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Pitot Pressure Measurements in Flow Fields Behind Circular-Arc Nozzles With Exhaust Jets at Subsonic Free-Stream Mach Numbers

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SUMMARY

An experimental investigation of the flow field behind a circular-arc nozzle with an exhaust jet has been conducted. A conical probe was used to measure the pitot pressure in the jet and free-stream regions. Two convergent nozzle configurations were tested at free-stream Mach numbers of 0.40, 0.60, and 0.80 with nozzle pressure ratios of 2.0, 2.9, and 5.0. Data were taken by traversing the probe from the jet center line into the free stream at seven data acquisition stations. The survey began at the nozzle exit and extended downstream. A comparison of the pitot pressure data with results of inviscid jet plume theory illustrates application of the experimental results. The inviscid theory is applicable to the test conditions only where viscous effects are minimal; in these regions, the theoretical pitot pressures in the jet agree well with the experimental data.

INTRODUCTION

Computational models are currently under development for the solution of the two-dimensional and three-dimensional Navier-Stokes equations as applied to internal and external nozzle flow and exhaust jet flow. These models must include the effects of jet interactions with the free-stream flow field. An accurate computational technique requires a detailed representation of such flow phenomena as shear layers, mixing regions, and jet entrainment. Experimental data are needed to extend the analysis of nozzle flow-field behavior including interactions between the jet and the free stream. Earlier flow-field investigations (ref. 1, for example) surveyed external flow fields or were conducted under predominantly ideal conditions. These studies have generally neglected the effects of large boattail angles, of engine operation at other than design conditions, and of separation of the boundary layer on the nozzle external surface.

To define the complex flow field behind a nozzle with an exhaust jet, some particular flow parameter or parameters, such as local Mach number or total pressure, must be measured at specific locations in the jet, in the jet and free-stream mixing region, and in the external free stream. Pressure data may be acquired by traversing a pitot probe through the survey region. At subsonic conditions, the pitot pressure or impact pressure, measured by the survey probe, is the local total pressure. To obtain local total pressure at supersonic conditions, additional measurements of local Mach number or local static pressure are necessary. In supersonic flow regions, which may occur in an exhaust jet, local static pressure and Mach number are extremely difficult to measure accurately.

The finite size of the survey probe and large flow-field gradients result in interference effects which may bias data measurements. However, the pitot pressure may be used instead of local total pressure to define dominant flow-field characteristics. Pitot data can indicate boundary-layer and shock-wave locations as well as magnitudes of local flow parameters. The comparison of computed pitot pressures with experimental pitot data provides a basis for the evaluation of computational flow-field models.

To obtain flow-field data with realistic nozzle configurations which represent various subsonic and transonic engine-operating conditions, an experiment has been conducted in the Langley 16-foot transonic tunnel. This experimental flow-field investigation was designed to measure local pitot pressure by traversing a conical probe from the jet center line through the shear layer and into the free-stream region. The experiment is a continuation of an extensive investigation to establish a comprehensive data base (refs. 2 to 4) for a series of convergent nozzles. Two convergent nozzle configurations with external circular-arc geometry were used. The free-stream velocity was set at Mach numbers of 0.40, 0.60, and 0.80. At each Mach number, pressure data were taken at ratios of jet total pressure to free-stream static pressure of 2.0, 2.9, and 5.0.

SYMBOLS

Symbols in parentheses are used in the computer-generated tables.

C_p		pressure coefficient
D		maximum nozzle diameter, cm
d_b		nozzle base diameter, cm
d_e		nozzle exit diameter, cm
l		nozzle length, cm
M	(M)	free-stream Mach number
$p_{t,j}$		jet total pressure, Pa
$\frac{p_{t,j}}{p}$	(NPR)	ratio of jet total pressure to free-stream static pressure
N_{Re}		Reynolds number per meter

p		free-stream static pressure, Pa
p_t	(PT)	free-stream total pressure, Pa
$p_{t,p}$	(PTP)	local pitot pressure measured by survey probe, Pa
r	(R)	radial distance from nozzle center line, cm
r_n		nozzle boattail circular-arc radius, cm
S		nozzle convergence length, cm
s		axial coordinate in nozzle convergence section, cm
T_t		tunnel total temperature, K
t		nozzle throat length, cm
x	(X)	axial distance downstream from nose of model, cm
β		terminal boattail angle, deg
β_c		boattail chord angle, deg

APPARATUS AND TESTS

Wind Tunnel

The flow-field investigation was conducted in the Langley 16-foot transonic tunnel (ref. 5). This facility is an atmospheric wind tunnel. The test section is octagonal with eight longitudinal slots and has continuous air exchange for cooling. The tunnel Mach number ranges from 0.20 to 1.30. The average Reynolds number per meter ranges from 4.5×10^6 at a free-stream Mach number of 0.20 to 12.6×10^6 at a free-stream Mach number of 1.30.

Model Description

A single-engine air-powered nacelle model was used to generate the exhaust jet in this investigation. A photograph of the model mounted in the test section of the Langley 16-foot transonic tunnel is given in figure 1. A drawing of the exhaust-nozzle simulator is given in figure 2. The nacelle model was supported in the tunnel by a sting-strut support system. (The support strut was attached to the model as shown in fig. 2.) The center line of the model was located on the test-section center line. The center line of the sting (see fig. 1) was located 55.88 cm below the test-section center line. The sting cross section measured 5.08 cm by 10.16 cm with top and bottom capped by half-cylinders of 2.54-cm radius. The strut blade (see figs. 1 and 2) was 5 percent thick with a 50.8-cm chord in the streamwise direction. The leading and trailing edges of the strut blade were swept 45°. The model blockage was 0.099 percent of the test-section cross section; the maximum blockage cross section of the model and support system was 0.148 percent.

Two circular-arc boattail nozzle configurations were used in this experiment. The nozzle details and geometries are given in figure 3. Configuration 1 had a length to maximum diameter ratio (l/D) of 0.80 and a base diameter to maximum diameter ratio $\left(d_b/D\right)$ of 0.51; these ratios for configuration 2 were $l/D = 1.768$ and $d_b/D = 0.51$. Previous wind-tunnel investigations (refs. 2 and 4) have indicated that the shorter nozzle had separated flow over the boattail, while the longer nozzle has attached flow over the boattail region.

Survey Probe and Translating Mechanism

A conical pitot probe was used for the flow-field data acquisition. A drawing of the survey probe is given in figure 4. The probe consisted of a 15° half-angle cone with a stagnation-pressure orifice 0.05 cm in diameter located at the cone tip.

The survey probe was moved through the flow field by a translating mechanism mounted on the tunnel angle-of-attack strut. (See fig. 1.) The probe was attached to the mechanism by a support sting 2.54 cm in diameter. (See fig. 4.) The translating mechanism allows the survey probe to be positioned within a cylindrical volume approximately 1.2 m in length and 1.2 m in diameter. The probe may be translated in both the longitudinal and lateral directions and may be rolled about the axis of the probe support sting. The actual longitudinal location of the survey region is determined by the length of the probe support sting.

Tests

For the flow-field investigation, each of the nozzle configurations was tested at free-stream Mach numbers of 0.40, 0.60, and 0.80. The average Reynolds number per meter and the average tunnel total temperature are given in the following table for each free-stream Mach number. Boundary-layer transition on the model was fixed by a 0.254-cm strip of No. 90 grit, which was located 2.54 cm from the model nose. The use of a grit distribution to force boundary-layer transition is discussed in references 6 and 7.

M	N_{Re}	T_t, K
0.40	8.1×10^6	305
.60	10.9	311
.80	12.5	322

At each free-stream Mach number, flow-field surveys were made at ratios of jet total pressure to free-stream static pressure, or nozzle pressure ratios $p_{t,j}/p$, of 2.0, 2.9, and 5.0. The jet total temperature averaged 297 K throughout the tests. Seven stations were established for survey data in the flow region downstream of the nozzle exit. At each data station, the survey probe was translated from the nozzle center line out into the free-stream flow to a distance of 1 nozzle diameter. The downstream stations extended from the nozzle exit to a distance of 2 model diameters or 4 exit diameters.

INSTRUMENTATION AND ACCURACY OF DATA

Instrumentation

The local pitot pressure was measured at the tip of the conical probe with a 689.40-kPa differential pressure transducer. The jet total pressure was averaged from five total pressures which were measured with a rake of 689.40-kPa differential pressure transducers. (See figs. 2 and 3.) Free-stream static and total pressures were recorded with precision sonar mercury manometers. The tunnel total temperature was measured with a platinum resistance thermometer. The total temperature in the exhaust jet was measured with an iron-constantan thermocouple located in the nozzle interior. (See fig. 2.)

Accuracy of Data

A measurement accuracy has been estimated from the calibration of the conical survey probe. The instrument calibration results showed less than a 0.10-percent variation from a least-squares linear fit to the calibration data. To check this estimated accuracy, an error analysis was applied to the probe pressure data at $r/D = 1.0$. The standard deviation of these data was less than 0.10 percent, indicating that a 0.10-percent measurement error is a conservative estimate. The influence of free-stream total-pressure variation on the estimated measurement error was also considered. The free-stream total pressure was monitored throughout the experiment with a high-precision sonar manometer. These data showed very little total-pressure oscillation, indicating minimal effects on the pressure transducer accuracy. Thus, an estimated instrument error for the probe pressure data of 0.10 percent was assumed for the range of the experimental investigation.

Accuracies of the free-stream Mach number and free-stream static pressure were obtained from reference 8. These errors were determined at a Mach number of 1.00. The accuracy of the free-stream flow-field parameters were estimated using a root-sum-square procedure given in reference 9. These estimated errors in flow-field parameters are given in the following table:

Parameter	Error
M (ref. 8)	±0.002
p (ref. 8), kPa . .	±0.007
p_t, kPa	±0.002
$p_{t,p}$, kPa	±0.7
$p_{t,p}/p_t$	±0.007

In the Langley 16-foot transonic tunnel, the upflow is small, generally less than 0.10°. As a result, the effects of tunnel upflow on the flow-field measurements are negligible.

RESULTS AND DISCUSSION

Pitot Pressure Distributions

The results of the flow-field investigation are presented in figures 5 and 6. The pitot pressure data are also given in tables I to XVIII. Each table contains the data at all x/D stations. Tables I to IX refer to configuration 1; tables X to XVIII refer to configuration 2. In the figures, the probe pitot pressure, nondimensionalized by the free-stream total pressure, is plotted as a function of r/D. The data are shown for each x/D station. The location of the nozzle exit for configuration 1 is x/D = 9.80; the location of the nozzle exit for configuration 2 is x/D = 10.768.

The pitot pressure profiles indicate that viscous effects caused by boundary layers and shear layers are dominant in the flow field. Both configuration 1, which has separated external flow at the nozzle exit, and configuration 2, which has attached flow, show characteristics of boundary-layer defects in the data profiles. These effects are caused by the presence of boundary layers over the external nozzle surface and over the inner surface near the nozzle exit. For configuration 1, the external boundary-layer thickness at the nozzle exit, based on a total-pressure ratio $p_{t,p}/p_t$ of approximately 0.995, is approximately equal to the nozzle exit radius. For configuration 2, the external boundary-layer thickness at the nozzle exit is approximately 75 percent of the exit radius.

The difference between the jet velocity and the free-stream velocity results in shear-layer effects. The shear forces contribute to dissipation of the defects in the data profiles resulting from the internal and external boundary layers. The rate of dissipation depends on the ratio of jet velocity to free-stream velocity and, thus, varies with M and $p_{t,j}/p$. When the free-stream velocity is low and the jet velocity is high, the boundary-layer effects disappear quickly, as can be seen in figure 5(c). For this case, the boundary-layer defect is negligible at 1/2 model diameter or 1 exit diameter downstream of the nozzle exit. When there is little difference between free-stream velocity and jet velocity, as in figure 5(g), the boundary-layer defect is still evident at 4 exit diameters downstream. Figures 5 and 6 also indicate that, for the same test conditions, the boundary-layer defect disappears faster for the separated-flow nozzle of configuration 1 than for the attached-flow nozzle of configuration 2.

The flow-field data exhibit characteristics of exhaust-jet flow, such as an inviscid jet core and lip or barrel shock waves. The effects of the inviscid jet core are apparent in both figures 5 and 6. Evidence of the jet core effect is present as far as 2 model diameters or 4 exit diameters downstream of the nozzle exit for both configurations over all test conditions. The effects of lip shocks are also apparent in the pressure data, especially at $p_{t,j}/p = 5.0$.

Comparison of Experiment and Inviscid Theory

To illustrate the use of the flow-field data in the evaluation of theoretical methods, the data were compared with pitot pressure profiles calculated by the inviscid computational model of Salas (ref. 10). This method has been widely used and found reliable in the calculation of inviscid jet plume flow. The data were not compared with results of viscous computational models, since most viscous nozzle-flow codes are currently under development and have not been validated for the range of the flow-survey test conditions. The accuracy of viscous computational models cannot be evaluated until data, such as the flow-field pitot pressures, are available for comparison with the theoretical results.

Limitations of the inviscid theory prevented its application over the entire range of the experimental data. The algorithm is restricted to supersonic exit flow. At $p_{t,j}/p = 2.0$, the jet flow rapidly becomes subsonic. As a result, the algorithm was not applicable and theoretical pressure profiles were not calculated for this nozzle pressure ratio. The theoretical calculations were also limited to the first three or four x/D stations, since the inviscid algorithm fails in regions downstream of the intersection of a shock wave with the jet plume center line.

The comparisons of data with theoretical results are presented in figures 7 and 8. The experimental results are again plotted as the pitot pressure, normalized by the free-stream total pressure, against the probe location r/D. The theoretical results are presented as the local pitot pressure, normalized by the free-stream total pressure, plotted against r/D.

The exhaust-jet calculation procedure of Salas requires a specific static-pressure distribution along the inviscid boundary between the jet and the external flow region. For a jet exhausting into a moving external stream, the static pressure varies along the boundary between the jet and the free stream. However, to limit total computational time and costs, the pressure along the jet boundary was assumed equal to the free-stream static pressure for each of the data-theory comparison cases. A pressure distribution of $C_p = 0$ was specified along the inviscid jet boundary. To estimate the error effects resulting from the $C_p = 0$ assumption, one theoretical case was computed with a variable boundary-pressure distribution for configuration 1 at a free-stream Mach number of 0.80 and $p_{t,j}/p = 5.0$. The C_p distribution applied in this case was taken from reference 11 and is plotted, along with the data-theory comparison, in figure 7(d). The comparison indicates that assuming a more realistic variable C_p distribution improves agreement between the inviscid theory and the flow-field data.

The agreement between theoretical and experimental values within the jet is optimal at the x/D station nearest the nozzle exit. Inviscid flow is dominant in the jet exit flow, since the viscous region influenced by the nozzle internal and external boundary layers and by the free-stream flow velocity is minimal. The good agreement within the jet region validates the accuracy of inviscid jet plume theory for predicting jet flow under predominantly inviscid conditions. However, the data-theory agreement decreases as the distance from the nozzle exit increases. This decrease indicates the significance and magnitude of viscous effects in the flow field. Inviscid theory becomes inadequate as viscous effects influence the jet flow.

In all the theoretical cases, a sharp discontinuity is evident in the vicinity of the jet and free-stream mixing region. This discontinuity indicates that the theory can predict the lip or barrel shock which is notable in the survey data. The shock-wave angle in the data appears steeper than the theoretical shock-wave angle. This discrepancy in the shock-wave geometry again reflects the importance of viscous effects in the flow field and illustrates the limitations of applying inviscid jet theory to a region with viscous characteristics.

By comparing the results of inviscid jet theory with the flow-field data, the validity of applying inviscid theory to the experimental conditions can be evaluated. Because the jet flow is predominantly inviscid at the nozzle exit, the theory predicts the pitot pressure accurately. When viscous effects begin to influence the jet flow, the theory is no longer adequate. The theory can predict the presence of a shock wave but cannot specify the exact location because of its restrictions to inviscid flow characteristics. Thus, the data-theory comparison illustrates the limitations of inviscid jet plume theory under the test conditions and indicates where the theory may be used with reasonable accuracy.

CONCLUDING REMARKS

An experimental investigation of the flow field behind a circular-arc nozzle with exhaust jet has been conducted. The pitot pressure was measured in the jet and free-stream regions for two nozzle configurations at subsonic free-stream Mach numbers with nozzle pressure ratios of 2.0, 2.9, and 5.0. A conical survey probe was used for the data acquisition. The probe was translated radially from the jet center line into the free-stream region at seven stations located up to 4 nozzle exit diameters downstream of the nozzle exit. The flow-field measurements provide a data base for the evaluation of two-dimensional and three-dimensional computational models for simulation of internal and external nozzle flow and exhaust jet flow. A comparison of the experimental results with results of inviscid jet plume theory illustrates the use of the flow-field data in evaluating the theory application. The theoretical jet pitot pressures show good agreement with the data in predominantly inviscid flow regions. Agreement deteriorates as viscous effects influence the flow field. As a result, the data-theory comparison defines where the theory is applicable in the range of test conditions and indicates the accuracy of the inviscid model under these conditions.

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TABLE I.- PITOT PRESSURE MEASUREMENTS FOR CONFIGURATION 1 AT $M = 0.40$ AND $p_{t,j}/p = 2.0$

X/D = 9.825		10.050		10.300		10.550		10.800		11.300		11.800	
R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT
-.001	1.7964	.003	1.7990	-.003	1.8025	.002	1.8057	.003	1.8084	-.004	1.8094	-.004	1.8101
.021	1.7999	.020	1.8021	.022	1.8041	.020	1.8032	.022	1.8061	.019	1.8084	.021	1.8072
.041	1.7969	.042	1.8061	.044	1.8083	.041	1.8117	.042	1.8046	.042	1.8103	.039	1.8134
.061	1.7893	.060	1.8114	.061	1.8097	.060	1.8089	.060	1.8136	.061	1.8161	.063	1.8121
.080	1.8005	.083	1.8125	.080	1.8133	.082	1.8173	.083	1.8133	.083	1.8138	.083	1.8044
.103	1.8081	.101	1.8108	.100	1.8141	.101	1.8162	.103	1.8189	.101	1.8074	.103	1.7850
.120	1.8095	.122	1.8115	.122	1.8148	.120	1.8179	.123	1.8156	.122	1.7989	.120	1.7538
.141	1.8089	.142	1.8132	.140	1.8130	.143	1.8122	.143	1.8021	.143	1.7561	.143	1.6974
.161	1.8056	.162	1.8085	.162	1.8108	.162	1.8006	.164	1.7633	.163	1.6906	.161	1.6321
.182	1.8030	.182	1.8078	.181	1.8030	.180	1.7465	.182	1.6883	.183	1.5927	.182	1.5465
.204	1.7987	.203	1.8053	.202	1.7260	.204	1.6228	.200	1.5866	.202	1.5037	.203	1.4604
.210	1.8018	.212	1.7885	.210	1.6748	.213	1.5394	.213	1.5025	.212	1.4568	.213	1.4145
.213	1.8006	.222	1.7107	.224	1.5411	.223	1.4632	.224	1.4269	.222	1.3987	.221	1.3880
.220	1.7994	.232	1.5403	.232	1.4391	.231	1.3883	.231	1.3772	.234	1.3419	.231	1.3471
.231	1.7899	.241	1.3769	.240	1.3541	.240	1.3244	.243	1.3053	.243	1.3104	.242	1.3070
.232	1.7778	.252	1.1865	.252	1.2431	.254	1.2358	.252	1.2600	.254	1.2672	.255	1.2690
.236	1.7398	.263	1.0537	.263	1.1431	.263	1.1772	.262	1.2099	.264	1.2274	.260	1.2477
.242	1.4574	.273	.9914	.272	1.0925	.271	1.1350	.272	1.1681	.273	1.1956	.273	1.2120
.244	1.4262	.280	.9685	.281	1.0488	.282	1.0914	.282	1.1254	.283	1.1665	.279	1.1968
.248	1.1070	.292	.9602	.291	1.0171	.291	1.0619	.293	1.0943	.290	1.1473	.294	1.1657
.252	.9266	.302	.9611	.301	.9931	.302	1.0317	.305	1.0629	.302	1.1160	.303	1.1424
.262	.9066	.322	.9676	.322	.9764	.322	.9982	.322	1.0238	.322	1.0738	.321	1.1055
.266	.9079	.341	.9736	.341	.9785	.343	.9855	.341	1.0027	.342	1.0405	.342	1.0703
.272	.9096	.362	.9790	.362	.9837	.361	.9863	.362	.9918	.362	1.0175	.360	1.0473
.280	.9123	.383	.9847	.381	.9883	.383	.9914	.382	.9924	.381	1.0043	.380	1.0260
.292	.9164	.403	.9905	.400	.9939	.404	.9954	.402	.9953	.405	.9990	.403	1.0108
.301	.9234	.450	.9984	.450	.9995	.450	.9988	.450	.9996	.451	.9996	.451	1.0004
.323	.9418	.501	.9997	.503	.9994	.503	.9995	.500	.9997	.502	.9997	.502	.9997
.341	.9536	.602	1.0000	.602	.9997	.602	.9995	.604	.9997	.601	.9997	.605	.9996
.361	.9623	.701	.9996	.702	.9997	.701	.9997	.705	.9996	.701	.9995	.703	.9996
.383	.9713	.803	.9997	.800	.9996	.804	.9992	.803	.9997	.803	.9996	.800	.9996
.401	.9775	.898	.9995	.899	.9997	.901	.9996	.902	.9997	.902	.9996	.900	.9997
.450	.9936	1.003	.9999	1.002	.9995	.999	.9996	1.001	.9997	1.007	.9997	1.004	.9996
.500	.9992												
.602	.9996												
.701	.9996												
.803	.9996												
.903	.9999												
1.006	.9996												

TABLE II.- PITOT PRESSURE MEASUREMENTS FOR CONFIGURATION 1 AT $M = 0.40$ AND $p_{t,j}/p = 2.9$

X/D = 9.825		10.050		10.300		10.550		10.800		11.300		11.800	
R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT
-.003	2.6224	.003	2.2524	.001	2.6232	-.000	2.4164	.001	2.5654	.002	2.4410	.021	2.4046
.022	2.6249	.021	2.2412	.022	2.6301	.022	2.4106	.022	2.5652	.020	2.4256	.041	2.4190
.043	2.6342	.042	2.2308	.041	2.6374	.040	2.4255	.040	2.5633	.040	2.4565	.059	2.4368
.063	2.6347	.062	2.3239	.064	2.6331	.059	2.4294	.060	2.5602	.060	2.4496	.081	2.4529
.083	2.6345	.082	2.4138	.084	2.6375	.080	2.4460	.080	2.5559	.080	2.4617	.099	2.4582
.102	2.6373	.101	2.4574	.101	2.6414	.101	2.4547	.102	2.5475	.101	2.4747	.122	2.4543
.123	2.6363	.123	2.4905	.122	2.6412	.121	2.4741	.120	2.5418	.120	2.4846	.141	2.4193
.142	2.6333	.142	2.5140	.142	2.6295	.140	2.4831	.140	2.5362	.140	2.4781	.160	2.3576
.162	2.6297	.163	2.5270	.161	2.5813	.160	2.4979	.161	2.5193	.161	2.4386	.181	2.2234
.181	2.6220	.182	2.5383	.183	2.5650	.180	2.4959	.181	2.4394	.180	2.3294	.201	2.0332
.202	2.5996	.203	2.5510	.202	2.4832	.200	2.4286	.201	2.2737	.201	2.1407	.210	1.9491
.210	2.5707	.211	2.5550	.213	2.3379	.211	2.3267	.211	2.1429	.210	2.0452	.221	1.8535
.223	2.5411	.221	2.5466	.223	2.1574	.220	2.2109	.220	2.0159	.221	1.9136	.232	1.7670
.230	2.5401	.231	2.4412	.229	1.9977	.230	2.0265	.231	1.8488	.231	1.8107	.241	1.6948
.235	2.5095	.235	2.3682	.235	1.8737	.240	1.8514	.242	1.7099	.241	1.7051	.252	1.5999
.242	2.3301	.241	2.1747	.243	1.7133	.251	1.6502	.251	1.5941	.251	1.6069	.261	1.5471
.244	1.8063	.245	2.0431	.253	1.5188	.262	1.5030	.260	1.4951	.260	1.5269	.272	1.4654
.246	1.7000	.246	1.9757	.261	1.3866	.270	1.3945	.269	1.4058	.271	1.4466	.281	1.4254
.247	1.2208	.254	1.6342	.271	1.2679	.281	1.2819	.280	1.3191	.281	1.3775	.290	1.3507
.248	1.0823	.255	1.5825	.283	1.1499	.291	1.1983	.290	1.2480	.291	1.3243	.300	1.3176
.251	.9735	.261	1.4086	.291	1.0895	.301	1.1370	.301	1.1846	.300	1.2683	.319	1.2277
.262	.9099	.266	1.3101	.302	1.0341	.322	1.0395	.320	1.0940	.319	1.1793	.341	1.1658
.270	.9116	.271	1.1760	.321	.9866	.340	.9997	.341	1.0340	.341	1.1053	.360	1.1091
.280	.9154	.287	.9990	.340	.9817	.361	.9885	.360	1.0046	.361	1.0538	.382	1.0670
.292	.9222	.291	.9788	.361	.9859	.379	.9913	.381	.9955	.380	1.0225	.399	1.0387
.301	.9299	.300	.9654	.381	.9907	.401	.9958	.400	.9965	.400	1.0058	.449	1.0033
.320	.9468	.322	.9688	.400	.9952	.450	.9994	.452	.9993	.450	.9984	.501	.9992
.340	.9578	.342	.9748	.451	.9995	.501	.9998	.500	.9994	.500	.9986	.601	.9992
.354	.9629	.361	.9813	.502	.9998	.601	.9997	.600	.9997	.599	.9997	.700	.9992
.364	.9676	.383	.9872	.600	.9997	.703	.9998	.701	.9995	.702	.9997	.802	.9992
.381	.9737	.401	.9922	.701	.9997	.802	.9997	.801	.9995	.800	.9995	.901	.9991
.403	.9817	.456	.9994	.799	.9995	.900	.9997	.901	.9994	.902	.9995	1.001	.9992
.449	.9958	.503	1.0001	.901	.9997	.999	.9995	1.000	.9995	1.000	.9994		
.507	1.0001	.604	.9998	.998	.9997								
.600	1.0002	.702	.9998										
.707	1.0002	.805	.9998										
.804	1.0005	.902	.9999										
.901	1.0005	.998	1.0002										
1.003	1.0002												

TABLE III.- PITOT PRESSURE MEASUREMENTS FOR CONFIGURATION 1 AT $M = 0.40$ AND $p_{t,j}/p = 5.0$

X/D = 9.825		10.050		10.300		10.550		10.800		11.300		11.800	
R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT
-.001	4.4944	.000	3.5901	.001	1.9185	-.006	1.3632	.000	1.7061	.003	2.2974	-.008	3.0259
.020	4.5108	.021	3.5557	.020	1.9044	.021	1.3611	.021	1.9622	.018	2.3295	.020	3.0823
.041	4.5059	.041	3.5111	.040	1.8716	.040	1.3901	.039	2.4601	.042	2.4641	.041	3.1919
.060	4.5159	.061	3.4340	.060	1.8408	.050	1.6190	.051	3.0394	.051	2.5560	.060	3.3397
.080	4.5086	.082	3.3649	.071	1.8132	.060	2.9124	.061	3.4721	.059	2.6309	.081	3.5248
.101	4.5028	.101	3.2543	.082	1.8283	.070	3.6081	.068	3.7049	.070	2.7606	.101	3.6964
.120	4.5012	.120	3.1236	.092	2.3777	.081	3.8928	.079	3.9666	.079	2.8896	.120	3.7983
.141	4.4588	.139	2.9674	.100	2.6570	.089	4.0189	.089	4.0935	.092	3.0549	.141	3.8206
.160	4.4275	.149	2.9141	.121	2.9154	.102	4.1250	.101	4.1447	.102	3.1743	.160	3.7640
.180	4.3132	.162	2.9128	.139	3.0755	.111	4.1555	.113	4.1665	.110	3.2678	.181	3.5986
.200	4.0405	.171	3.0972	.160	3.2154	.114	4.0789	.124	4.1619	.120	3.3371	.197	3.4113
.211	3.7580	.181	3.2931	.180	3.3490	.120	3.6910	.137	4.1251	.130	3.3964	.211	3.1894
.220	3.6247	.201	3.4755	.200	3.4450	.131	3.5717	.159	4.0654	.130	3.3937	.219	3.0414
.230	3.7086	.209	3.5210	.210	3.4908	.142	3.6066	.179	3.9199	.139	3.4337	.231	2.8398
.241	3.6551	.220	3.5881	.220	3.5381	.160	3.6458	.199	3.6956	.151	3.4801	.241	2.6580
.243	3.5819	.229	3.6280	.229	3.5798	.181	3.6791	.210	3.5115	.161	3.4934	.251	2.4909
.245	3.4736	.240	3.6793	.240	3.6164	.200	3.6760	.218	3.3450	.172	3.5133	.260	2.3267
.250	2.4210	.250	3.7064	.250	3.6325	.200	3.6799	.228	3.1091	.180	3.5315	.269	2.2019
.251	2.3401	.260	3.7116	.260	3.5617	.209	3.6571	.240	2.8282	.188	3.5247	.279	2.0515
.251	2.3811	.268	3.5223	.271	3.3667	.220	3.5866	.250	2.6193	.202	3.5003	.290	1.9307
.255	1.2243	.275	3.1970	.280	3.0869	.229	3.4841	.262	2.3534	.211	3.4569	.302	1.7857
.259	.9765	.281	2.7195	.291	2.6852	.239	3.3571	.273	2.1426	.223	3.3239	.321	1.5929
.261	.9355	.288	2.1768	.299	2.3459	.250	3.1538	.283	1.9699	.232	3.1862	.341	1.4564
.270	.9121	.300	1.4895	.320	1.6727	.261	2.9117	.289	1.8541	.240	3.0245	.359	1.3411
.281	.9179	.304	1.3425	.340	1.2933	.271	2.6847	.302	1.6781	.249	2.8712	.380	1.2337
.291	.9222	.321	1.0471	.360	1.0709	.280	2.4437	.321	1.4353	.260	2.6587	.397	1.1742
.301	.9296	.341	.9703	.380	.9982	.290	2.2085	.339	1.2883	.270	2.4605	.429	1.0815
.320	.9453	.360	.9742	.399	.9909	.301	1.9405	.360	1.1518	.281	2.2455	.449	1.0432
.341	.9571	.379	.9799	.451	.9994	.320	1.5729	.382	1.0572	.290	2.0969	.496	1.0055
.360	.9655	.400	.9863	.499	.9999	.340	1.3288	.402	1.0156	.299	1.9598	.601	1.0008
.380	.9729	.449	.9973	.599	1.0000	.360	1.1363	.416	1.0047	.322	1.6509	.700	1.0008
.400	.9806	.500	.9990	.701	1.0000	.380	1.0377	.448	1.0003	.342	1.4593	.798	1.0009
.450	.9957	.599	.9991	.800	1.0000	.400	1.0047	.501	1.0004	.359	1.3246	.896	1.0008
.502	.9988	.699	.9988	.898	.9996	.450	1.0001	.604	1.0007	.380	1.2087	.997	1.0010
.600	.9994	.802	.9991	1.001	.9990	.496	1.0004	.698	1.0005	.401	1.1195		
.701	.9982	.900	.9986			.597	1.0005	.797	1.0005	.419	1.0643		
.801	.9982	1.000	.9990			.700	1.0005	.899	1.0007	.450	1.0156		
.901	.9982					.798	1.0004	1.004	1.0008	.500	1.0012		
1.000	.9994					.900	1.0004			.601	1.0009		
						.999	1.0004			.699	1.0008		
										.798	1.0009		
										.900	1.0009		
										1.000	1.0004		

TABLE IV.- PITOT PRESSURE MEASUREMENTS FOR CONFIGURATION 1 AT $M = 0.60$ AND $p_{t,j}/p = 2.0$

X/D = 9.825		10.050		10.300		10.550		10.800		11.300		11.800	
R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT
.001	1.5799	.004	1.5765	.000	1.5855	-.000	1.5737	.001	1.5753	.006	1.5706	-.004	1.5737
.020	1.5834	.020	1.5789	.022	1.5742	.020	1.5772	.025	1.5761	.020	1.5743	.022	1.5734
.040	1.5833	.039	1.5791	.041	1.5781	.041	1.5745	.043	1.5739	.042	1.5734	.040	1.5742
.061	1.5841	.061	1.5815	.062	1.5794	.061	1.5776	.063	1.5798	.063	1.5780	.059	1.5693
.082	1.5880	.080	1.5832	.083	1.5799	.081	1.5789	.079	1.5778	.081	1.5734	.081	1.5685
.099	1.5861	.101	1.5870	.099	1.5836	.103	1.5815	.105	1.5777	.104	1.5700	.101	1.5532
.119	1.5845	.120	1.5866	.119	1.5833	.122	1.5801	.120	1.5779	.124	1.5581	.122	1.5251
.142	1.5843	.142	1.5867	.141	1.5853	.143	1.5745	.143	1.5654	.143	1.5236	.142	1.4830
.161	1.5824	.161	1.5842	.158	1.5801	.164	1.5574	.161	1.5328	.165	1.4704	.161	1.4293
.181	1.5835	.181	1.5833	.181	1.5679	.182	1.5148	.183	1.4685	.181	1.4147	.183	1.3645
.198	1.5827	.199	1.5827	.203	1.5027	.202	1.4253	.204	1.3825	.198	1.3506	.203	1.3013
.209	1.5820	.210	1.5597	.212	1.4582	.213	1.3691	.211	1.3439	.213	1.2982	.213	1.2748
.220	1.5799	.220	1.5034	.222	1.3928	.224	1.2993	.223	1.2815	.222	1.2632	.221	1.2491
.231	1.5662	.231	1.3844	.230	1.3202	.231	1.2522	.230	1.2536	.235	1.2153	.234	1.2138
.236	1.5550	.240	1.2675	.241	1.2311	.244	1.1824	.240	1.2005	.241	1.1963	.244	1.1864
.236	1.5482	.240	1.2637	.252	1.1500	.252	1.1396	.251	1.1567	.250	1.1720	.255	1.1610
.241	1.3005	.243	1.2406	.262	1.0828	.263	1.0868	.262	1.1142	.263	1.1312	.264	1.1408
.246	1.1945	.249	1.1674	.272	1.0339	.274	1.0452	.269	1.0887	.272	1.1070	.274	1.1176
.246	1.2035	.258	1.0343	.280	.9982	.279	1.0260	.282	1.0465	.281	1.0860	.280	1.1049
.249	.9069	.272	.9386	.289	.9676	.293	.9927	.289	1.0318	.292	1.0602	.293	1.0814
.255	.8634	.281	.9079	.302	.9455	.300	.9767	.303	.9995	.304	1.0371	.302	1.0643
.257	.8165	.287	.9002	.323	.9339	.324	.9516	.324	.9716	.320	1.0119	.323	1.0306
.259	.8030	.302	.9012	.341	.9395	.344	.9507	.340	.9622	.343	.9877	.343	1.0094
.270	.8090	.322	.9174	.361	.9525	.362	.9584	.364	.9638	.361	.9779	.361	.9958
.281	.8128	.339	.9310	.390	.9725	.380	.9697	.380	.9706	.381	.9765	.384	.9871
.292	.8178	.360	.9462	.401	.9767	.403	.9845	.400	.9808	.404	.9838	.403	.9868
.299	.8218	.382	.9581	.430	.9920	.454	.9990	.450	.9984	.450	.9982	.455	.9979
.311	.8314	.399	.9684	.452	.9977	.498	1.0001	.503	.9999	.502	.9997	.503	.9997
.322	.8532	.430	.9887	.502	1.0001	.601	1.0001	.603	1.0000	.600	.9999	.600	.9999
.340	.8861	.452	.9962	.601	1.0001	.702	.9999	.702	1.0001	.702	.9999	.704	.9996
.361	.9143	.502	1.0004	.701	1.0001	.802	1.0000	.801	1.0000	.803	.9997	.803	.9999
.379	.9304	.599	1.0001	.799	1.0001	.902	.9999	.901	1.0000	.900	.9999	.905	.9996
.401	.9470	.700	1.0001	.899	1.0000	1.003	.9999	1.000	1.0000	.998	.9997	.997	.9996
.431	.9704	.801	.9999	1.009	1.0001							1.003	.9995
.450	.9840	.904	1.0000									1.003	.9992
.501	.9991	1.002	1.0000										
.597	.9999												
.701	.9999												
.801	.9996												
.903	.9995												
.999	.9999												

TABLE V.- PITOT PRESSURE MEASUREMENTS FOR CONFIGURATION 1 AT $M = 0.60$ AND $p_{t,j}/p = 2.9$

X/D = 9.825		10.050		10.300		10.550		10.800		11.300		11.800	
R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT
-.000	2.2827	.001	1.9091	-.010	2.2513	.002	2.0392	-.002	2.2456	-.001	2.1982	-.001	2.1110
.019	2.2859	.020	1.9042	.020	2.2825	.022	2.0642	.020	2.2653	.022	2.2128	.022	2.1289
.040	2.2938	.041	1.9506	.040	2.2902	.041	2.0853	.040	2.2748	.041	2.2130	.040	2.1332
.061	2.2979	.061	2.0803	.061	2.2879	.061	2.1077	.059	2.2727	.060	2.2144	.061	2.1411
.079	2.2974	.080	2.1415	.081	2.2982	.082	2.1262	.081	2.2739	.079	2.2148	.081	2.1572
.100	2.2989	.100	2.1760	.102	2.2942	.102	2.1351	.102	2.2693	.102	2.1963	.098	2.1635
.120	2.2954	.122	2.1990	.120	2.2997	.120	2.1488	.120	2.2661	.102	2.2092	.120	2.1530
.140	2.2904	.141	2.2160	.141	2.2941	.140	2.1654	.139	2.2559	.121	2.1995	.140	2.1215
.160	2.2842	.159	2.2222	.158	2.2928	.160	2.1756	.160	2.2258	.140	2.1804	.161	2.0467
.179	2.2730	.180	2.2291	.181	2.2804	.180	2.1753	.178	2.1544	.159	2.1277	.180	1.9426
.200	2.2352	.202	2.2360	.200	2.1728	.199	2.1192	.201	1.9717	.180	2.0257	.200	1.8199
.210	2.2124	.211	2.2350	.210	2.0760	.213	2.0204	.210	1.8807	.202	1.8658	.210	1.7528
.221	2.2229	.220	2.2026	.219	1.9257	.221	1.9276	.220	1.7702	.209	1.8094	.219	1.6884
.232	2.2026	.231	2.0730	.228	1.7617	.230	1.8066	.229	1.6545	.220	1.7109	.229	1.6129
.235	2.1752	.240	1.8265	.240	1.5624	.240	1.6547	.242	1.5262	.229	1.6321	.241	1.5317
.239	2.0371	.250	1.5725	.249	1.4335	.250	1.5247	.250	1.4512	.240	1.5420	.250	1.4782
.244	1.6454	.259	1.3073	.259	1.2912	.261	1.3922	.259	1.3738	.250	1.4736	.259	1.4260
.245	1.4887	.269	1.1017	.269	1.1782	.270	1.2948	.270	1.2922	.261	1.3946	.269	1.3737
.246	1.3084	.279	.9772	.281	1.0859	.281	1.1963	.280	1.2184	.270	1.3408	.280	1.3250
.249	1.0018	.290	.9233	.289	1.0322	.291	1.1391	.289	1.1671	.280	1.2849	.291	1.2724
.254	.8298	.301	.9094	.301	.9808	.302	1.0721	.299	1.1201	.291	1.2332	.299	1.2423
.260	.8037	.320	.9198	.321	.9474	.322	1.0009	.319	1.0405	.299	1.1974	.321	1.1642
.272	.8087	.339	.9342	.341	.9475	.340	.9687	.341	.9913	.321	1.1132	.340	1.1142
.281	.8119	.359	.9496	.359	.9573	.362	.9641	.360	.9763	.340	1.0612	.360	1.0666
.291	.8162	.382	.9637	.379	.9702	.380	.9729	.382	.9769	.361	1.0169	.380	1.0299
.300	.8235	.401	.9764	.401	.9828	.402	.9849	.401	.9845	.379	.9971	.400	1.0090
.320	.8519	.449	.9977	.448	.9994	.429	.9959	.449	.9982	.401	.9896	.450	.9989
.340	.8901	.501	1.0005	.497	.9999	.450	.9995	.499	.9997	.450	.9980	.500	.9997
.361	.9207	.599	1.0003	.597	1.0002	.499	1.0010	.601	.9995	.501	.9997	.603	.9997
.381	.9362	.701	1.0003	.702	1.0005	.601	1.0007	.700	.9994	.601	.9997	.701	.9990
.400	.9527	.799	1.0002	.797	1.0003	.700	1.0009	.801	.9995	.698	.9995	.800	.9995
.431	.9757	.901	1.0002	.901	1.0005	.801	1.0006	.903	.9998	.801	.9995	.907	.9995
.450	.9886	1.005	1.0003	1.020	1.0003	.902	1.0009	1.008	.9995	.899	.9994	1.007	.9994
.472	.9968					.998	1.0006			1.001	.9995		
.499	.9999												
.601	1.0006												
.700	1.0005												
.797	1.0003												
.898	1.0003												
1.003	1.0005												

TABLE VI.- PITOT PRESSURE MEASUREMENTS FOR CONFIGURATION 1 AT M = 0.60 AND $p_{t,j}/p = 5.0$

X/D = 9.825		10.050		10.300		10.550		10.800		11.300		11.800	
R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT
.001	3.9589	-.001	3.2301	-.000	1.6940	-.000	1.1918	-.001	1.9461	-.007	1.9878	.002	3.0404
.020	3.9562	.021	3.1995	.020	1.6875	.006	1.1903	.019	2.1494	.020	2.0271	.020	3.0896
.040	3.9570	.039	3.1705	.040	1.6589	.022	1.3155	.040	2.8675	.040	2.0882	.040	3.1899
.060	3.9544	.060	3.1149	.059	1.6351	.026	1.3173	.059	3.5008	.059	2.1856	.060	3.3509
.081	3.9577	.080	3.0468	.079	1.6147	.031	1.5790	.080	3.7486	.081	2.3175	.080	3.5442
.099	3.9581	.101	2.9467	.086	1.8906	.036	2.0128	.099	3.8264	.099	2.4529	.099	3.6797
.121	3.9494	.120	2.8420	.090	2.1557	.037	2.1942	.119	3.8424	.119	2.6013	.119	3.7398
.139	3.9542	.141	2.7050	.095	2.3898	.041	2.8447	.141	3.8184	.140	2.7385	.140	3.7088
.160	3.9234	.160	2.5866	.099	2.4458	.046	3.0405	.160	3.7378	.160	2.8562	.161	3.5480
.181	3.8813	.170	2.6554	.121	2.6345	.050	3.2184	.182	3.5053	.182	2.9498	.181	3.2757
.199	3.7843	.178	2.8091	.140	2.7554	.055	3.3185	.200	3.2344	.200	2.9921	.201	2.9194
.210	3.6587	.190	2.9767	.161	2.8655	.060	3.4118	.210	3.0277	.210	2.9923	.211	2.7339
.216	3.5135	.201	3.0821	.178	2.9410	.065	3.4579	.221	2.8084	.221	2.9655	.220	2.5763
.218	3.4329	.210	3.1422	.202	3.0446	.070	3.5014	.231	2.6079	.229	2.9076	.229	2.4447
.225	3.2683	.219	3.1934	.210	3.0764	.076	3.5476	.241	2.4458	.240	2.7917	.240	2.2731
.231	3.2459	.230	3.2385	.220	3.1095	.081	3.5729	.249	2.2942	.251	2.6411	.251	2.1228
.240	3.2000	.240	3.2817	.230	3.1468	.086	3.5193	.260	2.1280	.261	2.4840	.260	2.0124
.244	3.0987	.251	3.3053	.240	3.1693	.091	3.2967	.269	1.9763	.271	2.3161	.269	1.9086
.247	2.9539	.260	3.2869	.250	3.1585	.096	3.0942	.278	1.8516	.281	2.1731	.279	1.8161
.251	2.1695	.266	3.2253	.258	3.1172	.101	3.0699	.290	1.6891	.291	2.0251	.290	1.7117
.253	1.5897	.266	3.2450	.268	2.9718	.120	3.1030	.302	1.5623	.301	1.9101	.301	1.6311
.256	1.0921	.271	2.9987	.280	2.6773	.140	3.1440	.319	1.3770	.320	1.6854	.320	1.4857
.256	.9043	.276	2.8912	.290	2.3907	.159	3.1753	.341	1.2144	.341	1.4822	.341	1.3593
.260	.8302	.279	2.5653	.301	2.1057	.179	3.2039	.360	1.1059	.359	1.3470	.360	1.2611
.270	.8036	.285	2.2389	.310	1.8020	.200	3.2147	.382	1.0236	.382	1.1979	.379	1.1804
.280	.8078	.290	1.8462	.320	1.5699	.211	3.1919	.401	.9985	.398	1.1179	.390	1.1403
.289	.8120	.295	1.6698	.340	1.2023	.221	3.1394	.450	.9990	.431	1.0295	.429	1.0483
.301	.8173	.298	1.4793	.360	1.0273	.229	3.0649	.502	1.0007	.450	1.0071	.450	1.0194
.319	.8330	.304	1.3181	.380	.9667	.240	2.9349	.599	1.0007	.498	1.0007	.499	1.0015
.341	.8677	.312	1.1497	.399	.9677	.251	2.7438	.699	1.0006	.600	1.0007	.600	1.0007
.362	.9069	.321	.9759	.429	.9856	.261	2.5670	.803	1.0006	.701	1.0009	.700	1.0007
.380	.9275	.339	.9220	.451	.9956	.269	2.3872	.899	1.0007	.799	1.0007	.800	1.0007
.400	.9447	.360	.9339	.501	1.0001	.279	2.2074	1.000	1.0007	.898	1.0007	.899	1.0006
.431	.9694	.380	.9499	.599	1.0003	.289	2.0044			.997	1.0007	1.002	1.0006
.450	.9841	.401	.9650	.701	1.0002	.299	1.8218						
.500	.9992	.433	.9856	.797	1.0002	.320	1.4860						
.599	.9997	.451	.9926	.899	1.0002	.340	1.2663						
.698	.9995	.501	.9997	1.004	1.0001	.359	1.1015						
.800	.9994	.601	.9995			.381	1.0062						
.902	.9994	.700	.9995			.398	.9876						
.999	.9997	.802	.9993			.431	.9913						
		.900	.9995			.451	.9984						
		1.000	.9995			.500	1.0007						
						.600	1.0007						
						.700	1.0005						
						.800	1.0006						
						.901	1.0007						
						.998	1.0005						

TABLE VII.- PITOT PRESSURE MEASUREMENTS FOR CONFIGURATION 1 AT M = 0.80 AND $p_{t,j}/p = 2.0$

X/D = 9.825		10.050		10.300		10.550		10.800		11.300		11.800	
R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT
.005	1.3371	.004	1.3329	-.000	1.3315	-.001	1.3302	.006	1.3405	.008	1.3383	-.004	1.3243
.021	1.3361	.022	1.3340	.019	1.3317	.023	1.3306	.023	1.3417	.023	1.3394	.019	1.3289
.039	1.3370	.040	1.3371	.040	1.3350	.041	1.3345	.043	1.3433	.040	1.3411	.041	1.3256
.059	1.3379	.061	1.3377	.061	1.3374	.063	1.3339	.062	1.3444	.063	1.3387	.061	1.3206
.082	1.3415	.079	1.3378	.080	1.3364	.082	1.3345	.081	1.3452	.082	1.3330	.079	1.3130
.102	1.3386	.102	1.3394	.100	1.3368	.100	1.3344	.100	1.3429	.104	1.3203	.100	1.2964
.122	1.3388	.122	1.3412	.120	1.3375	.119	1.3354	.121	1.3338	.122	1.3036	.121	1.2700
.140	1.3372	.141	1.3379	.139	1.3362	.141	1.3224	.144	1.3119	.142	1.2666	.141	1.2331
.161	1.3398	.160	1.3381	.162	1.3304	.164	1.2921	.159	1.2822	.160	1.2350	.162	1.1907
.181	1.3379	.181	1.3359	.182	1.2978	.183	1.2460	.180	1.2293	.181	1.1821	.181	1.1529
.201	1.3361	.202	1.3153	.204	1.2214	.202	1.1812	.202	1.1555	.201	1.1295	.201	1.1122
.211	1.3350	.212	1.2821	.211	1.1907	.212	1.1378	.210	1.1339	.209	1.1162	.212	1.0897
.221	1.3347	.220	1.2387	.221	1.1366	.223	1.0968	.221	1.0968	.222	1.0782	.223	1.0656
.230	1.3247	.232	1.1196	.231	1.0796	.231	1.0595	.231	1.0601	.231	1.0520	.230	1.0530
.239	1.2327	.242	1.0131	.242	1.0188	.242	1.0112	.241	1.0265	.241	1.0280	.241	1.0342
.245	1.0979	.252	.9300	.253	.9612	.250	.9877	.252	.9997	.251	1.0117	.253	1.0146
.248	.9836	.261	.8560	.264	.9178	.259	.9586	.263	.9687	.261	.9903	.263	.9976
.251	.8096	.271	.8153	.271	.8933	.273	.9220	.272	.9463	.271	.9720	.269	.9878
.255	.7808	.281	.7942	.281	.8724	.280	.9062	.280	.9326	.280	.9585	.283	.9687
.261	.6901	.292	.7899	.291	.8568	.291	.8905	.292	.9143	.294	.9424	.294	.9599
.271	.6835	.303	.7947	.302	.8516	.303	.8818	.303	.9026	.304	.9344	.299	.9558
.281	.6878	.320	.8235	.322	.8630	.322	.8801	.319	.8985	.320	.9253	.324	.9403
.291	.6913	.342	.8597	.343	.8848	.342	.8934	.340	.9011	.342	.9231	.342	.9372
.301	.6965	.361	.8910	.360	.9092	.359	.9150	.362	.9210	.364	.9299	.363	.9403
.322	.7182	.383	.9206	.382	.9369	.382	.9425	.379	.9408	.379	.9425	.379	.9484
.340	.7572	.401	.9438	.402	.9590	.402	.9633	.400	.9624	.402	.9619	.399	.9614
.362	.8220	.431	.9789	.433	.9884	.432	.9905	.429	.9879	.430	.9852	.450	.9916
.382	.8683	.449	.9894	.452	.9958	.451	.9961	.451	.9956	.456	.9952	.499	.9989
.402	.9012	.502	.9989	.502	.9990	.499	.9989	.499	.9989	.502	.9989	.599	.9992
.433	.9465	.602	.9995	.599	.9990	.604	.9989	.600	.9990	.600	.9989	.700	.9989
.455	.9707	.701	.9993	.702	.9990	.700	.9986	.702	.9989	.703	.9989	.807	.9989
.502	.9978	.801	.9990	.802	.9990	.801	.9989	.803	.9989	.802	.9989	.901	.9988
.600	.9993	.900	.9993	.902	.9990	.904	.9990	.900	.9989	.899	.9990	1.000	.9992
.701	.9993	1.004	.9993	1.005	.9988	.998	.9992	1.004	.9988	1.009	.9989		
.803	.9992												
.901	.9993												
.997	.9992												

TABLE VIII.- PITOT PRESSURE MEASUREMENTS FOR CONFIGURATION 1 AT M = 0.80 AND $p_{t,j}/p$ = 2.9

X/D = 9.825		10.050		10.300		10.550		10.800		11.300		11.800	
R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT
.003	1.9322	.003	1.6033	.008	1.9022	.007	1.7762	.001	1.8766	-.002	1.8890	-.006	1.8145
.021	1.9342	.022	1.6360	.021	1.9080	.021	1.7886	.023	1.9095	.022	1.8918	.023	1.8305
.042	1.9343	.043	1.7226	.042	1.9207	.043	1.8045	.041	1.9150	.040	1.8981	.042	1.8343
.062	1.9377	.061	1.7930	.052	1.9153	.063	1.8112	.061	1.9185	.063	1.9026	.061	1.8450
.081	1.9404	.081	1.8350	.063	1.9198	.080	1.8176	.081	1.9263	.081	1.9028	.081	1.8448
.103	1.9363	.105	1.8663	.081	1.9190	.101	1.8284	.102	1.9234	.101	1.8903	.103	1.8183
.127	1.9329	.124	1.8766	.102	1.9185	.122	1.8403	.120	1.9135	.123	1.8631	.120	1.7882
.143	1.9316	.142	1.8858	.123	1.9153	.141	1.8466	.141	1.8914	.143	1.8107	.142	1.7319
.160	1.9219	.162	1.8930	.140	1.9082	.162	1.8375	.162	1.8197	.162	1.7079	.162	1.6402
.181	1.8979	.184	1.9017	.160	1.9025	.183	1.7883	.180	1.7103	.180	1.6075	.182	1.5494
.202	1.8749	.204	1.8918	.181	1.8625	.203	1.6641	.203	1.5279	.203	1.4761	.204	1.4574
.210	1.8777	.210	1.8736	.203	1.7195	.212	1.5878	.212	1.4601	.211	1.4300	.210	1.4006
.221	1.8745	.222	1.7583	.214	1.6043	.221	1.4984	.221	1.3794	.222	1.3535	.220	1.3513
.230	1.8319	.232	1.5329	.224	1.4725	.233	1.3615	.232	1.2967	.231	1.2999	.231	1.2999
.236	1.6338	.243	1.2675	.233	1.3236	.242	1.2743	.242	1.2279	.242	1.2452	.242	1.2801
.239	1.4229	.250	1.1011	.241	1.2263	.251	1.1944	.252	1.1614	.253	1.1935	.250	1.2069
.241	1.0424	.262	.9264	.252	1.1104	.261	1.1154	.260	1.1134	.260	1.1572	.260	1.1861
.246	.8490	.273	.8436	.261	1.0252	.271	1.0607	.271	1.0687	.263	1.1511	.271	1.1414
.251	.6849	.284	.8144	.273	.9579	.282	1.0015	.284	1.0195	.271	1.1268	.283	1.1105
.264	.6822	.291	.8106	.285	.9104	.290	.9711	.291	.9965	.283	1.0789	.292	1.0912
.271	.6859	.300	.8166	.292	.8941	.300	.9420	.304	.9439	.290	1.0564	.303	1.0619
.280	.6892	.324	.8562	.302	.8793	.320	.9124	.321	.9393	.302	1.0265	.320	1.0283
.294	.6971	.341	.8850	.324	.8842	.343	.9137	.341	.9295	.325	.9836	.341	.9980
.304	.7090	.362	.9112	.342	.9057	.364	.9324	.362	.9401	.342	.9652	.359	.9810
.320	.7373	.385	.9337	.359	.9228	.383	.9530	.381	.9529	.361	.9567	.381	.9741
.345	.8059	.404	.9559	.382	.9491	.404	.9733	.402	.9729	.382	.9613	.404	.9777
.359	.8434	.453	.9941	.404	.9720	.456	.9977	.432	.9905	.399	.9696	.450	.9948
.384	.8843	.504	.9986	.451	.9963	.500	.9984	.451	.9968	.451	.9964	.500	.9986
.401	.9115	.603	.9982	.505	.9988	.601	.9984	.504	.9980	.500	.9982	.602	.9990
.431	.9529	.704	.9982	.603	.9985	.702	.9982	.603	.9980	.607	.9981	.703	.9985
.453	.9767	.802	.9978	.706	.9985	.801	.9980	.702	.9980	.703	.9978	.800	.9985
.500	.9978	.899	.9980	.803	.9984	.905	.9982	.803	.9980	.799	.9978	.902	.9982
.600	.9984	1.006	.9980	.900	.9985	.997	.9980	.901	.9981	.900	.9980	1.002	.9985
.702	.9985			.995	.9985			1.004	.9981	.999	.9980		
.801	.9985												
.900	.9989												
.994	.9986												

TABLE IX.- PITOT PRESSURE MEASUREMENTS FOR CONFIGURATION 1 AT $M = 0.80$ AND $p_{t,j}/p = 5.0$

X/D = 9.825		10.050		10.300		10.550		10.800		11.300		11.800	
R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT
-.004	3.3039	.007	2.5742	.021	1.3673	.007	1.9637	.006	2.1932	-.003	1.7033	.003	2.5587
.022	3.3137	.020	2.5642	.042	1.3468	.022	2.6924	.020	2.5687	.022	1.7656	.003	2.5473
.040	3.3183	.040	2.5281	.061	1.3873	.041	2.8932	.043	3.0015	.041	1.8436	.021	2.6638
.060	3.3209	.062	2.4755	.070	1.7651	.062	3.0035	.061	3.1265	.060	1.9528	.041	2.8349
.080	3.3191	.081	2.4260	.070	1.5325	.080	3.0599	.080	3.2076	.079	2.0615	.062	3.0559
.102	3.3137	.099	2.3480	.071	1.9375	.091	3.0277	.104	3.2197	.101	2.1973	.080	3.1593
.121	3.3141	.122	2.2416	.074	1.9981	.095	2.9437	.120	3.2067	.123	2.2942	.104	3.1833
.141	3.3028	.140	2.1454	.076	2.0534	.102	2.7673	.142	3.1576	.143	2.3699	.124	3.1211
.164	3.2736	.162	2.2559	.082	2.1657	.123	2.7121	.163	3.0178	.163	2.4245	.141	2.9947
.179	3.2209	.183	2.5597	.101	2.3003	.142	2.7205	.183	2.7578	.181	2.4539	.161	2.7652
.192	3.1670	.201	2.6946	.122	2.3981	.162	2.7227	.199	2.4859	.204	2.4343	.184	2.4585
.204	2.9802	.212	2.7423	.143	2.4782	.181	2.7091	.211	2.3172	.213	2.3979	.200	2.2265
.214	2.7526	.221	2.7743	.162	2.5335	.206	2.5860	.222	2.1497	.223	2.3380	.212	2.0757
.214	2.7732	.230	2.7964	.184	2.5894	.213	2.5170	.229	2.0287	.232	2.2677	.222	1.9554
.222	2.7364	.243	2.8195	.201	2.6310	.221	2.4276	.242	1.8498	.243	2.1345	.233	1.8524
.232	2.5798	.252	2.7765	.211	2.6534	.232	2.2872	.254	1.6991	.251	2.0535	.242	1.7651
.241	1.0261	.262	2.5971	.222	2.6709	.242	2.1237	.263	1.5973	.263	1.9234	.251	1.6947
.242	1.2493	.270	2.2362	.230	2.6636	.251	1.9928	.269	1.5257	.271	1.8279	.262	1.5948
.244	.9798	.280	1.7322	.242	2.5914	.262	1.8321	.281	1.4280	.282	1.7163	.274	1.5114
.246	.8107	.292	1.3158	.252	2.4795	.271	1.7029	.292	1.3167	.292	1.6169	.282	1.4559
.251	.6895	.301	1.0908	.260	2.3504	.282	1.5473	.302	1.2438	.304	1.5139	.293	1.3846
.260	.6838	.322	.8692	.271	2.1105	.291	1.4205	.322	1.1256	.321	1.3881	.300	1.3466
.273	.6887	.341	.8565	.282	1.8694	.302	1.3165	.342	1.0392	.343	1.2493	.322	1.2394
.282	.6927	.361	.8816	.292	1.6288	.321	1.1381	.360	.9920	.361	1.1474	.343	1.1581
.293	.6974	.382	.9084	.301	1.4774	.341	1.0269	.383	.9692	.381	1.0633	.361	1.1012
.302	.7060	.401	.9330	.322	1.1437	.362	.9707	.400	.9712	.399	1.0199	.383	1.0484
.322	.7344	.432	.9628	.341	.9802	.383	.9555	.429	.9858	.454	.9926	.400	1.0229
.343	.7872	.450	.9837	.361	.9245	.403	.9673	.450	.9968	.501	.9989	.433	1.0023
.362	.8441	.502	.9998	.382	.9267	.453	.9969	.454	.9969	.602	.9989	.455	.9997
.382	.8839	.603	.9998	.402	.9446	.503	.9994	.503	.9990	.700	.9989	.509	.9994
.404	.9112	.703	.9998	.452	.9925	.602	.9990	.604	.9989	.803	.9990	.603	.9992
.431	.9486	.803	.9998	.502	.9997	.706	.9993	.704	.9988	.901	.9988	.701	.9990
.450	.9733	.900	.9998	.601	.9994	.800	.9995	.803	.9993	1.001	.9988	.799	.9989
.452	.9767	1.001	.9995	.703	.9995	.901	.9992	.908	.9990			.901	.9985
.473	.9912			.801	.9995	1.001	.9990	.993	.9990			.999	.9992
.502	.9985			.905	.9994								
.601	.9992			.997	.9995								
.701	.9994												
.799	.9990												
.900	.9990												
1.004	.9984												

TABLE X.- PITOT PRESSURE MEASUREMENTS FOR CONFIGURATION 2 AT M = 0.40 AND $p_{t,j}/p = 2.0$

X/D = 10.800		11.050		11.300		11.550		11.800		12.300		12.800	
R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT
.003	1.8092	.000	1.8119	.003	1.8176	-.000	1.8192	.006	1.8172	.002	1.8227	-.000	1.8224
.022	1.8082	.021	1.8118	.004	1.8161	.022	1.8182	.022	1.8193	.020	1.8231	.020	1.8226
.040	1.8132	.041	1.8183	.021	1.8152	.042	1.8215	.042	1.8217	.042	1.8237	.043	1.8235
.061	1.8090	.062	1.8185	.041	1.8224	.061	1.8236	.059	1.8251	.062	1.8252	.061	1.8252
.080	1.8222	.080	1.8218	.063	1.8232	.082	1.8271	.081	1.8263	.080	1.8255	.081	1.8225
.100	1.8123	.102	1.8226	.080	1.8241	.105	1.8277	.102	1.8267	.101	1.8255	.104	1.8138
.124	1.8084	.120	1.8226	.104	1.8262	.123	1.8258	.121	1.8272	.120	1.8209	.123	1.7945
.142	1.8216	.143	1.8234	.122	1.8253	.141	1.8284	.141	1.8269	.141	1.8053	.142	1.7589
.160	1.8191	.180	1.8224	.139	1.8246	.160	1.8255	.161	1.8156	.161	1.7652	.161	1.7042
.180	1.8181	.202	1.8202	.162	1.8250	.183	1.8061	.182	1.7752	.183	1.6894	.183	1.6180
.202	1.8352	.211	1.8173	.181	1.8236	.204	1.7293	.204	1.6636	.203	1.5774	.211	1.4922
.223	1.8387	.221	1.8018	.201	1.8014	.211	1.6887	.213	1.6046	.210	1.5447	.211	1.4868
.234	1.8118	.230	1.7378	.214	1.7417	.222	1.6132	.223	1.5421	.221	1.4913	.221	1.4512
.241	1.8550	.239	1.6175	.220	1.7104	.239	1.4589	.231	1.4750	.230	1.4362	.230	1.4116
.246	1.7547	.246	1.4989	.220	1.7061	.245	1.4070	.243	1.3915	.241	1.3831	.242	1.3635
.253	1.4771	.246	1.4336	.232	1.5823	.252	1.3545	.251	1.3387	.252	1.3296	.252	1.3260
.257	1.1987	.251	1.3914	.241	1.4785	.262	1.2729	.263	1.2753	.260	1.2956	.261	1.2933
.263	.9383	.256	1.3034	.245	1.4298	.271	1.2170	.273	1.2183	.272	1.2470	.271	1.2615
.270	.9319	.260	1.2324	.254	1.3412	.280	1.1612	.280	1.1953	.291	1.1805	.280	1.2312
.281	.9378	.271	1.0896	.256	1.3197	.292	1.1072	.283	1.1741	.320	1.1047	.293	1.1971
.291	.9417	.281	1.0124	.261	1.2678	.300	1.0766	.291	1.1421	.340	1.0603	.301	1.1746
.301	.9466	.292	.9710	.273	1.1600	.322	1.0138	.300	1.1131	.364	1.0257	.321	1.1320
.323	.9564	.308	.9605	.282	1.0972	.341	.9892	.320	1.0541	.382	1.0087	.343	1.0909
.340	.9627	.320	.9641	.294	1.0418	.364	.9831	.341	1.0142	.400	.9995	.362	1.0611
.361	.9698	.341	.9707	.300	1.0208	.380	.9845	.362	.9934	.451	.9984	.383	1.0348
.381	.9765	.360	.9757	.320	.9806	.402	.9899	.382	.9887	.505	.9997	.399	1.0191
.401	.9824	.380	.9820	.341	.9746	.450	.9986	.401	.9905	.603	.9999	.450	1.0009
.453	.9953	.401	.9867	.361	.9786	.500	1.0003	.454	.9988	.704	.9999	.508	1.0005
.499	.9996	.452	.9972	.380	.9836	.603	1.0004	.504	.9999	.803	1.0000	.605	1.0004
.602	1.0001	.503	.9996	.404	.9894	.699	1.0004	.603	.9997	.906	1.0001	.704	1.0003
.705	1.0001	.604	.9996	.450	.9980	.804	1.0003	.706	1.0001	1.023	1.0003	.801	1.0005
.802	1.0001	.703	.9996	.517	1.0000	.902	1.0000	.801	1.0000			.903	1.0004
.902	1.0000	.799	.9999	.602	.9999	1.019	1.0000	.902	1.0001			1.008	1.0001
1.020	1.0000	.804	.9997	.704	.9997			1.012	1.0000				
		.904	.9997	.806	1.0000								
		1.030	.9997	.904	1.0001								
				.998	1.0000								

TABLE XI.- PITOT PRESSURE MEASUREMENTS FOR CONFIGURATION 2 AT $M = 0.40$ AND $p_{t,j}/p = 2.9$

X/D = 10.800		11.050		11.300		11.550		11.800		12.300		12.800	
R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT
-.000	2.6231	.003	2.0777	-.020	2.6170	.000	2.3528	-.000	2.6087	.001	2.5526	-.000	2.4526
.020	2.6240	.020	2.0773	.002	2.6169	.021	2.3530	.021	2.6103	.020	2.5180	.021	2.4486
.041	2.6258	.042	2.1325	.021	2.6177	.040	2.3599	.040	2.6097	.044	2.4907	.041	2.4400
.063	2.6322	.060	2.2707	.041	2.6216	.060	2.3702	.060	2.6060	.060	2.4920	.060	2.4571
.080	2.6297	.082	2.3492	.061	2.6228	.081	2.3879	.082	2.5994	.084	2.5308	.080	2.4602
.102	2.6322	.105	2.4049	.080	2.6248	.101	2.4063	.104	2.5855	.101	2.5246	.103	2.4699
.103	2.6326	.123	2.4384	.103	2.6249	.124	2.4347	.123	2.5715	.122	2.5205	.121	2.4717
.121	2.6334	.142	2.4662	.123	2.6252	.140	2.4503	.144	2.5609	.141	2.5128	.140	2.4570
.140	2.6289	.163	2.4941	.141	2.6220	.163	2.4759	.162	2.5518	.161	2.4876	.160	2.4087
.161	2.6266	.180	2.5057	.161	2.6209	.183	2.4898	.180	2.5249	.183	2.4031	.180	2.3131
.183	2.6128	.199	2.5218	.180	2.6191	.203	2.4860	.203	2.3975	.201	2.2556	.200	2.1563
.202	2.5852	.212	2.5300	.203	2.5832	.211	2.4610	.205	2.3770	.211	2.1586	.212	2.0481
.211	2.5637	.222	2.5365	.211	2.5178	.223	2.3782	.212	2.3151	.221	2.0523	.222	1.9575
.219	2.5481	.233	2.5329	.222	2.3761	.231	2.2801	.220	2.2276	.231	1.9329	.230	1.8722
.230	2.5465	.240	2.5145	.231	2.2041	.242	2.1084	.231	2.0561	.242	1.8128	.241	1.7784
.242	2.5525	.245	2.4661	.239	2.0066	.252	1.9092	.241	1.9092	.249	1.7301	.249	1.7037
.245	2.5517	.252	2.3248	.246	1.8769	.262	1.7459	.251	1.7650	.260	1.6230	.261	1.6081
.250	2.5387	.261	2.0015	.251	1.7583	.273	1.5597	.252	1.7469	.271	1.5343	.270	1.5428
.255	2.4690	.264	1.8730	.255	1.6750	.281	1.4552	.261	1.6372	.281	1.4558	.282	1.4752
.261	1.9240	.272	1.5873	.262	1.5590	.290	1.3414	.272	1.5088	.290	1.3848	.289	1.4260
.268	1.0768	.281	1.3304	.266	1.5004	.301	1.2466	.281	1.4235	.298	1.3391	.299	1.3718
.269	.9677	.291	1.1254	.270	1.4189	.301	1.2473	.292	1.3191	.320	1.2316	.321	1.2747
.282	.9368	.301	1.0179	.281	1.2784	.325	1.0877	.302	1.2621	.341	1.1486	.341	1.2004
.292	.9414	.321	.9649	.291	1.1748	.341	1.0252	.321	1.1521	.362	1.0876	.361	1.1421
.302	.9463	.340	.9694	.300	1.1060	.360	.9949	.341	1.0713	.383	1.0417	.381	1.0914
.323	.9553	.361	.9756	.324	1.0018	.383	.9873	.361	1.0219	.402	1.0161	.400	1.0550
.342	.9624	.382	.9820	.340	.9803	.401	.9902	.381	.9988	.450	.9999	.452	1.0066
.362	.9693	.402	.9869	.361	.9803	.421	.9938	.402	.9927	.501	1.0002	.502	.9995
.380	.9752	.451	.9976	.380	.9850	.449	.9982	.451	.9982	.602	1.0005	.604	.9997
.405	.9821	.501	1.0000	.401	.9898	.503	.9999	.503	1.0001	.700	1.0006	.702	.9997
.451	.9946	.602	1.0001	.450	.9978	.604	.9999	.601	1.0001	.800	1.0006	.800	.9995
.502	.9999	.702	1.0001	.503	1.0001	.702	1.0003	.699	1.0003	.900	1.0005	.904	.9993
.605	1.0004	.801	1.0001	.601	1.0001	.802	1.0000	.804	1.0001	1.002	1.0002	.997	.9995
.702	1.0001	.894	1.0003	.705	1.0001	.900	1.0001	.900	1.0001				
.802	1.0001	1.006	1.0000	.802	1.0000	.999	1.0001	1.010	1.0001				
.903	1.0001			.903	1.0001								
.998	1.0001			1.001	1.0001								

TABLE XII.- PITOT PRESSURE MEASUREMENTS FOR CONFIGURATION 2 AT M = 0.40 AND $p_{t,j}/p = 5.0$

X/D = 10.800		11.050		11.300		11.550		11.800		12.300		12.800	
R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT
.005	4.5058	-.005	3.5996	.007	1.9363	.006	1.3527	-.004	1.5156	.000	2.2378	.005	2.9421
.020	4.5164	.022	3.5675	.023	1.9167	.022	1.3510	.023	1.7843	.022	2.3019	.023	2.9927
.041	4.5123	.041	3.5111	.040	1.8934	.043	1.3493	.041	2.3272	.041	2.4281	.041	3.0987
.061	4.5192	.061	3.4363	.063	1.8497	.060	1.9114	.052	2.7347	.062	2.6501	.062	3.2623
.082	4.5190	.083	3.3453	.082	1.8073	.065	2.7105	.062	3.2514	.080	2.9050	.082	3.4421
.101	4.5097	.102	3.2281	.086	1.8656	.070	3.3244	.072	3.6168	.103	3.2219	.104	3.6463
.122	4.5011	.123	3.0922	.094	2.2575	.082	3.8416	.083	3.9455	.122	3.3874	.124	3.7750
.143	4.4866	.141	2.9431	.104	2.5998	.105	4.1234	.103	4.1118	.142	3.4804	.143	3.7988
.162	4.4490	.161	2.9256	.113	2.7353	.122	3.8708	.124	4.1235	.161	3.5299	.161	3.7464
.181	4.3588	.183	3.2876	.122	2.8572	.143	3.5896	.141	4.0966	.187	3.5586	.182	3.5638
.203	4.0861	.204	3.4479	.140	3.0357	.161	3.6360	.162	4.0383	.205	3.4892	.202	3.3036
.213	3.8491	.211	3.4967	.161	3.1793	.182	3.6758	.183	3.9034	.212	3.4218	.212	3.1120
.222	3.6722	.221	3.5602	.182	3.3179	.203	3.6722	.202	3.6762	.222	3.2950	.223	2.9160
.232	3.7137	.231	3.6105	.203	3.4310	.213	3.6353	.213	3.4750	.232	3.1161	.233	2.7103
.241	3.5873	.241	3.6568	.212	3.4802	.222	3.5645	.221	3.2786	.240	2.9569	.245	2.4968
.246	3.1886	.252	3.6956	.219	3.5145	.231	3.4636	.231	3.0113	.252	2.6790	.252	2.3775
.247	2.8933	.263	3.7210	.231	3.5693	.242	3.2746	.243	2.7175	.262	2.4882	.262	2.2108
.252	1.6816	.272	3.5850	.241	3.6054	.253	3.0497	.252	2.4959	.272	2.2988	.271	2.0732
.257	.9720	.276	3.2933	.251	3.6316	.261	2.8417	.259	2.3171	.284	2.0986	.281	1.9445
.260	.9426	.282	2.9409	.263	3.5705	.272	2.5458	.270	2.0883	.292	1.9658	.293	1.8076
.272	.9375	.286	2.5383	.270	3.4432	.282	2.2847	.281	1.8943	.302	1.8310	.301	1.7142
.282	.9426	.292	2.0948	.283	3.0703	.292	2.0206	.290	1.7554	.322	1.5864	.323	1.5174
.290	.9462	.302	1.4900	.292	2.6943	.300	1.8313	.302	1.5987	.343	1.3999	.343	1.3885
.302	.9516	.322	1.0211	.301	2.3103	.324	1.4081	.320	1.3827	.363	1.2493	.362	1.2743
.320	.9588	.344	.9688	.321	1.5960	.342	1.2152	.342	1.2084	.382	1.1519	.380	1.1964
.343	.9677	.364	.9764	.343	1.2093	.362	1.0691	.362	1.0904	.403	1.0755	.401	1.1197
.363	.9729	.382	.9819	.361	1.0311	.381	1.0088	.382	1.0269	.450	1.0062	.452	1.0220
.381	.9784	.401	.9873	.381	.9874	.403	.9963	.400	1.0032	.502	1.0001	.502	1.0011
.402	.9852	.453	.9982	.403	.9892	.452	.9998	.454	1.0001	.604	1.0002	.603	.9998
.454	.9965	.502	1.0005	.450	.9988	.503	1.0002	.500	1.0002	.701	1.0001	.704	.9999
.500	.9988	.601	1.0007	.499	1.0007	.604	1.0003	.604	1.0002	.805	.9999	.802	.9999
.604	.9992	.700	1.0007	.607	1.0002	.701	1.0003	.702	1.0003	.902	.9998	.997	.9998
.702	.9995	.801	1.0005	.701	1.0003	.803	1.0003	.804	1.0001	.999	1.0001		
.805	.9999	.900	1.0007	.804	1.0003	.900	1.0002	.902	1.0001				
.905	.9990	.996	1.0005	.903	1.0002	1.000	1.0002	.993	1.0001				
.994	.9994			.997	1.0002								

TABLE XIII.- PITOT PRESSURE MEASUREMENTS FOR CONFIGURATION 2 AT $M = 0.60$ AND $p_{t,j}/p = 2.0$

X/D = 10.800		11.050		11.300		11.550		11.800		12.300		12.800	
R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT
-.003	1.5899	-.001	1.5911	.002	1.5966	-.002	1.5983	-.000	1.6000	-.002	1.5984	.006	1.6019
-.000	1.6129	.022	1.5940	.020	1.5961	.020	1.5984	.021	1.6017	.020	1.6004	.023	1.6049
.020	1.6248	.044	1.5997	.041	1.5993	.042	1.6007	.042	1.6036	.043	1.6100	.042	1.6036
.041	1.6285	.044	1.5964	.061	1.6024	.062	1.6017	.060	1.6076	.066	1.6048	.061	1.6053
.062	1.6300	.061	1.5991	.081	1.6016	.082	1.6035	.081	1.6051	.083	1.6049	.081	1.6072
.082	1.6290	.085	1.5993	.102	1.6045	.103	1.6034	.102	1.6065	.102	1.6035	.102	1.5933
.102	1.6303	.103	1.6017	.121	1.6026	.121	1.6036	.123	1.6064	.122	1.5948	.124	1.5684
.121	1.6293	.119	1.5967	.142	1.6043	.140	1.6080	.141	1.5976	.141	1.5719	.140	1.5372
.142	1.6285	.142	1.5978	.164	1.5989	.163	1.5855	.160	1.5722	.162	1.5186	.160	1.4803
.161	1.6251	.162	1.5980	.182	1.5771	.182	1.5249	.160	1.5741	.183	1.4289	.184	1.3890
.182	1.6230	.184	1.5998	.204	1.4448	.203	1.4041	.183	1.5004	.201	1.3523	.204	1.3161
.203	1.6163	.200	1.5722	.214	1.3586	.214	1.3204	.203	1.3819	.212	1.2957	.213	1.2822
.211	1.6107	.211	1.4753	.223	1.2520	.223	1.2449	.214	1.3102	.223	1.2534	.223	1.2464
.221	1.4118	.223	1.2681	.230	1.1890	.231	1.1891	.223	1.2555	.231	1.2181	.233	1.2106
.225	1.2754	.233	1.1061	.241	1.1019	.242	1.1285	.231	1.2062	.245	1.1635	.240	1.1915
.226	1.2036	.242	.9884	.253	1.0139	.251	1.0708	.241	1.1569	.251	1.1433	.251	1.1602
.231	.8405	.251	.9232	.263	.9674	.259	1.0344	.252	1.1014	.264	1.0985	.262	1.1256
.240	.8452	.260	.8989	.271	.9466	.271	.9897	.261	1.0658	.270	1.0815	.272	1.1009
.252	.8581	.272	.8986	.283	.9276	.283	.9633	.269	1.0337	.284	1.0456	.285	1.0720
.261	.8679	.282	.9048	.292	.9244	.292	.9480	.282	1.0027	.292	1.0271	.291	1.0605
.274	.8810	.291	.9120	.302	.9266	.302	.9421	.291	.9826	.299	1.0134	.301	1.0409
.282	.8886	.302	.9214	.320	.9370	.322	.9419	.301	.9654	.323	.9789	.320	1.0099
.293	.8998	.320	.9338	.342	.9510	.344	.9523	.320	.9517	.343	.9678	.343	.9874
.300	.9062	.342	.9469	.362	.9625	.360	.9623	.340	.9544	.381	.9720	.361	.9786
.324	.9260	.361	.9599	.381	.9733	.383	.9740	.362	.9648	.405	.9837	.380	.9748
.343	.9396	.380	.9701	.400	.9834	.402	.9846	.380	.9716	.452	.9973	.400	.9802
.362	.9523	.403	.9834	.453	.9987	.453	.9984	.402	.9845	.503	.9990	.452	.9958
.382	.9648	.452	.9980	.502	.9996	.502	.9996	.452	.9984	.603	.9990	.502	.9985
.403	.9775	.503	.9987	.603	.9997	.604	.9994	.499	.9998	.702	.9992	.604	.9989
.452	.9967	.597	.9991	.701	.9995	.701	.9992	.603	.9995	.803	.9990	.700	.9985
.500	.9995	.704	.9990	.802	.9996	.800	.9994	.703	.9997	.901	.9992	.801	.9984
.601	.9995	.803	.9987	.901	.9996	.803	.9994	.801	.9995	.996	.9989	.900	.9981
.703	.9995	.904	.9988	.999	.9996	.899	.9995	.902	.9994			.990	.9986
.803	.9996	1.000	.9987			.999	.9994	1.001	.9993				
.903	.9995												
1.013	.9992												

TABLE XIV.- PITOT PRESSURE MEASUREMENTS FOR CONFIGURATION 2 AT $M = 0.60$ AND $p_{t,j}/p = 2.9$

X/D = 10.800		11.050		11.300		11.550		11.800		12.300		12.800	
R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT
0.000	2.2404	.005	1.9039	.002	2.2516	.003	1.9422	.005	2.2252	.004	2.0975	-.000	2.0481
.022	2.2448	.021	1.9599	.022	2.2574	.020	2.0619	.019	2.2235	.020	2.1036	.020	2.0597
.040	2.2469	.043	2.0274	.043	2.2576	.041	2.0701	.041	2.2219	.041	2.1031	.040	2.0735
.041	2.2455	.059	2.0614	.061	2.2581	.062	2.0821	.062	2.2205	.058	2.1072	.063	2.0991
.062	2.2472	.082	2.0912	.084	2.2601	.081	2.0958	.083	2.2122	.080	2.1152	.081	2.1201
.080	2.2488	.100	2.1175	.101	2.2606	.100	2.1039	.105	2.2064	.100	2.1272	.102	2.1327
.105	2.2450	.120	2.1452	.124	2.2581	.120	2.1172	.122	2.2040	.122	2.1322	.122	2.1426
.122	2.2439	.140	2.1490	.145	2.2523	.141	2.1260	.140	2.1963	.139	2.1264	.142	2.1267
.144	2.2417	.162	2.1688	.162	2.2498	.161	2.1364	.162	2.1777	.158	2.1006	.163	2.0724
.162	2.2350	.180	2.1802	.183	2.2230	.184	2.1296	.185	2.1170	.180	2.0177	.183	1.9617
.180	2.2202	.202	2.1726	.198	2.1428	.199	2.0800	.201	2.0097	.208	1.8276	.203	1.8194
.206	2.1811	.207	2.1869	.211	2.0388	.214	1.9860	.210	1.8571	.214	1.7251	.213	1.7257
.211	2.1672	.216	2.1718	.224	1.8675	.221	1.9037	.221	1.7634	.222	1.6197	.220	1.6772
.221	2.1700	.231	1.9615	.233	1.6449	.232	1.7432	.232	1.6144	.232	1.5572	.231	1.5910
.230	2.1251	.242	1.7159	.240	1.4252	.240	1.5994	.241	1.4714	.241	1.4402	.240	1.5212
.241	1.6755	.252	1.4268	.252	1.3200	.251	1.4726	.244	1.3816	.251	1.3896	.252	1.4444
.246	.8493	.261	1.1993	.262	1.1887	.261	1.3397	.264	1.3133	.259	1.3455	.263	1.3630
.250	1.2652	.273	1.0680	.273	1.0817	.272	1.2148	.272	1.2221	.273	1.2570	.273	1.3113
.255	.8559	.284	.9225	.281	1.0145	.282	1.1341	.280	1.1627	.284	1.1948	.283	1.2553
.260	.9533	.292	.9046	.292	.9579	.294	1.0569	.295	1.0869	.292	1.1468	.290	1.2249
.264	.8705	.302	.9084	.300	.9388	.300	1.0038	.302	1.0421	.304	1.0980	.302	1.1801
.269	.8887	.324	.9197	.320	.9299	.320	.9503	.322	.9832	.319	1.0492	.323	1.1069
.282	.8784	.343	.9325	.341	.9352	.340	.9388	.339	.9571	.342	.9991	.344	1.0515
.288	.8831	.360	.9414	.362	.9459	.362	.9444	.362	.9542	.359	.9723	.361	1.0207
.304	.8921	.382	.9551	.380	.9583	.381	.9546	.385	.9615	.381	.9660	.381	.9971
.321	.9088	.401	.9623	.391	.9632	.403	.9648	.404	.9691	.402	.9696	.403	.9887
.340	.9187	.449	.9781	.403	.9697	.431	.9807	.438	.9821	.452	.9832	.451	.9944
.362	.9341	.497	.9872	.430	.9813	.453	.9798	.449	.9825	.500	.9849	.504	.9982
.383	.9508	.502	.9862	.454	.9807	.504	.9846	.502	.9847	.602	.9847	.603	.9981
.401	.9586	.603	.9873	.502	.9854	.601	.9851	.601	.9854	.699	.9847	.707	.9981
.451	.9820	.702	.9875	.602	.9857	.703	.9851	.703	.9851	.800	.9847	.801	.9981
.502	.9866	.802	.9872	.706	.9855	.806	.9855	.805	.9853	.899	.9846	.903	.9978
.602	.9863	.905	.9873	.802	.9857	.904	.9853	.901	.9853	1.007	.9846	.995	.9981
.702	.9856	.997	.9876	.902	.9858	1.010	.9854	1.002	.9850				
.804	.9853			1.010	.9859								
.903	.9849												
1.005	.9846												

TABLE XV.- PITOT PRESSURE MEASUREMENTS FOR CONFIGURATION 2 AT M = 0.60 AND $p_{t,j}/p = 5.0$

X/D = 10.800		11.050		11.300		11.550		11.800		12.300		12.800	
R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT
.002	3.9540	.002	3.1278	.001	1.6533	.007	1.1638	.006	1.6462	.006	2.0186	-.000	2.7675
.020	3.9572	.024	3.0924	.023	1.6386	.021	1.1652	.022	1.8811	.021	2.0686	.023	2.8409
.042	3.9596	.044	3.0454	.042	1.6153	.033	1.2643	.031	2.0999	.041	2.1689	.040	2.9411
.062	3.9580	.061	2.9955	.059	1.5920	.042	2.1534	.045	2.7157	.062	2.3230	.060	3.1272
.085	3.9582	.080	2.9268	.075	1.9192	.050	2.9678	.061	3.3954	.083	2.5356	.080	3.3446
.101	3.9558	.103	2.8189	.080	2.1936	.061	3.3662	.071	3.5620	.100	2.7166	.104	3.5441
.123	3.9516	.124	2.7047	.101	2.4486	.083	3.6027	.081	3.6570	.121	2.8817	.124	3.5959
.140	3.9428	.144	2.6329	.121	2.5967	.085	3.6060	.101	3.7165	.142	2.9777	.144	3.5379
.163	3.9300	.164	2.8902	.144	2.7346	.104	3.2514	.122	3.7033	.161	3.0311	.162	3.3800
.183	3.8924	.184	3.0387	.161	2.8254	.113	3.0698	.140	3.6606	.184	3.0643	.183	3.0686
.200	3.7837	.199	3.1069	.183	2.9391	.123	3.1012	.160	3.5827	.202	3.0378	.200	2.7910
.210	3.6207	.202	3.1276	.204	3.0312	.139	3.1373	.183	3.3909	.210	2.9928	.213	2.5751
.223	3.3687	.210	3.1589	.213	3.0698	.164	3.1845	.202	3.1137	.221	2.8662	.223	2.4149
.229	3.3378	.222	3.2103	.223	3.1117	.181	3.2067	.214	2.8548	.231	2.7253	.237	2.2028
.232	3.2860	.244	3.2810	.232	3.1460	.204	3.2010	.222	2.6643	.241	2.5669	.244	2.1084
.235	3.1573	.250	3.2957	.241	3.1622	.212	3.1671	.232	2.4375	.249	2.4213	.252	1.9904
.241	1.9832	.263	3.1798	.252	3.1399	.221	3.1061	.244	2.2101	.263	2.1863	.262	1.8675
.244	1.2951	.265	3.1123	.263	2.9936	.232	2.9606	.252	2.0676	.284	1.8622	.272	1.7640
.245	.9423	.273	2.6677	.270	2.8099	.241	2.7904	.262	1.8960	.294	1.7217	.284	1.6334
.251	.8573	.276	2.5285	.281	2.4112	.251	2.5903	.269	1.7712	.304	1.5995	.293	1.5579
.262	.8566	.278	2.2987	.293	2.0184	.261	2.3515	.283	1.5797	.322	1.4199	.301	1.4895
.272	.8656	.284	1.9479	.300	1.7891	.270	2.1568	.292	1.4660	.341	1.2751	.321	1.3510
.283	.8765	.290	1.6059	.314	1.4741	.281	1.8896	.303	1.3636	.362	1.1516	.340	1.2513
.292	.8848	.301	1.1865	.322	1.2654	.291	1.7034	.320	1.2062	.384	1.0620	.361	1.1610
.301	.8935	.312	1.0097	.340	1.0496	.302	1.4907	.342	1.0831	.402	1.0184	.382	1.0911
.322	.9133	.322	.9265	.362	.9567	.323	1.2301	.360	1.0158	.432	.9969	.404	1.0397
.343	.9293	.341	.9241	.382	.9567	.342	1.0697	.383	.9853	.453	.9967	.450	1.0030
.362	.9423	.364	.9427	.400	.9675	.362	.9917	.405	.9840	.502	1.0001	.500	1.0003
.382	.9564	.382	.9539	.433	.9845	.383	.9716	.454	.9982	.601	1.0000	.603	1.0004
.400	.9671	.405	.9706	.454	.9943	.401	.9772	.501	.9994	.700	1.0004	.702	1.0003
.430	.9847	.452	.9944	.503	.9988	.431	.9898	.503	.9997	.801	1.0003	.801	1.0003
.450	.9926	.503	.9990	.604	.9990	.452	.9965	.601	.9996	.904	1.0001	.903	1.0001
.502	.9987	.604	.9991	.705	.9992	.500	.9990	.702	.9997	1.004	1.0003	.996	1.0004
.602	.9987	.703	.9991	.801	.9991	.601	.9991	.703	.9999				
.700	.9988	.801	.9988	.903	.9991	.701	.9992	.802	.9997				
.804	.9988	.903	.9987	1.002	.9991	.803	.9992	.901	.9996				
.904	.9990	.999	.9988			.905	.9994	1.000	.9999				
1.005	.9988					.996	.9994						

TABLE XVI.- PITOT PRESSURE MEASUREMENTS FOR CONFIGURATION 2 AT $M = 0.80$ AND $p_{t,j}/p = 2.0$

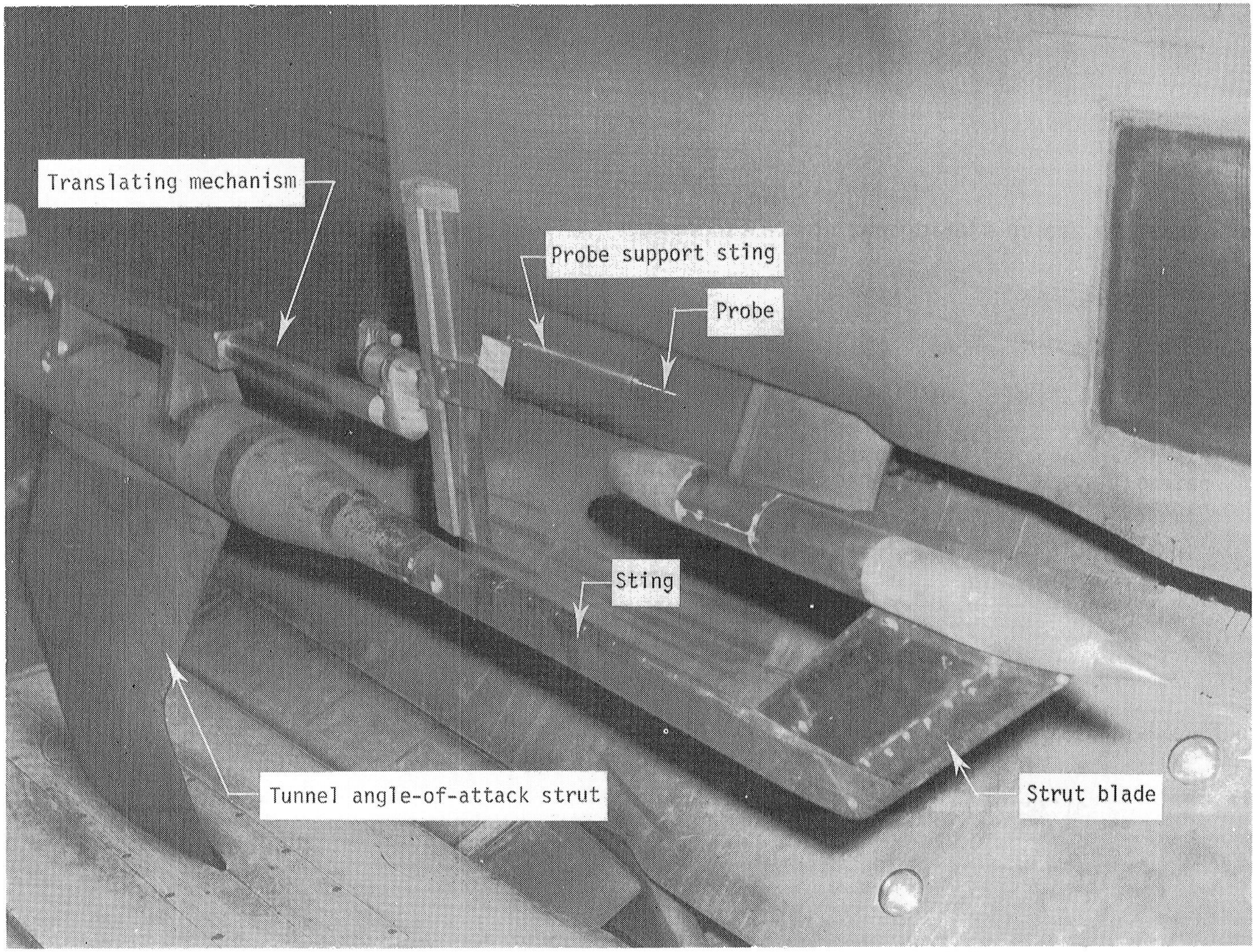
X/D = 10.800		11.050		11.300		11.550		11.800		12.300		12.800	
R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT
.003	1.3362	-.001	1.3331	.003	1.3455	.005	1.3427	-.005	1.3377	-.000	1.3236	.007	1.3345
.004	1.3390	.021	1.3360	.022	1.3480	.020	1.3436	.020	1.3382	.001	1.3228	.021	1.3360
.020	1.3394	.041	1.3367	.041	1.3487	.043	1.3443	.043	1.3396	.019	1.3241	.042	1.3375
.022	1.3380	.066	1.3366	.061	1.3486	.061	1.3453	.062	1.3397	.021	1.3247	.063	1.3372
.040	1.3380	.084	1.3370	.081	1.3501	.082	1.3472	.081	1.3398	.039	1.3254	.083	1.3367
.044	1.3390	.102	1.3365	.102	1.3501	.105	1.3456	.103	1.3397	.040	1.3234	.101	1.3351
.061	1.3387	.123	1.3379	.122	1.3495	.120	1.3451	.123	1.3377	.059	1.3386	.121	1.3305
.062	1.3409	.143	1.3380	.141	1.3490	.141	1.3430	.142	1.3259	.061	1.3241	.143	1.3144
.082	1.3403	.165	1.3375	.165	1.3446	.161	1.3301	.163	1.2838	.079	1.3245	.160	1.2885
.082	1.3389	.181	1.3348	.182	1.3229	.180	1.2769	.183	1.2127	.080	1.3239	.163	1.2849
.103	1.3403	.202	1.3014	.201	1.2291	.203	1.1640	.201	1.1269	.100	1.3235	.182	1.2424
.106	1.3391	.212	1.2246	.211	1.1595	.212	1.1075	.209	1.0867	.101	1.3262	.202	1.1810
.122	1.3412	.221	1.1129	.219	1.0971	.222	1.0545	.222	1.0280	.120	1.3232	.214	1.1506
.123	1.3399	.230	1.0049	.221	1.0817	.234	.9851	.231	.9908	.139	1.3190	.224	1.1209
.141	1.3394	.241	.8980	.240	.9499	.240	.9607	.240	.9657	.160	1.3046	.231	1.1110
.141	1.3387	.251	.8355	.250	.9013	.253	.9177	.250	.9369	.179	1.2705	.242	1.0783
.161	1.3389	.263	.8155	.260	.8681	.263	.8945	.252	.9293	.202	1.2056	.249	1.0585
.163	1.3390	.272	.8183	.270	.8548	.271	.8814	.263	.9064	.210	1.1822	.263	1.0268
.180	1.3375	.284	.8342	.281	.8517	.284	.8708	.273	.8946	.222	1.1400	.271	1.0110
.181	1.3376	.289	.8403	.294	.8582	.290	.8714	.283	.8877	.230	1.0930	.281	.9936
.200	1.3352	.305	.8626	.305	.8697	.302	.8756	.292	.8859	.240	1.0840	.292	.9717
.202	1.3351	.322	.8841	.321	.8924	.321	.8953	.304	.8889	.252	1.0435	.301	.9570
.214	1.3317	.341	.9057	.340	.9115	.343	.9186	.322	.9041	.259	1.0230	.322	.9348
.215	1.3304	.364	.9330	.360	.9345	.362	.9396	.342	.9230	.271	.9888	.342	.9235
.222	1.2922	.382	.9509	.381	.9534	.384	.9601	.362	.9443	.279	.9747	.364	.9240
.225	1.2509	.402	.9706	.400	.9705	.400	.9718	.380	.9589	.291	.9493	.380	.9304
.225	1.2658	.425	.9868	.423	.9891	.425	.9919	.400	.9769	.300	.9341	.400	.9433
.232	.9878	.453	.9972	.453	.9980	.450	.9973	.453	.9981	.322	.9112	.431	.9696
.234	1.0230	.501	.9989	.505	.9988	.503	.9986	.504	.9988	.339	.9052	.449	.9805
.234	.9787	.602	.9988	.600	.9989	.604	.9988	.603	.9988	.360	.9105	.470	.9936
.240	.7736	.704	.9988	.702	.9989	.705	.9988	.703	.9989	.381	.9297	.499	.9982
.250	.7567	.800	.9989	.804	.9988	.801	.9988	.801	.9990	.400	.9457	.602	.9989
.264	.7752	.902	.9993	.903	.9989	.902	.9989	.903	.9989	.448	.9837	.700	.9989
.270	.7832	.999	.9988	1.004	.9992	1.009	.9986	1.001	.9993	.498	.9985	.801	.9988
.282	.8032									.598	.9994	.899	.9990
.293	.8191									.701	.9994	1.007	.9990
.300	.8300									.800	.9992		
.320	.8610									.899	.9994		
.340	.8855									1.000	.9993		
.364	.9167												
.381	.9341												
.401	.9540												
.426	.9802												
.453	.9946												
.499	.9986												
.600	.9990												
.703	.9989												
.805	.9988												
.903	.9992												
.993	.9990												

TABLE XVII.- PITOT PRESSURE MEASUREMENTS FOR CONFIGURATION 2 AT M = 0.80 AND $p_{t,j}/p = 2.9$

X/D = 10.800		11.050		11.300		11.550		11.800		12.300		12.800	
R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT
.003	1.9248	.005	1.8425	-.004	1.9234	.002	1.7939	.001	1.9086	.002	1.8445	.003	1.7755
.021	1.9251	.022	1.8331	.022	1.9250	.020	1.7954	.019	1.9091	.022	1.8388	.022	1.7723
.041	1.9266	.041	1.8135	.043	1.9270	.041	1.7978	.042	1.9107	.042	1.8374	.042	1.7760
.061	1.9232	.062	1.8171	.061	1.9292	.061	1.8003	.060	1.9095	.062	1.8406	.060	1.7812
.081	1.9245	.081	1.8230	.082	1.9288	.082	1.8042	.080	1.9081	.081	1.8380	.082	1.7892
.101	1.9253	.103	1.8326	.104	1.9294	.104	1.8082	.104	1.9048	.102	1.8315	.106	1.7965
.121	1.9191	.122	1.8422	.124	1.9261	.125	1.8147	.124	1.9045	.121	1.8308	.121	1.8007
.143	1.9106	.140	1.8504	.144	1.9231	.145	1.8206	.140	1.8995	.141	1.8290	.143	1.7952
.163	1.8997	.163	1.8607	.163	1.9151	.161	1.8277	.160	1.8892	.163	1.8154	.162	1.7693
.180	1.8848	.183	1.8678	.182	1.9075	.182	1.8370	.180	1.8602	.185	1.7660	.183	1.7142
.204	1.8924	.202	1.8730	.202	1.8912	.199	1.8317	.203	1.7555	.200	1.6964	.201	1.6341
.211	1.8923	.211	1.8735	.212	1.8541	.210	1.8103	.212	1.6886	.210	1.6385	.214	1.5555
.220	1.8943	.222	1.8749	.221	1.7826	.220	1.7563	.221	1.6047	.224	1.5461	.221	1.5169
.232	1.8968	.232	1.8618	.230	1.6876	.231	1.6745	.230	1.5060	.232	1.4874	.233	1.4488
.241	1.8961	.243	1.7618	.243	1.4850	.241	1.5532	.244	1.3734	.242	1.4025	.241	1.3947
.245	1.8954	.250	1.6263	.252	1.3447	.253	1.4131	.251	1.3060	.250	1.3441	.250	1.3436
.251	1.8728	.260	1.3646	.262	1.2126	.261	1.3132	.260	1.2240	.263	1.2554	.260	1.2911
.255	1.7967	.273	1.0944	.271	1.1108	.270	1.2233	.273	1.1392	.272	1.2036	.272	1.2293
.259	1.5103	.281	.9774	.281	1.0192	.282	1.1215	.283	1.0785	.283	1.1442	.282	1.1835
.262	1.2739	.290	.8937	.291	.9543	.291	1.0498	.291	1.0356	.292	1.1069	.293	1.1401
.264	1.0949	.302	.8451	.303	.8979	.303	.9844	.303	.9880	.305	1.0525	.300	1.1127
.270	.8305	.324	.8514	.322	.8725	.321	.9190	.322	.9370	.320	1.0076	.322	1.0457
.272	.8047	.341	.8733	.346	.8895	.341	.8961	.342	.9148	.340	.9575	.341	.9992
.281	.7682	.361	.8977	.363	.9086	.361	.9072	.364	.9202	.362	.9389	.361	.9682
.290	.7788	.381	.9188	.382	.9284	.381	.9280	.382	.9358	.382	.9398	.381	.9541
.291	.7813	.401	.9412	.402	.9505	.401	.9492	.403	.9546	.402	.9535	.401	.9557
.301	.7955	.428	.9701	.425	.9719	.426	.9723	.433	.9808	.430	.9760	.453	.9848
.320	.8227	.450	.9866	.431	.9771	.450	.9899	.451	.9908	.451	.9863	.503	.9984
.340	.8541	.475	.9968	.454	.9915	.474	.9973	.473	.9976	.473	.9961	.602	.9994
.363	.8848	.505	.9989	.474	.9976	.502	.9993	.503	.9992	.504	.9988	.704	.9995
.382	.9094	.603	.9995	.502	.9992	.553	.9993	.605	.9993	.522	.9987	.804	.9990
.402	.9309	.700	.9997	.532	.9993	.576	.9994	.700	.9993	.602	.9990	.903	.9990
.435	.9683	.804	.9995	.598	.9994	.603	.9993	.802	.9993	.702	.9990	1.003	.9991
.453	.9830	.904	.9995	.700	.9993	.704	.9995	.903	.9992	.801	.9990		
.475	.9950	1.002	.9995	.801	.9993	.802	.9995	1.002	.9993	.898	.9991		
.501	.9981			.903	.9994	.904	.9993			1.008	.9988		
.600	.9988			1.005	.9995	1.000	.9994						
.702	.9992												
.801	.9993												
.902	.9993												
.997	.9994												

TABLE XVIII.- PITOT PRESSURE MEASUREMENTS FOR CONFIGURATION 2 AT M = 0.80 AND $p_{t,j}/p = 5.0$

X/D = 10.800		11.050		11.300		11.550		11.800		12.300		12.800	
R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT	R/D	PTP/PT
.006	3.3001	-.001	2.4417	.005	1.2866	-.000	2.7243	-.058	3.2468	.002	1.7520	.002	2.9074
.020	3.3002	-.001	2.4427	.023	1.2809	.000	2.7393	-.040	3.1748	.023	1.8094	.024	3.0648
.043	3.3058	-.001	2.4446	.042	1.2689	.021	2.8906	-.023	2.8822	.040	1.8783	.042	3.1642
.062	3.3051	.021	2.4289	.062	1.5875	.041	2.9634	.001	2.8927	.063	1.9477	.061	3.1982
.080	3.3083	.039	2.4047	.081	1.9554	.060	2.7847	.019	3.1367	.080	2.0015	.081	3.1877
.122	3.3051	.061	2.3616	.101	2.0845	.080	2.5814	.042	3.2534	.100	2.0705	.103	3.1827
.142	3.2931	.080	2.3128	.122	2.1983	.101	2.5768	.061	3.2845	.121	2.1493	.120	3.1580
.163	3.2763	.104	2.2338	.140	2.2760	.122	2.5954	.081	3.2945	.143	2.2338	.142	3.0329
.182	3.2377	.120	2.1763	.162	2.3602	.141	2.6157	.101	3.2994	.161	2.2996	.161	2.8456
.200	3.1419	.140	2.1532	.182	2.4272	.160	2.6395	.121	3.2999	.180	2.3652	.181	2.6384
.212	2.9706	.161	2.4280	.200	2.4911	.180	2.6675	.142	3.2787	.203	2.4312	.202	2.3757
.223	2.8686	.180	2.5292	.212	2.5275	.200	2.6831	.163	3.1563	.212	2.4482	.211	2.2615
.234	2.8526	.201	2.6154	.221	2.5507	.211	2.6689	.179	2.9334	.221	2.4543	.222	2.1491
.242	2.4762	.212	2.6513	.231	2.5770	.221	2.6307	.203	2.4843	.233	2.4297	.232	2.0120
.246	1.5867	.221	2.6797	.239	2.6058	.229	2.5706	.212	2.3174	.242	2.3750	.241	1.9037
.253	.7891	.232	2.7072	.245	2.6168	.241	2.4370	.221	2.1698	.249	2.3057	.251	1.7815
.257	.7584	.241	2.7324	.251	2.6229	.253	2.2680	.232	1.9983	.260	2.1874	.261	1.6961
.259	.7571	.251	2.7508	.257	2.6211	.261	2.1288	.243	1.8318	.272	2.0418	.271	1.5927
.267	.7628	.260	2.7697	.261	2.6043	.274	1.9187	.251	1.7116	.280	1.9286	.281	1.5005
.270	.7654	.272	2.7483	.265	2.5839	.280	1.8024	.263	1.5721	.290	1.8044	.292	1.4241
.283	.7777	.282	2.5474	.270	2.5308	.290	1.6357	.270	1.4937	.301	1.6757	.301	1.3547
.292	.7911	.292	2.0884	.281	2.3578	.300	1.4742	.282	1.3724	.321	1.4795	.322	1.2401
.302	.8031	.301	1.6902	.290	2.1483	.322	1.2115	.293	1.2765	.339	1.3095	.341	1.1478
.321	.8364	.314	1.2376	.303	1.7995	.343	1.0376	.303	1.1998	.362	1.1633	.361	1.0757
.342	.8649	.321	1.0665	.321	1.3859	.364	.9546	.321	1.0891	.383	1.0558	.383	1.0225
.364	.8947	.329	.9389	.342	1.0719	.383	.9359	.342	.9929	.404	.9929	.401	.9955
.382	.9182	.340	.8693	.350	1.0063	.401	.9469	.363	.9573	.452	.9762	.452	.9895
.404	.9413	.348	.8596	.362	.9378	.451	.9870	.381	.9525	.501	.9975	.501	.9981
.456	.9883	.360	.8721	.382	.9089	.501	.9993	.401	.9595	.604	.9992	.602	.9989
.501	.9980	.382	.9023	.402	.9267	.605	.9995	.449	.9917	.701	.9993	.702	.9988
.603	.9982	.401	.9241	.455	.9804	.702	.9997	.504	.9995	.801	.9993	.802	.9989
.704	.9981	.451	.9791	.502	.9988	.802	.9997	.601	.9994	.903	.9993	.903	.9988
.802	.9984	.501	.9990	.599	.9997	.901	.9993	.700	.9992	1.000	.9993	.998	.9986
.902	.9984	.604	.9997	.701	.9999	1.000	.9997	.801	.9990				
1.000	.9985	.702	.9998	.800	.9995			.902	.9994				
		.802	.9998	.903	.9995			.994	.9994				
		.903	.9999	1.010	.9995								
		1.003	.9999										



L-76-1298.1

Figure 1.- Photograph of experimental apparatus.

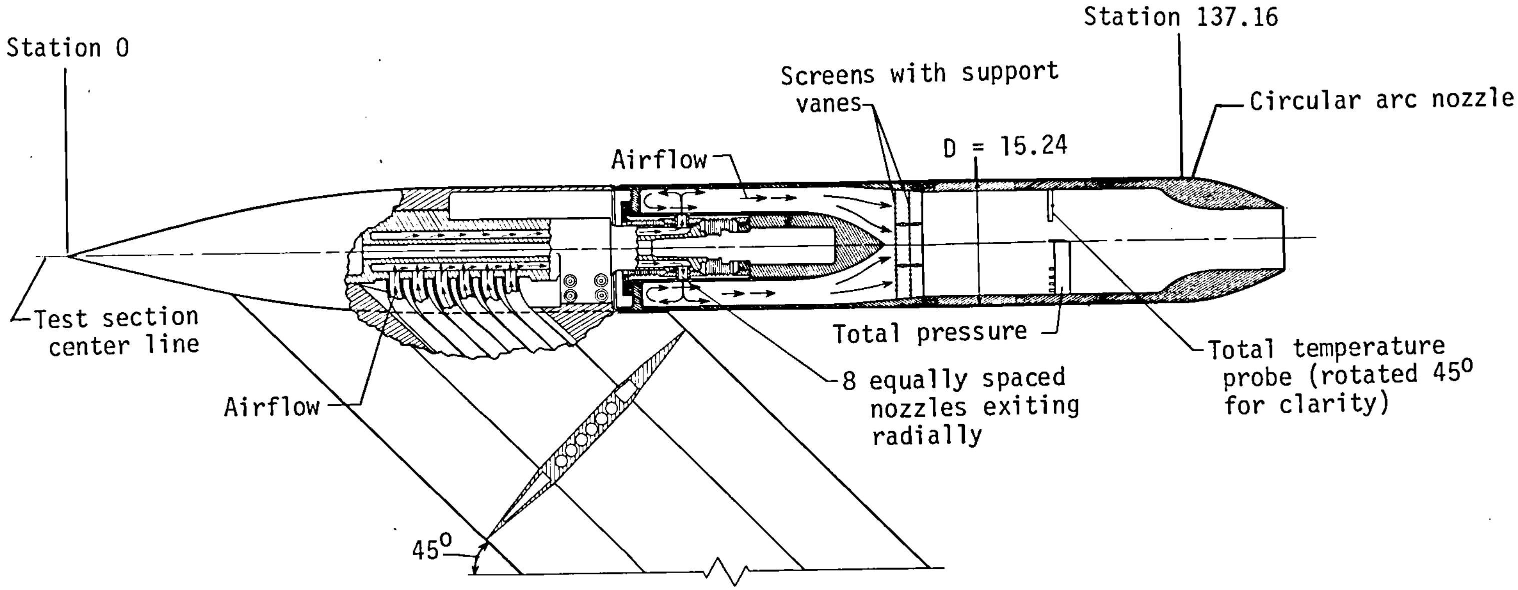
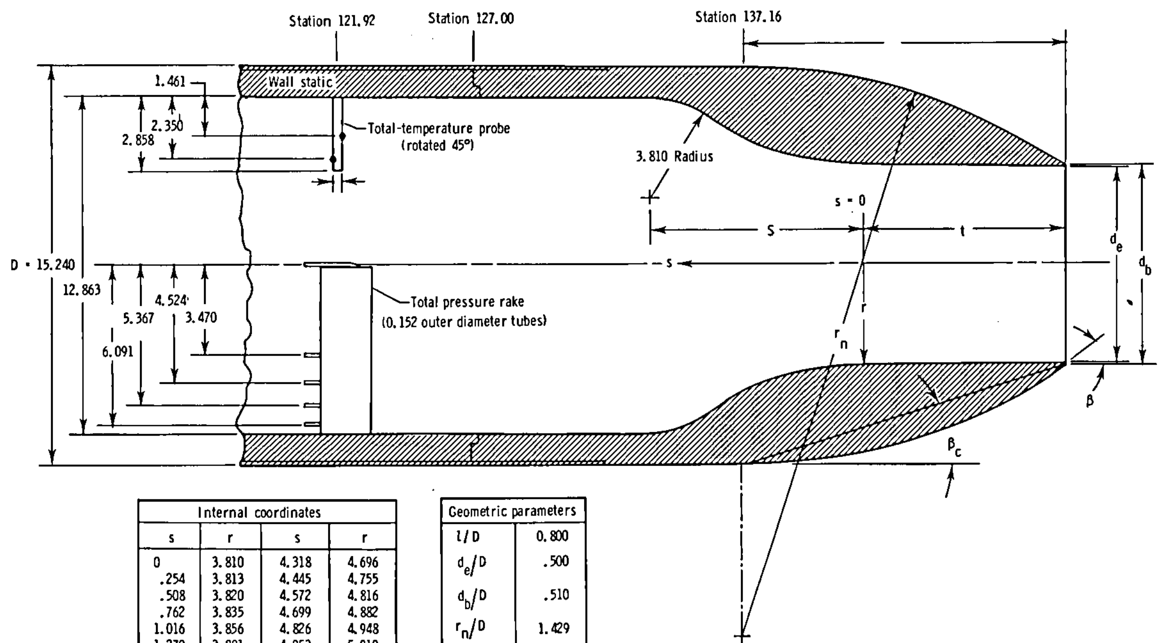


Figure 2.- Drawing of exhaust-nozzle simulator. (All dimensions are in centimeters unless otherwise noted.)

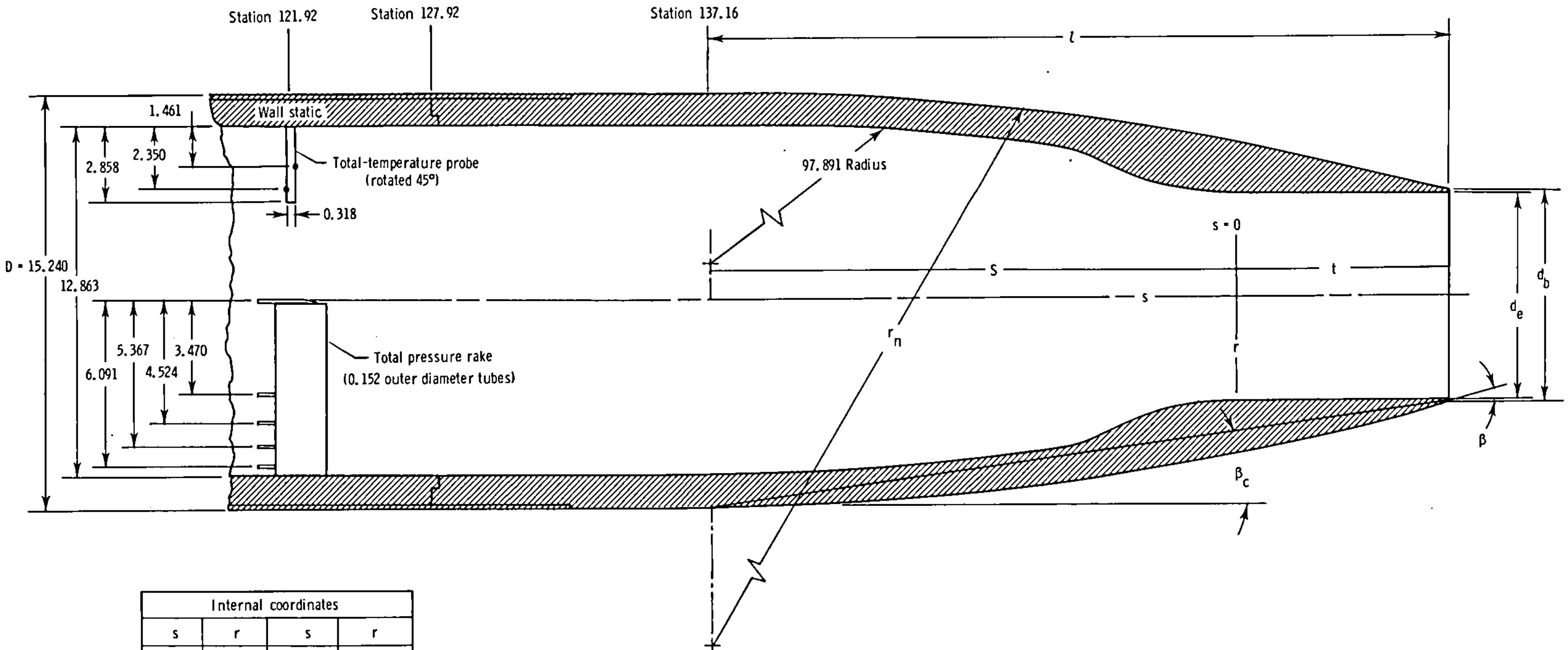


Internal coordinates			
s	r	s	r
0	3.810	4.318	4.696
.254	3.813	4.445	4.755
.508	3.820	4.572	4.816
.762	3.835	4.699	4.882
1.016	3.856	4.826	4.948
1.270	3.881	4.953	5.019
1.524	3.912	5.080	5.090
1.778	3.950	5.207	5.169
2.032	3.993	5.334	5.248
2.286	4.041	5.461	5.334
2.540	4.097	5.588	5.420
2.794	4.161	5.715	5.514
3.048	4.229	5.842	5.611
3.302	4.308	5.969	5.715
3.555	4.392	6.096	5.822
3.810	4.483	6.223	5.939
3.937	4.534	6.350	6.060
4.064	4.585	6.477	6.190
4.191	4.641		

Geometric parameters	
l/D	0.800
d_e/D	.500
d_b/D	.510
r_n/D	1.429
t/D	.500
S/D	.533
β, deg	34.054
β_c, deg	17.027

(a) Configuration 1.

Figure 3.- Detailed sketch of nozzle configurations with tables of geometric parameters and internal coordinates. (All dimensions are in centimeters unless otherwise noted.)

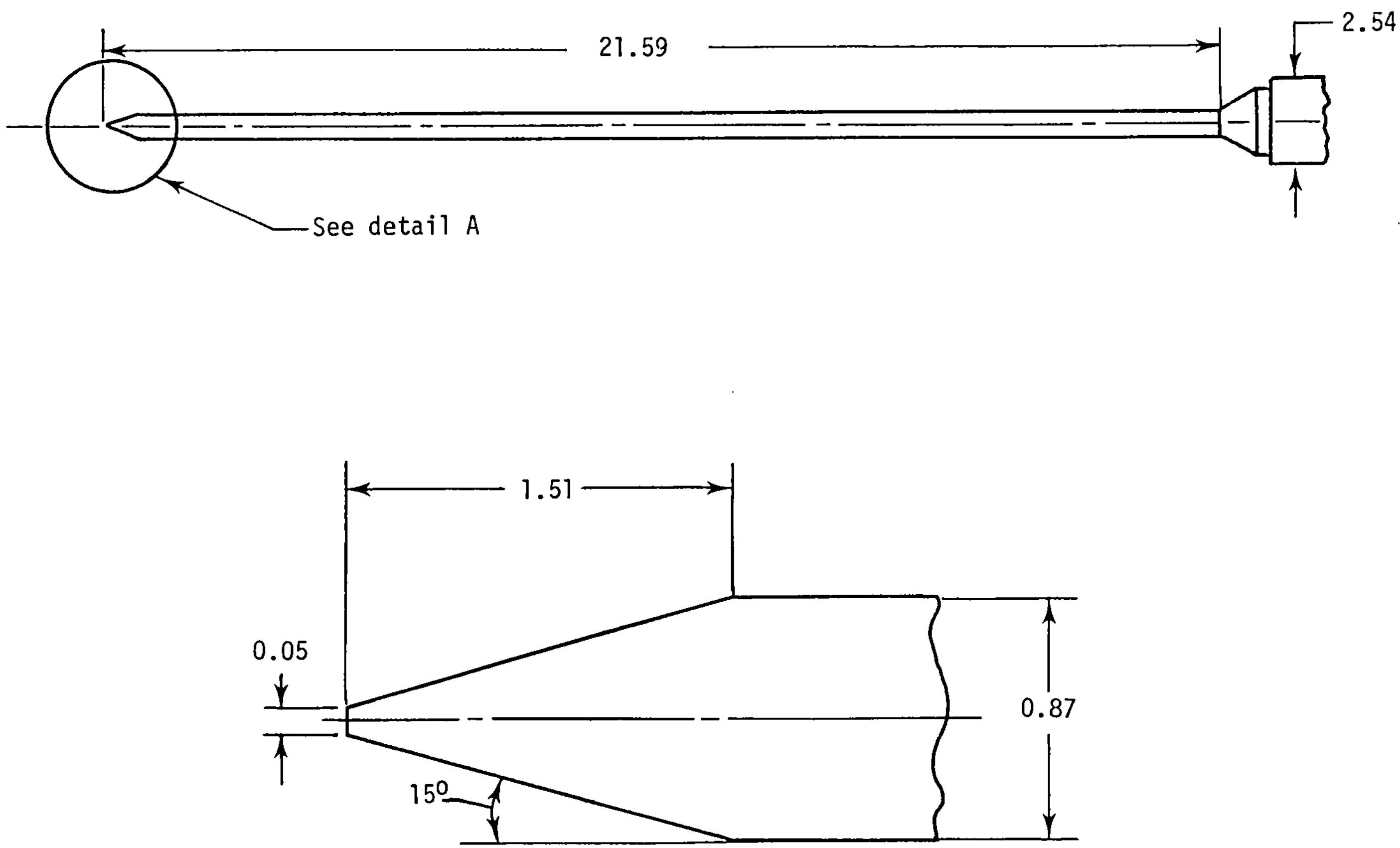


Internal coordinates			
s	r	s	r
0	3.810	4.318	4.696
.254	3.813	4.445	4.755
.508	3.820	4.572	4.816
.762	3.835	4.699	4.882
1.016	3.856	4.826	4.948
1.270	3.881	4.953	5.019
1.524	3.912	5.080	5.090
1.778	3.950	5.207	5.169
2.032	3.993	5.334	5.232
2.286	4.041	5.461	5.283
2.540	4.097	5.588	5.347
2.794	4.161	5.715	5.398
3.048	4.229	5.842	5.436
3.302	4.308	5.969	5.486
3.556	4.392	6.096	5.512
3.810	4.483	6.350	5.563
3.937	4.534	6.604	5.588
4.064	4.585	6.858	5.613
4.191	4.641	6.985	5.629

Geometric parameters	
l/D	1.768
d_e/D	.500
d_b/D	.510
r_n/D	6.500
t/D	.500
s/D	1.268
β, deg	15.781
β_c, deg	7.891

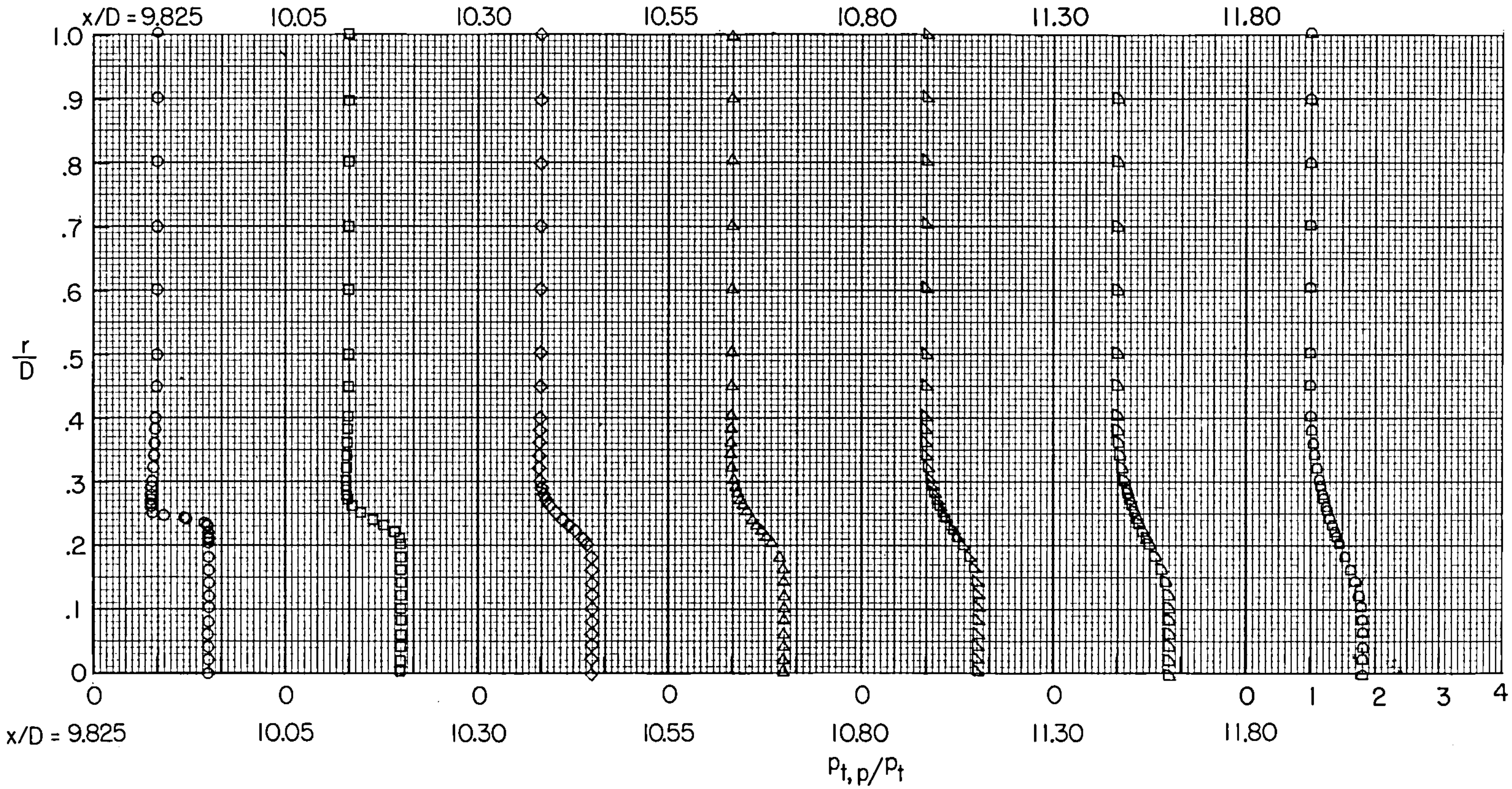
(b) Configuration 2.

Figure 3.- Concluded.



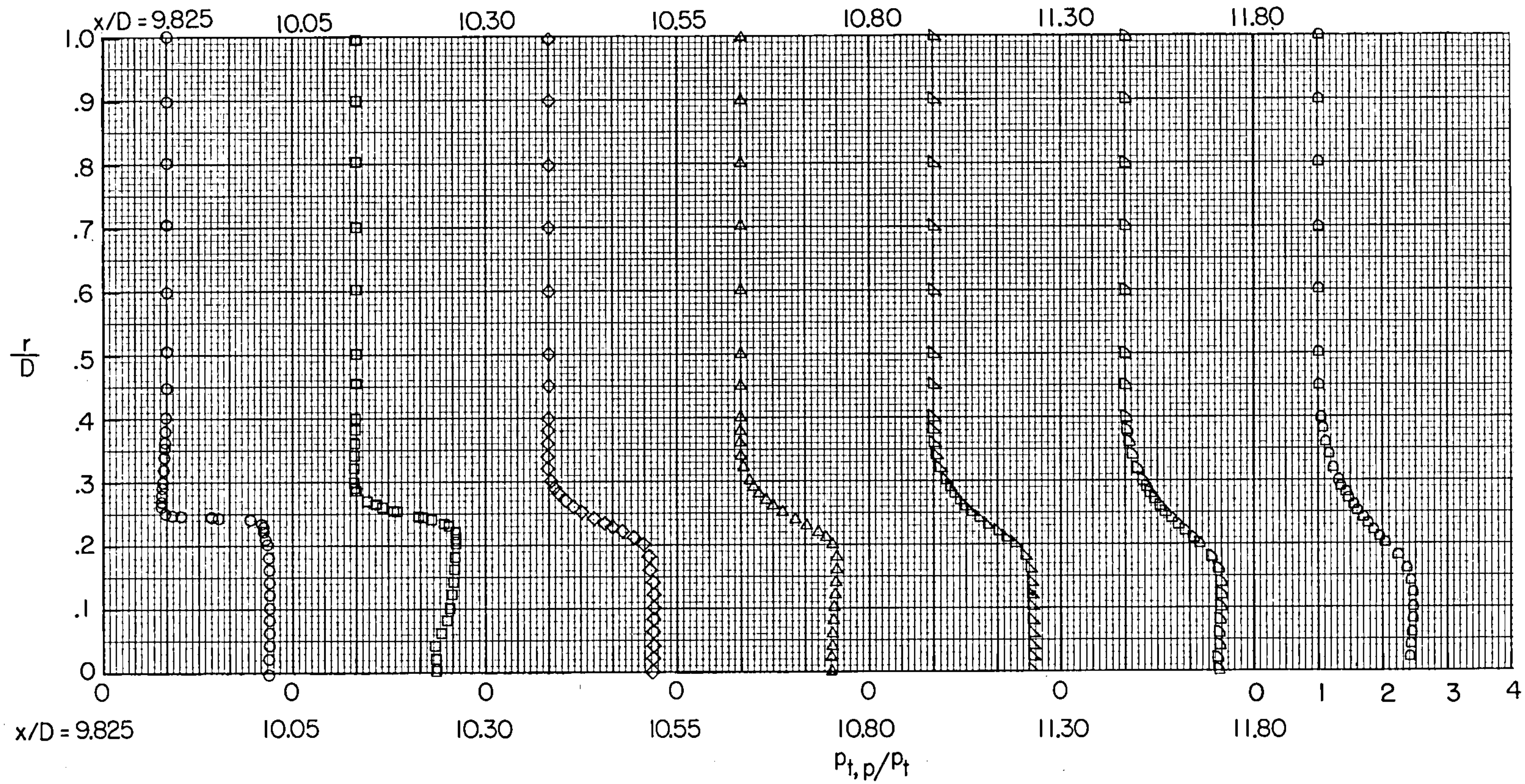
Detail A

Figure 4.- Drawing of conical survey probe. (All dimensions are in centimeters unless otherwise noted.)



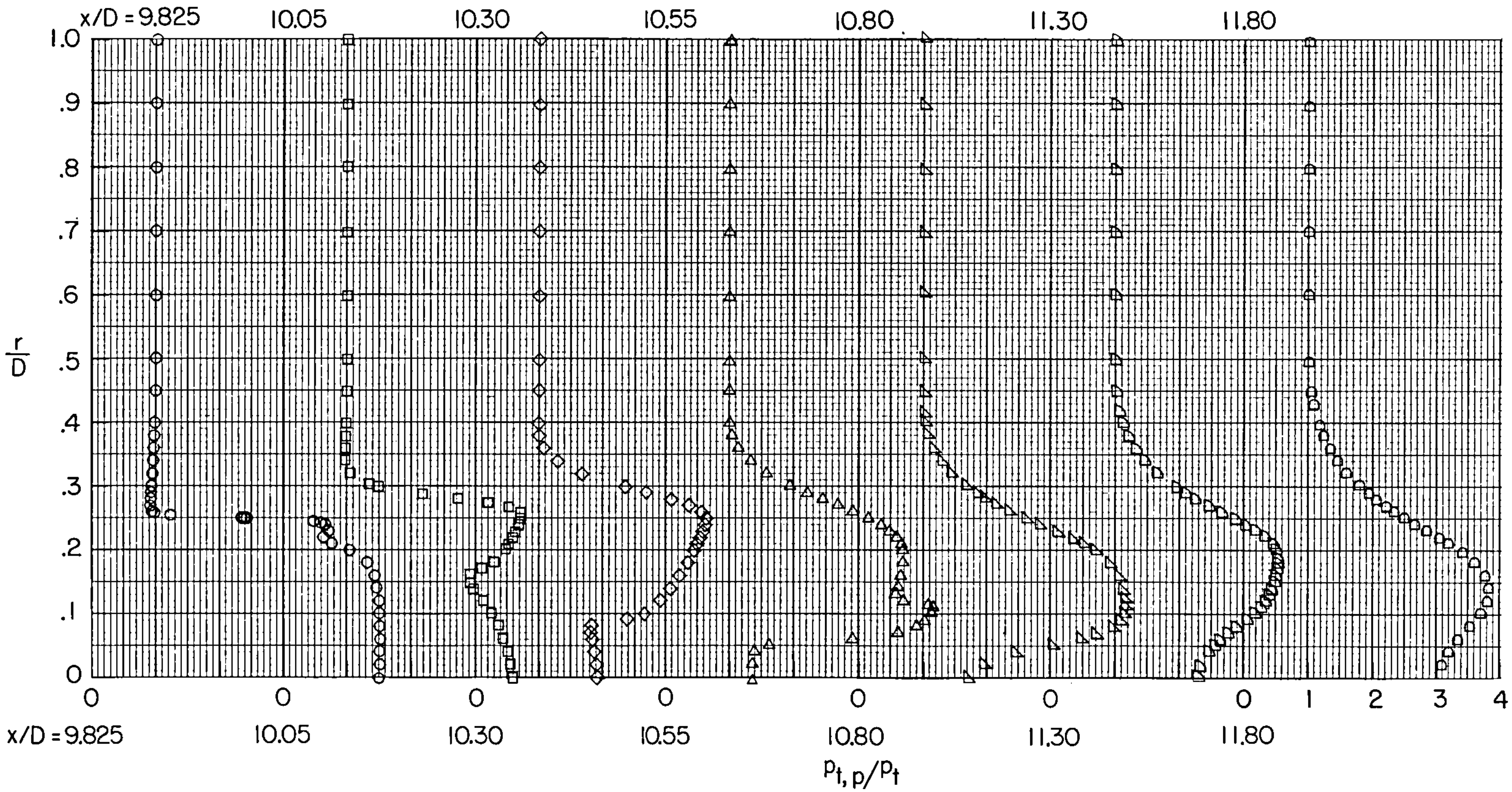
(a) M = 0.40; NPR = 2.0.

Figure 5.- Pitot pressure distributions for configuration 1. Nozzle exit is located at x/D = 9.80.



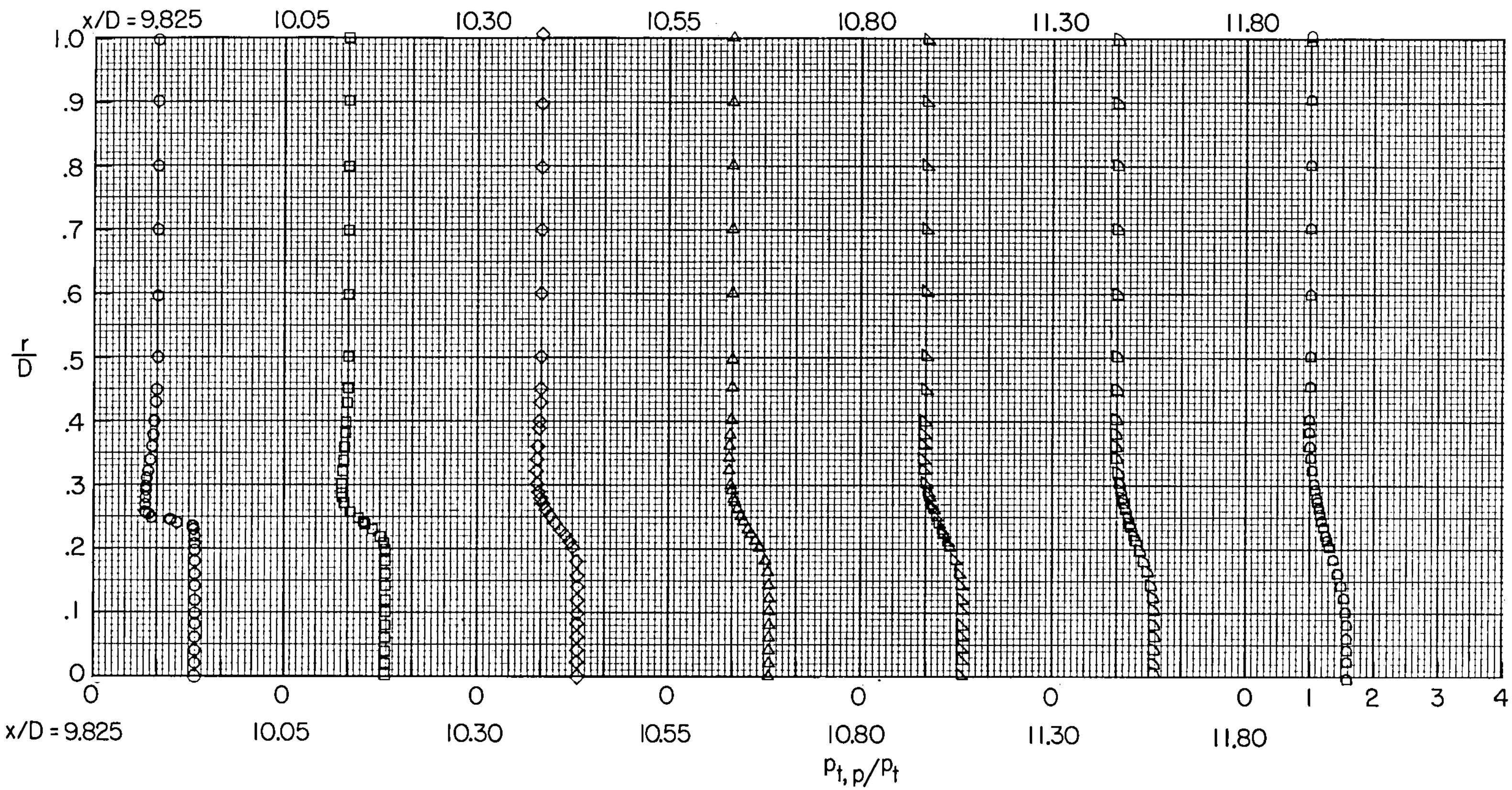
(b) M = 0.40; $p_{t,j}/p = 2.9$.

Figure 5.- Continued.



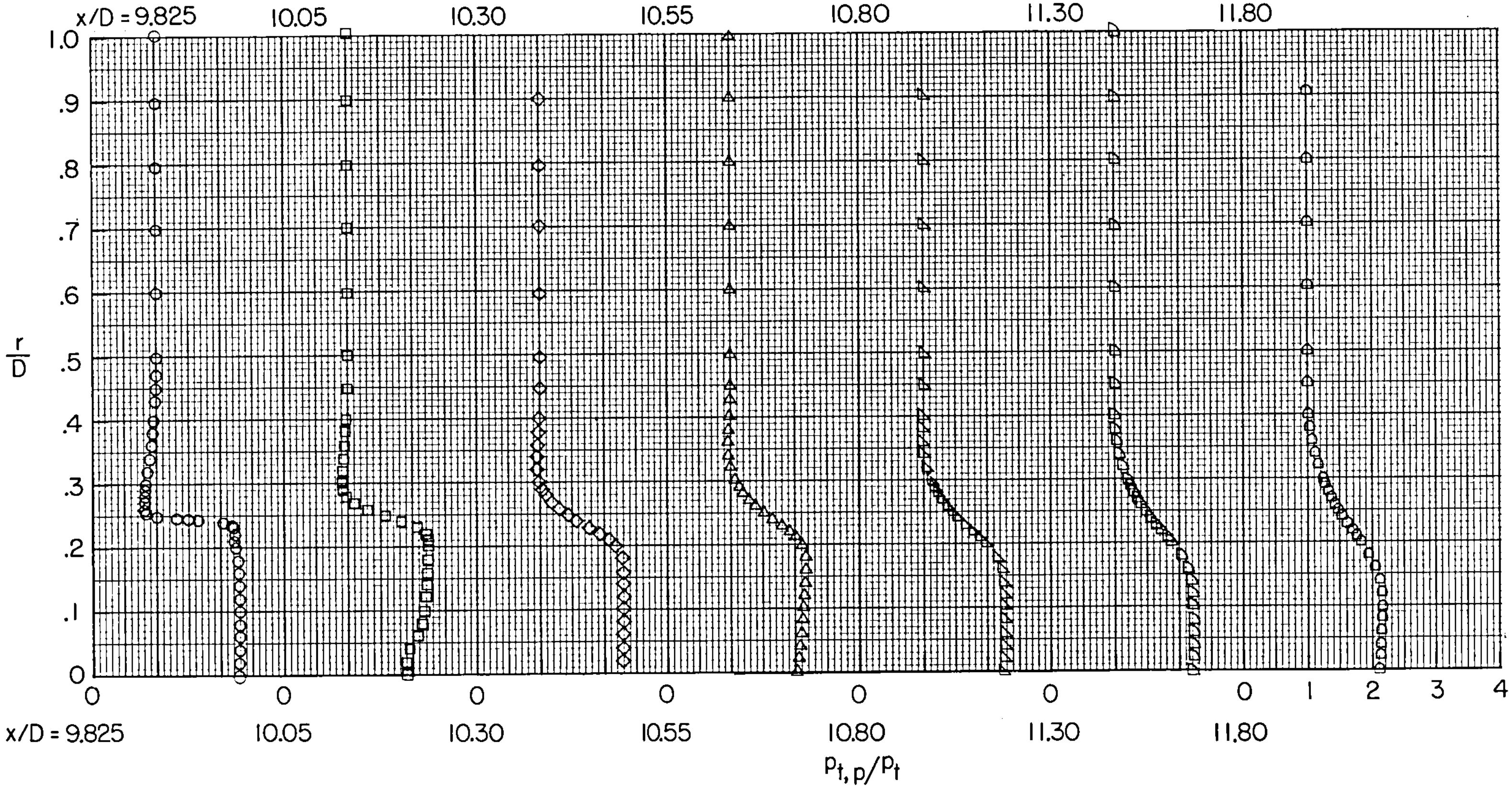
(c) M = 0.40; $p_{t,j}/p = 5.0$.

Figure 5.- Continued.



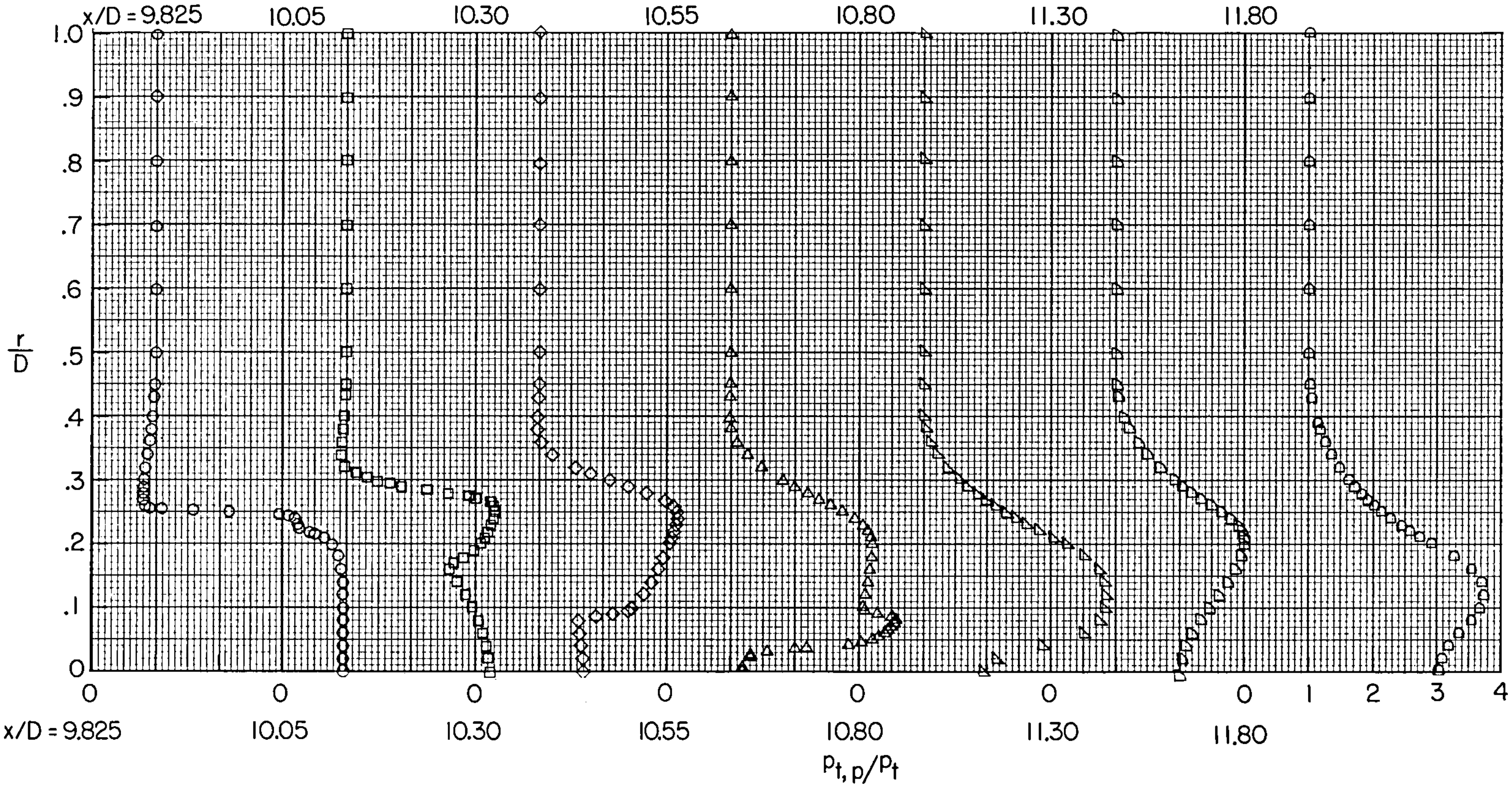
(d) M = 0.60; $p_{t,j}/p = 2.0$.

Figure 5.- Continued.



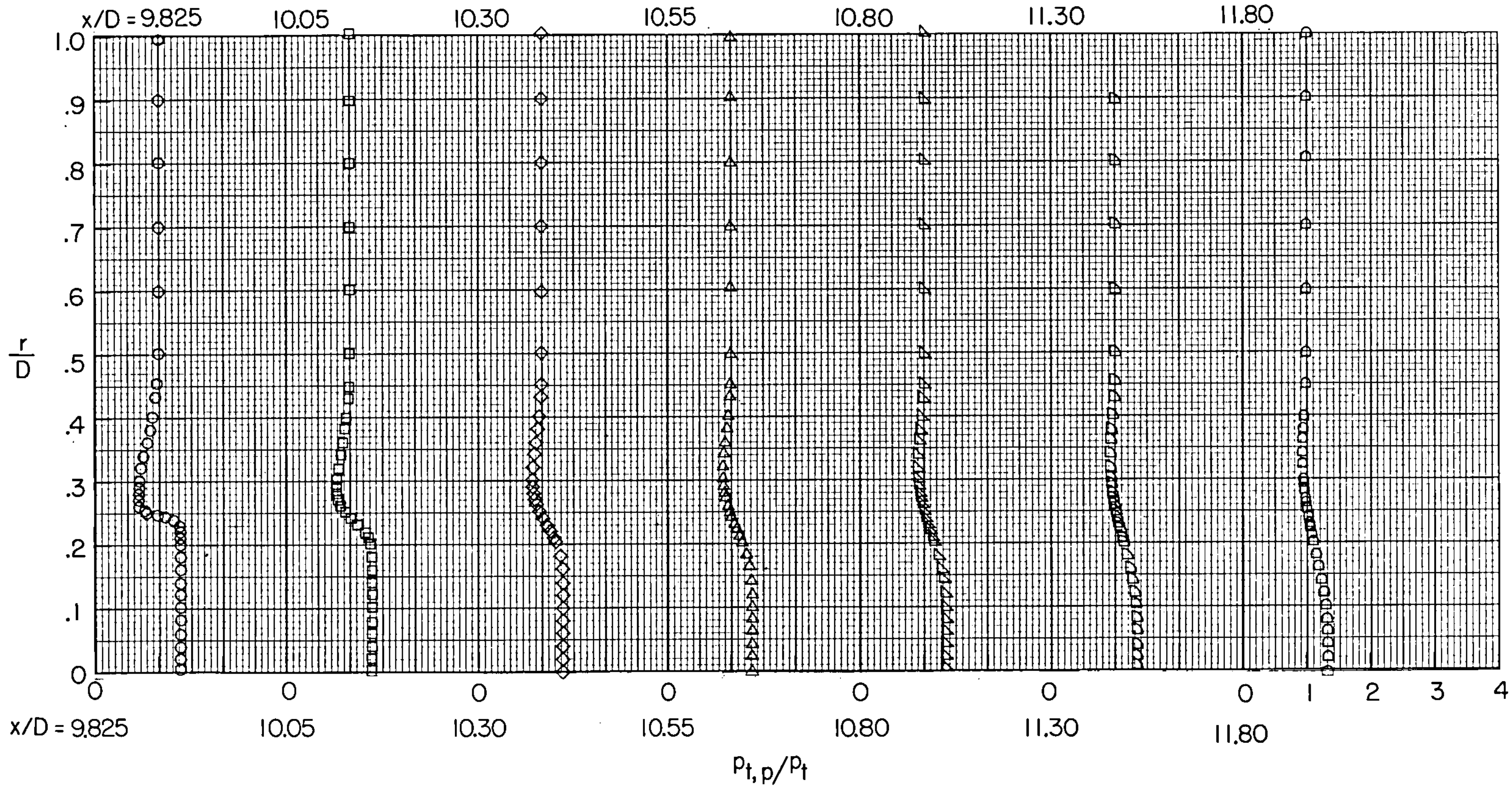
(e) M = 0.60; $p_{t,j}/p = 2.9$.

Figure 5.- Continued.



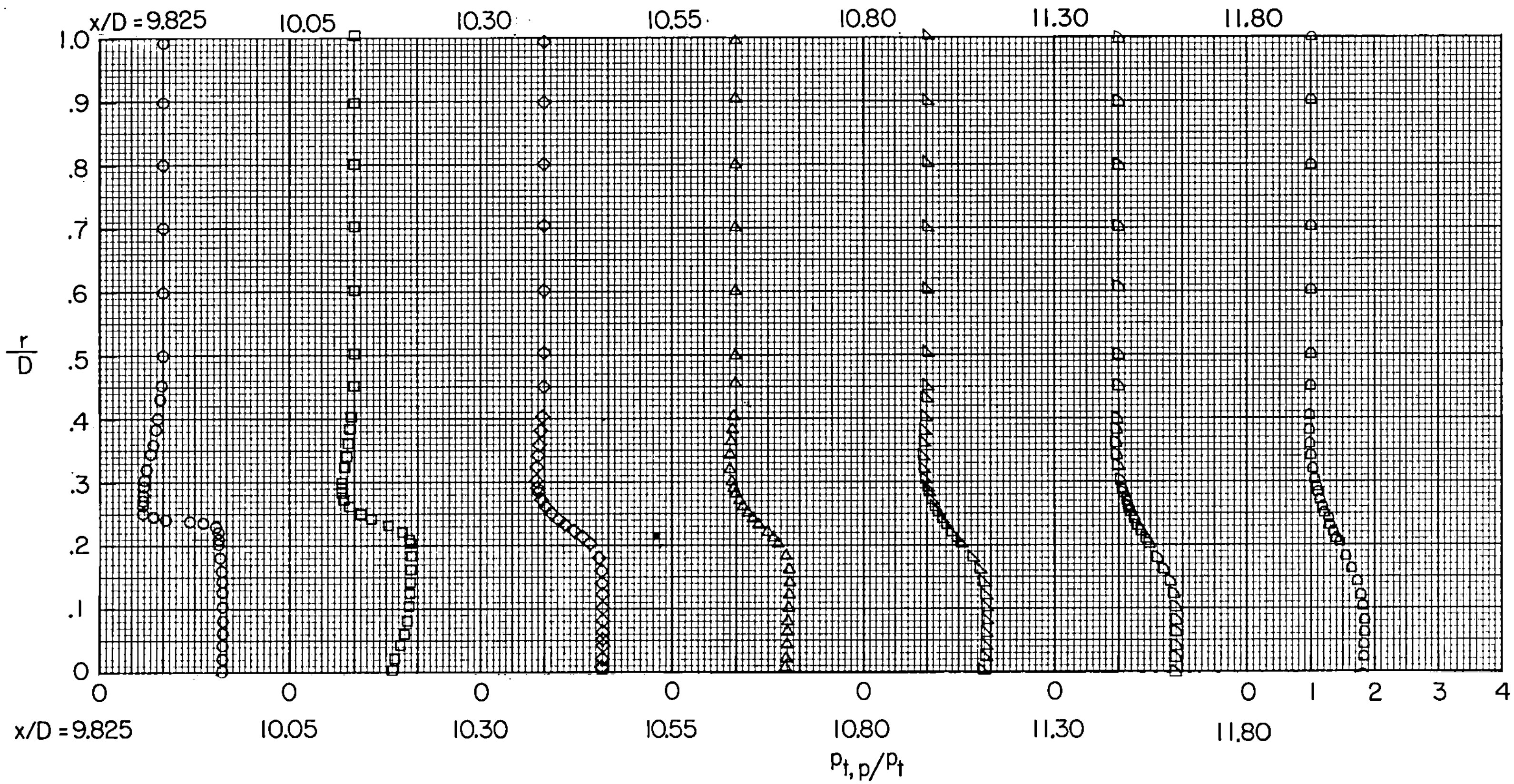
(f) M = 0.60; $p_{t,j}/p = 5.0$.

Figure 5.- Continued.



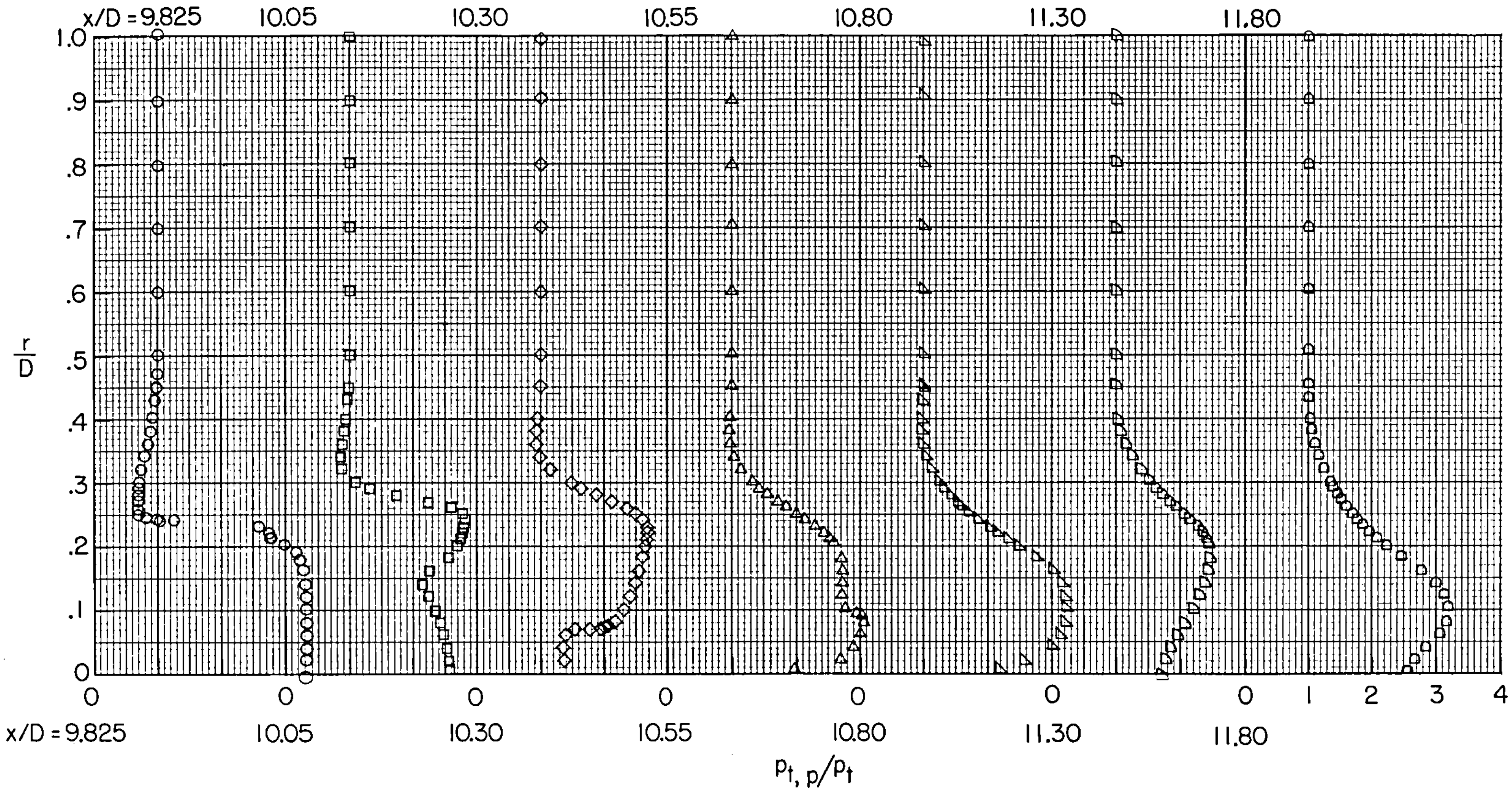
(g) M = 0.80; $p_{t,j}/p = 2.0$.

Figure 5.- Continued.



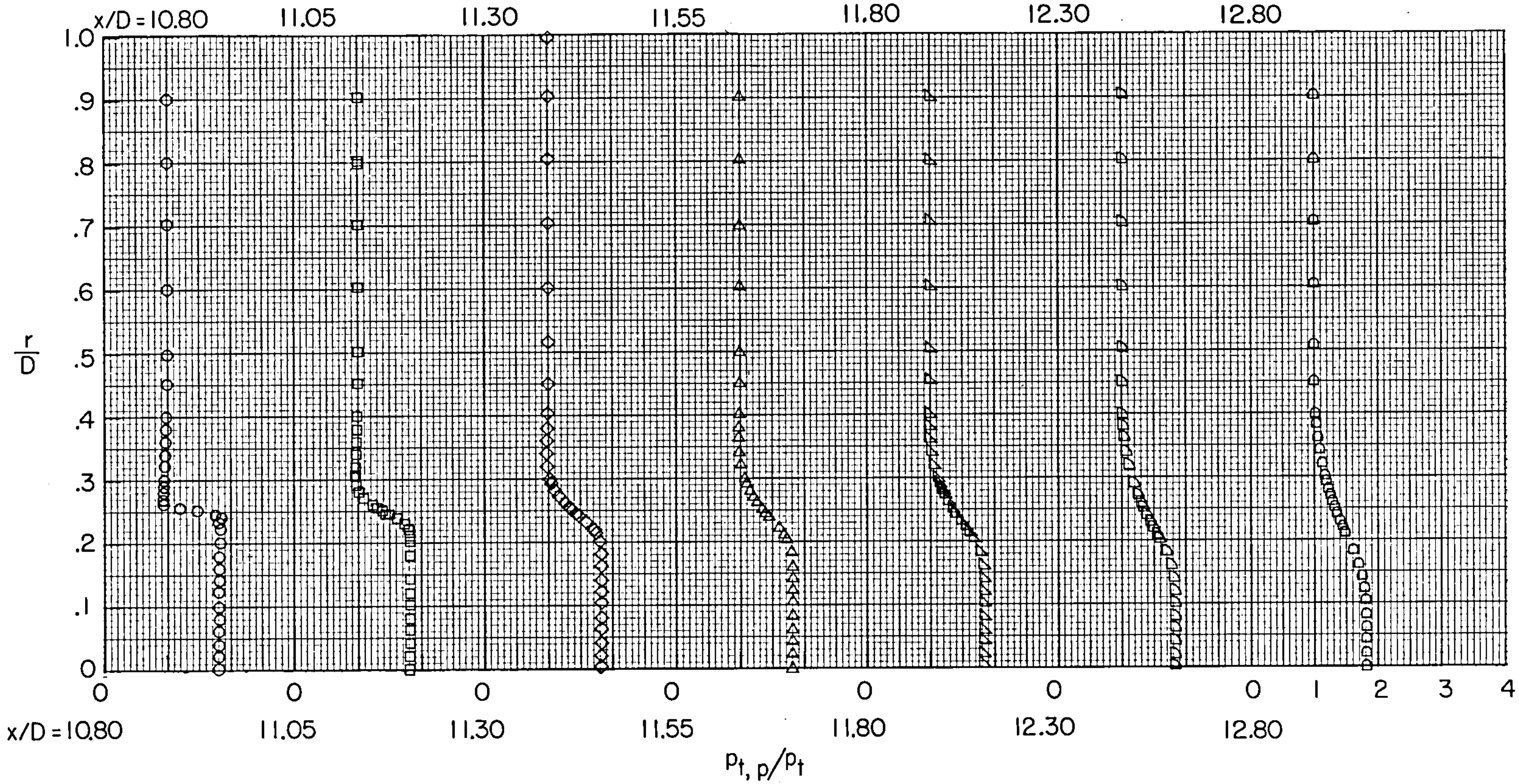
(h) M = 0.80; $p_{t,j}/p = 2.9$.

Figure 5.- Continued.



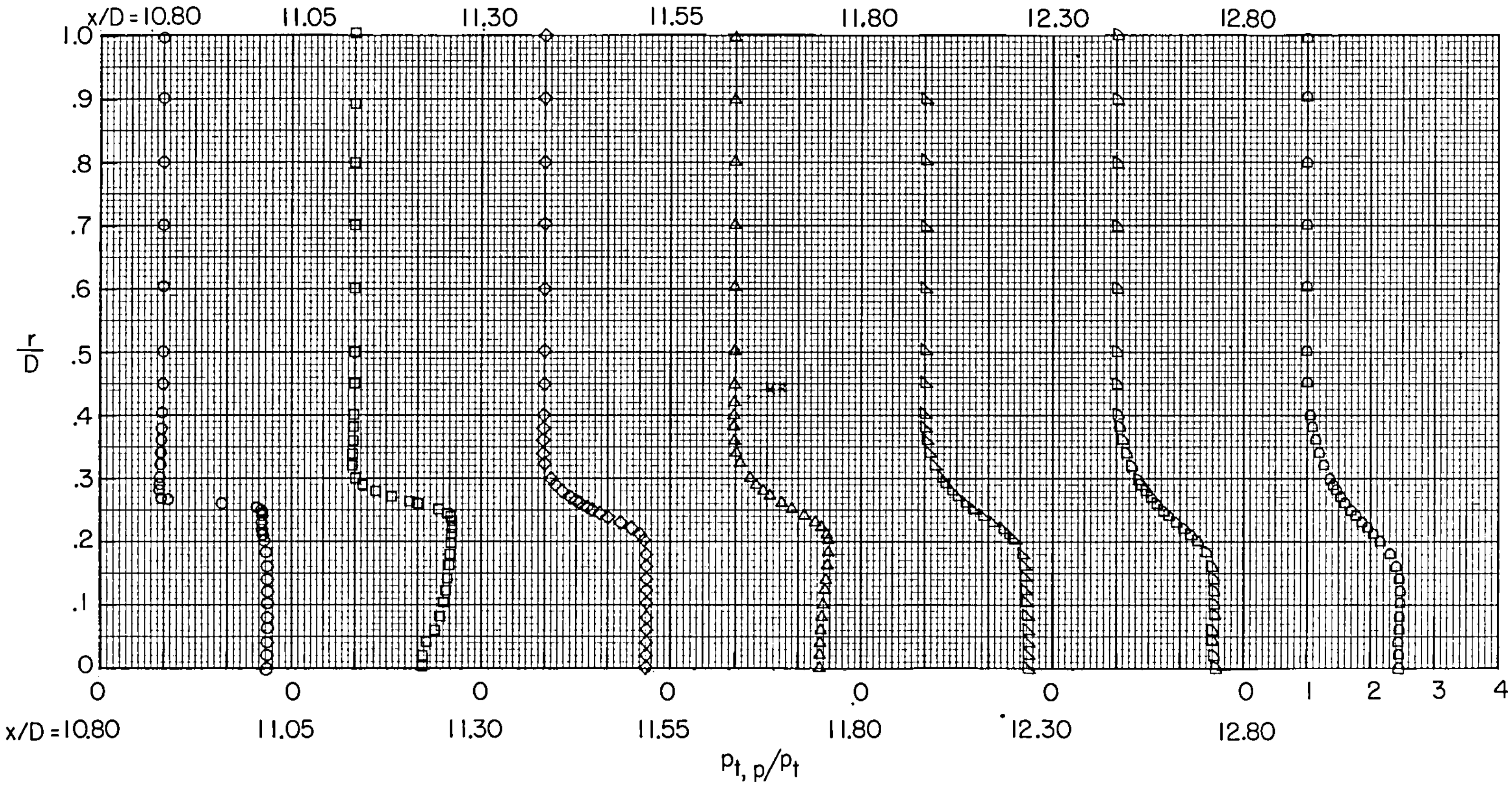
(i) M = 0.80; $p_{t,j}/p = 5.0$.

Figure 5.- Concluded.



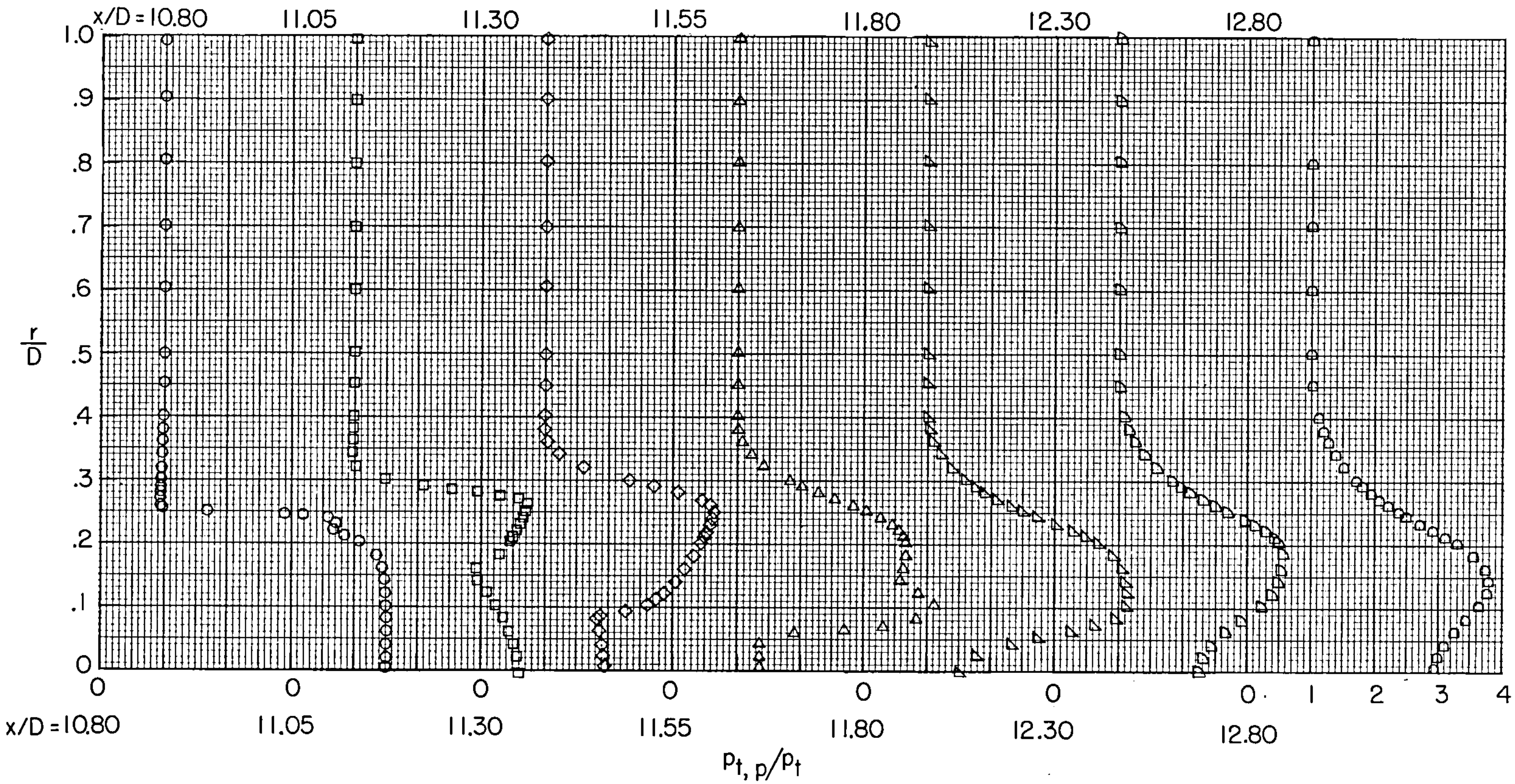
(a) M = 0.40; $p_{t,j}/p = 2.0$.

Figure 6.- Pitot pressure distributions for configuration 2. Nozzle exit is located at $x/D = 10.768$.



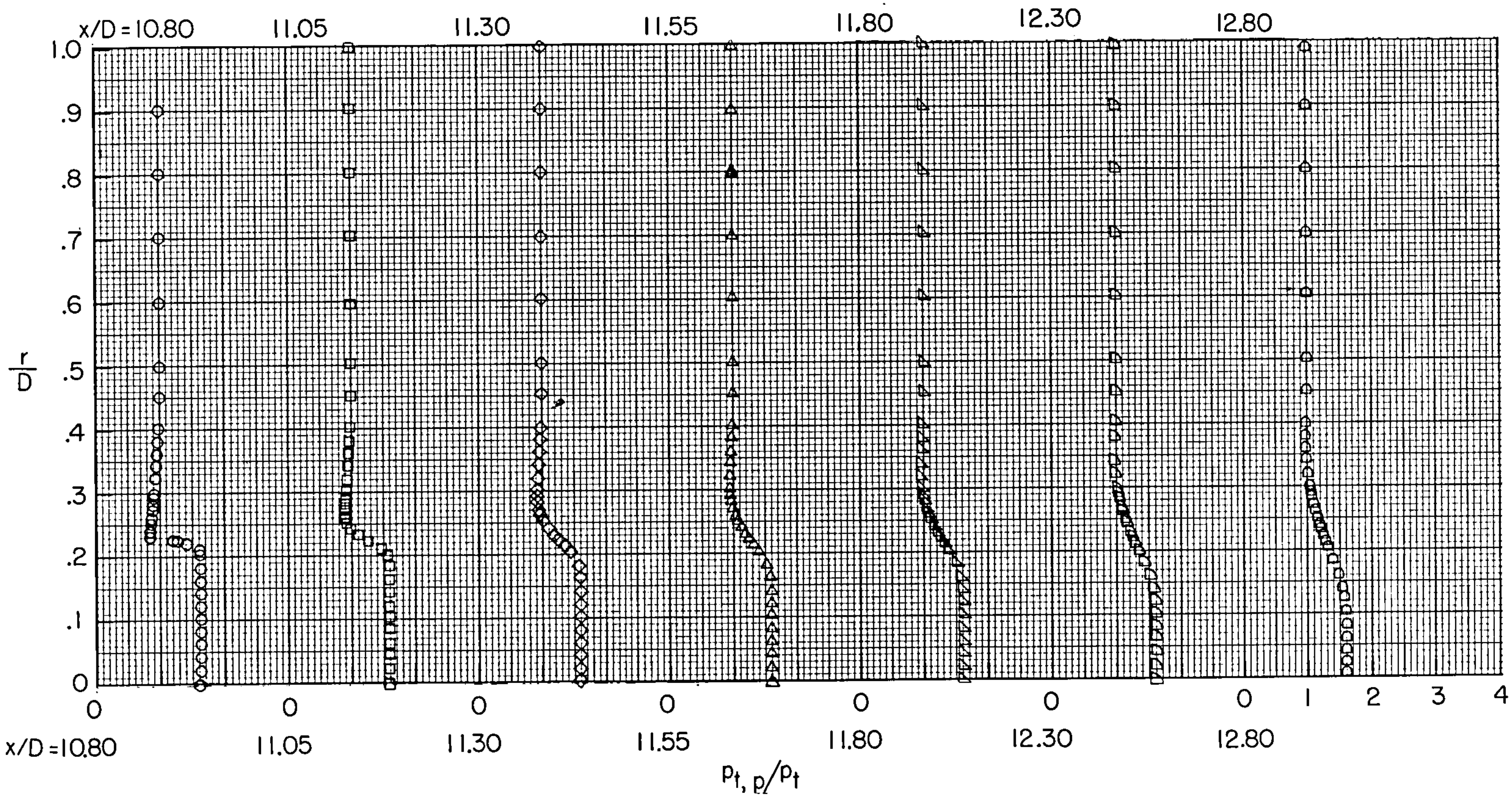
(b) M = 0.40; $p_{t,j}/p = 2.9$.

Figure 6.- Continued.



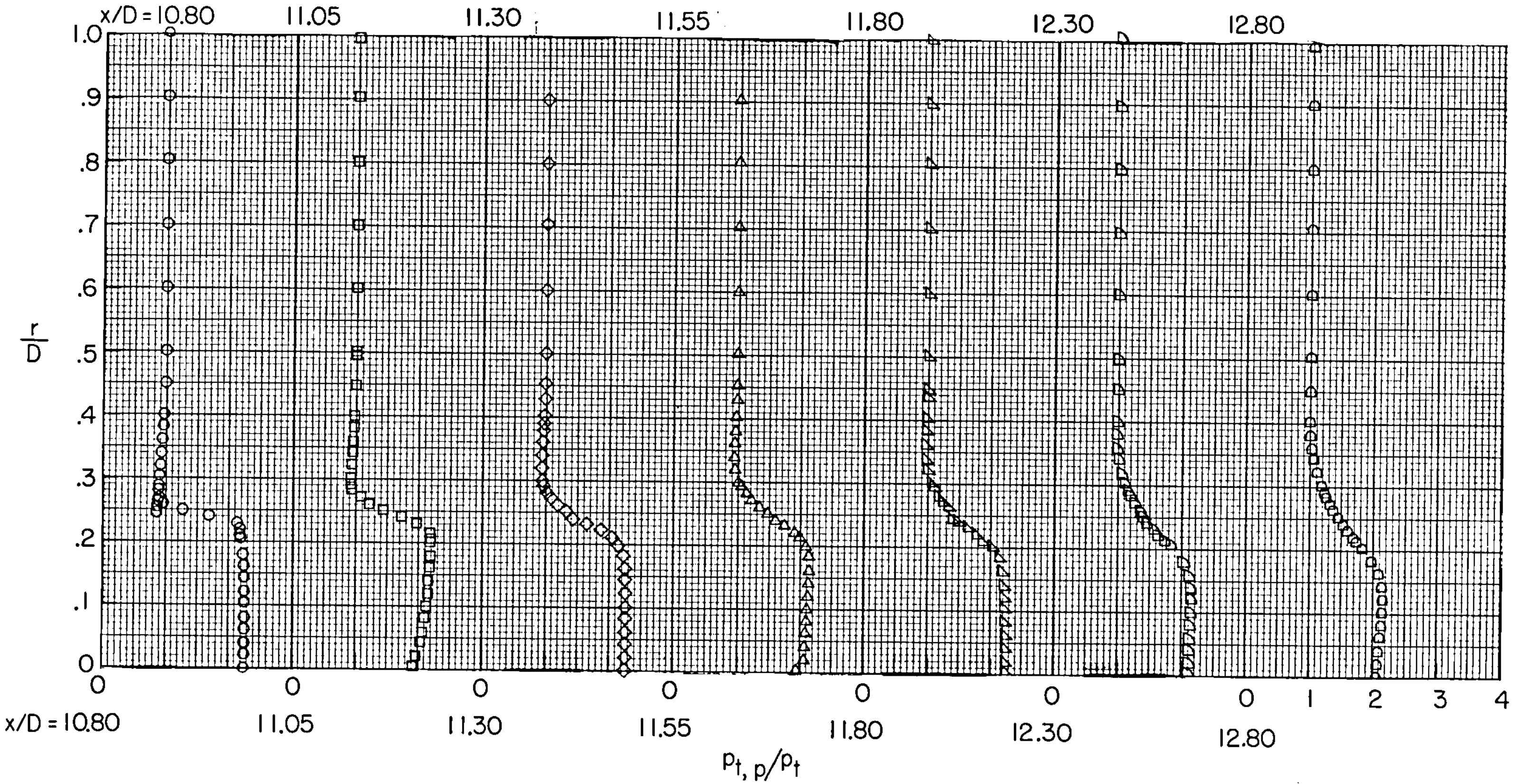
(c) M = 0.40; $p_{t,j}/p = 5.0$.

Figure 6.- Continued.



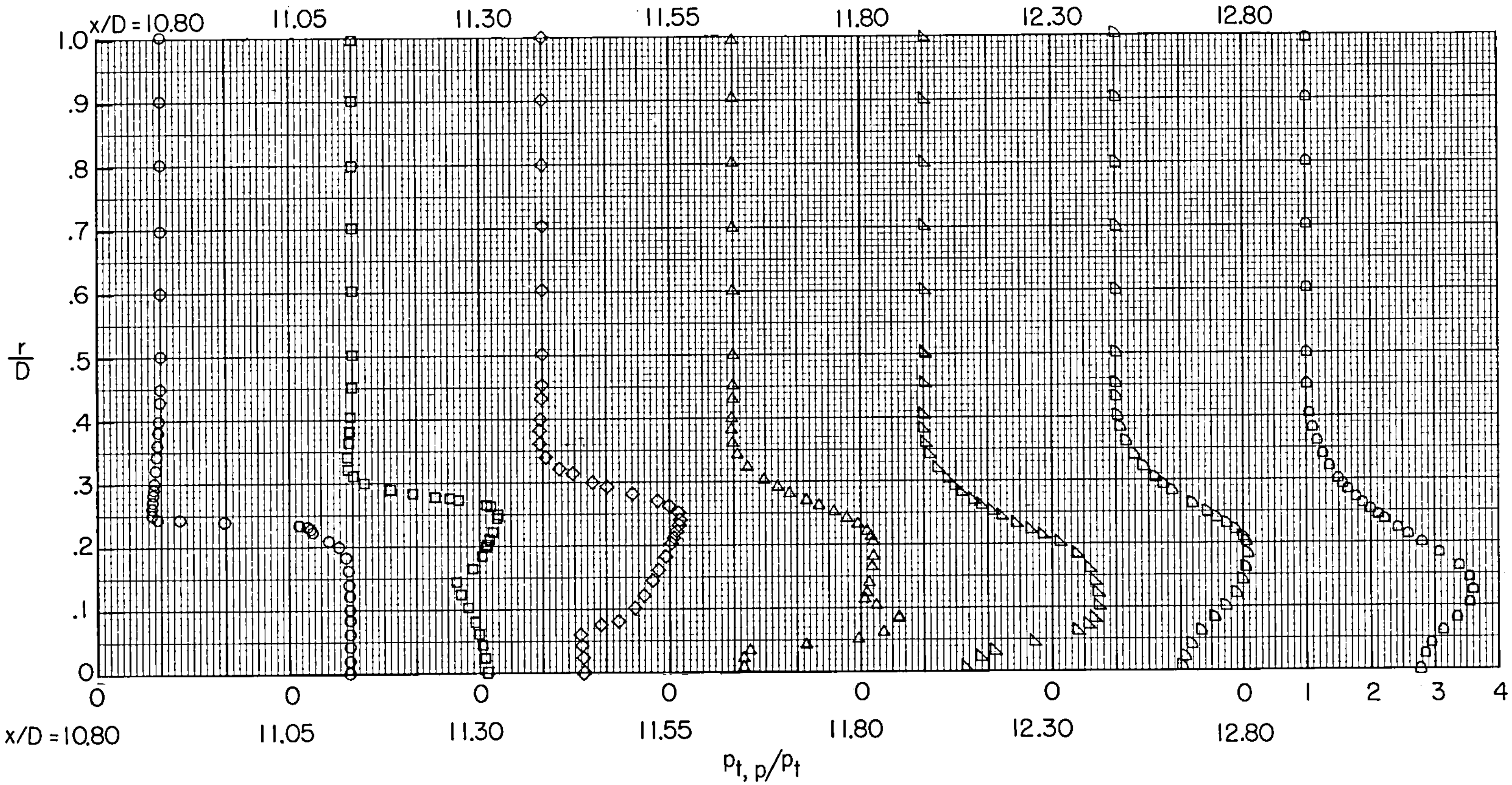
(d) $M = 0.60$; $p_{t,j}/p = 2.0$.

Figure 6.- Continued.



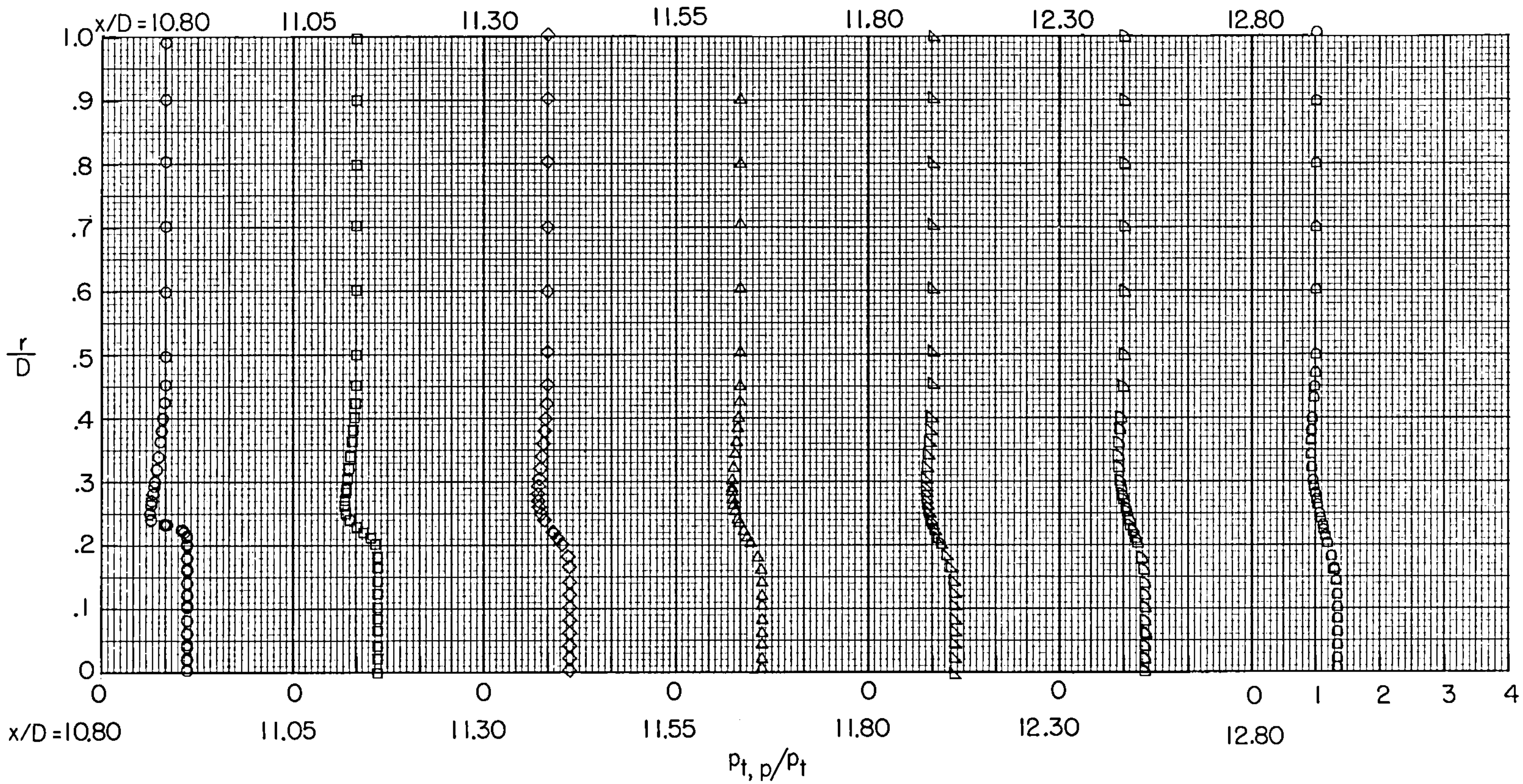
(e) $M = 0.60$; $p_{t,j}/p = 2.9$.

Figure 6.- Continued.



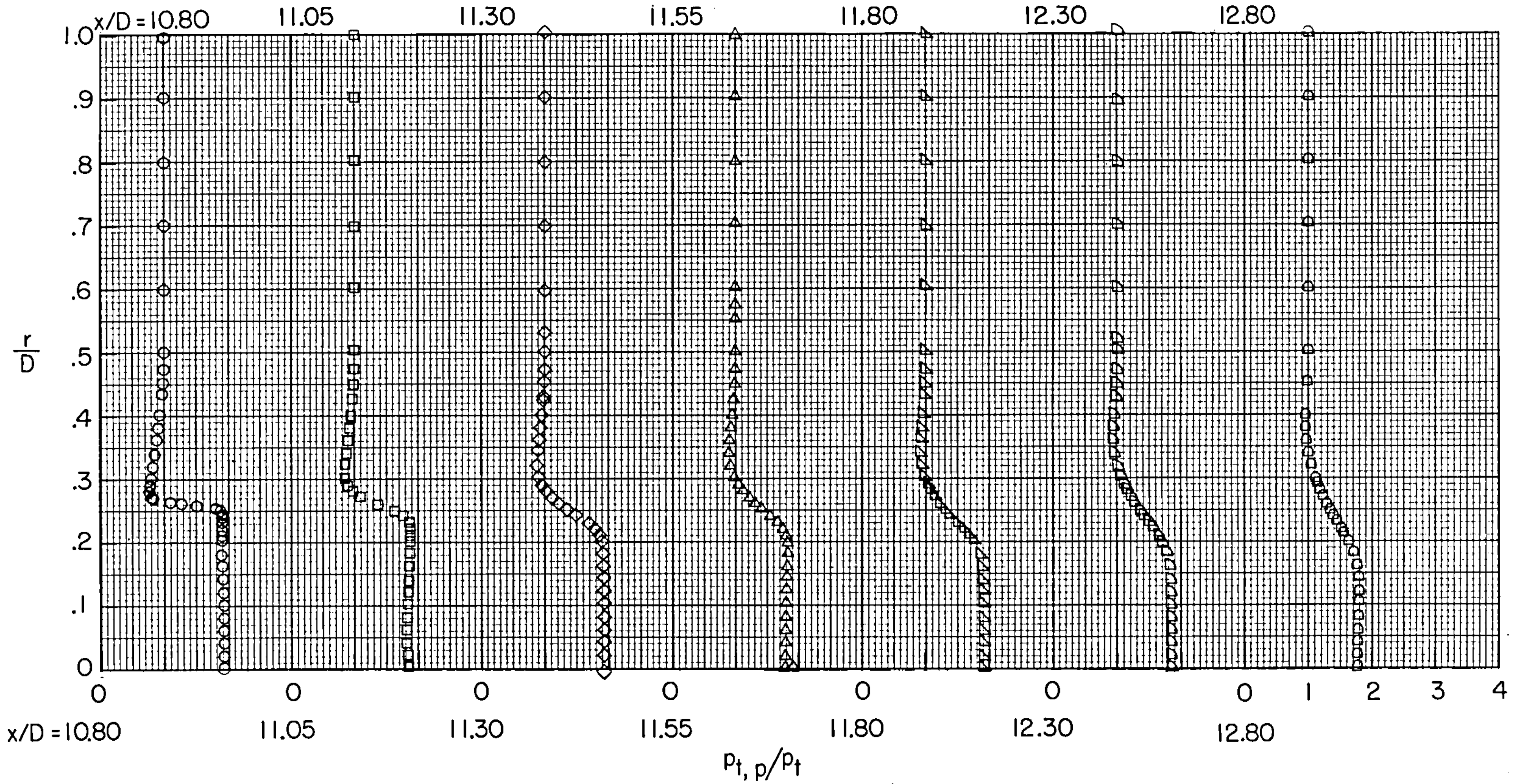
(f) M = 0.60; $p_{t,j}/p = 5.0$.

Figure 6.- Continued.



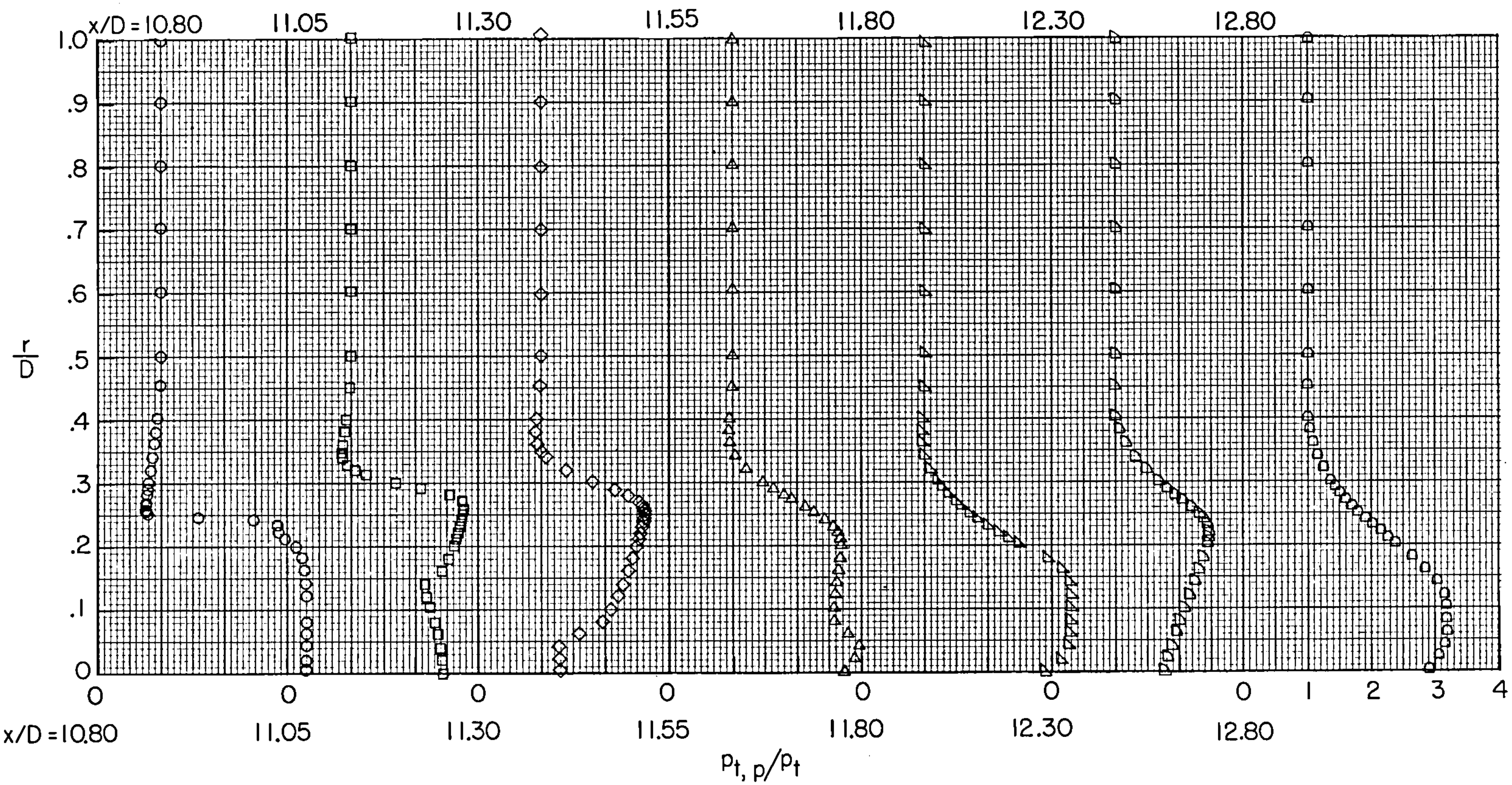
(g) M = 0.80; $p_{t,j}/p = 2.0$.

Figure 6.- Continued.



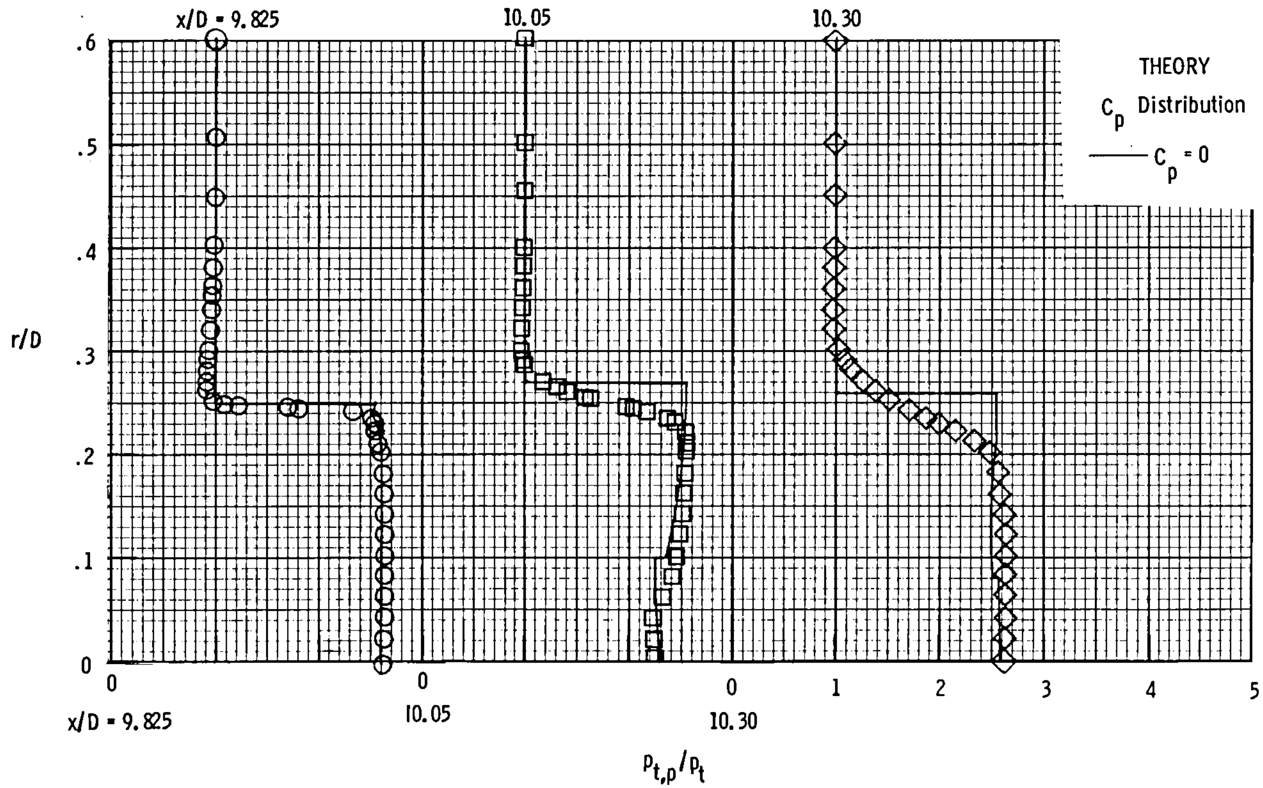
(h) M = 0.80; $p_{t,j}/p = 2.9$.

Figure 6.- Continued.



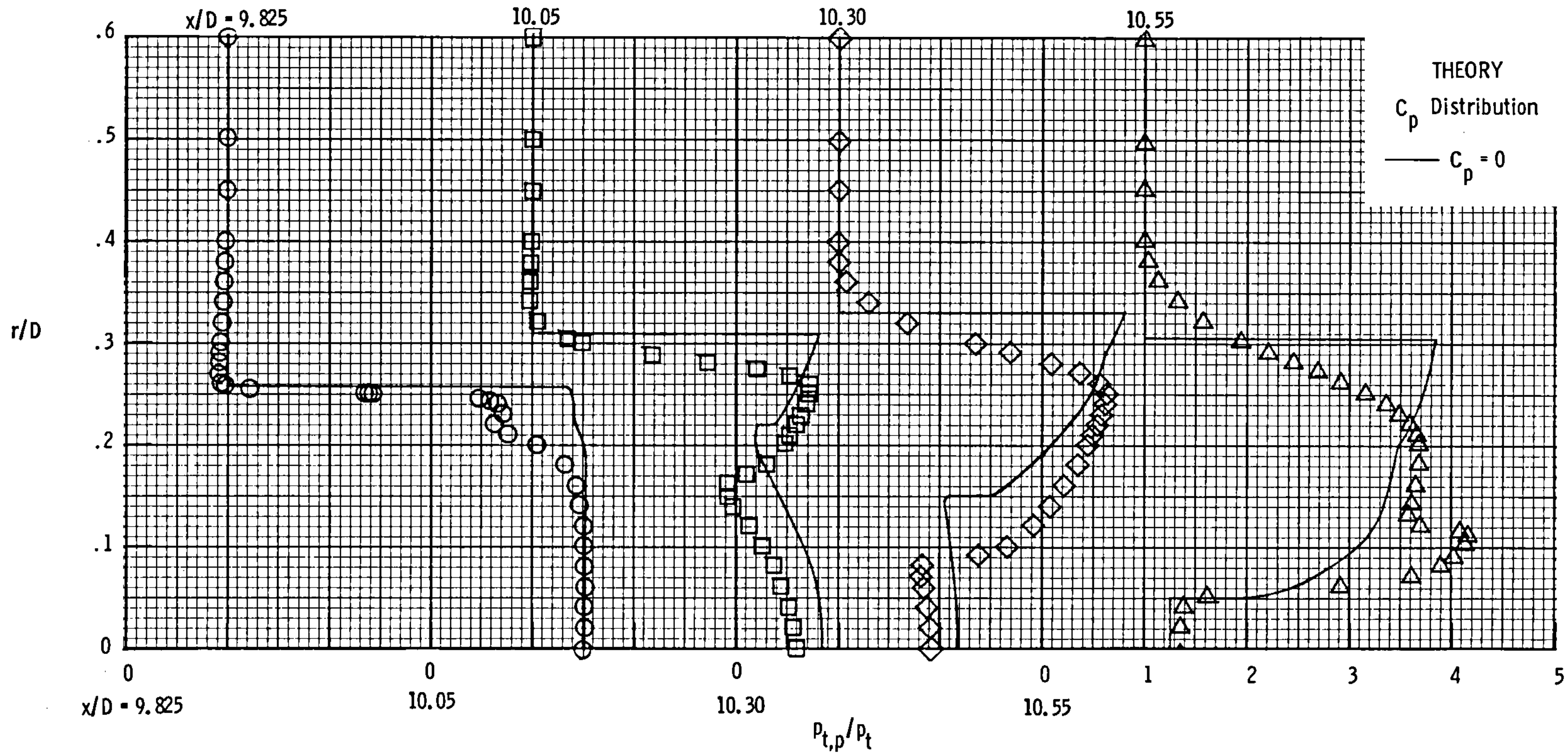
(i) M = 0.80; $p_{t,j}/p = 5.0$.

Figure 6.- Concluded.



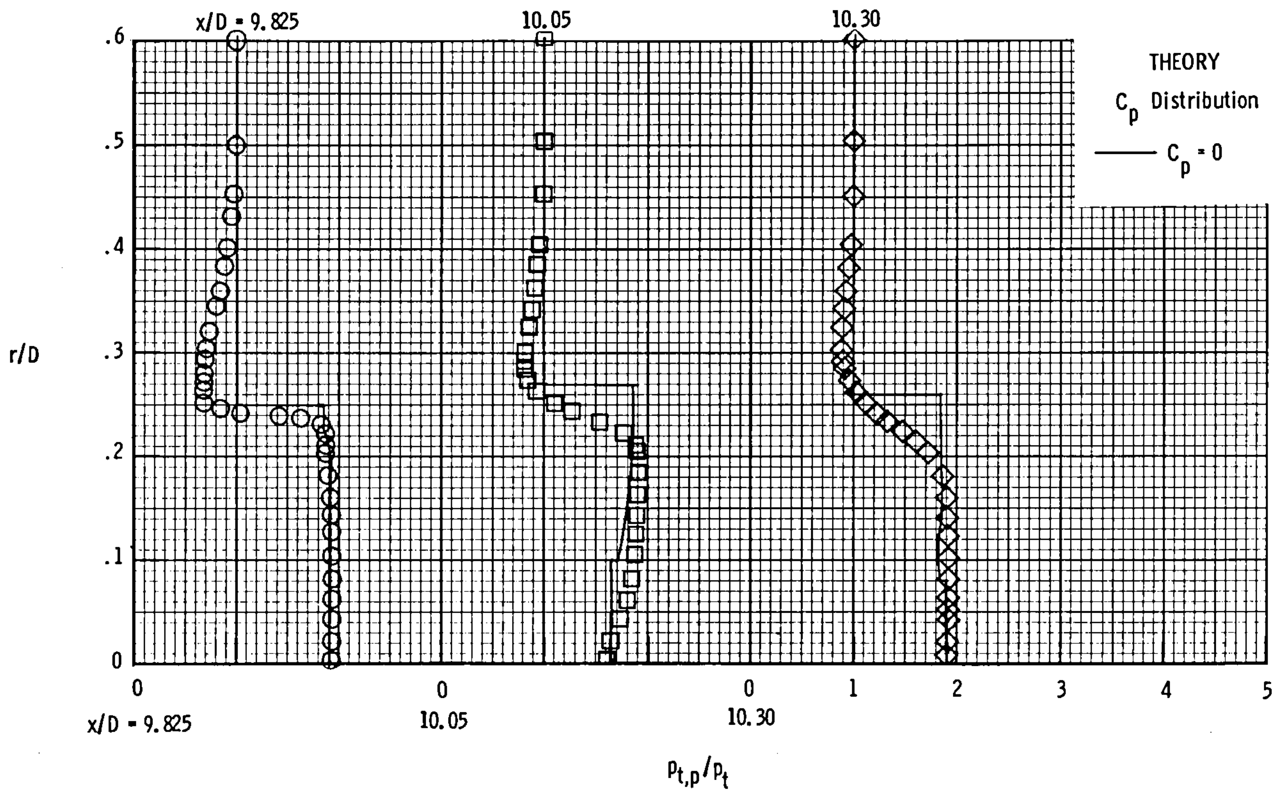
(a) M = 0.40; $p_{t,j}/p = 2.9$.

Figure 7.- Comparison of inviscid theory with experiment for configuration 1.



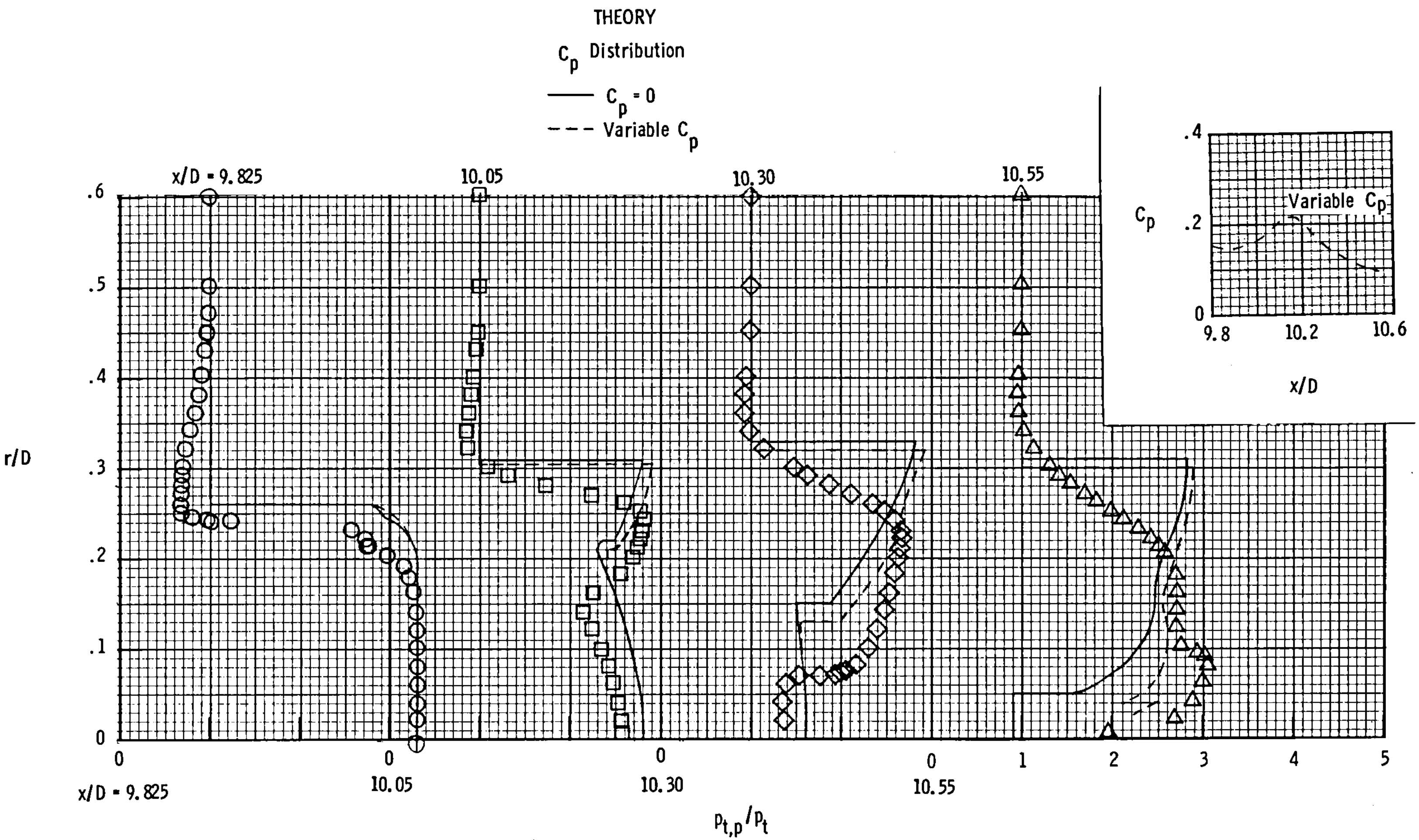
(b) M = 0.40; $p_{t,j}/p = 5.0$.

Figure 7.- Continued.



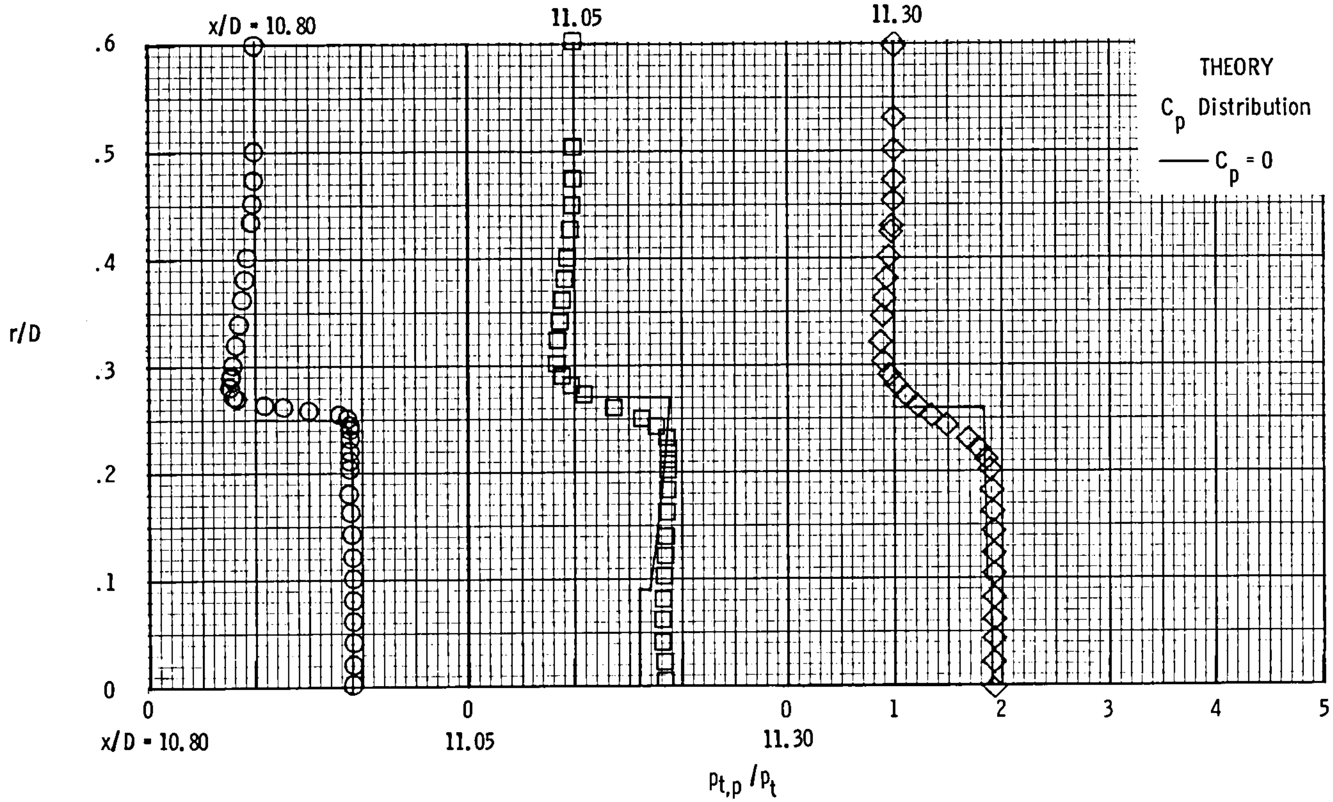
(c) M = 0.80; $p_{t,j}/p = 2.9$.

Figure 7.- Continued.



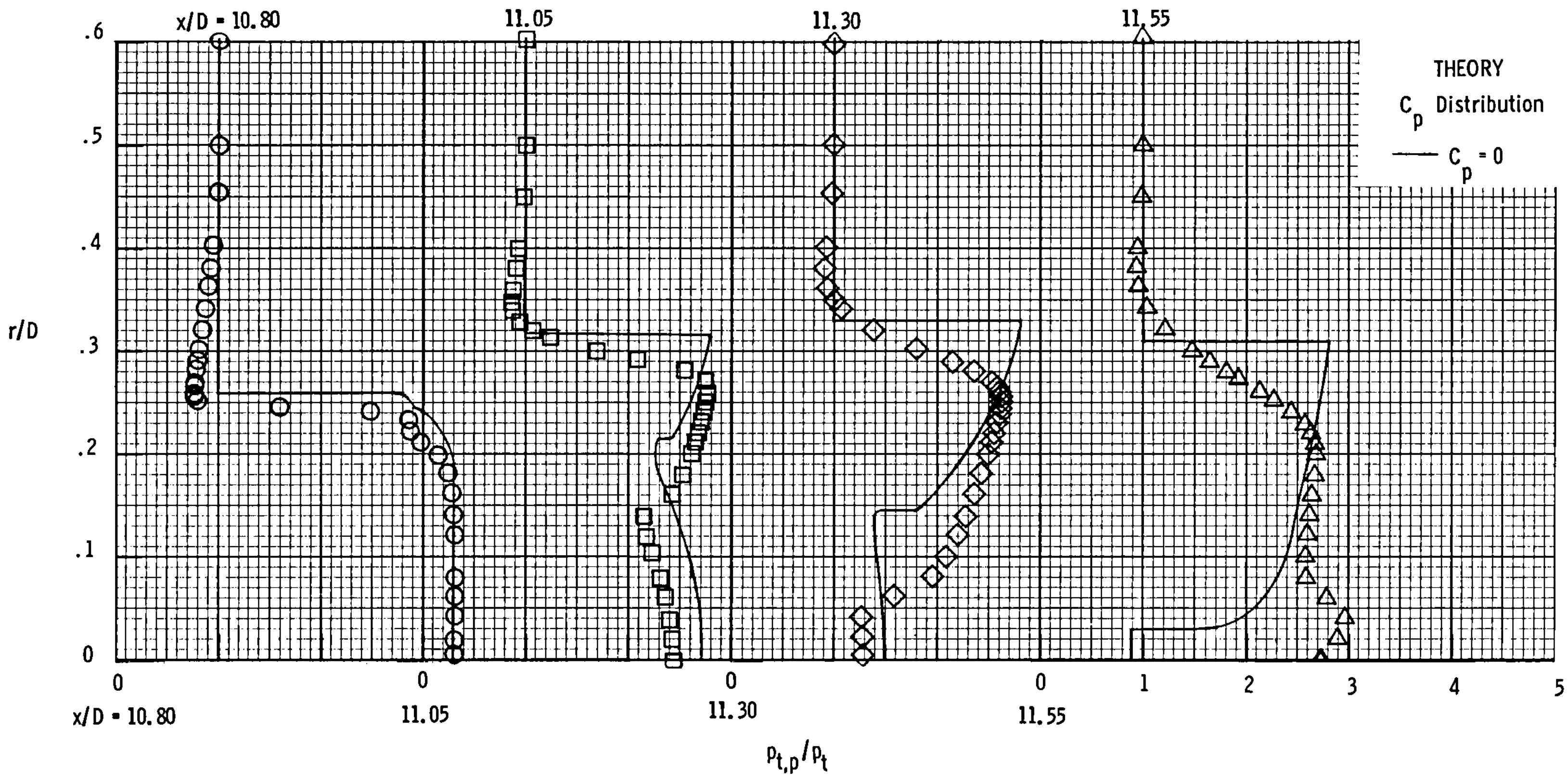
(d) M = 0.80; $p_{t,j}/p = 5.0$.

Figure 7.- Concluded.



(a) $M = 0.80$; $p_{t,j}/p = 2.9$.

Figure 8.- Comparison of inviscid theory with experiment for configuration 2.



(b) $M = 0.80$; $p_{t,j}/p = 5.0$.

Figure 8.- Concluded.

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16. Abstract

An experimental investigation of the flow field behind a circular-arc nozzle with exhaust jet has been conducted at subsonic free-stream Mach numbers. A conical probe was used to measure the pitot pressure in the jet and free-stream regions. Pressure data were recorded for two nozzle configurations at nozzle pressure ratios of 2.0, 2.9, and 5.0. At each set of test conditions, the probe was traversed from the jet center line into the free-stream region at seven data acquisition stations. The survey began at the nozzle exit and extended downstream at intervals. The pitot pressure data may be applied to the evaluation of computational flow-field models, as illustrated by a comparison of the flow-field data with results of inviscid jet plume theory.

17. Key Words (Suggested by Author(s))		18. Distribution Statement	
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