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MODEL SPECIFICATION
ENGINE, AIRCRAFT: MODEL V-1710-111 & -113

ALLISON DIVISION
General Motors Corporation
Indianapolis, Indiana

ALLISON MODEL V-1710 - F30R & F30L

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Allison Division of General Motors Corporation
Allison Model V-1710-F30R & F30L

A. APPLICABLE SPECIFICATIONS.

A-1. The specifications listed on pages 17 and 18 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-1710-111 and -113 engines.

B-1a. General Description. The V-1710-111 (R.H. Prop. Rotation) and -113 (L.H. Prop. Rotation) engines are 12 cylinder liquid cooled 60° Vee type engines equipped with an integral reduction gear assembly and a single stage supercharger, suitable for use with an exhaust driven 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:

53721	Engine Assembly, Complete (Showing Acc.Dr. Oil Seals (-111)
53722	Engine Assembly, Complete (Showing Acc.Dr. Oil Seals (-113)
53720	Installation Drawing (Showing clearances for engine accessories and their removal) (-111 & -113)
43590	Priming System Assembly
44694	Carburetor - Model PDL2K8 - 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)
53122	Radio Shielding Assembly V-1710-111 (F30R)
53137	Radio Shielding Assembly V-1710-113 (F30L)

Photographs - one top and bottom, one each side, one front, one rear.

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

- (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 Specification 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 2 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-2B, 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/BHP/hr. 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 test 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, and one half hour at normal sea level rated power. During the 100% power run the oil consumption shall be measured.
- (2) (Ref. Par. F-5a(1)b) Take-off Run. The take-off run shall be made at 3000 RPM with full throttle without carburetor ram or exhaust back pressure.
- (3) (Ref. Par. F-5c(1). One hour final run. The requirements of this paragraph shall be met except that the 1/2 hour normal run shall be made first followed by the 1/2 hour 90% normal power run.
- (4) (Ref. Par. 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.

- (5) (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.
- (6) (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.	1303.5 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 not furnished with Engine	
Accessory Drive covers	2.0
TOTAL DRY WEIGHT OF ENGINE	1395.0

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 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. The ratings are based upon guaranteed specific fuel consumption with 80°F. carburetor air inlet temperature and an absolute exhaust back-pressure and carburetor inlet pressure of (approximately 30.5" Hg. for take-off and military and 30" Hg. for normal rating.

1100	BHP at 2600 RPM at sea level
1100	BHP at 2600 RPM from sea level to 30,000 feet normal rating with an exhaust turbo supercharger installation of suitable output.
1800	BHP at 3000 RPM take-off for five minutes.
1500	BHP at 3000 RPM military rating from sea level to 30,000 feet, for 15 minutes with an exhaust turbo supercharger installation of suitable output.
3120	RPM rated overspeed dive rpm.

Note: Military rating shall be 15 minutes duration for flight and 15 minutes for 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 14.
- E-5b(2) Estimated horsepower at full throttle vs. altitude without turbo as shown on page 15.
- E-5b(3) Specific fuel consumption at low powers and low speeds and a table of guaranteed fuel consumption as shown on page 16.
- E-5b(4) Engine power vs. exhaust back pressure curves will be furnished after calibration has been made with 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, and .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 when operating on a dynamometer for 5 minutes with a 60°F., 10 MPH air blast over the engine.

Conditions:

Power	Take-off 1500 BHP
Speed	Take-off 3000 RPM
Fuel Consumption	Guaranteed specific
Oil Inlet Temperature	203°F
Oil Pressure	65 p.s.i.
Coolant Outlet Temp.	250°F.

Guarantee:

Coolant flow through the radiator not to exceed 265 GPM
Heat rejection to coolant not to exceed 19,947 Btu/min. (470 HP)

E-5h(1) Coolant Pump Characteristics. In lieu of the coolant pump flow data required by AN-9501, Paragraphs 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 AN9501, 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 1500 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	265 GPM

Guarantee:

Oil flow not to exceed 180 lb/min.
Heat rejection to oil not to exceed 6790 Btu/min. (160 HP)

E-6. Engine Performance. The complete engine shall function satisfactorily up to the military powers and speeds shown on page 14.

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 - - - - -	37 21/32 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-1a AN Aero. Specification) The requirements of Specification AN-C-80 shall not be applicable.
- (2) (Par. B-1b ANA Standard Drawings) The following Allison drawings shall apply in lieu of AN parts:
 - 42288 - Plug - crankcase dehydrator
 - 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.
- (7) (Par. F-3m Crankcase) A dehydrator plug, Allison Part No. 42288 shall be installed in a suitable opening of the crankcase.

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-16b. Parts list of the Engine. The parts list applicable in all details to the engine which successfully completes Government test shall constitute a requirement of this specification.

E-18. Propeller Drive. The engine shall be equipped with a reduction gearratio of 2.00:1. The direction of propeller rotation, when viewed from the anti-propeller end shall be clockwise for the V-1710-111 (F30R) and counter-clockwise for the V-1710-113 (F30L).

E-19. Impeller Gear. The impeller gear ratio shall be 8.1:1 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-348* spark plugs.

E-23b. Radio Shielded Ignition Assemblies. The ignition distributors and magneto shall be designed to permit supercharging. A single connectio to a suitable location in the turbo outlet duct shall be made by the airplane manufacturer. 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 DFLN5 magneto in accordance with AN-M-4 with the following exceptions:

- (1) (Ref. Par. D-1g(1)a. Type Designation) The type designation shall be DFLN5, utilizing the "F" to denote a flange type mount and omitting the numeral to designate the number of cylinders.
- (2) (Ref. Par. D-1h. Distributor Block Cable Connection) The requirements of this paragraph are not applicable. The distributor blocks are not furnished with the magneto.
- (3) (Ref. D-1j. Ground Terminal) Each magneto shall be provided with a primary ground terminal conforming to AN-3105 and terminal socket as shown in Figure 2 except that the terminal shall be secured by a hexagon nut.
- (4) (Ref. Par. D-3b. Installation Instruction) The requirements of this paragraph are not applicable.
- (5) (Ref. Par. D-4g(4)a. Rain and Spray) 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.
- (6) (Ref. Par. D-4h. Endurance) The requirements of this paragraph shall be applicable except as modified by deviations to paragraphs F-6h(1).
- (7) (Ref. Par. E-2a. Mounting Pad) The mounting pad and drive shall conform to the dimensions shown on the Allison Division drawing of the magneto, No. 53101.
- (8) (Ref. Par. E-2b. Coupling) The coupling shall conform to the detail requirements indicated on the Allison Division drawing of the magneto, No. 53101.
- (9) (Ref. Par. F-5. Test Conditions) The requirements of this paragraph shall apply except that the tests specified at room temperature shall be performed at an atmospheric temperature of 15°C to 35°C (Approx. 59°F to 95°F).
- (10) (Ref. Par. F-6a. Conditioning) In lieu of the requirements specified, the following shall apply: The standard sphere gap as shown in Fig. 3 set at 3 millimeters, unless otherwise specified, shall be used to calibrate test gaps used on all tests described below.
- (11) (Ref. Par. F-6h(1). Operating Run) In lieu of the requirements of this paragraph, the following shall apply:

The magneto shall be run for 600 hours continuously, except when stopped for short intervals for servicing, in an ambient air temperature of 60°C, (140°F), with the air passing over the magneto at 20 MPH, full spark advance, and rated maximum rotor speed with each lead connected to a standard test gap shunted by a normal load. No attention shall be required except by the breaker mechanism which may be reset and lubricated at 100-hour intervals. At the end of each hour, the primary current shall be short-circuited and grounded for a period of 5 seconds.

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 Installation Drawing 53720 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-M-4 (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-O-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 Airmaze oil strainer, Allison Part No. 53073. Foreign matter removed by the cleaner shall not re-enter the lubricating system under normal operation condition

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" of water. It is desired that the pressure at the front breather be held to 2 to 6" 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 PD12K8 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

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

- (3) (Ref. Par. D-32b(1)) The military power referred to in this paragraph shall be sea level military or take-off power.
- (4) (Ref. Par. D-32b(2)C) In the range from a speed midway between minimum idling speed and 50% of normal rated speed to 30% of normal rated power the mixture strength shall not be richer than a straight line drawn between the following points:
 - (a) A point at the speed midway between the minimum idling speed and 50% of normal rated speed which is 12% richer than best power.

- (b) A point at the air flow corresponding to 30% of normal rated power on propeller load which is 9% richer than best power.
- (5) (Ref. Par. D-32b(2)D) In the range between the air flows corresponding to 30% of normal rated power and 65% of normal rated power on propeller load the mixture strength in autorich shall fall within the limits specified below:
- (a) The minimum mixture strength at any point shall not be leaner than best power.
- (b) The rich limit shall not exceed 9% richer than best power at the air flow corresponding to 30% of normal rated power and 6% richer than best power at the corresponding airflows from 40% to 60% of normal rated power. At 65% of normal rated power the mixture strength shall fall between 2% and 7% richer than best power.
- (6) (Ref. Par. D-32b(3)) With the mixture control in the automatic lean position and in the range between the air flows corresponding to 30% of normal rated power and 65% of normal rated power on propeller load the mixture strength of the reference carburetor shall fall within the limits specified below:
- (a) The minimum mixture strength at any point shall not be leaner than best economy.
- (b) The rich limit shall not exceed 9% richer than best economy at the airflows corresponding to 30% and 65% of normal rated power and 6% richer than best economy at the corresponding airflows from 40% to 60% of normal rated power.
- (7) (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.
- (8) (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.

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 to .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. of this specification.

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 requirements 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 ratios 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:

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	-111 C
Generator					
Type I	1	1.440:1	600	3,600	C C
Fuel Pump	1	0.864:1	25	450	CC CC
Vac. & Hyd. Power Pump					
Side Drive					
Type II	1	1.440:1	150	2,250	CC CC

ACCESSORY AND TYPE	NO USED	RATIO TO C.S.	MAX. TORQUE	MAX. TORQUE	ROTATION	
			CONTINUOUS LBS - IN.	STATIC LBS - IN.	C-CLOCKWISE	CC-COUNTER CL.
Vac. & Hyd. Power Pump Rear Drive Type II	1	1.440:1	150	2,250	C	C
Tachometer Type I & II (2 drives)		0.500:1	2.5	12.5	C	C
Propeller Governor	1	0.845:1	125	2,300	CC	C

E-36a. (Ref. AN-9500 Par. D-36a Starter) The starter mounting pad and drive shall conform to AND10004 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 AND10002 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 AND10003 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 AND10001 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 AND10310 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 AND10010 except as follows:

- (1) The drive on the V-1710-111 (F3OR) engine shall rotate counter clockwise.
- (2) The oil holes shall be 5/16 diameter instead of 11/32 dia.
- (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.

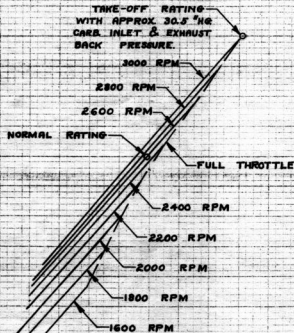
E-36g(2). Accessibility - Governor Space shall not be provided back of the governor mounting pad in accordance with AND10307. Clearance shall be provided as required in Specification AN-9507.

E-44. Supercharger and Boost Pressure Regulator Provision shall be made for installing Allison designed Exhaust Turbo Control and Automatic Engine Controls for coordinating manifold pressure, engine speed and ignition spark timing in accordance with Appendix A. The controls shall not be furnished with the engine unless so specified in the applicable engine contract. The spark timing device shall be furnished with the engine but its operation shall depend upon the installation of the automatic engine control mentioned above.

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

SEA LEVEL PERFORMANCE, HORSEPOWER VS. MANIFOLD PRESSURE

WITHOUT RAM EXCEPT AS NOTED
 AUTO RICH MIXTURE
 80°K CARB AIR TEMP

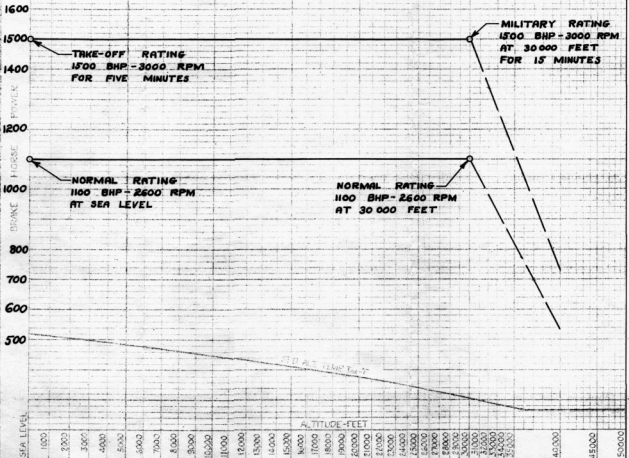


20 24 28 32 36 40 44 48 52 56 60
 ABSOLUTE MANIFOLD PRESSURE IN. HG

ALTITUDE PERFORMANCE - HORSEPOWER AND MANIFOLD PRESSURE

CONDITIONS TO RATED ALTITUDE :
 CARB. INLET TEMP - 80°K
 CARB. INLET & EXHAUST BACK PRESS -
 30.5" HG FOR NORMAL & APPROX.
 30.5" HG FOR TAKE-OFF & MILITARY
 GUARANTEED SPECIFIC FUEL CONS.

ALLISON DIVISION G. M. C. SPEC. NO. 182-F
 AIRCRAFT ENGINE
 NORMAL PERFORMANCE
 ENGINE MODEL V-1710-111 & -113 (F30 R&L)
 PRO. GEAR RATIO 2.0 : 1
 COMPRESSION RATIO 6.65 : 1
 MPELLER GEAR RATIO 8.1 : 1
 MPELLER DIA. M 3 1/2
 FUEL METERING PDL2K8 STROMBERG
 FUEL GRADE 130 AW-F-28 AMEND. 2
 DATE 7-27-44



1600
 1500
 1400
 1200
 1000
 800
 700
 600
 500
 SEA LEVEL
 ALTITUDE - FEET
 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000 11000 12000 13000 14000 15000 16000 17000 18000 19000 20000 21000 22000 23000 24000 25000 26000 27000 28000 29000 30000 31000 32000 33000 34000 35000
 40000 45000 50000

ALTITUDE PERFORMANCE-HORSEPOWER AND MANIFOLD PRESSURE

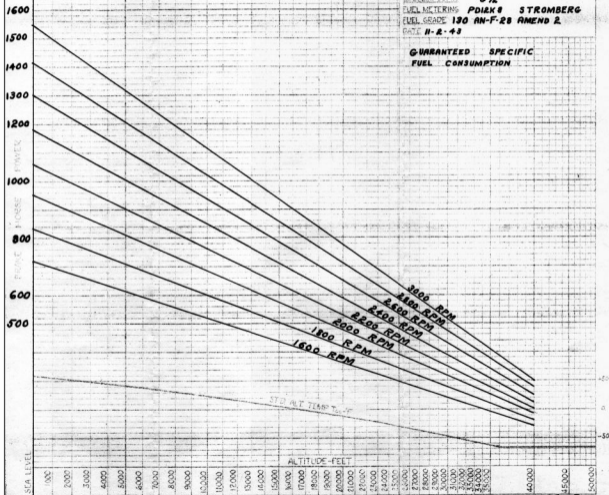
AT STANDARD ATMOSPHERIC CONDITIONS

AIRCRAFT ENGINE
NORMAL PERFORMANCE

ENGINE MODEL V-1710-111 & 113 (F302L)
 FUEL GEAR RATIO 2.0:1
 COMPRESSION RATIO 6.65:1
 MISC. GEAR RATIO 8.1:1
 MISC. GEAR IN 9/2
 FUEL METERING PDIK 8 STROMBERG
 FUEL GRADE 130 AN-F-28 AMEND 2
 RATE H-2-43

GUARANTEED SPECIFIC
 FUEL CONSUMPTION

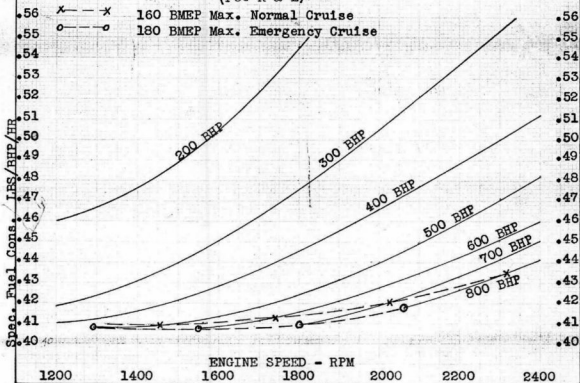
ESTIMATED FULL THROTTLE
 WITHOUT TURBO



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

V-1710 - 121 & -113

(P80 R & L)



Guaranteed B.S.F.C.
 On Normal S.L. Rated
 Propeller Load at
 Sea Level. (For
 Model Testing)

% Normal Power	LBS/EHP/HR
100%	.650
90%	.620
80%	.560
70%	.520
60%	Best. Econ.
Take-off power	.690
Military Power	.690

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)	(1)	12-4-42	Prep. for Storage
AN-GGG-P-363		(2)	5-9-42	Pipe Threads
AN-GGG-S-126	(a)	(1)	1-30-43	Screw Threads
AN-QQ-M-181	(a)	(1)	11-18-42	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-VV-F-756		(2)	6-6-41	Fuel Grade 65
AN-F-26			4-15-43	Fuel Grade 91
AN-F-28		(2)	10-2-43	Fuel Grade 130
AN-VV-O-446	(a)		1-5-43	Oil Lubricating
AN-P-4		(1)	2-13-42	Spark Plugs
AN-O-5			4-27-43	Oil-Low Pour Lubricating
AN-M-4		(1)	1-19-44	Magnetos

Army-Navy Specs.

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-9506		(2)	4-1-40	Noses - Engine
AN-9507		(3)	12-28-39	Governors
AN-9515	(b)		8-6-42	Carburetors
AN-9510	(a)	(2)	6-19-42	Shielding - Radio
AN-9511	(a)		7-11-40	Magnetos

AAF Specs.

32427			4-24-43	Cable-High Tension Ignition
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<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-4048			1-6-42	Oil Flange - 4 bolt
AN-5531-1			4-13-43	Tachometer Generator
<u>ANA Design Std.</u>				
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 (rot)
AND-10010	(1)		6-12-43	Governor Pad
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-10307			11-25-41	Prop. Gov. Clearance
AND-10310			12-5-41	Tachometer Clearance
AND-10320			2-16-43	Fuel Pump Clearance
<u>AMS SPECS.</u>				
2400	(B)		12-1-42	Cadmium Plating
3080			6-13-40	Compound Anti-Seize