

Spec. No. 183-A
Date issued: March 31, 1943
Revised: December 20, 1943

MODEL SPECIFICATION

ENGINE AIRCRAFT
Model V-1710-115

ALLISON DIVISION
General Motors Corporation
Indianapolis, Indiana

ALLISON MODEL DESIGNATION
V-1710-F31R

MODEL SPECIFICATION

ENGINE, AIRCRAFT: MODEL V-1710-115
 Allison Division of General Motors Corporation
 Allison Model V-1710-F31R

A. APPLICABLE SPECIFICATIONS

A-1. The specifications listed on pages 16 and 17 except as revised herein shall form a part of this specification.

B. TYPE AND MODEL

B-1. The specification covers the requirements for the V-1710-115 engine.

B-1a. General Description The V-1710-115 (R.H. Prop. Rotation) engine is a 12-cylinder liquid-cooled 60° Vee-type engine equipped with an integral reduction gear assembly and a single stage supercharger.

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. The following Allison Division Drawings form part of this specification:

| | |
|-------|--|
| 53806 | Engine Assembly, Complete (Showing Acc. Dr. Oil Seals) |
| 53805 | Installation Drawing (Showing clearances for engine accessories and their removal) |
| 43590 | Priming System Assembly |
| 44692 | Carburetor - Model Bendix-Stromberg |
| 53466 | Spark Plug Assembly Champion C34S* |
| 44099 | Spark Plug Assembly ACLS86 |
| 42354 | Contact Assembly, Spark Plug (Terminal) Lubrication System Diagram (To be included with Service Manual) |
| 53831 | Radio Shielding Assembly Control - Automatic Engine |

E-3a. Model Test The engine shall be model tested at the contractor's plant in accordance with Specification AN-9502 with the following exceptions:

- (1) (Ref. F-1) General All tests under this specification shall be conducted at the contractor's plant.
- (2) (Ref. Par. F-3b) Torsional Vibration and Spec. AN-9504, Par. E-3c and E-3e The vibration amplitude measured at the rear of the crankshaft shall not exceed $\pm 1.35^\circ$ for the single node vibration and $\pm 0.35^\circ$ for the two node vibration. The engine shall perform satisfactorily with these limits.
- (3) (Ref. Par. F-3d(7)) The 42% power 56% speed run shall be made at 42% power and at the lowest speed (but not less than 56%) obtainable with the propeller and ram available for stable testing.
- (4) (Ref. Par. F-4a(1)) Knock Rating Fuel The engine shall be rated and model tested using Grade 130 fuel conforming to Specification AN-F-28, Amendment No. 2.
- (5) (Ref. Par. F-4g) Fuel and Oil Consumption The specific fuel consumption for the normal power, 110% normal rated speed run of Par. F-3d(8) shall be increased by .03 lb. per BHP per hour above the guaranteed value for normal power and speed.
- (6) (Ref. Par. F-4i) Inspection and adjustments In addition to the normal cleaning and adjustments, the spark plugs may be cleaned before the 15-hour take-off period of Par. F-3d(2).

E-3b. Acceptance Test The acceptance of this engine in production shall be based upon tests run in accordance with AN-9503 with the following exceptions:

- (1) (Ref. Par. F-5a(1)) Two-hour Initial Run In lieu of the requirements of this paragraph, the following runs shall be made in the order listed:

One-hour run at 89% normal rated speed on propeller load
 One-half hour at 90% normal sea level power on propeller load
 One-half hour at normal sea level rated power.

During the 100% power run, the oil consumption shall be measured.

- (2) (Ref. Par. F-5c(1)) One-hour Final Run The requirements of this paragraph shall be met except that the one-half hour normal run shall be made first followed by the one-half hour 90% normal power run.
- (3) (Ref. F-5c(3)) Take-off Check The take-off check shall be made prior to the final run of Par. F-5c(1) and the engine shall be shut down and inspected for coolant, oil and fuel leaks.

- (4) (Ref. F-5c(4) Magneto check The magneto check shall be made starting at a speed of 2300 RPM instead of 85% normal rated speed.
- (5) (Ref. Par. F-9) Preparation for Storage The engine shall be prepared for storage in accordance with Par. E-14 of this specification.

E-4. Dry Weight of Complete Engine The total dry weight of the engine complete shall not exceed the value 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, generator drive, vacuum pump drives, propeller governor drive, fuel pump drive and all piping and controls between engine parts.

| | |
|---|-------------|
| | 1293.5 lbs. |
| Carburetor and Injection Nozzle | 35.5 |
| Carburetor Screens and Gaskets | 1.0 |
| Magneto | 13.0 |
| Ignition Distributors (Included in shielding assembly) | |
| Radio Shielded Ignition Assembly, complete with cable and distributors) | 33.0 |
| Spark Plugs | 6.0 |
| Priming System on Engine | 1.0 |
| Cooling Air Deflectors and Baffles | None |
| Automatic Controls <u>not</u> furnished with Engine | 5.0 |
| Accessory Drive Covers | 2.0 |
| | <hr/> |
| TOTAL DRY WEIGHT OF ENGINE | 1385.0 lbs. |

E-5. Performance Characteristics The engine shall be equipped with an Allison automatic engine control, Part No. 53807, and its use shall be a requirement in the installation of the engine. The ratings specified herein and the curves specified herein and shown on pages 13, 14, and 15 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 either specification AN-9502 or AN-9503.

E-5a. Ratings The engine shall be rated as follows: Using fuel conforming to Specification AN-F-28, Amendment No. 2, Grade 130 and oil conforming to Specification AN-VV-O-446, Grade 1120, and coolant conforming to Specification AN-E-2 (Ethylene Glycol).

| | |
|------|--|
| 870 | BHP at 2600 RPM at sea level |
| 1000 | BHP at 2600 RPM normal rating at 14,400 ft. |
| 1200 | BHP at 3000 RPM take-off for five minutes |
| 1125 | BHP at 3000 RPM military rating at 15,000 ft. for 15 minutes |
| 3120 | RPM rated overspeed dive rpm. |

Note: Military rating shall be 15 minutes duration for flight and model test purposes.

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

- E-5b(1) Horsepower vs. altitude at rated speeds up to and including the guaranteed altitude of the engine as shown on page 13.
- E-5b(2) Estimated horsepower at full throttle vs. altitude without turbo as shown on page 14.
- E-5b(3) Specific fuel consumption at low powers and low speeds and a table of guaranteed fuel consumption as shown on pages 15.

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

E-5h. Coolant Flow and Heat Rejection The following guarantee is given for coolant flow and heat rejection to the coolant when operating on a dynamometer for 5 minutes with a 60°F., 10 MPH air blast over the engine.

Conditions:

| | |
|----------------------------|---------------------|
| Power | Take-off 1200 BHP |
| Speed | Take-off 3000 RPM |
| Fuel Consumption | Guaranteed specific |
| Oil Inlet Temperature | 203°F. |
| Oil Pressure | 65 p.s.i. |
| Coolant Outlet Temperature | 250°F. |

Guarantee:

Coolant flow through the radiator not to exceed 250 GPM
Heat rejection to coolant not to exceed 440 HP (18,674 Btu/min.)

E-5h(1). Coolant Pump Characteristics In lieu of the coolant pump flow data required by AN-9501, Par. E-5h(1), E-5h(1)a, E-5h(1)b; the engine manufacturer will supply estimated coolant pump performance characteristics to the airplane manufacturer for preliminary design purposes. Characteristic curves required by AN-9501, Par. E-5h(1), E-5h(1)a, and E-5h(1)b; will be supplied prior to the 10th production engine delivery.

E-5j. Oil Flow and Heat Rejection The following guarantee is given for oil flow and heat rejection to the oil when operating on a dynamometer with a 60°F., 10 MPH air blast over the engine:

Condition:

| | |
|----------------------------|---------------------|
| Power | Take-off 1200 BHP |
| Speed | Take-off 3000 RPM |
| Fuel Consumption | Guaranteed specific |
| Oil Inlet Temperature | 203°F. |
| Oil Pressure | 65 p.s.i. |
| Coolant Outlet Temperature | 250°F. |
| Coolant Flow | 250 GPM |

Guarantee:

Oil flow not to exceed 160 lb/min.

Heat rejection to oil not to exceed 150 HP (6366 Btu/min.)

E-6. Engine Performance The complete engine shall function satisfactorily up to the military powers and speed shown on page 13.

E-7. Propeller The engine shall have a number 50 propeller shaft end in accordance with Specification AN-9506. Provision shall be made for mounting a governor by a pad and drive in accordance with Par. E-36g of this specification.

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

| | |
|------------------|-----------------|
| Length - - - - - | 85 13/16 inches |
| Width - - - - - | 29 9/32 inches |
| Height - - - - - | 36 3/4 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. E-1a AN Aero. Specification) The requirements of Specification AN-C-80 shall not be applicable.
- (2) (Par. E-1b ANA Standard Drawings) The following Allison drawings shall apply in lieu of AN parts:
41616 - Envelope - engine protector
36411 - Cap - propeller shaft thread
- (3) (Par. C-2 Auxiliary Oil Tank) The use of an auxiliary oil tank will depend upon the procedure as decided upon in reference to Par. F-2a(1).
- (4) (Par. F-2a(1) Operation Procedure) The method of introducing the compound lubricating oil mixture into the engine shall be that agreed upon between the procuring agency and the contractor.
- (5) (Par. F-3d Exhaust Ports and Manifolds) Dehydrating agent shall not be installed in the exhaust ports.
- (6) (Par. F-3h Intake Manifold) A one-pound bag of dehydrating agent shall be placed on top of the carburetor screen and the carburetor sealed by securing a gasketed cover to the carburetor.

E-15a(1). Cadmium Plating (Ref. AN-9500 Par. D-15a(1)) Cadmium plating shall be in accordance with Specification AMS 2400 in lieu of Specification AN-QQ-P-421.

E-18. Propeller Drive The engine shall be equipped with a reduction gear ratio of 2.00:1. The direction of propeller rotation, when viewed from the anti-propeller end shall be clockwise.

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-22. Crankshaft Torsional Vibration (Ref. AN-9500, Par. D-22) The crankshaft torsional vibration characteristics shall conform to the requirements of AN-9504 except as modified in Par. E-3a(2) of this specification.

E-23a(1). Spark Plugs The engine shall be fitted with AC LS86 or Champion C-34S* 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) (Ref. Par. A-1) The following specifications except as modified herein shall apply in lieu of those listed in AN-9510:

| | |
|-----------------|--------------------|
| AAF Spec. 32427 | High Tension Cable |
| AN-P-4 | Plugs - Spark |
- (2) (Ref. Par. D-1b Accessibility) The requirements shall be met except that it shall be necessary to loosen part of the shielding assembly to replace the intake spark plug conduits or cable.
- (3) (Ref. Par. D-3 Marking) The high tension ignition cables shall be marked with the proper cylinder designation.
- (4) (Ref. Par. D-5 Bonding) The requirements of this paragraph shall not apply.
- (5) (Ref. Par. D-8 Nameplate) A nameplate shall not be provided.
- (6) (Ref. Par. E-1a Single Cable Conduits) Single cable conduit connections shall be as shown on Allison Drawing Nos. 37712, 43999, and 53166.
- (7) (Ref. Par. E-5d Shielding Properties) The requirements of the last sentence of this paragraph shall not apply.
- (8) (Ref. Par. E-6 Weight) The requirements of this paragraph shall not apply.
- (9) (Ref. Par. E-8 Capacitance) The capacitance between the shielding and each ignition cable contained therein shall not exceed 175 micromicrofarads.

E-23c. High Tension Ignition Cable (Ref. AN-9500, Par. D-23c) High tension cable shall conform to AAF Specification No. 32427.

E-23d. Magnetos The engine shall be equipped with one Scintilla type DFLN6 magneto in accordance with AN-9511 with the following exceptions:

- (1) (Ref. Par. D-1a(1) Distributor Block) The openings in the distributor block for the ignition cables connecting to the spark plugs shall be for 5 mm. cable connections.
- (2) (Ref. Par. D-1a(4)a. Type Designation) The type designation shall be DFLN-6, utilizing the F to denote a flange type mount and omitting the numeral to designate the number of cylinders.

- (3) (Ref. Par. D-1b(1) Threads) Connections for the high tension terminals shall be 15/16-18 threads.
- (4) (Ref. Par. D-1b(2) Type D Magnetos) The mounting pad and drive shall conform to the dimensions shown on the applicable Allison Division Drawing of the magneto.
- (5) (Ref. Par. E-2c Normal Operating Temperature) The temperature rise of the magneto shall be 55.5°C.(100°F.)
- (6) (Ref. Par. E-2d Endurance) The requirements of this paragraph shall be applicable except as modified by the exceptions to paragraphs F-4a(11)a and F-4a(11)b below.
- (7) (Ref. Par. E-3e Simulated Service) The requirements of this paragraph shall apply except as modified by the exceptions to Par. F-4a(10)a below.
- (8) (Ref. Par. F-4a(10)a Rain and Spray Test) The requirements of this paragraph shall not be applicable. The installation of this magneto on Vee type engines requires and permits maximum ventilation in the breaker cover.
- (9) (Ref. Par. F-4a(11)a Operating Run) The requirements of this paragraph shall be applicable except that air shall be passed over the magneto at 20 MPH and the breaker mechanism shall be reset and lubricated at intervals of approximately 100 hours.
- (10) (Ref. Par. F-4a(11)b. Elevated Temperature Run) The requirements of this paragraph shall be applicable except that the ambient air temperature shall be 150°F.

E-23f. Cooling (Ref. Spec. AN-9500, Par. D-23f) Provision for ventilating the ignition harness and for cooling the spark plugs and the spark plug elbows shall consist of spark plug cooling manifolds (as shown on the installation drawing) to which the airplane manufacturer shall connect. The airplane manufacturer shall make provision for circulating sufficient air through the cooling manifolds and shall maintain engine compartment temperature suitable for operation of ignition parts when manufactured and installed in accordance with the following specifications:

Spark Plug - AN-P-4
 High Tension Cable - AAF Specification 32427
 Magneto - AN-9511 (except as modified herein)

E-24e. Scavenging System The engine scavenging system shall also operate satisfactorily at take-off power and speed with an oil having a viscosity equivalent at 100°F to specification AN-VV-C-446, Grade 1100 plus 30% by volume of gasoline in accordance with Specification AN-F-28 with 40 lbs/sq. in. gage back pressure on the scavenging pump outlet. For demonstration purposes the oil shall contain no gasoline.

A five-minute run at room temperature conditions with temperatures stabilized at 90°F. to 110°F. "oil in", and 160°F. to 180°F. "coolant out" and at take-off power and speed on an engine other than the model test endurance engine shall constitute the requirements for demonstrating satisfactory scavenging.

E-24g. Oil Cleaner The engine shall be equipped with one Airmage oil strainer, Allison Part No. 53073. Foreign matter removed by the cleaner shall not re-enter the lubricating system under normal operating conditions.

E-24q. Crankcase Breathers Ample breathing capacity shall be provided in accordance with Par. D-24q of Specification 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 and -4 inches of water. 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 FDI2KB injection carburetor in accordance with Specification AN-9515 except for the following:

- (1) (Ref. Par. D-7 Strainer) The carburetor shall meet the requirements except that foreign material is not removed with the strainer.
- (2) (Ref. Par. D-32a(2) and Par. D-32a(3) Density Compensation) Carburetors which compensate automatically for densities shall hold, at constant air flow, the fuel air ratios obtained at standard sea level conditions to within the following limits at carburetor entrance densities and temperatures given below:

Density Compensation:

| #/cu.ft. - Density | Temp. °F. | % Limits |
|--------------------|--------------|----------|
| .10 - .05 | -40° - +140° | ±3% |
| .05 - .034 | -40° - +100° | ±5% |

- (3) (Ref. Par. D-32b Metering Characteristics of Reference Carburetors) In lieu of the requirements of items D-32b to D-32b(3) inclusive of this paragraph, the carburetors shall be furnished with the same setting and production limits as approved for the -81, -83, and -85 engines by Materiel Command letter to Allison March 31, 1943 BJMcN:brm 70-5P. The above setting was also released for the V-1710-99 (F-26R) engine. Estimated fuel consumption in auto rich is shown on page 15.
- (4) (Ref. Par. D-9) The normal operating fuel pressure shall be 17 ± 1 lb/sq. in. in excess of the pressure of the air entering the carburetor.
- (5) (Ref. Par. F-4e(3) Metering Test of Production Carburetors) The requirements of this paragraph shall be met except that mixture readings in automatic lean shall not be checked at air flows corresponding to 40, 80, and 90% normal rated air flows.

(6)

The carburetors shall be checked for automatic altitude compensation at air flows equivalent to 50% of normal rated power airflow with the mixture control in the auto-lean position at air box pressure of 0, -4, -8, -16 inches Hg. less than atmospheric pressure.

The mixture ratio on production carburetor tests at altitude air box conditions shall be within $\pm 2\%$ of the reference carburetor at densities of .076 to .050 lbs/cu. ft. at any constant temperatures in the range of 65°F. to 85°F. and within $\pm 3\%$ of the reference carburetor at densities of .050 .030 lb/cu. ft.

E-26. Engine Starting 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 line assembly No. 43590. In lieu of the requirements of Par. D-26 of AN-9500, the following shall apply:

"The engine shall be capable of consistent starting when its temperature has been stabilized in an ambient temperature of minus 30°F. when cranked at a minimum of 30 RPM. This shall be accomplished with the specified lubricant diluted 30% by volume using the fuel specified in the engine model specification. The pour point of the diluted oil shall be minus 40°F. or lower. The use of special starting fuel shall be permitted. Consistent starting shall be defined as a complete start following not more than two 30-second cranking periods. Starting demonstrations when required shall be made in a laboratory under controlled conditions."

The specified lubricant for cold starting demonstration only shall be Grade 1100-P of Specification AN-O-5.

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

E-30a. Coolant Pressure The maximum inlet pressure to the cooling liquid pump shall be 50 inches Hg. absolute.

E-31a(3). Supercharger Drain Valve (Ref. Spec. 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. Spec. AN-9500, Par. D-32a) The use of exhaust flanges in accordance with Allison Part. #44018 (AMS-5080) or Part. #34667 (AMS-5645) and exhaust flange gaskets Part #40751 shall be a requirement in the installation of this engine. The exhaust flanges shall not be furnished with the engine and separate procurement must be initiated by the airplane manufacturer. The gaskets and nuts shall be furnished with the engine.

E-34c. Coating Threaded Parts Thread anti-seize compound shall be in accordance with AMS-3080 instead of AN-C-53.

E-36. Accessory Drives The gear ratio of each accessory drive to the engine crankshaft, 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:

| ACCESSORY AND TYPE | NO. USED | RATIO TO C.S. | MAX.TORQUE CONTINUOUS LBS. - IN. | MAX.TORQUE STATIC LBS. - IN. | ROTATION C-CLOCKWISE CC-COUNTER CL. |
|---|-------------|------------------|--|------------------------------------|---|
| Starter Type I | 1 | 1.000:1 | - - - - | 16,200 | C |
| Generator Type I | 1 | 1.440:1 | 600 | 3,600 | C |
| Fuel Pump | 1 | 0.864:1 | 25 | 450 | CC |
| Vac.& Hyd. Power Pump Side Drive Type II | 1 | 1.440:1 | 150 | 2,250 | CC |
| Vac.& Hyd. Power Pump Rear Drive Type II | 1 | 1.440:1 | 150 | 2,250 | C |
| Tachometer Type I & II (2 drives) | | 0.500:1 | 2.5 | 12.5 | C |
| Propeller Governor | 1 | 0.845:1 | 125 | 2,300 | CC |

E-36a. (Ref. AN-9500, Par. D-36a Starter) The starter mounting pad and drive shall conform to AND-10004 Type I except that the studs shall be located by rectangular dimensions from the center line of the pad with $\pm .005$ tolerance instead of by a stud circle with studs equally spaced.

E-36b. Generator and Power Take-off One type I pad and drive shall be furnished in accordance with AND-10002 except as follows:

- (1) The oil hole plug shall be 1/16 NPT instead of 1/8 NPT.
- (2) The studs shall be located by rectangular dimensions from the center line of the pad with $\pm .005$ tolerance instead of by a stud circle and angles.

E-36c. Fuel Pump The fuel pump mounting pad drive shall conform to AND-10003 except that the stud length shall be $.906 \pm .020$ instead of $7/8 \pm 1/32$.

E-36d. Gun Synchronizing Impulse Generators Provision shall not be made for mounting Gun Synchronizing Impulse Generators.

E-36e. Vacuum and Hydraulic Power Pump Provision shall be made for two type II vacuum and hydraulic power pump pads and drives in accordance with AND-10001 with the exception that the dowel hole shall be $.141 - .148$ diameter instead of #23 drill (.1540) diameter.

E-36f(1). Tachometer Accessibility The clearance requirements of Par. D-36f(1) of AN-9500 and AND-10310 shall not be met. Provision back of the Type I pad shall be made for installing a flexible cable drive. Clearance back of the Type II pad shall be provided for a tachometer in accordance with AN-5531-1.

E-36g. Propeller Governor Provision for mounting a propeller governor shall be made by a pad and drive conforming to AND-10010 except as follows:

- (1) The drive shall rotate counter clockwise.
- (2) The oil holes shall be 5/16 diameter instead of 11/32 diameter.
- (3) The length of the studs shall be 15/16 in. instead of 1 in.
- (4) The length of the threaded portion of the studs shall be 5/8 in. instead of 11/16 in.

E-36g(2). Accessibility - Governor Space shall not be provided back of the governor mounting pad in accordance with AND-10307. Clearance shall be provided as required in Specification AN-9507.

E-44. Supercharger and Boost Pressure Regulator The engine shall be equipped with one Allison automatic engine control, Allison Part No. 63826 designed to coordinate manifold pressure and engine speed.

E-46. Torquemeter The engine shall not be equipped with a torquemeter.

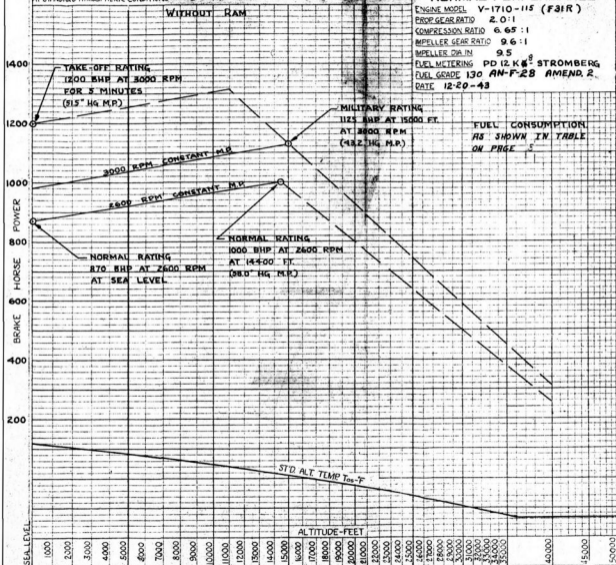
ALTITUDE PERFORMANCE-HORSEPOWER AND MANIFOLD PRESSURE

AT STANDARD ATMOSPHERIC CONDITIONS

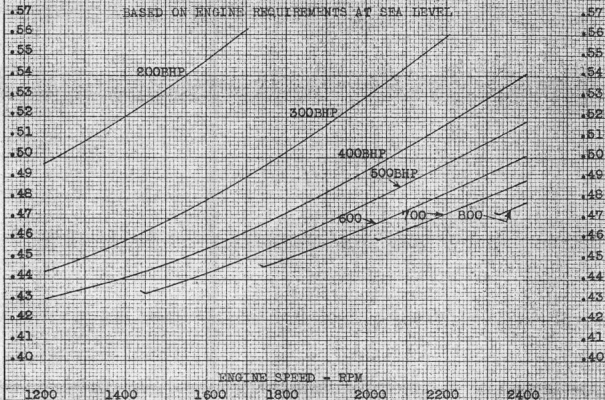
AIRCRAFT ENGINE
NORMAL PERFORMANCE

ENGINE MODEL V-1710-115 (FAIR)
 PROP. GEAR RATIO 2.0:1
 COMPRESSION RATIO 6.65:1
 IMPELLER GEAR RATIO 9.6:1
 IMPELLER DIA IN 9.5
 FUEL METERING PD 12 K⁸ STROMBERG
 FUEL GRADE 130 AN-F-28 AMEND. 2
 RATE 12-20-43

FUEL CONSUMPTION
 AS SHOWN IN TABLE
 ON PAGE 5



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



ESTIMATED SPECIFIC FUEL
 CONSUMPTION ON PROP. LOAD
 AS INDICATED USING PD12K
 CARBURETOR AT SEA LEVEL

| % Normal Power | LBS/BHP/HR 870 BEP | LES/BHP/HR 1000 BEP |
|----------------|-----------------------|------------------------|
| 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-- 0.75
 At Sea Level

Military Power-- 0.70
 At 15,000 Feet

The following specifications and drawings of the issue in effect as listed below and as modified herein shall form a part of this specification. Any 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.

| <u>ANA SPECS.</u> | <u>Rev.</u> | <u>Amend.</u> | <u>Dated</u> | <u>Title (In Brief)</u> |
|-------------------|-------------|---------------|--------------|---------------------------------|
| AN-VV-C-576 | (a) | (1) | 6/3/43 | Compound - Corrosion Preventive |
| AN-F-E-568 | (a) | | 12/4/42 | Preparation for Storage |
| AN-GGG-P-363 | | (2) | 5/9/42 | Pipe Threads |
| AN-GGG-S-126 | (a) | | 1/30/43 | Screw Threads |
| AN-QQ-M-181 | (a) | (2) | 5/10/43 | Magnetic Inspection |
| AN-VV-F-746 | | (1) | 11/5/40 | Fuel - Gen. (Knock Test) |
| AN-VV-F-748 | (a) | (1) | 3/23/43 | Fuel - Gen. (Super Knock Test) |
| AN-F-22 | | | 7/26/43 | Fuel - Grade 62 |
| AN-F-26 | | (1) | 10/15/43 | Fuel Grade 91 |
| AN-F-28 | | (2) | 10/2/43 | Fuel Grade 130 |
| AN-VV-O-446 | (a) | | 1/5/43 | Oil Lubricating |
| AN-F-4 | | (2) | 6/23/43 | Spark Plugs |
| AN-O-5 | | | 4/27/43 | Oil-Low Pour Lubricating |
| AN-E-2 | | | 7/23/42 | Ethylene Glycol |

Army-Navy Spec.

| | | | | |
|---------|-----|-----|----------|-------------------------------|
| AN-9500 | (b) | | 8/26/42 | Engines - General |
| AN-9501 | (b) | | 8/10/42 | Engines - Model Spec. |
| AN-9502 | (b) | | 8/11/42 | Engines - Type Test |
| AN-9503 | (b) | | 8/6/42 | Engines - Acceptance Test |
| AN-9504 | | (1) | 12/25/40 | Engines - Torsional Vibration |
| AN-9510 | (a) | (2) | 6/19/42 | Shielding - Radio |
| AN-9511 | (a) | | 7/31/40 | Magnetos |
| AN-9515 | (b) | | 8/6/42 | Carburetors |
| AN-9506 | | (2) | 4/1/40 | Noses - Engine |
| AN-9507 | | (3) | 12/28/39 | Governors |

AAF Specs.

| | | | | |
|-------|--|--|---------|-----------------------------|
| 32427 | | | 4/24/43 | Cable-High Tension Ignition |
|-------|--|--|---------|-----------------------------|

| <u>ANA Stand. Dwgs.</u> | <u>Rev.</u> | <u>Amend.</u> | <u>Dated</u> | <u>Title (In Brief)</u> |
|-------------------------|-------------|---------------|--------------|-------------------------|
| AN-4028 | | | 12/12/42 | Markers- Ignition Cable |
| AN-4034 | | | 11/2/42 | Data Plate |
| AN-4037 | | | 6/10/40 | Oil Flange-3 bolt |
| AN-4044 | 1 | | 8/1/42 | Gasket-Vacuum Pump |
| AN-4048 | | | 1/6/42 | Oil Flange-4 bolt |
| AN-4059 | | | 9/2/42 | Gasket-Fuel Pump |
| AN-5531-1 | | | 4/13/43 | Gen. - Elec. Tach. |

ANA Design Std.

| | | | | |
|-----------|---|--|----------|---------------------------------|
| AND-10001 | 1 | | 10/3/42 | Hyd. & Vac. Pump Pad Type II |
| AND-10002 | | | 10/30/42 | Generator Pad |
| AND-10003 | 1 | | 9/5/42 | Fuel Pump Pad |
| AND-10004 | 2 | | 4/30/43 | Starter Pad (All Types) |
| AND-10005 | 1 | | 8/20/42 | Tachometer Pad (Both Types) |
| AND-10201 | | | 4/12/40 | Carb. Screens and Gaskets |
| AND-10301 | 1 | | 3/28/42 | Vac. Pump Clearance Type II |
| AND-10302 | 1 | | 3/19/42 | Hyd. Pump Clearance Type II |
| AND-10304 | | | 9/2/41 | Starter Clearance Type I |
| AND-10305 | | | 2/28/42 | Generator Clearance |
| AND-10310 | | | 12/5/41 | Tachometer Clearance |
| AND-10320 | | | 2/16/42 | Fuel Pump Clearance |

AMS Specs.

| | | | | |
|------|---|--|---------|---------------------|
| 2400 | B | | 12/1/42 | Cadmium Plating |
| 3080 | | | 6/13/40 | Compound Anti-Sieze |

This forms part of and should be attached to Allison Division Specification 183-A dated March 31, 1943 and revised December 20, 1943, covering Engine, Aircraft, AAF Model V-1710-115, Allison model V-1710-F31R.

Corrections in the paragraphs listed below apply to the above specification.

Par. E-2. At the bottom of the page, last item, add the part number 43801 as the drawing number of the "Controls - Automatic Engine."

Par. E-4. Dry Weight of Complete Engine

Change the weight of the basic engine from 1293.5 to 1286.5.

In the next to last item, delete the word "not" and insert 7.0 in the weight column so that it now reads: "Automatic Controls furnished with engine 7.0 (lbs.)"

Par. E-5. Performance Characteristics

In the first sentence, change part number 53807 to 43801.

Par. E-44. Supercharger and Boost Pressure Regulator

Change part number 53826 to 43801.