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EVALUATION OF A POWER-AUGMENTED-RAM WING OPERATING FREE IN HEAVE AND PITCH OVER WATER

by

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AVIATION AND SURFACE EFFECTS DEPARTMENT

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An investigation was conducted at the David W. Taylor Naval Ship Research and Development Center Carriage III Facility to determine performance characteristics of a power-augmented-ram wing-in-ground-effect vehicle. The model was the first statically stable vehicle to be operated free in heave and pitch with excess thrust. The power-augmented-ram vehicle successfully accomplished a static takeoff at the extremely low thrust-to-weight ratio of 0.173. The model was able to accelerate through hump at a vehicle density of

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2 lb/ft^3 (32 kg/m^3); this is a higher density than in any previous test.

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NOTATION

AR	Aspect ratio
b	Span
C_T	Thrust coefficient, (thrust-drag)/thrust
c	Wing chord
D	Drag, block gage load (GAGE) plus the horizontal component of thrust
g	Gravity acceleration
$H_{1/3}$	Significant wave height
h	Heave, distance between the bottom of the wing and the mean static waterline (positive when wing is above water)
h_e	Endplate height
Imm	Immersion, (h_e - h) distance between the bottom of the endplate and the mean static waterline (positive when endplate is in water)
L	Lift
LCG	Longitudinal center of gravity (c.g.) position
PAPE	Pressure in the aft section of the port endplate
PASE	Pressure in the aft section of the starboard endplate
PFPE	Pressure in the forward section of the port endplate
PFSE	Pressure in the aft section of the starboard endplate
PT	Point number
RPM_o	Fan rotational velocity when the model has zero forward speed
T	Thrust
T_{exs}	Excess thrust, negative of the block gage load (GAGE)
T/W	Thrust-to-weight ratio
T/W_o	Thrust-to-weight ratio static
t_i/h	Theoretical incoming jet thickness-to-height ratio
V	Velocity

WT	Weight
α	Wing angle of attack as measured from the bottom of the airfoil
θ	Pitch as measured from the bottom of the airfoil
δ_f	Flap angle
θ_F	Fan angle

ABSTRACT

An investigation was conducted at the David W. Taylor Naval Ship Research and Development Center Carriage III Facility to determine performance characteristics of a power-augmented-ram wing-in-ground-effect vehicle. The model was the first statically stable vehicle to be operated free in heave and pitch with excess thrust. The power-augmented-ram vehicle successfully accomplished a static takeoff at the extremely low thrust-to-weight ratio of 0.173. The model was able to accelerate through hump at a vehicle density of 2 lb/ft^3 (32 kg/m^3); this is a higher density than in any previous test.

Trimming moments were supplied by one of several aero-dynamic/hydrodynamic control surfaces. The best performance was obtained using a large 40-deg deadrise, "V" shaped, planing tail.

ADMINISTRATIVE INFORMATION

This experimental investigation was undertaken by the Air ANVCE Projects Division (1612) of the Aviation and Surface Effects Department at the David W. Taylor Naval Ship Research and Development Center (DTNSRDC). The model design and construction was sponsored by the Advanced Naval Vehicle Concept Evaluation (ANVCE) Project Office (NOP-96V) of the Program Planning Office (Navy) and was funded under Task Area SSH15002, Work Unit 1612-009. The actual test and evaluation phase of this investigation was sponsored by the Naval Air Systems Command (NAIR-320D) and was funded under Task Area WF 41-421, Work Unit 1600-007.

INTRODUCTION AND BACKGROUND

Interest in the wing-in-ground effect (WIG) phenomenon stems from the early 1920's when Wieselsberger[1] first quantified the reduction in drag for wings flying "near ground."

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[1]Wieselsberger, C., "Wing Resistance Near the Ground," NACA TM 77 (1977).

In the 1960's a substantial WIG technology effort was funded jointly by the Navy and Army. This work involved several detailed wind tunnel investigations[2] and a number of design studies utilizing the new data. The primary reasons for discontinuing the program were takeoff and landing (loads) constraints which limited designs to unreasonably low wing loadings.

A resurgence of WIG investigations began in the early 1970's. At the NASA Langley Research Center, tests were conducted on the power-augmented-ram (PAR) concept,[3] wherein propulsors are located in front of the wing and their high energy exhaust is directed under the wing to generate high lift at low speeds. Obviously such a system, if properly designed, could significantly reduce the landing and takeoff velocities of an ocean-going WIG aircraft, thus reducing impact loads and also allowing much higher wing loadings.

Since ANVCE's beginning in September 1975, an extensive investigation of the PAR-WIG phenomenon has been conducted at the David W. Taylor Naval Ship Research and Development Center. In 1976 two simple theories were proposed to predict the static performance of the PAR-WIG.[4,5] These theories predicted that with proper matching of the propulsor jet area and the opening bounded by the wing leading edge, endplates, and the surface over which the wing is positioned, static lift many times the thrust of the propulsors could be generated and still recover a large percentage of the original thrust. These theories predicted considerably better performance than had been achieved previously in wind tunnels.

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[2] Anonymous, "Wind Tunnel Investigation of Single and Tandem Low Aspect Ratio Wings in Ground Effect," Lockheed Report 16906 (TRECOM Technical Report 63-63) (Mar 1964).

[3] Huffman, J. K. and C. M. Jackson, "Investigation of the Static Lift Capability of a Low Aspect Ratio Wing Operating in a Powered Ground Effect Mode," NASA TM-X-3031 (Jun 1974).

[4] Gallington, R. W., "Sudden Deceleration of a Free Jet at the Entrance of a Channel," DTNSRDC Report ASED 350 (Jan 1976).

[5] Gallington, R. W. and H. R. Chaplin, "Theory of Power Augmented-Ram Lift at Zero Forward Speed," DTNSRDC Report ASED 365 (Feb 1976).

A series of tests over groundboards and water have been conducted to verify these theories and to develop a data base from which vehicle designs can be generated. The first of these tests was conducted in the DTNSRDC 8- by 10- Ft Subsonic Wind Tunnel in April 1976[6]. This simple test showed that (by properly choosing the height of the wing above the groundboard, the flap angle, angle of attack, propulsor position and propulsor angle) performance at least as high as that predicted by the theory was possible at zero forward speed. Figure 1 is a comparison of the theory and the range of performance covered in this test.

A second investigation was completed at the DTNSRDC Langley Tank 1 in September 1976. This test was designed to evaluate the performance of the PAR phenomenon both statically and at forward speed over water. Results from this investigation were encouraging. Transport efficiencies as high as 30 were predicted using these data.*

The third major test in this series was completed on the DTNSRDC Carriage III in October 1976.[7] This test was designed to investigate the performance of the PAR-WIG model in various sea states. The effectiveness of various load alleviation devices was also studied. Significant results from this investigation include:

- Root mean square c.g. accelerations are on the order of 0.1 g for a PAR-WIG with thin endplates in Sea State 5.
- The equilibrium flying height with respect to mean sea level is greater in moderate waves (up to about 10 percent of the span in height) than in calm water, and there is no drag penalty.

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[6]Krause, F. H. and R. W. Gallington, "Static Performance of a Power-Augmented Ram Wing," Report DTNSRDC ASED-382 (Jun 1977).

[7]McCabe, E. F., "Assessment of Load Alleviation Devices Installed on a Power-Augmented-Ram Wing over Irregular Waves," Report DTNSRDC ASED-383 (Aug 1977).

*Reported informally by G. H. Kidwell and R. W . Gallington ("Effect of Configuration on the Measured Performance of a Power-Augmented, Wing-In-Ground Effect Vehicle," DTNSRDC ASED TM-16-77-115, Mar 1977); and F. H. Krause ("Parametric Investigation of a Power Augmented Ram Wing over Water," DTNSRDC ASED TM-16-76-95, Oct 1976).

This report presents the data and analysis from the fourth test in this series completed in February 1977. During the two previous tests over water, the model was not free in pitch; however, a new model was built which is free in both pitch and heave. This model was designed using a new analytical tool and previous test results.[8] In addition, ANVCE direction limited the aspect ratio to 1.10. The model can be trimmed at various angles by using one of two hydrodynamic skids and/or a horizontal tail. This test was designed to determine full vehicle performance, c.g. effects, and trim penalties.

DESCRIPTION OF MODEL

A general arrangement, three-view drawing of the "Sea-WIG" model is shown in Figure 2. Principal dimensions of the model are listed in Table 1. The vehicle is basically a semi-monocoque structure and is constructed primarily of balsa, spruce, and various thicknesses of plywood with some aluminum and fiberglass. The model contains six major components: propulsion section, fuselage, wing flap, endplate, and aerodynamic/hydrodynamic trimming system.

The propulsion section of the model consists of four light-weight, 8-in. diameter, air-powered, tip-driven fans. These fans are mounted above a 1-in.-square aluminum tube which runs completely through the nose of the fuselage. The entire system (mounting tube and fans) can be rotated and locked at angles of 20, 25, and 30 deg. The system location is fixed at approximately 33 in. (84 cm) ahead of the wing leading edge.

The fuselage is 132 in. (335.3 cm) long, 8 in. (20.3 cm) wide, and 10 in. (25.4 cm) high. It is constructed of four balsa stringers joining ten bulkheads. This frame is then covered with 1/16-in. plywood. Compartments are set aside in the nose of the fuselage and also in the aft section for balance weights.

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[8] Rousseau, D. G. and R. W. Gallington, "Performance Prediction Method for a Wing-In-Ground-Effect Vehicle with Under-the-Wing Blowing," DTNSRDC Report ASED 379 (Mar 1977).

A cavity 40 in. (102 cm) long, 6 in. (15 cm) wide, and 7 in. (18 cm) deep is located 10 in. (25 cm) aft of the wing leading edge in the top of the fuselage. Two aluminum channels run the length of this cavity in the bottom. Holes spaced 1 in. (2.54 cm) apart in the channels provide mounting points for the pitch pivot and block gage mounting brackets which attach the model to the carriage.

The wing is approximately 53.2 in. (135 cm) in chord and has a span of 62.3 in. (158 cm). It is composed of ten balsa sections mounted to two spruce spars and is covered with 1/16-in. marine plywood. The two spars pass through the fuselage under the mounting cavity and bolt directly to the fuselage.

Figure 3 is a simple line drawing of the flap mechanism as designed by J-Tec Associates, Inc. The flap itself is a simple, split flap arrangement made from a sheet of 1/8-in. marine plywood. It has a chord of 9 in. (23 cm) and is attached to the bottom of the wing with simple hinges. The flap is spring loaded down against a downstop (4 nylon chords) such that it will "blow back" if it hits water. The nylon downstops are adjustable, though this capability was never used. The loading mechanism is composed of an aluminum plate hinged to the wing and 10 lengths of rubber pulling the aluminum plate down against the flap. The rubbers were sized such that the flap would not be blown back by a uniform load less than 8 lb/ft^2.

When the model is tested at higher wing loadings (above 8 lb/ft^2), air pressure alone under the wing will cause the flap to close completely (flap angle = 0.0). This could be disasterous if the model does not pitch up to close the trailing edge gap with the water. Therefore, four wooden blocks were made and installed during some portions of the test to limit the minimum flap angle to 27 deg; see Figure 3.

Two distinct types of endplates were studied during this investigation. The first type, a low-drag, solid endplate, is shown in Figure 4. This endplate is constructed of three pieces: the forebody, the afterbody, and the upper body. The forebody, a wooden pyramid, is 6 in. (15.2 cm) deep, 2 in. (5.1 cm) wide, and 9.375 in. (23.81 cm) long. The afterbody is wedge shaped in cross section and is 5.5 in. (14 cm) deep, 1.84 in. (4.7 cm) wide, and 43.8 in. (111.3 cm) long. When the forebody and afterbody are lined up, the resulting step is 0.08 in. (0.2 cm), which should be sufficient to insure flow separation along most of the endplate. The upper body is 2 in. (5.1 cm) wide and matches the airfoil section of the wing. The 0.08 in. (0.2 cm) overhang of the upper body provides a spray strip along the wing.

The second type of endplate is called the "soft" endplate; see Figure 2. The upper body of this endplate is the same as that of the previous endplate. It is constructed of aluminum and fiberglass. This portion of the endplate serves as a plenum for the air which must be supplied to the lower portion of the endplate. The portion of the endplate which extends below the wing consists of 66 "fingers" made of 0.005-in. neoprene. The front and rear fingers are slightly larger in cross section than the other 64. This is a design variation of the fingers tested by McCabe[7] and reduces the tendency of the first finger to move outboard and around the second finger.

Three different aerodynamic or hydrodynamic control surfaces were used during this test. The horizontal tail shown in Figure 2 is located 25 in. (63.5 cm) above the bottom of the wing and 95 in. (241.3 cm) aft of the wing leading edge. Principal dimensions of the tail are listed in Table 1. The frame- and skin-type construction is of balsa and plywood. Boundary layer strips are installed on the foil upper surface at the 5- and 25-percent chord stations to delay stall. Tail incidence can be changed using shims.

Two extension pieces, which when attached to the tail increase its chord by 4 in. (10.2 cm), are also available. Attaching these pieces can result in a net increase in tail area of over 48 percent, and because they attach at the trailing edge, the effect on airfoil camber is much the same as adding a flap.

The other two control surfaces are hydrodynamic in nature. Skids 1 and 2 are made of solid pine and are both pyramids. The dimensions and normal locations of these skids are given in Table 1 and Figure 2.

TEST SETUP

All experiments were conducted at the DTNSRDC Carriage III Facility (January through February 1977). This high-speed towing facility is operated by the Experimental Aero-Hydro Group (1614) of the Aviation and Surface Effects Department. The usable dimensions of the tow basin are at least 2,100 ft long, 20 ft wide, and from 10 to 16 ft deep.

The model is designed to be free in both pitch and heave. A 2-in. block gage (100-lb maximum load) attaches to the model at the pitch gimbal. This gage is bolted to an aerodynamic heave post extension (designed especially for this test to improve airflow near the model). The entire assembly is attached to the light-weight tow post assembly on Carriage III; see Figure 5.

Raw data in the form of electric signals are recorded on magnetic tape. These data can then be processed anytime by the on-board Hewlett-Packard 2100 S Computer. The basic variables recorded throughout the investigation were four fan rotational velocities, speed, immersion, pitch, axial force (gage), vertical accelerations at the pitch pivot, vertical accelerations at a point 49 in. (124.5 cm) aft of the pitch pivot, four pressures in the flexible endplate plenum, and wave height. Many of these variables were also recorded on a 14-channel oscillograph as a backup system to the digital analysis. The run number, point number, configuration number, c.g. position, model weight, tail angle, aspect ratio, and fan angle were input as constants.

The model was tested in calm water (Sea State 0) and in irregular waves. The pneumatic-type wavemaker, located at the east end of the high-speed towing basin, produces waves by cyclical variation of air pressure on the water surface. The model was tested in waves having significant heights of 1.68 in. (4.27 cm), 1.83 in. (4.65 cm), and 5.54 in. (14.07 cm). The energy spectra which approximate the Pierson-Moskowitz spectra for the same significant wave heights are shown in Figure 6. These wave spectra most nearly correspond to high Sea State 2, low Sea State 3, and low Sea State 5 conditions for a scale factor of 20.87.

TEST PROGRAM

The first phase of this test was the propulsion system calibration. As mentioned previously, the four fans were mounted above a 1-in.-square aluminum tube. This arrangement was mounted directly to the 2-in. block gage on the carriage support system. A series of runs were made at velocities of 0, 10, 20, 30, 40, and 50 ft/sec (0, 3.05, 6.1, 9.14, 12.19, and 15.24 m/sec) and at various drive pressures. By recording fan rotational velocities, block gage force, and carriage speed, a calibration of installed thrust was completed. A similar series of runs were also made with the propulsion system turned to an angle of 20 deg. Table 2 shows the complete run schedule of the fan calibration.

The test was divided into two major portions, the rigid endplate and the soft endplate. Incidence angles of 1.0, 5.6, and 9.0 deg were investigated for the tail alone. Longitudinal c.g. positions from 38.80 to 51.56 measured in percentage of the chord aft of the wing leading edge were investigated. Model weights from 113.5 to 210 lb (51.47 to 95.24 k) and thrust-to-weight ratios from 0.173 to 0.262 were also tested. Table 3 contains the complete run schedule followed during the "Sea-WIG" investigation. Note that run numbers associated with calibrations, checks, and so forth have been omitted.

RESULTS AND DISCUSSION

All of the data taken during this investigation are presented in the Appendix. These include the thrust calibration and model data, but do not include the everyday calibration checks of drag, heave, and pitch.

Figure 7 is a plot of the final thrust calibration data for the fans mounted at zero angle. Thrust is plotted versus fan rotational velocity at zero forward speed squared for various carriage velocities. Problems with measuring fan rotational velocities when the carriage is moving were experienced on an earlier test, and for this reason thrust calibrations have been done as a function of fan rotational velocity at zero forward speed. Provided that the air supply conditions remain relatively unchanged during a test sequence, the results have been very good. At the beginning of each pass down the towing tank, a zero forward speed data point is taken and the fan rotational velocities are stored on the computer. These velocities are then used to calculate thrust until a new zero speed point is taken. Analysis of the thrust data taken at a fan angle of 20 deg reveals that the previously untested assumption of unchanged gross thrust for fans at angles is valid.

Three key quantities provide the basis for analysis of the results from this investigation: (1) excess thrust divided by model weight (T_{exs}/wt), (2) heave (h), and (3) pitch (θ). The excess thrust is obtained by changing the sign of the gage force measured during the test. The heave is defined as the distance form the bottom of the wing to the water surface and is printed in the data output. And pitch is defined as the angle between the bottom of the wing and the local horizontal. Pitch is also listed in the data output.

LONGITUDINAL CENTER OF GRAVITY

Figure 8 is a plot of excess thrust divided by weight and pitch angle versus longitudinal c.g. location at various velocities for the model with rigid endplates and the large skid. Performance of the model obviously improves as the c.g. is moved from 51.5 percent of the chord to 45.2 percent. The dashed extension to the zero velocity curves indicate measured performance for a position of 44.5 percent. Note that data for this c.g. location was not taken at forward speed because of the nose down model attitude at 6 ft/sec. The model would most likely perform well at the higher forward speed, but during the test discretion was exercised to prevent possible damage to the model.

The same data for various c.g. positions can be plotted in the form of excess thrust-to-weight ratio versus pitch angle for a constant velocity; see Figure 9. There appears to be some correlation between pitch angle and excess thrust and is to be expected. Note that along a constant velocity curve the c.g. is moving aft as the pitch angle is increasing. It is this pitch relation to performance which results in the importance of c.g. position.

AERODYNAMIC/HYDRODYNAMIC CONTROL SURFACES

Three longitudinal control surfaces were available to trim the model: (1) the aerodynamic horizontal tail, (2) a small 60-deg deadrise skid, and (3) a large 40-deg deadrise version. The large 40-deg skid was more effective by far and consequently was used for most of the data runs.

Figure 10 is a comparison of the WIG performance with the horizontal tail set at 9 deg both with and without the small skid; this usually results in more excess thrust. The associated increase in heave is probably due to less air escaping under the endplates in front of the 50-percent chord when the model is at a lower angle of attack. At forward speed the combination of lower pitch angle and higher heave results in greatly reduced hydro drag. Even with the additional wetted area of the skid in the water, much less total wetted area exists because at the higher pitch angle a large portion of the model aft fuselage is immersed as well as a major portion of the aft endplates.

Figure 11 is a sketch of the approximate water levels (assuming no hydrostatic deflection) on the model at 35 ft/sec (10.7 m/sec) for the above cases. Note the much greater deflection of the flap for the configuration without the skid and the consequential greater "wetted" flap area. These flap deflections assume a nominal zero clearance between the flap trailing edge and the mean waterline.

Three sets of data with a thrust-to-weight ratio of 0.225 and a c.g. position of about 47.42 $\bar{c}$ are shown in Figure 12. Run 66 is for the model with aerodynamic tail surfaces only (I_t = 9 deg). The last two runs are configurations with the large skid, one with the tail and one without. It is apparent from this figure that the aerodynamic tail surfaces provide very little trimming power. Several explanations for this performance have been proposed but none validated.

- The horizontal tail area is too small; however, when the area was increased with cardboard extensions, no improvement in trim resulted.
- Flow over the tail is separating too early because it is laminar. Attaching transition strips, however, provides no increase in trim power.
- Aerodynamic flow in the wake of the carriage photographic platform is too disturbed to allow the tail to function.
- Airflow is nearly stagnate or has a considerable downwash component back near the main carriage housing where the tail is located.

On the other hand, comparing data runs with and without the skid shows the large amount of trim forces provided by the large skid. Note also the substantial increase in excess thrust when the skid is used. This larger skid has a better trim capability for several reasons:

1. It has a better L/D because of its smaller deadrise angle.
2. It is larger, thus giving more area for lifting.
3. It is further aft of the c.g., resulting in more trim moment for a given amount of lift.

Figure 11 shows the approximate waterlines for this configuration.

Another interesting phenomenon is the dramatic decrease in heave which occurs at a velocity of 6 ft/sec (1.83 m/sec) for both configurations using the large skid. This decrease is due to the wake behind the wing caused by the pressure distribution under the wing moving down the towing tank. The shape of this wave form can be determined analytically; however, an approximate sketch showing the phenomenon, as observed during the test, is shown in Figure 13. The model pitches down at this velocity because of the location of the skid in the top of the wave hump. Note that visual observation and oscillograph traces showed that the worst skid position actually occurred between 7.5 and 8.5 ft/sec (2.3 and 2.6 m/sec) when the tip of the skid passes through the wave crest. At higher speeds the wave crest moves further downstream until the water surface in the vicinity of the model is essentially flat.

MODEL WEIGHT

During the test program a short series of runs at four model weights were made. Analysis of these data shows little evidence that vehicle densities in the range tested have any significant effect on performance. Figure 14 is a plot of these data for constant static thrust-to-weight ratio and model configuration. Model weight has the most noticeable effect on heave at the low forward speeds. Hydrostatic depression accounts for most of this because the model is supported primarily by the high pressure PAR lift under the wing.

Further analysis of the data reveals that the decrease in heave as weight is increased from 135 lb (61.24 kg) to 210 lb (95.26 kg) is greater than the theoretical decrease in water level due to the pressure increase. At zero forward speed wing loading accounts for a decrease in heave of 0.634 in. (1.61 cm) from the lightest to the heaviest model. The heave data show a decrease of 1.08 in. (2.74 cm). This 70-percent reduction in heave shows a definite decrease in performance at low forward speeds. Note that at the highest forward speed the difference in heave between the same two configurations is only 0.41 in. (1.04 cm). This decrease in the effect of model weight on heave is obviously a result of aerodynamic and hydrodynamic lift replacing some of the PAR lift at high forward speeds.

The variation of excess thrust-to-weight ratio with model weight at the various speeds is also of interest. It should be pointed out that most of the differences being discussed are on the order of twice the drag gage accuracy. At 0.0 and 9 ft/sec (0 and 2.74 m/sec) T_{exs}/wt decreases as weight increases due primarily to the decrease in heave. When the model is flying at 6 ft/sec (1.83 m/sec), the heave decreases as weight is increased; but model pitch attitude also decreases, resulting in a net increase in excess thrust-to-weight ratio. This decrease in pitch angle is due to the increase in the size of the pressure hump aft of the wing on which the skid is located at this speed.

At higher forward speeds the trend is not the same. At 25 ft/sec (7.62 m/sec) T_{exs}/wt increases with weight up to a model weight of 185 lb (83.9 kg) but decreases at the highest weight. Model performance increases with weight at 35 ft/sec (10.67 m/sec) for all weights tested. In general, it would appear from the trends that the faster the vehicle is intended to go, the more efficient it is to run at higher densities.

Further investigations are necessary to determine maximum and optimum vehicle densities.

ENDPLATES

Two types of endplates were studied during this investigation. The soft endplates extend 6.0 in. (16.2 cm) below the bottom of the wing; the solid endplates extend only 5.5 in. (14 cm). Assuming the same performance for both configurations, a difference in heave of approximately 0.5 in. (1.3 cm) is expected. Figure 15 is a comparison between 3 configurations identical in every respect except for endplates. Heaves for the two soft endplate cases are approximately 0.7 in. (1.8 cm) higher than the model heaves for the configuration with hard endplates at all forward speeds. Along with this increase in heave, an associated increase in pitch is necessary to get enough wetted area on the skid to trim the model. Finally, there is very little difference in model excess thrust characteristics for these two configurations. The only apparant cause for this performance is the difference in endplate lower edges. Similar characteristics were found by McCabe.[7]

FLAPS

During the investigation, three flap arrangements were used. One arrangement, the free flap, allows the flap angle to vary between 0 and 40 deg. The second arrangement, referred to as the partial flap, consists of the free flap limited to a travel of 28 to 40 deg. The fixed setup (the third arrangement) consists of the flap fixed at an angle of 28 deg. Figure 16 is a plot of the mode performance for the three flap configurations with the large skid, an approximate thrust-to-weight ratio of 0.178, and a fan angle of 20 deg.

The heave, pitch, and excess thrust-to-weight characteristics of the two configurations using the free and partial flap arrangements were nearly the same at all forward speeds. In general, this would be true unless the model weight (hence, cushion pressure) was high enough to close the flap. The fixed flap configuration has better performance in terms of excess thrust-to-weight at all speeds. The heave is lower, as expected with a smaller flap angle (28 deg as compared to the nominal undeflected angle of 40 deg), and the corresponding pitch angle is lower.

FAN ANGLE

Three specific fan angles (20, 25 and 30 deg) were tested during this investigation. Figure 17 contains comparison plots utilizing data from three identical configurations except for the fan angle. From these curves it is apparent that the 20-deg fan angle was the optimum tested in terms of excess thrust-to-weight ratio at all speeds up to 35 ft/sec (10.67 m/sec). At this speed the model heave is low enough to cause large hydrodynamic loads on the endplate, and the excess thrust drops to that of the 25-deg fan angle case. Although no runs were made with fan angles less than 20 deg, no performance improvements would be expected. In fact, considering the low values of heave for the 20-deg case, the model could not be expected to fly (at least statically) with a much lower fan angle.

OSCILLOGRAPH OUTPUT

No attempt to publish the large numbers of oscillograph traces or to analyze their contents has been made. The primary function of the oscillograph system is to back up the digital data system. Several interesting time histories are available from the 45 ft/sec (13.7 m/sec) runs made. Figure 18 is a reduced copy of the oscillograph trace from Run 119. The time axis is marked along the bottom and the zero points for velocity, gage force, c.g. accelerations, and stern accelerations; pitch and immersion are shown on the vertical axis. Also shown are the sensitivities in units per block for each data channel.

Two interesting phenomenon appear on this graph. The first is the model behavior at 7 ft/sec (2.1 m/sec) which corresponds to the theoretical hydronautic hump speed. This has been described earlier in the report but is shown dramatically during this acceleration to 45 ft/sec (13.7 m/sec). The model pitches down about 4 deg and its heave drops 1.75 in. (0.69 cm) (corresponding to an increase in immersion). Notice that immediately following this behavior, there is an increase in gage force (decrease in excess thrust). The reason for this behavior is the position of the skid in the model wake.

The second region of interest occurs as the model accelerates from 30 to 40 ft/sec (9.14 to 12.2 m/sec). In this speed regime large pitch and heave oscillations occur at a frequency of about 1.25 Hz. The oscillations are in phase, which is to say that when the model height above the water is high, its pitch attitude is high also. No physical explanation for this behavior can be offered with any degree of confidence. It is probably due to the system of pitch control (the fixed skid) and can be controlled with a better, more flexible system. Also, as the model reaches a speed of 45 ft/sec (13.7 m/sec), the oscillation dampens.

"SEA-WIG" PERFORMANCE

The best transport efficiencies obtained for the model with just the horizontal tail and/or the small skid were on the order of 0.7. By switching to the large skid configurations, transport efficiencies as high as 3.65 were obtained (Run 106). This five-fold increase in performance is due to the lowering of trim angles and to the reduction in drag on the trimming surface.

Based on results from earlier tests by Kidwell and Gallington, efficiencies of at least 20 were expected for this vehicle. This earlier work showed that efficiencies even higher than 20 are possible for similar vehicles with no drag penalty for trim. It would then appear that trim drag is the prime reason for the poor performance of the "Sea-WIG."

Using the data from Run 106, which is the best performance case tested in this series, an attempt to determine the trim drag penalties can be made. Two general assumptions are necessary. First, one must assume that 15 percent of the model weight is lifted by the large skid so that the model can be trimmed. This means that the lift on the skid will be approximately 20 lb. Next, one assumes that the L/D on the skid is 2.5, which is probably conservative considering only a small portion of the skid is in the water, and there are no spray strips to prevent attachment of a sheet of water to the upper portions of the skid. The drag due to the trimming surface is then 8 lb, or over 40 percent, of the total model drag. This results not only in a twofold increase in the power required but also in a dramatic decrease in the maximum cruise speed. In summary, predictions are that if a more efficient trimming device is utilized, much better performance can be realized.

CONCLUSIONS

This investigation was designed to study full vehicle performance of the "Sea-WIG" model. The following are test conclusions:

- Successful static takeoff was accomplished (Run 71) at the lowest thrust-to-weight ratio (0.173) ever tested.
- The first statically stable operation of a PAR-WIG vehicle over water free both in pitch and in heave with excess thrust was demonstrated.
- The model was able to accelerate through hump at the highest vehicle density ever tested (slightly greater than 2 lb/ft^3, Run 121).
- The optimum fan angle for this configuration is nearly 20 deg.
- A 40-deg deadrise planing tail produced better performance than a 60-deg deadrise planing tail and two different aerodynamic horizontal stabilizers.
- High vehicle densities are most efficient for the high-speed runs.
- Within the limits tested, the further forward the c.g. position can be located and still operate the vehicle, the better performance will be.
- The pitch-heave oscillation at 35 ft/sec is probably a result of the planing tail and is similar in behavior to a planing boat.

RECOMMENDATIONS

The limitations of several pitch control systems were discovered during this phase of the WIG experimental program. Based on the data generated during this investigation, it is recommended that several further studies be made. The first of these, predominately a stability test, would be conducted with the model fixed in pitch but free in heave. Forces and moments could then be measured using a six-component internal balance. Various hydrofoil sizes and positions could be investigated. Promising configurations would then be tested both free in pitch and heave. Later a smaller program could be carried out on the same model in irregular waves. Several additional capabilities for these follow-up tests would be helpful:

- Measurement of static pressures at several points on the wing upper and lower surface.
- Direct measurement of fan thrust during runs.
- Direct measurement of lift and drag on the trimming device.

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8. Rousseau, D. G. and R. W. Gallington, "Performance Prediction Method for a Wing-in-Ground-Effect Vehicle with Under-the-Wing-Blowing," DTNSRDC Report ASED 379 (Mar 1977).

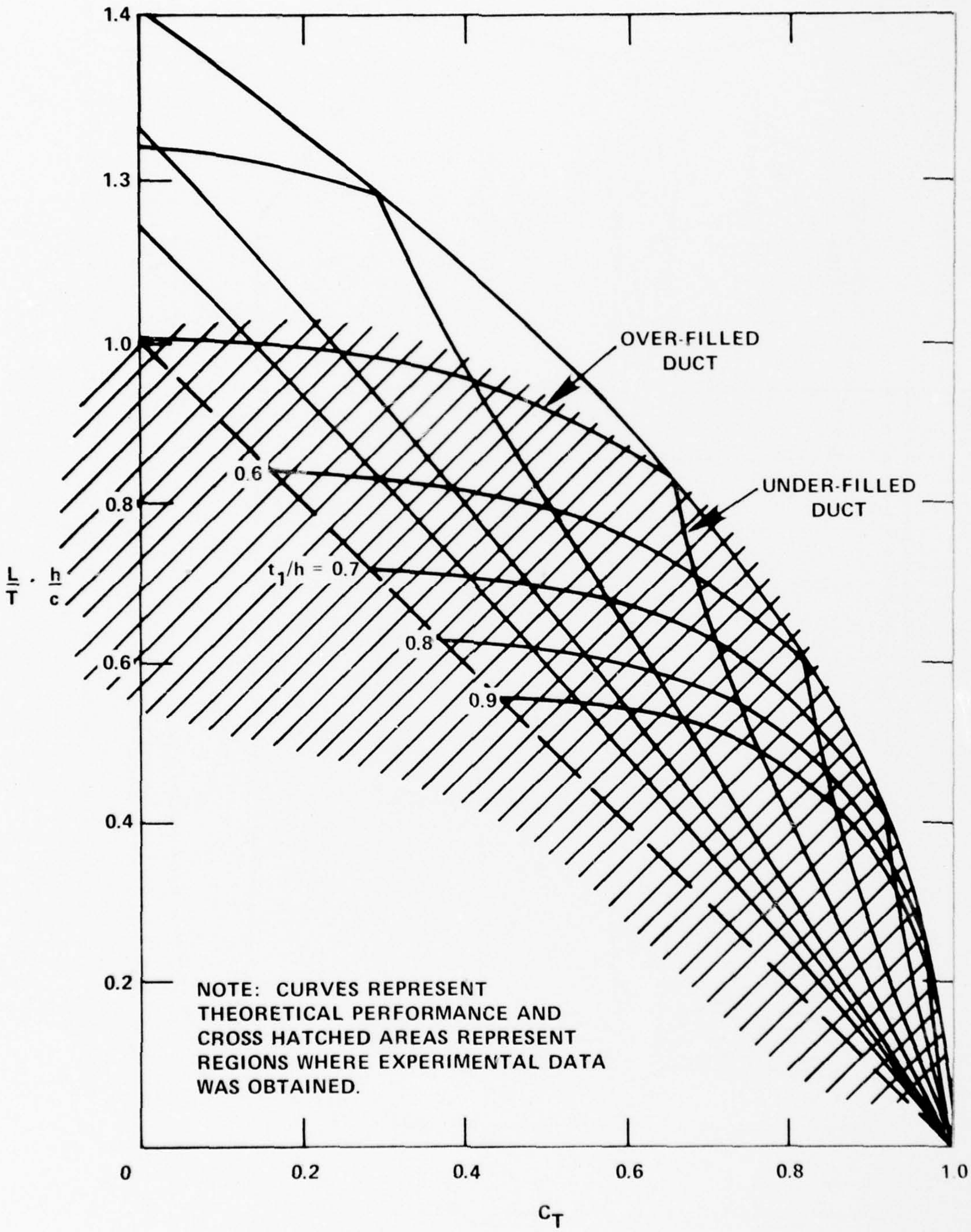

Figure 1 - Comparison of Potential Flow Theories and Two-Dimensional Model Data

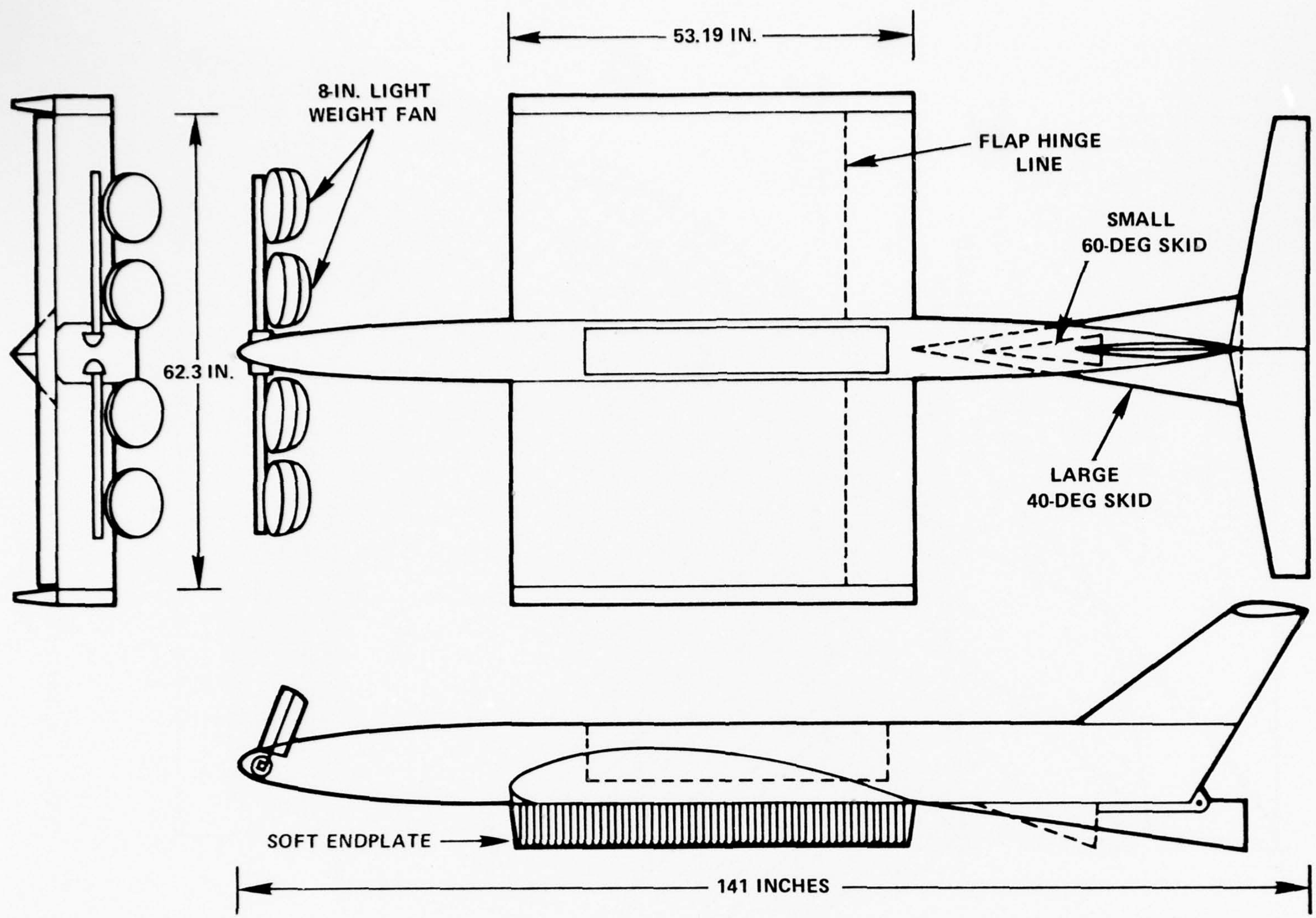

Figure 2 - General Arrangement of the "Sea-WIG" Model

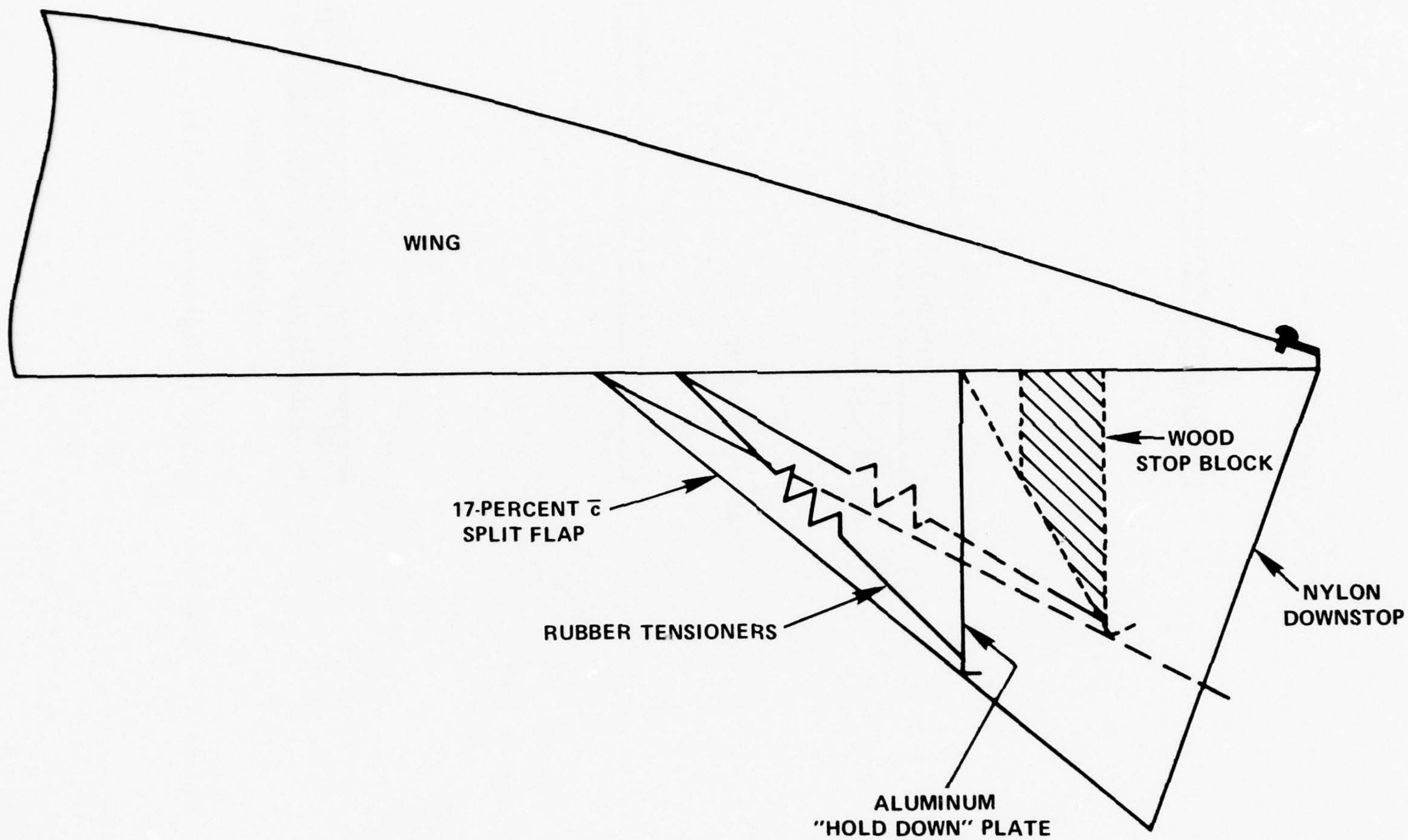

Figure 3 - Layout of Flap Mechanism and Stop Block

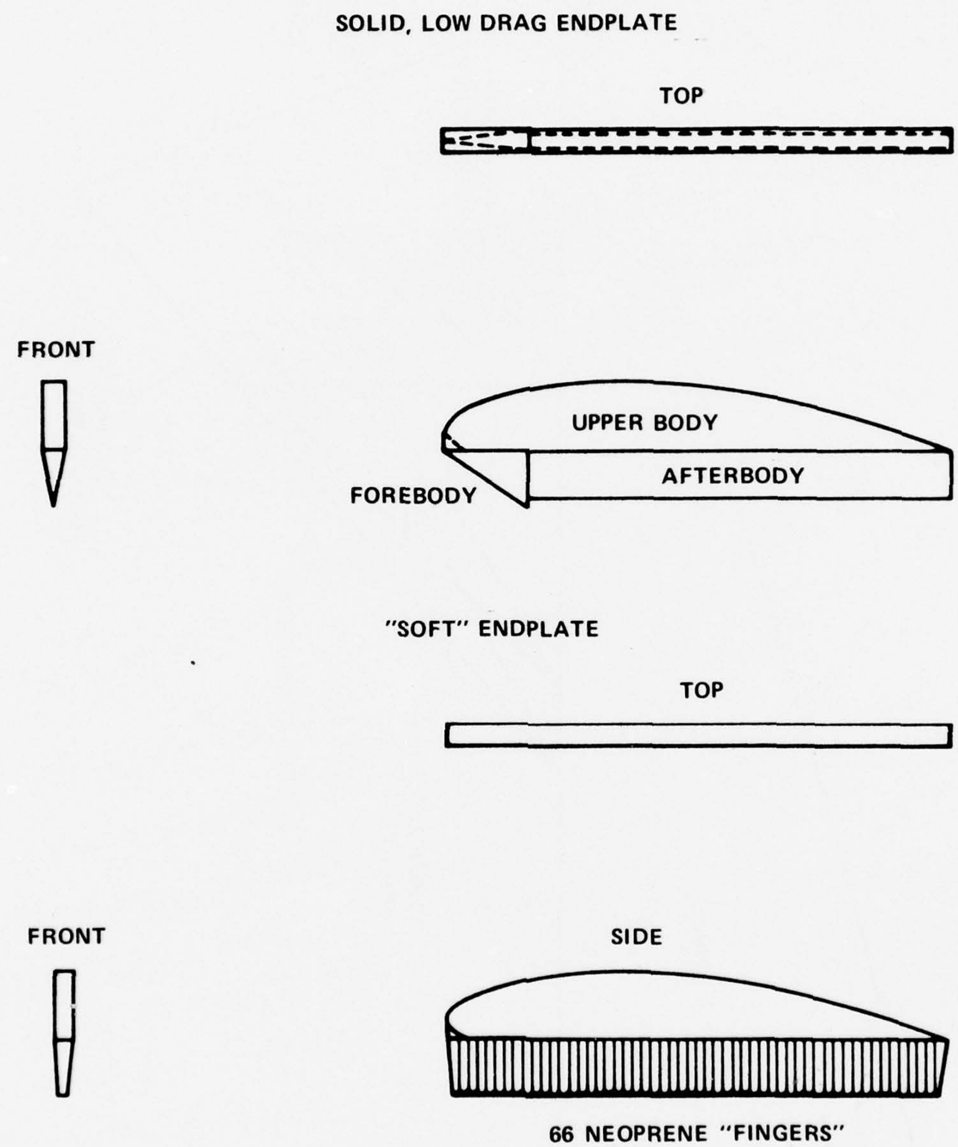

Figure 4 - Three-View General Arrangement of Endplates

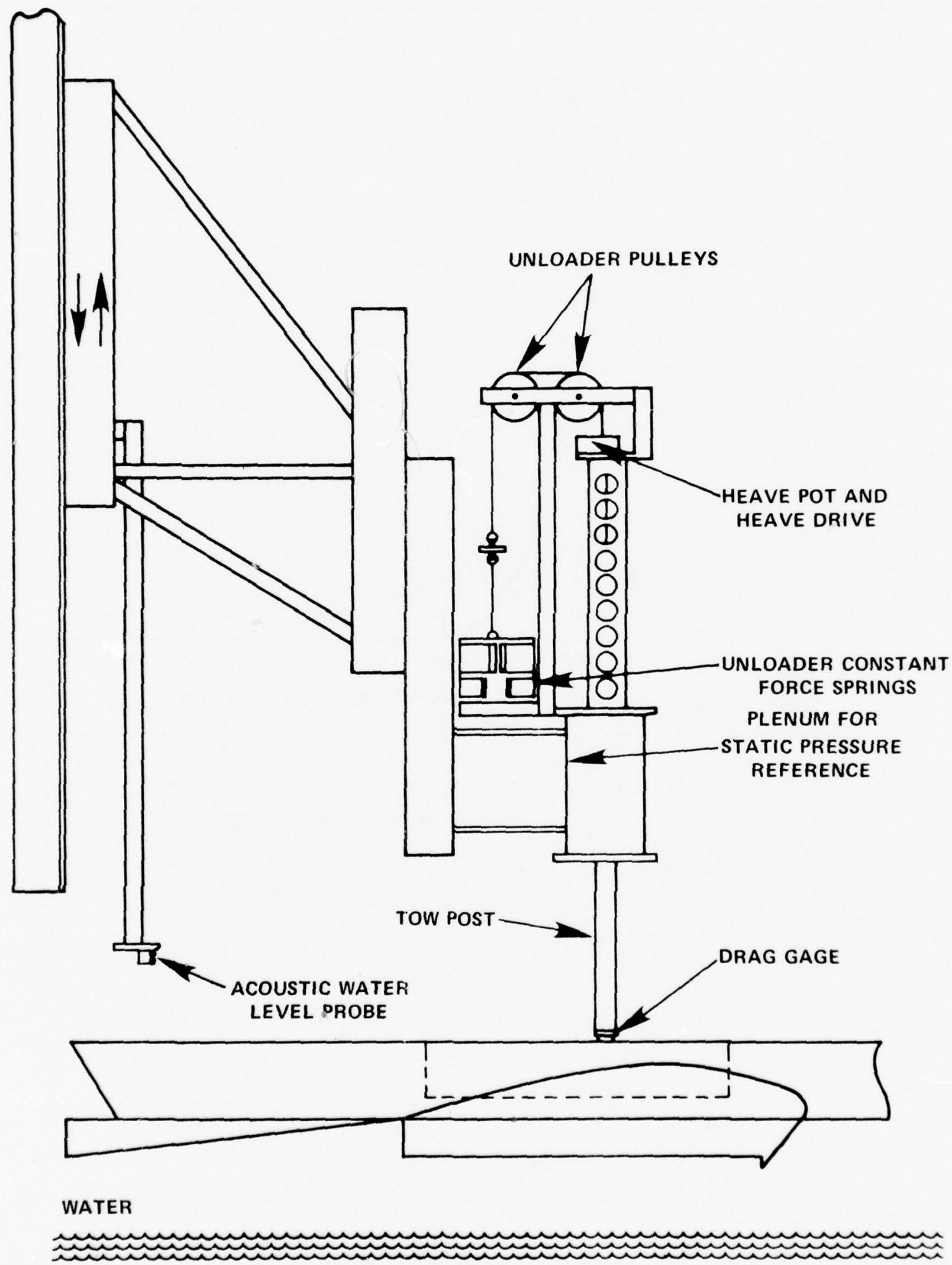

Figure 5 - "Sea-WIG" Model on Carriage Support System

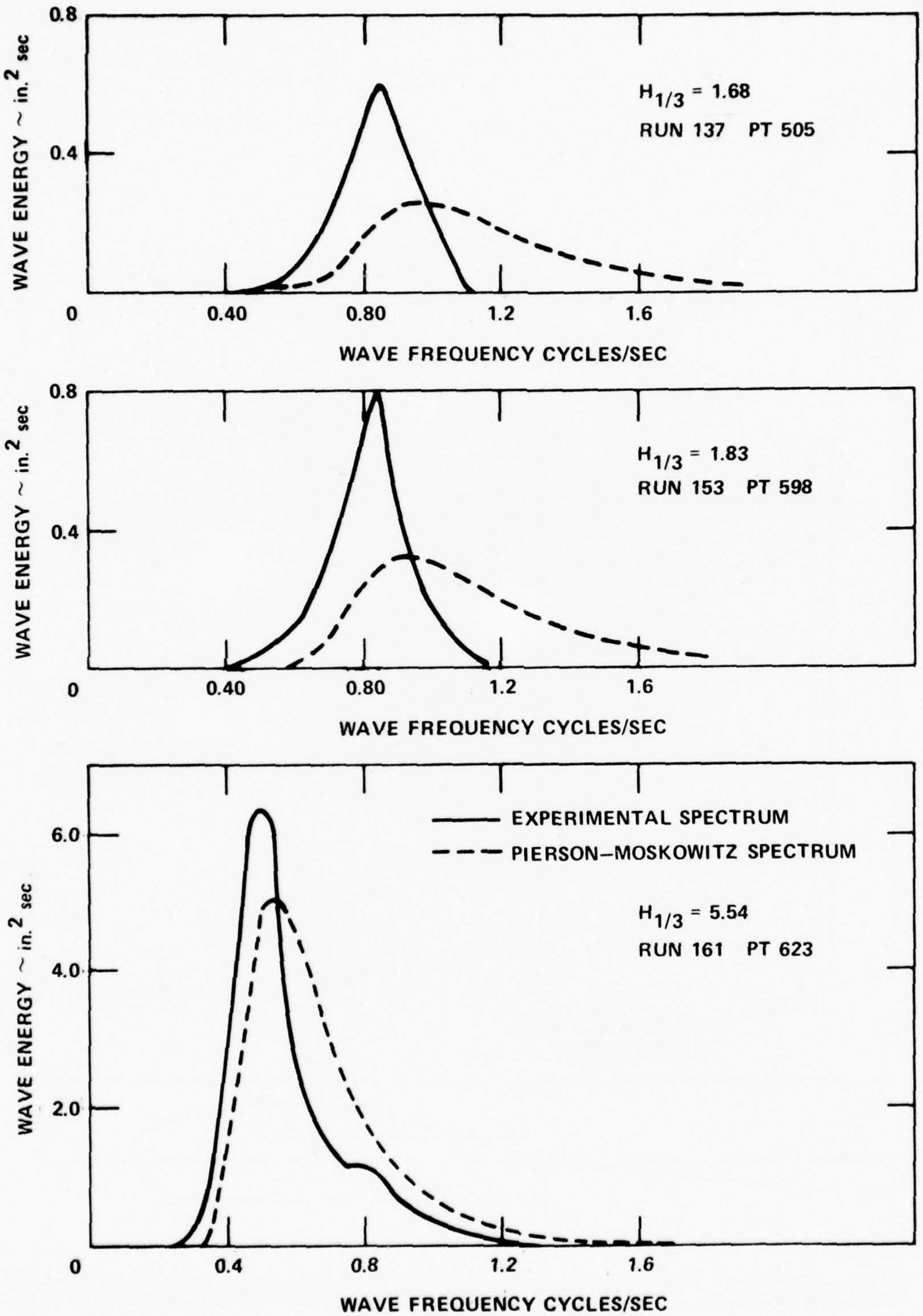

Figure 6 - Experimental Sea State Conditions

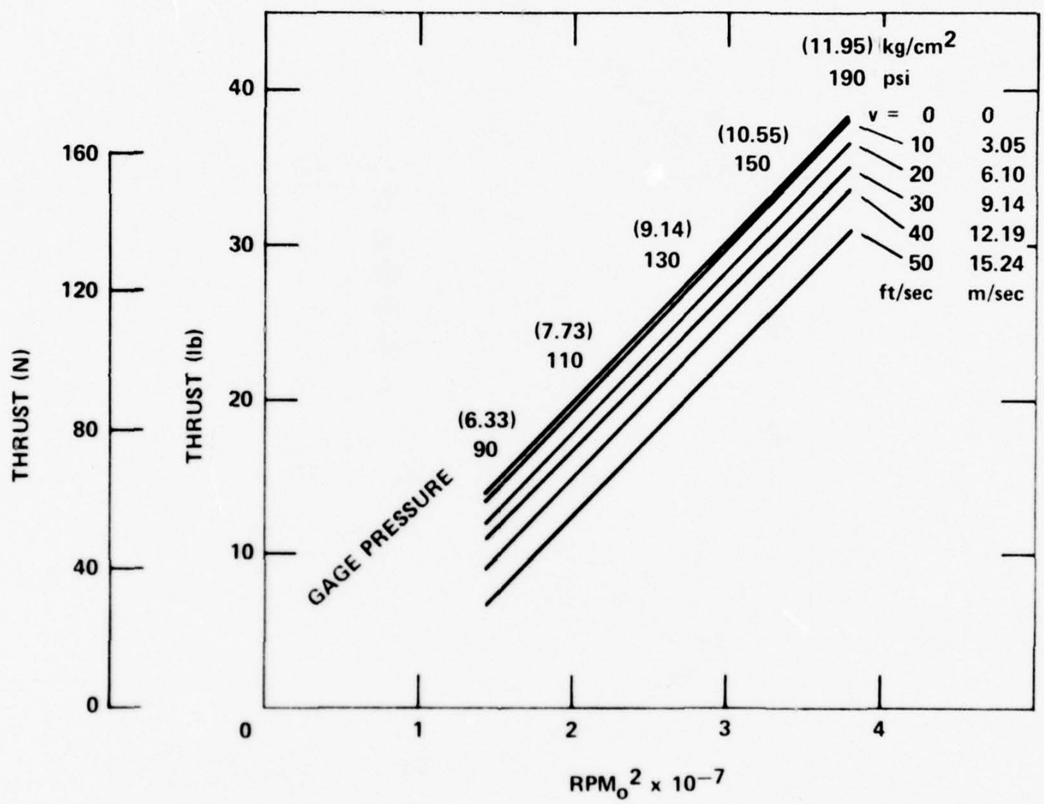

Figure 7 - Propulsor Calibration Data

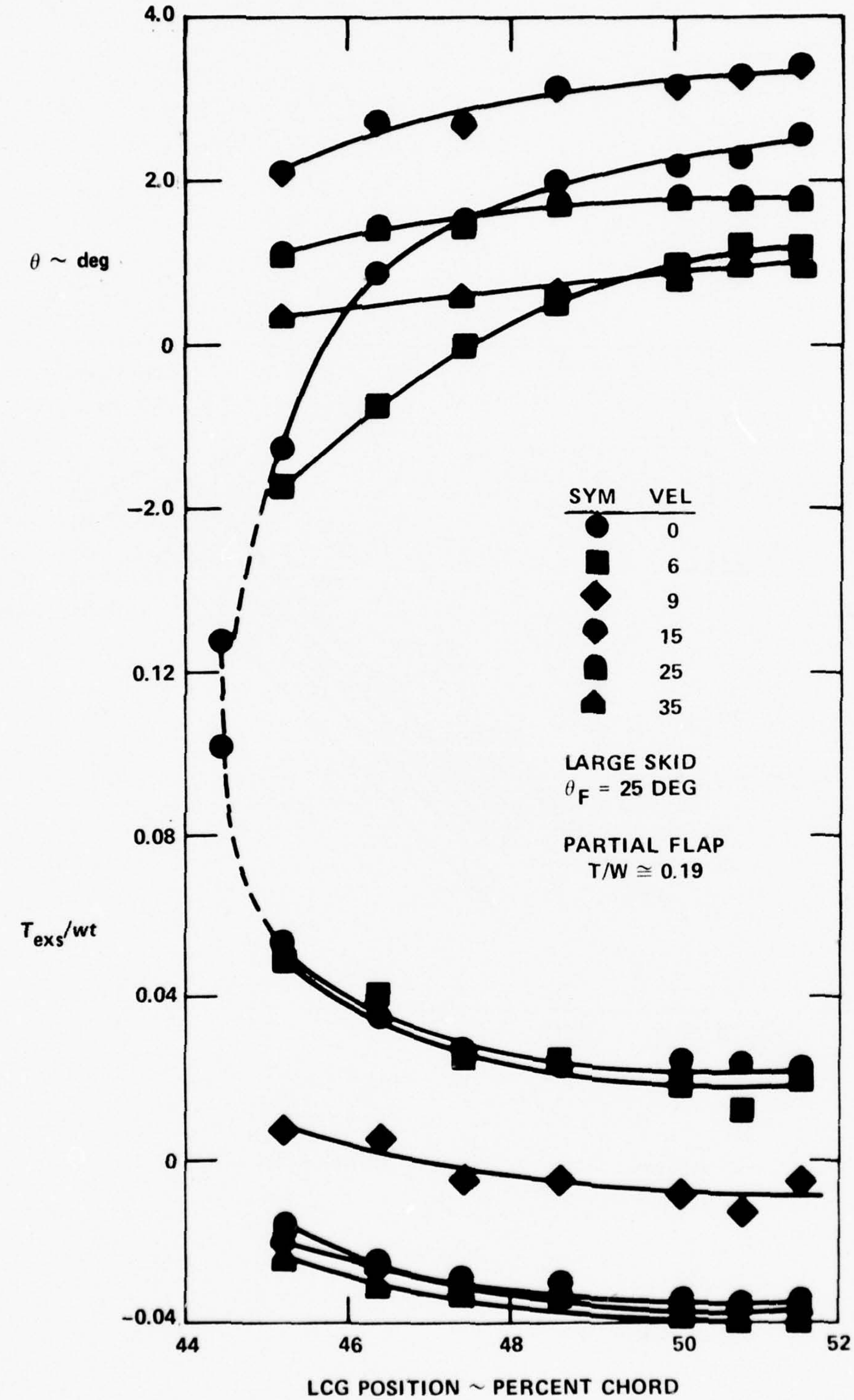

Figure 8 - "Sea-WIG" Performance versus LCG Position

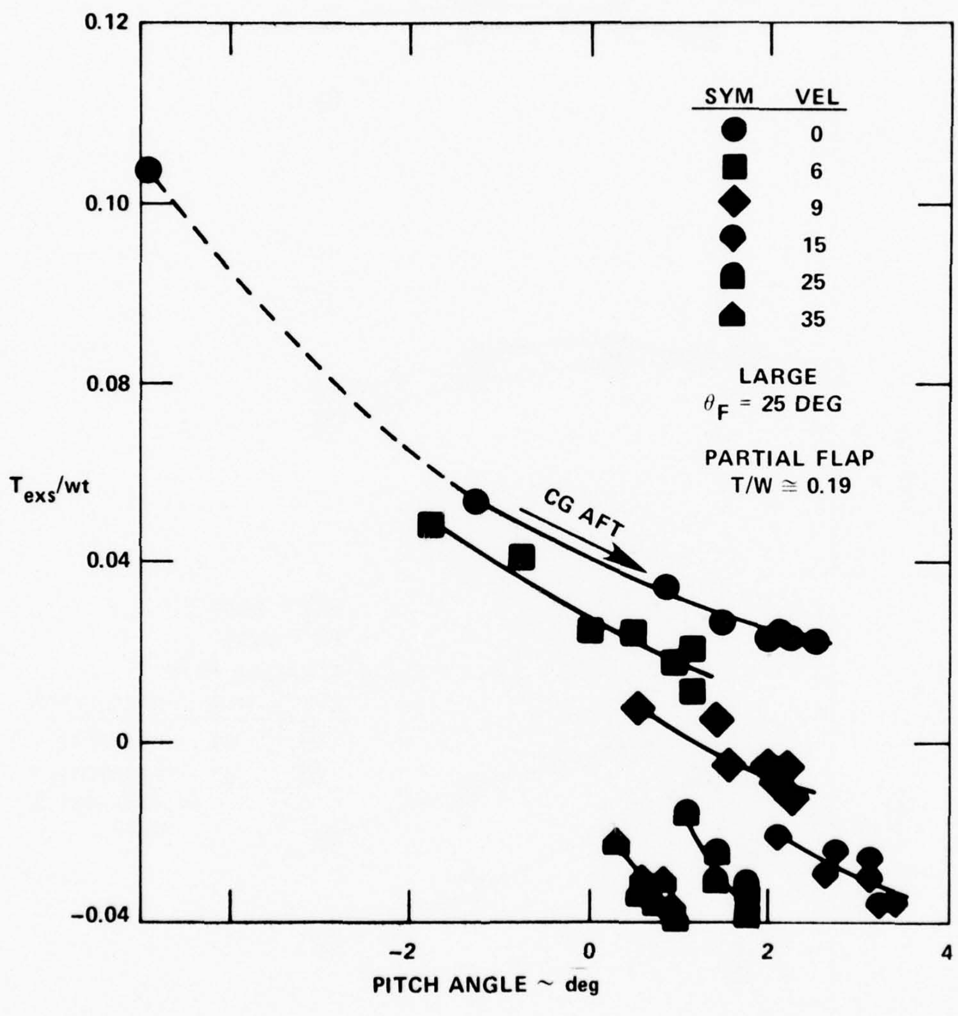

Figure 9 - Excess Thrust-to-Weight versus Pitch Angle

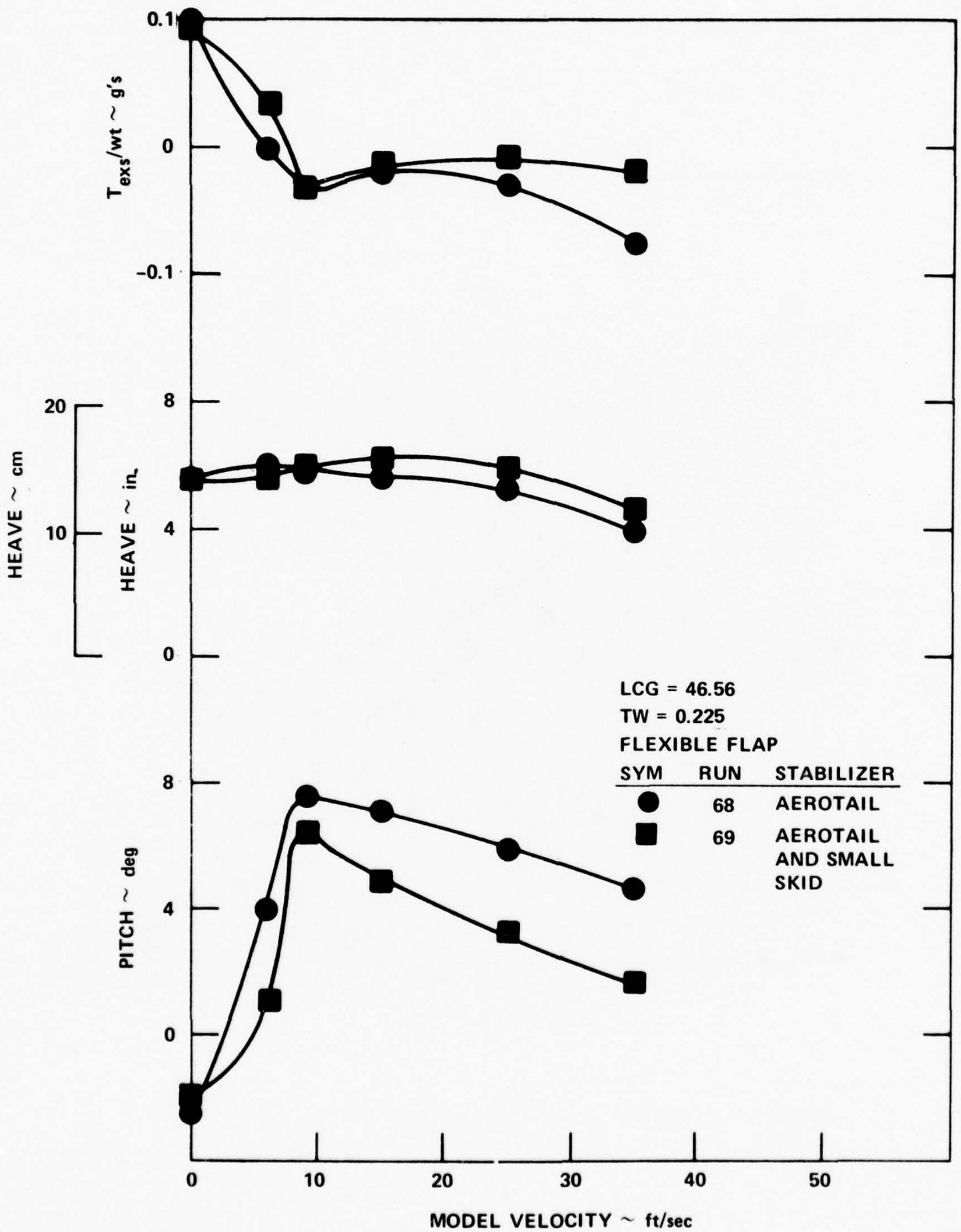

Figure 10 - Effects of Various Control Surfaces on Vehicle Performance

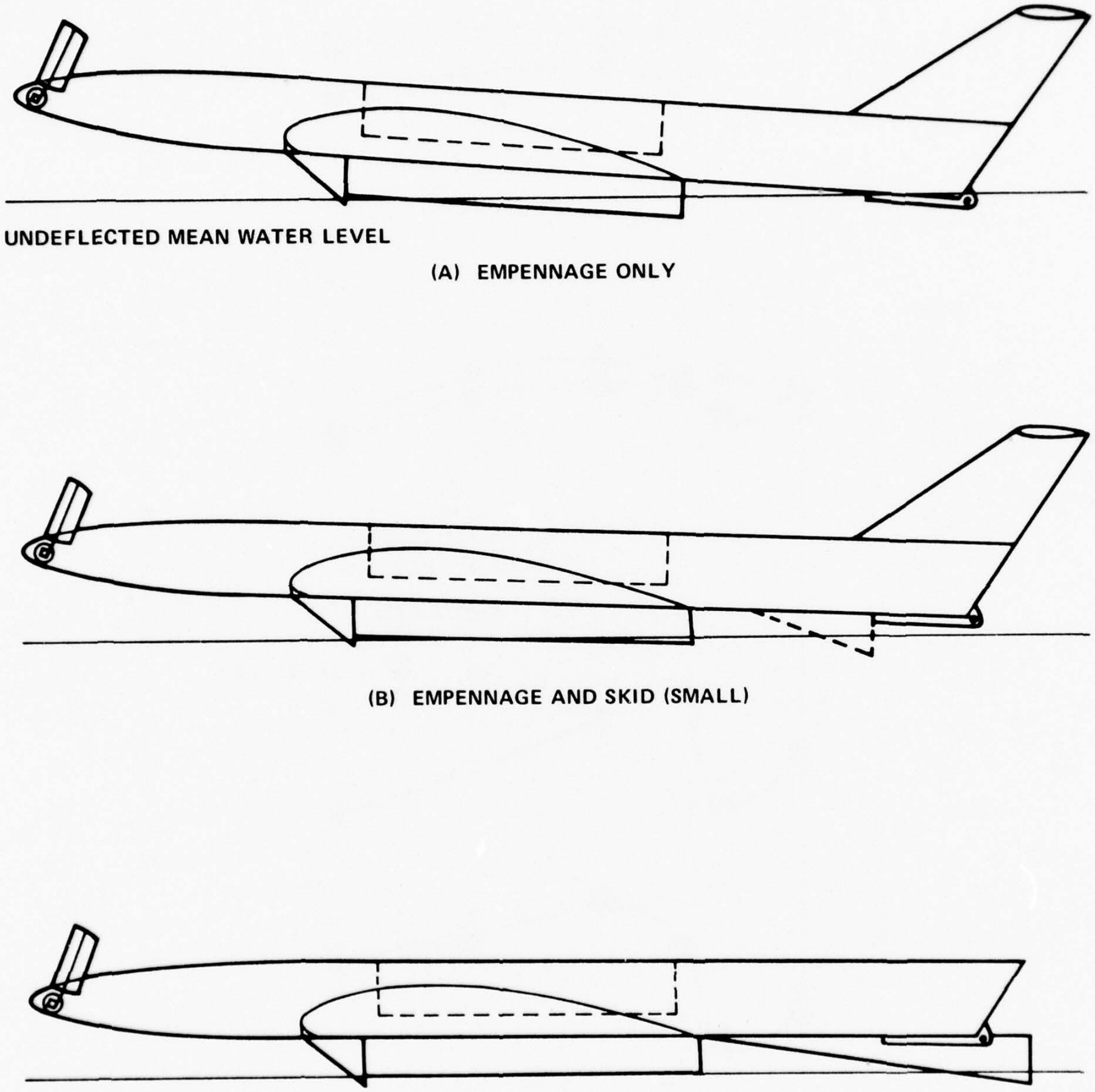

Figure 11 - Approximate Waterlines on the Model at 35 Feet per Second for Run 119

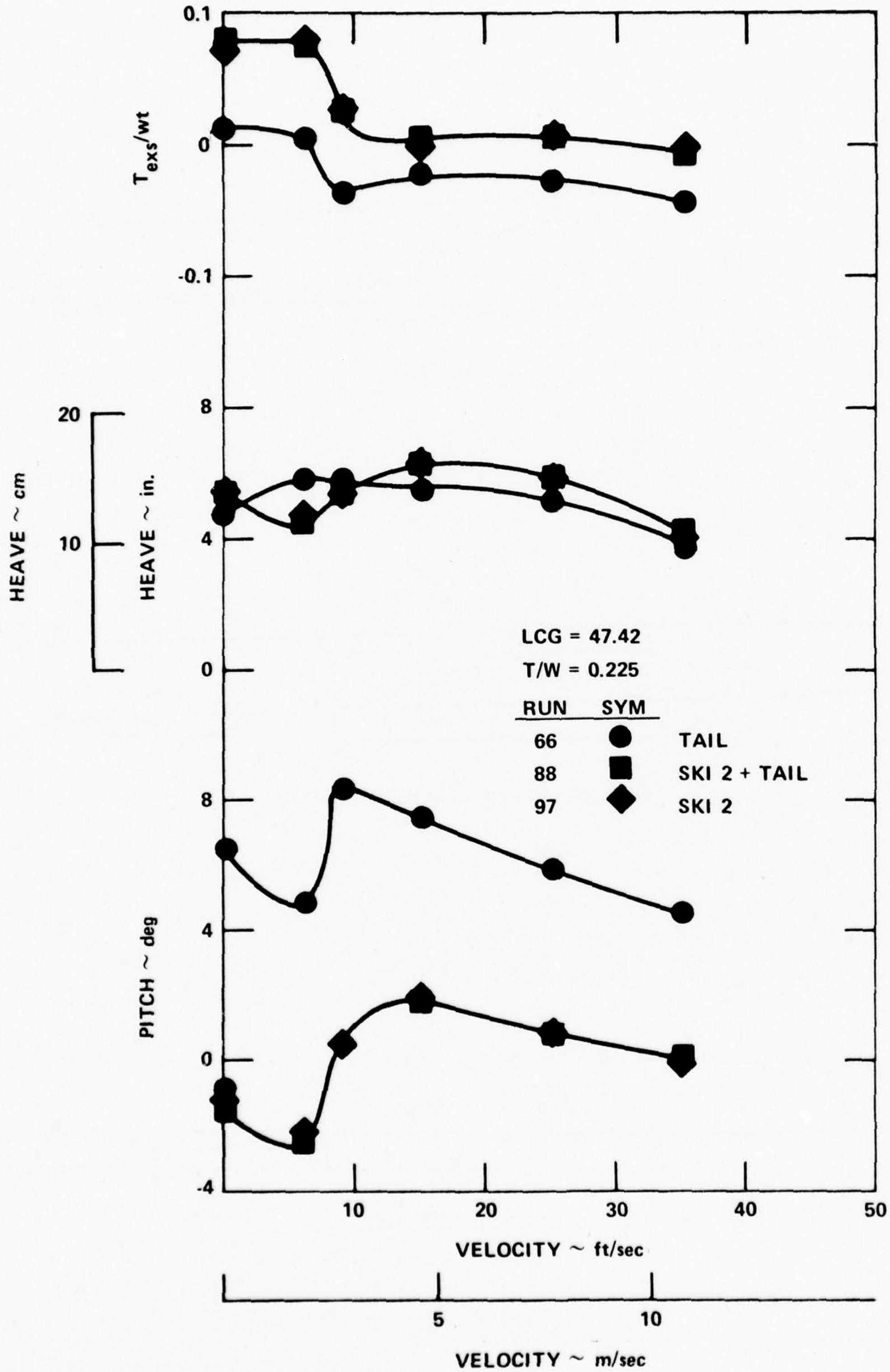

Figure 12 - Effects of the Large Skid on Performance

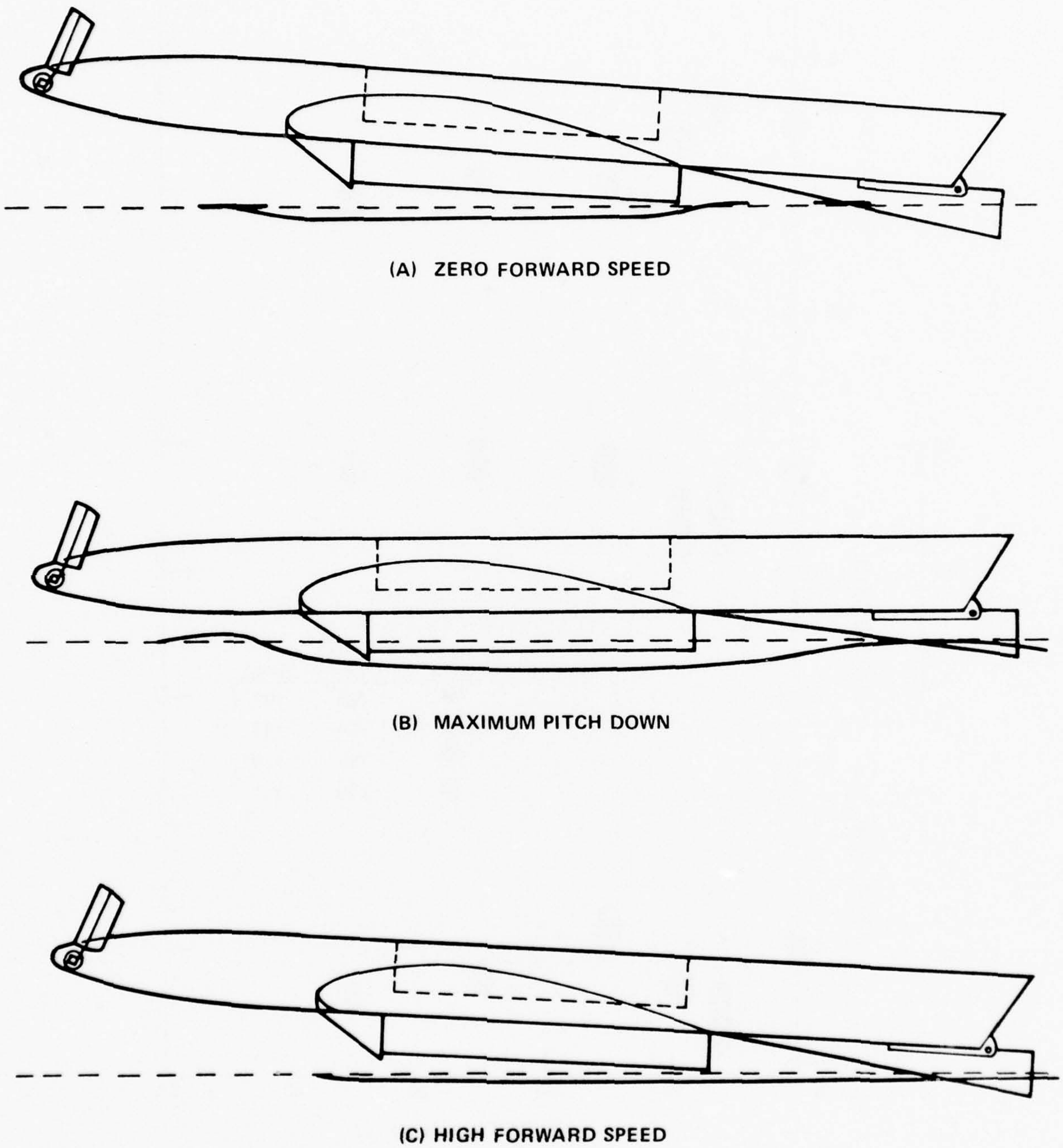

Figure 13 - Model-Water Interface at Various Forward Speeds

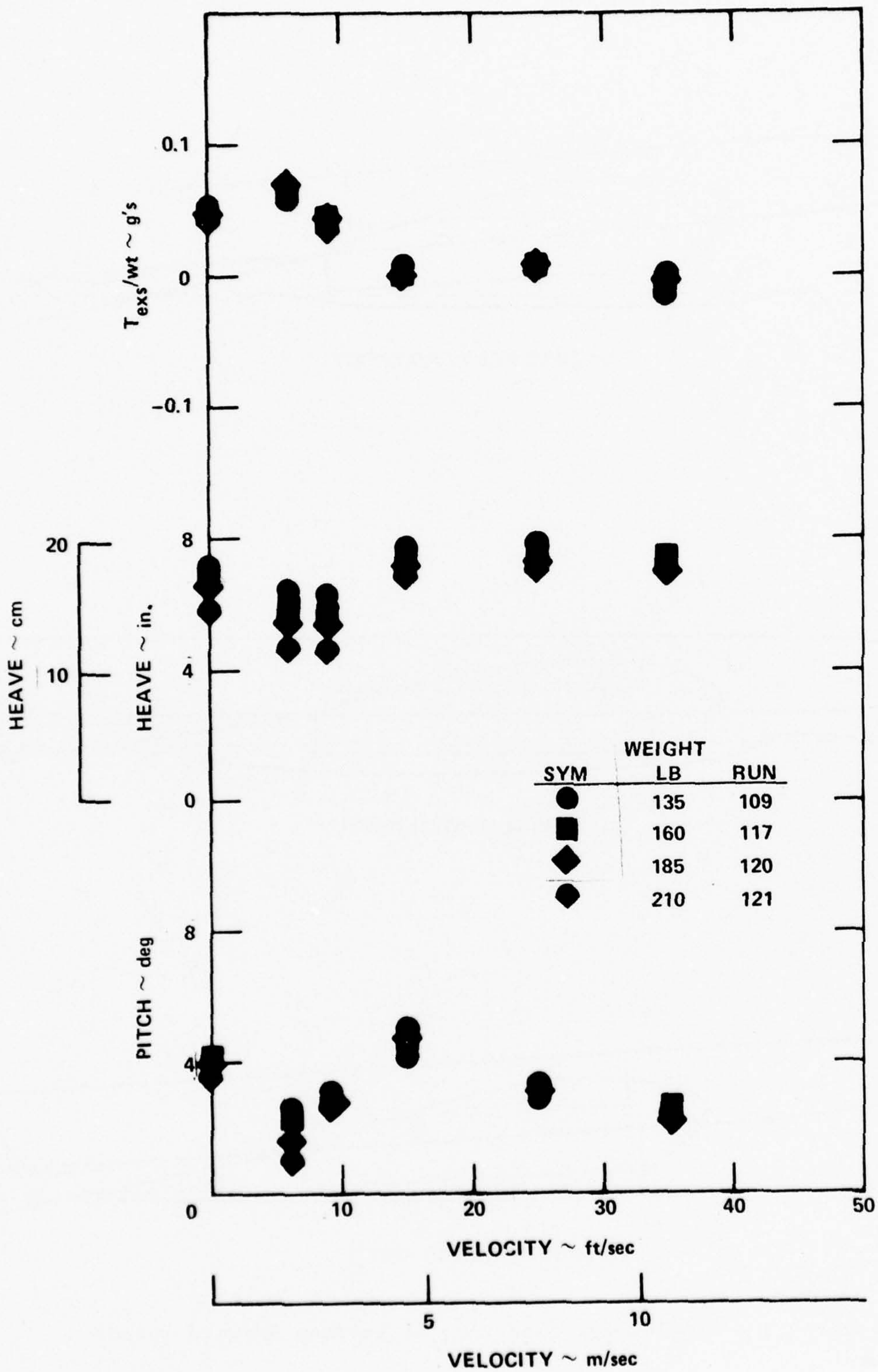

Figure 14 - Effects of Model Weight on Performance

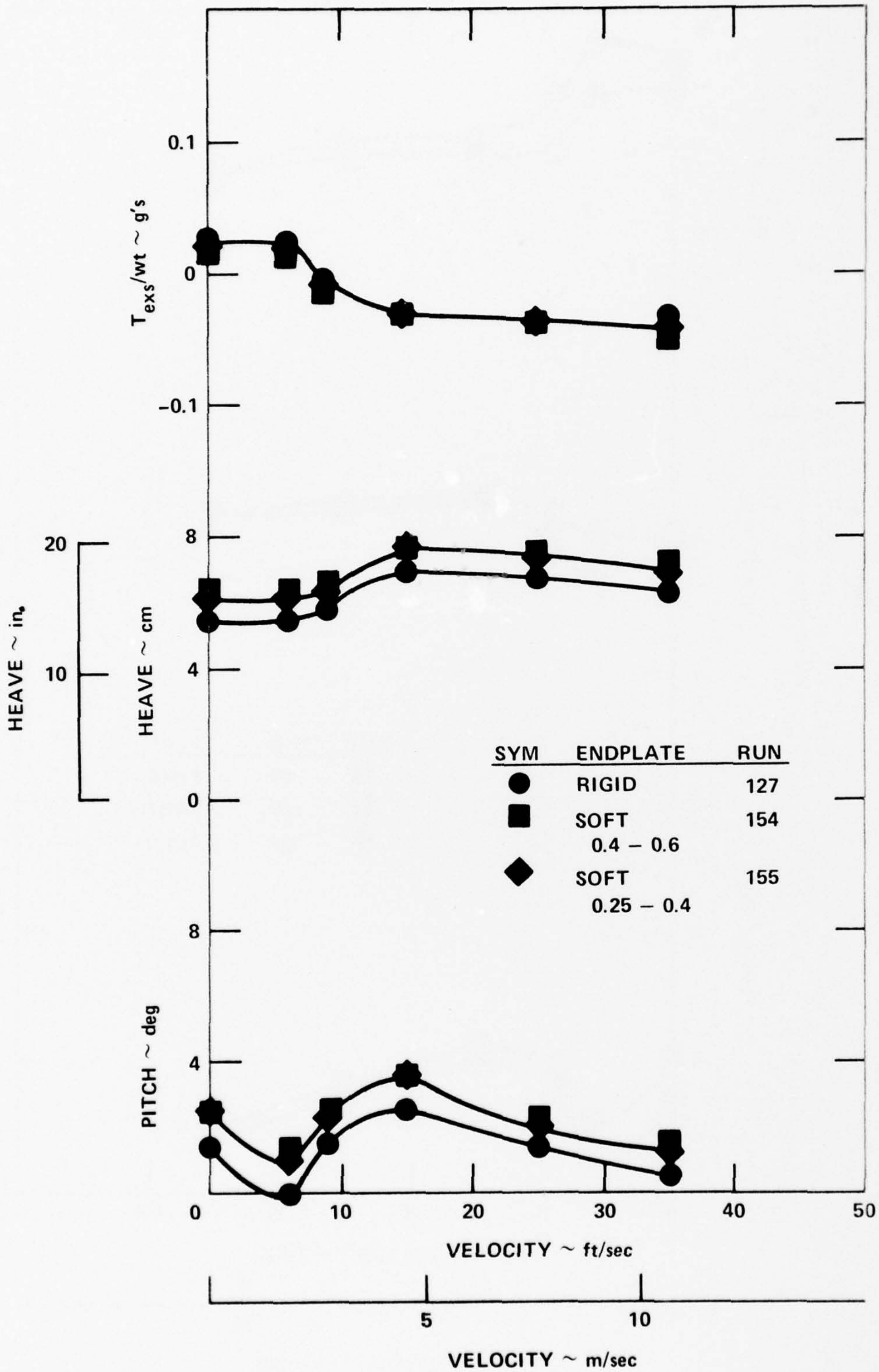

Figure 15 - Rigid versus Soft Endplate Performance in Calm Water

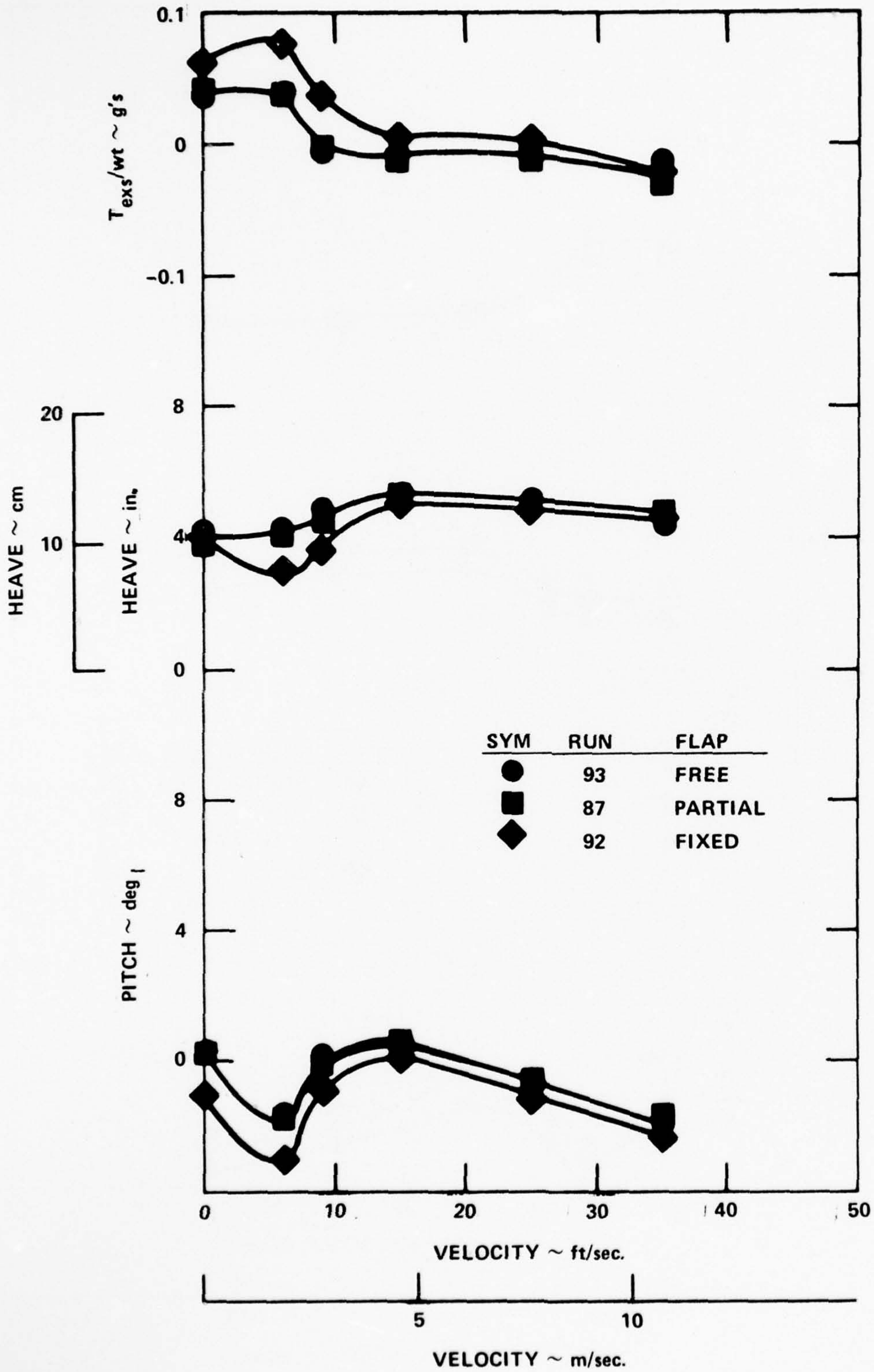

Figure 16 - Effects of Flap Arrangement on "Sea-WIG" Performance

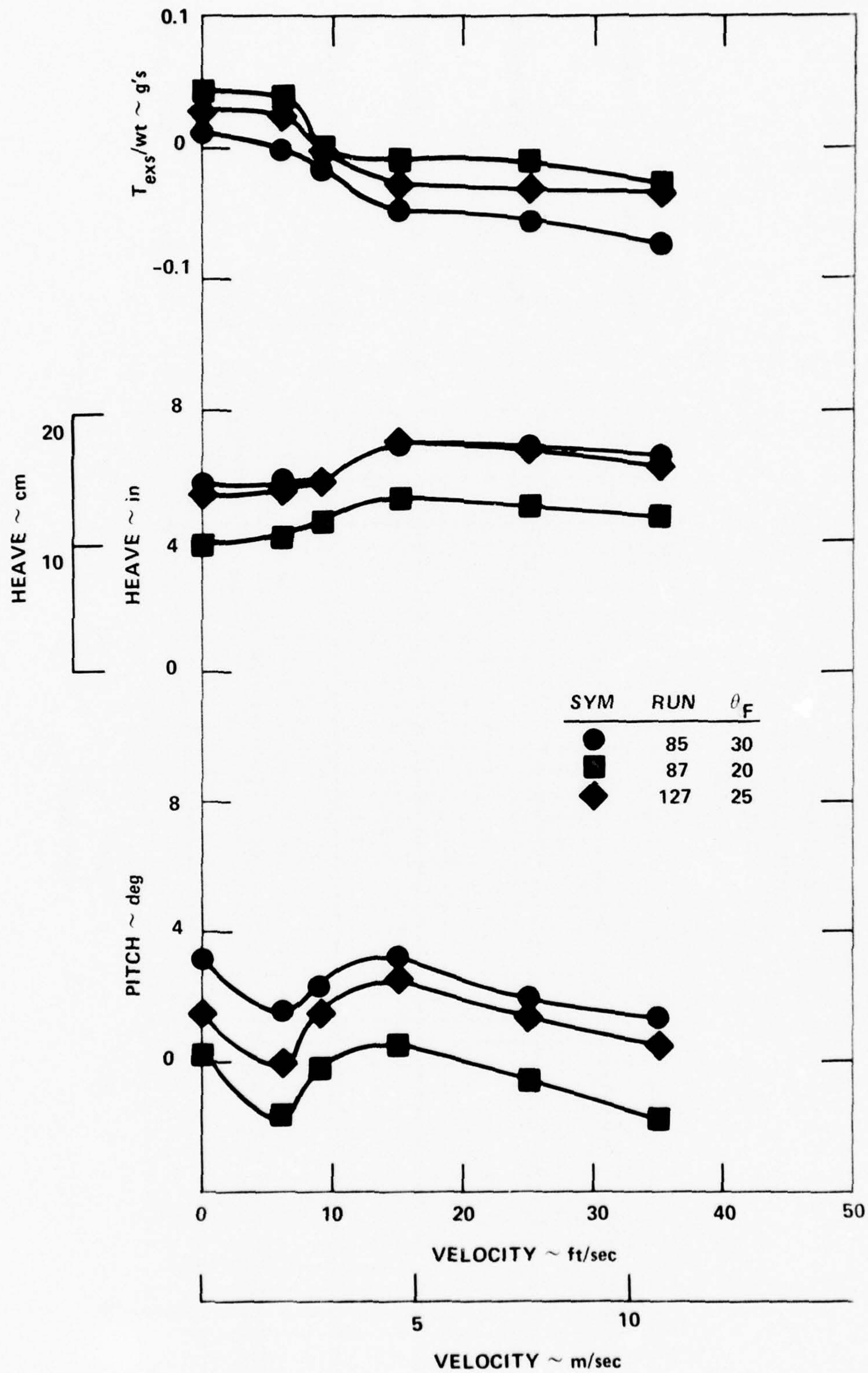

Figure 17 - "Sea-WIG" Performance versus Fan Angle

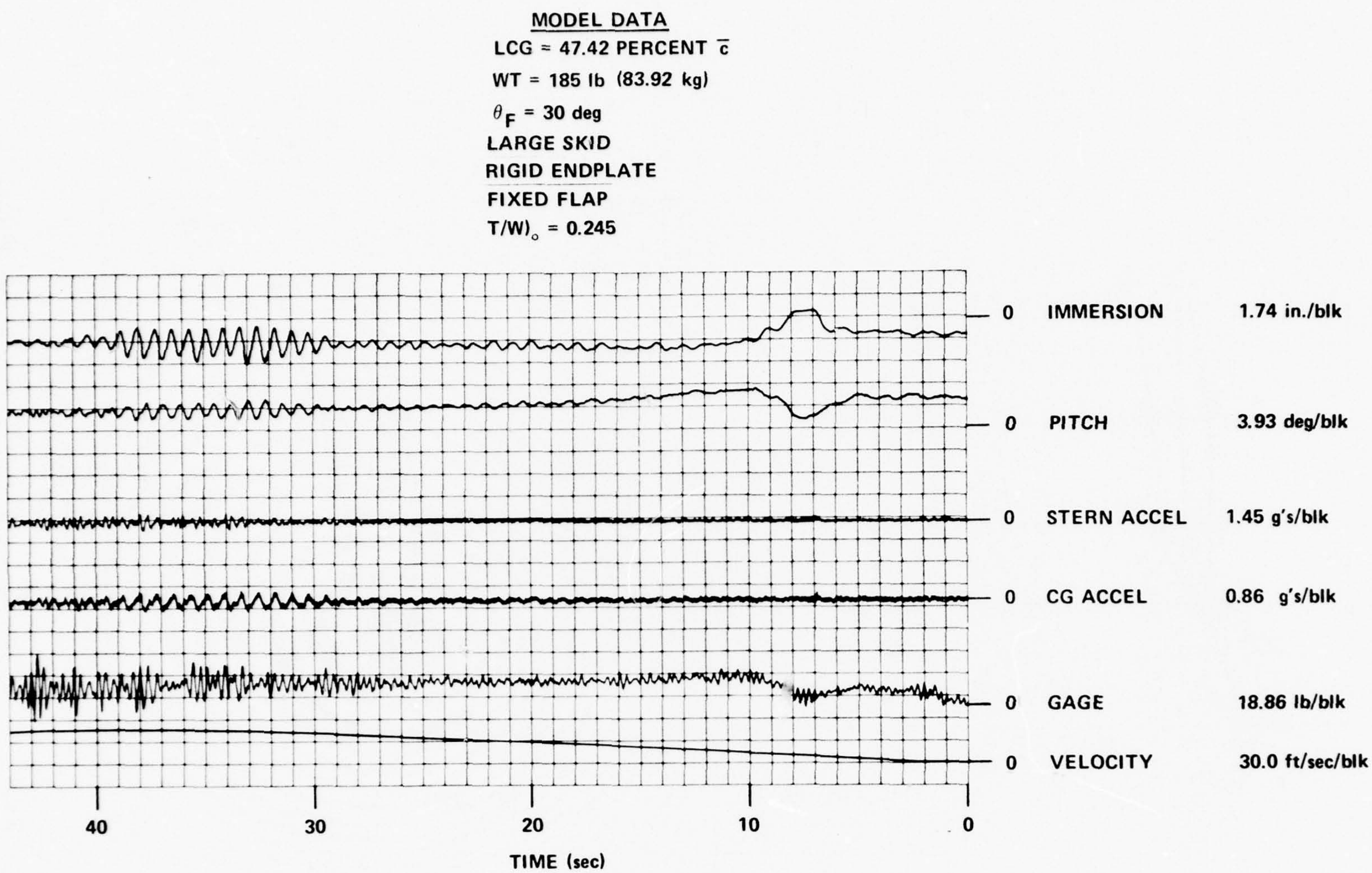

Figure 18 - Sample Oscillograph Trace of Run 119

TABLE 1 - "SEA-WIG" MODEL SPECIFICATIONS

Fuselage		
length	130 in.	330.2 cm
width	8 in.	20.3 cm
height	10 in.	25.4 cm
Wing		
chord, c	53.2 in.	135.1 cm
span, b	62.3 in.	158.2 cm
thickness ratio, t/c	0.15	0.15
flap	0.166 $\bar{c}$	0.166 $\bar{c}$
airfoil section	flat bottom	NACA 0015
taper ratio	1	1
sweep	0.0 deg	
Propulsors		
manufacturer	Tech Development Inc.	
model number	TD - 492	
diameter, D_F	8 in.	20.3 cm
max thrust		
angle range, θ_F	20-30 deg	
number used	4	
Soft End Plate		
bottom length	49.5 in.	125.7 cm
bottom width	0.75 in.	1.91 cm
depth	6.0 in.	15.2 cm
deadrise angle	84.5 deg	
flexible finger material	0.005 in. nylon, neoprene impregnated	
flexible finger number	66	
Solid End Plate		
Upper body		
width	2 in.	5.1 cm
shape	same as wing airfoil	

TABLE 1 - (Continued)

Fore body			
depth, base	6.0 in.		15.2 cm
width, base	2.0 in.		5.1 cm
length	9.375 in.		23.81 cm
deadrise angle		80.5 deg	
After body			
depth	5.5 in.		14.0 cm
width	1.84 in.		4.67 cm
length	43.8 in.		111.3 cm
deadrise angle		80.5 deg	
SKID 1			
length	16.0 in.		40.6 cm
depth, base	6.0 in.		15.2 cm
width, base	4.0 in.		10.2 cm
deadrise angle		71.6 deg	
keel angle		69.4 deg	
distance from base to leading edge of wing	77.5 in.		196.9 cm
SKID 2			
length	43.73 in.		111.1 cm
depth, base	6.0 in.		15.2 cm
width, base	14.3 in.		36.3 cm
deadrise angle		40 deg	
keel angle		82.2 deg	
distance from base to leading edge of wing	97.0 in.		246.4 cm
Horizontal tail			
span	62.3 in.		158.2 cm
chord, root	10.0 in.		25.4 cm
chord, tip	5.0 in.		12.7 cm
distance above bottom wing	25.5 in.		64.8 cm
distance from wing L.E. to L.E. tail	91.0 in.		231.1 cm
chord, root w/extension	14.0 in.		35.6 cm
chord, tip w/ extension	9.0 in.		22.9 cm

TABLE 2 - RUN SCHEDULE PROPULSION SYSTEM CALIBRATION

Run	Regulator Pressure (psig)	Fan Angle (deg)	Velocity (ft/sec)	Remarks
9	170	0.0	0-30	
10			40	
11			50	
12	150		0-30	
13			40	Fans off
14			40	
15	130		0-30	
16			40	
17	110		0-30	
18			40	
19	90		0-30	
20			40	Computer error
21			40	
23	160	20.0	0-30	
24			40	
25			50	
26	130		0-30	
27			40	
28			50	
29	100		0-30	
30			40	
31			50	
32	100	0.0	0-30	
33			40	
34			50	
35	180		0-30	
36			40	
37			50	
40	160		0-30	
41			40	
42			50	

TABLE 2 - (Continued)

Run	Regulator Pressure (psig)	Fan Angle (deg)	Velocity (ft/sec)	Remarks
43	150	↓	0-30	
44		↓	40	
45		↓	50	
46	140	↓	0-30	
47		↓	40	
48		↓	50	
49	120	↓	0-30	
50		↓	40	
51		↓	50	

TABLE 3 - RUN SCHEDULE "SEA-WIG" INVESTIGATION

RUN	LCG	WT	I_T/SKI	SIDEWALLS	FLAP	SS	ϵ_F	T/W Y=0	Vel	REMARKS
55	47.42	113.5	1.0	Rigid	Full Range Flexible	0	20	0.216	0-25	
62	47.42	113.5	5.6°			0	20	0.216	0-25	
63								0.216	35	
64								0.173	0-35	
65			9.0°					0.177		
66								0.225		
67	45.73							0.222	0-6	
68	46.56							0.226	0-35	
69	46.56		9.0/1					0.223	0-35	
70			9.0/1					0.173		
71	48.01		9.0 tail exten/1					0.173		Static lift off run
74	47.42	114.0	1.0/1		Partial range Flexible 28°		30	0.193		
75								0.186		
76								0.241		
77			9.0/1					0.197		
78	43.11							0.202		
79	38.80							0.213	0-25	0,6,9 operator held
80	38.80							0.213	35	
85	47.42	129.4	9.0/2					0.178	0-35	
86								0.213		
87							20	0.177		
88								0.225		
90								0.221	45	
91					Fixed 27°			0.222	0-35	
92								0.179	0-35	
93					Full Range Flexible			0.182	0-35	
94								0.224	0-35	
95		130.9	OFF/2					0.220		
96		129.4						0.174		
97								0.226		
98		179.4						0.192	0-6	Model sinking at 6 ft/sec
99								0.193	0-35	pitch cable held at 6 and
100								0.243	0-25	9 ft/sec pitch held at 699 ft/sec model torn off ≈ 20 ft/sec

TABLE 3 - (Continued)

RUN	LCG	WT	I_T/SKI	ENDPLATE	FLAP	SEA STATE	θ_F	T/W)v=0	Vel	REMARKS
106	47.42	135.0	OFF/2	Rigid	27° Fixed	0	20	0.176	0-35	
107								0.231		
108							30	0.250		
109								0.210		
110							20	0.238		Abort - pitch snub line taut
111	48.90						30	0.233		
112								0.262		
113							20	0.259		
114								0.217		
115							30	0.222		
116	47.42	160.0						0.270		
117								0.213		
118		185.						0.244		
119								0.245	45	
120								0.212	0-35	
121		210						0.201		
127		135			Partial Range Flexible 27-40		25	0.180		
128								0.237		
129	50.08							0.187		
130	50.82							0.191		
131	51.56							0.190		
132	48.60							0.193		
133	46.38							0.198		
134	45.20							0.185		
135	44.46							0.185		Abort at 6 ft/sec
138	47.42					Hi 2	30	0.247	0	
139									15	
140									6-9	
141									25	
143						0		0.23	0-35	
147		132		Soft			25			Gains?
148								0.204		
149	47.42	132	OFF/2	Soft	Partial Range Flexible	0	25	0.205	0-35	
154		137				0		0.187		Various finger pressures
155								0.186		

TABLE 3 - (Continued)

RUN	LCG	WT	I_T/SKI	ENDPLATE	FLAP	SEA STATE	θ_F	T/W)v=0	Vel	REMARKS
156	47.42	137	OFF/2	Soft	Partial	0	25	.189		
					Range Flexibility					
157						Low SS3		.210	0 15	
158									6 9	
159									25	
160									35	
162						Low SS5		.200	0 15	
163									6 9	Abort
164						0		.207		
173		138.6				Low SS5			0 15	Abort 15 ft/sec

APPENDIX

TABULATED DATA - THRUST CALIBRATION AND "SEA-WIG" PARAMETRIC INVESTIGATION

This appendix contains all of the data taken during the "Sea WIG" investigation, excluding instrumentation calibration runs and daily checks. Runs 9 to 51 are the fan thrust calibration runs. They are denoted in the data by a configuration number of 9990. Of interest for this portion of the investigation are the fan rpm's, speed, fan angle, and gage data channels. The gage value printed in the readout is the horizontal component of the net thrust for the entire propulsion system. The remaining runs presented in this appendix are all of the model data points taken during the investigation.

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PAR WIG MODEL : FINAL DATA

POINT # / SPEED FPS	RUN # / IMM IN	CONF # / HEAVE IN	LCG / PITCH DEG	MODEL WT / GAGE #	TAIL ANGLE / THRUST #	ASPECT RATIO / DRAG #	FAN ANGLE / AVERAGE FAN RPM FAN1	FAN RPM AT ZERO SPD FAN1 / AVERAGE FAN RPM FAN2	FAN RPM AT ZERO SPD FAN2 / AVERAGE FAN RPM FAN3	FAN RPM AT ZERO SPD FAN3 / AVERAGE FAN RPM FAN4	FAN RPM AT ZERO SPD FAN4	PFPE PSI	PAPE PSI	RMS G'S CG / PFSE PSI	RMS G'S STN / PASE PSI	FLAP ANGLE
33 / -.01	9 / -.00	9990 / 6.00	.00 / .00	.00 / -38.29	.00 / 37.53	.00 / -.76	.00 / 6162.	.00 / 6233.	6162. / 6171.	6233. / 6028.	6171.	6028.		.00	.00	.00
34 / 4.89	9 / -.00	9990 / 6.00	.00 / .00	.00 / -38.32	.00 / 37.40	.00 / -.91	.00 / 6145.	.00 / 6172.	6162. / 6045.	6233. / 5974.	6171.	6028.		.01	.01	.00
35 / 9.80	9 / -.00	9990 / 6.00	.00 / .00	.00 / -38.08	.00 / 37.62	.00 / -.47	.00 / 6156.	.00 / 6231.	6162. / 6102.	6233. / 5996.	6171.	6028.		.01	.01	.00
36 / 19.63	9 / -.00	9990 / 6.00	.00 / .00	.00 / -36.57	.00 / 36.61	.00 / .04	.00 / 6075.	.00 / 6191.	6162. / 6096.	6233. / 5911.	6171.	6028.		.01	.01	.00
37 / 29.45	9 / -.00	9990 / 6.00	.00 / .00	.00 / -35.05	.00 / 34.48	.00 / -.56	.00 / 5986.	.00 / 6146.	6162. / 6063.	6233. / 5834.	6171.	6028.		.01	.01	.00
38 / 39.21	10 / -.00	9990 / 6.00	.00 / .00	.00 / -33.61	.00 / 31.76	.00 / -1.85	.00 / 5969.	.00 / 6180.	6162. / 6037.	6233. / 5830.	6171.	6028.		.02	.01	.00
39 / 49.50	11 / -.00	9990 / 6.00	.00 / .00	.00 / -31.08	.00 / 28.23	.00 / -2.85	.00 / 5882.	.00 / 6129.	6162. / 5992.	6233. / 5772.	6171.	6028.		.02	.02	.00
40 / -.00	12 / -.00	9990 / 6.00	.00 / .00	.00 / -31.75	.00 / 30.95	.00 / -.80	.00 / 5631.	.00 / 5680.	5631. / 5647.	5680. / 5481.	5647.	5481.		.00	.00	.00
41 / 4.88	12 / -.00	9990 / 6.00	.00 / .00	.00 / -31.38	.00 / 30.88	.00 / -.50	.00 / 5613.	.00 / 5632.	5631. / 5565.	5680. / 5465.	5647.	5481.		.01	.01	.00
42 / 9.79	12 / -.00	9990 / 6.00	.00 / .00	.00 / -30.68	.00 / 31.14	.00 / .46	.00 / 5608.	.00 / 5646.	5631. / 5530.	5680. / 5449.	5647.	5481.		.01	.01	.00
43 / 19.60	12 / -.00	9990 / 6.00	.00 / .00	.00 / -29.67	.00 / 30.24	.00 / .58	.00 / 5531.	.00 / 5593.	5631. / 5522.	5680. / 5349.	5647.	5481.		.01	.01	.00
44 / 29.41	12 / -.00	9990 / 6.00	.00 / .00	.00 / -28.01	.00 / 28.22	.00 / .21	.00 / 5426.	.00 / 5539.	5631. / 5472.	5680. / 5252.	5647.	5481.		.02	.01	.00
46 / 39.18	14 / -.00	9990 / 6.00	.00 / .00	.00 / -25.99	.00 / 25.59	.00 / -.40	.00 / 5348.	.00 / 5497.	5631. / 5424.	5680. / 5201.	5647.	5481.		.02	.01	.00
47 / .00	15 / -.00	9990 / 6.00	.00 / .00	.00 / -25.66	.00 / 24.82	.00 / -.84	.00 / 5080.	.00 / 5153.	5080. / 5079.	5153. / 4909.	5079.	4909.		.00	.00	.00
48 / 4.88	15 / -.00	9990 / 6.00	.00 / .00	.00 / -25.26	.00 / 24.79	.00 / -.47	.00 / 5055.	.00 / 5056.	5080. / 5034.	5153. / 4937.	5079.	4909.		.01	.00	.00
49 / 9.78	15 / -.00	9990 / 6.00	.00 / .00	.00 / -24.57	.00 / 25.10	.00 / .53	.00 / 5064.	.00 / 5087.	5080. / 4980.	5153. / 4892.	5079.	4909.		.01	.01	.00
50 / 19.59	15 / -.00	9990 / 6.00	.00 / .00	.00 / -23.41	.00 / 24.29	.00 / .88	.00 / 4969.	.00 / 5036.	5080. / 4950.	5153. / 4783.	5079.	4909.		.01	.01	.00

PAR WIG MODEL : FINAL DATA

POINT #	RUN #	CONF #	LCG	MODEL WT	TAIL ANGLE	ASPECT RATIO	FAN ANGLE	FAN RPM AT ZERO SPD FAN1	FAN2	FAN3	FAN4	RMS G'S CG	RMS G'S STN	FLAP ANGLE
SPEED FPS	IMM IN	HEAVE IN	PITCH DEG	GAGE #	THRUST #	DRAG #	AVERAGE FAN RPM FAN1	FAN2	FAN3	FAN4	PFPE PSI	PAPE PSI	PFSE PSI	PASE PSI
51	15	9990	.00	.00	.00	.00	.00	5080.	5153.	5079.	4909.	.02	.01	.00
29.39	-.00	6.00	.00	-21.99	22.36	.37	4881.	5000.	4914.	4716.				
52	16	9990	.00	.00	.00	.00	.00	5080.	5153.	5079.	4909.	.02	.02	.00
39.15	-.00	6.00	.00	-20.18	19.83	-.35	4809.	4949.	4864.	4676.				
53	17	9990	.00	.00	.00	.00	.00	4418.	4475.	4426.	4304.	.00	.00	.00
-.00	-.00	6.00	.00	-19.26	18.45	-.81	4418.	4475.	4426.	4304.				
54	17	9990	.00	.00	.00	.00	.00	4418.	4475.	4426.	4304.	.01	.00	.00
4.87	-.00	6.00	.00	-18.82	18.46	-.36	4364.	4389.	4358.	4299.				
55	17	9990	.00	.00	.00	.00	.00	4418.	4475.	4426.	4304.	.01	.01	.00
9.78	-.00	6.00	.00	-18.22	18.82	.60	4362.	4424.	4333.	4257.				
56	17	9990	.00	.00	.00	.00	.00	4418.	4475.	4426.	4304.	.01	.01	.00
19.59	-.00	6.00	.00	-16.98	18.11	1.13	4281.	4384.	4293.	4157.				
57	17	9990	.00	.00	.00	.00	.00	4418.	4475.	4426.	4304.	.02	.01	.00
29.40	-.00	6.00	.00	-15.80	16.27	.47	4194.	4331.	4246.	4090.				
58	18	9990	.00	.00	.00	.00	.00	4418.	4475.	4426.	4304.	.02	.01	.00
39.17	-.00	6.00	.00	-13.86	13.84	-.03	4113.	4253.	4167.	4030.				
59	19	9990	.00	.00	.00	.00	.00	3751.	3879.	3776.	3705.	.00	.00	.00
-.00	-.00	6.00	.00	-13.88	13.12	-.76	3751.	3879.	3776.	3705.				
60	19	9990	.00	.00	.00	.00	.00	3751.	3879.	3776.	3705.	.01	.01	.00
4.87	.00	6.00	.00	-13.40	13.18	-.22	3727.	3788.	3704.	3664.				
61	19	9990	.00	.00	.00	.00	.00	3751.	3879.	3776.	3705.	.01	.00	.00
9.77	-.00	6.00	.00	-13.03	13.57	.54	3716.	3785.	3681.	3640.				
62	19	9990	.00	.00	.00	.00	.00	3751.	3879.	3776.	3705.	.01	.01	.00
19.59	.00	6.00	.00	-11.97	12.94	.98	3633.	3750.	3646.	3549.				
63	19	9990	.00	.00	.00	.00	.00	3751.	3879.	3776.	3705.	.02	.01	.00
29.39	.00	6.00	.00	-10.86	11.19	.34	3565.	3709.	3597.	3502.				
65	21	9990	.00	.00	.00	.00	.00	3751.	3879.	3776.	3705.	.02	.01	.00
39.16	.00	6.00	.00	-9.04	8.83	-.21	3547.	3660.	3566.	3488.				
75	23	9990	.00	.00	.00	.00	20.00	5881.	5968.	5880.	5722.	.00	.00	.00
.00	.00	6.00	.00	-34.26	33.96	-2.34	5881.	5968.	5880.	5722.				
76	23	9990	.00	.00	.00	.00	20.00	5881.	5968.	5880.	5722.	.01	.01	.00
4.98	.00	6.00	.00	-34.11	33.86	-2.29	5869.	5936.	5886.	5716.				
77	23	9990	.00	.00	.00	.00	20.00	5881.	5968.	5880.	5722.	.01	.01	.00
9.96	.00	6.00	.00	-33.70	34.12	-1.64	5855.	5952.	5926.	5686.				

*** PAR WIG MODEL : FINAL DATA ***

POINT # / SPEED FPS	RUN # / IMM IN	CONF # / HEAVE IN	LCG / PITCH DEG	MODEL WT / GAGE #	TAIL ANGLE / THRUST #	ASPECT RATIO / DRAG #	FAN ANGLE / AVERAGE FAN RPM FAN1	FAN RPM AT ZERO SPD FAN1 / FAN2	FAN2 / FAN3	FAN3 PFPE PSI / FAN4	FAN4 PAPE PSI	RMS G'S CG PFSE PSI	RMS G'S STN PASE PSI	FLAP ANGLE
78	23	9990	.00	.00	.00	.00	20.00	5881.	5968.	5880.	5722.	.01	.02	.00
19.96	.00	6.00	.00	-29.73	33.09	1.37	5734.	5944.	5900.	5557.				
79	23	9990	.00	.00	.00	.00	20.00	5881.	5968.	5880.	5722.	.01	.01	.00
29.94	.00	6.00	.00	-27.83	30.96	1.26	5645.	5908.	5873.	5518.				
80	24	9990	.00	.00	.00	.00	20.00	5881.	5968.	5880.	5722.	.01	.02	.00
39.90	.00	6.00	.00	-25.86	28.20	.64	5623.	5878.	5827.	5516.				
81	25	9990	.00	.00	.00	.00	20.00	5881.	5968.	5880.	5722.	.01	.02	.00
49.71	.00	6.00	.00	-23.46	24.86	-.10	5615.	5839.	5789.	5510.				
82	26	9990	.00	.00	.00	.00	20.00	5046.	5130.	5045.	4873.	.00	.00	.00
-.01	.00	6.00	.00	-24.35	24.49	-1.34	5046.	5130.	5045.	4873.				
83	26	9990	.00	.00	.00	.00	20.00	5046.	5130.	5045.	4873.	.01	.01	.00
4.97	.00	6.00	.00	-23.90	24.46	-.91	5005.	5048.	4998.	4857.				
84	26	9990	.00	.00	.00	.00	20.00	5046.	5130.	5045.	4873.	.01	.01	.00
9.95	.00	6.00	.00	-23.59	24.79	-.29	4957.	5048.	4999.	4781.				
85	26	9990	.00	.00	.00	.00	20.00	5046.	5130.	5045.	4873.	.01	.01	.00
19.93	.00	6.00	.00	-21.90	23.91	.57	4847.	5041.	4980.	4704.				
86	26	9990	.00	.00	.00	.00	20.00	5046.	5130.	5045.	4873.	.01	.01	.00
29.90	.00	6.00	.00	-18.74	21.93	1.87	4796.	5005.	4951.	4668.				
87	27	9990	.00	.00	.00	.00	20.00	5046.	5130.	5045.	4873.	.01	.02	.00
39.84	.00	6.00	.00	-16.97	19.32	1.18	4800.	4985.	4932.	4687.				
88	28	9990	.00	.00	.00	.00	20.00	5046.	5130.	5045.	4873.	.01	.02	.00
49.41	.00	6.00	.00	-15.12	16.21	.11	4807.	4961.	4917.	4703.				
89	29	9990	.00	.00	.00	.00	20.00	4066.	4188.	4071.	3996.	.01	.00	.00
.00	.00	6.00	.00	-14.52	15.58	.13	4066.	4188.	4071.	3996.				
90	29	9990	.00	.00	.00	.00	20.00	4066.	4188.	4071.	3996.	.01	.01	.00
4.98	.00	6.00	.00	-15.63	15.63	-.94	4042.	4116.	4060.	3992.				
91	29	9990	.00	.00	.00	.00	20.00	4066.	4188.	4071.	3996.	.01	.01	.00
9.96	.00	6.00	.00	-15.31	16.02	-.25	4003.	4119.	4060.	3932.				
92	29	9990	.00	.00	.00	.00	20.00	4066.	4188.	4071.	3996.	.01	.01	.00
19.93	.00	6.00	.00	-14.42	15.28	-.06	3905.	4107.	4042.	3853.				
93	29	9990	.00	.00	.00	.00	20.00	4066.	4188.	4071.	3996.	.01	.01	.00
29.89	.00	6.00	.00	-12.18	13.43	.44	3879.	4072.	4022.	3844.				
94	30	9990	.00	.00	.00	.00	20.00	4066.	4188.	4071.	3996.	.01	.02	.00
39.81	.00	6.00	.00	-9.73	10.97	.58	3876.	4023.	3977.	3848.				

SPEED FPS	IMM IN	HEAVE IN	PITCH DEG	WT GAGE #	ANGLE THRUST #	RATIO DRAG #	ANGLE FAN1	FAN1 AVERAGE FAN RPM FAN2	FAN3	FAN2 FAN4	FAN3 PFPE PSI	FAN4 PAPE PSI	CG PFSE PSI	STN PASE PSI	ANGLE
95	31	9990		.00	.00	.00	.00	20.00	4066.	4188.	4071.	3996.	.01	.02	.00
49.13	.00	6.00	.00	-7.74	8.08	-.15	3891.	3990.	3957.	3860.					
96	32	9990		.00	.00	.00	.00	.00	4057.	4145.	4042.	3969.	.01	.00	.00
.00	.00	6.00	.00	-15.77	15.36	-.41	4057.	4145.	4042.	3969.					
97	32	9990		.00	.00	.00	.00	.00	4057.	4145.	4042.	3969.	.01	.01	.00
4.95	.00	6.00	.00	-16.37	15.40	-.97	4038.	4126.	4061.	3977.					
98	32	9990		.00	.00	.00	.00	.00	4057.	4145.	4042.	3969.	.01	.01	.00
9.94	.00	6.00	.00	-16.06	15.80	-.26	4013.	4115.	4047.	3946.					
99	32	9990		.00	.00	.00	.00	.00	4057.	4145.	4042.	3969.	.01	.01	.00
19.90	.00	6.00	.00	-15.44	15.07	-.38	3930.	4066.	3998.	3856.					
100	32	9990		.00	.00	.00	.00	.00	4057.	4145.	4042.	3969.	.01	.01	.00
29.87	-.00	6.00	.00	-12.69	13.22	.54	3854.	4031.	3934.	3802.					
101	33	9990		.00	.00	.00	.00	.00	4057.	4145.	4042.	3969.	.01	.02	.00
39.78	-.00	6.00	.00	-10.77	10.76	-.01	3822.	3993.	3891.	3782.					
102	34	9990		.00	.00	.00	.00	.00	4057.	4145.	4042.	3969.	.02	.02	.00
49.49	-.00	6.00	.00	-9.09	7.74	-1.35	3818.	3942.	3862.	3782.					
103	35	9990		.00	.00	.00	.00	.00	6395.	6517.	6326.	6251.	.00	.00	.00
-.00	-.00	6.00	.00	-42.01	40.43	-1.58	6395.	6517.	6326.	6251.					
104	35	9990		.00	.00	.00	.00	.00	6395.	6517.	6326.	6251.	.01	.01	.00
4.95	-.00	6.00	.00	-41.34	40.28	-1.06	6308.	6469.	6324.	6192.					
105	35	9990		.00	.00	.00	.00	.00	6395.	6517.	6326.	6251.	.01	.01	.00
9.93	-.00	6.00	.00	-38.24	40.49	2.25	6339.	6493.	6377.	6215.					
106	35	9990		.00	.00	.00	.00	.00	6395.	6517.	6326.	6251.	.01	.01	.00
19.91	-.00	6.00	.00	-37.10	39.37	2.27	6279.	6445.	6329.	6127.					
107	35	9990		.00	.00	.00	.00	.00	6395.	6517.	6326.	6251.	.01	.01	.00
29.87	-.00	6.00	.00	-35.05	37.15	2.10	6174.	6392.	6264.	6035.					
108	36	9990		.00	.00	.00	.00	.00	6395.	6517.	6326.	6251.	.01	.02	.00
39.79	-.00	6.00	.00	-34.28	34.30	.02	6098.	6350.	6222.	5993.					
109	37	9990		.00	.00	.00	.00	.00	6395.	6517.	6326.	6251.	.01	.03	.00
49.58	-.00	6.00	.00	-32.83	30.88	-1.95	6031.	6305.	6164.	5951.					
114	40	9990		.00	.00	.00	.00	.00	5921.	6046.	5897.	5798.	.01	.00	.00
.00	-.00	6.00	.00	-36.01	34.61	-1.40	5921.	6046.	5897.	5798.					
115	40	9990		.00	.00	.00	.00	.00	5921.	6046.	5897.	5798.	.01	.01	.00
4.95	-.00	6.00	.00	-35.54	34.51	-1.03	5864.	5975.	5908.	5745.					

PAR WIG MODEL : FINAL DATA

POINT #	RUN #	CONF #	LCG	MODEL WT	TAIL ANGLE	ASPECT RATIO	FAN ANGLE	FAN RPM AT ZERO SPD FAN1	FAN2	FAN3	FAN4	RMS G'S CG	RMS G'S STN	FLAP ANGLE
SPEED FPS	IMM IN	HEAVE IN	PITCH DEG	GAGE #	THRUST #	DRAG #	AVERAGE FAN RPM FAN1	FAN2	FAN3	FAN4	PFPE PSI	PAPE PSI	PFSE PSI	PASE PSI
116	40	9990	.00	.00	.00	.00	.00	5921.	6046.	5897.	5798.	.01	.01	.00
9.93	-.00	6.00	.00	-34.95	34.76	-.19	5866.	6000.	5904.	5717.				
117	40	9990	.00	.00	.00	.00	.00	5921.	6046.	5897.	5798.	.01	.01	.00
19.89	-.00	6.00	.00	-31.79	33.73	1.95	5820.	5951.	5863.	5656.				
118	40	9990	.00	.00	.00	.00	.00	5921.	6046.	5897.	5798.	.01	.01	.00
29.86	-.00	6.00	.00	-30.07	31.60	1.53	5722.	5899.	5798.	5576.				
119	41	9990	.00	.00	.00	.00	.00	5921.	6046.	5897.	5798.	.01	.02	.00
39.77	-.00	6.00	.00	-27.87	28.85	.98	5626.	5846.	5751.	5517.				
120	42	9990	.00	.00	.00	.00	.00	5921.	6046.	5897.	5798.	.01	.02	.00
49.55	-.00	6.00	.00	-25.52	25.52	-.00	5570.	5813.	5708.	5487.				
121	43	9990	.00	.00	.00	.00	.00	5664.	5745.	5654.	5519.	.01	.00	.00
.00	.00	6.00	.00	-32.46	31.37	-1.09	5664.	5745.	5654.	5519.				
122	43	9990	.00	.00	.00	.00	.00	5664.	5745.	5654.	5519.	.01	.01	.00
4.93	.00	6.00	.00	-31.98	31.29	-.69	5590.	5691.	5629.	5498.				
123	43	9990	.00	.00	.00	.00	.00	5664.	5745.	5654.	5519.	.01	.01	.00
9.91	.00	6.00	.00	-31.26	31.56	.31	5576.	5679.	5628.	5424.				
124	43	9990	.00	.00	.00	.00	.00	5664.	5745.	5654.	5519.	.01	.01	.00
19.88	-.00	6.00	.00	-28.53	30.60	2.07	5538.	5655.	5589.	5380.				
125	43	9990	.00	.00	.00	.00	.00	5664.	5745.	5654.	5519.	.01	.01	.00
29.82	-.00	6.00	.00	-26.96	28.52	1.55	5435.	5601.	5526.	5295.				
126	44	9990	.00	.00	.00	.00	.00	5664.	5745.	5654.	5519.	.01	.02	.00
39.70	.00	6.00	.00	-25.18	25.82	.64	5350.	5556.	5467.	5235.				
127	45	9990	.00	.00	.00	.00	.00	5664.	5745.	5654.	5519.	.01	.02	.00
49.45	-.00	6.00	.00	-22.31	22.56	.25	5302.	5521.	5430.	5211.				
128	46	9990	.00	.00	.00	.00	.00	5365.	5479.	5372.	5236.	.01	.00	.00
-.00	.00	6.00	.00	-28.78	28.15	-.64	5365.	5479.	5372.	5236.				
129	46	9990	.00	.00	.00	.00	.00	5365.	5479.	5372.	5236.	.01	.01	.00
4.92	-.00	6.00	.00	-28.24	28.09	-.15	5305.	5394.	5359.	5205.				
130	46	9990	.00	.00	.00	.00	.00	5365.	5479.	5372.	5236.	.01	.01	.00
9.89	.00	6.00	.00	-27.84	28.38	.55	5303.	5410.	5335.	5157.				
131	46	9990	.00	.00	.00	.00	.00	5365.	5479.	5372.	5236.	.01	.01	.00
19.83	-.00	6.00	.00	-25.14	27.48	2.33	5242.	5356.	5284.	5078.				
132	46	9990	.00	.00	.00	.00	.00	5365.	5479.	5372.	5236.	.01	.01	.00
29.78	-.00	6.00	.00	-23.89	25.45	1.56	5145.	5312.	5231.	5004.				

** PAR WIG MODEL : FINAL DATA **

POINT # / SPEED FPS	RUN # / IMM IN	CONF # / HEAVE IN	LCG / PITCH DEG	MODEL WT / GAGE #	TAIL ANGLE / THRUST #	ASPECT RATIO / DRAG #	FAN ANGLE / AVERAGE FAN RPM FAN1	FAN RPM AT ZERO SPD FAN1 / FAN2	FAN2 / FAN3	FAN3 PFPE PSI / FAN4	FAN4 PAPE PSI	RMS G'S CG PFSE PSI	RMS G'S STN PASE PSI	FLAP ANGLE
133	47	9990	.00	.00	.00	.00	.00	5365.	5479.	5372.	5236.	.01	.02	.00
39.66	-.00	6.00	.00	-21.91	22.81	.90	5066.	5265.	5174.	4950.				
134	48	9990	.00	.00	.00	.00	.00	5365.	5479.	5372.	5236.	.01	.02	.00
49.43	-.00	6.00	.00	-20.03	19.58	-.44	5023.	5218.	5124.	4922.				
135	49	9990	.00	.00	.00	.00	.00	4790.	4876.	4771.	4642.	.01	.00	.00
.00	-.00	6.00	.00	-22.26	21.91	-.35	4790.	4876.	4771.	4642.				
136	49	9990	.00	.00	.00	.00	.00	4790.	4876.	4771.	4642.	.01	.01	.00
4.93	-.00	6.00	.00	-21.93	21.91	-.03	4733.	4824.	4787.	4636.				
137	49	9990	.00	.00	.00	.00	.00	4790.	4876.	4771.	4642.	.01	.01	.00
9.89	-.00	6.00	.00	-21.58	22.25	.66	4737.	4827.	4768.	4599.				
138	49	9990	.00	.00	.00	.00	.00	4790.	4876.	4771.	4642.	.01	.01	.00
19.84	-.00	6.00	.00	-20.67	21.43	.76	4652.	4763.	4704.	4502.				
139	49	9990	.00	.00	.00	.00	.00	4790.	4876.	4771.	4642.	.01	.01	.00
29.79	-.00	6.00	.00	-18.30	19.50	1.20	4561.	4729.	4637.	4435.				
140	50	9990	.00	.00	.00	.00	.00	4790.	4876.	4771.	4642.	.01	.02	.00
39.67	-.00	6.00	.00	-16.55	16.95	.40	4497.	4671.	4595.	4393.				
141	51	9990	.00	.00	.00	.00	.00	4790.	4876.	4771.	4642.	.01	.01	.00
49.44	-.00	6.00	.00	-14.72	13.82	-.91	4474.	4635.	4553.	4382.				
155	55	2110	47.42	113.50	1.00	1.17	20.00	5068.	5156.	5057.	4806.	.03	.04	40.00
-.01	1.00	4.50	6.84	-2.25	24.47	20.74	5068.	5156.	5057.	4806.				
156	55	2110	47.42	113.50	1.00	1.17	20.00	5068.	5156.	5057.	4806.	.04	.05	40.00
5.98	-.36	5.86	4.90	-.06	24.48	22.95	4937.	5189.	5067.	4767.				
157	55	2110	47.42	113.50	1.00	1.17	20.00	5068.	5156.	5057.	4806.	.04	.05	40.00
8.97	-.08	5.58	8.63	3.58	24.68	26.78	4901.	5152.	5081.	4744.				
158	55	2110	47.42	113.50	1.00	1.17	20.00	5068.	5156.	5057.	4806.	.04	.05	40.00
14.88	.27	5.23	7.76	1.15	24.66	24.33	4952.	5117.	5041.	4797.				
159	55	2110	47.42	113.50	1.00	1.17	20.00	5068.	5156.	5057.	4806.	.04	.05	40.00
24.84	.73	4.77	6.15	2.37	23.00	23.98	4920.	5115.	5021.	4773.				
185	62	2110	47.42	113.50	5.60	1.17	20.00	5068.	5197.	5040.	4782.	.03	.04	40.00
-.02	1.03	4.47	6.26	-2.04	24.47	20.95	5068.	5197.	5040.	4782.				
186	62	2110	47.42	113.50	5.60	1.17	20.00	5068.	5197.	5040.	4782.	.04	.05	40.00
6.00	-.36	5.86	4.84	.83	24.48	23.83	4941.	5149.	5066.	4760.				
187	62	2110	47.42	113.50	5.60	1.17	20.00	5068.	5197.	5040.	4782.	.04	.05	40.00
8.99	.08	5.42	8.25	3.81	24.68	27.01	4883.	5135.	5020.	4735.				

PAR WIG MODEL : FINAL DATA

POINT # / SPEED FPS	RUN # / IMM IN	CONF # / HEAVE IN	LCG / PITCH DEG	MODEL WT / GAGE #	TAIL ANGLE / THRUST #	ASPECT RATIO / DRAG #	FAN ANGLE / AVERAGE FAN RPM FAN1	FAN RPM AT ZERO SPD FAN1 / AVERAGE FAN RPM FAN2	FAN RPM AT ZERO SPD FAN2 / AVERAGE FAN RPM FAN3	FAN RPM AT ZERO SPD FAN3 / AVERAGE FAN RPM FAN4	FAN4	RMS G'S CG	RMS G'S STN	FLAP ANGLE
										PFPE PSI	PAPE PSI	PFSE PSI	PASE PSI	
188	62	2110	47.42	113.50	5.60	1.17	20.00	5068.	5197.	5040.	4782.	.03	.04	40.00
14.92	.26	5.24	7.37	2.26	24.65	25.43	4924.	5089.	5026.	4764.				
189	62	2110	47.42	113.50	5.60	1.17	20.00	5068.	5197.	5040.	4782.	.05	.07	40.00
24.90	.65	4.85	5.81	3.70	22.99	25.30	4888.	5087.	4988.	4750.				
190	63	2110	47.42	113.50	5.60	1.17	20.00	5068.	5197.	5040.	4782.	.08	.11	40.00
34.80	1.19	4.31	4.69	7.23	20.70	26.68	4900.	5111.	5006.	4787.				
191	64	2110	47.42	113.50	5.60	1.17	20.00	4566.	4671.	4571.	4333.	.03	.04	40.00
-.03	2.54	2.96	4.96	-3.17	19.65	15.30	4566.	4671.	4571.	4333.				
192	64	2110	47.42	113.50	5.60	1.17	20.00	4566.	4671.	4571.	4333.	.03	.04	40.00
5.99	.85	4.65	4.23	.90	19.71	19.43	4448.	4653.	4580.	4294.				
193	64	2110	47.42	113.50	5.60	1.17	20.00	4566.	4671.	4571.	4333.	.03	.04	40.00
8.98	1.42	4.08	7.11	4.44	19.93	23.16	4439.	4622.	4563.	4314.				
194	64	2110	47.42	113.50	5.60	1.17	20.00	4566.	4671.	4571.	4333.	.03	.04	40.00
14.88	1.38	4.12	6.42	4.11	19.95	22.85	4433.	4612.	4532.	4301.				
195	64	2110	47.42	113.50	5.60	1.17	20.00	4566.	4671.	4571.	4333.	.04	.06	40.00
24.85	1.80	3.70	4.56	6.15	18.36	23.40	4396.	4584.	4501.	4288.				
196	64	2110	47.42	113.50	5.60	1.17	20.00	4566.	4671.	4571.	4333.	.09	.11	40.00
34.78	2.64	2.86	3.52	14.35	16.15	29.52	4381.	4586.	4474.	4299.				
197	65	2110	47.42	113.50	9.00	1.17	20.00	4590.	4741.	4615.	4375.	.04	.04	40.00
-.02	2.56	2.94	4.92	-3.34	20.08	15.53	4590.	4741.	4615.	4375.				
198	65	2110	47.42	113.50	9.00	1.17	20.00	4590.	4741.	4615.	4375.	.03	.04	40.00
6.00	.71	4.79	4.11	1.14	20.13	20.06	4485.	4692.	4617.	4328.				
199	65	2110	47.42	113.50	9.00	1.17	20.00	4590.	4741.	4615.	4375.	.03	.04	40.00
8.97	1.32	4.18	7.12	4.53	20.35	23.65	4473.	4655.	4611.	4333.				
200	65	2110	47.42	113.50	9.00	1.17	20.00	4590.	4741.	4615.	4375.	.03	.04	40.00
14.89	1.32	4.18	6.67	4.03	20.36	23.17	4455.	4630.	4573.	4329.				
201	65	2110	47.42	113.50	9.00	1.17	20.00	4590.	4741.	4615.	4375.	.03	.05	40.00
24.85	1.72	3.78	4.82	5.67	18.77	23.31	4427.	4622.	4543.	4319.				
202	65	2110	47.42	113.50	9.00	1.17	20.00	4590.	4741.	4615.	4375.	.09	.12	40.00
34.77	2.55	2.95	3.51	13.57	16.55	29.12	4413.	4616.	4513.	4321.				
203	66	2110	47.42	113.50	9.00	1.17	20.00	5193.	5265.	5162.	4860.	.03	.04	40.00
-.01	.68	4.82	6.59	-1.62	25.51	22.35	5193.	5265.	5162.	4860.				
204	66	2110	47.42	113.50	9.00	1.17	20.00	5193.	5265.	5162.	4860.	.04	.04	40.00
6.00	-.39	5.89	4.90	-.79	25.[illegible]1	23.19	5037.	5229.	5157.	4839.				

** PAR WIG MODEL : FINAL DATA **

POINT # / SPEED FPS	RUN # / IMM IN	CONF # / HEAVE IN	LCG / PITCH DEG	MODEL WT / GAGE #	TAIL ANGLE / THRUST #	ASPECT RATIO / DRAG #	FAN ANGLE / FAN1	FAN RPM AT ZERO SPD FAN1 / AVERAGE FAN RPM FAN2	FAN2 / FAN3	FAN3 PFPE PSI / FAN4	FAN4 PAPE PSI	RMS G'S CG PFSE PSI	RMS G'S STN PASE PSI	FLAP ANGLE
205	66	2110	47.42	113.50	9.00	1.17	20.00	5193.	5265.	5162.	4860.	.04	.05	40.00
8.99	-.30	5.80	8.37	3.97	25.70	28.12	4958.	5141.	5167.	4788.				
206	66	2110	47.42	113.50	9.00	1.17	20.00	5193.	5265.	5162.	4860.	.04	.05	40.00
14.90	-.05	5.55	7.53	2.33	25.67	26.45	4989.	5137.	5120.	4831.				
207	66	2110	47.42	113.50	9.00	1.17	20.00	5193.	5265.	5162.	4860.	.04	.06	40.00
24.89	.29	5.21	6.00	2.83	23.99	25.37	4979.	5160.	5078.	4821.				
208	66	2110	47.42	113.50	9.00	1.17	20.00	5193.	5265.	5162.	4860.	.04	.05	40.00
34.80	1.65	3.85	4.61	8.53	21.69	28.91	4964.	5163.	5061.	4815.				
209	67	2110	45.73	113.50	9.00	1.17	20.00	5150.	5170.	5123.	4939.	.03	.04	40.00
-.01	.62	4.88	-4.52	-14.58	25.25	9.14	5150.	5170.	5123.	4939.				
210	67	2110	45.73	113.50	9.00	1.17	20.00	5150.	5170.	5123.	4939.	.03	.04	40.00
5.99	1.24	4.26	-3.68	-12.70	25.25	11.03	5114.	5097.	5118.	4912.				
213	68	2110	46.56	113.50	9.00	1.17	20.00	5163.	5284.	5145.	4923.	.03	.04	40.00
-.00	-.09	5.59	-2.49	-11.08	25.60	12.98	5163.	5284.	5145.	4923.				
214	68	2110	46.56	113.50	9.00	1.17	20.00	5163.	5284.	5145.	4923.	.04	.05	40.00
6.00	-.58	6.08	3.99	-.06	25.61	24.00	5037.	5220.	5160.	4842.				
215	68	2110	46.56	113.50	9.00	1.17	20.00	5163.	5284.	5145.	4923.	.04	.05	40.00
8.97	-.34	5.84	7.62	3.57	25.80	27.81	4959.	5158.	5150.	4784.				
216	68	2110	46.56	113.50	9.00	1.17	20.00	5163.	5284.	5145.	4923.	.05	.06	40.00
14.87	-.14	5.64	7.17	2.12	25.77	26.33	5000.	5153.	5097.	4839.				
217	68	2110	46.56	113.50	9.00	1.17	20.00	5163.	5284.	5145.	4923.	.05	.07	40.00
24.85	.23	5.27	5.92	3.20	24.09	25.83	4967.	5160.	5078.	4819.				
218	68	2110	46.56	113.50	9.00	1.17	20.00	5163.	5284.	5145.	4923.	.03	.05	40.00
34.73	1.57	3.93	4.59	8.28	21.79	28.76	4948.	5156.	5047.	4810.				
219	69	2210	46.56	113.50	9.00	1.17	20.00	5131.	5239.	5143.	4876.	.03	.04	40.00
.01	-.10	5.60	-2.06	-10.48	25.26	13.26	5131.	5239.	5143.	4876.				
220	69	2210	46.56	113.50	9.00	1.17	20.00	5131.	5239.	5143.	4876.	.03	.03	40.00
5.99	-.14	5.64	1.08	-4.01	25.27	19.74	5106.	5204.	5147.	4893.				
221	69	2210	46.56	113.50	9.00	1.17	20.00	5131.	5239.	5143.	4876.	.04	.05	40.00
8.96	-.59	6.09	6.44	3.65	25.46	27.57	4979.	5183.	5127.	4814.				
222	69	2210	46.56	113.50	9.00	1.17	20.00	5131.	5239.	5143.	4876.	.04	.05	40.00
14.90	-.76	6.26	4.91	1.54	25.43	25.44	4976.	5171.	5092.	4832.				
223	69	2210	46.56	113.50	9.00	1.17	20.00	5131.	5239.	5143.	4876.	.05	.06	40.00
24.88	-.51	6.01	3.39	.67	23.75	22.99	4947.	5152.	5073.	4813.				

PAR WIG MODEL : FINAL DATA

POINT # / SPEED FPS	RUN # / IMM IN	CONF # / HEAVE IN	LCG / PITCH DEG	MODEL WT / GAGE #	TAIL ANGLE / THRUST #	ASPECT RATIO / DRAG #	FAN ANGLE / AVERAGE FAN RPM FAN1	FAN RPM AT ZERO SPD FAN1 / FAN2	FAN2 / FAN3	FAN3 PFPE PSI / FAN4	FAN4 PAPE PSI	RMS G'S CG PFSE PSI	RMS G'S STN PASE PSI	FLAP ANGLE
224	69	2210	46.56	113.50	9.00	1.17	20.00	5131.	5239.	5143.	4876.	.05	.08	40.00
34.77	.86	4.64	1.62	1.92	21.46	22.09	4936.	5142.	5037.	4800.				
225	70	2210	46.56	113.50	9.00	1.17	20.00	4580.	4670.	4577.	4304.	.04	.04	40.00
-.02	2.41	3.09	3.99	-3.75	19.63	14.70	4580.	4670.	4577.	4304.				
226	70	2210	46.56	113.50	9.00	1.17	20.00	4580.	4670.	4577.	4304.	.03	.04	40.00
5.98	.55	4.95	1.67	.61	19.68	19.11	4495.	4671.	4580.	4317.				
227	70	2210	46.56	113.50	9.00	1.17	20.00	4580.	4670.	4577.	4304.	.04	.05	40.00
8.96	.49	5.01	4.53	4.97	19.90	23.67	4474.	4643.	4567.	4301.				
228	70	2210	46.56	113.50	9.00	1.17	20.00	4580.	4670.	4577.	4304.	.04	.05	40.00
14.98	.53	4.97	4.30	3.72	19.91	22.43	4438.	4610.	4556.	4303.				
229	70	2210	46.56	113.50	9.00	1.17	20.00	4580.	4670.	4577.	4304.	.05	.06	40.00
24.98	.70	4.80	2.38	3.17	18.31	20.38	4406.	4590.	4503.	4282.				
230	70	2210	46.56	113.50	9.00	1.17	20.00	4580.	4670.	4577.	4304.	.06	.09	40.90
34.92	1.45	4.05	1.04	7.24	16.09	22.36	4388.	4584.	4473.	4283.				
231	71	2310	48.01	114.70	9.00	1.17	20.00	4571.	4653.	4568.	4332.	.03	.03	40.00
-.03	2.51	2.99	4.38	-3.32	19.61	15.11	4571.	4653.	4568.	4332.				
232	71	2310	48.01	114.70	9.00	1.17	20.00	4571.	4653.	4568.	4332.	.03	.04	40.00
5.98	.68	4.82	3.36	1.70	19.67	20.18	4462.	4645.	4573.	4290.				
233	71	2310	48.01	114.70	9.00	1.17	20.00	4571.	4653.	4568.	4332.	.04	.04	40.00
8.99	.94	4.56	6.10	5.49	19.89	24.18	4439.	4611.	4563.	4304.				
234	71	2310	48.01	114.70	9.00	1.17	20.00	4571.	4653.	4568.	4332.	.04	.04	40.00
14.97	.65	4.85	5.13	5.29	19.90	23.99	4433.	4604.	4527.	4297.				
235	71	2310	48.01	114.70	9.00	1.17	20.00	4571.	4653.	4568.	4332.	.04	.05	40.00
24.99	.92	4.58	2.70	4.16	18.30	21.35	4401.	4589.	4501.	4284.				
236	71	2310	48.01	114.70	9.00	1.17	20.00	4571.	4653.	4568.	4332.	.09	.11	40.00
35.00	1.60	3.90	1.02	7.86	16.05	22.95	4386.	4574.	4472.	4283.				
244	74	2220	47.42	114.00	1.00	1.17	30.00	4811.	4868.	4812.	4623.	.03	.03	40.00
.00	-.32	5.82	9.29	2.79	22.00	21.84	4811.	4868.	4812.	4623.				
245	74	2220	47.42	114.00	1.00	1.17	30.00	4811.	4868.	4812.	4623.	.03	.05	40.00
6.03	-1.23	6.73	7.28	6.36	22.04	25.45	4701.	4859.	4825.	4524.				
246	74	2220	47.42	114.00	1.00	1.17	30.00	4811.	4868.	4812.	4623.	.04	.07	40.00
9.08	-1.37	6.87	9.18	13.33	22.25	32.60	4672.	4843.	4822.	4521.				
247	74	2220	47.42	114.00	1.00	1.17	30.00	4811.	4868.	4812.	4623.	.05	.10	40.00
15.08	-2.35	7.85	8.58	15.52	22.22	34.76	4706.	4904.	4807.	4539.				

PAR WIG MODEL : FINAL DATA

POINT # / SPEED FPS	RUN # / IMM IN	CONF # / HEAVE IN	LCG / PITCH DEG	MODEL WT / GAGE #	TAIL ANGLE / THRUST #	ASPECT RATIO / DRAG #	FAN ANGLE / AVERAGE FAN RPM FAN1	FAN RPM AT ZERO SPD FAN1 / FAN2	FAN2 / FAN3	FAN3 / FAN4	FAN4 / PFPE PSI	RMS G'S CG / PAPE PSI	RMS G'S STN / PFSE PSI	FLAP ANGLE / PASE PSI
248	74	2220	47.42	114.00	1.00	1.17	30.00	4811.	4868.	4812.	4623.	.05	.11	40.00
25.16	-1.99	7.49	7.17	16.11	20.56	33.92	4692.	4873.	4794.	4558.				
249	74	2220	47.42	114.00	1.00	1.17	30.00	4811.	4868.	4812.	4623.	.16	.31	40.00
35.27	-2.22	7.72	6.03	17.10	18.24	32.89	4721.	4896.	4821.	4594.				
250	75	2220	47.42	114.00	1.00	1.17	30.00	4762.	4744.	4763.	4543.	.03	.03	40.00
-.01	.02	5.48	8.90	2.27	21.26	20.68	4762.	4744.	4763.	4543.				
251	75	2220	47.42	114.00	1.00	1.17	30.00	4762.	4744.	4763.	4543.	.03	.06	40.00
6.01	-1.14	6.64	7.05	6.77	21.30	25.22	4634.	4739.	4773.	4477.				
252	75	2220	47.42	114.00	1.00	1.17	30.00	4762.	4744.	4763.	4543.	.04	.08	40.00
9.04	-1.21	6.71	8.74	13.48	21.52	32.11	4610.	4702.	4767.	4470.				
253	75	2220	47.42	114.00	1.00	1.17	30.00	4762.	4744.	4763.	4543.	.05	.12	40.00
15.04	-2.21	7.71	8.03	15.07	21.50	33.69	4659.	4750.	4772.	4512.				
254	75	2220	47.42	114.00	1.00	1.17	30.00	4762.	4744.	4763.	4543.	.10	.19	40.00
25.12	-1.88	7.38	6.39	15.53	19.86	32.72	4630.	4756.	4733.	4504.				
255	75	2220	47.42	114.00	1.00	1.17	30.00	4762.	4744.	4763.	4543.	.17	.33	40.00
35.21	-1.98	7.48	5.31	17.20	17.56	32.40	4661.	4774.	4747.	4544.				
256	76	2220	47.42	114.00	1.00	1.17	30.00	5179.	5479.	5429.	5129.	.03	.03	40.00
-.01	-1.95	7.45	10.65	4.83	27.49	28.64	5179.	5479.	5429.	5129.				
257	76	2220	47.42	114.00	1.00	1.17	30.00	5179.	5479.	5429.	5129.	.03	.04	40.00
6.03	-2.06	7.56	8.84	4.15	27.48	27.95	5072.	5433.	5327.	5017.				
258	76	2220	47.42	114.00	1.00	1.17	30.00	5179.	5479.	5429.	5129.	.04	.07	40.00
9.06	-2.40	7.90	11.19	13.64	27.67	37.60	5014.	5330.	5343.	5003.				
259	76	2220	47.42	114.00	1.00	1.17	30.00	5179.	5479.	5429.	5129.	.05	.12	40.00
15.07	-3.56	9.06	10.82	17.83	27.59	41.72	5076.	5353.	5362.	5056.				
260	76	2220	47.42	114.00	1.00	1.17	30.00	5179.	5479.	5429.	5129.	.05	.08	40.00
25.14	-3.02	8.52	8.57	20.12	25.85	42.50	5073.	5381.	5325.	5038.				
261	76	2220	47.42	114.00	1.00	1.17	30.00	5179.	5479.	5429.	5129.	.14	.17	40.00
35.25	-3.07	8.57	7.72	22.96	23.45	43.27	5122.	5382.	5343.	5081.				
262	77	2220	47.42	114.00	9.00	1.17	30.00	4511.	4953.	5016.	4821.	.03	.03	40.00
.00	-.57	6.07	9.27	3.29	22.47	22.74	4511.	4953.	5016.	4821.				
263	77	2220	47.42	114.00	9.00	1.17	30.00	4511.	4953.	5016.	4821.	.03	.05	40.00
6.02	-1.39	6.89	7.55	6.43	22.50	25.91	4524.	4977.	5009.	4694.				
264	77	2220	47.42	114.00	9.00	1.17	30.00	4511.	4953.	5016.	4821.	.04	.07	40.00
9.05	-1.50	7.00	9.42	13.50	22.71	33.16	4498.	4944.	5007.	4691.				

PAR WIG MODEL : FINAL DATA

POINT #	RUN #	CONF #	LCG	MODEL WT	TAIL ANGLE	ASPECT RATIO	FAN ANGLE	FAN RPM AT ZERO SPD FAN1	FAN2	FAN3	FAN4	RMS G'S CG	RMS G'S STN	FLAP ANGLE
SPEED FPS	IMM IN	HEAVE IN	PITCH DEG	GAGE #	THRUST #	DRAG #	AVERAGE FAN RPM FAN1	FAN2	FAN3	FAN4	PFPE PSI	PAPE PSI	PFSE PSI	PASE PSI
265	77	2220	47.42	114.00	9.00	1.17	30.00	4511.	4953.	5016.	4821.	.05	.12	40.00
15.07	-2.41	7.91	8.53	15.60	22.67	35.23	4562.	4964.	5043.	4712.				
266	77	2220	47.42	114.00	9.00	1.17	30.00	4511.	4953.	5016.	4821.	.05	.10	40.00
25.15	-2.09	7.59	7.20	15.93	21.01	34.12	4560.	4978.	4984.	4705.				
267	77	2220	47.42	114.00	9.00	1.17	30.00	4511.	4953.	5016.	4821.	.11	.17	40.00
35.25	-2.01	7.51	6.22	17.24	18.69	33.43	4599.	5007.	5005.	4750.				
268	78	2220	43.11	114.00	9.00	1.17	30.00	4775.	4930.	5035.	4771.	.03	.03	40.00
.01	-.75	6.25	7.53	2.50	22.99	22.41	4775.	4930.	5035.	4771.				
269	78	2220	43.11	114.00	9.00	1.17	30.00	4775.	4930.	5035.	4771.	.03	.04	40.00
6.03	-1.28	6.78	5.90	2.61	23.02	22.55	4702.	5024.	5040.	4677.				
270	78	2220	43.11	114.00	9.00	1.17	30.00	4775.	4930.	5035.	4771.	.03	.05	40.00
9.08	-1.32	6.82	8.75	9.09	23.23	29.21	4689.	4918.	5069.	4685.				
271	78	2220	43.11	114.00	9.00	1.17	30.00	4775.	4930.	5035.	4771.	.04	.07	40.00
15.07	-2.07	7.57	8.13	10.38	23.19	30.46	4734.	4950.	5046.	4712.				
272	78	2220	43.11	114.00	9.00	1.17	30.00	4775.	4930.	5035.	4771.	.04	.07	40.00
26.54	-1.90	7.40	6.38	10.87	21.23	29.25	4715.	4961.	5002.	4713.				
273	78	2220	43.11	114.00	9.00	1.17	30.00	4775.	4930.	5035.	4771.	.05	.08	40.00
35.25	-1.68	7.18	5.80	14.03	19.19	30.64	4752.	4976.	5021.	4751.				
274	79	2220	38.80	114.00	9.00	1.17	30.00	5049.	5158.	5030.	4784.	.02	.03	40.00
-.01	-1.72	7.22	3.01	-6.08	24.30	14.96	5049.	5158.	5030.	4784.				
275	79	2220	38.80	114.00	9.00	1.17	30.00	5049.	5158.	5030.	4784.	.02	.03	40.00
6.01	-.73	6.23	-.09	-9.06	24.31	12.00	5011.	5079.	5048.	4746.				
276	79	2220	38.80	114.00	9.00	1.17	30.00	5049.	5158.	5030.	4784.	.04	.14	40.00
9.05	-.48	5.98	.91	-3.02	24.52	18.21	4821.	4780.	4735.	4607.				
277	79	2220	38.80	114.00	9.00	1.17	30.00	5049.	5158.	5030.	4784.	.02	.03	40.00
15.05	-1.98	7.48	5.42	1.69	24.47	22.88	4897.	5084.	5084.	4709.				
278	79	2220	38.80	114.00	9.00	1.17	30.00	5049.	5158.	5030.	4784.	.03	.04	40.00
25.14	-1.90	7.40	4.45	3.72	22.77	23.44	4865.	4977.	4968.	4721.				
280	80	2220	38.80	114.00	9.00	1.17	30.00	5049.	5158.	5030.	4784.	.05	.06	40.00
35.20	-1.87	7.37	4.57	8.26	20.44	25.96	4921.	5103.	5045.	4788.				
292	85	2420	47.42	129.40	9.00	1.17	30.00	4903.	5017.	4884.	4738.	.03	.03	40.00
.00	-.18	5.68	3.18	-1.26	23.07	18.72	4903.	5017.	4884.	4738.				
293	85	2420	47.42	129.40	9.00	1.17	30.00	4903.	5017.	4884.	4738.	.03	.02	40.00
6.02	-.29	5.79	1.59	.22	23.10	20.23	4852.	5044.	4895.	4634.				

PAR WIG MODEL : FINAL DATA

POINT # / SPEED FPS	RUN # / IMM IN	CONF # / HEAVE IN	LCG / PITCH DEG	MODEL WT / GAGE #	TAIL ANGLE / THRUST #	ASPECT RATIO / DRAG #	FAN ANGLE / AVERAGE FAN RPM FAN1	FAN RPM AT ZERO SPD FAN1 / FAN2	FAN2 / FAN3	FAN3 / FAN4 / PFPE PSI	FAN4 / PAPE PSI	RMS G'S CG / PFSE PSI	RMS G'S STN / PASE PSI	FLAP ANGLE
294	85	2420	47.42	129.40	9.00	1.17	30.00	4903.	5017.	4884.	4738.	.02	.03	40.00
9.07	-.35	5.85	2.34	2.19	23.31	22.38	4810.	5038.	4887.	4652.				
295	85	2420	47.42	129.40	9.00	1.17	30.00	4903.	5017.	4884.	4738.	.02	.03	40.00
15.08	-1.47	6.97	3.24	6.23	23.27	26.38	4780.	5005.	4858.	4639.				
296	85	2420	47.42	129.40	9.00	1.17	30.00	4903.	5017.	4884.	4738.	.02	.03	40.00
25.16	-1.35	6.85	1.98	7.30	21.59	26.00	4774.	4974.	4858.	4637.				
297	85	2420	47.42	129.40	9.00	1.17	30.00	4903.	5017.	4884.	4738.	.06	.04	40.00
35.26	-1.11	6.61	1.40	9.73	19.26	26.41	4805.	4985.	4866.	4676.				
298	86	2420	47.42	129.40	9.00	1.17	30.00	5433.	5546.	5440.	5251.	.03	.03	40.00
-.00	-1.70	7.20	4.41	-1.14	28.76	23.77	5433.	5546.	5440.	5251.				
299	86	2420	47.42	129.40	9.00	1.17	30.00	5433.	5546.	5440.	5251.	.03	.02	40.00
6.02	-1.35	6.85	3.01	.01	28.73	24.90	5293.	5561.	5423.	5126.				
300	86	2420	47.42	129.40	9.00	1.17	30.00	5433.	5546.	5440.	5251.	.03	.03	40.00
9.05	-1.42	6.92	3.12	1.46	28.91	26.50	5240.	5525.	5414.	5106.				
301	86	2420	47.42	129.40	9.00	1.17	30.00	5433.	5546.	5440.	5251.	.03	.04	40.00
15.07	-2.54	8.04	4.29	5.61	28.82	30.57	5211.	5494.	5410.	5118.				
302	86	2420	47.42	129.40	9.00	1.17	30.00	5433.	5546.	5440.	5251.	.03	.04	40.00
25.14	-2.38	7.88	2.98	6.43	27.06	29.87	5205.	5448.	5380.	5101.				
303	86	2420	47.42	129.40	9.00	1.17	30.00	5433.	5546.	5440.	5251.	.05	.07	40.00
35.24	-2.16	7.66	2.15	9.09	24.64	30.43	5219.	5454.	5375.	5123.				
304	87	2420	47.42	129.40	9.00	1.17	20.00	4903.	5007.	4910.	4674.	.04	.04	40.00
-.02	1.61	3.89	.27	-5.33	22.95	16.24	4903.	5007.	4910.	4674.				
305	87	2420	47.42	129.40	9.00	1.17	20.00	4903.	5007.	4910.	4674.	.03	.03	40.00
6.00	1.41	4.09	-1.59	-4.78	22.98	16.81	4872.	5013.	4915.	4661.				
306	87	2420	47.42	129.40	9.00	1.17	20.00	4903.	5007.	4910.	4674.	.03	.04	40.00
9.05	.89	4.61	-.21	.53	23.19	22.31	4828.	5001.	4924.	4637.				
307	87	2420	47.42	129.40	9.00	1.17	20.00	4903.	5007.	4910.	4674.	.04	.05	40.00
15.07	.17	5.33	.56	1.53	23.15	23.29	4754.	4968.	4829.	4624.				
308	87	2420	47.42	129.40	9.00	1.17	20.00	4903.	5007.	4910.	4674.	.05	.06	40.00
25.14	.44	5.06	-.55	1.46	21.48	21.64	4732.	4930.	4846.	4590.				
309	87	2420	47.42	129.40	9.00	1.17	20.00	4903.	5007.	4910.	4674.	.09	.12	40.00
35.23	.76	4.74	-1.75	3.95	19.15	21.95	4734.	4909.	4829.	4594.				
310	88	2420	47.42	129.40	9.00	1.17	20.00	5437.	5598.	5575.	5232.	.03	.04	40.00
-.00	.03	5.47	-1.55	-10.20	29.24	17.28	5437.	5598.	5575.	5232.				

** PAR WIG MODEL : FINAL DATA **

POINT # / SPEED FPS	RUN # / IMM IN	CONF # / HEAVE IN	LCG / PITCH DEG	MODEL WT / GAGE #	TAIL ANGLE / THRUST #	ASPECT RATIO / DRAG #	FAN ANGLE / AVERAGE FAN RPM FAN1	FAN RPM AT ZERO SPD FAN1 / FAN2	FAN RPM AT ZERO SPD FAN2 / FAN3	FAN RPM AT ZERO SPD FAN3 / FAN4	FAN4 / PFPE PSI	RMS G'S CG / PAPE PSI	RMS G'S STN / PFSE PSI	FLAP ANGLE / PASE PSI
311	88	2420	47.42	129.40	9.00	1.17	20.00	5437.	5598.	5575.	5232.	.03	.03	40.00
6.00	.95	4.55	-2.62	-9.95	29.21	17.50	5451.	5548.	5550.	5232.				
312	88	2420	47.42	129.40	9.00	1.17	20.00	5437.	5598.	5575.	5232.	.03	.03	40.00
9.05	.08	5.42	.32	-3.30	29.39	24.32	5367.	5555.	5538.	5198.				
313	88	2420	47.42	129.40	9.00	1.17	20.00	5437.	5598.	5575.	5232.	.04	.05	40.00
15.07	-.83	6.33	1.91	-.81	29.29	26.72	5266.	5529.	5505.	5183				
314	88	2420	47.42	129.40	9.00	1.17	20.00	5437.	5598.	5575.	5232.	.05	.06	40.00
25.13	-.45	5.95	.90	-.94	27.53	24.93	5247.	5506.	5494.	5134.				
315	88	2420	47.42	129.40	9.00	1.17	20.00	5437.	5598.	5575.	5232.	.05	.07	40.00
35.21	.21	5.29	.09	.65	25.11	24.24	5240.	5490.	5459.	5128.				
316	89	2420	47.42	129.40	9.00	1.17	20.00	5458.	5606.	5573.	5247.	.03	.03	40.00
.00	.01	5.49	-.46	-8.33	29.36	19.26	5458.	5606.	5573.	5247.				
318	90	2420	47.42	129.40	9.00	1.17	20.00	5419.	5534.	5512.	5165.	.03	.04	40.00
-.01	-.03	5.53	-.88	-8.92	28.65	18.00	5419.	5534.	5512.	5165.				
319	90	2420	47.42	129.40	9.00	1.17	20.00	5419.	5534.	5512.	5165.	.08	.12	40.00
44.62	.36	5.14	-1.31	3.80	21.71	24.20	5238.	5417.	5383.	5105.				
320	91	2430	47.42	129.40	9.00	1.17	20.00	5379.	5504.	5568.	5202.	.03	.03	27.00
-.03	.61	4.89	-1.46	-13.78	28.71	13.20	5379.	5504.	5568.	5202.				
321	91	2430	47.42	129.40	9.00	1.17	20.00	5379.	5504.	5568.	5202.	.03	.03	27.00
5.98	2.14	3.36	-3.45	-15.45	28.68	11.51	5436.	5488.	5519.	5226.				
322	91	2430	47.42	129.40	9.00	1.17	20.00	5379.	5504.	5568.	5202.	.02	.03	27.00
9.01	1.19	4.31	-.79	-9.27	28.86	17.85	5372.	5501.	5516.	5173.				
323	91	2430	47.42	129.40	9.00	1.17	20.00	5379.	5504.	5568.	5202.	.03	.03	27.00
15.01	-.24	5.74	1.41	-5.04	28.78	22.00	5288.	5516.	5500.	5154.				
324	91	2430	47.42	129.40	9.00	1.17	20.00	5379.	5504.	5568.	5202.	.04	.05	27.00
25.05	.12	5.38	.24	-5.33	27.03	20.07	5248.	5490.	5462.	5111.				
325	91	2430	47.42	129.40	9.00	1.17	20.00	5379.	5504.	5568.	5202.	.05	.07	27.00
35.07	.53	4.97	-1.10	-1.58	24.64	21.58	5241.	5463.	5433.	5110.				
326	92	2430	47.42	129.40	9.00	1.17	20.00	4909.	5042.	4974.	4673.	.03	.04	27.00
-.02	1.50	4.00	-.98	-8.03	23.22	13.78	4909.	5042.	4974.	4673.				
327	92	2430	47.42	129.40	9.00	1.17	20.00	4909.	5042.	4974.	4673.	.03	.03	27.00
5.99	2.45	3.05	-2.98	-10.05	23.24	11.79	4914.	4981.	4951.	4695.				
328	92	2430	47.42	129.40	9.00	1.17	20.00	4909.	5042.	4974.	4673.	.03	.03	27.00
9.01	1.83	3.67	-.85	-4.75	23.44	17.28	4860.	5001.	4955.	4655.				

PAR WIG MODEL : FINAL DATA

POINT #	RUN #	CONF #	LCG	MODEL WT	TAIL ANGLE	ASPECT RATIO	FAN ANGLE	FAN RPM AT ZERO SPD FAN1	FAN2	FAN3	FAN4	RMS G'S CG	RMS G'S STN	FLAP ANGLE
SPEED FPS	IMM IN	HEAVE IN	PITCH DEG	GAGE #	THRUST #	DRAG #	AVERAGE FAN RPM FAN1	FAN2	FAN3	FAN4	PFPE PSI	PAPE PSI	PFSE PSI	PASE PSI
329	92	2430	47.42	129.40	9.00	1.17	20.00	4909.	5042.	4974.	4673.	.03	.04	27.00
15.01	.37	5.13	.25	-.65	23.41	21.35	4799.	5005.	4921.	4649.				
330	92	2430	47.42	129.40	9.00	1.17	20.00	4909.	5042.	4974.	4673.	.06	.06	27.00
25.06	.56	4.94	-1.12	-.25	21.75	20.18	4755.	4958.	4889.	4617.				
331	92	2430	47.42	129.40	9.00	1.17	20.00	4909.	5042.	4974.	4673.	.08	.11	27.00
35.10	.86	4.64	-2.32	3.04	19.44	21.30	4757.	4941.	4866.	4614.				
332	93	2410	47.42	129.40	9.00	1.17	20.00	4956.	5027.	5022.	4713.	.03	.04	40.00
-.03	1.34	4.16	.25	-4.95	23.52	17.16	4956.	5027.	5022.	4713.				
333	93	2410	47.42	129.40	9.00	1.17	20.00	4956.	5027.	5022.	4713.	.03	.03	40.00
5.98	1.29	4.21	-1.57	-4.91	23.54	17.21	4944.	5049.	5013.	4718.				
334	93	2410	47.42	129.40	9.00	1.17	20.00	4956.	5027.	5022.	4713.	.03	.03	40.00
9.01	.68	4.82	.03	.73	23.75	23.04	4888.	5043.	4997.	4691.				
335	93	2410	47.42	129.40	9.00	1.17	20.00	4956.	5027.	5022.	4713.	.04	.05	40.00
15.01	.13	5.37	.66	1.04	23.71	23.33	4797.	5014.	4945.	4680.				
336	93	2410	47.42	129.40	9.00	1.17	20.00	4956.	5027.	5022.	4713.	.05	.06	40.00
25.05	.33	5.17	-.53	.71	22.04	21.43	4790.	4975.	4937.	4643.				
337	93	2410	47.42	129.40	9.00	1.17	20.00	4956.	5027.	5022.	4713.	.08	.11	40.00
35.09	1.07	4.43	-2.05	2.02	19.73	20.56	4784.	4952.	4907.	4638.				
338	94	2410	47.42	129.40	9.00	1.17	20.00	5454.	5553.	5559.	5210.	.03	.03	40.00
-.00	.04	5.46	-1.25	-9.13	29.05	18.17	5454.	5553.	5559.	5210.				
339	94	2410	47.42	129.40	9.00	1.17	20.00	5454.	5553.	5559.	5210.	.03	.03	40.00
5.99	.94	4.56	-2.50	-9.54	29.03	17.73	5414.	5506.	5503.	5197.				
340	94	2410	47.42	129.40	9.00	1.17	20.00	5454.	5553.	5559.	5210.	.03	.03	40.00
9.02	.15	5.35	.26	-3.11	29.20	24.33	5333.	5508.	5507.	5159.				
341	94	2410	47.42	129.40	9.00	1.17	20.00	5454.	5553.	5559.	5210.	.04	.05	40.00
15.02	-.63	6.13	1.88	-.71	29.12	26.65	5229.	5492.	5466.	5146.				
342	94	2410	47.42	129.40	9.00	1.17	20.00	5454.	5553.	5559.	5210.	.05	.06	40.00
25.06	-.31	5.81	.76	-1.31	27.36	24.40	5211.	5465.	5448.	5101.				
343	94	2410	47.42	129.40	9.00	1.17	20.00	5454.	5553.	5559.	5210.	.07	.08	40.00
35.09	.39	5.11	-.71	-.04	24.97	23.42	5224.	5441.	5406.	5093.				
344	95	2510	47.42	130.90	.00	1.17	20.00	5440.	5566.	5476.	5209.	.03	.04	40.00
-.00	.05	5.45	-.52	-7.23	28.81	19.85	5440.	5566.	5476.	5209.				
345	95	2510	47.42	130.90	.00	1.17	20.00	5440.	5566.	5476.	5209.	.03	.03	40.00
6.00	.90	4.60	-2.20	-8.66	28.79	18.39	5422.	5512.	5476.	5204.				

** PAR WIG MODEL : FINAL DATA **

POINT #	RUN #	CONF #	LCG	MODEL WT	TAIL ANGLE	ASPECT RATIO	FAN ANGLE	FAN RPM AT ZERO SPD FAN1	FAN2	FAN3	FAN4	RMS G'S CG	RMS G'S STN	FLAP ANGLE
SPEED FPS	IMM IN	HEAVE IN	PITCH DEG	GAGE #	THRUST #	DRAG #	AVERAGE FAN RPM FAN1	FAN2	FAN3	FAN4	PFPE PSI	PAPE PSI	PFSE PSI	PASE PSI
346	95	2510	47.42	130.90	.00	1.17	20.00	5440.	5566.	5476.	5209.	.03	.04	40.00
9.02	.11	5.39	.59	-2.38	28.97	24.84	5327.	5523.	5481.	5167.				
347	95	2510	47.42	130.90	.00	1.17	20.00	5440.	5566.	5476.	5209.	.04	.05	40.00
15.01	-.51	6.01	1.81	-1.27	28.88	25.87	5232.	5434.	5420.	5151.				
348	95	2510	47.42	130.90	.00	1.17	20.00	5440.	5566.	5476.	5209.	.06	.07	40.00
25.07	-.27	5.77	.81	-1.60	27.13	23.89	5190.	5465.	5418.	5106.				
349	95	2510	47.42	130.90	.00	1.17	20.00	5440.	5566.	5476.	5209.	.08	.11	40.00
35.10	.41	5.09	-.47	-.11	24.73	23.13	5201.	5431.	5378.	5098.				
350	96	2510	47.42	129.40	.00	1.17	20.00	4865.	4980.	4842.	4629.	.04	.05	40.00
-.02	1.71	3.79	.20	-5.37	22.50	15.78	4865.	4980.	4842.	4629.				
351	96	2510	47.42	129.40	.00	1.17	20.00	4865.	4980.	4842.	4629.	.03	.03	40.00
5.94	1.52	3.98	-1.37	-5.38	22.53	15.79	4865.	4978.	4883.	4641.				
352	96	2510	47.42	129.40	.00	1.17	20.00	4865.	4980.	4842.	4629.	.03	.04	40.00
8.98	1.10	4.40	-.07	-.44	22.74	20.93	4827.	4972.	4904.	4631.				
353	96	2510	47.42	129.40	.00	1.17	20.00	4865.	4980.	4842.	4629.	.04	.05	40.00
14.97	.26	5.24	.65	1.30	22.73	22.66	4741.	4955.	4822.	4614.				
354	96	2510	47.42	129.40	.00	1.17	20.00	4865.	4980.	4842.	4629.	.05	.07	40.00
25.02	.48	5.02	-.46	1.20	21.07	20.99	4731.	4921.	4828.	4592.				
355	96	2510	47.42	129.40	.00	1.17	20.00	4865.	4980.	4842.	4629.	.07	.12	40.00
35.01	.89	4.61	-1.88	2.93	18.79	20.59	4736.	4900.	4817.	4590.				
356	97	2510	47.42	129.40	.00	1.17	20.00	5409.	5617.	5577.	5216.	.03	.04	40.00
-.01	-.04	5.54	-1.24	-9.41	29.18	18.01	5409.	5617.	5577.	5216.				
357	97	2510	47.42	129.40	.00	1.17	20.00	5409.	5617.	5577.	5216.	.03	.03	40.00
5.96	.82	4.68	-2.20	-9.54	29.15	17.85	5420.	5520.	5505.	5204.				
358	97	2510	47.42	129.40	.00	1.17	20.00	5409.	5617.	5577.	5216.	.03	.04	40.00
8.98	.06	5.44	.52	-3.45	29.32	24.10	5322.	5522.	5507.	5166.				
359	97	2510	47.42	129.40	.00	1.17	20.00	5409.	5617.	5577.	5216.	.04	.05	40.00
14.97	-.81	6.31	1.95	-.10	29.25	27.38	5245.	5499.	5475.	5156.				
360	97	2510	47.42	129.40	.00	1.17	20.00	5409.	5617.	5577.	5216.	.05	.06	40.00
24.96	-.40	5.90	.93	-.96	27.50	24.88	5208.	5474.	5453.	5109.				
361	97	2510	47.42	129.40	.00	1.17	20.00	5409.	5617.	5577.	5216.	.06	.07	40.00
34.94	.40	5.10	-.32	-.01	25.12	23.60	5220.	5456.	5418.	5097.				
362	98	2510	47.42	179.40	.00	1.17	20.00	5892.	6049.	5977.	5680.	.04	.05	40.00
-.02	1.24	4.26	.03	-7.75	34.41	24.59	5892.	6049.	5977.	5680.				

PAR WIG MODEL : FINAL DATA

POINT #	RUN #	CONF #	LCG	MODEL WT	TAIL ANGLE	ASPECT RATIO	FAN ANGLE	FAN RPM AT ZERO SPD FAN1	FAN2	FAN3	FAN4	RMS G'S CG	RMS G'S STN	FLAP ANGLE
SPEED FPS	IMM IN	HEAVE IN	PITCH DEG	GAGE #	THRUST #	DRAG #	AVERAGE FAN RPM FAN1	FAN2	FAN3	FAN4	PFPE PSI	PAPE PSI	PFSE PSI	PASE PSI
363	98	2510	47.42	179.40	.00	1.17	20.00	5892.	6049.	5977.	5680.	.03	.04	40.00
5.64	4.86	.64	-3.14	-20.61	34.32	11.64	5894.	5977.	5979.	5676.				
365	99	2510	47.42	179.40	.00	1.17	20.00	5936.	6096.	6006.	5645.	.04	.06	40.00
-.02	1.47	4.03	-.02	-7.79	34.67	24.79	5936.	6096.	6006.	5645.				
366	99	2510	47.42	179.40	.00	1.17	20.00	5936.	6096.	6006.	5645.	.03	.03	40.00
5.98	2.92	2.58	-1.36	-20.92	34.59	11.58	5933.	6021.	6035.	5729.				
367	99	2510	47.42	179.40	.00	1.17	20.00	5936.	6096.	6006.	5645.	.02	.04	40.00
9.01	2.96	2.54	-.93	-15.91	34.74	16.73	5884.	6040.	6018.	5682.				
368	99	2510	47.42	179.40	.00	1.17	20.00	5936.	6096.	6006.	5645.	.03	.04	40.00
15.01	1.43	4.07	.09	-7.82	34.61	24.70	5759.	5990.	6003.	5645.				
369	99	2510	47.42	179.40	.00	1.17	20.00	5936.	6096.	6006.	5645.	.03	.04	40.00
25.05	1.51	3.99	-1.31	-8.87	32.76	21.92	5715.	5970.	5962.	5595.				
370	99	2510	47.42	179.40	.00	1.17	20.00	5936.	6096.	6006.	5645.	.04	.06	40.00
35.10	1.79	3.71	-1.53	-4.22	30.28	24.23	5707.	5984.	5942.	5589.				
371	100	2510	47.42	179.40	.00	1.17	20.00	6624.	6694.	6699.	6413.	.08	.08	40.00
-.03	3.83	1.67	-1.42	-32.12	43.60	8.85	6624.	6694.	6699.	6413.				
372	100	2510	47.42	179.40	.00	1.17	20.00	6624.	6694.	6699.	6413.	.10	.11	40.00
6.00	4.79	.71	-1.28	-32.05	43.44	8.77	6554.	6689.	6692.	6349.				
373	100	2510	47.42	179.40	.00	1.17	20.00	6624.	6694.	6699.	6413.	.06	.06	40.00
9.00	4.80	.70	.80	-24.43	43.54	16.48	6497.	6697.	6659.	6292.				
374	100	2510	47.42	179.40	.00	1.17	20.00	6624.	6694.	6699.	6413.	.04	.04	40.00
15.00	3.39	2.11	-.42	-16.76	43.33	23.95	6382.	6654.	6622.	6217.				
395	106	2530	47.42	135.00	.00	1.17	20.00	5032.	5053.	4914.	4800.	.04	.05	27.00
-.03	1.30	4.20	-.50	-11.18	23.73	11.12	5032.	5053.	4914.	4800.				
396	106	2530	47.42	135.00	.00	1.17	20.00	5032.	5053.	4914.	4800.	.03	.04	27.00
5.98	2.30	3.20	-2.08	-13.04	23.75	9.28	5019.	5033.	4932.	4745.				
397	106	2530	47.42	135.00	.00	1.17	20.00	5032.	5053.	4914.	4800.	.03	.04	27.00
9.07	1.94	3.56	-.45	-8.30	23.95	14.21	4974.	5046.	4919.	4703.				
398	106	2530	47.42	135.00	.00	1.17	20.00	5032.	5053.	4914.	4800.	.03	.04	27.00
15.04	-.16	5.66	1.67	-2.64	23.91	19.83	4899.	5088.	4935.	4685.				
399	106	2530	47.42	135.00	.00	1.17	20.00	5032.	5053.	4914.	4800.	.05	.06	27.00
25.08	.08	5.42	.53	-1.91	22.23	18.98	4844.	5027.	4865.	4657.				
400	106	2530	47.42	135.00	.00	1.17	20.00	5032.	5053.	4914.	4800.	.11	.11	27.00
35.14	.50	5.00	-1.03	.34	19.91	19.05	4834.	4994.	4834.	4646.				

PAR WIG MODEL : FINAL DATA

POINT # / SPEED FPS	RUN # / IMM IN	CONF # / HEAVE IN	LCG / PITCH DEG	MODEL WT / GAGE #	TAIL ANGLE / THRUST #	ASPECT RATIO / DRAG #	FAN ANGLE / AVERAGE FAN RPM FAN1	FAN RPM AT ZERO SPD FAN1 / AVERAGE FAN RPM FAN2	FAN RPM AT ZERO SPD FAN2 / AVERAGE FAN RPM FAN3	FAN RPM AT ZERO SPD FAN3 / AVERAGE FAN RPM FAN4	FAN RPM AT ZERO SPD FAN4 / PFPE PSI	RMS G'S CG / PAPE PSI	RMS G'S STN / PFSE PSI	FLAP ANGLE / PASE PSI
401	107	2530	47.42	135.00	.00	1.17	20.00	5706.	5719.	5635.	5468.	.04	.05	27.00
-.03	.71	4.79	-2.04	-21.43	31.22	7.91	5706.	5719.	5635.	5468.				
402	107	2530	47.42	135.00	.00	1.17	20.00	5706.	5719.	5635.	5468.	.06	.06	27.00
5.98	2.11	3.39	-2.48	-20.57	31.17	8.72	5686.	5706.	5650.	5419.				
403	107	2530	47.42	135.00	.00	1.17	20.00	5706.	5719.	5635.	5468.	.07	.07	27.00
9.02	1.75	3.75	-.99	-15.80	31.34	13.64	5634.	5723.	5621.	5367.				
404	107	2530	47.42	135.00	.00	1.17	20.00	5706.	5719.	5635.	5468.	.04	.05	27.00
15.04	-.69	6.19	1.82	-8.93	31.23	20.41	5526.	5719.	5634.	5343.				
405	107	2530	47.42	135.00	.00	1.17	20.00	5706.	5719.	5635.	5468.	.05	.06	27.00
25.08	-.33	5.83	.73	-8.67	29.44	18.99	5477.	5717.	5598.	5304.				
406	107	2530	47.42	135.00	.00	1.17	20.00	5706.	5719.	5635.	5468.	.07	.10	27.00
35.13	-.02	5.52	.54	-4.82	27.00	20.55	5468.	5693.	5573.	5301.				
407	108	2530	47.42	135.00	.00	1.17	30.00	5895.	6100.	5760.	5606.	.03	.03	27.00
-.00	-2.35	7.85	4.73	-10.09	33.69	19.09	5895.	6100.	5760.	5606.				
408	108	2530	47.42	135.00	.00	1.17	30.00	5895.	6100.	5760.	5606.	.03	.02	27.00
5.99	-1.48	6.98	2.87	-11.39	33.62	17.72	5818.	5919.	5742.	5564.				
409	108	2530	47.42	135.00	.00	1.17	30.00	5895.	6100.	5760.	5606.	.03	.03	27.00
9.02	-1.38	6.88	3.66	-8.79	33.78	20.46	5742.	5803.	5702.	5516.				
410	108	2530	47.42	135.00	.00	1.17	30.00	5895.	6100.	5760.	5606.	.03	.03	27.00
15.02	-2.94	8.44	4.99	-3.65	33.65	25.49	5665.	5857.	5684.	5517.				
411	108	2530	47.42	135.00	.00	1.17	30.00	5895.	6100.	5760.	5606.	.03	.03	27.00
25.06	-2.75	8.25	3.46	-3.54	31.82	24.01	5640.	5835.	5639.	5489.				
412	108	2530	47.42	135.00	.00	1.17	30.00	5895.	6100.	5760.	5606.	.05	.04	27.00
35.11	-2.46	7.96	2.80	-1.57	29.35	23.85	5643.	5901.	5654.	5492.				
413	109	2530	47.42	135.00	.00	1.17	30.00	5427.	5529.	5360.	5195.	.03	.03	27.00
-.00	-1.64	7.14	4.07	-7.31	28.31	17.21	5427.	5529.	5360.	5195.				
414	109	2530	47.42	135.00	.00	1.17	30.00	5427.	5529.	5360.	5195.	.02	.02	27.00
5.98	-.97	6.47	2.55	-8.26	28.29	16.23	5285.	5463.	5261.	5131.				
415	109	2530	47.42	135.00	.00	1.17	30.00	5427.	5529.	5360.	5195.	.03	.03	27.00
9.02	-.80	6.30	3.16	-6.02	28.47	18.63	5141.	5377.	5194.	5104.				
416	109	2530	47.42	135.00	.00	1.17	30.00	5427.	5529.	5360.	5195.	.02	.03	27.00
15.02	-2.26	7.76	4.28	-1.21	28.39	23.38	4992.	5402.	5136.	5107.				
417	109	2530	47.42	135.00	.00	1.17	30.00	5427.	5529.	5360.	5195.	.04	.04	27.00
25.03	-2.24	7.74	2.95	-.82	26.65	22.26	4984.	5455.	5110.	5093.				

SPEED FPS	IMM IN	HEAVE IN	PITCH DEG	GAGE #	THRUST #	DRAG #	AVERAGE FAN RPM FAN1	FAN2	FAN3	FAN4	PFPE PSI	PAPE PSI	PFSE PSI	PASE PSI
418	109	2530	47.42	135.00	.00	1.17	30.00	5427.	5529.	5360.	5195.	.08	.07	27.00
35.08	-1.95	7.45	2.37	1.33	24.26	22.34	5120.	5474.	5229.	5104.				
419	110	2530	47.42	135.00	.00	1.17	20.00	5762.	5856.	5691.	5539.	.04	.04	27.00
-.03	.62	4.88	-2.15	-22.16	32.16	8.06	5762.	5856.	5691.	5539.				
422	111	2530	48.90	135.00	.00	1.17	30.00	5745.	5865.	5485.	5499.	.03	.03	27.00
-.00	-2.09	7.59	5.03	-8.01	31.40	19.18	5745.	5865.	5485.	5499.				
423	111	2530	48.90	135.00	.00	1.17	30.00	5745.	5865.	5485.	5499.	.02	.02	27.00
5.99	-1.35	6.85	3.24	-8.87	31.35	18.29	5655.	5782.	5514.	5419.				
424	111	2530	48.90	135.00	.00	1.17	30.00	5745.	5865.	5485.	5499.	.03	.03	27.00
9.02	-1.24	6.74	3.79	-6.54	31.52	20.76	5550.	5689.	5499.	5389.				
425	111	2530	48.90	135.00	.00	1.17	30.00	5745.	5865.	5485.	5499.	.02	.03	27.00
14.99	-2.74	8.24	4.99	-1.72	31.42	25.49	5480.	5669.	5494.	5378.				
426	111	2530	48.90	135.00	.00	1.17	30.00	5745.	5865.	5485.	5499.	.03	.03	27.00
25.04	-2.49	7.99	3.42	-1.80	29.63	23.86	5481.	5697.	5444.	5350.				
427	111	2530	48.90	135.00	.00	1.17	30.00	5745.	5865.	5485.	5499.	.05	.05	27.00
35.08	-2.19	7.69	2.76	.18	27.19	23.73	5495.	5732.	5441.	5361.				
428	112	2530	48.90	135.00	.00	1.17	30.00	5994.	6226.	5910.	5765.	.03	.03	27.00
-.01	-2.63	8.13	5.60	-10.41	35.33	20.18	5994.	6226.	5910.	5765.				
429	112	2530	48.90	135.00	.00	1.17	30.00	5994.	6226.	5910.	5765.	.03	.02	27.00
5.99	-1.74	7.24	3.64	-11.29	35.24	19.23	5936.	6053.	5892.	5694.				
430	112	2530	48.90	135.00	.00	1.17	30.00	5994.	6226.	5910.	5765.	.03	.03	27.00
9.03	-1.75	7.25	4.40	-8.99	35.39	21.66	5856.	6013.	5869.	5667.				
431	112	2530	48.90	135.00	.00	1.17	30.00	5994.	6226.	5910.	5765.	.03	.04	27.00
15.01	-3.27	8.77	5.44	-3.67	35.25	26.85	5793.	6007.	5873.	5677.				
432	112	2530	48.90	135.00	.00	1.17	30.00	5994.	6226.	5910.	5765.	.03	.05	27.00
25.04	-2.99	8.49	3.88	-4.07	33.40	24.86	5769.	6013.	5844.	5653.				
433	112	2530	48.90	135.00	.00	1.17	30.00	5994.	6226.	5910.	5765.	.08	.12	27.00
35.10	-2.72	8.22	3.30	-2.02	30.90	24.74	5782.	6077.	5848.	5664.				
434	113	2530	48.90	135.00	.00	1.17	20.00	5934.	6186.	5927.	5743.	.04	.04	27.00
-.00	-.22	5.72	.03	-20.25	35.00	12.64	5934.	6186.	5927.	5743.				
435	113	2530	48.90	135.00	.00	1.17	20.00	5934.	6186.	5927.	5743.	.04	.04	27.00
5.98	1.50	4.00	-1.70	-22.18	34.92	10.63	6003.	6072.	5962.	5742.				
436	113	2530	48.90	135.00	.00	1.17	20.00	5934.	6186.	5927.	5743.	.04	.04	27.00
9.01	.43	5.07	.92	-16.03	35.07	16.92	5923.	6089.	5958.	5680.				

*** PAR WIG MODEL : FINAL DATA ***

POINT #	RUN #	CONF #	LCG	MODEL WT	TAIL ANGLE	ASPECT RATIO	FAN ANGLE	FAN RPM AT ZERO SPD FAN1	FAN2	FAN3 PFPE PSI	FAN4 PAPE PSI	RMS G'S CG PFSE PSI	RMS G'S STN PASE PSI	FLAP ANGLE
SPEED FPS	IMM IN	HEAVE IN	PITCH DEG	GAGE #	THRUST #	DRAG #	AVERAGE FAN RPM FAN1	FAN2	FAN3	FAN4				
437	113	2530	48.90	135.00	.00	1.17	20.00	5934.	6186.	5927.	5743.	.05	.05	27.00
15.03	-.98	6.48	2.40	-10.73	34.93	22.09	5840.	6062.	5937.	5658.				
438	113	2530	48.90	135.00	.00	1.17	20.00	5934.	6186.	5927.	5743.	.08	.08	27.00
25.05	-.71	6.21	1.30	-10.54	33.08	20.55	5779.	6030.	5917.	5621.				
439	113	2530	48.90	135.00	.00	1.17	20.00	5934.	6186.	5927.	5743.	.08	.07	27.00
35.08	-.23	5.73	.96	-6.34	30.60	22.41	5766.	6000.	5884.	5611.				
440	114	2530	48.90	135.00	.00	1.17	20.00	5472.	5609.	5514.	5273.	.03	.04	27.00
-.01	.25	5.25	1.17	-12.15	29.32	15.40	5472.	5609.	5514.	5273.				
441	114	2530	48.90	135.00	.00	1.17	20.00	5472.	5609.	5514.	5273.	.03	.03	27.00
5.98	1.59	3.91	-1.06	-15.87	29.28	11.64	5503.	5549.	5490.	5249.				
442	114	2530	48.90	135.00	.00	1.17	20.00	5472.	5609.	5514.	5273.	.03	.04	27.00
9.02	.74	4.76	1.33	-10.05	29.46	17.63	5427.	5593.	5514.	5192.				
443	114	2530	48.90	135.00	.00	1.17	20.00	5472.	5609.	5514.	5273.	.05	.05	27.00
15.02	-.51	6.01	2.24	-5.80	29.37	21.80	5342.	5481.	5486.	5175.				
444	114	2530	48.90	135.00	.00	1.17	20.00	5472.	5609.	5514.	5273.	.05	.07	27.00
25.06	-.19	5.69	1.07	-5.85	27.61	20.10	5290.	5475.	5440.	5144.				
445	114	2530	48.90	135.00	.00	1.17	20.00	5472.	5609.	5514.	5273.	.08	.12	27.00
35.08	.30	5.20	.49	-2.33	25.22	21.37	5296.	5497.	5411.	5137.				
446	115	2530	48.90	135.00	.00	1.17	30.00	5571.	5679.	5575.	5280.	.03	.03	27.00
.00	-1.71	7.21	4.84	-7.05	29.99	18.92	5571.	5679.	5575.	5280.				
447	115	2530	48.90	135.00	.00	1.17	30.00	5571.	5679.	5575.	5280.	.02	.02	27.00
5.99	-1.05	6.55	3.20	-7.60	29.95	18.34	5464.	5570.	5561.	5231.				
448	115	2530	48.90	135.00	.00	1.17	30.00	5571.	5679.	5575.	5280.	.03	.03	27.00
9.01	-.96	6.46	3.74	-5.43	30.13	20.66	5378.	5477.	5536.	5206.				
449	115	2530	48.90	135.00	.00	1.17	30.00	5571.	5679.	5575.	5280.	.03	.03	27.00
15.00	-2.37	7.87	4.88	-.73	30.04	25.28	5304.	5479.	5490.	5211.				
450	115	2530	48.90	135.00	.00	1.17	30.00	5571.	5679.	5575.	5280.	.06	.06	27.00
25.03	-2.24	7.74	3.26	-.88	28.27	23.61	5323.	5463.	5468.	5186.				
451	115	2530	48.90	135.00	.00	1.17	30.00	5571.	5679.	5575.	5280.	.05	.09	27.00
35.07	-1.86	7.36	2.62	1.27	25.86	23.67	5330.	5511.	5465.	5198.				
452	116	2530	47.42	160.00	.00	1.17	30.00	6494.	6851.	6609.	6340.	.03	.03	27.00
-.00	-2.45	7.95	5.14	-13.68	43.13	23.67	6494.	6851.	6609.	6340.				
453	116	2530	47.42	160.00	.00	1.17	30.00	6494.	6851.	6609.	6340.	.03	.02	27.00
5.99	-1.22	6.72	2.59	-16.90	42.97	20.32	6505.	6654.	6579.	6278.				

PAR WIG MODEL : FINAL DATA

POINT #	RUN #	CONF #	LCG	MODEL WT	TAIL ANGLE	ASPECT RATIO	FAN ANGLE	FAN RPM AT ZERO SPD FAN1	FAN2	FAN3	FAN4	RMS G'S CG	RMS G'S STN	FLAP ANGLE
454	116	2530	47.42	160.00	.00	1.17	30.00	6494.	6851.	6609.	6340.	.03	.03	27.00
455	116	2530	47.42	160.00	.00	1.17	30.00	6494.	6851.	6609.	6340.	.03	.04	27.00
456	116	2530	47.42	160.00	.00	1.17	30.00	6494.	6851.	6609.	6340.	.03	.04	27.00
457	116	2530	47.42	160.00	.00	1.17	30.00	6494.	6851.	6609.	6340.	.03	.04	27.00
458	117	2530	47.42	160.00	.00	1.17	30.00	5898.	6032.	5922.	5643.	.03	.03	27.00
459	117	2530	47.42	160.00	.00	1.17	30.00	5898.	6032.	5922.	5643.	.03	.03	27.00
460	117	2530	47.42	160.00	.00	1.17	30.00	5898.	6032.	5922.	5643.	.03	.04	27.00
461	117	2530	47.42	160.00	.00	1.17	30.00	5898.	6032.	5922.	5643.	.03	.04	27.00
462	117	2530	47.42	160.00	.00	1.17	30.00	5898.	6032.	5922.	5643.	.04	.07	27.00
463	117	2530	47.42	160.00	.00	1.17	30.00	5898.	6032.	5922.	5643.	.12	.09	27.00
464	118	2530	47.42	185.00	.00	1.17	30.00	6667.	6992.	6740.	6475.	.03	.03	27.00
465	118	2530	47.42	185.00	.00	1.17	30.00	6667.	6992.	6740.	6475.	.03	.03	27.00
466	118	2530	47.42	185.00	.00	1.17	30.00	6667.	6992.	6740.	6475.	.03	.04	27.00
467	118	2530	47.42	185.00	.00	1.17	30.00	6667.	6992.	6740.	6475.	.03	.04	27.00
468	118	2530	47.42	185.00	.00	1.17	30.00	6667.	6992.	6740.	6475.	.04	.04	27.00
469	118	2530	47.42	185.00	.00	1.17	30.00	6667.	6992.	6740.	6475.	.05	.05	27.00
470	119	2530	47.42	185.00	.00	1.17	30.00	6718.	7033.	6767.	6424.	.03	.04	27.00

POINT #	SPEED FPS	IMM IN	HEAVE IN	PITCH DEG	GAGE #	THRUST #	DRAG #	AVERAGE FAN RPM FAN1	FAN2	FAN3	FAN4	PFPE PSI	PAPE PSI	PFSE PSI	PASE PSI
454	9.02	-1.28	6.78	3.79	-12.83	43.09	24.49	6408.	6644.	6538.	6206.				
455	14.99	-3.23	8.73	5.51	-5.54	42.88	31.59	6289.	6632.	6510.	6192.				
456	25.01	-3.01	8.51	3.96	-6.56	40.91	28.87	6258.	6631.	6470.	6158.				
457	35.05	-2.73	8.23	3.46	-4.26	38.30	28.91	6255.	6651.	6478.	6151.				
458	-.00	-1.41	6.91	4.18	-8.05	34.10	21.49	5898.	6032.	5922.	5643.				
459	5.97	-.49	5.99	2.23	-10.31	34.03	19.16	5825.	5885.	5928.	5590.				
460	9.01	-.20	5.70	3.04	-6.89	34.18	22.71	5757.	5866.	5871.	5551.				
461	15.02	-2.15	7.65	4.71	-.58	34.05	28.90	5668.	5844.	5837.	5530.				
462	25.00	-2.06	7.56	3.08	-1.38	32.23	26.53	5654.	5845.	5824.	5518.				
463	35.04	-1.94	7.44	2.67	.91	29.76	26.68	5656.	5829.	5827.	5521.				
464	-.00	-1.81	7.31	4.67	-12.69	45.13	26.39	6667.	6992.	6740.	6475.				
465	5.99	-.42	5.92	1.89	-17.10	44.95	21.83	6633.	6808.	6714.	6421.				
466	9.06	-.34	5.84	3.30	-11.10	45.06	27.92	6545.	6654.	6686.	6333.				
467	14.99	-2.54	8.04	5.31	-2.50	44.83	36.33	6427.	6342.	6572.	6278.				
468	25.02	-2.36	7.86	3.60	-3.69	42.83	33.40	6394.	6257.	6558.	6239.				
469	35.04	-2.19	7.69	2.96	-1.92	40.19	32.89	6376.	6306.	6573.	6236.				
470	-.01	-1.88	7.38	4.53	-12.98	45.37	26.30	6718.	7033.	6767.	6424.				

PAR WIG MODEL : FINAL DATA

POINT # / SPEED FPS	RUN # / IMM IN	CONF # / HEAVE IN	LCG / PITCH DEG	MODEL WT / GAGE #	TAIL ANGLE / THRUST #	ASPECT RATIO / DRAG #	FAN ANGLE / AVERAGE FAN RPM FAN1	FAN RPM AT ZERO SPD FAN1 / FAN2	FAN2 / FAN3	FAN3 PFPE PSI / FAN4	FAN4 PAPE PSI	RMS G'S CG PFSE PSI	RMS G'S STN PASE PSI	FLAP ANGLE
471	119	2530	47.42	185.00	.00	1.17	30.00	6718.	7033.	6767.	6424.	.09	.19	27.00
44.55	-2.06	7.56	2.61	.34	37.32	32.66	6406.	6764.	6622.	6326.				
472	120	2530	47.42	185.00	.00	1.17	30.00	6319.	6488.	6286.	6022.	.03	.04	27.00
.01	-1.16	6.66	4.10	-9.31	39.20	24.64	6319.	6488.	6286.	6022.				
473	120	2530	47.42	185.00	.00	1.17	30.00	6319.	6488.	6286.	6022.	.03	.03	27.00
5.99	.09	5.41	1.62	-12.95	39.08	20.89	6217.	6314.	6273.	5974.				
474	120	2530	47.42	185.00	.00	1.17	30.00	6319.	6488.	6286.	6022.	.04	.04	27.00
9.01	.21	5.29	2.81	-8.01	39.21	25.95	6121.	6278.	6233.	5902.				
475	120	2530	47.42	185.00	.00	1.17	30.00	6319.	6488.	6286.	6022.	.04	.04	27.00
14.95	-1.84	7.34	4.73	-.52	39.04	33.29	6008.	6140.	6168.	5887.				
476	120	2530	47.42	185.00	.00	1.17	30.00	6319.	6488.	6286.	6022.	.04	.05	27.00
25.00	-1.87	7.37	3.07	-1.90	37.13	30.26	5994.	6030.	6152.	5871.				
477	120	2530	47.42	185.00	.00	1.17	30.00	6319.	6488.	6286.	6022.	.08	.06	27.00
35.03	-1.59	7.09	2.32	-.34	34.59	29.61	5992.	6065.	6175.	5878.				
478	121	2530	47.42	210.00	.00	1.17	30.00	6513.	6690.	6560.	6229.	.03	.04	27.00
.00	-.56	6.06	3.70	-9.79	42.11	26.68	6513.	6690.	6560.	6229.				
479	121	2530	47.42	210.00	.00	1.17	30.00	6513.	6690.	6560.	6229.	.03	.03	27.00
5.97	.68	4.82	1.11	-14.51	41.96	21.83	6435.	6512.	6504.	6209.				
480	121	2530	47.42	210.00	.00	1.17	30.00	6513.	6690.	6560.	6229.	.03	.05	27.00
9.03	.84	4.66	2.66	-7.55	42.08	28.90	6364.	6293.	6437.	6138.				
481	121	2530	47.42	210.00	.00	1.17	30.00	6513.	6690.	6560.	6229.	.04	.05	27.00
14.98	-1.52	7.02	4.94	.62	41.88	36.89	6194.	6485.	6364.	6085.				
482	121	2530	47.42	210.00	.00	1.17	30.00	6513.	6690.	6560.	6229.	.04	.05	27.00
25.00	-1.67	7.17	3.29	-.99	39.93	33.59	6188.	6394.	6328.	6077.				
483	121	2530	47.42	210.00	.00	1.17	30.00	6513.	6690.	6560.	6229.	.05	.06	27.00
35.03	-1.54	7.04	2.51	.21	37.34	32.54	6195.	6402.	6288.	6069.				
503	127	2520	47.42	135.00	.00	1.17	25.00	5072.	5140.	5073.	4750.	.04	.04	40.00
-.00	.04	5.46	1.48	-3.66	24.34	18.39	5072.	5140.	5073.	4750.				
504	127	2520	47.42	135.00	.00	1.17	25.00	5072.	5140.	5073.	4750.	.03	.03	40.00
6.01	-.03	5.53	-.04	-3.41	24.36	18.66	5016.	5143.	5097.	4746.				
505	127	2520	47.42	135.00	.00	1.17	25.00	5072.	5140.	5073.	4750.	.03	.03	40.00
9.04	-.33	5.83	1.56	.63	24.56	22.88	4960.	5124.	5071.	4721.				
506	127	2520	47.42	135.00	.00	1.17	25.00	5072.	5140.	5073.	4750.	.03	.04	40.00
15.05	-1.55	7.05	2.63	3.90	24.51	26.11	4897.	5114.	5033.	4720.				

** PAR WIG MODEL : FINAL DATA **

POINT #	RUN #	CONF #	LCG	MODEL WT	TAIL ANGLE	ASPECT RATIO	FAN ANGLE	FAN RPM AT ZERO SPD FAN1	FAN2	FAN3	FAN4	RMS G'S CG	RMS G'S STN	FLAP ANGLE
SPEED FPS	IMM IN	HEAVE IN	PITCH DEG	GAGE #	THRUST #	DRAG #	AVERAGE FAN RPM FAN1	FAN2	FAN3	FAN4	PFPE PSI	PAPE PSI	PFSE PSI	PASE PSI
507	127	2520	47.42	135.00	.00	1.17	25.00	5072.	5140.	5073.	4750.	.04	.05	40.00
25.11	-1.27	6.77	1.40	4.23	22.82	24.91	4870.	5053.	4977.	4705.				
508	127	2520	47.42	135.00	.00	1.17	25.00	5072.	5140.	5073.	4750.	.10	.09	40.00
35.20	-.83	6.33	.57	4.55	20.48	23.10	4887.	5048.	4975.	4712.				
509	128	2520	47.42	135.00	.00	1.17	25.00	5760.	5854.	5732.	5441.	.03	.04	40.00
-.00	-1.73	7.23	2.12	-5.39	31.97	23.58	5760.	5854.	5732.	5441.				
510	128	2520	47.42	135.00	.00	1.17	25.00	5760.	5854.	5732.	5441.	.03	.03	40.00
6.00	-.80	6.30	.01	-7.70	31.92	21.23	5681.	5798.	5717.	5414.				
511	128	2520	47.42	135.00	.00	1.17	25.00	5760.	5854.	5732.	5441.	.03	.04	40.00
9.03	-1.37	6.87	2.04	-2.47	32.08	26.61	5544.	5709.	5720.	5365.				
512	128	2520	47.42	135.00	.00	1.17	25.00	5760.	5854.	5732.	5441.	.04	.04	40.00
15.04	-2.76	8.26	3.49	2.40	31.97	31.37	5471.	5648.	5639.	5373.				
513	128	2520	47.42	135.00	.00	1.17	25.00	5760.	5854.	5732.	5441.	.07	.08	40.00
25.10	-2.33	7.83	2.30	2.06	30.16	29.39	5462.	5659.	5613.	5333.				
514	128	2520	47.42	135.00	.00	1.17	25.00	5760.	5854.	5732.	5441.	.12	.10	40.00
35.16	-1.84	7.34	1.33	1.56	27.71	26.67	5486.	5703.	5602.	5333.				
515	129	2520	50.08	135.00	.00	1.17	25.00	5130.	5234.	5153.	4852.	.03	.04	40.00
.00	-.17	5.67	2.17	-3.34	25.21	19.51	5130.	5234.	5153.	4852.				
516	129	2520	50.08	135.00	.00	1.17	25.00	5130.	5234.	5153.	4852.	.03	.03	40.00
6.00	-.30	5.80	.91	-2.49	25.22	20.37	5085.	5204.	5170.	4822.				
517	129	2520	50.08	135.00	.00	1.17	25.00	5130.	5234.	5153.	4852.	.03	.03	40.00
9.05	-.50	6.00	2.09	1.14	25.42	24.18	5035.	5192.	5161.	4794.				
518	129	2520	50.08	135.00	.00	1.17	25.00	5130.	5234.	5153.	4852.	.03	.04	40.00
15.04	-1.75	7.25	3.11	4.80	25.36	27.79	4948.	5111.	5108.	4802.				
519	129	2520	50.08	135.00	.00	1.17	25.00	5130.	5234.	5153.	4852.	.04	.05	40.00
25.09	-1.47	6.97	1.79	5.16	23.66	26.60	4942.	5124.	5067.	4780.				
520	129	2520	50.08	135.00	.00	1.17	25.00	5130.	5234.	5153.	4852.	.15	.13	40.00
35.16	-.97	6.47	.76	4.83	21.31	24.14	4960.	5118.	5047.	4783.				
521	130	2520	50.82	135.00	.00	1.17	25.00	5163.	5224.	5190.	4998.	.04	.04	40.00
-.00	-.31	5.81	2.27	-3.26	25.76	20.09	5163.	5224.	5190.	4998.				
522	130	2520	50.82	135.00	.00	1.17	25.00	5163.	5224.	5190.	4998.	.03	.03	40.00
6.00	-.54	6.04	1.15	-1.64	25.76	21.70	5097.	5223.	5231.	4830.				
523	130	2520	50.82	135.00	.00	1.17	25.00	5163.	5224.	5190.	4998.	.04	.04	40.00
9.03	-.70	6.20	2.25	1.69	25.96	25.21	5010.	5243.	5167.	4809.				

** PAR WIG MODEL : FINAL DATA **

POINT # / SPEED FPS	RUN # / IMM IN	CONF # / HEAVE IN	LCG / PITCH DEG	MODEL WT / GAGE #	TAIL ANGLE / THRUST #	ASPECT RATIO / DRAG #	FAN ANGLE / AVERAGE FAN RPM FAN1	FAN RPM AT ZERO SPD FAN1 / AVERAGE FAN RPM FAN2	FAN RPM AT ZERO SPD FAN2 / AVERAGE FAN RPM FAN3	FAN RPM AT ZERO SPD FAN3 PFPE PSI / AVERAGE FAN RPM FAN4	FAN RPM AT ZERO SPD FAN4 PAPE PSI	RMS G'S CG PFSE PSI	RMS G'S STN PASE PSI	FLAP ANGLE
524	130	2520	50.82	135.00	.00	1.17	25.00	5163.	5224.	5190.	4998.	.03	.04	40.00
15.03	-1.86	7.36	3.26	5.10	25.90	28.57	4948.	5142.	5129.	4827.				
525	130	2520	50.82	135.00	.00	1.17	25.00	5163.	5224.	5190.	4998.	.05	.06	40.00
25.08	-1.58	7.08	1.77	5.29	24.19	27.21	4963.	5158.	5084.	4800.				
526	130	2520	50.82	135.00	.00	1.17	25.00	5163.	5224.	5190.	4998.	.14	.10	40.00
35.16	-1.21	6.71	.96	4.92	21.83	24.70	4978.	5144.	5078.	4805.				
527	131	2520	51.56	135.00	.00	1.17	25.00	5175.	5251.	5176.	4919.	.04	.04	40.00
-.00	-.24	5.74	2.52	-3.12	25.62	20.09	5175.	5251.	5176.	4919.				
528	131	2520	51.56	135.00	.00	1.17	25.00	5175.	5251.	5176.	4919.	.03	.02	40.00
6.01	-.28	5.78	1.14	-2.91	25.62	20.31	5104.	5235.	5201.	4837.				
529	131	2520	51.56	135.00	.00	1.17	25.00	5175.	5251.	5176.	4919.	.03	.03	40.00
9.04	-.47	5.97	2.22	.62	25.82	24.02	5035.	5207.	5203.	4813.				
530	131	2520	51.56	135.00	.00	1.17	25.00	5175.	5251.	5176.	4919.	.03	.03	40.00
15.03	-1.86	7.36	3.38	4.79	25.76	28.14	4957.	5151.	5106.	4831.				
531	131	2520	51.56	135.00	.00	1.17	25.00	5175.	5251.	5176.	4919.	.07	.07	40.00
25.08	-1.46	6.96	1.76	4.62	24.05	26.41	4959.	5153.	5084.	4802.				
532	131	2520	51.56	135.00	.00	1.17	25.00	5175.	5251.	5176.	4919.	.17	.15	40.00
35.15	-1.26	6.76	.97	5.44	21.70	25.10	4980.	5140.	5076.	4806.				
533	132	2520	48.60	135.00	.00	1.17	25.00	5203.	5298.	5220.	4973.	.03	.04	40.00
.00	-.46	5.96	1.99	-3.21	26.08	20.42	5203.	5298.	5220.	4973.				
534	132	2520	48.60	135.00	.00	1.17	25.00	5203.	5298.	5220.	4973.	.03	.03	40.00
6.01	-.38	5.88	.51	-3.38	26.08	20.25	5165.	5315.	5254.	4897.				
535	132	2520	48.60	135.00	.00	1.17	25.00	5203.	5298.	5220.	4973.	.04	.04	40.00
9.04	-.67	6.17	2.00	.68	26.27	24.49	5087.	5265.	5231.	4861.				
536	132	2520	48.60	135.00	.00	1.17	25.00	5203.	5298.	5220.	4973.	.04	.04	40.00
15.03	-1.91	7.41	3.11	4.06	26.21	27.81	5001.	5167.	5184.	4876.				
537	132	2520	48.60	135.00	.00	1.17	25.00	5203.	5298.	5220.	4973.	.06	.07	40.00
25.08	-1.58	7.08	1.72	4.42	24.49	26.62	5001.	5193.	5140.	4857.				
538	132	2520	48.60	135.00	.00	1.17	25.00	5203.	5298.	5220.	4973.	.15	.13	40.00
35.14	-1.11	6.61	.59	4.17	22.14	24.23	5021.	5190.	5132.	4858.				
539	133	2520	46.38	135.00	.00	1.17	25.00	5287.	5353.	5297.	4984.	.03	.04	40.00
.00	-.70	6.20	.85	-4.78	26.69	19.40	5287.	5353.	5297.	4984.				
540	133	2520	46.38	135.00	.00	1.17	25.00	5287.	5353.	5297.	4984.	.03	.03	40.00
6.00	-.13	5.63	-.73	-5.51	26.68	18.67	5213.	5337.	5271.	4951.				

POINT #	RUN #	CONF #	LCG	MODEL WT	TAIL ANGLE	ASPECT RATIO	FAN ANGLE	FAN RPM AT ZERO SPD FAN1	FAN2	FAN3	FAN4	RMS G'S CG	RMS G'S STN	FLAP ANGLE
SPEED FPS	IMM IN	HEAVE IN	PITCH DEG	GAGE #	THRUST #	DRAG #	AVERAGE FAN RPM FAN1	FAN2	FAN3	FAN4	PFPE PSI	PAPE PSI	PFSE PSI	PASE PSI
541	133	2520	46.38	135.00	.00	1.17	25.00	5287.	5353.	5297.	4984.	.03	.04	40.00
9.04	-.59	6.09	1.42	-.78	26.87	23.57	5142.	5330.	5291.	4913.				
542	133	2520	46.38	135.00	.00	1.17	25.00	5287.	5353.	5297.	4984.	.03	.04	40.00
15.03	-1.92	7.42	2.76	3.22	26.81	27.52	5049.	5248.	5212.	4920.				
543	133	2520	46.38	135.00	.00	1.17	25.00	5287.	5353.	5297.	4984.	.05	.06	40.00
25.08	-1.61	7.11	1.44	3.29	25.08	26.03	5045.	5247.	5194.	4900.				
544	133	2520	46.38	135.00	.00	1.17	25.00	5287.	5353.	5297.	4984.	.07	.10	40.00
35.12	-1.22	6.72	.95	4.16	22.72	24.75	5063.	5242.	5188.	4903.				
545	134	2520	45.20	135.00	.00	1.17	25.00	5067.	5164.	5203.	4864.	.03	.04	40.00
-.00	-.32	5.82	-1.28	-7.31	25.02	15.36	5067.	5164.	5203.	4864.				
546	134	2520	45.20	135.00	.00	1.17	25.00	5067.	5164.	5203.	4864.	.03	.03	40.00
5.99	.26	5.24	-1.75	-6.61	25.03	16.07	5055.	5150.	5130.	4791.				
547	134	2520	45.20	135.00	.00	1.17	25.00	5067.	5164.	5203.	4864.	.03	.04	40.00
9.03	-.28	5.78	.57	-1.06	25.23	21.80	5000.	5175.	5126.	4761.				
548	134	2520	45.20	135.00	.00	1.17	25.00	5067.	5164.	5203.	4864.	.03	.04	40.00
15.01	-1.51	7.01	2.10	2.67	25.18	25.49	4912.	5117.	5053.	4761.				
549	134	2520	45.20	135.00	.00	1.17	25.00	5067.	5164.	5203.	4864.	.04	.05	40.00
25.06	-1.28	6.78	1.10	2.17	23.48	23.45	4914.	5085.	5031.	4744.				
550	134	2520	45.20	135.00	.00	1.17	25.00	5067.	5164.	5203.	4864.	.08	.10	40.00
35.11	-.80	6.30	.32	3.07	21.14	22.24	4923.	5089.	5024.	4752.				
562	143	2520	47.42	135.00	.00	1.17	30.00	5624.	5735.	5653.	5461.	.03	.03	40.00
.00	-2.32	7.82	4.37	-2.24	31.05	24.65	5624.	5735.	5653.	5461.				
563	143	2520	47.42	135.00	.00	1.17	30.00	5624.	5735.	5653.	5461.	.03	.02	40.00
5.97	-1.93	7.43	3.05	-2.55	31.00	24.30	5591.	5751.	5749.	5326.				
564	143	2520	47.42	135.00	.00	1.17	30.00	5624.	5735.	5653.	5461.	.03	.03	40.00
8.99	-1.94	7.44	3.48	-.78	31.17	26.22	5504.	5677.	5721.	5292.				
565	143	2520	47.42	135.00	.00	1.17	30.00	5624.	5735.	5653.	5461.	.03	.03	40.00
14.97	-3.31	8.81	4.86	4.82	31.08	31.73	5411.	5628.	5577.	5314.				
566	143	2520	47.42	135.00	.00	1.17	30.00	5624.	5735.	5653.	5461.	.04	.04	40.00
24.99	-3.15	8.65	3.37	5.59	29.30	30.96	5423.	5634.	5588.	5281.				
567	143	2520	47.42	135.00	.00	1.17	30.00	5624.	5735.	5653.	5461.	.09	.06	40.00
35.02	-2.87	8.37	2.58	7.79	26.87	31.07	5445.	5672.	5590.	5299.				
577	147	1520	47.42	132.00	.00	1.17	25.00	5331.	5375.	5299.	5003.	.03	.04	40.00
.00	-.66	6.66	2.41	-3.73	26.92	20.67	5331.	5375.	5299.	5003.	.12	.11	.24	.24

** PAR WIG MODEL : FINAL DATA **

POINT #	RUN #	CONF #	LCG	MODEL WT	TAIL ANGLE	ASPECT RATIO	FAN ANGLE	FAN RPM AT ZERO SPD FAN1	FAN2	FAN3	FAN4	RMS G'S CG	RMS G'S STN	FLAP ANGLE
SPEED FPS	IMM IN	HEAVE IN	PITCH DEG	GAGE #	THRUST #	DRAG #	AVERAGE FAN RPM FAN1	FAN2	FAN3	FAN4	PFPE PSI	PAPE PSI	PFSE PSI	PASE PSI
578	147	1520	47.42	132.00	.00	1.17	25.00	5331.	5375.	5299.	5003.	.03	.03	40.00
6.00	-.07	6.07	.61	-4.67	26.91	19.72	5233.	5365.	5326.	4977.	.11	.11	.24	.24
579	147	1520	47.42	132.00	.00	1.17	25.00	5331.	5375.	5299.	5003.	.03	.03	40.00
9.04	-.49	6.49	2.38	-.45	27.10	24.11	5167.	5355.	5316.	4939.	.11	.10	.24	.24
580	147	1520	47.42	132.00	.00	1.17	25.00	5331.	5375.	5299.	5003.	.03	.04	40.00
15.04	-1.70	7.70	3.33	2.85	27.03	27.35	5113.	5300.	5259.	4941.	.11	.10	.24	.24
581	147	1520	47.42	132.00	.00	1.17	25.00	5331.	5375.	5299.	5003.	.04	.04	40.00
25.10	-1.36	7.36	1.91	3.42	25.30	26.35	5079.	5277.	5222.	4921.	.11	.10	.24	.24
582	147	1520	47.42	132.00	.00	1.17	25.00	5331.	5375.	5299.	5003.	.07	.07	40.00
35.17	-.93	6.93	1.37	4.77	22.93	25.54	5086.	5272.	5212.	4923.	.11	.10	.24	.24
583	148	1520	47.42	132.00	.00	1.17	25.00	5306.	5371.	5325.	4995.	.03	.03	40.00
.01	-.55	6.55	2.35	-3.73	26.90	20.65	5306.	5371.	5325.	4995.	.11	.10	.23	.23
584	148	1520	47.42	132.00	.00	1.17	25.00	5306.	5371.	5325.	4995.	.03	.02	40.00
6.00	.08	5.92	.36	-5.03	26.89	19.34	5231.	5366.	5333.	4966.	.10	.09	.22	.22
585	148	1520	47.42	132.00	.00	1.17	25.00	5306.	5371.	5325.	4995.	.03	.03	40.00
9.04	-.32	6.32	2.21	-.66	27.08	23.88	5164.	5363.	5300.	4936.	.10	.09	.21	.21
586	148	1520	47.42	132.00	.00	1.17	25.00	5306.	5371.	5325.	4995.	.03	.04	40.00
15.04	-1.52	7.52	3.07	2.31	27.01	26.78	5112.	5280.	5282.	4947.	.10	.09	.21	.21
587	148	1520	47.42	132.00	.00	1.17	25.00	5306.	5371.	5325.	4995.	.03	.05	40.00
25.09	-1.19	7.19	1.70	2.00	25.28	24.91	5082.	5279.	5227.	4917.	.10	.09	.21	.21
588	148	1520	47.42	132.00	.00	1.17	25.00	5306.	5371.	5325.	4995.	.11	.10	40.00
35.16	-.77	6.77	1.06	3.96	22.90	24.72	5091.	5270.	5208.	4923.	.10	.09	.22	.22
589	149	1520	47.42	132.00	.00	1.17	25.00	5336.	5401.	5320.	5015.	.03	.03	40.00
.00	-.81	6.81	2.48	-3.39	27.10	21.18	5336.	5401.	5320.	5015.	.13	.12	.31	.31
590	149	1520	47.42	132.00	.00	1.17	25.00	5336.	5401.	5320.	5015.	.03	.03	40.00
6.00	-.03	6.03	.49	-5.29	27.09	19.26	5252.	5393.	5348.	4988.	.13	.12	.30	.30
591	149	1520	47.42	132.00	.00	1.17	25.00	5336.	5401.	5320.	5015.	.03	.03	40.00
9.03	-.41	6.41	2.26	-1.10	27.28	23.62	5183.	5388.	5343.	4953.	.13	.12	.30	.30
592	149	1520	47.42	132.00	.00	1.17	25.00	5336.	5401.	5320.	5015.	.04	.04	40.00
15.03	-1.68	7.68	3.26	2.43	27.21	27.09	5111.	5298.	5299.	4961.	.13	.12	.31	.31
593	149	1520	47.42	132.00	.00	1.17	25.00	5336.	5401.	5320.	5015.	.06	.07	40.00
25.07	-1.32	7.32	1.81	2.24	25.48	25.34	5094.	5299.	5256.	4936.	.13	.12	.31	.31
594	149	1520	47.42	132.00	.00	1.17	25.00	5336.	5401.	5320.	5015.	.07	.09	40.00
35.14	-.87	6.87	1.28	4.05	23.10	24.99	5107.	5293.	5241.	4942.	.13	.12	.31	.31

PAR WIG MODEL : FINAL DATA

POINT # / SPEED FPS	RUN # / IMM IN	CONF # / HEAVE IN	LCG / PITCH DEG	MODEL WT / GAGE #	TAIL ANGLE / THRUST #	ASPECT RATIO / DRAG #	FAN ANGLE / AVERAGE FAN RPM FAN1	FAN RPM AT ZERO SPD FAN1 / FAN2	FAN2 / FAN3	FAN3 / FAN4	FAN4 / PFPE PSI	RMS G'S CG / PAPE PSI	RMS G'S STN / PFSE PSI	FLAP ANGLE / PASE PSI
599	154	1520	47.42	137.00	.00	1.17	25.00	5188.	5241.	5189.	4882.	.04	.05	40.00
.00	-.32	6.32	2.51	-3.11	25.56	20.05	5188.	5241.	5189.	4882.	.39	.00	.64	.00
600	154	1520	47.42	137.00	.00	1.17	25.00	5188.	5241.	5189.	4882.	.03	.03	40.00
5.97	-.30	6.30	1.34	-2.07	25.56	21.09	5114.	5261.	5206.	4851.	.37	.00	.63	.00
601	154	1520	47.42	137.00	.00	1.17	25.00	5188.	5241.	5189.	4882.	.03	.04	40.00
8.99	-.54	6.54	2.58	1.51	25.75	24.85	5042.	5251.	5182.	4820.	.38	.00	.68	.00
602	154	1520	47.42	137.00	.00	1.17	25.00	5188.	5241.	5189.	4882.	.03	.04	40.00
14.95	-1.66	7.66	3.61	4.33	25.71	27.63	4981.	5172.	5122.	4826.	.35	-.00	.63	.00
603	154	1520	47.42	137.00	.00	1.17	25.00	5188.	5241.	5189.	4882.	.04	.05	40.00
24.96	-1.50	7.50	2.19	4.98	24.02	26.75	4968.	5161.	5090.	4813.	.31	-.00	.56	.00
604	154	1520	47.42	137.00	.00	1.17	25.00	5188.	5241.	5189.	4882.	.10	.08	40.00
34.97	-1.00	7.00	1.55	6.69	21.69	26.35	4984.	5156.	5083.	4819.	.33	-.00	.60	-.00
605	155	1520	47.42	137.00	.00	1.17	25.00	5185.	5220.	5163.	4888.	.04	.04	40.00
-.00	-.18	6.18	2.50	-3.27	25.44	19.79	5185.	5220.	5163.	4888.	.26	.00	.43	.00
606	155	1520	47.42	137.00	.00	1.17	25.00	5185.	5220.	5163.	4888.	.03	.03	40.00
5.98	-.10	6.10	1.02	-2.86	25.45	20.20	5134.	5261.	5254.	4878.	.26	.00	.46	.00
607	155	1520	47.42	137.00	.00	1.17	25.00	5185.	5220.	5163.	4888.	.03	.04	40.00
8.99	-.34	6.34	2.40	.72	25.64	23.96	5065.	5276.	5205.	4841.	.25	.00	.43	.00
608	155	1520	47.42	137.00	.00	1.17	25.00	5185.	5220.	5163.	4888.	.04	.04	40.00
14.96	-1.67	7.67	3.57	4.60	25.60	27.80	5002.	5169.	5150.	4849.	.23	-.00	.41	-.00
609	155	1520	47.42	137.00	.00	1.17	25.00	5185.	5220.	5163.	4888.	.05	.07	40.00
24.97	-1.41	7.41	2.06	4.56	23.91	26.23	4971.	5173.	5117.	4829.	.24	-.00	.42	-.00
610	155	1520	47.42	137.00	.00	1.17	25.00	5185.	5220.	5163.	4888.	.11	.12	40.00
34.98	-.84	6.84	1.28	5.78	21.58	25.34	4992.	5167.	5107.	4832.	.23	-.00	.41	-.00
611	156	1520	47.42	137.00	.00	1.17	25.00	5209.	5267.	5217.	4909.	.04	.04	40.00
-.00	-.21	6.21	2.29	-3.72	25.83	19.69	5209.	5267.	5217.	4909.	.19	-.00	.31	-.00
612	156	1520	47.42	137.00	.00	1.17	25.00	5209.	5267.	5217.	4909.	.03	.03	40.00
5.98	.06	5.94	.45	-3.77	25.83	19.64	5138.	5266.	5232.	4882.	.18	.00	.29	-.00
613	156	1520	47.42	137.00	.00	1.17	25.00	5209.	5267.	5217.	4909.	.03	.03	40.00
8.99	-.20	6.20	2.15	.15	26.02	23.74	5079.	5248.	5196.	4851.	.17	.00	.29	-.00
614	156	1520	47.42	137.00	.00	1.17	25.00	5209.	5267.	5217.	4909.	.04	.04	40.00
14.96	-1.48	7.48	3.13	3.40	25.97	26.94	5000.	5154.	5174.	4849.	.17	-.00	.29	-.00
615	156	1520	47.42	137.00	.00	1.17	25.00	5209.	5267.	5217.	4909.	.05	.06	40.00
24.97	-1.28	7.28	1.81	3.52	24.28	25.52	4974.	5177.	5125.	4834.	.17	-.00	.29	-.00

*** PAR WIG MODEL : FINAL DATA ***

POINT #	RUN #	CONF #	LCG	MODEL WT	TAIL ANGLE	ASPECT RATIO	FAN ANGLE	FAN RPM AT ZERO SPD FAN1	FAN2	FAN3	FAN4	RMS G'S CG	RMS G'S STN	FLAP ANGLE
SPEED FPS	IMM IN	HEAVE IN	PITCH DEG	GAGE #	THRUST #	DRAG #	AVERAGE FAN RPM FAN1	FAN2	FAN3	FAN4	PFPE PSI	PAPE PSI	PFSE PSI	PASE PSI
616	156	1520	47.42	137.00	.00	1.17	25.00	5209.	5267.	5217.	4909.	.10	.17	40.00
34.98	-.81	6.81	.83	5.00	21.94	24.88	4987.	5170.	5110.	4834.	.17	-.00	.29	-.00
628	164	1520	47.42	137.00	.00	1.17	25.00	5417.	5542.	5440.	5138.	.04	.04	40.00
.00	-.83	6.83	.75	-3.25	28.38	22.48	5417.	5542.	5440.	5138.	.22	-.00	.57	.00
629	164	1520	47.42	137.00	.00	1.17	25.00	5417.	5542.	5440.	5138.	.03	.03	40.00
6.02	-.07	6.07	-1.09	-5.18	28.36	20.53	5350.	5488.	5450.	5097.	.19	.00	.50	.00
630	164	1520	47.42	137.00	.00	1.17	25.00	5417.	5542.	5440.	5138.	.03	.03	40.00
8.99	-.49	6.49	1.00	-.60	28.54	25.27	5270.	5455.	5424.	5055.	.21	.00	.55	.00
631	164	1520	47.42	137.00	.00	1.17	25.00	5417.	5542.	5440.	5138.	.03	.04	40.00
14.95	-1.80	7.80	2.26	3.13	28.47	28.93	5176.	5352.	5394.	5064.	.21	-.00	.56	.00
632	164	1520	47.42	137.00	.00	1.17	25.00	5417.	5542.	5440.	5138.	.05	.06	40.00
24.96	-1.49	7.49	.91	3.07	26.74	27.31	5184.	5391.	5349.	5032.	.18	-.00	.49	.00
633	164	1520	47.42	137.00	.00	1.17	25.00	5417.	5542.	5440.	5138.	.07	.09	40.00
34.96	-.98	6.98	.26	5.44	24.37	27.52	5187.	5397.	5333.	5034.	.19	-.00	.49	-.00