January 10, 1946
Superceding Spec. 1009
February 23, 1940
Rev. 10-28-42

DETAIL SPECIFICATION

For

ENGINE, AIRCRAFT CONTINENTAL

(Mfrs. Model A65 Series 8, 8J, 8F, 8FJ

CONTINENTAL MOTORS CORPORATION

MUSKEGON, MICHIGAN

CONTINENTAL ENGINE SPECIFICATIONS FOR MODEL A65

The engine warranty is subject to cancellation if the engine installation does not conform with the minimum requirements of these specifications.

A. GENERAL SPECIFICATIONS

The following Continental Motors Corporation drawings and engine power curves form a part of this specification:

Drawing No. A50381 Outline Assembly, Model A65 Series 8, 8J, 8F, 8FJ. *
Drawing No. A6445 Sectional Assembly, Model A65 Series 8 *
Curve Sheet 1009-1 Power Curve, A65
Curve Sheet 1009-3 Altitude Performance Curve *
* not yet available [see page 10]

B. TYPE

B-1. This specification covers the requirements for the Continental A65 engines.

B-2. The Continental A65 engines are of the four-cylinder, overhead valve, air-cooled, horizontally opposed, direct drive type of gasoline engine which operates on the four stroke Otto cycle. The cylinders have down directed exhaust outlets.

B-3. The series numbers of the A65 engine model are listed in Section D.

C. DETAIL REQUIREMENTS

C-1. Ratings:

Model A65 engine is rated at 65 H.P. at 2300 r.p.m. at sea level, using 73 minimum octane aviation gasoline. Engine Type Certificate No. 205 has been assigned to this engine by the Civil Aeronautics Authority.

C-2. Bore and Stroke:

The engine has a bore of 3.875 in. and a stroke of 3.625 in. The piston displacement is 171.0 cu. in.

C-3. Compression Ratio: The compression ratio is 6.3 to 1.

C-4. Propeller Shaft:

(a) The A65 series 8 and 8J engines have a modified S.A.E. No. “0” taper propeller shaft end. The direction of rotation is clockwise, viewed from the anti-propeller end of the engine. A separate propeller hub is furnished for propeller installation.

(b) The A65 series 8F and 8FJ engines have a standard S.A.E. Type I Flanged Crankshaft. The necessary propeller attaching bolts, hub plate, nuts, etc., are furnished with the engine.

C-5. Center of Gravity Location: The dimensions are as shown on outline drawing #A50381.

C-6. Mounting: Four vertical type mounting bosses, integral with the crankcases, are provided at the rear of the engine with provisions for four 3/8 in. mounting bolts. The horizontal distance between the top bearers is 7 in., between bottom bearers is 10-1/2 in., and the vertical distance between top and bottom bearers is 11-9/16 in. measured on the center-line of the engine. Eight cone type rubber mountings with steel washers, so installed as to prevent any direct metal to metal contact between engine and mounting frame, are provided for engine installation. A torque of 60 to 80 inch pounds should be applied in tightening mounting bolts.

C-7. Overall Dimensions:

Refer to outline drawing #A50381.

C-8. Magnetos:

(a) The standard engine is equipped with one Eiseman AM-4 magneto with impulse coupling, installed on the left hand mounting pad, and one Eiseman AM-4 magneto without impulse coupling, on the right hand mounting pad.

Other magnetos available for use on the A65 engines are:

1. Bendix-Scintilla Model SF4R-8 (without impulse coupling) installed on both left and right hand mounting pads.
2. J.I. Case Model 4CAMA-R , one, with impulse coupling, installed on the left hand mounting pad, and the other, without impulse coupling, on the right hand mounting pad.

(b) The direction of rotation of magneto drive shaft, facing mounting flange of magneto, is clockwise.

(c) The engine firing order is 1-3-2-4.

(d) Magneto Timing:
A65 Dual Ignition – Right mag. 30° B.T.C. (Top Spark Plugs)
Left mag. 30° B.T.C. (Lower Spark Plugs)

C-9. Spark Plugs: Champion C-26 spark plugs are used on all series except those equipped for radio shielding, in which case C-26S spark plugs are available. List of approved spark plugs are shown on Continental drawing #35916.

C-10. Radio Shielding: All model A65 engines may be equipped with radio shielding as special equipment.

C-11. Fuel Metering System: A Bendix-Stromberg type NA-S3B carburetor is standard equipment an all engines. An altitude control is not incorporated in the standard engine. However, it is available as special equipment if so desired.

C-12. Venturi Diameter: The carburetor venture diameter is 1-1/4 in.

C-13. Fuel Inlet Connection: The carburetor has provisions for a 1/4 in. pipe tap hole for fuel line connection.

C-14. Priming System: A 1/8 in. pipe tap hole on each cylinder head at the intake port and also one above the carburetor in the "X" manifold are provided for primer connections.

C-15. Ex-Cell-O Fuel Injector: A fuel injection system which replaces the Stromberg carburetor is offered as optional equipment.

(a) Air Filter: An Air Maze Air Filter is supplied as standard equipment on all Fuel Injection engines.

(b) Fuel Inlet Connection: The fuel injector has provisions for 1/8 in. pipe tap hole for fuel line connections.

(c) Vent Connection: The fuel injector has provisions for a 1/8 in. pipe tap hole for a vent and is located as shown on the installation drawing.

(d) Air Scoop Drain: The air scoop has provisions for draining outside the engine compartment, excess fuel caused by an overpriming condition. Minimum size of drain to be not less than 3/8 in. tubing.

C-16: Fuel Pump: A fuel pump of the AC diaphragm type is available when a special camshaft having an eccentric at the front end, and a pump mounting pad on the crankcase are provided.

C-17. Fuel: Aviation gasoline of 73 minimum octane rating is recommended for the A65 engines. For a gravity feed system, using a Bendix-Stromberg carburetor, the fuel tanks should be so arranged that the head of gasoline at the carburetor under extreme climb conditions does not fall below 6 inches. A minimum head of 19 inches should be maintained under all normal conditions of flight. A head of from 42 to 50 inches is the maximum pressure desirable to avoid flooding. Provision should be made not to exceed this head when the airplane is in the nose down or steep glide position.

(a) When the fuel pump is used and connected directly to the carburetor, a carburetor equipped with a smaller float needle valve seat is provided to maintain proper float operation with the higher pump pressures.

C-18: Fuel Consumption: Power curve sheet, No. 1009-1, shows average full rich fuel flow at sea level. Changes in atmospheric and engine conditions may be expected to vary the given values plus or minus 8 per cent.

C-19: Oil Sump:

(a) An integral oil sump is furnished with the engine and the oiling system is entirely self-contained. The capacity of the oil sump is 4 to 4-1/2 U.S. quarts. The minimum quantity of oil in the sump necessary to adequately lubricate the engine is 2 quarts.

(b) Dry sump type engines are also available, in which case a cover is attached to the sump mounting flange. The cover has provisions for oil inlet and drain connections.

(c) The oil sump filler cap is fitted with a graduated oil level gauge which indicates full at 4 quarts capacity.

(d) The breather connection is located at the front right hand side of the crankcase and a 5/8 in. standard ell hose fitting is provided. Breather pipe should exhaust into hot air side of the carburetor air intake or at cooling air exit of cowling.

C-20. Oil Drain Plug: A standard drain plug having a 5/8-18 thread is located at the bottom of the oil sump.

C-21. Oil Temperature Measurement: A standard 5/8-18 NF-3 S.A.E. thread connection is provided at the end of the oil screen in the rear cover for measurement of oil temperature.

C-22. Oil Pressure Connection: A 1/8 in. pipe tap hole on the right side of the crankcase at rear is provided for an oil pressure gauge connection.

C-23. Oil: The selection of the grade of oil should be based on average oil temperature. Normal engine oil temperatures vary between 120°F. and 180°F. Grade No. 80 aviation or S.A.E. 40 oils are recommended. S.A.E. 30 oils are recommended for operating temperatures below 120°F.

C-24. Oil Consumption. The average consumption at rated power and r.p.m. should not exceed 0.010 lb. per bhp-hr.

C-25. Valve Gear:

(a) Hydraulic type steel tappets eliminate tappet adjustments. Engine oil pressure feed on tappets, push rod ball ends and rocker bearing is provided. Gravity drain of oil from rocker housings to crankcase is provided by means of sealed push rod housings. Valve guides are oiled by splash.

(b) Intake valves are of hardened steel and the intake valve seats are aluminum-bronze on the A65 engines. Cylinders are equipped with austenitic steel exhaust valve seat inserts in the head, and austenitic steel exhaust valve are used.

(c) Valve timing intake opens 10° B.T.C. Intake closes 50° A.B.C. Exhaust valve opens 50° B.B.C. Exhaust valve closes 15° A.T.C

C-26. Tachometer: A single standard S.A.E. tachometer drive rotating in a counter-clockwise direction facing the drive is provided.

C-27. Cylinder and Head Cooling Baffles: The engine is designed for cross flow cooling. Baffles of some type are nearly always necessary to have the air pass from the top of the cylinders downward thru the fins, or vice-versa. The pressure differential across the cylinder baffles should not be less than 3 in. H_2O under best climbing angle conditions.

C-28. Exhaust Manifold: A set of steel flanges and gaskets for the exhaust manifold is furnished with each engine.

C-29. Exhaust Manifold Back Pressure: The exhaust manifold must be so designed and constructed so that the back pressure will not exceed 13.5 in. H_2O. (Pressure must be taken for each cylinder approximately 1 in. below exhaust flange.

C-30. Accessory Drive Ratios: The gear ratio of each accessory drive to the crankshaft is as follows:

Tachometer	0.500 to 1
Magnetos	1.000 to 1
Oil Pump	0.500 to 1
Fuel Pump	0.500 to 1 (camshaft)

D. DETAIL WEIGHTS

D-1. List of engine series numbers:

Engine Series No.	Identification
8	Standard carburetor engine with S.A.E. #0 taper crankshaft.
8F	Standard carburetor engine with flanged crankshaft in accordance with S.A.E. Aeronautical Standard AS-127 Type I.
8J	Same as Series 8 above except that Ex-Cell-O Fuel Injector equipment is provided instead of the Stromberg carburetor.
8FJ	Same as the Series 8F above except that Ex-Cell-O Fuel Injector equipment is provided instead of the Stromberg carburetor.

D-2. Engine (Standard):

		A65 Series 8
(a)	Basic engine, including engine lubrication system	
	Tachometer drive	151.00 lbs.
	Carburetor, Stromberg NA-S3B (without altitude control)	2.60
	Magnetos (2) Eiseman AM-4 (Unshielded) with gears	11.04
	Spark Plugs (8) Champion C26 (Unshielded)	1.28
	Ignition Cable Assembly – Complete (Unshielded)	1.20
	Engine Dry Weight (Average)	167.12 lbs.
	Engine Weight (Dry) Series 8F (Add 1.04 lbs. for Flanged Shaft)	168.16
	Engine Weight (Dry) Series 8J (Add 4 lbs. for Fuel Injection)	171.12
	Engine Weight (Dry) Series 8FJ (Add 1.04 lbs. for Flanged Shaft and 4 lbs. for Fuel Injection	172.16

D-3. Standard Accessories and Equipment: The following accessories are included as a part of the engines listed below, at the indicated additional weights:

Accessory	Weight (Lbs.)	Used on Engine Series			
		8	8F	8J	8FJ
Carburetor Air Intake and Filter Assy. (Cont. A40522)	2.56	x	x		
Propeller Hub Assembly (A3746)	4.39	x		x	
Propeller Attaching Parts – Flanged Crankshaft	.90		x		x
Exhaust Flanges and Gaskets (4)	.55	x	x	x	x
Rubber Mounting Bushings and Steel Washers (8)	.55	x	x	x	x

D-4. Optional Equipment: The following accessories are available as special equipment at the indicated additional weights:

Accessory	Additional Weights	Used on Engine Series			
		8	8F	8J	8FJ
Radio Shielding Equipment, Includes:					
Magnetos, Eiseman LA-4 (Impulse and Gears)	1.56 lbs.	x	x	x	x
Ignition Cable Assembly – Complete (Shielded)	1.06	x	x	x	x
Spark Plugs (8) Champion C26S (Shielded)	0.41	x	x	x	x
Fuel Pump – AC Diaphragm Type	1.75	x	x	x	x
Fuel Injection Equipment (Ex-Cell-O)	4.00			x	x
Oil Cooler – Harrison	4.00	x	x	x	x

D-5. Shipping Weights (Approximately):

Domestic Shipping Box and Cradle (Average) 70 Lbs.

Total A65 Engine Shipping Weight	8	8F	8J	8FJ
	245	243	247	244

E. OPERATION

E-1. Oil Pressure: Minimum, idling - 10 lbs. per sq. in.
Normal - 30 to 35 lbs. per sq. in.

E-2. Maximum Permissible Oil Temperature: The maximum oil inlet temperature is 220°F.

E-3. Cylinder Temperatures: The maximum permissible cylinder head temperature measured at the spark plug gasket is 550° F. The maximum permissible cylinder base temperature is 350° F measured with cylinder barrel contact type thermocouples. The above readings are to be taken at the bottom spark plug and bottom of cylinder base when cooling air is entering from top of cylinder. If cooling air is entering from bottom, temperatures are to be taken at top spark plugs and top of cylinder base.

E-4. Magneto Temperatures: The maximum permissible magneto temperature is 160° F.

E-5. Carburetor Air Intake: The carburetor air intake is provided with a valve to regulate the entrance air temperature. The intake scoop should extend forward so that impact air will be supplied to the carburetor. The 2 in. dia. tube connection at rear of carburetor intake should be connected to an adequate source of heated air so that with 30° F outside air at 90° F temperature rise can be obtained when operating at 75 per cent of maximum except take-off power. (Measure temperature rise just below venturi.) In warm weather little or no heat is required.

(a) Carburetor Entrance Pressures: The carburetor entrance pressures with heat on and heat off should be within minus 6 in. H_2O and plus 12 in. H_2O. Measurements to be taken at place provided at carburetor entrance.

E-6. Fuel Injector Air Intake: A fuel injector air intake scoop is provided with an Air Maze air filter covering the inlet. This scoop is provided with a spring loaded relief valve to admit air to the intake system in the event the filter becomes blocked for any reason. Provisions for supplying heat to the intake air are not required as no icing difficulties are encountered with fuel injection.

(a) Injector Air Entrance Pressures: The pressure at the fuel injector air entrance should be within 0 in. to 12 in. H_2O. Measurements taken at entrance to air throttle body.

F. PACKING

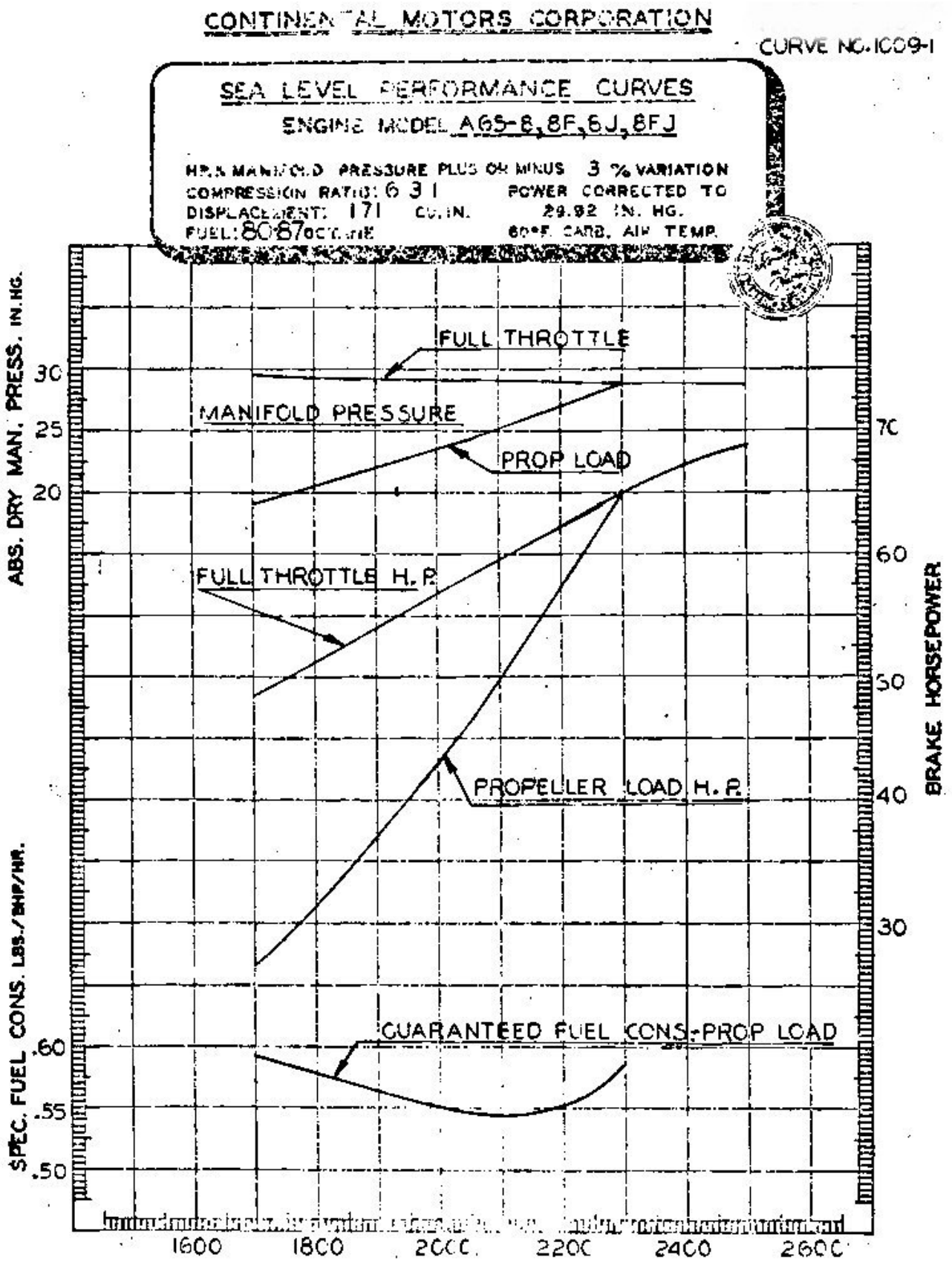
(a) Domestic: The engine, after processing, is set in an inverted horizontal position in a special wood cradle that is bolted to the base that forms the bottom of the wire bound shipping crate. The engine is secured in this cradle by inserting the propeller shaft in a hole in one side of the cradle after which the two upper mounting lugs are bolted to the other side. A prefabricated water-proof paper shroud is then placed over the engine and base and the wire bound crate put in place and nailed to the base.

The carburetor intake, propeller hub assembly, and rubber mounting equipment are fastened to the base of the crate.

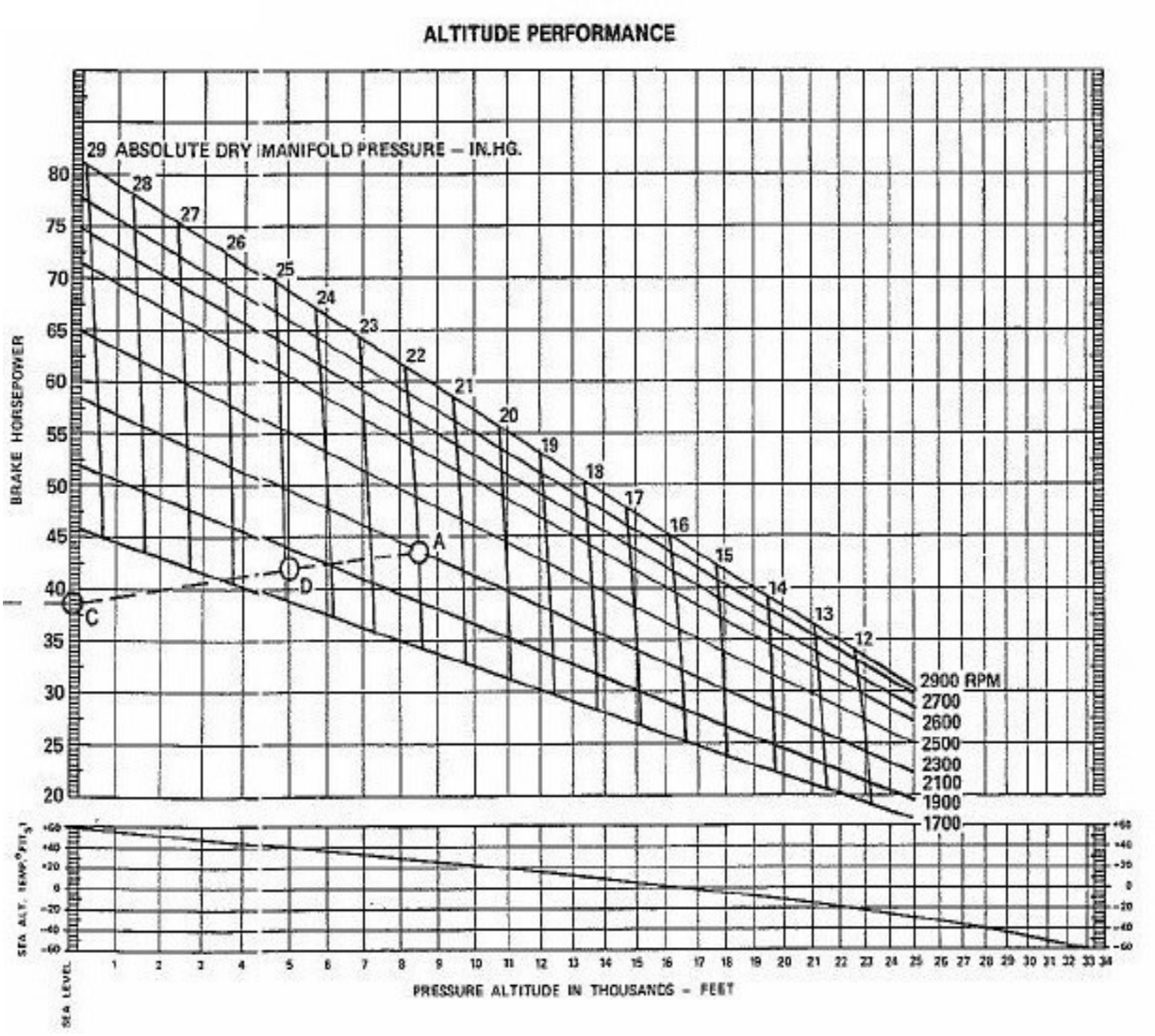
The engine thus processed and crated is preserved for six months storage in a dry place.

(b) Export: For export shipment, the engines are packed much the same as stated above for domestic shipment except that the cradle is omitted and the engine is fastened directly to the base by two angle iron straps to the upper mounting lugs and a wooden clamp to the propeller shaft.

The shipping box, however, is of much heavier construction and is made in different sizes to contain one, two, or four engines.



The following pages (10, 11, and 12) are taken from the MAINTENANCE AND OVERHAUL MANUAL WITH ILLUSTRATED PARTS LIST FOR A-65 AND A-75 ENGINES, form x30008, dated August 1977, and the OPERATOR'S MANUAL FOR A & C SERIES & 0-200 4 CYLINDER ENGINES, form x30012, dated December 1980.



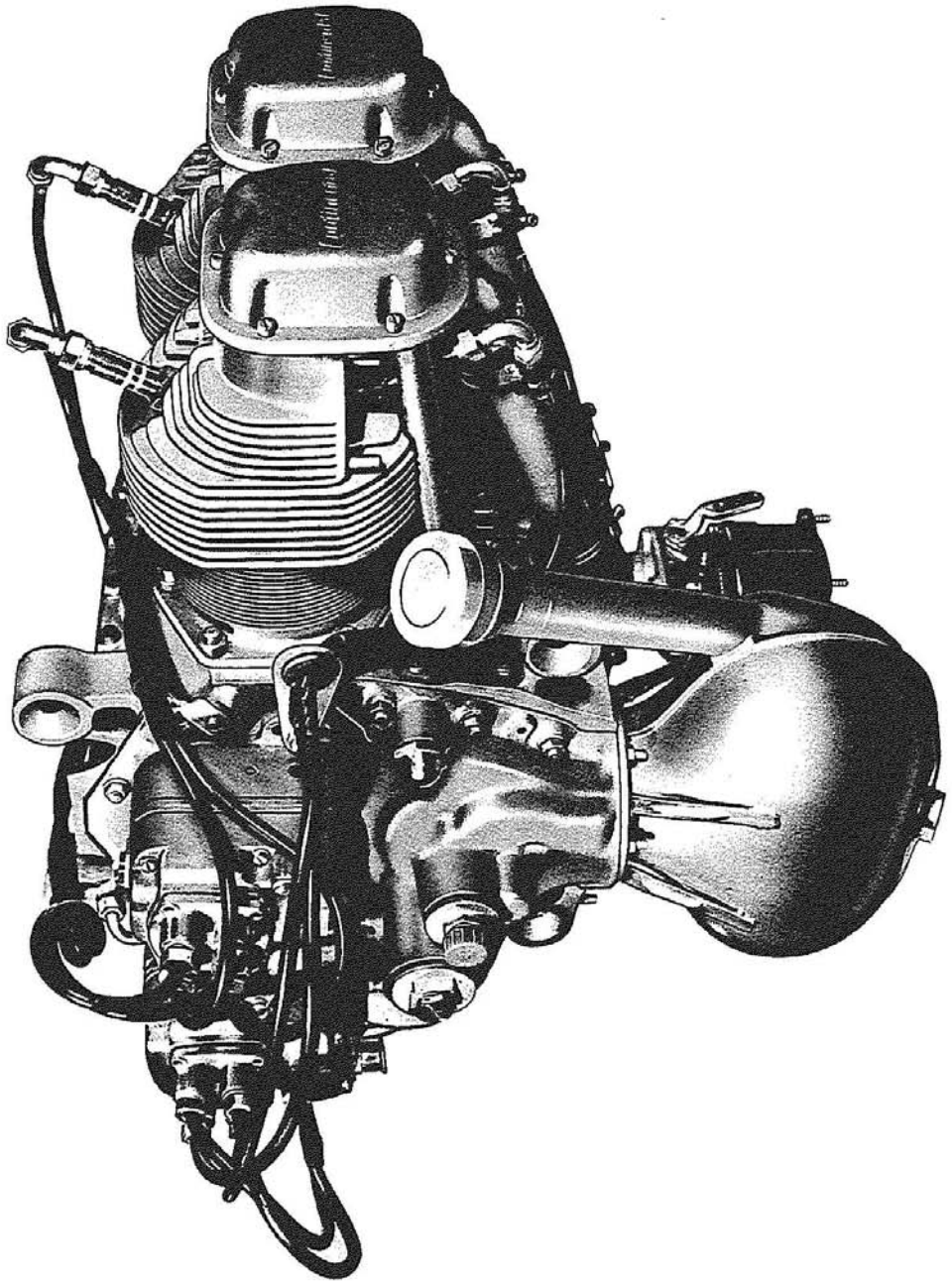


Figure 2. Three-Quarter Right Rear View of A65-8F.

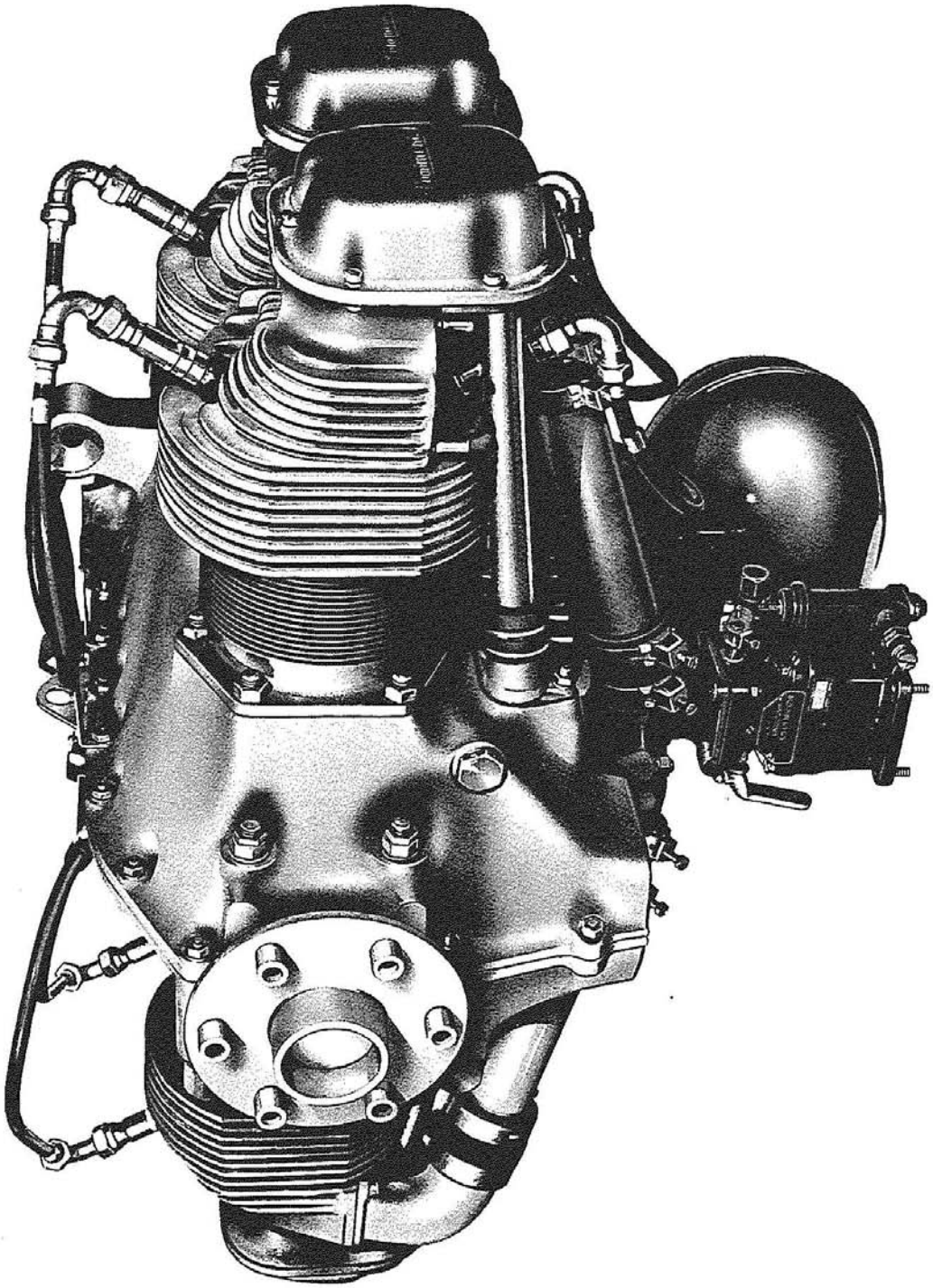


Figure 1. Three-Quarter Left Front View of A65-8F.

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