

Specifications and Data

MODELS

L-4 L-4M L-4MA—225 H.P.
L-5 L-5M L-5MA—285 H.P.



JACOBS AIRCRAFT ENGINE CO.

POTTSTOWN, PENNSYLVANIA, U. S. A.

JACOBS AIRCRAFT ENGINES

Specifications and Data

MODELS

L-4 L-4M L-4MA — 225 H.P.
L-5 L-5M L-5MA — 285 H.P.



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JACOBS AIRCRAFT ENGINE CO.

POTTSTOWN, PENNSYLVANIA, U. S. A.

FOREWORD

THIS booklet contains excerpts from the 1936 Instruction Manual on Jacobs engines Models L-4, L-4M, L-4MA, L-5, L-5M and L-5MA, giving descriptions, specifications, performance curves, photographs and diagrams of these models.

No elaborate advertising prospectus has been compiled on the company's products, as it is the policy of this company to confine its overhead and advertising expense to the minimum necessary, and to concentrate its resources on designing and producing the most reliable and efficient aircraft engines possible and giving real service to the owners of those engines.

We trust that the reader will understand, therefore, that this booklet makes no attempt to be an advertising brochure, but merely presents the essential engineering and performance data on our current production engines. Any specific data not covered herein will be gladly furnished on request.



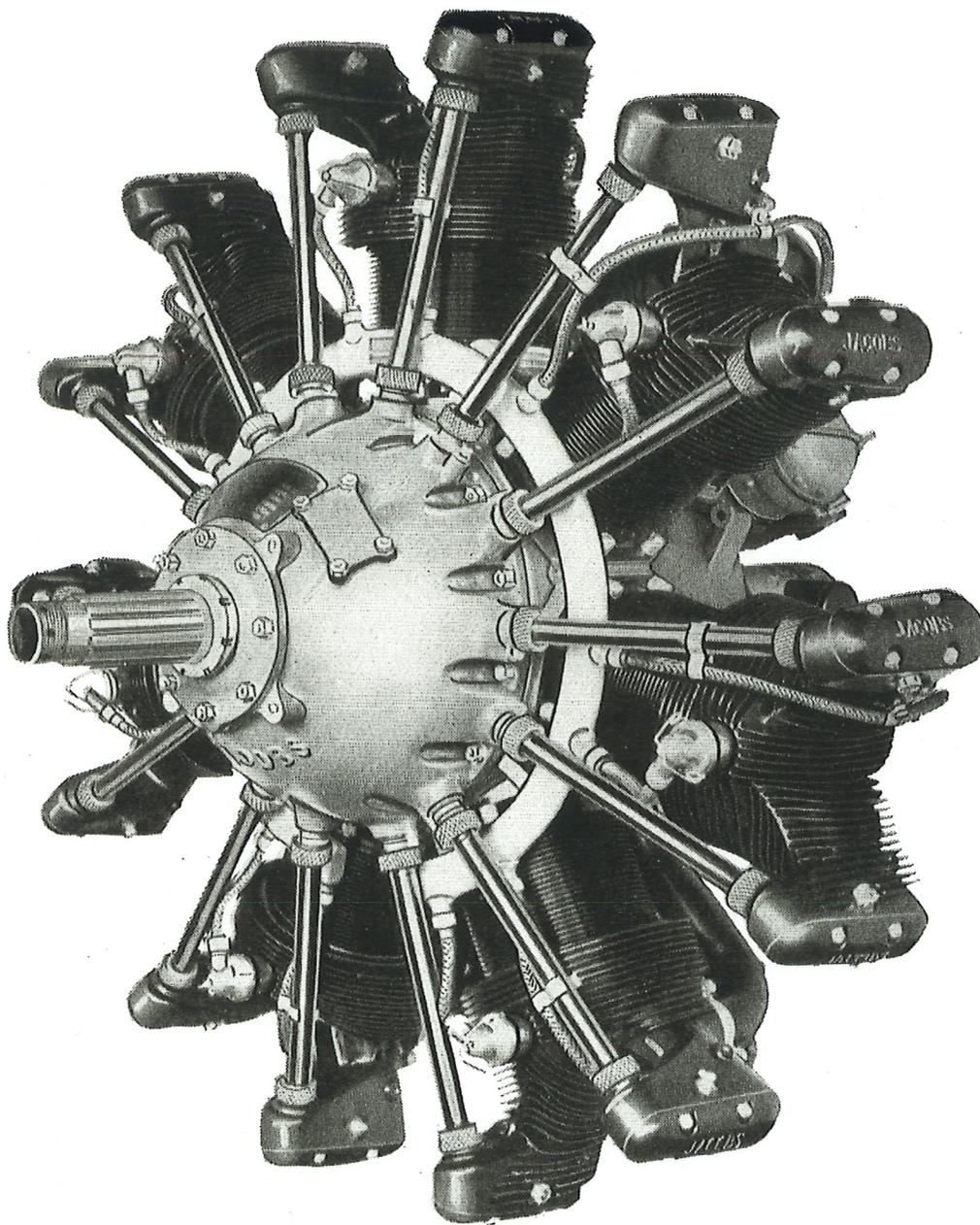
JACOBS AIRCRAFT ENGINE COMPANY

POTTSTOWN, PENNSYLVANIA, U. S. A.

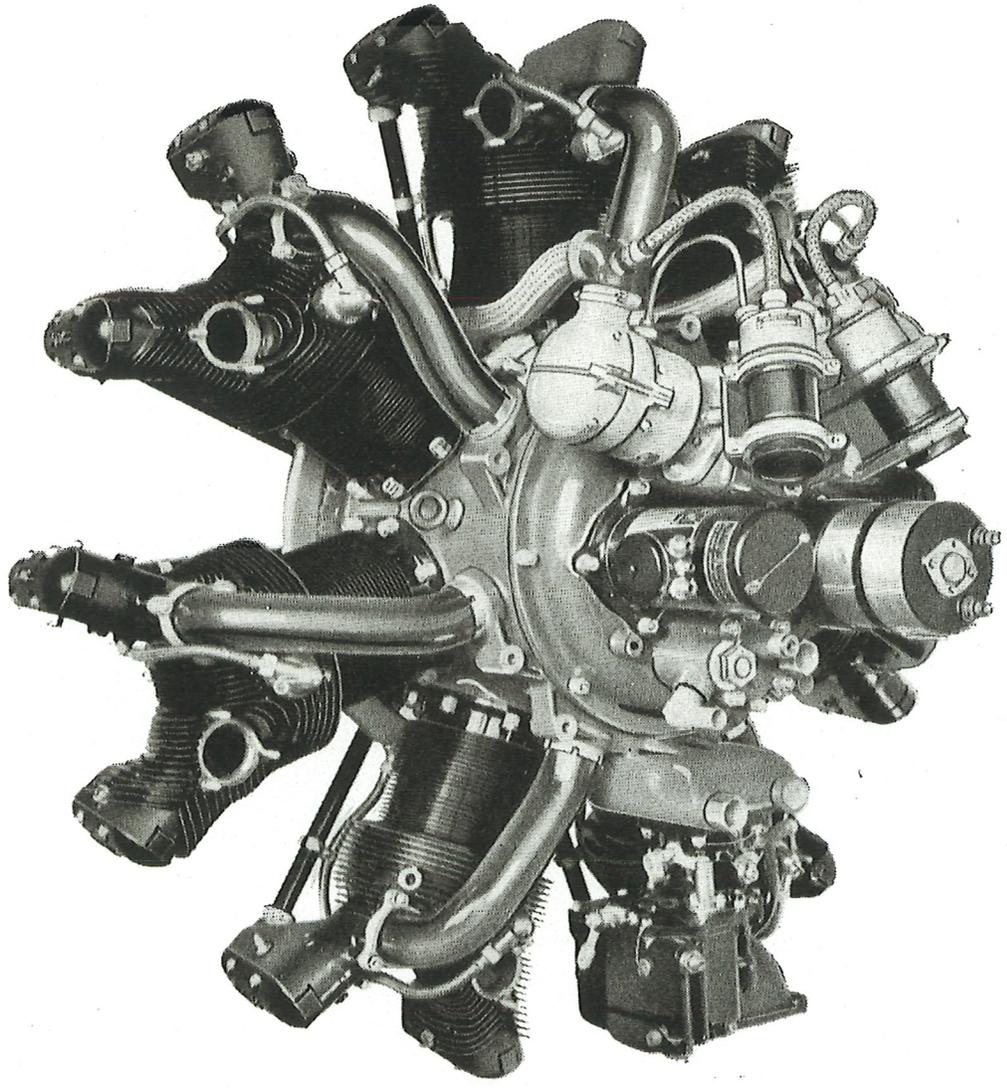
Cable Address:
JAECO, POTTSTOWN

Telephone:
POTTSTOWN 2134





$\frac{3}{4}$ FRONT VIEW
JACOBS L-4 225 H.P. ENGINE



$\frac{3}{4}$ REAR VIEW
JACOBS L-4 225 H.P. ENGINE

SPECIFICATIONS—JACOBS L-4 ENGINE

[3]

Name.....	Jacobs
Model.....	L-4
Type (Direct Drive).....	Static Air Cooled Radial
A.T.C. Number.....	121
A.T.C. Rating and Rated R.P.M.....	225 H.P. at 2000 R.P.M.
Number of Cylinders.....	7
Bore.....	5.25
Stroke.....	5.
Displacement.....	757 cubic inches
Normal Power at Rated R.P.M. at Sea Level.....	225
Rated R.P.M. of Crankshaft.....	2000
Recommended Cruising Output.....	175 H.P. at 1900 R.P.M.
Compression Ratio.....	5.375:1
Ignition.....	Battery (2 distributors)
Timing.....	30° Full Advance
Spark Plugs Recommended.....	B.G. 4B2
Oil Pump.....	1 Pressure—1 Scavenger
Oil Consumption (approx. max. service figures may be lower)	
Full Throttle at Rated R.P.M.....	.018 lb./B.H.P. hour
Full Throttle at Rated R.P.M.....	.53 gal./hour
Cruising at 1900 R.P.M.....	.40 gal./hour
Oil in Temperature in Flight (desired)...	140° F.
Oil in Temperature in Flight (maximum)	170° F.
Oil Pressure in Flight.....	60 to 90 lbs.
Carburetor.....	Stromberg NA-R7A
Fuel Required (73 Octane).....	Domestic Aviation Gas
Fuel Consumption at Sea Level (approx.)	
Full Rich:	
Full Throttle at Rated R.P.M.....	.5 to .55 lb./B.H.P. hour
Full Throttle at Rated R.P.M.....	19 to 20 gal./hour
Cruising at 1900 R.P.M.....	13 to 15 gal./hour
Best Setting:	
Full Throttle at Rated R.P.M.....	.48 to .52 lb./B.H.P. hour
Full Throttle at Rated R.P.M.....	17.5 to 19 gal./hour
Cruising at 1900 R.P.M.....	12 to 14 gal./hour
Valve Timing: (Average Hot Running Clearance .035 Intake, .040 Exhaust)	
Intake opens.....	14° B.T.C.
Intake closes.....	54° A.B.C.
Exhaust opens.....	54° B.B.C.
Exhaust closes.....	14° A.T.C.
Intake and Exhaust remain open (Cksft. Deg.).....	248°
Valve Tappet Clearance (Intake—cold)	.006
Valve Tappet Clearance (Exhaust—cold)	.006
Valve Spring Loading (plus or minus 10%)	
<i>Valve Closed:</i> Inner.....	35 lbs.
Outer.....	60 lbs.
<i>Valve Open:</i> Inner.....	50 lbs.
Outer.....	90 lbs.

[4] SPECIFICATIONS—JACOBS L-4 ENGINE—
(Continued)

Temperature

Cylinder Head-using Spark Plug Washer Type Couple	
Normal maximum.....	450°
Maximum permissible for short period	550°
Cylinder Barrel using Embedded Type Couple on Flange Thrust Side—Center of Barrel	
Maximum permissible.....	300°
Length from end of Propeller Shaft to end of Electric Starter.....	38 ⁷ / ₈ inches
Overall Diameter.....	43 ¹ / ₂ inches
Center of Gravity (Bare Engine)	
Distance forward of Mounting Bolt Circle.....	5 ⁹ / ₁₆ inches
Distance below Crankshaft Centerline.	¹ / ₂ inch
Crankshaft Rotation facing Ckshft. End.	Anti-Clockwise
Crankshaft Spline.....	S.A.E. No. 20
Diameter Mounting Bolt Circle.....	16 ¹ / ₂ inches
Number of Mounting Bolts.....	8
Tachometer Shaft Speed.....	One-Half Crankshaft
Rotation of Starter (facing Starter Flange).....	Clockwise
Diameter of Mounting Bolts.....	³ / ₈ inch

Dry Weight of Bare Engine includes the following:

Ignition Units, Generator and Control Box, Carburetor, Set Ignition Wiring and Spark Plugs (unshielded), Propeller Centering Cones and Nut, Oil Strainer (separately mounted)

Total Dry Weight (Battery Ignition) 440 lbs. (approx.)

Weight: Standard Equipment not included in Dry Weight

Tool Kit.....	4 ³ / ₄ lbs.
Instruction Book.....	¹ / ₄ lb.
Domestic Shipping Box.....	334 lbs.
Total Shipping Weight.....	774 lbs.

Weight: Extra Equipment available with Engine, not included in Standard Equipment nor in Dry Weight

Propeller Hub.....	15 lbs.
Eclipse E-80 Electric Starter.....	20 ¹ / ₄ lbs.
Eclipse Type G 15-amp. Generator and Control Box.....	19 lbs. 8 oz.
Eclipse Type D 25-amp. Generator and Control Box.....	23 lbs. 8 oz.
Eclipse Type B-2 Vacuum Pump.....	3 lbs. 14 oz.
Eclipse Type B-1 Vacuum Pump.....	5 lbs. 4 oz.
Romec Type B-2A Vacuum Pump...	4 lbs.
Romec Type C-16 Fuel Pump.....	1 lb. 10 oz.
Romec Type F-4RB Fuel Pump.....	2 lbs. 5 oz.
Eclipse F-141 Electric Starter.....	25 ¹ / ₂ lbs.
Breeze Radio Shielding, with ignition wires.....	13 lbs.

Note: Weight of standard generator and control box is 11³/₄ lbs., which should be deducted from the weights given above for special generators in figuring added weight of special generator installation.

SPECIFICATIONS—JACOBS L-4M ENGINE

[5]

Name	Jacobs
Model	L-4M
Type (Direct Drive)	Static Air-Cooled Radial
A.T.C. Number	121
A.T.C. Rating at Rated R.P.M.	225 H.P. at 2000 R.P.M.
Number of Cylinders	7
Bore	5.25
Stroke	5.
Displacement	757
Normal Power at Rated R.P.M. at Sea Level	225
Rated R.P.M. of Crankshaft	2000
Recommended Cruising Output	175 H.P. at 1900 R.P.M.
Compression Ratio	5-375:1
Ignition	Scintilla—2 Magnetos
Timing	30° Full Advance
Spark Plugs Recommended	B.G. 4B2
Oil Pump	1 Pressure—1 Scavenger
Oil Consumption (approx. max.—Service Figures may be lower)	
Full Throttle at Rated R.P.M. ....	.018 lb. /B.H.P. hour
Full Throttle at Rated R.P.M. ....	.53 gal. /hour
Cruising at 1900 R.P.M. ....	.40 gal. /hour
Oil in Temperature in Flight (desired) ...	140° F.
Oil in Temperature in Flight (maximum)	170° F.
Oil Pressure in Flight	60 to 90 lb.
Carburetor	Stromberg NA-R7A
Fuel Required (73 octane)	Domestic Aviation Gas
Fuel Consumption at Sea Level (approx.)	
Full Rich:	
Full Throttle at Rated R.P.M. ....	.5 to .55 lb. /B.H.P. hour
Full Throttle at Rated R.P.M.	19 to 20 gal. /hour
Cruising at 1900 R.P.M.	13 to 15 gal. /hour
Best Setting:	
Full Throttle at Rated R.P.M. ....	.48 to .52 lb. /B.H.P. hour
Full Throttle at Rated R.P.M.	17.5 to 19 gal. /hour
Cruising at 1900 R.P.M.	12 to 14 gal. /hour
Valve Timing: (Average Hot Running Clearance .035 Intake, .040 Exhaust)	
Intake opens	14° B.T.C.
Intake closes	54° A.B.C.
Exhaust opens	54° B.B.C.
Exhaust closes	14° A.T.C.
Intake and Exhaust remain open (Ckshft. Deg.)	248°
Valve Tappet Clearance (Intake—cold)	.006
Valve Tappet Clearance (Exhaust—cold) .....	.006
Valve Spring Loading (plus or minus 10%)	
<i>Valve Closed:</i> Inner	35 lbs.
Outer	60 lbs.
<i>Valve Open:</i> Inner	50 lbs.
Outer	90 lbs.
Temperature	
Cylinder Head—using Spark Plug Washer Type Couple	
Normal maximum	450°

[6] SPECIFICATIONS—JACOBS L-4M ENGINE—

(Continued)

Temperature (Continued)

Maximum permissible for short period Cylinder Barrel—using Embedded Type Couple on Flange Thrust Side— Center of Barrel	550°
Maximum permissible	300°
Length from end of Propeller Shaft to end of Electric Starter	40 ³ / ₁₆ inches
Overall Diameter	43 ¹ / ₂ inches
Center of Gravity (Bare Engine)	
Distance forward of Mounting Bolt Circle	5 ¹ / ₁₆ inches
Distance below Crankshaft Centerline	¹ / ₄ inch
Crankshaft Rotation facing Ckshft. End.	Anti-Clockwise
Crankshaft Spline	S.A.E. No. 20
Diameter Mounting Bolt Circle	16 ¹ / ₂ inches
Number of Mounting Bolts	8
Tachometer Shaft Speed	One-Half Crankshaft
Rotation of Starter (facing Starter Flange)	Clockwise
Diameter of Mounting Bolts	³ / ₈ inches
Dry Weight of Bare Engine includes the following:	

Magnetos, Set Ignition Wiring and Spark Plugs (unshielded), Car-
buretor, Propeller Centering Cones and Nut, Oil Strainer (sepa-
rately mounted)

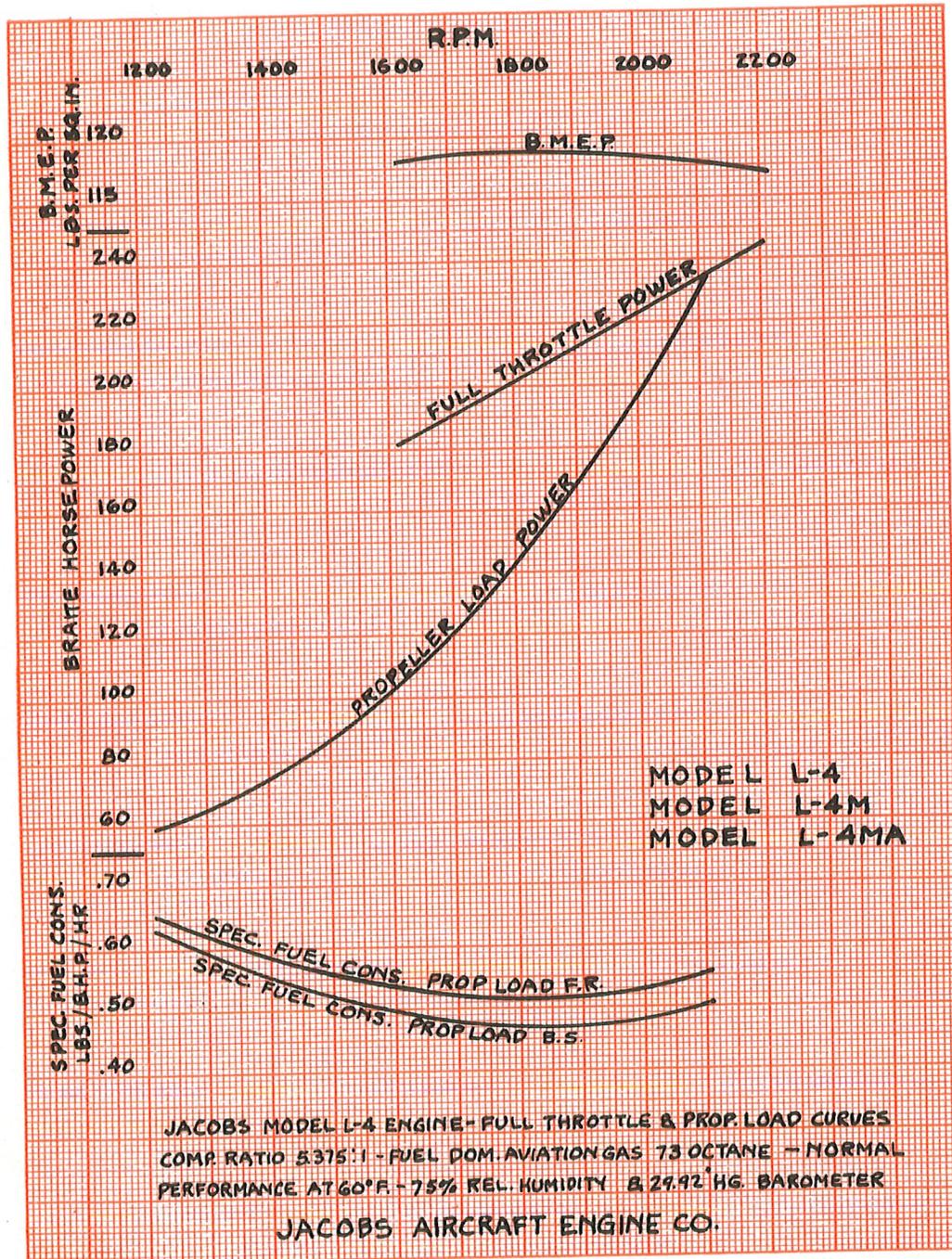
Total Dry Weight (Magneto Ignition) 445 lbs. (approx.)
Weight: Standard Equipment not in-
cluded in Dry Weight:

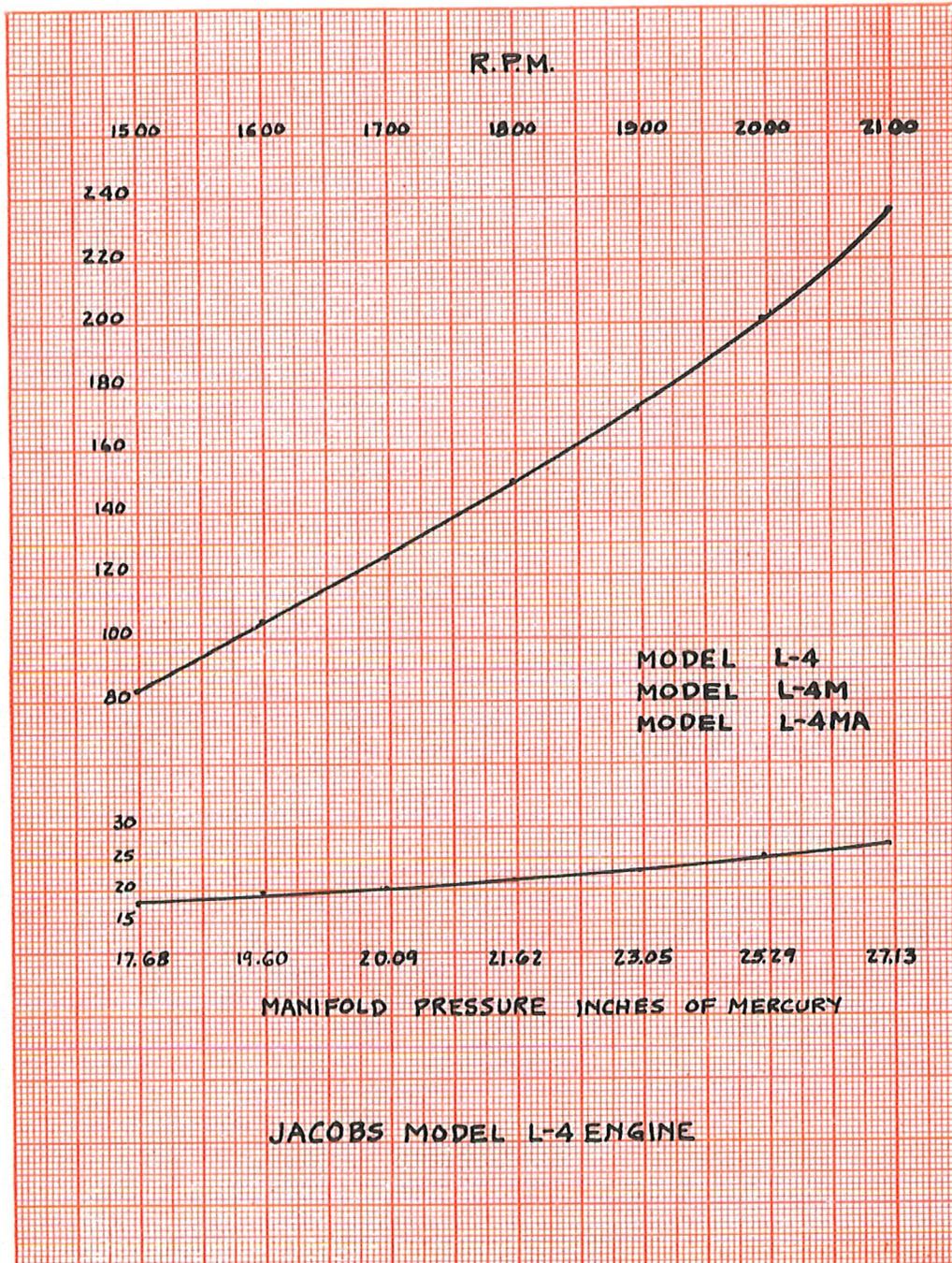
Tool Kit	4 ³ / ₄ lbs.
Instruction Book	¹ / ₄ lb.
Domestic Shipping Box	334 lbs.
Total Shipping Weight	779 lbs.

Weight: Extra Equipment available with
Engine, not included in Standard
Equipment nor in Dry Weight:

Propeller Hub	15 lbs.
Eclipse E-80 Electric Starter	20 ¹ / ₄ lbs.
Eclipse Type G 15-amp. Generator and Control Box	19 lbs. 8 oz.
Eclipse Type D 25-amp. Generator and Control Box	23 lbs. 8 oz.
Eclipse Type B-2 Vacuum Pump	3 lbs. 14 oz.
Eclipse Type B-1 Vacuum Pump	5 lbs. 4 oz.
Eclipse Model 3171—15-amp. Genera- tor	15 ¹ / ₄ lbs.
Eclipse Control Box CB-97-2	2 ¹ / ₄ lbs.
Romec Type B-2A Vacuum Pump	4 lbs.
Romec Type C-16 Fuel Pump	1 lb. 10 oz.
Romec Type F-4RB Fuel Pump	2 lbs. 5 oz.
Eclipse F-141 Electric Starter	25 ¹ / ₂ lbs.
Breeze Radio Shielding, with ignition wires	13 lbs.
Bosch LE/70-12 Generator with Con- trol Box	11 ³ / ₄ lbs.

Note: Generator is not included in standard equipment on L-4M engines.







GENERAL DESCRIPTION

JACOBS L-4 BATTERY IGNITION AND L-4M MAGNETO IGNITION ENGINES

L-4MA—AUTOGIRO INSTALLATION ONLY

General

The Jacobs L-4 battery ignition and L-4M magneto ignition engines are static air-cooled 7-cylinder radial engines, with piston displacement of 757 cubic inches. The rated power output is 225 H.P. at 2000 RPM; the bore is 5.25 and the stroke 5 inches; the compression ratio is 5.375 to 1.

The crankshaft front end is provided with an S.A.E. No. 20 spline. The weight of the model L-4 battery ignition engine, complete with carburetor, 6-ampere generator (including voltage regulator), two battery timers, two ignition coils, ignition wiring (unshielded), spark plugs, front and rear propeller hub centering cones and propeller nut, is approximately 440 pounds. The dry weight of the L-4M magneto ignition engine, including carburetor, two Scintilla magnetos (unshielded), ignition wiring, spark plugs, front and rear propeller hub centering cones and propeller nut, is approximately 445 pounds. The overall diameter of both engines is 43 $\frac{1}{2}$ " ; length from end of propeller shaft to end of electric starter is approximately 37" ; diameter of mounting bolt circle, 16 $\frac{1}{2}$ " ; number of mounting bolts, 8; diameter of mounting bolts, $\frac{3}{8}$ " ; tachometer shaft speed, one-half crankshaft.

Cylinders

The cylinders are machined from chrome-molybdenum steel forgings with closely spaced fins, and the bore is ground and honed. Cylinder heads are aluminum alloy heat-treated castings, with rocker arm supports cast integral, and the head is screwed and shrunk on the steel barrel.



Valves

The exhaust valve stems are hollow and filled with a sodium solution, and are made from CNS steel. The intake valves have a solid stem, are of the tulip type, made from CNS steel. Both exhaust and intake valves are made by Thompson Products, Inc.

Valve Seats

Valve seats are machined from forged aluminum bronze and are shrunk into the aluminum cylinder head.

Valve Operating Mechanism

The cam, cam drive gears, valve tappets and push rods are located in the nose section of the engine. The cams have three lobes and are run at one-sixth engine speed. Push rods, rocker arms, rocker arm bearings and valve springs are enclosed to prevent oil leakage.

Valve Springs

Two springs are used on both the intake and exhaust valve and are made from a special vanadium steel, and undergo a rigid magnaflux inspection for defects.

Crankshaft

The crankshaft is of the two-piece clamp type design and is machined and ground all over from selected chrome-nickel molybdenum steel forgings.

Master Rod and Link Rods

The master rod is of the one-piece type, machined all over from a chrome-nickel molybdenum steel forging and is provided with a steel-back, special alloy lined bearing, which is shrunk into the master rod.

The link rods are of forged aluminum alloy. The piston pin and link pin holes are diamond bored. No bushings are used in the link rod, and the aluminum bears directly on glass hard nitrided steel pins.



Pistons

Forged aluminum alloy pistons of a proven design are used. Three ring grooves are provided above the piston pin and one below. The top ring is a one-piece compression ring; the second a two-piece compression ring; the third a two-piece combination compression and oil ring, and the fourth a two-piece positive oil ring.

Piston Pins

Full floating piston pins, made from nitralloy steel having aluminum plugs in the end, are used.

Crankcase

The crankcase assembly is built up of six parts, secured together by studs and nuts, and consists of the following:

1. Thrust bearing plate, which locks and holds in place the thrust bearing.
2. Front case, made from a heat-treated magnesium alloy casting which carries the thrust bearing, cam, cam drive mechanism, tappet guides, and tappets and rollers.
3. An aluminum alloy casting, which supports the front crank-shaft ball bearing.
4. An aluminum alloy crankcase casting of the barrel type, having a rear wall cast integral which supports the rear main crankshaft ball bearing, the rearward section of the crankcase incorporating a ring type intake manifold.
5. A cast magnesium alloy rear intermediate bearing plate, incorporating the oil feed bearing to the crankshaft and providing support for accessory drive gears which are under pressure oil feed.
6. A cast magnesium alloy accessory case, providing suitable mounting pads for twin battery distributor units, fuel pump, oil pump, generator, starter, and tachometer connections.



Ignition System

L-4

Two complete and separate battery timer distributors are used, incorporating automatic advance, which gives the correct retard for starting and idling and automatically advances the proper amount in relation to the engine speed. This gives a very low idling speed and smooth acceleration. Either Bosch or Scintilla units are used.

L-4M

The L-4M engines are identical with the L-4 except that they are provided with dual Scintilla magnetos. Rear accessory cases, bearing mounting plate and gears are different to accommodate the magnetos and drives.

Starter

The standard engine is equipped for installation of direct drive electric starter.

Carburetor

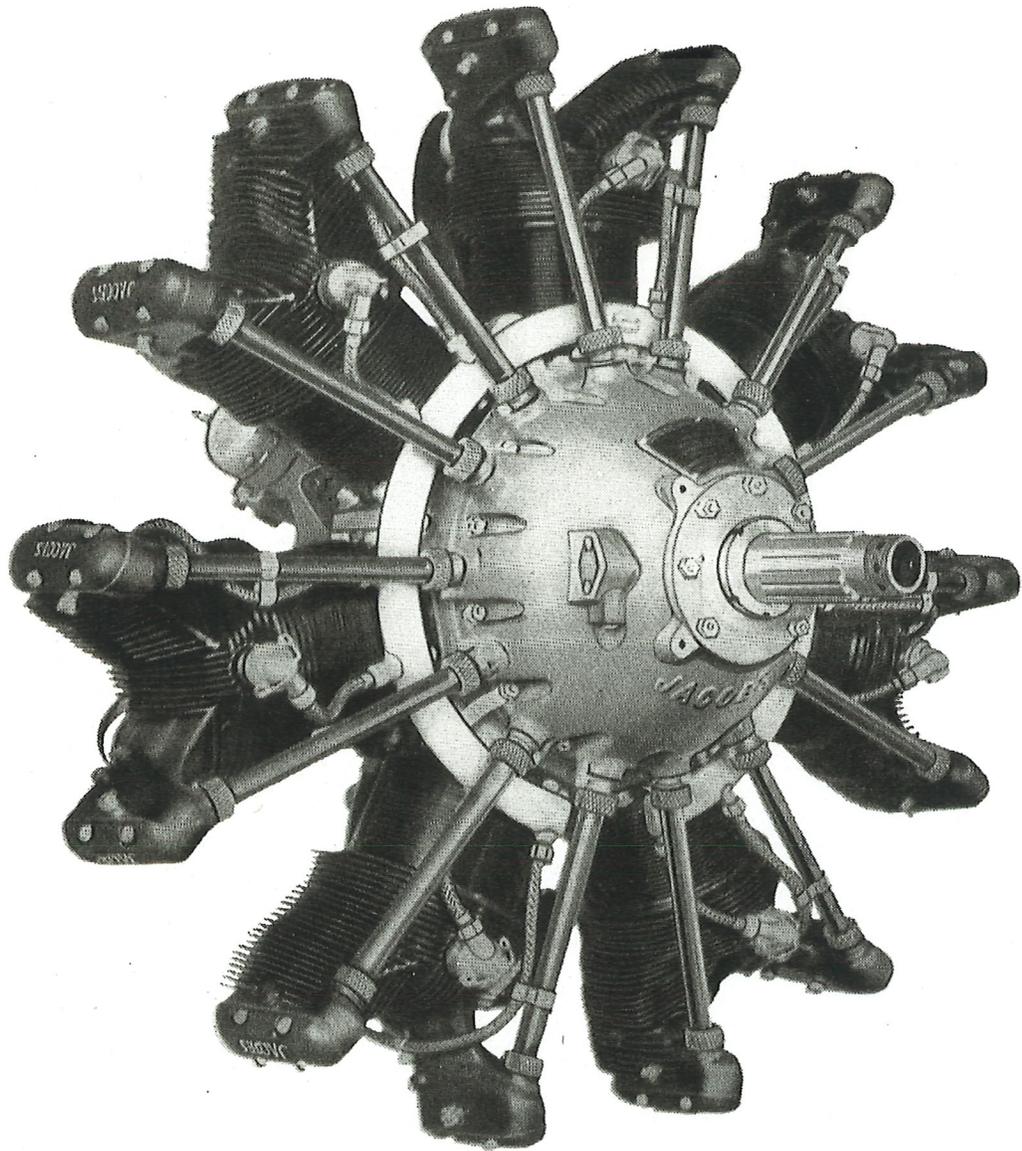
The Stromberg Type NA-R7A Carburetor is used.

Lubricating System

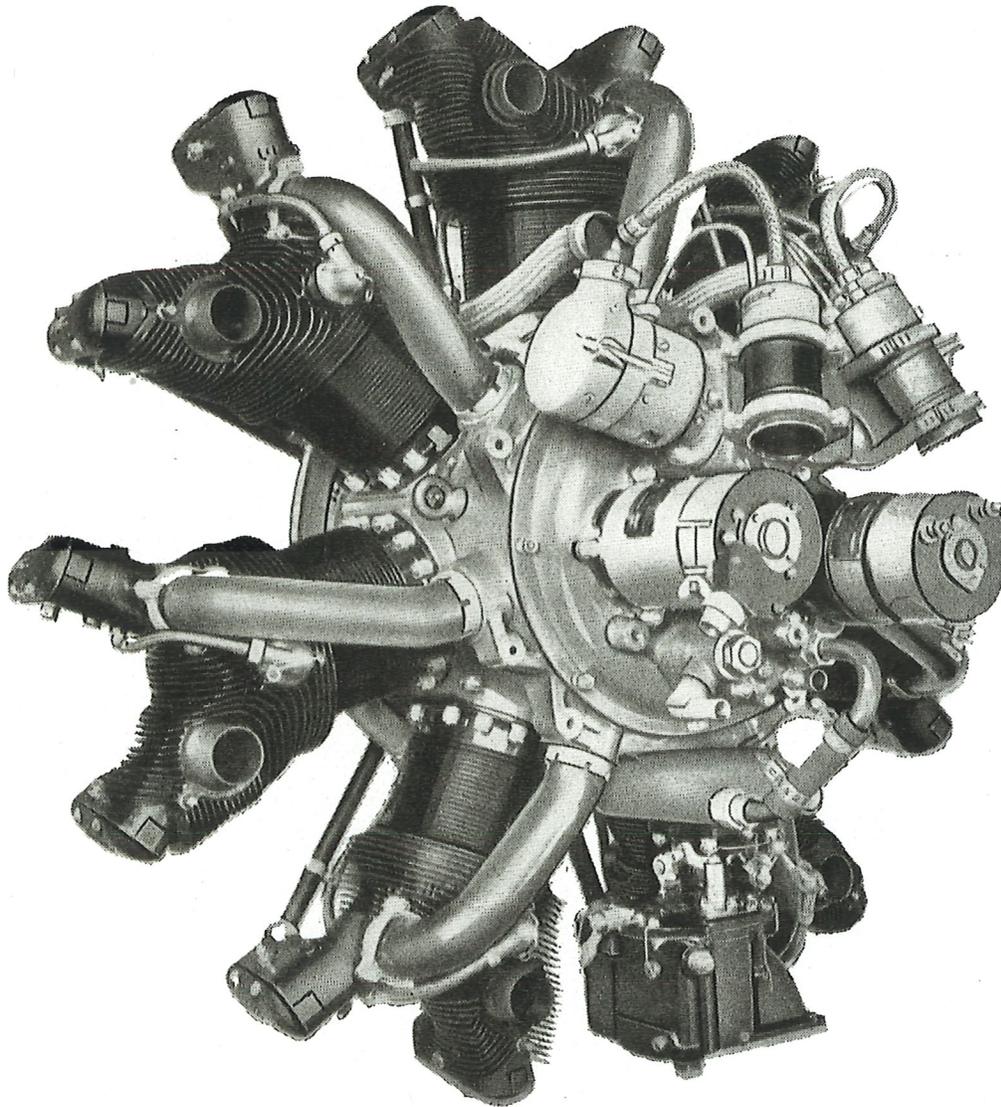
The lubricating system consists of one pressure pump and one scavenger pump of the gear type, built into one complete unit. The pressure pump supplies oil to the accessory drive gears, master rod, and piston assemblies, cam bearing, and drive gears. Provision is also made to incorporate a take-off to operate an adjustable pitch propeller with oil pressure.

Model L-4MA

The Model L-4MA, for autogiro installation only, is identical with Model L-4M except the accessory gears and rear case, which are arranged to provide a power take-off to drive the autogiro rotor. The approximate weight is 455 pounds.



$\frac{3}{4}$ FRONT VIEW
JACOBS L-5 285 H.P. ENGINE



$\frac{3}{4}$ REAR VIEW

JACOBS L-5 285 H.P. ENGINE

[16] SPECIFICATIONS—JACOBS L-5 ENGINE—

(Continued)

Length from end of Propeller Shaft to end of Electric Starter.....	36 ³¹ / ₃₂ inches
Overall Diameter.....	43 ¹ / ₂ inches
Center of Gravity (Bare Engine)	
Distance forward of Mounting Bolt Circle.....	4 ⁷ / ₁₆ inches
Distance below Crankshaft Centerline.....	1 ¹ / ₂ inch
Crankshaft Rotation facing Crankshaft End.....	Counter-Clockwise
Crankshaft Spline.....	S.A.E. No. 20
Diameter Mounting Bolt Circle.....	16 ¹ / ₂ inches
Number of Mounting Bolts.....	8
Tachometer Shaft Speed.....	1 ¹ / ₂ Crankshaft Speed
Rotation of Starter (facing Starter Flange).....	Clockwise
Diameter of Mounting Bolts.....	3 ³ / ₈ inch

Dry Weight of Bare Engine includes the following:

Eclipse Model 3171 15-amp. Generator and Control Box

Two Battery Timers; two Ignition Coils, Set Ignition Wiring and Spark Plugs (unshielded)

Carburetor

Set Propeller Hub Centering Cones and Nut

Total Dry Weight (Battery Ignition).....

475 lbs. (approx.)

Weight: Standard Equipment not included in Dry Weight:

Tool Kit.....

4³/₄ lbs.

Oil Strainer (separately mounted).....

2 lbs.

Instruction Book.....

1¹/₄ lb.

Domestic Shipping Box.....

334 lbs.

Total Shipping Weight.....

809 lbs.

Weight: Extra Equipment available with Engine, not included in Dry Weight:

Propeller Hub.....

15 lbs.

Eclipse E-80 Electric Starter.....

20¹/₄ lbs.

Eclipse Type G 15-amp. Generator and Control Box.....

19 lbs. 8 oz.

Eclipse Type D 25-amp. Generator and Control Box.....

23 lbs. 8 oz.

Eclipse Type B-2 Vacuum Pump.....

3 lbs. 14 oz.

Eclipse Type B-1 Vacuum Pump.....

5 lbs. 4 oz.

Romec Type B-2A Vacuum Pump....

4 lbs.

Romec Type C-16 Fuel Pump.....

1 lb. 10 oz.

Romec Type F-4RB Fuel Pump.....

2 lbs. 5 oz.

Eclipse F-141 Electric Starter.....

25¹/₂ lbs.

Breeze Radio Shielding, with ignition wires.....

13 lbs.

Bosch LE/70-12 Generator with Control Box.....

11³/₄ lbs.

Note: Weight of standard generator and control box is 15¹/₄ lbs., which should be deducted from the weights given above for special generators, in figuring added weight of special generator installation.

SPECIFICATIONS—JACOBS L-5M ENGINE [17]

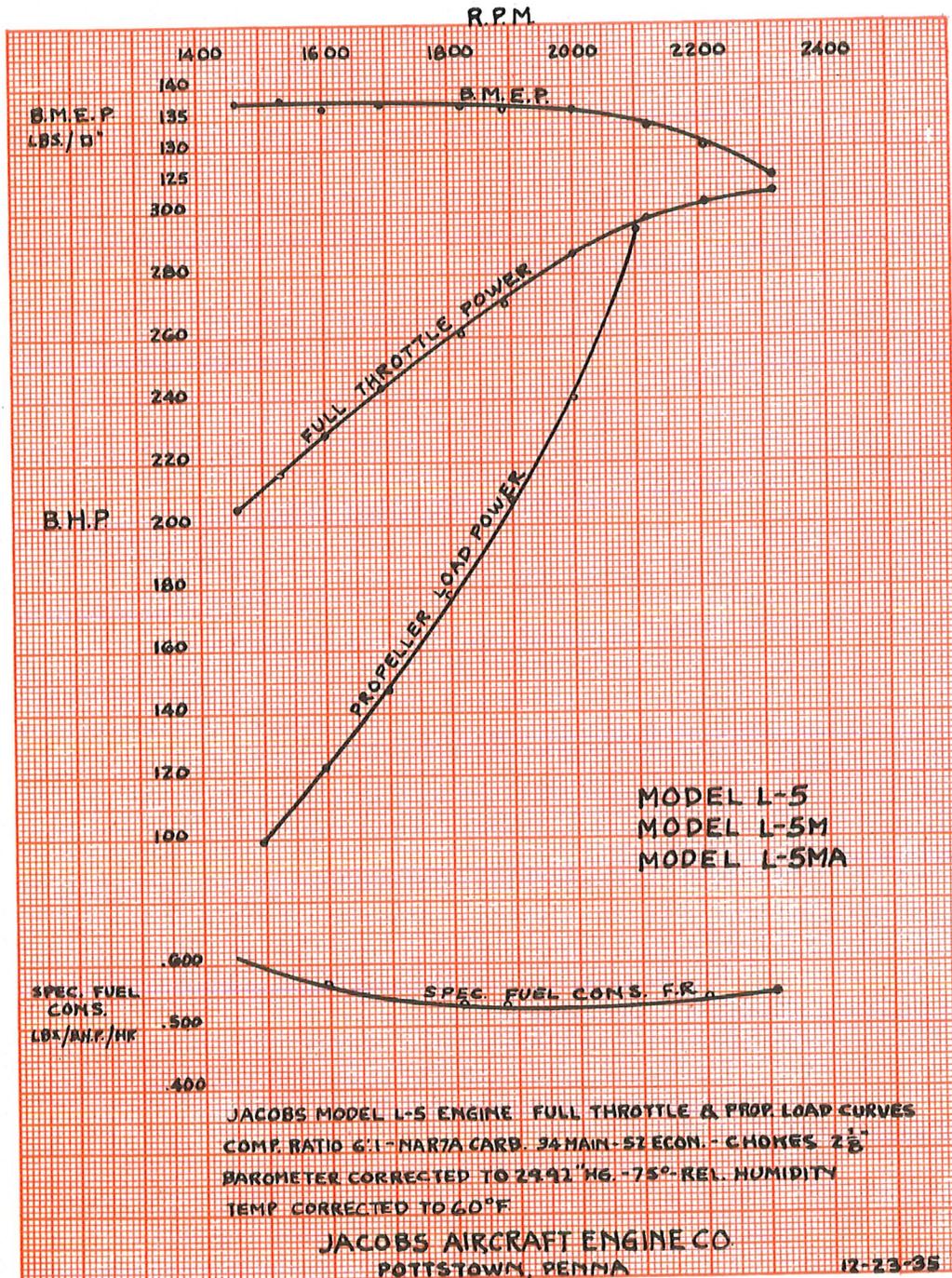
Name	Jacobs
Model	L-5M
Type (Direct Drive)	Static Air-Cooled Radial
Rated H.P.	285 at 2000 R.P.M.
Number of Cylinders	7
Bore	5½ inches
Stroke	5 inches
Displacement	831 cubic inches
Normal Power at Rated R.P.M. at Sea Level	285
Rated R.P.M. of Crankshaft	2000
Recommended Cruising Output	210 at 1900
Compression Ratio	6:1
Ignition	2 Magnetos—Scintilla
Timing	30°
Spark Plugs Recommended	B.G. 4B2
Oil Pump	1 Pressure—1 Scavenger
Oil Consumption (approx. max.—service figures may be lower)	
Full Throttle at Rated R.P.M. ....	.018 lbs. /B.H.P. hour
Full Throttle at Rated R.P.M. ....	.75 gals. /hour
Cruising at 1900 R.P.M.	1 quart to 3 pints per hour
Oil in Temperature in Flight (desired) ...	140°
Oil in Temperature in Flight (maximum)	170°
Oil Pressure in Flight	90 lbs.
Carburetor	Stromberg NA-R7A
Fuel Required	73 octane
Fuel Consumption at Sea Level (approx.)	
Full Rich:	
Full Throttle at Rated R.P.M. ....	.53 lbs. /B.H.P. hour
Full Throttle at Rated R.P.M.	23 to 25 gals. /hour
Cruising at 1900 R.P.M.	15 to 17 gals. /hour
Valve Timing: (Average Hot Running Clearance .035 Intake, .040 Exhaust)	
Intake opens	14° B.T.C.
Intake closes	54° A.B.C.
Exhaust opens	54° B.B.C.
Exhaust closes	14° A.T.C.
Intake and Exhaust remain open (Cksft. Deg.)	248°
Valve Tappet Clearance (Intake—cold)	.006
Valve Tappet Clearance (Exhaust—cold) .....	.006
Valve Spring Loading (plus or minus 10%)	
<i>Valve Closed:</i> Inner	35 lbs.
Outer	60 lbs.
<i>Valve Open:</i> Inner	50 lbs.
Outer	90 lbs.
Temperature	
Cylinder Head—using Spark Plug Washer Type Thermocouple	
Normal maximum	450°
Max. permissible for short period ...	550°
Cylinder Barrel—using Embedded Type Thermocouple on Flange Thrust Side—Center of Barrel	

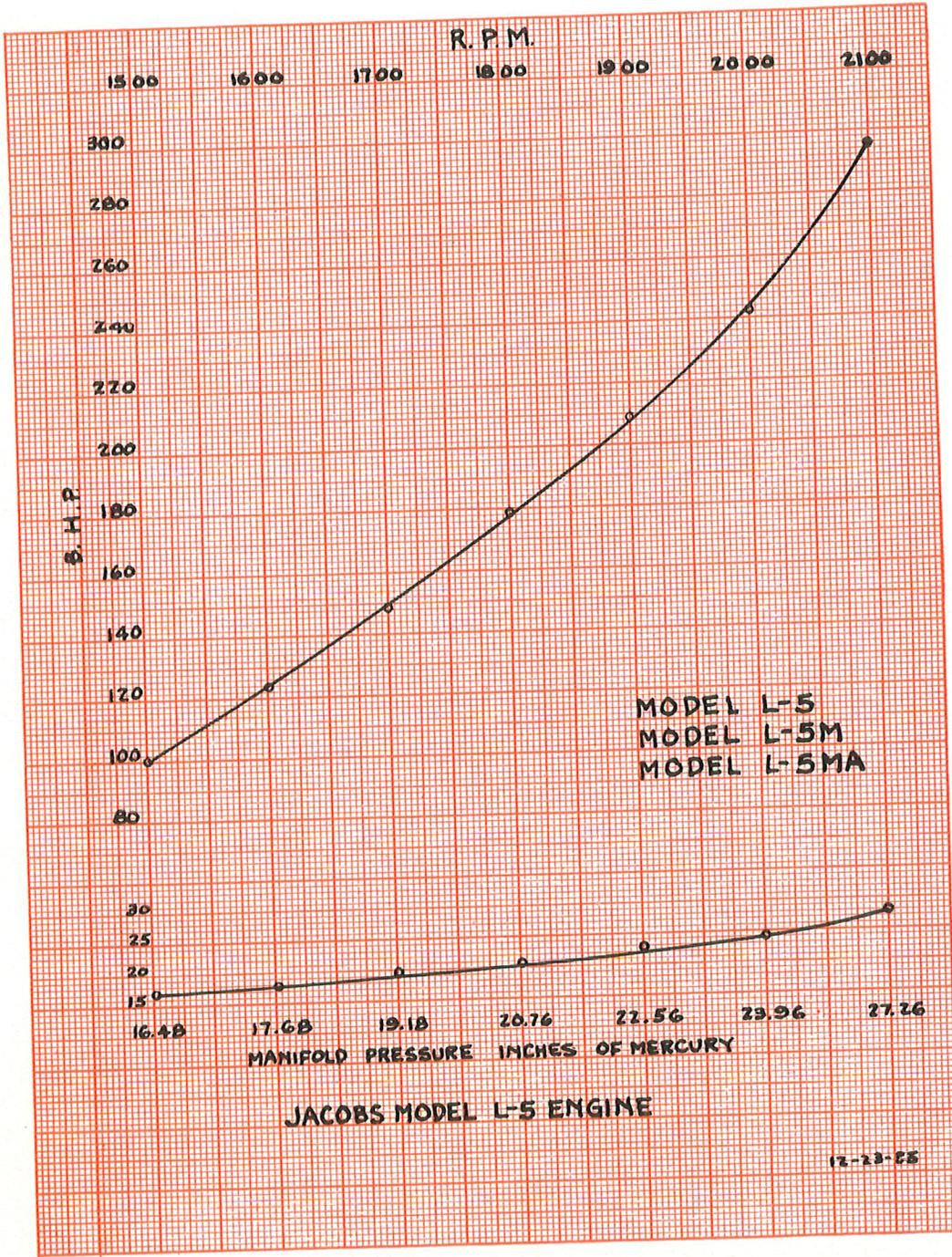
[18] SPECIFICATIONS—JACOBS L-5M ENGINE—

(Continued)

Length from end of Propeller Shaft to end of Electric Starter.....	36 ³¹ / ₃₂ inches
Overall Diameter.....	43 ¹ / ₂ inches
Center of Gravity (Bare Engine)	
Distance forward of Mounting Bolt Circle.....	4 inches
Distance below Crankshaft Centerline.....	⁵ / ₁₆ inch
Crankshaft Rotation facing Crankshaft End.....	Counter-Clockwise
Crankshaft Spline.....	S.A.E. No. 20
Diameter Mounting Bolt Circle.....	16 ¹ / ₂ inches
Number of Mounting Bolts.....	8
Tachometer Shaft Speed.....	¹ / ₂ Crankshaft Speed
Rotation of Starter (facing Starter Flange).....	Clockwise
Diameter of Mounting Bolts.....	³ / ₈ inch
Dry Weight of Bare Engine includes the following:	
Two Scintilla Magnetos	
Set Ignition Wiring and Spark Plugs (unshielded)	
Carburetor	
Set Propeller Hub Centering Cones and Nut	
Total Dry Weight (Magneto Ignition).....	480 lbs. (approx.)
Weight: Standard Equipment not included in Dry Weight:	
Tool Kit.....	4 ³ / ₄ lbs.
Oil Strainer (separately mounted)....	2 lbs.
Instruction Book.....	¹ / ₄ lb.
Domestic Shipping Box.....	334 lbs.
Total Shipping Weight.....	814 lbs.
Weight: Extra Equipment available with Engine, not included in Dry Weight:	
Propeller Hub.....	15 lbs.
Eclipse E-80 Electric Starter.....	20 ¹ / ₄ lbs.
Eclipse Type G 15-amp. Generator and Control Box.....	19 lbs. 8 oz.
Eclipse Type D 25-amp. Generator and Control Box.....	23 lbs. 8 oz.
Eclipse Type B-2 Vacuum Pump.....	3 lbs. 14 oz.
Eclipse Type B-1 Vacuum Pump.....	5 lbs. 4 oz.
Romec Type B-2A Vacuum Pump....	4 lbs.
Romec Type C-16 Fuel Pump.....	1 lb. 10 oz.
Romec Type F-4RB Fuel Pump.....	2 lbs. 5 oz.
Eclipse Model 3171 15-amp. Generator	15 ¹ / ₄ lbs.
Eclipse Control Box CB-97-2.....	2 ¹ / ₄ lbs.
Eclipse F-141 Electric Starter.....	25 ¹ / ₂ lbs.
Breeze Radio Shielding, with ignition wires.....	13 lbs.
Bosch LE/70-12 Generator with Control Box.....	11 ³ / ₄ lbs.

Note: Generator is not included in standard equipment on L-5M engines.







GENERAL DESCRIPTION

JACOBS L-5 BATTERY IGNITION AND L-5M MAGNETO IGNITION ENGINES L-5MA—AUTOGIRO INSTALLATION ONLY

General

The Jacobs L-5 battery ignition and L-5M magneto ignition engines are static, air-cooled, seven-cylinder, radial engines, with piston displacements of 831 cubic inches. The rated power output is 285 H.P. at 2000 RPM. The bore is 5.5" and the stroke 5". The compression ratio is 6:1.

The crankshaft front end is provided with an S.A.E. No. 20 spline. The weight of the model L-5 battery ignition engine, complete with carburetor, 15-ampere generator and voltage regulator box, two battery timers, two ignition coils, ignition wiring (unshielded), spark plugs, front and rear propeller hub centering cones and propeller nut, is approximately 475 pounds. The dry weight of the L-5M magneto ignition engine, including carburetor, two Scintilla magnetos (unshielded), ignition wiring, spark plugs, front and rear propeller hub centering cones and propeller nut, is approximately 480 pounds. The overall diameter of the engine is 43½"; length from end of propeller shaft to end of electric starter is approximately 37"; diameter of mounting bolt circle, 16½"; number of mounting bolts, 8; diameter of mounting bolts, ⅜"; tachometer shaft speed, one-half crankshaft.

Cylinders

The cylinders are machined from a chrome-molybdenum steel forging with closely spaced fins, and the bore is ground and honed. Cylinder heads are aluminum alloy heat-treated castings, with rocker arm supports cast integral, and the head is screwed and shrunk on the steel barrel.

Valves

Both exhaust and intake valves are made by Thompson Products, Inc. and are of the tulip type,



made from CNS steel. Exhaust valves are the hollow stem type and filled with sodium solution.

Valve Seats

Valve seats are machined from forged aluminum bronze and shrunk into the aluminum cylinder head.

Valve Operating Mechanism

The cam, cam drive gears, valve tappets and push rods are located in the nose section of the engine. The cams have three lobes and are run at one-sixth engine speed. Push rods, rocker arms, rocker arm bearings and valve springs are enclosed to prevent oil leakage.

Valve Springs

Two springs are used on both the intake and exhaust valve and are made from a special vanadium steel, and undergo a rigid magnaflux inspection for defects.

Crank Shaft

The crank shaft is of the two-piece clamp type design, and is machined and ground all over from selected chrome-nickel molybdenum steel forgings.

Master Rod and Link Rods

The master rod is of the one-piece type, machined all over from a chrome-nickel molybdenum steel forging and is provided with a steel-back, special alloy lined bearing, which is shrunk into the master rod.

The link rods are of forged aluminum alloy. The piston pin and link pin holes are diamond bored. No bushings are used in the link rod, and the aluminum bears directly on glass hard nitrided steel pins.

Pistons

Forged aluminum alloy pistons of a proven design are used. Three ring grooves are provided above the piston pin and one below. The top ring is a one-piece compression ring; the second a two-piece compres-



sion ring; the third a two-piece combination compression and oil ring; and the fourth a two-piece positive oil ring.

Piston Pins

Full floating piston pins, made from nitralloy steel, having aluminum plugs in the end, are used.

Crank Case

The crank case assembly is built up of six parts, secured together by studs and nuts, and consists of the following:

1. Thrust bearing plate, which locks and holds in place the thrust bearing.
2. Front case, made from a heat-treated magnesium alloy casting which carries the thrust bearing, cam, cam drive mechanism, tappet guides, and tappets and rollers.
3. The front half of the split type crankcase is a heat-treated aluminum alloy casting incorporating a rigidly ribbed webbed section supporting the front crankshaft ball bearing.
4. Rear section of the split crankcase is a heat-treated magnesium alloy casting incorporating a well ribbed webbed section supporting the rear main crankshaft ball bearing, the intake manifold system, a crankcase oil sump and engine mounting lugs.
5. A cast magnesium alloy heat-treated rear intermediate bearing plate incorporating the oil feed bearing to the crankshaft and providing a support for accessory drive gears which are under pressure oil feed.
6. A cast magnesium alloy accessory case, providing suitable mounting pads for twin battery distributor units, fuel pump, oil pump, generator, starter, and tachometer connections.

Ignition System

Model L-5

Two complete and separate battery timer distributors are used, incorporating automatic advance, which gives the correct retard for starting and idling and automatically advances the proper amount in relation to the engine speed. This gives a very low idling speed and smooth acceleration. Either Bosch or Scintilla units are used.



Model L-5M

The L-5M engines are identical with the L-5 except that they are provided with dual Scintilla magnetos. Rear accessory cases, bearing mounting plate and gears are different to accommodate the magnetos and drives:

Model L-5MA

The L-5MA engines, for autogiro installation only, are identical with Model L-5M except the accessory gears and rear case are arranged to provide a power take-off to drive the autogiro rotor. The approximate weight is 490 pounds.

Starter

The standard engine will be equipped for installation of direct drive electric starter, providing standard 6-inch mounting flange.

Carburetor

The Stromberg Type NA-R7A Carburetor is used.

Lubricating System

The lubricating system consists of one pressure pump and one scavenger pump of the gear type, built into one complete unit. The pressure pump supplies oil to the accessory drive gears, master rod, and piston assemblies, cam bearing, and drive gears. Provision is also made to incorporate a take-off to operate an adjustable pitch propeller with oil pressure.

Special Accessory Drive

Available on special order—an auxiliary aluminum alloy casting providing four outlets for special accessories. No. 1 outlet, provided with an S.A.E. standard round mounting pad, provides for a fuel pump operated at one-half crankshaft speed. No. 2 outlet provides for a Romec Type C-6 Model C-32 RD-2132 Fuel Pump, with rectangular mounting pad $1\frac{7}{8}$ " centers one way and $2\frac{1}{8}$ " centers the other way. No. 3 and No. 4 outlets provide for the standard square mounting pad for vacuum pumps and the Hamilton constant speed propeller control unit.

