

Spec. No. 156-C

Date Issued: Oct. 30, 1941

Revised: Nov. 21, 1941
Feb. 4, 1942
June 24, 1942

MODEL SPECIFICATION

ENGINE, AIRCRAFT: MODEL V-1710-63

ALLISON DIVISION
General Motors Corporation
Indianapolis, Indiana

(ALLISON MODEL DESIGNATION V-1710-E6)

MODEL SPECIFICATION

ENGINE, AIRCRAFT: MODEL V-1710-63

Allison Division of General Motors Corporation

(Allison Model Designation V-1710-E6)

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 10.

A-1b. U. S. Army Specification.

None applicable.

B. TYPE AND MODEL

B-1. This specification covers the requirements for the V-1710-63 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 Engineering drawings form part of this specification:

41891 Engine Assembly, Complete - (Showing Accessory Drive Oil Seals.)

41890 Installation Drawing (Showing clearances for engine accessories and their removal)

36905-E Priming System Assembly

37791-B Carburetor, PD12K2 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 Protector
 41616-C Bag - Engine Shipping
 41694-A Bag - Reduction Gear Box Shipping

E-3. Acceptance. - The engine shall be model tested in accordance with AN-9502 with the following exceptions:

(1) (Reference, Par. F-3c., Power Calibration) - Power calibration of the engine shall be made without loading the accessory drives.

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	1346.3 lbs
Carburetor and injection nozzle	34.5
Carburetor Screens and Gaskets	1.0
Magneto, Shielded	13.2
Ignition Distributors (included in Shielding Assembly)	
Radio Shielded Ignition assembly, complete with Cable and Distributors.	31.1
Spark Plugs	7.2
Priming System on Engine	.5
Cooling Air Deflectors and Baffles	None
Accessory Drive Covers	1.2
TOTAL DRY WEIGHT OF ENGINE	1436 lbs.

E-5 Performance Characteristics. - The ratings specified herein, and the curves specified herein and shown on pages 13 to 18, 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-9502.

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

880 B.H.P. at 2600 R.P.M. at sea level
 1000 B.H.P. at 2600 R.P.M. at 10,800 ft. - Normal
 1325 B.H.P. at 3000 R.P.M. Take-off for five minutes.
 1150 B.H.P. at 3000 R.P.M. military rating at
 12,000 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). Horsepower vs Altitude at Rated Speeds as shown on Page 14.
- E-5b.(2). BHP vs Altitude at Full Throttle (Various Speeds) as shown on Page 15.
- E-5b.(3). Specific Fuel Consumption Curves as shown on Pages 16, 17, & 18.

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 1325 BHP
Speed	Take-off 3000 RPM
Fuel Consumption	Guaranteed Specific
Oil Inlet Temp.	185°F.
Oil Pressure	65 p.s.i.
Coolant Outlet Temp.	250°F.
Oil Flow	140 lb./min.
Air Blast on Engine	60°F. at 10 M.P.H.

Guaranteed Maximum

Coolant Flow - 240 G.P.M.
Heat Rejection to Coolant - 450 H.P.

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 - 1325 BHP
Speed	Take-off - 3000 RPM
Fuel Consumption	Guaranteed specific
Oil Inlet Temp.	185°F.
Oil Pressure	65 p.s.i.
Coolant Outlet Temp.	250°F.
Coolant Flow	240 G.P.M.
Air Blast on Engine	60°F. at 10 M.P.H.

Guaranteed Maximum

Oil flow - 140 lb./min.
Heat Rejection to Oil - 145 H.P.

E-7. Propeller. - The engine shall have a No. 60 propeller shaft end as shown on Installation Drawing No. 41890. Provision shall be made for a governor type of propeller control mechanism. (Ref. AN-9507, Par. E-2a) The governor drive shaft shall rotate at 2778 RPM at military

rated engine speed. 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. 41890. 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 Spec. ES-10.
- (2) (Ref. Par. F-3n., Crankcase) - Dehydrator plugs conforming to Allison Division drawing No. 42288 shall be installed in the crankcase breather as soon as they can be made available. The crankcase breather elbow, Part No. AN-850-16, shall be attached to the engine for shipment.
- (3) (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.
- (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 for this engine in all details shall be the same as the parts list for the current V-1710-35 (E4) engine with the exception of:

- (1) Such design improvements as mutually agreed upon between the contractor and the Government.
- (2) The exception of parts in the reduction gear box peculiar to the 2.00:1 ratio, as herein specified.

E-16. Propeller Drive. - The engine shall be equipped with a reduction gear ratio of 2.00:1. 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 8.80:1 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 AC-LS85 or Champion C34S spark plugs.

E-23b. Radio Shielded Ignition Assemblies. - The engine shall be equipped with Allison designed radio shielded ignition assemblies with the following exceptions to Specification AN-9510:

- (1) (Reference, Paragraph D-1e., - Mounting Lugs) - Mounting clamps shall be provided in place of integral, soldered, or welded mounting lugs.
- (2) (Reference, Paragraph E-8., - Capacitance) - The capacitance between the shielding and each ignition cable contained therein shall not exceed 175 micro-microfarads.
- (3) (Reference, Paragraph E-1a, - Single Cable Conduits) - Single cable conduit connections shall be as shown on Allison Drawing Nos. 42347, 42348, and 42354.

E-23c. High Tension Ignition Cable. - (Reference, Specification AN-9500, Paragraph D-23c) - High tension ignition cable with saturated moisture resistant braid in conformance with U. S. Army Specification 95-32152 shall be used on all distributor head to spark plug leads.

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

- (1) (Reference, Paragraph D-1b(1), Threads) - Connections for the high tension terminals are 15/16-18 threads.
- (2) (Reference, Paragraph 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) (Reference, Paragraph E-2c., Normal Operating Temperature) - The temperature rise of this magneto is 55.5°C. (100°F.) above room temperature.
- (4) (Reference, Paragraph 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) (Reference, Paragraph 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 paragraph. The installation of this magneto on a liquid-cooled V engine requires and permits maximum ventilation in breaker cover.

E-23f. Cooling. - (Reference, Specification AN-9500, Paragraph 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 the spark plug elbows shall consist

of air ducts, as shown on Installation Drawing No. 41890 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 fall below this temperature.

E-24c. Oil Leakage Test. - (Reference, Specification AN-9500, Par. D-24c.) - With a mixture of equal parts of aviation gasoline and oil conforming to AN-VV-O-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 pounds per hour.

E-24e. Scavenging and Pressure Pumps. - (Reference, Spec. AN-9500, Par. 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 lbs. per sq. in. at maximum flow, and two lbs. per sq. in. at minimum idling speeds when using either Grade 1100 or Grade 1120 oil, conforming to AN-VV-O-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 Connection. - The oil inlet connection shall be a 2 inch 4-stud opening as shown on Installation Drawing 41890.

E-24q. Crankcase Breathers. - Ample breathing capacity shall be provided in accordance with Par. 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 PD-12K2 injection carburetor with A.C. setting No. 112. The carburetor shall meet the requirements of AN-9515 except for the following:

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

(2) (Reference, Par. 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 airflow for normal rated power and speed the variation in fuel/air ratio shall be plus or minus 2 per cent.

(8) (Reference, paragraph F-4c.(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 TOLERANCE</u>	<u>MIXTURE CONTROL POSITION</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 gurgler 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. 41890 & 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:

	Ratio to Crankshaft	TORQUE RATINGS		ROTATION
		IN. - Continuous	LEBS. Static	
<u>Accessory Drives</u>				
<u>Starter</u>	1.000:1	-	16200	C
<u>Generator</u>	1.440:1	600	6000	C
<u>Fuel Pump</u>	0.864:1	25	450	CC
<u>Vacuum Pump (Rear)</u>	1.440:1	150	2250	C
<u>Vacuum Pump (Red. Gear Box)</u>	1.313:1	150	2250	CC
<u>Tachometer (two drives)</u>	0.500:1	2.5	12.5	C
<u>Propeller Governor</u>	0.926:1	15	150	CC
<u>Gun Synchronizer Impulse Generator (Two drives)</u>	0.500:1	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. AN-9517, Par. E-4b) Clearance shall be provided as shown on Installation Drawing No. 41890.

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 paragraph 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 following exceptions to

the drive on the outboard reduction gear box.

- (1) (Ref. AN-9521 Par. D-1) - Provision shall not be made for supplying oil pressure to the outboard reduction gear box hydraulic mechanism oil pump pad.
- (2) (Ref. AN-9521 Par. E2b) The slotted drive adapter bushing shall not be furnished.

F. METHODS OF SAMPLING, INSPECTION, AND TESTS.

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

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

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 D FOR VARIATION OF AIR INLET TEMPERATURE T FROM STANDARD ALTITUDE TEMPERATURE T_s BY FORMULA-

$$HP \text{ AT } D \times \sqrt{\frac{560 - T}{460 + T}} = \text{ACTUAL HP}$$

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

CORRECTIONS FOR VARIATION OF CARB. INLET TEMP. T FROM 60° SHOULD BE MADE BY THE FORMULA:-

$$\text{CHART H.P.} \times \left(\frac{520}{460 + T} \right)^{0.50} = \text{CORRECTED H.P.}$$

MANIFOLD PRESSURE @ NORMAL RATING - 36 IN. Hg.
MANIFOLD PRESSURE @ TAKE-OFF - 51 IN. Hg.

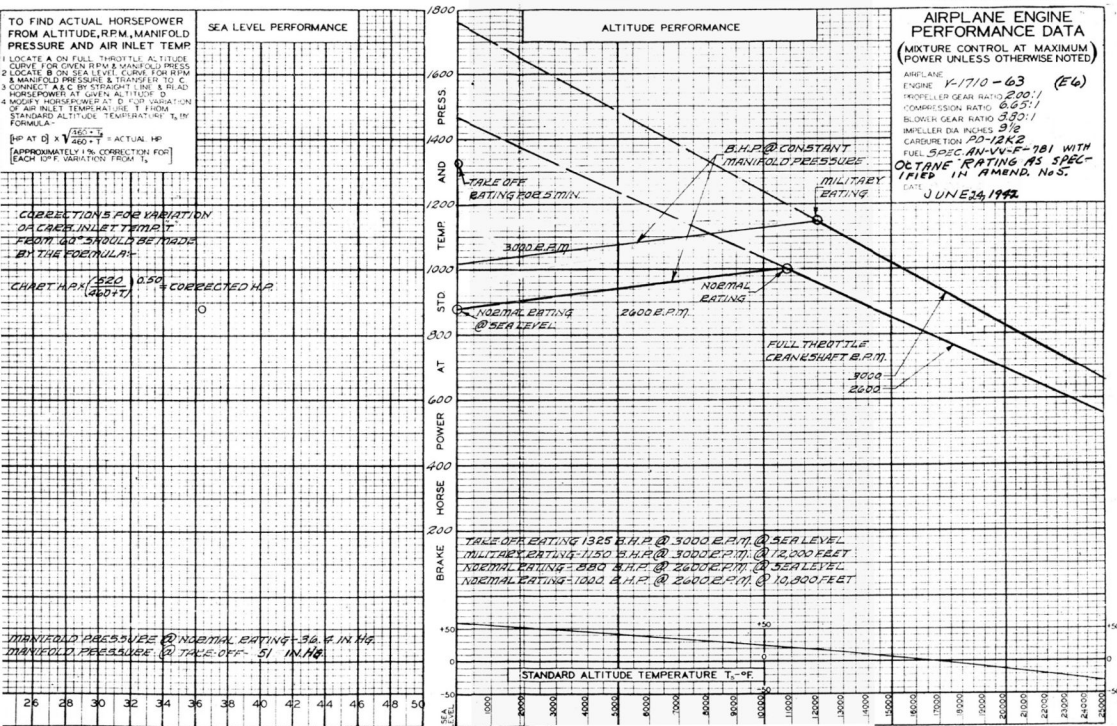
SEA LEVEL PERFORMANCE

ALTITUDE PERFORMANCE

AIRPLANE ENGINE PERFORMANCE DATA

(MIXTURE CONTROL AT MAXIMUM POWER UNLESS OTHERWISE NOTED)

AIRPLANE
ENGINE Y-1710-63 (E6)
PROPELLER GEAR RATIO 2.00:1
COMPRESSION RATIO 6.65:1
BLOWER GEAR RATIO 3.90:1
IMPELLER DIA INCHES 3 7/8
CARBURETOR PD-12K2
FUEL 50% AN-VV-F-781 WITH
OCTANE RATING AS SPECIFIED IN AMEND. No. 5.
DATE JUNE 24, 1942



AIRPLANE ENGINE PERFORMANCE DATA
(AT GUARANTEED MINIMUM)
SPECIFIC FUEL CONS.

AIRPLANE ENGINE V-1710-62 (E6)
PROPELLER GEAR RATIO 2.0:1
COMPRESSION RATIO 6.65:1
BLOWER GEAR RATIO 6.80:1
IMPELLER DIA INCHES 9.2
CAREURETION PD12K2
FUEL SPEC. AN-VV-F-701 WITH OXYGEN RATING AS SPECIFIED IN AMEND. No. 5
DATE JUNE 26, 1942

ALTITUDE PERFORMANCE WITHOUT RAM

ESTIMATED FULL THROTTLE BHP @ ALTITUDE

MILITARY RATING

1150 B.H.P. @ 12,000 FT
44 IN HG @ 3,000 R.P.M.

NORMAL RATING

1,000 B.H.P. @ 10,800 FT
37.2 IN HG @ 2,800 R.P.M.

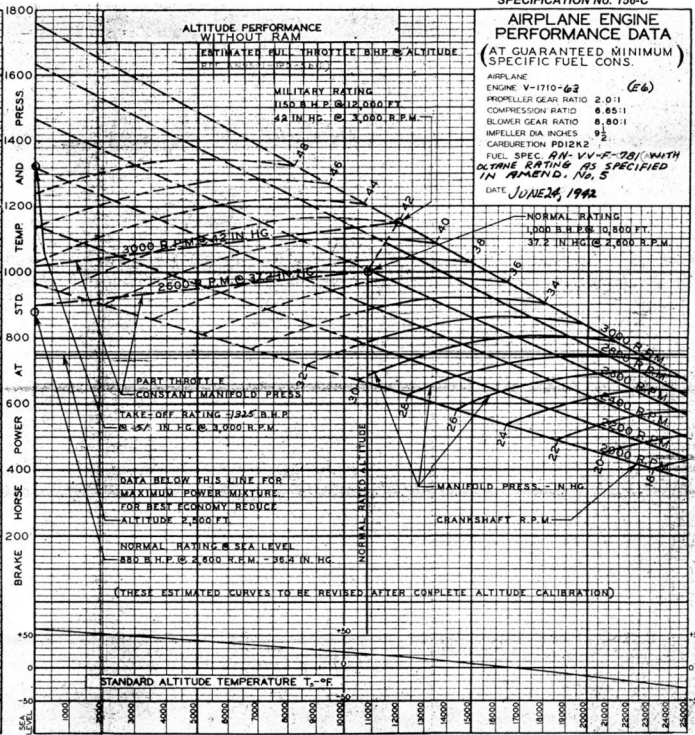
TO FIND ACTUAL HORSEPOWER FROM ALTITUDE, R.P.M., MANIFOLD PRESSURE AND AIR INLET TEMP.

1. LOCATE A ON FULL THROTTLE ALTITUDE CURVE FOR GIVEN RPM & MANIFOLD PRESSURE & TRANSFER TO C
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-

$HP \text{ AT } (C) \times \frac{460 - T}{460 - T_s} = \text{ACTUAL HP}$

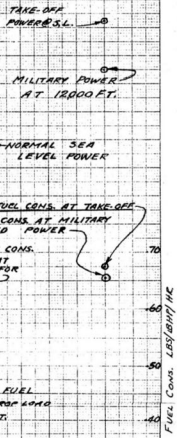
(APPROXIMATELY 1% CORRECTION FOR EACH 10°F VARIATION FROM T_s)

SEA LEVEL PERFORMANCE

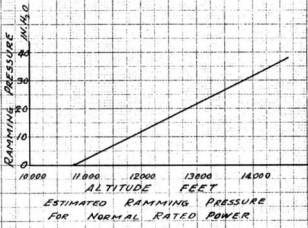


STANDARD ALTITUDE TEMPERATURE T_s - °F

PERFORMANCE CHARACTERISTICS
 ALLISON V-1710-63 (E6) ENGINE
 AT SEA LEVEL AND ALTITUDE
 (WITHOUT RAM)

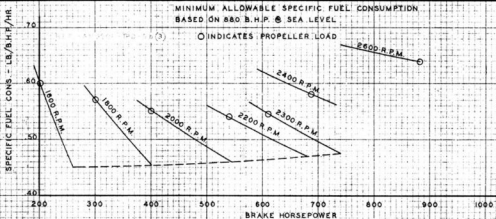
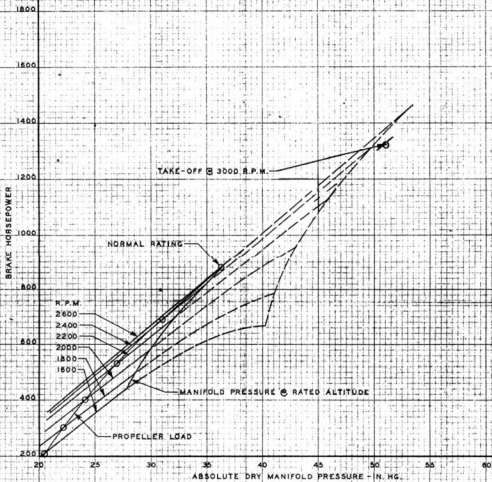


GUAR. SPEC. FUEL CONS. ON PROP. LOAD	
% NoR BHP	LBS/BHP/HR.
100%	0.64
90%	0.62
80%	0.59
75%	0.57
65%	0.54
TAKE-OFF	0.675
MILITARY	0.655



ALLISON V-17D-62 ENGINE PERFORMANCE - BRAKE HORSEPOWER
AND MINIMUM SPECIFIC FUEL CONSUMPTION VERSUS
MANIFOLD PRESSURE @ SEA LEVEL WITHOUT RAM

REF - AN-501 - (D) - 58 (1)

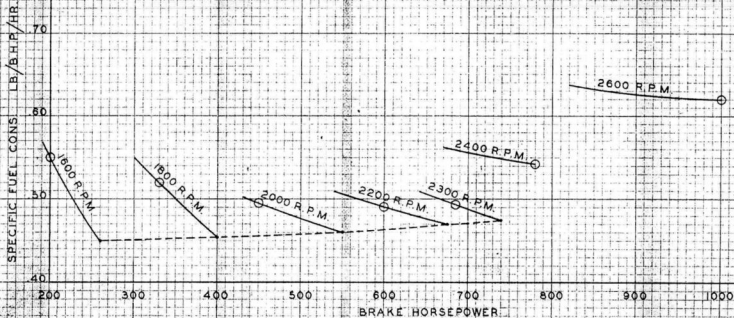


ALLISON V-1710-63 ENGINE PERFORMANCE @ 10,800 FEET
ALTITUDE GUARANTEED MIN. SPECIFIC FUEL CONS.
VERSUS B.H.P. FOR VARIOUS CRANKSHAFT SPEEDS (WITHOUT RAM)

1000 B.H.P. @ 10,800 FEET

O INDICATES PROPELLER LOAD

SPECIFIC FUEL CONS. LB./B.H.P./HR.



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
" " "	(2)*AN-9520	March 1, 1939
" " "	*AN-9521	March 1, 1939
" " "	AN-9533	March 1, 1939
A-N Aero Spec.	AN-F-E-568	Nov. 27, 1941
" " "	*AN-GGG-S-126	July 5, 1939
" " "	*AN-J-C-56	Oct. 10, 1941
" " "	*AN-P-4	Jan. 14, 1942
" " "	(2)*AN-CQ-M-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-C-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.