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# EXPERIMENTAL INVESTIGATION OF EFFECTS OF JET DECAY RATE ON JET-INDUCED PRESSURES ON A FLAT PLATE: TABULATED DATA

By

John M. Kuhlman, Don S. Ousterhout, and Ronald W. Warcup

## SUMMARY

This report consists of tabulated data values for all results presented in graphical form in NASA CR-2979, and together with that report comprises the final report for grant NGL-47-003-039. Data are presented for a small scale experimental model study of a single round jet exiting perpendicular to a flat plate into a uniform subsonic crossflow. The data are grouped into four main sections. Section 1 presents the static, or no-crossflow, nozzle calibration data. Section 2 lists the individual plate surface static pressure measurements, as well as the integrated loads, for each jet nozzle configuration and velocity ratio. Section 3 lists the jet centerline location data and the appropriate power law curve fit equation, and section 4 lists the jet dynamic pressure decay data.

## INTRODUCTION

An experimental study has been undertaken to determine the effects of jet decay rate upon the pressure distribution induced by the jet on an adjacent flat plate. This simplified geometry of a single circular jet issuing at right angles to a flat rectangular plate into a uniform subsonic crossflow has been utilized as a simplified model of the interaction of the exiting engine efflux with a fuselage or wing of a jet VTOL aircraft. Such an interaction between propulsive and aerodynamic loads is particularly important during transition from hover to forward flight, and has been found to be strongly configuration dependent (refs. 1,2, and 3).

The current data have been summarized previously in references 4 and 5, but in those reports only graphical comparisons of the data were made. The present report presents all data from references 4 and 5 in tabular form. The experimental configuration studied was the previously mentioned simplified model of a jet VTOL aircraft engine exhaust. Decay rates of the jet have been varied through use of axisymmetric centerbodies, or plugs, placed along the jet centerline in the jet nozzle and plenum. These centerbodies, having either a flat or a hemispherical tip, caused nonuniform jet exit plane dynamic pressure profiles, and increased the jet decay rate over that of a uniform jet having no plug. Details of the experimental apparatus and procedure have been given in references 4 and 5.

## SYMBOLS

Data are presented in nondimensional coefficient form or in both SI and U.S. customary units where appropriate. Measurements and calculations have been made in U.S. customary units.

| | |
|---|---|
| $A_{eff}$ | effective jet exit area, $m^2$ ($ft^2$) |
| $D_{eff}$ | effective jet diameter, m (ft) |
| $D_n$ | nominal jet diameter, m (ft) |
| K | constant in equation (3-1) |
| $\Delta L$ | jet-induced lift loss, N (lb) |
| m | jet mass flow rate, kg/sec (slug/sec) |
| M | jet-induced pitch moment, N-m (lb-ft) |
| n | exponent in equation (2-1) |
| $p_e$ | jet exit static pressure, $N/m^2$ ($lb/ft^2$) |
| q | dynamic pressure, $N/m^2$ ($lb/ft^2$) |

| | |
|---|---|
| $q_\infty$ | crossflow dynamic pressure, $N/m^2$ ($lb/ft^2$) |
| Q | jet volume flow rate $m^3/sec$ ($ft^3/sec$, or CFM) |
| r | radial coordinate measured from jet centerline, m (ft) |
| R | $V_{eff}/V_\infty$, jet-to-crossflow velocity ratio, also ideal gas constant, J/kg-K (ft lb/slug R) |
| s | arc length measured along jet trajectory, m (ft) |
| T | jet thrust, N (lb) |
| $T_e$ | jet exit temperature, K (R) |
| $V_{eff}$ | effective jet exit velocity, m/sec (ft/sec) |
| $V_\infty$ | crossflow velocity, m/sec (ft/sec) |
| x | streamwise plate coordinate, origin a center of jet orifice, m (ft) |
| y | transverse plate coordinate, origin at center of jet orifice, m (ft) |
| z | coordinate perpendicular to plate, origin at center of jet orifice on plate surface, m (ft) |
| $\gamma$ | specific heat ratio |
| $\rho_\infty$ | crossflow density, $kg/m^3$ ($slug/ft^3$) |

## PRESENTATION OF RESULTS

Data for static or no crossflow nozzle calibration are presented in section 1, while the tables of jet-induced plate surface static pressures and total jet-induced lift loss and pitching moment are presented in section 2. Section 3 displays all jet centerline trajectory data. Section 4 lists the jet centerline

dynamic pressure decay data. These data have been obtained for the following jet-centerbody configurations: no centerbody, flat ended centerbody flush with the nozzle exit, flat centerbody submerged 0.375 $D_n$ below the nozzle exit, flat centerbody submerged 0.875 $D_n$ below the nozzle exit, flat centerbody submerged 1.375 $D_n$ below the nozzle exit, round ended centerbody flush with the nozzle exit, round centerbody submerged 0.5 $D_n$ below the nozzle exit, and round centerbody submerged 1.0 $D_n$ below the nozzle exit. At the beginning of each section of the current report, a brief description of the data presented is given, as well as a table which lists how the data are organized in that section. No detailed discussion of these results is given in the current report, since it is intended merely as a data tabulation. Such discussion of results appears in references 4 and 5.

## SECTION I: STATIC NOZZLE CALIBRATION DATA

Nozzles used in the current work and in references 4 and 5 have been calibrated in the static, or no crossflow case only, using the following procedure, first developed by Ziegler and Wooler in reference 6:

1. Record barometric pressure, nozzle exit pressure and exit temperature, and jet flow rate.

2. Traverse 0.25 in. above nozzle exit plane across jet and record $q$ versus $r$.

3. Integrate product of $r$ times $q$ graphically to calculate jet thrust.

4. Calculate effective jet dynamic pressure from

$$q = \frac{p_e\left(\frac{T}{\dot{m}}\right)^2}{2RT_e - \frac{\gamma - 1}{\gamma}\left(\frac{T}{\dot{m}}\right)^2} \tag{1-1}$$

where $(p_e, T_e)$ are exit plane pressure and temperature, $T$ is the measured jet thrust, $\dot{m}$ is the jet mass flow rate, and $\gamma$ equals the specific heat ratio.

5. Calculate effective jet velocity and effective jet area from

$$A_{eff} = T/2q \tag{1-2}$$

$$V_{eff} = \frac{\dot{m}RTe}{p_e\ A_{eff}} \tag{1-3}$$

and

$$D_{eff} = \sqrt{\frac{4\ A_{eff}}{\pi}} \tag{1-4}$$

The calculated effective exit plane velocity, $V_{eff}$, has been used to calculate the nondimensional velocity ratio, $R$, for the crossflow data using

$$R = V_{eff}/\sqrt{2q_\infty/\rho_\infty} \tag{1-5}$$

where the subscript $\infty$ refers to crossflow free-stream conditions. This generally leads to no more than a 5 percent difference between R values in the current work and values calculated as the square root of the ratio of the dynamic pressures. Since the estimated accuracy of the computed R values in the current work is no better than 5 percent, largely due to the measurement of the jet thrust, T, the current R values may be considered equivalent to R values calculated in the more traditional manner. One exception to this is for the flat-ended centerbody flush case, where it is estimated that inaccuracies in measurement of T, and hence in R, are at least 10 percent. This is due to the size of the pitot static probe used [0.159-cm (1/16-in.) diameter probe body], which is of the same order as the width of the annular jet exit region, 0.318 cm (1/8 in.). Thus, it is believed that q values are reduced due to a blockage effect of the probe, as well as being averaged spatially in the shear layers at the edges of the jet.

Nozzle exit plane dynamic pressure profiles are shown in figures 1 to 8, and calibration data are tabulated in table 1. The local dynamic pressure in figures 1 to 8 is actually proportional to the vertical distance between the total pressure curve and the static pressure curve. Both curves were recorded at a distance of 0.635 cm (1/4 inch) above the nozzle exit plane, by first recording the static pressure distribution, and then moving the pitot static probe upwards 0.635 cm (1/4 inch) and recording the total pressure curve.

Table 1. Tabulated Static Nozzle Calibration Data.

| Nozzle Configuration | $Q$ $m^3/sec$ (CFM) | $T_e$ K (R) | $P_e$ kPa ($lb_f/ft^2$) | $T$ N ($lb_f$) | $\dot{m}$ kg/sec ($lb_m$/sec) | $q$ kPa ($lb_f/ft^2$) | $V_{eff}$ m/sec (ft/sec) | $b_{eff}$ m (ft) |
|---|---|---|---|---|---|---|---|---|
| No plug | 0.0779 (165) | 292 (525) | 102.1 (2132) | 12.7 (2.86) | 0.0936 (0.2063) | 11.6 (242.9) | 140.2 (460.0) | 0.0264 (0.0865) |
| Round plug flush | 0.0375 (79.5) | 292 (526) | 100.7 (2103) | 6.14 (1.38) | 0.0452 (0.0996) | 11.4 (238.3) | 140.1 (459.6) | 0.0185 (0.0607) |
| Round plug 0.5 $D_n$ down | 0.0632 (134) | 293 (527) | 102.4 (2139) | 11.2 (2.51) | 0.0761 (0.1678) | 13.6 (284.8) | 152.1 (499.0) | 0.0228 (0.0749) |
| Round plug 1.0 $D_n$ down | 0.0778 (164.8) | 299 (538) | 102.1 (2132) | 13.3 (2.99) | 0.0936 (0.2063) | 12.57 (262.6) | 147.5 (484.0) | 0.0260 (0.0852) |
| Square plug flush | 0.0269 (57.0) | 291 (524) | 101.4 (2119) | 4.08 (0.918) | 0.0324 (0.0714) | 9.91 (206.9) | 129.5 (425.0) | 0.0162 (0.0531) |
| Square plug 0.375 $D_n$ down | 0.0318 (67.4) | 295 (531) | 100.0 (2088) | 4.89 (1.099) | 0.0383 (0.0844) | 9.90 (206.7) | 131.4 (431.0) | 0.0177 (0.0582) |
| Square plug 0.875 $D_n$ down | 0.0589 (124.7) | 293 (527) | 104.2 (2177) | 9.70 (2.18) | 0.0709 (0.1562) | 12.0 (250.9) | 141.5 (464.1) | 0.0228 (0.0749) |
| Square plug 1.375 $D_n$ down | 0.0698 (147.8) | 296 (533) | 101.2 (2113) | 11.5 (2.59) | 0.0840 (0.1851) | 11.6 (241.4) | 141.6 (464.5) | 0.0252 (0.0826) |

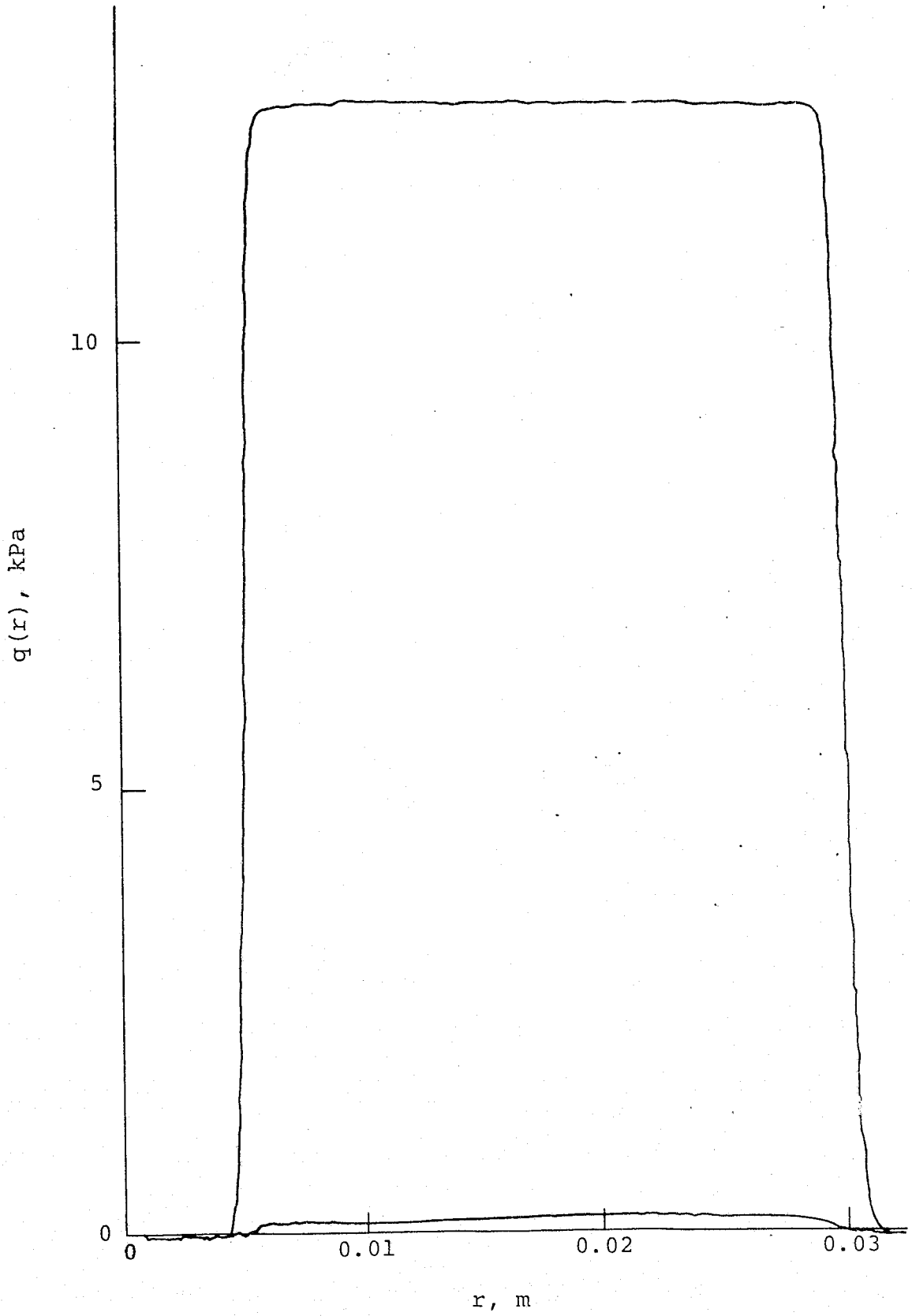


Figure 1. Static nozzle exit plane dynamic pressure profile; no plug.

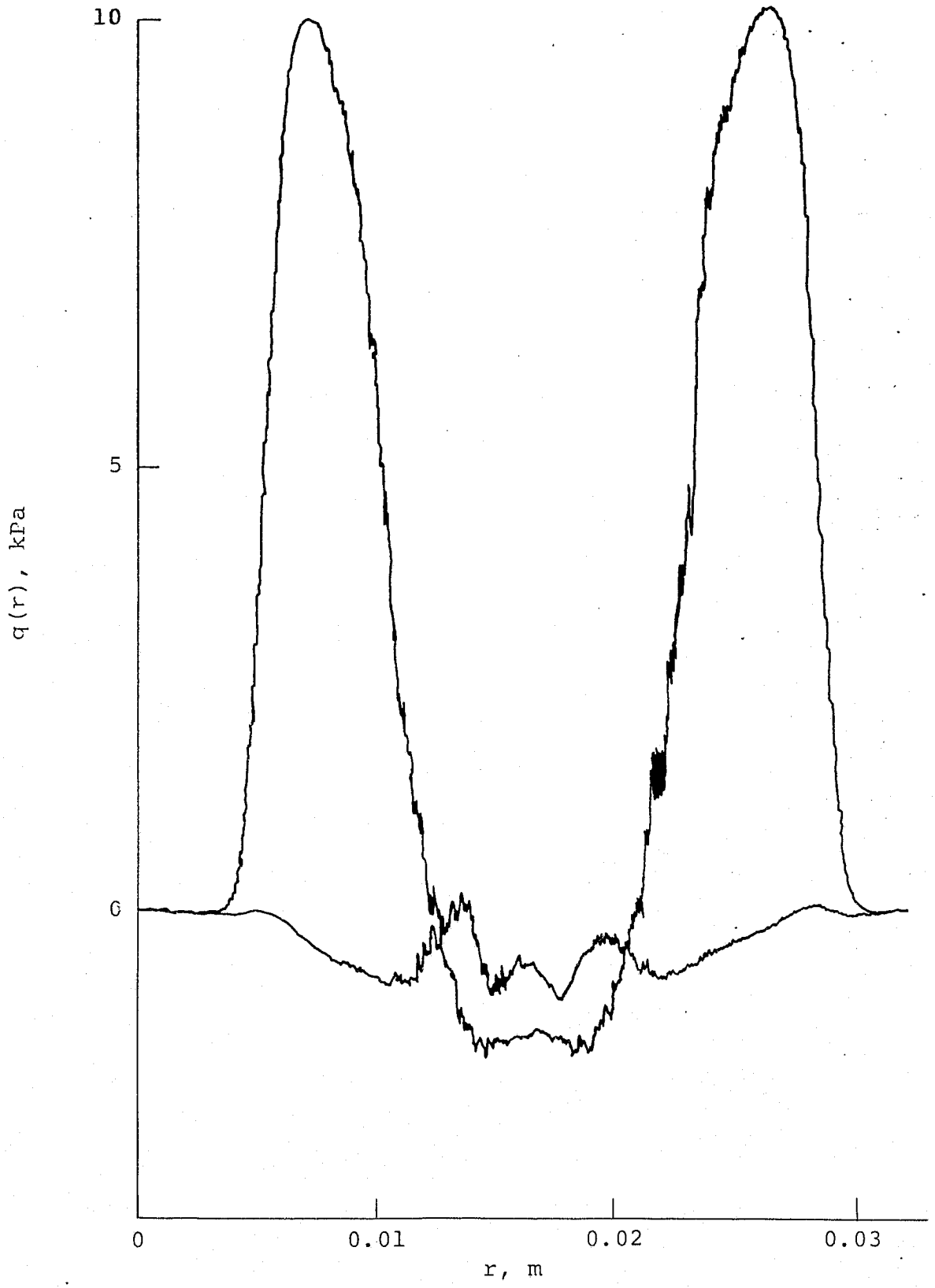


Figure 2. Static nozzle exit plane dynamic pressure profile; hemispherical tipped plug flush.

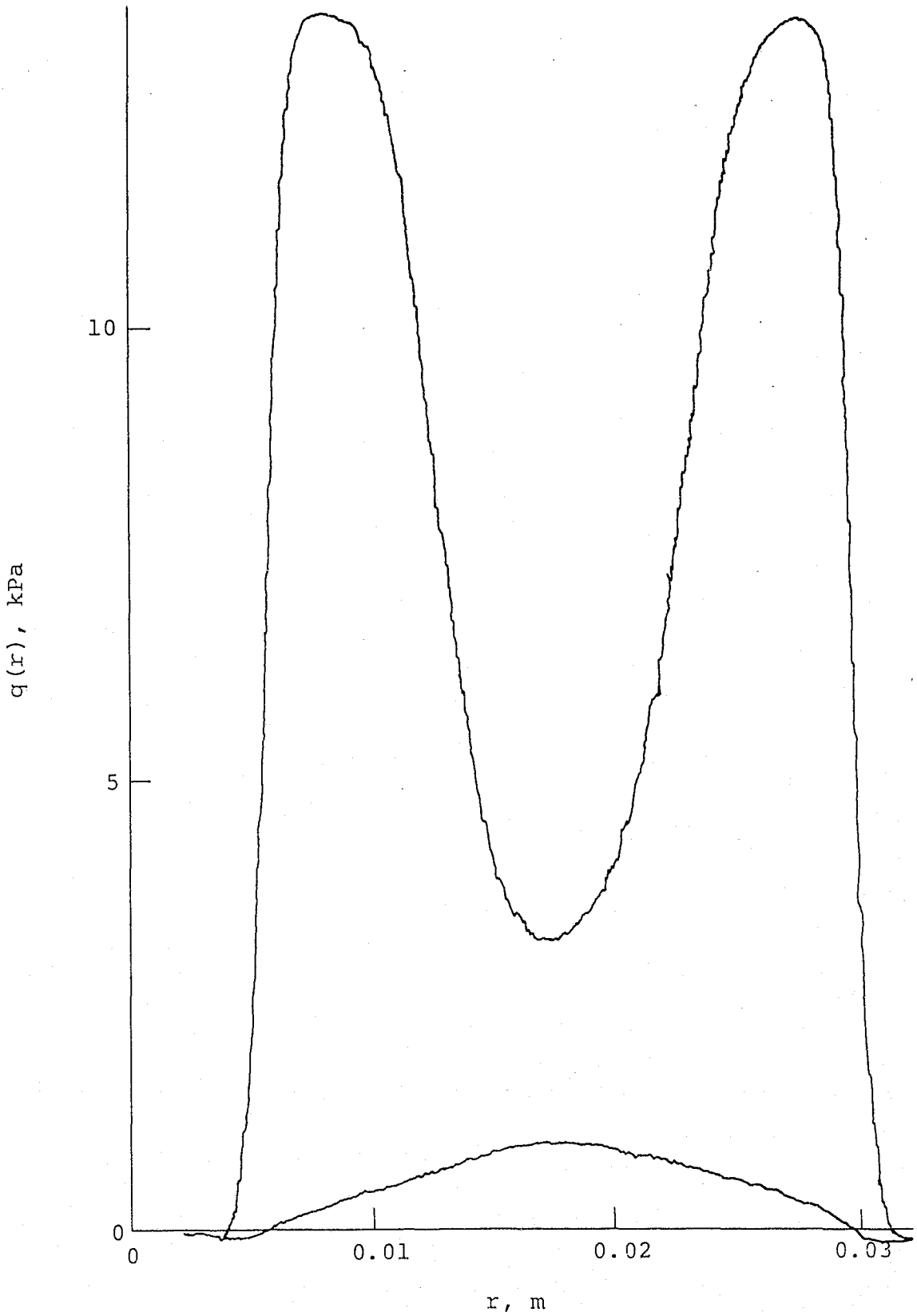


Figure 3. Static nozzle exit plane dynamic pressure profile; hemispherical tipped plug down 0.50 $D_n$.

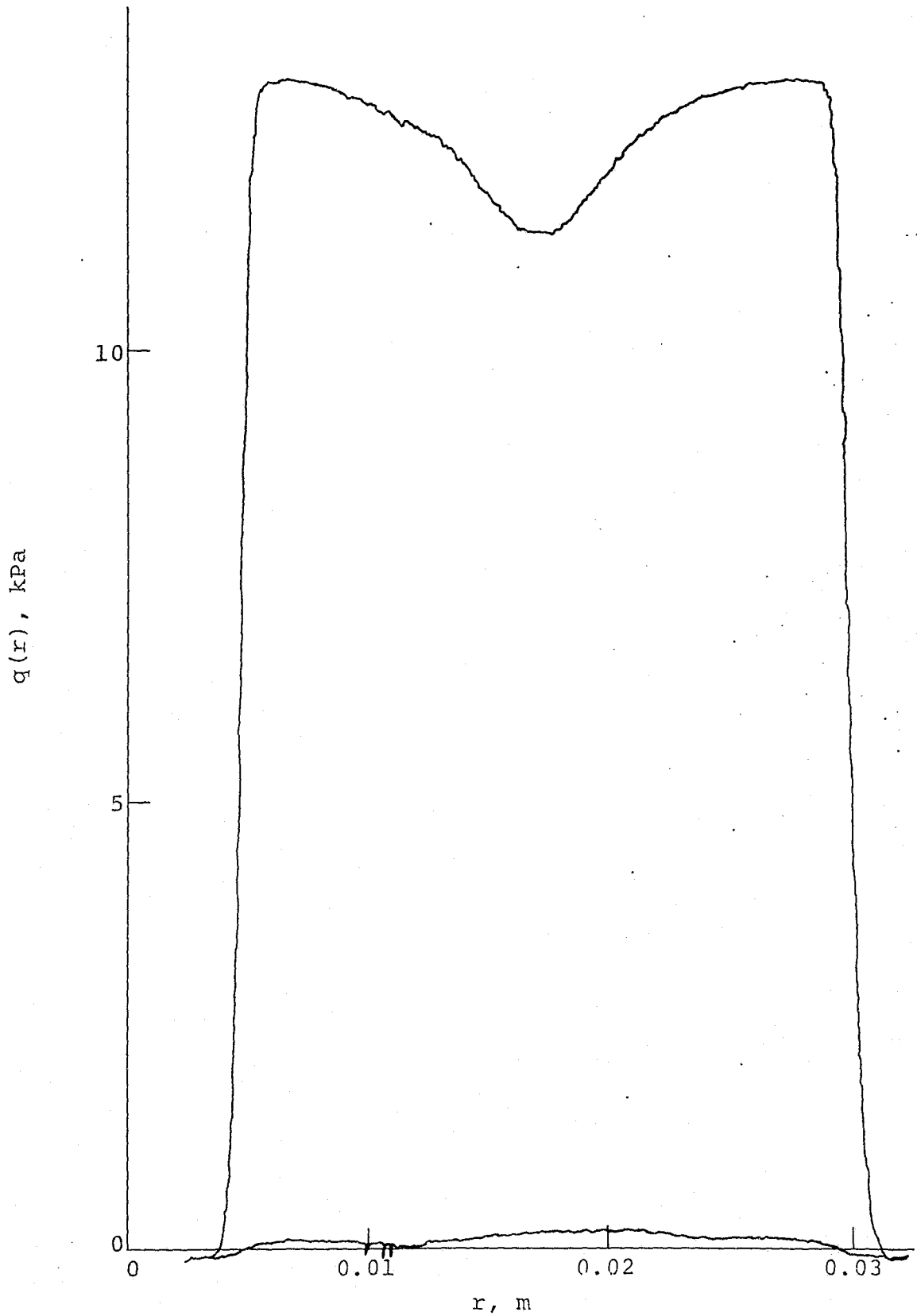


Figure 4. Static nozzle exit plane dynamic pressure profile; hemispherical tipped plug down 1.0 $D_n$.

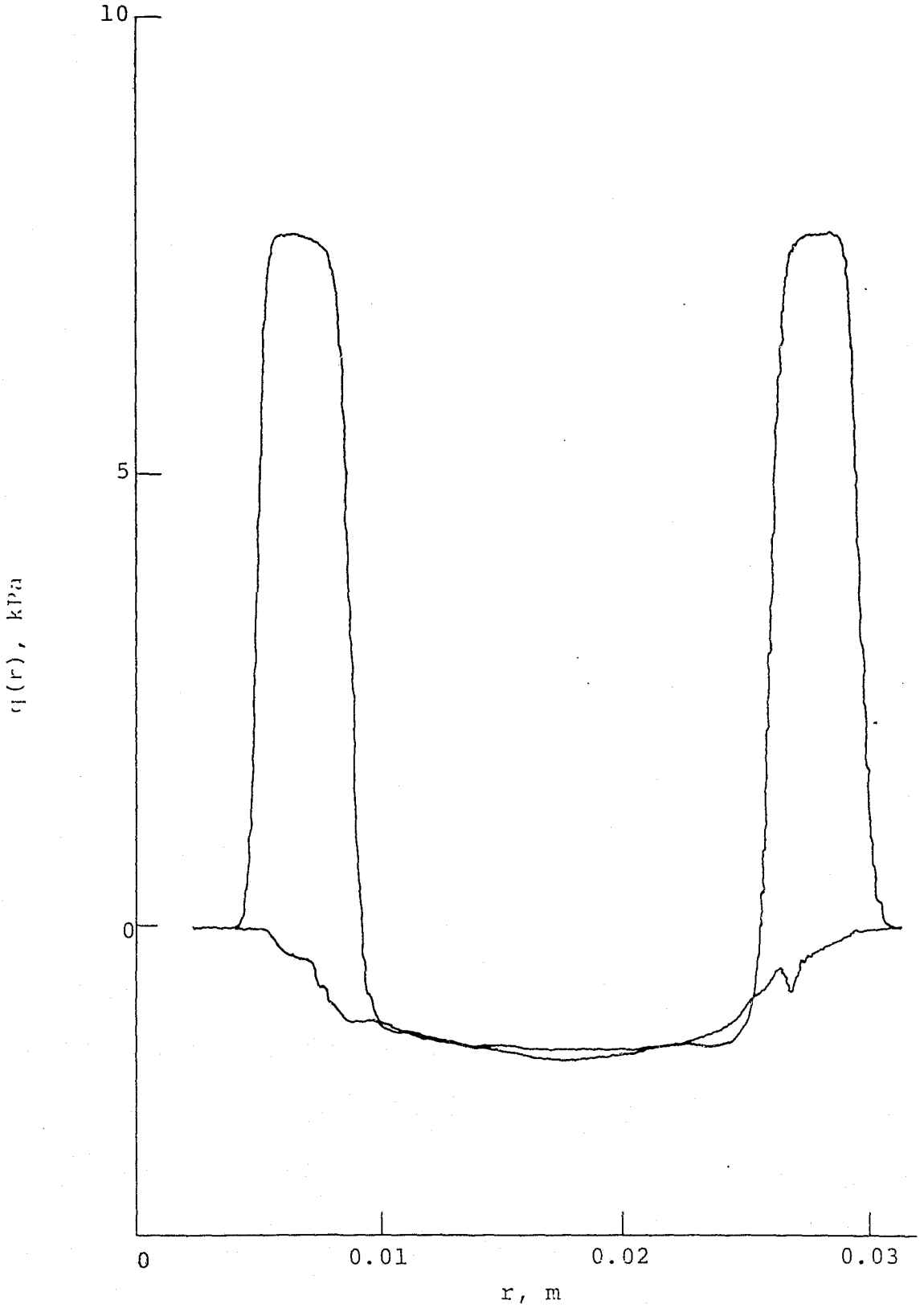


Figure 5. Static nozzle exit plane dynamic pressure profile; flat tipped plug flush.

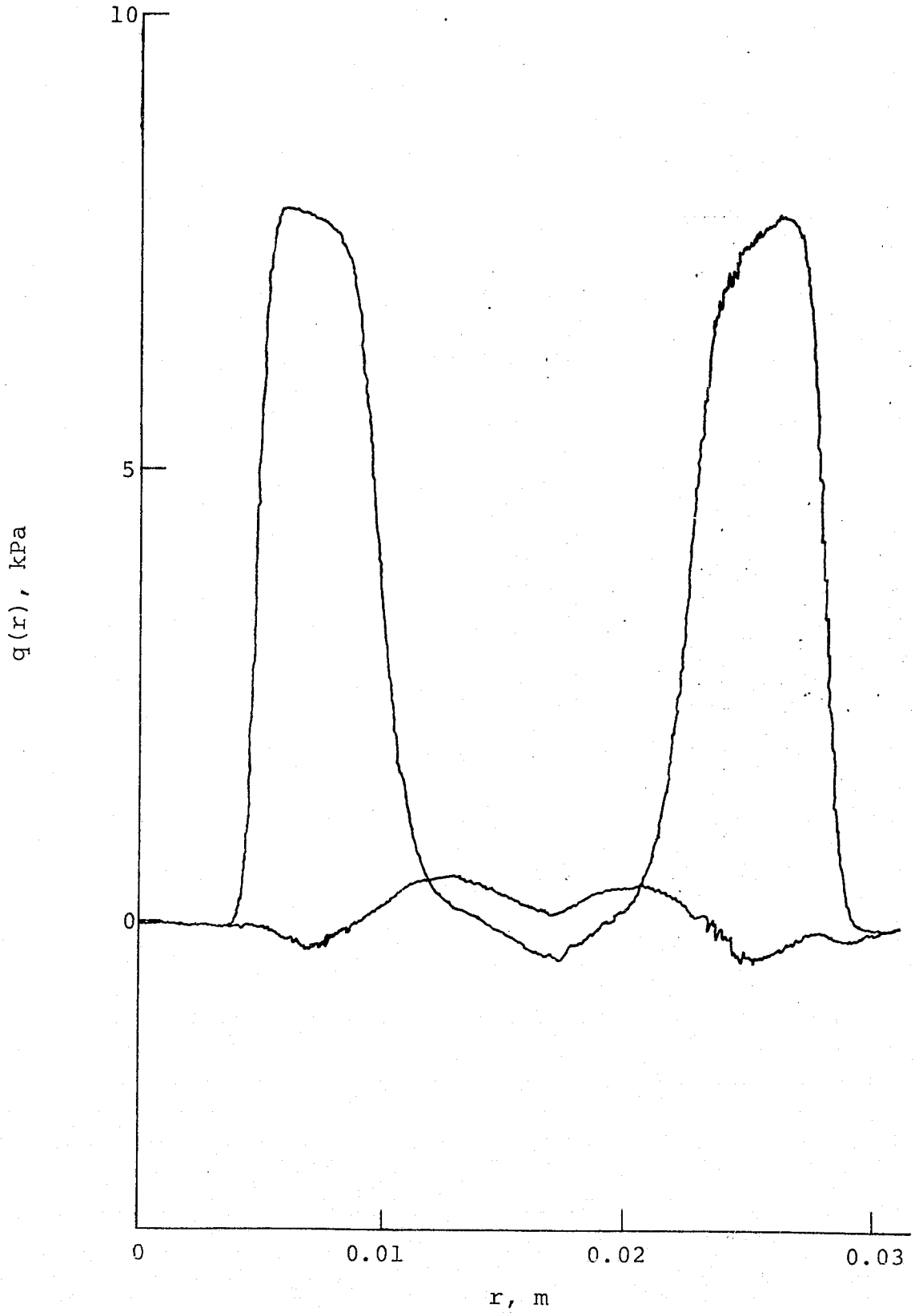


Figure 6. Static nozzle exit plane dynamic pressure profile; flat tipped plug down 0.375 $D_n$.

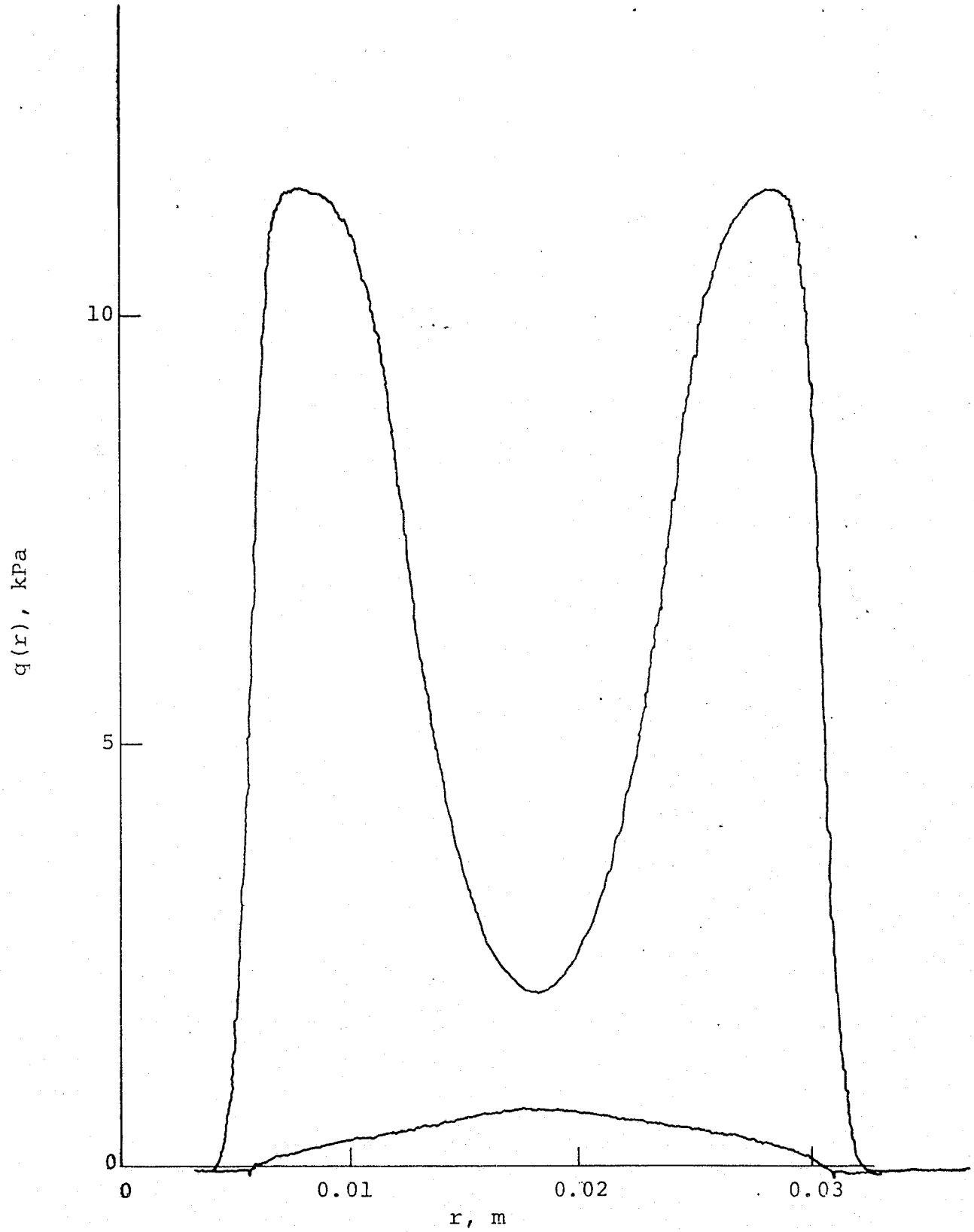


Figure 7. Static nozzle exit plane dynamic pressure profile; flat tipped plug down 0.875 $D_n$.

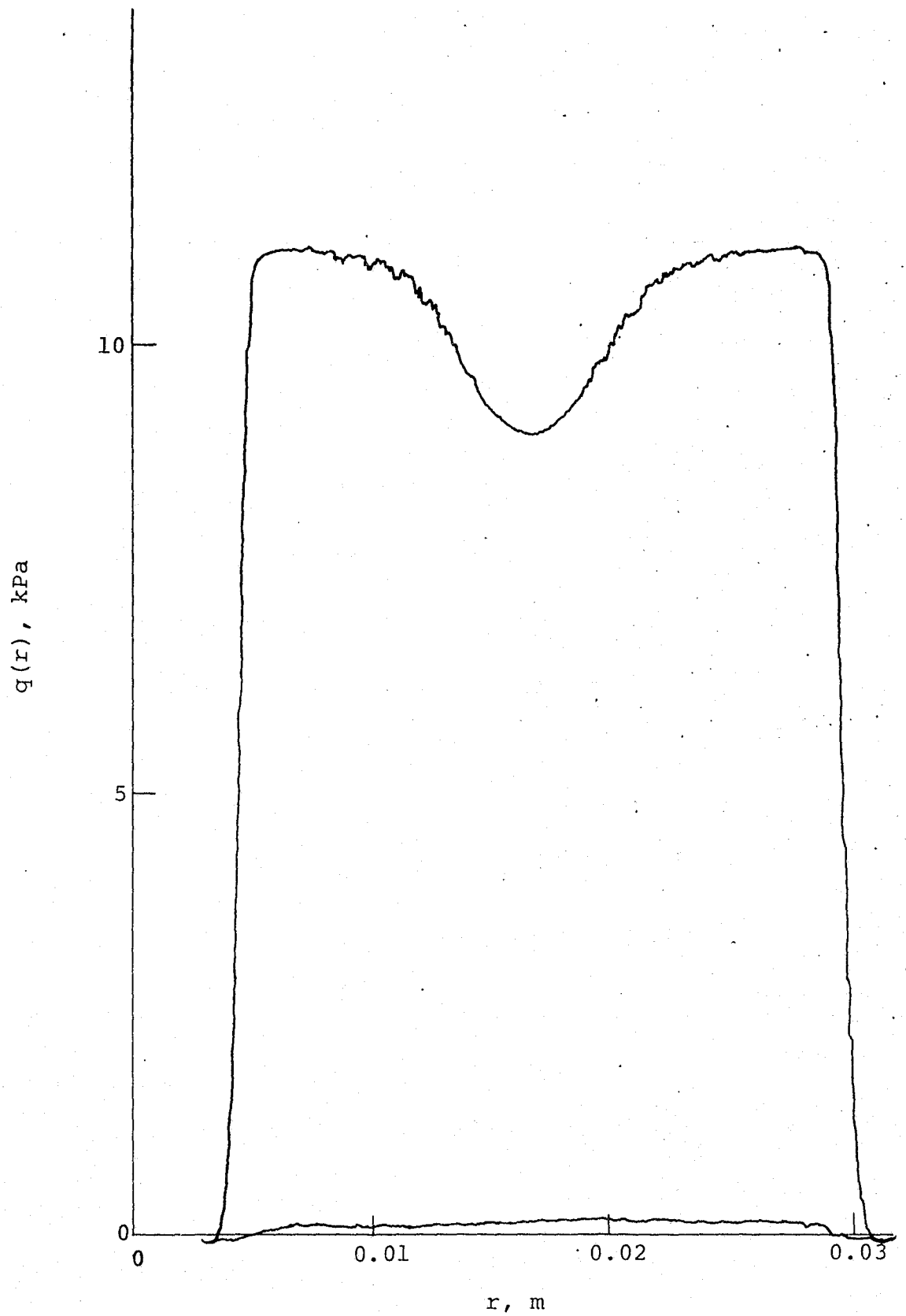


Figure 8. Static nozzle exit plane dynamic pressure profile; flat tipped plug down 1.375 $D_n$.

## SECTION 2: PRESSURE COEFFICIENTS AND INTEGRATED LOAD DATA

In this section the experimentally measured plate surface pressures and integrated loads are presented in tabular form. All pressures have been non-dimensionalized by the crossflow dynamic pressure, $q_\infty$, and have been calculated as the difference between the static pressures with the jet flow on and off. The integrated lift loss and pitching moment data have been calculated by integration of the pressure data. These have been calculated assuming the pressure to be constant on each panel centered around the individual pressure ports. In figure 9 the port locations on the plate are shown, and table 2 lists the radial locations of each port.

At the top of each pressure distribution table, pertinent data defining each nozzle configuration have been listed, including the jet-to-crossflow velocity ratio, R, the plug submergence depth and centerbody diameter, in nominal jet diameters, the effective jet diameter, $D_{eff}$, in inches, the plug diameter, in inches, the jet volume flow rate, Q, in $m^3$/sec and CFM, the crossflow velocity, $V_\infty$, in m/sec and ft/sec, and the jet thrust, T, in N and lb. Also included are the dates each data run was made.

The data for each configuration may be found in the following tables:

| Configuration | R | Table (part a. for pressures, b. for loads) |
|---|---|---|
| No Plug | 9.11 | 2-1 |
| | 7.81 | 2-2 |
| | 6.51 | 2-3 |
| | 5.21 | 2-4 |
| | 3.91 | 2-5 |
| | 2.61 | 2-6 |
| Round Plug Flush | 9.08 | 2-7 |
| | 6.81 | 2-8 |
| | 4.54 | 2-9 |
| | 2.27 | 2-10 |

| Configuration | R | Table (part a. for pressures, b. for loads) |
|---|---|---|
| Round Plug Down 0.5 $D_n$ | 10.35 | 2-11 |
| | 7.76 | 2-12 |
| | 5.18 | 2-13 |
| | 2.59 | 2-14 |
| Round Plug Down 1.0 $D_n$ | 9.98 | 2-15 |
| | 7.49 | 2-16 |
| | 4.49 | 2-17 |
| | 2.5 | 2-18 |
| Flat Plug Flush | 8.78 | 2-19 |
| | 6.58 | 2-20 |
| | 4.42 | 2-21 |
| | 2.21 | 2-22 |
| Flat Plug Down 0.375 $D_n$ | 8.72 | 2-23 |
| | 6.53 | 2-24 |
| | 4.36 | 2-25 |
| | 2.18 | 2-26 |
| Flat Plug Down 0.875 $D_n$ | 9.49 | 2-27 |
| | 7.11 | 2-28 |
| | 4.74 | 2-29 |
| | 2.37 | 2-30 |
| Flat Plug Down 1.375 $D_n$ | 9.48 | 2-31 |
| | 7.1 | 2-32 |
| | 4.74 | 2-33 |
| | 2.37 | 2-34 |

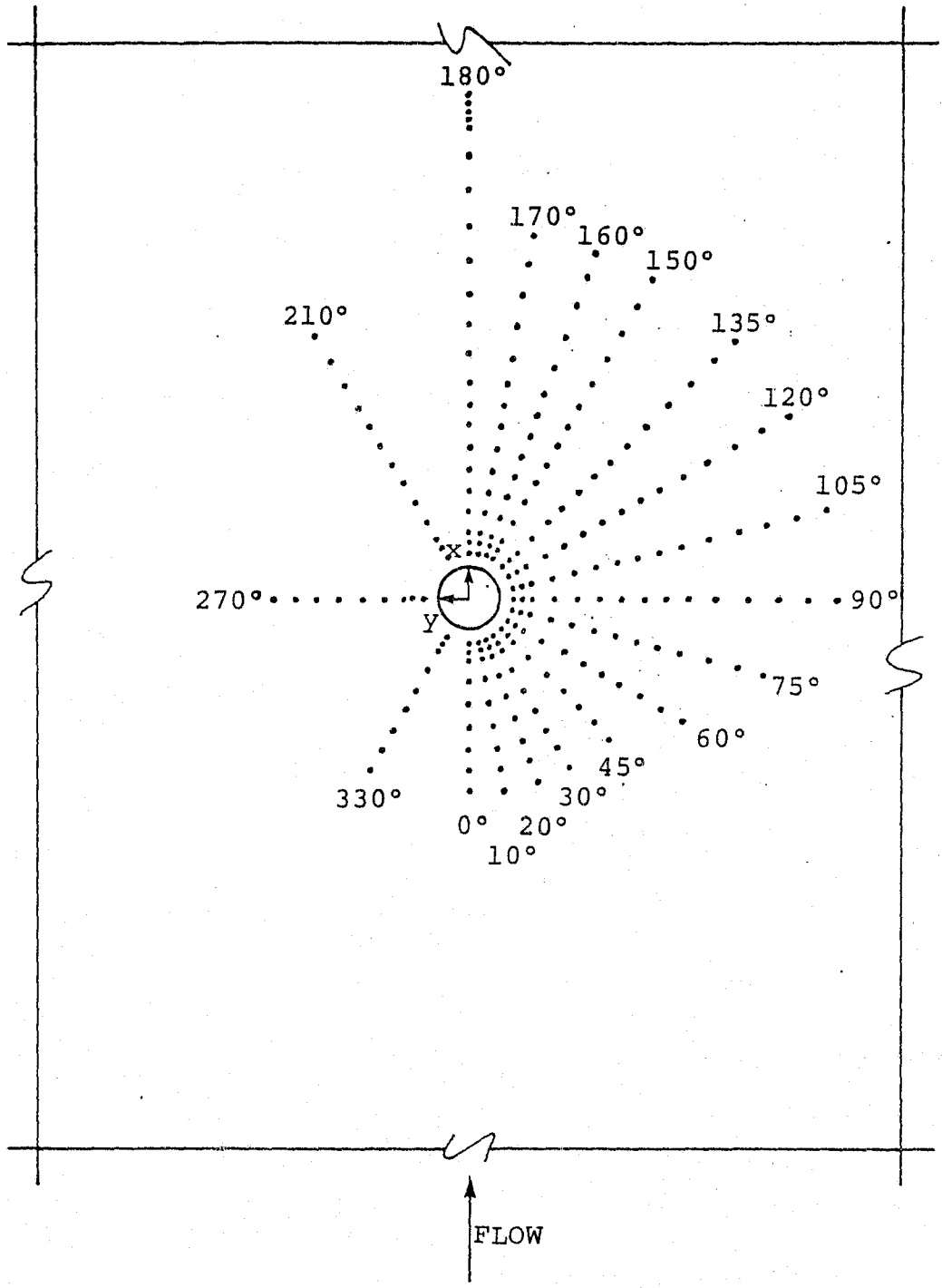


Figure 9. Plate pressure port distribution.

Table 2. Flat plate pressure port locations.

| Pressure Port No. | Radial Distance cm | (in.) |
|---|---|---|
| 1 | 1.905 | (0.750) |
| 2 | 2.223 | (0.875) |
| 3 | 2.540 | (1.000) |
| 4 | 3.493 | (1.375) |
| 5 | 4.445 | (1.750) |
| 6 | 5.398 | (2.125) |
| 7 | 6.350 | (2.500) |
| 8 | 7.303 | (2.875) |
| 9 | 8.255 | (3.250) |
| 10 | 9.208 | (3.625) |
| 11 | 10.160 | (4.000) |
| 12 | 11.430 | (4.500) |
| 13 | 12.700 | (5.000) |
| 14 | 13.970 | (5.500) |
| 15 | 15.240 | (6.000) |
| 16 | 16.510 | (6.500) |
| 17 | 17.780 | (7.000) |
| 18 | 19.050 | (7.500) |
| 19 | 20.320 | (8.000) |
| 20 | 20.638 | (8.125) |
| 21 | 20.955 | (8.250) |
| 22 | 21.273 | (8.375) |
| 23 | 21.590 | (8.500) |

Table 2-1a. Pressure coefficient data for no plug configuration, R = 9.11

NO PLUG 6-28-76

R = 9.11 PLUG DEPTH = .000 EFFECTIVE JET DIAMETER = 1.04 CENTERBODY DIAMETER = 0.00

JET FLOW RATE = 4.672 CMM ( 165.00 CFM ) FREE STREAM VELOCITY = 15.4 M/S ( 50.5 F/S )

JET EFFECTIVE VELOCITY = 140.2 M/S ( 460.0 F/S ) JET EFFECTIVE THRUST =12.727 N (2.8610 LB )

NON-DIMENSIONALIZED PRESSURES

ANGLE (DEGREES)

| PORT | 0 | 10 | 20 | 30 | 45 | 60 | 75 | 90 | 105 | 120 | 135 | 150 | 160 | 170 | 180 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.0811 | 0.0762 | 0.0885 | -0.2901 | -0.7104 | -1.1529 | -1.4749 | -1.5584 | -1.4749 | -1.2217 | -1.0152 | -0.8653 | -0.7497 | -0.7079 | -0.6391 |
| 2 | 0.0000 | 0.0000 | -0.0885 | -0.2778 | -0.6219 | -0.9832 | -1.1799 | -1.2758 | -1.1356 | -1.0054 | -0.8087 | -0.6760 | -0.5531 | -0.5359 | -0.5482 |
| 3 | -0.0737 | -0.0615 | -0.1672 | -0.2778 | -0.5113 | -0.8308 | -1.0004 | -1.0521 | -0.9390 | -0.8456 | -0.6735 | -0.5285 | -0.4007 | -0.4031 | -0.4326 |
| 4 | -0.1524 | -0.1450 | -0.1917 | -0.2704 | -0.3958 | -0.5555 | -0.6981 | -0.7399 | -0.6981 | -0.5506 | -0.4130 | -0.3196 | -0.2458 | -0.2483 | -0.2286 |
| 5 | -0.1622 | -0.1745 | -0.1991 | -0.2581 | -0.3589 | -0.4474 | -0.5359 | -0.5678 | -0.5408 | -0.4228 | -0.3245 | -0.2237 | -0.1917 | -0.1794 | -0.1819 |
| 6 | -0.1647 | -0.1745 | -0.1917 | -0.2237 | -0.3097 | -0.4007 | -0.4425 | -0.4572 | -0.3933 | -0.3318 | -0.2458 | -0.1770 | -0.1278 | -0.1426 | -0.1499 |
| 7 | -0.1426 | -0.1549 | -0.1819 | -0.2114 | -0.2606 | -0.3171 | -0.3835 | -0.3908 | -0.3638 | -0.2753 | -0.1917 | -0.1598 | -0.1131 | -0.1254 | -0.1082 |
| 8 | -0.1450 | -0.1549 | -0.1696 | -0.1917 | -0.2409 | -0.2655 | -0.3269 | -0.3417 | -0.3245 | -0.2360 | -0.1549 | -0.1303 | -0.1057 | -0.1082 | -0.0959 |
| 9 | -0.1131 | -0.1475 | -0.1426 | -0.1672 | -0.2139 | -0.2409 | -0.2704 | -0.2827 | -0.2507 | -0.2040 | -0.1377 | -0.1008 | -0.0959 | -0.0836 | -0.0983 |
| 10 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.2237 | -0.2532 | -0.2630 | -0.2409 | -0.1844 | -0.1278 | -0.0787 | -0.0664 | -0.0836 | -0.0639 |
| 11 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1770 | -0.2261 | -0.2384 | -0.2188 | -0.1721 | -0.1180 | -0.0516 | -0.0565 | -0.0885 | -0.0615 |
| 12 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1966 | -0.2188 | -0.1844 | -0.1524 | -0.0983 | -0.0664 | -0.0418 | -0.0615 | -0.0516 |
| 13 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1672 | -0.1647 | -0.1573 | -0.1327 | -0.0664 | -0.0295 | -0.0197 | -0.0442 | -0.0393 |
| 14 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1819 | -0.1573 | -0.1204 | -0.0664 | 0.0000 | -0.0098 | -0.0369 | -0.0442 |
| 15 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1524 | -0.1475 | -0.1057 | -0.0590 | 0.0000 | -0.0123 | -0.0320 | -0.0270 |
| 16 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0467 |
| 17 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0320 |
| 18 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0098 |
| 19 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0221 |
| 20 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0344 |
| 21 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0295 |
| 22 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 23 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0197 |

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Table 2-1b. Lift loss and pitching moment data for no plug configuration, R = 9.11.

| PORT | NON-DIMENSIONAL AREA | M N -M | M LB-FT | M/TD | L N | L LB | L/T |
|---|---|---|---|---|---|---|---|
| 1 | 1.5194 | 0.000348 | 0.000257 | 0.001035 | -0.101922 | -0.022912 | -0.008008 |
| 2 | 2.3297 | 0.000486 | 0.000358 | 0.001447 | -0.146834 | -0.033008 | -0.011537 |
| 3 | 4.2977 | 0.000726 | 0.000536 | 0.002162 | -0.238577 | -0.053632 | -0.018746 |
| 4 | 8.1179 | 0.000868 | 0.000640 | 0.002584 | -0.364467 | -0.081932 | -0.028638 |
| 5 | 12.9800 | 0.000794 | 0.000586 | 0.002364 | -0.493712 | -0.110986 | -0.038793 |
| 6 | 18.8840 | 0.000409 | 0.000301 | 0.001217 | -0.622041 | -0.139835 | -0.048876 |
| 7 | 25.8298 | -0.000107 | -0.000079 | -0.000319 | -0.751503 | -0.168938 | -0.059049 |
| 8 | 33.8175 | -0.000871 | -0.000642 | -0.002593 | -0.882218 | -0.198323 | -0.069319 |
| 9 | 42.8471 | -0.001812 | -0.001336 | -0.005394 | -1.007883 | -0.226572 | -0.079193 |
| 10 | 52.9185 | -0.000388 | -0.000286 | -0.001155 | -1.101816 | -0.247688 | -0.086574 |
| 11 | 62.1073 | 0.000987 | 0.000728 | 0.002939 | -1.177864 | -0.264784 | -0.092549 |
| 12 | 78.3142 | 0.004192 | 0.003092 | 0.012480 | -1.279168 | -0.287557 | -0.100509 |
| 13 | 101.1776 | 0.007636 | 0.005632 | 0.022734 | -1.390100 | -0.312495 | -0.109226 |
| 14 | 121.5520 | 0.011178 | 0.008245 | 0.033280 | -1.464216 | -0.329156 | -0.115049 |
| 15 | 143.7786 | 0.014902 | 0.010991 | 0.044366 | -1.535350 | -0.345147 | -0.120638 |
| 16 | 167.8575 | 0.015290 | 0.011278 | 0.045523 | -1.537704 | -0.345676 | -0.120823 |
| 17 | 193.7886 | 0.015598 | 0.011505 | 0.046441 | -1.539438 | -0.346066 | -0.120960 |
| 18 | 221.5719 | 0.015707 | 0.011586 | 0.046765 | -1.540010 | -0.346194 | -0.121005 |
| 19 | 239.8771 | 0.015880 | 0.011713 | 0.047278 | -1.540858 | -0.346385 | -0.121071 |
| 20 | 247.4017 | 0.015991 | 0.011795 | 0.047611 | -1.541400 | -0.346507 | -0.121114 |
| 21 | 255.0421 | 0.016090 | 0.011868 | 0.047905 | -1.541871 | -0.346613 | -0.121151 |
| 22 | 262.7983 | 0.016090 | 0.011868 | 0.047905 | -1.541871 | -0.346613 | -0.121151 |
| 23 | 270.6702 | 0.016160 | 0.011920 | 0.048113 | -1.542195 | -0.346686 | -0.121176 |

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Table 2-2a. Pressure coefficient data for no plug configuration, R = 7.81.

NO PLUG 6-28-76

R = 7.81 PLUG DEPTH = .000 EFFECTIVE JET DIAMETER = 1.04 CENTERBODY DIAMETER = 0.00

JET FLOW RATE = 4.672 CMM ( 165.00 CFM ) FREE STREAM VELOCITY = 18.0 M/S ( 58.9 F/S )

JET EFFECTIVE VELOCITY = 140.2 M/S ( 460.0 F/S ) JET EFFECTIVE THRUST =12.727 N (2.8610 LB )

NON-DIMENSIONALIZED PRESSURES

| PORT | ANGLE (DEGREES) 0 | 10 | 20 | 30 | 45 | 60 | 75 | 90 | 105 | 120 | 135 | 150 | 160 | 170 | 180 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.1048 | 0.0632 | -0.0524 | -0.3343 | -0.7571 | -1.4275 | -1.8847 | -2.0545 | -1.8196 | -1.5468 | -1.3101 | -1.2071 | -0.9727 | -0.8746 | -0.8501 |
| 2 | 0.0253 | 0.0000 | -0.1211 | -0.2873 | -0.6812 | -1.1655 | -1.4908 | -1.6064 | -1.5486 | -1.2631 | -1.0625 | -0.8818 | -0.7644 | -0.7138 | -0.7083 |
| 3 | -0.0488 | -0.0651 | -0.1572 | -0.3126 | -0.6216 | -0.9559 | -1.2414 | -1.3607 | -1.3083 | -1.0842 | -0.8547 | -0.7427 | -0.6288 | -0.5891 | -0.5909 |
| 4 | -0.1464 | -0.1626 | -0.2078 | -0.3090 | -0.4662 | -0.7101 | -0.8330 | -0.9125 | -0.8746 | -0.7571 | -0.5547 | -0.4445 | -0.3632 | -0.3487 | -0.3506 |
| 5 | -0.1771 | -0.1843 | -0.2313 | -0.2656 | -0.4102 | -0.5475 | -0.6722 | -0.7192 | -0.6921 | -0.5927 | -0.4355 | -0.3307 | -0.2871 | -0.2584 | -0.2837 |
| 6 | -0.1825 | -0.1789 | -0.2223 | -0.2530 | -0.3433 | -0.4301 | -0.5764 | -0.5945 | -0.5710 | -0.4698 | -0.3433 | -0.2692 | -0.2331 | -0.2403 | -0.2331 |
| 7 | -0.1662 | -0.1735 | -0.1861 | -0.2168 | -0.2873 | -0.3777 | -0.4698 | -0.5078 | -0.4734 | -0.4011 | -0.2620 | -0.2132 | -0.1717 | -0.1717 | -0.2006 |
| 8 | -0.1536 | -0.1554 | -0.1662 | -0.1933 | -0.2476 | -0.3343 | -0.3903 | -0.4174 | -0.4102 | -0.3433 | -0.2421 | -0.1933 | -0.1482 | -0.1717 | -0.1771 |
| 9 | -0.1355 | -0.1391 | -0.1590 | -0.1771 | -0.2277 | -0.2801 | -0.3469 | -0.3614 | -0.3542 | -0.3000 | -0.2042 | -0.1500 | -0.1536 | -0.1608 | -0.1409 |
| 10 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.2566 | -0.2982 | -0.3216 | -0.3144 | -0.2584 | -0.1861 | -0.1156 | -0.1030 | -0.1229 | -0.1391 |
| 11 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.2241 | -0.2602 | -0.2927 | -0.2710 | -0.2476 | -0.1644 | -0.1138 | -0.0958 | -0.0976 | -0.1229 |
| 12 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.2223 | -0.2638 | -0.2421 | -0.2168 | -0.1391 | -0.0723 | -0.0777 | -0.0940 | -0.1138 |
| 13 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1825 | -0.2186 | -0.2205 | -0.1789 | -0.1247 | -0.0506 | -0.0506 | -0.0651 | -0.0940 |
| 14 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1843 | -0.1807 | -0.1626 | -0.1247 | -0.0596 | -0.0470 | -0.0560 | -0.0849 |
| 15 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1861 | -0.1662 | -0.1464 | -0.1012 | -0.0416 | -0.0361 | -0.0470 | -0.0687 |
| 16 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0651 |
| 17 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0651 |
| 18 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0452 |
| 19 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0470 |
| 20 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0578 |
| 21 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0361 |
| 22 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0416 |
| 23 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0542 |

Table 2-2b. Lift loss and pitching moment data for no plug configuration, R = 7.81.

| PORT | NON-DIMENSIONAL AREA | M N -M | M LB-FT | M/TD | L N | L LB | L/T |
|---|---|---|---|---|---|---|---|
| 1 | 1.5194 | 0.000627 | 0.000463 | 0.001867 | -0.176763 | -0.039736 | -0.013889 |
| 2 | 2.3297 | 0.000912 | 0.000673 | 0.002715 | -0.253945 | -0.057087 | -0.019953 |
| 3 | 4.2977 | 0.001490 | 0.001099 | 0.004436 | -0.414092 | -0.093088 | -0.032537 |
| 4 | 8.1179 | 0.002033 | 0.001499 | 0.006052 | -0.631208 | -0.141896 | -0.049597 |
| 5 | 12.9800 | 0.002407 | 0.001776 | 0.007167 | -0.854808 | -0.192161 | -0.067166 |
| 6 | 18.8840 | 0.002660 | 0.001962 | 0.007918 | -1.081935 | -0.243219 | -0.085012 |
| 7 | 25.8298 | 0.002628 | 0.001939 | 0.007825 | -1.303940 | -0.293126 | -0.102456 |
| 8 | 33.8175 | 0.002691 | 0.001985 | 0.008012 | -1.526162 | -0.343081 | -0.119916 |
| 9 | 42.8471 | 0.002621 | 0.001934 | 0.007805 | -1.746698 | -0.392658 | -0.137245 |
| 10 | 52.9185 | 0.005910 | 0.004360 | 0.017597 | -1.913300 | -0.430110 | -0.150335 |
| 11 | 62.1073 | 0.008940 | 0.006594 | 0.026618 | -2.049123 | -0.460643 | -0.161008 |
| 12 | 78.3142 | 0.015529 | 0.011454 | 0.046234 | -2.229688 | -0.501234 | -0.175195 |
| 13 | 101.1776 | 0.023827 | 0.017575 | 0.070940 | -2.441398 | -0.548826 | -0.191830 |
| 14 | 121.5520 | 0.032528 | 0.023992 | 0.096843 | -2.581715 | -0.580370 | -0.202855 |
| 15 | 143.7786 | 0.041152 | 0.030354 | 0.122520 | -2.718321 | -0.611078 | -0.213589 |
| 16 | 167.8575 | 0.041888 | 0.030897 | 0.124712 | -2.722781 | -0.612081 | -0.213940 |
| 17 | 193.7886 | 0.042742 | 0.031527 | 0.127254 | -2.727584 | -0.613161 | -0.214317 |
| 18 | 221.5719 | 0.043423 | 0.032029 | 0.129281 | -2.731158 | -0.613964 | -0.214598 |
| 19 | 239.8771 | 0.043921 | 0.032396 | 0.130762 | -2.733607 | -0.614515 | -0.214790 |
| 20 | 247.4017 | 0.044176 | 0.032584 | 0.131524 | -2.734845 | -0.614793 | -0.214888 |
| 21 | 255.0421 | 0.044341 | 0.032706 | 0.132014 | -2.735632 | -0.614970 | -0.214949 |
| 22 | 262.7983 | 0.044536 | 0.032850 | 0.132595 | -2.736550 | -0.615176 | -0.215021 |
| 23 | 270.6702 | 0.044798 | 0.033043 | 0.133376 | -2.737765 | -0.615450 | -0.215117 |

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Table 2-3a. Pressure coefficient data for no plug configuration, R = 6.51.

NO PLUG 6-28-76

R = 6.51 PLUG DEPTH = .000 EFFECTIVE JET DIAMETER = 1.04 CENTERBODY DIAMETER = 0.00

JET FLOW RATE = 4.672 CMM ( 165.00 CFM ) FREE STREAM VELOCITY = 21.5 M/S ( 70.7 F/S )

JET EFFECTIVE VELOCITY = 140.2 M/S ( 460.0 F/S ) JET EFFECTIVE THRUST =12.727 N (2.8610 LB )

NON-DIMENSIONALIZED PRESSURES

ANGLE (DEGREES)

| PORT | 0 | 10 | 20 | 30 | 45 | 60 | 75 | 90 | 105 | 120 | 135 | 150 | 160 | 170 | 180 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.1430 | 0.1204 | 0.1066 | -0.2935 | -0.7588 | -1.4498 | -2.0029 | -2.2311 | -2.0041 | -1.6968 | -1.5125 | -1.3582 | -1.1701 | -1.0547 | -1.0246 |
| 2 | 0.0564 | 0.0188 | -0.0752 | -0.2558 | -0.6572 | -1.1739 | -1.5677 | -1.7470 | -1.6943 | -1.4335 | -1.2040 | -1.0673 | -0.9256 | -0.8754 | -0.8478 |
| 3 | 0.0000 | -0.0251 | -0.1179 | -0.2734 | -0.5932 | -0.9669 | -1.3005 | -1.4836 | -1.4435 | -1.2366 | -1.0221 | -0.8415 | -0.7487 | -0.6998 | -0.6973 |
| 4 | -0.0953 | -0.1191 | -0.1580 | -0.2546 | -0.4440 | -0.6622 | -0.8704 | -1.0008 | -1.0196 | -0.8704 | -0.6634 | -0.5531 | -0.4828 | -0.4678 | -0.4603 |
| 5 | -0.1317 | -0.1354 | -0.1756 | -0.2546 | -0.3750 | -0.5129 | -0.6434 | -0.7475 | -0.7801 | -0.6572 | -0.5004 | -0.4277 | -0.3675 | -0.3737 | -0.3587 |
| 6 | -0.1229 | -0.1417 | -0.1505 | -0.1994 | -0.2922 | -0.4302 | -0.5205 | -0.5932 | -0.5221 | -0.5543 | -0.4114 | -0.3311 | -0.2972 | -0.2947 | -0.2960 |
| 7 | -0.1166 | -0.1279 | -0.1430 | -0.1919 | -0.2508 | -0.3424 | -0.4440 | -0.4879 | -0.5205 | -0.4703 | -0.3512 | -0.2659 | -0.2370 | -0.2646 | -0.2671 |
| 8 | -0.1166 | -0.1229 | -0.1191 | -0.1580 | -0.2107 | -0.2859 | -0.3612 | -0.4126 | -0.4490 | -0.4114 | -0.3098 | -0.2132 | -0.2082 | -0.2257 | -0.2358 |
| 9 | -0.1028 | -0.0978 | -0.1141 | -0.1354 | -0.1856 | -0.2483 | -0.3123 | -0.3637 | -0.3963 | -0.3549 | -0.2621 | -0.1956 | -0.1681 | -0.1969 | -0.1982 |
| 10 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.2220 | -0.2621 | -0.3048 | -0.3374 | -0.3148 | -0.2358 | -0.1706 | -0.1392 | -0.1593 | -0.1856 |
| 11 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1844 | -0.2370 | -0.2584 | -0.3048 | -0.2935 | -0.2145 | -0.1480 | -0.1279 | -0.1430 | -0.1681 |
| 12 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.2057 | -0.2245 | -0.2521 | -0.2458 | -0.1919 | -0.1229 | -0.1104 | -0.1380 | -0.1467 |
| 13 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1655 | -0.1944 | -0.2132 | -0.2207 | -0.1768 | -0.1129 | -0.0978 | -0.1028 | -0.1304 |
| 14 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1668 | -0.1919 | -0.2007 | -0.1643 | -0.0978 | -0.0803 | -0.0978 | -0.1317 |
| 15 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1467 | -0.1580 | -0.1756 | -0.1392 | -0.0853 | -0.0715 | -0.0941 | -0.1229 |
| 16 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1166 |
| 17 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1066 |
| 18 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1028 |
| 19 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0953 |
| 20 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0916 |
| 21 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0890 |
| 22 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0890 |
| 23 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1016 |

Table 2-3b. Lift loss and pitching moment data for no plug configuration, R = 6.51.

| PORT | NON-DIMENSIONAL AREA | M N -M | M LB-FT | M/TD | L N | L LB | L/T |
|---|---|---|---|---|---|---|---|
| 1 | 1.5194 | 0.001191 | 0.000878 | 0.003545 | -0.275404 | -0.061911 | -0.021640 |
| 2 | 2.3297 | 0.001749 | 0.001290 | 0.005208 | -0.396504 | -0.089134 | -0.031155 |
| 3 | 4.2977 | 0.002940 | 0.002168 | 0.008752 | -0.646586 | -0.145352 | -0.050805 |
| 4 | 8.1179 | 0.004673 | 0.003447 | 0.013914 | -0.987040 | -0.221887 | -0.077556 |
| 5 | 12.9800 | 0.006446 | 0.004755 | 0.019192 | -1.326425 | -0.298180 | -0.104222 |
| 6 | 18.8840 | 0.008464 | 0.006243 | 0.025198 | -1.661716 | -0.373554 | -0.130568 |
| 7 | 25.8298 | 0.010677 | 0.007875 | 0.031787 | -1.995755 | -0.448646 | -0.156814 |
| 8 | 33.8175 | 0.013267 | 0.009786 | 0.039498 | -2.323587 | -0.522342 | -0.182573 |
| 9 | 42.8471 | 0.016050 | 0.011838 | 0.047785 | -2.645552 | -0.594720 | -0.207871 |
| 10 | 52.9185 | 0.023028 | 0.016986 | 0.068561 | -2.904256 | -0.652877 | -0.228199 |
| 11 | 62.1073 | 0.029498 | 0.021758 | 0.087824 | -3.114582 | -0.700158 | -0.244725 |
| 12 | 78.3142 | 0.042520 | 0.031363 | 0.126592 | -3.402719 | -0.764931 | -0.267365 |
| 13 | 101.1776 | 0.060548 | 0.044660 | 0.180267 | -3.754222 | -0.843949 | -0.294984 |
| 14 | 121.5520 | 0.078015 | 0.057544 | 0.232272 | -3.998760 | -0.898921 | -0.314198 |
| 15 | 143.7786 | 0.096312 | 0.071040 | 0.286746 | -4.230724 | -0.951067 | -0.332425 |
| 16 | 167.8575 | 0.098214 | 0.072443 | 0.292409 | -4.242246 | -0.953657 | -0.333330 |
| 17 | 193.7886 | 0.100231 | 0.073930 | 0.298412 | -4.253587 | -0.956206 | -0.334221 |
| 18 | 221.5719 | 0.102463 | 0.075577 | 0.305060 | -4.265309 | -0.958841 | -0.335142 |
| 19 | 239.8771 | 0.103918 | 0.076650 | 0.309390 | -4.272467 | -0.960451 | -0.335704 |
| 20 | 247.4017 | 0.104501 | 0.077080 | 0.311126 | -4.275293 | -0.961086 | -0.335927 |
| 21 | 255.0421 | 0.105086 | 0.077511 | 0.312867 | -4.278085 | -0.961713 | -0.336146 |
| 22 | 262.7983 | 0.105689 | 0.077956 | 0.314662 | -4.280918 | -0.962350 | -0.336368 |
| 23 | 270.6702 | 0.106397 | 0.078478 | 0.316770 | -4.284199 | -0.963088 | -0.336626 |

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Table 2-4a. Pressure coefficient data for no plug configuration, R = 5.21.

NO PLUG 6-29-76

R = 5.21 PLUG DEPTH = .000 EFFECTIVE JET DIAMETER = 1.04 CENTERBODY DIAMETER = 0.00

JET FLOW RATE = 4.672 CMM ( 165.00 CFM ) FREE STREAM VELOCITY = 26.9 M/S ( 88.4 F/S )

JET EFFECTIVE VELOCITY = 140.4 M/S ( 460.8 F/S ) JET EFFECTIVE THRUST =12.747 N (2.8656 LB )

NON-DIMENSIONALIZED PRESSURES

| PORT | ANGLE (DEGREES) 0 | 10 | 20 | 30 | 45 | 60 | 75 | 90 | 105 | 120 | 135 | 150 | 160 | 170 | 180 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.2345 | 0.1899 | 0.0446 | -0.1940 | -0.6873 | -1.4461 | -2.1935 | -2.6131 | -2.4921 | -2.0775 | -1.6969 | -1.5857 | -1.4023 | -1.2984 | -1.2716 |
| 2 | 0.1339 | 0.1039 | 0.0179 | -0.1720 | -0.5883 | -1.1556 | -1.6839 | -2.0296 | -2.0361 | -1.7131 | -1.4169 | -1.2757 | -1.1288 | -1.0671 | -1.0647 |
| 3 | 0.0665 | 0.0454 | -0.0203 | -0.1745 | -0.5064 | -0.9129 | -1.3471 | -1.6433 | -1.6993 | -1.4680 | -1.1945 | -1.0290 | -0.9129 | -0.8878 | -0.8724 |
| 4 | -0.0073 | -0.0219 | -0.0682 | -0.1688 | -0.3457 | -0.5794 | -0.8375 | -1.0347 | -1.1174 | -1.0030 | -0.7888 | -0.6476 | -0.5802 | -0.5567 | -0.5827 |
| 5 | -0.0316 | -0.0454 | -0.0714 | -0.1380 | -0.2597 | -0.4269 | -0.5948 | -0.7336 | -0.8034 | -0.7466 | -0.5745 | -0.4609 | -0.4439 | -0.4423 | -0.4358 |
| 6 | -0.0398 | -0.0414 | -0.0649 | -0.1096 | -0.2045 | -0.3287 | -0.4536 | -0.5478 | -0.5997 | -0.5713 | -0.4593 | -0.3400 | -0.3343 | -0.3700 | -0.3522 |
| 7 | -0.0414 | -0.0406 | -0.0633 | -0.0893 | -0.1639 | -0.2516 | -0.3465 | -0.4374 | -0.4820 | -0.4723 | -0.3554 | -0.2637 | -0.2572 | -0.3116 | -0.2978 |
| 8 | -0.0333 | -0.0414 | -0.0511 | -0.0755 | -0.1355 | -0.1972 | -0.2775 | -0.3489 | -0.3895 | -0.3814 | -0.2954 | -0.2013 | -0.1923 | -0.2508 | -0.2516 |
| 9 | -0.0276 | -0.0390 | -0.0414 | -0.0649 | -0.1128 | -0.1729 | -0.2337 | -0.2840 | -0.3246 | -0.3157 | -0.2532 | -0.1607 | -0.1623 | -0.2126 | -0.2175 |
| 10 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1363 | -0.1915 | -0.2337 | -0.2646 | -0.2678 | -0.2126 | -0.1307 | -0.1185 | -0.1858 | -0.2053 |
| 11 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1128 | -0.1623 | -0.2021 | -0.2280 | -0.2280 | -0.1866 | -0.1079 | -0.0844 | -0.1550 | -0.1923 |
| 12 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1282 | -0.1623 | -0.1964 | -0.1907 | -0.1607 | -0.0771 | -0.0665 | -0.1169 | -0.1615 |
| 13 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0941 | -0.1298 | -0.1582 | -0.1591 | -0.1307 | -0.0617 | -0.0552 | -0.1063 | -0.1493 |
| 14 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1096 | -0.1290 | -0.1298 | -0.1039 | -0.0552 | -0.0316 | -0.0852 | -0.1242 |
| 15 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0998 | -0.0990 | -0.1120 | -0.0852 | -0.0406 | -0.0162 | -0.0682 | -0.1209 |
| 16 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1144 |
| 17 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1055 |
| 18 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0917 |
| 19 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0917 |
| 20 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0933 |
| 21 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0812 |
| 22 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0917 |
| 23 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0868 |

Table 2-4b. Lift loss and pitching moment data for no plug configuration, R = 5.21.

| PORT | NON-DIMENSIONAL AREA | M N-M | M LB-FT | M/TD | L N | L LB | L/T |
|---|---|---|---|---|---|---|---|
| 1 | 1.5170 | 0.002466 | 0.001819 | 0.007323 | -0.487979 | -0.109698 | -0.038281 |
| 2 | 2.3260 | 0.003708 | 0.002735 | 0.011014 | -0.699101 | -0.157158 | -0.054843 |
| 3 | 4.2908 | 0.006516 | 0.004806 | 0.019352 | -1.124911 | -0.252880 | -0.088247 |
| 4 | 8.1049 | 0.011109 | 0.008194 | 0.032996 | -1.669765 | -0.375363 | -0.130989 |
| 5 | 12.9591 | 0.016463 | 0.012143 | 0.048897 | -2.181609 | -0.490426 | -0.171142 |
| 6 | 18.8536 | 0.022526 | 0.016615 | 0.066905 | -2.661061 | -0.598206 | -0.208754 |
| 7 | 25.7883 | 0.029208 | 0.021544 | 0.086749 | -3.111756 | -0.699523 | -0.244110 |
| 8 | 33.7631 | 0.036188 | 0.026692 | 0.107481 | -3.529236 | -0.793372 | -0.276860 |
| 9 | 42.7782 | 0.043595 | 0.032156 | 0.129480 | -3.925043 | -0.882350 | -0.307910 |
| 10 | 52.8335 | 0.054230 | 0.040000 | 0.161068 | -4.252594 | -0.955983 | -0.333606 |
| 11 | 62.0074 | 0.063316 | 0.046702 | 0.188054 | -4.506755 | -1.013119 | -0.353544 |
| 12 | 78.1883 | 0.079646 | 0.058747 | 0.236554 | -4.844899 | -1.089133 | -0.380071 |
| 13 | 101.0149 | 0.101444 | 0.074825 | 0.301297 | -5.234450 | -1.176704 | -0.410630 |
| 14 | 121.3566 | 0.119543 | 0.088175 | 0.355053 | -5.485691 | -1.233183 | -0.430339 |
| 15 | 143.5475 | 0.137028 | 0.101072 | 0.406982 | -5.712190 | -1.284100 | -0.448108 |
| 16 | 167.5877 | 0.139935 | 0.103216 | 0.415618 | -5.729803 | -1.288060 | -0.449489 |
| 17 | 193.4771 | 0.143044 | 0.105509 | 0.424852 | -5.747291 | -1.291991 | -0.450861 |
| 18 | 221.2157 | 0.146147 | 0.107798 | 0.434067 | -5.763578 | -1.295652 | -0.452139 |
| 19 | 239.4914 | 0.148327 | 0.109406 | 0.440542 | -5.774308 | -1.298065 | -0.452981 |
| 20 | 247.0040 | 0.149253 | 0.110089 | 0.443294 | -5.778797 | -1.299074 | -0.453333 |
| 21 | 254.6321 | 0.150084 | 0.110702 | 0.445760 | -5.782761 | -1.299965 | -0.453644 |
| 22 | 262.3758 | 0.151051 | 0.111415 | 0.448633 | -5.787308 | -1.300987 | -0.454000 |
| 23 | 270.2351 | 0.151994 | 0.112111 | 0.451434 | -5.791677 | -1.301969 | -0.454343 |

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Table 2.5a. Pressure coefficient data for no plug configuration, R = 3.91.

NO PLUG 6-29-76

R = 3.91 PLUG DEPTH = .000 EFFECTIVE JET DIAMETER = 1.04 CENTERBODY DIAMETER = 0.00

JET FLOW RATE = 4.672 CMM ( 165.00 CFM ) FREE STREAM VELOCITY = 35.9 M/S ( 117.9 F/S )

JET EFFECTIVE VELOCITY = 140.4 M/S ( 460.8 F/S ) JET EFFECTIVE THRUST = 12.747 N (2.8656 LB )

NON-DIMENSIONALIZED PRESSURES

| PORT | ANGLE (DEGREES) 0 | 10 | 20 | 30 | 45 | 60 | 75 | 90 | 105 | 120 | 135 | 150 | 160 | 170 | 180 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.3189 | 0.2882 | 0.1708 | -0.0167 | -0.4215 | -1.0986 | -1.8797 | -2.5564 | -2.8216 | -2.5198 | -1.9560 | -1.7930 | -1.7379 | -1.6236 | -1.5675 |
| 2 | 0.2462 | 0.2249 | 0.1378 | 0.0072 | -0.3289 | -0.8285 | -1.3742 | -1.9344 | -2.1720 | -2.0306 | -1.6353 | -1.4551 | -1.4049 | -1.3177 | -1.3200 |
| 3 | 0.1884 | 0.1699 | 0.1053 | 0.0072 | -0.2665 | -0.6275 | -1.0607 | -1.4605 | -1.7293 | -1.6701 | -1.3814 | -1.2080 | -1.1361 | -1.0977 | -1.1257 |
| 4 | 0.0989 | 0.0926 | 0.0583 | 0.0000 | -0.1540 | -0.3551 | -0.5886 | -0.8127 | -0.9988 | -1.0309 | -0.8615 | -0.7540 | -0.7409 | -0.7680 | -0.7377 |
| 5 | 0.0637 | 0.0619 | 0.0379 | 0.0000 | -0.0922 | -0.2218 | -0.3975 | -0.5181 | -0.6514 | -0.6997 | -0.6067 | -0.5032 | -0.5389 | -0.5936 | -0.5832 |
| 6 | 0.0510 | 0.0452 | 0.0298 | 0.0045 | -0.0551 | -0.1518 | -0.2620 | -0.3677 | -0.4535 | -0.4974 | -0.4504 | -0.3637 | -0.3840 | -0.5141 | -0.5005 |
| 7 | 0.0393 | 0.0352 | 0.0244 | 0.0099 | -0.0343 | -0.1039 | -0.1897 | -0.2683 | -0.3356 | -0.3763 | -0.3533 | -0.2756 | -0.2959 | -0.4165 | -0.4292 |
| 8 | 0.0384 | 0.0325 | 0.0235 | 0.0126 | -0.0244 | -0.0831 | -0.1459 | -0.2006 | -0.2598 | -0.2923 | -0.2670 | -0.2078 | -0.2232 | -0.3325 | -0.3763 |
| 9 | 0.0303 | 0.0298 | 0.0253 | 0.0126 | -0.0181 | -0.0596 | -0.1071 | -0.1581 | -0.1992 | -0.2313 | -0.2195 | -0.1590 | -0.1613 | -0.2828 | -0.3094 |
| 10 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0416 | -0.0840 | -0.1287 | -0.1608 | -0.1843 | -0.1811 | -0.1265 | -0.1274 | -0.2494 | -0.2918 |
| 11 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0316 | -0.0700 | -0.1034 | -0.1328 | -0.1527 | -0.1455 | -0.0994 | -0.0935 | -0.1988 | -0.2575 |
| 12 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0542 | -0.0754 | -0.1057 | -0.1247 | -0.1161 | -0.0759 | -0.0619 | -0.1608 | -0.2263 |
| 13 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0361 | -0.0605 | -0.0840 | -0.0967 | -0.0935 | -0.0520 | -0.0407 | -0.1197 | -0.1979 |
| 14 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0520 | -0.0651 | -0.0745 | -0.0714 | -0.0398 | -0.0262 | -0.1012 | -0.1799 |
| 15 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0375 | -0.0515 | -0.0678 | -0.0610 | -0.0352 | -0.0154 | -0.0881 | -0.1662 |
| 16 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1554 |
| 17 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1455 |
| 18 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1337 |
| 19 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1170 |
| 20 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1188 |
| 21 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1152 |
| 22 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1165 |
| 23 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1170 |

Table 2-5b. Lift loss and pitching moment for no plug configuration, R = 3.91.

| PORT | NON-DIMENSIONAL AREA | M N-M | M LB-FT | M/TD | L N | L LB | L/T |
|---|---|---|---|---|---|---|---|
| 1 | 1.5170 | 0.006270 | 0.004625 | 0.018623 | -0.890271 | -0.200133 | -0.069840 |
| 2 | 2.3260 | 0.009495 | 0.007004 | 0.028202 | -1.263434 | -0.284020 | -0.099113 |
| 3 | 4.2908 | 0.016961 | 0.012510 | 0.050374 | -1.992827 | -0.447988 | -0.156332 |
| 4 | 8.1049 | 0.029776 | 0.021963 | 0.088437 | -2.849968 | -0.640673 | -0.223573 |
| 5 | 12.9591 | 0.044749 | 0.033007 | 0.132908 | -3.594731 | -0.808095 | -0.281998 |
| 6 | 18.8536 | 0.061852 | 0.045622 | 0.183706 | -4.249705 | -0.955334 | -0.333379 |
| 7 | 25.7883 | 0.080756 | 0.059566 | 0.239851 | -4.832962 | -1.086450 | -0.379134 |
| 8 | 33.7631 | 0.100551 | 0.074167 | 0.298645 | -5.348525 | -1.202348 | -0.419579 |
| 9 | 42.7782 | 0.121164 | 0.089370 | 0.359866 | -5.803611 | -1.304652 | -0.455279 |
| 10 | 52.8335 | 0.141835 | 0.104617 | 0.421260 | -6.229826 | -1.400465 | -0.488715 |
| 11 | 62.0074 | 0.158653 | 0.117023 | 0.471212 | -6.544754 | -1.471261 | -0.513420 |
| 12 | 78.1883 | 0.186086 | 0.137257 | 0.552690 | -6.969232 | -1.566683 | -0.546719 |
| 13 | 101.0149 | 0.219436 | 0.161856 | 0.651741 | -7.430696 | -1.670420 | -0.582920 |
| 14 | 121.3566 | 0.246380 | 0.181730 | 0.731769 | -7.739375 | -1.739812 | -0.607135 |
| 15 | 143.5475 | 0.274115 | 0.202187 | 0.814142 | -8.023215 | -1.803619 | -0.629402 |
| 16 | 167.5877 | 0.281139 | 0.207368 | 0.835004 | -8.065764 | -1.813184 | -0.632740 |
| 17 | 193.4771 | 0.288765 | 0.212993 | 0.857652 | -8.108656 | -1.822826 | -0.636105 |
| 18 | 221.2157 | 0.296811 | 0.218928 | 0.881552 | -8.150901 | -1.832322 | -0.639419 |
| 19 | 239.4914 | 0.301760 | 0.222578 | 0.896249 | -8.175255 | -1.837797 | -0.641329 |
| 20 | 247.0040 | 0.303857 | 0.224125 | 0.902480 | -8.185420 | -1.840082 | -0.642127 |
| 21 | 254.6321 | 0.305954 | 0.225672 | 0.908708 | -8.195429 | -1.842332 | -0.642912 |
| 22 | 262.3758 | 0.308141 | 0.227285 | 0.915202 | -8.205708 | -1.844643 | -0.643718 |
| 23 | 270.2351 | 0.310402 | 0.228952 | 0.921917 | -8.216181 | -1.846997 | -0.644540 |

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Table 2-6a. Pressure coefficient data for no plug configuration, R = 2.61.

NO PLUG 6-29-76

R = 2.61 PLUG DEPTH = .000 EFFECTIVE JET DIAMETER = 1.04 CENTERBODY DIAMETER = 0.00

JET FLOW RATE = 4.672 CMM ( 165.00 CFM ) FREE STREAM VELOCITY = 53.9 M/S ( 176.8 F/S )

JET EFFECTIVE VELOCITY = 140.4 M/S ( 460.8 F/S ) JET EFFECTIVE THRUST =12.747 N (2.8656 LB )

NON-DIMENSIONALIZED PRESSURES

ANGLE (DEGREES)

| PORT | 0 | 10 | 20 | 30 | 45 | 60 | 75 | 90 | 105 | 120 | 135 | 150 | 160 | 170 | 180 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.3668 | 0.3457 | 0.2847 | 0.1782 | -0.0705 | -0.4809 | -1.0547 | -1.7039 | -2.3002 | -2.5734 | -2.0699 | -1.5776 | -1.2760 | -1.1085 | -1.0539 |
| 2 | 0.3220 | 0.3043 | 0.2614 | 0.1780 | -0.0115 | -0.3240 | -0.7075 | -1.1993 | -1.6632 | -1.8906 | -1.7268 | -1.3026 | -1.0263 | -0.8379 | -0.7975 |
| 3 | 0.2786 | 0.2704 | 0.2300 | 0.1657 | 0.0123 | -0.2041 | -0.5022 | -0.8361 | -1.2011 | -1.4367 | -1.4167 | -1.1197 | -0.8578 | -0.6929 | -0.6463 |
| 4 | 0.1961 | 0.1880 | 0.1655 | 0.1296 | 0.0436 | -0.0751 | -0.2294 | -0.3992 | -0.5938 | -0.7839 | -0.8964 | -0.8212 | -0.6428 | -0.4984 | -0.4747 |
| 5 | 0.1475 | 0.1428 | 0.1276 | 0.1053 | 0.0472 | -0.0295 | -0.1296 | -0.2387 | -0.3845 | -0.5090 | -0.6513 | -0.6465 | -0.4783 | -0.3885 | -0.3724 |
| 6 | 0.1175 | 0.1131 | 0.1021 | 0.0854 | 0.0430 | -0.0068 | -0.0804 | -0.1591 | -0.2521 | -0.3592 | -0.4661 | -0.4831 | -0.3576 | -0.2935 | -0.2907 |
| 7 | 0.0936 | 0.0908 | 0.0824 | 0.0679 | 0.0400 | 0.0000 | -0.0546 | -0.1135 | -0.1886 | -0.2680 | -0.3487 | -0.3648 | -0.2684 | -0.2109 | -0.2174 |
| 8 | 0.0771 | 0.0773 | 0.0709 | 0.0583 | 0.0368 | 0.0056 | -0.0416 | -0.0876 | -0.1448 | -0.2077 | -0.2666 | -0.2744 | -0.1941 | -0.1444 | -0.1517 |
| 9 | 0.0671 | 0.0645 | 0.0597 | 0.0512 | 0.0307 | 0.0082 | -0.0289 | -0.0693 | -0.1173 | -0.1655 | -0.2041 | -0.2125 | -0.1511 | -0.1041 | -0.1049 |
| 10 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0078 | -0.0233 | -0.0556 | -0.0928 | -0.1288 | -0.1643 | -0.1661 | -0.1119 | -0.0691 | -0.0771 |
| 11 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0060 | -0.0153 | -0.0460 | -0.0755 | -0.1101 | -0.1304 | -0.1282 | -0.0882 | -0.0452 | -0.0478 |
| 12 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0098 | -0.0346 | -0.0583 | -0.0834 | -0.1008 | -0.0974 | -0.0653 | -0.0267 | -0.0376 |
| 13 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0064 | -0.0285 | -0.0498 | -0.0687 | -0.0783 | -0.0747 | -0.0512 | -0.0145 | -0.0159 |
| 14 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0243 | -0.0402 | -0.0544 | -0.0635 | -0.0591 | -0.0352 | -0.0040 | -0.0062 |
| 15 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0177 | -0.0295 | -0.0436 | -0.0490 | -0.0432 | -0.0263 | -0.0018 | -0.0034 |
| 16 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 17 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 18 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 19 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 20 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 21 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 22 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 23 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |

Table 2-6b. Lift loss and pitching moment for no plug configuration, R = 2.61.

| PORT | NON-DIMENSIONAL AREA | M N-M | M LB-FT | M/D | L N | L LB | L/T |
|---|---|---|---|---|---|---|---|
| 1 | 1.5170 | 0.014306 | 0.010552 | 0.042491 | -1.503636 | -0.338017 | -0.117957 |
| 2 | 2.3260 | 0.021532 | 0.015882 | 0.063951 | -2.097196 | -0.471450 | -0.164520 |
| 3 | 4.2908 | 0.038196 | 0.028173 | 0.113444 | -3.192088 | -0.717581 | -0.250412 |
| 4 | 8.1049 | 0.068515 | 0.050536 | 0.203494 | -4.407234 | -0.990746 | -0.345737 |
| 5 | 12.9591 | 0.105423 | 0.077760 | 0.313114 | -5.461272 | -1.227694 | -0.428424 |
| 6 | 18.8536 | 0.146173 | 0.107817 | 0.434144 | -6.350453 | -1.427582 | -0.498178 |
| 7 | 25.7883 | 0.189011 | 0.139414 | 0.561377 | -7.111133 | -1.598583 | -0.557851 |
| 8 | 33.7631 | 0.232307 | 0.171349 | 0.689968 | -7.747932 | -1.741735 | -0.607807 |
| 9 | 42.7782 | 0.275716 | 0.203368 | 0.818898 | -8.289531 | -1.863486 | -0.650294 |
| 10 | 52.8335 | 0.308471 | 0.227528 | 0.916183 | -8.862529 | -1.992296 | -0.695244 |
| 11 | 62.0074 | 0.334044 | 0.246391 | 0.992136 | -9.273589 | -2.084703 | -0.727491 |
| 12 | 78.1883 | 0.371748 | 0.274202 | 1.104121 | -9.823488 | -2.208320 | -0.770629 |
| 13 | 101.0149 | 0.416462 | 0.307182 | 1.236923 | -10.426102 | -2.343788 | -0.817903 |
| 14 | 121.3566 | 0.449467 | 0.331527 | 1.334949 | -10.832953 | -2.435248 | -0.849819 |
| 15 | 143.5475 | 0.479029 | 0.353332 | 1.422751 | -11.167734 | -2.510507 | -0.876082 |
| 16 | 167.5877 | 0.479029 | 0.353332 | 1.422751 | -11.167734 | -2.510507 | -0.876082 |
| 17 | 193.4771 | 0.479029 | 0.353332 | 1.422751 | -11.167734 | -2.510507 | -0.876082 |
| 18 | 221.2157 | 0.479029 | 0.353332 | 1.422751 | -11.167734 | -2.510507 | -0.876082 |
| 19 | 239.4914 | 0.479029 | 0.353332 | 1.422751 | -11.167734 | -2.510507 | -0.876082 |
| 20 | 247.0040 | 0.479029 | 0.353332 | 1.422751 | -11.167734 | -2.510507 | -0.876082 |
| 21 | 254.6321 | 0.479029 | 0.353332 | 1.422751 | -11.167734 | -2.510507 | -0.876082 |
| 22 | 262.3758 | 0.479029 | 0.353332 | 1.422751 | -11.167734 | -2.510507 | -0.876082 |
| 23 | 270.2351 | 0.479029 | 0.353332 | 1.422751 | -11.167734 | -2.510507 | -0.876082 |

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Table 2-7a. Pressure coefficient data for round ended plug flush configuration, R = 9.08.

ROUND END PLUG 6-30-76

R = 9.08 PLUG DEPTH = .000 EFFECTIVE JET DIAMETER = 0.73 CENTERBODY DIAMETER = 0.75

JET FLOW RATE = 2.252 CMM ( 79.53 CFM ) FREE STREAM VELOCITY = 15.4 M/S ( 50.6 F/S )

JET EFFECTIVE VELOCITY = 140.1 M/S ( 459.6 F/S ) JET EFFECTIVE THRUST = 6.130 N (1.3779 LB )

NON-DIMENSIONALIZED PRESSURES

ANGLE (DEGREES)

| PORT | 0 | 10 | 20 | 30 | 45 | 60 | 75 | 90 | 105 | 120 | 135 | 150 | 160 | 170 | 180 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.0000 | -0.0372 | -0.1415 | -0.3178 | -0.6009 | -1.1050 | -1.5222 | -1.7432 | -1.5718 | -1.2664 | -0.7698 | -0.5314 | -0.4221 | -0.4122 | -0.4345 |
| 2 | -0.0596 | -0.1068 | -0.1664 | -0.3054 | -0.5885 | -0.9312 | -1.2142 | -1.3558 | -1.2490 | -1.0181 | -0.6456 | -0.4196 | -0.3005 | -0.2682 | -0.2905 |
| 3 | -0.1117 | -0.1266 | -0.2036 | -0.2980 | -0.5165 | -0.7400 | -0.9957 | -1.1199 | -1.0975 | -0.8716 | -0.5190 | -0.3203 | -0.2558 | -0.2011 | -0.2086 |
| 4 | -0.1540 | -0.1664 | -0.2210 | -0.2582 | -0.4470 | -0.5413 | -0.6978 | -0.7524 | -0.7325 | -0.5662 | -0.3675 | -0.1986 | -0.1564 | -0.1192 | -0.1093 |
| 5 | -0.1440 | -0.1540 | -0.1838 | -0.2260 | -0.3178 | -0.4196 | -0.4867 | -0.5513 | -0.5339 | -0.4395 | -0.2756 | -0.1465 | -0.1465 | -0.0944 | -0.1018 |
| 6 | -0.1564 | -0.1664 | -0.1664 | -0.1962 | -0.2558 | -0.3402 | -0.4172 | -0.4470 | -0.4420 | -0.3650 | -0.2111 | -0.1291 | -0.1068 | -0.0720 | -0.0919 |
| 7 | -0.1242 | -0.1316 | -0.1664 | -0.1689 | -0.2260 | -0.2806 | -0.3352 | -0.3650 | -0.3551 | -0.3228 | -0.1986 | -0.1117 | -0.0844 | -0.0695 | -0.0646 |
| 8 | -0.1192 | -0.1117 | -0.1316 | -0.1515 | -0.1887 | -0.2433 | -0.2856 | -0.3154 | -0.3178 | -0.2533 | -0.1689 | -0.0869 | -0.0819 | -0.0546 | -0.0447 |
| 9 | -0.0993 | -0.1068 | -0.1142 | -0.1291 | -0.1614 | -0.1937 | -0.2185 | -0.2533 | -0.2582 | -0.2409 | -0.1614 | -0.0795 | -0.0596 | -0.0447 | -0.0447 |
| 10 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1738 | -0.1986 | -0.2185 | -0.2309 | -0.1912 | -0.1415 | -0.0770 | -0.0521 | -0.0472 | -0.0472 |
| 11 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1515 | -0.1738 | -0.1962 | -0.1887 | -0.1763 | -0.1366 | -0.0571 | -0.0472 | -0.0372 | -0.0447 |
| 12 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1415 | -0.1788 | -0.1664 | -0.1564 | -0.1117 | -0.0521 | 0.0000 | -0.0323 | -0.0298 |
| 13 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1242 | -0.1266 | -0.1391 | -0.1391 | -0.1117 | -0.0447 | 0.0000 | -0.0248 | -0.0298 |
| 14 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1242 | -0.1391 | -0.1242 | -0.1043 | -0.0372 | 0.0000 | 0.0000 | -0.0422 |
| 15 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1117 | -0.1117 | -0.1018 | -0.0869 | -0.0397 | 0.0000 | 0.0000 | 0.0000 |
| 16 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0248 |
| 17 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 18 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 19 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 20 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 21 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 22 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 23 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |

Table 2-7b. Lift loss and pitching moment data for round ended plug flush configuration, R = 9.08.

| PORT | NON-DIMENSIONAL AREA | M N -M | M LB-FT | M/TD | L N | L LB | L/T |
|---|---|---|---|---|---|---|---|
| 1 | 3.0951 | 0.000168 | 0.000124 | 0.001479 | -0.096563 | -0.021707 | -0.015753 |
| 2 | 4.7458 | 0.000217 | 0.000160 | 0.001912 | -0.138822 | -0.031207 | -0.022648 |
| 3 | 8.7547 | 0.000286 | 0.000211 | 0.002524 | -0.225606 | -0.050716 | -0.036806 |
| 4 | 16.5366 | 0.000149 | 0.000110 | 0.001313 | -0.346336 | -0.077856 | -0.056502 |
| 5 | 26.4409 | -0.000037 | -0.000027 | -0.000324 | -0.462672 | -0.104009 | -0.075481 |
| 6 | 38.4675 | -0.000393 | -0.000290 | -0.003470 | -0.580375 | -0.130468 | -0.094683 |
| 7 | 52.6165 | -0.000787 | -0.000581 | -0.006946 | -0.697511 | -0.156800 | -0.113793 |
| 8 | 68.8878 | -0.001284 | -0.000947 | -0.011325 | -0.812010 | -0.182540 | -0.132472 |
| 9 | 87.2814 | -0.001705 | -0.001257 | -0.015041 | -0.921461 | -0.207144 | -0.150328 |
| 10 | 107.7974 | -0.000222 | -0.000164 | -0.001959 | -1.003818 | -0.225658 | -0.163764 |
| 11 | 126.5153 | 0.001110 | 0.000819 | 0.009791 | -1.069921 | -0.240518 | -0.174548 |
| 12 | 159.5296 | 0.003845 | 0.002836 | 0.033922 | -1.154672 | -0.259570 | -0.188375 |
| 13 | 206.1033 | 0.007754 | 0.005720 | 0.068413 | -1.256423 | -0.282444 | -0.204974 |
| 14 | 247.6069 | 0.011622 | 0.008572 | 0.102538 | -1.325747 | -0.298028 | -0.216284 |
| 15 | 292.8836 | 0.015285 | 0.011274 | 0.134852 | -1.388357 | -0.312103 | -0.226498 |
| 16 | 341.9333 | 0.015490 | 0.011426 | 0.136667 | -1.389603 | -0.312383 | -0.226702 |
| 17 | 394.7561 | 0.015490 | 0.011426 | 0.136667 | -1.389603 | -0.312383 | -0.226702 |
| 18 | 451.3520 | 0.015490 | 0.011426 | 0.136667 | -1.389603 | -0.312383 | -0.226702 |
| 19 | 488.6404 | 0.015490 | 0.011426 | 0.136667 | -1.389603 | -0.312383 | -0.226702 |
| 20 | 503.9685 | 0.015490 | 0.011426 | 0.136667 | -1.389603 | -0.312383 | -0.226702 |
| 21 | 519.5323 | 0.015490 | 0.011426 | 0.136667 | -1.389603 | -0.312383 | -0.226702 |
| 22 | 535.3320 | 0.015490 | 0.011426 | 0.136667 | -1.389603 | -0.312383 | -0.226702 |
| 23 | 551.3675 | 0.015490 | 0.011426 | 0.136667 | -1.389603 | -0.312383 | -0.226702 |

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Table 2-8a. Pressure coefficient data for round ended plug flush configuration, R = 6.81.

ROUND END PLUG 6-30-76

R = 6.81 PLUG DEPTH = .000 EFFECTIVE JET DIAMETER = 0.74 CENTERBODY DIAMETER = 0.75

JET FLOW RATE = 2.252 CMM ( 79.53 CFM ) FREE STREAM VELOCITY = 20.6 M/S ( 67.5 F/S )

JET EFFECTIVE VELOCITY = 140.1 M/S ( 459.6 F/S ) JET EFFECTIVE THRUST = 6.130 N (1.3779 LB )

NON-DIMENSIONALIZED PRESSURES

ANGLE (DEGREES)

| PORT | 0 | 10 | 20 | 30 | 45 | 60 | 75 | 90 | 105 | 120 | 135 | 150 | 160 | 170 | 180 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.0879 | 0.0488 | -0.0371 | -0.1870 | -0.4884 | -1.0228 | -1.5140 | -1.8531 | -1.8838 | -1.5600 | -0.9628 | -0.6684 | -0.5582 | -0.5121 | -0.5093 |
| 2 | 0.0293 | 0.0000 | -0.0447 | -0.1758 | -0.4326 | -0.8191 | -1.1679 | -1.4526 | -1.4526 | -1.2419 | -0.7730 | -0.5344 | -0.4368 | -0.3628 | -0.3851 |
| 3 | 0.0000 | -0.0223 | -0.0837 | -0.1814 | -0.3823 | -0.6544 | -0.9447 | -1.1624 | -1.2321 | -1.0465 | -0.6698 | -0.4326 | -0.3363 | -0.2791 | -0.2944 |
| 4 | -0.0642 | -0.0586 | -0.1005 | -0.1605 | -0.2791 | -0.4312 | -0.6084 | -0.7214 | -0.7675 | -0.6879 | -0.4465 | -0.2567 | -0.2051 | -0.1647 | -0.1633 |
| 5 | -0.0614 | -0.0754 | -0.0893 | -0.1437 | -0.2023 | -0.3154 | -0.4186 | -0.5023 | -0.5400 | -0.4549 | -0.3209 | -0.1898 | -0.1409 | -0.1074 | -0.1130 |
| 6 | -0.0572 | -0.0656 | -0.0740 | -0.1074 | -0.1744 | -0.2442 | -0.3209 | -0.3809 | -0.4130 | -0.3698 | -0.2609 | -0.1798 | -0.1005 | -0.1047 | -0.0837 |
| 7 | -0.0516 | -0.0460 | -0.0726 | -0.0893 | -0.1312 | -0.1870 | -0.2470 | -0.3056 | -0.3279 | -0.2930 | -0.2121 | -0.1130 | -0.0684 | -0.0530 | -0.0488 |
| 8 | -0.0419 | -0.0405 | -0.0530 | -0.0767 | -0.1005 | -0.1492 | -0.2065 | -0.2512 | -0.2581 | -0.2470 | -0.1814 | -0.0754 | -0.0460 | -0.0572 | -0.0572 |
| 9 | -0.0321 | -0.0391 | -0.0488 | -0.0530 | -0.0893 | -0.1200 | -0.1647 | -0.1995 | -0.2163 | -0.2093 | -0.1591 | -0.0795 | -0.0377 | -0.0307 | -0.0265 |
| 10 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1019 | -0.1326 | -0.1619 | -0.1772 | -0.1814 | -0.1298 | -0.0530 | -0.0335 | -0.0223 | -0.0419 |
| 11 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0879 | -0.1144 | -0.1395 | -0.1507 | -0.1521 | -0.1242 | -0.0405 | -0.0251 | -0.0181 | 0.0000 |
| 12 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0991 | -0.1144 | -0.1298 | -0.1312 | -0.0921 | -0.0405 | 0.0000 | 0.0000 | -0.0321 |
| 13 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0670 | -0.0921 | -0.0991 | -0.0977 | -0.0949 | -0.0419 | 0.0000 | 0.0000 | 0.0000 |
| 14 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0837 | -0.0949 | -0.0740 | -0.0684 | -0.0349 | 0.0000 | 0.0000 | 0.0000 |
| 15 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0586 | -0.0726 | -0.0865 | -0.0572 | -0.0279 | 0.0000 | 0.0000 | 0.0000 |
| 16 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 17 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 18 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 19 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 20 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 21 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 22 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 23 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |

Table 2-8b. Lift loss and pitching moment data for round plug flush configuration, R = 6.81.

| PORT | NON-DIMENSIONAL AREA | M N -M | M LB-FT | M/TD | L N | L LB | L/T |
|---|---|---|---|---|---|---|---|
| 1 | 3.0951 | 0.000623 | 0.000460 | 0.005497 | -0.184373 | -0.041447 | -0.030079 |
| 2 | 4.7458 | 0.000903 | 0.000666 | 0.007970 | -0.262521 | -0.059015 | -0.042828 |
| 3 | 8.7547 | 0.001503 | 0.001109 | 0.013261 | -0.420861 | -0.094610 | -0.068660 |
| 4 | 16.5366 | 0.002289 | 0.001688 | 0.020195 | -0.622847 | -0.140016 | -0.101612 |
| 5 | 26.4409 | 0.002995 | 0.002209 | 0.026427 | -0.806064 | -0.181203 | -0.131502 |
| 6 | 38.4675 | 0.003774 | 0.002784 | 0.033297 | -0.980834 | -0.220491 | -0.160014 |
| 7 | 52.6165 | 0.004527 | 0.003339 | 0.039939 | -1.141689 | -0.256652 | -0.186257 |
| 8 | 68.8878 | 0.005414 | 0.003993 | 0.047766 | -1.292697 | -0.290598 | -0.210892 |
| 9 | 87.2814 | 0.006368 | 0.004697 | 0.056184 | -1.433867 | -0.322333 | -0.233923 |
| 10 | 107.7974 | 0.008803 | 0.006493 | 0.077668 | -1.544637 | -0.347235 | -0.251994 |
| 11 | 126.5153 | 0.010797 | 0.007964 | 0.095262 | -1.630586 | -0.366556 | -0.266016 |
| 12 | 159.5296 | 0.014546 | 0.010729 | 0.128333 | -1.741783 | -0.391553 | -0.284157 |
| 13 | 206.1033 | 0.019646 | 0.014491 | 0.173327 | -1.866803 | -0.419657 | -0.304553 |
| 14 | 247.6069 | 0.023986 | 0.017692 | 0.211621 | -1.946987 | -0.437683 | -0.317634 |
| 15 | 292.8836 | 0.028675 | 0.021151 | 0.252994 | -2.021521 | -0.454438 | -0.329793 |
| 16 | 341.9333 | 0.028675 | 0.021151 | 0.252994 | -2.021521 | -0.454438 | -0.329793 |
| 17 | 394.7561 | 0.028675 | 0.021151 | 0.252994 | -2.021521 | -0.454438 | -0.329793 |
| 18 | 451.3520 | 0.028675 | 0.021151 | 0.252994 | -2.021521 | -0.454438 | -0.329793 |
| 19 | 488.6404 | 0.028675 | 0.021151 | 0.252994 | -2.021521 | -0.454438 | -0.329793 |
| 20 | 503.9685 | 0.028675 | 0.021151 | 0.252994 | -2.021521 | -0.454438 | -0.329793 |
| 21 | 519.5323 | 0.028675 | 0.021151 | 0.252994 | -2.021521 | -0.454438 | -0.329793 |
| 22 | 535.3320 | 0.028675 | 0.021151 | 0.252994 | -2.021521 | -0.454438 | -0.329793 |
| 23 | 551.3675 | 0.028675 | 0.021151 | 0.252994 | -2.021521 | -0.454438 | -0.329793 |

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Table 2-9a. Pressure coefficient data for round ended plug flush configuration, R = 4.54.

ROUND END PLUG 6-30-76

R = 4.54 PLUG DEPTH = .000 EFFECTIVE JET DIAMETER = 0.73 CENTERBODY DIAMETER = 0.75

JET FLOW RATE = 2.252 CMM ( 79.53 CFM ) FREE STREAM VELOCITY = 30.9 M/S ( 101.3 F/S )

JET EFFECTIVE VELOCITY = 140.1 M/S ( 459.6 F/S ) JET EFFECTIVE THRUST = 6.130 N (1.3779 LB )

NON-DIMENSIONALIZED PRESSURES

ANGLE (DEGREES)

| PORT | 0 | 10 | 20 | 30 | 45 | 60 | 75 | 90 | 105 | 120 | 135 | 150 | 160 | 170 | 180 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.2045 | 0.1983 | 0.1258 | 0.0142 | -0.2249 | -0.6307 | -1.1759 | -1.7403 | -2.1852 | -2.2329 | -1.4721 | -0.9442 | -0.8085 | -0.7323 | -0.7267 |
| 2 | 0.1580 | 0.1425 | 0.0929 | 0.0130 | -0.1840 | -0.4907 | -0.8469 | -1.2775 | -1.6034 | -1.6536 | -1.1889 | -0.7453 | -0.5886 | -0.5359 | -0.5328 |
| 3 | 0.1190 | 0.1134 | 0.0700 | 0.0000 | -0.1549 | -0.3736 | -0.6598 | -0.9516 | -1.2125 | -1.2645 | -0.9628 | -0.6072 | -0.4529 | -0.3996 | -0.3792 |
| 4 | 0.0657 | 0.0539 | 0.0341 | 0.0000 | -0.0892 | -0.2125 | -0.3581 | -0.5142 | -0.6505 | -0.6939 | -0.5811 | -0.3414 | -0.2503 | -0.2088 | -0.1921 |
| 5 | 0.0390 | 0.0341 | 0.0248 | 0.0000 | -0.0564 | -0.1382 | -0.2317 | -0.3079 | -0.4077 | -0.4448 | -0.3829 | -0.2398 | -0.1518 | -0.1351 | -0.1239 |
| 6 | 0.0316 | 0.0285 | 0.0204 | 0.0000 | -0.0409 | -0.0936 | -0.1617 | -0.2243 | -0.2751 | -0.2887 | -0.2745 | -0.1642 | -0.0973 | -0.0874 | -0.0886 |
| 7 | 0.0297 | 0.0198 | 0.0161 | 0.0000 | -0.0248 | -0.0700 | -0.1084 | -0.1524 | -0.2026 | -0.2243 | -0.2051 | -0.1282 | -0.0694 | -0.0558 | -0.0688 |
| 8 | 0.0265 | 0.0273 | 0.0173 | 0.0000 | -0.0211 | -0.0508 | -0.0874 | -0.1152 | -0.1413 | -0.1685 | -0.1567 | -0.0960 | -0.0477 | -0.0465 | -0.0576 |
| 9 | 0.0223 | 0.0204 | 0.0124 | 0.0000 | -0.0149 | -0.0353 | -0.0694 | -0.0942 | -0.1128 | -0.1252 | -0.1227 | -0.0793 | -0.0328 | -0.0347 | -0.0409 |
| 10 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0235 | -0.0471 | -0.0725 | -0.0886 | -0.1059 | -0.1047 | -0.0626 | -0.0167 | -0.0229 | -0.0378 |
| 11 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0198 | -0.0465 | -0.0601 | -0.0725 | -0.0787 | -0.0805 | -0.0533 | -0.0124 | -0.0142 | -0.0297 |
| 12 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0266 | -0.0477 | -0.0545 | -0.0675 | -0.0663 | -0.0514 | -0.0124 | -0.0124 | -0.0204 |
| 13 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0242 | -0.0316 | -0.0458 | -0.0576 | -0.0502 | -0.0285 | -0.0105 | 0.0000 | -0.0167 |
| 14 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0279 | -0.0359 | -0.0409 | -0.0427 | -0.0266 | -0.0087 | 0.0000 | -0.0235 |
| 15 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0167 | -0.0310 | -0.0328 | -0.0335 | -0.0223 | 0.0000 | 0.0000 | -0.0155 |
| 16 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0173 |
| 17 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0155 |
| 18 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0105 |
| 19 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0112 |
| 20 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0068 |
| 21 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0173 |
| 22 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0105 |
| 23 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0155 |

Table 2-9b. Lift loss and pitching moment data for round ended plug flush configuration, R = 4.54.

| PORT | NON-DIMENSIONAL AREA | M N-M | M LB-FT | M/Tn | L N | L LB | L/T |
|---|---|---|---|---|---|---|---|
| 1 | 3.0951 | 0.003008 | 0.002219 | 0.026542 | -0.438122 | -0.098490 | -0.071476 |
| 2 | 4.7458 | 0.004427 | 0.003265 | 0.039058 | -0.613647 | -0.137948 | -0.100111 |
| 3 | 8.7547 | 0.007475 | 0.005513 | 0.065947 | -0.942826 | -0.211947 | -0.153814 |
| 4 | 16.5366 | 0.011997 | 0.008849 | 0.105850 | -1.297990 | -0.291788 | -0.211756 |
| 5 | 26.4409 | 0.016770 | 0.012370 | 0.147956 | -1.586958 | -0.356748 | -0.258898 |
| 6 | 38.4675 | 0.021585 | 0.015921 | 0.190433 | -1.826881 | -0.410683 | -0.298040 |
| 7 | 52.6165 | 0.026661 | 0.019665 | 0.235224 | -2.031948 | -0.456782 | -0.331494 |
| 8 | 68.8878 | 0.031874 | 0.023510 | 0.281213 | -2.206789 | -0.496086 | -0.360018 |
| 9 | 87.2814 | 0.037029 | 0.027313 | 0.326697 | -2.359790 | -0.530481 | -0.384979 |
| 10 | 107.7974 | 0.041943 | 0.030937 | 0.370048 | -2.495620 | -0.561015 | -0.407139 |
| 11 | 126.5153 | 0.045681 | 0.033694 | 0.403026 | -2.595366 | -0.583438 | -0.423411 |
| 12 | 159.5296 | 0.052547 | 0.038759 | 0.463608 | -2.729599 | -0.613614 | -0.445350 |
| 13 | 206.1033 | 0.060103 | 0.044332 | 0.530266 | -2.871776 | -0.645575 | -0.468505 |
| 14 | 247.6069 | 0.066755 | 0.049238 | 0.588956 | -2.966264 | -0.666816 | -0.483920 |
| 15 | 292.8836 | 0.072682 | 0.053610 | 0.641248 | -3.043673 | -0.684218 | -0.496549 |
| 16 | 341.9333 | 0.073258 | 0.054035 | 0.646330 | -3.047162 | -0.685002 | -0.497118 |
| 17 | 394.7561 | 0.073854 | 0.054475 | 0.651592 | -3.050516 | -0.685756 | -0.497665 |
| 18 | 451.3520 | 0.074320 | 0.054818 | 0.655699 | -3.052961 | -0.686306 | -0.498064 |
| 19 | 488.6404 | 0.074666 | 0.055074 | 0.658756 | -3.054666 | -0.686689 | -0.498342 |
| 20 | 503.9685 | 0.074754 | 0.055139 | 0.659536 | -3.055094 | -0.686785 | -0.498412 |
| 21 | 519.5323 | 0.074986 | 0.055310 | 0.661582 | -3.056201 | -0.687034 | -0.498592 |
| 22 | 535.3320 | 0.075132 | 0.055417 | 0.662863 | -3.056884 | -0.687187 | -0.498704 |
| 23 | 551.3675 | 0.075351 | 0.055579 | 0.664802 | -3.057902 | -0.687416 | -0.498870 |

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Table 2-10a. Pressure coefficient data for round ended plug flush configuration, R = 2.27.

ROUND END PLUG 6-30-76
R = 2.27 PLUG DEPTH = .000 EFFECTIVE JET DIAMETER = 0.73 CENTERBODY DIAMETER = 0.75
JET FLOW RATE = 2.252 CMM ( 79.53 CFM ) FREE STREAM VELOCITY = 61.7 M/S ( 202.5 F/S )
JET EFFECTIVE VELOCITY = 140.1 M/S ( 459.7 F/S ) JET EFFECTIVE THRUST = 6.131 N (1.3782 LB )

NON-DIMENSIONALIZED PRESSURES

| PORT | ANGLE (DEGREES) 0 | 10 | 20 | 30 | 45 | 60 | 75 | 90 | 105 | 120 | 135 | 150 | 160 | 170 | 180 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.2406 | 0.2384 | 0.2227 | 0.1903 | 0.0993 | -0.0374 | -0.2637 | -0.5824 | -1.0168 | -1.5232 | -1.5502 | -1.0736 | -0.6384 | -0.4371 | -0.4003 |
| 2 | 0.2047 | 0.1984 | 0.1869 | 0.1628 | 0.0983 | -0.0115 | -0.1582 | -0.3750 | -0.6446 | -0.9396 | -1.0565 | -0.8786 | -0.5573 | -0.3342 | -0.2998 |
| 3 | 0.1749 | 0.1754 | 0.1625 | 0.1418 | 0.0876 | 0.0073 | -0.1044 | -0.2424 | -0.4125 | -0.5921 | -0.7697 | -0.7418 | -0.4766 | -0.2767 | -0.2449 |
| 4 | 0.1177 | 0.1149 | 0.1078 | 0.0948 | 0.0667 | 0.0223 | -0.0354 | -0.0993 | -0.1701 | -0.2482 | -0.3528 | -0.4239 | -0.3260 | -0.1652 | -0.1342 |
| 5 | 0.0851 | 0.0822 | 0.0803 | 0.0729 | 0.0516 | 0.0206 | -0.0121 | -0.0496 | -0.0954 | -0.1388 | -0.1948 | -0.2485 | -0.2139 | -0.1042 | -0.0755 |
| 6 | 0.0613 | 0.0617 | 0.0586 | 0.0515 | 0.0385 | 0.0206 | -0.0043 | -0.0306 | -0.0589 | -0.0893 | -0.1233 | -0.1582 | -0.1495 | -0.0696 | -0.0501 |
| 7 | 0.0485 | 0.0462 | 0.0462 | 0.0400 | 0.0301 | 0.0161 | 0.0000 | -0.0188 | -0.0427 | -0.0656 | -0.0848 | -0.1069 | -0.1092 | -0.0501 | -0.0337 |
| 8 | 0.0386 | 0.0386 | 0.0363 | 0.0326 | 0.0259 | 0.0150 | 0.0000 | -0.0124 | -0.0315 | -0.0485 | -0.0631 | -0.0768 | -0.0774 | -0.0351 | -0.0217 |
| 9 | 0.0310 | 0.0301 | 0.0304 | 0.0265 | 0.0209 | 0.0107 | 0.0000 | -0.0101 | -0.0225 | -0.0386 | -0.0496 | -0.0579 | -0.0596 | -0.0295 | -0.0144 |
| 10 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0124 | 0.0000 | -0.0092 | -0.0177 | -0.0307 | -0.0392 | -0.0458 | -0.0451 | -0.0219 | -0.0099 |
| 11 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0087 | 0.0000 | -0.0065 | -0.0147 | -0.0247 | -0.0310 | -0.0388 | -0.0352 | -0.0180 | -0.0092 |
| 12 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0045 | -0.0105 | -0.0195 | -0.0251 | -0.0278 | -0.0254 | -0.0138 | -0.0050 |
| 13 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0034 | -0.0101 | -0.0152 | -0.0202 | -0.0217 | -0.0192 | -0.0098 | -0.0029 |
| 14 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0019 | -0.0082 | -0.0136 | -0.0175 | -0.0203 | -0.0136 | -0.0074 | -0.0028 |
| 15 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0031 | -0.0070 | -0.0115 | -0.0130 | -0.0149 | -0.0115 | -0.0068 | 0.0000 |
| 16 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 17 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 18 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 19 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 20 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 21 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 22 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 23 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |

Table 2-10b. Lift loss and pitching moment data for round ended plug flush configuration, R = 2.27.

| PORT | NON-DIMENSIONAL AREA | TM N -M | TM LB-FT | M/ D | L N | L LB | L/T |
|---|---|---|---|---|---|---|---|
| 1 | 3.0946 | 0.012228 | 0.009019 | 0.107855 | -0.933258 | -0.209797 | -0.152228 |
| 2 | 4.7450 | 0.017875 | 0.013184 | 0.157664 | -1.264172 | -0.284186 | -0.206205 |
| 3 | 8.7532 | 0.030097 | 0.022199 | 0.265470 | -1.822781 | -0.409761 | -0.297322 |
| 4 | 16.5339 | 0.048308 | 0.035632 | 0.426104 | -2.308682 | -0.518992 | -0.376580 |
| 5 | 26.4366 | 0.066828 | 0.049292 | 0.589459 | -2.630698 | -0.591381 | -0.429105 |
| 6 | 38.4612 | 0.085363 | 0.062963 | 0.752944 | -2.864730 | -0.643991 | -0.467279 |
| 7 | 52.6079 | 0.103994 | 0.076706 | 0.917286 | -3.045223 | -0.684566 | -0.496721 |
| 8 | 68.8766 | 0.122558 | 0.090399 | 1.081031 | -3.181197 | -0.715133 | -0.518900 |
| 9 | 87.2672 | 0.141157 | 0.104118 | 1.245084 | -3.297330 | -0.741240 | -0.537843 |
| 10 | 107.7799 | 0.153364 | 0.113122 | 1.352757 | -3.468462 | -0.779710 | -0.565757 |
| 11 | 126.4947 | 0.163272 | 0.120429 | 1.440143 | -3.595581 | -0.808287 | -0.586492 |
| 12 | 159.5036 | 0.177410 | 0.130858 | 1.564854 | -3.774629 | -0.848537 | -0.615697 |
| 13 | 206.0697 | 0.194579 | 0.143522 | 1.716293 | -3.973951 | -0.893344 | -0.648210 |
| 14 | 247.5666 | 0.208766 | 0.153985 | 1.841425 | -4.122563 | -0.926752 | -0.672450 |
| 15 | 292.8359 | 0.221908 | 0.163679 | 1.957346 | -4.240000 | -0.953152 | -0.691606 |
| 16 | 341.8776 | 0.221908 | 0.163679 | 1.957346 | -4.240000 | -0.953152 | -0.691606 |
| 17 | 394.6918 | 0.221908 | 0.163679 | 1.957346 | -4.240000 | -0.953152 | -0.691606 |
| 18 | 451.2785 | 0.221908 | 0.163679 | 1.957346 | -4.240000 | -0.953152 | -0.691606 |
| 19 | 488.5608 | 0.221908 | 0.163679 | 1.957346 | -4.240000 | -0.953152 | -0.691606 |
| 20 | 503.8864 | 0.221908 | 0.163679 | 1.957346 | -4.240000 | -0.953152 | -0.691606 |
| 21 | 519.4477 | 0.221908 | 0.163679 | 1.957346 | -4.240000 | -0.953152 | -0.691606 |
| 22 | 535.2448 | 0.221908 | 0.163679 | 1.957346 | -4.240000 | -0.953152 | -0.691606 |
| 23 | 551.2777 | 0.221908 | 0.163679 | 1.957346 | -4.240000 | -0.953152 | -0.691606 |

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Table 2-11a. Pressure coefficient data for round ended plug down 0.5 $D_n$ configuration, R = 10.35.

ROUND END PLUG 7-6-76

R =10.35 PLUG DEPTH = .500 EFFECTIVE JET DIAMETER = 0.90 CENTERBODY DIAMETER = 0.75

JET FLOW RATE = 3.794 CMM ( 134.00 CFM ) FREE STREAM VELOCITY = 14.7 M/S ( 48.2 F/S )

JET EFFECTIVE VELOCITY = 152.1 M/S ( 499.0 F/S ) JET EFFECTIVE THRUST =11.153 N (2.5072 LB )

NON-DIMENSIONALIZED PRESSURES

| PORT | ANGLE (DEGREES) 0 | 10 | 20 | 30 | 45 | 60 | 75 | 90 | 105 | 120 | 135 | 150 | 160 | 170 | 180 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | -0.2625 | -0.2950 | -0.4357 | -0.6089 | -1.0121 | -1.5317 | -2.0026 | -2.0135 | -1.6508 | -1.2395 | -0.7036 | -0.5034 | -0.4005 | -0.3653 | -0.3572 |
| 2 | -0.3383 | -0.3464 | -0.4411 | -0.6116 | -0.9201 | -1.3044 | -1.5480 | -1.5615 | -1.3450 | -0.9797 | -0.5413 | -0.4114 | -0.3248 | -0.2598 | -0.2652 |
| 3 | -0.3789 | -0.4059 | -0.4465 | -0.5710 | -0.8389 | -1.1285 | -1.2774 | -1.3315 | -1.1691 | -0.8335 | -0.5034 | -0.3383 | -0.2598 | -0.1976 | -0.2057 |
| 4 | -0.4059 | -0.4032 | -0.4303 | -0.5142 | -0.6468 | -0.7902 | -0.9337 | -0.9093 | -0.7983 | -0.5764 | -0.3653 | -0.2382 | -0.1678 | -0.0785 | -0.0731 |
| 5 | -0.3708 | -0.3897 | -0.4141 | -0.4384 | -0.5413 | -0.6143 | -0.6982 | -0.7090 | -0.6360 | -0.4655 | -0.2787 | -0.1813 | -0.1326 | -0.0514 | -0.0406 |
| 6 | -0.3356 | -0.3518 | -0.3545 | -0.3843 | -0.4601 | -0.5061 | -0.5656 | -0.5791 | -0.5277 | -0.4276 | -0.2463 | -0.1488 | -0.1245 | -0.0650 | -0.0244 |
| 7 | -0.3193 | -0.3112 | -0.3275 | -0.3518 | -0.4249 | -0.4519 | -0.5061 | -0.4871 | -0.4655 | -0.3762 | -0.2246 | -0.1407 | -0.0974 | -0.0433 | 0.0000 |
| 8 | -0.2652 | -0.2787 | -0.2896 | -0.3139 | -0.3708 | -0.3924 | -0.4465 | -0.4438 | -0.4276 | -0.3410 | -0.2219 | -0.1055 | -0.0974 | -0.0595 | 0.0000 |
| 9 | -0.2354 | -0.2598 | -0.2815 | -0.2787 | -0.3193 | -0.3518 | -0.3951 | -0.4195 | -0.3762 | -0.3031 | -0.2111 | -0.1137 | -0.0812 | -0.0595 | 0.0000 |
| 10 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.3193 | -0.3437 | -0.3762 | -0.3518 | -0.2896 | -0.1949 | -0.1137 | -0.0731 | -0.0298 | 0.0000 |
| 11 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.2977 | -0.3058 | -0.3464 | -0.3139 | -0.2733 | -0.1949 | -0.1083 | -0.0785 | -0.0352 | 0.0000 |
| 12 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.2869 | -0.3031 | -0.2869 | -0.2463 | -0.1786 | -0.0947 | -0.0758 | -0.0460 | 0.0000 |
| 13 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.2436 | -0.2787 | -0.2544 | -0.2273 | -0.1732 | -0.0839 | -0.0650 | 0.0000 | 0.0000 |
| 14 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.2409 | -0.2354 | -0.2030 | -0.1651 | -0.0812 | -0.0785 | -0.0433 | 0.0000 |
| 15 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.2327 | -0.2111 | -0.1894 | -0.1651 | -0.0866 | -0.0487 | -0.0352 | 0.0000 |
| 16 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 17 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 18 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 19 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 20 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 21 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 22 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 23 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |

Table 2-11b. Lift loss and pitching moment data for round ended plug down 0.5 $D_n$ configuration, R = 10.35.

| PORT | NON-DIMENSIONAL AREA | M N -M | M LB-FT | M/TD | L N | L LB | L/T |
|---|---|---|---|---|---|---|---|
| 1 | 2.0327 | -0.000081 | -0.000060 | -0.000319 | -0.107398 | -0.024143 | -0.009629 |
| 2 | 3.1168 | -0.000163 | -0.000120 | -0.000640 | -0.154777 | -0.034794 | -0.013877 |
| 3 | 5.7496 | -0.000419 | -0.000309 | -0.001647 | -0.255639 | -0.057468 | -0.022921 |
| 4 | 10.8603 | -0.001201 | -0.000886 | -0.004720 | -0.398948 | -0.089684 | -0.035770 |
| 5 | 17.3649 | -0.002396 | -0.001767 | -0.009414 | -0.545781 | -0.122692 | -0.048935 |
| 6 | 25.2633 | -0.003855 | -0.002844 | -0.015149 | -0.697582 | -0.156817 | -0.062546 |
| 7 | 34.5555 | -0.005784 | -0.004266 | -0.022728 | -0.856183 | -0.192470 | -0.076766 |
| 8 | 45.2416 | -0.007889 | -0.005819 | -0.030998 | -1.020040 | -0.229305 | -0.091457 |
| 9 | 57.3215 | -0.010247 | -0.007558 | -0.040266 | -1.188053 | -0.267074 | -0.106521 |
| 10 | 70.7953 | -0.008779 | -0.006475 | -0.034497 | -1.306072 | -0.293605 | -0.117103 |
| 11 | 83.0881 | -0.007267 | -0.005360 | -0.028557 | -1.406379 | -0.316154 | -0.126096 |
| 12 | 104.7700 | -0.003023 | -0.002230 | -0.011880 | -1.542819 | -0.346826 | -0.138330 |
| 13 | 135.3570 | 0.002720 | 0.002007 | 0.010690 | -1.712951 | -0.385071 | -0.153584 |
| 14 | 162.6142 | 0.009569 | 0.007058 | 0.037600 | -1.829837 | -0.411347 | -0.164064 |
| 15 | 192.3494 | 0.017066 | 0.012588 | 0.067062 | -1.948781 | -0.438086 | -0.174728 |
| 16 | 224.5625 | 0.017066 | 0.012588 | 0.067062 | -1.948781 | -0.438086 | -0.174728 |
| 17 | 259.2535 | 0.017066 | 0.012588 | 0.067062 | -1.948781 | -0.438086 | -0.174728 |
| 18 | 296.4225 | 0.017066 | 0.012588 | 0.067062 | -1.948781 | -0.438086 | -0.174728 |
| 19 | 320.9114 | 0.017066 | 0.012588 | 0.067062 | -1.948781 | -0.438086 | -0.174728 |
| 20 | 330.9780 | 0.017066 | 0.012588 | 0.067062 | -1.948781 | -0.438086 | -0.174728 |
| 21 | 341.1995 | 0.017066 | 0.012588 | 0.067062 | -1.948781 | -0.438086 | -0.174728 |
| 22 | 351.5758 | 0.017066 | 0.012588 | 0.067062 | -1.948781 | -0.438086 | -0.174728 |
| 23 | 362.1070 | 0.017066 | 0.012588 | 0.067062 | -1.948781 | -0.438086 | -0.174728 |

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Table 2-12a. Pressure coefficient data for round ended plug down 0.5 $D_n$ configuration, R = 7.76.

ROUND END PLUG 7-6-76

R = 7.76 PLUG DEPTH = .500 EFFECTIVE JET DIAMETER = 0.90 CENTERBODY DIAMETER = 0.75

JET FLOW RATE = 3.794 CMM ( 134.00 CFM ) FREE STREAM VELOCITY = 19.6 M/S ( 64.3 F/S )

JET EFFECTIVE VELOCITY = 152.1 M/S ( 499.0 F/S ) JET EFFECTIVE THRUST =11.153 N (2.5072 LB )

NON-DIMENSIONALIZED PRESSURES

| PORT | ANGLE (DEGREES) 0 | 10 | 20 | 30 | 45 | 60 | 75 | 90 | 105 | 120 | 135 | 150 | 160 | 170 | 180 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | -0.0608 | -0.1064 | -0.2464 | -0.4729 | -0.9018 | -1.5389 | -2.0316 | -2.1776 | -1.9146 | -1.4477 | -0.8333 | -0.5779 | -0.4547 | -0.4395 | -0.4258 |
| 2 | -0.1521 | -0.1734 | -0.2828 | -0.4456 | -0.7938 | -1.2622 | -1.5876 | -1.7473 | -1.5922 | -1.1861 | -0.6797 | -0.4775 | -0.3984 | -0.3346 | -0.3315 |
| 3 | -0.1916 | -0.2129 | -0.3133 | -0.4197 | -0.7102 | -1.0371 | -1.3124 | -1.4386 | -1.3139 | -1.0097 | -0.5809 | -0.3878 | -0.3269 | -0.2555 | -0.2600 |
| 4 | -0.2266 | -0.2433 | -0.2965 | -0.3619 | -0.5140 | -0.7132 | -0.8774 | -0.9672 | -0.9322 | -0.7299 | -0.4060 | -0.2585 | -0.2053 | -0.1551 | -0.1338 |
| 5 | -0.2266 | -0.2266 | -0.2524 | -0.3117 | -0.4091 | -0.5338 | -0.6569 | -0.7117 | -0.7178 | -0.5505 | -0.3467 | -0.1916 | -0.1521 | -0.1049 | -0.0776 |
| 6 | -0.2053 | -0.2053 | -0.2220 | -0.2752 | -0.3346 | -0.4243 | -0.5186 | -0.5672 | -0.5551 | -0.4653 | -0.3011 | -0.1399 | -0.1186 | -0.0852 | -0.0623 |
| 7 | -0.1703 | -0.1734 | -0.1962 | -0.2205 | -0.2844 | -0.3574 | -0.4288 | -0.4577 | -0.4638 | -0.4060 | -0.2555 | -0.1262 | -0.0867 | -0.0730 | -0.0411 |
| 8 | -0.1566 | -0.1673 | -0.1794 | -0.1916 | -0.2524 | -0.3041 | -0.3574 | -0.3954 | -0.4030 | -0.3406 | -0.2357 | -0.1186 | -0.0836 | -0.0456 | -0.0350 |
| 9 | -0.1460 | -0.1399 | -0.1521 | -0.1703 | -0.2175 | -0.2585 | -0.3193 | -0.3376 | -0.3498 | -0.3041 | -0.2175 | -0.0836 | -0.0578 | -0.0441 | -0.0274 |
| 10 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.2235 | -0.2737 | -0.3117 | -0.3193 | -0.2768 | -0.1901 | -0.0821 | -0.0517 | -0.0395 | 0.0000 |
| 11 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.2007 | -0.2403 | -0.2692 | -0.2768 | -0.2570 | -0.1718 | -0.0852 | -0.0456 | -0.0259 | 0.0000 |
| 12 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.2068 | -0.2251 | -0.2311 | -0.2235 | -0.1475 | -0.0836 | -0.0411 | -0.0274 | 0.0000 |
| 13 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1658 | -0.2053 | -0.2083 | -0.1931 | -0.1338 | -0.0684 | -0.0350 | -0.0304 | 0.0000 |
| 14 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1703 | -0.1886 | -0.1673 | -0.1293 | -0.0532 | -0.0259 | 0.0000 | 0.0000 |
| 15 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1460 | -0.1566 | -0.1521 | -0.1217 | -0.0608 | -0.0289 | 0.0000 | 0.0000 |
| 16 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 17 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 18 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 19 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 20 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 21 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 22 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 23 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |

Table 2-12b. Lift loss and pitching moment data for round ended plug down 0.5 $D_n$ configuration, R = 7.76.

| PORT | NON-DIMENSIONAL AREA | M N -M | M LB-FT | M/TD | L N | L LB | L/T |
|---|---|---|---|---|---|---|---|
| 1 | 2.0327 | 0.000120 | 0.000088 | 0.000471 | -0.197916 | -0.044492 | -0.017745 |
| 2 | 3.1168 | 0.000144 | 0.000106 | 0.000566 | -0.285667 | -0.064218 | -0.025613 |
| 3 | 5.7496 | 0.000104 | 0.000076 | 0.000407 | -0.466341 | -0.104833 | -0.041812 |
| 4 | 10.8603 | -0.000267 | -0.000197 | -0.001050 | -0.715740 | -0.160898 | -0.064173 |
| 5 | 17.3649 | -0.000911 | -0.000672 | -0.003579 | -0.961629 | -0.216174 | -0.086220 |
| 6 | 25.2633 | -0.001794 | -0.001323 | -0.007051 | -1.204923 | -0.270867 | -0.108034 |
| 7 | 34.5555 | -0.002809 | -0.002072 | -0.011037 | -1.444522 | -0.324728 | -0.129516 |
| 8 | 45.2416 | -0.004051 | -0.002988 | -0.015919 | -1.684338 | -0.378639 | -0.151018 |
| 9 | 57.3215 | -0.005456 | -0.004024 | -0.021438 | -1.919411 | -0.431484 | -0.172095 |
| 10 | 70.7953 | -0.002647 | -0.001952 | -0.010400 | -2.097513 | -0.471521 | -0.188064 |
| 11 | 83.0881 | -0.000067 | -0.000049 | -0.000262 | -2.241996 | -0.504001 | -0.201018 |
| 12 | 104.7700 | 0.005158 | 0.004542 | 0.024196 | -2.432873 | -0.546910 | -0.218132 |
| 13 | 135.3570 | 0.014951 | 0.011028 | 0.058750 | -2.669020 | -0.599996 | -0.239305 |
| 14 | 162.6142 | 0.023168 | 0.017088 | 0.091036 | -2.819545 | -0.633834 | -0.252801 |
| 15 | 192.3494 | 0.032422 | 0.023914 | 0.127402 | -2.967365 | -0.667064 | -0.266055 |
| 16 | 224.5625 | 0.032422 | 0.023914 | 0.127402 | -2.967365 | -0.667064 | -0.266055 |
| 17 | 259.2535 | 0.032422 | 0.023914 | 0.127402 | -2.967365 | -0.667064 | -0.266055 |
| 18 | 296.4225 | 0.032422 | 0.023914 | 0.127402 | -2.967365 | -0.667064 | -0.266055 |
| 19 | 320.9114 | 0.032422 | 0.023914 | 0.127402 | -2.967365 | -0.667064 | -0.266055 |
| 20 | 330.9780 | 0.032422 | 0.023914 | 0.127402 | -2.967365 | -0.667064 | -0.266055 |
| 21 | 341.1995 | 0.032422 | 0.023914 | 0.127402 | -2.967365 | -0.667064 | -0.266055 |
| 22 | 351.5758 | 0.032422 | 0.023914 | 0.127402 | -2.967365 | -0.667064 | -0.266055 |
| 23 | 362.1070 | 0.032422 | 0.023914 | 0.127402 | -2.967365 | -0.667064 | -0.266055 |

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OF POOR QUALITY

Table 2-13a. Pressure coefficient data for round ended plug down 0.5 $D_n$ configuration, R = 5.18.

ROUND END PLUG 7-6-76

R = 5.18 PLUG DEPTH = .500 EFFECTIVE JET DIAMETER = 0.90 CENTERBODY DIAMETER = 0.75

JET FLOW RATE = 3.794 CMM ( 134.00 CFM ) FREE STREAM VELOCITY = 29.4 M/S ( 96.4 F/S )

JET EFFECTIVE VELOCITY = 152.1 M/S ( 499.0 F/S ) JET EFFECTIVE THRUST =11.153 N (2.5072 LB )

NON-DIMENSIONALIZED PRESSURES

| PORT | ANGLE (DEGREES) 0 | 10 | 20 | 30 | 45 | 60 | 75 | 90 | 105 | 120 | 135 | 150 | 160 | 170 | 180 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.1800 | 0.1468 | 0.0196 | -0.1962 | -0.6380 | -1.3572 | -2.0642 | -2.5364 | -2.5283 | -2.1237 | -1.2557 | -0.9303 | -0.7943 | -0.7584 | -0.7523 |
| 2 | 0.0934 | 0.0737 | -0.0203 | -0.1739 | -0.5318 | -1.0466 | -1.5351 | -1.9620 | -2.0324 | -1.7401 | -1.0906 | -0.7638 | -0.6691 | -0.5974 | -0.6123 |
| 3 | 0.0521 | 0.0338 | -0.0413 | -0.1516 | -0.4452 | -0.8153 | -1.2212 | -1.5514 | -1.6603 | -1.4499 | -0.9472 | -0.6224 | -0.5108 | -0.4621 | -0.4695 |
| 4 | 0.0000 | -0.0176 | -0.0514 | -0.1238 | -0.2815 | -0.4892 | -0.7192 | -0.9039 | -1.0155 | -0.9445 | -0.6597 | -0.3518 | -0.2672 | -0.2327 | -0.2206 |
| 5 | -0.0169 | -0.0223 | -0.0514 | -0.0954 | -0.1921 | -0.3234 | -0.4804 | -0.6103 | -0.7043 | -0.6745 | -0.4831 | -0.2476 | -0.1705 | -0.1130 | -0.1231 |
| 6 | -0.0189 | -0.0210 | -0.0386 | -0.0710 | -0.1455 | -0.2341 | -0.3423 | -0.4404 | -0.5074 | -0.5034 | -0.3816 | -0.1874 | -0.1055 | -0.0758 | -0.0710 |
| 7 | -0.0169 | -0.0135 | -0.0304 | -0.0555 | -0.1042 | -0.1759 | -0.2591 | -0.3193 | -0.3802 | -0.3816 | -0.2970 | -0.1394 | -0.0677 | -0.0467 | -0.0419 |
| 8 | -0.0169 | -0.0135 | -0.0271 | -0.0447 | -0.0852 | -0.0656 | -0.1962 | -0.2551 | -0.2997 | -0.3065 | -0.2469 | -0.1130 | -0.0528 | -0.0318 | -0.0263 |
| 9 | 0.0000 | 0.0000 | -0.0183 | -0.0318 | -0.0677 | -0.1035 | -0.1576 | -0.2043 | -0.2382 | -0.2483 | -0.2064 | -0.0961 | -0.0284 | -0.0183 | 0.0000 |
| 10 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0839 | -0.1204 | -0.1549 | -0.1915 | -0.2043 | -0.1678 | -0.0819 | -0.0189 | 0.0000 | 0.0101 |
| 11 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0731 | -0.1001 | -0.1313 | -0.1576 | -0.1685 | -0.1137 | -0.0722 | -0.0149 | 0.0000 | 0.0135 |
| 12 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0812 | -0.1015 | -0.1258 | -0.1319 | -0.0947 | -0.0609 | 0.0000 | 0.0149 | 0.0189 |
| 13 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0636 | -0.0839 | -0.0974 | -0.1035 | -0.0859 | -0.0480 | 0.0000 | 0.0122 | 0.0189 |
| 14 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0683 | -0.0852 | -0.0873 | -0.0656 | -0.0426 | 0.0000 | 0.0162 | 0.0250 |
| 15 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0562 | -0.0704 | -0.0758 | 0.0000 | -0.0359 | 0.0000 | 0.0162 | 0.0237 |
| 16 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0244 |
| 17 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0196 |
| 18 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0210 |
| 19 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0223 |
| 20 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0196 |
| 21 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0189 |
| 22 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0196 |
| 23 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0217 |

Table 2-13b. Lift loss and pitching moment data for round ended plug down 0.5 $D_n$ configuration, R = 5.18.

| PORT | NON-DIMENSIONAL AREA | M N -M | M LB-FT | M/TD | L N | L LB | L/T |
|---|---|---|---|---|---|---|---|
| 1 | 2.0327 | 0.001897 | 0.001399 | 0.007452 | -0.509252 | -0.114480 | -0.045660 |
| 2 | 3.1168 | 0.002872 | 0.002118 | 0.011285 | -0.727718 | -0.163591 | -0.065247 |
| 3 | 5.7496 | 0.005061 | 0.003733 | 0.019887 | -1.160023 | -0.260773 | -0.104008 |
| 4 | 10.8603 | 0.008402 | 0.006197 | 0.033015 | -1.677191 | -0.377033 | -0.150378 |
| 5 | 17.3649 | 0.011997 | 0.008849 | 0.047143 | -2.130782 | -0.479000 | -0.191047 |
| 6 | 25.2633 | 0.015870 | 0.011706 | 0.062360 | -2.534919 | -0.569850 | -0.227282 |
| 7 | 34.5555 | 0.019823 | 0.014621 | 0.077893 | -2.889124 | -0.649475 | -0.259040 |
| 8 | 45.2416 | 0.024445 | 0.018031 | 0.096056 | -3.200295 | -0.719426 | -0.286940 |
| 9 | 57.3215 | 0.028893 | 0.021312 | 0.113537 | -3.488009 | -0.784104 | -0.312736 |
| 10 | 70.7953 | 0.034627 | 0.025541 | 0.136065 | -3.720814 | -0.836439 | -0.333610 |
| 11 | 83.0881 | 0.038940 | 0.028722 | 0.153012 | -3.892106 | -0.874945 | -0.348968 |
| 12 | 104.7700 | 0.046314 | 0.034161 | 0.181991 | -4.104833 | -0.922766 | -0.368041 |
| 13 | 135.3570 | 0.055868 | 0.041208 | 0.219532 | -4.347746 | -0.977373 | -0.389821 |
| 14 | 162.6142 | 0.064006 | 0.047211 | 0.251510 | -4.499498 | -1.011487 | -0.403427 |
| 15 | 192.3494 | 0.068655 | 0.050640 | 0.269780 | -4.606070 | -1.035445 | -0.412982 |
| 16 | 224.5625 | 0.067917 | 0.050095 | 0.266878 | -4.601596 | -1.034439 | -0.412581 |
| 17 | 259.2535 | 0.067226 | 0.049586 | 0.264166 | -4.597714 | -1.033566 | -0.412233 |
| 18 | 296.4225 | 0.066380 | 0.048962 | 0.260838 | -4.593268 | -1.032567 | -0.411834 |
| 19 | 320.9114 | 0.065746 | 0.048494 | 0.258348 | -4.590149 | -1.031866 | -0.411555 |
| 20 | 330.9780 | 0.065514 | 0.048323 | 0.257435 | -4.589023 | -1.031612 | -0.411454 |
| 21 | 341.1995 | 0.065282 | 0.048152 | 0.256525 | -4.587918 | -1.031364 | -0.411355 |
| 22 | 351.5758 | 0.065035 | 0.047970 | 0.255555 | -4.586757 | -1.031103 | -0.411250 |
| 23 | 362.1070 | 0.064754 | 0.047763 | 0.254452 | -4.585457 | -1.030811 | -0.411134 |

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Table 2-14a. Pressure coefficient data for round ended plug down 0.5 $D_n$, R = 2.59.

ROUND END PLUG 7-6-76

R = 2.59 PLUG DEPTH = .500 EFFECTIVE JET DIAMETER = 0.90 CENTERBODY DIAMETER = 0.75

JET FLOW RATE = 3.794 CMM ( 134.00 CFM ) FREE STREAM VELOCITY = 58.8 M/S ( 192.8 F/S )

JET EFFECTIVE VELOCITY = 152.1 M/S ( 499.0 F/S ) JET EFFECTIVE THRUST =11.153 N (2.5072 LB )

NON-DIMENSIONALIZED PRESSURES

ANGLE (DEGREES)

| PORT | 0 | 10 | 20 | 30 | 45 | 60 | 75 | 90 | 105 | 120 | 135 | 150 | 160 | 170 | 180 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.3540 | 0.3421 | 0.2832 | 0.1851 | -0.0386 | -0.3667 | -0.8704 | -1.4094 | -1.8747 | -2.1711 | -1.8056 | -1.2851 | -0.9765 | -0.8175 | -0.7666 |
| 2 | 0.3249 | 0.2952 | 0.2568 | 0.1854 | 0.0194 | -0.2386 | -0.5498 | -0.9562 | -1.3538 | -1.6781 | -1.4468 | -1.0339 | -0.7544 | -0.5901 | -0.5447 |
| 3 | 0.2654 | 0.2600 | 0.2237 | 0.1736 | 0.0403 | -0.1364 | -0.3761 | -0.6443 | -0.9395 | -1.1543 | -1.1545 | -0.8719 | -0.6172 | -0.4680 | -0.4302 |
| 4 | 0.1848 | 0.1787 | 0.1610 | 0.1300 | 0.0602 | -0.0329 | -0.1485 | -0.2753 | -0.4125 | -0.5513 | -0.6553 | -0.6051 | -0.4565 | -0.3257 | -0.2965 |
| 5 | 0.1355 | 0.1303 | 0.1212 | 0.1033 | 0.0593 | 0.0000 | -0.0757 | -0.1492 | -0.2347 | -0.3282 | -0.4201 | -0.4471 | -0.3621 | -0.2611 | -0.2367 |
| 6 | 0.1074 | 0.1032 | 0.0969 | 0.0821 | 0.0513 | 0.0131 | -0.0383 | -0.0932 | -0.1517 | -0.2180 | -0.2905 | -0.3259 | -0.2736 | -0.1993 | -0.1866 |
| 7 | 0.0865 | 0.0848 | 0.0796 | 0.0661 | 0.0448 | 0.0169 | -0.0211 | -0.0622 | -0.1072 | -0.1563 | -0.2075 | -0.2392 | -0.2092 | -0.1480 | -0.1433 |
| 8 | 0.0708 | 0.0696 | 0.0652 | 0.0558 | 0.0396 | 0.0169 | -0.0135 | -0.0452 | -0.0811 | -0.1180 | -0.1561 | -0.1790 | -0.1603 | -0.1074 | -0.1013 |
| 9 | 0.0582 | 0.0577 | 0.0550 | 0.0491 | 0.0346 | 0.0169 | -0.0067 | -0.0351 | -0.0632 | -0.0922 | -0.1189 | -0.1381 | -0.1232 | -0.0782 | -0.0777 |
| 10 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0158 | -0.0032 | -0.0265 | -0.0509 | -0.0735 | -0.0944 | -0.1033 | -0.0937 | -0.0566 | -0.0577 |
| 11 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0152 | -0.0025 | -0.0201 | -0.0400 | -0.0578 | -0.0740 | -0.0848 | -0.0752 | -0.0416 | -0.0415 |
| 12 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0157 | -0.0312 | -0.0454 | -0.0582 | -0.0585 | -0.0521 | -0.0270 | -0.0265 |
| 13 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0094 | -0.0255 | -0.0357 | -0.0450 | -0.0474 | -0.0408 | -0.0169 | -0.0174 |
| 14 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0084 | -0.0192 | -0.0300 | -0.0347 | -0.0364 | -0.0302 | -0.0120 | -0.0118 |
| 15 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0061 | -0.0157 | -0.0248 | -0.0293 | -0.0293 | -0.0239 | -0.0074 | -0.0066 |
| 16 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0034 |
| 17 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 18 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 19 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 20 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 21 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 22 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 23 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |

Table 2-14b. Lift loss and pitching moment data for round ended plug down 0.5 $D_n$ configuration, R = 2.59.

| PORT | NON-DIMENSIONAL AREA | M N -M | M LB-FT | M/TD | L N | L LB | L/T |
|---|---|---|---|---|---|---|---|
| 1 | 2.0327 | 0.014293 | 0.010543 | 0.056166 | -1.454094 | -0.326880 | -0.130375 |
| 2 | 3.1168 | 0.021461 | 0.015830 | 0.084331 | -2.016262 | -0.453256 | -0.180779 |
| 3 | 5.7496 | 0.037405 | 0.027590 | 0.146984 | -2.998104 | -0.673974 | -0.268811 |
| 4 | 10.8603 | 0.064618 | 0.047663 | 0.253917 | -3.962492 | -0.890768 | -0.355279 |
| 5 | 17.3649 | 0.096476 | 0.071161 | 0.379103 | -4.727507 | -1.062744 | -0.423870 |
| 6 | 25.2633 | 0.131403 | 0.096923 | 0.516347 | -5.342498 | -1.200994 | -0.479010 |
| 7 | 34.5555 | 0.168087 | 0.123981 | 0.660496 | -5.840610 | -1.312969 | -0.523671 |
| 8 | 45.2416 | 0.205495 | 0.151573 | 0.807491 | -6.248770 | -1.404724 | -0.560267 |
| 9 | 57.3215 | 0.243224 | 0.179402 | 0.955746 | -6.582846 | -1.479824 | -0.590220 |
| 10 | 70.7953 | 0.269625 | 0.198875 | 1.059487 | -6.986051 | -1.570464 | -0.626372 |
| 11 | 83.0881 | 0.290619 | 0.214361 | 1.141985 | -7.272425 | -1.634841 | -0.652048 |
| 12 | 104.7700 | 0.319823 | 0.235902 | 1.256743 | -7.659169 | -1.721781 | -0.686724 |
| 13 | 135.3570 | 0.354879 | 0.261758 | 1.394492 | -8.075941 | -1.815472 | -0.724092 |
| 14 | 162.6142 | 0.381129 | 0.281121 | 1.497642 | -8.364299 | -1.880294 | -0.749946 |
| 15 | 192.3494 | 0.405908 | 0.299398 | 1.595011 | -8.615438 | -1.936751 | -0.772463 |
| 16 | 224.5625 | 0.406317 | 0.299699 | 1.596618 | -8.617916 | -1.937308 | -0.772686 |
| 17 | 259.2535 | 0.406317 | 0.299699 | 1.596618 | -8.617916 | -1.937308 | -0.772686 |
| 18 | 296.4225 | 0.406317 | 0.299699 | 1.596618 | -8.617916 | -1.937308 | -0.772686 |
| 19 | 320.9114 | 0.406317 | 0.299699 | 1.596618 | -8.617916 | -1.937308 | -0.772686 |
| 20 | 330.9780 | 0.406317 | 0.299699 | 1.596618 | -8.617916 | -1.937308 | -0.772686 |
| 21 | 341.1995 | 0.406317 | 0.299699 | 1.596618 | -8.617916 | -1.937308 | -0.772686 |
| 22 | 351.5758 | 0.406317 | 0.299699 | 1.596618 | -8.617916 | -1.937308 | -0.772686 |
| 23 | 362.1070 | 0.406317 | 0.299699 | 1.596618 | -8.617916 | -1.937308 | -0.772686 |

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Table 2-15a. Pressure coefficient data for round ended plug down 1.0 $D_n$ configuration, R = 9.98.

ROUND END PLUG 7-6-76

R = 9.98 PLUG DEPTH =1.000 EFFECTIVE JET DIAMETER = 1.02 CENTERBODY DIAMETER = 0.75

JET FLOW RATE = 4.666 CMM ( 164.76 CFM ) FREE STREAM VELOCITY = 14.8 M/S ( 48.6 F/S )

JET EFFECTIVE VELOCITY = 147.9 M/S ( 485.2 F/S ) JET EFFECTIVE THRUST =13.372 N (3.0060 LB )

NON-DIMENSIONALIZED PRESSURES

| | ANGLE (DEGREES) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PORT | 0 | 10 | 20 | 30 | 45 | 60 | 75 | 90 | 105 | 120 | 135 | 150 | 160 | 170 | 180 |
| 1 | 0.1100 | 0.0725 | -0.0483 | -0.2603 | -0.6629 | -1.1809 | -1.4547 | -1.4466 | -1.2963 | -1.1863 | -0.9716 | -0.8105 | -0.6978 | -0.6549 | -0.6334 |
| 2 | 0.0000 | 0.0000 | -0.1127 | -0.2469 | -0.5958 | -0.9179 | -1.1353 | -1.2212 | -1.0575 | -0.9233 | -0.8052 | -0.6361 | -0.5341 | -0.4777 | -0.4751 |
| 3 | -0.0483 | -0.0725 | -0.1127 | -0.2389 | -0.5234 | -0.7783 | -0.9555 | -0.9582 | -0.9313 | -0.7434 | -0.6307 | -0.4428 | -0.3596 | -0.3355 | -0.3704 |
| 4 | -0.1315 | -0.1396 | -0.1825 | -0.2335 | -0.3731 | -0.5529 | -0.6710 | -0.6629 | -0.5824 | -0.4724 | -0.3489 | -0.2684 | -0.1959 | -0.1825 | -0.1798 |
| 5 | -0.1261 | -0.1557 | -0.1610 | -0.2147 | -0.2899 | -0.4133 | -0.5019 | -0.4965 | -0.4106 | -0.3194 | -0.2389 | -0.1637 | -0.0805 | -0.0966 | -0.0966 |
| 6 | -0.1208 | -0.1476 | -0.1449 | -0.1959 | -0.2523 | -0.3248 | -0.3731 | -0.3784 | -0.3301 | -0.2308 | -0.1557 | -0.1154 | -0.0483 | -0.0725 | -0.0590 |
| 7 | -0.1100 | -0.1154 | -0.1449 | -0.1557 | -0.2120 | -0.2630 | -0.3113 | -0.2979 | -0.2684 | -0.1879 | -0.1181 | -0.0939 | 0.0000 | -0.0483 | -0.0590 |
| 8 | -0.1047 | -0.1154 | -0.1208 | -0.1396 | -0.1691 | -0.2174 | -0.2630 | -0.2550 | -0.2255 | -0.1610 | -0.0966 | -0.0725 | 0.0000 | 0.0000 | -0.0483 |
| 9 | -0.0859 | -0.0886 | -0.1074 | -0.1208 | -0.1530 | -0.1906 | -0.2228 | -0.2228 | -0.1745 | -0.1449 | -0.0590 | -0.0590 | 0.0000 | 0.0000 | 0.0000 |
| 10 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1557 | -0.1906 | -0.1959 | -0.1771 | -0.1315 | -0.0590 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 11 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1342 | -0.1557 | -0.1664 | -0.1422 | -0.0966 | -0.0403 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 12 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1369 | -0.1342 | -0.1181 | -0.0966 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 13 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1288 | -0.1127 | -0.1020 | -0.0644 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 14 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1020 | -0.0859 | -0.0644 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 15 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0859 | -0.0644 | -0.0537 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 16 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 17 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 18 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 19 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 20 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 21 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 22 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 23 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |

Table 2-15b. Lift loss and pitching moment data for round ended plug down 1.0 $D_n$ configuration, R = 9.98.

| PORT | NON-DIMENSIONAL AREA | M N -M | M LB-FT | M/TD | L N | L LB | L/T |
|---|---|---|---|---|---|---|---|
| 1 | 1.5633 | 0.000283 | 0.000209 | 0.000813 | -0.090293 | -0.020298 | -0.006752 |
| 2 | 2.3971 | 0.000401 | 0.000296 | 0.001153 | -0.129695 | -0.029155 | -0.009699 |
| 3 | 4.4220 | 0.000582 | 0.000429 | 0.001673 | -0.208328 | -0.046832 | -0.015579 |
| 4 | 8.3527 | 0.000576 | 0.000425 | 0.001656 | -0.312277 | -0.070200 | -0.023353 |
| 5 | 13.3554 | 0.000272 | 0.000201 | 0.000783 | -0.408624 | -0.091859 | -0.030558 |
| 6 | 19.4302 | -0.000311 | -0.000229 | -0.000894 | -0.499675 | -0.112327 | -0.037367 |
| 7 | 26.5769 | -0.001114 | -0.000822 | -0.003202 | -0.586061 | -0.131747 | -0.043827 |
| 8 | 34.7956 | -0.002156 | -0.001590 | -0.006197 | -0.668720 | -0.150328 | -0.050009 |
| 9 | 44.0864 | -0.003464 | -0.002555 | -0.009958 | -0.746478 | -0.167808 | -0.055824 |
| 10 | 54.4491 | -0.003298 | -0.002433 | -0.009480 | -0.800174 | -0.179879 | -0.059839 |
| 11 | 63.9036 | -0.003247 | -0.002395 | -0.009333 | -0.839727 | -0.188771 | -0.062797 |
| 12 | 80.5793 | -0.002779 | -0.002050 | -0.007988 | -0.885532 | -0.199068 | -0.066222 |
| 13 | 104.1040 | -0.002352 | -0.001735 | -0.006761 | -0.939797 | -0.211266 | -0.070280 |
| 14 | 125.0677 | -0.001451 | -0.001070 | -0.004170 | -0.969702 | -0.217989 | -0.072517 |
| 15 | 147.9372 | -0.000594 | -0.000438 | -0.001706 | -0.996079 | -0.223918 | -0.074489 |
| 16 | 172.7126 | -0.000594 | -0.000438 | -0.001706 | -0.996079 | -0.223918 | -0.074489 |
| 17 | 199.3937 | -0.000594 | -0.000438 | -0.001706 | -0.996079 | -0.223918 | -0.074489 |
| 18 | 227.9806 | -0.000594 | -0.000438 | -0.001706 | -0.996079 | -0.223918 | -0.074489 |
| 19 | 246.8152 | -0.000594 | -0.000438 | -0.001706 | -0.996079 | -0.223918 | -0.074489 |
| 20 | 254.5575 | -0.000594 | -0.000438 | -0.001706 | -0.996079 | -0.223918 | -0.074489 |
| 21 | 262.4189 | -0.000594 | -0.000438 | -0.001706 | -0.996079 | -0.223918 | -0.074489 |
| 22 | 270.3994 | -0.000594 | -0.000438 | -0.001706 | -0.996079 | -0.223918 | -0.074489 |
| 23 | 278.4990 | -0.000594 | -0.000438 | -0.001706 | -0.996079 | -0.223918 | -0.074489 |

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Table 2-16a. Pressure coefficient data for round ended plug down 1.0 $D_n$ configuration, R = 7.49.

ROUND END PLUG 7-6-76

R = 7.49 PLUG DEPTH =1.000 EFFECTIVE JET DIAMETER = 1.02 CENTERBODY DIAMETER = 0.75

JET FLOW RATE = 4.666 CMM ( 164.76 CFM ) FREE STREAM VELOCITY = 19.8 M/S ( 64.8 F/S )

JET EFFECTIVE VELOCITY = 148.0 M/S ( 485.5 F/S ) JET EFFECTIVE THRUST =13.379 N (3.0075 LB )

NON-DIMENSIONALIZED PRESSURES

| | ANGLE (DEGREES) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PORT | 0 | 10 | 20 | 30 | 45 | 60 | 75 | 90 | 105 | 120 | 135 | 150 | 160 | 170 | 180 |
| 1 | 0.1079 | 0.0629 | -0.0719 | -0.3312 | -0.7674 | -1.4149 | -1.8390 | -1.9559 | -1.7191 | -1.4643 | -1.2800 | -1.1826 | -0.9817 | -0.9442 | -0.9188 |
| 2 | 0.0000 | -0.0255 | -0.1259 | -0.3088 | -0.6895 | -1.1541 | -1.4478 | -1.6037 | -1.4718 | -1.2095 | -1.0612 | -0.9428 | -0.8124 | -0.7689 | -0.7879 |
| 3 | -0.0585 | -0.0779 | -0.1694 | -0.3162 | -0.6190 | -0.9517 | -1.2350 | -1.3309 | -1.2800 | -1.0267 | -0.8723 | -0.7509 | -0.6700 | -0.6385 | -0.6325 |
| 4 | -0.1439 | -0.1739 | -0.2158 | -0.3073 | -0.4796 | -0.6625 | -0.8258 | -0.9203 | -0.8828 | -0.7164 | -0.5680 | -0.4736 | -0.4127 | -0.3957 | -0.3912 |
| 5 | -0.1724 | -0.1769 | -0.2158 | -0.2743 | -0.3807 | -0.5141 | -0.6460 | -0.6895 | -0.6805 | -0.5725 | -0.4257 | -0.3537 | -0.3028 | -0.3043 | -0.2923 |
| 6 | -0.1694 | -0.1724 | -0.1978 | -0.2338 | -0.3297 | -0.4272 | -0.5216 | -0.5830 | -0.5576 | -0.4616 | -0.3387 | -0.2773 | -0.2533 | -0.2548 | -0.2533 |
| 7 | -0.1559 | -0.1649 | -0.1829 | -0.2038 | -0.2743 | -0.3627 | -0.4272 | -0.4811 | -0.4751 | -0.3852 | -0.2788 | -0.2398 | -0.2173 | -0.2158 | -0.2278 |
| 8 | -0.1439 | -0.1439 | -0.1649 | -0.1829 | -0.2383 | -0.3103 | -0.3672 | -0.4032 | -0.3972 | -0.3552 | -0.2353 | -0.1978 | -0.1739 | -0.1903 | -0.1963 |
| 9 | -0.1229 | -0.1229 | -0.1499 | -0.1604 | -0.2113 | -0.2623 | -0.3177 | -0.3552 | -0.3567 | -0.3103 | -0.2098 | -0.1619 | -0.1379 | -0.1679 | -0.1754 |
| 10 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.2368 | -0.2773 | -0.3058 | -0.3088 | -0.2713 | -0.1978 | -0.1379 | -0.1169 | -0.1574 | -0.1664 |
| 11 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.2083 | -0.2443 | -0.2713 | -0.2608 | -0.2443 | -0.1754 | -0.1124 | -0.1169 | -0.1349 | -0.1574 |
| 12 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.2143 | -0.2368 | -0.2428 | -0.2068 | -0.1529 | -0.0899 | -0.0944 | -0.1259 | -0.1424 |
| 13 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1784 | -0.2038 | -0.2068 | -0.1874 | -0.1379 | -0.0749 | -0.0764 | -0.1054 | -0.1304 |
| 14 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1724 | -0.1874 | -0.1784 | -0.1304 | -0.0629 | -0.0644 | -0.0869 | -0.1169 |
| 15 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1514 | -0.1574 | -0.1529 | -0.1184 | -0.0570 | -0.0540 | -0.0749 | -0.1169 |
| 16 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1094 |
| 17 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1124 |
| 18 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0914 |
| 19 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0884 |
| 20 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0929 |
| 21 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0869 |
| 22 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0854 |
| 23 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0929 |

Table 2-16b. Lift loss and pitching moment data for round ended plug down 1.0 $D_n$ configuration, R = 7.49.

| PORT | NON-DIMENSIONAL AREA | M N -M | M LB-FT | M/TD | L N | L LB | L/T |
|---|---|---|---|---|---|---|---|
| 1 | 1.5626 | 0.000748 | 0.000552 | 0.002149 | -0.209141 | -0.047015 | -0.015633 |
| 2 | 2.3960 | 0.001102 | 0.000813 | 0.003165 | -0.302511 | -0.068005 | -0.022612 |
| 3 | 4.4199 | 0.001821 | 0.001343 | 0.005231 | -0.496085 | -0.111520 | -0.037081 |
| 4 | 8.3487 | 0.002602 | 0.001919 | 0.007474 | -0.761047 | -0.171083 | -0.056886 |
| 5 | 13.3490 | 0.003275 | 0.002415 | 0.009405 | -1.025970 | -0.230638 | -0.076688 |
| 6 | 19.4208 | 0.003859 | 0.002847 | 0.011085 | -1.293727 | -0.290830 | -0.096702 |
| 7 | 26.5641 | 0.004446 | 0.003279 | 0.012770 | -1.560325 | -0.350761 | -0.116629 |
| 8 | 34.7789 | 0.004994 | 0.003683 | 0.014343 | -1.824125 | -0.410063 | -0.136347 |
| 9 | 44.0652 | 0.005558 | 0.004100 | 0.015965 | -2.084244 | -0.468538 | -0.155790 |
| 10 | 54.4229 | 0.010340 | 0.007627 | 0.029698 | -2.287961 | -0.514334 | -0.171017 |
| 11 | 63.8729 | 0.014628 | 0.010790 | 0.042015 | -2.451773 | -0.551159 | -0.183262 |
| 12 | 80.5406 | 0.023746 | 0.017515 | 0.068204 | -2.674484 | -0.601224 | -0.199909 |
| 13 | 104.0539 | 0.036270 | 0.026753 | 0.104175 | -2.945940 | -0.662247 | -0.220199 |
| 14 | 125.0076 | 0.048501 | 0.035774 | 0.139304 | -3.128736 | -0.703340 | -0.233863 |
| 15 | 147.8661 | 0.061372 | 0.045268 | 0.176274 | -3.303099 | -0.742537 | -0.246896 |
| 16 | 172.6295 | 0.062870 | 0.046373 | 0.180576 | -3.312173 | -0.744576 | -0.247574 |
| 17 | 199.2978 | 0.064655 | 0.047690 | 0.185703 | -3.322213 | -0.746833 | -0.248324 |
| 18 | 227.8710 | 0.066322 | 0.048919 | 0.190489 | -3.330961 | -0.748800 | -0.248978 |
| 19 | 246.6965 | 0.067454 | 0.049754 | 0.193743 | -3.336536 | -0.750053 | -0.249395 |
| 20 | 254.4351 | 0.067951 | 0.050121 | 0.195170 | -3.338945 | -0.750595 | -0.249575 |
| 21 | 262.2927 | 0.068431 | 0.050474 | 0.196547 | -3.341232 | -0.751109 | -0.249746 |
| 22 | 270.2694 | 0.068916 | 0.050832 | 0.197941 | -3.343515 | -0.751622 | -0.249917 |
| 23 | 278.3651 | 0.069460 | 0.051234 | 0.199504 | -3.346034 | -0.752188 | -0.250105 |

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Table 2-17a. Pressure coefficient data for round ended plug down 1.0 $D_n$, R = 4.99.

ROUND END PLUG 7-6-76

R = 4.99 PLUG DEPTH =1.000 EFFECTIVE JET DIAMETER = 1.02 CENTERBODY DIAMETER = 0.75

JET FLOW RATE = 4.666 CMM ( 164.76 CFM ) FREE STREAM VELOCITY = 29.6 M/S ( 97.2 F/S )

JET EFFECTIVE VELOCITY = 148.0 M/S ( 485.5 F/S ) JET EFFECTIVE THRUST =13.379 N (3.0075 LB )

NON-DIMENSIONALIZED PRESSURES

ANGLE (DEGREES)

| PORT | 0 | 10 | 20 | 30 | 45 | 60 | 75 | 90 | 105 | 120 | 135 | 150 | 160 | 170 | 180 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.2531 | 0.2185 | 0.0786 | -0.1466 | -0.6222 | -1.3589 | -2.0890 | -2.5187 | -2.4600 | -2.0570 | -1.7113 | -1.6247 | -1.4688 | -1.3742 | -1.3403 |
| 2 | 0.1659 | 0.1359 | 0.0413 | -0.1219 | -0.5149 | -1.0598 | -1.5741 | -1.9718 | -1.9858 | -1.7093 | -1.4142 | -1.2923 | -1.2024 | -1.1424 | -1.1358 |
| 3 | 0.1052 | 0.0853 | 0.0000 | -0.1192 | -0.4290 | -0.8260 | -1.2503 | -1.5641 | -1.6474 | -1.4389 | -1.1950 | -1.0658 | -0.9659 | -0.9433 | -0.9386 |
| 4 | 0.0273 | 0.0140 | -0.0353 | -0.1086 | -0.2878 | -0.5109 | -0.7607 | -0.9479 | -1.0372 | -0.9692 | -0.7631 | -0.6608 | -0.6308 | -0.6348 | -0.6042 |
| 5 | -0.0073 | -0.0120 | -0.0406 | -0.0913 | -0.2052 | -0.3464 | -0.5203 | -0.6528 | -0.7501 | -0.6928 | -0.5542 | -0.4550 | -0.4683 | -0.4816 | -0.4803 |
| 6 | -0.0113 | -0.0133 | -0.0380 | -0.0739 | -0.1525 | -0.2545 | -0.3737 | -0.4863 | -0.5169 | -0.5362 | -0.4170 | -0.3304 | -0.3404 | -0.4023 | -0.3804 |
| 7 | -0.0113 | -0.0147 | -0.0320 | -0.0600 | -0.1126 | -0.1952 | -0.2864 | -0.3584 | -0.4137 | -0.4130 | -0.3224 | -0.2491 | -0.2731 | -0.3324 | -0.3284 |
| 8 | -0.0100 | -0.0087 | -0.0280 | -0.0440 | -0.0926 | -0.1479 | -0.2238 | -0.2871 | -0.3264 | -0.3271 | -0.2678 | -0.1872 | -0.2012 | -0.2611 | -0.2871 |
| 9 | -0.0060 | -0.0113 | -0.0173 | -0.0346 | -0.0739 | -0.1166 | -0.1839 | -0.2345 | -0.2665 | -0.2725 | -0.2218 | -0.1366 | -0.1532 | -0.2078 | -0.2558 |
| 10 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0973 | -0.1412 | -0.1918 | -0.2245 | -0.2278 | -0.1885 | -0.1092 | -0.1132 | -0.1859 | -0.2265 |
| 11 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0833 | -0.1179 | -0.1579 | -0.1885 | -0.1905 | -0.1559 | -0.0873 | -0.0919 | -0.1512 | -0.2038 |
| 12 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0906 | -0.1219 | -0.1432 | -0.1446 | -0.1179 | -0.0673 | -0.0679 | -0.1119 | -0.1952 |
| 13 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0733 | -0.0946 | -0.1199 | -0.1199 | -0.0973 | -0.0553 | -0.0546 | -0.0986 | -0.1739 |
| 14 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0819 | -0.0906 | -0.1019 | -0.0846 | -0.0426 | -0.0360 | -0.0813 | -0.1625 |
| 15 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0653 | -0.0799 | -0.0846 | -0.0733 | -0.0366 | -0.0260 | 0.0000 | -0.1485 |
| 16 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1419 |
| 17 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1279 |
| 18 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1259 |
| 19 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1159 |
| 20 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1092 |
| 21 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1166 |
| 22 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1166 |
| 23 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1052 |

Table 2-17b. Lift loss and pitching moment data for round ended plug down 1.0 $D_n$ configuration, R = 4.99.

| PORT | NON-DIMENSIONAL AREA | M N -M | M LB-FT | M/TD | L N | L LB | L/T |
|---|---|---|---|---|---|---|---|
| 1 | 1.5626 | 0.003211 | 0.002368 | 0.009221 | -0.579845 | -0.130349 | -0.043341 |
| 2 | 2.3960 | 0.004853 | 0.003579 | 0.013938 | -0.829161 | -0.186395 | -0.061977 |
| 3 | 4.4199 | 0.008607 | 0.006349 | 0.024722 | -1.326977 | -0.298304 | -0.099187 |
| 4 | 8.3487 | 0.014901 | 0.010991 | 0.042800 | -1.948657 | -0.438058 | -0.145656 |
| 5 | 13.3490 | 0.022278 | 0.016432 | 0.063987 | -2.517389 | -0.565909 | -0.188166 |
| 6 | 19.4208 | 0.030588 | 0.022562 | 0.087855 | -3.036542 | -0.682615 | -0.226971 |
| 7 | 26.5641 | 0.039717 | 0.029295 | 0.114076 | -3.508257 | -0.788656 | -0.262231 |
| 8 | 34.7789 | 0.049344 | 0.036396 | 0.141727 | -3.937467 | -0.885143 | -0.294313 |
| 9 | 44.0652 | 0.059336 | 0.043766 | 0.170426 | -4.330680 | -0.973537 | -0.323704 |
| 10 | 54.4229 | 0.071661 | 0.052857 | 0.205825 | -4.669225 | -1.049642 | -0.349009 |
| 11 | 63.8729 | 0.081942 | 0.060441 | 0.235356 | -4.926498 | -1.107477 | -0.368239 |
| 12 | 80.5406 | 0.099241 | 0.073200 | 0.285041 | -5.252351 | -1.180728 | -0.392596 |
| 13 | 104.0539 | 0.122185 | 0.090123 | 0.350940 | -5.632802 | -1.266254 | -0.421033 |
| 14 | 125.0076 | 0.141876 | 0.104648 | 0.407498 | -5.884594 | -1.322857 | -0.439854 |
| 15 | 147.8661 | 0.158354 | 0.116802 | 0.454827 | -6.093627 | -1.369847 | -0.455478 |
| 16 | 172.6295 | 0.162725 | 0.120026 | 0.467380 | -6.120103 | -1.375799 | -0.457457 |
| 17 | 199.2978 | 0.167294 | 0.123396 | 0.480504 | -6.145804 | -1.381577 | -0.459378 |
| 18 | 227.8710 | 0.172458 | 0.127205 | 0.495334 | -6.172911 | -1.387670 | -0.461405 |
| 19 | 246.6965 | 0.175798 | 0.129669 | 0.504930 | -6.189353 | -1.391367 | -0.462634 |
| 20 | 254.4351 | 0.177113 | 0.130638 | 0.508705 | -6.195723 | -1.392799 | -0.463110 |
| 21 | 262.2927 | 0.178559 | 0.131705 | 0.512859 | -6.202625 | -1.394350 | -0.463626 |
| 22 | 270.2694 | 0.180049 | 0.132804 | 0.517140 | -6.209632 | -1.395925 | -0.464149 |
| 23 | 278.3651 | 0.181436 | 0.133827 | 0.521121 | -6.216053 | -1.397369 | -0.464629 |

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Table 2-18a. Pressure coefficient data for round ended plug down 1.0 $D_n$ configuration, R = 2.5.

ROUND END PLUG 7-6-76

R = 2.50 PLUG DEPTH =1.00 EFFECTIVE JET DIAMETER = 1.02 CENTERBODY DIAMETER = 0.75

JET FLOW RATE = 4.666 CMM ( 164.76 CFM ) FREE STREAM VELOCITY = 59.3 M/S ( 194.4 F/S )

JET EFFECTIVE VELOCITY = 148.0 M/S ( 485.5 F/S ) JET EFFECTIVE THRUST =13.379 N (3.0075 LB )

NON-DIMENSIONALIZED PRESSURES

| PORT | ANGLE (DEGREES) 0 | 10 | 20 | 30 | 45 | 60 | 75 | 90 | 105 | 120 | 135 | 150 | 160 | 170 | 180 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.3612 | 0.3456 | 0.2857 | 0.1837 | -0.0549 | -0.4377 | -0.9851 | -1.6350 | -2.2151 | -2.4122 | -1.6825 | -1.4735 | -1.2124 | -1.0700 | -1.0208 |
| 2 | 0.3150 | 0.3008 | 0.2604 | 0.1857 | -0.0048 | -0.2822 | -0.6391 | -1.1161 | -1.5628 | -1.7605 | -1.3053 | -1.2132 | -0.9840 | -0.8042 | -0.7594 |
| 3 | 0.2762 | 0.2672 | 0.2324 | 0.1667 | 0.0274 | -0.1743 | -0.4482 | -0.7714 | -1.1115 | -1.3163 | -1.2665 | -1.0417 | -0.8447 | -0.6820 | -0.6281 |
| 4 | 0.1965 | 0.1912 | 0.1711 | 0.1336 | 0.0549 | -0.0515 | -0.1937 | -0.3506 | -0.5189 | -0.6903 | -0.8014 | -0.7750 | -0.6367 | -0.4983 | -0.4551 |
| 5 | 0.1481 | 0.1432 | 0.1293 | 0.1072 | 0.0573 | -0.0128 | -0.1029 | -0.1974 | -0.3114 | -0.4382 | -0.5567 | -0.5685 | -0.4578 | -0.3748 | -0.3531 |
| 6 | 0.1159 | 0.1122 | 0.1057 | 0.0895 | 0.0506 | 0.0000 | -0.0596 | -0.1305 | -0.2098 | -0.3018 | -0.4007 | -0.4236 | -0.3409 | -0.2767 | -0.2633 |
| 7 | 0.0961 | 0.0939 | 0.0878 | 0.0745 | 0.0445 | 0.0085 | -0.0395 | -0.0915 | -0.1554 | -0.2243 | -0.2921 | -0.3170 | -0.2450 | -0.2453 | -0.1899 |
| 8 | 0.0812 | 0.0787 | 0.0730 | 0.0622 | 0.0393 | 0.0128 | -0.0251 | -0.0677 | -0.1170 | -0.1703 | -0.2196 | -0.2324 | -0.1794 | -0.1801 | -0.1353 |
| 9 | 0.0672 | 0.0662 | 0.0603 | 0.0516 | 0.0362 | 0.0121 | -0.0184 | -0.0530 | -0.0925 | -0.1336 | -0.1710 | -0.1806 | -0.1356 | -0.1353 | -0.0963 |
| 10 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0124 | -0.0134 | -0.0432 | -0.0727 | -0.1071 | -0.1335 | -0.1378 | -0.1051 | -0.1047 | -0.0720 |
| 11 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0128 | -0.0110 | -0.0349 | -0.0601 | -0.0863 | -0.1071 | -0.1057 | -0.0820 | -0.0825 | -0.0506 |
| 12 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0071 | -0.0254 | -0.0493 | -0.0677 | -0.0805 | -0.0803 | -0.0583 | -0.0586 | -0.0310 |
| 13 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0045 | -0.0207 | -0.0385 | -0.0551 | -0.0624 | -0.0599 | -0.0456 | -0.0455 | -0.0207 |
| 14 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0154 | -0.0315 | -0.0445 | -0.0508 | -0.0471 | -0.0325 | -0.0330 | -0.0156 |
| 15 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0138 | -0.0247 | -0.0360 | -0.0403 | -0.0382 | -0.0251 | 0.0000 | -0.0108 |
| 16 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0066 |
| 17 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0055 |
| 18 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0028 |
| 19 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0035 |
| 20 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 21 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 22 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 23 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |

Table 2-18b. Lift loss and pitching moment data for round ended plug down 1.0 $D_n$ configuration, R = 2.5.

| PORT | NON-DIMENSIONAL AREA | M N-M | M LB-FT | M/TD | L N | L LB | L/T |
|---|---|---|---|---|---|---|---|
| 1 | 1.5626 | 0.016012 | 0.011810 | 0.045990 | -1.676823 | -0.376950 | -0.125337 |
| 2 | 2.3960 | 0.023947 | 0.017663 | 0.068780 | -2.319200 | -0.521356 | -0.173353 |
| 3 | 4.4199 | 0.043071 | 0.031769 | 0.123709 | -3.532991 | -0.794216 | -0.264079 |
| 4 | 8.3487 | 0.078065 | 0.057581 | 0.224219 | -4.847032 | -1.089613 | -0.362300 |
| 5 | 13.3490 | 0.119195 | 0.087918 | 0.342352 | -5.928759 | -1.332785 | -0.443155 |
| 6 | 19.4208 | 0.164435 | 0.121287 | 0.472292 | -6.833792 | -1.536124 | -0.510766 |
| 7 | 26.5641 | 0.212924 | 0.157052 | 0.611561 | -7.601549 | -1.708828 | -0.568191 |
| 8 | 34.7789 | 0.261916 | 0.193189 | 0.752276 | -8.230766 | -1.850276 | -0.615222 |
| 9 | 44.0652 | 0.311093 | 0.229462 | 0.893525 | -8.763294 | -1.969988 | -0.655027 |
| 10 | 54.4229 | 0.347715 | 0.256475 | 0.998711 | -9.358571 | -2.103807 | -0.699522 |
| 11 | 63.8729 | 0.376789 | 0.277919 | 1.082217 | -9.786923 | -2.200100 | -0.731540 |
| 12 | 80.5406 | 0.418747 | 0.308868 | 1.202729 | -10.367588 | -2.330634 | -0.774943 |
| 13 | 104.0539 | 0.469572 | 0.346357 | 1.348711 | -11.003598 | -2.473609 | -0.822482 |
| 14 | 125.0076 | 0.508495 | 0.375066 | 1.460505 | -11.440992 | -2.571935 | -0.855176 |
| 15 | 147.8661 | 0.539765 | 0.398130 | 1.550317 | -11.786632 | -2.649635 | -0.881012 |
| 16 | 172.6295 | 0.540583 | 0.398734 | 1.552667 | -11.791588 | -2.650749 | -0.881382 |
| 17 | 199.2978 | 0.541365 | 0.399311 | 1.554916 | -11.795991 | -2.651739 | -0.881711 |
| 18 | 227.8710 | 0.541828 | 0.399653 | 1.556245 | -11.798421 | -2.652285 | -0.881893 |
| 19 | 246.6965 | 0.542230 | 0.399949 | 1.557399 | -11.800399 | -2.652730 | -0.882041 |
| 20 | 254.4351 | 0.542230 | 0.399949 | 1.557399 | -11.800399 | -2.652730 | -0.882041 |
| 21 | 262.2927 | 0.542230 | 0.399949 | 1.557399 | -11.800399 | -2.652730 | -0.882041 |
| 22 | 270.2694 | 0.542230 | 0.399949 | 1.557399 | -11.800399 | -2.652730 | -0.882041 |
| 23 | 278.3651 | 0.542230 | 0.399949 | 1.557399 | -11.800399 | -2.652730 | -0.882041 |

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Table 2-19a. Pressure coefficient data for flat ended plug flush configuration, R = 8.78.

SQUARE END PLUG 7-9-76

R = 8.78 PLUG DEPTH = .000 EFFECTIVE JET DIAMETER = 0.64 CENTERBODY DIAMETER = 0.75

JET FLOW RATE = 1.614 CMM ( 57.00 CFM ) FREE STREAM VELOCITY = 14.8 M/S ( 48.4 F/S )

JET EFFECTIVE VELOCITY = 129.5 M/S ( 424.9 F/S ) JET EFFECTIVE THRUST = 4.080 N ( .9172 LB )

NON-DIMENSIONALIZED PRESSURES

ANGLE (DEGREES)

| PORT | 0 | 10 | 20 | 30 | 45 | 60 | 75 | 90 | 105 | 120 | 135 | 150 | 160 | 170 | 180 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.1239 | 0.1051 | 0.0000 | -0.1212 | -0.4606 | -0.9320 | -1.3145 | -1.5004 | -1.4789 | -1.2607 | -1.1098 | -0.9644 | -0.8000 | -0.7677 | -0.7354 |
| 2 | 0.0593 | 0.0620 | 0.0000 | -0.1239 | -0.4121 | -0.7623 | -1.0236 | -1.1825 | -1.1610 | -1.0452 | -0.8539 | -0.7354 | -0.6896 | -0.5926 | -0.5684 |
| 3 | 0.0000 | 0.0000 | -0.0512 | -0.1508 | -0.3556 | -0.6196 | -0.8539 | -0.9724 | -0.9832 | -0.8674 | -0.7004 | -0.5899 | -0.4876 | -0.4525 | -0.4199 |
| 4 | -0.0835 | -0.0700 | -0.0997 | -0.1508 | -0.2828 | -0.4256 | -0.5576 | -0.6438 | -0.6600 | -0.5711 | -0.4418 | -0.3744 | -0.2990 | -0.2451 | -0.3017 |
| 5 | -0.0754 | -0.1051 | -0.0997 | -0.1293 | -0.2478 | -0.3098 | -0.4256 | -0.4687 | -0.4849 | -0.4337 | -0.3448 | -0.2801 | -0.2344 | -0.1913 | -0.2020 |
| 6 | -0.0727 | -0.0916 | -0.0808 | -0.1024 | -0.2020 | -0.2397 | -0.3286 | -0.3637 | -0.3879 | -0.3340 | -0.2667 | -0.1805 | -0.1751 | -0.1401 | -0.1805 |
| 7 | -0.0539 | -0.0593 | -0.0781 | -0.1024 | -0.1347 | -0.1913 | -0.2424 | -0.2909 | -0.3044 | -0.2694 | -0.2128 | -0.1482 | -0.1293 | -0.1185 | -0.1697 |
| 8 | -0.0620 | -0.0754 | -0.0566 | -0.0889 | -0.1077 | -0.1589 | -0.2155 | -0.2424 | -0.2424 | -0.2290 | -0.1670 | -0.1158 | -0.1212 | -0.1131 | -0.1455 |
| 9 | -0.0485 | -0.0512 | -0.0512 | -0.0727 | -0.0997 | -0.1266 | -0.1535 | -0.1913 | -0.1939 | -0.2101 | -0.1401 | -0.1024 | -0.0862 | -0.1024 | -0.1185 |
| 10 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0970 | -0.1320 | -0.1589 | -0.1724 | -0.1535 | -0.1320 | -0.0862 | -0.0808 | -0.0970 | -0.1185 |
| 11 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0862 | -0.1158 | -0.1347 | -0.1401 | -0.1401 | -0.1158 | -0.0808 | -0.0808 | -0.0700 | -0.1051 |
| 12 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0916 | -0.1077 | -0.1212 | -0.1293 | -0.0970 | -0.0700 | -0.0593 | -0.0700 | -0.0970 |
| 13 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0754 | -0.0943 | -0.1024 | -0.0997 | -0.0835 | -0.0620 | -0.0512 | -0.0646 | -0.0943 |
| 14 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0943 | -0.0916 | -0.0916 | -0.0727 | -0.0404 | -0.0512 | -0.0458 | -0.0862 |
| 15 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0754 | -0.0862 | -0.0835 | -0.0673 | -0.0377 | -0.0296 | -0.0350 | -0.0646 |
| 16 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0646 |
| 17 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0620 |
| 18 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0727 |
| 19 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0458 |
| 20 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0593 |
| 21 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0323 |
| 22 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0593 |
| 23 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0539 |

Table 2-19b. Lift loss and pitching moment data for flat ended plug flush configuration, R = 8.78.

| PORT | NON-DIMENSIONAL AREA | M N -M | M LB-FT | M/TD | L N | L LB | L/T |
|---|---|---|---|---|---|---|---|
| 1 | 4.0379 | 0.000434 | 0.000320 | 0.006573 | -0.089196 | -0.020051 | -0.021862 |
| 2 | 6.1914 | 0.000639 | 0.000471 | 0.009678 | -0.127392 | -0.028638 | -0.031224 |
| 3 | 11.4215 | 0.001049 | 0.000774 | 0.015880 | -0.204631 | -0.046001 | -0.050155 |
| 4 | 21.5739 | 0.001569 | 0.001157 | 0.023748 | -0.306856 | -0.068981 | -0.075211 |
| 5 | 34.4951 | 0.002105 | 0.001553 | 0.031868 | -0.407358 | -0.091574 | -0.099844 |
| 6 | 50.1852 | 0.002635 | 0.001944 | 0.039895 | -0.502161 | -0.112886 | -0.123080 |
| 7 | 68.6442 | 0.003282 | 0.002421 | 0.049688 | -0.590025 | -0.132638 | -0.144616 |
| 8 | 89.8720 | 0.003949 | 0.002912 | 0.059781 | -0.675341 | -0.151817 | -0.165527 |
| 9 | 113.8686 | 0.004727 | 0.003487 | 0.071567 | -0.754268 | -0.169560 | -0.184872 |
| 10 | 140.6340 | 0.006597 | 0.004866 | 0.099874 | -0.816950 | -0.183650 | -0.200235 |
| 11 | 165.0537 | 0.008244 | 0.006081 | 0.124810 | -0.866664 | -0.194826 | -0.212420 |
| 12 | 208.1245 | 0.011526 | 0.008502 | 0.174507 | -0.934486 | -0.210072 | -0.229043 |
| 13 | 268.8852 | 0.015992 | 0.011796 | 0.242117 | -1.015840 | -0.228361 | -0.248983 |
| 14 | 323.0314 | 0.019971 | 0.014730 | 0.302357 | -1.072255 | -0.241043 | -0.262810 |
| 15 | 382.1001 | 0.023943 | 0.017660 | 0.362497 | -1.124968 | -0.252893 | -0.275730 |
| 16 | 446.0910 | 0.024436 | 0.018024 | 0.369966 | -1.127956 | -0.253564 | -0.276463 |
| 17 | 515.0044 | 0.024985 | 0.018429 | 0.378266 | -1.131040 | -0.254258 | -0.277219 |
| 18 | 588.8402 | 0.025724 | 0.018974 | 0.389452 | -1.134918 | -0.255130 | -0.278169 |
| 19 | 637.4872 | 0.026050 | 0.019215 | 0.394402 | -1.136527 | -0.255491 | -0.278564 |
| 20 | 657.4844 | 0.026227 | 0.019345 | 0.397076 | -1.137383 | -0.255684 | -0.278774 |
| 21 | 677.7892 | 0.026326 | 0.019418 | 0.398580 | -1.137857 | -0.255790 | -0.278890 |
| 22 | 698.4017 | 0.026514 | 0.019557 | 0.401421 | -1.138740 | -0.255989 | -0.279106 |
| 23 | 719.3218 | 0.026690 | 0.019686 | 0.404082 | -1.139554 | -0.256172 | -0.279305 |

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Table 2-20a. Pressure coefficient data for flat ended plug flush configuration, R = 6.58.

SQUARE END PLUG 7-9-76

R = 6.58 PLUG DEPTH = .000 EFFECTIVE JET DIAMETER = 0.64 CENTERBODY DIAMETER = 0.75

JET FLOW RATE = 1.614 CMM ( 57.00 CFM ) FREE STREAM VELOCITY = 19.7 M/S ( 64.6 F/S )

JET EFFECTIVE VELOCITY = 129.5 M/S ( 424.9 F/S ) JET EFFECTIVE THRUST = 4.080 N ( .9172 LB )

NON-DIMENSIONALIZED PRESSURES

ANGLE (DEGREES)

| PORT | 0 | 10 | 20 | 30 | 45 | 60 | 75 | 90 | 105 | 120 | 135 | 150 | 160 | 170 | 180 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.1845 | 0.1860 | 0.0832 | -0.0529 | -0.3705 | -0.8226 | -1.2611 | -1.5257 | -1.5000 | -1.2974 | -1.0766 | -1.0040 | -0.8846 | -0.8135 | -0.7712 |
| 2 | 0.1255 | 0.1058 | 0.0711 | -0.0514 | -0.3054 | -0.6608 | -0.9511 | -1.1946 | -1.2172 | -1.0978 | -0.8921 | -0.7802 | -0.6653 | -0.5988 | -0.6245 |
| 3 | 0.0635 | 0.0680 | 0.0439 | -0.0544 | -0.2692 | -0.5156 | -0.7560 | -0.9572 | -1.0131 | -0.9299 | -0.7394 | -0.6169 | -0.5292 | -0.4808 | -0.4778 |
| 4 | 0.0257 | 0.0000 | 0.0000 | -0.0786 | -0.1845 | -0.3206 | -0.4793 | -0.5897 | -0.6275 | -0.5806 | -0.4884 | -0.3916 | -0.3145 | -0.2767 | -0.2828 |
| 5 | 0.0000 | 0.0000 | 0.0000 | -0.0620 | -0.1406 | -0.2434 | -0.3251 | -0.3931 | -0.4536 | -0.4279 | -0.3296 | -0.2737 | -0.2072 | -0.2087 | -0.2253 |
| 6 | 0.0000 | 0.0000 | 0.0000 | -0.0454 | -0.1058 | -0.1784 | -0.2313 | -0.3024 | -0.3145 | -0.3281 | -0.2571 | -0.1815 | -0.1724 | -0.1573 | -0.1739 |
| 7 | 0.0000 | 0.0000 | 0.0000 | -0.0454 | -0.0892 | -0.1270 | -0.1830 | -0.2268 | -0.2540 | -0.2434 | -0.2011 | -0.1517 | -0.1134 | -0.1195 | -0.1376 |
| 8 | 0.0000 | 0.0000 | 0.0000 | -0.0378 | -0.0635 | -0.1089 | -0.1421 | -0.1618 | -0.1920 | -0.1920 | -0.1557 | -0.1225 | -0.0847 | -0.0998 | -0.1240 |
| 9 | 0.0000 | 0.0000 | 0.0000 | -0.0257 | -0.0529 | -0.0801 | -0.1104 | -0.1467 | -0.1512 | -0.1678 | -0.1195 | -0.0937 | -0.0847 | -0.0907 | -0.1043 |
| 10 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0665 | -0.0953 | -0.1240 | -0.1316 | -0.1421 | -0.1058 | -0.0771 | -0.0726 | -0.0605 | -0.0968 |
| 11 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0590 | -0.0741 | -0.0862 | -0.1028 | -0.1028 | -0.0968 | -0.0756 | -0.0529 | -0.0454 | -0.0862 |
| 12 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0726 | -0.0801 | -0.0877 | -0.0968 | -0.0786 | -0.0559 | -0.0529 | -0.0544 | -0.0862 |
| 13 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0454 | -0.0711 | -0.0726 | -0.0801 | -0.0680 | -0.0272 | -0.0393 | -0.0484 | -0.0771 |
| 14 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0514 | -0.0680 | -0.0635 | -0.0635 | -0.0529 | -0.0151 | -0.0257 | -0.0680 |
| 15 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0514 | -0.0499 | -0.0544 | -0.0439 | -0.0363 | -0.0151 | -0.0272 | -0.0620 |
| 16 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0620 |
| 17 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0484 |
| 18 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0423 |
| 19 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0454 |
| 20 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0559 |
| 21 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0454 |
| 22 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0378 |
| 23 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0529 |

Table 2-20b. Lift loss and pitching moment data for flat ended plug flush configuration, R = 6.58.

| PORT | NON-DIMENSIONAL AREA | M N-M | M LB-FT | M/TD | L N | L LB | L/T |
|---|---|---|---|---|---|---|---|
| 1 | 4.0379 | 0.000900 | 0.000664 | 0.013620 | -0.154718 | -0.034781 | -0.037921 |
| 2 | 6.1914 | 0.001339 | 0.000988 | 0.020271 | -0.220755 | -0.049626 | -0.054107 |
| 3 | 11.4215 | 0.002310 | 0.001704 | 0.034980 | -0.352271 | -0.079190 | -0.086342 |
| 4 | 21.5739 | 0.003795 | 0.002799 | 0.057451 | -0.515493 | -0.115883 | -0.126348 |
| 5 | 34.4951 | 0.005454 | 0.004023 | 0.082566 | -0.663157 | -0.149078 | -0.162540 |
| 6 | 50.1852 | 0.007315 | 0.005396 | 0.110749 | -0.796379 | -0.179026 | -0.195193 |
| 7 | 68.6442 | 0.009243 | 0.006817 | 0.139933 | -0.917506 | -0.206255 | -0.224881 |
| 8 | 89.8720 | 0.011276 | 0.008317 | 0.170717 | -1.025717 | -0.230581 | -0.251404 |
| 9 | 113.8686 | 0.013544 | 0.009990 | 0.205056 | -1.126292 | -0.253190 | -0.276055 |
| 10 | 140.6340 | 0.016360 | 0.012067 | 0.247688 | -1.214500 | -0.273020 | -0.297675 |
| 11 | 165.0537 | 0.018700 | 0.013793 | 0.283114 | -1.278720 | -0.287456 | -0.313415 |
| 12 | 208.1245 | 0.023387 | 0.017251 | 0.354084 | -1.372703 | -0.308584 | -0.336450 |
| 13 | 268.8852 | 0.029336 | 0.021638 | 0.444137 | -1.477917 | -0.332236 | -0.362239 |
| 14 | 323.0314 | 0.034632 | 0.025544 | 0.524319 | -1.549326 | -0.348289 | -0.379741 |
| 15 | 382.1001 | 0.039680 | 0.029268 | 0.600749 | -1.613072 | -0.362619 | -0.395365 |
| 16 | 446.0910 | 0.040523 | 0.029889 | 0.613508 | -1.618177 | -0.363766 | -0.396616 |
| 17 | 515.0044 | 0.041285 | 0.030452 | 0.625056 | -1.622467 | -0.364731 | -0.397668 |
| 18 | 588.8402 | 0.042052 | 0.031017 | 0.636656 | -1.626490 | -0.365635 | -0.398654 |
| 19 | 637.4872 | 0.042628 | 0.031443 | 0.645391 | -1.629329 | -0.366273 | -0.399350 |
| 20 | 657.4844 | 0.042926 | 0.031662 | 0.649889 | -1.630769 | -0.366597 | -0.399703 |
| 21 | 677.7892 | 0.043174 | 0.031845 | 0.653648 | -1.631954 | -0.366863 | -0.399993 |
| 22 | 698.4017 | 0.043387 | 0.032002 | 0.656877 | -1.632957 | -0.367089 | -0.400239 |
| 23 | 719.3218 | 0.043695 | 0.032229 | 0.661533 | -1.634381 | -0.367409 | -0.400588 |

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Table 2-21a. Pressure coefficient data for flat ended plug flush configuration, R = 4.42.

SQUARE END PLUG 7-12-76

R = 4.42 PLUG DEPTH = .000 EFFECTIVE JET DIAMETER = 0.64 CENTERBODY DIAMETER = 0.75

JET FLOW RATE = 1.614 CMM ( 57.00 CFM ) FREE STREAM VELOCITY = 29.5 M/S ( 96.8 F/S )

JET EFFECTIVE VELOCITY = 130.4 M/S ( 427.8 F/S ) JET EFFECTIVE THRUST = 4.106 N ( .9230 LB )

NON-DIMENSIONALIZED PRESSURES

| PORT | ANGLE (DEGREES) 0 | 10 | 20 | 30 | 45 | 60 | 75 | 90 | 105 | 120 | 135 | 150 | 160 | 170 | 180 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.2731 | 0.2492 | 0.1891 | 0.0669 | -0.1632 | -0.5442 | -0.9874 | -1.4230 | -1.6327 | -1.5371 | -1.1875 | -1.0127 | -0.9102 | -0.8454 | -0.8235 |
| 2 | 0.2096 | 0.2042 | 0.1530 | 0.0669 | -0.1072 | -0.3995 | -0.7026 | -1.0345 | -1.2264 | -1.2025 | -0.9806 | -0.7846 | -0.6828 | -0.6316 | -0.6241 |
| 3 | 0.1707 | 0.1584 | 0.1154 | 0.0519 | -0.0751 | -0.2868 | -0.5353 | -0.7614 | -0.9396 | -0.9580 | -0.8023 | -0.6357 | -0.5408 | -0.4869 | -0.4882 |
| 4 | 0.0922 | 0.0806 | 0.0649 | 0.0307 | -0.0376 | -0.1516 | -0.2704 | -0.4042 | -0.4978 | -0.5463 | -0.4930 | -0.3960 | -0.3167 | -0.2800 | -0.2813 |
| 5 | 0.0512 | 0.0539 | 0.0423 | 0.0253 | -0.0096 | -0.0813 | -0.1700 | -0.2356 | -0.3032 | -0.3353 | -0.3196 | -0.2581 | -0.2090 | -0.2049 | -0.2178 |
| 6 | 0.0444 | 0.0396 | 0.0300 | 0.0184 | 0.0000 | -0.0458 | -0.1052 | -0.1550 | -0.1912 | -0.2226 | -0.2219 | -0.1782 | -0.1530 | -0.1536 | -0.1646 |
| 7 | 0.0307 | 0.0280 | 0.0253 | 0.0171 | 0.0000 | -0.0287 | -0.0676 | -0.1113 | -0.1413 | -0.1550 | -0.1605 | -0.1311 | -0.1052 | -0.1147 | -0.1332 |
| 8 | 0.0287 | 0.0280 | 0.0266 | 0.0171 | 0.0000 | -0.0191 | -0.0437 | -0.0683 | -0.0963 | -0.1113 | -0.1147 | -0.0881 | -0.0635 | -0.0799 | -0.1045 |
| 9 | 0.0259 | 0.0219 | 0.0259 | 0.0171 | 0.0000 | -0.0055 | -0.0362 | -0.0567 | -0.0656 | -0.0826 | -0.0833 | -0.0710 | -0.0471 | -0.0560 | -0.0806 |
| 10 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0246 | -0.0430 | -0.0567 | -0.0635 | -0.0642 | -0.0478 | -0.0341 | -0.0423 | -0.0649 |
| 11 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0198 | -0.0294 | -0.0410 | -0.0458 | -0.0478 | -0.0369 | -0.0273 | -0.0341 | -0.0594 |
| 12 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0096 | -0.0253 | -0.0300 | -0.0396 | -0.0355 | -0.0287 | -0.0178 | -0.0266 | -0.0444 |
| 13 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0164 | -0.0232 | -0.0307 | -0.0253 | -0.0205 | -0.0075 | -0.0143 | -0.0396 |
| 14 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0102 | -0.0198 | -0.0239 | -0.0219 | -0.0178 | 0.0000 | -0.0130 | -0.0280 |
| 15 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0130 | -0.0198 | -0.0219 | -0.0109 | 0.0000 | 0.0000 | -0.0246 |
| 16 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0266 |
| 17 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0259 |
| 18 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0246 |
| 19 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0266 |
| 20 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0253 |
| 21 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0259 |
| 22 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0239 |
| 23 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0212 |

Table 2-21b. Lift loss and pitching moment data for flat ended plug flush configuration, R = 4.42.

| PORT | NON-DIMENSIONAL AREA | M N -M | M LB-FT | M/TQ | L N | L LB | L/T |
|---|---|---|---|---|---|---|---|
| 1 | 4.0122 | 0.002577 | 0.001901 | 0.038644 | -0.323672 | -0.072761 | -0.078828 |
| 2 | 6.1521 | 0.003849 | 0.002839 | 0.057714 | -0.453905 | -0.102038 | -0.110546 |
| 3 | 11.3489 | 0.006685 | 0.004931 | 0.100249 | -0.699372 | -0.157219 | -0.170328 |
| 4 | 21.4368 | 0.011177 | 0.008244 | 0.167605 | -0.967505 | -0.217495 | -0.235630 |
| 5 | 34.2760 | 0.016086 | 0.011865 | 0.241230 | -1.180454 | -0.265366 | -0.287492 |
| 6 | 49.8664 | 0.021297 | 0.015708 | 0.319363 | -1.352230 | -0.303981 | -0.329327 |
| 7 | 68.2081 | 0.026621 | 0.019636 | 0.399209 | -1.495904 | -0.336279 | -0.364318 |
| 8 | 89.3010 | 0.031757 | 0.023424 | 0.476222 | -1.605209 | -0.360851 | -0.390939 |
| 9 | 113.1452 | 0.036825 | 0.027162 | 0.552229 | -1.694124 | -0.380839 | -0.412593 |
| 10 | 139.7406 | 0.040856 | 0.030135 | 0.612672 | -1.777983 | -0.399691 | -0.433017 |
| 11 | 164.0051 | 0.044003 | 0.032457 | 0.659870 | -1.835725 | -0.412671 | -0.447079 |
| 12 | 206.8024 | 0.048819 | 0.036009 | 0.732078 | -1.912746 | -0.429985 | -0.465837 |
| 13 | 267.1771 | 0.054189 | 0.039970 | 0.812611 | -1.986023 | -0.446458 | -0.483683 |
| 14 | 320.9793 | 0.058278 | 0.042986 | 0.873933 | -2.036526 | -0.457811 | -0.495983 |
| 15 | 379.6727 | 0.061779 | 0.045568 | 0.926422 | -2.073486 | -0.466120 | -0.504985 |
| 16 | 443.2571 | 0.062581 | 0.046160 | 0.938453 | -2.078346 | -0.467212 | -0.506168 |
| 17 | 511.7327 | 0.063487 | 0.046828 | 0.952047 | -2.083445 | -0.468358 | -0.507410 |
| 18 | 585.0994 | 0.064473 | 0.047555 | 0.966832 | -2.088621 | -0.469522 | -0.508671 |
| 19 | 633.4374 | 0.065224 | 0.048109 | 0.978089 | -2.092316 | -0.470353 | -0.509570 |
| 20 | 653.3075 | 0.065521 | 0.048328 | 0.982547 | -2.093756 | -0.470676 | -0.509921 |
| 21 | 673.4834 | 0.065836 | 0.048561 | 0.987268 | -2.095259 | -0.471014 | -0.510287 |
| 22 | 693.9649 | 0.066135 | 0.048781 | 0.991749 | -2.096664 | -0.471330 | -0.510629 |
| 23 | 714.7521 | 0.066407 | 0.048982 | 0.995837 | -2.097926 | -0.471614 | -0.510937 |

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Table 2-22a. Pressure coefficient data for flat ended plug flush configuration, R = 2.21.

SQUARE END PLUG 7-12-76

R = 2.21 PLUG DEPTH = .000 EFFECTIVE JET DIAMETER = 0.64 CENTERBODY DIAMETER = 0.75

JET FLOW RATE = 1.614 CMM ( 57.00 CFM ) FREE STREAM VELOCITY = 59.0 M/S ( 193.7 F/S )

JET EFFECTIVE VELOCITY = 130.4 M/S ( 427.8 F/S ) JET EFFECTIVE THRUST = 4.106 N ( .9230 LB )

NON-DIMENSIONALIZED PRESSURES

ANGLE (DEGREES)

| PORT | 0 | 10 | 20 | 30 | 45 | 60 | 75 | 90 | 105 | 120 | 135 | 150 | 160 | 170 | 180 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.2959 | 0.2905 | 0.2650 | 0.2152 | 0.0958 | -0.0458 | -0.2457 | -0.4905 | -0.7822 | -0.9834 | -0.8620 | -0.5990 | -0.3512 | -0.1948 | -0.1375 |
| 2 | 0.2526 | 0.2467 | 0.2269 | 0.1928 | 0.1099 | -0.0027 | -0.1440 | -0.3223 | -0.5077 | -0.6389 | -0.6662 | -0.5090 | -0.2950 | -0.1560 | -0.1080 |
| 3 | 0.2119 | 0.2099 | 0.1936 | 0.1657 | 0.1017 | 0.0166 | -0.0921 | -0.2133 | -0.3462 | -0.4522 | -0.5204 | -0.4373 | -0.2630 | -0.1457 | -0.1068 |
| 4 | 0.1363 | 0.1350 | 0.1233 | 0.1085 | 0.0730 | 0.0253 | -0.0285 | -0.0914 | -0.1558 | -0.2175 | -0.2601 | -0.2618 | -0.2031 | -0.1090 | -0.0875 |
| 5 | 0.0936 | 0.0919 | 0.0872 | 0.0771 | 0.0553 | 0.0239 | -0.0097 | -0.0502 | -0.0924 | -0.1270 | -0.1563 | -0.1657 | -0.1494 | -0.0843 | -0.0639 |
| 6 | 0.0685 | 0.0675 | 0.0632 | 0.0554 | 0.0404 | 0.0183 | 0.0000 | -0.0307 | -0.0580 | -0.0829 | -0.0985 | -0.1077 | -0.1139 | -0.0716 | -0.0532 |
| 7 | 0.0521 | 0.0510 | 0.0482 | 0.0412 | 0.0307 | 0.0154 | 0.0000 | -0.0214 | -0.0422 | -0.0585 | -0.0678 | -0.0770 | -0.0855 | -0.0561 | -0.0410 |
| 8 | 0.0409 | 0.0402 | 0.0365 | 0.0327 | 0.0229 | 0.0144 | 0.0000 | -0.0156 | -0.0310 | -0.0453 | -0.0509 | -0.0534 | -0.0644 | -0.0500 | -0.0327 |
| 9 | 0.0327 | 0.0305 | 0.0297 | 0.0249 | 0.0197 | 0.0125 | 0.0000 | -0.0109 | -0.0242 | -0.0348 | -0.0412 | -0.0439 | -0.0483 | -0.0422 | -0.0285 |
| 10 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0105 | 0.0000 | -0.0083 | -0.0203 | -0.0285 | -0.0326 | -0.0349 | -0.0390 | -0.0376 | -0.0237 |
| 11 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0085 | 0.0000 | -0.0068 | -0.0161 | -0.0241 | -0.0281 | -0.0298 | -0.0314 | -0.0305 | -0.0203 |
| 12 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0059 | -0.0141 | -0.0190 | -0.0215 | -0.0226 | -0.0246 | -0.0265 | -0.0164 |
| 13 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0053 | -0.0102 | -0.0146 | -0.0193 | -0.0207 | -0.0193 | -0.0210 | -0.0110 |
| 14 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0042 | -0.0081 | -0.0134 | -0.0156 | -0.0158 | -0.0156 | -0.0190 | -0.0090 |
| 15 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0042 | -0.0066 | -0.0110 | -0.0127 | -0.0137 | -0.0141 | -0.0151 | -0.0085 |
| 16 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0051 |
| 17 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0042 |
| 18 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0041 |
| 19 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 20 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 21 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 22 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 23 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |

Table 2-22b. Lift loss and pitching moment data for flat ended plug flush configuration, R = 2.21.

| PORT | NON-DIMENSIONAL AREA | M N -M | M LB-FT | M/TD | L N | L LB | L/1 |
|---|---|---|---|---|---|---|---|
| 1 | 4.0122 | 0.007163 | 0.005283 | 0.107411 | -0.500316 | -0.112471 | -0.121849 |
| 2 | 6.1521 | 0.010724 | 0.007910 | 0.160819 | -0.677278 | -0.152252 | -0.164947 |
| 3 | 11.3489 | 0.018877 | 0.013924 | 0.283083 | -0.984869 | -0.221399 | -0.239859 |
| 4 | 21.4368 | 0.032087 | 0.023668 | 0.481177 | -1.264902 | -0.284350 | -0.308059 |
| 5 | 34.2760 | 0.046475 | 0.034280 | 0.696929 | -1.467654 | -0.329929 | -0.357438 |
| 6 | 49.8664 | 0.061547 | 0.045397 | 0.922956 | -1.621930 | -0.364610 | -0.395011 |
| 7 | 68.2081 | 0.076976 | 0.056778 | 1.154325 | -1.747341 | -0.392802 | -0.425554 |
| 8 | 89.3010 | 0.092727 | 0.068396 | 1.390526 | -1.853514 | -0.416670 | -0.451412 |
| 9 | 113.1452 | 0.108865 | 0.080298 | 1.632518 | -1.947037 | -0.437694 | -0.474189 |
| 10 | 139.7406 | 0.119775 | 0.088346 | 1.796123 | -2.100183 | -0.472121 | -0.511486 |
| 11 | 164.0051 | 0.128927 | 0.095096 | 1.933368 | -2.216756 | -0.498327 | -0.539877 |
| 12 | 206.8024 | 0.142823 | 0.105346 | 2.141759 | -2.391915 | -0.537702 | -0.582536 |
| 13 | 267.1771 | 0.160700 | 0.118532 | 2.409839 | -2.593821 | -0.583091 | -0.631709 |
| 14 | 320.9793 | 0.175250 | 0.129265 | 2.628032 | -2.743224 | -0.616677 | -0.668095 |
| 15 | 379.6727 | 0.189851 | 0.140034 | 2.846987 | -2.881202 | -0.647694 | -0.701699 |
| 16 | 443.2571 | 0.190465 | 0.140487 | 2.856188 | -2.884919 | -0.648530 | -0.702604 |
| 17 | 511.7327 | 0.191058 | 0.140924 | 2.865081 | -2.888254 | -0.649280 | -0.703416 |
| 18 | 585.0994 | 0.191712 | 0.141406 | 2.874881 | -2.891685 | -0.650051 | -0.704252 |
| 19 | 633.4374 | 0.191712 | 0.141406 | 2.874881 | -2.891685 | -0.650051 | -0.704252 |
| 20 | 653.3075 | 0.191712 | 0.141406 | 2.874881 | -2.891685 | -0.650051 | -0.704252 |
| 21 | 673.4834 | 0.191712 | 0.141406 | 2.874881 | -2.891685 | -0.650051 | -0.704252 |
| 22 | 693.9649 | 0.191712 | 0.141406 | 2.874881 | -2.891685 | -0.650051 | -0.704252 |
| 23 | 714.7521 | 0.191712 | 0.141406 | 2.874881 | -2.891685 | -0.650051 | -0.704252 |

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Table 2-23a. Pressure coefficient data for flat ended plug down 0.375 $D_n$ configuration, R = 8.72.

SQUARE END PLUG 7-13-76

R = 8.72 PLUG DEPTH = .375 EFFECTIVE JET DIAMETER = 0.70 CENTERBODY DIAMETER = 0.75

JET FLOW RATE = 1.909 CMM ( 67.40 CFM ) FREE STREAM VELOCITY = 15.0 M/S ( 49.3 F/S )

JET EFFECTIVE VELOCITY = 131.1 M/S ( 430.0 F/S ) JET EFFECTIVE THRUST = 4.880 N (1.0971 LB )

NON-DIMENSIONALIZED PRESSURES

| PORT | ANGLE (DEGREES) 0 | 10 | 20 | 30 | 45 | 60 | 75 | 90 | 105 | 120 | 135 | 150 | 160 | 170 | 180 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.0000 | 0.0000 | -0.0990 | -0.2528 | -0.5212 | -0.9772 | -1.4228 | -1.6990 | -1.6390 | -1.4645 | -1.0814 | -0.7817 | -0.6645 | -0.6202 | -0.6254 |
| 2 | -0.0130 | -0.0365 | -0.1094 | -0.2345 | -0.4795 | -0.8130 | -1.1257 | -1.3107 | -1.3237 | -1.1439 | -0.8651 | -0.6254 | -0.5133 | -0.4508 | -0.4899 |
| 3 | -0.0391 | -0.0782 | -0.1251 | -0.2163 | -0.4326 | -0.7010 | -0.8999 | -1.0788 | -1.1127 | -0.9537 | -0.7088 | -0.4925 | -0.4013 | -0.3414 | -0.3857 |
| 4 | -0.1094 | -0.1094 | -0.1563 | -0.1954 | -0.3127 | -0.4690 | -0.6176 | -0.7140 | -0.7296 | -0.6436 | -0.4873 | -0.3179 | -0.2502 | -0.2423 | -0.2033 |
| 5 | -0.1381 | -0.1120 | -0.1485 | -0.1616 | -0.2554 | -0.3440 | -0.4430 | -0.5212 | -0.5394 | -0.4795 | -0.3231 | -0.2606 | -0.2085 | -0.2085 | -0.1954 |
| 6 | -0.0886 | -0.1199 | -0.1381 | -0.1694 | -0.2189 | -0.2762 | -0.3205 | -0.3883 | -0.4091 | -0.3804 | -0.2762 | -0.1798 | -0.1694 | -0.1563 | -0.1616 |
| 7 | -0.0756 | -0.0990 | -0.1068 | -0.1381 | -0.1668 | -0.2502 | -0.2736 | -0.3309 | -0.3205 | -0.2971 | -0.2267 | -0.1537 | -0.1251 | -0.1694 | -0.1511 |
| 8 | -0.0756 | -0.0678 | -0.0834 | -0.1147 | -0.1355 | -0.2033 | -0.2397 | -0.2814 | -0.2840 | -0.2606 | -0.1798 | -0.1485 | -0.1199 | -0.1381 | -0.1511 |
| 9 | -0.1042 | -0.0547 | -0.0678 | -0.0834 | -0.1147 | -0.1537 | -0.2033 | -0.2241 | -0.2345 | -0.2371 | -0.1563 | -0.1199 | -0.0938 | -0.1016 | -0.1068 |
| 10 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1303 | -0.1616 | -0.1928 | -0.2059 | -0.2137 | -0.1459 | -0.0860 | -0.0808 | -0.0834 | -0.1199 |
| 11 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1199 | -0.1563 | -0.1642 | -0.1902 | -0.1824 | -0.1485 | -0.0521 | -0.0678 | -0.0782 | -0.1120 |
| 12 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1433 | -0.1563 | -0.1642 | -0.1355 | -0.1094 | -0.0625 | -0.0417 | -0.0730 | -0.0886 |
| 13 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0938 | -0.1485 | -0.1173 | -0.1329 | -0.0964 | -0.0782 | -0.0365 | -0.0651 | -0.1068 |
| 14 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0964 | -0.1016 | -0.0938 | -0.0678 | -0.0339 | -0.0391 | -0.0521 | -0.0756 |
| 15 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0860 | -0.1016 | -0.0912 | -0.0834 | 0.0000 | -0.0261 | 0.0000 | -0.0443 |
| 16 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0756 |
| 17 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0730 |
| 18 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0834 |
| 19 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0704 |
| 20 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0495 |
| 21 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0417 |
| 22 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0782 |
| 23 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0730 |

Table 2-23b. Lift loss and pitching moment data for flat ended plug down 0.375 $D_n$ configuration, R = 8.72.

| PORT | NON-DIMENSIONAL AREA | M N -M | M LB-FT | M/TD | L N | L LB | L/T |
|---|---|---|---|---|---|---|---|
| 1 | 3.3721 | 0.000349 | 0.000257 | 0.004036 | -0.097515 | -0.021921 | -0.019982 |
| 2 | 5.1706 | 0.000503 | 0.000371 | 0.005819 | -0.139365 | -0.031329 | -0.028557 |
| 3 | 9.5383 | 0.000808 | 0.000596 | 0.009347 | -0.224227 | -0.050406 | -0.045946 |
| 4 | 18.0167 | 0.001208 | 0.000891 | 0.013974 | -0.338073 | -0.075999 | -0.069275 |
| 5 | 28.8074 | 0.001627 | 0.001200 | 0.018816 | -0.448326 | -0.100784 | -0.091867 |
| 6 | 41.9105 | 0.001993 | 0.001470 | 0.023051 | -0.554710 | -0.124699 | -0.113666 |
| 7 | 57.3258 | 0.002450 | 0.001807 | 0.028334 | -0.658525 | -0.148036 | -0.134938 |
| 8 | 75.0535 | 0.003106 | 0.002291 | 0.035922 | -0.760371 | -0.170931 | -0.155808 |
| 9 | 95.0935 | 0.003781 | 0.002789 | 0.043734 | -0.855504 | -0.192317 | -0.175301 |
| 10 | 117.4457 | 0.005791 | 0.004272 | 0.066987 | -0.931553 | -0.209413 | -0.190884 |
| 11 | 137.8390 | 0.007559 | 0.005575 | 0.087433 | -0.994013 | -0.223454 | -0.203683 |
| 12 | 173.8081 | 0.010862 | 0.008012 | 0.125642 | -1.077530 | -0.242229 | -0.220797 |
| 13 | 224.5503 | 0.015982 | 0.011788 | 0.184858 | -1.180133 | -0.265294 | -0.241821 |
| 14 | 269.7687 | 0.019875 | 0.014660 | 0.229895 | -1.237632 | -0.278220 | -0.253603 |
| 15 | 319.0978 | 0.023248 | 0.017148 | 0.268905 | -1.290642 | -0.290136 | -0.264465 |
| 16 | 372.5377 | 0.023840 | 0.017584 | 0.275749 | -1.294226 | -0.290942 | -0.265200 |
| 17 | 430.0884 | 0.024502 | 0.018073 | 0.283412 | -1.297953 | -0.291780 | -0.265963 |
| 18 | 491.7498 | 0.025371 | 0.018714 | 0.293466 | -1.302516 | -0.292806 | -0.266898 |
| 19 | 532.3757 | 0.025887 | 0.019094 | 0.299428 | -1.305053 | -0.293376 | -0.267418 |
| 20 | 549.0756 | 0.026038 | 0.019206 | 0.301180 | -1.305787 | -0.293541 | -0.267569 |
| 21 | 566.0325 | 0.026170 | 0.019303 | 0.302700 | -1.306414 | -0.293682 | -0.267697 |
| 22 | 583.2463 | 0.026424 | 0.019490 | 0.305639 | -1.307609 | -0.293950 | -0.267942 |
| 23 | 600.7171 | 0.026668 | 0.019670 | 0.308464 | -1.308740 | -0.294205 | -0.268174 |

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Table 2-24a. Pressure coefficient data for flat ended plug down 0.375 $D_n$ configuration, R = 6.53.

SQUARE END PLUG 7-13-76

R = 6.53 PLUG DEPTH = .375 EFFECTIVE JET DIAMETER = 0.70 CENTERBODY DIAMETER = 0.75

JET FLOW RATE = 1.909 CMM ( 67.40 CFM ) FREE STREAM VELOCITY = 20.1 M/S ( 65.8 F/S )

JET EFFECTIVE VELOCITY = 131.1 M/S ( 430.0 F/S ) JET EFFECTIVE THRUST = 4.880 N (1.0971 LB )

NON-DIMENSIONALIZED PRESSURES

| PORT | ANGLE (DEGREES) 0 | 10 | 20 | 30 | 45 | 60 | 75 | 90 | 105 | 120 | 135 | 150 | 160 | 170 | 180 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.0922 | 0.0819 | 0.0000 | -0.0995 | -0.4008 | -0.8543 | -1.3443 | -1.7685 | -1.9718 | -1.7393 | -1.1658 | -0.9289 | -0.7621 | -0.7285 | -0.7095 |
| 2 | 0.0439 | 0.0249 | 0.0000 | -0.0995 | -0.3438 | -0.6904 | -1.0430 | -1.3853 | -1.5140 | -1.3706 | -0.9567 | -0.7153 | -0.6114 | -0.5398 | -0.5251 |
| 3 | 0.0293 | 0.0000 | 0.0000 | -0.0995 | -0.2926 | -0.5515 | -0.8411 | -1.0898 | -1.2170 | -1.1483 | -0.8309 | -0.6012 | -0.4798 | -0.4315 | -0.4037 |
| 4 | -0.0366 | -0.0322 | -0.0527 | -0.0995 | -0.2106 | -0.3584 | -0.5266 | -0.6524 | -0.7387 | -0.7314 | -0.5412 | -0.3584 | -0.2794 | -0.2516 | -0.2501 |
| 5 | -0.0322 | -0.0410 | -0.0468 | -0.0834 | -0.1580 | -0.2662 | -0.3584 | -0.4315 | -0.5266 | -0.5047 | -0.3833 | -0.2560 | -0.1814 | -0.1902 | -0.1741 |
| 6 | -0.0293 | -0.0351 | -0.0395 | -0.0702 | -0.1229 | -0.1931 | -0.2735 | -0.3306 | -0.3789 | -0.3701 | -0.2896 | -0.1780 | -0.1229 | -0.1302 | -0.1346 |
| 7 | -0.0336 | -0.0190 | -0.0307 | -0.0527 | -0.0819 | -0.1360 | -0.2063 | -0.2575 | -0.2838 | -0.2867 | -0.2267 | -0.1317 | -0.0951 | -0.0995 | -0.1082 |
| 8 | -0.0190 | -0.0219 | -0.0307 | -0.0424 | -0.0731 | -0.0965 | -0.1782 | -0.2004 | -0.2355 | -0.2326 | -0.1872 | -0.0995 | -0.0658 | -0.0629 | -0.0980 |
| 9 | 0.0000 | -0.0234 | -0.0249 | -0.0380 | -0.0629 | -0.0892 | -0.1229 | -0.1375 | -0.1946 | -0.1843 | -0.1434 | -0.0717 | -0.0410 | -0.0658 | -0.0878 |
| 10 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0673 | -0.0951 | -0.1126 | -0.1463 | -0.1536 | -0.1214 | -0.0614 | -0.0322 | -0.0483 | -0.0746 |
| 11 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0614 | -0.0761 | -0.0995 | -0.1112 | -0.1068 | -0.1141 | -0.0468 | -0.0278 | -0.0190 | -0.0717 |
| 12 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0585 | -0.0746 | -0.0922 | -0.0863 | -0.0790 | -0.0570 | -0.0234 | -0.0249 | -0.0570 |
| 13 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0439 | -0.0644 | -0.0761 | -0.0790 | -0.0644 | -0.0410 | 0.0000 | -0.0307 | -0.0410 |
| 14 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0761 | -0.0658 | -0.0717 | -0.0541 | -0.0249 | 0.0000 | 0.0000 | -0.0717 |
| 15 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0439 | -0.0570 | -0.0629 | -0.0380 | -0.0219 | 0.0000 | 0.0000 | -0.0483 |
| 16 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0366 |
| 17 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0336 |
| 18 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0512 |
| 19 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0351 |
| 20 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0263 |
| 21 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0249 |
| 22 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0468 |
| 23 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0263 |

Table 2-24b. Lift loss and pitching moment data for flat ended plug down 0.375 $D_n$ configuration, R = 6.53.

| PORT | NON-DIMENSIONAL AREA | M N-M | M LB-FT | M/TD | L N | L LB | L/T |
|---|---|---|---|---|---|---|---|
| 1 | 3.3721 | 0.000914 | 0.000674 | 0.010577 | -0.180835 | -0.040652 | -0.037055 |
| 2 | 5.1706 | 0.001345 | 0.000992 | 0.015559 | -0.257162 | -0.057810 | -0.052695 |
| 3 | 9.5383 | 0.002324 | 0.001714 | 0.026882 | -0.409099 | -0.091966 | -0.083828 |
| 4 | 18.0167 | 0.003757 | 0.002771 | 0.043457 | -0.597286 | -0.134270 | -0.122390 |
| 5 | 28.8074 | 0.005298 | 0.003908 | 0.061277 | -0.766633 | -0.172339 | -0.157091 |
| 6 | 41.9105 | 0.006854 | 0.005055 | 0.079277 | -0.919320 | -0.206663 | -0.188378 |
| 7 | 57.3258 | 0.008602 | 0.006345 | 0.099499 | -1.055054 | -0.237176 | -0.216191 |
| 8 | 75.0535 | 0.010342 | 0.007628 | 0.119625 | -1.180751 | -0.265433 | -0.241947 |
| 9 | 95.0935 | 0.012049 | 0.008887 | 0.139365 | -1.291911 | -0.290422 | -0.264725 |
| 10 | 117.4457 | 0.014654 | 0.010809 | 0.169503 | -1.380186 | -0.310266 | -0.282814 |
| 11 | 137.8390 | 0.016663 | 0.012291 | 0.192742 | -1.445051 | -0.324847 | -0.296105 |
| 12 | 173.8081 | 0.020555 | 0.015162 | 0.237760 | -1.528943 | -0.343706 | -0.313295 |
| 13 | 224.5503 | 0.025379 | 0.018720 | 0.293554 | -1.624857 | -0.365268 | -0.332949 |
| 14 | 269.7687 | 0.029419 | 0.021699 | 0.340282 | -1.692534 | -0.380482 | -0.346817 |
| 15 | 319.0978 | 0.033195 | 0.024484 | 0.383959 | -1.748225 | -0.393001 | -0.358229 |
| 16 | 372.5377 | 0.033705 | 0.024861 | 0.389859 | -1.751315 | -0.393696 | -0.358862 |
| 17 | 430.0884 | 0.034249 | 0.025262 | 0.396154 | -1.754376 | -0.394384 | -0.359489 |
| 18 | 491.7498 | 0.035200 | 0.025963 | 0.407151 | -1.759367 | -0.395506 | -0.360512 |
| 19 | 532.3757 | 0.035658 | 0.026301 | 0.412450 | -1.761622 | -0.396013 | -0.360974 |
| 20 | 549.0756 | 0.035801 | 0.026407 | 0.414110 | -1.762317 | -0.396169 | -0.361116 |
| 21 | 566.0325 | 0.035941 | 0.026510 | 0.415725 | -1.762984 | -0.396319 | -0.361253 |
| 22 | 583.2463 | 0.036212 | 0.026710 | 0.418860 | -1.764258 | -0.396605 | -0.361514 |
| 23 | 600.7171 | 0.036369 | 0.026826 | 0.420676 | -1.764985 | -0.396769 | -0.361663 |

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Table 2-25a. Pressure coefficient data for flat ended plug down 0.375 $D_n$ configuration, R = 4.36.

SQUARE END PLUG 7-13-76

R = 4.36 PLUG DEPTH = .375 EFFECTIVE JET DIAMETER = 0.70 CENTERBODY DIAMETER = 0.75

JET FLOW RATE = 1.909 CMM ( 67.40 CFM ) FREE STREAM VELOCITY = 30.1 M/S ( 98.7 F/S )

JET EFFECTIVE VELOCITY = 131.1 M/S ( 430.0 F/S ) JET EFFECTIVE THRUST = 4.880 N (1.0971 LB )

NON-DIMENSIONALIZED PRESSURES

| PORT | ANGLE (DEGREES) 0 | 10 | 20 | 30 | 45 | 60 | 75 | 90 | 105 | 120 | 135 | 150 | 160 | 170 | 180 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.2235 | 0.2086 | 0.1623 | 0.0769 | -0.1075 | -0.4269 | -0.8740 | -1.4481 | -2.1070 | -2.5365 | -2.0595 | -1.1992 | -0.8525 | -0.7462 | -0.7136 |
| 2 | 0.1792 | 0.1694 | 0.1382 | 0.0658 | -0.0769 | -0.3161 | -0.6328 | -1.0447 | -1.5068 | -1.7766 | -1.5478 | -0.9756 | -0.6309 | -0.4966 | -0.4855 |
| 3 | 0.1473 | 0.1434 | 0.1134 | 0.0574 | -0.0593 | -0.2424 | -0.4901 | -0.7651 | -1.0936 | -1.3035 | -1.2142 | -0.7723 | -0.4758 | -0.3702 | -0.3083 |
| 4 | 0.0893 | 0.0880 | 0.0717 | 0.0365 | -0.0222 | -0.1264 | -0.2548 | -0.3871 | -0.5422 | -0.6563 | -0.6582 | -0.4634 | -0.2555 | -0.1864 | -0.1551 |
| 5 | 0.0600 | 0.0587 | 0.0456 | 0.0300 | -0.0163 | -0.0756 | -0.1512 | -0.2333 | -0.3259 | -0.3976 | -0.4106 | -0.2985 | -0.1623 | -0.1069 | -0.0841 |
| 6 | 0.0502 | 0.0456 | 0.0300 | 0.0274 | 0.0000 | -0.0450 | -0.1069 | -0.1532 | -0.2177 | -0.2600 | -0.2802 | -0.2066 | -0.1154 | -0.0710 | -0.0600 |
| 7 | 0.0371 | 0.0326 | 0.0261 | 0.0261 | 0.0000 | -0.0293 | -0.0684 | -0.1069 | -0.1558 | -0.1857 | -0.2053 | -0.1499 | -0.0925 | -0.0365 | -0.0371 |
| 8 | 0.0267 | 0.0254 | 0.0235 | 0.0228 | 0.0000 | -0.0241 | -0.0521 | -0.0886 | -0.1121 | -0.1408 | -0.1564 | -0.1186 | -0.0652 | -0.0248 | -0.0202 |
| 9 | 0.0228 | 0.0267 | 0.0248 | 0.0163 | 0.0000 | -0.0169 | -0.0332 | -0.0580 | -0.0893 | -0.1056 | -0.1173 | -0.0958 | -0.0482 | -0.0163 | -0.0143 |
| 10 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0293 | -0.0456 | -0.0678 | -0.0834 | -0.0938 | -0.0802 | -0.0300 | -0.0124 | 0.0000 |
| 11 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0228 | -0.0385 | -0.0541 | -0.0678 | -0.0769 | -0.0587 | -0.0248 | 0.0000 | 0.0000 |
| 12 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0163 | -0.0313 | -0.0443 | -0.0554 | -0.0534 | -0.0495 | -0.0182 | 0.0000 | 0.0000 |
| 13 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0111 | -0.0248 | -0.0371 | -0.0437 | -0.0495 | -0.0385 | -0.0189 | 0.0000 | 0.0000 |
| 14 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0156 | -0.0248 | -0.0332 | -0.0391 | -0.0371 | -0.0111 | 0.0000 | 0.0000 |
| 15 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0124 | -0.0189 | -0.0261 | -0.0287 | -0.0339 | -0.0085 | 0.0000 | 0.0000 |
| 16 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 17 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 18 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 19 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 20 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 21 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 22 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 23 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |

Table 2-25b. Lift loss and pitching moment data for flat ended plug down 0.375 $D_n$ configuration, R = 4.36.

| PORT | NON-DIMENSIONAL AREA | M N -M | M LB-FT | M/TD | L N | L LB | L/T |
|---|---|---|---|---|---|---|---|
| 1 | 3.3721 | 0.003620 | 0.002670 | 0.041869 | -0.417180 | -0.093782 | -0.085484 |
| 2 | 5.1706 | 0.005285 | 0.003898 | 0.061130 | -0.578169 | -0.129972 | -0.118473 |
| 3 | 9.5383 | 0.008802 | 0.006492 | 0.101812 | -0.870533 | -0.195696 | -0.178381 |
| 4 | 18.0167 | 0.013915 | 0.010264 | 0.160957 | -1.163804 | -0.261623 | -0.238475 |
| 5 | 28.8074 | 0.019076 | 0.014071 | 0.220653 | -1.390630 | -0.312614 | -0.284954 |
| 6 | 41.9105 | 0.024412 | 0.018007 | 0.282375 | -1.572505 | -0.353499 | -0.322222 |
| 7 | 57.3258 | 0.029808 | 0.021987 | 0.344789 | -1.722307 | -0.387175 | -0.352918 |
| 8 | 75.0535 | 0.035186 | 0.025953 | 0.406995 | -1.852077 | -0.416347 | -0.379509 |
| 9 | 95.0935 | 0.040614 | 0.029957 | 0.469772 | -1.958299 | -0.440226 | -0.401275 |
| 10 | 117.4457 | 0.045060 | 0.033236 | 0.521198 | -2.057664 | -0.462563 | -0.421636 |
| 11 | 137.8390 | 0.048478 | 0.035757 | 0.560737 | -2.128929 | -0.478583 | -0.436239 |
| 12 | 173.8081 | 0.053714 | 0.039619 | 0.621300 | -2.226661 | -0.500553 | -0.456265 |
| 13 | 224.5503 | 0.060823 | 0.044863 | 0.703532 | -2.341495 | -0.526368 | -0.479795 |
| 14 | 269.7687 | 0.066480 | 0.049036 | 0.768969 | -2.414511 | -0.542782 | -0.494757 |
| 15 | 319.0978 | 0.071852 | 0.052998 | 0.831102 | -2.477334 | -0.556905 | -0.507630 |
| 16 | 372.5377 | 0.071852 | 0.052998 | 0.831102 | -2.477334 | -0.556905 | -0.507630 |
| 17 | 430.0884 | 0.071852 | 0.052998 | 0.831102 | -2.477334 | -0.556905 | -0.507630 |
| 18 | 491.7498 | 0.071852 | 0.052998 | 0.831102 | -2.477334 | -0.556905 | -0.507630 |
| 19 | 532.3757 | 0.071852 | 0.052998 | 0.831102 | -2.477334 | -0.556905 | -0.507630 |
| 20 | 549.0756 | 0.071852 | 0.052998 | 0.831102 | -2.477334 | -0.556905 | -0.507630 |
| 21 | 566.0325 | 0.071852 | 0.052998 | 0.831102 | -2.477334 | -0.556905 | -0.507630 |
| 22 | 583.2463 | 0.071852 | 0.052998 | 0.831102 | -2.477334 | -0.556905 | -0.507630 |
| 23 | 600.7171 | 0.071852 | 0.052998 | 0.831102 | -2.477334 | -0.556905 | -0.507630 |

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Table 2-26a. Pressure coefficient data for flat ended plug down 0.375 $D_n$ configuration, R = 2.18.

SQUARE END PLUG 7-13-76

R = 2.18 PLUG DEPTH = .375 EFFECTIVE JET DIAMETER = 0.70 CENTERBODY DIAMETER = 0.75

JET FLOW RATE = 1.909 CMM ( 67.40 CFM ) FREE STREAM VELOCITY = 60.1 M/S ( 197.3 F/S )

JET EFFECTIVE VELOCITY = 131.1 M/S ( 430.0 F/S ) JET EFFECTIVE THRUST = 4.880 N (1.0971 LB )

NON-DIMENSIONALIZED PRESSURES

| PORT | ANGLE (DEGREES) 0 | 10 | 20 | 30 | 45 | 60 | 75 | 90 | 105 | 120 | 135 | 150 | 160 | 170 | 180 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.2388 | 0.2336 | 0.2183 | 0.1911 | 0.1144 | 0.0170 | -0.1358 | -0.3408 | -0.6046 | -0.9625 | -1.1471 | -1.0834 | -0.7268 | -0.4751 | -0.3898 |
| 2 | 0.2063 | 0.2014 | 0.1905 | 0.1686 | 0.1130 | 0.0291 | -0.0809 | -0.2282 | -0.4074 | -0.5979 | -0.7879 | -0.8250 | -0.6276 | -0.3829 | -0.3253 |
| 3 | 0.1771 | 0.1769 | 0.1647 | 0.1465 | 0.1010 | 0.0361 | -0.0511 | -0.1565 | -0.2777 | -0.4231 | -0.5943 | -0.6633 | -0.5113 | -0.3328 | -0.2705 |
| 4 | 0.1224 | 0.1168 | 0.1135 | 0.0993 | 0.0727 | 0.0338 | -0.0123 | -0.0701 | -0.1379 | -0.2109 | -0.2981 | -0.3607 | -0.3153 | -0.1991 | -0.1645 |
| 5 | 0.0863 | 0.0840 | 0.0789 | 0.0727 | 0.0554 | 0.0276 | 0.0000 | -0.0412 | -0.0866 | -0.1331 | -0.1822 | -0.2217 | -0.2111 | -0.1376 | -0.1127 |
| 6 | 0.0645 | 0.0614 | 0.0593 | 0.0529 | 0.0415 | 0.0229 | 0.0000 | -0.0268 | -0.0588 | -0.0912 | -0.1224 | -0.1470 | -0.1495 | -0.0985 | -0.0833 |
| 7 | 0.0492 | 0.0502 | 0.0477 | 0.0400 | 0.0299 | 0.0168 | 0.0036 | -0.0196 | -0.0426 | -0.0653 | -0.0869 | -0.1046 | -0.1054 | -0.0743 | -0.0601 |
| 8 | 0.0394 | 0.0381 | 0.0364 | 0.0330 | 0.0258 | 0.0152 | 0.0029 | -0.0172 | -0.0332 | -0.0498 | -0.0683 | -0.0776 | -0.0817 | -0.0529 | -0.0441 |
| 9 | 0.0310 | 0.0304 | 0.0309 | 0.0261 | 0.0204 | 0.0134 | 0.0029 | -0.0111 | -0.0268 | -0.0400 | -0.0519 | -0.0588 | -0.0596 | -0.0421 | -0.0320 |
| 10 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0118 | 0.0033 | -0.0093 | -0.0219 | -0.0319 | -0.0428 | -0.0466 | -0.0482 | -0.0320 | -0.0224 |
| 11 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0116 | 0.0000 | -0.0077 | -0.0173 | -0.0286 | -0.0332 | -0.0382 | -0.0392 | -0.0256 | -0.0185 |
| 12 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0042 | -0.0150 | -0.0212 | -0.0271 | -0.0297 | -0.0278 | -0.0191 | -0.0114 |
| 13 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0087 | -0.0121 | -0.0188 | -0.0229 | -0.0240 | -0.0237 | -0.0147 | -0.0077 |
| 14 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0038 | -0.0090 | -0.0144 | -0.0168 | -0.0203 | -0.0186 | -0.0103 | -0.0028 |
| 15 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0021 | -0.0083 | -0.0131 | -0.0157 | -0.0175 | -0.0158 | -0.0078 | -0.0036 |
| 16 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0026 |
| 17 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0021 |
| 18 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 19 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 20 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 21 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 22 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 23 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |

Table 2-26b. Lift loss and pitching moment data for flat ended plug down 0.375 $D_n$ configuration, R = 2.18.

| PORT | NON-DIMENSIONAL AREA | M N -M | M LB-FT | M/TD | L N | L LB | L/T |
|---|---|---|---|---|---|---|---|
| 1 | 3.3721 | 0.010042 | 0.007407 | 0.116159 | -0.628257 | -0.141232 | -0.128736 |
| 2 | 5.1706 | 0.014816 | 0.010928 | 0.171371 | -0.855370 | -0.192287 | -0.175274 |
| 3 | 9.5383 | 0.025451 | 0.018773 | 0.294391 | -1.257657 | -0.282721 | -0.257706 |
| 4 | 18.0167 | 0.041937 | 0.030933 | 0.485075 | -1.633675 | -0.367250 | -0.334756 |
| 5 | 28.8074 | 0.059668 | 0.044011 | 0.690166 | -1.916393 | -0.430805 | -0.392688 |
| 6 | 41.9105 | 0.078097 | 0.057604 | 0.903332 | -2.141463 | -0.481401 | -0.438607 |
| 7 | 57.3258 | 0.096850 | 0.071437 | 1.120250 | -2.322458 | -0.522088 | -0.475894 |
| 8 | 75.0535 | 0.115978 | 0.085545 | 1.341497 | -2.475973 | -0.556599 | -0.507351 |
| 9 | 95.0935 | 0.135005 | 0.099579 | 1.561577 | -2.602070 | -0.584945 | -0.533190 |
| 10 | 117.4457 | 0.148145 | 0.109272 | 1.713575 | -2.783314 | -0.625689 | -0.570329 |
| 11 | 137.8390 | 0.158932 | 0.117228 | 1.838344 | -2.918832 | -0.656153 | -0.598097 |
| 12 | 173.8081 | 0.174389 | 0.128629 | 2.017127 | -3.113920 | -0.700009 | -0.638073 |
| 13 | 224.5503 | 0.194328 | 0.143336 | 2.247759 | -3.352901 | -0.753732 | -0.687042 |
| 14 | 269.7687 | 0.209076 | 0.154214 | 2.418348 | -3.508411 | -0.788691 | -0.718908 |
| 15 | 319.0978 | 0.224533 | 0.165615 | 2.597135 | -3.656848 | -0.822059 | -0.749324 |
| 16 | 372.5377 | 0.224861 | 0.165857 | 2.600927 | -3.658834 | -0.822506 | -0.749731 |
| 17 | 430.0884 | 0.225169 | 0.166085 | 2.604499 | -3.660571 | -0.822896 | -0.750087 |
| 18 | 491.7498 | 0.225169 | 0.166085 | 2.604499 | -3.660571 | -0.822896 | -0.750087 |
| 19 | 532.3757 | 0.225169 | 0.166085 | 2.604499 | -3.660571 | -0.822896 | -0.750087 |
| 20 | 549.0756 | 0.225169 | 0.166085 | 2.604499 | -3.660571 | -0.822896 | -0.750087 |
| 21 | 566.0325 | 0.225169 | 0.166085 | 2.604499 | -3.660571 | -0.822896 | -0.750087 |
| 22 | 583.2463 | 0.225169 | 0.166085 | 2.604499 | -3.660571 | -0.822896 | -0.750087 |
| 23 | 600.7171 | 0.225169 | 0.166085 | 2.604499 | -3.660571 | -0.822896 | -0.750087 |

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Table 2-27a. Pressure coefficient data for flat ended plug down 0.875 $D_n$ configuration, R = 9.49.

SQUARE END PLUG 7-15-76

R = 9.49 PLUG DEPTH = .875 EFFECTIVE JET DIAMETER = 0.90 CENTERBODY DIAMETER = 0.75

JET FLOW RATE = 3.531 CMM ( 124.70 CFM ) FREE STREAM VELOCITY = 15.1 M/S ( 49.6 F/S )

JET EFFECTIVE VELOCITY = 143.5 M/S ( 470.8 F/S ) JET EFFECTIVE THRUST = 9.832 N (2.2103 LB )

NON-DIMENSIONALIZED PRESSURES

| PORT | ANGLE (DEGREES) 0 | 10 | 20 | 30 | 45 | 60 | 75 | 90 | 105 | 120 | 135 | 150 | 160 | 170 | 180 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | -0.0440 | -0.0828 | -0.2302 | -0.4553 | -0.8847 | -1.5004 | -1.9401 | -2.0255 | -1.7901 | -1.3012 | -0.7761 | -0.5329 | -0.4346 | -0.4242 | -0.4268 |
| 2 | -0.1397 | -0.1604 | -0.2639 | -0.4553 | -0.8097 | -1.2520 | -1.4900 | -1.6090 | -1.4254 | -1.0451 | -0.5846 | -0.4191 | -0.3363 | -0.2871 | -0.2846 |
| 3 | -0.1863 | -0.2044 | -0.2768 | -0.4294 | -0.7036 | -1.0011 | -1.2701 | -1.3219 | -1.2003 | -0.8899 | -0.4967 | -0.3311 | -0.2466 | -0.1759 | -0.1992 |
| 4 | -0.2458 | -0.2742 | -0.3104 | -0.3880 | -0.5381 | -0.7217 | -0.8588 | -0.9235 | -0.8381 | -0.6338 | -0.3544 | -0.2251 | -0.1164 | -0.1086 | -0.1138 |
| 5 | -0.2406 | -0.2716 | -0.2846 | -0.3415 | -0.4398 | -0.5407 | -0.6674 | -0.6778 | -0.6441 | -0.4915 | -0.2639 | -0.1888 | -0.1112 | -0.0776 | -0.0673 |
| 6 | -0.2251 | -0.2251 | -0.2587 | -0.2897 | -0.3622 | -0.4579 | -0.5303 | -0.5484 | -0.5174 | -0.4061 | -0.2432 | -0.1319 | -0.1035 | -0.0724 | 0.0000 |
| 7 | -0.2069 | -0.2069 | -0.2328 | -0.2483 | -0.3208 | -0.3829 | -0.4501 | -0.4708 | -0.4346 | -0.3441 | -0.2121 | -0.0905 | -0.0776 | 0.0000 | 0.0000 |
| 8 | -0.1837 | -0.1837 | -0.2121 | -0.2225 | -0.2768 | -0.3285 | -0.3751 | -0.4113 | -0.3725 | -0.3027 | -0.1888 | -0.1164 | -0.0698 | 0.0000 | 0.0000 |
| 9 | -0.1630 | -0.1656 | -0.1707 | -0.1656 | -0.2302 | -0.2768 | -0.3363 | -0.3518 | -0.3415 | -0.2535 | -0.1526 | -0.1293 | -0.0802 | 0.0000 | 0.0000 |
| 10 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.2458 | -0.2794 | -0.2975 | -0.2975 | -0.2458 | -0.1423 | -0.0698 | -0.0362 | 0.0000 | 0.0000 |
| 11 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.2225 | -0.2458 | -0.2716 | -0.2664 | -0.2199 | -0.1475 | -0.0621 | 0.0000 | 0.0000 | 0.0000 |
| 12 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.2069 | -0.2432 | -0.2328 | -0.2018 | -0.1242 | -0.0388 | 0.0000 | 0.0000 | 0.0000 |
| 13 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1914 | -0.2044 | -0.2095 | -0.1733 | -0.1035 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 14 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1811 | -0.1785 | -0.1681 | -0.1035 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 15 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1578 | -0.1500 | -0.1423 | -0.1035 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 16 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 17 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 18 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 19 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 20 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 21 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 22 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 23 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |

Table 2-27b. Lift loss and pitching moment data for flat ended plug down 0.875 $D_n$ configuration, R = 9.49.

| PORT | NON-DIMENSIONAL AREA | M N -M | M LB-FT | M/TD | L N | L LB | L/T |
|---|---|---|---|---|---|---|---|
| 1 | 2.0315 | 0.000053 | 0.000039 | 0.000236 | -0.109919 | -0.024710 | -0.011179 |
| 2 | 3.1150 | 0.000037 | 0.000028 | 0.000167 | -0.157783 | -0.035470 | -0.016047 |
| 3 | 5.7464 | -0.000063 | -0.000046 | -0.000281 | -0.255731 | -0.057488 | -0.026009 |
| 4 | 10.8543 | -0.000519 | -0.000383 | -0.002313 | -0.394896 | -0.088773 | -0.040163 |
| 5 | 17.3552 | -0.001243 | -0.000917 | -0.005538 | -0.534535 | -0.120163 | -0.054365 |
| 6 | 25.2493 | -0.002187 | -0.001613 | -0.009747 | -0.674562 | -0.151641 | -0.068607 |
| 7 | 34.5363 | -0.003536 | -0.002608 | -0.015757 | -0.813503 | -0.182876 | -0.082738 |
| 8 | 45.2165 | -0.005006 | -0.003692 | -0.022308 | -0.953666 | -0.214384 | -0.096993 |
| 9 | 57.2897 | -0.006409 | -0.004727 | -0.028560 | -1.090779 | -0.245207 | -0.110938 |
| 10 | 70.7560 | -0.005392 | -0.003977 | -0.024026 | -1.187399 | -0.266927 | -0.120765 |
| 11 | 83.0420 | -0.004502 | -0.003321 | -0.020063 | -1.266523 | -0.284714 | -0.128813 |
| 12 | 104.7119 | -0.001952 | -0.001440 | -0.008699 | -1.368718 | -0.307688 | -0.139207 |
| 13 | 135.2818 | 0.001056 | 0.000779 | 0.004706 | -1.491333 | -0.335252 | -0.151677 |
| 14 | 162.5239 | 0.004670 | 0.003444 | 0.020809 | -1.569918 | -0.352918 | -0.159670 |
| 15 | 192.2426 | 0.008558 | 0.006312 | 0.038134 | -1.645295 | -0.369862 | -0.167336 |
| 16 | 224.4378 | 0.008558 | 0.006312 | 0.038134 | -1.645295 | -0.369862 | -0.167336 |
| 17 | 259.1096 | 0.008558 | 0.006312 | 0.038134 | -1.645295 | -0.369862 | -0.167336 |
| 18 | 296.2579 | 0.008558 | 0.006312 | 0.038134 | -1.645295 | -0.369862 | -0.167336 |
| 19 | 320.7333 | 0.008558 | 0.006312 | 0.038134 | -1.645295 | -0.369862 | -0.167336 |
| 20 | 330.7943 | 0.008558 | 0.006312 | 0.038134 | -1.645295 | -0.369862 | -0.167336 |
| 21 | 341.0101 | 0.008558 | 0.006312 | 0.038134 | -1.645295 | -0.369862 | -0.167336 |
| 22 | 351.3806 | 0.008558 | 0.006312 | 0.038134 | -1.645295 | -0.369862 | -0.167336 |
| 23 | 361.9060 | 0.008558 | 0.006312 | 0.038134 | -1.645295 | -0.369862 | -0.167336 |

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Table 2-28a. Pressure coefficient data for flat ended plug down 0.875 $D_n$ configuration, R = 7.11.

SQUARE END PLUG 7-15-76

R = 7.11 PLUG DEPTH = .875 EFFECTIVE JET DIAMETER = 0.90 CENTERBODY DIAMETER = 0.75

JET FLOW RATE = 3.531 CMM ( 124.70 CFM ) FREE STREAM VELOCITY = 20.2 M/S ( 66.2 F/S )

JET EFFECTIVE VELOCITY = 143.5 M/S ( 470.8 F/S ) JET EFFECTIVE THRUST = 9.832 N (2.2103 LB )

NON-DIMENSIONALIZED PRESSURES

| PORT | ANGLE (DEGREES) 0 | 10 | 20 | 30 | 45 | 60 | 75 | 90 | 105 | 120 | 135 | 150 | 160 | 170 | 180 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.0651 | 0.0318 | -0.1056 | -0.3500 | -0.8215 | -1.5431 | -2.1404 | -2.4051 | -2.1332 | -1.6299 | -0.9646 | -0.7159 | -0.6291 | -0.5785 | -0.5742 |
| 2 | 0.0000 | -0.0376 | -0.1359 | -0.3167 | -0.7072 | -1.2307 | -1.6487 | -1.8989 | -1.7456 | -1.3754 | -0.7983 | -0.5958 | -0.5120 | -0.4483 | -0.4585 |
| 3 | -0.0738 | -0.0824 | -0.1764 | -0.3109 | -0.6233 | -1.0037 | -1.3363 | -1.5446 | -1.4752 | -1.1686 | -0.7029 | -0.4975 | -0.3934 | -0.3500 | -0.3370 |
| 4 | -0.1302 | -0.1490 | -0.1880 | -0.2589 | -0.4454 | -0.6522 | -0.8620 | -0.9921 | -0.9733 | -0.7925 | -0.5062 | -0.3138 | -0.2372 | -0.1952 | -0.1779 |
| 5 | -0.1302 | -0.1490 | -0.1938 | -0.2314 | -0.3500 | -0.4046 | -0.6349 | -0.7101 | -0.7275 | -0.6233 | -0.3876 | -0.2198 | -0.1793 | -0.1504 | -0.1302 |
| 6 | -0.1287 | -0.1490 | -0.1533 | -0.2025 | -0.2806 | -0.3717 | -0.4917 | -0.5655 | -0.5655 | -0.5033 | -0.3095 | -0.1721 | -0.1359 | -0.1027 | -0.1027 |
| 7 | -0.1085 | -0.1200 | -0.1302 | -0.1707 | -0.2213 | -0.2892 | -0.3775 | -0.4483 | -0.4628 | -0.4093 | -0.2704 | -0.1287 | -0.0911 | -0.0752 | -0.0752 |
| 8 | -0.0940 | -0.1056 | -0.1186 | -0.1388 | -0.1938 | -0.2415 | -0.3066 | -0.3601 | -0.3760 | -0.3326 | -0.2343 | -0.1157 | -0.0694 | -0.0593 | -0.0434 |
| 9 | -0.0911 | -0.0955 | -0.1070 | -0.1331 | -0.1533 | -0.2083 | -0.2632 | -0.3023 | -0.3109 | -0.2921 | -0.2068 | -0.1027 | -0.0636 | -0.0477 | -0.0231 |
| 10 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1837 | -0.2198 | -0.2632 | -0.2791 | -0.2560 | -0.1909 | -0.0897 | -0.0304 | -0.0289 | 0.0000 |
| 11 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1591 | -0.1895 | -0.2140 | -0.2314 | -0.2198 | -0.1822 | -0.0767 | 0.0000 | -0.0145 | 0.0000 |
| 12 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1649 | -0.1808 | -0.1981 | -0.1880 | -0.1519 | -0.0665 | 0.0000 | 0.0000 | 0.0000 |
| 13 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1287 | -0.1576 | -0.1837 | -0.1750 | -0.1273 | [illegible] | 0.0000 | 0.0000 | 0.0000 |
| 14 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1417 | -0.1475 | -0.1417 | -0.1215 | -0.0448 | 0.0000 | 0.0000 | 0.0000 |
| 15 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1157 | -0.1229 | -0.1171 | -0.1041 | -0.0390 | 0.0000 | 0.0000 | 0.0000 |
| 16 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 17 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 18 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 19 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 20 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 21 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 22 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 23 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |

Table 2-28b. Lift loss and pitching moment data for flat ended plug down 0.875 $D_n$ configuration, R = 7.11.

| PORT | NON-DIMENSIONAL AREA | M N -M | M LB-FT | M/TD | L N | L LB | L/T |
|---|---|---|---|---|---|---|---|
| 1 | 2.0315 | 0.000410 | 0.000302 | 0.001826 | -0.221397 | -0.049770 | -0.022517 |
| 2 | 3.1150 | 0.000603 | 0.000445 | 0.002686 | -0.317903 | -0.071465 | -0.032333 |
| 3 | 5.7464 | 0.000975 | 0.000719 | 0.004345 | -0.515475 | -0.115879 | -0.052427 |
| 4 | 10.8543 | 0.001343 | 0.000991 | 0.005985 | -0.775169 | -0.174258 | -0.078839 |
| 5 | 17.3552 | 0.001580 | 0.001165 | 0.007041 | -1.028352 | -0.231174 | -0.104589 |
| 6 | 25.2493 | 0.001712 | 0.001263 | 0.007628 | -1.272080 | -0.285963 | -0.129378 |
| 7 | 34.5363 | 0.001851 | 0.001365 | 0.008248 | -1.501423 | -0.337520 | -0.152703 |
| 8 | 45.2165 | 0.001868 | 0.001378 | 0.008326 | -1.719810 | -0.386613 | -0.174915 |
| 9 | 57.2897 | 0.001838 | 0.001356 | 0.008190 | -1.931649 | -0.434235 | -0.196460 |
| 10 | 70.7560 | 0.004768 | 0.003517 | 0.021247 | -2.095116 | -0.470982 | -0.213085 |
| 11 | 83.0420 | 0.007181 | 0.005297 | 0.032001 | -2.220980 | -0.499276 | -0.225886 |
| 12 | 104.7119 | 0.012400 | 0.009146 | 0.055255 | -2.385331 | -0.536222 | -0.242602 |
| 13 | 135.2818 | 0.019671 | 0.014510 | 0.087659 | -2.586743 | -0.581500 | -0.263087 |
| 14 | 162.5239 | 0.026746 | 0.019728 | 0.119186 | -2.717071 | -0.610797 | -0.276342 |
| 15 | 192.2426 | 0.033866 | 0.024980 | 0.150913 | -2.835801 | -0.637488 | -0.288417 |
| 16 | 224.4378 | 0.033866 | 0.024980 | 0.150913 | -2.835801 | -0.637488 | -0.288417 |
| 17 | 259.1096 | 0.033866 | 0.024980 | 0.150913 | -2.835801 | -0.637488 | -0.288417 |
| 18 | 296.2579 | 0.033866 | 0.024980 | 0.150913 | -2.835801 | -0.637488 | -0.288417 |
| 19 | 320.7333 | 0.033866 | 0.024980 | 0.150913 | -2.835801 | -0.637488 | -0.288417 |
| 20 | 330.7943 | 0.033866 | 0.024980 | 0.150913 | -2.835801 | -0.637488 | -0.288417 |
| 21 | 341.0101 | 0.033866 | 0.024980 | 0.150913 | -2.835801 | -0.637488 | -0.288417 |
| 22 | 351.3806 | 0.033866 | 0.024980 | 0.150913 | -2.835801 | -0.637488 | -0.288417 |
| 23 | 361.9060 | 0.033866 | 0.024980 | 0.150913 | -2.835801 | -0.637488 | -0.288417 |

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Table 2-29a. Pressure coefficient data for flat ended plug down 0.875 $D_n$ configuration, R = 4.74.

SQUARE END PLUG 7-15-76

R = 4.74 PLUG DEPTH = .875 EFFECTIVE JET DIAMETER = 0.90 CENTERBODY DIAMETER = 0.75

JET FLOW RATE = 3.531 CMM ( 124.70 CFM ) FREE STREAM VELOCITY = 30.3 M/S ( 99.3 F/S )

JET EFFECTIVE VELOCITY = 143.5 M/S ( 470.8 F/S ) JET EFFECTIVE THRUST = 9.832 N (2.2103 LB )

NON-DIMENSIONALIZED PRESSURES

ANGLE (DEGREES)

| PORT | 0 | 10 | 20 | 30 | 45 | 60 | 75 | 90 | 105 | 120 | 135 | 150 | 160 | 170 | 180 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.2404 | 0.2102 | 0.0906 | -0.1215 | -0.5599 | -1.2650 | -2.0331 | -2.6193 | -2.6919 | -2.3088 | -1.4636 | -1.1583 | -1.0374 | -0.9635 | -0.9519 |
| 2 | 0.1594 | 0.1337 | 0.0533 | -0.1003 | -0.4435 | -0.9558 | -1.4842 | -1.9817 | -2.1224 | -1.8364 | -1.2656 | -0.9481 | -0.8189 | -0.7668 | -0.7829 |
| 3 | 0.1170 | 0.0881 | 0.0270 | -0.0861 | -0.3664 | -0.7283 | -1.1570 | -1.5182 | -1.7155 | -1.5761 | -1.0927 | -0.7829 | -0.6511 | -0.5984 | -0.6132 |
| 4 | 0.0379 | 0.0270 | 0.0000 | -0.0713 | -0.2211 | -0.4217 | -0.6582 | -0.8780 | -1.0149 | -1.0046 | -0.7430 | -0.4609 | -0.3722 | -0.3323 | -0.3150 |
| 5 | 0.0161 | 0.0154 | 0.0000 | -0.0578 | -0.1523 | -0.2822 | -0.4345 | -0.5676 | -0.6800 | -0.6865 | -0.5425 | -0.3169 | -0.2320 | -0.2134 | -0.2025 |
| 6 | 0.0251 | 0.0000 | 0.0000 | -0.0386 | -0.1099 | -0.1954 | -0.3027 | -0.4075 | -0.4776 | -0.4936 | -0.4069 | -0.2391 | -0.1613 | -0.1504 | -0.1446 |
| 7 | 0.0148 | -0.0071 | 0.0000 | -0.0341 | -0.0771 | -0.1427 | -0.2275 | -0.2950 | -0.3593 | -0.3857 | -0.3162 | -0.1774 | -0.1196 | -0.1022 | -0.1106 |
| 8 | 0.0090 | -0.0116 | 0.0000 | -0.0129 | -0.0572 | -0.1080 | -0.1710 | -0.2308 | -0.2764 | -0.2944 | -0.2622 | -0.1466 | -0.0829 | -0.0823 | -0.0784 |
| 9 | 0.0129 | -0.0148 | 0.0000 | -0.0096 | -0.0392 | -0.0868 | -0.1363 | -0.1800 | -0.2153 | -0.2327 | -0.2198 | -0.1266 | -0.0636 | -0.0553 | -0.0559 |
| 10 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0630 | -0.1106 | -0.1408 | -0.1768 | -0.1941 | -0.1723 | -0.1022 | -0.0469 | -0.0463 | -0.0411 |
| 11 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0501 | -0.0874 | -0.1176 | -0.1433 | -0.1568 | -0.1408 | -0.0778 | -0.0315 | -0.0360 | -0.0360 |
| 12 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0688 | -0.0900 | -0.1106 | -0.1183 | -0.1176 | -0.0630 | -0.0206 | -0.0193 | -0.0296 |
| 13 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0463 | -0.0713 | -0.0842 | -0.1009 | -0.1016 | -0.0463 | -0.0161 | -0.0135 | -0.0244 |
| 14 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0546 | -0.0701 | -0.0803 | -0.0726 | -0.0405 | -0.0109 | -0.0077 | -0.0206 |
| 15 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0450 | -0.0578 | -0.0688 | -0.0604 | -0.0373 | 0.0000 | 0.0000 | -0.0148 |
| 16 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0174 |
| 17 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0122 |
| 18 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0109 |
| 19 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0141 |
| 20 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0096 |
| 21 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0064 |
| 22 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0135 |
| 23 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0116 |

Table 2-29b. Lift loss and pitching moment data for flat ended plug down 0.875 $D_n$ configuration, R = 4.74.

| PORT | NON-DIMENSIONAL AREA | M N-M | M LB-FT | M/TD | L N | L LB | L/T |
|---|---|---|---|---|---|---|---|
| 1 | 2.0315 | 0.002733 | 0.002016 | 0.012178 | -0.565068 | -0.127027 | -0.057471 |
| 2 | 3.1150 | 0.004134 | 0.003049 | 0.018420 | -0.802470 | -0.180384 | -0.081611 |
| 3 | 5.7464 | 0.007372 | 0.005438 | 0.032852 | -1.269437 | -0.285369 | -0.129109 |
| 4 | 10.8543 | 0.012584 | 0.009282 | 0.056077 | -1.818679 | -0.408839 | -0.184970 |
| 5 | 17.3552 | 0.018316 | 0.013510 | 0.081619 | -2.291430 | -0.515114 | -0.233052 |
| 6 | 25.2493 | 0.024520 | 0.018086 | 0.109267 | -2.703172 | -0.607673 | -0.274928 |
| 7 | 34.5363 | 0.031015 | 0.022877 | 0.138208 | -3.068149 | -0.689720 | -0.312048 |
| 8 | 45.2165 | 0.037928 | 0.027975 | 0.169011 | -3.393157 | -0.762782 | -0.345104 |
| 9 | 57.2897 | 0.045060 | 0.033237 | 0.200797 | -3.684362 | -0.828245 | -0.374721 |
| 10 | 70.7560 | 0.052988 | 0.039084 | 0.236125 | -3.932979 | -0.884134 | -0.400007 |
| 11 | 83.0420 | 0.059330 | 0.043762 | 0.264384 | -4.115308 | -0.925121 | -0.418551 |
| 12 | 104.7119 | 0.069897 | 0.051556 | 0.311471 | -4.349292 | -0.977721 | -0.442348 |
| 13 | 135.2818 | 0.083591 | 0.061656 | 0.372493 | -4.611544 | -1.036675 | -0.469021 |
| 14 | 162.5239 | 0.094507 | 0.069709 | 0.421139 | -4.775367 | -1.073503 | -0.485682 |
| 15 | 192.2426 | 0.104697 | 0.077225 | 0.466548 | -4.920043 | -1.106026 | -0.500397 |
| 16 | 224.4378 | 0.105251 | 0.077633 | 0.469013 | -4.923394 | -1.106779 | -0.500737 |
| 17 | 259.1096 | 0.105702 | 0.077966 | 0.471025 | -4.925933 | -1.107350 | -0.500996 |
| 18 | 296.2579 | 0.106166 | 0.078308 | 0.473091 | -4.928367 | -1.107897 | -0.501243 |
| 19 | 320.7333 | 0.106587 | 0.078619 | 0.474970 | -4.930443 | -1.108364 | -0.501454 |
| 20 | 330.7943 | 0.106707 | 0.078707 | 0.475505 | -4.931024 | -1.108494 | -0.501514 |
| 21 | 341.0101 | 0.106790 | 0.078768 | 0.475873 | -4.931418 | -1.108583 | -0.501554 |
| 22 | 351.3806 | 0.106968 | 0.078900 | 0.476668 | -4.932258 | -1.108772 | -0.501639 |
| 23 | 361.9060 | 0.107126 | 0.079016 | 0.477371 | -4.932988 | -1.108936 | -0.501713 |

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Table 2-30a. Pressure coefficient data for flat ended plug down 0.875 $D_n$ configuration, R = 2.37.

SQUARE END PLUG 7-15-76

R = 2.37 PLUG DEPTH = .875 EFFECTIVE JET DIAMETER = 0.90 CENTERBODY DIAMETER = 0.75

JET FLOW RATE = 3.531 CMM ( 124.70 CFM ) FREE STREAM VELOCITY = 60.5 M/S ( 198.5 F/S )

JET EFFECTIVE VELOCITY = 143.4 M/S ( 470.5 F/S ) JET EFFECTIVE THRUST = 9.826 N (2.2089 LB )

NON-DIMENSIONALIZED PRESSURES

ANGLE (DEGREES)

| PORT | 0 | 10 | 20 | 30 | 45 | 60 | 75 | 90 | 105 | 120 | 135 | 150 | 160 | 170 | 180 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.3624 | 0.3494 | 0.2996 | 0.2096 | 0.0114 | -0.2832 | -0.7129 | -1.2130 | -1.6777 | -1.9543 | -1.6734 | -1.2822 | -0.9368 | -0.7656 | -0.6684 |
| 2 | 0.3234 | 0.3124 | 0.2768 | 0.2159 | 0.0622 | -0.1610 | -0.4357 | -0.7931 | -1.1437 | -1.3776 | -1.3163 | -1.0340 | -0.7913 | -0.6016 | -0.5068 |
| 3 | 0.2855 | 0.2782 | 0.2466 | 0.1958 | 0.0803 | -0.0792 | -0.2822 | -0.5144 | -0.7683 | -0.9746 | -1.0512 | -0.8806 | -0.6867 | -0.5234 | -0.4385 |
| 4 | 0.1984 | 0.1937 | 0.1798 | 0.1516 | 0.0859 | 0.0045 | -0.1017 | -0.2066 | -0.3266 | -0.4594 | -0.6303 | -0.6451 | -0.5571 | -0.4405 | -0.3683 |
| 5 | 0.1468 | 0.1423 | 0.1317 | 0.1194 | 0.0753 | 0.0196 | -0.0442 | -0.1100 | -0.1899 | -0.2837 | -0.4053 | -0.4842 | -0.4554 | -0.3671 | -0.3123 |
| 6 | 0.1141 | 0.1100 | 0.1043 | 0.0911 | 0.0631 | 0.0243 | -0.0204 | -0.0691 | -0.1296 | -0.1981 | -0.2838 | -0.3569 | -0.3473 | -0.2802 | -0.2482 |
| 7 | 0.0912 | 0.0890 | 0.0832 | 0.0750 | 0.0509 | 0.0243 | -0.0093 | -0.0485 | -0.0957 | -0.1454 | -0.2053 | -0.2618 | -0.2525 | -0.2006 | -0.1891 |
| 8 | 0.0742 | 0.0724 | 0.0662 | 0.0599 | 0.0450 | 0.0215 | 0.0000 | -0.0344 | -0.0726 | -0.1110 | -0.1542 | -0.1916 | -0.1886 | -0.1455 | -0.1393 |
| 9 | 0.0623 | 0.0594 | 0.0559 | 0.0503 | 0.0386 | 0.0196 | 0.0000 | -0.0278 | -0.0593 | -0.0893 | -0.1208 | -0.1426 | -0.1417 | -0.1097 | -0.0980 |
| 10 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0167 | 0.0000 | -0.0228 | -0.0464 | -0.0715 | -0.0937 | -0.1083 | -0.1078 | -0.0776 | -0.0755 |
| 11 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0149 | 0.0000 | -0.0178 | -0.0387 | -0.0567 | -0.0755 | -0.0851 | -0.0840 | -0.0556 | -0.0535 |
| 12 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0129 | -0.0310 | -0.0456 | -0.0593 | -0.0617 | -0.0599 | -0.0358 | -0.0378 |
| 13 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0100 | -0.0249 | -0.0381 | -0.0466 | -0.0474 | -0.0448 | -0.0255 | -0.0243 |
| 14 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0088 | -0.0185 | -0.0299 | -0.0352 | -0.0361 | -0.0328 | -0.0177 | -0.0194 |
| 15 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0069 | -0.0169 | -0.0257 | -0.0294 | -0.0288 | -0.0263 | -0.0117 | -0.0141 |
| 16 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0100 |
| 17 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0069 |
| 18 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0043 |
| 19 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0051 |
| 20 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0039 |
| 21 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 22 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0026 |
| 23 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0024 |

Table 2-30b. Lift loss and pitching moment data for flat ended plug down 0.875 $D_n$ configuration, R = 2.37.

| PORT | NON-DIMENSIONAL AREA | M N-M | M LB-FT | M/TD | L N | L LB | L/T |
|---|---|---|---|---|---|---|---|
| 1 | 2.0329 | 0.014464 | 0.010668 | 0.064515 | -1.355133 | -0.304634 | -0.137914 |
| 2 | 3.1171 | 0.021747 | 0.016041 | 0.097004 | -1.861496 | -0.418464 | -0.189447 |
| 3 | 5.7501 | 0.038527 | 0.028418 | 0.171851 | -2.751737 | -0.618590 | -0.290048 |
| 4 | 10.8613 | 0.069578 | 0.051320 | 0.310349 | -3.679695 | -0.827195 | -0.374488 |
| 5 | 17.3664 | 0.107005 | 0.078927 | 0.477295 | -4.455836 | -1.001672 | -0.453477 |
| 6 | 25.2656 | 0.148471 | 0.109512 | 0.662250 | -5.109499 | -1.148615 | -0.520001 |
| 7 | 34.5587 | 0.191474 | 0.141231 | 0.854065 | -5.645024 | -1.269001 | -0.574502 |
| 8 | 45.2457 | 0.234855 | 0.173229 | 1.047565 | -6.079383 | -1.366645 | -0.618708 |
| 9 | 57.3267 | 0.278179 | 0.205185 | 1.240811 | -6.442199 | -1.448206 | -0.655632 |
| 10 | 70.8017 | 0.308615 | 0.227635 | 1.376572 | -6.883273 | -1.547360 | -0.700521 |
| 11 | 83.0956 | 0.332458 | 0.245221 | 1.482919 | -7.196865 | -1.617855 | -0.732435 |
| 12 | 104.7795 | 0.366264 | 0.270156 | 1.633711 | -7.627857 | -1.714742 | -0.776298 |
| 13 | 135.3692 | 0.406686 | 0.299971 | 1.814012 | -8.098572 | -1.820559 | -0.824204 |
| 14 | 162.6290 | 0.436428 | 0.321909 | 1.946675 | -8.417206 | -1.892188 | -0.856631 |
| 15 | 192.3668 | 0.464859 | 0.342886 | 2.073490 | -8.701728 | -1.956149 | -0.885588 |
| 16 | 224.5828 | 0.466129 | 0.343817 | 2.079156 | -8.709422 | -1.957878 | -0.886371 |
| 17 | 259.2770 | 0.467150 | 0.344570 | 2.083713 | -8.715169 | -1.959170 | -0.886955 |
| 18 | 296.4493 | 0.467887 | 0.345113 | 2.086997 | -8.719035 | -1.960039 | -0.887349 |
| 19 | 320.9405 | 0.468500 | 0.345566 | 2.089733 | -8.722054 | -1.960718 | -0.887656 |
| 20 | 331.0080 | 0.468692 | 0.345707 | 2.090590 | -8.722984 | -1.960927 | -0.887751 |
| 21 | 341.2304 | 0.468692 | 0.345707 | 2.090590 | -8.722984 | -1.960927 | -0.887751 |
| 22 | 351.6077 | 0.468828 | 0.345808 | 2.091197 | -8.723624 | -1.961071 | -0.887816 |
| 23 | 362.1398 | 0.468960 | 0.345905 | 2.091783 | -8.724232 | -1.961207 | -0.887878 |

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Table 2-31a. Pressure coefficient data for flat ended plug down 1.375 $D_n$ Configuration, R = 9.48.

SQUARE END PLUG 7-15-76

R = 9.48 PLUG DEPTH =1.375 EFFECTIVE JET DIAMETER = 0.99 CENTERBODY DIAMETER = 0.75

JET FLOW RATE = 4.185 CMM ( 147.80 CFM ) FREE STREAM VELOCITY = 14.9 M/S ( 49.0 F/S )

JET EFFECTIVE VELOCITY = 141.6 M/S ( 464.5 F/S ) JET EFFECTIVE THRUST =11.510 N (2.5875 LB )

NON-DIMENSIONALIZED PRESSURES

ANGLE (DEGREES)

| PORT | 0 | 10 | 20 | 30 | 45 | 60 | 75 | 90 | 105 | 120 | 135 | 150 | 160 | 170 | 180 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.0900 | 0.0953 | -0.0503 | -0.2913 | -0.6567 | -1.1227 | -1.3902 | -1.4484 | -1.3001 | -1.1227 | -1.0221 | -0.8977 | -0.7626 | -0.6964 | -0.6832 |
| 2 | 0.0000 | 0.0000 | -0.0927 | -0.2595 | -0.5878 | -0.9321 | -1.1783 | -1.1916 | -1.0459 | -0.9533 | -0.8235 | -0.7149 | -0.6090 | -0.5455 | -0.5508 |
| 3 | -0.0900 | -0.0662 | -0.1509 | -0.2701 | -0.5296 | -0.8050 | -0.9638 | -1.0009 | -0.9056 | -0.7785 | -0.6726 | -0.5375 | -0.4290 | -0.4210 | -0.4343 |
| 4 | -0.1350 | -0.1377 | -0.2171 | -0.2674 | -0.4157 | -0.5561 | -0.6885 | -0.6885 | -0.6170 | -0.4872 | -0.3892 | -0.2992 | -0.2171 | -0.2330 | -0.2171 |
| 5 | -0.1430 | -0.1589 | -0.2277 | -0.2410 | -0.3230 | -0.4528 | -0.5296 | -0.5534 | -0.4713 | -0.3840 | -0.2542 | -0.2463 | -0.1430 | -0.1192 | -0.1271 |
| 6 | -0.1324 | -0.1456 | -0.1959 | -0.2224 | -0.2754 | -0.3840 | -0.4210 | -0.4290 | -0.3919 | -0.2833 | -0.1854 | -0.1721 | -0.0821 | -0.1006 | -0.0794 |
| 7 | -0.1245 | -0.1271 | -0.1589 | -0.1933 | -0.2357 | -0.3178 | -0.3151 | -0.3760 | -0.3230 | -0.2118 | -0.1430 | -0.1086 | -0.0556 | -0.0583 | -0.0609 |
| 8 | -0.0900 | -0.1139 | -0.1324 | -0.1562 | -0.2145 | -0.2727 | -0.2780 | -0.3019 | -0.2568 | -0.1854 | -0.1112 | -0.0794 | -0.0583 | -0.0556 | -0.0530 |
| 9 | -0.0874 | -0.1112 | -0.1245 | -0.1218 | -0.1827 | -0.2224 | -0.2436 | -0.2357 | -0.2304 | -0.1748 | -0.1165 | -0.0530 | 0.0000 | -0.0609 | -0.0397 |
| 10 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1880 | -0.2065 | -0.2118 | -0.2039 | -0.1615 | -0.0530 | -0.0397 | 0.0000 | -0.0291 | 0.0000 |
| 11 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1774 | -0.1854 | -0.2065 | -0.1907 | -0.1350 | -0.0609 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 12 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1642 | -0.1721 | -0.1430 | -0.0980 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 13 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1324 | -0.1192 | -0.1192 | -0.0794 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 14 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1033 | -0.1059 | -0.0662 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 15 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0927 | -0.0980 | -0.0662 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 16 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 17 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 18 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 19 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 20 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 21 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 22 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 23 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |

Table 2-31b. Lift loss and pitching moment data for flat ended plug down 1.375 $D_n$ configuration, R = 9.48.

| POPT | NON-DIMENSIONAL AREA | M N -M | M LB-FT | M/TD | L N | L LB | L/T |
|---|---|---|---|---|---|---|---|
| 1 | 1.6694 | 0.000317 | 0.000234 | 0.001093 | -0.091296 | -0.020523 | -0.007932 |
| 2 | 2.5597 | 0.000455 | 0.000336 | 0.001571 | -0.132098 | -0.029696 | -0.011477 |
| 3 | 4.7219 | 0.000682 | 0.000503 | 0.002353 | -0.215854 | -0.048524 | -0.018754 |
| 4 | 8.9191 | 0.000710 | 0.000524 | 0.002450 | -0.327728 | -0.073673 | -0.028473 |
| 5 | 14.2611 | 0.000476 | 0.000351 | 0.001642 | -0.439099 | -0.098709 | -0.038149 |
| 6 | 20.7477 | -0.000044 | -0.000033 | -0.000153 | -0.547310 | -0.123035 | -0.047551 |
| 7 | 28.3791 | -0.000840 | -0.000620 | -0.002900 | -0.649559 | -0.146021 | -0.056434 |
| 8 | 37.1551 | -0.001782 | -0.001314 | -0.006149 | -0.748592 | -0.168284 | -0.065038 |
| 9 | 47.0758 | -0.002871 | -0.002118 | -0.009907 | -0.844181 | -0.189772 | -0.073333 |
| 10 | 58.1413 | -0.002482 | -0.001830 | -0.008563 | -0.907879 | -0.204091 | -0.078877 |
| 11 | 68.2369 | -0.002328 | -0.001717 | -0.008034 | -0.959741 | -0.215750 | -0.083383 |
| 12 | 86.0434 | -0.001856 | -0.001369 | -0.006403 | -1.014592 | -0.228080 | -0.088149 |
| 13 | 111.1632 | -0.001238 | -0.000913 | -0.004272 | -1.074933 | -0.241645 | -0.093391 |
| 14 | 133.5485 | -0.000228 | -0.000168 | -0.000787 | -1.107829 | -0.249040 | -0.096249 |
| 15 | 157.9688 | 0.000933 | 0.000688 | 0.003218 | -1.141300 | -0.256564 | -0.099157 |
| 16 | 184.4241 | 0.000933 | 0.000688 | 0.003218 | -1.141300 | -0.256564 | -0.099157 |
| 17 | 212.9145 | 0.000933 | 0.000688 | 0.003218 | -1.141300 | -0.256564 | -0.099157 |
| 18 | 243.4398 | 0.000933 | 0.000688 | 0.003218 | -1.141300 | -0.256564 | -0.099157 |
| 19 | 263.5516 | 0.000933 | 0.000688 | 0.003218 | -1.141300 | -0.256564 | -0.099157 |
| 20 | 271.8189 | 0.000933 | 0.000688 | 0.003218 | -1.141300 | -0.256564 | -0.099157 |
| 21 | 280.2134 | 0.000933 | 0.000688 | 0.003218 | -1.141300 | -0.256564 | -0.099157 |
| 22 | 288.7350 | 0.000933 | 0.000688 | 0.003218 | -1.141300 | -0.256564 | -0.099157 |
| 23 | 297.3839 | 0.000933 | 0.000688 | 0.003218 | -1.141300 | -0.256564 | -0.099157 |

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Table 2-32a. Pressure coefficient data for flat ended plug down 1.375 $D_n$ configuration, R = 7.1.

SQUARE END PLUG 7-15-76

R = 7.10 PLUG DEPTH =1.375 EFFECTIVE JET DIAMETER = 0.99 CENTERBODY DIAMETER = 0.75

JET FLOW RATE = 4.195 CMM ( 147.80 CFM ) FREE STREAM VELOCITY = 19.9 M/S ( 65.4 F/S )

JET EFFECTIVE VELOCITY = 141.6 M/S ( 464.5 F/S ) JET EFFECTIVE THRUST =11.510 N (2.5875 LB )

NON-DIMENSIONALIZED PRESSURES

| PORT | ANGLE (DEGREES) 0 | 10 | 20 | 30 | 45 | 60 | 75 | 90 | 105 | 120 | 135 | 150 | 160 | 170 | 180 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.1330 | 0.0931 | -0.0532 | -0.2867 | -0.7360 | -1.4070 | -1.8770 | -2.0395 | -1.8356 | -1.6139 | -1.3434 | -1.2680 | -1.0597 | -1.0198 | -0.9636 |
| 2 | 0.0399 | 0.0000 | -0.1035 | -0.2838 | -0.6532 | -1.1498 | -1.4617 | -1.6523 | -1.5341 | -1.3301 | -1.1336 | -0.9769 | -0.8882 | -0.8084 | -0.7981 |
| 3 | -0.0384 | -0.0488 | -0.1404 | -0.2793 | -0.5823 | -0.9281 | -1.2341 | -1.3567 | -1.3227 | -1.1669 | -0.9503 | -0.7848 | -0.7064 | -0.6695 | -0.6577 |
| 4 | -0.1094 | -0.1182 | -0.1788 | -0.2690 | -0.4227 | -0.6444 | -0.8069 | -0.9193 | -0.9089 | -0.7670 | -0.5971 | -0.4877 | -0.4301 | -0.4301 | -0.4049 |
| 5 | -0.1315 | -0.1345 | -0.1700 | -0.2291 | -0.3266 | -0.5040 | -0.6045 | -0.6798 | -0.6887 | -0.6045 | -0.4360 | -0.3429 | -0.3680 | -0.2926 | -0.3133 |
| 6 | -0.1345 | -0.1360 | -0.1640 | -0.1936 | -0.2690 | -0.3828 | -0.4921 | -0.5320 | -0.5542 | -0.4848 | -0.3296 | -0.2557 | -0.2483 | -0.2542 | -0.2586 |
| 7 | -0.1168 | -0.1271 | -0.1478 | -0.1714 | -0.2379 | -0.3074 | -0.3946 | -0.4508 | -0.4419 | -0.3916 | -0.2778 | -0.2099 | -0.1995 | -0.2276 | -0.2187 |
| 8 | -0.1064 | -0.1182 | -0.1360 | -0.1360 | -0.2025 | -0.2572 | -0.3237 | -0.3621 | -0.3724 | -0.3311 | -0.2498 | -0.1714 | -0.1700 | -0.2010 | -0.1862 |
| 9 | -0.0990 | -0.1108 | -0.1197 | -0.1197 | -0.1759 | -0.2202 | -0.2911 | -0.3104 | -0.3133 | -0.2911 | -0.2350 | -0.1478 | -0.1463 | -0.1685 | -0.1626 |
| 10 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1921 | -0.2498 | -0.2690 | -0.2808 | -0.2690 | -0.1921 | -0.1227 | -0.1212 | -0.1537 | -0.1478 |
| 11 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1626 | -0.2217 | -0.2365 | -0.2483 | -0.2335 | -0.1685 | -0.1049 | -0.1020 | -0.1330 | -0.1478 |
| 12 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1833 | -0.2099 | -0.2143 | -0.2173 | -0.1507 | -0.0887 | -0.0857 | -0.1182 | -0.1330 |
| 13 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1640 | -0.1833 | -0.1877 | -0.1847 | -0.1345 | -0.0739 | -0.0695 | -0.0902 | -0.1419 |
| 14 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1493 | -0.1626 | -0.1596 | -0.1241 | -0.0576 | -0.0517 | -0.0902 | -0.1241 |
| 15 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1345 | -0.1448 | -0.1448 | -0.1182 | -0.0502 | -0.0325 | -0.0621 | -0.1020 |
| 16 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1123 |
| 17 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1005 |
| 18 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1020 |
| 19 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0902 |
| 20 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0754 |
| 21 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0754 |
| 22 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0842 |
| 23 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0695 |

Table 2-32b. Lift loss and pitching moment data for flat ended plug down 1.375 $D_n$ configuration, R = 7.1.

| PORT | NON-DIMENSIONAL AREA | M N-M | M LB-FT | M/TD | L N | L LB | L/T |
|---|---|---|---|---|---|---|---|
| 1 | 1.6694 | 0.000880 | 0.000649 | 0.003036 | -0.219673 | -0.049382 | -0.019085 |
| 2 | 2.5597 | 0.001298 | 0.000957 | 0.004478 | -0.316805 | -0.071218 | -0.027524 |
| 3 | 4.7319 | 0.002188 | 0.001614 | 0.007551 | -0.516908 | -0.116201 | -0.044909 |
| 4 | 8.9191 | 0.003334 | 0.002459 | 0.011504 | -0.782997 | -0.176018 | -0.068027 |
| 5 | 14.2611 | 0.004502 | 0.003321 | 0.015535 | -1.043584 | -0.234620 | -0.090676 |
| 6 | 20.7477 | 0.005585 | 0.004119 | 0.019271 | -1.296596 | -0.291475 | -0.112644 |
| 7 | 28.3791 | 0.006700 | 0.004942 | 0.023119 | -1.544309 | -0.347161 | -0.134171 |
| 8 | 37.1551 | 0.007986 | 0.005891 | 0.027557 | -1.785012 | -0.401271 | -0.155083 |
| 9 | 47.0758 | 0.009394 | 0.006929 | 0.032416 | -2.023295 | -0.454837 | -0.175786 |
| 10 | 58.1413 | 0.014239 | 0.010502 | 0.049133 | -2.212137 | -0.497288 | -0.192192 |
| 11 | 68.2369 | 0.018537 | 0.013673 | 0.063964 | -2.362948 | -0.531191 | -0.205295 |
| 12 | 86.0434 | 0.027556 | 0.020325 | 0.095086 | -2.572254 | -0.578243 | -0.223480 |
| 13 | 111.1632 | 0.039697 | 0.029280 | 0.136980 | -2.829254 | -0.636016 | -0.245808 |
| 14 | 133.5485 | 0.051243 | 0.037797 | 0.176823 | -2.996723 | -0.673663 | -0.260358 |
| 15 | 157.9688 | 0.062894 | 0.046391 | 0.217024 | -3.156639 | -0.709613 | -0.274252 |
| 16 | 184.4241 | 0.064448 | 0.047537 | 0.222388 | -3.166055 | -0.711729 | -0.275070 |
| 17 | 212.9145 | 0.066061 | 0.048727 | 0.227954 | -3.175128 | -0.713769 | -0.275858 |
| 18 | 243.4398 | 0.067940 | 0.050113 | 0.234437 | -3.184992 | -0.715986 | -0.276715 |
| 19 | 263.5516 | 0.069107 | 0.050974 | 0.238465 | -3.190737 | -0.717278 | -0.277214 |
| 20 | 271.8189 | 0.069515 | 0.051274 | 0.239871 | -3.192711 | -0.717722 | -0.277386 |
| 21 | 280.2134 | 0.069935 | 0.051584 | 0.241321 | -3.194716 | -0.718172 | -0.277560 |
| 22 | 288.7350 | 0.070419 | 0.051941 | 0.242990 | -3.196991 | -0.718684 | -0.277757 |
| 23 | 297.3839 | 0.070830 | 0.052244 | 0.244408 | -3.198895 | -0.719112 | -0.277923 |

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Table 2-33a. Pressure coefficient data for flat ended plug down 1.375 $D_n$ configuration, R = 4.74.

SQUARE END PLUG 7-15-76

R = 4.74 PLUG DEPTH =1.375 EFFECTIVE JET DIAMETER = 0.99 CENTERBODY DIAMETER = 0.75

JET FLOW RATE = 4.185 CMM ( 147.80 CFM ) FREE STREAM VELOCITY = 29.9 M/S ( 98.0 F/S )

JET EFFECTIVE VELOCITY = 141.6 M/S ( 464.5 F/S ) JET EFFECTIVE THRUST =11.510 N (2.5875 LB )

NON-DIMENSIONALIZED PRESSURES

| PORT | ANGLE (DEGREES) 0 | 10 | 20 | 30 | 45 | 60 | 75 | 90 | 105 | 120 | 135 | 150 | 160 | 170 | 180 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.2633 | 0.2383 | 0.1047 | -0.1073 | -0.5529 | -1.2756 | -2.0081 | -2.5617 | -2.5630 | -2.2221 | -1.7600 | -1.7021 | -1.5718 | -1.5066 | -1.4493 |
| 2 | 0.1810 | 0.1652 | 0.0685 | -0.0836 | -0.4463 | -0.9643 | -1.4895 | -1.9535 | -2.0674 | -1.8107 | -1.4969 | -1.3750 | -1.3032 | -1.2275 | -1.2374 |
| 3 | 0.1316 | 0.1139 | 0.0388 | -0.0731 | -0.3725 | -0.7470 | -1.1716 | -1.5106 | -1.6823 | -1.5112 | -1.2591 | -1.1295 | -1.0623 | -1.0353 | -1.0248 |
| 4 | 0.0533 | 0.0401 | 0.0000 | -0.0724 | -0.2337 | -0.4410 | -0.6911 | -0.8965 | -1.0241 | -0.9787 | -0.8004 | -0.6970 | -0.6872 | -0.6937 | -0.6924 |
| 5 | 0.0230 | 0.0244 | 0.0000 | -0.0559 | -0.1606 | -0.2916 | -0.4706 | -0.5904 | -0.7049 | -0.6990 | -0.5707 | -0.4746 | -0.4950 | -0.5621 | -0.5358 |
| 6 | 0.0184 | 0.0201 | 0.0000 | -0.0395 | -0.1211 | -0.2086 | -0.3357 | -0.4344 | -0.5075 | -0.5075 | -0.4239 | -0.3377 | -0.3719 | -0.4811 | -0.4667 |
| 7 | 0.0178 | 0.0204 | 0.0000 | -0.0263 | -0.0869 | -0.1580 | -0.2521 | -0.3212 | -0.3916 | -0.3923 | -0.3291 | -0.2448 | -0.2699 | -0.4087 | -0.3910 |
| 8 | 0.0178 | 0.0171 | 0.0000 | -0.0197 | -0.0658 | -0.1152 | -0.1902 | -0.2488 | -0.3041 | -0.3067 | -0.2613 | -0.1830 | -0.2073 | -0.3219 | -0.3337 |
| 9 | 0.0191 | 0.0178 | 0.0000 | -0.0158 | -0.0474 | -0.0908 | -0.1481 | -0.2047 | -0.2416 | -0.2481 | -0.2218 | -0.1448 | -0.1514 | -0.2745 | -0.3080 |
| 10 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0717 | -0.1165 | -0.1626 | -0.2007 | -0.1994 | -0.1863 | -0.1099 | -0.1185 | -0.2389 | -0.2764 |
| 11 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0533 | -0.0935 | -0.1330 | -0.1593 | -0.1619 | -0.1468 | -0.0862 | -0.0895 | -0.2093 | -0.2317 |
| 12 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0810 | -0.1066 | -0.1231 | -0.1270 | -0.1158 | -0.0658 | -0.0612 | -0.1665 | -0.2159 |
| 13 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0619 | -0.0823 | -0.0974 | -0.1033 | -0.0954 | -0.0507 | -0.0448 | -0.1349 | -0.2086 |
| 14 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0645 | -0.0790 | -0.0823 | -0.0724 | -0.0428 | -0.0270 | -0.1007 | -0.1963 |
| 15 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0527 | -0.0625 | -0.0678 | -0.0625 | -0.0309 | -0.0250 | -0.0902 | -0.1685 |
| 16 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1507 |
| 17 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1507 |
| 18 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1409 |
| 19 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1204 |
| 20 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1185 |
| 21 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1145 |
| 22 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1165 |
| 23 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.1257 |

Table 2-33b. Lift loss and pitching moment data for flat ended plug down 1.375 $D_n$ configuration, R = 4.74.

| PORT | NON-DIMENSIONAL AREA | M N-M | M LB-FT | M/TD | L N | L LB | L/T |
|---|---|---|---|---|---|---|---|
| 1 | 1.6694 | 0.003617 | 0.002668 | 0.012482 | -0.595996 | -0.133980 | -0.051781 |
| 2 | 2.5597 | 0.005494 | 0.004053 | 0.018959 | -0.850083 | -0.191099 | -0.073856 |
| 3 | 4.7219 | 0.009833 | 0.007253 | 0.033930 | -1.353081 | -0.304173 | -0.117557 |
| 4 | 8.9191 | 0.017191 | 0.012680 | 0.059321 | -1.966141 | -0.441989 | -0.170820 |
| 5 | 14.2611 | 0.025957 | 0.019146 | 0.089569 | -2.514774 | -0.565321 | -0.218486 |
| 6 | 20.7477 | 0.035990 | 0.026546 | 0.124189 | -3.009850 | -0.676614 | -0.261498 |
| 7 | 28.3791 | 0.047029 | 0.034688 | 0.162280 | -3.455588 | -0.776816 | -0.300224 |
| 8 | 37.1551 | 0.058662 | 0.043269 | 0.202422 | -3.853014 | -0.866158 | -0.334753 |
| 9 | 47.0758 | 0.071183 | 0.052504 | 0.245626 | -4.216561 | -0.947883 | -0.366338 |
| 10 | 58.1413 | 0.084751 | 0.062513 | 0.292447 | -4.539617 | -1.020506 | -0.394406 |
| 11 | 68.2369 | 0.095945 | 0.070769 | 0.331072 | -4.777247 | -1.073925 | -0.415051 |
| 12 | 86.0434 | 0.114460 | 0.084426 | 0.394962 | -5.095654 | -1.145503 | -0.442715 |
| 13 | 111.1632 | 0.138545 | 0.102191 | 0.478070 | -5.458587 | -1.227090 | -0.474247 |
| 14 | 133.5485 | 0.157923 | 0.116484 | 0.544937 | -5.690004 | -1.279113 | -0.494352 |
| 15 | 157.9688 | 0.177749 | 0.131108 | 0.613348 | -5.902546 | -1.326892 | -0.512818 |
| 16 | 184.4241 | 0.182433 | 0.134562 | 0.629510 | -5.930917 | -1.333270 | -0.515283 |
| 17 | 212.9145 | 0.187865 | 0.138569 | 0.648254 | -5.961471 | -1.340139 | -0.517938 |
| 18 | 243.4398 | 0.193692 | 0.142867 | 0.668361 | -5.992063 | -1.347016 | -0.520596 |
| 19 | 263.5516 | 0.197194 | 0.145150 | 0.680445 | -6.009298 | -1.350890 | -0.522093 |
| 20 | 271.8189 | 0.198632 | 0.146511 | 0.685408 | -6.016267 | -1.352457 | -0.522698 |
| 21 | 280.2134 | 0.200065 | 0.147568 | 0.690353 | -6.023108 | -1.353995 | -0.523293 |
| 22 | 288.7350 | 0.201568 | 0.148676 | 0.695538 | -6.030171 | -1.355583 | -0.523906 |
| 23 | 297.3839 | 0.203238 | 0.149908 | 0.701301 | -6.037907 | -1.357322 | -0.524579 |

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Table 2-34a. Pressure coefficient data for flat ended plug down 1.375 $D_n$ configuration, R = 2.37.

SQUARE END PLUG 7-15-76

R = 2.37 PLUG DEPTH =1.375 EFFECTIVE JET DIAMETER = 0.99 CENTERBODY DIAMETER = 0.75

JET FLOW RATE = 4.185 CMM ( 147.80 CFM ) FREE STREAM VELOCITY = 59.8 M/S ( 196.1 F/S )

JET EFFECTIVE VELOCITY = 141.6 M/S ( 464.5 F/S ) JET EFFECTIVE THRUST =11.510 N (2.5875 LB )

NON-DIMENSIONALIZED PRESSURES

| PORT | ANGLE (DEGREES) 0 | 10 | 20 | 30 | 45 | 60 | 75 | 90 | 105 | 120 | 135 | 150 | 160 | 170 | 180 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.3611 | 0.3526 | 0.3018 | 0.2109 | 0.0043 | -0.3399 | -0.8160 | -1.3885 | -1.9323 | -2.1162 | -1.6706 | -1.3285 | -1.0739 | -0.9539 | -0.9110 |
| 2 | 0.3202 | 0.3090 | 0.2763 | 0.2073 | 0.0482 | -0.2027 | -0.5129 | -0.9279 | -1.3333 | -1.4991 | -1.3412 | -1.0752 | -0.8671 | -0.7672 | -0.7233 |
| 3 | 0.2822 | 0.2744 | 0.2428 | 0.1940 | 0.0672 | -0.1067 | -0.3145 | -0.6151 | -0.9215 | -1.1046 | -1.1249 | -0.9746 | -0.8147 | -0.6759 | -0.6483 |
| 4 | 0.2024 | 0.1973 | 0.1808 | 0.1522 | 0.0807 | -0.0117 | -0.1343 | -0.2622 | -0.4126 | -0.5711 | -0.7116 | -0.7392 | -0.6626 | -0.5448 | -0.5092 |
| 5 | 0.1542 | 0.1507 | 0.1409 | 0.1211 | 0.0759 | 0.0123 | -0.0674 | -0.1455 | -0.2472 | -0.3657 | -0.5061 | -0.5740 | -0.4977 | -0.4326 | -0.3978 |
| 6 | 0.1236 | 0.1165 | 0.1138 | 0.0970 | 0.0648 | 0.0207 | -0.0362 | -0.0950 | -0.1698 | -0.2582 | -0.3630 | -0.4192 | -0.3769 | -0.3085 | -0.2982 |
| 7 | 0.1039 | 0.0970 | 0.0896 | 0.0776 | 0.0536 | 0.0202 | -0.0187 | -0.0664 | -0.1276 | -0.1912 | -0.2661 | -0.3033 | -0.2720 | -0.2173 | -0.2152 |
| 8 | 0.0822 | 0.0822 | 0.0745 | 0.0658 | 0.0462 | 0.0191 | -0.0113 | -0.0534 | -0.0978 | -0.1476 | -0.1984 | -0.2144 | -0.1920 | -0.1517 | -0.1519 |
| 9 | 0.0695 | 0.0664 | 0.0626 | 0.0541 | 0.0406 | 0.0179 | -0.0071 | -0.0408 | -0.0779 | -0.1151 | -0.1527 | -0.1660 | -0.1473 | -0.1034 | -0.1080 |
| 10 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0164 | -0.0033 | -0.0316 | -0.0623 | -0.0937 | -0.1174 | -0.1244 | -0.1060 | -0.0756 | -0.0774 |
| 11 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0161 | 0.0000 | -0.0247 | -0.0518 | -0.0756 | -0.0965 | -0.0991 | -0.0850 | -0.0564 | -0.0582 |
| 12 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0199 | -0.0391 | -0.0582 | -0.0745 | -0.0710 | -0.0607 | -0.0350 | -0.0403 |
| 13 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0145 | -0.0319 | -0.0472 | -0.0554 | -0.0542 | -0.0444 | -0.0225 | -0.0283 |
| 14 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0130 | -0.0271 | -0.0383 | -0.0447 | -0.0436 | -0.0344 | -0.0148 | -0.0189 |
| 15 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0094 | -0.0209 | -0.0324 | -0.0380 | -0.0347 | -0.0263 | -0.0089 | -0.0133 |
| 16 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0087 |
| 17 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0054 |
| 18 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0043 |
| 19 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0028 |
| 20 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0046 |
| 21 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0036 |
| 22 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | -0.0030 |
| 23 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |

Table 2-34b. Lift loss and pitching moment data for flat ended plug down 1.375 $D_n$ configuration, R = 2.37.

| PORT | NON-DIMENSIONAL AREA | M N-M | M LB-FT | M/TD | L N | L LB | L/T |
|---|---|---|---|---|---|---|---|
| 1 | 1.6694 | 0.015218 | 0.011225 | 0.052511 | -1.476768 | -0.331978 | -0.128303 |
| 2 | 2.5597 | 0.022870 | 0.016869 | 0.078915 | -2.037814 | -0.458101 | -0.177047 |
| 3 | 4.7219 | 0.041232 | 0.030413 | 0.142278 | -3.073139 | -0.690842 | -0.266997 |
| 4 | 8.9191 | 0.076115 | 0.056143 | 0.262646 | -4.210994 | -0.946631 | -0.365855 |
| 5 | 14.2611 | 0.118623 | 0.087496 | 0.409326 | -5.181480 | -1.164797 | -0.450171 |
| 6 | 20.7477 | 0.165301 | 0.121926 | 0.570393 | -5.993205 | -1.347277 | -0.520695 |
| 7 | 28.3791 | 0.213444 | 0.157437 | 0.736520 | -6.659644 | -1.497088 | -0.578596 |
| 8 | 37.1551 | 0.261182 | 0.192648 | 0.901244 | -7.196327 | -1.617734 | -0.625223 |
| 9 | 47.0758 | 0.308531 | 0.227573 | 1.064631 | -7.639125 | -1.717275 | -0.663694 |
| 10 | 58.1413 | 0.341815 | 0.252122 | 1.179480 | -8.151326 | -1.832418 | -0.708194 |
| 11 | 68.2369 | 0.368701 | 0.271954 | 1.272256 | -8.520958 | -1.915511 | -0.740308 |
| 12 | 86.0434 | 0.406367 | 0.299736 | 1.402228 | -9.020791 | -2.027874 | -0.783734 |
| 13 | 111.1632 | 0.450346 | 0.332175 | 1.553981 | -9.553849 | -2.147705 | -0.830047 |
| 14 | 133.5485 | 0.484041 | 0.357029 | 1.670252 | -9.933847 | -2.233129 | -0.863061 |
| 15 | 157.9688 | 0.515803 | 0.380456 | 1.779851 | -10.263114 | -2.307148 | -0.891668 |
| 16 | 184.4241 | 0.516887 | 0.381256 | 1.783592 | -10.269681 | -2.308624 | -0.892239 |
| 17 | 212.9145 | 0.517670 | 0.381833 | 1.786293 | -10.274084 | -2.309614 | -0.892621 |
| 18 | 243.4398 | 0.518378 | 0.382355 | 1.788736 | -10.277801 | -2.310449 | -0.892944 |
| 19 | 263.5516 | 0.518703 | 0.382595 | 1.789858 | -10.279402 | -2.310809 | -0.893083 |
| 20 | 271.8189 | 0.518927 | 0.382760 | 1.790630 | -10.280486 | -2.311053 | -0.893177 |
| 21 | 280.2134 | 0.519108 | 0.382894 | 1.791256 | -10.281351 | -2.311248 | -0.893253 |
| 22 | 288.7350 | 0.519261 | 0.383007 | 1.791783 | -10.282069 | -2.311409 | -0.893315 |
| 23 | 297.3839 | 0.519261 | 0.383007 | 1.791783 | -10.282069 | -2.311409 | -0.893315 |

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## SECTION 3: JET CENTERLINE TRAJECTORY DATA AND RESULTANT POWER LAW CURVE FIT EQUATIONS

Data for each nozzle configuration are presented for the location of the jet centerline at values of R equal to 8, 6, 4 and 2.5. These data were taken using a Kiel total pressure probe. Also listed for each configuration are predicted nondimensional z coordinates calculated using a least squares curve fit power law equation, and a local slope of the curve, in degrees. These slopes were then used to orient a pitot-static probe to obtain the dynamic pressure data presented in Section 4. The power law equation was of the form

$$z/D_{eff} = K(x/D_{eff})^n \qquad 3\text{-}1$$

The trajectory data may be found in the following tables (also listed below are the appropriate values of K and n):

| Configuration | R | Table | K | n |
|---|---|---|---|---|
| No Plug | 8 | 3-1 | 7.0 | 0.325 |
| | 6 | 3-2 | 5.37 | 0.333 |
| | 4 | 3-3 | 3.66 | 0.324 |
| | 2.5 | 3-4 | 2.55 | 0.328 |
| Round Plug Flush | 8 | 3-5 | 6.04 | 0.337 |
| | 6 | 3-6 | 4.73 | 0.345 |
| | 4 | 3-7 | 3.15 | 0.370 |
| | 2.5 | 3-8 | 2.07 | 0.398 |
| Round Plug Down 0.5 $D_n$ | 8 | 3-9 | 6.14 | 0.334 |
| | 6 | 3-10 | 4.73 | 0.350 |
| | 4 | 3-11 | 3.33 | 0.353 |
| | 2.5 | 3-12 | 2.35 | 0.343 |
| Round Plug Down 1.0 $D_n$ | 8 | 3-13 | 6.64 | 0.326 |
| | 6 | 3-14 | 5.02 | 0.335 |
| | 4 | 3-15 | 3.44 | 0.329 |
| | 2.5 | 3-16 | 2.41 | 0.330 |
| Flat Plug Flush | 8 | 3-17 | 6.13 | 0.320 |
| | 6 | 3-18 | 4.85 | 0.322 |
| | 4 | 3-19 | 2.97 | 0.373 |
| | 2.5 | 3-20 | 2.23 | 0.377 |

| Configuration | R | Table | K | n |
|---|---|---|---|---|
| Flat Plug Down 0.375 $D_n$ | 8 | 3-21 | 6.01 | 0.319 |
| | 6 | 3-22 | 4.59 | 0.332 |
| | 4 | 3-23 | 2.83 | 0.396 |
| | 2.5 | 3-24 | 2.15 | 0.384 |
| Flat Plug Down 0.875 $D_n$ | 8 | 3-25 | 6.36 | 0.330 |
| | 6 | 3-26 | 4.79 | 0.349 |
| | 4 | 3-27 | 3.38 | 0.348 |
| | 2.5 | 3-28 | 2.41 | 0.342 |
| Flat Plug Down 1.375 $D_n$ | 8 | 3-29 | 6.45 | 0.332 |
| | 6 | 3-30 | 4.78 | 0.348 |
| | 4 | 3-31 | 3.43 | 0.312 |
| | 2.5 | 3-32 | 2.42 | 0.318 |

Table 3-1. Jet centerline trajectory data for no plug configuration, R = 6.

| $x/D_{eff}$ | $z/D_{eff}$ | PREDICTED $z/D_{eff}$ | SLOPE (DEGREES) |
|---|---|---|---|
| 0.955826E+00 | 0.698789E+01 | 0.689708E+01 | 0.668780E+02 |
| 0.287714E+01 | 0.969885E+01 | 0.986266E+01 | 0.480502E+02 |
| 0.479901E+01 | 0.115550E+02 | 0.116447E+02 | 0.382205E+02 |
| 0.672117E+01 | 0.129715E+02 | 0.129894E+02 | 0.320979E+02 |
| 0.864357E+01 | 0.140095E+02 | 0.140946E+02 | 0.278893E+02 |
| 0.105659E+02 | 0.151696E+02 | 0.150436E+02 | 0.248019E+02 |
| 0.124884E+02 | 0.160489E+02 | 0.158824E+02 | 0.224292E+02 |

Table 3-2. Jet centerline trajectory data for no plug configuration, R = 6.

| $x/D_{eff}$ | $z/D_{eff}$ | PREDICTED $z/D_{eff}$ | SLOPE (DEGREES) |
|---|---|---|---|
| 0.952518E+00 | 0.527681E+01 | 0.528013E+01 | 0.615825E+02 |
| 0.287261E+01 | 0.762143E+01 | 0.762911E+01 | 0.415226E+02 |
| 0.479394E+01 | 0.898912E+01 | 0.904952E+01 | 0.321841E+02 |
| 0.671540E+01 | 0.102591E+02 | 0.101258E+02 | 0.266888E+02 |
| 0.863745E+01 | 0.110651E+02 | 0.110121E+02 | 0.230280E+02 |
| 0.105597E+02 | 0.117489E+02 | 0.117751E+02 | 0.203935E+02 |
| 0.124820E+02 | 0.123595E+02 | 0.124503E+02 | 0.183944E+02 |

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Table 3-3. Jet centerline trajectory data for no plug configuration, R = 4.

| $x/D_{eff}$ | $z/D_{eff}$ | PREDICTED $z/D_{eff}$ | SLOPE (DEGREES) |
|---|---|---|---|
| 0.943921E+00 | 0.356256E+01 | 0.359642E+01 | 0.509914E+02 |
| 0.286171E+01 | 0.517447E+01 | 0.515161E+01 | 0.302544E+02 |
| 0.478142E+01 | 0.620024E+01 | 0.608381E+01 | 0.224049E+02 |
| 0.670249E+01 | 0.681081E+01 | 0.678738E+01 | 0.181655E+02 |
| 0.862380E+01 | 0.734812E+01 | 0.736494E+01 | 0.154676E+02 |
| 0.105454E+02 | 0.778773E+01 | 0.786098E+01 | 0.135787E+02 |
| 0.124670E+02 | 0.825176E+01 | 0.829911E+01 | 0.121717E+02 |

Table 3-4. Jet centerline trajectory data for no plug configuration, R = 2.5.

| $x/D_{eff}$ | $z/D_{eff}$ | PREDICTED $z/D_{eff}$ | SLOPE (DEGREES) |
|---|---|---|---|
| 0.919157E+00 | 0.249795E+01 | 0.247767E+01 | 0.414518E+02 |
| 0.283165E+01 | 0.357251E+01 | 0.358222E+01 | 0.225143E+02 |
| 0.474848E+01 | 0.420748E+01 | 0.424342E+01 | 0.163203E+02 |
| 0.666675E+01 | 0.469592E+01 | 0.474241E+01 | 0.131202E+02 |
| 0.858622E+01 | 0.506225E+01 | 0.515234E+01 | 0.111234E+02 |
| 0.105038E+02 | 0.562395E+01 | 0.550413E+01 | 0.974249E+01 |
| 0.124244E+02 | 0.586817E+01 | 0.581547E+01 | 0.871923E+01 |

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Table 3-5. Jet centerline trajectory data for round plug flush configuration, R = 8.

| $x/D_{eff}$ | $z/D_{eff}$ | PREDICTED $z/D_{eff}$ | SLOPE (DEGREES) |
|---|---|---|---|
| 0.136762E+01 | 0.666814E+01 | 0.670725E+01 | 0.588423E+02 |
| 0.411283E+01 | 0.980825E+01 | 0.972312E+01 | 0.385645E+02 |
| 0.685891E+01 | 0.116225E+02 | 0.115535E+02 | 0.295996E+02 |
| 0.960532E+01 | 0.129135E+02 | 0.129430E+02 | 0.244385E+02 |
| 0.123519E+02 | 0.139951E+02 | 0.140887E+02 | 0.210399E+02 |
| 0.150984E+02 | 0.151115E+02 | 0.150757E+02 | 0.186103E+02 |
| 0.178451E+02 | 0.159140E+02 | 0.159499E+02 | 0.167742E+02 |

Table 3-6. Jet centerline trajectory data for round plug flush configuration, R = 6.

| $x/D_{eff}$ | $z/D_{eff}$ | PREDICTED $z/D_{eff}$ | SLOPE (DEGREES) |
|---|---|---|---|
| 0.136363E+01 | 0.527045E+01 | 0.526605E+01 | 0.531303E+02 |
| 0.410777E+01 | 0.771275E+01 | 0.770611E+01 | 0.329316E+02 |
| 0.685324E+01 | 0.910836E+01 | 0.919569E+01 | 0.248572E+02 |
| 0.959872E+01 | 0.105040E+02 | 0.103300E+02 | 0.203836E+02 |
| 0.123451E+02 | 0.112018E+02 | 0.112676E+02 | 0.174913E+02 |
| 0.150914E+02 | 0.118996E+02 | 0.120768E+02 | 0.154453E+02 |
| 0.178374E+02 | 0.129463E+02 | 0.127944E+02 | 0.139095E+02 |

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Table 3-7. Jet centerline trajectory data for round plug flush configuration, R = 4.

| $x/D_{eff}$ | $z/D_{eff}$ | PREDICTED $z/D_{eff}$ | SLOPE (DEGREES) |
|---|---|---|---|
| 0.135373E+01 | 0.348443E+01 | 0.352026E+01 | 0.438873E+02 |
| 0.409479E+01 | 0.536849E+01 | 0.530133E+01 | 0.255893E+02 |
| 0.683838E+01 | 0.648697E+01 | 0.640869E+01 | 0.191192E+02 |
| 0.958306E+01 | 0.726999E+01 | 0.726070E+01 | 0.156559E+02 |
| 0.123283E+02 | 0.788056E+01 | 0.796976E+01 | 0.134483E+02 |
| 0.150733E+02 | 0.857836E+01 | 0.858497E+01 | 0.118969E+02 |
| 0.178188E+02 | 0.910171E+01 | 0.913313E+01 | 0.107355E+02 |

Table 3-8. Jet centerline trajectory data for round plug flush configuration, R = 2.5.

| $x/D_{eff}$ | $z/D_{eff}$ | PREDICTED $z/D_{eff}$ | SLOPE (DEGREES) |
|---|---|---|---|
| 0.132648E+01 | 0.220785E+01 | 0.231990E+01 | 0.348899E+02 |
| 0.405862E+01 | 0.374294E+01 | 0.362346E+01 | 0.195947E+02 |
| 0.679625E+01 | 0.471982E+01 | 0.445037E+01 | 0.146332E+02 |
| 0.953664E+01 | 0.541758E+01 | 0.509401E+01 | 0.120234E+02 |
| 0.122839E+02 | 0.541758E+01 | 0.563503E+01 | 0.103655E+02 |
| 0.150243E+02 | 0.611535E+01 | 0.610617E+01 | 0.920491E+01 |
| 0.177715E+02 | 0.611535E+01 | 0.652903E+01 | 0.833392E+01 |

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Table 3-9. Jet centerline trajectory data for round plug down 0.5 $D_n$ configuration, R = 8.

| $x/D_{eff}$ | $z/D_{eff}$ | PREDICTED $z/D_{eff}$ | SLOPE (DEGREES) |
|---|---|---|---|
| 0.110691E+01 | 0.639540E+01 | 0.635313E+01 | 0.624844E+02 |
| 0.333197E+01 | 0.908248E+01 | 0.918463E+01 | 0.426753E+02 |
| 0.555781E+01 | 0.107796E+02 | 0.108989E+02 | 0.332609E+02 |
| 0.778375E+01 | 0.123353E+02 | 0.121986E+02 | 0.276626E+02 |
| 0.100101E+02 | 0.133252E+02 | 0.132694E+02 | 0.239113E+02 |
| 0.122365E+02 | 0.143152E+02 | 0.141914E+02 | 0.212015E+02 |
| 0.144633E+02 | 0.148809E+02 | 0.150075E+02 | 0.191397E+02 |

Table 3-10. Jet centerline trajectory data for round plug down 0.5 $D_n$ configuration, R = 6.

| $x/D_{eff}$ | $z/D_{eff}$ | PREDICTED $z/D_{eff}$ | SLOPE (DEGREES) |
|---|---|---|---|
| 0.110270E+01 | 0.497911E+01 | 0.488947E+01 | 0.571709E+02 |
| 0.332664E+01 | 0.707220E+01 | 0.719268E+01 | 0.370815E+02 |
| 0.555172E+01 | 0.842988E+01 | 0.860279E+01 | 0.284426E+02 |
| 0.777702E+01 | 0.964614E+01 | 0.967852E+01 | 0.235101E+02 |
| 0.100029E+02 | 0.104947E+02 | 0.105686E+02 | 0.202705E+02 |
| 0.122285E+02 | 0.114847E+02 | 0.113375E+02 | 0.179567E+02 |
| 0.144546E+02 | 0.122201E+02 | 0.120200E+02 | 0.162081E+02 |

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Table 3-11. Jet centerline trajectory data for round plug down 0.5 $D_n$ configuration, R = 4.

| $x/D_{eff}$ | $z/D_{eff}$ | PREDICTED $z/D_{eff}$ | SLOPE (DEGREES) |
|---|---|---|---|
| 0.109148E+01 | 0.347353E+01 | 0.343521E+01 | 0.480215E+02 |
| 0.331247E+01 | 0.502920E+01 | 0.508413E+01 | 0.284587E+02 |
| 0.553559E+01 | 0.604745E+01 | 0.609498E+01 | 0.212476E+02 |
| 0.775973E+01 | 0.681114E+01 | 0.686708E+01 | 0.173551E+02 |
| 0.998409E+01 | 0.751826E+01 | 0.750634E+01 | 0.148692E+02 |
| 0.122092E+02 | 0.802739E+01 | 0.805909E+01 | 0.131215E+02 |
| 0.144337E+02 | 0.870623E+01 | 0.854979E+01 | 0.118150E+02 |

Table 3-12. Jet centerline trajectory data for round plug down 0.5 $D_n$ configuration, R = 2.5.

| $x/D_{eff}$ | $z/D_{eff}$ | PREDICTED $z/D_{eff}$ | SLOPE (DEGREES) |
|---|---|---|---|
| 0.105932E+01 | 0.246372E+01 | 0.239592E+01 | 0.378189E+02 |
| 0.327504E+01 | 0.342534E+01 | 0.352939E+01 | 0.202966E+02 |
| 0.549413E+01 | 0.410413E+01 | 0.421510E+01 | 0.147509E+02 |
| 0.771389E+01 | 0.472636E+01 | 0.473571E+01 | 0.118977E+02 |
| 0.993601E+01 | 0.515061E+01 | 0.516554E+01 | 0.101161E+02 |
| 0.121588E+02 | 0.551829E+01 | 0.553612E+01 | 0.888125E+01 |
| 0.143792E+02 | 0.608395E+01 | 0.586416E+01 | 0.796737E+01 |

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Table 3-13. Jet centerline trajectory data for round plug down 1.0 $D_n$ configuration, R = 8.

| $x/D_{eff}$ | $z/D_{eff}$ | PREDICTED $z/D_{eff}$ | SLOPE (DEGREES) |
|---|---|---|---|
| 0.971286E+00 | 0.668173E+01 | 0.657792E+01 | 0.655998E+02 |
| 0.292447E+01 | 0.921428E+01 | 0.941692E+01 | 0.463467E+02 |
| 0.487819E+01 | 0.110020E+02 | 0.111235E+02 | 0.365842E+02 |
| 0.683221E+01 | 0.123924E+02 | 0.124126E+02 | 0.305990E+02 |
| 0.878639E+01 | 0.135593E+02 | 0.134718E+02 | 0.265231E+02 |
| 0.107408E+02 | 0.144532E+02 | 0.143819E+02 | 0.235502E+02 |
| 0.126952E+02 | 0.152974E+02 | 0.151862E+02 | 0.212749E+02 |

Table 3-14. Jet centerline trajectory for round plug down 1.0 $D_n$ configuration, R = 6.

| $x/D_{eff}$ | $z/D_{eff}$ | PREDICTED $z/D_{eff}$ | SLOPE (DEGREES) |
|---|---|---|---|
| 0.967725E+00 | 0.499169E+01 | 0.496674E+01 | 0.598073E+02 |
| 0.291973E+01 | 0.710214E+01 | 0.718904E+01 | 0.395063E+02 |
| 0.487263E+01 | 0.859188E+01 | 0.853399E+01 | 0.303913E+02 |
| 0.682631E+01 | 0.953538E+01 | 0.955398E+01 | 0.251113E+02 |
| 0.878010E+01 | 0.104044E+02 | 0.103942E+02 | 0.216247E+02 |
| 0.107342E+02 | 0.110748E+02 | 0.111177E+02 | 0.191281E+02 |
| 0.126881E+02 | 0.118196E+02 | 0.117580E+02 | 0.172402E+02 |

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Table 3-15. Jet centerline trajectory for round plug down 1.0 $D_n$ configuration, R = 4.

| $x/D_{eff}$ | $z/D_{eff}$ | PREDICTED $z/D_{eff}$ | SLOPE (DEGREES) |
|---|---|---|---|
| 0.958267E+00 | 0.337251E+01 | 0.339333E+01 | 0.493211E+02 |
| 0.290752E+01 | 0.493672E+01 | 0.488658E+01 | 0.289077E+02 |
| 0.485952E+01 | 0.575607E+01 | 0.578492E+01 | 0.213619E+02 |
| 0.681190E+01 | 0.647611E+01 | 0.646382E+01 | 0.173161E+02 |
| 0.876454E+01 | 0.712166E+01 | 0.702189E+01 | 0.147476E+02 |
| 0.107183E+02 | 0.746926E+01 | 0.750186E+01 | 0.129508E+02 |
| 0.126720E+02 | 0.784169E+01 | 0.792613E+01 | 0.116132E+02 |

Table 3-16. Jet centerline trajectory data for round plug down 1.0 $D_n$ configuration, R = 2.5.

| $x/D_{eff}$ | $z/D_{eff}$ | PREDICTED $z/D_{eff}$ | SLOPE (DEGREES) |
|---|---|---|---|
| 0.930945E+00 | 0.236302E+01 | 0.235486E+01 | 0.398896E+02 |
| 0.287414E+01 | 0.343060E+01 | 0.341771E+01 | 0.214507E+02 |
| 0.482312E+01 | 0.397680E+01 | 0.405529E+01 | 0.155265E+02 |
| 0.677182E+01 | 0.454783E+01 | 0.453648E+01 | 0.124814E+02 |
| 0.872218E+01 | 0.496989E+01 | 0.493218E+01 | 0.105835E+02 |
| 0.106739E+02 | 0.526782E+01 | 0.527250E+01 | 0.926993E+01 |
| 0.126254E+02 | 0.559058E+01 | 0.557329E+01 | 0.829872E+01 |

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Table 3-17. Jet centerline trajectory data for flat plug flush configuration, R = 8.

| $x/D_{eff}$ | $z/D_{eff}$ | PREDICTED $z/D_{eff}$ | SLOPE (DEGREES) |
|---|---|---|---|
| 0.156203E+01 | 0.701203E+01 | 0.707447E+01 | 0.554190E+02 |
| 0.469517E+01 | 0.100775E+02 | 0.100642E+02 | 0.344718E+02 |
| 0.782889E+01 | 0.120681E+02 | 0.118550E+02 | 0.258737E+02 |
| 0.109630E+02 | 0.133819E+02 | 0.132050E+02 | 0.210963E+02 |
| 0.140973E+02 | 0.141782E+02 | 0.143125E+02 | 0.180135E+02 |
| 0.172316E+02 | 0.151735E+02 | 0.152631E+02 | 0.158387E+02 |
| 0.203660E+02 | 0.159697E+02 | 0.161023E+02 | 0.142107E+02 |

Table 3-18. Jet centerline trajectory data for flat plug flush configuration, R = 6.

| $x/D_{eff}$ | $z/D_{eff}$ | PREDICTED $z/D_{eff}$ | SLOPE (DEGREES) |
|---|---|---|---|
| 0.155840E+01 | 0.557683E+01 | 0.559429E+01 | 0.491772E+02 |
| 0.469063E+01 | 0.800535E+01 | 0.798108E+01 | 0.287524E+02 |
| 0.782395E+01 | 0.939877E+01 | 0.941266E+01 | 0.212035E+02 |
| 0.109575E+02 | 0.105931E+02 | 0.104926E+02 | 0.171599E+02 |
| 0.140914E+02 | 0.114690E+02 | 0.113792E+02 | 0.145957E+02 |
| 0.172257E+02 | 0.118671E+02 | 0.121405E+02 | 0.128042E+02 |
| 0.203594E+02 | 0.129022E+02 | 0.128128E+02 | 0.114717E+02 |

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Table 3-19. Jet centerline trajectory data for flat plug flush configuration, R = 4.

| $x/D_{eff}$ | $z/D_{eff}$ | PREDICTED $z/D_{eff}$ | SLOPE (DEGREES) |
|---|---|---|---|
| 0.154984E+01 | 0.350031E+01 | 0.349856E+01 | 0.400822E+02 |
| 0.467976E+01 | 0.529183E+01 | 0.528214E+01 | 0.228208E+02 |
| 0.781151E+01 | 0.640656E+01 | 0.639385E+01 | 0.169692E+02 |
| 0.109441E+02 | 0.720280E+01 | 0.725033E+01 | 0.138730E+02 |
| 0.140770E+02 | 0.791941E+01 | 0.796371E+01 | 0.119093E+02 |
| 0.172099E+02 | 0.859621E+01 | 0.858321E+01 | 0.105327E+02 |
| 0.203431E+02 | 0.919339E+01 | 0.913543E+01 | 0.950392E+01 |

Table 3-20. Jet centerline trajectory data for flat plug flush configuration, R = 2.5.

| $x/D_{eff}$ | $z/D_{eff}$ | PREDICTED $z/D_{eff}$ | SLOPE (DEGREES) |
|---|---|---|---|
| 0.152116E+01 | 0.264419E+01 | 0.261165E+01 | 0.328954E+02 |
| 0.464575E+01 | 0.387831E+01 | 0.397730E+01 | 0.178762E+02 |
| 0.777297E+01 | 0.479395E+01 | 0.482837E+01 | 0.131714E+02 |
| 0.109012E+02 | 0.559016E+01 | 0.548452E+01 | 0.107326E+02 |
| 0.140320E+02 | 0.606789E+01 | 0.603180E+01 | 0.919888E+01 |
| 0.171639E+02 | 0.642618E+01 | 0.650743E+01 | 0.812887E+01 |
| 0.202940E+02 | 0.698353E+01 | 0.693136E+01 | 0.733218E+01 |

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Table 3-21. Jet centerline trajectory data for flat plug down 0.375 $D_n$ configuration, R = 8.

| $x/D_{eff}$ | $z/D_{eff}$ | PREDICTED $z/D_{eff}$ | SLOPE (DEGREES) |
|---|---|---|---|
| 0.142738E+01 | 0.677311E+01 | 0.673584E+01 | 0.564190E+02 |
| 0.429118E+01 | 0.950233E+01 | 0.957128E+01 | 0.354475E+02 |
| 0.715556E+01 | 0.112126E+02 | 0.112680E+02 | 0.266849E+02 |
| 0.100201E+02 | 0.125955E+02 | 0.125465E+02 | 0.217842E+02 |
| 0.128849E+02 | 0.135052E+02 | 0.135950E+02 | 0.186118E+02 |
| 0.157497E+02 | 0.145969E+02 | 0.144946E+02 | 0.163698E+02 |
| 0.186146E+02 | 0.153247E+02 | 0.152888E+02 | 0.146896E+02 |

Table 3-22. Jet centerline trajectory data for flat plug down 0.375 $D_n$ configuration, R = 6.

| $x/D_{eff}$ | $z/D_{eff}$ | PREDICTED $z/D_{eff}$ | SLOPE (DEGREES) |
|---|---|---|---|
| 0.142413E+01 | 0.513371E+01 | 0.516570E+01 | 0.502942E+02 |
| 0.428687E+01 | 0.749904E+01 | 0.744769E+01 | 0.299760E+02 |
| 0.715069E+01 | 0.888184E+01 | 0.882662E+01 | 0.222844E+02 |
| 0.100149E+02 | 0.986437E+01 | 0.987111E+01 | 0.181197E+02 |
| 0.128793E+02 | 0.107741E+02 | 0.107309E+02 | 0.154624E+02 |
| 0.157439E+02 | 0.113927E+02 | 0.114708E+02 | 0.135980E+02 |
| 0.186085E+02 | 0.120841E+02 | 0.121254E+02 | 0.122068E+02 |

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Table 3-23, Jet centerline trajectory data for flat plug down 0.375 $D_n$ configuration, R = 4.

| $x/D_{eff}$ | $z/D_{eff}$ | PREDICTED $z/D_{eff}$ | SLOPE (DEGREES) |
|---|---|---|---|
| 0.141609E+01 | 0.319911E+01 | 0.324846E+01 | 0.422342E+02 |
| 0.427598E+01 | 0.512776E+01 | 0.503055E+01 | 0.249659E+02 |
| 0.713824E+01 | 0.621944E+01 | 0.616156E+01 | 0.188601E+02 |
| 0.100010E+02 | 0.712918E+01 | 0.704123E+01 | 0.155692E+02 |
| 0.128648E+02 | 0.767502E+01 | 0.777906E+01 | 0.134578E+02 |
| 0.157281E+02 | 0.840281E+01 | 0.842297E+01 | 0.119660E+02 |
| 0.185920E+02 | 0.891227E+01 | 0.899945E+01 | 0.108443E+02 |

Table 3-24. Jet centerline trajectory data for flat plug down 0.375 $D_n$ configuration, R = 2.5.

| $x/D_{eff}$ | $z/D_{eff}$ | PREDICTED $z/D_{eff}$ | SLOPE (DEGREES) |
|---|---|---|---|
| 0.138892E+01 | 0.248912E+01 | 0.243487E+01 | 0.339800E+02 |
| 0.424473E+01 | 0.361716E+01 | 0.374119E+01 | 0.187195E+02 |
| 0.710268E+01 | 0.449048E+01 | 0.456001E+01 | 0.138654E+02 |
| 0.996217E+01 | 0.518186E+01 | 0.519346E+01 | 0.113337E+02 |
| 0.128220E+02 | 0.583685E+01 | 0.572262E+01 | 0.973679E+01 |
| 0.156839E+02 | 0.623712E+01 | 0.618352E+01 | 0.861931E+01 |
| 0.185462E+02 | 0.660101E+01 | 0.659516E+01 | 0.778522E+01 |

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Table 3-25. Jet centerline trajectory data for flat plug down 0.876 $D_n$ configuration, R = 8.

| $x/D_{eff}$ | $z/D_{eff}$ | PREDICTED $z/D_{eff}$ | SLOPE (DEGREES) |
|---|---|---|---|
| 0.111405E+01 | 0.660221E+01 | 0.658655E+01 | 0.628346E+02 |
| 0.335177E+01 | 0.950344E+01 | 0.946953E+01 | 0.429597E+02 |
| 0.559037E+01 | 0.110678E+02 | 0.112087E+02 | 0.334587E+02 |
| 0.782901E+01 | 0.125753E+02 | 0.125246E+02 | 0.278020E+02 |
| 0.100680E+02 | 0.135424E+02 | 0.136072E+02 | 0.240113E+02 |
| 0.123070E+02 | 0.145379E+02 | 0.145383E+02 | 0.212738E+02 |
| 0.145460E+02 | 0.154766E+02 | 0.153617E+02 | 0.191921E+02 |

Table 3-26. Jet centerline trajectory data for flat plug down 0.875 $D_n$ configuration, R = 6.

| $x/D_{eff}$ | $z/D_{eff}$ | PREDICTED $z/D_{eff}$ | SLOPE (DEGREES) |
|---|---|---|---|
| 0.111057E+01 | 0.500764E+01 | 0.496890E+01 | 0.573826E+02 |
| 0.334725E+01 | 0.728311E+01 | 0.730467E+01 | 0.373133E+02 |
| 0.558523E+01 | 0.856306E+01 | 0.873488E+01 | 0.286434E+02 |
| 0.782320E+01 | 0.984302E+01 | 0.982579E+01 | 0.236847E+02 |
| 0.100615E+02 | 0.108385E+02 | 0.107284E+02 | 0.204251E+02 |
| 0.123005E+02 | 0.114074E+02 | 0.115082E+02 | 0.180951E+02 |
| 0.145389E+02 | 0.123460E+02 | 0.122002E+02 | 0.163343E+02 |

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Table 3-27. Jet centerline trajectory data for flat plug down 0.875 $D_n$ configuration, R = 4.

| $x/D_{eff}$ | $z/D_{eff}$ | PREDICTED $z/D_{eff}$ | SLOPE (DEGREES) |
|---|---|---|---|
| 0.110098E+01 | 0.352307E+01 | 0.349645E+01 | 0.478611E+02 |
| 0.333519E+01 | 0.514434E+01 | 0.514211E+01 | 0.287163E+02 |
| 0.557178E+01 | 0.605453E+01 | 0.614759E+01 | 0.210058E+02 |
| 0.780866E+01 | 0.687918E+01 | 0.691381E+01 | 0.171258E+02 |
| 0.100462E+02 | 0.750513E+01 | 0.754743E+01 | 0.146522E+02 |
| 0.122839E+02 | 0.807400E+01 | 0.809456E+01 | 0.129161E+02 |
| 0.145213E+02 | 0.875664E+01 | 0.857991E+01 | 0.116195E+02 |

Table 3-28. Jet centerline trajectory data for flat plug down 0.875 $D_n$ configuration, R = 2.5.

| $x/D_{eff}$ | $z/D_{eff}$ | PREDICTED $z/D_{eff}$ | SLOPE (DEGREES) |
|---|---|---|---|
| 0.107311E+01 | 0.253887E+01 | 0.247302E+01 | 0.382569E+02 |
| 0.330246E+01 | 0.356279E+01 | 0.363304E+01 | 0.206273E+02 |
| 0.553552E+01 | 0.421695E+01 | 0.433536E+01 | 0.150017E+02 |
| 0.776972E+01 | 0.475735E+01 | 0.486865E+01 | 0.121014E+02 |
| 0.100036E+02 | 0.532619E+01 | 0.530838E+01 | 0.102910E+02 |
| 0.122396E+02 | 0.569594E+01 | 0.568772E+01 | 0.903467E+01 |
| 0.144735E+02 | 0.626479E+01 | 0.602352E+01 | 0.810453E+01 |

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Table 3-29. Jet centerline trajectory data for flat plug down 1.375 $D_n$ configuration, R = 8.

| $x/D_{eff}$ | $z/D_{eff}$ | PREDICTED $z/D_{eff}$ | SLOPE (DEGREES) |
|---|---|---|---|
| 0.100249E+01 | 0.648102E+01 | 0.645941E+01 | 0.649194E+02 |
| 0.301681E+01 | 0.919513E+01 | 0.930797E+01 | 0.456548E+02 |
| 0.503171E+01 | 0.110387E+02 | 0.110288E+02 | 0.360107E+02 |
| 0.704687E+01 | 0.124982E+02 | 0.123320E+02 | 0.301269E+02 |
| 0.906240E+01 | 0.133943E+02 | 0.134048E+02 | 0.261279E+02 |
| 0.110779E+02 | 0.143673E+02 | 0.143279E+02 | 0.232140E+02 |
| 0.130936E+02 | 0.150330E+02 | 0.151445E+02 | 0.209842E+02 |

Table 3-30. Jet centerline trajectory data for flat plug down 1.375 $D_n$ configuration, R = 6.

| $x/D_{eff}$ | $z/D_{eff}$ | PREDICTED $z/D_{eff}$ | SLOPE (DEGREES) |
|---|---|---|---|
| 0.999371E+00 | 0.478954E+01 | 0.477988E+01 | 0.589822E+02 |
| 0.301263E+01 | 0.699155E+01 | 0.701538E+01 | 0.389978E+02 |
| 0.502700E+01 | 0.834860E+01 | 0.838245E+01 | 0.301060E+02 |
| 0.704163E+01 | 0.950082E+01 | 0.942464E+01 | 0.249571E+02 |
| 0.905676E+01 | 0.102690E+02 | 0.102866E+02 | 0.215509E+02 |
| 0.110720E+02 | 0.109859E+02 | 0.110309E+02 | 0.191076E+02 |
| 0.130871E+02 | 0.117284E+02 | 0.116912E+02 | 0.172565E+02 |

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Table 3-31. Jet centerline trajectory data for flat plug down 1.375 $D_n$ configuration, R = 4.

| $x/D_{eff}$ | $z/D_{eff}$ | PREDICTED $z/D_{eff}$ | SLOPE (DEGREES) |
|---|---|---|---|
| 0.990297E+00 | 0.340190E+01 | 0.342340E+01 | 0.471310E+02 |
| 0.300153E+01 | 0.486137E+01 | 0.483652E+01 | 0.266635E+02 |
| 0.501482E+01 | 0.570633E+01 | 0.567544E+01 | 0.194270E+02 |
| 0.702880E+01 | 0.634644E+01 | 0.630511E+01 | 0.156182E+02 |
| 0.904338E+01 | 0.680733E+01 | 0.682026E+01 | 0.132259E+02 |
| 0.110580E+02 | 0.726821E+01 | 0.726140E+01 | 0.115653E+02 |
| 0.130731E+02 | 0.757547E+01 | 0.765027E+01 | 0.103352E+02 |

Table 3-32. Jet centerline trajectory data for flat plug down 1.375 $D_n$ configuration, R = 2.5.

| $x/D_{eff}$ | $z/D_{eff}$ | PREDICTED $z/D_{eff}$ | SLOPE (DEGREES) |
|---|---|---|---|
| 0.964677E+00 | 0.241349E+01 | 0.239414E+01 | 0.382874E+02 |
| 0.297101E+01 | 0.338642E+01 | 0.342401E+01 | 0.201315E+02 |
| 0.498069E+01 | 0.402651E+01 | 0.403558E+01 | 0.144517E+02 |
| 0.699243E+01 | 0.446177E+01 | 0.449542E+01 | 0.115570E+02 |
| 0.900418E+01 | 0.489703E+01 | 0.487192E+01 | 0.976500E+01 |
| 0.110172E+02 | 0.520427E+01 | 0.519484E+01 | 0.852954E+01 |
| 0.130302E+02 | 0.551152E+01 | 0.547966E+01 | 0.761870E+01 |

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## SECTION 4: JET CENTERLINE DYNAMIC PRESSURE DECAY DATA

In this section the dynamic pressure decay data along the jet centerline are presented in tabular form. These data have been taken using a pitot static probe attached to a three dimensional traverse. The probe was oriented to be tangent to the local jet centerline using data from Section 3, and then the probe was traversed in the z-direction at various x locations to find the maximum q values. The x and z locations of the pitot static probe tip have been corrected for deflections of the probe traverse. These q data are listed in non-dimensional form versus $s/D_{eff}$, where s is the arc length along the jet centerline path.

These dynamic pressure data are found in the following tables:

| Configuration | R | Table |
|---|---|---|
| No Plug | 8 | 4-1 |
| | 6 | 4-2 |
| | 4 | 4-3 |
| | 2.5 | 4-4 |
| Round Plug Flush | 8 | 4-5 |
| | 6 | 4-6 |
| | 4 | 4-7 |
| | 2.5 | 4-8 |
| Round Plug Down 0.5 $D_n$ | 8 | 4-9 |
| | 6 | 4-10 |
| | 4 | 4-11 |
| | 2.5 | 4-12 |
| Round Plug Down 1.0 $D_n$ | 8 | 4-13 |
| | 6 | 4-14 |
| | 4 | 4-15 |
| | 2.5 | 4-16 |

| Configuration | R | Table |
|---|---|---|
| Flat Plug Flush | 8 | 4-17 |
| | 6 | 4-18 |
| | 4 | 4-19 |
| | 2.5 | 4-20 |
| Flat Plug Down 0.375 $D_n$ | 8 | 4-21 |
| | 6 | 4-22 |
| | 4 | 4-23 |
| | 2.5 | 4-24 |
| Flat Plug Down 0.875 $D_n$ | 8 | 4-25 |
| | 6 | 4-26 |
| | 4 | 4-27 |
| | 2.5 | 4-28 |
| Flat Plug Down 1.375 $D_n$ | 8 | 4-29 |
| | 6 | 4-30 |
| | 4 | 4-31 |
| | 2.5 | 4-32 |

Table 4-1
Jet Centerline Decay Data for
No Plug, R = 8

| $s/D_{eff}$ | $\frac{q(s) - q_\infty}{q(0) - q_\infty}$ |
|---|---|
| 0 | 1.000 |
| 2 | 0.992 |
| 3 | 0.997 |
| 4 | 0.929 |
| 5 | 0.636 |
| 6 | 0.358 |
| 7 | 0.217 |
| 8 | 0.148 |
| 9 | 0.107 |
| 10 | 0.076 |
| 11 | 0.058 |
| 12 | 0.045 |
| 13 | 0.035 |
| 14 | 0.029 |
| 15 | 0.024 |

Table 4-2

Jet Centerline Decay Data for

No Plug, R = 6

| $s/D_{eff}$ | $\frac{q(s) - q_\infty}{q(0) - q_\infty}$ |
|---|---|
| 0 | 1.000 |
| 2 | 0.986 |
| 3 | 0.986 |
| 4 | 0.7305 |
| 5 | 0.378 |
| 6 | 0.212 |
| 7 | 0.123 |
| 8 | 0.0829 |
| 9 | 0.061 |
| 10 | 0.0427 |
| 11 | 0.033 |
| 12 | 0.027 |
| 14 | 0.022 |

Table 4-3

Jet Centerline Decay Data for No Plug, R = 4

| $s/D_{eff}$ | $\frac{q(s) - q_\infty}{q(0) - q_\infty}$ |
|---|---|
| 0 | 1.000 |
| 1 | 0.9652 |
| 2 | 0.9248 |
| 3 | 0.7752 |
| 4 | 0.3745 |
| 5 | 0.1896 |
| 6 | 0.1114 |
| 7 | 0.0705 |
| 8 | 0.0507 |
| 9 | 0.0393 |
| 10 | 0.0306 |

Table 4-4

Jet Centerline Decay Data for

No Plug, R = 2.5

| $s/D_{eff}$ | $\frac{q(s) - q_\infty}{q(0) - q_\infty}$ |
|---|---|
| 0 | 1.000 |
| 1 | 0.7366 |
| 2 | 0.6865 |
| 3 | 0.4307 |
| 4 | 0.2194 |
| 5 | 0.1269 |
| 7 | 0.0515 |
| 10 | 0.0183 |

Table 4-5
Jet Centerline Decay Data for
Round Plug Flush, R = 8

| $s/D_{eff}$ | $\frac{q(s) - q_\infty}{q(0) - q_\infty}$ |
|---|---|
| 0 | 1.0000 |
| 2 | 0.8297 |
| 3 | 0.7998 |
| 4 | 0.7455 |
| 5 | 0.4668 |
| 6 | 0.2696 |
| 7 | 0.1661 |
| 8 | 0.1046 |
| 9 | 0.0731 |
| 10 | 0.0521 |

Table 4-6
Jet Centerline Decay Data for
Round Plug Flush, R = 6

| $s/D_{eff}$ | $\frac{q(s) - q_\infty}{q(0) - q_\infty}$ |
|---|---|
| 0 | 1.0000 |
| 2 | 0.8366 |
| 3 | 0.7420 |
| 4 | 0.4840 |
| 5 | 0.2726 |
| 6 | 0.1514 |
| 7 | 0.0936 |
| 8 | 0.0613 |
| 9 | 0.040 |
| 10 | 0.03 |

Table 4-7
Jet Centerline Decay Data for
Round Plug Flush, R = 4

| $s/D_{eff}$ | $\frac{q(s) - q_\infty}{q(0) - q_\infty}$ |
|---|---|
| 0 | 1.0000 |
| 1 | 0.7932 |
| 2 | 0.7321 |
| 3 | 0.364 |
| 4 | 0.2128 |
| 5 | 0.1293 |
| 6 | 0.0773 |
| 7 | 0.0576 |
| 8 | 0.039 |
| 10 | 0.022 |

Table 4-8
Jet Centerline Decay Data for
Round Plug Flush, R = 2.5

| $s/D_{eff}$ | $\frac{q(s) - q_\infty}{q(0) - q_\infty}$ |
|---|---|
| 0 | 1.0000 |
| 1 | 0.5044 |
| 2 | 0.2654 |
| 3 | 0.1313 |
| 4 | 0.0715 |
| 6 | 0.0291 |
| 8 | 0.0170 |
| 10 | 0.013 |

Table 4-9

Jet Centerline Decay Data for

Round Plug Down 0.5 $D_n$, R = 8

| $s/D_{eff}$ | $\frac{q(s) - q_\infty}{q(0) - q_\infty}$ |
|---|---|
| 0 | 1.0000 |
| 2 | 0.6944 |
| 3 | 0.693 |
| 4 | 0.5751 |
| 5 | 0.3941 |
| 6 | 0.2346 |
| 7 | 0.1588 |
| 8 | 0.1015 |
| 9 | 0.0754 |
| 10 | 0.0562 |

Table 4-10
Jet Centerline Decay Data for
Round Plug Down 0.5 $D_n$, R = 6

| $s/D_{eff}$ | $\frac{q(s) - q_\infty}{q(0) - q_\infty}$ |
|---|---|
| 0 | 1.0000 |
| 2 | 0.6972 |
| 3 | 0.6262 |
| 4 | 0.3705 |
| 5 | 0.2066 |
| 6 | 0.1175 |
| 7 | 0.0764 |
| 8 | 0.052 |
| 9 | 0.038 |
| 10 | 0.0266 |

Table 4-11

Jet Centerline Decay Data for

Round Plug Down 0.5 $D_n$, R = 4

| $s/D_{eff}$ | $\frac{q(s) - q_\infty}{q(0_- - q_\infty}$ |
|---|---|
| 0 | 1.0000 |
| 1 | 0.6978 |
| 2 | 0.6445 |
| 3 | 0.4344 |
| 4 | 0.2205 |
| 5 | 0.1226 |
| 6 | 0.0719 |
| 7 | 0.0508 |
| 8 | 0.0367 |
| 9 | 0.0265 |
| 10 | 0.020 |

Table 4-12

Jet Centerline Decay Data for

Round Plug Down 0.5 $D_n$, R = 2.5

| $s/D_{eff}$ | $\frac{q(s) - q_\infty}{q(0) - q_\infty}$ |
|---|---|
| 0 | 1.0000 |
| 1 | 0.6272 |
| 2 | 0.5565 |
| 3 | 0.3465 |
| 4 | 0.1748 |
| 6 | 0.062 |
| 8 | 0.0352 |
| 10 | 0.0234 |

Table 4-13

Jet Centerline Decay Data for

Round Plug Down 1.0 $D_n$, R = 8

| $s/D_{eff}$ | $\frac{q(s) - q_\infty}{q(0) - q_\infty}$ |
|---|---|
| 0 | 1.0709 |
| 3 | 0.9902 |
| 4 | 0.908 |
| 5 | 0.5385 |
| 6 | 0.3295 |
| 7 | 0.1745 |
| 8 | 0.1159 |
| 9 | 0.0892 |
| 10 | 0.0638 |
| 12 | 0.0413 |
| 15 | 0.0206 |

Table 4-14
Jet Centerline Decay Data for
Round Plug Down 1.0 $D_n$, R = 6

| $s/D_{eff}$ | $\frac{q(s) - q_\infty}{q(0) - q_\infty}$ |
|---|---|
| 0 | 1.0000 |
| 2 | 1.0007 |
| 3 | 0.981 |
| 4 | 0.624 |
| 5 | 0.3611 |
| 6 | 0.2086 |
| 7 | 0.1410 |
| 8 | 0.0931 |
| 9 | 0.0706 |
| 10 | 0.0508 |

Table 4-15

Jet Centerline Decay Data for

Round Plug Down 1.0 $D_n$, R = 4

| $s/D_{eff}$ | $\frac{q(s) - q_\infty}{q(0) - q_\infty}$ |
|---|---|
| 0 | 1.0000 |
| 1 | 0.9585 |
| 2 | 0.9539 |
| 3 | 0.7124 |
| 4 | 0.3683 |
| 5 | 0.2039 |
| 6 | 0.1287 |
| 7 | 0.0865 |
| 8 | 0.0640 |
| 9 | 0.0490 |
| 10 | 0.0410 |

Table 4-16

Jet Centerline Decay Data for

Round Plug Down 1.0 $D_n$, R = 2.5

| $s/D_{eff}$ | $\frac{q(s) - q_\infty}{q(0) - q_\infty}$ |
|---|---|
| 0 | 1.0000 |
| 1 | 0.7054 |
| 2 | 0.6557 |
| 3 | 0.4000 |
| 4 | 0.2327 |
| 5 | 0.1281 |
| 6 | 0.0886 |
| 7 | 0.060 |
| 8 | 0.047 |
| 10 | 0.030 |

Table 4-17
Jet Centerline Decay Data for
Square Plug Flush, R = 8

| $s/D_{eff}$ | $\frac{q(s) - q_\infty}{q(0) - q_\infty}$ |
|---|---|
| 0 | 1.0000 |
| 2 | 0.7166 |
| 3 | 0.7166 |
| 4 | 0.4881 |
| 5 | 0.3839 |
| 6 | 0.2067 |
| 7 | 0.1536 |
| 8 | 0.1134 |
| 9 | 0.077 |
| 10 | 0.0596 |

Table 4-18
Jet Centerline Decay Data for
Square Plug Flush, R = 6

| $s/D_{eff}$ | $\frac{q(s) - q_\infty}{q(0) - q_\infty}$ |
|---|---|
| 0 | 1.0000 |
| 2 | 0.7798 |
| 3 | 0.661 |
| 4 | 0.4714 |
| 5 | 0.3090 |
| 6 | 0.1873 |
| 7 | 0.1125 |
| 8 | 0.0757 |
| 10 | 0.039 |

Table 4-19
Jet Centerline Decay Data for
Square Plug Flush, R = 4

| $s/D_{eff}$ | $\frac{q(s) - q_\infty}{q(0) - q_\infty}$ |
|---|---|
| 0 | 1.0000 |
| 1 | 0.6851 |
| 2 | 0.6216 |
| 3 | 0.3377 |
| 4 | 0.1906 |
| 5 | 0.1179 |
| 6 | 0.0763 |
| 7 | 0.0574 |
| 8 | 0.042 |
| 10 | 0.025 |

Table 4-20
Jet Centerline Decay Data for
Square Plug Flush, R = 2.5

| $s/D_{eff}$ | $\frac{q(s) - q_\infty}{q(0) - q_\infty}$ |
|---|---|
| 0 | 1.0000 |
| 1 | 0.409 |
| 2 | 0.500 |
| 3 | 0.2024 |
| 4 | 0.108 |
| 6 | 0.039 |
| 8 | 0.0201 |
| 10 | 0.0180 |

Table 4-21
Jet Centerline Decay Data for
Square Plug Down 0.375 $D_n$, R = 8

| $s/D_{eff}$ | $\frac{q(s) - q_\infty}{q(0) - q_\infty}$ |
|---|---|
| 0 | 1.0000 |
| 2 | 0.7415 |
| 3 | 0.7688 |
| 4 | 0.6385 |
| 5 | 0.40725 |
| 6 | 0.2298 |
| 7 | 0.1406 |
| 8 | 0.0922 |
| 9 | 0.0586 |
| 10 | 0.0428 |

Table 4-22

Jet Centerline Decay Data for

Square Plug Down 0.375 $D_n$, R = 6

| $s/D_{eff}$ | $\frac{q(s) - q_\infty}{q(0) - q_\infty}$ |
|---|---|
| 0 | 1.0000 |
| 2 | 0.8288 |
| 3 | 0.7675 |
| 4 | 0.4520 |
| 5 | 0.2534 |
| 6 | 0.1344 |
| 7 | 0.0842 |
| 8 | 0.0575 |
| 9 | 0.042 |
| 10 | 0.033 |

Table 4-23

Jet Centerline Decay Data for

Square Plug Down 0.375 $D_n$, R = 4

| $s/D_{eff}$ | $\frac{q(s) - q_\infty}{q(0) - q_\infty}$ |
|---|---|
| 0 | 1.0000 |
| 1 | 0.7863 |
| 2 | 0.6744 |
| 3 | 0.4134 |
| 4 | 0.218 |
| 5 | 0.1265 |
| 6 | 0.081 |
| 8 | 0.038 |
| 10 | 0.024 |

Table 4-24
Jet Centerline Decay Data for
Square Plug Down 0.375 $D_n$, R = 2.5

| $s/D_{eff}$ | $\frac{q(s) - q_\infty}{q(0) - q_\infty}$ |
|---|---|
| 0 | 1.0000 |
| 1 | 0.4781 |
| 2 | 0.3328 |
| 3 | 0.1309 |
| 4 | 0.0782 |
| 6 | 0.032 |

Table 4-25

Jet Centerline Decay Data for

Square Plug Down 0.875 $D_n$, R = 8

| $s/D_{eff}$ | $\frac{q(s) - q_\infty}{q(0) - q_\infty}$ |
|---|---|
| 0 | 1.0000 |
| 2 | 0.6538 |
| 3 | 0.6439 |
| 4 | 0.549 |
| 5 | 0.4746 |
| 6 | 0.3447 |
| 7 | 0.1692 |
| 8 | 0.1082 |
| 9 | 0.0765 |
| 10 | 0.0531 |

Table 4-26
Jet Centerline Decay Data for
Square Plug Down 0.875 $D_n$, R = 6

| $s/D_{eff}$ | $\frac{q(s) - q_\infty}{q(0) - q_\infty}$ |
|---|---|
| 0 | 1.0000 |
| 2 | 0.6461 |
| 3 | 0.644 |
| 4 | 0.6036 |
| 5 | 0.2771 |
| 6 | 0.1359 |
| 7 | 0.0875 |
| 8 | 0.0609 |
| 9 | 0.0420 |
| 10 | 0.0323 |

Table 4-27
Jet Centerline Decay Data for
Square Plug Down 0.875 $D_n$, R = 4

| $s/D_{eff}$ | $\frac{q(s) - q_\infty}{q(0) - q_\infty}$ |
|---|---|
| 0 | 1.0000 |
| 1 | 0.6405 |
| 2 | 0.6160 |
| 3 | 0.4647 |
| 4 | 0.2366 |
| 5 | 0.1248 |
| 6 | 0.0791 |
| 7 | 0.052 |
| 8 | 0.0383 |
| 9 | 0.027 |
| 10 | 0.018 |

Table 4-28

Jet Centerline Decay Data for

Square Plug Down 0.875 $D_n$, R = 2.5

| $s/D_{eff}$ | $\frac{q(s) - q_\infty}{q(0) - q_\infty}$ |
|---|---|
| 0 | 1.0000 |
| 1 | 0.6149 |
| 2 | 0.5542 |
| 3 | 0.3415 |
| 4 | 0.1809 |
| 6 | 0.0642 |
| 8 | 0.0312 |
| 10 | 0.022 |

Table 4-29

Jet Centerline Decay Data for

Square Plug Down 1.375 $D_n$, R = 8

| $s/D_{eff}$ | $\frac{q(s) - q_\infty}{q(0) - q_\infty}$ |
|---|---|
| 0 | 1.0000 |
| 2 | 0.8740 |
| 3 | 0.8564 |
| 4 | 0.6636 |
| 5 | 0.6019 |
| 6 | 0.3412 |
| 7 | 0.2147 |
| 8 | 0.1607 |
| 9 | 0.1110 |
| 10 | 0.083 |

Table 4-30

Jet Centerline Decay Data for

Square Plug Down 1.375 $D_n$, R = 6

| $s/D_{eff}$ | $\frac{q(s) - q_\infty}{q(0) - q_\infty}$ |
|---|---|
| 0 | 1.0000 |
| 2 | 0.8266 |
| 3 | 0.758 |
| 4 | 0.557 |
| 5 | 0.3383 |
| 6 | 0.1830 |
| 7 | 0.125 |
| 8 | 0.0881 |
| 9 | 0.066 |
| 10 | 0.051 |

Table 4-31

Jet Centerline Decay Data for

Square Plug Down 1.375 $D_n$, R = 4

| $s/D_{eff}$ | $\frac{q(s) - q_\infty}{q(0) - q_\infty}$ |
|---|---|
| 0 | 1.0000 |
| 1 | 0.7405 |
| 2 | 0.7030 |
| 3 | 0.602 |
| 4 | 0.3294 |
| 5 | 0.1901 |
| 6 | 0.115 |
| 7 | 0.080 |
| 8 | 0.0573 |
| 9 | 0.0465 |
| 10 | 0.035 |

Table 4-32

Jet Centerline Decay Data for

Square Plug Down 1.375 $D_n$, R = 2.5

| $s/D_{eff}$ | $\frac{q(s) - q_\infty}{q(0) - q_\infty}$ |
|---|---|
| 0 | 1.0000 |
| 2 | 0.655 |
| 3 | 0.404 |
| 4 | 0.2192 |
| 5 | 0.1348 |
| 6 | 0.0888 |
| 7 | 0.0628 |
| 8 | 0.046 |
| 9 | 0.035 |
| 10 | 0.028 |

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