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WARTIME REPORT

ORIGINALLY ISSUED

January 1943 as
Advance [redacted] Report

FLIGHT INVESTIGATION OF NACA D_S COWLINGS ON THE XP-42 AIRPLANE

III - LOW-INLET-VELOCITY COWLING WITHOUT FAN OR PROPELLER CUFFS, WITH AXIAL-FLOW FAN ALONE, AND WITH TWO DIFFERENT SETS OF PROPELLER CUFFS

By J. Ford Johnston and T. J. Voglewede

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WASHINGTON

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ADVANCE [redacted] REPO

FLIGHT INVESTIGATI'ON OJ? NACA D_S COWLINGS ON THE XP-42 AIRPLANE

III - LOW-INLET-VELOCITY COWLING WITHOUT FAN OR PROPELLER CUFFS, WITH AXIAL-FLOW FAN ALONE, AND WITH TWO DIFFERENT SETS OF PROPELLER CUFFS

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SUMMARY

The results of flight measurements of the performance and cooling characteristics of the XP-42 airplane equipped with a short-nose low-inlet-velocity cowling are given. The tests include measurements in high-speed level flight and in climb of the effects of: (1) a spinner-mounted axial-flow fan without propeller cuffs; (2) no fan or cuffs; and (3) two different sets of propeller cuffs. This cowling is one of a series being tested in an effort to improve the characteristics of radial air-cooled engine installations.

The maximum speed of the airplane without fan or cuffs, when corrected to military power (1000 hp at 14,500 ft), was 343 miles per hour; witn No. 2 cuff set, 342 miles per hour; with No, 1 cuff set or with the fan, 339 miles per hour.

The cooling-air-pressure recovery on the front of the engine in the high-speed level-flight condition averaged 76 percent of free-stream impact pressure without fan or cuffs, 77 percent with cuffs 2, 80 percent with cuffs 1, and 84 percent with the axial-flow fan. In full-power climb at 140 miles per hour at 14,000 feet, the pressure recoveries were 74, 84, 84, and 97 percent of free-stream impact pressure in this same order.

Ground-cooling tests showed that engine cylinder and accessory temperatures were appreciably higher without fan or cuffs. Oil-in and rear-spark-plug-elbow temperatures exceeded their limits in this condition when corrected to Army standards.

INTRODUCTION

The NACA is conducting an extensive series of flight tests of several types of cowling, as outlined in references 1 and 2, in an attempt to improve the characteristics of radial air-cooled engine installations, The conditions so far investigated include:

Test	Airplane and flight condition
1	Long-nose high-inlet-velocity cowling with small cowl flaps; high speed
2	Long-nose high-inlet-velocity cowling with modified cowl flaps; climb
3	Short-nose high-inlet-velocity cowling with small cowl flaps; high speed
4	Short-nose low-inlet-velocity cowling with spinner-mounted axial-flow fan, cuffs 1, and small cowl flaps; high speed
5	Short-nose low-inlet-velocity cowling with fan, cuffs 1, and modified cowl flaps; climb
6	Short-nose low-inlet-velocity cowling with fan, cuffs 1, and modified cowl flaps; high speed
7	Short-nose low-inlet-velocity cowling with fan, cuffs 1, and modified cowl flaps; baffle seal strips at base of cylinders removed; high speed
8	Short-nose low-inlet-velocity cowling with fan only; high speed
9	Short-nose low-inlet-velocity cowling with fan only; climb
10	Short-nose low-inlet-velocity cowling without fan or cuffs; climb
11	Short-nose low-inlet-velocity cowling without fan or cuffs; high speed

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12	Short-nose low-inlet-velocity cowling with cuffs 1, without fan; high speed
13	Short-nose low-inlet-velocity cowling with cuff's 1, without fan; climb
14	Short-nose low-inlet-velocity cowling with cuffs 2, without fan; climb
15	Short-nose low-inlet-velocity cowling with cuffs 2, without fan; high speed

The results of tests 1 and 2 are described in reference 1, of test 3 in reference 2, and of tests 4 to 7 in reference 3. The present paper gives the results of tests 8 to 15, which represent high-speed and climb teste of variations of the fan and cuff arrangement on the cowling described in reference 3.

The design of the cowling and engine installation was a project of the Air-Cooled Engine,-Installation Group stationed at the Laboratory, The members of the group associated with this project included Mr, Howard S. Ditsch of the Curtiss-Wright Corporation, Mr. Peter Torraco of the Republic Aviation Corporation, Mr, William S. Richards of the Wright Aeronautical Corporation, and Mr, James R. Thompson of Pratt & Whitney Airoraft, The Materiel Command, Army Air Forces, sponsored the investigation and supplied the XP-42 airplane. The Cprtiss-Wright Corporation, Airplane Division, handled the construction as well as the structural and detail design of the cowling and supplied personnel to assist in the servicing and maintenance of the airplane and cowling during the tests. Pratt & Whitney Aircraft prepared the engine and torque meter for the tests and assisted in the operation and servicing of the engine, The propeller, cuffs, and spinner were supplied by the Curtiss-Wright Corporation, Propeller Division.

XP-42 AIRPLANE WITH SHORT-NOSE LOW-INLET-VELOCITY COWLING

The XP-42 airplane used in the tests is described in references 1 and 2. The installation of the short-nose low-inlet-velocity cowling and fan is desbribed in reference 3. Figure 1 is a dimensioned drawing of the cowling showing both the fan and the cuffs in place, Figure 2 is

a side view of the airplane with cuff 1 and with modified cowl flaps. Figure 3 shows a close-up of the aowling after the fan blades had been machined off and with cuff 2 in place. The small adjustable cowl flaps originally provided are shown 'in the open position. The extra flaps for cooling in climb, which are adjustable on the ground only., are shown in the closed position;

As originally planned, there was to be a difference of 5° at the spinner between the pitch of the two sets of cuffs, all other' characteristics being the same, After cuff 2 was fitted, measurements showed the average 'pitch angle of cuff 2 to be approximately 1½° higher than that of cuff 1, The cuff sections at the 14-inch radius are shown in figure 4, Figure 5 compares the average section of each set by .superposing the straight portion of their mean line. Although individual cuffs of either set varied only slightly in shape from the average for the set, it was found that individual cuff angles of the cuff 2 set varied from 30.8° to 33.5°. Cuff angles of the cuff 1 set varied only ±0.1° from the average.

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The airplane as prepared for the tests weighed about 6000 pounds with a 1.75-pound pilot and full tanks. It retained the standard aerial but had no provision for guns.

TEST APPARATUS AND PROCEDURE

The installation of the. test equipment was described in reference 2,

Speed and cooling characteristics in level. flight with military power were determined by making level runs at full throttle at 2700 rpm at and above the engine critical altitude, as described in reference 2, Two flights of five runs each were made for each high-speed test condition. The range of altitudes investigated was from 14,000 to 20,000 feet,

For climb tests with all cowling arrangements, two conditions have been investigated: (1) climb,. at 155 miles per hour indicated airspeed in automatic rich, with manifold pressure limited to 40 inches of mercury and (2) climb at 140 miles per hour indicated airspeed in full. rich, with manifold pressure limited to 43½ inches of

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mercury' to 7000 feet, ,then 42½ inches to full throttle. For tests 13 and 14, a third. condition was investigated: climb at an indicated airspeed of 140 miles per hour with carburetor setting in automatic rich, with %he manifold pressure limited to 40 inches of mercury,

On two occasions (with fan only and with cuffs 2) during the 140-mile-per-hour climbs with the manifold pressures previously specified for full-rich operation, the mixture control was inadvertently left in automatic rich for the first part of the climb-; then changed to full rich,

All data were recorded automatically and continuously during the climbs. Under these conditions, a "run" was taken as the period of time for one cycle of the pressure switch or of the thermocouple switch,

The tests were made in the following sequence:

(1) Test 9 (climb, fan only)

(2) Test 8 (high speed, fan only)

(3) Test 10 (climb, no fan or cuffs)

(4) Test 11 (high speed, no fan or cuffs)

(5) Test 15 (high speed, cuffs 2)

(6) Test 12 (high speed, cuffs 1)

(7) Test 13 (climb, cuffs 1)

(8) Test 14 (climb, cuffs 2)

The airplane and engine were given a 50-hour check between tests 11 and 15. During the check, the spark plugs were changed and valve clearances reset,

Ground-cooling tests were made for three of the four installations: without fan .or cuffs, with cuffs 1, and with cuffs 2. The tests were made by running 10 minutes at 1380 rpm, 5 minutes idling, and 10 minutes with the engine cut off. Temperatures were recorded continuously during the tests,

Measurements of the propellen-cuff sections were obtained by photographic means. A rubber strip 1/2 inch thick was laid around the cuff in a plane perpendicular to the blade axis and approximately 14 inches from the axis of rotation of the propeller. A thin flat steel bar was laid on the propefler-blade chord at the 42-inch radius, Photographs were then taken with the blade axis pointing directly into the telescopic camera, which was placed approximately 40 feet Prom the cuff, The result was an outline of the cuff section with the chord line at the 42-inch radius superposed upon it as a reference.

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SYMBOLS

σ density ratio

η propulsive efficiency

S wing area

a_c impact pressure

Q volume flow of free air, cubic feet per minute

Ap average pressure drop across engine, inches of water

C_D drag coefficient

p observed pressure above free-stream static pressure, inches of water

RESULTS AND DISCUSSION

The data obtained in the high-speed and climb tests are given in tables I(a), I(b), and II. The main climb-test data are shown in figures 6 to 9 in the form of time histories of the climbs,

Maximum Speed

The values of maximum speed and power obtained during tests 8, 11, 12, and 15 are plotted against density altitude in figure 10. Inasmuch as the speed figures are

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not directly comparable because of differences in power, they have been reduced in figure 11 to the parameters $\left(\frac{bhp}{\sigma}\right)^{1/3}$, representative of the effective power, and $52.73\left(\frac{\eta}{SC_D}\right)^{1/3}$ representative of the aerodynamic refinement. The product of these parameters is the airplane speed. It is evident that the installation having the highest value of the parameter $52.73\left(\frac{\eta}{SC_D}\right)^{1/3}$ will have the highest speed at a given power and altitude.

Measurements described in reference 3 showed that the addition of the fixed cowl flaps in the closed position reduced the top speed by two-thirds of 1 percent, or 2 miles per hour, from that obtained with the original cowl flaps. Because the drag of the modified cowl flaps is considered to be excessive in comparison with the drag of the best modern cowl-flap designs, the speeds obtained with the modified cowl flaps should be corrected to the original cowl-flap condition by adding approximately 2 miles per hour when comparisons with other installations are made. This correction has been incorporated in the data plotted in figure 12, which presents a comparison of the speeds obtained with the various cowling arrangements tested on the XP-42 airplane. Points obtained by the Army for similar airplanes with conventional air-cooled (P-36A) and liquid-cooled (P-40C) installations are also shown.

Examination of figure 12 shows that, if in each case the engine had delivered its rated military power (1000 hp at 14,500 ft; $\frac{bhp}{\sigma} = 1564$), the speeds obtained would have been as follows:

Airplane condition	Maximum speed at 1000 hp at 14,500 ft (mph)
Long nose with cuffs	344
Short-nose high-inlet velocity with cuffs	339
Short-nose low-inlet-velocity:	
With fan and cuffs 1	337
Fan only	339
Cuffs 1, no fan	339
Cuffs 2, no fan	342
No fan or cuffs	343

The comparison shows that the use of fans or propeller cuffs for increasing available cooling pressures resulted in a slight decrease in speed.

The difference in maximum speed obtained with cuffs 1 and with cuffs 2 is larger than would be expected from the small differences between the cuffs, although this result is, to some extent, supported by the difference in cooling-air pressures on the front of the engine.

Pressures and Temperatures

The average cooling-air pressures on the engine are listed in table III for both the climb and the high-speed conditions. The pressures on the front of the engine in the high-speed level-flight condition averaged $0.84q_c$ with fan, $0.80q_c$ with cuffs 1, $0.77q_c$ with cuffs 2, and $0.76q_c$ without fan or cuffs. The distribution of these pressures around the engine for typical locations on the cylinders is shown in figure 13. The values plotted are the average values obtained during 10 runs for each location of pressure measurement. The plotted points show that the fan and cuffs had only minor effects on the pattern of pressure distribution although they raised the general pressure level.

The fact that the rear pressures varied between installations so as to maintain almost a constant pressure drop across the engine regardless of the front pressures was largely accidental, as it was difficult to return the cowl flaps to the same setting each time. When the cowl-flap setting remained unchanged between tests with cuffs 2 and with cuffs 1, the rise in rear pressures was

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approximately one-half the rise in front pressures, which was about the variation to be expected from the relative conductivities of engine and skirt exit,

Figure 14 shows the distribution of cooling-air pressures for a 140-mile-per-hour climb plotted as in figure 13, The points for each installation were taken from runs at approximately the same altitude, 13,000 to 14,000 feet. Because they are not averaged over a series of runs, the individual values may be subject to errors of approximately ±4 percent, Figure 14 shows that, in climb as in the high-speed condition, the fan and cuffs had no important effect on the pattern of pressure distribution around the engine. For the condition of the airplane without fan or cuffs, the front pressures averaged $0.74q_c$; with either cuffs 1 or cuffs 2, $0.84q_c$; and with the fan, $0.97q_c$. These values are quoted for 140-mile-per-hour climbs for carburetor settings in full rich at 13,000 to 14,000 feet; the same values were observed with cuffs 1 and cuffs 2 at 140 miles per hour In automatic rich, In the climbs at 155-miles per hour indicated airspeed in automatic rich at the same altitude, the values were $0.75q_c$ without fan or cuffs, $0.82q_c$ with either cuffs 1 or cuffs 2, and $0.95q_c$ with the fan,

It is interesting to note that, when no fan nor cuff was used, the pressure recovery on the front of the engine remained very nearly the same percent of free-stream impact pressure in climb as at high speed, This fact indicates that the flow through the cowling remained stable through the useful range of angles of attack,

The distribution of cylinder temperatures around the engine in the full-throttle level-flight condition is illustrated in figure 15, The values for each modification were taken from runs at approximately 18,500 feet density altitude, A study of figures 15 and 13 shows that the individual cylinder temperatures are more affected by other operating factors than by cooling-air pressures.

Tables I and II show that the lower cylinder temperatures were obtained where the available cooling pressures were also low, Figure 16 indicates that this effect is, at least in part, the result of small variations in the full-throttle power delivered by the engine for each

installation. The observed values of brake horsepower and of average cylinder-head temperature above free air are plotted against the product of the free-air density ratio and the pressure drop across the engine in inches of water. Figure 16 shows that the temperature varies with power at a given air flow. The differences in temperature are somewhat larger than would normally be expected from the amount of power variation at constant $\sigma\Delta p$. It is probable that other factors, such as fuel-air-ratio variations between tests and possibly variations in rotation and turbulence of the air stream, may also have affected the temperatures. The variations are not, however., large enough in relation to the experimental error to warrant evaluation of possible causes.

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Ground Cooling

Time histories of representative temperatures observed during the ground-cooling runs are shown in figures 17 to 19 for the cowling without fan or cuffs, with cuffs 1, and with cuffs 2. It is immediately apparent that the ground cooling with either cuffs 1 or cuffs 2 is much improved over that obtained without fan or cuffs.

In no case were the cylinder head or barrel temperatures critical during the ground runs. Except in the case without fan or cuffs, cylinder temperatures were lower than for the high-speed condition.

In the test without fan or cuffs, the rear-spark-plug elbow of cylinder 11 slightly exceeded its limit of 248° F, after the engine had been cut off, when corrected to Army summer conditions. This elbow usually ran the hottest of the six measured on cylinders 1, 7, and 11. After cut-off in the ground run with the cuffs 1, however, the rear elbow temperature of cylinder 1 exceeded that of cylinder 11, as shown in figure 18.

The oil-in temperature also exceeded its limit of 185° F when corrected to Army summer conditions during the test without fan or cuffs.

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CONCLUSIONS

1. The maximum speed of the XP-42 airplane was about 1 mile per hour less at the same power and altitude with the short-nose low-inlet-velocity cowling, without fan or cuffs, than with the long-nose high-inlet-velocity cowling and propeller cuffs. The use of propeller cuffs or a fan on the low-inlet-velocity cowling cost from 1 to 4 miles per hour in top speed. The axial-flow fan provided a higher cooling pressure than the cuffs for the same loss in speed.

2. The cooling-air pressure recovery on the front of the engine in the high-speed level-flight condition averaged 76 percent of free-strenm impact pressure without fan or cuffs, 77 percent with propeller cuffs 2, 80 percent with propeller cuffs 1, and 84 percent with the axial-flow fan. Corresponding pressure recoveries in full-power climb a8 an indicated airspeed of 140 miles per hour were 74, 84, 84, and 97 percent free-stream impact pressure.

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REFERENCES

1. Bailey, F. J., Jr., Johnston, J. Ford, and Voglewede, T.J.: Flight Investigation of the Performance and Cooling Characteristics of a Long-Nose High-Inlet-Velocity Cowling on the XP-42 Airplane. NACA A.R.R., April 1942.

2. Bailey, F. J., Jr., and Johnston, J. Ford: Flight Investigation of NACA D_S Cowlings on the XP-42 Airplane. I - Bigh-Inlet-Velocity Cowling with Propeller Cuffs Tested in High-speed Level Flight. NACA A.R.R., Jan. 1943.

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TABLE I(a).–PRESSURE DATA

XP-42 airplane

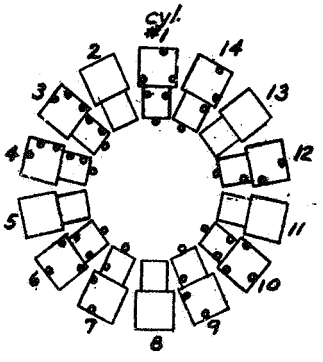
Short-nose low-inlet-velocity cowling

With fan, without cuffs

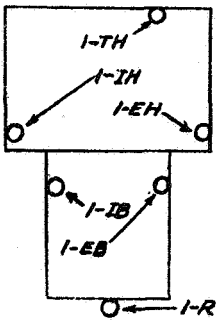
Test No. - Flight No. / Run No.	8-22 1	8-22 2	8-22 3	8-22 4	8-22 5	8-23 1	8-23 2	8-23 3	8-23 4	8-23 5
True Airspeed, mph.	332	330	331	327	330	328	332	328	330	326
q_c, impact press., in. H_2O	36.5	35.2	34.0	32.2	31.5	35.4	34.9	33.4	32.4	30.9
Atm. pressure, in. Hg.	17.10	16.50	15.79	15.16	14.56	17.22	16.56	15.91	15.29	14.64
Ambient Air Temp., °F	4	-2	-3	-7	-9	9	7	1	-2	-8
σ, density ratio	.639	.624	.599	.580	.560	.636	.614	.598	.576	.561
Density Altitude, ft.	14500	15250	16500	17400	18500	14650	15750	16550	17750	18450
Rpm.	2680					2680				
Bhp.	935	900	873	845	812	925	900	873	840	812
Manifold press., in. Hg.	40.2	39.2	37.6	36.2	34.8	40.4	39.0	37.8	36.3	34.9
	High speed					High speed				

Pressure ratio, p/q_c

Engine Pressure Tube Locations		8-22 1	8-22 2	8-22 3	8-22 4	8-22 5	8-23 1	8-23 2	8-23 3	8-23 4	8-23 5
1-R	Sheltered tubes behind engine	.37	.38	.37	.38	.37	.37	.37	.36	.36	.37
3-R		.37	.37	.37	.37	.37	.36	.37	.36	.36	.36
4-R		.36	.37	.37	.36	.37	.36	.36	.35	.36	.36
6-R		.39	.39	.39	.39	.39	.38	.38	.37	.38	.38
7-R		.39	.39	.39	.39	.39	.38	.38	.37	.38	.38
9-R		.40	.40	.40	.40	.39	.39	.39	.38	.39	.39
10-R		.40	.40	.40	.40	.39	.39	.39	.38	.39	.39
12-R		.38	.39	.38	.38	.38	.38	.37	.36	.37	.37
14-R		.37	.38	.38	.38	.37	.36	.37	.36	.36	.37
1-EB	Exhaust side of barrel	.86	.86	.86	.86	.86	.85	.85	.84	.85	.85
3-EB		.76	.77	.77	.77	.77	.76	.76	.75	.76	.76
4-EB		.83	.84	.83	.84	.83	.82	.83	.81	.82	.83
6-EB		.87	.86	.86	.86	.86	.86	.85	.84	.85	.86
7-EB		.84	.85	.84	.84	.84	.83	.83	.83	.83	.84
9-EB		.89	.89	.87	.89	.88	.88	.88	.86	.88	.87
10-EB		.89	.89	.89	.89	.89	.89	.88	.87	.88	.88
12-EB		.89	.90	.89	.89	.90	.89	.89	.88	.89	.89
14-EB		.87	.87	.87	.86	.87	.87	.87	.86	.87	.86
1-EH	Exhaust side of head	.84	.85	.84	.84	.84	.84	.85	.83	.84	.84
3-EH		.80	.81	.80	.80	.80	.79	.80	.78	.80	.80
4-EH		.91	.90	.90	.91	.90	.91	.91	.90	.90	.90
6-EH		.80	.80	.79	.79	.80	.79	.79	.78	.79	.79
7-EH		.87	.86	.86	.86	.86	.87	.87	.85	.86	.86
9-EH		.83	.84	.84	.84	.85	.85	.85	.83	.84	.84
10-EH		.90	.90	.90	.91	.91	.90	.90	.90	.90	.90
12-EH		.91	.92	.92	.93	.92	.92	.92	.92	.92	.92
14-EH		.86	.86	.87	.87	.87	.86	.86	.85	.86	.87
1-TH	Top of head	.84	.84	.84	.84	.84	.83	.84	.83	.83	.84
3-TH		.87	.86	.87	.86	.87	.87	.86	.86	.86	.86
4-TH		.79	.80	.80	.80	.80	.80	.80	.80	.80	.80
6-TH		.79	.79	.79	.79	.80	.79	.79	.78	.79	.79
7-TH		.84	.84	.84	.85	.85	.85	.85	.84	.84	.84
9-TH		.88	.90	.89	.89	.88	.88	.87	.87	.87	.89
10-TH		.83	.83	.83	.84	.83	.82	.83	.82	.83	.82
[illegible]-TH		.82	.83	.83	.84	.83	.82	.83	.82	.83	.82
14-TH		.78	.79	.78	.79	.78	.76	.77	.77	.78	.78
1-IH	Intake side of head	.86	.86	.86	.86	.86	.85	.85	.84	.85	.86
6-IH		.88	.88	.88	.88	.87	.88	.88	.87	.86	.87
10-IH		.94	.94	.93	.93	.93	.91	.92	.91	.92	.92
1-IB	Intake side of barrel	.83	.84	.84	.83	.84	.83	.83	.82	.82	.83
6-IB		.87	.88	.87	.88	.87	.87	.87	.87	.87	.87
10-IB		.87	.89	.88	.88	.88	.88	.88	.87	.88	.88
3-EH2		.82	.82	.82	.81	.81	.82	.82	.81	.81	.81
4-EH2		.88	.88	.87	.88	.88	.88	.87	.87	.88	.88
3-EB2		.66	.67	.67	.67	.67	.67	.66	.66	.67	.67
4-EB2		.79	.80	.80	.80	.80	.78	.79	.78	.78	.79



Cylinder no. 1



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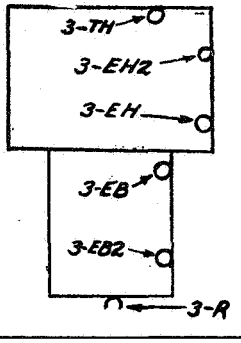

Method of designating tube locations for typical cylinders

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Table I (a)' continued

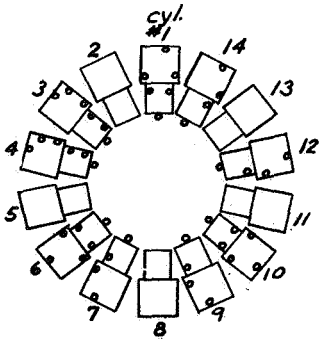
	9-21					9-20				
	1	2	3	4	5	1	2	3	4	5
Ind. airspeed, mph	158	157	155	154	153	138	138	138	136	137
q_c	12.4	12.2	11.9	11.8	11.7	9.5	9.4	9.4	9.2	9.3
Pressure altitude range, ft	4900-6400	7500-8800	12300-13300	16300-17200	19400-20000	2500-3900	8400-9500	13100-14100	17100-17800	19700-20400
Av. free air temp, °F	25	24	12	-1	-11	31	25	10	-5	-10
Av. bhp.	890	890	875	775	695	960	930	800	675	600
Av. manifold press.	40.0	40.0	38.7	33.6	30.0	42.7	41.6	36.4	31.7	28.8
Rpm	2540					2525				
	Auto. rich, climb					Full rich, climb				
	With fan, without cuffs									
Pressure ratio, p/q_c										
	-.22	-.20	-.20	-.15	-.18	-.28	-.27	-.25	-.26	-.26
	-.20	-.22	-.20	-.15	-.18	-.26	-.26	-.26	-.26	-.26
	-.25	-.26	-.24	-.21	-.22	-.33	-.30	-.28	-.30	.28
	-.09	-.11	-.08	-.09	-.09	-.16	-.11	-.15	-.14	-.14
	-.08	-.11	-.07	-.07	-.09	-.15	-.12	-.15	-.14	-.14
	-.08	-.11	-.08	-.07	-.07	-.16	-.15	-.15	-.14	-.14
	-.11	-.12	-.08	-.07	-.07	-.17	-.14	-.15	-.15	-.14
	-.20	-.20	-.18	-.15	-.16	-.26	-.26	-.25	-.24	-.24
	-.22	-.22	-.21	-.18	-.18	-.30	-.26	-.25	-.26	-.26
	.97	.91	.95	.93	.92	1.03	.99	.95	.90	.87
	.69	.73	.71	.73	.72	.75	.77	.71	.74	.71
	.97	.96	.90	.88	.89	.97	1.02	.92	.90	.87
	1.12	1.08	1.01	.99	.99	1.27	1.15	1.06	1.04	1.00
	1.07	.99	.98	.96	.97	1.08	1.09	.99	.96	.96
	1.06	1.01	1.02	1.05	1.03	1.11	1.09	1.04	1.02	1.02
	1.04	1.00	1.03	.99	1.01	1.10	1.10	1.04	1.01	.99
	.99	.96	.99	.99	.97	1.07	1.02	.99	.96	.92
	1.05	1.05	1.01	.99	.97	1.13	1.04	1.03	.98	.94
	.90	.94	.90	.91	.88	1.01	.95	.89	.89	.88
	.86	.86	.79	.78	.78	.88	.91	.80	.79	.78
	1.16	1.17	1.05	1.01	1.01	1.29	1.19	1.10	1.09	1.03
	.88	.93	.81	.82	.80	.98	.96	.86	.81	.79
	1.00	.97	.99	.96	.97	1.06	1.09	.99	.99	.95
	.90	.86	.92	.92	.91	.99	.97	.94	.90	.87
	1.07	1.08	1.08	1.06	1.04	1.19	1.13	1.14	1.07	1.02
	1.09	1.10	1.07	1.10	1.06	1.23	1.17	1.13	1.10	1.11
	1.11	1.12	1.06	1.03	.99	1.24	1.22	1.09	1.07	1.03
	1.01	.99	.97	.96	.91	1.06	1.03	.96	.95	.92
	.98	.97	.92	.90	.89	1.04	1.00	.94	.91	.90
	.94	.89	.86	.84	.83	.98	.94	.87	.82	.83
	.89	.94	.84	.86	.83	.97	.95	.89	.85	.83
	1.01	.99	1.01	.95	.94	1.07	1.12	1.01	.96	.94
	1.02	.99	1.03	1.05	1.03	1.18	1.14	1.09	1.02	.99
	.87	.88	.87	.88	.88	1.01	.94	.90	.87	.81
	.90	.94	.88	.92	.90	1.08	.99	.94	.91	.90
	.89	.92	.84	.85	.85	1.08	.99	.91	.87	.86
	1.02	1.03	.97	.95	.95	1.05	1.03	.97	.97	.91
	1.14	1.12	1.05	1.05	1.03	1.22	1.18	1.10	1.05	1.02
	1.18	1.14	1.08	1.10	1.09	1.34	1.24	1.16	1.12	1.10
	.91	.87	.92	.90	.89	1.00	.95	.90	.89	.84
	1.06	1.05	1.03	1.00	1.00	1.16	1.13	1.10	1.05	.96
	1.02	1.03	1.00	1.01	.98	1.16	1.11	1.02	1.00	.99
	.81	.83	.79	.76	.78	.69	.84	.74	.77	.74
	1.12	1.05	.98	.96	.95	1.17	1.12	1.02	.96	.96
	.47	.48	.48	.49	.51	.48	.51	.53	.49	.46
	.86	.83	.81	.83	.83	.90	.98	.86	.87	.86

a

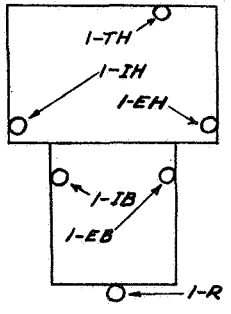
Table 1(a). - (Continued)

XP-42 airplane	Test No. - Flight No.	11-1					11-2				
Short-nose low-inlet-velocity cowling	Run No.	1	2	3	4	5	1	2	3	4	5
No fan, no cuffs	True Airspeed, mph.	330	328	330	330	331	327	331	328	330	328
	q_c, impact press., in. H_2O	35.2	34.1	33.2	32.2	31.3	34.0	33.6	32.0	31.2	30.0
	Atm. pressure, in. Hg.	17.18	16.70	15.84	15.18	14.54	16.46	15.81	15.17	14.53	13.95
	Ambient Air Temp., °F	15	12	6	1	-2	2	2	-4	-5	-10
	σ, density ratio	.628	.614	.590	.571	.552	.618	.594	.577	.555	.538
	Density Altitude, ft.	15050	15700	16950	17950	18950	15500	16750	17650	18800	20000
	Rpm.	2680					2680				
	Bhp.	871	857	834	810	794	860	832	803	780	752
	Manifold press., in. Hg.	39.2	37.7	36.4	35.1	33.9	37.7	36.5	35.1	33.8	32.5
		High Speed					High Speed				

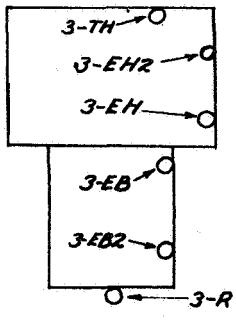
Engine Pressure Tube Locations



Cylinder no. 1



Cylinder no. 3



Method of designating tube locations for typical cylinders

		Pressure ratio, p/q_c									
1-R	Sheltered tubes behind engine	.29	.29	.29	.29	.29	.30	.30	.30	.30	.29
3-R		.29	.28	.28	.28	.28	.29	.29	.29	.29	.28
4-R		.28	.28	.27	.27	.28	.28	.28	.28	.28	.27
6-R		.31	.31	.31	.31	.30	.32	.31	.31	.31	.30
7-R		—	.31	.31	.31	.30	.32	.31	.31	.32	.30
9-R		—	.33	.32	.33	.32	.33	.33	.33	.34	.33
10-R		.33	.33	.32	.33	.32	.33	.33	.33	.34	.32
12-R		.31	.30	.30	.31	.30	.31	.31	.31	.31	.30
14-R		.29	.29	.29	.29	.28	.30	.30	.29	.30	.29
1-EB	Exhaust side of barrel	.80	.80	.79	.79	.79	.80	.81	.81	.80	.80
3-EB		.68	.68	.68	.67	.68	.68	.68	.67	.68	.68
4-EB		—	.69	.69	.69	.70	.69	.69	.69	.69	.69
6-EB		—	.80	.79	.80	.80	.80	.81	.80	.80	.80
7-EB		.78	.77	.78	.78	.78	.79	.78	.79	.79	.78
9-EB		.81	.81	.80	.80	.80	.82	.81	.82	.81	.81
10-EB		.80	.80	.80	.79	.80	.80	.81	.82	.80	.80
12-EB		.76	.76	.75	.75	.75	.76	.77	.77	.78	.77
14-EB		.81	.79	.80	.79	.80	.82	.82	.82	.81	.80
1-EH	Exhaust side of head	.80	.79	.79	.79	.79	.80	.81	.79	.79	.79
3-EH		.73	.74	.73	.73	.73	.73	.72	.73	.73	.72
4-EH		—	.76	.75	.74	.73	.75	.75	.74	.74	.74
6-EH		.74	.73	.72	.72	.73	.73	.73	.73	.73	.73
7-EH		.81	.80	.80	.80	.80	.81	.81	.81	.80	.80
9-EH		.77	.77	.77	.77	.78	.78	.78	.78	.78	.78
10-EH		.81	.81	.81	.81	.81	.81	.82	.83	.82	.82
12-EH		.76	.76	.75	.76	.75	.77	.78	.77	.77	.77
14-EH		.79	.79	.78	.78	.78	.79	.80	.79	.80	.79
1-TH	Top of head	—	.80	.80	.80	.79	.81	.80	.80	.80	.79
3-TH		—	.75	.76	.76	.75	.76	.75	.76	.74	.74
4-TH		.69	.69	.68	.69	.68	.69	.68	.69	.70	.68
6-TH		.69	.69	.68	.69	.68	.70	.68	.69	.69	.68
7-TH		.79	.78	.78	.78	.78	.79	.78	.78	.79	.79
9-TH		.81	.81	.81	.82	.82	.82	.82	.82	.82	.81
10-TH		.73	.72	.73	.74	.74	.74	.74	.74	.74	.75
12-TH		.73	.73	.73	.74	.74	.74	.75	.74	.75	.75
14-TH		.71	.71	.70	.72	.72	.71	.72	.72	.72	.72
1-IH	Intake side of head	—	.78	.78	.79	.78	.78	.79	.79	.79	.79
6-IH		.81	.80	.81	.82	.80	.82	.81	.81	.81	.81
10-IH		.82	.84	.83	.84	.84	.85	.85	.85	.85	.86
1-IB	Intake side of barrel	.76	.77	.76	.76	.75	.76	.77	.77	.77	.77
6-IB		.81	.81	.81	.80	.80	.81	.82	.83	.81	.80
10-IB		.78	.78	.78	.79	.78	.80	.80	.79	.80	.79
3-EH2		—	.74	.74	.73	.73	.74	.73	.73	.73	.72
4-EH2		.74	.73	.72	.72	.72	.72	.72	.73	.73	.72
3-EB2		.56	.55	.56	.56	.57	.60	.59	.60	.60	.59
4-EB2		.60	.59	.60	.61	.61	.59	.58	.60	.59	.59

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Table I(a).- Continued

	10-2				10-3				
	1	2	3	4	1	2	3	4	5
Ind. airspeed, mph	156	154	154	152	139	141	137	138	137
q_c	12.0	11.6	11.6	11.4	9.5	9.7	9.2	9.4	9.[illegible]
Pressure altitude range, ft	5000-6500	9300-10600	14900-16200	18800-19500	8200-9300	9900-10900	13300-14100	15500-16600	1880[illegible]-1950[illegible]
Av. free air temp, °F	20	4	-1	-6	16	13	7	1	-6
Av. bhp	900	920	820	720	920	890	785	700	600
Av. manifold press.	39.7	39.8	34.9	30.5	41.7	41.0	36.3	33.4	29.4
Rpm	2510				2545				
	Auto. rich, climb				Full rich, climb				
	No fan, no cuffs								
Pressure ratio, P/q_c									
	-.26	-.28	-.26	-.26	-.33	-.33	-.34	-.36	-.34
	-.26	-.26	-.26	-.24	-.30	-.33	-.34	-.34	-.30
	-.32	-.31	-.31	-.31	-.36	-.37	-.38	-.38	-.38
	-.20	-.20	-.18	-.17	-.21	-.24	-.24	-.26	:24
	-.18	-.17	-.20	-.17	-.22	-.21	-.24	-.24	-.24
	-.18	-.16	-.17	-.16	-.16	-.22	-.26	-.22	-.21
	-.20	-.17	-.17	-.17	-.21	-.24	-.24	-.24	-.24
	-.26	-.26	-.26	-.26	-.33	-.33	-.34	-.34	-.34
	-.29	-.28	-.29	-.26	-.34	-.34		-.35	-.36
	.80	.77	.75	.73	.75	.76	.73	.70	.73
	.55	.64	.58	.58	.60	.58	.59	.58	.59
	.61	.67	.62	.63	.62	.63	.59	.58	.61
	.79	.83	.80	.82	.79	.77	.77	.76	.77
	.76	.77	.77	.77	.76	.77	.73	.71	.73
	.88	.86	.86	.83	.86	.83	.80	.79	.80
	.88	.88	.88	.87	.86	.86	.85	.86	.83
	.89	.86	.82	.79	.88	.89	.88	.85	.86
	.79	.81	.77	.76	.81	.78	.79	.76	.79
	.71	.77	.73	.71	.73	.73	.72	.71	.70
	.59	.64	.58	.59	.65	.60	.58	.56	.54
	.73	.78	.73	.71	.74	.76	.72	.68	.70
	.67	.65	.65	.68	.63	.63	.58	.56	.59
	.84	.83	.82	.82	.84	.84	.82	.80	.76
	.79	.78	.77	.76	.79	.78	.78	.77	.78
	.88	.95	.85	.84	.94	.91	.89	.85	.85
	.90	.93	.89	.88	.97	.97	.97	.96	97
	.79	[illegible]	.75	.76	.83	.79	.80	.81	.80
	.78	.82	.75	.76	.81	.79	.75	.72	.73
	.75	.78	.71	.70	.77	.75	.73	.69	.68
	.60	.63	.61	.60	.62	.60	.59	.55	.55
	.68	.66	.64	.63	.67	.64	.59	.56	.59
	.82	.82	.82	.81	.83	.83	.85	.79	.78
	.88	.89	.88	.85	.92	.88	.87	.86	.87
	.75	.74	.74	.73	.75	.74	.74	.74	.74
	.70	.76	.72	.73	.76	.76	.74	.73	.77
	.62	.62	.60	.61	.65	.60	.62	.63	.64
	.79	.81	.75	.74	.78	.79	.77	.75	.74
	.86	.86	.84	.85	.88	.86	.85	.80	.83
	.02	.97	.96	.93	.98	.98	.95	.94	.92
	.73	.72	.72	.71	.74	.72	.74	.71	.72
	.83	.85	.84	.83	.88	.85	.86	.84	.84
	.83	.90	.83	.84	.88	.86	.88	.87	.88
	.64	.69	.62	.61	.66	.66	.62	.59	.59
	.74	.75	.69	.68	.74	.73	.70	.68	.66
	.27	.30	.30	.30	.27	.27	.29	.29	.29
	.52	.66	.58	.61	.62	.59	.56	.53	.54

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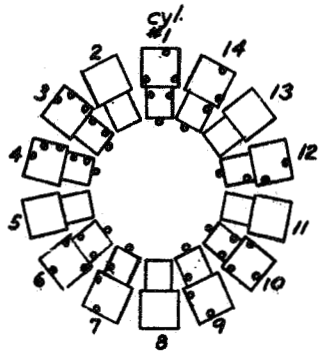
Table I(a).-(continued)

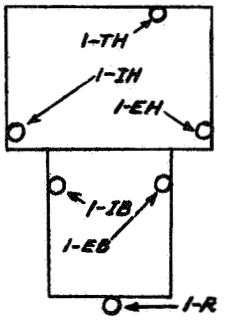
XP-42 airplane -
Short-nose low-inlet-Velocity cowling

Test No. - Flight No.	12-1					12-2				
Run No.	1	2	3	4	5	1	2	3	4	5
True Airspeed, mph	328	329	328	332	331	330	328	327	331	330
q_c, impact press., in. H_2O	35.5	34.5	33.2	32.7	31.8	34.4	32.3	32.0	31.1	30.1
Atm. pressure, in. Hg.	17.15	16.46	15.80	15.11	14.53	16.46	15.76	15.14	14.54	13.93
Ambient Air Temp., °F	5	4	1	-1	-8	7	4	4	1	-5
σ, density ratio	.690	.616	.595	.573	.559	.611	.590	.567	.548	.532
Density Altitude, ft.	14500	15650	16700	17850	18550	15900	17000	18150	19150	20050
Rpm.	2680									
Bhp.	935	891	863	840	812	891	873	850	821	789
Manifold press., in. Hg.	40.5	39.0	37.7	36.3	35.2	38.9	37.4	36.1	34.8	33.5
	High speed									
	Cuff 1, no fan									

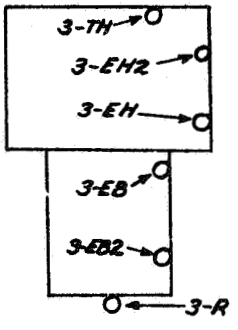
Engine Pressure Tube Locations



Cylinder no. 1



Cylinder no. 3



Method of designating tube locations for typical cylinders

		Pressure ratio, p/q_c									
1-R	sheltered tubes behind engine	.32	.32	.32	.32	.32	.32	.32	.31	.32	.33
3-R		.32	.31	.30	.32	.31	.31	.31	.31	.31	.32
4-R		.31	.31	.30	.31	.30	.31	.30	.31	.31	.32
6-R		.34	.33	.32	.33	.33	.33	.33	.33	.34	.34
7-R		.34	.34	.33	.33	.33	.33	.34	.33	.34	.34
9-R		.35	.35	.34	.36	.34	.35	.35	.34	.35	.36
10-R		.35	.35	.34	.36	.34	.35	.35	.34	.35	.36
12-R		.33	.33	.32	.33	.33	.33	.33	.32	.33	.34
14-R		.33	.32	.32	.32	.32	.32	.32	.32	.32	.33
1-EB	exhaust side of barrel	.82	.82	.82	.82	.81	.83	.83	.83	.83	.82
3-EB		.72	.71	.70	.72	.71	.72	.72	.72	.73	.73
4-EB		.74	.73	.73	.73	.73	.74	.74	.74	.74	.73
6-EB		.85	.84	.83	.83	.84	.85	.85	.83	.85	.85
7-EB		.80	.80	.80	.80	.80	.82	.82	.81	.81	.82
9-EB		.85	.84	.82	.83	.83	.84	.84	.83	.83	.84
10-EB		.86	.86	.85	.85		.86	.87	.86	.86	.86
12-EB		.78	.78	.77	.78	.77	.78	.77	.78	.78	.78
14-EB		.84	.84	.83	.84	.84	.84	.84	.84	.86	.85
1-EH	exhaust side of head	.82	.81	.81	.82	.81	.82	.82	.82	.82	.82
3-EH		.79	.78	.77	.78	.78	.78	.79	.79	.79	.79
4-EH		.83	.82	.82	.83	.81	.83	.83	.83	.82	.82
6-EH		.79	.78	.77	.78	.76	.78	.79	.78	.78	.78
7-EH		.84	.84	.83	.84	.84	.84	.85	.84	.84	.85
9-EH		.80	.80	.80	.80	.80	.80	.80	.80	.80	.81
10-EH		.88	.87	.87	.87	.86	.86	.88	.86	.87	.88
12-EH		.79	.77	.78	.80	.79	.80	.79	.79	.79	.79
14-EH		.83	.82	.82	.83	.82	.82	.82	.83	.82	.83
1-TH	top of head	.83	.82	.82	.83	.82	.82	.82	.82	.82	.83
3-TH		.81	.81	.80	.80	.81	.80	.80	.80	.80	.81
4-TH		.76	.76	.75	.76	.75	.76	.76	.75	.75	.76
6-TH		.76	.74	.74	.74	.74	.74	.75	.73	.75	.76
7-TH		.83	.82	.82	.82	.82	.82	.84	.82	.82	.84
9-TH		.84	.85	.83	.84	.83	.84	.85	.85	.85	.85
10-TH		.76	.76	.76	.77	.77	.77	.78	.77	.78	.79
12-TH		.76	.76	.76	.76	.77	.76	.77	.77	.77	.77
14-TH		.75	.74	.75	.74	.75	.78	.76	.77	.76	.77
1-IH	intake side of head	.82	.81	.80	.80	.81	.81	.82	.81	.81	.82
6-IH		.86	.85	.86	.86	.86	.87	.88	.87	.86	.89
10-IH		.92	.91	.90	.91	.90	.92	.92	.91	.92	.92
1-IB	intake side of barrel	.79	.79	.79	.79	.78	.79	.80	.79	.79	.79
6-IB		.87	.87	.86	.86	.85	.86	.87	.86	.86	.87
10-IB		.84	.84	.83	.84	.83	.84	.84	.84	.85	.85
3-EH2		.80	.79	.79	.74	.78	.78	.79	.78	.79	.79
4-EH2		.81	.80	.80	.80	.79	.80	.82	.80	.80	.81
3-EB2		.62	.61	.60	.62	.62	.62	.62	.62	.63	.64
4-EB2		.67	.64	.66	.66	.64	.67	.68	.66	.65	.65

Table I(a).- Continued

	13-1					13-3				13-2			
	1	2	3	4	5	1	2	3	4	1	2	3	4
Ind. airspeed, mph	161	158	158	154	157	138	140	137	137	138	138	137	138
q_c	12.7	12.3	12.2	11.6	12.1	9.4	9.6	9.2	9.2	9.3	9.3	9.2	9.3
Pressure altitude range, ft	1400-2600	8500-9400	12500-13500	16100-16900	19100-19600	6900-8100	12400-13400	16100-16800	19500-20100	9000-10100	12300-13800	16600-17300	19500-20000
Av. free air temp., °F	56	39	29	19	10	20	21	13	-1	21	22	13	0
Av. bhp.	840	880	860	770	700	915	890	780	700	910	795	660	580
Av. manifold press.	39.0	39.6	38.4	33.7	30.2	39.7	38.5	33.5	30.0	41.7	37.2	32.1	29.1
Rpm	2540					2520							
	Auto. rich climb					Auto. rich, climb				Full rich, climb			
	Cuff 1, no fan												
	Pressure ratio, p/p_c												
	-.33	-.32	-.30	-.29	-.28	-.33	-.36	-.39	-.39	-.34	-.36	-.36	-.39
	-.30	-.28	-.28	-.28	-.25	-.31	-.33	-.34	-.36	-.32	-.34	-.36	-.36
	-.35	-.34	-.32	-.32	-.31	-.36	-.38	-.39	-.41	-.35	-.38	-.41	-.41
	-.19	-.17	-.16	-.16	-.16	-.20	-.21	-.24	-.24	-.19	-.21	-.26	-.26
	-.19	-.17	-.16	-.16	-.13	-.20	-.20	-.24	-.24	-.20	-.22	-.24	-.24
	-.21	-.19	-.19	-.18	-.16	-.22	-.23	-.24	-.24	-.22	-.24	-.23	-.24
	-.21	-.21	-.19	-.18	-.16	-.24	-.27	-.26	-.26	-.24	-.24	-.26	-.26
	-.32	-.32	-.30	-.29	-.29	-.36	-.36	-.39	-.39	-.34	-.36	-.35	-.39
	-.32	-.29	-.30	-.28	-.26	-.36	-.36	-.36	-.36	-.33	-.36	-.35	-.39
	.78	.82	.79	.82	.78	.82	.83	.78	.73	.83	.80	.75	.74
	.58	.63	.62	.65	.62	.66	.65	.61	.61	.68	.63	.60	.60
	.65	.67	.66	.66	.65	.70	.66	.66	.64	.70	.70	.64	.66
	.87	.86	.89	.90	.88	.97	.88	.90	.90	.95	.97	.91	.89
	.85	.87	.86	.86	.83	.99	.87	.88	.85	.99	.95	.88	.84
	.92	.86	.88	.90	.88	1.03	.96	.94	.90	1.01	.97	.96	.92
	.92	.94	.94	.91	.89	1.01	.97	.96	.94	1.01	.99	.98	.95
	.84	.90	.84	.86	.84	.99	.99	.91	.88	1.00	.93	.88	.83
	.80	.81	.81	.84	.80	.87	.90	.82	.78	.91	.83	.81	.77
	.69	.78	.77	.80	.75	.79	.77	.74	.72	.80	.76	.71	.71
	.66	.67	.68	.69	.66	.71	.66	.62	.62	.72	.64	.62	.59
	.80	.81	.84	.80	.78	.88	.77	.78	.76	.85	.83	.77	.75
	.70	.66	.71	.72	.71	.77	.70	.70	.66	.76	.73	.71	.69
	.92	.91	.92	.90	.86	1.03	.95	.91	.91	1.01	.97	.92	.87
	.81	.85	.82	.85	.82	.91	.90	.85	.83	.89	.84	.83	.82
	.97	.97	.97	.99	.95	1.09	1.10	1.01	.99	1.11	1.03	.98	.98
	.97	1.01	1.01	1.01	.95	1.15	1.15	1.11	1.06	1.19	1.17	1.00	1.08
	.85	.84	.86	.87	.84	.92	.88	.89	.87	.94	.88	.83	.76
	.82	.82	.84	.85	.82	.84	.82	.79	.77	.84	.82	.77	.74
	.76	.81	.81	.81	.78	.84	.76	.75	.75	.82	.82	.76	.72
	.70	.73	.76	.76	.74	.77	.69	.73	.71	.80	.74	.71	.70
	.73	.69	.74	.76	.73	.78	.74	.71	.68	.80	.72	.72	.70
	.91	.97	.94	.93	.85	1.08	.98	.95	.89	1.08	.97	.91	.88
	.92	.96	.92	.96	.92	1.06	1.08	1.00	.98	1.08	1.01	.98	.95
	.73	.76	.75	.78	.77	.82	.84	.80	.77	.83	.76	.76	.74
	.78	.83	.83	.84	.83	.95	.93	.92	.88	.98	.90	.84	.82
	.70	.67	.66	.69	.65	.74	.71	.77	.73	.83	.76	.67	.64
	.78	.81	.84	.80	.81	.87	.81	.80	.80	.80	.84	.80	.76
	.93	.93	.97	.94	.92	1.04	.95	.98	.96	.99	1.01	.96	.89
	1.02	.98	1.00	.99	.97	1.09	1.08	1.08	1.02	1.10	1.10	1.04	.99
	.72	.78	.75	.76	.73	.80	.79	.74	.72	.80	.73	.72	.71
	.89	.91	.90	.91	.87	1.01	1.01	.92	.92	.99	.96	.91	.89
	.88	.91	.92	.91	.87	1.01	.99	.97	.95	1.01	.99	.94	.91
	.69	.70	.72	.72	.71	.76	.69	.66	.66	.73	.73	.64	.61
	.75	.78	.78	.78	.77	.81	.75	.74	.74	.81	.81	.74	.71
	.35	.40	.40	.44	.44	.44	.46	.41	.41	.45	.41	.39	.41
	.66	.67	.66	.66	.75	.70	.65	.68	.66	.76	.69	.66	.66

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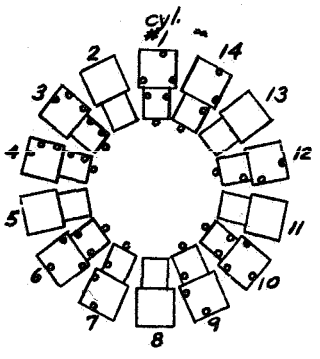
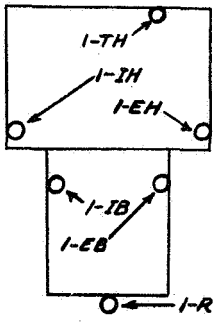
Table I(a).- (continued)

XP-42 airplane Short-nose low-inlet-velocity cowling	Test No. - Flight No. Run No.	15-1					15-2				
		1	2	3	4	5	1	2	3	4	5
	True Airspeed, mph.	330	331	332	330	332	330	331	331	332	330
	q_c, impact press., in. H_2O	36.5	35.5	34.4	33.3	32.3	36.2	35.1	34.3	33.2	31.6
	Atm. pressure, in. Hg.	17.17	16.46	15.81	15.18	14.54	17.09	16.42	15.82	15.13	14.51
	Ambient Air Temp., °F	1	-2	-5	-9	-12	3	0	-5	-8	-10
	σ, density ratio	.646	.624	.603	.584	.563	.640	.620	.603	.581	.560
	Density Altitude, ft.	14450	15250	16300	17250	18350	14500	15450	16300	17400	18500
	Rpm.	← 2680 →									
	Bhp.	914	882	863	840	811	914	886	872	839	811
	Manifold press., in. Hg.	40.3	38.9	37.6	36.3	34.9	40.4	38.9	37.8	36.4	34.9
		← Cuff 2, no fan →									
		← High speed →									
		Pressure ratio, p/q_c									
Engine Pressure Tube Locations	1-R	.30	.31	.30	.31	.31	.31	.31	.31	.30	.30
	3-R	.30	.30	.30	.31	.as	.30	.30	.31	.as	.30
	4-R	.28	.29	.28	.30	.28	.29	.30	.30	.as	.29
	6-R	.3a	.32	.32	.3a	.32	.32	.32	.32	.31	.3a
	7-R	.32	.32	.32	.32	.32	.32	.32	.32	.31	.3a
	9-R	.33	.34	.34	.34	.33	.34	.34	.34	.33	.34
	10-R	.33	.34	.34	.34	.34	.34	.34	.34	.33	.34
	12-R	.31	.32	.32	.32	.31	.32	.32	.3a	.31	.32
	14-R	.30	.31	.30	.31	.31	.31	.31	.31	.30	.30
	1-EB	.81	.sa	.80	.82	.80	.82	.82	.82	.81	.81
	3-EB	.70	.69	.70	.69	.79	.70	.70	.70	.69	.69
	4-EB	.71	.71	.71	.72	.71	.72	.71	.71	.70	.71
	6-EB	.%0	.81	.80	.80	.80	.81	.80	.81	.80	.80
	7-EB	.80	.80	.79	.80	.79	.81	.80	.80	.80	.80
	9-EB	.79	.81	.79	.80	.79	.80	.80	.80	.79	.80
	10-EB	.80	.82	.80	.81	.80	.81	.82	.82	.80	.82
	12-EB	74	.75	.74	.75	.75	.76	.77	.76	.75	.75
	14-EB	.82	.83	.82	.82	.82	.83	.84	.84	.83	.84
	1-EH	.81	.81	.81	.81	.80	.83	.83	.sa	.xr	.82
	3-EH	.75	.73	.73	.74	.73	.74	.75	.74	.74	.74
	4-EH	.79	.79	.78	.78	.?%	.80	.80	.78	.78	.79
	6-EH	.75	.75	.74	.74	.73	.75	.75	.75	.73	.74
	7-EH	.83	.83	.82	.83	.82	.83	.84	.83	.83	.%3
	9-EH	.76	.76	.76	.77	.76	.77	.77	.77	.74	.77
	10-EH	.81	.81	.80	.81	.80	.82	.83	.82	.82	.82
	12-EH	.75	.76	.77	.75	.76	.77	.78	.78	.76	.77
	14-EH	.80	.81	.80	.80	.80	.82	.82	.82	.81	.81
	1-TH	.82	.83	.82	.83	.%l	.83	.83	.84	.82	.83
	3-TH	.77	.78	.77	.77	.77	.78	.78	.76	.76	.77
	4-TH	.72	.72	.71	.72	.72	.73	.73	.73	.72	.72
	6-TH	.72	.72	.71	.72	.70	.71	.71	.71	.70	.71
	7-TH	.83	.82	.82	.82	.81	.83	.83	.a3	.80	.83
	9-TH	.80	.80	.80	.82	.80	.80	.81	.81	.80	.80
	10-TH	.74	.74	.74	.75	.74	.74	.75	.75	.74	.74
	12-TH	.73	.74	.74	.74	.74	.74	.75	.75	.74	.74
	14-TH	.72	.74	.74	.73	.73	.74	.75	.75	.74	.75
	1-IH	.79	.81	.80	.82	.a0	.80	.81	.81	.80	.80
	6-IH	.83	.84	.83	.85	.83	.84	.84	.84	.83	.84
	10-IH	.87	.89	.89	.89	.88	.87	.89	.88	.87	.87
	1-IB	.77	.78	.76	.77	.76	.78	.78	.78	.77	.77
	6-IB	.84	.82	.83	.84	.83	.84	.84	.83	.82	.83
	10-IB	.79	.81	.81	.B0	.80	.81	.m	.81	.80	.80
	3-EH2	.75	.75	.74	.75	.75	.75	.76	.75	.74	.75
	4-EH2	.77	.78	.75	.77	.76	.77	.78	.77	.7b	.76
	3-EB2	.60	.59	.60	.60	.60	.60	.60	.60	.60	.60
	4-EB2	.65	.64	.LS	.65	.L4	.66	.64	.64	.b4	.64

Method of designating tube locations for typical cylinders



Cylinder no. 1



Cylinder no. 3

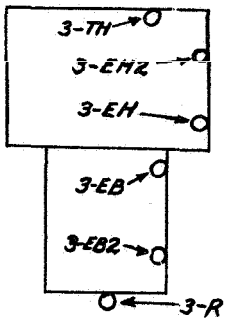


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Table I(a).- Concluded.

	14-3				14-1					14-2			
	1	2	3	4	1	2	3	4	5	1	2	3	4
Ind. airspeed, mph.	161	161	161	161	142	141	141	140	138	138	137	137	138
q_c	12.7	12.7	12.7	12.7	9.9	9.7	9.8	9.6	9.4	9.4	9.2	9.2	9.3
Pressure altitude range, ft.	4000-5100	11100-12100	15000-16000	19000-20400	2400-3600	8400-9600	12500-13400	16100-17000	19700-20400	5100-6400	13200-14100	16300-17100	19500-20100
Av. free-air temp, °F	47	24	14	5	43	25	16	6	-10	41	18	9	-7
Av. bhp	875	910	825	705	870	910	900	790	650	945	760	670	580
Av. manifold press.	40.6	40.7	35.7	30.1	39.8	40.2	38.6	33.8	29.6	43.0	36.9	33.0	29.0
Rpm	2550				2540								
	Auto. rich, climb.				Auto. rich, climb					Full rich, climb			
	Cuff 2, no fan												
	Pressure ratio, P/q_c												
	.28	.28	.27	.28	.33	.32	.33	.32	.33	.35	.36	.36	.31
	.27	.27	.25	.27	.31	.31	.31	.30	.33	.33	.34	.36	.31
	.31	.31	.31	.31	.35	.35	.35	.34	.38	.37	.38	.41	.37
	.16	.14	.14	.16	.20	.17	.16	.19	.23	.18	.18	.24	.23
	.14	.14	.14	.16	.20	.17	.16	.19	.21	.21	.22	.24	.23
	.18	.17	.16	.16	.24	.19	.20	.21	.21	.23	.24	.24	.23
	.18	.18	.18	.18	.24	.23	.22	.23	.23	.23	.26	.26	.23
	.28	.28	.27	.27	.33	.33	.33	.32	.33	.35	.36	.36	.34
	.28	.28	.27	.27	.33	.33	.33	.32	.33	.35	.36	.36	.31
	.82	.80	.80	.77	.82	.83	.76	.79	.77	.86	.78	.78	.76
	.67	.64	.63	.60	.66	.63	.66	.64	.60	.65	.62	.62	.64
	.70	.68	.65	.61	.67	.68	.68	.66	.63	.74	.66	.66	.64
	.91	.89	.87	.84	.95	.97	1.00	.96	.94	1.03	.96	.94	.94
	.90	.88	.86	.82	1.02	1.03	.98	.96	.94	1.05	.98	.94	.91
	.94	.94	.91	.91	1.04	1.01	.97	.90	.98	1.05	1.00	1.00	.99
	.97	.97	.94	.93	1.02	.98	.94	.96	.96	1.03	.96	.96	.94
	.87	.86	.86	.83	.97	.98	.90	.94	.90	1.05	.96	.90	.89
	.86	.84	.84	.79	.89	.89	.90	.84	.79	.94	.84	.82	.82
	.79	.77	.77	.72	.80	.79	.80	.75	.72	.82	.74	.72	.75
	.70	.67	.65	.61	.71	.69	.69	.67	.61	.70	.64	.62	.63
	.83	.81	.79	.73	.89	.84	.80	.77	.74	.88	.78	.74	.75
	.73	.72	.70	.69	.84	.78	.74	.77	.74	.82	.78	.76	.73
	.94	.93	.91	.87	1.09	1.02	.96	.98	.96	1.05	1.00	.96	.96
	.85	.85	.85	.82	.88	.89	.82	.91	.87	.95	.87	.87	.88
	1.06	1.00	.91	.94	1.13	1.10	1.08	1.06	1.02	1.16	1.06	1.04	1.04
	1.06	1.03	1.00	.94	1.19	1.16	1.17	1.12	1.06	1.19	1.09	1.09	1.06
	.85	.87	.84	.80	.90	.90	.91	.85	.83	.95	.85	.83	.86
	.84	.84	.80	.76	.84	.83	.81	.81	.78	.85	.80	.77	.78
	.80	.80	.76	.73	.81	.83	.79	.79	.76	.85	.75	.73	.76
	.75	.76	.71	.68	.81	.79	.75	.74	.73	.81	.75	.71	.73
	.73	.75	.71	.69	.83	.80	.74	.76	.73	.81	.77	.73	.73
	1.00	.98	.94	.89	1.15	1.06	1.00	1.04	1.02	1.06	1.04	1.01	.98
	.98	.97	.97	.91	1.06	1.08	.97	1.05	1.03	1.10	1.02	1.02	1.03
	.77	.77	.79	.74	.84	.92	.83	.81	.79	.86	.78	.78	.81
	.84	.84	.84	.79	.93	.90	.95	.88	.86	.94	.88	.88	.91
	.67	.70	.68	.65	.75	.75	.74	.74	.71	.79	.70	.67	.71
	.80	.82	.79	.76	.84	.86	.82	.81	.79	.88	.80	.78	.81
	.95	.98	.95	.89	1.06	1.07	1.02	1.03	1.03	1.07	1.02	1.00	1.11
	1.05	1.02	1.08	.98	1.13	1.10	1.05	1.05	1.05	1.15	1.08	1.05	1.05
	.78	.75	.75	.73	.80	.78	.72	.77	.74	.81	.74	.74	.75
	.95	.92	.94	.87	1.06	1.01	1.04	1.02	.97	1.09	1.00	1.00	1.00
	.98	.94	.94	.91	.99	1.00	1.01	.98	1.02	1.02	.95	.95	.98
	.78	.70	.69	.65	.71	.73	.71	.71	.65	.75	.70	.69	.66
	.77	.76	.73	.68	.87	.80	.78	.73	.72	.84	.78	.72	.73
	.43	.44	.46	.43	.43	.43	.46	.45	.44	.46	.41	.41	.45
	.70	.67	.65	.59	.73	.69	.75	.68	.63	.77	.68	.66	.68

Table I(b).- PRESSURE DATA

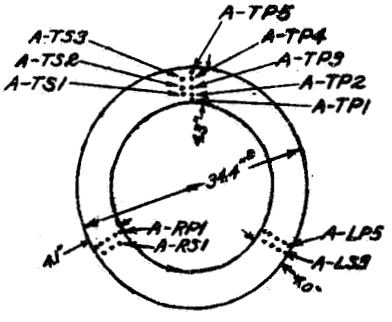
XP-42 Airplane

Short-nose low-inlet-velocity cowling

With fan, without cuffs

Test No. - Flight No. / Run No.	8-22 1	2	3	4	5	8-23 1	2	3	4	5
True Airspeed, mph.	332	330	331	327	330	328	332	328	330	326
q_c, impact press., in. H_2O	36.5	35.2	34.0	32.2	31.5	35.4	34.9	33.4	32.4	30.9
Atm. pressure, in. Hg.	17.10	16.50	15.79	15.16	14.56	17.22	16.56	15.91	15.23	14.64
Ambient Air Temp., °F	4	-2	-3	-7	-9	9	7	1	-2	-8
σ, density ratio	.639	.624	.599	.580	.560	.636	.614	.598	.576	.561
Density Altitude, ft.	14500	15250	16500	17400	18500	14650	15750	16550	17750	18450
Rpm	2680					2680				
Bhp	935	900	873	845	812	925	900	873	840	812
Manifold Press, in. Hg	40.2	39.2	37.6	36.2	34.8	40.4	39.0	37.8	36.3	34.9
	High speed					High speed				

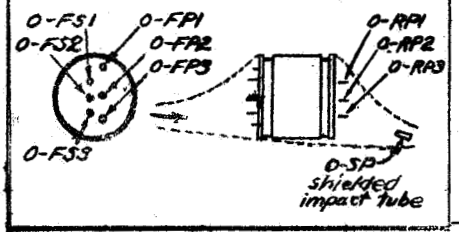
Pressure ratio, p/q_c



Location of Pressure Tubes in Annulus

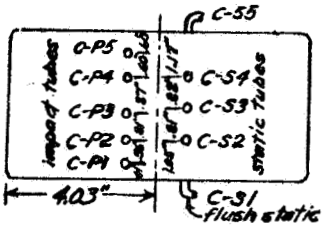
		1	2	3	4	5	1	2	3	4	5
A-TP1 (impact tubes)	Top survey Rake	.81	.82	.82	.82	.82	.82	.81	.81	.81	.81
2		.83	.84	.83	.84	.83	.84	.84	.82	.83	.84
3		.87	.88	.87	.87	.87	.87	.87	.86	.87	.87
4		.90	.90	.90	.89	.89	.89	.89	.89	.88	.88
5		.84	.85	.84	.85	.84	.84	.84	.83	.84	.84
A-TS1 (static tubes)		.75	.76	.76	.76	.76	.74	.75	.74	.75	.75
2		.77	.77	.77	.37	.77	.77	.76	.76	.77	.77
3		.76	.76	.76	.76	.77	.75	.76	.77	.76	.76
A-RP1 (impact tubes)	Right survey	.81	.81	.81	.81	.81	.81	.81	.80	.80	.80
2		.81	.82	.83	.83	.82	.82	.82	.81	.82	.83
3		.88	.88	.87	.87	.87	.88	.87	.87	.87	.87
4		.93	.93	.93	.93	.93	.93	.93	.92	.93	.92
5		.86	.87	.86	.87	.86	.85	.86	.85	.85	.86
A-RS1 (static tubes)		.77	.78	.77	.78	.78	.77	.77	.76	.77	.78
2		.78	.78	.78	.78	.78	.78	.78	.77	.77	.78
3		.80	.80	.81	.80	.81	.81	.80	.80	.80	.80
A-LP1 (impact tubes)	Left survey	.81	.82	.81	.82	.82	.82	.82	.81	.81	.82
2		.84	.84	.84	.84	.84	.82	.84	.83	.83	.84
3		.89	.90	.89	.89	.88	.89	.89	.88	.89	.89
4		.91	.92	.91	.91	.91	.91	.91	.90	.91	.91
5		.84	.86	.85	.84	.85	.84	.85	.83	.84	.85
A-LS1 (static tubes)		.82	.81	.81	.82	.82	.81	.81	.80	.80	.82
2		.82	.82	.82	.83	.82	.82	.82	.81	.82	.82
3		.83	.84	.84	.84	.84	.84	.83	.82	.83	.84

Oil Cooler Pressure Tube Locations



		1	2	3	4	5	1	2	3	4	5
O-FP1 (impact tubes)	Front survey	.90	.91	.91	.91	.91	.91	.91	.90	.91	.91
2		.96	.96	.96	.95	.96	.96	.96	.96	.95	.96
3		.96	.97	.97	.97	.97	.96	.96	.96	.96	.96
O-FS1 (static tubes)		.84	.84	.84	.84	.85	.85	.84	.83	.84	.85
2		.85	.86	.85	.85	.86	.85	.85	.85	.85	.86
3		.86	.87	.87	.86	.87	.86	.87	.86	.87	.86
O-RP1 (impact tubes)	Rear survey	.62	.62	.61	.62	.62	.61	.61	.60	.61	.62
2		.60	.61	.59	.60	.60	.59	.59	.58	.59	.59
3											
O-SP		.55	.56	.55	.55	.55	.55	.55	.54	.55	.55

Carburetor Scoop



		1	2	3	4	5	1	2	3	4	5
C-P1 (Impact tubes)		.95	.94	.94	.94	.94	.94	.94	.93	.94	.93
2		.96	.96	.96	.96	.96	.95	.96	.95	.96	.94
3		.97	.97	.96	.96	.97	.97	.97	.96	.96	.96
4		.98	.98	.98	.98	.98	.98	.98	.97	.97	.98
5		.98	.98	.98	.98	.98	.98	.98	.97	.97	.97
C-S1 (Static tubes)		.80	.80	.90	.80	.79	.79	.79	.78	.79	.79
2		.77	.78	.77	.77	.77	.76	.77	.76	.77	.76
3		.75	.75	.75	.75	.76	.74	.75	.74	.75	.74
4		.75	.75	.75	.75	.75	.75	.75	.74	.75	.74
5											
C-TH Impact press. in carb. throat		.78	.78	.78	.78	.78	.79	.79	.78	.79	.78

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Table I(b).- Continued

	9-21					9-20				
	1	2	3	4	5	1	2	3	4	5
Ind. airspeed, mph.	158	157	155	154	153	138	138	138	136	137
q_c	12.4	12.2	11.9	11.8	11.7	9.5	9.4	9.4	9.2	9.3
Pressure altitude range, ft.	4900-6400	7500-8800	12300-13300	16300-17200	19100-20000	2500-3900	8400-9500	13100-14100	17100-17800	19100-20100
Av. free air temp, °F	25	24	12	-1	-11	31	25	10	-5	-10
Av. bhp.	890	890	875	775	695	960	930	800	675	600
Av. manifold press.	40.0	40.0	38.7	33.6	30.0	42.7	41.6	36.4	31.7	28.8
Rpm.	2540					2525				
	Auto Rich, climb					Full rich, climb				
	With fan, without cuffs									
Pressure ratio, p/q_c										
	.80	.78	.82	.82	.81	.81	.87	.80	.80	.78
	.92	.91	.90	.89	.85	.95	.96	.88	.87	.83
	1.03	1.02	.98	.95	.92	1.10	1.03	.98	.94	.91
	.96	.94	.97	.97	.96	1.08	1.05	1.00	.95	.94
	.87	.87	.84	.88	.87	.94	.92	.85	.85	.83
	.70	.71	.72	.72	.72	.65	.74	.66	.67	.69
	.72	.74	.72	.72	.72	.68	.73	.69	.66	.67
	.71	.71	.73	.73	.73	.71	.73	.70	.71	.68
	.87	.83	.88	.85	.85	.94	.98	.91	.87	.86
	1.02	1.04	.97	.93	.93	1.15	1.16	1.00	.99	.98
	1.19	1.18	1.08	1.04	1.04	1.32	1.25	1.12	1.06	1.05
	1.04	1.01	1.03	1.01	1.01	1.14	1.14	1.04	.98	.97
	.97	.96	.98	.92	.92	1.05	.94	.94	.94	.92
	.81	.78	.78	.79	.79	.71	.81	.76	.77	.74
	.83	.80	.81	.82	.81	.84	.87	.81	.79	.79
	.83	.82	.82	.81	.81	.86	.86	.80	.80	.80
	.65	.69	.75	.81	.80	.67	.65	.71	.71	.73
	.90	.90	.94	.93	.93	.94	.92	.86	.90	.90
	1.08	1.00	1.01	1.03	1.02	1.09	1.05	1.04	1.00	.98
	.98	1.03	1.03	1.04	1.03	1.07	1.03	1.03	.98	.98
	.82	.82	.86	.85	.85	.84	.82	.76	.79	.79
	.90	.89	.88	.87	.87	.96	.89	.85	.86	.82
	.91	.88	.92	.88	.90	.96	.96	.90	.88	.86
	.97	.92	.90	.91	.88	.99	.97	.94	.89	.87
	.75	.78	.80	.84	.85	.66	.72	.74	.77	.76
	.78	.85	.87	.91	.89	.72	.74	.79	.79	.79
	.82	.85	.86	.92	.93	.76	.80	.80	.84	.85
	.68	.68	.71	.72	.73	.58	.63	.63	.65	.67
	.68	.66	.69	.73	.73	.55	.61	.63	.65	.67
	.65	.66	.70	.74	.73	.60	.64	.65	.69	.67
	.28	.28	.31	.32	.33	.18	.23	.23	.25	.25
	.22	.24	.23	.26	.28	.14	.21	.17	.21	.23
	.19	.20	.20	.24	.24	.12	.16	.18	.20	.21
	.87	.85	.83	.90	.90	.84	.83	.82	.86	.85
	.90	.85	.87	.91	.93	.86	.88	.86	.87	.88
	.87	.90	.90	.93	.96	.90	.91	.91	.89	.91
	.90	.91	.92	.95	.96	.90	.90	.87	.92	.93
	.89	.89	.94	.98	.97	.89	.89	.85	.89	.96
	.57	.51	.48	.57	.61	.40	.32	.33	.42	.46
	.50	.45	.43	.48	.56	.37	.21	.23	.35	.42
	.48	.42	.37	.44	.53	.33	.16	.23	.35	.37
	.47	.45	.37	.44	.52	.32	.17	.20	.33	.37
	.56	.49	.41	.53	.57	.34	.25	.30	.35	.42

Table I(b) (continued)

XP-42 Airplane	Test No. - Flight No. / Run No.	11-1					11-2				
		1	2	3	4	5	1	2	3	4	5
Short-nose low-inlet-velocity cowling	True airspeed, mph	330	328	330	330	331	327	331	328	330	328
	q_c, impact press., in. H_2O	35.2	34.1	33.2	32.2	31.3	34.0	33.6	32.0	31.2	30.0
	Atm. pressure in. Hg.	17.18	16.70	15.84	15.18	14.54	16.46	15.81	15.17	14.53	13.95
No fan, no cuffs	Ambient air temp., °F	15	12	6	1	-2	2	2	-4	-5	-10
	σ, density ratio	.628	.614	.590	.571	.552	.618	.594	.577	.555	.538
	Density altitude, ft.	15050	15700	16950	17950	18950	15500	16750	17650	18800	20000
	Rpm	2680					2680				
	Bhp	871	857	834	810	794	860	832	803	780	752
	Manifold press., in. Hg	39.2	37.7	36.4	35.1	33.9	37.7	36.5	35.1	33.8	32.5
		High speed					High speed				

Pressure ratio, p/q_c

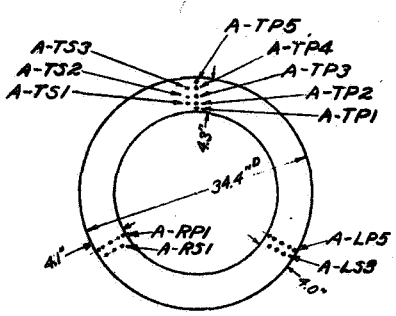
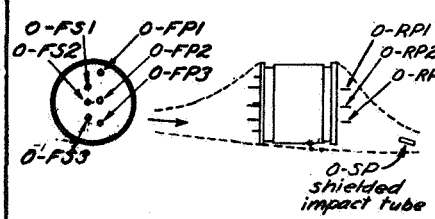
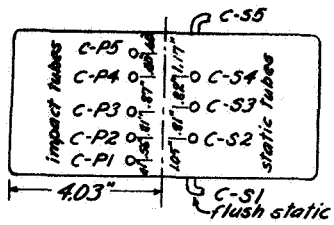
		11-1 1	2	3	4	5	11-2 1	2	3	4	5
 Location of pressure tubes in annulus	A-TP1 (impact tubes)	.72	.71	.71	.71	.72	.73	.72	.72	.72	.71
	2	.74	.73	.74	.74	.73	.74	.74	.73	.74	.75
	3	–	.85	.85	.84	.84	.84	.85	.84	.84	.84
	4	.90	.89	.89	.88	.88	.90	.90	.90	.89	.89
	5	.88	.86	.86	.86	.84	.86	.88	.86	.86	.86
	A-TS1 (static tubes)	.68	.68	.68	.68	.68	.68	.69	.68	.68	.68
	2	.68	.68	.68	.68	.68	.69	.68	.69	.69	.68
	3	–	.70	.69	.69	.70	.70	.70	.70	.70	.71
	Top survey rake										
	A-RP1 (impact tubes)	.72	.71	.71	.71	.72	.72	.71	.72	.71	.71
	2	.74	.73	.73	.73	.74	.73	.72	.72	.72	.72
	3	.79	.78	.79	.80	.79	.79	.78	.78	.79	.78
	4	.89	.87	.88	.87	.88	.88	.87	.87	.88	.87
	5	.84	.84	.83	.83	.84	.83	.83	.83	.84	.82
	A-RS1 (static tubes)	–	.69	.68	.69	.69	.69	.69	.69	.70	.69
	2	.70	.70	.69	.70	.69	.70	.70	.70	.71	.69
	3	–	.72	.72	.73	.72	.73	.72	.73	.72	.73
	Right survey										
	A-LP1 (impact tubes)	.74	.73	.74	.74	.73	.74	.74	.74	.74	.74
	2	.73	.74	.73	.73	.73	.75	.75	.74	.74	.75
	3	.79	.bo	.74	.79	.79	.80	.80	.80	.80	.80
	4	.84	.84	.83	.83	.84	.84	.86	.84	.86	.83
	5	.78	.79	.78	.78	.78	.80	.80	.79	.80	.80
	A-LS1 (static tubes)	–	.71	.70	.70	.70	.71	.71	.71	.72	.71
	2	.71	.71	.70	.70	.70	.71	.71	.72	.72	.72
	3	.72	.73	.72	.72	.72	.73	.73	.73	.74	.73
	Left survey										
 Oil cooler pressure tube locations	O-FP1 (impact tubes)	.91	.92	.92	.91	.91	.92	.92	.92	.91	.92
	2	.96	.96	.96	.96	.95	.96	.96	.97	.96	.96
	3	.98	.97	.96	.97	.96	.97	.97	.97	.96	.96
	O-FS1 (static tubes)	.85	.84	.85	.85	.84	.85	.85	.84	.85	.84
	2	.86	.86	.85	.85	.85	.86	.86	.85	.86	.85
	3	.87	.87	.86	.86	.86	.87	.86	.87	.86	.87
	Front survey										
	O-RP1 (impact tubes)	–	.62	.62	.62	.62	.63	.63	.62	.63	.62
	2	.59	58	.58	.59	.58	.59	.58	.59	.60	.58
	3										
	Rear survey										
	O-SP	.56	.56	.56	.55	.55	.57	.56	.56	.56	.56
 Carburetor presure tube locations	C-P1 (impact tubes)	.94	.94	.94	.93	.94	.95	.94	.94	.94	.93
	2	.96	.96	.95	.94	.95	.95	.96	.95	.94	.94
	3	.97	.96	.96	.97	.95	.96	.97	.97	.96	.95
	4	.98	.97	.97	.97	.96	.97	.98	.96	.96	.96
	5	.98	.97	.97	.97	.97	.97	.98	.96	.96	.96
	C-S1 (static tubes)	.80	.80	.79	.79	.80	.79	.81	.79	.79	.79
	2	.77	.77	.76	.78	.77	.79	.78	.77	.77	.77
	3	–	.74	.75	.76	.75	.75	.76	.76	.76	.75
	4	.75	.75	.75	.75	.74	.75	.75	.76	.76	.75
	5										
	C-TH Impact press. in carb. throat	.72	.73	.73	.72	.73	.72	.73	.73	.73	.73

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Table I(b) (continued)

	10-2				10-3				
	1	2	3	4	1	2	3	4	5
Ind. airspeed, mph.	156	154	154	152	139	141	137	138	137
q_c	12.0	11.6	11.6	11.4	9.5	9.7	9.2	9.4	9.2
Pressure altitude range, ft.	5000-6500	9300-10600	14900-16200	18800-19800	8700-9300	9900-10900	13300-14100	15500-16600	18800-19500
Av. free air temp, °F	20	4	-1	-6	16	13	7	1	-6
Av. bhp.	900	920	820	720	920	890	785	700	600
Av. Manifold press.	39.7	39.8	34.9	30.5	41.7	41.0	36.3	33.4	29.4
Rpm	2510				2545				
	Auto. rich, climb				Full rich, climb				
	No fan, no cuffs								
Pressure ratio, p/q_c									
	.74	.71	.71	.70	.79	.77	.72	.69	.68
	.72	.76	.72	.70	.78	.74	.75	.73	.73
	.81	.84	.80	.83	.82	.80	.78	.77	.78
	.93	.90	.90	.89	.93	.90	.83	.84	.84
	.85	.91	.88	.87	.90	.86	.86	.86	.84
	.61	.67	.65	.64	.70	.65	.65	.64	.68
	.63	.69	.67	.64	.68	.68	.70	.67	.62
	.67	.68	.64	.65	.70	.67	.67	.62	.63
	.71	.70	.69	.67	.75	.71	.71	.67	.65
	.69	.78	.74	.75	.81	.74	.75	.72	.71
	.82	.86	.83	.83	.84	.82	.81	.79	.78
	.91	.91	.90	.90	.96	.90	.90	.88	.86
	.84	.90	.86	.87	.95	.88	.86	.85	.86
	.68	.69	.64	.66	.68	.68	.66	.63	.65
	.74	.70	.70	.68	.70	.72	.66	.67	.66
	.73	.74	.70	.70	.74	.73	.73	.68	.71
	.73	.76	.74	.70	.75	.76	.75	.73	.75
	.85	.87	.82	.84	.89	.83	.85	.87	.87
	1.02	.96	.94	.92	.95	.95	.92	.94	.95
	.96	.99	.95	.94	.98	.97	.97	.98	.97
	.86	.86	.83	.85	.88	.82	.97	.84	.84
	.73	.72	.70	.71	.72	.71	.72	.70	.72
	.78	.77	.78	.76	.78	.78	.76	.74	.74
	.83	.80	.78	.76	.81	.81	.78	.75	.75
	.78	.78	.80	.81	.73	.72	.74	.71	.74
	.79	.84	.82	.83	.75	.76	.76	.76	.80
	.81	.87	.85	.86	.83	.76	.80	.80	.83
	.66	.67	.67	.70	.62	.63	.63	.61	.65
	.70	.68	.68	.68	.62	.64	.61	.62	.63
	.68	.68	.68	.71	.64	.64	.62	.64	.65
	.27	.28	.27	.23	.23	.22	.23	.21	.25
	.19	.21	.19	.21	.20	.19	.21	.19	.21
	.18	.18	.19	.19	.18	.18	.16	.16	.16
	.90	.87	.87	.88	.87	.85	.83	.82	.84
	.90	.91	.87	.90	.90	.86	.89	.88	.89
	.92	.93	.90	.92	.93	.92	.91	.91	.95
	.93	.95	.93	.94	.96	.94	.95	.95	.95
	.90	.95	.92	.94	.97	.92	.91	.94	.95
	.60	.55	.53	.57	.39	.34	.37	.45	.47
	.52	.47	.48	.53	.32	.27	.27	.37	.41
	.54	.43	.43	.53	.22	.21	.26	.31	.36
	.52	.41	.43	.51	.21	.22	.24	.31	.36
	.56	.51	.50	.56	.12	.04	.13	.18	.25

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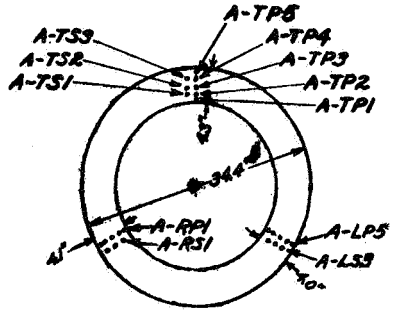
Table I(b) (continued)

XP-42 Airplane	Test No. - Flight No. / Run No.	12-1					12-2				
		1	2	3	4	5	1	2	3	4	5
Short-nose low-inlet-velocity Cowling	True Airspeed, m.p.h.	328	329	328	333	331	330	328	327	331	330
	q_c, impact press., in H_2O	35.5	34.5	33.2	32.7	31.8	34.4	32.8	32.0	31.1	30.1
	Atm. pressure, in. Hg	17.15	16.46	15.80	15.11	14.53	16.44	15.76	15.14	14.54	13.93
	Ambient Air Temp., F	5	4	1	-1	-8	7	4	4	1	-5
	σ, density ratio	.640	.616	.595	.573	.559	.611	.590	.567	.548	.532
	Density Altitude, ft.	14500	15650	11100	17850	18550	15900	17000	19150	19150	20050
	Rpm	← 2680 →									
	Bhp	92.5	89.1	86.3	84.0	81.2	89.11	87.3	85.0	82.1	78.9
	Manifold Press., in Hg	40.5	39.0	37.7	36.3	35.2	38.9	37.4	36.1	34.8	33.5
		← High speed — Cuff 1, no fan. →									

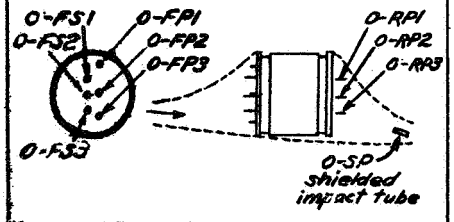
Pressure ratio, p/q_c



Location of Pressure Tubes in Annulus

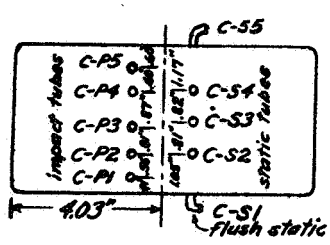
A-TP1 (impact tubes)	.75	.75	.76	.75	.75	.76	.75	.75	.76	.77
2	.76	.76	.76	.77	.76	.77	.77	.77	.77	.78
3	.86	.84	.85	.85	.85	.85	.85	.84	.85	.86
4	.91	.92	.89	.90	.90	.89	.92	.91	.91	.92
5	.89	.88	.88	.87	.88	.88	.88	.87	.87	.89
A-TS1 (static tubes)	.72	.71	.70	.71	.71	.71	.72	.72	.72	.72
2	.72	.72	.72	.73	.72	.72	.72	.72	.73	.73
3	.73	.72	.72	.72	.72	.72	.72	.71	.72	.73
Top Survey Rake										
A-RP1 (impact tubes)	.76	.75	.76	.75	.75	.76	.76	.75	.76	.76
2	.78	.76	.77	.77	.76	.77	.77	.78	.76	.78
3	.84	.84	.84	.84	.83	.84	.85	.83	.84	.84
4	.93	.92	.92	.91	.92	.91	.93	.92	.93	.92
5	.87	.86	.86	.86	.87	.85	.86	.86	.86	.86
A-RS1 (static tubes)	.72	.72	.71	.72	.72	.71	.72	.72	.72	.72
2	.74	.73	.72	.73	.72	.73	.74	.72	.73	.73
3	.75	.76	.76	.75	.75	.76	.76	.75	.76	.77
Right Survey										
A-LP1 (impact tubes)	.75	.75	.74	.75	.75	.75	.75	.75	.76	.77
2	.78	.77	.76	.77	.78	.77	.77	.78	.77	.79
3	.87	.87	.86	.87	.86	.87	.87	.85	.87	.89
4	.92	.92	.92	.92	.92	.92	.94	.93	.94	.95
5	.86	.84	.84	.85	.84	.83	.83	.84	.84	.84
A-LS1 (static tubes)	.73	.73	.72	.73	.72	.73	.74	.73	.74	.74
2	.76	.75	.76	.76	.75	.75	.76	.76	.75	.76
3	.77	.79	.79	.78	.78	.78	.79	.77	.79	.80
Left Survey										

Oil Cooler Pressure Tube Locations



O-FP1 (impact tubes)	.95	.95	.94	.95	.95	.95	.96	.96	.96	.96
2	.99	.99	.98	.99	.99	1.00	1.00	1.01	.99	1.01
3	1.00	1.01	1.01	1.02	1.01	1.02	1.02	1.01	1.02	1.03
O-FS1 (static tubes)	.88	.88	.88	.88	.88	.88	.89	.87	.88	.90
2	.89	.89	.88	.89	.89	.89	.90	.88	.89	.91
3	.91	.90	.91	.90	.90	.90	.92	.91	.92	.92
Front Survey										
O-RP1 (impact tubes)	.65	.65	.65	.65	.65	.65	.66	.64	.66	.67
2	.61	.61	.60	.60	.60	.61	.61	.60	.61	.62
3										
O-SP	.58	.58	.57	.58	.58	.57	.57	.57	.50	.59
Rear Survey										

Carburetor Scoop



C-P1 (impact tubes)	.99	.98	.98	.98	.96	.97	.98	.96	.97	.98
2	1.00	.99	1.00	.99	.98	.99	1.00	.99	.98	1.00
3	1.01	1.01	1.00	1.00	1.00	1.01	1.01	1.00	1.00	1.01
4	1.01	1.01	1.01	1.01	1.01	1.02	1.02	1.01	1.01	1.02
5	1.01	1.01	1.01	1.01	1.01	1.01	1.02	1.02	1.01	1.02
C-S1 (static tubes)	.83	.82	.82	.83	.82	.84	.84	.83	.84	.84
2	.81	.80	.80	.80	.80	.80	.80	.81	.81	.81
3	.79	.78	.78	.79	.78	.78	.80	.79	.79	.81
4	.78	.78	.78	.79	.78	.78	.80	.78	.79	.80
5										
C-TH Impact press. in carb. throat	.83	.82	.82	.83	.81	.84	.84	.83	.83	

Table I(b) (continued)

	13-1					13-3				15-2			
	1	2	3	4	5	1	2	3	4	1	2	3	4
Ind. airspeed, mph.	161	158	158	154	157	138	140	137	137	138	138	137	138
q_c	12.7	13.3	13.2	11.6	12.1	9.4	9.6	9.2	9.2	9.3	9.3	9.2	9.3
Pressure altitude range, ft.	1400-2600	8500-9400	13500-13500	16100-16900	19100-19600	6900-8100	12400-13400	16100-16800	19500-20100	9000-10100	12800-13800	16600-17300	19600-20000
Free air temp, °F	56	39	29	19	10	20	21	13	-1	21	22	13	0
Bhp.	840	880	860	770	700	915	890	780	700	910	795	660	580
Manifold pressure	39.0	39.6	38.4	33.7	30.2	39.7	38.5	33.5	30.0	41.7	37.2	32.1	29.1
Rpm	2540					2520				2520			
	Auto rich, climb					Auto rich, climb				Full rich, climb			
	Cuff 1, no fan												
Pressure ratio, p/q_c													
	.70	.75	.75	.75	.74	.78	.68	.73	.71	.77	.77	.72	.70
	.70	.78	.78	.79	.76	.79	.78	.75	.73	.77	.73	.74	.72
	.83	.83	.86	.85	.85	.85	.79	.78	.76	.85	.84	.78	.77
	.90	.95	.95	.92	.90	.97	.87	.85	.85	.95	.89	.90	.87
	.87	.94	.91	.95	.90	.95	.90	.85	.95	.92	.88	.87	.87
	.64	.65	.66	.66	.64	.67	.64	.64	.64	.67	.67	.62	.61
	.62	.65	.65	.66	.65	.69	.64	.66	.66	.69	.69	.69	.63
	.62	.64	.68	.68	.69	.70	.67	.68	.68	.70	.72	.67	.64
	.70	.73	.74	.73	.70	.78	.74	.71	.65	.74	.72	.70	.68
	.74	.80	.84	.81	.76	.93	.82	.79	.75	.84	.82	.76	.76
	.93	.94	.96	.95	.93	1.05	.95	.95	.95	1.03	1.03	.98	.91
	1.02	1.06	1.02	1.02	.99	1.12	1.14	1.04	1.00	1.10	1.10	1.07	1.01
	.88	.96	.96	.97	.93	1.05	.99	.95	.92	1.04	1.01	.94	.94
	.64	.65	.64	.65	.64	.67	.65	.62	.62	.64	.66	.62	.61
	.68	.66	.67	.69	.68	.73	.70	.66	.64	.71	.69	.68	.63
	.69	.71	.74	.73	.72	.74	.69	.71	.71	.74	.74	.71	.70
	.63	.68	.67	.70	.69	.62	.65	.65	.63	.65	.64	.63	.62
	.81	.82	.84	.83	.84	.86	.84	.89	.87	.90	.88	.85	.81
	.97	.91	.96	.97	.94	1.03	.99	1.00	.98	1.03	1.03	1.03	.97
	1.02	1.06	1.02	1.04	.99	1.08	1.11	1.09	1.06	1.09	1.08	1.09	1.03
	.89	.86	.84	.85	.85	.82	.83	.85	.83	.87	.87	.83	.82
	.70	.72	.72	.72	.71	.76	.72	.72	.72	.76	.75	.72	.69
	.77	.80	.78	.78	.74	.87	.82	.80	.78	.87	.82	.80	.77
	.82	.81	.84	.83	.84	.92	.84	.85	.82	.90	.88	.84	.81
	1.14	1.20	1.22	1.13	1.08	1.26	1.25	1.17	1.00	1.23	1.20	1.13	1.08
	1.13	1.22	1.15	1.16	1.10	1.28	1.29	1.20	1.00	1.27	1.20	1.13	1.08
	1.09	1.14	1.11	1.13	1.08	1.29	1.27	1.20	1.02	1.27	1.20	1.12	1.10
	.93	.96	.96	.96	.93	1.05	1.01	.99	.97	1.05	1.00	.97	.89
	.92	.91	.96	.96	.93	1.08	1.00	.99	.97	1.02	.98	.96	.89
	.88	.97	.95	.94	.92	1.04	1.00	.99	.94	1.02	.98	.98	.91
	.47	.45	.47	.43	.45	.49	.48	.47	.41	.49	.48	.41	.39
	.27	.31	.32	.30	.31	.37	.35	.32	.32	.37	.34	.29	.29
	.30	.34	.32	.30	.29	.37	.33	.32	.29	.35	.33	.29	.25
	1.08	1.11	1.03	.99	.98	1.15	1.00	.97	.94	1.13	1.05	1.02	.96
	1.12	1.15	1.07	1.07	1.02	1.19	1.10	.99	.97	1.17	1.07	1.03	1.00
	1.11	1.15	1.08	1.10	1.04	1.19	1.16	1.01	1.01	1.18	1.12	1.05	1.00
	1.11	1.15	1.10	1.11	1.07	1.24	1.19	1.09	1.03	1.21	1.13	1.10	1.04
	1.11	1.15	1.12	1.11	1.07	1.27	1.12	1.09	1.05	1.23	1.20	1.10	1.08
	.79	.78	.69	.71	.71	.78	.57	.55	.55	.53	.51	.50	.53
	.75	.72	.64	.66	.65	.70	.46	.49	.51	.46	.43	.44	.46
	.78	.68	.62	.60	.63	.65	.43	.48	.48	.50	.41	.45	.47
	.76	.68	.60	.60	.63	.65	.43	.46	.50	.48	.45	.43	.47
	.84	.72	.69	.69	.69	.70	.52	.51	.51	.50	.49	.50	.48

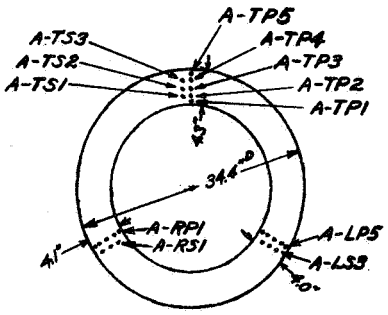
Table I(b) (continued)

XP-42 Airplane

Short-nose low-inlet-velocity cowling

Test No. - Flight No. / Run No.	15-1 1	15-1 2	15-1 3	15-1 4	15-1 5	15-2 1	15-2 2	15-2 3	15-2 4	15-2 5
True Airspeed, mph	330	331	332	330	332	330	331	331	332	330
q_c, impact press., in. H_2O	36.5	35.5	34.4	33.3	32.3	36.2	35.1	34.3	33.2	31.6
Atm. pressure, in. Hg.	17.17	16.46	15.81	15.18	14.54	17.09	16.42	15.82	15.13	14.51
Ambient Air Temp., °F	1	-2	-5	-9	-12	3	0	-5	-8	-10
σ, density ratio	.646	.624	.603	.584	.563	.640	.620	.603	.581	.560
Density Altitude, ft.	14450	15250	16300	17250	18350	14500	15450	16300	17400	18500
Rpm	2680									
Bhp	914	882	863	840	811	914	886	872	839	811
Manifold Press., in. Hg	40.3	38.9	37.6	36.3	34.9	40.4	38.9	37.8	36.4	34.9
	Cuff 2, no Fan, High speed									

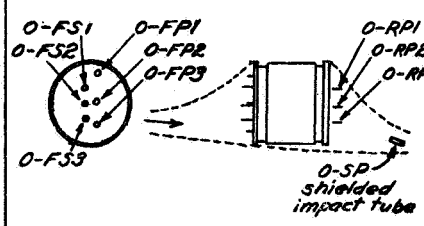
Pressure ratio, p/q_c



Location of Pressure Tubes in Annulus

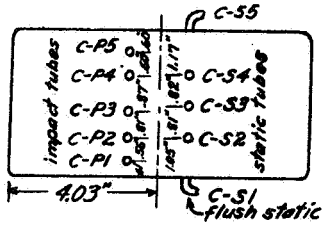
		15-1 1	15-1 2	15-1 3	15-1 4	15-1 5	15-2 1	15-2 2	15-2 3	15-2 4	15-2 5
A-TP1 (impact tubes)	Top Survey Rake	.72	.72	.72	.72	.72	.72	.72	.72	.71	.70
2		.73	.74	.73	.74	.73	.74	.74	.74	.73	.73
3		.84	.86	.85	.86	.86	.86	.87	.86	.86	.86
4		.93	.93	.92	.92	.92	.93	.93	.93	.92	.92
5		.93	.91	.90	.91	.90	.91	.92	.91	.90	.89
A-TS1 (static tubes)		.69	.69	.69	.68	.68	.68	.69	.69	.68	.68
2		.69	.70	.69	.69	.68	.69	.70	.69	.69	.68
3		.69	.70	.70	.70	.70	.70	.70	.70	.69	.70
A-RP1 (impact tubes)	Right Survey	.72	.72	.72	.72	.73	.73	.73	.72	.71	.72
2		.73	.72	.72	.72	.74	.73	.73	.72	.71	.72
3		.78	.79	.77	.78	.79	.78	.77	.77	.77	.78
4		.88	.86	.86	.87	.88	.87	.85	.86	.87	.85
5		.83	.83	.83	.82	.83	.82	.81	.81	.81	.81
A-RS1 (static tubes)		.68	.68	.68	.68	.68	.68	.69	.69	.68	.68
2		.70	.70	.69	.69	.68	.70	.70	.69	.68	.69
3		.73	.73	.72	.72	.73	.73	.73	.72	.71	.72
A-LP1 (impact tubes)	Left Survey	.72	.72	.72	.72	.73	.73	.74	.73	.72	.73
2		.74	.75	.75	.74	.74	.75	.75	.76	.74	.75
3		.82	.82	.83	.84	.83	.84	.83	.83	.81	.82
4		.89	.88	.89	.89	.88	.89	.90	.90	.89	.88
5		.81	.83	.83	.82	.82	.83	.83	.83	.82	.83
A-LS1 (static tubes)		.69	.71	.71	.70	.69	.70	.72	.71	.70	.71
2		.71	.72	.71	.72	.71	.72	.72	.73	.72	.72
3		.74	.74	.75	.75	.75	.76	.75	.75	.73	.74

Oil Cooler Pressure Tube Locations



		15-1 1	15-1 2	15-1 3	15-1 4	15-1 5	15-2 1	15-2 2	15-2 3	15-2 4	15-2 5
O-FP1 (impact tubes)	Front Survey	.95	.94	.92	.94	.94	.94	.95	.94	.94	.94
2		.98	.98	.97	.99	.99	.99	.99	.98	.99	.99
3		1.00	1.03	1.03	.99	.99	1.01	1.02	1.01	1.00	1.01
O-FS1 (static tubes)		.87	.87	.86	.87	.87	.87	.88	.87	.87	.89
2		.87	.88	.87	.88	.87	.88	.89	.88	.87	.89
3		.89	.90	.90	.90	.90	.90	.91	.91	.90	.90
O-RP1 (impact tubes)	Rear Survey	.64	.65	.65	.65	.64	.64	.66	.66	.65	.65
2		.60	.60	.59	.59	.60	.59	.60	.60	.59	.60
3											
O-SP		.56	.57	.56	.57	.57	.57	.58	.58	.57	.57

Carburetor Scoop



		15-1 1	15-1 2	15-1 3	15-1 4	15-1 5	15-2 1	15-2 2	15-2 3	15-2 4	15-2 5
C-P1 (impact tubes)		.99	.98	.97	.99	.98	.99	.99	.98	.98	.97
2		1.00	1.03	1.00	1.00	1.01	1.01	1.00	1.00	.99	.99
3		1.02	1.02	1.01	1.02	1.02	1.02	1.01	1.01	1.00	1.00
4		1.03	1.02	1.03	1.02	1.02	1.03	1.03	1.02	1.02	1.01
5		1.02	1.02	1.03	1.02	1.02	1.04	1.03	1.02	1.02	1.01
C-S1 (static tubes)		.84	.83	.83	.84	.84	.84	.84	.84	.84	.83
2		.83	.81	.82	.82	.82	.82	.82	.82	.82	.81
3		.79	.80	.80	.81	.80	.80	.80	.80	.80	.80
4		.79	.80	.79	.80	.80	.80	.80	.79	.80	.79
5											
C-TH Impact press in carb. throat		.80	.80	.80		.81	.83	.83		.83	.84

L-508

Table I(b) (concluded)

	14-3				14-1					14-2			
	1	2	3	4	1	2	3	4	5	1	2	3	4
Ind. airspeed, mph	161	161	161	161	142	141	141	140	138	138	137	137	138
q_c	12.7	12.7	12.7	12.7	9.9	9.7	9.8	9.6	9.4	9.4	9.2	9.2	9.3
Pressure altitude range, ft.	4000-5100	11100-12100	15000-16000	19800-20400	2400-3600	8400-9600	12300-13400	16100-17000	19700-20400	5100-6400	13200-14100	16300-17100	19550-20100
Av. free air temp. °F	47	24	14	5	43	25	16	6	-10	41	18	9	-7
Av. bhp.	875	910	825	705	870	910	900	790	650	945	760	670	580
Av. manifold press.	40.6	40.7	35.7	30.1	39.8	40.2	38.6	33.8	29.6	43.0	36.9	33.0	29.0
Rpm	2550				2540					2540			
	Auto rich, climb				Auto rich, climb					Full rich, climb			
	Cuff 2, no fan												
Pressure ratio, p/q_c													
	.74	.74	.72	.71	.79	.78	.71	.74	.73	.78	.75	.75	.74
	.80	.76	.78	.72	.81	.81	.80	.76	.70	.83	.75	.75	.76
	.87	.85	.83	.80	.84	.84	.84	.81	.77	.88	.80	.80	.82
	.95	.91	.90	.88	.99	.96	.88	.88	.86	.96	.92	.90	.88
	.94	.90	.88	.85	.99	.93	.93	.88	.83	.96	.88	.88	.92
	.65	.65	.65	.61	.65	.65	.69	.67	.63	.68	.64	.67	.68
	.68	.68	.65	.65	.71	.71	.69	.69	.70	.72	.72	.67	.70
	.69	.70	.67	.65	.70	.70	.71	.69	.66	.73	.68	.68	.69
	.74	.72	.71	.67	.81	.77	.67	.74	.68	.83	.77	.73	.74
	.87	.83	.81	.74	.92	.93	.96	.88	.83	.97	.89	.87	.85
	.95	.98	.91	.88	1.09	1.07	1.07	1.04	1.00	1.11	1.06	1.02	.98
	1.02	1.02	1.01	.97	1.21	1.13	1.02	1.08	1.06	1.18	1.13	1.09	1.05
	.98	.97	.91	.88	1.07	1.08	1.10	1.02	.98	1.08	1.02	1.00	1.01
	.68	.66	.65	.61	.65	.69	.69	.69	.65	.70	.70	.70	.68
	.72	.69	.68	.68	.75	.74	.68	.73	.72	.83	.74	.74	.73
	.74	.74	.71	.69	.79	.79	.77	.76	.76	.81	.75	.73	.76
	.69	.69	.71	.71	.61	.67	.64	.65	.64	.77	.61	.61	.85
	.87	.87	.87	.83	.85	.89	.84	.88	.85	.87	.85	.85	.90
	.98	.97	.97	.95	1.07	1.04	.97	1.00	1.02	1.04	.98	1.02	1.03
	1.09	1.04	1.06	1.02	1.09	1.15	1.06	1.06	1.06	1.13	1.06	1.09	1.12
	.88	.87	.85	.83	.86	.88	.82	.84	.83	.86	.83	.83	.88
	.75	.74	.73	.72	.75	.76	.73	.75	.74	.79	.72	.72	.75
	.84	.82	.80	.80	.86	.83	.81	.81	.83	.88	.80	.80	.82
	.87	.87	.87	.83	.92	.92	.87	.88	.87	.95	.87	.85	.88
	1.14	1.14	1.10	1.06	1.20	1.24	1.12	1.15	1.15	1.24	1.13	1.11	1.12
	1.16	1.14	1.13	1.08	1.23	1.31	1.27	1.19	1.17	1.32	1.17	1.15	1.27
	1.16	1.14	1.11	1.06	1.27	1.30	1.29	1.21	1.15	1.34	1.17	1.15	1.27
	.97	.95	.91	.87	1.01	1.05	1.01	.99	.99	1.08	.97	.92	.96
	.94	.94	.91	.90	1.03	1.04	.99	.95	.97	1.17	.97	.92	.96
	.95	.94	.91	.90	1.03	1.06	.98	.99	.99	1.17	.97	.95	.96
	.49	.46	.43	.41	.50	.50	.51	.41	.44	.54	.45	.45	.43
	.35	.33	.32	.30	.36	.38	.36	.33	.34	.42	.33	.29	.33
	.35	.33	.32	.30	.36	.34	.32	.33	.31	.36	.29	.29	.31
	1.09	1.05	1.00	.96	1.22	1.11	1.00	1.04	.97	1.14	1.06	.97	.93
	1.13	1.07	1.03	.98	1.27	1.61	1.02	1.08	1.01	1.19	1.06	1.01	.97
	1.13	1.09	1.05	1.02	1.29	1.21	1.21	1.14	1.03	1.23	1.09	1.03	1.02
	1.18	1.13	1.09	1.03	1.29	1.24	1.23	1.16	1.06	1.29	1.09	1.09	1.04
	1.16	1.14	1.07	1.03	1.27	1.21	1.24	1.16	1.09	1.26	1.11	1.09	1.06
	.87	.69	.69	.68	.86	.69	.67	1.21	.58	.71	.49	.51	.57
	.82	.65	.65	.65	.80	.65	.58	.55	.54	.62	.45	.45	.50
	.76	.59	.58	.62	.76	.59	.55	.55	.51	.61	.41	.44	.44
	.74	.60	.58	.60	.78	.57	.54	.48	.51	.61	.41	.44	.44
	.85	.69	.69	.68	.86	.60	.51	.57	.58	.69	.51	.51	.55

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Table II.—Temperature data

XP-42 Airplane -- Short-nose low-inlet-velocity cowling With fan, without cuffs	Test No. - Flight No. Run No.	8-22 1	2	3	4	5	8-23 1	2	3	4	5
	True airspeed, mph.	332	330	331	327	330	328	332	328	330	326
	q_c, impact press, in. H_2O	36.5	35.2	34.0	32.2	31.5	35.4	34.9	33.4	32.4	30.9
	Atm. pressure, in. Hg.	17.10	16.50	15.79	15.16	14.56	17.22	16.56	15.91	15.23	14.64
	Ambient air temp., °F	4	-2	-3	-7	-9	9	7	1	-2	-8
	σ, density ratio	.639	.624	.599	.580	.560	.636	.614	.598	.576	.561
	Density altitude, ft	14500	15250	16500	17400	18500	14650	15750	16550	17750	18450
	Rpm	2680					2680				
	Bhp	435	900	873	845	812	925	900	873	840	812
	Manifold press, in. Hg	40.2	39.2	37.6	36.2	34.8	40.4	39.0	37.8	36.3	34.9
		High speed					High speed				
Cylinder, Point of measurement		Temperature, °F									
1 - gasket thermocouple at rear sp. plug											
2		326	330	341	347	345	344	342	353	357	359
3		352	354	358	365	356	362	357	366	372	366
4		333	337	343	347	345	344	342	351	357	351
5											
6		337	337	337	341	339	342	342	342	347	342
7		383	392	396	401	398	398	399	404	408	406
8		354	356	362	365	362	366	363	366	368	368
9		360	366	375	375	369	374	374	382	385	382
10		373	379	385	385	383	389	385	389	392	385
11		360	365	371	375	377	374	374	382	387	380
12		350	354	360	365	365	363	363	370	372	368
13		366	375	383	395	390	387	389	395	402	399
14		362	368	371	377	375	374	379	382	389	385
1 - rear ℄ flange at base of cylinder		275	274	281	283	285	282	282	287	289	287
2		279	281	283	288	288	287	287	291	293	289
3		275	275	277	279	279	278	278	280	282	280
4		268	268	271	271	272	272	272	274	276	269
5		266	266	269	268	268	268	268	268	272	265
6		275	277	277	281	279	280	280	280	282	280
7											
8		277	277	281	283	281	280	280	285	285	282
9		285	285	288	288	290	287	287	289	291	287
10		292	292	296	298	298	297	297	300	302	297
11		268	268	271	275	27%	272	272	274	272	272
12		283	285	288	290	292	289	291	293	295	291
13		275	277	281	283	283	280	280	285	287	285
14		283	285	290	292	292	291	291	295	297	293
10 - intake port		194	194	194	194	194	202	202	202	202	196
Mixture at blower rim		131	131	134	131	128	140	140	137	137	134
Fuel on suction side of pump		59	62	62	65	68	56	59	59	65	65
" " pressure " " "		62	65	65	68	71	59	62	65	65	68
" in carburetor float chamber		62	62	65	65	65	59	62	62	65	65
11 - front spark plug elbow		28	25	22	19	16	35	35	28	28	22
11 - rear " " "		59	56	56	53	50	68	65	65	62	59
Recorded free air		22	16	16	11	9	27	25	19	16	10
Air in carburetor scoop											
" at top annular rake		28	25	22	16	13	35	35	28	25	22
" in front of cyl. #1		31	28	25	22	16	38	35	32	28	25
" behind cyl. #1											
" at exit from oil cooler		31	25	25	16	13	56	56	53	50	44
Oil-in line		140	134	134	134	134	131	131	131	131	128
Oil out		196	196	196	196	196	193	193	193	196	193
Accessory compartment		96	92	92	92	89	104	104	101	101	98
Left magneto		77	77	77	77	74	86	86	86	86	80
Pilot's cockpit		66	66	66	65	63	74	77	77	77	76
Recording instrument compartment		59	56	53	53	50	62	65	65	65	62

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Table II (continued)

	9-21					9-20				
	a	b	c	d	e	a	b	c	d	e
Ind. airspeed, mph.	156	155	155	155	154	140	139	138	138	138
q_c	12.1	12.0	12.0	12.0	11.8	9.7	9.6	9.4	9.4	9.4
Pressure altitude range, ft.	4700-7200	9300-11300	13300-15200	16900-18300	19600-20600	4600-7000	9500-11400	13800-15500	17300-18400	19500-20600
Av. free air temp., °F	25	21	6	-4	-12	30	19	7	-8	-9
Av. bhp.	890	890	840	750	690	960	890	770	765	600
Av. manif. press.	40.0	40.0	36.7	32.5	29.6	42.0	40.6	35.0	31.3	28.8
Rpm.	2540					2525				
	Auto. rich, climb					Full rich, climb				
	With fan, without cuffs									
Temperature, °F										
	333	346	339	339	342	348	337	308	289	278
	352	361	365	363	361	368	358	343	328	316
	339	352	350	348	346	358	339	326	310	297
	320	335	344	339	337	331	318	322	314	303
	361	377	388	390	390	376	354	370	362	354
	331	350	365	363	361	337	326	339	335	331
	350	357	380	377	380	364	356	373	364	358
	344	354	382	380	375	351	348	358	350	339
	348	352	375	375	375	362	356	333	325	318
	335	348	358	358	357	345	337	320	298	289
	358	371	374	375	377	374	362	314	287	274
	350	365	361	363	365	360	348	301	285	268
	260	275	280	280	282	270	276	264	257	251
	256	273	275	277	277	272	272	264	257	251
	254	267	271	271	271	268	268	264	257	251
	250	263	267	267	264	260	262	257	251	245
	238	251	256	258	256	249	249	249	245	240
	245	263	271	273	273	260	262	264	260	255
	245	263	271	275	273	257	262	266	262	257
	258	275	286	288	288	272	276	278	276	272
	260	280	292	292	292	272	280	282	276	272
	251	240	269	271	269	257	260	255	251	245
	254	271	277	280	280	266	268	260	255	251
	254	267	271	271	273	266	268	255	247	240
	258	273	277	277	280	270	270	262	253	249
	194	191	191	186	184	183	178	176	170	167
	135	141	141	135	132	132	138	127	121	115
	48	48	48	48	45	44	47	44	44	44
	51	51	51	48	45	47	47	47	44	44
	51	48	48	45	45	50	47	44	41	38
	45	39	27	14	5	44	41	29	20	11
	66	63	54	45	36	71	65	54	44	38
	30	26	14	2	-8	33	24	13	4	-4
	36	33	20	8	1	35	26	17	8	-2
	39	36	27	14	8	41	35	23	14	8
	48	57	45	39	17	44	38	32	11	-2
	147	147	129	126	135	152	138	144	132	138
	188	194	194	194	194	190	193	190	187	184
	78	81	78	72	66	80	77	68	66	59
	60	60	63	60	57	59	62	59	56	56
	57	54	51	98	48	47	50	44	44	38
	54	51	48	45	39	47	47	44	38	35

Table II (continued)

XP-42 Airplane Short-nose low-inlet-velocity cowling No fan, no cuffs	Test No. - Flight No. Run No.	11-1 1	2	3	4	5	11-2 1	2	3	4	5
	True airspeed, mph	330	328	330	330	331	327	331	328	330	328
	q_c	35.2	34.1	33.2	32.2	31.3	34.0	33.6	32.0	31.2	30.0
	Atm. pressure, in. Hg	17.18	16.70	15.84	15.18	14.54	16.46	15.81	15.17	14.53	13.95
	Ambient air temp., °F	15	12	6	1	-2	2	2	-4	-5	-10
	σ, density ratio	.628	.614	.590	.571	.552	.618	.594	.577	.555	.538
	Density altitude, ft	15050	15700	16950	17950	18950	15500	16750	17650	18800	20000
	Rpm	— 2680					2680				
	Bhp	871	857	834	810	794	860	832	808	780	752
	Manifold press., in. Hg	39.2	37.7	36.4	35.1	33.9	37.7	36.5	35.1	33.8	32.5
		High speed					High speed				
Cylinder, Point of measurement		Temperature, °F									
1 - gasket thermocouple at rear sp. plug		386	333	336	338	346	332	328	328	332	334
2		325	325	327	327	336	319	317	319	321	321
3		344	338	340	340	348	339	332	332	334	334
4		338	336	338	338	342	337	332	332	332	332
5		366	361	365	363		362				
6		312	314	314	316	316	309	304	313	313	311
7		368	370	372	374	378	369	366	369	369	369
8		334	336	336	336	338	326	326	328	326	326
9		357	361	363	363	368	358	360	362	360	364
10		363	368	368	370	376	364	364	364	366	366
11		368	370	376	376	385	371	371	373	375	377
12		355	357	359	363	368	356	358	358	360	360
13		374	376	380	380	385	371	371	373	375	377
14		353	357	363	365	368	347	349	353	356	354
1 - rear ℄ flange at base of cylinder		276	276	278	278	282	274	274	274	274	276
2		283	280	282	284	286	278	276	278	278	280
3		274	272	274	274	276	272	270	272	270	272
4		272	272	272	271	276	272	272	272	272	270
5		261	261	262	262	265	263	261	261	261	261
6		272	272	272	272	274	272	270	272	272	272
7											
8		270	272	272	272	274	270	270	270	270	270
9		281	280	282	284	284	280	280	280	280	283
10		289	291	293	293	295	289	289	289	291	291
11		270	272	274	269	274	270	270	270	270	272
12		285	286	291	291	293	285	287	287	287	289
13		276	278	280	280	282	274	274	278	276	278
14		283	282	285	285	289	280	280	280	283	283
10 - intake port		199	197	200	197	197	195	195	193	191	188
Mixture at blower rim		146	143	140	137	137	137	137	134	134	131
Fuel on suction side of pump		62	65	65	68	68	61	61	61	64	67
" " pressure " " "		65	68	68	71	71	64	64	64	64	67
" in carburetor float chamber		65	65	65	65	65	61	61	61	61	61
11 - front spark plug elbow		41	38	34	31	28	30	27	24	21	14
11 - rear " " "		74	71	71	65	65	64	61	61	58	55
Recorded free air		33	30	24	19	16	20	20	14	13	8
Air in carburetor scoop		34	31	28	22	19	21	21	18	14	11
" at top annular rake		34	31	28	22	19	21	21	18	14	11
" in front of cyl. #1		38	34	31	25	22	27	27	21	18	14
" behind cyl. #1		155	152	155	152	155	146	146	146	146	149
" at exit from oil cooler		53	53	44	31	22	24	30	21	14	11
Oil-in line		137	137	137	137	140	140	137	137	137	137
Oil out		196	196	196	196	196	199	193	193	196	193
Accessory compartment		95	92	92	89	86	86	83	83	79	79
Left magneto		83	80	80	80	77	76	76	73	73	71
Pilot's cockpit		61	64	70	72	70	67	67	67	67	64
Recording instrument compartment		62	62	65	62	56	58	58	55	55	52

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a

Table II (continued)

	10-2					10-3				
	a	b	c	d	e	a	b	c	d	e
Ind. airspeed, mph	157	155	156	157	153	139	139	138	140	137
q_c	12.1	11.8	11.9	12.1	11.5	9.5	9.5	9.4	9.6	9.3
Pressure altitude range, ft	3500-5500	7900-10000	12200-14000	16200-17900	19400-20500	2100-4500	7100-9200	11100-12800	14300-15400	19700-20700
Av. free air temp, °F	32	18	2	-3	-9	41	18	10	3	-10
Av. bhp	890	910	880	780	700	980	925	830	740	570
Av. manifold press.	39.6	39.9	38.1	33.0	29.7	42.7	42.2	38.6	34.8	28.4
Rpm	2510					2545				
	Auto rich, climb					Full rich, climb				
	No fan, no cuffs									
Temperature, °F										
	348	353	359	353	355	362	363	337	317	289
	338	346	351	346	346	346	352	326	309	283
	357	361	368	370	370	367	371	359	352	330
			357	355	355	339	352	343	335	309
		378	385	389	385	376	378	380	380	
	323	329	336	336	336	318	326	326	324	307
	372	382	391	400	400	378	374	380	386	367
	333	338	340	348	348	331	339	341	345	337
	357	365	374	383	383	361	359	367	378	360
	357	363	376	385	380	350	359	359	359	337
	351	357	370	380	380	352	354	324	304	285
	344	351	357	365	365	335	346	311	294	272
	368	378	380	380	387		374	330	304	276
	365	374	372	368	376	367	367	333	311	278
	282	286	293	288	286	264	279	272	267	254
	278	288	291	291	288					
	269	276	278	280	278	255	270	274	267	259
	269	280	282	285	282	255	272	274	272	263
	254	261	263	265	263	237	253	256	256	248
	267	276	282	282	282	248	270	274	274	269
									243	236
	267	276	280	280	278	248	264	272	272	265
	276	282	288	291	291	257	270	280	283	276
	276	285	295	295	295	257	275	283	283	272
	261	269	272	276	274	253	259	254	249	238
	265	274	280	282	285	253	266	261	254	245
	269	278	278	278	280	257	270	263	254	243
	276	284	285	286	286	259	277	269	265	252
	193	188	186	186	184	193	182	176	174	165
	149	143	137	134	131	136	145	133	118	109
	56	56	56	56	56	60	60	60	60	60
	62	59	56	56	56	63	63	60	60	57
	65	56	53	50	50	69	63	54	54	54
	348	31	19	12	6	54	35	23	16	4
	71	62	53	50	47	81	66	54	51	35
	36	23	8	4	-2	44	22	14	8	-4
	34	25	12	6	0	44	23	16	10	-3
	38	28	12	6	0	47	23	19	13	0
	44	34	19	16	6	51	35	23	19	6
	155	158	152	152	155	160	154	148	145	136
	47	28	22	10	3	54	44	32	26	4
	152	143	152	131	134	145	154	136	142	130
	193	196	196	193	190	172	189	189	186	183
	80	74	68	62	59	81	72	66	60	56
	71	68	65	65	62	78	76	69	66	63
	62	56	56	50	47	69	66	60	54	44
	62	56	53	47	44	69	63	57	54	44

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Table II.- (Continued)

XP-42 Airplane Short-nose Low-Inlet-Velocity cowling	Test No. - Flight No.	12-1					12-2				
	Run No.	1	2	3	4	5	1	2	3	4	5
	True Airspeed, mph.	328	329	328	332	331	330	328	327	331	330
	q_c, impact press., in. H_2O	35.5	34.5	33.2	32.7	31.8	34.4	32.8	32.0	31.1	30.1
	Atm. Pressure, in. Hg.	17.15	16.46	15.80	15.11	14.53	16.46	15.76	15.14	14.54	13.93
	Ambient Air Temp., °F	5	4	1	-1	-8	7	4	4	1	-5
	σ, density ratio	.640	.616	.595	.573	.559	.611	.590	.567	.548	.532
	Density Altitude, ft.	14500	15650	16700	17850	18550	15900	17000	18150	19150	20050
	Rpm	← 2680 →									
	Bhp	925	891	863	840	812	891	873	850	821	789
	Manifold Press., in. Hg	40.5	39.0	37.7	36.3	35.2	38.9	37.4	36.1	34.8	33.5
		High speed Cuff 1, no fan									
Cylinder, Point of measurement		Temperature, °F									
1 - Gasket thermocouple at rear spark plug		335	333	339	346	348	331	338	349	353	360
2		337	335	341	346	348	333	340	351	357	366
3		346	343	348	350	354	347	351	362	369	375
4			335	343	346	350	338	340	353	362	369
5		372	372	376		378	369		377	381	384
6		337	337		341	343	331	336	340	347	351
7		376	374	376	376	376	367	371	373	380	384
8		352	350	354	354	354	345	349	351	357	360
9		387	385	391	391	391	377	381	388	390	394
10		380	380	385	387	389	373	379	384	386	390
11		387	387	391	393	396	377	384	390	399	401
12		374	374	380	380	380	369	373	379	381	386
13		387	387	393	396	396	379	388	396	401	408
14		361	361	368	374	376	363	363	371	375	379
1 - Rear ℄ flange at base of cylinder		280	278	280	282	282	272	277	281	283	286
2											
3		276	274	274	278	278	270	275	277	281	283
4		274	274	274	276	278	270	272	275	279	279
5		267	263	263	265	265	261	261	264	266	268
6		278	276	278	278	280	272	275	277	281	283
7											
8		278	276	278	278	278	270	272	275	279	279
9		291	291	291	291	291	286	288	290	292	294
10		296	296	298	298	300	290	294	296	297	299
11		276	276	278	276	278	270	272	275	279	279
12		291	291	293	296	296	286	290	294	294	297
13		280	280	282	285	285	275	277	281	283	286
14		287	285	287	291	289	281	283	286	290	290
10 - Intake port		201	198	198	198	196	197	197	199	199	197
Mixture at blower rim		144	141	138	138	135	141	138	135	138	135
Fuel on suction side of pump		67	70	67	70	70	79	79	79	79	79
" " pressure " " "		70	70	70	73	70	82	82	82	79	82
" in carburetor float chamber		67	67	67	67	67	73	76	73	76	73
11 - Front spark plug elbow		36	33	26	23	20	38	32	32	25	22
11 - Rear " " "		80	77	73	73	67	79	76	76	73	73
Recorded free air		23	22	19	17	10	25	22	22	19	13
Air in carburetor scoop		33	26	20	20	17	32	29	25	22	16
" at top annular rake		30	26	20	17	13	32	25	22	19	16
" in front of cyl. 1		33	30	26	20	17	32	29	29	22	19
" behind cyl. 1		150	150	150	153	155	153	155	159	165	171
" at exit from oil cooler		45	30	36	23	17	45	35	38	35	29
Oil-in line		132	138	132	135	132	132	135	132	135	132
Oil out		191	197	191	194	194	191	191	191	194	194
Accessory compartment		92	89	86	86	83	92	92	92	92	89
Left magneto		86	83	83	80	77	85	85	82	82	79
Pilot's cockpit		73	75	75	73	72	81	77	73	73	72
Recording-instrument compartment		67	67	61	61	58	73	67	67	67	65

Table II - Continued

	13-1					13-3					13-2				
	a	b	c	d	e	a	b	c	d	e	a	b	c	d	e
Ind. airspeed, mph	160	156	157	154	156	146	138	137	137	137	140	137	136	137	138
q_c	12.6	12.0	12.1	11.7	12.0	10.5	9.4	9.2	9.2	9.2	9.6	9.2	9.1	9.2	9.4
Pressure altitude range, ft	1000-2700	6600-8600	12100-13700	16500-17700	19900-20600	1300-2900	6300-8400	12100-13800	16100-17400	19500-20710	2400-4700	8200-10100	13100-14800	16900-18000	19700-20600
Av. free air temp, °F	56	42	29	17	7	47	20	21	12	-3	36	22	22	10	-2
Av. bhp	850	890	870	750	630	870	910	890	770	690	960	920	760	640	570
Av. manifold press.	39.1	39.8	38.4	33.0	29.3	39.7	39.7	38.1	33.2	30.0	42.8	41.7	36.3	31.6	28.6
Rpm	2540					2820									
	Auto rich, climb					Auto rich, climb					Full rich, climb				
	Cuff 1, no fan														
Temperature, °F															
	343	357	365	363	363	341	354	361	369	367	346	352	314	301	282
	341	359	363	363	363	345	361	365	371	373	352	350	314	301	282
	365	374	378	376	378	373	376	378	386	386	371	365	339	327	312
	367	383	387	385	383		382	386	397	395	376	371	367	359	342
	334	352	354	354	354	330	345	348	361	358	335	327	320	314	301
	372	378	387	391	391	354	371	378	397	397	361	354	363	359	346
	341	357	361	363	363	330	348	350	369	367	335	331	337	335	324
	365	378	389	396	391	350	369	376	395	395	359	356	369	365	350
	345	372	383	390	390	341	363	376	397	393	354	352	363	356	344
	354	372	383	391	391	350	365	376	393	391	350	350	346	342	331
	345	367	376	376	376	341	358	365	382	382	346	348	329	320	307
	365	367	394	398	398	365	386	391	408	406	371	371	327	314	294
	354	381	387	387	385	350	371	373	389	386	361	361	316	301	284
	265	286	288	288	288	254	272	283	291	289	260	280	269	262	258
	263	288	293	293	293	261	280	291	298	298					
	259	279	281	281	283	254	269	278	283	285	260	271	267	262	256
	257	279	283	281	281	252	269	280	283	283	254	271	267	262	256
	243	261	263	261	261	234	252	263	265	265	239	252	252	249	245
	254	277	281	283	283	247	267	280	285	289	252	267	267	267	262
						223	243	254	263	263	232	247	249	249	246
	245	268	277	277	279	236	259	274	280	283	239	260	264	264	262
	265	283	290	295	293	243	274	289	296	296	254	273	277	277	273
	261	286	295	299	297	243	276	294	300	300	254	277	284	280	275
	252	272	279	281	279	239	263	278	283	283	245	262	262	260	256
	257	279	288	288	290	239	269	285	289	291	248	269	269	262	258
	261	279	286	286	283	241	272	280	287	287	254	273	264	256	252
	263	288	293	293	290	243	278	289	296	294	258	277	273	262	258
	209	207	200	198	196	199	190	197	197	190	191	179	184	177	171
	144	160	160	151	147	129	144	141	144	141	126	140	131	131	126
	75	75	75	75	75	58	58	58	55	55	56	56	56	56	56
	75	75	75	75	75	58	58	58	58	55	59	56	56	56	56
	65	56	43	33	23	64	33	30	30	33	47	34	34	28	12
	97	94	85	75	65	95	74	74	74	67	80	74	74	68	56
	59	47	34	24	16	51	23	27	17	2	40	27	27	16	4
	59	49	36	26	16	52	30	36	20	4	47	28	31	19	9
	69	49	36	26	16	52	30	36	23	4	47	28	31	19	9
	65	56	43	36	23	58	39	42	36	20	53	38	41	31	19
	160	166	166	169	166	156	153	170	176	173	149	155	155	149	140
	69	69	65	59	49	58	39	42	58	39	50	44	53	28	12
	154	147	132	132	129	147	153	141	132	129	152	152	137	140	134
	151	147	194	194	191	170	191	191	191	191	182	188	185	188	182
	94	91	85	81	75	86	77	70	70	64	80	71	68	65	59
	88	88	85	81	78	80	77	70	74	70	74	68	65	68	65
	72	69	65	62	64	64	58	55	55	49	62	53	53	50	47
	75	75	69	65	59	67	64	58	58	52	62	56	56	53	50

Table II (continued)

XP-42 Airplane	Test No. - Flight No.	15-1					15-2				
	Run No.	1	2	3	4	5	1	2	3	4	5
Short-nose - low-inlet-velocity cowling.	True airspeed, mph	330	331	332	330	332	330	331	331	332	330
	q_c, impact press., in. H_2O	36.5	35.5	34.4	33.3	32.3	36.2	35.1	34.3	33.2	31.6
	Atm. Pressure, in. Hg	17.17	16.46	15.81	15.18	14.54	17.09	16.42	15.82	15.13	14.51
	Ambient air temp., °F	1	-2	-5	-9	-12	3	0	-5	-8	-10
	σ, density ratio	.646	.624	.603	.594	.563	.640	.620	.603	.581	.560
	Density altitude, ft	14450	15250	16300	17250	18350	14500	15450	16300	17400	18500
	Rpm	← 2680 →									
	Bhp	914	882	863	840	811	914	886	872	839	811
	Manifold press., in. Hg	40.3	38.9	37.6	36.3	34.9	40.4	38.9	37.8	36.4	34.9
		High speed. Cuff 2, no fan									

Cylinder, Point of measurement	Temperature, °F									
1 - Gasket thermocouple at rear spark plug	317	310	317	325	327	321	321	330	338	336
2	321	317	321	330	332	326	324	339	346	340
3	332	327	331	336	333	337	337	342	354	347
4	325	323	331	332	333	328	33d	339	350	343
5		364	368	372	372	373	373	378	382	380
6	331	327	331	334	332	334	333	337	342	340
7	364	364	359	366	370	371	371	376	373	373
8	342	340	342	349	351	352	350	352	354	351
9	372	372	376	383	385	386	384	392	398	393
10	366	364	370	379	379	380	373	378	382	388
11	362	362	368	376	379	380	378	386	393	393
12	357	355	364	370	372	371	367	373	378	378
13	353	349	362	376	376	376	373	384	393	391
14	331	327	338	347	347	350	346	356	363	363
1 Rear ℄ flange at base of cylinder	272	265	275	272	268	275	273	278	280	279
2	276	272	274	278	280	278	278	282	286	286
3	272	265	268	270	271	273	273	275	278	277
4	272	265	266	270	273	273	275	278	278	279
5	263	257	259	259	260	265	265	265	267	266
6	274	270	272	272	273	275	275	278	280	279
7										
8	272	268	270	272	273	275	273	275	278	279
9	285	283	285	287	288	290	290	290	296	295
10	289	287	289	296	295	296	293	298	300	299
11	268	263	265	268	273	275	273	273	278	279
12	283	280	285	289	290	289	289	293	296	297
13	270	268	272	276	278	275	278	280	284	284
14	276	272	274	278	280	282	282	284	286	286
10 Intake port	191	189	189	191	190	198	196	196	196	194
Mixture at blower rim	134	131	131	132	132	139	139	137	134	134
Fuel on suction side of pump	53	56	56	59	59	67	66	66	69	72
" " pressure " " "	56	56	59	59	61	66	69	72	69	75
" in carburetor float chamber	56	56	56	56	59	62	66	66	66	66
11 Front spark plug elbow	28	25	22	19	16	30	30	24	21	18
11 Rear " " "	68	68	65	62	59	72	67	69	66	62
Recorded free air	19	16	13	4	7	21	18	14	11	8
Air in carburetor scoop	25	22	16	13	9	27	24	18	14	14
" at top annular rake	22	19	16	13	9	27	24	18	14	11
" in front of cyl. 1	25	25	19	16	13	30	27	21	18	14
" behind cyl. 1	143	140	137	144	141	145	142	145	152	149
" at exit of oil cooler	25	22	16	16	9	34	30	24	21	14
Oil-in line	143	140	134	141	135	134	142	134	134	137
Oil out	196	193	193	194	194	194	200	194	197	197
Accessory compartment	86	00	77	78	74	87	67	80	85	80
Left magneto	74	74	71	71	71	80	80	78	75	75
Pilot's cockpit	65	65	65	68	66	71	71	71	69	69
Recording-instrument compartment	56	56	56	56	50	62	62	56	56	56

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Table II (concluded)

	14-3				14-1					14-2			
	a	b	c	d	a	b	c	d	e	a	b	c	d
Ind. airspeed, mph	163	163	161	161	142	140	140	139	138	138	139	137	137
q_c	13.1	13.0	12.8	12.7	9.9	9.7	9.7	9.5	9.3	9.4	9.5	9.2	9.2
Pressure altitude range, ft.	1400-8200	14400-19450			1300-6500	11500-15300	13400			4700-11200	15800-19500		
	5200	9800	16100	20450	3500	8580	13400	17300	20680	6800	12800	17100	20400
Av. free air temp., °F	56	30	15	-5	48	28	16	6	-10	41	22	10	-8
Av. bhp	865	910	830	710	870	900	900	785	655	945	860	675	575
Av. manifold press.	39.9	40.7	36.0	30.3	39.7	39.8	39.1	33.8	29.7	43.0	40.0	33.3	28.8
Rpm	2550				2540								
	Auto rich, climb				Auto rich, climb					Full rich, climb			
	Cuff 2, no fan												
	Temperature, °F												
	341	350	352	346	349	358	367	367	367	352	371	315	287
	348	357	352	343	356	362	369	367	367	360	373	313	285
	367	369	367	361	375	377	386	386	386	380	388	341	317
							360	360	352				
		378	385	378	373	382	388	393	393	386	397	367	343
	339	343	343	335	336	345	356	358	354	350	356	320	296
	361	367	378	378	367	373	386	390	388	373	386	365	341
	341	346	352	348	341	345	358	367	362	350	363	339	320
	358	361	376	372	365	369	386	395	393	371	388	367	345
	357	361	378	372	354	365	386	395	390	363	384	360	339
	354	361	369	367	360	369	382	390	390	365	386	348	324
	352	361	372	363	354	365	367	382	377	358	373	328	302
	369	382	387	382		388		401	397	388	403	326	
	361	372	372	363	367	380	380	384	384	373	384	311	283
	249	286	285	280	249	280	287	291	291	274	287	270	257
	258	289		285			295	298	298	283	296	274	
	249	278	278	276	247	273	282	284	287	270	283	268	257
	241	280	280	276	245	278	287	287	287	272	287	268	257
	231	260	265	258	230	256	263	265	267	255	266	255	244
	244	276	280	278	238	271	280	284	287	268	283	270	259
							249	260	260	248	261	250	242
	238	267	273	271	230	263	273	278	278	257	274	264	255
	254	282	289	286	247	280	287	293	295	274	289	279	270
	255	285	293	289	247	284	293	302	304	279	296	285	274
	242	269	276	273	238	269	278	284	284	266	279	264	252
	251	278	285	282	247	278	287	291	291	272	285	268	257
	249	278	278	278	249	280	287	287	287	279	285	261	248
	251	286	289	282	251	287	293	293	293	279	292	270	257
	211	200	198	186	203	198	196	192	192	200	191	178	166
	153	154	150	141	139	151	148	145	139	154	151	142	127
	67	67	67	67	65	62	62	62	62	60	60	60	57
	70	67	67	67	65	62	62	62	62	63	60	60	57
	67	45	29	13	59	43	35	24	8	60	41	26	10
	101	83	70	61	93	84	74	71	59	94	82	66	54
	61	38	21	3	50	32	21	10	-4	41	24	12	-3
	67	45	29	9	59	37	27	14	4	44	32	16	0
	70	45	29	9	59	37	27	14	4	47	32	16	3
	73	48	39	19	65	43	37	27	18	54	41	32	16
	165	159	156	153	160	163	166	169	169	166	166	151	136
	73	51	58	13	62	56	34	24	11	63	51	41	19
	150	156	138	138	145	154	136	133	142	151	139	133	130
	186	195	195	195	175	190	193	196	196	187	196	187	187
		83	79	67	87	78	74	68	62	82	79	69	57
	95	89	79	76	78	74	68	68	65	82	76	72	69
	79	73	67	58	71	65	62	56	59	66	60	57	51
	83	76	67	58	14	68	65	59	53	72	63	57	51

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TABLE III

AVERAGE PRESSURE RECOVERIES ON FRONT OF ENGINE

Installation		Average engine front pressure, p/q_c		
		Full power climb		High speed
		140 mph	155 mph	
Fan only	12,000 ft	0.98	0.95	0.84
	19,000 ft	a 9 2	.92	
Cuffs 1	12,000 ft	.86	.81	.80
	19,000 ft	.78	.80	
Cuffs 2	12,000 ft	.a4	.82	.77
	19,000 ft	.82	.78	
No fan nor cuffs	12,000 ft	.74	.75	.76
	19,000 ft	.72	.73	
Fan and cuffs 1 (reference 3)	12,000 ft	1.02	95	
	19.000 ft			

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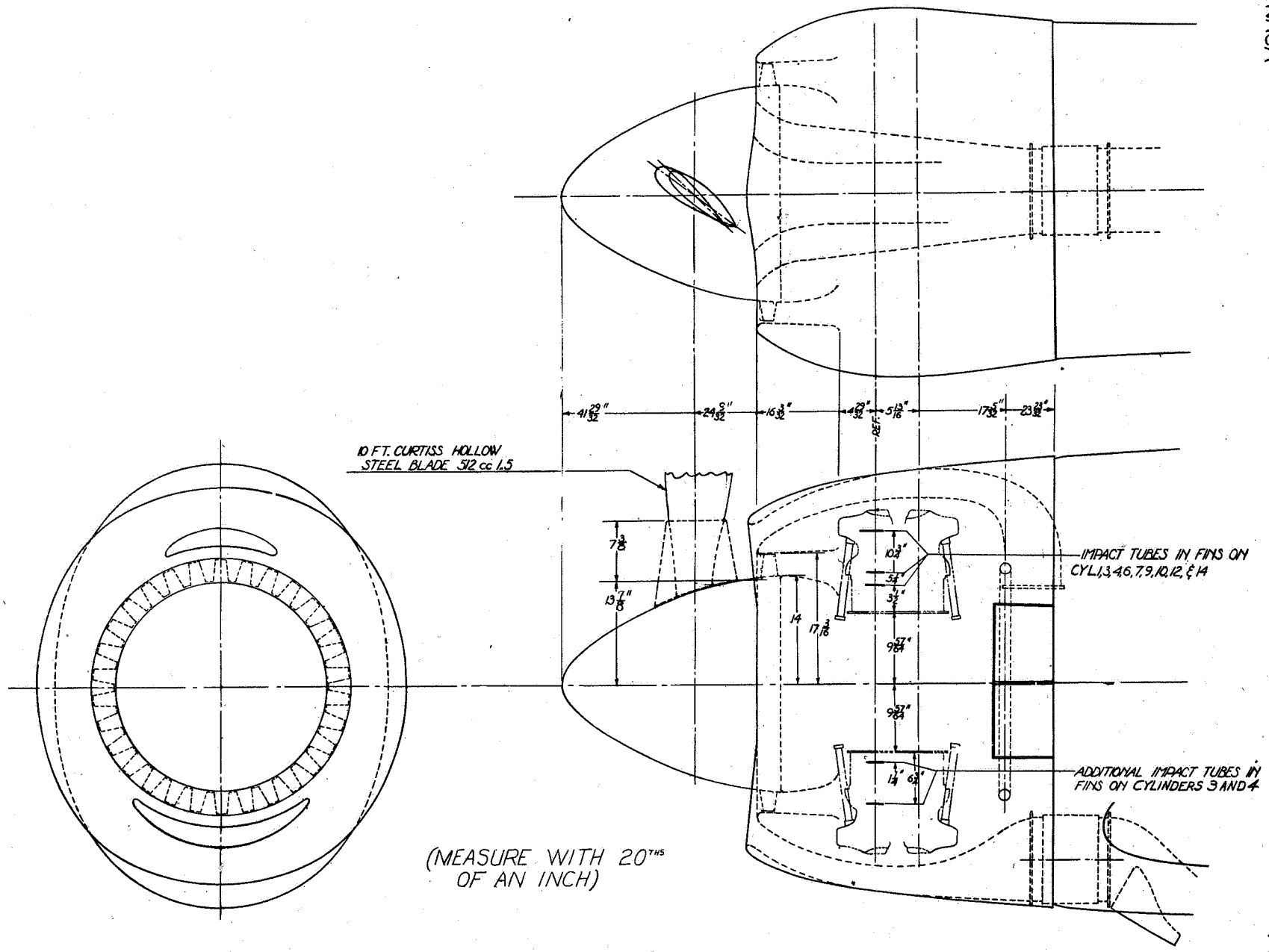

Figure 1.– Short-nose low-inlet-velocity cowling with axial-flow fan.

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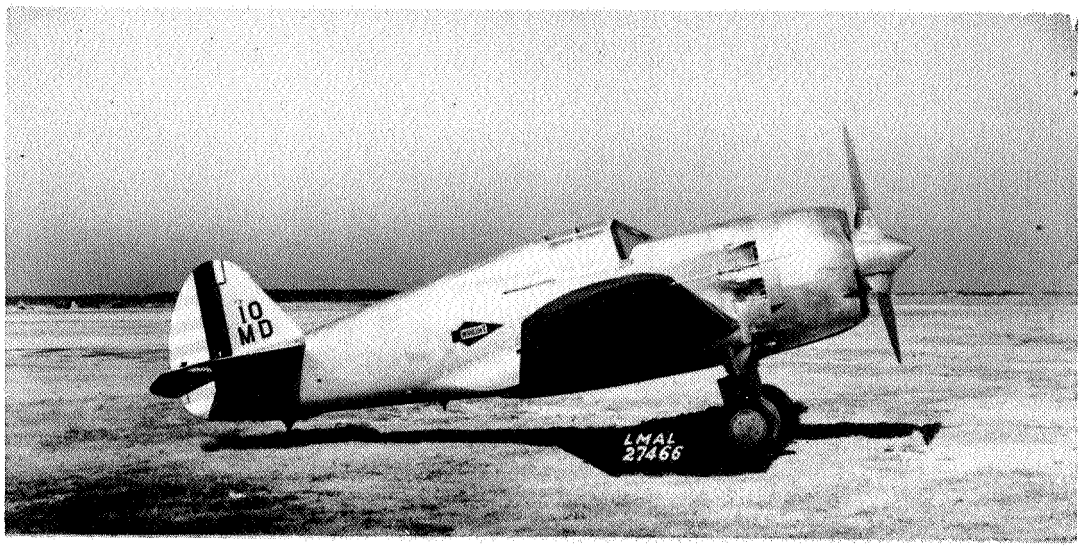

Figure 2.- Side view of XP-42 airplane with short-none lor-inlet-velocity cowling and cuff 1 (teet 12).

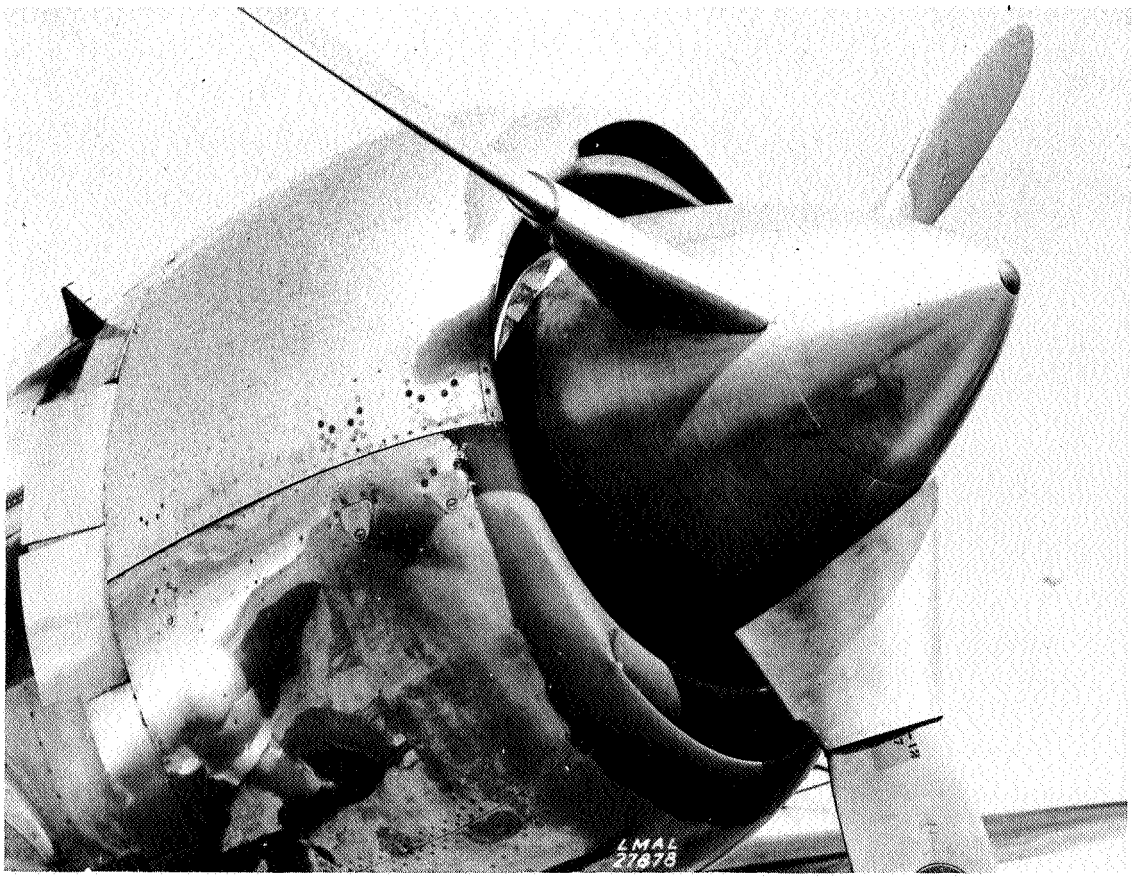

Figure 3.- Cloee-up of cowling with cuff 2, without fan (teat 15).

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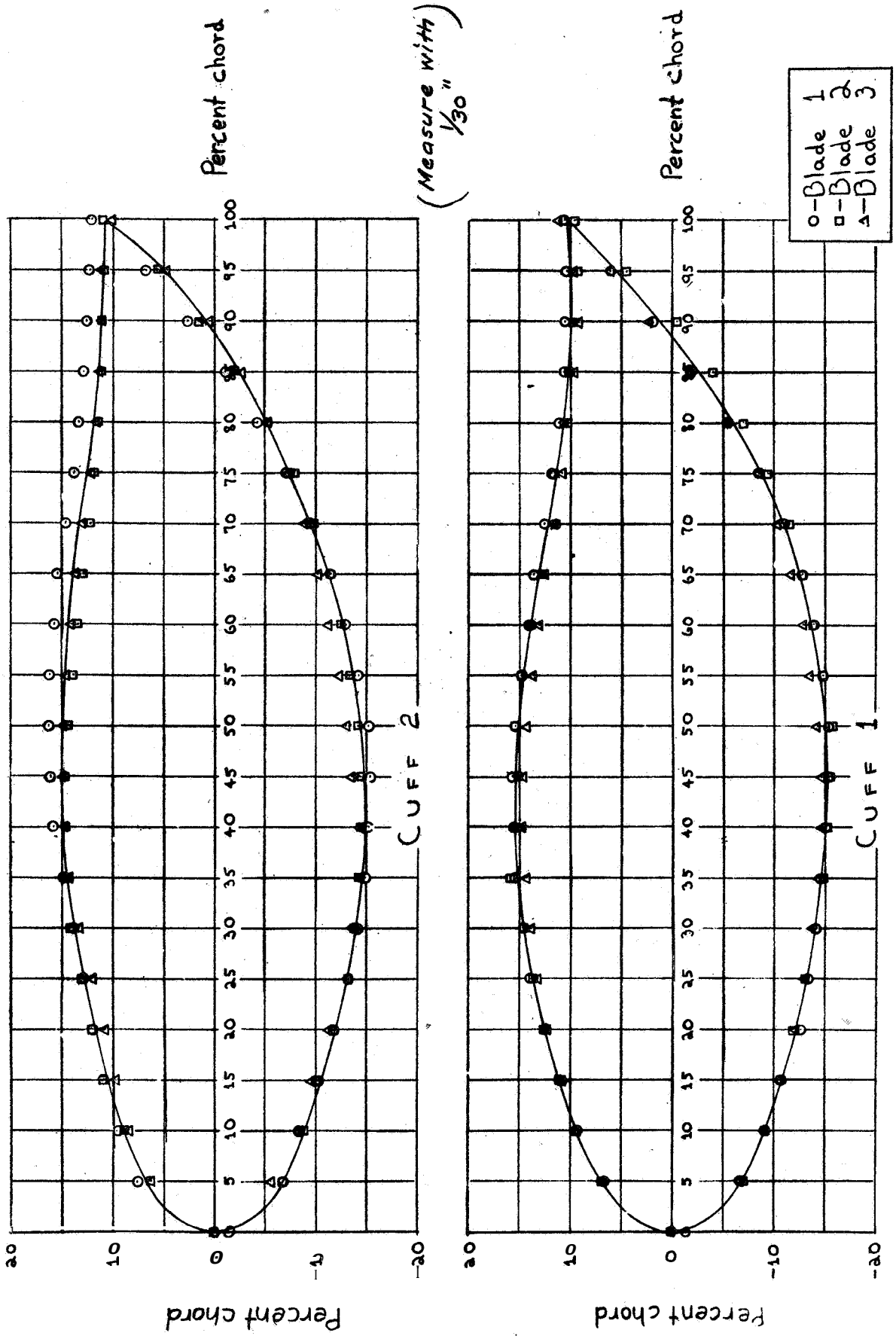


Figure 4.-Individual cuff sections of cuff sets 1 and 2.

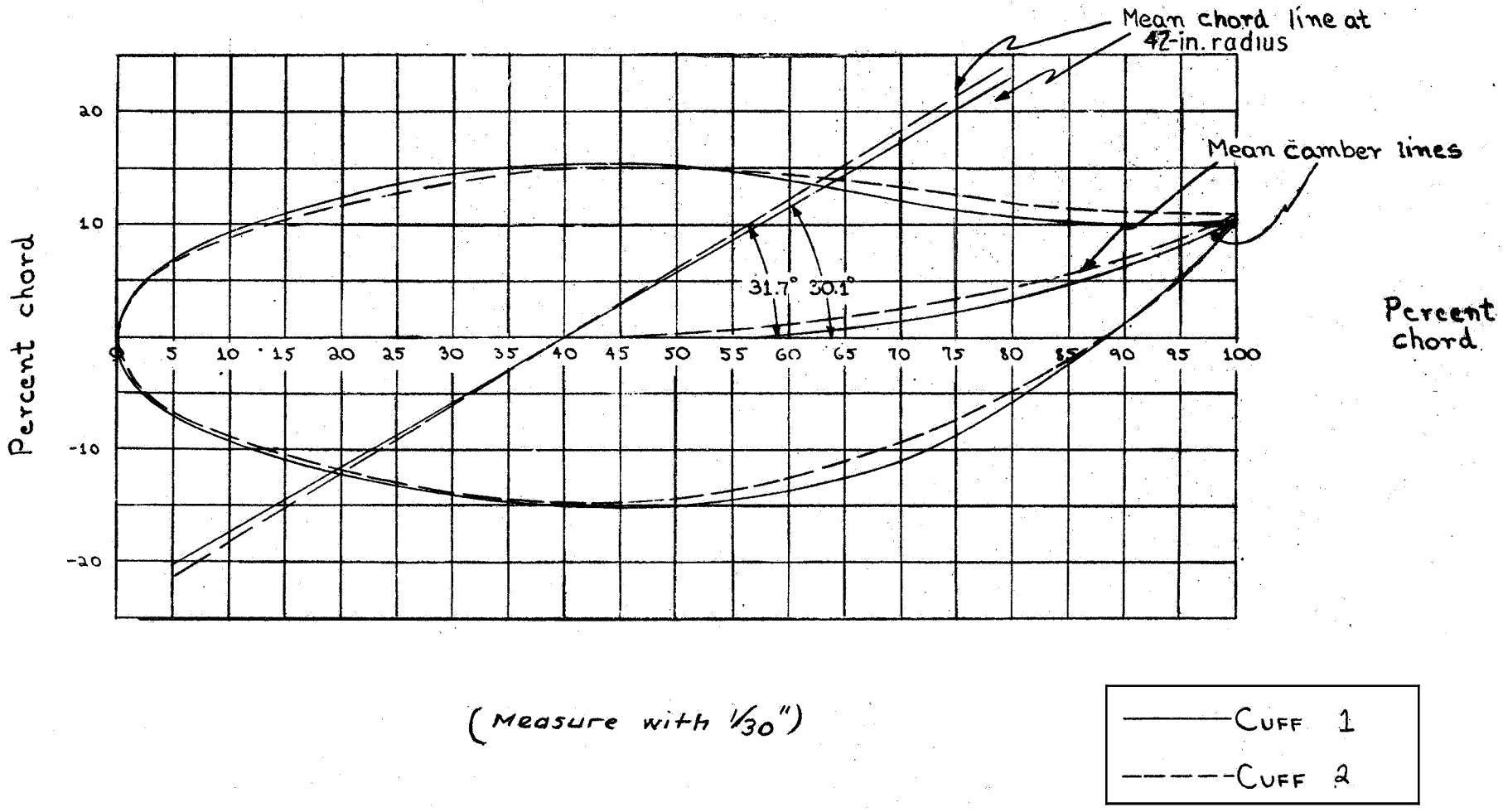
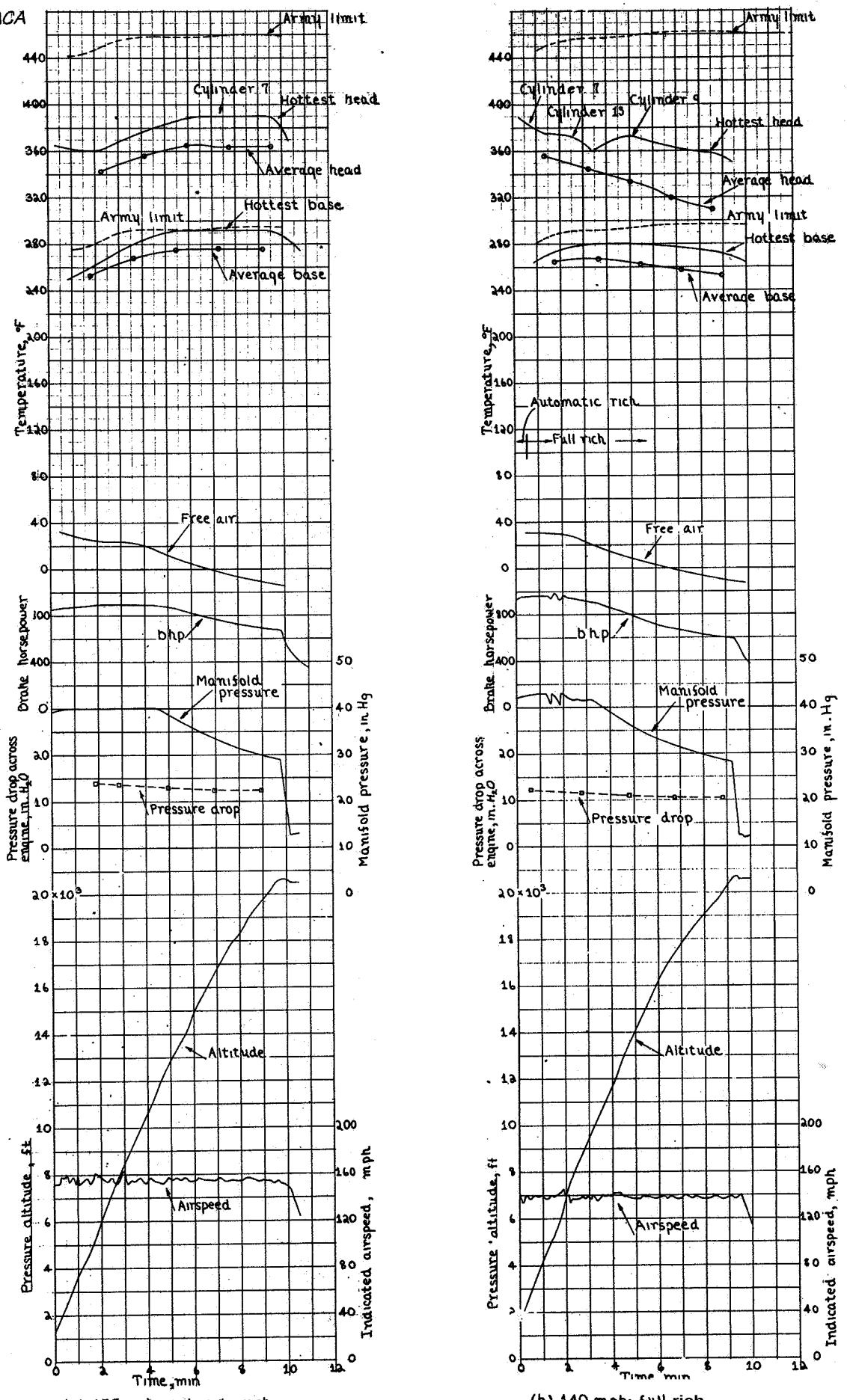


Figure 5.-Comparison of average cuff sections of cuffs 1 and 2.



(a) 155 mph; automatic rich.

(b) 140 mph; full rich.

Figure 6.– Time history of climbs. Test 9 (fan only).

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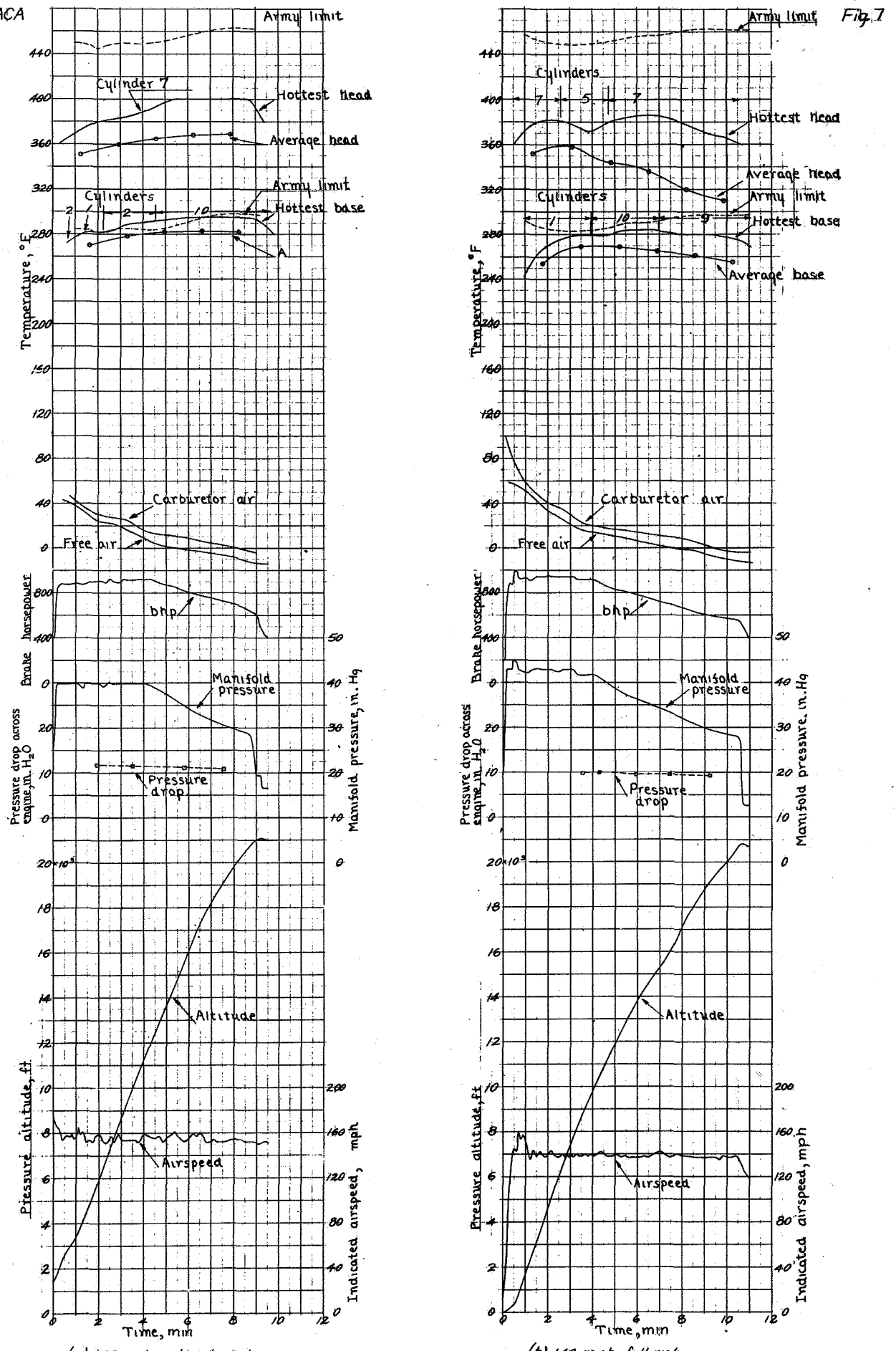

(a) 155 mph; automatic rich.

(b) 140 mph; full rich.

Figure 7.-Time histories of climbs. Test 10 (no fan or cuffs).

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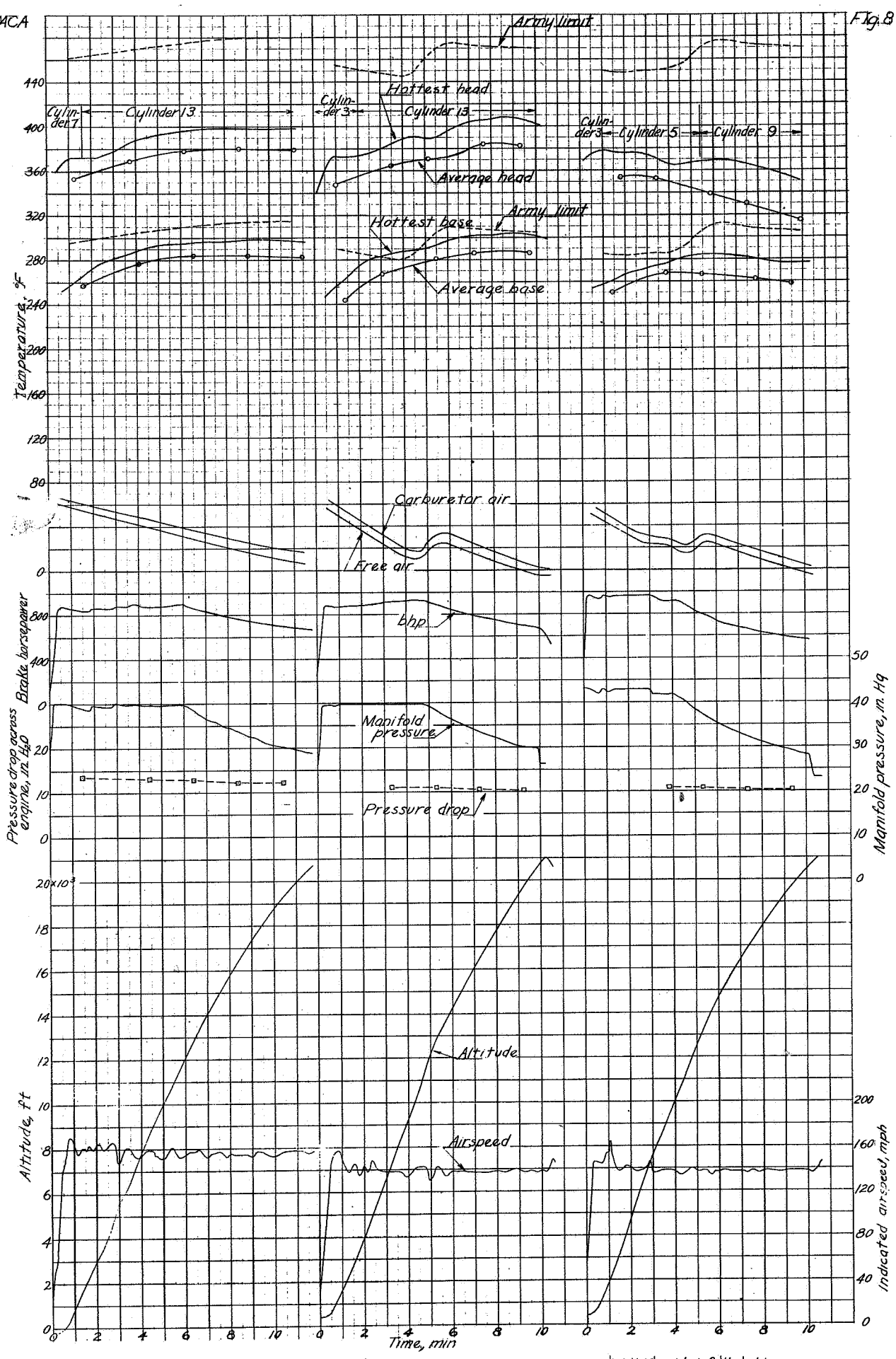
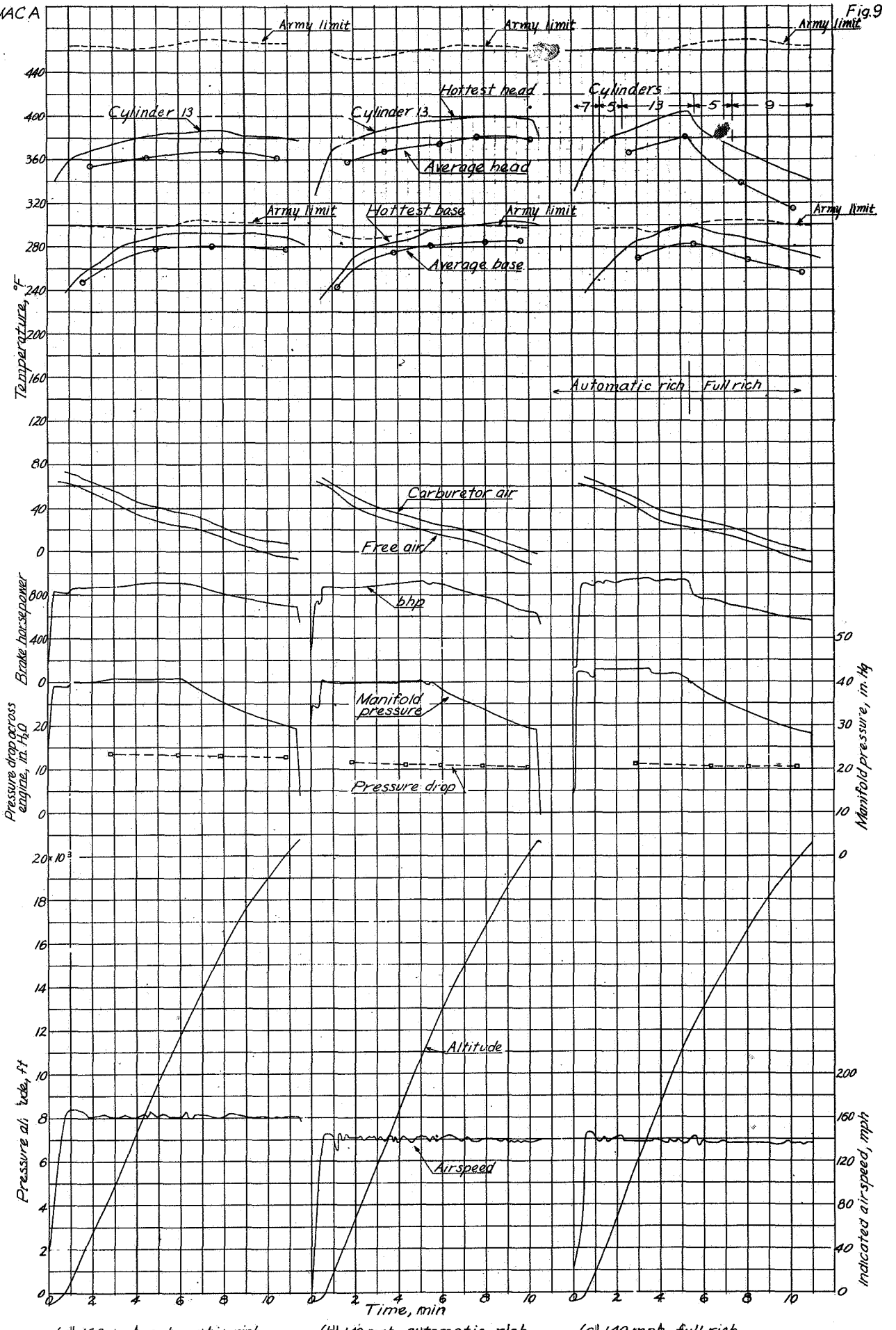


(a) 155 mph; automatic rich. (b) 140 mph; automatic rich. (c) 140 mph; full rich.

Figure 8. - Time histories of climbs. Test 13. (Cuff 1).



(a) 160 mph, automatic rich. (b) 140 mph, automatic rich. (c) 140 mph, full rich.

Figure 9.- Time histories of climbs, Test 14 (cuff 2).

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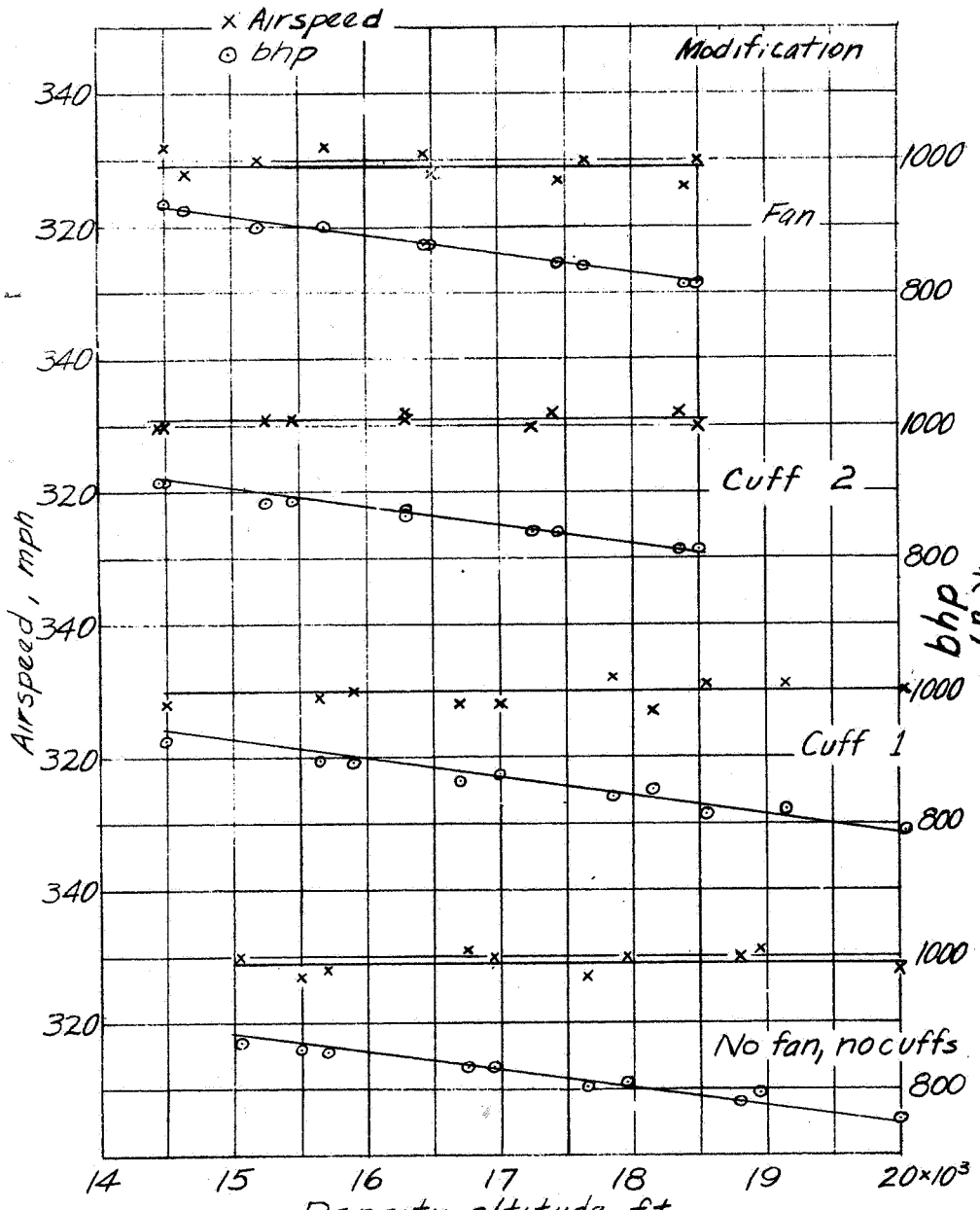

Figure 10. - Maximum speed and power observed in tests 8, 11, 12 and 15.

(Measure with 1/30")

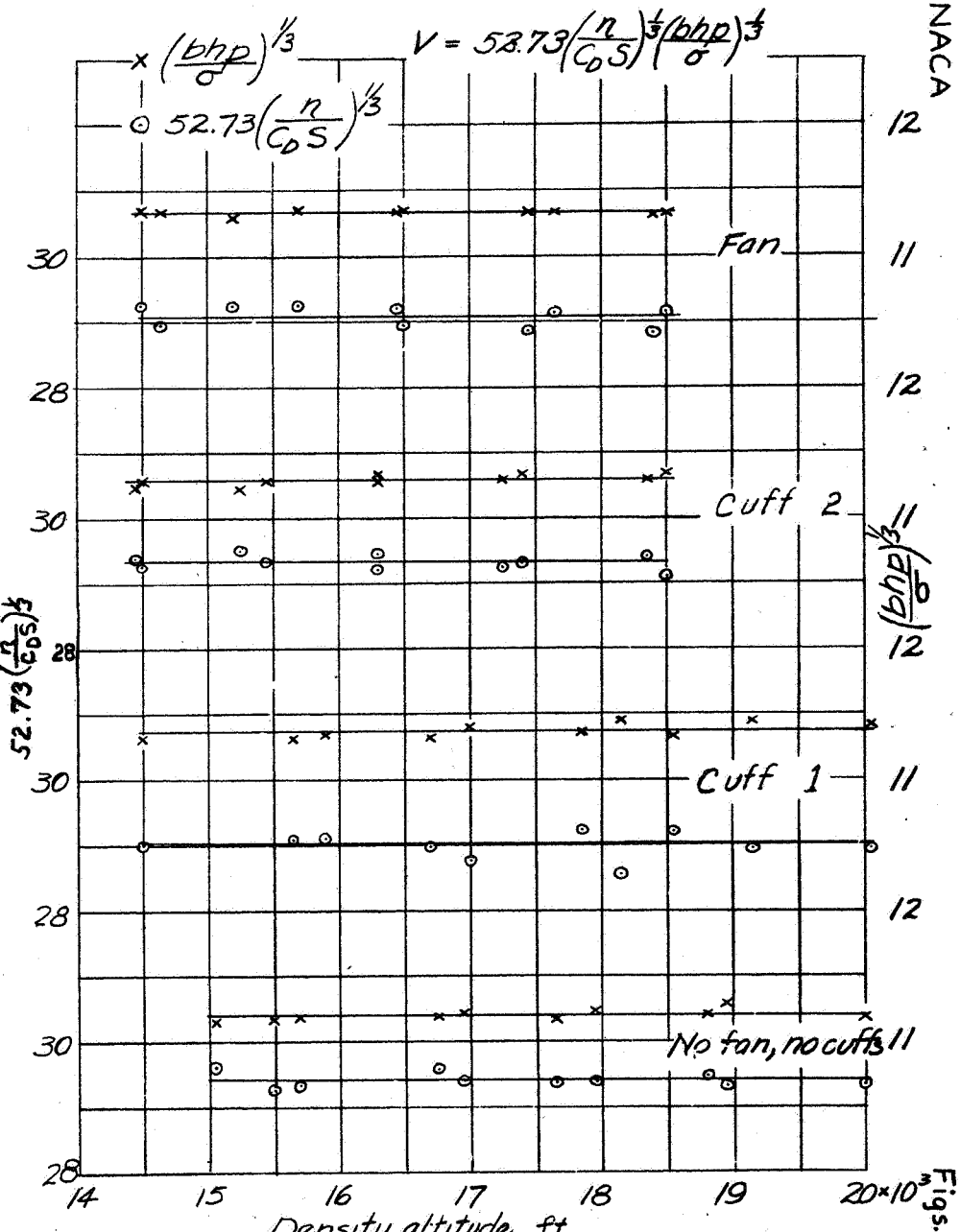

Figure 11. - Power and cleanness parameters of tests 8, 11, 12 and 15.

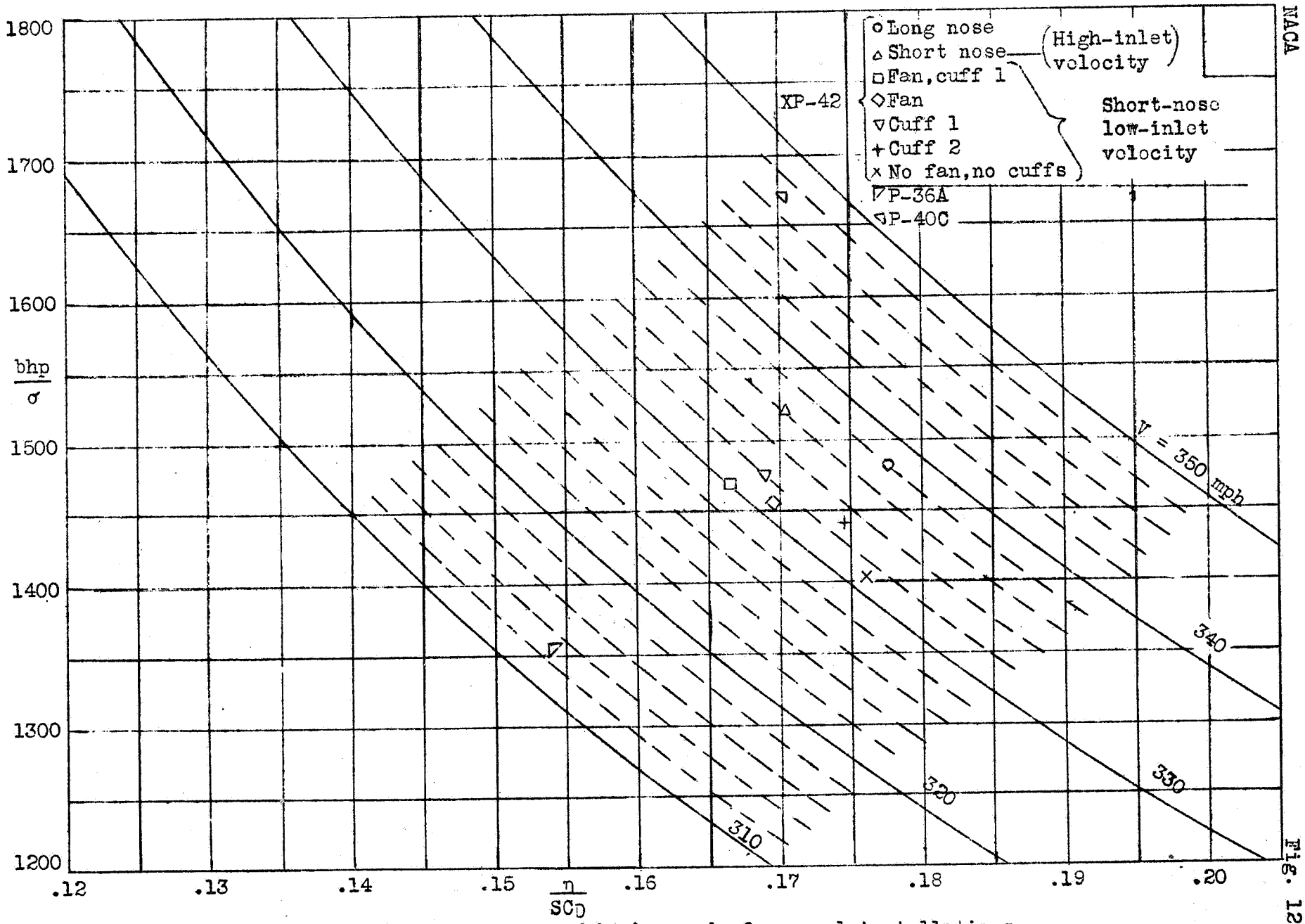

Figure 12.- Comparison of high speed of several installations.

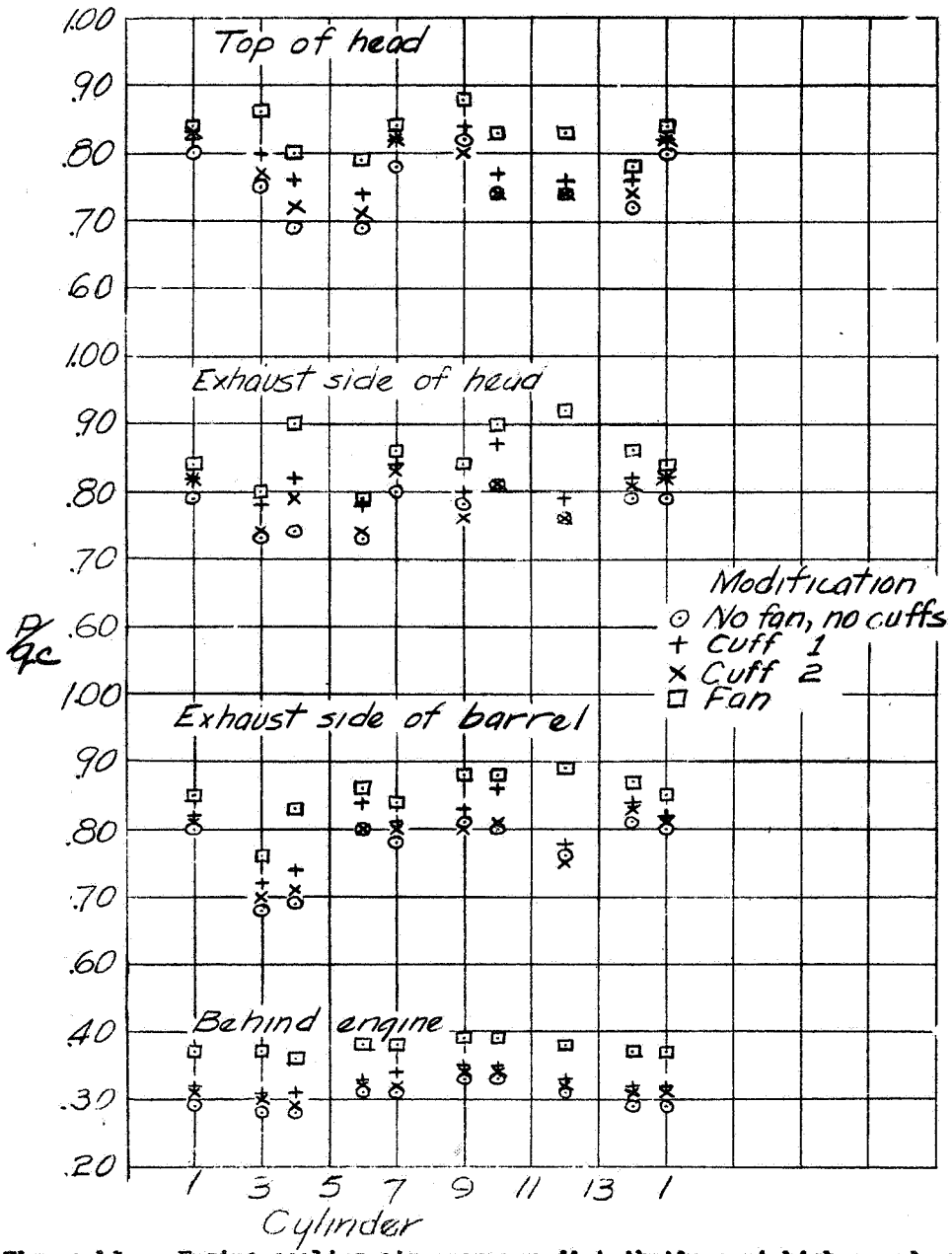

Figure 13. - Engine-cooling-air pressure distributions at high speed (Tests 8, 11, 12 and 15).

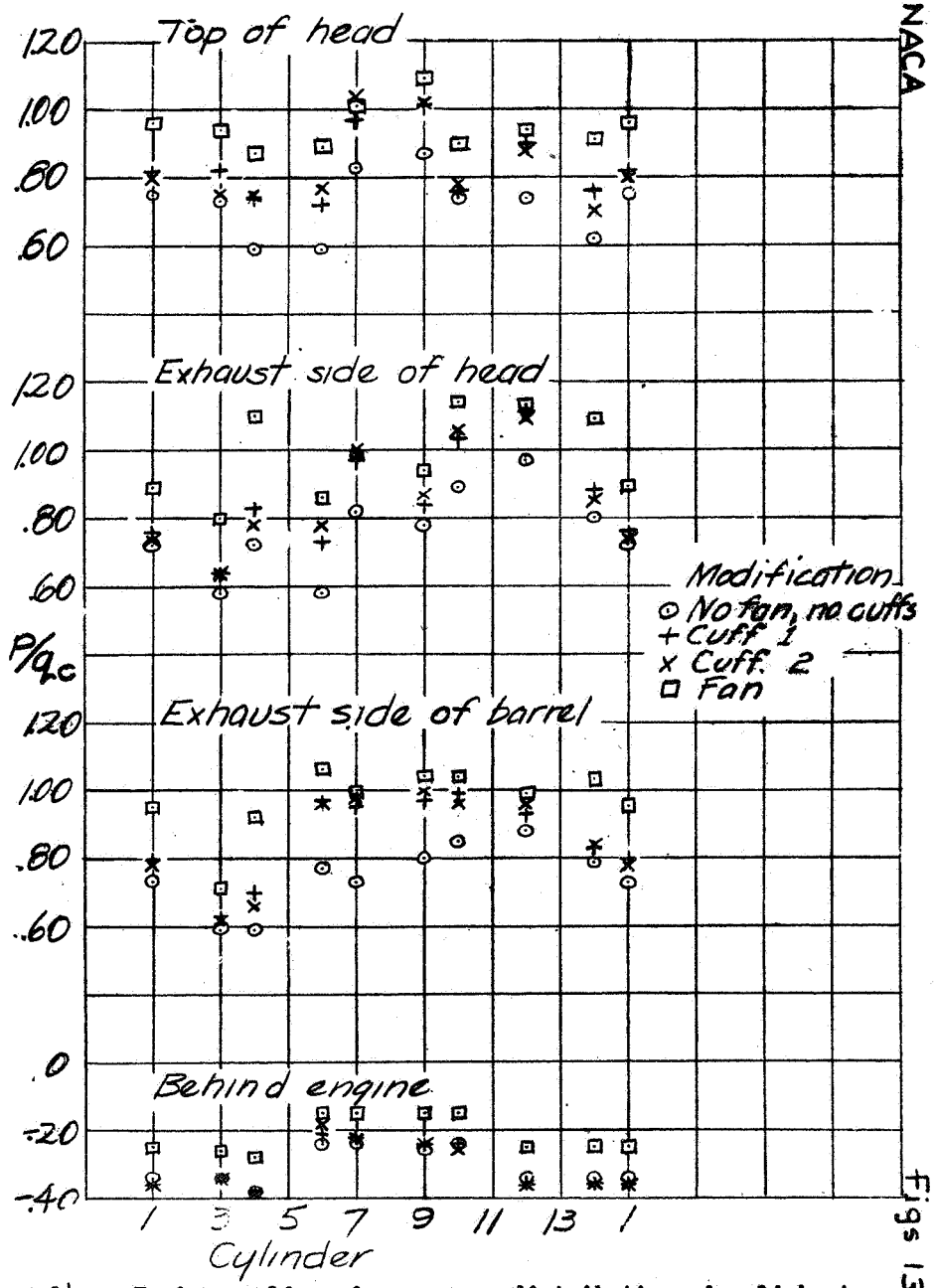

Figure 14. - Engine-cooling-air-pressure distributions in climb at 140 mph indicated at 13,000-14,000 feet (Tests 9, 10, 13 and 14)

(Measure with 1/30")

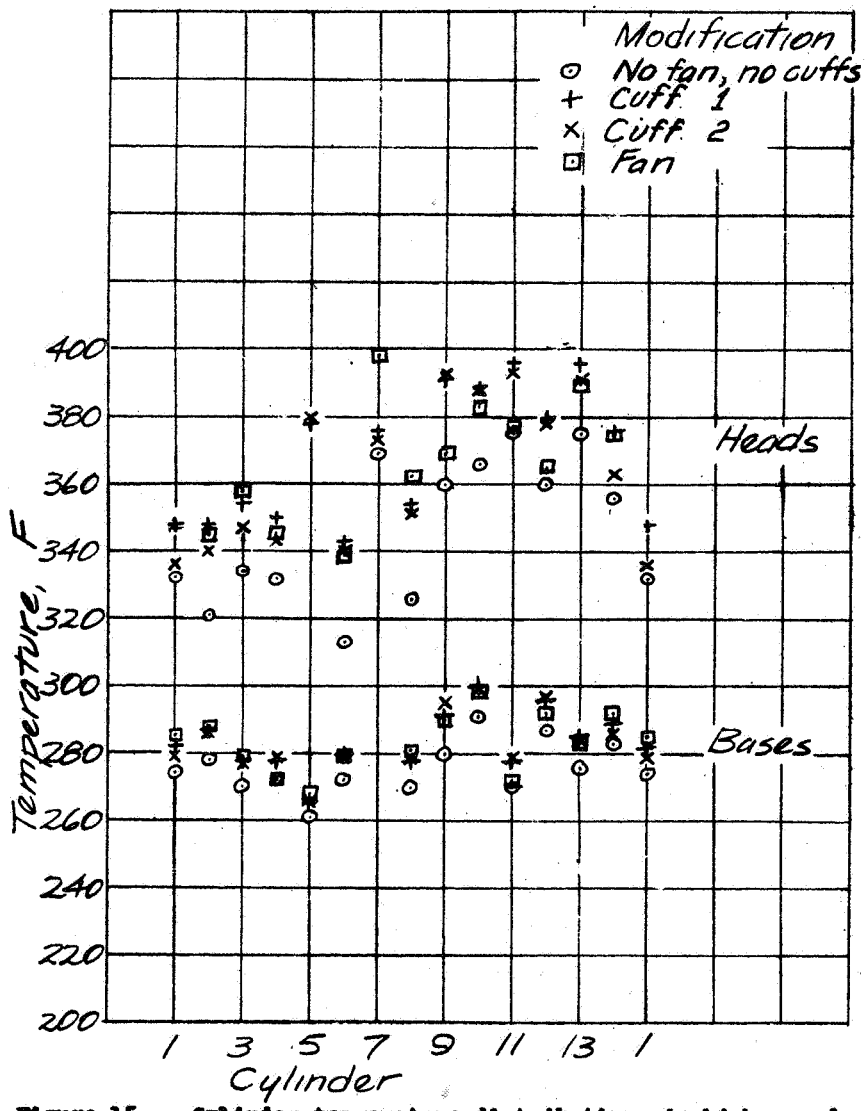

Figure 15. - Cylinder temperature distributions in high-speed level flight (tests 8, 11, 12 and 15).

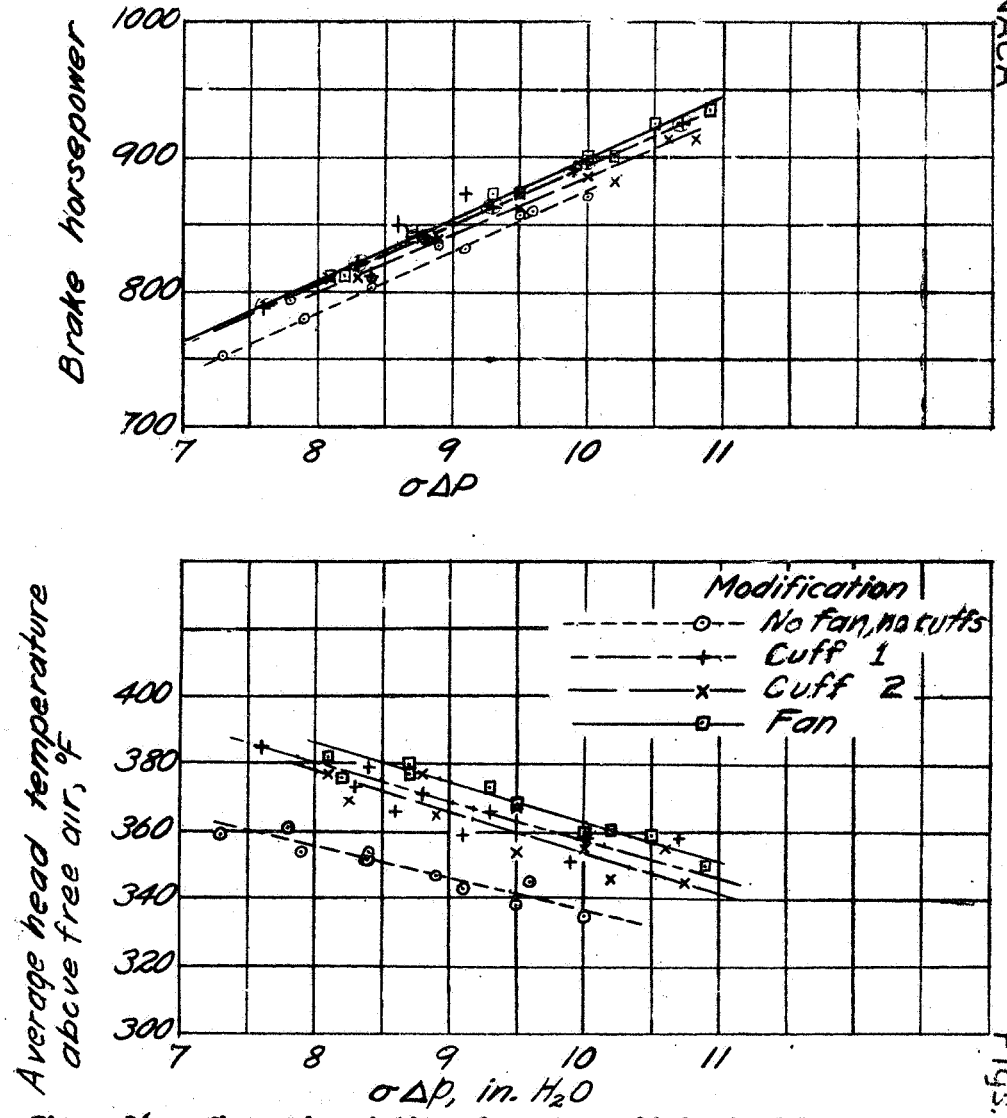

Figure 16. - Observed variation of average cylinder head temperatures with pressure drop and power for full-throttle operation above critical altitude.

(Measure with 1/30")

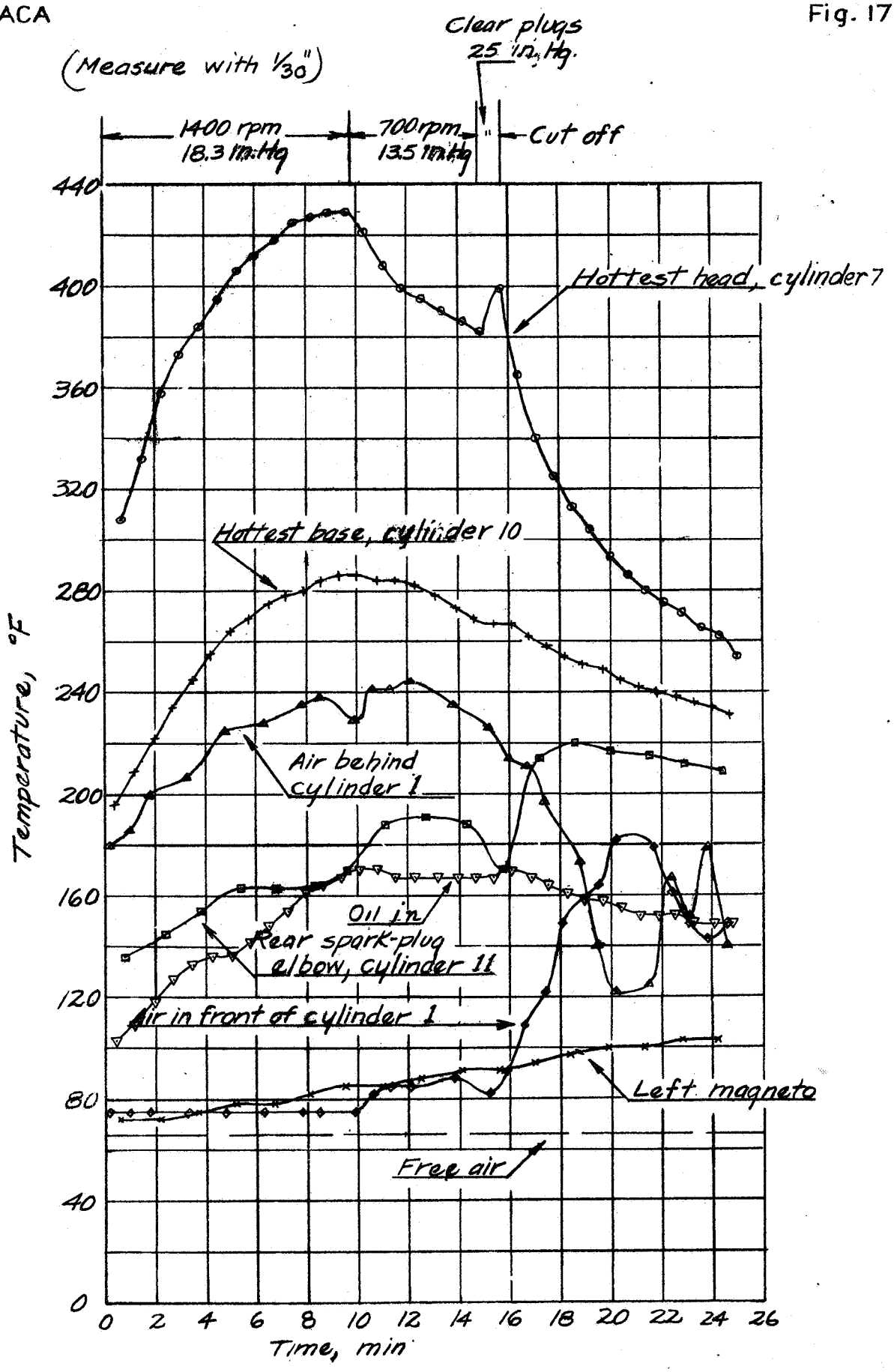

Figure 17.-Temperatures in ground run without fan or cuffs.

L-508

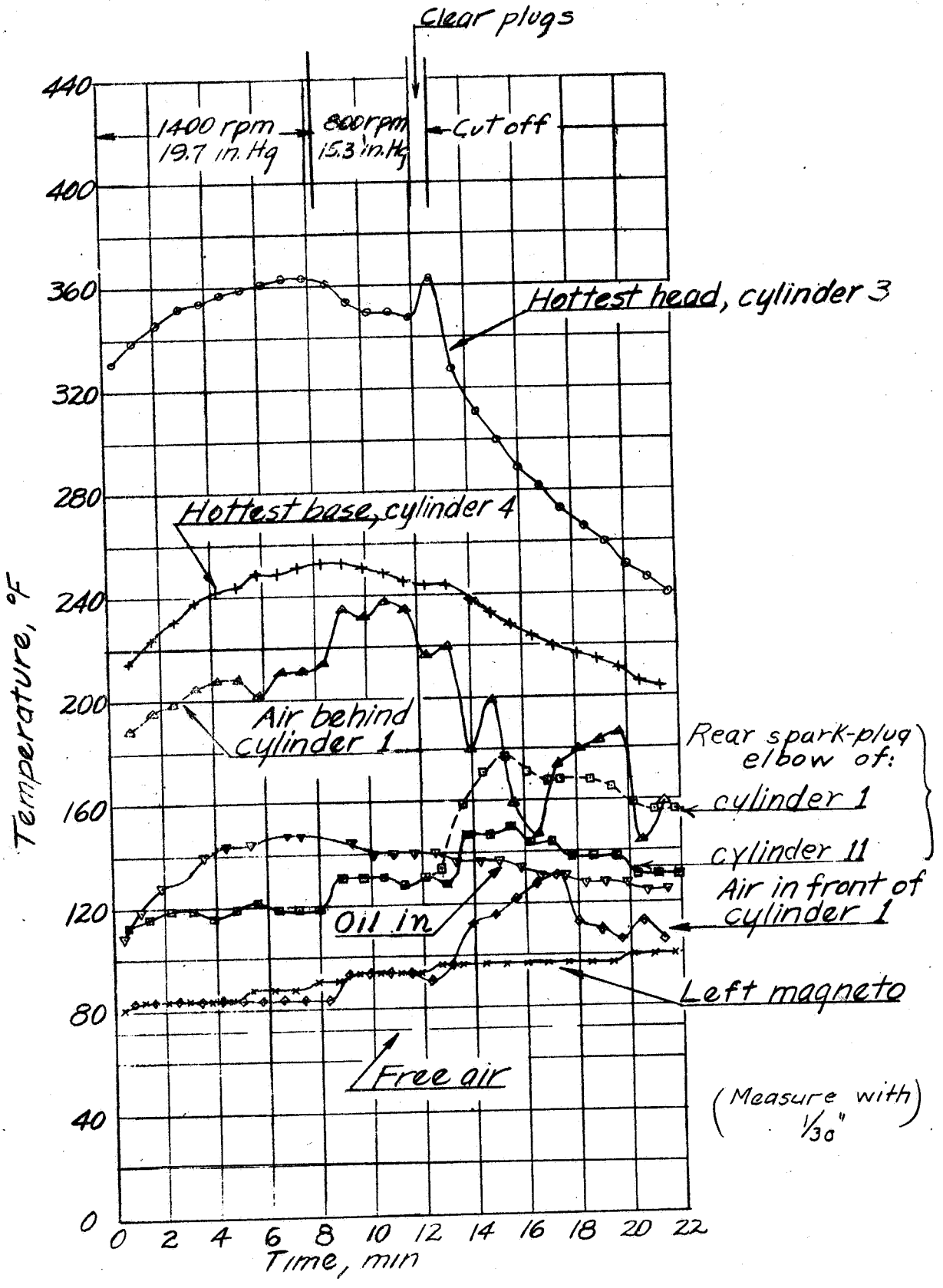

Figure 18.-Temperatures in ground run with cuff 1.

L-508

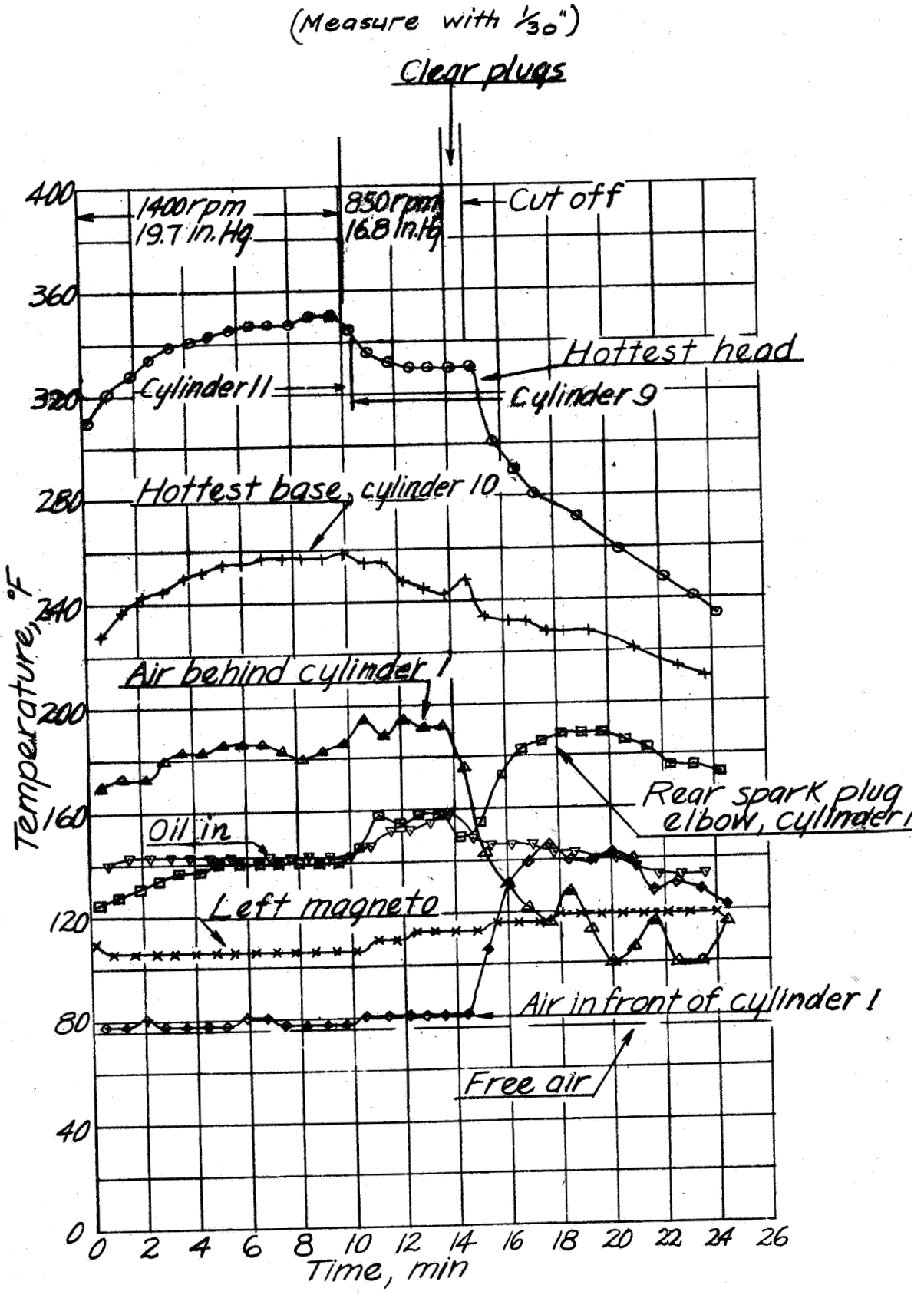

Figure 19.-Temperatures in ground run with cuff 2.