

**MINISTÉRIO DA AERONÁUTICA
DEPARTAMENTO DE PESQUISAS E DESENVOLVIMENTO
CENTRO TÉCNICO AEROESPACIAL**

TYPE CERTIFICATE DATA SHEET Nº EM-8210-02

Type Certificate Holder:

TEXTRON LYCOMING - AVCO CORPORATION
652, Oliver Street.
Williamsport, Pennsylvania PA 17701
USA

EM-8210-02

Sheet 01

LYCOMING
LTIO-540-J2BD,
TIO-540-J2BD, -AE2A,
-AA1AD, -AB1AD,
-AF1A, -AJ1A

MARCH 1999

Engines of models described herein conforming with this data sheet, which is part of Type Certificate No. 8210, meet the minimum standards for use in certificated aircraft in accordance with pertinent aircraft data sheets and applicable portions of the Brazilian Aeronautical Regulations provided they are installed, operated, and maintained as prescribed by the approved manufacturer's manuals and other instructions.

MODEL LTIO-540-J2BD , TIO-540-J2BD, -AE2A,-AA1AD, -AB1AD, -AF1A, -AJ1A

TYPE 6HOA DIRECT DRIVE TURBOCHARGED

| RATINGS | LTIO-540-J2BD | | | TIO-540-AA1AD | | |
|--|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|--|
| | TIO-540-J2BD | TIO-540-AE2A | TIO-540-AB1AD | TIO-540-AF1A | TIO-540-AJ1A | |
| Maximum continuous hp - rpm - in. Hg at: | | | | | | |
| Standard density critical alt. ft | 350-2575-46.0 15 000 | 350-2500-42.0 20 000 | 250-2575-32.5 15 000 | 270-2575-36.5 20 000 | 310-2500-39.0 14 000 | |
| Standard density sea level alt. ft | 350-2575-43.0 S.L. | 350-2500-42.0 S.L. | 250-2575-32.5 S.L. | 270-2575-35.0 S.L. | 310-2500-39.0 S.L. | |

| | LTIO-540-J2BD TIO-540-J2BD | TIO-540-AE2A | TIO-540-AA1AD ⁽¹⁾ TIO-540-AB1AD | TIO-540-AF1A | TIO-540-AJ1A |
|--|-------------------------------|-------------------------|---|-------------------------|-------------------------|
| Takeoff (5 min.) hp – rpm - in. Hg at: | | | | | |
| Standard density critical alt. ft | 350-2575-46.0 15 000 | 350-2500-42.0 20 000 | 250-2575-32.5 15 000 | 270-2575-36.5 20 000 | 310-2500-39.0 14 000 |
| Standard density sea level alt. ft | 350-2575-43.0 15 000 | 350-2500-42.0 S.L. | 250-2575-32.5 S.L. | 270-2575-35.0 S.L. | 310-2500-39.0 S.L. |

(1) TIO-540-AA1AD model is approved with an alternate rating of 270 hp / 2575 rpm from S.L. to 15 000 ft

| | | | | | | |
|------------------------------------|---|---|-------------|-------------|-------------|-------------|
| FUEL TYPE | Minimum grade aviation gasoline | 100/100LL | -- | -- | -- | -- |
| CARBURETION / INJECTION | Fuel Injection | RSA-10ED1 | -- | RSA-5AD1 | RSA-10ED1 | -- |
| OIL, LUBRICATION | Lubrication should conform to the specification as listed or to subsequent revisions thereto. | Lycoming Spec. No. 301-F Service Instruction No. 1014 | | | | |
| | Oil sump capacity, qt. | 12 | -- | 10 / 12 | 10 | 11 |
| | Usable oil, qt. (20° nose up or down) | 9 ¼ | -- | 7 ¼ / 9 ¼ | 7 ¼ | 5 ½ |
| | | | | AA1AD/AB1AD | | |
| TEMPERATURE LIMITS | Maximum permissible - °C / °F : | | | | | |
| | Cylinder head (well type thermocouple) - | 260 / 500 | -- | -- | -- | 249 / 480 |
| | Cylinder base - | See Note 4 | -- | -- | -- | -- |
| | Oil inlet - | 118 / 245 | -- | -- | -- | -- |
| | Exhaust gas - | 898 / 1 650 | 954 / 1 750 | 898 / 1 650 | 954 / 1 750 | 912 / 1 675 |
| | Fuel injector inlet air - | 204 / 400 | -- | -- | -- | -- |
| | Compressor temperature rise - | # | # | # | # | # |
| | (See Note 3) | -- | -- | -- | -- | -- |

| | | LTIO-540-J2BD | | TIO-540-AA1AD | | |
|---|---|---------------|--------------|---------------|--------------|--------------|
| | | TIO-540-J2BD | TIO-540-AE2A | TIO-540-AB1AD | TIO-540-AF1A | TIO-540-AJ1A |
| PRESSURE LIMITS | | | | | | |
| Fuel – psi: | | | | | | |
| Fuel pressure (above injector inlet air pressure) | | | | | | |
| at inlet to fuel injector - | minimum - | 34.0 | 29.0 | 20.0 | 24.0 | 29.0 |
| | maximum - | 65.0 | -- | -- | 55.0 | 65.0 |
| | minimum idle | 12.0 | -- | -- | -- | -- |
| - | | | | | | |
| | Fuel pres. (above ambient air pressure) | -2.0 | -- | -- | -- | -- |
| at inlet to engine fuel pump- | maximum - | 65.0 | -- | -- | 55.0 | 65.0 |
| | minimum - | # | # | # | # | # |
| | minimum idle | | | | | |
| - | | | | | | |
| Minifold pressure (cumulative total with | | 49.0 | 42.0 | 38.0 | 38.0 | 39.0 |
| altitude adjustment - inHg Abs) | | | | | | |
| | maximum - | | | | | |
| | | 55.0 | -- | -- | -- | -- |
| Oil - psi: | | 95.0 | -- | -- | -- | -- |
| Normal operation - | minimum - | 25.0 | -- | -- | -- | -- |
| | maximum - | # | # | # | # | # |
| Idle - | minimum - | # | # | # | # | # |
| | maximum - | 115.0 | -- | -- | -- | -- |
| Starting and warm-up - | minimum - | | | | | |
| | maximum - | | | | | |
| Turbocharger exhaust back pressure | | | | | | |
| | maximum - | 0.5 | -- | -- | -- | -- |
| -- Same as preceeding | | | | | | |
| # Does not apply | | | | | | |

| | | LTIO-540-J2BD TIO-540-J2BD | TIO-540-AE2A | TIO-540-AA1AD TIO-540-AB1AD | TIO-540-AF1A | TIO-540-AJ1A |
|---------------------------------------|--|--|----------------------------|--------------------------------|----------------------------|-------------------------|
| IGNITION | Ignition, Dual ⁽²⁾ - | D6LN-2230 (TIO-540-J2BD D6RN-2230) | Slick 6263,6260(right) | D6LN-3031 | Slick 6261,6260(right) | -- -- |
| | Timing, °BTC - | 20 | -- | -- | -- | -- |
| | Spark Plugs - | See Note 1 | -- | -- | -- | -- |
| | (2) For alternate magnetos see latest Textron Lycoming Service Instruction S.I. -1443 | | | | | |
| COMPRESSION | Bore and stroke, in - | 5.1250 x | -- | -- | -- | -- |
| | Displacement, cu. in. - | 4.3750 | -- | -- | -- | -- |
| | Compression ratio - | 541.5 | -- | 8.00:1 | -- | 7.30:1 |
| | Turbo-supercharger - | 7.30:1 TH08A60 | TA0411(2) | TE0659 | TA0413 | TA6102 |
| WEIGHT | | 518.0 | 595.0 | 483.0-AA1AD 474.0-AB1AD | 473.0 | 532 |
| C.G. LOCATION | (with starter and alternator installed) | | | | | |
| | From front face of prop. mounting flange, in | 22.75 | 18.88 | 18.91 | 18.30 | 18.50 ⁽³⁾ |
| | Off crankshaft C.L., in | 0.75 below & 0.16 right | 0.95 below & 0.63 right | 2.20 below & 0.67 right | 2.30 below & 0.64 right | 0.75 Below 1.13 Left |
| (3) No alternator inastalled | | | | | | |
| PROPELLER SHAFT-SPECIFICATIONS | A. S. 127 | Type 2 Flange modified | -- | -- | -- | -- |
| | Crankshaft Dampers (torsional) | One 5 th order One 6 th order | -- | -- | -- | -- |

IMPORT REQUIREMENTS Each engine imported separately and/or spare parts must be accompanied by an export airworthiness approval issued by FAA, attesting that the particular engine and/or parts were submitted to the governmental quality control before delivery and are in conformity with the CTA approved type design.

PRODUCTION BASIS Production Certificate No. 3 (FAA)

CERTIFICATION BASIS CAR - 13 effective June 15, 1956, as amended by 13-1, 13-2, 13-3, 13-4.

| | Application | Issued TC |
|---------------|--------------|--------------|
| TIO-540-J2BD | 05-Feb.-1980 | 13-May-1982 |
| LTIO-540-J2BD | 05-Feb.-1980 | 13-May-1982 |
| TIO-540-AE2A | 24-Aug.-1989 | 18-May-1990 |
| TIO-540-AA1AD | 22-Nov.-1989 | 18-May-1990 |
| TIO-540-AB1AD | 25-Sep-1990 | 20-Feb.-1992 |
| TIO-540-AF1A | 09-Nov.-1990 | 20-Feb.-1992 |
| TIO-540-AJ1A | 02-Oct.-1998 | 30-Mar.-1999 |

NOTES

NOTE 1 Spark plugs approved for use on these engines are listed in the latest revision of Textron Lycoming Service Instruction No. 1042.

NOTE 2 The following accessory provisions are available:

| Accessory | -AJ1A | -AE2A | -AF1A | -J2BD | Rotating | | Speed Ratio to Crankshaft | Maximum Torque (in.lb) | | Max. Overhang Moment (in.lb) |
|--------------------|-------|-------|-------|--------|--------------|------|------------------------------|---------------------------|-----------------|------------------------------------|
| | | | | -AB1AD | Facing Drive | Pad | | Continuous | Static | |
| | | | | -AA1AD | TIO | LTIO | | | | |
| Starter | * | * | * | * | CC | C | 16.5560:1 | # | 450 | 150 |
| Alternator | * | * | * | * | C | CC | 3.200:1 | 60 | 120 | 175 |
| Alternator | # | * | * | # | C | # | 3.800:1 | 60 | 120 | 175 |
| Vacuum pump | * | * | * | * | CC | C | 1.300:1 | 70 | 450 | 25 |
| Hydraulic pump | * | * | * | # | C | CC | 1.385:1 | 100 | 800 | 40 |
| Hydraulic pump | # | # | # | * | C | CC | 1.300:1 | 100 | 800 | 40 |
| Tachometer | * | # | * | * | C | CC | 0.500:1 | 7 | 50 | 5 |
| Prop. governor*** | # | # | # | # | C | CC | 0.895:1 | 125 | 1 200 | 25 |
| Prop. governor**** | * | * | * | * | C | CC | 0.947:1 | 125 | 2 200 | 25 |
| Prop. governor**** | # | # | # | # | C | CC | 1.300:1 | 125 | 2 200 | 25 |
| Fuel pump | * | # | # | * | C | CC | 1.000:1 | 25 | 450 | 25 |
| Fuel pump | # | * | * | # | CC | C | 1.000:1 | 25 | 450 | 25 |
| Freon comp. | # | # | # | # | C | CC | 1.300:1 | 180 | 2 200 | 150 |
| Freon comp. | # | * | * | ** | C | CC | 1.462:1 ***** | | Limited by belt | |

"#" indicates: Does not apply.

"C" Clockwise, "CC" Counter-Clockwise

*Standard

**Optional

***Narrow deck engines

****Wide deck engines

*****With compressor pulley diameter of 6.00 inches

NOTE 3 The Turbocharger meets the containment requirements of CAR 13.116 and does not require external protection. Measure exhaust gas temperature at inlet location shown on Lycoming Drawing No 63397 (-J2BD), 63545 (-AB1AD), 63546 (-AA1AD), 04D63570 (-AE2A), 04063573 (-AF1A), 04D63594 (-AJ1A).

Performance data for these engines are presented on Lycoming Curves No. 13215 (-J2BD), 13455 (-AB1AD, -AA1AD), 13482 (-AE2A), 13491(-AF1A), 13538(-AJ1A).

Maximum turbocharger speed is now being governed by manifold pressure rather than temperature rise. Maximum manifold pressure versus altitude are presented on Lycoming Curve Numbers 13216-C (-J2BD), 13456 (-AB1AD, -AA1AD), 13483 (-AE2A), 13492(-AF1A), 13540-A (-AJ1A).

NOTE 4 Cylinder base temperature limits are not applicable to engine models which incorporate internal piston cooling oil jets.

NOTE 5 These engines incorporate the following similarities or differences:

| | |
|---------------|--|
| TIO-540-J2BD | Similar to TIO-540-F2BD except rated power is increased and is equipped with an Air Research Model THO8460 turbocharger. |
| TIO-540-AE2A | Similar to the TIO-540-U2A except with (2) Slick retard breaker, pressurized magnetos, twin AiResearch turbochargers with individual intercoolers, and a single wastegate modulated by a variable absolute pressure controller. Two sonic nozzles are provided for cabin pressurization. |
| TIO-540-AA1AD | Similar to the model -AB1AD except for a rear mounted prop governor drive, uses the -K1AD turbocharger mounting and has no provisions for cabin bleed. |
| TIO-540-AB1AD | Similar to the -K1AD except for the relocation of the turbocharger and has a density-differential controller. Also, the dual magneto is equipped with an impulse coupling instead of retard breaker. |
| TIO-540-AF1A | Similar to the TIO-540-AA1AD except equipped with (2) Slick pressurized magnetos, an intercooler, drives for (2) alternators and a different model Garrett turbocharger. |
| TIO-540-AJ1A | Similar to the TIO-540-W2A except equipped with a different model Garret turbocharger and slope controller. |

NOTE 6 Starter, generators, and alternators approved for use on these engines are listed in the latest revision of Textron Lycoming Service Instruction No. 1154.

NOTE 7 Air from the compressor of the AiResearch Turbocharger is suitable for cabin pressurization. The installation must provide for cabin air temperature control from 148°C / 300°F to 20 000 feet hot day condition under maximum engine power. For cabin air outlet flange dimensions see Textron Lycoming Drawing No. 63444 for -R2AD model.

A sonic nozzle must be provided to preclude affecting engine performance by cabin air bleed. TIO-540-AE2A model is equipped with two sonic nozzles to supply air for cabin pressurization, reference Lycoming Drawing No. 04D63570.

NOTE 8 All models equipped with one impulse coupling magneto may use two impulse coupling magnetos as optional equipment.

NOTE 9 The maximum continuous ratings for these engines have been specified with 10 horsepower extracted at the accessory drives.

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