

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

E-223
Revision 19
Lycoming Engines

O-233-A1,O-235
O-235-A,-B,-AP,-BP-C,-C1,-C1A,-C1B,-C1C,-C2A,-C2B,-C2C,
-E1,-E1B,-E2A,-E2B,-F1,-F1B,-F2A,-F2B,-G1,-G1B,-G2A,-G2B,
-H2C,-J2A,-J2B,-K2A,-K2B,-K2C,-L2A,-L2C,-M1,-M2C,-M3C,
-N2A,-N2C,-P1,-P2A,-P2C,-P3C

December 17, 2003

TYPE CERTIFICATE DATA SHEET NO. E-223

Engines of models described herein conforming with this data sheet (which is a part of Type Certificate No. E-223) 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 Williamsport Div., AVCO Corporation transferred TC E-223 to Lycoming Engines, An Operating Division of AVCO Corporation on December 17, 2003

Model	O-235-C1,-C1B, -E1,-E1B	O-235-C1C	O-235-C1A	O-235-C2C, -H2C	O-235-L2C, -K2C
Type	4HOA Direct Drive				
Rating					
Max. continuous hp., r.p.m. Sea level pressure altitude	115-2800-S.L.	108-2600-S.L.	100-2450-S.L.	108-2600-S.L. (See Note 11)	115-2700-S.L. (See Note 12)
Takeoff (5 min.) hp., r.p.m. at full throttle	115-2800	115-2800	100-2450	115-2800	118-2800
Fuel (minimum grade aviation gasoline)**	80/87	--	--	--	100/100LL
Lubricating Oil (Lubricants should conform to the specifications as listed or later revisions thereto)	Lycoming Spec. No. 301-F and Service Instruction No. 1014	--	--	--	--
Bore and stroke, inch	4.375 x 3.875	--	--	--	--
Displacement, cubic inch	233	--	--	--	--
Compression ratio	6.75:1	--	--	--	8.5:11
Weight (dry), lb.	(See NOTE 8)	--	--	--	--
C.G. Location	(See NOTE 8)	--	--	--	--
Propeller shaft end size	Integral flange - SAE Type 2	--	--	Type 1	--
Crankshaft Dampers	None	--	--	--	--
Carburetor	Marvel MA-3A or MA-3PA	--	MA-3A	MA-3A or MA- 3PA	--
Ignition, dual	(See NOTE 8)	--	--	--	--
Spark plugs	(See NOTE 7)	--	--	--	--
Ignition, timing °BTC	25	--	15	25	20
Oil sump capacity, qt.	6	--	--	--	--
Usable oil, qt.	4	--	--	--	--
NOTES	1 thru 5,7,8,10	--	--	1 thru 5,7,8,10,11	--

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Models (Continued)	O-235-C2A, -C2B,-E2A, -E2B	O-235-F1, -F1B,-G1, -G1B	O-235-F2A, -F2B,-G2A, -G2B,-J2A, -J2B	O-235-K2A, -K2B,-L2A, -M1,-M2C, -M3C	O-235-N2A, -N2C,-P1, -P2A,-P2C, -P3C
Rating					
Max. continuous hp., r.p.m. Sea level pressure altitude	115-2800-S.L.	125-2800-S.L.	125-2800-S.L.	118-2800-S.L. (See NOTE 12)	116-2800-S.L. (See NOTE 14)
Takeoff (5 min.) hp., r.p.m. at full throttle	115-2800	125-2800	125-2800	118-2800	116-2800
Fuel (minimum grade aviation gasoline)**	80/87	100/100LL	--	--	--
Lubricating Oil (Lubricants should conform to the specifications as listed or later revisions thereto)	Lycoming Spec. No. 301-F and Service Instruction No. 1014	--	--	--	--
Bore and stroke, inch	4.375 x 3.875	--	--	--	--
Displacement, cubic inch	233	--	--	--	--
Compression ratio	6.75:1	9.7:1	--	8.5:1	8.1:1
Weight (dry), lb.	(See NOTE 8)	--	--	--	--
C.G. Location	(See NOTE 8)	--	--	--	--
Propeller shaft end size	Integral flange - SAE Type 1	Type 2	Type 1	Type 1*	Type 1*
Crankshaft Dampers	None	--	--	--	--
Carburetor	Marvel MA-3A or MA-3PA	--	--	--	--
Ignition, dual	(See NOTE 8)	--	--	--	--
Spark plugs	(See NOTE 7)	--	--	--	--
Ignition, timing °BTC	25	--	--	20	--
Oil sump capacity, qt.	6	--	--	--	--
Usable oil, qt.	4	--	--	--	--
NOTES	1 thru 5,7,8,10	--	--	--	--

"- -" indicates "same as preceding model"

* Models O-235-M1, -M3C, -P1 and -P3C have a type 2 flange

** See latest revision of Lycoming Service Instruction No. 1070 for alternate fuel grades

CERTIFICATION BASIS:

<u>Regulations & Amendments</u>	<u>Model</u>	<u>Date of Application</u>	<u>Date of Type Certificate E-223 Issued/Revised</u>	<u>Canceled (See Note 6)</u>
CAR 13 As Amended to May 31, 1938	O-233-A1	June 13, 1940	August 26, 1940	February 25, 1944
As Amended to November 15, 1940	O-235	April 19, 1941	February 11, 1942	December 1, 1947
CAR 13 Effective August 1, 1941	O-235-A	June 15, 1942	July 3, 1942 & 1947	December 1, 1947
	O-235-B	May 2, 1944	July 21, 1944	December 1, 1947
	O-235-AP	July 17, 1944	July 21, 1944	December 1, 1947
	O-235-BP	May 2, 1944	July 21, 1944	December 1, 1947
	O-235-C	November 15, 1945	January 3, 1946	December 1, 1947
	(O-235-2 SEE NOTE 6)			
	O-235-C1	September 11, 1946	March 20, 1947	
	O-235-C1A	May 28, 1948	July 7, 1948	

<u>Regulations & Amendments</u> (cont'd)	<u>Model</u>	<u>Date of Application</u>	<u>Date of Type Certificate E-223 Issued/Revised</u>	<u>Canceled (See Note 6)</u>
CAR 13 Effective June 15, 1956	O-235-C1B	October 4, 1960	October 12, 1960	
As Amended by 13-1, 13-2, & 13-3	O-235-C1C	January 6, 1976	January 23, 1976	
	O-235-C2A	May 26, 1965	July 22, 1965	
	O-235-C2B	October 4, 1966	November 29, 1966	
	O-235-C2C	February 6, 1968	February 16, 1968	
	O-235-E1	October 31, 1968	June 17, 1969	
	O-235-E1B	October 31, 1968	June 17, 1969	
	O-235-E2A	October 31, 1968	June 17, 1969	
	O-235-E2B	October 31, 1968	June 17, 1969	
	O-235-F1	February 27, 1979	March 11, 1971	
	O-235-F1B	February 27, 1970	March 11, 1971	
	O-235-F2A	February 27, 1970	March 11, 1971	
	O-235-F2B	February 27, 1970	March 11, 1971	
	O-235-G1	May 10, 1971	May 17, 1971	
	O-235-G1B	May 10, 1971	May 17, 1971	
	O-235-G2A	May 10, 1971	May 17, 1971	
	O-235-G2B	May 10, 1971	May 17, 1971	
	O-235-H2C	December 20, 1972	January 4, 1973	
	O-235-J2A	February 6, 1973	February 12, 1973	
	O-235-J2B	December 20, 1972	January 4, 1973	
	O-235-K2A	April 19, 1974	June 6, 1974	
	O-235-K2B	April 19, 1974	June 6, 1974	
	O-235-K2C	June 23, 1978	June 28, 1978	
	O-235-L2A	April 19, 1974	June 6, 1974	
	O-235-L2C	June 25, 1975	July 11, 1975	
	O-235-M1	September 27, 1978	October 6, 1978	
	O-235-M2C	October 23, 1981	November 4, 1981	
	O-235-M3C	October 23, 1981	November 4, 1981	
	O-235-N2A	December 3, 1981	January 5, 1982	
	O-235-N2C	December 3, 1981	January 5, 1982	
	O-235-P1	April 23, 1982	May 12, 1982	
	O-235-P2C	April 23, 1982	May 12, 1982	
	O-235-P3C	April 23, 1982	May 12, 1982	
	O-235-P2A	April 20, 1983	April 26, 1983	

PRODUCTION BASIS: Production Certificate No. 3

NOTE 1. Maximum Permissible Temperatures:

<u>Models</u>	<u>Cylinder Head</u>		<u>Cylinder Barrel</u>	<u>Oil Inlet</u>
	<u>Spark Plug Washer Thermocouple</u>	<u>Well Type Thermocouple</u>		
All except 0-223-A1 O-235, O-235-A, -AP O-235-B (O-235-2), -BP -C	525°F	500°F	325°F	245°F

NOTE 2. For all models except O-233-A1, O-235, O-235-A, -AP, -B(O-235-2), -BP, -C, allowable fuel pressures at carburetor inlet are:

3.0 p.s.i. desired, 0.5 p.s.i. minimum and 8.0 p.s.i. maximum.

For gravity feed systems, minimum fuel pressure is 7.5 inches of gasoline differential pressure across the fuel inlet fitting for the O-235-K, -L, -M, -N series.

Oil Pressure Limits - (Normal operations)	Minimum 60 p.s.i.	Maximum 90 p.s.i.
(Idling 25 p.s.i.)		
(Starting & Warm-up)		Maximum 100 p.s.i. (O-235-N and P series-115 p.s.i. max.)

NOTE 3. Deleted. (Accessories such as generators, fuel pumps, etc., previously listed in NOTE 3 are satisfactory for continued use with these engines. Accessories of these type are not integral engine accessories and therefore are not evaluated for approval during engine certification testing. The airworthiness of such accessories is substantiated during aircraft-installation system approval. The suitability of the accessory for the engine mounting provisions as described in NOTE 4 of this data sheet must be determined when processing such approval.

NOTE 4. The following accessory drives are available:

				-F1, -F1B, -F2A, -F2B, -H2C, -J2A, -J2B, -K2A, -K2B, -L2A, -L2C, -K2C, -M1, -M2C, -M3C, -N2A, -N2C
<u>Accessory Drive</u>	<u>-C1A</u>	<u>-C2A, -C2B</u> <u>-C1C, -C2C</u>	<u>-G1, -G1B</u> <u>-G2A, -G2B</u>	<u>-P1, -P2A, -P2C, -P3C</u>
Starter	*	*	*	*
Generator	*	*	#	#
or Generator		**	#	#
or Alternator		**	*	*
Fuel Pump (Plunger)	*	**	**	**
Tachometer	*	*	*	*
Vacuum Pump	**	**	**	**
Propeller Governor	#	#	**	***

"#" indicates "does not apply" * = Standard, ** = Optional C = Clockwise, CC = Counter-Clockwise
*** = Models O-235-M1, -M2C, -M3C, -P1, -P2A, -P2C, -P3C are equipped with a Propeller Governor Drive, AN20010, Type XX, note torque limitations.

<u>Accessory Drive</u>	Rotation	Speed	Maximum Torque		Maximum
	Facing	Ratio to	(in. -lb.)		Overhang Moment
	<u>Drive Pad</u>	<u>Crankcase</u>	<u>Cont.</u>	<u>Static</u>	(in. -lb.)
Starter	CC	13.556:1	#	450	150
Generator	C	1.910:1	60	120	175
or Generator	C	2.50:1	60	120	175
or Alternator	C	3.25:1	60	120	175
Fuel Pump (Plunger)	#	0.500:1	#	#	10
Tachometer	C	0.500:1	7	50	5
Vacuum Pump	CC	1.300:1	70	450	25
Propeller Governor	C	0.866:1	125	1200	40

"#" indicates "does not apply" * = Standard, ** = Optional C = Clockwise, CC = Counter-Clockwise
*** = Models O-235-M1, -M2C, -M3C, -P1, -P2A, -P2C, -P3C are equipped with a Propeller Governor Drive, AN20010, Type XX, note torque limitations.

NOTE 5. The foregoing models incorporate additional different characteristics as follows:

<u>Models</u>	<u>Characteristics</u>
O-235-C1-	Four cylinder, horizontally opposed, air cooled, direct drive. Has provisions for dual pump drives. Eligible for both tractor and pusher type installations.
O-235-C1A-	Similar to O-235-C1 except ignition timing, lower r.p.m. and hp. Has optional 2 position or automatic propeller governor drive.
O-235-C1B-	Similar to O-235-C1 except has retard breaker magnetos.
O-235-C1C-	Similar to O-235-C1 except has Slick magnetos.
O-235-C2A-	Similar to O-235-C1 except has a type 1 propeller flange.
O-235-C2B-	Similar to O-235-C2A but has S-1200 series magnetos.
O-235-C2C-	Similar to O-235-C2B except incorporates Slick magnetos with integral shielded ignition harness.
O-235-E1-	Similar to O-235-C1 except crankcase and crankshaft, modified to supply pressurized oil to constant speed propeller; Accessory case changed to accommodate a standard propeller governor drive.
O-235-E1B-	Similar to O-235-E1 except for S4LN-200 series retard breaker magnetos.
O-235-E2A-	Similar to O-235-E1 except has Type 1 propeller flange.
O-235-E2B-	Similar to O-235-E2A except incorporates S-1200 series magnetos.
O-235-F1-	Similar to O-235-C1 except for compression ratio, fuel grade and rating.
O-235-F1B-	Similar to O-235-F1 except has retard breaker magnetos.
O-235-F2A-	Similar to O-235-F1 except has a Type 1 propeller flange.
O-235-F2B-	Similar to O-235-F2A but has a S-1200 series magnetos.
O-235-G1-	Similar to O-235-F1 except has provisions for using constant speed propeller.
O-235-G1B-	Similar to O-235-G1 except has retard breaker magnetos.
O-235-G2A-	Similar to O-235-G1 except has a Type 1 propeller flange.
O-235-G2B-	Similar to O-235-G2A except has S-1200 series magnetos.
O-235-H2C-	Similar to O-235-C2C except has Type 1 dynafocal mounting.
O-235-J2B-	Similar to O-235-F2B except has Type 1 dynafocal mounting.
O-235-J2A-	Similar to O-235-J2B except for magnetos.
O-235-K2A-	Similar to O-235-F2A except ignition timing, lower hp. and reduced compression ratio.
O-235-K2B-	Similar to O-235-F2B except ignition timing, lower hp. and reduced compression ratio.
O-235-K2C-	Similar to O-235-K2A except has Slick magnetos.
O-235-L2A-	Similar to O-235-J2A except ignition timing, lower hp and reduced compression ratio.

O-235-L2C-	Similar to O-235-L2A except has Slick magnetos and lower maximum continuous rating.
O-235-M1-	Similar to -L2A except has provision for controllable propeller and has AS-127 Type 2 propeller flange.
O-235-M2C-	Similar to O-235-M1 except has Slick 4200 series magnetos and Type 1 propeller flange.
O-235-M3C-	Similar to O-235-M1 except has Slick 4200 series magnetos.
O-235-N2A-	Similar to O-235-L2A except has reduced compression ratio and reduced power ratings.
O-235-N2C-	Similar to O-235-L2C except has reduced compression ratio and reduced power ratings.
O-235-P1-	Similar to O-235-M1 except has reduced compression ratio and reduced power ratings.
O-235-P2C-	Similar to O-235-M2 except has reduced compression ratio and reduced power ratings.
O-235-P3C-	Similar to O-235-M3C except has reduced compression ratio and reduced power ratings.
O-235-P2A-	Similar to O-235-P1 except has a Type 1 propeller flange.

NOTE 6. Approval of the following models has expired. No engines of these models manufactured after the date or with serial numbers above those listed below are eligible for use in certificated aircraft. (The early production engines may still be used in certificated aircraft or installed under a supplemental type certificate). Detail specifications for these engines have been deleted from this data sheet. Such information can be obtained by contacting the Manager, Propulsion Branch of the New York Aircraft Certification Office, Federal Aviation Administration.

<u>Model</u>	<u>Date</u>	<u>Serial No.</u>
O-233-A1	2-25-44	106
O-235, O-235-A, -AP, O-235-B, -BP, O-235-C	12-1-47	4524-15
O-235-2	Identical to O-235-B. When engines of this model are installed in certificated aircraft, the corresponding commercial model designation should be added to the engine nameplate.	

NOTE 7. Spark Plugs: See latest revision of Lycoming Service Instruction No. 1042 for approved equipment.

NOTE 8. Ignition, C.G. and Weights

<u>Model</u>	<u>Ignition, dual</u>	<u>C.G. Location (dry) including starter and generator</u>		<u>Off prop. shaft C.L., in.</u>	<u>Weight (dry) lb.</u>
		<u>Propeller Flange front face, in.</u>	<u>Below prop. shaft C.L., in.</u>		
O-235-C1	Bendix S4LN-21, S4LN-20	14.75	1.13	0.20 Left	246
O-235-C1A	Bendix SF4LN-8, SF4N-8	14.75	1.13	0.20 Left	236
	Bendix SF4LN-21, S4LN-20				
O-235-C1B	Bendix S4LN-200, S4LN-204	14.75	1.13	0.20 Left	245
O-235-C1C	Slick 4251, 4250	14.75	1.13	0.20 Left	243
O-235-C2A	Bendix S4LN-21, S4LN-20	14.75	1.13	0.20 Left	246
O-235-C2B	Bendix S4LN-1227, S4LN-1209	14.75	1.13	0.20 Left	247
O-235-C2C	Slick 4251, 4250	14.75	1.13	0.20 Left	244
O-235-E1	Bendix S4LN-21, S4LN-20	14.51	1.17	0.15 Left	250
O-235-E1B	Bendix S4LN-200, S4LN-204	14.51	1.17	0.15 Left	249
O-235-E2A	Bendix S4LN-21, S4LN-20	14.51	1.17	0.15 Left	250
O-235-E2B	Bendix S4LN-1227, S4LN-1209	14.51	1.17	0.15 Left	251
O-235-F1	Bendix S4LN-21, S4LN-20	14.75	1.13	0.20 Left	250
O-235-F1B	Bendix S4LN-200, S4LN-204	14.75	1.13	0.20 Left	249
O-235-F2A	Bendix S4LN-21, S4LN-20	14.75	1.13	0.20 Left	250
O-235-F2B	Bendix S4LN-1227, S4LN-1209	14.75	1.13	0.20 Left	251
O-235-G1	Bendix S4LN-21, S4LN-20	14.51	1.17	0.15 Left	253
O-235-G1B	Bendix S4LN-200, S4LN-204	14.51	1.17	0.15 Left	252
O-235-G2A	Bendix S4LN-21, S4LN-20	14.51	1.17	0.15 Left	253
O-235-G2B	Bendix S4LN-1227, S4LN-1209	14.51	1.17	0.15 Left	254
O-235-H2C	Slick 4251, 4250	14.75	1.13	0.20 Left	243
O-235-J2A	Bendix S4LN-21, S4LN-20	14.75	1.13	0.20 Left	252
O-235-J2B	Bendix S4LN-1227, S4LN-1209	14.75	1.13	0.20 Left	253
O-235-K2A	Bendix S4LN-21, S4LN-20	14.75	1.13	0.20 Left	252
O-235-K2B	Bendix S4LN-1227, S4LN-1209	14.75	1.13	0.20 Left	253
O-235-K2C	Slick 4252 or 4281 and 4250	14.75	1.13	0.20 Left	248
O-235-L2A, -N2A	Bendix S4LN-20, -21 or S4LN-204, -21, or two S4LN-21	14.75	1.13	0.20 Left	252
O-235-L2C, -N2C	Slick 4250, 4252, or 4250, 4281, or two 4252, or two 4281	14.75	1.13	0.20 Left	249
O-235-M1, -P1 & -P2A	Bendix S4LN-20, -21 or S4LN-204, -21 or two S4LN-21	14.51	1.17	0.15 Left	255
O-235-M2C, -M3C, -P2C, and -P3C	Slick 4250, 4281 or 4252, Opt. two 4252 or 4281	14.51	1.17	0.15 Left	252

NOTE 9. Deleted 3/21/80.

NOTE 10. Starters, generators and alternators approved for use on these engines are listed in the latest revision of Textron Lycoming Service Instruction No. 1154.

NOTE 11. Models O-235-C2C and O-235-H2C have an alternate rated maximum continuous power rating of 100 hp at 2400 r.p.m.

NOTE 12. Models O-235-L2A, -L2C, O-235-M1, -M2C, and O-235-M3C have alternate ratings of 115 hp at 2700 r.p.m., 112 hp at 2600 r.p.m., 110 hp at 2550 r.p.m., and 105 hp at 2400 r.p.m.

NOTE 13. All models equipped with one impulse coupling magneto, may use two impulse coupling magnetos as optional equipment.

NOTE 14. Models O-235-N2A, -N2C, -P1, -P2A, -P2C, -P3C have alternate ratings of 113 hp at 2700 r.p.m., 110 hp at 2600 r.p.m., 108 hp at 2550 r.p.m. and 103 hp at 2400 r.p.m.

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