



**FOUNDATION INTERFACE LOADS
FOR
200° AZIMUTH TRAVEL CONFIGURATION
OF VERTEXRSI 6.3 METER KXC/KXX
SATELLITE EARTH STATION ANTENNA
(SHELL HUB DESIGN)**

700-0652

**Revision A
Sept 17, 2004**



**ANTENNA PRODUCTS DIVISION
2600 N. Longview St., Kilgore, TX USA 75662-6842
Phone (903) 984-0555 • FAX (903) 984-1826**

VERTEXRSI CONFIDENTIAL AND PROPRIETARY

All computer software, technical data or other information pertaining to the equipment covered by this document is considered proprietary by VertexRSI. Such information transmitted in this document or related document is for the benefit of VertexRSI customers and is not to be disclosed to other parties verbally or in writing without prior written approval of VertexRSI. Additionally, this document may not be reproduced in whole or in part without written consent from VertexRSI.

A	Original release	09/17/04	SPK	HAP	PES
REV.	DESCRIPTION	DATE	WRITER	CHK.	APPR.

TABLE OF CONTENTS

1.0	INTRODUCTION	1
2.0	LOAD CONDITIONS.....	1
3.0	CRITICAL LOADS	1
4.0	REFERENCE DRAWINGS	1
5.0	RESOLUTION OF FORCE COMPONENTS.....	2

1.0 INTRODUCTION

This document provides foundation interface loads for the 200° azimuth travel configuration of the VertexRSI 6.3 meter KXC/KXK satellite earth station antenna. Design loads are provided for three speed scenarios, 30 mph gusting to 45 mph excluding dead weight, 45 mph gusting to 60 mph excluding dead weight, and 100 mph in combination with dead weight. Use the 30 mph gusting to 45 mph and 45 mph gusting to 60 mph wind loads to evaluate the antenna support system for adequate rigidity as required by VertexRSI specification 300-2107. The loads for 125 mph wind combined with dead weight are maximum antenna survival loads; they should be used to evaluate the antenna support system for adequate strength as required by the governing building and/or construction codes.

2.0 LOAD CONDITIONS

All wind loads presented in this document were derived from the results of extensive wind tunnel studies of parabolic antenna structures. Load conditions are defined by specific combinations of wind speed, antenna orientation (azimuth and elevation) and wind direction. Each condition is represented by three angles (azimuth, elevation and wind approach). X, Y, Z cartesian coordinate axes have been defined to facilitate the description of load vectors and antenna orientations. Sign conventions for the X, Y, Z coordinate axes, azimuth angle and elevation angle are shown on pages 3 and 4. Using the right hand sign convention, wind approach angle (wind angle) is measured about the Z-axis from the azimuth heading of the antenna. A 0° wind angle represents a head wind or frontal wind approach. A 180° wind angle represents a tail wind. Antenna symmetry precludes the need to consider wind angles between 180° and 360°.

3.0 CRITICAL LOADS

Design loads acting on each foundation interface have been tabulated according to load condition and interface location. Each row represents a specific load condition with all forces acting concurrently. Forces that are critical design loads are show in reverse print. Note that due to antenna structural configuration, varying wind direction and the antenna's steerability, all maximum interface component forces do not occur simultaneously under a single load condition.

Sign conventions for the lower pintle loads correspond to those of the X, Y, Z coordinate axes (shown on pages 3 and 4). Azimuth jack and pedestal leg loads are axial forces that act along the member's centroidal axis; tensile loads are positive; compression is negative.

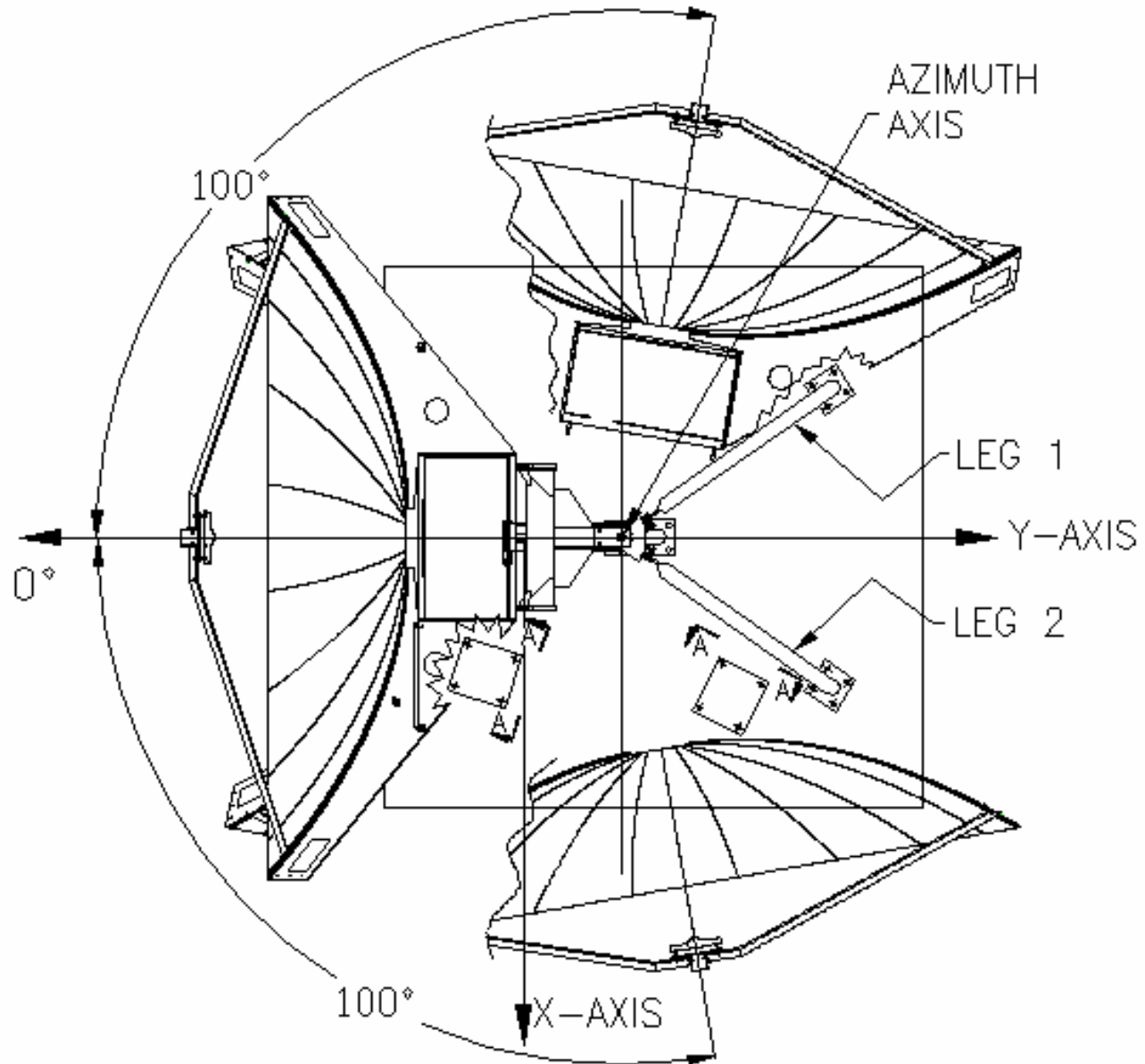
4.0 REFERENCE DRAWINGS

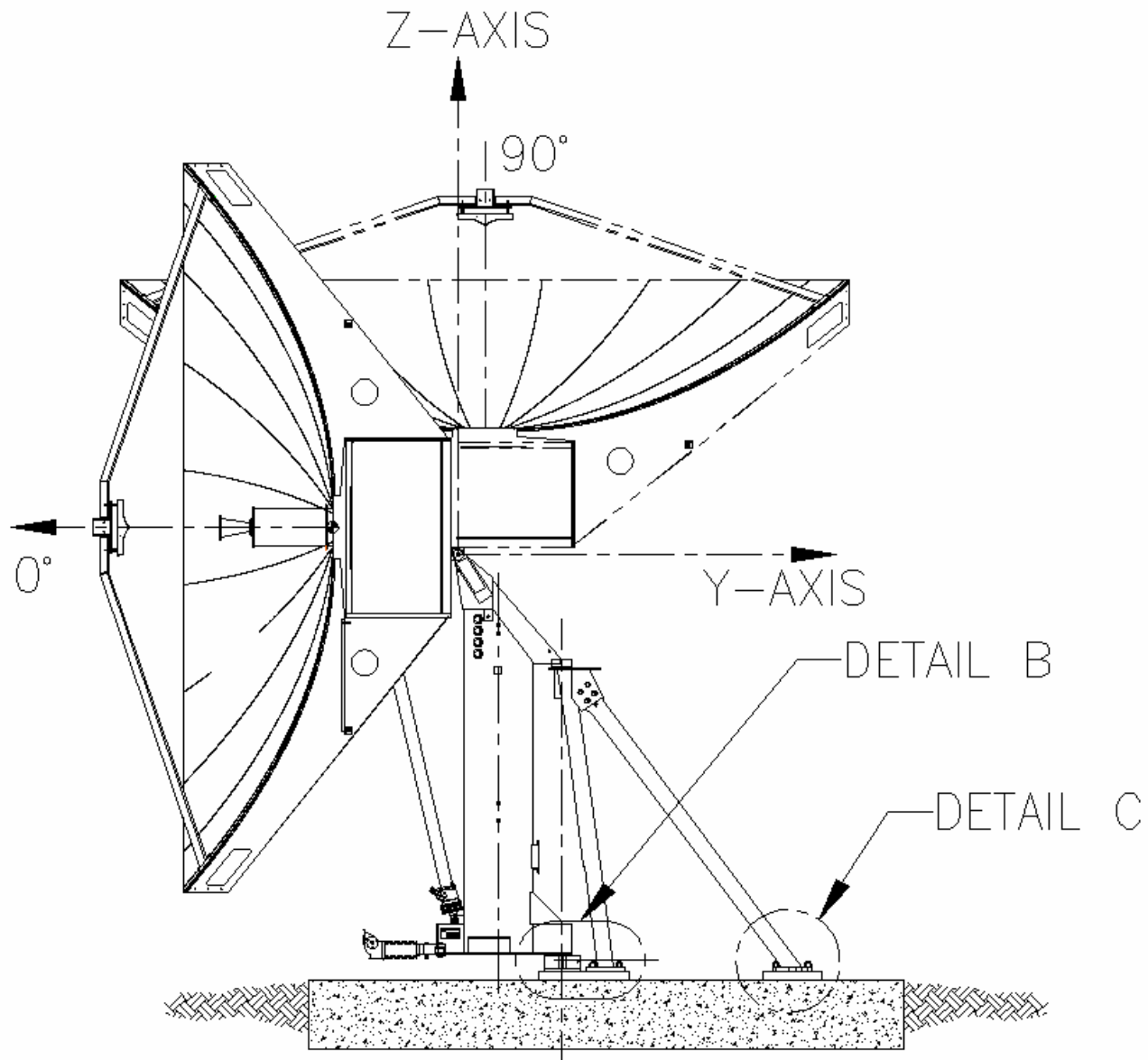
671548	Pedestal
630001	Reflector
009946	Foundation

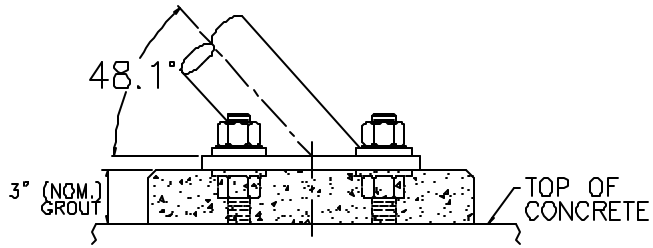
5.0 RESOLUTION OF FORCE COMPONENTS

During the course of structural analysis, it is often desirable to resolve forces into orthogonal vector components that correspond to convenient coordinate axes. Any orthogonal vector components of the leg loads can be easily resolved by applying appropriate trigonometric functions to the leg geometry (angles) illustrated on pages 3 and 4.

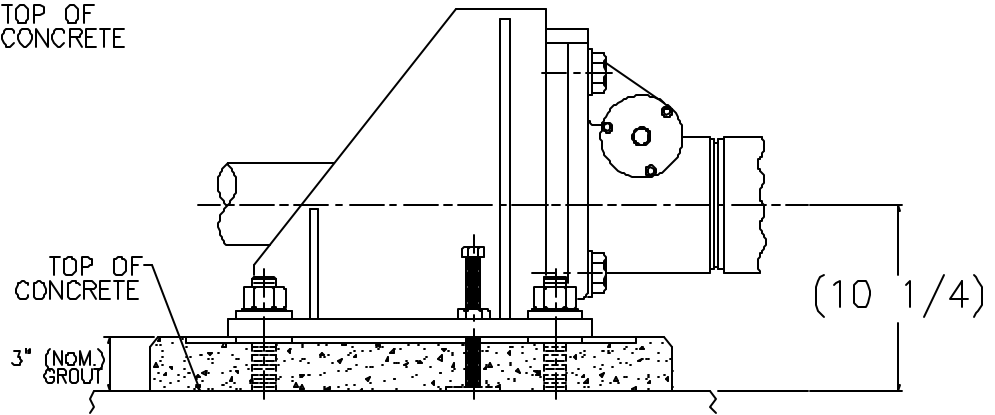
The X, Y vector components of the azimuth jack depend on azimuth angle of the load condition. Refer to page 9 to determine the angle of the azimuth jack relative to the foundation coordinate axes and the corresponding X, Y load coefficients.



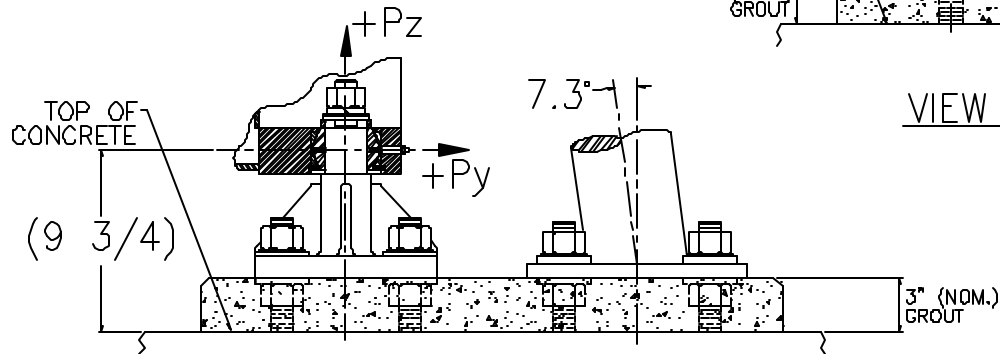




DETAIL C, OUTSIDE LEG



VIEW A-A, AZIMUTH JACK



DETAIL B, LOWER PINTLE/MIDDLE LEG

**Foundation Interface Loads
VertexRSI 6.3 Meter KXC/KXK Antenna
125 mph Wind, Dead Weight Included**

Az Angle (deg)	Elev Angle (deg)	Wind Angle (deg)	Axial Load (lb)	Px (lb)	Py (lb)	Pr (lb)	Pz (lb)	#1 (lb)	#2 (lb)	#3 (lb)
-20	0	135	33209	29312	-10325	31078	-3214	13335	18553	-24309
-20	0	60	-9712	-5510	-2815	6187	-3459	-41232	-14243	42292
100	0	135	33160	33577	-18735	38450	-3214	-24467	4670	15093
100	0	60	-9698	-16404	5744	17381	-3459	38873	-30976	-6021
20	0	135	33160	24281	29814	38450	-3214	-3548	24474	-15953
100	20	120	30067	29701	-18938	35225	-2082	-20593	-1541	16874
20	0	135	33160	24281	29814	38450	-3214	-3548	24474	-15953
-100	80	150	4644	-2642	5755	6332	1272	17241	-8939	-6329
-100	60	0	-179	-3808	-1074	3956	-20353	-8402	10204	-1374
100	0	30	-9460	-16214	6560	17490	-3691	44829	-29928	-11360
-50	0	15	-2888	4971	-8505	9851	-3691	-50427	6228	33695
-5	0	15	-3264	-3106	-7481	8100	-3691	-34276	-31015	49775
0	20	180	-706	-55	9010	9010	-1059	23938	24769	-37132

**Foundation Interface Loads
VertexRSI 6.3 Meter KXC/KXK Antenna
30 mph Wind Gusting to 45 mph, Dead Weight Excluded**

LOAD CONDITION			AZ JACK	LOWER PINTLE LOADS				AXIAL LEG LOADS		
Az Angle (deg)	Elev Angle (deg)	Wind Angle (deg)	Axial Load (lb)	Px (lb)	Py (lb)	Pr (lb)	Pz (lb)	#1 (lb)	#2 (lb)	#3 (lb)
-100	0	135	2710	1371	2231	2619	11	1733	-875	-654
-100	0	60	-793	274	-460	536	-9	-2431	3537	-843
100	0	135	2706	2614	-1506	3017	11	-1803	238	1193
100	0	60	-791	-1465	491	1545	-9	3365	-2670	-530
20	0	135	2706	1937	2313	3017	11	-367	1803	-1094
100	20	120	2453	2304	-1524	2763	103	-1497	-261	1341
20	0	135	2706	1937	2313	3017	11	-367	1803	-1094
-100	80	150	379	-142	483	503	377	1323	-616	-539
-100	60	0	-15	-219	-71	230	-1387	-789	973	-140
100	0	30	-772	-1449	557	1553	-28	3851	-2585	-965
-50	0	15	-236	504	-776	925	-28	-4338	546	2891
0	0	15	-250	-298	-751	808	-28	-2667	-2949	4282
0	20	180	-58	-4	614	614	187	1816	1884	-2821

**Foundation Interface Loads
VertexRSI 6.3 Meter KXC/KXK Antenna
45 mph Wind Gusting to 60 mph, Dead Weight Excluded**

LOAD CONDITION			AZ JACK	LOWER PINTLE LOADS				AXIAL LEG LOADS		
Az Angle (deg)	Elev Angle (deg)	Wind Angle (deg)	Axial Load (lb)	Px (lb)	Py (lb)	Pr (lb)	Pz (lb)	#1 (lb)	#2 (lb)	#3 (lb)
-100	0	135	5420	2742	4463	5238	22	3467	-1750	-1309
100	0	60	-1585	548	-921	1072	-18	-4863	7075	-1686
100	0	135	5412	5228	-3013	6034	22	-3607	477	2387
100	0	60	-1583	-2929	982	3090	-18	6731	-5341	-1059
20	0	135	5412	3875	4626	6034	22	-735	3606	-2189
100	20	120	4907	4609	-3049	5526	207	-2995	-522	2681
20	0	135	5412	3875	4626	6034	22	-735	3606	-2189
-100	80	150	758	-284	965	1006	754	2647	-1233	-1078
-100	60	0	-29	-438	-143	461	-2775	-1579	1946	-280
100	0	30	-1544	-2898	1115	3105	-56	7703	-5170	-1931
-50	0	15	-471	1007	-1553	1851	-56	-8678	1092	5783
0	0	15	-499	-596	-1503	1617	-56	-5335	-5899	8564
0	20	180	-115	-9	1228	1228	374	3633	3768	-5642

- Notes: 1) Pr is the Vector Resultant of Px and Py.
2) Mr is the Vector Resultant of Mx and My.

Azimuth Jack Load Coefficients

VertexRSI 6.3M Meter KXC/KXK (200° Azimuth Travel) Antenna

Azimuth mount #1		
Ant.	X-coeff	Y-coeff
Angle deg	unit	unit
-100	-0.623	-0.783
-95	-0.529	-0.849
-90	-0.452	-0.892
-85	-0.392	-0.920
-80	-0.349	-0.937
-75	-0.320	-0.947
-70	-0.302	-0.953
-65	-0.294	-0.956
-60	-0.292	-0.956
-55	-0.297	-0.955
-50	-0.306	-0.952
-45	0.319	-0.948
-40	-0.335	-0.942
-35	-0.354	-0.935
-30	-0.374	-0.927
-25	-0.396	-0.918
-20	-0.419	-0.908
-15	-0.443	-0.896
-10	-0.468	-0.884
-5	-0.494	-0.870
0	-0.519	-0.855
5	-0.545	-0.838
10	-0.571	-0.821
15	-0.597	-0.802
20	-0.623	-0.783

Azimuth mount #2		
Ant.	X-coeff	Y-coeff
Angle deg	unit	unit
-20.000	-0.879	0.477
-15.000	-0.928	0.374
-10.000	-0.957	0.290
-5.000	-0.974	0.226
0.000	-0.984	0.181
5.000	-0.989	0.151
10.000	-0.991	0.132
15.000	-0.992	0.123
20.000	-0.993	0.122
25.000	-0.992	0.127
30.000	-0.991	0.136
35.000	-0.989	0.150
40.000	-0.986	0.166
45.000	-0.983	0.186
50.000	-0.978	0.207
55.000	-0.973	0.230
60.000	-0.967	0.255
65.000	-0.960	0.281
70.000	-0.952	0.308
75.000	-0.942	0.335
80.000	-0.932	0.363
85.000	-0.920	0.391
90.000	-0.908	0.420
95.000	-0.894	0.449
100.000	-0.879	0.477