

Spec. No. 165-B

Date Issued: Apr. 24, 1942

Revised June 24, 1942

Nov. 2, 1942

MODEL SPECIFICATION
ENGINE, AIRCRAFT: MODEL V-1710-85

ALLISON DIVISION
General Motors Corporation
Indianapolis, Indiana

(ALLISON MODEL DESIGNATION V-1710-E19)

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ENGINE, AIRCRAFT: MODEL V-1710-85

Allison Division of General Motors Corporation

(Allison Model Designation V-1710-rE19)

A. APPLICABLE SPECIFICATIONS.

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

A-1a. Army-Navy Specification.

AN-9500 Engines, Aircraft: General Specification and applicable specifications of the issues indicated on Page 17.

B. TYPE AND MODEL

B-1. This specification covers the requirements for the V-1710-85 engines.

C. MATERIAL AND WORKMANSHIP.

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

D. GENERAL REQUIREMENTS.

D-1. See Section E.

E. DETAIL REQUIREMENTS.

E-2. Drawings. - The following Allison Division drawings form part of this specification:

43216 Engine Assembly, Complete - (Showing Accessory Drive Oil Seals.)

43215 Installation Drawing (Showing clearances for engine accessories and their removal)

43325 Priming System Assembly

42113 Carburetor, PD12K6 Bendix-Stromberg

40600-J Spark Plug Assembly AC-LS85

40601-B Spark Plug Assembly Champion C34S

42354 Terminal, Spark Plug (Contact)

40209 Lubrication System Diagram

41809 Magneto

42290 Radio Shielding Assembly

37583-B Manifold Assem. - Spark Plug Cooling R.H.

37584-B Manifold Assem. - Spark Plug Cooling L.H.

33536-K Nut - Magneto Cable Shielding Conn.

40751-F Gasket - Exhaust Port Flange

42348 Shielding - Spark Plug Cable - Intake

42347 Shielding - Spark Plug Cable - Exhaust

42288-B Plug Crankcase Dehydrator

41310-B Nut - #60 Prop. Shaft Thread Protecting

41616-C Bag - Engine Shipping

41694-A Bag - Reduction Gear Box Shipping

E-3. Acceptance. Approval of this engine is based upon Model Tests of V-1710-87 (E8) and V-1710-81 (F20R) and flight tests of V-1710-59 (E12) engines.

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

Basic engine, including integral supercharger, supercharger drive mechanism, propeller reduction

gears, 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 1363.0 lbs.

Carburetor and injection nozzle 34.0

Carburetor Screens and Gaskets 1.0

Magneto, Shielded 13.0

Ignition Distributors (included in Shielding Assembly)

Radio Shielded Ignition assembly, complete with Cable and Distributors. 31.0

Spark Plugs 7.0

Priming System on Engine 1.0

Cooling Air Deflectors and Baffles None

Accessory Drive Covers 2.0

TOTAL DRY WEIGHT OF ENGINE 1452 lbs.

E-5. Performance Characteristics. - The engine shall be equipped with an automatic manifold pressure regulator, Allison Part No. 42224, and its use shall be a requirement in the installation of this engine. The ratings specified herein, and the curves and data specified herein and shown on pages 14 and 15 shall constitute the power and specific fuel consumption guarantee. The terms used and the standard conditions shall be in accordance with the applicable definitions contained in Spec. AN-9502.

E-5a. Rating. - The engine shall be rated as follows, using fuel conforming to Spec. AN-VV-F-781 (Amendment No. 5) and oil conforming to Spec. AN-VV-C-446, Grade 1120.

870 B.H.P. at 2600 R.P.M. at sea level
 1000 B.H.P. at 2600 R.P.M. at 14,000 ft. - Normal
 1200 B.H.P. at 3000 R.P.M. take-off for five minutes
 1125 B.H.P. at 3000 R.P.M. military rating at
 15,500 feet for 15 minutes - Military
 Rated Altitude
 3120 R.P.M. rated overspeed dive R.P.M.

E-5b Curves. The following curves shall be furnished as part of this specification:

- E-5b(1) BHP vs Altitude at Rated Speeds as shown on Page 14.
- E-5b(2) Estimated performance data at altitude as shown on Page 16.
- E-5b(3) Estimated Fuel Consumption curves as shown on Page 15.

E-5e Specific Oil Consumption. The specific oil consumption shall not exceed .025 lb./BHP/hr. at normal rated power and speed, .025 lb./BHP/hr. at 70 per cent normal rated power and 89 per cent normal rated speed.

E-5h Coolant Flow and Heat Rejection. The following guarantee is given for the coolant flow and heat rejection to the coolant.

Conditions:

Operation On dynamometer for 5 minutes.
 Power Take-off 1200 BHP.
 Speed Take-off 3000 RPM.
 Fuel Consumption . . Auto Rich
 Oil Inlet Temp . . . 185°F.
 Oil Pressure 65 p.s.i.
 Coolant Outlet Temp . 250°F.
 Oil Flow 150 lb./min.
 Air Blast on Engine . 60°F. at 10 MPH

Guaranteed Maximum

Coolant Flow - 250 GPM
 Heat Rejection to Coolant - 430 HP

E-5i Oil Flow and Heat Rejection. The following guarantee is given for the oil flow and heat rejection to the oil.

Conditions:

Operation On dynamometer for 5 minutes.
 Power Take-off 1200 BHP
 Speed Take-off 3000 RPM
 Fuel Consumption . . Auto Rich
 Oil Inlet Temp . . . 185°F.
 Oil Pressure 65 p.s.i.
 Coolant Outlet Temp . 250°F.
 Coolant Flow 250 GPM
 Air Blast on Engine . 60°F. at 10 MPH

Guaranteed Maximum

Oil Flow - 150 lb./min.
 Heat Rejection to Oil 150 HP

E-7 Propeller. The engine shall have a No. 60 propeller shaft end as shown on Installation Dwg. No. 43215. Provision shall be made for a governor type of propeller control mechanism.

No provision shall be made for hydraulic propeller operation. An oil vapor opening shall be provided on the governor mounting pad as shown on Installation Drawing No. 43215. Oil pressure shall not be supplied to the pad.

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

Length	194	inches
Width	29-9/32	inches
Height	37-9/16	inches

E-14. Preparation for Storage. - The engine shall be prepared for storage in accordance with AN-F-E-568 with the following exceptions:

- (1) (Ref. Par. F-3g Carburetor) - The oil for filling the carburetor shall conform to Allison Division Specification ES-10.
- (2) (Ref. Par. F-3h., Intake Manifold) - The dehydrator bags shall be placed on the top of the carburetor screen and the carburetor sealed by securing a gasketed cover to the carburetor.
- (3) (Ref. Par. F-3n., Crankcase) A dehydrator plug conforming to Allison Division drawing No. 42288 shall be installed in an appropriate opening of the crankcase as soon as it can be made available.
- (4) (Ref. Par. F-3o., Propeller Shaft) - A propeller shaft thread cap conforming to Allison Division Drawing No. 41310 shall be installed.
- (5) (Ref. Par. F-4a., Packing Procedure) - The engine bag and outboard reduction gear bag shall conform to Allison Division Drawing Nos. 41616 and 41694.
- (6) (Ref. Par. F-4a(1))., After removing the engine from the engine case it shall be possible to reheat seal the openings which must be cut in the engine bag to insert the lifting hooks.
- (7) (Ref. Par. F-4b.) - The engine shipping case shall conform to Allison Division Drawing No. 37780 which provides a window through which the indicator card may be inspected instead of a hinged door.
- (8) The outboard reduction gear assembly and extension shafts shall be prepared for storage as nearly as practical in conformance with AN-F-E-568.

E-16b. Parts List of the Engine. - The parts list applicable in all details for this engine shall be the same as for the V-1710-67 (E8) engine as it passed the Model Test and was approved by the Materiel Center letter of April 20, 1942 (SGN-jft-70-5) with the exception of: (1) such design improvements as mutually agreed upon between the contractor and Government, including the intake Manifold Assembly, No. 43330, (2) the exception of parts peculiar to the 9.6:1 supercharger gear ratio as herein specified, and (3) the addition of the Automatic Manifold Pressure Regulator parts as herein specified. (Allison Part No. 42224)

E-18. Propeller Drive. - The engine shall be equipped with a reduction gear ratio of 2.23:1. The propeller drive shall be mounted on a remote gear box located outboard of an extension shaft which operates at crankshaft speed. The gear box should be lubricated from an external tank of not less than 2 gallons capacity which shall not be provided with the engine. The direction of propeller rotation when viewed from the anti-propeller end, shall be clockwise. The maximum oil flow required for the reduction gear box is 20 lbs./min. at military rated speed. The gear box will function satisfactorily, provided the correct specified lubricant is used and an oil inlet temperature of 60°C. (140°F.) is not exceeded. The lubricant for the gear box oil system shall conform to Air Corps Specification Y-3587.

E-19. Impeller Gear. - The impeller gear ratio shall be 9.6:1 and the impeller shall be 9-1/2 inches in diameter.

E-20. Pistons. - The engine shall be fitted with pistons of 6.65:1 compression ratio.

E-23a(1) Spark Plugs. - The engine shall be fitted with Champion C34S or AC-LS85 spark plugs.

E23b. Radio Shielded Ignition Assemblies. - The engine shall be equipped with Allison designed radio shielded ignition assemblies with the following exceptions to Spec. AN-9510:

- (1) (Ref., Par. D-1e. - Mounting Lugs)
Mounting clamps shall be provided in place of integral, soldered, or welded mounting lugs.
- (2) (Ref., Par. E-8. - Capacitance) The capacitance between the shielding and each ignition cable contained therein shall not exceed 175 micro-microfarads.
- (3) (Ref., Par. E-1a. - Single Cable Conduits)
Single cable conduit connections shall be as shown on Allison Drawing Nos. 33536, 42347, and 42348.

E-23c. High Tension Ignition Cable. - (Ref. AN-9500 Par. D-23c.) High tension ignition cable conforming to U. S. Army Spec. 95-32152 shall be used on all distributor head to spark plug leads, with the exception to par. E-7a that the marking shall be accomplished by stamping the date on the external surface of the cable instead of an interwoven thread. All other high tension cable shall conform to AN-J-C-56.

E-23d. Magnetos. - The engine shall be equipped with one Scintilla Type DFLN-6 magneto in accordance with Specification AN-9511 with the following exceptions:

- (1) (Ref., Par. D-1b(1). - Threads) - Connections for the high tension terminals are 15/16-18 threads.
- (2) (Ref., Par. E-1b(2). - Type D Magneto) The heads of screws for securing the bearing retainer in the flange project beyond the .125" minimum recess in pilot specified in Figure No. 3.
- (3) (Ref., Par. E-2c. - Normal Operating Temperature) - The temperature rise of this magneto is 55.5°C. (100°F.) above room temperature.
- (4) (Ref., Par. E-2d. - Endurance, F-4a (11)b.) - (Elevated Temperature Run) - This magneto will not meet the temperature requirements specified except for very short periods of time.
- (5) (Ref., Par. E-3e. - Simulated Service) - F-4a(10)a., Rain and Spray Test) - The magneto will not meet the requirements when subjected to the test specified in this par. The installation of this magneto on a liquid-cooled V engine requires and permits maximum ventilation in breaker cover.

E-23f. Cooling - (Ref., Spec. AN-9500, Par. D-23f.) - The engine shall be so designed as to permit the installation of adequate means for cooling the magnetos to required maximum temperature of 80°C. (176°F.). Provision for cooling the spark plugs and spark plug elbows shall consist of air ducts, as shown on Installation Drawing No. 43215 and Drawing Nos. 37583 and 37584, to which the airplane manufacturer shall connect. For flight and ground operation, spark plug elbows shall be satisfactory, provided the ignition wire temperature measured in the elbow does not exceed 115°C. (239°F.) and provided the cable furnished in accordance with U. S. Army Spec. 95-32152 does not fail below this temperature.

E-24c. Oil Leakage Test. - (Reference, Specification AN-9500, Paragraph D-24c.) - With a mixture of equal parts of aviation gasoline and oil conforming to Spec. AN-VV-0-446, Grade 1100, supplied to the pressure oil pump inlet under a head of 36 inches the total flow of oil into the engine shall not exceed 0.2 gallons per hours.

E-24e. Scavenging and Pressure Pumps. - (Reference, Specification AN-9500, Paragraph D-24e. and D-24f.) - Provided no air traps exist in the external scavenging system, the engine scavenging system shall adequately scavenge the engine for extended periods of time under normal operating conditions, with a back pressure on the scavenging system not to exceed a maximum of 30 pounds per square inch at maximum flow, and two pounds per square inch at minimum idling speeds when using either Grade 1100 or Grade 1120 oil, conforming to Specification AN-VV-0-446 at an inlet viscosity of 100 plus or minus 5 Saybolt Universal seconds. The oil pressure pump shall function properly when its inlet pressure is 88% or more of the absolute atmospheric pressure, and no air leaks exist in the external oil inlet line.

E-24g. Oil Cleaner. - The engine shall be equipped with one Automatic Cuno No. 10863, oil strainer, and shall meet the requirements of AN-9500, Par. D-24g. under normal operating conditions.

E-24j. Provision for Oil Connections. - The oil inlet connection shall be a 2 in., 4-stud opening as shown on Installation Drawing No. 43215.

E-24q. Crankcase Breathers. - Ample breathing capacity shall be provided in accordance with Paragraph D-24q. of AN-9500; however, the airplane manufacturer shall locate the front and rear breather outlets to maintain a crankcase pressure measured at the front within the limits of +8 to -4 inches of water on any new or modified airplane installation. It is desired that the pressure at the front breather be held to 2 to 6 inches of water higher than pressure at the rear breather to provide proper ventilation through the engine from front to rear.

E-25. Fuel Metering System - The engine shall be equipped with one Bendix-Stromberg Model PD12K6 injection carburetor. The carburetor shall meet the requirements of Specification AN-9515 except for the following:

(1) (Reference, Paragraph D-7. - Strainer) - The carburetor shall meet requirements except that foreign material is not removed with the strainer.

(2) (Reference, Paragraph D-17. - Mixture Control) - The mixture control positions are located as follows:

- (A) Idle Cut-off Full Forward
- (B) Automatic Lean Directly Back of A.
- (C) Automatic Rich Directly Back of B.

(D) Full Rich Directly Back of C.

(3) (Reference, Paragraph D-26.-Protective Treatment of Steel Parts) - Cadmium plated parts shall have a minimum plating thickness of .0003".

(4) (Reference, Paragraph D-32a(1). - Metering Characteristics) - Sea Level) - The carburetors shall meet requirements except that at 30 to 70 per cent of air flow for normal rated power and speed the variation in fuel/air ratio shall be plus or minus 2 per cent.

(5) (Reference, Paragraph D-32b(1). - Metering Characteristics, Master Carb.) - At take-off power and speed, the carburetor shall contain a setting which in the rich mixture control position will furnish mixture strengths within +4% -0% of the guaranteed fuel consumption.

(6) (Reference, Paragraph D-32b(13). - Carburetor Heat on Test) - The complete airflow to the carburetor shall be heated to avoid icing conditions on test. Duplication of the airplane method of admitting warm air shall not be attempted.

(7) (Reference, Paragraph D-32c. - Metering Characteristics of Production Carburetors) - The carburetors shall meet requirements except that at 30 to 70 per cent air-flow for normal rated power and speed the variation in fuel/air ratio shall be plus or minus 2 per cent.

(8) (Reference, Paragraph F-4e(3). - Metering Tests of Production Carburetors) - A procedure for air box testing production carburetors, in accordance with War Department, Air Corps, Materiel Division letter of April 29, 1938, Serial No. E-57-809-16, shall be used, the procedure being as follows:

Mixture readings are obtained on the normal rated power and speed propeller load curve, using the following points; such points being subject to change to agree with individual carburetor specifications:

<u>AIRFLOW</u>				<u>METERING</u>	<u>MIXTURE CONTROL POSITION</u>			
				<u>TOLERANCE</u>				
Take-off airflow				±2%	Auto.Rich		Auto.Lean	Full Rich
100% rated power airflow				"	"	"		"
75%	"	"	"	"	"	"		"
62-1/2%	"	"	"	"	"	"	Auto.Lean	
50%	"	"	"	"	"	"	"	Full Rich
35%	"	"	"	"	"	"	"	"

<u>AIRFLOW</u>			<u>METERING TOLERANCE</u>	<u>MIXTURE CONTROL POSITION</u>	
22-1/2%	rated power	airflow	+5%	Auto.	Rich
15%	"	"	"	"	"
10%	"	"	"	"	"
Airflow at min. idling speed			"	"	" Idle cut-off

In addition, carburetors designed for automatic altitude compensation are checked at an airflow equivalent to 50% of normal rated power airflow with the mixture control in the automatic rich position and readings are taken at air box pressures of 0, 4, 8, and 14 inches of Hg. less than atmospheric pressure.

E-26. Fuel Priming System. - Provision shall be made for priming the engine with fuel from a separately installed priming pump and lead line, supplied by the airplane manufacturer and attached to the engine priming connection.

E-29. Coolant Pump. - The coolant pump shall be supplied with an internal spring loaded packing. Replacement of the packing is made by disassembly of the pump. No provision shall be made for external packing adjustment.

E-30. Coolant Temperature. - The cooling liquid outlet temperature for liquid cooled engines shall be 121°C. (250°F.)

E-31a(3) Supercharger Drain Valve. - (Reference, Specification AN-9500, Paragraph D-31a(3).) - A gurgle passage without a valve shall be the only provision made for automatic drainage of the induction system.

E-32a. Exhaust Flanges. (Reference Specification AN-9500, Paragraph D-32a) - Exhaust flanges and gaskets in accordance with Installation Drawing No. 43215 and Drawing No. 40751 shall be supplied, but shall not be included in the engine dry weight. Flanges and gaskets shall be shipped with, or separate from the engine, at the request of the procuring agency.

E-36. Accessory Drives. - 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>ACCESSORY DRIVES</u>	<u>RATIO TO CRANKSHAFT</u>	<u>TORQUE RATINGS</u>		<u>ROTATION</u>
		<u>IN. - LBS.</u>		
		<u>CONTINUOUS</u>	<u>STATIC</u>	
Starter	1.000:1	-	16200	C
Generator	1.440:1	600	6000	C
Fuel Pump	0.864:1	25	450	CC
Vacuum Pump (Rear)	1.440:1	150	2250	C
Vacuum Pump (Side)	1.440:1	150	2250	CC
Tachometer (two drives)	0.500:1	2.5	12.5	C
Propeller Governor	0.832:1	15	150	CC
Gun Synchronizer				
Impulse Generator (Two Drives)	0.449:1	25	125	CC

Note: CC indicates counter-clockwise rotation
C indicates clockwise rotation.

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 clockwise.

E-36a(1) (Ref. Spec. AN-9517, Par. E-4b) Clearance shall be provided as shown on Installation Drawing No. 43215.

E-36c Power Take-off Drive. A power take-off drive shall not be provided for driving a gear box assembly.

E-36e Pad and Drive for Gun Synchronizer Impulse Generator. Provision shall be made for driving Gun Synchronizing Impulse Generators by a Type I pad and drive in accordance with Spec. AN-9520 with the following exception to Par. D-1a: The two pads shall be located on the rear face of the reduction gear box and the face of the mounting pad shall be perpendicular to the longitudinal axis of the engine.

E-36e(1) Gun Synchronizing Impulse Generators shall not be furnished.

E-36f Vacuum and Hydraulic Mechanism Oil Pump. Provision shall be made for two drives with the exception that the slotted drive adapter bushing shall not be furnished. (Ref. AN-9521 Par. E-26.)

F. METHODS OF SAMPLING, INSPECTION, AND TESTS.

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

G. PACKAGING, PACKING, AND MARKING FOR SHIPMENT.

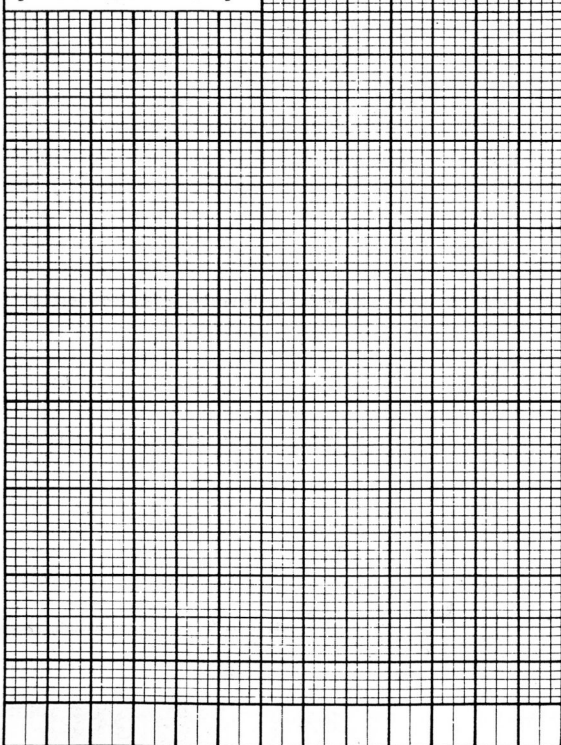
G-1. The requirements for packaging, packing, and marking for shipment shall be as shown in Specification AN-9500.

**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_s BY FORMULA--

$$[\text{HP AT D}] \times \sqrt{\frac{460 + T_s}{460 + T}} = \text{ACTUAL HP}$$

[APPROXIMATELY 1% CORRECTION FOR EACH 10°F. VARIATION FROM T_s]

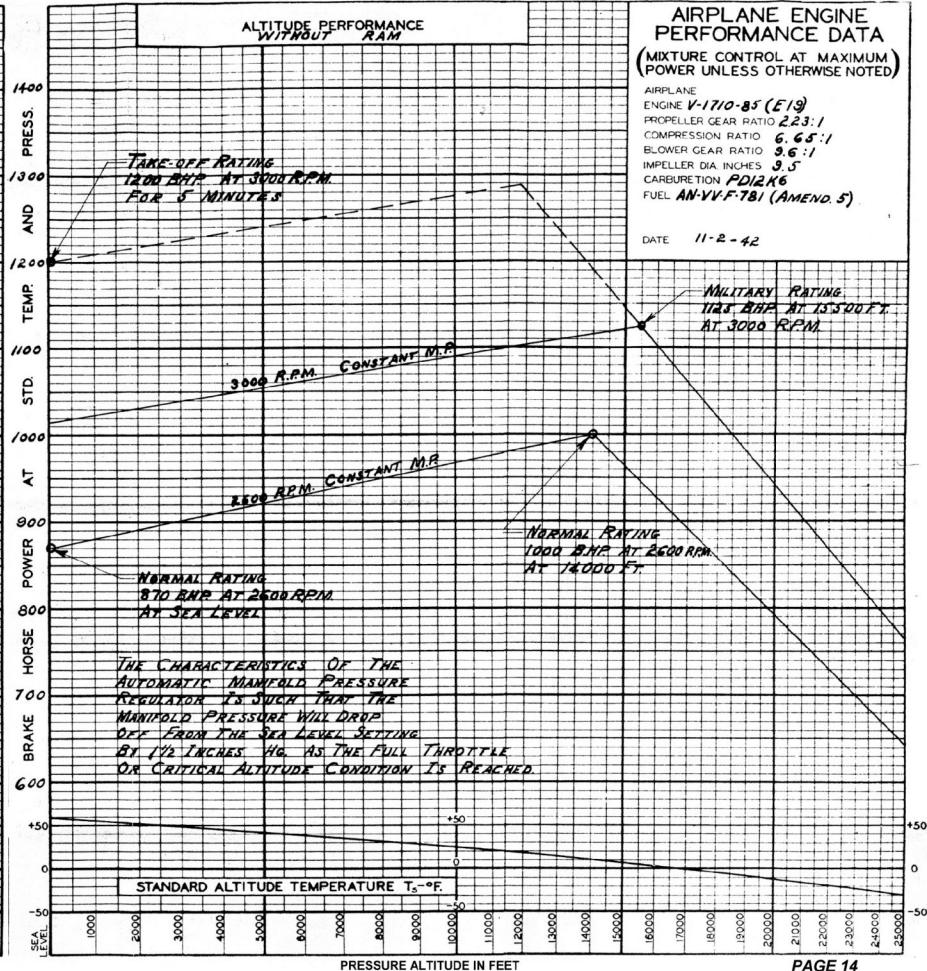


ABSOLUTE MANIFOLD PRESSURE IN HG

**ALTITUDE PERFORMANCE
WITHOUT RAM**
**AIRPLANE ENGINE
PERFORMANCE DATA**
**(MIXTURE CONTROL AT MAXIMUM
POWER UNLESS OTHERWISE NOTED)**

AIRPLANE
ENGINE V-1710-85 (E19)
PROPELLER GEAR RATIO 2.23:1
COMPRESSION RATIO 6.65:1
BLOWER GEAR RATIO 9.6:1
IMPELLER DIA INCHES 9.5
CARBURETION PD12K6
FUEL AN-VV-F7B1 (AMEND. 5)

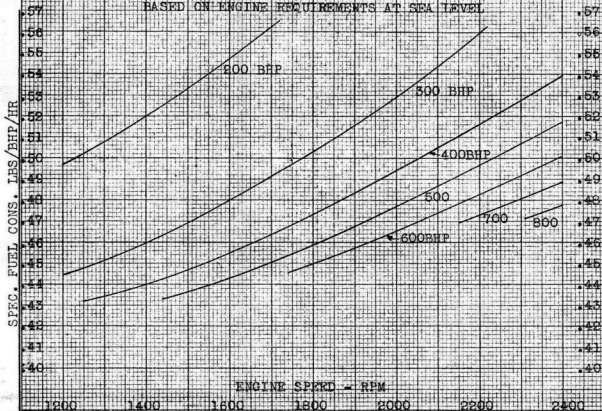
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PRESSURE ALTITUDE IN FEET

PAGE 14

ESTIMATED DATA ON MINIMUM SPECIFIC FUEL CONS.
 BASED ON ENGINE REQUIREMENTS AT SEA LEVEL



ESTIMATED SPECIFIC FUEL
 CONSUMPTION ON PROP LOAD
 AS INDICATED USING PE12K6
 CARBURETOR AT SEA LEVEL

% Normal Power	lbs/BHP/HR 870 BHP	lbs/BHP/HR 1000 BHP
100%	0.64	0.66
90%	0.62	0.64
80%	0.58	0.60
75%	0.56	0.57
65%	0.52	0.53

Take-off Power-- 0.74

At Sea Level

Military Power-- 0.71

At 15,500 Feet

Specifications as of dates listed below shall be applicable to this model specification. Any specification revisions and/or amendments issued prior to date of bid for this model engine and after the particular dates listed below shall not be applicable.

Army-Navy Spec.	AN-9500a	March 30, 1940
" " "	AN-9501a	March 30, 1940
" " "	*AN-9502a	March 30, 1940
" " "	*AN-9503a	March 30, 1940
" " "	*AN-9504	March 1, 1939
" " "	(2)*AN-9506	March 1, 1939
" " "	(3)*AN-9507	March 1, 1939
" " "	*AN-9510a	July 31, 1940
" " "	AN-9511a	July 31, 1940
" " "	AN-9513	March 1, 1939
" " "	*AN-9515a	March 30, 1940
" " "	AN-9516	March 1, 1939
" " "	AN-9517	March 1, 1939
" " "	AN-9518	March 1, 1939
" " "	AN-9519	March 1, 1939
" " "	*AN-9521	March 1, 1939
" " "	AN-9533	March 1, 1939
	(2)*AN-9520	March 1, 1939
A-N Aero Spec.	AN-F-E-568	Nov. 27, 1941
" " "	*AN-GGG-S-128	July 5, 1939
" " "	*AN-J-C-56	Oct. 10, 1941
" " "	*AN-P-4	Jan. 14, 1942
" " "	(2)*AN-QQ-K-181	March 24, 1939
" " "	*AN-VV-C-566	August 1, 1939
" " "	*AN-VV-F-746	Oct. 5, 1940
" " "	*AN-VV-F-748	Sept. 22, 1941
" " "	(5)*AN-VV-F-781	Sept. 26, 1940
" " "	AN-VV-O-446	Dec. 15, 1941
U. S. Army Spec.	95-32152	Nov. 5, 1941
Army-Navy Dwg.	AN-4033	March 1, 1939
" " "	AN-4034	Feb. 25, 1939
" " "	AN-4037	June 10, 1940
AND Dwg.	AND-10201	April 12, 1940

Note: *(Asterisk) and preface number in () (parentheses) indicate that the specification has been amended and the particular amendment that is applicable.

REVISION RECORD FOR 165-B

V-1710-85 (E19)

This revision was made primarily to incorporate the change in take-off speed from 2800 to 3000 RPM. Minor changes were made in order that the specification might conform to production engines. Each paragraph listed below was changed in detail as follows:

Page 1 Revision date, November 2, 1942, added.

Par. A-1a Army-Navy Specifications.

Page 16 changed to Page 17.

Par. E-2 Drawings.

36905-E Priming System Assembly changed to 43325 in order to conform to production practice.

Par. E-3 Acceptance.

The following sentence has been deleted:
"The approval of the 1200 BHP rating at 2800 RPM take-off rating is based upon tests run at Materiel Center in accordance with Par. F-3d(2) of Spec. AN-9502a using fuel conforming to AN-VV-F-781 Amendment No. 5."

Par. E-5a Ratings.

2800 RPM changed to 3000 RPM for take-off speed.

Par. E-5b(2) Curves.

"The curve required shall be furnished after altitude chamber calibration." changed to "Estimated performance data at altitude as shown on Page 16."
Note: Although the altitude chamber calibration has not been furnished, the estimated performance has been included in order to conform to the AN requirements.

Par. E-5b(3) Curves.

"Specific Fuel Consumption curves shall not be furnished (See Page 15)" has been changed to, "Estimated fuel consumption curves as shown on Page 15."
Note: It should be noted that the SFC had not been shown inasmuch as the carburetor had already been calibrated for an engine of different blower ratio. The curve shown in this revision is not a guarantee but is the probable fuel consumption obtained with the PD12K6 carburetor.

REVISION RECORD FOR 165-B

Par. E-5h

Coolant Flow and Heat Rejection.

Take-off speed changed from 2800 to 3000 RPM.

Oil flow changed from 140 to 150 lb./min. in order to conform to Par. E-5i below.

Par. E-5i

Oil Flow and Heat Rejection.

Take-off speed changed from 2800 to 3000 RPM.

Oil flow changed from 140 to 150 lb./min.

Heat rejection to oil changed from 140 to 150 HP.

Note: Oil flow and heat rejection has been increased due to the increase in take-off speed and the greater bearing clearances.

Par. E-36

Accessory Drives.

The listing of the vacuum and hydraulic mechanism oil pump on the reduction gear box has been deleted and the side vacuum pump drive has been included. This changed made to conform to Par. E-36f below.

Par. E-36f

Vacuum and Hydraulic Mechanism Oil Pump.

It was agreed that the drive on the out-board reduction gear box for vacuum and hydraulic mechanism oil pump should not be provided; therefore, the deviations which were taken in Specification 165-A are no longer necessary and have been deleted.

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Performance at Rated Speeds.

Take-off speed has been changed from 2800 to 3000 RPM and the constant manifold pressure line from take-off to full throttle has been shown by dashed lines.

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Fuel Consumption.

Conforming to Par. E-5b(3) as indicated above, the probable fuel consumption has been included instead of giving the authority for using the PD12K6 carburetor.

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Estimated Altitude Performance.

Conforming to Par. E-5b(2) as indicated above estimated performance has been included.

Note:

This revision record is submitted for your convenience. In case of discrepancy between revision record and the specification, the specification shall be considered correct.