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RESEARCH MEMORANDUM

PERFORMANCE OF THE COMPONENTS OF THE XJ34-WE-32 TURBOJET ENGINE OVER A RANGE OF ENGINE AND FLIGHT CONDITIONS

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SUMMARY

Performance of the compressor, combustor, and turbine operating as integral parts of the XJ34-WE-32 turbojet engine was determined in the Lewis altitude wind tunnel over a wide range of flight conditions. This investigation was conducted with the electronic control inoperative.

The peak compressor efficiency decreased from about 0.84 to 0.79 as altitude was increased from 10,000 to 55,000 feet at a flight Mach number of 0.53. For all flight conditions investigated, the peak compressor efficiency occurred at a compressor pressure ratio of approximately 3.8 and a corrected air flow of 55 pounds per second. The corresponding corrected engine speed varied slightly with Reynolds number but was about 11,800 rpm. Decreasing the Reynolds number generally resulted in a decrease in compressor efficiency and corrected air flow for a given corrected engine speed and compressor pressure ratio.

Within the range of flight Mach numbers investigated, the combustion efficiency for rated engine conditions remained constant at about 0.95 to altitudes of 25,000 feet and decreased to about 0.80 at an altitude of 55,000 feet.

Changes in exhaust-nozzle area or flight Mach number had no discernible effect on turbine efficiency. Within the range of corrected turbine speeds encountered during engine operation, the change in turbine efficiency was small. At rated engine conditions, the turbine efficiency decreased from about 0.86 to 0.82 as the altitude was increased from 10,000 to 55,000 feet.

INTRODUCTION

An investigation was conducted in the NACA Lewis altitude wind tunnel to determine the altitude performance characteristics of the XJ34-WE-32 turbojet engine. In conjunction with these over-all engine performance data, component performance data were obtained for each of

four exhaust-nozzle areas over a range of altitudes from 5000 to 55,000 feet and flight Mach numbers from 0.28 to 1.05. At each flight condition and exhaust-nozzle area, data were obtained over an extensive range of engine speeds.

Performance data of the compressor, combustor, and turbine are presented herein in graphical form to show the effects of changes in flight and engine conditions. A compressor map is presented for each flight condition investigated. For the combustor and turbine, only typical performance data are shown. All data obtained are presented in tabular form.

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APPARATUS

Engine Components

The XJ34-WE-32 turbojet engine used in this investigation (fig. 1) has a static sea-level thrust rating of 3370 pounds (afterburner inoperative) at an engine speed of 12,500 rpm and a turbine-inlet temperature of 1525° F. The engine is equipped with an afterburner and an electronic control which were inoperative during this investigation.

Compressor. - The eleven-stage axial-flow compressor has a single row of inlet guide vanes, a double row of outlet guide vanes, and a single row of mixer vanes. The compressor rotor is shown in figure 2. The blade-tip diameter of the eleven-stage rotor section is 18.91 inches and the blade height varied from 4.71 inches at the first stage to 2.46 inches at the eleventh stage. The compressor air flow is about 58 pounds per second at rated static sea-level conditions.

Combustor. - The combustor (fig. 3) is of the annular direct-flow type with a double-annular basket that merges into a single annulus near the downstream end. Two concentric fuel manifold rings, with 24 and 36 matched fuel nozzles at the inner and outer rings, respectively, are located at the upstream end of the double-annular basket.

Turbine. - The two-stage axial-flow turbine has a blade height of about 3.9 inches for both rotor stages and a blade tip diameter of 20.81 inches. The turbine rotor is shown in figure 4.

Installation and Instrumentation

The engine was mounted on a wing segment in the 20-foot-diameter test section of the altitude wind tunnel. Dry refrigerated air was

supplied to the engine inlet through a duct from the tunnel make-up air system. This air was throttled from approximately sea-level pressure to an engine-inlet total pressure corresponding to the desired flight condition.

Location of the instrumentation used to determine component performance is shown in figure 5. The temperatures measured at the exhaust-nozzle inlet (station 7) were used as the turbine-outlet temperatures because of the effect of radiation on the temperatures measured at station 5.

PROCEDURE

Dry refrigerated air was supplied to the engine at the NACA standard temperature for each flight condition except that the minimum temperature obtained was about -20° F. The data at an altitude of 5000 feet were obtained using an inlet temperature that was required to give a Reynolds number index of 1.00. Complete free-stream ram pressure recovery was assumed at each flight condition.

The following table indicates the flight conditions at which data were obtained:

Altitude (ft)	Flight Mach number			
	0.28	0.53	0.79	1.05
5,000	x			
10,000		x		
25,000	x	x	x	x
40,000		x	x	x
47,000		x		
55,000		x	x	

At each of these flight conditions, data were obtained over a range of engine speeds from about 6250 to 12,500 rpm at four fixed positions of the variable-area exhaust nozzle (projected exhaust-nozzle areas from 1.063 to 1.902 sq ft) except when instrumentation difficulties were encountered or when the engine operation was limited by either excessive exhaust-gas temperature, combustor blow-out, or compressor surge.

Data were not obtained because of instrumentation difficulties at the following flight conditions: at altitude of 5000 feet, flight Mach number of 0.28, and exhaust-nozzle area of 1.063 square feet for several intermediate engine speeds between 6250 and 12,500 rpm; at altitude of 25,000 feet, flight Mach number of 1.05, and exhaust-nozzle area of 1.902 square feet. Limiting exhaust-gas temperature prevented data from

being taken at rated engine speed with an exhaust-nozzle area of 1.063 square feet at any flight condition investigated. Within the range of flight Mach numbers investigated, combustor blow-out occurred at low engine speeds above an altitude of 40,000 feet. Compressor surge occurred in the medium engine speed range (corrected engine speeds greater than 10,000 rpm and less than 12,000 rpm) with the small exhaust-nozzle area. At and below altitudes of 25,000 feet and at the two highest flight Mach numbers investigated at an altitude of 40,000 feet, the instabilities caused by compressor surge were small and the exhaust-gas temperatures were not excessive. It was therefore possible to obtain some data at these flight conditions in the region of compressor surge.

The symbols and the methods of calculation used herein are given in appendixes A and B, respectively.

RESULTS AND DISCUSSION

Compressor Performance

In order to simplify the following discussion, an engine operating point is defined by a given corrected engine speed and exhaust-nozzle area; and a compressor operating point, by a given corrected engine speed and compressor pressure ratio.

Compressor performance maps. - Compressor performance maps for each flight condition investigated are presented in figure 6 where compressor pressure ratio is plotted against corrected air flow with lines of constant corrected engine speed, compressor efficiency, and exhaust-nozzle area.

Except near the region of compressor surge, increasing the altitude from 10,000 to 25,000 feet at a flight Mach number of 0.53 had no appreciable effect on engine operating points, but a further increase in altitude shifted engine operating points at high corrected engine speeds to higher compressor pressure ratios and lower corrected air flows on the compressor map (figs. 6(b), 6(e), 6(i), 6(j), and 6(l)). At low corrected engine speeds the shift in engine operating points was to lower corrected air flows with no distinguishable change in compressor pressure ratio.

The decrease in corrected air flow along with a decrease in compressor efficiency was due to a decrease in Reynolds number as altitude was increased. The lower compressor efficiency required the turbine to produce more work per pound of gas to maintain a given corrected engine speed. This requirement was met by operating at a higher turbine-inlet temperature. In order to satisfy the condition of continuity, engine

operating points at high corrected engine speeds shifted to higher compressor pressure ratios. Apparently, this condition was satisfied at low corrected engine speeds without an increase in compressor pressure ratio.

Except near the region of compressor surge, decreasing the flight Mach number from 1.05 to 0.28 at an altitude of 25,000 feet (figs. 6(c) to 6(f)) shifted engine operating points at high corrected engine speeds to higher compressor pressure ratios with no appreciable change in corrected air flow. At low corrected engine speeds, engine operating points shifted to higher compressor pressure ratios and lower corrected air flows on the compressor map. The increase in compressor pressure ratio is attributed to a decrease in the energy of the inlet air as flight Mach number was decreased, requiring that the turbine produce more work (higher turbine-inlet temperature) per pound of gas in order to maintain a given corrected engine speed. The amount the corrected air flow decreased depended on the slope of the compressor characteristic and the magnitude of the increase in compressor pressure ratio. At high corrected engine speeds, the corrected air flow did not change appreciably because the compressor characteristic was nearly vertical; whereas at low corrected engine speeds, the corrected air flow decrease was primarily due to a decrease in the slope of the compressor characteristic curve.

The peak compressor efficiency decreased from about 0.84 to 0.79 as altitude was increased from 10,000 to 55,000 feet at a flight Mach number of 0.53. For all flight conditions investigated, the peak compressor efficiency occurred at a compressor pressure ratio of approximately 3.8 and a corrected air flow of 55 pounds per second. At high Reynolds numbers (altitudes of 25,000 feet and less), this compressor pressure ratio and corrected air flow corresponded to a corrected engine speed of about 11,800 rpm; at low Reynolds numbers the corresponding corrected engine speed was somewhat higher.

As corrected engine speed was increased above the value at which peak compressor efficiency was encountered, the compressor efficiency decreased at a greater rate. This decrease in compressor efficiency is attributed to mismatching of the compressor stages, which resulted from the compressibility and boundary-layer effects that could not be completely accounted for in the compressor design. Therefore, if the engine were operated at rated engine speed above the tropopause, the corrected engine speed would be above 13,100 rpm at any flight Mach number of 1.00 or less and the compressor would be operating in a region of compressor efficiency considerably below the peak value. For example, by extrapolating the data available at an altitude of 40,000 feet at a flight Mach number of 0.53 and an exhaust-nozzle area of 1.138 square feet, the compressor efficiency would be expected to decrease from about 0.81 to 0.73 or less as corrected engine speed was increased from 12,500 to 14,000 rpm.

As stated previously, several data points were obtained when the compressor was in a mild surge. The data presented in figure 6(f) are a good example of how the compressor performance map is affected by compressor surge. At a corrected engine speed of 11,000 rpm the compressor characteristic curve assumed a positive slope as the exhaust-nozzle area was decreased. Positive slope of the compressor characteristic is associated with compressor surge (reference 3). A significant decrease in compressor efficiency also occurred when the compressor was operated in the surge region.

The increasing effect of surge on the compressor performance (figs. 6(b) and 6(e)) and the absence of performance data at the small exhaust-nozzle area (figs. 6(i), 6(j), and 6(l)) indicate that at a given flight Mach number an increase in altitude resulted in increasing restriction by compressor surge of the steady-state operating region. At a given altitude, decreasing the flight Mach number resulted in a similar effect, as shown by figures 6(g) through 6(i). It is therefore concluded that the steady-state operating region moved closer to the surge line as a result of an increase in altitude or a decrease in flight Mach number.

Reynolds number effect on compressor operating points. - The effect of Reynolds number on several compressor operating points is presented in figure 7. For a given compressor operating point, decreasing the Reynolds number generally resulted in a decrease in compressor efficiency and corrected air flow. For example, as Reynolds number index is decreased from 1.00 to 0.17 at a corrected engine speed of 12,500 rpm and a compressor pressure ratio of 4.2, the corrected air flow decreases from 58.0 to 57.0 pounds per second and the compressor efficiency decreases from 0.835 to 0.796. This decrease in Reynolds number index corresponds to an increase in altitude from about 10,000 to 55,000 feet at a flight Mach number of 0.80.

The effect of operating the engine at rated speed at high altitudes was discussed previously. If, therefore, the engine is operated at rated speed at a given flight Mach number and the altitude is increased, the compressor efficiency will decrease because of both decreased Reynolds number at high altitude and mismatching of the compressor stages at high corrected speeds.

Combustor Performance

Combustion efficiency. - Typical effects of altitude, flight Mach number, and exhaust-nozzle area on combustion efficiency are presented in figures 8, 9, and 10, respectively, where combustion efficiency is plotted against corrected engine speed. The primary variables affecting combustion efficiency are fuel atomization (measured roughly by fuel

flow, which determines the pressure difference across the fuel nozzles), fuel-air ratio, and combustor-inlet pressure, temperature, and velocity. As it was impossible to independently control these variables when the combustor was operating as an integral part of a turbojet engine, the data do not lend themselves to presentation using the aforementioned variables. By changing engine speed, altitude, flight Mach number, and exhaust-nozzle area, the primary variables affecting combustion efficiency were all changed varying degrees. For example, as the altitude was increased at a given corrected engine speed, flight Mach number, and exhaust-nozzle area, the fuel-air ratio increased, the combustor-inlet pressure and the fuel flow decreased, and there was a negligible change in combustor-inlet temperature and velocity. The increase in combustion efficiency due to increased fuel-air ratio was small compared with the decrease in combustion efficiency which resulted from the decrease in combustor-inlet pressure and fuel flow. The net result was a reduction in combustion efficiency as altitude was increased.

A combination of curves similar to those of figures 8, 9, and 10 or the data of table I indicate that when the engine was operated at rated conditions within the flight Mach numbers investigated, the combustion efficiency remained constant at about 0.95 up to an altitude of 25,000 feet and decreased to about 0.80 at an altitude of 55,000 feet.

Combustor total-pressure loss. - Representative data for various flight conditions and exhaust-nozzle areas are plotted in figure 11 to show combustor total-pressure loss coefficient as a function of combustor total-temperature ratio. The combustor total-pressure loss is a sum of the friction loss and the momentum loss. When the combustor temperature ratio is equal to unity, the entire total-pressure loss through the combustor is due to friction. The data of figure 11 can therefore be extrapolated to a combustor total-temperature ratio of 1, which gives a combustor total-pressure loss coefficient due to friction of 2.9. The method of calculating the combustor dynamic pressure is given in appendix B. Values of both combustor total-pressure loss coefficient and combustor total-pressure loss ratio are given in table I.

Turbine Performance

Turbine speed corrected to turbine-inlet temperature is plotted against corrected engine speed in figure 12 showing typical trends with altitude, flight Mach number, and exhaust-nozzle area. The primary purpose of this figure is to serve as a connecting link between engine operation and turbine performance, which can be better shown when plotted against corrected turbine speed.

Turbine pressure ratio. - The effect of corrected turbine speed, exhaust-nozzle area, flight Mach number, and altitude on turbine pressure

ratio is presented in figure 13. The effects shown are due to changes in the matched operation of the turbine and compressor at various steady-state conditions. When the engine was operating at rated conditions the turbine pressure ratio was approximately 2.0.

Turbine efficiency. - The effect of corrected turbine speed, exhaust-nozzle area, flight Mach number, and altitude on turbine efficiency is presented in figure 14. The data of figures 14(a) and 14(b) indicate that within the accuracy of the data there was no discernible effect of exhaust-nozzle area or flight Mach number on turbine efficiency. Similar plots at other flight conditions agree with this conclusion. Within the range of corrected turbine speeds encountered during engine operation, the change in turbine efficiency was small.

At the corrected turbine speed that corresponded to rated engine conditions (about 6400 rpm), the turbine efficiency decreased from about 0.86 to 0.82 as altitude was increased from 10,000 to 55,000 feet (fig. 14(c)). As shown in figure 13(c), the same change in altitude resulted in a small increase in turbine pressure ratio at any given corrected turbine speed. Similar changes in turbine pressure ratio obtained by changing exhaust-nozzle area or flight Mach number had no apparent effect on turbine efficiency (figs. 14(a) and 14(b)). This decrease in turbine efficiency with increasing altitude may therefore be associated with a decrease in Reynolds number.

Corrected turbine gas flow. - The effect of corrected turbine speed, exhaust-nozzle area, flight Mach number, and altitude on corrected turbine gas flow is presented in figure 15. Some inconsistencies which could not be explained existed in the values of corrected turbine gas flow. Within the accuracy of the data, however, there was no effect of exhaust-nozzle area, flight Mach number, or altitude on corrected turbine gas flow. At corrected turbine speeds above 6800 rpm the corrected turbine gas flow was constant at 29.8 pounds per second, indicating choking in the turbine.

SUMMARY OF RESULTS

The following results were obtained from an investigation of the performance of the components operating as integral parts of an XJ34-WE-32 turbojet engine in the Lewis altitude wind tunnel:

1. The peak compressor efficiency decreased from about 0.84 to 0.79 as altitude was increased from 10,000 to 55,000 feet at a flight Mach number of 0.53.

2. At all flight conditions investigated the peak compressor efficiency occurred at approximately a compressor pressure ratio of 3.8 and a corrected air flow of 55 pounds per second. At high Reynolds numbers

(altitudes of 25,000 feet and less) this compressor pressure ratio and corrected air flow corresponded to a corrected engine speed of about 11,800 rpm, whereas at low Reynolds numbers the corresponding corrected speed was somewhat higher.

3. If the engine were operated at rated speed above the tropopause at or below flight Mach number of 1.0, the compressor would be operating in a region of compressor efficiency considerably below the peak value.

4. The steady-state operating region moved closer to the surge line as a result of an increase in altitude or a decrease in flight Mach number.

5. For a given compressor operating point, decreasing the Reynolds number generally resulted in a decrease in compressor efficiency and corrected air flow. Thus, as Reynolds number index was decreased from 1.00 to 0.17 at a corrected engine speed of 12,500 rpm and a compressor pressure ratio of 4.2, the corrected air flow decreased from 58.0 to 57.0 pounds per second and the compressor efficiency decreased from 0.835 to 0.796. This decrease in Reynolds number index corresponds to an increase in altitude from about 10,000 to 55,000 feet at a flight Mach number of 0.80.

6. For rated engine conditions within the range of flight Mach numbers investigated, the combustion efficiency remained constant at about 0.95 up to an altitude of 25,000 feet and decreased to about 0.80 at an altitude of 55,000 feet.

7. Changes in exhaust-nozzle area or flight Mach number had no discernible effect on turbine efficiency. Within the range of corrected turbine speeds encountered during engine operation, the change in turbine efficiency was small. At rated engine conditions, the turbine efficiency decreased from about 0.86 to 0.82 as altitude was increased from 10,000 to 55,000 feet.

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APPENDIX A

SYMBOLS

The following symbols are used in this report:

A	cross-sectional area, sq ft
c_p	specific heat at constant pressure, Btu/(lb)($^\circ$F)
g	acceleration due to gravity, 32.2 ft/sec^2
M	Mach number
N	engine speed, rpm
P	total pressure, lb/sq ft absolute
p	static pressure, lb/sq ft absolute
q	theoretical dynamic pressure at combustor inlet, lb/sq ft absolute
R	gas constant, 53.4 ft-lb/(lb)($^\circ$R)
T	total temperature, $^\circ$R
t	static temperature, $^\circ$R
W_a	air flow, lb/sec
W_f	fuel flow, lb/hr
W_g	gas flow, lb/sec
γ	ratio of specific heats
δ	pressure correction factor, P/2116 (total pressure divided by NACA standard sea-level pressure)
η	efficiency
μ	absolute viscosity, lb-sec/ft^2
θ	temperature correction factor, $\gamma T/(1.4)(519)$ (product of γ and total temperature divided by product of γ at standard NACA sea-level temperature and standard NACA sea-level temperature)
ϕ	viscosity factor, μ/μ_0 (viscosity divided by NACA standard sea-level viscosity)

Subscripts:

0	free-stream conditions
1	inlet duct at frictionless slip joint
2	compressor inlet
3	compressor outlet, combustor inlet
4	combustor outlet, turbine inlet
5	turbine outlet
7	exhaust-nozzle inlet
b	burner
c	compressor
t	turbine

APPENDIX B

METHODS OF CALCULATION

Air flow. - Air flow was calculated at station 2 by use of the following equation:

$$W_{a,2} = p_2 A_2 \sqrt{\frac{2\,\gamma_2\,g}{(\gamma_2-1)\,Rt_2}\left[\left(\frac{P_2}{p_2}\right)^{\frac{\gamma_2-1}{\gamma_2}} - 1\right]}$$

Air flow at the other stations in the engine was considered the same as that at station 2. The gas flow downstream of the combustor is

$$W_g = W_{a,2} + \frac{W_f}{3600}$$

Reynolds number index. - For a given compressor Mach number (corrected engine speed) Reynolds number index varies linearly with Reynolds number and is defined as the ratio of Reynolds number at altitude to Reynolds number at standard sea-level conditions.

$$\text{Re index} = \frac{\delta_2}{\phi_2\sqrt{\theta_2}}$$

Combustor dynamic pressure. - In order to calculate a combustor dynamic pressure, based on a cross-sectional area of 1.78 square feet, a combustor Mach number was first calculated with the equation

$$\frac{M_b}{\left(1 + \frac{\gamma_3-1}{2} M_b^2\right)^{\frac{\gamma_3+1}{2(\gamma_3-1)}}} = \frac{W_{a,3}\sqrt{T_3}}{0.776\,A_b P_3\sqrt{\gamma_3}}$$

then

$$q = \frac{\gamma_3}{2} p_3 M_b^2$$

and

$$p_3 = \frac{P_3}{\left(1 + \frac{\gamma_3 - 1}{2} M_b^2\right)^{\frac{\gamma_3}{\gamma_3 - 1}}}$$

therefore

$$q = \frac{\gamma_3}{2} P_3 \frac{M_b^2}{\left(1 + \frac{\gamma_3 - 1}{2} M_b^2\right)^{\frac{\gamma_3}{\gamma_3 - 1}}}$$

where

$$\gamma_3 = 1.40$$

Turbine-inlet temperature. - Turbine-inlet temperature was calculated from the following equation, which assumes compressor and turbine work equal:

$$T_4 = \frac{W_{a,2}}{W_{g,4}} \frac{c_{p,c}}{c_{p,t}} \left[T_3 - T_2\right] + T_7$$

REFERENCES

1. Bullock, R. O., and Finger, H. B.: Compressor Surge Investigated by NACA. SAE Jour., vol. 59, no. 9, Sept. 1951, pp. 42-45.

TABLE I - COMPONENT PERFORMANCE

(a) Exhaust-nozzle area,

Run	Altitude (ft)	Ram pressure ratio P_2/P_0	Flight Mach number M_0	Tunnel static pressure p_0 (lb/sq ft abs)	Reynolds number index $\theta_2/\delta_2\sqrt{\theta_2}$	Engine speed N (rpm)	Fuel flow W_f (lb/hr)	Compressor inlet total pressure P_2 (lb/sq ft abs)	Compressor inlet total temperature T_2 (°R)	Compressor outlet total pressure P_3 (lb/sq ft abs)	Compressor outlet total temperature T_3 (°R)	Turbine inlet total pressure P_4 (lb/sq ft abs)	Turbine inlet total temperature T_4 (°R)	Turbine outlet total pressure P_5 (lb/sq ft abs)	Exhaust gas total temperature T_7 (°R)
1	5000	1.062	0.280	1754	0.998	11,689	3470	1853	469	7932	756	7710	1951	4014	1711
2		1.076	.312	1737	1.008	11,525	3405	1859	467	----	---	----	----	3967	1691
3		1.057	.278	1760	1.009	10,537	2410	1857	466	6347	706	6157	1733	3321	1523
4		1.056	.278	1754	1.005	9220	1635	1850	467	----	---	----	----	2666	1377
5		1.056	.278	1754	1.008	7903	1220	1850	466	----	---	----	----	2303	1285
6		1.055	.278	1752	1.003	6256	935	1848	468	2807	555	2739	1292	2143	1214
7	10,000	1.212	0.525	1450	0.8467	11,525	2845	1750	509	6712	792	6512	1949	3425	1710
8		1.212	.524	1456	.8511	11,525	2795	1756	509	6741	791	6542	1922	3434	1690
9		1.212	.524	1450	.8503	11,525	2790	1749	507	6705	790	6503	1932	3414	1693
10		1.213	.527	1454	.8726	10,537	1980	1757	500	5448	738	5266	1701	2847	1488
11		1.208	.519	1457	.8554	10,537	1935	1750	505	5311	743	5138	1711	2783	1506
12		1.208	.522	1454	.8547	10,537	1930	1751	507	5244	744	5077	1711	2765	1506
13		1.208	.522	1454	.8576	10,537	1920	1751	505	5269	742	5097	1702	2765	1493
14		1.208	.524	1457	.8598	9220	1305	1755	505	4015	686	3880	1460	2265	1305
15		1.209	.525	1452	.8576	9220	1300	1752	506	4000	685	3861	1455	2251	1296
16		1.207	.520	1456	.8489	9220	1291	1750	510	4005	690	3875	1468	2259	1311
17		1.213	.531	1456	.8628	7903	1006	1763	507	3119	635	3019	1279	1941	1160
18		1.208	.524	1450	.8696	7903	1005	1748	499	3143	631	3048	1280	1948	1157
19		1.212	.528	1455	.8584	7903	1000	1759	507	3125	636	3026	1283	1939	1165
20		1.207	.521	1456	.8576	7903	983	1751	506	3117	635	3022	1278	1943	1163
21		1.214	.532	1450	.8569	6256	785	1758	508	2379	583	2307	1092	1707	1024
22		1.212	.531	1455	.8757	6256	780	1762	501	2385	576	2314	1076	1715	1009
23		1.208	.525	1454	.8467	6256	770	1755	511	2361	587	2293	1100	1705	1032
24		1.208	.522	1450	.8503	6256	769	1746	509	2373	584	2309	----	1710	----
25	25,000	2.033	1.055	784	------	11,854	2555	1582	---	6144	822	5955	----	----	----
26		2.051	1.062	781	------	11,854	2495	1590	----	6124	808	5941	----	----	----
27		2.028	1.052	784	.7380	11,854	2560	1577	523	6154	818	5981	1958	3069	1707
28		2.037	1.055	782	.7402	11,525	2275	1580	522	5814	802	5634	1850	2901	1616
29		2.030	1.054	779	.7315	10,537	1450	1571	526	4513	756	4343	1536	2258	1335
30		2.040	1.059	784	.7435	9220	943	1590	524	3204	689	3063	1160	1642	1001
31		2.051	1.064	780	.7424	7903	688	1592	527	2312	636	2206	871	1263	782
32		2.010	1.048	788	.7396	6256	500	1578	524	1612	579	1534	625	1026	573
33		1.522	.792	783	.6127	11,960	2285	1184	484	5109	785	4956	2030	2567	1780
34		1.530	.798	781	.6143	11,854	2230	1187	484	5059	781	4908	2007	2536	1759
35		1.519	.791	784	.6127	11,525	2015	1184	484	4781	768	4638	1925	2408	1685
36		1.523	.794	784	.6165	10,537	1365	1188	483	3813	717	3679	1617	1940	1413
37		1.523	.796	782	.6203	9220	925	1187	481	2742	656	2634	1283	1448	1126
38		1.520	.796	784	.6188	7903	745	1189	482	2051	606	1968	1062	1170	942
39		1.526	.800	781	.6146	6256	570	1190	486	1443	553	1388	813	972	749
40		1.221	.535	783	.5376	11,689	1891	951	453	4226	744	4076	1974	2145	1732
41		1.218	.532	779	.533	11,525	1829	944	453	4114	737	3979	1934	2088	1694
42		1.222	.541	781	.5365	11,360	1728	953	454	3739	752	3624	2070	1868	1822
43		1.212	.528	784	.5299	10,537	1325	948	457	3301	701	3185	1729	1705	1517
44		1.214	.533	779	.5368	9220	940	945	451	2414	634	2319	1430	1320	1269
45		1.205	.524	784	.5350	7903	773	945	452	1839	586	1764	1239	1107	1115
46		1.202	.520	781	.5308	6256	667	939	453	1434	543	1374	1090	964	1010
47		1.060	.297	781	.4708	11,525	1700	830	452	3697	743	3569	2015	1887	1773
48		1.065	.286	787	.4704	11,525	1675	833	453	3679	741	3575	2010	1882	1764
49		1.061	.290	784	.4739	10,866	1374	831	450	3259	710	3140	1829	1685	1604
50		1.059	.287	783	.4721	10,537	1243	829	450	2635	720	2544	2010	1403	1781
51		1.058	.287	781	.4690	9220	890	827	452	2176	644	2080	1574	1180	1413
52		1.055	.280	780	.4658	7903	745	824	453	1679	595	1586	1430	1031	1308
53		1.053	.276	780	------	6256	633	823	---	1272	---	1240	----	----	----
54	40,000	2.043	1.059	394	0.4221	11,854	1010	789	477	3387	772	3257	2002	1700	1755
55		2.028	1.052	393	.4102	11,525	1410	791	484	3231	772	3108	1952	1627	1712
56		2.041	1.058	391	.4127	11,525	1395	792	482	----	769	----	1948	1622	1707
57		2.067	1.069	388	.4136	10,537	935	797	483	2482	716	2370	1609	1254	1400
58		2.043	1.062	393	.4188	9220	720	800	481	1797	652	1697	1210	919	1058
59		2.054	1.066	391	.4216	7903	570	800	478	1283	595	1198	900	683	792
60		1.557	.819	394	.3418	10,537	856	602	451	2003	702	1944	1762	1014	1549
61		1.515	.791	388	.3398	10,537	874	595	449	2004	701	1932	1784	1020	1564
62		1.529	.799	393	.3329	10,072	752	598	459	1806	679	1764	1560	929	1369
63		1..	.800	394	.3392	9220	675	600	453	1479	631	1430	1310	769	1150
64		1..18	.794	394	.3370	7903	573	597	453	1092	578	747	1055	615	936
65		1.520	.798	392	.3346	6256	495	596	455	762	532	737	855	509	781
66		1.206	.524	393	.2682	10,072	680	474	452	1432	681	1384	1693	756	1496
67		1.206	.524	393	.2695	10,072	695	474	451	1436	680	1324	1710	753	1514
68		1.203	.524	394	.2704	9220	632	475	450	1212	638	1109	1495	659	1329
69		1.202	.524	391	.2678	7903	570	471	452	913	589	856	1308	550	1190
70		1.191	.512	393	.2651	6250	495	470	453	681	547	668	1170	486	1091

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DATA FOR XJ34-WE-32 TURBOJET ENGINE

1.063 square feet.

Engine inlet air flow $W_{a,2}$ (lb/sec)	Corrected engine inlet air flow $W_{a,2}\sqrt{\theta_2}/\delta_2$ (lb/sec)	Corrected engine speed $N/\sqrt{\theta_2}$ (rpm)	Compressor Mach number M_c	Compressor total-pressure ratio P_3/P_2	Adiabatic compressor efficiency η_c	Fuel-air ratio $\frac{W_f}{3600\ W_{a,2}}$	Combustor total-pressure loss coefficient $(P_3-P_4)/q_b$	Combustor total-pressure loss ratio $(P_3-P_4)/P_3$	Combustor total-temperature ratio T_4/T_3	Combustor efficiency η_b	Corrected turbine speed $N/\sqrt{\theta_4}$ (rpm)	Corrected turbine gas flow $\frac{W_{g,4}\sqrt{\theta_4}}{\delta_4(\gamma_4/1.4)}$ (lb/sec)	Turbine total-pressure ratio P_4/P_5	Adiabatic turbine efficiency η_t	Run
53.04	57.60	12,297	0.908	4.281	0.843	0.0182	3.127	0.0280	2.581	0.948	6221	29.64	1.921	0.843	1
52.82	57.05	12,147	.897	-----	-----	.0179	-----	-----	-----	.950	----	-----	-----	-----	2
45.43	49.02	11,117	.821	3.418	.818	.0147	3.130	.0229	2.455	.982	5926	29.74	1.854	.850	3
34.39	37.31	9718	.717	-----	-----	.0132	-----	-----	-----	.932	----	-----	-----	-----	4
28.03	30.38	8338	.616	-----	-----	.0121	-----	-----	-----	.904	----	-----	-----	-----	5
22.69	24.66	6588	.486	1.519	.683	.0114	2.525	.0242	2.328	.862	4034	28.47	1.339	.822	6
45.24	54.15	11,640	0.859	3.835	0.843	0.0175	3.125	0.0298	2.461	0.952	6137	29.90	1.901	0.852	7
45.36	54.11	11,640	.859	3.839	.847	.0171	3.128	.0295	2.430	.957	6176	29.61	1.905	.832	8
45.27	54.14	11,663	.861	3.834	.840	.0171	3.159	.0301	2.446	.966	6163	29.81	1.905	.854	9
38.72	45.77	10,737	.793	3.101	.803	.0142	3.392	.0334	2.305	.948	5977	29.32	1.850	.882	10
37.87	45.06	10,685	.789	3.035	.793	.0142	3.274	.0326	2.303	.959	5963	29.41	1.846	.844	11
37.36	44.61	10,663	.787	2.995	.788	.0143	3.200	.0318	2.300	.952	5963	29.45	1.836	.851	12
37.77	45.02	10,685	.789	3.009	.789	.0141	3.281	.0327	2.294	.955	5973	29.57	1.815	.868	13
30.58	36.39	9349	.690	2.288	.745	.0119	3.182	.0336	2.128	.898	5615	28.90	1.713	.820	14
30.49	36.37	9340	.690	2.283	.753	.0118	3.289	.0348	2.124	.893	5625	28.91	1.715	.841	15
29.91	35.83	9303	.687	2.289	.757	.0120	3.162	.0325	2.128	.895	5598	28.41	1.715	.824	16
24.50	29.06	7998	.591	1.769	.702	.0114	3.089	.0321	2.014	.756	5122	27.72	1.558	.849	17
25.04	29.75	8061	.595	1.798	.691	.0112	2.831	.0302	2.029	.775	5119	28.08	1.565	.865	18
25.00	29.73	7998	.591	1.777	.702	.0111	2.967	.0317	2.017	.782	5115	28.26	1.560	.833	19
24.36	29.06	8006	.591	1.780	.703	.0112	2.937	.0305	2.013	.775	5125	27.52	1.555	.821	20
17.93	21.35	6325	.467	1.353	.612	.0122	3.445	.0303	1.873	.556	4369	24.45	1.352	.802	21
18.83	22.22	6369	.470	1.354	.604	.0115	3.139	.0298	1.868	.575	4399	25.39	1.349	.803	22
18.56	22.22	6306	.466	1.345	.595	.0115	3.005	.0288	1.874	.594	4354	25.54	1.345	.809	23
18.52	22.22	6319	.467	1.359	.622	.0115	2.843	.0270	-----	-----	----	-----	1.350	-----	24
-----	-----	------	-----	3.884	0.833	------	-----	0.0308	-----	-----	----	-----	-----	-----	25
-----	-----	------	-----	3.852	.839	------	-----	.0299	-----	-----	----	-----	-----	-----	26
41.25	55.56	11,809	.872	3.902	.844	.0172	2.890	.0281	2.394	.937	6295	29.73	1.949	.858	27
40.08	53.83	11,492	.848	3.680	.842	.0158	3.054	.0310	2.307	.957	6288	29.72	1.942	.842	28
34.34	46.53	10,466	.773	2.873	.806	.0117	3.237	.0377	2.052	.932	6265	29.80	1.923	.850	29
27.54	36.85	9176	.677	2.015	.706	.0095	3.248	.0440	1.684	.652	6255	29.11	1.865	.889	30
22.65	30.31	7843	.579	1.452	.545	.0084	2.854	.0459	1.369	.362	6141	28.55	1.747	.874	31
17.70	23.86	6226	.460	1.022	.059	.0078	2.605	.0484	1.079	.074	5718	27.07	1.495	.775	32
33.49	57.80	12,380	.914	4.315	.835	.0190	3.349	.0299	2.586	.953	6249	29.75	1.931	.843	33
33.25	57.26	12,269	.906	4.282	.837	.0186	3.340	.0298	2.570	.956	6226	29.65	1.935	.841	34
32.56	56.20	11,928	.881	4.038	.836	.0172	3.167	.0299	2.507	.966	6170	30.00	1.926	.845	35
28.33	48.67	10,927	.807	3.210	.817	.0134	3.363	.0351	2.255	.937	6119	29.85	1.896	.845	36
22.56	38.71	9580	.707	2.310	.744	.0114	3.348	.0394	1.956	.747	5968	29.31	1.819	.839	37
18.40	31.56	8203	.606	1.725	.656	.0112	3.118	.0405	1.752	.535	5593	28.96	1.682	.861	38
15.86	23.85	6462	.477	1.213	.412	.0114	2.806	.0381	1.470	.230	5029	26.91	1.428	.838	39
28.08	58.38	12,519	.924	4.444	.828	.0187	4.056	.0355	2.653	.952	6188	29.92	1.900	.854	40
27.48	57.54	12,343	.911	4.358	.835	.0185	3.750	.0328	2.624	.932	6160	29.66	1.905	.860	41
26.21	54.41	12,144	.897	3.923	.729	.0183	5.897	.0575	2.753	1.043	5880	33.07	1.886	.850	42
23.90	50.05	11,232	.829	3.482	.803	.0154	4.220	.0412	2.466	.939	5930	30.41	1.856	.858	43
16.76	39.15	9893	.730	2.554	.758	.0139	3.870	.0394	2.256	.784	5670	29.40	1.757	.831	44
15.09	31.52	8464	.625	1.946	.707	.0142	3.929	.0408	2.114	.619	5203	28.83	1.593	.866	45
12.46	26.23	6700	.495	1.527	.648	.0149	3.844	.0419	2.007	.491	4375	28.59	1.425	.810	46
24.41	58.07	------	-----	4.454	.828	.0193	4.049	.0346	2.712	.954	6044	30.01	1.891	.846	47
24.48	58.09	12,343	.911	4.417	.833	.0190	3.268	.0283	2.713	.961	6047	30.00	1.900	.855	48
22.45	53.23	11,670	.862	3.922	.828	.0170	4.119	.0365	2.576	.935	5961	29.73	1.864	.869	49
17.93	42.60	11,317	.836	3.179	.654	.0193	3.943	.0345	2.792	.962	5528	30.91	1.813	.855	50
16.22	38.73	9875	.729	2.631	.750	.0152	4.653	.0441	2.444	.855	5424	29.87	1.763	.765	51
12.90	30.95	8464	.625	2.038	.720	.0160	5.965	.0554	2.403	.720	4863	29.65	1.538	.816	52
-----	-----	------	-----	1.546	.635	------	-----	.0252	-----	-----	----	-----	-----	-----	53
22.33	58.70	12,364	0.913	4.239	0.827	0.0188	4.341	0.0384	2.593	0.950	6232	29.99	1.916	0.851	54
21.63	55.87	11,928	.881	4.085	.833	.0181	4.164	.0381	2.528	.945	6134	29.98	1.910	.849	55
21.60	55.62	11,963	.883	-----	-----	.0179	-----	------	2.533	.950	6140	-----	-----	-----	56
18.31	46.89	10,927	.807	3.114	.796	.0142	4.360	.0451	2.247	.874	6133	29.93	1.890	.870	57
15.22	38.75	9580	.707	2.246	.733	.0131	4.500	.0556	1.856	.578	6134	29.81	1.847	.835	58
12.43	31.55	8235	.608	1.604	.590	.0127	4.453	.0663	1.513	.324	6056	29.52	1.754	.839	59
14.86	48.70	11,306	.835	1.552	.737	.0160	2.871	.0295	2.510	.938	5860	31.14	1.917	.813	60
14.92	49.34	11,327	.836	1.510	.740	.0163	3.502	.0359	2.545	.936	5847	31.64	1.894	.845	61
13.53	45.01	10,707	.791	1.522	.776	.0154	2.313	.0233	2.297	.799	5949	29.27	1.899	.815	62
12.17	40.10	9875	.729	1.523	.749	.0154	2.913	.0331	2.076	.601	5914	29.59	1.859	.816	63
9.86	32.65	8464	.625	1.515	.683	.0161	2.531	.0412	1.825	.395	5617	29.22	1.702	.846	64
7.66	25.46	6681	.493	1.520	.431	.0180	2.296	.0328	1.607	.234	4918	28.99	1.448	.895	65
10.45	43.49	10,787	.795	3.021	.734	.0181	3.504	.0335	2.486	.791	5729	30.17	1.831	.834	66
10.44	43.48	10.807	.798	3.030	.735	.0185	8.151	.0780	2.515	.787	5707	30.73	1.758	.877	67
9.34	38.74	9902	.731	2.552	.736	.0188	8.519	.0850	2.343	.636	5561	30.86	1.683	.895	68
7.80	32.71	8464	.625	1.938	.687	.0203	5.439	.0624	2.221	.490	5076	31.85	1.556	.834	69
6.05	25.45	6700	.495	1.449	.539	.0227	1.661	.0191	2.139	.378	4238	29.92	1.375	.841	70

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TABLE I - COMPONENT PERFORMANCE DATA FOR

(b) Exhaust-nozzle area,

Run	Altitude (ft)	Ram pressure ratio P_2/P_0	Flight Mach number M_0	Tunnel static pressure P_0 (lb/sq ft abs)	Reynolds number index $\delta_2/\theta_2\sqrt{\theta_2}$	Engine speed N (rpm)	Fuel flow w_f (lb/hr)	Compressor inlet total pressure P_2 (lb/sq ft abs)	Compressor inlet total temperature T_2 (°R)	Compressor outlet total pressure P_3 (lb/sq ft abs)	Compressor outlet total temperature T_3 (°R)	Turbine inlet total pressure P_4 (lb/sq ft abs)	Turbine inlet total temperature T_4 (°R)	Turbine outlet total pressure P_5 (lb/sq ft abs)	Exhaust gas total temperature T_7 (°R)
1	5000	1.056	0.280	1754	0.9921	12,513	3405	1853	471	8064	775	7822	1919	3870	1659
2		1.056	.280	1754	1.003	12,513	3395	1853	467	8079	768	7835	1905	3867	1648
3		1.058	.286	1756	1.001	11,525	2810	1858	469	7441	739	7212	1738	3611	1504
4		1.055	.278	1754	.9940	10,537	2100	1851	470	6187	702	5981	1558	3104	1354
5		1.055	.278	1754	.9930	9220	1500	1850	471	4896	651	4443	1420	2536	1263
6		1.053	.273	1753	.9990	7903	1177	1846	469	3607	602	3495	1322	2232	1202
7		1.053	.273	1753	.9930	6256	921	1846	471	2790	552	2723	1233	2014	1160
8	10,000	1.205	.515	1454	.8418	12,513	2960	1742	510	7258	618	7034	1930	3456	1667
9		1.205	.514	1457	.8482	12,513	2970	1744	509	7261	618	7034	1934	3467	1670
10		1.204	.512	1453	.8467	12,513	2935	1738	507	7223	814	6999	1920	3445	1657
11		1.207	.518	1461	.8547	12,513	2990	1753	506	7297	816	7065	1928	3480	1661
12		1.208	.519	1457	.8418	11,525	2320	1750	512	6408	785	6198	1734	3098	1495
13		1.206	.516	1459	.8525	11,525	2355	1750	507	6487	781	6270	1734	3132	1491
14		1.212	.524	1454	.8576	10,537	1712	1754	506	5308	736	5126	1521	2642	1322
15		1.212	.527	1450	.8532	10,537	1710	1751	507	5288	738	5109	1535	2641	1333
16		1.215	.527	1449	.8489	9220	1195	1750	510	3936	685	3791	1303	2135	1195
17		1.203	.515	1456	.8496	9220	1190	1745	507	3886	682	3745	1302	2131	1195
18		1.207	.522	1456	.8340	7903	951	1753	517	3038	643	2936	1225	1863	1110
19		1.205	.520	1454	.8606	7903	960	1748	504	3056	629	2954	1206	1871	1091
20		1.203	.519	1456	.8525	6256	754	1748	507	2341	586	2274	1064	1677	990
21		1.209	.525	1458	.8598	6256	750	1760	506	2368	581	2296	1061	1687	992
22	25,000	2.032	1.052	784	0.7310	12,513	2430	1577	528	6503	837	6102	1875	2942	1608
23		2.029	1.051	785	.7299	12,513	2455	1577	527	6294	837	6093	1885	2949	1619
24		2.030	1.052	787	.7321	11,525	1839	1584	528	5489	798	5298	1657	2578	1419
25		2.031	1.053	785	.7364	10,537	1228	1581	525	4328	746	4154	1367	2043	1169
26		2.004	1.043	792	.7446	9220	877	1577	520	3137	682	2990	1062	1525	906
27		2.021	1.051	791	.7429	7903	637	1589	523	2266	633	2153	822	1208	718
28		1.506	.781	786	.6083	12,513	2017	1175	484	4949	786	4820	1869	2345	1611
29		1.501	.777	788	.6109	12,513	2025	1173	481	4990	784	4828	1872	2346	1614
30		1.503	.779	787	.6135	11,525	1652	1174	481	4542	752	4394	1683	2145	1447
31		1.504	.780	786	.6135	10,537	1203	1174	480	3707	708	3579	1441	1776	1241
32		1.508	.785	787	.6169	9220	879	1181	481	2646	649	2547	1159	1340	1001
33		1.500	.780	786	.6127	7903	700	1174	482	1984	599	1905	969	1109	854
34		1.498	.779	787	.6127	6256	561	1175	483	1428	547	1374	778	956	716
35		1.218	.529	786	.5400	12,513	1815	951	451	4257	759	4098	1918	2011	1658
36		1.210	.520	778	.5280	12,513	1768	935	453	4141	758	4005	1906	1970	1646
37		1.220	.533	781	.5350	11,525	1490	947	454	3881	724	3741	1710	1852	1474
38		1.211	.524	786	.5408	10,537	1180	947	449	3301	682	3181	1510	1609	1307
39		1.205	.518	781	.5325	9220	868	937	452	2374	629	2289	1290	1246	1136
40		1.211	.525	781	.5362	7903	735	943	451	1814	583	1751	1141	1057	1020
41		1.206	.521	783	.5328	6256	587	942	453	1329	534	1293	1016	922	941
42		1.062	.286	789	.4726	12,513	1670	835	452	3779	764	3657	1973	1816	1712
43		1.068	.302	784	.4721	12,513	1661	835	453	3761	764	3646	1960	1809	1702
44		1.068	.299	782	.4693	11,525	1373	832	454	3447	727	3339	1757	1669	1521
45		1.067	.299	781	.4693	11,525	1373	831	454	3460	727	3348	1757	1669	1519
46		1.065	.292	786	.4735	10,537	1116	834	451	2958	688	2864	1580	1468	1376
47		1.057	.278	786	.4697	9220	842	829	453	2141	637	2081	1435	1165	1275
48		1.056	.263	782	.4632	7903	717	820	454	1668	593	1617	1338	1015	1218
49		1.053	.276	778	.4583	6256	589	820	457	1236	550	1210	----	895	1202
50	40,000	2.026	1.048	391	0.4124	12,513	1420	783	477	3385	784	3279	1902	1585	1642
51		2.041	1.061	391	.4184	12,513	1437	791	476	3421	783	3314	1900	1605	1640
52		2.010	1.044	394	.4139	11,525	1174	785	477	-----	---	----	----	1475	1469
53		2.051	1.061	393	.4191	10,537	887	799	479	2517	705	2433	1430	1188	1230
54		2.031	1.055	392	.4191	9220	672	791	476	1749	641	1679	1076	834	922
55		2.020	1.050	394	.4170	7903	539	791	477	1251	591	1191	832	646	722
56		2.038	1.059	390	.4102	6256	421	791	484	823	541	781	585	504	533
57		1.525	.793	394	.3342	12,513	1207	596	456	2686	767	2602	1950	1269	1686
58		1.520	.790	398	.3376	12,475	1186	600	454	2680	766	2600	1953	1268	1681
59		1.529	.796	393	.3381	11,525	1002	596	452	2471	729	2395	1790	1178	1509
60		1.528	.794	394	.3380	10,537	800	597	452	2051	688	1989	1498	987	1293
61		1.513	.787	396	.3370	9220	632	596	453	1413	624	1359	1180	712	1021
62		1.520	.794	394	.3357	7903	532	597	455	-----	---	----	----	585	882
63		1.515	.791	390	.3329	6256	447	589	453	-----	---	----	----	488	726
64		1.215	.524	391	.2671	12,375	1017	471	452	2162	767	2102	2013	1042	1750
65		1.238	.552	391	.2719	12,250	982	481	453	-----	---	----	----	1022	1686
66		1.220	.532	396	.2726	12,113	966	480	451	2140	755	2074	1930	1023	1675
67		-----	-----	394	------	12,100	967	----	---	2136	755	2071	----	1020	----
68		1.214	.524	393	.2688	11,525	877	474	452	2007	734	1943	1820	969	1577
69		-----	-----	394	------	10,537	697	----	---	1624	694	1572	----	801	----
70		1.214	.532	392	.2673	9220	587	475	454	1181	639	1148	1361	624	1199
71		1.199	.514	396	.2673	7903	518	474	454	899	590	875	1230	534	1107
72		1.212	.528	392	.2673	6256	438	474	454	673	---	655	----	470	986
73	47,000	1.224	0.541	277	0.1913	12,083	743	338	452	1522	782	1479	1871	728	1716
74		1.216	.528	287	.1979	11,938	747	347	450	1546	754	1505	1943	744	1686
75		1.208	.519	283	.1930	11,638	700	342	453	1472	741	1432	1870	705	1627
76		1.220	.533	282	.1933	11,613	700	340	451	1478	741	1439	1874	709	1625
77		1.246	.562	276	.1927	11,275	655	342	453	1392	728	1352	1780	669	1544
78		1.232	.547	276	.1930	11,263	657	338	449	1392	726	1353	1800	671	1557
79	55,000	1.531	0.798	196	0.1727	12,100	688	298	444	1372	756	1338	1999	651	1743
80		1.521	.787	194	.1652	12,000	660	292	452	1311	763	1275	1986	625	1727
81		1.536	.798	194	.1656	11,725	636	295	455	1280	754	1243	1924	609	1672
82		1.552	.808	192	.1660	11,563	625	295	454	1260	746	1223	1877	601	1625

NACA

XJ34-WE-32 TURBOJET ENGINE - Continued

1.138 square feet.

Engine inlet air flow $W_{a,2}$ (lb/sec)	Corrected engine inlet air flow $W_{a,2}\sqrt{\theta_2}/\delta_2$ (lb/sec)	Corrected engine speed $N/\sqrt{\theta_2}$ (rpm)	Compressor Mach number M_c	Compressor total-pressure ratio P_3/P_2	Adiabatic compressor efficiency η_c	Fuel-air ratio $\frac{W_f}{3600 W_{a,2}}$	Combustor total-pressure loss coefficient $(P_3-P_4)/q_b$	Combustor total-pressure loss ratio $(P_3-P_4)/P_3$	Combustor total-temperature ratio T_4/T_3	Combustor efficiency η_b	Corrected turbine speed $N/\sqrt{\theta_4}$ (rpm)	Corrected turbine gas flow $\frac{W_{g,4}\sqrt{\theta_4}}{\delta_4(\gamma_4/1.4)}$ (lb/sec)	Turbine total-pressure ratio P_4/P_5	Adiabatic turbine efficiency η_t	Run
54.35	59.13	13,139	0.970	4.352	0.810	0.0174	3.213	0.0300	2.476	0.943	6709	29.66	2.021	0.859	1
54.58	59.11	13,139	.970	4.360	.813	.0173	3.266	.0302	2.480	.945	6731	29.60	2.026	.852	2
52.65	57.02	12,124	.895	4.005	.846	.0148	3.156	.0308	2.352	.954	6471	29.48	1.997	.850	3
46.34	50.42	11,074	.818	3.343	.835	.0126	3.213	.0333	2.219	.946	6228	29.42	1.927	.852	4
35.12	38.28	9681	.715	2.484	.778	.0119	3.305	.0333	2.181	.890	5691	28.56	1.752	.819	5
27.26	29.69	8314	.614	1.954	.745	.0120	3.417	.0311	2.196	.811	5043	27.14	1.566	.821	6
19.56	21.36	6569	.465	1.511	.729	.0131	3.338	.0240	2.234	.699	4127	24.12	1.353	.776	7
48.70	58.63	12,626	.932	4.166	.835	.0169	3.172	.0309	2.359	.950	6695	29.62	2.035	.857	8
48.53	58.28	12,638	.933	4.163	.830	.0170	3.246	.0313	2.364	.944	6888	29.56	2.029	.864	9
48.45	58.29	12,663	.935	4.156	.831	.0168	3.220	.0310	2.359	.950	6709	29.53	2.032	.862	10
49.18	58.62	12,676	.936	4.163	.822	.0169	3.235	.0318	2.363	.947	6695	29.76	2.030	.876	11
45.83	55.04	11,606	.857	3.662	.843	.0141	3.083	.0328	2.209	.952	6478	29.77	2.001	.868	12
46.05	55.03	11,663	.861	3.707	.841	.0142	3.206	.0335	2.220	.948	6478	29.58	2.002	.870	13
40.01	47.65	10,674	.788	3.026	.820	.0119	3.077	.0343	2.067	.920	6295	29.27	1.940	.839	14
39.88	47.62	10,663	.787	3.020	.816	.0119	3.038	.0339	2.080	.934	6268	29.41	1.935	.861	15
29.92	35.84	9303	.687	2.249	.760	.0111	3.521	.0368	1.975	.815	5813	27.76	1.776	.839	16
30.32	36.35	9331	.689	2.227	.745	.0109	3.281	.0363	1.982	.836	5821	28.47	1.757	.847	17
24.12	29.06	7919	.585	1.733	.699	.0110	3.115	.0336	1.905	.718	5227	27.40	1.576	.827	18
24.36	29.06	8022	.592	1.748	.698	.0109	3.156	.0334	1.917	.710	5265	27.30	1.579	.835	19
18.57	22.25	6331	.468	1.339	.559	.0113	2.924	.0286	1.816	.556	4421	25.32	1.355	.882	20
18.71	22.21	6337	.468	1.345	.597	.0111	3.172	.0304	1.826	.574	4427	25.24	1.361	.813	21
43.11	58.33	12,407	.916	3.997	.831	.0157	3.081	.0319	2.240	.953	6776	29.75	2.074	.869	22
42.95	58.03	12,418	.917	3.991	.826	.0159	3.095	.0319	2.252	.950	6764	29.76	2.066	.867	23
39.96	53.83	11,427	.844	3.465	.835	.0128	3.099	.0348	2.076	.947	6612	29.63	2.055	.864	24
34.58	46.54	10,477	.774	2.738	.793	.0099	3.182	.0402	1.832	.862	6615	29.41	2.033	.856	25
28.15	37.81	9211	.680	1.989	.698	.0087	3.221	.0489	1.657	.582	6521	29.05	1.961	.877	26
22.70	30.35	7875	.581	1.426	.508	.0078	2.957	.0499	1.299	.324	6317	28.49	1.782	.850	27
33.86	58.88	12,951	.956	4.212	.815	.0165	2.677	.0261	2.378	.939	6793	29.54	2.055	.855	28
33.91	58.90	13,001	.960	4.254	.814	.0166	3.369	.0325	2.388	.943	6789	29.57	2.058	.851	29
32.86	57.01	11,974	.884	3.869	.839	.0140	3.149	.0326	2.238	.936	6571	29.64	2.048	.852	30
28.87	50.03	10,958	.809	3.158	.820	.0116	3.040	.0345	2.035	.873	6456	29.38	2.015	.837	31
22.73	39.21	9580	.707	2.240	.743	.0107	2.953	.0374	1.786	.635	6259	28.91	1.901	.862	32
18.18	31.58	8203	.606	1.690	.667	.0107	2.976	.0398	1.618	.453	5841	28.15	1.718	.861	33
13.26	23.03	6487	.479	1.215	.432	.0117	3.027	.0378	1.422	.261	5141	25.44	1.437	.831	34
28.51	59.13	13,426	.991	4.476	.739	.0177	4.128	.0374	2.527	.940	6713	29.72	2.038	.852	35
27.83	58.83	13,401	.989	4.429	.788	.0176	3.630	.0329	2.515	.937	6731	29.57	2.033	.859	36
27.54	57.53	12,320	.911	4.098	.835	.0150	3.735	.0361	2.362	.930	6522	29.45	2.020	.854	37
25.01	51.97	11,327	.836	3.486	.827	.0131	3.508	.0364	2.214	.875	6317	29.40	1.977	.837	38
19.03	40.10	9875	.729	2.534	.778	.0127	3.353	.0358	2.051	.709	5952	28.57	1.837	.807	39
15.08	31.55	8480	.626	1.924	.703	.0135	3.251	.0347	1.957	.552	5406	27.79	1.656	.842	40
10.98	23.04	6700	.496	1.411	.579	.0149	2.795	.0271	1.903	.428	4523	25.80	1.402	.845	41
25.13	59.43	13,401	.989	4.526	.782	.0185	3.607	.0323	2.582	.946	6628	29.81	2.014	.851	42
25.21	59.67	13,401	.989	4.504	.783	.0183	3.579	.0306	2.565	.948	6645	29.86	2.015	.845	43
24.31	57.81	12,320	.909	4.143	.834	.0157	3.278	.0313	2.417	.929	6442	29.60	2.000	.849	44
24.38	58.05	12,320	.909	4.164	.838	.0156	3.387	.0324	2.417	.932	6442	29.61	2.006	.853	45
21.84	51.65	11,306	.835	3.547	.830	.0142	3.221	.0318	2.297	.878	6187	29.26	1.951	.828	46
16.25	38.74	9875	.729	2.583	.768	.0144	2.896	.0280	2.253	.763	5663	28.48	1.786	.802	47
10.54	25.43	8448	.624	2.034	.735	.0189	4.662	.0306	2.256	.546	5018	25.04	1.595	.790	48
9.17	22.20	6669	.492	1.507	.612	.0178	2.631	.0210	-----	-----	----	-----	-----	-----	49
22.84	59.16	13,051	.963	4.323	.808	.0173	3.318	.0313	2.426	.930	6738	29.56	2.069	.841	50
22.99	58.90	13,064	.964	4.325	.806	.0174	3.349	.0313	2.427	.921	6742	29.45	2.065	.844	51
22.07	57.05	12,021	.887	-----	-----	.0148	-----	-----	-----	.911	----	-----	-----	-----	52
19.54	49.71	10,969	.810	3.150	.823	.0126	2.938	.0334	2.028	.795	6480	29.15	2.048	.826	53
15.81	40.51	9626	.711	2.211	.735	.0118	2.844	.0400	1.679	.491	6484	29.41	2.013	.830	54
12.30	31.55	8243	.608	1.582	.587	.0122	3.160	.0480	1.408	.259	6287	28.18	1.844	.847	55
9.54	24.65	6475	.478	1.040	.096	.0122	2.647	.0510	1.081	.047	5907	27.88	1.550	.766	56
17.53	58.32	13,351	.986	4.507	.789	.0191	3.616	.0313	2.542	.895	6663	29.08	2.050	.849	57
17.92	59.12	13,336	.984	4.467	.777	.0184	3.299	.0299	2.550	.923	6636	29.73	2.050	.871	58
17.20	56.98	12,343	.911	4.147	.819	.0162	3.286	.0308	2.455	.893	6389	29.50	2.033	.972	59
15.42	50.99	11,285	.833	3.436	.811	.0144	2.918	.0302	2.177	.781	6344	28.90	2.015	.834	60
11.95	39.63	9875	.729	2.371	.742	.0147	3.218	.0382	1.891	.509	6209	28.94	1.909	.852	61
9.68	32.12	8440	.623	-----	-----	.0153	-----	-----	-----	.364	----	-----	-----	-----	62
7.58	25.45	6700	.495	-----	-----	.0164	-----	-----	-----	.218	----	-----	-----	-----	63
13.98	58.62	13,254	.978	4.590	.784	.0202	3.284	.0278	2.625	.898	6493	29.22	2.017	.843	64
14.27	58.65	13,120	.969	-----	-----	.0191	-----	-----	-----	.898	----	-----	-----	-----	65
14.26	58.59	12,997	.959	4.458	.791	.0188	3.485	.0309	2.556	.965	6481	29.50	2.028	.839	66
-----	-----	-----	-----	-----	-----	-----	-----	.0304	-----	-----	----	-----	2.030	-----	67
13.76	57.32	12,343	.911	4.324	.819	.0177	3.480	.0319	2.480	.875	6339	29.40	2.005	.850	68
-----	-----	-----	-----	-----	.787	-----	-----	.0320	-----	-----	----	-----	1.963	-----	69
9.07	37.79	9856	.728	2.486	.730	.0180	2.801	.0280	2.130	.556	5810	28.13	1.840	.815	70
7.12	29.73	8448	.624	1.897	.671	.0202	2.728	.0267	2.085	.435	5227	27.51	1.639	.823	71
5.32	22.21	6688	.494	1.420	.590	.0229	-----	.0268	-----	.310	----	-----	-----	-----	72
10.04	58.65	12,919	.954	4.503	.784	.0184	3.228	.0283	2.587	.857	6396	29.51	2.032	.825	73
10.19	57.86	12,821	.946	4.455	.789	.0198	3.064	.0265	2.577	.848	6370	29.20	2.023	.845	74
9.78	56.74	12,488	.922	4.304	.815	.0191	3.140	.0272	2.524	.822	6311	28.93	2.020	.832	75
9.81	56.70	12,438	.918	4.347	.812	.0192	3.049	.0264	2.529	.820	6318	28.73	2.041	.828	76
9.52	55.03	12,076	.891	4.070	.814	.0199	3.208	.0287	2.445	.788	6267	28.94	2.021	.833	77
9.50	55.31	12,108	.894	4.118	.809	.0206	3.128	.0280	2.479	.794	6230	29.03	2.017	.853	78
8.88	58.32	13,080	.966	4.604	.779	.0215	2.987	.0248	2.644	.848	6372	29.08	2.055	.808	79
8.80	58.16	12,852	.949	4.490	.780	.0213	3.175	.0275	2.603	.837	6339	29.43	2.040	.829	80
8.33	55.94	12,522	.924	4.339	.794	.0212	3.416	.0289	2.552	.799	6287	28.79	2.041	.826	81
8.33	55.89	12,361	.913	4.271	.800	.0208	3.391	.0294	2.516	.785	6271	28.85	2.035	.846	82

NACA

TABLE I - COMPONENT PERFORMANCE DATA FOR

(c) Exhaust-nozzle area,

Run	Altitude (ft)	Ram pressure ratio P_2/P_0	Flight Mach number M_0	Tunnel static pressure p_0 (lb/sq ft abs)	Reynolds number index $\frac{p_2}{\theta_2}\sqrt{\theta_2}$	Engine speed N (rpm)	Fuel flow W_f (lb/hr)	Compressor inlet total pressure P_2 (lb/sq ft abs)	Compressor inlet total temperature T_2 (°R)	Compressor outlet total pressure P_3 (lb/sq ft abs)	Compressor outlet total temperature T_3 (°R)	Turbine inlet total pressure P_4 (lb/sq ft abs)	Turbine inlet total temperature T_4 (°R)	Turbine outlet total pressure P_5 (lb/sq ft abs)	Exhaust gas total temperature T_5 (°R)
1	5000	1.061	0.278	1759	1.001	12,513	2615	1856	468	7473	755	7221	1663	3335	1411
2		1.066	.292	1752	1.001	12,513	2625	1859	469	7501	756	7249	1668	3343	1418
3		1.060	.283	1761	1.009	11,525	2195	1862	467	6942	725	6702	1519	3138	1291
4		1.062	.287	1756	1.008	10,537	1730	1860	467	5900	690	5673	1382	2781	1183
5		1.057	.278	1760	1.000	9220	1331	1857	470	4474	644	4304	1298	2363	1139
6		1.057	.280	1755	1.000	7903	1095	1853	470	3490	599	3377	1235	2122	1113
7		1.056	.280	1763	.9970	6256	865	1861	472	2703	555	2635	1185	1959	1111
8	10,000	1.207	.518	1452	.8503	12,513	2275	1742	506	6741	800	6515	1680	2981	1422
9		1.209	.519	1452	.8432	12,513	2260	1744	510	6707	802	6476	1662	2958	1408
10		1.206	0.516	1452	0.8375	12,513	2245	1741	512	6687	805	6453	1678	2951	1422
11		1.211	.522	1454	.8439	11,525	1827	1750	511	6022	773	5800	1510	2691	1282
12		1.209	.520	1453	.8439	11,525	1822	1747	510	6025	772	5804	1519	2693	1289
13		1.208	.520	1454	.8518	10,537	1396	1747	508	4994	726	4792	1343	2332	1149
14		1.207	.520	1454	.8475	10,537	1387	1748	510	4975	729	4774	1358	2324	1159
15		1.208	.524	1452	.8482	9220	1098	1749	510	3791	680	3641	1233	1975	1078
16		1.207	.522	1452	.8439	9220	1090	1748	512	3738	680	3595	1231	1960	1075
17		1.206	.521	1452	.8496	7903	917	1747	509	2986	633	2867	1134	1777	1019
18		1.208	.523	1454	.8453	7903	915	1752	511	2966	635	2859	1131	1772	1013
19		1.205	.521	1455	.8432	6256	720	1751	513	2308	587	2238	1027	1633	960
20		1.208	.524	1450	.8439	6256	716	1749	511	2283	587	2215	1015	1628	943
21	25,000	2.031	1.051	784	0.7386	12,513	1892	1576	522	5832	814	5671	1614	2534	1360
22		2.046	1.057	777	.7746	12,513	1923	1573	503	5977	792	5759	1602	2565	1351
23		2.033	1.052	784	.7342	12,513	1867	1577	525	5877	818	5661	1629	2524	1372
24		2.035	1.053	781	.7564	11,525	1412	1574	523	5126	779	4922	1421	2202	1195
25		2.046	1.059	781	.7194	10,537	1060	1585	522	4071	733	3893	1188	1776	984
26		2.038	1.057	785	.7397	9220	753	1589	526	2948	681	2797	930	1338	780
27		2.032	1.055	782	.7386	7903	570	1579	524	2146	628	2027	739	1094	636
28		1.515	.786	784	.6098	12,513	1557	1178	484	4616	774	4459	1630	2001	1380
29		1.521	.790	781	.6109	12,513	1572	1178	482	4623	770	4457	1634	2007	1380
30		1.525	.794	781	.6127	11,525	1300	1183	485	4225	741	4064	1460	1840	1235
31		1.519	.791	781	.6124	10,537	1040	1179	484	3496	701	3355	1256	1538	1060
32		1.513	.789	781	.6124	9220	818	1177	482	2569	646	2452	1060	1212	900
33		1.512	.787	782	.6143	7903	664	1177	482	1887	595	1806	890	1033	782
34		1.528	.800	786	.6219	6256	520	1197	483	----	---	----	----	915	666
35		1.221	.535	778	.5311	12,513	1370	945	454	3856	744	3722	1660	1691	1407
36		1.219	.533	781	.5305	12,513	1373	947	455	3850	741	3718	1650	1685	1399
37		1.224	.539	782	.5345	11,525	1180	953	456	3589	712	3466	1487	1584	1261
38		1.216	.531	788	.5362	10,537	1001	954	455	3098	676	2987	1324	1399	1129
39		1.217	.534	780	.5305	9220	807	947	457	----	626	----	1164	1125	1004
40		1.215	.534	782	.5316	7903	682	949	457	----	584	----	1069	991	950
41		1.209	.528	784	.5299	6256	544	948	457	1282	539	1242	986	897	904
42		1.064	.292	782	.4658	12,513	1280	830	455	3432	746	3316	1710	1528	1454
43		1.064	.297	784	.4655	12,513	1287	833	457	3449	748	3330	1709	1509	1453
44		1.064	.292	782	.4682	11,525	1107	830	454	3196	713	3091	1546	1446	1314
45		1.060	.286	789	.4708	10,537	960	835	454	2796	683	2698	1411	1317	1206
46		1.058	.286	782	.4636	9220	776	827	456	2051	634	1971	1301	1075	1142
47		1.054	.278	783	.4621	7903	678	826	456	1600	592	1550	1242	963	1122
48		1.053	.276	778	.4570	6256	554	820	458	1214	548	1188	1223	875	1140
49	40,000	2.025	1.050	394	0.4120	12,513	1090	791	481	3107	773	3002	1641	1343	1387
50		2.066	1.061	389	.4127	12,513	1094	791	481	3116	772	3005	1641	1344	1388
51		2.008	1.047	394	.4112	11,525	940	788	481	2839	742	2738	1473	1229	1246
52		2.051	1.051	394	.4102	10,537	766	792	483	2307	701	2217	1245	1004	1042
53		2.036	1.057	393	.4143	9220	592	796	482	1630	646	1553	975	733	816
54		2.023	1.047	389	.4052	7903	475	776	481	1192	593	1134	766	575	661
55		2.015	1.071	391	.4168	6256	336	805	485	784	539	743	----	485	----
56		1.531	.797	397	.3398	12,513	942	603	453	2483	746	2399	1660	1076	1401
57		1.534	.798	397	.3459	12,513	954	604	448	2501	740	2413	1655	1074	1402
58		1.524	.792	401	.3466	11,525	850	606	449	2319	708	2243	1478	1007	1248
59		1.526	.793	401	.3426	10,537	750	607	453	1939	674	1872	1280	846	1063
60		1.523	.796	396	.3369	9220	611	601	456	1357	619	1299	1036	639	888
61		1.515	.790	398	.3369	7903	522	600	456	1028	576	982	913	544	801
62		1.508	.787	398	.3358	6256	429	599	456	721	521	692	732	474	671
63		1.222	.535	396	.2738	12,513	829	481	450	2017	533	1957	1720	879	1460
64		1.214	.528	401	.2750	12,513	830	485	452	2035	749	1975	1723	899	1464
65		1.207	.520	401	.2734	11,525	749	482	452	1867	717	1799	1550	828	1319
66		1.204	.516	402	.2734	10,537	684	482	452	1606	681	1544	1376	720	1176
67		1.202	.511	401	.2717	9220	585	479	452	1177	628	1118	1215	590	1057
68		1.199	.512	397	.2694	7903	525	475	452	890	582	859	1111	507	997
69		1.201	.519	394	.2680	6256	446	473	453	658	533	636	1012	454	967
70	47,000	1.230	.544	282	.1951	12,513	669	345	453	1487	758	1441	1775	643	1513
71		1.206	.520	287	.1968	12,513	672	345	450	1479	754	1430	1781	646	1516
72		1.223	.536	287	.1987	11,525	622	349	450	1380	718	1336	1590	602	1354
73		1.220	.533	282	.1939	10,537	570	342	452	1151	684	1113	1411	520	1206
74		1.206	.524	282	.1928	9220	498	340	452	826	629	796	1250	414	1095
75		1.204	.522	280	.1905	7903	453	337	453	637	587	617	1159	364	1040
76		1.207	.525	280	.1901	6256	407	338	455	467	---	456	----	320	946
77	55,000	1.510	0.781	194	0.1656	12,563	601	290	449	1246	761	1215	1814	544	1547
78		1.536	.802	192	.1664	11,938	578	293	452	1204	736	1166	1620	519	1415
79		1.521	.802	192	.1644	11,563	550	290	452	1140	727	1102	1603	501	1369
80		1.531	.772	192	.1656	10,813	517	292	452	1004	696	973	1439	448	1228
81		1.487	.798	193	.1624	10,313	485	286	451	873	674	846	1336	391	1146
82		1.531	.791	194	.1691	9188	432	296	450	669	625	650	1133	324	975
83		1.191	.506	199	.1337	12,513	539	237	454	1040	773	1009	1899	464	1630
84		1.221	.536	190	.1307	12,438	530	231	452	1025	751	993	1900	453	1650
85		1.201	.519	194	.1323	12,225	527	233	451	1008	757	980	1845	445	1584
86		1.215	.528	191	.1307	12,063	507	231	452	979	751	951	1806	433	1552
87		1.206	.519	194	.1317	11,563	493	233	453	938	735	911	1709	420	1463
88		1.228	.543	189	.1323	11,250	482	231	448	916	719	890	1640	406	1408
89		1.300	.619	190	.1402	10,938	476	246	449	854	714	831	1635	388	1405

NACA

XJ34-WE-32 TURBOJET ENGINE - Continued

1.334 square feet.

Engine inlet air flow $W_{a,2}$ (lb/sec)	Corrected engine inlet air flow $W_{a,2}\sqrt{\theta_2}/\delta_2$ (lb/sec)	Corrected engine speed $N/\sqrt{\theta_2}$ (rpm)	Compressor Mach number M_c	Compressor total-pressure ratio P_3/P_2	Adiabatic compressor efficiency η_c	Fuel-air ratio $\frac{W_f}{3600\ W_{a,2}}$	Combustor total-pressure loss coefficient $(P_3-P_4)/q_b$	Combustor total-pressure loss ratio $(P_3-P_4)/P_3$	Combustor total temperature ratio T_4/T_3	Combustor efficiency η_b	Corrected turbine speed $N/\sqrt{\theta_4}$ (rpm)	Corrected turbine gas flow $\frac{W_{g,4}\sqrt{\theta_4}}{\delta_4(\gamma_4/1.4)}$ (lb/sec)	Turbine total-pressure ratio P_4/P_5	Adiabatic turbine efficiency η_t	Run
54.87	59.42	13,176	0.973	4.026	0.798	0.0132	3.140	0.0337	2.203	0.964	7171	29.90	2.165	0.856	1
54.86	59.38	13,164	.972	4.035	.810	.0133	3.158	.0336	2.206	.964	7158	29.84	2.168	.845	2
53.63	57.81	12,147	.897	3.728	.827	.0114	3.019	.0346	2.095	.963	6889	29.96	2.136	.847	3
47.57	51.38	11,106	.820	3.172	.819	.0101	3.218	.0385	2.003	.937	6582	29.80	2.040	.849	4
36.13	39.16	9690	.715	2.409	.772	.0102	3.400	.0380	2.016	.866	5933	28.88	1.821	.839	5
28.49	30.97	8306	.613	1.883	.723	.0107	3.059	.0324	2.062	.793	5206	28.27	1.591	.852	6
21.99	23.84	6563	.484	1.452	.640	.0109	2.595	.0252	2.135	.773	4201	27.39	1.345	.824	7
48.89	58.67	12,676	.936	3.870	.813	.0129	3.013	.0335	2.100	.963	7138	29.68	2.185	.858	8
48.50	58.30	12,626	.932	3.846	.821	.0129	3.095	.0345	2.072	.943	7171	29.47	2.189	.853	9
45.86	55.03	12,601	0.930	3.841	0.820	0.0128	3.117	0.0350	2.084	0.967	7142	29.73	2.187	0.852	10
46.10	55.32	11,617	.858	3.441	.827	.0111	3.090	.0369	1.953	.929	6905	29.50	2.155	.874	11
40.03	47.96	11,629	.858	3.449	.827	.0110	3.049	.0367	1.968	.947	6889	29.73	2.155	.845	12
39.98	47.98	10,653	.786	2.859	.817	.0097	3.276	.0405	1.850	.875	6669	29.24	2.055	.837	13
31.53	37.80	10,632	.785	2.846	.812	.0096	3.246	.0404	1.863	.890	6635	29.49	2.054	.852	14
31.44	37.92	9303	.687	2.168	.713	.0097	3.177	.0396	1.813	.766	6078	28.96	1.844	.840	15
24.77	29.70	9285	.685	2.138	.740	.0096	2.999	.0383	1.810	.775	6082	29.22	1.870	.851	16
24.78	29.71	7982	.589	1.709	.680	.0103	3.443	.0399	1.791	.648	5417	27.65	1.613	.840	17
18.48	22.19	7966	.588	1.693	.670	.0103	3.064	.0361	1.781	.638	5424	27.71	1.614	.863	18
19.19	23.05	6294	.465	1.318	.570	.0108	3.167	.0316	1.750	.541	4487	25.15	1.369	.799	19
14.25	17.15	6306	.465	1.305	.532	.0104	2.687	.0298	1.729	.540	4523	26.17	1.361	.884	20
44.25	58.34	12,477	0.921	3.739	0.819	0.0121	3.069	0.0375	1.983	0.930	7267	29.54	2.238	0.851	21
43.31	58.59	12,713	.938	3.80	.809	.0121	3.278	.0365	2.023	.943	7292	29.60	2.246	.843	22
43.24	58.37	12,442	.918	3.727	.818	.0120	3.137	.0368	1.991	.952	7237	29.68	2.249	.852	23
40.32	44.39	11,481	.848	3.257	.821	.0097	3.105	.0398	1.824	.918	7105	29.54	2.235	.841	24
35.03	46.91	10,506	.776	2.568	.766	.0084	3.028	.0437	1.621	.712	7062	29.46	2.192	.902	25
28.21	37.80	9158	.676	1.855	.656	.0074	3.097	.0512	1.366	.440	6938	29.01	2.090	.873	26
22.55	30.37	7865	.581	1.359	.462	.0070	3.004	.0555	1.177	.203	6652	28.41	1.854	.876	27
33.77	58.56	12,951	.956	3.919	.798	.0128	3.082	.0340	2.106	.942	7237	29.48	2.228	.835	28
34.01	59.08	12,988	.959	3.924	.801	.0128	3.254	.0359	2.122	.946	7233	29.74	2.221	.850	29
32.80	56.71	11,917	.880	3.571	.832	.0110	3.218	.0381	1.970	.904	7014	29.56	2.208	.833	30
29.08	50.40	10,906	.805	2.965	.813	.0099	3.158	.0403	1.792	.761	6887	29.27	2.181	.835	31
22.87	39.63	9570	.706	2.183	.735	.0099	3.356	.0456	1.641	.548	6525	28.83	2.023	.868	32
18.21	31.56	8203	.606	1.603	.616	.0101	2.904	.0429	1.496	.385	6070	28.48	1.748	.848	33
13.99	23.87	6487	.479	-----	-----	.0103	-----	-----	-----	.235	-----	-----	-----	-----	34
28.09	58.82	13,376	.987	4.080	.775	.0135	3.326	.0348	2.231	.953	7179	29.69	2.201	.845	35
28.38	59.37	13,364	.987	4.065	.785	.0134	3.220	.0343	2.227	.949	7196	29.92	2.206	.839	36
27.91	58.08	12,297	.901	3.766	.821	.0117	2.991	.0343	2.088	.914	6955	29.83	2.188	.830	37
25.51	52.98	11,254	.831	3.247	.825	.0109	2.947	.0358	1.959	.816	6716	29.70	2.135	.815	38
19.52	40.91	9829	.726	-----	-----	.0115	-----	-----	1.859	.621	6247	-----	-----	-----	39
15.34	32.09	8425	.622	-----	-----	.0123	-----	-----	1.830	.526	5577	-----	-----	-----	40
11.39	23.85	6669	.492	1.352	.502	.0133	2.762	.0312	1.829	.439	4587	27.39	1.384	.981	41
24.88	59.39	13,364	.987	4.135	.783	.0143	3.267	.0338	2.292	.945	7077	30.02	2.170	.849	42
22.72	54.14	13,339	.985	4.140	.787	.0157	3.985	.0345	2.285	.866	7081	27.33	2.206	.835	43
24.35	58.05	12,320	.910	3.851	.825	.0126	2.997	.0329	2.168	.916	6836	29.80	2.138	.849	44
24.72	58.59	11,264	.832	3.349	.819	.0108	2.495	.0351	2.066	.922	6516	32.96	2.049	.853	45
17.09	41.00	9838	.726	2.480	.760	.0126	3.340	.0351	2.052	.720	5929	29.82	1.841	.826	46
13.39	32.15	8433	.623	1.937	.698	.0141	2.846	.0313	2.098	.627	5196	29.16	1.609	.819	47
9.84	23.85	6656	.491	1.480	.604	.0156	2.257	.0214	2.232	.581	4143	27.78	1.361	.872	48
22.87	58.89	13,001	0.960	3.928	0.769	0.0132	3.035	0.0338	2.123	0.924	4216	29.76	2.235	0.840	49
22.97	59.15	13,001	.960	3.939	.794	.0132	3.199	.0356	2.126	.928	7216	29.87	2.236	.838	50
22.17	57.31	11,974	.884	3.603	.818	.0118	2.955	.0356	1.985	.862	6989	29.83	2.228	.824	51
19.40	50.01	10,927	.807	2.913	.793	.0110	2.966	.0390	1.776	.665	6919	29.45	2.208	.859	52
15.66	40.12	9570	.707	2.048	.669	.0105	2.978	.0472	1.509	.415	6794	29.85	2.119	.876	53
12.89	33.76	8211	.606	1.532	.558	.0102	2.634	.0487	1.292	.227	6542	29.65	1.972	.793	54
9.40	23.89	6469	.478	.9738	.067	.0099	2.553	.0523	-----	-----	-----	-----	1.532	-----	55
17.88	58.61	13,401	.989	4.118	.771	.0146	3.301	.0338	2.225	.881	7179	29.35	2.230	.852	56
18.01	58.62	13,464	.994	4.141	.769	.0147	3.502	.0352	2.236	.882	7191	29.37	2.247	.828	57
17.72	57.55	12,389	.915	3.827	.811	.0133	2.990	.0328	2.088	.802	6981	29.22	2.227	.835	58
15.66	51.00	11,285	.833	3.194	.807	.0133	2.963	.0346	1.899	.624	6829	28.66	2.213	.815	59
12.15	40.10	9835	.726	2.258	.734	.0140	3.246	.0428	1.674	.402	6605	28.70	2.033	.817	60
9.37	30.98	8433	.623	1.713	.632	.0155	3.528	.0448	1.585	.288	6014	27.46	1.805	.822	61
7.21	23.87	6675	.493	1.204	.382	.0165	2.917	.0402	1.405	.169	5297	26.78	1.460	.835	62
14.45	59.19	13,439	.992	4.193	.768	.0159	4.135	.0298	3.227	.867	7065	29.68	2.226	.834	63
14.59	59.41	13,401	.989	4.196	.772	.0158	2.906	.0295	2.300	.873	7058	29.72	2.197	.842	64
13.98	57.28	12,343	.911	3.873	.807	.0149	3.419	.0364	2.162	.784	6828	29.52	2.172	.832	65
12.85	52.65	11,285	.833	3.366	.812	.0148	3.443	.0398	2.021	.648	6602	29.69	2.144	.809	66
9.40	38.76	9875	.729	2.457	.753	.0173	4.739	.0501	1.935	.462	6126	28.16	1.896	.837	67
7.45	30.97	8464	.625	1.874	.684	.0196	3.230	.0348	1.909	.368	5481	27.81	1.695	.783	68
5.31	22.20	6700	.495	1.391	.567	.0233	3.637	.0334	1.899	.275	4540	25.55	1.401	.858	69
10.28	58.89	13,401	0.989	4.310	0.770	0.0181	3.242	0.0309	2.342	0.805	6963	29.26	2.234	0.818	70
10.32	58.94	13,439	.992	4.287	.766	.0181	3.398	.0331	2.362	.811	6952	29.64	2.214	.833	71
10.10	57.02	12,378	.914	3.954	.809	.0319	3.170	.0319	2.214	.717	6752	29.19	2.220	.812	72
8.89	51.33	11,285	.833	3.365	.808	.0178	3.040	.0330	2.063	.568	6529	28.97	2.140	.814	73
6.74	39.15	9875	.729	2.429	.738	.0205	3.249	.0363	1.987	.420	6050	28.90	1.923	.788	74
5.17	30.33	8464	.625	1.890	.675	.0243	3.053	.0314	1.974	.325	5380	27.61	1.695	.791	75
3.65	21.39	6681	.493	1.382	-----	.0310	-----	.0236	-----	.214	-----	-----	1.425	-----	76
8.44	57.28	13,505	0.997	4.297	0.744	0.0198	2.689	0.0249	2.384	0.766	6926	28.87	2.234	0.823	77
8.62	58.10	12,786	.944	4.109	.793	.0186	3.172	.0316	2.201	.708	6857	29.27	2.247	.806	78
8.30	56.52	12,384	.914	3.931	.788	.0184	3.251	.0333	2.205	.677	6750	29.24	2.200	.810	79
7.68	51.94	11,581	.855	3.438	.784	.0187	2.868	.0309	2.068	.561	6642	28.95	2.172	.811	80
6.96	48.00	11,066	.817	3.052	.760	.0194	2.700	.0309	1.982	.480	6560	29.02	2.163	.783	81
5.61	37.35	9868	.729	2.260	.675	.0214	2.433	.0284	1.813	.327	6315	27.98	2.006	.824	82
7.11	59.37	13,376	.987	4.388	.750	.0211	3.123	.0298	2.457	.776	6749	30.05	2.174	.824	83
6.92	59.15	13,321	.983	4.437	.803	.0213	3.447	.0312	2.530	.783	6709	29.74	2.192	.796	84
6.96	58.92	13,117	.968	4.326	.767	.0210	2.911	.0278	2.437	.749	6699	29.79	2.202	.807	85
6.63	56.67	12,919	.954	4.238	.773	.0212	3.123	.0286	2.405	.717	6661	28.96	2.197	.801	86
6.65	56.42	12,384	.914	4.026	.786	.0206	2.952	.0288	2.325	.678	6551	29.44	2.170	.823	87
6.54	55.66	12,105	.894	3.965	.798	.0205	2.939	.0284	2.281	.641	6499	28.96	2.192	.795	88
6.42	51.37	11,758	.868	3.472	.724	.0206	2.502	.0269	2.290	.637	6330	30.41	2.142	.812	89

NACA

TABLE I - COMPONENT PERFORMANCE DATA FOR

(d) Exhaust-nozzle area,

Run	Altitude (ft)	Ram pressure ratio P_2/P_0	Flight Mach number M_0	Tunnel static pressure P_0 (lb/sq ft abs)	Reynolds number index $\delta_2/\theta_2\sqrt{\theta_2}$	Engine speed N (rpm)	Fuel flow W_f (lb/hr)	Compressor inlet total pressure P_2 (lb/sq ft abs)	Compressor inlet total temperature T_2 (°R)	Compressor outlet total pressure P_3 (lb/sq ft abs)	Compressor outlet total temperature T_3 (°R)	Turbine inlet total pressure P_4 (lb/sq ft abs)	Turbine inlet total temperature T_4 (°R)	Turbine outlet total pressure P_5 (lb/sq ft abs)	Exhaust gas total temperature T_7 (°R)
1	5000	1.060	0.278	1756	0.9960	12,513	1774	1853	470	6692	737	6431	1340	2537	1093
2		1.069	.303	1756	1.009	12 513	1767	1872	470	6741	737	6476	1325	2532	1082
3		1.061	.280	1755	.9823	12,513	1770	1853	475	6692	743	6430	1345	2529	1100
4		1.058	.278	1756	1.007	11,525	1592	1853	467	6281	707	6012	1236	2427	1009
5		1.059	.280	1753	1.000	10,537	1395	1852	469	5430	678	5224	1150	2268	955
6		1.055	.273	1757	.9960	9220	1202	1850	470	4193	634	4024	1111	2079	954
7		1.054	.273	1759	1.012	7903	1064	1853	465	3362	589	3246	1090	1969	972
8		1.054	.276	1757	1.005	6256	918	1851	468	2769	555	2686	1085	1892	1003
9	10,000	1.208	0.527	1459	0.8584	12,513	1520	1763	508	6097	782	5734	1340	2229	1089
10		1.204	.522	1456	.8424	12,513	1514	1753	513	6022	788	5643	1337	2211	1090
11		1.211	.531	1450	.8584	11,525	1341	1756	506	5517	748	5076	1222	2076	992
12		1.209	.528	1447	.8532	10,537	1174	1750	508	4614	715	4271	1130	1902	931
13		1.205	.524	1452	.8554	9220	1002	1750	507	3542	668	3340	1069	1739	915
14		1.210	.529	1450	.8460	7903	846	1755	512	2804	628	2693	1024	1630	912
15		1.205	.524	1456	.8489	6256	721	1755	510	2237	581	2160	949	1563	885
16	25,000	1.513	0.793	781	0.6101	12,513	1145	1182	485	4138	754	3977	1300	1432	1053
17		1.504	.787	783	.6098	12,513	1154	1178	484	4131	753	3907	1300	1430	1057
18		1.507	.789	783	.6127	11,525	1038	1180	484	3786	723	3585	1154	1314	930
19		1.508	.790	781	.6090	10,537	879	1178	485	3168	688	2979	1014	1156	819
20		1.508	.790	782	.6128	9220	705	1179	483	2363	638	2241	881	999	728
21		1.499	.783	784	.6064	7903	625	1175	485	1775	593	1689	792	917	692
22		1.515	.794	786	.6162	6256	529	1191	484	1351	548	1282	685	864	624
23		1.220	.534	786	.5336	12,513	1039	954	456	3469	723	3327	1300	1254	1058
24		1.210	.524	780	.5291	12,513	1036	940	454	3419	721	3271	1300	1233	1058
25		1.216	.529	786	.5394	11,525	980	951	452	3234	691	3075	1170	1186	945
26		1.215	.529	781	.5336	10,537	890	945	454	2807	663	2690	1076	1087	869
27		1.211	.528	781	.5316	9220	769	944	455	2133	617	2034	972	968	820
28		1.214	.532	782	.5330	7930	683	948	455	1642	573	1570	930	893	823
29		1.204	.522	783	.5302	6256	587	943	455	1260	531	1215	892	847	820
30		1.069	.303	785	.4773	12,513	984	837	450	3096	721	2983	1347	1160	1100
31		1.063	.290	782	.4675	12,513	974	829	454	3066	724	2935	1350	1154	1106
32		1.066	.302	786	.4748	11,525	932	837	452	2894	696	2767	1230	1115	1007
33		1.065	.303	784	.4748	10,537	870	836	451	2569	665	2443	1140	1045	941
34		1.058	.286	781	.4735	9220	772	826	448	1950	617	1852	1085	937	929
35		1.052	.270	785	.4726	7930	697	826	449	1540	575	1466	1070	879	958
36		1.052	.273	786	.4721	6256	613	828	450	1212	532	1182	1080	843	1002
37	40,000	2.064	1.066	393	0.4241	12,513	864	804	477	2870	749	2744	1322	963	1073
38		1.995	1.020	396	.4023	12,513	859	767	479	2782	752	2671	1322	948	1076
39		2.056	1.064	390	.4195	11,525	803	796	478	2603	721	2491	1173	872	944
40		2.026	1.051	390	.4092	10,537	675	784	481	2118	690	2020	1016	733	814
41		2.036	1.058	391	.4105	9220	503	792	484	1506	636	1420	780	564	634
42		2.049	1.063	389	.4182	9220	503	793	477	1517	632	1432	783	567	635
43		1.530	.798	394	.3391	12,513	778	599	453	----	---	----	----	758	1074
44		1.525	.794	396	.3422	12,513	775	600	450	2212	722	2129	1319	766	1071
45		1.536	.806	394	.3414	11,525	732	604	453	2036	695	1932	1170	710	940
46		1.530	.800	394	.3403	10,537	650	600	452	----	---	----	----	634	825
47		1.528	.800	392	.3383	9220	556	597	453	----	---	----	----	525	717
48		1.527	.800	395	.3438	7903	503	602	449	----	---	----	----	480	672
49		1.240	.558	391	------	12,513	686	483	---	----	---	----	----	----	----
50		1.208	.521	389	.2645	12,513	667	468	452	1734	731	1676	1360	632	1115
51		1.212	.528	387	.2662	11,525	642	468	451	1617	696	1556	1225	595	1000
52		1.206	.521	389	.2643	10,537	602	468	454	1415	667	1449	1120	552	917
53		1.206	.524	389	.2657	9220	538	469	453	1063	621	1127	1035	492	878
54		1.208	.531	389	------	7903	510	471	---	828	578	948	----	----	----
55		1.199	.522	392	------	6256	470	472	---	628	528	799	----	----	----
56	47,000	1.212	0.532	283	0.1956	12,513	556	343	450	1310	733	1263	1395	460	1141
57		1.225	.542	280	.1968	12,500	564	342	447	1309	731	1257	1384	467	1136
58		1.235	.558	277	.1955	12,500	564	342	450	1289	734	1243	1400	459	1147
59		1.218	.539	284	.1983	12,000	554	346	449	1270	718	1222	1328	460	1087
60		1.229	.547	275	.1920	11,525	548	337	451	1166	705	1118	1282	433	1054
61		1.213	.528	282	.1974	11,313	550	341	445	1180	691	1132	1230	436	1002
62		1.209	.524	282	.1929	10,688	513	340	453	1060	674	1013	1160	409	956
63		1.213	.538	286	.2006	9938	487	348	447	926	645	893	1086	388	906
64		1.218	.539	280	.1969	8500	450	341	446	672	595	667	1022	330	888
65		1.221	.547	280	.1956	6875	431	343	450	519	550	521	960	310	867
66	55,000	1.517	0.789	201	------	12,513	520	303	---	1145	737	1102	----	----	----
67		1.528	.796	199	.1733	12,019	509	302	448	1104	717	1065	1318	383	1075
68		1.523	.793	199	.1692	11,625	497	301	455	1049	711	1010	1257	365	1029
69		1.538	.806	197	.1696	11,088	472	302	456	981	698	946	1191	349	967
70		1.533	.806	197	.1693	10,537	431	302	456	844	674	812	1082	317	883
71		1.528	.800	197	.1702	9313	396	300	452	648	620	619	936	361	785
72		1.219	.539	199	.1334	12,513	417	239	458	922	752	892	1460	328	1203
73		1.201	.519	197	.1337	12,019	451	233	448	866	722	835	1375	314	1136
74		1.206	.531	202	.1351	11,525	422	241	456	829	715	803	1300	312	1070
75		1.206	.524	202	.1340	11,000	424	240	458	808	705	775	1252	303	1032
76		1.219	.545	203	.1381	10,537	391	246	455	732	681	705	1190	284	986
77		1.237	.565	201	.1394	9220	378	246	453	535	638	515	1121	242	952

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XJ34-WE-32 TURBOJET ENGINE - Concluded

1.902 square feet.

Engine inlet air flow $W_{a,2}$ (lb/sec)	Corrected engine inlet air flow $W_{a,2}\sqrt{\theta_2}/\delta_2$ (lb/sec)	Corrected engine speed $N/\sqrt{\theta_2}$ (rpm)	Compressor Mach number M_c	Compressor total-pressure ratio P_3/P_2	Adiabatic compressor efficiency η_c	Fuel-air ratio $\frac{W_f}{3600\ W_{a,2}}$	Combustor total-pressure loss coefficient $(P_3-P_4)/q_b$	Combustor total-pressure loss ratio $(P_3-P_4)/P_3$	Combustor total-temperature ratio T_4/T_3	Combustor efficiency η_b	Corrected turbine speed $N/\sqrt{\theta_4}$ (rpm)	Corrected turbine gas flow $\frac{W_{g,4}\sqrt{\theta_4}}{\delta_4(\gamma_4/1.4)}$ (lb/sec)	Turbine total-pressure ratio P_4/P_5	Adiabatic turbine efficiency η_t	Run
54.66	59.42	13,151	0.971	3.611	0.781	0.0090	2.969	0.0390	1.818	0.906	7930	29.82	2.535	0.848	1
55.74	59.92	13,151	.971	3.601	.779	.0088	2.948	.0393	1.798	.910	7970	29.87	2.558	.835	2
54.13	59.16	13,076	.965	3.611	.786	.0091	3.026	.0392	1.810	.902	7915	29.74	2.543	.835	3
53.37	57.80	12,147	.897	3.390	.813	.0083	3.161	.0428	1.748	.848	7582	29.67	2.477	.852	4
48.14	52.33	11,085	.818	2.932	.808	.0080	2.681	.0379	1.696	.789	7173	29.64	2.303	.841	5
36.82	40.10	9690	.715	2.266	.755	.0091	3.107	.0403	1.752	.694	6381	29.13	1.935	.864	6
29.72	32.13	8346	.616	1.814	.696	.0099	2.809	.0345	1.851	.665	5519	28.33	1.648	.857	7
22.72	24.65	6588	.486	1.496	.657	.0112	3.030	.0300	1.955	.624	4381	27.14	1.420	.839	8
49.61	58.89	12,651	0.934	3.458	0.790	0.0085	4.341	0.0595	1.714	0.895	7925	30.85	2.573	0.848	9
49.08	58.90	12,588	.929	3.435	.789	.0086	5.719	.0795	1.697	.877	7935	31.42	2.507	.855	10
46.98	55.91	11,675	.862	3.142	.810	.0079	5.540	.0799	1.634	.800	7622	31.42	2.445	.882	11
40.98	49.01	10,653	.786	2.637	.691	.0080	4.978	.0743	1.580	.691	7232	31.23	2.246	.894	12
32.02	38.26	9331	.689	2.024	.703	.0087	3.945	.0570	1.600	.612	6498	30.82	1.920	.886	13
25.35	30.37	7958	.588	1.598	.633	.0093	2.896	.0396	1.631	.559	5686	29.86	1.652	.855	14
19.27	23.05	6312	.466	1.275	.517	.0104	2.997	.0344	1.633	.465	4669	28.49	1.382	.795	15
54.18	59.13	12,938	0.955	3.501	0.777	0.0093	2.834	0.0389	1.724	0.797	8042	30.35	2.777	0.801	16
53.92	58.82	12,951	.956	3.507	.777	.0095	4.037	.0542	1.726	.784	8042	30.98	2.732	.799	17
52.91	57.00	11,928	.881	3.208	.801	.0088	3.677	.0531	1.596	.659	7829	30.73	2.729	.816	18
29.19	50.67	10,895	.804	2.689	.781	.0084	3.838	.0597	1.474	.512	7613	30.80	2.577	.841	19
23.40	40.53	9561	.706	2.004	.686	.0084	3.117	.0516	1.381	.375	7125	31.16	2.243	.863	20
18.45	32.12	8172	.603	1.511	.563	.0094	2.854	.0485	1.336	.285	6436	31.43	1.842	.806	21
14.84	25.47	6475	.478	1.134	.277	.0099	2.920	.0511	1.250	.175	5464	32.20	1.486	.850	22
28.71	59.69	13,351	.986	3.636	.763	.0101	3.115	.0409	1.798	.776	8047	29.71	2.653	.818	23
28.21	59.38	13,376	.987	3.637	.760	.0102	3.344	.0433	1.803	.773	8047	29.69	2.653	.818	24
27.99	58.11	12,343	.911	3.407	.793	.0097	3.575	.0492	1.693	.658	7787	29.62	2.593	.850	25
26.40	53.19	11,264	.832	2.970	.793	.0097	2.322	.0417	1.623	.560	7405	29.41	2.475	.880	26
20.13	42.25	9847	.727	2.260	.738	.0106	3.185	.0464	1.575	.448	6804	29.23	2.101	.849	27
15.63	32.67	8440	.623	1.732	.656	.0121	3.182	.0438	1.623	.396	5956	28.81	1.758	.803	28
11.74	24.67	6681	.493	1.336	.517	.0139	2.905	.0357	1.680	.341	4812	27.39	1.435	.857	29
25.47	59.96	13,439	.992	3.699	.753	.0107	2.819	.0365	1.868	.798	7915	29.95	2.571	.834	30
24.87	59.36	13,376	.987	3.698	.763	.0109	3.379	.0427	1.865	.788	7905	29.77	2.543	.830	31
24.85	58.62	12,343	.911	3.458	.789	.0104	3.214	.0439	1.767	.697	7602	30.02	2.481	.842	32
23.17	54.73	11,285	.833	3.073	.803	.0104	3.416	.0490	1.714	.606	7202	30.45	2.338	.854	33
17.55	41.82	9912	.732	2.361	.744	.0122	3.787	.0503	1.759	.513	6457	29.72	1.977	.855	34
13.49	32.15	8496	.627	1.864	.695	.0144	4.077	.0481	1.861	.460	5573	28.72	1.608	.813	35
10.37	24.68	6719	.496	1.464	.632	.0164	2.429	.0248	2.030	.442	4396	27.58	1.402	.834	36
24.23	58.61	13,051	0.964	3.570	0.769	0.0106	3.393	0.0439	1.765	0.736	7980	30.77	2.850	0.779	37
20.06	53.18	13,026	.962	3.627	.782	.0119	3.856	.0399	1.758	.664	7980	30.74	2.818	.777	38
22.56	57.55	12,009	.887	3.270	.793	.0099	3.001	.0430	1.627	.612	7777	30.64	2.856	.793	39
19.51	50.69	10,948	.808	2.702	.757	.0096	2.977	.0463	1.472	.445	7608	31.06	2.756	.819	40
15.71	40.53	9543	.705	1.902	.643	.0089	3.094	.0571	1.226	.213	7557	31.52	2.518	.820	41
16.01	40.95	9616	.710	1.913	.627	.0087	3.002	.0560	1.259	.230	7545	31.76	2.526	.826	42
17.76	58.63	13,401	.989	-----	-----	.0122	-------	------	-----	.668	----	-----	-----	-----	43
18.01	59.14	13,439	.992	3.687	.748	.0120	2.944	.0375	1.827	.684	7996	29.41	2.779	.794	44
17.92	58.65	12,343	.911	3.371	.778	.0113	3.560	.0511	1.683	.558	7787	30.21	2.721	.834	45
16.27	53.54	11,285	.833	-----	-----	.0111	-------	------	-----	.436	----	-----	-----	-----	46
12.63	41.82	9875	.729	-----	-----	.0122	-------	------	-----	.280	----	-----	-----	-----	47
9.99	32.66	8496	.627	-----	-----	.0140	-------	------	-----	.207	----	-----	-----	-----	48
-----	-----	----	----	----	----	----	-------	------	-----	----	----	-----	-----	-----	49
14.01	59.11	13,401	.989	3.705	.736	.0132	2.645	.0334	1.860	.661	7885	29.57	2.652	.801	50
13.90	58.57	12,366	.913	2.455	.783	.0128	2.764	.0377	1.760	.560	7622	29.91	2.615	.814	51
12.73	53.82	11,264	.832	3.024	.795	.0131	-------	------	1.679	.462	7272	29.06	2.625	.793	52
9.93	41.85	9875	.729	2.267	.711	.0150	-------	------	1.667	.372	6609	27.06	2.290	.755	53
-----	-----	-----	-----	1.758	-----	-----	-------	.1449	-----	-----	----	-----	-----	-----	54
-----	-----	-----	-----	1.331	-----	-----	-------	.2723	-----	-----	----	-----	-----	-----	55
10.25	59.63	13,439	0.992	3.819	0.743	0.0149	3.003	0.0359	1.903	0.618	7791	29.51	2.746	0.787	56
10.45	58.86	13,463	.994	3.827	.736	.0153	3.218	.0397	1.893	.594	7913	29.19	2.692	.788	57
9.87	59.63	13,425	.991	3.769	.731	.0151	3.117	.0357	1.907	.613	7769	29.99	2.708	.791	58
9.00	59.44	12,900	.952	3.671	.752	.0147	3.954	.0378	1.850	.577	7648	29.91	2.657	.802	59
10.35	58.65	12,366	.913	3.460	.757	.0152	2.791	.0412	1.818	.519	7464	30.79	2.582	.804	60
8.50	56.71	12,218	.902	3.460	.771	.0155	4.297	.0407	1.780	.471	7472	29.32	2.596	.829	61
6.32	52.33	11,447	.845	3.118	.788	.0158	6.953	.0443	1.721	.420	7261	28.98	2.476	.817	62
4.82	47.97	10,703	.790	2.661	.729	.0159	7.765	.0356	1.684	.377	6964	30.01	2.301	.825	63
10.38	36.35	9172	.677	1.971	.641	.0198	.1961	.0075	1.718	.295	6133	29.09	2.021	.760	64
10.02	27.69	7384	.545	1.513	.566	.0248	-------	------	1.745	.223	5119	27.62	1.681	.742	65
-----	-----	-----	-----	3.779	0.717	-----	-------	0.0378	-----	-----	----	-----	-----	-----	66
9.04	58.85	12,932	.955	3.652	.747	.0156	2.772	.0353	1.838	.534	7685	29.63	2.781	.783	67
8.59	56.54	12,416	.917	3.485	.763	.0161	2.939	.0372	1.768	.467	7603	28.96	2.767	.769	68
8.42	55.30	11,831	.873	3.248	.755	.0156	2.614	.0357	1.706	.432	7437	29.43	2.711	.807	69
7.82	51.36	11,243	.830	3.795	.715	.0153	2.454	.0379	1.605	.364	7394	30.27	2.561	.820	70
5.89	38.77	9974	.736	2.160	.683	.0187	3.298	.0448	1.510	.231	7008	27.86	2.372	.767	71
6.99	58.14	13,314	.983	3.858	.734	.0166	2.844	.0325	1.941	.600	7630	28.92	2.720	.775	72
6.82	57.55	12,932	.955	3.618	.727	.0184	3.021	.0095	1.904	.497	7540	29.26	2.660	.774	73
6.89	56.70	12,297	.908	3.440	.746	.0170	2.585	.0314	1.818	.477	7421	29.77	2.574	.805	74
6.57	54.42	11,704	.864	3.367	.776	.0179	3.306	.0409	1.781	.426	7208	28.86	2.558	.801	75
6.37	51.30	11,254	.831	2.976	.737	.0170	2.681	.0369	1.747	.409	7072	29.92	2.483	.798	76
4.87	39.14	9875	.729	2.175	.609	.0216	2.657	.0374	1.757	.307	6372	30.55	2.128	.829	77

NACA

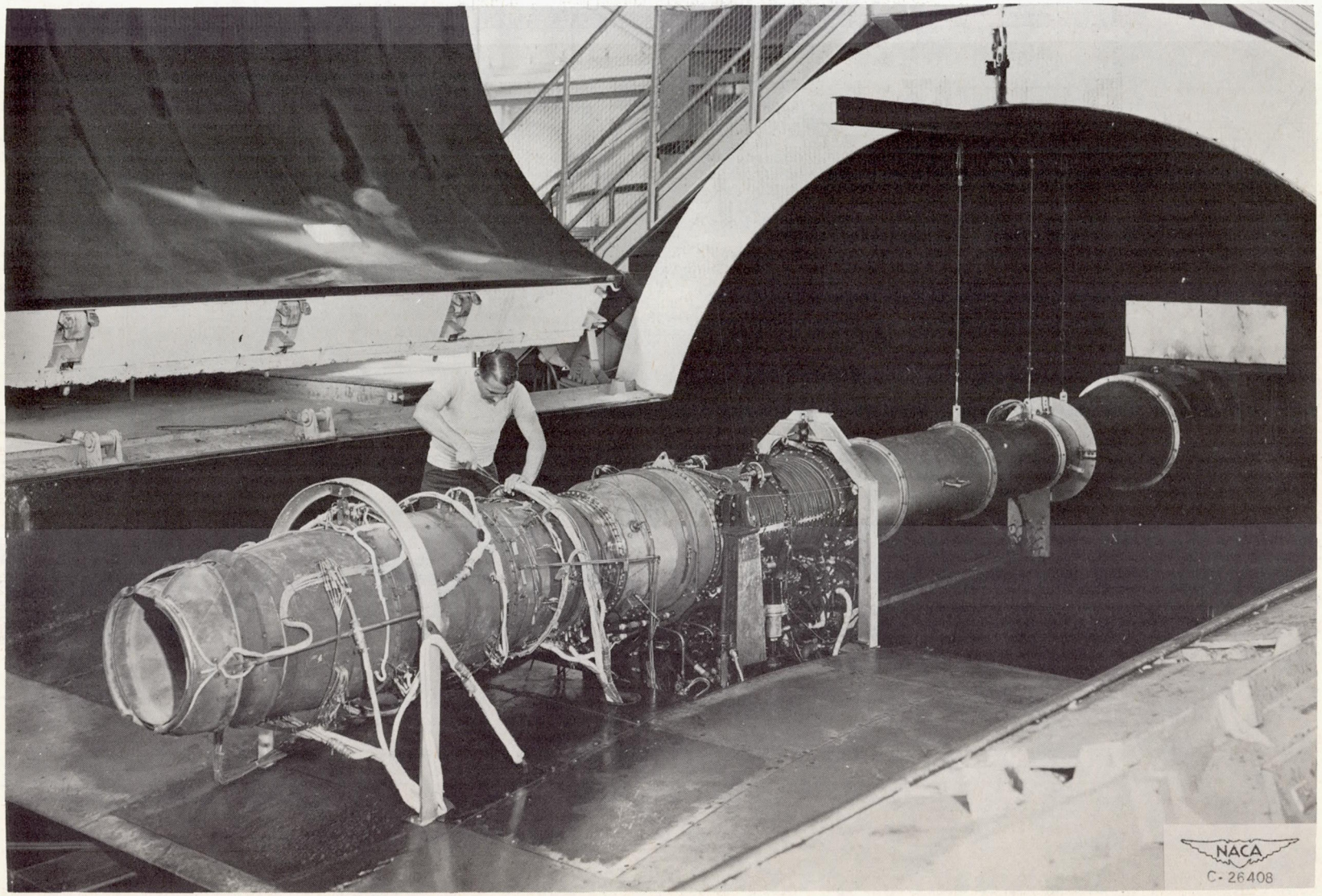


Figure 1. - XJ34-WE-32 turbojet engine installed in test section of altitude wind tunnel.

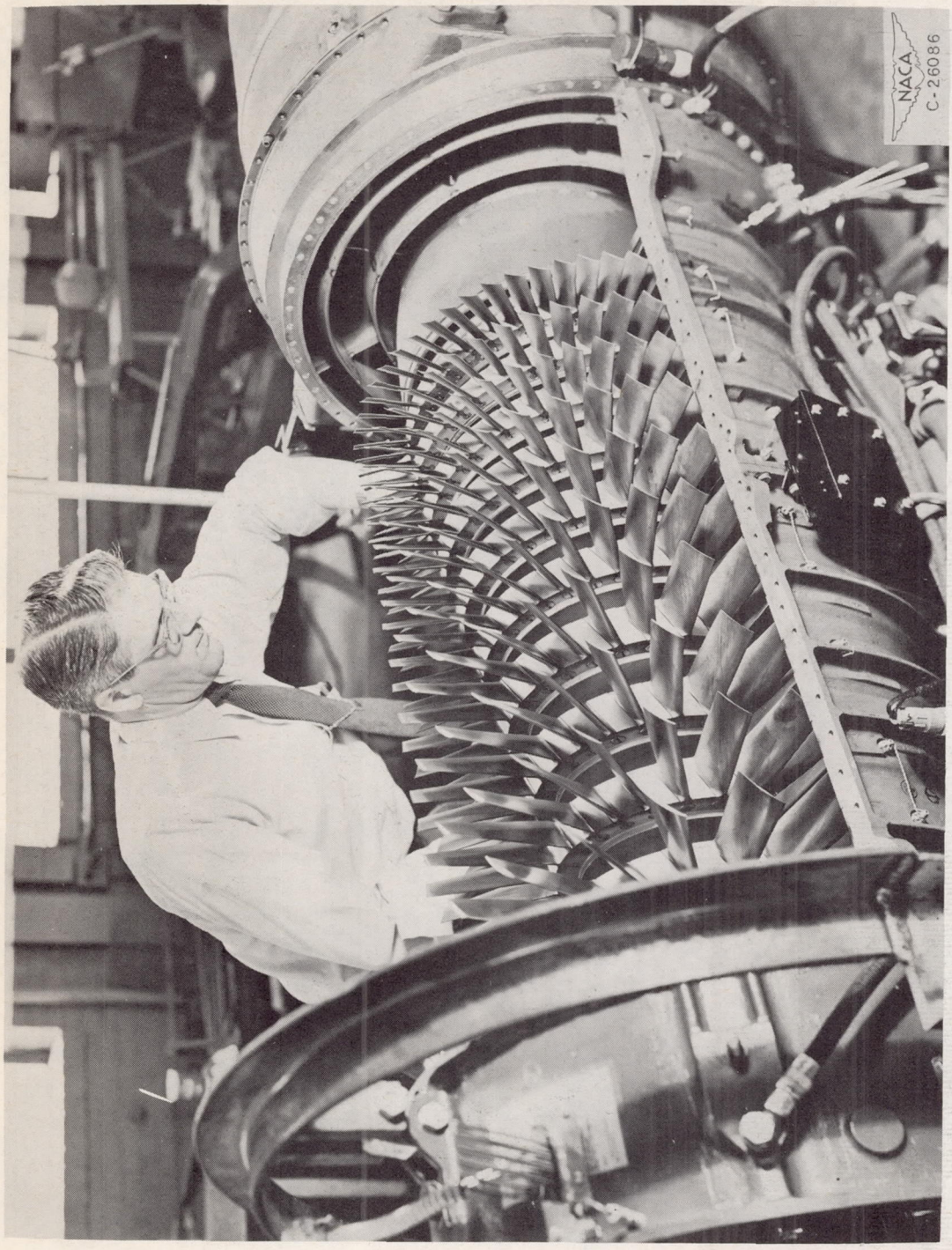


Figure 2. - Eleven-stage axial-flow compressor.

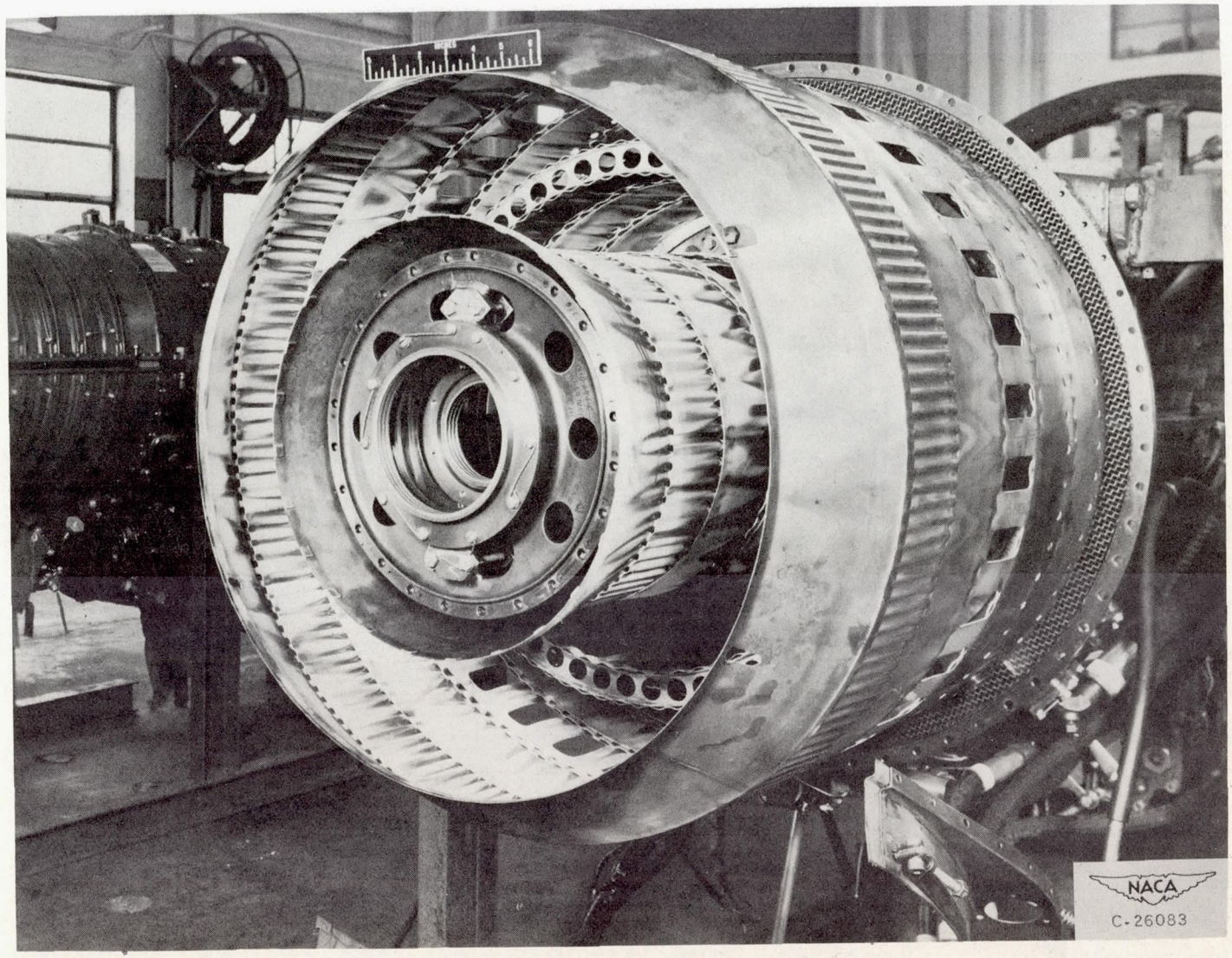


Figure 3. - Combustor (view looking upstream).

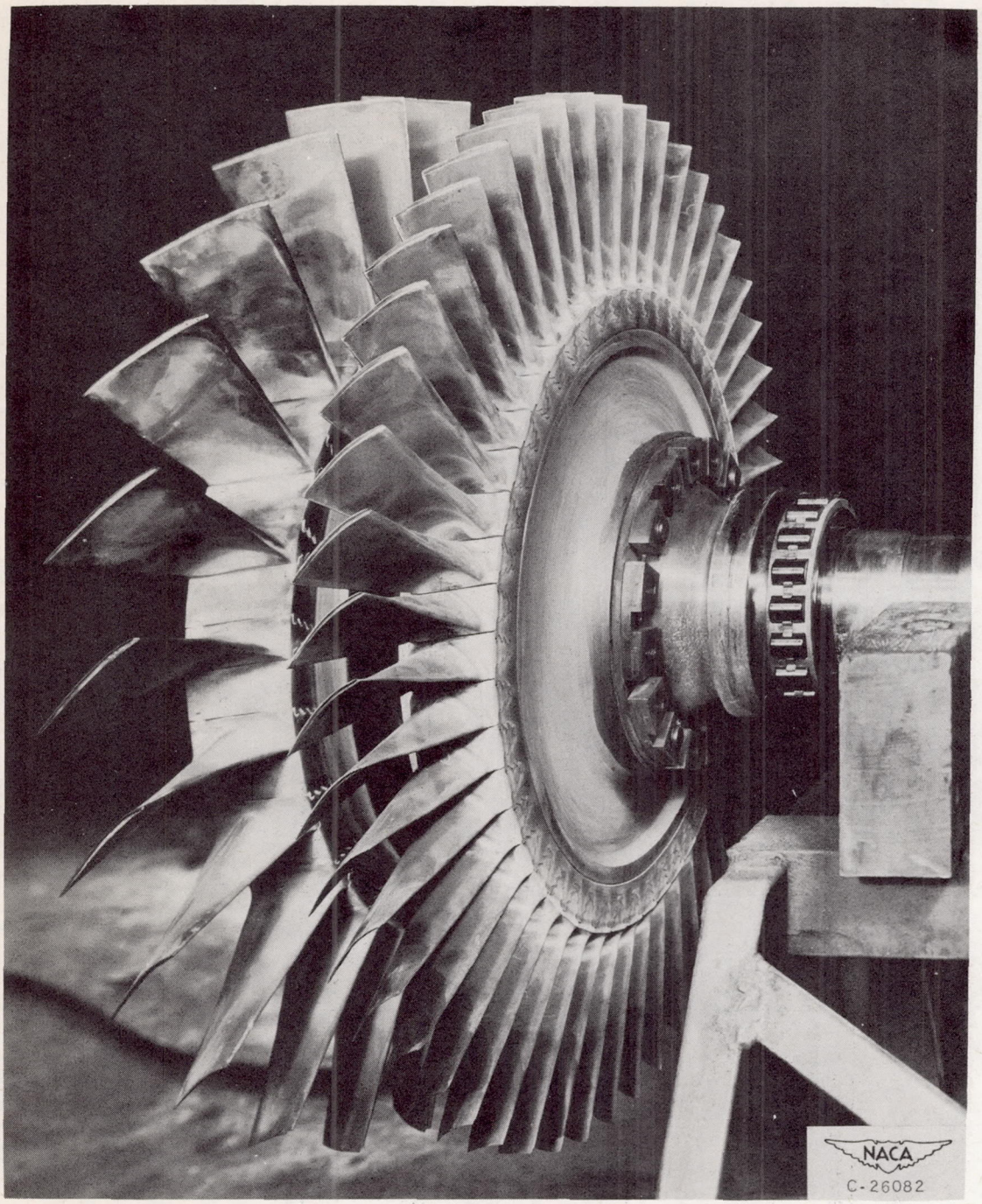


Figure 4. - Turbine rotors.

Station	Total-pressure tubes	Static-pressure tubes	Thermo-couples
1	17	5	9
2	16	10	8
3	15	3	3
4	5	--	--
5	21	6	36
7	30	20	30

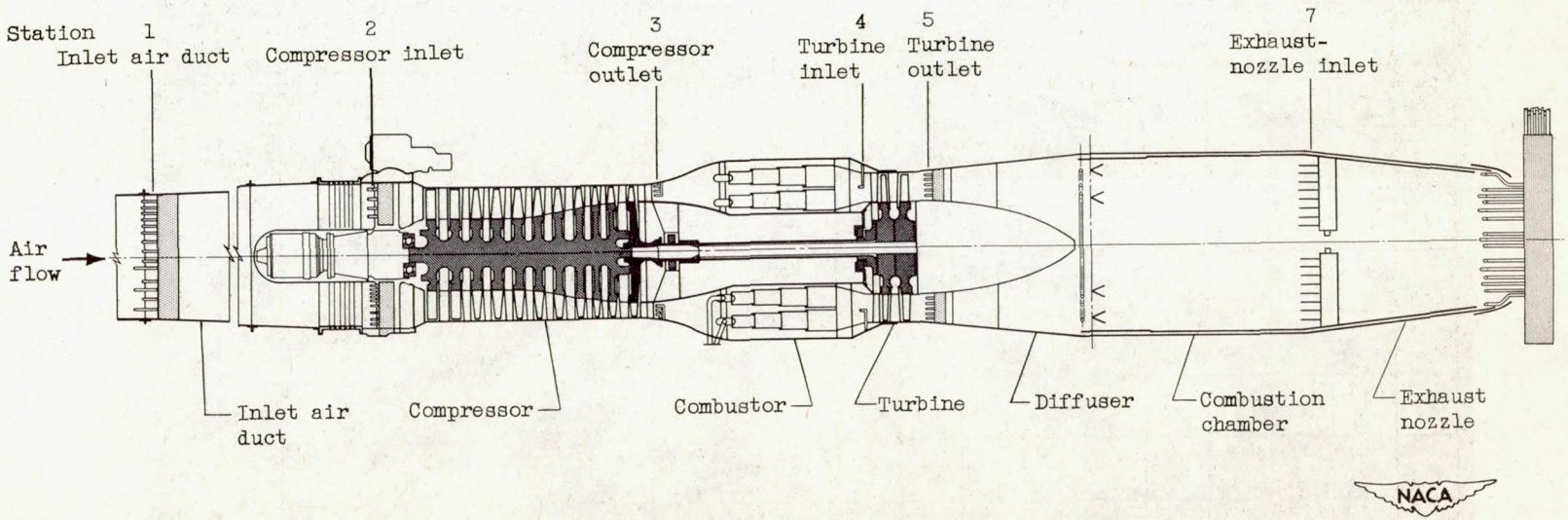
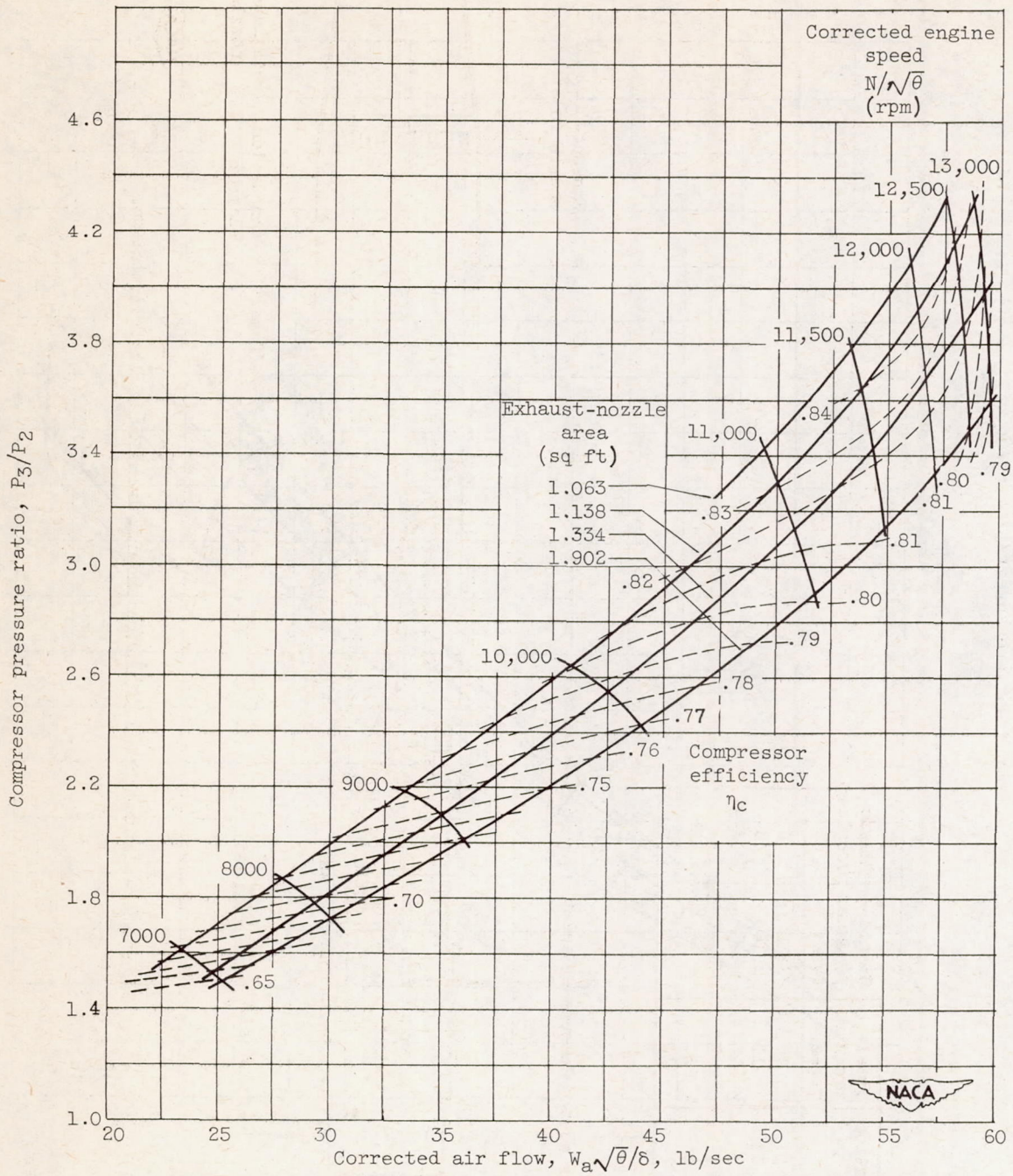
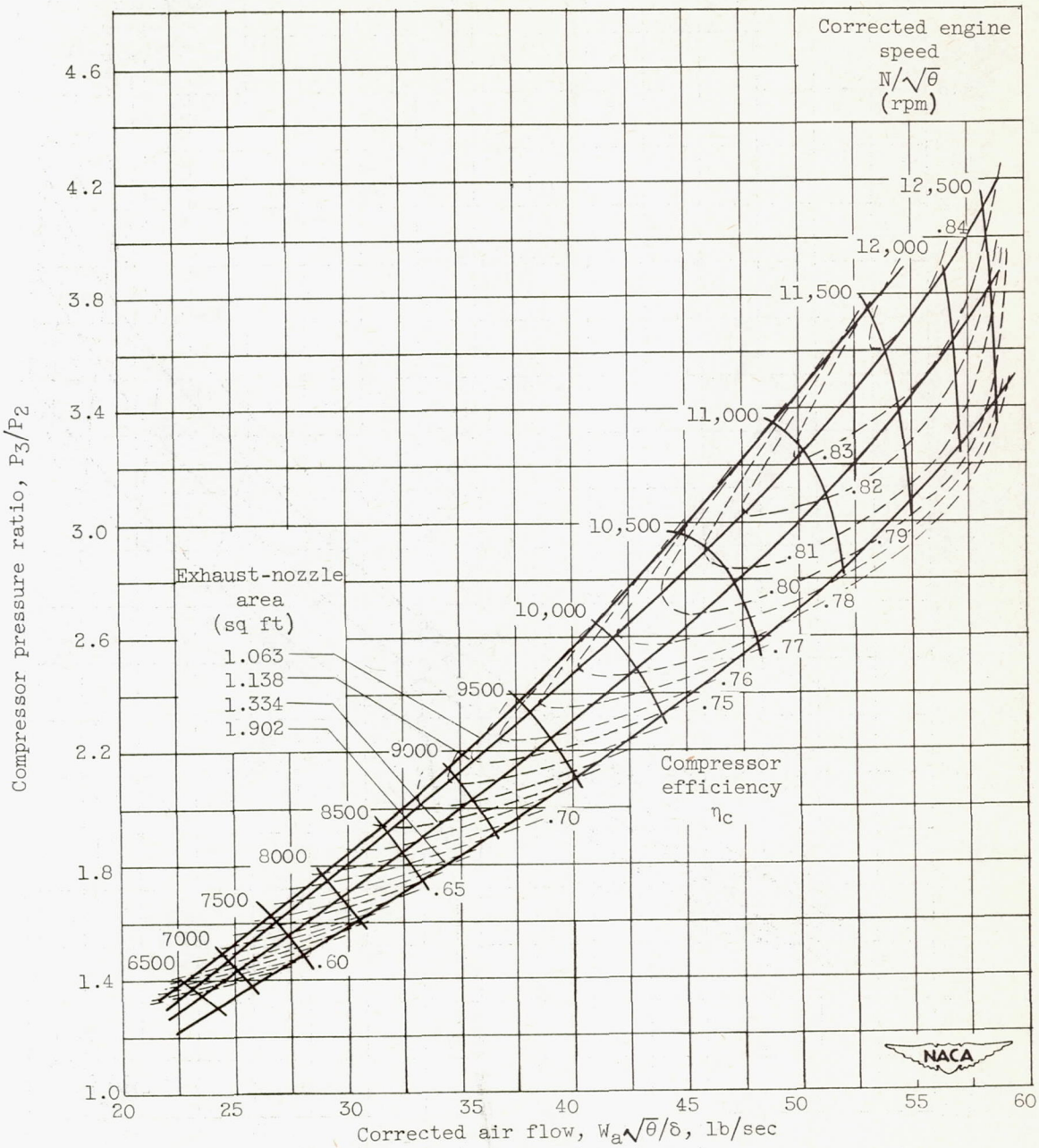


Figure 5. - Cross section of engine showing location of instrumentation.



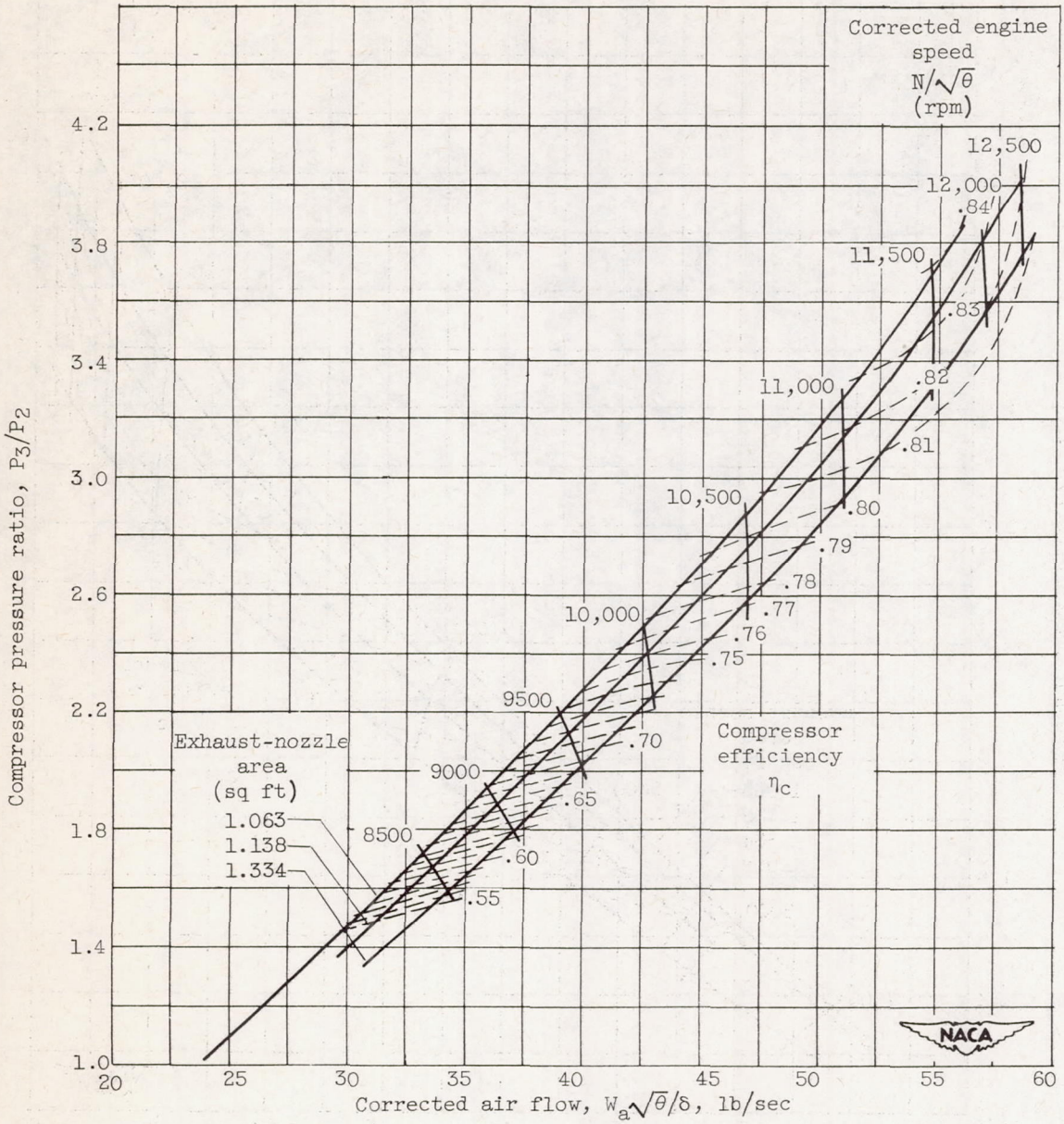
(a) Flight Mach number, 0.28; altitude, 5000 feet; Reynolds number index, 1.008.

Figure 6. - Compressor performance map.



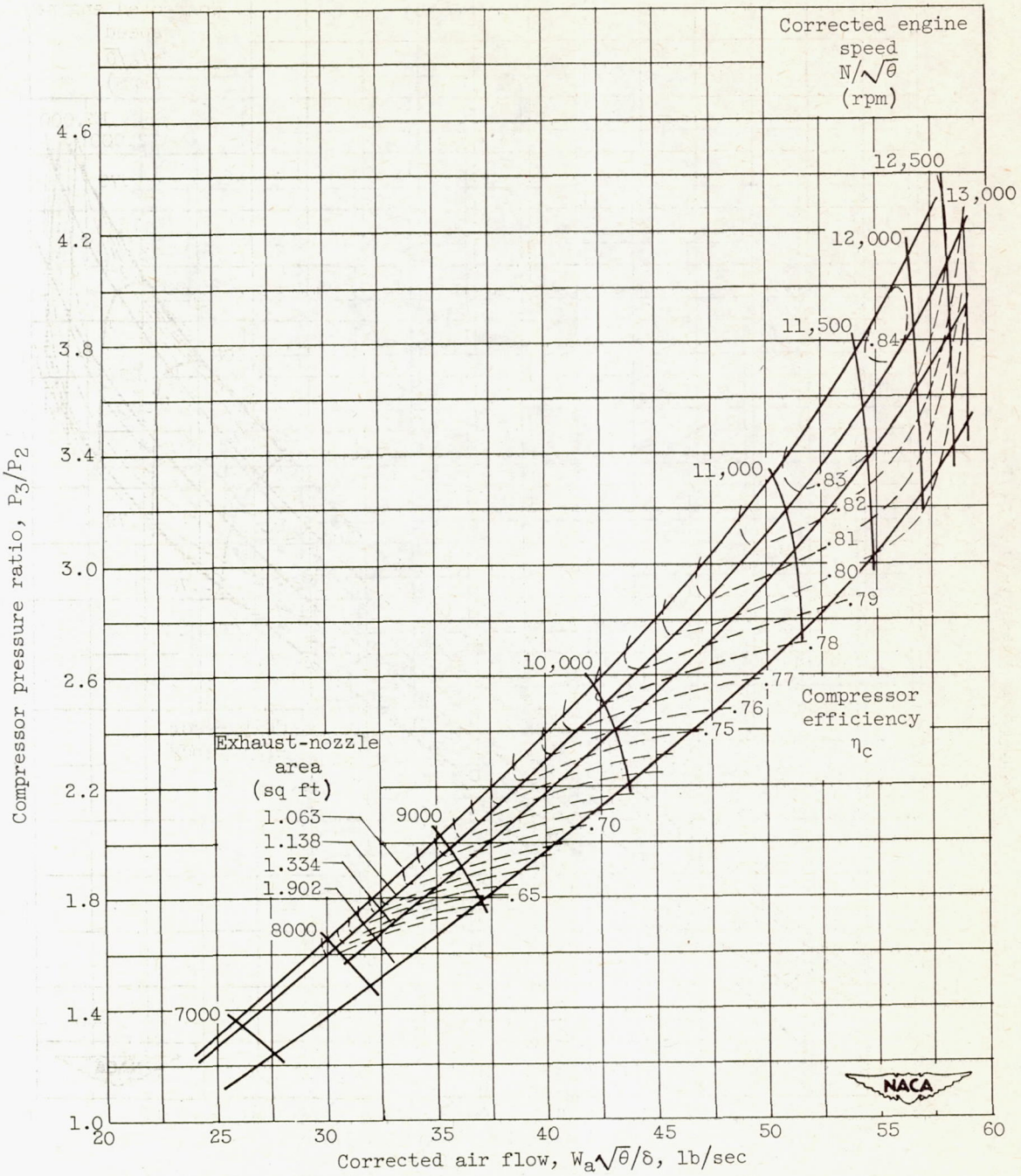
(b) Flight Mach number, 0.53; altitude, 10,000 feet; Reynolds number index, 0.857.

Figure 6. - Continued. Compressor performance map.



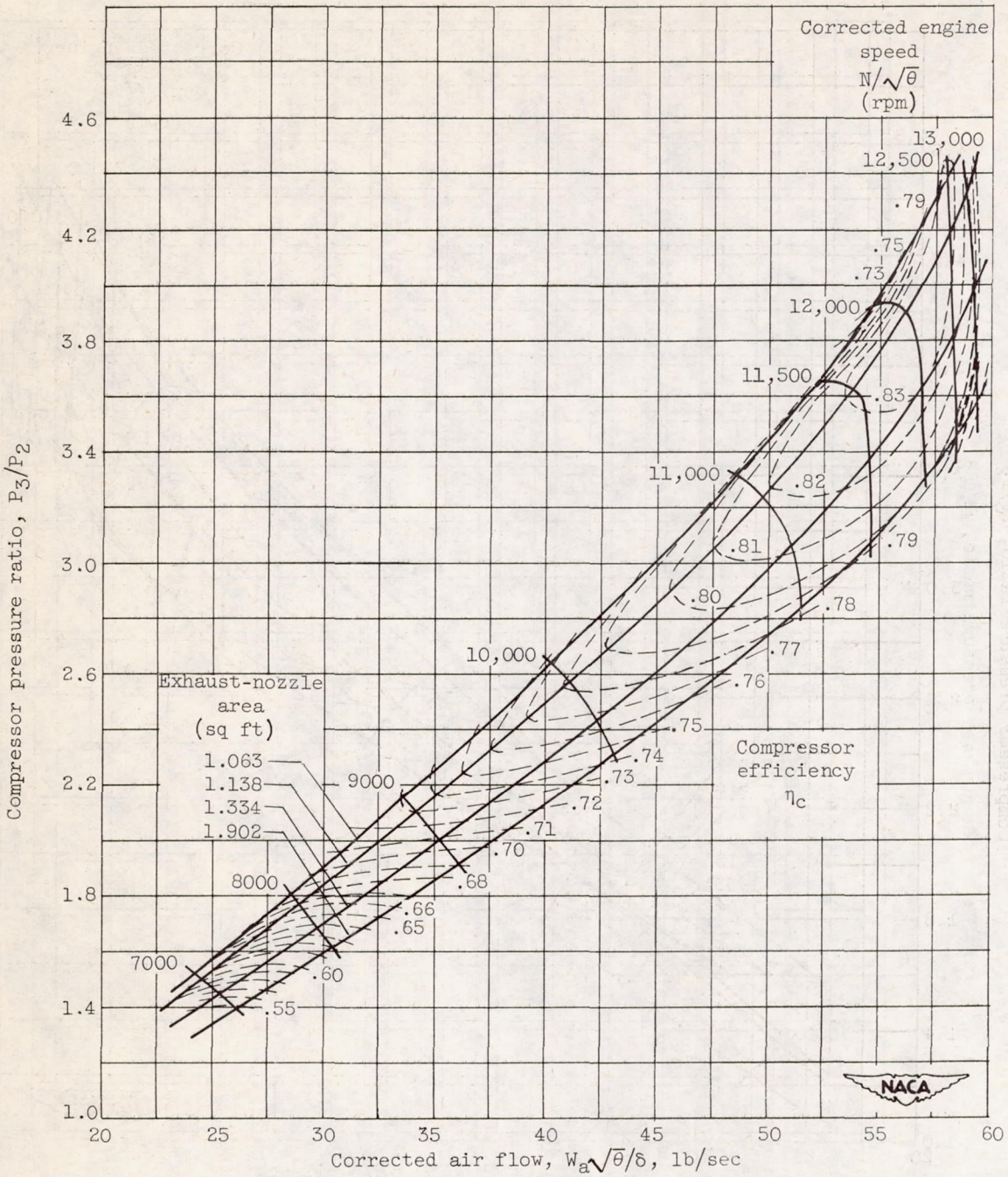
(c) Flight Mach number, 1.05; altitude, 25,000 feet; Reynolds number index, 0.739.

Figure 6. - Continued. Compressor performance map.



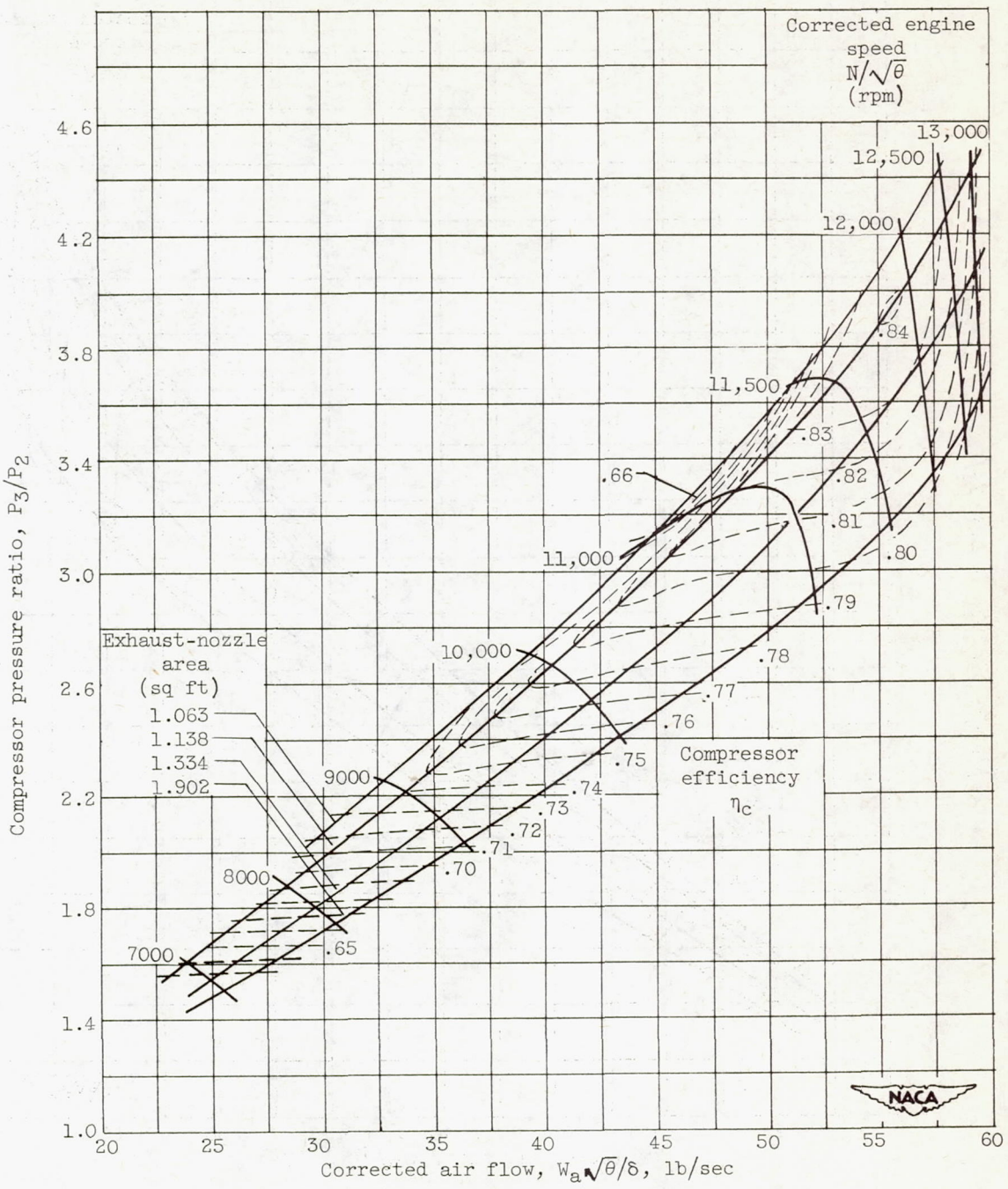
(d) Flight Mach number, 0.79; altitude, 25,000 feet; Reynolds number index, 0.616.

Figure 6. - Continued. Compressor performance map.



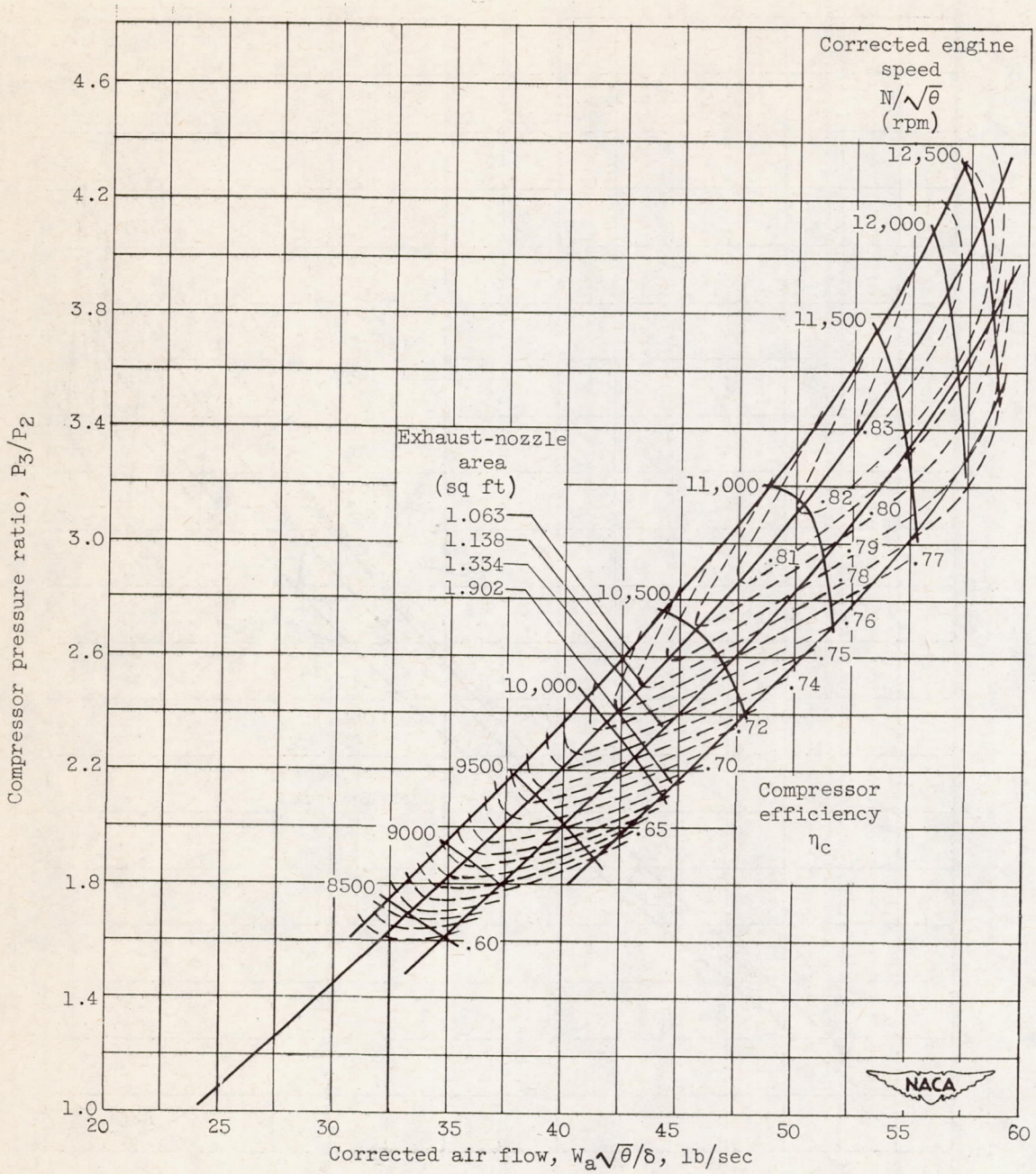
(e) Flight Mach number, 0.53; altitude, 25,000 feet; Reynolds number index, 0.534.

Figure 6. - Continued. Compressor performance map.



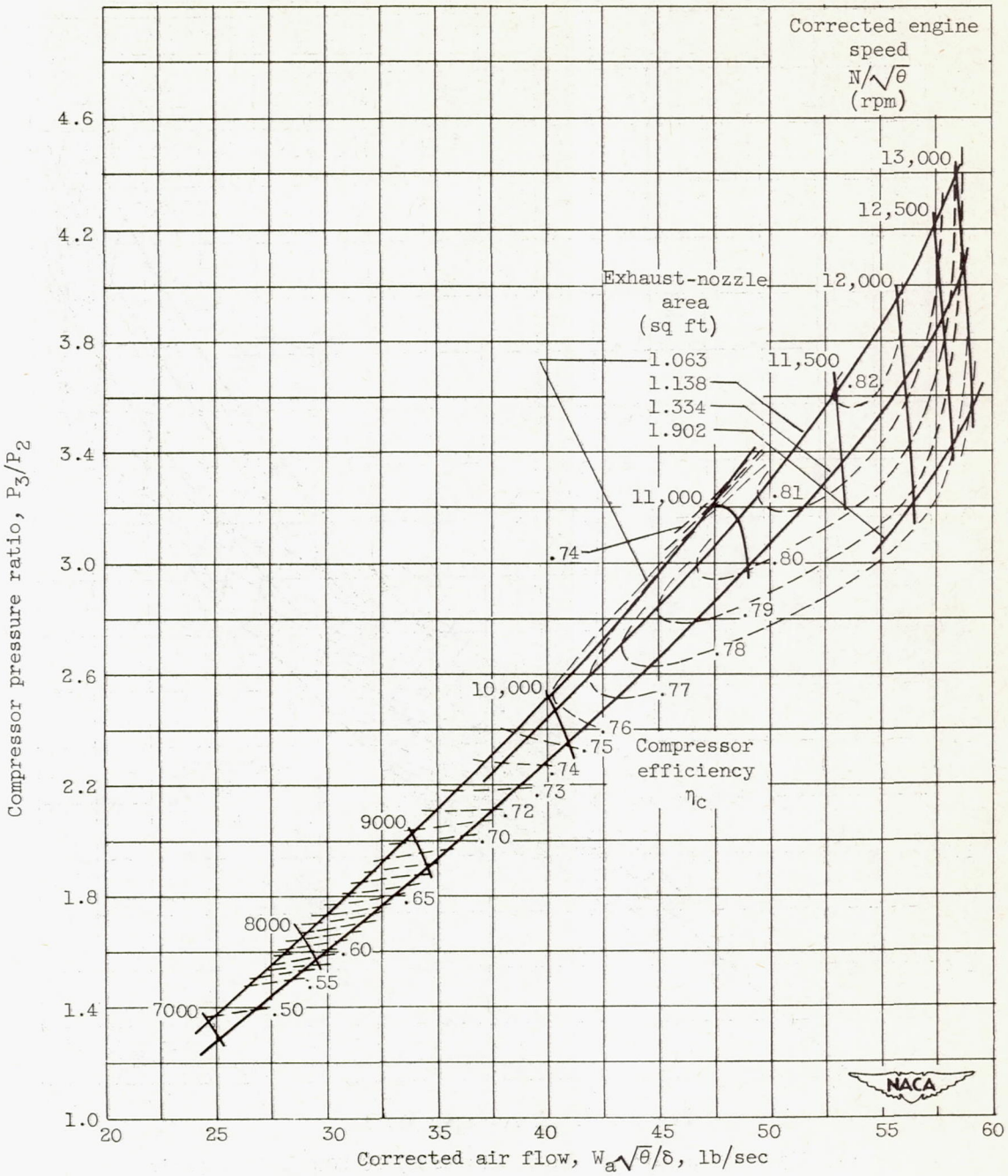
(f) Flight Mach number, 0.28; altitude, 25,000 feet; Reynolds number index, 0.470.

Figure 6. - Continued. Compressor performance map.



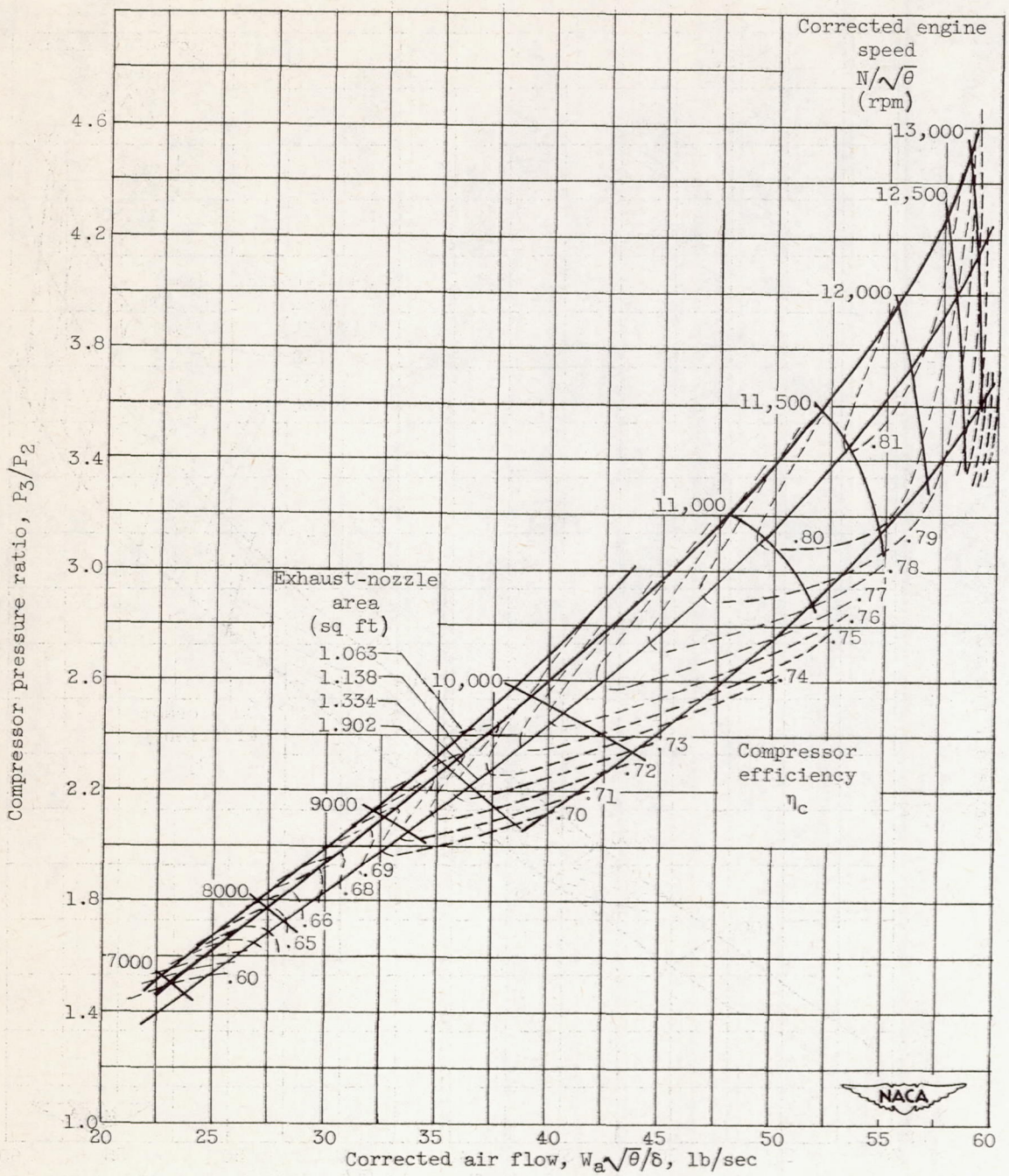
(g) Flight Mach number, 1.05; altitude, 40,000 feet; Reynolds number index, 0.417.

Figure 6. - Continued. Compressor performance map.



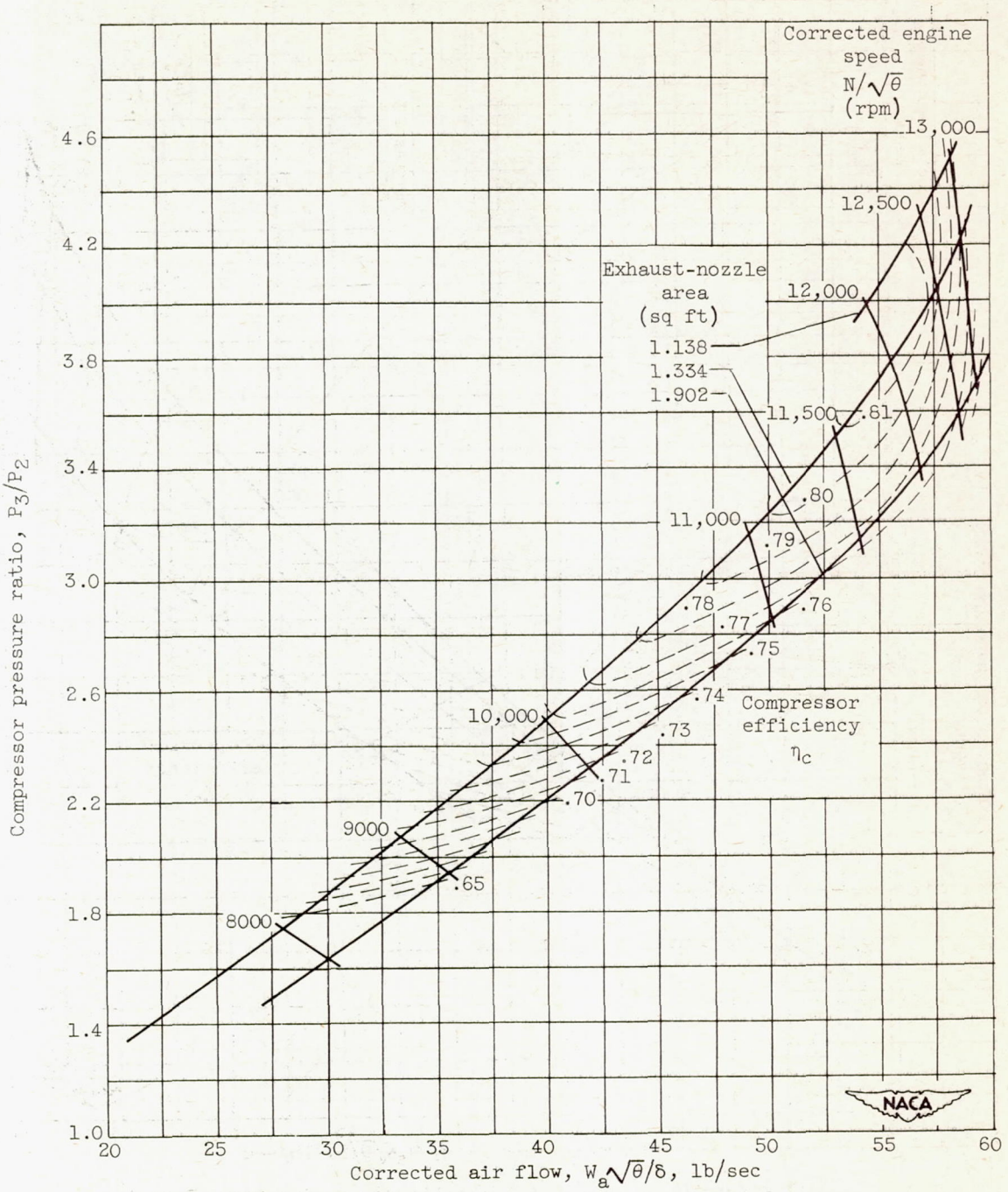
(h) Flight Mach number, 0.79; altitude, 40,000 feet; Reynolds number index, 0.338.

Figure 6. - Continued. Compressor performance map.



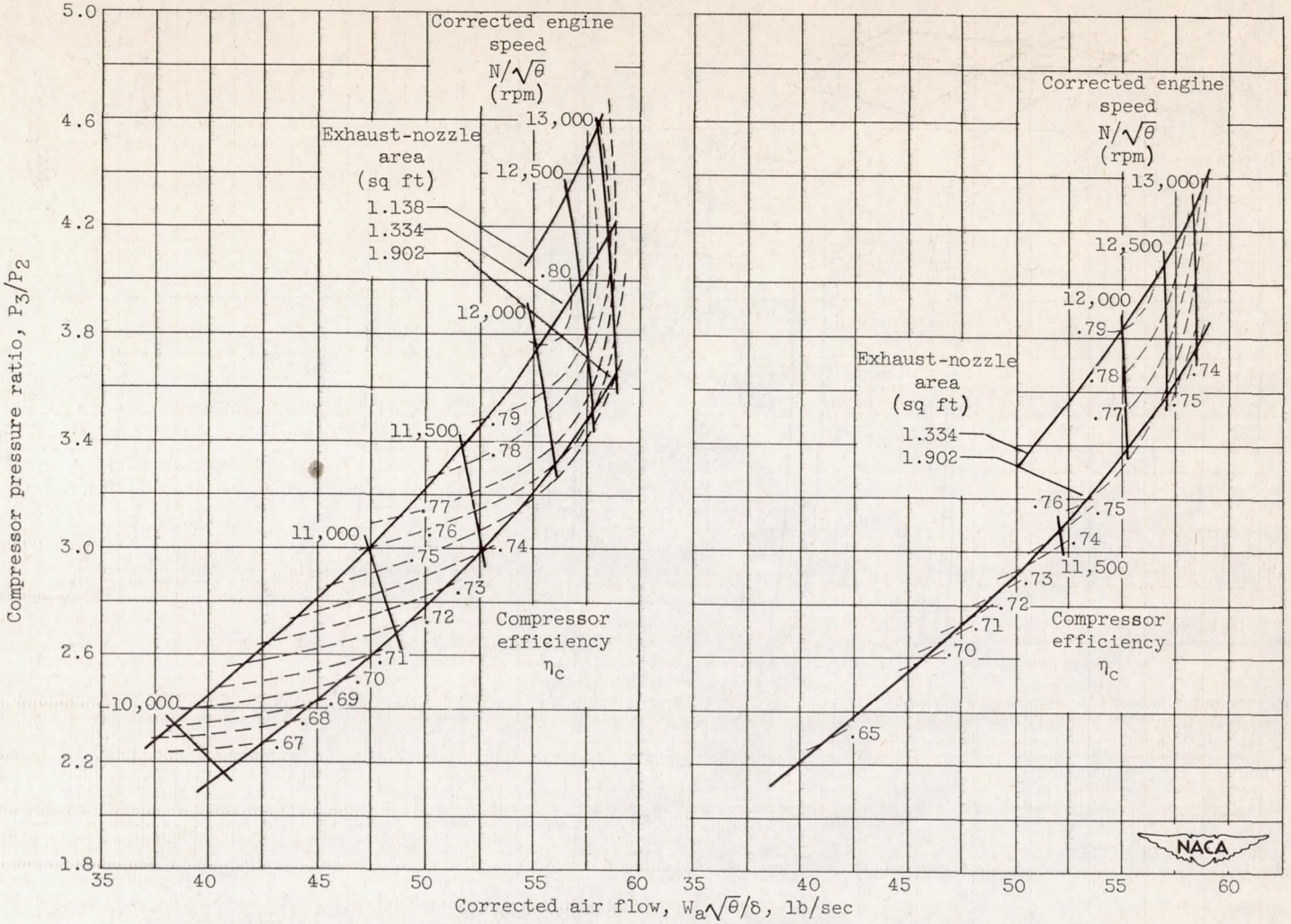
(i) Flight Mach number, 0.53; altitude, 40,000 feet; Reynolds number index, 0.268.

Figure 6. - Continued. Compressor performance map.



(j) Flight Mach number, 0.53; altitude, 47,000 feet; Reynolds number index, 0.196.

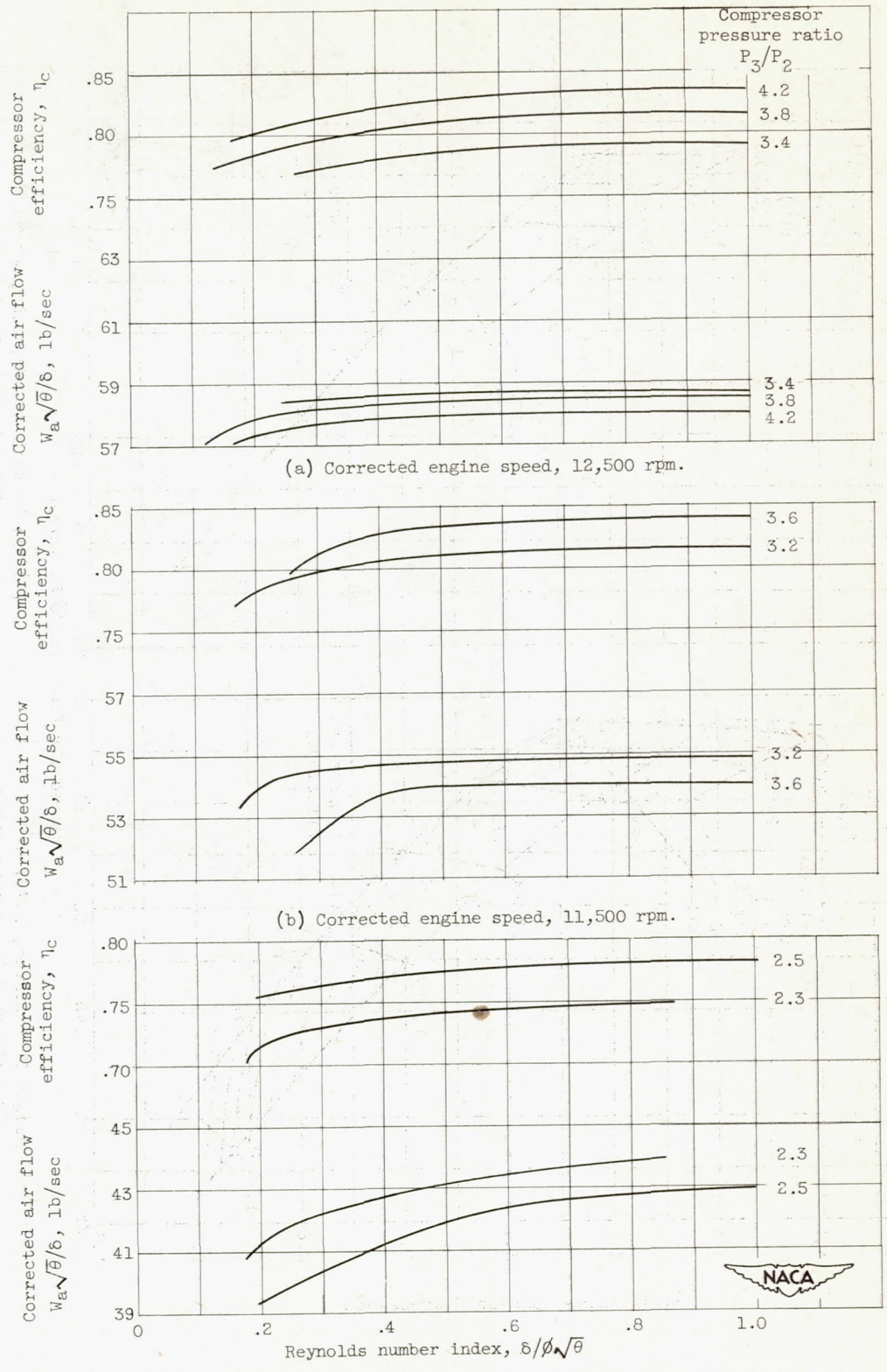
Figure 6. - Continued. Compressor performance map.



(k) Flight Mach number, 0.79; altitude, 55,000 feet; Reynolds number index, 0.170.

(l) Flight Mach number, 0.53; altitude, 55,000 feet; Reynolds number index, 0.136.

Figure 6. - Concluded. Compressor performance map.



(a) Corrected engine speed, 12,500 rpm.

(b) Corrected engine speed, 11,500 rpm.

(c) Corrected engine speed, 10,000 rpm.

Figure 7. - Effect of Reynolds number index on compressor performance.

2456

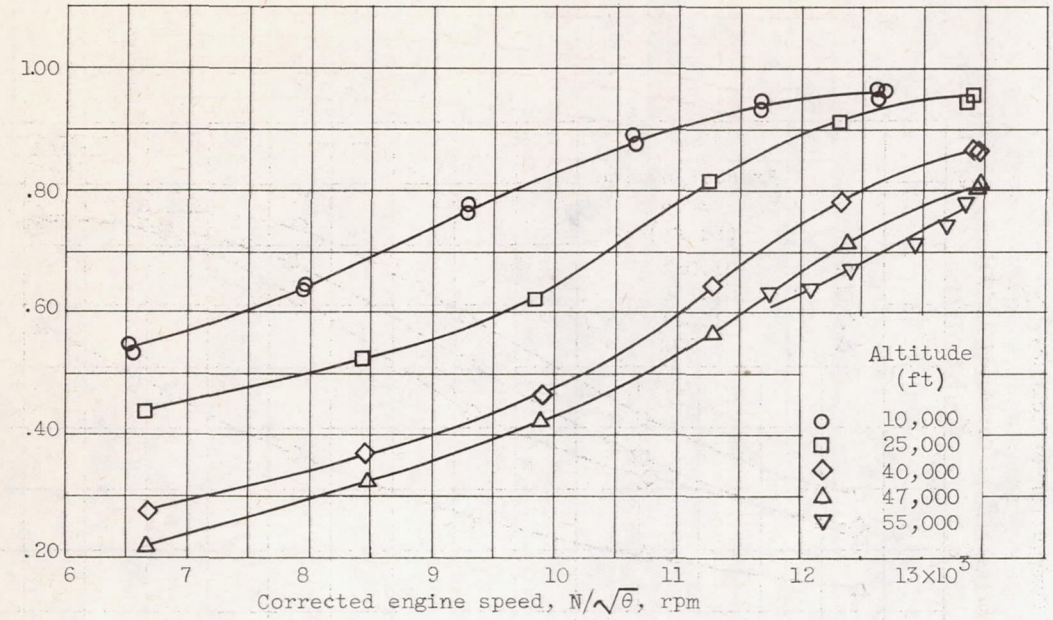


Figure 8. - Effect of corrected engine speed and altitude on combustion efficiency. Flight Mach number, 0.53; exhaust-nozzle area, 1.334 square feet.

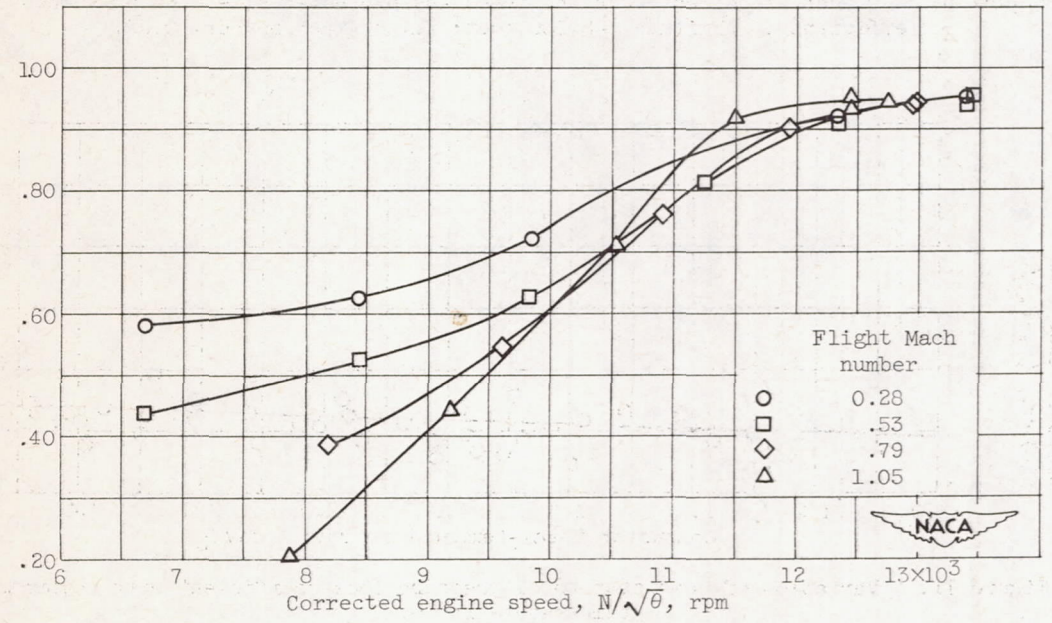


Figure 9. - Effect of corrected engine speed and flight Mach number on combustion efficiency. Altitude, 25,000 feet; exhaust-nozzle area, 1.334 square feet.

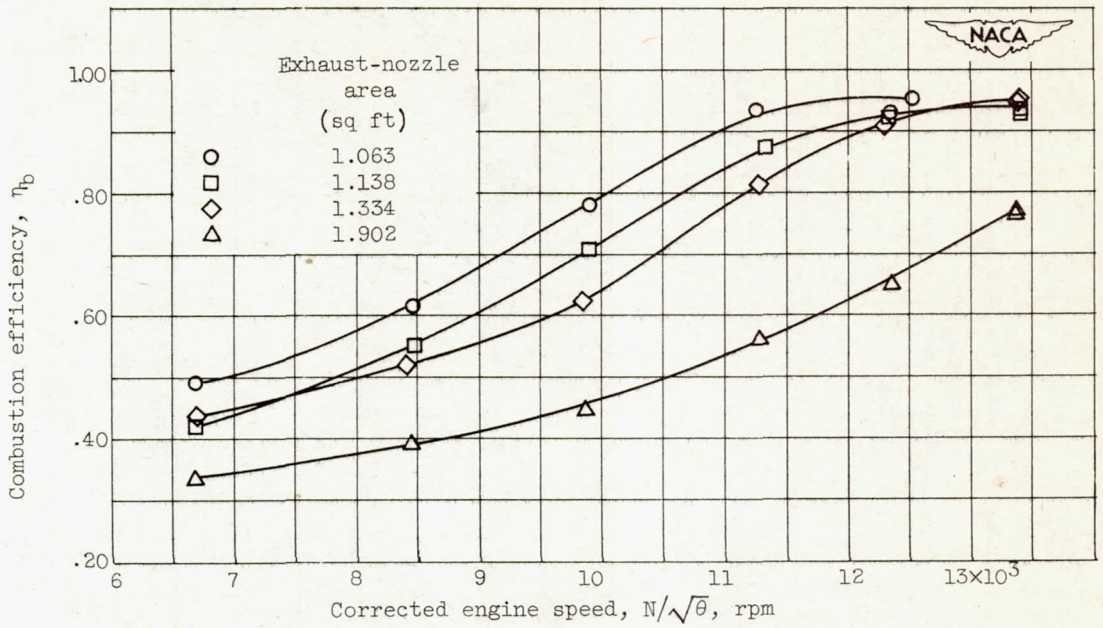


Figure 10. - Effect of corrected engine speed and exhaust-nozzle area on combustion efficiency. Altitude, 25,000 feet; flight Mach number, 0.53.

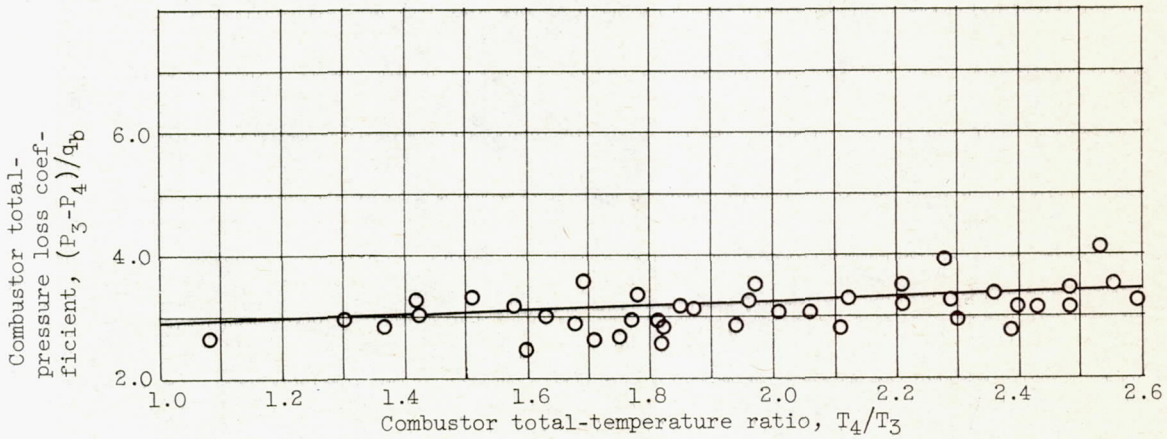
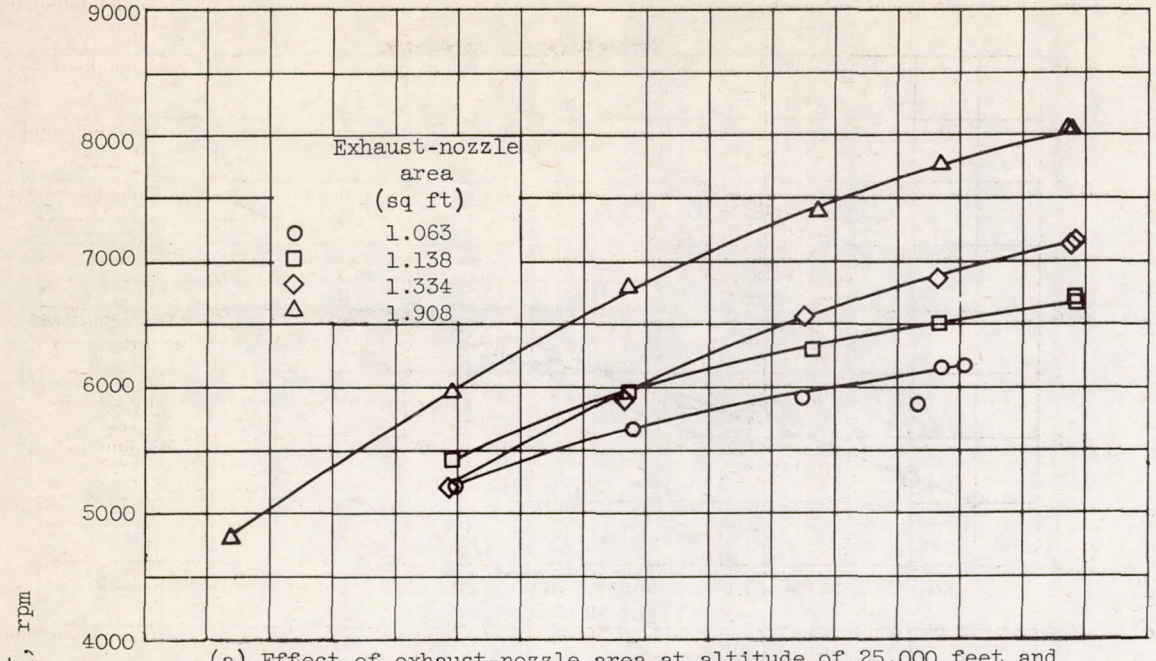
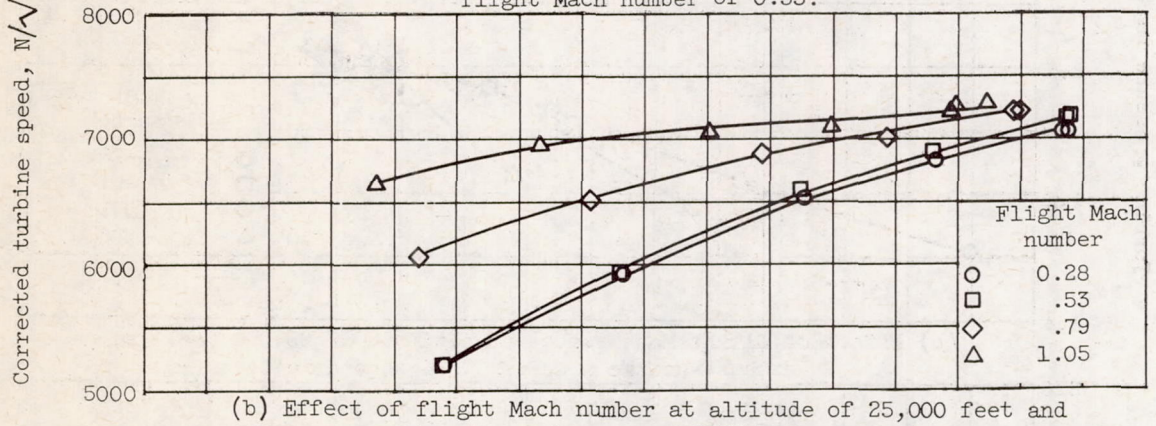


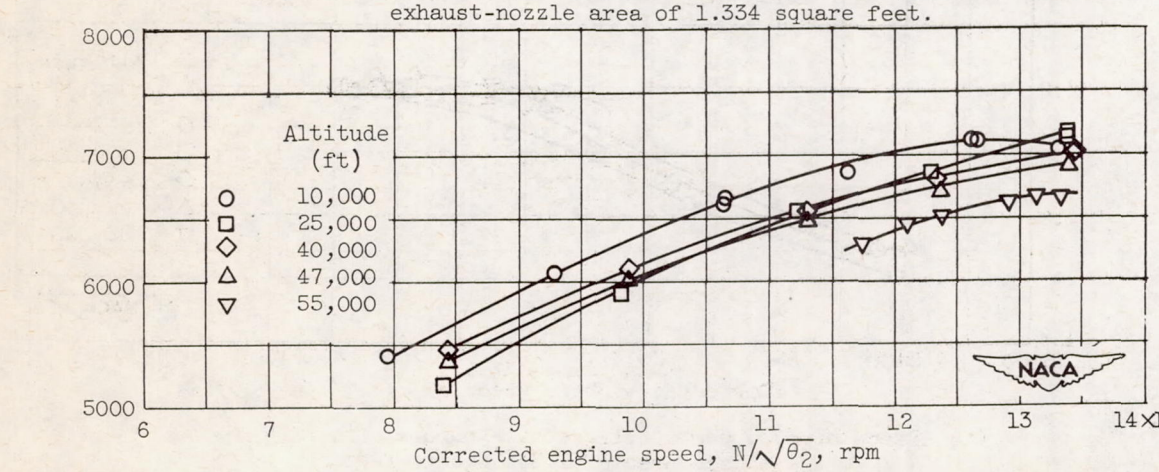
Figure 11. - Variation of combustor total-pressure loss coefficient with combustor temperature ratio.



(a) Effect of exhaust-nozzle area at altitude of 25,000 feet and flight Mach number of 0.53.

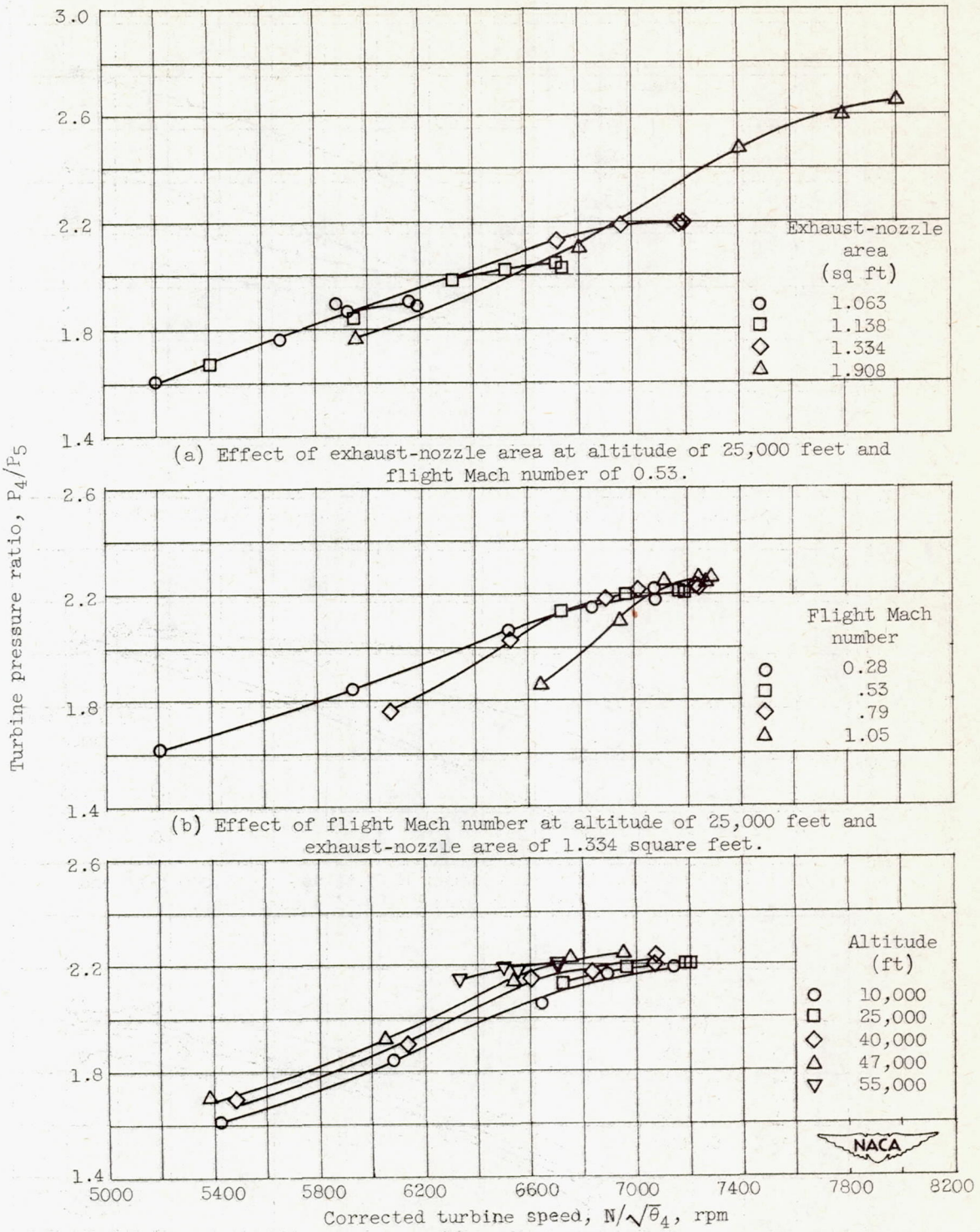


(b) Effect of flight Mach number at altitude of 25,000 feet and exhaust-nozzle area of 1.334 square feet.



(c) Effect of altitude at flight Mach number of 0.53 and exhaust-nozzle area of 1.334 square feet.

Figure 12. - Effect of corrected engine speed, exhaust-nozzle area, flight Mach number, and altitude on corrected turbine speed.

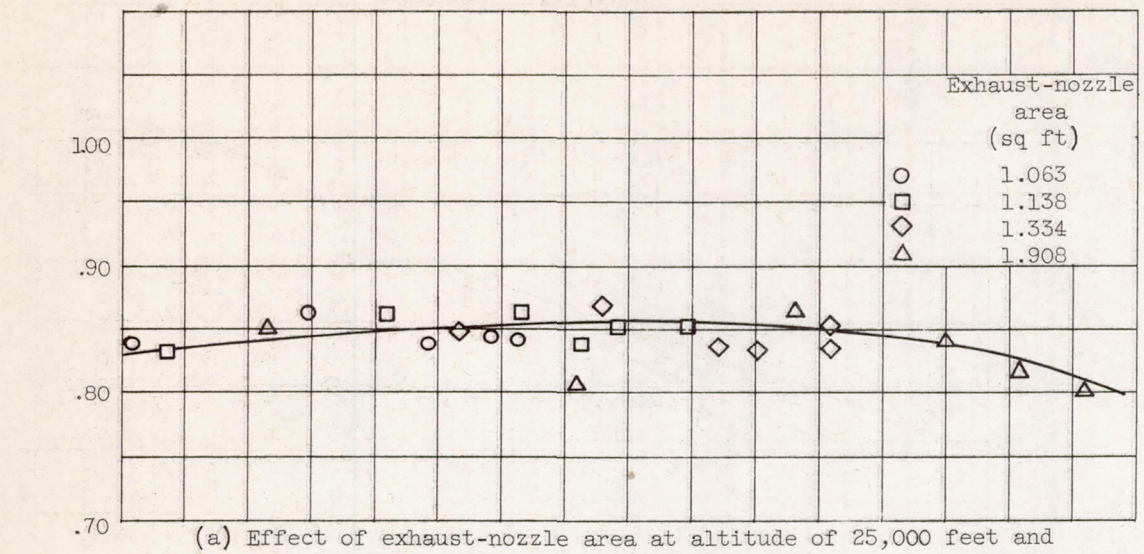


(a) Effect of exhaust-nozzle area at altitude of 25,000 feet and flight Mach number of 0.53.

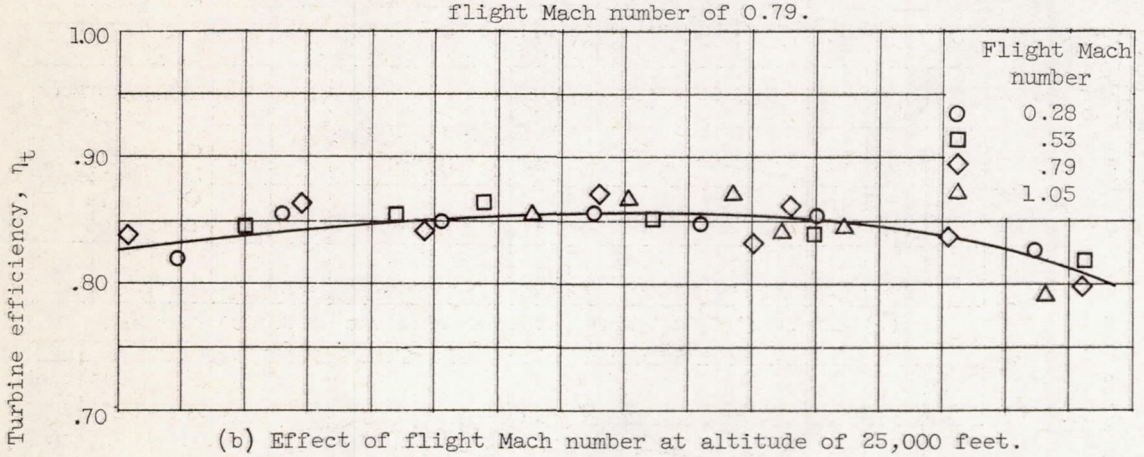
(b) Effect of flight Mach number at altitude of 25,000 feet and exhaust-nozzle area of 1.334 square feet.

(c) Effect of altitude at flight Mach number of 0.53 and exhaust-nozzle area of 1.334 square feet.

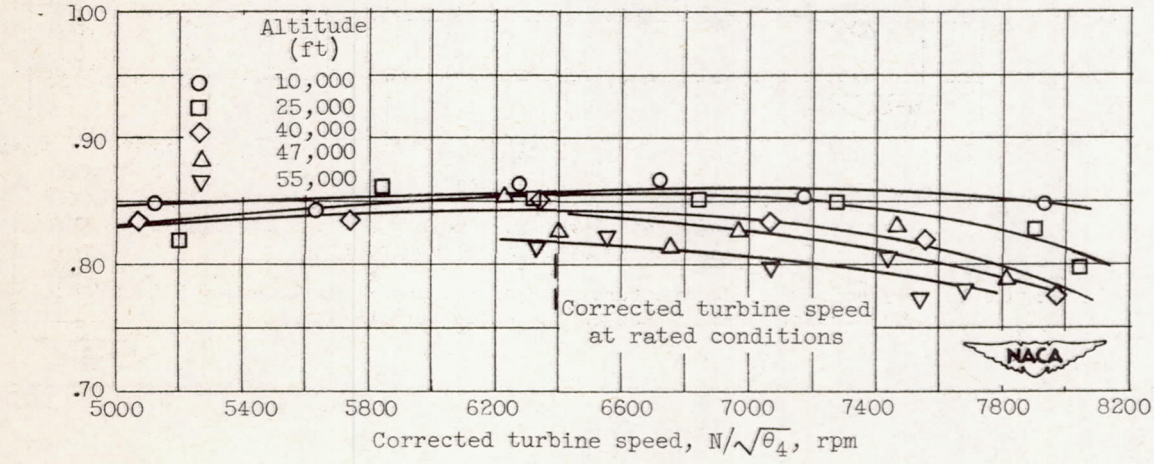
Figure 13. - Effect of corrected turbine speed, exhaust-nozzle area, flight Mach number, and altitude on turbine pressure ratio.



(a) Effect of exhaust-nozzle area at altitude of 25,000 feet and flight Mach number of 0.79.

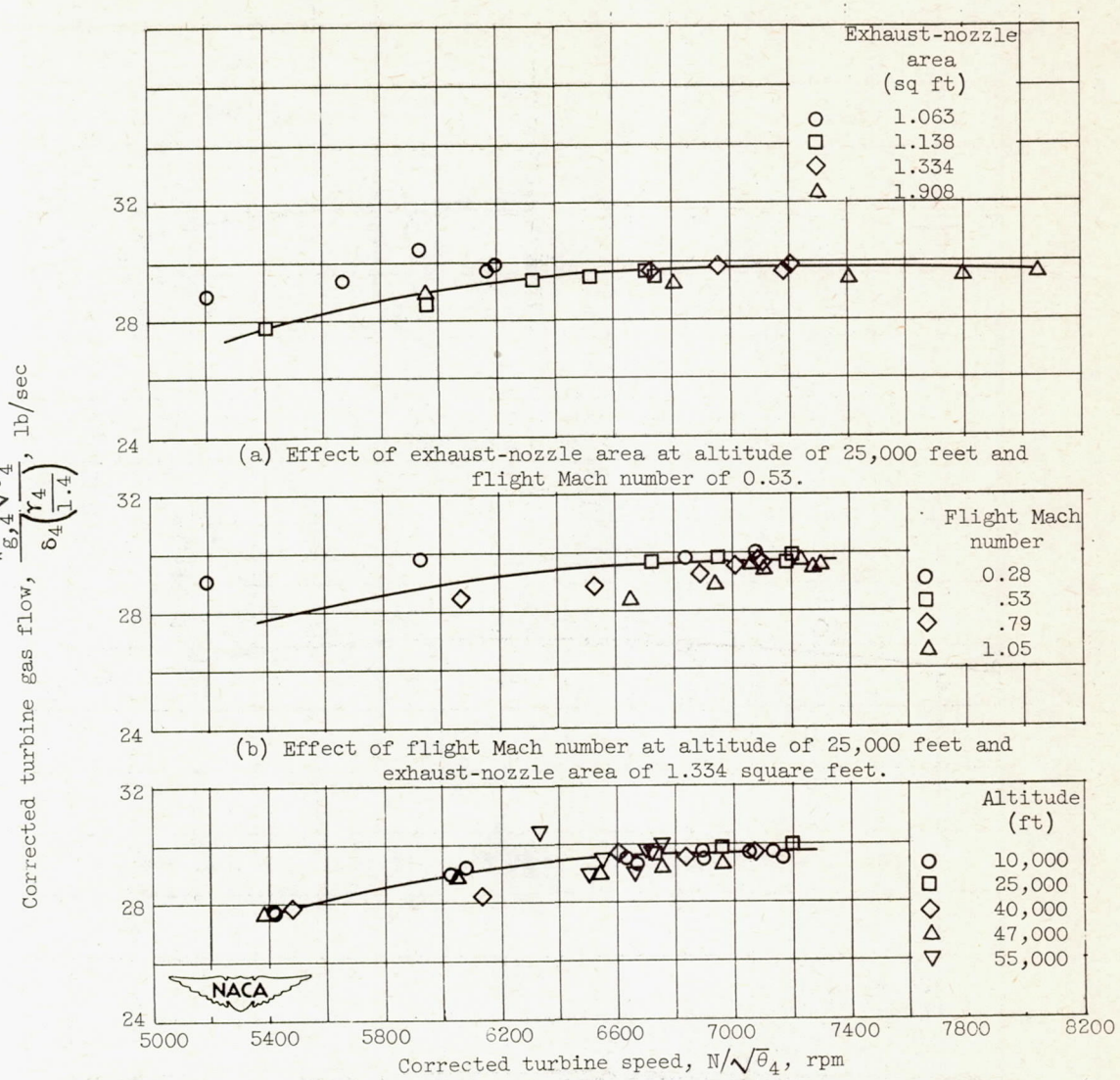


(b) Effect of flight Mach number at altitude of 25,000 feet.



(c) Effect of altitude.

Figure 14. - Effect of corrected turbine speed, exhaust-nozzle area, flight Mach number, and altitude on turbine efficiency.



(a) Effect of exhaust-nozzle area at altitude of 25,000 feet and flight Mach number of 0.53.

(b) Effect of flight Mach number at altitude of 25,000 feet and exhaust-nozzle area of 1.334 square feet.

(c) Effect of altitude at flight Mach number of 0.53 and exhaust-nozzle area of 1.334 square feet.

Figure 15. - Effect of corrected turbine speed, exhaust-nozzle area, flight Mach number, and altitude on corrected turbine gas flow.