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# RESEARCH MEMORANDUM

## ALTITUDE-WIND-TUNNEL INVESTIGATION OF COMPRESSOR PERFORMANCE ON J47 TURBOJET ENGINE

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NATIONAL ADVISORY COMMITTEE
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# ALTITUDE-WIND-TUNNEL INVESTIGATION OF COMPRESSOR PERFORMANCE ON J47 TURBOJET ENGINE

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## SUMMARY

An investigation has been conducted in the NACA Lewis altitude wind tunnel to determine the performance of a 12-stage axial-flow compressor operating as an integral part of the turbojet engine. Compressor-performance data were obtained while the turbojet engine was run over its full operable range of engine speeds at various simulated altitudes and flight Mach numbers. The use of three different exhaust-nozzle-outlet areas extended the range of compressor operation.

Increases in altitude from 5000 to 50,000 feet resulted in a decrease in compressor efficiency at all corrected air flows. The loss of compressor efficiency with increasing altitude is largely attributed to the effect of Reynolds number on compressor performance. The compressor operating lines shifted toward the high air-flow side of the region of peak efficiency as the altitude was increased. The maximum compressor efficiency obtained was approximately 87 percent and occurred at an altitude of 5000 feet and a corrected air flow of 80 pounds per second, which corresponds to a corrected engine speed of about 6300 rpm and a compressor pressure ratio of 3.5.

The velocity profile at the compressor outlet was symmetrical and was unaffected in general by variations in altitude, flight Mach number, exhaust-nozzle-outlet area, or engine speed.

## INTRODUCTION

An investigation of a turbojet engine having a thrust rating of 5000 pounds at static sea-level conditions has been conducted in the NACA Lewis altitude wind tunnel. The over-all engine performance is summarized in reference 1.

[redacted]

The performance of a 12-stage axial-flow compressor operating as an integral part of the turbojet engine is reported herein. The range of operation of a compressor functioning as a component of a turbojet engine is restricted by the characteristics of the other components. Three exhaust-nozzle-outlet areas were therefore used in this investigation in order to extend the range of operation of the compressor. The engine was operated with each exhaust nozzle over a range of simulated flight conditions covering altitudes from 5000 to 50,000 feet and flight Mach numbers from 0.20 to 0.97. At each simulated flight condition, the engine was run over the full operable range of speed.

The effects of variations in altitude, flight Mach number, and exhaust-nozzle-outlet area on the compressor performance characteristics are graphically presented. A complete tabulation of the compressor performance data is also presented.

## APPARATUS AND INSTRUMENTATION

### Engine

The J47 turbojet engine used in this investigation (fig. 1) has a sea-level static rating of 5000 pounds thrust at an engine speed of 7900 rpm and a turbine-outlet temperature of 1735° R (1275° F). The main components of the standard engine include a 12-stage axial-flow compressor, eight cylindrical direct-flow combustors, a single-stage impulse turbine, a tail pipe, and a fixed-area exhaust nozzle. The standard exhaust nozzle used in this investigation has an outlet area of 280 square inches.

### Compressor

The compressor has approximately a flow capacity of 94 pounds of air per second and a compressor pressure ratio of 5.1 when the engine is operating at rated sea-level conditions.

Air enters the engine through an annular inlet duct around the accessory housing and passes into the compressor through a single row of inlet guide vanes. The air is discharged from the compressor through two rows of guide vanes into the combustion chambers. Small amounts of air are extracted from the eighth and twelfth stages of the compressor to cool the turbine rotor and to balance the axial thrust of the compressor rotor.

A seal is provided on the rotor at the twelfth rotor stage of the compressor and restricts the leakage flow to about $1\frac{1}{2}$ pounds of air per second at rated sea-level conditions.

1175 The length of the 12-stage compressor rotor (fig. 2) from the front face of the first-stage rotor disk to the rear face of the twelfth-stage rotor disk is approximately 27.7 inches and the blading has a constant outside diameter of 28.9 inches. The compressor stator is the split-casing type (fig. 3).

## Installation

The engine was mounted on a wing section that spanned the 20-foot-diameter test section of the altitude wind tunnel (fig. 1). Compressor-inlet total pressures consistent with flight at high speeds were obtained by introducing dry refrigerated air from the tunnel make-up air system through a duct to the engine inlet. This air was throttled from approximately sea-level pressure to the desired pressure at the engine inlet while the static pressure in the tunnel test section was reduced to simulate the desired altitude. Inlet-air temperatures below -20° F, corresponding to high altitude and low flight Mach number, were not obtained. The inlet-air duct was connected to the engine by means of a frictionless slip joint, which permitted installation drag and engine thrust to be measured by the tunnel balance scales.

Three exhaust nozzles were used with the engine installation. The range of nozzle areas was limited from a minimum area fixed by maximum allowable turbine-outlet temperature at rated engine speed to a maximum area limited by the tail-pipe outlet area. The largest exhaust nozzle (342 sq in.) consisted of a straight pipe section 4-inches long clamped to the outlet of the standard tail pipe. The other two exhaust nozzles were uniformly tapered sections having lengths of 18 inches for the standard 280-square-inch nozzle and 12 inches for the 302-square-inch nozzle. These two nozzles were attached directly to the 4-inch straight-pipe section.

## Instrumentation

Pressures and temperatures were measured by instrumentation installed at several stations throughout the engine (fig. 4). Compressor-rotor-stage static pressures were measured by wall orifices located midway between the rows of stator blades. The location of instrumentation for stations 1, 2, and 3 is shown in figures 5, 6, and 7, respectively.

## SYMBOLS

The following symbols are used in the calculations:

$A$ area, square feet 1175

$a$ stagnation speed of sound in air, feet per second

$c_p$ specific heat at constant pressure, Btu per pound per °R

$D$ compressor rotor-blade-tip diameter, feet

$g$ acceleration due to gravity, 32.2 feet per second per second

$H$ total enthalpy, Btu per second

$M$ Mach number

$N$ engine speed, rpm

$P$ total pressure, pounds per square foot absolute

$p$ static pressure, pounds per square foot absolute

$R$ gas constant for air, 53.4 foot-pounds per pound per °F

$T$ total temperature, °R

$T_i$ indicated temperature, °R

$t$ static temperature, °R

$U$ rotor-tip speed, feet per second

$V$ velocity, feet per second

$W_a$ air flow, pounds per second

$\gamma$ ratio of specific heat at constant pressure to specific heat at constant volume

$\delta_1$ ratio of absolute total pressure at engine inlet to absolute static pressure at NACA standard atmospheric sea-level conditions

$\theta_1$ ratio of absolute total temperature at engine inlet to absolute static temperature at NACA standard atmospheric sea-level conditions

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$\eta_c$ compressor efficiency, percent

Subscripts:

c compressor

0 free-stream conditions

1 engine inlet

2 compressor inlet

2a compressor stages

3 compressor outlet

The stations to which the numerical subscripts refer are shown in figure 4.

Generalizing parameters:

$N/\sqrt{\theta_1}$ corrected engine speed, rpm

$W_a(\sqrt{\theta_1}/\delta_1)$ corrected air flow, pounds per second

## METHODS OF CALCULATION

In the calculation of desired parameters, arithmetic average values of temperature and pressure were used.

Flight Mach number. - Flight Mach number was calculated from the measured ram pressure ratio by the following relation, in which complete ram-pressure recovery at the engine inlet was assumed:

$$M_0 = \sqrt{\frac{2}{\gamma-1}\left[\left(\frac{P_1}{p_0}\right)^{\frac{\gamma-1}{\gamma}} -1\right]} \tag{1}$$

Temperatures. - Static temperatures were determined from indicated temperatures with the following relation:

$$t = \frac{T_1}{1 + 0.85\left[\left(\frac{P}{p}\right)^{\frac{\gamma-1}{\gamma}} - 1\right]} \tag{2}$$

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Air flow. - Air flow through the compressor was calculated from pressures and temperatures measured at the engine inlet, station 1, by the equation

$$W_{a,1} = p_1 A_1 \sqrt{\frac{2\gamma g}{(\gamma-1)Rt_1}\left[\left(\frac{P_1}{p_1}\right)^{\frac{\gamma-1}{\gamma}} - 1\right]} \tag{3}$$

Air-flow values obtained from measurements at the engine-inlet station agreed within approximately 1 percent with those obtained from measurements at the exhaust nozzle.

Compressor efficiency. - Compressor efficiency was calculated in the following manner: The ideal total temperature $T_3'$, which is the temperature the air would attain by an isentropic compression, is

$$T_3' = T_1 \left(\frac{P_3}{P_1}\right)^{\frac{\gamma-1}{\gamma}}$$

The actual total temperature of the air $T_3$ is higher than $T_3'$ because of losses in the compressor. These temperatures are related by the adiabatic efficiency, which is defined as

$$\eta_c = \frac{\Delta H_{ideal}}{\Delta H_{actual}}$$

$$= \frac{W_a c_p \,(T_3' - T_1)}{W_a c_p \,(T_3 - T_1)}$$

or substituting to eliminate $T_3'$ gives

$$\eta_c = \frac{\left(\frac{P_3}{P_1}\right)^{\frac{\gamma-1}{\gamma}} - 1}{\frac{T_3}{T_1} - 1} \tag{4}$$

Compressor Mach number. - Compressor Mach number is defined as the ratio of the tip speed of the compressor rotor blade to the velocity of sound in air at the total temperature of the engine-inlet air. The equation used is

$$M_c = \frac{U}{a_1} = \frac{\pi DN}{60\sqrt{\gamma gRT_1}} \tag{5}$$

Compressor-outlet velocity. - Compressor-outlet velocity was determined by the equation

$$V_3 = \sqrt{\frac{2\gamma}{\gamma-1} gRt_3 \left[\left(\frac{P_3}{p_3}\right)^{\frac{\gamma-1}{\gamma}} - 1\right]} \tag{6}$$

where $P_3$ is the average of the total pressures measured at each radial station. Average static pressures and static temperatures were used in equation (6).

## RESULTS AND DISCUSSION

### Method of Presentation

Compressor-performance data have been generalized to standard sea-level conditions by the use of correction factors $\delta_1$ and $\theta_1$.

A compressor operating line was obtained for each combination of altitude, flight Mach number, and exhaust-nozzle-outlet area. Three forms of the operating line are presented: (1) relation of compressor pressure ratio to corrected engine speed, (2) relation of corrected air flow to corrected engine speed, and (3) relation of compressor pressure ratio to corrected air flow. The characteristics of the compressor are shown by contours of constant efficiency and lines of constant corrected engine speed presented on plots of compressor pressure ratio as a function of corrected air flow. Data are presented to show the effect of altitude, flight Mach number, exhaust-nozzle-outlet area, and corrected engine speed on the velocity profiles at the compressor outlet and rotor-stage static-pressure ratios. A complete tabulation of compressor-performance data is presented in table I.

## Compressor Operating Lines

Effect of altitude. - The effect of altitude on the compressor operating lines is shown in figure 8. At corrected engine speeds below 6000 rpm, the operating lines showing the relation of compressor pressure ratio to corrected engine speed generalized to a single curve (fig. 8(a)). Above 6000 rpm, an increase in altitude caused a shift in the operating line to higher pressure ratios such that at 7900 rpm an increase in altitude from 5000 to 50,000 feet resulted in a 3-percent increase in pressure ratio. This increase in pressure ratio at a constant corrected engine speed is a result of the decrease in compressor efficiency with increasing altitude largely due to the effect of Reynolds number on compressor performance. The operating lines showing the relation of corrected air flow to corrected engine speed shifted toward lower air flows with increasing altitude over the entire range of engine speeds (fig. 8(b)). The decrease in corrected air flow amounts to 3.5 percent at a corrected engine speed of 7900 rpm for an increase in altitude from 5000 to 50,000 feet; this loss in weight flow is likewise attributed to the Reynolds number effect on the compressor with increase in altitude. The characteristic shape of the air-flow curve (fig. 8(b)) as the engine approaches rated speed is a result of the air flow at the compressor inlet reaching a choked condition and thereby limiting the flow through the engine. The effect of altitude on the relation of compressor pressure ratio to corrected air flow is shown in figure 8(c).

Effect of flight Mach number. - The compressor pressure ratio decreased with an increase in flight Mach number (fig. 9(a)), the greatest shift taking place at corrected engine speeds below 6500 rpm. In general, increases in flight Mach number slightly increased the corrected air flow at all corrected engine speeds (fig. 9(b)). A change in flight Mach number from 0.20 to 0.97 at a corrected engine speed of 7900 rpm raised the corrected air flow approximately $1\frac{1}{2}$ pounds. A trend similar to that in figure 9(a) can be observed for the operating line based on corrected air flow (fig. 9(c)).

Effect of exhaust-nozzle-outlet area. - An increase in exhaust-nozzle-outlet area caused a drop in the compressor pressure ratio at any constant corrected engine speed (fig. 10(a)); however, no significant change in corrected air flow occurred for any given corrected engine speed over the range of nozzles investigated (fig. 10(b)). Increasing the exhaust-nozzle-outlet area resulted in a decrease in compressor pressure ratio at any constant corrected air flow (fig. 10(c)).

## Compressor Efficiency

Effect of altitude. - An increase in altitude caused a decrease in compressor efficiency at all corrected air flows (fig. 11(a)). At rated engine speed of 7900 rpm, an increase in altitude from 5000 to 50,000 feet decreased the compressor efficiency from 79 to 72 percent. This loss of efficiency with increasing altitude is largely attributed to the Reynolds number effect on compressor performance (reference 2).

Effect of flight Mach number. - At constant corrected air flows less than 70 pounds per second, an increase in flight Mach number resulted in a loss of compressor efficiency (fig. 11(b)). Above a corrected air flow of 90 pounds per second, an increase in flight Mach number at constant corrected air flow indicated an increase in compressor efficiency.

Effect of exhaust-nozzle-outlet area. - The effect of nozzle area on compressor efficiency is shown for altitudes of 5000, 25,000, and 45,000 feet at a flight Mach number of 0.20 in figures 11(c), 11(d), and 11(e), respectively. At an altitude of 5000 feet, the medium nozzle area of 302 square inches gave the highest compressor efficiencies below a corrected air flow of 90 pounds per second (fig. 11(c)). At corrected air flows greater than 90 pounds per second, an increase in nozzle area resulted in a drop in compressor efficiency. The general trend was the same at 25,000 feet except that the reversal of the order of the efficiency curves occurred at a corrected air flow of approximately 80 pounds per second (fig. 11(d)). At 45,000 feet, the standard 280-square-inch nozzle area gave the highest compressor efficiencies for all corrected air flows; and, at a constant corrected air flow, any increase in nozzle area caused a drop in compressor efficiency (fig. 11(e)).

In general, the change in efficiency between corrected air flows of 60 and 90 pounds per second was relatively small for all the conditions investigated, which gives the compressor a wide range of operation at close to maximum efficiency (fig. 11).

## Characteristic Curves

Compressor-performance characteristics for three altitudes of 5000, 25,000, and 45,000 feet at a flight Mach number of 0.20 are presented in figures 12 and 13. These cross plots were constructed using figures 8 and 11 and comparable curves of the data for the other two nozzle configurations. Inasmuch as the range in compressor pressure ratio was small, because of the limited nozzle-area variation, only the operating line for the standard nozzle has been superimposed on figures 12 and 13. The length of the constant speed lines is indicative of the range of operation of the compressor with the nozzle-area variation used in this investigation. At a given compressor presssure ratio and a given corrected engine speed, an increase in altitude resulted in a decrease in corrected air flow (fig. 12). The operating lines and the lines indicating regions of maximum efficiency shift to higher compressor pressure ratios and lower corrected air flows with an increase in altitude. The shift of the region of maximum efficiency is greater, which results in the compressor operating lines shifting toward the high air-flow side of the region of maximum efficiency (fig. 12). The maximum compressor efficiency was approximately 87 percent and occurred at a corrected air flow of 80 pounds per second and an altitude of 5000 feet (fig. 13(a)). This maximum efficiency occurred at a compressor pressure ratio of approximately 3.5 and at a corrected engine speed of about 6300 rpm. A change in altitude from 5000 to 45,000 feet caused a decrease in maximum compressor efficiency for the range of nozzle areas investigated from 87 to about 80 percent (fig. 13).

The velocity profile at the compressor outlet (fig. 14) was symmetrical with no indication of reversal of flow at the blade roots. The data showed no general effect on the velocity profile or average velocities with variations in altitude (fig. 14(a)), flight Mach number (fig. 14(b)), exhaust-nozzle-outlet area (fig. 14(c)), or corrected engine speed (fig. 14(d)).

The compressor-rotor-stage static-pressure-ratio profiles for variations in altitude, flight Mach number, exhaust-nozzle-outlet area, and corrected engine speed are presented in figure 15.

## SUMMARY OF RESULTS

From an investigation of a turbojet engine in the NACA Lewis altitude wind tunnel over a range of simulated altitudes and flight Mach numbers, the following results relating to the performance of the compressor were obtained:

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1. Increases in altitude from 5000 to 50,000 feet resulted in a decrease in compressor efficiency at all corrected air flows. The loss of compressor efficiency with increasing altitude is largely attributed to the Reynolds number effect on compressor performance.

2. The change in efficiency between corrected air flows of 60 and 90 pounds per second is relatively small for all conditions investigated; as a result, the compressor may be operated over a wide range of engine speeds at close to maximum efficiency.

3. The compressor operating lines shifted toward the high air-flow side of the region of peak efficiency as the altitude was increased.

4. The maximum compressor efficiency obtained was approximately 87 percent and occurred at an altitude of 5000 feet and a corrected air flow of 80 pounds per second, which corresponds to a corrected engine speed of about 6300 rpm and a compressor pressure ratio of 3.5.

5. The velocity profile at the compressor outlet was symmetrical and was unaffected in general by variations in altitude, flight Mach number, exhaust-nozzle-outlet area, or engine speed.

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## REFERENCES

1. Conrad, E. William, and Sobolewski, Adam E.: Altitude-Wind-Tunnel Investigation of J47 Turbojet-Engine Performance. NACA RM E9G09.

2. Wallner, Lewis E., and Fleming, William A.: Reynolds Number Effect on Axial-Flow Compressor Performance. NACA RM E9G11.

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TABLE I - COMPRESSOR PERFORMANCE

| Run | Altitude (ft) | Exhaust-nozzle-outlet area, (sq in.) | Flight Mach number, $M_0$ | Ram pressure ratio, $P_1/p_0$ | Engine speed, N (rpm) | Tunnel static pressure, $p_0$ (lb/sq ft abs.) | Engine-inlet total temperature, $T_1$ (°R) | Engine-inlet total pressure, $P_1$ (lb/sq ft abs.) | Engine-inlet static pressure, $p_1$ (lb/sq ft abs.) | Compressor-inlet total pressure, $P_2$ (lb/sq ft abs.) | Compressor-inlet static pressure, $p_2$ (lb/sq ft abs.) | Compressor-rotor-stage static pressure, $p_{2a}$ (lb/sq ft abs.) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 |
| 1 | 5,000 | 280 | 0.230 | 1.038 | 7895 | 1740 | 512 | 1806 | 1618 | 1790 | 1411 | ---- | 1254 | 1480 | 1733 | 2113 | 2507 |
| 2 | 5,000 | 280 | .225 | 1.037 | 7692 | 1756 | 514 | 1821 | 1634 | 1803 | 1429 | 1094 | 1320 | 1552 | 1833 | 2200 | 2594 |
| 3 | 5,000 | 280 | .230 | 1.039 | 7500 | 1740 | 512 | 1808 | 1624 | 1784 | 1425 | 1128 | 1346 | 1606 | 1895 | 2261 | 2648 |
| 4 | 5,000 | 280 | .220 | 1.036 | 6993 | 1742 | 513 | 1805 | 1638 | 1788 | 1469 | 1291 | 1538 | 1812 | 2115 | 2488 | 2861 |
| 5 | 5,000 | 280 | .215 | 1.034 | 6459 | 1742 | 512 | 1802 | 1666 | ---- | 1538 | 1446 | 1707 | 1981 | 2263 | 2615 | 2953 |
| 6 | 5,000 | 280 | .210 | 1.033 | 5944 | 1744 | 511 | 1802 | 1692 | 1800 | 1605 | 1575 | 1807 | 2054 | 2314 | 2610 | 2920 |
| 7 | 5,000 | 280 | .210 | 1.033 | 5024 | 1740 | 510 | 1797 | 1737 | 1800 | 1689 | 1705 | 1888 | 2064 | 2247 | 2444 | 2669 |
| 8 | 5,000 | 280 | .215 | 1.034 | 4091 | 1749 | 509 | 1809 | 1779 | 1810 | 1755 | 1763 | 1890 | 1988 | 2101 | 2235 | 2361 |
| 9 | 5,000 | 280 | .210 | 1.032 | 3147 | 1745 | 509 | 1800 | 1785 | 1806 | 1774 | 1780 | 1844 | 1907 | 1963 | 2041 | 2118 |
| 10 | 5,000 | 280 | .210 | 1.032 | 2046 | 1738 | 509 | 1793 | 1786 | 1800 | 1782 | 1787 | 1815 | 1830 | 1858 | 1893 | 1921 |
| 11 | 5,000 | 302 | .220 | 1.036 | 7895 | 1740 | 496 | 1802 | 1616 | 1783 | 1405 | 1085 | 1247 | 1444 | 1677 | 2008 | 2352 |
| 12 | 5,000 | 302 | .215 | 1.033 | 7692 | 1745 | 497 | 1803 | 1617 | 1785 | 1410 | ---- | 1266 | 1492 | 1745 | 2083 | 2428 |
| 13 | 5,000 | 302 | .220 | 1.036 | 7500 | 1753 | 498 | 1816 | 1632 | 1792 | 1428 | ---- | 1331 | 1563 | 1683 | 2189 | 2541 |
| 14 | 5,000 | 302 | .215 | 1.033 | 6993 | 1747 | 499 | 1804 | 1634 | 1787 | 1456 | 1247 | 1487 | 1754 | 2050 | 2402 | 2768 |
| 15 | 5,000 | 302 | .206 | 1.030 | 6459 | 1745 | 501 | 1798 | 1655 | 1789 | 1521 | 1407 | 1653 | 1928 | 2217 | 2562 | 2907 |
| 16 | 5,000 | 302 | .206 | 1.030 | 5944 | 1745 | 501 | 1797 | 1687 | 1795 | 1588 | 1548 | 1787 | 2034 | 2294 | 2604 | 2914 |
| 17 | 5,000 | 302 | .206 | 1.030 | 5024 | 1754 | 501 | 1806 | 1743 | 1814 | 1692 | 1712 | 1895 | 2078 | 2275 | 2479 | 2704 |
| 18 | 5,000 | 302 | .198 | 1.029 | 4091 | 1748 | 499 | 1798 | 1764 | 1810 | 1740 | 1748 | 1875 | 1980 | 2100 | 2241 | 2375 |
| 19 | 5,000 | 302 | .196 | 1.028 | 3147 | 1745 | 498 | 1793 | 1777 | 1812 | 1766 | 1773 | 1837 | 1900 | 1963 | 2048 | 2118 |
| 20 | 5,000 | 302 | .198 | 1.029 | 2046 | 1748 | 497 | 1798 | 1792 | 1817 | 1786 | 1797 | 1818 | 1840 | 1868 | 1903 | 1931 |
| 21 | 5,000 | 342 | .215 | 1.034 | 7895 | 1752 | 495 | 1812 | 1626 | 1768 | 1416 | 1069 | 1259 | 1456 | 1675 | 2005 | 2329 |
| 22 | 5,000 | 342 | .210 | 1.032 | 7692 | 1745 | 496 | 1801 | 1618 | 1757 | 1406 | 1041 | 1259 | 1470 | 1717 | 2055 | 2379 |
| 23 | 5,000 | 342 | .210 | 1.030 | 7500 | 1747 | 496 | 1800 | 1619 | 1759 | 1417 | ---- | ---- | ---- | ---- | ---- | ---- |
| 24 | 5,000 | 342 | .210 | 1.030 | 6993 | 1753 | 498 | 1806 | 1638 | 1768 | 1460 | 1253 | 1485 | 1753 | 2035 | 2394 | 2739 |
| 25 | 5,000 | 342 | .195 | 1.027 | 6459 | 1753 | 497 | 1801 | 1660 | 1768 | 1523 | 1401 | 1661 | 1922 | 2211 | 2541 | 2879 |
| 26 | 5,000 | 342 | .210 | 1.030 | 5944 | 1741 | 497 | 1793 | 1682 | 1765 | 1581 | 1523 | 1769 | 2016 | 2269 | 2586 | 2881 |
| 27 | 5,000 | 342 | .200 | 1.029 | 5024 | 1753 | 497 | 1803 | 1740 | 1785 | 1688 | 1704 | 1894 | 2070 | 2267 | 2478 | 2703 |
| 28 | 5,000 | 342 | .200 | 1.029 | 4091 | 1744 | 498 | 1795 | 1762 | 1781 | 1737 | 1751 | 1878 | 1983 | 2103 | 2344 | 2378 |
| 29 | 5,000 | 342 | .200 | 1.029 | 3147 | 1744 | 496 | 1795 | 1780 | 1785 | 1768 | 1765 | 1843 | 1892 | 1969 | 2047 | 2117 |
| 30 | 5,000 | 342 | .200 | 1.029 | 2046 | 1742 | 495 | 1793 | 1787 | 1784 | 1783 | 1784 | 1812 | 1834 | 1862 | 1897 | 1918 |
| 38 | 15,000 | 302 | .220 | 1.035 | 7895 | 1186 | 478 | 1228 | 1102 | 1218 | 955 | 686 | 848 | 982 | 1123 | 1341 | 1580 |
| 39 | 15,000 | 302 | .215 | 1.034 | 7692 | 1186 | 478 | 1226 | 1101 | 1217 | 956 | 693 | 855 | 989 | 1151 | 1376 | 1608 |
| 40 | 15,000 | 302 | .215 | 1.034 | 7500 | 1190 | 476 | 1230 | 1107 | 1201 | 964 | 718 | 873 | 1028 | 1190 | 1429 | 1662 |
| 41 | 15,000 | 302 | .210 | 1.033 | 6993 | 1191 | 476 | 1230 | 1112 | 1223 | 981 | 804 | 966 | 1149 | 1339 | 1578 | 1818 |
| 42 | 15,000 | 302 | .205 | 1.030 | 6459 | 1189 | 475 | 1225 | 1124 | 1224 | 1022 | 929 | 1097 | 1281 | 1478 | 1717 | 1956 |
| 43 | 15,000 | 302 | .198 | 1.029 | 5944 | 1190 | 474 | 1225 | 1144 | 1229 | 1082 | 1028 | 1204 | 1373 | 1556 | 1774 | 1993 |
| 44 | 15,000 | 302 | .197 | 1.028 | 5024 | 1188 | 475 | 1221 | 1176 | 1234 | 1138 | 1153 | 1287 | 1413 | 1547 | 1695 | 1850 |
| 45 | 15,000 | 302 | .198 | 1.029 | 4091 | 1186 | 470 | 1220 | 1197 | 1238 | 1178 | 1193 | 1285 | 1355 | 1446 | 1545 | 1637 |
| 46 | 15,000 | 302 | .205 | 1.030 | 3147 | 1183 | 472 | 1218 | 1206 | 1237 | 1198 | 1204 | 1253 | 1296 | 1338 | 1394 | 1451 |
| 47 | 15,000 | 342 | .210 | 1.033 | 7895 | 1183 | 475 | 1222 | 1097 | 1190 | 951 | 669 | 838 | 965 | 1106 | 1310 | 1542 |
| 48 | 15,000 | 342 | .210 | 1.033 | 7692 | 1187 | 477 | 1226 | 1103 | 1195 | 957 | 694 | 863 | 997 | 1152 | 1363 | 1595 |
| 49 | 15,000 | 342 | .210 | 1.033 | 7500 | 1193 | 478 | 1232 | 1110 | 1202 | 966 | 721 | 883 | 1031 | 1200 | 1425 | 1658 |
| 50 | 15,000 | 342 | .205 | 1.030 | 6993 | 1190 | 472 | 1226 | 1109 | 1198 | 979 | 810 | 972 | 1141 | 1331 | 1570 | 1802 |
| 51 | 15,000 | 342 | .200 | 1.029 | 6459 | 1187 | 479 | 1221 | 1121 | 1197 | 1019 | 927 | 1103 | 1279 | 1469 | 1701 | 1933 |
| 52 | 15,000 | 342 | .198 | 1.028 | 5944 | 1188 | 479 | 1221 | 1143 | 1203 | 1069 | 1026 | 1195 | 1371 | 1547 | 1758 | 1969 |
| 53 | 15,000 | 342 | .198 | 1.028 | 5024 | 1188 | 481 | 1221 | 1176 | 1209 | 1137 | 1146 | 1272 | 1406 | 1533 | 1681 | 1836 |
| 54 | 15,000 | 342 | .200 | 1.029 | 4091 | 1190 | 479 | 1224 | 1202 | 1217 | 1183 | 1190 | 1274 | 1359 | 1443 | 1542 | 1634 |
| 55 | 15,000 | 342 | .200 | 1.029 | 3147 | 1190 | 478 | 1225 | 1213 | 1220 | 1205 | 1218 | 1267 | 1303 | 1352 | 1408 | 1465 |
| 56 | 15,000 | 342 | .200 | 1.029 | 2046 | 1186 | 477 | 1220 | 1215 | 1217 | 1212 | 1214 | 1235 | 1256 | 1270 | 1292 | 1313 |
| 57 | 25,000 | 280 | .225 | 1.037 | 7692 | 777 | 452 | 806 | 723 | 793 | 626 | 460 | 559 | 657 | 749 | 960 | 1115 |
| 58 | 25,000 | 280 | .225 | 1.037 | 7500 | 774 | 455 | 803 | 721 | 791 | 626 | 471 | 570 | 661 | 760 | 943 | 1105 |
| 59 | 25,000 | 280 | .220 | 1.036 | 6993 | 777 | 456 | 805 | 726 | 793 | 636 | 524 | 622 | 742 | 869 | 1030 | 1199 |
| 60 | 25,000 | 280 | .210 | 1.033 | 6459 | 779 | 455 | 805 | 735 | 794 | 662 | 596 | 709 | 828 | 962 | 1124 | 1293 |
| 61 | 25,000 | 280 | .210 | 1.033 | 5944 | 778 | 456 | 804 | 748 | 793 | 695 | 658 | 778 | 898 | 1024 | 1165 | 1320 |
| 62 | 25,000 | 280 | .205 | 1.031 | 5024 | 778 | 455 | 802 | 770 | 795 | 744 | 750 | 841 | 933 | 1024 | 1123 | 1229 |
| 63 | 25,000 | 280 | .205 | 1.030 | 4091 | 777 | 456 | 800 | 783 | 796 | 771 | 784 | 840 | 890 | 947 | 1016 | 1087 |
| 64 | 25,000 | 280 | .205 | 1.030 | 3147 | 774 | 456 | 797 | 789 | 793 | 784 | 788 | 823 | 844 | 873 | 915 | 950 |

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DATA FOR TURBOJET ENGINE

| Compressor-rotor-stage static pressure, $p_{2a}$ (lb/sq ft abs.) | | | | | | Straightening-vane static pressure, $p_{2a}$ (lb/sq ft abs.) | Compressor-outlet total temperature, $T_3$ (°R) | Compressor-outlet total pressure, $P_3$ (lb/sq ft abs.) | Compressor-outlet static pressure, $p_3$ (lb/sq ft abs.) | Compressor pressure ratio, $P_3/P_1$ | Corrected engine speed, $N/\sqrt{\theta_1}$, (rpm) | Compressor Mach number, $M_0$ | Air flow, $W_{a,1}$ (lb/sec) | Corrected air flow, $W_{a,1}\sqrt{\theta_1}/\delta_1$, (lb/sec) | Compressor efficiency, $\eta_c$, (percent) | Run |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | 8 | 9 | 10 | 11 | 12 | | | | | | | | | | | |
| 3035 | 3859 | 4711 | 5950 | 6879 | 7872 | 8808 | 902 | 9339 | 9066 | 5.171 | 7950 | 0.896 | 81.08 | 94.37 | 78.8 | 1 |
| 3058 | 3847 | 4586 | 5755 | 6585 | 7677 | 8585 | 885 | 9095 | 8794 | 4.995 | 7730 | .871 | 81.07 | 93.73 | 80.9 | 2 |
| 3092 | 3838 | 4542 | 5570 | 6400 | 7428 | 8308 | 873 | 8759 | 8458 | 4.845 | 7553 | .851 | 80.28 | 93.27 | 80.9 | 3 |
| 3291 | 3938 | 4558 | 5382 | 6107 | 6888 | 7585 | 837 | 7980 | 7710 | 4.421 | 7035 | .793 | 76.94 | 89.64 | 83.9 | 4 |
| 3333 | 3889 | 4389 | 5016 | 5551 | 6093 | 6593 | 798 | 6946 | 6703 | 3.855 | 6504 | .733 | 70.23 | 81.88 | 84.3 | 5 |
| 3229 | 3673 | 4060 | 4525 | 4898 | 5236 | 5567 | 755 | 5874 | 5674 | 3.260 | 5992 | .675 | 63.66 | 74.14 | 84.2 | 6 |
| 2866 | 3155 | 3373 | 3599 | 3760 | 3866 | 4007 | 684 | 4215 | 4082 | 2.346 | 5069 | .571 | 48.05 | 56.10 | 80.9 | 7 |
| 2474 | 2629 | 2749 | 2847 | 2897 | 2875 | 2946 | 622 | 3066 | 2983 | 1.695 | 4132 | .466 | 34.21 | 39.63 | 73.4 | 8 |
| 2174 | 2259 | 2308 | 2350 | 2350 | 2315 | 2350 | 574 | 2419 | 2372 | 1.344 | 3178 | .358 | 23.75 | 27.63 | 69.1 | 9 |
| 1935 | 1970 | 1984 | 1998 | 1984 | 1949 | 1963 | 532 | 1993 | 1974 | 1.112 | 2066 | .233 | 16.42 | 19.18 | 68.1 | 10 |
| 2754 | 3493 | 4225 | 5366 | 6288 | 7442 | 8414 | 869 | 8928 | 8634 | 4.954 | 8077 | .910 | 81.86 | 93.94 | 77.2 | 11 |
| 2822 | 3519 | 4230 | 5251 | 6166 | 7229 | 8194 | 853 | 8637 | 8353 | 4.790 | 7861 | .886 | 81.82 | 93.99 | 78.9 | 12 |
| 2943 | 3619 | 4301 | 5238 | 6132 | 7103 | 7997 | 841 | 8440 | 8149 | 4.648 | 7658 | .863 | 81.83 | 93.37 | 80.1 | 13 |
| 3169 | 3796 | 4394 | 5183 | 5915 | 6668 | 7358 | 808 | 7770 | 7499 | 4.307 | 7133 | .804 | 78.55 | 90.33 | 83.7 | 14 |
| 3273 | 3808 | 4315 | 4927 | 5469 | 5997 | 6497 | 770 | 6865 | 6621 | 3.818 | 6575 | .741 | 72.30 | 83.60 | 87.0 | 15 |
| 3216 | 3667 | 4054 | 4512 | 4885 | 5202 | 5533 | 734 | 5867 | 5656 | 3.265 | 6051 | .682 | 64.11 | 74.18 | 86.6 | 16 |
| 2909 | 3197 | 3422 | 3648 | 3817 | 3908 | 4049 | 668 | 4278 | 4130 | 2.369 | 5114 | .576 | 49.38 | 56.85 | 83.9 | 17 |
| 2494 | 2663 | 2776 | 2881 | 2924 | 2896 | 2959 | 612 | 3093 | 3001 | 1.720 | 4173 | .470 | 36.38 | 41.98 | 74.1 | 18 |
| 2189 | 2273 | 2322 | 2365 | 2365 | 2329 | 2350 | 562 | 2427 | 2379 | 1.354 | 3213 | .362 | 25.40 | 29.35 | 70.4 | 19 |
| 1952 | 1987 | 2001 | 2023 | 2001 | 1973 | 1973 | 525 | 2012 | 1992 | 1.119 | 2091 | .236 | 15.06 | 17.35 | 58.1 | 20 |
| 2688 | 3336 | 4026 | 5019 | 5969 | 7025 | 8011 | 855 | 8448 | 8178 | 4.662 | 8084 | .911 | 82.17 | 93.73 | 76.1 | 21 |
| 2738 | 3378 | 4040 | 4976 | 5877 | 6857 | 7785 | 839 | 8237 | 7937 | 4.573 | 7869 | .887 | 81.30 | 93.38 | 78.8 | 22 |
| ---- | ---- | ---- | ---- | ---- | ---- | ---- | --- | ---- | ---- | ----- | 7673 | .865 | 80.99 | 93.10 | ---- | 23 |
| 3119 | 3710 | 4287 | 5027 | 5709 | 6406 | 7061 | 795 | 7481 | 7204 | 4.142 | 7140 | .805 | 78.42 | 90.02 | 84.1 | 24 |
| 3231 | 3745 | 4231 | 4815 | 5329 | 5808 | 6266 | 764 | 6653 | 6406 | 3.693 | 6601 | .744 | 72.30 | 83.12 | 84.3 | 25 |
| 3184 | 3628 | 4001 | 4444 | 4789 | 5092 | 5395 | 727 | 5738 | 5531 | 3.200 | 6075 | .685 | 64.61 | 74.60 | 85.3 | 26 |
| 2901 | 3189 | 3414 | 3640 | 3788 | 3851 | 3992 | 664 | 4227 | 4078 | 2.343 | 5135 | .579 | 49.49 | 56.85 | 82.1 | 27 |
| 2490 | 2659 | 2772 | 2863 | 2906 | 2863 | 2927 | 606 | 3060 | 2971 | 1.705 | 4177 | .471 | 36.37 | 42.00 | 76.0 | 28 |
| 2180 | 2272 | 2321 | 2356 | 2349 | 2293 | 2321 | 561 | 2397 | 2342 | 1.335 | 3219 | .363 | 25.97 | 27.63 | 65.7 | 29 |
| 1939 | 1981 | 1988 | 1988 | 1974 | 1946 | 1946 | 519 | 1982 | 1962 | 1.105 | 2095 | .236 | 15.05 | 17.34 | 59.8 | 30 |
| 1890 | 2411 | 2981 | 3819 | 4495 | 5241 | 5882 | 857 | 6274 | 6086 | 5.109 | 8227 | .927 | 56.71 | 93.77 | 74.9 | 38 |
| 1883 | 2376 | 2869 | 3615 | 4248 | 5023 | 5678 | 837 | 6018 | 5811 | 4.909 | 8015 | .903 | 56.66 | 93.86 | 76.7 | 39 |
| 1929 | 2408 | 2880 | 3570 | 4196 | 4921 | 5583 | 821 | 5889 | 5687 | 4.788 | 7830 | .882 | 56.30 | 92.76 | 78.0 | 40 |
| 2099 | 2543 | 2972 | 3535 | 4084 | 4662 | 5190 | 787 | 5465 | 5279 | 4.443 | 7301 | .823 | 55.33 | 91.16 | 81.4 | 41 |
| 2217 | 2604 | 2970 | 3414 | 3836 | 4251 | 4632 | 751 | 4891 | 4718 | 3.993 | 6750 | .761 | 51.61 | 85.29 | 83.6 | 42 |
| 2211 | 2542 | 2830 | 3168 | 3464 | 3724 | 3985 | 712 | 4217 | 4073 | 3.442 | 6217 | .701 | 46.65 | 77.02 | 84.5 | 43 |
| 2005 | 2223 | 2385 | 2561 | 2695 | 2772 | 2878 | 646 | 3043 | 2938 | 2.492 | 5250 | .592 | 35.04 | 58.11 | 82.9 | 44 |
| 1728 | 1848 | 1932 | 2017 | 2052 | 2038 | 2087 | 580 | 2188 | 2126 | 1.793 | 4300 | .485 | 25.43 | 41.96 | 77.6 | 45 |
| 1493 | 1556 | 1598 | 1627 | 1627 | 1598 | 1619 | 535 | 1675 | 1641 | 1.375 | 3301 | .372 | 18.37 | 30.42 | 71.5 | 46 |
| 1781 | 2225 | 2704 | 3415 | 4091 | 4872 | 5541 | 843 | 5893 | 5689 | 4.822 | 8250 | .930 | 56.55 | 93.72 | 73.3 | 47 |
| 1835 | 2271 | 2729 | 3376 | 4024 | 4742 | 5397 | 828 | 5711 | 5503 | 4.658 | 8023 | .904 | 56.24 | 93.07 | 75.1 | 48 |
| 1904 | 2333 | 2784 | 3397 | 4002 | 4664 | 5283 | 814 | 5589 | 5414 | 4.537 | 7815 | .881 | 56.05 | 92.41 | 77.0 | 49 |
| 2063 | 2485 | 2894 | 3408 | 3914 | 4450 | 4935 | 776 | 5225 | 5034 | 4.262 | 7336 | .827 | 55.37 | 91.11 | 79.8 | 50 |
| 2187 | 2553 | 2898 | 3306 | 3686 | 4052 | 4397 | 747 | 4657 | 4489 | 3.814 | 6724 | .758 | 50.93 | 84.78 | 83.4 | 51 |
| 2181 | 2497 | 2765 | 3075 | 3328 | 3560 | 3793 | 712 | 4023 | 3879 | 3.295 | 6188 | .697 | 45.43 | 75.63 | 83.6 | 52 |
| 1984 | 2188 | 2343 | 2504 | 2624 | 2695 | 2786 | 650 | 2952 | 2849 | 2.418 | 5220 | .588 | 34.87 | 58.16 | 81.8 | 53 |
| 1711 | 1838 | 1915 | 1986 | 2014 | 2000 | 2042 | 590 | 2135 | 2075 | 1.744 | 4259 | .480 | 24.56 | 40.79 | 74.4 | 54 |
| 1500 | 1570 | 1605 | 1626 | 1626 | 1598 | 1612 | 542 | 1667 | 1632 | 1.361 | 3279 | .370 | 18.37 | 30.44 | 68.9 | 55 |
| 1327 | 1355 | 1362 | 1369 | 1362 | 1334 | 1334 | 502 | 1362 | 1352 | 1.116 | 2134 | .241 | 11.56 | 19.22 | 60.9 | 56 |
| 1502 | 1820 | 2431 | 2840 | 3354 | 3741 | 4177 | 846 | 4451 | 4327 | 5.522 | 8238 | .928 | 38.38 | 94.07 | 72.3 | 57 |
| 1358 | 1717 | 2140 | 2661 | 3125 | 3534 | 3942 | 819 | 4188 | 4064 | 5.215 | 8010 | .903 | 38.02 | 93.80 | 75.6 | 58 |
| 1397 | 1720 | 2044 | 2467 | 2840 | 3297 | 3677 | 779 | 3873 | 3734 | 4.811 | 7462 | .841 | 37.39 | 92.13 | 80.1 | 59 |
| 1483 | 1772 | 2039 | 2377 | 2680 | 3078 | 3320 | 742 | 3485 | 3368 | 4.329 | 6898 | .777 | 35.39 | 87.12 | 82.5 | 60 |
| 1482 | 1721 | 1926 | 2172 | 2397 | 2622 | 2827 | 703 | 2976 | 2876 | 3.701 | 6342 | .715 | 31.96 | 78.84 | 83.8 | 61 |
| 1334 | 1496 | 1609 | 1742 | 1834 | 1911 | 1996 | 633 | 2103 | 2040 | 2.622 | 5366 | .605 | 24.64 | 60.86 | 81.1 | 62 |
| 1143 | 1228 | 1284 | 1347 | 1382 | 1397 | 1425 | 575 | 1498 | 1457 | 1.873 | 4365 | .492 | 18.10 | 44.87 | 75.3 | 63 |
| 985 | 1020 | 1056 | 1077 | 1084 | 1077 | 1091 | 521 | 1127 | 1105 | 1.414 | 3358 | .378 | 12.24 | 30.46 | 73.1 | 64 |

NACA

TABLE I - COMPRESSOR PERFORMANCE

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| Run | Altitude (ft) | Exhaust-nozzle-outlet area, (sq in.) | Flight Mach number, $M_0$ | Ram pressure ratio, $P_1/p_0$ | Engine speed, N (rpm) | Tunnel static pressure, $p_0$ (lb/sq ft abs.) | Engine-inlet total temperature, $T_1$ (°R) | Engine-inlet total pressure, $P_1$ (lb/sq ft abs.) | Engine-inlet static pressure, $p_1$ (lb/sq ft abs.) | Compressor-inlet total pressure, $P_2$ (lb/sq ft abs.) | Compressor-inlet static pressure, $p_2$ (lb/sq ft abs.) | Compressor-rotor-stage static pressure, $p_{2a}$ (lb/sq ft abs.) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 |
| 65 | 25,000 | 280 | 0.205 | 1.030 | 2046 | 774 | 455 | 797 | 793 | 793 | 791 | 795 | 809 | 823 | 830 | 837 | 858 |
| 66 | 25,000 | 280 | .525 | 1.207 | 7895 | 781 | 468 | 943 | 845 | 927 | 732 | 535 | 647 | 753 | 858 | 1070 | 1260 |
| 67 | 25,000 | 280 | .530 | 1.209 | 7692 | 774 | 466 | 936 | 838 | 920 | 726 | 535 | 647 | 753 | 866 | 1077 | 1260 |
| 68 | 25,000 | 280 | .530 | 1.211 | 7500 | 781 | 456 | 946 | 847 | 928 | 735 | 542 | 661 | 774 | 894 | 1091 | 1281 |
| 69 | 25,000 | 280 | .535 | 1.213 | 6993 | 774 | 456 | 939 | 844 | 923 | 740 | 598 | 718 | 851 | 999 | 1189 | 1394 |
| 70 | 25,000 | 280 | .530 | 1.211 | 6459 | 778 | 458 | 942 | 858 | 927 | 774 | 701 | 834 | 975 | 1130 | 1320 | 1510 |
| 71 | 25,000 | 280 | .530 | 1.208 | 5944 | 785 | 460 | 948 | 879 | 925 | 818 | 778 | 912 | 1053 | 1193 | 1369 | 1545 |
| 72 | 25,000 | 280 | .520 | 1.203 | 5024 | 778 | 466 | 936 | 899 | 919 | 871 | 891 | 989 | 1088 | 1186 | 1299 | 1426 |
| 73 | 25,000 | 280 | .520 | 1.202 | 4091 | 781 | 466 | 939 | 919 | 930 | 905 | 915 | 985 | 1041 | 1105 | 1175 | 1246 |
| 74 | 25,000 | 280 | .525 | 1.204 | 3147 | 781 | 465 | 940 | 930 | 924 | 922 | 936 | 971 | 1006 | 1034 | 1084 | 1119 |
| 75 | 25,000 | 280 | .515 | 1.199 | 2727 | 778 | 463 | 933 | 925 | 927 | 920 | 926 | 954 | 975 | 1003 | 1031 | 1060 |
| 76 | 25,000 | 280 | .720 | 1.412 | 7895 | 774 | 469 | 1093 | 977 | 1061 | 848 | 626 | 753 | 880 | 1006 | 1246 | 1457 |
| 77 | 25,000 | 280 | .715 | 1.403 | 7692 | 776 | 475 | 1089 | 976 | 1054 | 849 | 635 | 769 | 889 | 1029 | 1283 | 1501 |
| 78 | 25,000 | 280 | .715 | 1.403 | 7500 | 781 | 478 | 1096 | 983 | 1057 | 858 | 661 | 767 | 929 | 1084 | 1316 | 1541 |
| 79 | 25,000 | 280 | .720 | 1.413 | 6993 | 780 | 478 | 1102 | 992 | 1062 | 878 | 738 | 886 | 1048 | 1224 | 1449 | 1688 |
| 80 | 25,000 | 280 | .720 | 1.410 | 6459 | 783 | 477 | 1104 | 1007 | 1072 | 916 | 839 | 994 | 1163 | 1339 | 1557 | 1776 |
| 81 | 25,000 | 280 | .725 | 1.415 | 5944 | 781 | 480 | 1105 | 1026 | 1082 | 960 | 929 | 1077 | 1232 | 1386 | 1591 | 1774 |
| 82 | 25,000 | 280 | .720 | 1.406 | 5024 | 781 | 477 | 1098 | 1054 | 1081 | 1020 | 1034 | 1147 | 1260 | 1379 | 1513 | 1647 |
| 83 | 25,000 | 280 | .850 | 1.603 | 7895 | 793 | 491 | 1247 | 1114 | 1213 | 970 | ---- | ---- | ---- | ---- | ---- | ---- |
| 84 | 25,000 | 280 | .830 | 1.567 | 7692 | 776 | 496 | 1236 | 1119 | 1191 | 976 | 755 | 889 | 1058 | 1227 | 1501 | 1762 |
| 85 | 25,000 | 280 | .855 | 1.611 | 7560 | 774 | 498 | 1247 | 1118 | 1221 | 981 | 774 | 915 | 1098 | 1274 | 1541 | 1802 |
| 86 | 25,000 | 280 | .855 | 1.611 | 6993 | 781 | 501 | 1258 | 1143 | 1231 | 1021 | 894 | 1056 | 1246 | 1457 | 1717 | 1978 |
| 87 | 25,000 | 280 | .850 | 1.609 | 6459 | 781 | 501 | 1257 | 1155 | 1236 | 1061 | 1006 | 1175 | 1365 | 1562 | 1802 | 2041 |
| 88 | 25,000 | 280 | .850 | 1.603 | 5944 | 781 | 498 | 1252 | 1173 | 1244 | 1104 | 1084 | 1246 | 1422 | 1591 | 1802 | 2013 |
| 89 | 25,000 | 280 | .855 | 1.612 | 5024 | 781 | 502 | 1259 | 1212 | 1253 | 1176 | 1189 | 1302 | 1429 | 1555 | 1696 | 1837 |
| 90 | 25,000 | 280 | .982 | 1.857 | 7895 | 746 | 502 | 1385 | 1238 | 1340 | 1083 | 816 | 971 | 1140 | 1316 | 1612 | 1894 |
| 91 | 25,000 | 280 | .965 | 1.817 | 7692 | 778 | 511 | 1414 | 1265 | 1380 | 1111 | 862 | 1024 | 1214 | 1419 | 1728 | 2024 |
| 92 | 25,000 | 280 | .975 | 1.839 | 7500 | 774 | 513 | 1423 | 1275 | 1391 | 1123 | 894 | 1063 | 1267 | 1485 | 1788 | 2098 |
| 93 | 25,000 | 280 | .975 | 1.840 | 6993 | 774 | 514 | 1424 | 1290 | 1392 | 1160 | 1027 | 1210 | 1429 | 1661 | 1957 | 2252 |
| 94 | 25,000 | 280 | .975 | 1.837 | 6459 | 773 | --- | 1420 | ---- | 1396 | 1208 | 1163 | 1329 | 1554 | 1773 | 2047 | 2308 |
| 95 | 25,000 | 280 | .965 | 1.820 | 5944 | 774 | --- | 1409 | ---- | 1389 | 1252 | 1232 | 1408 | 1598 | 1788 | 2013 | 2238 |
| 96 | 25,000 | 302 | .203 | 1.031 | 7895 | 785 | 458 | 809 | 728 | 814 | 629 | 454 | 560 | 637 | 736 | 869 | 1038 |
| 97 | 25,000 | 302 | .203 | 1.032 | 7692 | 781 | 460 | 806 | 726 | 812 | 628 | 457 | 556 | 647 | 739 | 887 | 1049 |
| 98 | 25,000 | 302 | .203 | 1.031 | 7500 | 781 | 458 | 805 | 726 | 813 | 629 | 471 | 577 | 668 | 774 | 922 | 1077 |
| 99 | 25,000 | 302 | .200 | 1.029 | 6993 | 781 | 458 | 804 | 728 | 812 | 638 | 513 | 619 | 732 | 858 | 1013 | 1175 |
| 100 | 25,000 | 302 | .200 | 1.029 | 6459 | 781 | 452 | 804 | 735 | 814 | 660 | 598 | 704 | 830 | 957 | 1112 | 1267 |
| 101 | 25,000 | 302 | .198 | 1.028 | 5944 | 781 | 451 | 803 | 748 | 813 | 692 | 661 | 760 | 894 | 1013 | 1161 | 1309 |
| 102 | 25,000 | 302 | .200 | 1.029 | 5024 | 781 | 451 | 804 | 772 | 817 | 744 | 746 | 844 | 929 | 1020 | 1119 | 1232 |
| 103 | 25,000 | 302 | .198 | 1.028 | 4091 | 781 | 459 | 803 | 788 | 825 | 776 | 781 | 844 | 894 | 950 | 1020 | 1084 |
| 104 | 25,000 | 302 | .203 | 1.032 | 3147 | 783 | 462 | 808 | 800 | 829 | 795 | 797 | 832 | 853 | 889 | 924 | 959 |
| 105 | 25,000 | 302 | .203 | 1.031 | 2046 | 774 | 463 | 798 | 795 | 823 | 793 | 795 | 809 | 816 | 830 | 844 | 858 |
| 106 | 25,000 | 302 | .712 | 1.402 | 7895 | 776 | 473 | 1088 | 974 | 1061 | 845 | 621 | 755 | 868 | 987 | 1191 | 1403 |
| 107 | 25,000 | 302 | .710 | 1.398 | 7692 | 781 | 474 | 1092 | 980 | ---- | 852 | 640 | 787 | 894 | 1034 | 1232 | 1443 |
| 108 | 25,000 | 302 | .720 | 1.406 | 7500 | 778 | 477 | 1093 | 980 | 1068 | 855 | 651 | 778 | 919 | 1067 | 1271 | 1475 |
| 109 | 25,000 | 302 | .720 | 1.408 | 6993 | 781 | 478 | 1100 | 992 | 1075 | 878 | 732 | 873 | 1034 | 1201 | 1429 | 1647 |
| 110 | 25,000 | 302 | .720 | 1.405 | 6459 | 780 | 479 | 1096 | 1004 | ---- | 913 | 836 | 984 | 1146 | 1322 | 1533 | 1744 |
| 111 | 25,000 | 302 | .720 | 1.406 | 5944 | 781 | 480 | 1098 | 1023 | 1084 | 957 | 929 | 1070 | 1232 | 1386 | 1577 | 1760 |
| 112 | 25,000 | 302 | .720 | 1.411 | 5024 | 776 | 479 | 1095 | 1052 | 1088 | 1017 | 1036 | 1142 | 1262 | 1374 | 1508 | 1642 |
| 113 | 25,000 | 302 | .707 | 1.393 | 4091 | 778 | 480 | 1084 | 1062 | 1081 | 1045 | 1067 | 1151 | 1214 | 1285 | 1355 | 1440 |
| 114 | 25,000 | 302 | .969 | 1.824 | 7895 | 774 | 491 | 1412 | 1262 | 1402 | 1103 | 816 | 985 | 1140 | 1309 | 1577 | 1837 |
| 115 | 25,000 | 302 | .970 | 1.829 | 7692 | 767 | 492 | 1403 | 1256 | 1391 | 1097 | 823 | 999 | 1161 | 1351 | 1619 | 1886 |
| 116 | 25,000 | 302 | .963 | 1.813 | 7500 | 781 | 492 | 1416 | 1268 | 1343 | 1112 | 858 | 1034 | 1217 | 1429 | 1703 | 1971 |
| 117 | 25,000 | 302 | .969 | 1.827 | 6993 | 781 | 493 | 1427 | 1288 | 1416 | 1148 | 992 | 1175 | 1386 | 1612 | 1893 | 2175 |
| 118 | 25,000 | 302 | .971 | 1.832 | 6459 | 779 | 495 | 1427 | 1309 | 1421 | 1204 | 1131 | 1321 | 1532 | 1751 | 2018 | 2286 |
| 119 | 25,000 | 302 | .964 | 1.817 | 5944 | 781 | 494 | 1419 | 1327 | 1412 | 1247 | 1210 | 1393 | 1591 | 1788 | 2020 | 2252 |
| 120 | 25,000 | 342 | .210 | 1.032 | 7895 | 781 | 463 | 806 | 725 | 785 | 627 | 457 | 563 | 647 | 732 | 865 | 1027 |
| 121 | 25,000 | 342 | .210 | 1.032 | 7692 | 781 | 463 | 806 | 726 | 785 | 630 | 464 | 570 | 654 | 746 | 887 | 1041 |
| 122 | 25,000 | 342 | .210 | 1.031 | 7500 | 778 | 463 | 802 | 723 | 781 | 629 | 468 | 574 | 665 | 764 | 912 | 1067 |
| 123 | 25,000 | 342 | .200 | 1.029 | 6993 | 781 | 462 | 804 | 728 | 785 | 639 | 513 | 619 | 739 | 858 | 1013 | 1161 |
| 124 | 25,000 | 342 | .200 | 1.028 | 6459 | 781 | 461 | 803 | 735 | 787 | 663 | 598 | 718 | 830 | 957 | 1112 | 1260 |
| 125 | 25,000 | 342 | .195 | 1.027 | 5944 | 780 | 460 | 801 | 746 | 787 | 692 | 660 | 773 | 886 | 1012 | 1153 | 1294 |
| 126 | 25,000 | 342 | .195 | 1.027 | 5024 | 780 | 459 | 801 | 770 | 794 | 744 | 752 | 843 | 928 | 1019 | 1111 | 1224 |
| 127 | 25,000 | 342 | .200 | 1.028 | 4091 | 781 | 459 | 803 | 788 | 799 | 776 | 781 | 844 | 894 | 950 | 1020 | 1077 |

NACA

**DATA FOR TURBOJET ENGINE - Continued**

| Compressor-rotor-stage static pressure, $p_{2a}$ (lb/sq ft abs.) | | | | | | Straightening-vane static pressure, $p_{2a}$ (lb/sq ft abs.) | Compressor-outlet total temperature, $T_3$ (°R) | Compressor-outlet total pressure, $P_3$ (lb/sq ft abs.) | Compressor-outlet static pressure, $p_3$ (lb/sq ft abs.) | Compressor pressure ratio, $P_3/P_1$ | Corrected engine speed, $N/\sqrt{\theta_1}$ (rpm) | Compressor Mach number, $M_c$ | Air flow, $W_{a,1}$ (lb/sec) | Corrected air flow, $W_{a,1}\sqrt{\theta_1}/\delta_1$ (lb/sec) | Compressor efficiency, $\eta_c$ (percent) | Run |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7. | 8 | 9 | 10 | 11 | 12 | | | | | | | | | | | |
| 866 | 887 | 894 | 901 | 901 | 894 | 894 | 485 | 909 | 898 | 1.141 | 2185 | 0.246 | 8.70 | 21.63 | 56.4 | 65 |
| 1647 | 2076 | 2717 | 3273 | 3872 | 4308 | 4822 | 879 | 5137 | 4979 | 5.448 | 8313 | .937 | 44.26 | 94.32 | 71.1 | 66 |
| 1591 | 2013 | 2555 | 3161 | 3738 | 4188 | 4681 | 851 | 4985 | 4833 | 5.326 | 8115 | .915 | 44.25 | 94.83 | 74.3 | 67 |
| 1569 | 1999 | 2464 | 3104 | 3632 | 4132 | 4618 | 817 | 4912 | 4764 | 5.192 | 8003 | .902 | 45.17 | 94.70 | 76.0 | 68 |
| 1626 | 2006 | 2358 | 2865 | 3308 | 3843 | 4294 | 774 | 4525 | 4366 | 4.819 | 7462 | .841 | 44.24 | 93.41 | 81.4 | 69 |
| 1728 | 2059 | 2362 | 2742 | 3094 | 3467 | 3805 | 737 | 4006 | 3874 | 4.253 | 6872 | .774 | 41.79 | 88.21 | 84.2 | 70 |
| 1728 | 1996 | 2228 | 2503 | 2756 | 2996 | 3221 | 698 | 3405 | 3289 | 3.592 | 6313 | .711 | 38.14 | 80.16 | 85.3 | 71 |
| 1545 | 1707 | 1834 | 1968 | 2066 | 2130 | 2214 | 628 | 2335 | 2251 | 2.495 | 5300 | .597 | 28.06 | 60.14 | 86.0 | 72 |
| 1309 | 1401 | 1457 | 1506 | 1513 | 1471 | 1492 | 566 | 1575 | 1524 | 1.677 | 4316 | .486 | 21.02 | 44.89 | 74.3 | 73 |
| 1154 | 1196 | 1217 | 1225 | 1196 | 1140 | 1126 | 520 | 1180 | 1151 | 1.255 | 3323 | .375 | 15.02 | 32.02 | 56.7 | 74 |
| 1081 | 1109 | 1116 | 1116 | 1088 | 1024 | 1010 | 499 | 1060 | 1033 | 1.136 | 2888 | .325 | 13.71 | 29.36 | 47.7 | 75 |
| 1879 | 2365 | 3090 | 3738 | 4456 | 4970 | 5561 | 869 | 5921 | 5755 | 5.417 | 8306 | .936 | 51.82 | 95.36 | 72.9 | 76 |
| 1895 | 2374 | 3001 | 3676 | 4331 | 4852 | 5415 | 856 | 5759 | 5589 | 5.288 | 8038 | .906 | 50.79 | 94.44 | 76.1 | 77 |
| 1830 | 2302 | 2773 | 3477 | 4012 | 4660 | 5209 | 835 | 5529 | 5348 | 5.045 | 7815 | .881 | 50.75 | 94.05 | 78.8 | 78 |
| 1949 | 2371 | 2779 | 3314 | 3807 | 4363 | 4863 | 799 | 5115 | 4938 | 4.642 | 7287 | .821 | 50.34 | 92.76 | 82.1 | 79 |
| 2022 | 2381 | 2712 | 3127 | 3507 | 3902 | 4254 | 758 | 4486 | 4328 | 4.063 | 6737 | .759 | 47.59 | 87.47 | 83.7 | 80 |
| 1971 | 2259 | 2506 | 2787 | 3027 | 3231 | 3449 | 716 | 3657 | 3525 | 3.310 | 6182 | .697 | 43.26 | 79.66 | 83.0 | 81 |
| 1767 | 1943 | 2069 | 2189 | 2266 | 2266 | 2337 | 635 | 2489 | 2390 | 2.267 | 5240 | .591 | 32.96 | 60.90 | 79,6 | 82 |
| ---- | ---- | ---- | ---- | ---- | ---- | ---- | --- | ---- | ---- | ----- | 8116 | .915 | 57.76 | 95.35 | ---- | 83 |
| 2142 | 2684 | 3296 | 4092 | 4747 | 5408 | 6035 | 875 | 6403 | 6208 | 5.180 | 7869 | .887 | 53.5 | 91.0 | 78.7 | 84 |
| 2112 | 2633 | 3139 | 3872 | 4449 | 5188 | 5786 | 860 | 6123 | 5911 | 4.910 | 7658 | .863 | 56.50 | 93.91 | 79.3 | 85 |
| 2273 | 2731 | 3175 | 3745 | 4266 | 4829 | 5343 | 823 | 5621 | 5425 | 4.468 | 7119 | .802 | 54.06 | 89.32 | 83.1 | 86 |
| 2309 | 2682 | 3034 | 3463 | 3843 | 4217 | 4569 | 780 | 4829 | 4651 | 3.842 | 6575 | .741 | 50.99 | 84.30 | 84.3 | 87 |
| 2217 | 2513 | 2766 | 3055 | 3280 | 3470 | 3660 | 727 | 3899 | 3759 | 3.114 | 6069 | .684 | 45.33 | 75.03 | 83.5 | 88 |
| 1971 | 2147 | 2281 | 2393 | 2435 | 2365 | 2435 | 654 | 2599 | 2490 | 2.064 | 5109 | .576 | 35.63 | 58.89 | 76.1 | 89 |
| 2330 | 2942 | 3639 | 4569 | 5336 | 6040 | 6751 | 887 | 7165 | 6964 | 5.173 | 8029 | .905 | 63.45 | 95.33 | 78.2 | 90 |
| 2411 | 3017 | 3629 | 4516 | 5185 | 5995 | 6670 | 882 | 7088 | 6854 | 5.013 | 7754 | .874 | 63.95 | 94.91 | 80.7 | 91 |
| 2450 | 3027 | 3583 | 4400 | 5047 | 5850 | 6540 | 874 | 6902 | 6663 | 4.850 | 7545 | .850 | 63.83 | 94.35 | 81.1 | 92 |
| 2583 | 3090 | 3569 | 4195 | 4759 | 5371 | 5913 | 838 | 6230 | 6012 | 4.375 | 7028 | .792 | 61.07 | 90.30 | 83.3 | 93 |
| 2589 | 3005 | 3392 | 3849 | 4251 | 4631 | 4997 | 794 | 5290 | 5096 | 3.725 | ---- | ----- | ----- | ----- | ---- | 94 |
| 2457 | 2773 | 3027 | 3322 | 3548 | 3703 | 3893 | 740 | 4155 | 3993 | 2.949 | ---- | ----- | ----- | ----- | ---- | 95 |
| 1250 | 1609 | 2031 | 2601 | 3087 | 3538 | 3967 | 848 | 4231 | 4103 | 5.230 | 8400 | .947 | 37.77 | 92.87 | 71.0 | 96 |
| 1225 | 1562 | 1907 | 2428 | 2858 | 3372 | 3787 | 825 | 4032 | 3904 | 5.002 | 8169 | .921 | 37.39 | 92.42 | 73.7 | 97 |
| 1253 | 1577 | 1893 | 2372 | 2773 | 3287 | 3703 | 806 | 3926 | 3791 | 4.877 | 7980 | .899 | 37.31 | 92.19 | 75.5 | 98 |
| 1351 | 1647 | 1943 | 2323 | 2696 | 3090 | 3463 | 767 | 3651 | 3522 | 4.541 | 7441 | .839 | 36.54 | 90.39 | 80.3 | 99 |
| 1450 | 1717 | 1971 | 2281 | 2576 | 2879 | 3161 | 727 | 3329 | 3214 | 4.141 | 6918 | .780 | 35.26 | 86.65 | 82.4 | 100 |
| 1464 | 1696 | 1893 | 2133 | 2344 | 2548 | 2738 | --- | 2894 | 2792 | 3.604 | 6378 | .719 | 31.91 | 78.36 | ---- | 101 |
| 1337 | 1485 | 1605 | 1731 | 1823 | 1893 | 1971 | 621 | 2085 | 2017 | 2.593 | 5391 | .608 | 24.49 | 60.07 | 83.1 | 102 |
| 1140 | 1225 | 1281 | 1337 | 1365 | 1365 | 1401 | 569 | 1466 | 1426 | 1.826 | 4349 | .490 | 16.93 | 41.97 | 78.4 | 103 |
| 980 | 1029 | 1058 | 1079 | 1079 | 1065 | 1072 | 523 | 1114 | 1091 | 1.379 | 3336 | .376 | 12.32 | 30.44 | 73.0 | 104 |
| 866 | 894 | 894 | 901 | 894 | 880 | 887 | 488 | 903 | 894 | 1.132 | 2167 | .244 | 7.67 | 19.21 | 66.9 | 105 |
| 1663 | 2121 | 2620 | 3374 | 3972 | 4634 | 5204 | 852 | 5547 | 5375 | 5.098 | 8266 | .932 | 51.04 | 94.81 | 74.1 | 106 |
| 1682 | 2119 | 2548 | 3203 | 3759 | 4442 | 5019 | 833 | 5320 | 5141 | 4.872 | 8046 | .906 | 50.60 | 93.75 | 75.6 | 107 |
| 1721 | 2130 | 2545 | 3129 | 3686 | 4312 | 4882 | 821 | 5155 | 4971 | 4.716 | 7823 | .882 | 50.64 | 94.00 | 77.4 | 108 |
| 1879 | 2266 | 2647 | 3118 | 3590 | 4076 | 4533 | 787 | 4788 | 4613 | 4.353 | 7287 | .821 | 49.93 | 92.20 | 80.9 | 109 |
| 1963 | 2294 | 2603 | 2976 | 3314 | 3638 | 3948 | 749 | 4186 | 4029 | 3.819 | 6724 | .758 | 46.36 | 85.99 | 82.8 | 110 |
| 1943 | 2217 | 2449 | 2710 | 2928 | 3104 | 3287 | 708 | 3504 | 3372 | 3.191 | 6182 | .697 | 42.12 | 78.05 | 82.9 | 111 |
| 1762 | 1938 | 2064 | 2184 | 2247 | 2219 | 2290 | 636 | 2441 | 2341 | 2.229 | 5230 | .589 | 32.38 | 60.10 | 78.7 | 112 |
| 1503 | 1595 | 1644 | 1679 | 1658 | 1538 | 1531 | 575 | 1631 | 1559 | 1.505 | 4255 | .480 | 23.54 | 44.18 | 62.7 | 113 |
| 2154 | 2717 | 3294 | 4188 | 4914 | 5808 | 6554 | 863 | 6964 | 6739 | 4.932 | 8116 | .915 | 65.43 | 95.41 | 76.3 | 114 |
| 2189 | 2717 | 3259 | 4041 | 4766 | 5589 | 6329 | 848 | 6696 | 6455 | 4.773 | 7900 | .890 | 64.49 | 94.69 | 77.9 | 115 |
| 2281 | 2794 | 3322 | 4048 | 4752 | 5505 | 6202 | 835 | 6549 | 6318 | 4.625 | 7703 | .868 | 65.10 | 94.70 | 78.8 | 116 |
| 2478 | 2970 | 3428 | 4033 | 4590 | 5174 | 5716 | 798 | 6040 | 5826 | 4.233 | 7175 | .809 | 63.48 | 91.75 | 82.6 | 117 |
| 2560 | 2961 | 3335 | 3785 | 4179 | 4538 | 4890 | 758 | 5204 | 5000 | 3.647 | 6614 | .745 | 58.85 | 85.22 | 84.3 | 118 |
| 2478 | 2801 | 3076 | 3379 | 3611 | 3773 | 3970 | 713 | 4256 | 4076 | 2.999 | 6093 | .687 | 52.31 | 76.09 | 83.2 | 119 |
| 1182 | 1478 | 1795 | 2295 | 2731 | 3266 | 3696 | 835 | 3938 | 3805 | 4.985 | 8361 | .942 | 37.53 | 93.03 | 71.4 | 120 |
| 1196 | 1492 | 1802 | 2252 | 2682 | 3175 | 3611 | 820 | 3827 | 3719 | 4.748 | 8146 | .918 | 37.28 | 92.41 | 72.8 | 121 |
| 1229 | 1510 | 1813 | 2221 | 2630 | 3080 | 3502 | 801 | 3697 | 3564 | 4.610 | 7943 | .895 | 37.01 | 92.19 | 75.1 | 122 |
| 1344 | 1619 | 1893 | 2245 | 2604 | 2963 | 3301 | 766 | 3490 | 3363 | 4.341 | 7413 | .835 | 36.37 | 90.31 | 79.3 | 123 |
| 1436 | 1682 | 1929 | 2210 | 2471 | 2738 | 2992 | 731 | 3163 | 3046 | 3.939 | 6853 | .772 | 34.82 | 86.48 | 82.0 | 124 |
| 1442 | 1660 | 1857 | 2068 | 2265 | 2434 | 2603 | 697 | 2759 | 2660 | 3.444 | 6313 | .711 | 31.50 | 78.36 | 82.4 | 125 |
| 1322 | 1463 | 1576 | 1695 | 1773 | 1822 | 1899 | 628 | 2012 | 1942 | 2.512 | 5341 | .602 | 23.99 | 59.63 | 81.9 | 126 |
| 1133 | 1217 | 1274 | 1323 | 1344 | 1330 | 1365 | 566 | 1433 | 1391 | 1.785 | 4349 | .490 | 16.94 | 41.99 | 77.3 | 127 |

TABLE I - COMPRESSOR PERFORMANCE

| Run | Altitude (ft) | Exhaust-nozzle-outlet area (sq in.) | Flight Mach number, $M_0$ | Ram pressure ratio, $P_1/p_0$ | Engine speed, N (rpm) | Tunnel static pressure, $p_0$ (lb/sq ft abs.) | Engine-inlet total temperature, $T_1$ (°R) | Engine-inlet total pressure, $P_1$ (lb/sq ft abs.) | Engine-inlet static pressure, $p_1$ (lb/sq ft abs.) | Compressor-inlet total pressure, $P_2$ (lb/sq ft abs.) | Compressor-inlet static pressure, $p_2$ (lb/sq ft abs.) | Compressor-rotor-stage static pressure, $p_{2a}$ (lb/sq ft abs.) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 |
| 128 | 25,000 | 342 | 0.200 | 1.028 | 3147 | 776 | 458 | 798 | 791 | 796 | 786 | 790 | 825 | 846 | 875 | 917 | 952 |
| 129 | 25,000 | 342 | .713 | 1.404 | 7895 | 778 | 471 | 1092 | 975 | 1041 | 847 | 623 | 750 | 870 | 989 | 1172 | 1376 |
| 130 | 25,000 | 342 | .710 | 1.399 | 7695 | 780 | 473 | 1091 | 978 | 1043 | 850 | 632 | 766 | 886 | 1012 | 1209 | 1407 |
| 131 | 25,000 | 342 | .710 | 1.399 | 7500 | 781 | 472 | 1093 | 978 | 1042 | 853 | 647 | 774 | 915 | 1056 | 1260 | 1457 |
| 132 | 25,000 | 342 | .712 | 1.403 | 6993 | 785 | 471 | 1101 | 992 | 1053 | 876 | 729 | 869 | 1024 | 1186 | 1405 | 1609 |
| 133 | 25,000 | 342 | .719 | 1.406 | 6459 | 781 | 472 | 1098 | 1004 | 1055 | 913 | 837 | 985 | 1147 | 1316 | 1520 | 1731 |
| 134 | 25,000 | 342 | .709 | 1.397 | 5944 | 778 | 472 | 1087 | 1013 | 1049 | 945 | 905 | 1053 | 1207 | 1355 | 1545 | 1728 |
| 135 | 25,000 | 342 | .709 | 1.397 | 5024 | 774 | 472 | 1081 | 1038 | 1051 | 1003 | 1020 | 1133 | 1246 | 1365 | 1492 | 1626 |
| 136 | 25,000 | 342 | .719 | 1.407 | 4091 | 778 | 474 | 1095 | 1071 | 1067 | 1053 | 1067 | 1158 | 1229 | 1299 | 1383 | 1468 |
| 137 | 25,000 | 342 | .970 | 1.836 | 7895 | 781 | 487 | 1434 | 1280 | 1358 | 1116 | 830 | 1006 | 1161 | 1323 | 1584 | 1844 |
| 138 | 25,000 | 342 | .970 | 1.827 | 7692 | 780 | 487 | 1425 | 1275 | 1346 | 1115 | 850 | 1019 | 1188 | 1364 | 1632 | 1892 |
| 139 | 25,000 | 342 | .965 | 1.823 | 7500 | 778 | 489 | 1418 | 1271 | 1338 | 1114 | 855 | 1024 | 1207 | 1412 | 1679 | 1933 |
| 140 | 25,000 | 342 | .970 | 1.827 | 6993 | 780 | 491 | 1425 | 1287 | 1344 | 1145 | 984 | 1174 | 1378 | 1597 | 1871 | 2146 |
| 141 | 25,000 | 342 | .965 | 1.819 | 6459 | 781 | 493 | 1421 | 1305 | 1338 | 1195 | 1119 | 1309 | 1520 | 1738 | 1992 | 2259 |
| 142 | 25,000 | 342 | .970 | 1.827 | 5944 | 784 | 493 | 1432 | 1338 | 1359 | 1257 | 1220 | 1404 | 1601 | 1805 | 2037 | 2269 |
| 143 | 35,000 | 280 | .210 | 1.032 | 7692 | 496 | 444 | 512 | 460 | 508 | 395 | 292 | 362 | 419 | 482 | 609 | 714 |
| 144 | 35,000 | 280 | .215 | 1.034 | 7500 | 493 | 445 | 510 | 458 | 508 | 395 | 303 | 373 | 430 | 486 | 606 | 711 |
| 145 | 35,000 | 280 | .220 | 1.036 | 6993 | 496 | 446 | 514 | 464 | 509 | 404 | 327 | 397 | 468 | 545 | 651 | 764 |
| 146 | 35,000 | 280 | .210 | 1.032 | 6459 | 496 | 445 | 512 | 467 | 509 | 418 | 376 | 447 | 524 | 609 | 714 | 820 |
| 147 | 35,000 | 280 | .205 | 1.030 | 5944 | 493 | 445 | 508 | 472 | 509 | 437 | 423 | 500 | 570 | 648 | 739 | 838 |
| 148 | 35,000 | 280 | .205 | 1.030 | 5024 | 494 | 445 | 509 | 488 | 508 | 470 | 480 | 543 | 593 | 649 | 719 | 792 |
| 149 | 35,000 | 280 | .195 | 1.028 | 4091 | 497 | 446 | 511 | 501 | 510 | 493 | 504 | 539 | 567 | 610 | 652 | 694 |
| 150 | 35,000 | 302 | .200 | 1.030 | 7895 | 494 | 456 | 509 | 459 | 522 | 397 | 290 | 353 | 410 | 466 | 564 | 677 |
| 151 | 35,000 | 302 | .203 | 1.032 | 7692 | 494 | 456 | 510 | 460 | 520 | 398 | 297 | 360 | 417 | 480 | 571 | 677 |
| 152 | 35,000 | 302 | .200 | 1.030 | 7500 | 494 | 457 | 509 | 460 | 521 | 400 | 304 | 367 | 424 | 494 | 586 | 691 |
| 153 | 35,000 | 302 | .198 | 1.028 | 6993 | 495 | 457 | 509 | 462 | 521 | 405 | 340 | 411 | 474 | 551 | 657 | 755 |
| 154 | 35,000 | 302 | .198 | 1.028 | 6459 | 496 | 457 | 510 | 469 | 523 | 422 | 376 | 447 | 551 | 616 | 707 | 813 |
| 155 | 35,000 | 302 | .200 | 1.030 | 5944 | 495 | 456 | 510 | 475 | 524 | 442 | 425 | 502 | 572 | 650 | 741 | 833 |
| 156 | 35,000 | 302 | .198 | 1.028 | 5024 | 496 | 457 | 510 | 491 | 528 | 474 | 462 | 538 | 588 | 644 | 707 | 778 |
| 157 | 35,000 | 302 | .200 | 1.030 | 4091 | 494 | 457 | 509 | 500 | 529 | 492 | 494 | 529 | 557 | 593 | 635 | 677 |
| 158 | 35,000 | 302 | .198 | 1.028 | 3147 | 496 | 457 | 510 | 506 | 533 | 502 | 510 | 524 | 538 | 552 | 580 | 602 |
| 159 | 35,000 | 302 | .203 | 1.032 | 2046 | 498 | 458 | 514 | 510 | 535 | 510 | 512 | 519 | 533 | 533 | 547 | 554 |
| 160 | 35,000 | 342 | .205 | 1.030 | 7895 | 492 | 444 | 507 | 457 | 493 | 395 | 295 | 358 | 400 | 457 | 541 | 647 |
| 161 | 35,000 | 342 | .210 | 1.032 | 7692 | 493 | 446 | 509 | 458 | 495 | 396 | 296 | 359 | 416 | 472 | 563 | 662 |
| 162 | 35,000 | 342 | .205 | 1.030 | 7500 | 494 | 443 | 509 | 458 | 495 | 397 | 304 | 367 | 424 | 480 | 571 | 670 |
| 163 | 35,000 | 342 | .200 | 1.028 | 6993 | 494 | 441 | 508 | 460 | 495 | 402 | 325 | 395 | 459 | 529 | 635 | 726 |
| 164 | 35,000 | 342 | .190 | 1.026 | 6459 | 496 | 442 | 509 | 465 | 499 | 416 | 376 | 447 | 517 | 602 | 700 | 799 |
| 165 | 35,000 | 342 | .200 | 1.028 | 5944 | 493 | 443 | 507 | 471 | 498 | 435 | 416 | 493 | 563 | 634 | 732 | 824 |
| 166 | 35,000 | 342 | .200 | 1.028 | 5024 | 493 | 444 | 507 | 486 | 502 | 467 | 472 | 528 | 585 | 641 | 711 | 782 |
| 167 | 35,000 | 342 | .200 | 1.028 | 4091 | 494 | 446 | 508 | 498 | 505 | 489 | 501 | 536 | 571 | 607 | 649 | 691 |
| 168 | 45,000 | 280 | .225 | 1.037 | 7500 | 298 | 442 | 309 | 278 | 313 | 240 | 185 | 228 | 263 | 312 | 390 | 467 |
| 169 | 45,000 | 280 | .200 | 1.029 | 6993 | 308 | 446 | 317 | 288 | 324 | 252 | 209 | 252 | 301 | 360 | 421 | 491 |
| 170 | 45,000 | 280 | .225 | 1.037 | 6459 | 297 | 443 | 308 | 281 | 316 | 253 | 234 | 283 | 325 | 381 | 438 | 508 |
| 171 | 45,000 | 280 | .210 | 1.033 | 5944 | 306 | 445 | 316 | 295 | 320 | 274 | 264 | 313 | 355 | 405 | 461 | 524 |
| 172 | 45,000 | 280 | .205 | 1.030 | 5024 | 303 | 444 | 312 | 299 | 326 | 290 | 296 | 331 | 359 | 395 | 437 | 486 |
| 173 | 45,000 | 302 | .210 | 1.032 | 7895 | 310 | 440 | 320 | 289 | 329 | 250 | 190 | ---- | 261 | 296 | 359 | 430 |
| 174 | 45,000 | 302 | .185 | 1.026 | 7692 | 308 | 439 | 316 | 285 | 327 | 247 | 195 | ---- | 268 | 308 | 364 | 435 |
| 175 | 45,000 | 302 | .215 | 1.034 | 7500 | 293 | 438 | 303 | 273 | 313 | 235 | 180 | ---- | 251 | 300 | 356 | 420 |
| 176 | 45,000 | 302 | .210 | 1.033 | 6993 | 306 | 440 | 316 | 286 | 326 | 251 | 207 | ---- | 292 | 334 | 398 | 468 |
| 177 | 45,000 | 302 | .210 | 1.032 | 6459 | 308 | 442 | 318 | 290 | 330 | 261 | 238 | ---- | 336 | 378 | 442 | 512 |
| 178 | 45,000 | 302 | .180 | 1.023 | 5944 | 311 | 442 | 318 | 296 | 333 | 274 | 269 | ---- | 360 | 410 | 466 | 522 |
| 179 | 45,000 | 302 | .205 | 1.030 | 5024 | 304 | 442 | 313 | 302 | 327 | 292 | 297 | ---- | 361 | 403 | 438 | 487 |
| 180 | 45,000 | 342 | .190 | 1.026 | 7895 | 312 | 440 | 320 | 289 | 311 | 250 | 192 | 235 | 256 | 291 | 340 | 411 |
| 181 | 45,000 | 342 | .190 | 1.026 | 7692 | 310 | 440 | 318 | 287 | 309 | 248 | 190 | 233 | 261 | 296 | 352 | 418 |
| 182 | 45,000 | 342 | .200 | 1.029 | 7500 | 310 | 440 | 319 | 288 | 311 | 250 | 197 | 233 | 268 | 310 | 366 | 430 |
| 183 | 45,000 | 342 | .190 | 1.026 | 6993 | 310 | 440 | 318 | 288 | 310 | 253 | 204 | 247 | 296 | 338 | 402 | 465 |
| 184 | 45,000 | 342 | .190 | 1.026 | 6459 | 310 | 440 | 318 | 292 | 312 | 263 | 240 | 275 | 331 | 380 | 437 | 507 |
| 185 | 45,000 | 342 | .190 | 1.026 | 5944 | 307 | 442 | 315 | 295 | 311 | 272 | 265 | 307 | 356 | 399 | 455 | 518 |
| 186 | 45,000 | 342 | .200 | 1.029 | 5024 | 306 | 443 | 315 | 302 | 311 | 293 | 292 | 334 | 362 | 390 | 426 | 475 |
| 187 | 50,000 | 280 | .190 | 1.027 | 7500 | 225 | 443 | 231 | 208 | 224 | 180 | 148 | 176 | 204 | 239 | 302 | 359 |
| 188 | 50,000 | 280 | .185 | 1.025 | 6993 | 236 | 443 | 242 | 220 | 235 | 194 | 166 | 194 | 236 | 278 | 328 | 391 |
| 189 | 50,000 | 280 | .185 | 1.025 | 6459 | 238 | 441 | 244 | 225 | 236 | 202 | 182 | 224 | 259 | 301 | 344 | 400 |
| 190 | 50,000 | 280 | .185 | 1.025 | 5944 | 239 | 440 | 245 | 229 | 239 | 212 | 211 | 246 | 281 | 316 | 366 | 415 |

DATA FOR TURBOJET ENGINE - Concluded

| Compressor-rotor-stage static pressure, $p_{2a}$ (lb/sq ft abs.) | | | | | | Straightening-vane static pressure, $p_{2a}$ (lb/sq ft abs.) | Compressor-outlet total temperature, $T_5$ (°R) | Compressor-outlet total pressure, $P_5$ (lb/sq ft abs.) | Compressor-outlet static pressure, $p_3$ (lb/sq ft abs.) | Compressor pressure ratio, $P_5/P_1$ | Corrected engine speed, $N/\sqrt{\theta_1}$, (rpm) | Compressor Mach number, $M_0$ | Air flow, $W_{a,1}$ (lb/sec) | Corrected air flow, $W_{a,1}\sqrt{\theta_1}/\delta_1$, (lb/sec) | Compressor efficiency, $\eta_c$, (percent) | Run |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | 8 | 9 | 10 | 11 | 12 | | | | | | | | | | | |
| 973 | 1022 | 1044 | 1065 | 1065 | 1044 | 1051 | 526 | 1134 | 1070 | 1.421 | 3348 | 0.377 | 11.80 | 29.41 | 71.2 | 128 |
| 1588 | 1982 | 2597 | 3017 | 3608 | 4291 | 4889 | 835 | 5191 | 5099 | 4.755 | 8290 | .934 | 51.83 | 95.66 | 72.7 | 129 |
| 1618 | 1998 | 2413 | 2984 | 3554 | 4187 | 4779 | 822 | 5058 | 4877 | 4.637 | 8054 | .908 | 50.99 | 94.48 | 74.7 | 130 |
| 1675 | 2048 | 2435 | 2963 | 3505 | 4083 | 4632 | 805 | 4902 | 4720 | 4.485 | 7868 | .887 | 51.43 | 94.92 | 76.0 | 131 |
| 1841 | 2200 | 2552 | 3000 | 3439 | 3883 | 4305 | 769 | 4572 | 4391 | 4.152 | 7343 | .828 | 50.49 | 92.42 | 79.4 | 132 |
| 1943 | 2259 | 2555 | 2907 | 3217 | 3505 | 3787 | 731 | 4041 | 3947 | 3.680 | 6775 | .764 | 47.18 | 86.67 | 82.3 | 133 |
| 1911 | 2179 | 2411 | 2658 | 2862 | 3010 | 3172 | 695 | 3405 | 3267 | 3.132 | 6235 | .703 | 41.99 | 77.93 | 81.7 | 134 |
| 1746 | 1922 | 2041 | 2147 | 2203 | 2161 | 2217 | 624 | 2381 | 2285 | 2.202 | 5270 | .594 | 32.18 | 60.04 | 78.7 | 135 |
| 1538 | 1644 | 1700 | 1728 | 1714 | 1581 | 1574 | 566 | 1685 | 1607 | 1.539 | 4279 | .482 | 24.31 | 44.90 | 67.6 | 136 |
| 2119 | 2618 | 3161 | 3949 | 4716 | 5582 | 6371 | 848 | 6750 | 6507 | 4.708 | 8148 | .918 | 66.93 | 95.73 | 75.2 | 137 |
| 2167 | 2660 | 3181 | 3892 | 4603 | 5370 | 6102 | 833 | 6462 | 6226 | 4.538 | 7938 | .895 | 65.99 | 94.96 | 76.2 | 138 |
| 2221 | 2700 | 3200 | 3869 | 4523 | 5227 | 5889 | 819 | 6241 | 6004 | 4.402 | 7725 | .871 | 65.18 | 94.42 | 78.2 | 139 |
| 2427 | 2892 | 3321 | 3885 | 4399 | 4927 | 5412 | 784 | 5757 | 5530 | 4.041 | 7189 | .810 | 63.24 | 91.35 | 82.3 | 140 |
| 2513 | 2907 | 3259 | 3674 | 4019 | 4329 | 4632 | 746 | 4962 | 4727 | 3.492 | 6627 | .747 | 58.44 | 84.81 | 83.8 | 141 |
| 2488 | 2812 | 3086 | 3368 | 3565 | 3684 | 3868 | 706 | 4162 | 3980 | 2.906 | 6099 | .687 | 53.07 | 76.45 | 82.6 | 142 |
| 968 | 1165 | 1566 | 1820 | 2157 | 2411 | 2692 | 845 | 2862 | 2784 | 5.590 | 8315 | .937 | 24.42 | 93.37 | 70.4 | 143 |
| 901 | 1120 | 1443 | 1739 | 2056 | 2267 | 2556 | 825 | 2717 | 2640 | 5.327 | 8100 | .913 | 24.43 | 93.85 | 71.8 | 144 |
| 890 | 1101 | 1313 | 1594 | 1841 | 2143 | 2390 | 777 | 2515 | 2432 | 4.893 | 7545 | .850 | 24.05 | 91.76 | 77.4 | 145 |
| 947 | 1130 | 1306 | 1524 | 1728 | 1953 | 2150 | 738 | 2256 | 2184 | 4.406 | 6976 | .786 | 22.87 | 87.52 | 80.2 | 146 |
| 937 | 1091 | 1225 | 1387 | 1528 | 1676 | 1809 | 697 | 1903 | 1845 | 3.746 | 6420 | .724 | 20.57 | 79.33 | 81.1 | 147 |
| 860 | 966 | 1036 | 1128 | 1198 | 1261 | 1311 | 627 | 1385 | 1339 | 2.721 | 5426 | .612 | 15.99 | 61.55 | 81.1 | 148 |
| 736 | 793 | 835 | 877 | 898 | 912 | 933 | 568 | 980 | 962 | 1.918 | 4414 | .497 | 11.23 | 43.10 | 74.8 | 149 |
| 846 | 1064 | 1395 | 1789 | 2022 | 2268 | 2529 | 861 | 2702 | 2622 | 5.308 | 8424 | .949 | 23.65 | 92.14 | 68.9 | 150 |
| 818 | 1036 | 1282 | 1627 | 1909 | 2191 | 2444 | 833 | 2604 | 2527 | 5.106 | 8207 | .925 | 23.70 | 92.16 | 71.8 | 151 |
| 818 | 1022 | 1240 | 1550 | 1803 | 2113 | 2353 | 813 | 2503 | 2427 | 4.917 | 7995 | .901 | 23.43 | 91.37 | 74.1 | 152 |
| 882 | 1065 | 1255 | 1502 | 1734 | 1980 | 2213 | 774 | 2333 | 2253 | 4.583 | 7455 | .840 | 23.01 | 89.73 | 78.7 | 153 |
| 932 | 1094 | 1263 | 1453 | 1636 | 1827 | 2003 | 739 | 2102 | 2035 | 4.122 | 6885 | .776 | 21.59 | 84.03 | 80.9 | 154 |
| 931 | 1072 | 1199 | 1347 | 1474 | 1593 | 1713 | 699 | 1807 | 1745 | 3.543 | 6342 | .715 | 20.15 | 78.35 | 81.8 | 155 |
| 841 | 940 | 1010 | 1087 | 1137 | 1186 | 1228 | 632 | 1299 | 1260 | 2.547 | 5356 | .604 | 15.14 | 58.93 | 80.0 | 156 |
| 705 | 762 | 797 | 832 | 846 | 846 | 867 | 568 | 912 | 893 | 1.792 | 4361 | .491 | 10.46 | 40.79 | 74.8 | 157 |
| 623 | 658 | 665 | 679 | 686 | 679 | 679 | 526 | 707 | 695 | 1.386 | 3355 | .378 | 7.10 | 27.64 | 64.8 | 158 |
| 568 | 582 | 582 | 597 | 590 | 582 | 590 | 489 | 599 | 592 | 1.165 | 2177 | .245 | 7.15 | 27.67 | 65.9 | 159 |
| 752 | 950 | 1168 | 1499 | 1794 | 2111 | 2393 | 826 | 2551 | 2468 | 5.032 | 8534 | .962 | 23.86 | 92.13 | 68.2 | 160 |
| 768 | 958 | 1162 | 1457 | 1732 | 2056 | 2323 | 809 | 2474 | 2392 | 4.861 | 8300 | .935 | 24.06 | 92.69 | 70.3 | 161 |
| 776 | 959 | 1163 | 1444 | 1705 | 2015 | 2289 | 792 | 2424 | 2338 | 4.762 | 8123 | .915 | 24.15 | 92.70 | 71.4 | 162 |
| 846 | 1022 | 1205 | 1437 | 1670 | 1923 | 2148 | 753 | 2269 | 2189 | 4.467 | 7587 | .855 | 23.51 | 90.25 | 75.5 | 163 |
| 911 | 1080 | 1235 | 1432 | 1608 | 1798 | 1974 | 726 | 2079 | 2003 | 4.084 | 7002 | .789 | 22.70 | 87.05 | 77.1 | 164 |
| 915 | 1063 | 1190 | 1331 | 1465 | 1584 | 1704 | 683 | 1804 | 1743 | 3.558 | 6437 | .725 | 20.57 | 79.28 | 80.8 | 165 |
| 845 | 944 | 1014 | 1091 | 1148 | 1190 | 1239 | 616 | 1312 | 1269 | 2.588 | 5431 | .612 | 15.95 | 61.59 | 80.7 | 166 |
| 726 | 790 | 825 | 860 | 874 | 874 | 902 | 571 | 951 | 925 | 1.872 | 4414 | .497 | 11.16 | 43.08 | 70.1 | 167 |
| 608 | 749 | 960 | 1124 | 1312 | 1460 | 1614 | 836 | 1714 | 1669 | 5.547 | 8130 | .916 | 14.72 | 92.99 | 70.8 | 168 |
| 583 | 716 | 850 | 1026 | 1174 | 1343 | 1484 | 787 | 1561 | 1517 | 4.924 | 7545 | .850 | 14.43 | 89.27 | 75.5 | 169 |
| 586 | 698 | 811 | 938 | 1057 | 1191 | 1311 | 741 | 1374 | 1336 | 4.461 | 6995 | .788 | 13.78 | 87.41 | 79.3 | 170 |
| 588 | 686 | 771 | 869 | 984 | 1045 | 1123 | 702 | 1181 | 1146 | 3.737 | 6420 | .724 | 12.42 | 77.00 | 79.3 | 171 |
| 521 | 585 | 627 | 683 | 718 | 754 | 789 | 632 | 832 | 812 | 2.667 | 5431 | .612 | 9.81 | 61.55 | 76.5 | 172 |
| 556 | 697 | 922 | 1098 | 1303 | 1450 | 1619 | 859 | 1726 | 1680 | 5.394 | 8574 | .752 | 15.01 | 91.40 | 65.1 | 173 |
| 540 | 674 | 864 | 1054 | 1244 | 1399 | 1554 | 831 | 1657 | 1608 | 5.244 | 8361 | .942 | 14.97 | 92.22 | 67.9 | 174 |
| 504 | 638 | 772 | 969 | 1138 | 1307 | 1462 | 805 | 1551 | 1506 | 5.119 | 8168 | .921 | 14.40 | 92.34 | 70.9 | 175 |
| 538 | 658 | 785 | 940 | 1080 | 1256 | 1404 | 769 | 1478 | 1430 | 4.677 | 7594 | .856 | 14.71 | 90.70 | 74.2 | 176 |
| 583 | 695 | 794 | 920 | 1040 | 1167 | 1280 | 735 | 1348 | 1308 | 4.237 | 7002 | .789 | 14.34 | 88.03 | 77.1 | 177 |
| 586 | 684 | 762 | 860 | 938 | 1029 | 1099 | 695 | 1163 | 1125 | 3.657 | 6443 | .726 | 12.76 | 78.33 | 78.4 | 178 |
| 522 | 586 | 628 | 684 | 712 | 740 | 769 | 629 | 818 | 788 | 2.613 | 5446 | .614 | 9.10 | 56.75 | 74.7 | 179 |
| 488 | 622 | 770 | 988 | 1178 | 1361 | 1523 | 850 | 1629 | 1579 | 5.091 | 8574 | .966 | 15.01 | 91.40 | 66.8 | 180 |
| 493 | 620 | 754 | 951 | 1127 | 1317 | 1479 | 816 | 1575 | 1530 | 4.953 | 8354 | .941 | 14.99 | 91.84 | 67.9 | 181 |
| 500 | 620 | 739 | 922 | 1077 | 1274 | 1429 | 796 | 1521 | 1470 | 4.768 | 8145 | .918 | 15.04 | 91.86 | 69.6 | 182 |
| 535 | 655 | 761 | 908 | 1049 | 1204 | 1345 | 762 | 1420 | 1373 | 4.465 | 7594 | .856 | 14.74 | 90.31 | 73.0 | 183 |
| 570 | 683 | 782 | 901 | 1007 | 1120 | 1225 | 731 | 1297 | 1253 | 4.079 | 7014 | .790 | 13.85 | 84.86 | 74.8 | 184 |
| 575 | 673 | 751 | 842 | 912 | 990 | 1067 | 693 | 1127 | 1092 | 3.578 | 6443 | .726 | 12.20 | 75.60 | 77.5 | 185 |
| 510 | 574 | 609 | 665 | 686 | 714 | 735 | 627 | 782 | 764 | 2.483 | 5441 | .613 | 9.92 | 61.53 | 71.5 | 186 |
| 464 | 570 | 718 | 845 | 978 | 1091 | 1204 | 843 | 1276 | 1244 | 5.524 | 8123 | .915 | 10.97 | 92.78 | 69.9 | 187 |
| 447 | 560 | 658 | 792 | 905 | 1032 | 1137 | 790 | 1204 | 1172 | 4.975 | 7573 | .853 | 11.00 | 88.81 | 74.3 | 188 |
| 456 | 548 | 632 | 738 | 822 | 928 | 1019 | 740 | 1067 | 1038 | 4.373 | 7008 | .790 | 10.34 | 82.64 | 77.4 | 189 |
| 457 | 542 | 605 | 683 | 753 | 823 | 887 | 702 | 936 | 912 | 3.820 | 6455 | .727 | 9.62 | 76.51 | 78.5 | 190 |

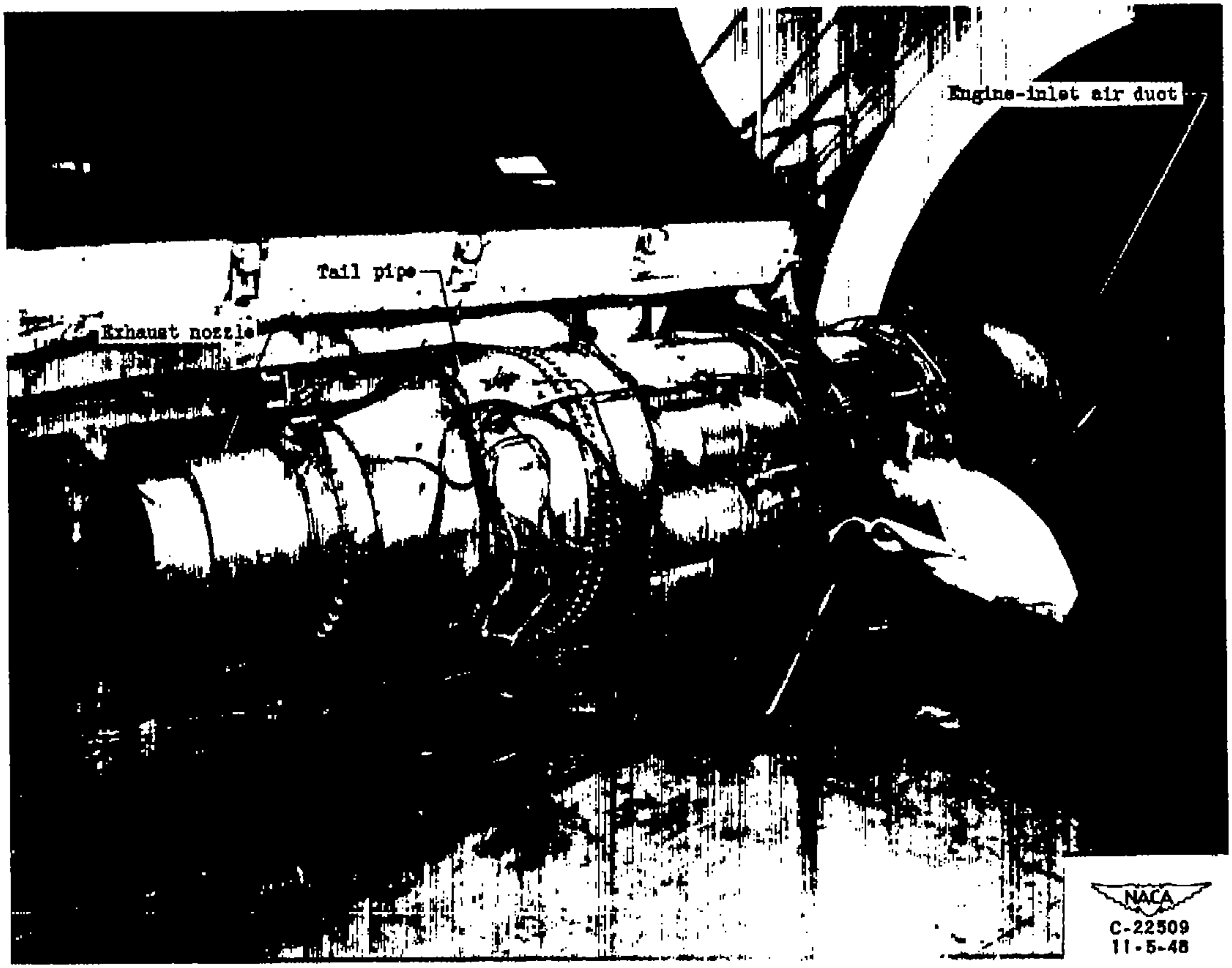



Figure 1. - Installation of turbojet engine in altitude wind tunnel.

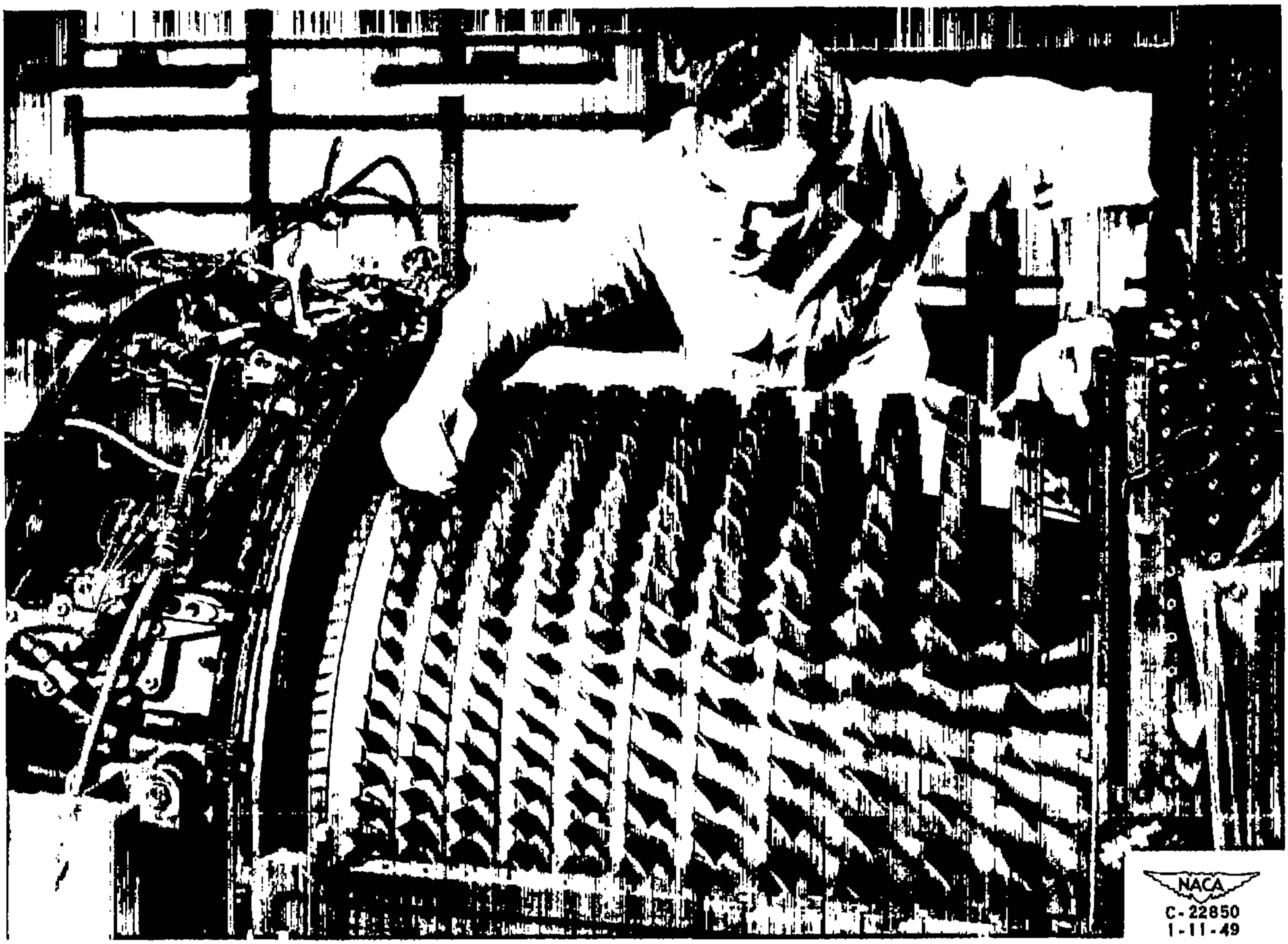



Figure 2. - Compressor installation with one-half of stator casing removed.

1175

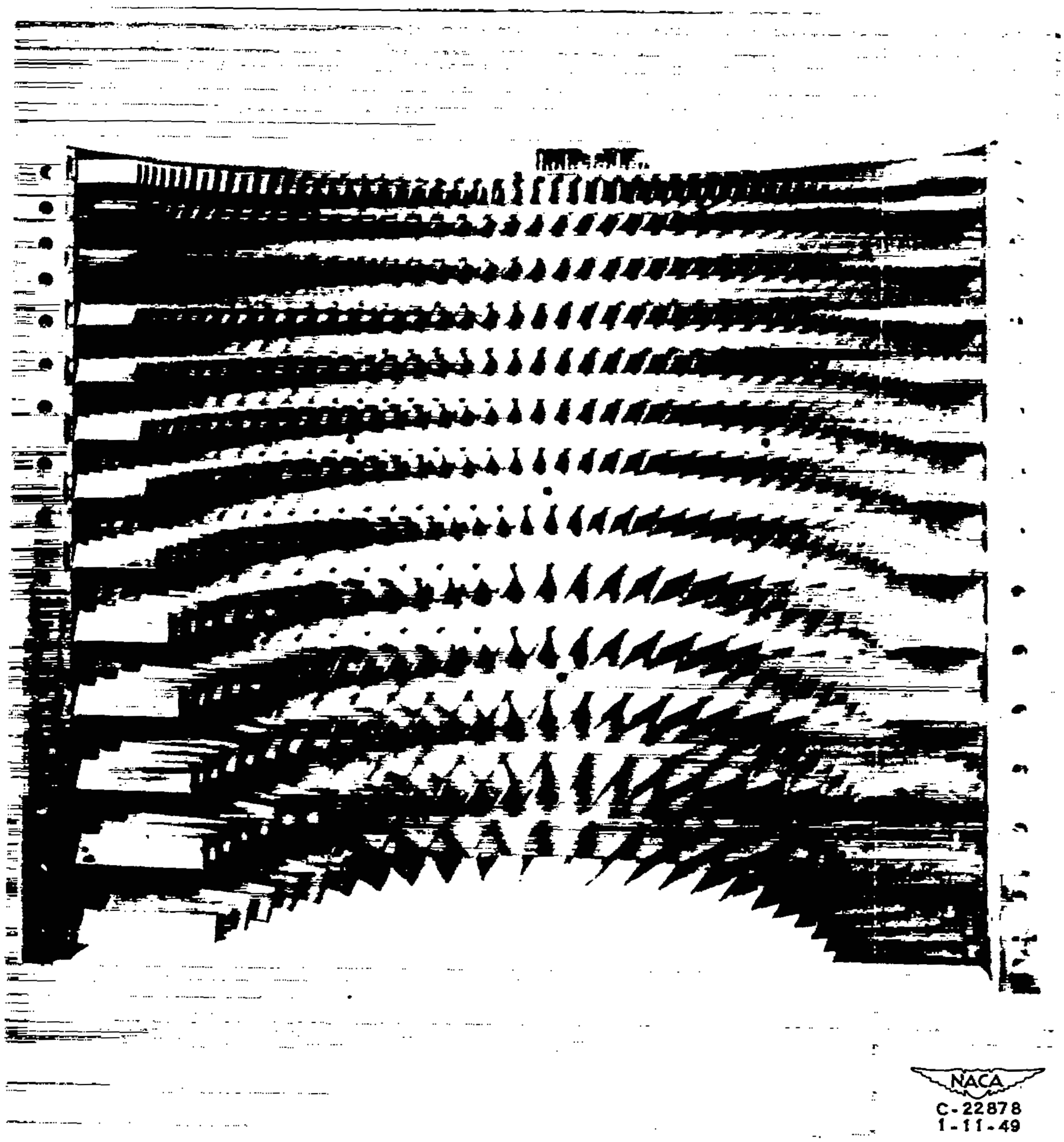
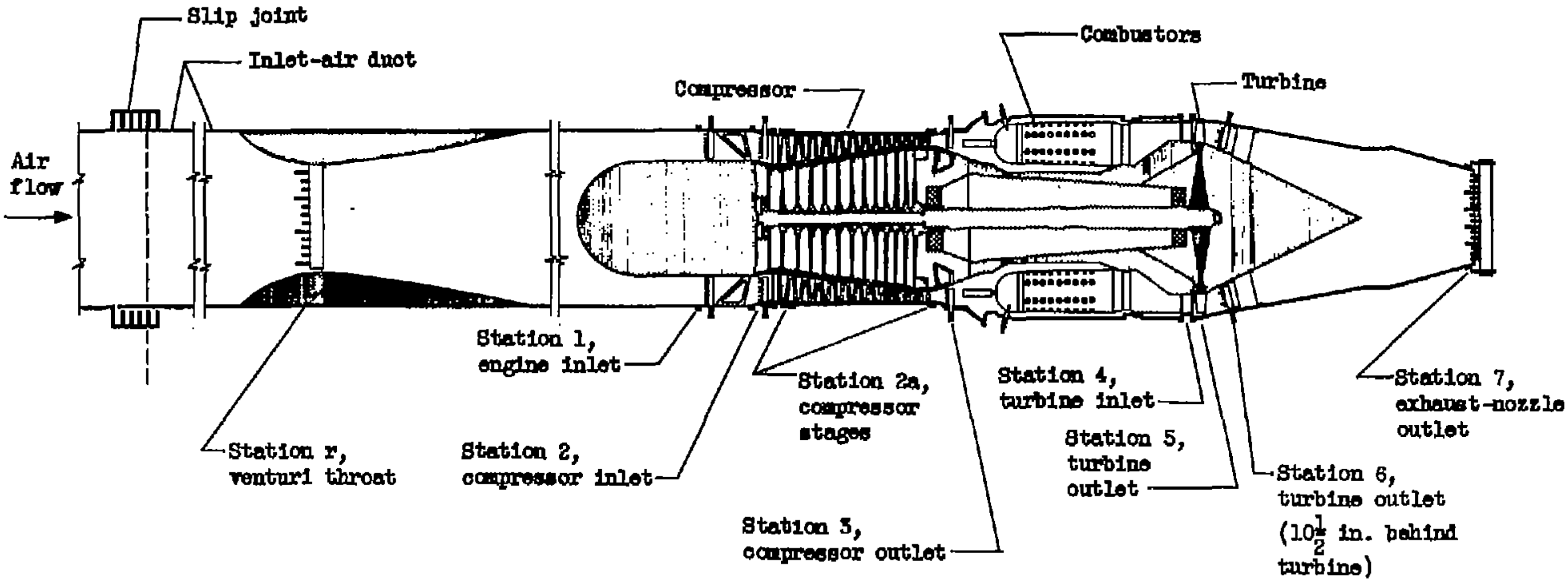



Figure 3. - Top half of compressor-casing assembly showing stator blades and outlet guide vanes.




| Station | Total-pressure tubes | Static-pressure tubes | Wall static-pressure orifices | Thermo-couples |
|---|---|---|---|---|
| r | 12 | 4 | 4 | 6 |
| 1 | 40 | 4 | 0 | 8 |
| 2 | 24 | 0 | 4 | 0 |
| 2a | 0 | 0 | 13 | 0 |
| 3 | 20 | 0 | 4 | 6 |
| 4 | 5 | 0 | 0 | 0 |
| 5 | 0 | 0 | 0 | 8 |
| 6 | 30 | 0 | 2 | 33 |
| 7 | 18 | 5 | 4 | 14 |

Figure 4. - Cross section of turbojet-engine installation showing instrumentation installations.

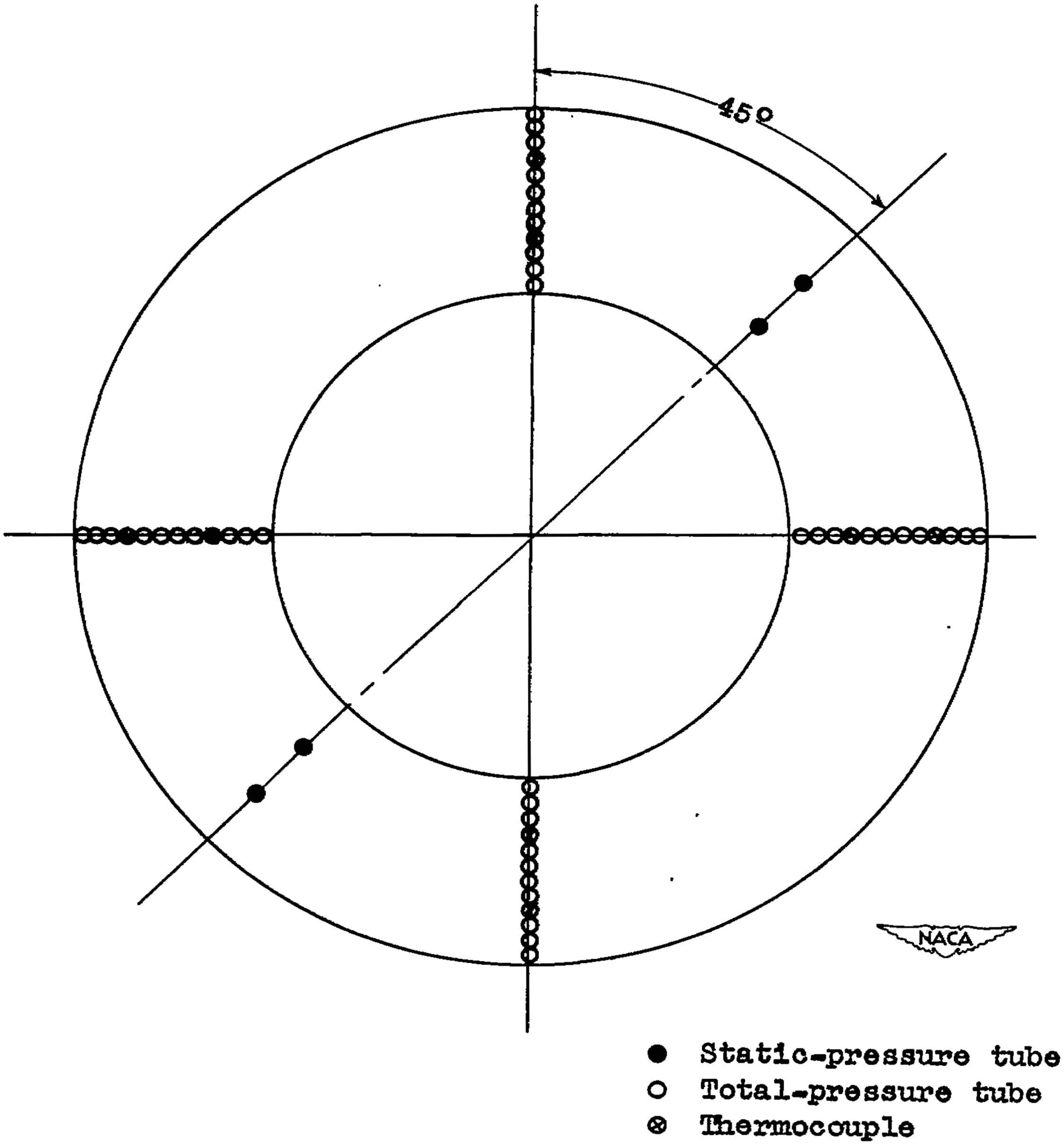



Figure 5. - Instrumentation at engine inlet, station 1, $18\frac{7}{8}$ inches upstream of leading edge of inlet guide vanes. Viewed from upstream.

1175

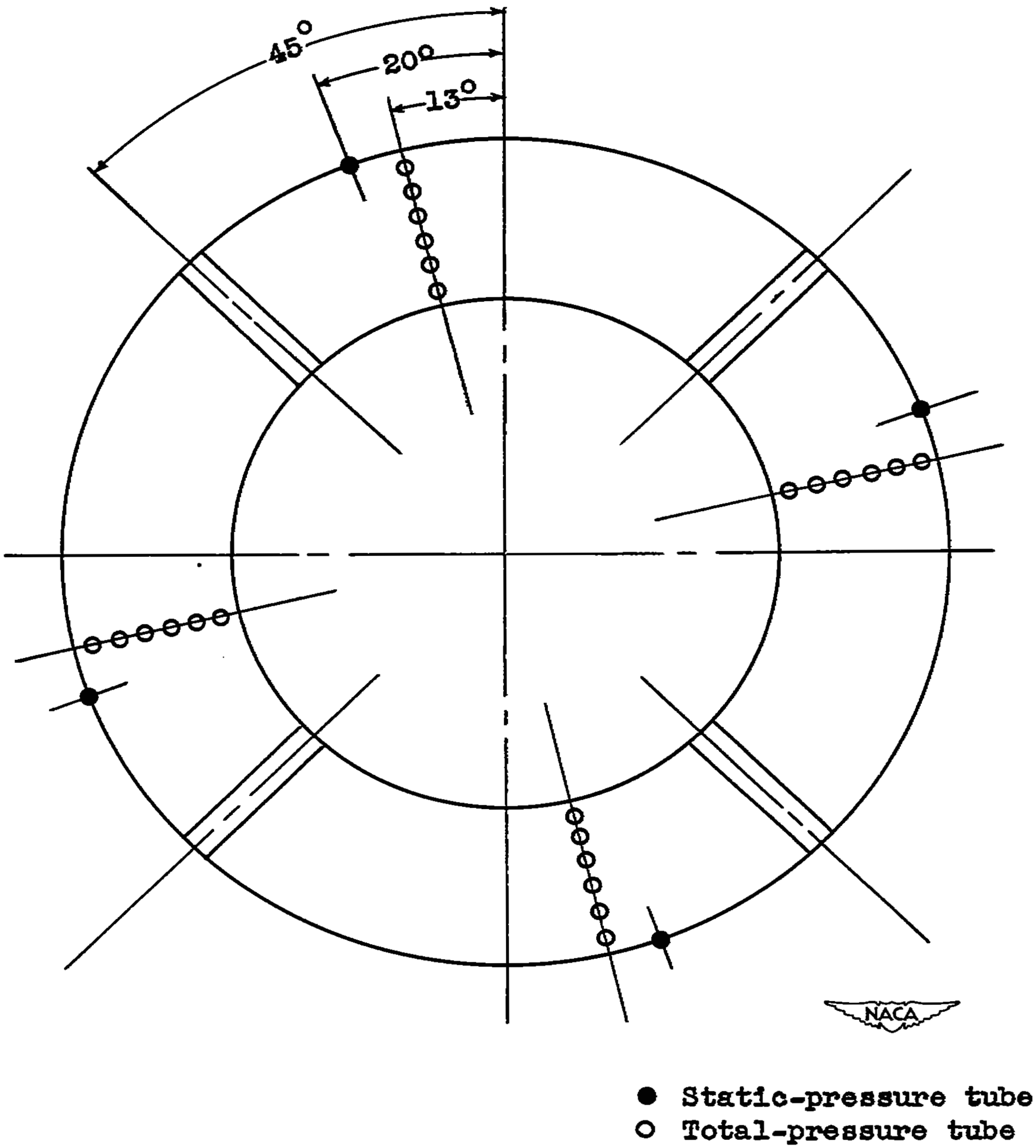



Figure 6. - Instrumentation at compressor inlet, station 2, 5 inches upstream of leading edge of inlet guide vanes, Viewed from upstream.

1175

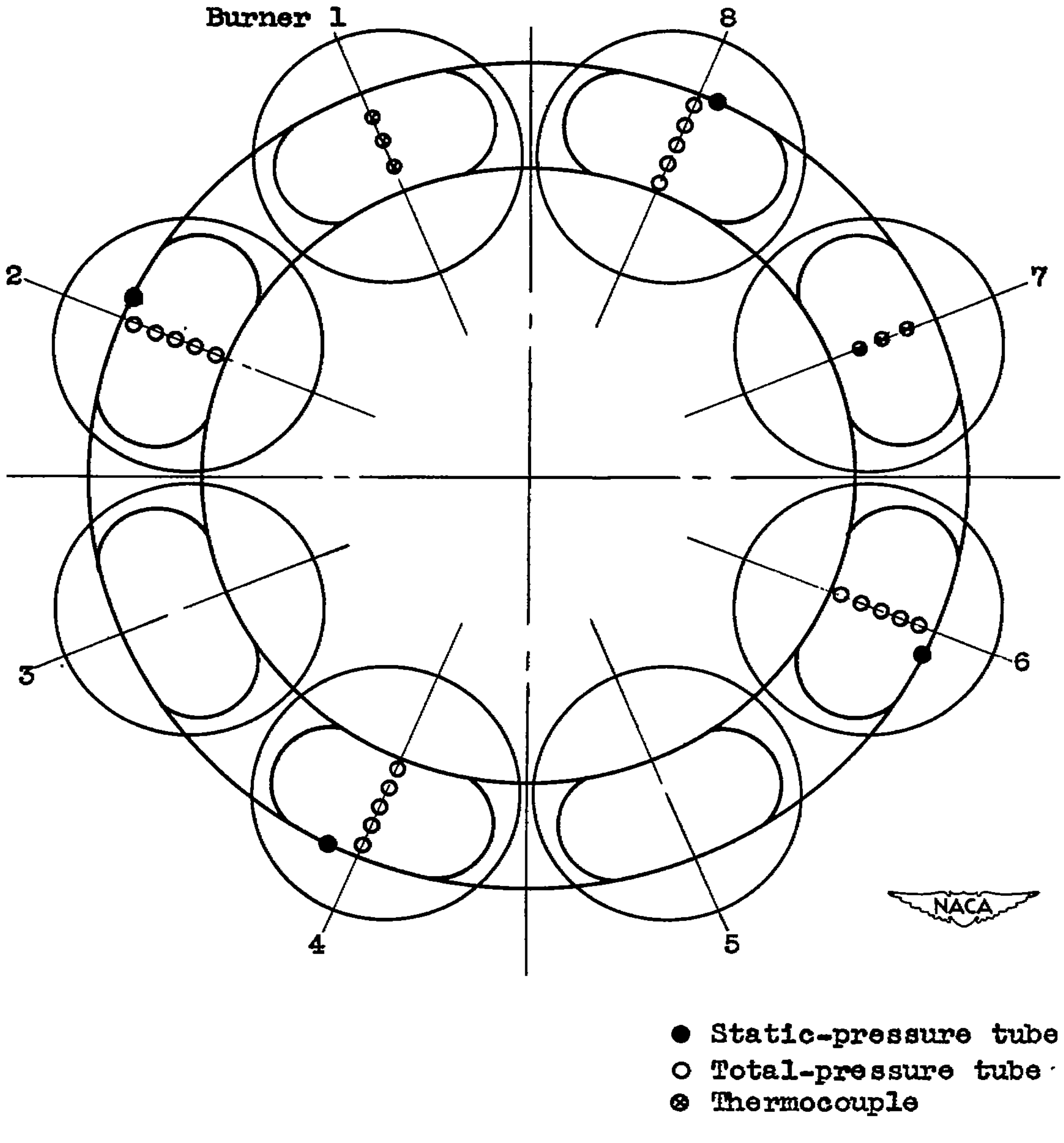
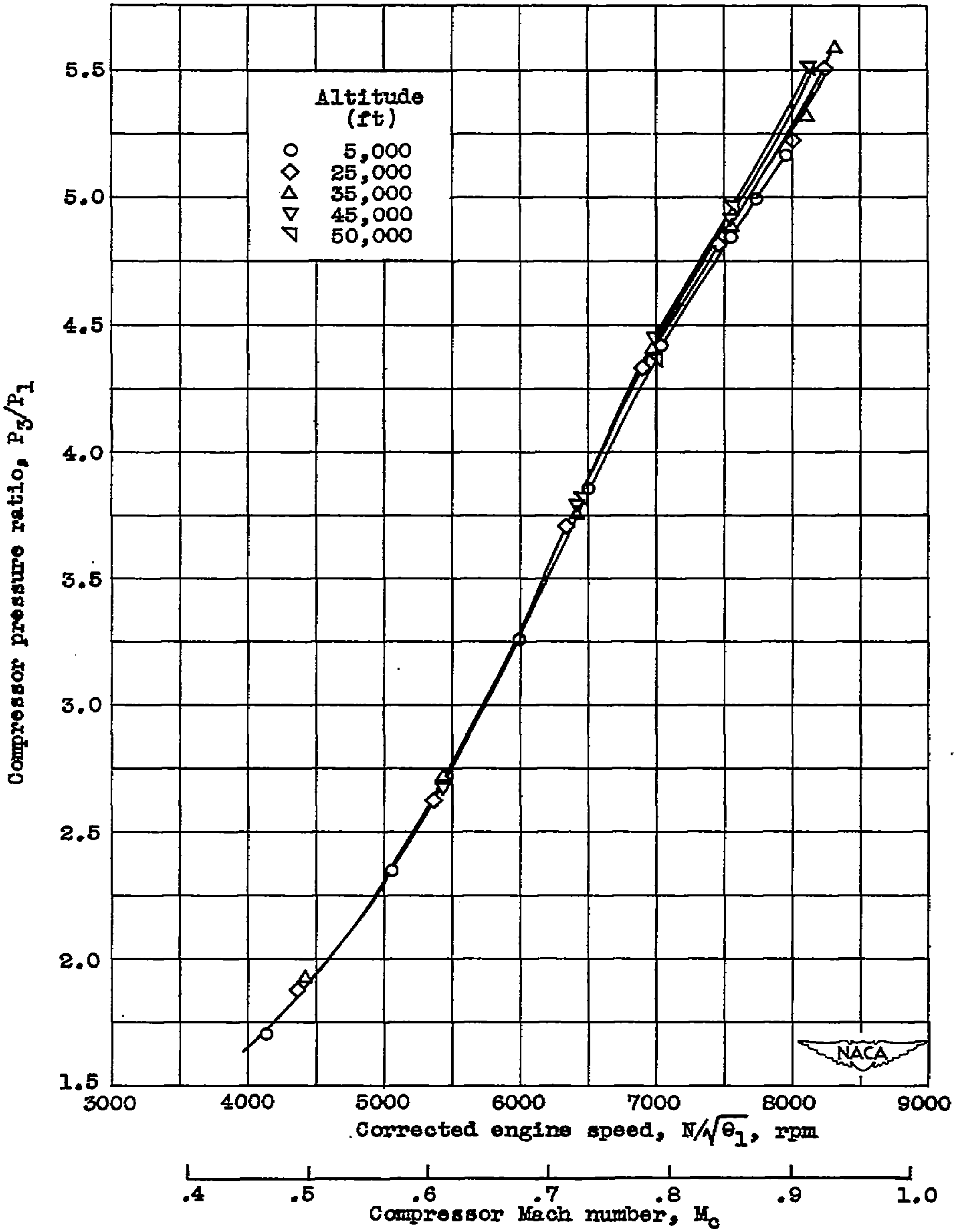



Figure 7. - Instrumentation at compressor outlet, station 3, $3\frac{1}{4}$ inches downstream of trailing edge of outlet guide vanes. Viewed from upstream.

1175




(a) Relation of compressor pressure ratio to corrected engine speed.

Figure 8. - Effect of altitude on compressor operating line. Flight Mach number, 0.20; exhaust-nozzle-outlet area, 280 square inches.

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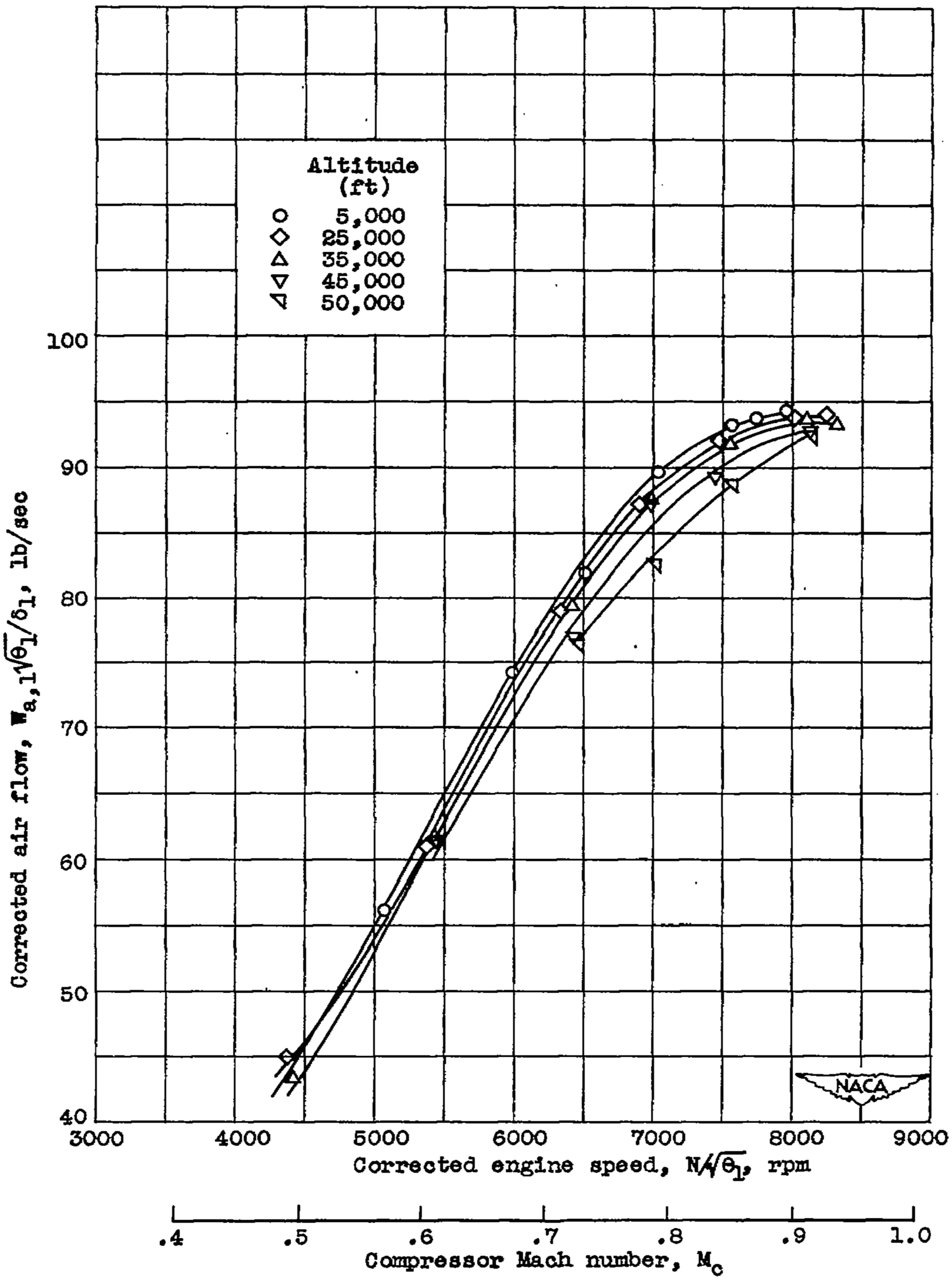
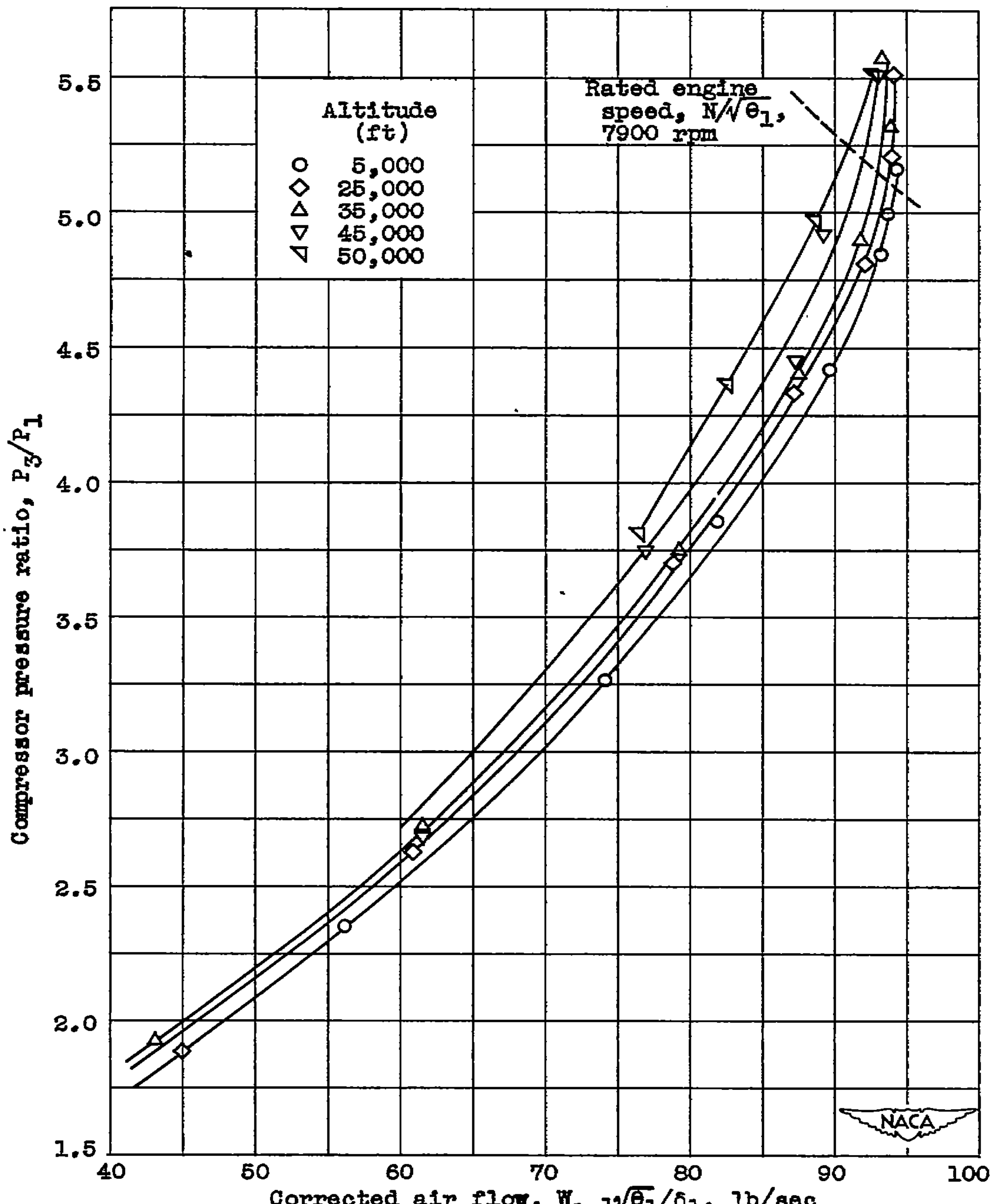


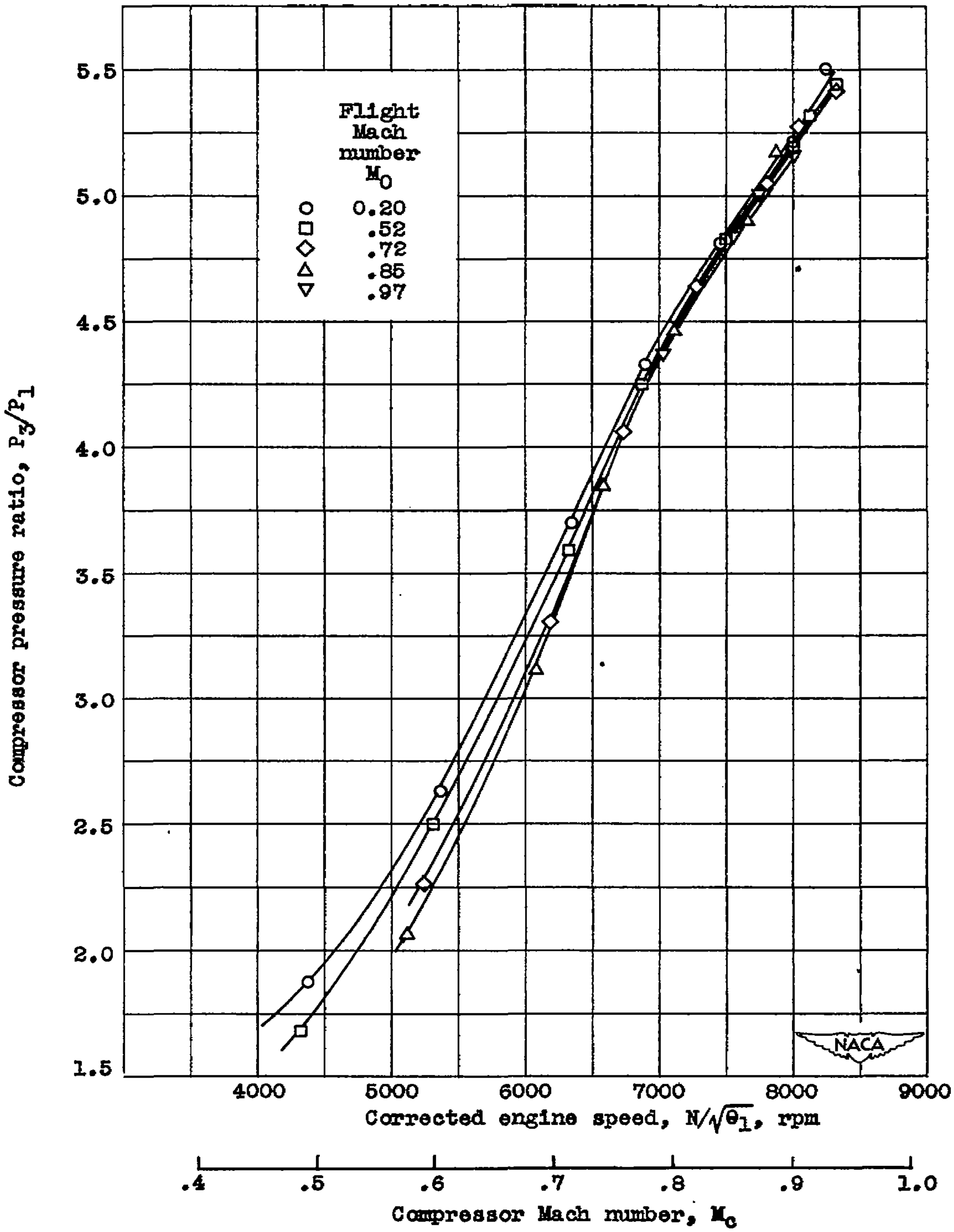

(b) Relation of corrected air flow to corrected engine speed.

Figure 8. - Continued. Effect of altitude on compressor operating line. Flight Mach number, 0.20; exhaust-nozzle-outlet area, 280 square inches.



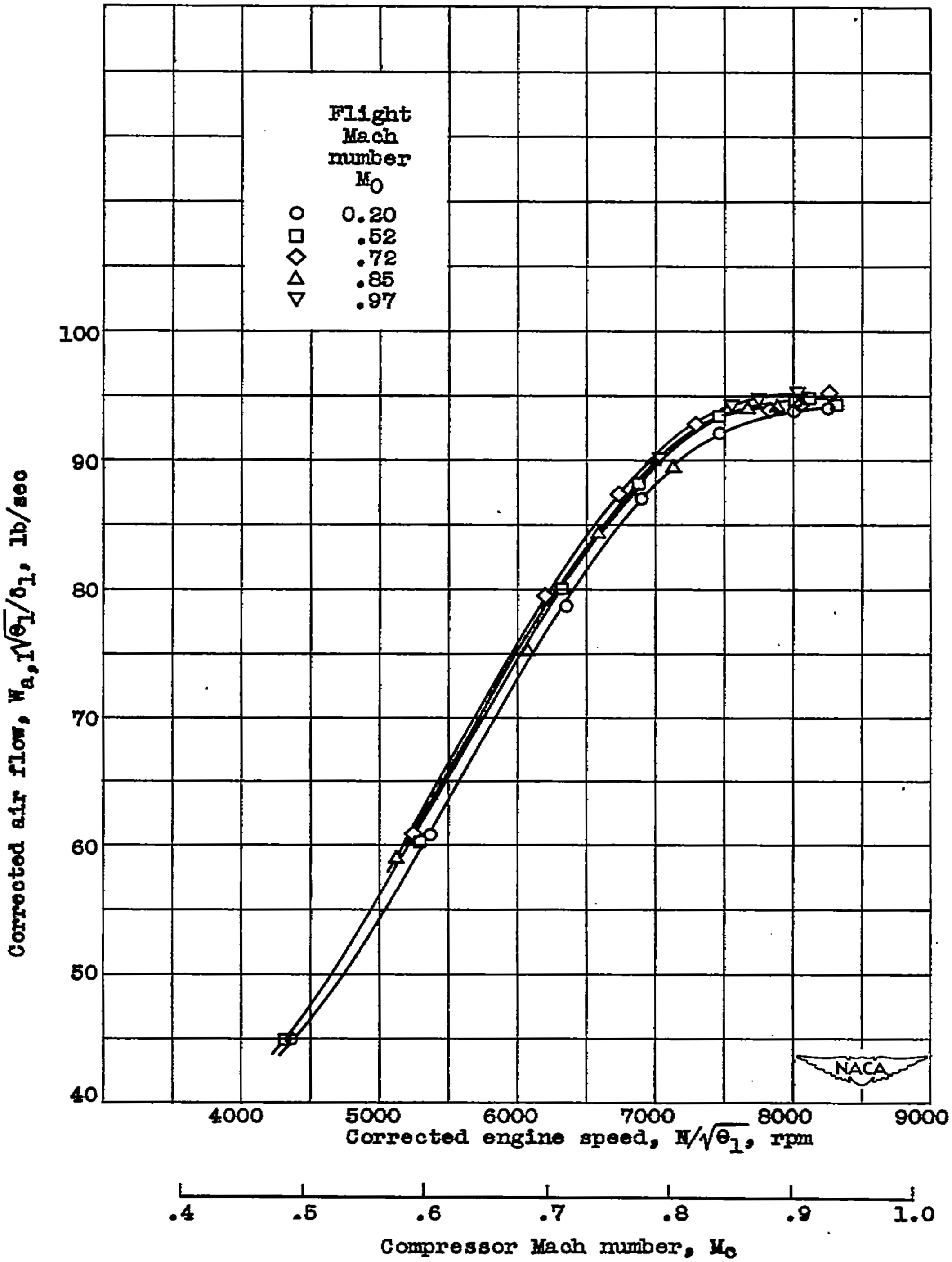

(c) Relation of compressor pressure ratio to corrected air flow.

Figure 8. - Concluded. Effect of altitude on compressor operating line. Flight Mach number, 0.20; exhaust-nozzle-outlet area, 280 square inches.



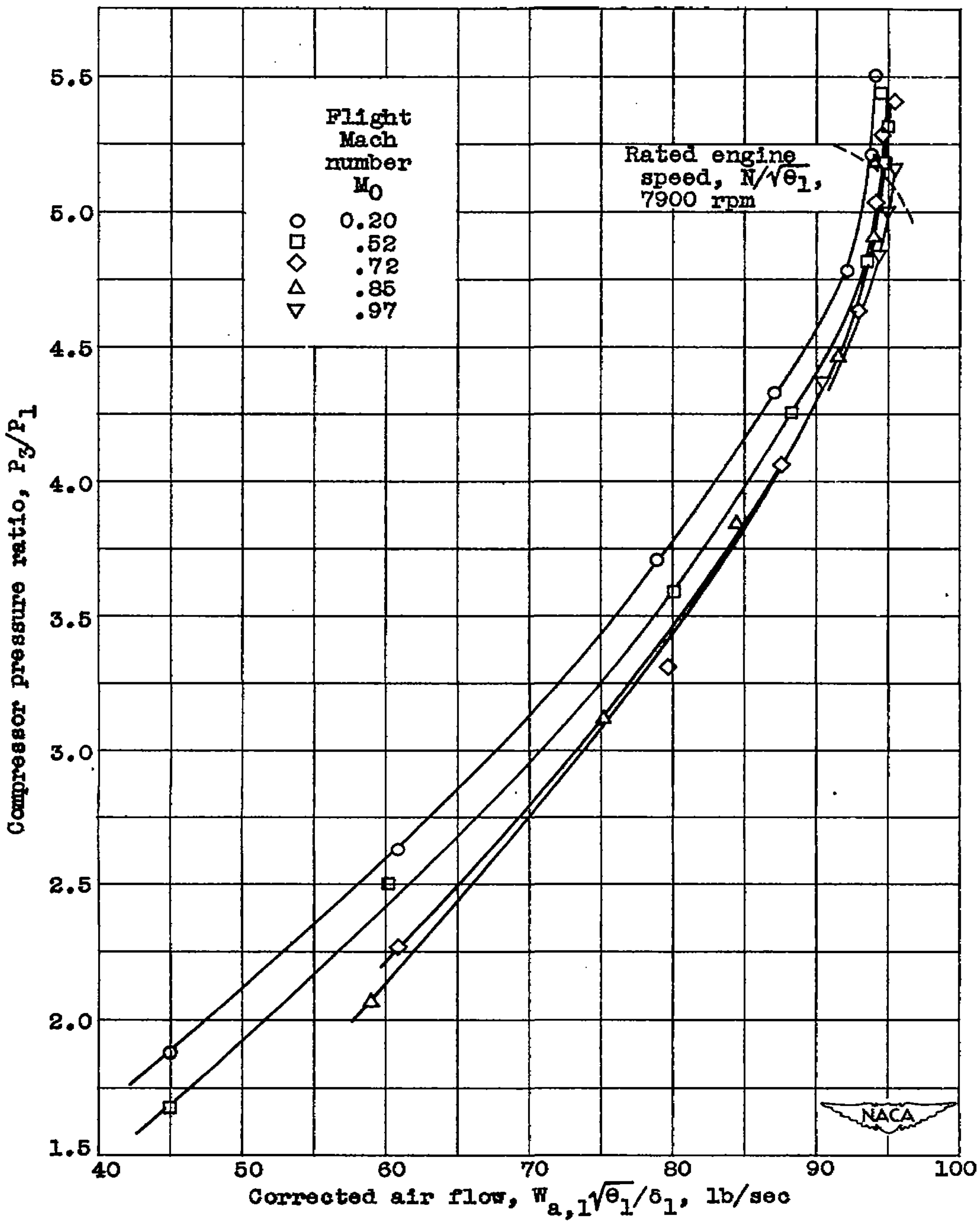

(a) Relation of compressor pressure ratio to corrected engine speed.

Figure 9. - Effect of flight Mach number on compressor operating line. Altitude, 25,000 feet; exhaust-nozzle-outlet area, 280 square inches.



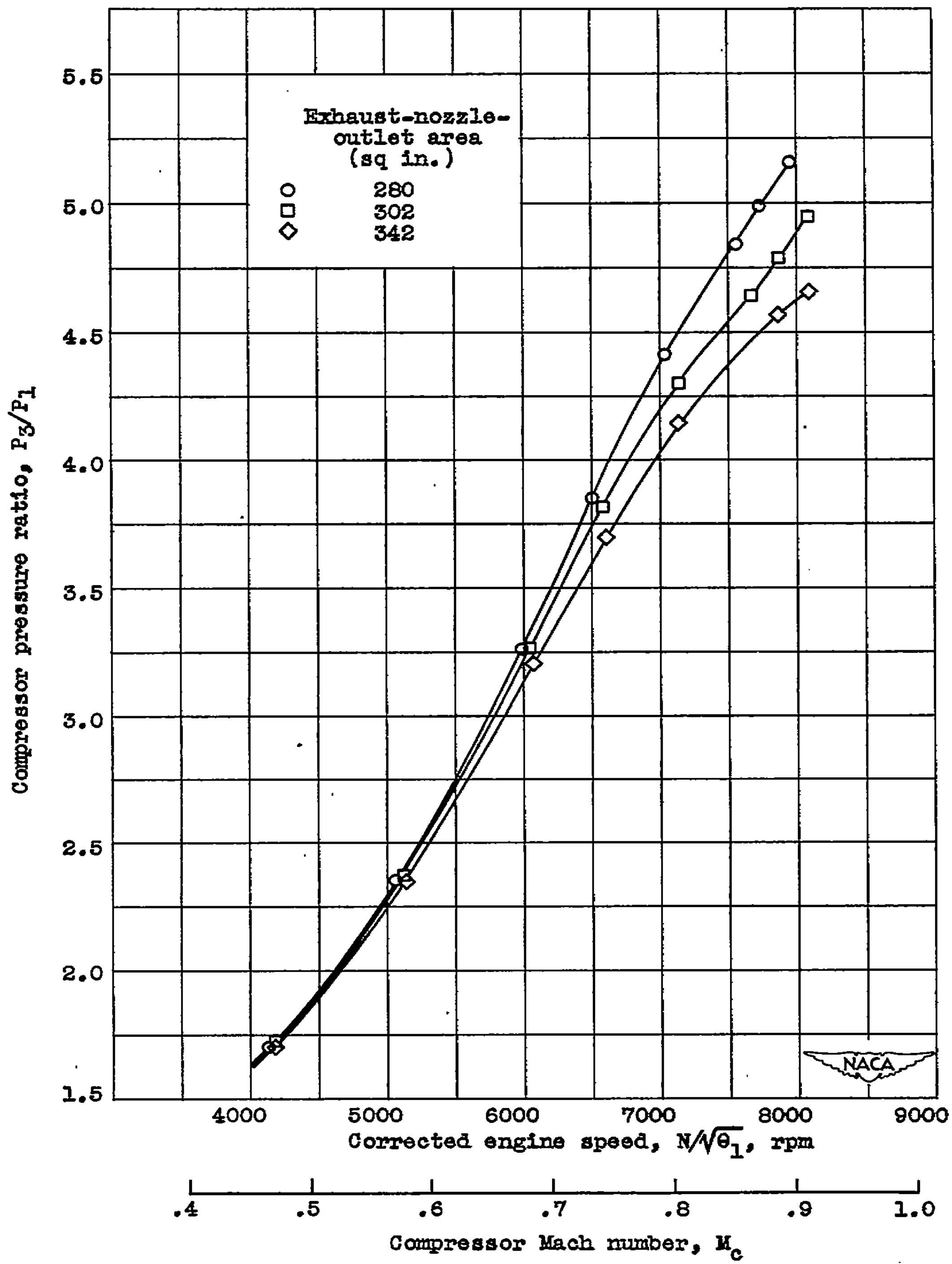

(b) Relation of corrected air flow to corrected engine speed.

Figure 9. - Continued. Effect of flight Mach number on compressor operating line. Altitude, 25,000 feet; exhaust-nozzle-outlet area, 280 square inches.




(c) Relation of compressor pressure ratio to corrected air flow.

Figure 9. - Concluded. Effect of flight Mach number on compressor operating line. Altitude, 25,000 feet; exhaust-nozzle-outlet area, 280 square inches.




(a) Relation of compressor pressure ratio to corrected engine speed.

Figure 10. - Effect of exhaust-nozzle-outlet area on compressor operating line. Altitude, 5000 feet; flight Mach number, 0.20.

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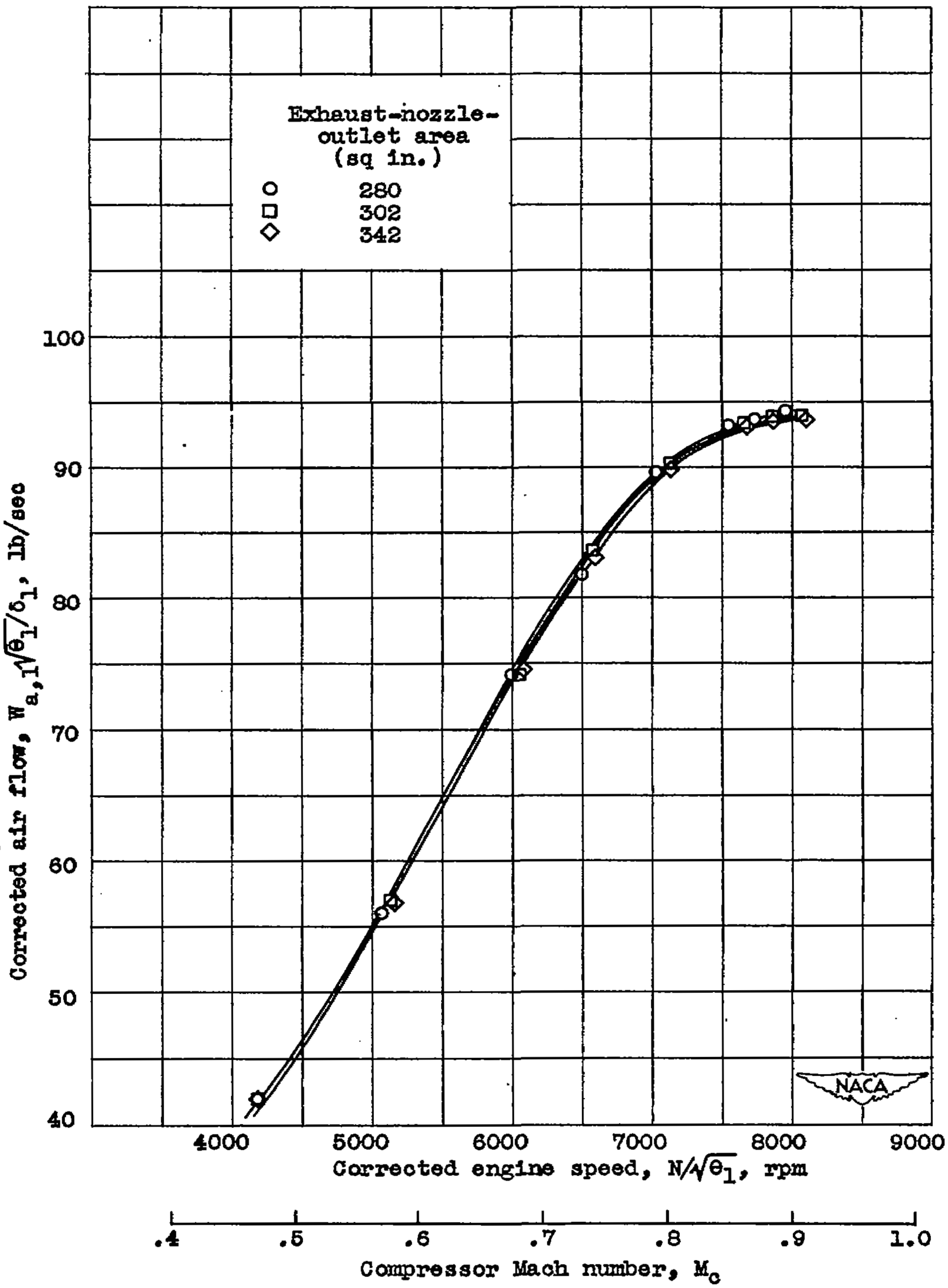


(b) Relation of corrected air flow to corrected engine speed.

Figure 10. - Continued. Effect of exhaust-nozzle-outlet area on compressor operating line. Altitude, 5000 feet; flight Mach number, 0.20.

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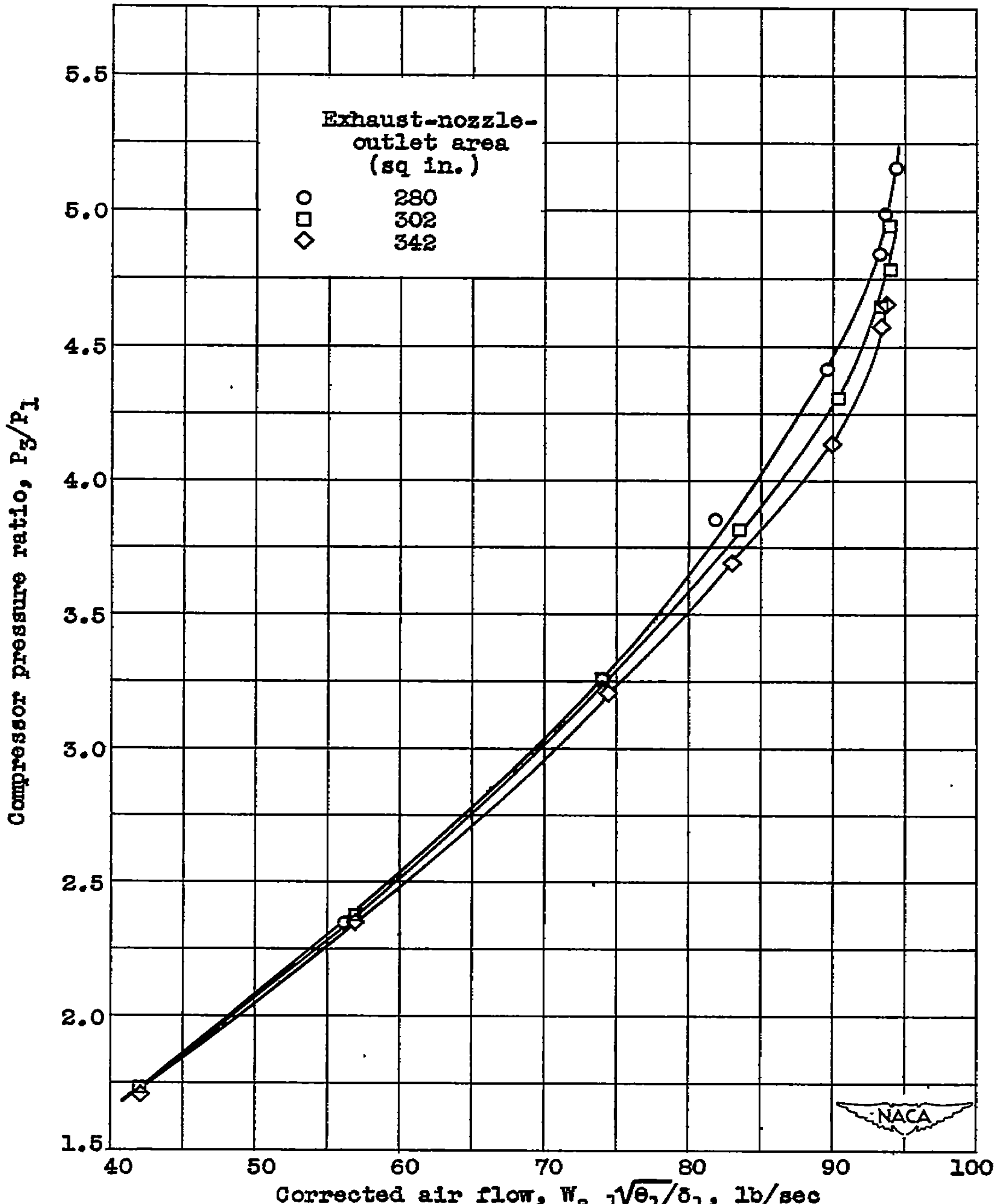


(c) Relation of compressor pressure ratio to corrected air flow.

Figure 10. - Concluded. Effect of exhaust-nozzle-outlet area on compressor operating line. Altitude, 5000 feet; flight Mach number, 0.20.

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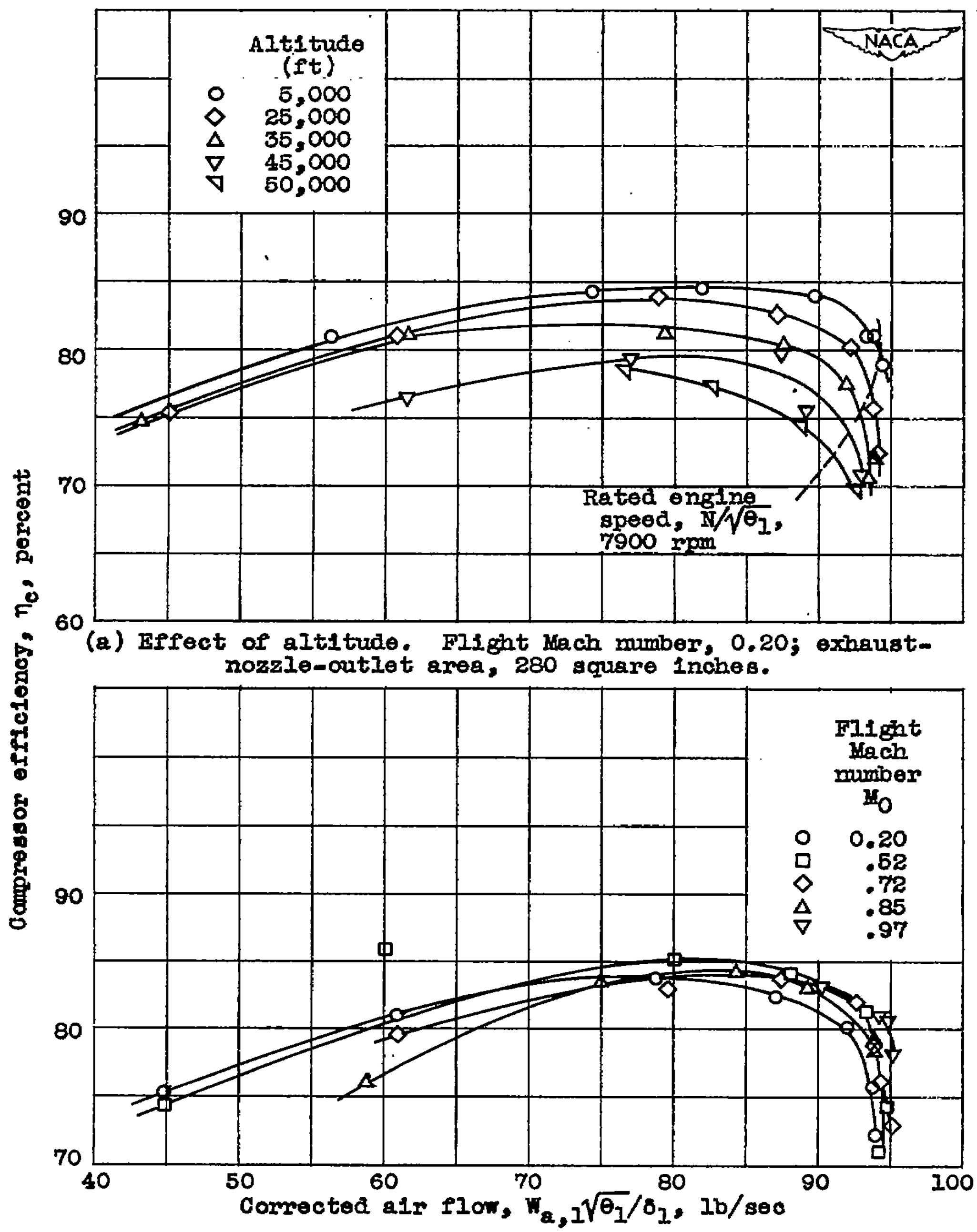
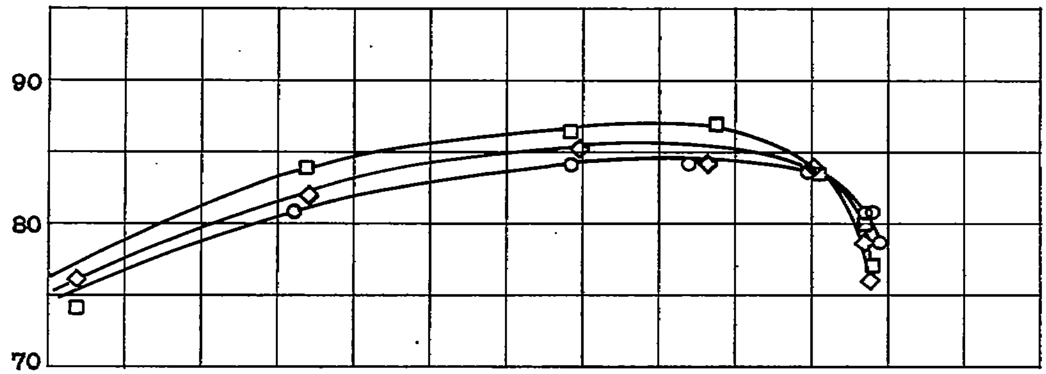


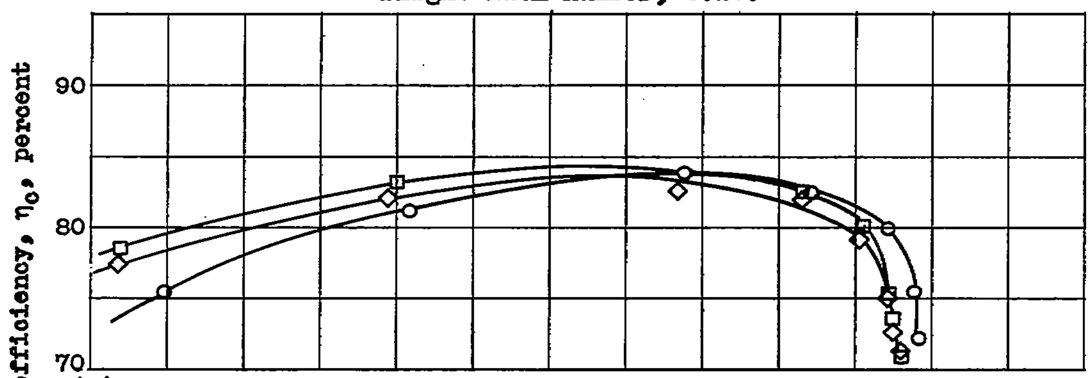

(a) Effect of altitude. Flight Mach number, 0.20; exhaust-nozzle-outlet area, 280 square inches.

(b) Effect of flight Mach number. Altitude, 25,000 feet; exhaust-nozzle-outlet area, 280 square inches.

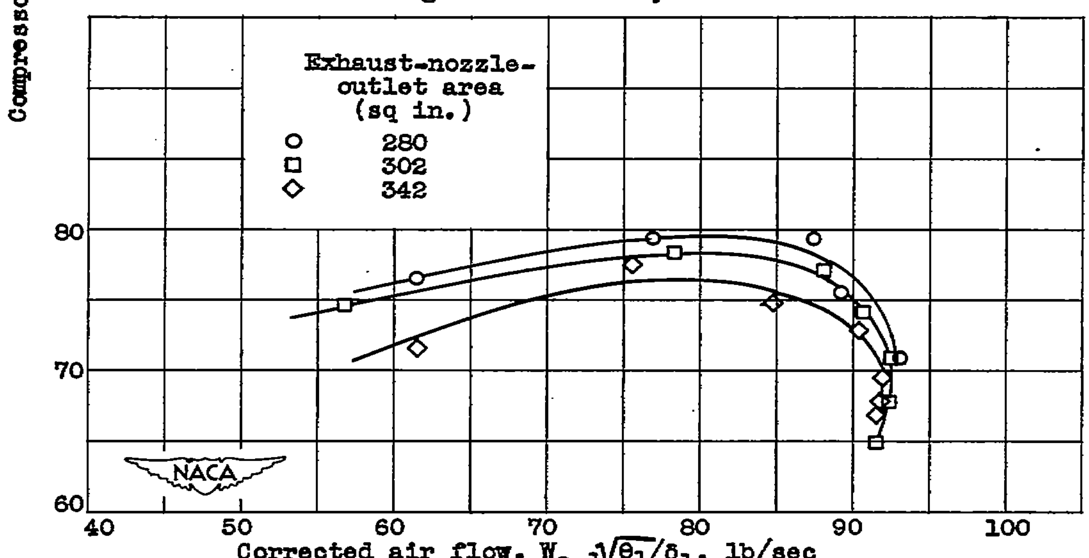
Figure 11. - Relation between compressor efficiency and corrected air flow.




(c) Effect of exhaust-nozzle-outlet area. Altitude, 5000 feet; flight Mach number, 0.20.




(d) Effect of exhaust-nozzle-outlet area. Altitude, 25,000 feet; flight Mach number, 0.20.




(e) Effect of exhaust-nozzle-outlet area. Altitude, 45,000 feet; flight Mach number, 0.20.

Figure 11. - Concluded. Relation between compressor efficiency and corrected air flow.

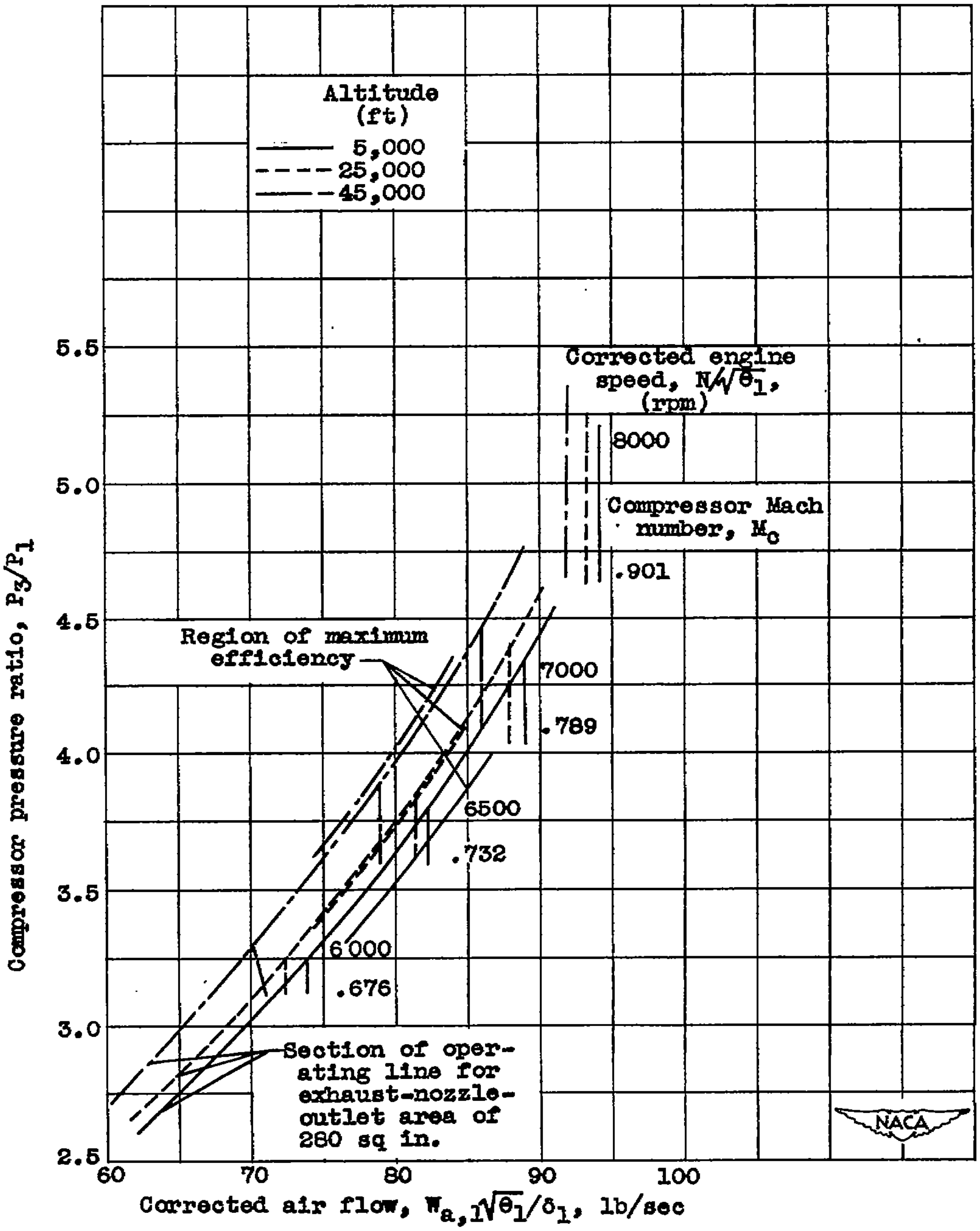
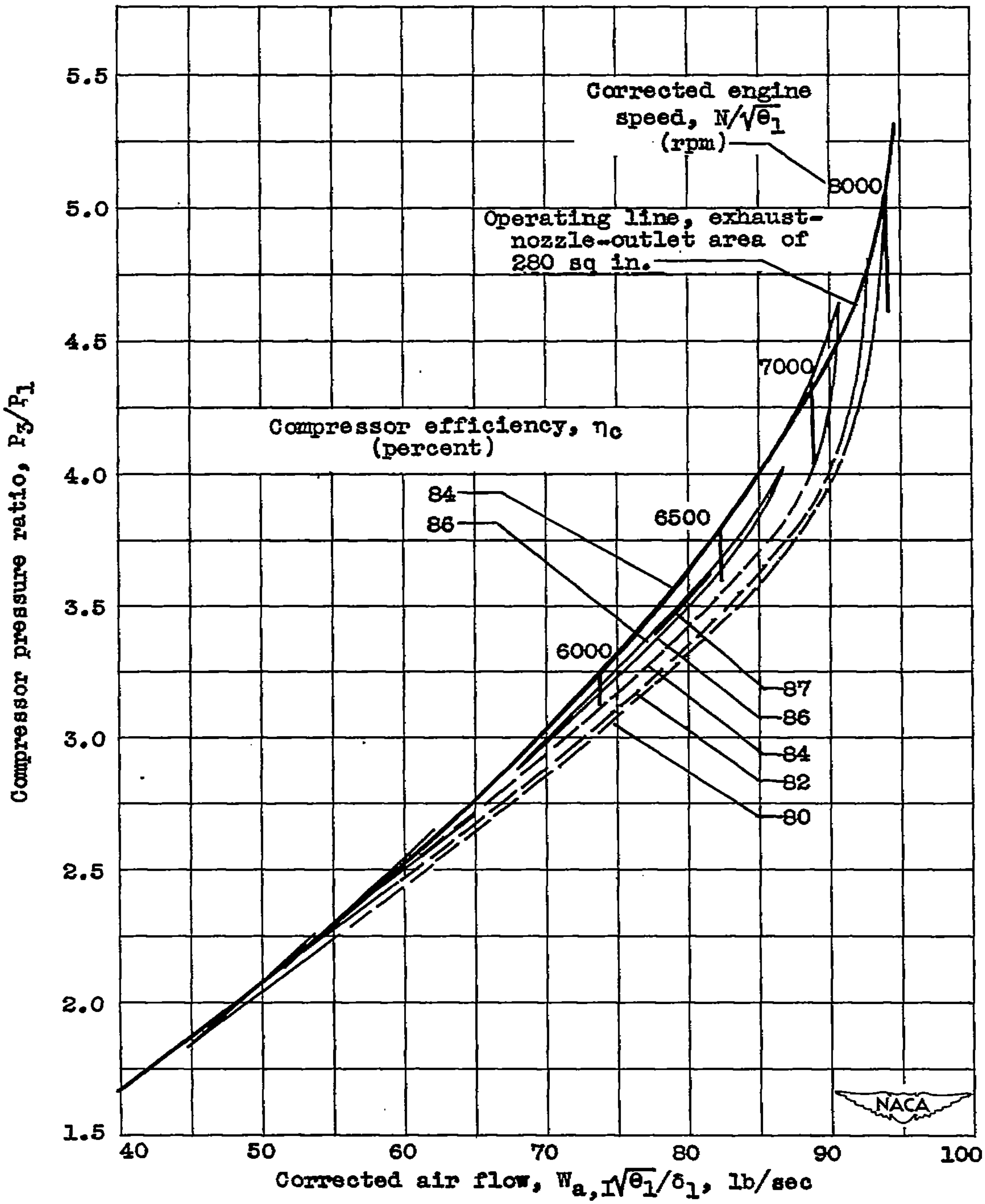
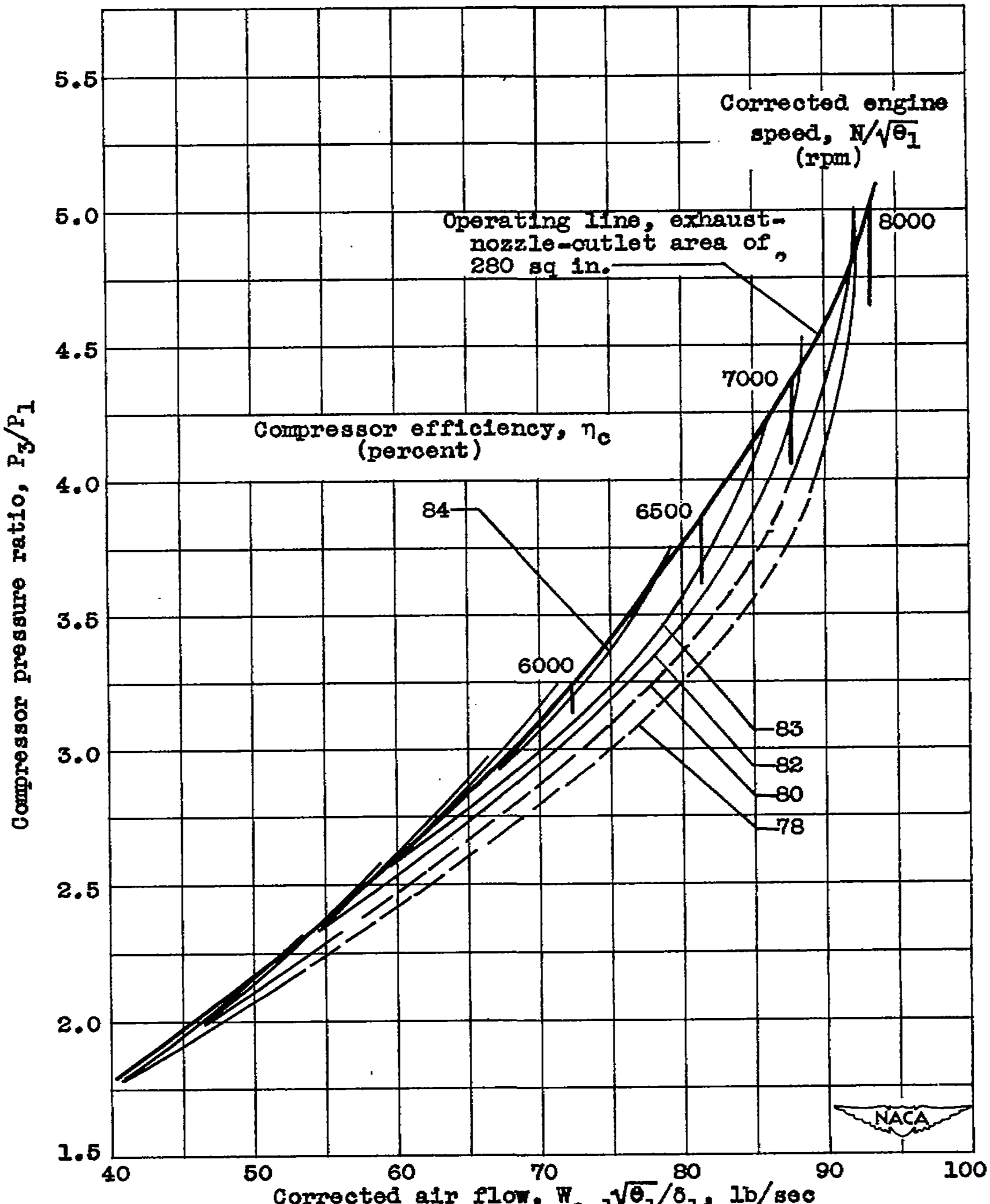



Figure 12. - Effect of altitude on relation between compressor pressure ratio and corrected air flow at constant corrected engine speed with operating lines for minimum exhaust-nozzle-outlet area and lines of region of maximum efficiency superimposed. Flight Mach number, 0.20; exhaust-nozzle-outlet area, 280 to 342 square inches.




(a) Altitude, 5000 feet.

Figure 13. - Effect of altitude on compressor-performance characteristics with operating line for minimum exhaust-nozzle-outlet area superimposed. Flight Mach number, 0.20; exhaust-nozzle-outlet area, 280 to 342 square inches.




(b) Altitude, 25,000 feet.

Figure 13. - Continued. Effect of altitude on compressor-performance characteristics with operating line for minimum exhaust-nozzle-outlet area superimposed. Flight Mach number, 0.20; exhaust-nozzle-outlet area, 280 to 342 square inches.

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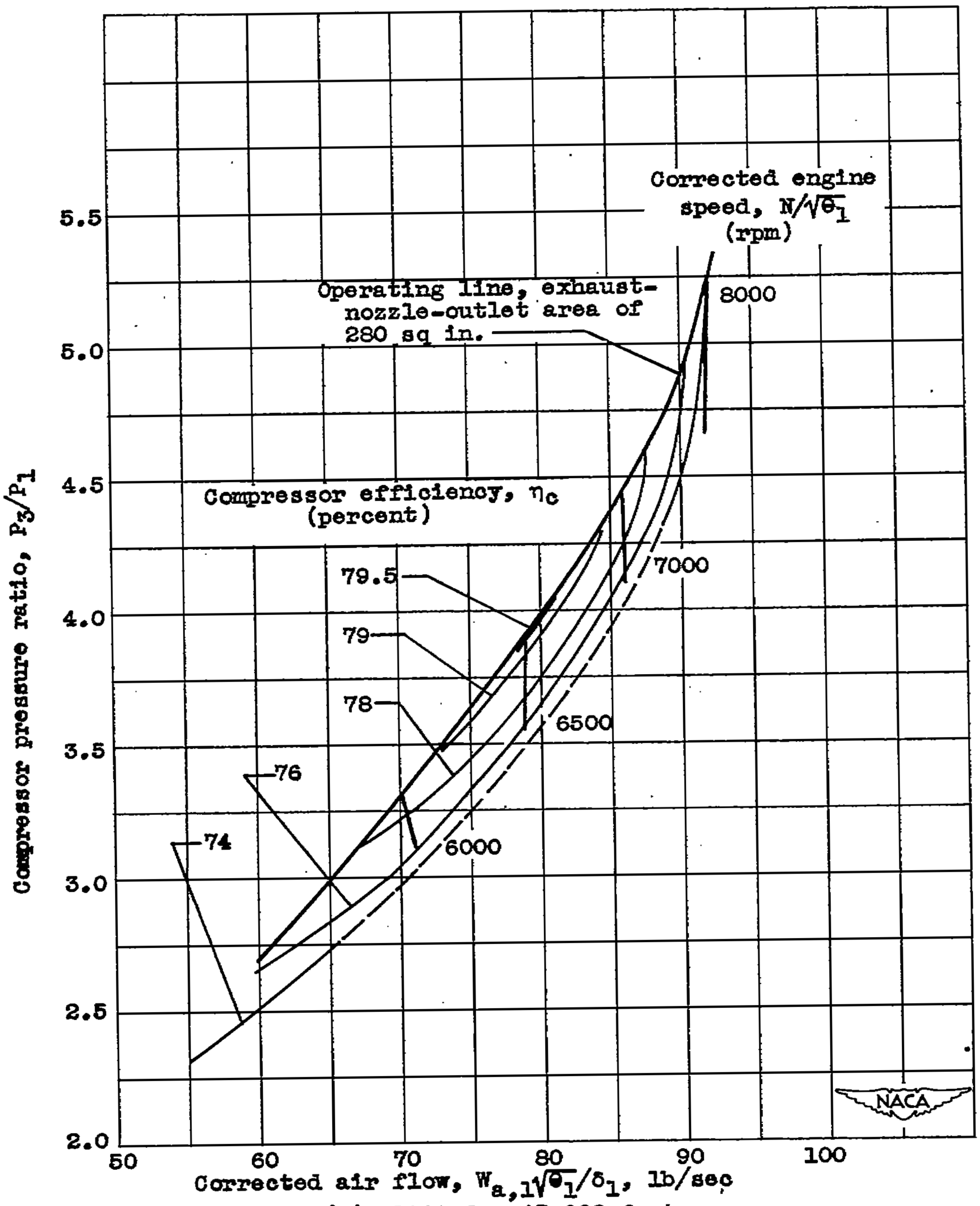


(c) Altitude, 45,000 feet.

Figure 13. - Concluded. Effect of altitude on compressor-performance characteristics with operating line for minimum exhaust-nozzle-outlet area superimposed. Flight Mach number, 0.20; exhaust-nozzle-outlet area, 280 to 342 square inches.

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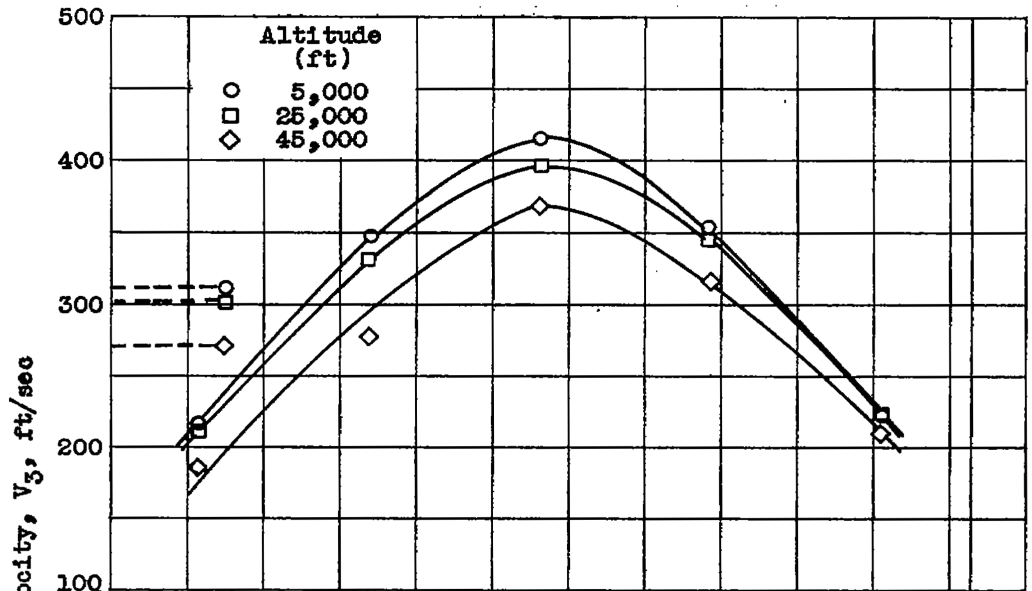
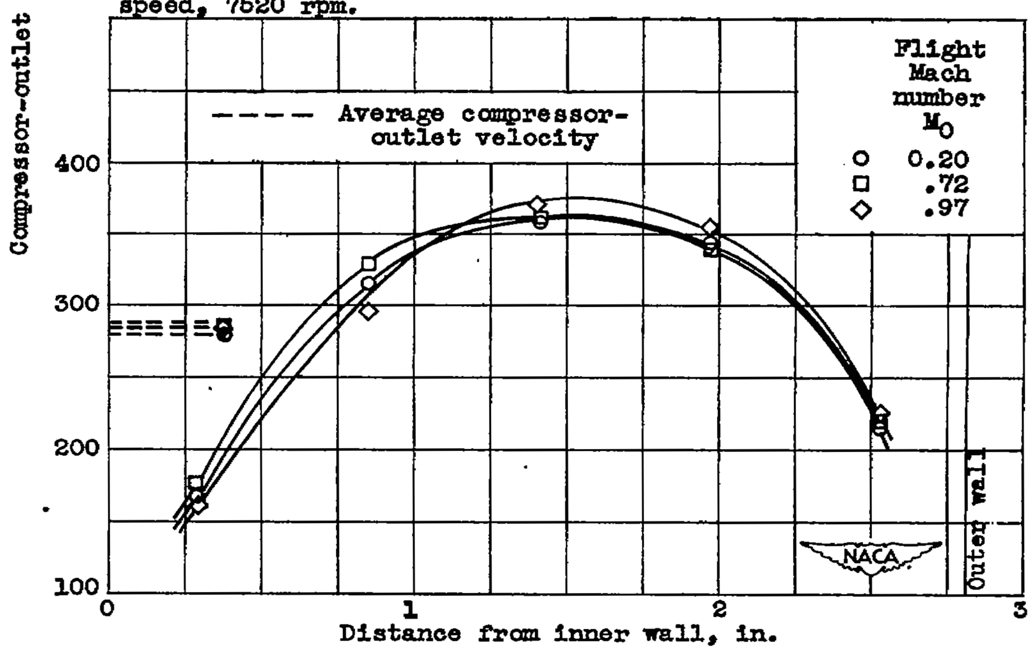


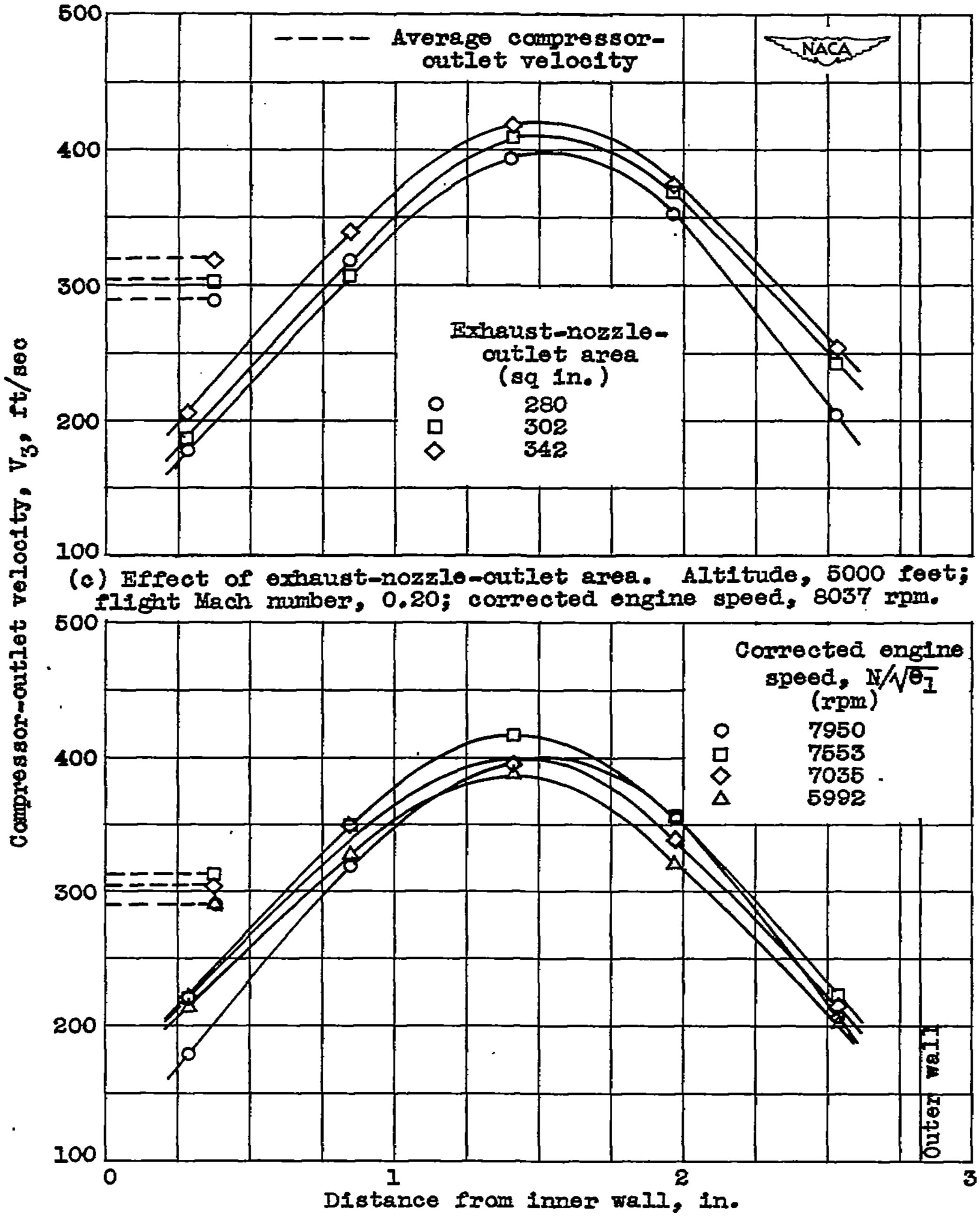

(a) Effect of altitude. Flight Mach number, 0.20; exhaust-nozzle-outlet area, 280 square inches; corrected engine speed, 7520 rpm.




(b) Effect of flight Mach number. Altitude, 25,000 feet; exhaust-nozzle-outlet area, 280 square inches; corrected engine speed, 8026 rpm.

Figure 14. - Velocity profile at compressor outlet.

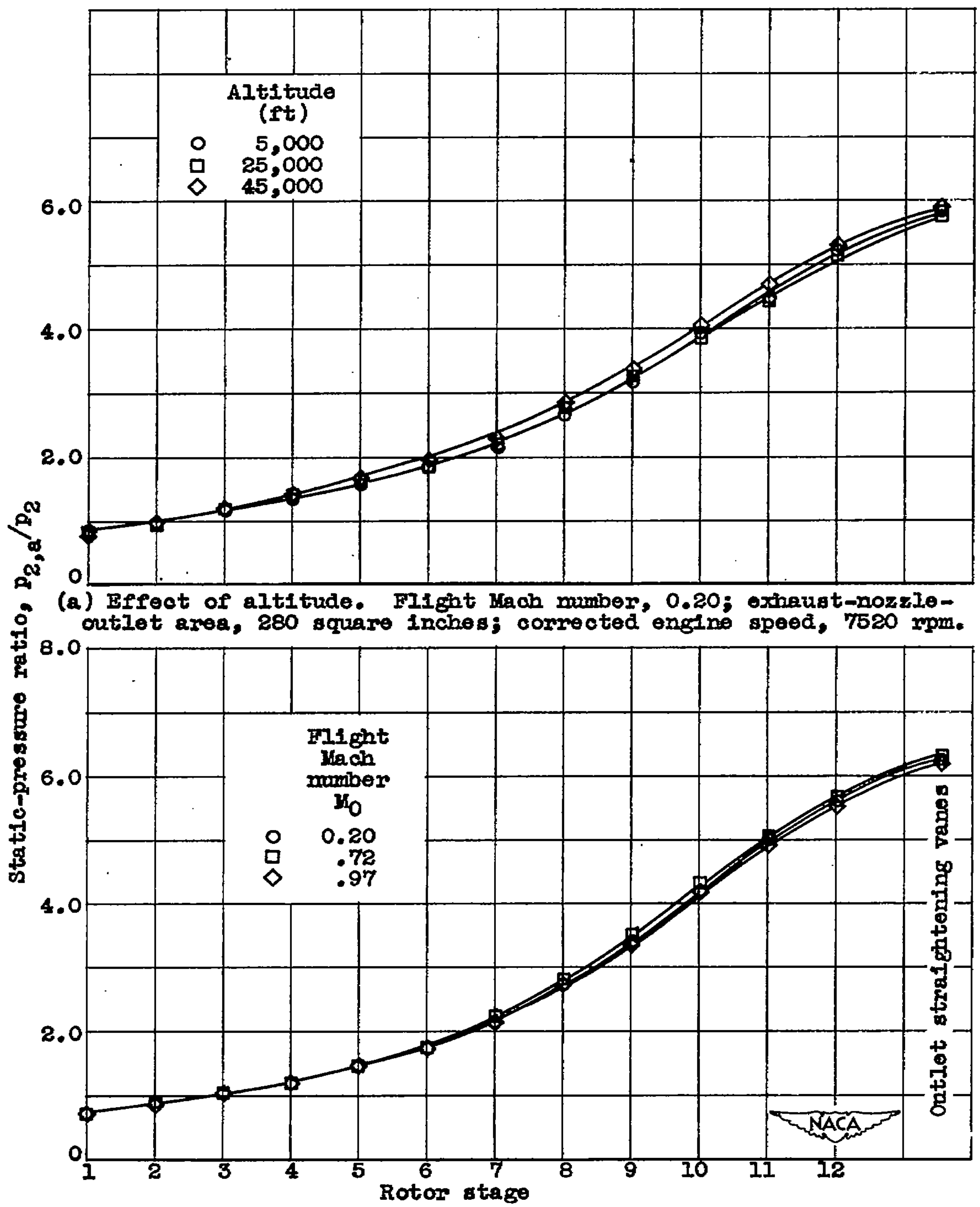
1175




(c) Effect of exhaust-nozzle-outlet area. Altitude, 5000 feet; flight Mach number, 0.20; corrected engine speed, 8037 rpm.

(d) Effect of engine speed. Altitude, 5000 feet; flight Mach number, 0.20; exhaust-nozzle-outlet area, 280 square inches.

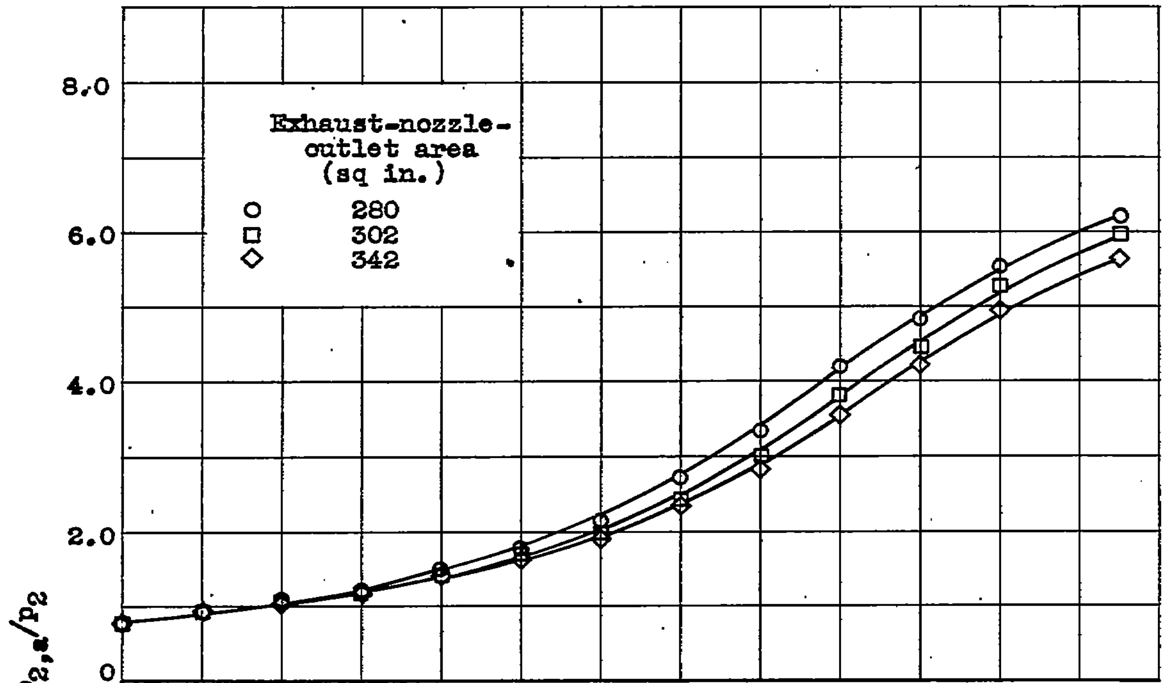
Figure 14. - Concluded. Velocity profile at compressor outlet.



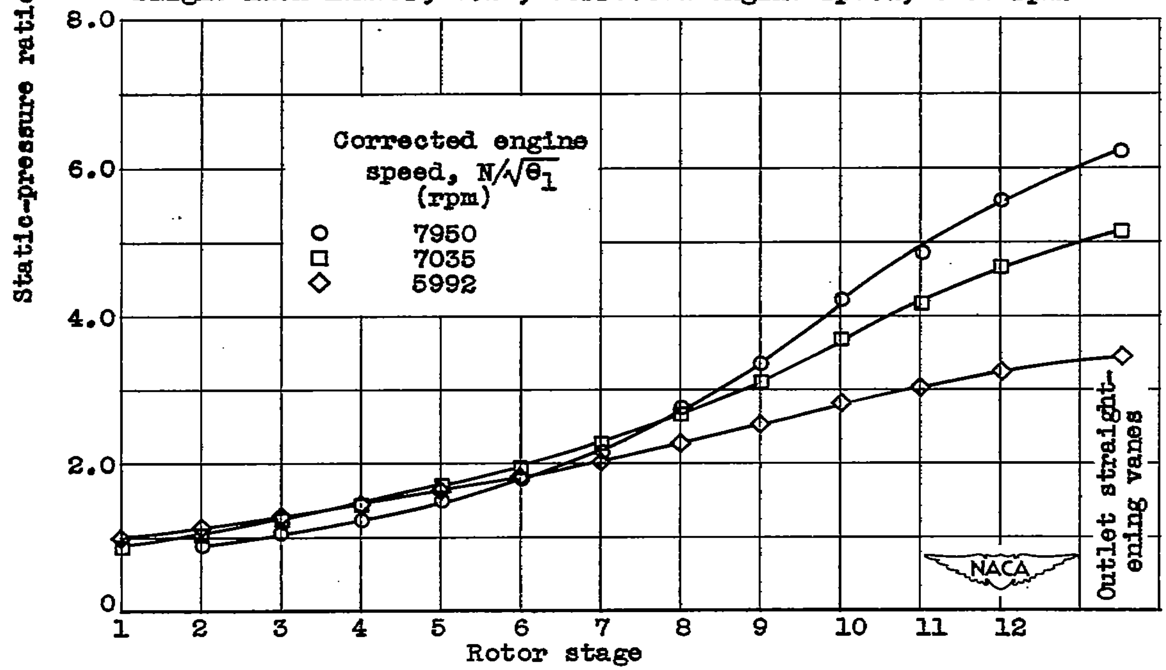

(a) Effect of altitude. Flight Mach number, 0.20; exhaust-nozzle-outlet area, 280 square inches; corrected engine speed, 7520 rpm.

(b) Effect of flight Mach number. Altitude, 25,000 feet; exhaust-nozzle-outlet area, 280 square inches; corrected engine speed, 8026 rpm.

Figure 15. - Compressor-rotor-stage static-pressure-ratio profile.




(c) Effect of exhaust-nozzle-outlet area. Altitude, 5000 feet; flight Mach number, 0.20; corrected engine speed, 8037 rpm.




(d) Effect of engine speed. Altitude, 5000 feet; flight Mach number, 0.20; exhaust-nozzle-outlet area, 280 square inches.

Figure 15. - Concluded. Compressor-rotor-stage static-pressure-ratio profile.

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