

AIR CORPS  
SPECIFICATION

No. 28717-1  
Sept. 12, 1940

ENGINE AIRCRAFT  
AIR CORPS MODEL XO-1430-3  
(Continental Aviation & Engineering Model 1002-C)

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1. This specification embodies the following, which constitutes the data of the Continental Aviation and Engineering Corporation for the XO-1430 type aircraft engine submitted in connection with Engineering Order No. X-504, Change No. 1 dated 9-12-40, on Contract W-535-AC-12594.

No. 1002-C      Engine, Aircraft, Continental,  
Model 1002-C Specification dated  
10-15-38, revised 8-15-40, consist-  
ing of pages 1 to 10, inclusive.

2. This specification sets forth the requirements applicable to the Air Corps Model XO-1430-3 Engine procured under E.O. #X-504. Change #1 dated 9-12-40, to Contract W-535-AC-12594.

(NOTE: Number 28717 is assigned to this specification for record purposes only, in view of the fact that no type specification was used in connection with the procurement of this engine.)

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W-535-AC-12594  
Change #1  
(E.O. #X-504)

Mimeo - MW - 1/23/41

**MODEL SPECIFICATION**

**ENGINE, AIRCRAFT, CONTINENTAL XD-1450-S**

**CONTINENTAL AVIATION AND ENGINEERING CORPORATION**

**DETROIT, MICHIGAN**

**MODEL NO. 1002-G**

CONFIDENTIAL MODEL XD-1430-S ENGINE SPECIFICATION

A. APPLICABLE SPECIFICATIONS

A-1. The following specifications of issue in effect on date of invitations for bids shall form a part of this specification.

A-1a. Army-Navy Specification.-

AN-9500a Engines, Aircraft, General Specification.

B. TYPE AND MODEL

B-1 This specification covers the requirements for the Continental XD-1430-S Engine.

B-2 The Continental Model XD-1430-S engine is a twelve cylinder horizontally opposed liquid cooled aircraft engine equipped with an extension shaft and coupling; a gear box containing a right angle drive, reduction gear and torquester; a propeller shaft and coupling; and a housing assembly at propeller with bearing for support and location of the propeller. A feature of this engine and drive is that without introducing new parts, it can be assembled either for right or left hand rotation.

C. MATERIAL AND WORKMANSHIP

C-1. The requirements for material and workmanship shall be as specified in specification AN-9500a.

D. GENERAL REQUIREMENTS

D-1. See Section E.

E. DETAIL REQUIREMENTS

E-1. Drawings.- The following Continental Aviation and Engineering Corporation drawings form a part of this specification.

<u>Drawing Number</u>	<u>Title</u>
504100	Engine Assembly, Complete (5 sheets) XD-1430-S
504150	Installation Drawing
504264	Priming System Assembly
504135	Carburetor Model Stromberg PD-1213
504280	Spark Plug Assembly
503855	Terminal Spark Plug
ND	Lubricating System Diagram
503899	Shielding Assembly

E-3. Acceptance.- The acceptance of this engine shall be predicated on the satisfactory completion of an acceptance test conducted in accordance with specification AN-9503a.

**E-4. Weight.**-The total dry weight of engine complete shall not exceed the values indicated below:

Basic engine, including integral superchargers, supercharger drive mechanism, coolant pump and piping on the engine, engine lubrication system oil pumps, starter connection, including starter dog, tachometer drives, fuel pump drive, generator drive, vacuum pump drives, propeller governor drive, and all piping and controls between engine parts.....	1124 lbs.
Reduction Gear, Torquemeter right angle drive assembly; Thrust bearing housing and connecting parts.....	390 "
Carburetor.....	49.
Carburetor Screens and Gaskets.....	1.75
Magnets.....	9.38
Ignition Distributors.....	4.5
Radio Shielded Ignition Assembly, complete with cable.....	15.
Spark Plugs.....	3.5
Priming system on engine.....	1.
Accessory Drive Covers.....	1.5
<b>TOTAL DRY WEIGHT OF ENGINE.....</b>	<b>1600, lbs.</b>

**E-5. Performance Characteristics.**-The ratings specified herein, and the curves specified herein and shown on pages 6-7-8-10 shall constitute the power and specific fuel consumption guarantees. The terms used and the standard conditions shall be in accordance with the applicable definitions contained in specification AN-2502.

**E-5a. Ratings.**-The engine shall be rated as follows, using fuel conforming to specification AN-9651 and oil conforming to specification AN-9632, Grade 1120:

- 1000 HP at 3000 RPM normal rating at sea level.
- 1150 HP at 3150 RPM take-off for 5 minutes.
- Rated Altitude 1000 HP at 3000 RPM at 25,000 feet obtained with turbo-supercharger and intercooler to give not over 100° Carburetor inlet air at 30.0 in. Hg. abs. with not over 31.0 in. Hg. abs. back pressure of engine exhaust.
- 3000 RPM rated overspeed dive RPM.

These data shall be applicable to engine operation with zero rpm.

**E-5c. Specific Oil Consumption.**-The specific oil consumption shall not exceed .035 lb. per HP hour at normal rated power and speed, and .017 lb. per HP hour at 70 percent normal rated power and 89 percent normal rated speed.

**E-5d. Coolant Flow and Heat Rejection.**-When operating with a coolant outlet temperature of 181° C. (250°F.) at maximum allowable power for continuous operation and at guaranteed specific fuel consumption, the coolant flow shall not exceed 180 gallons per minute, and the heat rejection to the coolant shall not exceed 285 H.P. with 10 MPH and 100°F. air blast on the engine when measured on a dynamometer.

E-5h (1). The flow characteristics of the coolant pump shall be as shown on page 9.

E-5i. Oil Flow and Heat Rejection.-When operating on a rigid test stand at the maximum allowable power for continuous operation, with an oil inlet temperature of 80°C. (180°F.) and other conditions as specified above under paragraph E-5h for liquid cooled engines, the oil flow shall not exceed 140 pounds per minute, and the heat rejection to the oil shall not exceed 85 horsepower. These data shall be obtained with oil conforming to Grade 1100 of Specification AN-953B.

E-7. Propeller.- The engine shall have a number 50 propeller shaft end. Provision shall be made for an electric type propeller governor control mechanism.

E-12. Overall Dimensions.- The overall dimension of the engine shall not exceed the following:

Length.....83-11/16 inches from R. A. D. coupling flange to rear end.  
Width.....43-3/8 inches.  
Height.....24-7/8 inches.

E-18b. Parts List of the Engine.-The parts list applicable in all details to the engine which successfully completes Government Tests shall constitute a requirement of this specification.

E-18. Propeller Drive.-The engine shall be direct drive to a gear box. The gear box shall be equipped with an overall reduction ratio of 2.978 to 1 or an alternate ratio of 2.447 to 1. The direction of propeller rotation when viewed from the anti-propeller end shall be counter-clockwise.

Note:-Propeller rotation can be clockwise by reassembling engine without additional parts.

E-19. Impeller Gear.-The impeller gear ratio shall be 6.45 and the impeller shall be 10.50 inches in diameter.

E-20. Pistons.-The engine shall be fitted with pistons of 6.00 to 1 compression ratio.

E-23a (1) Spark Plugs.-The engine shall be fitted with Champion ME-2-643 spark plugs.

E-23b. Radio Shielded Ignition Assemblies.-The engine shall be equipped with Breeze Radio Shielding Assembly.

E-23d. Magneto.-The engine shall be equipped with one Scintilla Model DF Magneto Type 10-6038-6. (four pole)

E-24g. Oil Cleaner.-The engine shall be equipped with June #10691 oil filter.

E-25. Fuel Metering System.-The engine shall be equipped with a Stromberg pressure type carburetor, Stromberg No. 1D-1213.

E-26. Fuel Priming System.-Provision shall be made for priming the engine with fuel from primer pump. (Pump not furnished by Contractor.)

E-30. Coolant Temperature.-The cooling liquid outlet temperature for liquid cooled engines shall be 121.22°C. (250°F.)

E-32a. Exhaust Flanges.-Exhaust flanges and gaskets shall be furnished with the engine.

E-36. Accessory Drive.-The gear ratio of each accessory drive to the engine crankshaft based on the lowest normal rated speed of the engine, the maximum permissible torque in inch-pounds for continuous operation, the maximum permissible static torque in inch-pounds, and the direction of rotation when looking at the end of the accessory drive shaft in the engine, shall be as follows:

<u>Name</u>	<u>Ratio</u>	<u>Continuous Torque %</u>	<u>Static Torque</u>	<u>L.H.Engine Rotation</u>	<u>R.H.Engine Rotation</u>
Magneto	1.500	7.03		Clockwise	Clockwise
Vacuum Pump	1.833	16.8		Clockwise	Clockwise
Coolant Pump	1.145	110.		C'ar-Clockwise	C'ar-Clockwise
Engine Oil Pump	1.145	110.		Clockwise	Clockwise
R.A.D. Oil Pump	.744	98.7		C'ar-Clockwise	Clockwise
Torquemeter Oil Pump	.825	127.5		Clockwise	C'ar-Clockwise
Fuel Pump	.568	17.95		C'ar-Clockwise	Clockwise
Tachometer	.500	13.58		C'ar-Clockwise	Clockwise
Ignition Distributors	.500	4.2		Clockwise	C'ar-Clockwise
Starter	.990		2000"	C'ar-Clockwise	C'ar-Clockwise
Generator	.990	349.		Clockwise	Clockwise
Propeller Speed Governor	.825	51.		Clockwise	C'ar-Clockwise
Hydraulic Pump	1.125	75.		C'ar-Clockwise	C'ar-Clockwise

E-36a. Starter.-The starter mounting pad and drive shall be Type I in accordance with specification AN-9517. The direction of rotation when looking at the starter dog attached to the engine shall be counter-clockwise.

E-36c. Power Take-Off.-A power take-off drive in accordance with specification AN-9522 shall not be provided for driving a gear box assembly.

E-36e. Pad and Drive for Gun Synchronizing Impulse Generator.-Provision shall not be made for driving gun synchronizing impulse generator in accordance with Specification AN-9520.

E-36e.(1). Gun Synchronizing impulse generators shall not be furnished.

E-36f. Vacuum and Hydraulic Mechanism Oil Pump.-Two mounting pads and drives shall be furnished. One each of Type I and II.

#### F. METHODS OF SAMPLING, INSPECTION AND TESTS

F-1. The requirements for sampling, inspection, and tests, shall be shown in specification AN-9500c.

#### G. PACKAGING, and MARKING FOR SHIPMENT

G-1. The requirements for packaging, packing, and marking for shipment shall be as shown in Specification AN-9500c.

BHA LEVEL PERFORMANCE

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No. 1002-C  
August 15, 1940

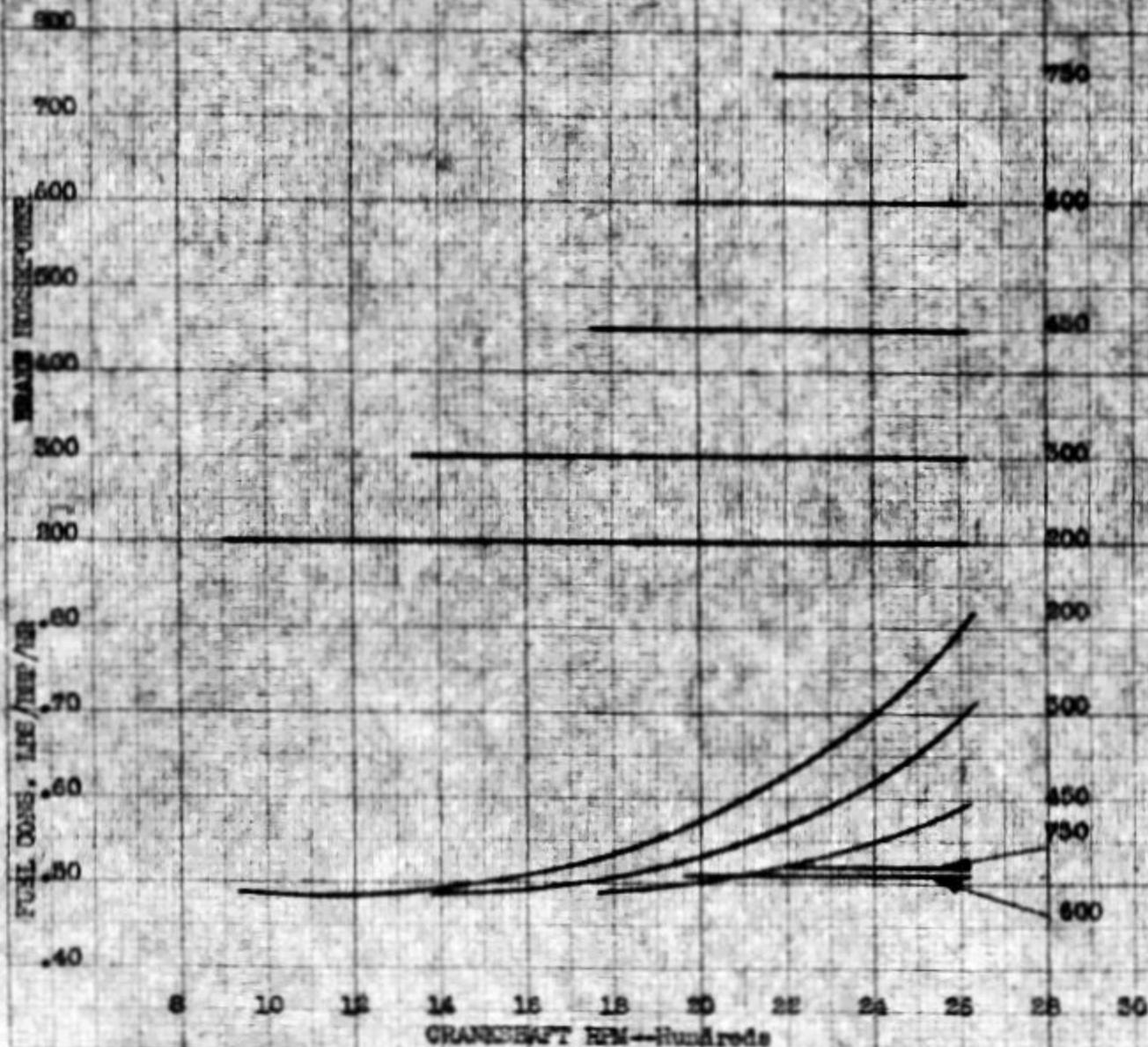
GUARANTEED SPECIFIC FUEL CONSUMPTION VS  
ENGINE SPEEDS AT CONSTANT POWERS WITH ZERO  
W/M

GUARANTEED SPECIFIC FUEL CONSUMPTION ON  
1000 HP PROPELLER LOAD AT 3000 RPM AND  
AT TAKE-OFF POWER

Engine: ED-1430-3  
C.R. - 6.0 to 1

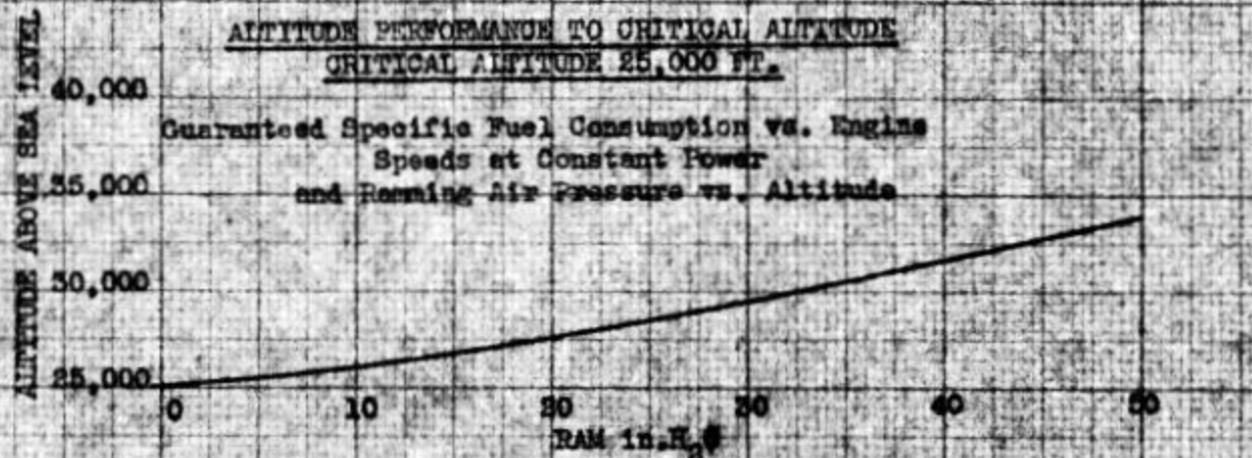
Fuels: AN-9531  
w/o Intake Heater  
Fixed Spark Adv. -  
34° BTC

Brake H.P. %	B.H.P.	R.P.M.		Guar. Sp. Fuel Cons. - lbs/HP/HR
		%	R.P.M.	
100	1000	100	3000	.550
90	900	96.5	2900	.528
80	800	90.8	2735	.530
75	750	90.8	2735	.530
65	650	86.6	2500	.520
-	1150	-	3150	.650
TAKEOFF				

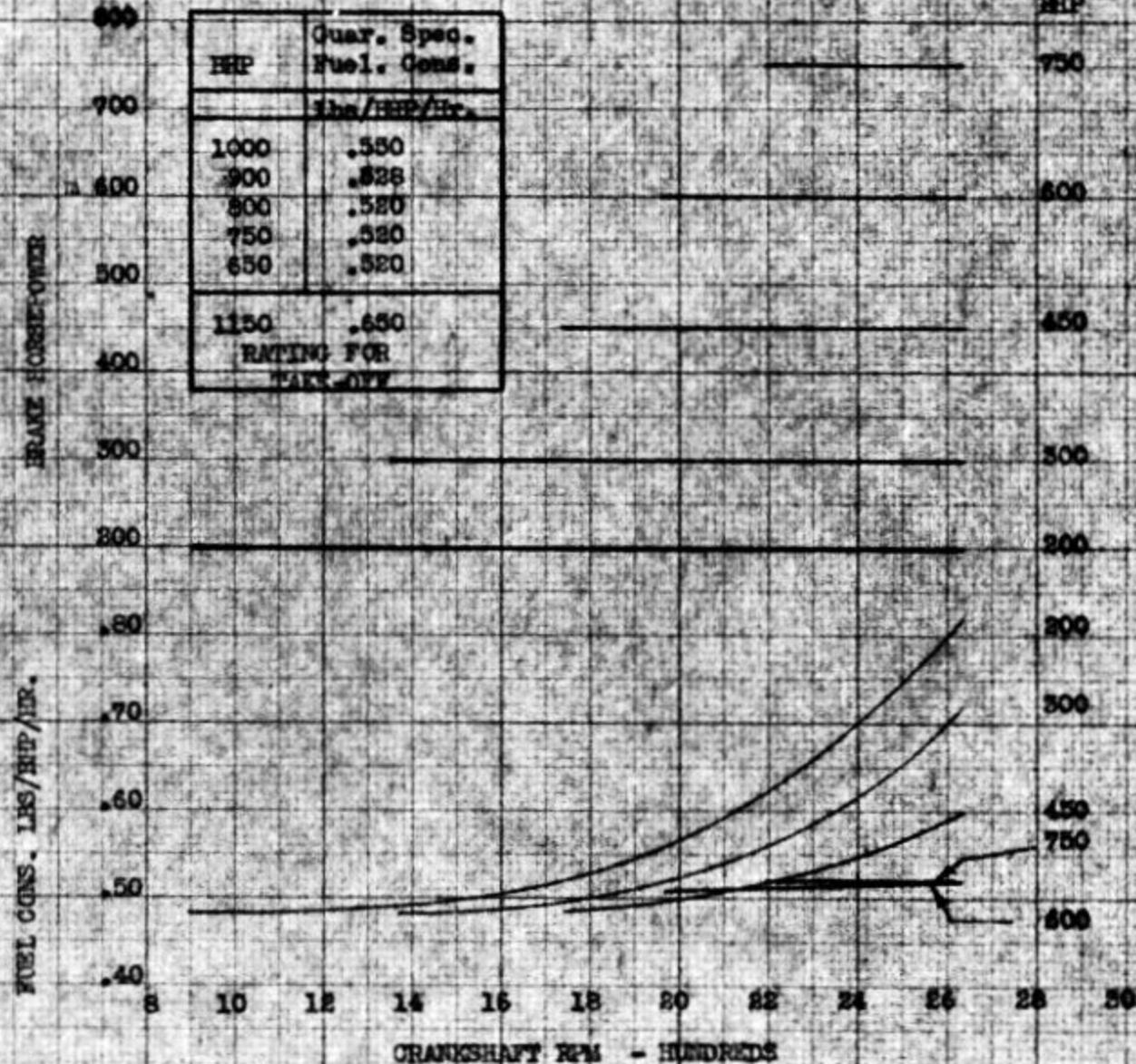


Engines: MD-1430-S  
 Fuel: AV-9331  
 Without Intake Heater

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1000 HP Propeller  
 Load Fuel Cons.



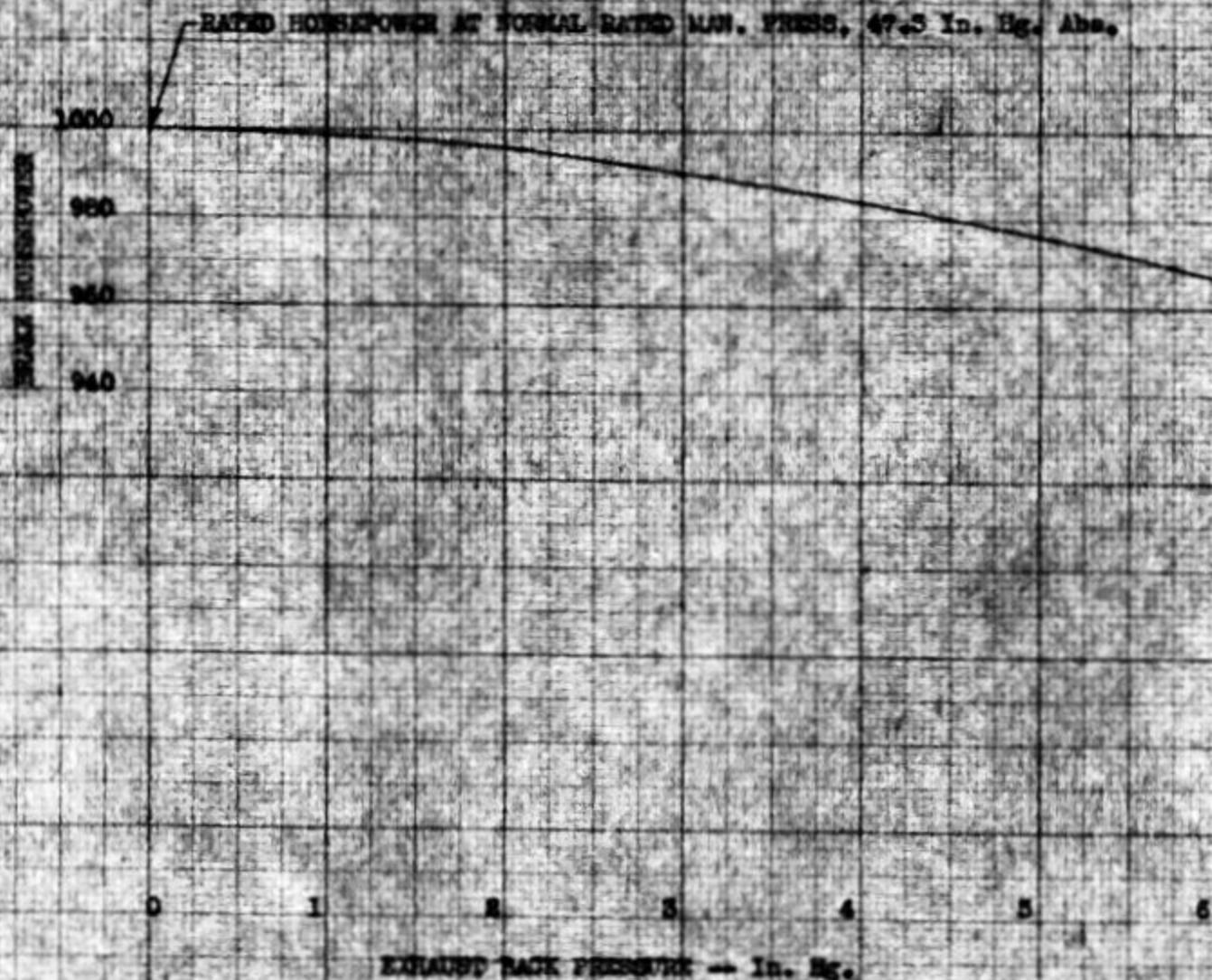
SEA LEVEL PERFORMANCE

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NO. 1002-0  
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POWER VS. EXHAUST STACK BACK PRESSURE

Engine: RD-1450-S  
Compression Ratio 6.0 to 1

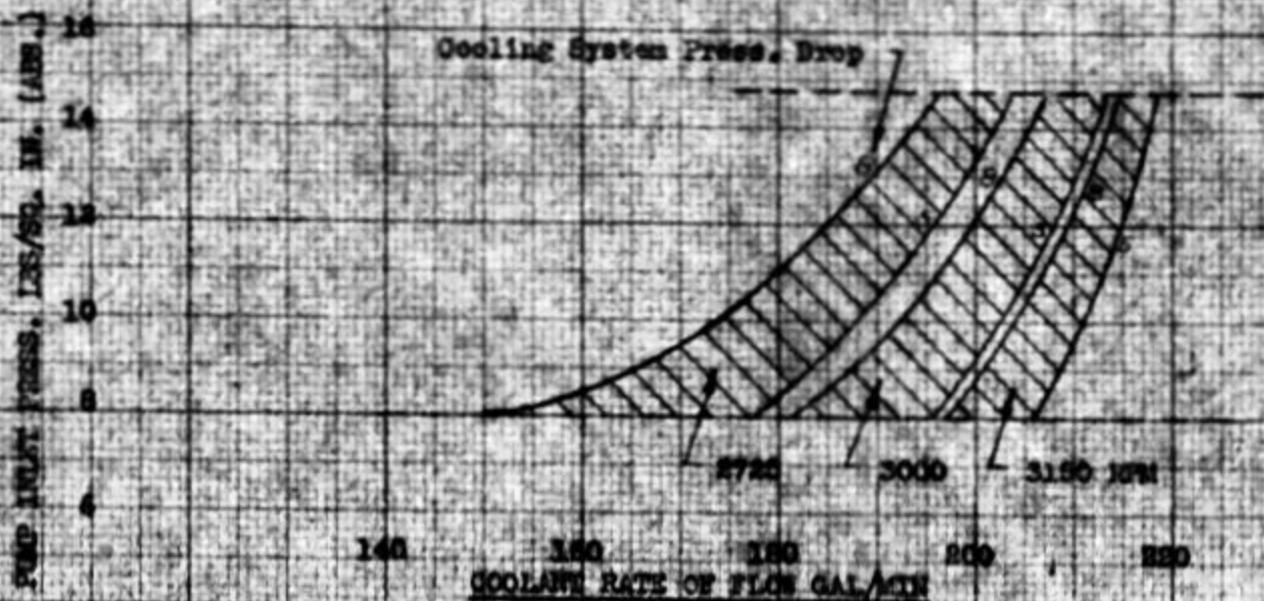
Fuel: AN-9631  
Without Intake Heater



COOLANT FLOW VS. PUMP INLET PRESSURE  
AT CRUISING, NORMAL RATED AND TAKE-OFF SPEED

Outlet Temp. 250°F.

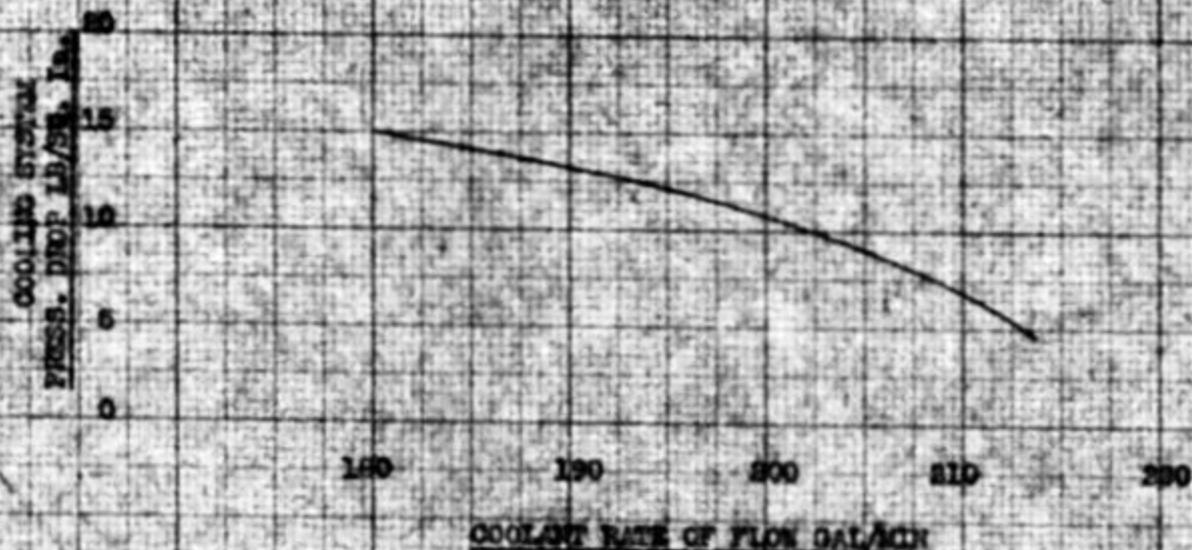
Coolant Solution of 97%  
 Ethylene Glycol with water  
 remainder  
 Specific Gravity @ 20/20 = 1.033



COOLANT FLOW VS. COOLING SYSTEM PRESSURE DROP

Rated RPM - 2000  
 Rated HP - 1000

Outlet Temp. 250°F  
 Pump Inlet Pressure  
 14.7 lbs/sq. in. Abs.



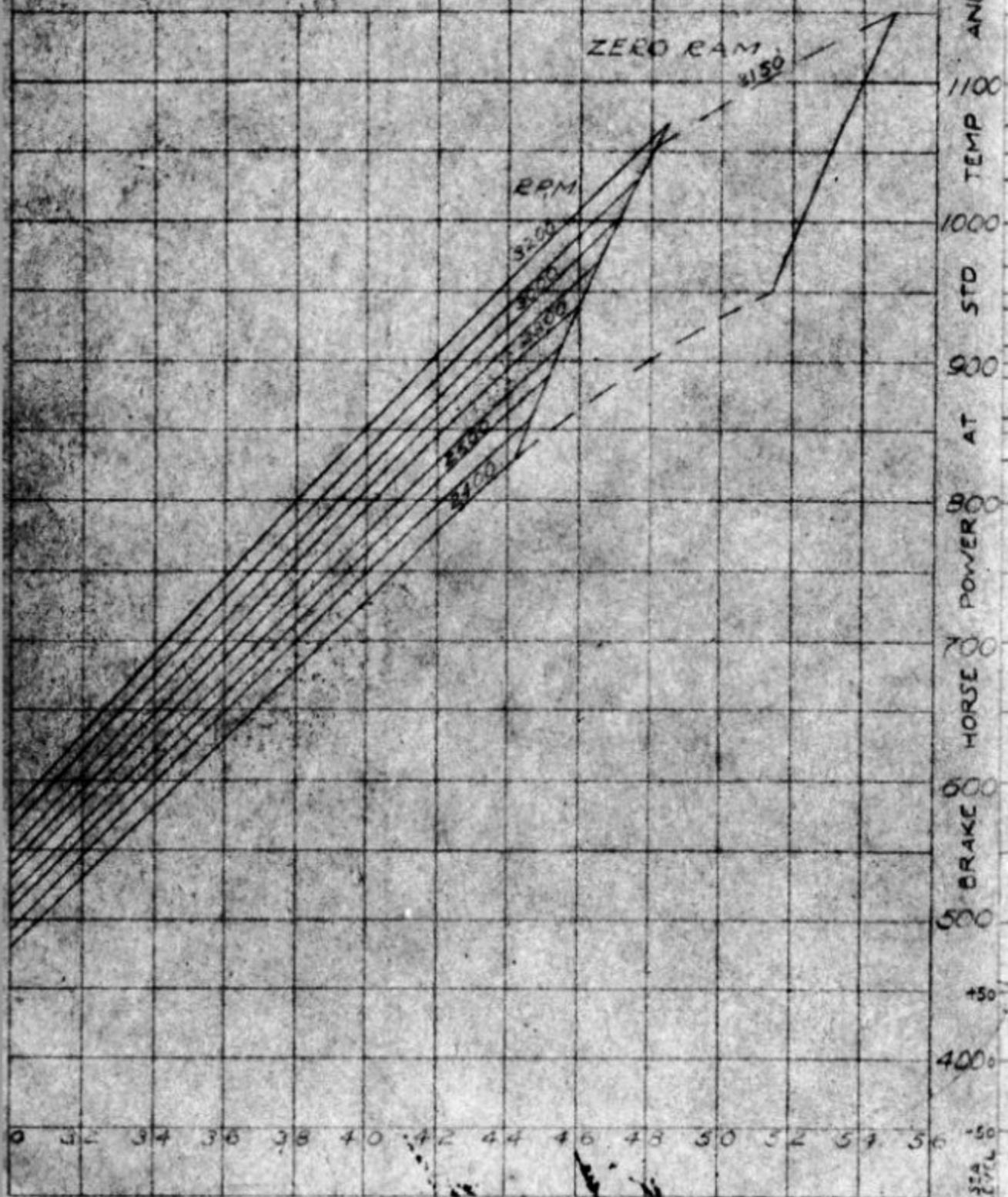
TO FIND ACTUAL HORSEPOWER  
FROM ALTITUDE RPM, MANIFOLD  
PRESSURE AND AIR INLET TEMP

SEA LEVEL PERFORMANCE

1. LOCATE A ON FULL THROTTLE ALTITUDE CURVE FOR GIVEN RPM & MANIFOLD PRESS
2. LOCATE B ON SEA LEVEL CURVE FOR RPM & MANIFOLD PRESSURE & TRANSFER TO C
3. CONNECT A & C BY STRAIGHT LINE & READ HORSEPOWER AT GIVEN ALTITUDE D
4. MODIFY HORSEPOWER AT D FOR VARIATION OF AIR INLET TEMPERATURE T FROM STANDARD ALTITUDE TEMPERATURE T<sub>s</sub> BY FORMULA

$$HP \text{ AT } D \times \frac{\sqrt{480 + T}}{480 + T} = \text{ACTUAL HP}$$

APPROXIMATELY 1% CORRECTION FOR EACH 10° F. VARIATION FROM T<sub>s</sub>



ABSOLUTE MANIFOLD PRESSURE, N. HG

ALTITUDE PERFORMANCE

OBTAINED WITH TURBO SUPERCHARGER AND INTERCOOLER TO GIVE NOT OVER 100°F CARBURETOR INLET AIR AT 300 IN. HG WITH NOT OVER 310 IN. HG BACK PRESSURE ON ENGINE EXHAUST

AIRPLANE ENGINE PERFORMANCE DATA

(MIXTURE CONTROL AT MAXIMUM POWER UNLESS OTHERWISE NOTED)

AIRPLANE  
 ENGINE XC-1430-3  
 PROPELLER GEAR RATIO 2.97 TO 1  
 COMPRESSION RATIO 6.0 TO 1  
 BLOWER GEAR RATIO 6.45 TO 1  
 IMPELLER DIA INCHES 10.5  
 CARBURTION FD-12-H3  
 FUEL SPEC - AN-9531

NO 1002C  
 DATE 10-15-40  
 REVISED 8-15-40

TEMP AND PRESS  
 1200  
 1100  
 1000  
 900  
 800  
 700  
 600  
 500  
 400

STANDARD ALTITUDE TEMPERATURE T<sub>s</sub> °F  
 100  
 50  
 0  
 -50  
 -100

SEA LEVEL

3200 R.P.M.  
 3100  
 3000  
 2900  
 2800  
 2700  
 2600  
 2500  
 2400

2000 3000 4000 5000 6000 7000 8000 9000 10000 11000 12000 13000 14000 15000 16000 17000 18000 19000 20000 21000 22000 23000 24000 25000

