DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

1E12
Revision 9
Lycoming Engines
IO-320 -A1A-A2A-B1A, -B1B, B1C, -B1E, -B1D, -B2A, -C1A, -C1B, -D1A, -D1C, -D1B, -E1A, -E1B, -E2A, -E2B, -F1A
LIO-320-B1A, -C1A
AIO-320-A1A, -A1B, -A2A, -A2B, -B1B, -C1B
AEIO-320-D1B, -D2B, -E1A, -E1B, -E2A, -E2B
December 17, 2003

TYPE CERTIFICATE DATA SHEET NO. 1E12

Engines of models described herein conforming with this data sheet (which is a part of type certificate No. 1E12) 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 Textron, Williamsport Division transferred TC 1E12 to Lycoming Engines, An Operating Division of AVCO Corporation on December 17, 2003

Model	Lycoming	**IO-320**-A1A -A2A,-E1A -E2A,-E1B -E2B	**IO-320**-B1A,-B1B -B1C,-B1D, -B2A -B1E, -D1A, -D1B -D1C **LIO-320**-B1A	**IO-320**-C1A -C1B, -F1A **LIO-320**-C1A,	**AEIO-320**-E1A -E1B,-E2A -E2B
Type	4HOA Direct Drive				
Rating					
Maximum continuous, hp.,r.p.m. full throttle at:					
Sea level pressure altitude		150-2700-S.L.	160-2700-S.L.	- -	150-2700-S.L.
Takeoff, hp., r.p.m., full throttle at					
Sea level pressure altitude		150-2700-S.L.	160-2700-S.L.	- -	150-2700-S.L.
Fuel (min grade aviation gasoline)		80/87	91/96-100LL	- -	80/87
Lubricating oil (Lubricants should conform to the specification as listed or subsequent revisions)		Lycoming Spec.No. 301 and Service Instruction 1014	- -	- -	- -
Bore and Stroke, in.		5.125 x 3.875	- -	- -	- -
Displacement, cu.in.		320	- -	- -	- -
Compression ratio		7.00:1	8.50:1	- -	7.00:1
Weight, lb.		See NOTE 9	- -	- -	- -
C. G. location		See NOTE 9	- -	- -	- -
Propeller shaft flangs, SAE No.		AS 127 Type 2 modified	- -	- -	- -
Crankshaft dampers and balancers		None	- -	- -	- -
Fuel Injector		Bendix RSA -5AD1	- -	- -	- -
Ignition, dual		See NOTE 9	- -	- -	- -
Timing, °BTC		25	- -	- -	- -
Spark plugs		See NOTE 4	- -	- -	- -
Oil sump capacity, qt.		8	- -	- -	- -
Minimum usable oil,qt. (30° nose up or down)		2	- -	- -	—
Minimum usable oil,qt. (30° nose up, 20° nose down)		—	—	—	4
NOTES		1,2,3,4,5,6,7,8,9	- -	- -	- -

"- -" same as preceding: "—"does not apply.

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Model	Lycoming	**AIO-320**-A1A	**AEIO-320**-D1B,
Type	4HOA Direct Drive	-A1B,-A2A, -A2B,-B1B, -C1B	-D2B
Rating			
Maximum continuous, hp.,r.p.m. full throttle at:			
Sea level pressure altitude		160-2700-S.L.	- -
Takeoff, hp., r.p.m., full throttle at			
Sea level pressure altitude		160-2700-S.L	- -
Fuel (min grade aviation gasoline)		91/96 or 100LL	- -
Lubricating oil (Lubricants should conform to the specification as listed or subsequent revisions)		Lycoming Spec.No. 301 and Service Instruction 1014	- -
Bore and Stroke, in.		5.125 x 3.875	- -
Displacement, cu.in.		320	- -
Compression ratio		8.50:1	- -
Weight, lb.		See NOTE 9	- -
C. G. location		See NOTE 9	- -
Propeller shaft flangs, SAE No.		AS 127 Type 2 modified	- -
Crankshaft dampers and balancers		None	- -
Fuel Injector		Bendix RSA -5AD1	- -
Ignition, dual		See NOTE 9	- -
Timing, °BTC		25	- -
Spark plugs		See NOTE 4	- -
Oil sump capacity, qt.		Dry sump	8
Minimum usable oil,qt. (30° nose up or down)		—	—
Minimum usable oil,qt. (30° nose up, 20° nose down)		—	4
NOTES		1,2,3,4,5,6,7,8,9	- -

"- -" same as preceding: "—"does not apply.

Certification basis:

Regulations & Amendments	Model	Date of Application	Date Type Certificate No.1E12 Issued/Revised
CAR 13 effective June 15,1956			
As amended by 13-1,13-2,13-3	IO-320-A1A	February 16, 1961	April 10, 1961
	IO-320-A2A	February 16, 1961	April 10, 1961
13-1,13-2,13-3 & 13-4	IO-320-B1A	September 18, 1962	January 24, 1963
	IO-320-B2A	September 18, 1962	January 24, 1963
	IO-320-B1B	December 12, 1963	December 31, 1963
	IO-320-C1A	January 18, 1965	May 7, 1965
	IO-320-B1C	April 1, 1965	May 5, 1965
	IO-320-E2A	March 11, 1966	March 28, 1966
	IO-320-B1D	April 11, 1966	April 27, 1966
	IO-320-D1A	February 25, 1969	February 27, 1969
	IO-320-E1A	April 16, 1970	April 21, 1970
	IO-320-D1B	July 24, 1970	August 3, 1970
	IO-320-E2B	May 4, 1972	May 15, 1972
	AIO-320-A1A	June 16, 1969	June 23, 1969
	AIO-320-A1B	June 16, 1969	June 23, 1969
	AIO-320-A2A	June 16, 1969	June 23, 1969
	AIO-320-A2B	June 16, 1969	June 23, 1969
	AIO-320-B1B	June 16, 1969	June 23, 1969
	AIO-320-C1B	July 29, 1971	August 9, 1971
	LIO-320-B1A	August 19, 1969	August 28, 1969

Certification basis: (Cont.)

LIO-320-C1A	August 19, 1969	August 28, 1969
IO-320-P1A	December 19, 1973	January 8, 1974
IO-320-E1B	January 10, 1974	January 14, 1974
AEIO-320-E1A	April 2, 1974	April 12, 1974
AEIO-320-E1B	April 2, 1974	April 12, 1974
AEIO-320-E2A	April 2, 1974	April 12, 1974
AEIO-320-E2B	April 2, 1974	April 12, 1974
AEIO-320-D1B	October 5, 1976	October 8, 1976
AEIO-320-D2B	May 29, 1980	June 9,1980
IO-320-D1C	July 24, 1986	August 6, 1986
IO-320-B1E	August 19, 1986	September 10, 1986
IO-320-C1B	November 11, 1986	December 3, 1986

Production basis: Production Certificate No. 3

NOTE 1. Maximum permissible temperatures, °F:

Cylinder head (well-type thermocouple)	500
Cylinder base (not applicable to engine models which incorporate internal piston cooling oil jets)	325
Oil inlet	245
Fuel injector air inlet (IO-320-C1A, F1A LIC-320-C1A)	400

NOTE 2. Pressure limits:

Fuel:

	Inlet to Diaphragm Pump			Inlet to Injector		
	Maximum	Minimum	Maximum with Injector in Idle Cut-Off	Maximum	Minimum	Idle
IO-320-A1A, -A2A,-B1A, -B1B,-B1C,-B1D,-B1C -B1E,-B2A,-D1A,-D1B, -D1C,-E1A, -E1B, -E2B ,-E2A	35	-2	-	45	12	-
IO-320-C1A,-C1B,-F1A*	45	-2	55	45	12	12
AEIO-320-D & E series	35	-2	-	45	12	-
LIO-320-B1A	35	-2	-	45	12	-
LIO-320-C1A, -C1B *	45	-4	55	45	12	12
AIO-320-A,-B & -C Series	35	-2	55	45	14	-

Boost pump outlet limits to injectors:

AIO-320-A, -B & -C Series	Parallel Boosts		Series Boosts	
	Maximum	Minimum	Maximum	Minimum
Zero Fuel Flow	45 p.s.i.	-	35 p.s.i.	-
Maximum Fuel Flow	-	14 p.s.i.	-	14 p.s.i.

Oil:

Maximum		Minimum	
Normal Operating	Starting and Warm-up	Normal	Idling
90 p.s.i.	100 p.s.i.	60 p.s.i.	25 p.s.i.

Manifold pressure, in. Hg. - Absolute 29 max. (IO-320-C1A, -F1A, LIO-320-C1A)
Exhaust back pressure, in. Hg. - Absolute 32 max. (IO-320-C1A, -F1A, LIO-320-C1A)
*AN-type fuel pump.

NOTE 3. The following accessory provisions are incorporated:

Accessory	**IO-320** -A1A,-A2A, -B1A,-B1C, -B2A, -B1D	**IO-320** -B1B, -C1A,-C1B -F1A	**IO-320** -D1A,-E1A -E2B, -E2A **AEIO-320-** E1A, -E1B, -E2A	Rotation Facing Drive Pad	Speed Ratio to Crankshaft	Max. Torque (in.- lb.) Cont	Max. Torque (in.- lb.) Static	Maximum Overhang Moment (in. - lb.)
Starter	*	*	*	CC	13.556:1	-	450	150
Starter	**	**	**	CC	16.556:1	-	450	150
Generator	*	*	-	C	1.91:1	60	120	175
Generator	**	**	-	C	2.500:1	60	120	175
Alternator	**	*	*	C	3.250:1	60	120	175
Fuel pump, plunger	*	-	*	-	0.500:1	-	-	10
Fuel Pump	-	*	-	CC	1.000:1	25	450	25
Vacuum Pump	*	*	*	CC	1.300:1	70	450	25
Hydraulic Pump	-	-	-	C	1.300:1	100	800	40
Tachometer	*	*	*	C	0.500:1	7	50	5
Propeller governor	-	-	-	C	0.895:1	125	1200	40
Propeller governor	*	*	*	C	0.866:1	125	1200	40
Optional Dual Drive Mounting on Vacuum Pump Drive Pad								
(Vacuum Pump)	**	**	**	CC	1.300:1	70	450	6
(Hydraulic Pump)	**	**	**	CC	1.300:1	Total	Total	10
or								
(Vacuum Pump)	**	**	**	CC	1.300:1	70	450	6
(Prop. Governor)	**	**	**	CC	1.300:1	Total	Total	10

Accessory	**IO-320-** -E2B, **AEIO-**320 -E2B	**IO-320** -B1E, -D1B, -D1C **AEIO-**320 -D1B, -D2B	**AIO-320-** -A1A, -A1B, -A2A, -A2B, -B1B, -C1B	Rotation Facing Drive Pad	Speed Ratio to Crankshaft	Max. Torque (in.- lb.) Cont	Max. Torque (in.- lb.) Static	Maximum Overhang Moment (in. - lb.)
Starter	*	*	--	CC	13.556:1	-	450	150
Starter	**	**	*	CC	16.556:1	-	450	150
Generator	-	-	-	C	1.91:1	60	120	175
Generator	-	-	-	C	2.500:1	60	120	175
Alternator	*	*	*	C	3.250:1	60	120	175
Fuel pump, plunger	*	*	*	-	0.500:1	-	-	10
Fuel Pump	-	-	-	CC	1.000:1	25	450	25
Vacuum Pump	*	*	*	CC	1.300:1	70	450	25
Hydraulic Pump	-	*	-	C	1.300:1	100	800	40
Tachometer	*	*	*	C	0.500:1	7	50	5
Propeller governor	-	*	*	C	0.895:1	125	1200	40
Propeller governor	-	-	-	C	0.866:1	125	1200	40
Optional Dual Drive Mounting on Vacuum Pump Drive Pad								
(Vacuum Pump)	-	-	**	CC	1.300:1	70	450	6
(Hydraulic Pump)	-	-	**	CC	1.300:1	Total	Total	10
or								
(Vacuum Pump)	-	-	-	CC	1.300:1	70	450	6
(Prop. Governor)	-	-	-	CC	1.300:1	Total	Total	10

"C" - Clockwise, "CC" - Counterclockwise

- * - Standard. ** - Optional

Models with a "2" designation (A2A) have no provision for propeller governor drive

NOTE 3. (continued)

Accessory	LIO-320- -B1A	LIO-320 -C1A	Rotation Facing Drive Pad	Speed Ratio to Crankshaft	Max. Torque (in.- lb.) Cont	Max. Torque (in.- lb.) Static	Maximum Overhang Moment (in. - lb.)
Starter	*	*	C	13.556:1	-	450	150
Starter	**	**	C	16.556:1	-	450	150
Generator	-	-	-	1.91:1	60	120	175
Generator	-	-	-	2.500:1	60	120	175
Alternator	*	*	CC	3.250:1	60	120	175
Fuel pump, plunger	*	-	-	0.500:1	-	-	10
Fuel Pump	-	*	C	1.000:1	25	450	25
Vacuum Pump	*	*	C	1.300:1	70	450	25
Hydraulic Pump	-	-	CC	1.300:1	100	800	40
Tachometer	*	*	CC	0.500:1	7	50	5
Propeller governor	-	-	-	0.895:1	125	1200	40
Propeller governor	*	*	CC	0.866:1	125	1200	40
Optional Dual Drive Mounting on Vacuum Pump Drive Pad							
(Vacuum Pump)	**	**	C	1.300:1	70	450	6
(Hydraulic Pump)	**	**	C	1.300:1	Total	Total	10
or							
(Vacuum Pump)	**	**	C	1.300:1	70	450	6
(Prop. Governor)	**	**	C	1.300:1	Total	Total	10

"C" - Clockwise, "CC" - Counterclockwise
* - Standard. ** - Optional

NOTE 4. Spark plugs: See latest revision of Lycoming Service Instruction No. 1042 for approved equipment.

NOTE 5. This engine incorporates provisions for absorbing propeller thrust in both tractor and pusher type installations.

NOTE 6. This engine is approved for horizontal helicopter application and operation.

NOTE 7. These engines incorporate the following similarities or differences:

IO-320-A1A - Basic model - four cylinder, horizontally-opposed, air cooled, direct drive, fuel injection engine with automotive type generator and starter.
-A2A - Similar to -A1A but has provisions for fixed pitch propeller.
-B1A - Same as -A1A except that fuel injector is offset toward the fore and aft centerline of engine.
-B1B - Similar to -B1A except has an AN fuel pump drive.
-B1C - Similar to -B1A but has adapter for mounting fuel injector straight to rear.
-BID - Similar to -B1C but has S-1200 series high altitude magnetos.
-B2A - Similar to -BIA but has provisions for fixed pitch propeller.
-B1E - Same as – D1C except horizontal fuel injector
-C1A - Normally aspirated, similar to -B1B except has features making it suitable for turbo supercharging by STC. See limits, NOTES 1 and 2. Incorporates internal piston cooling oil nozzles.
-C1B Same as –C1A except horizontal rear mounted fuel injector
-DIA - Similar to -B1D except has type 1 Dynafocal mounts, S4LN-1227 and S4LN-1209 magnetos and has fuel injection mounted vertically under the sump.
-DIB - Similar to -DIA except has propeller governor drive located on left front of crankcase instead of on accessory housing.
-D1C Same as –D1B except Slick Magnetos
-EIA - Identical to -E2A except has provisions for controllable pitch propeller.
-E1B - Similar to -E1A except is equipped with Slick 4050 and 4051 magnetos.
-E2A - Similar to -A2A except uses Scintilla S4LN-20 and S4LN-21 magnetos, has straight conical mounts, and has fuel injector mounted under the sump.
-E2B - Similar to -E2A but is equipped with Slick 4050 and 4051 magnetos.
-F1A - Similar to -C1A except has Type 1 (30°) dynafocal mount attachment instead of Type 2 (18°) mount attachment.

AIO-320-A1A - Similar to IO-320-B1D except permits operation in an inverted position. Differences include a front mounted propeller governor, two dry oil sumps, dual external oil scavenge pumps, an oil tank, three options of position for fuel injector mounting and Type 1 Dynafocal mount.

-A1B - Similar to AIO-320-A1A except uses one impulse coupling magneto.

-A2A - Similar to AIO-320-A1A but uses a fixed pitch propeller.

-A2B - Similar to AIO-320-A1A but uses one impulse coupling magneto and has a fixed pitch propeller.

-B1B - Similar to AIO-320-A1B except has front mounted fuel injector.

-C1B - Identical to AIO-320-B1B except that the fuel injector is vertically mounted on bottom of sump in a forward position.

LIO-320-B1A - Similar to IO-320-B1A except counter clockwise rotation of engine and reverse rotation of accessories. Uses modified starter ring gear, crankshaft, cam shaft, accessory housing and oil pump body.

-C1A - Similar to IO-320-C1A except incorporates changes shown for LIO-320-B1A. Suitable for turbo-supercharging - See limits, NOTES 1 and 2.

AEIO-320-D1B- Similar to IO-320-D1B except is equipped with an inverted oil system kit for aerobatic flight.

-D2B Same as AEIO-320-D1A except no provision for propeller governor.

-E1A - Similar to IO-320-E1A except I equipped with an inverted oil system kit for aerobatic flight.

-E1B - Similar to IO-320-E1B except is equipped with an inverted oil system kit for aerobatic flight.

-E2A - Similar to IO-320-E2A except is equipped with an inverted oil system kit for aerobatic flight.

-E2B - Similar to IO-320-E2B except is equipped with an inverted oil system kit for aerobatic flight.

NOTE 8. Starters, generators and alternators approved for use on these engines are listed in the latest revision of AVCO Lycoming Service Instruction No. 1154.

NOTE 9. The following tabulation shows weights, C.G.s and magnetos for these models:

		Center of Gravity		Ignition Dual	
Model	*Weight	From front face of Prop. Shaft Flange;in.	Off Crankshaft Center Line, in.	Bendix +	Slick
IO-320-A1A	252	14.59	1.24 Below-.17 Left	S4LN-200,S4LN-204	-
-A2A	252	14.59	1.24 Below-.17 Left	S4LN-200,S4LN-204	-
-B1A	259	14.61	1.02 Below-.08 Left	S4LN-20,S4LN-21 or S4LN-21, S4LN-21	-
-B1B	257	14.61	1.02 Below-.08 Left	S4LN-20,S4LN-21 or S4LN-21, S4LN-21	-
-B1C	259	14.61	1.02 Below-.08 Left	S4LN-20,S4LN-21 or S4LN-21, S4LN-21	-
-B1D	260	14.61	1.02 Below-.08 Left	S4LN-1209, S4LN-1208	-
-B1E	264	14.06	1.31 Below- .03 Right	-	4251, 4250
-B2A	259	14.61	1.02 Below-.08 Left	S4LN-20,S4LN-21 or S4LN-21, S4LN-21	-
-C1A	269	14.61	1.02 Below-.08 Left	S4LN-21,S4LN-21	-
-C1B	269	14.61	1.02 Below-.08 Left	S4LN-21,S4LN-21	-
-D1A	261	14.59	1.24 Below-.17 Left	S4LN-1227, S4LN-1209	-
-D1B	263	14.59	1.24 Below-.17 Left	S4LN-1227, S4LN-1209	-
-D1C	263	13.77	1.44 Below-.03 Right	-	4251, 4250
-E1A	255	14.59	1.24 Below-.17 Left	S4LN-20,S4LN-21	-
-E1B	253	14.59	1.24 Below-.17 Left	-	4051, 4050
-E2A	255	14.59	1.24 Below-.17 Left	S4LN-20,S4LN-21	-
-E2B	255	14.59	1.24 Below-.17 Left	-	4051, 4050
-F1A	269	14.61	1.02 Below-.08 Left	S4LN-21,S4LN-21	-
AIO-320-A1A	275	14.74	0.93 Below-.01 Left	S4LN-1208, S4LN-1209	-
-A1B	276	14.74	0.93 Below-.01 Left	S4LN-1227, S4LN-1209	-
-A2A	275	14.74	0.93 Below-.01 Left	S4LN-1208, S4LN-1209	-
-A2B	276	14.74	0.93 Below-.01 Left	S4LN-1227, S4LN-1209	-
-B1B	276	14.74	0.93 Below-.01 Left	S4LN-1227, S4LN-1209	-
-C1B	276	14.74	0.93 Below-.01 Left	S4LN-1227, S4LN-1209	-
LIO-320-B1A	262	14.61	1.02 Below-.08 Left	S4RN-21,S4RN-20 or S4RN-21, S4RN-21	-
-C1A	269	14.61	1.02 Below-.08 Left	S4RN-21, S4RN-21	-

AEIO-320-D1B	271	14.59	1.24 Below-.17 Left	S4LN-1227, S4LN-1209	-
-D2B	271	14.59	1.24 Below-.17 Left	S4LN-1227, S4LN-1209	-
-E1A	262	14.59	1.24 Below-.17 Left	S4LN-21, S4LN-20	-
-E1B	258	14.59	1.24 Below-.17 Left	-	4051, 4050
-E2A	262	14.59	1.24 Below-.17 Left	S4LN-21, S4LN-20	-
-E2B	260	14.59	1.24 Below-.17 Left	-	4051, 4050

* Standard engine dry weight less starter and generator/alternator.
+ For alternate magnetos see latest issue of Textron Lycoming Service Instruction 1443

...END...