541	97.678	1.688	0.109
318	HRDE	MD1R	0.541	97.678	1.688	0.109

PANEL C

NO	INCIDENCIES		AREA SQR. IN.	LENTH IN.	DIAMETER IN.	THICKNESS IN.
1	UA2L	UA1L	2.019	75.109	4 BY 2	0.188
2	UA1L	UA0C	2.019	75.350	4 BY 2	0.188
3	UA00	UA1R	2.019	75.350	4 BY 2	0.188
4	UA1R	UA2R	2.019	75.109	4 BY 2	0.188
5	UB2L	UB1L	2.019	84.771	4 BY 2	0.188
6	UB1L	UB00	2.019	88.913	4 BY 2	0.188
7	UB0C	UB1R	2.019	88.913	4 BY 2	0.188
8	UB1R	UB2R	2.019	84.771	4 BY 2	0.188
9	UC2L	UC1L	2.019	99.093	4 BY 2	0.188
10	UC1L	UC00	2.019	103.142	4 BY 2	0.188
11	UC00	UC1R	2.019	103.142	4 BY 2	0.188
12	UC1R	UC2R	2.019	99.093	4 BY 2	0.188
13	UD2L	UD1L	2.019	111.277	4 BY 2	0.188
14	UD1L	UD00	2.019	117.263	4 BY 2	0.188
15	UD00	UD1R	2.019	117.263	4 BY 2	0.188
16	UD1R	UD2R	2.019	113.157	4 BY 2	0.188
17	UE2L	UE1L	2.019	130.912	4 BY 2	0.188
18	UE1L	UE00	2.019	130.533	4 BY 2	0.188
19	UE00	UE1R	2.019	130.533	4 BY 2	0.188
20	UE1R	UE2R	2.019	130.912	4 BY 2	0.188
21	UA2L	UB2L	0.496	74.501	1.313	0.134
22	UB2L	UC2L	0.496	73.805	1.313	0.134
23	UC2L	UD2L	0.496	74.406	1.313	0.134
24	UD2L	UE2L	0.496	75.170	1.313	0.134
25	UA1L	UB1L	0.496	70.263	1.313	0.134
26	UB1L	UC1L	0.496	74.386	1.313	0.134
27	UC1L	UD1L	0.496	74.386	1.313	0.134
28	UD1L	UE1L	0.496	70.346	1.313	0.134
29	UA00	UB0C	0.496	70.396	1.313	0.134
30	UB00	UC00	0.496	74.385	1.313	0.134
31	UC00	UD0C	0.496	74.386	1.313	0.134
32	UD00	UE00	0.496	70.388	1.313	0.134
33	UA1R	UB1R	0.496	70.263	1.313	0.134
34	UB1R	UC1R	0.496	74.386	1.313	0.134
35	UC1R	UD1R	0.496	74.386	1.313	0.134
36	UD1R	UE1R	0.496	70.346	1.313	0.134
37	UA2R	UB2R	0.496	74.501	1.313	0.134
38	UB2R	UC2R	0.496	73.805	1.313	0.134
39	UC2R	UD2R	0.496	74.696	1.313	0.134
40	UD2R	UE2R	0.496	74.735	1.313	0.134
53	UB00	MB1L	0.455	106.024	1.438	0.109
54	UB0C	MB1R	0.455	106.024	1.438	0.109
55	UD00	MD1L	0.812	141.964	1.813	0.156
56	UD00	MD1R	0.812	141.964	1.813	0.156
57	UC1L	MB1L	0.496	94.188	1.313	0.134
58	UC1L	MC1L	0.602	111.319	1.563	0.134
59	UC1R	MB1R	0.496	94.188	1.313	0.134
60	UC1R	MD1R	0.602	111.319	1.563	0.134
61	MB2L	MB1L	0.496	89.687	1.313	0.134
62	MB1R	MB2R	0.496	89.687	1.313	0.134
63	MD2L	MD1L	0.626	123.830	1.938	0.109
64	MD1R	MD2R	0.626	125.522	1.938	0.109
65	MA1L	MB1L	0.496	72.913	1.313	0.134
66	MD1L	ME1L	0.496	76.836	1.313	0.134
67	MA1R	MB1R	0.496	72.913	1.313	0.134
68	MD1R	ME1R	0.496	76.836	1.313	0.134
69	SA2L	MA1L	0.667	79.503	1.188	0.219

NC	INCIDENCIES		AREA SQR. IN.	LENTH IN.	DIAMETER IN.	THICKNESS IN.
70	UA00	MA1L	0.667	86.588	1.188	0.219
71	UA00	MA1R	0.667	86.588	1.188	0.219
72	SA2R	MA1R	0.667	79.503	1.188	0.219
73	SE2L	ME1L	1.070	136.817	2.000	0.188
74	SE00	ME1L	1.070	132.097	2.000	0.188
75	SE00	ME1R	1.070	132.097	2.000	0.188
76	SE2R	ME1R	1.070	136.817	2.000	0.188
77	SA2L	MB2L	0.496	78.205	1.313	0.134
78	UC2L	MB2L	0.667	81.833	1.188	0.219
79	UC2L	MD2L	0.496	82.374	1.313	0.134
80	SE2L	MD2L	0.667	77.374	1.188	0.219
81	SA2R	MB2R	0.667	78.205	1.188	0.219
82	UC2R	MB2R	0.667	81.833	1.188	0.219
83	UC2R	MD2R	0.667	82.637	1.188	0.219
84	SE2R	MD2R	0.667	76.873	1.188	0.219
85	UA1L	MA1L	0.237	44.542	0.750	0.120
86	UA1R	MA1R	0.237	44.542	0.750	0.120
87	UB2L	MB2L	0.258	36.499	0.625	0.188
88	UB1L	MB1L	0.495	59.993	0.938	0.219
89	UB1R	MB1R	0.495	59.993	0.938	0.219
90	UB2R	MB2R	0.495	36.499	0.938	0.219
91	UD2L	MD2L	0.258	36.551	0.625	0.188
92	UD1L	MD1L	0.667	82.970	1.188	0.219
93	UD1R	MD1R	0.667	82.970	1.188	0.219
94	UD2R	MD2R	0.258	36.551	0.625	0.188
95	UE1L	ME1L	0.305	54.394	1.000	0.109
96	UE1R	ME1R	0.305	54.394	1.000	0.109
98	UA00	MA00	0.738	78.699	1.438	0.188
99	UC2L	MC2L	0.667	75.366	1.188	0.219
100	UC2R	MC2R	0.667	75.366	1.188	0.219
101	UB1L	SA2L	1.011	121.363	1.688	0.219
102	UB1R	SA2R	1.011	121.363	1.688	0.219
103	UD1L	SE2L	1.070	149.325	2.000	0.188
104	UD1R	SE2R	1.070	149.325	2.000	0.188
105	UB00	MA00	0.602	101.869	1.563	0.134
106	UC1L	MC2L	0.626	119.902	1.938	0.109
107	UC1R	MC2R	0.626	119.841	1.938	0.109
108	UD00	SE00	0.667	82.487	1.188	0.219
109	UA2L	UB1L	0.602	110.297	1.563	0.134
110	UB1L	UC00	0.626	121.259	1.938	0.109
111	UC00	UD1R	0.626	132.770	1.938	0.109
112	UD1R	UE2R	0.812	144.657	1.813	0.156
113	UA2R	UB1R	0.602	110.297	1.563	0.134
114	UB1R	UC00	0.626	121.259	1.938	0.109
115	UC00	UD1L	0.626	132.770	1.938	0.109
116	UD1L	UE2L	0.812	144.657	1.813	0.156
117	UA00	UB1R	0.602	107.958	1.563	0.134
118	UB1R	UC2R	0.602	117.965	1.563	0.134
119	UC2L	UD1L	0.626	129.529	1.938	0.109
120	UD1L	UE00	0.812	142.331	1.813	0.156
121	UA00	UB1L	0.602	107.958	1.563	0.134
122	UB1L	UC2L	0.602	117.965	1.563	0.134
123	UC2R	UD1R	0.626	129.529	1.938	0.109
124	UD1R	UE00	0.812	142.331	1.813	0.156
125	SA2L	MC00	2.452	311.406	6.625	0.120
126	MC00	SE2R	3.109	355.577	6.500	0.156
127	SA2R	MC00	2.452	311.406	6.625	0.120

NO	INCIDENCIES		AREA SQR. IN.	LENTH IN.	DIAMETER IN.	THICKNESS IN.
128	MC00	SE2L	3.109	355.577	6.500	0.156
129	UC00	MC00	1.700	240.285	3.625	0.156
130	SA2L	MA00	1.070	157.917	2.000	0.188
131	MA00	SA2R	1.070	157.917	2.000	0.188
132	MC00	ME1L	2.206	267.526	5.375	0.134
133	MC00	ME1R	2.206	267.526	5.375	0.134
134	SA2L	MC2L	1.070	154.553	2.000	0.188
135	MC2L	SE2L	1.070	158.069	2.000	0.188
136	SA2R	MC2R	1.700	154.795	3.625	0.156
137	MC2R	SE2R	1.700	157.841	3.625	0.156
138	MC2L	MC00	2.206	266.167	5.375	0.134
139	MC00	MC2R	2.206	266.132	5.375	0.134
140	MA00	MC00	1.700	220.687	3.625	0.156
141	MC00	SE00	2.206	257.358	5.375	0.134
142	SA2L	MB1L	0.812	117.507	1.813	0.156
143	UC00	MB1L	0.812	133.177	1.813	0.156
144	UC00	MD1R	0.759	155.125	1.938	0.134
145	SE2R	MD1R	1.070	159.383	2.000	0.188
146	SE2L	MD1L	1.070	159.383	2.000	0.188
147	UC00	MD1L	0.759	155.125	1.938	0.134
148	UC00	MB1R	0.812	133.177	1.813	0.156
149	SA2R	MB1R	0.812	117.507	1.813	0.156
150	UB00	MC00	2.206	253.160	5.375	0.134
151	UC1L	MC00	2.206	263.719	5.375	0.134
152	UC1R	MC00	2.206	263.719	5.375	0.134
153	UD00	MC00	2.206	252.129	5.375	0.134
154	UE00	HE1L	0.496	68.350	1.313	0.134
155	UE00	HE1R	0.496	68.350	1.313	0.134
156	ME1L	HE1L	0.496	72.120	1.313	0.134
157	ME1R	HE1R	0.496	72.120	1.313	0.134
158	UE1L	HE1L	0.982	69.638	1.500	0.250
159	UE1R	HE1R	0.982	69.638	1.500	0.250
160	SE00	HE1L	0.982	67.270	1.500	0.250
161	SE00	HE1R	0.982	67.270	1.500	0.250
162	UD1L	SE00	0.759	149.760	1.938	0.134
163	UD1R	SE00	0.759	149.760	1.938	0.134
164	MD1L	SE00	0.759	152.882	1.938	0.134
165	MD1R	SE00	0.759	152.882	1.938	0.134
181	UA2L	HALL	0.982	44.559	1.500	0.250
182	UA2R	HARR	0.982	44.559	1.500	0.250
183	MA1L	HALL	0.982	45.555	1.500	0.250
184	MA1R	HARR	0.982	45.555	1.500	0.250
185	UE2L	HELL	2.060	69.968	2.250	0.344
186	UE2R	HERR	2.060	69.968	2.250	0.344
187	ME1L	HELL	2.060	75.662	2.250	0.344
188	ME1R	HERR	2.060	75.662	2.250	0.344
189	UA2L	HLAB	0.982	42.953	1.500	0.250
190	UA2R	HRAB	0.982	42.953	1.500	0.250
191	MB2L	HLAB	0.982	41.756	1.500	0.250
192	MB2R	HRAB	0.982	41.756	1.500	0.250
193	UE2L	HLDE	0.982	41.887	1.500	0.250
194	UE2R	HRDE	0.982	41.887	1.500	0.250
195	MD2L	HLDE	0.982	43.205	1.500	0.250
196	MD2R	HRDE	0.982	42.812	1.500	0.250
197	SA2L	HALL	0.982	46.389	1.500	0.250
198	SA2R	HARR	0.982	46.389	1.500	0.250
199	UA1L	HALL	0.982	43.613	1.500	0.250

NC	INCIDENCIES		AREA SQR. IN.	LENTH IN.	DIAMETER IN.	THICKNESS IN.
200	UA1R	HARR	C.982	43.613	1.500	0.250
201	SE2L	HELL	2.060	68.050	2.250	0.344
202	SE2R	HERR	2.060	68.C50	2.250	0.344
203	UE1L	HELL	2.060	68.333	2.250	0.344
204	UE1R	HERR	2.060	68.333	2.250	0.344
205	SA2L	HLAB	C.982	46.948	1.500	0.250
206	SA2R	HRAB	C.982	46.948	1.500	0.250
207	UB2L	HLAB	C.982	42.659	1.500	0.250
208	UB2R	HRAB	0.982	42.659	1.500	0.250
209	SE2L	HLDE	C.982	42.007	1.500	0.250
210	SE2R	HRDE	C.982	42.CC7	1.500	0.250
211	UD2L	HLDE	0.982	41.336	1.500	0.250
212	UD2R	HRDE	0.982	40.925	1.500	0.250
311	HALL	MB2L	C.541	84.397	1.688	0.1C9
312	HARR	MB2R	C.541	84.397	1.688	0.1C9
313	HELL	MD2L	0.541	89.886	1.688	0.1C9
314	HERR	MC2R	C.541	90.873	1.688	0.1C9
315	HLAB	MA1L	0.541	88.233	1.688	0.1C9
316	HRAB	MA1R	C.541	88.233	1.688	0.1C9
317	HLDE	ME1L	C.541	136.493	1.688	0.1C9
318	HRDE	ME1R	0.541	136.493	1.688	0.1C9
319	HE1L	MD1L	C.541	110.984	1.688	0.1C9
320	HE1R	MD1R	0.541	110.984	1.688	0.1C9

PANEL D

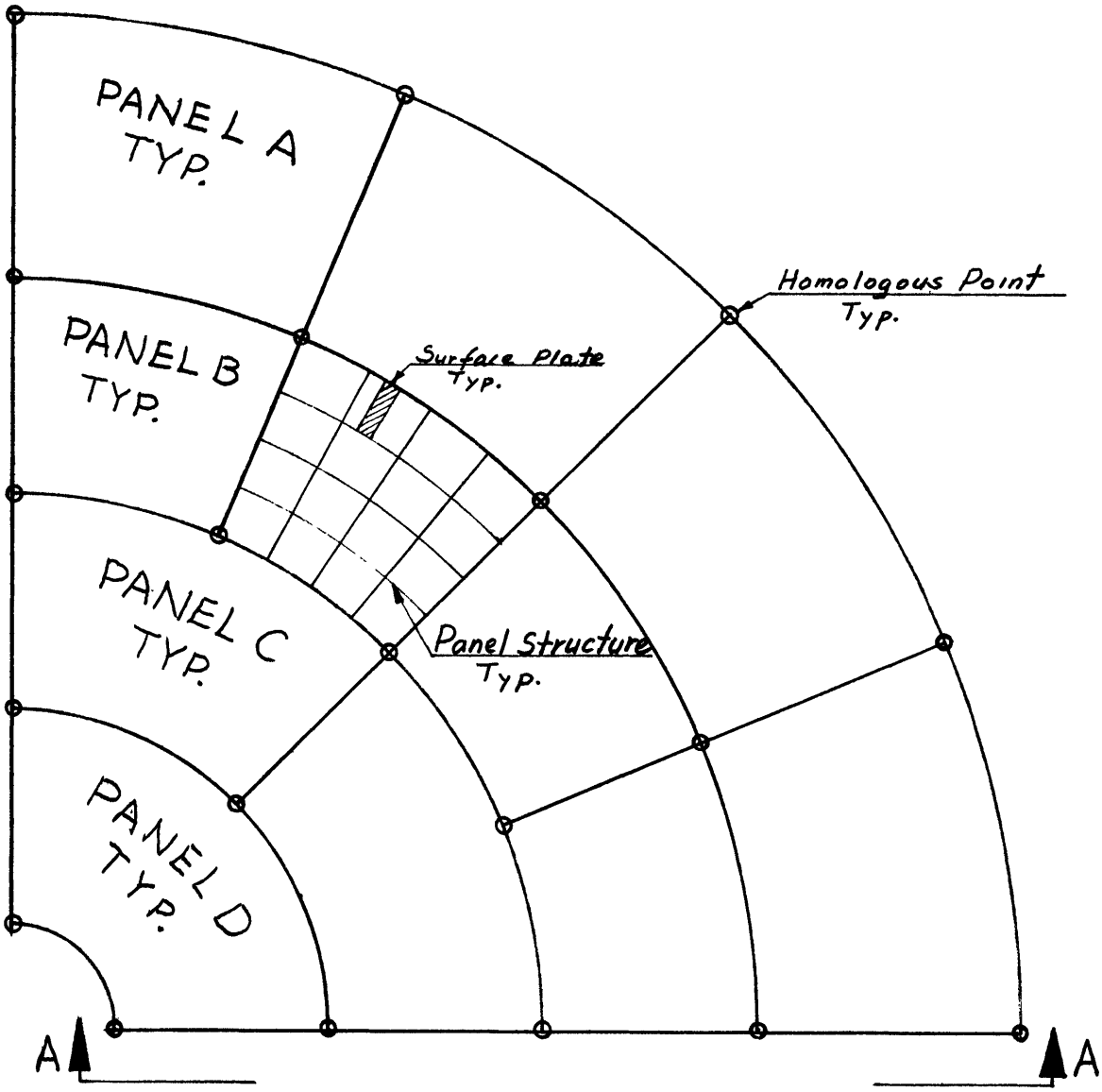
NO	INCIDENCIES		AREA SQR. IN.	LENTH IN.	DIAMETER IN.	THICKNESS IN.
1	UA2L	UA1L	2.019	50.722	4 BY 2	0.188
2	UA1L	UA0C	2.019	50.723	4 BY 2	0.188
3	UA0C	UA1R	2.019	50.723	4 BY 2	0.188
4	UA1R	UA2R	2.019	50.722	4 BY 2	0.188
5	UB2L	UB1L	2.019	71.193	4 BY 2	0.188
6	UB1L	UB00	2.019	75.269	4 BY 2	0.188
7	UB00	UB1R	2.019	75.269	4 BY 2	0.188
8	UB1R	UB2R	2.019	71.193	4 BY 2	0.188
9	UC2L	UC1L	2.019	95.551	4 BY 2	0.188
10	UC1L	UC00	2.019	99.755	4 BY 2	0.188
11	UC0C	UC1R	2.019	99.755	4 BY 2	0.188
12	UC1R	UC2R	2.019	95.551	4 BY 2	0.188
13	UD2L	UD1L	2.019	120.002	4 BY 2	0.188
14	UD1L	UD00	2.019	124.159	4 BY 2	0.188
15	UD00	UD1R	2.019	124.159	4 BY 2	0.188
16	UD1R	UD2R	2.019	120.002	4 BY 2	0.188
17	UE2L	UE1L	2.019	147.735	4 BY 2	0.188
18	UE1L	UE00	2.019	146.893	4 BY 2	0.188
19	UE00	UE1R	2.019	146.893	4 BY 2	0.188
20	UE1R	UE2R	2.019	147.735	4 BY 2	0.188
21	UA2L	UB2L	0.495	62.418	0.938	0.219
22	UB2L	UC2L	0.495	62.940	0.938	0.219
23	UC2L	UD2L	0.495	63.153	0.938	0.219
24	UD2L	UE2L	0.495	64.046	0.938	0.219
25	UA1L	UB1L	0.305	63.085	1.000	0.109
26	UB1L	UC1L	0.495	63.083	0.938	0.219
27	UC1L	UD1L	0.495	63.084	0.938	0.219
28	UD1L	UE1L	0.305	58.981	1.000	0.109
29	UA00	UB00	0.305	63.085	1.000	0.109
30	UB00	UC00	0.737	63.083	1.188	0.250
31	UC00	UD00	0.737	63.084	1.188	0.250
32	UD00	UE00	0.495	59.085	0.938	0.219
33	UA1R	UB1R	0.305	63.085	1.000	0.109
34	UB1R	UC1R	0.495	63.083	0.938	0.219
35	UC1R	UD1R	0.495	63.084	0.938	0.219
36	UD1R	UE1R	0.305	58.981	1.000	0.109
37	UA2R	UB2R	0.495	62.418	0.938	0.219
38	UB2R	UC2R	0.495	62.940	0.938	0.219
39	UC2R	UD2R	0.495	63.153	0.938	0.219
40	UD2R	UE2R	0.495	64.046	0.938	0.219
41	SE2L	ME1L	1.070	159.424	2.000	0.188
42	SE2R	ME1R	1.070	159.424	2.000	0.188
43	ME1L	SE00	1.070	149.972	2.000	0.188
44	ME1R	SE00	1.070	149.972	2.000	0.188
45	SE2L	MC2L	1.070	132.929	2.000	0.188
46	SE2R	MC2R	1.070	132.929	2.000	0.188
47	SE2L	MC00	2.452	282.614	6.625	0.120
48	SE2R	MC0C	2.452	282.614	6.625	0.120
49	ME1L	MC00	1.700	175.347	3.625	0.156
50	ME1R	MC00	1.700	175.347	3.625	0.156
51	SE00	MC00	2.251	138.334	4.000	0.188
52	MC2L	MC00	1.700	192.778	3.625	0.156
53	MC2R	MC00	1.700	192.778	3.625	0.156
54	MC2L	SA2L	1.700	130.540	3.625	0.156
55	MC2R	SA2R	1.700	130.540	3.625	0.156
56	MC00	SA2L	1.700	198.875	3.625	0.156
57	MC00	SA2R	1.700	198.875	3.625	0.156

NO	INCIDENCIES		AREA SQR. IN.	LENTH IN.	DIAMETER IN.	THICKNESS IN.
58	MC00	MA00	2.251	136.047	4.000	0.188
59	SA2L	MA00	2.251	102.036	4.000	0.188
60	SA2R	MA00	2.251	102.036	4.000	0.188
61	UA2L	UB1L	0.496	88.305	1.313	0.134
62	UA00	UB1L	0.496	88.304	1.313	0.134
63	UA00	UB1R	0.496	88.304	1.313	0.134
64	UA2R	UB1R	0.496	88.305	1.313	0.134
65	UC2L	UB1L	0.602	103.711	1.563	0.134
66	UC00	UB1L	0.602	107.181	1.563	0.134
67	UC00	UB1R	0.602	107.181	1.563	0.134
68	UC2R	UB1R	0.602	103.711	1.563	0.134
69	UC2L	UD1L	0.654	124.314	1.688	0.134
70	UC00	UD1L	0.654	127.926	1.688	0.134
71	UC00	UD1R	0.654	127.926	1.688	0.134
72	UC2R	UD1R	0.654	124.314	1.688	0.134
73	UE2L	UD1L	0.759	149.708	1.938	0.134
74	UE00	UD1L	0.759	147.421	1.938	0.134
75	UE00	UD1R	0.759	147.421	1.938	0.134
76	UE2R	UD1R	0.759	149.708	1.938	0.134
85	UA2L	MA1L	0.305	66.662	1.000	0.109
87	UA2R	MA1R	0.305	66.662	1.000	0.109
89	UE1L	ME1L	1.070	78.535	2.000	0.188
90	UE1R	ME1R	1.070	78.535	2.000	0.188
91	UD2L	MD2L	0.237	42.349	0.750	0.120
92	UD1L	MD1L	0.237	34.089	0.750	0.120
93	UD1R	MD1R	0.237	34.089	0.750	0.120
94	UD2R	MD2R	0.237	42.349	0.750	0.120
95	MD2L	MD1L	0.654	119.511	1.688	0.134
96	MD1R	MD2R	0.654	119.511	1.688	0.134
97	MD1L	UD00	0.654	127.702	1.688	0.134
98	MD1R	UD00	0.654	127.702	1.688	0.134
99	UC2L	MC2L	0.496	71.566	1.313	0.134
100	UC2R	MC2R	0.496	71.566	1.313	0.134
101	MC2L	UC1L	0.602	113.827	1.563	0.134
102	MC2R	UC1R	0.602	113.827	1.563	0.134
103	UC1L	MC00	1.070	139.210	2.000	0.188
104	UC1R	MC00	1.070	139.210	2.000	0.188
105	UC00	MC00	1.700	94.861	3.625	0.156
106	UB2L	MB2L	0.258	27.331	0.625	0.188
107	UB2R	MB2R	0.258	27.331	0.625	0.188
108	UB1L	MB1L	0.237	35.505	0.750	0.120
109	UB1R	MB1R	0.237	35.505	0.750	0.120
110	MB2L	MB1L	0.496	72.436	1.313	0.134
111	MB1R	MB2R	0.496	72.436	1.313	0.134
112	MB1L	UB00	0.496	82.194	1.313	0.134
113	MB1R	UB00	0.496	82.194	1.313	0.134
114	UA1L	MA1L	0.237	38.900	0.750	0.120
115	UA1R	MA1R	0.237	38.900	0.750	0.120
116	UA00	MA1L	0.496	62.931	1.313	0.134
117	UA00	MA1R	0.496	62.931	1.313	0.134
118	UA00	MA00	0.495	56.294	0.938	0.219
122	UA2L	ME2L	0.496	69.202	1.313	0.134
124	UA2R	ME2R	0.496	69.202	1.313	0.134
128	UC2L	MC2L	0.667	75.537	1.188	0.219
130	UC2R	MC2R	0.667	75.537	1.188	0.219
131	MA1L	MB1L	0.667	62.913	1.188	0.219
132	MA1R	MB1R	0.667	62.913	1.188	0.219

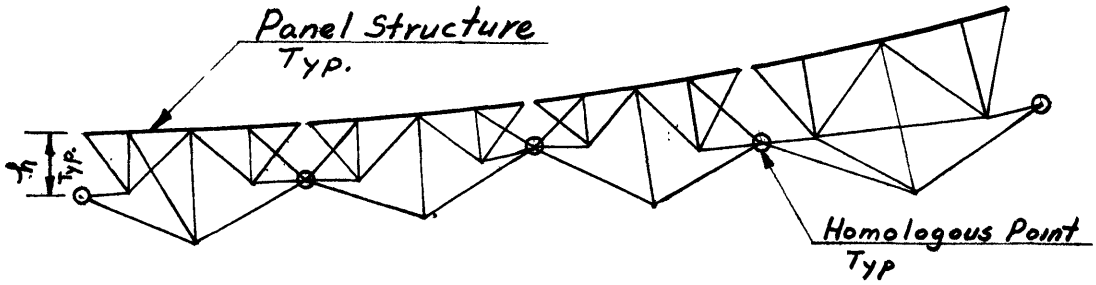
NC	INCIDENCIES		AREA SQR. IN.	LENTH IN.	DIAMETER IN.	THICKNESS IN.
133	MD1L	ME1L	0.496	73.583	1.313	0.134
134	MD1R	ME1R	0.496	73.583	1.313	0.134
135	MB1L	UC1L	0.667	70.852	1.188	0.219
136	MB1R	UC1R	0.667	70.852	1.188	0.219
137	MD1L	UC1L	0.667	72.329	1.188	0.219
138	MD1R	UC1R	0.667	72.329	1.188	0.219
139	UB00	MA00	0.664	85.151	1.313	0.188
140	UB00	MC00	1.700	114.666	3.625	0.156
145	MD1L	SE2L	1.070	155.129	2.000	0.188
146	MD1R	SE2R	1.070	155.129	2.000	0.188
147	MD1L	MC00	1.070	143.675	2.000	0.188
148	MD1R	MC00	1.070	143.675	2.000	0.188
149	MB1R	MC00	0.812	122.749	1.813	0.156
150	MB1L	MC00	0.812	122.749	1.813	0.156
153	SA2R	MB1R	0.496	94.857	1.313	0.134
154	SA2L	MB1L	0.496	94.857	1.313	0.134
155	SA2L	MB2L	0.496	69.751	1.313	0.134
156	SA2R	MB2R	0.496	69.751	1.313	0.134
157	SE2L	MD2L	0.667	67.274	1.188	0.219
158	SE2R	MD2R	0.667	67.274	1.188	0.219
159	SA2L	MA1L	1.700	56.798	3.625	0.156
160	SA2R	MA1R	1.700	56.798	3.625	0.156
161	MA1L	MA1R	1.700	99.496	3.625	0.156
166	UC00	MC1L	0.812	131.910	1.813	0.156
167	UC00	MB1R	0.602	110.918	1.563	0.134
168	UC00	MB1L	0.602	110.918	1.563	0.134
169	UC00	MC1R	0.812	131.910	1.813	0.156
170	UD1L	SE00	1.070	158.746	2.000	0.188
171	UD1R	SE00	1.070	158.746	2.000	0.188
172	MD1L	SE00	1.070	150.990	2.000	0.188
173	MD1R	SE00	1.070	150.990	2.000	0.188
174	UD00	MD00	0.667	37.635	1.188	0.219
175	UE00	MD00	0.667	69.877	1.188	0.219
176	SE00	MD00	1.700	64.395	3.625	0.156
177	MC00	MD00	1.070	87.115	2.000	0.188
179	MA1L	MA00	0.667	53.290	1.188	0.219
180	MA1R	MA00	0.667	53.290	1.188	0.219
185	MD00	UD1L	0.654	130.879	1.688	0.134
186	MD00	UD1R	0.654	130.879	1.688	0.134
187	UE00	MD1L	0.759	150.343	1.938	0.134
188	UE00	MD1R	0.759	150.343	1.938	0.134
191	UE2L	HELL	0.667	64.712	1.188	0.219
192	UE2R	HERR	0.667	64.712	1.188	0.219
193	ME1L	HELL	0.602	108.829	1.563	0.134
194	ME1R	HERR	0.602	108.829	1.563	0.134
195	UE2L	HLDE	0.495	40.702	0.938	0.219
196	UE2R	HRDE	0.495	40.702	0.938	0.219
197	MD2L	HLDE	0.495	37.961	0.938	0.219
198	MD2R	HRDE	0.495	37.961	0.938	0.219
199	SE2L	HELL	1.070	62.533	2.000	0.188
200	SE2R	HERR	1.070	62.533	2.000	0.188
201	UE1L	HELL	1.070	94.348	2.000	0.188
202	UE1R	HERR	1.070	94.348	2.000	0.188
203	SE2L	HLDE	0.495	42.772	0.938	0.219
204	SE2R	HRDE	0.495	42.772	0.938	0.219
205	UD2L	HLDE	0.495	38.155	0.938	0.219
206	UD2R	HRDE	0.495	38.155	0.938	0.219

NC	INCIDENCIES		AREA SQR. IN.	LENTH IN.	DIAMETER IN.	THICKNESS IN.
211	UE1L	HE1L	1.070	96.368	2.000	0.188
212	UE1R	HE1R	1.070	96.368	2.000	0.188
213	SE0C	HE1L	1.070	60.523	2.000	0.188
214	SE0C	HE1R	1.070	60.523	2.000	0.188
215	UE0C	HE1L	1.070	63.278	2.000	0.188
216	UE0C	HE1R	1.070	63.278	2.000	0.188
217	ME1L	HE1L	1.070	101.242	2.000	0.188
218	ME1R	HE1R	1.070	101.242	2.000	0.188
219	SE2L	L2DE	1.070	95.455	2.000	0.188
220	SE2R	R2DE	1.070	95.455	2.000	0.188
221	UD1L	L2DE	1.070	63.296	2.000	0.188
222	UD1R	R2DE	1.070	63.296	2.000	0.188
223	UC0C	MD00	1.070	74.522	2.000	0.188
231	UC2L	HLBC	0.667	51.564	1.188	0.219
232	UC2R	HRBC	0.667	51.564	1.188	0.219
233	MB2L	HLBC	0.667	17.700	1.188	0.219
234	MB2R	HRBC	0.667	17.700	1.188	0.219
235	UA2L	L2AB	0.667	58.818	1.188	0.219
236	UA2R	R2AB	0.667	58.818	1.188	0.219
237	MB1L	L2AB	0.667	39.858	1.188	0.219
238	MB1R	R2AB	0.667	39.858	1.188	0.219
239	SA2L	L2AB	0.667	65.174	1.188	0.219
240	SA2R	R2AB	0.667	65.174	1.188	0.219
241	UB1L	L2AB	0.667	38.731	1.188	0.219
242	UB1R	R2AB	0.667	38.731	1.188	0.219
243	UE2L	L2DE	0.664	91.731	1.313	0.188
244	UE2R	R2DE	0.664	91.731	1.313	0.188
245	MD1L	L2DE	0.667	64.869	1.188	0.219
246	MD1R	R2DE	0.667	64.869	1.188	0.219
247	UB2L	HLBC	0.495	24.960	0.938	0.219
248	UB2R	HRBC	0.495	24.960	0.938	0.219
249	MC2L	HLBC	0.496	71.689	1.313	0.134
250	MC2R	HRBC	0.496	71.689	1.313	0.134
251	HLBC	MB1L	0.541	82.994	1.688	0.109
252	HRBC	MB1R	0.541	82.994	1.688	0.109
253	HLDE	UC1L	0.541	150.467	1.688	0.109
254	HRDE	UC1R	0.541	150.467	1.688	0.109
255	HELL	MD1L	0.541	102.445	1.688	0.109
256	HERR	MD1R	0.541	102.445	1.688	0.109
257	HE1L	MD1L	0.541	100.385	1.688	0.109
258	HE1R	MD1R	0.541	100.385	1.688	0.109
259	MD00	MD1L	0.541	124.322	1.688	0.109
260	MD0C	MD1R	0.541	124.322	1.688	0.109
261	L2AB	UB00	0.541	95.971	1.688	0.109
262	R2AB	UB00	0.541	95.971	1.688	0.109
263	L2DE	UC1L	0.541	98.981	1.688	0.109
264	R2DE	UC1R	0.541	98.981	1.688	0.109

FIG. 1 ONE QUARTER OF TELESCOPE SURFACE WITH PANELS

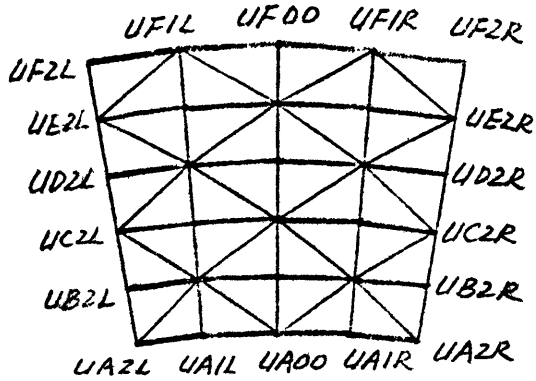


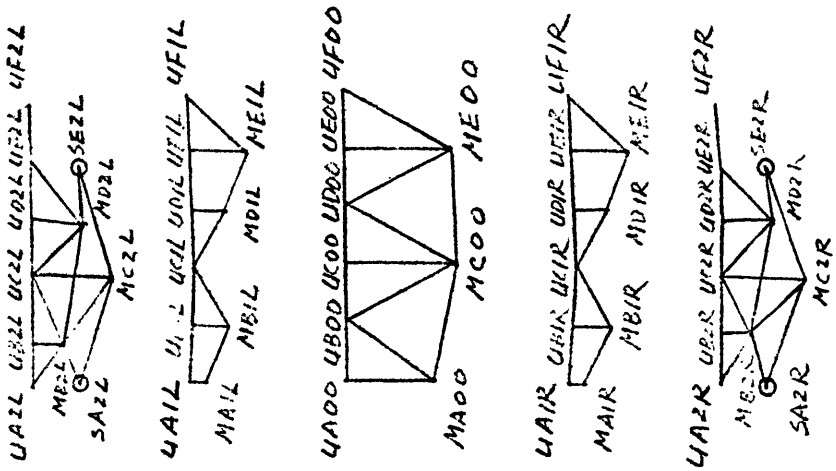
PLAN
Scale: None

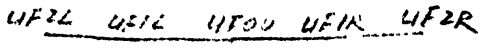


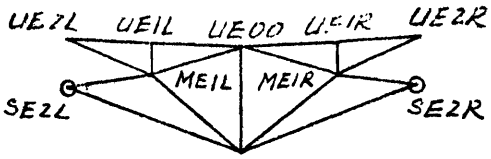
SECTION A-A

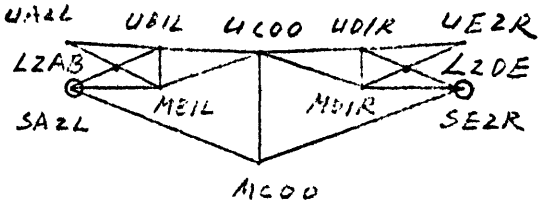
FIG. 2 PANEL A

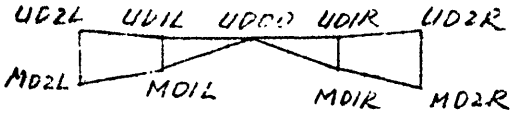


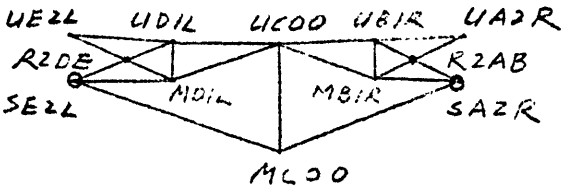


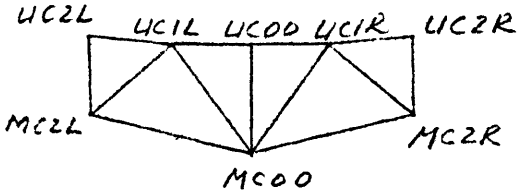


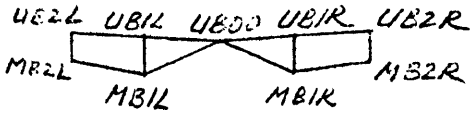


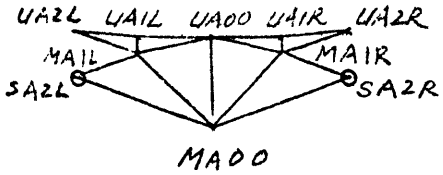


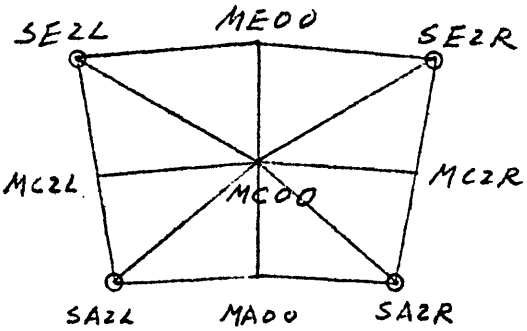






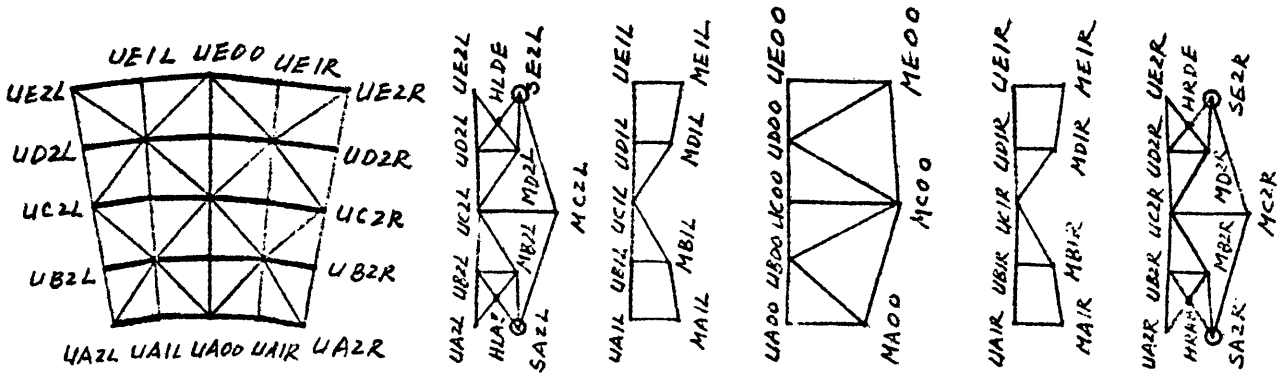






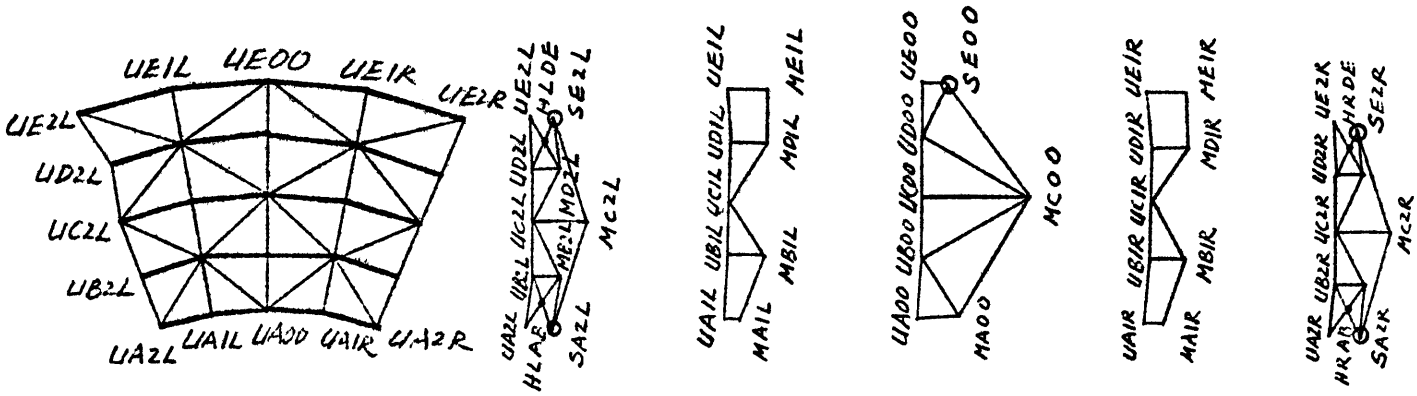
U = Upper points
S = Supporting Points
M = Medium Points
H = Halfway Points
L, R = Others

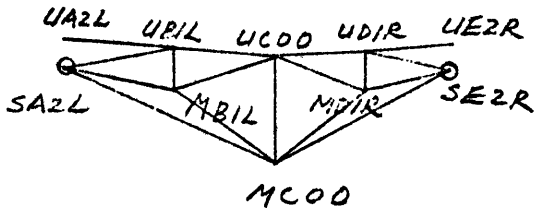
FIG. 3 PANEL B

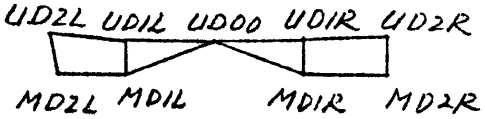


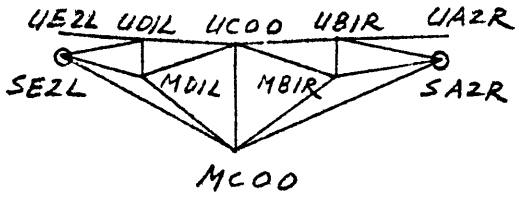
U = Upper points
S = Supporting points
M = Medium points
H = Halfway points

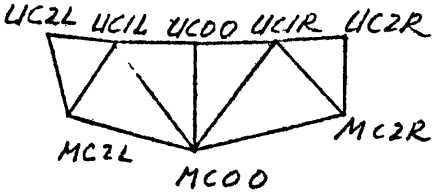
FIG. 4 PANEL C

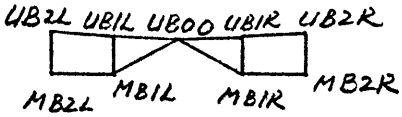


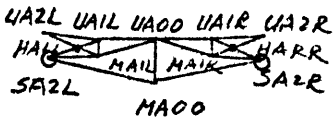


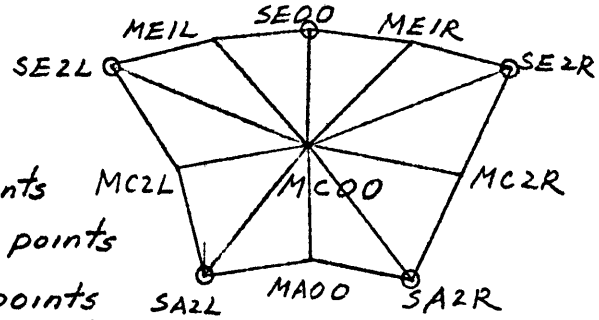






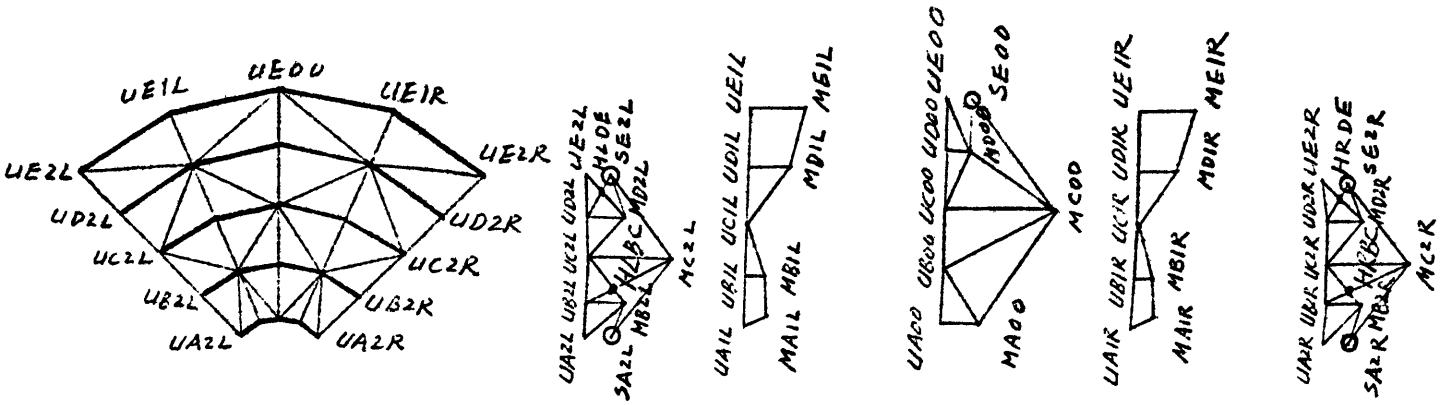


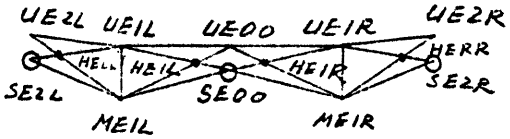


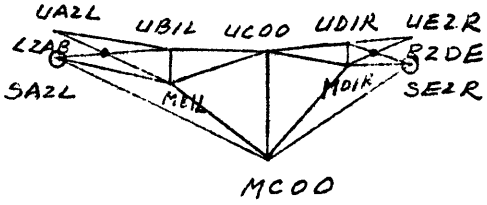


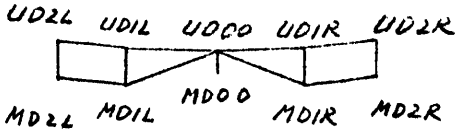
U = Upper points
S = Supporting points
M = Medium points
H = Halfway points

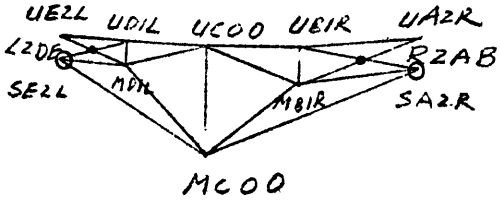
FIG. 5 PANEL D

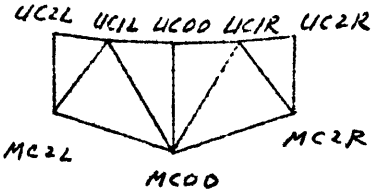


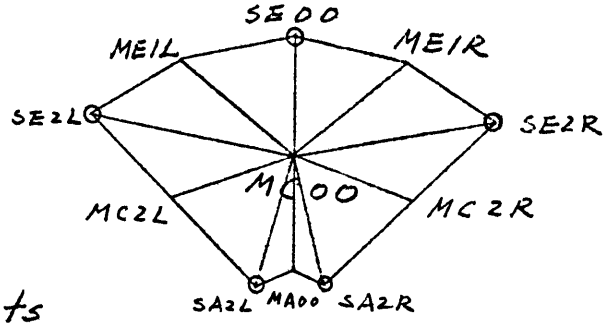


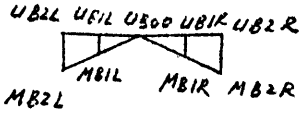






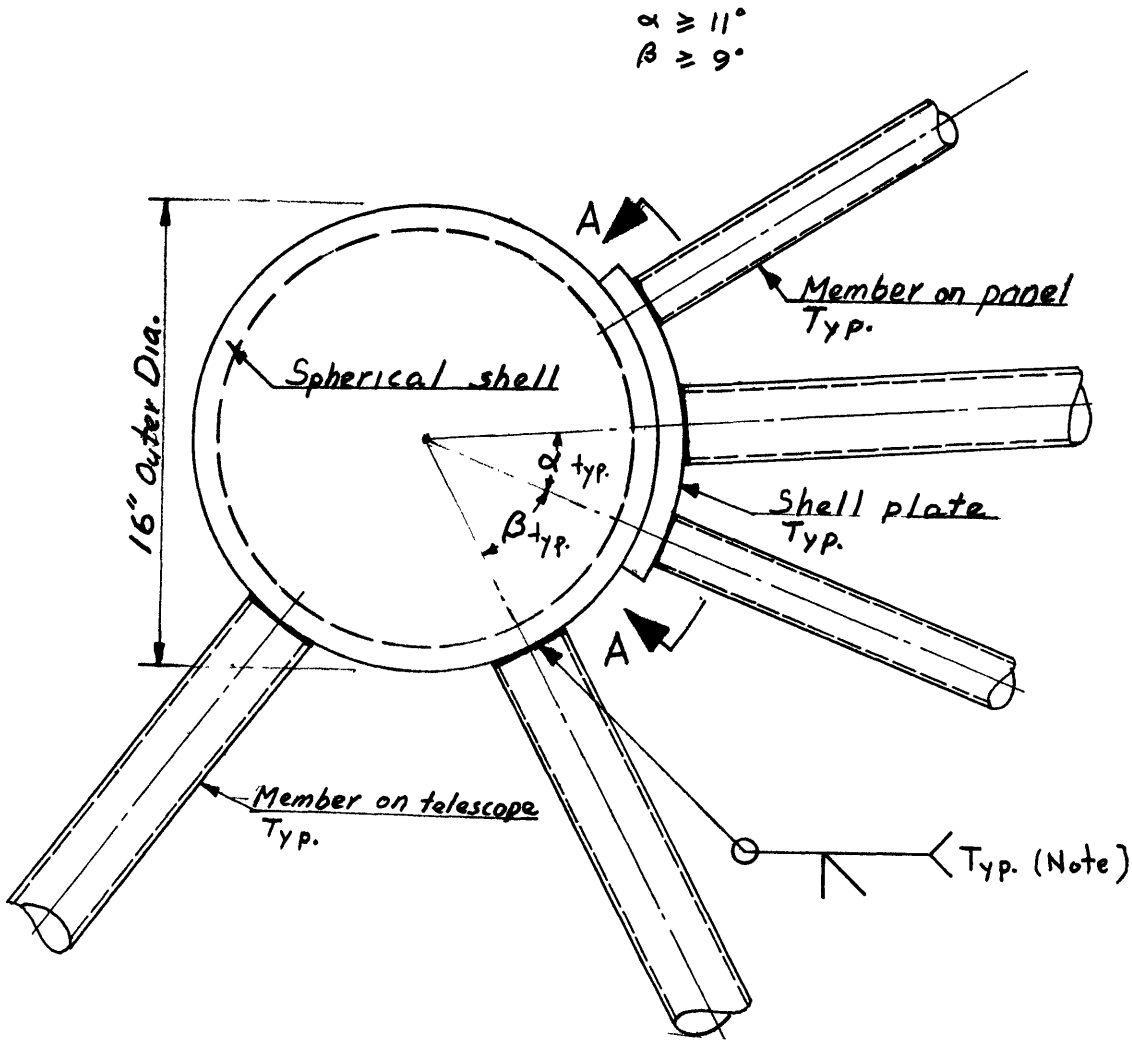




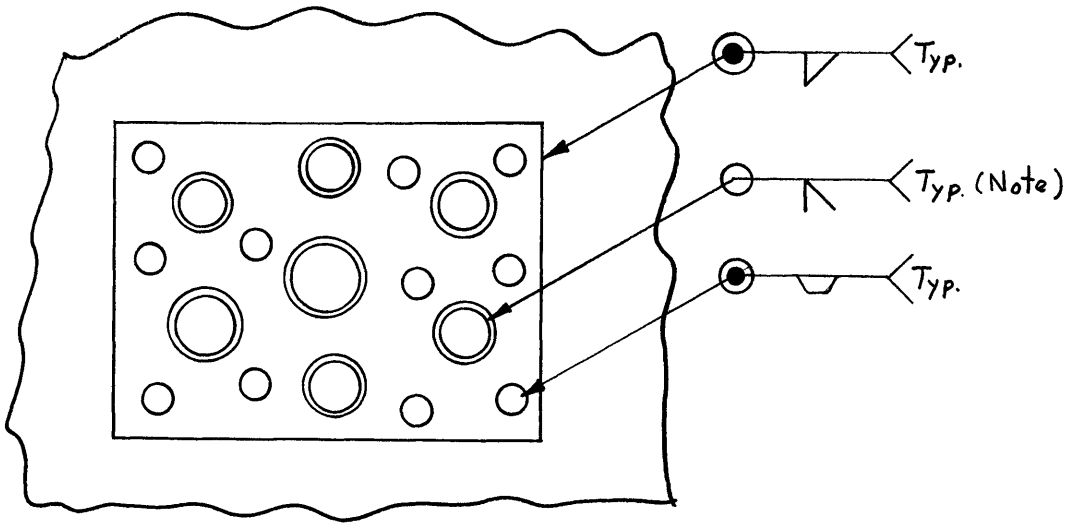


U = Upper points
S = Supporting points
M = Medium points
H = Halfway points
L, R = Others

FIG. 6 PANEL SUPPORT JOINT



Note: Fillet weld may be needed also as required.



SECTION A-A