A GRADUATE PROGRAM IN AERONAUTICS

N A S A GRANT NSG 1229

FINAL REPORT

entitled

AEROELASTIC ANALYSIS AND GROUND VIBRATION SURVEY OF THE NASA, GRUMMAN AMERICAN YANKEE MODIFIED FOR SPIN TESTING

Period Covering August 7, 1975
through June 30, 1977

by

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I. GENERAL

A complete ground vibration and aeroelastic analysis was made of a modified version of the Grumman American Yankee, Fig. 1. The aircraft had been modified for four empennage configurations — Fig. 2, a wing boom was added, a spin chute installed — Fig. 3, and provisions included for large masses in the wing tip to vary the lateral and directional inertia. Other minor changes were made which have much less influence on the flutter and vibrations.

This report contains information necessary to show aeroelastic conformity according to FAR Part 23. Neither static divergence nor aileron reversal was considered since the wing structure was not sufficiently changed to affect its static aeroelastic qualities. These were covered under the original certification of the Bede BD-1.

The aircraft was found to be free from flutter in all of the normal modes explored in the ground shake test. The analysis demonstrated freedom from flutter up to 214 miles per hour.

II. GROUND SHAKE TESTS

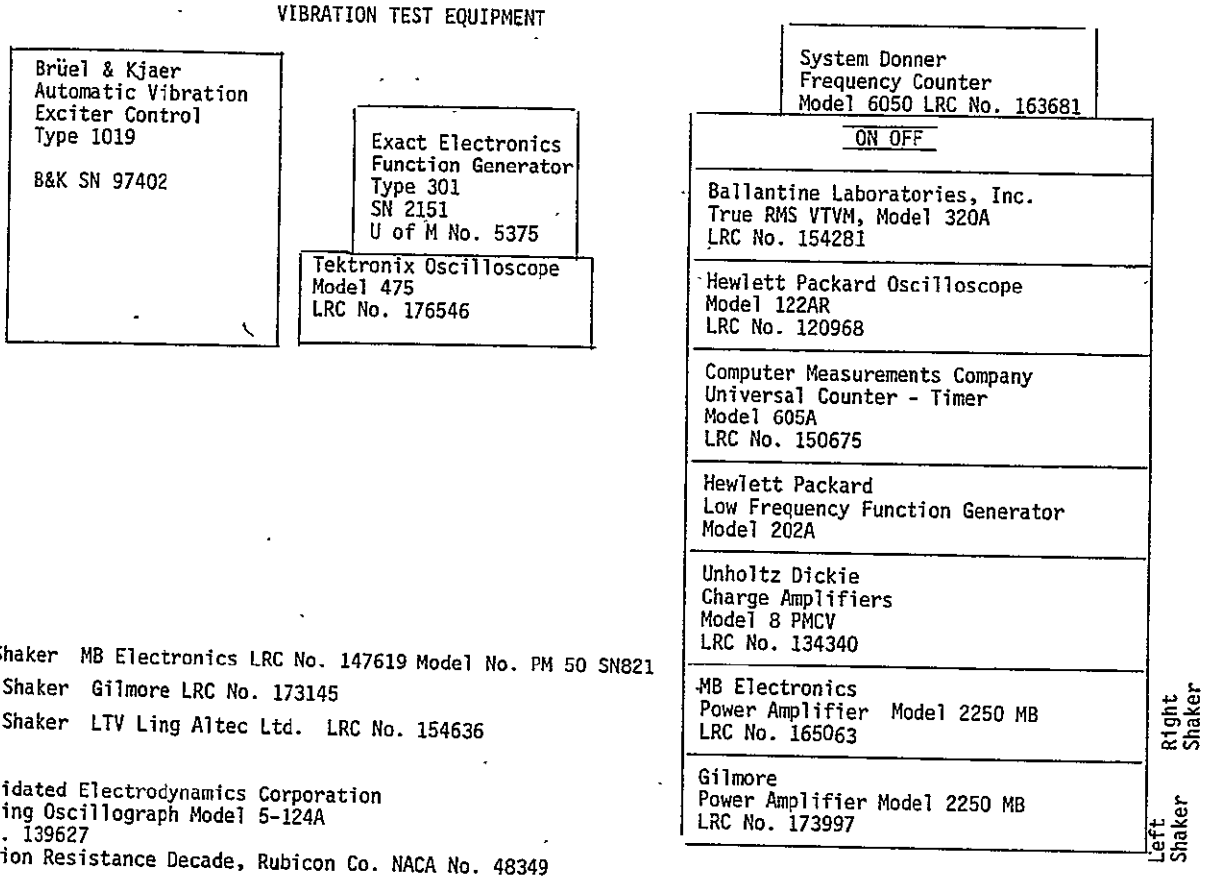
A ground vibration survey was conducted in compliance with the Federal Air Regulations. Constant force frequency sweeps were made to determine the relative amplitude of the natural modes of the airplane. Subsequently, constant force, constant frequency vibration amplitude patterns were mapped to determine the dynamic qualities of the airplane which might contribute to flutter divergence. The following sections describe the equipment and procedures used and the final results.

A. Equipment

The vibration survey was made using two electrodynamic exciters which could be operated from separate power supplies. The amplifiers were driven from a single oscillator which could be smoothly tuned to any frequency within a practical range. Two accelerometers were used to record the motion. The vibration amplitudes were monitored by a displacement read-out on a meter which provided two signal integrations. A selector on the meter also allowed velocity or acceleration to be read out. A reference accelerometer was placed on the airplane in such a position to always provide a strong coherent signal. The output of this accelerometer was read into the horizontal trace of an oscilloscope while a second "roving" accelerometer signal was input to the vertical. This allowed phase to be easily determined. The shaker power supplies could be switched to operate either in phase or 180° out of phase. An oscillograph recorder was available to record wave forms and amplitude decays when necessary.

The shake test was run using NASA furnished equipment. Figure 4 shows the NASA instrumentation setup. The NASA equipment was as follows:

VIBRATION TEST EQUIPMENT



Left Shaker MB Electronics LRC No. 147619 Model No. PM 50 SN821
Right Shaker Gilmore LRC No. 173145
Small Shaker LTV Ling Altec Ltd. LRC No. 154636

Consolidated Electrodynamics Corporation
Recording Oscillograph Model 5-124A
LRC No. 139627
Precision Resistance Decade, Rubicon Co. NACA No. 48349

B. Procedure

A vibration survey of the modified Yankee airplane was conducted in the experimental hangar at NASA, Langley. The airplane was prepared for the first sequence of tests by placing it in the flight configuration.

Next, it was necessary to isolate the aircraft from the ground in such a way that the influence of the floor would not be read into the vibration data. The gear tire pressures were set to the nominal working pressure. One vibration exciter and an accelerometer were attached to the right wing tip and the lowest symmetrical wing resonance was excited. This occurred at 8.25 CPS. In this condition, the effect of the main gear tire stiffness would be felt the most. The tires were then deflated to 1/4 of the nominal pressure. Upon repeated excitation of the lowest symmetrical mode in the minimum weight condition no tire pressure effects could be distinguished, i.e. the 8.25 CPS resonance could be repeated.

The conclusion was that the airplane was suspended in an effectively "free-flight" state allowing the vibration survey to be conducted in a simulated zero speed flight condition. The tires were retained at low pressure throughout the tests.

Instrumentation (Fig. 4) was set up to provide for data taking. Figure 5 shows a typical reference accelerometer attachment to solid structure beside a roving accelerometer. Care was taken in preventing an accelerometer from being affixed to soft structure or near a loose or rattling element inside the structure. The roving accelerometer was attached by double adhesive tape so it could be repeatedly concentrated on a predetermined hard point. Prior to selecting the points to be probed, the structure surrounding the location was studied. For example, the wing pick-up points were chosen at ribs of the bonded structure to provide stiffest load path to a spar. This minimized the possibility of a local deformation in a rib causing a ficticious result. Figure 6 shows the shaker arrangement. An adjustable length light weight pushrod had a screw affixed to each end so that it could be screwed into both the wing structure and the shaker. An adjustment clamp (Fig. 7) would allow the smaller end of the pushrod to be tied tightly to or slide and rotate inside the larger end. This provided safety for both the shaker and the aircraft should the aircraft be inadvertently rocked on the soft landing gear. Figure 8 shows a smaller shaker attachment for use on the empennage. The lighter armature made it more desirable because of the mass effects on the modes and frequencies.

The symmetrical wing modes were obtained by symmetrically forcing both wing tips. The shaker attachments were made by removing screws from the close-out ribs which secure the tip and replacing them with the shaker push rod attachments.

Again, the sitffest load path to the spars was chosen so that artificial phaselags between force and displacement and spurrious responses would not occur. The shakers were put in phase and the amplitude of the power supply to the right wing exciter adjusted until both wing tips had the same displacement amplitude (as measured by the roving accelerometer probe). Unsymmetrical excitation was accomplished in the same fashion with the exciters 180° out of phase. Vibration modes and frequency sweeps were recorded and are shown in Appendix A. Damping decays were individually obtained by exciting a normal mode and instantly cutting the shaker force to zero. These results are also given in Appendix A.

Wing torsion modes were excited by attaching both exciters to the left tip. The exciter levels were balanced to obtain pure torsion (E.A. becoming a nodal line) as well as possible. By placing the front shaker below the front spar and the rear exciter on a rib near the trailing edge, the force level of the rear exciter fell to nearly zero to obtain the stationary elastic axis. The center of the turbular spar sufficiently represented the elastic axis. An attempt was made to differentiate between antisymmetrical and symmetrical torsion modes. The frequency and nodal difference was too subtle to discern.

The empennage vibration survey was conducted in much the same manner as for the wing. Both the large and small shaker were used. Both empennage symmetrical (vertical) and antisymmetrical (lateral) modes were excited and probed. The influence of the large exciter mass was shown to be negligible in the vertical modes by attaching a single shaker to the tail skid and exciting the same (vertical) modes. Fuselage side bending modes were studied by shaking horizontally at the spin chute attachment.

The control surfaces were excited to determine the circuit resonances. The aileron circuit resonance was obtained by placing accelerometers on both surfaces at mirror image points. The small shaker was always used for shaking the control surfaces. Vibration was induced over the frequency range until the probes showed in-phase motion. In the case of the elevator and rudder, a pick-up was placed on the surface itself and another on the controls in the cockpit. The influence of the shaker mass was shown to be negligible by exciting a control surface mode, adding a mass equivalent to the exciter armature mass and demonstrating the same mode to exist.

C. Results

The raw vibration data are contained in Appendix A. The modes used in the flutter analysis were normalized, plotted and averaged as per Fig. 9. The remainder of the modes used are shown in the input data to the flutter analysis in digital form, Section IV.

A summary of the modal frequencies found in the shake test are as follows:

1. Wing Bending Modes

Symmetrical Bending	8.25 Hz
Assymetrical Bending	44.0 Hz
First Torsion (no wing boom)	32.5 Hz
First Torsion (with wing boom)	19.8 Hz

2. Tail 6

Fin Bending	42.60
Fuselage Torsion	16.72
Fuselage Side Bending	14.48
Stabilizer Yaw	29.70

3. Tail 2

Fuselage Vertical Bending	24.24
Fin Bending	40.63
Fuselage Torsion	17.26
Fuselage Side Bending	21.36
Stabilizer Yaw	27.86
Horizontal Stabilizer Bending	49.0

4. Tail 3

Fuselage Vertical Bending	*
Horizontal Stabilizer Bending	*
Fuselage Side Bending	*
Fuselage Torsion	*

5. Tail 4

Horizontal Stabilizer Bending	33.9
Fuselage Vertical Bending	*
Fin Bending	31.87
Fuselage Side Bending	14.87
Fuselage Torsion	16.3
Stabilizer Yaw	*

During the previous vibration surveys, the control surface motions were monitored at several descriptive locations. In addition, the control surfaces were excited directly to determine their pertinent dynamic properties.

The rudder was excited at the trailing edge. For either rudder, the circuit frequency was 12.1 CPS. Rudder torsion modes were found to be at 48 and 106 CPS for the long and short rudders respectively.

The aileron circuit resonance was not investigated since it had been studied in previous analyses.

The elevator torsion mode, for the split elevator, occurred at 44.2 CPS. The continuous elevator had a significantly higher frequency which was not monitored because of previous tests. The elevator circuit frequency was 17.3 CPS.

Throughout the shake test, consideration was given only to those modes which might influence the flutter speed. Modes such as wing second symmetrical bending were out of the frequency range of interest and were therefore not monitored. Also, numerous modes were the same in the different tail configurations. These also were not monitored.

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*Same as Tail 2.

III. DETERMINATION OF AIRPLANE PHYSICAL PROPERTIES

The airplane physical properties were obatined by several methods. These include measurement of the actual part, calculation from drawings and engineering data, and reference to NASA and Grumman/American engineering personnel. The results and description of the method of determination are described in the following sections. In addition, the computer input data in Section IV lists the geometric inertial and aerodynamic and elastic properties.

A. Wing Mass and Geometry

The wing mass distribution was primarily obtained from the data in Appendix B. First, the wing was conceptually broken into nine streamwise (Fig. 10) elements per side to conform to the requirements of the digital computer program (see Appendix C). Next, the section inertial properties, including mass, static moment, mass moment of inertia, aileron mass, mass moment and static unbalance were calculated. Some of the properties were measured at NASA and Grumman/American or obtained from previous certification reports. In some instances, numerical integration of the section was necessary to obtain inertial data. For example,

$$\text{Mass Moment} = \sum_{\text{Root}}^{\text{Tip}} d^2 \, \Delta m$$

Several configurations were defined. These include the wing alone, the wing plus wingtip boom and the wing plus a 150 pound tip weight.

The wing geometric properties were obtained by reference to Grumman/American drawings or by direct measurement.

B. Empennage Mass and Geometry

The empennage, including the spin chute, was conceptually segmented in a manner similar to the wing. The main difference is that the fuselage and spin chute were distributed into lumped segments in a fuselage longitudinal direction. This procedure

is described in Introduction to Flutter and Virbation, Scanlan and Rosenbaum, MacMillan. The arrangement is shown in the working drawing (Fig. 12). A breakdown of rudder components for weight and C.G. locations is shown in Fig. 13.

Additional discussions of wing and empennage mass and geometry will be made in Section IV.

IV. FLUTTER ANALYSIS

A. Wing

The wing/aileron flutter analysis was conducted by the use of the digital computer program listed in Appendix C. The comment cards at the beginning explain the input requirements as well as the output results. More should be said about the output so that a quick scan of the output included in this section may be most productive. The column "Cycles to Damp (1/2 amplitude)" will read 9999999 when the flutter boundary is exceeded. The left hand column "Velocity" at this point yields the flutter speed. The other information is further defined in the Scanlan and Rosenbaum reference cited.

The flutter analysis of the wing showed that no divergence would occur below the design dive speed. The indicated air speed of 214 miles per hour was found to be safe. All combinations of wing geometry were studied, including the wing less the wingtip boom, the wing with the wingtip boom and the wing with cameras and ballast weight at the tip.

The vibration modes used in the flutter analysis were derived from the shake test data. All of the combinations of mode coupling, altitude, control surface natural frequencies and inertial properties are displayed in the input data on the following pages.

```
$1 yank.wing.1
>      1      001
>      2        YANKEE WING, FIRST BENDING/TORSION
>      3             NO WING BOOM - 8.25/32.5
>      4      1
>      5       &DATA1 N=20, NWS=9, NAS=5, NIS=0, BR=24., A=-8.55, L=13.89,
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>      7       GR=1., GEB=0., &END
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>     10       DELTAX=20.9, 13.9, 15.1, 16.2, 15.7, 15.8, 16.1, 15.5, 18.1,
>     11       YBAR=0., 28.1, 40.5, 58.3, 74.3, 90.3, 106.5, 122.2, 139.1,
>     12       STRTPM=622., 26.41, 28.69, 30.78, 29.83, 30.02, 30.59, 29.45, 34.39
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>     14       113.49,
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>     16       6320.9,
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>     18       WTM=0., .203, .271, .416, .534, .649, .761, .874, 1.,
>     19       SHICKD=24., 24., 24., 24., 24., 24., 24., 24., 24.,
>     20       DELTXA=8.78, 10., 10., 10., 7.,
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>     23       FSA=.401, .505, .596, .706, .81,
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>     26       CMA=5*24.319,
>     27       BSH=15%0.,
>     28       HSW=15%0.,
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>     31       &CONT2 WB=10., &END
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>     33       &CONT2 WB=30., &END
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:      1      001
:      2        YANKEE WING, FIRST BENDING/TORSI!
:EDIT AFTN
:win 72
:r /f
:win
:col
:ml
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#    $.25,    $1.58!
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ORIGINAL PAGE IS
OF POOR QUALITY

1 yank.wing.1.o
>   8   1RUN NO. 001
>ATTN!
$.01, $1.60T
#co yank.wing.1.o

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OF POOR QUALITY

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RUN BY

YANKEE WING, FIRST BENDING/TORSION

NO WING BOOM - 8.25/32.5

WBR = 10.000   SB = 0.00   ALT = 0.   WH = 8.25   WA = 32.50
GB = 0.030   GEB = 0.0   GS = 0.030   GR = 1.000

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0.0	0.0	0.76067	8.07100	7.35455
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17.29	-0.01022	1.02013	8.07368	5.48585
140.88	-0.03558	6.77468	32.88452	3.36457
34.62	-0.02083	1.29047	8.08123	4.34066
232.40	-0.05918	9.12283	32.56256	2.47409
57.79	-0.03592	1.67699	8.09734	3.34687
341.96	-0.08760	11.79605	31.92946	1.87621
87.02	-0.05662	2.21096	8.12498	2.54723
444.24	-0.11301	13.94931	31.04726	1.54276
116.75	-0.07957	2.80859	8.15920	2.01366
517.57	-0.12922	15.10824	30.20389	1.38572
140.34	-0.09910	3.32168	8.18972	1.70899
568.56	-0.13863	15.62392	29.49284	1.30844
158.36	-0.11479	3.73666	8.21472	1.52383
615.46	-0.14519	15.81415	28.73286	1.25939
176.53	-0.13126	4.17509	8.24121	1.36821
658.24	-0.14871	15.68470	27.93651	1.23459
194.84	-0.14853	4.63790	8.26913	1.23585
696.99	-0.14908	15.25507	27.11620	1.23209
213.30	-0.16663	5.12631	8.29842	1.12206
731.89	-0.14627	14.55486	26.28364	1.25171
231.93	-0.18561	5.64177	8.32905	1.02331
763.18	-0.14035	13.61989	25.44953	1.29519
250.73	-0.20551	6.18600	8.36097	0.93686
816.12	-0.11970	11.19902	23.81306	1.47388
288.86	-0.24829	7.36889	8.42849	0.79282
858.51	-0.08843	8.28428	22.26656	1.86305
327.73	-0.29552	8.69283	8.50025	0.67779
893.24	-0.04806	5.11359	20.85072	2.82632
367.34	-0.34775	10.17605	8.57483	0.58408
448.32	-0.46847	13.65671	8.72086	0.41263
951.02	0.05353	0.0	18.49944	99999.00000
529.75	-0.60749	17.68970	8.83280	0.39610
1008.31	0.17081	0.0	16.8[illegible]	99999.00000
608.59	-0.75219	21.81636	8.87891	0.26210
1074.85	0.28815	0.0	15.68[illegible]	99999.00000
[illegible]	-0.88641	25.5[illegible]	5.35[illegible]	0.24[illegible]
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RUN BY
YANKEE WING, FIRST BENDING/TORSION
NO WING BOOM - 8.25/32.5

WBR = 20.000 SB = 0.00 ALI = 0. WH = 8.25 WA = 32.50
GB = 0.030 GEB = 0.0 GS = 0.030 GR = 1.000

VELOCITY (EAS-MPH)	CAMPING (D)	DAMPING (LAMBDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	3.11623	33.06421	7.35455
0.0	0.0	0.76067	8.07100	7.35455
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17.29	-0.01022	1.02016	8.07368	5.48569
140.87	-0.03555	6.77137	32.88364	3.36613
34.62	-0.02083	1.29057	8.08123	4.34032
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444.14	-0.11355	13.99857	31.04029	1.53628
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615.34	-0.14692	15.96713	28.72728	1.24708
176.55	-0.13168	4.18651	8.24215	1.36463
658.16	-0.15091	15.87558	27.93318	1.21960
194.87	-0.14911	4.65378	8.27046	1.23183
696.99	-0.15177	15.48458	27.11596	1.21382
213.35	-0.16742	5.14780	8.30025	1.11762
731.99	-0.14948	14.82225	26.28728	1.22930
232.00	-0.18664	5.67037	8.33149	1.01845
763.42	-0.14409	13.92299	25.45772	1.25740
250.82	-0.20684	6.22330	8.36416	0.93160
816.77	-0.12443	11.56224	23.83198	1.42871
289.04	-0.25041	7.42947	8.43359	0.78683
859.71	-0.09401	8.68384	22.29780	1.77921
328.03	-0.29873	8.78643	8.50792	0.67118
895.16	-0.05427	5.53161	20.89503	2.61836
367.81	-0.35241	10.61478	8.58576	0.57696
449.32	-0.47762	13.93036	8.74030	0.43490
954.94	0.04688	0.0	18.57569	99999.00000
531.56	-0.62229	18.16206	8.86290	0.33825
1015.38	0.16448	0.0	16.92975	99999.00000
611.51	-0.77436	22.54408	8.92143	0.27430
1085.59	0.28258	0.0	15.83787	99999.00000
687.06	-0.91937	26.57417	8.90991	0.23240
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co yank.wing.1.o(214)

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RUN BY

YANKEE WING, FIRST BENDING/TORSION

NO WING BOOM - 8.25/32.5

WBR = 30.000 SB = 0.00 ALT = 0. WH = 8.25 WA = 32.50

GB = 0.030 GEB = 0.0 GS = 0.030 GR = 1.000

VELOCITY (EAS-MPH)	DAMPING (G)	DAMPING (LAMBDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
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0.0	0.0	0.76067	8.07100	7.35455
70.73	-0.01775	4.95277	33.01921	4.62111
17.29	-0.01022	1.02016	8.07368	5.48567
140.87	-0.03554	6.77076	32.88348	3.36641
34.62	-0.02083	1.29059	8.08123	4.34025
232.38	-0.05919	9.12311	32.55954	2.47379
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116.75	-0.07970	2.81213	8.15944	2.01118
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568.40	-0.14018	15.76304	29.48453	1.29653
158.38	-0.11515	3.74615	8.21547	1.52011
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816.89	-0.12538	11.63494	23.83552	1.42000
289.07	-0.25084	7.44158	8.43458	0.78564
859.95	-0.09516	8.76969	22.30389	1.76288
328.09	-0.29939	8.80554	8.50944	0.66984
895.55	-0.05558	5.62043	20.90455	2.57809
367.91	-0.35339	10.34375	8.58797	0.57549
449.53	-0.47927	13.99048	8.74446	0.43324
955.78	0.04535	0.0	18.59204	99999.00000
531.97	-0.62573	18.27204	8.86976	0.33617
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612.22	-0.77986	22.72494	8.93183	0.27244
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688.22	-0.92758	26.84903	8.92490	0.25041
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$.07- $1.75T
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ORIGINAL PAGE IS OF POOR QUALITY

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      3              WING BOOM - 8.25/19.8
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      5       &DATA1 N=20, NWS=9, NAS=5, NHS=0, BR=24., A=-8.53, C=15.89,
      6       E=14.04, ALT=0., WH=8.25, WA=19.8, GBET=0.03, GS=0.03,
      7       GR=1., GEB=0., &END
      8       &DATA2 CK=0., 0.25, 0.5, 0.833, 1.25, 1.67, 2., 2.25,
      9       2.5, 2.75, 3., 3.25, 3.5, 4., 4.5, 5., 6., 7., 8., 9.,
     10       DELTAX=20.9, 13.9, 15.1, 16.2, 15.7, 15.8, 16.1, 15.5, 18.1,
     11       YBAR=0., 28.1, 40.5, 58.3, 74.3, 90.3, 106.5, 122.2, 139.1,
     12       STRIPM=622., 26.41, 28.69, 30.78, 29.83, 30.02, 30.59, 29.45, 4
     13       SALPHA=2052.6, 87.15, 94.68, 101.57, 99.44, 99.07, 100.95, 97.1
     14       362.94,
     15       MMOM=7298.7, 4854.2, 5273.2, 4260.5, 5482.8, 5517.7, 5622.4, 54.
     16       15187.71,
     17       WBM=-.073, -.0122, .0487, .1521, .2981, .444, .6131, .82, 1.,
     18       WTM=0., .203, .271, .416, .534, .644, .761, .874, 1.,
     19       SMICRD=24., 24., 24., 24., 24., 24., 24., 24., 24.,
     20       DELTXA=8.78, 10., 10., 10., 7.,
     21       SBETA=.76057, .86625, .86625, .86625, -3.3592,
     22       MIBETA=5.618, 6.399, 6.399, 6.399, 11.915,
     23       FSA=.401, .505, .596, .706, .81,
     24       CAPFSA=.613, .68, .76, .825, .89,
     25       BSA=5*24.,
     26       CMA=5*24.319,
     27       BSH=15*0.,
     28       HSW=15*0.,
     29       IITMODE=15*0., &END
     30       &CONTL ID=0, &END
     31       &CONT2 WB=10., &END
     32       &CONT2 WB=20., &END
     33       &CONT2 WB=30., &END
      $.04,    $1.29T
      $
```

RUN NO. 002 DATE 05-20-77 PAGE NO. 1

RUN BY

YANKEE WING, FIRST BENDING/TORSION

WING BOOM - 8.25/19.8

WBR = 10.000 SB = 0.00 ALT = 0. WH = 8.25 WA = 19.80

GB = 0.030 GEB = 0.0 GS = 0.030 GR = 1.000

VELOCITY (EAS-MPH)	DAMPING (G)	DAMPING (LAMBDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	1.99522	21.16993	7.35455
0.0	0.0	0.75441	8.00457	7.35455
45.28	-0.00946	2.62049	21.14123	5.59209
17.15	-0.01005	1.00742	8.00758	5.50955
90.20	-0.01913	3.24992	21.05445	4.49054
34.34	-0.02042	1.26788	8.01624	4.37558
148.78	-0.03250	4.09321	20.84614	3.53011
57.35	-0.03507	1.64267	8.03546	3.39068
218.84	-0.04949	5.10274	20.43349	2.77566
86.44	-0.05502	2.15052	8.07055	2.59524
284.07	-0.06532	5.94532	19.85331	2.31465
116.15	-0.07716	2.73283	8.11764	2.05894
330.61	-0.07541	6.38916	19.29363	2.09314
139.88	-0.09623	3.23716	8.16312	1.74791
362.77	-0.08091	6.55676	18.81803	1.98936
158.14	-0.11182	3.65466	8.20291	1.55579
392.11	-0.08404	6.55049	18.30589	1.93470
176.67	-0.12856	4.10831	8.24771	1.39155
418.58	-0.08438	6.38348	17.76494	1.92901
195.52	-0.14665	4.60512	8.29797	1.24899
442.19	-0.08152	6.02693	17.20306	1.97850
214.74	-0.16638	5.15423	8.35428	1.12350
463.02	-0.07507	5.48848	16.62810	2.09999
234.39	-0.18811	5.76773	8.41726	1.01156
481.24	-0.06461	4.77001	16.04791	2.33199
254.52	-0.21233	6.46162	8.48757	0.91048
510.82	-0.02981	2.80056	14.90504	3.68905
296.52	-0.27093	8.17955	8.65188	0.73318
534.16	0.02689	0.13524	13.85426	71.00992
340.96	-0.34893	10.52737	8.84317	0.58226
386.88	-0.45061	13.63059	9.03086	0.45907
556.99	0.10563	0.0	13.00168	99999.00000
474.34	-0.68344	20.68096	9.22704	0.30926
617.80	0.28133	0.0	12.01756	99999.00000
551.79	-0.88811	26.53624	9.20015	0.24032
691.09	0.42684	0.0	11.52288	99999.00000
620.83	-1.05167	30.77848	9.05742	0.20398
765.40	0.54024	0.0	11.16863	99999.00000
682.36	-1.17790	33.57971	8.84903	0.18268
836.80	0.62891	0.0	10.85182	99999.00000

RUN BY
YANKEE WING, FIRST BENDING/TORSION
WING BOOM - 8.25/19.8

WBR = 20.000 SB = 0.00 ALT = 0. WH = 8.25 WA = 19.80
GR = 0.030 GEB = 0.0 GS = 0.030 GR = 1.000

VELOCITY (EAS-MPH)	CAMPING (G)	DAMPING (LAMBDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	1.99523	21.17002	7.35455
0.0	0.0	0.75441	8.00457	7.35455
45.28	-0.00944	2.61947	21.14122	5.59428
17.15	-0.01005	1.00744	8.00758	5.50949
90.20	-0.01911	3.24845	21.05415	4.49251
34.34	-0.02043	1.26997	8.01623	4.37527
148.77	-0.03250	4.09272	20.84519	3.53038
57.35	-0.03509	1.64510	8.03545	3.38980
218.82	-0.04957	5.10740	20.43154	2.77286
86.44	-0.05507	2.15702	8.07057	2.59344
284.03	-0.06556	5.95934	19.85039	2.30886
116.15	-0.07731	2.73667	8.11778	2.05609
330.56	-0.07582	6.41298	19.29020	2.08499
139.89	-0.09650	3.24414	8.16347	1.74422
362.70	-0.08147	6.58880	18.81443	1.97930
158.15	-0.11221	3.66505	8.20352	1.55148
392.03	-0.08477	6.59884	18.30233	1.92250
176.69	-0.12912	4.12335	8.24868	1.38663
418.50	-0.08526	6.43153	17.76163	1.91424
195.55	-0.14743	4.62627	8.29945	1.24350
442.11	-0.08254	6.08136	17.20019	1.96047
214.79	-0.16744	5.18336	8.35643	1.11747
462.96	-0.07620	5.54713	16.62586	2.07751
234.47	-0.18953	5.80725	8.42028	1.00504
481.20	-0.06581	4.82991	16.04647	2.30286
254.65	-0.21420	6.51461	8.49170	0.90351
510.86	-0.03088	2.85089	14.90606	3.62418
296.76	-0.27410	8.27249	8.65905	0.72554
534.40	0.02638	0.15765	13.84033	60.93945
341.38	-0.35411	10.68462	8.85427	0.57441
387.52	-0.45847	13.88137	9.04580	0.45169
557.67	0.10589	0.0	13.01762	99999.00000
475.55	-0.69740	21.13902	9.25048	0.30332
619.93	0.28246	0.0	12.05906	99999.00000
554.05	-0.91009	27.28299	9.26794	0.23470
695.03	0.42907	0.0	11.58846	99999.00000
624.71	-1.08413	31.90035	9.11399	0.19803
771.60	0.54471	0.0	11.25710	99999.00000
688.34	-1.22281	35.13298	8.92651	0.17611
845.77	0.63686	0.0	10.96813	99999.00000

RUN BY

YANKEE WING, FIRST BENDING/TORSION

WING BOOM - 8.25/19.8

WBR = 30.000 SB = 0.00 ALT = 0. WH = 8.25 WA = 19.80

GB = 0.030 GEB = 0.0 GS = 0.030 GR = 1.000

VELOCITY (EAS-MPH)	DAMPING (G)	DAMPING (LAMBDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	1.99523	21.17004	7.35455
0.0	0.0	0.75441	8.00457	7.35455
45.28	-0.00944	2.61928	21.14122	5.59468
17.15	-0.01005	1.00744	8.00758	5.50948
90.20	-0.01911	3.21818	21.05409	4.49287
34.34	-0.02043	1.26998	8.01623	4.37521
148.77	-0.03250	4.09264	20.84502	3.53041
57.35	-0.03509	1.64318	8.03544	3.38964
218.82	-0.04958	5.10824	20.43118	2.77236
86.44	-0.05509	2.15730	8.07057	2.59311
284.02	-0.06560	5.96191	19.84984	2.30780
116.15	-0.07734	2.73738	8.11780	2.05556
330.54	-0.07590	6.41738	19.28965	2.08349
139.89	-0.09655	3.24545	8.16353	1.74353
362.69	-0.08158	6.59476	18.81374	1.97744
158.15	-0.11228	3.66702	8.20363	1.55067
392.02	-0.08490	6.60640	18.50164	1.92023
176.69	-0.12922	4.12621	8.24885	1.38570
418.48	-0.08543	6.44060	17.76097	1.91147
195.56	-0.14758	4.63032	8.29972	1.24245
442.10	-0.08274	6.09172	17.19961	1.95707
214.80	-0.16765	5.18898	8.35683	1.11631
462.95	-0.07642	5.55841	16.62539	2.07323
234.49	-0.18981	5.81494	8.42085	1.00378
481.19	-0.06604	4.84154	16.04615	2.29728
254.67	-0.21457	6.52501	8.49249	0.90215
510.86	-0.03109	2.86092	14.90623	3.61151
296.81	-0.27473	8.29108	8.66044	0.72403
534.44	0.02627	0.16242	13.86159	59.15472
341.47	-0.35517	10.71669	8.85646	0.57283
387.65	-0.46010	13.93251	9.04880	0.45018
557.82	0.10593	0.0	13.02093	99999.00000
475.80	-0.70045	21.23924	9.25547	0.30206
620.39	0.28266	0.0	12.06806	99999.00000
554.57	-0.91520	27.45700	9.24657	0.23643
695.93	0.42950	0.0	11.60348	99999.00000
625.66	-1.09221	32.18054	9.12790	0.19661
773.12	0.54568	0.0	11.27915	99999.00000
689.92	-1.23480	35.55093	8.94704	0.17444
848.11	0.63876	0.0	10.99842	99999.00000

$.21, $1.19T

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list yank.wing.3
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      3             WING BOOM - 8.25/44.0
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      5      &DATA1 N=20, NWG=9, NAS=5, NHS=0, BR=24., A=-8.53, C=15.87,
      6      E=14.04, ALT=0., WH=8.25, WA=44.0, GBET=0.03, GS=0.03,
      7      GR=1., GEB=0., &END
      8      &DATA2 CR=0., 0.25, 0.5, 0.833, 1.25, 1.67, 2., 2.25,
      9      2.5, 2.75, 3., 3.25, 3.5, 4., 4.5, 5., 6., 7., 8., 9.,
     10      DELTAX=20.9, 13.9, 15.1, 16.2, 15.7, 15.8, 16.1, 15.5, 18.1,
     11      YBAR=0., 28.1, 40.5, 58.3, 74.3, 90.3, 106.5, 122.2, 139.1,
     12      STRIPM=622., 26.41, 28.69, 30.78, 29.85, 30.02, 30.59, 29.45, 42.87,
     13      SALPHA=2052.6, 87.15, 94.68, 101.57, 99.44, 99.07, 100.95, 97.19,
     14      362.94,
     15      MMOM=7298.7, 4854.2, 5273.2, 4260.5, 5482.8, 5517.7, 5622.4, 5412.9,
     16      15187.71,
     17      WBM=0., -.363, -.393, -.306, -.166, .045, .310, .637, 1.,
     18      WTM=0., .203, .271, .416, .534, .644, .761, .874, 1.,
     19      SMICRD=24., 24., 24., 24., 24., 24., 24., 24., 24.,
     20      DELTXA=8.78, 10., 10., 10., 7.,
     21      SBETA=.76057, .86625, .86625, .86625, -3.3592,
     22      MIBETA=5.618, 6.399, 6.399, 6.399, 11.915,
     23      FSA=0., .121, .290, .49, .659,
     24      CAPFSA=.613, .68, .76, .825, .89,
     25      BSA=5*24.,
     26      CNA=5*24.319,
     27      BSH=15*0.,
     28      HSW=15*0.,
     29      HTMODE=15*0., &END
     30      &CONT1 ID=0, &END
     31      &CONT2 WB=0., &END
   $.05,   $1.13T
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RUN NO. 003 DATE 05-20-77 PAGE NO. 1

RUN BY

YANKEE WTNG, UNSYM BENDING/TORSION

WING BOOM - 8.25/44.0

WBR = 0.0 SB = 0.00 ALT = 0. WM = 8.25 WA = 44.00

GB = 0.030 GEB = 0.0 GS = 0.030 GR = 1.000

VELOCITY (EAS-MPH)	CAMPING (G)	DAMPING (LAMBDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	0.76250	8.09036	7.35455
0.0	0.0	4.30182	45.64373	7.35455
97.62	-0.01129	5.91233	45.57514	5.34314
17.34	-0.00990	1.01451	8.09355	5.52978
194.33	-0.02238	7.46506	45.36298	1.21207
34.71	-0.02057	1.28738	8.10254	4.36257
320.02	-0.03463	9.10433	44.83914	3.41379
57.95	-0.03735	1.71793	8.11973	3.27615
470.70	-0.03791	9.37592	43.94971	3.24915
87.07	-0.06240	2.36992	8.12949	2.38777
617.60	-0.03984	9.47006	43.16304	3.15927
116.22	-0.08341	2.89407	8.12274	1.94545
727.13	-0.05014	10.68374	42.43320	2.75302
139.29	-0.09759	3.25827	8.12874	1.72927
804.84	-0.05984	11.78666	41.74923	2.45581
156.92	-0.10895	3.55321	8.13972	1.58788
877.57	-0.06930	12.78149	40.96955	2.22181
174.65	-0.12114	3.87167	8.15374	1.48978
945.22	-0.07778	13.58343	40.11659	2.04711
192.49	-0.13412	4.21220	8.16960	1.34435
1007.86	-0.08492	14.15599	39.21023	1.91993
210.42	-0.14779	4.57249	8.18631	1.24097
1065.59	-0.09056	14.49405	38.26724	1.83006
228.44	-0.16209	4.95061	8.20380	1.14864
1118.60	-0.09465	14.60711	37.30183	1.77008
246.55	-0.17694	5.34518	8.22178	1.06618
1211.51	-0.09816	14.23328	35.34985	1.72151
283.04	-0.20819	6.18010	8.25879	0.92629
1288.87	-0.09584	13.21550	33.42866	1.75333
319.89	-0.24135	7.07275	8.29680	0.81511
1353.22	-0.08838	11.74712	31.58795	1.86388
357.09	-0.27631	8.02124	8.33553	0.72031
1452.50	-0.06125	8.09959	28.25440	2.41796
432.56	-0.35148	10.08417	8.41426	0.57837
1525.96	-0.02291	4.22906	25.44234	4.17012
509.37	-0.43355	12.36809	8.49294	0.47597
1585.58	0.02162	0.60875	23.13242	26.33960
587.33	-0.52222	14.86534	8.56871	0.39955
666.09	-0.61672	17.54990	8.63797	0.34116
1639.17	0.06840	0.0	21.25710	99999.00000

RUN NO. 003 DATE 05-20-77 PAGE NO. 1

RUN BY

YANKEE WING, UNSYM BENDING/TORSION

WING BOOM - 8.25/44.0

WBR = 10.000 SB = 0.00 ALT = 0. WH = 8.25 WA = 44.00

OB = 0.030 DEB = 0.0 OS = 0.030 OR = 1.000

VELOCITY (EAS-MPH)	CAMPING (G)	DAMPING (LAMBDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	4.29857	45.60929	7.35455
0.0	0.0	0.76235	8.08876	7.35455
97.61	-0.01402	6.30258	45.56903	5.01163
17.33	-0.00908	0.99644	8.09103	5.64531
194.70	-0.02818	8.30691	45.44721	3.79223
34.69	-0.01852	1.23436	8.09738	4.54706
322.27	-0.04732	10.96863	45.15427	2.85347
57.89	-0.03196	1.57886	8.11074	3.56076
477.35	-0.07145	14.20489	44.67081	2.17490
87.11	-0.05038	2.05390	8.13308	2.74475
625.88	-0.09503	17.18153	43.74146	1.76465
116.75	-0.07074	2.58242	8.15981	2.19018
735.65	-0.11221	19.18011	42.93030	1.55146
140.22	-0.08794	3.03194	8.18281	1.87072
814.15	-0.12400	20.43237	42.23196	1.43268
158.10	-0.10165	3.39181	8.20108	1.67597
888.29	-0.13446	21.42600	41.67040	1.34160
176.07	-0.11591	3.76781	8.21992	1.51219
957.91	-0.14337	22.14315	40.65499	1.27263
194.13	-0.13070	4.15949	8.23921	1.37301
1022.91	-0.15059	22.57748	39.79566	1.22176
212.29	-0.14600	4.56644	8.25886	1.25363
1083.28	-0.15601	22.73343	38.90251	1.18615
230.53	-0.16180	4.98834	8.27882	1.15037
1139.10	-0.15909	22.62468	37.98543	1.16376
248.87	-0.17807	5.42491	8.29902	1.06038
1237.77	-0.16127	21.70154	36.11611	1.15355
285.83	-0.21203	6.34130	8.34000	0.91162
1320.64	-0.15607	20.02258	34.25263	1.18577
323.16	-0.24779	7.31455	8.38155	0.79426
1389.93	-0.14485	17.82187	32.44470	1.26188
360.86	-0.28532	8.34430	8.42346	0.69773
1496.99	-0.10842	12.66351	29.11992	1.59391
437.35	-0.36560	10.57340	8.50752	0.55772
1575.87	-0.05987	7.41803	26.27504	2.45517
515.20	-0.45273	13.02713	8.59005	0.45706
1639.41	-0.00553	2.67007	23.91762	6.20902
594.14	-0.54628	15.69287	8.66804	0.38287
673.79	-0.64529	18.53738	8.73787	0.32675
1696.06	0.04985	0.0	21.29477	99999.00000

Wing 1
modified
heavy

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001
 YANKEE WING, FIRST BENDING/TORSION
        HEAVY WING - 8.25*32.5.02,   $3.15T

&DATA1 N=20, NWS=9, NAS=5, NHS=0, BR=24., A=-8.53, C=15.89,
E=14.04, ALT=0., WA=4.39, WA=32.5, GBET=0.03, GS=0.03,
GR=1., GEB=0., &END
&DATA2 CK=0., 0.25, 0.5, 0.833, 1.25, 1.67, 2., 2.25,
2.5, 2.75, 3., 3.25, 3.5, 4., 4.5, 5., 6., 7., 8., 9.,
DELTAX=20.9, 13.9, 15.1, 16.2, 15.7, 15.8, 16.1, 15.5, 18.1,
YBAR=0., 28.1, 40.5, 58.3, 74.3, 90.3, 106.5, 122.2, 139.1,
STRIPM=622., 26.41, 28.69, 30.78, 29.83, 30.02, 30.59, 29.45,
198.39,
SALPHA=2052.6, 87.15, 94.68, 101.57, 99.44, 99.07, 100.95, 97.
19,
113.49,
MMOM=7298.7, 4854.2, 5273.2, 4260.5, 5482.8, 5517.7, 5622.4,
5412.9,
6320.9,
WBM=-.073, -.0122, .0487, .1521, .2981, .444, .6131, .82, 1.,
WTM=0., .203, .271, .416, .534, .644, .761, .874, 1.,
SMICRO=24., 24., 24., 24., 24., 24., 24., 24., 24.,
DELTXA=8.78, 10., 10., 10., 7.,
SBETA=.76057, .86625, .86625, .86625, -3.3592,
MIBETA=5.618, 6.399, 6.399, 6.399, 11.915,
FSA=.401, .505, .596, .706, .81,
CAPFSA=.613, .68, .76, .825, .89,
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ORIGINAL PAGE IS
OF POOR QUALITY

RUN BY
YANKEE WING, FIRST BENDING/TORSION
HEAVY WING - ~~8.25~~/32.5

WBR = 10.000 SB = 0.00 ALT = 0. WH = 4.39 WA = 32.50
GB = 0.030 GEB = 0.0 GS = 0.030 GR = 1.000

VELOCITY (EAS-MPH)	CAMPING (G)	DAMPING (LAMBDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	3.04563	32.31515	7.35455
0.0	0.0	0.41089	4.35971	7.35455
69.16	-0.02172	5.24629	32.28555	4.26563
9.34	-0.00341	0.45763	4.36017	6.60407
137.93	-0.04347	7.43156	32.19630	3.00299
18.68	-0.00694	0.50622	4.36145	5.97203
228.27	-0.07242	10.29054	31.98299	2.15431
31.15	-0.01196	0.57526	4.36415	5.25853
338.02	-0.10813	13.69629	31.56151	1.59728
46.79	-0.01878	0.66946	4.36863	4.52325
443.09	-0.14245	16.77679	30.96698	1.27943
62.58	-0.02624	0.77283	4.37394	3.92299
520.74	-0.16737	18.84267	30.38859	1.11788
75.03	-0.03249	0.85957	4.37848	3.53075
576.26	-0.18463	20.15605	29.89217	1.02797
84.48	-0.03743	0.92826	4.38205	3.27216
628.71	-0.20025	21.23178	29.35180	0.95824
93.94	-0.04253	0.99932	4.38571	3.04204
677.97	-0.21405	22.06093	28.77381	0.90407
103.42	-0.04778	1.07258	4.38943	2.83664
723.95	-0.22590	22.64230	28.16484	0.86221
112.92	-0.05317	1.14792	4.39319	2.65274
766.64	-0.23576	22.98618	27.53161	0.83022
122.44	-0.05869	1.22519	4.39698	2.48759
806.09	-0.24361	23.10583	26.88064	0.80639
131.97	-0.06434	1.30427	4.40078	2.33878
875.63	-0.25347	22.75320	25.54949	0.77834
151.08	-0.07596	1.46748	4.40841	2.08226
933.59	-0.25617	21.76892	24.21403	0.77101
170.26	-0.08799	1.63690	4.41603	1.86998
981.33	-0.25271	20.34490	22.90703	0.78044
189.51	-0.10039	1.81205	4.42363	1.69213
1051.90	-0.23173	16.82478	20.46181	0.84299
228.19	-0.12623	2.17856	4.43875	1.41227
1097.97	-0.19843	13.13782	18.30682	0.96587
267.12	-0.15342	2.56640	4.45379	1.20291
1127.90	-0.15838	9.73831	16.45512	1.17124
306.31	-0.18204	2.97684	4.46880	1.04055
1147.64	-0.11488	6.77400	14.88286	1.52289
345.75	-0.21225	3.41242	4.48374	0.91076

RUN BY
YANKEE WING, FIRST BENDING/TORSION
HEAVY WING - ~~8.25~~/32.5

WBR = 20.000 SB = 0.00 ALT = 0. WH = 4.39 WA = 32.50
GB = 0.030 GEB = 0.0 GS = 0.030 GR = 1.000

VELOCITY (EAS-MPH)	CAMPING (G)	DAMPING (LAMBDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	3.04565	32.31534	7.35455
0.0	0.0	0.41089	4.35971	7.35455
69.16	-0.02170	5.24369	32.28542	4.26772
9.34	-0.00341	0.45764	4.36017	6.60399
137.92	-0.04344	7.42829	32.19529	3.00421
18.68	-0.00695	0.50624	4.36145	5.97181
228.25	-0.07244	10.29229	31.98015	2.15375
31.15	-0.01196	0.57532	4.36415	5.25796
337.96	-0.10838	13.71864	31.55593	1.59440
46.79	-0.01879	0.66965	4.36864	4.52196
442.98	-0.14315	16.84056	30.95929	1.27427
62.59	-0.02627	0.77329	4.37398	3.92069
520.60	-0.16860	18.95535	30.38057	1.11094
75.03	-0.03255	0.86039	4.37855	3.52747
576.12	-0.18637	20.31418	29.88504	1.01972
84.48	-0.03751	0.92945	4.38217	3.26806
628.61	-0.20260	21.44485	29.34679	0.94856
93.95	-0.04265	1.00099	4.38587	3.03706
677.93	-0.21711	22.33630	28.77227	0.89287
103.43	-0.04794	1.07487	4.38966	2.83075
724.03	-0.22977	22.98746	28.16819	0.84937
112.93	-0.05339	1.15096	4.39349	2.64592
766.91	-0.24050	23.40497	27.54123	0.81565
122.45	-0.05897	1.22914	4.39737	2.47981
806.61	-0.24930	23.60181	26.89785	0.78995
131.99	-0.06469	1.30932	4.40129	2.33002
876.86	-0.26122	23.40776	25.58532	0.75763
151.11	-0.07651	1.47533	4.40919	2.07156
935.83	-0.26608	22.57695	24.27191	0.74519
170.31	-0.08879	1.64843	4.41716	1.85738
984.84	-0.26479	21.29027	22.98884	0.74845
189.57	-0.10151	1.82825	4.42519	1.67773
1058.57	-0.24776	17.96873	20.59165	0.79433
228.32	-0.12820	2.20738	4.44142	1.39467
1108.28	-0.21746	14.36566	18.47871	0.89161
267.36	-0.15654	2.61246	4.45786	1.18278
1141.92	-0.17922	10.95009	16.65969	1.05457
306.70	-0.18660	3.04475	4.47452	1.01864
1165.20	-0.13639	7.89860	15.11058	1.32604
346.33	-0.21852	3.50653	4.49131	0.88782

RUN BY

YANKEE WING, FIRST BENDING/TORSION

HEAVY WING - ~~9.25~~/32.5

WBR = 30.000 SB = 0.00 ALT = 0. WH = 4.39 WA = 32.50

GB = 0.030 GEB = 0.0 GS = 0.030 GR = 1.000

VELOCITY (EAS-MPH)	CAMPING (G)	DAMPING (LAMBDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	3.04565	32.31537	7.35455
0.0	0.0	0.41089	4.35971	7.35455
69.16	-0.02169	5.24322	32.28540	4.26811
9.34	-0.00341	0.45764	4.36017	6.60397
137.92	-0.04344	7.42769	32.19511	3.00444
18.68	-0.00695	0.50624	4.36145	5.97176
228.24	-0.07245	10.29260	31.97962	2.15365
31.15	-0.01196	0.57533	4.36415	5.25786
337.95	-0.10843	13.72271	31.55489	1.59387
46.79	-0.01879	0.66968	4.36864	4.52173
442.96	-0.14328	16.85229	30.95784	1.27332
62.59	-0.02628	0.77338	4.37399	3.92026
520.57	-0.16883	18.97623	30.37902	1.10966
75.03	-0.03256	0.86054	4.37857	3.52686
576.10	-0.18670	20.34393	29.88363	1.01818
84.48	-0.03753	0.92968	4.38219	3.26728
628.58	-0.20305	21.48514	29.34575	0.94675
93.95	-0.04267	1.00131	4.38590	3.03611
677.92	-0.21769	22.38871	28.77185	0.89077
103.43	-0.04797	1.07531	4.38970	2.82962
724.05	-0.23051	23.05346	28.16866	0.84695
112.93	-0.05343	1.15155	4.39355	2.64460
766.96	-0.24142	23.48585	27.54289	0.81289
122.45	-0.05903	1.22992	4.39745	2.47829
806.70	-0.25042	23.69863	26.90096	0.78681
131.99	-0.06476	1.31032	4.40138	2.32830
877.09	-0.26277	23.53859	25.59213	0.75362
151.12	-0.07662	1.47690	4.40934	2.06942
936.26	-0.26812	22.74280	24.28330	0.74010
170.32	-0.08895	1.65079	4.41738	1.85482
985.55	-0.26734	21.49004	23.00545	0.74203
189.59	-0.10174	1.83165	4.42551	1.67474
1060.02	-0.25137	18.22666	20.61974	0.78416
228.35	-0.12863	2.21373	4.44198	1.39085
1110.66	-0.22204	14.66306	18.51846	0.87540
267.42	-0.15727	2.62318	4.45878	1.17819
1145.40	-0.18462	11.26692	16.71041	1.02804
306.80	-0.18772	3.06152	4.47590	1.01338
1169.88	-0.14240	8.21709	15.17120	1.27976
346.48	-0.22016	3.53125	4.49325	0.88198

Wing 3 with changes

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 CAPFSA=.613, .68, .76, .825, .89,
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RUN NO. 002 DATE 10-04-77 PAGE NO. 1

RUN BY

YANKEE WING, FIRST BENDING/TORSION

HEAVY WING - ~~9.25~~/19.8

WBR = 10.000 SB = 0.00 ALT = 0. WH = 4.39 WA = 19.80

GB = 0.030 GEB = 0.0 GS = 0.030 GR = 1.000

VELOCITY (EAS-MPH)	CAMPING (G)	DAMPING (LAMBDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	1.89219	20.07677	7.35455
0.0	0.0	0.41047	4.35527	7.35455
42.97	-0.01392	2.76826	20.06119	5.02317
9.33	-0.00351	0.45854	4.35577	6.58438
85.74	-0.02796	3.64402	20.01415	3.80700
18.67	-0.00714	0.50841	4.35717	5.94037
142.04	-0.04690	4.80823	19.90138	2.86896
31.12	-0.01228	0.57909	4.36015	5.21892
210.74	-0.07090	6.23725	19.67730	2.18675
46.75	-0.01923	0.67519	4.36523	4.48132
276.99	-0.09475	7.58717	19.35866	1.76857
62.55	-0.02683	0.78040	4.37145	3.88274
326.37	-0.11269	8.53764	19.04596	1.54629
75.00	-0.03317	0.86862	4.37693	3.49275
361.95	-0.12548	9.17073	18.77549	1.41910
84.46	-0.03818	0.93852	4.38137	3.23589
395.82	-0.13736	9.71586	18.47891	1.31832
93.95	-0.04337	1.01093	4.38603	3.00729
427.87	-0.14817	10.16464	18.15922	1.23832
103.46	-0.04871	1.08577	4.39090	2.80313
458.04	-0.15778	10.51212	17.81967	1.17500
112.99	-0.05421	1.16295	4.39596	2.62012
486.29	-0.16606	10.75654	17.46363	1.12535
122.56	-0.05986	1.24242	4.40120	2.45545
512.63	-0.17297	10.90006	17.09448	1.08706
132.15	-0.06565	1.32414	4.40663	2.30675
559.65	-0.18253	10.90292	16.32983	1.03816
151.41	-0.07766	1.49431	4.41803	2.04934
599.53	-0.18651	10.57665	15.54957	1.01905
170.81	-0.09025	1.67364	4.43018	1.83480
632.89	-0.18531	9.99300	14.77332	1.02473
190.34	-0.10344	1.86259	4.44311	1.65347
683.11	-0.16968	8.33564	13.28796	1.10496
229.87	-0.13181	2.27309	4.47158	1.36355
716.35	-0.14029	6.38997	11.94397	1.29562
270.13	-0.16343	2.73691	4.50398	1.14068
737.86	-0.10069	4.41964	10.76483	1.68829
311.25	-0.19936	3.27193	4.54082	0.96196
751.87	-0.05266	2.53205	9.75036	2.66917
353.34	-0.24119	3.90379	4.58215	0.81360

RUN BY

YANKEE WING, FIRST BENDING/TORSION

HEAVY WING - ~~8.25~~/19.8

WBR = 20.000 SB = 0.00 ALT = 0. WH = 4.39 WA = 19.80

GB = 0.030 GEB = 0.0 GS = 0.030 GR = 1.000

VELOCITY (EAS-MPH)	CAMPING (G)	DAMPING (LAMBDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	1.89220	20.07685	7.35455
0.0	0.0	0.41047	4.35527	7.35455
42.97	-0.01391	2.76716	20.06114	5.02514
9.33	-0.00351	0.45854	4.35577	6.58431
85.74	-0.02793	3.64265	20.01374	3.80836
18.67	-0.00714	0.50843	4.35717	5.94014
142.03	-0.04692	4.80898	19.90020	2.86835
31.12	-0.01228	0.57916	4.36015	5.21831
210.72	-0.07106	6.24664	19.67494	2.18320
46.75	-0.01925	0.67541	4.36524	4.47990
276.95	-0.09521	7.61378	19.35530	1.76209
62.55	-0.02686	0.78092	4.37148	3.88018
326.31	-0.11350	8.58442	19.04230	1.53757
75.00	-0.03324	0.86954	4.37700	3.48912
361.89	-0.12662	9.23672	18.77204	1.40871
84.47	-0.03828	0.93986	4.38148	3.23137
395.76	-0.13890	9.80398	18.47617	1.30628
93.95	-0.04350	1.01282	4.38620	3.00182
427.83	-0.15018	10.27816	18.15773	1.22454
103.46	-0.04889	1.08833	4.39114	2.79668
458.04	-0.16030	10.65361	17.82001	1.15941
113.00	-0.05445	1.16635	4.39629	2.61267
486.37	-0.16916	10.92833	17.46639	1.10784
122.57	-0.06017	1.24683	4.40164	2.44700
512.80	-0.17668	11.10338	17.10024	1.06752
132.16	-0.06604	1.32976	4.40720	2.29729
560.11	-0.18758	11.17135	16.34314	1.01404
151.45	-0.07827	1.50301	4.41893	2.03789
600.39	-0.19299	10.90868	15.57204	0.98947
170.86	-0.09113	1.68640	4.43151	1.82146
634.28	-0.19321	10.38249	14.80591	0.98846
190.42	-0.10467	1.88054	4.44499	1.63838
685.84	-0.18017	8.80860	13.34120	1.04982
230.05	-0.13398	2.30527	4.47494	1.34553
720.63	-0.15267	6.89543	12.01533	1.20782
270.45	-0.16689	2.78926	4.50938	1.12061
743.70	-0.11404	4.90966	10.85003	1.53182
311.79	-0.20451	3.35136	4.54884	0.94082
759.18	-0.06602	2.96984	9.84512	2.29782
354.20	-0.24846	4.01832	4.59337	0.79235

RUN BY

YANKEE WING, FIRST BENDING/TORSION

HEAVY WING - ~~8.25~~/19.8

WBR = 30.000 SB = 0.00 ALT = 0. WH = 4.39 WA = 19.80

GB = 0.030 GEB = 0.0 GS = 0.030 GR = 1.000

VELOCITY (EAS-MPH)	CAMPING (G)	DAMPING (LAMBDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	1.89220	20.07687	7.35455
0.0	0.0	0.41047	4.35527	7.35455
42.97	-0.01390	2.76696	20.06113	5.02550
9.33	-0.00351	0.45855	4.35577	6.58429
85.74	-0.02793	3.64240	20.01367	3.80861
18.67	-0.00714	0.50844	4.35717	5.94010
142.03	-0.04692	4.80911	19.89998	2.86824
31.12	-0.01228	0.57917	4.36015	5.21820
210.71	-0.07109	6.24835	19.67450	2.18256
46.75	-0.01925	0.67545	4.36524	4.47963
276.94	-0.09530	7.61867	19.35467	1.76090
62.55	-0.02687	0.78101	4.37149	3.87970
326.30	-0.11365	8.59310	19.04160	1.53596
75.00	-0.03325	0.86971	4.37702	3.48843
361.87	-0.12683	9.24872	18.77137	1.40683
84.47	-0.03830	0.94011	4.38150	3.23050
395.75	-0.13920	9.82061	18.47561	1.30403
93.95	-0.04353	1.01318	4.38623	3.00078
427.82	-0.15056	10.29974	18.15739	1.22195
103.46	-0.04893	1.08882	4.39118	2.79545
458.04	-0.16078	10.68073	17.82000	1.15647
113.00	-0.05450	1.16701	4.39635	2.61124
486.38	-0.16976	10.96151	17.46684	1.10451
122.57	-0.06023	1.24769	4.40172	2.44536
512.83	-0.17741	11.14306	17.10126	1.06378
132.17	-0.06612	1.33087	4.40730	2.29544
560.20	-0.18859	11.22495	16.34564	1.00936
151.45	-0.07839	1.50476	4.41910	2.03561
600.56	-0.19431	10.97668	15.57643	0.98361
170.87	-0.09131	1.68901	4.43177	1.81874
634.57	-0.19488	10.46451	14.81249	0.98115
190.44	-0.10493	1.88430	4.44537	1.63525
686.43	-0.18251	8.91458	13.35264	1.03823
230.08	-0.13446	2.31236	4.47566	1.34162
721.61	-0.15564	7.01678	12.03170	1.18855
270.53	-0.16770	2.80145	4.51061	1.11604
745.14	-0.11747	5.03641	10.87095	1.49614
311.93	-0.20579	3.37098	4.55078	0.93574
761.10	-0.06973	3.09251	9.87006	2.21226
354.43	-0.25037	4.04843	4.59628	0.78695

Yankee
Wing 2
modified heavy

```
8112002
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2.5, 2.75, 3., 3.25, 3.5, 4., 4.5, 5., 6., 7., 8., 9
DELTAX=20.9, 13.9, 15.1, 16.2, 15.7, 15.8, 16.1, 15.5, 16 1.
YBAR=0., 28.1, 40 5, 58.3, 74.3, 90.3, 106.5, 122.2, 139 1.
STRIPM=622., 26.41, 28.69, 30.78, 29.83, 30.02, 30 59, 25 4
199 39,
SALPHA=2052.6, 87.15, 94.68, 101.57, 99.44, 99.07, 100 35
19,
362.94,
MMOM=7298.7, 4854.2, 5273.2, 4260.5, 5482.8, 5517.7, 5522 4
5412.9,
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WBM=-.073, -.0122, .0487, .1521, .2981, .444, .6131, .82,

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SBETA=.76057, .86625, .86625, .86625, -3.3592,
MIBETA=5.618, 6.399, 6.399, 6.399, 11.915,
FSA=.401, .505, .596, .706, .81,
CAPFSA=.613, .68, .76, .825, .89,
BSA=5*24.,
CMA=5*24.319,
BSH=15*0.,
HSW=15*0.,
HTMODE=15*0., &END
&CONT1 ID=0, &END
&CONT2 W8=10., &END
&CONT2 W8=20., &END
&CONT2 W8=30., &END
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RUN BY
YANKEE WING, UNSYM BENDING/TORSION
HEAVY WING - ~~8.25~~/44.0

WBR = 0.0 SB = 0.00 ALT = 0. WH = 4.39 WA = 44.00
GB = 0.030 GEB = 0.0 GS = 0.030 GR = 1.000

VELOCITY (EAS-MPH)	CAMPING (G)	DAMPING (LAMEDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	0.41129	4.36388	7.35455
0.0	0.0	4.16315	44.17239	7.35455
94.50	-0.01292	5.94921	44.11740	5.14017
9.35	-0.00323	0.45557	4.36443	6.64047
188.26	-0.02577	7.69915	43.94480	3.95633
18.70	-0.00670	0.50332	4.36600	6.01264
310.49	-0.04057	9.64486	43.50356	3.12648
31.18	-0.01212	0.57818	4.36899	5.23778
457.66	-0.04575	10.16896	42.73212	2.91276
46.81	-0.02026	0.69013	4.37065	4.38976
603.02	-0.04586	10.04352	42.14430	2.90857
62.52	-0.02718	0.78482	4.36928	3.85892
713.95	-0.05535	11.17152	41.66368	2.58507
74.89	-0.03179	0.84826	4.37006	3.57098
794.22	-0.06563	12.37734	41.19822	2.30716
84.28	-0.03542	0.89852	4.37173	3.37250
870.69	-0.07666	13.62107	40.64876	2.06854
93.69	-0.03928	0.95202	4.37388	3.18453
943.19	-0.08761	14.78986	40.03009	1.87607
103.11	-0.04336	1.00855	4.37629	3.00772
1011.61	-0.09806	15.83300	39.35637	1.72298
112.55	-0.04761	1.06766	4.37882	2.84282
1075.96	-0.10781	16.72853	38.63978	1.60105
122.00	-0.05202	1.12900	4.38143	2.68998
1136.26	-0.11675	17.46892	37.89070	1.50347
131.47	-0.05656	1.19225	4.38406	2.54880
1245.09	-0.13202	18.49171	36.32989	1.36180
150.43	-0.06599	1.32363	4.38934	2.29858
1339.15	-0.14373	18.95708	34.73257	1.26997
169.44	-0.07579	1.46047	4.39458	2.08570
1419.82	-0.15207	18.95709	33.14242	1.21182
188.48	-0.08589	1.60189	4.39973	1.90379
1547.28	-0.15997	17.96272	30.09809	1.16143
226.70	-0.10687	1.89620	4.40976	1.61197
1639.51	-0.15881	16.21500	27.33613	1.16855
265.06	-0.12870	2.20333	4.41940	1.39031
1706.50	-0.15150	14.19622	24.89653	1.21561
303.56	-0.15122	2.52140	4.42870	1.21748
1755.74	-0.14021	12.17500	22.76878	1.29628
342.20	-0.17438	2.84936	4.43771	1.07954

B. Empennage

The empennage flutter analysis was somewhat more complicated than that of the wing because of the numerous combinations of geometry. The swept vertical and horizontal tails added complexity to the calculation of the geometric and inertial properties to be input to the computer program. In many instances, however, the aeroelastic similarity between tail configurations made it possible to rule out many arrangements in the analysis. Also, the geometric similarity between the horizontal and vertical tail helped further.

The limiting configuration found in the analysis was tail number 2. The flutter speed with nominal structural damping (.03) was found to be 214 mph (indicated). This occurred at altitude, as was expected, as light surfaces are more prone to flutter at high true air speeds and low air density.

The results may be seen by inspecting the following data.

B.1 Tail 6

```
STOP    9999
#   $.18,   $6.24T
#
STOP    9999
#   $.16,   $6.40T
#
```

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>RUN NO. 001   DATE 05-27-77   PAGE NO.

RUN BY

YANKEE TAIL 6 - TAIL EXTENSION.

SIDE BENDING/TORSION 14.48/16.72 - NO BALANCE WEIGHT

WBR = 0.0   SB = 10.22   ALT = 10000.   WH = 16.72   WB = 14.48

GB = 0.030   GEB = 0.0   GS = 0.030   GR = 1.000

VELOCITY (EAS-MPH)	DAMPING (G)	DAMPING (LAMBDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	1.17507	12.46785	7.35455
0.0	0.0	2.14578	22.76742	7.35455
23.17	-0.03289	4.49800	22.76483	3.50810
12.69	-0.00193	1.25072	12.46722	6.90933
46.29	-0.07059	7.18693	22.74153	2.19533
25.37	-0.00423	1.34049	12.46518	6.44560
76.65	-0.16305	11.57752	22.60199	1.35319
42.25	-0.00861	1.51134	12.45926	5.71421
112.21	-0.22164	17.43100	22.04936	0.87680
63.30	-0.01785	1.86786	12.43854	4.61091
143.12	-0.28584	20.88697	21.05006	0.69856
84.20	-0.03172	2.40135	12.38369	3.57456
164.26	-0.30984	21.53677	20.17262	0.64925
100.23	-0.04467	2.88781	12.30785	2.95469
178.91	-0.31776	21.33751	19.53066	0.63445
112.07	-0.05542	3.28366	12.23661	2.58303
192.59	-0.31997	20.80360	18.92178	0.63045
123.65	-0.06713	3.70726	12.14878	2.27137
205.42	-0.31775	20.04534	18.34811	0.63446
134.86	-0.08006	4.16499	12.04565	2.00467
217.55	-0.31169	19.12027	17.81169	0.64572
145.66	-0.09439	4.66038	11.92571	1.77374
229.13	-0.30217	18.07138	17.31720	0.66425
155.96	-0.11018	5.19067	11.78692	1.57400
240.38	-0.28971	16.91332	16.86932	0.69012
165.68	-0.12725	5.74403	11.62712	1.40308
262.71	-0.25930	14.66147	16.13190	0.76267
183.02	-0.16319	6.82121	11.23885	1.14206
285.94	-0.22860	12.67971	15.60752	0.85320
197.24	-0.19619	7.65020	10.75091	0.97545
310.53	-0.20383	11.20592	15.25461	0.94558
208.46	-0.22120	8.08159	10.29049	0.87832
362.72	-0.17541	9.58215	14.84903	1.07415
224.09	-0.24617	7.95940	9.17386	0.79891
417.11	-0.16600	9.01240	14.65021	1.12557
233.89	-0.24976	7.21304	8.20688	0.78865
472.30	-0.16656	8.96042	1[illegible].21020	1.12246
240.28	-0.21532	[illegible]	7.[illegible]	0.80[illegible]
528.71	-0.1[illegible]45	7.17[illegible]	14.[illegible]	1.05[illegible]
2[illegible]	-0.[illegible]	[illegible]	[illegible]	0.[illegible]
[illegible]	-0.[illegible]	7.[illegible]	[illegible]	1.[illegible]
[illegible]	-0.[illegible]	[illegible]	6.[illegible]	[illegible]
[illegible]	-0.20[illegible]	1[illegible]	[illegible]	[illegible]
2[illegible]	-0.19[illegible]	3.70[illegible]	[illegible]	0.[illegible]
81[illegible]	-0.230[illegible]	1[illegible].68005	14.27256	0.64703
255.32	-0.17955	2.72526	4.49446	1.05292
10[illegible].47	-0.[illegible]	[illegible]	14.[illegible]	0.[illegible]

255.30	-0.14873	1.95614	3.48384	1.23448
1274.28	-0.34757	16.87567	14.22705	0.58436
256.12	-0.12661	1.40685	2.85948	1.40805
1505.60	-0.40888	19.61108	14.22358	0.50273
256.48	-0.11020	1.06717	2.42299	1.57378
1737.28	-0.47097	22.38650	14.22399	0.44042
256.64	-0.09759	0.84230	2.10128	1.72920
2317.57	-0.62816	29.42502	14.23133	0.33523
256.74	-0.07608	0.52540	1.57655	2.07791
2898.94	-0.78690	36.54799	14.24109	0.27009
256.70	-0.06252	0.36652	1.26103	2.38479
3481.11	-0.94656	43.72090	14.25080	0.22593
256.63	-0.05318	0.27453	1.05058	2.65259

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RUN BY

YANKEE TAIL 6 - TAIL EXTENSION

SIDE BENDING/TORSION 14.98/16.72 - NO BALANCE WEIGHT

WBR = 10.000 SB = 10.22 ALT = 10000. WH = 16.72 WA = 14.48

GB = 0.030 GEB = 0.0 GS = 0.030 GR = 1.000

VELOCITY (EAS-MPH)	DAMPING (G)	DAMPING (LAMBDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	2.08009	22.07048	7.35455
0.0	0.0	1.16409	12.35142	7.35455
22.42	-0.00957	2.73872	22.03039	5.57572
12.57	-0.00282	1.27288	12.34685	6.72350
44.59	-0.02109	3.51571	21.90591	4.31893
25.10	-0.00583	1.38831	12.33282	6.15748
73.25	-0.04108	4.82345	21.59885	3.10385
41.71	-0.01050	1.56468	12.29815	5.44804
106.82	-0.07298	6.79066	20.99086	2.14262
62.22	-0.01797	1.84231	12.22532	4.59958
137.17	-0.10837	8.77006	20.17541	1.59458
82.35	-0.02816	2.21314	12.11278	3.79369
158.35	-0.13433	10.03996	19.44760	1.34264
97.64	-0.03874	2.58961	11.99161	3.20974
172.92	-0.15097	10.73212	18.87701	1.21920
108.80	-0.04865	2.93493	11.87774	2.80519
186.38	-0.16394	11.15675	18.31154	1.13766
119.52	-0.06046	3.33700	11.74264	2.43914
198.93	-0.17267	11.31314	17.76848	1.08867
129.70	-0.07429	3.79537	11.58439	2.11566
210.84	-0.17701	11.22631	17.26241	1.06584
139.25	-0.09010	4.30189	11.40136	1.83707
222.35	-0.17728	10.94297	16.80467	1.06444
148.10	-0.10759	4.83818	11.19263	1.60353
233.73	-0.17425	10.52485	16.40266	1.08025
156.15	-0.12615	5.37586	10.95861	1.41298
256.85	-0.16250	9.54299	15.77207	1.14060
169.76	-0.1630[illegible]	6.52257	10.92070	[illegible]
281.05	-0.15001	8.67859	13.34312	[illegible]
180.38	-0.17437	6.71[illegible]	[illegible]	[illegible]
306.51	-0.11070	8.077[illegible]	13.0671[illegible]	[illegible]
186.25	-0.21[illegible]	7.20[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
179.[illegible]	[illegible]	7.[illegible]	[illegible]	[illegible]
[illegible]	-0.135[illegible]	[illegible]	[illegible]	[illegible]
205.99	-0.[illegible]	[illegible]	7.22620	[illegible]
470.91	-0.1426[illegible]	7.84279	14.458[illegible]	1.[illegible]
210.89	-0.24972	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

214.69	-0.24295	5.02426	5.85915	0.80833
584.55	-0.16540	8.81396	14.35800	1.12915
217.85	-0.23383	4.46505	5.35086	0.83628
699.19	-0.19281	10.01767	14.31164	0.99026
223.07	-0.21336	3.49090	4.56606	0.90663
814.32	-0.22221	11.32042	14.28703	0.87480
227.40	-0.19342	2.80043	3.98973	0.78752
1045.26	-0.28345	14.01559	14.26355	0.70391
234.25	-0.15993	1.90739	3.19661	1.16166
1276.65	-0.34587	16.83087	14.25350	0.58701
239.27	-0.13491	1.38400	2.67145	1.33794
1508.28	-0.40871	19.63880	14.24896	0.50292
242.95	-0.11624	1.05441	2.29514	1.50878
1740.12	-0.47178	22.45918	14.24725	0.43971
245.65	-0.10201	0.83411	2.01125	1.67137
2320.44	-0.63009	29.54874	14.24900	0.33425
249.81	-0.07821	0.52151	1.53401	2.03889
2901.67	-0.78917	36.68364	14.25447	0.26934
252.00	-0.06364	0.36418	1.23796	2.35625
3483.64	-0.94886	43.85575	14.26116	0.22540
253.26	-0.05380	0.27296	1.03678	2.63275

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RUN NO. 002 DATE 05-27-77 PAGE NO. 1

RUN BY

YANKEE TAIL 6 - TAIL EXTENSION

SIDE BENDING/TORSION 14.98/16.72 - 7 OZ BALANCE

WBR = 0.0 SB - 5.72 ALT - 10000. WH - 16.72 WA - 14.48

GB = 0.030 GEB = 0.0 GS = 0.030 GR = 1.000

VELOCITY (EAS-MPH)	CAMPING (G)	DAMPING (LAMBDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	1.16926	12.40627	7.35455
0.0	0.0	2.20669	23.41375	7.35455
23.83	-0.04617	5.60370	23.41726	2.89660
12.63	-0.00131	1.22015	12.40426	7.04666
47.65	-0.09880	9.47162	23.40851	1.71308
25.24	-0.00268	1.27294	12.39844	6.75129
78.94	-0.18603	15.79735	23.27686	1.02133
42.01	-0.00481	1.35468	12.38625	6.33769
114.99	-0.31022	24.15102	22.59539	0.64850
62.94	-0.00936	1.52938	12.36725	5.60512
144.23	-0.38709	27.79752	21.21415	0.52899
83.87	-0.01722	1.90750	12.33612	4.48252
163.18	-0.39688	26.87587	20.04049	0.51686
100.05	-0.03157	2.37660	12.28692	3.58355
176.39	-0.38896	25.64425	19.25549	0.52663
112.03	-0.04310	2.80864	12.22945	3.01813
188.98	-0.37600	23.68310	18.56775	0.54344
123.70	-0.05621	3.29171	12.15565	2.56924
201.07	-0.36078	22.04760	17.95081	0.56460
135.01	-0.07057	3.82130	12.05920	2.19738
212.69	-0.34291	20.40730	17.41388	0.59002
145.87	0.08715	[illegible]	[illegible]	[illegible]
223.76	[illegible]	18.70[illegible]	16.7[illegible]	[illegible]
156.25	-0.10706	[illegible]	11.8[illegible]	[illegible]
235.05	-0.30280	17.0[illegible]	16.47[illegible]	[illegible]
166.01	-0.12137	[illegible]	11.65000	1.1[illegible]
247.12	[illegible]	[illegible]	15.8[illegible]	[illegible]
135.28	-0.16400	6.87536	11.25467	[illegible]
281.22	-0.22749	12.41717	15.34990	0.86687
177.26	-0.17974	7.77121	10.76720	0.78057
306.47	-0.30006	10.37867	13.05503	0.95215

208.22	-0.22521	8.20139	10.22897	0.86451
359.59	-0.17044	9.26992	14.72088	1.10074
223.55	-0.24906	8.02312	9.15144	0.79063
414.59	-0.16113	8.73520	14.54767	1.15438
233.25	-0.25156	7.23969	8.18174	0.78363
470.47	-0.16190	8.70855	14.44505	1.14974
239.64	-0.24465	6.34862	7.35785	0.80534
526.88	-0.16798	8.94383	14.37946	1.11441
244.00	-0.23405	5.52371	6.65908	0.83559

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RUN NO. 002 DATE 05-27-7[illegible] PAGE NO. 2

RUN BY

YANKEE TAIL 6 - TAIL EXTENSION

SIDE BENDING/TORSION 14.98/16.72 -- 7 OZ BALANCE

WBR = 10.000 SR = 5.72 ALT = 10000. WH = 16.72 WA = 14.48

GB = 0.030 GEB = 0.0 GS = 0.030 GR = 1.000

VELOCITY (EAS-MPH)	DAMPING (G)	DAMPING (LAMBDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	2.07941	22.06324	7.35455
0.0	0.0	1.16418	12.35235	7.35455
22.42	-0.00956	2.75706	22.02311	5.57727
12.57	-0.00278	1.27168	12.34777	6.73038
44.58	-0.02103	3.51099	21.89849	4.32327
25.11	-0.00577	1.38592	12.33371	6.16858
73.22	-0.04095	4.81275	21.59103	3.10962
41.71	-0.01039	1.56048	12.29905	5.46314
106.78	-0.07269	6.76871	20.98196	2.14866
62.22	-0.01778	1.83527	12.22613	4.61760
137.10	-0.10786	8.73316	20.16463	1.60046
82.36	-0.02787	2.20236	12.11332	3.81242
158.25	-0.13362	9.78994	19.43488	1.34849
97.64	-0.03836	2.57536	11.99169	3.22757
172.79	-0.15009	10.67209	18.86269	1.22513
108.80	-0.04820	2.91773	11.87724	2.82161
186.21	-0.16290	11.08714	18.29565	1.14381
119.50	-0.05992	3.31674	11.74129	2.45375
198.74	-0.17146	11.23472	17.75119	1.09520
129.67	-0.07367	3.77200	11.58184	2.12830
210.61	-0.17564	11.14018	17.24403	1.07294
139.20	-0.08941	4.27536	11.39721	1.84779
222.10	-0.17576	10.85055	16.78559	1.07229
148.01	-0.10682	4.80830	11.18645	1.61260
233.45	-0.17260	10.42779	16.68330	1.08902
156.03	-0.12530	5.34223	10.94998	1.42075
256.54	-0.16079	9.44201	15.75319	1.15646
169.55	-0.16199	6.27960	10.41125	1.14921
280.77	-0.14818	8.57874	15.32535	1.23827
179.90	-0.1[illegible]330	6.88878	9.81971	0.98806
306.17	-0.13885	7.97828	15.04048	1.30671
187.70	-0.21661	7.14374	9.22008	0.89469
329.38	-0.13117	7.4[illegible]929	14.71266	1.36096
[illegible]	[illegible]	6.9[illegible]	[illegible]	[illegible]
[illegible]	-0.[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4[illegible]	-[illegible].14[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible].80777	[illegible]

RUN BY

YANKEE TAIL 6 - PRODUCTION TAIL

SIDE BENDING/TORSION 14.98/16.72 - STROBE LIGHT BALANCE

WBR = 0.0 SB = 1.19 ALT = 10000. WH = 16.72 WA 14.48

SB = 0.030 GEB - 0.0 GS - 0.030 GR - 1.000

VELOCITY (EAS-MPH)	CAMPING (G)	DAMPING (LAMBDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	1.17402	12.45671	7.35455
0.0	0.0	2.15075	22.82022	7.35455
23.24	-0.03513	4.67255	22.83490	3.38745
12.68	-0.00051	1.19385	12.45529	7.23154
46.55	-0.07552	7.58050	22.86719	2.09094
25.35	-0.00114	1.21802	12.45119	7.08574
77.58	-0.14497	12.57448	22.87529	1.26097
42.20	-0.00250	1.27037	12.44279	6.78913
114.89	-0.25831	20.44804	22.57598	0.76528
63.25	-0.00665	1.43091	12.42873	6.02064
147.15	-0.35677	26.29763	21.64267	0.57046
84.29	-0.01626	1.80179	12.39791	4.76947
168.31	-0.39269	27.44928	20.67069	0.52198
100.53	-0.02762	2.23489	12.34611	3.82914
182.80	-0.40123	27.03538	19.95603	0.51165
112.56	-0.03770	2.61347	12.28743	3.25890
196.43	-0.40092	26.12667	19.29929	0.51202
124.30	-0.04877	3.02217	12.21256	2.80101
209.37	-0.39540	24.99209	18.70051	0.51865
135.72	-0.06084	3.45934	12.12201	2.42890
221.72	-0.38628	23.74086	18.15343	0.53002
146.76	-0.07402	3.92657	12.01570	2.12111
233.59	-0.37424	22.41984	17.65407	0.54581
157.36	-0.08840	4.42365	11.89267	1.86349
245.11	-0.35972	21.06063	17.20180	0.56615
167.45	-0.10394	4.94496	11.75165	1.63726
267.80	-0.32555	18.36900	16.41493	0.62055
185.82	-0.13734	5.99879	11.41043	1.31846
291.11	-0.29012	15.98019	15.88991	0.68923
201.36	-0.16787	6.70117	10.99068	1.10390
315.75	-0.25976	14.11997	15.51101	0.76144
214.00	-0.19636	7.47501	10.51262	0.97472
368.46	-0.22179	11.93195	15.08404	0.87626
232.27	-0.22530	7.62656	9.50874	0.86421
423.76	-0.20660	11.05235	11.86919	0.93254
244.31	-0.23127	7.03650	8.57280	0.84449
480.30	-0.20407	10.84404	14.74666	0.94201
252.58	-0.22597	6.23616	7.75492	0.86196
537.53	-0.20858	10.97550	11.67013	0.92400
258.46	-0.21592	5.41975	7.05336	0.89718

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RUN NO. 003 DATE 05-27-77 PAGE NO. 2

RUN BY

YANKEE TAIL 6 - PRODUCTION TAIL

SIDE BENDING/TORSION 14.98/16.72 - STROBE LIGHT BALANCE

WBR = [illegible] SB = [illegible] ALT = 10000. WH = 16.72 WA = [illegible]

GB = 0.030 GEB = 0.0 GS = 0.030 GR = 1.000

VELOCITY (EAS-MPH)	DAMPING (G)	DAMPING (LAMBDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	[illegible]	[illegible]	[illegible]

>	0.0	0.0	1.16412	12.35167	7.35455
:	22.42	-0.00954	2.73633	22.03015	5.58055
>	12.57	-0.00282	1.27292	12.34712	6.72343
>	44.57	-0.02102	3.51129	21.90531	4.32425
>	25.11	-0.00583	1.38832	12.33314	6.15760
:	73.21	-0.04100	4.81749	21.59748	3.10749
>	41.71	-0.01049	1.56134	12.29860	5.44946
.	106.81	-0.07291	6.78537	20.78825	2.14403
>	62.22	-0.01792	1.84075	12.22599	4.60381
>	137.15	-0.10867	8.76889	20.17161	1.59450
>	82.36	-0.02805	2.20910	12.11366	3.80090
:	158.32	-0.13444	10.04458	19.44617	1.34172
>	97.65	-0.03855	2.58270	11.99262	3.21860
:.	172.88	-0.15119	10.74257	18.87237	1.21771
>	108.81	-0.04837	2.92531	11.87878	2.81467
:	186.33	-0.16429	11.17419	18.30676	1.13560
.	117.53	-0.06010	3.32426	11.74365	2.44870
.	198.89	-0.17317	11.33052	17.76423	1.08597
:	129.71	-0.07384	3.77923	11.58530	2.12487
>	210.79	-0.17768	11.26032	17.25874	1.06239
>	139.26	-0.08954	4.28219	11.40311	1.84564
>	222.31	-0.17813	10.78602	16.80177	1.06009
	148.10	-0.10693	4.81497	11.19320	1.61134
.	233.70	-0.17528	10.57703	16.40066	1.07479
:	156.16	-0.12538	5.34939	10.95901	1.42002
:	256.85	-0.16400	9.61280	15.77221	1.13729
.	169.79	-0.16207	6.29113	10.47593	1.14872
>	281.14	-0.15180	8.70454	15.34572	1.21363
>	180.29	-0.19347	6.90891	9.84092	0.98731
>	306.62	-0.14279	8.17643	15.06256	1.27692
>	188.27	-0.21690	7.17391	9.24885	0.89363
>	360.04	-0.13574	7.67444	14.73922	1.33124
>	199.19	-0.24272	6.98652	8.15446	0.80902
>	415.40	-0.13863	7.72189	14.57610	1.30841
:.	206.27	-0.25040	6.37597	7.23801	0.78686
>	471.83	-0.14700	8.05529	14.48669	1.24657
.	211.42	-0.24847	5.67891	6.49141	0.79232
.	528.93	-0.15850	8.54836	14.43542	1.17051
>	215.57	-0.24158	5.01950	5.88328	0.81243

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RUN NO. 001 DATE 05-27-77 PAGE NO. 1

RUN BY

YANKEE TAIL 6

SIDE BENDING/TORSION 14.78/16.72

WBR = 0.0 SB = 10.22 ALT = 10000. WH = 16.72 WA = 14.48

GB = 0.030 GEB = 0.0 GS = 0.030 GR = 1.000

VELOCITY (EAS-MPH)	DAMPING (G)	DAMPING (LAMBDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	1.17507	12.46785	7.35455
0.0	0.0	2.14578	22.76740	7.35455
23.17	-0.03289	4.49800	22.76483	3.50810
12.69	-0.00193	1.25072	12.46722	6.90933
46.29	-0.07059	7.18693	22.74153	2.19333
25.37	-0.00423	1.31049	12.46518	6.44560
76.65	-0.13305	11.57752	22.60199	1.35319
42.25	-0.00861	1.51134	12.45926	5.71421
112.21	-0.22164	17.43100	22.04936	0.87680
63.30	-0.01785	1.86986	12.43854	4.61091
143.12	-0.28584	20.88677	21.05006	0.69856
84.20	-0.03172	2.40135	12.38369	3.57456
164.26	-0.30984	21.53677	20.17262	0.64925
100.25	-0.04467	2.88781	12.30985	2.95469
178.91	-0.31776	21.33751	19.53066	0.63445
112.09	-0.05542	3.28366	12.23661	2.58303
192.59	-0.31977	20.80360	18.92178	0.63045
123.65	-0.06713	3.70726	12.14878	2.27147
205.42	-0.31775	20.04564	18.34811	0.63446
134.86	-0.08006	4.16499	12.04565	2.00467
217.55	-0.31169	19.12027	17.81187	0.64572
145.66	-0.09469	4.66038	11.92571	1.77374
229.13	-0.30217	18.07128	17.31720	0.66423
155.96	-0.11018	5.19067	11.78692	1.57400
240.38	-0.28971	16.94332	16.86932	0.69012
165.68	-0.12725	5.74403	11.62712	1.40308
262.71	-0.25930	14.66147	16.13190	0.76267
183.02	-0.16319	6.82121	11.25803	1.14206
285.94	-0.22860	12.67971	15.60752	0.85320
197.24	-0.19619	7.65020	10.75591	0.97545
310.53	-0.20383	11.20592	15.25461	0.94358
208.46	-0.22120	8.08159	10.24049	0.87832
362.72	-0.17511	9.58213	14.84903	1.07415
224.09	-0.24617	7.95940	9.17386	0.79891
417.11	-0.16600	9.01385	14.66621	1.12537
236.39	-0.21976	7.21301	8.20668	0.78863
472.65	-0.16656	[illegible]	[illegible]	[illegible]
240.26	-0.18882	6.33071	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	-0.233[illegible]	[illegible]	[illegible]	[illegible]

RUN BY

YANKEE TAIL 6

SIDE BENDING/TORSION 14.98/16.72

WBR = 10.000 SB = 10.22 ALT = 10000. WH = 16.72 WA = 14.48
GB = 0.030 GEB = 0.0 GS = 0.030 GR = 1.000

VELOCITY (EAS-MPH)	CAMPING (G)	DAMPING (LAMBDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	2.08009	22.67048	7.35455
0.0	0.0	1.13409	12.35142	7.35455
22.42	-0.00957	2.73872	22.03039	5.37572
12.57	-0.00382	1.27208	12.34685	6.72350
44.59	-0.02109	3.51571	21.90591	4.31893
25.10	-0.00583	1.38831	12.33202	6.15748
73.25	-0.04108	4.87345	21.59885	5.10385
41.71	-0.01050	1.56468	12.29815	5.44804
106.82	-0.07298	6.79066	20.99086	2.14262
62.23	-0.01797	1.84234	12.22532	4.57958
137.17	-0.10837	8.77006	20.17541	1.59458
82.35	-0.02816	2.21314	12.11278	3.79369
158.55	-0.13453	10.03996	19.44760	1.34264
97.64	-0.03874	2.58961	11.99161	3.20974
172.92	-0.15097	10.73212	18.87701	1.21920
108.80	-0.04865	2.93493	11.87774	2.80519
186.38	-0.16394	11.15675	18.31154	1.15766
119.52	-0.06046	3.33700	11.74264	2.45914
198.93	-0.17267	11.31314	17.76848	1.08667
129.70	-0.07429	3.79537	11.58459	2.11566
210.84	-0.17701	11.20631	17.26241	1.06584
137.25	-0.09010	4.30189	11.40136	1.85707
222.35	-0.17728	10.94297	16.80467	1.06444
148.10	-0.10759	4.83818	11.19263	1.60353
233.73	-0.17425	10.52485	16.40266	1.08025
156.15	-0.12615	5.37586	10.95861	1.41298
256.05	-0.16260	7.54299	15.77207	1.14560
169.78	-0.16304	6.32257	10.42570	1.14298
281.09	-0.15004	8.67839	15.34312	1.22547
180.28	-0.19457	6.94254	9.84044	0.98248
306.51	-0.14070	8.07476	13.05715	1.29253
188.25	-0.21808	7.20710	9.24756	0.88937
359.75	-0.13299	7.54109	14.72721	1.35367
199.08	-0.24394	7.01382	8.14985	0.80542
414.84	-0.13515	7.50246	14.56637	1.33595
205.99	-0.25161	6.39486	7.22820	0.78348
470.91	-0.14266	7.84279	14.45832	1.27783
210.89	-0.24972	5.68785	6.47493	0.78879
527.55	-0.15315	8.28431	14.39767	1.20466
214.69	-0.24295	5.02426	5.85915	0.80833

RUN NO. 002 DATE 05-27-77 PAGE NO. 1

RUN BY

YANKEE TAIL 6

SIDE BENDING/TORSION 14.98/16.72

WBR = 0.0 SB = 5.72 ALT = 10000. WH = 16.72 WA = 14.48

GB = 0.030 GEB = 0.0 GS 0.030 GR = 1.000

VELOCITY (EAS-MPH)	DAMPING (G)	DAMPING (LAMBDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	1.16926	12.40627	7.35455
0.0	0.0	2.20669	23.41375	7.35455
23.83	-0.04617	5.60370	23.41726	2.89660
12.63	-0.00131	1.22015	12.40436	7.04668
47.65	-0.09880	9.47162	23.40851	1.71308
25.24	-0.00268	1.27294	12.39844	6.75129
78.94	-0.18603	15.79735	23.27686	1.02133
42.01	-0.00481	1.35460	12.38625	6.33769
114.99	-0.31022	24.15102	22.59539	0.64850
62.94	-0.00936	1.52938	12.36725	5.60512
144.23	-0.38709	27.79752	21.21415	0.52899
83.87	-0.01922	1.90758	12.33612	4.48252
163.18	-0.39688	26.87587	20.04049	0.51686
100.05	-0.03157	2.37660	12.28692	3.58355
176.39	-0.38896	25.34425	19.25549	0.52663
112.03	-0.04310	2.80864	12.22985	3.01813
188.98	-0.37600	23.68310	18.56775	0.54344
123.70	-0.05621	3.29171	12.15565	2.55924
201.07	-0.36078	22.04760	17.95881	0.56460
135.01	-0.07087	3.82140	12.05920	2.18738
212.69	-0.34374	20.45752	17.41388	0.59002
145.89	-0.08715	4.39630	11.94513	1.86335
223.96	-0.32552	18.90524	16.92632	0.62059
156.26	-0.10506	5.01103	11.80962	1.63356
235.05	-0.30568	17.39555	16.49555	0.65729
166.01	-0.12437	5.65005	11.65030	1.42927
257.48	-0.26436	14.62133	15.81119	0.74956
183.28	-0.16440	6.87366	11.25469	1.13494
281.22	-0.22749	12.41717	15.34999	0.85687
197.26	-0.19974	7.77131	10.76728	0.96037
306.42	-0.20004	10.87867	15.05308	0.95913
208.22	-0.22521	8.20139	10.22897	0.86451
359.59	-0.17044	7.26992	14.72088	1.10074
223.55	-0.24906	8.07312	9.15144	0.79063
414.59	-0.16113	8.73020	14.34767	1.15438
233.35	-0.25156	7.23967	8.18474	0.78365
470.37	-0.16190	8.70853	14.11505	1.11970
257.34	[illegible]	6.54661	7.85782	[illegible]
573.81	-0.16795	8.91586	[illegible]	[illegible]
244.00	[illegible]	5.82291	[illegible]	[illegible]

RUN BY

YANKEE TAIL 6

SIDE BENDING/TORSION 14.98/16.72

WBR = 10.000 SB = 5.72 ALT = 10000. WH = 16.72 WA = 14.48

GB = 0.030 GEB = 0.0 GS = 0.030 GR = 1.000

VELOCITY (EAS-MPH)	CAMPING (G)	DAMPING (LAMBDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	2.07941	22.06624	7.35455
0.0	0.0	1.16413	12.35235	7.35455
22.42	-0.00956	2.73706	22.02311	5.57727
12.57	-0.00278	1.27168	12.34777	6.73038
44.58	-0.02103	5.51099	21.89847	4.32327
25.11	-0.00577	1.38592	12.33374	6.16858
73.22	-0.04095	4.81275	21.59103	3.10962
41.71	-0.01039	1.56048	12.29905	5.46314
106.78	-0.07269	6.76871	20.98196	2.14866
62.22	-0.01778	1.83527	12.22613	4.61760
137.10	-0.10786	8.73316	20.16463	1.60046
82.36	-0.02787	2.20236	12.11332	5.81242
158.25	-0.13362	9.98994	19.43488	1.34849
97.64	-0.03836	2.57533	11.99169	3.22757
172.79	-0.15009	10.67209	18.86269	1.22513
108.80	-0.04820	2.91773	11.87724	2.82161
186.21	-0.16290	11.08714	18.39565	1.14381
119.50	-0.05992	3.31674	11.74129	2.45375
198.74	-0.17146	11.23472	17.75117	1.09520
129.67	-0.07367	3.77200	11.58184	2.12830
210.61	-0.17564	11.14018	17.24403	1.07224
139.20	-0.08941	4.27536	11.39721	1.84779
222.10	-0.17576	10.85055	16.78559	1.07229
148.01	-0.10682	4.80830	11.18645	1.61360
233.45	-0.17260	10.42779	16.38330	1.08902
156.03	-0.12530	5.34223	10.94998	1.42075
256.54	-0.16072	9.44201	15.75319	1.15646
169.55	-0.16199	6.27960	10.41125	1.14921
280.77	-0.14818	8.57874	15.32535	1.23827
179.90	-0.19330	6.88378	9.81971	0.96806
306.17	-0.13885	7.97828	15.04048	1.30671
187.70	-0.21661	7.14374	9.32088	0.89469
359.38	-0.13117	7.44929	14.71226	1.36896
198.19	-0.24229	6.94015	8.11325	0.81061
414.45	-0.13331	7.46135	14.54273	1.35100
204.75	-0.25008	6.32151	7.18447	0.78777
470.50	-0.14077	7.74984	14.44587	1.29205
209.31	-0.24850	5.62272	6.42651	0.79224
527.13	-0.15118	8.18845	14.38640	1.21780
212.81	-0.24215	4.96571	5.80797	0.81072

>RUN NO. 003 DATE 05-27-77 PAGE NO. 1

RUN BY

YANKEE TAIL 6

SIDE BENDING/TORSION 14.98/16.72

WBR = 0.0 SB = 1.19 ALT = 10000. WH = 16.72 WA = 14.48

GB = 0.030 GEB = 0.0 GS = 0.030 GR = 1.000

VELOCITY (EAS-MPH)	CAMPING (G)	DAMPING (LAMBDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	1.17402	12.45671	7.35455
0.0	0.0	2.15075	22.82022	7.35455
23.24	-0.03513	4.67250	22.83490	3.38745
12.68	-0.00051	1.19385	12.45329	7.23154
46.55	-0.07552	7.58050	22.86719	2.09094
25.35	-0.00114	1.21802	12.45119	7.08574
77.58	-0.14497	12.57448	22.87529	1.26097
42.20	-0.00250	1.27037	12.44279	6.78913
114.89	-0.25831	20.14804	22.57598	0.76528
63.25	-0.00665	1.43091	12.42873	6.02064
147.15	-0.35677	26.29763	21.64267	0.57046
84.29	-0.01626	1.80179	12.39791	4.76947
168.31	-0.39269	27.44928	20.67069	0.52198
100.53	-0.02762	2.03189	12.34611	3.82914
182.80	-0.40123	27.03530	19.95603	0.51165
112.56	-0.03770	2.61347	12.28743	3.25890
196.43	-0.40092	26.12667	19.29929	0.51202
124.30	-0.04877	3.02217	12.21256	2.80101
209.37	-0.39540	24.09209	18.70051	0.51865
135.72	-0.06084	3.15934	12.12204	2.42890
221.72	-0.38628	23.74086	18.15543	0.53002
146.76	-0.07402	3.92657	12.01570	2.12111
233.59	-0.37424	22.41984	17.65407	0.54581
157.36	-0.08840	4.42365	11.89267	1.86349
245.11	-0.35972	21.06063	17.20180	0.56015
167.45	-0.10394	4.94496	11.75163	1.64726
257.80	-0.32555	18.36900	16.44493	0.62055
185.82	-0.13734	5.99879	11.41043	1.31046
291.11	-0.29012	15.98019	15.88991	0.68923
201.36	-0.16987	6.90117	10.99068	1.10390
315.79	-0.25976	14.11997	15.51104	0.76144
214.00	-0.19636	7.47581	10.91262	0.97472
368.46	-0.22179	11.93195	15.08404	0.87626
232.27	-0.22530	7.62656	9.50874	0.86421
423.76	-0.20660	11.05235	14.86749	0.93254
244.31	-0.23127	7.03650	8.57280	0.84449
480.30	-0.20407	10.84404	14.74666	0.94261
252.58	-0.22597	6.23616	7.75492	0.86176
537.53	-0.20858	10.79550	14.67013	0.92480
258.46	-0.21592	5.44975	7.05386	0.89718

RUN BY

YANKEE TAIL 6

SIDE BENDING/TORSION 14.98/16.72

WBR = 10.000 SB = 1.19 ALT = 10000. WH = 16.72 WA = 14.48

GB = 0.030 GEB = 0.0 GS = 0.030 OR = 1.000

VELOCITY (EAS-MPH)	CAMPING (G)	DAMPING (LAMBDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	2.08008	22.07037	7.35455
0.0	0.0	1.16412	12.35167	7.35455
22.42	-0.00954	2.73633	22.03015	5.58055
12.57	-0.00282	1.27292	12.34712	6.72343
44.59	-0.02102	3.51129	21.90531	4.32425
25.11	-0.00583	1.38832	12.33514	6.15760
73.24	-0.04100	4.81749	21.59748	3.10749
41.71	-0.01049	1.56434	12.29860	5.44946
106.81	-0.07291	6.78537	20.98825	2.14403
62.22	-0.01792	1.84075	12.22599	4.60381
137.15	-0.10837	8.76889	20.17161	1.59450
82.36	-0.02805	2.20910	12.11366	3.80090
153.32	-0.13444	10.04458	19.44317	1.34172
97.65	-0.03855	2.58270	11.99262	3.21860
172.88	-0.15119	10.74257	18.87237	1.21771
108.81	-0.04839	2.92531	11.87878	2.81467
186.33	-0.16429	11.17419	18.30696	1.13560
119.53	-0.06010	3.32426	11.74365	2.44870
198.89	-0.17317	11.33852	17.76423	1.08597
129.71	-0.07384	3.77923	11.58530	2.12487
210.79	-0.17768	11.26032	17.25874	1.06239
139.26	-0.08754	4.28219	11.40211	1.84564
222.31	-0.17813	10.96602	16.80177	1.06009
148.10	-0.10693	4.81497	11.19320	1.61134
233.70	-0.17528	10.57705	16.40066	1.07479
156.16	-0.12538	5.34959	10.95901	1.42002
256.85	-0.16400	9.61280	15.77221	1.13729
169.79	-0.16207	6.29113	10.42593	1.14872
281.14	-0.15180	8.76454	15.34572	1.21363
180.29	-0.19347	6.90891	9.84092	0.98731
303.62	-0.14279	8.17643	15.06256	1.27692
188.27	-0.21670	7.17391	7.24885	0.89363
360.04	-0.13574	7.67144	14.75922	1.33124
199.19	-0.24272	6.98652	8.15443	0.80902
415.40	-0.13863	7.72189	14.57610	1.30841
206.27	-0.25040	6.37597	7.25801	0.78686
471.83	-0.14700	8.05529	14.48669	1.24657
211.42	-0.24847	5.67891	6.49191	0.79232
528.93	-0.15850	8.54836	14.43542	1.17031
215.57	-0.24158	5.01550	5.88228	[illegible]

001

YANKEE TAIL 6 - TAIL EXTENSION
SIDE BENDING/TORSION 14.98/16.72 - NO BALANCE WEIGHT

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30., 40., 50., 60.,
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RUN BY

YANKEE TAIL 6 - TAIL EXTENSION

SIDE BENDING/TORSION 14.98/16.72 - NO BALANCE WEIGHT

WBR = 0.0 SB = 10.22 ALT = 10000. WH = 16.72 WA = 14.48

GB = 0.030 GEB = 0.0 GS = 0.030 GR = 1.000

VELOCITY (EAS-MPH)	CAMPING (G)	DAMPING (LAMBDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	1.17507	12.46785	7.35455
0.0	0.0	2.14578	22.76742	7.35455
23.17	-0.03289	4.49800	22.76483	3.50810
12.69	-0.00193	1.25072	12.46722	6.90933
46.29	-0.07059	7.18693	22.74153	2.19333
25.37	-0.00423	1.34049	12.46518	6.44560
76.65	-0.13305	11.57752	22.60199	1.35319
42.25	-0.00861	1.51134	12.45926	5.71421
112.21	-0.22164	17.43100	22.04936	0.87680
63.30	-0.01785	1.86986	12.43854	4.61091
143.12	-0.28584	20.88697	21.05006	0.69856
84.20	-0.03172	2.40135	12.38369	3.57456
164.26	-0.30984	21.53677	20.17262	0.64925
100.23	-0.04467	2.88781	12.30985	2.95469
178.91	-0.31776	21.33751	19.53066	0.63445
112.09	-0.05542	3.28366	12.23661	2.58303
192.59	-0.31997	20.80360	18.92178	0.63045
123.65	-0.06713	3.70726	12.14878	2.27147
205.42	-0.31775	20.04534	18.34811	0.63446
134.86	-0.08006	4.16499	12.04565	2.00467
217.55	-0.31169	19.12027	17.81189	0.64572
145.66	-0.09439	4.66038	11.92571	1.77374
229.13	-0.30217	18.07128	17.31720	0.66423
155.96	-0.11018	5.19067	11.78692	1.57400
240.38	-0.28971	16.94332	16.86932	0.69012
165.68	-0.12725	5.74403	11.62712	1.40308
262.71	-0.25930	14.66147	16.13190	0.76267
183.02	-0.16319	6.82121	11.23883	1.14206
285.94	-0.22860	12.67971	15.60752	0.85320
197.24	-0.19619	7.65020	10.76591	0.97545
310.53	-0.20383	11.20592	15.25461	0.94358
208.46	-0.22120	8.08159	10.24049	0.87832
362.72	-0.17541	9.58213	14.84903	1.07415
224.09	-0.24617	7.95940	9.17386	0.79891
417.11	-0.16600	9.01245	14.63621	1.12567
233.89	-0.24976	7.21304	8.20688	0.78865
472.60	-0.16656	8.96042	14.51020	1.12246
240.26	-0.24352	6.33871	7.37671	0.80666
528.71	-0.17245	9.17758	14.42946	1.08981
244.56	-0.23330	5.52098	6.67443	0.83796
585.23	-0.18140	9.54660	14.37486	1.04372
247.55	-0.22182	4.81041	6.08052	0.87616
699.05	-0.20422	10.52865	14.30866	0.94201
251.26	-0.19931	3.70508	5.14304	0.96216
813.50	-0.23049	11.68008	14.27256	0.84700
253.32	-0.17955	2.92586	4.44448	1.05292
1043.47	-0.28762	14.20827	14.23906	0.69465
255.30	-0.14873	1.95614	3.49384	1.23448
1274.28	-0.34757	16.87567	14.22705	0.58436
256.12	-0.12661	1.40685	2.85948	1.40885
1505.60	-0.40888	19.61108	14.22358	0.50273
256.48	-0.11020	1.06717	2.42299	1.57378

1737.28	-0.47097	22.38650	14.22399	0.44042
256.64	-0.09759	0.84230	2.10128	1.72920
2317.57	-0.62816	29.42552	14.23133	0.33523
256.74	-0.07608	0.52540	1.57655	2.07991
2898.94	-0.78690	36.54799	14.24109	0.27009
256.70	-0.06252	0.36652	1.26103	2.38479
3481.11	-0.94656	43.72090	14.25080	0.22593
256.63	-0.05318	0.27453	1.05058	2.65259

RUN BY

YANKEE TAIL 6 - TAIL EXTENSION

SIDE BENDING/TORSION 14.98/16.72 - NO BALANCE WEIGHT

WBR = 1.000 SB = 10.22 ALT = 10000. WH = 16.72 WA = 14.48

GB = 0.030 GEB = 0.0 GS = 0.030 GR = 1.000

VELOCITY (EAS-MPH)	CAMPING (G)	DAMPING (LAMBDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	1.19871	12.71872	7.35455
0.0	0.0	2.33842	24.81143	7.35455
23.96	-0.17159	14.91051	23.54328	1.09446
12.87	-0.02318	2.11229	12.64423	4.14922
45.67	-0.19448	15.82098	22.43379	0.98287
25.56	-0.02969	2.35489	12.55777	3.69632
73.43	-0.20241	15.80997	21.65297	0.94932
42.33	-0.03283	2.46341	12.48068	3.51180
106.65	-0.22510	16.79491	20.95615	0.86489
63.13	-0.03821	2.65837	12.40591	3.23474
137.53	-0.25366	18.02633	20.22801	0.77781
83.78	-0.04714	2.98625	12.32228	2.86018
159.59	-0.27318	18.66839	19.59998	0.72774
99.67	-0.05682	3.33867	12.24034	2.54125
174.97	-0.28409	18.84783	19.10136	0.70247
111.44	-0.06583	3.66267	12.16547	2.30228
189.27	-0.29081	18.74152	18.59569	0.68776
122.93	-0.07641	4.03730	12.07750	2.07355
202.59	-0.29302	18.36330	18.09537	0.68304
134.07	-0.08863	4.46282	11.97449	1.85984
215.11	-0.29075	17.74762	17.61248	0.68787
144.79	-0.10255	4.93644	11.85434	1.66452
227.03	-0.28432	16.94338	17.15824	0.70194
155.00	-0.11808	5.44977	11.71479	1.48999
238.57	-0.27438	16.01003	16.74248	0.72486
164.63	-0.13492	5.98612	11.55375	1.33784
261.43	-0.24798	14.01922	16.05317	0.79371
181.79	-0.17010	7.01745	11.16291	1.10262
285.07	-0.22046	12.24373	15.56028	0.88091
195.85	-0.20188	7.78758	10.69017	0.95150
309.94	-0.19810	10.91074	15.22591	0.96729
207.00	-0.22564	8.16664	10.16873	0.86308
362.43	-0.17244	9.43618	14.83687	1.08987
222.66	-0.24888	7.98628	9.11535	0.79114
416.94	-0.16429	8.93014	14.63027	1.13559
232.59	-0.25158	7.21970	8.16138	0.78356
472.50	-0.16548	8.90887	14.50710	1.12872
239.11	-0.24484	6.33897	7.34156	0.80278
528.65	-0.17171	9.14281	14.42784	1.09383
243.56	-0.23431	5.51945	6.64712	0.83477
585.20	-0.18086	9.52194	14.37407	1.04636
246.68	-0.22262	4.80859	6.05906	0.87340
699.05	-0.20392	10.51503	14.30865	0.94323
250.59	-0.19984	3.70369	5.12928	0.95995
813.51	-0.23031	11.67203	14.27284	0.84760
252.80	-0.17992	2.92494	4.43522	1.05106
1043.50	-0.28755	14.20539	14.23947	0.69481
254.96	-0.14893	1.95572	3.47914	1.23308
1274.31	-0.34754	16.87497	14.22744	0.58440
255.87	-0.12673	1.40663	2.85678	1.40775
1505.63	-0.40887	19.61143	14.22393	0.50273
256.30	-0.11027	1.06704	2.42131	1.57289

1737.31	-0.47098	22.38741	14.22428	0.44041
256.51	-0.09765	0.84221	2.10017	1.72847
2317.60	-0.62818	29.42693	14.23153	0.33522
256.66	-0.07610	0.52535	1.57607	2.07946
2898.97	-0.78693	36.54947	14.24123	0.27008
256.65	-0.06253	0.36650	1.26078	2.38449
3481.13	-0.94659	43.72234	14.25091	0.22593
256.59	-0.05318	0.27451	1.05044	2.65238

RUN BY

YANKEE TAIL 6 - TAIL EXTENSION

SIDE BENDING/TORSION 14.98/16.72 - NO BALANCE WEIGHT

WBR = 2.000 SB = 10.22 ALT = 10000. WH = 16.72 WA = 14.48

GB = 0.030 GEB = 0.0 GS = 0.030 GR = 1.000

VELOCITY (EAS-MPH)	CAMPING (G)	DAMPING (LAMBDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	2.04854	21.73567	7.35455
0.0	0.0	1.15808	12.28763	7.35455
22.06	-0.01111	2.79909	21.67120	5.36653
12.51	-0.00709	1.43191	12.28832	5.94845
43.74	-0.02630	3.80063	21.48908	3.91913
25.01	-0.01345	1.67691	12.28561	5.07825
71.63	-0.05765	5.81636	21.12181	2.51714
41.62	-0.02171	1.99374	12.27278	4.26679
104.51	-0.10877	8.95300	20.53662	1.58997
62.27	-0.03259	2.40564	12.23517	3.52538
134.92	-0.16175	11.95437	19.84441	1.15064
82.73	-0.04537	2.88089	12.16757	2.92755
156.70	-0.19766	13.76460	19.24520	0.96914
98.45	-0.05744	3.32124	12.09055	2.52333
171.95	-0.21929	14.70103	18.77160	0.88508
110.07	-0.06809	3.70305	12.01653	2.24929
186.19	-0.23523	15.24223	18.29291	0.83188
121.40	-0.08023	4.13040	11.92751	2.00164
199.52	-0.24521	15.40798	17.82087	0.80170
132.36	-0.09396	4.60366	11.82187	1.77996
212.12	-0.24940	15.24421	17.36722	0.78968
142.87	-0.10928	5.11835	11.69774	1.58416
224.18	-0.24834	14.81542	16.94294	0.79269
152.87	-0.12602	5.66282	11.55317	1.41415
235.93	-0.24295	14.19793	16.55738	0.80834
162.25	-0.14378	6.21652	11.38653	1.26961
259.34	-0.22413	12.71394	15.92491	0.86821
178.91	-0.17959	7.23347	10.98593	1.05273
283.53	-0.20283	11.31986	15.47605	0.94765
192.56	-0.21056	7.94324	10.51066	0.91719
308.81	-0.18524	10.25808	15.17036	1.02508
203.47	-0.23300	8.25858	9.99536	0.83892
361.77	-0.16534	9.08859	14.81016	1.12951
219.06	-0.25411	8.00456	8.96798	0.77658
416.54	-0.15998	8.72341	14.61613	1.16138
229.21	-0.25553	7.21452	8.04266	0.77272
472.24	-0.16263	8.77443	14.49936	1.14540
236.05	-0.24796	6.32871	7.24740	0.79377
528.50	-0.16971	9.04968	14.42366	1.10476
240.82	-0.23684	5.50961	6.57243	0.82686
585.12	-0.17940	9.45454	14.37198	1.05367
244.25	-0.22470	4.80045	5.99945	0.86628
699.05	-0.20307	10.47676	14.30863	0.94667
248.68	-0.20129	3.69870	5.09021	0.95392
813.56	-0.22978	11.64905	14.27364	0.84932
251.28	-0.18097	2.92190	4.40958	1.04583
1043.59	-0.28733	14.19704	14.24067	0.69528
253.95	-0.14952	1.95442	3.46537	1.22902
1274.42	-0.34747	16.87293	14.22859	0.58452
255.16	-0.12709	1.40595	2.84884	1.40451
1505.74	-0.40887	19.61250	14.22494	0.50274
255.78	-0.11051	1.06662	2.41634	1.57027

1737.42	-0.47101	22.39011	14.22515	0.44038
256.11	-0.09781	0.84193	2.09687	1.72632
2317.70	-0.62824	29.43113	14.23214	0.33519
256.43	-0.07617	0.52522	1.57463	2.07809
2899.06	-0.78700	36.55390	14.24167	0.27006
256.49	-0.06257	0.36642	1.26003	2.38358
3481.21	-0.94666	43.72663	14.25124	0.22591
256.49	-0.05320	0.27446	1.05000	2.65177

RUN BY

YANKEE TAIL 6 - TAIL EXTENSION

SIDE BENDING/TORSION 14.98/16.72 - NO BALANCE WEIGHT

WBR = 3.000 SB = 10.22 ALT = 10000. WH = 16.72 WA = 14.48

GB = 0.030 GEB = 0.0 GS = 0.030 GR = 1.000

VELOCITY (EAS-MPH)	CAMPING (G)	DAMPING (LAMBDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	2.06969	21.96009	7.35455
0.0	0.0	1.16217	12.33101	7.35455
22.30	-0.00917	2.69599	21.90938	5.63298
12.55	-0.00393	1.31394	12.32706	6.50294
44.29	-0.02097	3.48410	21.75716	4.32851
25.07	-0.00799	1.46973	12.31442	5.80771
72.59	-0.04399	4.97523	21.40449	2.98207
41.66	-0.01422	1.70632	12.28347	4.98984
105.66	-0.08372	7.41769	20.76256	1.94017
62.19	-0.02401	2.07356	12.22019	4.08497
135.74	-0.12927	9.98960	19.96510	1.38532
82.44	-0.03693	2.54972	12.12606	3.29651
157.02	-0.16289	11.68604	19.28445	1.14385
97.94	-0.04978	3.01453	12.02819	2.76572
171.85	-0.18445	12.63933	18.76029	1.02883
109.36	-0.06134	3.42586	11.93840	2.41548
185.68	-0.20134	13.25904	18.24328	0.95371
120.44	-0.07464	3.89008	11.83364	2.10857
198.67	-0.21292	13.54246	17.74514	0.90826
131.13	-0.08972	4.40500	11.71232	1.84299
211.01	-0.21906	13.51811	17.27646	0.88586
141.35	-0.10650	4.96264	11.57266	1.61640
222.91	-0.22015	13.23697	16.84651	0.88203
151.01	-0.12471	5.54693	11.41291	1.42617
234.58	-0.21700	12.77468	16.46253	0.89325
160.05	-0.14380	6.13284	11.23187	1.26946
258.05	-0.20285	11.59127	15.84569	0.94756
176.00	-0.18151	7.18140	10.80744	1.04314
282.43	-0.18604	10.46281	15.41591	1.02129
189.05	-0.21335	7.88891	10.31877	0.90665
307.89	-0.17222	9.60915	15.12537	1.09106
199.51	-0.23613	8.19431	9.80097	0.82906
361.13	-0.15733	8.70074	14.78397	1.17777
214.69	-0.25750	7.93826	8.78905	0.76744
416.09	-0.15471	8.47240	14.60044	1.19450
224.84	-0.25894	7.16157	7.88945	0.76360
471.94	-0.15894	8.60084	14.49005	1.16777
231.90	-0.25120	6.29009	7.12008	0.78461
528.31	-0.16701	8.92379	14.41836	1.11994
236.99	-0.23980	5.48215	6.46779	0.81777
585.01	-0.17735	9.36020	14.36926	1.06408
240.76	-0.22734	4.78092	5.91358	0.85736
699.05	-0.20181	10.42054	14.30868	0.95178
245.82	-0.20333	3.68843	5.03168	0.94558
813.63	-0.22898	11.61422	14.27488	0.85194
248.94	-0.18252	2.91610	4.36762	1.03817
1043.73	-0.28700	14.18392	14.24257	0.69602
252.35	-0.15045	1.95213	3.44356	1.22272
1274.58	-0.34735	16.86968	14.23043	0.58471
254.02	-0.12767	1.40480	2.83606	1.39935
1505.91	-0.40886	19.61423	14.22657	0.50275
254.92	-0.11089	1.06594	2.40827	1.56603

255.45	-0.09807	0.84147	2.09146	1.72281
2317.86	-0.62835	29.43806	14.23313	0.33513
256.04	-0.07629	0.52500	1.57226	2.07583
2899.21	-0.78712	36.56123	14.24239	0.27002
256.24	-0.06262	0.36629	1.25879	2.38209
3481.35	-0.94678	43.73375	14.25179	0.22588
256.31	-0.05324	0.27438	1.04927	2.65076

RUN BY

YANKEE TAIL 6 - TAIL EXTENSION

SIDE BENDING/TORSION 14.98/16.72 - NO BALANCE WEIGHT

WBR = 4.000 SB = 10.22 ALT = 10000. WH = 16.72 WA = 14.48

GB = 0.030 GEB = 0.0 GS = 0.030 GR = 1.000

VELOCITY (EAS-MPH)	CAMPING (G)	DAMPING (LAMBDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	2.07507	22.01721	7.35455
0.0	0.0	1.16317	12.34165	7.35455
22.36	-0.00926	2.71007	21.97181	5.61968
12.56	-0.00332	1.29129	12.33726	6.62251
44.44	-0.02077	3.48245	21.83313	4.34569
25.09	-0.00682	1.42546	12.32364	5.99255
72.92	-0.04201	4.86373	21.50070	3.06415
41.68	-0.01226	1.63157	12.29020	5.22131
106.20	-0.07765	7.05732	20.86802	2.04960
62.19	-0.02100	1.95820	12.22112	4.32595
136.33	-0.11853	9.35689	20.05224	1.48545
82.38	-0.03290	2.39444	12.11709	3.50770
157.50	-0.14912	10.88489	19.34345	1.23179
97.78	-0.04510	2.83302	12.00803	2.93798
172.17	-0.16902	11.75137	18.79532	1.10863
109.08	-0.05634	3.22991	11.90767	2.55542
185.81	-0.18482	12.32027	18.25556	1.02707
120.01	-0.06950	3.68556	11.79063	2.21749
198.59	-0.19584	12.58524	17.73809	0.97695
130.49	-0.08465	4.19796	11.65551	1.92451
210.74	-0.20188	12.56942	17.25472	0.95152
140.47	-0.10169	4.75818	11.50085	1.67539
222.49	-0.20322	12.32033	16.81503	0.94602
149.85	-0.12031	5.34811	11.32538	1.46784
234.06	-0.20066	11.90268	16.42586	0.95656
158.57	-0.13991	5.94014	11.12852	1.29858
257.44	-0.18834	10.84351	15.80820	1.01051
173.85	-0.17859	6.99569	10.67527	1.05773
281.83	-0.17380	9.84893	15.38299	1.08263
186.24	-0.21128	7.70553	10.16565	0.91445
307.33	-0.16212	9.11231	15.09751	1.14843
196.16	-0.23486	8.01810	9.63619	0.83303
360.66	-0.15041	8.36794	14.76443	1.22300
210.62	-0.25781	7.79597	8.62225	0.76662
415.72	-0.14974	8.23708	14.58718	1.22751
220.47	-0.26045	7.05896	7.73599	0.75963
471.66	-0.15522	8.42657	14.48147	1.19121
227.51	-0.25340	6.21923	6.98528	0.77853
528.12	-0.16413	8.79047	14.41319	1.13651
232.75	-0.24229	5.43362	6.35204	0.81031
584.90	-0.17508	9.25600	14.36651	1.07586
236.75	-0.22986	4.74741	5.81522	0.84906
699.06	-0.20034	10.35453	14.30885	0.95786
242.38	-0.20558	3.67163	4.96112	0.93659
813.72	-0.22800	11.57163	14.27646	0.85517
246.03	-0.18437	2.90698	4.31651	1.02924
1043.91	-0.28657	14.16708	14.24503	0.69696
250.27	-0.15163	1.94874	3.41518	1.21475
1274.80	-0.34718	16.86540	14.23287	0.58496
252.49	-0.12844	1.40317	2.81904	1.39258
1506.15	-0.40884	19.61658	14.22877	0.50277
253.77	-0.11140	1.06499	2.39737	1.56034

1737.83	-0.47113	22.40051	14.22850	0.44028
254.55	-0.09842	0.84084	2.08410	1.71804
2318.08	-0.62850	29.44760	14.23450	0.33506
255.51	-0.07645	0.52469	1.56899	2.07272
2899.41	-0.78729	36.57138	14.24340	0.26996
255.89	-0.06270	0.36611	1.25708	2.38001
3481.53	-0.94695	43.74364	14.25255	0.22584
256.06	-0.05328	0.27426	1.04826	2.64935

B.2 Tail 2

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001
            YANKEE TAIL 2
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 30., 40., 50., 60.,
 DELTAX=0., 0., 12.5, 9.04, 6.9, 7.5, 6.55, 6.55, 4.36,
 YBAR=5.95, 5.95, 5.95, 16.78, 24.63, 31.89, 38.5, 45.22, 50.93,
 STRIPM=42.8, 16.14, 58.86, 5.62, 4.55, 2.34, 1.81, 1.62, 1.1,
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 WTM=0., .047, .252, 6*1.,
 SMICRD=0., 0., 20.35, 19.28, 17.255, 15.41, 13.74, 12.02, 10.47,
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 SBETA=3.413, 1.96, 1.683, 1.091, .791, -7.747,
 MIBETA=18.74, 8.5, 7.57, 4.35, 2.82, 97.96,
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 CAPFSA=6*1.,
 BSA=19.28, 17.255, 15.41, 13.74, 12.02, 10.47,
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RUN BY

YANKEE TAIL 2
SIDE BENDING/TORSION 21.36/17.26

WBR = 0.0 SB = 1.19 ALT = 10000. WH = 17.26 WA = 21.36
GB = 0.030 GEB = 0.0 GS = 0.030 GR = 1.000

VELOCITY (EAS-MPH)	CAMPING (G)	DAMPING (LAMBDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	1.49191	15.82966	7.35455
0.0	0.0	2.28630	24.25844	7.35455
24.70	-0.02234	3.99014	24.26474	4.21517
16.11	-0.00897	1.93789	15.83083	5.66241
49.41	-0.04851	5.98753	24.27430	2.81013
32.23	-0.01804	2.38940	15.83321	4.59312
82.22	-0.09495	9.51631	24.24306	1.76582
53.70	-0.02995	2.98211	15.83434	3.68047
121.83	-0.17436	15.36966	23.93980	1.07965
80.57	-0.04245	3.60343	15.83146	3.04531
157.19	-0.25204	20.48565	23.12021	0.78229
107.77	-0.04984	3.97596	15.85078	2.76335
181.09	-0.29177	22.48174	22.23970	0.68569
129.52	-0.05318	4.15684	15.90717	2.65251
197.30	-0.31175	23.12512	21.53914	0.64561
146.36	-0.05521	4.27723	15.97764	2.58927
212.09	-0.32762	23.41150	20.83799	0.61696
163.58	-0.05660	4.37226	16.07139	2.54785
225.50	-0.34293	23.59760	20.14118	0.59162
181.24	-0.05618	4.38260	16.18814	2.56031
237.66	-0.36125	23.91709	19.45826	0.56393
199.37	-0.05168	4.18857	16.32374	2.70135

249.06	-0.38631	24.61812	18.82306	0.52998
217.74	-0.04026	3.63237	16.45644	3.14031
260.53	-0.41835	25.75295	18.28338	0.49210
235.74	-0.02215	2.71033	16.54396	4.23102
284.46	-0.48349	28.17828	17.46773	0.42968
269.26	0.01611	0.72168	16.53418	15.88063
307.91	-0.53263	29.70686	16.80674	0.39215
300.08	0.04300	0.0	16.37918	99999.00000
329.58	-0.56397	30.21245	16.19089	0.37146
328.98	0.05792	0.0	16.16098	99999.00000
366.28	-0.58137	28.79983	14.99452	0.36089
382.50	0.05863	0.0	15.65850	99999.00000
393.64	-0.55147	25.23173	13.81242	0.37945
432.51	0.02775	0.10705	15.17638	98.26590
411.49	-0.49058	20.66218	12.63405	0.42383
482.92	-0.02707	2.65819	14.82716	3.86633
420.84	-0.42262	16.33188	11.48545	0.48746
538.19	-0.09073	5.57093	14.68820	1.82755
425.41	-0.36832	13.07558	10.44909	0.55392
598.33	-0.14666	8.15639	14.69653	1.24895
430.47	-0.29870	9.09875	8.81114	0.67124
723.18	-0.23237	12.20134	14.80252	0.84092
433.76	-0.25465	6.80548	7.61023	0.77512
848.78	-0.30255	15.55779	14.89154	0.66347
437.82	-0.19828	4.28461	5.97439	0.96652
1099.76	-0.42900	21.64005	15.00718	0.48069
440.09	-0.16254	2.97201	4.91346	1.14595
1350.68	-0.54955	27.45636	15.08005	0.38070
441.47	-0.13763	2.19640	4.17065	1.31619
1601.78	-0.66819	33.19141	15.13222	0.31601

442.38	-0.11927	1.69852	3.62202	1.47812
1853.15	-0.78608	38.89965	15.17267	0.27036
443.65	-0.08928	1.02085	2.72432	1.84980
2482.82	-1.07995	53.16348	15.24610	0.19878
444.29	-0.07123	0.69410	2.18256	2.17957
3114.17	-1.37404	67.48007	15.29840	0.15714
444.65	-0.05920	0.51010	1.82029	2.47350
3746.98	-1.66887	81.86787	15.33925	0.12987

RUN BY

YANKEE TAIL 2
SIDE BENDING/TORSION 21.36/17.26

WBR = 2.000 SB = 1.19 ALT = 10000. WH = 17.26 WA = 21.36
GB = 0.030 GEB = 0.0 GS = 0.030 GR = 1.000

VELOCITY (EAS-MPH)	CAMPING (G)	DAMPING (LAMBDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	2.19098	23.24703	7.35455
0.0	0.0	1.49112	15.82122	7.35455
23.60	-0.00595	2.61820	23.18291	6.13751
16.11	-0.01133	2.05578	15.83250	5.33827
46.81	-0.01503	3.25311	22.99653	4.89993
32.29	-0.02224	2.60329	15.86390	4.22390
76.64	-0.03710	4.76359	22.59924	3.28842
54.03	-0.03572	3.28948	15.93151	3.35704
111.59	-0.07852	7.47574	21.92764	2.03313
81.69	-0.05081	4.07499	16.05148	2.73034
143.39	-0.12810	10.47510	21.09051	1.39558
110.27	-0.06404	4.79149	16.21813	2.34616
165.42	-0.16838	12.66124	20.31593	1.11221
133.55	-0.07222	5.26711	16.40136	2.15841
180.00	-0.20036	14.22110	19.65042	0.95778
152.00	-0.07471	5.45877	16.59359	2.10704
192.67	-0.24113	16.12433	18.93004	0.81376
171.46	-0.06621	5.09162	16.84595	2.29333
205.35	-0.30291	19.18301	18.34184	0.66276
190.71	-0.03571	3.51634	17.03356	3.35770
219.61	-0.36608	22.37356	17.98074	0.55706
208.17	-0.00262	1.74682	17.04367	6.76306

234.13	-0.41876	24.94633	17.69473	0.49166
224.62	0.02253	0.39862	16.97599	29.51881
248.29	-0.46219	26.94295	17.42460	0.44828
240.51	0.04139	0.0	16.87857	99999.00000
274.91	-0.52726	29.55303	16.88095	0.39593
271.08	0.06635	0.0	16.64603	99999.00000
298.98	-0.56913	30.71734	16.31959	0.36826
300.28	0.07932	0.0	16.39029	99999.00000
320.50	-0.59232	30.78179	15.74456	0.35454
328.25	0.08317	0.0	16.12508	99999.00000
356.13	-0.59494	28.62353	14.57917	0.35305
381.10	0.06861	0.0	15.60113	99999.00000
382.38	-0.55511	24.66345	13.41742	0.37709
431.62	0.02917	0.03940	15.14515	266.46929
399.69	-0.49124	20.09546	12.27177	0.42329
483.30	-0.02810	2.70840	14.83885	3.79765
409.64	-0.42567	16.00386	11.17967	0.48421
539.42	-0.08956	5.52941	14.72170	1.84547
415.47	-0.37327	12.92874	10.20502	0.54712
599.50	-0.14340	8.02141	14.72514	1.27244
422.76	-0.30344	9.06486	8.65344	0.66169
723.79	-0.22848	12.03021	14.81501	0.85360
427.62	-0.25827	6.79452	7.50254	0.76538
849.09	-0.29915	15.40432	14.89707	0.67033
433.68	-0.20037	4.28296	5.91797	0.95776
1099.86	-0.42648	21.52352	15.00856	0.48334
437.13	-0.16383	2.97186	4.88051	1.13832
1350.72	-0.54758	27.36388	15.08047	0.38200
439.27	-0.13848	2.19650	4.14984	1.30956
1601.79	-0.66657	33.11494	15.13237	0.31675

440.68	-0.11985	1.69861	3.60808	1.47234
1853.15	-0.78471	38.83453	15.17274	0.27082
442.66	-0.08954	1.02084	2.71818	1.84565
2482.83	-1.07896	53.11609	15.24615	0.19896
443.63	-0.07137	0.69405	2.17935	2.17653
3114.18	-1.37326	67.44296	15.29845	0.15723
444.19	-0.05928	0.51004	1.81840	2.47123
3747.00	-1.66823	81.83748	15.33931	0.12992

RUN BY

YANKEE TAIL 2
SIDE BENDING/TORSION 21.36/17.26

WBR = 4.000 SB = 1.19 ALT = 10000. WH = 17.26 WA = 21.36
GB = 0.030 GEB = 0.0 GS = 0.030 GR = 1.000

VELOCITY (EAS-MPH)	CAMPING (G)	DAMPING (LAMBDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	2.21612	23.51377	7.35455
0.0	0.0	1.49135	15.82367	7.35455
23.89	-0.00429	2.52814	23.46868	6.43451
16.11	-0.01068	2.02297	15.83082	5.42428
47.49	-0.01018	2.94463	23.33000	5.49176
32.27	-0.02158	2.56894	15.85196	4.27717
77.97	-0.02240	3.78470	22.99006	4.21052
53.93	-0.03675	3.33472	15.90225	3.30542
113.52	-0.04484	5.24502	22.30715	2.94798
81.46	-0.05724	4.38692	16.00656	2.52910
145.09	-0.07188	6.83025	21.33951	2.16558
110.00	-0.08066	5.62408	16.17821	1.99391
165.97	-0.09130	7.76745	20.38289	1.81892
133.51	-0.10303	6.85258	16.39709	1.65859
178.72	-0.09958	7.94234	19.51011	1.70270
152.69	-0.12615	8.17736	16.66912	1.41295
187.34	-0.07841	6.26888	18.40621	2.03518
174.85	-0.17812	11.23207	17.17886	1.06014
194.51	-0.28668	17.28411	17.37294	0.69671
199.31	-0.00326	1.85994	17.80213	6.63437
210.66	-0.36293	21.29094	17.24752	0.56151
214.26	0.04003	0.0	17.54241	99999.00000

225.69	-0.42150	24.19472	17.05731	0.48867
229.28	0.06761	0.0	17.32810	99999.00000
239.86	-0.46878	26.37724	16.83326	0.44235
244.09	0.08641	0.0	17.12962	99999.00000
265.78	-0.53828	29.13694	16.32047	0.38825
272.89	0.10757	0.0	16.75716	99999.00000
288.61	-0.58116	30.24601	15.75311	0.36102
300.62	0.11410	0.0	16.40898	99999.00000
308.53	-0.60260	30.12129	15.15639	0.34878
327.42	0.11036	0.0	16.08452	99999.00000
340.47	-0.59724	27.46557	13.93815	0.35176
379.09	0.08070	0.0	15.51892	99999.00000
363.17	-0.55049	23.23987	12.74355	0.38009
430.28	0.03049	0.0	15.09814	99999.00000
378.22	-0.48739	18.87544	11.61256	0.42644
483.92	-0.02940	2.77272	14.85799	3.71434
388.00	-0.42812	15.24052	10.58928	0.48161
541.38	-0.08721	5.44066	14.77528	1.88240
394.99	-0.38037	12.50799	9.70206	0.53766
601.56	-0.13752	7.77625	14.77594	1.31708
405.23	-0.31248	8.92440	8.29461	0.64424
725.12	-0.22050	11.68065	14.84235	0.88077
412.74	-0.26617	6.73784	7.24142	0.74496
849.89	-0.29147	15.05903	14.91098	0.68634
422.87	-0.20559	4.27080	5.77043	0.93654
1100.16	-0.42015	21.23097	15.01268	0.49013
429.08	-0.16727	2.96896	4.79064	1.11845
1350.84	-0.54234	27.11814	15.08190	0.38550
433.11	-0.14083	2.19586	4.09161	1.29157
1601.86	-0.66213	32.90484	15.13295	0.31878

435.84	-0.12151	1.69850	3.56842	1.45626
1853.19	-0.78086	38.65173	15.17302	0.27210
439.75	-0.09032	1.02074	2.70032	1.83369
2482.85	-1.07609	52.97921	15.24631	0.19947
441.71	-0.07179	0.69387	2.16988	2.16763
3114.22	-1.37099	67.33429	15.29863	0.15749
442.82	-0.05952	0.50985	1.81282	2.46454
3747.05	-1.66635	81.74781	15.33950	0.13007

```
002
            YANKEE TAIL 2
   STAB YAW, FUS TORS 27.86/17.26
1
 &DATA1 N=30, NWS=9, NAS=6, NHS=0, BR=13.27, A=5.355, C=-4.165,
 E=2.975, ALT=10000., WH=17.26, WA=27.86, GBET=.03, GS=.03,
 GR=1., GEB=0., &END
 &DATA2 CK=0., .25, .5, .833, 1.25, 1.67, 2., 2.25, 2.5, 2.75, 3.,
 3.25, 3.5, 4., 4.5, 5., 6., 7., 8., 9., 10., 12., 14., 18., 22., 26.
 30., 40., 50., 60.,
 DELTAX=0., 0., 12.5, 9.04, 6.9, 7.5, 6.55, 6.55, 4.36,
 YBAR=5.95, 5.95, 5.95, 16.78, 24.63, 31.89, 38.5, 45.22, 50.93,
 STRIPM=42.8, 16.14, 58.86, 5.62, 4.55, 2.34, 1.81, 1.62, 1.1,
 SALPHA=470.8, 383.8, 1759.5, 36.19, 27.07, 13.08, 9.39, 7.81, 4.95,
 MMOM=5179., 9127., 54773., 233.06, 161.07, 73.12, 48.73, 37.64, 22.2
 WBM=0., 0., .01, .21, .41, .575, .734, .825, 1.,
 WTM=0., .047, .252, 6*1.,
 SMICRD=0., 0., 20.35, 19.28, 17.255, 15.41, 13.74, 12.02, 10.47,
 DELTXA=9.04, 6.9, 7.5, 6.55, 6.55, 4.36,
 SBETA=3.413, 1.96, 1.683, 1.091, .791, -7.747,
 MIBETA=18.74, 8.5, 7.57, 4.35, 2.82, 97.96,
 FSA=.21, .41, .575, .734, .825, 1.,
 CAPFSA=6*1.,
 BSA=19.28, 17.255, 15.41, 13.74, 12.02, 10.47,
 CMA=13.92, 12.32, 10.95, 9.64, 8.45, 7.26,
 BSH=15*0.,
 HSW=15*0.,
 HTMODE=15*0., &END
 &CONT1 ID=0 &END
 &CONT2 WB=0. &END
 &CONT2 WB=2. &END
 &CONT2 WB=4. &END
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RUN BY

YANKEE TAIL 2
STAB YAW, FUS TORS 27.86/17.26

WBR = 0.0 SB = 1.19 ALT = 10000. WH = 17.26 WA = 27.86
GB = 0.030 GEB = 0.0 GS = 0.030 GR = 1.000

VELOCITY (EAS-MPH)	CAMPING (G)	DAMPING (LAMBDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	1.54083	16.34872	7.35455
0.0	0.0	2.88737	30.63591	7.35455
31.19	-0.01769	4.59041	30.64078	4.62674
16.64	-0.01362	2.24070	16.35123	5.05817
62.38	-0.03875	6.61922	30.64518	3.20910
33.30	-0.02778	2.96924	16.35647	3.81831
103.76	-0.07720	10.30341	30.59516	2.05825
55.48	-0.04760	3.98771	16.35812	2.84339
153.77	-0.14496	16.60819	30.21568	1.26106
83.14	-0.07121	5.19433	16.33612	2.17995
198.61	-0.21137	22.15129	29.21212	0.91409
110.90	-0.08862	6.07885	16.31166	1.85996
229.05	-0.24285	24.11276	28.13044	0.80864
132.98	-0.09911	6.62431	16.33167	1.70890
249.76	-0.25558	24.46149	27.26502	0.77259
150.02	-0.10754	7.07660	16.37695	1.60412
268.65	-0.26194	24.20883	26.39521	0.75575
167.38	-0.11749	7.61978	16.44526	1.49598
285.77	-0.26368	23.54989	25.52467	0.75127
185.12	-0.12938	8.27908	16.53439	1.38431
301.06	-0.26141	22.56662	24.64937	0.75712
203.30	-0.14357	9.07650	16.64496	1.27114

314.43	-0.25496	21.27366	23.76368	0.77428
222.04	-0.16061	10.04861	16.78097	1.15755
325.75	-0.24335	19.63188	22.86083	0.80716
241.54	-0.18162	11.26922	16.95077	1.04261
341.65	-0.19176	14.61589	20.97944	0.99494
284.22	-0.24979	15.34086	17.45267	0.78857
359.11	-0.07340	6.36757	19.60154	2.13375
327.01	-0.39151	23.63583	17.84909	0.52345
359.38	-0.50603	29.73037	17.65476	0.41161
388.49	0.01281	1.03061	19.08445	12.83554
413.36	-0.63966	35.60018	16.92176	0.32947
448.60	0.10137	0.0	18.36460	99999.00000
458.23	-0.70581	37.16859	16.07904	0.29986
504.02	0.13928	0.0	17.68564	99999.00000
495.35	-0.72824	36.22825	15.20867	0.29099
554.30	0.14734	0.0	17.01863	99999.00000
525.48	-0.71879	33.73646	14.34129	0.29466
600.19	0.13368	0.0	16.38027	99999.00000
549.23	-0.68550	30.32383	13.49047	0.30837
643.00	0.10276	0.0	15.79379	99999.00000
578.80	-0.57235	22.41943	11.84742	0.36629
727.46	0.00126	1.34461	14.89022	7.67596
587.37	-0.44599	15.41010	10.30530	0.46353
827.07	-0.12427	7.03254	14.51061	1.43021
1067.64	-0.31944	15.99339	14.56881	0.63141
584.72	-0.30038	8.28148	7.97900	0.66783
1316.64	-0.46438	22.83107	14.69997	0.44629
582.72	-0.23296	5.37466	6.50593	0.83905
1565.56	-0.59377	28.98285	14.79004	0.35372
581.88	-0.19233	3.83951	5.49711	0.99240

1814.22	-0.71687	34.85253	14.85394	0.29542
581.49	-0.16441	2.90778	4.76099	1.13492
2435.66	-1.01376	49.04350	14.95650	0.21139
581.16	-0.12122	1.69536	3.56871	1.45907
3057.65	-1.30483	62.98927	15.02072	0.16529
581.09	-0.09618	1.13161	2.85461	1.74855
3680.51	-1.59400	76.87157	15.06710	0.13586
581.08	-0.07975	0.82022	2.37881	2.01029

RUN BY

YANKEE TAIL 2
STAB YAW, FUS TORS 27.86/17.26

WBR = 2.000 SB = 1.19 ALT = 10000. WH = 17.26 WA = 27.86
GB = 0.030 GEB = 0.0 GS = 0.030 GR = 1.000

VELOCITY (EAS-MPH)	CAMPING (G)	DAMPING (LAMBDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	2.76591	29.34722	7.35455
0.0	0.0	1.54061	16.34634	7.35455
29.79	-0.00524	3.24019	29.27139	6.26180
16.65	-0.01204	2.16031	16.35517	5.24766
59.13	-0.01313	3.93609	29.04924	5.11560
33.34	-0.02413	2.78575	16.38027	4.07573
96.91	-0.03246	5.60731	28.57642	3.53249
55.73	-0.04036	3.63248	16.43335	3.13581
141.38	-0.06813	8.56459	27.78106	2.24838
84.09	-0.06118	4.73290	16.52338	2.41991
182.23	-0.10858	11.66851	26.80272	1.59217
113.12	-0.08340	5.92727	16.63805	1.94570
211.08	-0.13772	13.65917	25.92299	1.31549
136.38	-0.10240	6.96677	16.74881	1.66640
230.81	-0.15593	14.71766	25.19694	1.18669
154.34	-0.11818	7.84391	16.84925	1.48893
248.59	-0.16943	15.30217	24.42362	1.10633
172.71	-0.13571	8.83418	16.96915	1.33144
264.29	-0.17701	15.35192	23.60565	1.06581
191.63	-0.15586	9.99410	17.11586	1.18709
277.78	-0.17697	14.78760	22.74316	1.06606
211.31	-0.18031	11.43091	17.30081	1.04909

288.92	-0.16592	13.43948	21.83556	1.12618
232.09	-0.21276	13.37756	17.54091	0.90887
298.00	-0.13626	10.92344	20.91357	1.32708
254.24	-0.26191	16.36211	17.84203	0.75584
321.61	-0.03193	3.84233	19.74918	3.56272
295.13	-0.40760	24.91466	18.12287	0.50420
327.98	-0.51853	30.85010	17.90212	0.40223
352.85	0.04012	0.0	19.25992	99999.00000
357.27	-0.59676	34.55863	17.55106	0.35203
384.49	0.08648	0.0	18.88832	99999.00000
408.57	-0.69419	38.05328	16.72596	0.30467
444.78	0.13952	0.0	18.20808	99999.00000
451.62	-0.73869	38.26895	15.84693	0.28703
500.00	0.15998	0.0	17.54460	99999.00000
487.37	-0.74618	36.48800	14.96372	0.28426
550.34	0.15763	0.0	16.89711	99999.00000
516.54	-0.72642	33.50004	14.09716	0.29168
596.62	0.13734	0.0	16.28267	99999.00000
539.64	-0.68638	29.83124	13.25494	0.30799
640.13	0.10220	0.0	15.72330	99999.00000
568.76	-0.56821	21.87889	11.64188	0.36883
726.85	-0.00252	1.51997	14.87780	6.78469
578.38	-0.44462	15.13045	10.14741	0.46487
828.25	-0.12571	7.10830	14.53134	1.41699
578.92	-0.30179	8.23448	7.89987	0.66498
1068.49	-0.31788	15.93469	14.58040	0.63424
1317.07	-0.46276	22.76376	14.70485	0.44776
578.71	-0.23410	5.36075	6.46116	0.83543
1565.82	-0.59235	28.92178	14.79252	0.35452
578.93	-0.19312	3.83367	5.46923	0.98887

1814.40	-0.71564	34.79851	14.85540	0.29590
579.23	-0.16497	2.90477	4.74246	1.13167
2435.76	-1.01286	49.00283	14.95710	0.21157
579.85	-0.12148	1.69441	3.56062	1.45658
3057.72	-1.30412	62.95707	15.02107	0.16538
580.23	-0.09632	1.13116	2.85039	1.74666
3680.57	-1.59341	76.84509	15.06735	0.13591
580.48	-0.07983	0.81995	2.37633	2.00884

RUN BY

YANKEE TAIL 2
STAB YAW, FUS TORS 27.86/17.26

WBR = 4.000 SB = 1.19 ALT = 10000. WH = 17.26 WA = 27.86
GB = 0.030 GEB = 0.0 GS = 0.030 GR = 1.000

VELOCITY (EAS-MPH)	CAMPING (G)	DAMPING (LAMBDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	2.79796	29.68732	7.35455
0.0	0.0	1.54067	16.34702	7.35455
30.16	-0.00246	3.02107	29.62964	6.79819
16.65	-0.01251	2.18420	16.35493	5.19018
59.96	-0.00635	3.36314	29.45313	6.07036
33.34	-0.02542	2.85130	16.37792	3.98146
98.43	-0.01554	4.15288	29.02515	4.84454
55.72	-0.04362	3.79980	16.42993	2.99711
143.41	-0.03358	5.62875	28.18053	3.47028
84.11	-0.06853	5.11626	16.52838	2.23926
183.71	-0.05578	7.28124	27.01995	2.57221
113.33	-0.09682	6.64113	16.66852	1.73973
211.16	-0.07209	8.31759	25.93353	2.16118
136.91	-0.12235	8.04775	16.81431	1.44821
229.31	-0.08126	8.74992	25.03280	1.98305
155.28	-0.14466	9.30153	16.95197	1.26326
245.11	-0.08541	8.73110	24.08198	1.91184
174.25	-0.17096	10.80860	17.12011	1.09790
258.61	-0.08160	8.09858	23.09831	1.97696
193.98	-0.20378	12.72518	17.32633	0.94378
270.12	-0.06545	6.63222	22.11651	2.31145
214.61	-0.24766	15.32736	17.57107	0.79462

280.92	-0.03300	4.20188	21.23146	3.50238
235.70	-0.30759	18.89244	17.81330	0.65356
293.11	0.00956	1.32116	20.57002	10.79209
255.87	-0.37837	23.03722	17.95654	0.54028
291.44	-0.50627	30.15025	17.89610	0.41143
322.09	0.08219	0.0	19.77810	99999.00000
322.56	-0.60166	34.93794	17.60622	0.34930
352.74	0.12952	0.0	19.25368	99999.00000
350.52	-0.67092	37.91742	17.21946	0.31478
383.01	0.15987	0.0	18.81517	99999.00000
398.79	-0.75185	40.09914	16.32532	0.28220
440.65	0.18903	0.0	18.03927	99999.00000
438.50	-0.77830	39.07168	15.38653	0.27296
494.02	0.19090	0.0	17.33478	99999.00000
471.10	-0.76841	36.28008	14.46417	0.27635
543.47	0.17400	0.0	16.68624	99999.00000
497.59	-0.73412	32.59961	13.57997	0.28874
589.86	0.14272	0.0	16.09839	99999.00000
518.59	-0.68354	28.55384	12.73782	0.30921
634.49	0.09979	0.0	15.58473	99999.00000
545.58	-0.55824	20.63736	11.16738	0.37508
725.82	-0.01075	1.90200	14.85671	5.41425
556.81	-0.44154	14.47184	9.76905	0.46790
830.90	-0.12866	7.26627	14.57784	1.39062
563.83	-0.30523	8.10277	7.69390	0.65817
1070.62	-0.31403	15.79004	14.60956	0.64133
567.79	-0.23709	5.31926	6.33926	0.82607
1318.26	-0.45848	22.58661	14.71812	0.45168
570.68	-0.19530	3.81596	5.39131	0.97930
1566.56	-0.58846	28.75482	14.79955	0.35675

572.80	-0.16654	2.89567	4.68978	1.12262
1814.91	-0.71218	34.64734	14.85964	0.29728
576.01	-0.12223	1.69157	3.53709	1.44938
2436.04	-1.01023	48.88548	14.95887	0.21210
577.70	-0.09672	1.12982	2.83797	1.74112
3057.93	-1.30203	62.86284	15.02210	0.16564
578.69	-0.08007	0.81917	2.36901	2.00457
3680.74	-1.59169	76.76699	15.06807	0.13605

```
003
            YANKEE TAIL 2
   FUS SIDE BEND, FIN BEND  21.36/40.63
1
 &DATA1 N=30, NWS=9, NAS=6, NHS=0, BR=13.27, A=5.355, C=-4.165,
 E=2.975, ALT=10000., WH=40.63, WA=21.36, GBET=.03, GS=.03,
 GR=1., GEB=0., &END
 &DATA2 CK=0., .25, .5, .833, 1.25, 1.67, 2., 2.25, 2.5, 2.75, 3.,
 3.25, 3.5, 4., 4.5, 5., 6., 7., 8., 9., 10., 12., 14., 18., 22., 26.
 30., 40., 50., 60.,
 DELTAX=0., 0., 12.5, 9.04, 6.9, 7.5, 6.55, 6.55, 4.36,
 YBAR=5.95, 5.95, 5.95, 16.78, 24.63, 31.89, 38.5, 45.22, 50.93,
 STRIPM=42.8, 16.14, 58.86, 5.62, 4.55, 2.34, 1.81, 1.62, 1.1,
 SALPHA=470.8, 383.8, 1759.5, 36.19, 27.07, 13.08, 9.39, 7.81, 4.95,
 MMOM=5179., 9127., 54773., 233.06, 161.07, 73.12, 48.73, 37.64, 22.
 WBM=0., 0., .01, .21, .41, .575, .734, .825, 1.,
 WTM=0., .047, .252, 6*1.,
 SMICRD=0., 0., 20.35, 19.28, 17.255, 15.41, 13.74, 12.02, 10.47,
 DELTXA=9.04, 6.9, 7.5, 6.55, 6.55, 4.36,
 SBETA=3.413, 1.96, 1.683, 1.091, .791, -7.747,
 MIBETA=18.74, 8.5, 7.57, 4.35, 2.82, 97.96,
 FSA=.21, .41, .575, .734, .825, 1.,
 CAPFSA=6*1.,
 BSA=19.28, 17.255, 15.41, 13.74, 12.02, 10.47,
 CMA=13.92, 12.32, 10.95, 9.64, 8.45, 7.26,
 BSH=15*0.,
 HSW=15*0.,
 HTMODE=15*0., &END
 &CONT1 ID=0 &END
 &CONT2 WB=0. &END
 &CONT2 WB=2. &END
 &CONT2 WB=4. &END
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RUN BY

YANKEE TAIL 2
FUS SIDE BEND, FIN BEND 21.36/40.63

WBR = 0.0 SB = 1.19 ALT = 10000. WH = 40.63 WA = 21.36
GB = 0.030 GEB = 0.0 GS = 0.030 GR = 1.000

VELOCITY (EAS-MPH)	CAMPING (G)	DAMPING (LAMBDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	1.99334	21.15002	7.35455
0.0	0.0	4.02811	42.73954	7.35455
43.52	-0.02894	7.91694	42.75926	3.74369
21.53	-0.00238	2.15113	21.14870	6.81467
87.12	-0.06084	12.21441	42.79952	2.42881
43.04	-0.00574	2.37439	21.14448	6.17266
145.11	-0.11119	18.97976	42.78854	1.56266
71.67	-0.01387	2.91224	21.13242	5.02978
215.54	-0.18166	28.16405	42.35426	1.04239
107.25	-0.03536	4.32736	21.07484	3.37574
280.75	-0.22972	33.69204	41.29264	0.84952
141.77	-0.07102	6.61742	20.85208	2.18418
329.09	-0.24165	34.49131	40.41598	0.81221
167.03	-0.10025	8.39436	20.51376	1.69389
365.37	-0.24330	34.24584	39.88582	0.80731
184.93	-0.11925	9.46626	20.18855	1.47827
401.68	-0.24333	33.88840	39.46558	0.80723
201.82	-0.13527	10.29498	19.82868	1.33504
438.02	-0.24335	33.59711	39.12329	0.80716
217.73	-0.14886	10.92768	19.44754	1.23357
474.30	-0.24373	33.39515	38.83345	0.80603
232.70	-0.16058	11.40702	19.05225	1.15771

510.48	-0.24444	33.26350	38.58045	0.80395
246.73	-0.17078	11.76173	18.64701	1.09892
546.54	-0.24537	33.18155	38.35558	0.80123
259.84	-0.17965	12.01021	18.23498	1.05240
618.38	-0.24765	33.12154	37.97243	0.79467
283.38	-0.19386	12.23794	17.40159	0.98562
689.99	-0.25042	33.17920	37.66211	0.78680
303.61	-0.20381	12.17317	16.57233	0.94364
761.56	-0.25383	33.35901	37.41154	0.77736
320.89	-0.21008	11.88961	15.76375	0.91901
904.99	-0.26304	34.10718	37.04796	0.75291
348.13	-0.21401	10.92497	14.25161	0.90421
1049.12	-0.27562	35.34557	36.81290	0.72193
367.96	-0.21030	9.74724	12.91157	0.91817
1194.01	-0.29120	36.99301	36.65993	0.68691
382.59	-0.20247	8.57909	11.74685	0.94909
1339.59	-0.30924	38.96384	36.55984	0.65038
393.58	-0.19276	7.51701	10.74145	0.99048
1485.78	-0.32923	41.18622	36.49450	0.61419
401.98	-0.18245	6.58996	9.87366	1.03854
1779.61	-0.37354	46.17991	36.42647	0.54675
413.70	-0.16250	5.12107	8.46798	1.14616
2074.97	-0.42188	51.68055	36.40476	0.48827
421.26	-0.14492	4.06150	7.39087	1.26135
2668.99	-0.52586	63.60114	36.42064	0.39693
430.05	-0.11740	2.71739	5.86838	1.49690
3266.12	-0.63560	76.25170	36.46560	0.33148
434.76	-0.09773	1.94788	4.85404	1.72731
3865.51	-0.74873	89.33933	36.51801	0.28333
437.59	-0.08332	1.47172	4.13395	1.94700

4466.65	-0.86406	102.71855	36.57076	0.24678
439.42	-0.07242	1.15758	3.59774	2.15430
5975.26	-1.15834	136.98160	36.69192	0.18567
441.93	-0.05426	0.71837	2.71376	2.61850
7490.07	-1.45784	171.98716	36.79502	0.14829
443.16	-0.04321	0.50073	2.17703	3.01360
9009.56	-1.76060	207.47870	36.88296	0.12322
443.85	-0.03583	0.37579	1.81703	3.35154

RUN BY

YANKEE TAIL 2
FUS SIDE BEND, FIN BEND 21.36/40.63

WBR = 2.000 SB = 1.19 ALT = 10000. WH = 40.63 WA = 21.36
GB = 0.030 GEB = 0.0 GS = 0.030 GR = 1.000

VELOCITY (EAS-MPH)	CAMPING (G)	DAMPING (LAMBDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	3.96658	42.08671	7.35455
0.0	0.0	1.93883	20.57163	7.35455
42.79	-0.01141	5.46889	42.04290	5.32869
20.92	-0.00587	2.31616	20.55091	6.15022
85.34	-0.02499	7.24280	41.92367	4.01218
41.70	-0.01227	2.72043	20.48448	5.21933
141.35	-0.04859	10.29091	41.67991	2.80737
68.97	-0.02424	3.46506	20.33584	4.06797
210.11	-0.08456	14.85874	41.28622	1.92597
102.14	-0.04480	4.71618	20.07020	2.94977
277.51	-0.12213	19.50763	40.81619	1.45029
134.10	-0.06994	6.19263	19.72365	2.20770
329.01	-0.14903	22.72634	40.40690	1.23240
157.95	-0.09122	7.38709	19.39777	1.82014
367.17	-0.16677	24.77825	40.08321	1.12129
175.15	-0.10748	8.25843	19.12068	1.60484
404.65	-0.18192	26.46930	39.75697	1.04111
191.55	-0.12339	9.06889	18.81935	1.43839
441.53	-0.19451	27.81556	39.43657	0.98274
207.08	-0.13858	9.79591	18.49624	1.30878
477.91	-0.20475	28.85764	39.12926	0.93987
221.73	-0.15276	10.42343	18.15445	1.20726

513.92	-0.21298	29.64837	38.84050	0.90805
235.49	-0.16570	10.94211	17.79754	1.12742
549.65	-0.21956	30.24299	38.57371	0.88408
248.35	-0.17726	11.34889	17.42921	1.06451
620.64	-0.22926	31.04163	38.11124	0.85101
271.52	-0.19605	11.84009	16.67277	0.97607
691.42	-0.23628	31.57096	37.74017	0.82860
291.50	-0.20921	11.95747	15.91115	0.92234
762.30	-0.24222	32.02571	37.44797	0.81051
308.68	-0.21746	11.78905	15.16414	0.89159
904.81	-0.25418	33.06902	37.04086	0.77640
336.16	-0.22286	10.93191	13.76140	0.87256
1048.48	-0.26824	34.47127	36.79047	0.73978
356.62	-0.21891	9.78552	12.51364	0.88639
1193.16	-0.28483	36.23329	36.63386	0.70081
372.10	-0.21024	8.62265	11.42456	0.91839
1338.67	-0.30362	38.29237	36.53462	0.66133
383.99	-0.19956	7.55782	10.47986	0.96114
1484.85	-0.32422	40.58599	36.47163	0.62288
393.29	-0.18833	6.62595	9.66025	1.0.1057
1778.75	-0.36943	45.68784	36.40888	0.55237
406.61	-0.16687	5.14765	8.32289	1.12071
2074.22	-0.41842	51.26601	36.39145	0.49204
415.46	-0.14821	4.08087	7.28912	1.23808
2668.41	-0.52325	63.28864	36.41276	0.39880
426.05	-0.11935	2.72786	5.81377	1.47728
3265.68	-0.63352	76.00225	36.46061	0.33253
431.88	-0.09898	1.95377	4.82180	1.71066
3865.16	-0.74699	89.13227	36.51467	0.28396
435.42	-0.08415	1.47519	4.11347	1.93281

4466.36	-0.86258	102.54181	36.56843	0.24719
437.74	-0.07300	1.15969	3.58397	2.14215
5975.09	-1.15726	136.85263	36.69083	0.18584
440.94	-0.05453	0.71906	2.70766	2.61010
7489.95	-1.45699	171.88595	36.79445	0.14838
442.51	-0.04336	0.50098	2.17383	3.00766
9009.48	-1.75990	207.39566	36.88264	0.12327
443.39	-0.03592	0.37588	1.81515	3.34727

RUN BY

YANKEE TAIL 2
FUS SIDE BEND, FIN BEND 21.36/40.63

WBR = 4.000 SB = 1.19 ALT = 10000. WH = 40.63 WA = 21.36
GB = 0.030 GEB = 0.0 GS = 0.030 GR = 1.000

VELOCITY (EAS-MPH)	CAMPING (G)	DAMPING (LAMBDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	3.98244	42.25502	7.35455
0.0	0.0	1.95357	20.72800	7.35455
42.99	-0.01365	5.79245	42.24196	5.05486
21.07	-0.00132	2.03702	20.70427	7.04519
85.90	-0.02838	7.73873	42.19730	3.77957
42.00	-0.00339	2.16417	20.63222	6.60818
142.67	-0.05056	10.64707	42.06961	2.73883
69.39	-0.00862	2.48218	20.46070	5.71367
212.61	-0.08182	14.67685	41.77789	1.97306
102.43	-0.02035	3.18383	20.12786	4.38202
281.06	-0.11449	18.76443	41.33908	1.52705
133.76	-0.03827	4.21938	19.67294	3.23183
333.15	-0.13863	21.67552	40.91481	1.30839
156.70	-0.05602	5.20058	19.24497	2.56503
371.58	-0.15507	23.58488	40.56433	1.19217
173.01	-0.07102	5.99398	18.88751	2.18417
409.19	-0.16951	25.19769	40.20260	1.10591
188.37	-0.08683	6.79284	18.50738	1.88852
446.06	-0.18181	26.51140	39.84134	1.04167
202.76	-0.10297	7.56496	18.10993	1.65935
482.33	-0.19205	27.54865	39.49047	0.99362
216.19	-0.11895	8.28277	17.70024	1.48126

518.11	-0.20044	28.34806	39.15757	0.95746
228.68	-0.13437	8.92493	17.28307	1.34228
553.55	-0.20725	28.95532	38.84776	0.92996
240.28	-0.14890	9.47711	16.86270	1.23333
623.83	-0.21740	29.77266	38.30689	0.89184
261.00	-0.17431	10.28729	16.02695	1.07988
693.82	-0.22471	30.30484	37.87122	0.86621
278.77	-0.19418	10.71679	15.21649	0.98419
763.94	-0.23084	30.75253	37.52877	0.84588
294.07	-0.20849	10.82381	14.44620	0.92513
905.20	-0.24298	31.77991	37.05674	0.80824
318.83	-0.22309	10.37787	13.05214	0.87177
1047.99	-0.25725	33.18562	36.77339	0.76809
337.89	-0.22461	9.48364	11.85626	0.86656
1192.11	-0.27414	34.97216	36.60164	0.72545
352.95	-0.21873	8.46780	10.83679	0.88707
1337.28	-0.29332	37.07078	36.49667	0.68242
365.12	-0.20916	7.48697	9.96482	0.92255
1483.27	-0.31434	39.41256	36.43280	0.64074
375.11	-0.19810	6.60242	9.21377	0.96730
1777.05	-0.36046	44.61934	36.37405	0.56506
390.41	-0.17570	5.16405	7.99112	1.07262
2072.56	-0.41031	50.29909	36.36245	0.50110
401.37	-0.15563	4.10658	7.04190	1.18860
2667.00	-0.51658	62.49264	36.39354	0.40367
415.58	-0.12432	2.74935	5.67089	1.42971
3264.52	-0.62792	75.33461	36.44768	0.33535
424.00	-0.10232	1.96790	4.73386	1.66740
3864.21	-0.74220	88.56103	36.50568	0.28572
429.35	-0.08647	1.48414	4.05616	1.89438

4465.58	-0.85840	102.04445	36.56198	0.24835
432.95	-0.07465	1.16539	3.54479	2.10836
5974.58	-1.15412	136.47966	36.68771	0.18633
438.05	-0.05532	0.72103	2.68993	2.58593
7489.61	-1.45449	171.58942	36.79279	0.14863
440.59	-0.04378	0.50171	2.16441	2.99030
9009.26	-1.75783	207.15058	36.88171	0.12341
442.03	-0.03616	0.37615	1.80958	3.33465

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1     004
2                 YANKEE TAIL 2
3        STAB YAW, FIN BEND  27.86/40.63
4     1
5      &DATA1 N=30, NWS=9, NAS=6, NHS=0, BR=13.27, A=5.355, C=-4.165,
6      E=2.975, ALT=10000., WH=40.63, WA=27.86, GBET=.03, GS=.03,
7      GR=1., GEB=0., &END
8      &DATA2 CK=0., .25, .5, .833, 1.25, 1.67, 2., 2.25, 2.5, 2.75, 3.,
9      3.25, 3.5, 4., 4.5, 5., 6., 7., 8., 9., 10., 12., 14., 18., 22., 26.
10     30., 40., 50., 60.,
11     DELTAX=0., 0., 12.5, 9.04, 6.9, 7.5, 6.55, 6.55, 4.36,
12     YBAR=5.95, 5.95, 5.95, 16.78, 24.63, 31.89, 38.5, 45.22, 50.93,
13     STRIPM=42.8, 16.14, 58.86, 5.62, 4.55, 2.34, 1.81, 1.62, 1.1,
14     SALPHA=470.8, 383.8, 1759.5, 36.19, 27.07, 13.08, 9.39, 7.81, 4.95,
15     MMOM=5179., 9127., 54773., 233.06, 161.07, 73.12, 48.73, 37.64, 22.
16     WBM=0., 0., .01, .21, .41, .575, .734, .825, 1.,
17     WTM=0., .047, .252, 6*1.,
18     SMICRD=0., 0., 20.35, 19.28, 17.255, 15.41, 13.74, 12.02, 10.47,
19     DELTXA=9.04, 6.9, 7.5, 6.55, 6.55, 4.36,
20     SBETA=3.413, 1.96, 1.683, 1.091, .791, -7.747,
21     MIBETA=18.74, 8.5, 7.57, 4.35, 2.82, 97.96,
22     FSA=.21, .41, .575, .734, .825, 1.,
23     CAPFSA=6*1.,
24     BSA=19.28, 17.255, 15.41, 13.74, 12.02, 10.47,
25     CMA=13.92, 12.32, 10.95, 9.64, 8.45, 7.26,
26     BSH=15*0.,
27     HSW=15*0.,
28     HTMODE=15*0., &END
29     &CONT1 ID=0 &END
30     &CONT2 WB=0. &END
31     &CONT2 WB=2. &END
32     &CONT2 WB=4. &END
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RUN BY

YANKEE TAIL 2
STAB YAW, FIN BEND 27.86/40.63

WBR = 0.0 SB = 1.19 ALT = 10000. WH = 40.63 WA = 27.86
GB = 0.030 GEB = 0.0 GS = 0.030 GR = 1.000

VELOCITY (EAS-MPH)	CAMPING (G)	DAMPING (LAMBDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	2.53938	26.94366	7.35455
0.0	0.0	4.12416	43.75865	7.35455
44.56	-0.03031	8.29479	43.78183	3.65861
27.42	-0.00101	2.62438	26.94065	7.11554
89.22	-0.06400	12.94328	43.83155	2.34731
54.82	-0.00260	2.75848	26.93200	6.76746
148.67	-0.11817	20.40626	43.83692	1.48903
91.27	-0.00697	3.12629	26.91364	5.96720
220.81	-0.19727	30.97848	43.38832	0.97082
136.72	-0.02029	4.24414	26.86563	4.38768
286.67	-0.25568	37.84157	42.16423	0.77233
181.50	-0.04642	6.40885	26.69543	2.88725
334.25	-0.27132	38.85962	41.05050	0.73223
215.00	-0.07221	8.47835	26.40517	2.15876
369.42	-0.27241	38.31393	40.32836	0.72959
239.06	-0.09165	9.97406	26.09733	1.81364
404.41	-0.26991	37.43693	39.73317	0.73567
261.90	-0.10995	11.31290	25.73147	1.57659
439.34	-0.26631	36.52908	39.24106	0.74461
283.50	-0.12689	12.48030	25.32134	1.40634
474.22	-0.26254	35.68366	38.82710	0.75421
303.83	-0.14250	13.48111	24.87636	1.27905

509.07	-0.25892	34.92160	38.47388	0.76366
322.89	-0.15679	14.32073	24.40340	1.18117
543.90	-0.25559	34.24650	38.17019	0.77257
340.68	-0.16974	15.00260	23.90824	1.10461
613.66	-0.25014	33.16325	37.68251	0.78761
372.49	-0.19143	15.91127	22.87315	0.99643
683.72	-0.24669	32.43993	37.31987	0.79742
399.61	-0.20748	16.27310	21.81199	0.92908
754.19	-0.24544	32.05980	37.04990	0.80104
422.57	-0.21834	16.19567	20.75856	0.88843
896.38	-0.24906	32.17027	36.69544	0.79065
458.33	-0.22778	15.19453	18.76272	0.85593
1039.94	-0.25918	33.15074	36.49067	0.76298
483.99	-0.22638	13.67877	16.98297	0.86059
1184.55	-0.27391	34.72382	36.36931	0.72600
502.72	-0.21920	12.08387	15.43507	0.88538
1329.96	-0.29188	36.70427	36.29682	0.68546
516.66	-0.20932	10.60149	14.10049	0.92192
1476.00	-0.31218	38.97282	36.25432	0.64480
527.25	-0.19847	9.29558	12.95056	0.96569
1769.53	-0.35746	44.08871	36.22008	0.56944
541.92	-0.17710	7.21679	11.09237	1.06539
2064.50	-0.40680	49.70379	36.22095	0.50512
551.31	-0.15809	5.71546	9.67251	1.17305
2657.46	-0.51233	61.78449	36.26338	0.40683
562.16	-0.12822	3.81311	7.67113	1.39446
3253.29	-0.62301	74.51485	36.32230	0.33788
567.95	-0.10686	2.72631	6.34104	1.61217
3851.19	-0.73664	87.62643	36.38273	0.28780
571.41	-0.09118	2.05507	5.39818	1.82074

4450.73	-0.85217	100.99140	36.44038	0.25011
573.65	-0.07931	1.61291	4.69674	2.01843
5955.00	-1.14615	135.11660	36.56748	0.18759
576.72	-0.05953	0.99604	3.54143	2.46451
7465.18	-1.44470	169.90102	36.67275	0.14961
578.22	-0.04747	0.69129	2.84050	2.84813
8979.88	-1.74614	205.12576	36.76146	0.12422
579.06	-0.03940	0.51683	2.37055	3.17929

RUN BY

YANKEE TAIL 2
STAB YAW, FIN BEND 27.86/40.63

WBR = 2.000 SB = 1.19 ALT = 10000. WH = 40.63 WA = 27.86
GB = 0.030 GEB = 0.0 GS = 0.030 GR = 1.000

VELOCITY (EAS-MPH)	CAMPING (G)	DAMPING (LAMBDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	4.04128	42.87936	7.35455
0.0	0.0	2.48208	26.33572	7.35455
43.58	-0.01082	5.49087	42.81856	5.40528
26.79	-0.00646	3.01475	26.31909	6.05126
86.82	-0.02425	7.26857	42.65150	4.06736
53.46	-0.01302	3.54924	26.26201	5.12885
143.49	-0.04886	10.48258	42.31120	2.79779
88.61	-0.02397	4.43002	26.12852	4.08824
212.56	-0.08753	15.42272	41.76900	1.87724
131.69	-0.04184	5.84020	25.87676	3.07121
279.68	-0.12801	20.41912	41.13500	1.39637
173.58	-0.06413	7.54986	25.53060	2.34396
330.52	-0.15636	23.76566	40.59228	1.18392
205.12	-0.08400	9.02186	25.19098	1.93543
367.95	-0.17441	25.79460	40.16812	1.07939
228.02	-0.09998	10.16475	24.89270	1.69747
404.53	-0.18909	27.35622	39.74532	1.00706
249.96	-0.11636	11.29266	24.55899	1.50744
440.40	-0.20046	28.47953	39.33573	0.95737
270.84	-0.13275	12.36878	24.19090	1.35566
475.72	-0.20887	29.22869	38.94967	0.92368
290.57	-0.14872	13.35792	23.79080	1.23452

510.67	-0.21483	29.68498	38.59471	0.90119
309.12	-0.16388	14.23007	23.36230	1.13798
545.40	-0.21892	29.93129	38.27514	0.88638
326.45	-0.17790	14.96343	22.91008	1.06126
614.67	-0.22364	30.07599	37.74496	0.86989
357.55	-0.20161	15.97564	21.95581	0.95262
684.20	-0.22640	30.08244	37.34608	0.86052
384.19	-0.21902	16.40548	20.97032	0.88602
754.23	-0.22914	30.16342	37.05138	0.85143
406.90	-0.23048	16.35753	19.98894	0.84703
895.83	-0.23740	30.80754	36.67317	0.82512
442.80	-0.23953	15.34911	18.12696	0.81859
1039.13	-0.25010	32.08529	36.46237	0.78771
469.21	-0.23680	13.79994	16.46411	0.82697
1183.64	-0.26647	33.84849	36.34162	0.74420
489.00	-0.22812	12.17496	15.01373	0.85477
1329.04	-0.28559	35.96155	36.27189	0.69913
504.11	-0.21688	10.67056	13.75809	0.89371
1475.11	-0.30672	38.32808	36.23257	0.65525
515.87	-0.20486	9.34918	12.67108	0.93944
1768.74	-0.35315	43.57917	36.20395	0.57584
532.63	-0.18171	7.25129	10.90236	1.04216
2063.81	-0.40324	49.28314	36.20896	0.50927
543.71	-0.16150	5.73908	9.53930	1.15213
2656.95	-0.50970	61.47338	36.25637	0.40881
556.92	-0.13022	3.82531	7.59971	1.37708
3252.89	-0.62093	74.26846	36.31790	0.33896
564.17	-0.10811	2.73309	6.29890	1.59749
3850.88	-0.73492	87.42269	36.37981	0.28845
568.58	-0.09202	2.05903	5.37142	1.80823

4450.48	-0.85070	100.81785	36.43835	0.25052
571.45	-0.07989	1.61531	4.67875	2.00771
5954.85	-1.14508	134.99027	36.56655	0.18776
575.42	-0.05980	0.99681	3.53347	2.45708
7465.08	-1.44386	169.80199	36.67228	0.14970
577.37	-0.04761	0.69156	2.83632	2.84284
8979.82	-1.74545	205.04456	36.76121	0.12427
578.46	-0.03948	0.51692	2.36809	3.17546

RUN BY

YANKEE TAIL 2
STAB YAW, FIN BEND 27.86/40.63

WBR = 4.000 SB = 1.19 ALT = 10000. WH = 40.63 WA = 27.86
GB = 0.030 GEB = 0.0 GS = 0.030 GR = 1.000

VELOCITY (EAS-MPH)	CAMPING (G)	DAMPING (LAMBDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	4.06252	43.10474	7.35455
0.0	0.0	2.49782	26.50273	7.35455
43.85	-0.01289	5.80518	43.07974	5.14381
26.95	-0.00207	2.66799	26.47944	6.87942
87.53	-0.02707	7.70939	42.99935	3.86606
53.76	-0.00469	2.87832	26.40838	6.35959
145.11	-0.04908	10.63016	42.78856	2.79007
88.98	-0.01009	3.30468	26.23784	5.50333
215.49	-0.08100	14.76679	42.34438	1.98764
131.81	-0.02117	4.16334	25.90106	4.31224
283.63	-0.11473	18.96721	41.71603	1.52450
172.88	-0.03803	5.43460	25.42792	3.24318
334.92	-0.13936	21.88543	41.13266	1.30274
203.31	-0.05530	6.69099	24.96916	2.58667
372.49	-0.15568	23.72036	40.66338	1.18825
225.12	-0.07042	7.75295	24.57572	2.19718
409.05	-0.16945	25.18226	40.18951	1.10623
245.77	-0.08689	8.86706	24.14712	1.88761
444.78	-0.18053	26.27537	39.72687	1.04800
265.21	-0.10422	9.98827	23.68783	1.64385
479.86	-0.18907	27.03955	39.28848	1.00715
283.39	-0.12187	11.07059	23.20291	1.45278

514.49	-0.19542	27.53636	38.88372	0.97879
300.33	-0.13930	12.07214	22.69784	1.30325
548.86	-0.20003	27.83497	38.51809	0.95918
316.03	-0.15600	12.95943	22.17845	1.18624
617.35	-0.20586	28.08985	37.90923	0.93545
343.93	-0.18571	14.31239	21.11966	1.02283
686.10	-0.20965	28.19601	37.44997	0.92064
367.66	-0.20915	15.07720	20.06798	0.92259
755.44	-0.21328	28.36335	37.11087	0.90692
387.86	-0.22601	15.32477	19.05370	0.86181
895.96	-0.22299	29.15196	36.67860	0.87211
420.14	-0.24308	14.75584	17.19952	0.80794
1038.55	-0.23685	30.55082	36.44203	0.82681
444.66	-0.24490	13.47515	15.60297	0.80260
1182.62	-0.25421	32.42020	36.31017	0.77632
463.90	-0.23833	12.00681	14.24323	0.82226
1327.76	-0.27418	34.62822	36.23675	0.72535
479.37	-0.22772	10.59241	13.08285	0.85612
1473.68	-0.29607	37.08041	36.19743	0.67664
492.04	-0.21552	9.32223	12.08580	0.89863
1767.23	-0.34380	42.47953	36.17303	0.59025
511.40	-0.19102	7.26836	10.46770	0.99826
2062.36	-0.39495	48.30576	36.18340	0.51920
525.27	-0.16919	5.76698	9.21561	1.10765
2655.72	-0.50300	60.68237	36.23952	0.41395
543.23	-0.13529	3.84918	7.41282	1.33488
3251.88	-0.61536	73.60967	36.30660	0.34188
553.88	-0.11150	2.74893	6.18395	1.55930
3850.06	-0.73016	86.86093	36.37199	0.29025
560.65	-0.09435	2.06910	5.29654	1.77434

4449.80	-0.84657	100.32966	36.43278	0.25170
565.20	-0.08155	1.62172	4.62759	1.97791
5954.42	-1.14199	134.62498	36.56391	0.18826
571.65	-0.06059	0.99898	3.51032	2.43566
7464.80	-1.44139	169.51186	36.67092	0.14995
574.87	-0.04804	0.69233	2.82403	2.82736
8979.64	-1.74341	204.80494	36.76049	0.12441
576.69	-0.03973	0.51717	2.36083	3.16414

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005
                YANKEE TAIL 2
   HORIZ STAB BEND/FUS VERT BEND 49.0/24.24
1
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 E=2.975, ALT=10000., WH=49., WA=24.24, GBET=.03, GS=.03,
 GR=1., GEB=0., &END
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 3.25, 3.5, 4., 4.5, 5., 6., 7., 8., 9., 10., 12., 14., 18., 22., 26
 30., 40., 50., 60.,
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 STRIPM=21.4, 8.07, 17.6, 16.28, 15.21, 2.34, 1.81, 1.62, 1.1,
 SALPHA=235.4, 191.9, 547.9, 104.84, 90.5, 13.08, 9.39, 7.81, 4.95,
 MMOM=2589.5, 4563.5, 17056., 675.17, 538.48, 73.12, 48.73, 37.64,
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 WTM=0., .047, .252, 6*1.,
 SMICRD=0., 0., 20.35, 19.28, 17.255, 15.41, 13.74, 12.02, 10.47,
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 SBETA=3.413, 1.96, 1.683, 1.091, .791, -7.747,
 MIBETA=18.74, 8.5, 7.57, 4.35, 2.82, 97.96,
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 BSA=19.28, 17.255, 15.41, 13.74, 12.02, 10.47,
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RUN BY

YANKEE TAIL 2
HORIZ STAB BEND/FUS VERT BEND 49.0/24.24

WBR = 0.0 SB = 1.19 ALT = 10000. WH = 49.00 WA = 24.24
GB = 0.030 GEB = 0.0 GS = 0.030 GR = 1.000

VELOCITY (EAS-MPH)	CAMPING (G)	DAMPING (LAMBDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	2.29987	24.40237	7.35455
0.0	0.0	4.97191	52.75360	7.35455
53.70	-0.06259	15.34810	52.76313	2.38289
24.83	-0.00467	2.65794	24.39959	6.36304
107.35	-0.13052	26.59379	52.73391	1.37448
49.65	-0.01109	3.14868	24.39103	5.36943
177.44	-0.23140	42.96682	52.32201	0.84407
82.65	-0.02606	4.29172	24.36992	3.93596
256.41	-0.33702	58.09508	50.38489	0.60116
123.53	-0.06582	7.30736	24.27465	2.30261
322.56	-0.34181	55.41676	47.44286	0.59341
162.09	-0.13372	12.26188	23.84064	1.34768
374.89	-0.30069	47.83268	46.04147	0.66719
188.34	-0.18589	15.68796	23.13053	1.02199
418.11	-0.27412	43.60825	45.64359	0.72550
205.74	-0.21458	17.25707	22.45968	0.90212
463.89	-0.25794	41.22973	45.57765	0.76625
221.40	-0.23433	18.06352	21.75224	0.83470
511.38	-0.25099	40.31979	45.67549	0.78522
235.61	-0.24770	18.35956	21.04415	0.79450
559.95	-0.25091	40.45988	45.84596	0.78542
248.54	-0.25676	18.33280	20.34964	0.76941

609.24	-0.25578	41.33943	46.04483	0.77205
260.32	-0.26282	18.09840	19.67389	0.75349
659.05	-0.26421	42.74945	46.25155	0.74993
271.01	-0.26667	17.72593	19.01910	0.74372
759.80	-0.28830	46.65552	46.65656	0.69317
289.50	-0.26958	16.73086	17.77694	0.73649
861.70	-0.31876	51.53444	47.03443	0.63262
304.65	-0.26800	15.56792	16.62898	0.74039
964.54	-0.35343	57.07696	47.38297	0.57542
317.08	-0.26344	14.35927	15.57650	0.75191
1172.60	-0.43122	69.55593	48.00356	0.47837
335.75	-0.24926	12.05866	13.74468	0.79007
1383.39	-0.51680	83.38715	48.54221	0.40350
348.67	-0.23236	10.08394	12.23444	0.84097
1596.49	-0.60795	98.23869	49.01727	0.34585
357.86	-0.21530	8.46721	10.98729	0.89945
1811.60	-0.70337	113.91132	49.44160	0.30085
364.58	-0.19922	7.16525	9.94994	0.96253
2028.48	-0.80225	130.27071	49.82456	0.26511
369.62	-0.18454	6.11920	9.07888	1.02841
2466.82	-1.00817	164.68277	50.49290	0.21252
376.54	-0.15951	4.58870	7.70730	1.16423
2910.38	-1.22259	200.93358	51.06171	0.17614
380.94	-0.13953	3.55962	6.68338	1.30143
3810.14	-1.67004	277.68348	51.99263	0.12978
386.01	-0.11050	2.32493	5.26741	1.57041
4723.49	-2.13585	358.83328	52.73679	0.10187
388.73	-0.09085	1.64773	4.34007	1.82574
5647.86	-2.61557	443.45746	53.35605	0.08340
390.37	-0.07685	1.23797	3.68785	2.06486

6581.52	-3.10653	530.97853	53.88630	0.07034
391.44	-0.06645	0.97109	3.20490	2.28762
8949.05	-4.37300	760.13078	54.95285	0.05011
392.93	-0.04941	0.60192	2.41282	2.77851
11355.27	-5.68387	1001.33869	55.78289	0.03861
393.67	-0.03919	0.42034	1.93389	3.18906
13792.95	-7.03049	1252.45989	56.46499	0.03125
394.09	-0.03241	0.31630	1.61332	3.53552

RUN BY

YANKEE TAIL 2
HORIZ STAB BEND/FUS VERT BEND 49.0/24.24

WBR = 2.000 SB = 1.19 ALT = 10000. WH = 49.00 WA = 24.24
GB = 0.030 GEB = 0.0 GS = 0.030 GR = 1.000

VELOCITY (EAS-MPH)	CAMPING (G)	DAMPING (LAMBDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	4.45282	47.24595	7.35455
0.0	0.0	2.20243	23.36853	7.35455
48.09	-0.01780	7.09530	47.25047	4.61597
23.73	-0.00817	2.79626	23.31954	5.78056
96.17	-0.03394	9.48918	47.24207	3.45086
47.16	-0.01786	3.48375	23.16895	4.60985
160.13	-0.05765	13.00139	47.21852	2.51739
77.47	-0.03759	4.85080	22.84346	3.26419
240.09	-0.08978	17.75217	47.17715	1.84208
113.43	-0.07199	7.14185	22.28978	2.16333
320.44	-0.12246	22.57433	47.13073	1.44716
146.91	-0.11210	9.64575	21.60740	1.55272
383.52	-0.14717	26.21543	47.10059	1.24536
170.98	-0.14356	11.44955	20.99865	1.27125
431.34	-0.16511	28.86290	47.08773	1.13082
187.81	-0.16585	12.61485	20.50281	1.12657
479.26	-0.18246	31.42943	47.08731	1.03847
203.40	-0.18607	13.56513	19.98404	1.02114
527.34	-0.19938	33.94194	47.10148	0.96189
217.75	-0.20382	14.28688	19.44929	0.94361
575.64	-0.21605	36.43119	47.13102	0.89673
230.91	-0.21893	14.78454	18.90554	0.88636

624.20	-0.23265	38.92627	47.17554	0.84004
242.92	-0.23137	15.07529	18.35928	0.84415
673.05	-0.24934	41.45164	47.23386	0.78984
253.87	-0.24128	15.18403	17.81619	0.81331
771.66	-0.28346	46.66373	47.38507	0.70386
272.89	-0.25434	14.96913	16.75728	0.77595
871.51	-0.31902	52.16017	47.57027	0.63216
288.64	-0.26010	14.35840	15.75473	0.76056
972.55	-0.35626	57.97591	47.77653	0.57121
301.71	-0.26054	13.52864	14.82148	0.75939
1177.79	-0.43581	70.55772	48.21570	0.47366
321.80	-0.25178	11.66209	13.17378	0.78300
1386.60	-0.52143	84.28896	48.65503	0.40011
336.19	-0.23693	9.89246	11.79678	0.82658
1598.35	-0.61214	98.99907	49.07432	0.34360
346.79	-0.22040	8.37603	10.64748	0.88112
1812.52	-0.70703	114.53704	49.46666	0.29936
354.79	-0.20421	7.12457	9.68269	0.94203
2028.74	-0.80540	130.78089	49.83105	0.26411
360.96	-0.18916	6.10436	8.86603	1.00674
2466.31	-1.01051	165.02023	50.48239	0.21205
369.70	-0.16323	4.59362	7.56731	1.14186
2909.49	-1.22437	201.15842	51.04606	0.17589
375.46	-0.14245	3.56868	6.58726	1.27945
3809.01	-1.67118	277.78779	51.97716	0.12970
382.32	-0.11230	2.33233	5.21705	1.55046
4722.37	-2.13669	358.88620	52.72429	0.10183
386.10	-0.09202	1.65244	4.31072	1.80822
5646.82	-2.61624	443.48875	53.34629	0.08338
389.41	-0.07765	1.24089	3.66934	2.04966

6580.59	-3.10711	531.00163	53.87867	0.07033
389.92	-0.06700	0.97291	3.19251	2.27449
8948.34	-4.37348	760.15375	54.94850	0.05011
392.04	-0.04967	0.60254	2.40737	2.76938
11354.73	-5.68431	1001.36788	55.78021	0.03861
393.09	-0.03933	0.42056	1.93104	3.18263
13792.52	-7.03091	1252.49455	56.46323	0.03125
393.68	-0.03249	0.31638	1.61164	3.53091

RUN BY

YANKEE TAIL 2
HORIZ STAB BEND/FUS VERT BEND 49.0/24.24

WBR = 4.000 SB = 1.19 ALT = 10000. WH = 49.00 WA = 24.24
GB = 0.030 GEB = 0.0 GS = 0.030 GR = 1.000

VELOCITY (EAS-MPH)	CAMPING (G)	DAMPING (LAMBDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	4.56934	48.48220	7.35455
0.0	0.0	2.22938	23.65444	7.35455
49.35	-0.01440	6.76305	48.48397	4.96916
24.02	-0.00147	2.33344	23.60435	7.01168
98.70	-0.02927	9.02755	48.48412	3.72269
47.74	-0.00437	2.53216	23.45319	6.42003
164.37	-0.05104	12.33969	48.46871	2.72260
78.33	-0.01263	3.09320	23.09814	5.17602
246.37	-0.08120	16.91243	48.41137	1.98412
114.14	-0.03141	4.32725	22.42900	3.59274
328.50	-0.11340	21.76698	48.31578	1.53857
146.56	-0.05869	6.00649	21.55627	2.48760
392.70	-0.13891	25.59207	48.22808	1.30624
169.18	-0.08385	7.43144	20.77700	1.93792
441.19	-0.15800	28.44571	48.16300	1.17361
184.63	-0.10377	8.46988	20.15496	1.64942
489.61	-0.17678	31.25033	48.10468	1.06699
199.68	-0.12353	9.41513	19.52020	1.43709
538.04	-0.19528	34.01141	48.05690	0.97940
211.42	-0.14248	10.23241	18.88371	1.27919
586.53	-0.21355	36.74297	48.02209	0.90593
222.95	-0.16012	10.90282	18.25428	1.16052

635.13	-0.23169	39.46273	48.00139	0.84313
233.39	-0.17610	11.42092	17.63863	1.07051
683.90	-0.24980	42.18824	47.99496	0.78855
242.83	-0.19024	11.79142	17.04161	1.00178
782.04	-0.28630	47.71966	48.02222	0.69754
259.18	-0.21279	12.13916	15.91531	0.90877
881.13	-0.32363	53.43145	48.09511	0.62392
272.76	-0.22809	12.07145	14.88802	0.85488
981.23	-0.36209	59.37603	48.20302	0.56272
284.17	-0.23722	11.71930	13.96008	0.82568
1184.41	-0.44289	72.03415	48.48700	0.46657
302.30	-0.24190	10.57101	12.37530	0.81146
1391.25	-0.52879	85.69872	48.81797	0.39485
316.08	-0.23552	9.25166	11.09105	0.83096
1601.25	-0.61924	100.27698	49.16363	0.33984
326.95	-0.22385	8.00574	10.03848	0.86915
1813.99	-0.71366	115.66081	49.50679	0.29669
335.75	-0.21020	6.91465	9.16323	0.91856
2029.06	-0.81146	131.75068	49.83879	0.26221
343.00	-0.19629	5.98928	8.42495	0.97503
2465.01	-1.01547	165.71983	50.45586	0.21104
354.15	-0.17057	4.56761	7.24898	1.10006
2907.26	-1.22842	201.65282	51.00687	0.17533
362.19	-0.14897	3.57291	6.35451	1.23278
3806.02	-1.67402	278.03253	51.93636	0.12948
372.68	-0.11689	2.34686	5.08548	1.50201
4719.31	-2.13886	359.01361	52.69008	0.10173
378.93	-0.09517	1.66369	4.23069	1.76265
5643.93	-2.61805	443.56530	53.31893	0.08332
382.93	-0.07985	1.24845	3.61755	2.00850

6577.93	-3.10872	531.05977	53.85694	0.07030
385.62	-0.06859	0.97787	3.15727	2.23799
8946.28	-4.37486	760.21711	54.93586	0.05009
389.46	-0.05043	0.60431	2.39152	2.74310
11353.12	-5.68560	1001.45195	55.77233	0.03860
391.38	-0.03974	0.42123	1.92264	3.16380
13791.24	-7.03213	1252.59613	56.45800	0.03124
392.47	-0.03273	0.31663	1.60669	3.51730

B.3 Tail 3

```
001
            YANKEE TAIL 3
   HORIZ STAB BEND/FUS VERT BEND 49.0/24.24
1
 &DATA1 N=30, NWS=9, NAS=7, NHS=0, BR=13.27, A=5.355, C=-4.165,
·E=2.975, ALT=10000., WH=49., WA=24.24, GBET=.03, GS=.03,
 GR=1., GEB=0., &END
 &DATA2 CK=0., .25, .5, .833, 1.25, 1.67, 2., 2.25, 2.5, 2.75, 3.,
 3.25, 3.5, 4., 4.5, 5., 6., 7., 8., 9., 10., 12., 14., 18., 22., 26.
 30., 40., 50., 60.,
 DELTAX=0., 0., 12.5, 9.04, 6.9, 7.5, 6.55, 6.55, 4.36,
 YBAR=5.95, 5.95, 5.95, 16.78, 24.63, 31.89, 38.5, 45.22, 50.93,
 STRIPM=21.4, 8.07, 17.6, 16.28, 15.21, 2.34, 1.81, 1.62, 1.1,
 SALPHA=235.4, 191.9, 547.9, 104.84, 90.5, 13.08, 9.39, 7.81, 4.95,
 MMOM=2589.5, 4563.5, 17056., 675.17, 538.48, 73.12, 48.73, 37.64,
   22.28,
 WBM=5*0., .05, .35, .68, 1.,
 WTM=0., .047, .252, 6*1.,
 SMICRD=0., 0., 20.35, 19.28, 17.255, 15.41, 13.74, 12.02, 10.47,
 DELTXA=7., 9.04, 6.9, 7.5, 6.55, 6.55, 4.36,
 SBETA=4.52, 3.413, 1.96, 1.683, 1.091, .791, -7.747,
 MIBETA=31.15, 18.74, 8.5, 7.57, 4.35, 2.82, 97.96,
 FSA=0., 0., 0., .05, .35, .68, 1.,
 CAPFSA=.252, 6*1.,
 BSA=20.35, 19.28, 17.255, 15.41, 13.74, 12.02, 10.47,
 CMA=14.16, 13.92, 12.32, 10.95, 9.64, 8.45, 7.26,
 BSH=15*0.,
 HSW=15*0.,
 HTMODE=15*0., &END
 &CONT1 ID=0 &END
 &CONT2 WB=0. &END
 &CONT2 WB=2. &END
 &CONT2 WB=4. &END
```

RUN BY

YANKEE TAIL 3
HORIZ STAB BEND/FUS VERT BEND 49.0/24.24

WBR = 0.0 SB = 5.71 ALT = 10000. WH = 49.00 WA = 24.24
GB = 0.030 GEB = 0.0 GS = 0.030 GR = 1.000

VELOCITY (EAS-MPH)	CAMPING (G)	DAMPING (LAMBDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	2.30088	24.41311	7.35455
0.0	0.0	4.89607	51.94897	7.35455
52.85	-0.05554	13.95366	51.92707	2.57948
24.84	-0.00652	2.80007	24.40661	6.04180
105.46	-0.11432	23.48838	51.80563	1.52880
49.64	-0.01540	3.47763	24.38432	4.86021
173.73	-0.19514	36.23282	51.22782	0.98001
82.45	-0.03528	4.98618	24.31255	3.37979
251.79	-0.26435	45.75267	49.47646	0.74957
122.38	-0.08043	8.34212	24.04677	1.99806
323.46	-0.26368	43.89456	47.57510	0.75127
158.90	-0.13939	12.43757	23.37173	1.30251
381.38	-0.24486	40.44579	46.83873	0.80271
183.83	-0.17735	14.70685	22.57719	1.06409
427.36	-0.23543	38.90370	46.65377	0.83123
200.66	-0.19809	15.69701	21.90557	0.96731
474.75	-0.23228	38.43367	46.64397	0.84122
215.94	-0.21342	16.22489	21.21624	0.90639
523.11	-0.23450	38.82461	46.72295	0.83416
229.82	-0.22488	16.43629	20.52691	0.86566
572.14	-0.24082	39.85501	46.84401	0.81470
242.39	-0.23350	16.42892	19.84608	0.83732

621.66	-0.25018	41.35620	46.98359	0.78747
253.76	-0.23995	16.26496	19.17865	0.81732
671.57	-0.26184	43.21071	47.13012	0.75602
264.01	-0.24464	15.98608	18.52803	0.80337
772.30	-0.29006	47.68445	47.42422	0.68937
281.52	-0.24984	15.19761	17.28709	0.78845
874.04	-0.32288	52.88847	47.70788	0.62525
295.64	-0.25079	14.23482	16.13681	0.78577
976.63	-0.35895	58.62504	47.97728	0.56726
307.02	-0.24874	13.20744	15.08227	0.79154
1184.09	-0.43811	71.28579	48.47376	0.47134
323.71	-0.23918	11.20667	13.25188	0.81965
1394.15	-0.52406	85.15167	48.91995	0.39822
334.88	-0.22620	9.45787	11.75069	0.86119
1606.46	-0.61506	99.95427	49.32347	0.34204
342.56	-0.21239	8.00926	10.51778	0.91025
1820.73	-0.71001	115.52146	49.69078	0.29815
348.00	-0.19898	6.83212	9.49748	0.96356
2036.73	-0.80818	131.73326	50.02723	0.26323
351.94	-0.18647	5.87896	8.64463	1.01923
2473.24	-1.01223	165.75637	50.62416	0.21170
357.10	-0.16467	4.47014	7.30933	1.13340
2914.88	-1.22434	201.52641	51.14069	0.17590
360.16	-0.14684	3.51055	6.31886	1.24765
3810.68	-1.66641	277.13128	52.00007	0.13006
363.37	-0.12021	2.33996	4.95852	1.46883
4719.97	-2.12624	356.97525	52.69754	0.10232
364.88	-0.10162	1.68445	4.07377	1.67636
5640.22	-2.59962	440.18774	53.28389	0.08390
365.66	-0.08801	1.28076	3.45448	1.86957

6569.72	-3.08401	526.22096	53.78968	0.07085
366.11	-0.07767	1.01389	2.99753	2.04927
8926.73	-4.33342	751.41933	54.81578	0.05057
366.59	-0.06017	0.63767	2.25112	2.44698
11322.32	-5.62664	988.43226	55.62101	0.03900
366.74	-0.04924	0.44851	1.80162	2.78432
13749.27	-6.95517	1235.17575	56.28619	0.03159
366.78	-0.04177	0.33853	1.50151	3.07443

RUN BY

YANKEE TAIL 3
HORIZ STAB BEND/FUS VERT BEND 49.0/24.24

WBR = 2.000 SB = 5.71 ALT = 10000. WH = 49.00 WA = 24.24
GB = 0.030 GEB = 0.0 GS = 0.030 GR = 1.000

VELOCITY (EAS-MPH)	CAMPING (G)	DAMPING (LAMBDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	4.47063	47.43483	7.35455
0.0	0.0	2.19995	23.34218	7.35455
48.29	-0.01864	7.24985	47.44834	4.53648
23.71	-0.00923	2.87128	23.29743	5.62418
96.61	-0.03564	9.78714	47.46165	3.36136
47.14	-0.01957	3.60645	23.15663	4.45065
161.01	-0.05998	13.42085	47.47762	2.45209
77.49	-0.03932	4.97611	22.84930	3.18281
241.67	-0.09224	18.23734	47.48772	1.80487
113.55	-0.07206	7.15456	22.31337	2.16177
322.85	-0.12479	23.09083	47.48510	1.42543
147.06	-0.10920	9.45897	21.63028	1.58506
386.62	-0.14942	26.76314	47.48150	1.22974
171.05	-0.13803	11.08911	21.00661	1.31307
434.97	-0.16738	29.44432	47.48403	1.11782
187.72	-0.15841	12.12979	20.49287	1.17105
483.41	-0.18482	32.05344	47.49510	1.02707
203.08	-0.17690	12.96901	19.95226	1.06638
532.00	-0.20189	34.61589	47.51712	0.95148
217.12	-0.19318	13.59721	19.39324	0.98862
580.78	-0.21875	37.16027	47.55120	0.88697
229.91	-0.20708	14.02052	18.82404	0.93063

629.79	-0.23559	39.71352	47.59734	0.83075
241.50	-0.21862	14.25615	18.25213	0.88744
679.05	-0.25253	42.29822	47.65473	0.78093
251.98	-0.22790	14.32783	17.68392	0.85551
778.39	-0.28717	47.62662	47.79796	0.69564
269.97	-0.24044	14.08513	16.57814	0.81583
878.82	-0.32322	53.22982	47.96918	0.62465
284.61	-0.24647	13.49298	15.53475	0.79804
980.31	-0.36089	59.13831	48.15760	0.56445
296.53	-0.24775	12.71110	14.56722	0.79437
1186.08	-0.44106	71.85656	48.55537	0.46838
314.36	-0.24156	10.97913	12.86930	0.81248
1395.05	-0.52699	85.65751	48.95154	0.39612
326.65	-0.22966	9.35012	11.46199	0.84971
1606.66	-0.61769	100.37522	49.32953	0.34065
335.36	-0.21599	7.95732	10.29665	0.89693
1820.47	-0.71232	115.86592	49.68389	0.29723
341.70	-0.20235	6.80725	9.32558	0.94958
2036.19	-0.81020	132.01520	50.01399	0.26260
346.42	-0.18950	5.86765	8.50907	1.00518
2472.41	-1.01380	165.95065	50.60720	0.21138
352.81	-0.16699	4.46923	7.22159	1.12002
2913.96	-1.22562	201.66803	51.12451	0.17572
356.77	-0.14861	3.51217	6.25933	1.23532
3809.79	-1.66737	277.22220	51.98785	0.12999
361.12	-0.12126	2.34168	4.92785	1.45867
4719.18	-2.12704	357.04763	52.68871	0.10229
363.29	-0.10227	1.68549	4.05607	1.66805
5639.53	-2.60033	440.25360	53.27744	0.08388
364.49	-0.08845	1.28134	3.44341	1.86274

6569.13	-3.08466	526.28493	53.78487	0.07084
365.21	-0.07796	1.01419	2.99016	2.04362
8926.31	-4.33400	751.48379	54.81325	0.05056
366.07	-0.06030	0.63771	2.24791	2.44335
11322.02	-5.62716	988.49738	55.61953	0.03900
366.40	-0.04931	0.44848	1.79995	2.78190
13749.04	-6.95565	1235.24029	56.28525	0.03158
366.54	-0.04180	0.33849	1.50053	3.07276

RUN BY

YANKEE TAIL 3
HORIZ STAB BEND/FUS VERT BEND 49.0/24.24

WBR = 4.000 SB = 5.71 ALT = 10000. WH = 49.00 WA = 24.24
GB = 0.030 GEB = 0.0 GS = 0.030 GR = 1.000

VELOCITY (EAS-MPH)	CAMPING (G)	DAMPING (LAMBDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	4.57333	48.52456	7.35455
0.0	0.0	2.22903	23.65077	7.35455
49.39	-0.01453	6.78876	48.52737	4.95477
24.02	-0.00152	2.33703	23.60069	6.99982
98.79	-0.02957	9.08295	48.53051	3.70352
47.73	-0.00447	2.53944	23.44956	6.40064
164.55	-0.05157	12.43358	48.52184	2.70501
78.32	-0.01281	3.10612	23.09488	5.15376
246.70	-0.08197	17.05255	48.47674	1.97048
114.13	-0.03167	4.34487	22.42715	3.57787
329.05	-0.11439	21.95262	48.39648	1.52811
146.56	-0.05888	6.01929	21.55664	2.48235
393.46	-0.14005	25.81416	48.32187	1.29752
169.19	-0.08382	7.43014	20.77880	1.93843
442.14	-0.15925	28.69640	48.26682	1.16587
184.64	-0.10346	8.45139	20.15710	1.65321
490.77	-0.17815	31.53068	48.21834	1.06000
198.69	-0.12285	9.37441	19.52165	1.44344
539.42	-0.19676	34.32246	48.18000	0.97301
211.41	-0.14136	10.16540	18.88321	1.28759
588.14	-0.21514	37.08564	48.15407	0.90002
222.91	-0.15848	10.80669	18.25047	1.17060

636.99	-0.23341	39.83775	48.14163	0.83763
233.27	-0.17392	11.29419	17.63013	1.08200
686.00	-0.25164	42.59649	48.14274	0.78340
242.63	-0.18749	11.63386	17.02713	1.01448
784.66	-0.28838	48.19396	48.18283	0.69299
258.70	-0.20892	11.92381	15.88561	0.92346
884.25	-0.32594	53.97152	48.26551	0.61987
271.88	-0.22329	11.80859	14.83998	0.87109
984.84	-0.36462	59.97951	48.38030	0.55910
282.79	-0.23172	11.42238	13.89205	0.84302
1188.89	-0.44580	72.75090	48.67018	0.46372
299.65	-0.23587	10.24585	12.26679	0.82987
1396.39	-0.53194	86.50147	48.99847	0.39263
311.94	-0.22993	8.93832	10.94588	0.84883
1606.84	-0.62249	101.13038	49.33525	0.33814
321.23	-0.21935	7.72616	9.86286	0.88484
1819.80	-0.71682	116.52512	49.66542	0.29543
328.44	-0.20712	6.67736	8.96374	0.93049
2034.89	-0.81437	132.58503	49.98197	0.26130
334.15	-0.19474	5.79496	8.20765	0.98174
2470.36	-1.01735	166.37758	50.56526	0.21066
342.50	-0.17196	4.44795	7.01057	1.09250
2911.59	-1.22870	201.99839	51.08292	0.17529
348.17	-0.15280	3.50796	6.10852	1.20700
3807.36	-1.66986	277.45201	51.95472	0.12980
355.07	-0.12402	2.34437	4.84520	1.43256
4716.97	-2.12922	357.24035	52.66402	0.10218
358.88	-0.10409	1.68784	4.00677	1.64548
5637.59	-2.60232	440.43516	53.25907	0.08382
361.16	-0.08968	1.28279	3.41191	1.84361

6567.44	-3.08653	526.46538	53.77100	0.07080
362.62	-0.07882	1.01501	2.96892	2.02748
8925.11	-4.33567	751.67118	54.80583	0.05054
364.54	-0.06070	0.63781	2.23849	2.43271
11321.13	-5.62870	988.68918	55.61515	0.03899
365.39	-0.04952	0.44841	1.79500	2.77472
13748.36	-6.95708	1235.43165	56.28245	0.03158
365.83	-0.04192	0.33838	1.49762	3.06781

```
002
            YANKEE TAIL 3
   SIDE BENDING/TORSION 21.36/17.26
1
 &DATA1 N=30, NWS=9, NAS=7, NHS=0, BR=13.27, A=5.355, C=-4.165,
 E=2.975, ALT=10000., WH=17.26, WA=21.36, GBET=.03, GS=.03,
 GR=1., GEB=0., &END
 &DATA2 CK=0., .25, .5, .833, 1.25, 1.67, 2., 2.25, 2.5, 2.75, 3.,
 3.25, 3.5, 4., 4.5, 5., 6., 7., 8., 9., 10., 12., 14., 18., 22., 26.
 30., 40., 50., 60.,
 DELTAX=0., 0., 12.5, 9.04, 6.9, 7.5, 6.55, 6.55, 4.36,
 YBAR=5.95, 5.95, 5.95, 16.78, 24.63, 31.89, 38.5, 45.22, 50.93,
 STRIPM=42.8, 16.14, 58.86, 5.62, 4.55, 2.34, 1.81, 1.62, 1.1,
 SALPHA=470.8, 383.8, 1759.5, 36.19, 27.07, 13.08, 9.39, 7.81, 4.95,
 MMOM=5179., 9127., 54773., 233.06, 161.07, 73.12, 48.73, 37.64, 22.2
 WBM=0., 0., .01, .21, .41, .575, .734, .825, 1.,
 WTM=0., .047, .252, 6*1.,
 SMICRD=0., 0., 20.35, 19.28, 17.255, 15.41, 13.74, 12.02, 10.47,
 DELTXA=12.5, 9.04, 6.9, 7.5, 6.55, 6.55, 4.36,
 SBETA=9.03, 3.413, 1.96, 1.683, 1.091, .791, -7.747,
 MIBETA=62.29, 18.74, 8.5, 7.57, 4.35, 2.82, 97.96,
 FSA=.01, .21, .41, .575, .734, .825, 1.,
 CAPFSA=.252, 6*1.,
 BSA=20.35, 19.28, 17.255, 15.41, 13.74, 12.02, 10.47,
 CMA=14.16, 13.92, 12.32, 10.95, 9.64, 8.45, 7.26,
 BSH=15*0.,
 HSW=15*0.,
 HTMODE=15*0., &END
 &CONT1 ID=0 &END
 &CONT2 WB=0. &END
 &CONT2 WB=2. &END
 &CONT2 WB=4. &END
```

RUN BY

YANKEE TAIL 3
SIDE BENDING/TORSION 21.36/17.26

WBR = 0.0 SB = 10.22 ALT = 10000. WH = 17.26 WA = 21.36
GB = 0.030 GEB = 0.0 GS = 0.030 GR = 1.000

VELOCITY (EAS-MPH)	CAMPING (G)	DAMPING (LAMBDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	1.49245	15.83538	7.35455
0.0	0.0	2.28323	24.22588	7.35455
24.65	-0.02149	3.91778	24.21949	4.28501
16.12	-0.00882	1.93186	15.83870	5.68290
49.24	-0.04666	5.82511	24.18793	2.87820
32.26	-0.01771	2.37529	15.84814	4.62476
81.55	-0.09000	9.06478	24.04523	1.83865
53.82	-0.02939	2.96095	15.86951	3.71501
119.77	-0.15591	13.74470	23.53390	1.18682
81.00	-0.04290	3.64517	15.91725	3.02676
153.57	-0.21156	17.14101	22.58740	0.91339
108.86	-0.05530	4.29061	16.01174	2.58670
176.47	-0.23988	18.37523	21.67262	0.81753
131.38	-0.06516	4.82381	16.13538	2.31855
191.69	-0.25540	18.76253	20.92575	0.77307
149.03	-0.07263	5.24538	16.26872	2.14983
204.88	-0.26919	18.92097	20.12990	0.73744
167.46	-0.07882	5.62476	16.45319	2.02756
215.78	-0.28740	19.21777	19.27301	0.69514
187.15	-0.07883	5.71553	16.71624	2.02726
225.39	-0.32773	20.73908	18.45371	0.61677
207.83	-0.05701	4.65158	17.01634	2.53567

237.13	-0.38680	23.46670	17.92159	0.52936
226.69	-0.01806	2.58697	17.13219	4.59038
250.10	-0.43933	25.87875	17.55159	0.47011
243.78	0.01487	0.81337	17.10810	14.57939
275.58	-0.51845	29.15738	16.92253	0.40229
275.56	0.05964	0.0	16.92127	99999.00000
298.89	-0.57115	30.81096	16.31458	0.36703
305.33	0.08561	0.0	16.66617	99999.00000
319.58	-0.60313	31.22648	15.69933	0.34849
333.53	0.09849	0.0	16.38480	99999.00000
352.92	-0.61829	29.42487	14.44758	0.34034
386.27	0.09513	0.0	15.81312	99999.00000
376.08	-0.58625	25.54828	13.19633	0.35803
436.32	0.06261	0.0	15.31033	99999.00000
390.21	-0.52839	21.01661	11.98058	0.39513
487.12	0.01168	0.86061	14.95618	12.04595
397.49	-0.46664	16.92561	10.84809	0.44426
541.50	-0.04421	3.44552	14.77843	2.97304
400.93	-0.41469	13.75769	9.84788	0.49616
599.44	-0.09489	5.77680	14.72381	1.76669
403.73	-0.34216	9.66179	8.26383	0.59286
720.23	-0.17645	9.56173	14.74222	1.06869
404.84	-0.29445	7.23989	7.10278	0.68002
842.85	-0.24299	12.68194	14.78753	0.80823
405.59	-0.23310	4.57460	5.53456	0.83861
1088.92	-0.35897	18.15788	14.85922	0.56723
405.65	-0.19406	3.18800	4.52904	0.98472
1335.18	-0.46632	23.24354	14.90699	0.44454
1581.56	-0.57025	28.17528	14.94121	0.36757
405.52	-0.16665	2.36678	3.83098	1.12197

1828.09	-0.67251	33.03317	14.96748	0.31407
405.32	-0.14625	1.83753	3.31860	1.25184
2445.09	-0.92491	45.04210	15.01438	0.23106
404.85	-0.11238	1.11203	2.48605	1.54960
3063.04	-1.17550	56.98653	15.04720	0.18303
404.48	-0.09153	0.75866	1.98702	1.81544
3681.85	-1.42558	68.92445	15.07261	0.15158
404.20	-0.07736	0.55811	1.65470	2.05506

RUN BY

YANKEE TAIL 3
SIDE BENDING/TORSION 21.36/17.26

WBR = 2.000 SB = 10.22 ALT = 10000. WH = 17.26 WA = 21.36
GB = 0.030 GEB = 0.0 GS = 0.030 GR = 1.000

VELOCITY (EAS-MPH)	CAMPING (G)	DAMPING (LAMBDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	2.18963	23.23265	7.35455
0.0	0.0	1.49077	15.81752	7.35455
23.59	-0.00761	2.73849	23.17543	5.86602
16.11	-0.01167	2.07243	15.82908	5.29422
46.83	-0.01792	3.46364	23.00723	4.60425
32.29	-0.02289	2.63527	15.86043	4.17174
76.81	-0.04025	4.99833	22.64840	3.14080
54.01	-0.03700	3.35219	15.92646	3.29320
112.08	-0.07863	7.51620	22.02463	2.03113
81.65	-0.05390	4.22869	16.04349	2.62979
144.16	-0.12117	10.06990	21.20321	1.45950
110.23	-0.07111	5.15004	16.21246	2.18205
166.11	-0.15267	11.70707	20.40059	1.20787
133.62	-0.08521	5.93974	16.41066	1.91507
180.17	-0.17441	12.63068	19.66865	1.07938
152.43	-0.09568	6.57036	16.64022	1.75549
190.78	-0.20033	13.56372	18.74433	0.95790
173.44	-0.09949	6.93211	17.04088	1.70394
201.12	-0.28414	17.72855	17.96369	0.70234
194.97	-0.04585	4.14956	17.41423	2.90890
215.83	-0.36176	21.74899	17.67133	0.56319
212.16	0.00173	1.54251	17.37032	7.80561

230.49	-0.42058	24.65777	17.41949	0.48968
228.45	0.03299	0.0	17.26571	99999.00000
244.58	-0.46811	26.85964	17.16412	0.44294
244.28	0.05572	0.0	17.14299	99999.00000
270.71	-0.53934	29.73295	16.62333	0.38753
274.78	0.08579	0.0	16.87315	99999.00000
293.97	-0.58586	31.04511	16.04593	0.35826
303.89	0.10199	0.0	16.58724	99999.00000
314.37	-0.61243	31.16893	15.44347	0.34344
331.73	0.10789	0.0	16.29625	99999.00000
346.99	-0.61893	28.95933	14.20498	0.34000
384.37	0.09550	0.0	15.73515	99999.00000
369.60	-0.58186	24.92923	12.96900	0.36060
434.95	0.05833	0.0	15.26229	99999.00000
383.57	-0.52302	20.46066	11.77695	0.39897
486.66	0.00623	1.11581	14.94208	9.28214
391.22	-0.46295	16.53482	10.67700	0.44759
541.79	-0.04853	3.64782	14.78644	2.80968
395.33	-0.41284	13.50928	9.71027	0.49823
600.06	-0.09769	5.91270	14.73900	1.72786
399.42	-0.34200	9.55476	8.17572	0.59311
720.90	-0.17766	9.62660	14.75587	1.06248
401.48	-0.29470	7.18522	7.04389	0.67952
843.43	-0.24367	12.72260	14.79773	0.80621
403.40	-0.23339	4.55492	5.50477	0.83770
1089.37	-0.35939	18.18498	14.86546	0.56662
404.13	-0.19427	3.17896	4.51203	0.98382
1335.57	-0.46668	23.26702	14.91132	0.44422
404.40	-0.16680	2.36197	3.82040	1.12115
1581.90	-0.57058	28.19703	14.94445	0.36737

404.47	-0.14635	1.83470	3.31159	1.25112
1828.40	-0.67283	33.05368	14.97002	0.31393
2445.34	-0.92519	45.06016	15.01594	0.23099
404.36	-0.11243	1.11102	2.48301	1.54912
3063.26	-1.17575	57.00263	15.04828	0.18299
404.16	-0.09155	0.75819	1.98544	1.81512
3682.04	-1.42581	68.93893	15.07339	0.15156
403.98	-0.07737	0.55786	1.65378	2.05486

RUN BY

YANKEE TAIL 3
SIDE BENDING/TORSION 21.36/17.26

WBR = 4.000 SB = 10.22 ALT = 10000. WH = 17.26 WA = 21.36
GB = 0.030 GEB = 0.0 GS = 0.030 GR = 1.000

VELOCITY (EAS-MPH)	CAMPING (G)	DAMPING (LAMBDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	2.21602	23.51268	7.35455
0.0	0.0	1.49129	15.82305	7.35455
23.89	-0.00447	2.54109	23.46822	6.40157
16.11	-0.01072	2.02533	15.83013	5.41772
47.49	-0.01051	2.96906	23.33132	5.44688
32.27	-0.02170	2.57444	15.85105	4.26778
77.99	-0.02287	3.81930	22.99562	4.17339
53.93	-0.03701	3.34746	15.90083	3.29254
113.59	-0.04522	5.27453	22.32087	2.93329
81.45	-0.05788	4.41859	16.00414	2.51059
145.25	-0.07154	6.81502	21.36332	2.17285
109.97	-0.08215	5.69846	16.17433	1.96742
166.23	-0.08948	7.66296	20.41506	1.84664
133.46	-0.10594	6.99991	16.39106	1.62309
179.11	-0.09537	7.70112	19.55242	1.75984
152.59	-0.13132	8.44181	16.65744	1.36773
188.39	-0.07156	5.90544	18.50953	2.17255
174.20	-0.18584	11.60586	17.11553	1.02221
193.68	-0.28789	17.27673	17.29942	0.69406
200.50	-0.00246	1.82623	17.90803	6.79702
209.87	-0.36417	21.27783	17.18277	0.55975
215.43	0.04121	0.0	17.63837	99999.00000

224.85	-0.42341	24.20554	16.99329	0.48662
230.53	0.06977	0.0	17.42300	99999.00000
238.91	-0.47153	26.41732	16.76662	0.43993
245.46	0.08970	0.0	17.22587	99999.00000
264.52	-0.54298	29.23863	16.24320	0.38507
274.51	0.11330	0.0	16.85690	99999.00000
286.90	-0.58800	30.40393	15.66005	0.35702
302.48	0.12233	0.0	16.51037	99999.00000
306.22	-0.61162	30.32295	15.04330	0.34387
329.47	0.12100	0.0	16.18514	99999.00000
336.51	-0.61047	27.71835	13.77580	0.34449
381.39	0.09586	0.0	15.61301	99999.00000
357.08	-0.56809	23.54290	12.52975	0.36890
432.65	0.05036	0.0	15.18130	99999.00000
369.95	-0.50969	19.25823	11.35854	0.40882
485.95	-0.00416	1.60114	14.92025	6.45912
377.69	-0.45398	15.67293	10.30786	0.45587
542.47	-0.05703	4.04805	14.80482	2.53504
382.67	-0.40804	12.93502	9.39941	0.50369
601.40	-0.10356	6.19794	14.77180	1.65201
388.95	-0.34128	9.28611	7.96130	0.59426
722.45	-0.18049	9.77848	14.78767	1.04823
392.89	-0.29516	7.04143	6.89319	0.67856
844.88	-0.24539	12.82457	14.82309	0.80117
397.48	-0.23413	4.50073	5.42391	0.83533
1090.60	-0.36051	18.25791	14.88215	0.56499
399.86	-0.19484	3.15350	4.46436	0.98128
1336.64	-0.46767	23.33245	14.92333	0.44334
401.20	-0.16721	2.34822	3.79018	1.11879
1582.87	-0.57153	28.25887	14.95363	0.36679

401.99	-0.14665	1.82651	3.29132	1.24903
1829.29	-0.67374	33.11277	14.97731	0.31352
402.90	-0.11256	1.10805	2.47409	1.54768
2446.09	-0.92602	45.11314	15.02052	0.23079
403.21	-0.09162	0.75680	1.98077	1.81417
3063.90	-1.17651	57.05022	15.05145	0.18287
403.31	-0.07740	0.55710	1.65104	2.05425
3682.61	-1.42649	68.98193	15.07573	0.15149

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003
              YANKEE TAIL 3
   SIDE BENDING/TORSION 21.36/17.26
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 SBETA=9.03, 3.413, 1.96, 1.683, 1.091, .791, -12.25,
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RUN BY

YANKEE TAIL 3
SIDE BENDING/TORSION 21.36/17.26

WBR = 0.0 SB = 5.72 ALT = 10000. WH = 17.26 WA = 21.36
GB = 0.030 GEB = 0.0 GS = 0.030 GR = 1.000

VELOCITY (EAS-MPH)	CAMPING (G)	DAMPING (LAMBDA)	FRFQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	1.49319	15.84328	7.35455
0.0	0.0	2.32383	24.65660	7.35455
25.09	-0.02954	4.61080	24.65134	3.70588
16.13	-0.01329	2.15499	15.84509	5.09656
50.12	-0.06363	7.24174	24.61969	2.35650
32.26	-0.02686	2.83125	15.84912	3.88020
82.93	-0.12111	11.60942	24.45489	1.46010
53.76	-0.04525	3.74780	15.85235	2.93186
121.16	-0.20462	17.54817	23.80758	0.94040
80.65	-0.06645	4.80171	15.84692	2.28758
153.61	-0.26150	20.69063	22.59370	0.75690
107.84	-0.08184	5.57297	15.86106	1.97275
175.16	-0.27687	20.73909	21.51202	0.71898
129.71	-0.09093	6.05216	15.93033	1.82449
189.63	-0.27954	20.13083	20.70122	0.71279
146.88	-0.09802	6.44890	16.03422	1.72341
202.35	-0.27950	19.33047	19.88088	0.71289
164.86	-0.10582	6.91118	16.19769	1.62453
212.74	-0.28078	18.55196	19.00157	0.70995
184.27	-0.11225	7.35520	16.45830	1.55102
220.39	-0.30356	18.90900	18.04437	0.66145
205.99	-0.09884	6.82672	16.86586	1.71247

230.99	-0.36626	21.73240	17.45721	0.55679
225.62	-0.04992	4.28152	17.05186	2.76058
243.74	-0.41982	24.17237	17.10548	0.49050
242.70	-0.01097	2.19241	17.03271	5.38505
268.90	-0.49658	27.31592	16.51219	0.41900
274.48	0.03903	0.0	16.85502	99999.00000
291.92	-0.54674	28.87096	15.93425	0.38256
304.41	0.06756	0.0	16.61556	99999.00000
312.40	-0.57713	29.27138	15.34646	0.36341
332.88	0.08213	0.0	16.35260	99999.00000
345.52	-0.59214	27.64613	14.14489	0.35464
386.46	0.08141	0.0	15.82079	99999.00000
368.77	-0.56352	24.12739	12.93984	0.37175
437.68	0.05199	0.0	15.35782	99999.00000
383.39	-0.51188	20.03935	11.77141	0.40717
489.64	0.00552	1.15638	15.03347	9.01131
391.62	-0.45678	16.34489	10.68801	0.45325
544.60	-0.04551	3.52566	14.86315	2.92211
396.13	-0.40938	13.43066	9.72985	0.50215
602.50	-0.09271	5.70496	14.79905	1.79808
400.49	-0.34057	9.54339	8.19757	0.59540
722.73	-0.17150	9.36482	14.79344	1.09496
402.52	-0.29391	7.18616	7.06202	0.68118
844.96	-0.23751	12.45874	14.82451	0.82477
404.21	-0.23304	4.55795	5.51573	0.83880
1090.76	-0.35388	17.95030	14.88435	0.57476
404.73	-0.19408	3.18108	4.51877	0.98463
1337.09	-0.46194	23.07120	14.92838	0.44851
404.86	-0.16669	2.36337	3.82475	1.12176
1583.70	-0.56659	28.04146	14.96147	0.36983

1830.54	-0.66954	32.93799	14.98760	0.31540
404.83	-0.14629	1.83566	3.31455	1.25158
2448.51	-0.92354	45.04052	15.03543	0.23139
404.57	-0.11241	1.11145	2.48433	1.54934
3067.57	-1.17557	57.07426	15.06946	0.18301
404.30	-0.09155	0.75842	1.98613	1.81520
3687.55	-1.42699	69.09837	15.09593	0.15143
404.08	-0.07737	0.55800	1.65419	2.05485

RUN BY

YANKEE TAIL 3
SIDE BENDING/TORSION 21.36/17.26

WBR = 2.000 SB = 5.72 ALT = 10000. WH = 17.26 WA = 21.36
GB = 0.030 GEB = 0.0 GS = 0.030 GR = 1.000

VELOCITY (EAS-MPH)	CAMPING (G)	DAMPING (LAMBDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	2.17483	23.07570	7.35455
0.0	0.0	1.49038	15.81339	7.35455
23.43	-0.00822	2.76450	23.02094	5.77210
16.10	-0.00938	1.95720	15.81918	5.60243
46.52	-0.01809	3.45312	22.85503	4.58773
32.24	-0.01890	2.43283	15.83694	4.51219
76.27	-0.03919	4.88865	22.49096	3.18894
53.85	-0.03206	3.09572	15.87915	3.55543
111.19	-0.07590	7.26924	21.84864	2.08335
81.25	-0.04956	3.99076	15.96593	2.77310
142.85	-0.11677	9.68763	21.00983	1.50325
109.51	-0.06881	4.99586	16.10734	2.23302
164.50	-0.14622	11.18441	20.20229	1.25203
132.60	-0.08557	5.91262	16.28468	1.90909
178.38	-0.16492	11.92459	19.47286	1.13191
151.12	-0.09952	6.71283	16.49765	1.70351
188.66	-0.18184	12.33590	19.53609	1.04154
171.96	-0.11249	7.56277	16.89476	1.54845
197.42	-0.26970	16.60250	17.63330	0.73619
194.51	-0.05462	4.61843	17.37329	2.60744
212.06	-0.34942	20.69618	17.36266	0.58150
211.33	-0.00476	1.88951	17.30247	6.34726

226.44	-0.40754	23.52372	17.11366	0.50427
227.44	0.02621	0.20493	17.18960	58.14176
240.20	-0.45388	25.62524	16.85715	0.45598
243.17	0.04829	0.0	17.06505	99999.00000
265.66	-0.52243	28.31202	16.31352	0.39940
273.59	0.07699	0.0	16.80016	99999.00000
288.30	-0.56650	29.48958	15.73663	0.36989
302.76	0.09206	0.0	16.52546	99999.00000
308.17	-0.59119	29.54352	15.13868	0.35518
330.78	0.09716	0.0	16.24960	99999.00000
340.00	-0.59625	27.38443	13.91884	0.35231
384.15	0.08432	0.0	15.72635	99999.00000
362.26	-0.56133	23.61414	12.71147	0.37312
435.90	0.04861	0.0	15.29534	99999.00000
376.45	-0.50778	19.52753	11.55829	0.41027
488.80	0.00012	1.40857	15.00769	7.38523
384.86	-0.45364	15.95917	10.50353	0.45620
544.57	-0.05026	3.74761	14.86235	2.74891
389.92	-0.40770	13.16960	9.57741	0.50408
602.90	-0.09619	5.87077	14.80874	1.74844
395.54	-0.34043	9.42182	8.09622	0.59563
723.33	-0.17334	9.45807	14.80571	1.08506
398.58	-0.29419	7.12195	6.99288	0.68059
845.54	-0.23867	12.52123	14.83469	0.82122
401.59	-0.23337	4.53427	5.48005	0.83773
1091.25	-0.35457	17.99090	14.89108	0.57372
402.89	-0.19433	3.17011	4.49820	0.98354
1337.52	-0.46248	23.10415	14.93317	0.44801
403.50	-0.16686	2.35751	3.81190	1.12077
1584.09	-0.56706	28.07047	14.96510	0.36954

403.79	-0.14641	1.83219	3.30600	1.25072
1830.89	-0.66997	32.96443	14.99046	0.31521
403.97	-0.11246	1.11021	2.48061	1.54875
2448.80	-0.92390	45.06278	15.03720	0.23130
3067.82	-1.17588	57.09369	15.07067	0.18297
403.91	-0.09158	0.75785	1.98420	1.81481
3687.77	-1.42727	69.11567	15.09683	0.15140
403.80	-0.07739	0.55768	1.65306	2.05460

RUN BY

YANKEE TAIL 3
SIDE BENDING/TORSION 21.36/17.26

WBR = 4.000 SB = 5.72 ALT = 10000. WH = 17.26 WA = 21.36
GB = 0.030 GEB = 0.0 GS = 0.030 GR = 1.000

VELOCITY (EAS-MPH)	CAMPING (G)	DAMPING (LAMBDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	2.21306	23.48135	7.35455
0.0	0.0	1.49122	15.82231	7.35455
23.85	-0.00446	2.53753	23.43698	6.40204
16.11	-0.01030	2.00404	15.82870	5.47477
47.43	-0.01035	2.95389	23.30015	5.46754
32.26	-0.02087	2.53283	15.84778	4.33700
77.88	-0.02234	3.77593	22.96400	4.21552
53.90	-0.03573	3.28197	15.89334	3.35667
113.42	-0.04386	5.17157	22.28660	2.98709
81.37	-0.05624	4.33153	15.98844	2.55854
144.98	-0.06892	6.62662	21.32418	2.23053
109.78	-0.08049	5.60497	16.14659	1.99680
165.89	-0.08545	7.38928	20.37338	1.91112
133.13	-0.10475	6.92111	16.34961	1.63742
178.77	-0.08983	7.34684	19.51566	1.84124
152.05	-0.13102	8.39635	16.59870	1.37028
188.40	-0.06581	5.57142	18.51046	2.30292
173.11	-0.18524	11.50085	17.00824	1.02508
192.28	-0.28207	16.83763	17.17405	0.70700
200.43	-0.00113	1.75084	17.90177	7.08723
208.26	-0.35692	20.72707	17.05151	0.57023
215.17	0.04180	0.0	17.61734	99999.00000

222.98	-0.41506	23.56230	16.85208	0.49575
230.14	0.06986	0.0	17.39347	99999.00000
236.74	-0.46208	25.68463	16.61437	0.44837
244.95	0.08923	0.0	17.19042	99999.00000
261.69	-0.53132	28.33718	16.06917	0.39306
273.82	0.11149	0.0	16.81430	99999.00000
283.36	-0.57421	29.35851	15.46674	0.36517
301.67	0.11899	0.0	16.46599	99999.00000
301.97	-0.59594	29.17065	14.83421	0.35249
328.64	0.11613	0.0	16.14423	99999.00000
330.92	-0.59253	26.49466	13.54710	0.35442
380.92	0.08862	0.0	15.59391	99999.00000
350.52	-0.55106	22.45207	12.29935	0.37971
433.10	0.04282	0.0	15.19705	99999.00000
363.03	-0.49668	18.44263	11.14611	0.41892
487.45	-0.00946	1.85531	14.96623	5.59145
371.03	-0.44565	15.13152	10.12609	0.46386
544.59	-0.05914	4.16214	14.86292	2.47522
376.55	-0.40312	12.58515	9.24907	0.50941
603.71	-0.10311	6.20124	14.82875	1.65750
383.95	-0.33965	9.12652	7.85900	0.59688
724.66	-0.17744	9.66666	14.83297	1.06360
388.80	-0.29467	6.95772	6.82142	0.67957
846.93	-0.24146	12.67211	14.85905	0.81277
394.64	-0.23423	4.47030	5.38522	0.83501
1092.54	-0.35639	18.09748	14.90866	0.57102
397.81	-0.19501	3.13963	4.44144	0.98056
1338.70	-0.46397	23.19438	14.94626	0.44666
399.65	-0.16736	2.34093	3.77559	1.11795
1585.16	-0.56839	28.15195	14.97525	0.36872

400.79	-0.14676	1.82228	3.28150	1.24820
1831.89	-0.67119	33.03990	14.99860	0.31466
402.20	-0.11262	1.10660	2.46975	1.54699
2449.64	-0.92494	45.12769	15.04235	0.23105
402.75	-0.09165	0.75615	1.97849	1.81365
3068.55	-1.17681	57.15095	15.07426	0.18283
402.98	-0.07743	0.55676	1.64971	2.05386
3688.41	-1.42810	69.16692	15.09947	0.15132

B.4 Tail 4

```
001
          YANKEE TAIL 4
   HORIZ STAB BEND/FUS VERT BEND 33.9/24.24
1
 &DATA1 N=30, NWS=9, NAS=7, NHS=0, BR=13.27, A=5.355, C=-4.165,
 E=2.975, ALT=10000., WH=33.9, WA=24.24, GBET=.03, GS=.03,
 GR=1., GEB=0., &END
 &DATA2 CK=0., .25, .5, .833, 1.25, 1.67, 2., 2.25, 2.5, 2.75, 3.,
 3.25, 3.5, 4., 4.5, 5., 6., 7., 8., 9., 10., 12., 14., 18., 22., 26.
 30., 40., 50., 60.,
 DELTAX=0., 0., 12.5, 9.04, 6.9, 7.5, 6.55, 6.55, 4.36,
 YBAR=5.95, 5.95, 5.95, 16.78, 24.63, 31.89, 38.5, 45.22, 50.93,
 STRIPM=21.4, 8.07, 17.6, 16.28, 15.21, 2.34, 1.81, 1.62, 1.1,
 SALPHA=235.4, 191.9, 547.9, 104.84, 90.5, 13.08, 9.39, 7.81, 4.95,
 MMOM=2589.5, 4563.5, 17056., 675.17, 538.48, 73.12, 48.73, 37.64,
   22.28,
 WBM=5*0., .05, .35, .68, 1.,
 WTM=0., .047, .252, 6*1.,
 SMICRD=0., 0., 20.35, 19.28, 17.255, 15.41, 13.74, 12.02, 10.47,
 DELTXA=7., 9.04, 6.9, 7.5, 6.55, 6.55, 4.36,
 SBETA=4.52, 3.413, 1.96, 1.683, 1.091, .791, -7.747,
 MIBETA=31.15, 18.74, 8.5, 7.57, 4.35, 2.82, 97.96,
 FSA=0., 0., 0., .05, .35, .68, 1.,
 CAPFSA=.252, 6*1.,
 BSA=20.35, 19.28, 17.255, 15.41, 13.74, 12.02, 10.47,
 CMA=14.16, 13.92, 12.32, 10.95, 9.64, 8.45, 7.26,
 BSH=15*0.,
 HSW=15*0.,
 HTMODE=15*0., &END
 &CONT1 ID=0 &END
 &CONT2 WB=0. &END
 &CONT2 WB=2. &END
 &CONT2 WB=4. &END
```

RUN BY

YANKEE TAIL 4
HORIZ STAB BEND/FUS VERT BEND 33.9/24.24

WBR = 0.0 SB = 5.71 ALT = 10000. WH = 33.90 WA = 24.24
GB = 0.030 GEB = 0.0 GS = 0.030 GR = 1.000

VELOCITY (EAS-MPH)	CAMPING (G)	DAMPING (LAMBDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	2.25273	23.90221	7.35455
0.0	0.0	3.45969	36.70842	7.35455
37.35	-0.05886	10.24471	36.69916	2.48304
24.32	-0.00321	2.49271	23.89387	6.64418
74.56	-0.12198	17.48947	36.62946	1.45171
48.59	-0.00784	2.83736	23.86907	5.83107
122.89	-0.21182	27.52958	36.23749	0.91240
80.75	-0.01925	3.68427	23.81194	4.47992
177.52	-0.29609	35.73576	34.88347	0.67662
120.46	-0.05087	6.01409	23.67064	2.72814
225.36	-0.29576	33.92165	33.14563	0.67729
158.16	-0.10918	10.17154	23.26225	1.58523
263.65	-0.26341	29.84598	32.37900	0.75198
184.12	-0.15943	13.45703	22.61202	1.16471
294.76	-0.24432	27.73172	32.17850	0.80430
201.31	-0.18937	15.14585	21.97674	1.00577
327.28	-0.23444	26.71299	32.15518	0.83436
216.72	-0.21129	16.14025	21.29246	0.91441
360.66	-0.23224	26.53898	32.21360	0.84136
230.61	-0.22713	16.63880	20.59751	0.85806
394.58	-0.23562	26.95902	32.30627	0.83063
243.16	-0.23869	16.80537	19.90872	0.82115

428.86	-0.24299	27.79675	32.41167	0.80823
254.49	-0.24714	16.74589	19.23366	0.79612
463.39	-0.25324	28.93690	32.52029	0.77899
264.70	-0.25321	16.52785	18.57642	0.77906
533.06	-0.27971	31.84888	32.73306	0.71239
282.14	-0.26003	15.78569	17.32515	0.76075
603.36	-0.31160	35.34238	32.93320	0.64590
296.20	-0.26171	14.81656	16.16746	0.75635
674.20	-0.34716	39.24372	33.11998	0.58499
307.53	-0.25990	13.75920	15.10745	0.76107
817.31	-0.42589	47.91983	33.45875	0.48397
324.14	-0.25010	11.67680	13.26963	0.78770
962.11	-0.51168	57.45039	33.75974	0.40732
335.25	-0.23649	9.84861	11.76377	0.82794
1108.37	-0.60253	67.62423	34.03059	0.34881
342.89	-0.22196	8.33340	10.52773	0.87567
1255.94	-0.69727	78.31517	34.27670	0.30338
348.28	-0.20785	7.10272	9.50524	0.92761
1404.66	-0.79514	89.43765	34.50205	0.26739
352.20	-0.19471	6.10699	8.65082	0.98188
1705.14	-0.99826	112.74672	34.90216	0.21457
357.30	-0.17182	4.63695	7.31347	1.09325
2009.09	-1.20909	137.21423	35.24888	0.17806
360.32	-0.15313	3.63710	6.32178	1.20479
2625.48	-1.64780	188.84249	35.82689	0.13150
363.49	-0.12526	2.41940	4.96014	1.42107
3251.02	-2.10349	243.28273	36.29695	0.10342
364.97	-0.10582	1.73872	4.07476	1.62442
3884.00	-2.57218	299.96161	36.69265	0.08479
365.73	-0.09162	1.32013	3.45514	1.81416

4523.26	-3.05146	358.51798	37.03429	0.07160
366.17	-0.08082	1.04373	2.99800	1.99099
6143.99	-4.28679	511.65203	37.72804	0.05111
366.63	-0.06256	0.65469	2.25134	2.38361
7790.90	-5.56451	672.67143	38.27289	0.03944
366.77	-0.05118	0.45949	1.80175	2.71799
9459.08	-6.87648	840.19032	38.72317	0.03195
366.80	-0.04339	0.34619	1.50159	3.00654

RUN BY

YANKEE TAIL 4.
HORIZ STAB BEND/FUS VERT BEND 33.9/24.24

WBR = 2.000 SB = 5.71 ALT = 10000. WH = 33.90 WA = 24.24
GB = 0.030 GEB = 0.0 GS = 0.030 GR = 1.000

VELOCITY (EAS-MPH)	CAMPING (G)	DAMPING (LAMBDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	3.11313	33.03130	7.35455
0.0	0.0	2.18569	23.19085	7.35455
33.62	-0.01967	5.15461	33.03571	4.44237
23.56	-0.00820	2.77820	23.15002	5.77584
67.23	-0.03748	7.00205	33.02774	3.26950
46.86	-0.01773	3.45229	23.02238	4.62243
111.92	-0.06301	9.64331	33.00235	2.37217
77.13	-0.03630	4.73675	22.74240	3.32800
167.69	-0.09620	13.06348	32.95082	1.74837
113.22	-0.06813	6.85878	22.24869	2.24846
223.60	-0.12824	16.34860	32.88665	1.39433
146.91	-0.10576	9.21600	21.60815	1.62518
267.41	-0.15144	18.71945	32.84095	1.21605
171.09	-0.13602	10.95922	21.01233	1.32899
300.61	-0.16791	20.40393	32.81642	1.11482
187.92	-0.15788	12.10849	20.51463	1.17436
333.88	-0.18371	22.02453	32.80413	1.03240
203.41	-0.17801	13.06006	19.98547	1.06071
367.29	-0.19914	23.61551	32.80536	0.96289
217.58	-0.19592	13.79284	19.43371	0.97663
400.85	-0.21448	25.20790	32.81992	0.90246
230.45	-0.21134	14.30583	18.86834	0.91421

434.61	-0.22997	26.82613	32.84658	0.84871
242.11	-0.22421	14.61319	18.29770	0.86792
468.57	-0.24576	28.48754	32.88367	0.80012
252.63	-0.23462	14.73863	17.72896	0.83378
537.11	-0.27864	31.97969	32.98187	0.71487
270.64	-0.24881	14.55703	16.61912	0.79134
606.44	-0.31353	35.72413	33.10148	0.64226
285.26	-0.25583	13.98121	15.57020	0.77193
676.49	-0.35046	39.72131	33.23283	0.57992
297.14	-0.25760	13.18908	14.59724	0.76716
818.49	-0.42984	48.40563	33.50719	0.47981
314.88	-0.25157	11.40264	12.89053	0.78360
962.60	-0.51537	57.87195	33.77717	0.40456
327.09	-0.23930	9.71020	11.47725	0.81929
1108.45	-0.60578	67.97610	34.03284	0.34703
335.73	-0.22508	8.26050	10.30794	0.86495
1255.75	-0.70009	78.60686	34.27156	0.30220
342.01	-0.21086	7.06310	9.33417	0.91603
1404.31	-0.79759	89.68109	34.49347	0.26660
346.70	-0.19745	6.08502	8.51578	0.97004
1704.64	-1.00017	112.92316	34.89188	0.21417
353.02	-0.17396	4.63012	7.22595	1.08176
2008.55	-1.21066	137.35030	35.23935	0.17784
356.94	-0.15477	3.63521	6.26234	1.19408
2624.97	-1.64898	188.93864	35.81997	0.13141
361.24	-0.12624	2.41966	4.92949	1.41213
3250.58	-2.10448	243.36288	36.29210	0.10337
363.38	-0.10644	1.73906	4.05708	1.61706
3883.63	-2.57306	300.03485	36.68921	0.08476
364.56	-0.09203	1.32033	3.44407	1.80808

4522.96	-3.05227	358.58796	37.03180	0.07158
365.27	-0.08110	1.04381	2.99062	1.98594
6143.80	-4.28749	511.71867	37.72683	0.05110
366.11	-0.06269	0.65465	2.24813	2.38034
7790.77	-5.56514	672.73590	38.27224	0.03943
366.43	-0.05124	0.45943	1.80007	2.71581
9458.99	-6.87706	840.25240	38.72280	0.03194
366.56	-0.04342	0.34613	1.50061	3.00504

RUN BY

YANKEE TAIL 4
HORIZ STAB BEND/FUS VERT BEND 33.9/24.24

WBR = 4.000 SB = 5.71 ALT = 10000. WH = 33.90 WA = 24.24
GB = 0.030 GEB = 0.0 GS = 0.030 GR = 1.000

VELOCITY (EAS-MPH)	CAMPING (G)	DAMPING (LAMBDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	3.19552	33.90548	7.35455
0.0	0.0	2.20705	23.41750	7.35455
34.50	-0.01421	4.70786	33.89920	4.99106
23.79	-0.00184	2.33831	23.37355	6.92866
68.96	-0.02908	6.28758	33.87718	3.73466
47.31	-0.00497	2.55303	23.24039	6.30980
114.69	-0.05127	8.63459	33.81861	2.71482
77.74	-0.01310	3.10438	22.92442	5.11859
171.51	-0.08227	11.88712	33.70226	1.96521
113.58	-0.03137	4.30281	22.31801	3.59526
228.16	-0.11487	15.27284	33.55819	1.52302
146.23	-0.05840	5.97350	21.50828	2.49577
272.33	-0.14002	17.86490	33.44571	1.29768
169.12	-0.08384	7.42819	20.76956	1.93808
305.68	-0.15848	19.75903	33.36982	1.17062
184.77	-0.10422	8.50503	20.17054	1.64388
339.00	-0.17641	21.59821	33.30638	1.06890
199.00	-0.12456	9.49364	19.55174	1.42751
372.35	-0.19395	23.39889	33.25755	0.98520
211.88	-0.14411	10.35158	18.92453	1.26720
405.79	-0.21126	25.18130	33.22397	0.91454
223.49	-0.16230	11.05454	18.29854	1.14737

439.35	-0.22849	26.96485	33.20512	0.85356
233.95	-0.17873	11.59439	17.68152	1.05706
473.08	-0.24580	28.76572	33.19981	0.80000
243.37	-0.19319	11.97541	17.07932	0.98857
541.04	-0.28104	32.46503	33.22348	0.70934
259.50	-0.21602	12.31610	15.93486	0.89681
609.75	-0.31754	36.33836	33.28216	0.63485
272.68	-0.23130	12.21771	14.88354	0.84439
679.18	-0.35550	40.40720	33.36482	0.57234
283.55	-0.24026	11.82649	13.92939	0.81640
820.05	-0.43582	49.12815	33.57098	0.47365
300.29	-0.24471	10.60958	12.29333	0.80315
963.26	-0.52147	58.55844	33.80010	0.40009
312.48	-0.23858	9.25170	10.96473	0.82149
1108.42	-0.61163	68.59953	34.03196	0.34387
321.68	-0.22761	7.99324	9.87653	0.85646
1255.23	-0.70556	79.16232	34.25727	0.29996
328.81	-0.21494	6.90531	8.97391	0.90079
1403.44	-0.80265	90.17322	34.47205	0.26498
334.47	-0.20211	5.99068	8.21541	0.95056
1703.37	-1.00450	113.31366	34.86598	0.21328
342.74	-0.17851	4.59553	7.01541	1.05815
2007.14	-1.21443	137.67139	35.21457	0.17730
348.35	-0.15867	3.62252	6.11177	1.16946
2623.58	-1.65206	189.18508	35.80107	0.13117
355.19	-0.12883	2.41855	4.84691	1.38911
3249.36	-2.10718	243.57872	36.27848	0.10324
358.97	-0.10816	1.73950	4.00779	1.59701
3882.59	-2.57552	300.23827	36.67939	0.08468
361.23	-0.09319	1.32073	3.41258	1.79101

4522.08	-3.05458	358.78630	37.02461	0.07153
362.67	-0.08191	1.04400	2.96939	1.97149
6143.22	-4.28953	511.91264	37.72328	0.05108
364.57	-0.06307	0.65454	2.23871	2.37076
7790.38	-5.56700	672.92582	38.27033	0.03942
365.42	-0.05144	0.45926	1.79512	2.70932
9458.71	-6.87877	840.43645	38.72169	0.03194
365.85	-0.04353	0.34598	1.49770	3.00057

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002
            YANKEE TAIL 4
   FIN BEND/ FUS SIDE BEND  31.87/14.87
1
 &DATA1 N=30, NWS=9, NAS=6, NHS=0, BR=13.27, A=5.355, C=-4.165,
 E=2.975, ALT=10000., WH=31.87, WA=14.87, GBET=.03, GS=.03,
 GR=1., GEB=0., &END
 &DATA2 CK=0., .25, .5, .833, 1.25, 1.67, 2., 2.25, 2.5, 2.75, 3.,
 3.25, 3.5, 4., 4.5, 5., 6., 7., 8., 9., 10., 12., 14., 18., 22., 26.
 30., 40., 50., 60.,
 DELTAX=0., 0., 12.5, 9.04, 6.9, 7.5, 6.55, 6.55, 4.36,
 YBAR=5.95, 5.95, 5.95, 16.78, 24.63, 31.89, 38.5, 45.22, 50.93,
 STRIPM=42.8, 16.14, 58.86, 5.62, 4.55, 2.34, 1.81, 1.62, 1.1,
 SALPHA=470.8, 383.8, 1759.5, 36.19, 27.07, 13.08, 9.39, 7.81, 4.95,
 MMOM=5179., 9127., 54773., 233.06, 161.07, 73.12, 48.73, 37.64, 22.2
 WBM=0., 0., .01, .21, .41, .575, .734, .825, 1.,
 WTM=0., .047, .252, 6*1.,
 SMICRD=0., 0., 20.35, 19.28, 17.255, 15.41, 13.74, 12.02, 10.47,
 DELTXA=9.04, 6.9, 7.5, 6.55, 6.55, 4.36,
 SBETA=3.413, 1.96, 1.683, 1.091, .791, -7.747,
 MIBETA=18.74, 8.5, 7.57, 4.35, 2.82, 97.96,
 FSA=.21, .41, .575, .734, .825, 1.,
 CAPFSA=6*1.,
 BSA=19.28, 17.255, 15.41, 13.74, 12.02, 10.47,
 CMA=13.92, 12.32, 10.95, 9.64, 8.45, 7.26,
 BSH=15*0.,
 HSW=15*0.,
 HTMODE=15*0., &END
 &CONT1 ID=0 &END
 &CONT2 WB=0. &END
 &CONT2 WB=2. &END
 &CONT2 WB=4. &END
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RUN BY

YANKEE TAIL 4
FIN BEND/ FUS SIDE BEND 31.87/14.87

WBR = 0.0 SB = 1.19 ALT = 10000. WH = 31.87 WA = 14.87
GB = 0.030 GEB = 0.0 GS = 0.030 GR = 1.000

VELOCITY (EAS-MPH)	CAMPING (G)	DAMPING (LAMBDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	1.39534	14.80501	7.35455
0.0	0.0	3.14230	33.34086	7.35455
33.95	-0.02847	6.12726	33.35560	3.77337
15.07	-0.00284	1.52734	14.80428	6.71860
67.96	-0.05980	9.41854	33.38528	2.45696
30.13	-0.00678	1.71036	14.80177	5.99865
113.18	-0.10900	14.57363	33.37396	1.58733
50.17	-0.01603	2.13945	14.79344	4.79285
168.14	-0.17715	21.50174	33.03992	1.06511
75.05	-0.03974	3.23119	14.74799	3.16372
219.24	-0.22298	25.62766	32.24547	0.87214
99.09	-0.07746	4.92021	14.57426	2.05320
257.33	-0.23456	26.26668	31.60374	0.83399
116.59	-0.10704	6.16456	14.31887	1.61003
285.99	-0.23666	26.15529	31.22095	0.82740
128.96	-0.12562	6.88310	14.07869	1.41777
314.70	-0.23746	25.98036	30.91957	0.82493
140.63	-0.14092	7.41880	13.81658	1.29091
343.43	-0.23839	25.86373	30.67451	0.82208
151.61	-0.15366	7.81322	13.54179	1.20136
372.11	-0.23972	25.81590	30.46645	0.81802
161.94	-0.16447	8.10051	13.25898	1.13455

400.70	-0.24138	25.81849	30.28381	0.81303
171.62	-0.17376	8.30292	12.97080	1.08284
429.19	-0.24322	25.85348	30.12023	0.80754
180.67	-0.18175	8.43452	12.67922	1.04198
485.91	-0.24717	25.98116	29.83797	0.79605
196.93	-0.19433	8.52233	12.09282	0.98355
542.39	-0.25134	26.16698	29.60527	0.78423
210.92	-0.20291	8.42393	11.51259	0.94730
598.76	-0.25587	26.41613	29.41418	0.77182
222.88	-0.20809	8.18945	10.94895	0.92671
711.59	-0.26657	27.14104	29.13086	0.74397
241.79	-0.21057	7.48074	9.89823	0.91715
824.84	-0.27993	28.18066	28.94305	0.71190
255.60	-0.20613	6.65341	8.96892	0.93438
938.61	-0.29586	29.50202	28.81825	0.67709
265.82	-0.19801	5.84625	8.16164	0.96767
1052.88	-0.31402	31.05642	28.73503	0.64134
273.52	-0.18824	5.11793	7.46475	1.01099
1167.61	-0.33401	32.79754	28.67958	0.60612
279.41	-0.17800	4.48467	6.86309	1.06076
1398.21	-0.37816	36.69802	28.61966	0.54057
287.66	-0.15835	3.48399	5.88798	1.17143
1630.01	-0.42627	40.99311	28.59803	0.48356
292.98	-0.14112	2.76331	5.14032	1.28940
2096.23	-0.52988	50.31342	28.60490	0.39408
299.19	-0.11421	1.84969	4.08273	1.52996
2564.95	-0.63937	60.22110	28.63716	0.32962
302.53	-0.09503	1.32668	3.37767	1.76473
3035.47	-0.75236	70.48318	28.67652	0.28201
304.53	-0.08097	1.00300	2.87693	1.98817

3507.39	-0.86764	80.98230	28.71683	0.24580
305.83	-0.07035	0.78940	2.50396	2.19865
4691.79	-1.16203	107.89230	28.81057	0.18509
307.61	-0.05268	0.49062	1.88892	2.66869
5881.10	-1.46183	135.40378	28.89098	0.14790
308.48	-0.04193	0.34245	1.51541	3.06735
7074.14	-1.76498	163.30703	28.95980	0.12292
308.97	-0.03475	0.25731	1.26486	3.40729

RUN BY

YANKEE TAIL 4
FIN BEND/ FUS SIDE BEND . 31.87/14.87

WBR = 2.000 SB = 1.19 ALT = 10000. WH = 31.87 WA = 14.87
GB = 0.030 GEB = 0.0 GS = 0.030 GR = 1.000

VELOCITY (EAS-MPH)	CAMPING (G)	DAMPING (LAMBDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	3.09789	32.86961	7.35455
0.0	0.0	1.35561	14.38348	7.35455
33.42	-0.01153	4.28433	32.83842	5.31284
14.62	-0.00575	1.61371	14.36767	6.17147
66.67	-0.02513	5.67287	32.75374	4.00208
29.15	-0.01213	1.89520	14.31755	5.23651
110.49	-0.04846	8.03035	32.58028	2.81221
48.18	-0.02437	2.42665	14.20621	4.05788
164.37	-0.08377	11.54393	32.29864	1.93936
71.29	-0.04558	3.32654	14.00912	2.91908
217.29	-0.12069	15.13050	31.95985	1.46413
93.52	-0.07136	4.38001	13.75448	2.17669
257.81	-0.14731	17.63696	31.66293	1.24438
110.06	-0.09292	5.21979	13.51701	1.79496
287.88	-0.16502	19.25439	31.42699	1.13136
121.98	-0.10921	5.82361	13.31640	1.58497
317.44	-0.18032	20.60707	31.18820	1.04906
133.33	-0.12497	6.37749	13.09946	1.42374
346.54	-0.19321	21.70478	30.95262	0.98848
144.07	-0.13986	6.86698	12.86812	1.29890
375.27	-0.20387	22.57523	30.72553	0.94340
154.19	-0.15362	7.28270	12.62470	1.20159

403.71	-0.21261	23.25533	30.51094	0.90941
163.70	-0.16606	7.62014	12.37173	1.12537
431.92	-0.21977	23.78420	30.31146	0.88338
172.59	-0.17707	7.87901	12.11181	1.06553
487.93	-0.23061	24.53068	29.96227	0.84663
188.59	-0.19472	8.17592	11.58085	0.98182
543.72	-0.23864	25.04734	29.67822	0.82130
202.43	-0.20688	8.22250	11.04909	0.93143
599.52	-0.24541	25.48231	29.45149	0.80112
214.34	-0.21431	8.08157	10.52935	0.90309
711.57	-0.25845	26.39684	29.12990	0.76492
233.43	-0.21866	7.46520	9.55610	0.88729
824.40	-0.27303	27.53882	28.92776	0.72811
247.70	-0.21425	6.66935	8.69163	0.90333
937.98	-0.28980	28.93397	28.79887	0.68991
258.52	-0.20545	5.87108	7.93727	0.93709
1052.17	-0.30862	30.54756	28.71565	0.65158
266.85	-0.19481	5.14362	7.28273	0.98142
1166.89	-0.32914	32.33826	28.66173	0.61435
273.37	-0.18373	4.50847	6.71463	1.03233
1397.53	-0.37412	36.31688	28.60570	0.54597
282.73	-0.16264	3.50240	5.78707	1.14530
1629.40	-0.42284	40.66986	28.58738	0.48722
288.95	-0.14436	2.77698	5.06954	1.26539
2095.77	-0.52727	50.06815	28.59855	0.39592
296.41	-0.11615	1.85718	4.04475	1.50961
2564.59	-0.63729	60.02479	28.63312	0.33065
300.52	-0.09626	1.33092	3.35524	1.74742
3035.19	-0.75063	70.32002	28.67381	0.28264
303.02	-0.08181	1.00550	2.86268	1.97340

3507.16	-0.86616	80.84293	28.71493	0.24620
304.66	-0.07093	0.79093	2.49437	2.18600
4691.64	-1.16095	107.79050	28.80968	0.18526
306.92	-0.05295	0.49112	1.88468	2.65997
5881.01	-1.46097	135.32388	28.89050	0.14798
308.03	-0.04208	0.34263	1.51318	3.06120
7074.07	-1.76428	163.24144	28.95953	0.12297
308.65	-0.03484	0.25738	1.26355	3.40287

RUN BY

YANKEE TAIL 4
FIN BEND/ FUS SIDE BEND 31.87/14.87

WBR = 4.000 SB = 1.19 ALT = 10000. WH = 31.87 WA = 14.87
GB = 0.030 GEB = 0.0 GS = 0.030 GR = 1.000

VELOCITY (EAS-MPH)	CAMPING (G)	DAMPING (LAMBDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	3.10937	32.99140	7.35455
0.0	0.0	1.36632	14.49706	7.35455
33.57	-0.01379	4.53717	32.98326	5.03890
14.74	-0.00118	1.41831	14.47957	7.07641
67.08	-0.02860	6.06736	32.95456	3.76481
29.37	-0.00316	1.50287	14.42651	6.65374
111.47	-0.05078	8.34175	32.86922	2.73124
48.50	-0.00839	1.72479	14.30035	5.74693
166.25	-0.08187	11.48068	32.66779	1.97233
71.53	-0.02031	2.22160	14.05626	4.38563
220.00	-0.11430	14.66897	32.35785	1.52900
93.31	-0.03845	2.95141	13.72437	3.22322
261.00	-0.13838	16.95609	32.05389	1.31033
109.22	-0.05626	3.63524	13.41398	2.55772
291.30	-0.15489	18.47169	31.80052	1.19331
120.51	-0.07119	4.18231	13.15608	2.18041
320.99	-0.16952	19.76822	31.53714	1.10581
131.13	-0.08681	4.72785	12.88315	1.88880
350.12	-0.18214	20.84198	31.27227	1.04003
141.06	-0.10264	5.25011	12.59917	1.66341
378.79	-0.19280	21.70762	31.01321	0.99029
150.32	-0.11822	5.73118	12.30783	1.48855

407.08	-0.20167	22.39167	30.76564	0.95237
158.94	-0.13317	6.15778	12.01249	1.35218
435.08	-0.20901	22.92631	30.53353	0.92315
166.95	-0.14718	6.52148	11.71610	1.24527
490.56	-0.22018	23.67645	30.12378	0.88190
181.25	-0.17158	7.04817	11.12986	1.09456
545.75	-0.22840	24.18188	29.78874	0.85387
193.54	-0.19055	7.31974	10.56434	1.00040
600.95	-0.23521	24.59671	29.52162	0.83194
204.15	-0.20417	7.37778	10.02875	0.94221
711.98	-0.24816	25.47004	29.14668	0.79321
221.37	-0.21797	7.05968	9.06215	0.88976
824.09	-0.26271	26.59077	28.91670	0.75378
234.66	-0.21925	6.44775	8.23417	0.88519
937.19	-0.27960	27.98704	28.77464	0.71266
245.20	-0.21342	5.75712	7.52841	0.90641
1051.09	-0.29866	29.61863	28.68615	0.67133
253.72	-0.20404	5.09129	6.92454	0.94274
1165.64	-0.31952	31.43791	28.63109	0.63126
260.73	-0.19321	4.49090	6.40414	0.98845
1396.17	-0.36528	35.48786	28.57784	0.55818
271.45	-0.17132	3.51416	5.55635	1.09596
1628.08	-0.41480	39.91501	28.56406	0.49603
279.15	-0.15169	2.79560	4.89761	1.21433
2094.63	-0.52061	49.44308	28.58300	0.40071
289.12	-0.12109	1.87275	3.94535	1.46027
2563.65	-0.63169	59.49923	28.62263	0.33345
295.04	-0.09960	1.34115	3.29405	1.70247
3034.41	-0.74583	69.86980	28.66650	0.28439
298.80	-0.08412	1.01199	2.82280	1.93345

3506.52	-0.86197	80.45068	28.70968	0.24736
301.33	-0.07258	0.79506	2.46711	2.15088
4691.23	-1.15780	107.49612	28.80712	0.18575
304.91	-0.05374	0.49255	1.87234	2.63487
5880.73	-1.45846	135.08974	28.88913	0.14823
306.69	-0.04250	0.34316	1.50663	3.04320
7073.88	-1.76220	163.04789	28.95876	0.12311
307.71	-0.03509	0.25758	1.25967	3.38981

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003
            YANKEE TAIL 4
  FIN BEND/ FUS SIDE BEND  31.87/27.96
1
 &DATA1 N=30, NWS=9, NAS=6, NHS=0, BR=13.27, A=5.355, C=-4.165,
 E=2.975, ALT=10000., WH=31.87, WA=17.96, GBET=.03, GS=.03,
 GR=1., GEB=0., &END
 &DATA2 CK=0., .25, .5, .833, 1.25, 1.67, 2., 2.25, 2.5, 2.75, 3.,
 3.25, 3.5, 4., 4.5, 5., 6., 7., 8., 9., 10., 12., 14., 18., 22., 26.
 30., 40., 50., 60.,
 DELTAX=0., 0., 12.5, 9.04, 6.9, 7.5, 6.55, 6.55, 4.36,
 YBAR=5.95, 5.95, 5.95, 16.78, 24.63, 31.89, 38.5, 45.22, 50.93,
 STRIPM=42.8, 16.14, 58.86, 5.62, 4.55, 2.34, 1.81, 1.62, 1.1,
 SALPHA=470.8, 383.8, 1759.5, 36.19, 27.07, 13.08, 9.39, 7.81, 4.95,
 MMOM=5179., 9127., 54773., 233.06, 161.07, 73.12, 48.73, 37.64, 22.2
 WBM=0., 0., .01, .21, .41, .575, .734, .825, 1.,
 WTM=0., .047, .252, 6*1.,
 SMICRD=0., 0., 20.35, 19.28, 17.255, 15.41, 13.74, 12.02, 10.47,
 DELTXA=9.04, 6.9, 7.5, 6.55, 6.55, 4.36,
 SBETA=3.413, 1.96, 1.683, 1.091, .791, -7.747,
 MIBETA=18.74, 8.5, 7.57, 4.35, 2.82, 97.96,
 FSA=.21, .41, .575, .734, .825, 1.,
 CAPFSA=6*1.,
 BSA=19.28, 17.255, 15.41, 13.74, 12.02, 10.47,
 CMA=13.92, 12.32, 10.95, 9.64, 8.45, 7.26,
 BSH=15*0.,
 HSW=15*0.,
 HTMODE=15*0., &END
 &CONT1 ID=0 &END
 &CONT2 WB=0. &END
 &CONT2 WB=2. &END
 &CONT2 WB=4. &END
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RUN BY

YANKEE TAIL 4
FIN BEND/ FUS SIDE BEND 31.87/27.86

WBR = 0.0 SB = 1.19 AIT = 10000. WH = 31.87 WA = 17.96
GB = 0.030 GEB = 0.0 GS = 0.030 GR = 1.000

VELOCITY (EAS-MPH)	CAMPING (G)	DAMPING (LAMBDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	1.66891	17.70770	7.35455
0.0	0.0	3.17314	33.66811	7.35455
34.28	-0.02926	6.27068	33.68412	3.72338
18.02	-0.00206	1.78314	17.70642	6.88292
68.64	-0.06157	9.69941	33.71717	2.40953
36.04	-0.00502	1.94761	17.70247	6.30026
114.32	-0.11275	15.11779	33.71080	1.54564
60.00	-0.01233	2.35279	17.69216	5.21223
169.80	-0.18495	22.53182	33.36625	1.02645
89.81	-0.03218	3.44725	17.64809	3.54856
221.01	-0.23480	27.04185	32.50588	0.83321
118.83	-0.06617	5.28027	17.47720	2.29426
258.79	-0.24714	27.67161	31.78281	0.79613
140.14	-0.09503	6.76028	17.21121	1.76471
287.09	-0.24850	27.42088	31.34055	0.79223
155.28	-0.11428	7.68350	16.95098	1.52919
315.40	-0.24796	27.05977	30.98800	0.79377
169.56	-0.13082	8.41696	16.65965	1.37195
343.72	-0.24728	26.74341	30.70041	0.79571
183.04	-0.14507	8.99155	16.34840	1.26028
372.00	-0.24692	26.49719	30.45737	0.79675
195.71	-0.15750	9.43838	16.02347	1.17676

400.20	-0.24688	26.30965	30.24616	0.79686
207.58	-0.16841	9.77902	15.68862	1.11203
428.33	-0.24709	26.16649	30.05954	0.79628
218.68	-0.17798	10.02749	15.34672	1.06084
484.39	-0.24804	25.98181	29.74476	0.79354
238.60	-0.19347	10.28637	14.65182	0.98732
540.34	-0.24973	25.91831	29.49339	0.78876
255.70	-0.20450	10.28213	13.95717	0.94090
596.30	-0.25228	25.97763	29.29314	0.78162
270.29	-0.21160	10.07797	13.27780	0.91323
708.58	-0.26040	26.46390	29.00746	0.75977
293.23	-0.21660	9.29984	12.00422	0.89472
821.51	-0.27243	27.38865	28.82634	0.72954
309.90	-0.21340	8.31489	10.87402	0.90649
935.09	-0.28778	28.66299	28.71037	0.69430
322.16	-0.20576	7.32604	9.89136	0.93587
1049.24	-0.30576	30.20552	28.63564	0.65712
331.35	-0.19606	6.42232	9.04320	0.97602
1163.87	-0.32577	31.95239	28.58764	0.62016
338.37	-0.18568	5.63151	8.31133	1.02299
1394.28	-0.37023	35.88422	28.53927	0.55127
348.15	-0.16549	4.37650	7.12628	1.12866
1625.89	-0.41874	40.21462	28.52567	0.49168
354.45	-0.14764	3.47050	6.21870	1.24204
2091.64	-0.52302	49.58835	28.54225	0.39897
361.76	-0.11966	2.32096	4.93652	1.47428
2559.81	-0.63295	59.52314	28.57971	0.33281
365.68	-0.09965	1.66293	4.08271	1.70178
3029.71	-0.74617	69.79219	28.62209	0.28426
368.02	-0.08498	1.25585	3.47676	1.91896

3500.97	-0.86153	80.28393	28.66425	0.24748
369.54	-0.07387	0.98734	3.02563	2.12410
4683.59	-1.15575	107.13606	28.76023	0.18607
371.63	-0.05538	0.61208	2.28204	2.58430
5871.02	-1.45505	134.55703	28.84144	0.14857
372.65	-0.04412	0.42625	1.83063	2.97692
7062.10	-1.75752	162.35168	28.91053	0.12343
373.22	-0.03659	0.31962	1.52788	3.31344

RUN BY

YANKEE TAIL 4
FIN BEND/ FUS SIDE BEND 31.87/27.86

WBR = 2.000 SB = 1.19 ALT = 10000. WH = 31.87 WA = 17.96
GB = 0.030 GEB = 0.0 GS = 0.030 GR = 1.000

VELOCITY (EAS-MPH)	CAMPING (G)	DAMPING (LAMBDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	3.12187	33.12405	7.35455
0.0	0.0	1.62473	17.23894	7.35455
33.68	-0.01131	4.29356	33.08723	5.34158
17.53	-0.00597	1.94647	17.22279	6.13314
67.15	-0.02487	5.68667	32.98685	4.02078
34.95	-0.01239	2.28667	17.17052	5.20485
111.17	-0.04868	8.10277	32.78188	2.80432
57.83	-0.02415	2.90108	17.05280	4.07439
165.15	-0.08515	11.73929	32.45197	1.91614
85.70	-0.04421	3.92635	16.84074	2.97303
217.98	-0.12323	15.43320	32.06006	1.43991
112.60	-0.06885	5.14342	16.56183	2.23194
258.28	-0.15036	17.97323	31.72025	1.22331
132.70	-0.08991	6.13936	16.29775	1.84006
288.11	-0.16813	19.57739	31.45234	1.11359
147.22	-0.10614	6.87407	16.07203	1.62063
317.38	-0.18318	20.88407	31.18308	1.03498
161.07	-0.12216	7.56478	15.82541	1.45006
346.17	-0.19554	21.90799	30.91947	0.97827
174.21	-0.13757	8.19142	15.55977	1.31665
374.56	-0.20545	22.68429	30.66755	0.93709
186.60	-0.15207	8.73881	15.27755	1.21179

402.66	-0.21327	23.25806	30.43182	0.90695
198.23	-0.16541	9.19717	14.98166	1.12910
430.54	-0.21942	23.67607	30.21505	0.88459
209.11	-0.17740	9.56209	14.67523	1.06380
485.98	-0.22824	24.21027	29.84214	0.85439
228.69	-0.19706	10.01734	14.04314	0.97172
541.30	-0.23447	24.54890	29.54617	0.83425
245.57	-0.21100	10.14850	13.40402	0.91550
596.75	-0.23980	24.84793	29.31559	0.81778
260.06	-0.21986	10.02823	12.77546	0.88304
708.37	-0.25099	25.59851	28.99884	0.78522
283.18	-0.22601	9.32392	11.59271	0.86181
820.97	-0.26471	26.67151	28.80733	0.74866
300.36	-0.22238	8.35643	10.53958	0.87424
934.41	-0.28119	28.04755	28.68934	0.70901
313.33	-0.21377	7.36736	9.62033	0.90512
1048.51	-0.30000	29.66649	28.61568	0.66860
323.29	-0.20302	6.45890	8.82315	0.94687
1163.14	-0.32066	31.47372	28.56974	0.62920
331.06	-0.19166	5.66279	8.13177	0.99536
1393.62	-0.36608	35.49502	28.52564	0.55705
342.19	-0.16991	4.39891	7.00420	1.10367
1625.30	-0.41526	39.88825	28.51541	0.49552
349.57	-0.15096	3.48660	6.13308	1.21928
2091.20	-0.52041	49.34337	28.53620	0.40086
358.39	-0.12162	2.32957	4.89058	1.45516
2559.46	-0.63036	59.32795	28.57589	0.33386
363.25	-0.10090	1.66776	4.05559	1.68557
3029.44	-0.74444	69.63031	28.61954	0.28490
366.20	-0.08581	1.25869	3.45953	1.90514

3500.75	-0.86006	80.14582	28.66247	0.24789
368.13	-0.07445	0.98907	3.01404	2.11227
4683.46	-1.15467	107.03534	28.75940	0.18624
370.79	-0.05565	0.61264	2.27692	2.57612
5870.93	-1.45420	134.47801	28.84101	0.14866
372.10	-0.04426	0.42645	1.82794	2.97113
7062.04	-1.75682	162.28685	28.91029	0.12348
372.84	-0.03667	0.31969	1.52630	3.30927

RUN BY

YANKEE TAIL 4
FIN BEND/ FUS SIDE BEND 31.87/27.86

WBR = 4.000 SB = 1.19 ALT = 10000. WH = 31.87 WA = 17.96
GB = 0.030 GEB = 0.0 GS = 0.030 GR = 1.000

VELOCITY (EAS-MPH)	CAMPING (G)	DAMPING (LAMEDA)	FREQUENCY (CPS)	CYC TO DAMP (1/2 AMPL)
0.0	0.0	3.13507	33.26410	7.35455
0.0	0.0	1.63671	17.36602	7.35455
33.84	-0.01353	4.54738	33.25219	5.06858
17.66	-0.00144	1.71314	17.34698	7.01871
67.61	-0.02818	6.07013	33.21217	3.79251
35.19	-0.00359	1.82431	17.28911	6.56902
112.25	-0.05035	8.35553	33.10038	2.74591
58.17	-0.00882	2.09184	17.15120	5.68320
167.18	-0.08175	11.53297	32.85014	1.97435
85.92	-0.02042	2.67437	16.88287	4.37574
220.83	-0.11459	14.75394	32.47924	1.52590
112.28	-0.03816	3.53638	16.51453	3.23694
261.57	-0.13880	17.03585	32.12404	1.30705
131.63	-0.05585	4.36000	16.16631	2.57011
291.59	-0.15520	18.52080	31.83242	1.19134
145.41	-0.07089	5.03143	15.87420	2.18689
320.94	-0.16949	19.76255	31.53291	1.10598
158.40	-0.08684	5.71251	15.56235	1.88832
349.71	-0.18156	20.76037	31.23524	1.04289
170.57	-0.10321	6.37563	15.23498	1.65633
377.99	-0.19149	21.53443	30.94760	0.99614
181.94	-0.11950	6.99639	14.89623	1.47581

405.89	-0.19951	22.11804	30.67613	0.96135
192.52	-0.13529	7.55533	14.55002	1.33486
433.53	-0.20592	22.55000	30.42489	0.93521
202.34	-0.15020	8.03889	14.20001	1.22439
488.39	-0.21527	23.10887	29.99000	0.89955
219.87	-0.17640	8.75466	13.50124	1.06896
543.09	-0.22192	23.46122	29.64373	0.87581
234.88	-0.19694	9.14071	12.82080	0.97221
597.95	-0.22754	23.76668	29.37455	0.85670
247.78	-0.21176	9.24509	12.17234	0.91262
708.61	-0.23914	24.52719	29.00867	0.81980
268.61	-0.22691	8.87530	10.99636	0.85880
820.55	-0.25324	25.62080	28.79266	0.77896
284.60	-0.22857	8.11230	9.98657	0.85330
933.57	-0.27016	27.02919	28.66363	0.73506
297.23	-0.22261	7.24222	9.12576	0.87342
1047.42	-0.28945	28.68838	28.58597	0.69068
307.41	-0.21288	6.40168	8.38973	0.90841
1161.91	-0.31062	30.53979	28.53958	0.64775
315.77	-0.20162	5.64384	7.75604	0.95256
1392.30	-0.35702	34.65094	28.49879	0.57008
328.55	-0.17884	4.41229	6.72501	1.05647
1624.03	-0.40711	39.12756	28.49314	0.50476
337.71	-0.15843	3.50754	5.92507	1.17089
2090.12	-0.51373	48.71961	28.52147	0.40578
349.58	-0.12661	2.34711	4.77038	1.40879
2558.58	-0.62527	58.80563	28.56600	0.33671
356.62	-0.10425	1.67930	3.98161	1.64346
3028.71	-0.73965	69.18377	28.61267	0.28667
361.10	-0.08813	1.26600	3.41133	1.86774

3500.15	-0.85589	79.75720	28.65755	0.24906
364.10	-0.07611	0.99372	2.98109	2.07939
4683.07	-1.15154	106.74406	28.75703	0.18674
368.37	-0.05644	0.61425	2.26200	2.55258
5870.68	-1.45170	134.24648	28.83975	0.14891
370.49	-0.04469	0.42704	1.82002	2.95419
7061.87	-1.75476	162.09553	28.90960	0.12362
371.69	-0.03692	0.31991	1.52162	3.29694

NASA
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Figure 1. NASA Grumman/American Yankee

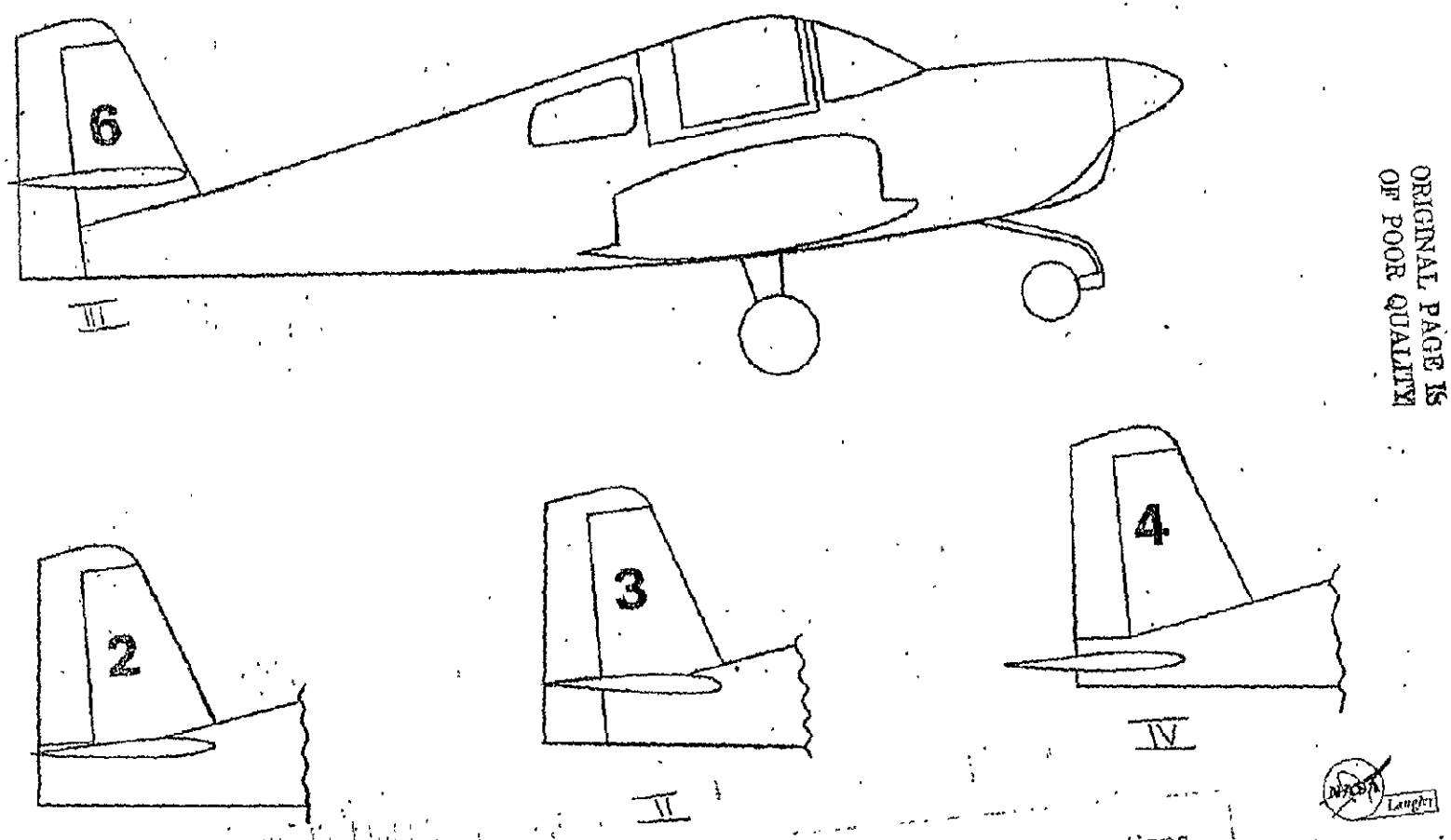

Figure 2a. Empennage Configurations

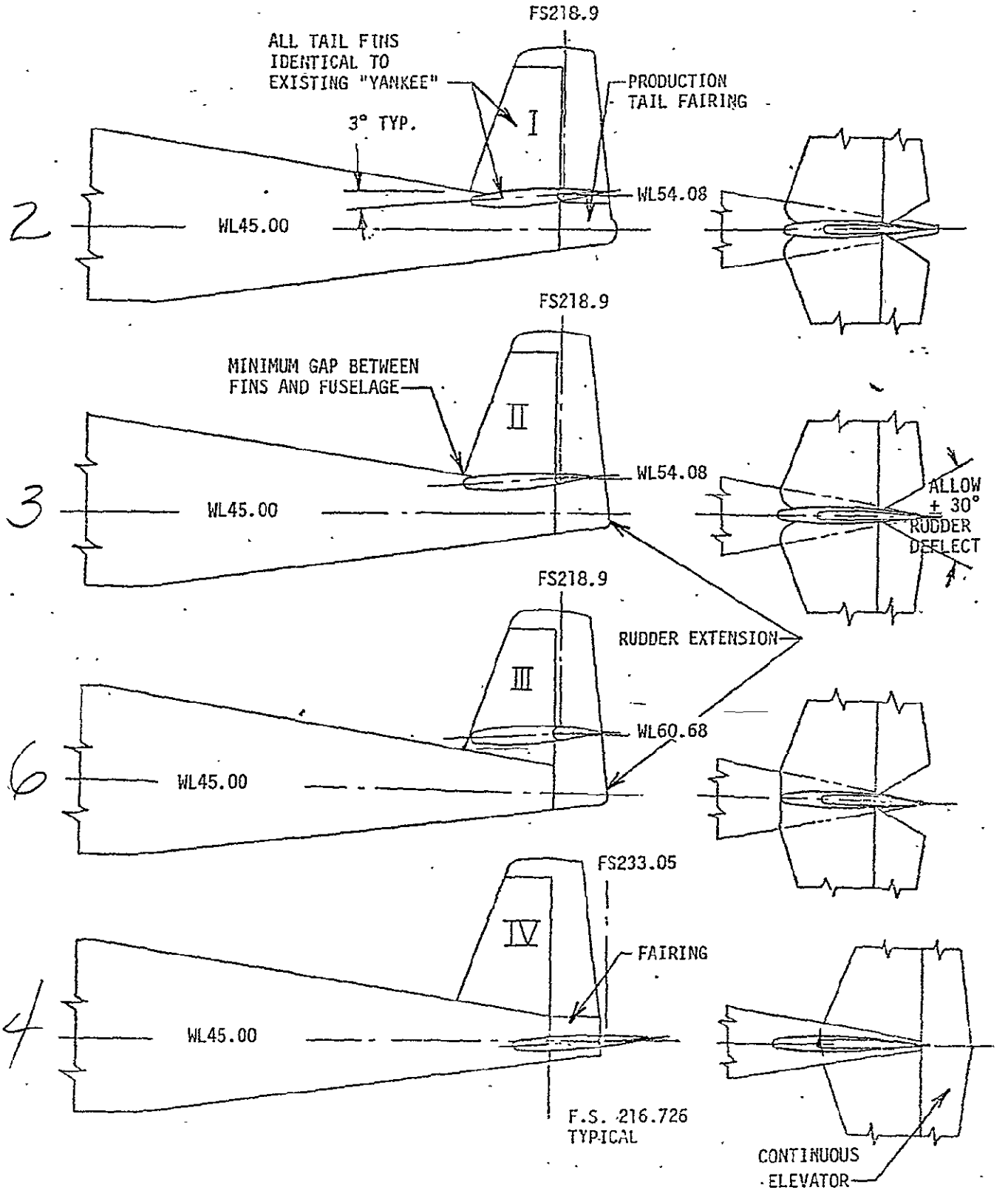

Figure 2b. Empennage Configurations

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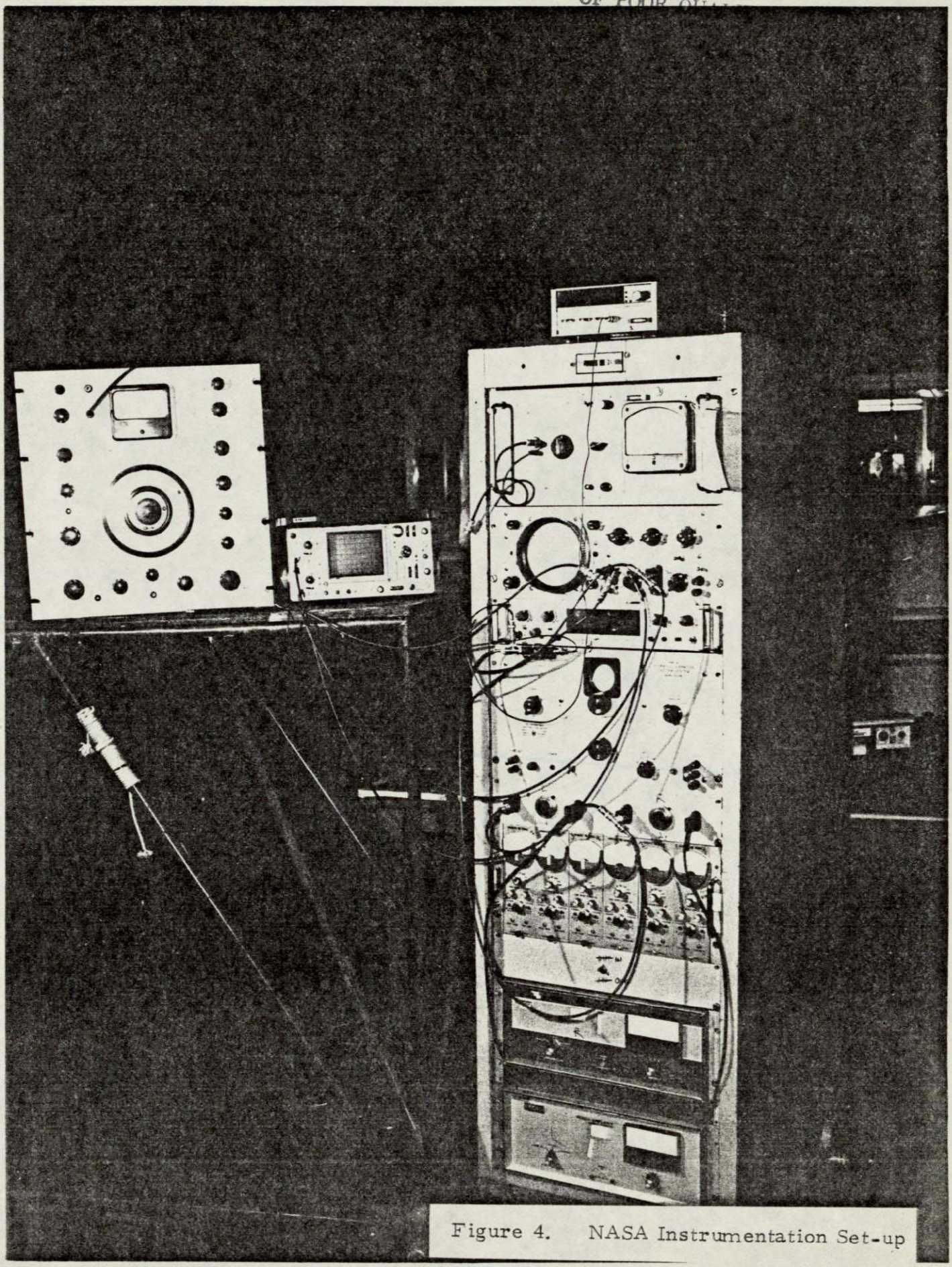
L-77-1242

Figure 3. Spin Chute Installation



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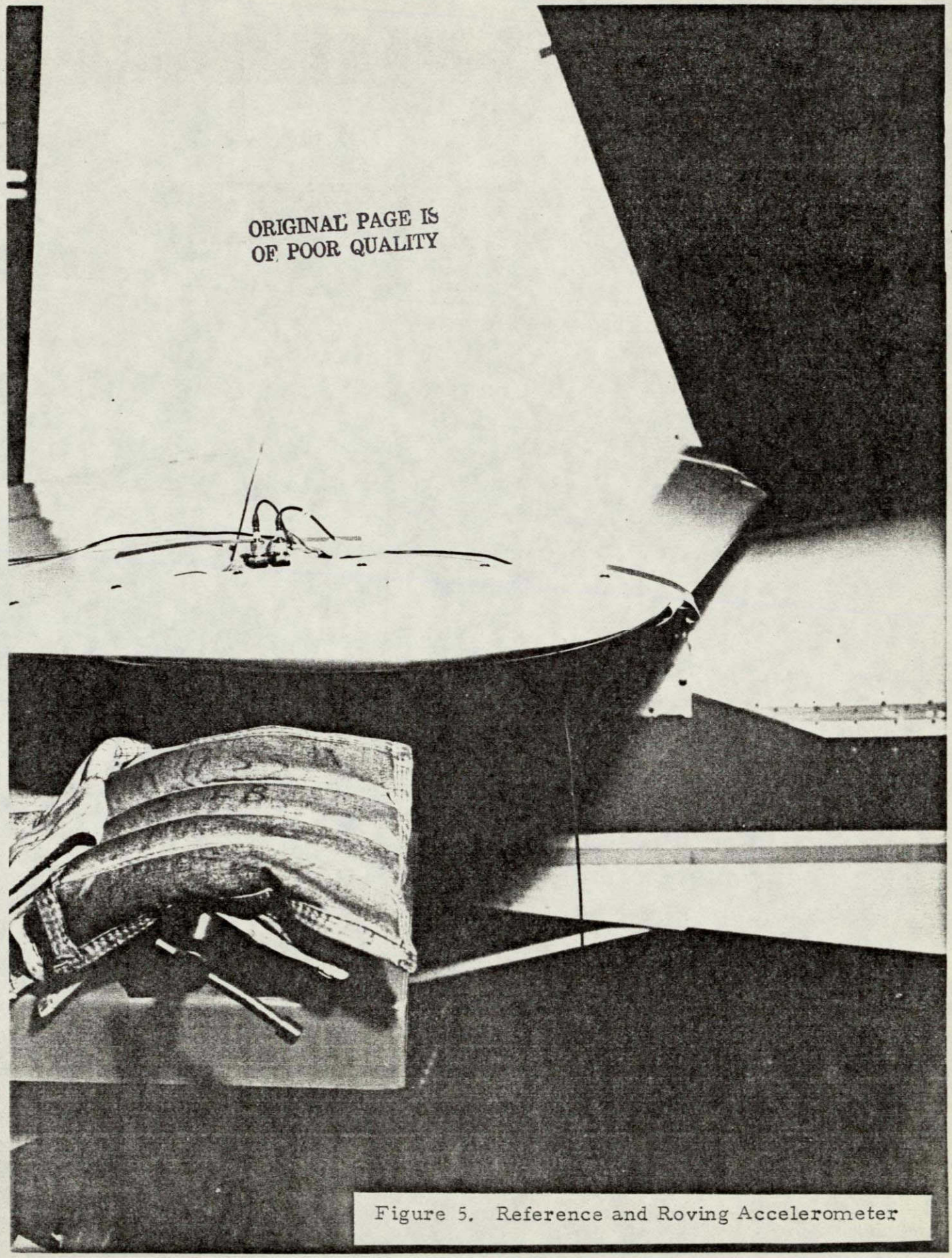
L-77-1288

Figure 4. NASA Instrumentation Set-up



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L-77-1293

Figure 5. Reference and Roving Accelerometer

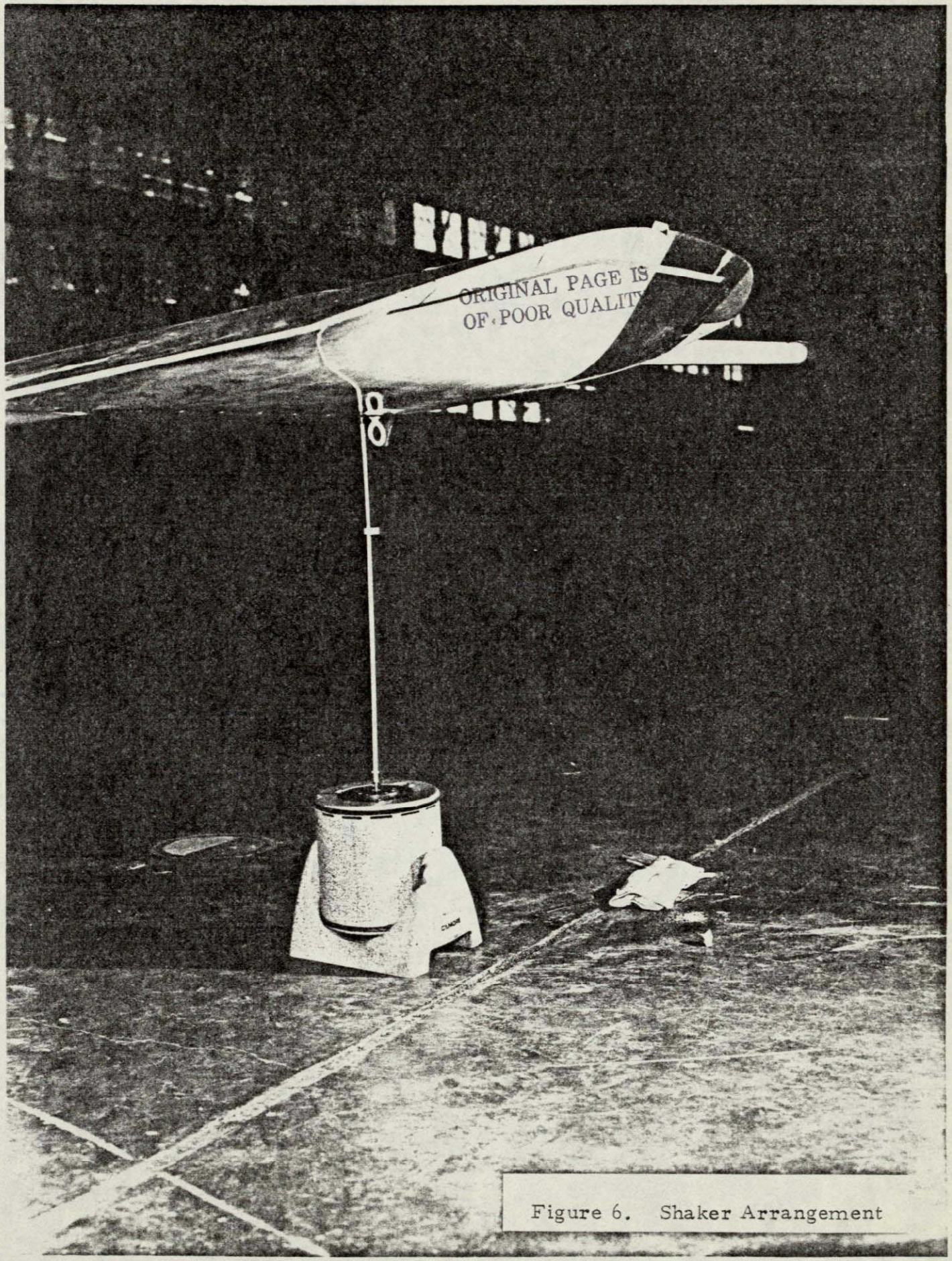

Figure 6. Shaker Arrangement

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1-77-1294

NASA
L-77-1284

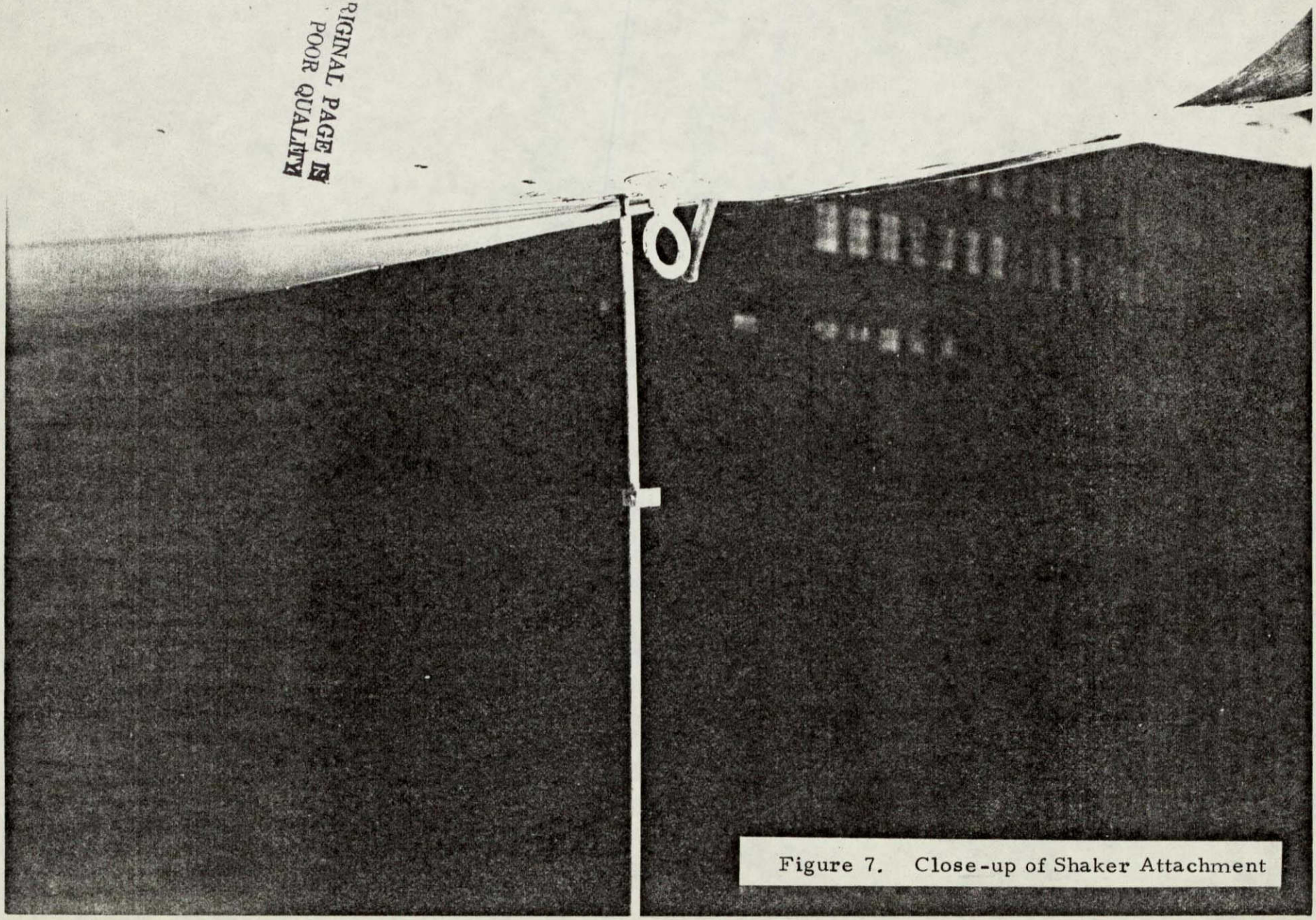

Figure 7. Close-up of Shaker Attachment

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L-77-1295

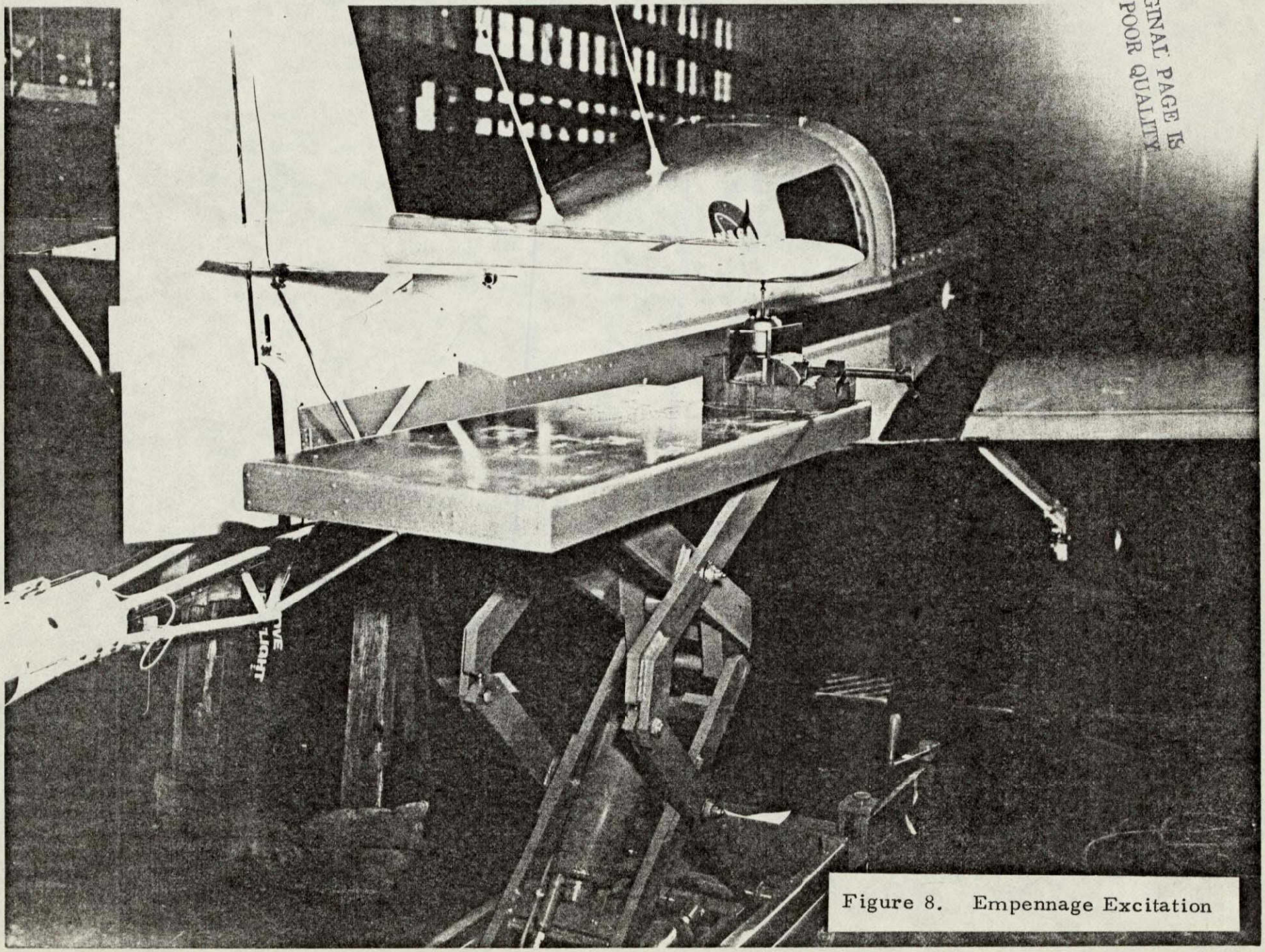


Figure 8. Empennage Excitation

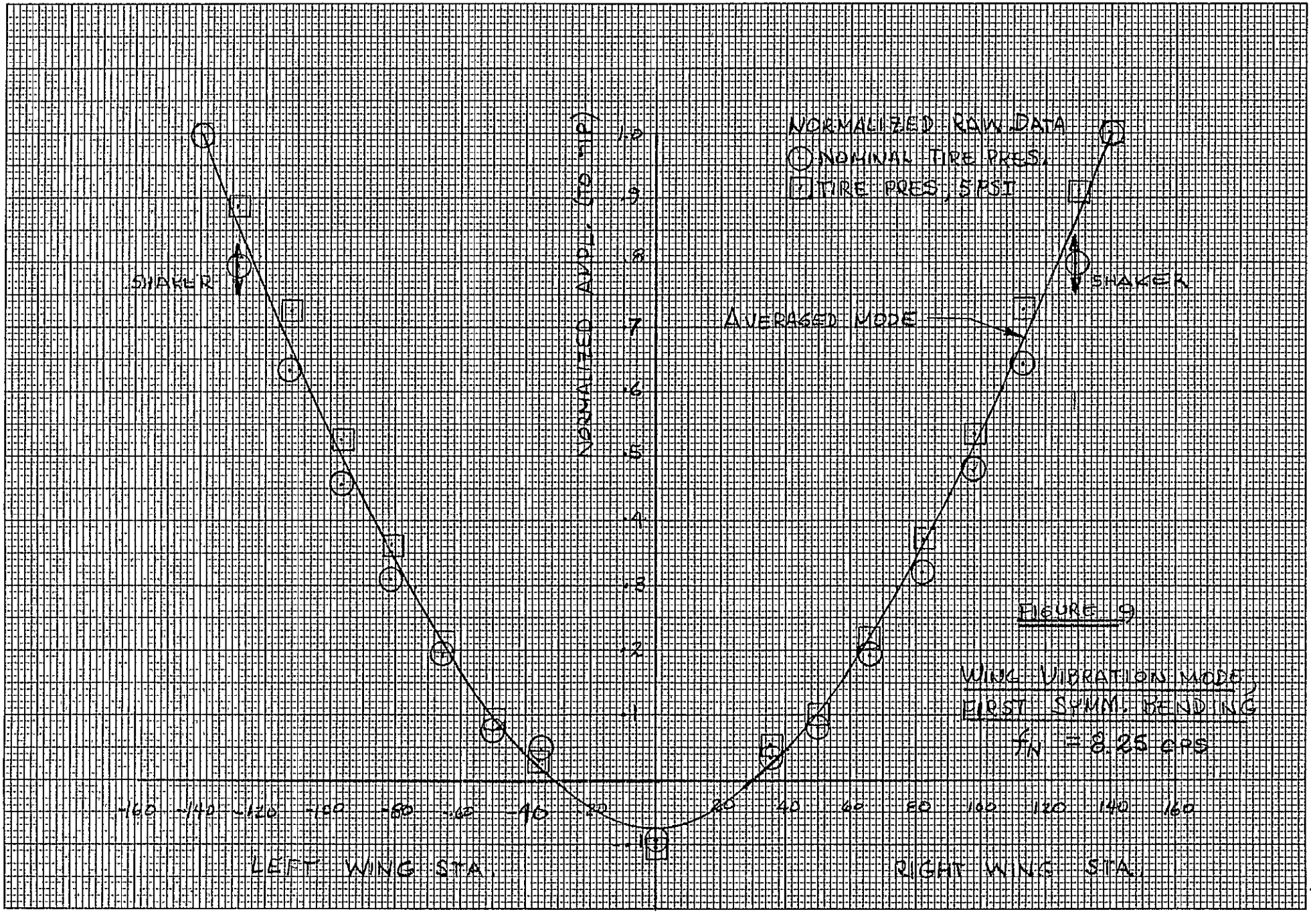
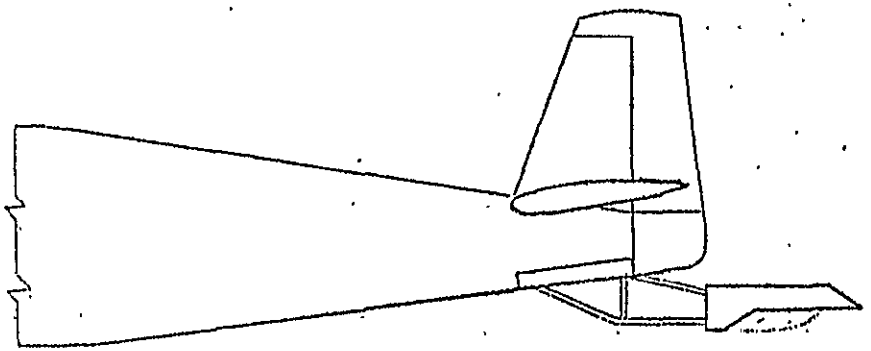


FIGURE 9

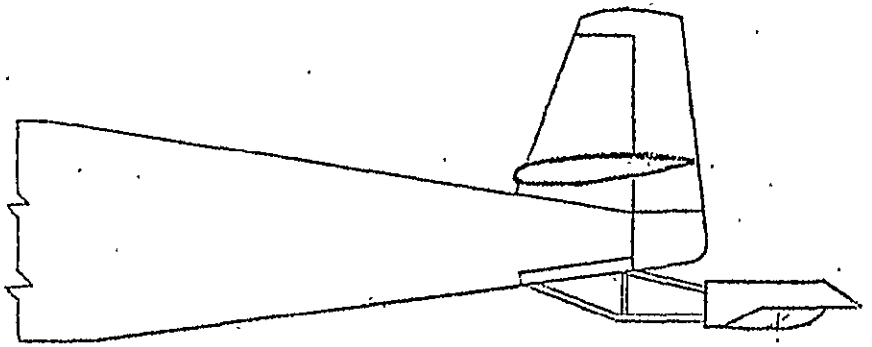
WING VIBRATION MODE 2
FIRST SYMM. BENDING
f_N = 8.25 CPS

FIGURE 10
WING STRIP MODELING

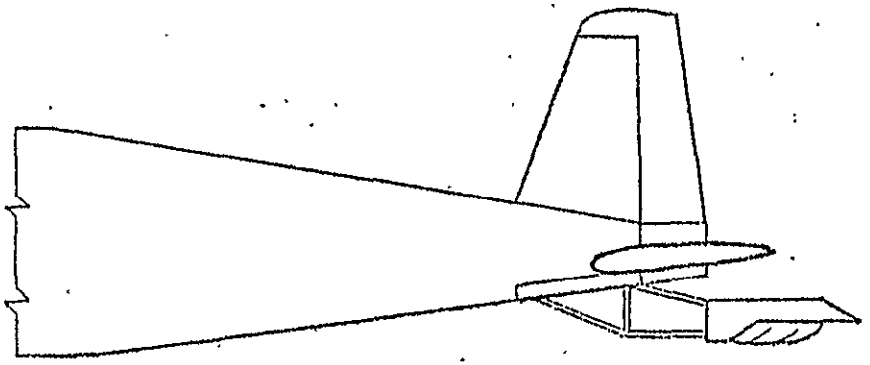
AIRCRAFT MODIFICATION WEIGHT AND BALANCE



CONFIGURATION I & II



CONFIGURATION III



CONFIGURATION IV

FLIGHT CONFIG.	MODIF. WEIGHT	C.G. LOCATION	
		W.L.	F.S.
I 2	35.9#	39.2	221.4
II 3	35.9	39.2	221.4
III 6	35.9	39.7	221.4
IV 4	39.1	39.3	221.5

AIRCRAFT MODIFICATIONS CONSIST OF PARACHUTES, DEPLOYMENT MECHANISM, SUPPORT AND TRUSS ASSEMBLY, FUSELAGE MODS, AND HORIZONTAL AND VERTICAL TAIL MODS.

FIGURE 11

ORIGINAL PAGE IS
OF POOR QUALITY

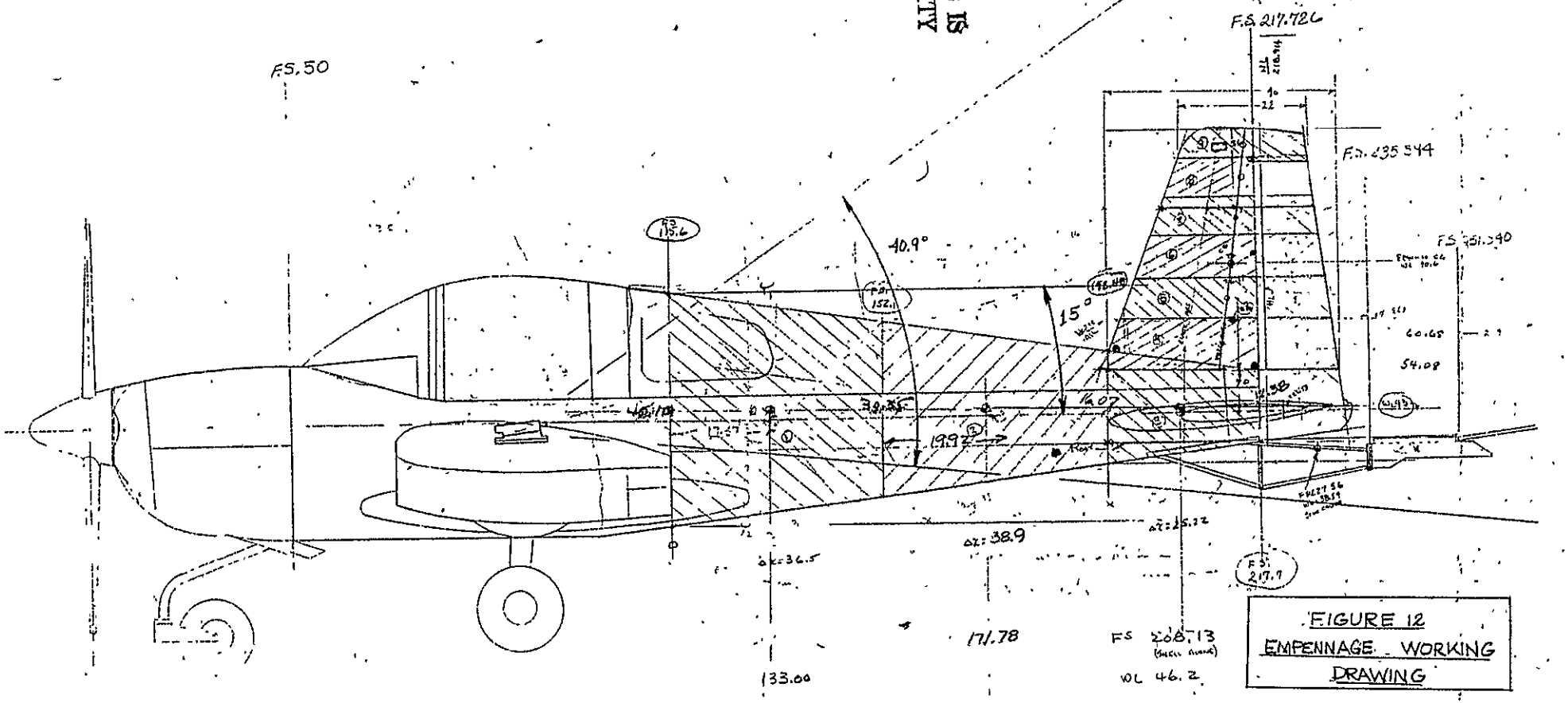
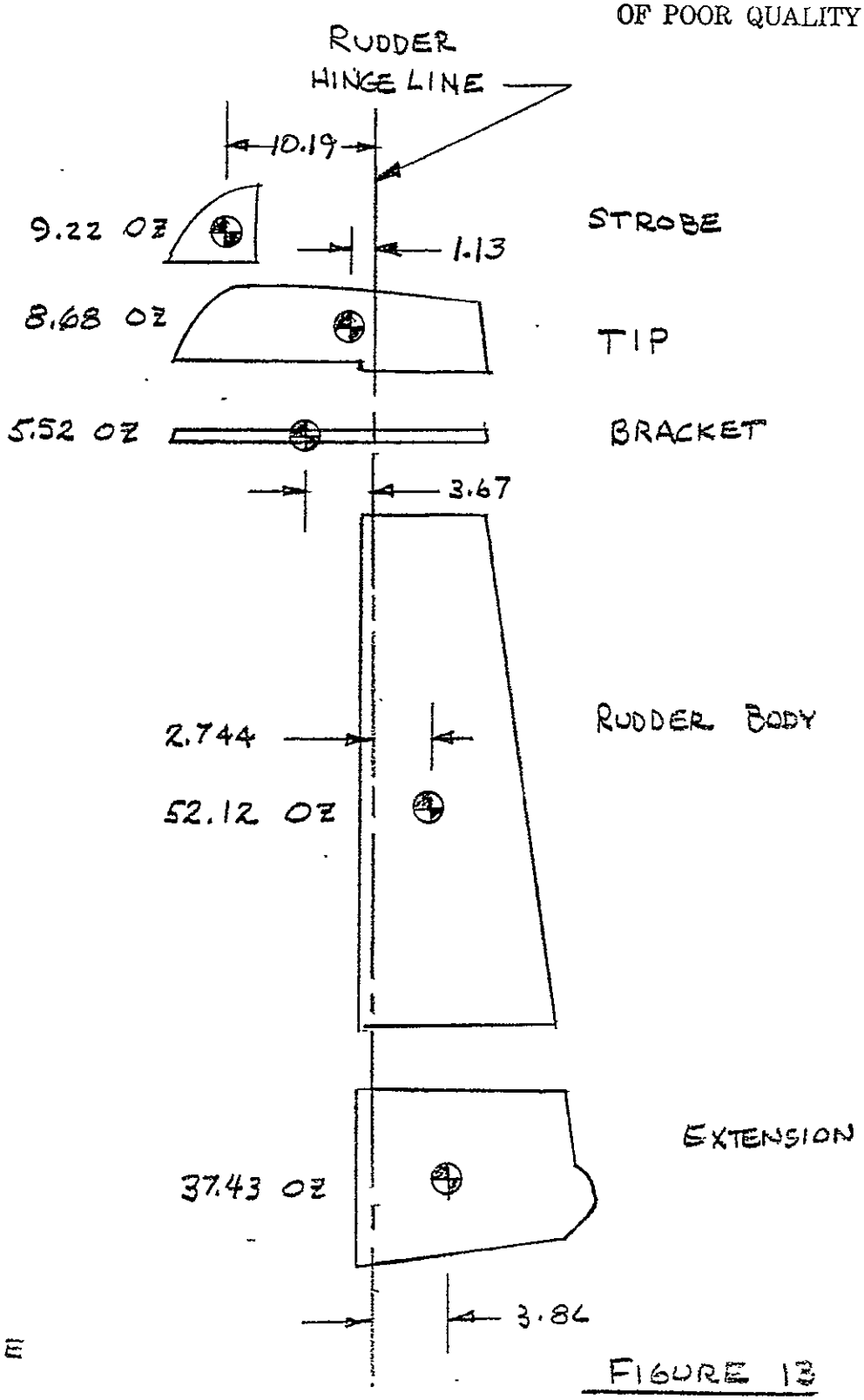


FIGURE 12
EMPENNAGE WORKING
DRAWING



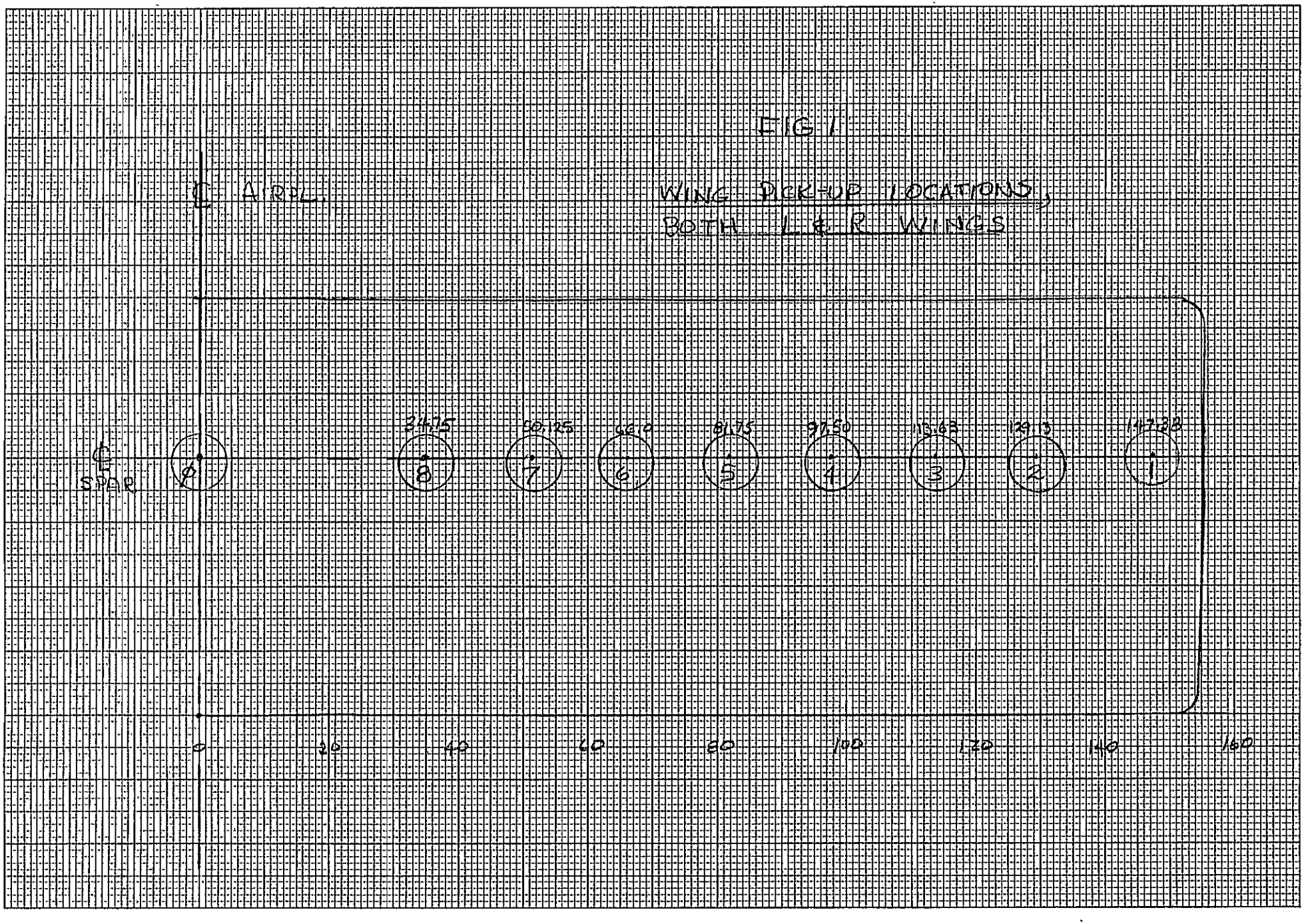
NOTE:
No SCALE
WEIGHTS:
SHORT RUDDER = 75.54 OZ
LONG RUDDER = 112.97 OZ

FIGURE 13
RUDDER WEIGHT
BREAKDOWN

IV.A.1 Wing

FIG 1

WING PICK-UP LOCATIONS,
BOTH L & R WINGS



DATE

OBSERVER

OUT - OF - PHASE

f	h	f	h	f	h	f	h
6.18	.32	17.67	.31	30.40	.21	42.92	.64
6.44	.30	17.99	.27	30.96	.23	43.48	.62
6.78	.28	18.18	.25	31.45	.24	44.44	.60
6.98	.26	18.48	.23	31.95	.25	45.66	.58
7.36	.24	18.66	.22	32.05	.24	47.17	.56
7.90	.22	18.83	.20	32.26	.23	49.02	.56
8.33	.20	19.01	.19	32.79	.23	50.25	.59
8.43	.19	19.16	.16	33.22	.23	51.02	.57
8.67	.17	19.34	.12	33.56	.24	51.55	.55
8.89	.16	19.49	.12	33.67	.25	52.36	.57
9.36	.13	20.0	.16	33.90	.28	52.63	.63
9.38	.16	20.0	.16	34.25	.31	53.19	.70
9.39	.21	20.16	.23	34.36	.29	53.76	.73
9.48	.23	20.37	.28	34.72	.32	54.35	.78
9.57	.25	20.53	.30	34.97	.30	54.95	.73
9.79	.18	20.70	.31	35.21	.29	55.25	.70
9.83	.18	21.41	.33	35.59	.27	56.52	.53
8.94	.14	21.37	.34	35.84	.27	55.87	.59
9.52	.24	21.83	.33	36.10	.28	56.50	.53
9.87	.18	22.03	.32	36.63	.33	57.14	.46
10.55	.17	22.22	.31	36.76	.38	57.8	.51
11.40	.16	22.52	.30	37.17	.41	58.14	.57
12.61	.14	22.83	.33	37.59	.25	58.48	.58
13.09	.13	22.99	.30	37.74	.28	59.17	.62
13.62	.11	23.31	.28	38.02	.33	59.52	.71
14.12	.09	23.47	.26	38.17	.34	60.24	.82
14.2	.09	23.64	.30	38.31	.36		
14.47	.08	23.47	.26	38.46	.38		
14.77	.06	23.64	.29	38.76	.40		
14.97	.06	23.92	.24	38.91	.44		
15.48	.05	24.45	.23	39.22	.48		
15.65	.08	24.81	.22	39.53	.51		
15.82	.12	25.13	.20	39.84	.52		
15.95	.17	25.32	.18	40.0	.55		
15.97	.19	25.45	.20	40.0	.58		
16.16	.26	25.64	.24	40.16	.68		
16.31	.34	25.84	.24	40.32	.82		
16.34	.36	26.18	.25	40.65	1.0		
16.5	.46	26.32	.24	40.65	1.0		
16.53	.48	26.46	.23	40.65	.98		
16.64	.52	26.81	.22	40.82	.93		
16.84	.49	27.17	.20	40.98	.89		
17.0	.46	27.47	.20	41.15	.84		
17.15	.42	27.93	.19	41.67	.78		
17.33	.37	28.90	.19	42.19	.72		
17.51	.34	29.59	.20	42.55	.68		

DATE

WING FREQ/AMPL SWEEP

OBSERVER

IN - PHASE

f	h	f	h	f	h	f	h
5.82	.16	18.9	.24	34.60	.24	52.63	.56
6.11	.18	19.08	.26	34.72	.30	53.48	.59
6.28	.20	19.27	.30	34.97	.28	54.05	.59
6.72	.24	19.27	.30	35.21	.28	53.76	.55
6.99	.29	19.42	.32	35.46	.29	54.35	.50
6.98	.33	19.42	.32	35.71	.27	55.56	.50
7.13	.38	19.61	.30	35.97	.30	56.18	.52
7.24	.42	19.72	.26	35.84	.32	57.14	.50
7.31	.44	19.76	.24	36.36	.34	57.47	.45
7.8	.73	19.88	.20	36.50	.37	57.8	.54
7.89	.78	19.92	.19	36.63	.42	58.48	.56
8.01	.87	20.24	.19	36.76	.43	59.17	.54
8.13	.93	20.45	.23	37.04	.44	59.88	.60
8.24	.98	20.58	.23	37.17	.47	60.24	.64
8.61	.98	20.75	.25	37.31	.49	60.60	.67
8.40	1.0	20.92	.26	38.31	.38		
8.59	.98	21.28	.27	38.02	.42		
8.69	.96	21.14	.27	38.46	.38		
8.78	.93	21.6	.27	38.61	.34		
8.9	.89	22.12	.27	38.91	.30		
8.98	.87	22.78	.26	39.06	.28		
9.07	.82	23.09	.28	39.37	.31		
9.17	.78	23.26	.27	39.84	.31		
9.25	.73	23.50	.28	39.84	.33		
9.32	.70	23.58	.24	40.16	.40		
9.37	.66	24.57	.23	40.0	.38		
9.53	.74	25.25	.22	40.16	.46		
9.59	.67	25.58	.28	40.16	.49		
9.73	.65	25.71	.28	40.32	.57		
9.82	.70	26.18	.27	40.49	.66		
9.66	.74	26.60	.24	40.65	.70		
10.03	.65	27.25	.22	40.65	.71		
10.35	.58	28.09	.20	40.98	.68		
10.54	.56	28.74	.18	41.32	.60		
10.91	.52	29.67	.18	41.67	.55		
11.39	.46	30.58	.19	42.37	.52		
11.90	.42	31.15	.20	42.55	.51		
12.41	.38	31.55	.21	43.48	.48		
13.09	.35	32.15	.30	45.45	.46		
13.93	.32	32.47	.17	46.3	.43		
15.63	.29	32.47	.17	47.17	.46		
17.15	.26	33.11	.19	48.31	.50		
18.45	.24	33.44	.20	49.26	.53		
18.94	.24	33.78	.21	50.5	.56		
19.76	.23	34.14	.21	51.02	.57		
19.42	.24	34.60	.23	51.81	.54		

WING (OUT OF-PHASE)

ORIGINAL PAGE IS
OF POOR QUALITY

PERIOD	AMPL	PERIOD	AMPL	PERIOD	AMPL	PERIOD	AMPL	PERIOD	AMPL
161.7	.071	73.4	025	55.6	061	42.6	059	31.3	057
155.3	.067	70.8	021	55.0	057	42.3	067	31.2	054
147.6	.062	70.4	021	54.1	052	42.6	059	31.0	051
143.2	.059	69.1	019	53.6	049	42.3	066	30.5	051
135.8	.055	67.7	014	53.1	046	41.8	055	30.1	051
126.6	.050	66.8	014	52.6	042	40.9	051	29.8	054
120.1	.045	64.6	012	52.2	035	40.3	049	29.7	057
118.6	.043	63.9	017	51.7	026	39.8	044	29.5	062
115.4	.039	63.2	026	51.3	027	39.5	041	29.2	069
112.5	.035	62.7	039	50.0	035	39.3	045	29.1	066
106.8	.029	62.6	043	50.0	037	39.0	053	28.8	071
106.6	.037	61.9	058	49.6	051	38.7	054	28.6	068
106.5	.048	61.3	077	49.1	063	38.2	056	28.4	066
105.5	.052	61.2	080	48.7	067	38.0	053	28.1	061
104.5	.057	60.6	103	48.3	070	37.8	052	27.9	061
102.1	041	60.5	108	47.6	075	37.3	049	27.7	062
101.7	041	60.1	118	46.8	077	36.8	046	27.3	074
111.9	0325	59.4	103	45.8	074	36.4	045	27.2	086
105.0	055	59.4	111	45.4	072	35.8	043	26.9	093
101.3	041	58.8	104	45.0	070	34.6	043	26.6	056
94.8	039	58.3	094	44.4	067	33.8	045	26.5	064
87.7	035	57.7	084	43.8	065	32.9	047	26.3	074
79.3	031	57.1	076	43.5	068	32.3	052	26.2	077
76.4	029	56.6	070	42.9	062	31.8	054	26.1	080

SKIN RESONANCE

NASA-Langley Form 10 (AUG 1969)

(OUT-OF-PHASE)

PERIOD	AMPL	PER.	AMPL						
26.0	085	20.4	127						
25.8	091	19.9	132						
25.7	098	19.6	129						
25.5	108	19.4	123						
25.3	115	19.1	128						
25.1	118	19.0	142						
25.0	124	18.8	157						
25.0	131	18.6	165						
24.9	153	18.4	175						
24.8	184	18.2	165						
24.6	225	18.1	157						
24.6	225	18.0	142						
24.6	220	17.9	133						
24.5	210	17.7	119						
24.4	200	17.5	103						
24.3	190	17.3	115						
24.0	175	17.2	129						
23.7	162	17.1	131						
23.5	152	16.9	140						
23.3	145	16.8	160						
23.0	140	16.6	185						
22.5	135								
21.9	130								
21.2	126								

SKID RES

FREQ / AMPL SWEEP (IN PHASE)

SHAKER LOCATION ——

FREQ	AMPL	FREQ	AMPL	FREQ	AMPL	FREQ	AMPL	FREQ	AMPL
25.1	.074	19.0	.127						
24.9	.089	18.7	.133						
25.0	.085	18.5	.133						
24.9	.104	18.5	.114						
24.9	.111	18.6	.123						
24.8	.128	18.4	.112						
24.7	.148	18.0	.113						
24.6	.158	17.8	.118						
24.6	.159	17.5	.113						
24.4	.154	17.4	.101						
24.2	.135	17.3	.121						
24.0	.123	17.1	.127						
23.6	.118	16.9	.122						
23.5	.114	16.7	.134						
23.0	.108	16.6	.143						
22.0	.103	16.5	.151						
21.6	.097								
21.2	.103								
20.7	.112								
20.3	.120								
19.8	.125								
19.6	.128								
19.3	.122								

NASA-Langley Form 10 (AUG 1969)

REFERENCE ACCELEROMETER ——

EMPENNAGE CONFIGURATION ——

FREQ/AMPL SWEEP (IN PHASE) SHAKER LOCATION

(WING)

PERIOD ~~FREQ~~	AMPL	~~FREQ~~	AMPL	~~FREQ~~	AMPL	~~FREQ~~	AMPL	~~FREQ~~	AMPL
171.8	.03 6	108.1	.165	52.9	.053	42.5	.063	28.9	.053
163.8	.04.1	107.3	.158	52.4	.058	42.4	.055	28.8	.067
159.3	.04.5	106.7	.148	51.9	.067	40.7	.051	28.6	.064
148.9	.055	104.9	.167	51.9	.067	39.6	.049	28.4	.062
142.9	.06 5	104.3	.151	51.5	.072	39.1	.062	28.2	.066
143.2	.07 5	102.8	.147	51.5	.0725	38.9	.062	28.0	.060
140.3	.08.5	101.8	.157	51.0	.067	38.2	.060	27.8	.068
138.1	.09 5	103.5	.167	50.7	.058	37.6	.055	27.7	.071
136.8	.10 0	99.7	.146	50.6	.054	36.7	.050	27.5	.077
128.2	.165	96.6	.131	50.3	.046	35.6	.045	27.4	.083
126.8	.176	94.9	.126	20 Hz 50.2	.043	34.8	.041	27.3	.095
124.8	.195	91.7	.116	49.4	.042	33.7	.0395	27.2	.096
123.0	.21	87.8	.104	48.9	.051	32.7	.043	27.0	.098
121.4	.22	84.0	.094	48.6	.051	32.1	.044	26.9	.105
116.1	.22	80.6	.086	48.2	.0565	31.7	.048	26.8	.111
119.0	.225	76.4	.079	47.8	.059	31.1	.045	26.1	.086
116.4	.22	71.8	.071	47.0	.061	30.8	.039	26.3	.095
115.1	.215	64.0	.065	47.3	.060	30.8	.038	26.0	.085
113.9	.21	58.3	.059	46.3	.061	30.2	.042	25.9	.077
112.3	.2	54.2	.054	45.2	.060	29.9	.045	25.7	.067
111.4	.195	52.8	.053	43.9	.059	29.6	.047	25.6	.064
110.3	.185	53.3	.052	43.3	.062	29.3	.048	25.4	.069
109.1	.175	54.3	.054	43.0	.060	28.9	.051	25.1	.069

NASA-Langley Form 10 (AUG 1969)

REFERENCE ACCELEROMETER

EMPENNAGE CONFIGURATION

WING SHAKE TEST

REF ACC → 1L

169

MODE = 1 SYM BEND (1)

SIMULATED TIP CAMERA & FDV

WING STATION	AMPL (#2)	PHASE
1L	~~1.69~~ 1.68	IN
2L	~~1.34~~ 1.32	+
3L	1.016	+
4L	.765	+
5L	.52	+
6L	.32	+
7L	.125	±
8L	.088	±
8R	0.065	±
7R	0.142	±
6R	0.348	+
5R	0.58	IN
4R	0.86	IN
3R	1.16	IN
2R	1.44	IN
1R	1.81	IN
Ø	.175	±

RIGHT SHAKER AT 2R

LEFT SHAKER AT 2L

#3 ⇒ REF ACC

#2 ⇒ ROVING ACC

+ ⇒ IN PHASE

— ⇒ OUT OF PHASE

FREQ = 8.2

T = 122,550

C3

NASA-Langley Form 10 (AUG 1969)

CONFIGURATION - PER WT & BAL

TAIL = 4

TIRE PRESSURE 24 PSI

NG SHAKE TEST MODE 1 SYM BEND

PER (1) TIRE PRESSURE = 5 PSI

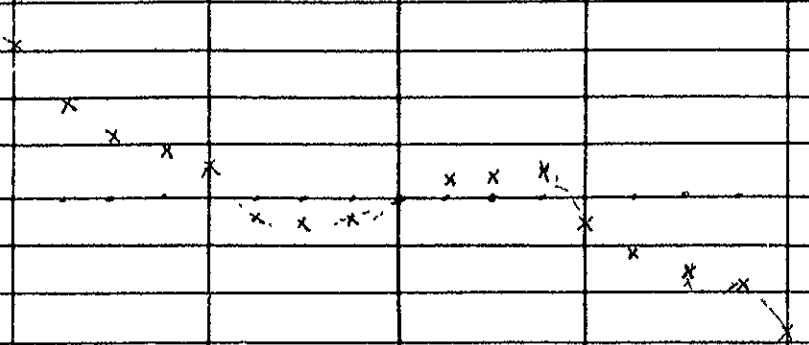
WING STATION	AMPL (±2)	PHASE							
1L	1.581	IN	1.0						
2L	1.44	+	.911						
3L	1.15	+	.727						
4L	0.85	+	.538						
5L	0.585	+	.370						
6L	0.35	+	.221						
7L	0.155	±	.01						
8L	0.08	90° OUT	.051						
1R	1.578	IN	1.0			FREQ = 8.3			
2R	1.40	IN	.887						
3R	1.165	IN	.738			T = 120.7			
4R	0.83	+	.526						
5R	0.57	+	.361						
6R	0.33	+	.209						
7R	0.135	+	.085						
8R	.075	90° OUT	.047						
ϕ	0.165		1.05						

NASA-Langley Form 10 (AUG 1969)

CHANGED OSCILLATOR (301)

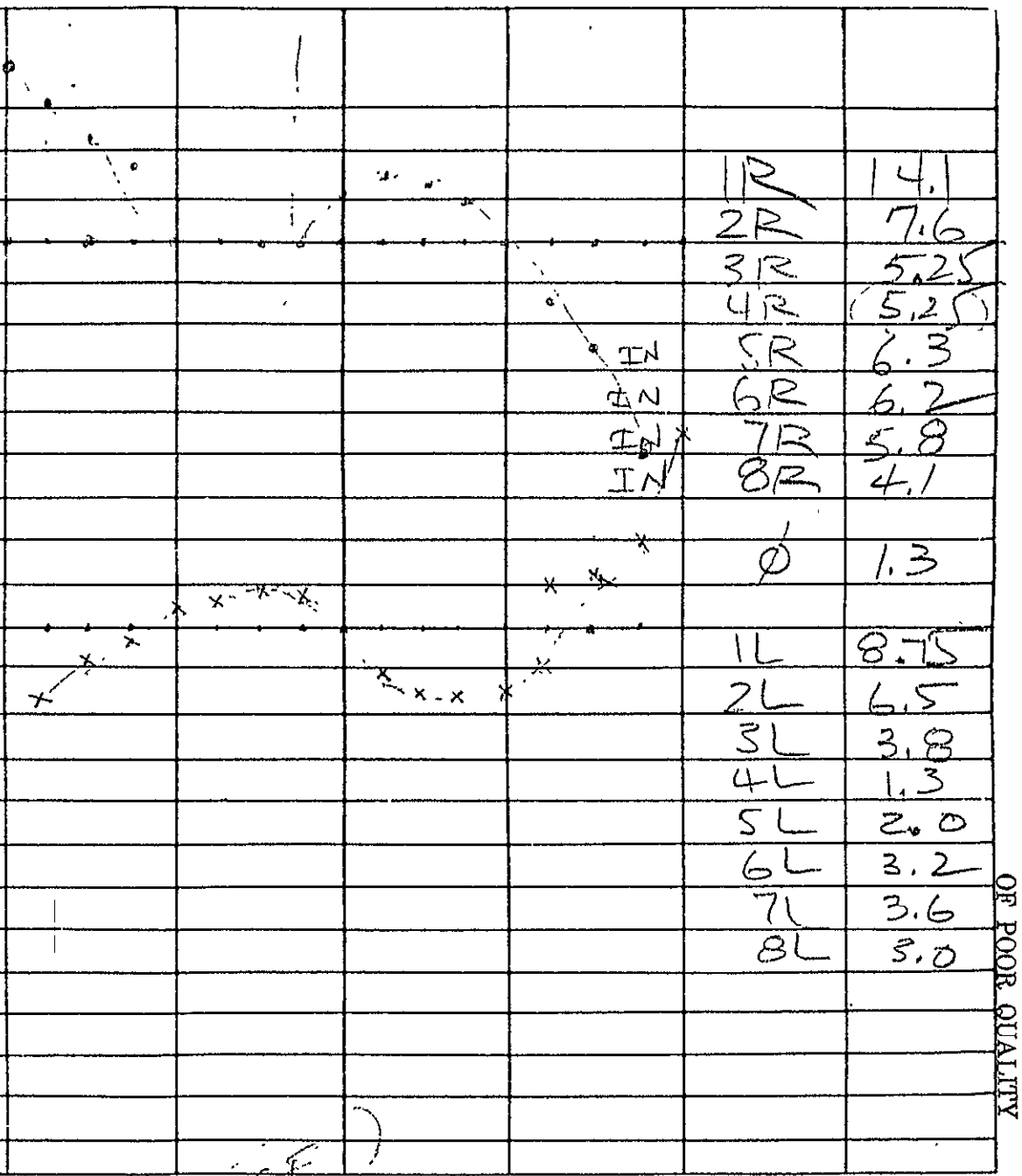
WING UNSYMMETRIC BENDING
f = 41 Hz

WING	AMPL	PHASE
11	12.5	IN
21	7.6	IN
31	5.6	IN
41	3.8	IN
51	2.4	IN
61	1.6	90° OUT
71	2.0	OUT
81	1.6	OUT
0	0.8	90° OUT
12	11.2	OUT
22	7.8	OUT
32	6.2	OUT
42	4.3	OUT
52	2.5	OUT
62	1.1	90° OUT
72	0.8	IN
82	0.6	IN



WING UNSYMMETRIC BENDING MODE

WING STATION	AMPL	PHASE
1L	16.4	IN
2L	12.5	"
3L	9.0	"
4L	7.1	"
5L	4.4	"
6L	3.6	90° OUT
7L	4.0	±
8L	3.7	±
1R	19.0	OUT
2R	10.0	OUT
3R	6.0	OUT
4R	1.5	90° OUT
5R	4.0	IN
6R	5.3	IN
7R	5.8	IN
8R	4.4	IN



1R	14.1
2R	7.6
3R	5.25
4R	(5.25)
5R	6.3
6R	6.2
7R	5.8
8R	4.1
Ø	1.3
1L	8.75
2L	6.5
3L	3.8
4L	1.3
5L	2.0
6L	3.2
7L	3.6
8L	5.0

(VSE)

NASA-Langley Form 10 (AUG 1969)

WING TORSION MODE

	LOCATION	AMPL	PHASE						
	1RF	4.8	IN		1RR	21.0	IN		
	BOOM TIP	90.0	OUT		2RR	20.0	IN		
	2RF	6.0	IN		3RR	18.0	IN		
	3RF	4.2	IN		4RR	15.0	IN		
	4RF	3.4	IN		5RR	13.0	IN		
	5RF	2.7	IN		6RR	10.0	IN		
	6RF	1.7	IN		7RR	7.2	IN		
	7RF	1.1	90° OUT		8RR	5.0	IN		
	8RF	0.8	90° OUT						

NASA-Langley Form 10 (AUG 1969)

I = 50.05

RF IRR

DATE

OBSERVER

UNSYMMETRIC MODE

20 Hz

ζ = 50.0

SUSPECTED BOOM
RESONANCE

HORIZONTAL TAIL

16.8 Hz

2ND SYMMETRIC
WING BENDING

15 Hz

ENGINE FREQ.

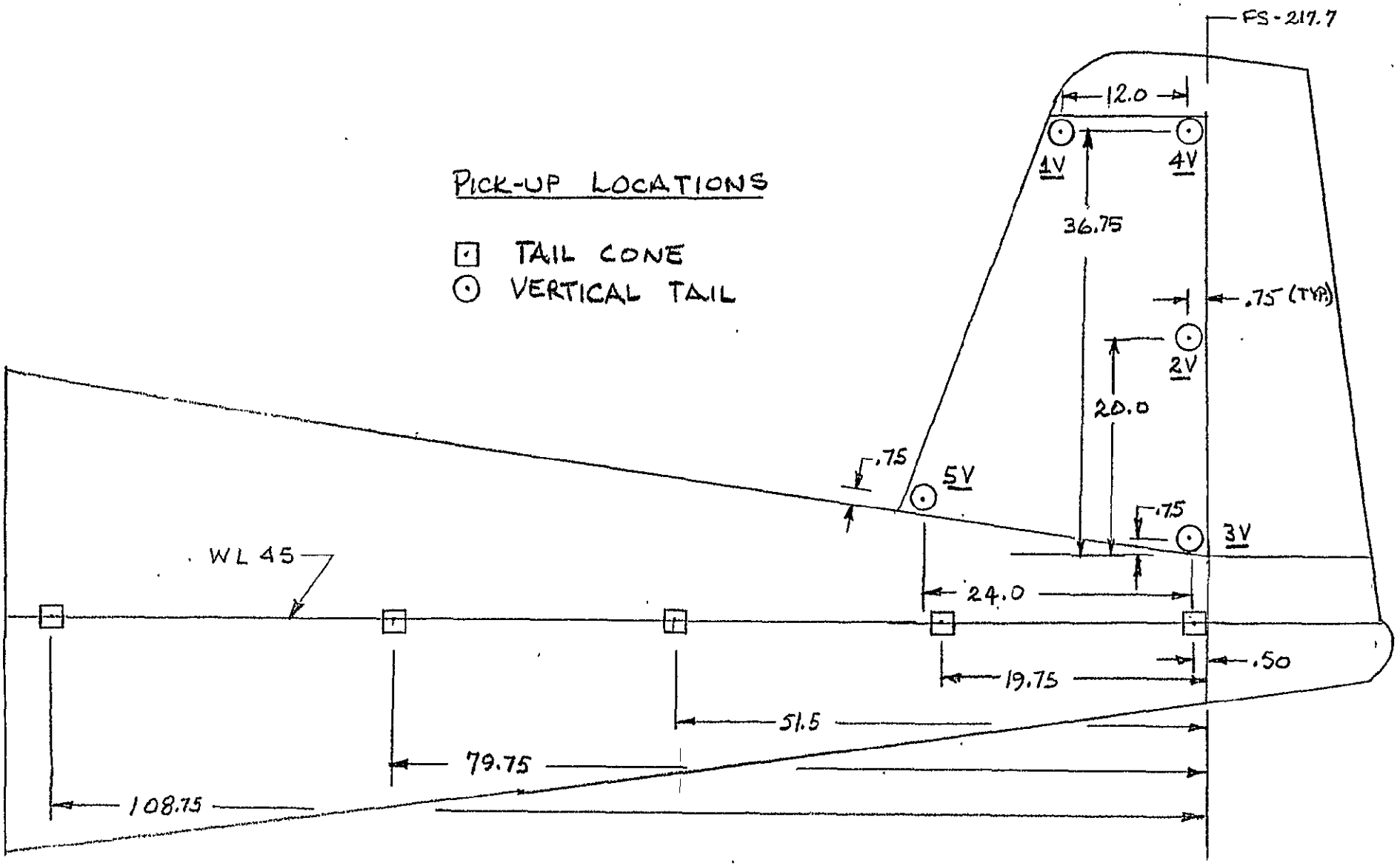
T=67.2

WING FREQ

T=50.6

NASA-Langley Form 10 (AUG 1969)

IV.A.2 Tail 6



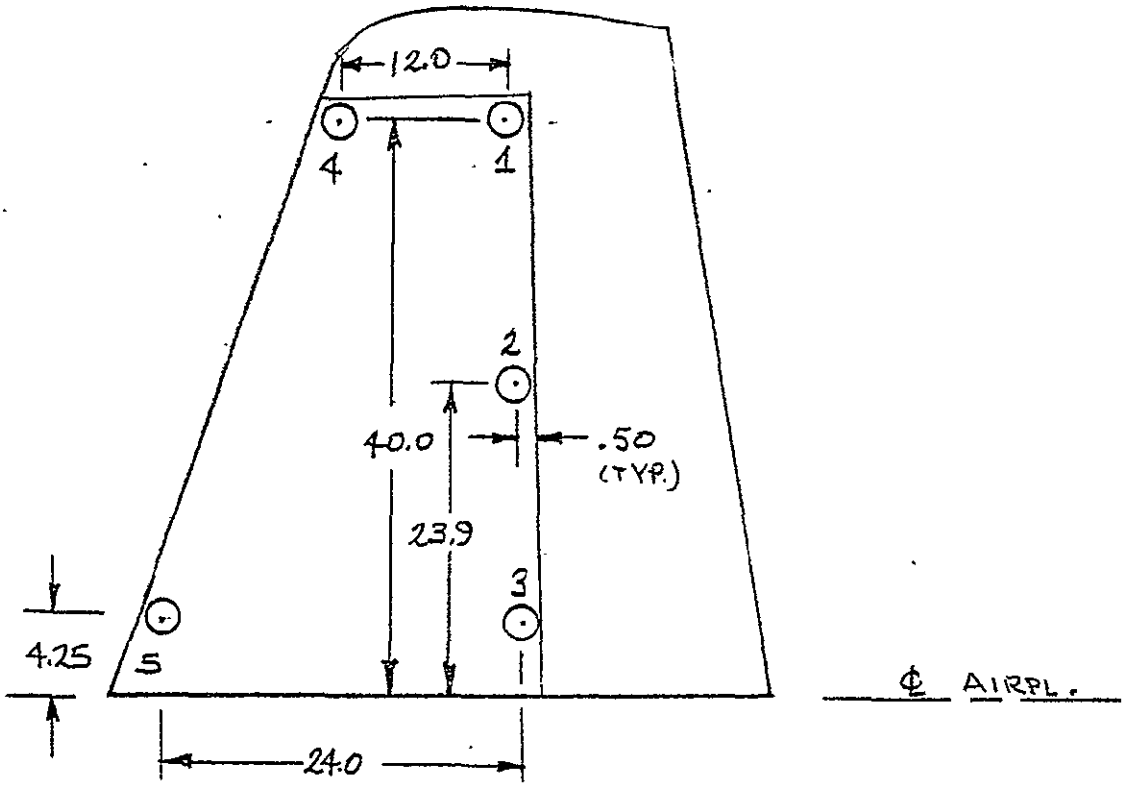
NOTE:
UNITS IN INCHES,
NO SCALE

BY_____ DATE_____
CHKD. BY_____ DATE_____
SUBJECT_____
SHEET NO._____ OF_____
JOB NO._____

BY_____DATE_____ SUBJECT_____ SHEET NO._____OF_____

CHKD. BY_____DATE_____ _____ JOB NO._____

_____ _____ _____



NOTE -
UNITS = INCHES
NO SCALE

HORIZONTAL PICK-UP LOCATIONS

HT #6

FIN BENDING

	1L	19.0	OUT						
	2L	7.4	OUT						
	3L	1.6	OUT						
	1V	6.2	IN						
	2V	2.1	OUT						
	3V	2.6	OUT						
	6V	0.8	IN						

NASA-Langley Form 10 (AUG 1969)

T = 23.5

REF IV

HORIZONTAL TAIL #6 FUSELAGE TORSION

	1V	6.8	IN						
	2V	3.8	IN						
	3V	1.4	IN						
	6V	1.3	OUT						
	1L	5.2	IN						
	2L	2.8	IN						
	3L	0.8	IN						

NASA-Langley Form 10 (AUG 1969)

$\bar{I} = 59.8$ REF 1V

RT #6 T= 69.1

WING									
3R IE	5.0	OUT							
		REF ACC @ 6V							

NASA-Langley Form 10 (AUG 1969)

HORIZONTAL TAIL #6 FUSELAGE SIDE BENDING

LOCATION	AMPL	PHASE

T = 69.07 sec.

AMPL = 18.0

STABILIZER

YAW

N = 35.5

NASA-Langley Form 10 (AUG 1969)

T =

HORIZONTAL TAIL #6 STABILIZER YAW

T= 33.67

REF ACC @ 6V

4RLE 3.0 OUT

6V 14.0 IN

LONGITUDINAL TAIL #2 FUSELAGE VERTICAL BENDING

LOCATION	AMP	PHASE							
1L	1.6	IN		4F	5.5	OUT	3F BOTTOM	6.0	IN
2L	1.2	IN		5F	14.0	OUT	FIREWALL BOTTOM		90° OUT
3L	.9	IN		TOP COWL	7.4	±			
1R	1.7	IN		TOP SPINNER	5.7	±			
2R	8.2	IN		WING 1R	4.8	IN			
3R	.8	IN		WING 8R	3.3	OUT			
1V	1.4	IN		WING 1L	4.0	IN			
4R	1.4	IN		WING 8L	2.8	OUT			
5R	8.0	IN		∅	4.3	OUT			
2F	1.2	IN		BOTTOM COWL	4.5	IN			
3F	1.5	IN		WING TE	5.5	OUT			

NASA-Langley Form 10 (AUG 1969)

REF ACC @ 1R T = 41.25

HORIZ TAIL #2 FIN BENDING

TAIL LOCATION	AMPL	PHASE							
1R	15	OUT		1L	7.6	IN			
2R	5.5	OUT		2L	3.7	IN			
3R	2.2	90° OUT		3L	1.7	90° OUT			
4R	14.0	OUT							
7R	3.2	90° OUT		7V	6.2	IN			
6V	1.2	OUT							
5V	2.6	OUT							
4V	13.0	OUT		NOTE: 7V ON SPIN CHUTE					
3V	1.1	90° OUT		MOUNT (SIDE OF CHANNEL)					
2V	5.8	OUT							
1V	13.0	OUT							

ORIGINAL PAGE IS OF POOR QUALITY

NASA-Langley Form 10 (AUG 1969)

REF ACC @ 1L T=24.61

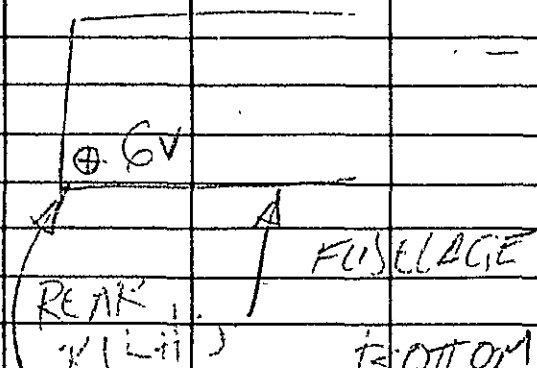
HORIZONTAL TAIL #2 — FUSELAGE TORSION

LOCATION	AMPL	PHASE
1R	3.2	OUT
2R	4.4	OUT
3R	1.4	OUT
4R	7.6	OUT
5R	1.2	OUT
1L	10.6	IN
2L	3.8	IN
3L	1.4	IN
1V	8.5	IN
2V	8.5	IN
3V	2.6	IN
4V	8.2	IN

LOCATION	AMPL	PHASE
5V	1.8	IN
6V	0.6	90° OUT

NOTE

6V @ F.S. 128.376



NASA-Langley Form 10 (AUG 1969)

T = 1.1.94

REF ACC @ 1L

HORIZONTAL TAIL #2 FUSELAGE SIDE BENDING

TAIL LOCATION	AMPL	PHASE
7V	24.5	IN
1V	24.0	OUT
2V	12.0	OUT
3V	5.7	90° OUT
4V	25.0	OUT
5V	4.5	OUT
6V	12.0	IN
WING L.E. (3R)	2.6	OUT
WING L.E. (3L)	2.1	IN

FUSELAGE		
3F BOTTOM	4.7	IN
4F BOTTOM	2.5	90° OUT
5F SIDE	11.0	OUT
FIREWALL BOTTOM	1.8	OUT
COWL SIDE	3.5	OUT
SPINNER	5.5	IN
HOR. STAB.		
4R L.E.	11.0	IN

NASA-Langley Form 10 (AUG 1969)

REF ACC @ 1R

t = 46.81

HT #2 STABILIZER YAW

	LOCATION	AMPL	PHASE						
	4R LE	20.0	IN		WING				
	1V	20.8	±		3R LE	2.4	OUT		
	2V	18.0	±						
	3V	15.0	IN						
	4V	27.0	±						
	5V	4.0	±						
	6V	20.0	IN						
	7V	28.0	IN						
	3F BOTT	11.0	IN			REF ACC @ 6V			
	4F BOTT	9.0	IN						

NASA-Langley Form 10 (AUG 1969)

T = 35.89

[illegible]ONTAL TAIL #2 ELEVATOR TWIST

[illegible] PHASE

[illegible] TORSION

$\tau = 4295$

IN-PHASE

CONTROL COLUMN FREQ.

$\tau = 20.29$

HORIZ TAIL

SECOND VERTICAL

BENDING

$\tau = 20.40$

T:

IV.A.4 Tail 3

HORIZONTAL TAIL #3 RUDDER TORSION

	LOCATION	AMPL	PHASE						
							CONTROL COLUMN		
							$\tau = 33.43$		
	RUDDER	TORSION							
		$\tau = 9.43$							

$\tau =$

REF ACC @ BOTTOM OF RUDDER ABOVE

TAIL #4

TAIL LOCATION	AMPL	PHASE		TAIL LOCATION	AMPL	PHASE	FUSE LOCATION	AMPL	PHASE
1L	34.0	IN		1V	4.8	OUT	1 SIDE	4.4	OUT
2L	15.9	IN		2V	2.1	OUT	2 1.2	3.9	OUT
3L	4.4	OUT		3V	0.8	90° OUT	3 .9	3.6	OUT
							4 .6	3.3	OUT
1R	41.0	IN		1R	11.0	IN	5 0	2.7	OUT
2R	19.0	IN		2R	6.7	90° OUT			
3R	4.9	OUT		3R	3.65	OUT			
FUSELAGE				1L	22.2	IN			
				2L	11.0	IN			
1	7.0	OUT		3L	2.2	90° OUT			
2	6.0	OUT							
3	3.8	OUT							
4	2.0	OUT							
5	3.7	IN							
REF ACC = 2L				REF ACC = 1L			REF ACC = L.E. WING		
HORIZ. TAIL	BEND								
FUSELAGE							FUSELAGE		
VERTICAL					FIN		SIDE		
FUSELAGE	BENDING				BENDING		BENDING		

NASA-Langley Form 10 (AUG 1969)

T = 79.5

T = 31.87

T = 67.24

HORIZONTAL TAIL #4

TAIL LOCATION	AMPL	PHASE		TAIL LOCATION	AMPL	PHASE
1R	37.5	IN		1R	36.0	OUT
2R	21.0	IN		2R	16.5	OUT
3R	3.7	IN		3R	6.0	90° OUT
1L	37.0	OUT		1L	38.5	OUT
2L	21.0	OUT		2L	16.8	OUT
3L	2.85	OUT		3L	4.5	90° OUT
1V	20.0	OUT		1V	18.0	OUT
2V	12.0	OUT		2V	8.5	OUT
3V	3.6	OUT		3V	1.8	OUT
WING						
1R	6.5	OUT				
1L	7.0	IN				
FUSELAGE						
TAIL				FIN BENDING		

NASA-Langley Form 10 (AUG 1969)

T = 31.07

T - 11.33

DATE.

OBSERVER

HORIZONTAL #4

✱ ELEVATOR IN-PHASE MODE

$\zeta = 22.65$

✱ ELEVATOR CONTROL SYSTEM

$\zeta = 57.92$

(ACC ON CONTROL COLUMN)

✱ RUDDER CONTROL SYSTEM

$\zeta = 82.42$

(ACC ON LEFT RUDDER PEDAL)

✱ RUDDER TWISTING

$\zeta = 20.80$

PREPARED BY: RDF	AMERICAN AVIATION	PAGE NO. I-1
CHECKED BY: JL.		REPORT NO. S-AA1B-O
DATE: 20 APR 71	TITLE	MODEL NO. AA-1B
REV.	BASIC DATA	

1- AIRCRAFT MASS DISTRIBUTION

PREPARED BY: RDF	AMERICAN AVIATION	PAGE NO. I-2
CHECKED BY: J.L.		REPORT NO. S-AA1B-0
DATE: 20 APR 71	TITLE: BASIC DATA	MODEL NO. AA-1B
REV.		

DISCUSSION

THE INFORMATION IN THIS SECTION PRESENTS CONSERVATIVE FORWARD AND AFT LOADINGS FOR THE MODEL AA-1B IN TABULAR AND GRAPHICAL FORM. THE SELECTED STRUCTURAL CG ENVELOPE IS ALSO SHOWN. THIS DATA IS FOLLOWED BY A PANEL POINT WEIGHT DISTRIBUTION DEVELOPED USING THE TABULATED LOADINGS. THE CRITICAL POINTS ON THE STRUCTURAL CG ENVELOPE ARE REACHED BY ADDING COUPLES TO THE LOADING CG's - THE COUPLE ADDITIONS BEING MANIFESTED BY SMALL MASS REDISTRIBUTIONS. THE PANEL POINT WEIGHT DISTRIBUTION PROVIDES COMPLETE CG LOCATION INFORMATION AS WELL AS MASS DISTRIBUTION INPUT FOR THE FUSELAGE LOADS ANALYSIS.

THE FOLLOWING POINTS ARE CONSIDERED TO INCLUDE THE CRITICAL STRUCTURAL CG POSITIONS AND WILL BE USED THROUGOUT THE LOADS ANALYSIS. THIS LIST ALSO SUMMARIZES THE PANEL POINT WEIGHT DISTRIBUTION.

	CONDITION	WEIGHT (LBS)	CG LOCATION	
			STATION	W.L.
1)	UTILITY GROSS WEIGHT FORWARD	1600	78.00	37.90
2)	UTILITY GROSS WEIGHT AFT	1600	81.00	38.02
* 3)	REDUCED WEIGHT FORWARD	1300	74.50	37.72
4)	MINIMUM FLYING WEIGHT FORWARD	1187	74.50	37.66
5)	MINIMUM FLYING WEIGHT AFT	1187	81.00	37.66

* THE REDUCED WEIGHT AFT CONDITION (1300 LBS) WILL BE COVERED BY THE MINIMUM FLYING WEIGHT AFT CONDITION (1187 LBS).

MODEL AA-1B AIRCRAFT LOADING ANALYSIS

ITEM	WT.	X	MOMENT	Σ WT.	Σ MOMENT	CG	% MAC	№
EMPTY WT. (REF P. I-7)	965.00	73.15	70,591				13.1	1
OIL (6 QTS)	11.00	39.00	429					
UNUSABLE FUEL (2 GAL)	12.00	84.50	1014					
MINIMUM FUEL (4.78 GAL)	28.70	84.50	2425					
PILOT	170.00	92.50	15,725					
MINIMUM FLYING WEIGHT				1186.70	90,184	76.00	18.9	2
FORWARD EQUIPMENT OPTIONAL INSTRUMENTS, DUAL CONTROLS, GYRO SYST, LANDING LIGHT, ELECTRONICS OPTIONS, AUX. POWER RECEPTACLE, WHEEL FAIRINGS, KX-170 RADIOS (2)	66.45	68.23	4534	1253.15	94,718	75.58	18.0	3
FULL FUEL (24 GAL TOTAL)	103.30	84.50	8729	1356.45	103,447	76.26	19.4	4
COPILOT & PARACHUTES	210.00	92.50	19,425	1566.45	122,872	78.44	23.8	5
BAGGAGE	33.55	120.00	4026	1600.00	126,898	79.31	25.6	6
GROSS WEIGHT (FWD LOADING)				1600.00	126,898	79.31	25.6	6

PREPARED BY: RDF
CHECKED BY: J.L.
DATE: 20 APR 71
REV.

AMERICAN AVIATION

TITLE: BASIC DATA

REPORT NO. S-AA1B-0
MODEL NO. AA-1B

PAGE NO. I-3

FORM AA423

MODEL AA-1B AIRCRAFT LOADING ANALYSIS (CONT'D)

ITEM	WT	X	MOMENT	Σ WT	Σ MOMENT	CG	% MAC	NO
MINIMUM FLYING WEIGHT	1186.70	76.00	90,184				18.9	2
AFT EQUIPMENT OMNI-FLASH BEACON, PITOT HEAT, NARCO ADF-31, TOW BAR, WING LEVELER, SUN CURTAIN, CHILD SEAT, FIRE EXTINGUISHER, SHOULDER HARNESS, EMERG. LOCATOR BEACON, ELECTRONICS OPTIONS, GENAVE α-200, DUAL CONTROLS	64.50	105.21	6786	1251.20	96,970	77.50	21.9	7
BAGGAGE	35.50	120.00	4260	1286.70	101,230	78.67	24.3	8
COPILOT & PARACHUTES	210.00	92.50	19,425	1496.70	120,655	80.61	28.2	9
FULL FUEL (24 GAL TOTAL)	103.30	84.50	8729	1600.00	129,384	80.86	28.8	10
GROSS WEIGHT (AFT LOADING)				1600.00	129,384	80.86	28.8	10

PREPARED BY: RDF
CHECKED BY: J.L.
DATE: 20 APR 71
REV.

AMERICAN AVIATION

TITLE: BASIC DATA

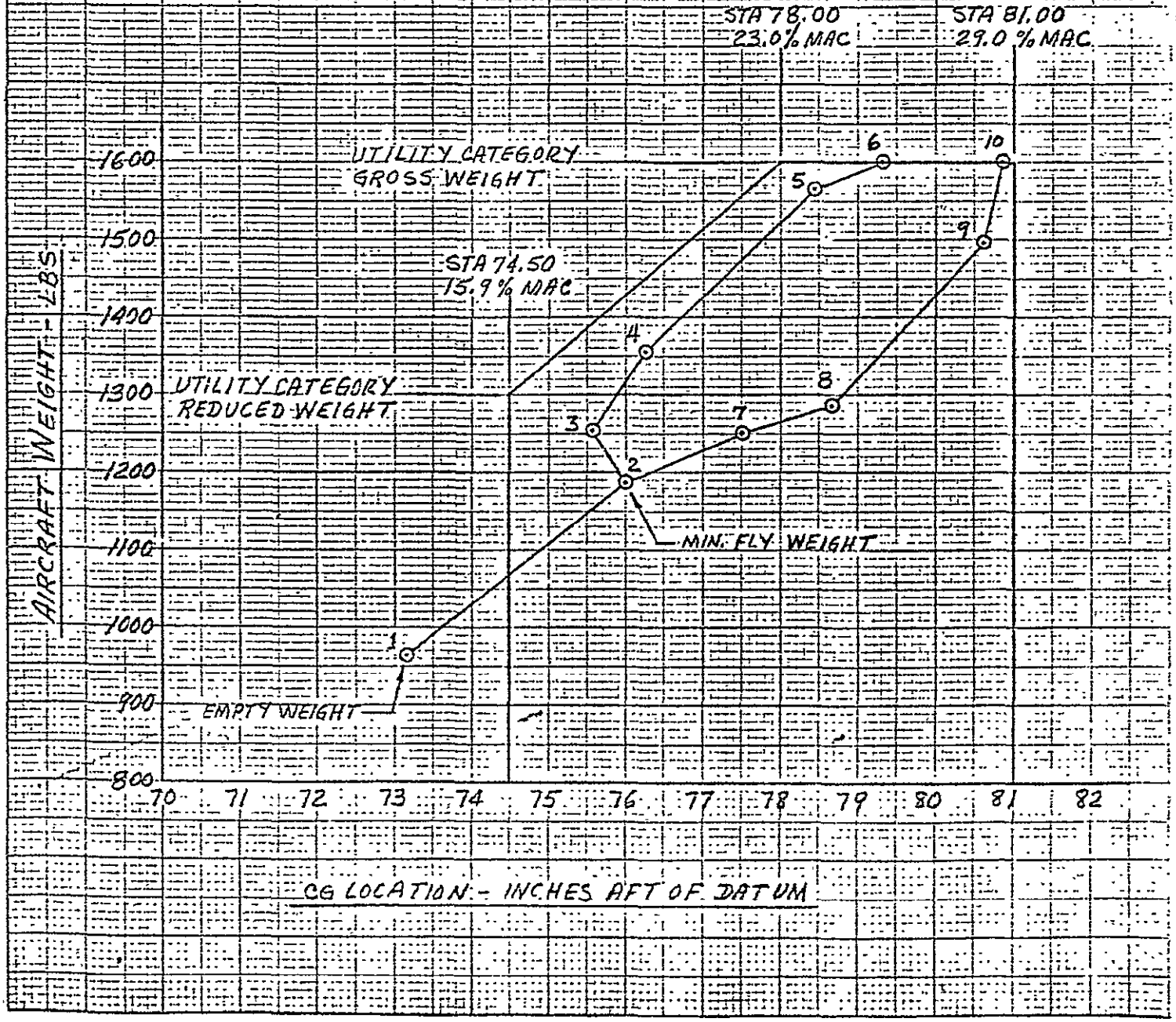
REPORT NO. S-AA1B-0
MODEL NO. AA-1B

PREPARED BY: RDF
CHECKED BY: J.L.
DATE: 20APR71

RPT. NO: S-AA1B-0
MODEL: AA-1B

MODEL AA-1B

STRUCTURAL CG ENVELOPE



CG LOCATION - INCHES AFT OF DATUM

J.L

17 MAY 71

BASIC DATA

Report No. S-AAIB-O

Model AA-1B

PANEL POINT

No.	Item	Wt.	16.00		33.50		50.00		67.25		84.50		104.00		120.00		136.55		164.53		197.81	
			W	Z	W	Z	W	Z	W	Z	W	Z	W	Z	W	Z	W	Z	W	Z	W	Z
1	ENGINE & ACCESSORIES	271.63	.75	37.09	250.07	43.07	20.81	43.48														
2	PROPELLER & SPINNER	20.60	19.66	45.00	.94	45.00																
3	ENGINE MOUNT	10.46			3.59	41.27	6.87	41.27														
4	COWL	18.90	3.37	39.80	12.38	40.16	3.15	40.25														
5	FIREWALL	8.05					8.05	40.02														
6	INSTRUMENT PANEL	3.60					.29	45.22	2.95	47.95	.36	49.48										
7	WINDSHIELD ASSY	8.92					.25	59.61	7.71	59.81	.96	61.14										
8	CANOPY ASSY	19.58							2.52	56.90	11.36	59.41	5.61	59.98	.09	62.00						
9	CENTER SPAR	38.00									38.00	30.86										
10	BAGGAGE FLOOR	5.02											.64	33.65	4.04	34.48	.34	37.50				
11	SIDE WINDOWS	2.23													2.03	57.00	.20	57.00				
12	HORIZ. BLKHD, STA 207	.56																			.35	49.06
13	FUSELAGE PARTS - MISC.	3.25											.01	27.00	.32	27.40	.22	29.52	.37	33.45	.62	45.06
14	FUSELAGE BONDED ASSY.	77.03					13.13	36.56	10.22	34.38	9.52	31.27	11.36	35.11	7.39	42.97	8.97	43.36	8.83	43.18	5.20	42.82
15	WING BONDED ASSY	91.15									80.42	35.63	10.73	35.63								
16	WING TIP	15.30							3.08	40.50	6.95	41.05	4.07	40.08	1.20	38.69						
17	FLAP ASSY	6.59											3.89	30.53	2.70	30.53						
18	AILERON ASSY	13.68											9.47	34.90	4.21	34.90						
19	WING ROOT FAIRING	26.88							5.37	31.32	9.31	30.76	6.29	30.42	5.91	31.17						
20	FUEL TANK PARTS - WING	10.32									10.32	37.48										
21	WING PARTS - MISC.	6.79							.75	33.84	3.28	34.24	2.62	34.44	.14	33.88						
22	VERTICAL TAIL	10.24																			1.96	68.89
23	HORIZONTAL TAIL	21.32																			3.92	44.08
24	FUEL SYSTEM	9.38			.20	42.11	2.16	41.93	1.72	37.35	1.30	36.73										
25	ELECTRICAL SYSTEM	7.51			.93	39.64	3.09	40.96	2.54	44.71	.49	33.55	.46	30.47								
26	BATTERY	25.28			6.80	37.74	18.48	37.74														
27	HEAT & VENT SYSTEM	4.10			.06	35.75	1.31	39.56	2.73	42.50												
28	AIRSPEED SYSTEM	.66							.11	42.70	.11	42.70	.11	42.70	.11	42.70	.11	42.70	.11	42.70		
—																						

WEIGHT DISTRIBUTION

Checked By: J. L.
Date: 5 APR 71
Division:

AMERICAN AVIATION
Title: BASIC DATA

Report No: S-AAIB-0
Model: AA-1B

	216.73		226.00												
	W	Z	W	Z											
1															
2															
3															
4															
5															
6															
7															
8															
9															
10															
11															
12	21	49.06													
13	.46	50.01	1.25	45.12											
14	2.41	42.96													
15															
16															
17															
18															
19															
20															
21															
22	7.16	70.67	1.12	73.19											
23	15.14	44.41	2.26	44.61											
24															
25															
26															
27															
28															
—															

AMERICAN AVIATION

Report No. S-AAIB-0

Model No. AA-1B

Title: BASIC DATA

PANEL POINT

	Item	Wt.	16.00 W	16.00 Z	33.50 W	33.50 Z	50.00 W	50.00 Z	67.25 W	67.25 Z	84.50 W	84.50 Z	104.00 W	104.00 Z	120.00 W	120.00 Z	136.55 W	136.55 Z	164.53 W	164.53 Z	197.81 W	197.81 Z
29	Hydraulic System	2.53					1.76	30.10	.60	29.84	.12	27.39	.05	27.96								
30	Rudder Bars	6.37					3.47	29.44	2.90	29.44												
31	Tee Column	7.21					2.98	39.25	3.52	41.07	.71	46.00										
32	Primary Flight Controls-Misc.	7.70					.34	30.30	.57	27.83	1.41	26.91	2.50	27.80	.93	28.45	.39	33.69	.52	37.48	.53	41.21
33	Flap Control System	7.61									3.10	28.75	4.32	28.67	.19	28.00						
34	Trim Control System	2.32							.22	31.15	.54	30.88	.08	28.17	.08	30.31	.10	32.81	.14	35.84	.12	38.48
35	Nose Landing Gear	30.56			17.67	10.77	11.71	24.70	1.18	27.10												
36	Main Landing Gear	85.27									63.15	18.20	22.12	18.20								
37	Instruments & Equipment	9.04					1.44	39.75	4.52	48.48	1.48	36.17	1.10	32.00	.50	34.62						
38	Interior Appointments	30.89					4.10	37.91	7.80	39.23	5.93	36.41	4.87	38.90	3.62	48.35	4.57	47.05				
39	Seats	19.50									13.00	36.40	6.50	36.40								
40	Paint	11.00	.19	40.00	.95	39.40	.46	34.66	1.25	33.42	2.14	34.14	2.12	35.52	.98	39.09	.64	44.00	.72	44.00	.78	47.58
41	Misc. Parts, Adhesive, Etc.	11.97	1.85	40.00	2.65	40.00	3.84	40.00	2.69	40.00	.94	40.00										
	Empty Weight	965.00	25.82	43.70	295.74	40.83	107.69	37.74	64.95	41.44	264.90	31.74	98.92	32.23	34.44	38.36	15.54	44.01	10.69	42.52	13.43	47.42
	WX = 70,590.94																					
	WZ = 36,339.31																					
	$\bar{X}$ = 73.15 $\bar{Z}$ = 37.66																					
	Oil (8 qts)	11.00			7.33	36.50	3.67	36.50														
	Unusable Fuel (2 gal)	12.00									12.00	31.62										
	Minimum Fuel (4.78 gal)	28.70									28.70	32.62										
	Pilot	170.00									100.26	39.00	69.74	39.00								
	Minimum Flying Weight	1186.70	25.82	43.70	303.07	40.73	111.36	37.70	64.95	41.44	405.86	33.59	168.66	35.03	34.44	38.36	15.54	44.01	10.69	42.52	13.48	47.42
	WX = 90,184.08																					
	WZ = 44,687.21																					
	$\bar{X}$ = 76.00 $\bar{Z}$ = 37.66																					
	Plus Couple (−1775.08)	0.00	4.00	37.66	3.00	37.66	2.00	37.66	3.61	37.66							-3.61	37.66	-2.00	37.66	-3.00	37.66
—																						
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Checked By: J.Z. | AMERICAN AVIATION | Report NAS-AAIB-0
Date: 8 APR 71 | Title: BASIC DATA | Model AA-1B
Revision:

WEIGHT DISTRIBUTION

	216.73		226.00	
	W	Z	W	Z
29				
30				
31				
32	.51	43.16		
33				
34	.58	41.80	.46	41.90
35				
36				
37				
38				
39				
40	.85	50.83	.42	52.34
41				
42	27.32	51.42	5.51	50.90
43				
44				
45				
46				
47				
48				
49				
50	27.32	51.42	5.51	50.90
51				
52				
53				
54	-4.00	37.66		
–				
–				
–				

Checked: JL | AMERICAN AVIATION | Report No: S-AAIB-0
Date: 13 APR 71 | Title: | Model No: AA-1B
Revision

BASIC DATA

PANEL POINT

No.	Item	Wt.	16.00 W	16.00 Z	33.50 W	33.50 Z	50.00 W	50.00 Z	67.25 W	67.25 Z	84.50 W	84.50 Z	104.00 W	104.00 Z	120.00 W	120.00 Z	136.55 W	136.55 Z	164.53 W	164.53 Z	197.81 W	197.81 Z
55	MIN. FLY WT. FORWARD	1186.70	29.82	42.89	306.07	40.70	113.36	37.70	68.56	41.24	405.86	33.59	168.66	35.03	34.44	38.36	11.93	45.93	8.69	43.64	10.48	50.21
56	Wx = 88,497.00																					
57	Wz = 44,687.22																					
58	$\bar{X}$ = 74.50 $\bar{Z}$ = 37.66																					
59	PLUS COUPLE (+5938.67)		-5.00	37.66	-16.00	37.66	-10.00	37.66	-9.00	37.66	-8.99	37.66	–	–	+8.99	37.66	+9.00	37.66	+8.00	37.66	+10.00	37.66
60	MIN. FLY WT AFT	1186.70	20.82	45.15	287.07	40.90	101.36	37.70	55.95	42.05	396.87	33.50	168.66	35.03	43.43	38.22	24.54	41.68	18.69	40.44	23.48	43.26
61	Wy = 96,122.75															37.215						
62	Wz = 44,687.44																					
63	$\bar{X}$ = 81.00 $\bar{Z}$ = 37.66																					
64	MINIMUM FLYING WT.	1186.70	25.82	43.70	303.07	40.73	111.36	37.70	64.95	41.44	405.86	33.59	168.66	35.03	34.44	38.36	15.54	44.01	10.69	42.52	13.48	47.42
65	Wx = 90,164.08																					
66	Wz = 44,687.21																					
67	FORWARD EQUIPMENT																					
68	OPTIONAL INSTRUMENTS	4.31							4.17	50.96	.14	50.96										
69	DUAL CONTROLS	6.83					3.22	33.00	3.41	40.95	.20	45.00										
70	GYROS & VACUUM SYSTEM	13.81			.93	50.80	5.76	50.80	6.04	50.80	1.08	50.80										
71	LANDING LIGHT	1.12	.64	36.00	.48	36.00																
72	ELECTRONICS OPTIONS (1,3)	7.29					1.36	47.67	.60	42.22	.43	35.00	1.77	58.12	.59	43.12	.68	42.04	1.25	44.97	.61	71.50
73	AUX. POWER RECEPTACLE	1.50			.50	33.50	1.00	33.50														
74	NOSE WHEEL FAIRING	3.75			3.34	9.08	.41	9.08														
75	MAIN WHEEL FAIRINGS	6.88									5.40	10.68	1.48	10.68								
76	RADIOS - KX-170 (2 EA.)	20.96					2.67	49.67	18.29	49.69												
77	FUEL TO REDUCED WEIGHT (7.8 GAL)	46.85									46.85	33.60										
78	REDUCED WEIGHT	1300.00	26.46	43.51	308.32	40.40	125.78	38.41	97.46	43.76	459.96	33.37	171.91	35.07	35.03	38.44	16.22	43.93	11.94	42.78	14.09	48.46
79	Wx = 98,676.92																					
80	Wz = 49,038.65																					
81	$\bar{X}$ = 75.90 $\bar{Z}$ = 37.72																					
82	PLUS COUPLE (-1826.94)	0.00	4.00	37.72	3.00	37.72	2.84	37.72	2.97	37.72							-2.97	37.72	-2.84	37.72	-3.00	37.72
—	[illegible]																					

WEIGHT DISTRIBUTION

Checked By: J.L.
Date: 13 APR 71
Revision:

AMERICAN AVIATION
Title: BASIC DATA

Report No. S-AAIB-0
Model No: AA-1B

	216.73		226.00												
	W	Z	W	Z											
55	23.32	53.72	5.51	50.90	LINE 50	PLUS LINE	54								
56															
57															
58															
59	+13.00	37.66													
60	10.32	46.98	5.51	50.90	LINE 50	PLUS LINE	59								
61															
62															
63															
64	27.32	51.42	5.51	50.90											
65					SAME	AS LINES	50, 51, 52								
66															
67															
68															
69															
70															
71															
72															
73															
74															
75															
76															
77															
78	27.32	51.42	5.51	50.90											
79															
80															
81															
82	-4.00	37.72													
—															

By: JL	Title: BASIC DATA	Report No: S-AAIB-0
Date: 16 AP '71		Model No: AA-1B
Revision:		

PANEL POINT

	Item		16.00		33.50		50.00		67.25		84.50		104.00		120.00		136.55		164.53		197.81	
			W	Z	W	Z	W	Z	W	Z	W	Z	W	Z	W	Z	W	Z	W	Z	W	Z
33	REDUCED WEIGHT FORWARD	1300.00	30.46	42.75	311.32	40.37	128.62	38.40	100.43	43.78	459.96	33.37	171.91	35.07	35.03	38.44	13.25	45.32	9.10	44.36	11.09	51.36
24	WX = 96,849.98																					
35	WZ = 49,038.41																					
86	X̄ = 74.50 Z̄ = 37.72																					
27	REDUCED WEIGHT	1300.00	26.46	43.51	308.32	40.40	125.78	38.41	97.96	43.96	459.96	33.37	171.91	35.07	35.03	38.44	16.22	43.93	11.94	42.78	14.09	48.46
[illegible]	WX = 92,676.92																					
[illegible]	WZ = 49,038.65																					
[illegible]	X̄ = 75.90 Z̄ = 37.72																					
91	FULL FUEL (24 GAL TOTAL)	56.45									56.45	36.50										
72	CO-PILOT & PARACHUTES	210.00									123.85	37.00	86.15	39.00								
[illegible]	BAGGAGE	33.55											8.53	40.00	16.78	40.00	8.24	40.00				
92	UTILITY GROSS WEIGHT	1600.00	26.46	43.51	308.32	40.40	125.78	38.41	97.46	43.96	640.26	34.74	266.59	36.50	51.81	38.94	29.46	42.61	11.94	42.78	14.09	48.46
95	WX = 126,897.76																					
[illegible]	WZ = 60,634.69																					
77	X̄ = 79.31 Z̄ = 37.90																					
[illegible]	PLUS COUPLE (-2097.65)	0.00	5.00	37.90	3.50	37.90	3.00	37.90	2.53	37.90							-2.53	37.90	-3.00	37.90	-3.50	37.90
79	UTILITY GROSS WT. FWD	1600.00	31.46	42.62	311.82	40.37	128.78	38.40	99.99	43.81	640.26	34.74	266.59	36.50	51.81	38.94	21.93	43.15	8.94	44.42	10.59	51.95
[illegible]	WX = 124,800.11																					
101	WZ = 60,634.69																					
102	X̄ = 78.00 Z̄ = 37.90																					
	MINIMUM FLYING WEIGHT	1186.70	25.82	43.70	303.07	40.73	111.36	37.70	64.95	41.44	405.86	33.59	168.66	35.03	34.44	38.36	15.54	44.01	10.69	42.52	13.48	47.42
[illegible]	WX = 90,184.08																					
105	WZ = 44,687.21																					
[illegible]	OPT. EQUIPMENT																					
[illegible]	[illegible] - FLASH BEACON	1.04																			.50	71.50
[illegible]	PITOT HEAT (EXCHANGE)	.14							.01	36.31	.13	36.31										
109	ADF (NARCO ADF-31)	10.14					.42	54.62	4.73	53.21	.85	34.69	3.21	28.31	.93	27.67						
—																						
—																						

ORIGINAL PAGE IS OF POOR QUALITY

WEIGHT - DISTRIBUTION

	216.73		226.00													
	W	Z	W	Z												
83	23.32	53.77	5.51	50.90	LINE 78	PLUS LINE	82									
84																
85																
86																
87	27.32	51.42	5.51	50.90												
88					SAME AS	LINES 78,	79, 80									
89																
90																
91																
92																
93																
94	27.32	51.42	5.51	50.90												
95																
96																
97																
98	-5.00	37.90														
99	22.32	54.45	5.51	50.90	LINE 94	PLUS LINE	98									
100																
101																
102																
103	27.32	51.42	5.51	50.90												
[illegible]					SAME AS	LINES 50;51, 52										
105																
[illegible]																
107	.54	71.50														
108																
109																
—																
—																

Ck. By: J.L.
Date: 19 AP
Revision:

AMERICAN AVIATION

Title: BASIC DATA

Report No: S-AA1B-O
Model No: AA-1B

PANEL POINT

			16.00		33.50		50.00		67.25		84.50		104.00		120.00		136.55		164.53		197.81	
		Wt.	W	Z	W	Z	W	Z	W	Z	W	Z	W	Z	W	Z	W	Z	W	Z	W	Z
110	Tow Bar	2.00													.31	38.00	1.69	38.00				
111	Wing Leveler	9.90					.10	49.00	2.58	48.13	.72	33.52	1.85	31.24	1.08	32.29	.78	33.00	.97	33.72	1.53	40.00
112	Sun Curtain-Canopy	2.50									2.18	68.00	.32	68.00								
113	Child's Seat	7.61													3.33	43.00	4.28	43.00				
114	Fire Extinguisher	4.60											3.75	35.00	.85	35.00						
115	Shoulder Harness	2.26													2.03	49.00	.23	49.00				
116	Emerg. Locator Beacon	2.50																			1.10	50.50
117	Electronics Option (1)	4.95					.26	40.00	.30	35.00	.43	35.00	1.77	58.82	.59	43.12	.43	38.00	.56	40.00	.61	71.50
118	Radio (Genave α-200)	5.55					1.10	51.50	4.45	51.50												
119	Dual Controls	6 83					3.22	33.00	3 41	40.95	.26	45.00										
120	Electronic Option (2)	4.48					.76	49.70	.89	33.18	.96	24.01	.88	22.62	.69	22.05	.30	22.00				
121	Baggage	35.50											9.02	40.00	17.75	40.00	8.73	40.00				
122	Co-Pilot & Parachutes	210.00									123.85	39.00	86.15	39.00								
123	Full Fuel (24 GAL TOTAL)	103.30									103.30	36.50										
124	Utility Gross Weight	1600.00	25.82	43.70	303.07	40.73	117.22	37.85	81.32	42.77	638.48	35.22	275.61	36.48	62.00	38.98	31.98	41.94	12.22	41.71	17.22	48.51
125	Wx = 129,384.08																					
126	Wz = 60,837.39																					
127	x̄ = 80.86 z̄ = 38.02 "																					
128	Plus couple (+ 215.96)								-2.22	38.02									2.22	33.02		
129	Utility Gross Wt. Aft	1600.00	25.82	43.70	303.07	40.73	117.22	37.85	79.10	42.90	638.48	35.22	275.61	36.48	62.00	38.98	31.98	41.94	14.44	41.14	17.22	48.51
130	Wx = 129,600.04																					
131	Wz = 60,837.59 "																					
132	x̄ = 81.00 z̄ = 38.02 "																					

WEIGHT DISTRIBUTION

Checked By: J.L.
Date: 19 APR 71
Division:

AMERICAN AVIATION
Title: BASIC DATA

Report No: S-AA1B-0
Model No: AA-1B

Sta.	216.73		226.00												
	W	Z	W	Z											
110															
111	.29	40.00													
112															
113															
114															
115															
116	1.40	50.50													
117															
118															
119															
120															
121															
122															
123															
124	29.55	51.63	5.51	50.90											
125															
126															
127															
128															
129	29.55	51.63	5.51	50.90											
130															
131															
132															

BY _____ DATE _____ SUBJECT WING TIP CAMERA INSTALLATION SHEET NO. _____ OF _____

CHKD. BY _____ DATE 1/27/77 JOB NO. R-456 C BRADSHAW

WEIGHT OF CAMERA INSTALLATION, ONE SIDE ONLY

ITEM	WEIGHT LB's
MOUNTING BRACKET-CAMERA LD-315107	1.048
AIRCRAFT/CAMERA MOUNT ADAPTER R-LC-315109	.915
MOUNTING BRACKET-CAMERA ADAPTER LC-315108	.528
MIRROR MOUNT	.437
CAMERA WITH SPOOL, LESS FILM & LENS	4.688
FILM & LENS ESTIMATE	1.0
TOTAL WT.	8.62 #

12-21-76

N50M Parts — unpainted		grams	ounces
Pushrod 1 (long)	LC-315051	83.0	2.93
Pushrod 2 (long)	LC-315051	83.5	2.95
Pushrod 3 (short)	LC-314756	62.3	2.20
Pushrod 4 (short)	LC-314756	62.6	2.21
Elevator bellcrank, thrusharts + arms (including 2 bolts + bushings)		447.3	15.78
Elevator 4 bellcrank	LC-315101	166.0	5.86
Elevator 4 thrushart (including 2 bolts)		166.5	5.87
Long strut including clevis end bolt (left)	LD-314823	239.9	8.46
Short strut (right)	LD-314823	207.0	7.30
Short strut (left)	LD-314823	207.3	7.31
Top cable #4 tail elevator	LC-315030	142.0	5.01
Bottom cable #4 tail elevator	LC-315030	140.4	4.95
Long strut (right) including bolt, nuts	LD-314823	251.5	8.87
Elevator 5 cover plate, inboard bracket (right)		45.2	1.59
Elevator 6 cover plate, inboard bracket (left)		43.6	1.54
Elevator 6 cover plate (right)	LE-314767	59.5	2.10
Elevator 6 cover plate (left)	LE-314767	59.0	2.08
Vertical fin leading edge cover plate (tail 5)	LX-314817	76.3	2.69
Vertical fin leading edge cover plate (tail 6)	LX-314817	61.3	2.16
Elevator bellcrank (inside fuselage)	LC-314754	144.6	5.10
Thrushart + arm (-)	LC-314755	110.4	3.89
Thrushart + arm (+)	LC-314755	109.7	3.87

12-21-76

Item	Part No.	grams	ounces
Inner sleeve for thrushafts + bellcranks	LX 314817	43.2	1.52
Horizontal tail mounting bracket with fairing mounting blocks		333.7	11.77
Tail 4 elevator center fairing	LC-314717	316.4	11.16
Rear mounting bracket horizontal tail 2,3,4,5	LD-314810	79.6	2.81
Front mounting bracket horizontal tail 2+3 (right)	LD-314820	63.0	2.22
Front mounting bracket horizontal tail 2+3 (left)	LD-314820	63.8	2.25
Rudder tip with stops tips		498.5	17.58
Rudder extension	LX-314314	1061.2	37.43
Tail 4 lower fairing extension fairing		263.9	9.31
Tail 4 upper fuselage extension fairing		344.0	12.13
Rudder extension-aft fuselage gap fairing (right) with screws	LX 314814	142.1	5.01
Rudder extension-aft fuselage gap fairing (left) with screws	LX 314814	112.0	3.95
Aft fuselage side fairing (right) for tail 6		151.9	5.36
Aft fuselage side fairing (left) for tail 6		152.3	5.37
Elevator, tail 4 (right)		1317.6	46.48
Short rudder with bellcrank + bolt and fixed tab		1477.6	52.12
Long rudder with bellcrank + ... (with old paint ...)		1668.0	58.84
Elevator, tail 4 (left) (with ... paint)		1476.1	52.07
[illegible]		11.2 lbs.	
Parachute support [illegible]	LX-[illegible]	3.5 lbs.	
Modified vertical tail	[illegible]	8.0 lbs.	
Horizontal stabilizer tail 4 (with paint)		5.2 lbs.	
Elevator tip, plastic		246.0 grams	8.68 ounces

			grams	ounces
	Elevator tip rib		115.6	4.08
	Elevator [illegible] + bracket [illegible]		33.3	1.13
	Lock-release handle assembly		1366	48.18
	Deployment handle assembly	LD-315022 + LX-315042	1174.6	41.43
	Chute drag [illegible] assembly	LC-314323	88.1	3.11
	Gun disconnect + mounting bracket	LC-315039 + LX-315042	324.9	11.46

2- DETERMINATION OF WING AERODYNAMIC CHARACTERISTICS

FLAPS RETRACTED

DISCUSSION

THE WING PLANFORM AND THE AIRFOIL SECTION OF THE AA-1B ARE IDENTICAL TO THOSE OF THE AA-1A. THEREFORE, THE WING AERODYNAMIC AND GEOMETRIC CHARACTERISTICS OF THE AA-1B ARE IDENTICAL TO THOSE OF THE AA-1A. A SUMMARY OF PERTINENT DATA, TAKEN FROM "BASIC DATA", REPORT S-AAIA-O, AMERICAN AVIATION CORPORATION, OCTOBER 1, 1970, IS PRESENTED ON THE FOLLOWING PAGES. THE AIRCRAFT DESIGN SPEEDS, LOAD FACTORS, AND NORMAL FORCE COEFFICIENTS FOR THE FLAPS RETRACTED CONDITION ARE DETERMINED IN THIS SECTION OF THE REPORT.

PREPARED BY: RDF	AMERICAN AVIATION	PAGE NO. II-3
CHECKED BY: J.L.		REPORT NO. S-AA1B-0
DATE: 21 APR 71	TITLE: BASIC DATA	MODEL NO AA-1B
REV.		

AERODYNAMIC & GEOMETRIC DATA SUMMARY

AIRFOIL SECTION: ROOT & TIP - NACA 64_2415 (MODIFIED)

REF: REPORT S-AA1A-0, P. II-3 (REF 1)
AA-1A LOFT DWG 16-298013

CHORD LENGTH: 49.32 INCHES (CONSTANT), REF 1, P. II-3

WING AREA - PER SIDE INCLUDING FUSELAGE: REF 1, P. II-4

TOTAL - 7266.464 IN^2 = 50.46 FT^2

FLAP - 391.68 IN^2 = 2.72 FT^2

AILERON - 374.40 IN^2 = 2.60 FT^2

MEAN AERODYNAMIC CHORD (MAC): REF 1, P. II-4

LENGTH - 49.32 IN.

L.E. STATION - 66.68

SPANWISE LOCATION - WING STA. 73.666

INCIDENCE ANGLE - ROOT & TIP: +1°25' = 1.42° REF 1, P. II-3

DIHEDRAL ANGLE: +5° REF 1, P. II-4

GEOMETRIC TWIST: 0° REF 1, P. II-4

ASPECT RATIO: 5.975 REF 1, P. II-4

TAPER RATIO: 1.00 REF 1, P. II-4

FLAP DEFLECTION: 0° UP REF 1, P. II-4
30° DOWN

AILERON DEFLECTION: 25° UP REF 1, P. II-4
20° DOWN

PREPARED BY: RDF	AMERICAN AVIATION	PAGE NO. II-4
CHECKED BY: J.L.		REPORT NO. S-AA1B-0
DATE: 21 APR 71	TITLE: BASIC DATA	MODEL NO. AA-1B
REV.		

ANGLE OF ZERO LIFT : $\alpha_{l_0} = -4°$ REF 1, P. II-7

SECTION LIFT CURVE SLOPE : REF 1, P. II-7

$a_0 = dC_L/d\alpha = .074\ C_L/DEG$

$m_0 = 4.24\ C_L/RADIAN.$

MAXIMUM SECTION LIFT COEFFICIENT : REF 1, P. II-7,8

$C_{L\,MAX} = 1.51 \quad (RN = 2.25 \times 10^6)$

$C_{L\,MAX} = 1.67 \quad (RN = 6.0 \times 10^6)$

$C_{L\,MAX}\ (INVERTED) = -.93 \quad (RN = 2.25 \times 10^6)$

SECTION DRAG COEFFICIENT : REF 1, P. II-9

$C_{D_0} = .0104$

DRAG LIFT CURVE SLOPE : REF 1, P. II-9

$dC_D/dC_L^2 = .0605$

SECTION MOMENT COEFFICIENT : REF 1, P. II-7

$C_{mac} = -.083$

FUSELAGE MOMENT COEFFICIENT : REF 1, P. II-10

ASSUME $dm_f/dC_L = 0$

AERODYNAMIC CENTER : REF 1, P. II-9

a.c. $(\bar{x}/c) = .242$, FUS. STA. 78.563

a.c. $(\frac{u}{U}/c) = -.040$, FUS. W.L. 32.24

AIRFOIL CHARACTERISTICS EQUATIONS : REF 1, P. II-10

$C_L = .074\ (\alpha + 4°)$ TO $C_{L\,MAX} = 1.67$

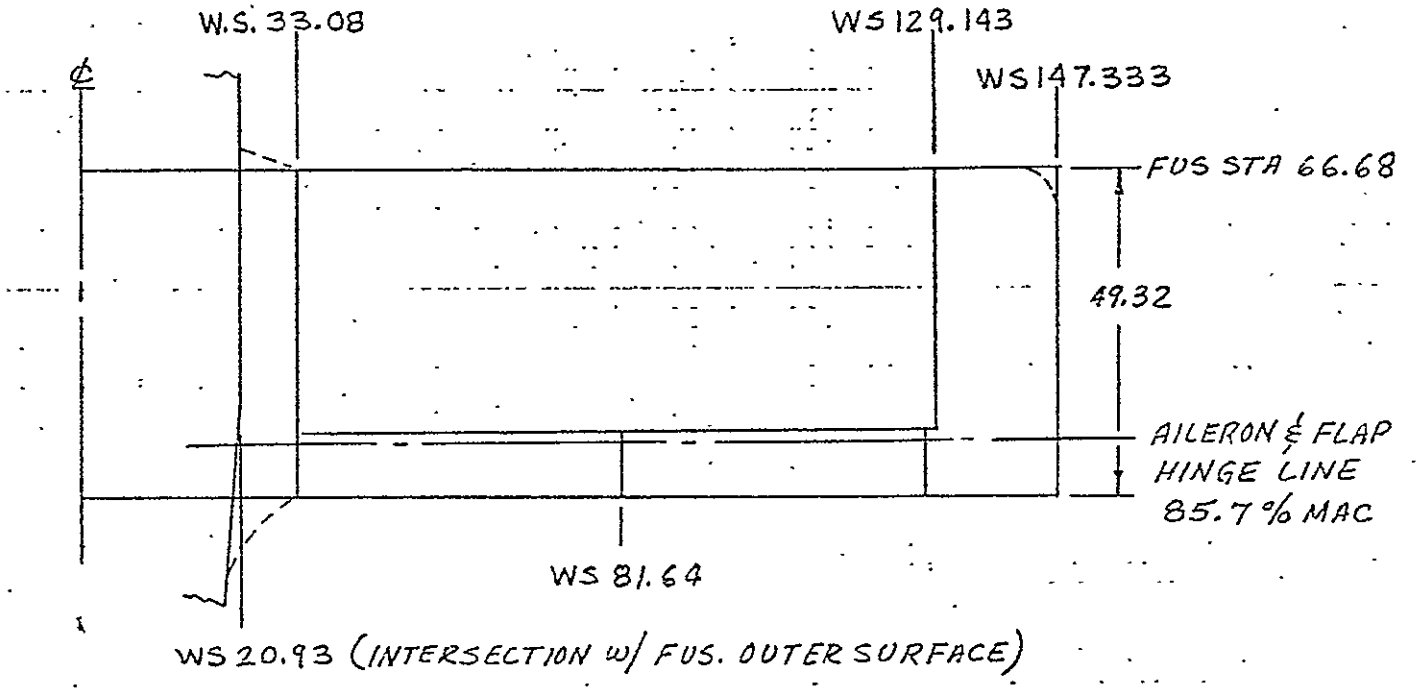
$C_D = .0104 + .0605\ C_L^2$

PREPARED BY: RDF	AMERICAN AVIATION	PAGE NO. II-5
CHECKED BY: J.L.		REPORT NO. S-AA1B-0
DATE: 21 APR 71	TITLE: BASIC DATA	MODEL NO. AA-1B
REV.		

MODEL AA-1B WING PLANFORM

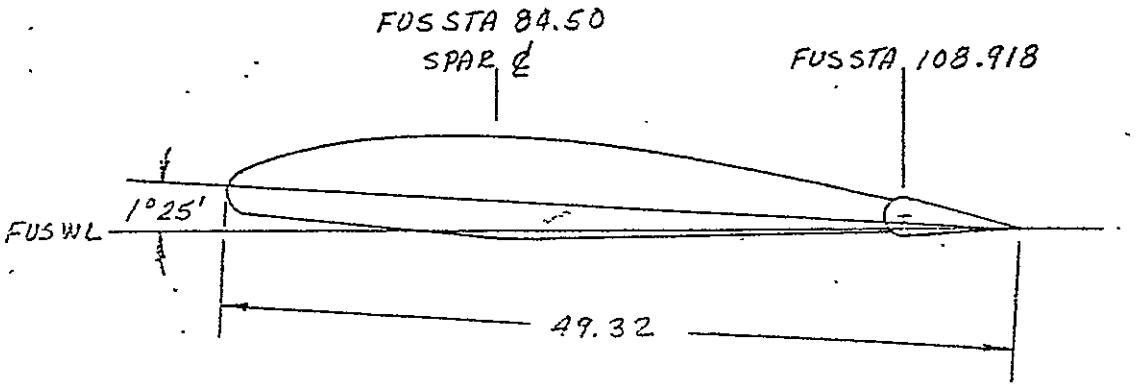
REF 1, P. II-2, DWGS 14-298001
16-098001

WS ~ WING STATION



MODEL AA-1B AIRFOIL SECTION GEOMETRY

REF 1, P. II-3
DWG 16-298013



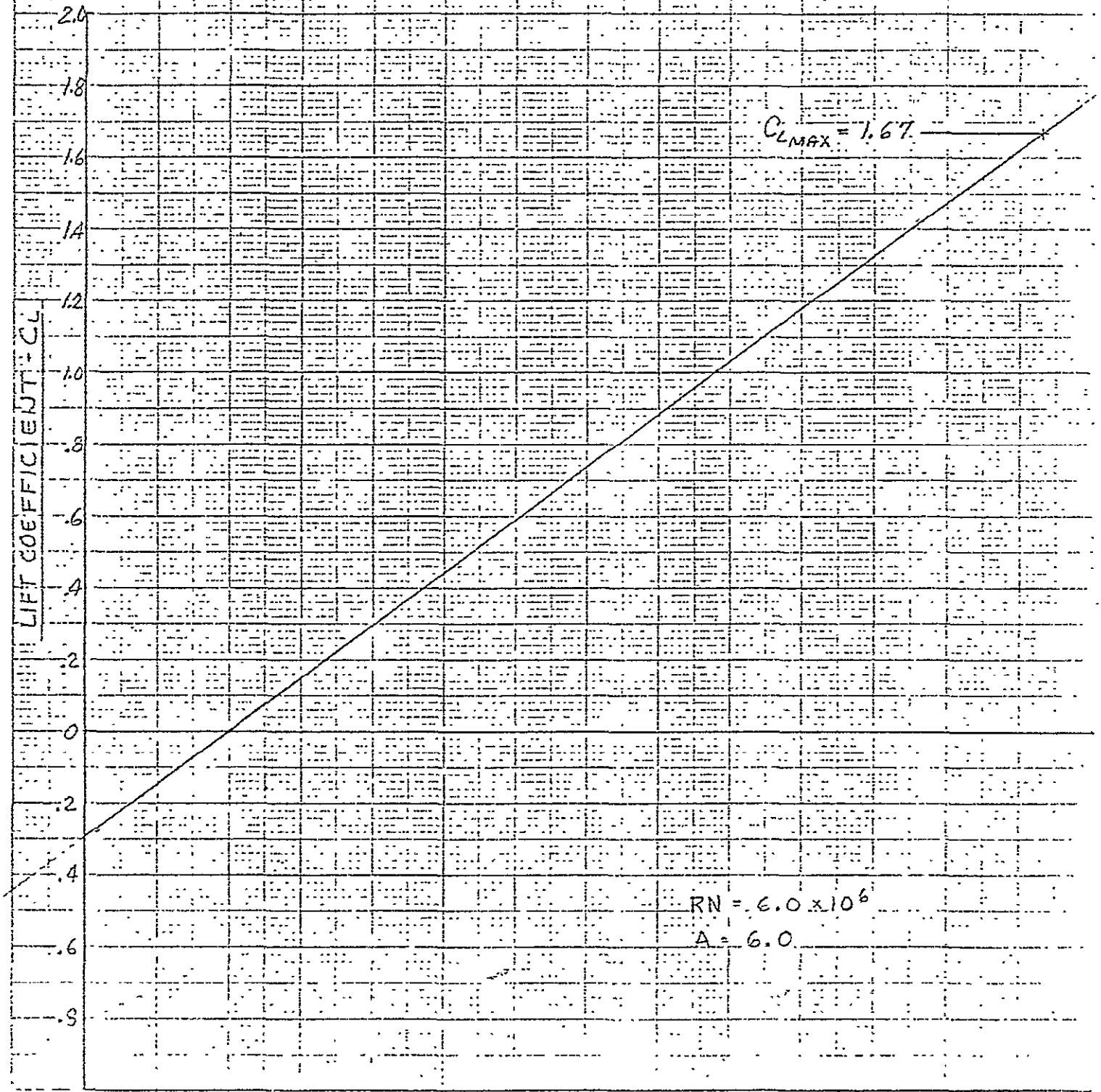
ORIGINAL PAGE IS
OF POOR QUALITY

CHECKED BY: J.L.
DATE: 22 APR 71

RPT. NO. : S-AAIB-0
MODEL : AA-1B

LIFT COEFFICIENT v.s. ANGLE OF ATTACK

REF 1, P. II-11

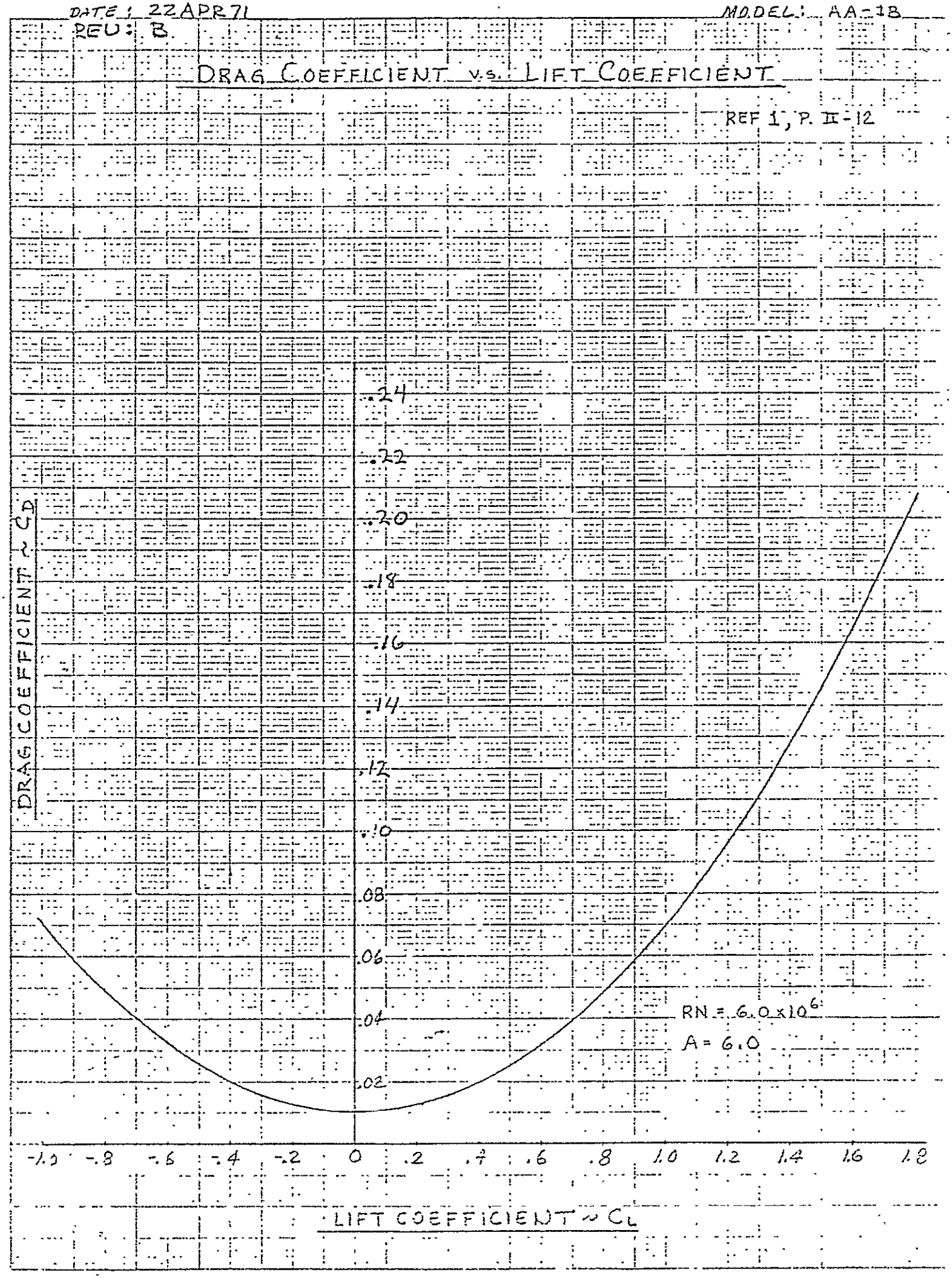


PREPARED BY: ADT
CHECKED BY: J.L.
DATE: 22 APR 71
REV: B.

PAGE: II-7
RPT. NO.: S-AAIB-0
MODEL: AA-1B

DRAG COEFFICIENT vs. LIFT COEFFICIENT

REF 1, P. II-12



PREPARED BY: RDF	AMERICAN AVIATION	PAGE NO. II-8
CHECKED BY: J.L.		REPORT NO. S-AA1B-0
DATE: 22APR71	TITLE: BASIC DATA	MODEL NO. AA-1B
REV.		

CORRECTED AIRFOIL CHARACTERISTICS & THE "Z" & "X" COMPONENT OF THE FORCE COEFFICIENT

REF 1, P. II-13

THE FOLLOWING IS A SUMMARY OF PERTINENT DATA TAKEN FROM PAGE II-13 OF REFERENCE 1. INTERMEDIATE CALCULATION DATA HAS BEEN OMITTED.

C_L	α	C_D	C_Z	C_X	$C_{M_{AC}}$
1.8	20.42	.2064	1.7691	-.3908	-.0830
1.6	17.70	.1653	1.5821	-.2899	
1.4	14.95	.1290	1.3913	-.2022	
1.2	12.25	.0975	1.1969	-.1297	
1.0	9.55	.0709	.9999	-.0713	
.8	6.85	.0491	.8010	-.0269	
.6	4.18	.0322	.6009	+.0032	
.4	1.50	.0201	.4000	+.0195	
.2	-1.22	.0128	.1992	+.0220	
0	-4.00	.0104	-.0010	+.0104	
-.2	-6.62	.0128	-.1998	-.0153	
-.4	-9.35	.0201	-.3968	-.0550	
-.6	-11.95	.0322	-.5911	-.1074	
-.8	-14.7	.0491	-.7822	-.1749	
-1.0	-17.39	.0709	-.9695	-.2554	-.0830

AIRFOIL(MAC) - NACA $64_2 415$ (MODIFIED)
ASPECT RATIO - 5.975 (CORRECTION NOT REQUIRED)
FLAP DEFLECTION - 0°
INCIDENCE ANGLE - 1°25'

3

YANKEE VIBRATION DATA

WING MASS INFORMATION FROM GRUMMAN - AIRCRAFT

4 MARCH, 1976

Ref. conversation with Herb Waibel, 912/964-3335
(standing in for Norm Steiner)

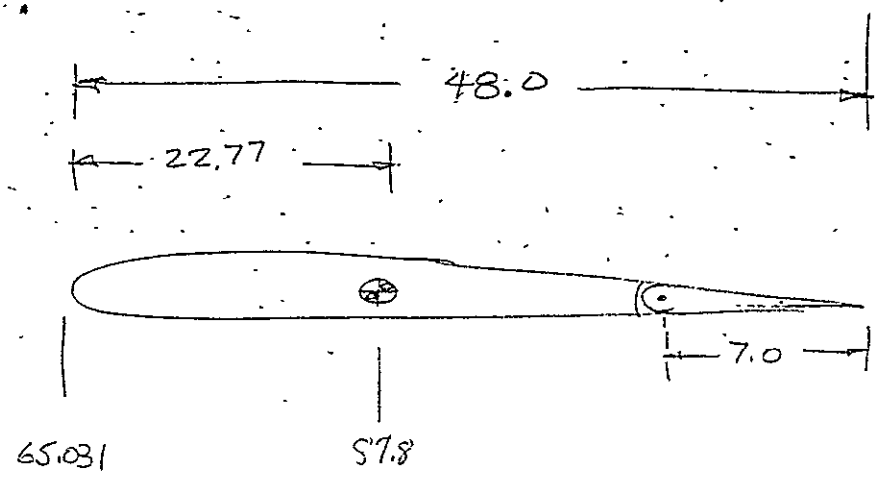
Wing mass = 177.5 LBS / side (from fuselage, out)

$\bar{x}_{CG}$ = 87.8 (F.S) INCHES

$\bar{z}_{CG}$ = 35.4 (W.L.)

I_α = ?

S_α = ?



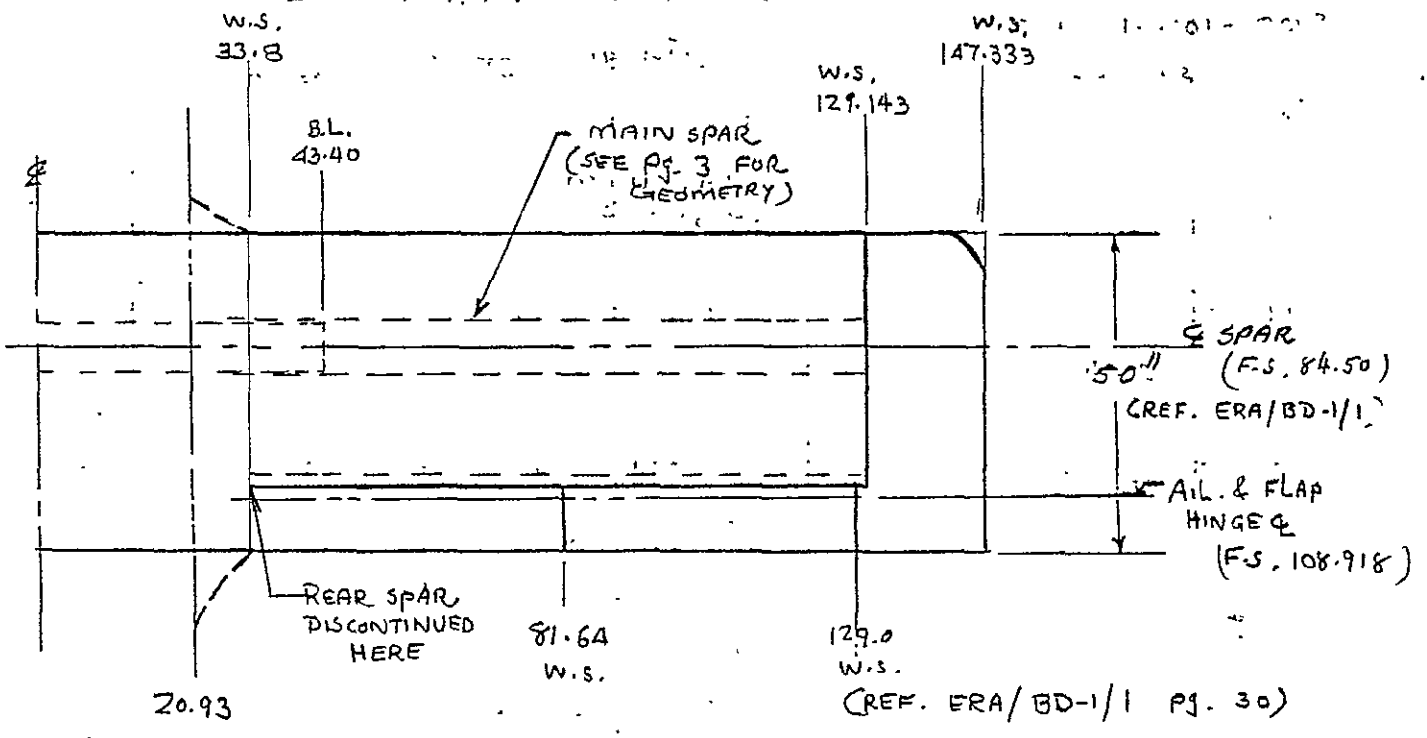
TITLE _____ PAGE NO. _____

PREPARED BY R.C.H. DATE 9-21-76

CHECKED BY _____ DATE _____ MODEL AA-1

INFORMATION NOTED BELOW IS PREPARED IN RESPONSE TO THE REQUEST OF "RAY KROEGER", AEROSPACE ENGG.
UNIVERSITY OF MICHIGAN
ANN ARBOR 48109. TEL. 1-313-764-3332

WING PLANFORM. REF. S-AA1A-0, P. II-3, EXCEPT WHERE NOTED.



WING TORSIONAL FACTOR: 1.145×10^{-3} (REF. 1-0112-005 p. 32)

Critical Velocity (WING): 418 mph. (REF. 1-0112-005, P. 32)

FREQUENCIES: (WING) (REF. 1-0102-023 Pg. 7)

	NO FUEL	FULL FUEL
SYMMETRIC BENDING	6.1 – 9.1	7.1 – 8.1
UNSYMMETRIC BENDING	20.0	18.0
SYMMETRIC TORSION		
INNER PANEL	31.5 – 33.0	32.0
OUTER PANEL	39.0	40.0
UNSYMMETRIC TORSION		
INNER PANEL	32.8	32.5
OUTER PANEL	38.5	37.5

MASS PROPERTIES OF AILERONS:

TOTAL SURFACE WEIGHT = 6.840 lbs (PAINTED)
BALANCE WEIGHT : 2.115 lbs.
100% BALANCED.

} REF. F-0112-005, pg. 29.

K = −127.93 lb.in^2 ABOUT NODE LINE
I_{HINGE} = 36.73 lb.in^2

} REF. 1-401-003, pg. 13.

GRUMMAN AMERICAN AVIATION — AJ NO. 3

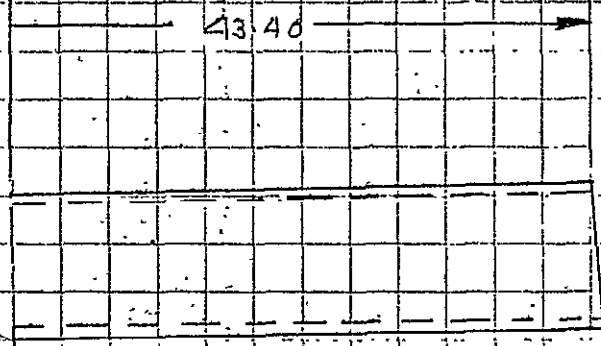
PREPARED BY: R.C.H. 9-28-76

MODEL AA-1

DATA FOR FLUTTER ANALYSIS

MAIN SPAR:

INBOARD SPAR

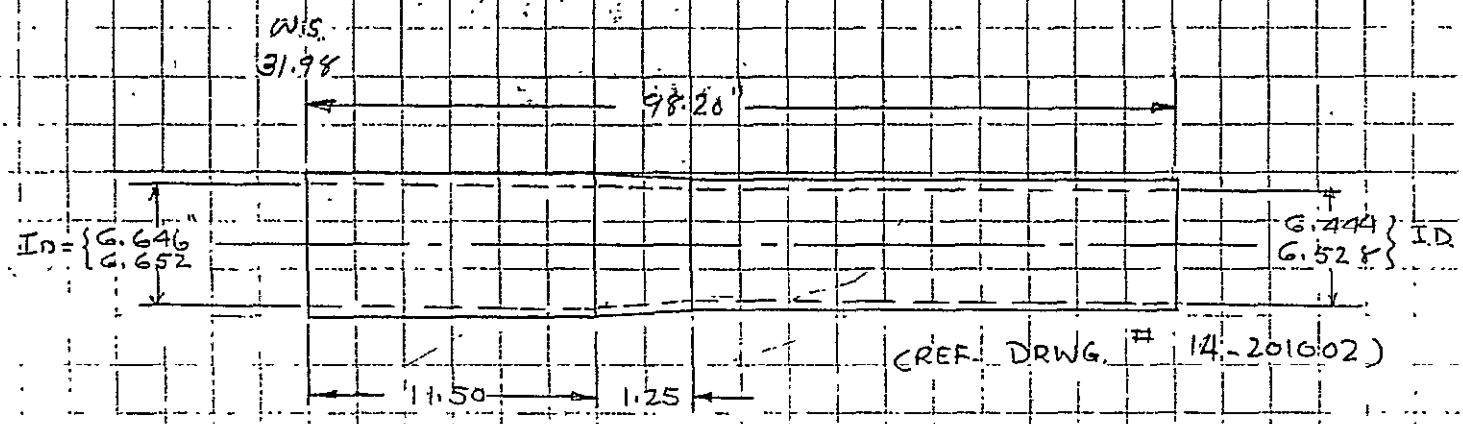


(REF. DRWG # 16-102310 C)

℄ AIRPLANE

MATERIAL: AL EXTRUSION 6.521 ± 0.021 O.D.
0.200 ± 0.014 THK.
(REF. DRWG. # 12-903001)

OUTBOARD SPAR



(REF. DRWG. # 14-201002)

MATERIAL: AL. EXTRUSION 6.444 / 6.528 } I.D.

0.098 TO 0.112" THICKNESS

(REF. DRWG. # 12-903002

APPENDIX C

DIGITAL COMPUTER PROGRAM

The digital computer flutter analysis presented in this appendix has been adapted for use on the U of M AMDAHL which compiles in either FORTRAN G or H. It is based on the strip theory described, for example, in Scanland and Rosenbaums text, "An Introduction to the Study of Aircraft Vibrations and Flutter," by Macmillan. The comment cards in the beginning explain the operation of the program and the input format. A sample input and output is provided for debugging purposes.

FLUTTER ANALYSIS PROGRAM

WRITTEN BY DR RICHARD A KROEGER
ADAPTED FOR THE IBM 360/67 BY EARL F WEENER

THE SOURCE DECK IS NAMED FLUTTER; THE OBJECT DECK IS NAMED FLOBJ. THE OBJECT DECK CAN BE RUN BY THE FOLLOWING COMMAND:

```
RUN FLOBJ 5="INPUT FILE"  6="OUTPUT FILE"
          7="1ST ROOT FILE" 8="2ND ROOT FILE"
```

THE OUTPUT FILE CAN ALSO BE SET TO *SINK* IF THE RESULTS ARE DESIRED ON-LINE. OTHERWISE IT IS OFTEN LESS EXPENISVE TO SET THE PROGRAM OUTPUT TO A FILE, AND COPY THE FILE AFTER PROGRAM EXECUTION. THE FILE CAN ALSO BE COPIED TO THE COMP UTING CENTER LINE PRINTERS BY THE COMMAND

```
COPY "OUTPUT FILE" TO *PRINT*
```

THE TWO FILES, 1ST AND 2ND ROOT, ARE USED FOR DYNAGRAPH PLOTS. THEY MUST BE SORTED VIA THE "SORT" PROGRAM.

THE SOURCE DECK CAN BE COMPILED IN EITHER FORTRAN G OR FORTRAN H: THE LATTER PRODUCES A FASTER RUNNING OBJECT DECK BUT ALSO COSTS MORE TO COMPILE THE SOURCE PROGRAM. TO COMPILE THE PROGRAM AS A FORTRAN H PROGRAM, CONSULT THE MTS MANUAL, VOL. II. THE PROGRAM CAN BE COMPILED IN FORTRAN G BY THE FOLLOWING COMMAND:

```
RUN *FTN PAR=SOURCE=FLUTTER LOAD=FLOBJ
```

WHERE FLUTTER IS THE SOURCE DECK AND FLOBJ IS THE FILE FOR THE OBJECT DECK.

THE INPUT FILE IS COMPOSED OF TWO TYPES OF INFORMATION, TITLES AND REMARKS WHICH ARE PRINTED AT THE HEADINGS, AND COMPUTATIONAL DATA UTILIZED FOR THE ANALYSIS. BOTH THE HEADING DATA AND THE COMPUTATIONAL DATA CONTAIN CONTROL INPUTS. THE FIRST CONTROL DATA ENCOUNTERED ARE AS FOLLOWS:

IS AND IP: BOTH LESS THAN ZERO
A HEADING IS PRINTED WITH THE FIRST LINE OF THE REMARKS
A MAXIMUM OF 50 LINES OF REMARKS CAN BE PRINTED.

IS LESS THAN OR EQUAL TO ZERO, IP=0:
THIS COMBINATION ALLOWS PRINTING OF REMARKS SUBSEQUENT TO THE FIRST LINE OF REMARKS.

IS GREATER THAN ZERO:
FOR THIS VALUE OF IS, THE PRINTING OF A PAGE HEADING AND REMARKS IS SUPPRESSED.

THE SECTION OF TITLES AND REMARKS MUST BE THE FIRST SECTION OF DATA IN THE INPUT FILE. THE LINES MUST BE STRUCTURED AS FOLLOWS:

LINE 1: RUN NUMBER (A6)
LINE 2: TITLE 1 (A60)
LINE 2: TITLE 2 (A60)
LINE 4: IS (I3), IP (I3), REMARKS (A60)
LINE 5: IS, IP, REMARKS (IS=IP=0 FOR SUBSEQUENT LINES OF REMARKS)
LINE..... : IS GREATER THAN ZERO TO TERMINATE REMARKS PRINTING MUST FOLLOW LAST LINE OF REMARKS

THE DATA NECESSARY FOR THE ACTUAL FLUTTER COMPUTATION AND CONTROL ARE READ IN VIA THE NAMELIST CONVENTION. THE FOUR NAMELIST DATA SETS ARE:

DATA1
DATA2
CONT1
CONT2

THE VARIOUS NAMELIST CONTENTS AND A DESCRIPTION OF THE PHYSICAL CHARACTERISTICS OF THE INPUT DATA FOLLOWS:

DATA1

N=NO. OF 1/K VALUES
NWS= NO. OF WING STRIPS
NAS= NO. OF AILERON STRIPS
NHS= NO. OF HORIZONTAL TAIL STRIPS
BR= WING REFERENCE SEMI-CHORD
A= DISTANCE, MIDCHORD TO ELASTIC AXIS , (INCHES, + AFT)
C= DISTANCE, MIDCHORD TO AILERON HINGE LINE (INCHES, +AFT)
E= DISTANCE, MIDCHORD TO AILERON LEADING EDGE (INCHES, + AFT)
ALT= ALTITUDE, FT.
WH= BENDING FREQ., CPS
WA= TORSIONAL FREQ., CPS
GBET= AILERON MECHANICAL DAMPING RATIO
GS= STRUCTURAL MECHANICAL DAMPING RATIO
GR= SURFACE GEARING RATIO (1.0 FOR NO GEARING)
GEB= AILERON COULOMB DAMPING RATIO

DATA2

CK= 1/K VALUES, REDUCED FREQUENCY VALUES, MAXIMUM OF 20
DELTAX(I)= DELTA X VALUES (STRIP WIDTH, INCHES)
YBAR(I)= BAR Y VALUES (SPANWISE POSITION OF STRIP C.G., INCHES)
STRIPM(I)= STRIP MASS (TOTAL, LBS.)
SALPHA(I)= S-ALPHA, STATIC UNBALANCE (IN-LBS, +AFT)
MMOM(I)= I-ALPHA, MASS MOMENT OF INERTIA ABOUT THE ELASTIC AXIS (LB-IN*2)
WBM= BENDING MODE, WING RATIO
WTM= TORSION MODE, WING RATIO
SMICRD(I)= LOCAL SEMI-CHORD (INCHES)
DELTXA(J)= DELTA-XA-AILERON, STRIP WIDTH (INCHES)
SBETA(J)= S-BETA, AILERON UNBALANCE ABOUT HINGE LINE, TRAILING EDGE HEAVY=+ (IN-LB)
MIBETA(J)= I-BETA, AILERON INERTIA ABOUT HINGE LINE (LB-IN*2)
FSA(J)= FSA=WING MODE IN AILERON REGION (RATIO)
CAPFSA(J)= CAP FSA, WING TORSIONAL MODE IN AILERON REGION (RATIO)
BSA(J)= BSA, WING SEMI-CHORD AT AILERON STRIP (INCHES)

```
C         CMA(J)= C-A, DISTANCE FROM ELASTIC AXIS TO AILERON HINGE
C             (INCHES, + HINGE LINE AFT)
C         BSH(K)= BSH, SEMICHORD OF HORIZONTAL TAIL IN VERTICAL
C             TAIL ANALYSIS (INCHES, 0 IF NOT CONSIDERED)
C         HSW(K)= HORIZONTAL STRIP WIDTH (INCHES, 0 IF NOT CONSIDERED)
C         HTMODE(K)= HORIZONTAL TAIL MODE, RATIO
C
C    CONT1
C         ID: CONTROL PRINTING OF AERODYNAMIC TABLES
C             ID=0, NO TABLES PRINTED
C             ID NOT ZERO, TABLES ARE PRINTED
C
C    CONT2
C         WB=OMEGA BETA VALUE, IF NEGATIVE THE CASE WILL BE
C             COMPLETED;  OTHER WB VALUES MAY FOLLOW IN THE
C             PROPER NAMELIST CONVENTION
C
C         THE NAMELIST CONVENTION IS DESCRIBED IN  "IBM SYSTEM
C    /360 AND SYSTEM /370 FORTRAN IV LANGUAGE.  THE CONVENTION WILL
C    BE DESCRIBED BRIEFLY.
C         EACH NAMELIST GROUP MUST BE IDENTIFIED BY THE NAME OF
C    THAT PARTICULAR GROUP.  EACH GROUP STARTS ON A LINE IN
C    COLUMN 2, PRECEDED BY &.  A BLANK MUST FOLLOW THE NAME, FOLLOW
C    ED BY THE DATA.  EACH DATA ENTRY MUST BE SEPERATED BY A
C    COMMA.  THE LAST DATA ENTRY MUST BE FOLLOWED BY A BLANK AND
C    &END.
C         DATA1 IS COMPOSED OF SINGLE ENTRY VARIABLES. AN EXAMPLE
C    OF DATA1 MIGHT BE
C
C     &DATA1 N=19, NWS=.......,GEB=1.0 &END
C
C    THE DATA CAN BE CONTINUED FROM ONE LINE TO ANOTHER BUT
C    COLUMN 1 MUST ALWAYS CONTAIN A BLANK.
C         DATA2 IS COMPOSED OF MULTIPLE OR ARRAY ENTRIES.  AN
C    EXAMPLE OF INPUT FOR A PARITCULAR VARIABLE MIGHT BE
C
C     &DATA2 CK=0.0,.25,.5, .833,  1.25,....., 6*0.0,DELTAX=...
C     &END
C
C   /WHERE THE NOTATION N*M IMPLIES N ENTRIES OF THE VALUE M.
C         FOR REPEATED RUNS WITH DIFFERENT VALUES OF WB, THE CONT2
C    CARD WOULD CONTAIN THE DESIRED SERIES OF VALUES, I.E.
C     &CONT2 WB=1.C &END
C     &CONT2 WB=40.0 &END
C     &CONT2 WB=-1.0 &END
C
C    WHERE THE LAST CARD CAUSES COMPUTATION TO BE COMPLETED FOR
C    THIS CASE FOLLOWED BY A JUMP BACK TO THE BEGINNING OF THE
C    PROGRAM TO READ A NEW SET OF DATA.  IF THE CONT2 CARD IS FOLLOWED
C    BY AN END-OF-FILE, THE COMPUTATION WILL BE COMPLETED
C    AND THE PROGRAM WILL STOP "9999"
C
C       THE FOLLOWING IS A LISTING OF THE INPUT FOR A TEST CASE*****
C
C
  TEST
C         FLUTTER PROGRAM TEST CASE
C
C1
C &DATA1 N=6, NWS=7, NAS=5, NHS=0, BR=30.25, A=-13.2507, C=18.45039,
```

```
C E=16.25136, ALT=0.0, WH=11.166667, WA=22.5, GBET=0.0, GS=.05,
C GR=1.0, GEB=0.0, &END
C &DATA2 CK=0.0, .5, .833, 1.25, 1.67, 2.00,
C DELTAX=22.0, 21.0, 29.0, 29.0, 30.0, 30.0, 28.0,
C YBAR=0.0, 32.88, 57.75, 86.50, 116.0, 146.0, 176.0,
C STRIPM=619.916, 53.370, 12.546, 12.610, 13.125, 13.125, 16.182,
C SALPHA=0.0, 406.07, 153.24, 145.52, 160.19, 160.19, 165.21,
C MMOM=0.0, 7147.18, 7225.92, 7272.24, 7527.00, 7527.00, 7105.49,
C WBM=-.011, -.19, -.31, -.322, .046, .598, 1.00,
C WTM=0.0, -.149, -.319, -.217, -.032, .46, 1.00,
C SMICRD=7*30.25,
C DELTXA=5*15.0,
C SBETA=3*3.13675, 1.38858, -2.98192,
C MIBETA=3*36.2625, 39.3220, 46.5703,
C FSA=-.103, .207, .471, .701, .908,
C CAPFSA=-.106, .043, .277, .660, .936,
C BSA=5*30.25,
C CMA=5*31.700,
C BSH=15*0.0,
C HSW=15*0.0,
C HTMODE=15*0.0,
C &END
C &CONT1 ID=0 &END
C &CONT2 WB=11.25 &END
C
C
C
C
C
C     THE OUTPUT PRODUCED BY THIS INPUT IS AS FOLLOWS:
C
C
C
C
CRUN NO.  TEST                DATE 04-10-74                PAGE NO.   1
C
C                        RUN BY
C
C                  FLUTTER PROGRAM TEST CASE
C
C
C
C
C
C WBR = 11.250  SB =   7.82  ALT =     0.  WH = 11.17  WA = 22.50
C               GB = 0.0     GEB = 0.0     GS = 0.050  GR = 1.000
C
C    VELOCITY        DAMPING         DAMPING       FREQUENCY     CYC TO DAMP
C    (EAS-MPH)         (G)           (LAMBDA)        (CPS)       (1/2 AMPL)
C
C
C
C        0.0          0.0          4.04200       25.73217        4.41273
C        0.0          0.0          1.52619        9.71605        4.41273
C
C
C       52.90       -0.11781        5.16455        9.79642        1.31481
C      135.22       -0.06704        9.20836       25.04271        1.88507
C
C
```

```
C        89.37        -0.20927         8.09193         9.93441         0.85098
C       215.00        -0.08907        10.44228        23.90057         1.58650
C
C
C       137.67        -0.35232        12.88992        10.19834         0.54641
C       297.13        -0.06921         8.24335        22.01152         1.85086
C
C
C       190.19        -0.54549        19.72923        10.54596         0.37051
C       383.04         0.01250         2.37168        20.12981         5.88316
C
C
C       233.90        -0.73657        26.76026        10.82941         0.28051
C       410.71         0.10844         0.0            19.01590     99999.00000
C
C
C
C
C***** ********************************************************************
      IMPLICIT REAL*8 (A-H,O-Z)
      REAL*8 MMOM, MIBETA
      COMMON RUNNO(2), DATE(2),TITLE1(20),TITLE2(20),ANAME(6)
      COMMON/PAGE/NPAGE
      DIMENSION WET(25,27),AIL(12,20),CK(20),R(3),RI(3),AA(4),
     1 BB(4),G(3),V(3),C2HR(20),C2HI(20),C2AR(20),C2AI(20),
     1 C2MI(20),C3R(20),C3I(20),ELBR(20),ELBI(20),
     1 ELZR(20),ELZI(20),EMBR(20),EMBI(20),EMZR(20),EMZI(20)
     1 ,THR(20),THI(20),PHR(20),PHI(20),TAR(20),TAI(20),
     1 PAR(20),PAI(20),TBR(20),TBI(20),PBR(20),PBI(20),
     1 TZR(20),TZI(20),PZR(20),PZI(20),WF(3),ALMBA(3),ZCYC(3)
      DIMENSION ELHR(20),ELHI(20),ELAR(20),ELAI(20),
     1 EMHR(20),EMAR(20),EMAI(20)
      DIMENSION HORZ(15,3)
      DIMENSION DELTAX(25),YBAR(25),STRIPM(25),SALPHA(25),MMOM(25),
     1WBM(25),WTM(25),SMICRD(25),DELTXA(12),SBETA(12),MIBETA(12
     1),FSA(12),CAPFSA(12),BSA(12),CMA(12),BSH(15),HSW(15),HTMODE(15)
      NAMELIST /DATA1/N,NWS,NAS,NHS,BR,A,C,E,ALT,WH,WA,GBET,GS,GR,GEB
     1/DATA2/CK,DELTAX,YBAR,STRIPM,SALPHA,MMOM,WBM,WTM,SMICRD,DELTXA,
     1 SBETA,MIBETA,FSA,CAPFSA,BSA,CMA,BSH,HSW,HTMODE/CONT1/ID/CONT2
     1/WB
    1 FORMAT(//2X'WBR = ',F6.3,2X,'SB = ',F6.2,2X,'ALT = ',F6.0,
     1 2X,'WH = ',F5.2,2X,'WA = ',F5.2,/,16X,'GB = ',F5.3,3X,
     1 'GEB = ',F5.3,3X,'GS = ',F5.3,2X,'GR = ',F5.3
     1    ,//5X,'VELOCITY',7X,'CAMPING',
     1    7X,'DAMPING',5X,'FREQUENCY',4X,'CYC TO DAMP',/
     1    5X,'(EAS-MPH)',3X,'(G)',9X,'(LAMBDA)',6X'(CPS)',
     1    6X,'(1/2 AMPL)',/)
    4 FORMAT(4I3)
    6 FORMAT(//1X,F12.2,4F14.5)
    7 FORMAT(1XF12.2,4F14.5)
    9 FORMAT (///10X,5HLH(R),15X,5HLA(R),15X,5HLB(R),15X,5HLZ(R)/
     1    15X,5HLH(I),15X,5HLA(I),15X,5HLB(I),15X,5HLZ(I)//)
   69 FORMAT(//////)
  112 FORMAT (///10X,5HMH(R),15X,5HMA(R),15X,5HMB(R),15X,5HMZ(R)/
     1 35X,5HMA(I),15X,5HMB(I),15X,5HMZ(I)//)
  113 FORMAT (///10X,5HTH(R),15X,5HTA(R),15X,5HTB(R),15X,5HTZ(R)/
     1    15X,5HTH(I),15X,5HTA(I),15X,5HTB(I),15X,5HTZ(I)//)
  114 FORMAT (///10X,5HPH(R),15X,5HPA(R),15X,5HPB(R),15X,5HPZ(R)/
     1    15X,5HPH(I),15X,5HPA(I),15X,5HPB(I),15X,5HPZ(I)//)
  115 FORMAT (5X,E14.5,5X,E14.5,5X,E14.5,5X,E14.5,
```

```
   1      /10X,E14.5,5X,E14.5,5X,E14.5,5X,E14.5/)
116 FORMAT (5X,E14.5,5X,E14.5,5X,E14.5,5X,E14.5,
   1      /30X,E14.5,5X,E14.5,5X,E14.5/)
105 FORMAT(////)
800 FORMAT(2F14.5)
801 FORMAT(I2)
    NPAGE=0
 10 CALL START
    CALL COMENT
    READ(5,DATA1)
    READ(5,DATA2)
    WRITE(7,801) N
    WRITE(8,801) N
    DO 401 I=1,25
    WET(I,1) = DELTAX(I)
    WET(I,2) = YBAR(I)
    WET(I,3) = STRIPM(I)
    WET(I,4) = SALPHA(I)
    WET(I,5) = MMOM(I)
    WET(I,6) = WBM(I)
    WET(I,7) = WTM(I)
    WET(I,15) = SMICRO(I)
401 CONTINUE
    DO 402 I=1,12
    AIL(I,1) = DELTXA(I)
    AIL(I,3) = SBETA(I)
    AIL(I,4) = MIBETA(I)
    AIL(I,5) = FSA(I)
    AIL(I,6) = CAPFSA(I)
    AIL(I,8) = BSA(I)
    AIL(I,9) = CMA(I)
402 CONTINUE
    DO 403 I=1,15
    HORZ(I,1) = BSH(I)
    HORZ(I,2) = HSW(I)
    HORZ(I,3) = HTMODE(I)
403 CONTINUE
    SUMB=0.
    DO 71 I=1,NWS
    WET(I,3)=WET(I,3)/32.174
    WET(I,4)=WET(I,4)/(12.*32.174)
    WET(I,5)=WET(I,5)/(144.*32.174)
 71 WET(I,15)=WET(I,15)/(12.)
    DO 72 I=1,NAS
    AIL(I,4)=AIL(I,4)/(144.*32.174)
    AIL(I,8)=AIL(I,8)/12.
    AIL(I,9)=AIL(I,9)/(12.*AIL(I,8))
    SUMB=SUMB+AIL(I,3)
 72 AIL(I,3)=AIL(I,3)/(12.*32.174)
    BJO=0.
    BJ1 = 0.0
    BY0 = 0.0
    BY1 = 0.0
    IER = 0
    PI = 3.1415927
    BR=BR/12.
    A=A/(12.*BR)
    C=C/(12.*BR)
    E=E/(12.*BR)
    WH=WH*2.*PI
```

```
      WA=WA*2.*PI
      RHOO=.002378
      RHO=RHOO*(1.-6.875E-6*ALT)**4.255
      F1=.5+A
      F2 = C-E
      W11 = 0.0
      W12 = 0.0
      W13 = 0.0
      W20 = 0.0
      W21 = 0.0
      W22 = 0.0
      W23 = 0.0
      W24 = 0.0
      W25 = 0.0
      W26 = 0.0
      W27 = 0.0
      A4 = 0.0
      A7 = 0.0
      A13 = 0.0
      A18 = 0.0
      A19 = 0.0
      A20 = 0.0
      H21=0.
      H20=0.
      DIAN=0.0
      DSAN=0.0
      DPABN=0.0
      GRM1=GR-1.0
      GRM12=GRM1*GRM1
      DO 12 I=1,NWS
      WET(I,8) = WET(I,6)*WET(I,6)
      WET(I,9) = WET(I,7)*WET(I,7)
      WET(I,10) = WET(I,6)*WET(I,7)
      WET(I,11) = WET(I,3)*WET(I,8)
      W11 = W11+WET(I,11)
      WET(I,12) = WET(I,5)*WET(I,9)
      W12 = W12+WET(I,12)
      WET(I,13) = WET(I,4)*WET(I,10)
      W13 = W13+WET(I,13)
      WET(I,14) = WET(I,1)/12.0
      WET(I,16) = WET(I,14)*WET(I,15)
      WET(I,17) = WET(I,15)*WET(I,16)
      WET(I,18) = WET(I,15)*WET(I,17)
      WET(I,19) = WET(I,15)*WET(I,18)
      WET(I,20) = WET(I,8)*WET(I,16)
      W20 = W20+WET(I,20)
      WET(I,21) = WET(I,8)*WET(I,17)
      W21 = W21+WET(I,21)
      WET(I,22) = WET(I,9)*WET(I,17)
      W22 = W22+WET(I,22)
      WET(I,23) = WET(I,9)*WET(I,18)
      W23 = W23+WET(I,23)
      WET(I,24) = WET(I,9)*WET(I,19)
      W24 = W24+WET(I,24)
      WET(I,25) = WET(I,10)*WET(I,16)
      W25 = W25+WET(I,25)
      WET(I,26) = WET(I,10)*WET(I,17)
      W26 = W26+WET(I,26)
      WET(I,27) = WET(I,10)*WET(I,18)
      W27 = W27+WET(I,27)
```

```
 12 CONTINUE
    DO 13 I=1,NAS
    AIL(I,2) = AIL(I,1)/12.0
    A4 = A4+AIL(I,4)
    AIL(I,7) = AIL(I,3)*AIL(I,5)
    A7 = A7+AIL(I,7)
    AIL(I,10) = AIL(I,8)*AIL(I,9)
    AIL(I,11) = AIL(I,3)*AIL(I,10)
    AIL(I,12) = AIL(I,11)+AIL(I,4)
    AIL(I,13) = AIL(I,12)*AIL(I,6)
    A13 = A13+AIL(I,13)
    AIL(I,14) = AIL(I,8)*AIL(I,8)
    AIL(I,15) = AIL(I,8)*AIL(I,14)
    AIL(I,16) = AIL(I,8)*AIL(I,15)
    AIL(I,17) = AIL(I,15)*AIL(I,5)
    AIL(I,18) = AIL(I,17)*AIL(I,2)
    A18 = A18+AIL(I,18)
    AIL(I,19) = AIL(I,16)*AIL(I,2)
    A19 = A19+AIL(I,19)
    AIL(I,20) = AIL(I,19)*AIL(I,6)
    A20 = A20+AIL(I,20)
    DIAN=DIAN+(2.0*GRM1*AIL(I,12)+GRM12*AIL(I,4))*AIL(I,6)*AIL(I,6)
    DSAN=DSAN+(AIL(I,3)*AIL(I,5)*AIL(I,6))
    DPABN=DPABN+(AIL(I,4)*AIL(I,6))
 13 CONTINUE
    DO 300 I=1,NHS
    H21=H21+HORZ(I,3)**2*HORZ(I,1)**2*HORZ(I,2)/1728.
    H2O=H2O+HORZ(I,3)**2*HORZ(I,2)*HORZ(I,1)/144.
300 CONTINUE
    W12=W12+DIAN
    W13=W13+(GRM1*DSAN)
    A13=A13+(GRM1*DPABN)
    FK1 = 1.0-E*E
    FK2 = DSQRT(FK1)
    FK3=PI/2.-DARSIN(E)
    T1=(-FK2/3.)*(2.+E*E)+E*FK3
    T2 = E*FK1-FK2*(1.0+E*E)*FK3+E*FK3*FK3
    T3 = -(0.125+E*E)*FK3*FK3+0.25*E*FK2*FK3*(7.0+2.0*E*E)
   1 -0.125*FK1*(5.0*E*E+4.0)
    T4 = -FK3+E*FK2
    T5 = -FK1-FK3*FK3+2.0*E*FK2*FK3
    T7 = -(0.125+E*E)*FK3+0.125*E*FK2*(7.0+2.0*E*E)
    T10 = FK2+FK3
    T11 = FK3*(1.0-2.0*E)+FK2*(2.0-E)
    T12 = FK2*(2.0+E)-FK3*(2.0*E+1.0)
    TOL = 0.00005
    FK5 = 1.0/PI
    FK6 = FK5*FK5
    FI=PI/2.-DARSIN(-E)
    FK4 = PI-FI
    SFI = DSIN(FI)
    PH1 = FK4+SFI
    PH2 = FK4*(1.0-2.0*E)+SFI*(2.0-E)
    PH3 = FK4-SFI*E
    PH5 = SFI*(1.0+E)
    PH6=2.*FK4+SFI*2.*(2.+E)*(1.-2.*E)/3.
    PH8 = FK4*(-1.0-2.0*E)+SFI*(2.0+E)
    PH10 = (FK4-SFI)*PH5
    PH17 = PH3*PH3+SFI**4
    PH31 = FK4-SFI
```

```
      PH32 = FK4+SFI*(1.0-2.0*E)
      PH35 = 2.0*SFI*SFI
      PH36 = PH32*PH3+2.0*SFI**4
      PH37 = PH3*(PH2-PH3)
      DO 130 I=1,N
      IF(CK(I))31,30,31
   30 BF = 0.5
      BG = 0.0
      GO TO 40
   31 RAK = 1.0/CK(I)
      CALL BESJ(RAK,0,BJ0,TOL,IER)
      IERC=1
      IF(IER) 35,32,35
   32 CALL BESJ(RAK,1,BJ1,TOL,IER)
      IERC=2
      IF(IER)35,33,35
   33 CALL BESY(RAK,0,BY0,IER)
      IERC=3
      IF(IER)35,34,35
   34 CALL BESY(RAK,1,BY1,IER)
      IERC=4
      IF(IER)35,36,35
   35 WRITE(6,820) IER, IERC
  820 FORMAT(///'******WARNING******'/'IER=',I2,'FOR BESSEL CALL',I2)
      STOP 0001
   36 BV1=BJ1+BY0
      BV2 = BY1-BJ0
      BVN=1./(BV1*BV1+BV2*BV2)
      BF = BVN*(BJ1*BV1+BY1*BV2)
      BG = -BVN*(BY1*BY0+BJ1*BJ0)
   40 CC = CK(I)
      C2HR(I) = 2.0*BG*CC
      C2HI(I) = -2.0*BF*CC
      C2AR(I) = C2HR(I)
      C2AI(I) = -(1.0+2.0*BF)*CC
      C2MI(I) = -CC
      C3R(I) = -2.0*BF*CC*CC
      C3I(I) = -2.0*BG*CC*CC
      ELHR(I) = 1.0+2.0*BG*CC
      ELHI(I) = -2.0*BF*CC
      ELAR(I) = 0.5+2.0*BG*CC-2.0*BF*CC*CC
      ELAI(I) = -CC*((1.0+2.0*BF)+2.0*BG*CC)
      ELBR(I) = FK5*(-T1+CC*BG*T11-2.0*BF*CC*CC*T10)
      ELBI(I) = CC*FK5*(T4-BF*T11-2.0*BG*CC*T10)
      ELZR(I) = FK5*(2.0*BG*CC*PH1+PH3)
      ELZI(I) = -2.0*BF*CC*PH1*FK5
      EMHR(I) = 0.5
      EMAR(I) = 0.375
      EMAI(I) = -CC
      EMBR(I) = -FK5*((T7+(E+0.5)*T1)+CC*CC*(T4+T10))
      EMBI(I) = CC*FK5*(-2.0*FK1*FK2/3.0+T4)
      EMZR(I) = 0.25*PH6*FK5
      EMZI(I) = -CC*PH5*FK5
      THR(I) = FK5*(-T1+BG*CC*T12)
      THI(I) = -BF*CC*T12*FK5
      TAR(I) = -FK5*((T7+(E+0.5)*T1)+CC*T12*(-BG+CC*BF))
      TAI(I)=-CC*FK5*(-FK1*FK2/3.-T1-T4/2.+BF*T12+BG*CC*T12)
      TBR(I) = FK6*(-T3+CC*(3G*T11*T12/2.0-CC*((T5-T4*T10)
     1 +BF*T10*T12)))
      TBI(I) = CC*FK6*(T4*T11/2.0-T12*(BF*T11/2.0+CC*BG*T10))
```

```
      TZR(I) = FK6*(BG*CC*PH1*PH8+C.5*PH37)
      TZI(I) = -CC*FK6*(BF*PH1*PH8+PH10)
      PHR(I) = FK5*(2.0*BG*CC*PH31+PH3)
      PHI(I) = -2.0*BF*CC*PH31*FK5
      PAR(I) = (2.0*CC*PH31*FK5)*(-BF*CC+BG)+0.25*PH6*FK5
      PAI(I) = -CC*FK5*(2.0*PH31*(BF+BG*CC)+PH32)
      PBR(I) = FK6*(CC*(BG*PH2*PH31+CC*(-2.0*PH1*PH31*BF-PH35))
     1 +C.5*PH37)
      PBI(I) = -CC*FK6*(PH31*(2.0*CC*PH1*BG+PH2*BF)+PH36)
      PZR(I) = FK6*(2.0*BG*PH1*PH31*CC+PH17)
      PZI(I) = -CC*FK6*(2.0*BF*PH1*PH31+PH35)
  130 CONTINUE
      READ(5,CCNT1)
      IF(ID)140,14,140
  140 WRITE(6,9)
      WRITE(6,115) (ELHR(I),ELAR(I),ELBR(I),ELZR(I),
     1         ELHI(I),ELAI(I),ELBI(I),ELZI(I) ,I=1,N)
      WRITE(6,112)
      WRITE(6,116) (EMHR(I),EMAR(I),EMBR(I),EMZR(I),
     1   EMAI(I),EMBI(I),EMZI(I) ,I=1,N)
      WRITE(6,113)
      WRITE(6,115) (THR(I),TAR(I),TBR(I),TZR(I),
     1 THI(I),TAI(I),TBI(I),TZI(I) ,I=1,N)
      WRITE(6,114)
      WRITE(6,115) (PHR(I),PAR(I),PBR(I),PZR(I),
     1 PHI(I),PAI(I),PBI(I),PZI(I) ,I=1,N)
   14 WRITE(6,69)
      READ(5,CCNT2,END=9999)
      IF(WB)10,15,15
   15 CALL PAGEHD
      WWH = WH/(2.*PI)
      WWA = WA/(2.*PI)
      WRITE(6,1) WB,SUMB,ALT,WWH,WWA,GBET,GEB,GS,GR
      OV1=0.0
      OV2=0.0
   20 DO 25 I=1,N
      AHHR=W21+BR*W20*C2HR(I)+H21+BR*H20*C2HR(I)
      AHHI=BR*W20*C2HI(I)+BR*H2C*C2HI(I)
      AAHR = -A*W27-BR*F1*W26*C2HR(I)
      AAHI = -BR*F1*W26*C2HI(I)
      AHAR = AAHR+BR*(C2AR(I)*W26+BR*C3R(I)*W25)
      AHAI = AAHI+BR*(C2AI(I)*W26+BR*C3I(I)*W25)
      AAAR = (0.125+A*A)*W24+BR*( C2HR(I)*F1*F1-C2AR(I)
     1 *F1)*W23-BR*BR*C3R(I)*F1*W22
      AAAI = BR*(C2MI(I)+C2HI(I)*F1*F1-C2AI(I)*F1)*W23-BR*BR
     1 *C3I(I)*F1*W22
      AHBR = A18*(ELBR(I)-F2*ELZR(I))
      AHBI = A18*(ELBI(I)-F2*ELZI(I))
      AABR = A20*(EMBR(I)-F1*ELBR(I)-F2*(EMZR(I)-F1*ELZR(I)))
      AABI = A20*(EMBI(I)-F1*ELBI(I)-F2*(EMZI(I)-F1*ELZI(I)))
      ABHR = A18*(THR(I)-F2*PHR(I))
      ABHI = A18*(THI(I)-F2*PHI(I))
      ABAR = A20*(TAR(I)-F2*PAR(I)-F1*(THR(I)-F2*PHR(I)))
      ABAI = A20*(TAI(I)-F2*PAI(I)-F1*(THI(I)-F2*PHI(I)))
      ABBR = A19*(TBR(I)-F2*(PBR(I)+TZR(I)-F2*PZR(I)))
      ABBI = A19*(TBI(I)-F2*(PBI(I)+TZI(I)-F2*PZI(I)))
      AHAR = AHAR+(GRM1)*(AHBR)
      AHAI = AHAI+(GRM1)*(AHBI)
      AAAR = AAAR+(GRM1)*(AABR)
      AAAI = AAAI+(GRM1)*(AABI)
```

```
      ABAR = ABAR+(GRM1)*(ABBR)
      ABAI = ABAI+(GRM1)*(ABBI)
      FAC = PI*RHO/W11
      DHHR=1.+FAC*AHHR
      DHHI = FAC*AHHI
      DHAR=W13/W11+FAC*AHAR
      DHAI = FAC*AHAI
      DHBR=A7/W11+FAC*AHBR
      DHBI = FAC*AHBI
      FAC = PI*RHO/W12
      DAHR=W13/W12+FAC*AAHR
      DAHI = FAC*AAHI
      DAAR=1.+FAC*AAAR
      DAAI = FAC*AAAI
      DABR=A13/W12+FAC*AABR
      DABI = FAC*AABI
      FAC = PI*RHO/A4
      DBHR=A7/A4+FAC*ABHR
      DBHI = FAC*ABHI
      DBAR=A13/A4+FAC*ABAR
      DBAI = FAC*ABAI
      DBBR=1.+FAC*ABBR
      DBBI = FAC*ABBI
      P = WH/WA
      P = P*P
  902 DBPR=DBBR-WB*WB
  903 IF(CK(I))201,200,201
  200 DBPI = 0.0
      GO TO 202
  201 DBPI=DBBI-GBET*WB*WB-GEB
  202 T1 = P*DABR
      T2 = P*DABI
      T3 = P*DBPR
      T4 = P*DBPI
      CALL COMP(3,DHBR,DHBI,DBHR,DBHI,ER1,EI1)
      CALL COMP(3,T1,T2,DBAR,DBAI,ER2,EI2)
      CALL COMP(3,T3,T4,DAAR,DAAI,ER3,EI3)
      CALL COMP(3,DHHR,DHHI,DBPR,DBPI,ER4,EI4)
      AA(1) = P*DBPR
      BB(1) = P*DBPI
      AA(2) = ER1+ER2-ER3-ER4
      BB(2) = EI1+EI2-EI3-EI4
      CALL COMP(3,DBPR,DBPI,DAAR,DAAI,ER1,EI1)
      CALL COMP(3,DABR,DABI,DBAR,DBAI,ER2,EI2)
      CALL COMP(2,ER1,EI1,ER2,EI2,ER3,EI3)
      CALL COMP(3,DHHR,DHHI,ER3,EI3,ER1,EI1)
      CALL COMP(3,DAHR,DAHI,DBPR,DBPI,ER2,EI2)
      CALL COMP(3,DABR,DABI,DBHR,DBHI,ER3,EI3)
      CALL COMP(2,ER2,EI2,ER3,EI3,ER4,EI4)
      CALL COMP(3,DHAR,DHAI,ER4,EI4,ER2,EI2)
      CALL COMP(3,DAHR,DAHI,DBAR,DBAI,ER3,EI3)
      CALL COMP(3,DBHR,DBHI,DAAR,DAAI,ER4,EI4)
      CALL COMP(2,ER3,EI3,ER4,EI4,ER5,EI5)
      CALL COMP(3,DHBR,DHBI,ER5,EI5,ER3,EI3)
      AA(3) = ER1-ER2+ER3
      BB(3) = EI1-EI2+EI3
      CALL QUADRT(AA,BB,R,RI)
      DO 21 J=1,2
      IF(R(J)) 223,223,221
  223 G(J) = 0.0
```

```
      V(J) = 0.0
      WF(J) = 0.0
      ZCYC(J) = 88888.0
      ALMBA(J) = 0.0
      GO TO 500
  221 WF(J) = WA/DSQRT(R(J))
      G(J) = RI(J)/R(J)
      V(J) = WF(J)*BR*CK(I)*DSQRT(RHO/RHOO)*60./88.
  222 CONTINUE
      IF (GS-G(J)) 224,224,424
  224 ALMBA(J)=0.0
      ZCYC(J) = 99999.0
      GO TO 500
  424 ALMBA(J) = 0.5*WF(J)*(GS-G(J))
      ZCYC(J) = WF(J) * 0.6931500/(2.0*PI*ALMBA(J))
  500 WF(J) = 0.5*WF(J)/PI
   21 CONTINUE
      IF(ZCYC(1)-88888.0) 501,544,501
  501 IF(ZCYC(2)-88888.0) 502,544,502
  502 IF(ZCYC(1)-99999.0) 503,544,503
  503 IF(ZCYC(2)-99999.0) 504,544,504
  504 IF(V(1)-OV1) 42,43,43
   43 IF(V(2) -OV2) 42,44,44
   42 CONTINUE
      GSAVE = G(1)
      VSAVE = V(1)
      WSAVE = WF(1)
      ASAVE = ALMBA(1)
      ZSAVE = ZCYC(1)
      G(1)  = G(2)
      V(1)  = V(2)
      WF(1) = WF(2)
      ALMBA(1) = ALMBA(2)
      ZCYC(1) = ZCYC(2)
      G(2) = GSAVE
      V(2) = VSAVE
      WF(2) = WSAVE
      ALMBA(2) = ASAVE
      ZCYC(2) = ZSAVE
   44 OV1 = V(1)
      OV2 = V(2)
  544 WRITE(7,800) V(1), G(1)
      WRITE(8,800) V(2), G(2)
      WRITE(6,6) V(1),G(1),ALMBA(1),WF(1),ZCYC(1)
   23 WRITE(6,7) V(2),G(2),ALMBA(2),WF(2),ZCYC(2)
   25 CONTINUE
      GO TO 14
 9999 STOP 9999
      END
      SUBROUTINE BESJ(X,N,BJ,D,IER)
      IMPLICIT REAL*8 (A-H,O-Z)
      REAL*4 X4
      BJ=.0
      IF(N)10,20,20
   10 IER=1
      RETURN
   20 IF(X)30,30,31
   30 IER=2
      RETURN
   31 IF(X-15.)32,32,34
```

```
 32 NTEST=20.+10.*X-X** 2/3
    GO TO 36
 34 NTEST=90.+X/2.
 36 IF(N-NTEST)40,38,38
 38 IER=4
    RETURN
 40 IEP=0
    BPREV=.0
    IF(X-5.)50,60,60
 50 MA=X+6.
    GO TO 70
 60 MA=1.4*X+60./X
 70 X4=SNGL(X)
    MB=N+IFIX(X4)/4+2
    MZERO=MAXO(MA,MB)
    MMAX=NTEST
100 DO 190 M=MZERO,MMAX,3
    FM1=1.0E-28
    FM=.0
    ALPHA=.0
    IF(M-(M/2)*2)120,110,120
110 JT=-1
    GO TO 130
120 JT=1
130 M2=M-2
    DO 160 K=1,M2
    MK=M-K
    BMK=2.*DFLOAT(MK)*FM1/X-FM
    FM=FM1
    FM1=BMK
    IF(MK-N-1)150,140,150
140 BJ=BMK
150 JT=-JT
    S=1+JT
160 ALPHA=ALPHA+BMK*S
    BMK=2.*FM1/X-FM
    IF(N)180,170,180
170 BJ=BMK
180 ALPHA=ALPHA+BMK
    BJ=BJ/ALPHA
    IF(DABS(BJ-BPREV)-DABS(D*EJ))200,200,190
190 BPREV=BJ
    IER=3
200 RETURN
    END
    SUBROUTINE BESY(X,N,BY,IER)
    IMPLICIT REAL*8 (A-H,C-Z)
    IF(N)160,10,10
 10 IER=0
    IF(X)190,190,20
 20 PI=3.141592653
    IF(X-4.)40,40,30
 30 T=4./X
    P0=.3989422793
    Q0=-.0124669441
    P1=.3989422819
    Q1=.0374008364
    A=T*T
    B=A
    P0=P0-.0017530620*A
```

```
      Q0=Q0+.0004564324*A
      P1=P1+.0029218256*A
      Q1=Q1-.00063904*A
      A=A*A
      P0=P0+.00017343*A
      Q0=Q0-.0000869791*A
      P1=P1-.000223203*A
      Q1=Q1+.0001064741*A
      A=A*B
      P0=P0-.0000487613*A
      Q0=Q0+.0000342468*A
      P1=P1+.0000580759*A
      Q1=Q1-.0000398708*A
      A=A*B
      P0=P0+.0000173565*A
      Q0=Q0-.0000142078*A
      P1=P1-.0000020092*A
      Q1=Q1+.00001622*A
      A=A*B
      P0=P0-.0000037043*A
      Q0=Q0+.0000032312*A
      P1=P1+.0000042414*A
      Q1=Q1-.0000036594*A
      A=DSQRT(2.*PI)
      B=4.*A
      P0=A*P0
      Q0=B*Q0/X
      P1=A*P1
      Q1=B*Q1/X
      A=X-PI/4.
      B=DSQRT(2./(PI*X))
      Y0=B*(P0*DSIN(A)+Q0*DCOS(A))
      Y1=B*(-P1*DCOS(A)+Q1*DSIN(A))
      GO TO 90
   40 XX=X/2.
      X2=XX*XX
      T=DLOG(XX)+.5772156649
      SUM=0.
      TERM=T
      Y0=T
      DO 70 L=1,15
      IF(L-1)50,60,50
   50 SUM=SUM+1./DFLOAT(L-1)
   60 FL=L
      TS=T-SUM
      TERM=(TERM*(-X2)/FL**2)*(1.-1./(FL*TS))
   70 Y0=Y0+TERM
      TERM = XX*(T-.5)
      SUM=0.
      Y1=TERM
      DO 80 L=2,16
      SUM=SUM+1./DFLOAT(L-1)
      FL=L
      FL1=FL-1.
      TS=T-SUM
      TERM=(TERM*(-X2)/(FL1*FL))*((TS-.5/FL)/(TS+.5/FL1))
   80 Y1=Y1+TERM
      PI2=2./PI
      Y0=PI2*Y0
      Y1=-PI2/X+PI2*Y1
```

```
 90 IF(N-1)100,100,130
100 IF(N)110,120,110
110 BY=Y1
    GO TO 170
120 BY=Y0
    GO TO 170
130 YA=Y0
    YB=Y1
    K=1
140 T=CFLOAT(2*K)/X
    YC=T*YB-YA
    K=K+1
    IF(K-N)150,160,150
150 YA=YB
    YB=YC
    GO TO 140
160 BY=YC
170 RETURN
180 IER=1
    RETURN
190 IER=2
    RETURN
    END
    SUBROUTINE COMP(N,A,B,C,D,ER,EI)
    IMPLICIT REAL*8 (A-H,O-Z)
    GO TO (1,2,3,4,5),N
  1 ER=A+C
    EI=B+D
    RETURN
  2 ER = A-C
    EI = B-D
    RETURN
  3 ER = A*C-B*D
    EI=B*C+A*D
    RETURN
  4 FAK = 1.0/(C*C+D*D)
    ER=FAK*(A*C+B*D)
    EI = FAK*(B*C-A*D)
    RETURN
  5 ER=C*C+D*D
    EI = 0.0
    RETURN
    END
    SUBROUTINE QUADRT(AA,BB,R,RI)
    IMPLICIT REAL*8 (A-H,O-Z)
    DIMENSION AA(3),BB(3),R(2),RI(2)
    AR=AA(1)
    AI=BB(1)
    BR=AA(2)
    BI=BB(2)
    CR=AA(3)
    CI=BB(3)
    X=BR*BR-BI*BI-4.*AR*CR+4.*AI*CI
    Y=2.*BR*BI-4.*AI*CR-4.*AR*CI
    THETA=ATTN(Y,X,1)
    THETA=THETA/2.0
    ZB=DSQRT(X*X+Y*Y)
    ZB=DSQRT(ZB)
    ZR=ZB*DCOS(THETA)
    ZI=ZB*DSIN(THETA)
```

```
      TR=-BR+ZR
      TI=-BI+ZI
      PR=2.*TR*AR+2.*TI*AI
      PI=2.*TI*AR-2.*TR*AI
      D=4.*AR*AR+4.*AI*AI
      R(1)=PR/D
      RI(1)=PI/D
      TR=-BR-ZR
      TI=-BI-ZI
      PR=2.*TR*AR+2.*TI*AI
      PI=2.*TI*AR-2.*TR*AI
      D=4.*AR*AR+4.*AI*AI
      R(2)=PR/D
      RI(2)=PI/D
      RETURN
      END
      FUNCTION ATTN(Y,X,N)
      IMPLICIT REAL*8 (A-H,O-Z)
      IF(X)10,5,10
    5 IF(Y)15,10,20
   10 ATTN=ATN(Y,X,N)
      RETURN
   15 ATTN=4.712390
      RETURN
   20 ATTN=1.570797
      RETURN
      END
      SUBROUTINE START
      IMPLICIT REAL*8 (A-H,O-Z)
      COMMON RUNNO(2),DATE(2),TITLE1(20),TITLE2(20),ANAME(6)
    1 FORMAT(20A3)
    2 FORMAT(1X'END OF INPUT DATA HAS BEEN REACHED'//)
    5 FORMAT(2A3,6A3)
      READ(5,5,END=6) RUNNO,ANAME
      GO TO 10
    6 WRITE(6,2)
      STOP 1000
   10 READ(5,1) TITLE1
      READ(5,1) TITLE2
      RETURN
      END
      SUBROUTINE COMENT
      IMPLICIT REAL*8 (A-H,O-Z)
      COMMON V1(50)
      DIMENSION REMARK(15)
    1 FORMAT(2I3,15A4)
    2 FORMAT(10X,15A4)
    3 FORMAT(////////////)
      N = 0
   10 READ(5,1) IS,IP,REMARK
      IF (IS) 11,11,20
   11 N=N+1
      IF (IP) 13,14,13
   13 CALL PAGEHD
      WRITE(6,3)
      N=1
   14 IF (N-49) 15,16,15
   16 N=0
   15 WRITE(6,2) REMARK
      GO TO 10
```

```
   20 RETURN
      END
      SUBROUTINE PAGEHD
      IMPLICIT REAL*8 (A-H,O-Z)
      REAL*4 SDATE(2)
      COMMON RUNNO(2),DATE(2),TITLE1(20),TITLE2(20),ANAME(6)
      COMMON/PAGE/NPAGE
    1 FORMAT('1RUN NO. ',2A3,15X,'DATE ',2A4,14X,'PAGE NO. '
     1,I3,//24X'RUN BY ',6A3//10X20A3/10X20A3//)
      NPAGE=NPAGE+1
      CALL TIME(10,0,SDATE)
      DATE(1)=DBLE(SDATE(1))
      DATE(2)=DBLE(SDATE(2))
      WRITE(6,1) RUNNO,DATE,NPAGE,ANAME,TITLE1,TITLE2
      RETURN
      END
      FUNCTION ATN(SIN,COS,I)
      IMPLICIT REAL*8 (A-H,O-Z)
      ARG=DABS(SIN/COS)
      TEMP=DATAN(ARG)
      IF(SIN)3,7,1
    1 IF(COS)5,8,2
    2 ATT=TEMP
      GO TO 10
    3 IF(COS)4,9,6
    4 ATT=TEMP+3.141593
      GO TO 10
    5 ATT=3.141593-TEMP
      GO TO 10
    6 ATT=6.283185-TEMP
      GO TO 10
    7 IF(COS)14,13,13
    8 ATT=1.5707963
      GO TO 10
    9 ATT=4.712389
   10 IF(I)12,11,12
   11 ATN=ATT*57.29578
      RETURN
   12 ATN=ATT
      RETURN
   13 ATN=0.
      RETURN
   14 ATT=3.141593
      GO TO 10
      END
FILE
```