

TUBE NO.	TYPE	LENGTH	[END-A]	[END-B]
1	H*, I**	15123	2007500	1992377
2	G	14334	1992377	1978043
3	S	19806	1978043	1958237
4	A	19818	1958237	1938419
5	B	19806	1938419	1918613
6	A	19818	1918613	1898795
7	B	19806	1898795	1878989
8	A	19818	1878989	1859171
9	B	19806	1859171	1839365
10	A	19818	1839365	1819547
11	B	19806	1819547	1799741
12	A	19818	1799741	1779923
13	B	19806	1779923	1760117
14	A	19818	1760117	1740299
15	B	19806	1740299	1720493
16	A	19818	1720493	1700675
17	D	19806	1700675	1680869
18	A	19818	1680869	1661051
19	B	19806	1661051	1641245
20	A	19818	1641245	1621427
21	B	19806	1621427	1601621
22	A	19818	1601621	1581803
23	B	19806	1581803	1561997
24	A	19818	1561997	1542179
25	B	19806	1542179	1522373
26	A	19818	1522373	1502555
27	B	19806	1502555	1482749
28	A	19818	1482749	1462931
29	D	19806	1462931	1443125
30	A	19818	1443125	1423307
31	B	19806	1423307	1403501
32	A	19818	1403501	1383683
33	B	19806	1383683	1363877
34	A	19818	1363877	1344059
35	B	19806	1344059	1324253
36	A	19818	1324253	1304435
37	B	19806	1304435	1284629
38	A	19818	1284629	1264811
39	B	19806	1264811	1245005
40	A	19818	1245005	1225187
41	D	19806	1225187	1205381
42	A	19818	1205381	1185563
43	B	19806	1185563	1165757
44	A	19818	1165757	1145939
45	B	19806	1145939	1126133
46	A	19818	1126133	1106315
47	B	19806	1106315	1086509
48	A	19818	1086509	1066691
49	B	19806	1066691	1046885
50	A	19818	1046885	1027067
51	B	19806	1027067	1007261
52	A	19818	1007261	987443
53	D	19806	987443	967637
54	A	19818	967637	947819
55	B	19806	947819	928013
56	A	19818	928013	908195
57	B	19806	908195	888389
58	A	19818	888389	868571
59	B	19806	868571	848765
60	A	19818	848765	828947
61	B	19806	828947	809141
62	A	19818	809141	789323
63	B	19806	789323	769517
64	A	19818	769517	749699
65	D	19806	749699	729893
66	A	19818	729893	710075
67	B	19806	710075	690269
68	A	19818	690269	670451
69	B	19806	670451	650645
70	A	19818	650645	630827

TUBE NO.	TYPE	LENGTH	[END-A]	[END-B]
71	B	19806	630827	611021
72	A	19818	611021	591203
73	B	19806	591203	571397
74	A	19818	571397	551579
75	B	19806	551579	531773
76	A	19818	531773	511955
77	D	19806	511955	492149
78	A	19818	492149	472331
79	B	19806	472331	452525
80	A	19818	452525	432707
81	B	19806	432707	412901
82	A	19818	412901	393083
83	B	19806	393083	373277
84	A	19818	373277	353459
85	B	19806	353459	333653
86	A	19818	333653	313835
87	B	19806	313835	294029
88	A	19818	294029	274211
89	D	19806	274211	254405
90	A	19818	254405	234587
91	B	19806	234587	214781
92	A	19818	214781	194963
93	B	19806	194963	175157
94	A	19818	175157	155339
95	B	19806	155339	135533
96	A	19818	135533	115715
97	B	19806	115715	95909
98	A	19818	95909	76091
99	F	14324	76091	61767
100	E*, J**	15767	61767	46000

NOTES (FOR DWG. #2 SHT. 1-4):

* TYPE FOR MODULE HX1
 ** TYPE FOR MODULE HY1

- DIMENSIONS GIVEN IN THE TABLE LOCATE THE ENDS OF EACH BEAM TUBE SUB-ASSEMBLY.
- END LOCATIONS ARE MEASURED FROM THE VERTEX OF THE BEAM TUBES.
- THE TUBE NUMBER GIVEN IN THE TABLE REFERS TO THE INSTALLATION SEQUENCE FOR THE MODULE.
- THE 'END-A' DIMENSIONS IN THE TABLE LOCATE THE FREE END OF THE EXPANSION JOINT FOR SUB-ASSEMBLIES THAT INCLUDE AN EXPANSION JOINT WELDED TO 'END-A' OF THE COMPONENT BEAM TUBE SECTION.
- ALL DIMENSIONS ARE GIVEN IN MILLIMETERS.
- THE TOLERANCE OF THE GIVEN LENGTH DIMENSIONS IS +/- 4 MM. THE TOLERANCE FOR THE SUB-ASSEMBLY END LOCATIONS IS +/- 40 MM EXCEPT AT THE ENDS OF THE MODULES WHERE THE TOLERANCE IS +/- 12 MM.

APPROVED

M. Tellalian 12-6-96
 CBI DATE

J. [Signature] 12/13/96
 CALTECH DATE

ENTIRE DRAWING REVISED		REVISIONS		REMARKS	
BY	DATE	BY	DATE		
3	3-11-96	5	12-2-96		
4	3-11-96	6	6-24-96		
MODIFIED TUBE TYPES AND NOTES CHANGED REV. NO. TO BE IN SEQUENCE WITH CONTRACT 930212					
GBI SUPPLIER'S / PURCHASER'S NO					
LIGO BEAM TUBE HANFORD, WA & LIVINGSTON, LA					
SUB-ASSEMBLY END LOCATIONS FOR HANFORD MODULES (HX1) & (HY1)					
CUSTOMER'S NO				CONTRACT NO	
BY ARL CHKD MLT DATE 3-11-96				953571	
M. L. TELLALIAN				DWG 2	
ENGINEERING ASSIGNED				SHT 1	
				REV 5	
LIGO-D950032-05-B					

TUBE NO.	TYPE	LENGTH	[END-A]	[END-B]
1	I*, H**	15123	2027000	2042123
2	G	14334	2042123	2056457
3	S	19806	2056457	2076263
4	A	19818	2076263	2096081
5	B	19806	2096081	2115887
6	A	19818	2115887	2135705
7	B	19806	2135705	2155511
8	A	19818	2155511	2175329
9	B	19806	2175329	2195135
10	A	19818	2195135	2214953
11	B	19806	2214953	2234759
12	A	19818	2234759	2254577
13	B	19806	2254577	2274383
14	A	19818	2274383	2294201
15	B	19806	2294201	2314007
16	A	19818	2314007	2333825
17	C	19806	2333825	2353631
18	A	19818	2353631	2373449
19	B	19806	2373449	2393255
20	A	19818	2393255	2413073
21	B	19806	2413073	2432879
22	A	19818	2432879	2452697
23	B	19806	2452697	2472503
24	A	19818	2472503	2492321
25	B	19806	2492321	2512127
26	A	19818	2512127	2531945
27	B	19806	2531945	2551751
28	A	19818	2551751	2571569
29	C	19806	2571569	2591375
30	A	19818	2591375	2611193
31	B	19806	2611193	2630999
32	A	19818	2630999	2650817
33	B	19806	2650817	2670623
34	A	19818	2670623	2690441
35	B	19806	2690441	2710247
36	A	19818	2710247	2730065
37	B	19806	2730065	2749871
38	A	19818	2749871	2769689
39	B	19806	2769689	2789495
40	A	19818	2789495	2809313
41	C	19806	2809313	2829119
42	A	19818	2829119	2848937
43	B	19806	2848937	2868743
44	A	19818	2868743	2888561
45	B	19806	2888561	2908367
46	A	19818	2908367	2928185
47	B	19806	2928185	2947991
48	A	19818	2947991	2967809
49	B	19806	2967809	2987615
50	A	19818	2987615	3007433
51	B	19806	3007433	3027239
52	A	19818	3027239	3047057
53	C	19806	3047057	3066863
54	A	19818	3066863	3086681
55	B	19806	3086681	3106487
56	A	19818	3106487	3126305
57	B	19806	3126305	3146111
58	A	19818	3146111	3165929
59	B	19806	3165929	3185735
60	A	19818	3185735	3205553
61	B	19806	3205553	3225359
62	A	19818	3225359	3245177
63	B	19806	3245177	3264983
64	A	19818	3264983	3284801
65	C	19806	3284801	3304607
66	A	19818	3304607	3324425
67	B	19806	3324425	3344231
68	A	19818	3344231	3364049
69	B	19806	3364049	3383855
70	A	19818	3383855	3403673

TUBE NO.	TYPE	LENGTH	[END-A]	[END-B]
71	B	19806	3403673	3423479
72	A	19818	3423479	3443297
73	B	19806	3443297	3463103
74	A	19818	3463103	3482921
75	B	19806	3482921	3502727
76	A	19818	3502727	3522545
77	C	19806	3522545	3542351
78	A	19818	3542351	3562169
79	B	19806	3562169	3581975
80	A	19818	3581975	3601793
81	B	19806	3601793	3621599
82	A	19818	3621599	3641417
83	B	19806	3641417	3661223
84	A	19818	3661223	3681041
85	B	19806	3681041	3700847
86	A	19818	3700847	3720665
87	B	19806	3720665	3740471
88	A	19818	3740471	3760289
89	C	19806	3760289	3780095
90	A	19818	3780095	3799913
91	B	19806	3799913	3819719
92	A	19818	3819719	3839537
93	B	19806	3839537	3859343
94	A	19818	3859343	3879161
95	B	19806	3879161	3898967
96	A	19818	3898967	3918785
97	B	19806	3918785	3938591
98	A	19818	3938591	3958409
99	F	14324	3958409	3972733
100	E*, J**	15767	3972733	3988500

* TYPE FOR MODULE HX2
** TYPE FOR MODULE HY2

APPROVED

M. Tellalian 12-6-96
CBI DATE

JQ 12/13/96
CALTECH DATE

ENTIRE DRAWING REVISED		REV. TUBE LENGTHS		MODIFIED TUBE TYPES AND NOTES		REMARKS	
BY	DATE	BY	DATE	BY	DATE	BY	DATE
3	3-11-96	5	12-2-96	4	6-24-96		
CBI				SUPPLIER'S / PURCHASER'S NO			
LIGO BEAM TUBE				HANFORD, WA & LIVINGSTON, LA			
SUB-ASSEMBLY END LOCATIONS FOR				HANFORD MODULES (HX2) & (HY2)			
CUSTOMER'S NO		CONTRACT NO		BY		DATE	
BY ARL		953571		M. L. TELLALIAN		3-11-96	
ENGINEERING ASSIGNED		DWG		SHT		REV	
		2		2		5	
L190-D950032-05-B							

55710202.DGN

▶ INDICATES CHANGE FROM PREVIOUS ISSUE

TUBE NO.	TYPE	LENGTH	[END-A]	[END-B]
1	N*, P**	17356	2016432	1999076
2	M	16567	1999076	1982509
3	S	19806	1982509	1962703
4	A	19818	1962703	1942885
5	B	19806	1942885	1923079
6	A	19818	1923079	1903261
7	B	19806	1903261	1883455
8	A	19818	1883455	1863637
9	B	19806	1863637	1843831
10	A	19818	1843831	1824013
11	B	19806	1824013	1804207
12	A	19818	1804207	1784389
13	B	19806	1784389	1764583
14	A	19818	1764583	1744765
15	B	19806	1744765	1724959
16	A	19818	1724959	1705141
17	D	19806	1705141	1685335
18	A	19818	1685335	1665517
19	B	19806	1665517	1645711
20	A	19818	1645711	1625893
21	B	19806	1625893	1606087
22	A	19818	1606087	1586269
23	B	19806	1586269	1566463
24	A	19818	1566463	1546645
25	B	19806	1546645	1526839
26	A	19818	1526839	1507021
27	B	19806	1507021	1487215
28	A	19818	1487215	1467397
29	D	19806	1467397	1447591
30	A	19818	1447591	1427773
31	B	19806	1427773	1407967
32	A	19818	1407967	1388149
33	B	19806	1388149	1368343
34	A	19818	1368343	1348525
35	B	19806	1348525	1328719
36	A	19818	1328719	1308901
37	B	19806	1308901	1289095
38	A	19818	1289095	1269277
39	B	19806	1269277	1249471
40	A	19818	1249471	1229653
41	D	19806	1229653	1209847
42	A	19818	1209847	1190029
43	B	19806	1190029	1170223
44	A	19818	1170223	1150405
45	B	19806	1150405	1130599
46	A	19818	1130599	1110781
47	B	19806	1110781	1090975
48	A	19818	1090975	1071157
49	B	19806	1071157	1051351
50	A	19818	1051351	1031533
51	B	19806	1031533	1011727
52	A	19818	1011727	991909
53	D	19806	991909	972103
54	A	19818	972103	952285
55	B	19806	952285	932479
56	A	19818	932479	912661
57	B	19806	912661	892855
58	A	19818	892855	873037
59	B	19806	873037	853231
60	A	19818	853231	833413
61	B	19806	833413	813607
62	A	19818	813607	793789
63	B	19806	793789	773983
64	A	19818	773983	754165
65	D	19806	754165	734359
66	A	19818	734359	714541
67	B	19806	714541	694735
68	A	19818	694735	674917
69	B	19806	674917	655111
70	A	19818	655111	635293

TUBE NO.	TYPE	LENGTH	[END-A]	[END-B]
71	B	19806	635293	615487
72	A	19818	615487	595669
73	B	19806	595669	575863
74	A	19818	575863	556045
75	B	19806	556045	536239
76	A	19818	536239	516421
77	D	19806	516421	496615
78	A	19818	496615	476797
79	B	19806	476797	456991
80	A	19818	456991	437173
81	B	19806	437173	417367
82	A	19818	417367	397549
83	B	19806	397549	377743
84	A	19818	377743	357925
85	B	19806	357925	338119
86	A	19818	338119	318301
87	B	19806	318301	298495
88	A	19818	298495	278677
89	D	19806	278677	258871
90	A	19818	258871	239053
91	B	19806	239053	219247
92	A	19818	219247	199429
93	B	19806	199429	179623
94	A	19818	179623	159805
95	B	19806	159805	139999
96	A	19818	139999	120181
97	B	19806	120181	100375
98	A	19818	100375	80557
99	L	16556	80557	64001
100	K*, R**	18001	64001	46000

* TYPE FOR MODULE LX1
** TYPE FOR MODULE LY1

APPROVED

M. Tellalian 12-6-96
CBI DATE

J. Don 12/8/96
CALTECH DATE

ENTIRE DRAWING REVISED		REV. TUBE LENGTHS		MODIFIED TUBE TYPES AND NOTES		REMARKS	
BY	CHKD	DATE	BY	CHKD	DATE	REVISIONS	
3	ARL	3-11-96	2	MLT	3-11-96	CUSTOMER'S NO	
4	ARL	6-24-96	1	MLT	6-24-96	CONTRACT NO	
BY ARL CHKD MLT DATE 3-11-96						953571	
M. L. TELLALIAN						DWG 2 REV	
ENGINEERING ASSIGNED						SHT 3 5	
LIGO-D950032-05-B							

▶ INDICATES CHANGE FROM PREVIOUS ISSUE

TUBE NO.	TYPE	LENGTH	[END-A]	[END-B]
1	O*, Q**	17991	2017433	2035424
2	M	16567	2035424	2051991
3	S	19806	2051991	2071797
4	A	19818	2071797	2091615
5	B	19806	2091615	2111421
6	A	19818	2111421	2131239
7	B	19806	2131239	2151045
8	A	19818	2151045	2170863
9	B	19806	2170863	2190669
10	A	19818	2190669	2210487
11	B	19806	2210487	2230293
12	A	19818	2230293	2250111
13	B	19806	2250111	2269917
14	A	19818	2269917	2289735
15	B	19806	2289735	2309541
16	A	19818	2309541	2329359
17	C	19806	2329359	2349165
18	A	19818	2349165	2368983
19	B	19806	2368983	2388789
20	A	19818	2388789	2408607
21	B	19806	2408607	2428413
22	A	19818	2428413	2448231
23	B	19806	2448231	2468037
24	A	19818	2468037	2487855
25	B	19806	2487855	2507661
26	A	19818	2507661	2527479
27	B	19806	2527479	2547285
28	A	19818	2547285	2567103
29	C	19806	2567103	2586909
30	A	19818	2586909	2606727
31	B	19806	2606727	2626533
32	A	19818	2626533	2646351
33	B	19806	2646351	2666157
34	A	19818	2666157	2685975
35	B	19806	2685975	2705781
36	A	19818	2705781	2725599
37	B	19806	2725599	2745405
38	A	19818	2745405	2765223
39	B	19806	2765223	2785029
40	A	19818	2785029	2804847
41	C	19806	2804847	2824653
42	A	19818	2824653	2844471
43	B	19806	2844471	2864277
44	A	19818	2864277	2884095
45	B	19806	2884095	2903901
46	A	19818	2903901	2923719
47	B	19806	2923719	2943525
48	A	19818	2943525	2963343
49	B	19806	2963343	2983149
50	A	19818	2983149	3002967
51	B	19806	3002967	3022773
52	A	19818	3022773	3042591
53	C	19806	3042591	3062397
54	A	19818	3062397	3082215
55	B	19806	3082215	3102021
56	A	19818	3102021	3121839
57	B	19806	3121839	3141645
58	A	19818	3141645	3161463
59	B	19806	3161463	3181269
60	A	19818	3181269	3201087
61	B	19806	3201087	3220893
62	A	19818	3220893	3240711
63	B	19806	3240711	3260517
64	A	19818	3260517	3280335
65	C	19806	3280335	3300141
66	A	19818	3300141	3319959
67	B	19806	3319959	3339765
68	A	19818	3339765	3359583
69	B	19806	3359583	3379389
70	A	19818	3379389	3399207

TUBE NO.	TYPE	LENGTH	[END-A]	[END-B]
71	B	19806	3399207	3419013
72	A	19818	3419013	3438831
73	B	19806	3438831	3458637
74	A	19818	3458637	3478455
75	B	19806	3478455	3498261
76	A	19818	3498261	3518079
77	C	19806	3518079	3537885
78	A	19818	3537885	3557703
79	B	19806	3557703	3577509
80	A	19818	3577509	3597327
81	B	19806	3597327	3617133
82	A	19818	3617133	3636951
83	B	19806	3636951	3656757
84	A	19818	3656757	3676575
85	B	19806	3676575	3696381
86	A	19818	3696381	3716199
87	B	19806	3716199	3736005
88	A	19818	3736005	3755823
89	C	19806	3755823	3775629
90	A	19818	3775629	3795447
91	B	19806	3795447	3815253
92	A	19818	3815253	3835071
93	B	19806	3835071	3854877
94	A	19818	3854877	3874695
95	B	19806	3874695	3894501
96	A	19818	3894501	3914319
97	B	19806	3914319	3934125
98	A	19818	3934125	3953943
99	L	16556	3953943	3970499
100	K*, R**	18001	3970499	3988500

* TYPE FOR MODULE LX2
** TYPE FOR MODULE LY2

APPROVED

M. Tellalian 12-6-96
CBI DATE

J. Jones 12/8/96
CALTECH DATE

ENTIRE DRAWING REVISED		REV. TUBE LENGTHS		REMARKS	
BY	DATE	BY	DATE	MODIFIED TUBE TYPES AND NOTES CHANGED REV. NO. TO BE IN SEQUENCE WITH CONTRACT 930212	
3	3-11-96	5	12-3-96		
4	6-24-96	4	6-24-96		
CUSTOMER'S NO				CONTRACT NO	
BY ARL CHKD MLT DATE 3-11-96				953571	
M. L. TELLALIAN				DWC 2	
ENGINEERING ASSIGNED				SHT 4	
				REV 5	
LIGO-0950032-05-B					

55710402.DGN

INDICATES CHANGE FROM PREVIOUS ISSUE