

Spec. No. 225-C

Date Issued: March 28, 1942

Revised: May 5, 1942

Revised: June 30, 1942

Revised: Feb. 26, 1943

MODEL SPECIFICATION

ENGINE, AIRCRAFT: MODEL V-3420-11 & -13

ALLISON DIVISION
General Motors Corporation
Indianapolis, Indiana

(ALLISON MODEL DESIGNATION V-3420-A16R & A16L)

MODEL SPECIFICATION

ENGINE, AIRCRAFT: MODEL V-3420-11 & -13

Allison Division of General Motors Corporation

(Allison Model Designation V-3420-A16R & L)

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 18.

B. TYPE AND MODEL

B-1. This specification covers the requirements for the V-3420-11 & -13.

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:

42781 Engine Assembly, Complete - (Showing Accessory Drive Oil Seals) V-3420-11 (A16R)

43406 ~~43201~~ Engine Assembly, Complete - (Showing Accessory Drive Oil Seals) V-3420-13 (A16L)

42780 Installation Drawing - (Showing clearances for engine accessories and their removal) V-3420-11 (A16R)

43405

~~43206~~

Installation Drawing (Showing clearances for engine accessories and their removal) V-3420-13 (A16L)

43012 Priming System Assembly

42942 Carburetor, PR58B2 Bendix-Stromberg

40600-N Spark Plug Assembly AC-LS85

40601-I Spark Plug Assembly Champion C34S

42354-D Terminal, Spark Plug (Contact)

43400 Lubrication System Diagram (V-3420)

42279 **Magneto**

42490-E Radio Shielding Assembly V-3420-11 (A16R)

42100-E Radio Shielding Assembly V-3420-13 (A16L)

43016 Manifold Assembly - Spark Plug Cooling R.H.

43017 Manifold Assembly - Spark Plug Cooling L.H.

33536-Q Nut - Magneto Cable Shielding Conn.

42348-D Shielding - Spark Plug Cable - Intake

42347-E Shielding - Spark Plug Cable - Exhaust

43401 Bag - Engine Shipping (V-3420)

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

42288-C Plug - Crankcase Dehydrator

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

- (1) (Ref. AN-9502 Par. F-3b Torsional Vibration and AN-9504 Par. E-3) The torsional vibration measured at the rear of the crankshaft shall not exceed $\pm 1.25^\circ$ for the 1 1/2 order single node vibration and ± 0.35 for the 6th order 2 node vibration.
- (2) (Ref. AN-9502 Par. F-4a (1) Knock Rating of 100 Octane Fuel) The fuel shall conform to Amend. No. 5 of AN-VV-F-781.

E-4. Weight. - The total dry weight of the engine complete 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.	2511.0 lbs.
Carburetor and Injection Nozzle	48.0
Carburetor Screen and Gaskets	2.0
Magnetos, Shielded	26.0
Ignition Distributors (included in Shielding Assembly)	
Radio Shielded Ignition Assembly, complete with Cable and Distributors	63.0
Spark Plugs	12.0
Priming System on Engine	1.5
Cooling Air Deflectors and Baffles	None
Accessory Drive Covers	1.5
TOTAL DRY WEIGHT OF ENGINE	2655.0 lbs.

E-5. Performance Characteristics. - The ratings specified herein, and the curves specified herein and shown on Pages 15, 16, and 17 shall constitute the power and specific fuel consumption guarantees unless specifically stated otherwise on curve sheet. The terms used and the standard conditions shall be in accordance with the applicable definitions contained in Spec. AN-9502.

E-5a. Ratings. - The engine shall be given the ratings listed below using fuel conforming to AN-VV-F-781 (Amend. No. 5) and oil conforming to AN-VV-O-446 grade 1120. The ratings are based upon guaranteed specific fuel consumption with 80° F. carburetor air inlet temperature, and 30 inches Hg. absolute dry carburetor inlet pressure and 30 inches Hg. exhaust back pressure.

- 2100 BHP at 2600 RPM at sea level.
- 2100 BHP at 2600 RPM - normal rating from sea level to 25,000 feet with an exhaust turbo supercharger installation of suitable output.
- 2600 BHP at 3000 RPM take-off for 5 minutes.
- 2600 BHP at 3000 RPM - Military rating from sea level to 25,000 feet for 15 minutes with an exhaust turbo supercharger installation of suitable output.
- 3120 RPM rated overspeed dive.

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

- E-5b.(1) BHP vs. Altitude as shown on Page 15 .
- E-5b.(2) Estimated BHP vs. Altitude without turbo as shown on page 16.
- E-5b.(3) Specific Fuel Consumption as shown on Page 17.
- E-5b.(4) Engine Power vs. Exhaust Back Pressure curves will be furnished after calibration has been made on the particular airplane manufacturer's turbo exhaust piping.

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 coolant flow and heat rejection to the coolant.

Conditions:

- Operation On dynamometer for 5 minutes
- Power Take-off - 2600 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. 300 lb./min.
- Air Blast on Engine 10 M.P.H. at 60°F.

Guarantee:

Coolant Flow not to exceed 530 GPM
Heat Rejection to Coolant not to exceed 860 HP.

E-5h(1); E-5h(1)(a); E-5h(1)(b). The coolant pump shall function satisfactorily providing the pressure at the coolant pump inlet shall not fall below 25" Hg. absolute at the altitude at which military power is obtained and providing the pressure drop with 530 GMP flow through the radiator circuit does not exceed 15 lbs./sq.in. To obtain these conditions it will be necessary to pressurize the coolant system. The pressure at the coolant pump inlet in the pressurized system shall not exceed 36" Hg. absolute under altitude or sea level conditions. The coolant pump flow data required by AN-9501 shall be furnished following completion of tests by the engine manufacturer, of the coolant pump with the external system to be used in the airplane as furnished by the airplane manufacturer.

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

Conditions:

Operation	On dynamometer for 5 minutes
Power	Take-off - 2600 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.	530 GPM
Air Blast on Engine	10 MPH at 60°F.

Guarantee:

Oil Flow not to exceed 300 lb./min.
Heat Rejection to Oil not to exceed 300 HP.

E-6. Engine Performance. - (Ref. AN-9500, Par. D-6)
The complete engine shall function satisfactorily up to an altitude of 40,000 ft. or to the service ceiling of the airplane whichever is the minimum value.

E-7. Propeller. - The engine shall have a number 60 propeller shaft in accordance with AN-9506 with the exception (to Par. E-3) that the engine nose end shall be modified to accommodate proposed propeller design and shall be in accordance with installation drawings 42780 and 43200.

A governor mounting pad and drive in accordance with AND 10010 shall be provided. Two oil supply lines from the governor mounting pad shall be furnished; one connecting to the outer row of holes (Fig. 4 of AN-9506) in the propeller shaft, and the other connecting to the oil supply passage in the center of the propeller shaft. By the removal of an externally accessible

plug, the center passage in the propeller shaft may be supplied with engine oil pressure instead of governor controlled pressure.

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

Length	95-15/16 inches
Width	60 inches
Height	37-29/32 inches

E-14. Preparation for Storage. The engine shall be prepared for storage in accordance with AN-F-E-568 with the exceptions to paragraphs as listed below:

(1) (Par. B-1b. AN-Aero. Standard Drawings). The following Allison Division drawings shall apply in lieu of AN parts.

42288 - Plug Crankcase Dehydrator
41310 - Cap - Prop. Shaft Thread
43401 - Envelope - Engine Protector

(2) (Par. F-2a(1) - Operation Procedure). The requirements of this paragraph shall be met except that the specified compound-lubricating oil mixture shall not be used in the manner specified.

(3) (Par. F-3h - Intake Manifold). A one pound bag of dehydrating agent shall be secured to the inside of the air intake cover.

(4) (Par. F-3n - Crankcase). A dehydrator plug No. 42288 shall be installed in an appropriate opening of the crankcase.

(5) (Par. F-4a(1) Packing Procedure). The base of the engine shipping box shall function as the shipping saddle and the upper case may be removed leaving the engine, bag, and shipping box base intact.

E-16b. 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 equipped with a reduction gear ratio of 3.13:1. The direction of propeller rotation, when viewed from the anti-propeller end, shall be clockwise for the A16R and counterclockwise for the A16L.

E-19. Impeller Gear. - The impeller gear ratio shall be 6.9:1 on the V-3420-11 (A16R) and 6.82:1 on the V-3420-13 (A16L). The impeller diameter shall be 10 in. These ratios and diameters may be changed at the option of the engine manufacturer.

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.

E-23b Radio Shielded Ignition Assemblies. - The ignition harness and magneto are designed to permit supercharging. A single connection to a suitable location in the turbo outlet duct is to be made by the airplane manufacturer. The engine shall be equipped with Allison designed radio shielded ignition assemblies in accordance with AN-9510 with the following exceptions:

- (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 (5 mm) shall be used on all distributor head to spark plug leads. All other high tension cable shall conform to AN-J-C-56 (7 mm). Date marking procedure shall conform to that agreed upon between the manufacturer and the Government.

E-23d. Magnetos. - The engine shall be equipped with two Scintilla Type DFLN6 magnetos in accordance with 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-2c., Normal Operating Temperature) The temperature rise of this magneto is 55.5°C. (100°F.) above room temperature.

- (3) (Ref. Par. E-2d., Endurance) These requirements shall be met except that during the Operating Run, Par. F-4a(11)a, the breaker shall be lubricated at intervals of approximately 100 hours, and during the Elevated Temperature Run, Par. F-4a(11)b, the ambient temperature shall be 150°F.

E-23f. Cooling. - (Ref. 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 the spark plug elbows shall consist of air ducts, as shown on Installation Drawing Nos. 42780 and 43200 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. (230°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. - (Ref. 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 0.3 pounds per hour.

E-24e. Scavenging and Pressure Pumps. - (Ref. 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 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 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 down to a minimum of 10 in. Hg. absolute inlet pressure, when no air leaks exist in the external oil inlet line.

E-24g. Oil Cleaner. - The engine shall be equipped with one Automatic Cuno oil strainer, Allison Division No. 35499, and shall meet the requirements of AN-9500, Par. D-24g under normal operating conditions.

E-24j. Provisions for Oil Connections. - The oil inlet connection shall be a 4-stud flange as shown on Installation Drawing Nos. 42780 and 43200.

E-24q. Crankcase Breathers. - Ample breathing capacity shall be provided in accordance with Par. D-24g. 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 PR58E2 injection carburetor in accordance with AN-9515 except for the following:

- (1) (Ref. Par. D-10, Fuel Line Connection)
The carburetor shall be furnished with one 3-bolt fuel inlet flange.
- (2) (Ref. Par. D-17, Mixture Control) - The mixture control positions are located as follows:
 - (A) Idle Cut-off - full forward
 - (B) Manual Control Range directly back of A
 - (C) Automatic Lean directly back of B
 - (D) Automatic Rich directly back of C
 - (E) Full Rich directly back of D
- (3) (Ref. Par. D-26 Protective Treatment of Steel Parts) Cadmium plated parts shall have minimum plating thickness of .0003".
- (4) (Ref. Par. D-32a(2) Altitude) - Carburetors which compensate automatically for altitude shall hold the fuel air ratios at constant air flow at all altitudes up to 16,000 ft. standard altitudes to within $\pm 2\%$ of that obtained at sea level. At altitudes greater than 16,000 ft. standard altitudes, the fuel air ratios shall be within limits as specified in deviation to Par. D-32a(3).
- (5) (Ref. Par. D-32a(3) Carburetor Air Temperature) Carburetors which compensate automatically for altitude shall hold the fuel air ratio at constant air flow, to within $\pm 2\%$ of that obtained for 15.6°C (60°F) over a range of carburetor air intake temperatures from -28.9° to 48.9°C (-20 to + 120°F) and to within $\pm 3\%$ from 16,000 ft. to 25,000 ft. standard altitudes with carburetor air intake temperatures from 40° to 4.4°C (-40° to + 40°F) and to within $\pm 5\%$ from 25,000 ft. to 40,000 ft. standard altitudes with carburetor air intake temperatures from -54° to -17.8°C (-67° to 0°F).

- (6) (Ref. Par. D-32b to D-32b(3) Inclusive Metering Characteristics.) - In lieu of the requirements of these paragraphs, the carburetor shall be set to give mixture strengths as shown on Page 14.
- (7) (Ref. Par. D-32b(17) Fuel Pressure) - The fuel pressure used during the reference carburetor tests shall be maintained at 15 ± 1 p.s.i.
- (8) (Ref. Par. F4e(3) Metering Test of Production Carburetors) - This paragraph is complied with, except as follows: Mixture readings in automatic lean position are checked for normal rated power and speed propeller lead curve at airflows corresponding to 30, 40, 50, 60 and 100 percent of normal rated power airflow and take-off airflow.
- In addition, carburetors designed for automatic altitude compensation are checked at airflow equivalent to 50% of normal rated power airflow with the mixture control in the automatic lean position and readings are taken at airbox pressures of 0, 8, 14, and 23 inches of Hg less than atmospheric pressure.

E-26. Fuel Priming System. - Provision shall be made for priming the engine from a separately installed priming pump and lead line, supplied by the Airplane manufacturer and attached to the engine priming lines Assembly No. 43012

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 $121^{\circ}\text{C.}(250^{\circ}\text{F.})$.

E-31a.(3) Supercharger Drain Valve. - (Ref. AN-9500 Par. D-31a (3).) - A fuel aspirator without a valve shall be the only provision made for automatic drainage of the induction system.

E-32a. Exhaust Flanges. - (Ref. AN-9500 Par. D-32a) Exhaust flanges and gaskets in accordance with Installation Drawings Nos. 42780 and 43200 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 ration 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 RATING IN.-LBS.</u>		<u>ROTATION</u>	
		<u>CONTINUOUS</u>	<u>STATIC</u>	<u>A16R</u>	<u>A16L</u>
<u>Starter</u>	1.000:1	-	24,000	CC	C
<u>Generator</u>	3.000:1	300	3,000	C	C
<u>Fuel Pump</u>	.750:1	25	450	CC	CC
<u>Vacuum Pump Rear</u>	1.284:1	150	2,250	CC	CC
<u>Vacuum Pump Red. Gear</u>	1.278:1	150	2,250	CC	C
<u>Tachometer - Type I</u>	.500:1	2.5	12.5	CC	CC
<u>Tachometer - Type II</u>	.500:1	2.5	12.5	C	C
<u>Propeller Governor</u>	.913:1	15	150	C	CC
<u>Power Take-Off</u>	2.963:1	1000	5,000	C	C

C - Clockwise
CC - Counter-clockwise

E-36a. Starter - The starter mounting pad and drive shall be Type IV, in accordance with AN-9517. The direction of rotation when looking at the starter dog attached to the engine shall be counter-clockwise on the A16R and clockwise on the A16L.

E-36a (1). (Ref. AN-9517 Par. E-4b.) - Clearance for the starter shall be provided as shown on Installation Drawing Nos. 42780 and 43200.

E-36b. Generator. - (Ref. AN-9500 Par. D-36b) a generator mounting pad and drive conforming to AN-9518 shall be provided with the following exceptions:

- (1) (Ref. Par. E-1 Dimensions) The dimensions shall conform to a Type II pad and drive as specified in Fig. 2 of AN-9522.
- (2) (Ref. Par. E-3) - The generator drive shall rotate at 7800 RPM when the engine is running at normal rated speed.

E-36c. Power Take-off Drive. - A Type II power take-off pad and drive shall be furnished in accordance with AN-9522 with the following exceptions:

- (1) (Ref. Par. D-2 Accessibility) Clearance shall be provided as shown on installation drawings Nos. 42780 and 43200.
- (2) (Ref. Par. D-3 Speed) The drive shall rotate at 7704 RPM when the engine is running at normal rated speed.
- (3) (Ref. Par. E-1b Dimensions) The pad and drive shall conform to Fig. 2 of AN-9522 with the exception that the splined bushing shall not be furnished. In addition the pad will not support any accessory or accessory drive having a weight moment in excess of 40 in.-lbs.

E-36e. Pad and Drive for Gun Synchronizer Impulse Generator. Provision shall not be made for driving gun synchronizing impulse generators.

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

E-36f. Vacuum and Hydraulic Mechanism Oil Pump. - Two Type II mounting pads and drives shall be furnished in accordance with Spec. AN-9521 with the exception that the adapter flange and slotted adapter bushing shall not be furnished as required in Fig. 2 of AN-9521.

E-45. Interchangeability. - The V-3420-11 (A16R) engine can be built at assembly from the detail parts of the V-3420-13 (A16L) engine or vice versa, by the substitution, addition or deletion of a few special parts that have been held to a practical minimum that is commensurate with similar performance and durability for either direction of rotation.

F. METHODS OF SAMPLING, INSPECTION, AND TESTS.

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

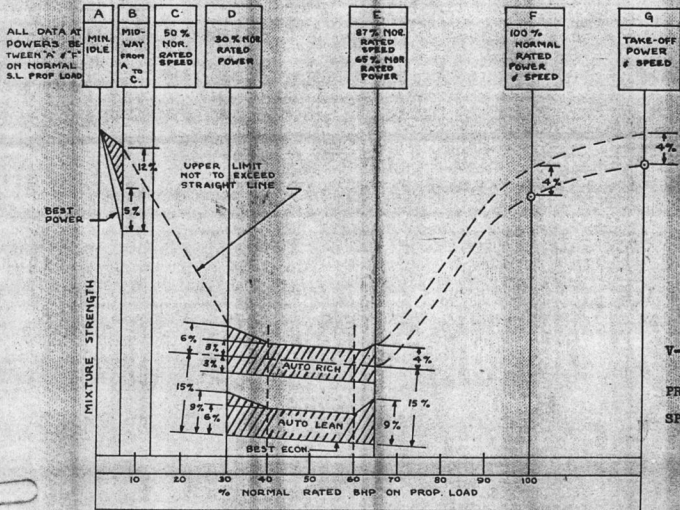
G. PACKAGING, PACKING, AND MARKING FOR SHIPMENT.

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

CARBURETOR SETTING

IN LIEU OF PAR. D-32 b TO D-32 b (3) OF AN 9515 b THE CARBURETOR SETTING SHALL BE ESTABLISHED AS SHOWN BELOW.

- - GUARANTEED SPECIFIC FUEL CONSUMPTION - POINTS
- ▨ - SETTING WILL FALL WITHIN SHADED AREA AND WITHIN LIMITS SPECIFIED AT SPECIFIED AIRFLOWS.



V-3420-11 & 13
A16R & A16L

PR58B2 Carb.

SPEC. 225-C

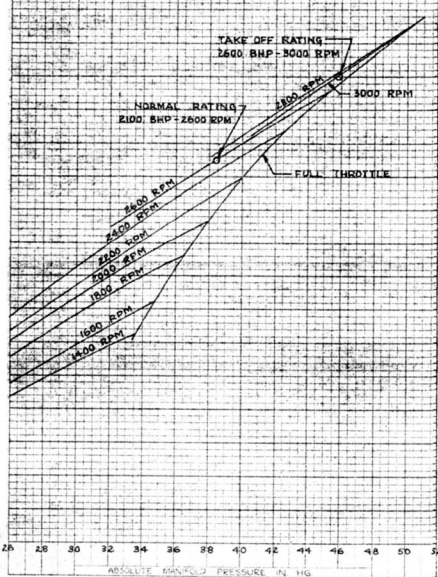
SEA LEVEL PERFORMANCE, HORSEPOWER VS MANIFOLD PRESSURE
WITH BEST POWER MIXTURE STRENGTH UNLESS OTHERWISE NOTED

80°F. CARB. AIR TEMP.
29.9 IN. HG. CARB. INLET PRESS.
AUTO. RICH MIXTURE SETTING

TAKE OFF RATING
2600 BHP - 3000 RPM

NORMAL RATING
2100 BHP - 2600 RPM

FULL THROTTLE

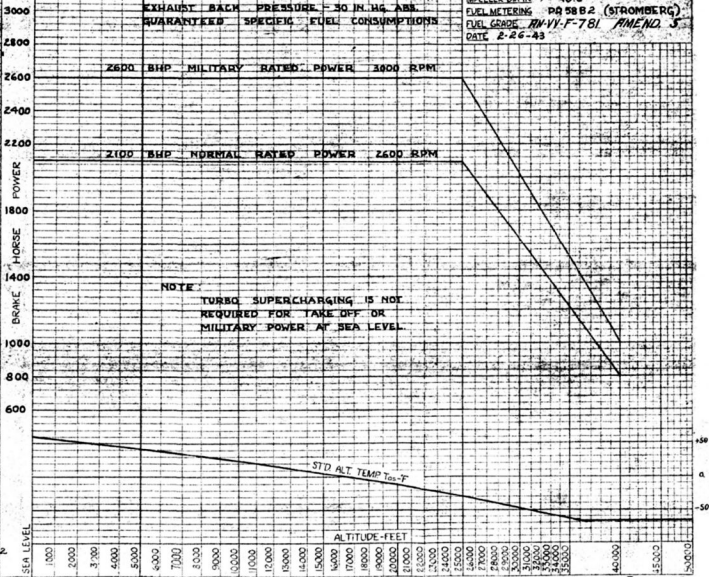


ALTITUDE PERFORMANCE - HORSEPOWER AND MANIFOLD PRESSURE
AT STANDARD ATMOSPHERIC CONDITIONS WITH BEST POWER MIXTURE STRENGTHS UNLESS OTHERWISE NOTED

CONDITIONS TO RATED ALTITUDE:
CARB. INLET PRESS - 30 IN. HG. ABS.
CARB. INLET TEMP - 80°F.
EXHAUST BACK PRESSURE - 30 IN. HG. ABS.
GUARANTEED SPECIFIC FUEL CONSUMPTIONS

ALLISON DIV GMC SPEC. NO. 225-C
AIRCRAFT ENGINE
NORMAL PERFORMANCE

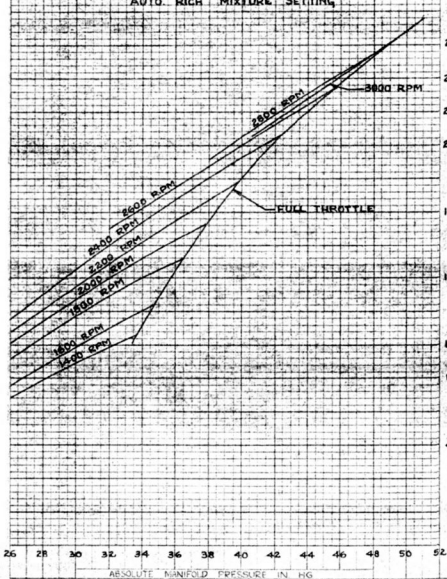
ENGINE MODEL V-3420-11 & -13 (A16R&L)
PROP. GEAR RATIO 3.13:1
COMPRESSION RATIO 6.65:1
IMPELLER GEAR RATIO 69:1 A16R, 68.2:1 A16L
IMPELLER DIA. IN. 10.0
FUEL METERING PQ 5882 (STROMBERG)
FUEL GRADE RN-VY-F-781 AMEND. 5
DATE 2-26-43



NOTE:
TURBO SUPERCHARGING IS NOT
REQUIRED FOR TAKE OFF OR
MILITARY POWER AT SEA LEVEL

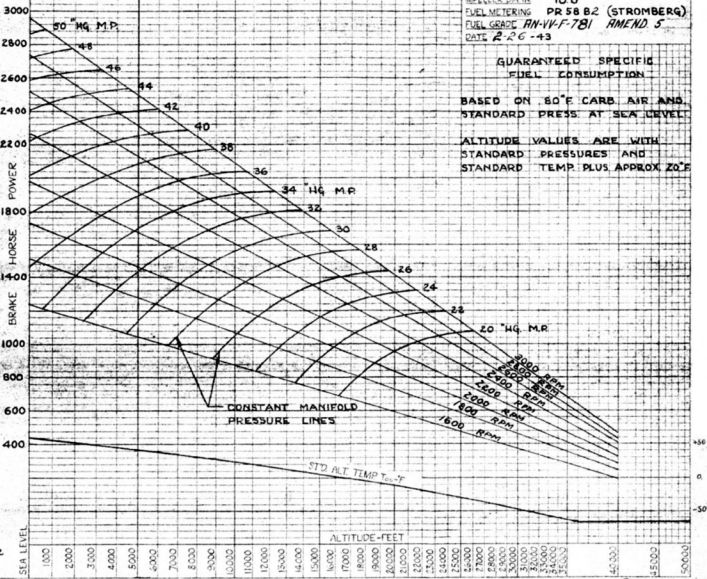
SEA LEVEL PERFORMANCE, HORSEPOWER VS MANIFOLD PRESSURE
WITH BEST POWER MIXTURE STRENGTH UNLESS OTHERWISE NOTED

80°F CARB AIR TEMP
29.9 IN HG CARB INLET PRESS.
AUTO. RICH MIXTURE SETTING



ALTITUDE PERFORMANCE - HORSEPOWER AND MANIFOLD PRESSURE
AT STANDARD ATMOSPHERIC CONDITIONS WITH BEST POWER MIXTURE STRENGTHS UNLESS OTHERWISE NOTED

ESTIMATED FULL THROTTLE
WITHOUT TURBO OR RAM
SUBJECT TO 2% VARIATION

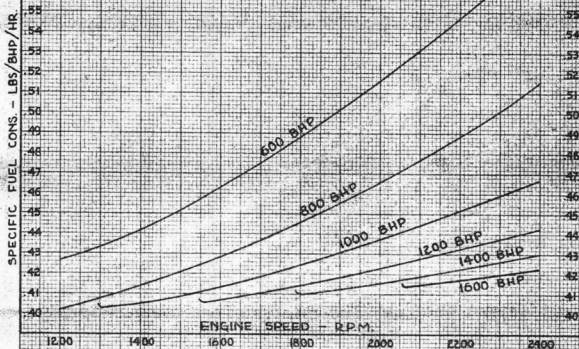


ALLISON DIV. G.M.C. SPEC NO. 225-C
AIRCRAFT ENGINE
NORMAL PERFORMANCE
ENGINE MODEL V-3420-11B-13(A16R&L)
PISTON GEAR RATIO 3.13:1
COMPRESSION RATIO 6.65:1
MPELLER GEAR RATIO 6.9:1-A/R, 6.82:1-A/I, G/L
MPELLER DIA. IN 10.0
FUEL METERING PR 58 B2 (STROMBERG)
FUEL GRADE AN-VV-F-781 AMEND 5
DATE 2-26-43

GUARANTEED SPECIFIC FUEL CONSUMPTION
BASED ON 80°F CARB AIR AND STANDARD PRESS AT SEA LEVEL
ALTITUDE VALUES ARE WITH STANDARD PRESSURES AND STANDARD TEMP PLUS APPROX 20°F

ESTIMATED BEST ECONOMY SPECIFIC FUEL CONS.
BASED ON ENGINE REQUIREMENTS AT SEA LEVEL

V-3420-11&13(A16R&L)



GUAR B.S.F.C. ON
NORMAL S/L PROP.
LOAD AT SEA
LEVEL.

% NORMAL POWER	B.S.F.C. LBS/BHP/HR
100	0.60
90	0.57
80	0.51
70	0.48
60	BEST ECON. EST. 0.43

TAKE OFF POWER 0.66

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-9515b	August 6, 1942
" " "	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
" " "	(2)*AN-9522	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-QQ-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-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.	AND10201	April 12, 1940
"	AND10010	April 18, 1942

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

REVISION RECORD 225-C

V-3420-11 & -13 (A16R & L)

This revision was made in order to maintain an accurate record of changes which were made in the engines after coordination of the Specification for contract. Ordinarily changes of a minor nature are not necessary in the model specification but it was considered advisable in this case since the ratio of the accessory drives, the setting of the carburetor, and requirements for Coolant pumps installation are of sufficient importance to warrant a specification revision.

Detail changes on the various pages or paragraphs are as follows:

Page 1 Revision date February 26, 1943 added.

Par. E-2 Drawings.

42960 changed to 43012
 42392 changed to 42942
 40600J changed to 40600N
 40601B changed to 40601I
 42354 revision D added
 41550C changed to 42279
 42490 revision E added
 42100 revision E added
 37583B changed to 43016
 37584B changed to 43017
 33536N changed to 33536Q
 42348 revision D added
 42347 revision E added
 42288B changed to 42288C

Par. E-5b Curves.

The following paragraph has been added "E-5B(2) estimated BHP vs. Altitude without Turbo as shown on page 16.

E-5b(3) "and ram vs. altitude" has been omitted.

Par. E-5b(4) In paragraph E-5b(4) "engine power vs. exhaust back pressure curves will be incorporated on page 17" has been changed to "engine power vs. exhaust back pressure curves will be furnished....."

Par. E-5h.(1); E-5h(1)(a); E-5h(1)(b) Coolant Pump Calibration.
 This paragraph has been rewritten entirely in order to more accurately describe the conditions underwhich the Coolant pump will function satisfactorily.

E-14 Preparation for Storage

This paragraph has been rewritten in order to conform to the procedure now being used in production.

E-25 Fuel Metering System.

This paragraph has been rewritten entirely in order to conform to the actual setting which is being made on the PR58B2 carburetor. The PR58B2 carburetor will contain the same setting as the PR58B3 which will be used on the V-3420-17 engine which is a later model of the A series.

E-26 Fuel Priming System.

This paragraph has been rewritten to eliminate the statement that provision will be made for electric valves installed on the carburetor. It was decided that the priming pumps or priming valves were to be considered as part of the government furnished equipment.

E-36 Accessory Drives.

The rotation of the Type I Tachometer has been changed from clockwise to counter-clockwise, and the rotation of the Type II has been changed from counter-clockwise to clockwise. The ratio to crankshaft of the propeller has been changed from .821:1 to .913:1.

Page 15 Showing the rated power curves has been corrected on the sea level calibration in order to conform to actual calibration on the later model engines. It should be noted that the actual full throttle power available at sea level has been increased considerably.

Page 16 Of the Specification 225-C has been added as indicated in paragraph E-5b(2) showing estimated full throttle HP without turbo.

Page 17 Which was page 16 of 225-B has been redrawn showing the actual fuel consumption in the low speed cruising range based on engine tests with the latest developments. The guaranteed fuel consumption table has been changed to include the 70% normal power at .48 lbs/BHP/HR instead of the 75% power at .47 lbs/BHP/HR, likewise, the 65% power has been changed to 60% power at best economy which is estimated at .43lbs/BHP/HR. The curve showing the effect of ram pressure has been omitted.

Page 17(cont) In Specification 225-B, page 17 was a blank curve sheet indicating that the effect of exhaust back pressure would be incorporated after calibration with the particular aircraft manufacturer's exhaust piping. This page has been omitted in 225-C. The data however, will be furnished after calibration has been completed, but not as part of the specification.

Page 18 In the list of Applicable Specifications, the requirements for carburetor setting has been changed from AN-9515a dated March 30, 1940, to AN-9515b dated August 6, 1942.

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