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Flow Quality Studies of the NASA Glenn Research Center Icing Research Tunnel Circuit (1995 Tests)

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March 2000

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FLOW QUALITY STUDIES OF THE NASA GLENN[1] RESEARCH CENTER ICING RESEARCH TUNNEL CIRCUIT (1995 TESTS)

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SUMMARY

The purpose of conducting the flow-field surveys described in this report was to more fully document the flow quality in several areas of the tunnel circuit in the NASA Glenn Research Center Icing Research Tunnel. The results from these surveys provide insight into areas of the tunnel that were known to exhibit poor flow quality characteristics and provide data that will be useful to the design of flow quality improvements and a new heat exchanger for the facility.

An instrumented traversing mechanism was used to survey the flow field at several large cross sections of the tunnel loop over the entire speed range of the facility. Flow-field data were collected at five stations in the tunnel loop, including downstream of the fan drive motor housing, upstream and downstream of the heat exchanger, and upstream and downstream of the spraybars located in the settling chamber upstream of the test section. The data collected during these surveys greatly expanded the data base describing the flow quality in each of these areas. The new data matched closely the flow quality trends recorded from earlier tests. Data collected downstream of the heat exchanger and in the settling chamber showed how the configuration of the folded heat exchanger affected the pressure, velocity, and flow angle distributions in these areas. Smoke flow visualization was also used to qualitatively study the flow field in an area downstream of the drive fan and in the settling chamber/contraction section.

INTRODUCTION

Detailed flow-field surveys were conducted throughout the tunnel loop of the NASA Glenn Icing Research Tunnel to augment the existing data base on flow quality. These measurements were necessary because in several areas of the tunnel loop there were either known or suspected flow quality problems. Limited data were available from several locations in the tunnel loop, but gaps in the data set restricted the usefulness of these data in answering questions pertaining to facility design for improved flow quality. The data collected during the surveys described in this report were intended to fill the gaps in the existing data base.

Figure 1 shows the six areas of the tunnel loop where flow quality studies were conducted: downstream of the fan, downstream of the drive motor housing, upstream and downstream of the facility heat exchanger, and upstream and downstream of the spraybars, which are located in the settling chamber upstream of the test section. Flow-field measurements were made at five stations around the tunnel circuit by using instrumented plates riding on cables, and flow visualization tests were conducted at two tunnel stations. Each of the stations was the site of multiple surveys with the instrumented plates; at four stations vertical surveys were made, and at three stations horizontal surveys were made. The instruments mounted on the plates sensed the total and static pressures, total temperature, airspeed, flow direction, and turbulence levels. These data provided very detailed quantitative information about the flow field at each station surveyed. Smoke flow visualization provided qualitative data both. on the flow field downstream of the fan, where earlier studies indicated poor flow quality, and on the flow field in the settling chamber upstream of the test section.

There was a major concern about the effect of the facility heat exchanger on the overall flow quality in the tunnel. Figure 2 shows an elevation view of the facility primary heat exchanger. The folded design of the heat

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exchanger increases the area available for cooling, which is required to create the cold static temperatures needed to produce icing conditions. There are three folds in the main heat exchanger. At each fold, contoured fairings are used to house coolant supply and return piping, thereby reducing the total pressure loss of the heat exchanger. Although the heat exchanger is absolutely necessary to produce the low temperatures needed for icing simulations, it does degrade the aerodynamic flow quality of the facility (ref. 1). In addition to documenting the existing flow quality at these stations in the tunnel loop, we conducted a sensitivity study to determine the effect of the heat exchanger's turning vanes on the flow downstream from the heat exchanger. A symbols list is provided in appendix A to aid the reader.

DESCRIPTION OF FACILITY

The NASA Glenn Research Center Icing Research Tunnel (IRT) is a closed-loop atmospheric tunnel with rectangular cross sections. The airflow is driven by a 25-ft-diameter 12-blade fan that is powered by a 5000-hp electric motor. The tunnel test section is 6-ft high, 9-ft wide, and 20-ft long. The velocity in an empty test section can be varied from 50 to 400 mph (Mach number range of 0.065 to 0.56) at 0 °F. A schematic of the tunnel is shown in figure 1. A 2100-ton heat exchanger (cooler) located in the tunnel leg between corners C and D is used to control the tunnel air temperature. The heat exchanger (see fig. 2) has been designed with folds to increase the amount of cooling area available. Fairings at the heat exchanger folds house inlet and outlet piping for the coolant. A set of eight horizontally oriented spraybars, located upstream of the test section, inject atomized water into the airflow to create icing conditions (no icing conditions were studied in these tests). A complete description of the facility can be found in reference 2.

INSTRUMENTATION AND TEST HARDWARE

Flow-Field Surveys

Several different types of flow-sensing probes were used during the flow-field surveys, including pitot-static probes, thermocouples, hot-wire anemometry probes, and wind anemometers. A traversing plate mechanism was used to position the probes at any point along a particular survey plane. The survey planes studied during these surveys are shown in figure 1. The traversing plate mechanism and each of the probe types are described in the following paragraphs.

Pressure probes.—Standard pitot-static probes were used to sense the total and dynamic pressures. Two pitot-static pressure probes were mounted on each traversing plate. Originally, the pressure probes were on supports that moved the probe heads well off to the sides of the plates to allow for measurements closer to the tunnel surfaces. These probes were replaced with probes that extended directly forward of the plate. This change was made because we felt that the smaller probes might enhance the stability of the plate in the airflow. The transducers used to measure the total and dynamic pressures were mounted on the tunnel floor at the survey station to reduce the length of the pressure tubing. Absolute transducers (0- to 25-in. H_2O range) were used for the total pressure measurements, and differential pressure transducers were used for the dynamic pressure measurements. (Transducers in the 0- to 1-in. H_2O range were used for the first run; all subsequent runs used transducers in the 0- to 5-in. H_2O range.)

Thermocouples.—One Chromel-Alumel (type K) aspirated thermocouple was mounted on each traversing plate to measure the total temperature distribution. Such thermocouples are accurate to ±1 °R.

Wind anemometers.—Vane wind anemometers were used to measure airspeed and two components of flow angle. (A typical wind anemometer is shown in fig. 3.) The wind anemometers were calibrated for airspeed and flow angle prior to the tunnel tests. Linear calibration relationships were used to convert the output from the anemometers directly to engineering units. These instruments are accurate to within ±3.28 ft/sec in airspeed, ±0.35° in pitch angle, and ±0.25° in yaw angle.

Hot-wire anemometry.—Hot-wire anemometry was used to measure the mean airspeed, turbulence levels, and flow direction. Commercially available hot-wire probes (one- and two-component probes), constant temperature anemometers, signal conditioners, and a 12-bit analog-to-digital converter were used. A personal computer with commercially available software controlled the data acquisition and carried out the subsequent data reduction.

Traversing plates.—For obtaining velocity and pressure distribution data across the large sections of the tunnel, a traversing plate mechanism was used. This apparatus consisted of a flat plate supported by cables at the leading and trailing edges. The cables were attached to channels that were mounted to the tunnel walls. The leading edge cable rode on a pulley driven by a remotely controlled electric motor, so the plate could be positioned at any point across the tunnel. The traverses were operated along both horizontal and vertical surveys. Two traversing plate setups were used simultaneously at each tunnel-loop area surveyed during these studies. Figure 4 shows this apparatus installed downstream of the spraybars in the settling chamber (survey station 5). Two different instrumentation layouts were used for the traversing surveys (see fig. 5), depending on the type of pitot-static probe used. Configuration 1 was used for surveys made downstream of the heat exchanger (station 3) and for some surveys upstream of the spraybars (station 4); configuration 2 was used for all other surveys.

Data system.—Real-time data acquisition and display were provided by Escort D+, the standard data system used in the large test facilities at the NASA Glenn Research Center. This system was used to record the signals from all steady-state analog signals (all pressure transducers, thermocouples, wind anemometers, traverse controls, and tunnel parameters; hot-wire anemometry data were collected by using a separate system, as described previously). The Escort D+ facility microcomputer acquires the data, converts the data to engineering units, executes performance calculations, checks limits on selected channels, and displays the information in alphanumeric and graphical form at a rate of 1 update/sec. For this test, each collected data reading was the average of 20 scans (20 sec) of data.

Flow Visualization

A commercially available hand-held smoke wand system was used to manually place smoke into the airstream for visualization purposes. In this system, liquid propylene glycol is heated to form a superheated vapor, which is forced through an 8-ft-long wand. The vapor condenses to form a viable cloud when it is discharged from the nozzle at the end of the wand. This smoke-generating system permitted visualization of the flow field around the drive motor housing and in the settling chamber upstream of the test section.

TEST PROCEDURES

Prior to the start of the test entry, the hot-wire probes and wind anemometers were calibrated over the expected operating range by using the free-jet calibration rig in cell CE–12 of the Engine Research Building. During installation of the traversing hardware, all appropriate measurements were made to determine the position of the probes during the surveys. Prior to each run, the traversing plate position was calibrated. A simple two-point calibration relating distance from the reference surface (as measured by a tape measure) to the output voltage was used. For vertical surveys, the traverse position was referenced to the tunnel floor; for horizontal surveys, the inside tunnel wall was the reference. The pressure transducers were also zeroed prior to each run (the delta pressure transducer output was set to zero, and the absolute pressure transducer output was set to match the barometric reference pressure).

The test matrix for the flow quality surveys is given in table 1. The order in which the surveys were made can be inferred from the run number column: the first surveys were conducted downstream of the heat exchanger and the last were downstream of the spraybars. (The testing priority was based on the need for the data.) For each test run, the tunnel total temperature was held constant at 40 °F (500 °R). All tests were conducted with an empty test section (no blockage in the test section). No air or water sprays were used during these surveys. Each survey was conducted at airspeed conditions based on test section velocities V_{TS} of 350, 250, 150, and 50 mph (only the data for 350 and 250 mph are presented in this report). Typical test section conditions are listed in table 2. At most of the survey stations, two surveys were made. For the first, the traverse was stopped at discrete points along the survey line, and data were collected from all the instrumentation at each point. The second was a continuous motion survey in which data were collected from only the hot-wire instrumentation. For most test runs, the discrete point surveys were conducted first, starting at the highest test section velocity then stepping down through the velocity schedule. The continuous surveys were conducted next, starting at the lowest velocity setting and stepping up through the range. Data were collected in both directions across the survey line (i.e., from floor to ceiling and back to the floor for a vertical survey). For the discrete point surveys, data were collected every 6 to 12 in. along the initial survey and then in 18- to 36-in. increments along the return survey. One data reading was collected at each survey increment (20 sec of data were averaged for each data reading). For each survey, about 50 data readings were collected. All data were monitored online with the Escort D+ displays. A detailed log was maintained to track any data anomalies that occurred during the testing.

DATA REVIEW AND REDUCTION

The first step of the data analysis process was to review the quality of the collected data. This was done by reviewing graphical output and tabular listings of the data. Any anomalies were noted and investigated. If the cause for the anomaly could be determined and corrected, the appropriate modifications were made in the data analysis software; otherwise, the questionable data were not used in any further analysis. The only major anomaly that was found during the data review was the mismatch of the total pressure levels sensed by the two probes on each traverse. The difference in pressure levels was too small to detect during the data collection. Since the primary intent of the test was to determine the flow quality in the tunnel loop, the data trends—not the absolute values of the data—were of greater importance. In order to better understand the data trends, the measurement offset of one pressure measurement was adjusted so that the absolute pressure levels sensed by the two probes were the same. In doing this, one continuous data trace was created with the data from the two pressure probes. This greatly simplified the task of analyzing the pressure distributions at each station. The offsets were generally small, on the order of 0.010 to 0.020 psia, although larger offsets were required in some cases. Probe 1 readings were used as the reference pressure, and probe 2 data were adjusted to match (there was only one exception to this rule). The differences were probably due to incorrectly setting the transducer offsets prior to each test run and due to temperature changes in the tunnel during the testing (the transducers were mounted inside the tunnel for each test). These small changes to the total pressure levels had no effect on the remaining data analysis. However, the total pressure levels at different traverse positions cannot be compared to determine gradients at a station, nor can data from different stations be compared to determine losses through the tunnel loop.

Static pressure was calculated from the measured total and differential pressures from the following equation:

$$P_s = P_o - \Delta P \tag{1}$$

The Mach number was then determined from the ratio of static to total pressure (eq. (44) from ref. 3) by using $\gamma = 1.4$:

$$M = \sqrt{5\left[\left(\frac{P_s}{P_o}\right)^{-0.2857} - 1\right]} \tag{2}$$

Velocity was determined by using the definition of Mach number, $M = V/a$, where a is the speed of sound ($a = (\gamma R T_s)^{0.5}$). The static temperature T_s was calculated by using the following relation (eq. (43) from ref. 3):

$$T_s = \frac{T_o}{1 + 0.2M^2} \tag{3}$$

For any one data point (reading), there were two sets of pressure measurements (one from each of the two pitot-static probes mounted on each traverse) and one temperature measurement. The instrumentation was configured such that the thermocouple was about midway between the two pressure probes, so the one temperature measurement was used in the calculation of velocity at both pressure probe positions. The local velocity was then determined by using

$$V = M \cdot a \tag{4}$$

The output from the thermocouples and wind anemometers was converted to engineering units via calibration curves. The absolute value of the flow angles measured by the wind anemometers was slightly affected by the angle of the plate, however the trends indicated by the data were not.

The hot-wire probes were calibrated in a free jet prior to use in the IRT. The calibration curves related the mean airspeed to the voltage output of the hot-film probe. Once the calibration curves were generated, they were used to transform the raw bridge voltage data into unsteady velocity data. Means and standard deviations of the unsteady velocity data were then computed. Turbulence intensity was computed from these statistical quantities:

$$\bar{u} = \frac{\sum_{1}^{N} u_i}{N} \qquad \sigma_u = \frac{\sqrt{\sum (u_i - \bar{u})}}{N-1} \qquad TI_u = \frac{\sigma_u}{\bar{u}} \cdot 100\% \tag{5}$$

DISCUSSION OF RESULTS

Flow-Field Surveys

Flow quality measurements were made at stations 2 through 6, as illustrated in figure 1, around the tunnel circuit of the Icing Research Tunnel. At each station, surveys were made across the tunnel cross section in order to document the total and static pressure, total temperature, airspeed, flow direction, and turbulence levels over the operating speed range of the facility. The data collected and the results of the data analysis at each station are discussed in the sections that follow. The data presented in this section—that is, the total and static pressures and total temperature—were normalized by the corresponding test section condition. Because the transducers were placed inside the tunnel, the transducer zeros drifted, so some of the pressure data indicated unreasonable pressure levels (slightly higher total pressures); however, these had only a small effect on the data set, and the overall data trends were unaffected. Only data corresponding to test section airspeeds of 350 and 250 mph are presented in this report (data at 150 and 50 mph are not included). This decision was made primarily for brevity, in that the data trends recorded at the high-speed conditions were also seen at the lower speed conditions and because some of the instrumentation (generally the wind anemometers and in some cases the pitot-static probes) did not always operate reliably at the low airspeeds encountered in the tunnel loop at V_{TS} = 150 or 50 mph. A listing of all collected readings is contained in appendix B. Appendix C has tabular listings of flow-field survey data for the 250 and 350 mph V_{TS} conditions.

Station 2: Downstream of the fan drive motor housing.—Two vertical and two horizontal surveys were made downstream of the drive motor housing. The survey plane was approximately 23.75 ft downstream of the aft end of the housing. The tunnel at the survey plane is 29.17-ft wide by 26.17-ft high. The traverse locations were at intervals approximately one-third the tunnel dimension; the vertical surveys were made at 9.46 and 19.52 ft from the south (inside) tunnel wall, and the horizontal surveys were made at 8.69 and 17.5 ft above the tunnel floor. All surveys were made under standard tunnel operating conditions and with the standard configuration.

The total pressure data along the station 2 vertical surveys are shown in figure 6. These data show a fairly uniform pressure profile over the upper half to two-thirds of the survey, but they indicate a high-pressure region at the lower portion of this station. The effect is more evident at the traverse location nearer the inside tunnel wall. The high-pressure region decreases with decreasing airspeed. Figure 7, which presents the static pressure data along the vertical surveys at station 2, shows a fair amount of data scatter at the V_{TS} = 350 mph setting, probably because the transducers are located inside the tunnel. These data indicate that there is a static pressure gradient in the vertical plane, with the higher pressures occurring near the ceiling.

Figure 8 contains the velocity data from the pressure probes along the vertical surveys at station 2. The reason for the discrepancy between the total pressure and velocity levels measured by the two probes on traverse 1 is not known. These data show that there is a large velocity gradient in the vertical plane, with lower airspeeds closer to the tunnel ceiling. This result is consistent with the trends shown by the total and static pressure data. The gradient is more severe closer to the inside tunnel wall.

Velocity measured by the wind anemometer is shown in figure 9. These data match the pressure probe data very closely in both magnitude and trend, confirming the strong negative gradient from floor to ceiling. Comparison of the pressure probe data and wind anemometer data from traverse 1 shows that the results from the pressure probe closer to the inside tunnel wall (probe 2 for this configuration) and those from the wind anemometer closely agree at all conditions. (This implies that the difference in the airspeeds measured by pressure probes 1 and 2 on traverse 1 was due to some problem associated with probe 1, which makes the data from that probe suspect for this configuration.)

Total temperature data along the vertical surveys at station 2 are given in figure 10. In general, these data show a uniform temperature profile in the vertical plane with variations of less than 2 °R, although there was a 4 °R gradient measured near the inside tunnel wall at the V_{TS} = 350 mph setting (higher temperatures were measured near the tunnel floor).

For a better understanding of the flow angularity data downstream of the drive motor housing, where the effects of the fan rotation are very prominent, see the definitions of the expected flow direction components in figure 11.

Positive pitch flow angle is defined as upflow, and positive yaw (crossflow) angle is defined as flow from the inside to the outside tunnel wall. Figure 12 shows the pitch flow angle along the vertical surveys at station 2. The expected distribution would be pitch angles that are larger near the midpoint of the vertical surveys than near the tunnel floor or ceiling. Downward flow (negative pitch angles) would be expected along the inside tunnel wall (traverse 1) with upflow (positive pitch angles) along the outside tunnel wall (traverse 2). This is the general trend indicated by the data, although traverse 1 data does indicate positive pitch flow angles (this could be due to the angle of incidence of the traverse plate, which was not measured or otherwise accounted for in the data reduction).

The yaw flow angle distributions along the vertical surveys at station 2 are given in figure 13. The data show that there is a negative yaw angle along the upper portion of the survey (flow from outside to inside wall), a positive yaw flow angle along the lower portion of the survey, and a 0° yaw angle at the center of the survey for all test conditions. These results are consistent with yaw angle expectations based on the swirl produced by the fan rotation. The maximum yaw angle recorded was approximately 10° in both the positive and negative directions. The data also indicate more of a gradient in yaw angle along the upper portion of the surveys; along the lower portion the distribution is more uniform. The difference in the shape of the distribution above and below the centerline may be due to the drive motor housing supports, which may straighten the flow somewhat below the centerline.

Results from the hot-wire anemometry measurements are presented in figures 14 through 18. Figure 14 shows the mean axial velocity distribution measured by the hot-wire probes along the vertical surveys made at station 2. These data agree very well in magnitude and trend with the velocities recorded by the pressure probes and wind anemometer. Figure 15 shows that the vertical velocity gradient is apparent for all test conditions, that the gradient is more pronounced along the inside wall traverse, and that higher mean velocities were recorded nearer the inside tunnel wall.

The pitch flow angles measured by the hot-wire probes are presented in figure 16. Again, these data closely agree with the wind anemometer pitch flow angle data in both magnitude and distribution. The axial turbulence intensity for this test configuration is given in figure 17, which shows that axial turbulence intensity increases with distance from the tunnel floor (the local velocity at this station decreases with distance from the tunnel floor). The axial turbulence varies from about 10 percent near the floor to as high as 30 percent toward the ceiling. Also, slightly higher axial turbulence levels were recorded along traverse 2, nearer the outside tunnel wall (lower velocities were recorded along traverse 2 than along traverse 1). Similar trends were seen for turbulence levels in the vertical direction for these surveys (fig. 18). These trends are due to the disturbances caused by the drive motor housing and to the poor airflow distribution out of the fan along the outside tunnel wall.

Figures 19 and 20 show the total and static pressure ratio distributions, respectively, for the horizontal surveys made downstream of the drive motor housing. The data from traverse 1 (upper survey) indicate a fairly uniform total pressure distribution across the tunnel for all the conditions; however, traverse 2 (lower survey) data indicate uniform total pressure distributions only for the V_{TS} = 150 and 50 mph settings. At the V_{TS} = 350 and 250 mph settings, higher total pressure levels were recorded along the inside half of the survey. At the V_{TS} = 350 mph setting, the data show a higher total pressure region along the lower traverse between 100 and 200 in. from the inside tunnel wall. The static pressure distributions show fairly uniform distributions (variations on the order of 0.010 psia), although there is a slight static pressure gradient at the V_{TS} = 250 mph setting, with higher static pressures nearer the inside tunnel wall (the data scatter at the V_{TS} = 350 mph setting masks any trend in the distribution).

The pressure probe velocity data from the horizontal surveys are given in figure 21.[2] The data indicate that the airspeed is much higher along the inside half of the survey plane, especially for traverse 2 (lower survey). The velocity peak at about 140 in. from the inside tunnel wall corresponds to the position of the high total pressure levels shown in figure 19. This high velocity is probably due to the presence of the drive motor housing supports. The low velocities recorded near the outside tunnel wall confirm results from past studies (ref. 1) and the current flow visualization. The wind anemometer velocity data (fig. 22) agree closely with the pressure probe velocity data in both trend and magnitude. Comparison of the wind anemometer data and pressure probe data on traverse 1 shows that pressure probe 2 and the wind anemometer agree (as was the case for the vertical surveys at this station; data from probe 1 is considered suspect).

The horizontal total temperature distributions (fig. 23) indicate a gradient across the tunnel, with higher temperatures recorded near the inside tunnel wall. The gradient is most evident at the V_{TS} = 350 mph setting, where a 3° gradient was recorded for traverse 2 (lower survey) and a 2° gradient for the upper traverse. The magnitude of the gradient decreases with decreasing velocity.

[2] As a check of the data quality, the velocities measured along the vertical and horizontal surveys were compared where the survey lines intersected. For all cases checked, the velocity readings agreed to ±1 ft/sec or better.

Pitch and yaw flow angle data are presented in figures 24 and 25, respectively. The fan rotation was expected to induce a swirl to the flow that would produce a negative pitch component (downflow) along the inside portion of the survey and a positive (upflow) pitch component along the outside portion of the survey (fig. 11). Thus, the pitch angle distribution would vary from large flow angles near the tunnel walls to 0° angles near the center of the survey. The pitch angle data indicate this trend for the inside portion of the survey, with large negative pitch angles near the inside tunnel wall and the magnitude of the pitch angle gradually approaching zero near the center of the tunnel. However, the pitch angle does not continue to increase to a large positive value over the outside portion of the survey. Along this part of the survey, the pitch angle remains constant or decreases slightly.

In the horizontal surveys, the yaw angle was expected to remain virtually constant—with higher angles near the tunnel centerline, negative angles along traverse 1 (upper survey), and positive angles (outflow) along traverse 2 (lower survey). The data (fig. 25) indicate that such is the case, although at all test conditions, the yaw angles recorded along the inside portion of the surveys were higher than those along the outside portion for both traverses. The fact that both the pitch and yaw data in the outside half of the tunnel downstream of the drive motor housing did not indicate flow angles that follow the swirl induced by the fan is an indication of low flow quality in that area. The flow angle data from the horizontal surveys indicate reversed flow at some points between the drive motor housing and the outside wall.

Results from the hot-wire probe measurements along the horizontal surveys at station 2 are given in figures 26 through 30. The mean axial velocity data (fig. 26) agree with the pressure probe and wind anemometer data in both magnitude and trend (for traverse 1, the hot-wire data agree with pitot-static probe 2, as does the wind anemometer). The three sets of independent velocity data all show that there was a definite deficit region toward the outside of the tunnel, most likely caused by the drive motor housing supports blocking the whirl flow. The yaw flow angle measurements by the hot-wire probes along the horizontal surveys (fig. 28) provide a clear presentation of the yaw angle for this configuration. These data, which also agree with the wind anemometer flow angle data for both traverses in all test cases, show positive angles (outflow) along the lower traverse (traverse 2) and negative angles (inflow) for the upper traverse (traverse 1) between the inside wall and the drive motor housing. Between the drive motor housing and the outside tunnel wall, the data from both traverses reveal a change in the flow direction that the fan swirl would be expected to induce; this is indicative of poor flow quality.

Figure 29 shows the axial turbulence intensity for the horizontal surveys. The turbulence levels are the same for the V_{TS} = 350 and 250 mph test conditions. For both the upper and lower traverses, the turbulence levels along the inside portion of the survey are about 20 percent for all test conditions (slightly less for the lower traverse), but then they increase beyond the drive motor housing to 30 percent near the outside tunnel wall. This is another indication of the poor flow quality in that area of the tunnel. The crossflow turbulence intensity data (fig. 30) indicate 10 percent levels near the inside tunnel wall, increasing to about 20 percent near the outside tunnel wall.

Station 3: Upstream of the heat exchanger.—Two vertical surveys were made upstream of the heat exchanger. In this leg of the tunnel circuit, the tunnel is 29.17-ft wide by 26.17-ft high; however, because of the configuration of the heat exchanger and turning vanes, the actual survey area was 12.33-ft wide by 26.17-ft high.[3] The survey plane was approximately 2.42-ft upstream of the leading edge of the heat exchanger fairings. The traverse locations were at 5.56 and 12.33 ft from the outside (west) tunnel wall. All surveys were made under standard tunnel operating conditions and with the standard configuration.

The total pressure distributions along the vertical surveys conducted upstream of the heat exchanger (fig. 31) indicate a gradient at the higher velocity settings, with higher total pressure levels recorded near the tunnel floor. At V_{TS} = 350 mph, the gradient is about 0.020 psia; it decreased to about 0.010 psia at 250 mph. More severe gradients were recorded along traverse 2 (closer to the inside tunnel wall). At the lower velocity settings, the total pressure distribution was uniform.

Figure 32 shows the vertical static pressure distributions at station 3. As is typical of this data set, there is a good deal of scatter in the static pressure data at 350 mph. The scatter in the static pressure data was significantly reduced at the lower velocities. At 250 mph, a vertical gradient occurred (higher pressures near the floor), with a nonuniform distribution over the gradient. These nonuniformities could be caused by the presence of the heat exchanger (pressure disturbances associated with the shape of the heat exchanger and the fairings at the heat exchanger folds). The

[3]There are two heat exchangers in the tunnel loop between the C and D corners: the large outer heat exchanger, which has three folds, and a smaller inner heat exchanger, which has six folds. The two heat exchangers are separated by a wall (called the splitter wall). The surveys described in this report were made upstream and downstream of the outer heat exchanger, that is, between the outside tunnel wall and the heat exchanger splitter wall. The width of the survey plane at station 3 is the distance from the outside tunnel wall to the corner *C* turning vanes at the actual measurement plane.

variation in the static pressure along the vertical surveys at 250 mph are about 0.018 psia. At the lower velocity settings, the gradient trend was not recorded, but there was some variation in the static pressure distribution due to the heat exchanger pressure disturbances.

Velocity data from both the pitot-static probes and the wind anemometers indicate a gradient along the vertical surveys upstream of the heat exchanger (figs. 33 and 34, respectively). Higher velocities were recorded near the tunnel floor at all test section velocities, with traverse 2 (closer to inside tunnel wall) showing higher velocities than traverse 1. The velocities measured near the floor were twice as high as those measured near the tunnel ceiling. At all test conditions, the velocity increased with distance from the floor to a height of about 70 in., then steadily decreased toward the tunnel ceiling. This is the same trend recorded in earlier studies (ref. 1). The exact cause of the gradient is not known, but it is thought to be related to poor flow quality along the outside tunnel wall from the drive motor housing through corner C, as documented in this and earlier studies (ref. 1).

Figure 35 shows the vertical total temperature distribution at station 3. These data show that for both traverses and at all test conditions, the total temperature variation is on the order of 2 °R or less. The shape of the distributions and the magnitude of the variations from the two traverses at each test condition closely agree.

Data from pitch and yaw flow angle surveys are shown in figures 36 and 37, respectively. The pitch flow angle data from the two traverses indicate very different distributions; traverse 1 data (nearer to the outside wall) indicate large positive pitch angles (upflow), whereas traverse 2 data indicate large negative pitch angles (downflow). The distributions from the two traverses are a mirror image of one another, but the data do not correlate well with the hotwire data or with data from earlier tests. The yaw angle data distributions (fig. 37) again indicate mirror image distributions from traverses 1 and 2. Since both the pitch and yaw distributions are mirror images, it is possible that one anemometer was incorrectly installed (mounted inverted or wired improperly). At this point, it is not possible to determine if this was the case. There are some similarities between the current pitch and yaw data and the data collected in an earlier study (ref. 1), but there is not enough consistency in the trends to indicate where the problem was or how the data could be logically corrected. The flow angle data collected at station 3 are included here for completeness, although they are believed to be of little value.

Results from the hot-wire anemometer are presented in figures 38 through 42. The mean axial velocity magnitude and distribution for both traverses (fig. 38) very closely match both the pitot-static probe and wind anemometer data. The hot-wire data show slightly higher velocities along traverse 1 than was measured by the wind anemometer. The mean velocity in the vertical plane (pitch direction) indicates upflow over most of the survey, except near the tunnel ceiling where downflow is indicated (fig. 39). These trends in vertical velocity are also exhibited in the pitch angle data measured by the hot-wire probes (fig. 40). The axial and vertical turbulence levels at station 3 (see figs. 41 and 42) are similar for the V_{TS} = 350 and 250 mph settings. For these test conditions, axial turbulence varies from 10 to 18 percent, and vertical turbulence varies between 6 and 14 percent. Axial turbulence varies around a mean value, whereas the vertical turbulence shows a slight gradient trend with higher turbulence recorded near the tunnel ceiling along both traverses.

Station 4: Downstream of the heat exchanger.—The tunnel and test configurations downstream of the facility heat exchanger are very similar to those upstream of the heat exchanger. Two vertical surveys were made downstream of the heat exchanger. The survey plane was approximately 2.04-ft downstream of the trailing edge of the heat exchanger fairings. Traverses were made at 5.35 and 12.11 ft from the west (outside) tunnel wall. All surveys were made under standard tunnel operating conditions; however, it should be noted that the heat exchanger was working at only a fraction of its capacity. The tests were all conducted at a nominal 500 °R (40 °F) setting; for icing tests, total temperatures as low as –20 °F are required. Several surveys were made to determine the effect on the flow quality due to the configuration of the heat exchanger's exit guide vanes.

Figure 43 shows the total pressure distributions downstream of the heat exchanger at the two vertical survey locations. The data indicate that the heat exchanger configuration does have an adverse effect on the total pressure distribution. The distributions are similar for both traverse locations, with a large deficit region at the center of the tunnel and two smaller disturbances at 80 and 230 in. (6.7 and 19.2 ft, respectively) from the floor. Each of the total pressure distortions was caused by the fairings at the folds of the heat exchanger—the large deficit region by the fairing over the centerline fold of the heat exchanger, and the two smaller disturbances by the fairings at the off-centerline folds.

The disturbances caused by the heat exchanger are more dominant at the higher test section velocity settings. At the 350 mph setting, the centerline total pressure deficit is approximately 0.014 psia; at 250 mph, it is on the order of 0.007 psia. At the lower test section velocity settings, the presence of the heat exchanger is still apparent, but the magnitude of the disturbances is much less severe. Figure 44 shows the static pressure data along the two surveys. There was a lot of scatter in the data at 350 mph, but we cannot be certain that this is due only to the heat exchanger effects. At 250 mph and lower settings, the amount of data scatter is less, and the static pressure profiles are fairly uniform.

Velocity data measured by the pitot-static probes are shown in figure 45, and those measured by the wind anemometer are shown in figure 46. As with the total pressure, the velocity distributions for both survey locations are very similar. These data very clearly show the effect of the folded heat exchanger on the tunnel flow quality. Deficit regions corresponding to the height of the fairings at the heat exchanger folds are evident at both the V_{TS} = 350 and 250 mph settings. The airspeed recorded in the large centerline deficit is about half of the peak airspeed measured along the survey. The velocity data also clearly show the wake region of the off-centerline fold fairings at approximately 80 and 230 in. above the tunnel floor.

The total temperature distributions from vertical surveys downstream of the heat exchanger are shown in figure 47. These data show large variations in the total temperature over most of the survey at the V_{TS} = 350 mph setting, but the magnitude of the variations and the affected survey length decrease at lower velocity settings. At the highest velocity setting, uniform temperature distributions were recorded over only the upper fourth of the surveys. Over the lower three-fourths of the surveys, temperature variations of 10 to 15 °R were measured for both traverses (with slightly higher variations along traverse 1, nearer to the outside tunnel wall). At V_{TS} = 250 mph, the uniform portion of the temperature distribution increased to the upper third of the survey, and the largest variations were restricted to the lower quarter of the survey. Over most of the survey, the variations were on the order of 5 °R, although variations of up to 15 °R were recorded along the lower quarter of the survey. The poor temperature distributions downstream of the heat exchanger may be partially due to the exceptionally low coolant flow through the heat exchanger during these flow quality tests, which affects the uniformity of the heat transfer over this area.

Pitch flow angle data at this station are shown in figure 48. At all V_{TS} settings, the flow followed the folds of the heat exchanger at both traverse locations. For example, the pitch flow angle from 0 to about 80 in. above the tunnel floor was positive (upflow), which matches the orientation of the lowest element of the heat exchanger. From 80 to 160 in. above the floor, negative (downward) flow angles were recorded, which again matches the orientation of the second heat exchanger element, and so on. This indicates that the heat exchanger exit guide vanes tend to "overturn" the flow, causing it to follow the contours of the heat exchanger rather than flow axially into the tunnel duct.

The yaw (crossflow) angle data exhibit essentially uniform distributions along the vertical survey for all test conditions (at V_{TS} = 50 mph, the wind anemometer was apparently not functioning; see fig. 49). The only discontinuities in the distributions were due to the wakes of the fairings at the heat exchanger bends at 78, 156, and 234 in. above the tunnel floor. Traverse 1 (nearer to the outside tunnel wall) revealed a yaw angle of virtually zero over the survey. Traverse 2 revealed negative yaw angles (flow toward the inside tunnel wall) of the order of 5° because the flow was being influenced by the corner D turning vanes (the flow was starting to make the turn around corner D). The results of additional studies to determine the effects of the heat exchanger exit guide vanes on the flow quality at station 4 are contained in appendix D.

Station 5: Upstream of the spraybars.—Three horizontal and three vertical surveys were made at station 5. Since only two traverse systems were available during the testing, four runs were required to complete the six surveys at station 5. At this station the tunnel measures 29.17-ft wide by 26.17-ft high. The survey plane was located 3.29-ft upstream of the leading edge of the spraybar vertical support struts. The vertical surveys were made at 7.35, 16.42, and 21.92 ft from the north (inside) tunnel wall; the horizontal surveys were made at 6.55, 13.06, and 19.56 ft above the tunnel floor.

Total pressure ratio distributions along the vertical surveys at station 5 are shown in figure 50. The effect of the heat exchanger configuration on the flow quality is still evident in the data along all three vertical surveys made at this station: the centerline deficit area still appears large, but the smaller disturbances caused by the upper and lower folds of the heat exchanger have dissipated. The data also indicate that there were higher pressure levels along the lower portion of the survey than along the upper part. The static pressure data (fig. 51) show a high degree of scatter at the V_{TS} = 350 mph setting for the inside wall and centerline surveys (less data scatter was recorded for the outside wall survey); the variation in the data decreased with decreasing velocity.

The velocity distributions from the pitot-static probes and the wind anemometers are presented in figures 52 and 53, respectively. As with the total pressure, the velocity distributions were very much affected by the heat exchanger configuration. The centerline deficit region caused by the middle fold of the heat exchanger is still very apparent in the velocity distributions along all three vertical surveys at station 5. The disturbances caused by the upper and lower heat exchanger folds were not as severe as at station 4, but both are evident along the survey closest to the inside tunnel wall. However, only the lower fold disturbance appears along the survey nearest the outside tunnel wall. These disturbances are not as strong along the centerline vertical survey.

The total temperature distributions (fig. 54) reveal a temperature gradient in the vertical plane, with the higher temperatures near the tunnel ceiling. The gradient is more severe near the outside tunnel wall. There is also another temperature distortion at the tunnel centerline at the V_{TS} = 350 mph setting, which is most likely an artifact of the heat exchanger configuration. At V_{TS} = 350 mph, the vertical temperature gradient is 6 °R along the inside wall survey, 8 °R along the centerline survey (the peak variation along the centerline survey is 11 °R), and 16 °R along the outside wall survey. The magnitude of the gradient and the temperature distortions decreased with the velocity.

Figure 55 shows the pitch flow angle data taken from vertical surveys upstream of the spraybars. Although the data indicate upflow along the entire survey (positive angles), it is likely that there was a bias in the data caused by an offset angle in the traversing plate. In any event, the trend exhibited by the data is correct. The data show that the pitch angle was fairly constant along the surveys, with slightly larger flow angles being recorded along the lower half of the survey (this trend is more noticeable at the higher velocity conditions). The discontinuities recorded at 80 and 240 in. above the tunnel floor in the survey nearest the inside tunnel wall were caused by the heat exchanger fold fairing extensions (junction of the heat exchanger, the turning vanes, and the splitter wall). Similar trends can be seen in the yaw angle data (fig. 56). Constant yaw flow angles were recorded along the centerline and outside wall surveys; the magnitude of the yaw flow angle along these surveys was close to zero (±2°). The data from the inside wall survey show the discontinuities caused by the heat exchanger fairings.

Figure 57 shows the total pressure ratio distributions along the horizontal surveys upstream of the spraybars. For all conditions and locations, the total pressure distributions are uniform and do not show any gradients or other non-uniformities across the tunnel. The static pressure profiles across the tunnel are shown in figure 58. As at other test locations, there is a high degree of scatter in the static pressure data at the higher velocity conditions, particularly along the upper survey; the reason for the scatter is not known. Because of the scatter in the static pressure data, no firm conclusions could be drawn about the flow quality in terms of static pressure for these data.

The velocity surveys (fig. 59) are the best indicators of the flow quality across the tunnel at this station even though there was some problem with the velocity data along the upper traverse. At V_{TS} = 350 mph, the velocity measured along the upper survey was lower than would be expected when compared with the vertical survey data. Also, at all V_{TS} settings, one of the two pitot-static probes along the upper survey was not operating properly and indicated a lower velocity that the other probe did. Otherwise, the velocity data from the horizontal surveys agree well with those from the vertical surveys. The upper and lower surveys indicate higher velocities than the centerline survey does (except at V_{TS} = 350 mph, because of the upper survey probe problem), which confirms the distributions from the vertical surveys. The low-velocity region near the inside tunnel wall (between 0 and 60 in. from the inside wall) is the area downstream of the secondary or inner heat exchanger. This portion of the distribution represents the flow exiting the area between the inside tunnel wall and the splitter wall between the primary and secondary heat exchangers.

Along the upper and lower surveys, the velocity decreased over the outside third of the survey (from ≅220 to 320 in. from the inside wall), whereas along the centerline survey it increased slightly over this same area. This probably indicates a gradual smoothing of the flow discontinuities caused by the heat exchanger as the distance from the heat exchanger increased. Along the centerline survey, the velocity spike at 60 in. from the inside wall was caused by the splitter wall; the discontinuity between 250 and 270 in. was probably caused by a heat exchanger vertical support strut. The velocity distributions from the wind anemometers (fig. 60) are the same as the distributions from the pressure probes.

Total temperature distributions across the tunnel at station 5 are shown in figure 61. At the V_{TS} = 350 mph setting, there is a total temperature gradient of 10 to 15 °R across the tunnel along the lower and centerline surveys, with the higher temperatures recorded near the inside tunnel wall (the upper survey thermocouple was inoperative at the test condition). At V_{TS} = 250 mph, the gradient along the centerline survey is about 5 °R, but there is no gradient apparent along the upper survey; the scatter in the lower survey data makes it difficult to draw a conclusion from these data, although the gradient trend in these data appears similar to that of the centerline survey data. At the lower velocity settings, the variation in the total temperature distributions was on the order of 3 °R or less.

The pitch flow angle data (fig. 62) reveal a constant pitch angle of about 2° (upflow) all across the tunnel except immediately downstream of the splitter wall, where a disturbance was recorded along each survey for most test settings (discontinuity occurred at 60 in. from the inside tunnel wall). Other than the effect of the splitter wall, these data indicate no significant flow quality problems. Figure 63 shows the yaw (crossflow) angle distributions across the tunnel. As with the pitch angle, the only major disturbance is that caused by the splitter wall, with the upper survey data being most affected. Away from the area affected by the splitter wall, the data along each survey are fairly uniform, with the lower and upper survey indicating a slight positive flow (toward the outside tunnel wall) and the centerline survey indicating a more pronounced negative flow of up to 5° (toward the inside tunnel wall).

Hot-wire anemometry results are presented in figures 64 through 68. The mean axial velocity data (fig. 64) match very closely the results from the pitot-static and wind anemometer instrumentation. These data also show the low-speed region between the inside tunnel wall and the splitter wall, as well as the gradient trend from the tunnel centerline to the outside tunnel wall along the upper and lower surveys. The hot-wire data from the centerline survey again match the pitot-static and wind anemometer data in magnitude and general distribution. The yaw flow angles measured by the hot-wire probes along the centerline and upper surveys are shown in figure 66. These data clearly show the effect of the splitter wall on the flow field. The magnitude and distribution of the centerline hot-wire data closely match the wind anemometer data from the same survey; the distribution of the hot-wire upper survey data is similar to that of the wind anemometer data, except that the hot-wire data indicate a negative flow angle on the order of 5° (flow toward the inside tunnel wall). The negative yaw flow angle at this station could be an indication of overturning by the D corner turning vanes. Along the centerline survey, turbulence levels on the order of 10 percent (see fig. 67) are indicated. The data vary between 6 and 15 percent for both V_{TS} = 350 and 250 mph. The upper survey data indicate lower axial turbulence, ranging from 3 to 12 percent in the center of the tunnel at V_{TS} = 250 to 350 mph (higher turbulence levels were also recorded near the tunnel walls). Horizontal turbulence levels are presented in figure 68. The horizontal turbulence varied between 5 and 10 percent along the centerline survey and between 3 and 10 percent along the upper survey at these same velocities.

Station 6: Downstream of the spraybars.—Two horizontal surveys were made at the inlet of the bellmouth-contraction section. The survey plane was 4.56 ft downstream of the leading edge of the spraybar system support strut. Although the traversing plates were physically mounted in the bellmouth, the survey plane was taken to be the exit of the settling chamber (the tunnel at this station was 29.17 ft wide by 26.17 ft high). The traverse locations were 8.72 and 17.22 ft from the tunnel floor (roughly one-third and two-thirds of the tunnel height). All surveys were made under standard tunnel operating conditions.

Figure 69 shows the total pressure ratio distributions across the tunnel at the bellmouth inlet. Here the total pressure is fairly uniform across the tunnel, although there is a slight gradient along the upper survey at the higher velocity settings (higher pressures were recorded near the inside tunnel wall). The static pressure distributions are presented in figure 70. The differential pressure transducers for pitot-static probe 1 on traverse 1 (upper survey) were not operating properly, so the static pressures calculated with the data from that probe are incorrect; the data from pitot-static probe 2 along this survey were not affected. The static pressure instrumentation problem is more readily apparent in the velocity data (fig. 71); the data from probe 1 on traverse 1 are not considered in further discussion of these data.

The velocity data at station 6 still show the effects of the splitter wall and inner cooler area near the inside tunnel wall at all test conditions. The gradient along the outer third of the surveys, as seen at station 5, is also still apparent. The velocity distributions and magnitude from the two surveys were the same for all test conditions (comparing probe 2 from traverse 1 to all traverse 2 data), indicating a symmetric distribution around the tunnel's horizontal centerline. The velocity data from the wind anemometer (fig. 72) also show the similarity between the two survey planes, the effect of the splitter wall, and the gradient near the outside tunnel wall. The wind anemometer data also exhibit a slight deficit region near the center of both surveys (more apparent at the higher velocity settings). This is probably due to the wake of the center vertical support for the spraybar system.

The total temperature data (fig. 73) reveal a significant gradient across the tunnel at the V_{TS} = 350 mph setting; this gradient is on the order of 10 °R along both the upper and lower surveys, with the higher temperatures near the inside tunnel wall. This gradient may be a result of less heat being transferred by the secondary heat exchanger since it is most severe in the area of the splitter wall. The gradient decreases with decreasing test section velocity. At V_{TS} = 250 mph, there is less than 5 °R variation along the upper survey and a gradient of about 7 °R along the lower survey. At the lower velocity settings, the variation is on the order of 3 °R or less.

Pitch and yaw flow angle distributions are shown in figures 74 and 75, respectively. Because the survey plane was at the inlet of the bellmouth section, the flow was already being influenced by the presence of the bellmouth contours. In the pitch plane, the data along the upper survey (traverse 1) indicate a downward (negative) flow angle, whereas data along the lower survey (traverse 2) show an upward (positive) flow angle trend. These are the expected trends, since the flow from the upper portion of the tunnel would be turned downward (negative flow angle) and flow from the lower portion of the tunnel would be turned upward (positive flow angle) into the bellmouth. The lower survey data also show the effect of the splitter wall, although there is no noticeable effect seen along the upper traverse. The magnitude of the pitch angle is about the same for both surveys over the test range, and it generally varies between 5 to 10° (at V_{TS} = 350 mph, the average pitch angles are –7.1° along both the upper and lower traverses).

The yaw flow angle (fig. 75) also clearly shows the effect of the bellmouth contours on the incoming airflow. For all test conditions, the yaw angle varies from 15° near the inside wall to –15° near the outside wall. The positive flow angles measured along the inside portion of the surveys indicate flow from the inside toward the outside wall of the tunnel, which matches the contour of the bellmouth; along the outside portion of the surveys, negative yaw angles were recorded, indicating flow from the outside wall toward the inside wall, which again matches the bellmouth contour. The 0° yaw angles measured near the tunnel centerline (175 in. from the inside tunnel wall) indicate a symmetric flow pattern around the tunnel centerline. In both surveys, the effects of the splitter wall (disturbances between 40 and 100 in. from the inside wall) can be seen.

Hot-wire data are presented in figures 76 through 80. The mean axial velocity data from the hot-wire instrumentation (fig. 76) very closely match the data sets from the pitot-static probes and the wind anemometers in terms of magnitude and distribution. The mean horizontal (crossflow) velocity (fig. 77) and the yaw flow angle (fig. 78) show the influence of the bellmouth contours on the incoming airflow as the air is turned toward the center of the tunnel. The yaw flow angle data match the wind anemometer data in terms of magnitude and trend for all test points. Axial turbulence intensity levels (fig. 79) along traverse 1 (upper survey) vary between 2 and 10 percent, whereas along traverse 2 (lower survey), the variation is between 4 and 12 percent. Neglecting the data near the tunnel walls, the average axial turbulence value from the upper traverse is about 4 to 5 percent; along the lower traverse, the average is between 6 and 7 percent. Similar values were recorded for horizontal turbulence levels (fig. 80).

Flow Visualization

Station 1: Downstream of the fan.—A portable smoke wand system was used to briefly study the characteristics of the flow immediately downstream of the IRT fan. Observations were made with the fan rotating at 50, 100, and 187 rpm (187 rpm corresponds to a test section speed of 150 mph). Flow visualization studies were carried out only at low test sections speeds (150 mph and below) because safety regulations do not allow personnel to be present in the IRT tunnel-loop sections (i.e., settling chamber section, heat exchanger section, and fan section) at high test section speeds. In general, the same results were observed at all three fan speeds. In the area between the downstream half of the fan motor housing and the outer wall, reversed and separated flow was observed along the outer wall and along the fan motor housing. This reversed flow subsided at elevations closer to the floor. Further downstream along the outer wall and near the outer wall vent tower doors, more reversed flow was noted.

Between the fan motor housing and the inner wall, the flow was relatively smooth and appeared to be attached along the fan motor housing and along the inner wall. Generally, flow swirl induced by the fan rotation could be seen at all locations. Such flow phenomena in and around the fan motor housing have been noted in previous flow visualization studies (ref. 1) and generally result from the blockage introduced by the solid fan motor housing supports. As the flow exits the fan, it tends to swirl clockwise (from a downstream viewpoint, the fan spins in a clockwise direction; see fig. 11). With the solid support legs hindering the swirl, flow is drawn from the outer wall side and accumulates on the inner wall side. The drawn flow is more susceptible to separation and reversal, whereas the accumulated flow is more likely to remain attached and be more directionally uniform.

Station 5: Upstream of the spraybars.—The smoke wand system was also used to inject flow visualization smoke into the settling chamber. The smoke was injected immediately downstream of the spraybar plane, at three spanwise locations and at five vertical locations. The spanwise locations were about 2 ft from the inner wall, 2 ft from the centerline, and 2 ft from the outer wall. The five vertical locations corresponded to the vertical locations of the five spraybars closest to the settling chamber floor (vertical heights of 6, 8, 10, 12, and 14 ft, respectively). Smoke trails were observed from three locations: the settling chamber at the point of smoke injection, which gives an eye-level view from the settling chamber; the windows of the main IRT control room, which give a view of the inner test section wall; and the windows of the auxiliary IRT control room, which give a view of the outer test section wall.

The smoke trails were videotaped from the settling chamber. Observers in the control rooms located the smoke trails in the test section by using 1-ft graduation marks on the test section walls. Table 3 summarizes the observations made during the flow visualization tests. These observations should be used only for qualitative purposes and should not be used in any quantitative manner. As a rule, the smoke streams diffused rather quickly after leaving the tip of the smoke wand because of the turbulence of the flow in the settling chamber. In addition, the smoke streams appeared to be unsteady as they moved through the test section. When the smoke was injected at the 14-ft vertical location (centerline spanwise location), the resulting smoke trail appeared to pass through the test section centerline. When the smoke was injected near the inner wall, the smoke trails tended to be on the test section centerline. Smoke injected on the centerline and at the lower vertical heights tended to move toward the outer test section wall.

Follow-On Tests

As a result of the initial series of tunnel-loop flow quality surveys described in this report, several follow-on tests were identified. These tests included the heat exchanger exit guide vane studies mentioned previously and described in appendix D. Two other tests were also conducted: detailed tempurature surveys at the heat exchanger inlet (app. E) and flow quality surveys directly downstream of the fan (app. F). Each of these tests addressed specific questions concerning the tunnel flow quality, and the results of the tests were used in the design of facility improvements.

SUMMARY OF RESULTS

The purpose of these studies was to characterize the flow quality throughout the tunnel loop of NASA Glenn Research Center's Icing Research Tunnel. The data reported herein will be used to determine areas in the facility where modifications can be made to improve flow quality and efficiency. These data could also be used to provide boundary or starting conditions for computer simulations of the flow field in the actual facility. Results of these studies follow.

Station 1—Downstream of the Fan

Smoke flow visualization around the drive motor housing (station 1) indicated the presence of a reversed flow area along the outside wall of the tunnel adjacent to the housing.

Station 2—Downstream of the Drive Motor Housing

1. A velocity gradient was found along the vertical surveys downstream of the drive motor housing (station 2), with the higher velocities being near the tunnel floor. The gradient was more severe along the survey made near the inside tunnel wall. Horizontal surveys indicated that there were much higher velocities along the inside portion of the tunnel. Overall, the highest velocities recorded at station 2 were in the lower inside quadrant, and the lowest velocities were in the upper outside quadrant.
2. There were no significant temperature variations recorded at station 2 over the test range.
3. Flow angle measurements at station 2 were consistent with the expected swirl due to rotation of the fan.
4. Axial turbulence intensity at station 2 varied between 10 and 30 percent, with the higher values being recorded near the ceiling and the outside tunnel wall.

Station 3—Upstream of the Heat Exchanger

1. A velocity (total pressure) gradient was measured along the vertical surveys at the heat exchanger inlet, with larger velocities near the tunnel floor (at V_{TS} = 350 mph, the velocity near the floor was approximately twice that at the tunnel ceiling).
2. No significant temperature variations were recorded at the heat exchanger inlet.
3. Pitch flow angle data indicated upflow over most of the survey.
4. Axial turbulence intensity levels at the heat exchanger inlet varied between 10 and 18 percent.

Station 4—At the Heat Exchanger Exit

1. The folded configuration of the heat exchanger and the aerodynamic fairings at the corners of the folds caused large disturbances in the flow field downstream of the heat exchanger. The heat exchanger adversely affected the total pressure and velocity distributions at this station by causing a large deficit region near the tunnel centerline and two smaller disturbances at about one-quarter and three-quarters of the tunnel height (these three flow disturbances were caused by the fairings at the corners of the heat exchanger folds).

2. There was a significant total temperature gradient along the vertical surveys downstream of the heat exchanger at V_{TS} = 350 mph (10 to 15 °R). The gradient decreased with decreasing velocity.

3. The flow direction (pitch flow angle) was directly affected by the folded configuration of the heat exchanger. The exit guide vanes on the downstream surfaces of the heat exchanger sections overturned the flow such that the flow followed the angle of the heat exchanger sections.

Station 5—Upstream of the Spraybars

1. The effect of the heat exchanger on the flow field (total pressure and velocity profiles) was still apparent in the vertical surveys between the D corner turning vanes and the spraybars. The large centerline deficit region was still very apparent, although the two smaller disturbances had dissipated to some extent. Horizontal surveys showed a low-speed region near the inside wall caused by the inner cooler and a disturbance caused by the splitter wall; there was also a velocity gradient region along the outside portion of the horizontal surveys.
2. The temperature variations recorded downstream of the heat exchanger continued to be apparent at station 5.
3. Axial turbulence intensity levels at station 5 varied between 3 and 12 percent.

Station 6—Downstream of the Spraybars

1. Velocity trends were similar to those seen along the horizontal surveys at station 5 (effect of the splitter wall near the inside wall and the gradient over the outside portion of the survey).
2. There was a 10 °R gradient across the tunnel at V_{TS} = 350 mph (higher temperatures were recorded near the outside tunnel wall). The magnitude of the gradient decreased with decreasing velocity.
3. The flow direction at this station was heavily influenced by the bellmouth contours, as demonstrated in both the pitch and yaw flow angle distributions.
4. Axial turbulence intensity at station 6 was between 2 and 12 percent.

CONCLUDING REMARKS

Flow quality in several key areas of the Icing Research Tunnel has been more fully documented in terms of local airspeeds, flow angles, turbulence intensities, and air temperatures. Additional insight has been provided to explain causes of poor flow quality in certain areas of the tunnel. Data are now available to serve as a basis for the design of flow quality improvements and a new facility heat exchanger.

APPENDIX A

SYMBOLS

a	speed of sound, ft/sec
M	Mach number
N	number of data points
P	pressure, psia
Pitch	vertical flow angle, positive toward ceiling, deg
P_o	total pressure, psia
$P_{o,TS}$	test section total pressure, psia
P_s	static pressure, psia
$P_{s,TS}$	test section static pressure, psia
R	gas constant, 1716 lb-ft/(slug·°R)
T	temperature, °F or °R
T_o	total temperature, °R
T_s	static temperature, °R
TI_u	turbulence intensity in mean flow direction
u	velocity component in mean flow direction
$\bar{u}$	average velocity in mean flow direction
V	velocity, ft/sec or mph
V_{TS}	test section velocity, mph
Yaw	horizontal flow angle, positive toward outer wall, deg
Z	vertical distance from reference surface, in.
γ	ratio of specific heats (constant = 1.4)
ΔP	differential pressure ($P_o - P_s$), psid

Subscripts

A	corner A in the IRT
avg	average
B	corner B in the IRT
C	corner C in the IRT
D	corner D in the IRT
crawl	crawl space below the tunnel floor
outside	outside weather conditions
$PS1$	traverse pitot-static probe 1
$PS2$	cable traverse pitot-static probe 2

T	total or stagnation conditions
traverse	measurements made by probes on the cable traverse
TS	test section
WA	cable traverse wind anemometer

APPENDIX B

DATA READING LIST FOR 1995 ICING RESEARCH TUNNEL LOOP FLOW QUALITY STUDIES

Table 4 lists the reading numbers collected during the flow quality surveys for each configuration tested.

APPENDIX C

TABULAR LISTING OF FLOW-FIELD SURVEY DATA

Tables 5 through 36 list the data collected during surveys in the tunnel loop at test section velocities of 250 and 350 mph. Each table contains data from one traverse for one survey station and test configuration. The test section conditions corresponding to the first reading of each survey are also listed on each table. In addition, each table lists the position of the flow-sensing probe from the tunnel reference surface and the measured flow-field parameters.

APPENDIX D

HEAT EXCHANGER EXIT GUIDE VANE STUDIES

Additional measurements were made to quantify the effects of the heat exchanger exit guide vanes on the flow quality downstream of the heat exchanger (station 4). The vane angles of the existing exit guide vanes cannot easily be adjusted with respect to the heat exchanger surface. In order to study the effects of the vane angle on the flow quality, replacement panels of adjustable exit guide vanes were built and installed on the heat exchanger. Because of limited resources, only four panels were constructed. These panels were mounted on the downstream face of the second heat exchanger element such that the portion of that element with the replacement panels was in line with traverse 2 (inside position). In addition to the baseline configuration (described in the text), three other exit guide vane configurations were studied:

Configuration 1—No exit guide vanes (baseline panels removed; no mechanism to turn the flow).

Configuration 2—Replacement panels installed with exit guide vanes stowed (maximum turning of the flow; flow expected to follow contour of the heat exchanger); guide vane exit angle of 0° (parallel to heat exchanger surface).

Configuration 3—Replacement panels installed with exit guide vanes deployed (minimum turning of the flow; flow expected to be more evenly distributed downstream of the heat exchanger); guide vane exit angle of 11° with respect to heat exchanger surface.

Because only a small number of the heat exchanger exit guide vanes were changed, the effects on the flow quality were expected to be localized to just downstream of the new panels; therefore, the length of the surveys was reduced so as to cover only the affected areas. Total and static pressure, velocity from both pitot-static probes and wind anemometers, total temperature, and pitch and yaw flow angle data are included for each configuration (figs. 81 through 87 for configuration 1; figs. 88 through 94 for configuration 2; and figs. 95 through 101 for configuration 3). A summary comparing the data from each configuration to baseline data is given in this appendix.

Configuration 1—No Exit Guide Vanes

Removal of the exit guide vane panels produced a larger than baseline total pressure deficit (both in the magnitude of the deficit and in the size of the affected area; see fig. 81) near the center of the survey directly downstream of the area where the vanes were removed (traverse position 2). There was little difference between the baseline and configuration 1 data at traverse position 1. The effect was more noticeable at the higher velocity conditions. At the V_{TS} = 350 mph setting, the total pressure deficit at the tunnel center was about 0.025-psia lower than the peak at 240 in. above the tunnel floor (in comparison to a deficit of about 0.014-psia for the baseline configuration). Static pressure data (fig. 82) show a good deal of scatter for configuration 1, but the distributions indicate increased variation in the static pressure profiles in comparison to the baseline. Velocity data from both the pitot-static probes (fig. 83) and wind anemometers (fig. 84) show a very poor velocity distribution directly downstream of the area where the exit guide vanes were removed (traverse 2). There was a very large velocity deficit in this region (between 70 and 160 in. above the tunnel floor). The data from traverse 1 indicate that the flow from this deficit region was displaced toward the outside wall of the tunnel. Comparison of the baseline and configuration 1 data along traverse 1 shows that the configuration 1 data are much more uniform (the deficit recorded at the baseline was filled in by the displaced flow during the configuration 1 surveys). This trend was recorded at all test conditions by both the pitot-static and wind anemometer instrumentation. These data illustrate not only that the exit guide vanes are required for good flow quality (witness the poor flow quality along traverse 2), but also that the baseline configuration does not provide the optimum velocity distribution (note the improved distribution along traverse 1 for configuration 1, in comparison to the baseline data).

Removing the exit guide vanes actually had a positive effect on the temperature distribution along traverse 2 while degrading the profile along traverse 1 at the V_{TS} = 350 mph setting (fig. 85). There is little difference between the baseline and configuration 1 data sets at the other test conditions. Figure 86 shows that much higher pitch flow angles were recorded directly downstream of the area where the exit guide vanes were removed. At traverse position 2, the data indicate large positive angles (upflow), as expected, since there was no mechanism in place to turn the flow in this area. The traverse 1 data indicate little difference in the flow along the portion of the survey below the tunnel centerline; above the tunnel centerline, the pitch angles were smaller than at baseline. With configuration 1, there was a yaw angle gradient over the area directly downstream of where the exit guide vanes were removed (fig. 87). The yaw flow angle changed direction, from positive (outflow) at about 80 in. above the tunnel floor to negative (inflow) at about the tunnel centerline. Above the tunnel centerline, the data from traverse 2 are similar to the baseline data. Traverse 1 data are similar to the baseline data except at locations near the tunnel centerline, where the positive yaw angles recorded at the baseline are no longer evident.

Configuration 2—New Exit Guide Vanes With Vanes Stowed

The replacement exit guide vanes with vanes in the stowed position produced nearly identical flow-field distributions as those from the baseline heat exchanger surveys for each flow-field parameter (total and static pressure, velocity, total temperature, and pitch and yaw flow angles; see figs. 88 through 94). There was an increased amount of scatter in the total pressure data at V_{TS} = 250 mph and lower settings for configuration 2. The pitot-static velocity results were also affected (the cause of the data scatter is not known).

Configuration 3: New Exit Guide Vanes With Vanes Deployed

Flow-field data collected downstream of the heat exchanger with the replacement exit guide vanes installed and in the deployed (fully extended or open position) are presented in figures 95 through 101. Although the total pressure data (fig. 95) indicate an improvement in the flow quality downstream of the heat exchanger with the new exit guide vanes deployed, the effect on the flow field is more readily apparent in the velocity data (figs. 97 and 98). Even though there was still a deficit area at the tunnel centerline along the traverse 2 survey, the size of the deficit area was greatly reduced by deployment of the new exit guide vanes. At V_{TS} = 350 mph, the baseline data indicated a minimum velocity of 23 ft/sec at the tunnel centerline along traverse 2, the height of the affected area being approximately 60 in. (fig. 45); with the new exit guide vanes, the minimum velocity increased to about 31 ft/sec and the height of the deficit area decreased to 20 in. (similar results were seen at the lower velocity conditions). The pitot-static probes also recorded a slight positive effect on the velocity distributions along the traverse 1 surveys (fig. 97), but the wind anemometer data did not vary significantly from the baseline data (figs. 98 and 46, respectively). The effect on the total temperature distribution appeared to be negligible for all except the V_{TS} = 350 mph case, where there was a slight improvement in the temperature distribution along traverse 2 (there was no apparent effect on traverse 1 data). The pitch flow angle data along traverse 2 (fig. 100) show that in the region directly downstream of the new exit guide vane panels, the pitch angle became more constant and the flow direction changed from generally downflow to upflow, in comparison to the baseline data (fig. 48 shows the pitch flow angle distribution starting as positive at 200 in. above the tunnel floor and decreasing to a negative value through about 80 in. above the floor; the configuration 3 data shows that over this same survey distance, the pitch angle remained roughly constant). The new exit guide vanes had no effect on the yaw flow angle distribution (fig. 101).

APPENDIX E

ICING RESEARCH TUNNEL HEAT EXCHANGER INLET TEMPERATURE SURVEYS— JANUARY 19, 1996

Introduction

On January 19, 1996, a 1-day test program was executed in the NASA Glenn Icing Research Tunnel (IRT). A vertical cable traverse immediately upstream of the facility heat exchanger was used to monitor the facility temperatures and the crawl space temperatures below corners C and D. These data were used to better understand the heat loading on the heat exchanger and the overall thermodynamics of the facility.

Test Setup

A single vertical cable traverse was installed for this test. This traverse was strung between the tunnel ceiling and floor, about 24 in. upstream of the heat exchanger inlet fairings and 148.5 in. from the outside wall. (The heat exchanger leg is 350-in. wide by 314-in. high.) Installed on the cable traverse carriage were a wind anemometer for measuring airspeed, pitch angle, and yaw angle, and two type-T, aspirated total-temperature probes for measuring total temperature. In the crawl space below corners C and D (the space between the floor and the ground), type-T thermocouple probes were installed.

Test Matrix

Table 37 gives the test matrix for this 1-day program.

Results

Figures 102, 103, and 104 graphically show the important results. Figure 102 shows data versus time for the duration of the test. Figure 102(a) shows the test section velocity and cable traverse vertical position. Figure 102(b) shows the air velocity, pitch flow angle, and yaw flow angle as measured by the wind anemometer on the cable traverse. Figure 102(c) shows all pertinent temperatures: the outside air temperature, the temperature measured by the thermocouple probes on the cable traverse, the temperatures in the crawl spaces beneath corners C and D, and the average air temperatures in corners A, B, C, and D.

If the data in figure 102(c) are closely examined for a test section airspeed of 250 mph, the following data trends can be observed: (1) crawl space C is warmer than crawl space D, and (2) corner C is warmest followed by the traverse, corner D, corner B, and corner A, respectively. The temperatures in corners D, B, and A are within about 3 °F. These results make intuitive sense because crawl space C should be warmer than crawl space D since C is upstream of the heat exchanger and D is downstream. There is also a significant temperature drop (close to 5 °F) between corners C and D due to the cooling of the heat exchanger. The temperatures measured at the traverse are between those measured in corners C and D.

If the data in figure 102(c) are examined for a test section airspeed of 350 mph, the following data trends can be observed: (1) crawl space D is warmer than crawl space C (this is counterintuitive), and corner C is the warmest followed by the traverse, corner B, corner A, and corner D, respectively. Corner D is, of course, the coldest since it is directly downstream of the heat exchanger. The temperatures in corners A and B are close to each other. The traverse temperature approaches the temperature in corner C.

Figures 103 and 104 show the air velocity, flow angle, and air temperature versus distance from the floor as measured by the wind anemometer and thermocouple probes on the cable traverse. Figure 103 is for a test section velocity of 250 mph and a tunnel total temperature of 15 °F. Figure 104 is for a test section velocity of 350 mph and a tunnel total temperature of –17 °F. The air velocity profiles and magnitudes are consistent with previous measurements. Higher air velocities are present near the floor. The flow angles are also consistent with data taken previously. Pitch angles are generally toward the ceiling by 5° to 10° and yaw angles are generally toward the outer wall by 0° to 5°. The temperature profiles exhibit a temperature gradient with warmer temperatures near the floor. This is counterintuitive because cooler, more dense, air would have a tendency to collect near the floor. In figure 103(c), the gradient range is about 2 °F. In figure 104(c), the gradient range is about 4 °F.

Measurement Uncertainties

During this test, some electronic noise present in the frequency-to-direct-current converter used to measure the wind anemometer airspeed introduced some uncertainty in the measured airspeed. The uncertainty in these measurements was estimated to be ±2 ft/sec.

In addition, temperature bath calibrations were carried out on the thermocouple probes used on the traverse and in the crawl spaces. Temperature measurements made with these probes were estimated to have an uncertainty of ±0.5 °F.

APPENDIX F

ICING RESEARCH TUNNEL FAN EXIT FLOW QUALITY SURVEYS—AUGUST 23, 1996

Introduction

On August 23, 1996, a 1-day test program was executed in the NASA Glenn Icing Research Tunnel (IRT). Flow quality data (total pressures, static pressures, total temperatures, airspeeds, pitch angles, and yaw angles) were collected immediately downstream of the IRT fan. These data were needed to aid in the design of fan outlet guide vanes.

Test Setup

A single vertical cable traverse was installed for this test about 50-in. downstream of the fan blade leading edges. This traverse was strung between the tunnel ceiling and fan motor nacelle at the 12 o'clock position (with respect to the fan) as depicted in figure 105. The vertical distance between the nacelle housing and tunnel ceiling where the traverse was installed was 94.25 in. Structural channels were used to reinforce the cable traverse system and to guide the traverse carriage vertically under the air loads. As shown in figure 105, the traverse was rotated "into the wind" or "in the yaw plane" by 30° to compensate for the fan swirl. The traverse carriage was instrumented with two pitot-static probes, a type "K" thermocouple total temperature probe, and a wind anemometer that could resolve airspeed, pitch angle, and yaw angle. On the traverse carriage, the two pitot-static probes were vertically spaced 11.0 in. apart. The wind anemometer was located 5.5 in. above the pitot-static probe closest to the fan motor nacelle. The vertical position of the temperature probe exactly coincided with the pitot-static probe closest to the fan motor nacelle.

The total pressures from the pitot-static probes were measured by 25-psia absolute pressure transducers. The pressure differences between the total and static pressure ports on the pitot-static probes were measured by differential pressure transducers that had 1.0 in. of water range.

In the test section, a flat plate blockage model was used to vary the test section blockage. During this test, the blockage model was installed at a 55° angle of attack or was not used at all. A 90° angle of attack would have corresponded to maximum model blockage.

Test Matrix

Table 38 gives the test matrix for this 1-day test program.

Results

Figure 106 shows measured and computed variables versus time. Figure 106(a) shows the traverse position and the test section velocity for all data acquired. This plot is useful in determining what the test section velocity and traverse position were at any given instant in time during the test. Figure 106(b) shows computed velocities from the wind anemometer and the two pitot-static probes. From Figure 106(b), it is apparent that the wind anemometer and the pitot-static probes worked properly for the first 2.4 hr of the test. Beyond this, the data are questionable. During this test, we noticed that the airspeed sensor failed on the wind anemometer and that the delta-pressure transducers were overranged. Figure 106(c) shows temperatures measured near the traverse, in corner D, and outside. Over the course of the test, the outside air temperature varied between 72 and 84 °F. The traverse and corner D temperatures correlated well and ranged between 59 and 80 °F. The traverse temperature was always higher than the average corner D temperature. The peaks and valleys for the two temperatures were identical. Figure 106(d) shows pitch and yaw flow angles from the wind anemometer. The yaw angles at about 5 hr into the test appear to be questionable since they are around 90°. Figure 106(e) shows the total pressures measured by the two traverse pitot-static probes and the total pressure measured in the test section. The pressures matched at zero flow (at times of 0.0, 1.45, 4.1, and

5.85 hr). Generally speaking, the total pressure downstream of the fan increased with increasing airspeed near the fan blade midspan and tip. Near the root, the total pressure decreased with increasing airspeed. Some of these results are clearer in subsequent figures.

Figure 107(a) shows the wind anemometer air velocity versus test section airspeed for three different elevations (Z = 23.8, 47.6, and 73.0 in.) and for two different blockages (no blockage plate and a blockage plate at 55°). Airspeeds as high as 55 and 75 ft/sec were measured for test section speeds of 300 mph. The flat velocity lines indicate that the airspeed sensor on the wind anemometer was not functioning.

Figures 107(b) and (c) show the air velocities computed using the pressures from the two traverse pitot-static probes. Much of the data are near zero and are unusable. This may have resulted from the delta-pressure transducers being overranged. There are a couple of data lines that vary between 30 and 70 ft/sec. These data lines follow the lines seen in figure 107(a).

Figures 108(a) and (b) show the pitch and corrected yaw wind anemometer flow angles, respectively. The pitch angles generally varied between 15° and –10°; however, the pitch angles near the blade roots (Z = 23.8 in.) varied between –15° and –50°. The yaw angles generally varied between 10° and –40°. Two yaw data lines varied between –70° and –95°. However, these data lines are questionable since they are so close to –90°.

Figures 109(a) and (b) show the total pressure recoveries for the two traverse pitot-static probes normalized with respect to the test section total pressure. The data from pitot-static probe 1 (fig. 109(a)) is better behaved and may be of better quality than the data from pitot-static probe 2 (fig. 109(b)). The data generally show increasing total pressure with increasing test section airspeed near the blade tips (Z = 67.5 in.), constant total pressure near the blade midspan (Z = 42.1 in.), and decreasing total pressure with increasing test section airspeed near the blade roots (Z = 18.3 in.). Figure 109(c) shows the total temperature measured by the traverse normalized with respect to the average corner D temperature. The data generally indicate warmer temperatures (by as much as 8 °F) with increasing test section airspeed.

Measurement Uncertainties

The measurement uncertainties for the data presented in this appendix are estimated to be ±3.0 ft/sec for the wind anemometer airspeed, ±2.0° for the wind anemometer pitch and yaw flow angles, ±0.03 psia for the total pressure and ±0.00005 psid for the delta-pressure (based on accuracy data from the manufacturer), and ±1.0 °F for the temperature.

REFERENCES

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2. Soeder, R.H.; and Andracchio, C.R.: NASA Lewis Icing Research Tunnel User Manual. NASA TM–102319, 1990.
3. Ames Research Staff: Equations, Tables, and Charts for Compressible Flow. NACA TR–1135, 1953.

TABLE 1.— TEST MATRIX FOR THE 1995 TUNNEL-LOOP FLOW QUALITY STUDIES IN THE NASA GLENN ICING RESEARCH TUNNEL

[For each test configuration, surveys were conducted corresponding to test section velocity settings V_{TS} of 350, 250, 150, and 50 mph]

Type of survey	Priority	Run number	Comment
At station 1—downstream of the fan			
Flow visualization	4	n/a	Baseline
At station 2—downstream of the drive motor			
Vertical at 1/3 and 2/3 tunnel width	2a	14	Baseline
Horizontal at 1/3 and 2/3 tunnel height	2a	15	Baseline
At station 3—upstream of the heat exchanger			
Vertical at 1/2 and 3/4 tunnel width	1c	12	Baseline
At station 4 downstream of the heat exchanger			
Vertical at 1/2 and 3/4 tunnel width	1b	3,4,6	Baseline heat exchanger
Vertical at 1/2 and 3/4 tunnel width	1b	4	Exit guide vanes removed
Vertical at 1/2 and 3/4 tunnel width	1b	4	Replacement guide vanes (stowed)
Vertical at 1/2 and 3/4 tunnel width	1b	5	Replacement guide vanes (deployed)
At station 5—upstream of the spraybars			
Vertical at 1/4 and 1/2 tunnel width	1a	8	Baseline
Vertical at 1/2 and 3/4 tunnel width	1a	9	Baseline
Horizontal surveys at 1/4 and 1/2 tunnel height	1a	10	Baseline
Horizontal at 1/2 and 3/4 tunnel height	1a	11	Baseline
Flow visualization	4	17	Baseline
At station 6—downstream of the spraybars			
Horizontal at 1/3 and 2/3 tunnel height	3	17	Baseline

TABLE 2.—TYPICAL TEST SECTION CONDITIONS FOR THE TUNNEL-LOOP FLOW QUALITY STUDIES

[Conditions were from run 3 (2/13/1995)—empty test section and no icing/spray conditions.]

Flow parameter						
Nominal test section velocity, V_{TS}, mph	Static pressure, P_s, psia	Mach number, M	Total pressure, P_o, psia	Actual test section velocity, V_{TS}, mph (ft/sec)	Total temperature, T_o, °R	Fan speed, rpm
350	12.315	0.480	14.418	350.6 (514.2)	499	393
250	13.321	.339	14.424	250.6 (367.5)	500	291
150	14.021	.203	14.430	150.7(221.0)	497	180
50	14.425	.068	14.472	51.0 (74.8)	503	65

TABLE 3.—SUMMARY OF OBSERVATIONS DURING SMOKE FLOW VISUALIZATIONS IN SETTLING CHAMBER

Vertical distance of smoke injection site from settling chamber floor, ft	Test section velocity, V_{TS}, mph	Vertical distance of smoke from floor in test section, ft	Comments
Smoke injected spanwise near inner wall			
6	200	2.0	Smoke steady in bellmouth
8	200	2.5	Smoke steady in bellmouth
8	150	2.0±0.5	Smoke steady in bellmouth and unsteady in test section
10	150	3.0	Smoke steady in bellmouth
12	150	4.0±0.5	Smoke steady in bellmouth
14	150	4.5±0.5	Smoke steady in bellmouth
Smoke injected spanwise near centerline			
6	150	1.0±1.0	Spanwise location of smoke was closer to outer wall
8	150	2.0±1.0	Spanwise location of smoke was closer to outer wall
10	150	2.8±0.5	Spanwise location of smoke was closer to outer wall
12	150	3.5±1.0	Spanwise location of smoke was near centerline
14	150	3.8±1.0	Spanwise location of smoke was near centerline
Smoke injected spanwise near outer wall			
6	150	1.0±1.0	Smoke followed bellmouth contour smoothly
8	150	2.0±0.5	Some smoke unsteadiness in bellmouth
10	150	2.5±1.0	Smoke unsteady in test section
12	150	3.0±1.0	Smoke unsteadiness reduced
14	150	4.0±1.0	Smoke unsteadiness reduced

TABLE 4.—SUMMARY OF DATA[a] RECORDED DURING EACH RUN DAY FOR EACH TEST CONFIGURATION

Run day	Station	Reading numbers for various test section velocities, V_{TS}			
		50 mph	150 mph	250 mph	350 mph
3,4	4	210 to 260	156 to 206	105 to 127; 129 to 155	54 to 104
4	4	348 to 376	319 to 347	290 to 318	261 to 289
5	4	465 to 493	436 to 464	407 to 435	378 to 406
5,6	4	583 to 611	554 to 582	525 to 553	494 to 523
6	4	681 to 700	661 to 680	641 to 660	612 to 640
8	5	860 to 908	811 to 859	761 to 810	711 to 760
9	5	1168 to 1219	1109 to 1159	1050 to 1100	991 to 1041
10	5	1425 to 1469	1373 to 1416	1317 to 1364	1265 to 1308
11	5	1588 to 1622	1552 to 1587	1516 to 1551	1480 to 1515
12	3	1785 to 1836	1732 to 1784	1679 to 1731	1626 to 1678
14	2	2023 to 2065	1979 to 2022	1934 to 1978	1883 to 1933
15	2	2244 to 2293	2195 to 2243	2148 to 2194	2098 to 2147
17	6	2432 to 2472	2391 to 2431	2350 to 2390	2308 to 2349

[a]Data are stored in data base as part of IRT ESCORT program D033.

TABLE 5.—DATA LISTING FOR TRAVERSE 1 AT STATION 2—VERTICAL SURVEY

[Test section data for reading 1883; total pressure, 14.312; static pressure, 12.222 psia; total temperature, 449 °R; velocity, 350.9 mph; fan speed, 387.5 rpm.]

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
1883	31.3	14.335	14.326	33.7	20.8	14.360	14.324	65.8	31.1	506.8	26.1	66.0	1.9	11.8
1884	36.3	14.337	14.328	32.4	25.8	14.361	14.326	64.7	36.0	506.5	31.0	65.2	2.3	11.3
1885	38.9	14.338	14.329	33.3	28.4	14.363	14.328	65.2	38.6	506.5	33.6	64.7	1.8	11.6
1886	44.8	14.338	14.330	31.8	34.3	14.363	14.329	64.5	44.5	506.1	39.5	63.9	1.9	9.6
1887	51.3	14.339	14.330	31.8	40.8	14.361	14.327	63.9	51.0	506.1	46.0	63.4	1.9	9.8
1888	60.5	14.339	14.330	34.1	50.0	14.360	14.327	62.9	60.3	506.0	55.3	64.4	4.9	8.9
1889	66.3	14.340	14.330	34.8	55.8	14.358	14.326	62.5	66.0	505.8	61.0	58.4	2.7	10.1
1890	72.9	14.341	14.330	35.6	62.4	14.360	14.327	62.8	72.6	505.7	67.6	60.2	2.8	7.8
1891	78.3	14.338	14.329	32.8	67.8	14.354	14.325	58.8	78.0	505.8	73.0	54.5	2.2	10.3
1892	84.3	14.338	14.330	32.5	73.8	14.352	14.325	57.4	84.1	505.6	79.1	58.6	2.4	8.1
1893	90.2	14.339	14.329	34.2	79.7	14.353	14.326	57.3	89.9	505.5	84.9	61.7	2.9	5.0
1894	96.6	14.338	14.330	31.9	86.1	14.349	14.325	53.5	96.4	505.5	91.4	50.1	2.2	9.5
1895	102.3	14.337	14.329	29.5	91.8	14.346	14.325	50.2	102.1	505.4	97.1	45.5	3.2	11.1
1896	108.8	14.337	14.330	30.4	98.3	14.345	14.324	50.1	108.5	505.3	103.5	48.3	1.4	7.7
1897	114.9	14.337	14.329	30.4	104.4	14.344	14.324	48.9	114.7	505.2	109.7	45.9	3.9	7.2
1898	120.8	14.337	14.329	30.0	110.3	14.344	14.325	47.9	120.5	505.1	115.5	45.3	3.6	12.0
1899	126.6	14.335	14.329	28.1	116.1	14.341	14.324	44.8	126.3	504.9	121.3	41.6	3.4	8.4
1900	132.4	14.336	14.330	25.3	121.9	14.338	14.324	41.4	132.1	505.0	127.1	38.1	5.7	8.2
1901	138.2	14.336	14.330	26.5	127.7	14.339	14.324	41.7	138.0	505.0	133.0	37.2	1.1	6.0
1902	144.5	14.335	14.330	25.3	134.0	14.336	14.323	38.9	144.3	505.3	139.3	35.7	1.9	9.0
1903	150.3	14.336	14.331	26.2	139.8	14.335	14.322	38.7	150.0	505.8	145.0	35.0	8.7	4.8
1904	156.5	14.336	14.331	24.5	146.0	14.334	14.323	36.6	156.3	505.6	151.3	34.7	3.4	-.9
1905	162.4	14.336	14.332	20.9	151.9	14.334	14.324	33.3	162.1	505.2	157.1	29.5	1.4	4.7
1906	168.3	14.336	14.332	20.0	157.8	14.335	14.325	34.2	168.0	505.2	163.0	32.1	3.2	6.3
1907	175.0	14.336	14.332	22.0	164.5	14.335	14.326	33.6	174.8	505.0	169.8	28.8	−2.7	5.6

TABLE 5.—Concluded.

Reading number	Probe one Position, in.	Probe one Total pressure, psia	Probe one Static pressure, psia	Probe one Velocity, ft/sec	Probe two Position, in.	Probe two Total pressure, psia	Probe two Static pressure, psia	Probe two Velocity, ft/sec	Thermocouple Position, in.	Thermocouple Total temperature, °R	Wind anemometer Position, in.	Wind anemometer Velocity, ft/sec	Wind anemometer Pitch, deg	Wind anemometer Yaw, deg
1908	181.0	14.336	14.331	22.6	170.5	14.335	14.325	34.1	180.7	504.8	175.7	28.5	–1.4	4.1
1909	186.4	14.337	14.333	21.8	175.9	14.336	14.327	33.2	186.2	504.6	181.2	29.7	4.3	0.0
1910	192.0	14.336	14.333	20.7	181.5	14.335	14.327	31.3	191.8	504.7	186.8	27.8	.9	.4
1911	198.0	14.336	14.333	18.8	187.5	14.333	14.326	29.8	197.8	504.7	192.8	26.5	–5.7	–1.1
1912	204.7	14.337	14.334	17.4	194.2	14.335	14.328	28.1	204.4	504.3	199.4	25.1	–1.4	–4.1
1913	210.1	14.337	14.334	17.2	199.6	14.334	14.328	26.7	209.9	504.3	204.9	23.4	–3.1	2.5
1914	217.8	14.337	14.334	17.8	207.3	14.334	14.328	25.9	217.6	504.5	212.6	23.6	–6.3	–2.4
1915	221.5	14.337	14.334	18.5	211.0	14.334	14.328	27.8	221.2	504.5	216.2	25.0	–.3	–2.8
1916	228.2	14.337	14.335	16.7	217.7	14.334	14.328	27.3	227.9	504.4	222.9	24.3	–3.5	–5.1
1917	233.6	14.336	14.335	14.9	223.1	14.333	14.327	25.9	233.4	503.8	228.4	22.8	–3.7	–5.4
1918	239.9	14.337	14.334	18.0	229.4	14.333	14.328	24.8	239.7	503.8	234.7	20.8	0.7	–8.0
1919	247.4	14.337	14.335	17.1	236.9	14.333	14.327	26.0	247.1	503.7	242.1	22.2	–2.8	–9.9
1920	255.1	14.337	14.334	16.3	244.6	14.333	14.328	23.8	254.9	503.6	249.9	20.1	1.7	–6.9
1921	258.1	14.337	14.334	16.8	247.6	14.332	14.327	24.6	257.8	503.9	252.8	21.4	2.1	–10.4
1922	265.4	14.337	14.335	16.3	254.9	14.332	14.327	24.1	265.2	503.8	260.2	20.2	–1.8	–2.5
1923	269.8	14.337	14.334	17.5	259.3	14.333	14.328	23.8	269.5	503.6	264.5	22.3	0.7	–11.0
1924	276.0	14.337	14.335	17.1	265.5	14.334	14.328	26.2	275.8	503.6	270.8	23.9	–.4	–5.7
1925	283.0	14.337	14.335	16.7	272.5	14.332	14.328	23.0	282.8	503.4	277.8	21.3	2.9	–7.3
1926	288.9	14.337	14.335	17.1	278.4	14.331	14.327	21.6	288.7	503.6	283.7	19.3	2.8	–9.7
1927	251.9	14.337	14.335	16.1	241.4	14.333	14.327	27.0	251.6	503.7	246.6	25.0	–1.8	–8.0
1928	215.6	14.338	14.336	17.0	205.1	14.333	14.327	26.5	215.4	503.9	210.4	22.1	–1.6	–6.5
1929	180.5	14.339	14.335	20.6	170.0	14.336	14.327	32.6	180.3	504.2	175.3	29.9	1.4	5.3
1930	144.3	14.340	14.335	24.8	133.8	14.341	14.327	40.1	144.1	504.4	139.1	34.4	5.3	6.8
1931	109.0	14.345	14.336	31.8	98.5	14.350	14.328	51.5	108.8	504.6	103.8	47.0	1.7	5.4
1932	73.2	14.348	14.338	34.3	62.7	14.360	14.329	61.1	73.0	504.7	68.0	57.9	4.6	8.7
1933	32.0	14.349	14.339	34.4	21.5	14.366	14.331	65.1	31.7	505.2	26.7	64.4	1.4	13.3

TABLE 6.—DATA LISTING FOR TRAVERSE 2 AT STATION 2—VERTICAL SURVEY

[Test section data for reading 1883: total pressure, 14.312; static pressure, 12.222 psia; total temperature, 499 °R; velocity, 350.9 mph; fan speed, 387.5 rpm.]

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
1883	30.7	14.345	14.323	51.2	20.4	14.344	14.324	49.7	28.9	503.7	22.9	51.2	3.6	7.5
1884	36.5	14.348	14.327	50.1	26.3	14.348	14.328	49.0	34.8	503.9	28.8	50.8	5.3	8.8
1885	40.1	14.347	14.327	49.5	29.9	14.347	14.328	48.1	38.4	503.6	32.4	48.7	5.7	10.7
1886	45.5	14.350	14.328	50.9	35.3	14.350	14.329	49.5	43.8	503.5	37.8	46.2	5.5	9.4
1887	51.7	14.349	14.329	48.7	41.5	14.348	14.329	46.7	50.0	503.6	44.0	45.8	5.8	9.4
1888	60.2	14.347	14.329	47.0	49.9	14.346	14.330	44.9	58.4	503.6	52.4	43.2	7.6	8.5
1889	66.3	14.348	14.329	47.5	56.0	14.347	14.330	44.8	64.5	503.4	58.5	44.7	6.8	7.3
1890	72.6	14.346	14.329	45.2	62.3	14.345	14.330	42.4	70.8	503.4	64.8	43.4	4.2	8.4
1891	78.4	14.345	14.328	44.8	68.1	14.345	14.330	41.8	76.6	503.5	70.6	41.3	11.7	6.0
1892	84.7	14.345	14.329	43.9	74.4	14.343	14.330	39.9	82.9	503.4	76.9	38.6	4.6	7.6
1893	90.2	14.344	14.330	40.9	79.9	14.342	14.330	38.0	88.4	503.4	82.4	34.8	9.1	7.3
1894	96.0	14.343	14.330	38.9	85.7	14.342	14.331	36.4	94.2	503.5	88.2	33.8	8.5	3.6
1895	102.2	14.343	14.330	39.0	92.0	14.341	14.330	35.3	100.5	503.5	94.5	34.2	6.3	4.4
1896	108.2	14.341	14.330	36.1	97.9	14.340	14.331	33.1	106.4	503.3	100.4	30.1	8.0	9.5
1897	114.5	14.338	14.330	32.0	104.2	14.338	14.330	29.8	112.7	503.3	106.7	27.0	6.3	3.3
1898	120.5	14.338	14.330	32.5	110.2	14.338	14.331	30.7	118.7	503.5	112.7	27.3	3.5	9.6
1899	126.6	14.338	14.329	33.1	116.4	14.339	14.330	32.0	124.9	503.4	118.9	27.3	9.3	−2.3
1900	132.2	14.339	14.330	32.4	122.0	14.338	14.331	30.1	130.5	503.4	124.5	28.1	4.1	7.7
1901	138.2	14.338	14.330	30.4	128.0	14.338	14.332	28.6	136.5	503.6	130.5	25.4	8.6	−1.0
1902	144.2	14.338	14.331	29.5	133.9	14.339	14.332	28.1	142.4	503.9	136.4	25.3	4.7	4.9
1903	149.3	14.339	14.331	30.1	139.0	14.339	14.332	29.3	147.5	504.4	141.5	24.8	6.2	4.7
1904	156.2	14.339	14.332	28.5	145.9	14.339	14.332	28.1	154.4	504.4	148.4	21.6	5.6	−3.8
1905	162.1	14.339	14.332	28.8	151.9	14.339	14.332	28.4	160.4	504.2	154.4	23.0	8.4	.3
1906	167.7	14.339	14.332	28.7	157.5	14.339	14.333	28.0	166.0	504.1	160.0	26.9	8.5	5.6
1907	174.6	14.338	14.332	27.0	164.4	14.338	14.333	26.2	172.9	503.9	166.9	24.9	10.8	6.0

TABLE 6.—Concluded.

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
1908	180.4	14.338	14.333	25.4	170.1	14.338	14.333	25.1	178.6	503.9	172.6	21.8	7.5	5.8
1909	187.5	14.340	14.333	29.0	177.3	14.340	14.334	28.3	185.8	503.8	179.8	26.4	8.5	6.4
1910	191.8	14.340	14.334	26.9	181.6	14.340	14.335	25.7	190.1	503.9	184.1	23.3	11.7	−1.2
1911	198.6	14.340	14.335	26.8	188.4	14.341	14.336	26.6	196.9	503.8	190.9	25.8	11.9	5.6
1912	205.5	14.341	14.335	26.4	195.3	14.342	14.336	25.9	203.8	503.6	197.8	22.0	4.1	3.5
1913	209.9	14.340	14.335	24.6	199.6	14.342	14.337	24.1	208.1	503.6	202.1	24.2	12.4	3.3
1914	217.1	14.340	14.335	24.4	206.8	14.341	14.337	24.1	215.3	504.0	209.3	22.4	−1.8	2.8
1915	220.9	14.341	14.336	24.7	210.7	14.341	14.336	24.6	219.2	504.0	213.2	21.9	5.0	4.1
1916	228.4	14.341	14.336	25.3	218.1	14.342	14.337	24.4	226.6	503.8	220.6	22.5	3.3	6.4
1917	235.3	14.340	14.334	25.5	225.0	14.341	14.336	25.3	233.5	503.4	227.5	20.9	4.3	7.0
1918	239.2	14.340	14.335	23.7	228.9	14.341	14.336	23.5	237.4	503.5	231.4	21.7	5.0	2.7
1919	246.8	14.340	14.335	24.3	236.6	14.341	14.336	24.2	245.1	503.3	239.1	22.2	9.7	−1.1
1920	255.4	14.340	14.335	23.8	245.2	14.342	14.337	24.6	253.7	503.3	247.7	22.5	6.3	−.3
1921	259.6	14.340	14.335	24.1	249.4	14.341	14.336	24.8	257.9	503.6	251.9	19.3	7.6	−2.4
1922	264.9	14.340	14.336	23.3	254.6	14.342	14.337	24.2	263.1	503.4	257.1	21.3	2.4	−4.9
1923	270.7	14.341	14.335	25.4	260.4	14.343	14.337	26.4	268.9	503.3	262.9	23.5	2.1	−.9
1924	276.3	14.342	14.336	25.6	266.1	14.342	14.337	25.2	274.6	503.2	268.6	22.8	8.8	2.2
1925	283.2	14.342	14.337	24.4	272.9	14.343	14.338	24.4	281.4	503.3	275.4	22.1	2.9	−4.6
1926	287.1	14.341	14.336	23.7	276.9	14.342	14.338	23.6	285.4	503.2	279.4	23.8	2.0	−4.0
1927	250.7	14.342	14.338	24.2	240.4	14.343	14.338	24.7	248.9	503.5	242.9	23.4	13.1	5.4
1928	215.4	14.342	14.338	24.0	205.2	14.343	14.339	24.1	213.7	503.4	207.7	21.3	3.5	0.1
1929	180.2	14.343	14.338	26.2	169.9	14.345	14.339	25.9	178.4	503.4	172.4	26.9	10.1	6.9
1930	144.1	14.345	14.337	30.7	133.9	14.345	14.338	29.6	142.4	503.2	136.4	27.0	3.1	6.7
1931	108.4	14.349	14.338	36.0	98.1	14.348	14.339	32.7	106.6	502.9	100.6	32.6	7.4	8.5
1932	73.5	14.357	14.340	44.6	63.3	14.354	14.340	41.6	71.8	502.9	65.8	40.8	4.1	6.7
1933	29.2	14.362	14.341	51.3	18.9	14.361	14.340	50.3	27.4	502.8	21.4	54.1	4.7	9.1

TABLE 7.—DATA LISTING FOR TRAVERSE 1 AT STATION 2—VERTICAL SURVEY

[Test section data for reading 1934: total pressure, 14.333; static pressure, 13.234 psia; total temperature, 497 °R; velocity, 250.2 mph; fan speed, 287.5 rpm.]

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
1934	32.0	14.340	14.336	20.9	21.5	14.356	14.341	43.1	31.7	499.6	26.7	42.0	1.0	13.1
1935	40.3	14.338	14.334	21.3	29.8	14.353	14.337	44.8	40.1	499.8	35.1	43.0	1.4	11.5
1936	47.5	14.338	14.334	21.9	37.0	14.352	14.335	45.3	47.2	499.7	42.2	45.5	.8	9.1
1937	54.8	14.338	14.334	21.7	44.3	14.351	14.334	44.2	54.5	499.6	49.5	41.8	–.4	9.7
1938	61.3	14.339	14.335	21.8	50.8	14.349	14.333	44.1	61.1	499.5	56.1	44.7	.7	5.8
1939	69.3	14.338	14.334	22.4	58.8	14.349	14.333	43.4	69.0	499.7	64.0	44.0	0.7	7.9
1940	76.6	14.339	14.334	23.6	66.1	14.348	14.332	43.4	76.3	500.1	71.3	45.0	3.6	5.0
1941	83.2	14.339	14.334	24.5	72.7	14.346	14.330	43.5	83.0	500.7	78.0	42.6	2.2	7.9
1942	90.7	14.338	14.333	24.5	80.2	14.342	14.327	41.8	90.4	501.9	85.4	41.0	1.6	7.7
1943	97.8	14.340	14.334	25.5	87.3	14.341	14.327	41.3	97.5	502.6	92.5	39.8	2.8	6.5
1944	105.0	14.340	14.335	24.4	94.5	14.341	14.328	39.6	104.8	502.7	99.8	38.4	2.9	8.0
1945	112.9	14.343	14.338	23.9	102.4	14.342	14.330	37.3	112.7	501.9	107.7	34.4	4.3	7.3
1946	119.3	14.345	14.340	24.1	108.8	14.347	14.336	37.2	119.1	500.9	114.1	34.7	4.1	6.7
1947	126.1	14.343	14.339	23.3	115.6	14.345	14.334	35.1	125.8	501.5	120.8	34.0	1.5	7.2
1948	134.2	14.342	14.338	22.2	123.7	14.343	14.333	33.9	133.9	501.9	128.9	30.9	3.7	10.0
1949	141.6	14.342	14.338	22.4	131.1	14.342	14.333	32.0	141.4	502.2	136.4	30.6	4.6	9.0
1950	149.6	14.341	14.337	20.9	139.1	14.340	14.332	30.7	149.4	502.5	144.4	29.8	4.6	4.0
1951	155.2	14.344	14.340	20.4	144.7	14.342	14.335	29.1	154.9	502.3	149.9	26.5	3.3	4.3
1952	162.3	14.344	14.341	19.9	151.8	14.342	14.335	28.1	162.1	502.0	157.1	25.7	2.1	8.7
1953	169.0	14.343	14.341	18.7	158.5	14.342	14.336	26.7	168.7	501.8	163.7	26.1	5.9	7.3
1954	176.1	14.343	14.340	20.5	165.6	14.342	14.336	27.9	175.9	502.0	170.9	25.7	3.8	3.9
1955	183.8	14.342	14.339	18.6	173.3	14.341	14.335	25.4	183.6	502.1	178.6	21.8	3.3	4.1
1956	190.2	14.342	14.339	18.8	179.7	14.340	14.335	24.7	190.0	502.3	185.0	22.9	3.1	1.0
1957	197.5	14.342	14.340	17.3	187.0	14.340	14.336	23.0	197.3	502.1	192.3	20.0	5.2	–.2
1958	204.5	14.342	14.339	17.1	194.0	14.339	14.335	22.6	204.2	502.1	199.2	20.8	2.6	2.0

TABLE 7.—Concluded.

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
1959	211.9	14.343	14.340	17.6	201.4	14.340	14.336	22.0	211.7	502.0	206.7	18.5	4.4	3.5
1960	217.3	14.342	14.340	15.7	206.8	14.339	14.336	20.1	217.0	501.7	212.0	17.6	4.5	–5.0
1961	223.8	14.343	14.341	15.2	213.3	14.340	14.336	21.0	223.6	501.6	218.6	18.7	2.5	–6.0
1962	230.4	14.343	14.341	15.9	219.9	14.341	14.338	19.7	230.1	501.5	225.1	17.6	2.3	–1.8
1963	237.1	14.342	14.341	14.5	226.6	14.341	14.338	19.4	236.8	501.4	231.8	18.3	.2	–.7
1964	243.5	14.343	14.341	14.9	233.0	14.340	14.337	19.7	243.2	501.5	238.2	17.3	1.7	–5.8
1965	251.3	14.343	14.341	15.6	240.8	14.339	14.336	18.2	251.0	501.6	246.0	17.1	5.2	–1.2
1966	258.1	14.343	14.341	15.0	247.6	14.340	14.337	18.2	257.8	501.8	252.8	16.4	.2	–5.8
1967	265.6	14.343	14.341	14.9	255.1	14.338	14.336	17.6	265.3	501.8	260.3	16.0	3.1	–7.1
1968	271.2	14.343	14.341	14.8	260.7	14.339	14.337	18.0	270.9	501.8	265.9	14.1	–.7	–8.8
1969	278.2	14.344	14.342	15.0	267.7	14.340	14.337	18.4	277.9	501.9	272.9	13.3	–0.2	–4.2
1970	284.6	14.344	14.342	15.5	274.1	14.340	14.338	17.6	284.3	501.7	279.3	12.4	–1.1	–8.2
1971	287.7	14.345	14.343	15.5	277.2	14.341	14.339	17.9	287.5	501.7	282.5	11.9	2.5	–6.3
1972	250.4	14.345	14.343	15.7	239.9	14.341	14.338	19.2	250.2	501.7	245.2	15.2	1.3	–2.3
1973	212.0	14.346	14.344	16.4	201.5	14.343	14.339	21.5	211.8	501.8	206.8	17.3	4.1	–4.9
1974	176.3	14.347	14.344	18.3	165.8	14.345	14.339	26.0	176.0	501.6	171.0	22.4	4.0	–0.1
1975	141.4	14.348	14.344	21.8	130.9	14.349	14.340	31.3	141.1	501.4	136.1	28.3	2.2	5.5
1976	110.2	14.349	14.345	23.6	99.7	14.352	14.340	37.9	110.0	501.4	105.0	35.7	2.5	11.6
1977	67.4	14.350	14.345	23.9	56.9	14.358	14.341	45.3	67.1	501.0	62.1	43.8	1.0	6.5
1978	31.8	14.350	14.345	22.2	21.3	14.357	14.341	43.8	31.6	501.1	26.6	43.0	1.4	12.1

TABLE 8.—DATA LISTING FOR TRAVERSE 2 AT STATION 2—VERTICAL SURVEY

[Test section data for reading 1934: total pressure, 14.333; static pressure, 13.234 psia; total temperature, 497 °R; velocity, 250.2 mph; fan speed, 287.5 rpm.]

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
1934	29.2	14.347	14.336	36.7	18.9	14.347	14.336	35.8	27.4	498.4	21.4	38.1	4.3	7.8
1935	40.1	14.347	14.336	36.9	29.8	14.347	14.336	36.0	38.3	498.5	32.3	38.4	4.1	9.3
1936	47.1	14.346	14.335	36.1	36.8	14.346	14.336	35.2	45.3	498.4	39.3	37.1	2.7	9.9
1937	54.3	14.346	14.336	35.9	44.0	14.346	14.336	34.6	52.5	498.3	46.5	36.7	6.8	8.2
1938	61.1	14.346	14.336	34.2	50.9	14.346	14.337	32.8	59.4	498.3	53.4	34.4	2.9	.6
1939	69.1	14.346	14.336	33.8	58.9	14.346	14.337	31.8	67.4	498.6	61.4	34.6	9.3	6.8
1940	76.2	14.346	14.337	32.1	66.0	14.345	14.338	30.2	74.5	499.1	68.5	31.0	7.2	5.4
1941	83.3	14.345	14.337	30.4	73.0	14.344	14.338	28.4	81.5	499.7	75.5	31.6	5.7	6.9
1942	90.3	14.345	14.338	28.9	80.1	14.345	14.339	27.0	88.6	500.9	82.6	26.7	4.0	4.1
1943	97.4	14.345	14.339	27.5	87.1	14.345	14.339	25.3	95.6	501.8	89.6	26.9	3.8	4.3
1944	104.8	14.345	14.340	24.9	94.5	14.345	14.340	23.5	103.0	501.9	97.0	25.2	4.5	3.1
1945	112.2	14.345	14.341	21.1	101.9	14.345	14.341	20.4	110.4	501.0	104.4	21.2	4.6	8.8
1946	119.0	14.345	14.341	22.7	108.8	14.345	14.341	21.2	117.3	500.0	111.3	20.8	5.4	7.5
1947	126.2	14.345	14.341	22.9	115.9	14.346	14.341	22.7	124.4	500.4	118.4	22.1	5.8	5.0
1948	134.3	14.345	14.341	20.7	124.1	14.346	14.342	21.0	132.6	501.0	126.6	20.4	6.8	4.9
1949	141.4	14.345	14.341	20.7	131.2	14.346	14.342	21.1	139.7	501.4	133.7	19.6	5.0	1.2
1950	149.3	14.345	14.341	20.8	139.1	14.346	14.342	21.3	147.6	501.8	141.6	20.5	5.5	5.8
1951	155.0	14.346	14.342	20.4	144.7	14.346	14.342	20.5	153.2	501.4	147.2	19.0	5.0	4.3
1952	162.6	14.347	14.343	21.2	152.3	14.346	14.343	20.9	160.8	501.2	154.8	19.2	2.4	7.7
1953	167.9	14.347	14.343	21.6	157.6	14.347	14.343	21.1	166.1	501.0	160.1	19.3	5.9	6.9
1954	176.1	14.345	14.342	20.2	165.9	14.346	14.343	20.5	174.4	501.3	168.4	19.2	3.3	3.7
1955	182.9	14.346	14.343	20.3	172.6	14.345	14.342	20.1	181.1	501.5	175.1	20.2	5.5	7.0
1956	189.8	14.346	14.342	20.6	179.6	14.346	14.342	19.9	188.1	501.6	182.1	19.5	2.4	4.4
1957	197.0	14.346	14.343	20.4	186.7	14.346	14.343	19.9	195.2	501.6	189.2	19.6	7.0	4.0
1958	204.3	14.345	14.342	19.0	194.1	14.346	14.343	18.6	202.6	501.6	196.6	17.4	8.8	1.8

TABLE 8.—Concluded.

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
1959	211.7	14.346	14.343	18.2	201.4	14.346	14.343	18.3	209.9	501.6	203.9	17.6	8.4	3.7
1960	217.4	14.347	14.343	19.8	207.2	14.346	14.343	19.9	215.7	501.4	209.7	18.1	6.9	1.2
1961	222.9	14.347	14.344	18.4	212.6	14.346	14.343	18.5	221.1	501.1	215.1	17.9	4.5	3.0
1962	230.2	14.346	14.343	17.5	220.0	14.346	14.344	18.1	228.5	501.0	222.5	17.6	5.7	3.9
1963	237.2	14.347	14.344	18.8	226.9	14.347	14.344	18.6	235.4	500.9	229.4	19.6	5.9	2.4
1964	242.6	14.347	14.344	18.2	232.4	14.346	14.343	18.7	240.9	501.2	234.9	19.1	5.8	2.2
1965	252.0	14.347	14.344	17.8	241.7	14.347	14.344	18.4	250.2	501.3	244.2	16.9	5.1	–1.4
1966	258.3	14.347	14.345	16.8	248.1	14.347	14.344	18.0	256.6	501.6	250.6	17.0	3.0	–6.1
1967	265.1	14.347	14.345	18.2	254.9	14.348	14.345	19.2	263.4	501.6	257.4	17.7	7.4	–6.4
1968	271.0	14.348	14.345	18.1	260.7	14.348	14.345	18.4	269.2	501.6	263.2	16.5	4.7	–4.4
1969	278.1	14.347	14.345	16.2	267.8	14.348	14.346	16.3	276.3	501.5	270.3	14.6	0.6	–2.1
1970	283.4	14.348	14.346	16.4	273.1	14.348	14.346	16.8	281.6	501.5	275.6	14.4	8.4	–3.7
1971	288.6	14.349	14.346	17.8	278.3	14.349	14.347	18.5	286.8	501.4	280.8	16.2	4.8	–2.8
1972	249.1	14.349	14.346	17.9	238.8	14.349	14.346	18.2	247.3	501.5	241.3	16.2	6.4	4.0
1973	212.3	14.350	14.347	18.2	202.0	14.350	14.347	18.5	210.5	501.3	204.5	15.0	.9	2.0
1974	176.4	14.351	14.348	19.5	166.1	14.351	14.348	19.5	174.6	500.9	168.6	19.2	4.1	1.9
1975	141.6	14.351	14.347	21.1	131.3	14.351	14.347	20.6	139.8	500.6	133.8	17.3	3.3	4.1
1976	110.0	14.353	14.348	24.7	99.8	14.353	14.348	22.6	108.3	500.1	102.3	21.4	8.0	1.6
1977	67.4	14.358	14.349	32.8	57.1	14.354	14.346	30.9	65.6	499.9	59.6	32.9	7.2	4.1
1978	29.2	14.361	14.349	37.6	18.9	14.359	14.348	36.6	27.4	499.6	21.4	37.3	2.2	7.3

TABLE 9.—DATA LISTING FOR TRAVERSE 1 AT STATION 2—HORIZONTAL SURVEY

[Test section data for reading 2098: total pressure, 14.297; static pressure, 12.213 psia; total temperature, 499 °R; velocity, 350.6 mph; fan speed, 387.2 rpm.]

Reading	Probe one				Probe two				Thermocouple		Wind anemometer			
number	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
2098	31.7	14.315	14.313	15.0	21.2	14.315	14.308	29.0	31.5	505.3	26.5	26.8	–0.3	–17.4
2099	38.5	14.314	14.312	15.0	28.0	14.314	14.307	29.1	38.2	505.6	33.2	28.3	–4.0	–17.4
2100	44.5	14.314	14.312	15.0	34.0	14.312	14.306	27.9	44.3	505.4	39.3	27.1	–.4	–13.7
2101	50.9	14.314	14.313	12.3	40.4	14.313	14.307	27.9	50.6	505.3	45.6	27.1	–6.0	–15.6
2102	58.7	14.315	14.314	12.8	48.2	14.313	14.307	26.9	58.5	505.4	53.5	25.4	–5.0	–11.7
2103	66.9	14.316	14.314	12.2	56.4	14.314	14.308	27.8	66.6	505.1	61.6	26.0	–7.7	–15.2
2104	72.9	14.313	14.312	11.3	62.4	14.314	14.308	26.8	72.6	505.4	67.6	25.1	–.5	–14.0
2105	79.2	14.315	14.314	10.8	68.7	14.314	14.308	25.7	79.0	505.2	74.0	24.1	–4.2	–13.1
2106	86.3	14.314	14.313	9.7	75.8	14.314	14.308	26.1	86.1	505.1	81.1	25.6	–3.2	–13.4
2107	93.7	14.312	14.311	11.3	83.2	14.313	14.308	25.6	93.4	504.9	88.4	23.1	–.6	–12.6
2108	101.2	14.313	14.312	11.1	90.7	14.314	14.308	27.2	100.9	504.6	95.9	25.7	–5.0	–9.5
2109	108.2	14.312	14.311	8.6	97.7	14.314	14.307	28.8	108.0	504.6	103.0	26.1	–5.9	–2.0
2110	115.8	14.312	14.311	9.0	105.3	14.315	14.307	31.6	115.6	504.5	110.6	26.9	–6.8	–12.7
2111	121.5	14.312	14.311	9.8	111.0	14.314	14.308	28.9	121.3	504.6	116.3	26.9	–5.6	–7.0
2112	127.8	14.312	14.312	7.9	117.3	14.314	14.307	30.1	127.6	504.6	122.6	26.1	–.6	–4.9
2113	135.2	14.312	14.311	8.9	124.7	14.315	14.307	30.5	134.9	504.5	129.9	25.0	–7.4	–3.1
2114	143.7	14.312	14.311	10.7	133.2	14.317	14.309	32.4	143.5	504.2	138.5	27.9	–6.8	–.8
2115	150.4	14.313	14.312	12.2	139.9	14.317	14.308	34.0	150.2	504.4	145.2	30.1	–3.9	–5.3
2116	158.4	14.312	14.311	13.7	147.9	14.317	14.308	33.7	158.2	504.2	153.2	26.9	0.0	1.3
2117	165.3	14.312	14.311	13.9	154.8	14.318	14.308	34.1	165.0	504.0	160.0	30.2	–4.2	2.0
2118	174.2	14.313	14.311	15.5	163.7	14.317	14.307	34.1	173.9	503.8	168.9	29.8	–0.8	0.3
2119	181.2	14.313	14.310	16.3	170.7	14.317	14.307	34.2	180.9	503.7	175.9	30.4	–.3	1.1
2120	188.4	14.312	14.310	16.4	177.9	14.315	14.307	31.5	188.2	503.8	183.2	27.8	–.8	3.8
2121	196.7	14.313	14.310	19.2	186.2	14.315	14.306	32.4	196.5	503.6	191.5	28.2	1.2	–1.7
2122	202.8	14.313	14.310	18.9	192.3	14.314	14.307	30.6	202.5	503.8	197.5	26.2	–1.2	4.1

TABLE 9.—Concluded.

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
2123	209.7	14.314	14.310	20.1	199.2	14.315	14.306	31.6	209.4	503.5	204.4	26.9	–0.8	–1.6
2124	217.2	14.313	14.310	18.0	206.7	14.312	14.305	27.8	216.9	503.5	211.9	26.1	2.9	2.8
2125	224.2	14.312	14.309	19.8	213.7	14.312	14.305	28.5	223.9	503.4	218.9	24.6	.6	1.1
2126	230.5	14.313	14.311	16.7	220.0	14.312	14.306	26.3	230.3	503.4	225.3	23.4	3.4	4.3
2127	238.5	14.312	14.310	16.1	228.0	14.310	14.305	23.8	238.2	503.3	233.2	21.0	2.3	–2.9
2128	244.7	14.312	14.309	17.5	234.2	14.310	14.306	23.2	244.4	503.3	239.4	20.7	–0.6	0.0
2129	250.8	14.312	14.310	16.7	240.3	14.310	14.305	22.8	250.5	503.0	245.5	23.3	–.1	5.0
2130	257.6	14.312	14.310	16.9	247.1	14.309	14.305	21.6	257.4	503.1	252.4	23.3	5.3	–8.4
2131	264.9	14.311	14.310	14.8	254.4	14.309	14.305	22.0	264.7	503.1	259.7	19.4	.7	–.3
2132	271.9	14.312	14.310	13.8	261.4	14.308	14.305	18.9	271.6	502.8	266.6	22.5	1.5	–5.0
2133	277.4	14.311	14.310	11.6	266.9	14.307	14.305	16.7	277.1	503.0	272.1	23.0	–3.4	–2.6
2134	285.3	14.311	14.309	14.5	274.8	14.309	14.306	19.4	285.0	502.9	280.0	24.1	.4	2.1
2135	292.8	14.311	14.309	14.7	282.3	14.308	14.305	19.0	292.6	502.9	287.6	23.4	12.0	3.9
2136	297.4	14.311	14.310	13.8	286.9	14.308	14.305	17.3	297.1	502.9	292.1	25.1	6.4	–1.9
2137	304.7	14.311	14.310	11.5	294.2	14.307	14.304	16.8	304.5	503.0	299.5	22.2	–2.0	0.0
2138	312.0	14.311	14.310	11.3	301.5	14.308	14.306	15.3	311.8	503.0	306.8	33.5	–0.4	–2.7
2139	319.6	14.311	14.311	9.9	309.1	14.308	14.306	13.1	319.3	503.0	314.3	31.6	–2.2	–4.0
2140	321.6	14.312	14.311	11.2	311.1	14.309	14.306	16.8	321.3	503.0	316.3	25.4	–3.7	–1.9
2141	282.1	14.312	14.309	16.6	271.6	14.310	14.306	21.5	281.8	503.1	276.8	19.3	7.0	1.4
2142	240.3	14.312	14.310	16.1	229.8	14.310	14.306	22.8	240.1	503.1	235.1	20.8	3.0	.8
2143	200.5	14.312	14.309	17.7	190.0	14.314	14.305	31.4	200.3	503.2	195.3	25.6	–0.9	5.0
2144	160.7	14.312	14.310	13.1	150.2	14.315	14.305	34.1	160.5	503.6	155.5	27.9	.6	2.5
2145	118.7	14.311	14.310	7.3	108.2	14.312	14.305	29.1	118.5	504.0	113.5	22.0	.7	–7.5
2146	70.6	14.312	14.310	12.3	60.1	14.311	14.306	25.5	70.3	504.1	65.3	22.4	–7.8	–18.0
2147	31.8	14.314	14.312	16.8	21.3	14.314	14.307	29.2	31.5	504.6	26.5	26.4	–3.3	–13.4

TABLE 10.—DATA LISTING FOR TRAVERSE 2 AT STATION 2—HORIZONTAL SURVEY

[Test section data for reading 2098: total pressure, 14.297; static pressure, 12.213 psia; total temperature, 499 °R; velocity, 350.6 mph; fan speed, 387.2 rpm.]

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
2098	30.5	14.325	14.315	34.7	20.2	14.326	14.316	35.0	28.7	506.0	22.7	35.8	0.9	−10.8
2099	37.5	14.325	14.315	34.8	27.2	14.326	14.316	35.3	35.7	506.1	29.7	34.6	1.4	−13.8
2100	43.4	14.326	14.315	36.9	33.2	14.326	14.314	37.1	41.7	506.2	35.7	34.2	2.2	−15.3
2101	49.0	14.326	14.315	36.1	38.8	14.326	14.315	36.0	47.3	506.1	41.3	34.8	.8	−6.3
2102	56.5	14.326	14.315	36.2	46.3	14.327	14.316	37.8	54.8	506.2	48.8	34.0	2.1	−12.7
2103	63.8	14.328	14.317	37.4	53.5	14.329	14.317	38.5	62.0	506.3	56.0	34.6	6.2	−12.3
2104	69.5	14.329	14.317	38.0	59.2	14.330	14.317	39.4	67.7	506.2	61.7	36.7	5.4	−9.3
2105	75.4	14.331	14.317	40.4	65.1	14.332	14.317	42.8	73.6	506.3	67.6	38.5	8.5	−9.7
2106	82.2	14.331	14.317	41.0	71.9	14.331	14.315	43.5	80.4	506.1	74.4	41.4	3.7	−12.6
2107	88.6	14.331	14.316	43.2	78.3	14.332	14.315	45.7	86.8	505.9	80.8	43.7	5.6	−9.0
2108	95.6	14.331	14.315	43.5	85.3	14.332	14.315	46.6	93.8	505.7	87.8	42.8	4.6	−4.1
2109	102.4	14.333	14.315	46.8	92.1	14.334	14.314	49.8	100.6	505.7	94.6	47.2	7.5	−3.0
2110	108.9	14.334	14.315	48.7	98.6	14.337	14.315	51.5	107.1	505.6	101.1	46.3	.8	−6.6
2111	114.2	14.336	14.316	49.9	103.9	14.339	14.316	53.0	112.4	505.7	106.4	47.3	8.6	−3.7
2112	119.8	14.337	14.315	51.7	109.6	14.342	14.317	54.8	118.1	505.5	112.1	53.2	6.8	−2.4
2113	127.0	14.337	14.316	51.4	116.8	14.341	14.316	54.7	125.3	505.4	119.3	49.7	3.7	−1.5
2114	134.5	14.342	14.317	55.1	124.2	14.344	14.318	56.5	132.7	505.2	126.7	51.6	4.7	1.1
2115	141.0	14.343	14.317	56.3	130.7	14.345	14.318	57.6	139.2	505.0	133.2	55.9	5.9	.4
2116	148.2	14.344	14.317	56.9	137.9	14.345	14.317	58.0	146.4	504.7	140.4	56.2	5.0	−.8
2117	154.3	14.344	14.317	56.3	144.1	14.344	14.318	55.4	152.6	504.4	146.6	53.9	7.9	−.6
2118	163.0	14.343	14.316	56.3	152.7	14.342	14.317	54.4	161.2	504.3	155.2	55.0	2.6	2.2
2119	169.5	14.341	14.316	54.6	159.3	14.341	14.318	52.8	167.8	504.1	161.8	51.8	5.6	.9
2120	175.9	14.338	14.316	51.6	165.6	14.337	14.317	49.0	174.1	503.7	168.1	48.1	1.3	3.7
2121	183.2	14.339	14.316	52.1	172.9	14.336	14.316	49.4	181.4	503.6	175.4	44.1	2.5	3.4
2122	188.7	14.336	14.316	48.7	178.5	14.334	14.317	45.7	187.0	503.5	181.0	44.8	5.0	1.4

TABLE 10.—Concluded.

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
2123	195.1	14.334	14.315	47.9	184.9	14.333	14.316	45.5	193.4	503.5	187.4	43.6	3.1	–0.3
2124	202.4	14.333	14.316	45.0	192.1	14.332	14.317	42.8	200.6	503.3	194.6	40.1	6.6	2.3
2125	208.9	14.332	14.316	44.0	198.7	14.329	14.315	41.3	207.2	503.2	201.2	39.0	.9	1.5
2126	214.5	14.331	14.317	42.4	204.2	14.331	14.317	40.0	212.7	503.1	206.7	37.6	.8	1.4
2127	221.8	14.330	14.316	40.9	211.5	14.328	14.316	38.5	220.0	503.0	214.0	37.0	.9	4.8
2128	227.3	14.327	14.316	37.8	217.0	14.326	14.315	36.7	225.5	502.9	219.5	34.1	1.3	3.6
2129	232.5	14.327	14.315	38.4	222.2	14.326	14.315	35.6	230.7	502.9	224.7	33.0	1.7	4.6
2130	238.9	14.326	14.315	35.4	228.6	14.324	14.315	33.3	237.1	502.8	231.1	30.8	–1.1	.1
2131	245.4	14.325	14.315	34.0	235.2	14.323	14.315	31.7	243.7	502.8	237.7	32.7	1.5	–1.7
2132	252.0	14.322	14.314	30.4	241.8	14.321	14.314	28.3	250.3	502.7	244.3	27.0	7.1	4.6
2133	257.5	14.323	14.315	31.2	247.3	14.322	14.315	29.8	255.8	502.6	249.8	29.5	1.2	0.8
2134	265.0	14.321	14.315	27.5	254.7	14.319	14.314	24.3	263.2	502.7	257.2	23.7	–2.4	.1
2135	271.5	14.320	14.315	25.9	261.3	14.320	14.315	24.6	269.8	502.7	263.8	21.9	.9	4.2
2136	276.0	14.320	14.315	24.1	265.7	14.319	14.315	21.3	274.2	502.7	268.2	21.0	5.4	–1.2
2137	282.0	14.319	14.314	24.4	271.7	14.318	14.314	22.7	280.2	502.7	274.2	21.3	4.0	–1.8
2138	290.0	14.320	14.316	20.8	279.7	14.318	14.315	19.8	288.2	502.6	282.2	19.7	–5.3	–8.1
2139	295.8	14.320	14.316	20.9	285.5	14.319	14.316	20.5	294.0	502.6	288.0	22.2	–2.4	–.2
2140	323.4	14.320	14.317	19.9	313.2	14.320	14.316	21.4	321.7	502.6	315.7	20.9	–6.1	–.6
2141	262.2	14.323	14.316	28.5	251.9	14.321	14.315	25.9	260.4	502.9	254.4	21.9	–.2	–1.7
2142	223.8	14.330	14.316	40.7	213.6	14.329	14.317	38.8	222.1	503.1	216.1	36.3	.7	2.6
2143	186.6	14.337	14.316	50.4	176.4	14.334	14.316	47.5	184.9	503.1	178.9	43.9	1.2	2.7
2144	149.8	14.343	14.315	57.5	139.5	14.344	14.317	57.0	148.0	504.2	142.0	57.0	1.9	2.3
2145	111.3	14.334	14.315	47.8	101.0	14.336	14.315	51.0	109.5	505.1	103.5	48.3	4.7	–5.8
2146	67.4	14.328	14.316	38.3	57.1	14.329	14.316	39.4	65.6	505.3	59.6	34.1	3.3	–11.2
2147	30.0	14.327	14.317	34.5	19.8	14.328	14.317	35.3	28.3	505.5	22.3	36.3	1.2	–10.1

TABLE 11.—DATA LISTING FOR TRAVERSE 1 AT STATION 2—HORIZONTAL SURVEY

[Test section data for reading 2148: total pressure, 14.302; static pressure, 13.198 psia; total temperature, 499 °R; velocity, 251.6 mph; fan speed, 287.8 rpm.]

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
2148	32.6	14.314	14.313	13.4	22.1	14.301	14.296	23.1	32.3	502.6	27.3	22.3	−1.4	−13.3
2149	39.3	14.315	14.313	13.5	28.8	14.303	14.299	23.1	39.1	503.0	34.1	18.8	−3.9	−13.8
2150	46.8	14.314	14.313	11.7	36.3	14.303	14.299	21.8	46.6	503.1	41.6	17.8	−2.8	−13.0
2151	54.7	14.315	14.314	11.5	44.2	14.306	14.303	21.6	54.5	503.1	49.5	18.6	−5.0	−8.6
2152	61.6	14.315	14.314	10.1	51.1	14.309	14.305	19.3	61.4	502.7	56.4	16.2	−8.2	−14.0
2153	69.3	14.315	14.314	10.7	58.8	14.310	14.307	20.3	69.1	502.1	64.1	17.7	−1.5	−13.0
2154	76.8	14.316	14.315	10.1	66.3	14.314	14.310	21.3	76.6	501.6	71.6	18.6	−3.8	−10.1
2155	84.2	14.315	14.315	9.9	73.7	14.314	14.311	20.6	83.9	501.3	78.9	17.5	−5.8	−7.1
2156	92.6	14.315	14.314	9.9	82.1	14.314	14.311	20.7	92.3	501.1	87.3	18.5	−5.0	−7.4
2157	98.9	14.314	14.313	10.0	88.4	14.314	14.310	20.5	98.6	500.9	93.6	18.6	−7.4	−12.3
2158	105.6	14.313	14.312	9.4	95.1	14.314	14.310	21.9	105.3	500.8	100.3	20.6	−6.2	−9.7
2159	114.4	14.313	14.312	9.9	103.9	14.314	14.310	21.2	114.1	500.8	109.1	17.4	−2.7	−6.7
2160	121.2	14.312	14.311	8.6	110.7	14.314	14.310	22.7	121.0	500.7	116.0	19.6	−5.8	−4.1
2161	129.1	14.312	14.312	9.2	118.6	14.314	14.310	23.8	128.9	500.5	123.9	19.6	−4.7	−4.3
2162	135.9	14.312	14.311	11.0	125.4	14.314	14.309	25.5	135.6	500.7	130.6	21.1	−5.9	1.0
2163	143.3	14.312	14.310	12.4	132.8	14.313	14.307	25.0	143.0	500.8	138.0	20.7	−6.3	4.8
2164	151.7	14.312	14.311	11.9	141.2	14.312	14.307	24.8	151.4	500.8	146.4	19.7	−1.1	−3.1
2165	160.2	14.312	14.311	12.8	149.7	14.314	14.308	26.8	159.9	500.9	154.9	22.0	−2.6	1.1
2166	167.5	14.312	14.311	14.1	157.0	14.313	14.308	26.0	167.3	501.0	162.3	20.1	−1.4	.4
2167	175.0	14.312	14.310	13.3	164.5	14.312	14.306	26.2	174.7	500.9	169.7	21.1	−1.6	−.7
2168	181.8	14.312	14.311	12.9	171.3	14.312	14.307	24.5	181.5	501.0	176.5	20.2	−0.5	2.1
2169	189.4	14.312	14.310	12.8	178.9	14.312	14.307	23.4	189.1	500.8	184.1	19.8	−.4	.7
2170	198.1	14.312	14.311	14.3	187.6	14.312	14.307	23.6	197.9	500.8	192.9	19.2	−1.5	−1.2
2171	205.4	14.313	14.311	13.6	194.9	14.312	14.309	20.5	205.1	500.9	200.1	16.9	−.1	1.3
2172	213.7	14.313	14.311	14.7	203.2	14.313	14.309	21.6	213.5	500.7	208.5	18.7	1.1	−.3

TABLE 11.—Concluded.

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
2173	220.7	14.312	14.311	14.4	210.2	14.312	14.308	20.7	220.5	500.8	215.5	17.0	0.7	–0.6
2174	226.9	14.313	14.311	13.6	216.4	14.312	14.308	19.7	226.7	500.7	221.7	16.3	–1.1	–5.1
2175	233.7	14.313	14.311	13.7	223.2	14.312	14.309	18.7	233.4	500.6	228.4	16.3	3.3	–2.8
2176	240.6	14.312	14.311	12.9	230.1	14.312	14.309	18.4	240.4	500.7	235.4	15.7	–.8	–.4
2177	248.3	14.312	14.311	13.0	237.8	14.312	14.309	18.5	248.1	500.8	243.1	14.7	3.9	–2.9
2178	255.9	14.312	14.310	13.7	245.4	14.310	14.307	17.4	255.6	500.8	250.6	13.5	2.8	–5.8
2179	262.2	14.312	14.311	12.3	251.7	14.311	14.309	17.1	262.0	500.9	257.0	15.6	2.9	–6.1
2180	268.9	14.312	14.310	11.6	258.4	14.310	14.307	15.9	268.7	500.9	263.7	13.9	2.5	–.5
2181	275.8	14.311	14.310	11.3	265.3	14.310	14.308	15.1	275.5	501.0	270.5	14.4	–.8	–4.7
2182	282.3	14.312	14.310	11.3	271.8	14.310	14.308	15.7	282.1	501.1	277.1	14.4	.4	–3.9
2183	289.2	14.312	14.310	11.5	278.7	14.310	14.307	16.9	288.9	501.2	283.9	14.5	1.0	–5.6
2184	296.8	14.312	14.310	11.8	286.3	14.309	14.307	16.2	296.6	501.3	291.6	14.3	.5	–.5
2185	304.2	14.311	14.310	11.2	293.7	14.310	14.308	16.5	304.0	501.1	299.0	13.5	–3.9	.3
2186	311.4	14.311	14.310	10.1	300.9	14.310	14.308	14.1	311.1	501.2	306.1	14.8	–4.9	–6.2
2187	321.9	14.312	14.311	10.7	311.4	14.309	14.307	15.2	321.7	501.3	316.7	13.7	–2.3	.7
2188	282.5	14.312	14.311	10.9	272.0	14.311	14.309	15.5	282.2	501.1	277.2	12.8	–0.3	–7.3
2189	243.2	14.313	14.312	13.1	232.8	14.313	14.310	19.0	243.0	500.9	238.0	14.8	1.8	–1.8
2190	201.0	14.313	14.311	14.5	190.5	14.314	14.310	22.7	200.7	501.0	195.7	17.8	–1.0	–1.8
2191	161.8	14.312	14.311	12.1	151.3	14.315	14.310	25.1	161.5	501.3	156.5	21.6	–3.7	–.2
2192	121.3	14.312	14.312	9.9	110.8	14.313	14.309	21.7	121.1	501.9	116.1	18.3	–4.1	–6.4
2193	74.8	14.313	14.312	10.3	64.3	14.314	14.310	21.3	74.5	502.2	69.5	19.1	–5.0	–12.6
2194	31.8	14.314	14.312	13.3	21.3	14.316	14.311	22.9	31.5	502.2	26.5	19.7	–2.8	–12.2

TABLE 12.—DATA LISTING FOR TRAVERSE 2 AT STATION 2—HORIZONTAL SURVEY
[Test section data for reading 2148: total pressure, 14.302; static pressure, 13.198 psia; total temperature, 499 °R; velocity, 251.6 mph; fan speed, 287.8 rpm.]

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
2148	30.5	14.332	14.326	27.2	20.3	14.334	14.327	29.0	28.8	502.4	22.8	28.8	3.8	-8.0
2149	39.1	14.332	14.326	28.7	28.9	14.333	14.326	29.6	37.4	502.9	31.4	30.4	.5	-12.1
2150	46.5	14.332	14.325	29.1	36.3	14.334	14.326	30.1	44.8	503.1	38.8	33.0	.8	-6.0
2151	54.5	14.332	14.325	29.6	44.2	14.333	14.325	31.3	52.7	502.9	46.7	32.1	3.1	-4.5
2152	61.2	14.332	14.324	30.7	50.9	14.333	14.324	32.3	59.4	502.6	53.4	34.4	5.4	-6.6
2153	69.6	14.331	14.323	30.7	59.3	14.331	14.323	31.9	67.8	501.9	61.8	32.9	7.8	-10.4
2154	76.5	14.331	14.323	32.4	66.3	14.333	14.323	34.3	74.8	501.4	68.8	34.4	4.0	-3.4
2155	84.2	14.331	14.322	33.4	73.9	14.333	14.323	35.1	82.4	501.1	76.4	35.7	5.0	-6.1
2156	92.0	14.332	14.322	34.7	81.8	14.333	14.321	36.9	90.3	500.9	84.3	37.9	5.9	-3.7
2157	98.3	14.332	14.321	36.5	88.1	14.334	14.321	38.6	96.6	500.6	90.6	39.4	3.7	-2.8
2158	105.4	14.333	14.322	36.9	95.2	14.334	14.322	38.9	103.7	500.6	97.7	39.9	6.6	-3.3
2159	114.5	14.332	14.320	38.3	104.2	14.335	14.321	40.2	112.7	500.4	106.7	41.2	6.0	-1.6
2160	121.6	14.333	14.320	39.5	111.4	14.335	14.321	40.8	119.9	500.2	113.9	40.3	3.0	-2.6
2161	129.3	14.334	14.320	41.0	119.1	14.336	14.321	41.5	127.6	500.0	121.6	42.5	1.3	-1.0
2162	135.6	14.334	14.320	41.0	125.4	14.335	14.321	41.3	133.9	500.3	127.9	42.1	3.0	-.6
2163	143.7	14.334	14.320	41.9	133.4	14.334	14.319	41.5	141.9	500.2	135.9	42.6	4.4	1.7
2164	151.7	14.334	14.320	41.0	141.4	14.333	14.320	40.3	149.9	500.1	143.9	40.6	4.4	.1
2165	160.0	14.332	14.320	38.4	149.7	14.333	14.321	37.3	158.2	500.1	152.2	40.1	4.9	-1.2
2166	167.5	14.332	14.320	37.9	157.2	14.331	14.320	35.9	165.7	500.1	159.7	36.2	4.2	1.4
2167	174.8	14.331	14.320	36.9	164.6	14.329	14.319	34.6	173.1	500.0	167.1	36.6	-.4	3.7
2168	181.5	14.331	14.320	35.6	171.3	14.329	14.320	33.6	179.8	500.1	173.8	34.4	2.0	0.0
2169	189.3	14.328	14.319	32.4	179.0	14.327	14.319	30.3	187.5	500.0	181.5	31.8	-1.4	2.2
2170	198.5	14.328	14.320	31.1	188.3	14.326	14.319	29.1	196.8	499.8	190.8	31.6	3.7	-.6
2171	205.6	14.326	14.320	27.6	195.4	14.325	14.320	26.1	203.9	499.9	197.9	27.3	-2.9	5.0
2172	213.5	14.326	14.320	27.4	203.3	14.325	14.319	26.3	211.8	499.7	205.8	28.3	1.5	1.9

TABLE 12.—Concluded.

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
2173	220.4	14.325	14.319	25.0	210.2	14.324	14.319	24.3	218.7	499.8	212.7	25.1	2.4	0.2
2174	226.4	14.325	14.319	25.8	216.2	14.324	14.319	25.6	224.7	499.7	218.7	26.1	–.8	1.5
2175	233.4	14.324	14.319	25.1	223.1	14.324	14.319	24.0	231.6	499.8	225.6	24.5	.7	1.4
2176	240.6	14.324	14.320	22.9	230.3	14.324	14.320	22.6	238.8	499.9	232.8	24.3	3.6	1.7
2177	248.4	14.323	14.319	22.2	238.1	14.324	14.320	21.5	246.6	500.0	240.6	22.3	–1.7	–.1
2178	254.9	14.323	14.319	21.4	244.7	14.323	14.319	21.4	253.2	500.1	247.2	21.4	–3.8	–1.5
2179	262.0	14.323	14.319	22.5	251.7	14.323	14.319	22.0	260.2	500.1	254.2	22.6	1.5	–1.0
2180	268.5	14.322	14.318	19.8	258.2	14.322	14.319	20.0	266.7	500.4	260.7	19.4	–1.2	1.6
2181	275.0	14.323	14.319	20.2	264.7	14.321	14.318	19.4	273.2	500.5	267.2	19.8	.1	–1.6
2182	282.0	14.322	14.318	19.2	271.7	14.320	14.317	19.1	280.2	500.5	274.2	19.6	2.9	–.4
2183	288.9	14.322	14.318	19.9	278.6	14.322	14.318	19.6	287.1	500.4	281.1	18.8	–1.3	0.4
2184	296.5	14.321	14.319	16.3	286.3	14.320	14.318	17.1	294.8	500.6	288.8	17.2	1.0	–3.4
2185	304.4	14.321	14.318	18.8	294.2	14.322	14.318	19.8	302.7	500.7	296.7	19.0	.1	2.4
2186	311.9	14.321	14.318	18.6	301.6	14.321	14.318	20.1	310.1	500.7	304.1	19.2	2.8	1.3
2187	323.5	14.322	14.319	19.6	313.3	14.322	14.318	20.9	321.8	500.6	315.8	21.5	–2.7	3.0
2188	282.5	14.322	14.319	18.6	272.3	14.322	14.319	19.4	280.8	500.6	274.8	19.2	1.8	2.6
2189	243.6	14.324	14.319	22.9	233.3	14.324	14.320	21.6	241.8	500.2	235.8	21.0	1.1	3.5
2190	200.5	14.327	14.320	30.5	190.2	14.327	14.320	29.0	198.7	500.2	192.7	28.4	2.0	0.0
2191	161.3	14.332	14.319	39.8	151.0	14.333	14.321	38.2	159.5	500.6	153.5	36.7	5.0	2.1
2192	121.0	14.334	14.320	40.9	110.7	14.335	14.320	42.2	119.2	501.6	113.2	40.5	3.7	–1.0
2193	74.6	14.330	14.321	32.5	64.3	14.331	14.321	34.4	72.8	502.2	66.8	35.1	3.0	–8.2
2194	30.0	14.326	14.320	26.7	19.7	14.326	14.319	28.2	28.2	502.3	22.2	28.6	2.5	–9.1

TABLE 13.—DATA LISTING FOR TRAVERSE 1 AT STATION 3—VERTICAL SURVEY

[Test section data for reading 1629: total pressure, 14.254; static pressure, 12.179 psia; total temperature, 498 °R; velocity, 349.8 mph; fan speed, 384.7 rpm.]

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
1626	32.2	14.331	14.321	35.1	21.7	14.333	14.320	38.8	32.0	500.6	27.0	39.6	28.6	2.8
1627	38.6	14.331	14.319	38.4	28.1	14.334	14.320	41.2	38.3	504.1	33.3	42.9	27.0	2.5
1628	44.7	14.331	14.318	39.7	34.2	14.333	14.319	41.5	44.4	503.3	39.4	43.0	22.7	2.7
1629	50.4	14.331	14.318	39.3	39.9	14.332	14.318	41.0	50.1	501.5	45.1	42.6	24.6	3.0
1630	56.1	14.331	14.317	41.4	45.6	14.333	14.318	41.8	55.8	501.6	50.8	47.0	21.2	2.9
1631	62.6	14.332	14.318	41.6	52.1	14.334	14.320	42.1	62.3	502.2	57.3	45.7	22.3	2.4
1632	68.5	14.333	14.319	41.4	58.0	14.333	14.319	41.1	68.2	502.7	63.2	46.3	24.4	3.1
1633	74.1	14.334	14.319	42.5	63.6	14.334	14.319	42.3	73.9	502.6	68.9	46.0	23.3	2.6
1634	80.5	14.334	14.320	40.8	70.0	14.334	14.321	39.9	80.2	502.6	75.2	45.9	24.1	3.0
1635	86.8	14.333	14.320	39.9	76.3	14.334	14.322	38.1	86.5	502.5	81.5	43.0	22.3	3.2
1636	92.5	14.333	14.321	39.4	82.0	14.333	14.322	36.0	92.3	502.6	87.3	42.7	23.3	3.2
1637	98.8	14.334	14.321	38.7	88.3	14.333	14.322	36.5	98.6	502.7	93.6	40.5	22.0	2.3
1638	104.4	14.332	14.322	35.4	93.9	14.333	14.323	34.8	104.1	502.8	99.1	39.2	22.8	2.5
1639	110.3	14.331	14.322	34.5	99.8	14.332	14.322	34.2	110.1	502.8	105.1	39.8	21.7	3.1
1640	116.6	14.331	14.322	33.7	106.1	14.332	14.322	33.5	116.3	502.8	111.3	37.0	21.5	2.2
1641	122.6	14.331	14.322	32.5	112.1	14.331	14.322	32.0	122.3	502.6	117.3	36.6	20.9	3.6
1642	128.4	14.331	14.321	34.1	117.9	14.332	14.323	33.6	128.1	502.6	123.1	37.8	17.8	3.0
1643	134.3	14.330	14.321	33.4	123.8	14.331	14.322	33.0	134.0	502.6	129.0	36.0	17.3	3.4
1644	140.8	14.329	14.321	32.2	130.3	14.329	14.321	31.7	140.6	502.6	135.6	37.5	17.9	4.0
1645	146.6	14.329	14.321	31.8	136.1	14.329	14.321	31.4	146.4	502.5	141.4	35.9	22.5	5.1
1646	152.2	14.328	14.320	30.0	141.7	14.328	14.320	29.8	151.9	502.7	146.9	34.9	19.7	4.2
1647	158.4	14.328	14.320	31.3	147.9	14.327	14.319	31.2	158.2	503.0	153.2	37.2	19.7	4.5
1648	164.7	14.327	14.320	30.3	154.2	14.327	14.320	30.1	164.4	503.2	159.4	34.9	23.1	4.3
1649	170.3	14.326	14.319	29.8	159.8	14.326	14.319	29.2	170.0	503.1	165.0	34.5	16.7	4.8
1650	176.5	14.324	14.317	29.4	166.0	14.325	14.318	28.2	176.3	503.1	171.3	33.7	18.4	4.5

TABLE 13.—Concluded.

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
1651	182.6	14.324	14.318	28.1	172.1	14.324	14.318	27.3	182.3	503.0	177.3	30.9	17.4	4.4
1652	188.6	14.325	14.318	28.9	178.1	14.324	14.317	28.9	188.4	503.0	183.4	35.2	15.1	3.9
1653	194.3	14.325	14.319	26.8	183.8	14.324	14.318	27.2	194.0	502.8	189.0	31.2	14.2	4.6
1654	200.2	14.324	14.318	27.1	189.7	14.324	14.318	27.7	199.9	502.8	194.9	32.0	11.1	3.8
1655	206.4	14.325	14.318	27.3	195.9	14.325	14.318	28.0	206.1	502.8	201.1	33.2	13.3	2.5
1656	212.2	14.324	14.318	26.5	201.7	14.324	14.318	26.8	211.9	502.8	206.9	30.2	14.5	2.1
1657	218.3	14.323	14.317	26.4	207.8	14.324	14.318	26.8	218.0	503.1	213.0	30.4	9.3	1.7
1658	224.6	14.324	14.318	26.9	214.1	14.325	14.319	27.0	224.3	503.2	219.3	32.2	10.8	1.8
1659	230.1	14.323	14.318	26.5	219.6	14.323	14.318	26.7	229.9	503.1	224.9	30.7	13.3	1.2
1660	236.7	14.324	14.318	25.6	226.2	14.324	14.318	25.8	236.4	503.0	231.4	29.4	11.0	.2
1661	242.5	14.323	14.317	26.5	232.0	14.323	14.318	25.7	242.3	503.0	237.3	29.0	15.1	0.6
1662	248.2	14.321	14.316	25.8	237.7	14.323	14.317	25.3	248.0	503.0	243.0	28.7	12.8	0.0
1663	254.2	14.321	14.316	25.3	243.7	14.322	14.317	24.2	254.0	503.2	249.0	27.4	17.9	–.5
1664	260.4	14.319	14.314	23.3	249.9	14.322	14.317	23.5	260.2	503.2	255.2	25.2	12.8	–.8
1665	266.3	14.320	14.315	24.2	255.8	14.321	14.316	24.3	266.0	503.3	261.0	27.2	9.9	–1.5
1666	272.2	14.319	14.315	23.0	261.7	14.321	14.317	23.1	271.9	503.2	266.9	24.6	11.5	–1.6
1667	278.7	14.320	14.316	22.2	268.2	14.322	14.318	21.7	278.4	503.2	273.4	25.1	15.3	–2.3
1668	284.8	14.321	14.317	22.2	274.3	14.322	14.318	22.0	284.6	503.0	279.6	24.5	14.5	–2.0
1669	290.3	14.321	14.317	22.6	279.8	14.322	14.318	21.8	290.1	503.1	285.1	24.5	11.0	–2.6
1670	292.2	14.321	14.317	20.8	281.7	14.322	14.319	19.9	292.0	503.2	287.0	22.7	15.4	–2.7
1671	254.4	14.324	14.318	25.3	243.9	14.324	14.319	24.6	254.1	503.2	249.1	27.9	14.0	–0.4
1672	218.9	14.324	14.318	27.3	208.4	14.324	14.318	27.9	218.6	502.9	213.6	32.8	10.7	2.3
1673	182.6	14.325	14.318	27.9	172.1	14.325	14.318	27.6	182.4	502.8	177.4	31.8	14.0	4.5
1674	146.8	14.329	14.319	33.4	136.3	14.328	14.319	32.9	146.5	502.5	141.5	37.0	19.9	4.5
1675	110.6	14.330	14.320	35.3	100.1	14.331	14.320	35.8	110.4	502.6	105.4	40.7	19.7	2.5
1676	74.4	14.335	14.320	42.1	63.9	14.335	14.321	41.9	74.2	502.6	69.2	47.6	25.5	2.7
1677	38.8	14.334	14.322	38.2	28.3	14.336	14.322	40.9	38.5	502.9	33.5	45.1	25.2	2.6
1678	32.3	14.333	14.322	36.1	21.8	14.336	14.323	39.3	32.0	502.9	27.0	40.5	30.0	2.4

TABLE 14.—DATA LISTING FOR TRAVERSE 2 AT STATION 3—VERTICAL SURVEY
[Test section data for reading 1629: total pressure, 14.254; static pressure, 12.179 psia; total temperature, 498 °R; velocity, 349.8 mph; fan speed, 384.7 rpm.]

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
1626	32.5	14.350	14.326	53.0	22.3	14.345	14.327	45.3	30.8	502.5	24.8	53.3	−26.4	−4.5
1627	38.1	14.345	14.322	52.8	27.8	14.342	14.321	50.9	36.3	505.9	30.3	53.1	−27.8	−4.8
1628	44.4	14.341	14.317	52.9	34.1	14.342	14.319	52.1	42.6	505.3	36.6	56.1	−25.8	−4.8
1629	50.5	14.347	14.323	54.4	40.2	14.342	14.320	52.7	48.7	503.1	42.7	56.7	−25.6	−4.8
1630	56.1	14.348	14.325	53.1	45.9	14.343	14.320	52.2	54.4	503.1	48.4	54.6	−27.4	−4.7
1631	62.5	14.345	14.323	51.9	52.2	14.343	14.319	53.1	60.7	503.9	54.7	55.4	−26.1	−4.9
1632	68.4	14.346	14.323	52.9	58.2	14.343	14.319	53.4	66.7	504.3	60.7	54.0	−26.1	−4.4
1633	73.9	14.343	14.322	50.5	63.7	14.342	14.321	51.4	72.2	504.1	66.2	52.8	−23.9	−4.6
1634	80.6	14.343	14.323	48.8	70.3	14.343	14.322	51.3	78.8	503.9	72.8	53.1	−24.8	−4.6
1635	86.1	14.343	14.324	48.1	75.8	14.342	14.323	48.7	84.3	503.8	78.3	52.5	−22.4	−4.4
1636	92.2	14.344	14.325	48.5	81.9	14.342	14.325	44.9	90.4	504.0	84.4	50.0	−27.4	−4.4
1637	98.5	14.344	14.325	47.4	88.2	14.341	14.324	45.3	96.7	503.9	90.7	50.3	−23.1	−4.7
1638	104.5	14.342	14.325	45.5	94.2	14.342	14.325	45.3	102.7	503.8	96.7	47.8	−19.5	−4.8
1639	110.5	14.342	14.325	44.9	100.2	14.341	14.325	45.1	108.7	504.0	102.7	47.5	−20.8	−4.2
1640	116.6	14.341	14.325	44.0	106.4	14.340	14.325	43.7	114.9	503.8	108.9	46.9	−21.3	−4.5
1641	122.1	14.341	14.326	43.0	111.9	14.341	14.326	42.6	120.4	503.8	114.4	45.1	−19.5	−4.4
1642	128.1	14.340	14.325	42.4	117.8	14.340	14.326	41.0	126.3	503.9	120.3	44.8	−23.3	−4.2
1643	134.1	14.341	14.326	42.2	123.9	14.340	14.326	42.0	132.4	503.9	126.4	42.6	−23.8	−4.1
1644	140.4	14.338	14.324	40.4	130.2	14.340	14.325	41.7	138.7	503.6	132.7	40.3	−24.7	−5.1
1645	146.0	14.338	14.325	39.7	135.8	14.339	14.325	41.1	144.3	503.6	138.3	41.1	−27.6	−5.5
1646	152.1	14.339	14.324	41.5	141.8	14.340	14.325	43.0	150.3	503.6	144.3	43.3	−27.4	−5.3
1647	158.4	14.336	14.323	39.4	148.2	14.337	14.323	41.4	156.7	503.8	150.7	43.1	−25.5	−5.2
1648	164.0	14.332	14.322	34.4	153.8	14.338	14.325	39.8	162.3	504.0	156.3	39.0	−20.3	−5.6
1649	170.1	14.333	14.322	36.0	159.8	14.337	14.323	41.3	168.3	504.1	162.3	35.9	−16.2	−5.0
1650	176.6	14.332	14.321	36.4	166.4	14.335	14.324	36.1	174.9	504.1	168.9	35.5	−17.8	−4.9

TABLE 14.—Concluded.

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
1651	182.5	14.334	14.322	37.5	172.3	14.336	14.324	37.7	180.8	503.8	174.8	38.2	−16.6	−5.6
1652	188.4	14.333	14.322	37.4	178.2	14.335	14.323	37.6	186.7	503.9	180.7	38.2	−15.6	−4.9
1653	194.3	14.333	14.322	36.4	184.0	14.336	14.324	38.3	192.5	503.7	186.5	37.4	−14.7	−5.1
1654	199.9	14.333	14.322	35.8	189.6	14.336	14.324	37.7	198.1	503.6	192.1	36.0	−14.7	−4.8
1655	206.2	14.333	14.323	35.6	196.0	14.336	14.324	38.4	204.5	503.6	198.5	37.1	−13.1	−5.0
1656	211.8	14.332	14.322	34.9	201.6	14.336	14.323	38.5	210.1	503.8	204.1	36.8	−15.9	−5.2
1657	218.5	14.330	14.321	32.4	208.2	14.334	14.324	34.5	216.7	503.7	210.7	34.7	−18.7	−4.7
1658	224.4	14.331	14.321	33.0	214.1	14.335	14.324	35.8	222.6	503.8	216.6	35.3	−18.8	−4.6
1659	230.0	14.331	14.321	33.2	219.8	14.334	14.323	35.2	228.3	503.9	222.3	34.0	−18.3	−4.1
1660	236.4	14.329	14.321	31.2	226.1	14.333	14.324	32.1	234.6	503.7	228.6	32.8	−22.7	−3.4
1661	242.1	14.329	14.322	29.4	231.8	14.332	14.325	30.6	240.3	503.6	234.3	32.4	−20.4	−3.5
1662	248.5	14.328	14.321	28.8	238.2	14.330	14.324	25.6	246.7	503.5	240.7	28.9	−15.2	−2.2
1663	254.3	14.327	14.320	29.9	244.0	14.329	14.324	23.8	252.5	503.7	246.5	29.9	−17.3	−2.0
1664	260.5	14.326	14.319	28.8	250.2	14.328	14.324	20.6	258.7	503.7	252.7	28.8	−17.0	−1.0
1665	266.2	14.326	14.320	27.7	255.9	14.328	14.324	21.1	264.4	503.8	258.4	29.9	−18.2	−1.1
1666	272.3	14.325	14.320	26.6	262.1	14.328	14.324	20.8	270.6	503.8	264.6	27.5	−18.3	−1.4
1667	278.2	14.326	14.321	25.0	267.9	14.328	14.325	20.6	276.4	503.6	270.4	24.9	−21.5	−1.2
1668	284.1	14.326	14.321	24.3	273.8	14.330	14.327	19.5	282.3	503.6	276.3	25.6	−18.9	−1.2
1669	290.5	14.327	14.322	23.8	280.3	14.331	14.327	20.8	288.8	503.5	282.8	23.6	−19.4	−1.3
1670	292.5	14.328	14.323	23.0	282.2	14.330	14.327	19.0	290.7	503.6	284.7	24.5	−23.1	−1.0
1671	254.3	14.329	14.321	30.0	244.0	14.332	14.327	23.8	252.5	503.8	246.5	31.4	−18.5	−1.7
1672	218.3	14.330	14.321	34.1	208.1	14.335	14.323	37.5	216.6	503.7	210.6	36.0	−20.0	−4.3
1673	182.4	14.333	14.322	36.3	172.2	14.335	14.324	35.8	180.7	503.7	174.7	37.0	−14.7	−5.4
1674	146.5	14.338	14.324	41.6	136.2	14.339	14.323	43.1	144.7	503.7	138.7	45.0	−26.5	−5.1
1675	110.1	14.342	14.325	45.4	99.9	14.340	14.323	45.4	108.4	503.7	102.4	47.6	−19.9	−4.2
1676	74.1	14.349	14.326	52.5	63.9	14.344	14.321	52.7	72.4	504.2	66.4	56.6	−26.0	−4.8
1677	37.9	14.350	14.328	52.3	27.6	14.345	14.326	48.2	36.1	504.7	30.1	53.3	−27.1	−4.6
1678	32.7	14.351	14.328	52.3	22.5	14.344	14.327	46.0	31.0	504.9	25.0	52.6	−30.4	−4.4

TABLE 15.—DATA LISTING FOR TRAVERSE 1 AT STATION 3—VERTICAL SURVEY

[Test section data for reading 1679: total pressure, 14.269; static pressure, 13.172 psia; total temperature, 499 °R; velocity, 251.0 mph; fan speed, 287.1 rpm.]

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
1679	32.2	14.324	14.318	26.7	21.7	14.325	14.318	29.6	32.0	499.5	27.0	31.9	22.6	2.4
1680	38.2	14.327	14.320	29.3	27.7	14.326	14.319	30.6	37.9	499.3	32.9	32.8	23.9	2.2
1681	44.3	14.328	14.319	31.2	33.8	14.327	14.319	31.8	44.1	499.3	39.1	35.4	21.0	2.8
1682	50.5	14.327	14.319	30.5	40.0	14.326	14.318	30.9	50.3	499.4	45.3	34.5	21.2	2.6
1683	56.9	14.326	14.318	30.5	46.4	14.325	14.318	30.5	56.6	499.4	51.6	33.0	20.6	2.7
1684	62.7	14.325	14.318	29.9	52.2	14.325	14.318	30.1	62.5	499.9	57.5	33.4	20.9	2.3
1685	68.9	14.325	14.318	30.2	58.4	14.325	14.318	30.3	68.6	499.9	63.6	33.0	20.9	2.8
1686	74.5	14.326	14.318	30.8	64.0	14.326	14.318	30.5	74.3	500.2	69.3	33.6	19.2	3.0
1687	80.9	14.325	14.317	29.8	70.4	14.325	14.317	29.4	80.6	500.6	75.6	32.8	19.7	2.9
1688	86.7	14.324	14.316	29.3	76.2	14.323	14.317	28.1	86.4	501.3	81.4	32.6	25.1	2.8
1689	92.6	14.324	14.316	29.4	82.1	14.321	14.315	26.5	92.4	501.5	87.4	31.2	23.6	2.9
1690	98.6	14.322	14.315	27.4	88.1	14.321	14.315	26.1	98.4	501.7	93.4	29.2	21.8	2.7
1691	104.4	14.320	14.315	25.4	93.9	14.319	14.314	25.5	104.1	501.8	99.1	27.7	23.0	2.6
1692	110.8	14.320	14.314	26.3	100.3	14.319	14.313	26.6	110.5	501.8	105.5	28.5	25.3	2.4
1693	116.2	14.319	14.314	25.0	105.7	14.319	14.313	24.8	116.0	501.2	111.0	26.9	24.4	3.0
1694	122.7	14.318	14.313	25.1	112.2	14.319	14.313	25.1	122.5	500.3	117.5	26.7	17.2	3.5
1695	128.5	14.317	14.313	22.5	118.0	14.318	14.314	22.5	128.3	499.5	123.3	25.3	19.7	3.5
1696	134.3	14.318	14.313	24.4	123.8	14.318	14.313	24.1	134.0	499.4	129.0	26.1	20.5	3.5
1697	140.8	14.316	14.312	22.4	130.3	14.316	14.312	22.5	140.5	500.1	135.5	24.5	17.3	4.3
1698	146.6	14.316	14.312	22.8	136.1	14.317	14.312	23.3	146.4	500.0	141.4	25.1	19.9	4.7
1699	152.5	14.317	14.313	22.1	142.0	14.317	14.313	22.3	152.2	499.4	147.2	23.4	23.9	4.3
1700	158.5	14.318	14.313	22.3	148.0	14.318	14.313	22.4	158.3	499.1	153.3	24.4	22.2	5.5
1701	164.4	14.319	14.314	22.8	153.9	14.318	14.314	22.9	164.2	499.0	159.2	25.0	21.3	4.7
1702	170.5	14.318	14.314	21.6	160.0	14.319	14.315	21.4	170.2	499.3	165.2	23.6	19.9	5.0
1703	176.9	14.318	14.315	21.4	166.4	14.319	14.315	21.3	176.6	499.8	171.6	23.2	18.2	4.8

TABLE 15.—Concluded.

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
1704	182.4	14.318	14.314	20.3	171.9	14.319	14.315	20.4	182.2	500.2	177.2	21.8	16.2	4.5
1705	188.7	14.318	14.314	20.7	178.2	14.318	14.314	21.5	188.4	500.6	183.4	23.4	16.0	4.1
1706	194.3	14.317	14.314	20.2	183.8	14.319	14.315	20.9	194.0	500.8	189.0	21.4	13.3	4.2
1707	200.5	14.319	14.315	20.1	190.0	14.319	14.316	21.1	200.3	501.1	195.3	22.1	11.8	3.3
1708	206.2	14.320	14.316	21.0	195.7	14.319	14.316	21.8	205.9	501.3	200.9	23.2	12.0	3.1
1709	212.3	14.320	14.316	21.0	201.8	14.319	14.315	21.9	212.0	501.4	207.0	22.8	10.8	2.5
1710	218.5	14.319	14.316	20.5	208.0	14.320	14.316	21.2	218.2	501.5	213.2	22.9	12.2	2.9
1711	224.4	14.320	14.316	20.5	213.9	14.319	14.316	21.1	224.2	501.4	219.2	22.8	14.9	1.6
1712	230.3	14.319	14.315	19.6	219.8	14.319	14.316	19.9	230.0	501.0	225.0	20.6	13.3	1.4
1713	236.7	14.319	14.315	20.7	226.2	14.319	14.315	21.2	236.4	500.4	231.4	21.8	14.5	.8
1714	242.7	14.319	14.315	20.5	232.2	14.319	14.315	20.4	242.4	500.3	237.4	21.8	16.8	0.4
1715	248.6	14.318	14.315	19.6	238.1	14.318	14.315	19.6	248.4	500.4	243.4	20.2	16.8	0.0
1716	254.2	14.317	14.314	19.6	243.7	14.318	14.315	19.8	253.9	501.2	248.9	20.0	14.9	–.3
1717	260.3	14.318	14.315	18.8	249.8	14.318	14.315	19.5	260.1	501.8	255.1	19.6	11.6	–.5
1718	266.6	14.318	14.315	19.1	256.1	14.318	14.314	19.7	266.4	502.2	261.4	20.7	16.2	–2.1
1719	272.2	14.318	14.315	18.4	261.7	14.318	14.315	18.4	271.9	502.1	266.9	18.4	13.0	–1.7
1720	278.2	14.319	14.316	18.4	267.7	14.319	14.316	18.6	277.9	502.3	272.9	18.8	13.7	–2.2
1721	284.3	14.319	14.316	17.9	273.8	14.319	14.316	17.8	284.0	502.4	279.0	17.6	14.1	–2.6
1722	290.1	14.319	14.316	17.5	279.6	14.319	14.316	17.4	289.9	502.6	284.9	14.6	13.8	–2.3
1723	292.3	14.320	14.317	17.3	281.8	14.319	14.317	16.9	292.1	502.4	287.1	13.2	19.7	–2.7
1724	254.8	14.321	14.318	18.7	244.3	14.319	14.316	19.2	254.6	502.0	249.6	17.1	16.3	–0.8
1725	218.6	14.322	14.318	20.6	208.1	14.320	14.316	21.4	218.4	501.5	213.4	22.0	10.6	2.6
1726	182.6	14.321	14.318	20.6	172.1	14.319	14.316	20.8	182.4	501.0	177.4	20.8	16.4	4.9
1727	146.4	14.324	14.320	22.1	135.9	14.322	14.318	22.3	146.1	500.5	141.1	23.8	22.4	4.3
1728	110.7	14.326	14.321	25.2	100.2	14.325	14.320	25.1	110.5	499.9	105.5	27.1	23.5	2.5
1729	74.5	14.331	14.323	30.4	64.0	14.330	14.323	30.1	74.2	499.7	69.2	33.2	19.8	3.1
1730	38.4	14.331	14.324	29.0	27.9	14.332	14.325	30.5	38.2	500.1	33.2	33.0	23.3	2.3
1731	32.2	14.331	14.325	27.8	21.7	14.333	14.325	30.2	32.0	500.3	27.0	31.1	23.8	2.1

TABLE 16.—DATA LISTING FOR TRAVERSE 2 AT STATION 3—VERTICAL SURVEY

[Test section data for reading 1679: total pressure, 14.269; static pressure, 13.172 psia; total temperature, 499 °R; velocity, 251.0 mph; fan speed, 287.1 rpm.]

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
1679	32.7	14.341	14.329	37.3	22.4	14.335	14.327	32.7	30.9	500.8	24.9	36.9	–29.6	–4.5
1680	37.9	14.341	14.330	35.7	27.6	14.337	14.326	35.8	36.1	500.5	30.1	37.0	–28.2	–5.0
1681	44.1	14.340	14.329	36.2	33.8	14.337	14.325	37.4	42.3	500.6	36.3	38.4	–24.6	–4.9
1682	50.3	14.339	14.328	35.7	40.0	14.336	14.325	36.4	48.5	500.4	42.5	37.6	–24.8	–5.0
1683	56.3	14.339	14.327	36.9	46.0	14.335	14.324	37.1	54.5	500.5	48.5	39.4	–27.7	–5.0
1684	62.1	14.337	14.326	36.6	51.9	14.335	14.323	37.5	60.4	500.7	54.4	38.0	–26.6	–4.9
1685	68.5	14.336	14.325	36.3	58.2	14.334	14.323	36.8	66.7	500.8	60.7	38.3	–24.5	–4.7
1686	74.4	14.335	14.324	36.2	64.2	14.335	14.323	36.9	72.7	501.0	66.7	38.9	–24.0	4.7
1687	80.4	14.333	14.324	34.0	70.2	14.334	14.323	36.0	78.7	501.1	72.7	36.4	–27.7	–4.9
1688	86.6	14.331	14.322	33.0	76.3	14.332	14.322	34.9	84.8	501.8	78.8	37.6	–22.1	–4.8
1689	92.3	14.330	14.321	33.1	82.0	14.330	14.322	31.0	90.5	502.2	84.5	33.1	–23.9	–4.5
1690	98.7	14.329	14.320	33.2	88.4	14.330	14.322	32.2	96.9	502.3	90.9	34.1	–22.5	–4.4
1691	104.0	14.328	14.319	32.3	93.7	14.330	14.321	32.3	102.2	502.4	96.2	35.4	–21.7	–4.3
1692	110.6	14.328	14.320	31.1	100.3	14.330	14.321	32.1	108.8	502.2	102.8	34.2	–20.7	–4.9
1693	116.5	14.328	14.320	32.0	106.3	14.329	14.321	31.9	114.8	501.8	108.8	34.3	–22.1	–4.3
1694	122.5	14.329	14.321	31.3	112.2	14.329	14.321	31.4	120.7	500.9	114.7	32.9	–24.2	–4.0
1695	128.7	14.330	14.322	30.7	118.4	14.329	14.321	30.6	126.9	500.1	120.9	31.6	–20.4	–4.3
1696	134.5	14.330	14.322	30.2	124.2	14.329	14.321	31.2	132.7	500.1	126.7	31.4	–22.7	–5.0
1697	140.1	14.328	14.321	29.2	129.8	14.328	14.321	29.3	138.3	500.8	132.3	31.0	–24.2	–5.0
1698	146.5	14.327	14.320	28.9	136.2	14.327	14.320	30.0	144.7	500.6	138.7	28.2	–28.7	–5.0
1699	152.2	14.328	14.322	28.2	142.0	14.327	14.320	29.3	150.5	500.0	144.5	29.6	–28.0	–5.5
1700	158.2	14.329	14.322	29.6	147.9	14.329	14.321	31.0	156.4	499.6	150.4	29.7	–26.1	–5.4
1701	164.4	14.329	14.323	26.1	154.1	14.329	14.322	30.3	162.6	499.5	156.6	29.6	–19.5	–5.7
1702	170.1	14.328	14.322	26.5	159.9	14.329	14.322	29.8	168.4	499.9	162.4	25.1	–18.6	–5.0
1703	176.2	14.328	14.322	28.1	165.9	14.328	14.322	28.8	174.4	500.5	168.4	26.6	–17.9	–5.3

TABLE 16.—Concluded.

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
1704	182.2	14.327	14.321	28.1	172.0	14.328	14.321	28.4	180.5	500.7	174.5	27.4	-17.2	-5.2
1705	188.1	14.328	14.321	27.6	177.8	14.328	14.321	29.1	186.3	500.9	180.3	26.9	-15.5	-5.3
1706	194.0	14.327	14.321	28.3	183.8	14.328	14.320	29.7	192.3	501.3	186.3	28.6	-16.7	-5.2
1707	200.1	14.327	14.321	27.2	189.8	14.329	14.322	28.7	198.3	501.6	192.3	26.5	-16.3	-4.8
1708	206.1	14.328	14.322	27.1	195.8	14.329	14.322	29.8	204.3	501.8	198.3	27.3	-16.2	-5.3
1709	212.0	14.327	14.321	27.0	201.7	14.330	14.323	28.7	210.2	502.0	204.2	27.5	-14.7	-4.9
1710	218.2	14.327	14.322	25.0	207.9	14.329	14.323	27.5	216.4	501.9	210.4	26.6	-16.9	-5.2
1711	224.3	14.328	14.322	26.6	214.0	14.330	14.323	28.2	222.5	501.7	216.5	27.0	-19.2	-4.6
1712	230.1	14.328	14.323	25.4	219.8	14.329	14.323	27.1	228.3	501.4	222.3	25.5	-20.2	-4.4
1713	236.2	14.328	14.323	22.7	226.0	14.328	14.324	23.8	234.5	500.8	228.5	24.0	-19.9	-4.5
1714	242.7	14.328	14.323	23.3	232.5	14.329	14.324	24.4	241.0	500.6	235.0	24.3	-18.9	-3.4
1715	248.2	14.328	14.323	23.8	238.0	14.327	14.323	21.4	246.5	500.8	240.5	23.3	-19.1	-2.4
1716	254.3	14.327	14.323	23.1	244.0	14.325	14.322	19.0	252.5	501.7	246.5	22.6	-17.7	-2.1
1717	260.3	14.325	14.320	22.3	250.0	14.326	14.323	18.2	258.5	502.1	252.5	21.7	-17.7	-2.1
1718	266.3	14.323	14.320	21.5	256.1	14.325	14.322	16.2	264.6	502.5	258.6	22.0	-17.9	-1.4
1719	272.2	14.324	14.321	20.3	261.9	14.325	14.323	16.8	270.4	502.5	264.4	18.9	-18.9	-2.1
1720	278.2	14.325	14.321	20.2	267.9	14.325	14.323	16.4	276.4	502.6	270.4	19.5	-17.1	-1.6
1721	284.4	14.325	14.322	20.5	274.2	14.327	14.325	17.2	282.7	502.7	276.7	19.8	-18.6	-1.8
1722	289.9	14.327	14.324	19.0	279.7	14.328	14.326	15.6	288.2	502.7	282.2	17.6	-22.6	-1.9
1723	293.5	14.327	14.324	18.3	283.2	14.329	14.327	16.0	291.7	502.6	285.7	11.1	-23.9	-1.7
1724	254.2	14.329	14.324	24.0	243.9	14.329	14.326	19.3	252.4	502.4	246.4	24.3	-19.3	-2.0
1725	218.0	14.330	14.325	25.7	207.8	14.331	14.325	27.2	216.3	502.0	210.3	27.3	-17.7	-4.6
1726	182.2	14.331	14.324	27.4	172.0	14.331	14.325	28.2	180.5	501.5	174.5	28.1	-19.2	-5.2
1727	146.6	14.334	14.327	29.5	136.4	14.334	14.326	29.9	144.9	501.0	138.9	31.1	-28.9	-5.3
1728	110.6	14.337	14.329	31.4	100.3	14.336	14.328	31.6	108.8	500.6	102.8	34.0	-21.0	-4.5
1729	74.5	14.342	14.331	35.7	64.2	14.340	14.328	36.7	72.7	500.7	66.7	37.5	-26.2	-4.8
1730	38.4	14.343	14.333	35.8	28.2	14.341	14.330	35.8	36.7	501.4	30.7	36.4	-30.4	-5.0
1731	32.5	14.344	14.333	36.0	22.3	14.339	14.332	29.7	30.8	501.5	24.8	33.6	-28.8	-3.9

TABLE 17.—DATA LISTING FOR TRAVERSE 1 AT STATION 4—VERTICAL SURVEY

[Test section data for reading 54: total pressure, 14.412; static pressure, 12.319 psia; total temperature, 500 °R; velocity, 352.0 mph; fan speed, 394.2 rpm.]

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
54	4.9	14.403	14.400	17.2	51.9	14.419	14.403	43.5	33.6	492.5	28.8	11.1	9.3	0.5
55	11.0	14.400	14.397	17.4	58.0	14.419	14.403	44.0	39.7	491.4	34.9	25.6	7.2	1.9
56	17.3	14.403	14.399	22.5	64.3	14.426	14.405	48.8	46.0	490.5	41.1	34.6	19.8	−13.4
57	22.7	14.403	14.398	24.2	69.7	14.426	14.407	46.3	51.5	490.5	46.6	15.1	24.6	3.0
58	28.9	14.406	14.399	28.5	75.9	14.413	14.405	30.9	57.6	489.1	52.8	43.9	3.6	2.1
59	35.1	14.409	14.400	32.7	82.1	14.419	14.411	30.8	63.8	487.1	59.0	37.7	10.4	−1.4
60	41.1	14.412	14.399	39.3	88.1	14.429	14.408	48.7	69.9	486.7	65.0	46.0	7.0	.3
61	46.8	14.418	14.404	41.2	93.8	14.422	14.407	42.1	75.6	489.1	70.7	44.2	8.1	−1.0
62	53.0	14.422	14.405	43.6	100.0	14.422	14.409	40.0	81.7	490.0	76.9	30.0	4.0	−5.1
63	58.9	14.425	14.408	45.0	105.9	14.419	14.404	42.9	87.6	494.9	82.7	28.8	4.5	−.7
64	64.9	14.428	14.408	48.7	111.9	14.422	14.406	44.2	93.7	497.8	88.8	44.6	1.6	0.0
65	71.1	14.428	14.411	45.2	118.1	14.422	14.407	42.3	99.9	497.7	95.0	37.8	−.6	−1.5
66	77.1	14.418	14.411	30.0	124.1	14.419	14.408	36.6	105.8	498.5	101.0	35.1	−1.7	−2.8
67	83.2	14.425	14.415	34.0	130.2	14.422	14.412	35.0	111.9	498.7	107.0	35.1	−1.4	−1.2
68	94.9	14.425	14.410	42.5	141.9	14.419	14.410	32.5	123.7	497.6	118.8	33.6	−1.3	−2.2
69	107.0	14.425	14.409	43.4	154.0	14.413	14.405	30.5	135.7	495.7	130.8	26.1	0.1	4.2
70	118.9	14.422	14.407	41.6	165.9	14.416	14.411	25.4	147.7	494.6	142.8	23.5	4.7	3.3
71	131.3	14.415	14.405	34.2	178.3	14.413	14.408	25.0	160.0	493.9	155.1	23.7	10.3	3.5
72	143.2	14.415	14.407	31.6	190.2	14.419	14.411	31.5	172.0	492.9	167.1	17.5	10.0	−6.2
73	155.0	14.415	14.408	29.0	202.0	14.429	14.412	44.3	183.7	492.9	178.8	21.3	8.8	−1.5
74	167.1	14.412	14.407	24.0	214.1	14.426	14.410	43.5	195.9	493.0	191.0	22.5	8.6	−0.9
75	178.8	14.415	14.409	26.7	225.8	14.422	14.416	26.9	207.6	499.8	202.7	39.9	9.0	−.3
76	185.0	14.413	14.407	28.3	232.0	14.416	14.414	16.4	213.7	500.8	208.9	40.9	9.2	−.9
77	191.0	14.417	14.408	33.1	238.0	14.429	14.414	43.0	219.8	497.6	214.9	39.8	8.6	−.2
78	196.7	14.422	14.409	39.8	243.7	14.429	14.413	43.2	225.4	497.9	220.5	37.2	5.7	1.3

TABLE 17.—Concluded.

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
79	202.8	14.427	14.410	44.7	249.8	14.428	14.412	43.0	231.6	500.0	226.7	17.7	4.8	–8.6
80	208.5	14.426	14.410	43.4	255.5	14.426	14.412	41.0	237.3	501.0	232.4	15.3	3.0	–2.8
81	214.9	14.427	14.411	43.5	261.9	14.426	14.412	40.0	243.6	501.2	238.8	38.9	2.2	1.5
82	221.2	14.419	14.412	30.2	268.2	14.423	14.410	38.8	249.9	501.4	245.0	38.6	1.3	–.7
83	226.7	14.416	14.411	23.8	273.7	14.422	14.410	37.6	255.4	501.5	250.6	38.2	1.3	.2
84	233.4	14.418	14.412	26.0	280.4	14.421	14.410	35.8	262.2	501.4	257.3	35.0	2.3	–0.5
85	239.1	14.427	14.412	43.0	286.1	14.419	14.410	32.5	267.9	501.3	263.0	33.2	4.6	.2
86	244.9	14.426	14.411	42.0	291.9	14.417	14.410	29.3	273.6	501.3	268.7	29.3	5.2	–.7
87	251.0	14.423	14.409	41.2	298.0	14.416	14.410	25.0	279.8	501.2	274.9	25.6	5.1	–1.0
88	256.9	14.422	14.408	40.1	303.9	14.414	14.410	21.5	285.6	501.5	280.7	25.0	6.3	–1.7
89	261.2	14.421	14.408	39.4	308.2	14.413	14.410	18.9	289.9	501.5	285.1	23.4	6.8	–3.7
90	242.7	14.426	14.411	42.3	289.7	14.419	14.411	30.6	271.5	501.2	266.6	31.1	5.5	.2
91	224.6	14.417	14.411	27.3	271.6	14.424	14.412	38.2	253.4	501.1	248.5	38.6	1.0	–.7
92	207.2	14.427	14.410	43.9	254.2	14.427	14.413	41.1	235.9	501.3	231.0	13.0	4.4	–8.0
93	189.0	14.416	14.408	30.8	236.0	14.428	14.417	37.7	217.7	501.4	212.8	40.3	8.8	–.4
94	171.3	14.413	14.408	24.4	218.3	14.430	14.416	41.8	200.0	494.6	195.1	30.8	9.1	–0.2
95	153.1	14.416	14.408	29.8	200.1	14.429	14.413	43.3	181.9	492.3	177.0	17.6	11.3	–4.9
96	135.0	14.418	14.409	33.3	182.0	14.419	14.413	26.7	163.8	493.5	158.9	22.0	10.1	–1.8
97	117.1	14.426	14.411	42.7	164.1	14.419	14.413	25.7	145.8	494.6	141.0	23.3	3.4	6.4
98	99.4	14.424	14.411	39.2	146.4	14.422	14.414	30.8	128.1	496.2	123.2	28.3	–2.8	–.5
99	81.1	14.420	14.417	20.1	128.1	14.426	14.415	36.0	109.9	498.8	105.0	37.5	–2.3	–2.4
100	63.0	14.432	14.413	46.6	110.0	14.432	14.416	44.0	91.7	497.4	86.9	44.6	1.7	1.0
101	45.2	14.426	14.412	40.9	92.2	14.435	14.417	44.7	74.0	488.4	69.1	44.7	7.3	0.0
102	27.1	14.418	14.411	28.3	74.1	14.431	14.420	34.8	55.9	489.5	51.0	38.1	8.7	.4
103	9.3	14.413	14.410	18.6	56.3	14.434	14.416	45.3	38.1	490.3	33.2	22.1	5.7	–1.5
104	5.0	14.415	14.412	17.2	52.0	14.432	14.415	44.1	33.7	490.5	28.8	16.2	6.6	0.7

TABLE 18.—DATA LISTING FOR TRAVERSE 2 AT STATION 4—VERTICAL SURVEY

[Test section data for reading 54: total pressure, 14.412; static pressure, 12.319 psia; total temperature, 500 °R; velocity, 352.0 mph; fan speed, 394.2 rpm.]

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
54	5.0	14.406	14.404	16.7	51.1	14.428	14.410	45.9	31.6	496.0	28.1	23.4	6.9	0
55	11.5	14.403	14.399	21.5	57.6	14.428	14.410	45.6	38.1	495.1	34.6	33.1	2.8	–2.4
56	17.5	14.406	14.400	26.6	63.6	14.425	14.406	47.7	44.1	494.8	40.6	35.3	5.5	–4.3
57	23.1	14.406	14.399	30.1	69.2	14.425	14.406	46.7	49.7	494.9	46.2	35.6	5.4	–3.7
58	28.7	14.406	14.397	32.8	74.8	14.422	14.408	40.7	55.3	494.6	51.8	45.1	6.0	–1.5
59	34.9	14.413	14.399	39.4	81.1	14.422	14.407	41.9	61.6	494.4	58.1	39.6	6.9	–4.3
60	41.1	14.413	14.397	42.3	87.2	14.422	14.404	45.7	67.7	494.3	64.2	45.9	4.9	–5.2
61	47.2	14.416	14.399	43.9	93.3	14.422	14.405	44.3	73.8	492.7	70.3	44.0	6.3	–6.1
62	52.8	14.419	14.401	46.0	98.9	14.422	14.406	43.4	79.4	492.8	75.9	39.0	5.0	–5.8
63	58.7	14.419	14.401	46.5	104.8	14.419	14.403	42.9	85.3	496.5	81.8	46.1	–3.5	–.3
64	64.8	14.425	14.405	48.8	110.9	14.419	14.403	43.3	91.4	496.7	87.9	39.8	–3.3	–0.9
65	70.9	14.425	14.406	47.2	117.0	14.419	14.403	42.6	97.5	496.0	94.0	39.0	–4.9	–5.1
66	76.5	14.419	14.405	41.1	122.6	14.415	14.403	38.2	103.1	496.0	99.6	38.7	–3.7	–5.8
67	82.8	14.425	14.411	41.4	129.0	14.412	14.402	35.6	109.5	495.8	106.0	39.5	–4.6	–8.3
68	95.0	14.422	14.405	44.5	141.1	14.406	14.401	25.3	121.6	494.7	118.1	35.4	–1.3	–8.0
69	106.6	14.419	14.403	43.5	152.7	14.406	14.402	22.4	133.2	493.9	129.7	23.5	–1.1	–9.3
70	119.6	14.416	14.401	41.2	165.8	14.409	14.402	29.2	146.3	492.5	142.8	10.1	–.7	–10.8
71	130.9	14.413	14.403	34.1	177.1	14.412	14.402	34.8	157.6	492.0	154.1	11.6	–.2	–4.5
72	143.2	14.403	14.399	23.3	189.3	14.415	14.403	37.8	169.8	492.5	166.3	21.0	2.1	–8.7
73	155.0	14.406	14.402	23.3	201.1	14.415	14.403	38.5	181.6	493.7	178.1	26.3	3.1	–7.4
74	166.2	14.410	14.402	29.2	212.3	14.412	14.399	39.6	192.8	495.9	189.3	32.5	4.9	–5.2
75	178.3	14.413	14.402	34.9	224.5	14.422	14.408	40.9	205.0	498.5	201.5	35.2	5.7	–4.6
76	185.9	14.414	14.403	37.3	232.0	14.408	14.406	12.3	212.5	499.3	209.0	35.2	7.9	–4.4
77	190.9	14.415	14.402	38.3	237.0	14.422	14.407	41.3	217.5	498.7	214.0	37.7	8.1	–4.2
78	197.2	14.415	14.403	38.5	243.3	14.419	14.405	41.0	223.8	498.3	220.3	39.2	7.4	–3.8

TABLE 18.—Concluded.

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
79	203.2	14.416	14.403	39.3	249.3	14.415	14.403	36.6	229.8	499.5	226.3	33.8	7.8	-6.0
80	208.4	14.417	14.404	39.5	254.5	14.413	14.403	36.1	235.0	501.8	231.5	20.8	6.7	-11.8
81	215.2	14.418	14.404	41.1	261.3	14.411	14.401	34.3	241.8	502.0	238.3	38.3	.1	-4.4
82	221.8	14.419	14.404	42.2	267.9	14.407	14.399	30.9	248.4	502.2	244.9	30.9	-1.9	-6.2
83	226.5	14.419	14.405	40.6	272.6	14.406	14.400	27.8	253.1	502.3	249.6	29.3	-2.8	-6.2
84	233.1	14.411	14.409	16.7	279.2	14.405	14.400	23.6	259.7	502.4	256.2	27.4	-3.3	-5.6
85	239.0	14.419	14.404	42.9	285.2	14.403	14.400	18.9	265.7	502.3	262.2	25.8	-2.8	-5.4
86	245.5	14.417	14.404	39.6	291.6	14.402	14.399	16.2	272.1	502.3	268.6	18.6	-2.7	-3.0
87	251.0	14.415	14.403	36.9	297.1	14.401	14.400	12.4	277.6	502.2	274.1	14.5	-1.5	-3.7
88	256.4	14.413	14.402	35.9	302.5	14.401	14.400	10.0	283.0	502.5	279.5	10.1	-1.5	-5.5
89	260.2	14.411	14.401	35.0	306.3	14.400	14.399	8.4	286.8	502.5	283.3	5.8	-2.3	-5.6
90	242.6	14.419	14.404	42.4	288.7	14.402	14.400	18.5	269.2	502.2	265.7	22.2	-2.3	-5.5
91	224.5	14.419	14.405	40.7	270.6	14.407	14.400	28.8	251.1	501.9	247.6	28.9	-2.8	-6.8
92	207.7	14.417	14.404	39.6	253.8	14.413	14.402	36.0	234.3	502.1	230.8	26.4	6.8	-11.4
93	189.2	14.415	14.402	38.3	235.3	14.418	14.406	36.6	215.8	502.0	212.3	36.2	8.2	-4.3
94	171.1	14.410	14.401	32.0	217.3	14.418	14.404	40.8	197.8	497.3	194.3	33.0	5.8	-5.7
95	152.7	14.405	14.401	22.3	198.8	14.415	14.403	38.5	179.3	493.1	175.8	27.4	2.5	-5.4
96	135.5	14.410	14.402	29.4	181.6	14.414	14.403	35.9	162.1	491.9	158.6	15.3	-1.3	-8.1
97	117.4	14.419	14.404	42.0	163.6	14.408	14.401	27.2	144.1	492.1	140.6	14.6	-.4	-7.9
98	99.2	14.421	14.404	44.3	145.3	14.406	14.402	22.1	125.8	494.1	122.3	30.1	-1.6	-6.3
99	81.1	14.413	14.411	15.7	127.2	14.414	14.403	36.2	107.7	496.3	104.2	39.2	-4.1	-5.2
100	63.2	14.425	14.406	47.8	109.4	14.420	14.404	43.7	89.9	496.9	86.4	41.0	-3.6	-.4
101	45.0	14.420	14.404	43.7	91.1	14.425	14.408	44.3	71.6	491.7	68.1	44.5	5.9	-4.8
102	27.6	14.413	14.404	31.9	73.7	14.427	14.411	43.2	54.2	493.5	50.7	41.6	5.9	-3.5
103	9.4	14.407	14.403	20.6	55.5	14.424	14.406	46.2	36.0	493.5	32.5	23.0	6.0	-4.3
104	4.9	14.406	14.403	18.8	51.1	14.423	14.405	45.8	31.6	493.1	28.1	21.8	2.5	-3.3

TABLE 19.—DATA LISTING FOR TRAVERSE 1 AT STATION 4—VERTICAL SURVEY

[Test section data for reading 105: total pressure, 14.427; static pressure, 13.320 psia; total temperature, 498 °R; velocity, 250.6 mph; fan speed 290.6 rpm.]

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
105	4.9	14.422	14.421	12.1	51.9	14.430	14.420	33.4	33.6	489.5	28.8	10.4	5.7	1.8
106	11.1	14.421	14.420	14.1	58.1	14.430	14.420	35.2	39.8	493.0	34.9	15.8	5.6	–2.0
107	17.0	14.422	14.420	16.3	64.0	14.433	14.422	36.7	45.8	494.9	40.9	20.3	7.9	–1.0
108	22.9	14.425	14.421	19.7	69.9	14.433	14.423	34.0	51.6	495.9	46.8	22.9	9.7	1.2
109	29.2	14.427	14.422	22.9	76.2	14.427	14.423	22.7	58.0	492.4	53.1	28.8	7.7	–.9
110	35.2	14.427	14.421	26.4	82.2	14.427	14.423	21.6	63.9	496.4	59.0	29.6	9.3	–1.2
111	40.8	14.428	14.421	29.2	87.8	14.434	14.423	36.8	69.5	490.7	64.7	31.3	8.1	–.5
112	47.0	14.430	14.422	31.5	94.0	14.430	14.421	32.1	75.8	485.4	70.9	30.9	6.9	0.1
113	53.1	14.429	14.420	32.8	100.1	14.428	14.420	30.2	81.8	486.3	77.0	19.5	6.7	–3.8
114	59.0	14.431	14.421	33.9	106.0	14.431	14.422	32.2	87.7	494.8	82.9	15.8	4.0	–1.2
115	65.0	14.433	14.421	36.6	112.0	14.430	14.421	32.5	93.7	499.1	88.8	31.5	1.7	1.5
116	71.2	14.431	14.422	32.6	118.2	14.429	14.421	31.2	100.0	499.2	95.1	27.0	0.1	–1.0
117	77.2	14.427	14.423	22.1	124.2	14.427	14.420	28.1	105.9	500.2	101.1	25.6	–1.3	–2.0
118	83.1	14.428	14.424	23.4	130.1	14.426	14.420	25.5	111.9	497.6	107.0	26.0	–2.3	–2.1
119	94.9	14.429	14.420	32.1	141.9	14.426	14.421	23.6	123.6	498.8	118.8	21.2	–2.1	–.9
120	106.9	14.430	14.421	32.3	153.9	14.426	14.421	22.4	135.7	497.9	130.8	16.1	–2.6	3.9
121	119.0	14.428	14.420	31.3	166.0	14.424	14.421	18.6	147.7	498.1	142.9	15.5	3.7	7.4
122	130.8	14.426	14.420	25.7	177.8	14.423	14.420	19.3	159.6	496.6	154.7	13.5	10.2	1.4
123	143.0	14.424	14.420	23.2	190.0	14.424	14.420	24.0	171.7	497.8	166.9	10.9	10.6	–3.5
124	154.7	14.424	14.420	21.8	201.7	14.430	14.421	33.6	183.5	497.3	178.6	9.9	11.8	–3.6
125	166.8	14.422	14.419	17.9	213.8	14.430	14.420	33.8	195.5	499.2	190.6	15.8	10.5	–0.6
126	179.4	14.423	14.419	19.9	226.4	14.425	14.421	20.0	208.1	500.1	203.2	28.2	10.4	.3
127	184.9	14.422	14.418	21.3	231.9	14.423	14.422	11.6	213.7	499.5	208.8	29.5	9.7	–.7
128	175.5	14.421	14.418	19.3	222.5	14.425	14.421	23.1	204.2	499.7	199.3	25.7	9.2	.8
129	196.7	14.427	14.419	30.7	243.7	14.427	14.418	32.5	225.5	500.9	220.6	26.4	5.9	1.5

TABLE 19.—Concluded.

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
130	202.9	14.429	14.419	33.7	249.9	14.427	14.419	32.3	231.7	501.2	226.8	11.0	5.7	−9.4
131	208.9	14.428	14.419	32.9	255.9	14.427	14.419	31.3	237.6	500.9	232.7	9.7	3.3	−1.8
132	215.1	14.429	14.420	33.2	262.1	14.427	14.419	30.7	243.8	501.3	238.9	27.6	2.0	1.6
133	221.1	14.427	14.422	24.0	268.1	14.426	14.419	29.6	249.8	500.4	244.9	27.7	1.1	−1.3
134	227.2	14.422	14.420	16.3	274.2	14.425	14.418	28.2	256.0	501.9	251.1	26.3	1.5	−.8
135	232.9	14.424	14.421	17.2	279.9	14.424	14.418	25.8	261.7	500.4	256.8	25.2	2.8	−0.8
136	239.1	14.429	14.420	32.9	286.1	14.423	14.418	24.1	267.8	501.1	263.0	21.4	2.5	−3.0
137	245.0	14.427	14.419	31.9	292.0	14.422	14.418	21.2	273.8	500.6	268.9	20.9	4.3	−1.0
138	251.3	14.427	14.419	31.5	298.3	14.422	14.419	18.3	280.0	500.5	275.2	17.6	4.4	−1.3
139	257.2	14.426	14.418	30.8	304.2	14.420	14.418	15.6	285.9	500.6	281.0	17.3	6.7	−1.7
140	261.4	14.426	14.418	30.4	308.4	14.420	14.418	14.5	290.1	501.0	285.2	14.5	7.8	−0.5
141	243.3	14.427	14.419	31.5	290.3	14.423	14.419	21.9	272.1	499.8	267.2	18.6	2.7	−1.0
142	224.8	14.424	14.421	20.6	271.8	14.427	14.420	28.9	253.5	500.4	248.7	27.5	1.4	−.9
143	207.4	14.428	14.418	33.6	254.4	14.427	14.418	31.6	236.2	499.8	231.3	5.7	3.9	−7.1
144	189.0	14.422	14.418	23.8	236.0	14.427	14.420	29.3	217.7	500.8	212.9	28.9	8.9	−.3
145	171.2	14.421	14.418	18.2	218.2	14.428	14.419	32.3	199.9	498.6	195.0	19.9	9.4	0.1
146	153.2	14.422	14.418	22.1	200.2	14.427	14.418	33.2	182.0	498.3	177.1	9.6	11.2	−4.9
147	134.9	14.423	14.418	24.5	181.9	14.422	14.419	20.3	163.7	498.1	158.8	13.2	10.8	−.5
148	117.2	14.427	14.418	31.8	164.2	14.420	14.417	19.2	145.9	499.0	141.1	15.5	2.0	7.0
149	99.2	14.426	14.418	30.1	146.2	14.423	14.419	23.4	128.0	495.5	123.1	19.3	−3.0	−.3
150	81.0	14.422	14.420	13.3	128.0	14.424	14.418	26.3	109.8	497.1	104.9	25.7	−2.3	−2.1
151	63.1	14.428	14.417	35.6	110.1	14.427	14.418	33.2	91.9	498.5	87.0	30.4	1.9	.8
152	45.3	14.427	14.419	31.1	92.3	14.429	14.419	34.3	74.0	492.1	69.2	32.0	8.7	.3
153	27.1	14.421	14.417	20.9	74.1	14.427	14.422	24.6	55.9	490.4	51.0	27.7	7.4	.2
154	9.2	14.419	14.417	13.4	56.2	14.430	14.420	34.2	37.9	491.7	33.0	12.3	5.7	−.3
155	4.9	14.420	14.419	11.1	51.9	14.428	14.419	33.8	33.7	490.8	28.8	10.6	6.5	1.5

TABLE 20.—DATA LISTING FOR TRAVERSE 2 AT STATION 4—VERTICAL SURVEY

[Test section data for reading 105: total pressure, 14.427; static pressure, 13.320 psia; total temperature, 498 °R; velocity, 250.6 mph; fan speed, 290.6 rpm.]

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
105	4.9	14.412	14.411	12.8	51.0	14.422	14.413	33.8	31.5	489.7	28.0	12.3	3.2	–3.2
106	11.4	14.412	14.410	14.3	57.5	14.420	14.410	33.4	38.0	493.5	34.5	17.8	4.2	–3.8
107	17.0	14.412	14.410	17.7	63.1	14.422	14.412	35.1	43.6	496.9	40.1	21.2	6.7	–3.5
108	23.2	14.414	14.410	21.6	69.4	14.422	14.413	33.3	49.9	497.2	46.4	25.0	6.0	–4.3
109	29.0	14.417	14.412	24.7	75.2	14.421	14.416	24.7	55.7	492.0	52.2	28.8	6.0	–2.7
110	35.6	14.418	14.411	28.6	81.7	14.425	14.416	32.7	62.2	495.3	58.7	27.9	5.7	–3.6
111	41.0	14.418	14.410	31.5	87.1	14.422	14.412	33.1	67.6	489.7	64.1	29.0	5.5	–4.3
112	47.2	14.421	14.412	32.8	93.3	14.424	14.415	33.0	73.8	485.2	70.3	30.2	5.9	–5.2
113	53.1	14.421	14.411	34.0	99.2	14.423	14.414	32.3	79.7	489.1	76.2	23.6	4.0	–5.0
114	59.0	14.422	14.412	34.2	105.1	14.421	14.413	32.1	85.6	497.0	82.1	29.8	–3.9	1.5
115	65.2	14.422	14.411	35.7	111.3	14.418	14.410	32.1	91.8	499.1	88.3	25.1	–4.7	–1.8
116	71.1	14.422	14.413	33.9	117.2	14.417	14.409	31.1	97.7	499.4	94.2	25.7	–5.2	–4.9
117	76.8	14.417	14.413	21.5	123.0	14.417	14.410	28.8	103.5	501.0	100.0	26.4	–4.9	–5.7
118	83.0	14.422	14.414	30.5	129.1	14.418	14.412	25.6	109.6	498.2	106.1	27.1	–4.8	–4.7
119	94.7	14.419	14.410	33.4	140.9	14.413	14.410	18.2	121.4	499.6	117.9	23.8	–2.6	–5.8
120	107.0	14.419	14.410	32.8	153.1	14.411	14.409	15.9	133.6	496.1	130.1	15.3	–0.9	–7.1
121	119.3	14.418	14.410	30.8	165.4	14.414	14.410	20.7	145.9	495.9	142.4	3.0	1.2	–7.4
122	130.8	14.415	14.410	25.5	177.0	14.416	14.411	25.7	157.5	495.3	154.0	3.0	–.6	–7.5
123	143.2	14.411	14.408	17.5	189.3	14.416	14.409	28.4	169.8	497.4	166.3	12.8	.3	–6.6
124	154.7	14.412	14.410	16.8	200.9	14.418	14.411	28.9	181.4	498.4	177.9	18.7	3.4	–6.1
125	166.8	14.413	14.409	22.2	213.0	14.418	14.410	30.5	193.5	500.3	190.0	22.5	5.4	–5.9
126	179.1	14.415	14.409	26.8	225.2	14.419	14.411	30.9	205.7	500.7	202.2	24.9	6.7	–4.5
127	184.9	14.415	14.408	28.2	231.1	14.413	14.412	10.1	211.6	500.1	208.1	25.5	7.7	–4.0
128	176.4	14.414	14.408	25.9	222.5	14.418	14.410	31.4	203.0	500.4	199.5	24.2	6.4	–5.0
129	197.1	14.415	14.408	29.3	243.2	14.414	14.406	30.8	223.7	501.6	220.2	28.1	7.0	–3.8

TABLE 20.—Concluded.

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
130	203.0	14.416	14.409	29.6	249.1	14.412	14.406	27.1	229.6	501.8	226.1	23.2	7.9	–5.8
131	209.0	14.418	14.410	30.3	255.1	14.414	14.408	27.5	235.6	501.5	232.1	11.8	6.4	–11.7
132	215.2	14.419	14.410	31.4	261.4	14.412	14.407	24.7	241.9	501.9	238.4	26.8	.4	–4.6
133	221.0	14.419	14.411	32.1	267.2	14.413	14.409	22.9	247.7	501.0	244.2	21.7	–1.9	–5.4
134	227.1	14.419	14.411	30.4	273.3	14.407	14.404	19.7	253.8	502.4	250.3	19.1	–4.1	–7.3
135	233.0	14.413	14.412	9.2	279.1	14.411	14.409	18.2	259.6	501.1	256.1	18.6	–4.0	–6.8
136	239.0	14.419	14.410	32.9	285.1	14.407	14.406	12.6	265.6	501.7	262.1	16.6	–4.1	–4.6
137	245.2	14.417	14.410	30.1	291.4	14.408	14.407	11.7	271.9	501.3	268.4	11.6	–3.6	–6.7
138	251.2	14.417	14.410	27.7	297.3	14.408	14.408	8.4	277.8	501.1	274.3	7.7	–1.7	–3.2
139	257.0	14.414	14.408	27.4	303.1	14.408	14.407	4.9	283.6	501.3	280.1	4.8	–.5	–6.3
140	260.4	14.414	14.408	26.9	306.5	14.407	14.407	0.0	287.0	501.6	283.5	3.2	1.1	–6.3
141	243.1	14.419	14.411	31.3	289.3	14.409	14.408	12.5	269.8	500.6	266.3	13.6	–3.4	–2.6
142	224.9	14.419	14.411	30.8	271.0	14.411	14.407	21.2	251.5	500.9	248.0	19.3	–3.5	–7.3
143	207.4	14.416	14.409	29.7	253.5	14.414	14.408	27.2	234.0	500.6	230.5	20.9	7.1	–10.5
144	189.1	14.412	14.405	29.0	235.3	14.414	14.408	27.5	215.8	501.4	212.3	25.1	7.2	–4.1
145	171.2	14.412	14.407	24.1	217.3	14.417	14.409	31.2	197.8	499.5	194.3	22.7	5.8	–5.8
146	153.3	14.409	14.407	16.7	199.4	14.415	14.408	28.9	179.9	499.5	176.4	18.5	2.6	–5.2
147	135.1	14.412	14.407	22.7	181.2	14.413	14.407	26.9	161.7	497.8	158.2	8.8	–1.2	–7.8
148	117.0	14.415	14.407	31.5	163.2	14.409	14.405	19.9	143.7	497.8	140.2	7.3	0.0	–8.1
149	99.5	14.418	14.409	33.0	145.6	14.407	14.405	15.6	126.1	493.5	122.6	20.0	–2.7	–6.8
150	81.0	14.412	14.411	8.2	127.1	14.415	14.409	27.2	107.6	497.9	104.1	26.4	–5.1	–5.2
151	63.1	14.418	14.408	35.5	109.2	14.417	14.408	32.6	89.7	498.6	86.2	27.8	–4.5	–.7
152	45.5	14.415	14.406	32.9	91.6	14.414	14.405	32.6	72.1	490.4	68.6	30.8	5.4	–4.8
153	27.0	14.412	14.407	23.6	73.2	14.417	14.410	29.9	53.7	491.3	50.2	27.3	6.3	–4.4
154	9.2	14.408	14.407	13.1	55.3	14.418	14.408	33.7	35.8	492.9	32.3	14.9	5.2	–4.1
155	5.7	14.407	14.406	11.7	51.8	14.415	14.405	33.5	32.3	491.7	28.8	13.7	1.3	–5.0

TABLE 21.—DATA LISTING FOR TRAVERSE 1 AT STATION 5—VERTICAL SURVEY AT INSIDE WALL

[Test section data for reading 711: total pressure, 14.362; static pressure, 12.256 psia; total temperature, 499 °R; velocity, 351.6 mph; fan speed, 395.9 rpm.]

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
711	6.5	14.326	14.324	15.7	53.5	14.336	14.323	39.8	35.2	496.5	30.4	21.8	9.1	–6.3
712	10.9	14.326	14.323	19.7	57.9	14.342	14.327	42.1	39.7	496.3	34.8	22.2	10.3	–1.1
713	17.2	14.333	14.329	21.0	64.2	14.345	14.330	43.1	45.9	496.4	41.0	29.6	9.0	3.0
714	23.0	14.329	14.324	25.2	70.0	14.342	14.327	43.2	51.7	496.5	46.9	28.2	7.2	–2.6
715	29.0	14.333	14.326	28.7	76.0	14.342	14.326	43.6	57.8	496.5	52.9	34.4	.8	–3.2
716	35.0	14.333	14.325	30.4	82.0	14.339	14.326	40.3	63.7	496.3	58.9	34.7	1.2	1.8
717	41.1	14.336	14.326	34.0	88.1	14.336	14.323	39.8	69.9	497.0	65.0	36.5	1.2	.7
718	47.1	14.336	14.325	36.1	94.1	14.342	14.327	43.3	75.8	497.6	70.9	39.9	–3.2	5.1
719	53.1	14.339	14.327	38.3	100.1	14.339	14.324	43.1	81.8	496.0	77.0	38.9	–1.4	9.2
720	59.0	14.339	14.324	41.4	106.0	14.339	14.324	42.5	87.8	494.5	82.9	36.9	–1.8	8.3
721	65.1	14.342	14.327	42.6	112.1	14.342	14.328	40.8	93.8	496.5	88.9	34.8	–5.2	–0.3
722	70.9	14.342	14.327	42.8	117.9	14.339	14.325	41.7	99.7	499.1	94.8	39.2	1.2	–2.6
723	76.8	14.342	14.327	42.2	123.8	14.342	14.329	40.5	105.6	499.5	100.7	35.8	4.8	–1.1
724	83.0	14.339	14.326	39.6	130.0	14.342	14.329	39.3	111.7	500.2	106.9	40.0	5.6	–1.4
725	95.0	14.345	14.329	43.4	142.0	14.336	14.329	29.5	123.7	502.2	118.8	37.1	6.4	–.7
726	107.0	14.342	14.327	42.1	154.0	14.330	14.324	25.5	135.8	500.9	130.9	36.0	6.7	–1.6
727	119.0	14.345	14.330	42.1	166.0	14.333	14.327	27.5	147.8	500.7	142.9	24.0	7.6	–2.1
728	131.0	14.339	14.327	38.1	178.0	14.336	14.326	34.7	159.7	499.6	154.9	18.1	4.8	–5.3
729	142.9	14.333	14.326	29.1	189.9	14.339	14.328	37.3	171.6	497.8	166.8	19.8	3.4	–2.7
730	154.9	14.333	14.328	24.6	201.9	14.339	14.327	38.0	183.7	498.4	178.8	29.8	4.8	–6.0
731	166.9	14.333	14.326	28.1	213.9	14.342	14.327	42.7	195.7	498.9	190.8	31.9	4.7	–1.4
732	178.9	14.336	14.326	34.6	225.9	14.339	14.328	37.1	207.7	498.9	202.8	34.8	3.5	.1
733	185.0	14.339	14.327	37.1	232.0	14.342	14.331	36.8	213.8	498.9	208.9	34.3	2.8	4.2
734	191.5	14.339	14.327	38.4	238.5	14.342	14.329	39.7	220.2	499.2	215.4	35.2	3.8	6.9
735	196.9	14.339	14.327	37.4	243.9	14.342	14.331	37.0	225.7	499.8	220.8	34.4	2.7	5.6

TABLE 21.—Concluded.

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
736	203.1	14.339	14.327	37.9	250.1	14.342	14.331	36.3	231.8	500.5	226.9	33.7	–4.6	3.7
737	208.9	14.342	14.328	40.6	255.9	14.336	14.327	32.4	237.6	501.1	232.8	32.0	–2.9	–1.2
738	215.0	14.342	14.328	41.0	262.0	14.336	14.328	30.5	243.8	501.9	238.9	35.5	.9	–2.7
739	221.0	14.342	14.329	39.6	268.0	14.336	14.330	28.2	249.7	502.0	244.9	30.3	.2	–1.9
740	227.0	14.342	14.331	36.7	274.0	14.336	14.331	24.3	255.8	502.0	250.9	26.5	8.2	4.5
741	233.1	14.342	14.331	36.9	280.1	14.333	14.330	20.4	261.8	502.0	256.9	30.3	6.8	0.0
742	238.9	14.342	14.329	39.1	285.9	14.333	14.330	18.1	267.6	502.2	262.8	28.5	.2	–2.8
743	244.8	14.342	14.330	37.9	291.8	14.330	14.327	18.1	273.6	502.5	268.7	17.1	5.2	–9.3
744	251.1	14.342	14.333	33.7	298.1	14.336	14.333	19.5	279.8	502.2	274.9	17.6	6.2	–2.3
745	256.9	14.342	14.334	30.9	303.9	14.336	14.333	19.7	285.7	503.1	280.8	11.7	8.0	–.4
746	243.1	14.345	14.332	39.7	290.1	14.336	14.333	18.8	271.9	502.9	267.0	24.9	3.7	–1.1
747	225.5	14.345	14.334	37.1	272.5	14.339	14.333	27.4	254.3	503.0	249.4	30.2	3.7	–.1
748	207.3	14.348	14.335	39.9	254.3	14.339	14.330	33.0	236.0	503.0	231.2	33.3	4.1	–.1
749	189.4	14.342	14.330	37.4	236.4	14.345	14.333	38.6	218.1	503.3	213.3	35.2	4.0	6.9
750	170.8	14.342	14.334	30.1	217.8	14.349	14.335	41.0	199.5	502.7	194.6	33.1	4.1	1.0
751	153.4	14.339	14.333	25.4	200.4	14.345	14.334	36.7	182.2	499.1	177.3	30.0	3.2	–1.8
752	135.1	14.342	14.332	34.6	182.1	14.345	14.334	36.4	163.9	499.1	159.0	19.0	5.3	–8.8
753	117.4	14.348	14.334	41.1	164.4	14.339	14.333	26.8	146.2	500.8	141.3	21.2	5.1	–4.8
754	99.1	14.351	14.335	44.2	146.1	14.336	14.329	28.4	127.8	502.0	123.0	37.5	8.8	–1.5
755	81.0	14.348	14.334	40.7	128.0	14.349	14.336	39.5	109.7	500.6	104.9	36.2	7.0	–1.5
756	63.0	14.351	14.335	43.7	110.0	14.349	14.334	42.0	91.7	497.1	86.8	36.6	–6.2	3.1
757	45.4	14.345	14.335	35.6	92.4	14.352	14.337	41.7	74.2	498.5	69.3	39.8	1.0	2.5
758	27.1	14.342	14.336	27.4	74.1	14.349	14.333	42.5	55.9	497.6	51.0	30.2	6.6	.5
759	8.9	14.339	14.337	16.7	55.9	14.352	14.337	41.8	37.7	496.9	32.8	24.3	6.5	–5.8
760	6.5	14.339	14.336	16.9	53.5	14.349	14.336	39.4	35.2	496.7	30.4	24.8	4.4	–7.1

TABLE 22.—DATA LISTING FOR TRAVERSE 2 AT STATION 5—VERTICAL SURVEY AT CENTERLINE

[Test section data for reading 711: total pressure, 14.362; static pressure, 12.256 psia; total temperature, 499 °R; velocity, 351.6 mph; fan speed, 395.9 rpm.]

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
711	4.6	14.340	14.338	16.8	50.7	14.352	14.339	38.7	31.2	494.7	27.7	25.0	2.3	1.2
712	11.2	14.346	14.342	22.0	57.3	14.358	14.343	42.0	37.8	493.8	34.3	29.1	4.0	.4
713	17.6	14.343	14.338	24.4	63.7	14.358	14.341	45.2	44.2	494.5	40.7	30.4	5.0	−8.2
714	23.1	14.346	14.340	26.4	69.2	14.358	14.341	45.0	49.7	494.5	46.2	27.4	7.9	−9.1
715	29.0	14.353	14.344	31.6	75.2	14.361	14.342	46.9	55.7	494.6	52.2	33.0	8.1	−2.1
716	34.9	14.349	14.339	36.0	81.0	14.361	14.342	47.6	61.5	494.7	58.0	38.6	5.1	−1.7
717	41.3	14.349	14.337	38.3	87.4	14.361	14.342	47.2	67.9	494.7	64.4	36.9	9.0	−4.0
718	47.1	14.356	14.343	39.5	93.3	14.358	14.339	47.0	73.8	494.8	70.3	42.4	6.7	−3.8
719	53.4	14.356	14.341	41.5	99.5	14.358	14.341	44.4	80.0	495.5	76.5	45.9	6.7	−1.9
720	59.1	14.356	14.339	44.3	105.2	14.355	14.339	42.7	85.7	495.7	82.2	42.9	6.4	−1.6
721	65.1	14.359	14.342	45.1	111.3	14.355	14.341	40.2	91.8	496.3	88.3	44.2	5.8	−0.6
722	71.2	14.359	14.341	46.6	117.3	14.352	14.339	38.1	97.8	496.5	94.3	46.2	6.3	−.8
723	77.3	14.359	14.340	47.6	123.4	14.345	14.336	33.2	103.9	496.8	100.4	41.7	5.9	−1.7
724	83.3	14.362	14.342	48.2	129.4	14.345	14.338	29.3	109.9	496.0	106.4	39.5	5.8	−2.5
725	95.0	14.359	14.341	46.6	141.1	14.345	14.340	25.8	121.6	494.9	118.1	31.4	5.9	.1
726	107.1	14.356	14.341	42.0	153.3	14.345	14.340	25.7	133.8	493.8	130.3	22.5	4.9	0.6
727	118.9	14.353	14.341	36.8	165.0	14.345	14.338	29.1	145.5	493.0	142.0	21.0	6.6	−3.7
728	131.3	14.346	14.340	28.4	177.4	14.352	14.342	33.3	157.9	492.7	154.4	21.2	2.4	1.6
729	143.0	14.343	14.338	25.4	189.1	14.352	14.340	36.5	169.6	492.5	166.1	21.1	2.4	1.1
730	154.8	14.346	14.340	26.4	200.9	14.355	14.341	40.1	181.4	493.4	177.9	31.6	1.6	−1.1
731	166.9	14.346	14.338	31.5	213.1	14.358	14.342	43.5	193.6	494.8	190.1	33.8	2.9	−1.9
732	178.9	14.349	14.339	34.6	225.0	14.358	14.343	41.5	205.5	496.0	202.0	39.1	2.7	−.1
733	184.9	14.353	14.341	36.6	231.0	14.358	14.343	42.2	211.5	496.3	208.0	38.5	2.0	−1.0
734	190.9	14.353	14.341	37.3	237.0	14.358	14.344	41.2	217.5	496.0	214.0	41.8	2.5	.1
735	196.9	14.353	14.340	39.4	243.0	14.355	14.342	39.6	223.5	497.0	220.0	40.6	2.8	.2

TABLE 22.—Concluded.

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
736	203.5	14.353	14.338	41.5	249.6	14.355	14.344	36.4	230.1	499.0	226.6	39.5	3.3	−0.9
737	209.0	14.356	14.341	42.7	255.2	14.352	14.340	36.5	235.7	500.6	232.2	38.9	3.8	−1.4
738	214.2	14.356	14.341	42.8	260.3	14.348	14.339	34.0	240.8	501.4	237.3	35.5	2.7	1.0
739	221.2	14.356	14.340	43.0	267.3	14.348	14.339	33.2	247.8	501.6	244.3	34.8	3.5	−1.9
740	227.4	14.356	14.341	42.2	273.6	14.348	14.341	30.8	254.1	501.8	250.6	30.8	3.8	−.4
741	232.6	14.356	14.341	41.7	278.7	14.345	14.339	28.1	259.2	501.8	255.7	37.1	4.6	0.1
742	238.9	14.356	14.342	41.0	285.0	14.348	14.344	22.4	265.5	502.2	262.0	20.1	2.9	4.6
743	245.5	14.356	14.343	38.6	291.7	14.342	14.339	19.3	272.2	502.2	268.7	26.5	5.2	2.1
744	251.1	14.356	14.344	37.9	297.2	14.342	14.340	16.8	277.7	502.5	274.2	24.5	6.2	.6
745	255.1	14.353	14.342	35.6	301.2	14.339	14.338	12.5	281.7	502.7	278.2	9.9	9.8	−1.6
746	243.4	14.359	14.345	40.4	289.5	14.345	14.342	21.2	270.0	502.9	266.5	24.2	6.1	0.1
747	225.3	14.359	14.343	43.8	271.5	14.348	14.340	31.6	252.0	502.9	248.5	38.7	6.0	−1.6
748	207.2	14.359	14.343	43.1	253.4	14.352	14.340	38.1	233.9	502.7	230.4	40.5	3.8	.6
749	189.8	14.353	14.341	37.6	236.0	14.355	14.340	41.8	216.5	501.4	213.0	42.3	2.4	−.7
750	170.5	14.353	14.344	32.2	216.6	14.358	14.341	44.3	197.1	497.8	193.6	35.3	2.9	−2.4
751	153.4	14.349	14.344	25.1	199.5	14.355	14.342	38.7	180.0	495.1	176.5	27.9	1.2	−2.2
752	135.4	14.349	14.343	27.3	181.5	14.355	14.345	34.6	162.0	494.3	158.5	19.1	2.9	−1.0
753	117.4	14.353	14.341	37.4	163.5	14.348	14.342	28.0	144.0	494.3	140.5	20.2	4.5	1.4
754	99.3	14.365	14.348	45.5	145.4	14.345	14.340	25.7	125.9	495.1	122.4	31.0	6.1	−.9
755	81.3	14.365	14.346	47.4	127.4	14.355	14.346	31.8	107.9	496.0	104.4	37.8	5.8	−2.1
756	62.9	14.365	14.347	45.8	109.0	14.361	14.346	42.0	89.5	496.8	86.0	48.0	6.4	−1.6
757	44.9	14.359	14.346	38.7	91.1	14.361	14.343	46.5	71.6	495.6	68.1	40.2	7.2	−3.1
758	27.0	14.353	14.345	29.6	73.2	14.364	14.346	46.9	53.7	495.3	50.2	35.8	4.5	−9.2
759	9.2	14.349	14.346	20.9	55.4	14.361	14.346	42.3	35.9	494.9	32.4	24.2	5.1	−2.4
760	5.5	14.349	14.346	19.2	51.7	14.361	14.347	41.0	32.2	495.0	28.7	24.9	.7	.6

TABLE 23.—DATA LISTING FOR TRAVERSE 1 AT STATION 5—VERTICAL SURVEY

[Test section data for reading 991: total pressure, 14.273; static pressure, 12.190 psia; total temperature, 498 °R; velocity, 350.4 mph; fan speed, 395.5 rpm.]

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
991	6.8	14.254	14.250	21.3	53.8	14.263	14.248	42.8	35.6	486.3	30.7	27.1	4.9	0.8
992	11.1	14.255	14.250	24.6	58.1	14.265	14.249	43.6	39.9	486.8	35.0	29.6	5.7	-1.0
993	17.1	14.257	14.250	27.5	64.1	14.265	14.249	44.3	45.9	486.6	41.0	31.9	5.0	-.8
994	22.9	14.257	14.249	30.5	69.9	14.265	14.248	44.3	51.7	486.4	46.8	33.9	5.4	-.7
995	28.2	14.259	14.250	33.2	75.2	14.264	14.247	43.4	57.0	486.5	52.1	36.0	6.4	-1.0
996	35.3	14.260	14.249	36.4	82.3	14.262	14.246	42.9	64.0	486.4	59.2	37.5	7.4	-1.1
997	40.9	14.263	14.250	38.9	87.9	14.263	14.247	43.4	69.7	486.8	64.8	37.8	8.3	0.0
998	46.9	14.263	14.249	41.2	93.9	14.263	14.246	44.3	75.6	488.2	70.8	38.2	8.1	-.8
999	53.0	14.264	14.249	42.9	100.0	14.262	14.246	44.1	81.7	489.8	76.9	38.3	8.1	.2
1000	59.2	14.265	14.249	43.9	106.2	14.261	14.245	43.0	87.9	492.2	83.1	37.7	8.1	.1
1001	65.1	14.265	14.248	44.0	112.1	14.259	14.245	40.8	93.9	494.0	89.0	38.0	8.0	0.4
1002	70.9	14.264	14.248	43.3	117.9	14.257	14.245	39.0	99.7	495.8	94.8	38.5	8.5	.1
1003	76.9	14.264	14.249	43.1	123.9	14.256	14.245	36.3	105.7	497.1	100.8	38.1	9.2	0.0
1004	83.3	14.265	14.249	43.2	130.3	14.254	14.244	33.4	112.0	497.4	107.1	35.6	8.8	.4
1005	95.0	14.264	14.248	44.3	142.0	14.252	14.245	30.6	123.7	496.9	118.9	31.2	9.5	.3
1006	106.7	14.262	14.247	42.5	153.7	14.251	14.243	29.3	135.5	496.1	130.6	26.2	9.2	1.0
1007	119.0	14.260	14.247	39.1	166.0	14.250	14.243	28.4	147.7	495.3	142.9	22.8	8.8	2.7
1008	131.0	14.254	14.245	33.0	178.0	14.250	14.243	28.9	159.8	494.9	154.9	22.6	8.8	1.6
1009	143.1	14.252	14.245	29.9	190.1	14.252	14.242	34.5	171.8	494.2	166.9	20.5	9.2	1.1
1010	155.0	14.252	14.245	29.5	202.0	14.255	14.243	37.4	183.7	493.9	178.9	22.3	7.9	2.1
1011	166.9	14.252	14.245	27.6	213.9	14.255	14.242	39.5	195.6	495.2	190.8	27.6	6.5	0.1
1012	179.2	14.251	14.244	30.0	226.2	14.256	14.242	40.0	207.9	498.4	203.0	32.3	6.9	-.3
1013	185.0	14.253	14.244	32.4	232.0	14.256	14.243	39.4	213.8	499.8	208.9	32.8	6.9	-.3
1014	190.7	14.254	14.244	35.1	237.7	14.254	14.241	38.2	219.5	501.0	214.6	34.2	6.9	.3
1015	197.0	14.254	14.243	37.2	244.0	14.252	14.241	36.9	225.8	501.6	220.9	34.7	7.6	.7

TABLE 23.—Concluded.

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
1016	202.8	14.255	14.243	37.9	249.8	14.250	14.240	35.1	231.6	501.8	226.7	34.6	7.3	0.7
1017	208.8	14.255	14.242	38.9	255.8	14.249	14.240	34.2	237.6	501.9	232.7	34.4	7.5	.2
1018	214.9	14.255	14.242	39.3	261.9	14.248	14.239	32.5	243.6	502.1	238.8	32.4	7.4	.5
1019	220.9	14.255	14.242	40.0	267.9	14.247	14.239	30.7	249.7	502.1	244.8	31.1	7.4	1.0
1020	227.0	14.255	14.242	39.9	274.0	14.246	14.239	29.0	255.8	502.0	250.9	29.5	8.5	.5
1021	232.9	14.254	14.242	38.9	279.9	14.245	14.239	27.5	261.7	502.1	256.8	27.1	7.2	1.7
1022	238.8	14.254	14.242	37.7	285.8	14.244	14.238	26.0	267.6	502.2	262.7	26.8	8.0	1.7
1023	245.0	14.252	14.241	36.0	292.0	14.242	14.238	24.0	273.8	502.3	268.9	23.5	9.9	.8
1024	250.8	14.251	14.241	34.7	297.8	14.242	14.238	22.6	279.5	502.4	274.7	22.9	8.6	2.3
1025	256.8	14.249	14.240	32.6	303.8	14.241	14.237	20.0	285.5	502.5	280.7	21.0	8.2	1.6
1026	261.2	14.248	14.240	32.1	308.2	14.239	14.237	17.2	290.0	502.4	285.1	18.3	8.3	0.7
1027	242.8	14.250	14.239	36.7	289.8	14.240	14.235	24.3	271.6	502.3	266.7	25.1	8.3	1.3
1028	225.3	14.252	14.239	40.1	272.3	14.242	14.235	29.8	254.0	502.2	249.1	30.5	7.5	1.2
1029	206.8	14.251	14.239	38.7	253.8	14.246	14.236	34.3	235.5	502.0	230.7	34.6	7.6	.6
1030	189.0	14.248	14.238	34.7	236.0	14.248	14.235	38.8	217.7	500.7	212.8	33.7	7.0	.3
1031	171.3	14.243	14.237	27.8	218.3	14.249	14.235	39.9	200.0	496.4	195.1	30.1	6.2	–0.6
1032	152.9	14.244	14.237	29.4	199.9	14.247	14.235	37.4	181.6	493.8	176.8	21.3	8.9	1.6
1033	135.1	14.245	14.236	32.0	182.1	14.242	14.234	31.0	163.8	494.3	159.0	21.5	9.4	1.1
1034	116.9	14.250	14.237	39.8	163.9	14.240	14.233	28.9	145.6	494.8	140.7	23.2	9.5	2.0
1035	99.2	14.255	14.238	44.2	146.2	14.241	14.234	30.0	128.0	495.8	123.1	29.2	9.9	.4
1036	80.8	14.252	14.237	42.8	127.8	14.243	14.233	35.0	109.6	496.5	104.7	36.2	9.3	0.1
1037	62.9	14.254	14.238	43.6	109.9	14.249	14.234	41.8	91.7	493.5	86.8	37.7	8.4	.2
1038	45.0	14.251	14.238	40.0	92.0	14.250	14.233	43.9	73.7	489.2	68.8	37.2	7.6	–1.0
1039	25.4	14.244	14.236	31.6	72.4	14.249	14.233	43.1	54.1	488.1	49.3	34.2	5.8	–1.7
1040	8.8	14.241	14.236	23.1	55.8	14.249	14.233	43.3	37.6	489.3	32.7	29.1	5.0	.4
1041	7.1	14.240	14.236	21.8	54.1	14.248	14.232	42.7	35.8	489.5	31.0	26.4	5.6	–2.7

TABLE 24.—DATA LISTING FOR TRAVERSE 1 AT STATION 5—VERTICAL SURVEY AT INSIDE WALL
[Test section data for reading 761: total pressure, 14.378; static pressure, 13.271 psia; total temperature, 497 °R; velocity, 250.7 mph; fan speed, 291.1 rpm.]

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
761	6.5	14.348	14.347	13.2	53.5	14.356	14.349	29.3	35.2	493.0	30.4	13.8	9.5	−4.6
762	11.3	14.348	14.346	15.1	58.3	14.356	14.347	31.9	40.1	494.0	35.2	11.1	8.4	.2
763	17.2	14.348	14.346	16.7	64.2	14.356	14.347	33.0	45.9	494.9	41.0	19.7	4.5	−4.0
764	23.1	14.348	14.345	20.3	70.1	14.359	14.350	32.7	51.8	494.9	47.0	20.9	1.9	−3.2
765	28.9	14.348	14.344	21.5	75.9	14.356	14.347	32.5	57.7	494.8	52.8	20.7	5.6	.4
766	35.2	14.351	14.347	22.6	82.2	14.356	14.348	29.8	63.9	493.8	59.1	24.5	1.2	−4.9
767	40.9	14.354	14.349	24.8	87.9	14.359	14.351	29.9	69.7	492.2	64.8	26.3	3.4	1.8
768	47.1	14.354	14.348	27.7	94.1	14.359	14.350	31.8	75.8	493.1	70.9	27.7	−1.4	5.8
769	53.3	14.354	14.347	29.1	100.3	14.359	14.350	33.2	82.0	491.7	77.2	29.5	−3.8	8.7
770	59.0	14.358	14.349	31.3	106.0	14.359	14.350	32.0	87.8	491.1	82.9	24.9	−4.8	7.1
771	64.9	14.358	14.348	33.3	111.9	14.362	14.353	32.3	93.6	494.5	88.7	24.2	−4.4	2.1
772	71.1	14.358	14.349	32.8	118.1	14.362	14.353	32.7	99.9	498.9	95.0	27.5	1.2	−1.3
773	77.3	14.361	14.353	31.1	124.3	14.362	14.354	32.0	106.1	500.2	101.2	26.9	6.1	−2.1
774	83.4	14.358	14.350	29.4	130.4	14.365	14.358	29.8	112.1	499.1	107.3	26.9	7.0	−.9
775	95.0	14.361	14.352	32.7	142.0	14.358	14.353	24.0	123.7	500.3	118.8	28.0	6.5	−1.9
776	107.0	14.362	14.353	32.5	154.0	14.356	14.353	19.5	135.8	499.3	130.9	24.4	6.9	−1.4
777	118.9	14.362	14.353	32.6	165.9	14.356	14.353	20.9	147.6	499.9	142.8	15.8	6.4	−2.5
778	131.0	14.360	14.352	29.6	178.0	14.359	14.353	26.2	159.8	501.0	154.9	12.2	4.7	−6.4
779	143.3	14.358	14.354	22.6	190.3	14.362	14.355	29.1	172.1	501.8	167.2	14.3	4.3	−5.6
780	155.1	14.358	14.355	19.3	202.1	14.362	14.355	28.9	183.9	501.3	179.0	20.7	4.1	−2.8
781	167.0	14.358	14.354	21.4	214.0	14.364	14.355	31.8	195.8	500.9	190.9	22.9	4.4	−1.7
782	179.1	14.359	14.353	26.6	226.1	14.361	14.355	28.2	207.9	500.1	203.0	24.8	3.2	1.8
783	185.2	14.361	14.354	28.5	232.2	14.362	14.355	28.3	213.9	500.1	209.1	26.4	3.2	3.9
784	191.2	14.362	14.355	29.0	238.2	14.364	14.356	30.4	220.0	501.1	215.1	24.6	2.7	5.7
785	197.0	14.363	14.357	28.4	244.0	14.365	14.358	29.7	225.8	501.8	220.9	23.4	.2	5.8

TABLE 24.—Concluded.

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
786	203.0	14.364	14.357	29.0	250.0	14.364	14.358	27.8	231.7	501.7	226.8	23.4	–2.6	3.2
787	209.1	14.365	14.357	31.9	256.1	14.363	14.357	25.6	237.8	500.8	232.9	25.1	–1.2	.1
788	215.1	14.363	14.355	31.3	262.1	14.361	14.357	23.4	243.9	500.2	239.0	26.4	1.6	–.3
789	221.4	14.363	14.356	29.3	268.4	14.361	14.357	20.7	250.1	501.3	245.3	23.7	3.6	–.5
790	226.9	14.363	14.356	28.0	273.9	14.362	14.359	19.0	255.7	502.0	250.8	22.1	4.9	–.1
791	233.4	14.365	14.358	28.8	280.4	14.361	14.359	17.1	262.2	501.5	257.3	17.6	6.7	2.0
792	239.0	14.365	14.358	30.0	286.0	14.360	14.358	15.7	267.8	500.4	262.9	14.4	5.9	.9
793	245.1	14.364	14.357	29.0	292.1	14.359	14.357	14.4	273.8	500.1	269.0	12.7	7.6	–.2
794	251.4	14.363	14.357	26.6	298.4	14.360	14.358	14.4	280.1	501.1	275.3	6.9	6.8	.8
795	257.3	14.363	14.358	23.9	304.3	14.361	14.359	15.3	286.1	502.7	281.2	5.6	8.3	–3.2
796	243.0	14.367	14.359	29.8	290.0	14.362	14.360	14.4	271.7	503.0	266.9	11.9	6.3	–0.5
797	225.0	14.366	14.360	28.3	272.0	14.363	14.360	19.6	253.8	501.5	248.9	20.2	4.9	.2
798	207.3	14.367	14.359	31.4	254.3	14.367	14.361	25.9	236.1	501.7	231.2	22.9	–1.5	.3
799	189.3	14.367	14.360	28.9	236.3	14.367	14.360	29.9	218.0	502.4	213.1	24.3	3.0	5.2
800	171.2	14.364	14.359	23.0	218.2	14.369	14.361	30.8	199.9	502.6	195.1	22.0	4.4	–1.0
801	152.9	14.364	14.361	19.6	199.9	14.368	14.362	28.5	181.7	501.7	176.8	19.0	4.3	–3.1
802	135.0	14.366	14.359	27.4	182.0	14.368	14.361	27.6	163.8	502.2	158.9	11.6	4.6	–6.9
803	117.6	14.369	14.360	32.2	164.6	14.364	14.360	20.7	146.3	502.0	141.4	17.5	7.3	–1.8
804	99.3	14.369	14.360	33.6	146.3	14.365	14.361	21.4	128.0	501.4	123.2	27.6	6.9	–1.6
805	80.9	14.367	14.359	30.8	127.9	14.369	14.361	30.8	109.7	498.5	104.8	26.9	6.6	–1.3
806	63.2	14.370	14.361	32.8	110.2	14.371	14.362	32.3	92.0	492.5	87.1	25.2	–4.6	3.0
807	45.2	14.367	14.361	27.0	92.2	14.369	14.361	31.5	73.9	493.8	69.0	27.4	–.3	4.1
808	27.1	14.364	14.361	20.2	74.1	14.372	14.362	33.0	55.9	496.2	51.0	22.7	4.9	–1.7
809	9.1	14.363	14.362	13.3	56.1	14.370	14.362	31.1	37.9	496.8	33.0	14.6	6.9	–2.9
810	6.5	14.363	14.362	12.4	53.5	14.370	14.362	30.4	35.2	496.5	30.4	11.9	8.1	–4.2

TABLE 25.—DATA LISTING FOR TRAVERSE 2 AT STATION 5—VERTICAL SURVEY

[Test section data for reading 761: total pressure, 14.378; static pressure, 13.271 psia; total temperature, 497 °R; velocity, 250.7 mph; fan speed, 291.1 rpm.]

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
761	5.5	14.359	14.357	13.6	51.7	14.372	14.365	29.8	32.2	491.1	28.7	11.6	4.2	5.3
762	11.0	14.362	14.360	15.9	57.1	14.369	14.361	31.9	37.6	492.0	34.1	14.6	3.2	–5.4
763	17.1	14.362	14.359	19.5	63.2	14.369	14.359	34.3	43.7	492.5	40.2	23.2	3.4	–7.9
764	23.0	14.362	14.358	22.7	69.1	14.369	14.359	35.4	49.6	492.5	46.1	22.2	3.6	–3.4
765	29.3	14.362	14.358	22.5	75.5	14.369	14.359	34.9	56.0	491.7	52.5	24.6	2.1	–7.3
766	34.9	14.362	14.357	25.4	81.0	14.372	14.362	35.0	61.5	492.0	58.0	28.6	5.8	–2.3
767	41.0	14.365	14.359	27.3	87.1	14.372	14.362	35.0	67.6	492.1	64.1	29.3	6.4	–3.5
768	46.8	14.368	14.362	27.6	93.0	14.369	14.359	34.6	73.5	492.2	70.0	29.2	6.4	–1.4
769	53.3	14.365	14.357	30.4	99.4	14.369	14.360	33.8	79.9	492.0	76.4	32.8	6.2	–2.0
770	59.1	14.368	14.359	33.1	105.2	14.369	14.360	32.3	85.7	493.5	82.2	31.6	6.4	–2.2
771	65.5	14.368	14.358	34.6	111.7	14.369	14.361	31.0	92.2	496.3	88.7	33.0	6.3	–0.9
772	71.1	14.371	14.361	35.6	117.2	14.360	14.354	27.5	97.7	499.2	94.2	32.4	5.8	–.9
773	77.0	14.365	14.355	35.1	123.1	14.363	14.358	25.2	103.6	500.2	100.1	30.9	6.2	–.8
774	83.0	14.371	14.361	34.9	129.1	14.363	14.359	22.3	109.6	498.1	106.1	28.7	6.1	.4
775	95.0	14.372	14.362	35.0	141.1	14.363	14.360	18.4	121.6	495.4	118.1	22.1	5.9	–2.1
776	107.3	14.371	14.363	31.9	153.5	14.366	14.363	18.6	134.0	493.8	130.5	15.4	6.2	–1.3
777	119.1	14.367	14.361	27.3	165.2	14.366	14.362	22.6	145.7	495.6	142.2	11.8	4.5	0.0
778	131.0	14.365	14.361	21.9	177.1	14.366	14.361	25.9	157.6	498.2	154.1	12.0	3.2	–1.4
779	143.0	14.363	14.361	18.6	189.2	14.366	14.359	28.3	169.7	499.8	166.2	16.9	2.1	–1.2
780	154.6	14.365	14.362	19.6	200.7	14.370	14.362	30.9	181.2	499.6	177.7	21.8	2.1	0.0
781	167.0	14.367	14.363	23.4	213.2	14.373	14.363	32.9	193.7	499.4	190.2	25.1	2.4	–1.6
782	179.3	14.369	14.363	26.8	225.4	14.373	14.364	32.4	205.9	499.5	202.4	29.0	2.6	–1.2
783	185.3	14.369	14.362	27.9	231.5	14.373	14.364	31.6	212.0	499.6	208.5	29.8	2.7	–.8
784	191.1	14.371	14.364	29.1	237.3	14.370	14.362	31.3	217.8	501.1	214.3	30.2	2.5	–.6
785	197.1	14.371	14.363	30.3	243.2	14.369	14.362	30.1	223.7	501.9	220.2	29.5	3.4	–.6

TABLE 25.—Concluded.

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
786	203.0	14.372	14.363	32.1	249.2	14.370	14.363	28.8	229.7	501.8	226.2	29.0	2.7	−0.3
787	209.1	14.374	14.365	33.2	255.2	14.372	14.365	27.8	235.7	500.4	232.2	28.4	2.4	−.8
788	215.4	14.373	14.363	33.4	261.5	14.371	14.365	26.7	242.0	499.8	238.5	27.1	4.1	−1.3
789	221.7	14.372	14.363	32.6	267.8	14.367	14.362	23.4	248.3	501.1	244.8	25.4	2.4	−2.1
790	227.3	14.372	14.364	32.4	273.4	14.366	14.362	22.1	253.9	501.9	250.4	25.5	4.1	.1
791	232.7	14.374	14.366	31.8	278.8	14.369	14.366	19.7	259.3	501.2	255.8	22.9	4.5	1.3
792	239.0	14.374	14.366	30.9	285.1	14.368	14.366	15.6	265.6	500.2	262.1	20.2	5.4	1.4
793	245.0	14.373	14.365	29.9	291.1	14.367	14.365	14.5	271.6	499.8	268.1	18.7	6.9	.9
794	250.9	14.371	14.364	28.7	297.0	14.364	14.363	12.1	277.5	501.0	274.0	15.0	6.7	−.7
795	255.2	14.370	14.364	27.4	301.3	14.361	14.361	9.6	281.8	502.8	278.3	9.1	7.3	.2
796	243.1	14.374	14.366	30.4	289.2	14.365	14.364	14.5	269.7	503.1	266.2	18.2	5.7	1.1
797	225.9	14.377	14.368	32.2	272.0	14.373	14.368	22.9	252.5	501.3	249.0	25.3	4.0	−.9
798	207.3	14.377	14.368	32.9	253.5	14.374	14.367	28.5	234.0	501.7	230.5	28.3	3.1	−.5
799	189.1	14.374	14.367	28.8	235.3	14.375	14.367	31.4	215.8	502.3	212.3	30.6	2.7	−.5
800	171.4	14.372	14.367	25.0	217.6	14.375	14.366	32.9	198.1	502.0	194.6	26.4	2.7	−1.6
801	153.6	14.371	14.368	19.4	199.7	14.375	14.368	30.5	180.2	500.2	176.7	22.1	2.6	−0.4
802	134.9	14.370	14.367	20.2	181.0	14.373	14.366	26.9	161.5	499.8	158.0	14.5	2.2	−1.2
803	117.3	14.374	14.367	28.0	163.4	14.372	14.368	21.9	143.9	497.7	140.4	12.8	6.2	−.2
804	99.4	14.378	14.369	34.1	145.5	14.370	14.367	18.0	126.0	496.2	122.5	19.7	5.9	−1.7
805	81.1	14.379	14.369	35.1	127.2	14.372	14.368	23.4	107.7	499.4	104.2	29.8	5.7	−1.9
806	63.4	14.378	14.369	34.0	109.5	14.376	14.368	30.8	90.0	496.4	86.5	32.4	6.6	−1.7
807	45.2	14.376	14.369	29.4	91.3	14.379	14.369	35.1	71.8	494.4	68.3	33.1	5.8	−2.3
808	26.9	14.373	14.369	21.7	73.0	14.380	14.369	35.3	53.5	494.9	50.0	24.4	4.7	−3.5
809	9.3	14.371	14.370	14.1	55.4	14.378	14.369	32.2	35.9	495.2	32.4	16.5	2.7	−2.6
810	5.7	14.370	14.369	13.0	51.8	14.375	14.367	30.9	32.3	495.2	28.8	16.3	2.1	−1.8

TABLE 26.—DATA LISTING FOR TRAVERSE 1 AT STATION 5—VERTICAL SURVEY

[Test section data for reading 1050: total pressure, 14.263; static pressure, 13.158 psia; total temperature, 497 °R; velocity, 251.7 mph; fan speed, 292.4 rpm.]

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
1050	6.8	14.245	14.243	16.7	53.8	14.252	14.244	31.2	35.6	489.8	30.7	18.4	6.4	−1.0
1051	11.1	14.246	14.243	18.1	58.1	14.253	14.245	31.7	39.9	489.7	35.0	18.7	5.4	−2.5
1052	17.0	14.246	14.242	20.5	64.0	14.253	14.244	32.0	45.8	489.8	40.9	21.3	5.7	−.3
1053	23.1	14.247	14.243	22.9	70.1	14.253	14.245	32.1	51.9	489.5	47.0	23.1	6.6	−1.6
1054	29.0	14.248	14.243	24.6	76.0	14.253	14.245	31.4	57.7	489.3	52.9	24.3	6.0	−.4
1055	35.2	14.249	14.243	26.8	82.2	14.253	14.244	31.8	63.9	488.9	59.1	24.9	7.3	−1.3
1056	40.8	14.251	14.244	28.2	87.8	14.254	14.245	32.1	69.6	488.7	64.7	25.4	8.2	−.5
1057	47.0	14.251	14.244	30.2	94.0	14.254	14.246	32.4	75.8	488.7	70.9	25.5	8.3	−.2
1058	53.1	14.252	14.244	31.0	100.1	14.253	14.245	31.8	81.9	489.0	77.0	25.2	8.4	.4
1059	59.2	14.252	14.244	31.7	106.2	14.253	14.245	30.9	87.9	489.9	83.1	25.4	8.2	.6
1060	65.0	14.253	14.244	31.8	112.0	14.253	14.246	29.4	93.8	491.6	88.9	25.7	8.1	0.3
1061	71.0	14.252	14.243	31.5	118.0	14.252	14.246	27.8	99.8	493.2	94.9	25.7	8.9	.5
1062	78.9	14.252	14.244	31.2	125.9	14.251	14.245	25.7	107.6	494.7	102.8	24.2	8.8	.8
1063	83.0	14.253	14.244	31.4	130.0	14.250	14.245	24.7	111.7	495.1	106.8	23.0	8.7	.9
1064	95.1	14.254	14.245	32.5	142.1	14.249	14.245	22.4	123.8	495.7	119.0	20.0	9.5	.8
1065	106.8	14.252	14.245	30.4	153.8	14.250	14.246	21.9	135.6	495.7	130.7	15.2	9.0	2.8
1066	118.9	14.251	14.245	26.9	165.9	14.249	14.246	20.9	147.6	495.4	142.8	12.7	8.8	2.9
1067	131.4	14.250	14.245	23.7	178.4	14.250	14.246	22.1	160.2	495.1	155.3	12.6	9.0	1.7
1068	142.9	14.248	14.244	21.9	189.9	14.252	14.246	26.3	171.6	495.2	166.7	12.5	8.6	1.4
1069	155.2	14.249	14.245	21.3	202.2	14.254	14.247	28.6	184.0	495.4	179.1	13.8	7.2	1.1
1070	167.4	14.248	14.244	20.5	214.4	14.255	14.248	30.1	196.1	496.1	191.3	18.1	6.3	0.9
1071	179.3	14.249	14.245	22.2	226.3	14.256	14.248	30.5	208.0	496.7	203.1	21.1	7.6	−.1
1072	184.8	14.251	14.246	24.4	231.8	14.256	14.249	30.3	213.6	496.8	208.7	22.1	7.7	.6
1073	190.8	14.251	14.245	26.5	237.8	14.256	14.249	29.4	219.6	496.7	214.7	23.8	7.2	.7
1074	197.4	14.252	14.245	28.0	244.4	14.255	14.249	28.1	226.2	496.4	221.3	24.8	7.7	.9

TABLE 26.—Concluded.

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
1075	203.0	14.252	14.245	28.6	250.0	14.256	14.250	26.9	231.7	496.4	226.8	24.5	7.3	0.7
1076	208.9	14.252	14.245	29.3	255.9	14.254	14.249	25.8	237.7	496.9	232.8	23.8	7.0	.1
1077	215.3	14.254	14.247	29.8	262.3	14.255	14.250	24.2	244.1	497.6	239.2	22.3	7.1	.2
1078	221.6	14.255	14.247	30.5	268.6	14.256	14.251	23.4	250.3	498.1	245.4	21.4	7.8	.5
1079	227.0	14.256	14.248	30.3	274.0	14.255	14.251	22.4	255.7	498.2	250.8	20.7	8.2	.7
1080	233.2	14.256	14.249	29.6	280.2	14.256	14.252	21.1	261.9	498.4	257.0	18.8	8.0	1.5
1081	238.8	14.256	14.249	28.7	285.8	14.255	14.252	20.0	267.5	498.4	262.6	16.7	8.2	1.5
1082	244.7	14.256	14.250	27.6	291.7	14.256	14.253	18.9	273.4	498.5	268.5	15.7	9.0	2.3
1083	250.7	14.256	14.251	26.5	297.7	14.256	14.253	17.7	279.5	498.6	274.6	14.6	10.0	1.6
1084	257.0	14.256	14.251	25.3	304.0	14.256	14.254	15.0	285.7	498.7	280.9	12.2	10.0	3.7
1085	260.7	14.256	14.251	24.4	307.7	14.255	14.254	13.9	289.4	498.7	284.5	12.3	10.2	2.2
1086	243.3	14.258	14.252	27.6	290.3	14.257	14.254	18.5	272.1	498.7	267.2	15.9	8.9	2.3
1087	224.8	14.260	14.253	30.3	271.8	14.259	14.254	23.0	253.6	498.6	248.7	20.8	7.4	.9
1088	207.0	14.261	14.254	29.1	254.0	14.261	14.255	26.1	235.8	498.4	230.9	24.2	7.2	.9
1089	188.9	14.260	14.254	25.5	235.9	14.263	14.255	29.7	217.7	498.1	212.8	23.6	7.1	.7
1090	171.2	14.258	14.254	20.3	218.2	14.264	14.256	30.5	200.0	497.3	195.1	19.3	7.0	0.7
1091	153.2	14.259	14.255	21.5	200.2	14.262	14.256	28.0	182.0	496.1	177.1	13.2	7.9	1.4
1092	135.1	14.259	14.254	22.8	182.1	14.261	14.257	23.3	163.8	495.7	159.0	12.4	9.1	1.5
1093	116.0	14.262	14.255	27.8	163.0	14.261	14.258	21.3	144.7	496.2	139.8	13.7	8.9	2.6
1094	99.0	14.264	14.256	31.7	146.0	14.262	14.258	21.9	127.8	496.8	122.9	18.1	9.8	2.2
1095	81.1	14.264	14.256	31.2	128.1	14.263	14.258	24.5	109.8	496.1	105.0	23.6	9.0	1.0
1096	63.3	14.265	14.256	31.8	110.3	14.265	14.257	29.7	92.1	492.1	87.2	25.8	7.9	.3
1097	44.8	14.264	14.257	29.7	91.8	14.267	14.258	32.4	73.6	489.3	68.7	25.7	7.8	.3
1098	27.3	14.262	14.257	24.4	74.3	14.265	14.257	31.3	56.0	489.6	51.2	24.2	5.6	−1.8
1099	8.9	14.260	14.257	17.6	55.9	14.267	14.259	31.3	37.7	490.1	32.8	20.2	5.8	−2.8
1100	7.4	14.259	14.256	16.2	54.4	14.266	14.257	31.4	36.1	490.1	31.2	21.0	2.4	−1.7

TABLE 27.—DATA LISTING FOR TRAVERSE 1 AT STATION 5—HORIZONTAL SURVEY NEAR FLOOR

[Test section data for reading 1265: total pressure, 14.209; static pressure, 12.148 psia; total temperature, 500 °R; velocity, 349.9 mph; fan speed, 395.3 rpm.]

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
1265	5.4	14.194	14.188	26.5	52.4	14.198	14.189	32.4	34.2	504.7	29.3	13.5	1.7	–0.8
1266	14.9	14.192	14.188	21.3	61.9	14.201	14.189	38.5	43.7	504.2	38.8	17.1	.4	–1.1
1267	24.9	14.192	14.188	21.0	71.9	14.204	14.189	43.0	53.6	495.6	48.8	25.2	.3	–5.3
1268	35.0	14.193	14.189	20.9	82.0	14.204	14.188	43.7	63.8	494.1	58.9	32.3	3.6	1.2
1269	45.4	14.195	14.188	28.6	92.4	14.205	14.189	44.3	74.2	496.1	69.3	37.4	3.9	–4.3
1270	54.9	14.198	14.189	34.1	101.9	14.205	14.189	44.1	83.7	497.4	78.8	36.7	–1.1	–3.4
1271	65.4	14.201	14.188	39.6	112.4	14.205	14.188	45.8	94.2	499.4	89.3	38.6	–4.8	8.0
1272	75.2	14.204	14.188	44.3	122.2	14.207	14.189	46.9	104.0	497.3	99.1	39.3	–2.8	10.7
1273	85.1	14.203	14.188	42.3	132.1	14.208	14.189	47.4	113.8	499.2	109.0	37.3	3.2	.6
1274	95.3	14.204	14.188	44.8	142.3	14.210	14.190	49.1	124.0	499.7	119.1	40.9	3.3	–1.8
1275	104.9	14.202	14.187	41.7	151.9	14.209	14.190	47.1	133.7	494.2	128.8	40.0	3.6	1.7
1276	114.9	14.208	14.189	47.0	161.9	14.206	14.189	44.4	143.6	492.5	138.8	43.6	2.8	.7
1277	124.8	14.207	14.190	46.0	171.8	14.206	14.190	43.3	153.6	495.0	148.7	42.4	3.6	–.4
1278	134.8	14.209	14.190	47.9	181.8	14.209	14.190	47.5	163.5	493.8	158.6	39.5	2.7	1.2
1279	145.2	14.211	14.190	49.5	192.2	14.208	14.190	45.6	174.0	493.8	169.1	37.2	2.2	1.6
1280	154.9	14.207	14.189	46.6	201.9	14.208	14.189	47.9	183.6	494.3	178.7	42.3	1.8	1.9
1281	164.9	14.205	14.190	43.0	211.9	14.211	14.191	48.8	193.7	495.3	188.8	40.6	2.2	1.9
1282	174.8	14.207	14.190	44.7	221.8	14.209	14.191	46.6	203.6	494.7	198.7	42.2	1.8	1.6
1283	184.7	14.209	14.190	46.8	231.7	14.208	14.191	45.5	213.5	494.3	208.6	42.5	2.1	.6
1284	195.1	14.208	14.191	46.1	242.1	14.208	14.192	44.4	223.9	494.3	219.0	41.4	1.9	.2
1285	205.4	14.210	14.191	48.7	252.4	14.207	14.191	43.7	234.1	494.5	229.3	40.4	1.9	1.5
1286	215.1	14.210	14.191	47.8	262.1	14.208	14.192	43.1	243.8	493.0	239.0	39.3	1.7	2.0
1287	224.8	14.209	14.191	46.1	271.8	14.207	14.192	42.3	253.6	491.6	248.7	38.8	1.5	1.0
1288	235.2	14.208	14.191	44.4	282.2	14.207	14.192	41.6	263.9	490.2	259.1	38.6	.9	1.1
1289	244.8	14.207	14.191	43.4	291.8	14.206	14.192	40.8	273.6	489.8	268.7	37.2	1.0	–.1

TABLE 27.—Concluded.

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
1290	255.4	14.207	14.192	43.2	302.4	14.206	14.193	39.3	284.2	490.1	279.3	35.5	0.9	–0.3
1291	264.8	14.207	14.192	42.7	311.8	14.205	14.193	38.6	293.6	490.1	288.7	34.8	.8	–.6
1292	275.3	14.207	14.192	41.4	322.3	14.206	14.194	37.4	304.1	491.2	299.2	33.4	1.4	–1.3
1293	284.9	14.207	14.193	40.8	331.9	14.205	14.194	35.5	313.7	491.1	308.8	32.4	1.5	–1.5
1294	290.1	14.207	14.193	40.5	337.1	14.204	14.195	34.2	318.9	490.0	314.0	31.9	2.2	–2.6
1295	270.4	14.209	14.194	42.4	317.4	14.206	14.194	37.5	299.1	490.5	294.2	34.3	0.8	–0.5
1296	249.9	14.208	14.193	42.9	296.9	14.206	14.193	39.6	278.7	490.1	273.8	36.0	.7	.5
1297	230.4	14.212	14.194	45.7	277.4	14.209	14.194	41.6	259.2	490.8	254.3	39.0	1.2	2.0
1298	209.8	14.214	14.194	49.3	256.8	14.211	14.195	43.7	238.6	493.8	233.7	39.8	1.9	2.4
1299	190.3	14.211	14.194	45.5	237.3	14.211	14.195	44.8	219.1	494.3	214.2	43.0	2.1	1.2
1300	170.0	14.210	14.194	43.5	217.0	14.213	14.194	47.4	198.7	495.0	193.9	41.1	2.6	1.9
1301	150.1	14.213	14.194	48.3	197.1	14.212	14.194	46.2	178.8	493.9	173.9	39.4	2.1	2.2
1302	130.0	14.211	14.194	45.9	177.0	14.212	14.194	46.0	158.8	494.3	153.9	41.9	3.3	–.2
1303	110.0	14.207	14.192	43.2	157.0	14.212	14.193	46.8	138.8	494.1	133.9	42.5	2.7	.8
1304	90.1	14.208	14.193	42.7	137.1	14.213	14.193	49.0	118.9	500.6	114.0	42.6	3.3	–3.1
1305	69.9	14.207	14.193	40.8	116.9	14.212	14.193	48.0	98.6	497.9	93.8	40.0	–4.2	8.5
1306	50.4	14.198	14.192	27.0	97.4	14.209	14.192	45.6	79.2	497.4	74.3	38.5	.4	–5.1
1307	30.1	14.196	14.192	20.4	77.1	14.211	14.194	45.0	58.9	494.7	54.0	28.4	1.6	5.2
1308	10.5	14.197	14.192	25.8	57.5	14.205	14.193	37.5	39.3	503.2	34.4	13.8	1.5	0.0

TABLE 28.—DATA LISTING FOR TRAVERSE 2 AT STATION 5—HORIZONTAL SURVEY AT CENTERLINE

[Test section data for reading 1265: total pressure, 14.209; static pressure, 12.148 psia; total temperature, 500 °R; velocity, 349.9 mph; fan speed, 395.3 rpm.]

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
1265	5.1	14.194	14.190	22.2	51.3	14.195	14.189	26.9	31.8	504.7	28.3	16.2	-0.2	1.4
1266	15.0	14.193	14.189	21.2	61.2	14.200	14.190	35.1	41.7	504.9	38.2	20.7	2.0	-.5
1267	24.9	14.193	14.190	20.0	71.0	14.197	14.189	31.6	51.5	504.9	48.0	22.2	3.9	-5.5
1268	35.4	14.195	14.191	23.5	81.5	14.195	14.190	25.1	62.0	504.4	58.5	29.7	3.3	-9.1
1269	45.4	14.197	14.191	25.0	91.5	14.195	14.190	25.5	72.0	503.2	68.5	26.9	4.5	1.6
1270	54.8	14.199	14.191	31.3	100.9	14.196	14.190	25.1	81.4	501.3	77.9	19.8	5.7	6.1
1271	65.0	14.200	14.191	34.4	111.1	14.196	14.191	23.7	91.6	500.3	88.1	20.0	4.3	5.2
1272	75.1	14.196	14.190	27.6	121.2	14.196	14.191	23.7	101.7	499.5	98.2	20.7	5.0	3.2
1273	85.1	14.196	14.191	25.1	131.3	14.197	14.192	25.3	111.8	498.2	108.3	19.2	4.1	2.4
1274	95.4	14.197	14.191	25.6	141.5	14.197	14.191	25.6	122.0	496.6	118.5	18.4	1.6	2.0
1275	105.0	14.196	14.191	25.1	151.1	14.198	14.193	24.1	131.6	496.0	128.1	20.7	0.4	1.6
1276	115.1	14.196	14.191	23.6	161.2	14.196	14.192	22.0	141.7	496.3	138.2	21.4	.2	.4
1277	125.0	14.196	14.191	24.7	171.1	14.197	14.192	24.5	151.6	495.9	148.1	20.7	.8	.1
1278	134.9	14.197	14.191	25.8	181.0	14.196	14.191	24.4	161.5	494.8	158.0	17.4	-.5	.8
1279	145.0	14.196	14.190	26.2	191.1	14.197	14.192	24.0	171.6	493.9	168.1	20.1	-3.3	-.1
1280	154.9	14.196	14.192	23.0	201.0	14.197	14.192	24.8	181.5	493.3	178.0	21.0	-2.1	-1.1
1281	165.0	14.195	14.191	23.5	211.1	14.198	14.193	25.7	191.6	492.8	188.1	17.5	-.7	.9
1282	174.9	14.197	14.192	25.2	221.0	14.198	14.193	26.1	201.5	492.5	198.0	17.9	-2.0	2.6
1283	185.2	14.195	14.191	24.1	231.3	14.199	14.193	27.9	211.8	492.5	208.3	19.7	-2.9	1.7
1284	194.7	14.196	14.191	24.4	240.8	14.202	14.194	32.0	221.3	492.7	217.8	20.8	-3.9	2.1
1285	205.4	14.196	14.191	25.5	251.5	14.203	14.194	34.3	232.0	493.5	228.5	22.5	-4.4	1.5
1286	214.8	14.197	14.192	26.2	261.0	14.202	14.194	30.9	241.4	494.3	237.9	27.6	-3.2	-.6
1287	225.0	14.198	14.192	26.9	271.1	14.201	14.194	27.4	251.6	494.9	248.1	31.4	-2.8	-2.6
1288	235.1	14.199	14.192	30.1	281.2	14.202	14.195	28.1	261.7	495.4	258.2	27.3	-2.6	-1.4
1289	245.3	14.203	14.193	34.4	291.5	14.204	14.195	32.3	272.0	495.7	268.5	21.2	-3.9	0.0

TABLE 28.—Concluded.

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
1290	255.0	14.203	14.194	33.6	301.1	14.204	14.195	32.0	281.6	496.4	278.1	21.6	–5.4	0.9
1291	265.2	14.201	14.194	29.4	311.3	14.204	14.195	31.8	291.8	497.0	288.3	26.4	–5.3	–.3
1292	275.4	14.201	14.195	27.3	321.5	14.204	14.196	31.1	302.0	496.4	298.5	28.3	–5.2	–.4
1293	285.1	14.203	14.195	30.7	331.2	14.205	14.197	30.8	311.7	496.1	308.2	27.4	–4.9	–.2
1294	290.5	14.204	14.195	32.2	336.7	14.206	14.198	29.9	317.2	496.0	313.7	27.2	–5.4	–.7
1295	269.8	14.202	14.195	27.8	316.0	14.205	14.197	31.2	296.5	496.4	293.0	28.8	–5.3	0.0
1296	250.2	14.203	14.193	34.6	296.3	14.206	14.197	32.4	276.8	496.4	273.3	21.3	–4.9	1.1
1297	230.4	14.201	14.194	28.3	276.5	14.203	14.197	27.1	257.0	495.6	253.5	30.3	–2.4	–2.1
1298	210.3	14.200	14.195	25.9	256.4	14.207	14.198	33.1	236.9	494.2	233.4	26.0	–4.5	–.1
1299	190.2	14.199	14.194	24.2	236.3	14.204	14.197	29.9	216.8	492.8	213.3	19.5	–3.8	2.0
1300	169.9	14.200	14.195	24.5	216.1	14.202	14.197	25.7	196.6	492.6	193.1	16.8	–2.2	1.5
1301	150.2	14.199	14.194	24.4	196.3	14.201	14.196	24.0	176.8	493.4	173.3	19.0	–2.8	–.1
1302	130.0	14.199	14.194	25.3	176.1	14.201	14.196	24.8	156.6	494.8	153.1	17.5	–.9	.6
1303	110.3	14.199	14.195	24.0	156.5	14.200	14.196	22.2	137.0	496.0	133.5	20.1	–.7	1.0
1304	89.9	14.199	14.194	25.4	136.1	14.201	14.196	25.3	116.6	496.9	113.1	17.4	2.7	1.5
1305	70.0	14.203	14.195	32.1	116.2	14.201	14.196	22.9	96.7	499.8	93.2	20.1	4.7	2.8
1306	50.3	14.200	14.194	26.9	96.5	14.201	14.196	25.4	77.0	501.5	73.5	22.6	5.4	4.4
1307	30.1	14.198	14.195	21.4	76.2	14.202	14.196	26.7	56.7	503.5	53.2	24.2	2.8	–9.9
1308	10.4	14.199	14.195	23.8	56.5	14.205	14.195	34.2	37.0	504.4	33.5	18.3	1.5	1.0

TABLE 29.—DATA LISTING FOR TRAVERSE 2 AT STATION 5—HORIZONTAL SURVEY

[Test section data for reading 1480: total pressure, 14.106; static pressure, 12.048 psia; total temperature, 498 °R; velocity, 250.3 mph; fan speed, 389.9 rpm.]

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
1480	35.2	14.094	14.092	14.6	24.9	14.107	14.106	8.7	33.4	367.9	27.4	20.6	0.4	−2.5
1481	45.6	14.094	14.091	9.2	35.4	14.107	14.106	5.0	43.9	118.3	37.9	21.5	−1.0	.8
1482	55.0	14.106	14.098	16.0	44.7	14.108	14.108	5.0	53.2	118.3	47.2	21.7	.8	2.3
1483	65.5	14.109	14.099	17.3	55.2	14.108	14.107	5.0	63.7	118.3	57.7	39.1	7.0	10.3
1484	75.0	14.110	14.099	17.6	64.8	14.108	14.107	5.0	73.3	118.3	67.3	41.6	−2.7	5.7
1485	85.3	14.110	14.099	17.8	75.0	14.108	14.107	5.0	83.5	118.3	77.5	42.1	−4.8	2.6
1486	95.5	14.113	14.100	19.5	85.3	14.111	14.110	5.0	93.8	118.3	87.8	41.1	5.7	.7
1487	105.1	14.112	14.098	20.0	94.9	14.112	14.111	5.0	103.4	118.3	97.4	47.2	10.0	2.1
1488	115.8	14.110	14.097	19.2	105.6	14.110	14.109	5.0	114.1	118.3	108.1	45.3	7.8	2.6
1489	125.3	14.111	14.098	19.5	115.0	14.108	14.107	5.0	123.5	118.3	117.5	44.3	3.2	2.6
1490	135.7	14.112	14.097	21.0	125.4	14.109	14.108	5.0	133.9	118.3	127.9	46.7	−0.5	−0.3
1491	145.3	14.112	14.097	20.6	135.0	14.111	14.110	5.0	143.5	118.3	137.5	47.7	−.6	−1.7
1492	155.2	14.109	14.096	19.4	145.0	14.111	14.110	5.0	153.5	118.3	147.5	44.0	.4	−1.1
1493	165.3	14.107	14.096	17.8	155.1	14.111	14.111	5.0	163.6	118.3	157.6	42.4	3.2	−.5
1494	175.3	14.110	14.096	19.9	165.1	14.109	14.109	5.0	173.6	118.3	167.6	43.7	2.7	.2
1495	185.5	14.112	14.097	21.1	175.2	14.109	14.109	5.0	183.7	118.3	177.7	46.9	2.4	0.4
1496	195.2	14.112	14.097	20.9	184.9	14.110	14.109	5.0	193.4	118.3	187.4	47.9	2.6	.7
1497	205.3	14.110	14.096	20.3	195.0	14.109	14.109	5.0	203.5	118.3	197.5	46.0	2.6	1.1
1498	215.5	14.111	14.097	20.3	205.3	14.109	14.108	5.0	213.8	118.3	207.8	47.3	2.6	1.7
1499	225.2	14.110	14.097	19.8	215.0	14.108	14.107	5.0	223.5	118.3	217.5	45.2	3.6	2.1

TABLE 29.—Concluded.

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
1500	235.1	14.110	14.096	19.5	224.8	14.108	14.107	5.0	233.3	118.3	227.3	44.9	3.5	2.3
1501	245.6	14.110	14.096	20.1	235.4	14.108	14.107	5.0	243.9	118.3	237.9	45.4	2.9	2.1
1502	255.0	14.109	14.095	20.1	244.7	14.107	14.106	5.0	253.2	118.3	247.2	46.0	2.0	2.1
1503	265.3	14.109	14.096	19.0	255.1	14.108	14.107	5.0	263.6	118.3	257.6	44.1	1.9	2.1
1504	275.0	14.110	14.098	18.6	264.7	14.108	14.107	5.0	273.2	118.3	267.2	43.2	1.8	2.3
1505	285.2	14.111	14.100	18.2	275.0	14.109	14.108	5.0	283.5	118.3	277.5	43.1	1.6	1.4
1506	295.6	14.111	14.101	17.3	285.4	14.109	14.108	5.0	293.9	118.3	287.9	41.9	1.4	1.3
1507	305.3	14.110	14.101	16.5	295.0	14.109	14.108	5.0	303.5	118.3	297.5	41.0	1.6	1.1
1508	315.4	14.108	14.099	15.8	305.1	14.108	14.107	5.0	313.6	118.3	307.6	38.1	2.3	.7
1509	320.8	14.106	14.098	15.6	310.6	14.108	14.107	5.0	319.1	118.3	313.1	38.0	2.1	0.0
1510	260.0	14.111	14.097	19.6	249.8	14.108	14.107	5.0	258.3	118.3	252.3	45.2	1.5	2.7
1511	210.3	14.112	14.098	20.3	200.1	14.108	14.107	5.1	208.6	118.3	202.6	45.8	3.0	1.7
1512	160.6	14.109	14.097	18.4	150.4	14.108	14.107	5.1	158.9	118.3	152.9	42.3	3.0	–.5
1513	110.5	14.110	14.098	19.1	100.3	14.108	14.107	5.1	108.8	118.3	102.8	44.7	8.2	2.2
1514	58.3	14.109	14.098	17.3	48.0	14.109	14.108	5.0	56.5	118.3	50.5	32.2	2.3	5.0
1515	35.4	14.102	14.099	8.5	25.2	14.109	14.108	5.0	33.7	118.3	27.7	20.3	.2	–2.6

TABLE 30.—DATA LISTING FOR TRAVERSE 1 AT STATION 5—HORIZONTAL SURVEY NEAR FLOOR

[Test section data for reading 1317: total pressure, 14.219; static pressure, 13.132 psia; total temperature, 500 °R; velocity, 267.5 mph; fan speed, 292.9 rpm.]

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
1317	8.1	14.204	14.201	19.2	55.1	14.205	14.200	24.8	36.8	496.7	32.0	6.9	2.3	−0.7
1318	5.1	14.205	14.202	20.4	52.1	14.206	14.202	22.5	33.9	500.8	29.0	5.7	2.8	.3
1319	5.1	14.205	14.201	20.3	52.1	14.205	14.201	22.8	33.9	500.7	29.0	5.7	3.0	.2
1320	8.4	14.204	14.201	19.3	55.4	14.206	14.201	24.6	37.2	500.9	32.3	1.4	2.4	.2
1321	15.1	14.203	14.201	16.1	62.1	14.207	14.200	28.2	43.8	499.9	38.9	8.2	1.3	0.0
1322	25.1	14.203	14.201	15.8	72.1	14.209	14.200	33.0	53.8	491.3	49.0	13.8	1.6	−4.4
1323	35.5	14.202	14.200	16.1	82.5	14.209	14.199	34.0	64.2	490.3	59.4	21.1	5.1	−.2
1324	45.1	14.204	14.200	21.7	92.1	14.207	14.199	31.5	73.8	494.9	69.0	24.2	4.8	−4.5
1325	55.3	14.205	14.200	24.9	102.3	14.207	14.199	31.0	84.1	494.3	79.2	26.7	−.4	−2.7
1326	65.2	14.207	14.201	27.7	112.2	14.210	14.199	35.5	94.0	494.1	89.1	24.9	−2.5	3.9
1327	74.9	14.210	14.201	34.3	121.9	14.210	14.199	35.5	103.7	494.1	98.8	25.2	−0.3	5.0
1328	85.3	14.208	14.199	32.5	132.3	14.209	14.199	35.9	114.0	496.9	109.2	28.9	2.7	.1
1329	95.3	14.208	14.200	31.4	142.3	14.210	14.199	36.0	124.0	495.4	119.1	29.5	4.0	.1
1330	105.0	14.207	14.198	32.3	152.0	14.210	14.199	36.6	133.8	493.8	128.9	28.7	4.0	1.7
1331	114.8	14.210	14.199	36.3	161.8	14.208	14.199	32.6	143.6	492.0	138.7	30.7	3.8	1.2
1332	125.0	14.208	14.199	34.0	172.0	14.207	14.198	32.0	153.8	494.5	148.9	31.1	4.3	0.4
1333	135.3	14.209	14.198	36.3	182.3	14.208	14.198	33.5	164.0	491.9	159.1	26.6	3.4	1.7
1334	145.3	14.210	14.199	36.2	192.3	14.207	14.198	32.6	174.1	490.6	169.2	25.0	2.5	2.2
1335	155.0	14.210	14.200	35.4	202.0	14.210	14.199	34.6	183.7	491.3	178.8	26.9	1.9	2.1
1336	165.5	14.207	14.199	31.4	212.5	14.210	14.199	35.6	194.3	494.5	189.4	25.7	1.1	2.4
1337	175.0	14.208	14.199	32.4	222.0	14.208	14.199	34.6	203.7	497.0	198.8	28.1	1.4	3.0
1338	185.0	14.209	14.200	32.7	232.0	14.209	14.200	32.6	213.7	494.5	208.9	30.4	1.4	1.5
1339	206.1	14.211	14.201	35.3	253.1	14.208	14.200	30.7	234.9	494.6	230.0	26.0	1.3	1.9
1340	195.3	14.209	14.200	33.0	242.3	14.208	14.200	31.1	224.0	492.1	219.1	28.5	1.4	1.8
1341	205.2	14.210	14.200	35.0	252.2	14.208	14.200	30.8	234.0	493.1	229.1	26.4	1.4	1.6

TABLE 30.—Concluded.

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
1342	215.4	14.210	14.200	34.6	262.4	14.208	14.200	30.4	244.1	492.1	239.2	24.8	0.9	1.7
1343	225.3	14.209	14.199	33.2	272.3	14.208	14.200	30.1	254.0	490.5	249.2	23.7	.2	1.8
1344	235.3	14.208	14.200	31.2	282.3	14.208	14.200	29.6	264.1	491.2	259.2	23.6	.7	.6
1345	245.3	14.208	14.200	30.8	292.3	14.207	14.200	29.1	274.1	491.9	269.2	23.3	–.1	.7
1346	255.3	14.208	14.200	30.5	302.3	14.208	14.201	28.5	284.1	491.2	279.2	22.3	.5	.4
1347	264.9	14.209	14.202	30.0	311.9	14.208	14.202	28.3	293.7	488.2	288.8	21.4	.9	–0.5
1348	275.1	14.211	14.203	29.6	322.1	14.210	14.204	27.0	303.9	487.5	299.0	21.3	2.3	–2.2
1349	285.3	14.212	14.205	29.1	332.3	14.212	14.206	26.3	314.1	488.3	309.2	20.2	1.0	–2.5
1350	289.8	14.211	14.204	29.0	336.8	14.211	14.205	25.4	318.5	492.0	313.7	19.7	1.9	–1.5
1351	270.0	14.212	14.205	29.9	317.0	14.211	14.205	27.7	298.8	491.7	293.9	21.7	1.1	–.3
1352	250.2	14.214	14.206	30.6	297.2	14.212	14.205	29.0	279.0	489.2	274.1	23.0	0.4	0.1
1353	230.4	14.215	14.207	32.2	277.4	14.214	14.207	29.8	259.1	490.3	254.3	23.5	–.1	2.4
1354	210.3	14.217	14.206	35.1	257.3	14.215	14.207	30.7	239.0	494.5	234.1	25.6	1.2	2.4
1355	189.8	14.216	14.207	32.4	236.8	14.215	14.207	31.7	218.5	493.9	213.6	29.1	1.5	2.2
1356	170.3	14.216	14.208	31.2	217.3	14.218	14.208	34.5	199.1	494.2	194.2	27.2	1.3	3.2
1357	150.5	14.218	14.210	32.2	197.5	14.219	14.209	34.9	179.2	493.8	174.3	26.6	1.4	2.9
1358	130.6	14.221	14.210	35.6	177.6	14.218	14.210	32.5	159.4	492.2	154.5	25.0	2.7	2.7
1359	110.2	14.220	14.211	33.8	157.2	14.218	14.210	31.4	138.9	495.3	134.1	31.3	4.1	1.1
1360	89.9	14.219	14.210	32.7	136.9	14.221	14.209	37.3	118.7	492.5	113.8	28.3	4.5	1.6
1361	69.9	14.221	14.211	34.8	116.9	14.221	14.211	35.3	98.6	491.8	93.8	29.9	4.1	1.1
1362	50.9	14.220	14.211	33.0	97.9	14.222	14.210	37.5	79.7	494.5	74.8	27.8	4.4	1.9
1363	29.8	14.220	14.211	32.3	76.8	14.222	14.211	36.8	58.6	494.6	53.7	28.4	4.4	1.0
1364	9.9	14.220	14.212	32.2	56.9	14.222	14.211	36.6	38.6	494.3	33.8	28.8	4.6	1.6

TABLE 31.—DATA LISTING FOR TRAVERSE 2 AT STATION 5—HORIZONTAL SURVEY AT CENTERLINE

[Test section data for reading 1317: total pressure, 14.219; static pressure, 13.132 psia; total temperature, 500 °R; velocity, 267.5 mph; fan speed, 292.9 rpm.]

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
1317	80.5	14.206	14.202	20.9	126.6	14.205	14.202	19.2	107.1	499.3	103.6	13.2	2.9	2.3
1318	5.0	14.205	14.202	16.9	51.1	14.205	14.202	20.3	31.6	501.9	28.1	9.4	1.3	2.3
1319	5.0	14.204	14.202	16.8	51.1	14.205	14.202	20.3	31.6	501.8	28.1	9.2	.9	2.3
1320	7.5	14.204	14.202	16.8	53.7	14.205	14.201	22.2	34.2	501.9	30.6	10.6	.5	1.8
1321	15.3	14.204	14.202	15.9	61.4	14.207	14.201	26.4	41.9	501.8	38.4	13.1	.6	.1
1322	25.1	14.203	14.201	15.0	71.2	14.206	14.202	24.1	51.7	501.7	48.2	14.9	0.7	–4.8
1323	35.3	14.203	14.200	17.5	81.4	14.204	14.201	18.8	61.9	501.1	58.4	21.0	2.3	–9.3
1324	44.9	14.203	14.200	18.7	91.0	14.203	14.200	19.2	71.5	501.5	68.0	18.7	4.7	.4
1325	55.3	14.205	14.200	25.7	101.4	14.202	14.199	19.5	81.9	501.5	78.4	13.2	4.8	5.3
1326	64.9	14.207	14.201	26.3	111.0	14.203	14.200	18.3	91.5	501.0	88.0	13.7	4.7	4.0
1327	74.9	14.205	14.202	21.2	121.1	14.204	14.201	18.2	101.6	500.6	98.1	14.8	3.8	2.2
1328	85.4	14.203	14.200	19.2	131.5	14.205	14.202	19.2	112.0	500.0	108.5	14.4	5.7	1.4
1329	95.3	14.203	14.200	19.9	141.4	14.204	14.201	19.0	121.9	498.6	118.4	13.2	1.4	1.4
1330	105.1	14.203	14.200	19.9	151.2	14.204	14.201	18.2	131.7	498.6	128.2	14.4	1.0	1.1
1331	115.4	14.201	14.198	18.2	161.5	14.202	14.200	15.6	142.0	498.7	138.5	14.4	.4	1.5
1332	125.0	14.202	14.199	19.3	171.1	14.202	14.199	16.5	151.6	497.8	148.1	13.9	2.2	–0.3
1333	135.0	14.202	14.199	19.8	181.1	14.201	14.199	16.8	161.6	497.6	158.1	10.3	–.3	1.5
1334	145.0	14.202	14.198	19.6	191.1	14.202	14.199	17.6	171.6	496.8	168.1	11.4	–2.2	.4
1335	155.0	14.202	14.199	16.9	201.1	14.202	14.199	18.3	181.6	496.8	178.1	11.9	–.9	.3
1336	165.3	14.201	14.198	16.6	211.4	14.201	14.199	18.9	191.9	497.5	188.4	10.9	0.0	2.1
1337	175.0	14.199	14.197	17.3	221.1	14.197	14.194	19.0	201.6	499.1	198.1	11.4	–0.4	3.3
1338	185.4	14.200	14.197	17.4	231.5	14.199	14.195	20.8	212.0	499.1	208.5	12.6	–.9	2.9
1339	205.6	14.202	14.199	19.0	251.7	14.203	14.198	24.3	232.2	497.3	228.7	14.5	–4.7	2.4
1340	195.5	14.203	14.200	18.4	241.6	14.205	14.200	23.6	222.1	496.2	218.6	13.4	–4.1	2.1
1341	205.4	14.204	14.201	19.0	251.5	14.207	14.202	24.4	232.0	497.2	228.5	15.4	–4.5	1.2

TABLE 31.—Concluded.

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
1342	215.5	14.205	14.202	19.5	261.6	14.207	14.203	21.0	242.1	496.6	238.6	19.5	-4.5	-0.4
1343	225.0	14.204	14.201	19.8	271.1	14.206	14.203	19.8	251.6	497.6	248.1	21.6	-2.6	-2.4
1344	235.1	14.204	14.200	22.3	281.2	14.205	14.201	22.0	261.7	498.4	258.2	18.4	-1.0	-1.3
1345	244.8	14.204	14.199	24.7	291.0	14.204	14.199	25.7	271.5	498.9	268.0	14.2	-4.0	1.1
1346	255.4	14.204	14.199	23.7	301.5	14.206	14.200	25.6	282.0	499.4	278.5	17.1	-6.5	.4
1347	264.8	14.205	14.201	20.9	310.9	14.207	14.202	24.9	291.4	499.2	287.9	22.4	-6.0	-0.5
1348	275.3	14.207	14.204	20.5	321.4	14.209	14.204	24.1	301.9	498.5	298.4	22.8	-5.1	-.5
1349	285.5	14.210	14.205	25.0	331.6	14.210	14.206	22.2	312.1	498.4	308.6	21.4	-5.1	-.3
1350	290.4	14.208	14.203	26.0	336.5	14.207	14.203	21.0	317.0	498.9	313.5	21.0	-5.3	-.2
1351	269.9	14.207	14.204	20.5	316.0	14.208	14.203	24.3	296.5	499.7	293.0	23.9	-5.5	-.9
1352	249.8	14.209	14.204	24.8	296.0	14.211	14.205	26.1	276.5	499.2	273.0	15.0	-5.6	0.9
1353	230.0	14.209	14.206	21.0	276.1	14.211	14.208	20.4	256.6	498.3	253.1	20.3	-1.7	-1.6
1354	210.2	14.209	14.206	19.4	256.3	14.211	14.207	23.1	236.8	498.3	233.3	17.2	-5.0	-.3
1355	190.3	14.209	14.206	18.1	236.4	14.210	14.206	22.0	216.9	498.7	213.4	13.3	-3.9	2.7
1356	170.4	14.209	14.207	16.9	216.5	14.210	14.207	19.1	197.0	499.1	193.5	11.5	-3.6	3.3
1357	150.5	14.212	14.209	18.4	196.6	14.211	14.208	18.5	177.1	498.3	173.6	11.4	-1.5	0.7
1358	130.4	14.211	14.208	19.6	176.5	14.211	14.209	16.6	157.0	499.3	153.5	11.8	1.4	.4
1359	109.9	14.212	14.209	19.0	156.0	14.211	14.209	16.4	136.5	500.4	133.0	14.5	1.4	.6
1360	90.0	14.213	14.209	19.5	136.1	14.212	14.209	19.0	116.6	500.0	113.1	13.1	3.3	2.3
1361	70.4	14.215	14.210	25.0	116.5	14.213	14.211	17.4	97.0	501.1	93.5	14.9	5.0	3.2
1362	50.3	14.213	14.209	20.6	96.5	14.211	14.208	19.2	77.0	501.5	73.5	16.9	5.6	4.4
1363	30.5	14.212	14.210	16.2	76.6	14.212	14.209	20.2	57.1	501.5	53.6	18.4	2.3	-10.4
1364	9.8	14.213	14.211	17.2	55.9	14.214	14.209	25.8	36.4	501.9	32.9	12.4	1.9	1.1

TABLE 32.—DATA LISTING FOR TRAVERSE 2 AT STATION 5—HORIZONTAL SURVEY NEAR CEILING

[Test section data for reading 1516: total pressure, 14.117; static pressure, 13.031 psia; total temperature, 498 °R; velocity, 251.0 mph; fan speed, 288.6 rpm.]

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
1516	35.4	14.109	14.108	13.6	25.2	14.114	14.113	9.3	33.7	499.4	27.7	15.1	–0.3	–2.4
1517	45.3	14.108	14.106	15.1	35.1	14.113	14.112	9.9	43.6	500.3	37.6	12.4	–.9	1.2
1518	55.1	14.111	14.106	25.5	44.9	14.113	14.112	10.4	53.4	499.1	47.4	14.6	.9	3.4
1519	65.2	14.112	14.105	27.5	55.0	14.112	14.111	10.4	63.5	499.6	57.5	28.3	6.9	9.7
1520	75.8	14.112	14.105	28.2	65.6	14.110	14.109	10.4	74.1	500.4	68.1	30.6	–2.4	5.1
1521	85.1	14.110	14.104	28.2	74.9	14.110	14.110	10.4	83.4	500.8	77.4	31.4	–4.5	3.3
1522	95.6	14.113	14.105	31.0	85.3	14.113	14.112	10.4	93.8	501.3	87.8	29.1	6.5	1.7
1523	105.4	14.112	14.104	31.1	95.2	14.113	14.112	10.4	103.7	501.5	97.7	34.3	9.6	1.9
1524	115.4	14.112	14.105	30.6	105.1	14.113	14.112	10.4	113.6	501.3	107.6	33.4	7.7	2.5
1525	125.6	14.113	14.105	31.2	115.4	14.113	14.112	10.4	123.9	501.0	117.9	32.3	2.6	2.3
1526	135.5	14.114	14.105	33.8	125.3	14.113	14.112	10.4	133.8	500.9	127.8	34.9	–1.0	–0.2
1527	145.3	14.113	14.105	32.6	135.1	14.113	14.112	10.4	143.6	500.9	137.6	35.5	–.6	–1.1
1528	155.2	14.111	14.103	30.6	145.0	14.113	14.112	10.4	153.5	500.8	147.5	33.5	.6	–.9
1529	164.9	14.110	14.104	28.4	154.6	14.112	14.111	10.4	163.1	500.7	157.1	31.6	3.1	–.3
1530	175.2	14.112	14.104	31.0	165.0	14.112	14.111	10.4	173.5	500.7	167.5	32.3	3.4	0.0
1531	185.1	14.113	14.104	33.6	174.8	14.113	14.112	10.4	183.3	500.8	177.3	35.8	2.2	0.7
1532	195.5	14.112	14.103	33.2	185.2	14.112	14.111	10.4	193.7	500.6	187.7	36.3	2.5	.7
1533	205.1	14.111	14.103	32.3	194.9	14.112	14.111	10.4	203.4	500.3	197.4	35.6	2.7	.8
1534	215.4	14.113	14.105	31.9	205.2	14.110	14.109	10.4	213.7	500.2	207.7	35.0	2.4	2.1
1535	225.2	14.111	14.103	31.2	215.0	14.110	14.109	10.4	223.5	500.4	217.5	33.7	3.9	2.4
1536	235.6	14.110	14.102	30.7	225.3	14.110	14.109	10.4	233.8	500.4	227.8	34.0	3.7	2.5
1537	245.4	14.112	14.103	32.0	235.1	14.110	14.109	10.4	243.6	500.0	237.6	34.7	2.1	2.6
1538	255.2	14.113	14.104	31.8	244.9	14.110	14.109	10.4	253.4	499.9	247.4	35.7	1.5	2.2
1539	265.4	14.111	14.104	30.0	255.2	14.110	14.109	10.4	263.7	499.6	257.7	33.4	2.2	2.3
1540	275.4	14.110	14.103	30.0	265.1	14.110	14.109	10.4	273.6	499.7	267.6	32.8	1.9	2.2

TABLE 32.—Concluded.

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
1541	285.3	14.107	14.101	29.1	275.0	14.109	14.108	10.4	283.5	500.6	277.5	32.1	2.1	2.6
1542	295.7	14.105	14.099	27.6	285.5	14.108	14.107	10.5	294.0	501.6	288.0	31.5	1.5	2.2
1543	305.5	14.103	14.098	25.4	295.2	14.108	14.107	10.5	303.7	501.8	297.7	30.3	2.4	1.7
1544	315.3	14.103	14.098	24.5	305.0	14.108	14.107	10.5	313.5	501.4	307.5	29.2	2.0	.9
1545	321.3	14.106	14.101	23.7	311.0	14.108	14.107	10.5	319.5	500.8	313.5	26.7	2.9	.6
1546	260.1	14.110	14.102	31.0	249.8	14.109	14.108	10.5	258.3	500.2	252.3	34.1	1.6	2.5
1547	210.2	14.111	14.102	32.3	200.0	14.109	14.108	10.6	208.5	500.5	202.5	35.3	2.5	2.0
1548	160.6	14.105	14.099	28.6	150.4	14.107	14.106	10.6	158.9	500.8	152.9	32.6	2.5	−.8
1549	110.3	14.107	14.099	30.3	100.0	14.107	14.106	10.6	108.5	501.0	102.5	35.1	8.7	2.3
1550	60.4	14.107	14.101	27.8	50.1	14.108	14.107	10.6	58.6	501.1	52.6	27.2	3.9	6.9
1551	35.7	14.102	14.101	13.6	25.5	14.108	14.108	9.2	34.0	501.7	28.0	14.6	.4	−2.4

TABLE 33.—DATA LISTING FOR TRAVERSE 1 AT STATION 6—UPPER HORIZONTAL SURVEY

[Test section data for reading 2309: total pressure, 14.308; static pressure, 12.215 psia; total temperature, 498 °R; velocity, 350.7 mph; fan speed, 387.6 rpm.]

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
2309	51.1	14.290	14.285	26.8	40.6	14.287	14.278	33.6	50.8	504.7	45.8	35.0	15.4	−8.0
2310	61.1	14.293	14.286	28.7	50.6	14.285	14.275	35.0	60.8	500.3	55.8	38.0	13.8	−7.3
2311	70.9	14.293	14.286	28.8	60.4	14.293	14.273	48.3	70.6	494.5	65.6	39.0	11.2	−10.1
2312	80.9	14.294	14.285	32.3	70.4	14.290	14.272	46.8	80.7	495.9	75.7	51.6	8.0	−5.3
2313	91.0	14.293	14.285	31.5	80.5	14.315	14.296	47.2	90.8	498.5	85.8	49.3	6.6	−7.6
2314	97.7	14.292	14.285	28.8	87.2	14.314	14.296	46.5	97.5	499.9	92.5	49.7	5.1	−8.5
2315	107.3	14.290	14.283	28.0	96.8	14.292	14.274	46.6	107.1	499.0	102.1	50.1	5.0	−10.0
2316	120.7	14.291	14.284	29.4	110.2	14.288	14.268	49.5	120.4	497.1	115.4	51.5	5.9	−7.5
2317	130.7	14.292	14.284	31.2	120.2	14.288	14.268	49.2	130.5	496.9	125.5	52.4	5.2	−7.2
2318	140.7	14.290	14.283	29.1	130.2	14.288	14.269	48.8	140.5	495.9	135.5	51.1	3.8	−7.3
2319	150.5	14.290	14.283	29.1	140.0	14.289	14.269	48.7	150.2	496.1	145.2	50.8	2.5	−6.6
2320	160.9	14.289	14.283	27.0	150.4	14.293	14.273	48.7	160.6	496.9	155.6	51.4	1.5	−8.2
2321	170.6	14.287	14.282	24.5	160.1	14.293	14.275	45.6	170.3	496.5	165.3	49.2	.2	−8.0
2322	181.0	14.286	14.282	22.0	170.5	14.304	14.283	50.3	180.8	496.4	175.8	49.1	−.8	−10.0
2323	190.7	14.286	14.283	19.9	180.2	14.293	14.272	50.4	190.4	496.6	185.4	53.0	−2.6	−8.5
2324	201.0	14.286	14.283	18.4	190.5	14.290	14.267	53.1	200.7	496.5	195.7	54.8	−3.7	−8.0
2325	211.3	14.286	14.283	18.7	200.8	14.288	14.265	52.1	211.0	496.7	206.0	55.9	−4.7	−7.1
2326	220.6	14.286	14.284	15.8	210.1	14.287	14.265	50.8	220.3	496.5	215.3	54.6	−5.6	−7.1
2327	231.1	14.284	14.283	14.0	220.6	14.282	14.264	47.3	230.9	496.6	225.9	51.1	−6.5	−6.9
2328	240.4	14.284	14.283	10.8	229.9	14.283	14.264	46.5	240.1	497.1	235.1	47.6	−7.0	−6.2
2329	250.7	14.284	14.283	9.2	240.2	14.281	14.264	45.8	250.5	497.9	245.5	48.1	−9.2	−7.0
2330	260.6	14.284	14.283	4.6	250.1	14.278	14.263	43.0	260.3	497.3	255.3	46.6	−9.6	−6.8
2331	270.6	14.284	14.284	0.0	260.1	14.278	14.265	40.3	270.4	496.9	265.4	42.6	−11.3	−6.4
2332	281.0	14.286	14.286	0.0	270.5	14.277	14.266	36.5	280.8	497.2	275.8	38.3	−12.2	−8.8
2333	290.6	14.286	14.287	0.0	280.1	14.280	14.267	40.0	290.4	497.2	285.4	41.5	−12.1	−6.8

TABLE 33.—Concluded.

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
2334	300.5	14.287	14.287	0.0	290.0	14.281	14.268	39.2	300.3	497.9	295.3	41.8	−12.2	−6.4
2335	310.1	14.287	14.288	0.0	299.6	14.281	14.269	37.4	309.9	498.6	304.9	40.2	−13.2	−7.0
2336	315.5	14.289	14.289	0.0	305.0	14.281	14.270	36.3	315.3	499.0	310.3	39.6	−13.7	−6.2
2337	295.8	14.287	14.288	0.0	285.3	14.281	14.268	39.7	295.5	498.2	290.5	42.0	−12.2	−6.9
2338	276.2	14.287	14.287	0.0	265.7	14.278	14.267	36.6	276.0	497.5	271.0	40.8	−11.9	−7.5
2339	255.9	14.285	14.285	5.9	245.4	14.282	14.265	44.8	255.6	497.6	250.6	48.2	−9.1	−7.4
2340	235.8	14.286	14.285	11.3	225.3	14.282	14.264	46.1	235.6	496.9	230.6	48.8	−6.7	−6.6
2341	215.8	14.287	14.285	16.8	205.3	14.286	14.263	51.7	215.5	497.0	210.5	56.2	−5.4	−7.3
2342	195.6	14.287	14.284	18.6	185.1	14.286	14.264	52.4	195.3	498.0	190.3	54.2	−3.2	−8.6
2343	175.7	14.289	14.284	25.2	165.2	14.281	14.262	47.6	175.5	497.2	170.5	48.0	−.6	−10.0
2344	155.9	14.290	14.284	27.6	145.4	14.282	14.262	49.1	155.7	498.9	150.7	51.7	1.9	−7.6
2345	135.7	14.292	14.285	30.6	125.2	14.283	14.263	49.0	135.4	499.1	130.4	52.1	4.4	−7.6
2346	116.0	14.293	14.286	28.5	105.5	14.285	14.265	49.1	115.8	501.6	110.8	52.1	5.4	−8.4
2347	96.0	14.294	14.287	29.3	85.5	14.284	14.266	46.9	95.7	503.3	90.7	50.1	5.4	−8.0
2348	76.1	14.295	14.288	29.4	65.6	14.288	14.268	48.8	75.9	504.1	70.9	47.5	9.8	−6.8
2349	56.0	14.296	14.290	27.1	45.5	14.278	14.268	35.1	55.7	504.7	50.7	35.9	14.9	−7.6

TABLE 34.—DATA LISTING FOR TRAVERSE 2 AT STATION 6—LOWER HORIZONTAL SURVEY

[Test section data for reading 2309: total pressure, 14.308; static pressure, 12.215 psia; total temperature, 498 °R; velocity, 350.7 mph; fan speed, 387.6 rpm.]

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
2309	50.5	14.287	14.281	27.6	40.2	14.290	14.279	37.5	48.7	500.6	42.7	37.5	13.7	15.3
2310	60.8	14.293	14.282	36.6	50.5	14.293	14.281	38.1	59.0	501.0	53.0	39.0	11.5	6.7
2311	70.4	14.295	14.283	37.0	60.2	14.300	14.282	46.3	68.7	498.1	62.7	44.0	10.3	2.7
2312	80.9	14.299	14.282	45.0	70.6	14.299	14.281	47.1	79.1	495.9	73.1	49.8	13.0	10.1
2313	90.4	14.300	14.282	46.1	80.2	14.300	14.281	47.5	88.7	497.0	82.7	50.7	17.2	7.8
2314	97.9	14.301	14.281	48.4	87.6	14.300	14.280	49.1	96.1	498.4	90.1	50.6	11.6	−0.1
2315	108.0	14.303	14.283	48.5	97.8	14.301	14.281	49.9	106.3	499.4	100.3	52.5	3.6	1.2
2316	120.6	14.305	14.284	49.7	110.3	14.305	14.282	51.7	118.8	498.5	112.8	56.1	2.2	3.8
2317	130.5	14.305	14.283	51.4	120.2	14.302	14.281	50.4	128.7	498.4	122.7	56.6	2.3	4.7
2318	140.5	14.304	14.283	50.5	130.2	14.302	14.281	49.9	138.7	497.7	132.7	57.3	3.1	5.7
2319	150.4	14.303	14.283	49.3	140.2	14.307	14.281	55.2	148.7	496.3	142.7	59.7	3.1	9.0
2320	160.2	14.306	14.281	54.3	150.0	14.304	14.280	53.2	158.5	495.5	152.5	59.0	2.6	10.7
2321	170.5	14.306	14.282	53.7	160.2	14.300	14.281	47.6	168.7	495.1	162.7	56.5	.3	10.1
2322	181.1	14.300	14.281	47.4	170.9	14.305	14.282	52.6	179.4	495.3	173.4	54.4	−2.2	8.9
2323	190.4	14.306	14.282	53.3	180.1	14.304	14.281	52.0	188.6	495.5	182.6	57.9	−2.7	6.3
2324	200.9	14.305	14.282	51.8	190.6	14.306	14.283	52.9	199.1	495.4	193.1	59.7	−3.4	6.0
2325	210.8	14.306	14.283	52.8	200.6	14.306	14.283	52.3	209.1	495.6	203.1	59.7	−4.3	6.4
2326	220.3	14.306	14.283	52.2	210.0	14.305	14.284	50.6	218.5	495.4	212.5	58.4	−4.6	7.5
2327	230.8	14.304	14.283	50.5	220.5	14.304	14.283	49.1	229.0	495.1	223.0	56.7	−6.1	7.6
2328	240.1	14.303	14.283	48.9	229.9	14.305	14.285	48.6	238.4	495.2	232.4	54.7	−7.8	6.5
2329	250.7	14.304	14.284	48.4	240.4	14.304	14.285	46.9	248.9	495.3	242.9	55.0	−8.9	6.2
2330	260.3	14.304	14.285	47.1	250.1	14.300	14.284	43.3	258.6	496.1	252.6	52.1	−10.0	7.2
2331	270.7	14.301	14.285	43.2	260.4	14.300	14.285	42.6	268.9	495.7	262.9	50.3	−9.9	8.7
2332	280.4	14.301	14.286	42.0	270.1	14.300	14.288	37.5	278.6	495.5	272.6	42.8	−12.5	9.2
2333	290.4	14.298	14.287	36.9	280.1	14.300	14.287	39.1	288.6	495.2	282.6	47.0	−12.3	9.8

TABLE 34.—Concluded.

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
2334	300.6	14.301	14.288	38.5	290.3	14.300	14.288	37.9	298.8	494.5	292.8	45.3	−12.4	9.2
2335	310.0	14.301	14.289	37.9	299.7	14.300	14.289	36.2	308.2	493.1	302.2	43.1	−13.6	10.1
2336	315.9	14.302	14.291	37.1	305.6	14.301	14.291	34.4	314.1	492.1	308.1	42.0	−14.4	9.3
2337	295.3	14.302	14.288	39.8	285.0	14.301	14.289	38.7	293.5	495.2	287.5	46.5	−12.4	9.1
2338	275.9	14.302	14.288	41.8	265.6	14.301	14.288	38.9	274.1	495.3	268.1	46.7	−11.7	9.6
2339	255.6	14.307	14.287	48.6	245.4	14.305	14.287	45.9	253.9	495.4	247.9	53.2	−9.2	6.6
2340	235.9	14.307	14.286	49.6	225.6	14.306	14.286	48.4	234.1	496.0	228.1	55.6	−7.1	7.3
2341	215.9	14.310	14.286	53.9	205.6	14.308	14.285	52.1	214.1	496.6	208.1	58.8	−4.3	6.7
2342	195.6	14.308	14.285	51.7	185.4	14.309	14.285	53.0	193.9	496.7	187.9	59.2	−3.1	5.5
2343	175.6	14.307	14.285	52.1	165.3	14.307	14.285	50.8	173.8	497.2	167.8	53.2	−.9	10.7
2344	155.4	14.307	14.284	52.2	145.1	14.311	14.286	54.8	153.6	494.8	147.6	60.0	2.8	9.9
2345	135.3	14.309	14.287	50.9	125.0	14.307	14.286	50.1	133.5	499.2	127.5	57.7	2.7	5.1
2346	115.3	14.309	14.289	49.1	105.1	14.309	14.288	50.7	113.6	499.3	107.6	55.1	2.0	2.8
2347	95.8	14.308	14.289	47.6	85.6	14.308	14.289	47.9	94.1	498.3	88.1	49.9	13.5	1.7
2348	75.6	14.306	14.291	41.3	65.3	14.308	14.289	47.5	73.8	496.8	67.8	46.8	11.8	6.8
2349	55.7	14.302	14.292	34.3	45.4	14.303	14.292	36.4	53.9	501.0	47.9	42.7	12.1	12.3

TABLE 35.—DATA LISTING FOR TRAVERSE 1 AT STATION 6—UPPER HORIZONTAL SURVEY

[Test section data for reading 2350: total pressure, 14.324; static pressure, 13.227 psia; total temperature, 500 °R; velocity, 250.7 mph; fan speed, 286.2 rpm.]

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
2350	50.7	14.309	14.306	20.2	40.2	14.305	14.299	25.5	50.5	503.1	45.5	26.7	13.4	−8.0
2351	61.1	14.308	14.304	22.3	50.6	14.304	14.298	26.7	60.8	501.9	55.8	28.8	12.8	−8.1
2352	70.9	14.307	14.303	22.9	60.4	14.309	14.298	37.3	70.6	501.8	65.6	31.1	12.1	−9.8
2353	81.0	14.308	14.302	25.7	70.5	14.306	14.295	36.0	80.7	502.2	75.7	39.1	8.1	−5.9
2354	90.6	14.306	14.301	24.5	80.1	14.304	14.293	36.0	90.4	502.3	85.4	37.7	6.3	−8.1
2355	100.5	14.305	14.301	22.5	90.0	14.303	14.293	35.7	100.3	502.5	95.3	38.4	5.3	−9.1
2356	110.8	14.304	14.300	22.0	100.3	14.303	14.292	36.2	110.5	502.6	105.5	38.7	5.1	−9.5
2357	120.5	14.304	14.299	22.9	110.0	14.303	14.291	37.9	120.3	502.0	115.3	39.2	5.2	−7.9
2358	130.9	14.306	14.301	24.4	120.4	14.303	14.291	37.8	130.6	502.0	125.6	40.2	5.3	−7.9
2359	140.9	14.305	14.301	23.1	130.4	14.304	14.292	37.5	140.7	501.3	135.7	39.5	4.0	−8.0
2360	150.8	14.305	14.300	23.4	140.3	14.304	14.292	37.4	150.5	501.6	145.5	38.9	3.0	−7.2
2361	161.0	14.303	14.299	21.2	150.5	14.303	14.292	37.0	160.7	502.3	155.7	39.0	1.8	−8.8
2362	170.6	14.302	14.299	19.5	160.1	14.300	14.290	35.0	170.3	502.2	165.3	38.3	−.1	−8.5
2363	180.7	14.302	14.300	17.7	170.2	14.303	14.291	38.3	180.5	502.1	175.5	37.7	−.7	−10.7
2364	190.7	14.301	14.299	15.6	180.2	14.304	14.291	39.1	190.4	501.9	185.4	41.0	−2.8	−9.0
2365	200.8	14.301	14.299	14.6	190.3	14.306	14.292	40.5	200.6	501.7	195.6	42.3	−3.8	−8.2
2366	211.1	14.302	14.300	15.4	200.6	14.306	14.293	39.8	210.8	501.8	205.8	42.9	−4.7	−7.8
2367	220.6	14.301	14.299	12.6	210.1	14.304	14.292	38.2	220.3	501.5	215.3	41.2	−6.2	−8.1
2368	231.0	14.300	14.299	11.4	220.5	14.303	14.292	35.5	230.7	500.9	225.7	38.0	−6.6	−7.9
2369	240.8	14.300	14.300	8.2	230.3	14.303	14.292	35.4	240.6	500.7	235.6	36.4	−7.3	−7.8
2370	251.1	14.300	14.299	8.8	240.6	14.303	14.293	34.6	250.9	500.6	245.9	37.0	−8.6	−8.0
2371	260.9	14.300	14.300	5.6	250.4	14.301	14.293	32.6	260.6	500.1	255.6	35.5	−9.8	−7.8
2372	270.7	14.300	14.300	0.0	260.2	14.301	14.293	30.7	270.4	499.6	265.4	33.1	−11.3	−7.3
2373	280.6	14.299	14.299	0.0	270.1	14.299	14.293	27.7	280.3	500.2	275.3	29.8	−12.6	−9.9
2374	290.6	14.299	14.300	0.0	280.1	14.301	14.293	30.7	290.4	500.5	285.4	34.2	−11.8	−7.7

TABLE 35.—Concluded.

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
2375	300.7	14.300	14.300	0.0	290.2	14.301	14.294	29.9	300.5	500.5	295.5	32.5	−12.0	−7.4
2376	310.3	14.302	14.302	0.0	299.8	14.301	14.295	28.7	310.1	500.8	305.1	31.5	−13.1	−7.2
2377	315.9	14.301	14.301	0.0	305.4	14.301	14.294	27.7	315.7	500.8	310.7	30.6	−11.9	−7.1
2378	295.9	14.300	14.300	0.0	285.4	14.300	14.292	30.3	295.6	500.4	290.6	33.3	−12.6	−8.2
2379	276.2	14.300	14.300	0.0	265.7	14.299	14.292	28.3	276.0	500.1	271.0	31.4	−12.0	−8.3
2380	255.6	14.299	14.299	6.5	245.1	14.301	14.292	33.8	255.3	499.9	250.3	36.4	−9.3	−7.7
2381	235.8	14.299	14.298	10.3	225.3	14.301	14.291	35.0	235.6	499.9	230.6	36.7	−6.9	−7.6
2382	215.6	14.299	14.298	13.6	205.1	14.304	14.291	39.2	215.4	500.6	210.4	42.5	−5.7	−8.1
2383	195.6	14.300	14.298	14.8	185.1	14.303	14.290	39.9	195.3	500.9	190.3	41.4	−3.3	−9.2
2384	175.7	14.300	14.296	20.0	165.2	14.300	14.289	36.3	175.5	500.9	170.5	36.7	−.5	−10.8
2385	155.8	14.301	14.298	21.3	145.3	14.301	14.289	37.1	155.5	501.2	150.5	39.0	1.8	−7.9
2386	135.6	14.302	14.297	24.0	125.1	14.300	14.289	37.5	135.3	501.2	130.3	39.7	4.8	−8.3
2387	115.8	14.303	14.299	22.7	105.3	14.301	14.290	37.4	115.6	501.3	110.6	39.9	5.6	−8.8
2388	95.8	14.304	14.300	23.6	85.3	14.301	14.290	35.5	95.6	501.4	90.6	38.9	5.6	−8.8
2389	75.8	14.304	14.300	22.6	65.3	14.303	14.292	37.3	75.5	501.6	70.5	36.4	10.0	−7.4
2390	55.6	14.304	14.301	20.0	45.1	14.298	14.292	26.6	55.4	502.1	50.4	27.8	13.2	−8.3

TABLE 36.—DATA LISTING FOR TRAVERSE 2 AT STATION 6—LOWER HORIZONTAL SURVEY

[Test section data for reading 2350: total pressure, 14.324; static pressure, 13.227 psia; total temperature, 500 °R; velocity, 250.7 mph; fan speed, 286.2 rpm.]

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
2350	50.9	14.310	14.307	20.4	40.7	14.311	14.304	28.6	49.2	498.1	43.2	28.9	13.3	14.8
2351	60.5	14.310	14.304	27.6	50.3	14.311	14.304	29.0	58.8	497.9	52.8	29.9	13.0	6.8
2352	70.2	14.311	14.304	28.0	60.0	14.314	14.304	35.0	68.5	497.2	62.5	33.1	8.8	1.8
2353	80.7	14.313	14.304	34.2	70.4	14.315	14.304	36.3	78.9	496.9	72.9	38.0	11.0	8.1
2354	90.3	14.315	14.305	34.9	80.1	14.315	14.304	36.5	88.6	497.3	82.6	39.8	15.6	8.5
2355	101.1	14.314	14.303	36.3	90.9	14.315	14.304	37.1	99.4	497.9	93.4	38.0	10.0	−0.2
2356	110.8	14.315	14.304	36.5	100.5	14.316	14.304	37.7	109.0	497.8	103.0	38.9	4.2	.3
2357	120.2	14.316	14.304	37.4	109.9	14.316	14.304	38.5	118.4	497.6	112.4	42.4	3.0	3.7
2358	130.4	14.315	14.303	38.0	120.1	14.314	14.303	37.9	128.6	498.0	122.6	42.8	3.4	4.9
2359	140.3	14.315	14.304	37.3	130.0	14.315	14.303	38.2	138.5	496.2	132.5	43.1	3.7	6.2
2360	150.5	14.314	14.303	37.6	140.3	14.317	14.302	41.1	148.8	495.0	142.8	44.8	3.4	8.7
2361	160.6	14.317	14.303	40.3	150.4	14.317	14.303	39.6	158.9	494.4	152.9	44.1	3.1	9.4
2362	170.2	14.316	14.303	39.7	160.0	14.312	14.302	34.9	168.5	494.7	162.5	42.6	1.6	9.7
2363	180.6	14.313	14.303	34.6	170.4	14.316	14.304	39.1	178.9	494.9	172.9	41.1	−1.6	9.0
2364	190.4	14.316	14.303	38.6	180.1	14.316	14.303	38.8	188.6	495.9	182.6	43.3	−2.9	6.9
2365	200.5	14.316	14.303	38.7	190.3	14.317	14.304	39.5	198.8	495.4	192.8	44.1	−3.3	6.3
2366	210.6	14.316	14.303	39.2	200.3	14.316	14.304	38.3	208.8	496.4	202.8	43.9	−4.3	6.0
2367	220.4	14.315	14.303	38.1	210.1	14.315	14.303	37.1	218.6	497.0	212.6	42.6	−4.8	6.9
2368	230.7	14.315	14.304	36.7	220.4	14.315	14.304	36.4	228.9	496.4	222.9	41.3	−6.2	7.2
2369	240.5	14.314	14.303	35.8	230.3	14.314	14.303	36.1	238.8	495.3	232.8	40.6	−7.2	6.2
2370	250.8	14.314	14.303	35.7	240.5	14.314	14.304	34.7	249.0	494.7	243.0	40.0	−8.8	6.9
2371	260.6	14.313	14.303	34.5	250.4	14.312	14.303	32.0	258.9	495.9	252.9	38.7	−10.4	6.5
2372	270.5	14.313	14.305	31.7	260.3	14.312	14.304	31.8	268.8	495.2	262.8	37.6	−10.8	8.3
2373	280.8	14.312	14.304	31.1	270.5	14.311	14.304	28.2	279.0	495.1	273.0	31.5	−12.6	9.7
2374	290.6	14.310	14.304	27.4	280.3	14.312	14.305	29.1	288.8	495.4	282.8	36.1	−12.9	9.5

TABLE 36.—Concluded.

Reading number	Probe one				Probe two				Thermocouple		Wind anemometer			
	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total pressure, psia	Static pressure, psia	Velocity, ft/sec	Position, in.	Total temperature, °R	Position, in.	Velocity, ft/sec	Pitch, deg	Yaw, deg
2375	300.5	14.311	14.304	28.8	290.3	14.312	14.305	28.3	298.8	494.6	292.8	33.4	−14.0	8.3
2376	310.2	14.312	14.306	28.1	299.9	14.312	14.305	26.8	308.4	492.5	302.4	30.5	−14.4	7.9
2377	315.6	14.312	14.305	27.1	305.3	14.311	14.306	25.5	313.8	490.6	307.8	29.1	−14.4	7.9
2378	295.5	14.311	14.304	29.6	285.3	14.312	14.305	28.8	293.8	494.4	287.8	34.7	−14.1	8.3
2379	275.9	14.311	14.303	30.8	265.6	14.311	14.304	28.8	274.1	494.5	268.1	35.6	−12.6	9.3
2380	255.9	14.313	14.302	35.3	245.6	14.313	14.304	33.1	254.1	495.0	248.1	40.4	−9.8	6.6
2381	235.5	14.313	14.302	36.1	225.2	14.314	14.303	36.0	233.7	495.6	227.7	41.4	−7.1	6.6
2382	215.5	14.315	14.303	39.2	205.2	14.316	14.304	38.2	213.7	496.7	207.7	43.7	−4.5	6.1
2383	195.4	14.315	14.302	39.0	185.1	14.317	14.305	39.1	193.6	495.7	187.6	44.6	−3.8	6.4
2384	175.3	14.314	14.301	38.6	165.1	14.314	14.303	36.0	173.6	495.0	167.6	39.9	−.3	10.9
2385	155.8	14.316	14.302	40.2	145.6	14.318	14.304	41.2	154.1	494.6	148.1	45.4	2.0	9.6
2386	135.4	14.316	14.304	37.9	125.2	14.317	14.305	37.5	133.7	497.4	127.7	43.5	3.7	6.2
2387	115.7	14.316	14.304	37.3	105.5	14.317	14.305	38.1	114.0	498.3	108.0	41.1	1.6	1.8
2388	95.5	14.316	14.305	36.1	85.2	14.317	14.306	36.1	93.7	496.6	87.7	37.6	13.5	3.1
2389	75.7	14.313	14.305	31.2	65.5	14.316	14.305	35.2	74.0	495.9	68.0	37.2	9.5	4.6
2390	55.7	14.310	14.305	23.6	45.4	14.313	14.307	27.2	53.9	497.8	47.9	32.5	13.1	13.4

TABLE 37.—TEST MATRIX

Test section air speed, V_{TS}, mph	Tunnel total temperature, $T_{D,avg}$, °F	Temperature condition	Traverse	Traverse position above floor, Z, in.
350	48	Warm	No	79
350	15	Outside air matched	No	79
300	15	Outside air matched	No	79
250	14	Outside air matched	No	79
200	15	Outside air matched	No	79
350	−17	Cold	No	79
250	14	Outside air matched	Yes	0 to 314
350	−17	Cold	Yes	0 to 314

TABLE 38.—TEST MATRIX

Traverse position, Z, in.	Test section air speed, V_{TS}, mph	Test section blockage	Total temperature, $T_{D,avg}$, °F
18.25	100, 150, 200, 250, 300	Blockage plate at 55°; no blockage plate	60 to 70
42.1	100, 150, 200, 250, 300	Blockage plate at 55°; no blockage plate	60 to 70
67.5	100, 150, 200, 250, 300	Blockage plate at 55°; no blockage plate	60 to 70

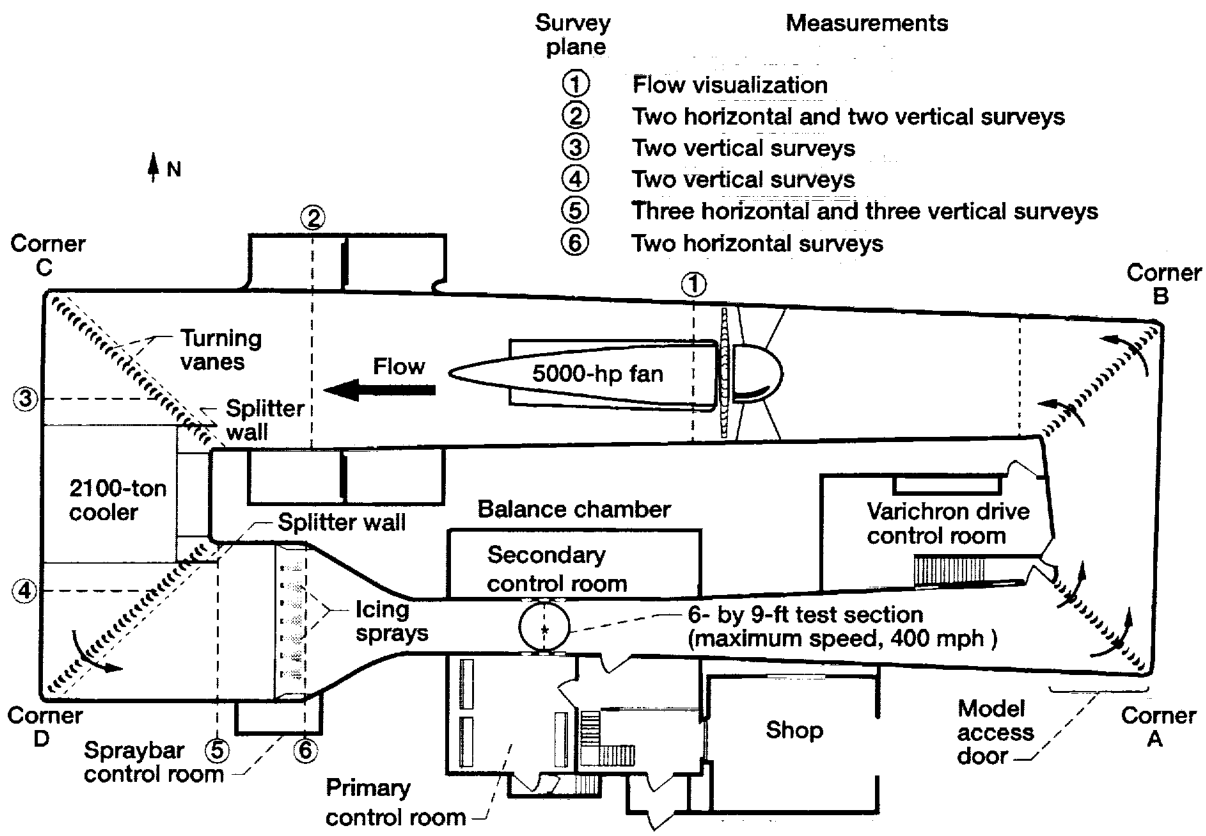


Figure 1.—Plan view of Icing Research Tunnel, shop, and control room showing tunnel loop survey planes.

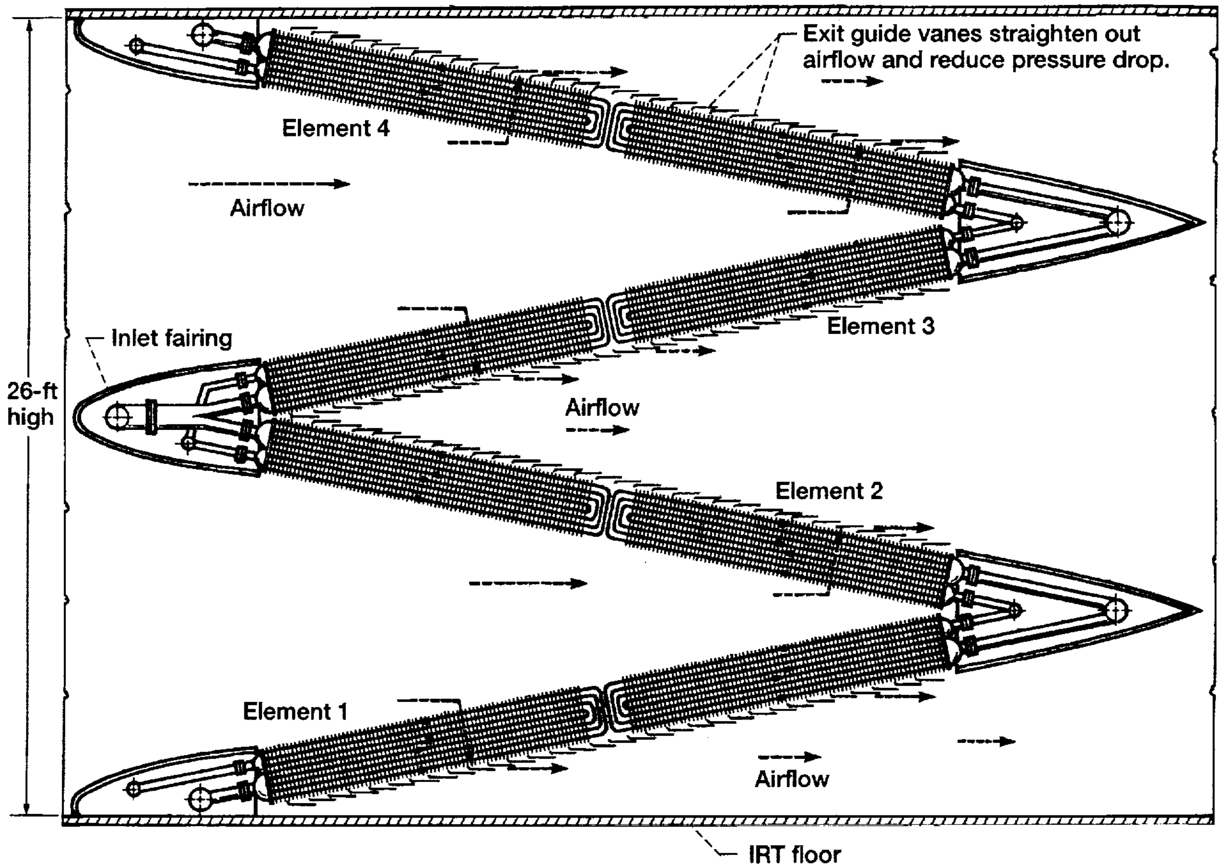


Figure 2.—Elevation view of cooler in IRT.

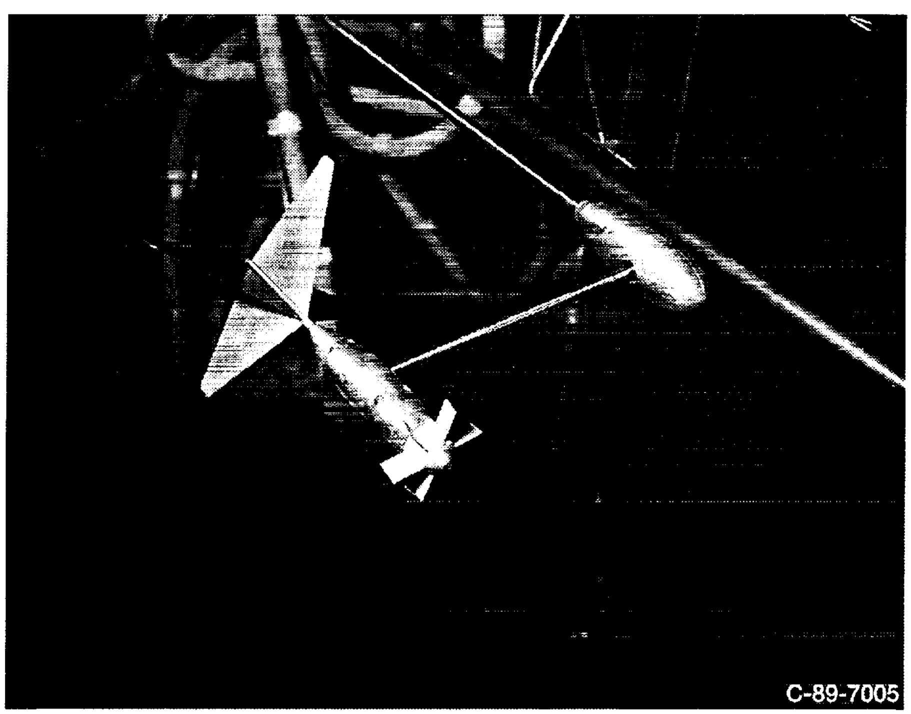


Figure 3.—Typical wind anemometer used on traversing plates during IRT flow quality studies.

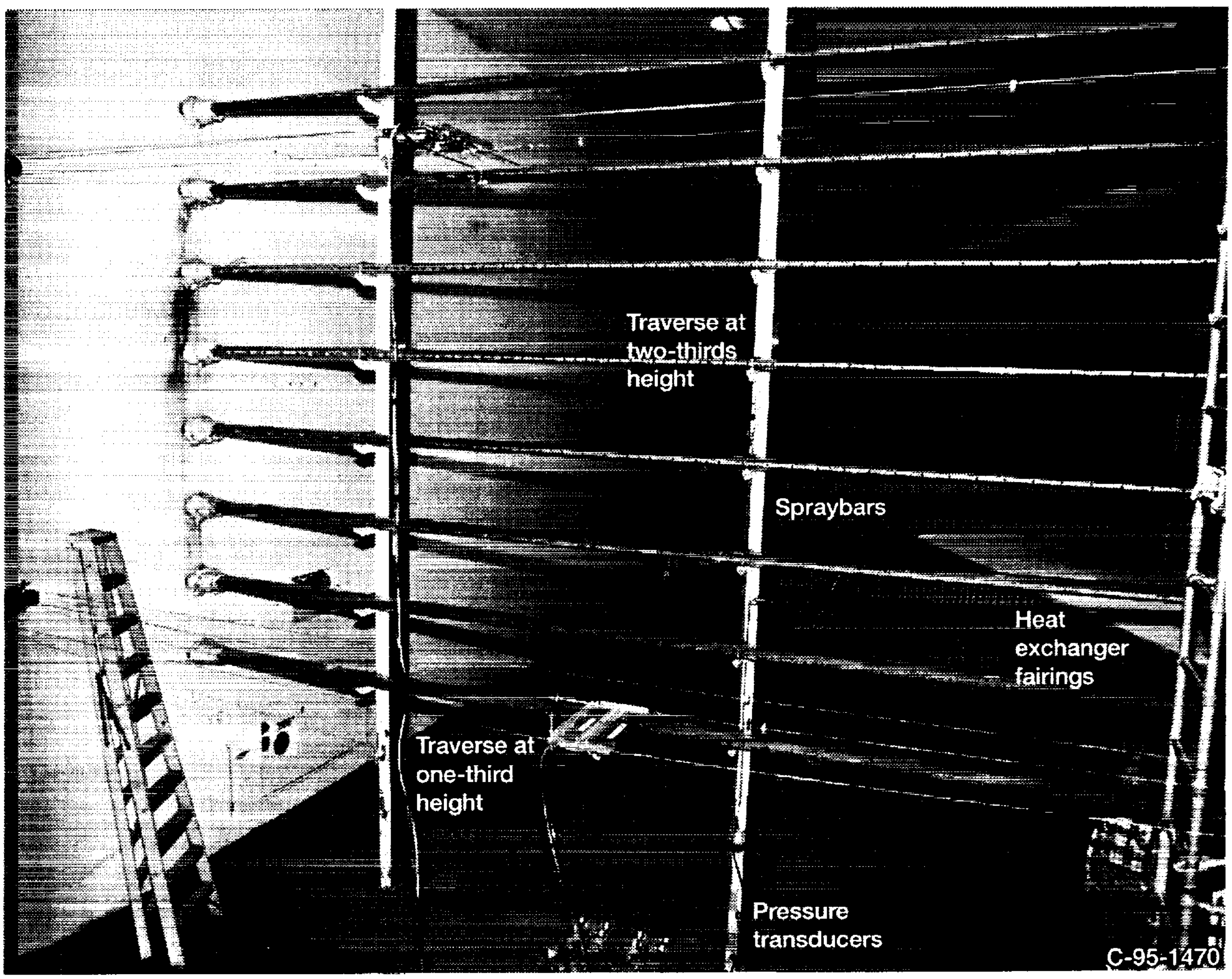


Figure 4.—Setup (at station 6, downstream of spraybars) showing typical flow field survey installation with traversing plates.

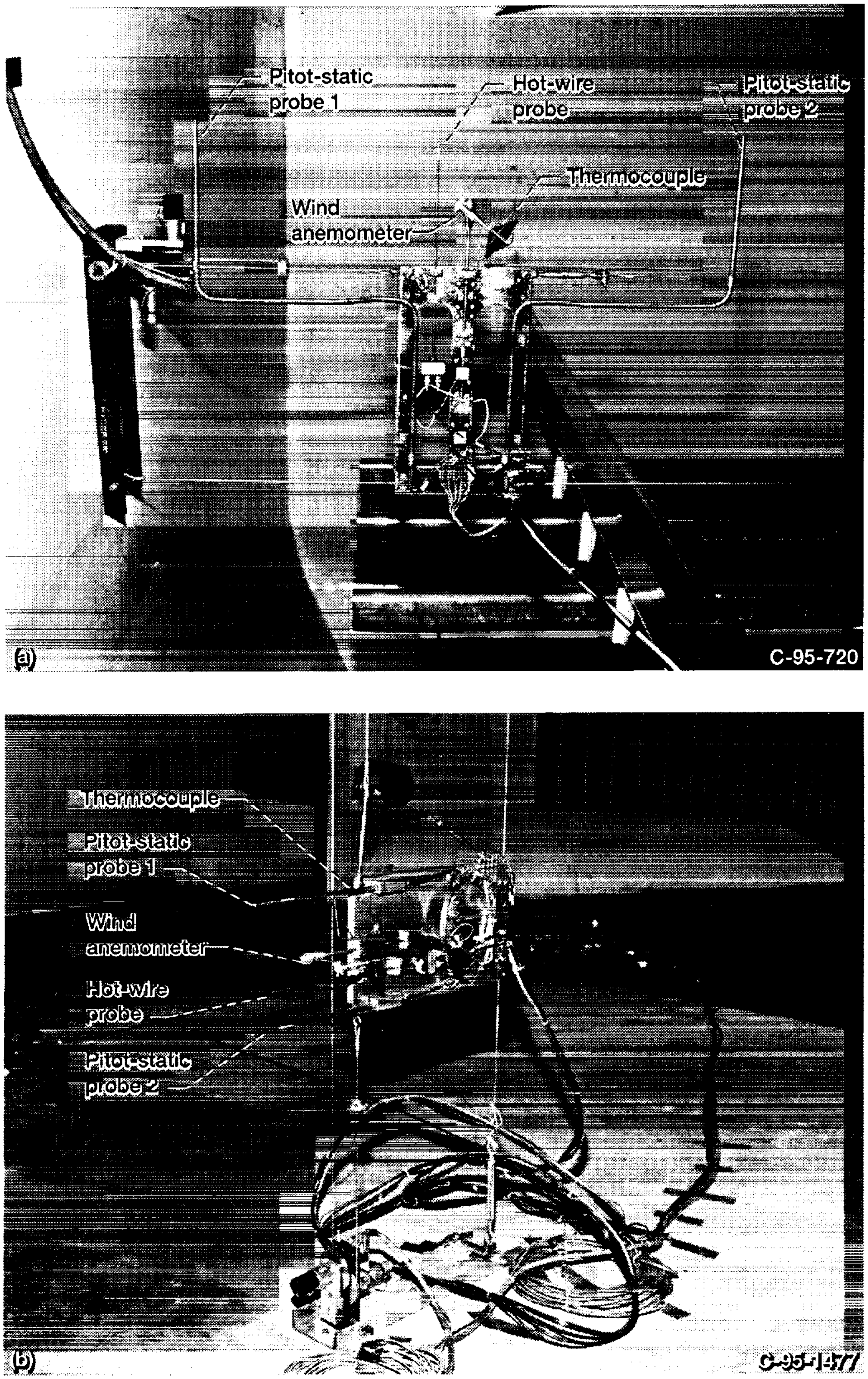


Figure 5.—Instrumentation configuration on traversing plates during tunnel-loop flow quality surveys. (a) Configuration 1, used at stations 4 and 5 for runs 1 to 10 (actual installation at station 5—horizontal, view from floor). (b) Configuration 2, used at stations 2, 3, 5, and 6 (actual installation at station 2—vertical, view from outside tunnel wall).

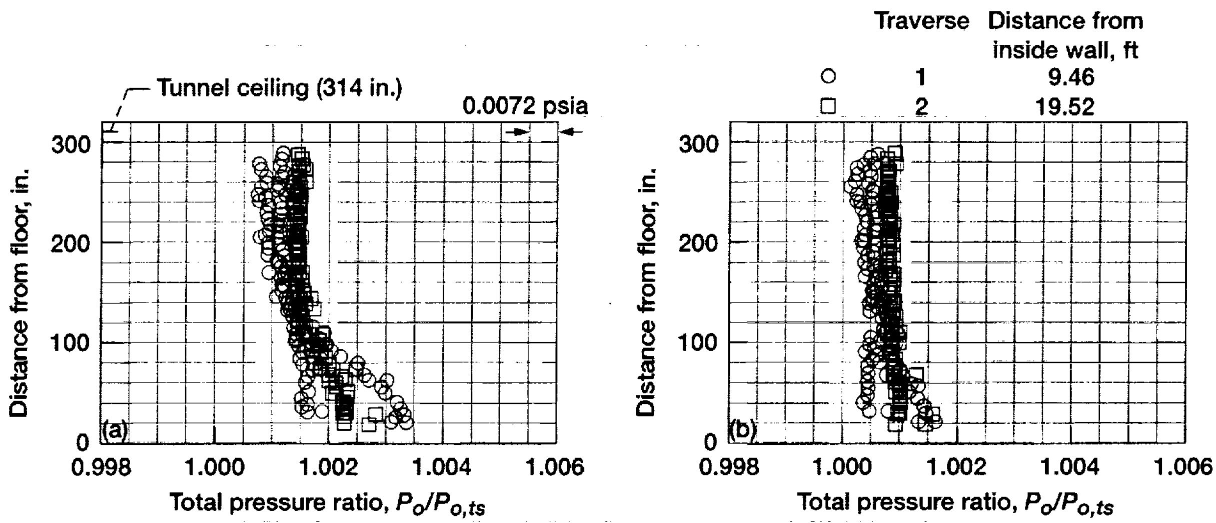


Figure 6.—Total pressure ratio distributions along vertical surveys downstream of drive motor housing (station 2). (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

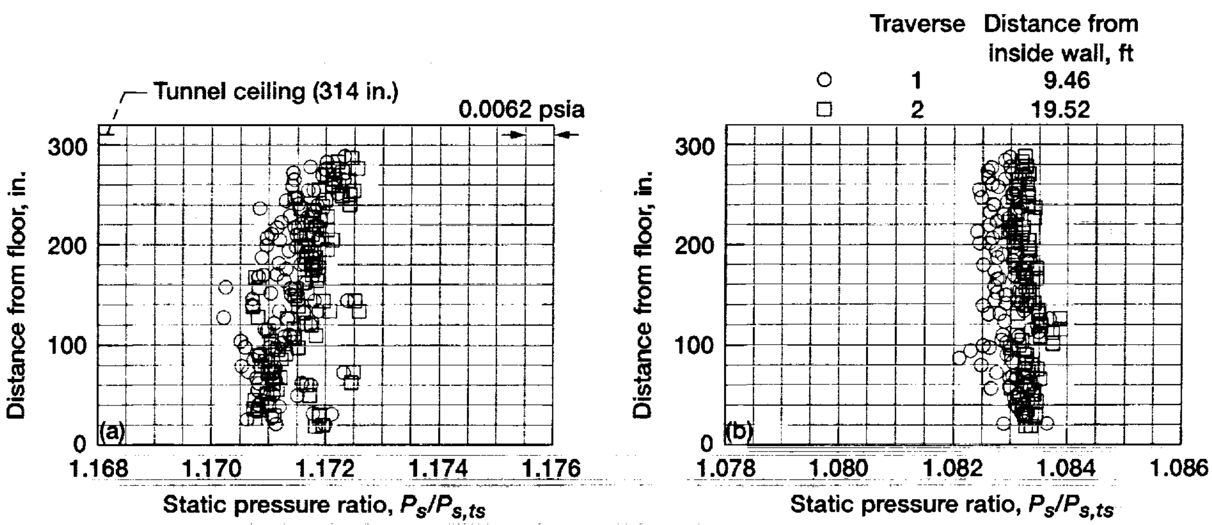


Figure 7.—Static pressure ratio distributions along vertical surveys downstream of drive motor housing (station 2). (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

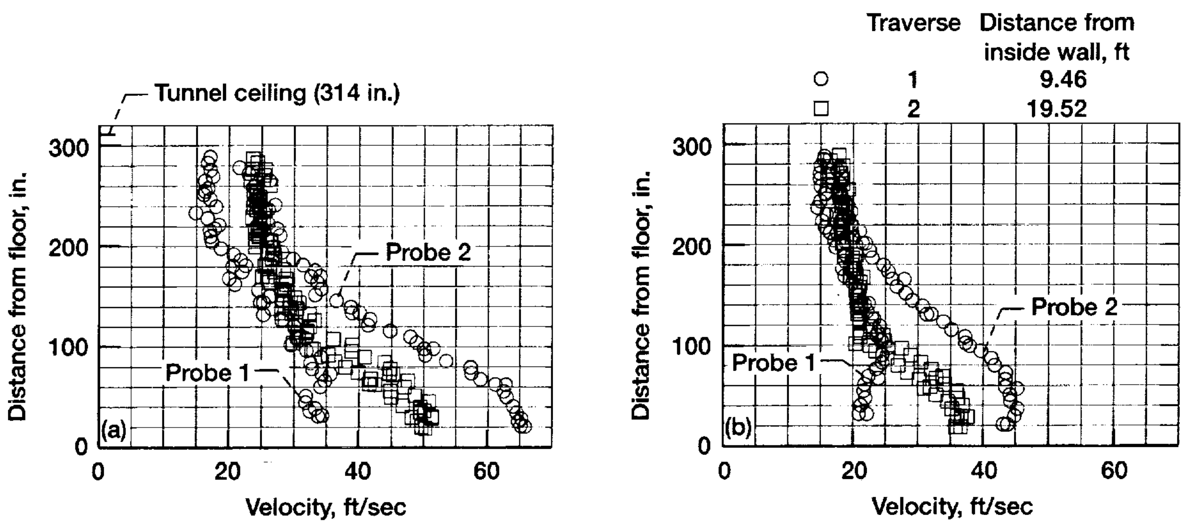


Figure 8.—Velocity distribution measured by pitot-static probes along vertical surveys downstream of drive motor housing (station 2). (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

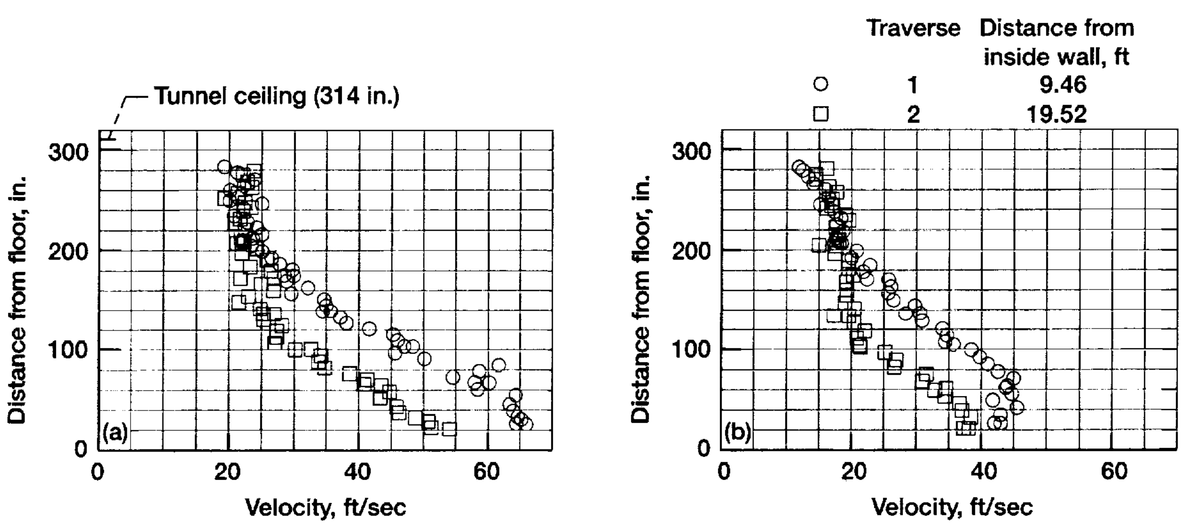


Figure 9.—Velocity distribution measured by wind anemometers along vertical surveys downstream of drive motor housing (station 2). (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

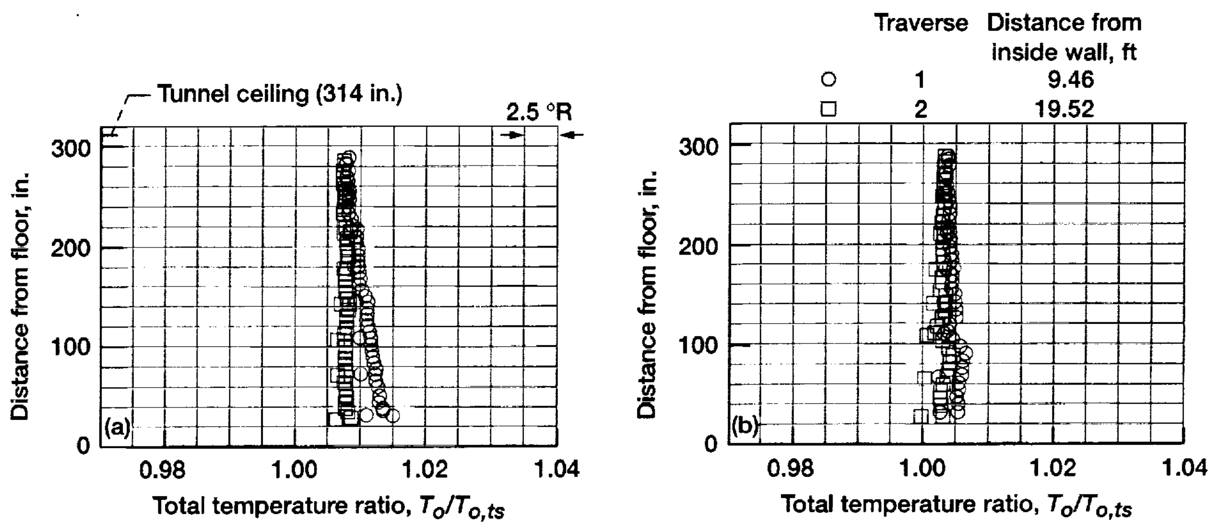


Figure 10.—Total temperature ratio distribution along vertical surveys downstream of drive motor housing (station 2). (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

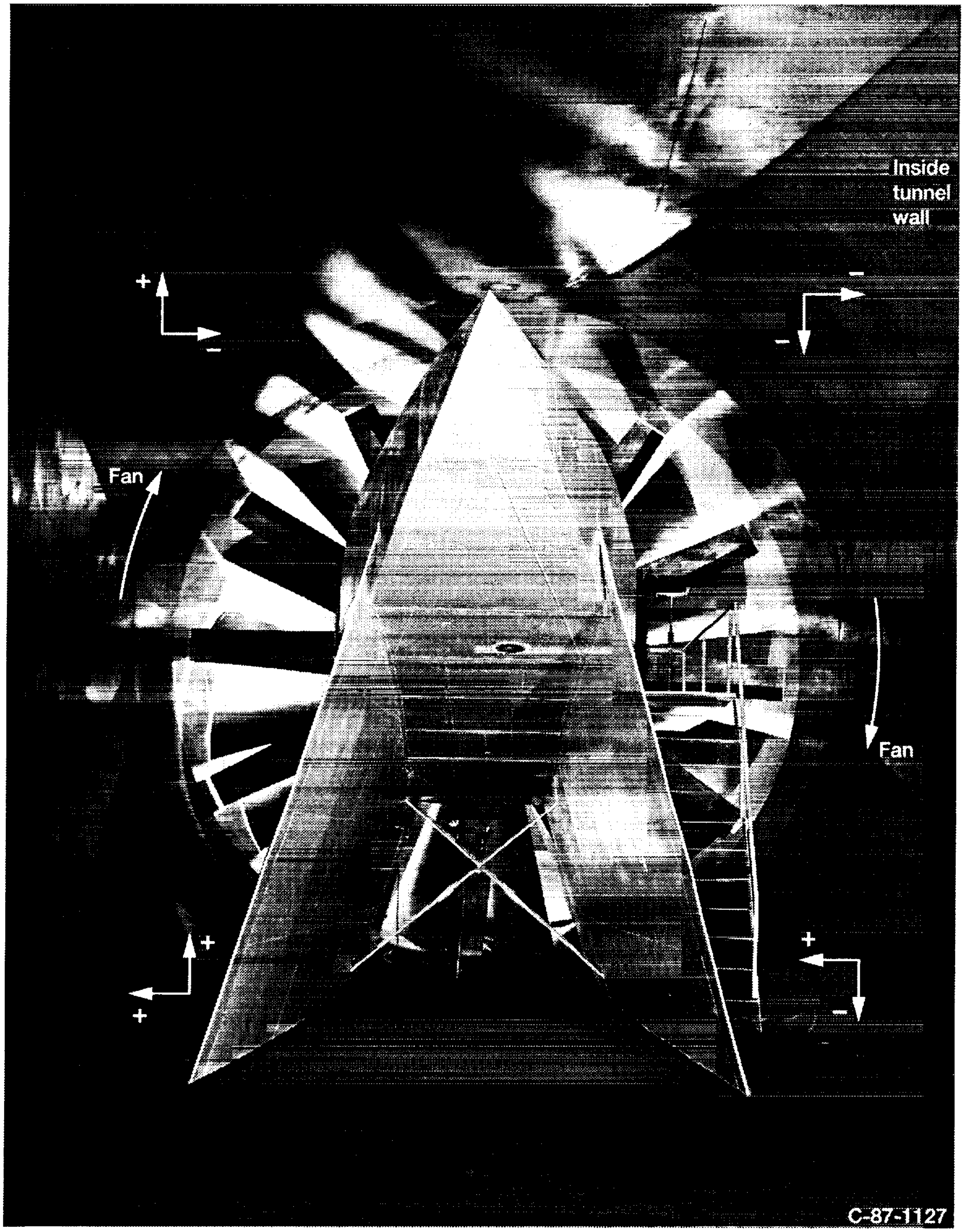


Figure 11.—IRT fan exit as viewed from corner C of tunnel (i.e., looking upstream, see fig. 1). Direction of fan rotation and components of swirl are indicated. Traverse 1 position was to the right (inside wall) and traverse 2 to the left. Pitch angle is defined as positive for upflow; positive yaw angle is from inside wall toward outside wall.

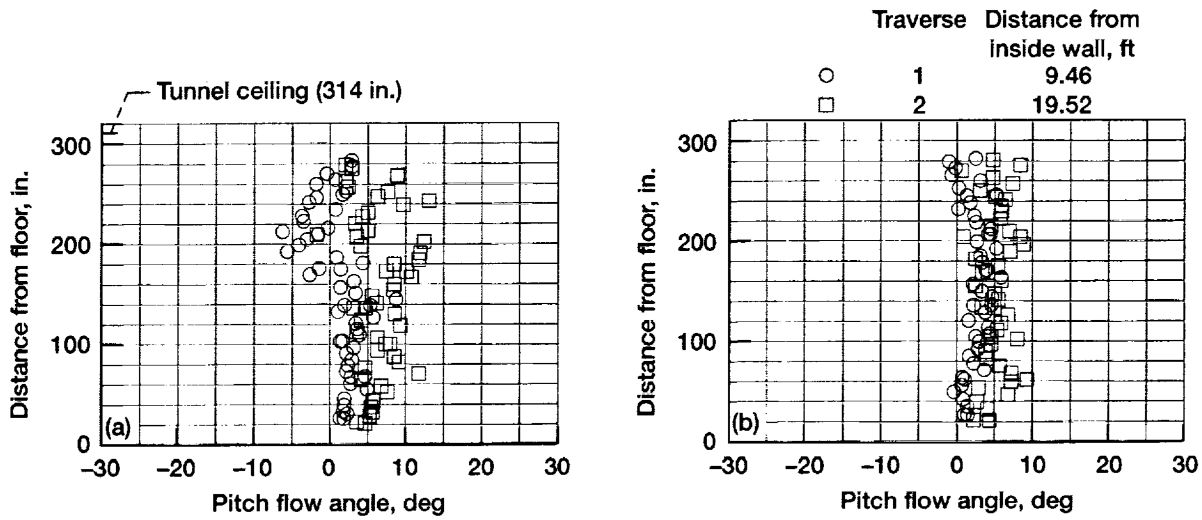


Figure 12.—Pitch flow angle distribution (positive indicates upflow; negative indicates downflow) along vertical surveys downstream of drive motor housing (station 2). (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

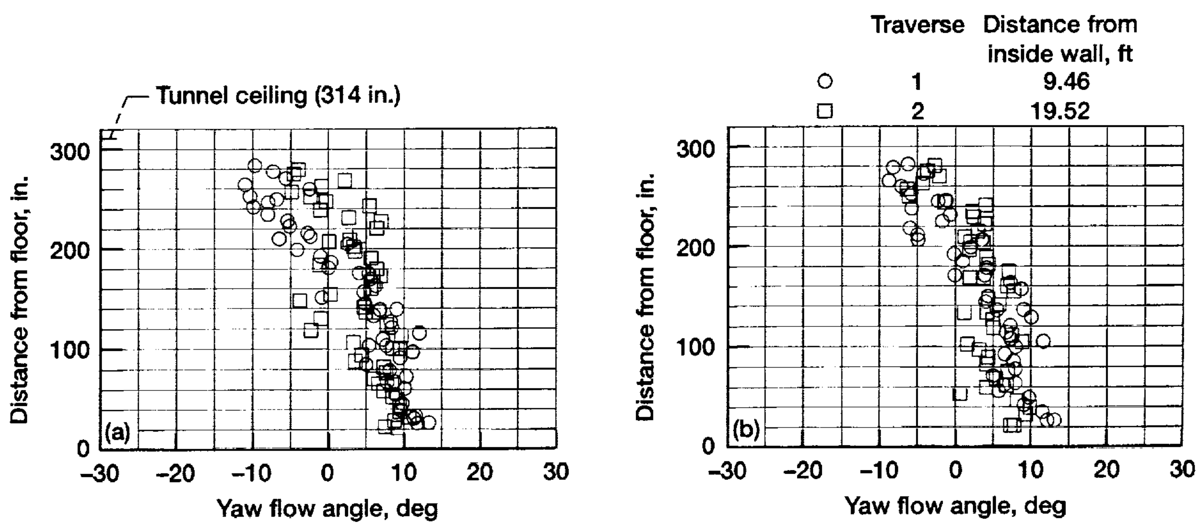


Figure 13.—Yaw flow angle distribution (positive = flow from inside wall to outside wall (outflow); negative = flow from outside to inside wall (inflow)) along vertical surveys downstream of drive motor housing (station 2). (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

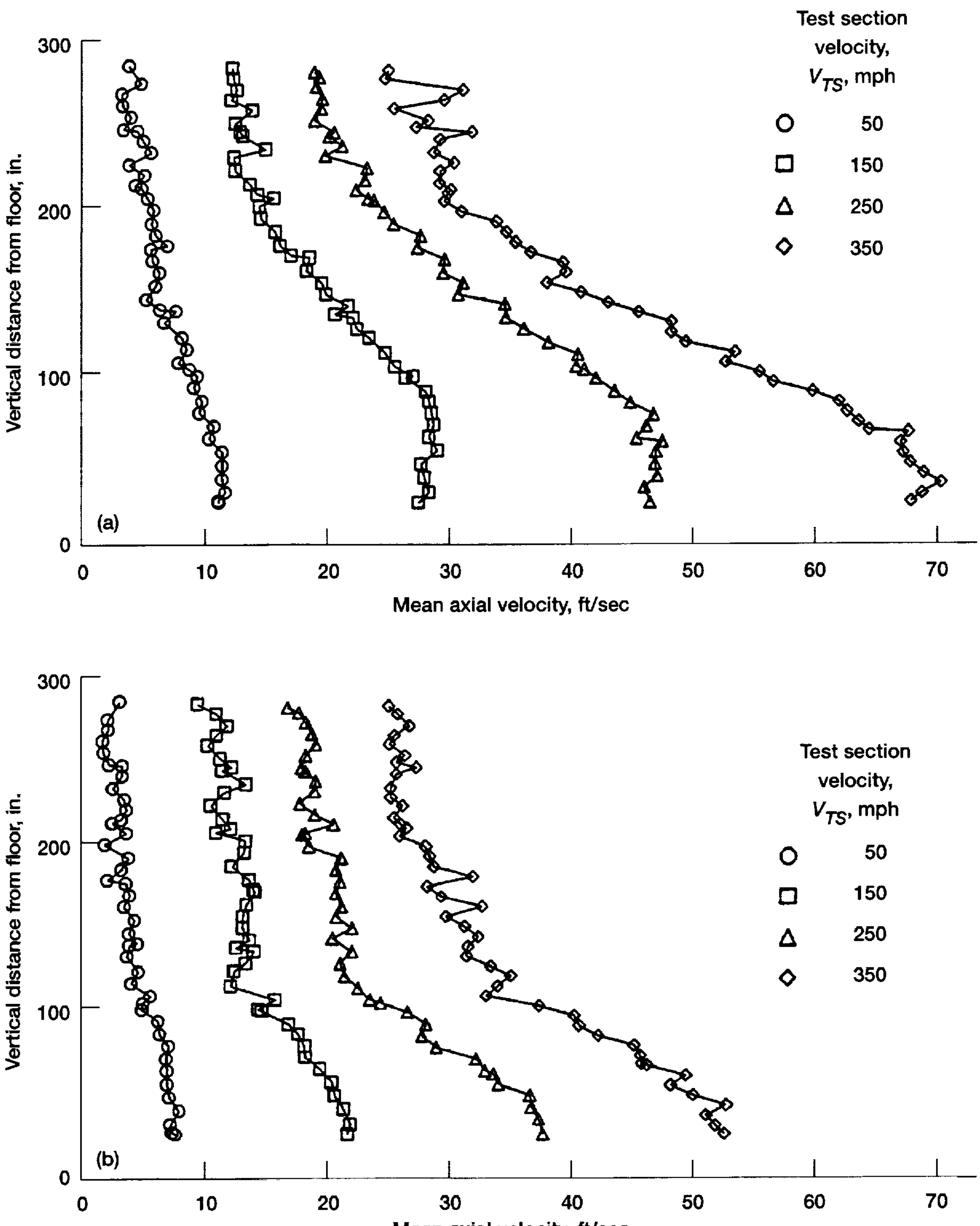


Figure 14.—Mean axial velocity distributions along vertical surveys downstream of drive motor housing (station 2) as measured by hot-wire anemometers. (a) Traverse 1 (9.46 ft from inside wall). (b) Traverse 2 (19.52 ft from inside wall).

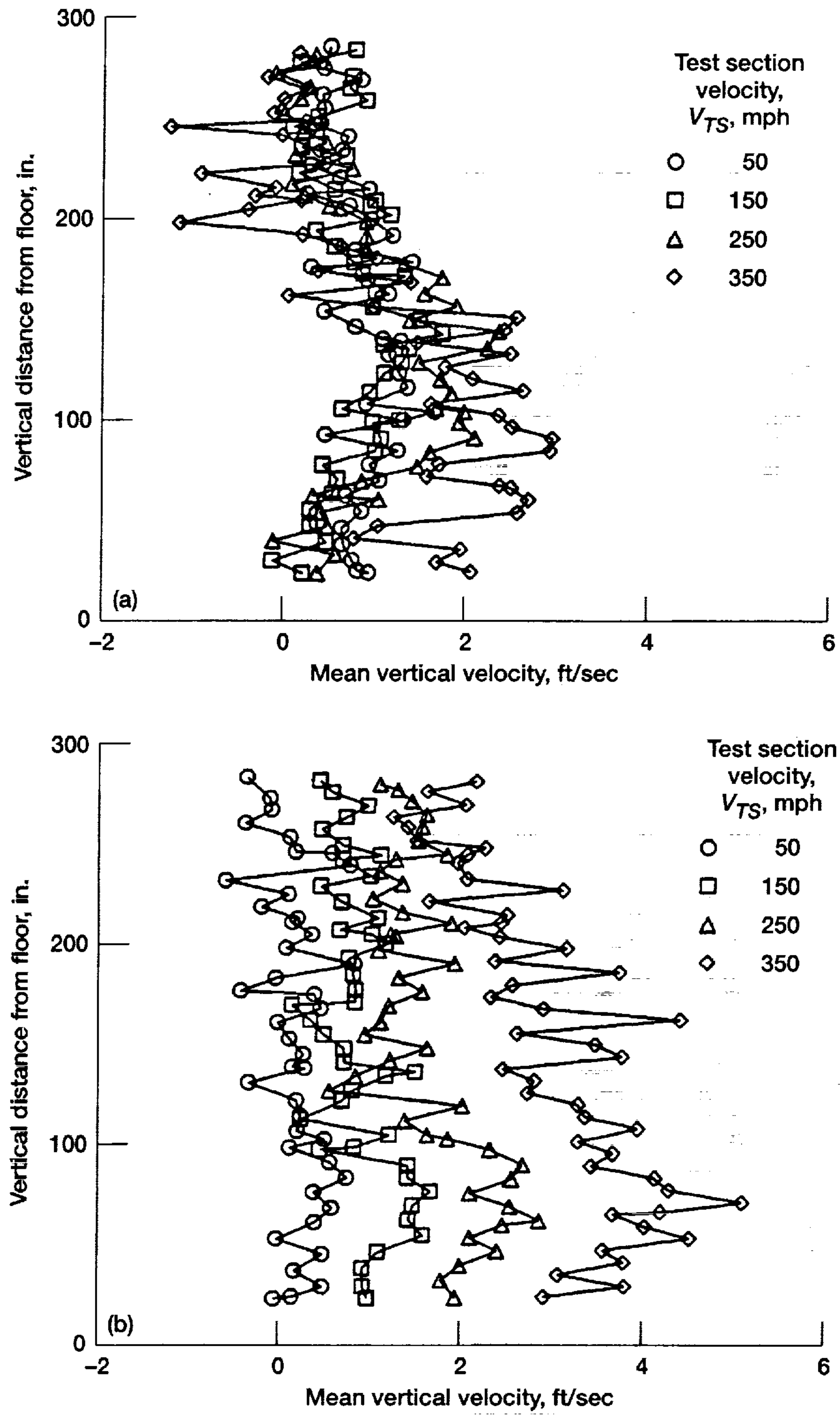
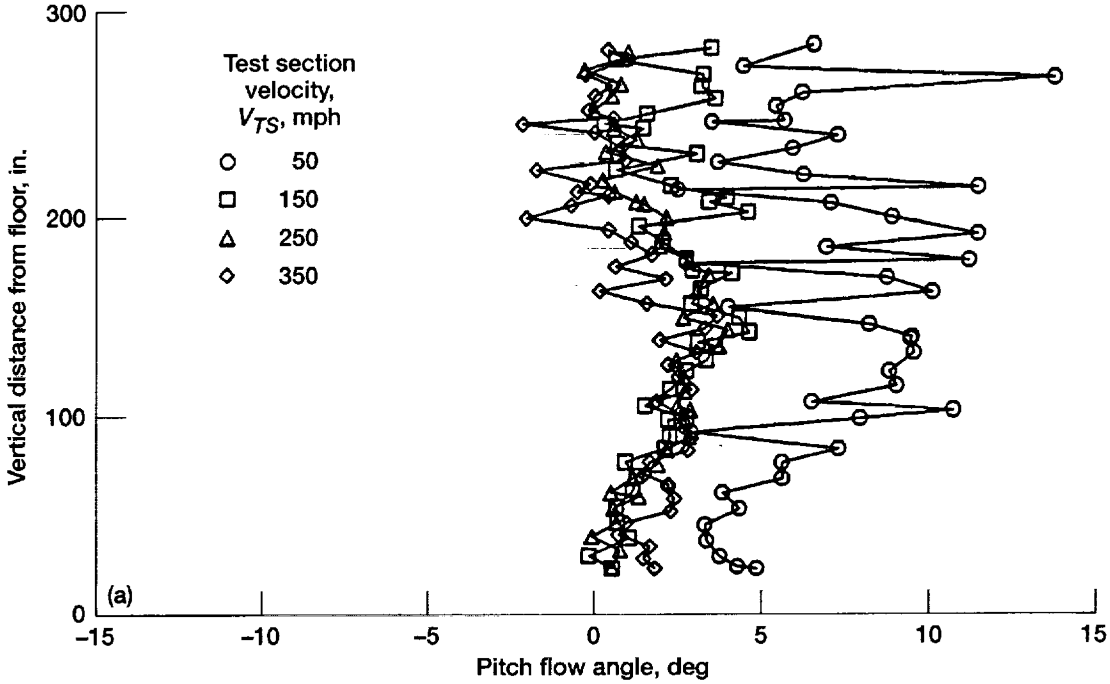


Figure 15.—Mean verticial velocity distributions along vertical surveys downstream of drive motor housing (station 2) as measured by hot-wire anemometers. (a) Traverse 1 (9.46 ft from inside wall). (b) Traverse 2 (19.52 ft from inside wall).



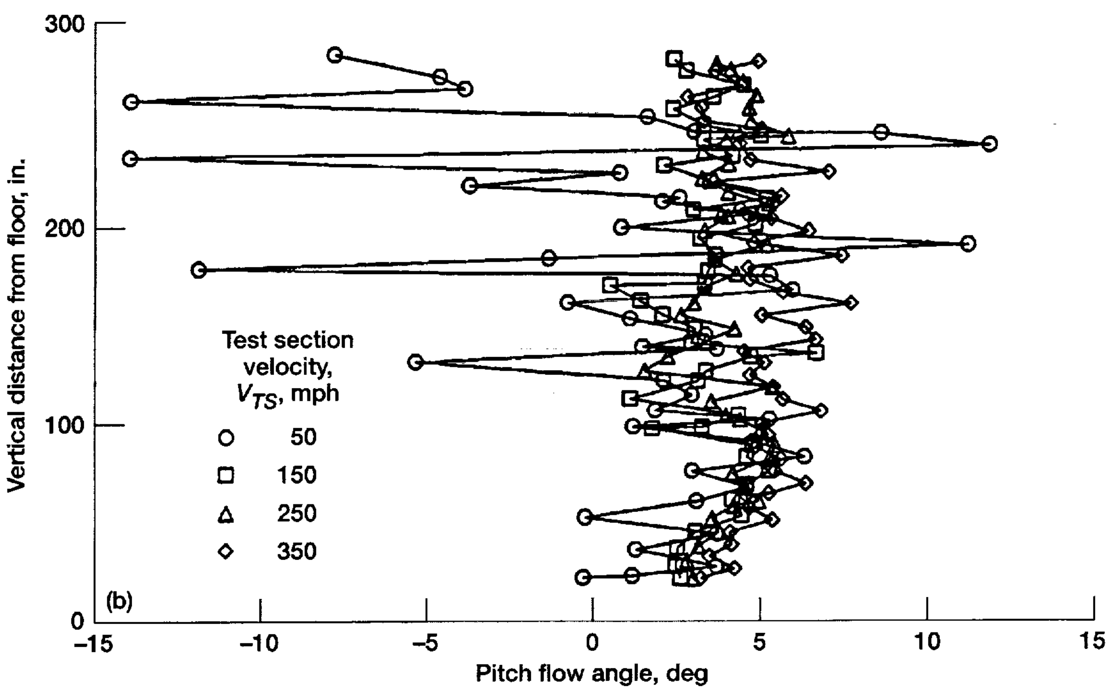
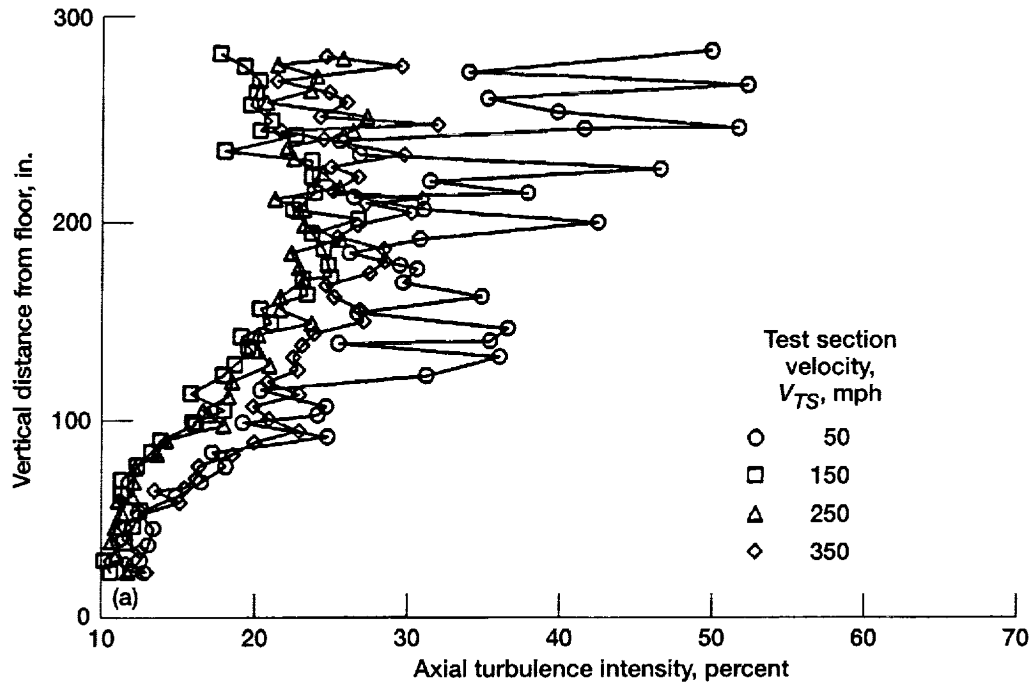


Figure 16.—Pitch flow angle distribution along vertical surveys downstream of drive motor housing (station 2). (a) Traverse 1 (9.46 ft from inside wall). (b) Traverse 2 (19.52 ft from inside wall).



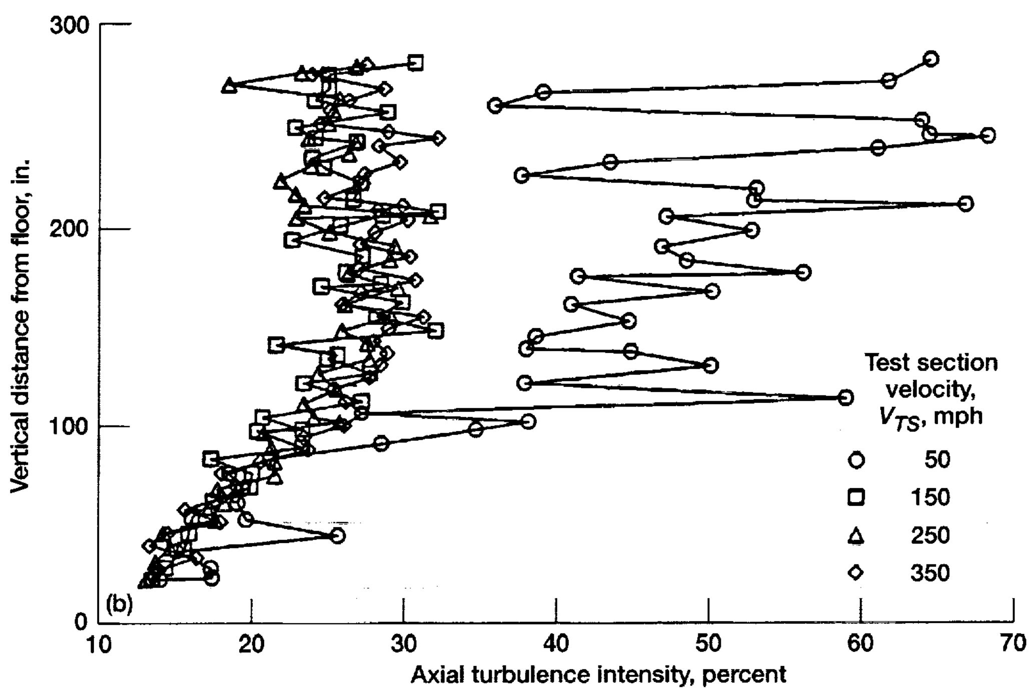


Figure 17.—Axial turbulence intensity distribution along vertical surveys downstream of drive motor housing (station 2). (a) Traverse 1 (9.46 ft from inside wall). (b) Traverse 2 (19.52 ft from inside wall).

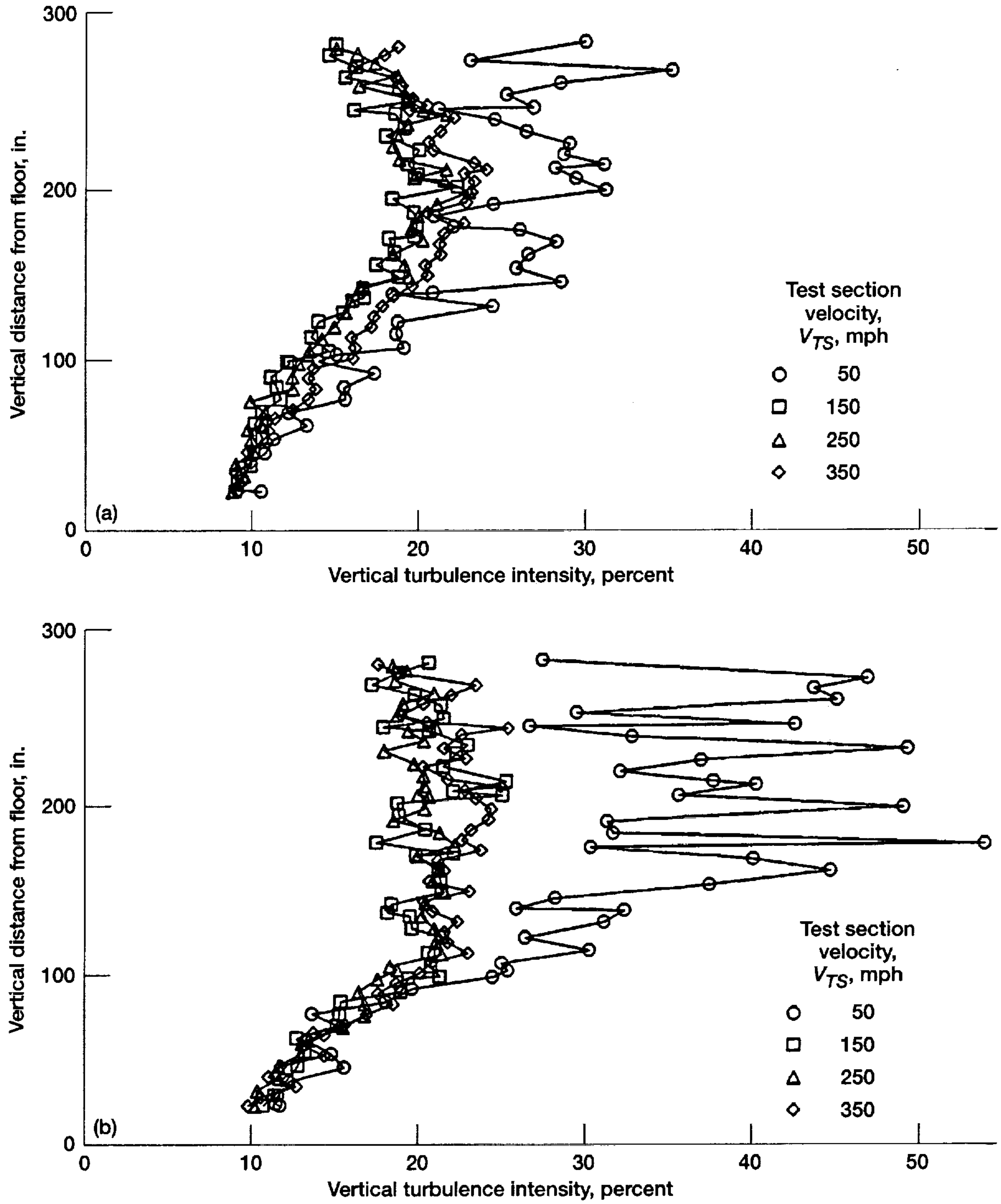


Figure 18.—Vertical turbulence intensity distribution along vertical surveys downstream of drive motor housing (station 2). (a) Traverse 1 (9.46 ft from inside wall). (b) Traverse 2 (19.52 ft from inside wall).

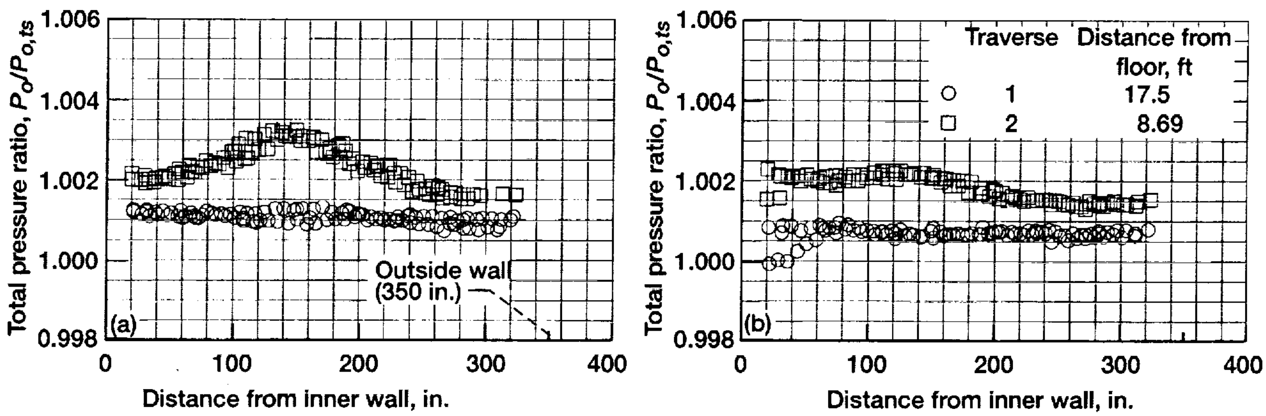


Figure 19.—Total pressure ratio distribution along horizontal surveys downstream of drive motor housing (station 2). (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

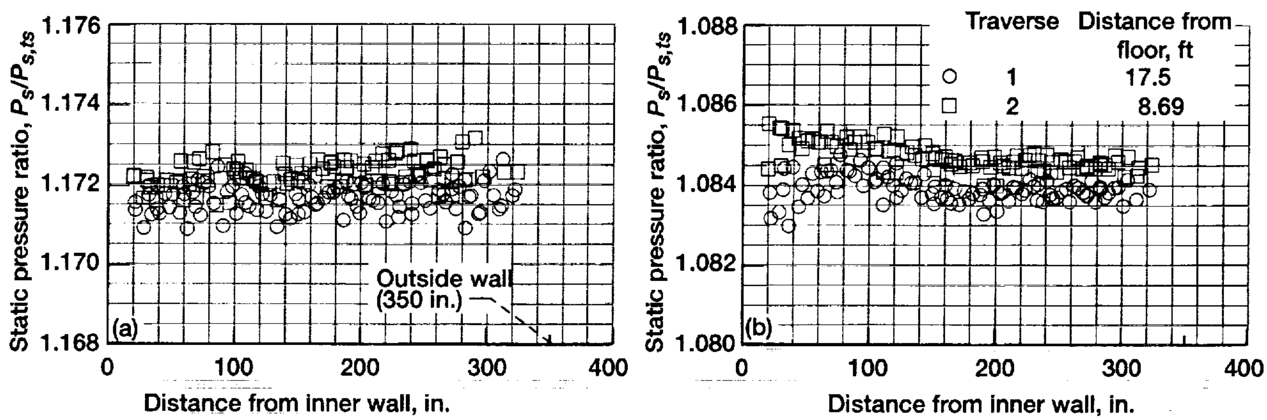


Figure 20.—Static pressure ratio distribution along horizontal surveys downstream of drive motor housing (station 2). (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

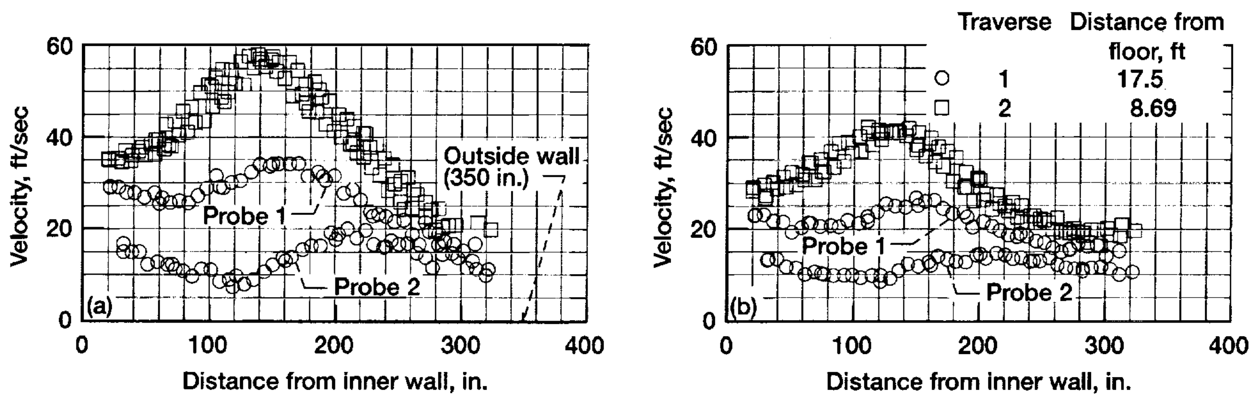


Figure 21.—Velocity distribution measured by pitot-static probes along horizontal surveys downstream of drive motor housing (station 2). (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

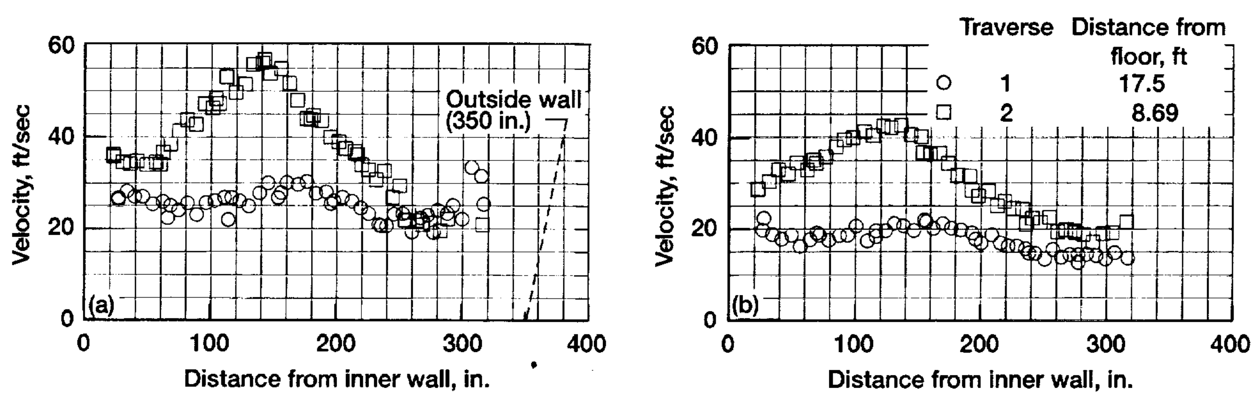


Figure 22.—Velocity distribution measured by wind anemometers along horizontal surveys downstream of drive motor housing (station 2). (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

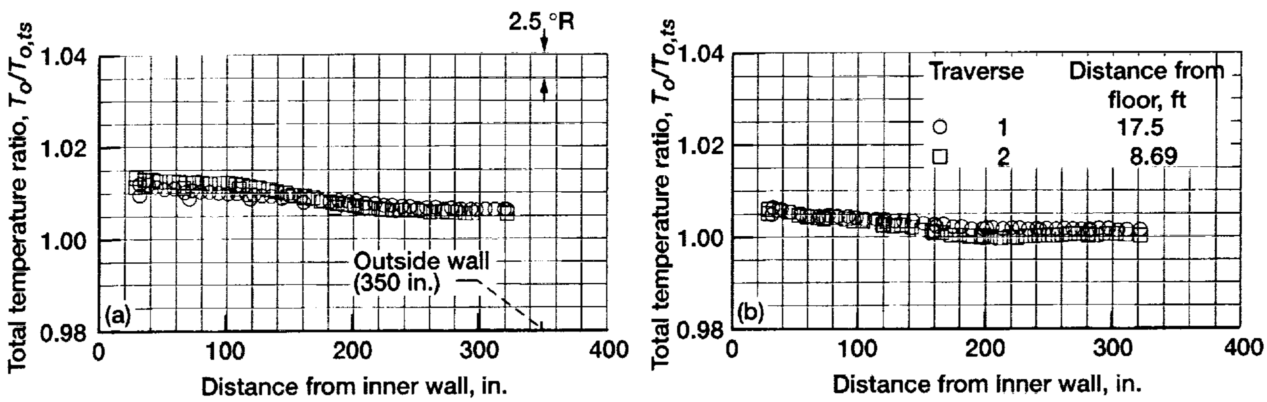


Figure 23.—Total temperature ratio distribution along horizontal surveys downstream of drive motor housing (station 2). (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

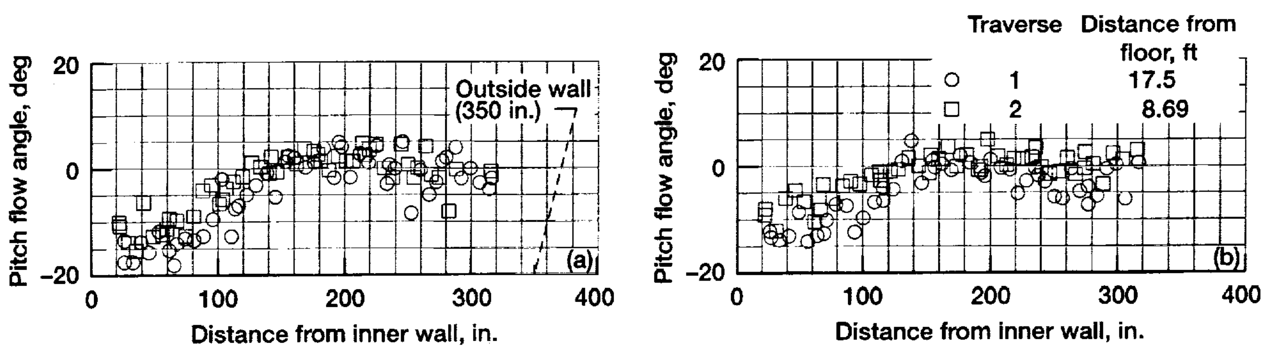


Figure 24.—Pitch flow angle distribution (positive = upflow; negative = downflow) along horizontal surveys downstream of drive motor housing (station 2). (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

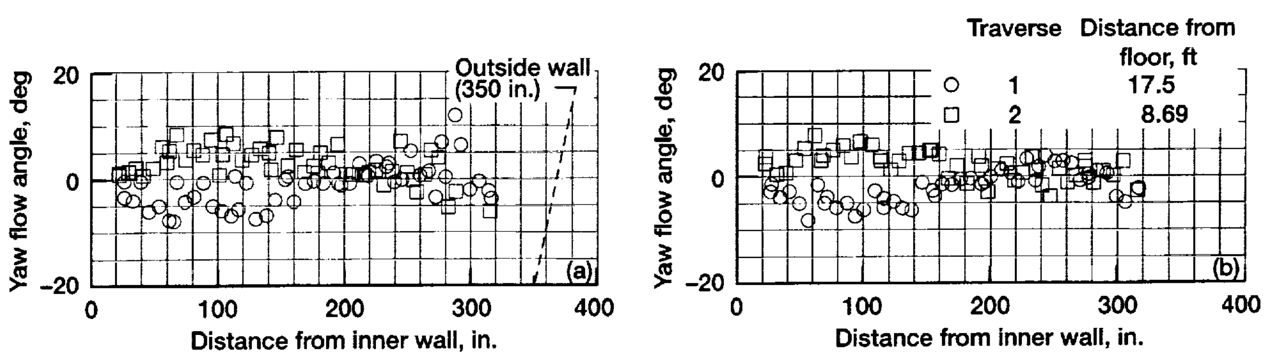


Figure 25.—Yaw flow angle distribution (positive = flow from inside wall to outside wall (outflow); negative = flow from outside to inside wall (inflow)) along horizontal surveys downstream of drive motor housing (station 2). (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

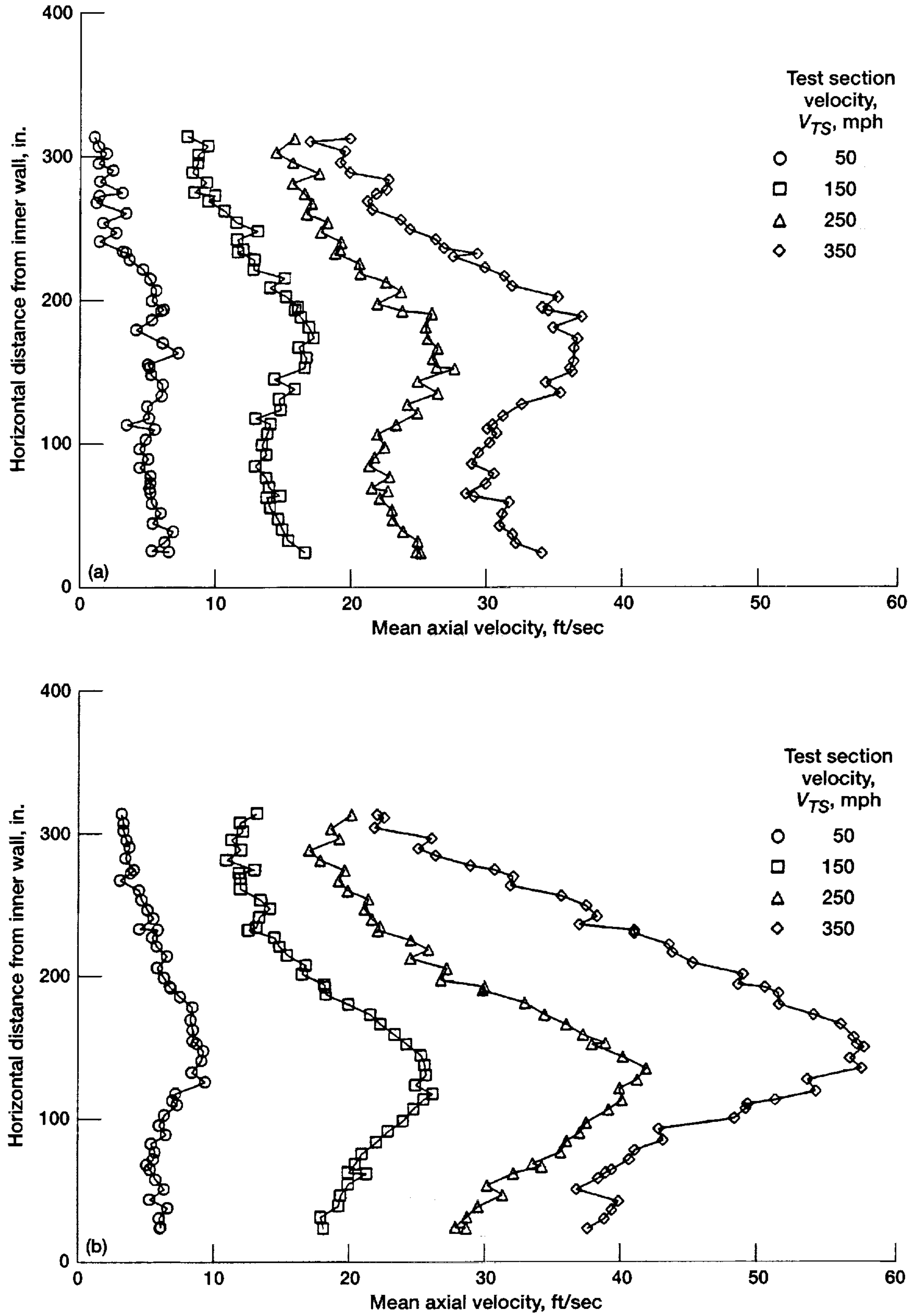
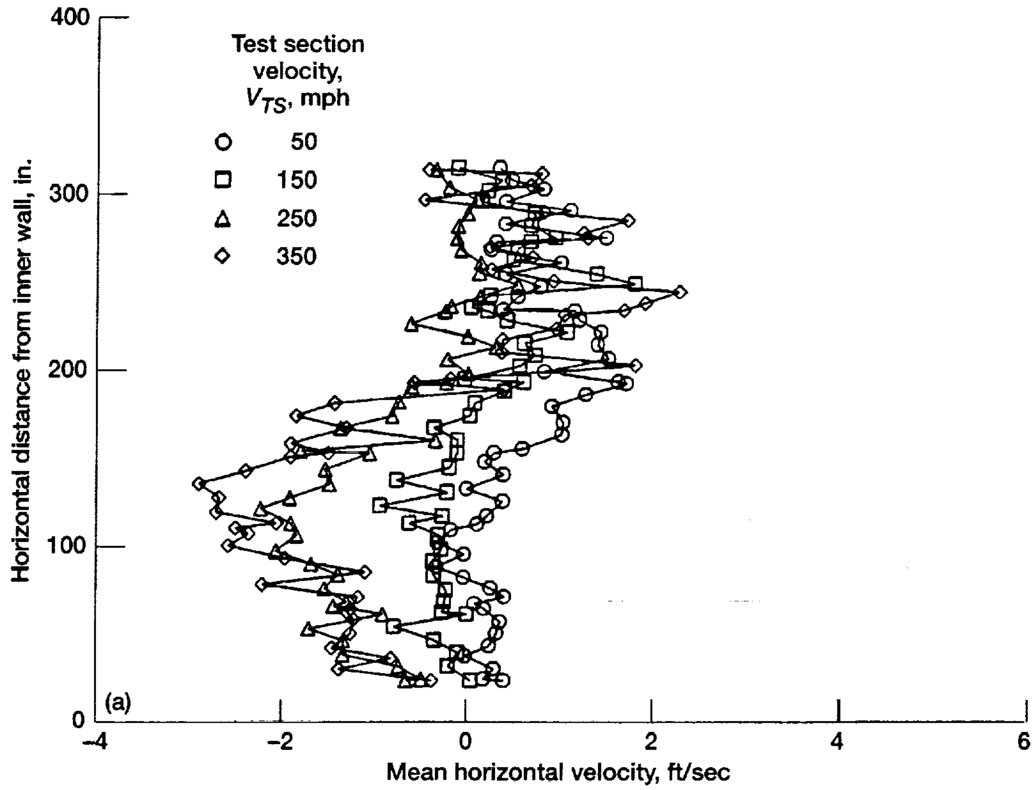


Figure 26.—Mean axial velocity distributions along horizontal surveys downstream of drive motor housing (station 2) as measured by hot-wire anemometers. (a) Traverse 1 (9.46 ft from inside wall). (b) Traverse 2 (19.52 ft from inside wall).



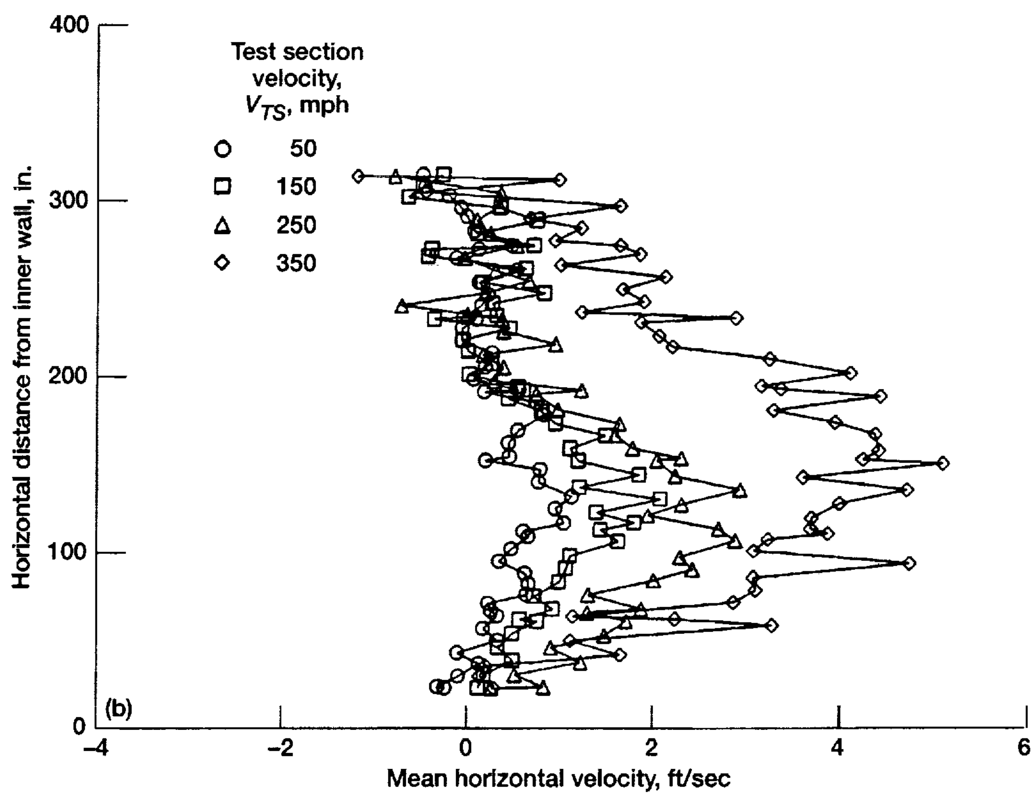


Figure 27.—Mean horizontal velocity distributions along horizontal surveys downstream of drive motor housing (station 2) as measured by hot-wire anemometers. (a) Traverse 1 (9.46 ft from inside wall). (b) Traverse 2 (19.52 ft from inside wall).

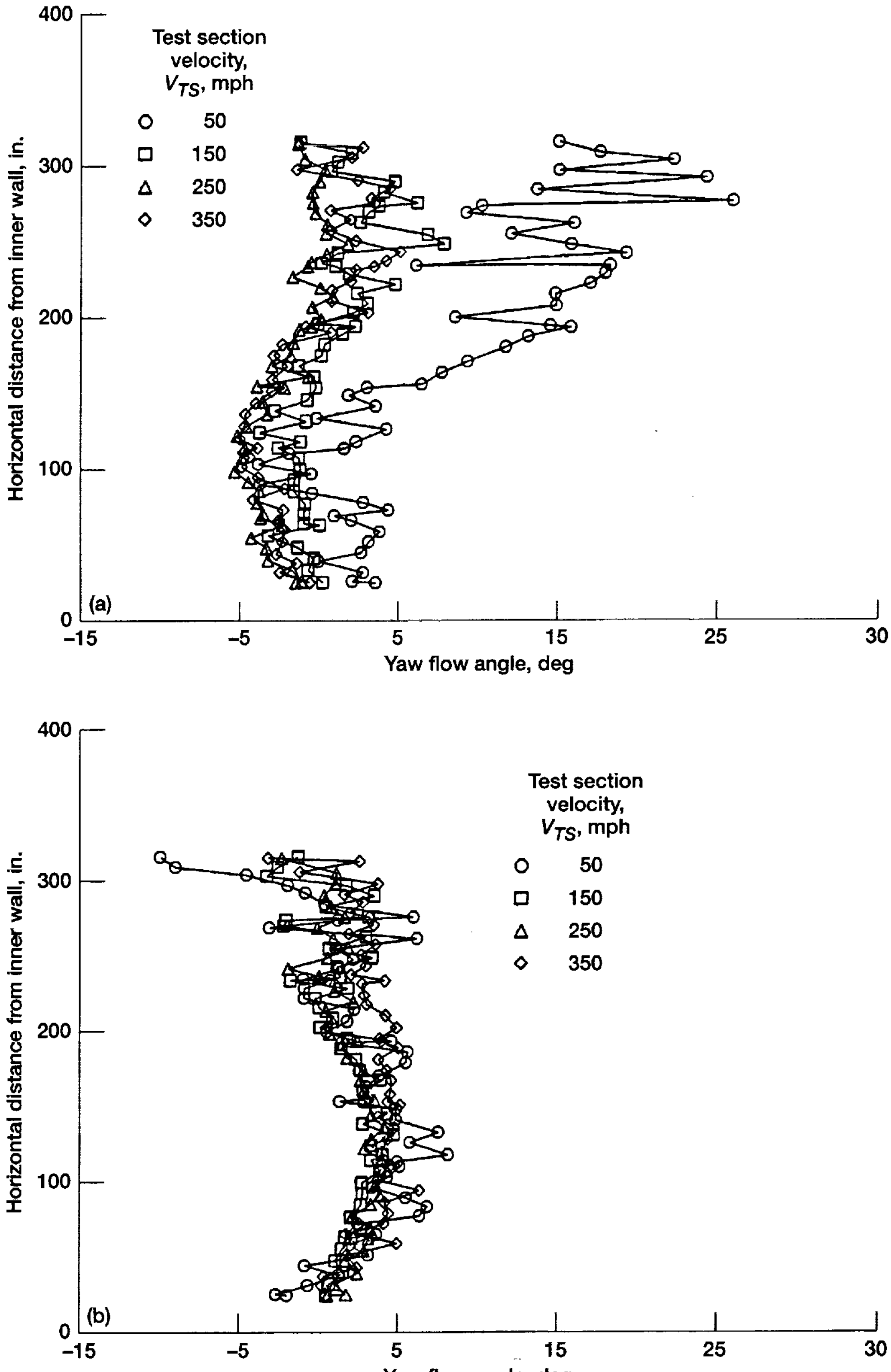
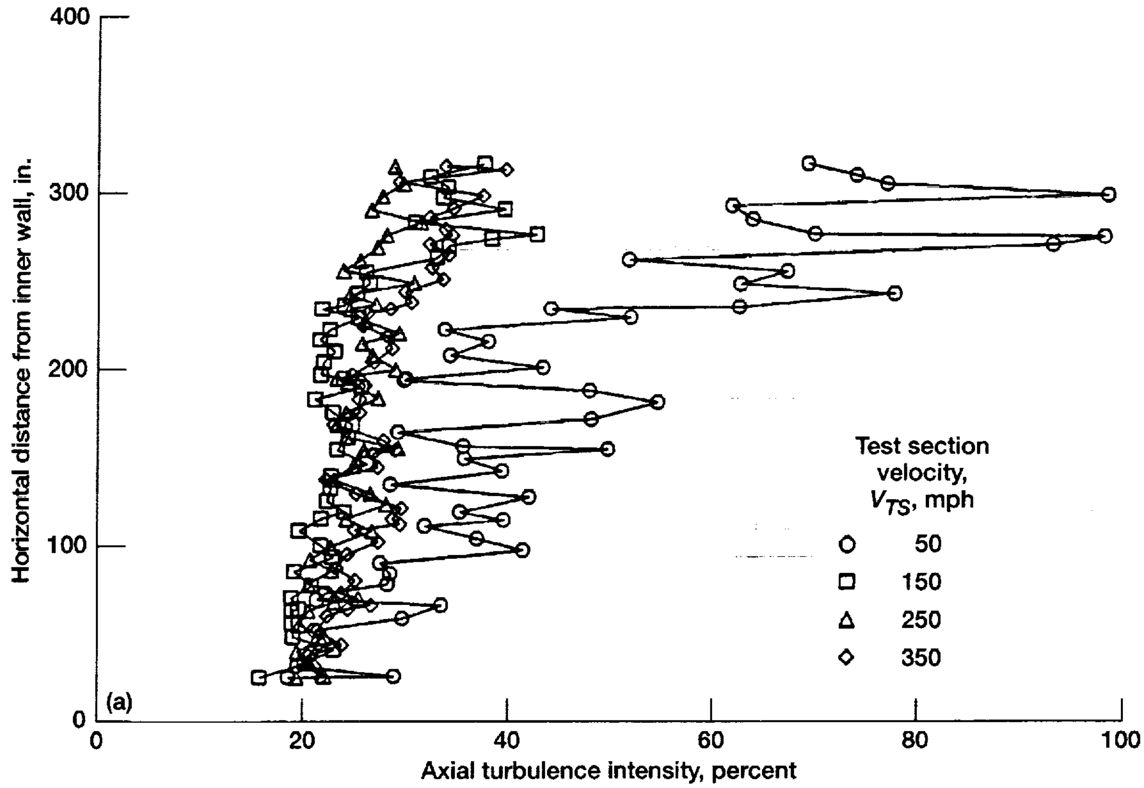


Figure 28.—Yaw flow angle distribution along horizontal surveys downstream of drive motor housing (station 2) as measured by hot-wire anemometers (positive angle indicates flow from inside wall to outside wall (outflow)). (a) Traverse 1 (17.5 ft above tunnel floor). (b) Traverse 2 (8.69 ft above tunnel floor). Positive angles indicate flow inside toward outside wall.



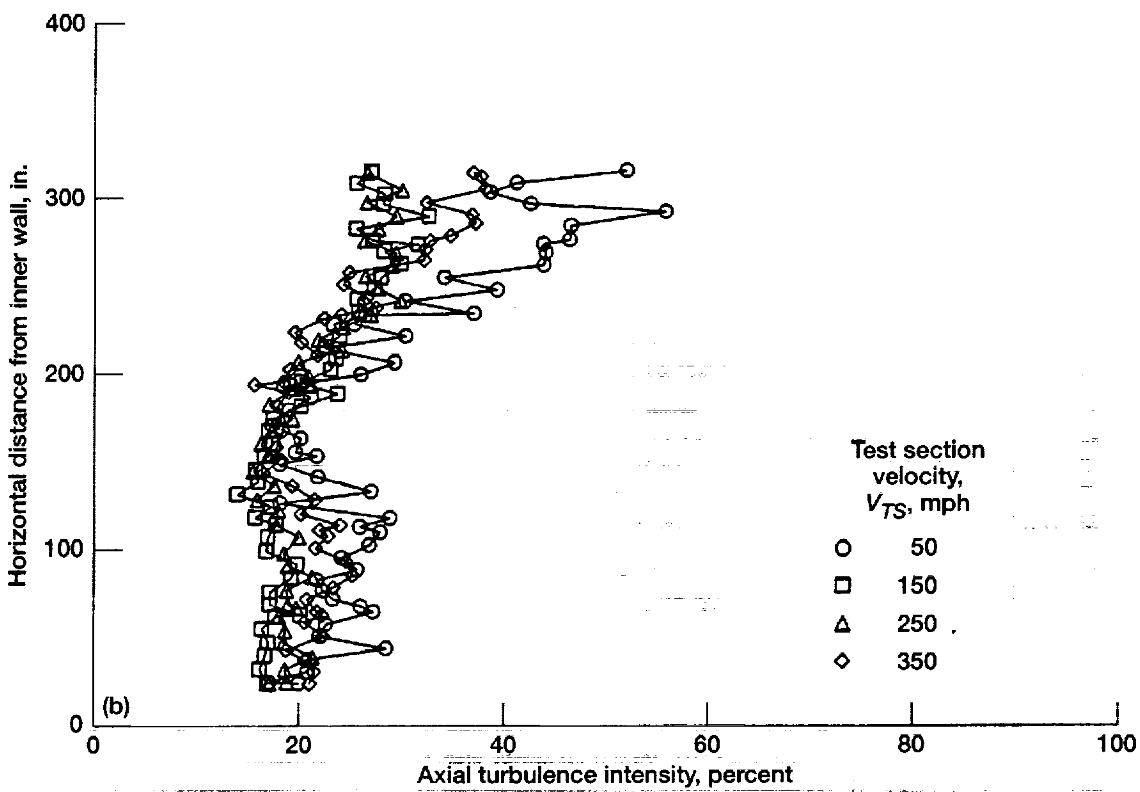


Figure 29.—Axial turbulence intensity distribution along horizontal surveys downstream of drive motor housing (station 2). (a) Traverse 1 (17.5 ft above floor). (b) Traverse 2 (8.69 ft above floor).

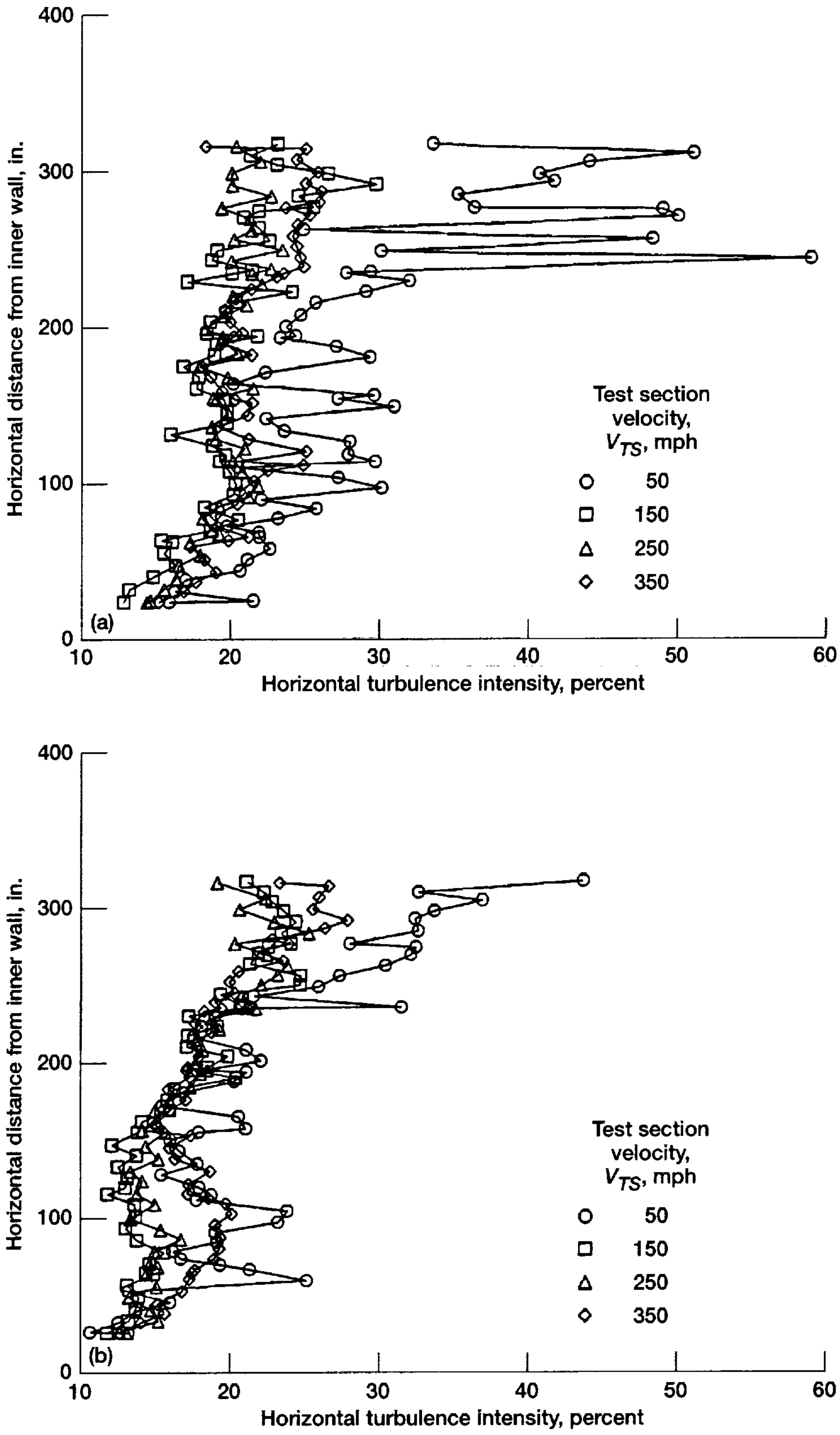


Figure 30.—Horizontal turbulence intensity distribution along horizontal surveys downstream of drive motor housing (station 2). (a) Traverse 1 (17.5 ft above floor). (b) Traverse 2 (8.69 ft above floor).

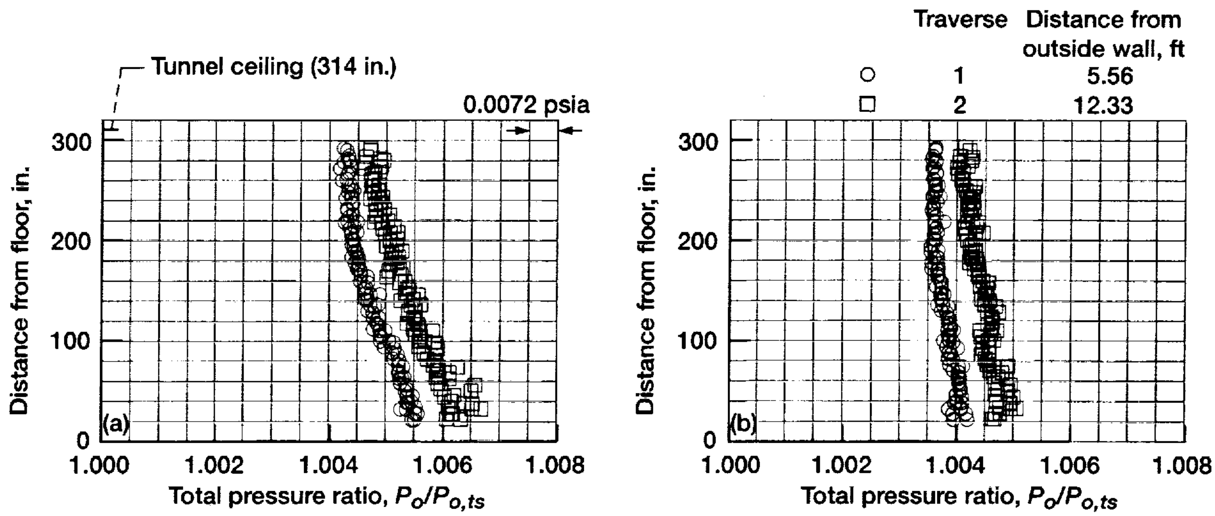


Figure 31.—Total pressure ratio distribution along vertical surveys uptream of facility heat exchanger (station 3). (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

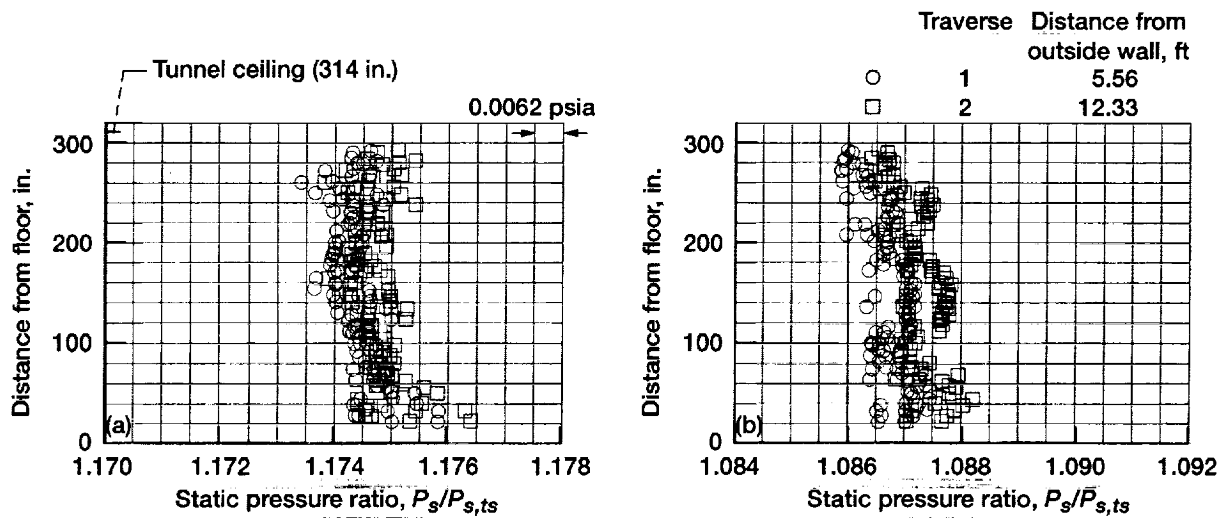


Figure 32.—Static pressure ratio distribution along vertical surveys upstream of facility heat exchanger (station 3). (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

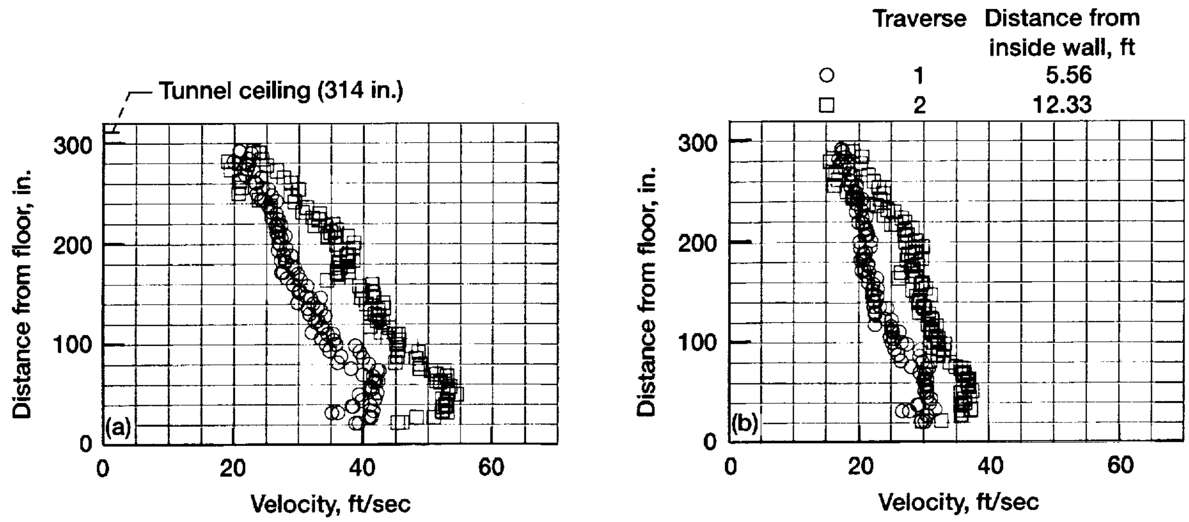


Figure 33.—Velocity distribution measured by pitot-static probes along vertical surveys uptream of facility heat exchanger (station 3). (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

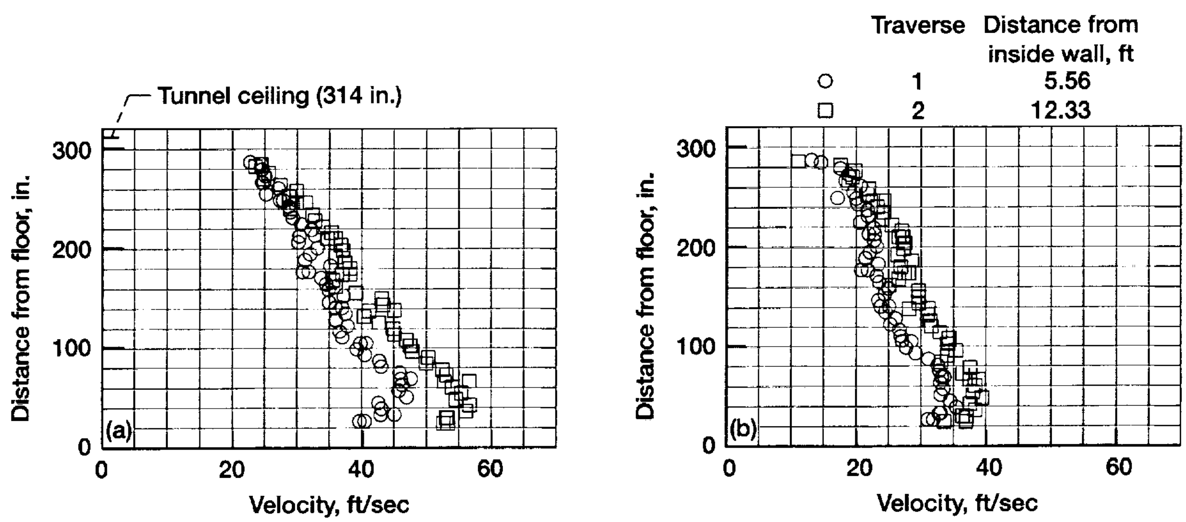


Figure 34.—Velocity distribution along vertical surveys upstream of facility heat exchanger (station 3) as measured by wind anemometers. (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

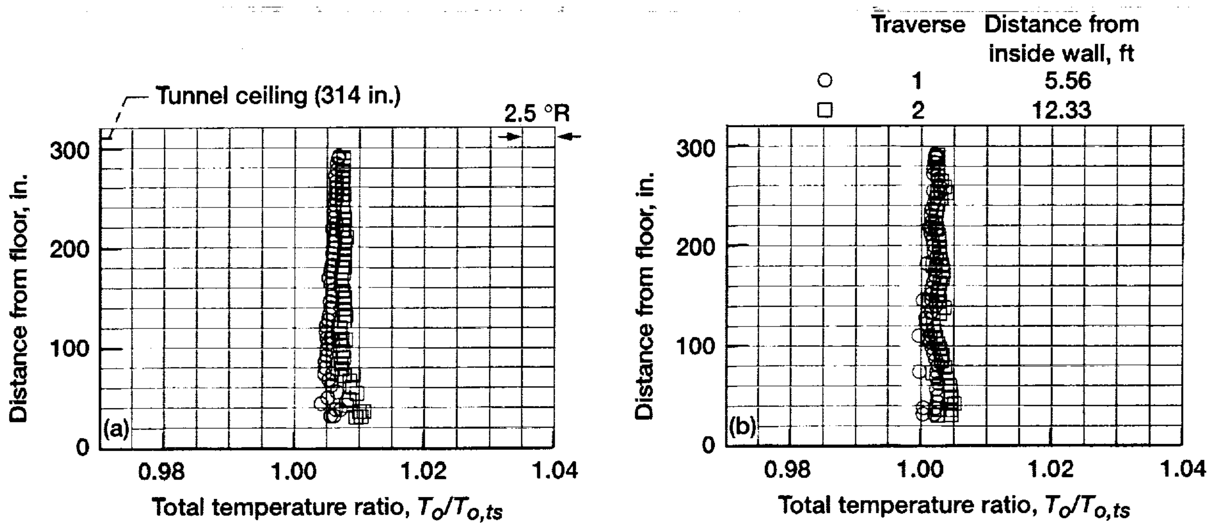


Figure 35.—Total temperature ratio distribution along vertical surveys upstream of facility heat exchanger (station 3). (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

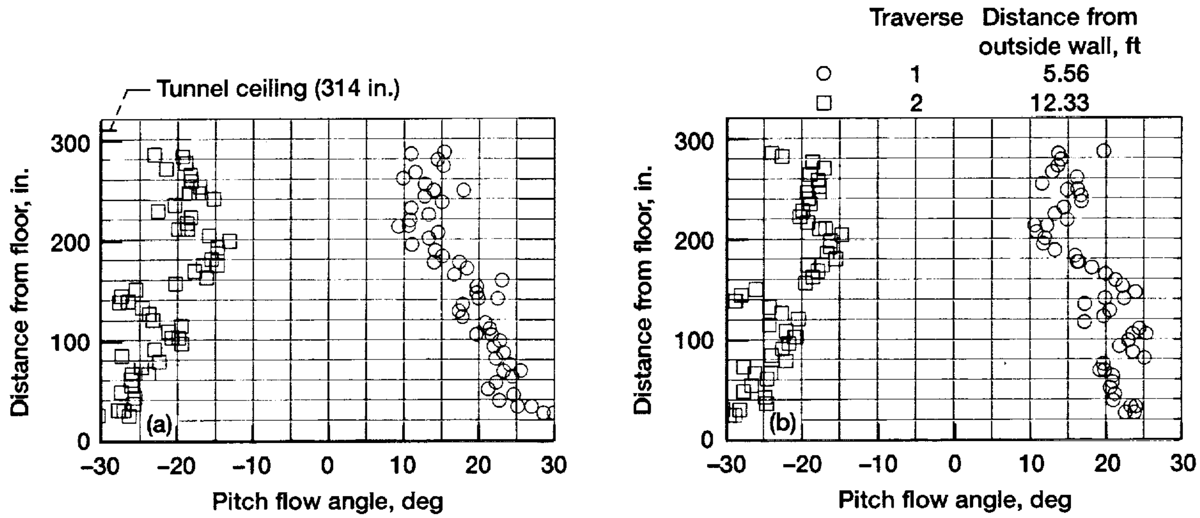


Figure 36.—Pitch flow angle distribution along vertical surveys upstream of facility heat exchanger (station 3) as measured by wind anemometers. (These data are believed to have been affected by some undetected instrumentation problem and are, therefore, of little value; they are included here only for completeness.) (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

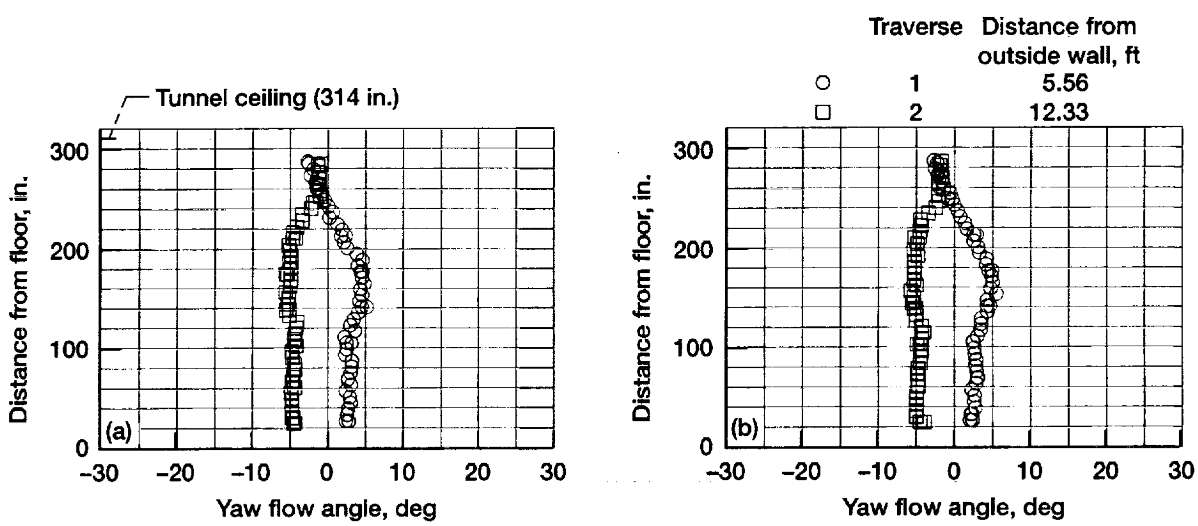


Figure 37.—Yaw flow angle distribution measured by wind anemometers along vertical surveys upstream of facility heat exchanger (station 3). (These data are believed to have been affected by some undetected instrumentation problem and are, therefore, of little value; they are included here only for completeness.) (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

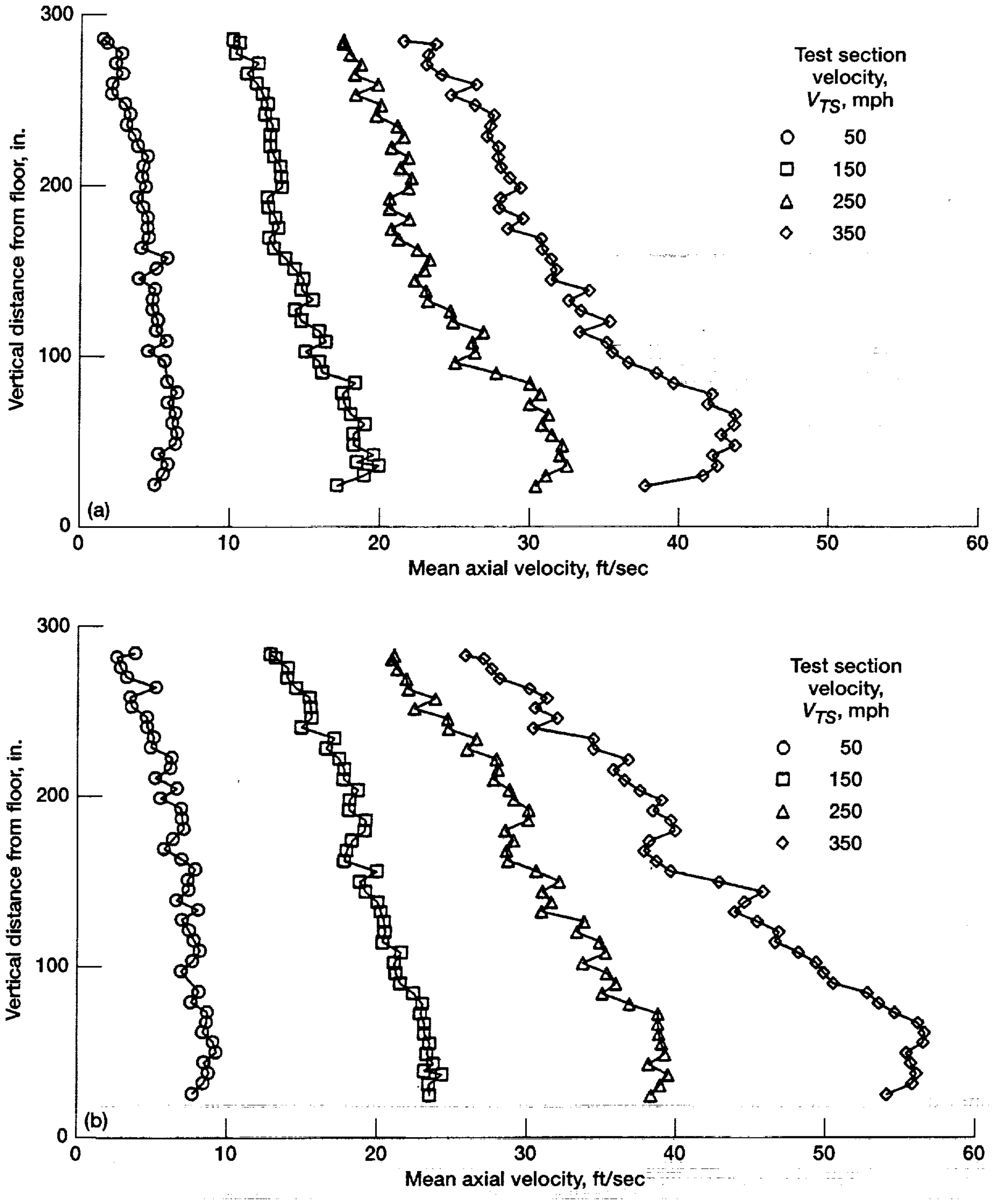
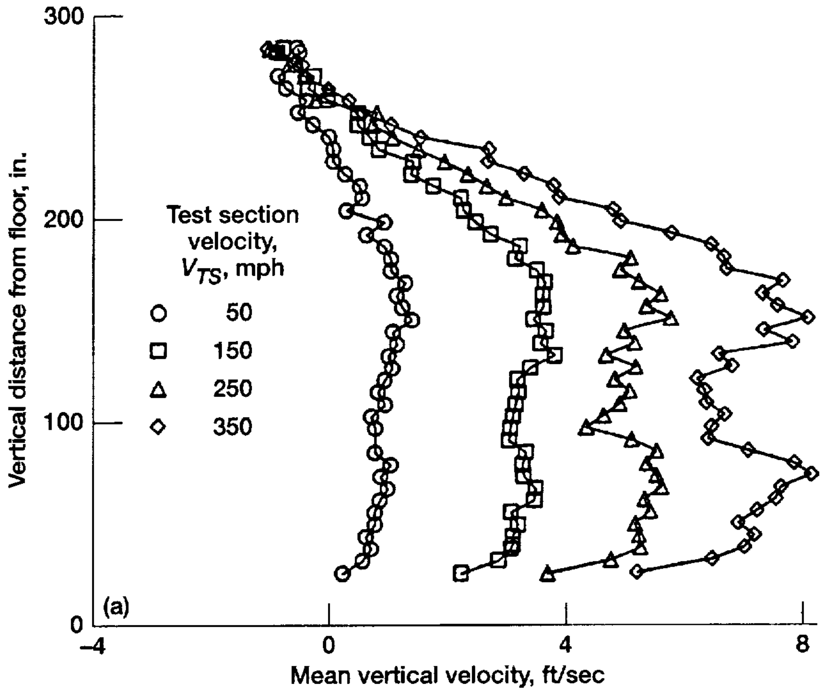


Figure 38.—Mean axial velocity distribution measured by hot-wire anemometers along vertical surveys upstream of facility heat exchanger (station 3). (a) Traverse 1 (5.56 ft from outside wall). (b) Traverse 2 (12.33 ft from outside wall).



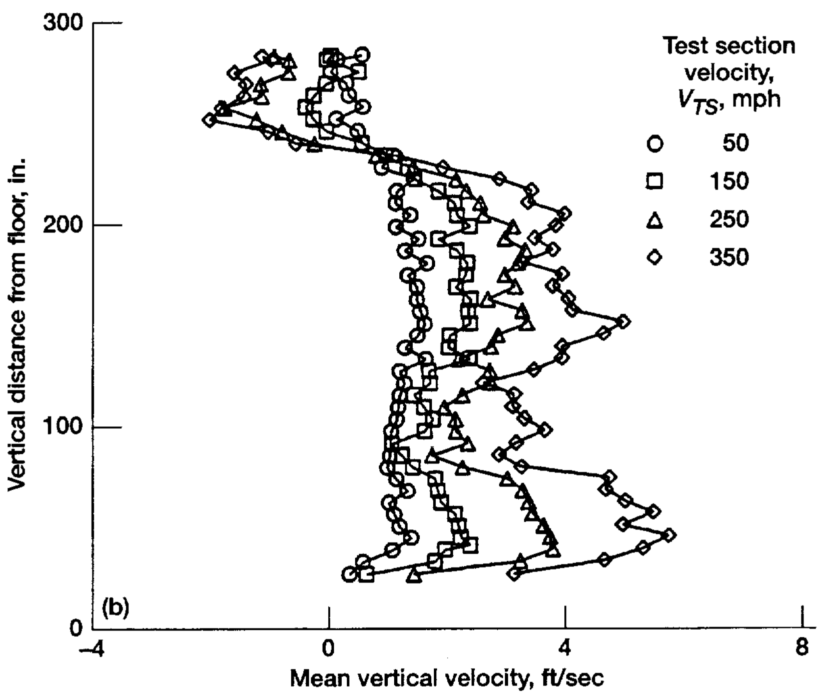
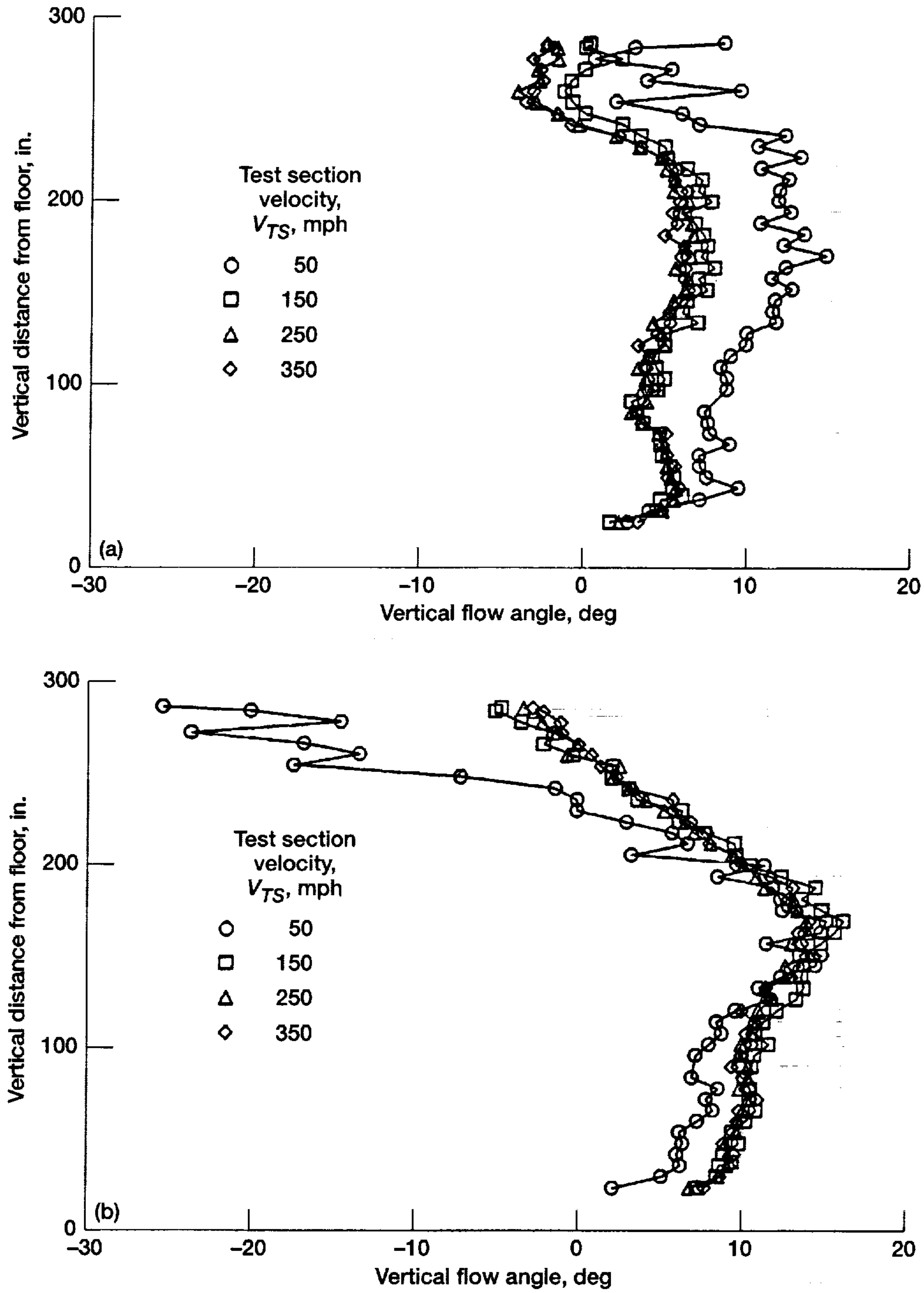


Figure 39.—Mean vertical velocity distribution along vertical surveys upstream of heat exchanger (station 3) as measured by hot-wire anemometers. (a) Traverse 1 (5.56 ft from outside wall). (b) Traverse 2 (12.33 ft from outside wall).



Figures 40.—Pitch flow angle distribution along vertical surveys upstream of facility heat exchanger (station 3) as measured by hot-wire anemometers. Traverse 1 (5.56 ft from outside wall). (b) Traverse 2 (12.33 ft from outside wall).

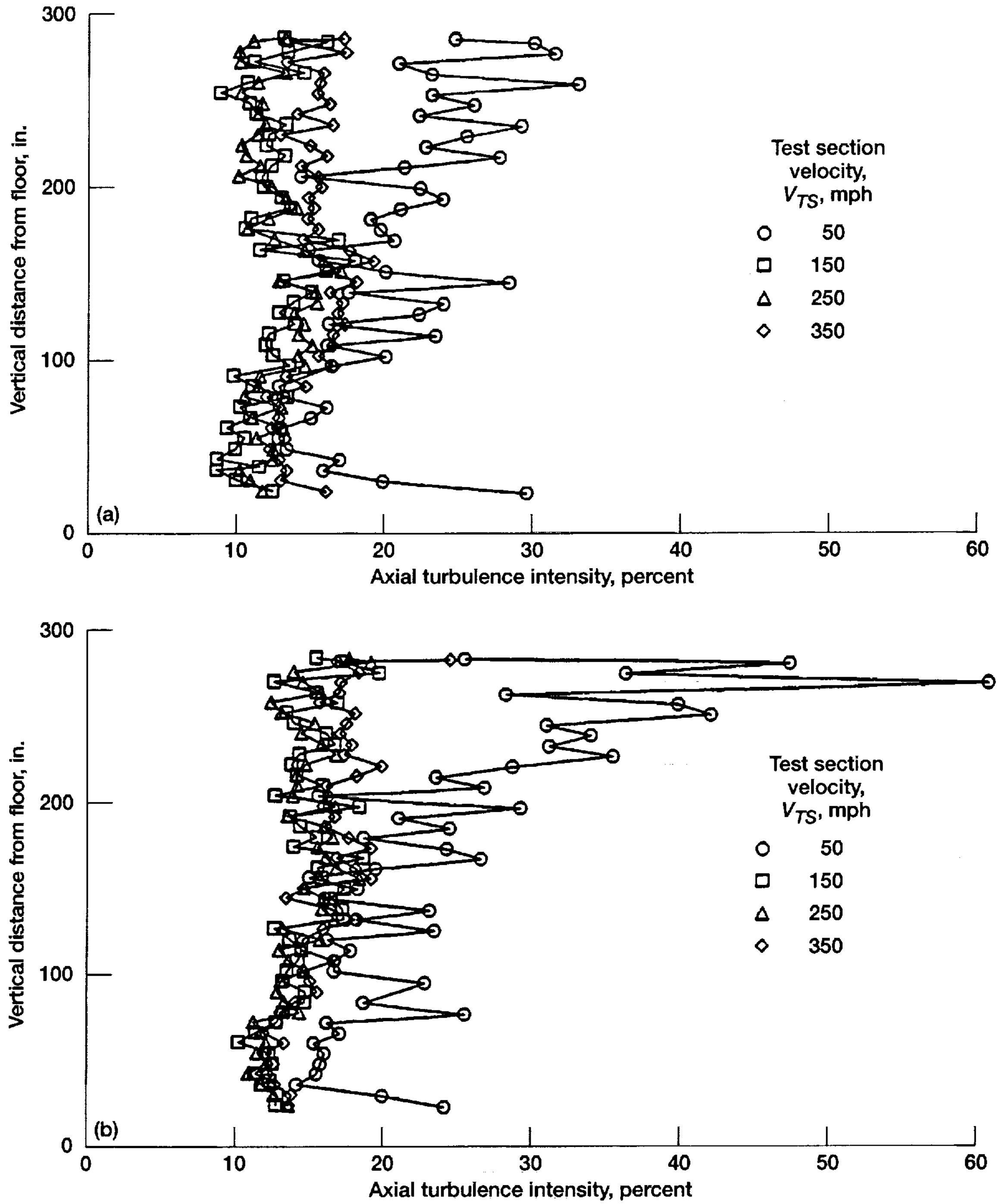


Figure 41.—Axial turbulence intensity along vertical surveys upstream of facility heat exchanger (station 3). (a) Traverse 1 (5.56 ft from outside wall). (b) Traverse 2 (12.33 ft from outside wall).

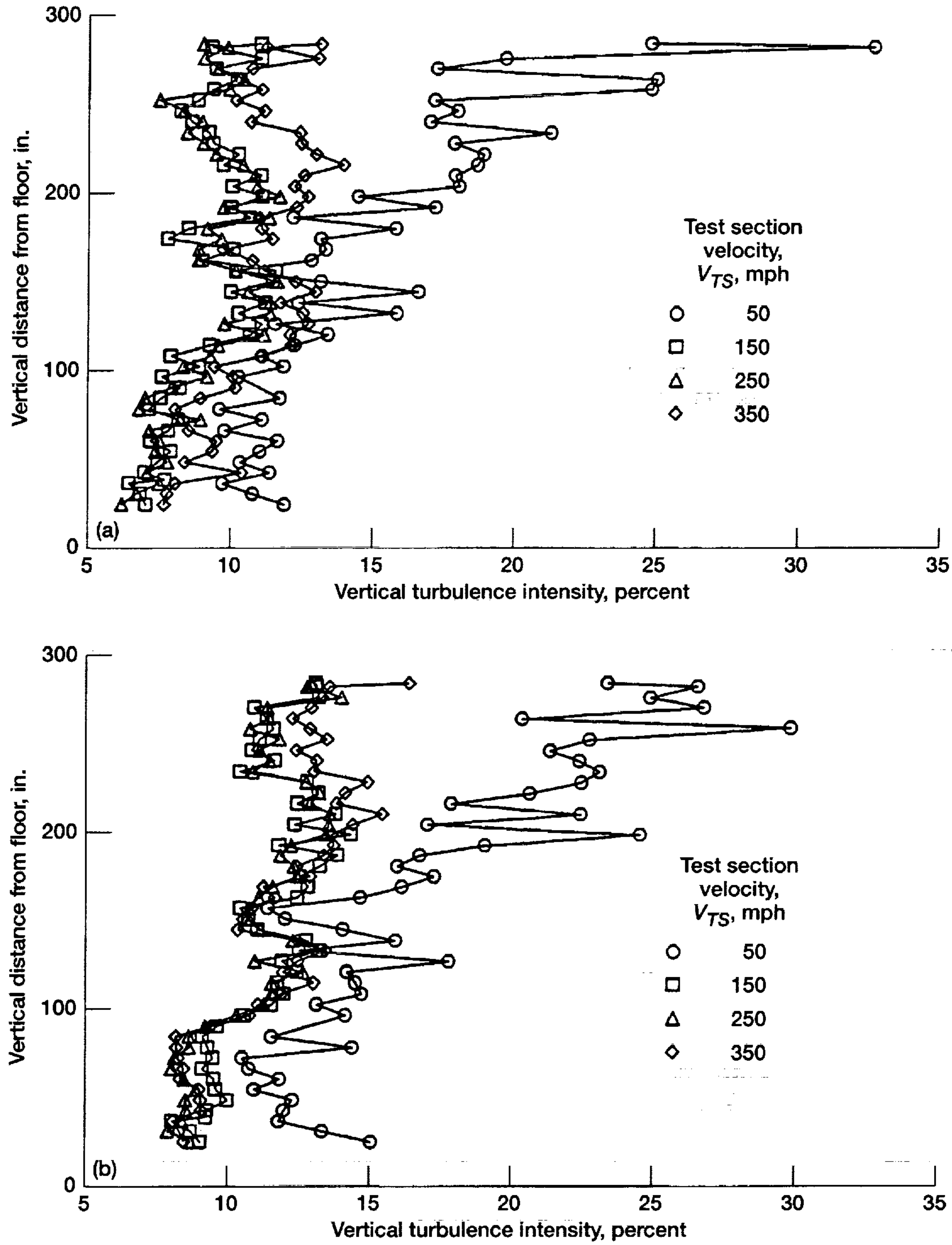


Figure 42.—Vertical turbulence intensity distribution along vertical surveys upstream of facility heat exchanger (station 3). (a) Traverse 1 (5.56 ft from outside wall). (b) Traverse 2 (12.33 ft from outside wall).

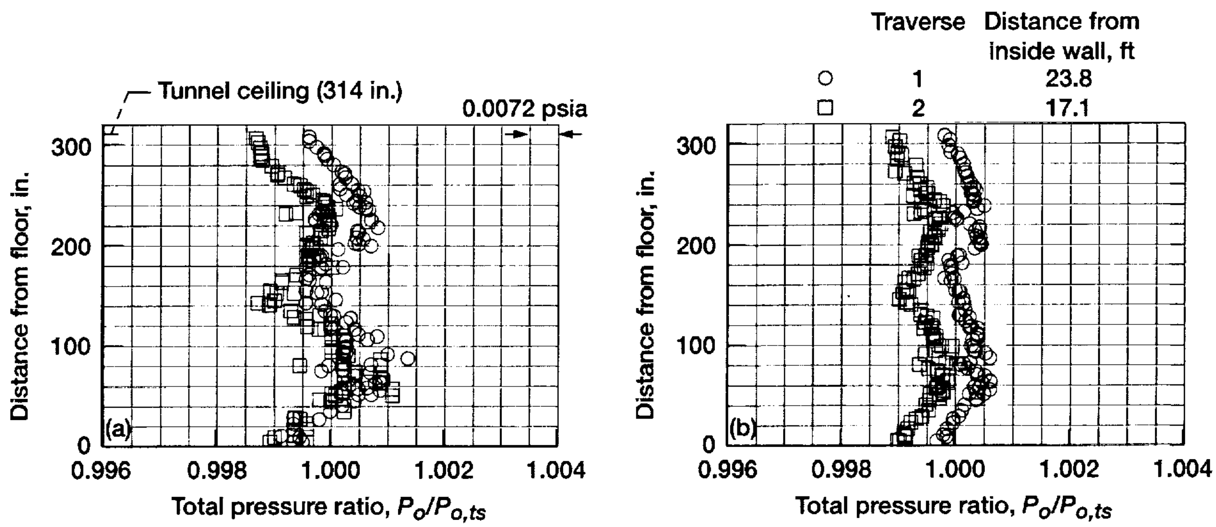


Figure 43.—Total pressure ratio distribution along vertical surveys downstream of facility heat exchanger (station 4). (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

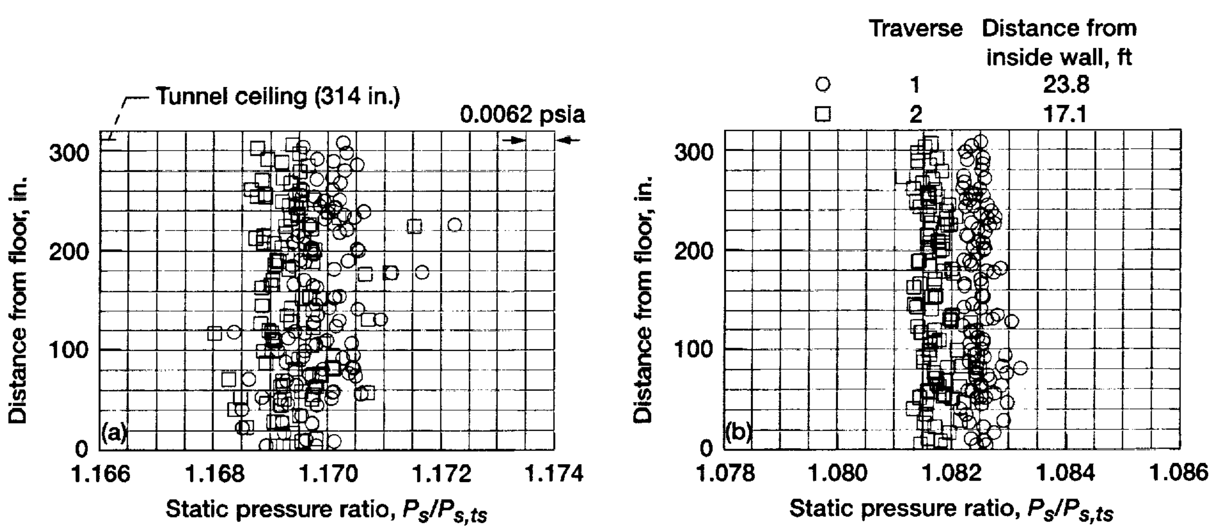


Figure 44.—Static pressure ratio distribution along vertical surveys downstream of facility heat exchanger (station 4). (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

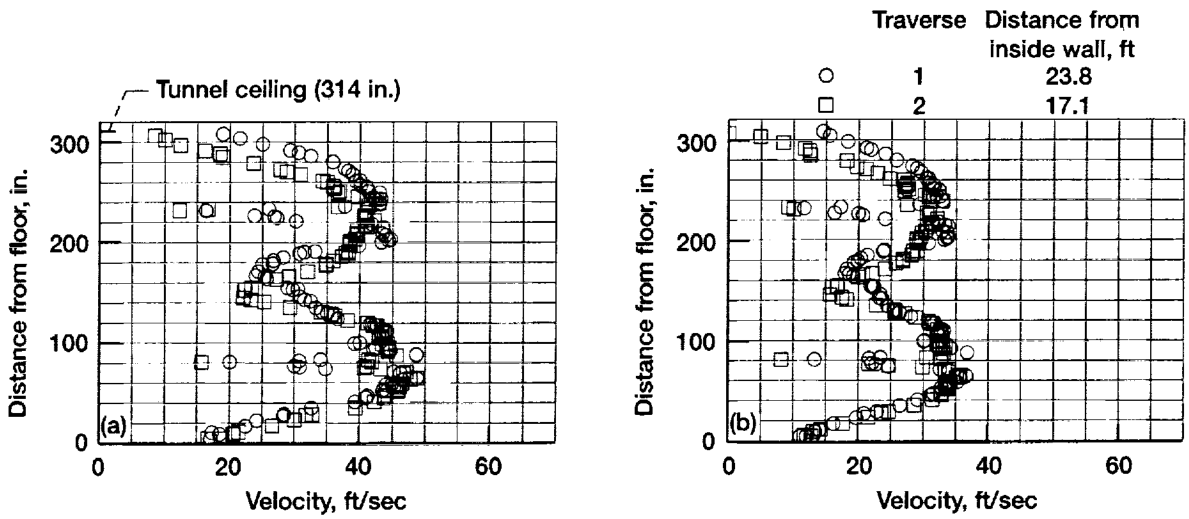


Figure 45.—Velocity distribution measured by pitot-static probes along vertical surveys downstream of heat exchanger (station 4). (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

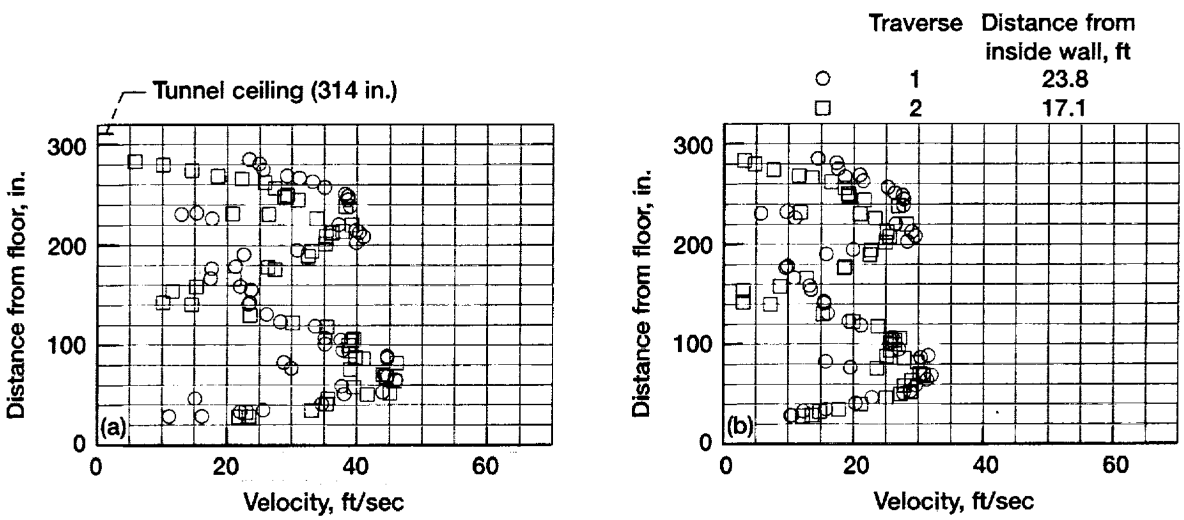


Figure 46.—Velocity distribution measured by wind anemometers along vertical surveys downstream of heat exchanger (station 4). (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

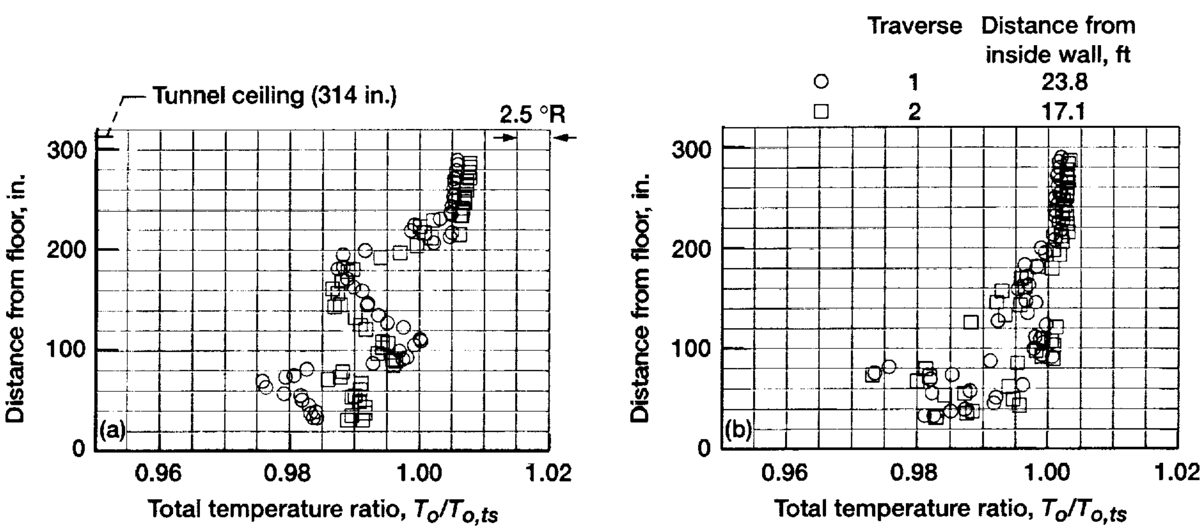


Figure 47.—Total temperature ratio distribution along vertical surveys downstream of heat exchanger (station 4). (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

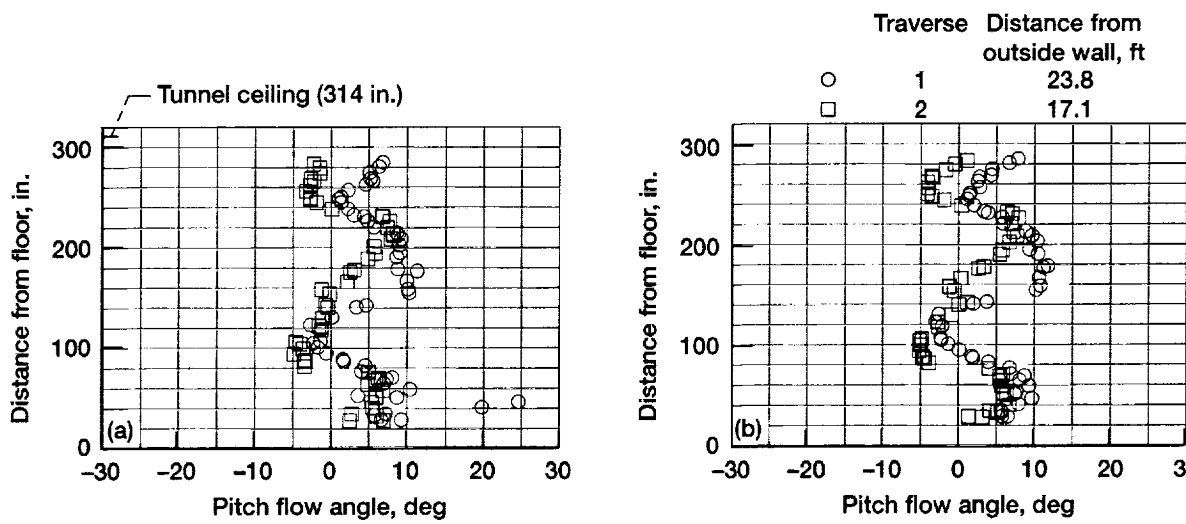


Figure 48.—Pitch flow angle distribution (positive = upflow; negative = downflow) along vertical surveys downstream of heat exchanger (station 4). (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

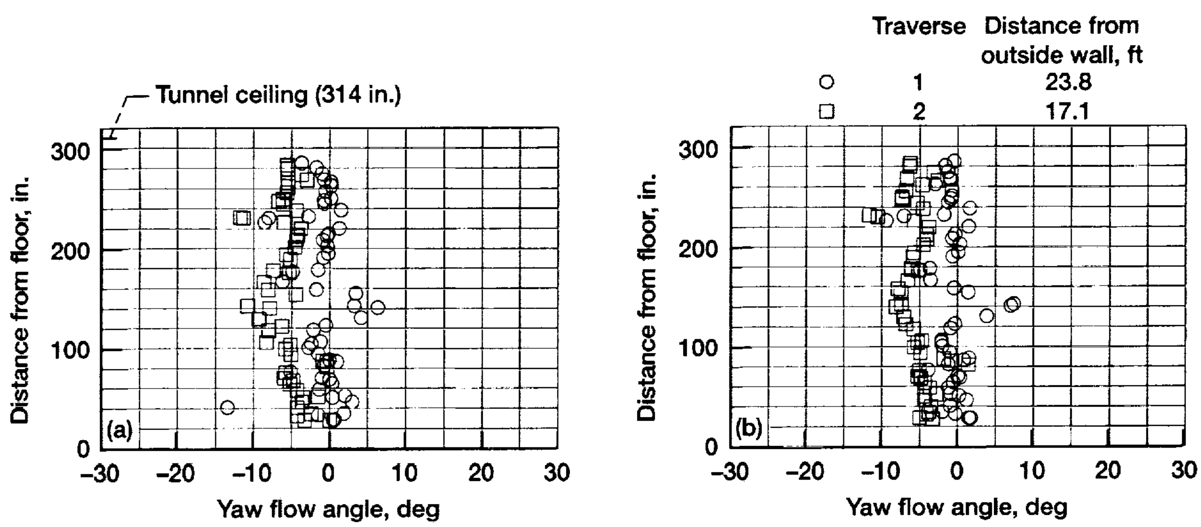


Figure 49.—Yaw flow angle distribution (positive = flow toward outside tunnel wall) along vertical surveys downstream of heat exchanger (station 4). (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

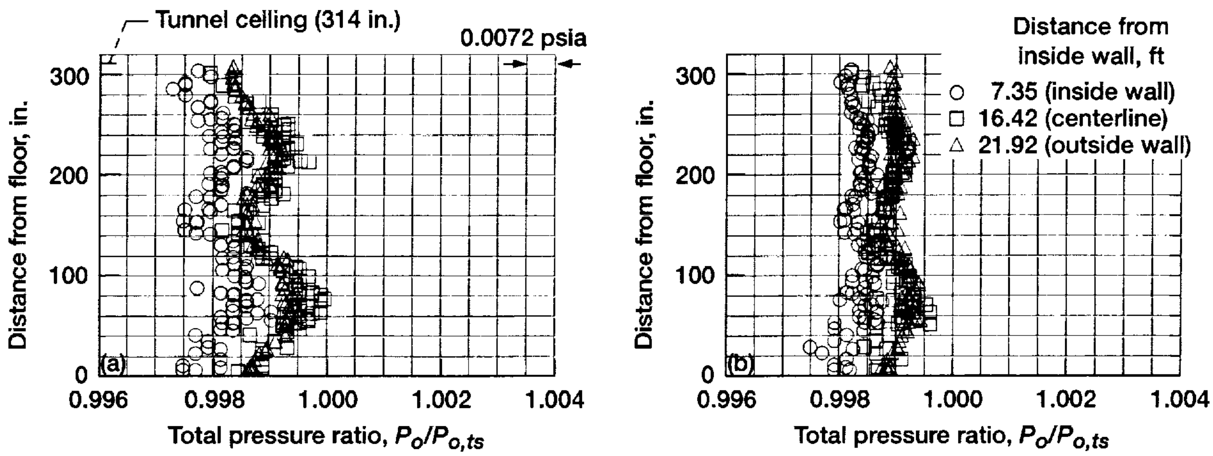


Figure 50.—Total pressure ratio distribution along vertical surveys upstream of spraybars (station 5). (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

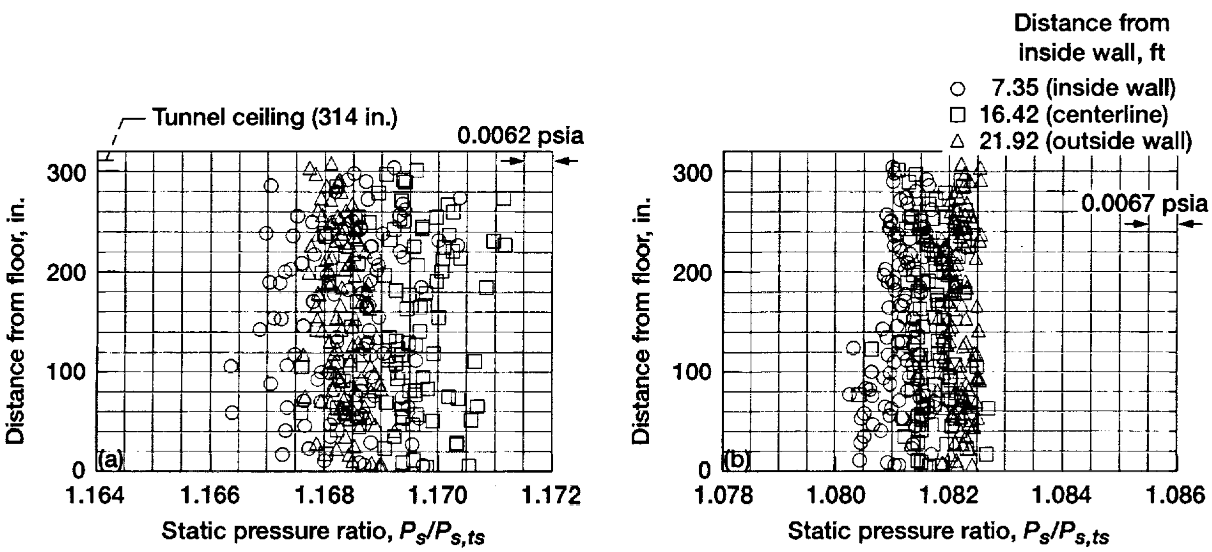


Figure 51.—Static pressure ratio distribution along vertical surveys upstream of spraybars (station 5). (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

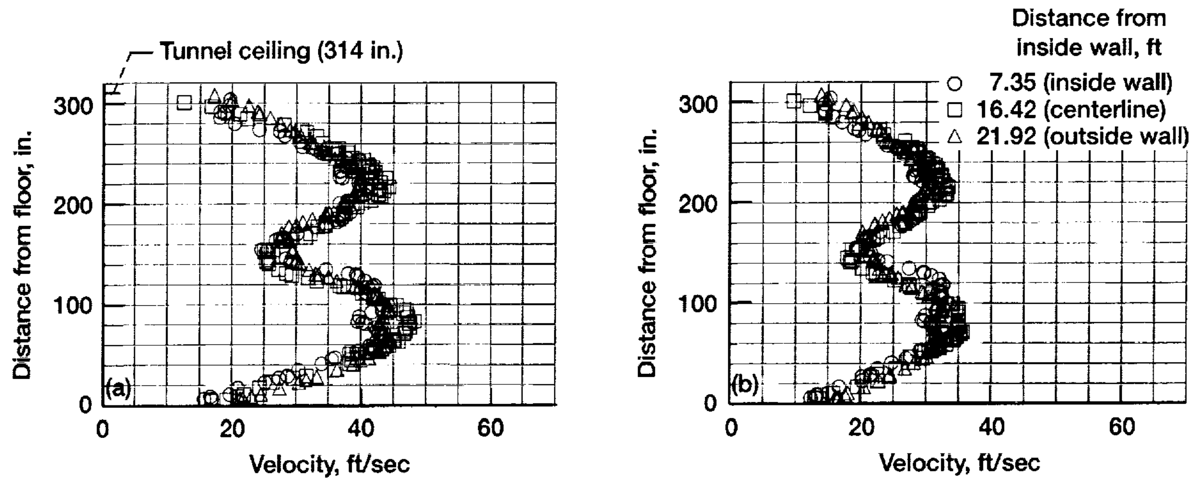


Figure 52.—Velocity distribution measured by pitot-static probes along vertical surveys upstream of spraybars (station 5). (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

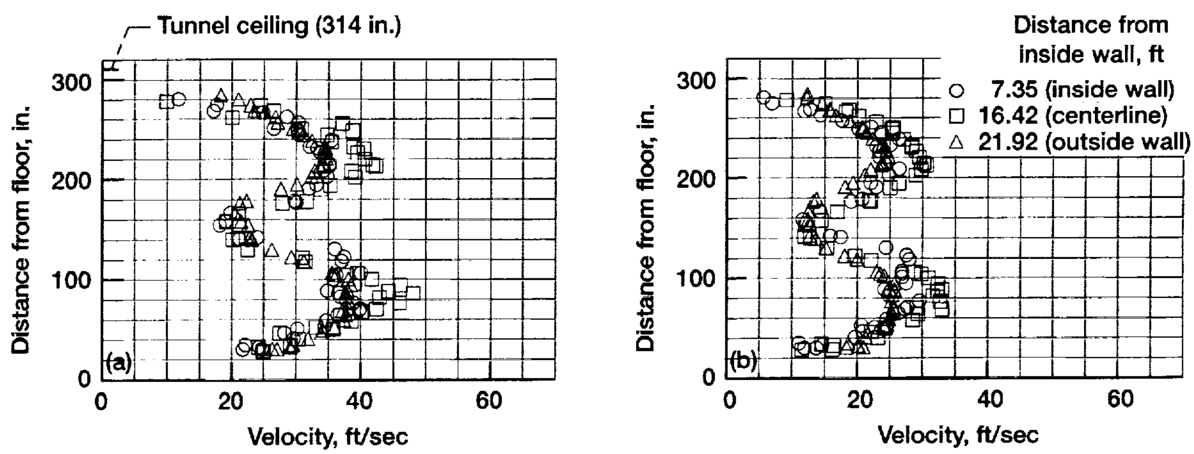


Figure 53.—Velocity distribution measured by wind anemometers along vertical surveys upstream of spraybars (station 5). (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

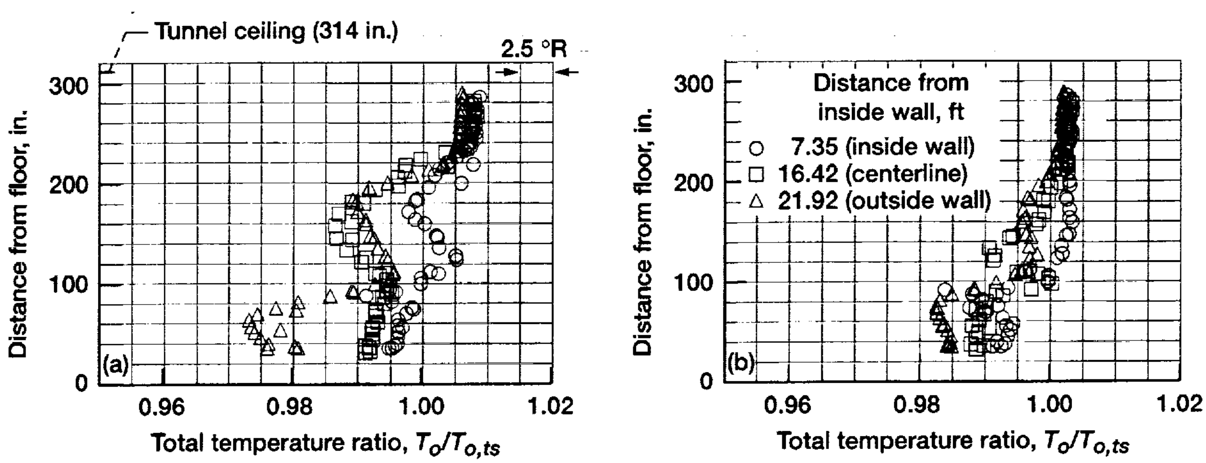


Figure 54.—Total temperature ratio distribution along vertical surveys upstream of spraybars (station 5). (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

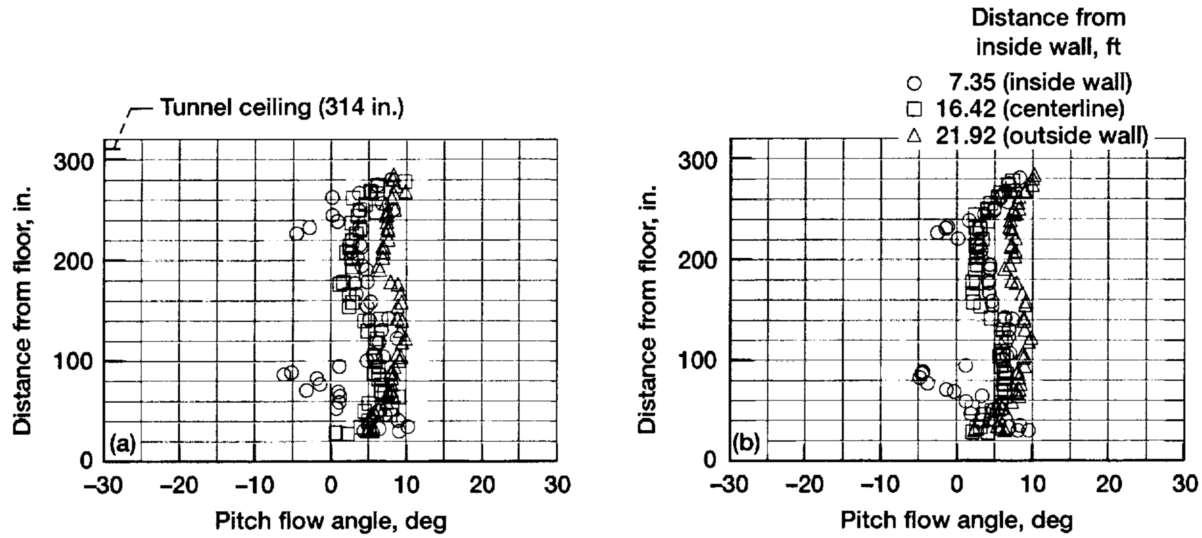


Figure 55.—Pitch flow angle distributions along vertical surveys upstream of spraybars (station 5). Positive angles indicate upflow. (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

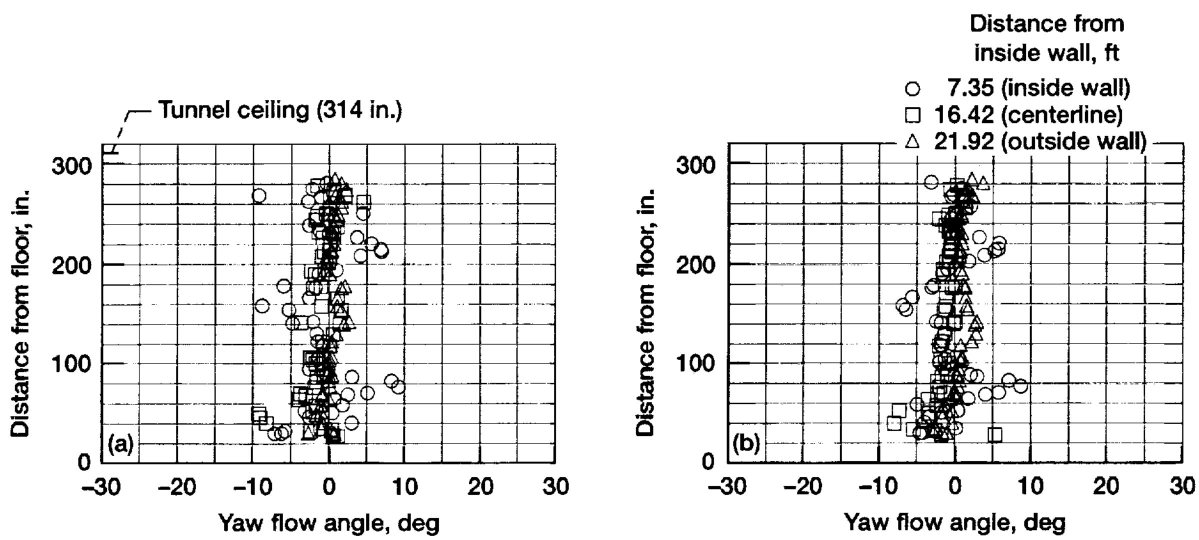


Figure 56.—Yaw flow angle distributions along vertical surveys upstream of spraybars (station 5). Positive angles indicate flow from inside to outside tunnel wall. (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

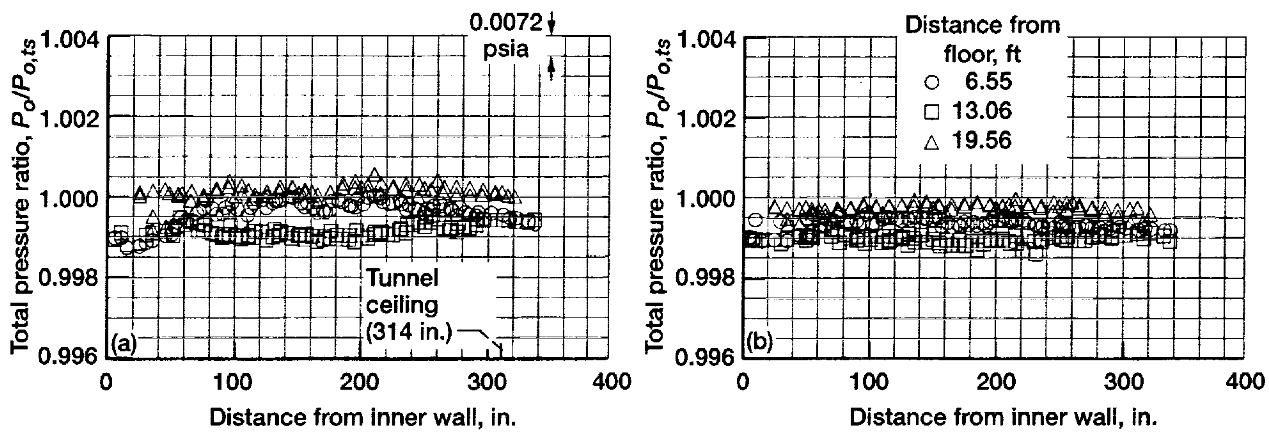


Figure 57.—Total pressure ratio distribution along horizontal surveys upstream of spraybars (station 5). (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

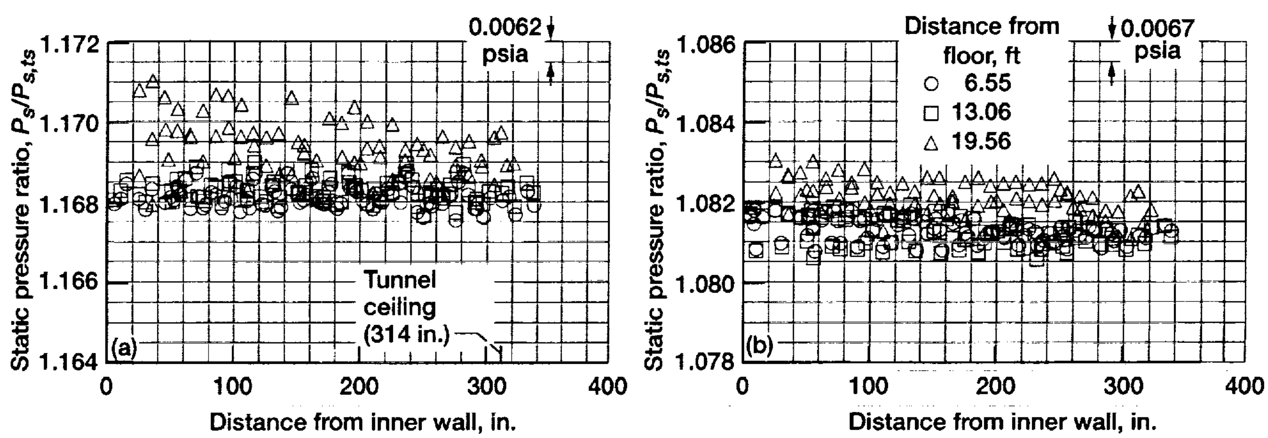


Figure 58.—Static pressure ratio distribution along horizontal surveys upstream of spraybars (station 5). (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

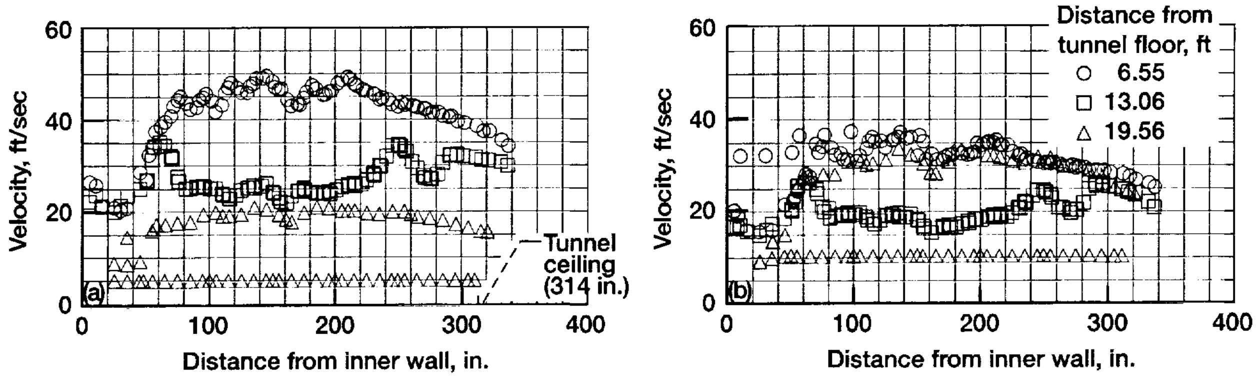


Figure 59.—Velocity distribution along horizontal surveys upstream of spraybars (station 5) as measured by pitot-static probes. (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

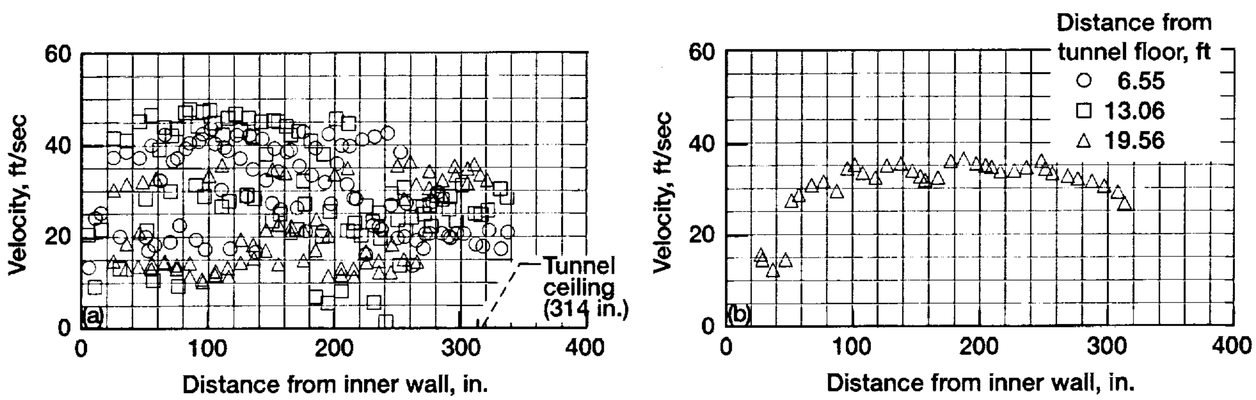


Figure 60.—Velocity distribution along horizontal surveys upstream of spraybars (station 5) as measured by wind anemometers. (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

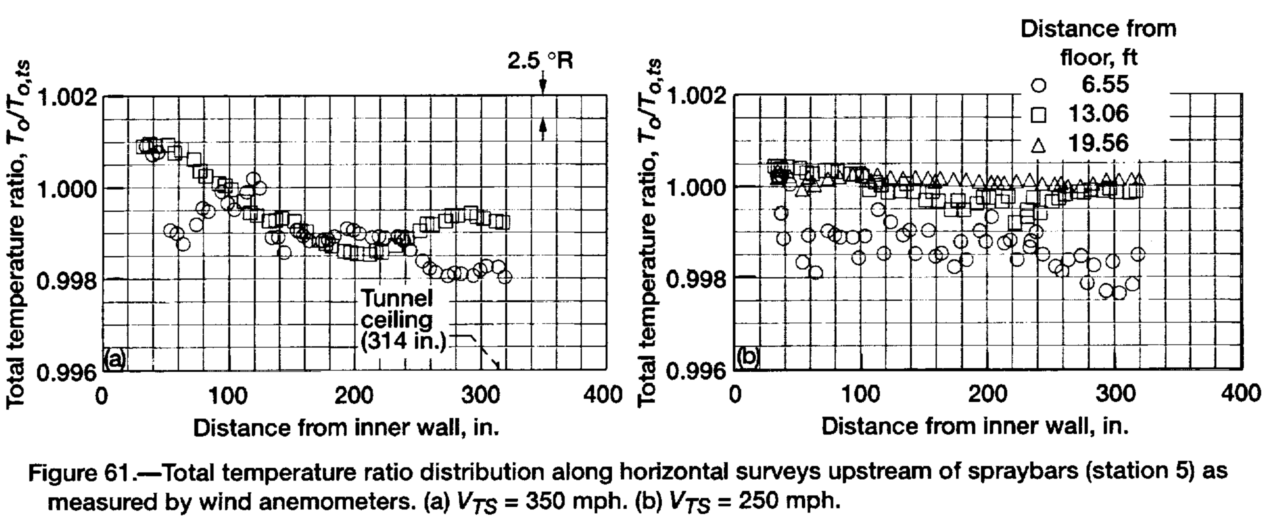


Figure 61.—Total temperature ratio distribution along horizontal surveys upstream of spraybars (station 5) as measured by wind anemometers. (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

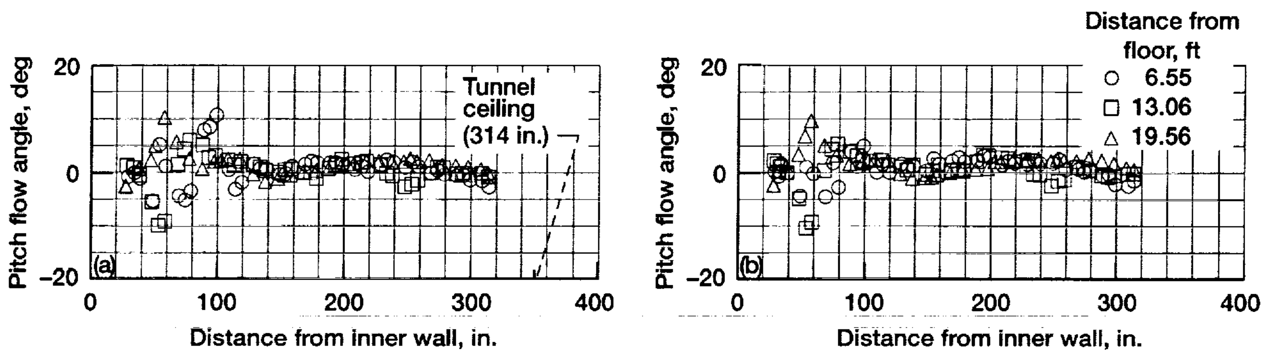


Figure 62.—Pitch flow angle distributions along horizontal surveys upstream of spraybars (station 5) as measured by wind anemometers. Positive angles indicate upflow. (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

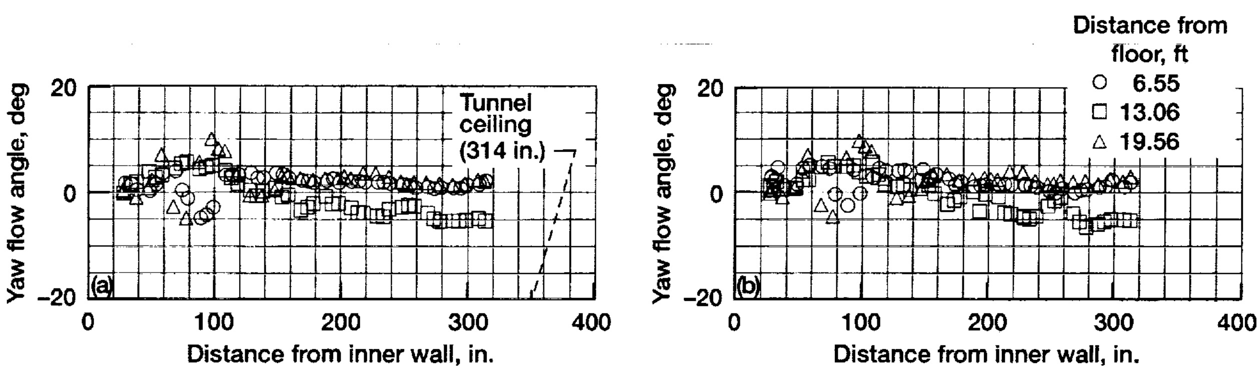
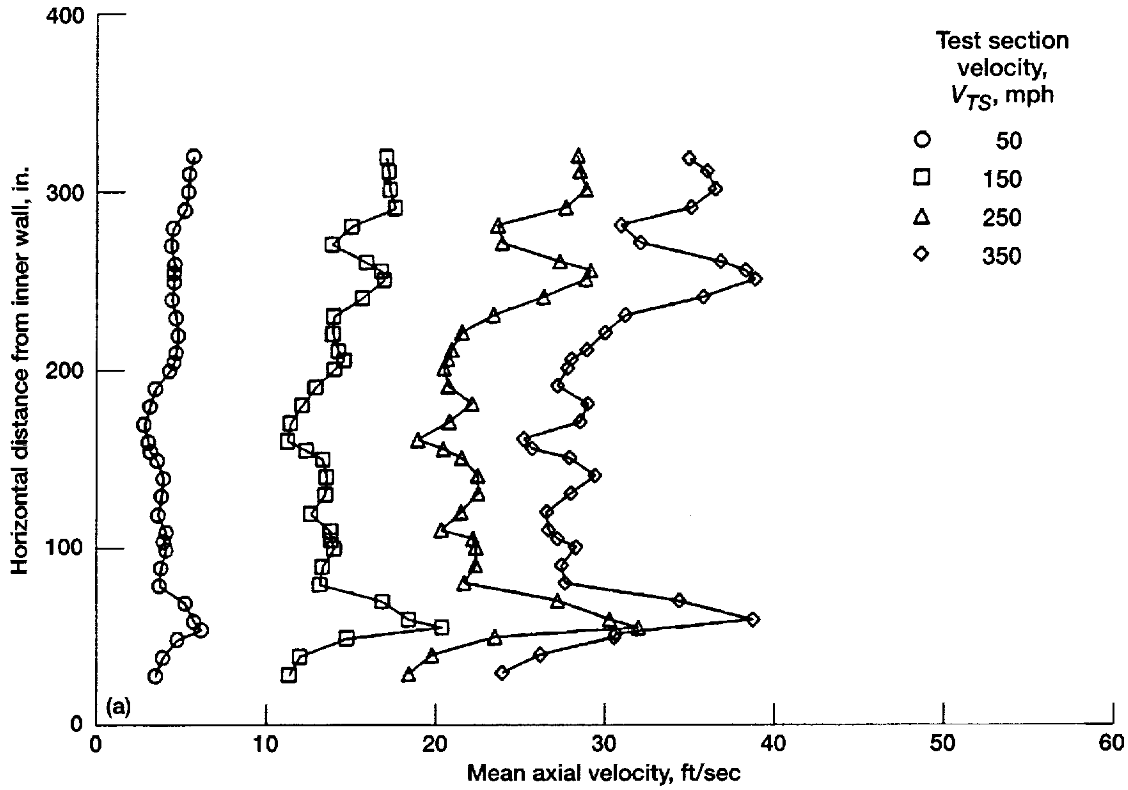


Figure 63.—Yaw flow angle distributions along horizontal surveys upstream of spraybars (station 5) as measured by wind anemometers. Positive angles indicate flow toward outside tunnel wall. (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.



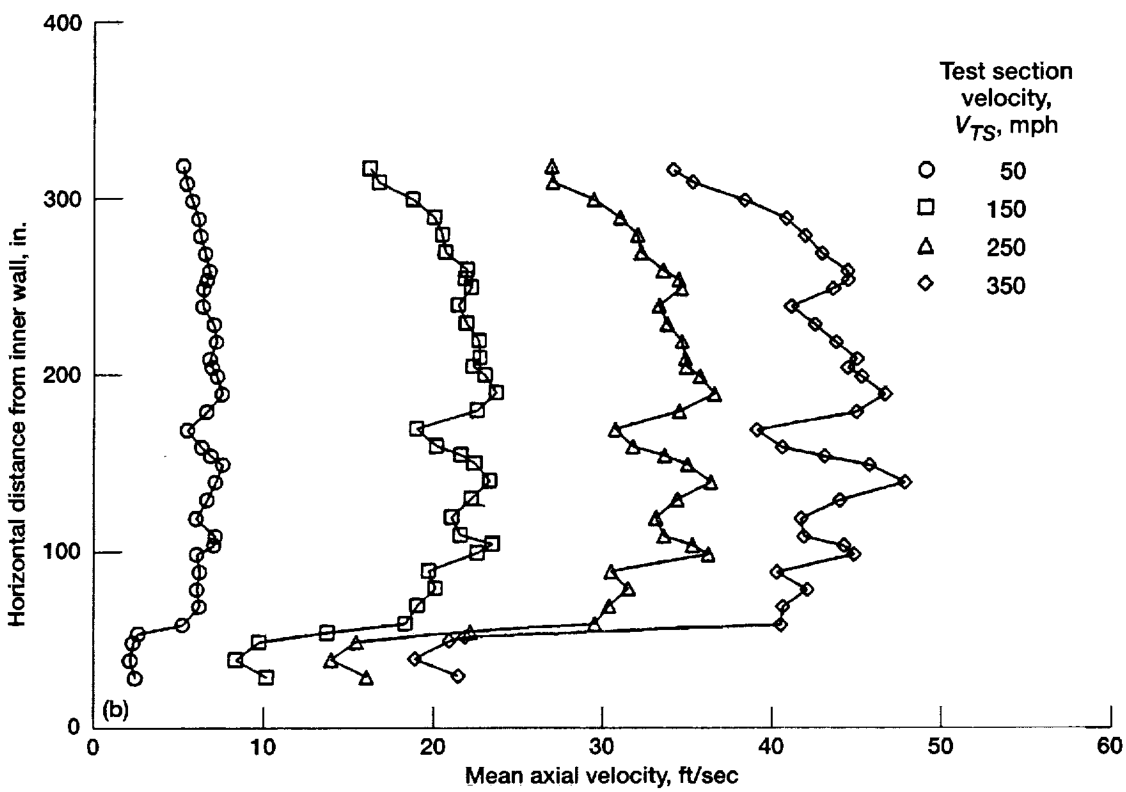
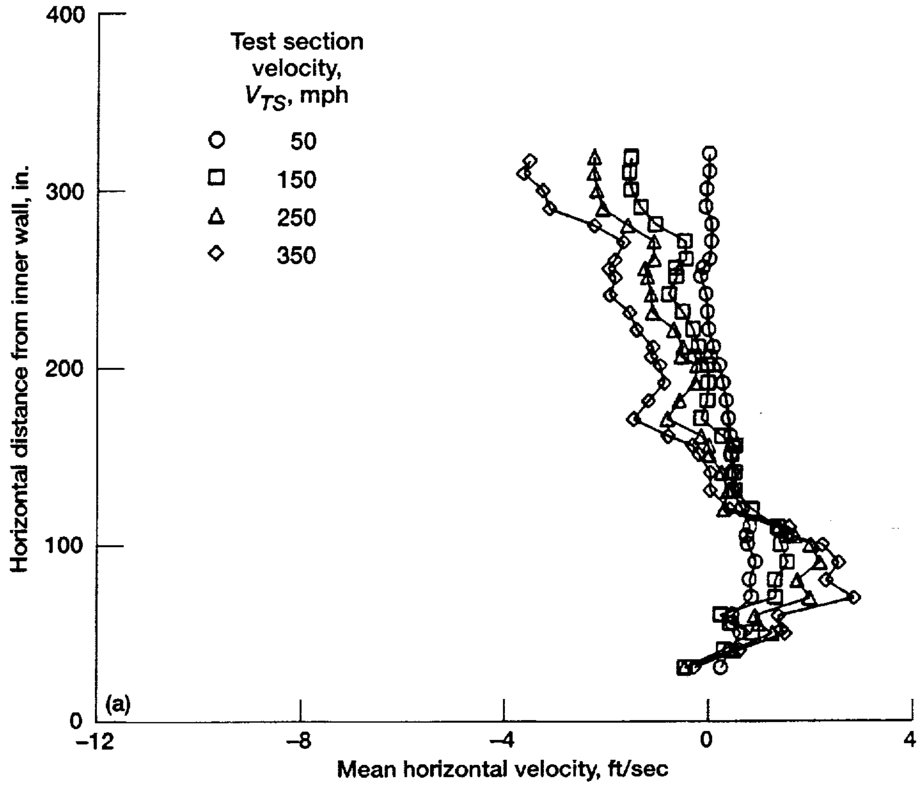


Figure 64.—Mean axial velocity distributions along horizontal surveys upstream of spraybars (station 5) as measured by hot-wire anemometers. (a) Mean axial velocity for traverse 1(13.06 ft above tunnel floor). (b) Mean axial velocity for traverse 2 (19.56 ft above the tunnel floor).



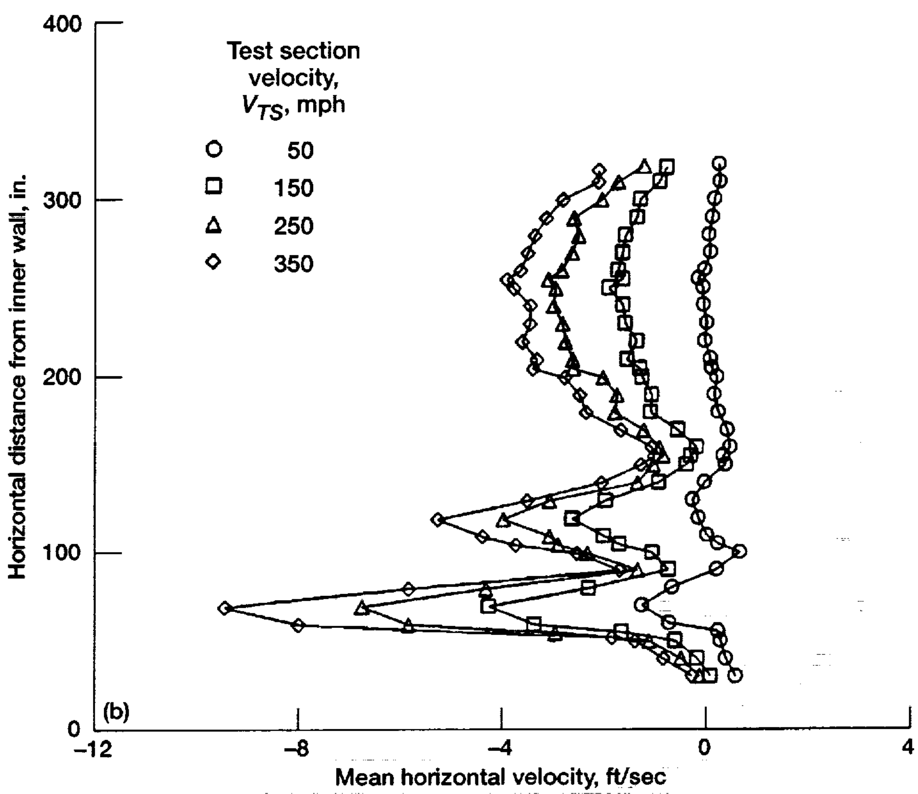


Figure 65.—Mean horizontal velocity distributions along horizontal surveys upstream of spraybars (station 5) as measured by hot-wire anemometers. (a) Mean horizontal velocity for traverse 1 (13.06 ft above tunnel floor). (b) Mean horizontal velocity for traverse 2 (19.56 ft above the tunnel floor).

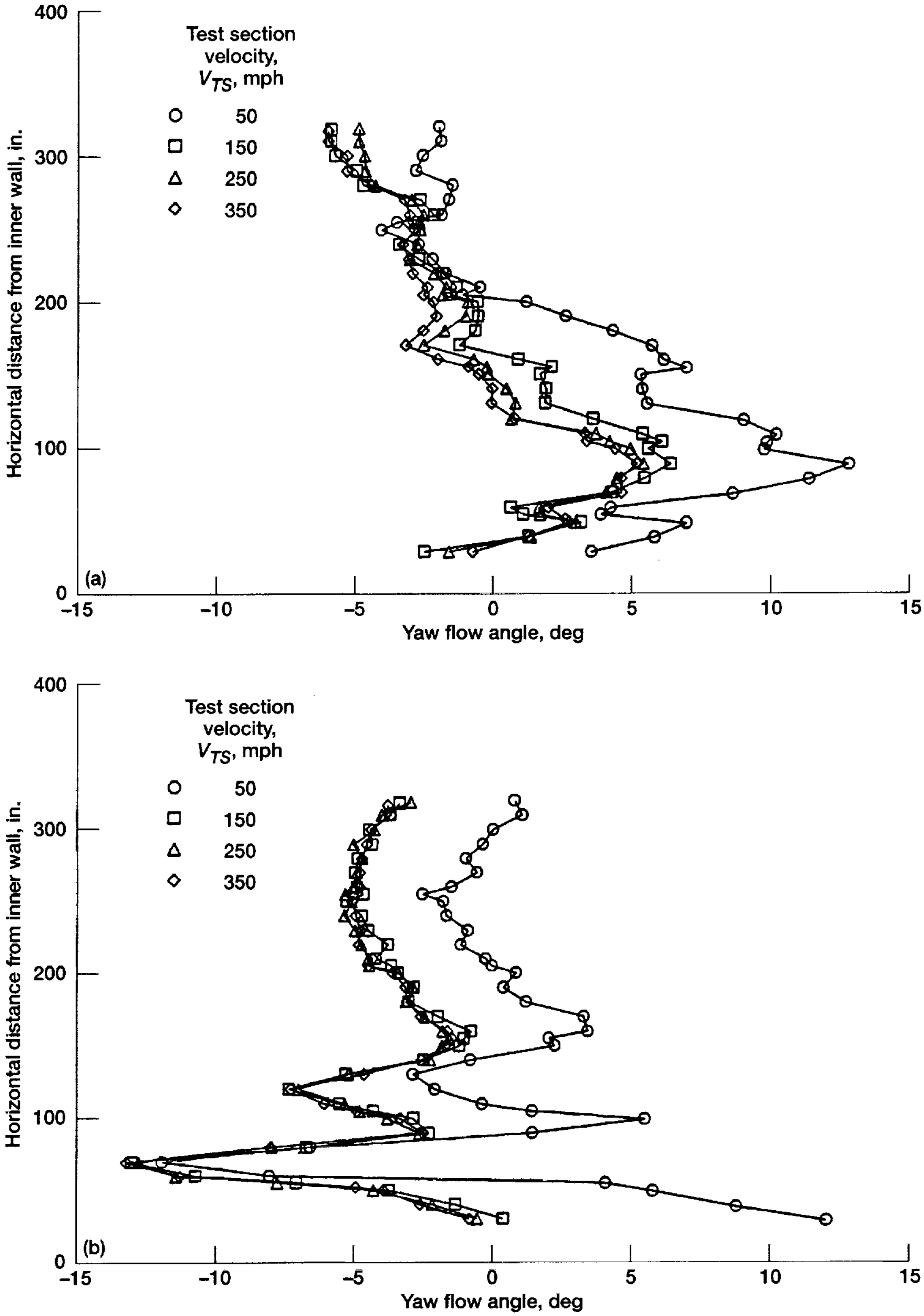
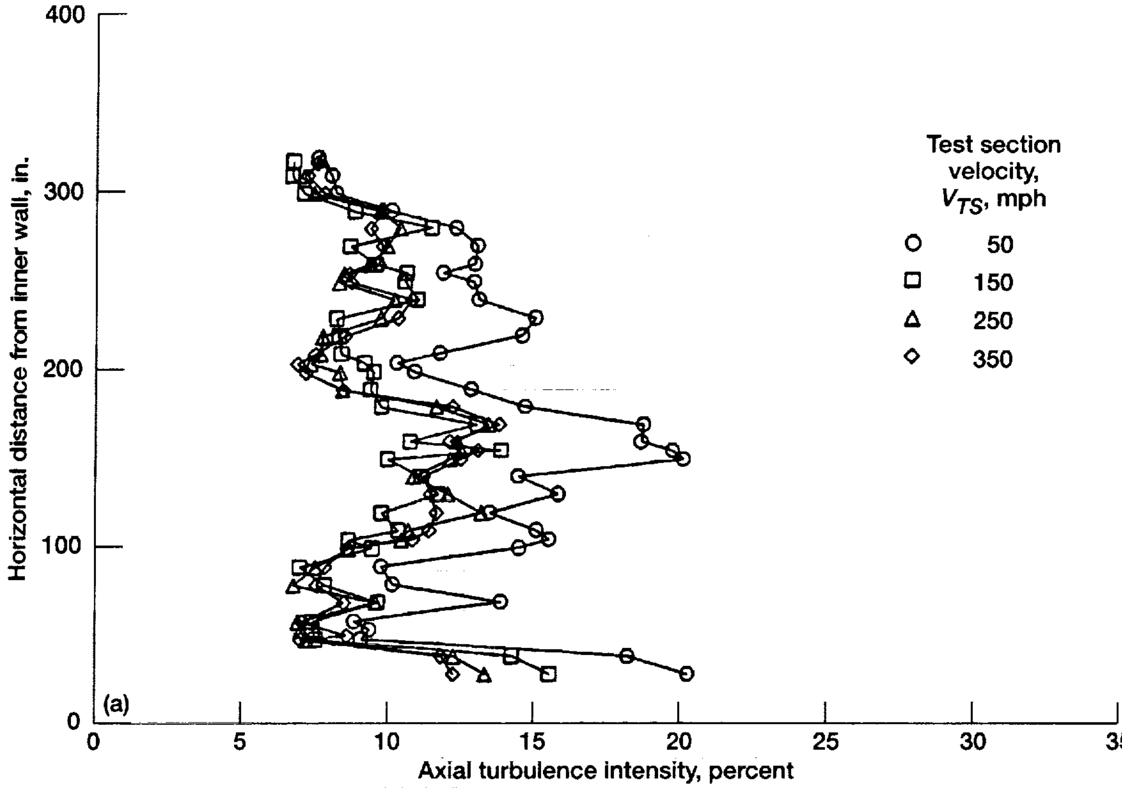


Figure 66.—Yaw flow angle distribution along horizontal surveys upstream of spraybars (station 5) as measured by hot-wire anemometers. Positive angles indicate flow toward outside tunnel wall. (a) Traverse 1 (centerline surveys at 13.06 ft above the tunnel floor). (b) Traverse 2 (upper survey at 19.56 ft above the tunnel floor).



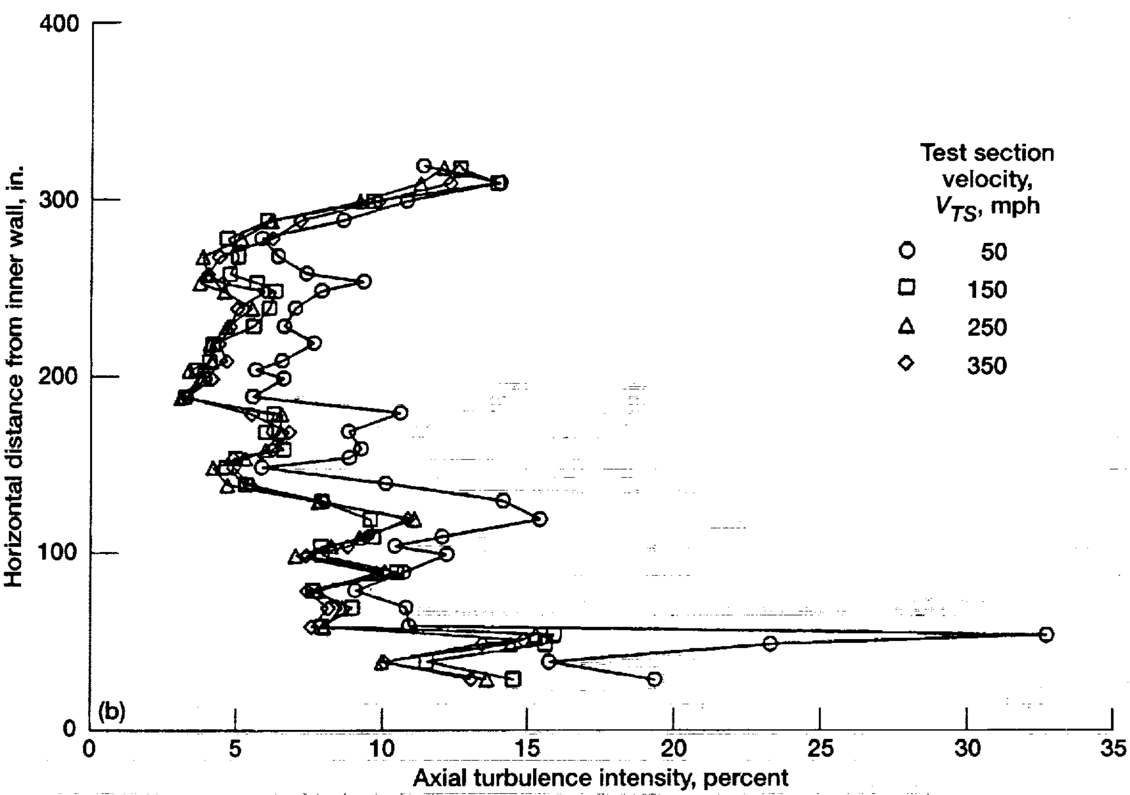
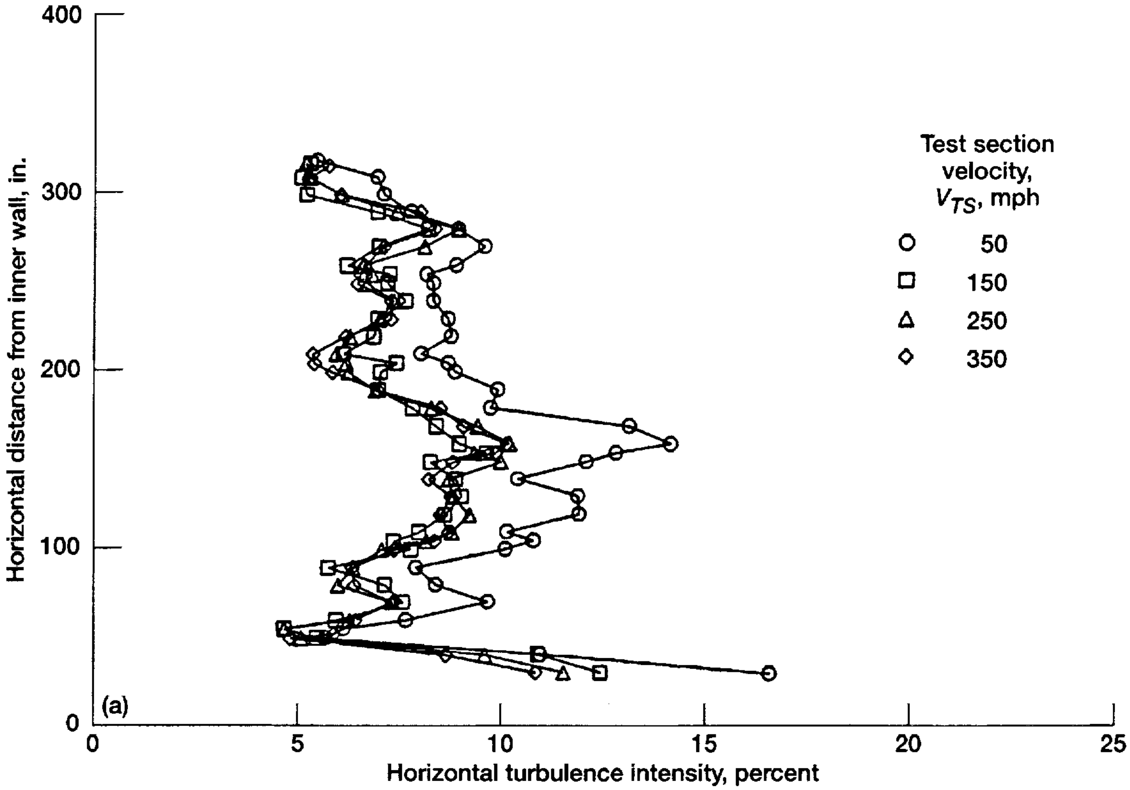


Figure 67.—Axial turbulence intensity along horizontal surveys upstream of spraybars (station 5). (a) Traverse 1 (centerline surveys at 13.06 ft above the tunnel floor). (b) Traverse 2 (upper survey at 19.56 ft above the tunnel floor).



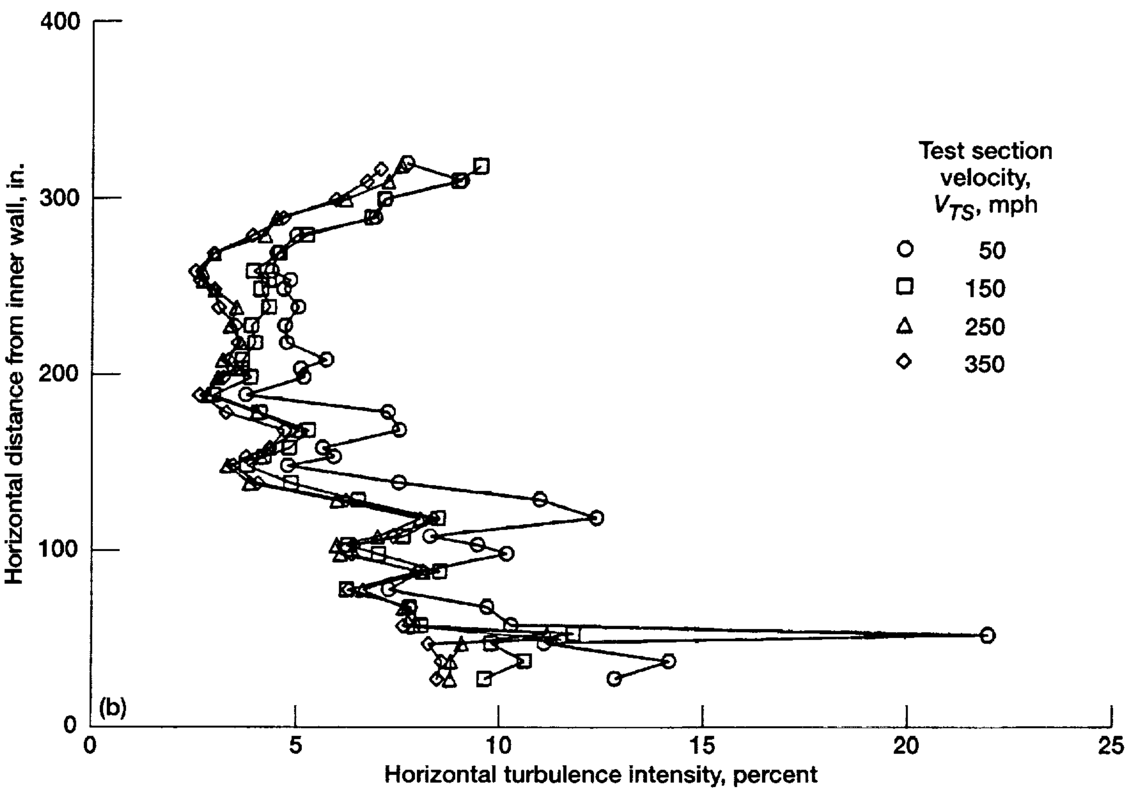


Figure 68.—Horizontal turbulence intensity along horizontal surveys upstream of spraybars (station 5). (a) Traverse 1 (centerline surveys at 13.06 ft above the tunnel floor). (b) Traverse 2 (upper survey at 19.56 ft above the tunnel floor).

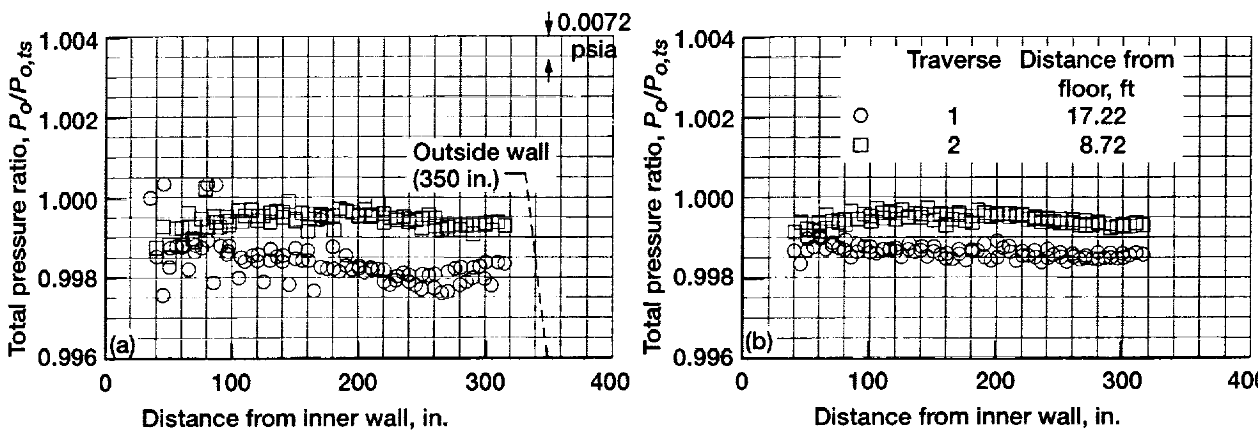


Figure 69.—Total pressure ratio distribution along horizontal surveys downstream of spraybars (station 6). (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

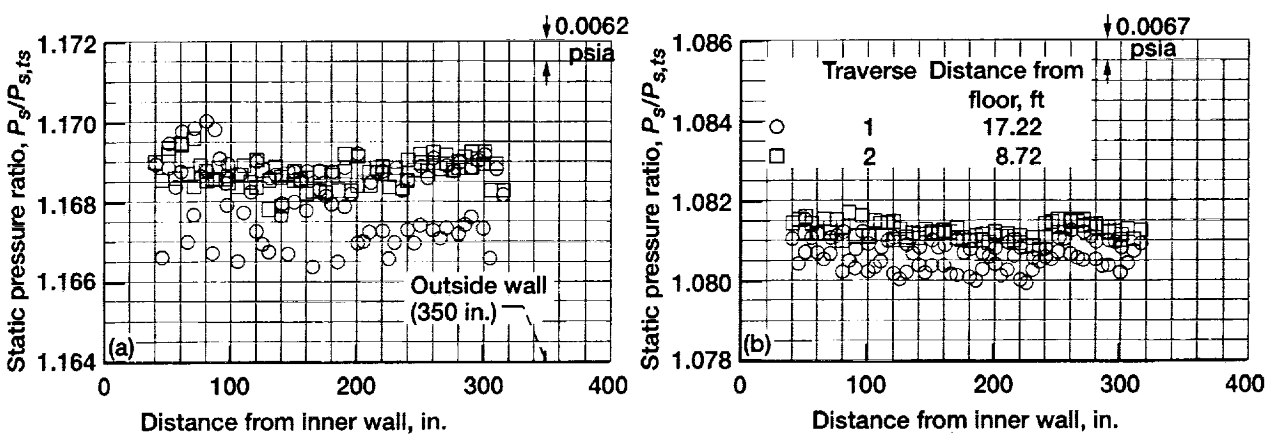


Figure 70.—Static pressure ratio distribution along horizontal surveys downstream of spraybars (station 6). (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

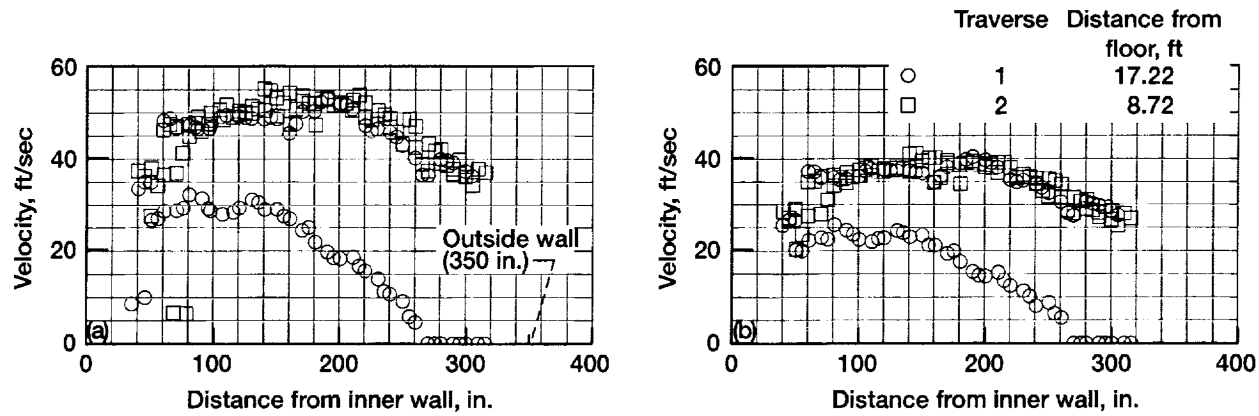


Figure 71.—Velocity distribution along horizontal surveys downstream of spraybars (station 6) as measured by pitot-static probes. (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph. (Note that the data provided by probe 1 on traverse 1 are in error due to an error in the measurement of ΔP; all other data are correct.)

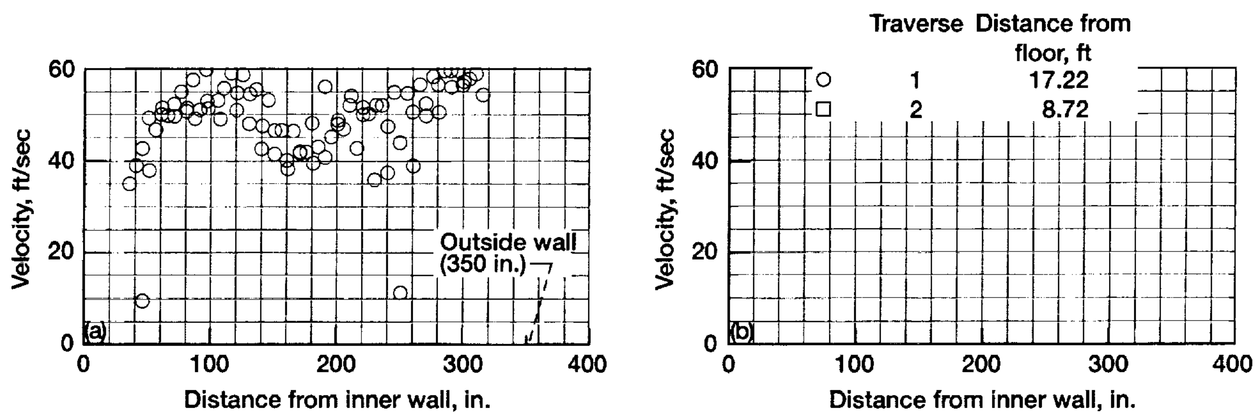


Figure 72.—Velocity distribution along horizontal surveys downstream of spraybars (station 6) as measured by wind anemometers. (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

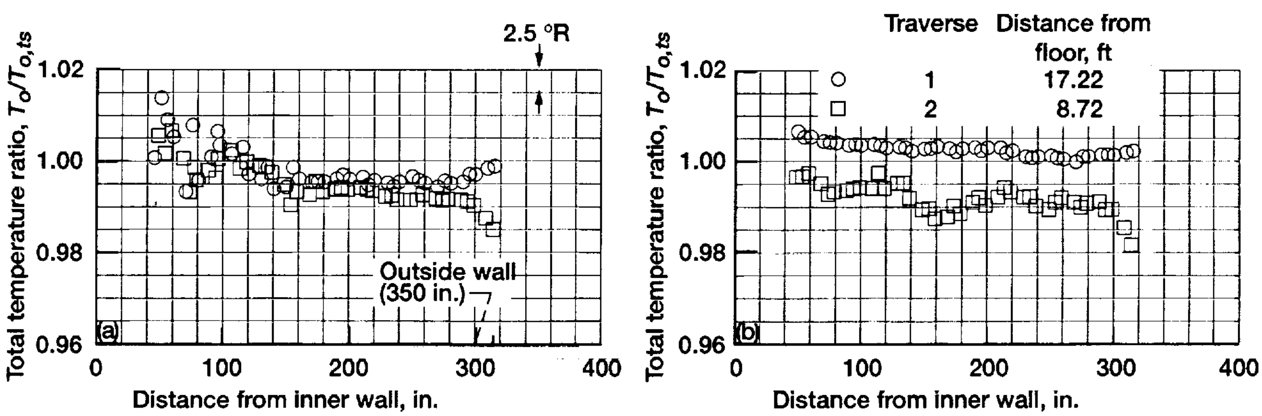


Figure 73.—Total temperature ratio distribution along horizontal surveys downstream of spraybars (station 6). (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

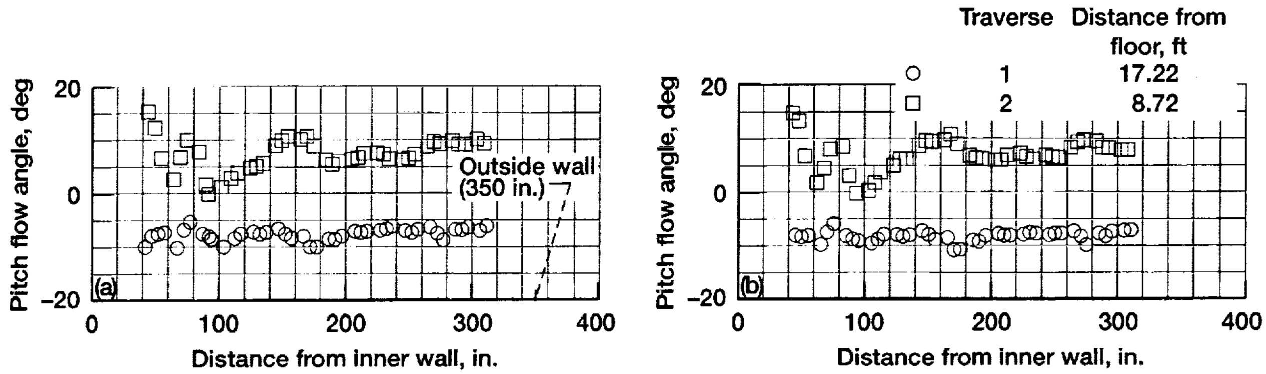


Figure 74.—Pitch flow angle distribution along horizontal surveys downstream of spraybars (station 6). (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

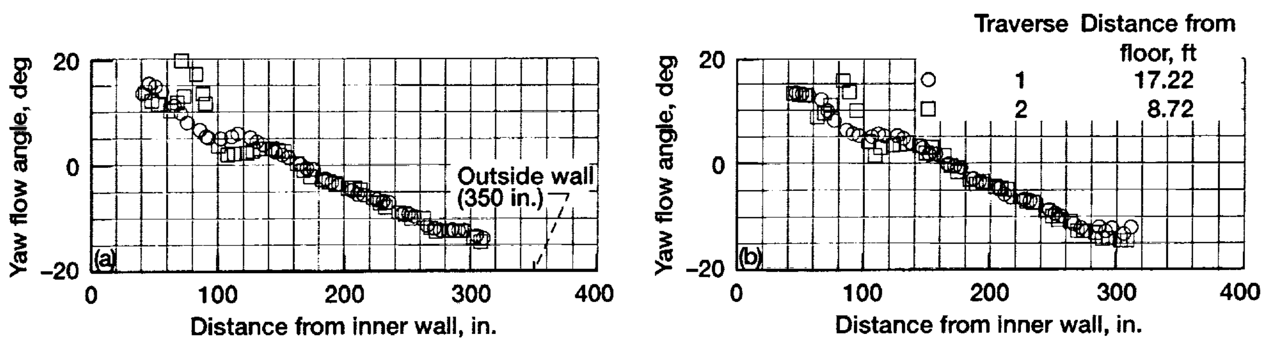
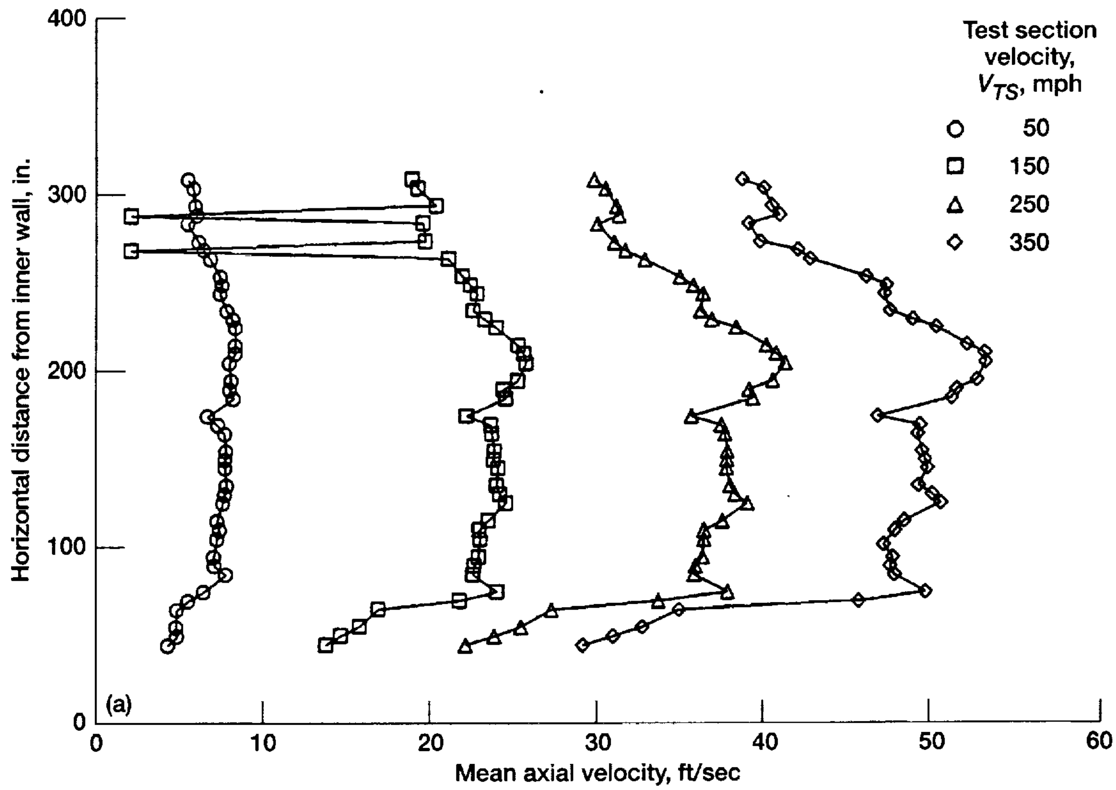


Figure 75.—Yaw flow angle distribution along horizontal surveys downstream of spraybars (station 6). (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.



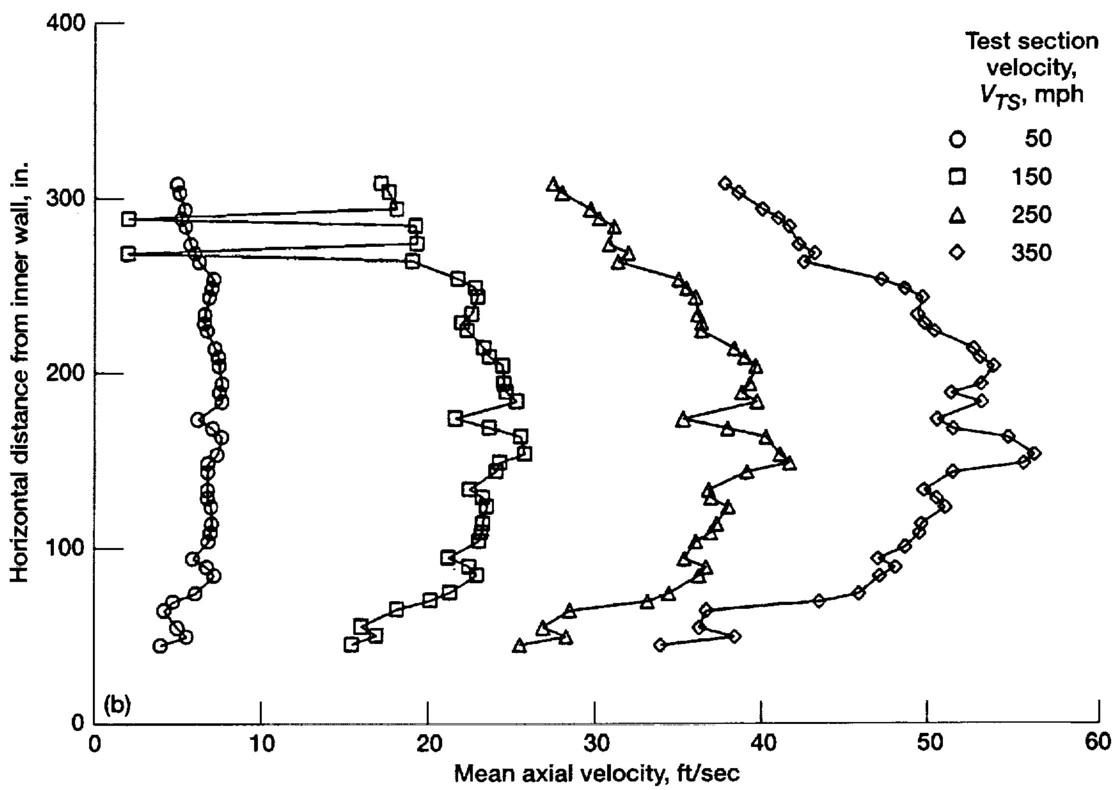


Figure 76.—Mean axial velocity distributions along horizontal surveys downstream of spraybars (station 6) as measured by hot-wire anemometers. (a) Traverse 1 (17.2 ft above tunnel floor). (b) Traverse 2 (8.72 ft above tunnel floor).

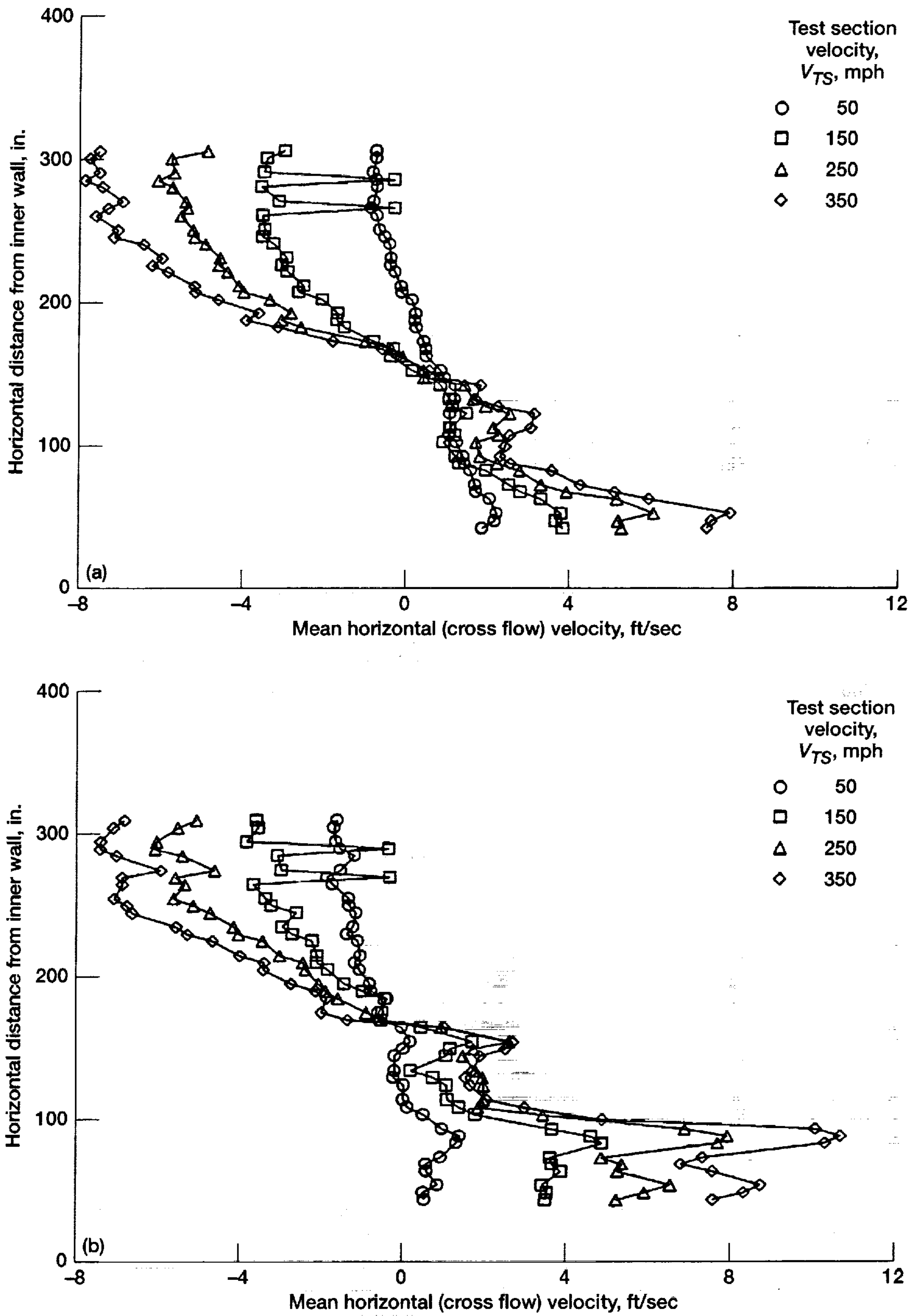


Figure 77.—Mean horizontal (cross flow) velocity distribution along horizontal surveys downstream of spraybars (station 6) as measured by hot-wire anemometers. (a) Traverse 1 (17.2 ft above tunnel floor). (b) Traverse 2 (8.72 ft above tunnel floor).

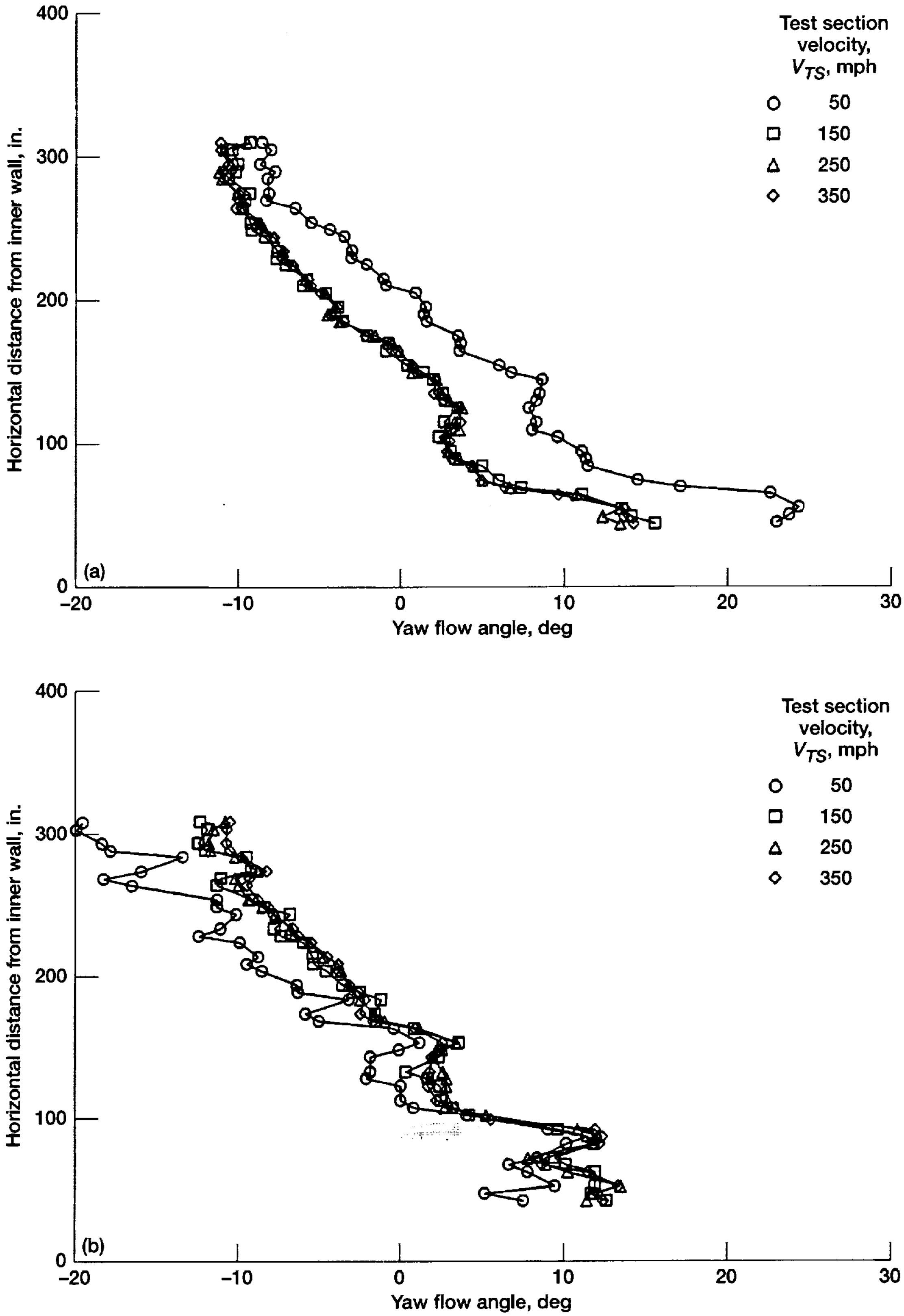


Figure 78.—Yaw flow angle distribution along horizontal surveys downstream of spraybars (station 6) as measured by hot-wire anemometers. (a) Traverse 1 (17.2 ft above tunnel floor). (b) Traverse 2 (8.72 ft above tunnel floor).

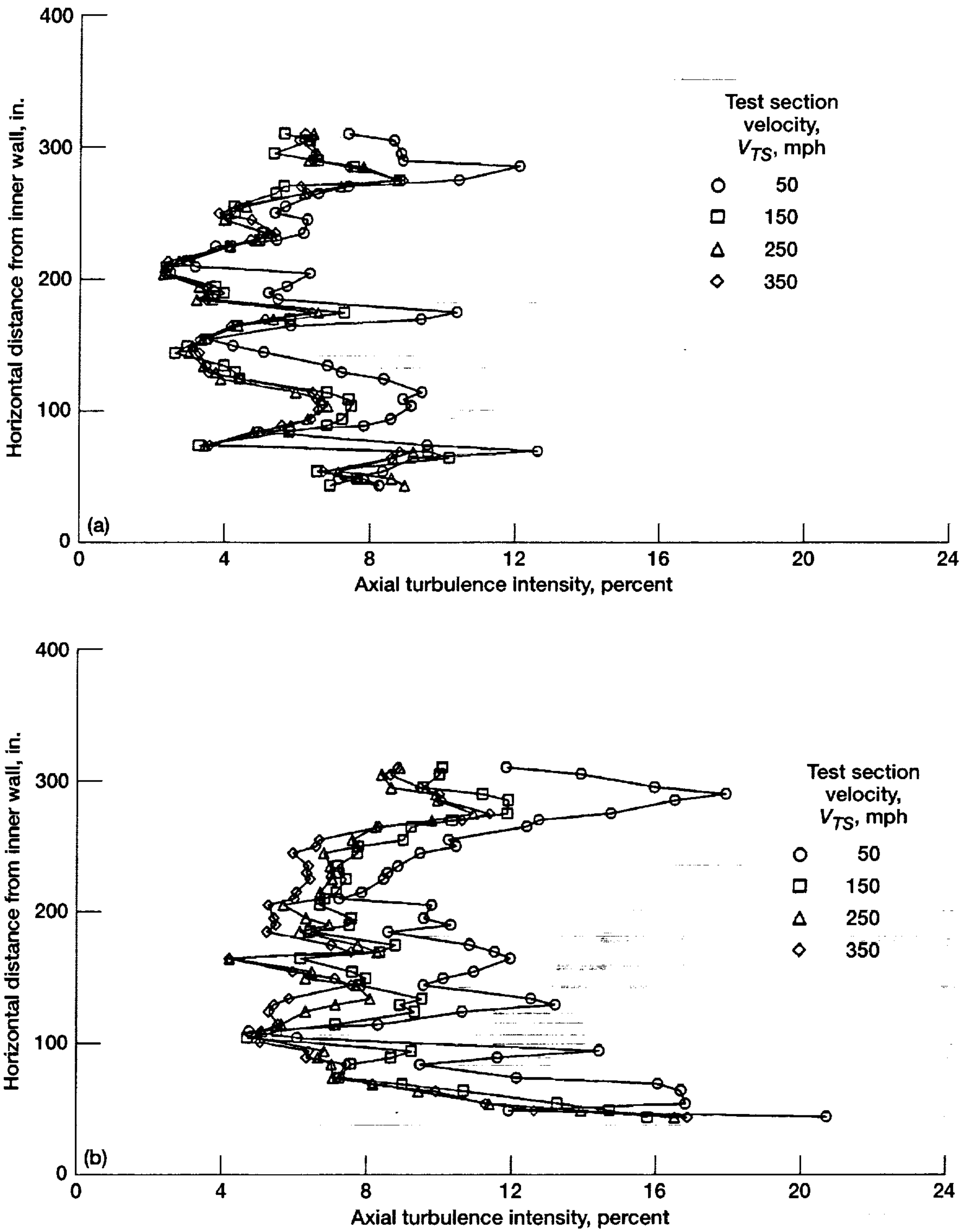


Figure 79.—Axial turbulence intensity distribution along horizontal surveys downstream of spraybars (station 6) as measured by hot-wire anemometers. (a) Traverse 1 (17.2 ft above tunnel floor). (b) Traverse 2 (8.72 ft above tunnel floor).

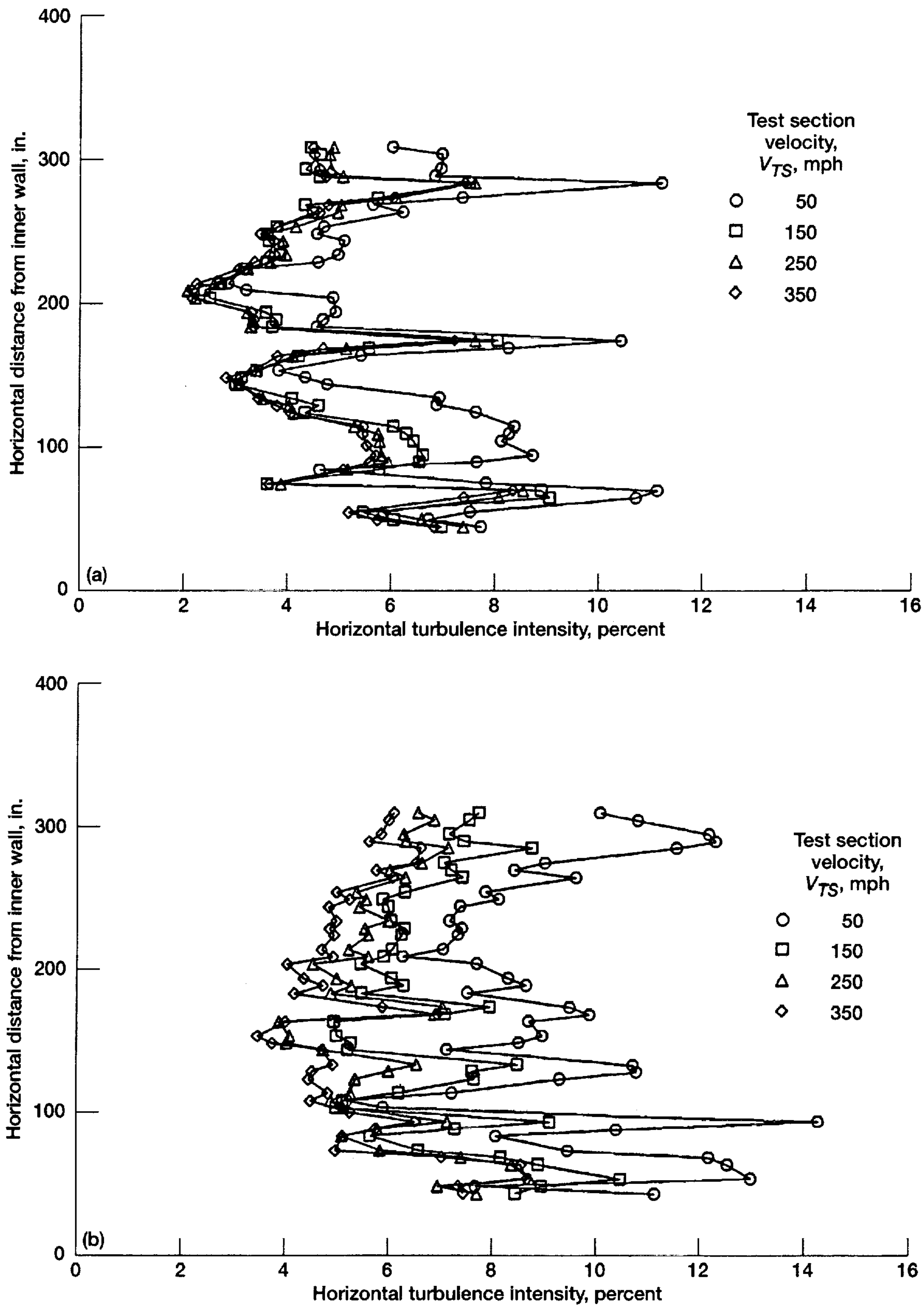


Figure 80.—Horizontal turbulence intensity distribution along horizontal surveys downstream of spraybars (station 6) as measured by hot-wire anemometers. (a) Traverse 1 (17.2 ft above tunnel floor). (b) Traverse 2 (8.72 ft above tunnel floor).

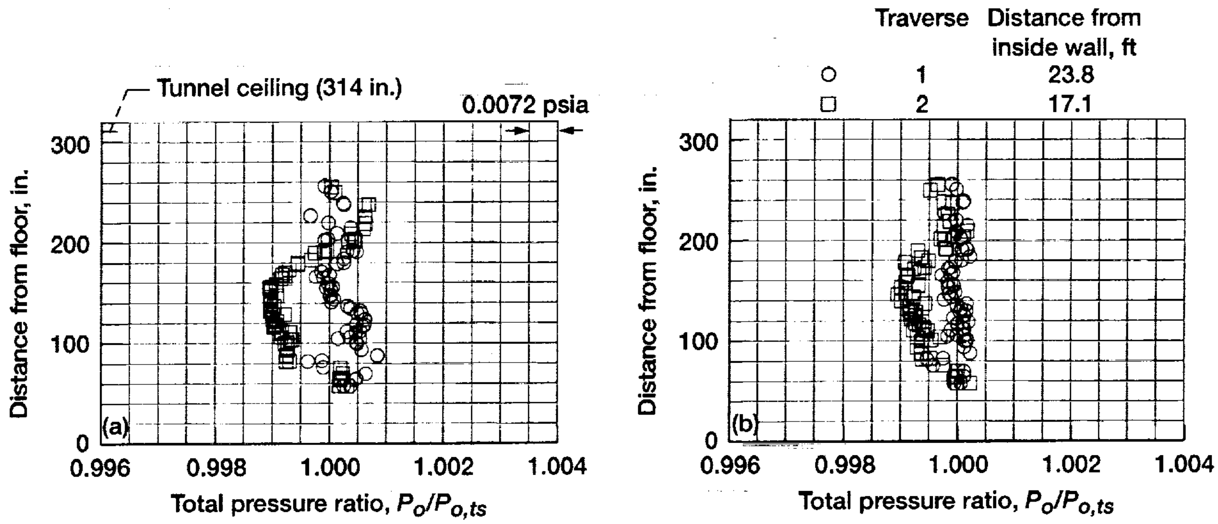


Figure 81.—Total pressure ratio distribution along vertical surveys downstream of heat exchanger (station 4). Traverse 2 was directly downstream of part of heat exchanger from which exit guide vanes had been removed. (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

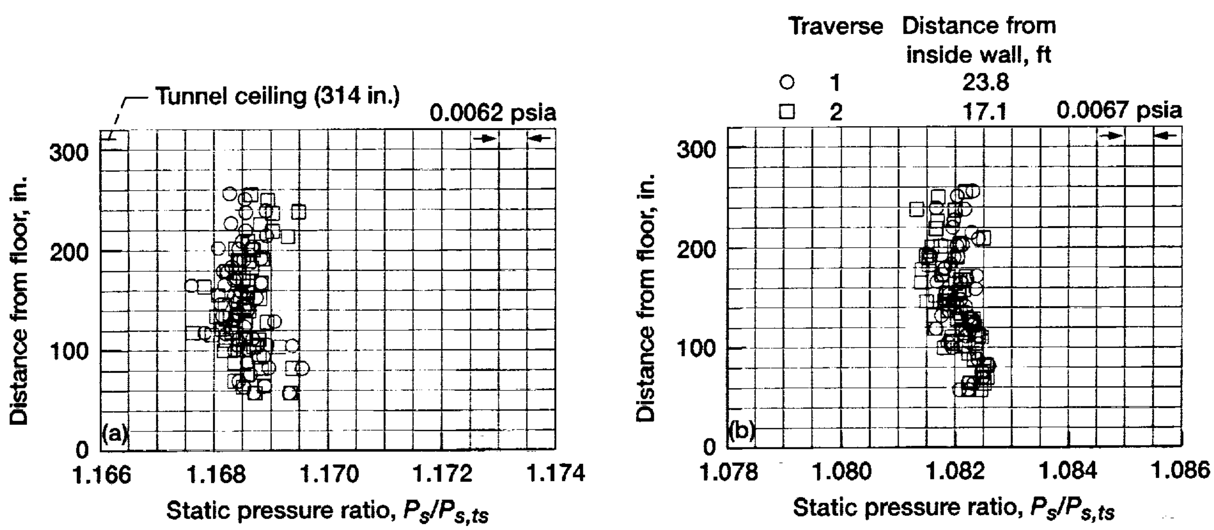


Figure 82.—Static pressure ratio distribution along vertical surveys downstream of heat exchanger (station 4). Traverse 2 was directly downstream of part of heat exchanger from which exit guide vanes had been removed. (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

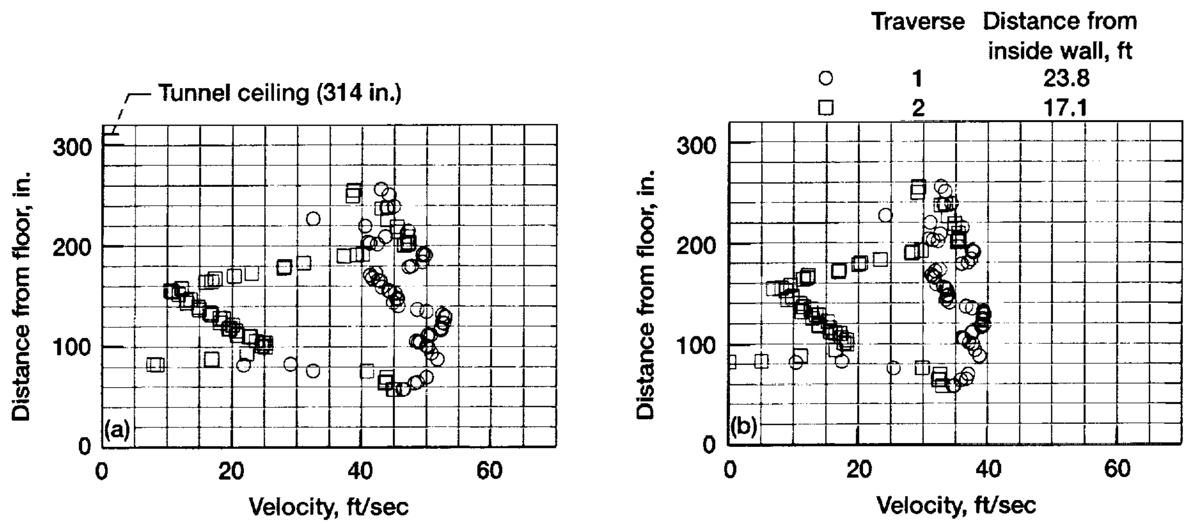


Figure 83.—Velocity distribution along vertical surveys downstream of heat exchanger (station 4) as measured by pitot-static probes. Traverse 2 was directly downstream of part of heat exchanger from which exit guide vanes had been removed. (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

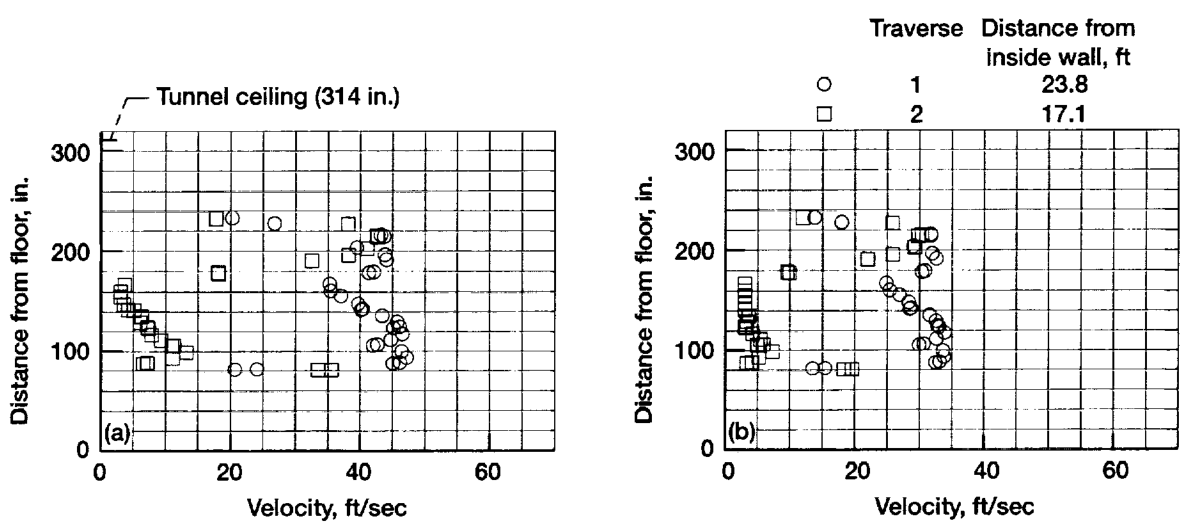


Figure 84.—Velocity distribution along vertical surveys downstream of heat exchanger (station 4) as measured by wind anemometers. Traverse 2 was directly downstream of part of heat exchanger from which exit guide vanes had been removed. (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

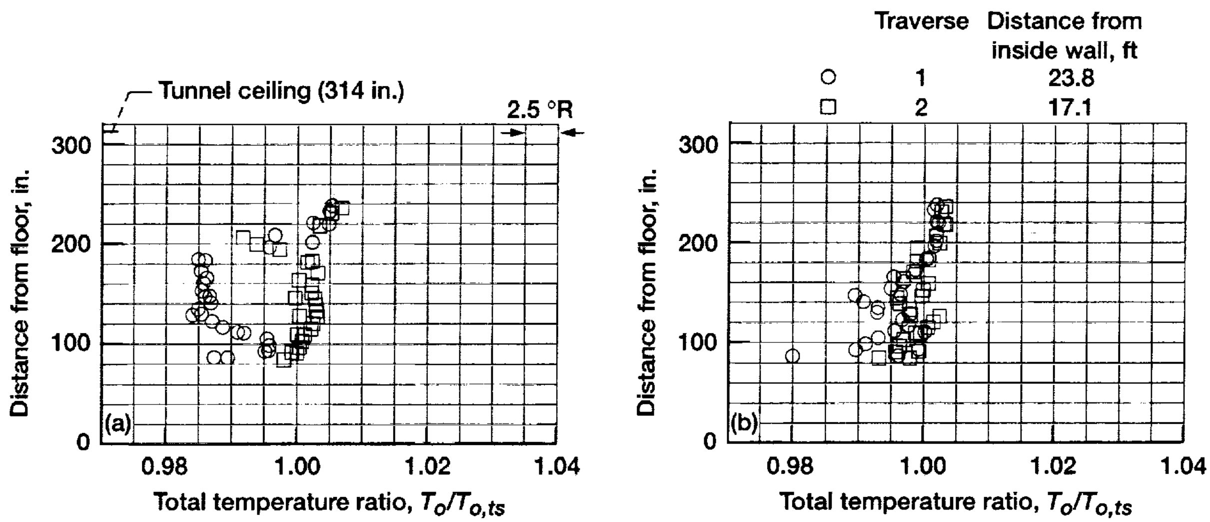


Figure 85.—Total temperature ratio along vertical surveys downstream of heat exchanger (station 4). Traverse 2 was directly downstream of part of heat exchanger from which exit guide vanes had been removed. (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

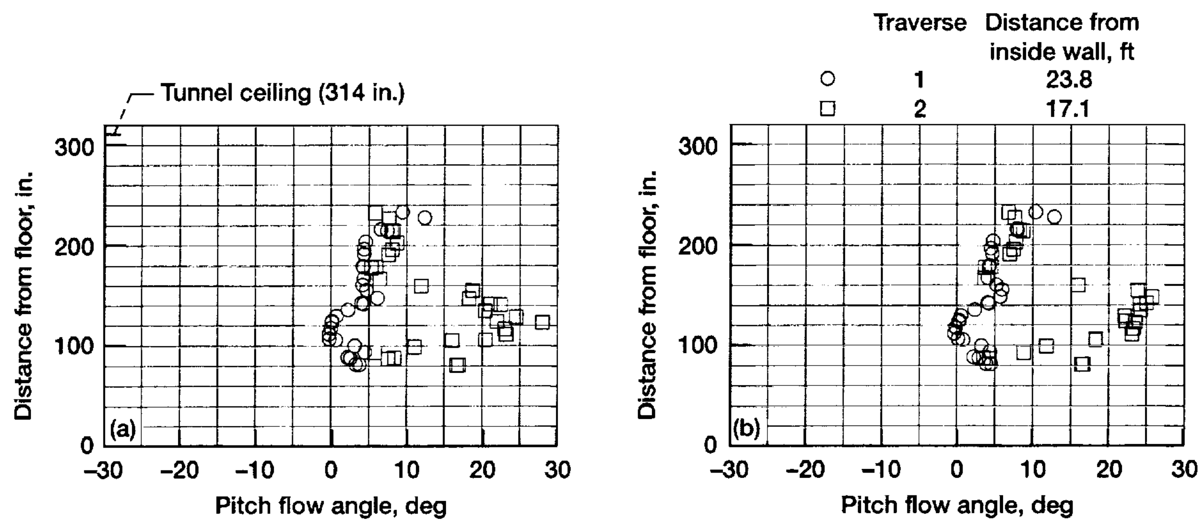


Figure 86.—Pitch flow angle distribution along vertical surveys downstream of heat exchanger (station 4) as measured by wind anemometers. Traverse 2 was directly downstream of part of heat exchanger from which exit guide vanes had been removed (positive angles indicate upflow). (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

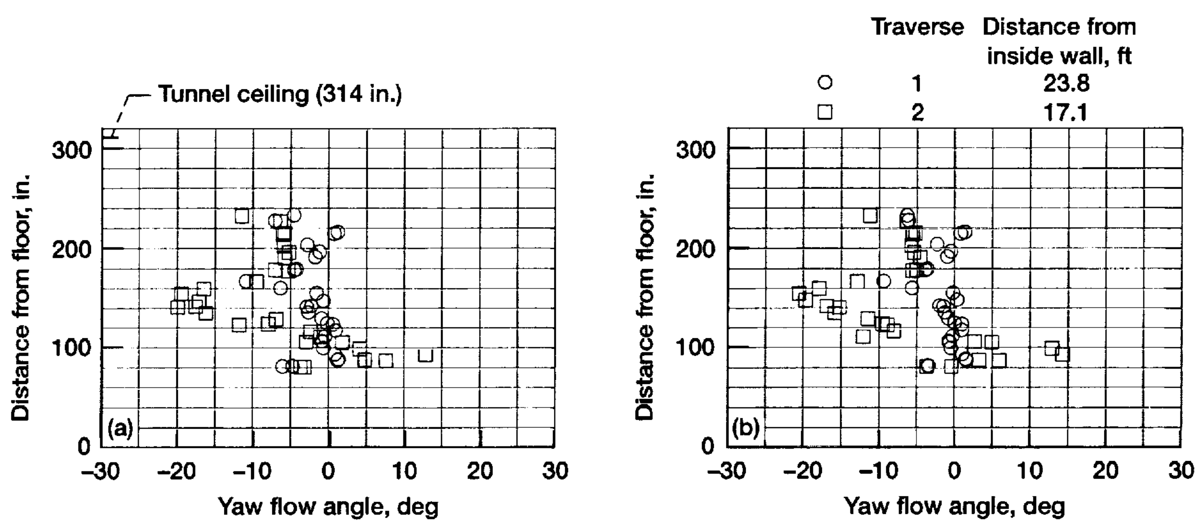


Figure 87.—Yaw flow angle distribution along vertical surveys downstream of heat exchanger (station 4). Traverse 2 was directly downstream of part of heat exchanger from which exit guide vanes had been removed (positive angles indicate flow toward outside tunnel wall). (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

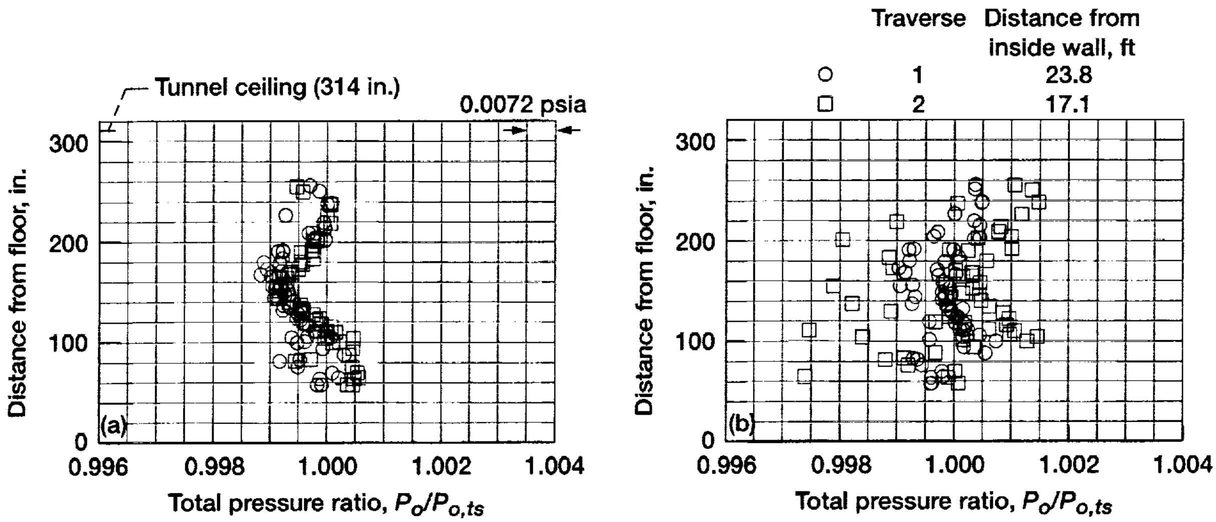


Figure 88.—Total pressure ratio distribution along vertical surveys downstream of heat exchanger (station 4). Traverse 2 was directly downstream of heat exchanger element two, where exit guide vanes had been installed but not deployed. (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

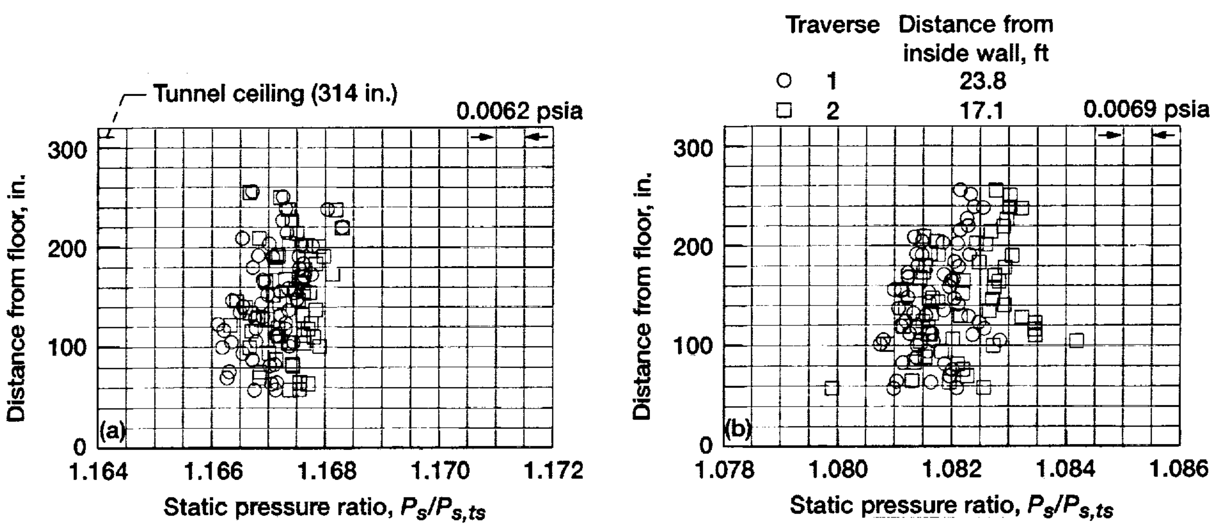


Figure 89.—Static pressure ratio distribution along vertical surveys downstream of heat exchanger (station 4). Traverse 2 was directly downstream of heat exchanger element two, where exit guide vanes had been installed but not deployed. (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

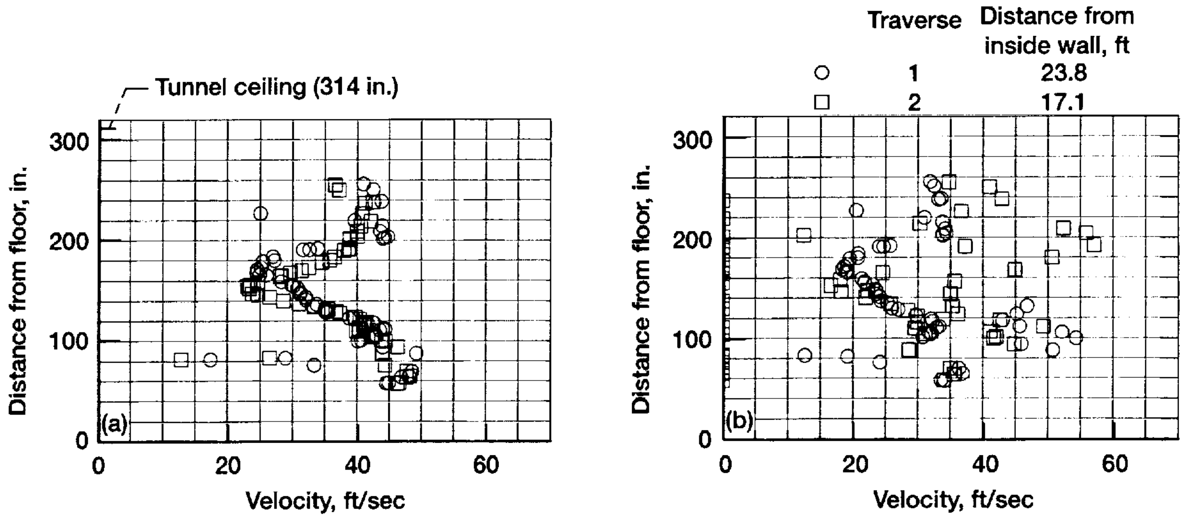


Figure 90.—Velocity distribution along vertical surveys downstream of heat exchanger (station 4) as measured by pitot-static probes. Traverse 2 was directly downstream of heat exchanger element two, where exit guide vanes had been installed but not deployed. (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

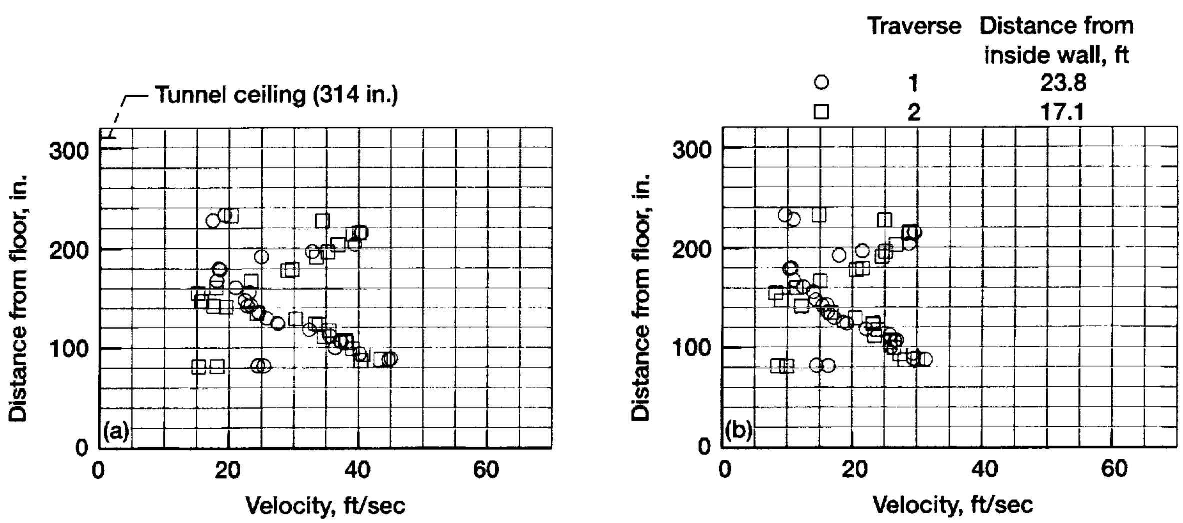


Figure 91.—Velocity distribution along vertical surveys downstream of heat exchanger (station 4) as measured by wind anemometers. Traverse 2 was directly downstream of heat exchanger element two, where exit guide vanes had been installed but not deployed. (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

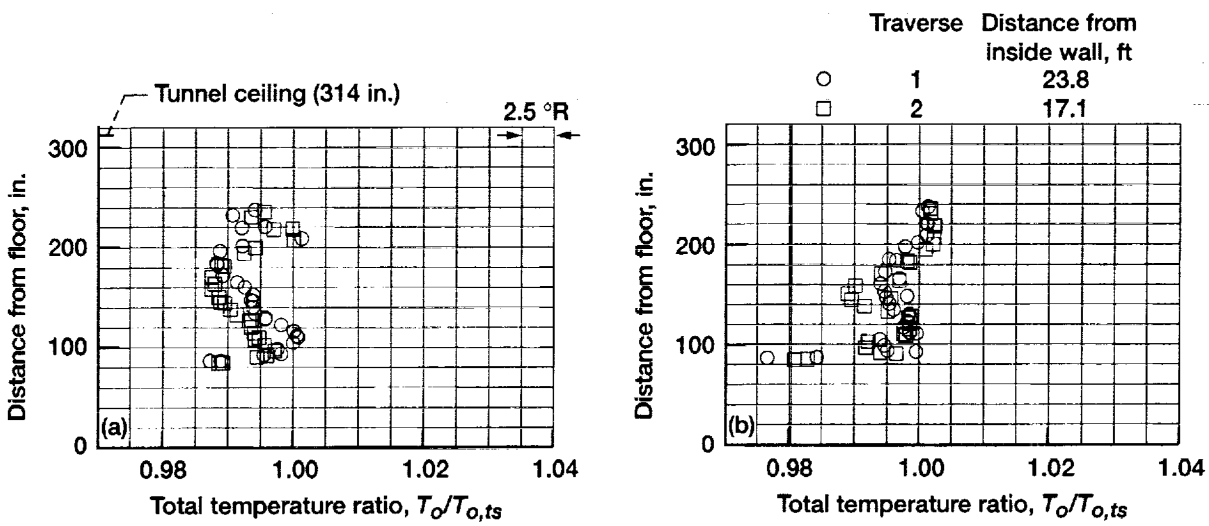


Figure 92.—Total temperature ratio distribution along vertical surveys downstream of heat exchanger (station 4) as measured by wind anemometers. Traverse 2 was directly downstream of heat exchanger element two, where exit guide vanes had been installed but not deployed. (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

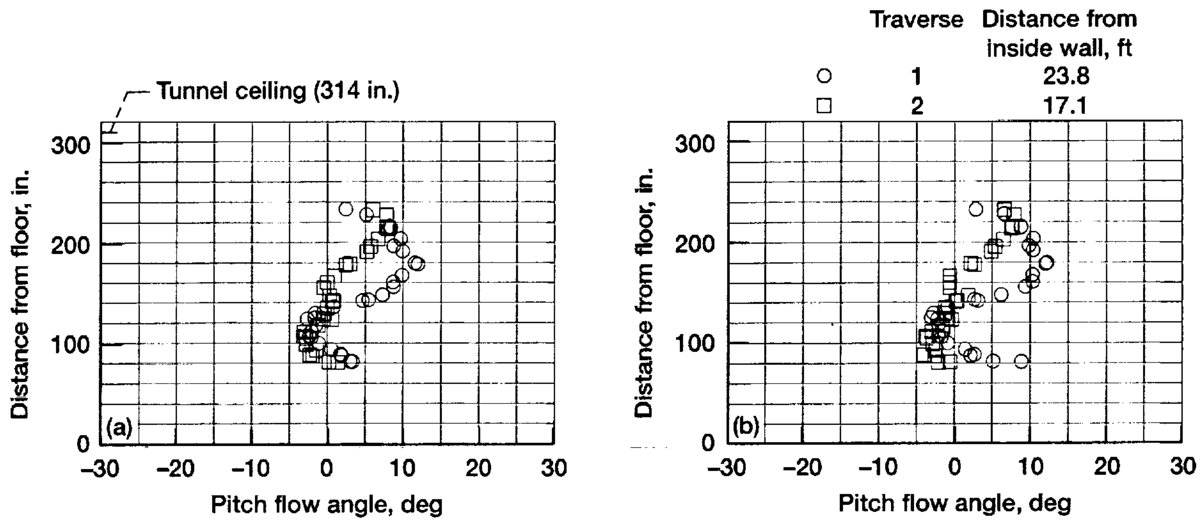


Figure 93.—Pitch flow angle distribution along vertical surveys downstream of heat exchanger (station 4) as measured by wind anemometers. Traverse 2 was directly downstream of heat exchanger element two, where exit guide vanes had been installed but not deployed. (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

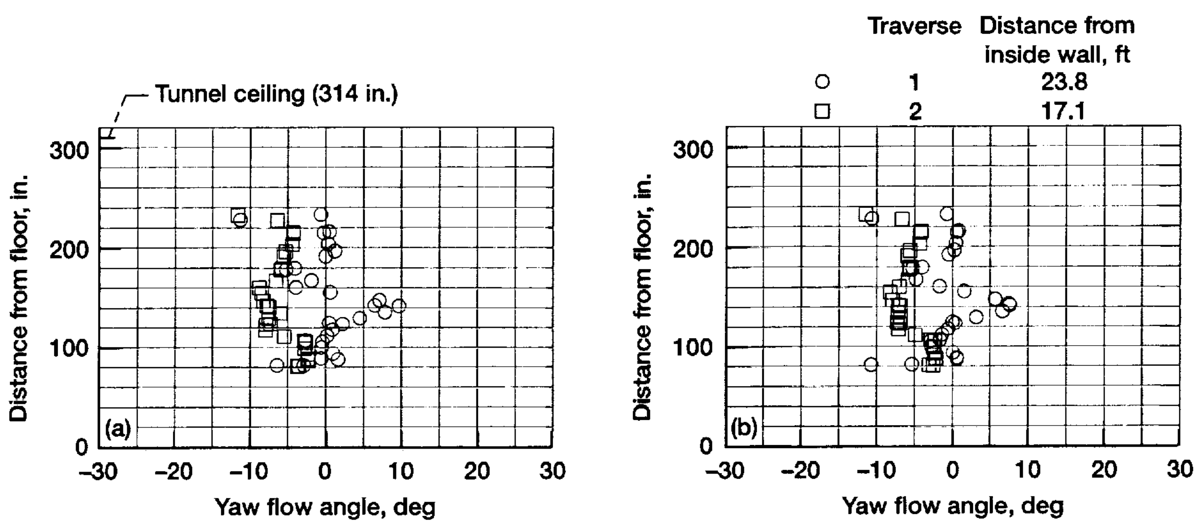


Figure 94.—Yaw flow angle distribution along vertical surveys downstream of heat exchanger (station 4) as measured by wind anemometers. Traverse 2 was directly downstream of heat exchanger element two, where exit guide vanes had been installed but not deployed. (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

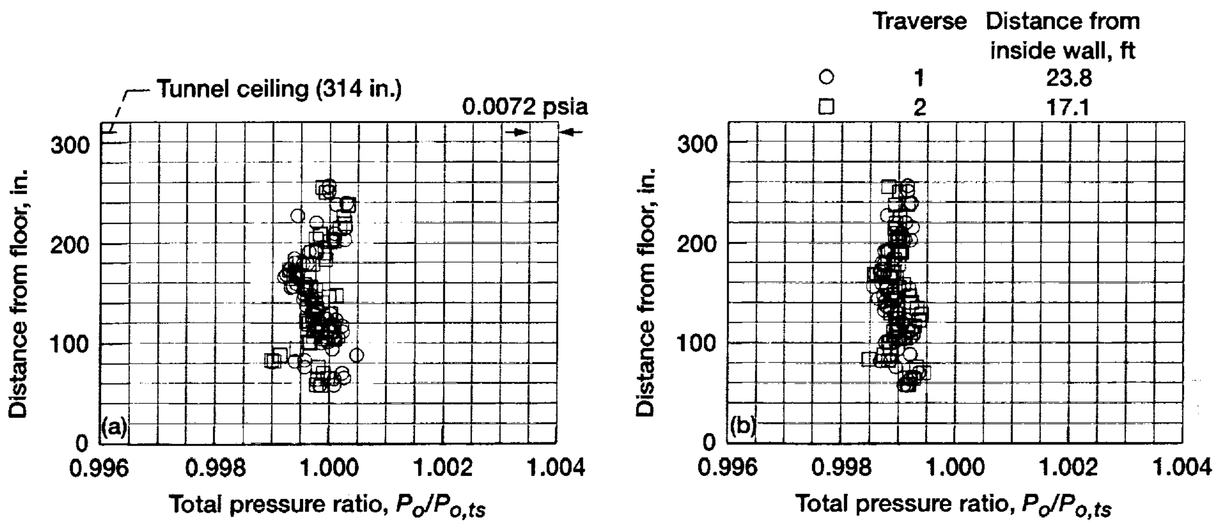


Figure 95.—Total pressure ratio distribution along vertical surveys downstream of heat exchanger (station 4). Traverse 2 was directly downstream of heat exchanger element two, where exit guide vanes had been installed and deployed. (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

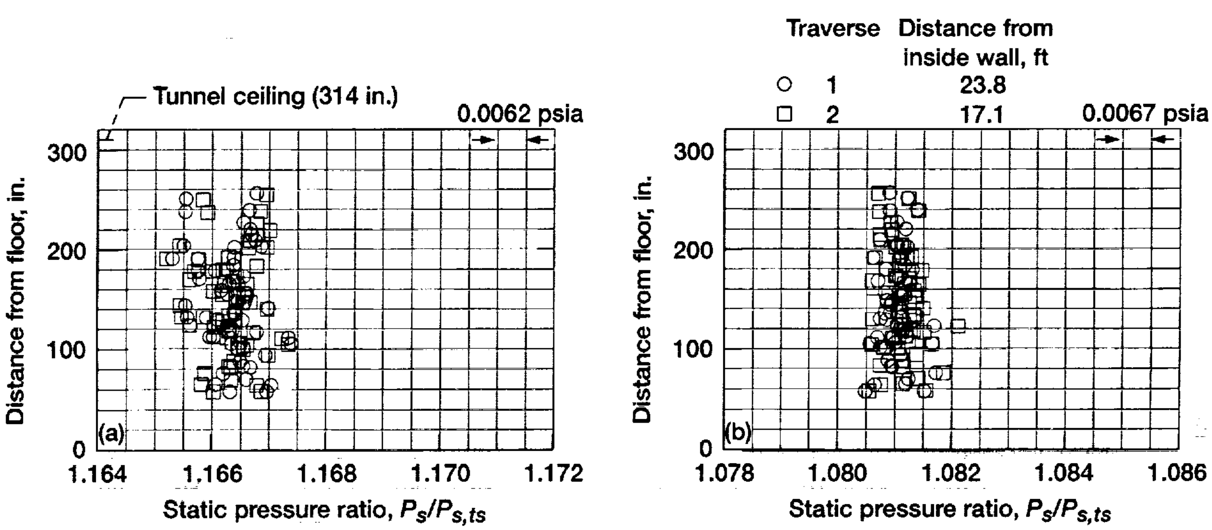


Figure 96.—Static pressure ratio distribution along vertical surveys downstream of heat exchanger (station 4). Traverse 2 was directly downstream of heat exchanger element two, where exit guide vanes had been installed but not deployed. (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

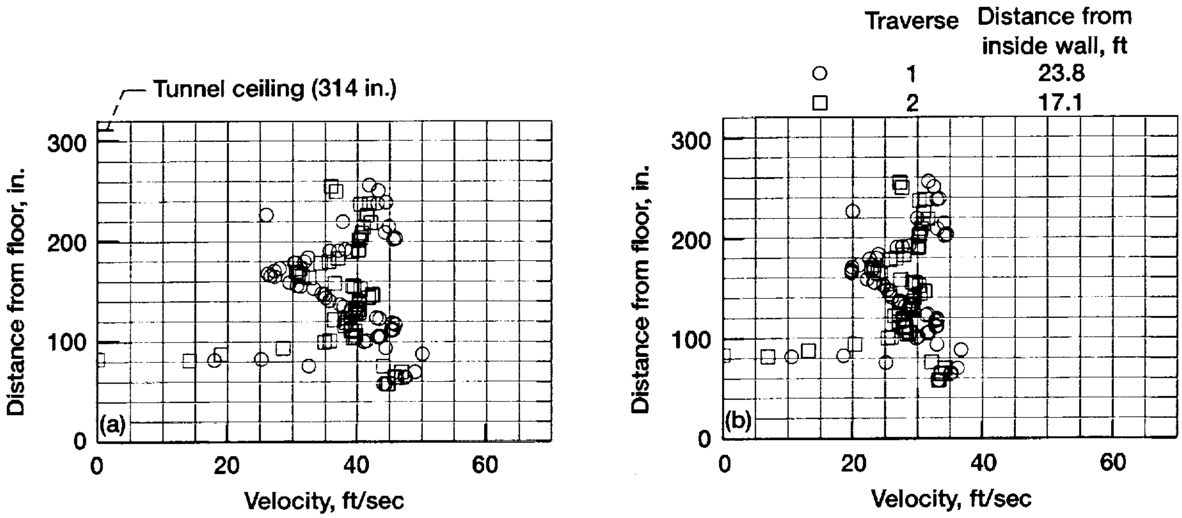


Figure 97.—Velocity distribution along vertical surveys downstream of heat exchanger (station 4) as measured by pitot-static probes. Traverse 2 was directly downstream of heat exchanger element two, where exit guide vanes had been installed and deployed. (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

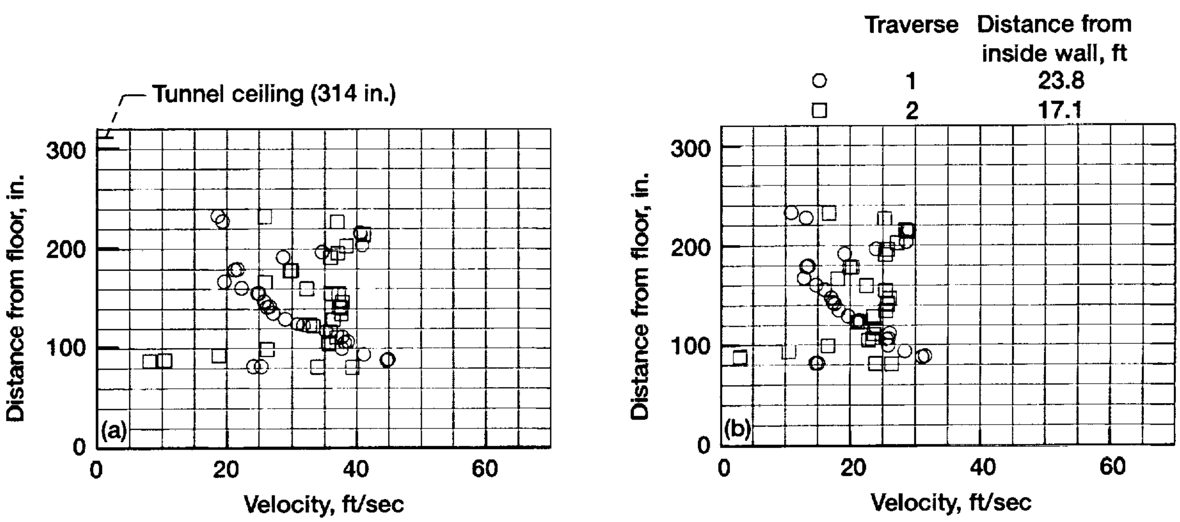


Figure 98.—Velocity distribution along vertical surveys downstream of heat exchanger (station 4) as measured by wind anemometers. Traverse 2 was directly downstream of heat exchanger element two, where exit guide vanes had been installed and deployed. (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

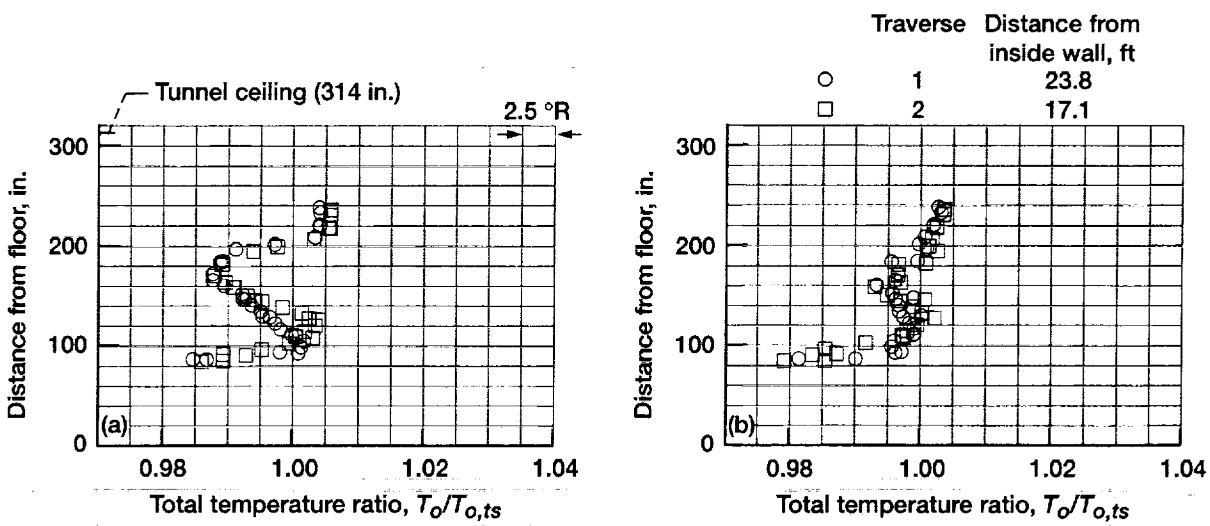


Figure 99.—Total temperature ratio distribution along vertical surveys downstream of heat exchanger (station 4) as measured by wind anemometers. Traverse 2 was directly downstream of heat exchanger element two, where exit guide vanes had been installed and deployed. (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

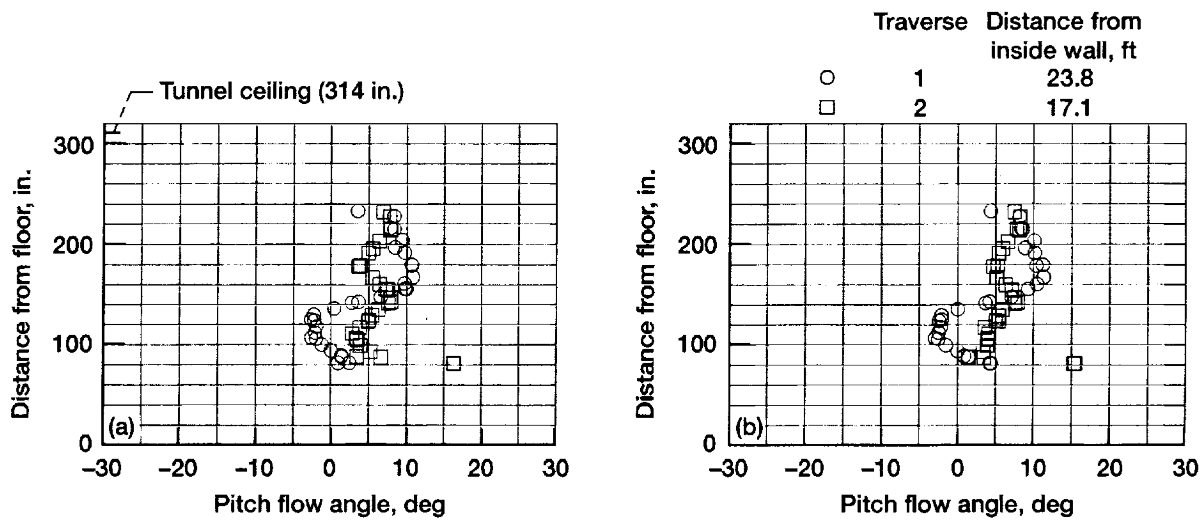


Figure 100.—Pitch flow angle distribution along vertical surveys downstream of heat exchanger (station 4). Traverse 2 was directly downstream of heat exchanger element two, where exit guide vanes had been installed and deployed. (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

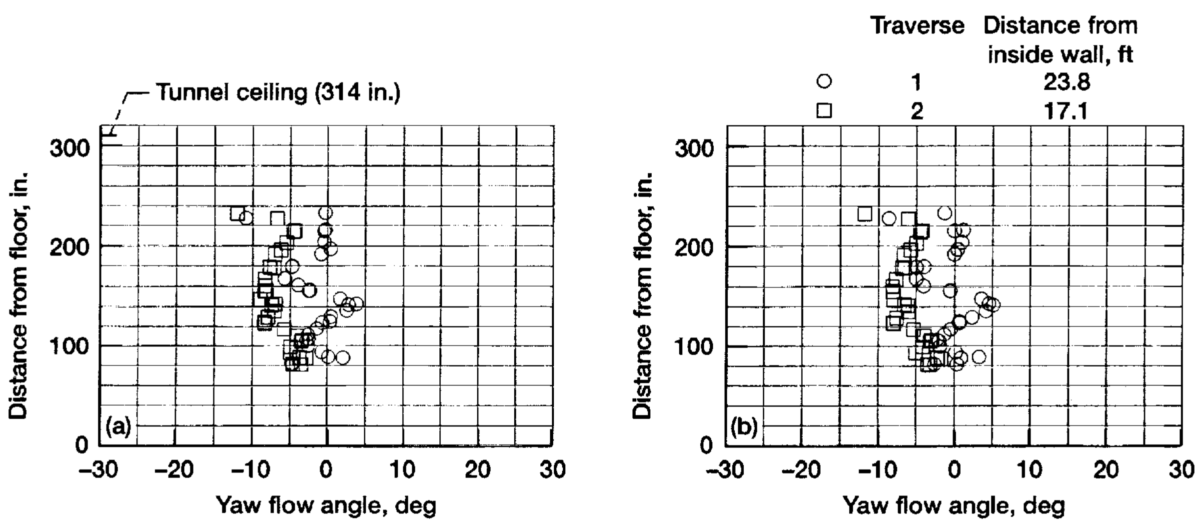


Figure 101.—Yaw flow angle distribution along vertical surveys downstream of heat exchanger (station 4). Traverse 2 was directly downstream of heat exchanger element two, where exit guide vanes had been installed and deployed. (a) V_{TS} = 350 mph. (b) V_{TS} = 250 mph.

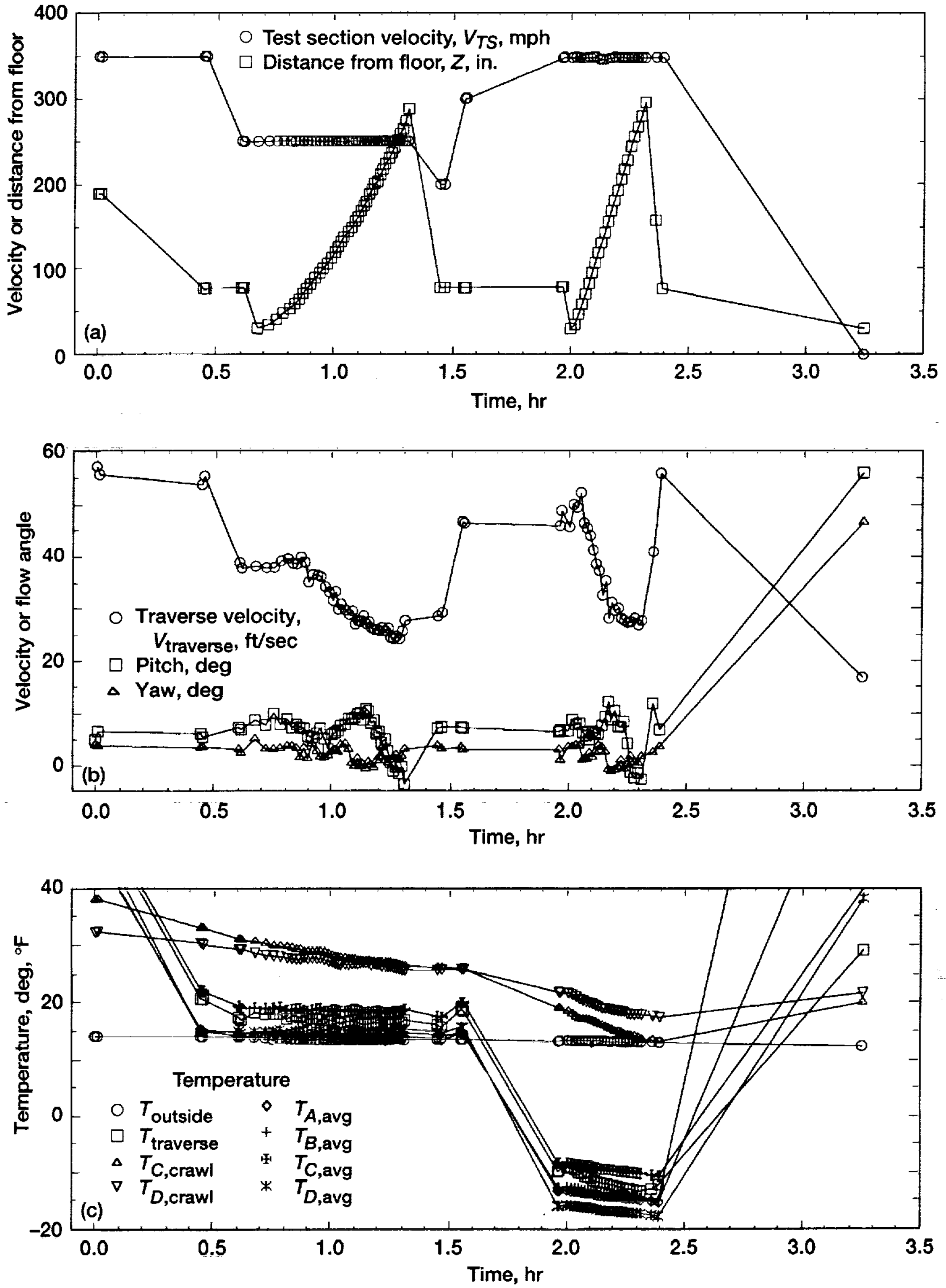


Figure 102.—Time histories. (a) Test section velocity and cable traverse position. (b) Air speed, pitch flow angle, and yaw flow angle measured by the wind anemometer on the cable traverse. (c) Air temperatures measured outside, near the cable traverse, in the crawl spaces, and in tunnel corners C and D.

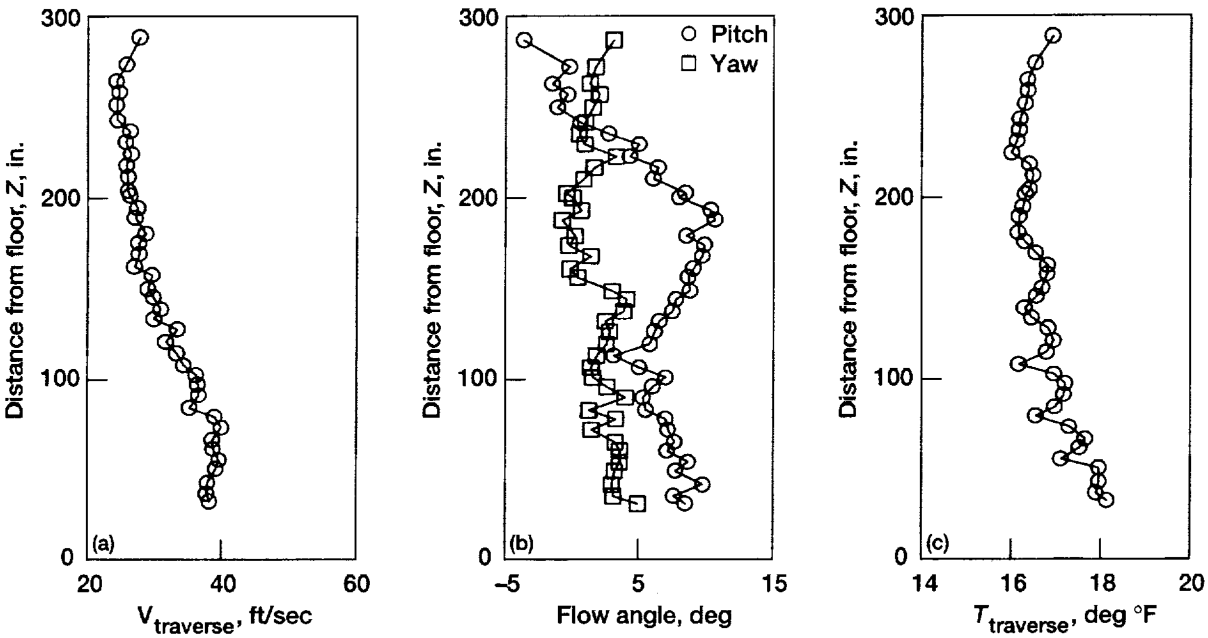


Figure 103.—Measurements made by the wind anemometer and thermocouple probes on the cable traverse for a test section air velocity, V_{TS}, of 250 mph and a tunnel total temperature $T_{D,avg}$, of 15 °F. (a) Air velocity. (b) Pitch and yaw flow angles. (c) Air temperature.

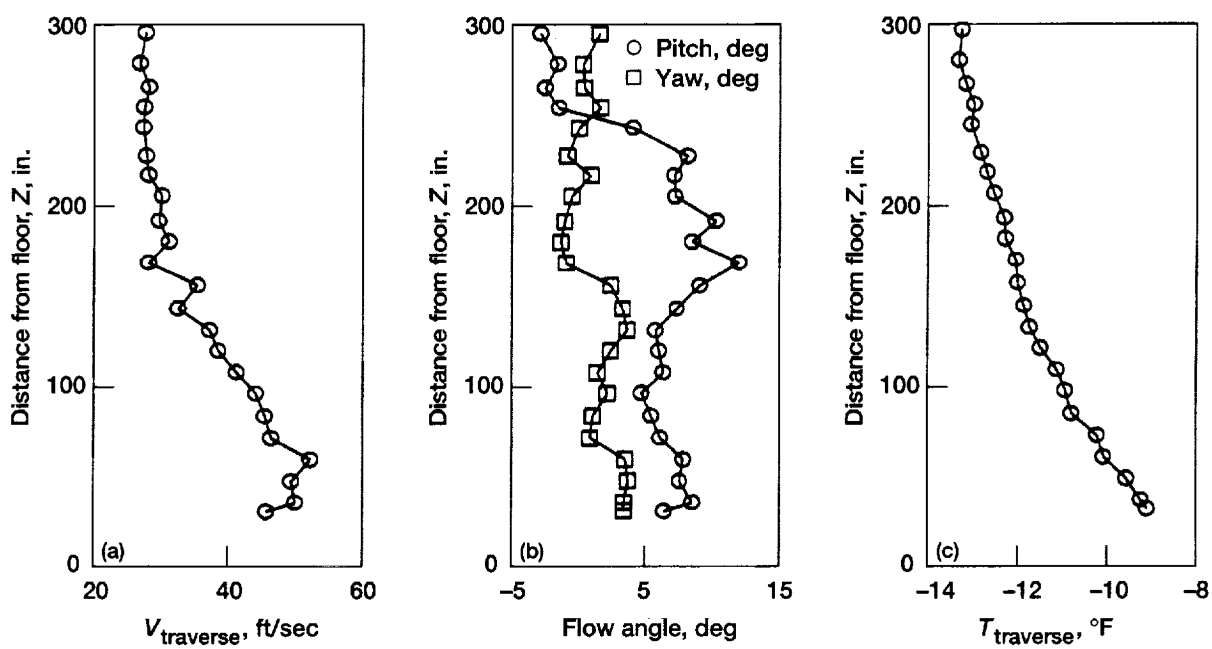


Figure 104.—Measurements made by the wind anemometer and thermocouple probes on the cable traverse for a test section air velocity, V_{TS}, of 350 mph and a tunnel total temperature $T_{D,avg}$, of 17 °F. (a) Air velocity, (b) Pitch and yaw flow angles. (c) Air temperature.

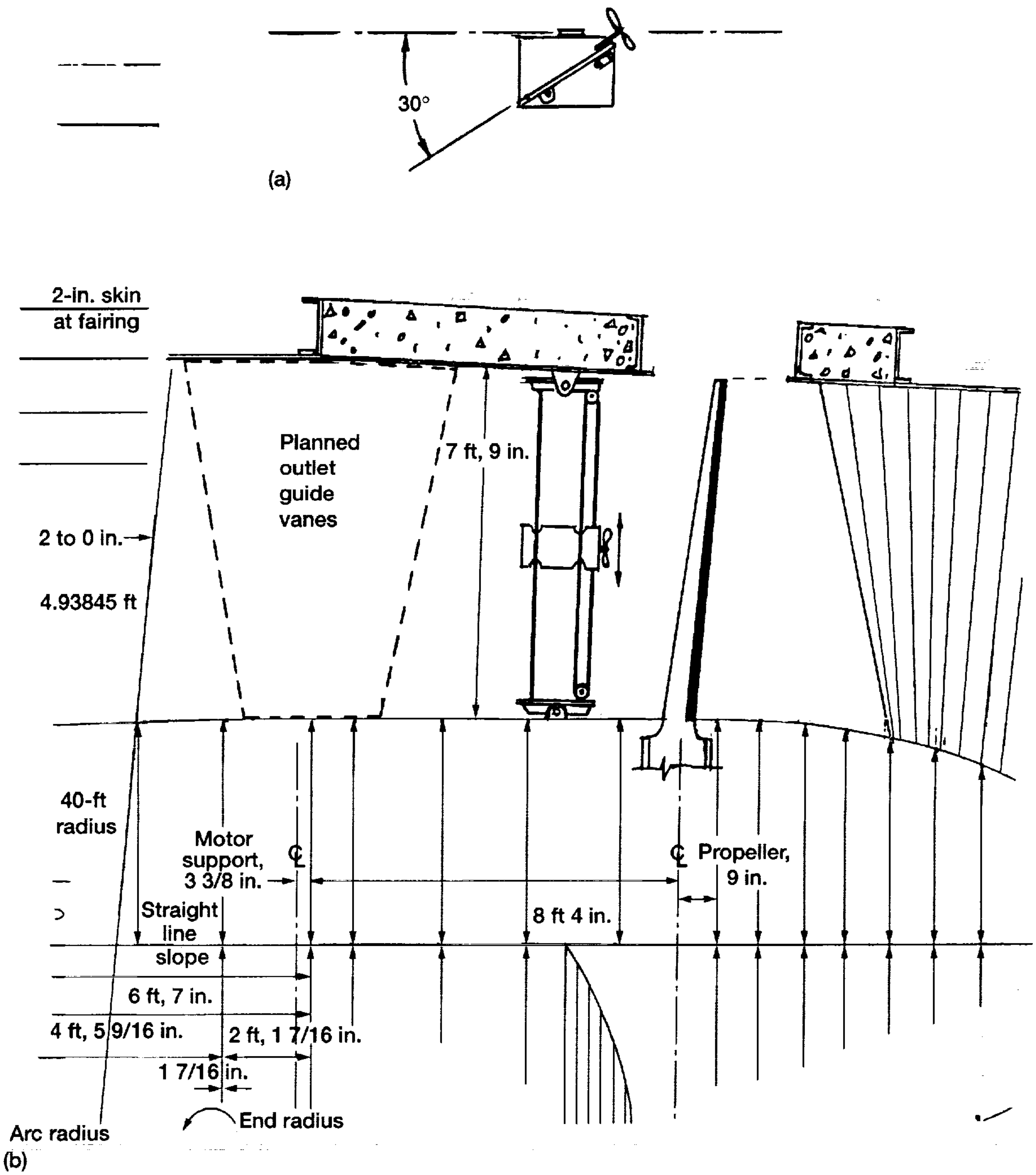


Figure 105.—Cable traverse installed at the IRT fan exit (Copyright David A. Spera; used with permission.) (a) Top view. (b) Side view.

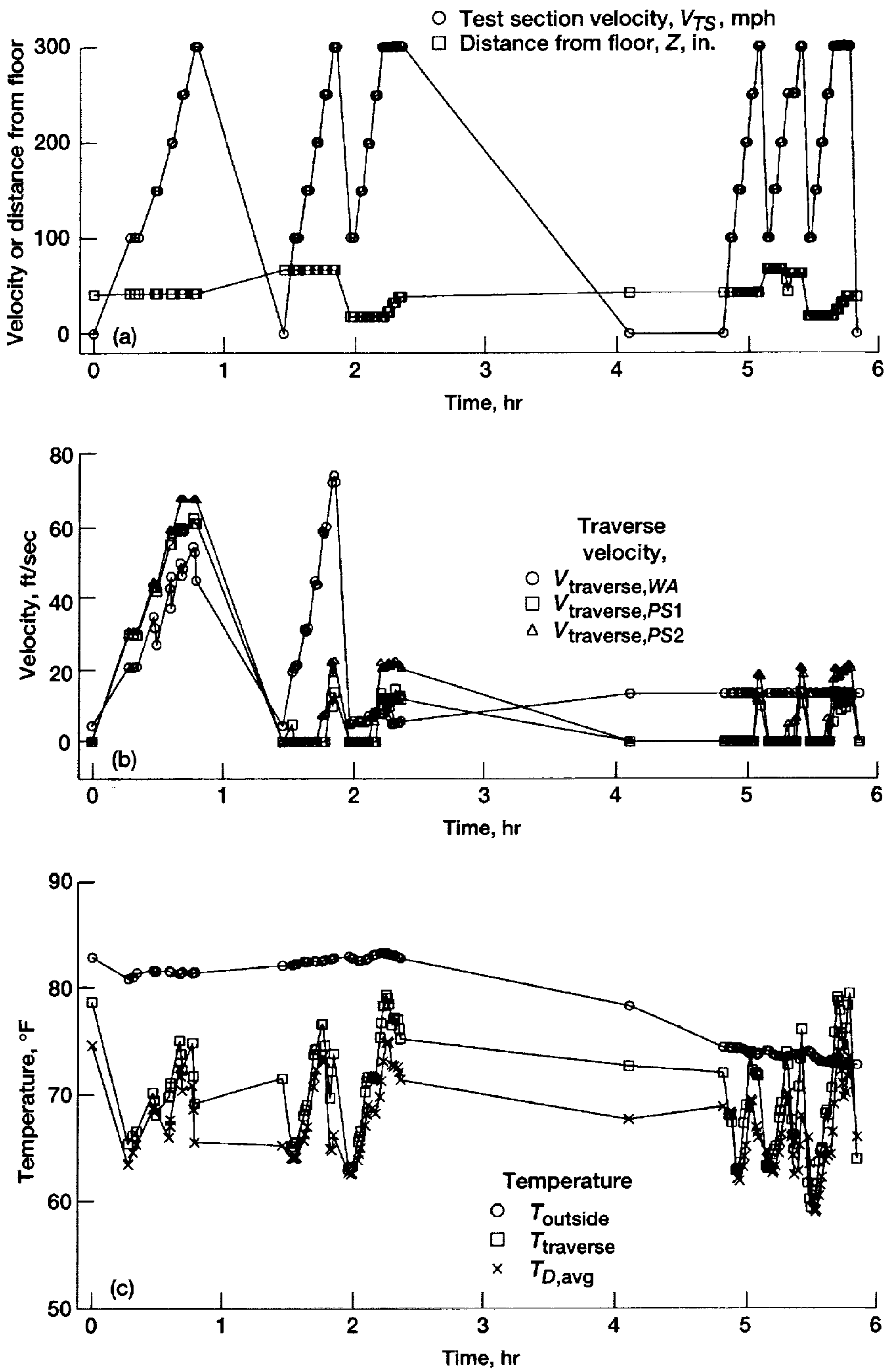


Figure 106.—Time histories. (a) Test section velocity, V_{TS}, and cable traverse position, Z. (b) Air velocity measured by the wind anemometer and the two traverse pitot-static probes. (c) Outside air temperature, cable traverse temperature, and corner D average temperature.

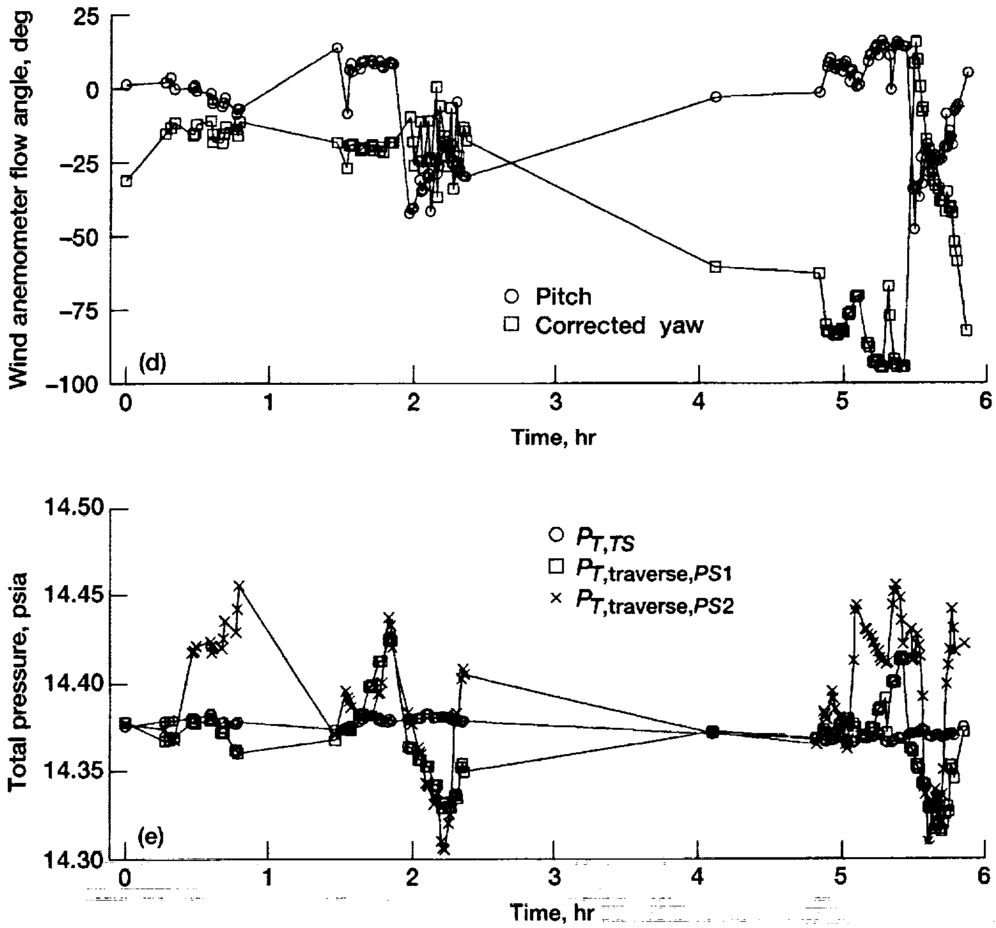


Figure 106.—Concluded. (d) Wind anemometer pitch and corrected yaw angle. (e) Total pressure measured in the test section and by the two traverse pitot-static probes.

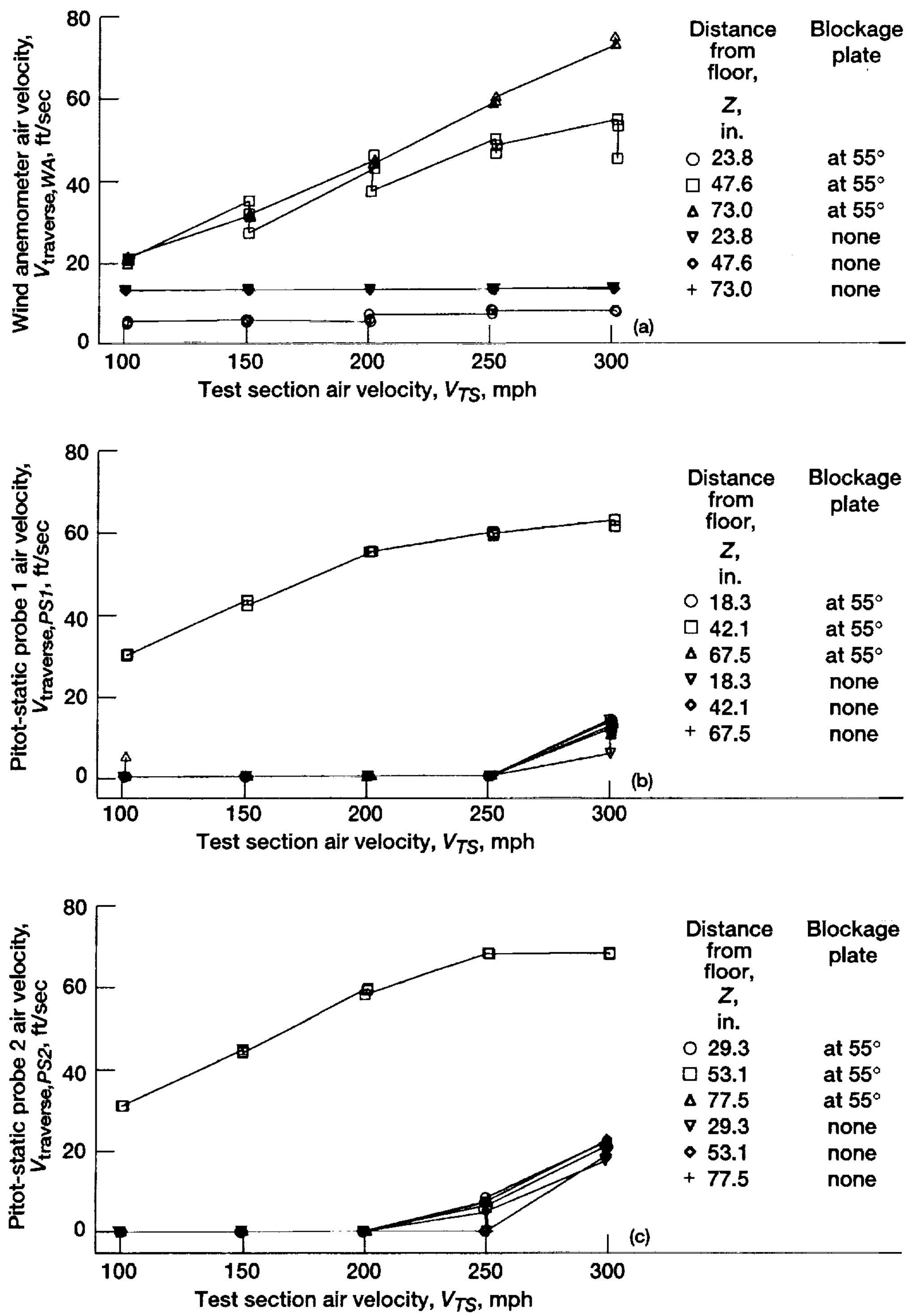


Figure 107.—Traverse air velocities downstream of the Icing Research Tunnel fan. (a) Measured by the wind anemometer. (b) Measured by pitot-static probe 1. (c) Measured by pitot-static probe 2.

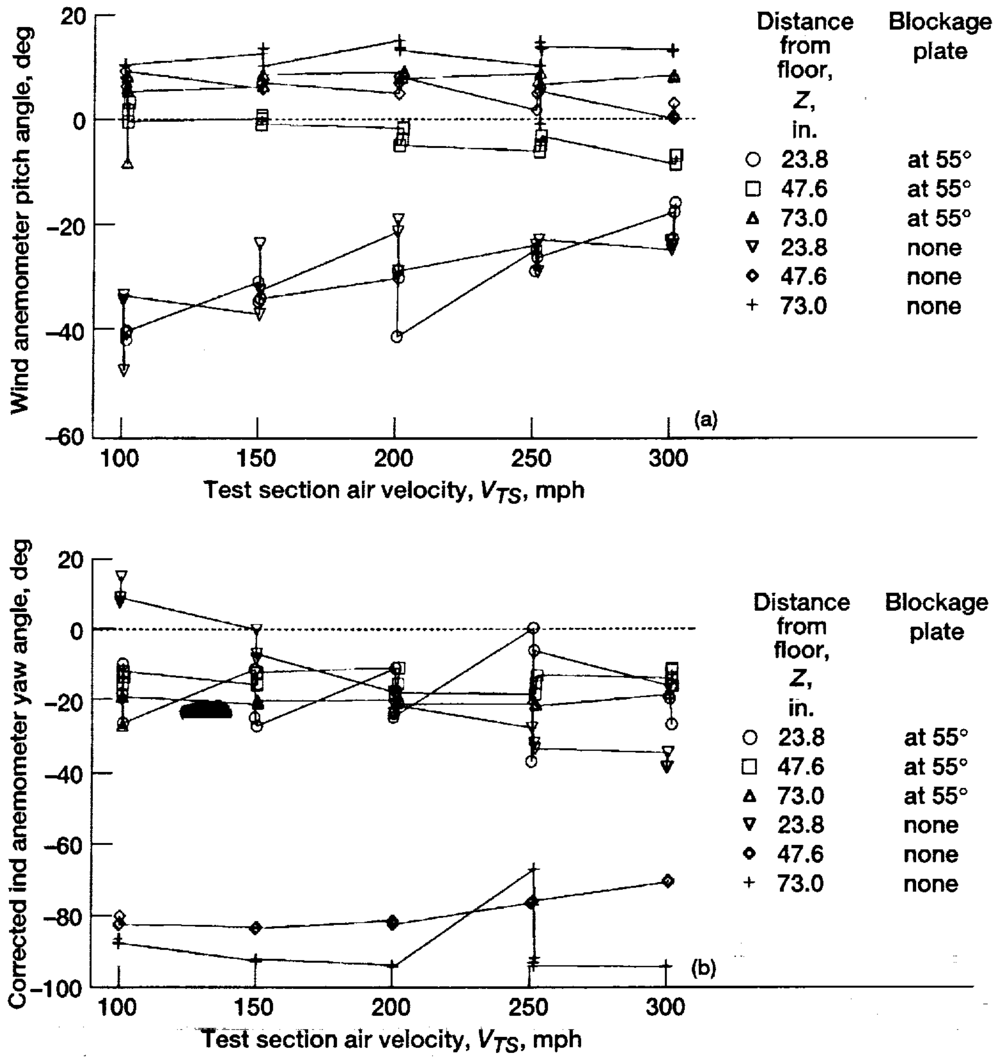


Figure 108.—Flow angles measured by the traverse wind anemometer downstream of the Icing Research Tunnel fan. (a) Pitch. (b) Corrected yaw.

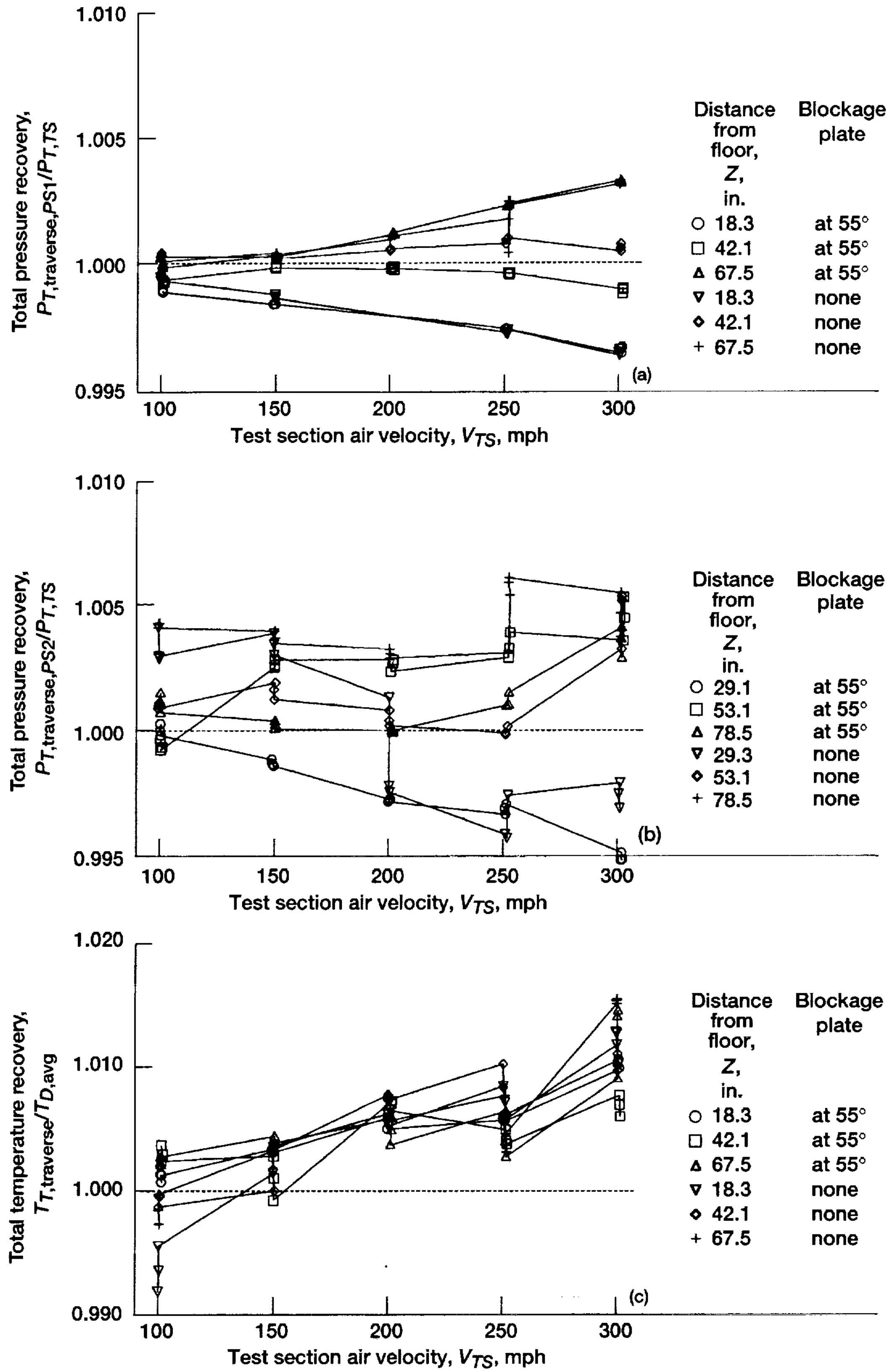


Figure 109.—Flow recoveries measured by traverse probe downstream of the Icing Research Tunnel fan. (a) Total pressure from pitot-static probe 1. (b) Total pressure from pitot-static probe 2. (c) Total temperature from thermocouple probe.

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13. ABSTRACT ***(Maximum 200 words)***
The purpose of conducting the flow-field surveys described in this report was to more fully document the flow quality in several areas of the tunnel circuit in the NASA Glenn Research Center Icing Research Tunnel. The results from these surveys provide insight into areas of the tunnel that were known to exhibit poor flow quality characteristics and provide data that will be useful to the design of flow quality improvements and a new heat exchanger for the facility. An instrumented traversing mechanism was used to survey the flow field at several large cross sections of the tunnel loop over the entire speed range of the facility. Flow-field data were collected at five stations in the tunnel loop, including downstream of the fan drive motor housing, upstream and downstream of the heat exchanger, and upstream and downstream of the spraybars located in the settling chamber upstream of the test section. The data collected during these surveys greatly expanded the data base describing the flow quality in each of these areas. The new data matched closely the flow quality trends recorded from earlier tests. Data collected downstream of the heat exchanger and in the settling chamber showed how the configuration of the folded heat exchanger affected the pressure, velocity, and flow angle distributions in these areas. Smoke flow visualization was also used to qualitatively study the flow field in an area downstream of the drive fan and in the settling chamber/contraction section.

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