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XB-70 AERODYNAMIC, GEOMETRIC, MASS, AND SYMMETRIC STRUCTURAL MODE DATA

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16. Abstract

XB-70-1 mass, structural, and aerodynamic data were updated to reflect as closely as possible the characteristics of the airplane at three specific flight conditions which were actually flown; a nominal Mach number of 0.90 at an altitude of 25,000 feet (two cases), a nominal Mach number of 1.6 at an altitude of 40,000 feet (one case). In-flight response characteristics at a number of points on the vehicle were obtained by exciting a pair of shaker vanes on the nose of the airplane. Data were recorded with the basic stability augmentation system (SAS) operating both alone and together with the identical location of accelerometer and force (ILAF) structural mode control system.

Detailed total vehicle weight, mass characteristics, structural frequencies, generalized masses, all aerodynamic data used in the present analyses, and a description of the actual mode shapes are tabulated and presented.

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INTRODUCTION

Design effort on the identical location of accelerometer and force (ILAF) structural mode control system (ref. 1) was based on early, and the only available, estimates of the XB-70 mass, structural, and aerodynamic characteristics. Comparison of vehicle response characteristics obtained by shaker vane excitation in flight showed discrepancies with the analytical results based on these early estimates. To determine the reason for the discrepancies, response characteristics that reflected ground vibration test natural frequencies were analyzed. (It had been observed that these natural frequencies were close to the flight-test structural frequencies.) The analytical results which incorporated the ground vibration test natural frequencies were more in agreement with the flight-test responses than those based on early analyses.

These results led to a decision by the NASA Flight Research Center to determine how well the response characteristics of a flexible airplane could be analytically predicted, using the XB-70-1 as the study aircraft. The problem was approached by having North American Rockwell review the weight accounting on the airplane, in order to define the total weight and its distribution for the three flight conditions actually flown. These data, together with structural mode data from ground vibration tests, were used to obtain the new structural mode characteristics which are presented here. The aerodynamic characteristics of the airplane were reviewed and updated to reflect all known new information, including wind-tunnel test data obtained by the NASA Ames Research Center. The aerodynamic data are also presented here. The structural mode and aerodynamic data were then combined in frequency response analyses of the airplane for the three specific flight conditions.

ANALYTICAL AIRPLANE MODEL

This section details the physical characteristics of the XB-70-1 airplane which are relevant to the analytical studies reported herein. A complete description of the airplane may be found in reference 1.

Flight Conditions

Three specific flight conditions were selected for the analyses. They are listed

in table 1. For ease of reference the nominal Mach numbers, altitudes, and weights shown in the table are used in identifying data in the report. The actual conditions shown, however, were used in the analyses.

TABLE 1

FLIGHT TEST CONDITIONS

Flight ID	Flight Record Time Point	Weight lbs	Wing Tip Position deg	Mach Number	Altitude ft
1-75	1 hr 11 min 48.75 sec	431,435 (Heavy)*	25	.865 (.90)	25,000 (25,000)
1-81 Pt 2	2 hr 41 min 1.5 sec	324,994 (Light)	25	.855 (.90)	25,043 (25,000)
1-81 Pt 1	2 hr 4 min 1.5 sec	379,614 (Medium)	65	1.585 (1.6)	39,109 (40,000)

*The nominal callouts for identification purposes are indicated in parentheses.

Weight

The last detailed empty weight accounting before the present effort was done for the XB-70-1 airplane on flight 1-50. Using this information as a base, the weight change records for the airplane were reviewed. Change items of 50 pounds or greater were noted for the time from flight 1-50 through the flights indicated in table 1. Fuel, water, and other useful load information was provided by the NASA Flight Research Center. Total inertia, weight, and center of gravity (CG) were determined, along with the distribution of weight at the specific control points required by the structural mode calculations. These new mass characteristics were used in obtaining the data presented. Detailed total vehicle weight and mass characteristics are given in appendixes A and B.

Structural Mode Characteristics

New structural mode data were obtained which reflected the actual weight at the time of the three specific flight conditions selected for study. This was done by using the original symmetric, orthogonalized, measured ground vibration test (GVT) modal data as the base for the required new modal vibration analysis. These GVT data were for the no-fuel case. The GVT natural frequencies and generalized masses defined the basic vehicle structural stiffness. To determine modal characteristics including the three different fuel loadings, new equations of motion were written. These equations included a mass matrix which had off-diagonal, or mass coupling, terms reflecting the fuel loading. Eigenvalue solution of the new equations of motion resulted in definitions of new free-free mode shapes, natural frequencies, and generalized masses. The new shapes were defined in the 97 GVT control point system. Data were calculated for

nine wing-fuselage modes, four canard modes, and three vertical stabilizer modes. These data were, in turn, interpolated and renormalized for a 118 control point system. Only the wing-fuselage modes were converted to this system. All response calculations were based on data derived from the 118 control point set of modal data.

Appendix A contains detailed descriptions of both the 97 and 118 control point grid system. Corresponding structural frequencies, generalized masses, and tabulated data descriptions of the mode shapes also are presented.

Aerodynamics

The rigid vehicle aerodynamic force, moment, and distributed load data as a function of angle of attack were reviewed in light of all available data. No changes were made in these data beyond those used to generate the data used in the analyses of reference 1. Although there were no changes in the angle-of-attack distributed loads, data from reference 1 and those presented will show differences when compared at the aerodynamic derivative level because of differences in center-of-gravity location and mode shape characteristics. Besides these differences, in reference 1 data for a wing tip deflection, δ_T, of 0° were assumed to be equivalent to $\delta_T = 25^\circ$ data. Actual $\delta_T = 25^\circ$ data were used in the present analyses.

The main change in the rigid vehicle aerodynamic force, moment, and distributed load data was associated with the elevons. The data used in the reference 1 analyses assumed that the elevon gaps had no effects on the aerodynamics. More complete elevon test data revealed that the elevon gaps had a significant effect on control effectiveness. The analyses of the present study reflect these new data.

The Mach 0.90 quasisteady aerodynamics of the wing due to the structural mode shapes were determined by using a lifting surface theory (vortex lattice based on ref. 2). The corresponding data of reference 1 were determined by using a modified strip theory. Similar wing data at Mach 1.6 were also determined by using lifting surface theory (Etkin Mach Box, refs. 3 and 4). The Etkin approach does not take into account the wing tip deflection geometry when determining mutual interference effects between Mach boxes. In effect, the structural deformations are referenced to a flat plane. After the aerodynamic loading due to mode shape was determined with the wing having the flap plane reference, the loading on the deflectable tip was isolated. Because the tip was deflected 65°, the component of the tip load due to structural deformation in the vertical plane was determined through the cosine relationship with the vertical axis. In this manner, the tip contributions to the total normal force and moment due to the mode shape are correctly computed.

To determine the effect of unsteady aerodynamics on response characteristics of the wing at Mach 0.90, data were generated for the light weight flight condition. A digital program based on the theory of reference 5 was used.

The elevon aerodynamics at Mach 0.90 were unsteady for all cases. Modified subsonic strip theory was used as explained in reference 6. The zero frequency (quasisteady) elevon force, moment, and generalized modal force coefficients were ratioed to the force, moments, and generalized modal force coefficients obtained by using the previously mentioned rigid air vehicle data and load distributions. The elevon data at

Mach 1.6 were quasisteady. The structural generalized force coefficients for these data were computed by using the pressure distributions based on static wind-tunnel data.

All aerodynamic data used in the present analyses are included in appendix B.

APPENDIX A

SYMMETRIC STRUCTURAL MODE CHARACTERISTICS

The control point geometry for the 97 point GVT modal data is shown in figure A1. The similar control point geometry for the 118 point modal data is given in figure A2. Point 93 in the 97 point GVT grid set modes is the normalizing point, whereas point 118 is the normalizing point for the 118 point grid set modes.

The 118 point grid was obtained by interpolating from the 97 point GVT grid and renormalizing to point 118 from point 93. Linear interpolation between points was used. However, the interpolation scheme separates the wing surface proper from the elevon surfaces. Because of this, no lines are faired across the elevon hinge line. This interpolation to the 118 point grid system was done because most existing XB-70 aerodynamic digital programs use this larger grid system. It was judged more efficient to use existing programs than to reprogram to the 97 point grid system. These existing digital programs use only deflection data, with mode slope data being determined from internal curve fit routines. Since the linear interpolation scheme can distort slopes in some instances, slope data required for other than aerodynamic purposes were obtained by manual techniques. The 118 point data presented herein contain only those modes which are primarily wing-body modes in the 97 point grid system. These modes are identified in tables A1, A2, and A3 for the heavy weight, light weight, and medium weight mode sets, respectively. Modal frequencies and generalized masses are also contained in these tables.

The actual mode shape data tabulated against the control point number for the heavy weight case are presented in table A4 (97 point) and table A5 (118 point); for the light weight case, in table A6 (97 point) and table A7 (118 point); for the medium weight case, in table A8 (97 point) and table A9 (118 point).

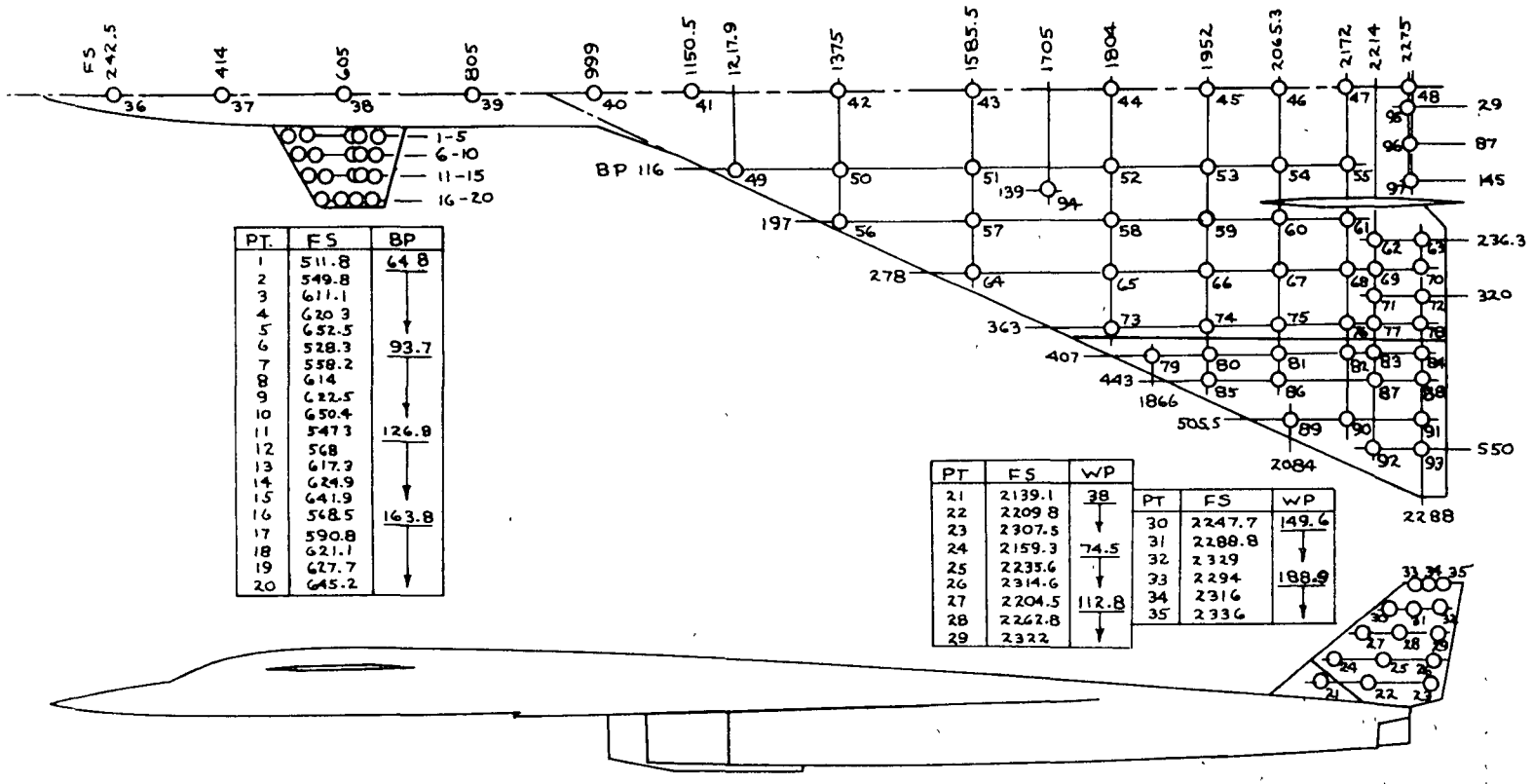

Figure A1.- XB-70 ground vibration test 97 control point geometry.
Symmetric modes.

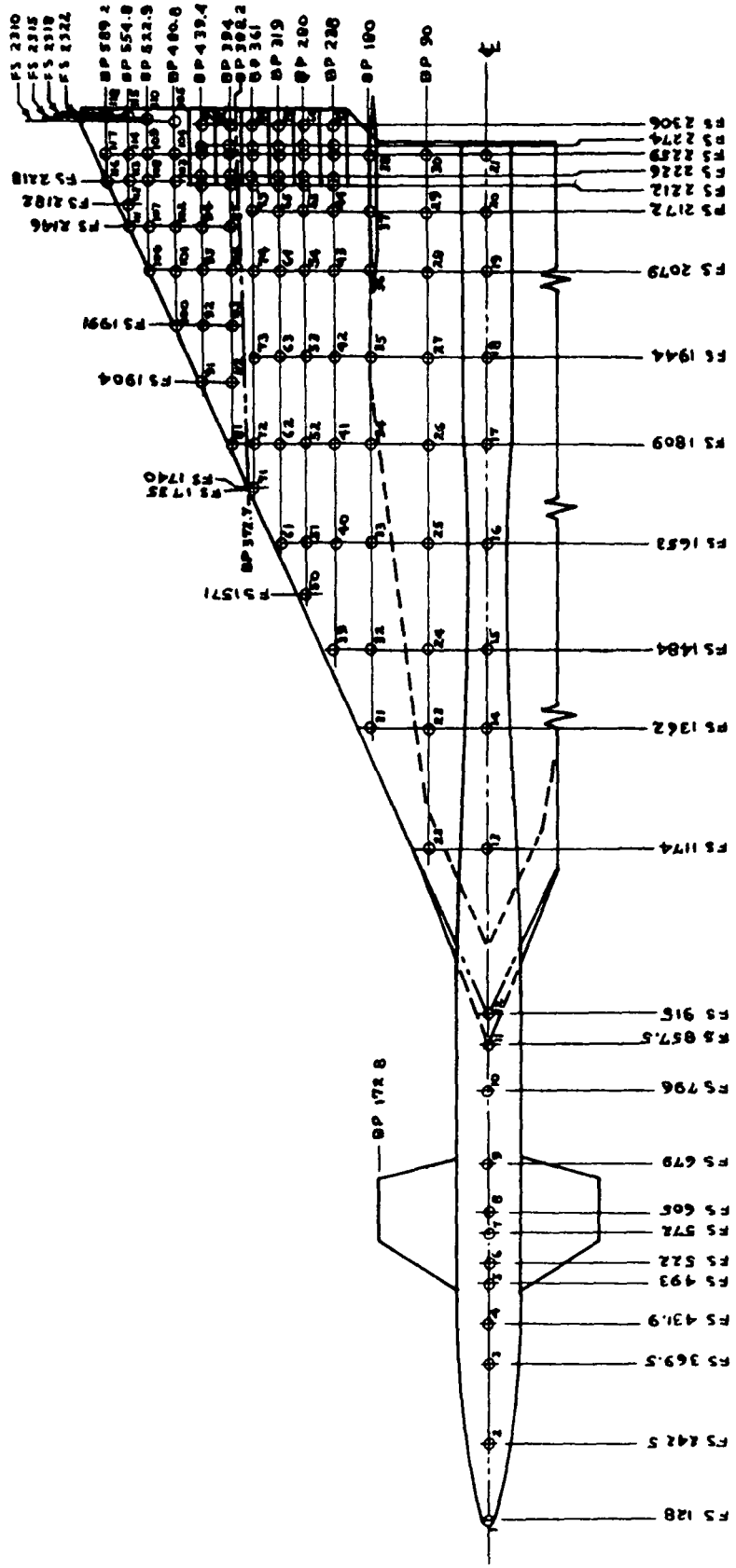

Figure A2.- XB-70 interpolated modes 118 control point geometry.
Symmetric modes.

TABLE A1

XB-70-1 SYMMETRIC FREE-FREE VACUUM VIBRATION MODE CHARACTERISTICS FOR FLIGHT 1-75 (TABLE 1)

Heavy Weight, $\delta_T = 25°$, M = 0.90, Weight = 431,435 Lb, CG at FS 1582.3 In.

Mode Number		Mode* Description	Frequency, Hz	Generalized Mass**	
118 Point Modal Data	97 Point Modal Data			97 GVT Points	118 Interpolated Points
1	1	WF 1	2.3270	0.23753×10^5	0.16511×10^5
2	2	WF 2	3.6003	$.21299 \times 10^4$	$.14812 \times 10^4$
3	3	WF 3	5.1360	$.16442 \times 10^8$	$.97346 \times 10^6$
-	4	V 1	6.0086	$.18720 \times 10^5$	$.66178 \times 10^4$
4	5	WF 4	6.6645	$.24366 \times 10^4$	$.12347 \times 10^4$
5	6	WF 5	7.9809	$.13393 \times 10^4$	$.44614 \times 10^3$
-	7	C 1	9.4910	$.51713 \times 10^5$	$.15212 \times 10^5$
6	8	WF 6	10.2304	$.47419 \times 10^6$	$.97697 \times 10^7$
7	9	WF 7	14.8350	$.93125 \times 10^4$	$.11846 \times 10^5$
8	10	WF 8	19.6666	$.48103 \times 10^4$	$.27169 \times 10^3$
-	11	V 2	22.1393	$.29713 \times 10^5$	$.13388 \times 10^6$
9	12	WF 9	24.6532	$.22484 \times 10^5$	$.65011 \times 10^4$
-	13	V 3	26.3977	$.22928 \times 10^5$	$.63749 \times 10^4$
-	14	C 2	26.7159	$.50467 \times 10^6$	$.63780 \times 10^5$
-	15	C 3	40.3124	$.22245 \times 10^7$	$.11856 \times 10^6$
-	16	C 4	52.0627	$.51202 \times 10^7$	$.21339 \times 10^7$

*WF refers to wing-fuselage; V refers to vertical stabilizer; C refers to canard.
**For 1/2 air vehicle in units of pounds. Normalizing point CP 93 for the 97 GVT points and CP 118 for the 118 analytical points.

TABLE A2

XB-70-1 SYMMETRIC FREE-FREE VACUUM VIBRATION MODE CHARACTERISTICS FOR FLIGHT 1-81, POINT TWO (TABLE 1)

Light Weight, $\delta_T = 25°$, M = 0.90, Weight = 324,944 Lb, CG at FS 1603.5 In.

Mode Number		Mode* Description	Frequency, Hz	Generalized Mass**	
118 Point Modal Data	97 Point Modal Data			97 GVT Points	118 Interpolated Points
1	1	WF 1	2.4868	0.16965×10^5	0.11765×10^5
2	2	WF 2	3.7357	$.18558 \times 10^4$	$.12666 \times 10^4$
3	3	WF 3	5.7760	$.15939 \times 10^6$	$.40559 \times 10^5$
-	4	V 1	6.1068	$.16060 \times 10^6$	$.38252 \times 10^5$
4	5	WF 4	7.3332	$.17787 \times 10^4$	$.78402 \times 10^3$
5	6	WF 5	8.5870	$.16643 \times 10^4$	$.50398 \times 10^3$
-	7	C 1	9.6967	$.76625 \times 10^5$	$.17272 \times 10^5$
6	8	WF 6	10.8087	$.50280 \times 10^6$	$.94709 \times 10^6$
7	9	WF 7	15.3600	$.78236 \times 10^4$	$.79180 \times 10^4$
8	10	WF 8	20.3424	$.64789 \times 10^4$	$.28804 \times 10^3$
-	11	V 2	22.6182	$.60048 \times 10^5$	$.76165 \times 10^5$
9	12	WF 9	24.9361	$.32082 \times 10^5$	$.94607 \times 10^4$
-	13	C 2	26.6771	$.16884 \times 10^6$	$.78941 \times 10^5$
-	14	V 3	27.0232	$.15943 \times 10^5$	$.37281 \times 10^4$
-	15	C 3	40.3783	$.28315 \times 10^7$	$.15893 \times 10^6$
-	16	C 4	52.0642	$.48251 \times 10^7$	$.18644 \times 10^7$

*WF refers to wing-fuselage; V refers to vertical stabilizer; C refers to canard.
**For 1/2 air vehicle in units of pounds. Normalizing point CP 93 for the 97 GVT points and CP 118 for the 118 analytical points.

TABLE A3

XB-70-1 SYMMETRIC FREE-FREE VACUUM VIBRATION MODE CHARACTERISTICS FOR FLIGHT 1-81, POINT ONE (TABLE 1)

Medium Weight, $\delta_T = 25°$, M = 1.60, Weight = 379,614 Lb, CG at FS 1596.4 In.

Mode Number		Mode* Description	Frequency, Hz	Generalized Mass**	
118 Point Modal Data	97 Point Modal Data			97 GVT Points	118 Interpolated Points
1	1	WF 1	2.3704	0.52198×10^5	0.33722×10^5
2	2	WF 2	3.7799	$.19417 \times 10^4$	$.10421 \times 10^4$
3	3	WF 3	5.2933	$.14032 \times 10^6$	$.80597 \times 10^5$
-	4	V 1	5.8821	$.74978 \times 10^4$	$.29854 \times 10^4$
4	5	WF 4	6.9633	$.10965 \times 10^4$	$.48291 \times 10^3$
5	6	WF 5	7.5398	$.28773 \times 10^5$	$.79802 \times 10^4$
-	7	C 1	8.9335	$.14390 \times 10^5$	$.15453 \times 10^5$
6	8	WF 6	11.0415	$.11609 \times 10^8$	$.27350 \times 10^5$
7	9	WF 7	16.2104	$.19330 \times 10^4$	$.29428 \times 10^3$
8	10	WF 8	19.1179	$.61142 \times 10^5$	$.60936 \times 10^3$
-	11	V 2	23.0056	$.49244 \times 10^6$	$.85036 \times 10^5$
9	12	WF 9	25.2822	$.38635 \times 10^7$	$.10515 \times 10^6$
-	13	C 2	26.1689	$.34311 \times 10^7$	$.23251 \times 10^6$
-	14	V 3	26.6156	$.50196 \times 10^8$	$.14078 \times 10^5$
-	15	C 3	40.8039	$.18566 \times 10^9$	$.94337 \times 10^7$
-	16	C 4	52.8775	$.14028 \times 10^9$	$.44721 \times 10^7$

*WF refers to wing-fuselage; V refers to vertical stabilizer; C refers to canard.
**For 1/2 air vehicle in units of pounds. Normalizing point CP 93 for the 97 GVT points and CP 118 for the 118 analytical points.

TABLE A4.- XB-70 SYMMETRIC FREE-FREE VACUUM VIBRATION MODE SHAPES
97 POINT GVT GRID SYSTEM
HEAVY WEIGHT, δ_T = 25°

Control Point	Mode 1		2		3		4		5		6	
1	84472040	0	-87233597	-1	-47717993	1	73682503	-1	-16474471	-1	93451106	-1
2	76222312	0	-62124954	-1	-16234988	1	15673878	-1	-56080355	-1	77888685	-1
3	62941522	0	-34449575	-1	45363297	1	-56519123	-1	-93754262	-1	58051260	-1
4	61082127	0	-34914922	-1	51192698	1	-65500859	-1	-11118855	0	66868288	-1
5	55145809	0	-45835283	-1	91867182	1	-11020189	0	-15561720	0	70978831	-1
6	83300573	0	-78535156	-1	-33764935	1	93240583	-2	-75702049	-1	32207665	-1
7	76133149	0	-57028518	-1	11574359	1	-38114639	-1	-10603551	0	30601945	-1
8	62769189	0	-33524475	-1	53745304	1	-90131112	-1	-15286047	0	35697106	-1
9	61139399	0	-33422798	-1	62399068	1	-10094772	0	-16948517	0	43307638	-1
10	55164915	0	-44191023	-1	98689959	1	-13238417	0	-18461308	0	25107447	-1
11	81812927	0	-67375574	-1	-49685099	0	-69030047	-1	-14355141	0	-39193056	-1
12	76078319	0	-50819150	-1	32697116	1	-91995300	-1	-14895641	0	-38020878	-1
13	63564162	0	-33102635	-1	66806982	1	-12669026	0	-17773298	0	-40538725	-1
14	61362534	0	-33760246	-1	75337191	1	-13099456	0	-18002162	0	-40819075	-1
15	55310380	0	-44066858	-1	11169274	2	-15433246	0	-19891392	0	-41118091	-1
16	80266292	0	-58002983	-1	27274309	1	-13475701	0	-20309144	0	-12879591	0
17	72801222	0	-39026455	-1	61125534	1	-16064121	0	-21656585	0	-12411993	0
18	63022877	0	-33089347	-1	86650811	1	-18285534	0	-23464314	0	-12308292	0
19	61455343	0	-33045339	-1	94200938	1	-18856267	0	-22414340	0	-14169991	0
20	56266177	0	-41941199	-1	12250454	2	-20683231	0	-20501766	0	-18615208	0
21	51390241	-1	40807499	-1	22871197	1	76769788	0	-88027033	-1	-97785097	-1
22	29150302	-1	40260809	-1	30977528	1	95301594	0	-89922579	-1	-88226904	-1
23	-10942936	-1	79137755	-1	11246440	2	32961978	1	-26384775	0	-11358584	0
24	10650249	0	79355949	-1	57572014	1	17597711	1	-18804988	0	-17167740	0
25	62520853	-1	99948807	-1	84630244	1	24397953	1	-19696501	0	-13842373	0
26	14827444	-1	14327821	0	15996002	2	44874792	1	-38057375	0	-15225217	0
27	13660428	0	13292847	0	11055675	2	28840913	1	-23627619	0	-19362875	0
28	92815588	-1	16403520	0	15341995	2	41000309	1	-35226936	0	-19260130	0
29	42948234	-1	21824837	0	23629019	2	63628642	1	-59267578	0	-20566756	0
30	16145480	0	19328187	0	19977350	2	47942914	1	-42193464	0	-22394863	0
31	12026971	0	22299660	0	24363435	2	59634371	1	-56744022	0	-22890564	0
32	74579731	-1	27536520	0	32543306	2	81539450	1	-82164760	0	-23995684	0
33	18375804	0	26572648	0	34450051	2	80189558	1	-78093012	0	-28838332	0
34	14427001	0	29497854	0	38608426	2	89778795	1	-91296734	0	-28759656	0
35	11582233	0	34041422	0	46739375	2	113700019	2	-12134394	1	-37139348	0
36	15740518	1	-10549920	0	-43326026	2	41022114	0	38664498	0	-24257523	0

TABLE A4.- Continued.

Control Point	Mode 1		2		3		4		5		6	
37	11057784	1	-10810606	0	-18529613	2	10848732	0	53518317	-1	-38204472	-1
38	60090424	0	-36609960	-1	21972518	1	-28471851	-1	-82853608	-1	92534225	-1
39	12008728	0	25731402	-1	11562939	2	-99242863	-1	-10495616	0	79295814	-1
40	-16254014	0	49919711	-1	10931062	2	-87365097	-1	-49674161	-1	12801764	-1
41	-26959481	0	46283959	-1	66560043	1	-45695025	-1	28617630	-2	-31626011	-1
42	-30507573	0	18870614	-1	-47339992	0	28612176	-1	77295073	-1	-52414408	-1
43	-25491526	0	-14981470	-1	-57600771	1	69396877	-1	79537177	-1	-29090020	-1
44	-13474848	0	-52256147	-1	-60603669	1	87612763	-1	62014447	-1	88977522	-2
45	-83377682	-2	-82300440	-1	-10626229	1	71324142	-1	36534039	-1	35191703	-1
46	14144356	0	-10734211	0	49773232	1	54178497	-1	10629109	-1	52772832	-1
47	28406996	0	-13129273	0	13361184	2	48468916	-1	-90668110	-2	81660181	-1
48	43437864	0	-15381296	0	22676609	2	44551655	-1	-22586235	-1	11501722	0
49	-38961545	0	47053752	-1	35701521	1	-91868848	-2	83844400	-1	-83130914	-1
50	-38327521	0	23981360	-1	-16608402	1	20295146	-1	65701705	-1	-61865319	-1
51	-32177349	0	-12602507	-1	-72125033	1	73121601	-1	56274082	-1	-73885886	-2
52	-16399195	0	-51135056	-1	-74294695	1	79972377	-1	16653270	-1	40428572	-1
53	35786664	-2	-75877690	-1	-20092491	1	59794954	-1	-57969702	-2	63873461	-1
54	16084146	0	-93420792	-1	47631457	1	30145209	-1	59350470	-3	42928398	-1
55	31664881	0	-11520275	0	13395169	2	62334453	-2	36778971	-1	-12798138	-2
56	-43099731	0	34162321	-1	-39939768	1	58664675	-1	11691279	0	-81126995	-1
57	-32525079	0	-14621297	-2	-89336515	1	68909582	-1	12035061	-1	27508282	-1
58	-15937724	0	-34340313	-1	-86549949	1	81913306	-1	-24191960	-1	89539594	-1
59	84427436	-2	-56808816	-1	-26643961	1	59212152	-1	-14459805	-1	75387028	-1
60	17295503	0	-56681910	-1	37259843	1	34897574	-1	32710156	-1	23556983	-1
61	36204917	0	-47661254	-1	12114296	2	-47431595	-1	65531334	-1	-72107903	-1
62	49810835	0	-24567521	-2	15676531	2	-11808532	0	90990088	-1	-15593389	0
63	64300387	0	58553514	-2	22281150	2	-17572674	0	17334258	0	-27057349	0
64	-36023873	0	36125471	-1	-11792978	2	85431355	-1	-22127985	-1	87392226	-1
65	-16994774	0	42808421	-2	-13986172	2	10818925	-2	-17253798	0	95905506	-1
66	37740491	-1	24471177	-1	-81489386	1	-69590575	-1	-15379789	0	22615432	-1
67	23770417	0	39419862	-1	-39249284	-1	-10386038	0	-80259312	-1	-40218551	-1
68	43075186	0	68078746	-1	88203788	1	-14919410	0	43329026	-1	-16927287	0
69	50312395	0	77042781	-1	13188472	2	-18113120	0	84400018	-1	-22402254	0
70	64849596	0	98349503	-1	18745022	2	-25998809	0	17845201	0	-36776089	0
71	51528125	0	15690908	0	99097005	1	-24324387	0	52993614	-1	-27194249	0
72	67431689	0	19255831	0	15587451	2	-31373217	0	16531314	0	-43022390	0
73	-10284747	0	58492190	-1	-21630631	2	-15356320	0	-39619529	0	75724690	-1

TABLE A4.- Continued.

Control Point	Mode 1		2		3		4		5		6	
74	97438095	-1	10788820	0	-13263518	2	-21165490	0	-31410568	0	-29818389	-1
75	28928471	0	17010404	0	-51727468	1	-22471793	0	-19032494	0	-92380085	-1
76	48722484	0	23161128	0	34986424	1	-22774153	0	41079476	-2	-21102591	0
77	56332861	0	25641711	0	67817764	1	-24256117	0	60900928	-1	-25655637	0
78	71352924	0	30257649	0	12018196	2	-26488726	0	18826437	0	-39821695	0
79	65189720	-2	12311190	0	-22623631	2	-28091261	0	-55019148	0	50376661	-1
80	11507308	0	17545203	0	-16986024	2	-25605389	0	-38509946	0	-24611631	-1
81	30519407	0	24985116	0	-91759356	1	-20296103	0	-17707507	0	-78188784	-1
82	51815026	0	34259795	0	-34736803	0	-15327606	0	55866055	-1	-12513233	0
83	60317107	0	37332660	0	28748423	1	-11099044	0	14673907	0	-11653623	0
84	75068000	0	43624084	0	99757723	1	-98422191	-3	31847735	0	-11492326	0
85	18098708	0	24038630	0	-20622182	2	-27896513	0	-43854344	0	-11930688	-1
86	35119590	0	32502549	0	-12916772	2	-19321882	0	-17613785	0	-63791899	-1
87	64805003	0	50337446	0	67921931	0	-20583295	-1	21099621	0	32275072	-2
88	79906735	0	60304704	0	62540888	1	14850891	0	45087814	0	16194623	0
89	48488525	0	51608985	0	-14946638	2	-19074387	0	-15634316	0	-11857089	-1
90	66255512	0	63731344	0	-78825433	1	52579598	-1	18150737	0	12245036	0
91	88624697	0	83296193	0	21556569	1	56724226	0	80602945	0	50176677	0
92	81957630	0	88215826	0	-67230151	1	50170476	0	54584102	0	54984928	0
93	99999999	0	99999999	0	99999998	0	99999998	0	99999999	0	99999999	0
94	-26416478	0	-17847750	-1	-93433099	1	81730095	-1	26152129	-1	28387225	-1
95	41914158	0	-15477189	0	22455704	2	96123070	-2	-31950273	-1	72385457	-1
96	42951012	0	-15371456	0	22683625	2	-85687499	-2	23872723	-1	72097840	-2
97	44470174	0	-14241983	0	22993003	2	-46211301	-1	60965851	-1	-51531227	-1

TABLE A4.- Continued.

Control Point	Mode 7		8		9		10		11		12	
1	21558621	0	-29861006	1	74143480	-1	-30268301	0	-48341732	0	-28993565	0
2	37060634	0	-37305028	1	60317762	-1	-24287235	0	-14908633	0	-15700548	0
3	42326337	0	-42760830	1	31975682	-1	-10308489	0	33860945	0	-16191571	-1
4	52327477	0	-49511942	1	23334650	-1	-89491747	-1	44434480	0	-38863159	-1
5	55428468	0	-59257548	1	23482491	-1	-96801710	-1	48221665	0	-10422622	0
6	24267440	1	-81645923	1	98988160	-1	-32613669	0	-38063609	0	-27286584	0
7	25689249	1	-87483361	1	87884341	-1	-25780537	0	-85104264	-1	-15533381	0
8	28943008	1	-99808564	1	52045616	-1	-10529293	0	39453482	0	42150494	-1
9	29694697	1	-10395669	2	39904171	-1	-86289943	-1	45597318	0	83540574	-1
10	31674011	1	-11026362	2	43669568	-1	-58758646	-1	48335245	0	84511213	-1
11	53298801	1	-15693490	2	15143410	0	-32590557	0	-22892664	0	-17458500	0
12	55052664	1	-16313899	2	16105690	0	-26323765	0	-41612000	-2	-81919995	-1
13	60723624	1	-17733565	2	13883261	0	-78022750	-1	55032025	0	19161369	0
14	61641091	1	-18098431	2	13688342	0	-42243541	-1	64399826	0	23492944	0
15	64779810	1	-19275030	2	12959948	0	38674261	-1	77569163	0	33060706	0
16	97024075	1	-25710621	2	20684704	0	-19153222	0	40178725	-1	82215121	-1
17	97878251	1	-26047655	2	20151757	0	-11528951	0	24420404	0	16983257	0
18	99592999	1	-26433684	2	17689077	0	31039544	-1	72570202	0	40612011	0
19	10112108	2	-26943057	2	19567652	0	58679390	-1	82650229	0	48297239	0
20	10501784	2	-27786729	2	23320914	0	15025573	0	10817192	1	71652585	0
21	-25063325	0	-70175129	0	-18013906	-1	81979719	-1	85214186	0	23336021	0
22	-10227619	0	-41376325	0	-66723777	-1	28231552	0	20562079	1	-10944322	1
23	-60172549	-1	32396375	0	-13609854	0	29924400	0	20434261	1	-80038334	1
24	-33447668	0	-13558372	1	-94379200	-1	36529697	0	25892343	1	36399774	0
25	-11678389	0	-44579620	0	-11740720	0	46439544	0	32736101	1	-19344984	1
26	-47323497	-1	25625986	0	-33367095	-1	16064803	0	18910575	1	-78460755	1
27	-23404860	0	-97885682	0	-28360526	0	75742888	0	55106739	1	-18443034	0
28	-15324258	0	-24301734	0	-12599188	0	46438647	0	33429084	1	-14916376	1
29	-11146991	0	31260931	0	18841789	0	-35984749	0	-17523905	1	-45087828	1
30	-25515387	0	-60609850	0	-24777984	0	46588544	0	34011510	1	28673585	1
31	-18710880	0	-14872507	0	61526927	-1	-12921276	0	-10517699	1	29688932	1
32	-21051734	0	28360996	0	41517547	0	-10907587	1	-76195882	1	21696865	1
33	-41556988	0	-27820156	0	16049085	0	-61147473	0	-47168335	1	10850460	2
34	-33431301	0	-53431977	-1	49261369	0	-13454415	1	-10212211	2	12295322	2
35	-46841839	0	39425794	0	54394963	0	-17276096	1	-12889080	2	10654970	2
36	14776025	1	55629951	1	-16213049	-1	39258627	0	-22954538	0	-12969831	0

TABLE A4.- Continued.

Control Point	Mode 7		8		9		10		11		12	
37	-30845936	0	44698155	0	71598242	-1	-18599763	0	-15364474	0	42773024	-1
38	-73386301	0	-11513516	1	-39065829	-1	-72587475	-1	17189207	0	35188591	-1
39	-55060326	0	-49364700	0	-76349088	-1	10925446	0	67727371	-1	29025255	-1
40	16515369	-1	49119694	0	18605407	-1	37921297	-1	-49796036	-1	-52427361	-1
41	43590361	0	12607010	1	67625856	-1	-25891453	-1	-20302546	0	-71146690	-1
42	11313722	0	60974041	0	63858915	-2	-41327466	-1	19583522	0	14577755	-1
43	-17359150	0	-30213858	0	-92884780	-2	-15419034	-1	15921560	0	84283201	-1
44	-33482233	0	-88234402	0	-81659578	-1	-20313918	-1	-70089446	-1	-11780362	-1
45	-28031706	0	-64820752	0	-24555505	-1	-30989778	-2	-41937221	-1	88912335	-2
46	18831436	0	74340974	0	-23217569	-1	76771949	-1	21631661	0	31952224	-1
47	11092371	1	32470243	1	-14834943	-1	20426640	0	-25370909	0	36303538	-1
48	21001023	1	59320905	1	17715324	-1	44691316	0	11903897	0	37219197	0
49	13887248	0	38259439	0	-65079675	-1	47692412	-1	-37347296	0	37990923	-2
50	29865072	0	16596944	0	-90297836	-1	53091653	-1	28217637	0	23794574	0
51	-26844401	-1	-11179056	1	-98331916	-1	22698190	-1	98198195	-1	10213992	0
52	-25457273	0	-14807122	1	-10147877	0	12480623	-1	-13201457	0	-30740508	-1
53	-26840285	0	-87461451	0	-68386006	-1	38085035	-4	-28159823	-1	-95488401	-2
54	-81752695	-1	-62158588	-1	-51413177	-1	-79915300	-1	54446299	-1	-35267779	-1
55	31079918	0	12857177	1	-49333869	-1	-19820511	0	22741621	-1	-75264356	-1
56	25137743	0	22274976	0	-25110515	0	10920747	0	-10577368	1	-14358297	0
57	11372961	0	-12573948	1	11594980	0	-41995630	-1	-34248157	0	-16605417	0
58	-20958446	0	-10478677	1	55939568	-1	87951746	-2	-34078912	0	-16546664	0
59	-23641360	0	-80933046	0	-42706375	-1	35738694	-1	-22720206	0	-11068658	0
60	-48507943	-1	-65930888	0	-21301401	-1	-20029135	-1	-25806244	-1	-90388405	-1
61	-26358704	0	-49197676	0	87651318	-1	-16269029	0	21210208	0	52864959	-1
62	-57532583	0	-15099832	1	56265607	0	12280135	0	-16737784	0	-33132344	-1
63	-12077250	1	-39585469	1	69897447	0	50574392	0	-71428263	0	32706116	-1
64	36713830	0	-81112872	0	41300740	0	-29210105	-1	-62335941	0	-23658313	0
65	24768102	0	92271658	0	44957190	0	-51651112	-1	-47261462	0	-30768948	0
66	21514096	-1	25671937	0	-71075991	-1	74805175	-1	21361331	0	12266958	0
67	-24262401	0	-72113117	0	-58271097	-1	12545734	0	23429366	0	15616882	0
68	-54010613	0	-12690499	1	25487034	0	19462835	0	11263165	0	12740976	0
69	-72122725	0	-19666246	1	49964535	0	32623944	0	91254226	-1	19767748	0
70	-13409416	1	-39681444	1	15827498	1	12627217	1	11788908	1	14305949	1
71	-79305253	0	-21319518	1	52609280	0	37442624	0	-11147749	0	98556023	-1
72	-14021288	1	-47573603	1	17778756	1	17559247	1	-12613799	1	63247906	0
73	58610281	0	30550474	1	10364490	1	-16220346	0	49992935	0	-48096073	-1

TABLE A4.- Continued.

Control Point	Mode 7		8		9		10		11		12	
74	34408121	0	21081051	1	-20155488	0	87012083	-1	39351823	0	26973392	0
75	18649311	-1	33358670	0	-30904462	0	19921197	0	20679361	0	22382875	0
76	-50326839	0	-16373603	1	15871191	0	18972026	0	-50006536	0	-12070843	0
77	-75079539	0	-21010586	1	52767239	0	34196298	0	-74534668	0	-19446570	0
78	-13254028	1	-47762359	1	19627977	1	16274031	1	-36781673	1	-22847433	1
79	10867401	1	47822315	1	21496518	0	-13874585	0	30823067	0	11282743	0
80	67886023	0	28150753	1	-53743289	0	89455472	-1	21871609	0	34084284	0
81	30039566	0	11343075	1	-84726545	0	-39443585	-1	-24260657	0	-34446482	-1
82	-28922553	0	-12429192	1	-62162131	-1	-63191753	-1	-33891569	0	-12749308	0
83	-38379183	0	-16368519	1	49571678	0	-19310271	0	-91492741	0	-46792600	0
84	-75679653	0	-27948378	1	28316942	1	-88143634	0	-93444442	1	-65868438	1
85	10078236	1	37451615	1	-10594059	1	-86310256	-1	-55218766	0	98152847	-2
86	56673483	0	16913846	1	-13667900	1	-24744934	0	-47111653	0	-89416142	-1
87	-10484267	0	-99708077	0	30650126	0	-67711091	0	-39993413	0	-52530889	0
88	-35447715	0	-73750779	0	35351536	1	-21702670	1	26410456	1	-19251491	0
89	78189115	0	17418047	1	-22865745	1	-75367811	0	-42176004	0	-46486512	0
90	65445077	0	14504500	1	-12237237	1	-10184554	1	-18114968	0	-65217608	0
91	51447821	-1	15319200	1	23612357	1	-88975207	0	32232165	1	13802697	1
92	11695257	1	13334039	1	-13116987	1	-81171081	0	-57034367	0	-97619698	0
93	99999998	0	99999999	0	99999999	0	99999999	0	99999998	0	99999998	0
94	-91896752	-1	-16274696	1	-11892065	0	13353049	-1	-17231410	0	-28919489	-1
95	18211329	1	56741172	1	40388041	-2	31268250	0	-12350548	0	17257802	0
96	11394948	1	40381413	1	16749333	-2	-40861299	-1	24698120	-1	12399613	0
97	23217717	0	11801749	1	35115873	-1	-24064116	0	99413643	-1	91516258	-1

TABLE A4.- Continued.

Control Point	Mode 13		14		15		16	
1	-11608584	1	37359033	2	57934625	2	-79879122	2
2	-79890905	0	27765406	2	28728418	2	-32801002	2
3	15008100	0	-76987270	1	20739402	2	43639852	0
4	27693116	0	-14905901	2	35627914	2	65813164	1
5	51486351	0	-28958428	2	91215574	2	11476877	3
6	-11195994	1	36616889	2	45791456	2	-67935768	2
7	-77292451	0	26850564	2	28144995	2	-36638559	2
8	24396703	0	-86104068	1	30090703	2	-22600856	2
9	45734190	0	-15908836	2	42446273	2	-26599887	2
10	74264350	0	-28471404	2	83101245	2	-11316261	2
11	-10085499	1	37275969	2	20218596	2	34931534	2
12	-72113094	0	28867497	2	21525826	2	48828148	2
13	52485348	0	-12752381	2	90466808	1	-31279756	2
14	76051285	0	-21961889	2	13933122	2	-69714612	2
15	11797226	1	-34672400	2	22887715	2	-15512895	3
16	-51816723	0	29529040	2	-60729404	2	23754266	3
17	-14617090	0	17249326	2	-63136394	2	15376416	3
18	81040388	0	-13649112	2	-59342757	2	-38629695	2
19	10510330	1	-20247085	2	-65175107	2	-69948833	2
20	16612352	1	-34919624	2	-98388972	2	-14012823	3
21	-85925941	0	-27465587	0	-21711958	0	-10401000	0
22	-14877729	1	-46470257	0	-50294097	0	-29461605	0
23	40610533	1	21198042	1	-50480834	0	-15540381	0
24	-28714984	1	-96592437	0	-60934156	0	-41448937	0
25	-19639482	1	-51927016	0	-70535191	0	-40133208	0
26	52454822	1	28165751	1	-24307958	0	-12165064	0
27	-64405600	1	-24849503	1	-15014044	1	-72045244	0
28	-23717617	1	-72449778	0	-71415059	0	-34637641	0
29	75856576	1	36681167	1	91597995	0	35589853	0
30	-81236776	1	-38085283	1	-14279579	1	-52587596	0
31	-12559185	1	-70737737	0	30755622	0	11374747	0
32	79617322	1	30976229	1	21653099	1	95184864	0
33	-50675784	1	-32244708	1	68486194	0	53509480	0
34	21803244	1	22094069	-1	27802225	1	12369658	1
35	35624953	1	-14271928	0	25234472	1	13899398	1
36	-19348787	0	-59280507	0	48903690	0	47184458	0

TABLE A4.- Continued.

Control Point	Mode 13		14		15		16	
37	98758209	-1	-53344496	0	-17624443	1	45851921	0
38	52329901	-1	-24464670	0	-20039681	1	34092934	0
39	35111533	-1	-44925601	-1	-11773491	1	31777764	0
40	-59884387	-1	-20959515	-1	-36271957	0	35191835	-1
41	-72120623	-1	-26854224	-1	19490017	0	-12370168	0
42	-44897925	-2	23737796	-1	23879581	0	64065774	-1
43	86112157	-1	44166807	-1	12246329	0	14059232	0
44	-72603371	-2	-10367720	0	-13849643	0	14630004	0
45	14093766	-1	-66997480	-1	-21128462	0	14447262	0
46	15563173	-2	67433489	-1	50367810	-1	75231933	-1
47	27589449	-1	13394305	0	72908358	0	-61167425	-1
48	36620511	0	70048914	0	16834361	1	-17882115	0
49	36247797	-1	32696058	-1	45215509	0	-23144056	-1
50	25263518	0	39725021	0	63569684	0	-17393679	0
51	10822502	0	18830313	0	21761384	0	-18528572	0
52	-28594098	-1	-39484199	-1	-17409024	0	-82296232	-1
53	-10790921	-1	-60183594	-1	-32829132	0	69399067	-1
54	-44747749	-1	-91631870	-1	-33533516	0	59011688	-1
55	-85101670	-1	-14400814	0	-16181859	0	-43955573	-3
56	-87518301	-1	-17612030	0	74085653	0	-88249014	-1
57	-17507882	0	-11003829	0	35203784	-2	-40378272	0
58	-17582864	0	-23966114	0	-32739029	0	-21229475	-1
59	-11873126	0	-16931141	0	-32888990	0	54537458	-1
60	-10725655	0	-66459646	-1	-21272594	0	-12334298	0
61	71271114	-1	22501374	-1	-30226914	0	12409663	-1
62	-49594246	-3	39310347	-1	-10290159	0	-46471952	-1
63	13113314	0	25060550	0	15203392	0	-12446248	0
64	-24050278	0	-20066657	0	55212067	-1	-50130115	0
65	-33857131	0	-43117338	0	-19062846	0	-40300730	-1
66	12514843	0	17140922	0	75695303	-1	21119566	-1
67	17400316	0	26624734	0	21602955	-1	-28905926	-1
68	16339729	0	25811931	0	17341291	0	19077508	-1
69	25224598	0	41125615	0	32834720	0	-26235407	-1
70	16212455	1	21543323	1	17976416	1	15601727	0
71	15461956	0	32871149	0	43017229	0	-64633816	-1
72	85586431	0	13227606	1	22325332	1	-56632624	-1
73	-10572286	0	-13460199	0	-11374472	0	36803219	-1

TABLE A4.- Concluded.

Control Point	Mode 13		14		15		16	
74	28951027	0	33283911	0	44774786	0	12088913	0
75	25848711	0	39581990	0	45220216	0	-45190464	-1
76	-70866561	-1	31747531	-2	24259564	0	-18100111	0
77	-13840564	0	-60716523	-1	33282577	0	-10651182	0
78	-24967286	1	-18100260	1	64975494	0	-55715631	0
79	10627963	0	62262457	-1	34752448	0	21199138	-1
80	39080774	0	42766927	0	72712725	0	19407117	-1
81	-35230688	-2	-14888783	-1	35229036	0	-76396621	-1
82	-84076311	-1	-11462061	0	22718009	-1	-18066913	0
83	-43079632	0	-59486754	0	-32099362	0	-24867654	0
84	-70529447	1	-79312372	1	-40691469	1	-12215721	1
85	68346503	-1	-55392079	-1	60930598	0	-62838220	-1
86	-37462199	-1	-17146364	0	32300018	0	-13689028	0
87	-52704383	0	-81368874	0	-88628855	0	-27088026	0
88	-29840247	0	-92109742	0	-30579179	1	-21347485	0
89	-46977624	0	-67556067	0	-35424615	0	-34188627	0
90	-70726826	0	-10832326	1	-94056728	0	-16027636	0
91	14455312	1	82586146	0	-73208810	0	10871748	1
92	-11202515	1	-14738780	1	-11372432	1	-89423391	-1
93	99999999	0	99999999	0	99999998	0	99999998	0
94	-24843781	-1	26706886	-1	12294179	-1	-26118074	0
95	16252900	0	37951792	0	13646913	1	-83199154	-1
96	13258952	0	15332587	0	63433303	0	10438120	-1
97	12463674	0	41274316	-1	-13891534	0	-60968327	-2

TABLE A5.- XB-70 SYMMETRIC FREE-FREE VACUUM VIBRATION MODE SHAPES
118 POINT GRID SYSTEM
HEAVY WEIGHT, $\delta_T = 25°$

Control Point	Mode 1		2		3		4		5		6	
1	15729866	1	-21168680	0	-14570536	2	43355986	0	-21875589	0	40754488	2
2	13123319	1	-16303020	0	-10542170	2	27523664	0	-14000480	0	25250701	2
3	10232215	1	-10906173	0	-60740260	1	99629218	-1	-52656425	-1	80543600	1
4	88247079	0	-84563928	-1	-40357952	1	28999643	-1	-14978464	-1	13489602	1
5	74781791	0	-65491183	-1	-24225453	1	-20550117	-2	91599359	-2	-97185146	0
6	68390736	0	-56438651	-1	-16568457	1	-16794536	-1	20616787	-1	-20733823	1
7	57371680	0	-40830840	-1	-33667393	0	-42207510	-1	40369978	-1	-39725735	1
8	50099102	0	-30529684	-1	53463943	0	-58980073	-1	53407084	-1	-52260398	1
9	35266881	0	-11294291	-1	13778237	1	-64901614	-1	50580030	-1	-41214593	1
10	11815938	0	19118425	-1	27109666	1	-74005944	-1	46110230	-1	-23750282	1
11	36353111	-1	26916526	-1	27719086	1	-64064323	-1	35380673	-1	-10309537	1
12	-33487023	-1	32895059	-1	27263385	1	-52400425	-1	24005831	-1	29399261	0
13	-22786539	0	36204034	-1	14379639	1	75835908	-2	-19509219	-1	54130886	1
14	-25263739	0	17060303	-1	-14735906	-1	51954947	-1	-29556742	-1	29387394	1
15	-23269527	0	11187058	-2	-78128686	0	55849644	-1	-23280741	-1	62437342	0
16	-18158007	0	-22095919	-1	-14241249	1	52765807	-1	-10016425	-1	-21849989	1
17	-10878311	0	-44423747	-1	-14335367	1	43532745	-1	56481264	-2	-39690978	1
18	-12648312	-1	-67277476	-1	-32429239	0	26987535	-1	19490940	-1	-29996912	1
19	13319349	0	-92078918	-1	14730195	1	57655804	-2	32599108	-1	48334846	1
20	23683724	0	-10948730	0	32510684	1	-64542895	-2	47131017	-1	14738399	2
21	34268721	0	-12535003	0	51656144	1	-14583233	-1	63392717	-1	25032816	2
22	-30424533	0	42730168	-1	12722454	1	50807456	-1	-44259526	-1	27738313	1
23	-30488977	0	20575204	-1	-23512543	0	48761592	-1	-35115879	-1	13063018	1
24	-27948042	0	35101578	-2	-10313606	1	46109137	-1	-20289355	-1	-16168064	1
25	-21731131	0	-20808136	-1	-16934606	1	36147119	-1	10611588	-2	-48213500	1
26	-12680001	0	-43582510	-1	-16893072	1	18536114	-1	19724425	-1	-60321015	1
27	-63792360	-2	-63307341	-1	-50731163	0	35174747	-2	32403502	-1	-38678299	1
28	14683593	0	-82891597	-1	14386014	1	41861536	-2	23988102	-1	14739397	1
29	25791114	0	-99077000	-1	32574840	1	18866531	-1	99907520	-2	78313140	1
30	36381344	0	-11412348	0	50153250	1	33340013	-1	-25056917	-2	14009068	2
31	-35731656	0	28648908	-1	-89903222	0	81639602	-1	-46611667	-1	10289654	1
32	-29528682	0	11541391	-1	-14345023	1	18412694	-1	-35112293	-2	-27645237	1
33	-22827758	0	-11944796	-1	-20727308	1	70533390	-2	22177761	-1	-54491226	1
34	-12895941	0	-32222846	-1	-19951042	1	-11047268	-1	45607669	-1	-51202580	1
35	-13728454	-2	-49676972	-1	-69206432	0	-91136740	-2	42311089	-1	-38132350	1
36	16157233	0	-53424392	-1	12232437	1	21551127	-1	96536374	-2	-21818438	1

TABLE A5.- Continued.

Control Point	Mode 1		2		3		4		5		6	
37	29390657	0	-51566644	-1	30130842	1	42353384	-1	-33038244	-1	-53960377	0
38	41770312	0	-49828749	-1	46874511	1	61813559	-1	-72975809	-1	99668534	0
39	-32844748	0	28971358	-1	-19463624	1	32256565	-1	31383547	-2	-14425235	1
40	-24033061	0	63114482	-2	-25990188	1	-24419219	-1	39601468	-1	-33063449	1
41	-13204291	0	-12359423	-1	-27139463	1	-70330126	-1	52678832	-1	-26245092	0
42	10930426	-1	-13025585	-1	-14015675	1	-61050069	-1	29468955	-1	-11704852	1
43	19197887	0	-46726558	-2	71239651	0	-10221358	-1	-13377199	-1	-32481503	1
44	33084400	0	91090387	-2	25419847	1	38649043	-1	-70003873	-1	-40184648	1
45	39057093	0	15036649	-1	33289044	1	59668559	-1	-94359431	-1	-43497828	1
46	43418838	0	-96419110	-3	40658857	1	73944458	-1	-10035127	0	-85928341	1
47	48842670	0	21479594	-2	47874176	1	10026515	0	-13005820	0	-13582860	2
48	51308049	0	35625733	-2	51153865	1	11222909	0	-14356135	0	-15851053	2
49	56567521	0	65804162	-2	58150538	1	13775218	0	-17236806	0	-20689865	2
50	-31162325	0	32660480	-1	-28502685	1	-91139141	-2	51017267	-1	-41653395	1
51	-25001381	0	22985638	-1	-30781138	1	-52574932	-1	51683174	-1	-10227789	1
52	-13452902	0	52217617	-2	-33984344	1	-12608233	0	53634937	-1	43128481	1
53	23284506	-1	21102627	-1	-20896544	1	-11294593	0	14650835	-1	15280185	1
54	21987043	0	38588487	-1	23771274	0	-47528415	-1	-33466459	-1	-34994460	1
55	36023796	0	59980821	-1	21157230	1	30187211	-1	-98264600	-1	-57996143	1
56	42061108	0	69181824	-1	29234693	1	63613286	-1	-12613477	0	-67889338	1
57	43843219	0	67027353	-1	34205859	1	70556339	-1	-14227707	0	-10348065	2
58	49284887	0	75004843	-1	40276197	1	10061631	0	-17952445	0	-14427042	2
59	51758373	0	78630975	-1	43035442	1	11427992	0	-19645508	0	-16281122	2
60	57035141	0	86366723	-1	48921831	1	14342498	0	-23257374	0	-20236493	2
61	-22434565	0	43728037	-1	-39315550	1	-12562534	0	46338996	-1	34180603	1
62	-10895653	0	26341682	-1	-42423336	1	-19843371	0	48002210	-1	87339199	1
63	46273923	-1	52415689	-1	-26759222	1	-16642371	0	12272660	-2	54153821	1
64	23984206	0	90204749	-1	-33809847	0	-80506784	-1	-46925697	-1	-16833901	1
65	38184081	0	12255179	0	15215947	1	17376918	-1	-10932142	0	-65666654	1
66	44291554	0	13646450	0	23214628	1	59477434	-1	-13615829	0	-86669987	1
67	45035046	0	13550062	0	26274032	1	50234039	-1	-17124786	0	-11541573	2
68	50988181	0	14884812	0	32476779	1	86132492	-1	-21226383	0	-16891998	2
69	53694151	0	15491516	0	35296210	1	10244997	0	-23090745	0	-19324009	2
70	59466888	0	16785819	0	41310994	1	13726059	0	-27068051	0	-24512299	2
71	-15933516	0	30148913	-1	-60935657	1	-30309980	0	70131680	-1	15484983	2
72	-81416934	-1	49086212	-1	-51511481	1	-27535058	0	41936195	-1	13495074	2
73	71031755	-1	86137447	-1	-33072876	1	-22401516	0	-13228885	-1	96017737	1

TABLE A5.- Continued.

Control Point	Mode 1		2		3		4		5		6	
74	26134996	0	14579149	0	-95820285	0	-11602195	0	-61420261	-1	27236253	0
75	40510542	0	18993592	0	88176431	0	35812159	-2	-12122877	0	-73927204	1
76	46693572	0	20892276	0	16731480	1	55023440	-1	-14695285	0	-10689530	2
77	48925641	0	21985343	0	18495090	1	57538510	-1	-16086668	0	-11436693	2
78	54548058	0	23713605	0	24215698	1	98245148	-1	-19757564	0	-16888543	2
79	57103702	0	24499179	0	26815974	1	11574817	0	-21426153	0	-19366657	2
80	62555742	0	26175069	0	32363229	1	15622127	0	-24985809	0	-24653300	2
81	-50269271	-1	67377927	-1	-58947094	1	-42534517	0	62529843	-1	26161767	2
82	30422966	-1	10563736	0	-45873078	1	-32133665	0	12345430	-1	16770527	2
83	12656605	0	14558516	0	-32556919	1	-22052951	0	-26119480	-1	92112385	1
84	26335978	0	19380268	0	-16646716	1	-10818844	0	-55874799	-1	26913555	1
85	37314942	0	23563044	0	-35832344	0	-11161918	-1	-82707885	-1	-45430975	1
86	48234110	0	28096463	0	95461617	0	88767322	-1	-10312055	0	-11388265	2
87	52212308	0	31953241	0	96984986	0	12358559	0	-67114432	-1	-82521402	1
88	57733968	0	34308825	0	17456020	1	17847488	0	-66696458	-1	-10612046	2
89	60243813	0	35379545	0	20982166	1	20342455	0	-66506471	-1	-11684730	2
90	65598149	0	37663748	0	28504611	1	25665052	0	-66101163	-1	-13973124	2
91	89271299	-1	16666941	0	-56986946	1	-37607683	0	17631358	-1	21657922	2
92	18625127	0	21335118	0	-43219041	1	-25205979	0	-17019081	-1	13646127	2
93	31185360	0	27930562	0	-26851685	1	-96220238	-1	-30490820	-1	64346451	1
94	42757187	0	34466536	0	-12301951	1	25592443	-1	-23029385	-1	80276219	0
95	53896929	0	39875457	0	13804017	0	13474333	0	-30682833	-1	-54461715	1
96	55999762	0	43277771	0	37750848	0	17691739	0	16195724	-1	-43414508	1
97	61652750	0	47009631	0	98654375	0	25358607	0	57325014	-1	-38124568	1
98	64222290	0	48705931	0	12633780	1	28843547	0	76020145	-1	-35720049	1
99	69703973	0	52324704	0	18539576	1	36278086	0	11590310	0	-30590408	1
100	24479642	0	30864499	0	-49408537	1	-26705562	0	49563804	-2	15298994	2
101	36366959	0	36731832	0	-33626538	1	-11710882	0	-22625545	-1	72203481	1
102	47802855	0	44085371	0	-19840785	1	41923931	-1	16947008	-1	43807977	1
103	59075718	0	51614880	0	-61806597	0	25085595	0	61889612	-1	71465888	1
104	64668772	0	57539708	0	14258028	0	39510641	0	10177562	0	78184047	1
105	71625985	0	64909615	0	10887500	1	57453990	0	15138991	0	86540782	1
106	41906206	0	48537932	0	-39487746	1	-68965354	-1	70567506	-1	80232763	1
107	53184170	0	56234598	0	-26401060	1	11414410	0	12958617	0	70163936	1
108	65141892	0	65253448	0	-11828301	1	34399970	0	22483453	0	64370527	1
109	72437177	0	70908711	0	-24721158	0	51020794	0	32862587	0	61865683	1
110	82401467	0	78632972	0	10307065	1	73722406	0	47038963	0	58444433	1

TABLE A5.- Continued.

Control Point	Mode 1		2		3		4		5		6	
111	54900855	0	66085077	0	-34637215	1	95073716	-1	81934683	-1	74935649	1
112	62200216	0	70801407	0	-25486934	1	25402877	0	21465006	0	67329807	1
113	69738352	0	75587658	0	-16107630	1	41457655	0	34830108	0	58994234	1
114	78323449	0	81038667	0	-54256448	0	59742262	0	50051472	0	49500940	1
115	90677616	0	88882802	0	99459926	0	86054260	0	71955390	0	35839860	1
116	74695035	0	86731761	0	-20722330	1	49058451	0	48144371	0	53196598	1
117	84671030	0	91962508	0	-86106425	0	69147233	0	68587455	0	36167169	1
118	99999999	0	99999999	0	99999999	0	99999998	0	99999999	0	99999999	0

TABLE A5.- Continued.

Control Point	Mode 7		Mode 8		Mode 9	
1	-84409126	-1	18510284	0	-13165963	0
2	-18286252	-1	93300200	-1	-69741694	-1
3	55055276	-1	-85245629	-2	-10641597	-2
4	69056369	-1	-41677402	-1	22617806	-1
5	29128651	-1	-33955417	-1	21313171	-1
6	10177688	-1	-28963149	-1	20693950	-1
7	-22496385	-1	-21907515	-1	19626327	-1
8	-44061273	-1	-17250797	-1	18921696	-1
9	-59620055	-1	-12609890	-2	17695455	-1
10	-84219750	-1	24020193	-1	15756669	-1
11	-57129718	-1	21377184	-1	37547364	-2
12	-25387181	-1	16352542	-1	-92268964	-2
13	69043206	-1	-65372452	-2	-33431983	-1
14	11202121	-1	-96092535	-2	51695326	-2
15	-19518148	-2	-66333624	-2	27247613	-1
16	-35692295	-1	-40237851	-2	29363310	-1
17	-89925709	-1	-46894928	-2	-59590385	-2
18	-31176889	-1	-95763553	-3	41801737	-2
19	-24972518	-1	22135668	-1	17481853	-1
20	-16731924	-1	48544988	-1	19521228	-1
21	14277706	-1	97253401	-1	17207932	0
22	-35307689	-1	70504529	-2	-33205650	-1
23	-74680319	-1	75532662	-2	92345815	-1
24	-83095165	-1	54007330	-2	76039484	-1
25	-94898341	-1	27013727	-2	32068044	-1
26	-10797881	0	11726719	-2	-13861857	-1
27	-68396031	-1	-83606460	-4	-35247248	-2
28	-50353969	-1	-12574458	-1	-12937822	-1
29	-46921019	-1	-25665814	-1	-27024726	-1
30	-38486980	-1	-32532601	-1	-64363522	-2
31	-27230025	0	24953001	-1	-70020174	-1
32	84422396	-1	-32707632	-2	-23811943	-1
33	63302131	-1	-39647865	-2	-63579522	-1
34	23124319	-1	24240016	-2	-72903475	-1
35	-49917659	-1	64728718	-2	-49492069	-1
36	-18623302	-1	-11944178	-1	-35148044	-1

TABLE A5.- Continued.

Control Point	Mode 7		Mode 8		Mode 9	
37	66433201	-1	-40435623	-1	13966600	-1
38	14600218	0	-67088909	-1	59912555	-1
39	10074586	0	87699026	-2	-10266129	0
40	29648944	0	-74349549	-2	-11441832	0
41	27591878	0	-45603975	-2	-12323670	0
42	-45326741	-1	12199782	-1	-31215953	-2
43	-14385486	-1	11659863	-1	22383355	-1
44	19432458	0	43193137	-2	48716317	-1
45	28409243	0	11620880	-2	60042322	-1
46	65866038	0	43423786	-1	-12276789	-1
47	72769089	0	84284665	-1	36183539	-2
48	75906839	0	10285779	0	10843419	-1
49	82600706	0	14248046	0	26256891	-1
50	47117710	0	-64844713	-2	-12555194	0
51	49413440	0	-92076954	-2	-13574348	0
52	50215259	0	-11854860	-1	-15439716	0
53	-50856420	-1	16184512	-1	55390998	-1
54	-26502714	-1	32282254	-1	82332956	-1
55	28490936	0	46227009	-1	65371825	-1
56	41885004	0	52224752	-1	58076714	-1
57	75467149	0	11235483	0	21002521	0
58	13031466	1	21227971	0	50768402	0
59	15524535	1	25770010	0	64298348	0
60	20843081	1	35459696	0	93162232	0
61	79784005	0	-21262527	-1	-71696668	-1
62	79331675	0	-23457465	-1	-91288289	-1
63	-98312154	-1	16792014	-1	93175380	-1
64	-14600322	0	39223262	-1	89022716	-1
65	23514792	0	45691821	-1	41561757	-2
66	39908389	0	48473997	-1	-32345563	-1
67	81426749	0	14035423	0	97916571	-1
68	14481599	1	28776339	0	22681969	0
69	17362929	1	35476756	0	28541202	0
70	23509764	1	49770977	0	41040898	0
71	17489852	1	-63245310	-1	-10366704	0
72	11068781	1	-35952578	-1	-23324896	-1
73	-14941833	0	17446246	-1	13386625	0

TABLE A5.- Continued.

Control Point	Mode 7		8		9	
74	-27469607	0	46698194	-1	96227073	-1
75	18155866	0	45115466	-1	-61768371	-1
76	37779726	0	44434722	-1	-12972340	0
77	84840349	0	12906731	0	-28043083	0
78	15751391	1	26622682	0	-78507905	0
79	19054734	1	32857205	0	-10144646	1
80	26101867	1	46157521	0	-15038204	1
81	12648572	1	-10033507	0	-46994846	-1
82	20743811	0	-14274610	-1	13741203	0
83	-51023340	0	27117181	-1	16813718	0
84	-64906657	0	10419277	-1	-73395238	-2
85	-10993144	0	14877084	-1	-22126763	-1
86	43151307	0	14363067	-1	-46887970	-1
87	97133487	0	-71486985	-1	-76641994	0
88	21542545	1	-14493382	0	-22436883	1
89	26919453	1	-17831874	0	-29151739	1
90	38390188	1	-24953990	0	-43476765	1
91	-60625061	0	-46429697	-1	-41001103	-1
92	-12126044	1	-25544649	-1	88613571	-2
93	-13225416	1	-61235581	-1	-68829505	-1
94	-72440927	0	-84722382	-1	-14169407	0
95	-16101503	0	-95633142	-1	-18806284	0
96	91545408	0	-21644074	0	-25447128	0
97	25504169	1	-37576403	0	-17412603	0
98	32935818	1	-44818372	0	-13760545	0
99	48790002	1	-60267904	0	-59694903	-1
100	-18770175	1	-99244433	-1	-12469444	0
101	-21580401	1	-12931491	0	-17112851	0
102	-13729862	1	-16871313	0	-24969769	0
103	10993464	1	-26183191	0	39187535	0
104	25144346	1	-37833247	0	56354387	0
105	42746663	1	-52324782	0	10014730	1
106	-29122481	1	-14444543	0	-29335247	0
107	-19995560	1	-19235475	0	-37003807	0
108	-39399786	0	-20742585	0	-13510243	0
109	10450148	1	-10692989	0	33191722	0
110	30104955	1	30332888	-1	96979770	0

TABLE A5.- Concluded.

Control Point	Mode 7		8		9	
111	-41062648	1	-62794271	0	-16287432	1
112	-28049746	1	-39881265	0	-10744398	1
113	-15255340	1	-16620131	0	-53440379	0
114	-68393320	-1	98717151	-1	80637226	-1
115	20284677	1	47994129	0	96569626	0
116	-27457488	1	-12174601	0	-96499846	0
117	-12690594	1	32048078	0	-19033562	0
118	99999999	0	99999999	0	99999998	0

TABLE A6.- XB-70 SYMMETRIC FREE-FREE VACUUM VIBRATION MODE SHAPES
97 POINT GVT GRID SYSTEM
LIGHT WEIGHT, δ_T = 25°

Control Point	Mode 1		Mode 2		Mode 3		Mode 4		Mode 5		Mode 6	
1	64192809	0	-68490765	-1	-10905524	0	19308706	0	-12687482	-1	11768250	0
2	57224538	0	-46908308	-1	20995807	0	-88393381	-1	-52886751	-1	99584519	-1
3	46068686	0	-24290326	-1	82538548	0	-53481090	0	-88637164	-1	71465558	-1
4	44450699	0	-25049160	-1	90081518	0	-58419692	0	-10429585	0	83559235	-1
5	39416911	0	-38257304	-1	13169673	1	-85502911	0	-14281578	0	89331736	-1
6	63383839	0	-62842057	-1	38923749	-1	-19852397	-1	-90923731	-1	59663959	-1
7	57418434	0	-45039780	-1	50453819	0	-33969818	0	-11833596	0	55841548	-1
8	46041279	0	-24952295	-1	96089304	0	-66091558	0	-16139439	0	62589974	-1
9	44656519	0	-25432036	-1	10598027	1	-72486522	0	-17591805	0	73049212	-1
10	39615894	0	-38132777	-1	14095195	1	-94267360	0	-19015832	0	50645651	-1
11	62355001	0	-55627350	-1	34965309	0	-34201992	0	-18240656	0	-86888048	-2
12	57584120	0	-41496149	-1	74038940	0	-57677166	0	-18603710	0	-11144266	-1
13	46917484	0	-26278425	-1	11106131	1	-82028618	0	-21390955	0	-13175328	-1
14	45021834	0	-27244411	-1	12008530	1	-86919830	0	-21569676	0	-13899697	-1
15	39849136	0	-39113560	-1	15734253	1	-10758822	1	-23100311	0	-14234017	-1
16	61446150	0	-50318272	-1	70533555	0	-65204900	0	-27409586	0	-93196799	-1
17	55112395	0	-33706384	-1	10635248	1	-87651205	0	-28461772	0	-90532726	-1
18	46665832	0	-29270928	-1	13362083	1	-10431471	1	-29939569	0	-89039526	-1
19	45334785	0	-29576680	-1	13994194	1	-10906893	1	-29247909	0	-11303783	0
20	40910858	0	-39747834	-1	16455519	1	-12456691	1	-27900386	0	-16953498	0
21	46835878	-1	39747292	-1	10575271	1	20980254	1	-61826894	-1	-10102343	0
22	27930916	-1	40055808	-1	13248667	1	25769038	1	-52032860	-1	-86506865	-1
23	-58335089	-3	84991510	-1	46066974	1	87758656	1	-10709754	0	-75523539	-1
24	98163453	-1	78079747	-1	24681348	1	47668843	1	-11949620	0	-16881609	0
25	63117079	-1	10134218	0	34419832	1	65120252	1	-90803674	-1	-12193266	0
26	27403749	-1	14918321	0	64002870	1	11938384	2	-16822156	0	-99143942	-1
27	13107706	0	13269987	0	41762484	1	76591792	1	-11344752	0	-16965438	0
28	96477086	-1	16625144	0	59238125	1	10889678	2	-16646067	0	-15584452	0
29	59537896	-1	22478873	0	92313922	1	16894915	2	-28922955	0	-12452205	0
30	16144948	0	19448460	0	71374343	1	12651650	2	-20375762	0	-18433240	0
31	12863729	0	22593553	0	88795527	1	15758747	2	-28660749	0	-16237164	0
32	95106877	-1	28214918	0	12116536	2	21573949	2	-42580831	0	-12893194	0
33	19262040	0	27024860	0	12108738	2	21138510	2	-39715241	0	-19633423	0
34	16100653	0	30045370	0	13615469	2	23659923	2	-47744844	0	-17180906	0
35	14179548	0	34903599	0	17040677	2	30113906	2	-65798122	0	-21786353	0
36	12657803	1	-15510505	0	-43964905	1	28361240	1	29948867	0	-26699354	0

TABLE A6.- Continued.

Control Point	Mode 1		2		3		4		5		6	
37	86253921	0	-84017957	-1	-16502945	1	93591544	0	26673570	-1	-32952912	-1
38	43319106	0	-24464945	-1	59407818	0	-35905886	0	-66890601	-1	10990020	0
39	24321142	-1	31269050	-1	15569615	1	-95836884	0	-82593075	-1	86427390	-1
40	-21042803	0	55153228	-1	14289511	1	-89202329	0	-42646398	-1	44611636	-2
41	-29385483	0	53709464	-1	92933294	0	-57864559	0	-39001578	-2	-46411550	-1
42	-31168255	0	31497858	-1	12532517	0	-59107304	-1	58169825	-1	-72529782	-1
43	-25372591	0	58978806	-1	-46723954	0	31712729	0	59828936	-1	-39509761	-1
44	-12870705	0	-37258296	-1	-57565953	0	43897451	0	48293761	-1	83498315	-2
45	-19971942	-1	-71383953	-1	-15246870	0	24625910	0	32843322	-1	39150438	-1
46	14899185	0	-10194953	0	36866580	0	16729607	-1	16788488	-1	62936109	-1
47	29492830	0	-13278743	0	11263073	1	-27958521	0	10962253	-1	99993306	-1
48	44795796	0	-16285041	0	19784849	1	-61294539	0	13603731	-1	14340060	0
49	-39833493	0	57932788	-1	58031382	0	-37342952	0	62700111	-1	-11658249	0
50	-38328372	0	37136427	-1	23479660	-1	-31120080	-1	44514583	-1	-78698337	-1
51	-31522112	0	42259588	-2	-56570759	0	37802391	0	39225766	-1	-82460727	-2
52	-15637065	0	-35589758	-1	-66612685	0	47776480	0	85562403	-2	53417980	-1
53	98252794	-2	-65223067	-1	-21426854	0	25807149	0	-47881053	-2	79500252	-1
54	16546324	0	-88526031	-1	34581078	0	-48607532	-1	21896641	-2	48292121	-1
55	32127358	0	-11676895	0	10630753	1	-41584245	0	35608375	-1	-14625939	-1
56	-42627832	0	49644317	-1	-21373276	0	14264963	0	87400115	-1	-10827106	0
57	-31827209	0	15584968	-1	-69144258	0	43404835	0	-28898126	-3	38844285	-1
58	-15150339	0	-18989588	-1	-73592507	0	52319393	0	-24283800	-1	11706513	0
59	14832412	-1	-46583092	-1	-26046403	0	27012210	0	-13386099	-1	93641100	-1
60	17734556	0	-52125016	-1	24326018	0	-31466318	-1	24630782	-1	19224019	-1
61	36063992	0	-51427422	-1	90117238	0	-55294099	0	43053383	-1	-11158338	0
62	48861031	0	-12175894	-1	11563303	1	-88955762	0	52837346	-1	-22753629	0
63	62526033	0	-90528875	-2	16582456	1	-13107660	1	11628876	0	-39081768	0
64	-34834027	0	53666594	-1	-89416023	0	56029002	0	-27917569	-1	11618305	0
65	-16054314	0	16686711	-1	-12375917	1	59245703	0	-17087267	0	15094499	0
66	40679290	-1	29142410	-1	-81680603	0	20651714	0	-16679642	0	54718565	-1
67	23420282	0	37547725	-1	-15126493	0	-22104840	0	-10545426	0	-43653159	-1
68	42246601	0	58644369	-1	53085511	0	-71490219	0	-62717597	-2	-23048990	0
69	49290213	0	64041805	-1	88584034	0	-97821614	0	26629416	-1	-30958017	0
70	62928320	0	78871373	-1	12568125	1	-14044173	1	10236130	0	-50523672	0
71	50414884	0	14085715	0	55534290	0	-10279225	1	-21632005	-1	-36496185	0
72	65377355	0	16954526	0	93306958	0	-14479505	1	69769962	-1	-58631144	0
73	-10179744	0	65390849	-1	-19975549	1	60672184	0	-39696768	0	16544831	0

TABLE A6.- Continued.

Control Point	Mode 1		2		3		4		5		6	
74	94910208	-1	10572644	0	-13470958	1	11051181	0	-34019359	0	19380165	-1
75	28255277	0	16125839	0	-65811379	0	-32844134	0	-23629275	0	-89318399	-1
76	47601064	0	21677532	0	34655556	-1	-78309653	0	-72920420	-1	-28062047	0
77	55039778	0	23853731	0	29447674	0	-97902894	0	-25175539	-1	-35189588	0
78	69494949	0	27915988	0	66575905	0	-12791062	1	80656466	-1	-56568317	0
79	37989873	-2	12092959	0	-21370375	1	39447966	0	-55716463	0	16154283	0
80	11082729	0	17006687	0	-16785792	1	14284533	0	-41660131	0	39628739	-1
81	29774357	0	24025701	0	-10054567	1	-17045817	0	-23451448	0	-71190203	-1
82	50559950	0	32821383	0	-21828016	0	-57577784	0	-24956120	-1	-18528605	0
83	58994412	0	35787846	0	85714137	-1	-67004625	0	61448471	-1	-19857452	0
84	74355362	0	42001025	0	77887596	0	-82723972	0	22011843	0	-27541328	0
85	17223959	0	23276303	0	-20127222	1	22022828	0	-47855827	0	64824522	-1
86	34142101	0	31455090	0	-13413930	1	-44319155	-1	-24552562	0	-51044313	-1
87	63755117	0	48805554	0	17545512	-1	-52496456	0	12326944	0	-67679525	-1
88	79302699	0	58937874	0	68192291	0	-60568318	0	37061730	0	61539363	-1
89	47088256	0	50036228	0	-14452319	1	-12495209	0	-24743476	0	10593513	-2
90	65203207	0	62284511	0	-66183705	0	-93742862	-1	88731288	-1	93242743	-1
91	88522241	0	82593957	0	61698707	0	21604554	0	74599368	0	42851264	0
92	81617909	0	87409698	0	-12077549	0	49610797	0	48030951	0	53984494	0
93	99999999	0	99999999	0	99999998	0	99999999	0	99999999	0	99999999	0
94	-25471088	0	-91102436	-3	-79299155	0	51337989	0	12395986	-1	39305373	-1
95	43292232	0	-16427161	0	19222799	1	-67761572	0	-29785828	-2	90824461	-1
96	43960715	0	-16222794	0	18890721	1	-75757990	0	36574053	-1	-20277919	-2
97	44935083	0	-15042875	0	18831107	1	-90261489	0	58607803	-1	-88244956	-1

TABLE A6.- Continued.

Control Point	Mode 7		8		9		10		11		12	
1	54283977	0	-29741929	1	49916272	-1	-35209406	0	-82762251	0	-62753548	0
2	81861481	0	-34092669	1	41220906	-1	-27994278	0	-33863192	0	-38173794	0
3	95501472	0	-36735754	1	17035532	-1	-93606112	-1	47587365	0	55668770	-1
4	11485799	1	-42381107	1	74427093	-2	-70603016	-1	66259646	0	94898766	-1
5	12888264	1	-51276903	1	15963833	-2	-55346281	-1	77906268	0	11424798	0
6	37523358	1	-57074490	1	69446811	-1	-38989620	0	-68571823	0	-58901123	0
7	40143669	1	-59730762	1	63481237	-1	-30753545	0	-25228351	0	-36711508	0
8	45356714	1	-66944114	1	35191379	-1	-11119462	0	52398670	0	11412662	0
9	46807994	1	-70005120	1	24204690	-1	-83202313	-1	62422265	0	20300937	0
10	49919275	1	-73373724	1	24832175	-1	-37165208	-1	70608060	0	27767587	0
11	81122510	1	-99861019	1	11170721	0	-40780153	0	-50369857	0	-47458741	0
12	83981041	1	-10316787	2	12285174	0	-33542530	0	-17624915	0	-30106084	0
13	92472598	1	-10959633	2	10924342	0	-10799707	0	70904780	0	30070829	0
14	94014999	1	-11201843	2	10738670	0	-62917771	-1	86395442	0	40647345	0
15	99146406	1	-11965545	2	10017692	0	38504776	-1	10815231	1	59945234	0
16	14497517	2	-15138113	2	16270250	0	-29061067	0	-15111097	0	-12795128	0
17	14641554	2	-15270198	2	16084147	0	-19558310	0	16780687	0	63559099	-1
18	14837065	2	-15346552	2	14549585	0	-17416271	-1	91292876	0	54943746	0
19	15149059	2	-15662066	2	16174434	0	123634C9	-1	10616084	1	67798530	0
20	15736001	2	-15980465	2	19805455	0	11030976	0	14213440	1	10300641	1
21	-18847946	0	-91900153	0	-20217535	-1	96418092	-1	13200702	1	63688695	0
22	-39428451	-1	-44035457	0	-59295628	-1	32961106	0	34544416	1	-56501690	0
23	-63836535	-1	34641248	0	-12999878	0	37286422	0	42639246	1	-10003878	2
24	-18410124	0	-16036868	1	-86543514	-1	42240858	0	41090954	1	15833938	1
25	-28517491	-1	-43948876	0	-10074527	0	53143001	0	54813277	1	-12305999	1
26	-39431730	-1	32161228	0	-27010839	-1	18819480	0	38162004	1	-10163740	2
27	-82645460	-1	-10318624	1	-25292768	0	86738242	0	89438035	1	22902815	1
28	-87317273	-1	-22153573	0	-10510271	0	52654322	0	55272216	1	-60722701	0
29	-14317453	0	29474757	0	17862775	0	-43030437	0	-25734309	1	-74514071	1
30	-16441048	0	-68011872	0	-23143177	0	54537228	0	53801107	1	59131267	1
31	-17059106	0	-19715491	0	59576030	-1	-15991472	0	-20496736	1	35972788	1
32	-30095336	0	98550439	-1	37324243	0	-12646337	1	-12686478	2	-70571127	0
33	-44386527	0	-62920480	0	13541101	0	-71735998	0	-86866399	1	13134472	2
34	-41350063	0	-37018816	0	44525541	0	-15877355	1	-17985351	2	12125592	2
35	-64897690	0	-90471384	-1	46356761	0	-19553022	1	-21704841	2	94318943	1
36	11759608	1	65280507	1	58376183	-2	39547820	0	-15010766	0	-63712709	-1

TABLE A6.- Continued.

Control Point	Mode 7		8		9		10		11		12	
37	-44345735	0	-22947085	0	55718038	-1	-21674101	0	-26097975	0	-42212306	-2
38	-78737429	0	-18120053	1	-41436646	-1	-56295149	-1	20376173	0	38096651	-1
39	-62055123	0	-51447549	0	-61687211	-1	16725668	0	77134264	-1	29104987	-1
40	-30103490	-1	12233762	1	33654783	-1	68544382	-1	-93527524	-1	-80543572	-1
41	39603249	0	24061684	1	83121905	-1	-20894255	-1	-32601587	0	-13368570	0
42	12011431	0	11569975	1	17153847	-1	-59836279	-1	23843129	0	22974383	-1
43	-12105385	0	-36238385	0	-43101298	-2	-28150537	-1	18327851	0	91983048	-1
44	-27319028	0	-13723809	1	-81922098	-1	-17181042	-1	-92929175	-1	-19076626	-1
45	-26939835	0	-11845483	1	-25984442	-1	44012079	-2	-60630136	-1	26490346	-2
46	85146355	-1	71477803	0	-74422435	-2	88217923	-1	30994421	0	71047104	-1
47	82385479	0	42795612	1	23971009	-1	23879371	0	-36836508	0	-43842554	-2
48	16510052	1	81664173	1	96308555	-1	48737769	0	58318754	-1	36032754	0
49	20247178	0	12040764	1	-56190951	-1	67491239	-1	-55370252	0	-67557046	-1
50	40416335	0	99050005	0	-65737459	-1	43474875	-1	30515441	0	24825584	0
51	14736586	0	-10089327	1	-86657096	-1	20614647	-1	99144958	-1	10356377	0
52	-12293926	0	-19072410	1	-97381390	-1	28658508	-1	-17095953	0	-43962548	-1
53	-24720315	0	-14198675	1	-63894145	-1	14862266	-1	-31994157	-1	-99394856	-2
54	-14147581	0	-41741108	0	-49344457	-1	-80776122	-1	82955378	-1	-26590367	-1
55	15410716	0	14039125	1	-49470710	-1	-22523164	0	27924347	-1	-81349429	-1
56	36466838	0	99722442	0	-23859292	0	15838586	0	-14452765	1	-28572883	0
57	30096903	0	-10880374	1	11289478	0	-37509904	-1	-47375549	0	-22950571	0
58	-15103761	0	-14873942	1	57009104	-1	32375317	-1	-44632991	0	-21292378	0
59	-22341070	0	-13263095	1	-39612206	-1	67726170	-1	-27528073	0	-12792329	0
60	-14832187	-1	-97712408	0	-26926093	-1	-46251137	-2	85825857	-2	-74703989	-1
61	-28116560	0	-10087274	1	61390124	-1	-17479934	0	28917129	0	85325313	-1
62	-50730275	0	-24081841	1	49441255	0	18692343	0	-16078442	0	-14262797	-1
63	-90670213	0	-55616190	1	58950645	0	67377419	0	-84032617	0	33496775	-1
64	51770001	0	-44119788	0	40462679	0	-22654400	-1	-89387840	0	-36601540	0
65	94919895	-1	97709753	0	45683127	0	-30237095	-1	-63969445	0	-39505183	0
66	-73659636	-1	17285133	0	-37215779	-1	11838391	0	29922967	0	16857526	0
67	-24877182	0	-11159294	1	-47583726	-1	18799495	0	36066868	0	22947963	0
68	-48841331	0	-19889324	1	21964773	0	27609735	0	23089181	0	20581823	0
69	-59835632	0	-28921223	1	44055810	0	43217465	0	20342846	0	28105959	0
70	-10128455	1	-56307707	1	14829050	1	14642991	1	14731232	1	16353526	1
71	-65928822	0	-30687438	1	46334190	0	51510202	0	-19030691	-1	18251854	0
72	-97449065	0	-64721260	1	16393418	1	21646030	1	-16043246	1	61684857	0
73	16092106	0	34542940	1	10587971	1	-18739793	0	58970267	0	-52450489	-1

TABLE A6.- Continued.

Control Point	Mode 7		8		9		10		11		12	
74	47101790	-1	25631359	1	-12932249	0	15138429	0	53244729	0	34815070	0
75	-84645333	-1	44172879	0	-26394385	0	30661855	0	35583442	0	32537994	0
76	-40504864	0	-22166257	1	12079547	0	32397066	0	-51944797	0	-85584087	-1
77	-62206575	0	-30046669	1	45593520	0	51157741	0	-82123244	0	-17722314	0
78	-91238170	0	-65556022	1	17435715	1	21888196	1	-40049381	1	-23323409	1
79	50560214	0	60176950	1	30844199	0	-11766092	0	34053882	0	11526291	0
80	33965455	0	37666871	1	-43211827	0	17247173	0	28302013	0	40115502	0
81	14970670	0	16563653	1	-77859639	0	53493495	-1	-20407032	0	22989146	-1
82	-21140247	0	-15987704	1	-86150964	-1	13114720	-1	-34505994	0	-10012785	0
83	-27588550	0	-22847330	1	41537045	0	-13321215	0	-11203444	1	-54163814	0
84	-65044417	0	-47790486	1	24005515	1	-55366958	0	-11249487	2	-74634835	1
85	58895226	0	51445355	1	-92793792	0	16434180	-1	-69348134	0	-68773174	-2
86	38941207	0	25898033	1	-12699548	1	-17263376	0	-51475828	0	-61024106	-1
87	-52606411	-1	-13816170	1	23770299	0	-72998727	0	-48312488	0	-53151555	0
88	-45556849	0	-23126688	1	32735361	1	-27266462	1	30870931	1	-22349216	0
89	61445875	0	30366726	1	-21550952	1	-72818744	0	-33140524	0	-38971246	0
90	51833311	0	21798708	1	-11823372	1	-11108841	1	-10153383	0	-63345128	0
91	-17643193	0	54240872	0	22424795	1	-13099550	1	36234056	1	14281887	1
92	11257609	1	22611010	1	-12673737	1	-90378466	0	-59158603	0	-10124549	1
93	99999998	0	99999998	0	99999998	0	99999999	0	99999999	0	99999999	0
94	10502465	0	-17590772	1	-11145826	0	27704159	-1	-23467658	0	-51984960	-1
95	13580383	1	76149910	1	67715638	-1	35141081	0	-22663240	0	13977328	0
96	77644022	0	51720310	1	29566910	-1	-61264371	-1	-41285999	-1	93681705	-1
97	75566012	-1	12352725	1	20359958	-1	-27139892	0	74249815	-1	74969164	-1

TABLE A6.- Continued.

Control Point	Mode 13		14		15		16	
1	-20544230	2	22189219	1	65340024	2	-77604377	2
2	-15154338	2	17304560	1	32344426	2	-31862752	2
3	40905197	1	-55576777	0	23214932	2	42704552	0
4	79016184	1	-10853578	1	40005073	2	63783751	1
5	15283685	2	-21581490	1	10275985	3	11134744	3
6	-20098677	2	22062111	1	51727088	2	-66013247	2
7	-14654370	2	16771842	1	31770204	2	-35603543	2
8	46836811	1	-55797997	0	33868019	2	-21964565	2
9	86619427	1	-10249698	1	47800399	2	-25857972	2
10	15375712	2	-19143095	1	93695895	2	-11065606	2
11	-20244095	2	23935120	1	23010928	2	33856508	2
12	-15581177	2	19172959	1	24469734	2	47343928	2
13	71938828	1	-65856035	0	10254345	2	-30391072	2
14	11718627	2	-11887855	1	15740852	2	-67706193	2
15	19176442	2	-20272439	1	25783583	2	-15063044	3
16	-15586420	2	21572358	1	-68180940	2	23061228	3
17	-88572323	1	14467696	1	-70976476	2	14929030	3
18	31016436	1	-43401610	0	-66822754	2	-37475447	2
19	11778434	2	-80053076	0	-73414638	2	-67873281	2
20	20072026	2	-15384442	1	-11094207	3	-13596425	3
21	-84731733	0	-47937548	0	-22418776	0	-98905556	-1
22	-16837183	1	-10434467	1	-63794082	0	-27609974	0
23	31234126	1	19247648	1	-67601256	0	-14086305	0
24	-29276091	1	-17354351	1	-72727799	0	-38990713	0
25	-22986937	1	-13941224	1	-89894240	0	-37298968	0
26	43242104	1	28249788	1	-26985168	0	-11261695	0
27	-66528797	1	-41898928	1	-19345340	1	-65671992	0
28	-26544833	1	-16243171	1	-91832920	0	-31819144	0
29	71491360	1	47229168	1	12653245	1	32905107	0
30	-79128186	1	-52415980	1	-19267997	1	-48446485	0
31	-90688504	0	-57023956	0	37285312	0	10565271	0
32	84507319	1	54207319	1	28144506	1	38030762	0
33	-36977793	1	-25777330	1	79211804	0	50264955	0
34	38574815	1	24965940	1	35710412	1	11478658	1
35	51919675	1	28521743	1	31067408	1	12866558	1
36	56025995	-1	-17027984	0	94245778	0	40765320	0

TABLE A6.- Continued.

Control Point	Mode 13		14		15		16	
37	39157104	0	34386897	-2	-19844733	1	44941564	0
38	19858030	0	21530620	-1	-25083090	1	36877613	0
39	58054817	-1	26C77073	-1	-16265223	1	34932984	0
40	-12698746	0	-87258049	-1	-61635486	0	56696184	-1
41	-16811419	0	-12822199	0	11100266	0	-11401955	0
42	-30239647	-1	-32200537	-2	28631580	0	60331376	-1
43	10937624	0	87573901	-1	18627264	0	13322055	C
44	40336347	-1	-21939944	-1	-14970938	0	14026504	0
45	55075324	-1	22525722	-2	-26327162	0	14082909	0
46	-62205949	-2	37174150	-1	30194824	-1	73591556	-1
47	-65701937	-1	73233660	-2	74918448	0	-63020851	-1
48	17306849	0	40110332	0	18762498	1	-17885556	C
49	-28979498	-1	-16722512	-1	46884702	0	-21847909	-1
50	17861739	0	28C79486	0	79137604	0	-17141877	C
51	69405961	-1	11877229	0	28317992	0	-18109814	0
52	-26978423	-1	-40506375	-1	-22491714	0	-77870754	-1
53	18924878	-1	-16300878	-1	-42316155	0	71862904	-1
54	-13840316	-1	-45CC4849	-1	-42182456	0	58C93849	-1
55	-65082463	-1	-10072102	0	-19739652	0	-82709363	-2
56	-15108954	0	-19866932	0	80223150	0	-93432861	-1
57	-26195141	0	-23274116	0	-56470222	-1	-39344486	0
58	-17962529	0	-23025713	0	-47478546	0	-15582904	-1
59	-10319164	0	-14CC0152	0	-46280783	0	58128620	-1
60	-11473949	0	-91193126	-1	-27581427	0	-12159497	C
61	12479765	0	10291800	0	-29720489	0	31709851	-2
62	-81402871	-3	42993836	-1	-12079124	0	-56547714	-1
63	97619899	-1	20521320	0	14459533	0	-13197531	C
64	-36966497	C	-36259081	0	-53996268	-1	-48827124	0
65	-37452244	0	-44345036	0	-35497768	0	-39251597	-1
66	13847884	C	17680140	0	10053112	0	22325754	-1
67	19148356	0	26585671	0	53734140	-1	-28237291	-1
68	18484134	0	27233072	C	27298533	0	78572886	-2
69	24815633	0	38239982	0	45783044	0	-38258063	-1
70	15449469	1	19598525	1	23520397	1	13848628	0
71	14293422	0	29253968	0	57538418	0	-78699286	-1
72	65493755	0	10266673	1	25538236	1	-71347795	-1
73	-12926220	0	-14906383	0	-16284180	0	30398493	-1

TABLE A6.- Concluded.

Control Point	Mode 13		14		15		16	
74	32689397	0	37986585	0	59951284	0	11549847	0
75	27604093	0	39463789	0	60741192	0	-47278478	-1
76	-69882910	-1	87892117	-2	32324822	0	-19139712	0
77	-15401661	0	-67744852	-1	39183038	0	-12187809	0
78	-29202662	1	-24547424	1	10004077	0	-55919562	0
79	10843633	0	95626503	-1	41907605	0	17000696	-1
80	42425463	0	47791945	0	94565460	0	16343407	-1
81	56290031	-1	76911536	-1	49599435	0	-82486647	-1
82	-37768338	-1	-32574474	-1	10690361	0	-19186242	0
83	-40257361	0	-49269780	0	-38206553	0	-26456558	0
84	-74331957	1	-80835391	1	-62624152	1	-12382221	1
85	12662305	0	76272425	-1	75812278	0	-66573730	-1
86	68780086	-1	11052572	-1	50586249	0	-14533295	0
87	-43462769	0	-61553983	0	-97962551	0	-28759177	0
88	-85125906	-1	-52807586	0	-32399037	1	-25868719	0
89	-29729542	0	-40799076	0	-24610161	0	-34488084	0
90	-51330272	0	-75161110	0	-96246255	0	-17688587	0
91	17720435	1	13777595	1	-42001149	0	10316132	1
92	-99149663	0	-12417806	1	-14251059	1	-90252811	-1
93	99999998	0	99999999	0	99999999	0	99999998	0
94	-63706526	-1	-38914564	-1	12529795	-2	-25343679	0
95	11032337	-1	16409706	0	14902350	1	-88257303	-1
96	88283849	-1	11307298	0	71945638	0	-16998643	-2
97	15498341	0	11022209	0	-14097355	0	-16065147	-1

TABLE A7.- XB-70 SYMMETRIC FREE-FREE VACUUM VIBRATION MODE SHAPES
118 POINT GRID SYSTEM
LIGHT WEIGHT, $\delta_T = 25°$

Control Point	Mode 1		2		3		4		5		6	
1	12782746	1	-16734911	0	-31426814	1	31976057	0	-23290871	0	15151394	2
2	10540816	1	-12813973	0	-22177954	1	19883430	0	-14692358	0	89594475	1
3	80541341	0	-84649847	-1	-11919393	1	64706465	-1	-51551422	-1	20915351	1
4	68477390	0	-64800414	-1	-72638218	0	11887349	-1	-10766461	-1	-51848783	0
5	57039831	0	-49061694	-1	-36420743	0	-79840447	-2	14380660	-1	-12132961	1
6	51611202	0	-41591597	-1	-19230779	0	-17415639	-1	26316283	-1	-15430594	1
7	42251497	0	-28712120	-1	10407089	0	-33677008	-1	46894941	-1	-21116341	1
8	36074092	0	-20211665	-1	29968082	0	-44409513	-1	60476857	-1	-24868934	1
9	23476057	0	-31751899	-2	47939847	0	-48266788	-1	55697631	-1	-18279976	1
10	35575425	-1	23760859	-1	76354664	0	-54365455	-1	48141288	-1	-78622978	0
11	-32649174	-1	31172672	-1	76792915	0	-47661074	-1	35353753	-1	-60635783	-1
12	-90590189	-1	37021034	-1	74878381	0	-39804373	-1	21984973	-1	64629443	0
13	-24627981	0	42451133	-1	42634417	0	17242717	-2	-27044238	-1	31228933	1
14	-25835163	0	27084480	-1	86705528	-1	36233409	-1	-39080067	-1	16872020	1
15	-23464315	0	12799680	-1	-91563930	-1	39190054	-1	-30503353	-1	50813050	0
16	-17912882	0	-91722351	-2	-25259477	0	37355333	-1	-13605761	-1	-92557823	0
17	-10356574	0	-31733327	-1	-28318239	0	31716291	-1	51674285	-2	-18748207	1
18	-59509002	-2	-57449772	-1	-88451924	-1	22359567	-1	20627876	-1	-16396725	1
19	13967730	0	-87496536	-1	23504448	0	10649433	-1	37251385	-1	16091844	1
20	24560202	0	-10970207	0	56816206	0	72779781	-2	55025203	-1	58734998	1
21	35324219	0	-13068045	0	93126311	0	87592672	-2	75201218	-1	10379365	2
22	-31582002	0	50373326	-1	38358330	0	35301229	-1	-60356141	-1	20456525	1
23	-30649794	0	30977599	-1	46657527	-1	31926107	-1	-43697909	-1	14517041	1
24	-27746137	0	15749416	-1	-13073385	0	30302964	-1	-24861495	-1	66150058	-1
25	-21210827	0	-72311514	-2	-29016475	0	23697726	-1	15429533	-2	-15773055	1
26	-12061657	0	-30560553	-1	-31820676	0	11283962	-1	24341139	-1	-24335820	1
27	-78998889	-3	-53656434	-1	-11324549	0	29168053	-2	37964049	-1	-19074897	1
28	15113863	0	-78678819	-1	22407041	0	57251385	-2	25518575	-1	16522061	0
29	26262392	0	-99434594	-1	54341425	0	19973618	-1	60887160	-2	28114090	1
30	36883284	0	-11889734	0	85369273	0	34341771	-1	-11292161	-1	54026801	1
31	-35343960	0	41005219	-1	-92062718	-1	56852317	-1	-59364582	-1	13777009	1
32	-29133855	0	24016256	-1	-19217220	0	70072162	-2	-27569192	-2	-14731568	0
33	-22203374	0	18011971	-2	-34424568	0	10548825	-3	28643626	-1	-16842152	1
34	-12233702	0	-19348593	-1	-35582693	0	-11416088	-1	56826543	-1	-21516706	1
35	39005278	-2	-40465144	-1	-13932836	0	-78176575	-2	50284185	-1	-18642781	1
36	16441808	0	-49945382	-1	17698858	0	15064481	-1	57006681	-2	-11168744	1

TABLE A7.- Continued.

Control Point	Mode 1		2		3		4		5		6	
37	29344352	0	-53816169	-1	47173440	0	27546382	-1	-50205429	-1	-68948075	0
38	41414474	0	-57437228	-1	74746435	0	39222998	-1	-10250468	0	-28966089	0
39	-32108502	0	42367983	-1	-28436073	0	18595241	-1	38818585	-2	33605593	0
40	-23207539	0	19665467	-1	-43107039	0	-26747797	-1	52475418	-1	-82315808	0
41	-12479901	0	-97367248	-3	-49169799	0	-65217188	-1	72736019	-1	-34448716	0
42	14964345	-1	-64911548	-2	-28565503	0	-60708607	-1	42481011	-1	-75453410	0
43	19141121	0	-43952808	-2	65381267	-1	-22307878	-1	-18181053	-1	-15181054	1
44	32638451	0	35424640	-2	36003770	0	12007746	-1	-94523599	-1	-20653789	1
45	38443753	0	69565476	-2	48677165	0	26767154	-1	-12735910	0	-23007653	1
46	42469619	0	-96554066	-2	62294304	0	41670552	-1	-13926915	0	-39822825	1
47	47578811	0	-84570099	-2	73660866	0	60584354	-1	-17961084	0	-59254408	1
48	49901171	0	-79704659	-2	78827486	0	69181536	-1	-19794796	0	-68086946	1
49	54855539	0	-68471720	-2	89849607	0	87522190	-1	-23705717	0	-86929692	1
50	-30110634	0	47144022	-1	-44183740	0	-12559971	-1	63754818	-1	-71686707	0
51	-24061789	0	35845389	-1	-51359547	0	-51386690	-1	70031477	-1	75807870	-1
52	-12688351	0	15098394	-1	-62605622	0	-11685721	0	81440402	-1	13836323	1
53	25885415	-1	24979118	-1	-42995043	0	-11363775	0	32550628	-1	37423605	0
54	21612314	0	35748504	-1	-38124131	-1	-63472768	-1	-37821623	-1	-16425029	1
55	35285877	0	51522800	-1	26189858	0	-52050505	-2	-12748511	0	-27370706	1
56	41166979	0	58307443	-1	39094061	0	19856334	-1	-16605005	0	-32078524	1
57	42823513	0	54824897	-1	47613904	0	25546442	-1	-18720447	0	-45573950	1
58	47922654	0	60325533	-1	56015915	0	48120843	-1	-23554504	0	-62449604	1
59	50240443	0	62825822	-1	59835011	0	58381935	-1	-25751802	0	-70120354	1
60	55135059	0	68159773	-1	67982415	0	80272263	-1	-30439372	0	-86484624	1
61	-21817196	0	54306994	-1	-68949050	0	-12025947	0	73693355	-1	16357334	1
62	-10449585	0	33917025	-1	-80015534	0	-18518766	0	84677133	-1	29417087	1
63	46699557	-1	53437517	-1	-55555051	0	-16732548	0	24308428	-1	18823902	1
64	23485185	0	84317019	-1	-15511886	0	-10081801	0	-49496192	-1	-80597587	0
65	37331744	0	11146331	0	14705218	0	-25507480	-1	-14014235	0	-28804523	1
66	43287253	0	12313913	0	27701822	0	68841463	-2	-17912995	0	-37727002	1
67	43932648	0	12007712	0	30995378	0	-48671548	-2	-21989256	0	-49425431	1
68	49526949	0	13071821	0	39550370	0	22378237	-1	-27458106	0	-70397199	1
69	52069813	0	13555507	0	43439003	0	34762506	-1	-29943947	0	-79929821	1
70	57494590	0	14587371	0	51734752	0	61182279	-1	-35247075	0	-10026608	2
71	-15679763	0	38900109	-1	-11393515	1	-27596360	0	12533628	0	51885433	1
72	-80386075	-1	54183243	-1	-98764672	0	-25877430	0	88162845	-1	46196373	1
73	69114787	-1	84085025	-1	-69083289	0	-22514305	0	15432213	-1	35065562	1

TABLE A7.- Continued.

Control Point	Mode 1		2		3		4		5		6	
74	25502122	0	13662157	0	-28111318	0	-14103596	0	-62068806	-1	94899355	-1
75	39534986	0	17601462	0	23371442	-1	-47371635	-1	-15377323	0	-30348633	1
76	45570626	0	19295787	0	15433257	0	-70859015	-2	-19321599	0	-43809977	1
77	47717942	0	20231804	0	17785206	0	-57207954	-2	-21205139	0	-48948753	1
78	53122568	0	21738591	0	26194241	0	25825948	-1	-26487149	0	-71076230	1
79	55579218	0	22423494	0	30016530	0	40165377	-1	-28888062	0	-81134173	1
80	60820068	0	23884621	0	38170747	0	70756157	-1	-34010011	0	-10259112	2
81	-50126157	-1	67524454	-1	-11262301	1	-38983991	0	13150789	0	95176352	1
82	28991213	-1	10252002	0	-91270770	0	-30320061	0	59026745	-1	63541580	1
83	12317455	0	13925010	0	-68577856	0	-22960601	0	-10076710	-2	37135926	1
84	25671931	0	18374538	0	-40610012	0	-13877733	0	-55571109	-1	11933583	1
85	36317091	0	22255166	0	-17413579	0	-59360305	-1	-10507327	0	-17628526	1
86	46940563	0	26496104	0	64937869	-1	24151383	-1	-14765899	0	-45824237	1
87	51129199	0	30369180	0	97947434	-1	57278929	-1	-11588913	0	-36713138	1
88	56872473	0	32673795	0	25493709	0	10457593	0	-13487357	0	-52083204	1
89	59483064	0	33721347	0	32629894	0	12607413	0	-14359286	0	-59069597	1
90	65052313	0	35956125	0	47853328	0	17193759	0	-16191201	0	-73973922	1
91	83186185	-1	16065597	0	-11272425	1	-36684930	0	73306635	-1	86090294	1
92	17896317	0	20457909	0	-88848562	0	-26658542	0	14557953	-1	57535127	1
93	30369783	0	26781397	0	-58111385	0	-13548372	0	-26464782	-1	29615154	1
94	41796612	0	33044612	0	-28830706	0	-29980088	-1	-40774127	-1	93240594	0
95	52710912	0	38171988	0	-26514762	-1	64060304	-1	-70266414	-1	-20910543	1
96	55117936	0	41630327	0	61288122	-1	10753400	0	-26117592	-1	-20941373	1
97	60931064	0	45388643	0	21176050	0	18126425	0	58083206	-2	-26608548	1
98	63573308	0	47096969	0	28015704	0	21477709	0	20320097	-1	-29304355	1
99	69210281	0	50741397	0	42666965	0	28627394	0	51278560	-1	-34869477	1
100	23497350	0	29643956	0	-97961300	0	-28800191	0	40081446	-1	67330374	1
101	35209763	0	35234887	0	-69574142	0	-16458318	0	-19625980	-1	36987040	1
102	46777517	0	42480817	0	-34458190	0	-14548801	-1	30307817	-2	21953654	1
103	58281165	0	50006630	0	-10249157	0	17457905	0	21977744	-1	15807031	1
104	64214831	0	56008159	0	77021123	-1	30759007	0	44980021	-1	89047941	0
105	71535731	0	63473474	0	30031989	0	47304280	0	73592608	-1	20601415	-1
106	40851912	0	46967795	0	-71940094	0	-11744981	0	84216206	-1	45001595	1
107	52337290	0	54671960	0	-41852448	0	52475104	-1	12283838	0	36048564	1
108	64617634	0	63818122	0	-60824776	-1	27236691	0	19667506	0	24604130	1
109	72136341	0	69698364	0	20134624	0	44154875	0	29161766	0	15991585	1
110	82405792	0	77729914	0	55943347	0	67262637	0	42129534	0	42283322	0

TABLE A7.- Continued.

Control Point	Mode 1		2		3		4		5		6	
111	54338916	0	64185812	0	-59445957	0	27864056	-2	67411232	-1	48398321	1
112	61762559	0	69200912	0	-31444793	0	17384780	0	19781944	0	39840515	1
113	69418901	0	74283359	0	-29251518	-1	34646268	0	32904663	0	31201003	1
114	78138623	0	80071701	0	29554980	0	54305185	0	47849981	0	21361560	1
115	90686513	0	88401267	0	76294683	0	82594846	0	69356659	0	72023618	0
116	74596442	0	85568756	0	47961422	-2	42636535	0	47179217	0	38314865	1
117	84611306	0	91257996	0	39713611	0	65250977	0	68032794	0	27152274	1
118	99999999	0	99999999	0	99999999	0	99999998	0	99999999	0	99999998	0

TABLE A7.- Continued.

Control Point	Mode 7		Mode 8		Mode 9	
1	-27629719	-1	16957086	0	-56167202	-1
2	58727424	-2	83387177	-1	-34598398	-1
3	43032677	-1	-12205202	-1	-10674922	-1
4	46893429	-1	-42529691	-1	-13864532	-3
5	15627104	-1	-31707552	-1	72126134	-2
6	78711316	-3	-26571022	-1	10701754	-1
7	-24799078	-1	-17714935	-1	16717514	-1
8	-41685964	-1	-11869918	-1	20687915	-1
9	-49223755	-1	55704921	-2	18881275	-1
10	-61141614	-1	33145193	-1	16024830	-1
11	-36101817	-1	29633768	-1	-30841697	-3
12	-76732094	-2	23464777	-1	-17956558	-1
13	76675144	-1	-52650869	-2	-63690905	-1
14	21190020	-1	-12141101	-1	75497397	-2
15	60758224	-2	-91570568	-2	31880700	-1
16	-28456562	-1	-52210612	-2	31319150	-1
17	-80513854	-1	-34689105	-2	-99607497	-2
18	-29182636	-1	68202026	-3	80080376	-3
19	-34293718	-2	22677391	-1	33321868	-1
20	24115239	-1	50350016	-1	-23808157	-2
21	85583517	-1	94711343	-1	16490602	0
22	-24590731	-1	10958785	-1	-79920820	-1
23	-45964167	-1	47159611	-2	95277292	-1
24	-58403349	-1	31231903	-2	80174376	-1
25	-76602700	-1	26086635	-2	31451985	-1
26	-93172678	-1	38345311	-2	-20270704	-1
27	-57825128	-1	27062072	-2	-47830837	-2
28	-39296149	-1	-11165692	-1	-66967056	-2
29	-33208249	-1	-25560677	-1	-34807960	-1
30	-19511226	-1	-34886220	-1	-16124213	-1
31	-23014043	0	32227077	-1	-14479154	0
32	81588638	-1	-30126592	-2	-48783167	-1
33	57018136	-1	-16044051	-2	-39666262	-1
34	22398312	-1	69207313	-2	-95005840	-1
35	-41208147	-1	11659948	-1	-58201447	-1
36	-22811347	-1	-88060672	-2	-27068658	-1

TABLE A7.- Continued.

Control Point	Mode 7		Mode 8		Mode 9	
37	38352416	-1	-39088475	-1	27338792	-1
38	95570128	-1	-67417178	-1	78236083	-1
39	91627423	-1	13593092	-1	-17687451	0
40	26176469	0	-43094912	-2	-16324468	0
41	25082800	0	85446333	-3	-15968330	0
42	-22436773	-1	18633177	-1	24252308	-2
43	-14500310	-1	18514814	-1	47719189	-1
44	14234718	0	11266285	-1	79454851	-1
45	20980847	0	81486380	-2	93104599	-1
46	51235551	0	55474477	-1	-36873400	-2
47	55530761	0	10156368	0	79570554	-2
48	57483130	0	12251331	0	13249963	-1
49	61648183	0	16720587	0	24541497	-1
50	41064456	0	-45663357	-2	-19950352	0
51	43753476	0	-60503382	-2	-19925367	0
52	45648282	0	-60646916	-2	-19988061	0
53	-11865955	-1	23380263	-1	77405443	-1
54	-18113484	-1	42567646	-1	12355624	0
55	21862939	0	58453054	-1	10804369	0
56	32045427	0	65285486	-1	10137163	0
57	60727844	0	12517455	0	26769354	0
58	10780868	1	22288288	0	59788753	0
59	12920906	1	26729576	0	74797572	0
60	17486320	1	36204323	0	10681638	1
61	71539270	0	-21254650	-1	-11389165	0
62	72351732	0	-20647485	-1	-11589087	0
63	-37063503	-1	25578413	-1	12434382	0
64	-11101885	0	53164890	-1	13506027	0
65	17300075	0	63084492	-1	35438345	-1
66	29515971	0	67350987	-1	-74097957	-2
67	65123683	0	16302769	0	13601732	0
68	11824137	1	31918269	0	24191254	0
69	14238577	1	39016224	0	29004674	0
70	19389383	1	54158526	0	39273302	0
71	15606868	1	-69215293	-1	-12783291	0
72	10110929	1	-36352032	-1	-25440380	-1
73	-64199324	-1	27945652	-1	17489283	0

TABLE A7.- Continued.

Control Point	Mode 7		8		9	
74	-21107079	0	64577306	-1	14744923	0
75	12386221	0	68072195	-1	-42752028	-1
76	26791941	0	69575372	-1	-12455902	0
77	66135758	0	16319971	0	-27934933	0
78	12429585	1	32198092	0	-80479683	0
79	15073225	1	39415419	0	-10436366	1
80	20712991	1	54812384	0	-15531615	1
81	11825503	1	-10404777	0	-56617738	-1
82	26635418	0	-79905996	-2	16521554	0
83	-36943033	0	41591438	-1	21370441	0
84	-53113993	0	30633324	-1	25756735	-1
85	-10824014	0	34463967	-1	-23587976	-2
86	31721571	0	32611828	-1	-38554919	-1
87	73034503	0	-41959030	-1	-88266980	0
88	16270137	1	-81762905	-1	-25715234	1
89	20345903	1	-93855576	-1	-33391842	1
90	29040872	1	-13845327	0	-49768605	1
91	-41941252	0	-27865009	-1	-62895991	-1
92	-96378690	0	-30315063	-2	12261413	-1
93	-10990554	1	-40774958	-1	-50574820	-1
94	-62563656	0	-68992457	-1	-12711468	0
95	-18138524	0	-82768052	-1	-18132699	0
96	71698547	0	-21978944	0	-28536534	0
97	20882137	1	-40880920	0	-19807466	0
98	27114993	1	-49472727	0	-15839707	0
99	40411751	1	-67801915	0	-73751551	-1
100	-15292031	1	-73701334	-1	-11514433	0
101	-18084737	1	-10453708	0	-14054640	0
102	-11736514	1	-15403478	0	-23411367	0
103	92239822	0	-29496300	0	43174568	0
104	21099574	1	-44232127	0	20871686	0
105	35869438	1	-62562058	0	10532420	1
106	-24419165	1	-11664251	0	-25958851	0
107	-16968380	1	-17807855	0	-36036217	0
108	-34837554	0	-21981980	0	-13374911	0
109	89076220	0	-14129966	0	34559381	0
110	25832430	1	-34052635	-1	10023061	1

TABLE A7.- Concluded.

Control Point	Mode 7		8		9	
111	-35752047	1	-59708396	0	-16887740	1
112	-24336716	1	-38210708	0	-11177629	1
113	-13112657	1	-16788234	0	-56223556	0
114	-32970028	-1	86790288	-1	70448393	-1
115	18065286	1	44607529	0	98089604	0
116	-23496176	1	-10143267	0	-10243026	1
117	-10290953	1	33275569	0	-22626022	0
118	99999999	0	99599998	0	99999998	0

TABLE A8.- XB-70 SYMMETRIC FREE-FREE VACUUM VIBRATION MODE SHAPES
97 POINT GVT GRID SYSTEM
MEDIUM WEIGHT, $\delta_T = 65°$

Control Point	Mode 1		2		3		4		5		6	
1	12202872	1	-53414409	-1	54718275	0	-10489188	-2	-16765790	-1	31608054	0
2	10746038	1	-41464104	-1	31408683	0	-23018629	-1	-46297683	-1	40781945	0
3	84590895	0	-21043960	-1	-13587420	0	-34555474	-1	-72134685	-1	52658433	0
4	81197933	0	-15685263	-1	-21315069	0	-40507658	-1	-83470828	-1	59494183	0
5	70675700	0	-77932564	-2	-45852410	0	-40935418	-1	-95786475	-1	68669354	0
6	11921306	1	-43196730	-1	79178883	0	-12314763	0	-15730092	0	70921085	0
7	10822211	1	-33253447	-1	65497077	0	-14022384	0	-18153941	0	82667016	0
8	86053960	0	-14986708	-1	19508651	0	-15917989	0	-22226563	0	10484077	1
9	83568876	0	-10969116	-1	12793378	0	-16031222	0	-22469650	0	10463816	1
10	73883886	0	-19570919	-2	-32479224	-1	-17006918	0	-24748984	0	11939523	1
11	11582367	1	-29945529	-1	12346750	1	-29092170	0	-34986181	0	12801409	1
12	10860060	1	-22358684	-1	11985691	1	-30563224	0	-36932166	0	13751156	1
13	90529244	0	-62673888	-2	71530624	0	-33242515	0	-41970679	0	15916579	1
14	87030901	0	-24688926	-2	61277744	0	-33775395	0	-43072660	0	16452911	1
15	77402215	0	46623638	-2	52393375	0	-35080569	0	-45713527	0	18134341	1
16	11380391	1	-14524167	-1	19288544	1	-51715260	0	-61305260	0	20912883	1
17	10584780	1	-57578275	-2	18245783	1	-52179207	0	-62570821	0	22075420	1
18	93734828	0	48828509	-2	13447336	1	-52832977	0	-65229798	0	23628800	1
19	91239672	0	83523379	-2	12403522	1	-53923813	0	-66719165	0	23743891	1
20	84622749	0	13589662	-1	11360817	1	-56432359	0	-70177876	0	24666538	1
21	81646697	-1	23170360	-1	66986122	-1	43558895	0	-12802940	0	-28059331	0
22	52794918	-1	55512194	-1	33813780	0	55016442	0	-12284669	0	-25310395	0
23	41590578	-1	10978820	0	10674801	1	19061552	1	-35730359	0	-46147541	0
24	18366395	0	84239292	-1	45250051	0	98623175	0	-26813213	0	-53299928	0
25	89209338	-1	12260895	0	88086666	0	14112148	1	-28053680	0	-46892499	0
26	64036464	-1	18348008	0	16372716	1	26313162	1	-47026094	0	-61955044	0
27	23651633	0	14280689	0	85019247	0	16708274	1	-34801084	0	-58249450	0
28	14290773	0	18988325	0	13368533	1	24176486	1	-44426910	0	-62681255	0
29	10555285	0	25968897	0	23247792	1	37772630	1	-65321638	0	-81559047	0
30	28250075	0	23092734	0	15004542	1	28522542	1	-50823168	0	-69849582	0
31	20030197	0	27780073	0	20255009	1	35804888	1	-60295057	0	-75350771	0
32	14196277	0	35631795	0	30617168	1	48996028	1	-80506789	0	-94068258	0
33	35356737	0	35830849	0	27031434	1	48161576	1	-81162440	0	-97521031	0
34	27384230	0	39632290	0	32364065	1	54121504	1	-89197369	0	-10311207	1
35	19213660	0	51861633	0	42138017	1	68921539	1	-11071739	1	-12444014	1
36	24034475	1	-18225476	0	41894606	1	-77112182	-1	87293155	-1	-13603298	1

TABLE A8.- Continued.

Control Point	Mode 1		2		3		4		5		6	
37	15679902	1	-92476597	-1	15619446	1	-16334930	-1	36461178	-1	-34812003	0
38	83247990	0	-27774525	-1	-31543825	0	33790201	-1	51075835	-2	32108790	0
39	16193565	0	24973940	-1	-12606872	1	45332802	-1	-60637619	-2	41068289	0
40	-33155695	0	48562235	-1	-12053270	1	27951031	-1	-38430930	-2	13111994	0
41	-49339148	0	46950928	-1	-68919664	0	-11793962	-1	-15792532	-1	-44295683	-1
42	-51817030	0	22881449	-1	31066608	-1	-14386729	-1	60168956	-2	-30196399	0
43	-43468684	0	-11651449	-1	51267052	0	-77219522	-2	14129744	-1	-27933439	0
44	-23251432	0	-45284702	-1	66416495	0	20739429	-1	24690726	-1	-10556194	0
45	-72818925	-2	-75398104	-1	28201693	0	61846623	-1	34940870	-1	51690714	-1
46	21237350	0	-10350296	0	-33963134	0	11851955	C	51569606	-1	22317899	0
47	42590043	0	-13588330	0	-10235500	1	18414788	0	68135193	-1	47710634	0
48	62525090	0	-17785970	0	-17444468	1	24233C06	0	80529808	-1	65086544	0
49	-65302384	0	46602886	-1	-25389951	0	-50827069	-1	-23314798	-1	-35499581	0
50	-64232014	0	27862920	-1	23739341	0	-33693227	-1	-19966340	-2	-36693850	0
51	-53403058	0	-52179456	-2	76149513	0	-90180125	-2	18617971	-1	-27064181	0
52	-27064852	0	-39943025	-1	75350391	0	23432737	-1	27427455	-1	-44347140	-1
53	30233831	-2	-68260986	-1	26426399	0	59622774	-1	33916938	-1	99966710	-1
54	21854757	0	-87157357	-1	-35309120	0	83346495	-1	35103281	-1	81914731	-1
55	45666108	0	-11184497	0	-10846756	1	10898684	C	33645872	-1	52784829	-1
56	-67231280	0	30556047	-1	37324343	0	-21853730	-1	77571694	-2	-33271757	0
57	-51669223	0	-83408066	-3	90597032	0	-19746372	-1	43479323	-2	-67798078	-1
58	-23568413	0	-28952469	-1	92051907	0	18265895	-2	71559501	-2	20690852	0
59	15328061	-1	-46858198	-1	39774544	0	20811948	-1	87070512	-2	17288586	0
60	24361005	0	-42126542	-1	-25785584	0	20360074	-1	28951327	-2	-38615310	-1
61	49329968	0	-36797575	-1	-10010622	1	45048931	-2	-95588855	-2	-36222822	0
62	70078756	C	10907872	-1	-13824290	1	-67817180	-1	-47773972	-1	-70862955	0
63	83971968	0	52648794	-2	-21444435	1	-95096675	-1	-61441912	-1	-12669769	1
64	-54308281	0	68747409	-2	13678027	1	-49687949	-1	-38079069	-1	53475969	0
65	-24568442	0	-96523568	-2	14420526	1	-35934869	-1	-31429513	-1	76267824	0
66	40140382	-1	10700296	-1	74471966	0	-47429484	-1	-37033318	-1	47827487	0
67	34982057	0	44822513	-1	-28361885	-1	-77008948	-1	-49934655	-1	53274069	-1
68	64258584	C	75801964	-1	-87966586	0	-12400785	C	-72421192	-1	-53457786	0
69	75627481	0	86942161	-1	-12640419	1	-14627214	C	-83217919	-1	-83027268	0
70	96233986	0	89075689	-1	-20263627	1	-19792802	C	-10626913	0	-15198183	1
71	86031063	0	18029804	0	-11060908	1	-23675966	0	-11897908	0	-10111521	1
72	10438737	1	19947118	0	-17847344	1	-28901996	0	-13899310	0	-17270788	1
73	-24490606	0	26075370	-1	21861086	1	-10414124	C	-10616081	0	17261642	1

TABLE A8.- Continued.

Control Point	Mode 1		2		3		4		5		6	
74	11344514	0	12067667	0	12718252	1	-14658817	0	-10059901	0	99281600	0
75	43030500	0	17799204	0	37082611	0	-18007299	0	-97397519	-1	23003186	0
76	78769516	0	24551757	0	-49940911	0	-23841562	0	-10834018	0	-65472672	0
77	91599223	0	26681644	0	-85665616	0	-25443147	0	-10912619	0	-96984998	0
78	11367637	1	32475000	0	-15141242	1	-33245303	0	-13338847	0	-18328424	1
79	-18646710	-1	51732567	-1	10955991	1	-59471717	-1	-61436554	-1	12798168	1
80	91836200	-1	10209652	0	76033267	0	-70443009	-1	-45850795	-1	80402879	0
81	25299779	0	15514721	0	42045448	0	-81325995	-1	-29330214	-1	30141721	0
82	40573955	0	19487577	0	79805825	-1	-78292085	-1	-49831913	-2	-22979104	0
83	47752502	0	21957500	0	-11820974	0	-63334180	-1	16410520	-1	-44446567	0
84	56943519	0	25059896	0	-47437400	0	-62606303	-1	13297226	-1	-79527699	0
85	12740960	0	17567683	0	10501638	1	-89637502	-1	-47482120	-1	10315481	1
86	31319937	0	25729456	0	82121443	0	-10812642	0	-25182046	-1	43588891	0
87	56631503	0	36704562	0	25862391	0	49747603	-1	13875431	0	-15489926	0
88	69520953	0	43259503	0	-13436981	0	18087384	0	29007309	0	-29712960	0
89	39022304	0	39649215	0	12738927	1	13220833	-1	94705173	-1	74761623	0
90	56810958	0	51166844	0	10176437	1	18579697	0	26540180	0	45690956	0
91	88371932	0	67670560	0	46133588	0	63925259	0	67063326	0	24016191	0
92	74348038	0	85883381	0	13432612	1	55859836	0	63067555	0	80056164	0
93	99999999	0	99999998	0	99999999	0	99999998	0	99999999	0	99999999	0
94	-41063359	0	-22714006	-1	86243271	0	-36851907	-2	16837601	-1	-16318003	0
95	62258705	0	-14649766	0	-16436570	1	19852745	0	55349295	-1	65873513	0
96	62816684	0	-14216947	0	-16034901	1	15200220	0	36012474	-1	32230800	0
97	63140204	0	-10694993	0	-15107155	1	76180106	-1	32352662	-2	-39388902	-1

TABLE A8.- Continued.

Control Point	Mode 7		8		9		10		11		12	
1	52903502	0	95419950	1	38282132	-1	-74719466	0	-86602877	0	-87706587	1
2	65163816	0	89833905	1	25234437	-1	-46485381	0	-60368084	0	-63704638	1
3	73468261	0	77267402	1	-11925565	-1	10843233	0	90064781	-1	14810097	1
4	83048284	0	78438540	1	-19904987	-1	21164808	0	21763708	0	30336131	1
5	93987833	0	86528897	1	-43195842	-1	43420651	0	46370304	0	59930104	1
6	17264736	1	-56370112	1	10514026	0	-30441865	0	-71688933	0	-81539647	1
7	18313740	1	-60051206	1	82682513	-1	-70283458	-1	-46737137	0	-57658258	1
8	20363621	1	-85389437	1	31146185	-1	48345944	0	22549712	0	21099549	1
9	20631593	1	-90714446	1	22210476	-1	57564086	0	34609302	0	36567128	1
10	22639684	1	-10316110	2	-48967298	-2	78997310	0	56831339	0	62775854	1
11	33886630	1	-26831452	2	18176538	0	29392600	0	-52084772	0	-76159684	1
12	35136147	1	-28105292	2	16037766	0	47136866	0	-33208609	0	-56733823	1
13	38138707	1	-33776482	2	10056509	0	10546284	1	43132953	0	34066068	1
14	39016450	1	-34177875	2	86261864	-1	11597741	1	56672223	0	51428331	1
15	41407790	1	-37055397	2	58305511	-1	13769272	1	79532882	0	79271459	1
16	57465422	1	-59172528	2	26557686	0	12739871	1	-98032685	-1	-51852303	1
17	58177468	1	-59965354	2	22641359	0	14442189	1	14950461	0	-24292122	1
18	59261764	1	-62285689	2	16730757	0	17954034	1	68866188	0	42598669	1
19	60682182	1	-64136195	2	15970873	0	19067005	1	81122700	0	57158921	1
20	63640910	1	-69762874	2	14279278	0	21874123	1	11051312	1	89693760	1
21	-29413332	-1	34331921	0	-11186795	-1	-29269722	0	30970108	1	94473257	1
22	-30031210	-2	41807469	0	16777490	-1	-45440118	0	11546085	2	40196061	1
23	-14010668	0	21428882	1	17038468	-1	-51018222	0	22764293	2	-93340958	2
24	-64200772	-1	60707922	0	-22293339	-1	-82687345	0	11083030	2	27319183	2
25	-46962176	-1	62754351	0	33760853	-1	-76818919	0	18328498	2	21026910	1
26	-15132732	0	19064981	1	25101866	-1	-28445654	0	19312069	2	-10186444	3
27	-50306677	-1	20246956	0	-10681611	-1	-14882276	1	27018718	2	51917031	2
28	-97436514	-1	88695693	0	43732787	-1	-77360157	0	17843905	2	86558825	1
29	-21878557	0	21039147	1	16790393	-1	59001824	0	-49612160	1	-95413589	2
30	-90155718	-1	-69587223	-1	-22268326	-1	-11059557	1	15241993	2	88773490	2
31	-13789440	0	61236593	0	21208514	-1	22866504	0	-96232901	1	32608086	2
32	-28281442	0	22444597	1	-10624295	-1	18800587	1	-41711817	2	-49218000	2
33	-22960721	0	30826203	0	-97985867	-1	84372299	0	-36611104	2	12220301	3
34	-27002080	0	71758636	0	-57021544	-1	23213904	1	-68936475	2	73939251	2
35	-39522089	0	21215544	1	-52446484	-1	30917245	1	-74113286	2	45410603	2
36	-55043993	0	-40919202	2	61291761	-1	11026623	1	71772451	0	26339887	1

TABLE A8.- Continued.

Control Point	Mode 7		8		9		10		11		12	
37	-11382133	0	27790186	1	36386872	-1	-65488128	0	-49556583	0	-16393167	1
38	22899149	-1	15856033	2	-48775837	-1	-22767031	C	-13826603	0	-52809533	0
39	-66247827	-1	95173404	1	-55350506	-1	32690667	0	30231104	0	10660735	1
40	-10520C54	0	-35993597	1	87736026	-2	17218142	C	95094154	-1	21847812	0
41	-12813218	0	-10961175	2	64607305	-1	-29474480	C	-10228935	0	-56164740	-2
42	-14489948	-1	-48165870	1	17133945	-1	-41706594	-1	-93993887	-1	-37212585	0
43	82026767	-1	273993C5	1	-52963783	-2	67676973	-1	11503529	-1	36127095	-1
44	155411C8	0	76266757	1	-28966616	-1	21939051	0	14000715	0	40432671	0
45	14303756	0	70455605	1	-4C839896	-3	14948429	C	56355291	-1	-45011319	-1
46	59008822	-1	607C2986	0	66104595	-1	24332271	C	10594518	0	30119968	-2
47	-12919939	0	-14350553	2	11447131	0	33538325	C	22354054	0	32318767	0
48	-22626835	C	-23014587	2	11404358	0	44162023	C	40417331	-1	-11255585	1
49	-46687987	-1	-9C998840	1	-19415306	-2	-14125074	C	-23216951	0	-93375815	0
50	28532381	-1	-60C72303	1	-17887589	-1	-15399450	-1	-12234598	0	-59024847	0
51	11286252	C	89463C02	0	-34131149	-1	94767542	-1	45396891	-1	97534459	-1
52	14932723	C	79992777	1	-24286239	-1	74604158	-1	14085631	0	61442500	0
53	77563580	-1	78676486	1	-86427187	-2	-36044150	-1	71500596	-1	3346C182	0
54	52653189	-1	265C0299	1	-46356888	-1	-87098110	-1	-11156532	0	-72822869	0
55	-61894285	-2	-10556843	2	-97814748	-1	-16256492	C	-13307489	0	-85436952	0
56	79421256	-1	-86200160	1	-52537773	-1	67244797	-1	-14763285	0	-10192810	1
57	81092243	-1	-23534820	1	-49029459	-1	-29204540	-1	24938203	-1	78794523	-1
58	-93373445	-2	61721649	1	-57735268	-2	-13285777	C	77288707	-1	54715537	0
59	41987405	-2	73563494	1	11975C67	-1	-12986233	0	51359825	-1	46062114	0
60	75729444	-1	19807814	1	14161080	-2	-11213901	0	-32777776	-1	37718445	-1
61	83303866	-1	-16182073	1	-7C651832	-1	-11771621	C	-56903467	-1	30583456	-1
62	12625679	0	-22143109	1	-58544355	-1	-23501115	0	56619330	-2	97565140	0
63	28666116	0	-39236382	1	-14311251	-1	-13953728	1	-89891279	-1	28163675	1
64	-49145205	-1	-14087539	2	-66719192	-1	-17106173	C	-45135048	0	-27990785	1
65	-19996880	0	11191494	1	50033526	-1	-46365264	0	-56860175	-1	19089467	0
66	-18355493	0	36565923	1	70C80995	-1	-17748167	0	-13031032	-1	22552359	0
67	-11391966	0	35171174	1	64682458	-1	-22041162	-1	-38657633	-1	11991339	0
68	19828945	-1	94383982	0	90336488	-1	-53397597	-1	22145955	0	21774823	1
69	94801385	-1	88545554	0	11245215	0	50599210	-1	11728999	0	16374573	1
70	28264810	0	22122772	1	40589452	0	-91107229	0	16957966	1	13558317	2
71	56017958	-1	59230291	1	10169380	0	-83888781	-4	-17639680	0	25154266	0
72	30230675	0	74419797	1	52601260	0	-24315798	0	60102285	0	64017535	1
73	-50194514	0	-12801710	2	11937554	0	-73404493	0	-22691824	0	-61842334	0

TABLE A8.- Continued.

Control Point	Mode 7		8		9		10		11		12	
74	-46943795	0	-36422480	1	46526090	-1	-34614817	-1	33317541	-1	12512051	0
75	-32300125	0	13655583	1	24671109	-1	16631012	0	29625094	-1	21388066	0
76	-17919358	-1	48028433	1	49587163	-1	33740025	0	-85415425	-1	-13267222	0
77	46558329	-1	63645667	1	89454922	-1	34871624	0	-15741671	0	-31534341	0
78	33228035	0	12296069	2	43774337	0	96484083	-1	-33106137	0	24008428	0
79	-71715950	0	-34226258	1	-12709195	0	25874142	0	17227616	0	-10484886	0
80	-49650308	0	-19539790	1	-17429942	0	31751582	0	17914996	0	-18447318	-1
81	-24665606	0	-31919753	1	-25204974	0	48130938	0	20676743	0	-42466276	-1
82	14824056	0	-41566293	1	-15209457	0	-21663217	0	-25865399	0	-12827363	1
83	31610475	0	-23810038	1	-72113743	-1	-11314949	1	-21205968	1	-10589566	2
84	67787837	0	-47059491	0	22241388	0	-56447443	1	-23910051	2	-13128113	3
85	-58579090	0	-63545361	1	-44641731	0	84554525	0	40254978	0	-15906593	0
86	-24638767	0	-73426418	1	-59649593	0	87860871	0	37826470	0	-35336169	0
87	43084574	0	-93536228	1	-27324528	0	-28301325	1	-78701441	0	-85031197	0
88	11127494	1	-52042979	1	78162453	0	-23821420	2	-19074547	1	29139874	2
89	-80831569	-1	-19701380	2	-12808433	1	14486265	1	86137533	0	-26155435	0
90	36110256	0	-18533640	2	-79841476	0	-32030677	0	43847625	0	11510248	0
91	10977771	1	-48859020	1	59208488	0	-68060585	1	-36077921	0	73111799	1
92	72262550	0	-19739802	2	-85531288	0	46450311	0	99842327	0	59091450	0
93	99999999	0	99999999	0	99999999	0	99999999	0	99999999	0	99999999	0
94	16203460	0	65875977	1	-40969258	-1	78758826	-1	93394689	-1	39051502	0
95	-26157510	0	-24426829	2	87153476	-1	34335215	0	23057176	0	20925953	0
96	-15132993	0	-21338015	2	-79833815	-2	15891259	-1	-73712156	-1	-89142406	0
97	-52279544	-1	-16714068	2	-55093278	-1	-21590355	0	-24115091	0	-11955604	1

TABLE A8.- Continued.

Control Point	Mode 13		14		15		16	
1	-93C73476	2	-94145275	2	-54817516	3	41980226	3
2	-69435229	2	-71411408	2	-27611215	3	17307126	3
3	198825C9	2	21719930	2	-18675695	3	-37104285	1
4	38383207	2	41422767	2	-31969991	3	-37057737	2
5	74611569	2	80540592	2	-81997032	3	-60582121	3
6	-9145960e	2	-95675176	2	-43732880	3	35675957	3
7	-67027478	2	-71E40963	2	-27C67449	3	19234642	3
8	22784722	2	21996421	2	-27172134	3	11552474	3
9	41698867	2	42375375	2	-38134282	3	13491496	3
10	74141804	2	77568038	2	-74626464	3	53820132	2
11	-93882667	2	-10333675	3	-20332526	3	-18165533	3
12	-72426457	2	-81336d82	2	-21C72649	3	-25504690	3
13	33038495	2	29416313	2	-78459373	2	16044042	3
14	54308843	2	52337656	2	-11968373	3	36084614	3
15	89325962	2	90566866	2	-19665861	3	80648758	3
16	-76691187	2	-92039627	2	54352843	3	-12417584	4
17	-45215363	2	-59158709	2	57022338	3	-80439957	3
18	34049838	2	25022211	2	54747285	3	19966136	3
19	50754183	2	42372831	2	60332085	3	36343815	3
20	87484299	2	80284781	2	91262622	3	73114191	3
21	-27033C06	1	26099213	2	23723386	-1	-10508732	-3
22	-39816442	1	44648660	2	-18504406	0	15418945	0
23	15953454	2	-13547333	3	48958827	0	-30196471	0
24	-87246184	1	87424334	2	16707863	0	-11621473	0
25	-50179301	1	57940332	2	-30663493	0	11234987	0
26	187024C8	2	-16370758	3	-11040450	0	72896732	-1
27	-18836408	2	19411944	3	73114398	0	-41613795	0
28	-64754885	1	71781128	2	-16207698	-1	84364684	-2
29	23791E77	2	-22833436	3	-47770772	0	32687790	0
30	-24077698	2	23440675	3	74237284	0	-46535604	0
31	-5C999185	1	41607454	2	-19914156	0	27135305	0
32	22214412	2	-23514031	3	-64920644	0	34937828	0
33	-19226381	2	159C8802	3	74946293	0	-46882190	0
34	37919967	0	-46552688	2	-57337110	0	48080802	0
35	58736739	1	-50707511	2	-45984554	0	-86730934	-1
36	17460605	1	-11E69748	2	-47670580	1	-74974293	0

TABLE A8.- Continued.

Control Point	Mode 13		14		15		16	
37	10339592	1	99357800	1	15879597	2	-28389245	1
38	58579671	0	36318073	1	19016366	2	-20890463	1
39	39976298	0	-5127826?	1	11816329	2	-13821365	1
40	-92645104	-1	-11934332	1	21671117	1	-35562409	0
41	-56992709	-1	-67607790	0	-29995468	1	26541014	0
42	-13910214	0	18584814	1	-25302661	1	96795877	-2
43	29745193	-1	16094996	0	-23715364	0	-20763840	-1
44	77110772	-1	-14973577	1	18682683	1	20926510	0
45	-18185584	-1	10288333	1	26393684	1	89072974	-1
46	-94694286	-1	95667482	0	79700534	0	24689041	0
47	-21331085	0	-89574573	0	-43452374	1	59905556	0
48	-83272877	0	69165205	1	-65265003	1	61626680	0
49	-43243517	0	42754574	1	-40804406	1	41799900	0
50	-34801375	0	27813824	1	-38550405	1	57699890	0
51	-79516685	-1	-36329936	0	-15652880	1	48385568	0
52	21732042	0	-27106271	1	21201666	1	79017754	-1
53	29463214	0	-10699364	1	35084370	1	-75248557	0
54	-10043001	0	41631745	1	24043556	1	-82383946	0
55	-36214453	0	37086971	1	-21143417	1	-16111390	0
56	-67356546	0	48588712	1	-50647827	1	12897394	1
57	-18139635	0	-63908991	0	-24288571	1	10463106	1
58	35850498	0	-22728037	1	22008410	1	-56273204	0
59	38734961	0	-18413137	1	32347133	1	-80306464	0
60	56550464	-1	-44121449	0	97063917	0	13577104	0
61	19250207	-1	-13475491	1	-21513287	0	-11590477	0
62	33142575	0	-74668050	1	-86004351	0	41368686	0
63	14025447	1	-19752676	2	-19539910	1	49515430	0
64	-14660210	1	14424448	2	-59704604	1	27806801	1
65	27034468	0	-40726579	0	10093397	1	-16593408	0
66	28919974	0	-51608026	0	15948610	1	-55959644	0
67	20745226	0	-56251266	0	13718373	1	-39928670	0
68	74723936	0	-13080278	2	-11401153	1	68334738	0
69	51067922	0	-10442165	2	-15631802	1	11794255	1
70	46809220	1	-77096656	2	-49080614	1	29172269	1
71	29085299	0	-30744029	1	32862546	0	39497915	0
72	23023423	1	-36923905	2	-40325617	1	34166167	1
73	-31703123	0	35738444	1	-36152950	1	17603670	1

TABLE A8.- Concluded.

Control Point	Mode 13		14		15		16	
74	15583694	-1	-19787590	0	-11068593	1	-15962045	0
75	16030616	0	-12450158	1	46784349	-1	-76893169	0
76	-63093849	-1	-52457252	0	-11485402	0	57788939	0
77	-38919106	-1	29023086	0	26625338	-1	57394359	0
78	38830176	0	-30565990	1	-75423716	0	25916567	1
79	11496664	0	21737146	1	15045731	1	-33581189	1
80	22423293	-1	79311686	0	11512935	1	-25666392	1
81	-26858514	0	-25488362	0	-29320126	0	-11970101	1
82	-57969098	0	47199681	1	-15351159	1	11275511	1
83	-29162080	1	54773461	2	17670457	1	58395707	0
84	-37148127	2	71326618	3	27411086	2	-83851176	1
85	-48837527	0	10098148	1	13331893	0	-28079313	1
86	-85813892	0	21626021	0	-11156954	1	-11847929	1
87	72680567	0	-15691971	1	14016242	1	-31686524	0
88	21075661	2	-18708543	3	22218542	2	-10996747	2
89	-17648063	1	-27124740	1	-31679044	1	-11069535	1
90	-65262858	0	-62161688	1	-16392179	1	-70773848	0
91	60966681	1	-46282656	2	68854434	1	-21170004	1
92	-59854189	0	-67194579	1	-12402993	1	-71370194	0
93	99999998	0	99999999	0	99999999	0	99999998	0
94	78995773	-1	-17515813	1	10123683	1	37079043	0
95	-45485647	0	-89838822	0	-74871779	1	86116945	0
96	-63847285	0	41209575	1	-61233792	1	57784759	0
97	-59378231	0	49629080	1	-49387856	1	54254211	0

TABLE A9.- XB-70 SYMMETRIC FREE-FREE VACUUM VIBRATION MODE SHAPES
118 POINT GRID SYSTEM
MEDIUM WEIGHT, δ_T = 65°

Control Point	Mode 1		2		3		4		5		6	
1	23801537	1	-17743117	0	45045834	1	80452935	-1	-10723025	1	-34021870	1
2	19318231	1	-13351966	0	31750933	1	57930870	-1	-71640425	0	-19861207	1
3	14345482	1	-84814311	-1	17004623	1	32950063	-1	-32165249	0	-41546196	0
4	12049022	1	-63306002	-1	10504177	1	22246936	-1	-15030503	0	19455379	0
5	10157857	1	-48142750	-1	5952624?	0	15590756	-1	-37563773	-1	39822109	0
6	92502503	0	-40545789	-1	3792320?	0	12431522	-1	15946804	-1	49488806	0
7	77126524	0	-28537235	-1	67650470	-2	69845662	-2	10820642	0	66155525	0
8	66912379	0	-20347590	-1	-23906320	0	33895757	-2	16909777	0	77155559	0
9	46970692	0	-60495047	-2	-50412448	0	64650458	-3	18655596	0	65700116	0
10	15441269	0	16550927	-1	-92320767	0	-36905132	-2	21415878	0	47588134	0
11	22816984	-1	22972379	-1	-94409094	0	-36253151	-2	17643916	0	28965882	0
12	-94748400	-1	28094254	-1	-93165548	0	-31885180	-2	13280168	0	10096001	0
13	-39865891	0	32550404	-1	-46518574	0	-89654453	-2	-37532399	-1	-50081007	0
14	-41533732	0	17784007	-1	-80647793	-2	31549175	-2	-15116853	0	-25105590	0
15	-38174440	0	36476787	-2	21254507	0	67809303	-2	-15285521	0	-43863980	-1
16	-29918858	0	-16167894	-1	42400975	0	11542147	-1	-11683730	0	20626380	0
17	-18077237	0	-33920834	-1	49357044	0	16615461	-1	-52795330	-1	36922778	0
18	-15638679	-1	-54044088	-1	22938916	0	22820319	-1	22745886	-1	34349938	0
19	19273627	0	-79248244	-1	-32395029	0	35634981	-1	13470538	0	-63753484	-1
20	34232672	0	-10247837	0	-77572435	0	45216959	-1	25126333	0	-69654168	0
21	47766853	0	-12597806	0	-12372050	1	52164720	-1	32855693	0	-10517480	1
22	-49845593	0	36761178	-1	-33428627	0	-17081323	-1	-15210014	0	-48748336	0
23	-49420631	0	20704665	-1	11387639	0	-12292142	-2	-18340990	0	-29213185	0
24	-45115590	0	69182664	-2	34680648	0	59880330	-2	-16381738	0	-10146771	0
25	-34934889	0	-12687121	-1	54134994	0	13574493	-1	-10865581	0	16257482	0
26	-20353294	0	-30850170	-1	54397503	0	17959159	-1	-27961564	-1	38383127	0
27	-10844990	-1	-50042543	-1	22235412	0	22397773	-1	42757235	-1	37354301	0
28	19855518	0	-69104127	-1	-33546349	0	25965126	-1	62134703	-1	21647961	-1
29	36150955	0	-86541500	-1	-81166668	0	27458755	-1	77885528	-1	-55367625	0
30	51292022	0	-10325022	0	-12658556	1	28404154	-1	85505027	-1	-10388166	1
31	-53933939	0	22724671	-1	26505411	0	43549850	-2	-17600949	0	-41631053	0
32	-46019689	0	10400676	-1	47210715	0	-17235823	-2	-82578779	-1	-24267620	0
33	-34937035	0	-79625901	-2	66593190	0	57069070	-2	-15085848	-1	42221404	-1
34	-18838924	0	-23397659	-1	65786929	0	76304061	-2	81255784	-1	31968379	0
35	-86782910	-3	-36823459	-1	30133803	0	91967636	-2	82891958	-1	35988590	0
36	21739680	0	-37876910	-1	-28267552	0	55427767	-2	-24717509	-1	67963846	-1

TABLE A9.- Continued.

Control Point	Mode 1		2		3		4		5		6	
37	39031965	0	-384968C6	-1	-77198097	0	-32599148	-3	-14489276	0	-16960099	0
38	55236683	0	-39C76709	-1	-12297183	1	-58161293	-2	-25731477	0	-39183905	0
39	-48635291	0	13336066	-1	66910198	0	-10262659	-1	57646041	-1	-54918247	0
40	-35420386	0	-27882883	-2	87426133	0	-10392073	-1	16575875	0	-22397456	0
41	-18621023	0	-14017524	-1	88206112	0	-82588905	-2	25425817	0	17850259	0
42	10743743	-1	-13042131	-1	45958264	0	-95122652	-2	17703277	0	26125843	0
43	26703727	0	31032840	-2	-18504361	0	-17318880	-1	-26767917	-1	11469411	0
44	45723864	0	14796488	-1	-71211176	0	-27459976	-1	-23670731	0	-15598469	-1
45	53904567	0	19825823	-1	-93880772	0	-31821738	-1	-32700382	0	-71638289	-1
46	58074535	0	73442719	-2	-11380694	1	-33123720	-1	-41920027	0	-12045856	0
47	63088276	0	54881676	-2	-13973609	1	-37196206	-1	-55122186	0	-15770890	0
48	65367249	0	46444837	-2	-15152206	1	-39047336	-1	-61123168	0	-17464088	0
49	70229059	0	28446249	-2	-17666548	1	-42996412	-1	-73925261	0	-21076242	0
50	-45292301	0	59654460	-2	10414592	1	-26262870	-1	28153615	0	-74735099	0
51	-36265443	0	19119136	-2	10672775	1	-25074314	-1	33064549	0	-47165803	0
52	-18965171	0	-55C84797	-2	10881807	1	-22144426	-1	4C834799	0	42838728	-1
53	21157655	-1	88596112	-2	60258125	0	-25377617	-1	26665150	0	16208039	0
54	31306938	0	38127388	-1	-97259563	-1	-35772473	-1	-99759412	-2	15309976	0
55	51923981	0	58457936	-1	-65985710	0	-48622175	-1	-28301897	0	50218957	-1
56	60791524	0	67202260	-1	-9C1d9172	0	-54148927	-1	-40045683	0	59691482	-2
57	633787C7	0	63938296	-1	-10483830	1	-57619901	-1	-49407309	0	53054214	-1
58	7C815122	0	64640060	-1	-13077786	1	-64488216	-1	-65711660	0	81968843	-1
59	74195311	0	64959044	-1	-14256857	1	-67610178	-1	-73122729	0	95111857	-1
60	81406380	0	65639542	-1	-16772209	1	-74270362	-1	-88933008	0	12315029	0
61	-36236738	0	13921206	-1	13260093	1	-47829379	-1	56345733	0	-78167839	0
62	-16846104	0	69439700	-2	13443637	1	-44784630	-1	63749491	0	-26219940	0
63	46745883	-1	44477322	-1	78995031	0	-44916622	-1	39684641	0	-84378096	-2
64	34581109	0	84467431	-1	40705442	-1	-49773205	-1	23523285	-1	12237171	0
65	57275311	0	115505C7	0	-52766984	0	-59559209	-1	-31205112	0	13615974	0
66	67036257	0	12E85459	0	-77213231	0	-63768242	-1	-45638420	0	14209008	0
67	71457826	0	13428387	0	-91875318	0	-81036924	-1	-59150521	0	29902513	0
68	78082195	0	14059035	0	-11496759	1	-87000280	-1	-76078655	0	33212671	0
69	81093271	0	14345692	0	-12546408	1	-89710895	-1	-83773263	0	34717289	0
70	87516901	0	14957228	0	-14785659	1	-95493543	-1	-10018842	1	37927139	0
71	-32C82475	0	-10929266	-1	19414971	1	-70805909	-1	10617325	1	-79444579	0
72	-18717879	0	2C785C70	-1	16202532	1	-69166387	-1	88426852	0	-59070199	0
73	74302447	-1	82834855	-1	99173240	0	-65958627	-1	53705630	0	-19207279	0

TABLE A9.- Continued.

Control Point	Mode 1		2		3		4		5		6	
74	38107133	0	13437209	0	18928314	0	-64850915	-1	59599374	-1	89279968	-1
75	63C38281	0	17654044	0	-38527125	0	-71337554	-1	-34331652	0	22871136	0
76	73761352	0	19524940	0	-63239142	0	-74127507	-1	-51661367	0	28868185	0
77	76431290	0	20211006	0	-72720157	0	-74939305	-1	-58187201	0	35396665	0
78	84308424	0	22116568	0	-95091889	0	-82168470	-1	-78592714	0	48322833	0
79	87989843	0	22982733	0	-10526086	1	-85454454	-1	-87867948	0	54198364	0
80	95715555	0	24830551	0	-12695466	1	-92464552	-1	-10765511	1	66732831	0
81	-56107568	-1	29328344	-2	96735514	0	-45303589	-1	77340957	0	-19923175	0
82	19981813	-1	36131745	-1	67205555	0	-35647965	-1	52579708	0	-86839525	-1
83	10099010	0	65198338	-1	41489235	0	-27152425	-1	30780650	0	-41108468	-1
84	20237654	0	90407165	-1	18438866	0	-24615623	-1	92096745	-1	-84908345	-1
85	27905568	0	10559954	0	28468977	-1	-28412272	-1	-97979497	-1	-98527912	-1
86	35484280	0	12245546	0	-12891966	0	-23005168	-1	-27638526	0	-12161857	0
87	39537974	0	16446238	0	-13182208	0	10567343	-1	-26298011	0	-10106000	0
88	42854801	0	17479841	0	-25301446	0	96397093	-2	-34592968	0	-59427601	-1
89	44362450	0	17949661	0	-30810190	0	92180576	-2	-38363403	0	-40503785	-1
90	47578767	0	18951943	0	-42562178	0	83185338	-2	-46406997	0	-13297640	-3
91	45676618	-1	10143479	0	91379255	0	-37468283	-1	67378280	0	-31911485	0
92	14227065	0	13957455	0	70756015	0	-27066396	-1	43333666	0	-29193304	0
93	26083502	0	18466645	0	53751519	0	61850165	-3	19938648	0	-35044371	0
94	33895024	0	21062757	0	35996976	0	45513151	-1	59633342	-1	-41917649	0
95	41527139	0	23148999	0	19453534	0	68435763	-1	-10004979	0	-46277193	0
96	47119439	0	27641082	0	14940404	0	10779440	0	-93295866	-1	-42412901	0
97	51781773	0	29797146	0	15679660	-1	15288118	0	-12692632	0	-33283356	0
98	53901014	0	30777176	0	-45104148	-1	17337518	0	-14221289	0	-29133563	0
99	58422066	0	32867904	0	-17477627	0	21709570	0	-17482425	0	-20280671	0
100	16845154	0	20317233	0	96473168	0	18483022	-1	57861955	0	-67283994	0
101	28881444	0	24674242	0	81545003	0	29437199	-1	32010925	0	-72344762	0
102	38494001	0	29566633	0	65391624	0	10135579	0	19688873	0	-73886774	0
103	52937460	0	30550317	0	38115885	0	20093749	0	67005623	-1	-50340433	0
104	60496496	0	33993633	0	22997712	0	27286019	0	-28254177	-1	-44031601	0
105	69899197	0	38276783	0	41921789	-1	36232501	0	-14674808	0	-36184030	0
106	33364186	0	36918852	0	11096541	1	12980589	0	50210001	0	-98071227	0
107	44250203	0	43343099	0	96179360	0	21605356	0	38553702	0	-95234065	0
108	57684791	0	50541874	0	76108033	0	34042277	0	28578191	0	-75088322	0
109	67642273	0	55400036	0	61358801	0	45176740	0	28412113	0	-38454701	0
110	81242736	0	62035575	0	41213506	0	60384787	0	28185274	0	11581469	0

TABLE A9.- Continued.

Control Point	Mode 1		2		3		4		5		6	
111	40744764	0	55402096	0	13032992	1	19877930	0	32932404	0	-19859770	1
112	50943059	0	60482847	0	11760051	1	32211948	0	39073844	0	-14618192	1
113	61281937	0	65689868	0	10489543	1	44611350	0	45155299	0	-93840283	0
114	73056708	0	71620086	0	90425747	0	58732890	0	52081401	0	-34228973	0
115	90001041	0	80153817	0	69603525	0	79054131	0	62048231	0	51553156	0
116	65160991	0	82025011	0	13593889	1	56008721	0	63031556	0	-11406184	1
117	78695599	0	89111305	0	12177068	1	73351435	0	77605654	0	-29672076	0
118	99999999	0	99999999	0	99999999	0	99999999	0	99999999	0	99999998	0

TABLE A9.- Continued.

Control Point	Mode 7		8		9	
1	30402326	-1	22722360	0	-90521401	0
2	23914665	-1	11C08068	0	-43453952	0
3	16718743	-1	-19850768	-1	87518649	-1
4	11083247	-1	-61380962	-1	25326405	0
5	45358354	-3	-47737680	-1	19462003	0
6	-45915921	-2	-41262146	-1	16678571	0
7	-13290171	-1	-30C97431	-1	11879551	0
8	-19031233	-1	-22728720	-1	87121972	-1
9	-19980389	-1	-22439001	-2	-10186672	-1
10	-21481C83	-1	30144261	-1	-16403953	0
11	-14825703	-1	28455551	-1	-13803345	0
12	-74100459	-2	23877339	-1	-96588649	-1
13	23269378	-1	-26780610	-1	72558178	-2
14	77578827	-2	-56264303	-2	57889786	-1
15	21534649	-2	149C8699	-2	26515679	-1
16	-49196285	-2	11425973	-1	-24725136	-1
17	-10925676	-1	21637423	-1	-64199014	-1
18	-76166012	-3	15298892	-1	34187184	-2
19	28215590	-1	25471372	-1	-72789384	-2
20	44664127	-1	33481889	-1	-53317546	-1
21	44523160	-1	42440204	-1	14856078	0
22	59767291	-2	-19667168	-1	13343104	0
23	-32767106	-2	-326C5075	-2	92163709	-1
24	-74785851	-2	35599282	-2	35907829	-1
25	-10514306	-1	94188071	-2	-38464546	-1
26	-96408947	-2	10338743	-1	-91823990	-1
27	-30430565	-2	11C05003	-2	-43597804	-1
28	-97C97965	-2	-17876660	-2	93652683	-1
29	-19599938	-1	-50870105	-2	97406276	-1
30	-32332487	-1	-78452201	-2	15581955	0
31	-19551643	-1	58489290	-2	16610686	0
32	-14854153	-1	-56211864	-2	41063364	-1
33	-13541528	-1	-29743446	-2	-38036757	-1
34	-35405571	-2	-89869479	-2	-91887145	-1
35	26190177	-2	-10886126	-1	-72760599	-1
36	-67534407	-2	-1C929874	-1	2C977911	-1

TABLE A9.- Continued.

Control Point	Mode 7		Mode 8		Mode 9	
37	-29791101	-1	-12691498	-1	25595282	-1
38	-51342459	-1	-14339468	-1	29914758	-1
39	-23283910	-1	-54410635	-2	31466843	0
40	-12925827	-1	-16230028	-1	13839929	0
41	90183333	-2	-29485652	-1	-60376237	-1
42	15749290	-1	-16160334	-1	-56583352	-1
43	11915065	-1	-68809469	-2	-35072636	-1
44	42279953	-2	-85016571	-2	-18432298	0
45	92172846	-3	-91587368	-2	-24851667	0
46	-20142338	-1	-41586337	-1	-20847009	0
47	-18393507	-1	-93596542	-1	-34481181	0
48	-88713106	-2	-11723754	0	-40678533	0
49	-13572922	-2	-16767168	0	-53899548	0
50	-29272790	-1	-15457745	-1	50691348	0
51	-11322888	-1	-26736174	-1	31253413	0
52	20394006	-1	-45924428	-1	-28637055	-1
53	26751062	-1	-18579449	-1	-36358227	-1
54	26154648	-1	-20588462	-2	-62533028	-1
55	34873158	-1	-44127973	-2	-35026044	0
56	38623054	-1	-54080451	-2	-47401416	0
57	61790616	-1	-99658350	-2	-57784200	0
58	11319625	0	-53074268	-1	-14608193	1
59	13656245	0	-72667191	-1	-18621726	1
60	18641033	0	-11446543	0	-27183930	1
61	10909001	-2	-39121533	-1	37379459	0
62	32245947	-1	-57670280	-1	30810549	-1
63	23433155	-1	-13458623	-1	-25857753	-1
64	18974749	-1	77192535	-2	-46280339	-1
65	27578108	-1	13487755	-1	-17539576	0
66	31278476	-1	15968830	-1	-23092928	0
67	65582519	-1	-38051750	-2	-20024877	0
68	13991542	0	-14700341	-1	-65579450	0
69	17370310	0	-19652689	-1	-86286073	0
70	24578348	0	-30217699	-1	-13046020	1
71	57863790	-1	-10242078	0	15073668	0
72	45009576	-1	-70319659	-1	94831044	-1
73	19850025	-1	-75131176	-2	-14549551	-1

TABLE A9.- Continued.

Control Point	Mode 7		8		9	
74	11242550	-1	18292592	-1	-28777443	-1
75	19721899	-1	32765273	-1	12920040	-1
76	23368931	-1	38990081	-1	30854441	-1
77	56165671	-1	30873C96	-1	37686609	-1
78	11717944	0	19567443	-1	-34538842	-2
79	14491297	0	14428510	-1	-22154109	-1
80	20407784	0	34654529	-2	-62047920	-1
81	-20081192	-1	25564199	-2	41436252	-1
82	-27430227	-1	95914638	-2	12094411	-1
83	-37910908	-1	19930911	-1	-65931124	-2
84	-48021309	-1	29661678	-1	28989974	-1
85	-25000826	-1	-49334718	-2	18689036	0
86	-14235172	-2	-44625672	-1	32439971	0
87	-10156784	-1	-18345573	0	48623233	1
88	41439072	-1	-38575044	0	13801940	2
89	64891734	-1	-47770257	0	17865402	2
90	11492408	0	-67386712	0	26534121	2
91	-14764212	0	73173800	-1	31252812	-1
92	-17491106	0	78216479	-1	31226100	-1
93	-20627629	0	62635887	-1	43963417	-1
94	-17812631	0	-39378177	-2	99125408	-1
95	-15264059	0	-55527578	-1	19841113	0
96	-42216275	-1	-61041945	0	-63383485	0
97	14257764	0	-15512995	1	-28552060	1
98	22657487	0	-19789723	1	-38649202	1
99	40576896	0	-28913408	1	-60189769	1
100	-34371755	0	11873551	0	23592023	-1
101	-39436278	0	12405927	0	58505835	-1
102	-33340317	0	15996928	-1	47775564	-1
103	-56598575	-1	-47615533	0	-70571269	0
104	59953412	-1	-84858541	0	-13373207	1
105	20543077	0	-13118521	1	-21229794	1
106	-50499456	0	21863641	0	27721514	-1
107	-42109478	0	84182969	-1	-19588552	-1
108	-20438144	0	-15671051	0	-33763368	0
109	87089138	-1	-28441648	0	-60788655	0
110	48519529	0	-45884686	0	-97701238	0

TABLE A9.- Concluded.

Control Point	Mode 7		8		9	
111	-10611494	1	-52284485	-2	-39227338	-1
112	-68809092	0	34655657	-1	-61852706	-1
113	-31605601	0	85339066	-1	-58733021	-1
114	10765041	0	14306184	0	-55180045	-1
115	71737429	0	22612632	0	-50067233	-1
116	-43648254	0	34635811	0	24202513	0
117	12982307	0	60404386	0	54084215	0
118	99999999	0	99999999	0	99999999	0

APPENDIX B

XB-70 AERODYNAMIC, GEOMETRIC, MASS, AND STRUCTURAL MODE DATA

The equations of motion for which the basic data are presented in this appendix may be found in reference 1.

The data used in the response analyses for the heavy weight, Mach 0.90, light weight, Mach 0.90, and medium weight, Mach 1.6, cases are presented in tables B1 through B13. The Mach 0.90 data in tables B1 and B5 are similar to but not the same as the data used in reference 1. In reference 1, $\delta_T = 0°$ data were assumed to approximate $\delta_T = 25°$ data. In addition, center-of-gravity location and mode shape characteristics are different from the similar data of reference 1.

The Mach 0.90 unsteady elevon characteristics are tabulated in tables B2 and B6. These data are presented as a function of the reduced frequency, k, defined as $\frac{\omega b_{ref}}{V_o}$ in which ω is the forcing frequency in rad/sec, b_{ref} is 58.9 ft and V_o is the flight velocity in ft/sec.

Total vehicle unsteady aerodynamics for the light weight, Mach 0.90, case as a function of reduced frequency, k, are presented in table B9.

TABLE B1

XB-70 TOTAL VEHICLE AERODYNAMIC, GEOMETRIC, MASS AND STRUCTURAL MODE DATA
HEAVY WEIGHT, δ_T = 25°, M = .90

Units: ft, slugs, rad/sec

AERODYNAMIC COEFFICIENTS DUE TO RIGID-BODY MODES

C_{N_α}	+2.469	C_{m_α}	-.4800	$C_{\eta_{1\alpha}}$	-.2028	$C_{\eta_{2\alpha}}$	-.0143	$C_{\eta_{3\alpha}}$	+4.309	$C_{\eta_{4\alpha}}$	+.0712	$C_{\eta_{5\alpha}}$	-.0758
$C_{N_{\dot\alpha}}$	-.0141	$C_{m_{\dot\alpha}}$	+.3587	$C_{\eta_{1\dot\alpha}}$	+.1809	$C_{\eta_{2\dot\alpha}}$	-.0045	$C_{\eta_{3\dot\alpha}}$	+.3474	$C_{\eta_{4\dot\alpha}}$	-.0323	$C_{\eta_{5\dot\alpha}}$	+.0150
C_{N_q}	+2.202	C_{m_q}	-1.962	$C_{\eta_{1q}}$	-.4860	$C_{\eta_{2q}}$	-.3507	$C_{\eta_{3q}}$	-1.592	$C_{\eta_{4q}}$	-.1726	$C_{\eta_{5q}}$	+.0896
$C_{N_{\delta_{SV}}}$	+.00389	$C_{m_{\delta_{SV}}}$	+.00517	$C_{\eta_{1\delta_{SV}}}$	-.00439	$C_{\eta_{2\delta_{SV}}}$	+.00049	$C_{\eta_{3\delta_{SV}}}$	+.02960	$C_{\eta_{4\delta_{SV}}}$	-.00062	$C_{\eta_{5\delta_{SV}}}$	+.00031

AERODYNAMIC COEFFICIENTS DUE TO STRUCTURAL MODES

$C_{N_{\eta_1}}$	+.0401	$C_{m_{\eta_1}}$	-.0126	$C_{\eta_1\eta_1}$	+.0048	$C_{\eta_2\eta_1}$	-.0054	$C_{\eta_3\eta_1}$	+.0599	$C_{\eta_4\eta_1}$	+.0003	$C_{\eta_5\eta_1}$	-.0012
$C_{N_{\eta_2}}$	+.0084	$C_{m_{\eta_2}}$	-.0023	$C_{\eta_1\eta_2}$	-.0036	$C_{\eta_2\eta_2}$	-.0023	$C_{\eta_3\eta_2}$	+.0148	$C_{\eta_4\eta_2}$	-.0002	$C_{\eta_5\eta_2}$	-.0006
$C_{N_{\eta_3}}$	+.5290	$C_{m_{\eta_3}}$	-.0668	$C_{\eta_1\eta_3}$	-.1319	$C_{\eta_2\eta_3}$	-.0537	$C_{\eta_3\eta_3}$	+.8582	$C_{\eta_4\eta_3}$	+.0137	$C_{\eta_5\eta_3}$	-.0237
$C_{N_{\eta_4}}$	+.0272	$C_{m_{\eta_4}}$	-.0101	$C_{\eta_1\eta_4}$	-.0067	$C_{\eta_2\eta_4}$	-.0069	$C_{\eta_3\eta_4}$	+.0333	$C_{\eta_4\eta_4}$	-.0011	$C_{\eta_5\eta_4}$	-.0019
$C_{N_{\eta_5}}$	-.0004	$C_{m_{\eta_5}}$	+.0001	$C_{\eta_1\eta_5}$	-.0034	$C_{\eta_2\eta_5}$	-.0036	$C_{\eta_3\eta_5}$	+.0081	$C_{\eta_4\eta_5}$	-.0022	$C_{\eta_5\eta_5}$	-.0014

$C_{N_{\dot\eta_1}}$	+.4000	$C_{m_{\dot\eta_1}}$	-.4600	$C_{\eta_1\dot\eta_1}$	-.6699	$C_{\eta_2\dot\eta_1}$	-.1388	$C_{\eta_3\dot\eta_1}$	-.1013	$C_{\eta_4\dot\eta_1}$	+.00006	$C_{\eta_5\dot\eta_1}$	-.0621
$C_{N_{\dot\eta_2}}$	+.3914	$C_{m_{\dot\eta_2}}$	-.1041	$C_{\eta_1\dot\eta_2}$	-.0874	$C_{\eta_2\dot\eta_2}$	-.1089	$C_{\eta_3\dot\eta_2}$	+.3396	$C_{\eta_4\dot\eta_2}$	-.0329	$C_{\eta_5\dot\eta_2}$	-.0249
$C_{N_{\dot\eta_3}}$	+13.96	$C_{m_{\dot\eta_3}}$	-2.593	$C_{\eta_1\dot\eta_3}$	-.9036	$C_{\eta_2\dot\eta_3}$	-.6920	$C_{\eta_3\dot\eta_3}$	-15.29	$C_{\eta_4\dot\eta_3}$	-.7959	$C_{\eta_5\dot\eta_3}$	+.1426
$C_{N_{\dot\eta_4}}$	+.2518	$C_{m_{\dot\eta_4}}$	-.1972	$C_{\eta_1\dot\eta_4}$	-.2079	$C_{\eta_2\dot\eta_4}$	-.1072	$C_{\eta_3\dot\eta_4}$	-.4911	$C_{\eta_4\dot\eta_4}$	-.0649	$C_{\eta_5\dot\eta_4}$	-.0237
$C_{N_{\dot\eta_5}}$	+.0721	$C_{m_{\dot\eta_5}}$	+.0230	$C_{\eta_1\dot\eta_5}$	-.0054	$C_{\eta_2\dot\eta_5}$	-.0499	$C_{\eta_3\dot\eta_5}$	+.2733	$C_{\eta_4\dot\eta_5}$	-.0358	$C_{\eta_5\dot\eta_5}$	-.0296

MASS

WT = 431,435 LBS

I_Y = 21,690,761

C.G. AT F.S. 1582.3 in.

STRUCTURAL FREQUENCIES, DAMPING AND GENERALIZED MASSES

ω_1	14.62	M_1	1026	g_{s1}	.02
ω_2	22.60	M_2	92	g_{s2}	.02
ω_3	32.20	M_3	60500	g_{s3}	.02
ω_4	41.90	M_4	76.6	g_{s4}	.02
ω_5	50.10	M_5	27.7	g_{s5}	.02

GEOMETRY

S_w = 6300 sq ft

$\bar{c}_w$ = 78.53 ft

TABLE B2

ELEVON UNSTEADY GENERALIZED FORCES, XB-70
HEAVY WEIGHT, δ_T = 25°, M = .90

$C_{N\delta_1}$

K	REAL	IMAG
0.0	0.82999945E-01	0.0
0.19999999E 00	0.67999959E-01	-0.13999999E-01
0.39999998E 00	0.58999997E-01	-0.11000000E-01
0.59999996E 00	0.53999998E-01	-0.74999966E-02
0.79999995E 00	0.50999999E-01	-0.44999979E-02
0.10000000E 01	0.48999995E-01	-0.19999999E-02
0.11999998E 01	0.46999998E-01	0.19999999E-02
0.15999994E 01	0.44999998E-01	0.69999993E-02
0.20000000E 01	0.44000000E-01	0.11999998E-01
0.23999996E 01	0.42999998E-01	0.16500000E-01
0.27999992E 01	0.42999998E-01	0.20999998E-01
0.33999996E 01	0.42999998E-01	0.26999999E-01

$C_{m\delta_1}$

REAL	IMAG
-0.43499999E-01	0.0
-0.39999999E-01	0.19999999E-02
-0.37499998E-01	0.0
-0.36499999E-01	-0.19999999E-02
-0.35999998E-01	-0.39999969E-02
-0.34999996E-01	-0.59999973E-02
-0.34799997E-01	-0.74999966E-02
-0.33799998E-01	-0.11000000E-01
-0.33000000E-01	-0.13499998E-01
-0.32799996E-01	-0.16500000E-01
-0.32499999E-01	-0.19499999E-01
-0.31999998E-01	-0.23999996E-01

$C_{n_1\delta_1}$

K	REAL	IMAG
0.0	-0.21799996E-01	0.0
0.19999999E 00	-0.22499997E-01	-0.12999999E-02
0.39999998E 00	-0.22699997E-01	-0.25999998E-02
0.59999996E 00	-0.22999998E-01	-0.37999998E-02
0.79999995E 00	-0.22999998E-01	-0.49999990E-02
0.10000000E 01	-0.22999998E-01	-0.59999973E-02
0.11999998E 01	-0.22799999E-01	-0.69999993E-02
0.15999994E 01	-0.22599999E-01	-0.89999996E-02
0.20000000E 01	-0.22499997E-01	-0.11000009E-01
0.23999996E 01	-0.22099998E-01	-0.13299998E-01
0.27999992E 01	-0.22000000E-01	-0.15499998E-01
0.33999996E 01	-0.21599997E-01	-0.18999999E-01

$C_{n_2\delta_2}$

REAL	IMAG
-0.31999999E-02	0.0
-0.25199999E-02	0.49999985E-03
-0.21799998E-02	0.44999993E-03
-0.19999999E-02	0.34999987E-03
-0.18799999E-02	0.23999999E-03
-0.18000000E-02	0.10999999E-03
-0.17499998E-02	0.0
-0.16500000E-02	-0.14999999E-03
-0.15999998E-02	-0.32999995E-03
-0.15699998E-02	-0.49999985E-03
-0.15499999E-02	-0.64999983E-03
-0.15199999E-02	-0.89999987E-03

TABLE B2. · Continued.

$C_{m_{\delta_1}}$

K	REAL	IMAG
0.0	-0.17799997E CC	0.0
0.19999999E 00	-0.16499996E 00	0.69999993E-07
0.39999998E 00	-0.15599996E CC	0.0
0.59999996E 00	-0.15199995E CC	-0.59999973E-02
0.79999995E 0C	-0.14799994E 00	-0.13999999E-01
0.10000000E 01	-0.14599997E 0C	-0.20999998E-01
0.11999998E 01	-0.14499998E 0C	-0.27999997E-01
0.15999994E 01	-0.13999999E 00	-0.42999998E-01
0.20000000E 01	-0.13799995E 00	-0.56999996E-01
0.23999996E 01	-0.13499999E CC	-0.71999967E-01
0.27999992E 01	-0.13499999E 00	-0.85999966E-01
0.33999996E 01	-0.13499999E 0C	-0.10999995E 00

$C_{n_{\delta_1}}$

REAL	IMAG
-0.46999976E-02	0.0
-0.38999999E-02	0.61999983E-03
-0.34999999E-02	0.55000000E-03
-0.32100000E-02	0.17999999E-03
-0.30499999E-02	0.19999999E-03
-0.29499999E-02	0.0
-0.29000000E-02	-0.17999999E-03
-0.27800000E-02	-0.47999993E-03
-0.26999998E-02	-0.74999989E-03
-0.25999998E-02	-0.10099998E-02
-0.25999998E-02	-0.12999999E-02
-0.24999999E-02	-0.16500000E-02

$C_{m_{\delta_1}}$

0.19999999E 00	0.20999999E-02	-0.19999999E-03
0.39999998E 0C	0.18999998E-02	-0.19999999E-03
0.59999996E 00	0.17799998E-02	-0.99999990E-04
0.79999995E 00	0.16999999E-02	0.0
0.10000000E 01	0.16500000E-02	0.99999990E-04
0.11999998E 01	0.16099999E-02	0.17999999E-03
0.15999994E 01	0.15799999E-02	0.35999995E-03
0.20000000E 01	0.15499999E-02	0.52999984E-03
0.23999996E 01	0.15099999E-02	0.67999982E-03
0.27999992E 01	0.14799999E-02	0.81999996E-03
0.33999996E 01	0.14199999E-02	0.10399998E-02

TABLE B2. - Continued.

$C_{N_{\delta_{2-4}}}$

K	REAL	IMAG
0.0	0.24499995E 00	0.0
0.19999999E 00	0.20999998E 00	-0.34999996E-01
0.39999998E 00	0.18599999E 00	-0.29999997E-01
0.59999996E 00	0.16999996E 00	-0.24999999E-01
0.79999995E 00	0.15999997E 00	-0.17999999E-01
0.10000000E 01	0.15300000E 00	-0.99999979E-02
0.11999998E 01	0.14799994E 00	-0.19999999E-02
0.15999994E 01	0.13999999E 00	0.12999997E-01
0.20000000E 01	0.13499999E 00	0.26999999E-01
0.23999996E 01	0.13199997E 00	0.40999997E-01
0.27999992E 01	0.12799996E 00	0.53999998E-01
0.33999996E 01	0.12500000E 00	0.73999941E-01

$C_{m_{\delta_{2-4}}}$

REAL	IMAG
-0.14899999E 00	0.0
-0.13299996E 00	0.11999998E-01
-0.12399995E 00	0.99999979E-02
-0.11899996E 00	0.39999969E-02
-0.11499995E 00	-0.99999993E-03
-0.11099994E 00	-0.79999976E-02
-0.10849994E 00	-0.13499998E-01
-0.10399997E 00	-0.23999996E-01
-0.10149997E 00	-0.33999998E-01
-0.99999964E-01	-0.44000000E-01
-0.97999990E-01	-0.53999998E-01
-0.96999943E-01	-0.67999959E-01

$C_{n_{\delta_{2-4}}}$

REAL	IMAG
0.0	-0.69999993E-01
0.19999995E 00	-0.68999946E-01
0.39999998E 00	-0.67999959E-01
0.59999996E 00	-0.67499995E-01
0.79999995E 00	-0.66999972E-01
0.10000000E 01	-0.65999985E-01
0.11999998E 01	-0.65999985E-01
0.15999994E 01	-0.64999998E-01
0.20000000E 01	-0.63999951E-01
0.23999996E 01	-0.62999964E-01
0.27999992E 01	-0.61999999E-01
0.33999996E 01	-0.59999999E-01

$C_{n_{z_{\delta_{2-4}}}}$

REAL	IMAG
-0.29599998E-01	0.0
-0.26600000E-01	0.22000000E-02
-0.24599999E-01	0.19999999E-02
-0.23199998E-01	0.99999993E-03
-0.22499997E-01	0.0
-0.21699999E-01	-0.99999993E-03
-0.21100000E-01	-0.20999999E-02
-0.20499997E-01	-0.39999969E-02
-0.19899998E-01	-0.59999973E-02
-0.19399997E-01	-0.81999972E-02
-0.18999998E-01	-0.10100000E-01
-0.18499997E-01	-0.13200000E-01

TABLE B2. - Concluded.

$C_{n_{3\delta_2-4}}$

K	REAL	IMAG
0.0	-0.20000000E-01	0.0
0.19999999E 00	-0.64999998E-01	-0.55000000E-01
0.39999998E 00	-0.93999982E-01	-0.80999970E-01
0.59999996E 00	-0.11499995E 00	-0.88999987E-01
0.79999995E 00	-0.12699997E 00	-0.95999956E-01
0.10000000E 01	-0.13599998E 00	-0.99999964E-01
0.11999998E 01	-0.14099997E 00	-0.10499996E 00
0.15999994E 01	-0.14899999E 00	-0.11600000E 00
0.20000000E 01	-0.14999998E 00	-0.13499999E 00
0.23999996E 01	-0.14999998E 00	-0.15099996E 00
0.27999992E 01	-0.14999998E 00	-0.17499995E 00
0.33999996E 01	-0.14999998E 00	-0.21499997E 00

$C_{n_{4\delta_2-4}}$

REAL	IMAG
-0.18000000E-02	0.0
-0.24999999E-02	-0.10499998E-02
-0.29499999E-02	-0.14599999E-02
-0.32499998E-02	-0.17499998E-02
-0.34699999E-02	-0.19999999E-02
-0.36299999E-02	-0.21799998E-02
-0.37499999E-02	-0.23500000E-02
-0.38699999E-02	-0.27500000E-02
-0.38999999E-02	-0.31499998E-02
-0.38999999E-02	-0.35499998E-02
-0.38999999E-02	-0.39499998E-02
-0.38699999E-02	-0.46499968E-02

$C_{n_{5\delta_2-4}}$

K	REAL	IMAG
0.0	0.73999986E-02	0.0
0.19999999E 00	0.67199990E-02	-0.34999987E-03
0.39999998E 00	0.62999986E-02	-0.14999999E-03
0.59999996E 00	0.59999973E-02	-0.49999988E-04
0.79999995E 00	0.57999976E-02	0.21000000E-03
0.10000000E 01	0.56799985E-02	0.51999977E-03
0.11999998E 01	0.55000000E-02	0.87999995E-03
0.15999994E 01	0.54099970E-02	0.14799999E-02
0.20000000E 01	0.52999966E-02	0.19999999E-02
0.23999996E 01	0.51999986E-02	0.24999999E-02
0.27999992E 01	0.51499978E-02	0.29499999E-02
0.33999996E 01	0.50999969E-02	0.35999999E-02

TABLE B3

ELEVON MASS, GEOMETRY AND PERTINENT STRUCTURAL MODE SHAPE DATA, XB-70, HEAVY WT , $\delta_T = 25°$

INBOARD ELEVON (δ_1)

$m_1 = 8.86$ SLUGS

$I_{1_H} = 134.5$ SLUG-FT.^{2}

$\ell_1 = 2.87$ FT

$\bar{\ell}_1 = 51.2$ FT

AT ELEVON H

MODE	ϕ_i'	ϕ_i'' (RAD)
1	+.3906	-.0199
2	+.0150	-.0006
3	+3.329	-.3000
4	+.0597	-.0084
5	-.0944	+.0085

REMAINING ELEVONS (δ_2 THRU δ_4)

$m_e = 26.58$ SLUGS

$I_{e_H} = 402.5$ SLUG-FT^2

$\ell_e = 2.84$ FT

$\bar{\ell}_e = 51.2$ FT

AT ELEVON H

MODE	ϕ_i^e	$\phi_i^{e\prime}$ (RAD)
1	+.4435	-.0190
2	+.1382	-.0041
3	+2.306	-.2392
4	+.0594	-.0125
5	-.1364	+.0111

TABLE B4

MODE SHAPE CHARACTERISTICS AT RESPONSE AND SENSOR LOCATIONS

HEAVY WEIGHT, $\delta_T = 25°$, M = 0.90

SENSOR LOCATION	MODE NO.	ϕ_i	ϕ_i'
Nose FS 194.75 in.	1	+1.4200	-------
	2	-.1810	-------
	3	-12.1000	-------
	4	+.3400	-------
	5	-.1720	-------
Pilot station FS 438 in.	1	+.8825	-------
	2	-.0846	-------
	3	-4.0358	-------
	4	+.0289	-------
	5	-.0149	-------
Nose wheel well FS 1284 in.	1	-.2500	+.00120
	2	+.0300	+.00127
	3	+.5500	+.09120
	4	+.0300	-.00288
	5	-.0280	+.00096
Near center of gravity FS 1485 in.	1	-.2330	-------
	2	+.0011	-------
	3	-.7812	-------
	4	+.0559	-------
	5	-.0233	-------
ILAF wing accelerometer FS 2212 in.	1	+.4050	-------
	2	+.0660	-------
	3	+2.850	-------
	4	+.0600	-------
	5	-.1250	-------
Midship accelerometer FS 1653 in.	1	-.1816	-------
	2	-.0221	-------
	3	-1.4241	-------
	4	+.0528	-------
	5	-.0100	-------

TABLE B5

XB-70 TOTAL VEHICLE AERODYNAMIC, GEOMETRIC, MASS AND STRUCTURAL MODE DATA
LIGHT WEIGHT, δ_T = 25°, M = .90

Units: ft, slugs, rad/sec

AERODYNAMIC COEFFICIENTS DUE TO RIGID-BODY MODES

C_{N_α}	+2.469	C_{m_α}	-.4122	$C_{\eta_{1_\alpha}}$	-.1570	$C_{\eta_{2_\alpha}}$	-.2546	$C_{\eta_{3_\alpha}}$	+.7156	$C_{\eta_{4_\alpha}}$	+.0064	$C_{\eta_{5_\alpha}}$	-.0232
$C_{N_{\dot\alpha}}$	-.0141	$C_{m_{\dot\alpha}}$	+.3718	$C_{\eta_{1_{\dot\alpha}}}$	+.1746	$C_{\eta_{2_{\dot\alpha}}}$	-.0117	$C_{\eta_{3_{\dot\alpha}}}$	+.0132	$C_{\eta_{4_{\dot\alpha}}}$	+.0210	$C_{\eta_{5_{\dot\alpha}}}$	+.0190
C_{N_q}	+2.002	C_{m_q}	-1.999	$C_{\eta_{1_q}}$	-.5599	$C_{\eta_{2_q}}$	-.3358	$C_{\eta_{3_q}}$	-.1150	$C_{\eta_{4_q}}$	-.0685	$C_{\eta_{5_q}}$	+.0097
$C_{N_{\delta_{SV}}}$	+.00389	$C_{m_{\delta_{SV}}}$	+.00530	$C_{\eta_{1_{\delta_{SV}}}}$	-.00346	$C_{\eta_{2_{\delta_{SV}}}}$	+.00039	$C_{\eta_{3_{\delta_{SV}}}}$	+.00603	$C_{\eta_{4_{\delta_{SV}}}}$	-.00043	$C_{\eta_{5_{\delta_{SV}}}}$	+.00031

AERODYNAMIC COEFFICIENTS DUE TO STRUCTURAL MODES

$C_{N_{\eta_1}}$	+.0397	$C_{m_{\eta_1}}$	-.0113	$C_{\eta_1\eta_1}$	-.00003	$C_{\eta_2\eta_1}$	-.0055	$C_{\eta_3\eta_1}$	+.0113	$C_{\eta_4\eta_1}$	+.0013	$C_{\eta_5\eta_1}$	-.0014
$C_{N_{\eta_2}}$	+.0072	$C_{m_{\eta_2}}$	-.0021	$C_{\eta_1\eta_2}$	-.0034	$C_{\eta_2\eta_2}$	-.0022	$C_{\eta_3\eta_2}$	+.0023	$C_{\eta_4\eta_2}$	-.00006	$C_{\eta_5\eta_2}$	-.0006
$C_{N_{\eta_3}}$	+.1013	$C_{m_{\eta_3}}$	-.0102	$C_{\eta_1\eta_3}$	-.0281	$C_{\eta_2\eta_3}$	-.0133	$C_{\eta_3\eta_3}$	+.0308	$C_{\eta_4\eta_3}$	+.0017	$C_{\eta_5\eta_3}$	-.0064
$C_{N_{\eta_4}}$	+.0250	$C_{m_{\eta_4}}$	-.0087	$C_{\eta_1\eta_4}$	-.0071	$C_{\eta_2\eta_4}$	-.0068	$C_{\eta_3\eta_4}$	+.0051	$C_{\eta_4\eta_4}$	-.0005	$C_{\eta_5\eta_4}$	-.0019
$C_{N_{\eta_5}}$	-.0062	$C_{m_{\eta_5}}$	+.0018	$C_{\eta_1\eta_5}$	-.0021	$C_{\eta_2\eta_5}$	-.0029	$C_{\eta_3\eta_5}$	-.0011	$C_{\eta_4\eta_5}$	-.0021	$C_{\eta_5\eta_5}$	-.00014

$C_{N_{\dot\eta_1}}$	+.4898	$C_{m_{\dot\eta_1}}$	-.4458	$C_{\eta_1\dot\eta_1}$	-.5725	$C_{\eta_2\dot\eta_1}$	-.1312	$C_{\eta_3\dot\eta_1}$	+.0629	$C_{\eta_4\dot\eta_1}$	-.0338	$C_{\eta_5\dot\eta_1}$	-.0490
$C_{N_{\dot\eta_2}}$	+.3567	$C_{m_{\dot\eta_2}}$	-.0849	$C_{\eta_1\dot\eta_2}$	-.0857	$C_{\eta_2\dot\eta_2}$	-.1046	$C_{\eta_3\dot\eta_2}$	+.0489	$C_{\eta_4\dot\eta_2}$	-.0138	$C_{\eta_5\dot\eta_2}$	-.0222
$C_{N_{\dot\eta_3}}$	+2.729	$C_{m_{\dot\eta_3}}$	-.3131	$C_{\eta_1\dot\eta_3}$	-.1594	$C_{\eta_2\dot\eta_3}$	-.1701	$C_{\eta_3\dot\eta_3}$	-.5849	$C_{\eta_4\dot\eta_3}$	-.0414	$C_{\eta_5\dot\eta_3}$	+.0462
$C_{N_{\dot\eta_4}}$	+.2153	$C_{m_{\dot\eta_4}}$	-.1612	$C_{\eta_1\dot\eta_4}$	-.1749	$C_{\eta_2\dot\eta_4}$	-.0909	$C_{\eta_3\dot\eta_4}$	-.0944	$C_{\eta_4\dot\eta_4}$	-.0555	$C_{\eta_5\dot\eta_4}$	-.0140
$C_{N_{\dot\eta_5}}$	-.0077	$C_{m_{\dot\eta_5}}$	+.0607	$C_{\eta_1\dot\eta_5}$	+.0259	$C_{\eta_2\dot\eta_5}$	-.0383	$C_{\eta_3\dot\eta_5}$	+.0322	$C_{\eta_4\dot\eta_5}$	-.0233	$C_{\eta_5\dot\eta_5}$	-.0319

MASS

WT = 324,994 LBS

I_y = 16,848,730

C.G. AT F.S. 1603.5

STRUCTURAL FREQUENCIES, DAMPING AND GENERALIZED MASSES

ω_1	15.65	M_1	731	g_{g_1}	.02
ω_2	23.50	M_2	78.5	g_{g_2}	.02
ω_3	36.30	M_3	2520	g_{g_3}	.02
ω_4	46.00	M_4	48.6	g_{g_4}	.02
ω_5	53.90	M_5	31.2	g_{g_5}	.02

GEOMETRY

S_w = 6300

$\bar{c}_w$ = 78.53

TABLE B6

ELEVON UNSTEADY GENERALIZED FORCES, XB-70
LIGHT WEIGHT, δ_T = 25°, M = .90

$C_{N_{\delta_1}}$ $C_{m_{\delta_1}}$

K	$C_{N_{\delta_1}}$ REAL	$C_{N_{\delta_1}}$ IMAG	$C_{m_{\delta_1}}$ REAL	$C_{m_{\delta_1}}$ IMAG
0.0	C.82999945E-01	0.0	-0.385COCCCE-01	0.0
0.1999999CE 0C	C.65999985E-01	-0.10899998E-01	-C.35999998E-01	0.14999998E-02
0.3999999BE 0C	C.58499999E-01	-0.11999998E-01	-C.34199998E-01	-0.49999985E-03
0.5999999CE CC	C.53499997E-01	-0.89999996E-02	-C.330000C0E-01	-0.19999999E-02
0.7999999SE CC	C.51700CC0E-01	-0.44999979E-02	-C.31999998E-01	-0.37999998E-02
0.1CCCCCCCE C1	C.48999999E-01	0.0	-0.31499997E-01	-0.49999990E-02
0.1199999BE C1	C.47499999E-01	0.14999998E-02	-C.30999999E-01	-0.64999983E-02
0.1599999AE C1	C.45999996E-01	0.59999973E-02	-C.30299999E-01	-0.95999986E-02
0.2CCCCCCCE C1	C.44199999E-01	C.11000000E-01	-C.29999997E-01	-0.12499999E-01
0.2399999BE C1	C.43199997E-01	0.14999997E-01	-C.29999997E-01	-0.15499998E-01
0.2799999ZE C1	C.42199999E-01	0.20000000E-01	-C.29999997E-01	-0.18499997E-01
0.3399999BE C1	C.41999999E-01	0.25999997E-01	-0.29999997E-01	-0.22999998E-01

$C_{n_{\delta_1}}$ $C_{n_{\delta_2}}$

K	$C_{n_{\delta_1}}$ REAL	$C_{n_{\delta_1}}$ IMAG	$C_{n_{\delta_2}}$ REAL	$C_{n_{\delta_2}}$ IMAG
0.0	-C.19499999E-01	0.0	-C.29499999E-02	0.0
0.1999999SE 0C	-C.2C199999E-01	-0.14999998E-02	-C.21799998E-02	0.60999999E-03
0.3999999BE 0C	-C.2C599999E-01	-0.26999998E-02	-0.18199999E-02	0.64999983E-03
0.5999999CE 0C	-C.2C999998E-01	-C.36999998E-02	-C.15999998E-02	0.51999977E-03
0.7999999SE 0C	-0.21100CCCE-01	-0.47999993E-02	-C.14499999E-02	0.39999979E-03
0.1CCCCCCCE C1	-C.21100C00E-01	-0.56999996E-02	-C.13599999E-02	0.29999996E-03
0.1199999BE C1	-C.21100CC0E-01	-0.66000000E-02	-0.12999999E-02	0.21000000E-03
0.1599999AE C1	-C.2C999998E-01	-0.85999966E-02	-C.12200CC0E-02	0.49999988E-04
0.2CCCCCCCE C1	-C.2C900CCCE-01	-0.10599997E-01	-C.11699998E-02	-0.79999998E-04
0.2399999BE C1	-C.2C499997E-01	-0.12499999E-01	-C.113C00C0E-02	-0.19999999E-03
0.2799999ZE C1	-C.20099998E-01	-C.14500000E-01	-C.11C00CC0E-02	-0.29999996E-03
0.3399999BE C1	-0.19599997E-01	-0.17600000E-01	-0.10299999E-02	-0.47999993E-03

TABLE B6. - Continued.

$C_{n_{\delta_3}}$

K	REAL	IMAG
0.0	-0.91999948E-01	0.0
0.19999999E 00	-0.84999979E-01	0.29999998E-02
0.39999998E 00	-0.80499947E-01	-0.49999985E-03
0.59999996E 00	-0.77999949E-01	-0.44999979E-02
0.79999995E 00	-0.76999962E-01	-0.80999993E-02
0.10000000E 01	-0.75999975E-01	-0.11999998E-01
0.11999998E 01	-0.74799955E-01	-0.15799999E-01
0.13999994E 01	-0.73099971E-01	-0.22999998E-01
0.15999999E 01	-0.71999967E-01	-0.30499998E-01
0.17999996E 01	-0.70999980E-01	-0.37999999E-01
0.19999992E 01	-0.69799960E-01	-0.44999998E-01
0.21999996E 01	-0.67999959E-01	-0.56499999E-01

$C_{n_{\delta_4}}$

REAL	IMAG
-0.73499978E-02	0.0
-0.59999973E-02	0.79999981E-03
-0.51799975E-02	0.94999978E-03
-0.47499985E-02	0.69999998E-03
-0.44799969E-02	0.39999979E-03
-0.42599998E-02	0.14999999E-03
-0.41799992E-02	-0.14999999E-03
-0.40499978E-02	-0.59999991E-03
-0.39699972E-02	-0.99999993E-03
-0.38800000E-02	-0.14000000E-02
-0.37799999E-02	-0.18199999E-02
-0.36199999E-02	-0.24299999E-02

$C_{n_{\delta_5}}$

K	REAL	IMAG
0.0	0.36199999E-02	0.0
0.19999999E 00	0.30799999E-02	-0.27999980E-03
0.39999998E 00	0.28100000E-02	-0.26999996E-03
0.59999996E 00	0.26299998E-02	-0.16000000E-03
0.79999995E 00	0.25099998E-02	0.0
0.10000000E 01	0.24199998E-02	0.14999999E-03
0.11999998E 01	0.23599998E-02	0.27999980E-03
0.13999994E 01	0.22900000E-02	0.52999984E-03
0.15999999E 01	0.22199999E-02	0.76999981E-03
0.17999996E 01	0.22199999E-02	0.98999985E-03
0.19999992E 01	0.22199999E-02	0.11999998E-02
0.21999996E 01	0.22199999E-02	0.14999998E-02

TABLE B6.- Continued.

$C_{N_{\delta_{2-4}}}$

K	REAL	IMAG
0.C	C.24499995E CC	C.C
0.19999995E CC	C.20699996E 00	-0.29999997E-01
0.39999998E CC	C.18499994E 0C	-0.33000000E-01
0.59999996E CC	C.16999996E CC	-0.24999999E-01
0.79999995E CC	C.15999997F 0C	-0.16999997E-01
0.1C000CCCE C1	C.15199995E 0C	-0.99999979E-02
0.11999998E 01	C.14699996E CC	0.0
0.15999994E C1	0.13999999E 00	0.14999997F-01
0.2CCCCCCCE C1	C.13499999E 0C	0.27999997E-01
0.23999996E C1	C.13199997F CC	0.40999997E-01
0.27999992E C1	C.13CC0CCCE 00	0.53999998E-01
0.33999996E C1	C.1300CCCCE CC	0.69999993E-01

$C_{m_{\delta_{2-4}}}$

REAL	IMAG
-0.13399994E CC	0.0
-C.11999995E 0C	0.69999993E-02
-C.11199999E 00	0.69999993E-02
-C.10749996E 00	0.19999999E-02
-C.1C399997E CC	-0.19999999E-02
-0.10099995E 0C	-0.74999966E-02
-C.98499954E-01	-0.11999998E-01
-C.94999969E-01	-0.22000000E-01
-C.91999948E-01	-0.31999998E-01
-C.90999961E-01	-0.40999997E-01
-C.89999974E-C1	-0.50999999E-01
-C.88999987E-C1	-0.65999985E-01

$C_{m_{1_{\delta_{2-4}}}}$

REAL	IMAG
0.C	-C.65499961E-01	0.C
0.19999999E 0C	-0.64999998E-C1	-0.19999999E-02
0.39999996E CC	-C.64499974E-01	-C.45999990E-02
0.59999996E CC	-C.63799977E-01	-C.79999976E-02
0.79999995E CC	-C.62999964E-01	-0.11000000E-01
0.1000000CE C1	-C.62500CC0E-01	-0.13999999E-01
0.11999998E C1	-C.61999999E-01	-0.17199997E-01
0.15999994E C1	-C.60999997E-01	-C.23499999E-01
0.2CCC0CCCE 01	-C.60299996E-01	-0.29799998E-01
0.23999996E C1	-C.59999999E-01	-0.35799999E-01
0.27999992E C1	-C.59499998E-01	-0.41800000E-01
0.33999996E C1	-C.59099998E-01	-0.50999999E-01

$C_{m_{2_{\delta_{2-4}}}}$

REAL	IMAG
-C.27999997F-01	0.0
-C.25199998E-01	0.24999999E-02
-0.22999998E-01	0.23999999E-02
-C.21499999E-01	0.14999998E-02
-C.20299997E-01	0.0
-C.19800C0E-01	-0.99999993E-03
-0.19399997E-C1	-0.18000000E-02
-C.18599998E-01	-0.35999999E-02
-C.17999999E-01	-0.55000000E-02
-C.17699998E-01	-0.73999986E-02
-C.1749999E-C1	-0.90999976E-02
-C.1739999E-C1	-0.11599999E-01

TABLE B6. - Concluded.

$C_{n_{\delta_{2-4}}}$

K	REAL	IMAG
0.0	C.78499973E-01	C.0
0.19999995E 00	C.44000000E-01	-0.40999997E-01
0.39999998E 00	C.20999998E-01	-0.52999999E-01
0.59999996E 00	C.44999979E-02	-0.56999996E-01
0.79999995E 00	-C.59999973E-02	-0.58499999E-01
0.10000000E 01	-C.13999999E-01	-0.58999997E-01
0.11999998E 01	-C.18499997E-01	-0.58999997E-01
0.15999994E 01	-C.25500000E-01	-0.60500000E-01
0.20000000E 01	-C.29199999E-01	-0.62999964E-01
0.23999996E 01	-C.30999999E-01	-0.65799952E-01
0.27999992E 01	-0.31499997E-01	-0.68999946E-01
0.33999996E 01	-C.31499997E-01	-0.73499978E-01

$C_{n_{\delta_{2-4}}}$

REAL	IMAG
C.69999993E-02	0.0
C.44499971E-02	-0.29999998E-02
C.25999998E-02	-0.39999969E-02
C.13199998E-02	-0.42999983E-02
C.47999993E-03	-0.44000000E-02
-C.49999988E-04	-C.44000000E-02
-0.49999985E-03	-0.44000000E-02
-0.99999993E-03	-C.44199973E-02
-C.12999999E-02	-0.45999996E-02
-C.14499999E-02	-C.47999993E-02
-C.15499999E-02	-0.50499998E-02
-C.16500000E-02	-0.55000000E-02

$C_{n_{\delta_{2-4}}}$

K	REAL	IMAG
0.0	C.99499971E-02	0.0
0.19999999E 00	C.91499984E-02	-0.44999993E-03
0.39999998E 00	C.85999966E-02	-0.31999988E-03
0.59999996E 00	C.82199983E-02	0.0
0.79999995E 00	C.79999976E-02	0.39999979E-03
0.10000000E 01	C.77999979E-02	C.84999995E-03
0.11999998E 01	C.76799989E-02	0.12500000E-02
0.15999994E 01	C.74999966E-02	0.20499998E-02
0.20000000E 01	C.72999969E-02	0.27999999E-02
0.23999996E 01	C.71799979E-02	0.34999999E-02
0.27999992E 01	C.70499964E-02	C.41999966E-02
0.33999996E 01	0.68999976E-02	0.51999986E-02

TABLE B7

ELEVON MASS, GEOMETRY AND PERTINENT STRUCTURAL MODE SHAPE DATA, XB-70, LIGHT WT , $\delta_T = 25°$

INBOARD ELEVON (δ_1)

$m_1 = 8.86$ SLUGS

$I_{1_H} = 134.5$ SLUG-FT^2

$\ell_1 = 2.87$ FT

$\bar{\ell}_1 = 51.2$ FT

AT ELEVON H.L.

MODE	ϕ_i'	ϕ_i'' / ϕ_i' (RAD)
1	+.3844	−.0179
2	+.0070	+.0001
3	+.4868	−.0432
4	+.0268	−.0058
5	−.1274	+.0118

REMAINING ELEVONS (δ_2 THRU δ_4)

$m_e = 26.58$ SLUGS

$I_{e_H} = 402.5$ SLUG-FT^2

$\ell_e = 2.84$ FT

$\bar{\ell}_e = 51.2$ FT

AT ELEVON H.L.

MODE	ϕ_i^e	$\phi_i^{e\prime} / \phi_i^e$ (RAD)
1	+.4334	−.0186
2	+.1248	−.0037
3	+.2741	−.0343
4	+.0065	−.0084
5	−.1795	+.0150

TABLE B8

MODE SHAPE CHARACTERISTICS AT RESPONSE AND SENSOR LOCATIONS

LIGHT WEIGHT, $\delta_T = 25°$, $M = 0.90$

SENSOR LOCATION	MODE NO.	ϕ_i	ϕ_i'
Nose FS 194.75 in.	1	+1.1450	--------
	2	-.1430	--------
	3	-2.6000	--------
	4	+.2450	--------
	5	-.1800	--------
Pilot station FS 438 in.	1	+.6848	--------
	2	-.0648	--------
	3	-.7264	--------
	4	+.0119	--------
	5	-.0108	--------
Nose wheel well FS 1284 in.	1	-.2600	+.00048
	2	+.0400	+.001032
	3	+.2400	+.02210
	4	+.0220	-.00216
	5	-.0390	+.000961
Near center of gravity FS 1485 in.	1	-.2346	--------
	2	+.0128	--------
	3	-.0916	--------
	4	+.0382	--------
	5	-.0305	--------
ILAF wing accelerometer FS 2212 in.	1	+.4050	--------
	2	+.0520	--------
	3	+.3800	--------
	4	+.0150	--------
	5	-.1650	--------
Midship accelerometer FS 1653 in.	1	-.1791	--------
	2	-.0092	--------
	3	-.2526	--------
	4	+.0374	--------
	5	-.0136	--------

TABLE B9

UNSTEADY AERODYNAMICS, XB-70, LIGHT WEIGHT, δ_T = 25°, M = .90, TOTAL VEHICLE

k	C_{N_α}	$C_{N_{\dot\alpha}}$	C_{N_q}	$C_{N_{\dot q}}$
0.50834998E-01	0.24538994E 01	-0.12070999E-01	0.19793997E 01	-0.12084999E 02
0.20333999E 00	0.24446993E 01	0.66315949E-01	0.20451994E 01	-0.14759998E 01
0.61001998E 00	0.24619999E 01	0.18951994E 00	0.21308994E 01	-0.87053996E 00
0.10166998E 01	0.25363998E 01	0.20675999E 00	0.19442997E 01	-0.80822998E 00
0.14233999E 01	0.26714993E 01	0.20883995E 00	0.17339993E 01	-0.62456995E 00
0.20333996E 01	0.29903994E 01	0.14287996E 00	0.14777994E 01	-0.42900997E 00
0.26433992E 01	0.33533993E 01	0.21079998E-01	0.12284994E 01	-0.31105000E 00
0.32533998E 01	0.37026997E 01	-0.11409998E 00	0.10050993E 01	-0.22770995E 00
0.38634996E 01	0.39425993E 01	-0.25244999E 00	0.80550998E 00	-0.16091996E 00

k	$C_{N_{\eta_1}}$	$C_{N_{\dot\eta_1}}$	$C_{N_{\eta_2}}$	$C_{N_{\dot\eta_2}}$
0.50834998E-01	0.42738996E-01	0.60156000E 00	0.91946982E-02	0.17228997E 00
0.20333999E 00	0.42990997E-01	0.63874996E 00	0.92327967E-02	0.17417997E 00
0.61001998E 00	0.46537999E-01	0.58205998E 00	0.94281994E-02	0.12355000E 00
0.10166998E 01	0.51587999E-01	0.34446996E 00	0.83037987E-02	0.85278988E-01
0.14233999E 01	0.55569999E-01	0.20062000E 00	0.66391975E-02	0.11505997E 00
0.20333996E 01	0.61758999E-01	0.60663000E-01	0.47112964E-02	0.16951996E 00
0.26433992E 01	0.67587972E-01	-0.61731998E-01	0.35104998E-02	0.20760000E 00
0.32533998E 01	0.72105944E-01	-0.16962999E 00	0.24821998E-02	0.23156995E 00
0.38634996E 01	0.73779941E-01	-0.24315995E 00	0.17158999E-02	0.25678998E 00

k	$C_{N_{\eta_3}}$	$C_{N_{\dot\eta_3}}$	$C_{N_{\eta_4}}$	$C_{N_{\dot\eta_4}}$
0.50834998E-01	0.10877997E 00	0.19565992E 01	0.30927997E-01	-0.33973998E 00
0.20333999E 00	0.10936999E 00	0.20316000E 01	0.30860998E-01	-0.32060999E 00
0.61001998E 00	0.11688995E 00	0.16992998E 01	0.30398998E-01	-0.39534998E 00
0.10166998E 01	0.12368000E 00	0.10578995E 01	0.27430996E-01	-0.38145995E 00
0.14233999E 01	0.12328994E 00	0.88885999E 00	0.24616998E-01	-0.24961996E 00
0.20333996E 01	0.12074995E 00	0.87167996E 00	0.22949997E-01	-0.12347996E 00
0.26433992E 01	0.11754996E 00	0.91762996E 00	0.22903997E-01	-0.69418967E-01
0.32533998E 01	0.11465997E 00	0.98448998E 00	0.23124997E-01	-0.42438999E-01
0.38634996E 01	0.11311996E 00	0.10871992E 01	0.24180997E-01	-0.18762998E-01

TABLE B9. - Continued.

k	$C_{N_{\eta_5}}$	$C_{N_{\dot{\eta}_5}}$	C_{m_α}	$C_{m_{\dot{\alpha}}}$
0.5C834998E-C1	-0.38561998E-02	-0.88421941E-01	-0.41242999E 00	0.36960000E 00
0.20333999E 0C	-C.40613972E-C2	-0.86027980E-01	-0.41667998E 00	0.36067998E 00
0.61CC1998E 0C	-C.59535988E-C2	0.65345988E-02	-C.46523994E CC	0.38395000E 00
0.1C166998E 01	-0.79013966E-02	0.19103998E 00	-C.53096998E 0C	0.44869995E 00
0.14233999E C1	-0.73932968E-02	0.24891996E 00	-0.60208994E 00	0.48788995E 00
0.20333996E C1	-0.5294C995E-02	0.22174996E 00	-C.74179995E 00	0.54456997E 00
0.26433992E C1	-C.4C445998E-02	0.15888995E 00	-C.88946998E 00	0.61309999E 00
0.32533998E 01	-C.43773986E-02	0.11633998E 00	-C.10121994E 01	0.67880994E 00
0.38634996E C1	-C.5530C966E-02	0.89279950E-01	-C.11039991E 01	0.73757994E 00

k	C_{m_g}	$C_{m_{\dot{g}}}$	$C_{m_{\eta_1}}$	$C_{m_{\dot{\eta}_1}}$
0.5CE34998E-C1	-0.19963999E 01	0.16382999E 01	-0.18868998E-01	-0.10230999E 01
0.20333999E CC	-C.20204992E 01	-0.30960000E 00	-C.19053999E-01	-0.10303993E 01
0.61001998E CC	-C.21011992E 01	-0.21151996E 00	-C.212C2996E-01	-0.98771000E 00
0.1C166998E 01	-C.20369997E 01	-0.10968998E-01	-C.2441C997E-01	-0.82303995E 00
0.14233999E C1	-0.19408998E C1	0.14784999E-01	-C.26433997E-01	-0.70836997E 00
0.20333996E 01	-C.18337994E 01	-0.34310999E-02	-C.28648999E-01	-0.60649997E 00
0.26433992E C1	-C.17325993E C1	-C.18060997E-01	-0.30141998E-C1	-0.53233999E 00
0.32533998E C1	-C.16424999E 01	-0.31189997E-01	-C.30655999E-01	-0.47714996E 00
0.38634996E C1	-C.15695992E 01	-0.41981999E-01	-C.30020997E-01	-0.43701994E 00

k	$C_{m_{\eta_2}}$	$C_{m_{\dot{\eta}_2}}$	$C_{m_{\eta_3}}$	$C_{m_{\dot{\eta}_3}}$
0.5C834998E-C1	-C.44510998E-C2	-0.16916996E 00	-C.29367998E-01	-0.13566999E 01
0.20333999E 0C	-0.45355CC0E-C2	-0.16564000E 00	-C.30157CCCE-01	-0.13537998E 01
0.61CC1998E CC	-C.50961971E-C2	-0.11627996E 00	-0.37591998E-01	-0.10563993E 01
0.10166998E C1	-C.49709976E-02	-0.60246997E-01	-C.46554998E-01	-0.50383997E 00
0.14233999E C1	-C.42618997E-02	-0.57487000E-01	-C.4995CCCCE-C1	-0.21866995E 00
0.20333996E 01	-0.3280C999E-C2	-0.77940941E-01	-C.52391998E-C1	-0.27198996E-01
0.26433992E C1	-0.26133000E-C2	-0.98365963E-01	-C.53947996E-01	0.70464969E-01
0.32533998E C1	-0.21426999E-02	-C.11260998E 00	-C.55431999E-01	C.12514997E 00
0.38634996E C1	-0.16773999E-02	-0.12403995E 00	-C.56904998E-01	0.16000998E 00

TABLE B9. - Continued.

k	$C_{m_{\eta_4}}$	$C_{m_{\dot{\eta}_4}}$	$C_{m_{\eta_5}}$	$C_{m_{\dot{\eta}_5}}$
0.50834998E-01	-0.16223997E-01	-0.26476997E 00	0.15599998E-02	0.21519995E 00
0.20333999E 00	-0.16434997E-01	-0.25255996E 00	0.16564999E-02	0.21770996E 00
0.61001998E 00	-0.17660998E-01	-0.11240000E 00	0.28696998E-02	0.18798000E 00
0.10166998E 01	-0.17209999E-01	-0.16578998E-01	0.47929995E-02	0.73662996E-01
0.14233999E 01	-0.16001999E-01	-0.37861999E-01	0.50216988E-02	0.10226998E-01
0.20333996E 01	-0.15370999E-01	-0.79134941E-01	0.39311983E-02	-0.13135999E-01
0.26433992E 01	-0.15993999E-01	-0.98760962E-01	0.26278000E-02	-0.33207999E-02
0.32533998E 01	-0.16899999E-01	-0.10407996E 00	0.19381999E-02	0.80920979E-02
0.38634996E 01	-0.18122997E-01	-0.10561997E 00	0.15309998E-02	0.13120998E-01

k	$C_{n_{1_\alpha}}$	$C_{n_{1_{\dot{\alpha}}}}$	$C_{n_{1_q}}$	$C_{n_{1_{\dot{q}}}}$
0.50834998E-01	-0.15969998E 00	0.17369998E 00	-0.55725998E 00	-0.21986997E 00
0.20333999E 00	-0.16128999E 00	0.17006999E 00	-0.57083994E 00	-0.41540998E 00
0.61001998E 00	-0.18431997E 00	0.17554998E 00	-0.65050000E 00	-0.31781995E 00
0.10166998E 01	-0.21612996E 00	0.21706998E 00	-0.65398997E 00	-0.14959997E 00
0.14233999E 01	-0.24131995E 00	0.24185997E 00	-0.62356997E 00	-0.96709967E-01
0.20333996E 01	-0.28527999E 00	0.26830995E 00	-0.59442997E 00	-0.79668999E-01
0.26433992E 01	-0.32774997E 00	0.29657996E 00	-0.56886995E 00	-0.71999967E-01
0.32533998E 01	-0.35036999E 00	0.32111996E 00	-0.54760998E 00	-0.68777978E-01
0.38634996E 01	-0.36243999E 00	0.33693999E 00	-0.53881997E 00	-0.66856980E-01

k	$C_{n_{1_{\eta_1}}}$	$C_{n_{1_{\dot{\eta}_1}}}$	$C_{n_{1_{\eta_2}}}$	$C_{n_{1_{\dot{\eta}_2}}}$
0.50834998E-01	-0.47336984E-03	-0.82610995E 00	-0.38867998E-02	-0.15972996E 00
0.20333999E 00	-0.51223999E-03	-0.83229995E 00	-0.39299987E-02	-0.15892994E 00
0.61001998E 00	-0.13513998E-02	-0.83789998E 00	-0.43122992E-02	-0.13584995E 00
0.10166998E 01	-0.29964000E-02	-0.75765997E 00	-0.44155978E-02	-0.94569981E-01
0.14233999E 01	-0.38214000E-02	-0.69272995E 00	-0.40661991E-02	-0.85532963E-01
0.20333996E 01	-0.42428970E-02	-0.63983995E 00	-0.34687999E-02	-0.93339980E-01
0.26433992E 01	-0.41080974E-02	-0.60747999E 00	-0.30244000E-02	-0.10427999E 00
0.32533998E 01	-0.33568998E-02	-0.59896995E 00	-0.26971998E-02	-0.11243999E 00
0.38634996E 01	-0.22145999E-02	-0.57833999E 00	-0.23586999E-02	-0.11771995E 00

TABLE B9. - Continued.

k	$C_{n_1 \eta_3}$	$C_{n_1 \dot{\eta}_3}$	$C_{n_1 \eta_4}$	$C_{n_1 \dot{\eta}_4}$
0.50834998E-01	-C.29305000E-01	-0.90436000E 00	-C.90345964E-02	-0.30960000E 00
0.20333999E CC	-C.29642999E-01	-0.91065997E 00	-0.91714971E-02	-0.30469996E 00
0.61001998E CC	-C.33712CC0E-01	-0.81702995E 00	-C.10236997E-C1	-0.22845995E 00
0.10166998E 01	-0.40073998E-01	-C.50457996E 00	-C.10529999E-C1	-0.14573997E 00
0.14233999E C1	-0.43211997E-C1	-0.30100995E 00	-0.10083999E-Q1	-0.13986999E 00
0.20333996E C1	-C.4615C997E-01	-0.14771998E 00	-C.99997967E-02	-0.15341997E 00
0.26433992E C1	-C.48710998E-01	-0.58270000E-01	-C.10708999E-01	-0.15912998E 00
0.32533998E 01	-0.51272999E-C1	-0.62353979E-03	-C.118130C0E-01	-0.15676999E 00
0.38634996E C1	-0.53693999E-01	0.49553998E-01	-0.129520C0E-01	-0.15019000E 00

k	$C_{n_1 \eta_5}$	$C_{n_1 \dot{\eta}_5}$	$C_{n_2 \alpha}$	$C_{n_2 \dot{\alpha}}$
0.5C834998E-C1	-C.28449998E-C2	0.10451996E 00	-0.25290996E 00	-0.11056997E-01
0.20333999E CC	-C.28295999E-02	0.10754997E 00	-0.24833995E CC	-0.26412997E-01
0.61001998E 0C	-C.23402998E-02	0.10971999E 00	-C.22869998E CC	-0.66982985E-01
0.10166998E C1	-C.10775998E-C2	0.54488000E-01	-C.21027994E 0C	-0.96680999E-01
0.14233999E C1	-C.74959989E-C3	C.10814000E-01	-0.20C08999E 00	-0.11607999E 00
0.20333996E C1	-0.12623998E-C2	-0.13457999E-01	-C.19380999E CC	-0.12778997E 00
0.26433992E 01	-C.20424998E-C2	-0.13715997E-01	-0.18800998E CC	-0.12991995E 00
0.32533998E C1	-C.25159998E-02	-0.96973963E-02	-0.17586994E 00	-C.13079000E 00
0.38634996E C1	-0.28728999E-C2	-0.91539994E-02	-0.15517998E 00	-0.13464999E 00

k	$C_{n_2 g}$	$C_{n_2 \dot{g}}$	$C_{n_2 \eta_1}$	$C_{n_2 \dot{\eta}_1}$
0.50834998E-C1	-C.33429998E 0C	0.17310991E 01	-C.64916983E-C2	-0.80796957E-01
0.20333999E 0C	-0.34306997E CC	0.31547999E 00	-0.646049C0E-02	-0.87835968E-01
0.61001998E 0C	-C.351120C0E 00	0.18321997E 00	-C.64094998E-02	-0.94320953E-01
0.10166998E C1	-C.34018999E 00	0.12637997E 00	-0.62429979E-02	-0.94511986E-01
0.14233999E C1	-0.33328998E 0C	0.83797991E-01	-C.60104989E-02	-0.10013998E 00
0.20333996E C1	-C.32308996E 00	0.48777997E-01	-C.56665987E-02	-0.10685998E 00
0.26433992E C1	-C.3132C995E CC	0.30438997E-01	-0.52931979E-02	-0.11205000E 00
0.32533998E 01	-0.30789995E CC	0.18165998E-01	-0.48108995E-02	-0.11844999E 00
0.38634996E C1	-C.30953997E 0C	0.88181980E-02	-0.42471997E-02	-0.12721997E 00

TABLE B9. - Continued.

k	$C_{\eta_2\eta_2}$	$C_{\eta_2\dot{\eta}_2}$	$C_{\eta_2\eta_3}$	$C_{\eta_2\dot{\eta}_3}$
0.50834998E-01	-0.23792998E-02	-0.10591996E 00	-0.16785998E-01	-0.46377999E 00
0.20333999E 00	-0.23590999E-02	-0.10754997E 00	-0.16682997E-01	-0.48364997E 00
0.61001998E 00	-0.22209999E-02	-0.11014998E 00	-0.16396999E-01	-0.50999999E 00
0.10166998E 01	-0.19508998E-02	-0.11679000E 00	-0.15711997E-01	-0.53697997E 00
0.14233999E 01	-0.16689999E-02	-0.12520999E 00	-0.15123997E-01	-0.57261997E 00
0.20333996E 01	-0.12830999E-02	-0.13615996E 00	-0.15097998E-01	-0.61014998E 00
0.26433992E 01	-0.10325999E-02	-0.14396000E 00	-0.15938997E-01	-0.62698996E 00
0.32533998E 01	-0.80650998E-03	-0.14861000E 00	-0.17417997E-01	-0.63499999E 00
0.38634996E 01	-0.57755993E-03	-0.15215999E 00	-0.19295998E-01	-0.63492996E 00

k	$C_{\eta_2\eta_4}$	$C_{\eta_2\dot{\eta}_4}$	$C_{\eta_2\eta_5}$	$C_{\eta_2\dot{\eta}_5}$
0.50834998E-01	-0.82254969E-02	-0.39651997E-01	-0.28201998E-02	-0.92250943E-01
0.20333999E 00	-0.81593990E-02	-0.47346000E-01	-0.28212999E-02	-0.92218995E-01
0.61001998E 00	-0.78123994E-02	-0.68266988E-01	-0.28247000E-02	-0.96412957E-01
0.10166998E 01	-0.74013993E-02	-0.97218990E-01	-0.30117999E-02	-0.99180996E-01
0.14233999E 01	-0.72714984E-02	-0.11938000E 00	-0.33684999E-02	-0.95103979E-01
0.20333996E 01	-0.76002963E-02	-0.13682997E 00	-0.39809979E-02	-0.84623992E-01
0.26433992E 01	-0.84149987E-02	-0.13959998E 00	-0.43889992E-02	-0.70202947E-01
0.32533998E 01	-0.93789995E-02	-0.13590997E 00	-0.44084974E-02	-0.60976997E-01
0.38634996E 01	-0.10367997E-01	-0.12974000E 00	-0.42968988E-02	-0.56955997E-01

k	$C_{\eta_3\alpha}$	$C_{\eta_3\dot{\alpha}}$	$C_{\eta_3 q}$	$C_{\eta_3\dot{q}}$
0.50834998E-01	0.71328998E 00	0.12481999E-01	-0.11453998E 00	-0.39742994E 01
0.20333999E 00	0.70726997E 00	0.26600998E-01	-0.11840999E 00	-0.12332993E 01
0.61001998E 00	0.65883994E 00	0.51486999E-01	-0.27195996E 00	-0.97906995E 00
0.10166998E 01	0.58209997E 00	0.14387000E 00	-0.39848000E 00	-0.61432999E 00
0.14233999E 01	0.53287995E 00	0.21318996E 00	-0.43176997E 00	-0.39795995E 00
0.20333996E 01	0.47630996E 00	0.26437998E 00	-0.47535998E 00	-0.25590998E 00
0.26433992E 01	0.41914999E 00	0.29624999E 00	-0.51388997E 00	-0.18169999E 00
0.32533998E 01	0.37077999E 00	0.32264996E 00	-0.53763998E 00	-0.13655996E 00
0.38634996E 01	0.33065999E 00	0.34178996E 00	-0.55563998E 00	-0.10652000E 00

TABLE B9. - Continued.

k	$C_{n_3\eta_1}$	$C_{n_3\dot{\eta}_1}$	$C_{n_3\eta_2}$	$C_{n_3\dot{\eta}_2}$
0.50834998E-01	0.10847997E-01	-0.38219994E 00	0.19504998E-02	-0.10202998E 00
0.20333999E 00	0.10907996E-01	-0.38710999E 00	0.19002999E-02	-0.10319996E 00
0.61001998E 00	0.10681998E-01	-0.46845996E 00	0.11983998E-02	-0.95364988E-01
0.10166998E 01	0.82917996E-02	-0.42785996E 00	0.17353999E-03	-0.20795997E-01
0.14233995E 01	0.65426975E-02	-0.34478998E 00	-0.91906986E-04	0.22717997E-01
0.20333996E 01	0.51588975E-02	-0.27045000E 00	-0.30566996E-04	0.44199999E-01
0.26433992E 01	0.43484978E-02	-0.22761995E 00	0.15363999E-03	0.49547996E-01
0.32533998E 01	0.41373000E-02	-0.20042998E 00	0.34074998E-03	0.50802998E-01
0.38634996E 01	0.43022968E-02	-0.18100995E 00	0.48753992E-03	0.52811999E-01

k	$C_{n_3\eta_3}$	$C_{n_3\dot{\eta}_3}$	$C_{n_3\eta_4}$	$C_{n_3\dot{\eta}_4}$
0.50834998E-01	0.30430999E-01	-0.20299997E 01	0.38589998E-02	-0.48275000E 00
0.20333995E 00	0.30311000E-01	-0.20391998E 01	0.36457998E-02	-0.47749996E 00
0.61001998E 00	0.26662998E-01	-0.21391993E 01	0.14279999E-02	-0.40189999E 00
0.10166998E 01	0.15715998E-01	-0.18335991E 01	-0.76610991E-03	-0.20892996E 00
0.14233999E 01	0.87210983E-02	-0.14779997E 01	-0.75747981E-03	-0.12356997E 00
0.20333996E 01	0.32253000E-02	-0.11568995E 01	0.51203999E-04	-0.87371945E-01
0.26433992E 01	0.62676985E-03	-0.97700995E 00	0.89291995E-03	-0.81558943E-01
0.32533998E 01	0.24812995E-03	-0.87681997E 00	0.17581999E-02	-0.83956957E-01
0.38634996E 01	0.15927998E-02	-0.81244999E 00	0.28223998E-02	-0.86486995E-01

k	$C_{n_3\eta_5}$	$C_{n_3\dot{\eta}_5}$	$C_{n_4\alpha}$	$C_{n_4\dot{\alpha}}$
0.50834998E-01	-0.18779000E-02	0.12797999E 00	0.59647970E-02	0.20923998E-01
0.20333999E 00	-0.19337998E-02	0.13326997E 00	0.58693998E-02	0.21410000E-01
0.61001998E 00	-0.18322999E-02	0.18305999E 00	0.44075996E-02	0.20186998E-01
0.10166998E 01	0.43058000E-03	0.16496998E 00	0.63306978E-03	0.22572998E-01
0.14233995E 01	0.21164999E-02	0.98498940E-01	-0.39307997E-02	0.24871998E-01
0.20333996E 01	0.31869998E-02	0.33537999E-01	-0.11957999E-01	0.28301999E-01
0.26433992E 01	0.33618999E-02	0.10724999E-02	-0.21726999E-01	0.32497000E-01
0.32533998E 01	0.31766000E-02	-0.12775999E-01	-0.29252999E-01	0.36148999E-01
0.38634996E 01	0.28797998E-02	-0.19522998E-01	-0.32873999E-01	0.38729999E-01

TABLE B9. - Continued.

k	$C_{n_4 g}$	$C_{n_4 \dot{g}}$	$C_{n_4 n_1}$	$C_{n_4 \dot{n}_1}$
0.5083499E-01	-0.68481982E-01	-0.37953997E 00	0.69908984E-03	-0.10661995E 00
0.2033399E 00	-0.69734991E-01	-0.11477000E 00	0.70697977E-03	-0.10719997E 00
0.6100199E 00	-0.87535977E-01	-0.91101944E-01	0.70677977E-03	-0.11417997E 00
0.1016699E 01	-0.10757955E 00	-0.62386997E-01	0.54963981E-03	-0.11508000E 00
0.1423399E 01	-0.12191999E 00	-0.42864997E-01	0.39094989E-03	-0.11072999E 00
0.2033399E 01	-0.13556999E 00	-0.26898999E-01	0.22618999E-03	-0.10463995E 00
0.2643392E 01	-0.14389998E 00	-0.16827997E-01	0.70668990E-04	-0.10068995E 00
0.3253398E 01	-0.14836997E 00	-0.11142999E-01	-0.38757998E-05	-0.98570943E-01
0.3863496E 01	-0.14958996E 00	-0.79487972E-02	0.39923994E-04	-0.97017944E-01

k	$C_{n_4 n_2}$	$C_{n_4 \dot{n}_2}$	$C_{n_4 n_3}$	$C_{n_4 \dot{n}_3}$
0.5083499E-01	-0.15297999E-03	-0.36222998E-01	-0.13851000E-02	-0.22226000E 00
0.2033399E 00	-0.15099999E-03	-0.36477000E-01	-0.13877000E-02	-0.22344995E 00
0.6100199E 00	-0.16206999E-03	-0.36457997E-01	-0.16796000E-02	-0.23314995E 00
0.1016699E 01	-0.18110000E-03	-0.32314997E-01	-0.25189999E-02	-0.22318000E 00
0.1423399E 01	-0.12371999E-03	-0.30017000E-01	-0.31986998E-02	-0.19221997E 00
0.2033399E 01	0.50983988E-04	-0.31091999E-01	-0.39696991E-02	-0.15661997E 00
0.2643392E 01	0.18614999E-03	-0.33893999E-01	-0.46131983E-02	-0.13114995E 00
0.3253398E 01	0.31699985E-03	-0.35537999E-01	-0.50000995E-02	-0.11730999E 00
0.3863496E 01	0.47353981E-03	-0.36591999E-01	-0.49939975E-02	-0.10790998E 00

k	$C_{n_4 n_4}$	$C_{n_4 \dot{n}_4}$	$C_{n_4 n_5}$	$C_{n_4 \dot{n}_5}$
0.5083499E-01	-0.17545999E-02	-0.10072994E 00	-0.19059000E-02	-0.52772999E-01
0.2033399E 00	-0.17636998E-02	-0.10096997E 00	-0.19206000E-02	-0.52090999E-01
0.6100199E 00	-0.18916000E-02	-0.98785996E-01	-0.19657000E-02	-0.46494998E-01
0.1016699E 01	-0.20162999E-02	-0.90377986E-01	-0.18745000E-02	-0.43567996E-01
0.1423399E 01	-0.19824000E-02	-0.85661948E-01	-0.18461000E-02	-0.48469000E-01
0.2033399E 01	-0.19407000E-02	-0.85770965E-01	-0.20178999E-02	-0.54442998E-01
0.2643392E 01	-0.20829998E-02	-0.85501969E-01	-0.22973998E-02	-0.52898999E-01
0.3253398E 01	-0.22147000E-02	-0.84282994E-01	-0.24332998E-02	-0.50189000E-01
0.3863496E 01	-0.22276998E-02	-0.83015978E-01	-0.25292998E-02	-0.48956998E-01

TABLE B9. - Continued .

k	$C_{n_{s\alpha}}$	$C_{n_{s\dot{\alpha}}}$	$C_{n_{sq}}$	$C_{n_{s\dot{q}}}$
0.50834998E-01	-0.23084000E-01	0.18858999E-01	0.10144997E-01	0.64102995E 00
0.20333999E 00	-0.21270998E-01	0.14202997E-01	0.78716986E-02	0.19814998E 00
0.61001998E 00	-0.10423999E-01	0.45653991E-02	0.18629000E-01	0.15899998E 00
0.10166998E 01	0.72107986E-02	-0.12433000E-01	0.34348000E-01	0.10434997E 00
0.14233999E 01	0.20078000E-01	-0.28174996E-01	0.31916000E-01	0.64500988E-01
0.20333996E 01	0.34473997E-01	-0.40687997E-01	0.28069999E-01	0.38727999E-01
0.26433992E 01	0.47187999E-01	-0.48389997E-01	0.24481997E-01	0.26905999E-01
0.32533998E 01	0.59936997E-01	-0.55357996E-01	0.19795999E-01	0.19676000E-01
0.38634996E 01	0.70468962E-01	-0.61679997E-01	0.16018000E-01	0.15115999E-01

k	$C_{n_{s\eta_1}}$	$C_{n_{s\dot{\eta}_1}}$	$C_{n_{s\eta_2}}$	$C_{n_{s\dot{\eta}_2}}$
0.50834998E-01	-0.19538999E-02	-0.53187981E-02	-0.74101985E-03	-0.10873999E-02
0.20333999E 00	-0.19588999E-02	-0.60253963E-02	-0.73085981E-03	-0.12755999E-02
0.61001998E 00	-0.19740998E-02	0.58295988E-02	-0.62082987E-03	-0.12383000E-02
0.10166998E 01	-0.16085999E-02	0.57363994E-02	-0.40628994E-03	-0.11650000E-01
0.14233999E 01	-0.12732998E-02	-0.67597963E-02	-0.30580978E-03	-0.19819997E-01
0.20333996E 01	-0.97967987E-03	-0.18849999E-01	-0.23337999E-03	-0.25493000E-01
0.26433992E 01	-0.82178996E-03	-0.26815999E-01	-0.23056999E-03	-0.28917000E-01
0.32533998E 01	-0.73874998E-03	-0.33386000E-01	-0.24667988E-03	-0.30582998E-01
0.38634996E 01	-0.71834982E-03	-0.37660997E-01	-0.24580979E-03	-0.31463999E-01

k	$C_{n_{s\eta_3}}$	$C_{n_{s\dot{\eta}_3}}$	$C_{n_{s\eta_4}}$	$C_{n_{s\dot{\eta}_4}}$
0.50834998E-01	-0.94312988E-02	0.18082994E 00	-0.31346998E-02	0.55515997E-01
0.20333999E 00	-0.93920976E-02	0.17888999E 00	-0.30945998E-02	0.52948996E-01
0.61001998E 00	-0.89369975E-02	0.20134997E 00	-0.27317998E-02	0.39865997E-01
0.10166998E 01	-0.71722977E-02	0.17626995E 00	-0.22157999E-02	0.44788979E-02
0.14233999E 01	-0.59382990E-02	0.13040996E 00	-0.20591998E-02	-0.15814997E-01
0.20333996E 01	-0.50898977E-02	0.89281976E-01	-0.20422000E-02	-0.28121997E-01
0.26433992E 01	-0.49247965E-02	0.70737958E-01	-0.21952998E-02	-0.32140996E-01
0.32533998E 01	-0.50586984E-02	0.59756000E-01	-0.23667000E-02	-0.33159997E-01
0.38634996E 01	-0.51731989E-02	0.55666000E-01	-0.24632998E-02	-0.33142999E-01

TABLE B9. - Concluded.

k	$C_{n_s n_s}$	$C_{n_s n_s}$
0.50834998E-01	-0.79034991E-03	-0.76057971E-01
0.20333999E 00	-0.79324981E-03	-0.76646984E-01
0.61001998E 00	-0.83111995E-03	-0.84706962E-01
0.10166998E 01	-0.11853999E-02	-0.88063955E-01
0.14233999E 01	-0.14926000E-02	-0.81510961E-01
0.20333996E 01	-0.17360998E-02	-0.75064957E-01
0.26433992E 01	-0.18829999E-02	-0.70011973E-01
0.32533998E 01	-0.19051998E-02	-0.67078948E-01
0.38634996E 01	-0.19393000E-02	-0.66134989E-01

TABLE B10

XB-70 TOTAL VEHICLE AERODYNAMIC, GEOMETRIC, MASS AND STRUCTURAL MODE DATA
MEDIUM WEIGHT, $\delta_T = 65°$, M = 1.6

Units: ft, slugs, rad/sec

AERODYNAMIC COEFFICIENTS DUE TO RIGID-BODY MODES

C_{L_α}	+1.792	C_{m_α}	-.1961	$C_{n_{1\alpha}}$	-.2452	$C_{n_{2\alpha}}$	-.0018	$C_{n_{3\alpha}}$	-.8869	$C_{n_{4\alpha}}$	-.0618	$C_{n_{5\alpha}}$	-.3448
$C_{N_{\dot\alpha}}$	+.2472	$C_{m_{\dot\alpha}}$	+.2141	$C_{n_{1\dot\alpha}}$	+.2504	$C_{n_{2\dot\alpha}}$	-.0137	$C_{n_{3\dot\alpha}}$	-.2145	$C_{n_{4\dot\alpha}}$	+.0018	$C_{n_{5\dot\alpha}}$	+.0812
C_{N_q}	+.9657	C_{m_q}	-1.219	$C_{n_{1q}}$	-.0199	$C_{n_{2q}}$	-.0504	$C_{n_{3q}}$	+.2142	$C_{n_{4q}}$	+.0088	$C_{n_{5q}}$	+.1468
$C_{N_{\delta_{SV}}}$	+.00317	$C_{m_{\delta_{SV}}}$	+.00428	$C_{n_{1\delta_{SV}}}$	-.00510	$C_{n_{2\delta_{SV}}}$	+.00032	$C_{n_{3\delta_{SV}}}$	-.00714	$C_{n_{4\delta_{SV}}}$	-.00013	$C_{n_{5\delta_{SV}}}$	+.00143

AERODYNAMIC COEFFICIENTS DUE TO STRUCTURAL MODES

$C_{N_{\eta_1}}$	+.0326	$C_{m_{\eta_1}}$	-.0231	$C_{n_1\eta_1}$	+.0022	$C_{n_2\eta_1}$	-.0052	$C_{n_3\eta_1}$	-.0085	$C_{n_4\eta_1}$	-.0027	$C_{n_5\eta_1}$	-.0044
$C_{N_{\eta_2}}$	+.0016	$C_{m_{\eta_2}}$	-.0008	$C_{n_1\eta_2}$	-.0032	$C_{n_2\eta_2}$	-.0015	$C_{n_3\eta_2}$	-.0019	$C_{n_4\eta_2}$	-.0011	$C_{n_5\eta_2}$	-.0013
$C_{N_{\eta_3}}$	-.0879	$C_{m_{\eta_3}}$	+.0341	$C_{n_1\eta_3}$	+.0617	$C_{n_2\eta_3}$	+.0048	$C_{n_3\eta_3}$	-.0138	$C_{n_4\eta_3}$	+.0046	$C_{n_5\eta_3}$	+.0048
$C_{N_{\eta_4}}$	+.0023	$C_{m_{\eta_4}}$	-.0017	$C_{n_1\eta_4}$	-.0027	$C_{n_2\eta_4}$	-.0030	$C_{n_3\eta_4}$	-.0040	$C_{n_4\eta_4}$	-.0022	$C_{n_5\eta_4}$	-.0019
$C_{N_{\eta_5}}$	-.0198	$C_{m_{\eta_5}}$	+.0178	$C_{n_1\eta_5}$	+.0065	$C_{n_2\eta_5}$	+.0024	$C_{n_3\eta_5}$	-.0100	$C_{n_4\eta_5}$	-.0004	$C_{n_5\eta_5}$	-.0003

$C_{N_{\dot\eta_1}}$	-.2136	$C_{m_{\dot\eta_1}}$	-.3546	$C_{n_1\dot\eta_1}$	-.9930	$C_{n_2\dot\eta_1}$	-.0029	$C_{n_3\dot\eta_1}$	+.6487	$C_{n_4\dot\eta_1}$	-.0379	$C_{n_5\dot\eta_1}$	-.0284
$C_{N_{\dot\eta_2}}$	+.0139	$C_{m_{\dot\eta_2}}$	-.0142	$C_{n_1\dot\eta_2}$	-.0117	$C_{n_2\dot\eta_2}$	-.0463	$C_{n_3\dot\eta_2}$	-.0588	$C_{n_4\dot\eta_2}$	-.0268	$C_{n_5\dot\eta_2}$	-.0089
$C_{N_{\dot\eta_3}}$	-1.012	$C_{m_{\dot\eta_3}}$	-.0653	$C_{n_1\dot\eta_3}$	-.4683	$C_{n_2\dot\eta_3}$	-.0288	$C_{n_3\dot\eta_3}$	-.9148	$C_{n_4\dot\eta_3}$	-.0562	$C_{n_5\dot\eta_3}$	-.5345
$C_{N_{\dot\eta_4}}$	+.0009	$C_{m_{\dot\eta_4}}$	-.0147	$C_{n_1\dot\eta_4}$	-.0428	$C_{n_2\dot\eta_4}$	-.0258	$C_{n_3\dot\eta_4}$	-.0235	$C_{n_4\dot\eta_4}$	-.0235	$C_{n_5\dot\eta_4}$	-.0063
$C_{N_{\dot\eta_5}}$	+.2350	$C_{m_{\dot\eta_5}}$	+.1068	$C_{n_1\dot\eta_5}$	+.2246	$C_{n_2\dot\eta_5}$	-.0044	$C_{n_3\dot\eta_5}$	-.3135	$C_{n_4\dot\eta_5}$	-.0164	$C_{n_5\dot\eta_5}$	-.1382

MASS

WT = 379,614 LBS

I_y = 20,276,093

C.G. AT F.S. 1596.4

STRUCTURAL FREQUENCIES, DAMPING AND GENERALIZED MASSES

ω_1	14.90	M_1	2080	g_{s_1}	.02
ω_2	23.70	M_2	64.8	g_{s_2}	.02
ω_3	33.20	M_3	5000	g_{s_3}	.02
ω_4	43.70	M_4	30	g_{s_4}	.02
ω_5	47.30	M_5	495	g_{s_5}	.02

GEOMETRY

S_w = 6300

$\bar{C}_w$ = 78.53

TABLE B11

ELEVON MASS, GEOMETRY AND PERTINENT STRUCTURAL MODE SHAPE DATA, XB-70, MEDIUM WT , $\delta_T = 65°$

INBOARD ELEVON (δ_1)

$m_1 = 8.86$ SLUGS

$I_{1_{HL}} = 134.5$ SLUG-FT.^{2}

$\ell_1 = 2.87$ FT

$\bar{\ell}_1 = 51.2$ FT

AT ELEVON HL

MODE	ϕ_i'	$\phi_i'/$ (RAD)
1	+.5391	−.0240
2	+.0198	+.0002
3	−.9388	+.0816
4	−.0318	+.0142
5	−.3270	+.0382

REMAINING ELEVONS (δ_2 THRU δ_4)

$m_e = 26.58$ SLUGS

$I_{e_{HL}} = 402.5$ SLUG-FT^2

$\ell_e = 2.84$ FT

$\bar{\ell}_e = 51.2$ FT

AT ELEVON HL

MODE	ϕ_i^e	$\phi_i^e/$ (RAD)
1	+.6720	−.0286
2	+.1304	−.0036
3	−.7688	+.0804
4	−.0640	+.0182
5	−.4578	+.0536

TABLE B12

ELEVON GENERALIZED FORCES, XB-70
MEDIUM WT , $\delta_T = 65°$, M = 1.6

INBOARD ELEVON (δ_1)	REMAINING ELEVONS (δ_2 THRU δ_4)
$C_{N_{\delta_1}} = +.0183$ /RAD	$C_{N_{\delta_e}} = +.0549$ /RAD
$C_{m_{\delta_1}} = -.0129$	$C_{m_{\delta_e}} = -.0387$
$C_{\eta_{1\delta_1}} = -.01196$	$C_{\eta_{1\delta_e}} = -.04240$
$C_{\eta_{2\delta_1}} = -.00008$	$C_{\eta_{2\delta_e}} = -.00751$
$C_{\eta_{3\delta_1}} = +.02773$	$C_{\eta_{3\delta_e}} = +.06237$
$C_{\eta_{4\delta_1}} = +.00071$	$C_{\eta_{4\delta_e}} = +.00425$
$C_{\eta_{5\delta_1}} = +.01119$	$C_{\eta_{5\delta_e}} = +.03936$

TABLE B13

MODE SHAPE CHARACTERISTICS AT RESPONSE AND SENSOR LOCATIONS

MEDIUM WEIGHT, $\delta_T = 65°$

SENSOR LOCATION	MODE NO.	ϕ_i	ϕ'_i
Nose FS 194.75 in.	1	+2.1200	-------
	2	-.1500	-------
	3	+3.7300	-------
	4	+.0680	-------
	5	-.8600	-------
Pilot station FS 438 in.	1	+1.2500	-------
	2	-.0650	-------
	3	+1.1000	-------
	4	+.2100	-------
	5	-.1500	-------
Nose wheel well FS 1284 in.	1	-.4200	0
	2	+.0250	+.00077
	3	-.1900	-.02930
	4	-.0045	-.00072
	5	-.1100	+.00720
Near center of gravity FS 1485 in.	1	-.3817	-------
	2	+.0037	-------
	3	+.2125	-------
	4	+.0068	-------
	5	-.1529	-------
ILAF wing accelerometer FS 2212 in.	1	+.6000	-------
	2	-.0600	-------
	3	-.9000	-------
	4	-.0550	-------
	5	-.4300	-------
Midship accelerometer FS 1653 in.	1	-.2992	-------
	2	-.0162	-------
	3	+.4240	-------
	4	+.0112	-------
	5	-.1190	-------

REFERENCES

1. Wykes, John H.; Nardi, Louis U.; and Mori, Alva S.: XB-70 Structural Mode Control System Design and Performance Analyses. North American Rockwell Corporation (NASA CR-1557), 1969.

2. Falkner, V. M.: The Calculation of Aerodynamic Loading on Surfaces of Any Shape. R. & M. No. 1910, British A.R.C., 1943.

3. Etkin, Bernard; and Woodward, Frank A.: Lift Distribution on Supersonic Wings with Subsonic Leading Edges and Arbitrary Angle of Attack Distribution. J. Aeron. Sci., vol. 21, no. 11, Nov. 1954, pp. 783-785.

4. Etkin, Bernard: Lift Distribution on Warped Supersonic Wings. Can. Aeron. J., vol. 1, no. 1, April 1955, pp. 16-20.

5. Watkins, C. E.; Woolston, D. S.; and Cunningham, H. J.: A Systematic Kernel Function Procedure for Determining Aerodynamic Forces on Oscillating or Steady Finite Wings at Subsonic Speeds. NASA TR R-48, 1959.

6. Wykes, John H.; and Mori, Alva S.: An Analysis of Flexible Aircraft Structural Mode Control. Tech. Rep. AFFDL-TR-65-190, Part I, Wright-Patterson Air Force Base, U.S. Air Force, June 1966.