WIND-TUNNEL STUDY OF FLOW THROUGH STS SHUTTLE LAUNCH SITE EXHAUST VENTS, VANDENBERG AIR FORCE BASE

by

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LIST OF SYMBOLS

Symbol	Definition
U	Local mean velocity
D	Characteristic dimension (building height, width, etc.)
ν, ρ	Kinematic viscosity and density of approach flow
$\frac{UD}{\nu}$	Reynolds number
E	Mean voltage
A, B, n	Constants
U_{rms}	Root-mean-square of fluctuating velocity
E_{rms}	Root-mean-square of fluctuating voltage
U_∞	Reference mean velocity outside the boundary layer
Z	Height above surface
δ	Height of boundary layer
T_u	Turbulence intensity $\frac{U_{rms}}{U_\infty}$ or $\frac{U_{rms}}{U}$
$C_{p_{mean}}$	Mean pressure coefficient, $\frac{(p-p_\infty)_{mean}}{0.5\ \rho\ U_\infty^2}$
$C_{p_{rms}}$	Root-mean-square pressure coefficient, $\frac{\left((p-p_\infty)-(p-p_\infty)_{mean}\right)_{rms}}{0.5\ \rho\ U_\infty^2}$
$C_{p_{max}}$	Peak maximum pressure coefficient, $\frac{(p-p_\infty)_{max}}{0.5\ \rho\ U_\infty^2}$
$C_{p_{min}}$	Peak minimum pressure coefficient, $\frac{(p-p_\infty)_{min}}{0.5\ \rho\ U_\infty^2}$
$(\ )_{min}$	Minimum value during data record
$(\ )_{max}$	Maximum value during data record
p	Fluctuating pressure at a pressure tap on the structure
p_∞	Static pressure in the wind tunnel above the model

1. INTRODUCTION

1.1 General

Two previous wind-tunnel studies (1,2) investigated the wind loads on the Mobile Service Tower (MST) and Shuttle Assembly Building (SAB) at the Vandenberg Air Force Base shuttle launch site. The first study (1) showed that the MST and Payload Changeout Room (PCR) alone would not provide adequate protection from the wind of shuttle launch vehicle components during assembly. The SAB, studied in reference (2), provided protection from the wind by sealing the above-ground openings in the MST. However, large openings into the shuttle assembly area remained by means of three rocket engine exhaust ducts. This investigation provides data to assess the need for closures for the ducts and to determine wind loads required for the closures, if needed.

Techniques have been developed for wind-tunnel modeling of structures which allow the prediction of wind pressures on cladding and windows, overall structural loading, and also wind velocities and gusts in areas of concern. Accurate knowledge of the intensity and distribution of the pressures on the structure permits adequate but economical selection of structural elements such as exhaust vent closures.

Modeling of the aerodynamic loading on a structure requires special consideration of flow conditions in order to guarantee similitude between model and prototype. A detailed discussion of the similarity requirements and their wind-tunnel implementation can be found in references (3), (4), and (5). In general, the requirements are that the model and prototype be geometrically similar, that the approach mean velocity at the building site have a vertical profile shape similar to the full-scale flow, that the turbulence characteristics of the flows be similar, and that the Reynolds number for the model and prototype be equal.

These criteria are satisfied by constructing a scale model of the structure and its surroundings and performing the wind tests in a wind tunnel specifically designed to model atmospheric boundary-layer flows. Reynolds number similarity requires that the quantity UD/ν be similar for model and prototype. Since ν , the kinematic viscosity of air, is identical for both, Reynolds numbers cannot be made precisely equal with reasonable wind velocities. To accomplish this the air velocity in the wind tunnel would have to be as large as the model scale factor times the prototype wind velocity, a velocity which would introduce unacceptable compressibility effects. However, for sufficiently high Reynolds numbers ($>2\times10^4$) the pressure coefficient at any location on the structure will be essentially constant for a large range of Reynolds numbers. Typical values encountered are 10^7-10^8 for the full-scale and 10^5-10^6 for the wind-tunnel model. In this range acceptable flow similarity is achieved without precise Reynolds number equality.

1.2 The Wind-Tunnel Test

The wind-tunnel study was performed on a model of the shuttle launch site at a scale of 1:100. Models of the MST and SAB used in earlier studies were placed on a base which included accurate models of the three exhaust ducts. The model was subjected to a simulated atmospheric wind flow in a boundary-layer wind tunnel. The model was rotated to 16 approach wind directions to observe the influence of wind direction. Velocities were measured in the exhaust ducts for open ducts and for ducts which were almost closed. In addition, pressure measurements were obtained on both sides of duct closures to provide information for design of the duct closures. Table 1 lists the configurations and data acquisition program.

The following pages discuss in greater detail the procedures followed and the equipment and data collecting and processing methods used. In addition, the data presentation format is explained and the implications of the data are discussed.

2. EXPERIMENTAL CONFIGURATION

2.1 Wind Tunnel

Wind engineering studies are performed in the Fluid Dynamics and Diffusion Laboratory at Colorado State University (Figure 1). Three large wind tunnels are available for wind loading studies depending on the detailed requirements of the study. The Environmental Wind Tunnel used for this investigation is shown in Figure 2. The wind tunnel has a flexible roof adjustable in height to maintain a zero pressure gradient along the test section. The mean velocity can be adjusted continuously to the maximum velocity available.

2.2 Model

In order to obtain an accurate assessment of local velocities and pressures, models are constructed to the largest scale that does not produce significant blockage in the wind-tunnel test section. The building models were constructed of thin Lucite plastic and fastened together with glue and metal screws. The ducts were constructed from wood with duct closures made from Lucite. Piezometer taps (1/16 in. diameter) were drilled normal to the exterior surfaces of the duct closures. Photographs of the model installed in the wind tunnel are shown in Figure 3.

A site plan showing duct entrances and exits and their position in relation to the MST and SAB is shown in Figure 4. Six door locations are identified in the figure. Doors 1, 2 and 3 were horizontal and were located at ground level. Door 1 was about 35 ft square; doors 2 and 3 were about 25 x 50 ft. Door 4 was always open. Doors 5 and 6 were vertical, about 50 ft square, and were located in the plane of the duct exit. All doors were fabricated with approximately a 6-in. gap (0.06

in model) all around the door. The actual gap spacing was set by requiring a gap area of 2.5 percent of the total door area. Data were obtained with the gap open (partially closed (PC) door) and with the gap sealed (closed (C) door).

The seal between the MST and SAB was simulated, at the sponsor's request, as a slightly porous seal. The full-scale gap between buildings of 18 in. was to be closed to a 1 1/2-in. opening by a seal. This 1 1/2-in. gap in the full scale was approximated in the model by a 1/8-in. square gap located at 1 in. spacing along the seal. This gave a total opening area between buildings in the model which was equivalent, at model scale, to the 1 1/2-in. gap in the full scale.

Pressure tap locations on the duct doors were located as shown in Figure 5. Door locations are shown in Figure 4. Pressure tap locations on the doors are shown to scale. Pressure tap numbers are shown on Figure 5.

A model of the shuttle and tanks assembly was obtained from NASA and installed on a model of the launch mount (LM) in the MST and SAB interior.

The terrain features surrounding the model were not modeled for lack of time and dollar resources. A model of the terrain was not considered to be a major influence on determination of the need for duct closures or determination of closure design loads. An open-country environment was assumed to be a reasonably conservative estimate for establishing approach wind characteristics. The floor of the wind tunnel upwind of the model turntable was covered with a randomized roughness selected to provide an open-country environment. Spires and a two-dimensional barrier were installed at the test section entrance to provide a thicker boundary layer than would otherwise be available. The thicker boundary layer permitted a larger scale model than would otherwise be possible and resulted in an improved simulation of internal flows.

3. INSTRUMENTATION AND DATA ACQUISITION

3.1 Flow Visualization

Making the air flow visible in the vicinity of the model is helpful in understanding and interpreting mean and fluctuating pressures and in determining how wind flow through the duct system might interact with the air mass inside the MST/SAB enclosure. Titanium tetrachloride smoke was released from sources on and near the model to make the flow lines visible to the eye and to make it possible to obtain photographic records of the tests. Conclusions obtained from these smoke studies are discussed in Section 4.1.

3.2 Pressures

Mean and fluctuating pressures were measured at each of the pressure taps on the model structure. Data were obtained for 16 wind directions at 22.5-degree azimuthal increments, rotating the entire model assembly in a complete circle. Pieces of 1/16-in. I.D. plastic tubing were used to connect the pressure ports to an 80-tap pressure switch mounted underneath the model. The switch was designed and fabricated in the Fluid Dynamics and Diffusion Laboratory to minimize the attenuation of pressure fluctuations across the switch. Each of the measurement ports was directed in turn by the switch to one of four pressure transducers mounted close to the switch. Four pressure input taps not used for transmitting building surface pressures were connected to a common tube leading outside the wind tunnel. This arrangement provided both a means of performing in-place calibration of the transducers and, by connecting this tube to a pitot tube mounted inside the wind tunnel, a means of automatically monitoring the tunnel speed. A computer-controlled stepping motor stepped the switch into each switch position. The computer kept track of switch position but a digital readout of position was provided at the wind tunnel.

The pressure transducers used were setra differential transducers (Model 237) with a 0.10 psid range. Reference pressures were obtained by connecting the reference sides of the four transducers, using plastic tubing, to the static side of a pitot-static tube mounted in the wind tunnel free stream above the model building. In this way the transducer measured the instantaneous difference between the local pressures on the surface of the building and the static pressure in the free stream above the model.

Output from the pressure transducers was fed to an on-line data acquisition system consisting of a Hewlett-Packard 21 MX computer, disk unit, card reader, printer, Digi-Data digital tape drive and a Preston Scientific analog-to-digital converter. The data were processed immediately into pressure coefficient form as described in Section 4.3 and stored for printout and further analysis.

All four transducers were recorded simultaneously for 16 seconds at a 250 sample-per-second rate. An examination of a large number of pressure taps from previous experiments showed that the overall accuracy for a 16-second period is, in pressure coefficient form, 0.03 for mean pressures, 0.1 for peak pressures, and 0.01 for rms pressures. Pressure coefficients are defined in Section 4.3.

3.3 Velocity

Mean velocity and turbulence intensity profiles were measured upstream of the model to determine that the desired approach boundary-layer flow had been established. Tests were made at one wind velocity in the tunnel. This velocity was well above that required to produce

Reynolds number similarity between the model and the prototype as discussed in Section 1.1. Very low velocities measured within the model interior may have some distortion due to Reynolds number effects, but conclusions drawn from the data should be valid.

In addition, mean velocity and turbulence intensity measurements were made at duct entrances to the interior space and, for one configuration, at selected locations about the shuttle and tank model. The duct measurements were made at the center of the duct cross section when ducts were open and centered on the gap when the duct was in the PC mode.

Measurements are made with a single hot-wire anemometer mounted with its axis horizontal. The instrumentation used was a TSI constant temperature anemometer (Model 1050) with a 0.001 in. diameter platinum film sensing element 0.020 in. long. Output was directed to the on-line data acquisition system for analysis.

Calibration of the hot-wire anemometer was performed by comparing output with the pitot-static tube in the wind tunnel. The calibration data were fit to a variable exponent King's Law relationship of the form

$$E^2 = A + BU^n$$

where E is the hot-wire output voltage, U the velocity and A, B, and n are coefficients selected to fit the data. The above relationship was used to determine the mean velocity at measurement points using the measured mean voltage. The fluctuating velocity in the form U_{rms} (root-mean-square velocity) was obtained from

$$U_{rms} = \frac{2\ E\ E_{rms}}{B\ n\ U^{n-1}}$$

where E_{rms} is the root-mean-square voltage output from the anemometer. For interpretation all turbulence measurements for locations within the model were divided by the mean velocity outside the boundary layer U_∞. Turbulence intensity in velocity profile measurements used the local mean velocity.

4. RESULTS AND DISCUSSION

4.1 Flow Visualization

Flow visualization using smoke to make the flow visible showed that for northerly or southerly winds, wind flowed into the upstream exhaust ducts, into the cavity holding the shuttle assembly and out through the downstream exhaust duct (see Figure 3). Much of the higher velocity wind penetrated only a short distance into the interior space, say 50 to 80 ft, before turning downward toward the exit duct. However, significant air motion was observed enveloping the entire shuttle and tank assembly with the ducts open. With ducts partially closed (2.5 percent opening gap), wind speeds in the interior were much reduced.

Flow was observed to pass through the 1/8-in. square openings representing the porosity in the seal between the MST and SAB. The flow entered the interior space on the upwind face and exited on the downwind face.

4.2 Velocity

Velocity and turbulence profiles are shown in Figure 6. Profiles were taken upstream from the model which are characteristic of the boundary layer approaching the model. The height of the reference velocity measurement, δ, is shown in Figure 6. The corresponding prototype value of δ for this study is also shown in the figure. The mean velocity profile approaching the modeled area has the form

$$\frac{U}{U_\infty} = \left(\frac{z}{\delta}\right)^n .$$

The exponent n for the approach flow established for this study is shown in Figure 6. An open-country environment might expect $n = 0.14$; the value of $n = 0.13$ used in this study should produce the same results as a 0.14 profile within measurement accuracy.

The profile of longitudinal turbulence intensity in the flow approaching the modeled area is shown in Figure 6. The turbulence intensities are appropriate for the approach mean velocity profile selected. For the velocity profiles, turbulence intensity is defined as the root-mean-square about the mean of the longitudinal velocity fluctuations divided by the local mean velocity U,

$$Tu = \frac{U_{rms}}{U} .$$

Velocity data obtained at each of the doors and interior measurement locations (shown in Figure 7) are listed in Table 3 as mean velocity U/U_∞, turbulence intensity U_{rms}/U_∞, and largest effective gust

$$U_{pk} = \frac{U + 3U_{rms}}{U_\infty} .$$

Table 4 shows the same data in miles per hour for a 40 mph fastest mile wind speed at 30 ft. This is the design wind for the upper limit for operations. Velocities for any other design wind speed may be obtained by ratio. Locations 1-12 inside the assembly area adjacent to the shuttle and tanks are shown in Figure 7 with maximum velocities measured at those locations for partially closed doors.

The velocity data show that velocities entering the enclosed cavity during design wind conditions can be as high as 15 mph when the vents are completely open, Configuration A. These velocities drop to about 8 mph at the gap for the partially closed doors when all three doors are partially closed, Configuration E. The conclusion from these data is that the exhaust ducts should have doors installed.

The largest velocities measured at locations 1-12 inside the assembly area and adjacent to the shuttle and tanks are shown in Figure 7. These data were obtained for the case with doors 1, 2, and 3 partially closed.

The highest velocity was 4.6 mph measured at location 10 near the shuttle tail. From the wind direction at which this velocity occurred, the velocity probably originated from flow through the 1/8- x 1/8-in. openings between the MST and SAB simulating that closure porosity (see Section 2.2). The maximum velocity at locations 1-9, which probably obtained their velocities from the gaps around the partially closed doors, was 1.8 mph. Table 4 shows that peak gusts will often be 1.5 to 2.0 times the mean value. Whether or not the velocities measured at locations 1-12 represent an acceptable level depends on criteria not known to this investigation.

4.3 Pressures

For each of the pressure taps examined at each wind direction, the data record was analyzed to obtain four separate pressure coefficients. The first was the mean pressure coefficient

$$C_{p_{mean}} = \frac{(p-p_\infty)_{mean}}{0.5\ \rho\ U_\infty^2}$$

where the symbols are as defined in the List of Symbols. It represents the mean of the instantaneous pressure difference between the building pressure tap and the static pressure in the wind tunnel above the building model, nondimensionalized by the dynamic pressure

$$0.5\ \rho\ U_\infty^2$$

at the reference velocity position. This relationship produces a dimensionless coefficient which indicates that the mean pressure difference between building and ambient wind at a given point on the structure is some fraction less or some fraction greater than the undisturbed wind dynamic pressure near the upper edge of the boundary layer. Using the measured coefficient, prototype mean pressure values for any wind velocity may be calculated.

The magnitude of the fluctuating pressure is obtained by the rms pressure coefficient

$$C_{p_{rms}} = \frac{\left((p-p_\infty) - (p-p_\infty)_{mean}\right)_{rms}}{0.5\ \rho\ U_\infty^{\ 2}}$$

in which the numerator is the root-mean-square of the instantaneous pressure difference about the mean.

If the pressure fluctuations followed a Gaussian probability distribution, no additional data would be required to predict the frequency with which any given pressure level would be observed. However, the pressure fluctuations do not, in general, follow a Gaussian probability distribution so that additional information is required to show the extreme values of pressure expected. The peak maximum and peak minimum pressure coefficients were used to determine these values:

$$C_{p_{max}} = \frac{(p-p_\infty)_{max}}{0.5\ \rho\ U_\infty^{\ 2}}$$

$$C_{p_{min}} = \frac{(p-p_\infty)_{min}}{0.5\ \rho\ U_\infty^{\ 2}}$$

The values of $p-p_\infty$ which were digitized at 250 samples per second for 16 seconds, representing about one hour of time in the full-scale, were examined individually by the computer to obtain the most positive and most negative values during the 16-second period. These were converted to $C_{p_{max}}$ and $C_{p_{min}}$ by nondimensionalizing with the free stream dynamic pressure.

The four pressure coefficients were calculated by the on-line data acquisition system computer and tabulated along with the approach wind azimuth in degrees from true north. The list of coefficients is included as Appendix A. The pressure tap code numbers used in the appendix are explained in Figure 5.

To determine the largest peak loads acting at any point on the structure for cladding design purposes, the pressure coefficients for all wind directions were searched to obtain, at each pressure tap, the largest peak negative pressure coefficients. Table 5 lists the largest values and associated wind directions.

The pressure coefficients of Table 5 can be converted to full-scale loads by multiplication by a suitable reference pressure selected for the field site. This reference pressure is represented in the equations for pressure coefficients by the $0.5\ \rho\ U_\infty^2$ denominator. This value is the dynamic pressure associated with an hourly mean wind at the reference velocity measurement position. In general, the method of arriving at a design reference pressure for a particular site involves selection of a design wind velocity, translation of the velocity to an hourly mean wind at the reference velocity location and conversion to a reference pressure. The design velocity was specified by the sponsor as 80 mph fastest mile wind at 30 ft. The calculation of reference pressure for this study is shown in Table 2. The factor used in Table 2 to reduce gust winds to hourly mean winds is given in reference (6).

The reference pressure associated with the design hourly mean velocity at the reference velocity location can be used directly with the peak-pressure coefficients to obtain peak local design wind loads. Local, instantaneous peak loads on the full-scale structure suitable for design were computed by multiplying the reference pressure of Table 2 by the peak coefficients of Table 5 and are listed as peak pressures in that table. The maximum psf loads given at each tap location are the largest peak positive and peak negative values found in the tests.

The net load on any door is the vector sum of the pressure on each side (positive pressures act toward the door surface; negative pressures act away from the door surface). In most cases, the peak negative pressure on one side is associated with a pressure near zero on the other side of the door. Thus a reasonable design procedure is to design the door strength for the largest peak negative pressure observed on one side of that door. For convenience, those values are presented on drawings of the doors in Figure 8. The largest loads on doors 1-3 act downward while the largest loads on doors 5 and 6 act outward from the duct.

The four configurations that are of primary interest are: D with all inner doors completely sealed, E with all inner doors partially closed (2 1/2 percent open), F with inner door 1 partially closed and outer doors 5 and 6 completely closed, and G with inner door 1 and outer doors 5 and 6 partially closed. For Configurations D, E and G, a pressure of 30 psf on all doors would be adequate. For Configuration F, 30 psf on the inner door and 35 psf on the outer doors (with capability for local peak pressures of 40 psf) would be adequate.

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2. Peterka, J. A., J. E. Cermak, and J. H. Cooley, Jr., "Wind-Tunnel Study of STS Shuttle Assembly Building, Vandenberg Air Force Base," Technical Report CER82-83JAP-JEC-JHC6, Fluid Mechanics and Wind Engineering Program, Colorado State University, July 1982.

3. Cermak, J. E., "Laboratory Simulation of the Atmospheric Boundary Layer," AIAA Jl., Vol. 9, September 1971.

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FIGURES

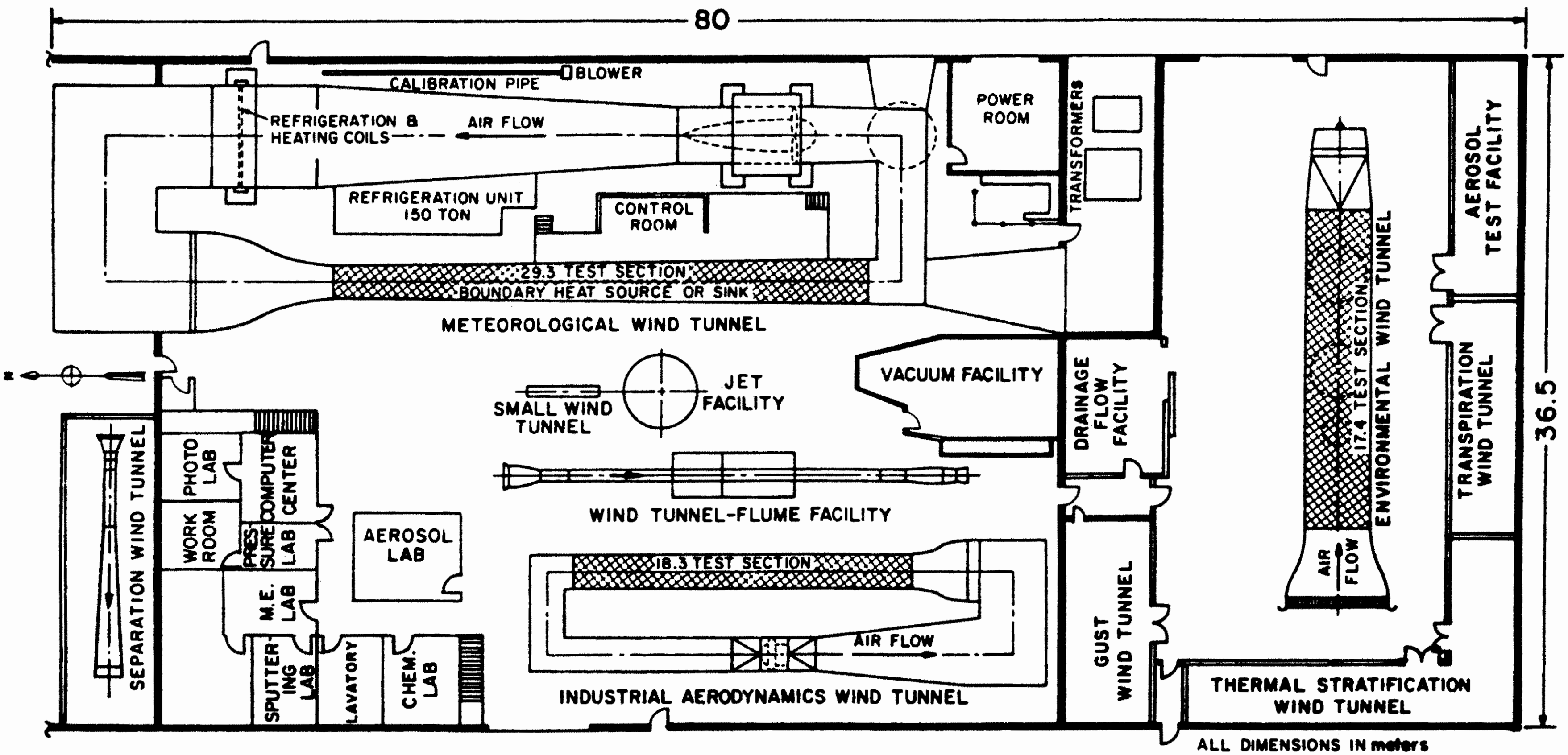
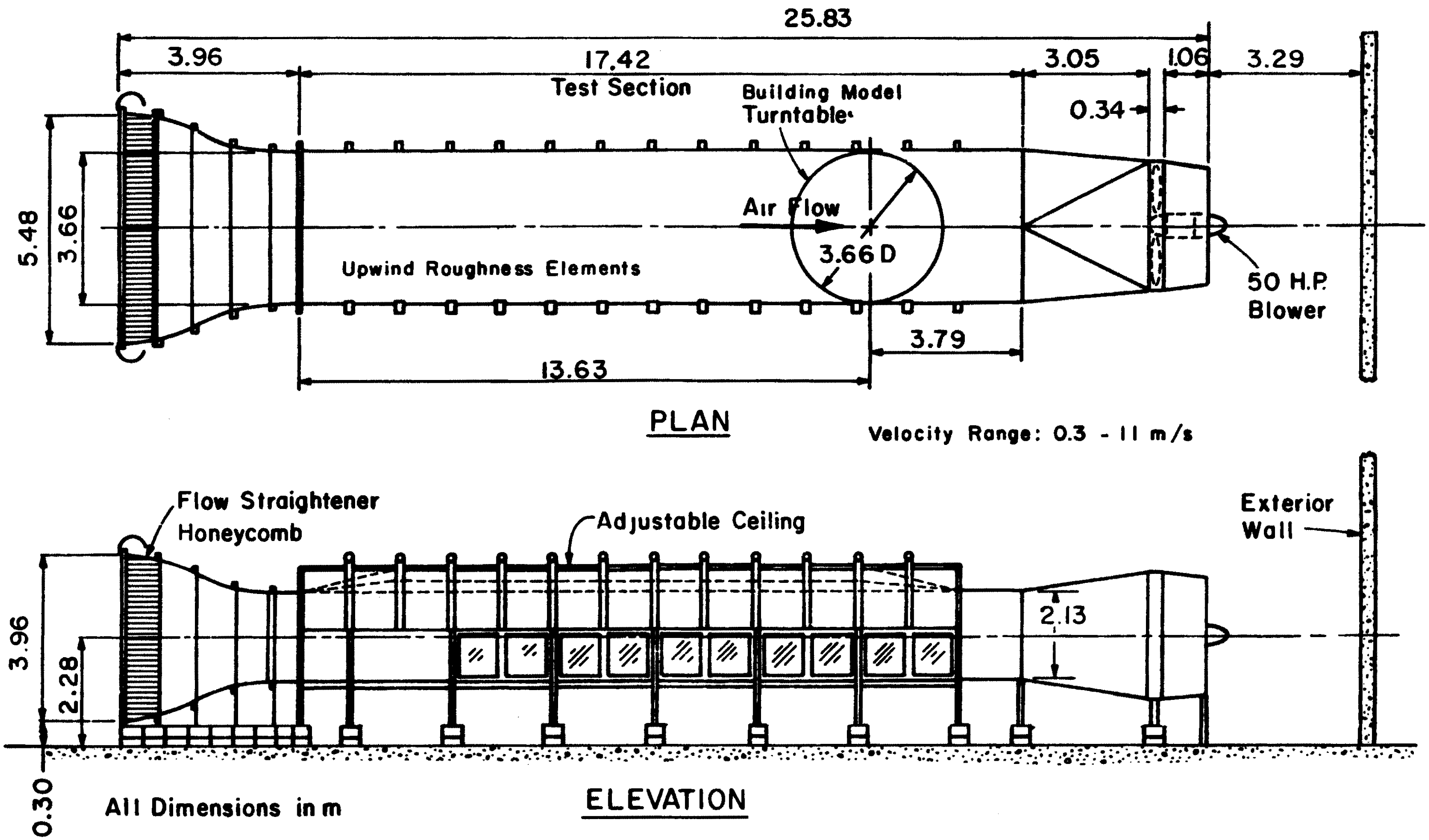


Figure 1. **FLUID DYNAMICS AND DIFFUSION LABORATORY COLORADO STATE UNIVERSITY**



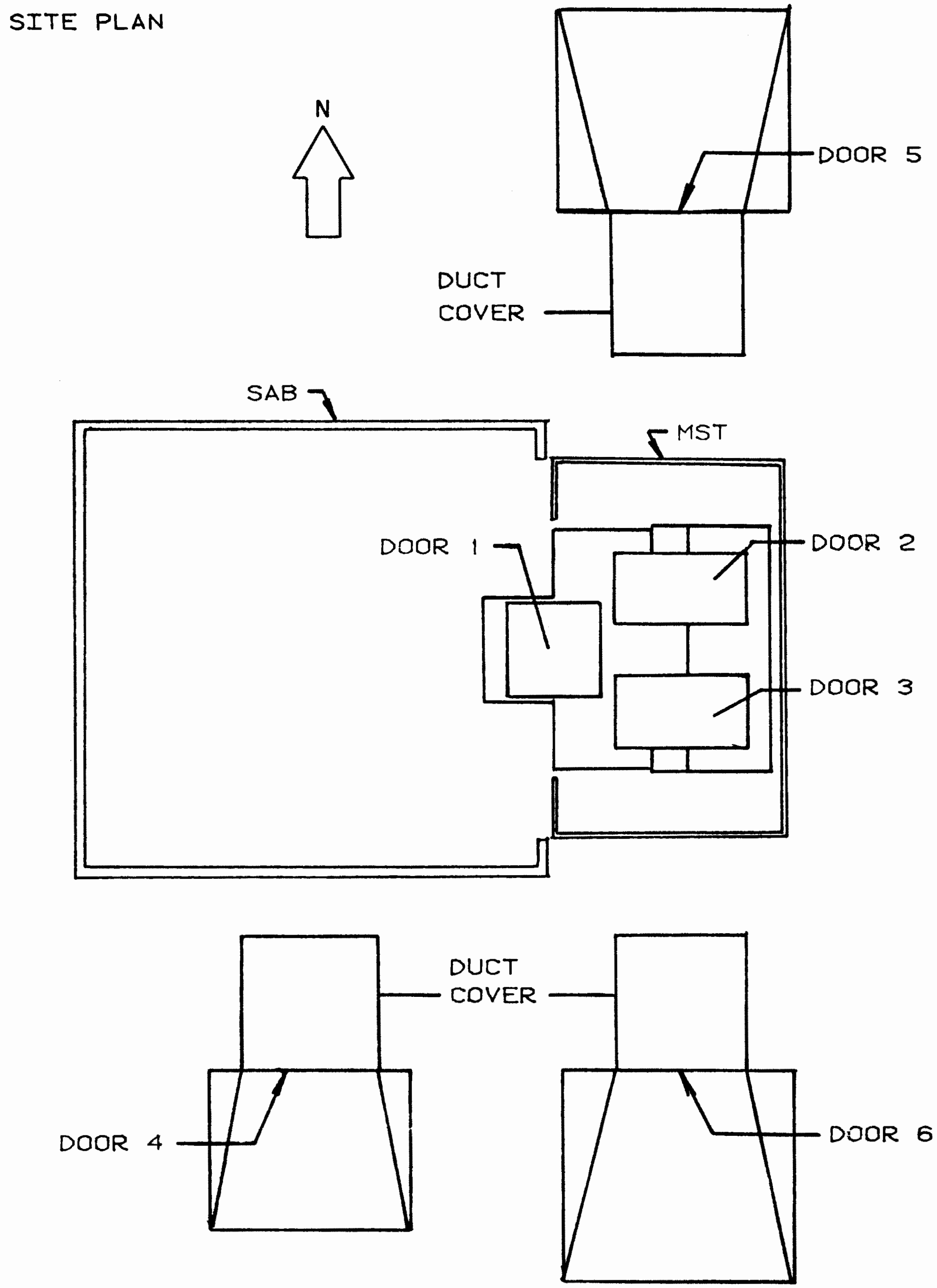
ENVIRONMENTAL WIND TUNNEL

Figure 2. Wind-Tunnel Configuration

Figure 3a. Completed Model in Wind Tunnel

Flow Visualization

Figure 3b. Completed Model in Wind Tunnel



NOTE : DRAWING IS NOT TO SCALE

Figure 4. Site Plan Showing Door Locations for Duct Closure

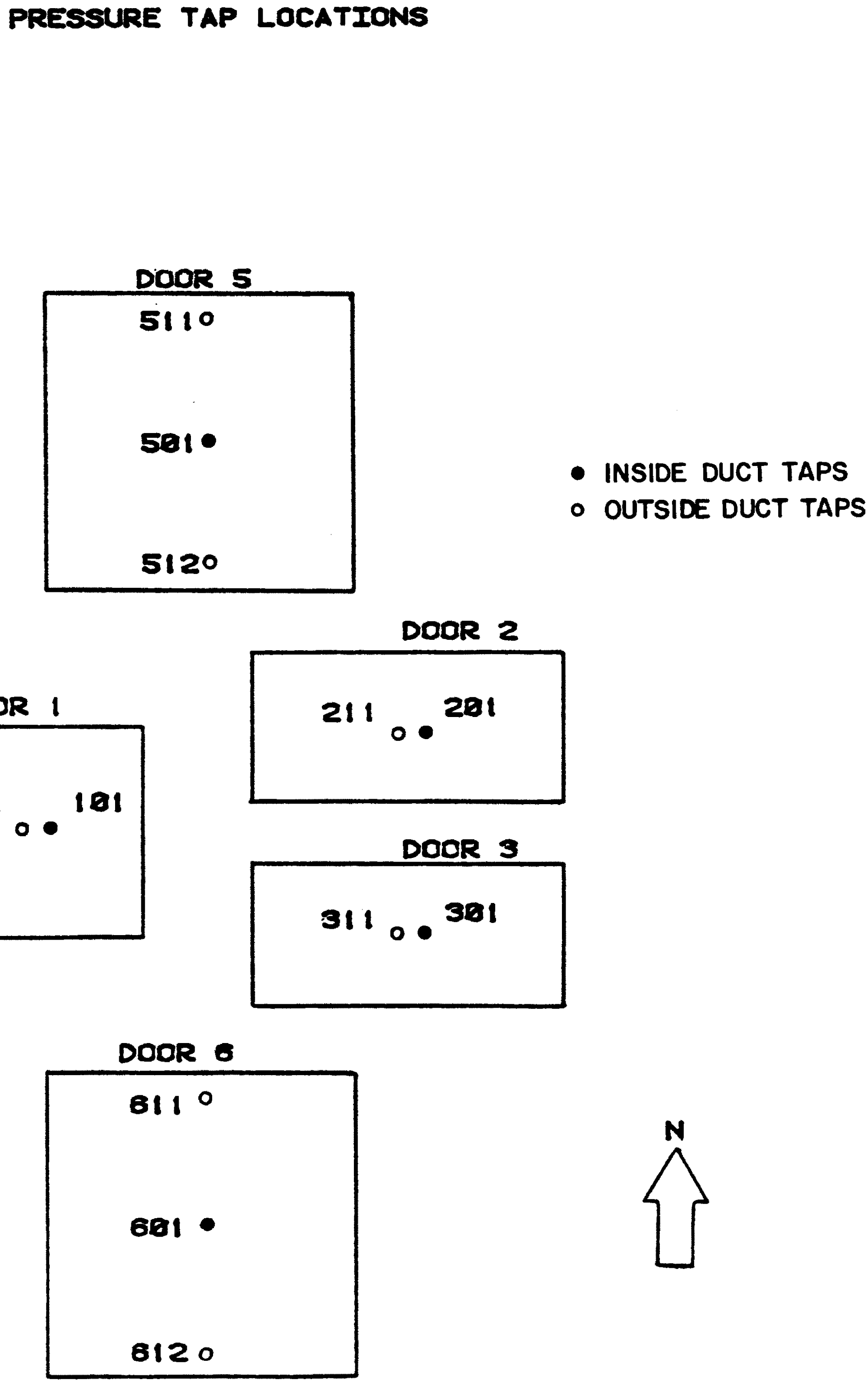


Figure 5. Pressure Tap Locations

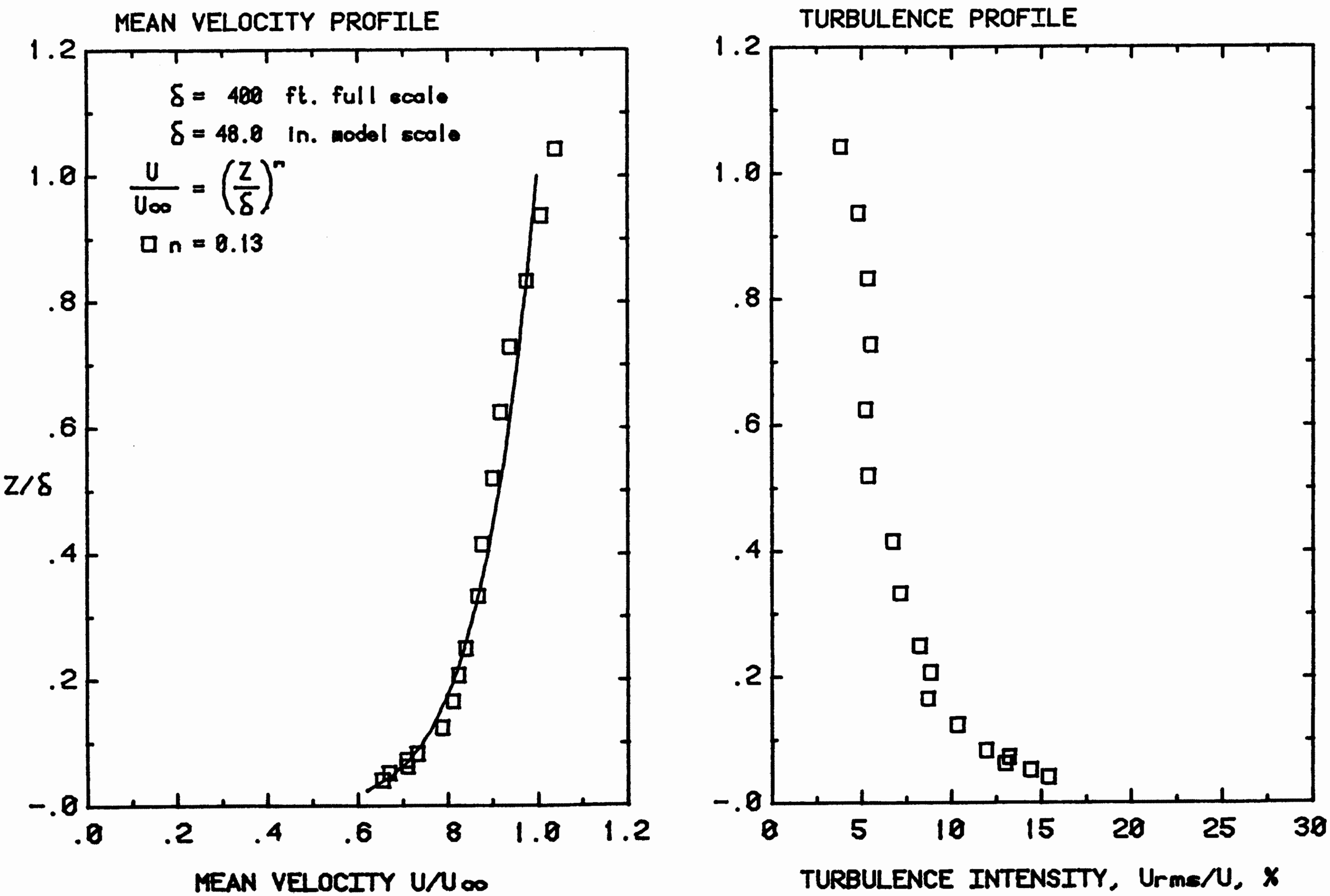


Figure 6. Mean Velocity and Turbulence Profiles Approaching the Model

PEAK MEAN WIND VELOCITIES

LOCATIONS ARE AT 7, 14 AND 21 MODEL INCHES WITH

RESPECT TO FLOOR (58 117 AND 175 FT FULL SCALE)

CONFIGURATION E

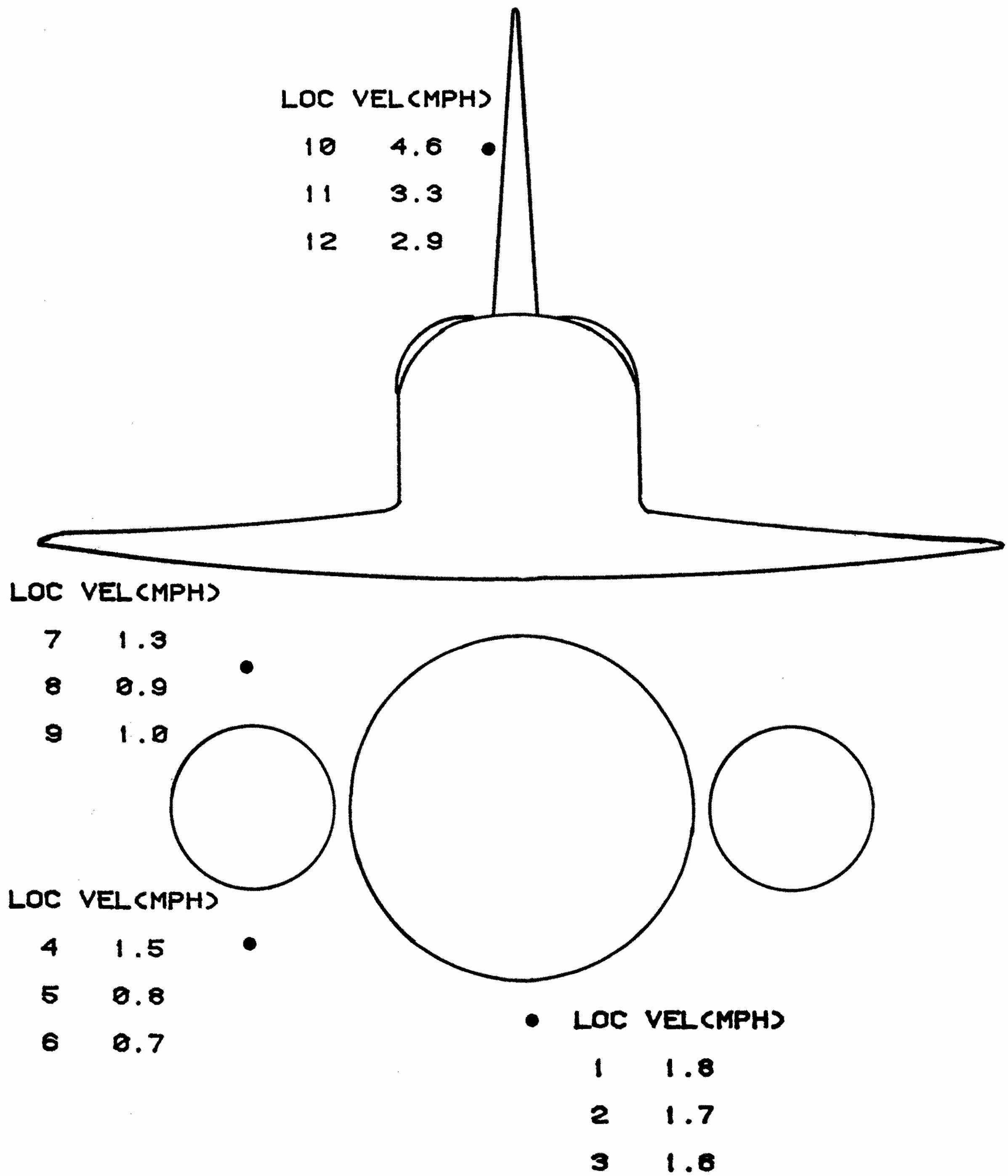


Figure 7. Mean Velocities and Turbulence Intensities at Interior Locations

CONFIGURATION B

NEGATIVE PEAK CLADDING LOADS (PSF)

FOR 80 MPH FASTEST MILE WIND

REFERENCE PRESSURE = 21 PSF

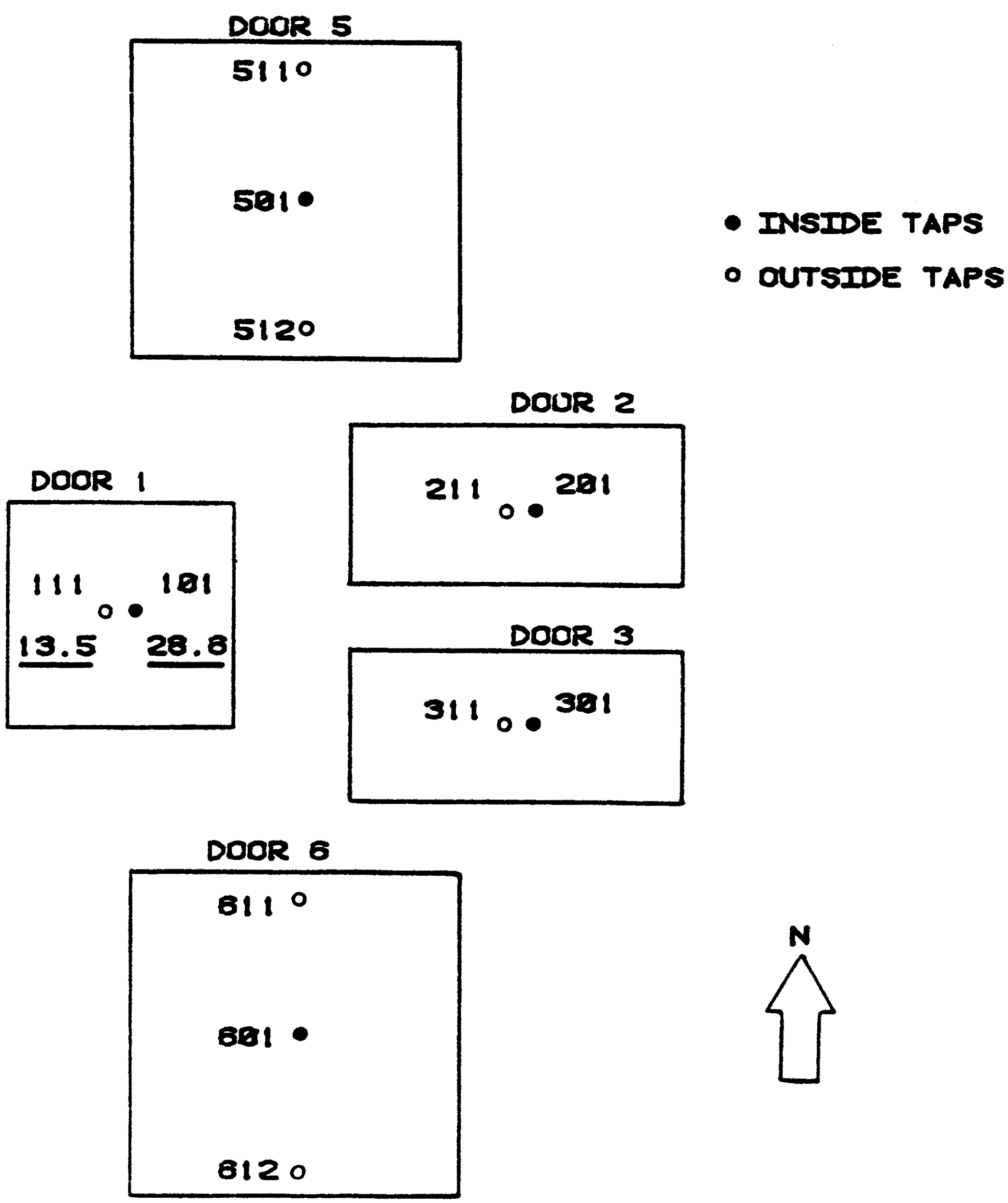


Figure 8a. Peak Pressures on the Duct Closure Doors

CONFIGURATION D

NEGATIVE PEAK CLADDING LOADS (PSF)

FOR 80 MPH FASTEST MILE WIND

REFERENCE PRESSURE = 21 PSF

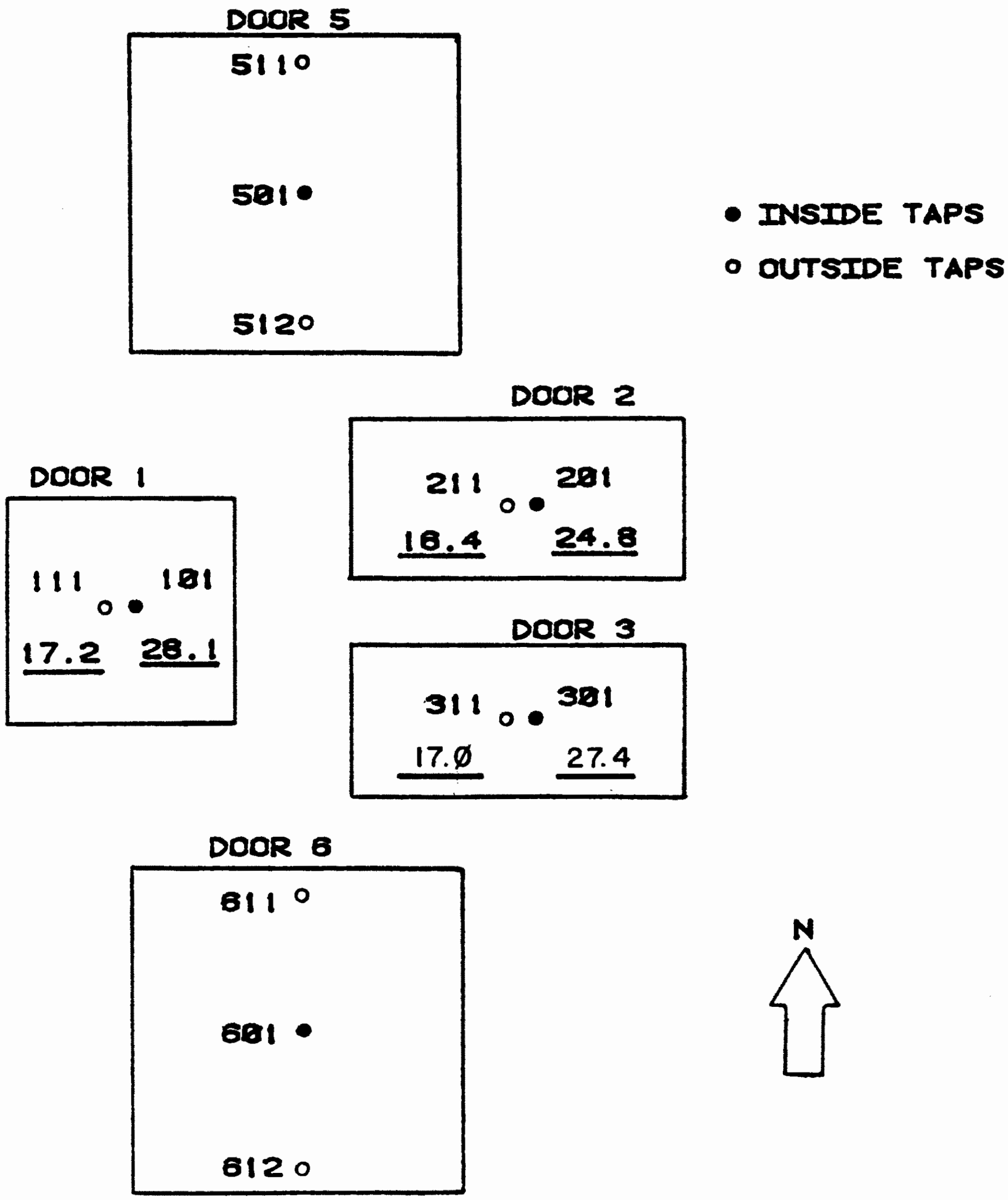


Figure 8b. Peak Pressures on the Duct Closure Doors

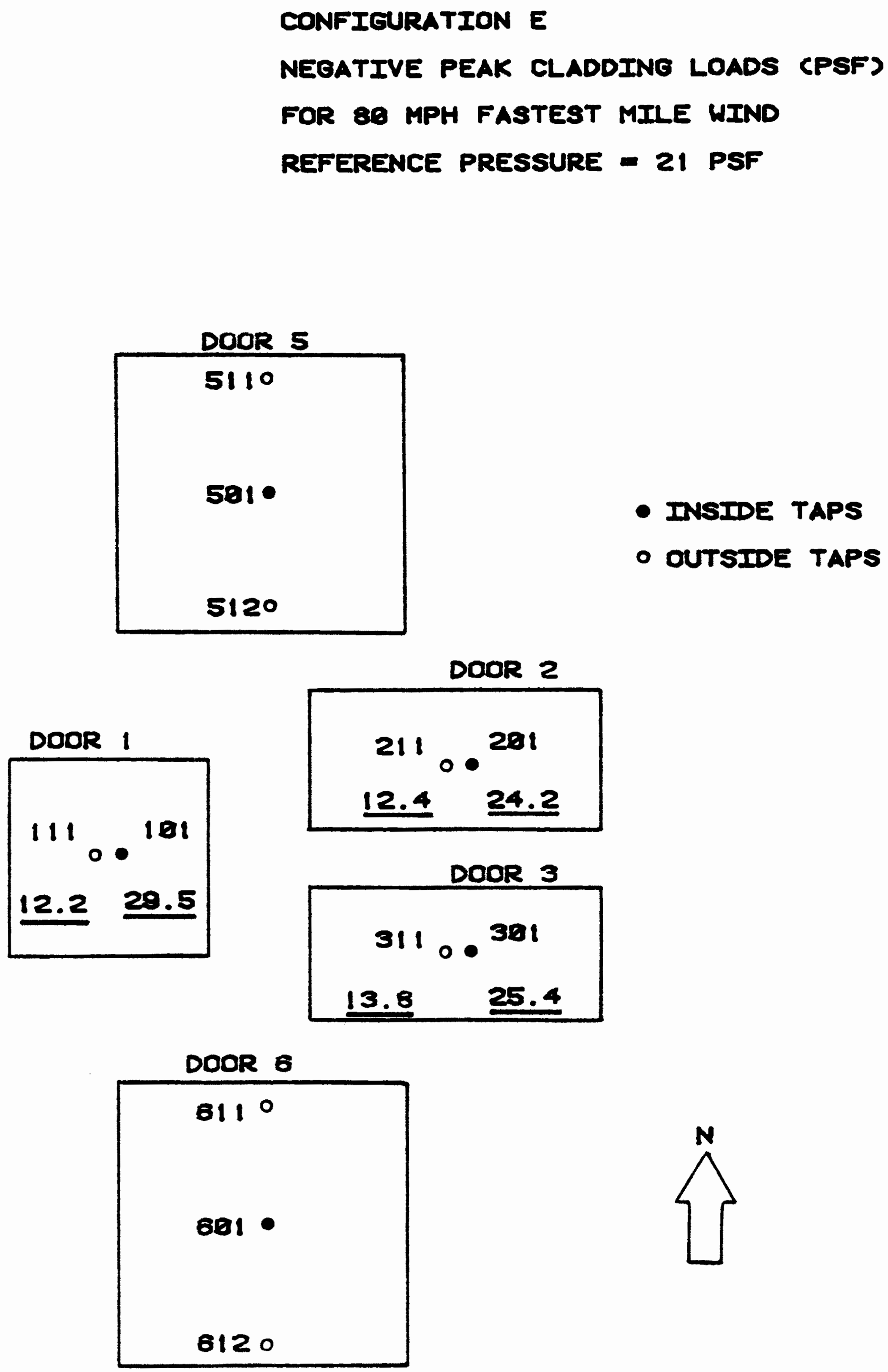


Figure 8c. Peak Pressures on the Duct Closure Doors

CONFIGURATION F

NEGATIVE PEAK CLADDING LOADS (PSF)

FOR 80 MPH FASTEST MILE WIND

REFERENCE PRESSURE = 21 PSF

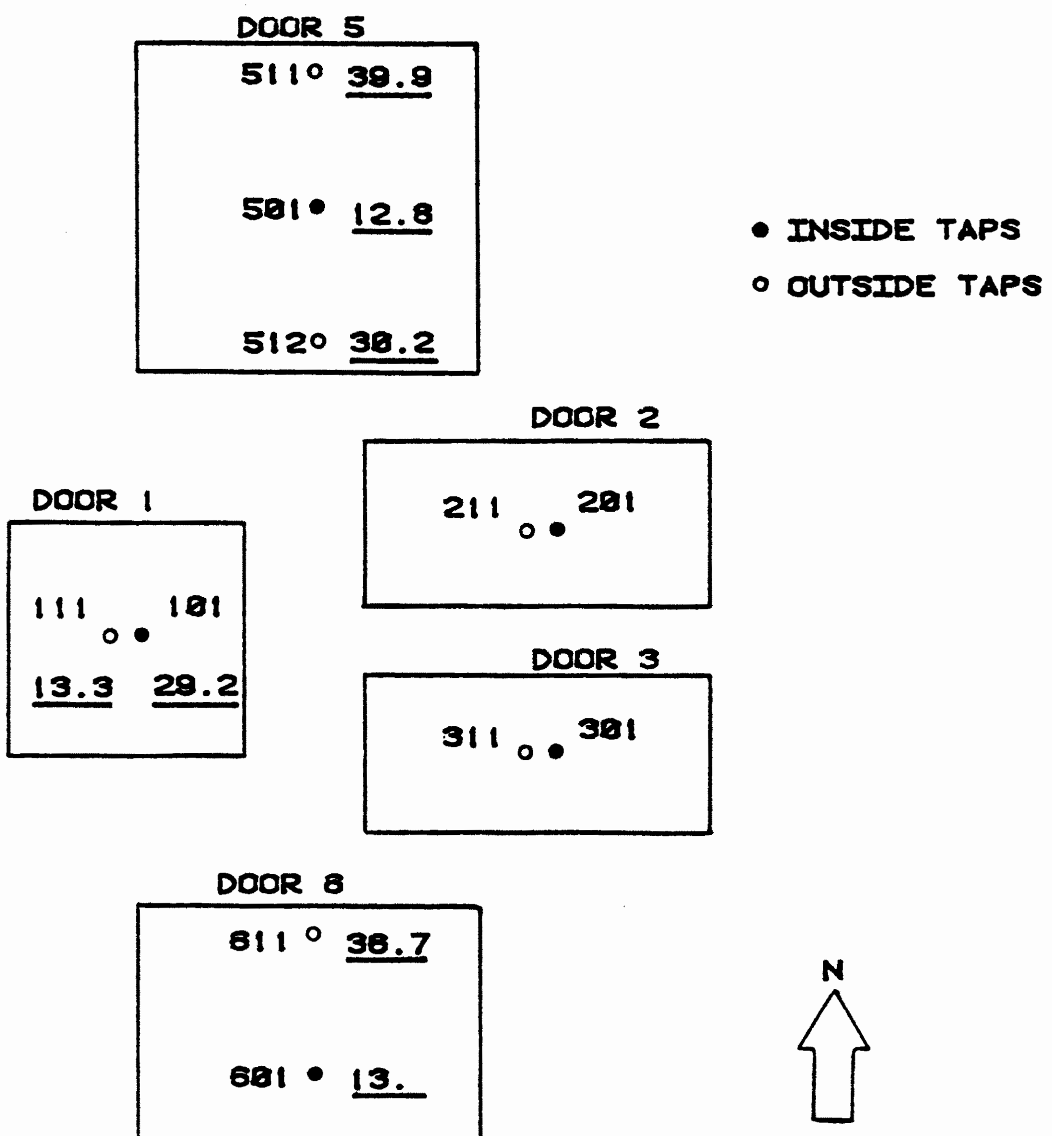


Figure 8d. Peak Pressures on the Duct Closure Doors

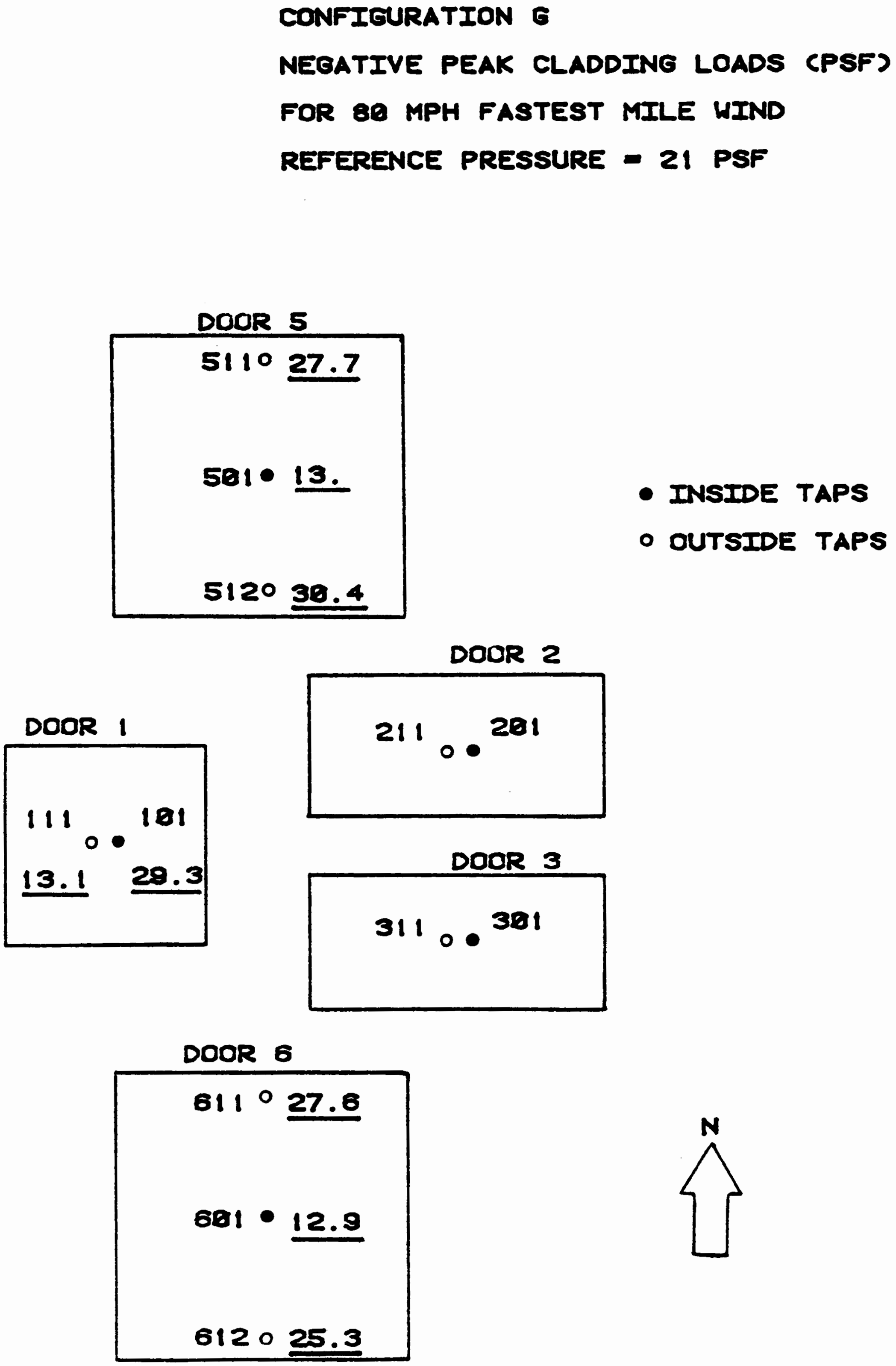


Figure 8e. Peak Pressures on the Duct Closure Doors

TABLES

TABLE 1

CONFIGURATION GUIDE AND TEST PLAN

Configurations

Air flow speeds and pressures were obtained for seven configurations of the exhaust ducts. Exhaust duct identification numbers are shown in Figure 4.

Configuration	Exhaust Duct Intakes and Outlets 1	2	3	4	5	6
A	O	O	O	O	O	O
B	C	O	O	O	O	O
C	PC	O	O	O	O	O
D	C	C	C	O	O	O
E	PC	PC	PC	O	O	O
F	PC	O	O	O	C	C
G	PC	O	O	O	PC	PC

O = Open

C = Closed

PC = 2 1/2% Open

SAB was mated with the MST and the space shuttle vehicle, external tank and boosters were in place for each configuration.

Test Plan

Air flow speeds were measured at exhaust duct intakes and outlets for each configuration as indicated by V. Pressure measurements were made on the closure panel as indicated by P.

Configuration	Exhaust Duct Intakes and Outlets 1	2	3	4	5	6	Interior
A	V	V	V	-	-	-	-
B	P	V	V	-	-	-	-
C	-	V	V	-	-	-	-
D	P	P	P	-	-	-	-
E	V,P	V,P	V,P	-	-	-	S
F	P	-	-	-	P	P	-
G	V,P	V	V	-	P	P	-

V = Wind speed measurement

P = Pressure measurement

S = Wind speed measurement at 12 locations near space shuttle vehicle

TABLE 2

CALCULATION OF REFERENCE PRESSURE

1. Basic wind speed assigned by the sponsor:

Fastest mile at 30 ft = 80 mph

Mean hourly wind speed = $\frac{80}{1.28}$ = 62.5 mph

Mean hourly gradient wind speed = 62.5 $(\frac{1000}{30})^{.14}$ = 102.1 mph

Mean hourly wind at ref location at 400' = 102.1 $(\frac{400}{1000})^{.14}$ = 89.8 mph

Reference pressure = 0.5 $\rho U_\infty{}^2$ = (0.00256) $(89.8)^2$ = 20.6 psf

Use reference pressure = 21 psf

2. Mean hourly gradient wind speed for 40 mph fastest mile wind =

$\frac{90}{2}$ = 45.0 mph

TABLE 3--WIND VELOCITIES AND TURBULENCE INTENSITIES

FLOW THROUGH EXHAUST VENTS, SHUTTLE ASSEMBLY, VANDENBERG

CONFIGURATION A : DATA ON DOORS 1, 2, 3,
DOORS OPENED : 1, 2, 3, 4, 5, 6

DOOR 1

WIND AZIMUTH	UMEAN/UINF (PERCENT)	URMS/UINF (PERCENT)	UMEAN+3*URMS/UINF (PERCENT)
0.00	21.3	4.5	34.8
22.50	15.6	3.3	25.5
45.00	17.3	2.6	25.0
67.50	15.4	1.5	19.9
90.00	4.3	1.7	9.3
112.50	7.3	2.3	14.3
135.00	11.4	3.9	23.1
157.50	20.5	5.8	37.8
180.00	20.9	6.3	39.8
202.50	29.7	8.1	53.9
225.00	35.4	8.9	61.9
247.50	18.7	5.2	34.4
270.00	8.7	1.2	12.4
292.50	16.0	1.6	20.8
315.00	21.5	2.4	28.7
337.50	23.1	2.2	29.6

DOOR 2

WIND AZIMUTH	UMEAN/UINF (PERCENT)	URMS/UINF (PERCENT)	UMEAN+3*URMS/UINF (PERCENT)
0.00	9.3	4.8	23.7
22.50	14.7	8.2	39.3
45.00	16.7	9.1	44.1
67.50	9.2	5.0	24.2
90.00	5.8	1.2	9.5
112.50	16.6	3.5	27.1
135.00	22.4	4.5	36.0
157.50	20.1	4.6	33.9
180.00	17.9	3.3	27.8
202.50	18.4	3.6	29.4
225.00	18.9	3.6	29.8
247.50	13.8	2.7	22.0
270.00	4.5	1.9	10.3
292.50	10.6	6.3	29.4
315.00	9.3	4.8	23.6
337.50	8.9	4.8	23.5

DOOR 3

WIND AZIMUTH	UMEAN/UINF (PERCENT)	URMS/UINF (PERCENT)	UMEAN+3*URMS/UINF (PERCENT)
0.00	12.7	7.2	34.4
22.50	15.2	5.7	32.2
45.00	14.6	5.7	31.6
67.50	8.8	4.0	20.6
90.00	2.1	.6	3.9
112.50	5.6	2.2	12.2
135.00	8.0	4.1	20.4
157.50	6.6	2.8	15.2
180.00	5.9	2.1	12.3
202.50	6.5	2.9	15.1
225.00	7.9	3.0	16.9
247.50	5.3	2.1	11.6
270.00	3.9	1.5	8.3
292.50	5.6	3.0	14.7
315.00	15.0	8.8	41.4
337.50	15.5	10.3	46.4

TABLE 3--WIND VELOCITIES AND TURBULENCE INTENSITIES

FLOW THROUGH EXHAUST VENTS, SHUTTLE ASSEMBLY, VANDENBERG

CONFIGURATION A : DATA ON DOORS 1, 2, 3,
DOORS OPENED : 1, 2, 3, 4, 5, 6

* * GREATEST VALUES * *

UMEAN/UINF (PERCENT)					URMS/UINF (PERCENT)					UMEAN+3*RMS/UINF (PERCENT)				
LOC/DR	AZ	MEAN	RMS	M+3RMS	LOC/DR	AZ	MEAN	RMS	M+3RMS	LOC/DR	AZ	MEAN	RMS	M+3RMS
1	225.0	35.4	8.9	61.9	3	337.5	15.5	10.3	46.4	1	225.0	35.4	8.9	61.9
1	202.5	29.7	8.1	53.9	2	45.0	16.7	9.1	44.1	1	202.5	29.7	8.1	53.9
1	337.5	23.1	2.2	29.6	1	225.0	35.4	8.9	61.9	3	337.5	15.5	10.3	46.4
2	135.0	22.4	4.5	36.0	3	315.0	15.0	8.8	41.4	2	45.0	16.7	9.1	44.1
1	315.0	21.5	2.4	28.7	2	22.5	14.7	8.2	39.3	3	315.0	15.0	8.8	41.4
1	0.0	21.3	4.5	34.8	1	202.5	29.7	8.1	53.9	1	180.0	20.9	6.3	39.8
1	180.0	20.9	6.3	39.8	3	0.0	12.7	7.2	34.4	2	22.5	14.7	8.2	39.3
1	157.5	20.5	5.8	37.8	1	180.0	20.9	6.3	39.8	1	157.5	20.5	5.8	37.8
2	157.5	20.1	4.6	33.9	2	292.5	10.6	6.3	29.4	2	135.0	22.4	4.5	36.0
2	225.0	18.9	3.6	29.8	1	157.5	20.5	5.8	37.8	1	0.0	21.3	4.5	34.8

TABLE 3--WIND VELOCITIES AND TURBULENCE INTENSITIES

FLOW THROUGH EXHAUST VENTS, SHUTTLE ASSEMBLY, VANDENBERG

CONFIGURATION B : DATA ON DOORS 2, 3,
DOORS OPENED : 2, 3, 4, 5, 6,
DOORS CLOSED : 1,

DOOR 3				DOOR 2			
WIND AZIMUTH	UMEAN/UINF (PERCENT)	URMS/UINF (PERCENT)	UMEAN+3*URMS/UINF (PERCENT)	WIND AZIMUTH	UMEAN/UINF (PERCENT)	URMS/UINF (PERCENT)	UMEAN+3*URMS/UINF (PERCENT)
0.00	15.1	4.7	29.3	0.00	6.9	3.3	16.9
22.50	20.5	5.8	37.9	22.50	10.9	5.9	28.4
45.00	19.4	5.4	35.4	45.00	11.0	6.5	30.6
67.50	11.3	3.1	20.7	67.50	5.7	2.6	13.5
90.00	2.5	.8	4.8	90.00	6.4	1.8	11.7
112.50	7.2	3.4	17.3	112.50	15.8	4.2	28.3
135.00	10.7	5.8	28.1	135.00	19.6	5.1	34.9
157.50	9.3	4.2	21.8	157.50	21.7	5.3	37.7
180.00	5.8	2.6	13.7	180.00	16.5	4.6	30.3
202.50	5.3	2.3	12.1	202.50	14.6	4.4	27.8
225.00	5.2	2.3	12.0	225.00	16.3	4.3	29.1
247.50	5.0	1.9	10.6	247.50	12.8	3.3	22.8
270.00	2.6	.9	5.2	270.00	6.3	1.6	11.1
292.50	10.8	3.1	20.2	292.50	5.1	2.7	13.3
315.00	14.5	5.1	29.7	315.00	7.3	3.6	18.1
337.50	13.1	4.8	27.4	337.50	6.4	3.1	15.8

TABLE 3--WIND VELOCITIES AND TURBULENCE INTENSITIES

FLOW THROUGH EXHAUST VENTS, SHUTTLE ASSEMBLY, VANDENBERG

CONFIGURATION B : DATA ON DOORS 2, 3,
DOORS OPENED : 2, 3, 4, 5, 6,
DOORS CLOSED : 1,

* * GREATEST VALUES * *

UMEAN/UINF (PERCENT)					URMS/UINF (PERCENT)					UMEAN+3*RMS/UINF (PERCENT)				
LOC/DR	AZ	MEAN	RMS	M+3RMS	LOC/DR	AZ	MEAN	RMS	M+3RMS	LOC/DR	AZ	MEAN	RMS	M+3RMS
2	157.5	21.7	5.3	37.7	2	45.0	11.0	6.5	30.6	3	22.5	20.5	5.8	37.9
3	22.5	20.5	5.8	37.9	2	22.5	10.9	5.9	28.4	2	157.5	21.7	5.3	37.7
2	135.0	19.6	5.1	34.9	3	22.5	20.5	5.8	37.9	3	45.0	19.4	5.4	35.4
3	45.0	19.4	5.4	35.4	3	135.0	10.7	5.8	28.1	2	135.0	19.6	5.1	34.9
2	180.0	16.5	4.6	30.3	3	45.0	19.4	5.4	35.4	2	45.0	11.0	6.5	30.6
2	225.0	16.3	4.3	29.1	2	157.5	21.7	5.3	37.7	2	180.0	16.5	4.6	30.3
2	112.5	15.8	4.2	28.3	2	135.0	19.6	5.1	34.9	3	315.0	14.5	5.1	29.7
3	0.0	15.1	4.7	29.3	3	315.0	14.5	5.1	29.7	3	0.0	15.1	4.7	29.3
2	202.5	14.6	4.4	27.8	3	337.5	13.1	4.8	27.4	2	225.0	16.3	4.3	29.1
3	315.0	14.5	5.1	29.7	3	0.0	15.1	4.7	29.3	2	22.5	10.9	5.9	28.4

TABLE 3--WIND VELOCITIES AND TURBULENCE INTENSITIES

FLOW THROUGH EXHAUST VENTS, SHUTTLE ASSEMBLY, VANDENBERG

CONFIGURATION C : DATA ON DOORS 2, 3,
DOORS OPENED : 2, 3, 4, 5, 6,
DOORS PARTIALLY CLOSED :1,

DOOR 3

WIND AZIMUTH	UMEAN/UINF (PERCENT)	URMS/UINF (PERCENT)	UMEAN+3*URMS/UINF (PERCENT)
0.00	15.2	5.0	30.3
22.50	19.5	5.8	36.8
45.00	19.3	5.6	36.2
67.50	11.8	3.3	21.6
90.00	2.5	.8	4.8
112.50	6.9	2.9	15.7
135.00	10.1	5.3	26.0
157.50	8.9	4.1	21.4
180.00	5.9	2.4	13.0
202.50	5.4	2.1	11.6
225.00	5.6	2.1	12.1
247.50	4.9	1.7	9.9
270.00	2.8	1.0	5.7
292.50	10.7	3.6	21.5
315.00	13.8	4.9	28.4
337.50	13.0	4.6	26.9

DOOR 2

WIND AZIMUTH	UMEAN/UINF (PERCENT)	URMS/UINF (PERCENT)	UMEAN+3*URMS/UINF (PERCENT)
0.00	6.8	4.1	18.9
22.50	16.5	11.2	50.2
45.00	19.6	12.2	56.1
67.50	5.8	3.4	15.9
90.00	7.0	1.9	12.8
112.50	17.6	4.7	31.8
135.00	22.3	5.4	38.6
157.50	23.8	5.4	40.1
180.00	18.0	5.0	33.2
202.50	15.9	4.6	29.5
225.00	17.4	4.9	32.2
247.50	14.3	3.1	23.8
270.00	6.8	1.9	12.5
292.50	7.7	5.1	22.9
315.00	7.5	4.9	22.3
337.50	6.5	4.3	19.3

TABLE 3--WIND VELOCITIES AND TURBULENCE INTENSITIES

FLOW THROUGH EXHAUST VENTS, SHUTTLE ASSEMBLY, VANDENBERG

CONFIGURATION C : DATA ON DOORS 2, 3,
DOORS OPENED : 2, 3, 4, 5, 6,
DOORS PARTIALLY CLOSED :1,

* * GREATEST VALUES * *

UMEAN/UINF (PERCENT)

LOC/DR	AZ	MEAN	RMS	M+3RMS
2	157.5	23.8	5.4	40.1
2	135.0	22.3	5.4	38.6
2	45.0	19.6	12.2	56.1
3	22.5	19.5	5.8	36.8
3	45.0	19.3	5.6	36.2
2	180.0	18.0	5.0	33.2
2	112.5	17.6	4.7	31.8
2	225.0	17.4	4.9	32.2
2	22.5	16.5	11.2	50.2
2	202.5	15.9	4.6	29.5

URMS/UINF (PERCENT)

LOC/DR	AZ	MEAN	RMS	M+3RMS
2	45.0	19.6	12.2	56.1
2	22.5	16.5	11.2	50.2
3	22.5	19.5	5.8	36.8
3	45.0	19.3	5.6	36.2
2	157.5	23.8	5.4	40.1
2	135.0	22.3	5.4	38.6
3	135.0	10.1	5.3	26.0
2	292.5	7.7	5.1	22.9
2	180.0	18.0	5.0	33.2
3	0.0	15.2	5.0	30.3

UMEAN+3*RMS/UINF (PERCENT)

LOC/DR	AZ	MEAN	RMS	M+3RMS
2	45.0	19.6	12.2	56.1
2	22.5	16.5	11.2	50.2
2	157.5	23.8	5.4	40.1
2	135.0	22.3	5.4	38.6
3	22.5	19.5	5.8	36.8
3	45.0	19.3	5.6	36.2
2	180.0	18.0	5.0	33.2
2	225.0	17.4	4.9	32.2
2	112.5	17.6	4.7	31.8
3	0.0	15.2	5.0	30.3

TABLE 3--WIND VELOCITIES AND TURBULENCE INTENSITIES

FLOW THROUGH EXHAUST VENTS, SHUTTLE ASSEMBLY, VANDENBERG

CONFIGURATION E : DATA ON DOORS 1, 2, 3,
DOORS OPENED : 4, 5, 6,
DOORS PARTIALLY CLOSED :1, 2, 3,

LOCATION 1

WIND AZIMUTH	UMEAN/UINF (PERCENT)	URMS/UINF (PERCENT)	UMEAN+3*URMS/UINF (PERCENT)
0.00	3.7	.5	5.1
22.50	3.9	.6	5.6
45.00	3.9	.6	5.7
67.50	3.6	.5	5.0
90.00	2.6	.0	2.7
112.50	2.8	.2	3.3
135.00	3.4	.4	4.7
157.50	3.5	.4	4.7
180.00	3.4	.4	4.5
202.50	2.9	0.0	2.9
225.00	3.0	.3	3.8
247.50	2.9	.1	3.3
270.00	2.3	0.0	2.3
292.50	2.9	.3	3.8
315.00	3.7	.4	4.9
337.50	3.8	.5	5.3

LOCATION 2

WIND AZIMUTH	UMEAN/UINF (PERCENT)	URMS/UINF (PERCENT)	UMEAN+3*URMS/UINF (PERCENT)
0.00	3.4	.4	4.6
22.50	3.6	.5	5.0
45.00	3.7	.4	5.0
67.50	3.1	.3	3.9
90.00	2.3	0.0	2.3
112.50	2.3	0.0	2.3
135.00	3.0	.2	3.6
157.50	2.6	.1	3.0
180.00	2.7	.2	3.3
202.50	2.7	.1	2.9
225.00	2.8	.2	3.5
247.50	3.1	.2	3.8
270.00	2.3	0.0	2.3
292.50	2.7	.1	3.1
315.00	2.7	0.0	2.7
337.50	2.9	.3	3.7

LOCATION 3

WIND AZIMUTH	UMEAN/UINF (PERCENT)	URMS/UINF (PERCENT)	UMEAN+3*URMS/UINF (PERCENT)
0.00	3.3	.2	4.0
22.50	3.5	.2	4.0
45.00	3.5	.2	4.0
67.50	3.1	0.0	3.1
90.00	2.4	0.0	2.4
112.50	2.5	0.0	2.5
135.00	2.7	.1	2.9
157.50	2.6	.1	2.8
180.00	2.6	0.0	2.6
202.50	2.5	0.0	2.5
225.00	2.9	.1	3.2
247.50	3.1	0.0	3.1
270.00	2.3	0.0	2.3
292.50	2.8	.3	3.6
315.00	2.9	.2	3.4
337.50	3.1	0.0	3.1

LOCATION 4

WIND AZIMUTH	UMEAN/UINF (PERCENT)	URMS/UINF (PERCENT)	UMEAN+3*URMS/UINF (PERCENT)
0.00	2.8	.1	3.1
22.50	2.9	.1	3.1
45.00	2.9	.1	3.3
67.50	2.6	0.0	2.6
90.00	2.5	0.0	2.5
112.50	3.3	.2	3.9
135.00	3.1	.1	3.5
157.50	3.1	.1	3.4
180.00	3.2	.2	3.8
202.50	3.1	.2	3.6
225.00	3.0	.1	3.3
247.50	2.6	.1	2.8
270.00	2.3	0.0	2.3
292.50	2.6	.1	2.9
315.00	2.8	0.0	2.8
337.50	2.7	.1	2.9

TABLE 3--WIND VELOCITIES AND TURBULENCE INTENSITIES

FLOW THROUGH EXHAUST VENTS, SHUTTLE ASSEMBLY, VANDENBERG

CONFIGURATION E : DATA ON DOORS 1, 2, 3,
DOORS OPENED : 4, 5, 6,
DOORS PARTIALLY CLOSED :1, 2, 3,

LOCATION 5

WIND AZIMUTH	UMEAN/UINF (PERCENT)	URMS/UINF (PERCENT)	UMEAN+3*URMS/UINF (PERCENT)
0.00	1.1	.2	1.7
22.50	1.1	.2	1.8
45.00	1.2	.2	1.7
67.50	1.0	.2	1.6
90.00	.9	.2	1.5
112.50	1.6	.3	2.4
135.00	1.8	.5	3.3
157.50	1.6	.4	2.6
180.00	1.4	.3	2.2
202.50	1.1	.2	1.7
225.00	.9	.2	1.5
247.50	.8	.2	1.5
270.00	.8	.3	1.6
292.50	.8	.2	1.5
315.00	.9	.2	1.4
337.50	1.0	.1	1.4

LOCATION 6

WIND AZIMUTH	UMEAN/UINF (PERCENT)	URMS/UINF (PERCENT)	UMEAN+3*URMS/UINF (PERCENT)
0.00	1.5	.3	2.4
22.50	1.7	.3	2.5
45.00	1.6	.2	2.3
67.50	1.5	.1	1.8
90.00	.8	.1	1.1
112.50	.8	.2	1.4
135.00	.9	.2	1.5
157.50	.9	.2	1.6
180.00	1.0	.2	1.4
202.50	1.0	.2	1.7
225.00	1.1	.3	1.9
247.50	1.0	.2	1.6
270.00	.9	.2	1.4
292.50	.9	.2	1.6
315.00	1.1	.1	1.4
337.50	1.4	.3	2.1

LOCATION 7

WIND AZIMUTH	UMEAN/UINF (PERCENT)	URMS/UINF (PERCENT)	UMEAN+3*URMS/UINF (PERCENT)
0.00	1.1	.2	1.8
22.50	1.1	.2	1.7
45.00	1.2	.2	1.9
67.50	1.2	.2	1.9
90.00	1.2	.3	2.1
112.50	1.0	.2	1.5
135.00	1.4	.3	2.4
157.50	2.1	.9	4.8
180.00	3.0	1.1	6.3
202.50	2.3	.9	5.0
225.00	1.8	.7	4.0
247.50	1.6	.4	2.9
270.00	1.1	.2	1.6
292.50	.9	.1	1.3
315.00	.8	.1	1.2
337.50	1.0	.2	1.6

LOCATION 8

WIND AZIMUTH	UMEAN/UINF (PERCENT)	URMS/UINF (PERCENT)	UMEAN+3*URMS/UINF (PERCENT)
0.00	.9	.2	1.6
22.50	1.0	.2	1.7
45.00	1.0	.2	1.7
67.50	.9	.2	1.6
90.00	1.1	.3	2.0
112.50	.9	.1	1.3
135.00	1.0	.2	1.7
157.50	1.2	.3	2.3
180.00	1.9	.7	3.9
202.50	2.1	.6	4.0
225.00	1.7	.4	3.1
247.50	1.1	.2	1.7
270.00	.8	.2	1.4
292.50	.8	.2	1.5
315.00	.9	.2	1.4
337.50	.9	.1	1.3

TABLE 3--WIND VELOCITIES AND TURBULENCE INTENSITIES

FLOW THROUGH EXHAUST VENTS, SHUTTLE ASSEMBLY, VANDENBERG

CONFIGURATION E : DATA ON DOORS 1, 2, 3,
DOORS OPENED : 4, 5, 6,
DOORS PARTIALLY CLOSED :1, 2, 3,

LOCATION 9

WIND AZIMUTH	UMEAN/UINF (PERCENT)	URMS/UINF (PERCENT)	UMEAN+3*URMS/UINF (PERCENT)
0.00	1.9	.3	2.8
22.50	2.0	.4	3.2
45.00	2.1	.4	3.3
67.50	1.7	.3	2.5
90.00	1.0	.2	1.6
112.50	.8	.2	1.4
135.00	1.3	.2	2.0
157.50	1.1	.2	1.7
180.00	1.1	.2	1.7
202.50	1.2	.2	1.7
225.00	2.2	.7	4.2
247.50	1.5	.4	2.8
270.00	.9	.2	1.6
292.50	.9	.2	1.5
315.00	1.1	.2	1.8
337.50	1.3	.2	1.9

LOCATION 10

WIND AZIMUTH	UMEAN/UINF (PERCENT)	URMS/UINF (PERCENT)	UMEAN+3*URMS/UINF (PERCENT)
0.00	3.0	0.0	3.0
22.50	3.1	0.0	3.1
45.00	3.1	0.0	3.1
67.50	3.0	0.0	3.0
90.00	5.6	1.0	8.7
112.50	5.0	.8	7.4
135.00	5.3	1.0	8.2
157.50	5.8	1.2	9.4
180.00	6.2	1.5	10.7
202.50	6.4	1.8	11.9
225.00	10.2	1.8	15.5
247.50	6.3	1.2	9.8
270.00	2.7	.2	3.2
292.50	2.9	0.0	2.9
315.00	3.0	.1	3.5
337.50	3.0	0.0	3.0

LOCATION 11

WIND AZIMUTH	UMEAN/UINF (PERCENT)	URMS/UINF (PERCENT)	UMEAN+3*URMS/UINF (PERCENT)
0.00	5.6	.6	7.4
22.50	6.0	.8	8.3
45.00	6.0	.7	8.1
67.50	5.4	.6	7.1
90.00	4.9	.7	7.1
112.50	5.1	.6	7.0
135.00	5.7	.8	7.9
157.50	5.0	.9	7.6
180.00	4.1	.7	6.3
202.50	3.8	.6	5.6
225.00	7.3	1.6	12.1
247.50	5.9	.7	8.1
270.00	2.7	.0	2.9
292.50	2.5	0.0	2.5
315.00	4.3	.5	5.7
337.50	5.1	.6	6.8

LOCATION 12

WIND AZIMUTH	UMEAN/UINF (PERCENT)	URMS/UINF (PERCENT)	UMEAN+3*URMS/UINF (PERCENT)
0.00	4.1	.7	6.2
22.50	4.3	.7	6.4
45.00	4.2	.7	6.2
67.50	3.9	.7	5.9
90.00	3.4	.6	5.2
112.50	4.3	.5	5.9
135.00	4.5	.6	6.4
157.50	4.2	.6	6.1
180.00	4.2	.7	6.3
202.50	4.1	.6	5.8
225.00	6.5	1.2	10.3
247.50	4.4	.6	6.3
270.00	2.7	.0	2.8
292.50	2.9	.1	3.1
315.00	2.9	.1	3.3
337.50	3.7	.6	5.4

TABLE 3--WIND VELOCITIES AND TURBULENCE INTENSITIES

FLOW THROUGH EXHAUST VENTS, SHUTTLE ASSEMBLY, VANDENBERG

CONFIGURATION E : DATA ON DOORS 1, 2, 3,
DOORS OPENED : 4, 5, 6,
DOORS PARTIALLY CLOSED :1, 2, 3,

DOOR 1

WIND AZIMUTH	UMEAN/UINF (PERCENT)	URMS/UINF (PERCENT)	UMEAN+3*URMS/UINF (PERCENT)
0.00	1.1	.4	2.4
22.50	.9	.3	1.7
45.00	.9	.3	1.7
67.50	1.0	.3	1.9
90.00	3.8	1.8	9.3
112.50	2.6	1.4	6.9
135.00	4.5	2.1	10.8
157.50	2.6	.9	5.3
180.00	2.7	1.0	5.7
202.50	2.7	.7	4.8
225.00	3.5	1.1	6.8
247.50	3.0	1.0	5.9
270.00	.6	.2	1.2
292.50	1.3	.2	1.9
315.00	1.9	.3	2.9
337.50	1.6	.3	2.5

DOOR 2

WIND AZIMUTH	UMEAN/UINF (PERCENT)	URMS/UINF (PERCENT)	UMEAN+3*URMS/UINF (PERCENT)
0.00	8.7	.9	11.4
22.50	8.8	.8	11.4
45.00	8.7	.8	11.1
67.50	7.4	.7	9.5
90.00	5.5	1.7	10.6
112.50	16.5	1.3	20.5
135.00	17.8	1.2	21.3
157.50	18.6	1.8	24.1
180.00	14.8	2.6	22.5
202.50	14.7	2.2	21.4
225.00	18.0	1.8	23.3
247.50	15.5	1.9	21.3
270.00	8.2	1.9	13.9
292.50	5.7	.6	7.5
315.00	7.8	.7	10.0
337.50	8.5	.9	11.2

DOOR 3

WIND AZIMUTH	UMEAN/UINF (PERCENT)	URMS/UINF (PERCENT)	UMEAN+3*URMS/UINF (PERCENT)
0.00	3.6	1.4	7.8
22.50	5.4	.7	7.4
45.00	6.0	.7	8.1
67.50	3.5	.4	4.8
90.00	.9	.2	1.5
112.50	1.2	.2	1.8
135.00	1.2	.3	2.1
157.50	1.1	.2	1.8
180.00	1.1	.2	1.8
202.50	1.0	.2	1.7
225.00	.8	.2	1.5
247.50	.8	.2	1.5
270.00	.8	.2	1.6
292.50	3.5	.5	5.0
315.00	5.0	.9	7.8
337.50	3.1	1.1	6.4

TABLE 3--WIND VELOCITIES AND TURBULENCE INTENSITIES

FLOW THROUGH EXHAUST VENTS, SHUTTLE ASSEMBLY, VANDENBERG

CONFIGURATION E : DATA ON DOORS 1, 2, 3,
DOORS OPENED : 4, 5, 6,
DOORS PARTIALLY CLOSED :1, 2, 3,

* * GREATEST VALUES * *

UMEAN/UINF (PERCENT)

LOC/DR	AZ	MEAN	RMS	M+3RMS
2	157.5	18.6	1.8	24.1
2	225.0	18.0	1.8	23.3
2	135.0	17.8	1.2	21.3
2	112.5	16.5	1.3	20.5
2	247.5	15.5	1.9	21.3
2	180.0	14.8	2.6	22.5
2	202.5	14.7	2.2	21.4
10	225.0	10.2	1.8	15.5
2	22.5	8.8	.8	11.4
2	45.0	8.7	.8	11.1

URMS/UINF (PERCENT)

LOC/DR	AZ	MEAN	RMS	M+3RMS
2	180.0	14.8	2.6	22.5
2	202.5	14.7	2.2	21.4
1	135.0	4.5	2.1	10.8
2	247.5	15.5	1.9	21.3
2	270.0	8.2	1.9	13.9
2	157.5	18.6	1.8	24.1
10	202.5	6.4	1.8	11.9
1	90.0	3.8	1.8	9.3
2	225.0	18.0	1.8	23.3
10	225.0	10.2	1.8	15.5

UMEAN+3*RMS/UINF (PERCENT)

LOC/DR	AZ	MEAN	RMS	M+3RMS
2	157.5	18.6	1.8	24.1
2	225.0	18.0	1.8	23.3
2	180.0	14.8	2.6	22.5
2	202.5	14.7	2.2	21.4
2	135.0	17.8	1.2	21.3
2	247.5	15.5	1.9	21.3
2	112.5	16.5	1.3	20.5
10	225.0	10.2	1.8	15.5
2	270.0	8.2	1.9	13.9
11	225.0	7.3	1.6	12.1

TABLE 3--WIND VELOCITIES AND TURBULENCE INTENSITIES

FLOW THROUGH EXHAUST VENTS, SHUTTLE ASSEMBLY, VANDENBERG

CONFIGURATION G : DATA ON DOORS 1, 2, 3,
DOORS OPENED : 2, 3, 4,
DOORS PARTIALLY CLOSED :1, 5, 6,

DOOR 1

WIND AZIMUTH	UMEAN/UINF (PERCENT)	URMS/UINF (PERCENT)	UMEAN+3*URMS/UINF (PERCENT)
0.00	2.3	.7	4.5
22.50	2.4	.8	4.7
45.00	2.1	.6	3.9
67.50	1.9	.5	3.4
90.00	2.1	.7	4.1
112.50	2.1	.7	4.1
135.00	2.6	.8	5.1
157.50	3.6	1.1	7.0
180.00	3.7	1.2	7.2
202.50	4.0	1.4	8.1
225.00	4.3	1.5	8.9
247.50	3.2	1.0	6.3
270.00	1.1	.2	1.8
292.50	1.2	.2	1.7
315.00	2.3	.7	4.4
337.50	2.1	.6	3.8

DOOR 2

WIND AZIMUTH	UMEAN/UINF (PERCENT)	URMS/UINF (PERCENT)	UMEAN+3*URMS/UINF (PERCENT)
0.00	1.8	.6	3.5
22.50	1.7	.6	3.5
45.00	1.8	.7	4.0
67.50	1.3	.2	2.0
90.00	1.1	.2	1.7
112.50	2.3	.5	3.9
135.00	2.7	.7	4.8
157.50	2.5	.6	4.2
180.00	2.5	.6	4.3
202.50	2.0	.5	3.5
225.00	1.7	.3	2.7
247.50	1.6	.2	2.3
270.00	1.3	.3	2.1
292.50	1.4	.2	2.2
315.00	1.9	.6	3.7
337.50	2.1	.7	4.4

DOOR 3

WIND AZIMUTH	UMEAN/UINF (PERCENT)	URMS/UINF (PERCENT)	UMEAN+3*URMS/UINF (PERCENT)
0.00	2.7	.7	4.9
22.50	2.7	.7	4.7
45.00	2.8	.7	4.9
67.50	2.3	.5	3.9
90.00	1.6	.4	2.7
112.50	2.0	.6	3.9
135.00	2.3	1.0	5.1
157.50	1.6	.5	3.2
180.00	1.5	.3	2.5
202.50	1.5	.3	2.4
225.00	1.4	.4	2.6
247.50	1.7	.4	2.9
270.00	2.0	.5	3.4
292.50	1.5	.3	2.3
315.00	2.3	.5	3.9
337.50	2.4	.6	4.4

TABLE 3--WIND VELOCITIES AND TURBULENCE INTENSITIES

FLOW THROUGH EXHAUST VENTS, SHUTTLE ASSEMBLY, VANDENBERG

CONFIGURATION G : DATA ON DOORS 1, 2, 3,
DOORS OPENED : 2, 3, 4,
DOORS PARTIALLY CLOSED :1, 5, 6,

* * GREATEST VALUES * *

UMEAN/UINF (PERCENT)

LOC/DR	AZ	MEAN	RMS	M+3RMS
1	225.0	4.3	1.5	8.9
1	202.5	4.0	1.4	8.1
1	180.0	3.7	1.2	7.2
1	157.5	3.6	1.1	7.0
1	247.5	3.2	1.0	6.3
3	45.0	2.8	.7	4.9
3	0.0	2.7	.7	4.9
2	135.0	2.7	.7	4.8
3	22.5	2.7	.7	4.7
1	135.0	2.6	.8	5.1

URMS/UINF (PERCENT)

LOC/DR	AZ	MEAN	RMS	M+3RMS
1	225.0	4.3	1.5	8.9
1	202.5	4.0	1.4	8.1
1	180.0	3.7	1.2	7.2
1	157.5	3.6	1.1	7.0
1	247.5	3.2	1.0	6.3
3	135.0	2.3	1.0	5.1
1	135.0	2.6	.8	5.1
1	22.5	2.4	.8	4.7
2	337.5	2.1	.7	4.4
2	45.0	1.8	.7	4.0

UMEAN+3*RMS/UINF (PERCENT)

LOC/DR	AZ	MEAN	RMS	M+3RMS
1	225.0	4.3	1.5	8.9
1	202.5	4.0	1.4	8.1
1	180.0	3.7	1.2	7.2
1	157.5	3.6	1.1	7.0
1	247.5	3.2	1.0	6.3
3	135.0	2.3	1.0	5.1
1	135.0	2.6	.8	5.1
3	45.0	2.8	.7	4.9
3	0.0	2.7	.7	4.9
2	135.0	2.7	.7	4.8

TABLE 4--WIND VELOCITIES AND TURBULENCE INTENSITIES

FLOW THROUGH EXHAUST VENTS, SHUTTLE ASSEMBLY, VANDENBERG

CONFIGURATION A : DATA ON DOORS 1, 2, 3,
DOORS OPENED : 1, 2, 3, 4, 5, 6

DOOR 1

WIND AZIMUTH	UMEAN (MPH)	URMS (MPH)	UMEAN+3*URMS (MPH)
0.00	9.6	2.0	15.6
22.50	7.0	1.5	11.5
45.00	7.8	1.2	11.3
67.50	6.9	.7	8.9
90.00	1.9	.8	4.2
112.50	3.3	1.1	6.5
135.00	5.1	1.7	10.4
157.50	9.2	2.6	17.0
180.00	9.4	2.8	17.9
202.50	13.4	3.6	24.3
225.00	15.9	4.0	27.9
247.50	8.4	2.4	15.5
270.00	3.9	.6	5.6
292.50	7.2	.7	9.4
315.00	9.7	1.1	12.9
337.50	10.4	1.0	13.3

DOOR 2

WIND AZIMUTH	UMEAN (MPH)	URMS (MPH)	UMEAN+3*URMS (MPH)
0.00	4.2	2.2	10.7
22.50	6.6	3.7	17.7
45.00	7.5	4.1	19.8
67.50	4.1	2.3	10.9
90.00	2.6	.6	4.3
112.50	7.5	1.6	12.2
135.00	10.1	2.0	16.2
157.50	9.1	2.1	15.2
180.00	8.1	1.5	12.5
202.50	8.3	1.6	13.2
225.00	8.5	1.6	13.4
247.50	6.2	1.2	9.9
270.00	2.0	.9	4.6
292.50	4.7	2.8	13.2
315.00	4.2	2.1	10.6
337.50	4.0	2.2	10.6

DOOR 3

WIND AZIMUTH	UMEAN (MPH)	URMS (MPH)	UMEAN+3*URMS (MPH)
0.00	5.7	3.3	15.5
22.50	6.8	2.5	14.5
45.00	6.6	2.6	14.2
67.50	4.0	1.8	9.3
90.00	.9	.3	1.8
112.50	2.5	1.0	5.5
135.00	3.6	1.9	9.2
157.50	3.0	1.3	6.8
180.00	2.7	1.0	5.5
202.50	2.9	1.3	6.8
225.00	3.6	1.4	7.6
247.50	2.4	.9	5.2
270.00	1.7	.7	3.8
292.50	2.5	1.4	6.6
315.00	6.7	4.0	18.6
337.50	7.0	4.6	20.9

TABLE 4--WIND VELOCITIES AND TURBULENCE INTENSITIES

FLOW THROUGH EXHAUST VENTS, SHUTTLE ASSEMBLY, VANDENBERG

CONFIGURATION A : DATA ON DOORS 1, 2, 3,
DOORS OPENED : 1, 2, 3, 4, 5, 6

* * GREATEST VALUES * *

UMEAN (MPH)

LOC/DR	AZ	MEAN	RMS	M+3RMS
1	225.0	15.9	4.0	27.9
1	202.5	13.4	3.6	24.3
1	337.5	10.4	1.0	13.3
2	135.0	10.1	2.0	16.2
1	315.0	9.7	1.1	12.9
1	0.0	9.6	2.0	15.6
1	180.0	9.4	2.8	17.9
1	157.5	9.2	2.6	17.0
2	157.5	9.1	2.1	15.2
2	225.0	8.5	1.6	13.4

URMS (MPH)

LOC/DR	AZ	MEAN	RMS	M+3RMS
3	337.5	7.0	4.6	20.9
2	45.0	7.5	4.1	19.8
1	225.0	15.9	4.0	27.9
3	315.0	6.7	4.0	18.6
2	22.5	6.6	3.7	17.7
1	202.5	13.4	3.6	24.3
3	0.0	5.7	3.3	15.5
1	180.0	9.4	2.8	17.9
2	292.5	4.7	2.8	13.2
1	157.5	9.2	2.6	17.0

UMEAN+3*RMS (MPH)

LOC/DR	AZ	MEAN	RMS	M+3RMS
1	225.0	15.9	4.0	27.9
1	202.5	13.4	3.6	24.3
3	337.5	7.0	4.6	20.9
2	45.0	7.5	4.1	19.8
3	315.0	6.7	4.0	18.6
1	180.0	9.4	2.8	17.9
2	22.5	6.6	3.7	17.7
1	157.5	9.2	2.6	17.0
2	135.0	10.1	2.0	16.2
1	0.0	9.6	2.0	15.6

TABLE 4--WIND VELOCITIES AND TURBULENCE INTENSITIES

FLOW THROUGH EXHAUST VENTS, SHUTTLE ASSEMBLY, VANDENBERG

CONF ˆURATION B : DATA ON DOORS 2, 3,
DOORS OPENED : 2, 3, 4, 5, 6,
DOORS CLOSED : 1,

DOOR 3 WIND AZIMUTH	UMEAN (MPH)	URMS (MPH)	UMEAN+3*URMS (MPH)	DOOR 2 WIND AZIMUTH	UMEAN (MPH)	URMS (MPH)	UMEAN+3*URMS (MPH)
0.00	6.8	2.1	13.2	0.00	3.1	1.5	7.6
22.50	9.2	2.6	17.1	22.50	4.9	2.6	12.8
45.00	8.7	2.4	15.9	45.00	5.0	2.9	13.8
67.50	5.1	1.4	9.3	67.50	2.6	1.2	6.1
90.00	1.1	.3	2.1	90.00	2.9	.8	5.3
112.50	3.2	1.5	7.8	112.50	7.1	1.9	12.7
135.00	4.8	2.6	12.7	135.00	8.8	2.3	15.7
157.50	4.2	1.9	9.8	157.50	9.8	2.4	17.0
180.00	2.6	1.2	6.2	180.00	7.4	2.1	13.6
202.50	2.4	1.0	5.4	202.50	6.6	2.0	12.5
225.00	2.3	1.0	5.4	225.00	7.4	1.9	13.1
247.50	2.2	.8	4.8	247.50	5.8	1.5	10.3
270.00	1.2	.4	2.4	270.00	2.8	.7	5.0
292.50	4.8	1.4	9.1	292.50	2.3	1.2	6.0
315.00	6.5	2.3	13.4	315.00	3.3	1.6	8.2
337.50	5.9	2.2	12.3	337.50	2.9	1.4	7.1

TABLE 4--WIND VELOCITIES AND TURBULENCE INTENSITIES

FLOW THROUGH EXHAUST VENTS, SHUTTLE ASSEMBLY, VANDENBERG

CONFIGURATION B : DATA ON DOORS 2, 3,
DOORS OPENED : 2, 3, 4, 5, 6,
DOORS CLOSED : 1,

* * GREATEST VALUES * *

UMEAN (MPH)

LOC/DR	AZ	MEAN	RMS	M+3RMS
2	157.5	9.8	2.4	17.0
3	22.5	9.2	2.6	17.1
2	135.0	8.8	2.3	15.7
3	45.0	8.7	2.4	15.9
2	180.0	7.4	2.1	13.6
2	225.0	7.4	1.9	13.1
2	112.5	7.1	1.9	12.7
3	0.0	6.8	2.1	13.2
2	202.5	6.6	2.0	12.5
3	315.0	6.5	2.3	13.4

URMS (MPH)

LOC/DR	AZ	MEAN	RMS	M+3RMS
2	45.0	5.0	2.9	13.8
2	22.5	4.9	2.6	12.8
3	22.5	9.2	2.6	17.1
3	135.0	4.8	2.6	12.7
3	45.0	8.7	2.4	15.9
2	157.5	9.8	2.4	17.0
2	135.0	8.8	2.3	15.7
3	315.0	6.5	2.3	13.4
3	337.5	5.9	2.2	12.3
3	0.0	6.8	2.1	13.2

UMEAN+3*RMS (MPH)

LOC/DR	AZ	MEAN	RMS	M+3RMS
3	22.5	9.2	2.6	17.1
2	157.5	9.8	2.4	17.0
3	45.0	8.7	2.4	15.9
2	135.0	8.8	2.3	15.7
2	45.0	5.0	2.9	13.8
2	180.0	7.4	2.1	13.6
3	315.0	6.5	2.3	13.4
3	0.0	6.8	2.1	13.2
2	225.0	7.4	1.9	13.1
2	22.5	4.9	2.6	12.8

TABLE 4--WIND VELOCITIES AND TURBULENCE INTENSITIES

FLOW THROUGH EXHAUST VENTS, SHUTTLE ASSEMBLY, VANDENBERG

CONFIGURATION C : DATA ON DOORS 2, 3,
DOORS OPENED : 2, 3, 4, 5, 6,
DOORS PARTIALLY CLOSED : 1,

DOOR 3				DOOR 2			
WIND AZIMUTH	UMEAN (MPH)	URMS (MPH)	UMEAN+3*URMS (MPH)	WIND AZIMUTH	UMEAN (MPH)	URMS (MPH)	UMEAN+3*URMS (MPH)
0.00	6.9	2.3	13.6	0.00	3.0	1.8	8.5
22.50	8.8	2.6	16.6	22.50	7.4	5.1	22.6
45.00	8.7	2.5	16.3	45.00	8.8	5.5	25.2
67.50	5.3	1.5	9.7	67.50	2.6	1.5	7.2
90.00	1.1	.4	2.2	90.00	3.1	.9	5.8
112.50	3.1	1.3	7.0	112.50	7.9	2.1	14.3
135.00	4.5	2.4	11.7	135.00	10.0	2.4	17.4
157.50	4.0	1.9	9.6	157.50	10.7	2.5	18.0
180.00	2.6	1.1	5.9	180.00	8.1	2.3	14.9
202.50	2.4	.9	5.2	202.50	7.1	2.1	13.3
225.00	2.5	1.0	5.4	225.00	7.8	2.2	14.5
247.50	2.2	.7	4.5	247.50	6.4	1.4	10.7
270.00	1.3	.4	2.6	270.00	3.1	.9	5.6
292.50	4.8	1.6	9.7	292.50	3.5	2.3	10.3
315.00	6.2	2.2	12.8	315.00	3.4	2.2	10.0
337.50	5.9	2.1	12.1	337.50	2.9	1.9	8.7

TABLE 4--WIND VELOCITIES AND TURBULENCE INTENSITIES

FLOW THROUGH EXHAUST VENTS, SHUTTLE ASSEMBLY, VANDENBERG

CONFIGURATION C : DATA ON DOORS 2, 3,
DOORS OPENED : 2, 3, 4, 5, 6,
DOORS PARTIALLY CLOSED : 1,

* * GREATEST VALUES * *

UMEAN (MPH)

LOC/DR	AZ	MEAN	RMS	M+3RMS
2	157.5	10.7	2.5	18.0
2	135.0	10.0	2.4	17.4
2	45.0	8.8	5.5	25.2
3	22.5	8.8	2.6	16.6
3	45.0	8.7	2.5	16.3
2	180.0	8.1	2.3	14.9
2	112.5	7.9	2.1	14.3
2	225.0	7.8	2.2	14.5
2	22.5	7.4	5.1	22.6
2	202.5	7.1	2.1	13.3

URMS (MPH)

LOC/DR	AZ	MEAN	RMS	M+3RMS
2	45.0	8.8	5.5	25.2
2	22.5	7.4	5.1	22.6
3	22.5	8.8	2.6	16.6
3	45.0	8.7	2.5	16.3
2	157.5	10.7	2.5	18.0
2	135.0	10.0	2.4	17.4
3	135.0	4.5	2.4	11.7
2	292.5	3.5	2.3	10.3
2	180.0	8.1	2.3	14.9
3	0.0	6.9	2.3	13.6

UMEAN+3*RMS (MPH)

LOC/DR	AZ	MEAN	RMS	M+3RMS
2	45.0	8.8	5.5	25.2
2	22.5	7.4	5.1	22.6
2	157.5	10.7	2.5	18.0
2	135.0	10.0	2.4	17.4
3	22.5	8.8	2.6	16.6
3	45.0	8.7	2.5	16.3
2	180.0	8.1	2.3	14.9
2	225.0	7.8	2.2	14.5
2	112.5	7.9	2.1	14.3
3	0.0	6.9	2.3	13.6

TABLE 4--WIND VELOCITIES AND TURBULENCE INTENSITIES

FLOW THROUGH EXHAUST VENTS, SHUTTLE ASSEMBLY, VANDENBERG

CONFIGURATION E : DATA ON DOORS 1, 2, 3,
DOORS OPENED : 4, 5, 6,
DOORS PARTIALLY CLOSED : 1, 2, 3,

LOCATION 1

WIND AZIMUTH	UMEAN (MPH)	URMS (MPH)	UMEAN+3*URMS (MPH)
0.00	1.6	.2	2.3
22.50	1.7	.3	2.5
45.00	1.8	.3	2.5
67.50	1.6	.2	2.2
90.00	1.1	.0	1.2
112.50	1.3	.1	1.5
135.00	1.5	.2	2.1
157.50	1.6	.2	2.1
180.00	1.5	.2	2.0
202.50	1.3	0.0	1.3
225.00	1.3	.1	1.7
247.50	1.3	.1	1.5
270.00	1.1	0.0	1.1
292.50	1.3	.1	1.7
315.00	1.7	.2	2.2
337.50	1.7	.2	2.4

LOCATION 2

WIND AZIMUTH	UMEAN (MPH)	URMS (MPH)	UMEAN+3*URMS (MPH)
0.00	1.5	.2	2.0
22.50	1.6	.2	2.2
45.00	1.7	.2	2.3
67.50	1.4	.1	1.8
90.00	1.0	0.0	1.0
112.50	1.1	0.0	1.1
135.00	1.4	.1	1.6
157.50	1.2	.1	1.3
180.00	1.2	.1	1.5
202.50	1.2	.0	1.3
225.00	1.3	.1	1.6
247.50	1.4	.1	1.7
270.00	1.0	0.0	1.0
292.50	1.2	.1	1.4
315.00	1.2	0.0	1.2
337.50	1.3	.1	1.7

LOCATION 3

WIND AZIMUTH	UMEAN (MPH)	URMS (MPH)	UMEAN+3*URMS (MPH)
0.00	1.5	.1	1.8
22.50	1.6	.1	1.8
45.00	1.6	.1	1.8
67.50	1.4	0.0	1.4
90.00	1.1	0.0	1.1
112.50	1.1	0.0	1.1
135.00	1.2	.0	1.3
157.50	1.1	.0	1.3
180.00	1.2	0.0	1.2
202.50	1.1	0.0	1.1
225.00	1.3	.0	1.4
247.50	1.4	0.0	1.4
270.00	1.1	0.0	1.1
292.50	1.3	.1	1.6
315.00	1.3	.1	1.5
337.50	1.4	0.0	1.4

LOCATION

WIND AZIMUTH	UMEAN (MPH)	URMS (MPH)	UMEAN+3*URMS (MPH)
0.00	1.3	.0	1.4
22.50	1.3	.0	1.4
45.00	1.3	.1	1.5
67.50	1.1	0.0	1.1
90.00	1.1	0.0	1.1
112.50	1.5	.1	1.7
135.00	1.4	.1	1.6
157.50	1.4	.0	1.5
180.00	1.5	.1	1.7
202.50	1.4	.1	1.6
225.00	1.4	.0	1.5
247.50	1.2	.0	1.3
270.00	1.0	0.0	1.0
292.50	1.2	.0	1.3
315.00	1.3	0.0	1.3
337.50	1.2	.0	1.3

TABLE 4--WIND VELOCITIES AND TURBULENCE INTENSITIES

FLOW THROUGH EXHAUST VENTS, SHUTTLE ASSEMBLY, VANDENBERG

CONFIGURATION E : DATA ON DOORS 1, 2, 3,
DOORS OPENED : 4, 5, 6,
DOORS PARTIALLY CLOSED : 1, 2, 3,

LOCATION 5

WIND AZIMUTH	UMEAN (MPH)	URMS (MPH)	UMEAN+3*URMS (MPH)
0.00	.5	.1	.8
22.50	.5	.1	.8
45.00	.5	.1	.8
67.50	.5	.1	.7
90.00	.4	.1	.7
112.50	.7	.1	1.1
135.00	.8	.2	1.5
157.50	.7	.2	1.2
180.00	.6	.1	1.0
202.50	.5	.1	.8
225.00	.4	.1	.7
247.50	.4	.1	.7
270.00	.4	.1	.7
292.50	.4	.1	.7
315.00	.4	.1	.6
337.50	.4	.1	.6

LOCATION

WIND AZIMUTH	UMEAN (MPH)	URMS (MPH)	UMEAN+3*URMS (MPH)
0.00	.7	.1	1.1
22.50	.7	.1	1.1
45.00	.7	.1	1.0
67.50	.7	.1	.8
90.00	.4	.0	.5
112.50	.4	.1	.6
135.00	.4	.1	.7
157.50	.4	.1	.7
180.00	.4	.1	.6
202.50	.5	.1	.8
225.00	.5	.1	.8
247.50	.4	.1	.7
270.00	.4	.1	.6
292.50	.4	.1	.7
315.00	.5	.0	.6
337.50	.6	.1	.9

LOCATION 7

WIND AZIMUTH	UMEAN (MPH)	URMS (MPH)	UMEAN+3*URMS (MPH)
0.00	.5	.1	.8
22.50	.5	.1	.8
45.00	.5	.1	.8
67.50	.5	.1	.8
90.00	.6	.1	.9
112.50	.5	.1	.7
135.00	.6	.1	1.1
157.50	1.0	.4	2.2
180.00	1.3	.5	2.8
202.50	1.0	.4	2.3
225.00	.8	.3	1.8
247.50	.7	.2	1.3
270.00	.5	.1	.7
292.50	.4	.1	.6
315.00	.4	.1	.6
337.50	.4	.1	.7

LOCATION 8

WIND AZIMUTH	UMEAN (MPH)	URMS (MPH)	UMEAN+3*URMS (MPH)
0.00	.4	.1	.7
22.50	.4	.1	.8
45.00	.5	.1	.7
67.50	.4	.1	.7
90.00	.5	.1	.9
112.50	.4	.1	.6
135.00	.5	.1	.7
157.50	.6	.2	1.0
180.00	.9	.3	1.8
202.50	.9	.3	1.8
225.00	.8	.2	1.4
247.50	.5	.1	.8
270.00	.4	.1	.6
292.50	.4	.1	.7
315.00	.4	.1	.6
337.50	.4	.1	.6

TABLE 4--WIND VELOCITIES AND TURBULENCE INTENSITIES

FLOW THROUGH EXHAUST VENTS, SHUTTLE ASSEMBLY, VANDENBERG

CONFIGURATION E : DATA ON DOORS 1, 2, 3,
DOORS OPENED : 4, 5, 6,
DOORS PARTIALLY CLOSED : 1, 2, 3,

LOCATION 9

WIND AZIMUTH	UMEAN (MPH)	URMS (MPH)	UMEAN+3*URMS (MPH)
0.00	.8	.1	1.3
22.50	.9	.2	1.5
45.00	.9	.2	1.5
67.50	.8	.1	1.1
90.00	.4	.1	.7
112.50	.4	.1	.6
135.00	.6	.1	.9
157.50	.5	.1	.8
180.00	.5	.1	.8
202.50	.6	.1	.8
225.00	1.0	.3	1.9
247.50	.7	.2	1.2
270.00	.4	.1	.7
292.50	.4	.1	.7
315.00	.5	.1	.8
337.50	.6	.1	.9

LOCATION 10

WIND AZIMUTH	UMEAN (MPH)	URMS (MPH)	UMEAN+3*URMS (MPH)
0.00	1.3	0.0	1.3
22.50	1.4	0.0	1.4
45.00	1.4	0.0	1.4
67.50	1.3	0.0	1.3
90.00	2.5	.5	3.9
112.50	2.2	.4	3.3
135.00	2.4	.4	3.7
157.50	2.6	.5	4.2
180.00	2.8	.7	4.8
202.50	2.9	.8	5.4
225.00	4.6	.8	7.0
247.50	2.8	.5	4.4
270.00	1.2	.1	1.4
292.50	1.3	0.0	1.3
315.00	1.4	.1	1.6
337.50	1.3	0.0	1.3

LOCATION 11

WIND AZIMUTH	UMEAN (MPH)	URMS (MPH)	UMEAN+3*URMS (MPH)
0.00	2.5	.3	3.3
22.50	2.7	.3	3.7
45.00	2.7	.3	3.7
67.50	2.4	.3	3.2
90.00	2.2	.3	3.2
112.50	2.3	.3	3.1
135.00	2.5	.3	3.6
157.50	2.2	.4	3.4
180.00	1.9	.3	2.8
202.50	1.7	.3	2.5
225.00	3.3	.7	5.4
247.50	2.7	.3	3.7
270.00	1.2	.0	1.3
292.50	1.1	0.0	1.1
315.00	1.9	.2	2.6
337.50	2.3	.2	3.0

LOCATION 12

WIND AZIMUTH	UMEAN (MPH)	URMS (MPH)	UMEAN+3*URMS (MPH)
0.00	1.8	.3	2.8
22.50	1.9	.3	2.9
45.00	1.9	.3	2.8
67.50	1.7	.3	2.6
90.00	1.6	.3	2.3
112.50	2.0	.2	2.7
135.00	2.0	.3	2.9
157.50	1.9	.3	2.7
180.00	1.9	.3	2.8
202.50	1.9	.3	2.6
225.00	2.9	.6	4.6
247.50	2.0	.3	2.8
270.00	1.2	.0	1.2
292.50	1.3	.0	1.4
315.00	1.3	.1	1.5
337.50	1.7	.2	2.4

TABLE 4--WIND VELOCITIES AND TURBULENCE INTENSITIES

FLOW THROUGH EXHAUST VENTS, SHUTTLE ASSEMBLY, VANDENBERG

CONFIGURATION E : DATA ON DOORS 1, 2, 3,
DOORS OPENED : 4, 5, 6,
DOORS PARTIALLY CLOSED : 1, 2, 3,

DOOR 1

WIND AZIMUTH	UMEAN (MPH)	URMS (MPH)	UMEAN+3*URMS (MPH)
0.00	.5	.2	1.1
22.50	.4	.1	.8
45.00	.4	.1	.8
67.50	.5	.1	.8
90.00	1.7	.8	4.2
112.50	1.2	.7	3.1
135.00	2.0	.9	4.8
157.50	1.2	.4	2.4
180.00	1.2	.4	2.6
202.50	1.2	.3	2.2
225.00	1.6	.5	3.1
247.50	1.4	.4	2.7
270.00	.3	.1	.5
292.50	.6	.1	.9
315.00	.8	.2	1.3
337.50	.7	.1	1.1

DOOR 2

WIND AZIMUTH	UMEAN (MPH)	URMS (MPH)	UMEAN+3*URMS (MPH)
0.00	3.9	.4	5.1
22.50	4.0	.4	5.1
45.00	3.9	.4	5.0
67.50	3.3	.3	4.3
90.00	2.5	.8	4.8
112.50	7.4	.6	9.2
135.00	8.0	.5	9.6
157.50	8.4	.8	10.9
180.00	6.7	1.1	10.1
202.50	6.6	1.0	9.6
225.00	8.1	.8	10.5
247.50	7.0	.9	9.6
270.00	3.7	.9	6.3
292.50	2.5	.3	3.4
315.00	3.5	.3	4.5
337.50	3.8	.4	5.0

DOOR 3

WIND AZIMUTH	UMEAN (MPH)	URMS (MPH)	UMEAN+3*URMS (MPH)
0.00	1.6	.6	3.5
22.50	2.4	.3	3.3
45.00	2.7	.3	3.6
67.50	1.6	.2	2.2
90.00	.4	.1	.7
112.50	.5	.1	.8
135.00	.6	.1	.9
157.50	.5	.1	.8
180.00	.5	.1	.8
202.50	.5	.1	.8
225.00	.4	.1	.7
247.50	.4	.1	.7
270.00	.4	.1	.7
292.50	1.6	.2	2.2
315.00	2.2	.4	3.5
337.50	1.4	.5	2.9

TABLE 4--WIND VELOCITIES AND TURBULENCE INTENSITIES

FLOW THROUGH EXHAUST VENTS, SHUTTLE ASSEMBLY, VANDENBERG

CONFIGURATION E : DATA ON DOORS 1, 2, 3,
DOORS OPENED : 4, 5, 6,
DOORS PARTIALLY CLOSED : 1, 2, 3,

* * GREATEST VALUES * *

UMEAN (MPH)					URMS (MPH)					UMEAN+3*RMS (MPH)				
LOC/DR	AZ	MEAN	RMS	M+3RMS	LOC/DR	AZ	MEAN	RMS	M+3RMS	LOC/DR	AZ	MEAN	RMS	M+3RMS
2	157.5	8.4	.8	10.9	2	180.0	6.7	1.1	10.1	2	157.5	8.4	.8	10.9
2	225.0	8.1	.8	10.5	2	202.5	6.6	1.0	9.6	2	225.0	8.1	.8	10.5
2	135.0	8.0	.5	9.6	1	135.0	2.0	.9	4.8	2	180.0	6.7	1.1	10.1
2	112.5	7.4	.6	9.2	2	247.5	7.0	.9	9.6	2	202.5	6.6	1.0	9.6
2	247.5	7.0	.9	9.6	2	270.0	3.7	.9	6.3	2	135.0	8.0	.5	9.6
2	180.0	6.7	1.1	10.1	2	157.5	8.4	.8	10.9	2	247.5	7.0	.9	9.6
2	202.5	6.6	1.0	9.6	10	202.5	2.9	.8	5.4	2	112.5	7.4	.6	9.2
10	225.0	4.6	.8	7.0	1	90.0	1.7	.8	4.2	10	225.0	4.6	.8	7.0
2	22.5	4.0	.4	5 1	2	225.0	8.1	.8	10.5	2	270.0	3.7	.9	6.3
2	45.0	3.9	.4	5.0	10	225.0	4.6	.8	7.0	11	225.0	3.3	.7	5.4

TABLE 4--WIND VELOCITIES AND TURBULENCE INTENSITIES

FLOW THROUGH EXHAUST VENTS, SHUTTLE ASSEMBLY, VANDENBERG

CONFIGURATION G : DATA ON DOORS 1, 2, 3,
DOORS OPENED : 2, 3, 4,
DOORS PARTIALLY CLOSED : 1, 5, 6,

DOOR 1

WIND AZIMUTH	UMEAN (MPH)	URMS (MPH)	UMEAN+3*URMS (MPH)
0.00	1.0	.3	2.0
22.50	1.1	.3	2.1
45.00	.9	.3	1.8
67.50	.8	.2	1.5
90.00	1.0	.3	1.8
112.50	.9	.3	1.8
135.00	1.2	.4	2.3
157.50	1.6	.5	3.2
180.00	1.7	.5	3.2
202.50	1.8	.6	3.7
225.00	1.9	.7	4.0
247.50	1.4	.5	2.8
270.00	.5	.1	.8
292.50	.5	.1	.8
315.00	1.0	.3	2.0
337.50	.9	.3	1.7

DOOR 2

WIND AZIMUTH	UMEAN (MPH)	URMS (MPH)	UMEAN+3*URMS (MPH)
0.00	.8	.3	1.6
22.50	.8	.3	1.6
45.00	.8	.3	1.8
67.50	.6	.1	.9
90.00	.5	.1	.8
112.50	1.0	.2	1.8
135.00	1.2	.3	2.2
157.50	1.1	.3	1.9
180.00	1.1	.3	1.9
202.50	.9	.2	1.6
225.00	.8	.1	1.2
247.50	.7	.1	1.0
270.00	.6	.1	.9
292.50	.6	.1	1.0
315.00	.9	.3	1.7
337.50	.9	.3	2.0

DOOR 3

WIND AZIMUTH	UMEAN (MPH)	URMS (MPH)	UMEAN+3*URMS (MPH)
0.00	1.2	.3	2.2
22.50	1.2	.3	2.1
45.00	1.3	.3	2.2
67.50	1.0	.2	1.8
90.00	.7	.2	1.2
112.50	.9	.3	1.8
135.00	1.0	.4	2.3
157.50	.7	.2	1.4
180.00	.7	.1	1.1
202.50	.7	.1	1.1
225.00	.6	.2	1.2
247.50	.8	.2	1.3
270.00	.9	.2	1.5
292.50	.7	.1	1.0
315.00	1.1	.2	1.7
337.50	1.1	.3	2.0

TABLE 4--WIND VELOCITIES AND TURBULENCE INTENSITIES

FLOW THROUGH EXHAUST VENTS, SHUTTLE ASSEMBLY, VANDENBERG

CONFIGURATION G : DATA ON DOORS 1, 2, 3,
DOORS OPENED : 2, 3, 4,
DOORS PARTIALLY CLOSED : 1, 5, 6,

* * GREATEST VALUES * *

UMEAN (MPH)

LOC/DR	AZ	MEAN	RMS	M+3RMS
1	225.0	1.9	.7	4.0
1	202.5	1.8	.6	3.7
1	180.0	1.7	.5	3.2
1	157.5	1.6	.5	3.2
1	247.5	1.4	.5	2.8
3	45.0	1.3	.3	2.2
3	0.0	1.2	.3	2.2
2	135.0	1.2	.3	2.2
3	22.5	1.2	.3	2.1
1	135.0	1.2	.4	2.3

URMS (MPH)

LOC/DR	AZ	MEAN	RMS	M+3RMS
1	225.0	1.9	.7	4.0
1	202.5	1.8	.6	3.7
1	180.0	1.7	.5	3.2
1	157.5	1.6	.5	3.2
1	247.5	1.4	.5	2.8
3	135.0	1.0	.4	2.3
1	135.0	1.2	.4	2.3
1	22.5	1.1	.3	2.1
2	337.5	.9	.3	2.0
2	45.0	.8	.3	1.8

UMEAN+3*RMS (MPH)

LOC/DR	AZ	MEAN	RMS	M+3RMS
1	225.0	1.9	.7	4.0
1	202.5	1.8	.6	3.7
1	180.0	1.7	.5	3.2
1	157.5	1.6	.5	3.2
1	247.5	1.4	.5	2.8
3	135.0	1.0	.4	2.3
1	135.0	1.2	.4	2.3
3	45.0	1.3	.3	2.2
3	0.0	1.2	.3	2.2
2	135.0	1.2	.3	2.2

TABLE 5A. PEAK LOADS FOR CONFIGURATION B : FLOW THROUGH EXHAUST VENTS, SHUTTLE ASSEMBLY, VANDENBERG
DATA ON DOORS 2,
DOORS OPENED : 2, 3, 4, 5, 6,
DOORS CLOSED : 1,

LARGEST VALUES OF CLADDING LOAD REFERENCE PRESSURE = 21.0 PSF

TAP	AZI-MUTH	PRESS COEFF	NEGATIVE PEAK ---- PSF	POSITIVE PEAK ----	TAP	AZI-MUTH	PRESS COEFF	NEGATIVE PEAK ---- PSF	POSITIVE PEAK ----	TAP	AZI-MUTH	PRESS COEFF	NEGATIVE PEAK ---- PSF	POSITIVE PEAK ----
101	315	-1.36	-28.6	13.9	111	225	-.64	-13.5	4.3					

TABLE 5A. PEAK LOADS FOR CONFIGURATION B : FLOW THROUGH EXHAUST VENTS, SHUTTLE ASSEMBLY, VANDENBERG
DATA ON DOORS 2,
DOORS OPENED : 2, 3, 4, 5, 6,
DOORS CLOSED : 1,

LARGEST VALUES OF CLADDING LOAD REFERENCE PRESSURE = 21.0 PSF

* * 2 GREATEST PRESSURE MAGNITUDES * *

TAP	AZI-MUTH	PRESS COEFF	NEGATIVE PEAK (PSF)	POSITIVE PEAK (PSF)
101	315	-1.36	-28.6	13.9
111	225	-.64	-13.5	4.3

TABLE 5A. PEAK LOADS FOR CONFIGURATION D : FLOW THROUGH EXHAUST VENTS, SHUTTLE ASSEMBLY, VANDENBERG
DATA ON DOORS 1, 2, 3,
DOORS OPENED : 4, 5, 6,
DOORS CLOSED : 1, 2, 3,

LARGEST VALUES OF CLADDING LOAD REFERENCE PRESSURE = 21.0 PSF

TAP	AZI-MUTH	PRESS COEFF	NEGATIVE PEAK ---- PSF ----	POSITIVE PEAK ---- PSF ----	TAP	AZI-MUTH	PRESS COEFF	NEGATIVE PEAK ---- PSF ----	POSITIVE PEAK ---- PSF ----	TAP	AZI-MUTH	PRESS COEFF	NEGATIVE PEAK ---- PSF ----	POSITIVE PEAK ---- PSF ----
101	315	-1.34	-28.1	14.0	201	225	-1.18	-24.8	13.7	301	22	-1.30	-27.4	12.8
111	0	-.82	-17.2	3.2	211	0	-.78	-16.4	2.8	311	0	-.81	-17.0	3.2

TABLE 5A. PEAK LOADS FOR CONFIGURATION D : FLOW THROUGH EXHAUST VENTS, SHUTTLE ASSEMBLY, VANDENBERG
DATA ON DOORS 1, 2, 3,
DOORS OPENED : 4, 5, 6,
DOORS CLOSED : 1, 2, 3,

LARGEST VALUES OF CLADDING LOAD REFERENCE PRESSURE = 21.0 PSF

* * 6 GREATEST PRESSURE MAGNITUDES * *

TAP	AZI-MUTH	PRESS COEFF	NEGATIVE PEAK (PSF)	POSITIVE PEAK (PSF)
101	315	-1.34	-28.1	14.0
301	22	-1.30	-27.4	12.8
201	225	-1.18	-24.8	13.7
111	0	-.82	-17.2	3.2
311	0	-.81	-17.0	3.2
211	0	-.78	-16.4	2.8

TABLE 5A. PEAK LOADS FOR CONFIGURATION E : FLOW THROUGH EXHAUST VENTS, SHUTTLE ASSEMBLY, VANDENBERG
DATA ON DOORS 1, 2, 3,
DOORS OPENED : 4, 5, 6,
DOORS PARTIALLY CLOSED : 1, 2, 3,

LARGEST VALUES OF CLADDING LOAD REFERENCE PRESSURE = 21.0 PSF

TAP	AZI-MUTH	PRESS COEFF	NEGATIVE PEAK (PSF)	POSITIVE PEAK (PSF)	TAP	AZI-MUTH	PRESS COEFF	NEGATIVE PEAK (PSF)	POSITIVE PEAK (PSF)	TAP	AZI-MUTH	PRESS COEFF	NEGATIVE PEAK (PSF)	POSITIVE PEAK (PSF)
101	315	-1.40	-29.5	13.1	201	225	-1.15	-24.2	11.9	301	0	-1.21	-25.4	11.7
111	90	-.58	-12.2	3.9	211	45	-.59	-12.4	4.3	311	292	-.66	-13.8	3.5

TABLE 5A. PEAK LOADS FOR CONFIGURATION E : FLOW THROUGH EXHAUST VENTS, SHUTTLE ASSEMBLY, VANDENBERG
DATA ON DOORS 1, 2, 3,
DOORS OPENED : 4, 5, 6,
DOORS PARTIALLY CLOSED : 1, 2, 3,

LARGEST VALUES OF CLADDING LOAD   REFERENCE PRESSURE = 21.0 PSF

* * 6 GREATEST PRESSURE MAGNITUDES * *

TAP	AZI-MUTH	PRESS COEFF	NEGATIVE PEAK ---- PSF	POSITIVE PEAK ----
101	315	-1 40	-29.5	13.1
301	0	-1.21	-25.4	11.7
201	225	-1.15	-24.2	11.9
311	292	-.66	-13.8	3.5
211	45	-.59	-12.4	4.3
111	90	-.58	-12.2	3.9

TABLE 5A. PEAK LOADS FOR CONFIGURATION F : FLOW THROUGH EXHAUST VENTS, SHUTTLE ASSEMBLY, VANDENBERG
DATA ON DOORS 1, 5, 6,
DOORS OPENED : 2, 3, 4,
DOORS CLOSED : 5, 6,
DOORS PARTIALLY CLOSED : 1,

LARGEST VALUES OF CLADDING LOAD

REFERENCE PRESSURE = 21.0 PSF

TAP	AZIMUTH	PRESS COEFF	NEGATIVE PEAK (PSF)	POSITIVE PEAK (PSF)	TAP	AZIMUTH	PRESS COEFF	NEGATIVE PEAK (PSF)	POSITIVE PEAK (PSF)	TAP	AZIMUTH	PRESS COEFF	NEGATIVE PEAK (PSF)	POSITIVE PEAK (PSF)
101	0	-1.39	-29.2	14.0	511	247	-1.90	-39.9	17.6	611	0	-1.75	-36.7	14.3
111	45	-.63	-13.3	5.4	512	180	-1.44	-30.2	12.5	612	0	-1.65	-34.6	13.5
501	90	-.61	-12.8	5.6	601	315	-.62	-13.0	5.6					

TABLE 5A. PEAK LOADS FOR CONFIGURATION F : FLOW THROUGH EXHAUST VENTS, SHUTTLE ASSEMBLY, VANDENBERG
DATA ON DOORS 1, 5, 6,
DOORS OPENED : 2, 3, 4,
DOORS CLOSED : 5, 6,
DOORS PARTIALLY CLOSED : 1,

LARGEST VALUES OF CLADDING LOAD REFERENCE PRESSURE = 21.0 PSF

* * 8 GREATEST PRESSURE MAGNITUDES * *

TAP	AZI-MUTH	PRESS COEFF	NEGATIVE PEAK (PSF)	POSITIVE PEAK (PSF)
511	247	-1.90	-39.9	17.6
611	0	-1.75	-36.7	14.3
612	0	-1.65	-34.6	13.5
512	180	-1.44	-30.2	12.5
101	0	-1.39	-29.2	14.0
111	45	-.63	-13.3	5.4
601	315	-.62	-13.0	5.6
501	90	-.61	-12.8	5.6

TABLE 5A. PEAK LOADS FOR CONFIGURATION G : FLOW THROUGH EXHAUST VENTS, SHUTTLE ASSEMBLY, VANDENBERG
DATA ON DOORS 1, 5, 6,
DOORS OPENED : 2, 3, 4,
DOORS PARTIALLY CLOSED : 1, 5, 6,

LARGEST VALUES OF CLADDING LOAD

REFERENCE PRESSURE = 21.0 PSF

TAP	AZI-MUTH	PRESS COEFF	NEGATIVE PEAK (PSF)	POSITIVE PEAK (PSF)	TAP	AZI-MUTH	PRESS COEFF	NEGATIVE PEAK (PSF)	POSITIVE PEAK (PSF)	TAP	AZI-MUTH	PRESS COEFF	NEGATIVE PEAK (PSF)	POSITIVE PEAK (PSF)
101	315	-1.39	-29.3	14.1	511	180	-1.32	-27.7	16.1	611	315	-1.32	-27.6	14.9
111	292	-.63	-13.1	4.5	512	180	-1.45	-30.4	14.2	612	45	-1.20	-25.3	13.9
501	45	-.62	-13.0	3.8	601	292	-.61	-12.9	4.3					

TABLE 5A. PEAK LOADS FOR CONFIGURATION G : FLOW THROUGH EXHAUST VENTS, SHUTTLE ASSEMBLY, VANDENBERG
DATA ON DOORS 1, 5, 6,
DOORS OPENED : 2, 3, 4,
DOORS PARTIALLY CLOSED : 1, 5, 6,

LARGEST VALUES OF CLADDING LOAD

REFERENCE PRESSURE = 21.0 PSF

* * 8 GREATEST PRESSURE MAGNITUDES * *

TAP	AZI-MUTH	PRESS COEFF	NEGATIVE PEAK (PSF)	POSITIVE PEAK (PSF)
512	180	-1.45	-30.4	14.2
101	315	-1.39	-29.3	14.1
511	180	-1.32	-27.7	16.1
611	315	-1.32	-27.6	14.9
612	45	-1.20	-25.3	13.9
111	292	-.63	-13.1	4.5
501	45	-.62	-13.0	3.8
601	292	-.61	-12.9	4.3

APPENDIX A

NOTES

1. Table of Pressure Coefficients of each Tap for each Wind Direction is included.

2. Plot of pressure Coefficients of each Tap for each Wind Direction is included.

APPENDIX A -- PRESSURE DATA ;   CONFIGURATION B : FLOW THROUGH EXHAUST VENTS, SHUTTLE ASSEMBLY, VANDENBERG

WD	TAP	CPMEAN	CPRMS	CPMAX	CPMIN
0	101	-.557	.169	-.068	-1.118
0	111	-.128	.119	.207	-.555
22	101	-.424	.113	-.062	-.755
22	111	-.109	.088	.181	-.382
45	101	-.523	.118	-.116	-.970
45	111	-.139	.083	.101	-.401
67	101	-.602	.119	-.119	-.974
67	111	-.243	.078	.013	-.463
90	101	-.214	.086	.069	-.506
90	111	-.262	.071	-.013	-.480
112	101	-.125	.082	.130	-.459
112	111	-.258	.070	-.023	-.477
135	101	.047	.100	.381	-.355
135	111	-.145	.076	.145	-.391
157	101	.248	.097	.541	-.128
157	111	-.088	.075	.138	-.357
180	101	.304	.102	.660	-.068
180	111	-.089	.102	.202	-.435
202	101	.262	.094	.546	-.015
202	111	-.195	.097	.121	-.542
225	101	.225	.084	.515	-.053
225	111	-.327	.087	.012	-.643
247	101	-.052	.084	.204	-.360
247	111	-.308	.084	-.049	-.561
270	101	-.416	.083	-.155	-.770
270	111	-.270	.074	-.043	-.508
292	101	-.730	.105	-.377	-1.079
292	111	-.360	.084	-.083	-.639
315	101	-.951	.117	-.581	-1.360
315	111	-.296	.090	-.009	-.551
337	101	-.727	.127	-.286	-1.269
337	111	-.187	.104	.145	-.509

APPENDIX A -- PRESSURE DATA ;   CONFIGURATION D : FLOW THROUGH EXHAUST VENTS, SHUTTLE ASSEMBLY, VANDENBERG

WD	TAP	CPMEAN	CPRMS	CPMAX	CPMIN	WD	TAP	CPMEAN	CPRMS	CPMAX	CPMIN	WD	TAP	CPMEAN	CPRMS	CPMAX	CPMIN
0	101	-.557	.202	-.005	-1.154	112	201	-.719	.104	-.357	-1.081	225	301	-.027	.087	.282	-.316
0	111	-.523	.101	-.193	-.820	112	211	-.431	.080	-.157	-.701	225	311	-.114	.071	.151	-.322
0	201	.231	.128	.654	-.172	112	301	.093	.083	.405	-.178	247	101	-.047	.087	.251	-.337
0	211	-.504	.085	-.239	-.783	112	311	-.439	.070	-.190	-.631	247	111	-.078	.070	.150	-.287
0	301	-.471	.188	.050	-1.205	135	101	-.023	.094	.291	-.322	247	201	-.605	.115	-.184	-1.039
0	311	-.496	.088	-.190	-.808	135	111	-.372	.071	-.154	-.617	247	211	-.077	.062	.118	-.298
22	101	-.426	.113	-.045	-.753	135	201	-.751	.109	-.392	-1.164	247	301	-.108	.084	.196	-.386
22	111	-.440	.082	-.143	-.701	135	211	-.376	.074	-.144	-.609	247	311	-.075	.064	.127	-.265
22	201	.256	.101	.589	-.053	135	301	.274	.088	.594	-.017	270	101	-.413	.085	-.139	-.752
22	211	-.449	.077	-.178	-.689	135	311	-.368	.068	-.117	-.595	270	111	-.134	.064	.094	-.380
22	301	-.646	.131	-.199	-1.303	157	101	.215	.100	.512	-.167	270	201	-.428	.094	-.143	-.782
22	311	-.439	.080	-.229	-.704	157	111	-.378	.062	-.158	-.602	270	211	-.141	.066	.045	-.362
45	101	-.522	.120	.002	-1.007	157	201	-.705	.121	-.323	-1.152	270	301	-.211	.084	.064	-.477
45	111	-.438	.080	-.170	-.705	157	211	-.376	.072	-.116	-.602	270	311	-.140	.061	.067	-.307
45	201	.234	.089	.539	-.045	157	301	.273	.097	.608	-.027	292	101	-.725	.104	-.403	-1.084
45	211	-.433	.077	-.182	-.692	157	311	-.363	.070	-.143	-.557	292	111	-.110	.067	.101	-.312
45	301	-.771	.123	-.323	-1.193	180	101	.303	.107	.665	-.090	292	201	-.226	.091	.095	-.531
45	311	-.433	.087	-.097	-.703	180	111	-.497	.085	-.221	-.752	292	211	-.109	.062	.079	-.332
67	101	-.611	.120	-.235	-1.052	180	201	-.457	.182	.144	-1.148	292	301	-.546	.096	-.185	-.884
67	111	-.415	.077	-.155	-.713	180	211	-.497	.080	-.216	-.736	292	311	-.111	.067	.121	-.313
67	201	-.018	.089	.259	-.341	180	301	.277	.103	.600	-.081	315	101	-.985	.120	-.506	-1.339
67	211	-.413	.081	-.120	-.687	180	311	-.496	.083	-.232	-.807	315	111	-.119	.068	.105	-.336
67	301	-.535	.100	-.218	-.916	202	101	.263	.098	.601	-.051	315	201	.032	.103	.358	-.323
67	311	-.401	.082	-.144	-.702	202	111	-.427	.083	-.161	-.682	315	211	-.122	.064	.095	-.380
90	101	-.234	.100	.062	-.547	202	201	-.490	.152	.033	-1.060	315	301	-.657	.118	-.254	-1.058
90	111	-.392	.079	-.131	-.635	202	211	-.432	.084	-.191	-.709	315	311	-.114	.062	.101	-.305
90	201	-.365	.089	-.077	-.663	202	301	.098	.118	.484	-.305	337	101	-.718	.126	-.269	-1.133
90	211	-.378	.077	-.126	-.608	202	311	-.429	.085	-.194	-.694	337	111	-.271	.076	-.053	-.508
90	301	-.201	.088	.138	-.511	225	101	.237	.091	.566	-.134	337	201	.146	.111	.514	-.291
90	311	-.387	.077	-.130	-.650	225	111	-.121	.071	.071	-.364	337	211	-.274	.074	-.045	-.541
112	101	-.119	.095	.187	-.464	225	201	-.711	.139	-.275	-1.183	337	301	-.505	.146	.007	-.998
112	111	-.412	.077	-.142	-.689	225	211	-.116	.071	.132	-.361	337	311	-.273	.070	-.030	-.505

WD	TAP	CPMEAN	CPRMS	CPMAX	CPMIN
0	101	-.556	.151	-.129	-1.051
0	111	-.227	.069	.008	-.467
0	201	.225	.120	.564	-.218
0	211	-.222	.070	.005	-.451
0	301	-.489	.177	.001	-1.209
0	311	-.227	.067	.023	-.425
22	101	-.437	.108	-.054	-.819
22	111	-.240	.072	-.013	-.516
22	201	.245	.088	.547	-.058
22	211	-.240	.064	-.062	-.465
22	301	-.650	.117	-.288	-1.114
22	311	-.241	.070	.011	-.455
45	101	-.536	.104	-.185	-.958
45	111	-.309	.068	-.099	-.579
45	201	.228	.087	.527	-.069
45	211	-.307	.071	-.082	-.590
45	301	-.761	.104	-.411	-1.186
45	311	-.306	.068	-.060	-.528
67	101	-.597	.119	-.210	-1.099
67	111	-.345	.068	-.138	-.566
67	201	-.025	.078	.242	-.345
67	211	-.347	.063	-.097	-.575
67	301	-.545	.087	-.275	-.808
67	311	-.343	.061	-.177	-.554
90	101	-.238	.087	.037	-.491
90	111	-.372	.070	-.148	-.580
90	201	-.390	.078	-.117	-.631
90	211	-.360	.068	-.128	-.577
90	301	-.207	.073	.115	-.433
90	311	-.360	.067	-.069	-.627
112	101	-.138	.076	.126	-.428
112	111	-.245	.060	-.054	-.457

WD	TAP	CPMEAN	CPRMS	CPMAX	CPMIN
112	201	-.720	.085	-.388	-1.020
112	211	-.245	.061	-.069	-.438
112	301	.075	.074	.346	-.237
112	311	-.249	.058	-.075	-.469
135	101	-.033	.084	.233	-.313
135	111	-.183	.058	.023	-.359
135	201	-.753	.097	-.353	-1.102
135	211	-.185	.062	.025	-.410
135	301	.253	.078	.515	-.026
135	311	-.175	.061	-.008	-.395
157	101	.217	.100	.517	-.076
157	111	-.086	.060	.109	-.265
157	201	-.682	.113	-.318	-1.092
157	211	-.086	.062	.108	-.298
157	301	.292	.081	.551	-.006
157	311	-.082	.056	.085	-.308
180	101	.290	.099	.622	-.034
180	111	-.050	.077	.185	-.290
180	201	-.459	.168	.014	-1.103
180	211	-.045	.071	.203	-.306
180	301	.282	.095	.559	-.041
180	311	-.042	.071	.164	-.260
202	101	.260	.096	.568	-.110
202	111	-.098	.081	.154	-.389
202	201	-.462	.138	-.025	-.885
202	211	-.096	.087	.177	-.367
202	301	.081	.114	.492	-.355
202	311	-.099	.070	.117	-.321
225	101	.216	.092	.492	-.112
225	111	-.135	.078	.094	-.414
225	201	-.698	.139	-.189	-1.154
225	211	-.135	.067	.090	-.330

WD	TAP	CPMEAN	CPRMS	CPMAX	CPMIN
225	301	-.037	.077	.205	-.343
225	311	-.137	.061	.075	-.378
247	101	-.059	.076	.236	-.332
247	111	-.218	.063	-.008	-.477
247	201	-.611	.120	-.172	-1.004
247	211	-.209	.062	.001	-.417
247	301	-.117	.088	.209	-.476
247	311	-.211	.077	.048	-.512
270	101	-.428	.080	-.159	-.674
270	111	-.335	.064	-.120	-.518
270	201	-.424	.089	-.156	-.782
270	211	-.327	.067	-.109	-.523
270	301	-.221	.076	.058	-.501
270	311	-.320	.063	-.052	-.578
292	101	-.755	.093	-.417	-1.084
292	111	-.356	.067	-.113	-.577
292	201	-.224	.081	.063	-.545
292	211	-.353	.061	-.151	-.577
292	301	-.537	.099	-.237	-.905
292	311	-.342	.080	-.132	-.658
315	101	-1.028	.110	-.638	-1.405
315	111	-.332	.065	-.118	-.557
315	201	.010	.091	.423	-.282
315	211	-.330	.059	-.124	-.562
315	301	-.686	.120	-.290	-1.077
315	311	-.324	.066	-.100	-.538
337	101	-.753	.136	-.367	-1.351
337	111	-.281	.066	-.058	-.454
337	201	.138	.108	.525	-.210
337	211	-.276	.067	-.009	-.522
337	301	-.484	.127	-.050	-.879
337	311	-.280	.059	-.078	-.473

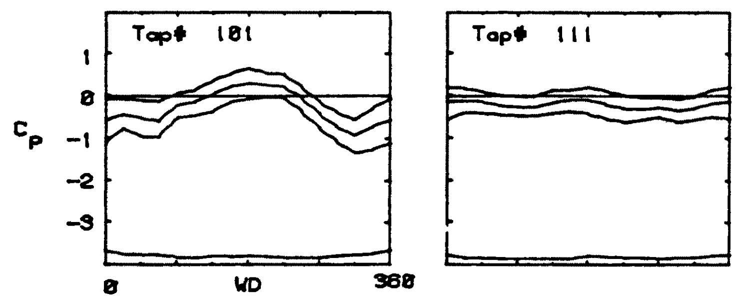
WD	TAP	CPMEAN	CPRMS	CPMAX	CPMIN
0	101	-.559	.184	-.125	-1.389
0	111	-.323	.072	-.098	-.551
0	501	-.335	.073	-.086	-.558
0	511	.268	.158	.840	-.408
0	512	.246	.105	.574	-.109
0	601	-.335	.072	-.020	-.561
0	611	-.575	.213	-.086	-1.747
0	612	-.506	.194	-.101	-1.648
22	101	-.439	.114	-.056	-.850
22	111	-.299	.078	-.037	-.587
22	501	-.300	.079	-.042	-.575
22	511	.299	.121	.707	-.088
22	512	.253	.097	.594	-.046
22	601	-.303	.073	-.084	-.564
22	611	-.687	.106	-.287	-1.058
22	612	-.654	.114	-.197	-1.038
45	101	-.517	.115	-.053	-1.011
45	111	-.352	.073	-.095	-.632
45	501	-.359	.069	-.087	-.603
45	511	.231	.086	.521	-.047
45	512	.241	.083	.508	-.048
45	601	-.353	.069	-.122	-.572
45	611	-.819	.107	-.504	-1.198
45	612	-.802	.111	-.399	-1.175
67	101	-.598	.113	-.258	-.968
67	111	-.377	.064	-.160	-.561
67	501	-.368	.068	-.141	-.579
67	511	-.018	.091	.317	-.358
67	512	.113	.074	.358	-.127
67	601	-.370	.061	-.166	-.569
67	611	-.604	.087	-.305	-.868
67	612	-.536	.110	-.067	-.928
90	101	-.223	.075	.000	-.501
90	111	-.343	.076	-.093	-.568
90	501	-.334	.076	-.097	-.610
90	511	-.393	.094	-.060	-.852
90	512	-.176	.085	.104	-.838
90	601	-.338	.071	-.122	-.557
90	611	-.212	.077	.071	-.507
90	612	-.153	.096	.188	-.541
112	101	-.144	.074	.084	-.412
112	111	-.149	.062	.039	-.333
112	501	-.146	.064	.040	-.367
112	511	-.776	.097	-.498	-1.110
112	512	-.593	.148	.209	-1.043
112	601	-.147	.065	.121	-.348
112	611	.057	.098	.388	-.312
112	612	.123	.078	.380	-.200
135	101	-.035	.088	.258	-.691
135	111	-.084	.061	.163	-.248
135	501	-.082	.064	.141	-.293
135	511	-.785	.105	-.478	-1.205
135	512	-.764	.103	-.452	-1.166
135	601	-.091	.063	.085	-.329
135	611	.261	.077	.516	-.003
135	612	.282	.077	.557	.056
157	101	.198	.092	.594	-.177
157	111	.021	.059	.224	-.201
157	501	.024	.060	.256	-.209
157	511	-.708	.123	-.309	-1.083
157	512	-.699	.122	-.319	-1.152
157	601	.028	.059	.204	-.197
157	611	.291	.101	.681	-.020
157	612	.286	.081	.572	.057
180	101	.286	.097	.667	-.047
180	111	.036	.062	.256	-.207
180	501	.038	.062	.227	-.155
180	511	-.539	.194	-.066	-1.230
180	512	-.485	.163	-.061	-1.437
180	601	.040	.061	.218	-.151
180	611	.310	.108	.681	-.070
180	612	.304	.094	.642	.006
202	101	.265	.087	.603	.002
202	111	-.014	.064	.184	-.231
202	501	-.011	.066	.267	-.225
202	511	-.533	.118	-.080	-.932
202	512	-.478	.134	-.032	-.944
202	601	-.011	.068	.266	-.236
202	611	.084	.123	.460	-.423
202	612	.117	.110	.513	-.297
225	101	.219	.082	.476	-.067
225	111	-.035	.063	.176	-.238
225	501	-.031	.066	.177	-.280
225	511	-.774	.136	-.378	-1.271
225	512	-.722	.132	-.358	-1.247
225	601	-.030	.064	.192	-.239
225	611	-.046	.095	.273	-.357
225	612	.012	.083	.286	-.254
247	101	-.057	.073	.170	-.270
247	111	-.114	.057	.067	-.281
247	501	-.119	.061	.058	-.325
247	511	-.624	.138	-.156	-1.898
247	512	-.504	.147	.139	-.974
247	601	-.115	.060	.077	-.279
247	611	-.128	.079	.171	-.503
247	612	-.098	.071	.180	-.353
270	101	-.419	.076	-.189	-.680
270	111	-.289	.063	-.089	-.488
270	501	-.288	.074	-.049	-.569
270	511	-.453	.173	.190	-1.345
270	512	-.241	.110	.158	-.704
270	601	-.292	.064	-.067	-.557
270	611	-.274	.098	.114	-.555
270	612	-.221	.088	.067	-.476
292	101	-.733	.092	-.450	-1.108
292	111	-.349	.059	-.163	-.528
292	501	-.351	.063	-.164	-.553
292	511	-.224	.102	.151	-.545
292	512	-.075	.100	.241	-.509
292	601	-.354	.065	-.117	-.532
292	611	-.602	.101	-.213	-.969
292	612	-.532	.101	-.152	-.827
315	101	-.981	.104	-.627	-1.341
315	111	-.355	.059	-.177	-.580
315	501	-.359	.065	-.133	-.564
315	511	.032	.100	.394	-.408
315	512	.124	.083	.395	-.192
315	601	-.369	.068	-.130	-.617
315	611	-.733	.131	-.262	-1.273
315	612	-.684	.127	-.281	-1.117
337	101	-.788	.119	-.348	-1.314
337	111	-.381	.058	-.133	-.561
337	501	-.357	.066	-.119	-.594
337	511	.159	.131	.589	-.344
337	512	.179	.103	.531	-.143
337	601	-.377	.070	-.147	-.593
337	611	-.570	.135	.066	-1.007
337	612	-.521	.132	.011	-.908

APPENDIX A -- PRESSURE DATA ;   CONFIGURATION G : FLOW THROUGH EXHAUST VENTS, SHUTTLE ASSEMBLY, VANDENBERG

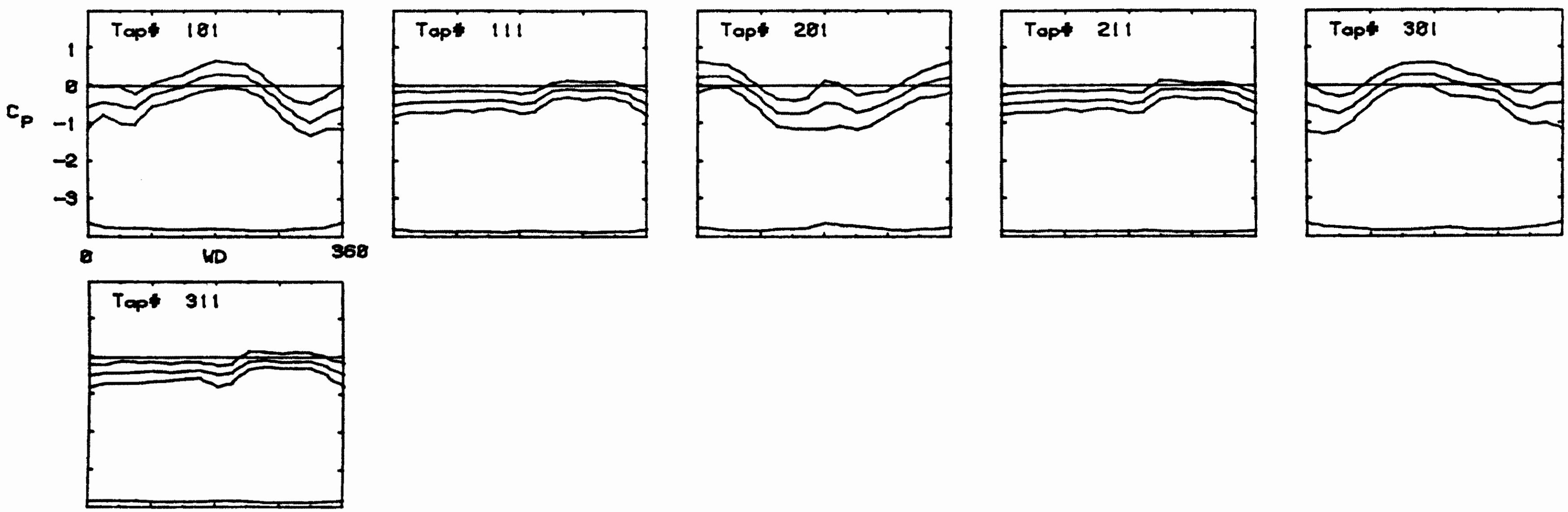
WD	TAP	CPMEAN	CPRMS	CPMAX	CPMIN
0	101	-.565	.164	-.042	-1.041
0	111	-.243	.075	.019	-.454
0	501	-.251	.081	.005	-.522
0	511	.215	.151	.719	-.482
0	512	.236	.119	.676	-.143
0	601	-.251	.077	-.019	-.503
0	611	-.538	.193	.049	-1.251
0	612	-.486	.178	.096	-1.128
22	101	-.433	.114	-.026	-.832
22	111	-.261	.077	-.006	-.552
22	501	-.267	.067	-.053	-.538
22	511	.297	.107	.765	-.074
22	512	.247	.085	.538	.005
22	601	-.262	.071	-.014	-.466
22	611	-.663	.116	-.353	-1.018
22	612	-.642	.118	-.317	-.972
45	101	-.505	.101	-.153	-.888
45	111	-.305	.068	-.016	-.516
45	501	-.321	.073	-.098	-.621
45	511	.218	.085	.523	-.066
45	512	.232	.081	.521	-.027
45	601	-.309	.068	-.113	-.505
45	611	-.807	.101	-.488	-1.199
45	612	-.816	.105	-.488	-1.204
67	101	-.607	.120	-.229	-1.034
67	111	-.329	.072	-.090	-.575
67	501	-.329	.073	-.105	-.598
67	511	-.019	.098	.319	-.373
67	512	.105	.079	.390	-.137
67	601	-.327	.064	-.123	-.541
67	611	-.592	.104	-.295	-.953
67	612	-.536	.121	-.119	-.948
90	101	-.226	.081	.053	-.479
90	111	-.293	.071	-.053	-.519
90	501	-.297	.065	-.115	-.513
90	511	-.388	.090	-.006	-.756
90	512	-.181	.082	.087	-.431
90	601	-.293	.063	-.041	-.513
90	611	-.211	.086	.092	-.603
90	612	-.147	.100	.181	-.519
112	101	-.147	.079	.125	-.400
112	111	-.201	.064	.020	-.419
112	501	-.200	.062	.038	-.402

WD	TAP	CPMEAN	CPRMS	CPMAX	CPMIN
112	511	-.737	.090	-.386	-1.034
112	512	-.632	.133	-.070	-1.052
112	601	-.199	.067	.005	-.439
112	611	.052	.101	.432	-.285
112	612	.125	.081	.478	-.167
135	101	-.028	.093	.315	-.353
135	111	-.133	.062	.097	-.370
135	501	-.137	.061	.072	-.296
135	511	-.741	.095	-.417	-1.048
135	512	-.737	.108	-.359	-1.060
135	601	-.141	.070	.127	-.373
135	611	.273	.081	.590	-.005
135	612	.299	.081	.645	.040
157	101	.203	.097	.563	-.118
157	111	-.054	.061	.154	-.249
157	501	-.058	.064	.130	-.257
157	511	-.707	.121	-.322	-1.062
157	512	-.690	.108	-.335	-1.043
157	601	-.055	.059	.147	-.249
157	611	.300	.102	.687	-.027
157	612	.296	.080	.605	.064
180	101	.296	.102	.671	-.026
180	111	-.022	.074	.213	-.329
180	501	-.013	.067	.181	-.228
180	511	-.506	.189	-.016	-1.319
180	512	-.488	.175	-.049	-1.447
180	601	-.021	.071	.206	-.238
180	611	.316	.111	.708	-.211
180	612	.303	.092	.662	-.019
202	101	.255	.093	.616	-.079
202	111	-.093	.078	.196	-.368
202	501	-.079	.077	.164	-.300
202	511	-.560	.145	-.096	-1.037
202	512	-.493	.131	-.009	-.979
202	601	-.085	.071	.202	-.298
202	611	.080	.131	.643	-.481
202	612	.109	.115	.528	-.360
225	101	.228	.089	.510	-.045
225	111	-.156	.075	.053	-.421
225	501	-.147	.068	.101	-.372
225	511	-.780	.128	-.353	-1.236
225	512	-.722	.143	-.210	-1.169
225	601	-.155	.076	.089	-.371

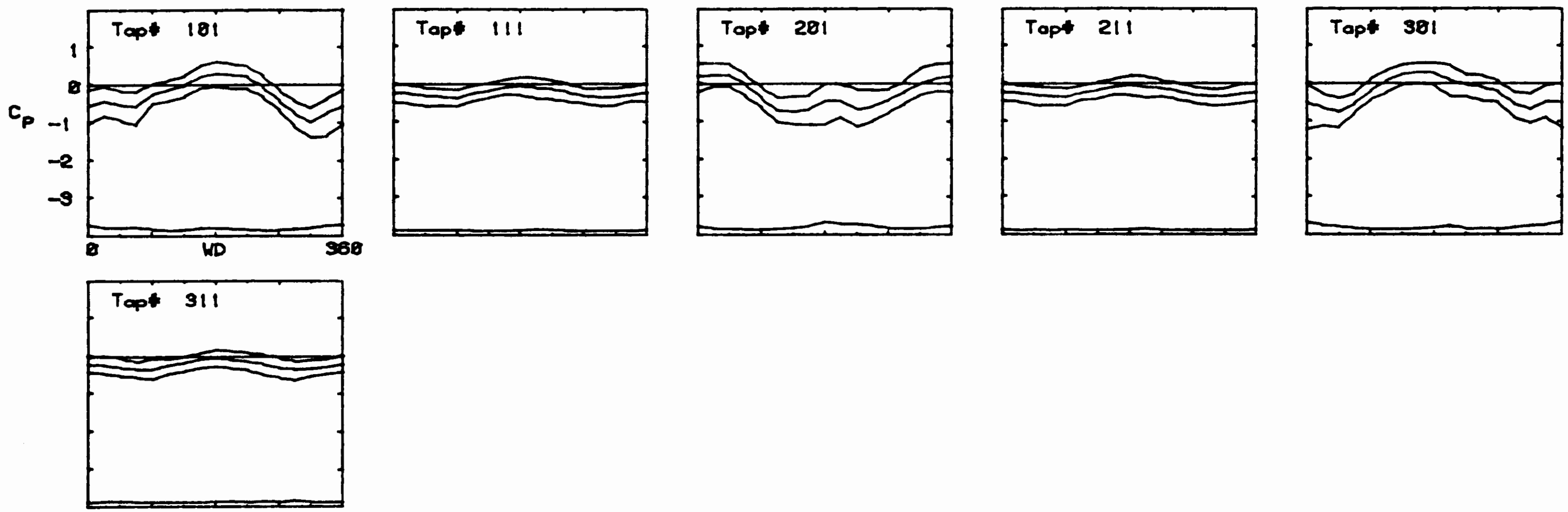
WD	TAP	CPMEAN	CPRMS	CPMAX	CPMIN
225	611	-.047	.106	.318	-.526
225	612	.007	.090	.346	-.329
247	101	-.064	.077	.192	-.309
247	111	-.229	.068	-.013	-.428
247	501	-.229	.061	-.032	-.426
247	511	-.633	.129	-.205	-1.142
247	512	-.538	.163	-.027	-1.018
247	601	-.231	.065	.007	-.435
247	611	-.133	.087	.186	-.474
247	612	-.106	.077	.145	-.329
270	101	-.422	.085	-.170	-.707
270	111	-.304	.070	-.108	-.508
270	501	-.306	.077	-.066	-.522
270	511	-.442	.162	.063	-1.033
270	512	-.243	.113	.149	-.724
270	601	-.300	.068	-.008	-.510
270	611	-.278	.096	.072	-.593
270	612	-.219	.087	.109	-.536
292	101	-.745	.088	-.475	-1.077
292	111	-.372	.064	-.186	-.626
292	501	-.378	.071	-.147	-.610
292	511	-.237	.111	.159	-.698
292	512	-.084	.093	.312	-.415
292	601	-.379	.065	-.146	-.613
292	611	-.622	.104	-.256	-1.050
292	612	-.560	.105	-.216	-1.070
315	101	-.975	.103	-.607	-1.394
315	111	-.344	.063	-.138	-.583
315	501	-.358	.070	-.141	-.570
315	511	.034	.109	.368	-.611
315	512	.127	.083	.371	-.251
315	601	-.351	.065	-.161	-.598
315	611	-.738	.114	-.405	-1.316
315	612	-.705	.119	-.336	-1.148
337	101	-.740	.118	-.329	-1.181
337	111	-.286	.061	-.104	-.487
337	501	-.293	.068	-.096	-.518
337	511	.158	.126	.630	-.308
337	512	.165	.101	.479	-.233
337	601	-.289	.059	-.104	-.491
337	611	-.545	.134	.050	-1.080
337	612	-.491	.135	.018	-.976



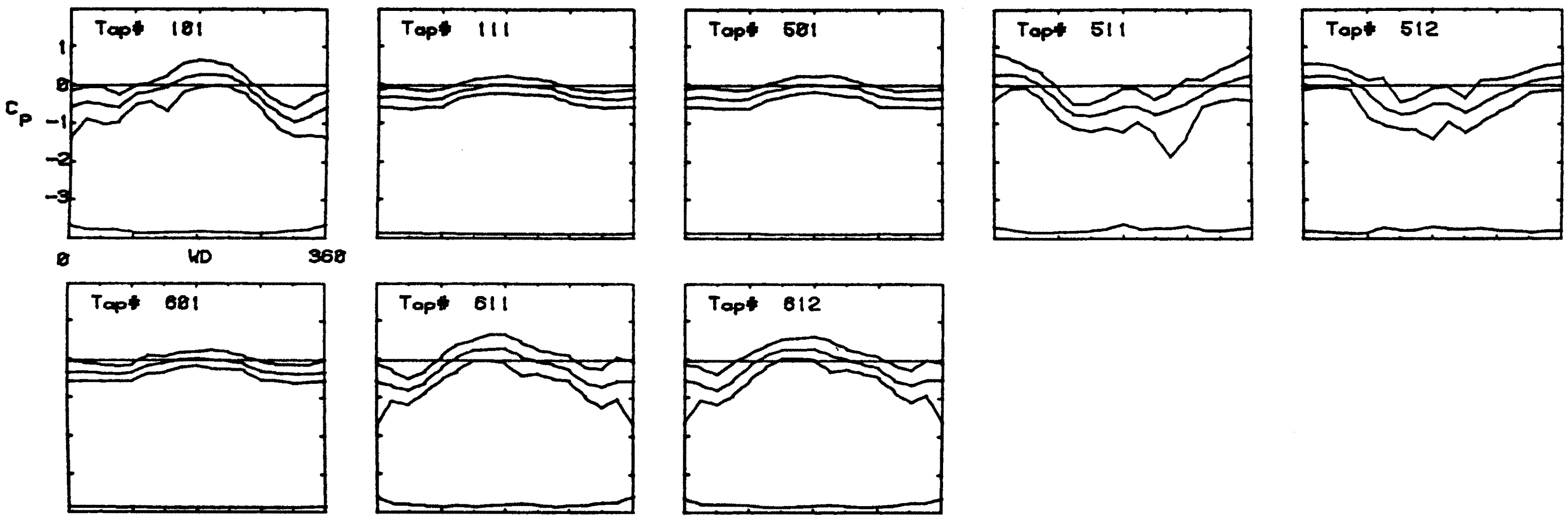
Configuration B



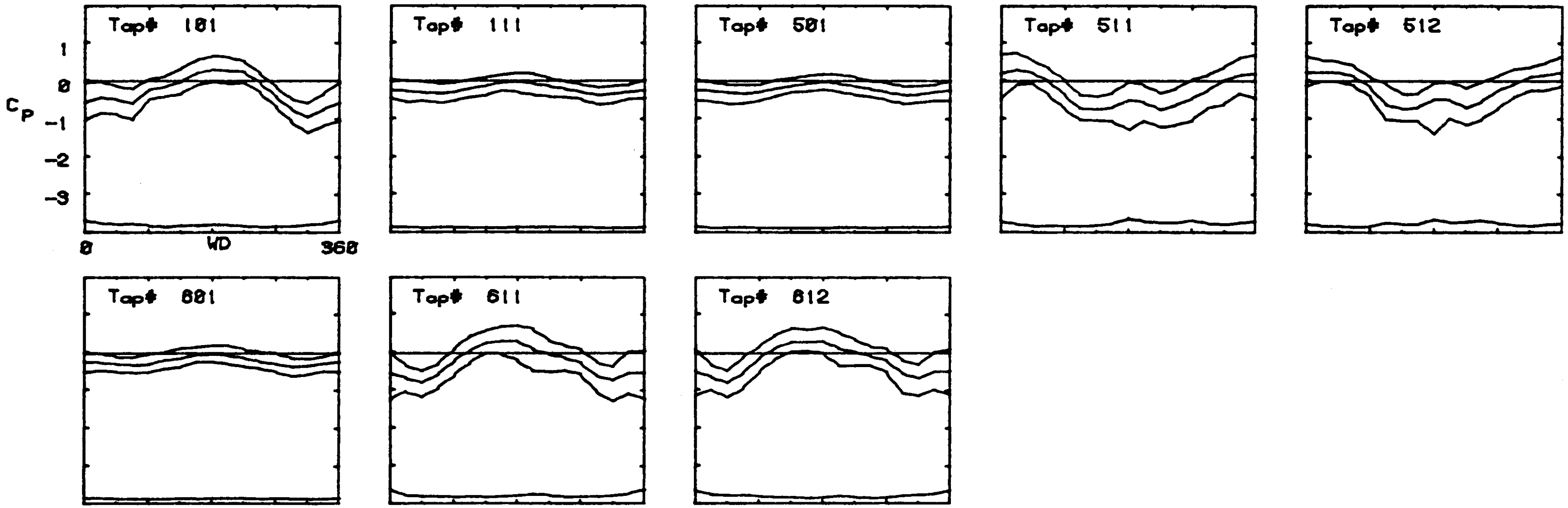
Configuration D



Configuration E



Configuration F



Configuration G