

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

E-304
Revision 8
Lycoming Engines
VO-540-A1A, -A2A
VO-540-B1A, -B1B, -B1B3, -B1C,
-B1D, -B1E, -B1F, -B1H3
VO-540-B2A, -B2C, -B2D,
-B2E, -B2G
VO-540-C1A, -C1B, -C1C3
VO-540-C2A (O-540-9), -C2B,
-C2C

November 04, 2010

TYPE CERTIFICATE DATA SHEET NO. E-304

Engines of models described herein conforming with this data sheet (which is a part of type certificate No. 304) and other approved data on file with the Federal Aviation Administration meet the minimum standards for use in certificated aircraft in accordance with pertinent aircraft data sheets and applicable portions of the Civil Air Regulations/Federal Aviation Regulations provided they are installed, operated and maintained as prescribed by the approved manufacturer's manuals and other approved instructions.

Type Certificate Holder Lycoming Engines
An Operating Division of AVCO Corporation
Williamsport, Pennsylvania 17701

Type Certificate Holder Record AVCO Lycoming Division, AVCO Corp. Williamsport PA transferred TC E-304 to
Lycoming Engines, An Operating Division of AVCO Corporation on November 04,
2010

Model	Lycoming	VO-540-B1A, -B1B, -B1B3, -B1C, -B1F, -B1H3, -B2A, - -A2A	VO-540-B1D, -B1E, -B2D, -B2E, -B2C	VO-540-C1A, -C1B, -C2A, -C2B, -C2C	VO-540-C1C3
Type 6HOA Vertical Mounted Direct Drive Rating					
Max. Continuous, hp., r.p.m., full throttle at:					
Sea level pressure altitude	305-3200-S.L.	305-3200-S.L.	305-3200-1000 ft.	315-3200-3000 ft.	305-3200-2500- ft.
Takeoff (5 min.) hp., r.p.m. full throttle at:					
Sea level pressure altitude	310-3300-S.L.	305-3200-S.L.	305-3200-1000 ft.	315-3200-3000 ft.	305-3200-2500 ft.
Fuel (Min. grade aviation gasoline)	100/100LL	--	--	--	--
Lubricating oil	See Latest Edition of Lycoming Service Instruction No. 1014	--	--	--	--
Bore and stroke, in.	5.125 x 4.375	--	--	--	--
Displacement, cu. in.	541.5	--	--	--	--
Compression ratio	7.3:1	--	--	8.7:1	--
Weight (dry), lb.	See NOTE 8	--	--	--	--
C.G. location (dry & in horizontal position)					
From front face of crankcase, in.	15.40	14.84	14.90	--	--
Off propeller shaft C.L., in.	0.14 above 0.24 left	0.09 below 0.26 left	0.22 below 0.26 left	--	--
Propeller shaft	Six-bolt flange	--	--	--	--
Carburetion	See NOTE 8	--	--	--	--
Ignition, dual	See NOTE 8	--	--	--	--
Timing, °BTC	25	--	--	--	--
Spark plugs	See NOTE 5	--	--	--	--
Oil sump capacity	Dry sump	--	--	--	--
NOTES	1,2,3,4,5,6,8,9	--	--	1 thru 10	1,2,3,4,5,6,8,9

"- -" indicates "same as preceding models."

"—" indicates "does not apply."

Certification basis:

<u>Regulations & Amendments</u>	<u>Model</u>	<u>Date of Application</u>	<u>Date Type Certificate No. E-304 Issued/Revised</u>	
CAR 13 Effective June 15, 1956				
As Amended by 13-1	VO-540-A1A	January 30, 1958	July 24, 1958	
13-2	VO-540-B1A	February 23, 1959	February 27, 1959	
	VO-540-B1B, -B1C	September 18, 1959	October 15, 1959	
13-3	VO-540-B1D, -B1E	June 9, 1960	June 27, 1960	
	VO-540-C1A, -C1B	August 26, 1960	September 22, 1960	
13-4	VO-540-B1B3	November 17, 1960	December 6, 1960	
	VO-540-A2A, -B2A, -B2C, -B2D, -B2E, -C2A, -C2B	February 15, 1963	February 19, 1963	
	VO-540-B1F	September 4, 1963	September 13, 1963	
	VO-540-C1C3	October 3, 1963	January 29, 1964	
	VO-540-B2G	May 10, 1966	June 27, 1966	
	VO-540-C2C	May 19, 1966	June 7, 1966	
	VO-540-B1H3	June 15, 1967	August 21, 1967	

Production basis: Production Certificate No. 3

NOTE 1. Maximum permissible temperatures:	-A SERIES	-B, -C SERIES
Cylinder head (Well type)	500°F.	500°F.
Cylinder base	325°F.	--
This parameter dispensed with where pistons internally cooled by oil jets.		
Oil inlet	235°F.	--

NOTE 2. Fuel and oil pressure limits:	<u>Min.</u>	<u>Max.</u>
Fuel pressure (-A1A)	9 p.s.i.	15 p.s.i.
(B&C Series)	0.5 p.s.i.	8 p.s.i.
Oil pressure		
(Normal operation)	55 p.s.i.	95 p.s.i.
(Idling)	25 p.s.i.	--

NOTE 3. The following accessory drives are provided:

VO-540 Model Designation										
Accessory Drive						Rotation Facing Drive Pad	Speed Ratio to Crank Shaft	Maximum Torque (in. lb.)		Maximum Overhang (in. lb.)
	-A1A, -A2A, -B2A, -B2C	-B1A -B1C	-B1B, -B1B3, -B1H3	-B1D, -B1E, -B1F, -B2D, -B2E, -B2G, -C1A, -C1B, -C2A, -C2B, -C1C3				Cont.	Static	
Starter	*	*	*	*	*	C	1.000:1	—	12,000	300
Starter, manual	**	**	**	**	**	C	2.600:1			
Generator (a)	*	*	*	*	*	C	2.600:1	500	2,200	400
Fuel pump (b)	*	*	—	*	**	CC	.803:1	25	450	25
Vacuum pump	*	*	*	*	*	C	1.219:1	200	800	25
Hydraulic pump	—	—	**	*	—	C	1.083:1	400	1,650	175
Tachometer	*	*	*	*	*	CC	.500:1	7	50	—

- (a) Inoperative as generator drive when fitted with hand crank jaw.
- (b) Accessory housing machined for drive. Drive supplied on standard engine, except for models -B1B, -B1B3 and -B1H3.
- * Standard
- ** Optional
- "C" - Clockwise, "CC" - Counter-clockwise

- NOTE 4. These engines are approved for helicopter application and operation in a vertical installation.
- NOTE 5. Spark plugs approved for use on these engines are listed in the latest revision of Lycoming Service Instruction No. 1042.
- NOTE 6. The following engines incorporate the additional detailed characteristics:

VO-540 Model

-A1A	Basic Model. Six cylinder, horizontally opposed, air cooled dry sump, vertical direct drive engine with side mounted, AN type accessory drives and automatic altitude mixture control, pressure type carburetor. Incorporates internal piston cooling oil jets.
-B1A	Similar to -A1A except incorporating float type carburetor and reduced takeoff rating.
-B1B	Similar to -B1A except incorporating retard breaker magnetos and less fuel pump and hydraulic pump drives.
-B1B3	Similar to -B1B except incorporating six (6) third order counterweights.
-B1C	Similar to -B1A except incorporating retard breaker magnetos.
-B1D	Similar to -B1C except incorporating two (2) MA-6-AA carburetors and 1,000 ft. rating.
-B1E	Similar to -B1A except incorporating two (2) MA-6-AA carburetors and 1,000 ft. rating.
-B1F	Similar to -B1B except incorporates fuel and hydraulic pump drives as standard equipment.
-B1H3	Similar to -B1B3 but has TCM+ 1200 series high altitude magnetos.
-C1A	Similar to -B1D except incorporating high compression pistons and 3,000 ft. rating.
-C1B	Similar to -C1A except incorporating impulse coupling magnetos.
-C1C3	Similar to -B1B3 except has dual MA-6-AA carburetors, inconel exhaust valves and ni-resist valve guides.
-A2A, -B2A, -B2C, -B2D, -B2E, -C2A, -C2B	Similar to -A1A, -B1A, -B1C, -B1D, -B1E, -C1A, -C1B respectively except incorporating spring coupling assembly in accessory drive section.
-B2G	Same as -B2D except has TCM+ 1200 series high altitude magnetos.
-C2C	Same as -C2A except has TCM+ 1200 series high altitude magnetos.

NOTE 7. Military model 0-540-9 is equivalent to civil model VO-540-C2A. When installed in certificated aircraft, the corresponding civil model designation and type certificate number should be added to the engine data plate.

NOTE 8. Weights, carburetion and ignition:

<u>VO-540 Models</u>	<u>Weight (dry), lb.</u>	<u>Carburetion **</u>	<u>Ignition, dual+</u>
-A1A	435	PAC# PS-7BD	TCM S6LN-20, S6RN-21
-A2A	438	PAC# PS-7BD	TCM S6LN-20, S6RN-21
-B1A	430	Marvel-Schebler* MA-6-AA	TCM S6LN-20, S6RN-21
-B1B	429	Marvel-Schebler* MA-6-AA	TCM S6RN-200, S6LN-204
-B1B3	444	Marvel-Schebler* MA-6-AA	TCM S6RN-200, S6LN-204
-B1C	430	Marvel-Schebler* MA-6-AA	TCM S6RN-200, S6LN-204
-B1D	439	(2) Marvel-Schebler* MA-6-AA	TCM S6RN-200, S6LN-204
-B1E	439	(2) Marvel-Schebler* MA-6-AA	TCM S6RN-21, S6LN-20
-B1F	430	Marvel-Schebler* MA-6-AA	TCM S6RN-200, S4LN-204
-B1H3	445	Marvel-Schebler* MA-6-AA	TCM S6RN-1208, S6LN-1209
B2A	433	Marvel-Schebler* MA-6-AA	TCM S6LN-20, S6RN-21
-B2C	433	Marvel-Schebler* MA-6-AA	TCM S6RN-200, S6LN-204
-B2D	442	(2) Marvel-Schebler* MA-6-AA	TCM S6RN-200, S6LN-204
-B2E	442	(2) Marvel-Schebler* MA-6-AA	TCM S6RN-21, S6LN-20
-B2G	443	(2) Marvel-Schebler* MA-6-AA	TCM S6LN-1209, S6RN-1208
-C1A	441	(2) Marvel-Schebler* MA-6-AA	TCM S6RN-200, S6LN-204
-C1B	441	(2) Marvel-Schebler* MA-6-AA	TCM S6RN-21, S6LN-20
-C1C3	453	(2) Marvel-Schebler* MA-6-AA	TCM S6RN-200, S6LN-204
-C2A	444	(2) Marvel-Schebler* MA-6-AA	TCM S6RN-200, S6LN-204
-C2B	444	(2) Marvel-Schebler* MA-6-AA	TCM S6RN-21, S6LN-20
-C2C	445	(2) Marvel-Schebler* MA-6-AA	TCM S6LN-1209, S6RN-1208

+ TCM Formerly Bendix

**See latest edition of Lycoming SI 1523 for alternate approved Carburetors

* Marvel-Schebler formerly Volare, Precision Airmotive Corporation, Facet Aerospace Products Company, and Borg Warner Corporation

PAC Formerly Bendix

NOTE 9. These engines are not equipped with crankshaft dampers unless the number "3" is shown in the rear of model designation. Models so shown, i.e., "B1B3", incorporate six (6) third order crankshaft dampers.

NOTE 10. The models VO-540-C1A, -C2A, -C1B, -C2A, -C2C have an alternate rating of 305 hp. at 3200 RPM.

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