AEIO-580-B1A Operation and Installation Manual

June 2007

652 Oliver Street
Williamsport, PA 17701

Part No. 60297-32

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Lycoming Part Number: 60297-32

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ATTENTION

OWNERS, OPERATORS, AND MAINTENANCE PERSONNEL

This manual contains a description of the engine, its specifications, and detailed information on how to operate and install it. This manual is FAA Approved and complies with FAR 33.5 and is intended for use by owners, pilots and maintenance personnel responsible for care of Lycoming powered aircraft. Modifications and repair procedures are contained in the Lycoming Maintenance and Overhaul Manual; maintenance personnel should refer to these for such procedures.

SAFETY WARNING

MAINTENANCE MUST BE PERFORMED BY QUALIFIED AND PROPERLY CERTIFIED PERSONNEL. NEGLECTING TO FOLLOW THE OPERATING INSTRUCTIONS AND TO CARRY OUT PERIODIC MAINTENANCE PROCEDURES CAN RESULT IN POOR ENGINE PERFORMANCE AND POWER LOSS. ALSO, IF POWER AND SPEED LIMITATIONS SPECIFIED IN THIS MANUAL ARE EXCEEDED, FOR ANY REASON, DAMAGE TO THE ENGINE AND PERSONAL INJURY CAN HAPPEN. CONSULT YOUR LOCAL FAA APPROVED MAINTENANCE FACILITY.

SERVICE PUBLICATIONS

Lycoming service publications and subscriptions are available through Lycoming distributors or direct from the factory.

NOTE

The illustrations, pictures and drawings shown in this publication are typical of the subject matter they portray; in no instance are they to be interpreted as examples of any specific engine, equipment or part thereof.

IMPORTANT SAFETY NOTICE

Proper service and repair is essential to increase the safe, reliable operation of all aircraft engines. The service procedures recommended by Lycoming are effective methods for performing service operations. Some of these service operations require the use of tools specially designed for the task. These special tools must be used when and as recommended.

It is important to note that this manual uses the following Notes, Cautions and Warnings which must be carefully read in order to minimize the risk of personal injury or the use of improper service methods that may damage the engine or render it unsafe.

NOTE	Read for added information and reminders.
CAUTION	Equipment damage may result if instructions are not followed.
WARNING	Personal injury could result if instructions are not followed.

It is also important to understand that these Warnings and Cautions are not all inclusive. Lycoming could not possibly know, evaluate or advise the service trade of all conceivable ways in which service might be done or of the possible hazardous consequences that may be involved. Accordingly, anyone who uses a service procedure must first satisfy themselves thoroughly that neither their safety nor aircraft safety will be jeopardized by the service procedure they select.

LYCOMING

WARRANTY

NEW AND REBUILT RECIPROCATING AIRCRAFT ENGINES

(1) WARRANTY: Lycoming Engines, a division of Avco Corporation (hereinafter "Lycoming") warrants each new and rebuilt Lycoming reciprocating engine to be free from defect in material or workmanship under normal use and service for a period of twenty-four (24) months or the recommended engine time (hours) between overhauls ("TBO") in accordance with the latest edition of Lycoming Service Instruction 1009, whichever occurs first. Lycoming's sole obligation under this warranty is limited to replacement or repair of parts which are determined by Lycoming to have been defective within the warranty period. The warranty period commences on: (a) the date of first operation after new aircraft delivery to the original retail purchaser or first user; or (b) twenty-four (24) months from the engine ship date from Lycoming, whichever occurs first.

(2) HIGHLY UTILIZED ENGINES / LYCOMING LOYALTY PROGRAM WARRANTY: Additionally, Lycoming also warrants the crankcase, crankshaft, cylinders*, sump, accessory housing and all internally lubricated parts to be free from defects in material or workmanship under normal use and service for an additional twelve (12) month period from the warranty period applicable in (1) above on highly utilized engines that consistently accumulate forty (40) or more flight hours per month. This additional twelve (12) month warranty period is limited to new or rebuilt engines purchased on an exchange basis in accordance with a Lycoming Loyalty program through an Authorized Lycoming distributor.

(3) REMEDY: Within the warranty period, Lycoming may reimburse the purchaser for (a) parts; (b) prorated engine replacement; (c) labor; and (d) freight associated with warranty related issues.

(3)(a): Warranty replacement parts installed on engines which are covered by this New and Rebuilt Engine Warranty will be warranted for the balance of the original engine warranty period. At Lycoming's sole discretion, warranty replacement parts may be either new or reconditioned. A claim for warranty must be reported in writing to an Authorized Lycoming distributor within 30 days of any suspected defect in material or workmanship. Warranty is contingent upon the purchaser complying with the Lycoming Warranty Administration disposition instructions for all parts being returned for warranty evaluation. Lycoming Warranty Administration may require the return of additional components, documents or photographs necessary to evaluate a warranty claim. Failure to comply with all of the terms of this paragraph (3)(a) may, at Lycoming's sole option, void this warranty.

(3)(b): At Lycoming's sole option, Lycoming may elect, on a prorated exchange basis, to replace rather than repair an engine. Warranty reimbursement for a prorated replacement engine will be calculated based on the documented time (hours) on the engine, the recommended engine time (hours) between overhauls ("TBO") in accordance with the latest edition of Lycoming Service Instruction 1009 and the then current published engine list price.
Warranty reimbursement for labor charges in connection with a prorated exchange engine replacement will be calculated based on the documented time (hours) on the engine, the recommended engine time (hours) between overhauls ("TBO") in accordance with the latest edition of Lycoming Service Instruction 1009 and Lycoming's then current Removal and Installation Labor and Allowance Guidebook.

(3)(c): Lycoming will only reimburse the cost of such labor charges in connection with repair or replacement of parts as provided in Lycoming's then current Removal and Installation Labor and Allowance Guidebook.

(3)(d): Lycoming will, in connection with the foregoing warranty, reimburse standard freight charges with respect to any such approved warranty replacement or repair. The use of expedited freight must be pre-approved by Lycoming.

(4) THIS WARRANTY IS GIVEN AND ACCEPTED IN PLACE OF (i) ALL OTHER WARRANTIES OR CONDITIONS, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OR CONDITION OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE AND (ii) ANY OBLIGATION, LIABILITY, RIGHT, CLAIM OR REMEDY IN CONTRACT OR IN TORT (DELICT), INCLUDING PRODUCT LIABILITIES BASED UPON STRICT LIABILITY, NEGLIGENCE, OR IMPLIED WARRANTY IN LAW AND PURCHASER HEREBY WAIVES SUCH RIGHTS AND CLAIMS.

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(5) THIS WARRANTY IS THE ONLY WARRANTY MADE BY LYCOMING. THE PURCHASER'S SOLE REMEDY FOR A BREACH OF THIS WARRANTY OR ANY DEFECT IN A PART IS THE REPAIR OR REPLACEMENT OF ENGINE PARTS AND REIMBURSEMENT OF REASONABLE FREIGHT CHARGES AS PROVIDED HEREIN. LYCOMING DISCLAIMS LIABILITY, WHETHER AS A RESULT OF A BREACH OF CONSEQUENTIAL DAMAGES, INCLUDING, BUT NOT LIMITED TO, DAMAGE TO THE ENGINE OR OTHER PROPERTY (INCLUDING THE AIRCRAFT IN WHICH THE ENGINE IS INSTALLED), COSTS AND EXPENSES RESULTING FROM REQUIRED CHANGES OR MODIFICATIONS TO ENGINE COMPONENTS AND ASSEMBLIES, CHANGES IN RETIREMENT LIVES AND OVERHAUL PERIODS, LOCAL CUSTOMS FEES AND TAXES, AND COSTS OR EXPENSES FOR COMMERCIAL LOSSES OR LOST PROFITS DUE TO LOSS OF USE OR GROUNDING OF THE AIRCRAFT IN WHICH THE ENGINE IS INSTALLED OR OTHERWISE. LYCOMING'S TOTAL LIABILITY FOR ANY AND ALL CLAIMS RELATED TO ANY ENGINE SHALL IN NO CASE EXCEED THE ORIGINAL SALES PRICE OF THE ENGINE. SELLER MAKES NO WARRANTY AND DISCLAIMS ALL LIABILITY WITH RESPECT TO COMPONENTS OR PARTS DAMAGED BY, OR WORN DUE TO, CORROSION.

(6) This warranty shall not apply to any engine or part thereof which has been repaired or altered outside Lycoming's factory in any way so as, in Lycoming's sole judgment, to affect its durability, safety or reliability, or which has been subject to misuse, negligence or accident. Repairs and alterations which use or incorporate parts and components other than genuine Lycoming parts or parts approved by Lycoming for direct acquisition from sources other than Lycoming itself are not warranted by Lycoming, and this warranty shall be void to the extent that such repairs and alterations, in Lycoming's sole judgment, affect the durability, safety or reliability of the engine or any part thereof, or damage genuine Lycoming or Lycoming-approved parts. No person, corporation or organization, including distributors of Lycoming engines, is authorized by Lycoming to assume for it any other liability in connection with the sale of its engines or parts, nor to make any warranties beyond the foregoing warranty nor to change any of the terms hereof. NO STATEMENT, WHETHER WRITTEN OR ORAL, MADE BY ANY PERSON, CORPORATION OR ORGANIZATION, INCLUDING DISTRIBUTORS OF LYCOMING ENGINES, MAY BE TAKEN AS A WARRANTY NOR WILL IT BIND LYCOMING. NO AGREEMENT VARYING THE TERMS OF THIS WARRANTY OR LYCOMING'S OBLIGATIONS UNDER IT IS BINDING UPON LYCOMING UNLESS IN WRITING AND SIGNED BY A DULY AUTHORIZED REPRESENTATIVE OF LYCOMING.

(7) All legal actions based upon claims or disputes pertaining to or involving this warranty including, but not limited to, Lycoming's denial of any claim or portion thereof under this warranty, must be filed in the courts of general jurisdiction of Lycoming County, Commonwealth of Pennsylvania or in the United States District Court for the Middle District of Pennsylvania located in Williamsport, Pennsylvania. In the event that purchaser files such an action in either of the court systems identified above, and a final judgment in Lycoming's favor is rendered by such court, then purchaser shall indemnify Lycoming for all costs, expenses and attorneys' fee incurred by Lycoming in defense of such claims. In the event purchaser files such a legal action in a court other than those specified, and Lycoming successfully obtains dismissal of that action or transfer thereof to the above described court systems, then purchaser shall indemnify Lycoming for all costs, expenses and attorneys' fees incurred by Lycoming in obtaining such dismissal or transfer.

(8) Any invalidity of a provision of this Warranty shall not affect any other provision, and in the event of a judicial finding of such invalidity, this Agreement shall remain in force in all other respects.

*Excludes O-235 series cylinders.

Effective November 2013 Revision "P"

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LYCOMING

WARRANTY

REPLACEMENT PARTS FOR RECIPROCATING AIRCRAFT ENGINES

(1) WARRANTY: Lycoming Engines, a division of Avco Corporation (hereinafter "Lycoming") warrants each reciprocating aircraft engine replacement part to be free from defect in material or workmanship under normal use and service for a period of twelve (12) months or the recommended engine time (hours) between overhauls ("TBO") in accordance with the latest edition of Lycoming Service Instruction 1009, whichever occurs first. Cylinder Kits are warranted for a period of twenty-four (24) months* or the recommended engine time (hours) between overhauls ("TBO") in accordance with the latest edition of Lycoming Service Instruction 1009, whichever occurs first. Lycoming's sole obligation under this warranty is limited to replacement or repair of parts which are determined by Lycoming to have been defective within the warranty period. The warranty period commences on: (a) the date of first operation by the original retail purchaser or first user; or (b) twenty-four (24) months from the date of shipment from Lycoming, whichever occurs first.

(2) REMEDY: Within the warranty period, Lycoming may reimburse the purchaser for (a) parts; (b) labor; and (c) freight associated with warranty related issues.

(2)(a): Warranty replacement parts installed on engines which are covered by this Replacement Parts Warranty will be warranted for the balance of the original warranty period. At Lycoming's sole discretion, warranty replacement parts may be either new or reconditioned. A claim for warranty must be reported in writing to an Authorized Lycoming distributor within 30 days of any suspected defect in material or workmanship. Warranty is contingent upon the purchaser complying with the Lycoming Warranty Administration disposition instructions for all parts being returned for warranty evaluation. Lycoming Warranty Administration may require the return of additional components, documents or photographs necessary to evaluate a warranty claim. Failure to comply with all of the terms of this paragraph (2)(a) may, at Lycoming's sole option, void this warranty.

(2)(b): Labor reimbursement associated with engine, propeller or cowling removal and installation is specifically excluded under this warranty. Lycoming will only reimburse the cost of such labor charges in connection with direct repair or replacement of parts in an engine as provided in Lycoming's then current Removal and Installation Labor and Allowance Guidebook.

(2)(c): Lycoming will, in connection with the foregoing warranty, reimburse standard freight charges with respect to any such approved warranty replacement or repair of a part, to or from, the Lycoming factory or an authorized Lycoming distributor. The use of expedited freight must be pre-approved by Lycoming.

(3)THIS WARRANTY IS GIVEN AND ACCEPTED IN PLACE OF (i) ALL OTHER WARRANTIES OR CONDITIONS, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OR CONDITION OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE AND (ii) ANY OBLIGATION, LIABILITY, RIGHT, CLAIM OR REMEDY IN CONTRACT OR IN TORT (DELICT), INCLUDING PRODUCT LIABILITIES BASED UPON STRICT LIABILITY, NEGLIGENCE, OR IMPLIED WARRANTY IN LAW AND PURCHASER HEREBY WAIVES SUCH RIGHTS AND CLAIMS.

(4) THIS WARRANTY IS THE ONLY WARRANTY MADE BY LYCOMING. THE PURCHASER'S SOLE REMEDY FOR A BREACH OF THIS WARRANTY OR ANY DEFECT IN A PART IS THE REPAIR OR REPLACEMENT OF ENGINE PARTS AND REIMBURSEMENT OF REASONABLE FREIGHT CHARGES AS PROVIDED HEREIN. LYCOMING DISCLAIMS LIABILITY, WHETHER AS A RESULT OF A BREACH OF CONSEQUENTIAL DAMAGES, INCLUDING, BUT NOT LIMITED TO, DAMAGE TO THE ENGINE OR OTHER PROPERTY (INCLUDING THE AIRCRAFT IN WHICH THE ENGINE IS INSTALLED), COSTS AND EXPENSES RESULTING FROM REQUIRED CHANGES OR MODIFICATIONS TO ENGINE COMPONENTS AND ASSEMBLIES, CHANGES IN RETIREMENT LIVES AND OVERHAUL PERIODS, LOCAL CUSTOMS FEES AND TAXES, AND COSTS OR EXPENSES FOR COMMERCIAL LOSSES OR LOST PROFITS DUE TO LOSS OF USE OR GROUNDING OF THE AIRCRAFT IN WHICH THE ENGINE IS INSTALLED OR OTHERWISE. SELLER MAKES NO WARRANTY AND DISCLAIMS ALL LIABILITY WITH RESPECT TO COMPONENTS OR PARTS DAMAGED BY, OR WORN DUE TO, CORROSION.

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(5) This warranty shall not apply to any engine or part thereof which has been repaired or altered outside Lycoming's factory in any way so as, in Lycoming's sole judgment, to affect its durability, safety or reliability, or which has been subject to misuse, negligence or accident. Repairs and alterations which use or incorporate parts and components other than genuine Lycoming parts or parts approved by Lycoming for direct acquisition from sources other than Lycoming itself are not warranted by Lycoming, and this warranty shall be void to the extent that such repairs and alterations, in Lycoming's sole judgment, affect the durability, safety or reliability of the engine or any part thereof, or damage genuine Lycoming or Lycoming-approved parts. No person, corporation or organization, including Distributors of Lycoming engines, is authorized by Lycoming to assume for it any other liability in connection with the sale of its engines or parts, nor to make any warranties beyond the foregoing warranty nor to change any of the terms hereof. NO STATEMENT, WHETHER WRITTEN OR ORAL, MADE BY ANY PERSON, CORPORATION OR ORGANIZATION, INCLUDING DISTRIBUTORS OF LYCOMING ENGINES, MAY BE TAKEN AS A WARRANTY NOR WILL IT BIND LYCOMING. NO AGREEMENT VARYING THE TERMS OF THIS WARRANTY OR LYCOMING'S OBLIGATIONS UNDER IT IS BINDING UPON LYCOMING UNLESS IN WRITING AND SIGNED BY A DULY AUTHORIZED REPRESENTATIVE OF LYCOMING.

(6) All legal actions based upon claims or disputes pertaining to or involving this warranty including, but not limited to, Lycoming's denial of any claim or portion thereof under this warranty, must be filed in the courts of general jurisdiction of Lycoming County, Commonwealth of Pennsylvania or in the United States District Court for the Middle District of Pennsylvania located in Williamsport, Pennsylvania. In the event that purchaser files such an action in either of the court systems identified above, and a final judgment in Lycoming's favor is rendered by such court, then purchaser shall indemnify Lycoming for all costs, expenses and attorneys' fee incurred by Lycoming in defense of such claims. In the event purchaser files such a legal action in a court other than those specified, and Lycoming successfully obtains dismissal of that action or transfer thereof to the above described court systems, then purchaser shall indemnify Lycoming for all costs, expenses and attorneys' fees incurred by Lycoming in obtaining such dismissal or transfer.

(7) Any invalidity of a provision of this Warranty shall not affect any other provision, and in the event of a judicial finding of such invalidity, this Agreement shall remain in force in all other respects.

*O-235 series Cylinder Kits are warranted for a period of twelve (12) months or the recommended engine time (hours) between overhauls ("TBO") in accordance with the latest edition of Lycoming Service Instruction 1009, whichever occurs first.

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LYCOMING

WARRANTY

OVERHAULED RECIPROCATING AIRCRAFT ENGINES

(1) WARRANTY: Lycoming Engines, a division of Avco Corporation (hereinafter "Lycoming") warrants each overhauled Lycoming reciprocating engine to be free from defect in material or workmanship under normal use and service for a period of twelve (12) months or the recommended engine time (hours) between overhauls ("TBO") in accordance with the latest edition of Lycoming Service Instruction 1009, whichever occurs first. Lycoming's sole obligation under this warranty is limited to replacement or repair of parts which are determined by Lycoming to have been defective within the warranty period. The warranty period commences on: (a) the date of first operation after new aircraft delivery to the original retail purchaser or first user; or (b) twenty-four (24) months from the engine ship date from Lycoming, whichever occurs first.

(2) HIGHLY UTILIZED ENGINES / LYCOMING LOYALTY PROGRAM WARRANTY: Additionally, Lycoming also warrants the crankcase, crankshaft, cylinders*, sump, accessory housing and all internally lubricated parts to be free from defects in material or workmanship under normal use and service for an additional twelve (12) month period from the warranty period applicable in (1) above on highly utilized engines that consistently accumulate forty (40) or more flight hours per month. This additional twelve (12) month warranty period is limited to overhauled engines purchased on an exchange basis in accordance with a Lycoming Loyalty program through an Authorized Lycoming distributor.

(3) REMEDY: Within the warranty period, Lycoming may reimburse the purchaser for (a) parts; (b) prorated engine replacement; (c) labor; and (d) freight associated with warranty related issues.

(3)(a): Warranty replacement parts installed on engines which are covered by this Overhauled Engine Warranty will be warranted for the balance of the original engine warranty period. At Lycoming's sole discretion, warranty replacement parts may be either new or reconditioned. A claim for warranty must be reported in writing to an Authorized Lycoming distributor within 30 days of any suspected defect in material or workmanship. Warranty is contingent upon the purchaser complying with the Lycoming Warranty Administration disposition instructions for all parts being returned for warranty evaluation. Lycoming Warranty Administration may require the return of additional components, documents or photographs necessary to evaluate a warranty claim. Failure to comply with all of the terms of this paragraph (3)(a) may, at Lycoming's sole option, void this warranty.

(3)(b): At Lycoming's sole option, Lycoming may elect, on a prorated exchange basis, to replace rather than repair an engine. Warranty reimbursement for a prorated replacement engine will be calculated based on the documented time (hours) on the engine, the recommended engine time (hours) between overhauls ("TBO") in accordance with the latest edition of Lycoming Service Instruction 1009 and the then current published engine list price.
Warranty reimbursement for labor charges in connection with a prorated exchange engine replacement will be calculated based on the documented time (hours) on the engine, the recommended engine time (hours) between overhauls ("TBO") in accordance with the latest edition of Lycoming Service Instruction 1009 and Lycoming's then current Removal and Installation Labor and Allowance Guidebook.

(3)(c): Lycoming will only reimburse the cost of such labor charges in connection with repair or replacement of parts as provided in Lycoming's then current Removal and Installation Labor and Allowance Guidebook.

(3)(d): Lycoming will, in connection with the foregoing warranty, reimburse standard freight charges with respect to any such approved warranty replacement or repair. The use of expedited freight must be pre-approved by Lycoming.

(4) THIS WARRANTY IS GIVEN AND ACCEPTED IN PLACE OF (i) ALL OTHER WARRANTIES OR CONDITIONS, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OR CONDITION OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE AND (ii) ANY OBLIGATION, LIABILITY, RIGHT, CLAIM OR REMEDY IN CONTRACT OR IN TORT (DELICT), INCLUDING PRODUCT LIABILITIES BASED UPON STRICT LIABILITY, NEGLIGENCE, OR IMPLIED WARRANTY IN LAW AND PURCHASER HEREBY WAIVES SUCH RIGHTS AND CLAIMS.

LYCOMING

(5) THIS WARRANTY IS THE ONLY WARRANTY MADE BY LYCOMING. THE PURCHASER'S SOLE REMEDY FOR A BREACH OF THIS WARRANTY OR ANY DEFECT IN A PART IS THE REPAIR OR REPLACEMENT OF ENGINE PARTS AND REIMBURSEMENT OF REASONABLE FREIGHT CHARGES AS PROVIDED HEREIN. LYCOMING DISCLAIMS LIABILITY, WHETHER AS A RESULT OF A BREACH OF CONSEQUENTIAL DAMAGES, INCLUDING, BUT NOT LIMITED TO, DAMAGE TO THE ENGINE OR OTHER PROPERTY (INCLUDING THE AIRCRAFT IN WHICH THE ENGINE IS INSTALLED), COSTS AND EXPENSES RESULTING FROM REQUIRED CHANGES OR MODIFICATIONS TO ENGINE COMPONENTS AND ASSEMBLIES, CHANGES IN RETIREMENT LIVES AND OVERHAUL PERIODS, LOCAL CUSTOMS FEES AND TAXES, AND COSTS OR EXPENSES FOR COMMERCIAL LOSSES OR LOST PROFITS DUE TO LOSS OF USE OR GROUNDING OF THE AIRCRAFT IN WHICH THE ENGINE IS INSTALLED OR OTHERWISE. LYCOMING'S TOTAL LIABILITY FOR ANY AND ALL CLAIMS RELATED TO ANY ENGINE SHALL IN NO CASE EXCEED THE ORIGINAL SALES PRICE OF THE ENGINE. SELLER MAKES NO WARRANTY AND DISCLAIMS ALL LIABILITY WITH RESPECT TO COMPONENTS OR PARTS DAMAGED BY, OR WORN DUE TO, CORROSION.

(6) This warranty shall not apply to any engine or part thereof which has been repaired or altered outside Lycoming's factory in any way so as, in Lycoming's sole judgment, to affect its durability, safety or reliability, or which has been subject to misuse, negligence or accident. Repairs and alterations which use or incorporate parts and components other than genuine Lycoming parts or parts approved by Lycoming for direct acquisition from sources other than Lycoming itself are not warranted by Lycoming, and this warranty shall be void to the extent that such repairs and alterations, in Lycoming's sole judgment, affect the durability, safety or reliability of the engine or any part thereof, or damage genuine Lycoming or Lycoming-approved parts. No person, corporation or organization, including Distributors of Lycoming engines, is authorized by Lycoming to assume for it any other liability in connection with the sale of its engines or parts, nor to make any warranties beyond the foregoing warranty nor to change any of the terms hereof. NO STATEMENT, WHETHER WRITTEN OR ORAL, MADE BY ANY PERSON, CORPORATION OR ORGANIZATION, INCLUDING DISTRIBUTORS OF LYCOMING ENGINES, MAY BE TAKEN AS A WARRANTY NOR WILL IT BIND LYCOMING. NO AGREEMENT VARYING THE TERMS OF THIS WARRANTY OR LYCOMING'S OBLIGATIONS UNDER IT IS BINDING UPON LYCOMING UNLESS IN WRITING AND SIGNED BY A DULY AUTHORIZED REPRESENTATIVE OF LYCOMING.

(7) All legal actions based upon claims or disputes pertaining to or involving this warranty including, but not limited to, Lycoming's denial of any claim or portion thereof under this warranty, must be filed in the courts of general jurisdiction of Lycoming County, Commonwealth of Pennsylvania or in the United States District Court for the Middle District of Pennsylvania located in Williamsport, Pennsylvania. In the event that Purchaser files such an action in either of the court systems identified above, and a final judgment in Lycoming's favor is rendered by such court, then Purchaser shall indemnify Lycoming for all costs, expenses and attorneys' fee incurred by Lycoming in defense of such claims. In the event Purchaser files such a legal action in a court other than those specified, and Lycoming successfully obtains dismissal of that action or transfer thereof to the above described court systems, then Purchaser shall indemnify Lycoming for all costs, expenses and attorneys' fees incurred by Lycoming in obtaining such dismissal or transfer.

(8) Any invalidity of a provision of this Warranty shall not affect any other provision, and in the event of a judicial finding of such invalidity, this Agreement shall remain in force in all other respects.

*Excludes O-235 series cylinders.

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LYCOMING OPERATION AND INSTALLATION MANUAL

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SECTION I

PART 1
DESCRIPTION

The AEIO-580-B1A is a direct drive, six cylinder, fuel injected, horizontally opposed, air cooled engine. Although similar to the Lycoming IO-580 engine, the AEIO-580 aerobatic series differs in respect to the sump and the inverted oil system. It uses the same power section as the AEIO-540, but the AEIO-580 delivers enhanced hot/high performance and better climb.

In this manual all references to locations of various components will be designated when viewing the engine from the rear (anti-propeller). Thus the propeller end is considered the front and the accessory drive end the rear. The sump section is considered the bottom and the opposite side of the engine where the shroud tubes are located is the top. Reference to the left and right side is made with the observer facing the rear of the engine. The cylinders are numbered from front to rear, odd numbers on the right, even numbers on the left. The direction of rotation for accessory drives is determined with the observer facing the drive pad. The direction of rotation of the crankshaft, viewed from the rear, is clockwise.

Cylinders – The cylinders are of conventional air-cooled construction with the two major parts, head and barrel, screwed and shrunk together. The heads are made from an aluminum alloy casting with a fully machined combustion chamber. Rocker shaft bearing supports are integral with the head along with housings to form the rocker boxes for both valve rockers. The cylinder barrels, which are machined from chrome nickel molybdenum steel forgings, have deep integral cooling fins and the inside of the barrels are ground and honed to a specified finish.

Valve Operating Mechanism – A conventional type camshaft is located above and parallel to the crankshaft. The camshaft actuates hydraulic tappets which operate the valves through push rods and valve rockers. The valve rockers are supported on full-floating steel shafts. The valve springs bear against hardened steel seats and are retained on the valve stems by means of split keys.

Crankcase – The crankcase assembly consists of two reinforced aluminum alloy castings, fastened together by means of studs, bolts, and nuts. The mating surfaces of the two castings are joined without the use of a gasket, and the main bearing bores are machined for use of precision type main bearing inserts.

Crankshaft – The crankshaft is made from a chrome nickel molybdenum steel forging. All bearing journal surfaces are nitride hardened.

Connecting Rods – The connecting rods are made in the form of “H” sections from alloy steel forgings. They have replaceable bearing inserts in the crankshaft ends and bronze bushings in the piston ends. The bearing caps on the crankshaft ends are retained by two bolts and nuts through each cap.

Pistons – The pistons are machined from an aluminum alloy forging. The piston pin is a full floating type with a plug located in each end of the pin. The pistons are machined for three rings and may employ either half-wedge or full-wedge rings.

Accessory Housing – The accessory housing is made from an aluminum casting fastened to the rear of the crankcase and the top rear of the sump. It forms a housing for the oil pump and the various accessory drives.

Oil Sump – Besides the usual oil drain plug and injector mounting pad, the sump is further modified by having a plug installed in the oil suction screen hole. (See paragraph on Lubrication System for explanation.) On the opposite side of the sump from the oil drain plug a fitting is provided for oil return. The conventional intake riser and intake pipe connectors are also incorporated in the sump.

Cooling System – This engine is designed to be cooled by air pressure. Baffles are provided to build up a pressure and force the air through the cylinder fins. The air is then exhausted to the atmosphere through gills or augmenter tubes usually located at the rear of the cowling.

Induction System – Lycoming AEIO-580-B1A engines are equipped with a Precision Airmotive RSA type fuel injection system. The system is based on the principle of measuring air flow and using the air flow signal in a stem type regulator to convert the air force of the air into a corresponding fuel force. This fuel force (fuel pressure differential) applied across the fuel metering section (jet system) makes fuel flow proportional to air flow. A manual mixture control and idle cut-off are provided. Particularly good distribution of the fuel-air mixture is obtained through the center zone induction system, which is integral with the oil sump and is submerged in the oil and aids in cooling the oil in the sump. From the riser, distribution to each cylinder is by individual intake pipes. Fuel vaporization takes place at the intake ports.

Lubrication System – The lubrication system is of the pressure wet sump type. The main bearings, connecting rod bearings, camshaft bearings, valve tappets, push rods and crankshaft idler gears are lubricated by means of oil collectors and spray. The oil pump, which is located in the accessory housing, draws oil through a drilled passage leading from the oil suction screen located in the sump. The oil from the pump then enters a drilled passage in the accessory housing, where a flexible line leads the oil to the external oil cooler. In the event that cold oil or an obstruction should restrict the flow of oil to the cooler, an oil cooler bypass valve is provided. Pressure oil from the cooler returns to a second threaded connection on the accessory housing from which point a drilled passage conducts the oil to the oil pressure screen, which is installed in a cast chamber located on the accessory housing below the tachometer drive.

The oil pressure screen is provided to filter from the oil any solid particles that may have passed through the suction screen in the sump. After being filtered in the pressure screen chamber, the oil is fed through a drilled passage to the oil relief valve, located in the upper right side of the crankcase in the front of the accessory housing.

This relief valve regulates the engine oil pressure by allowing excessive oil to return to the sump, while the balance of the pressure oil is fed to the main oil gallery in the right half of the crankcase. During its travel through this main gallery, the oil is distributed by means of separate drilled passages to the main bearings of the crankshaft. Separate passages from the rear main bearings supply pressure oil to both crankshaft idler gears. Angular holes are drilled through the main bearings to the rod journals. Oil from the main oil gallery also flows to the cam and the valve gear passages, and is then conducted through branch passages to the roller tappets and camshaft bearings. Oil enters the tappets through indexing holes and travels out through the hollow push rods to the valve mechanism, lubricating the valve rocker bearings and valve stems. Residual oil from the bearings, accessory drives and the rocker boxes is returned by gravity to the sump. From the sump, oil is conducted to the oil valve (which is part of the inverted oil system) and from there to the oil suction screen in the sump.

The lubrication system of this engine differs from conventional models in that the hole in the front of the oil suction screen housing is plugged, preventing passage of the oil from the sump to the screen housing. Instead, oil from the sump is supplied to the screen housing by way of the oil valve which is connected by a hose to the rear of the oil screen housing. The breather port, in the top of the engine is connected to the oil separator which permits entrapped oil to return to the sump. For mechanical details of the inverted oil system see Section 3.

Magnetos – This engine is equipped with two magnetos, a plain type on the right side and a retard type on the left. The direction of rotation for the magneto shafts is clockwise. The engine firing order is 1-4-5-2-3-6 and the spark advance is 20°.

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SECTION I

PART 2
SPECIFICATIONS

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SECTION I

PART 2
SPECIFICATIONS

1. SPECIFICATIONS.

Model Designation.....AEIO-580-B1A
FAA Type Certificate E00004NY
Rated horsepower 315
Rated speed, RPM 2700
Bore, inches 5.319
Stroke, inches 4.375
Displacement, cubic inches 583
Compression ratio 8.9:1
Firing order 1-4-5-2-3-6
Spark occurs, degrees BTC .....20°
Valve rocker clearance (hydraulic tappets collapsed) 028-.080
Prop. drive ratio 1:1
Prop. driven rotation ..... Clockwise

2. Standard Engine, Dry Weight (Includes all engine accessories except alternator.)

AEIO-580-B1A .....446 lbs.

3. Moments of Inertia (Standard Dry Weight, all)

About the axis parallel to the crankshaft centerline (Ixg).....84.4 in. lb. sec²
About the vertical axis (Izg) .....145.8 in. lb. sec²
About the axis parallel to the centerline (Iyg) .....93.5 in. lb. sec²

4. Accessory Drives

*Accessory Drive	Drive Ratio	**Direction of Rotation
Starter	16.556:1	Counter-Clockwise
Hydraulic Pump	1.385:1	Clockwise
Tachometer	.500:1	Clockwise
Propeller Governor	.947:1	Clockwise
Magneto Drive	1.500:1	Clockwise
Fuel Pump – AN (Gear Driven)	1.000:1	Counter-Clockwise

* - When applicable.
** - Viewed facing drive pad.

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SECTION I

PART 3
OPERATING INSTRUCTIONS

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SECTION I

PART 3
OPERATING INSTRUCTIONS

1. GENERAL.

Close adherence to these instructions will greatly contribute to the long life, economy and satisfactory operation of the engine.

NOTE

YOUR ATTENTION IS DIRECTED TO THE WARRANTIES THAT APPEAR IN THE FRONT OF THIS MANUAL REGARDING ENGINE SPEED, THE USE OF SPECIFIED FUELS AND LUBRICANTS, REPAIRS AND ALTERATIONS. PERHAPS NO OTHER ITEM OF ENGINE OPERATION AND MAINTENANCE CONTRIBUTES QUITE SO MUCH TO SATISFACTORY PERFORMANCE AND LONG LIFE AS THE CONSTANT USE OF CORRECT GRADES OF FUEL AND OIL, CORRECT ENGINE TIMING, AND FLYING THE AIRCRAFT AT ALL TIMES WITHIN THE SPEED AND POWER RANGE SPECIFIED FOR THE ENGINE. DO NOT FORGET THAT VIOLATION OF THE OPERATION AND MAINTENANCE SPECIFICATIONS FOR YOUR ENGINE WILL NOT ONLY VOID YOUR WARRANTY BUT WILL SHORTEN THE LIFE OF YOUR ENGINE AFTER ITS WARRANTY PERIOD HAS PASSED.

New engines have been carefully run-in by Lycoming and therefore, no further break-in is necessary insofar as operation is concerned; however, new or newly overhauled engines should be operated using only the recommended lubricating oils. Refer to Oil Requirements, Section 8.d.

NOTE

Cruising should be done at 65% to 75% power until a total of 50 hours has been accumulated or the oil consumption has stabilized. This is to insure the proper seating of the rings as is applicable to new engines and engines in service following cylinder replacement or top overhaul of one or more cylinders.

The minimum fuel octane rating is listed in the flight chart, Part 9 of this section. Under no circumstances should fuel of a lower octane rating or automotive fuel (regardless of octane rating) be used.

2. PRESTARTING ITEMS OF MAINTENANCE.

Before starting the aircraft engines for the first flight of the day, the following items of maintenance inspection should be performed in conjunction with the aircraft Pilot's Operating Handbook preflight check.

CAUTION

DO NOT START ANY AEIO SERIES ENGINE THAT DOES NOT HAVE THE INVERTED OIL SYSTEM INSTALLED; TO DO SO WILL CAUSE ENGINE DAMAGE BECAUSE OF OIL STARVATION.

(a) Be sure all switches are in the “Off” position.

(b) Be sure magneto ground wires are connected.

(c) Check oil level.

(d) Check fuel level.

(e) Check fuel and oil line connections, note minor indications for repair at 50 hour inspection. Repair any leaks before aircraft is flown.

(f) Open the fuel drain to remove any accumulation of water and sediment.

(g) Make sure all shields and cowling are in place and secure. If any are missing or damaged, repair or replace before the aircraft is flown.

(h) Check engine controls for general condition, travel and freedom of operation.

(i) Inspect and service the induction system air filter in accordance with the airframe manufacturer’s recommendations.

3 STARTING PROCEDURES.

The following starting procedures are recommended; however, the starting characteristics of various installations will necessitate some variation from these procedures.

NOTE

Limit the cranking periods from ten (10) to twelve (12) seconds with 5 minutes rest between cranking periods.

(a) *Cold Engine.*

(1) Perform pre-flight inspection.

(2) Set alternate air control in “off” position.

(3) Set propeller governor in “Full RPM”.

(4) Turn fuel valve to “on” position.

(5) Open throttle approximately ¼ inch travel.

(6) Turn boost pump on and move mixture control to “Full Rich” position until a slight but steady flow is indicated.

(7) Return mixture control to “Idle Cut-Off” position.

(8) Set magneto selector switch. Consult aircraft manufacturer’s handbook for correct position.

(9) Engage starter.

(10) When engine starts, place magneto selector switch in "Both" position.

(11) Move mixture control slowly and smoothly to "Full Rich".

(12) Check oil pressure gage for indicated pressure. If minimum is not indicated within thirty seconds, stop the engine and determine trouble.

NOTE

If engine fails to achieve a normal start, assume it to be flooded. Crank engine over with throttle wide open and ignition off. Then repeat above procedure.

Hot Engine – Because fuel percolates, the system must be cleared of vapor; it is recommended that the same procedure, as outlined above be used for starting a hot engine.

4. COLD WEATHER STARTING. In very cold weather it is important to use the proper viscosity engine oil and to run the engine sufficiently long to bring the engine oil to the normal operating temperature. Cold oil will not circulate well in cold lines and other engine parts, so the flow of oil from an engine sump through the external hoses, valve and fittings of the inverted oil system will be severely impeded until the oil, the engine and all external system parts are warmed up. Once the engine oil itself is warm, fly the aircraft inverted for an extended period to allow the oil to warm up the oil separator and associated external lines. When all system components are warm, the system function and oil pressure should be normal. It may be necessary in some very cold areas to modify or partially bypass the engine oil cooling system to keep the oil at normal operating temperature.

5. GROUND RUNNING AND WARM-UP.

Subject engines are air pressure cooled and depend on the forward movement of the aircraft to maintain proper cooling. Particular care is necessary, therefore, when operating these engines on the ground. To prevent overheating, it is recommended that the following precautions be observed.

NOTE

Any ground check that requires full throttle operation must be limited to three minutes, or less if indicated cylinder head temperature should exceed the maximum stated in this manual.

(a) Head the aircraft into the wind.

(b) Leave mixture in "Full Rich".

(c) Operate the engine on the ground only with the propeller in minimum blade angle setting.

(d) Warm up at approximately 1000-1200 RPM. Avoid prolonged idling and do not exceed 2200 RPM on the ground.

(e) Engine is warm enough for take-off when the throttle can be opened without the engine faltering. If indicated lubricating oil pressure due to cold temperature is above maximum, do not take-off with turbocharged engines. Excessive oil pressure can cause over boost and consequent engine damage.

(f) In these aerobatic engines, the oil flow path from the engine sump to the engine oil pump is much longer than it is on an engine without an inverted flight oil system. As a result, there is a greater resistance to the flow of oil to the pump, and a so-called “pressure drop” effect occurs. This condition varies with the viscosity of the engine oil, the arrangement of hoses and fittings in the system, and the size of the engine. Since oil viscosity varies with temperature, oil pressure change with increasing engine oil temperature will be different in these engines than it is in a non-aerobatic engine. When a conventional engine is cold, oil pressure is normally high and it falls to the recommended operating range as the engine warms up. In these aerobatic engines, cold and high viscous oil lowers oil pressure due to the pressure drop effect, and the pressure rises to the recommended operating range as the engine warms up. In some cases, there is a balance between the pressure drop effect and the change of oil viscosity and temperature, and no oil pressure change occurs as oil temperature changes. This depends on the particular engine characteristics and the oil system arrangement.

6. GROUND CHECK.

(a) Warm up as directed above.

(b) Check that both oil pressure and oil temperature are within prescribed limits.

(c) Leave mixture in “Full Rich”.

(d) (Where applicable) Move the propeller control through its complete range to check operation and return to full low pitch position. Full feathering check (twin engine) on the ground is not recommended but the feathering action can be checked by running the engine between 1000-1500 RPM; then momentarily pulling the propeller control into the feathering position. Do not allow the RPM to drop more than 500 RPM.

(e) A proper magneto check is important. Additional factors, other than the ignition system, affect magneto drop-off. They are load-power output, propeller pitch and mixture strength. The important thing is that the engine runs smoothly because magneto drop-off is affected by the variables listed above. Make the magneto check in accordance with the following procedures.

(1) (Controllable Pitch Propeller) With propeller in minimum pitch angle, set the engine to produce 50-65% power as indicated by the manifold pressure gage unless specified in the aircraft manufacturer’s manual. Set the manufacture control to the full rich position. At these settings, the ignition system and spark plugs must work harder because of the greater pressure within the cylinders. Under these conditions, ignition problems can occur. Mag checks at low power settings will only indicate fuel-air distribution quality.

NOTE

Aircraft that are equipped with fixed pitch propellers, or not equipped with manifold pressure gage, may check magneto drop-off with engine operating at a maximum of 2000/2100 RPM.

(2) Switch from both magnetos to one and note drop-off; return to both until engine regains speed and switch to the other magneto and note drop-off, then return to both. Drop-off must not exceed 175 RPM and must not exceed 50 RPM between magnetos. A smooth drop-off past normal is usually a sign of a too lean or too rich mixture.

(f) Do not operate on a single magneto for too long a period; a few seconds is usually sufficient to check drop-off and will minimize plug fouling.

7. OPERATING IN FLIGHT.

(a) Subject engines are equipped with a dynamic counterweight system and must be operated accordingly. Use a smooth, steady movement (avoid rapid opening and closing) of the throttle.

(b) See airframe manufacturer's instructions for recommended power settings.

(c) *Oil Pressure Indication* – It is normal for oil pressure to "flicker" momentarily from 10 to 30 psi when transitioning from upright to inverted flight. This "flicker" should last about a second, and oil pressure in the inverted flight attitude should be the same as in the upright flight attitude. (Some engines have a restricted orifice fitting at the oil pressure port to prevent major loss of oil in the event of an oil pressure line failure. This restrictor dampens the oil pressure gauge reaction to oil pressure change, and causes the gauge to lag actual pressure substantially.) The normal "flicker" of the oil pressure when transitioning from upright to inverted flight and vice versa may become a prolonged pressure change indication lasting up to four or five seconds in engines with the restricted orifice fitting. Remember that this is an oil pressure gauge phenomenon and not an indication that the oil system is not functioning properly. A slow rather than "flicker-like" change of pressure when no restrictor is present does indicate an oil system problem. When this occurs, thoroughly check the system.

(d) *Momentary Loss of Oil Pressure* –

(1) Oil pressure may be interrupted momentarily in certain aircraft attitudes or during certain combinations of maneuvers. These attitudes and maneuver combinations are generally of the type which can only be maintained for short periods of time, so there is no serious effect on engine performance. The effect is normal and is not to be construed as a system malfunction.

(2) The main cause of momentary loss of oil pressure is that in certain attitudes, the oil in the sump (or at the top of the crankcase during inverted flight) is placed so that it cannot be drawn into the oil pickup line (or breather line, for inverted flight). For example, during a vertical or steep inverted dive the engine oil will fall to the front or top-front of the engine so that neither the breather line nor the oil feed line at the sump has an available supply of oil.

(3) A secondary cause of oil pressure loss is that conditions may occur which result in uncertain closure of the ball valves in the oil valve. For example, if an abrupt entry into knife-edge flight is made from a zero-g condition, it is possible for both balls in the oil valve to be jarred from their proper positions, with a resultant interruption in oil flow in the oil pickup line.

(4) Oil pressure is usually maintained by the existing oil in the oil feed line for a short period of time after the oil supply is interrupted in some aerobatic attitudes. These effects vary depending on the engine type, quantity of oil in the engine, and the design of the particular installation.

CAUTION

DO NOT FLY FOR MORE THAN TEN SECONDS IN THE FOLLOWING ATTITUDES:
1. *VERTICAL FLIGHT, STEEP DIVE.*
2. *INVERTED FLIGHT, STEEP DIVE.*
3. *ZERO-G PERIODS.*
4. *WING-DOWN OR KNIFE-EDGE FLIGHTS.*

IN THESE MODES THE OIL SYSTEM WILL NOT SCAVENGE AND ENGINE DAMAGE CAN OCCUR. NORMALLY OIL PRESSURE WILL "FLICKER" FROM 10 TO 30 PSI WHEN TRANSITIONING FROM UPRIGHT TO INVERTED FLIGHT; HOWEVER, RETURN IMMEDIATELY TO NORMAL ATTITUDE ANYTIME OIL PRESSURE DROPS 20 PSI BELOW NORMAL.

(e) *Oil Loss from Unusual Maneuvers –*

(1) If the system is functioning properly, only very small losses from normal oil level will occur.

(2) Certain uncommon aerobatic maneuvers, if performed for an extended period of time or in rapid repetitive sequences, may result in abnormal oil losses. For example, if any aircraft performs a lengthy series of vertical roll-type maneuvers in rapid succession, from inverted flight entry and with inverted recovery, oil which accumulates in the oil separator has no opportunity to return to the engine sump. As a result, the oil eventually flows overboard through the breather line. Such a series of maneuvers would be performed rarely, and then only in unusual competition practice and not in competition sequence. The oil loss problem in such practice can be eliminated simply by bringing the aircraft to the normal upright attitude occasionally to allow oil accumulated in the oil separator to return to the engine sump.

8. *FUEL MIXTURE LEANING PROCEDURE.*

Improper fuel/air mixture during flight is responsible for many engine problems, particularly during take-off and climb power settings. The procedures described in this manual provide proper fuel/air mixture when leaning Lycoming engines; they have proven to be both economical and practical by eliminating excessive fuel consumption and reducing damaged parts replacement. It is therefore recommended that operators, of all Lycoming aircraft power-plants, utilize the instructions in this publication any time the fuel/air mixture is adjusted during flight.

Manual leaning may be monitored by exhaust gas temperature indication, fuel flow indication, and by observation of engine speed and/or airspeed. However, whatever instruments are used in leaning the mixture, observe the following general rules.

GENERAL LEANING RULES

Never exceed the maximum red line cylinder head temperature limit.

For maximum service life, cylinder head temperatures must be maintained below 450°F. (232°C.) during high performance cruise operation and below 435°F. (224°C.) for economy cruise powers.

On engines with manual mixture control, maintain mixture control in "Full Rich" position for rated take-off, climb and maximum cruise powers (above approximately 75%). However, during take-off from a high elevation airport or during climb, roughness or loss of power may result from over-richness. In such a case adjust the mixture control only enough to obtain smooth operation – not for economy. Observe instruments for temperature rise. Rough operation due to over-rich fuel/air mixture is most likely to be encountered at altitudes above 5,000 feet.

Always return the mixture to full rich before increasing power settings.

Operate the engine at maximum power mixture for performance cruise powers and at best economy mixture for economy cruise power; unless otherwise specified in the airplane owners manual.

During let-down flight operations it may be necessary to manually lean engines to obtain smooth operation.

(a) Leaning to Exhaust Gas Temperature.

(1) *Maximum Power Cruise (approximately 75% power)* – Never lean beyond 150°F. on rich side of peak EGT unless aircraft operator's manual shows otherwise. Monitor cylinder head temperatures.

(2) *Best Economy Cruise (approximately 75% power and below)* – Operate at peak EGT.

(b) Leaning to Flowmeter.

Lean to applicable fuel-flow tables or lean to indicator marked for correct fuel-flow for each power setting.

(c) LEANING WITH MANUAL MIXTURE CONTROL. (Economy Cruise, 75% power or less) without flowmeter or EGT gage.)

(1) Slowly move mixture control from "Full Rich" position toward lean position.

(2) Continue leaning until slight loss of power is noted (loss of power may or may not be accomplished by roughness).

(3) Enrich until engine runs smoothly and power is regained.

9. ENGINE FLIGHT CHART.

(a) Fuel Requirements.

*100/100LL Octane, Minimum Aviation Grade Fuel

NOTE

Aviation grade 100LL fuels in which the lead content is limited to 2 c.c. per gal. are approved for continuous use.

(b) Fuel Pressure, psi

	Min.	Max.	Idle Min.
Inlet to fuel pump	-2	65	
Inlet to fuel injector	29	65	12

(c) Oil Requirements

Average Ambient Air	*Recommended Grade Oil MIL-L-6082B or SAEJ1966 Spec. Mineral Grades Grades	 MIL-L-22851 or SAEJ1899 Spec. Ashless Dispersant Grades
All Temperatures	---	SAE15W50 or SAE20W-50
Above 80°F.	SAE 60	SAE60
Above 60°F.	SAE 50	SAE40 or SAE50
30°F. to 90°F.	SAE 40	SAE40
0°F. to 70°F.	SAE 30	SAE30, SAE40, SAE20W40
Below 10°F.	SAE 20	SAE30 or SAE20W-30

* - In new, newly overhauled, or rebuilt engines or following the replacement of one or more cylinders, use only mineral oil during the first 50 hours of operation.

(d) Oil Sump Capacity

AEIO-580-B1A .....16 U.S. Qts.
(Minimum safe quantity in sump) .....8 U.S. Qts.*

* - Minimum safe quantity of oil in sump for 37° nose up and 25° nose down is 9 quarts.

(e) Oil Pressure, psi

	Maximum	Minimum	Idling	Start and Warm-up
Normal Operation	95	55	25	115

(f) Oil Temperature: The maximum permissible oil temperature is 245°F. (118°C.). For maximum engine life, maintain the oil temperature between 165°F. (74°C.) and 200°F. (93°C.) in level-flight cruise conditions.

(g) Fuel and Oil Consumption

Operation	RPM	HP	Fuel Cons. Gal/Hr.	Max. Oil Cons. Qts./Hr.	*Max. Cyl. Head Temp.
Normal Rated	2700	315	----	1.0	465°F. (241°C.)
Performance Cruise (75% Rated)	2400	240	20.4	0.75	465°F. (241°C.)
Economy Cruise (60% Rated)	2200	192	14.0	0.60	465°F. (241°C.)

* - At Bayonet Location – For maximum service life of the engine maintain cylinder head temperatures between 150°F. and 435°F. during continuous operation.

10. ENGINE SHUT DOWN.

(a) Set propeller at minimum blade angle.

(b) Idle until there is a decided decrease in cylinder head temperature.

(c) Move mixture control to “Idle Cut-Off”.

(d) When engine stops, turn ignition switch off.

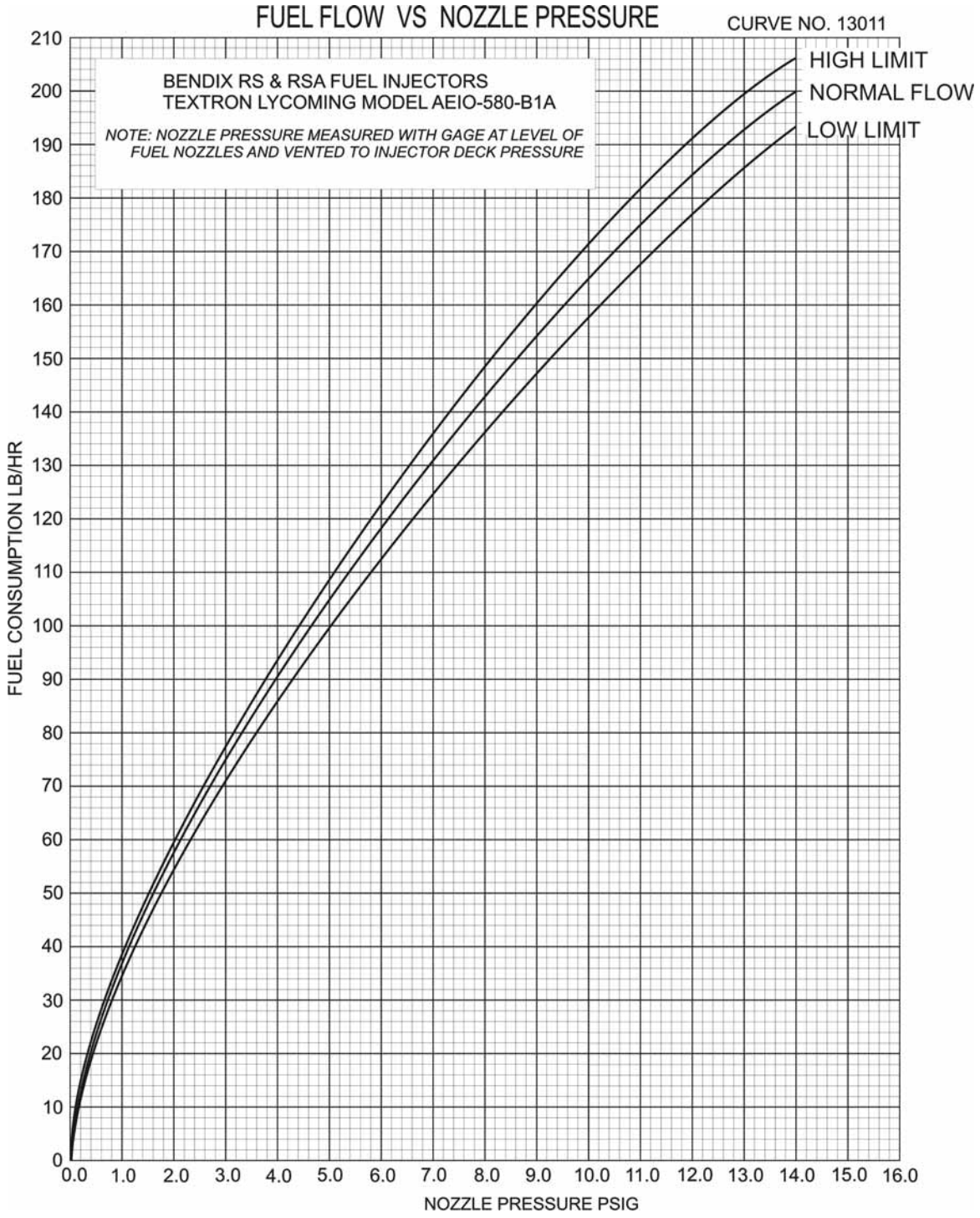

Figure 3-1. Part Throttle Fuel Consumption

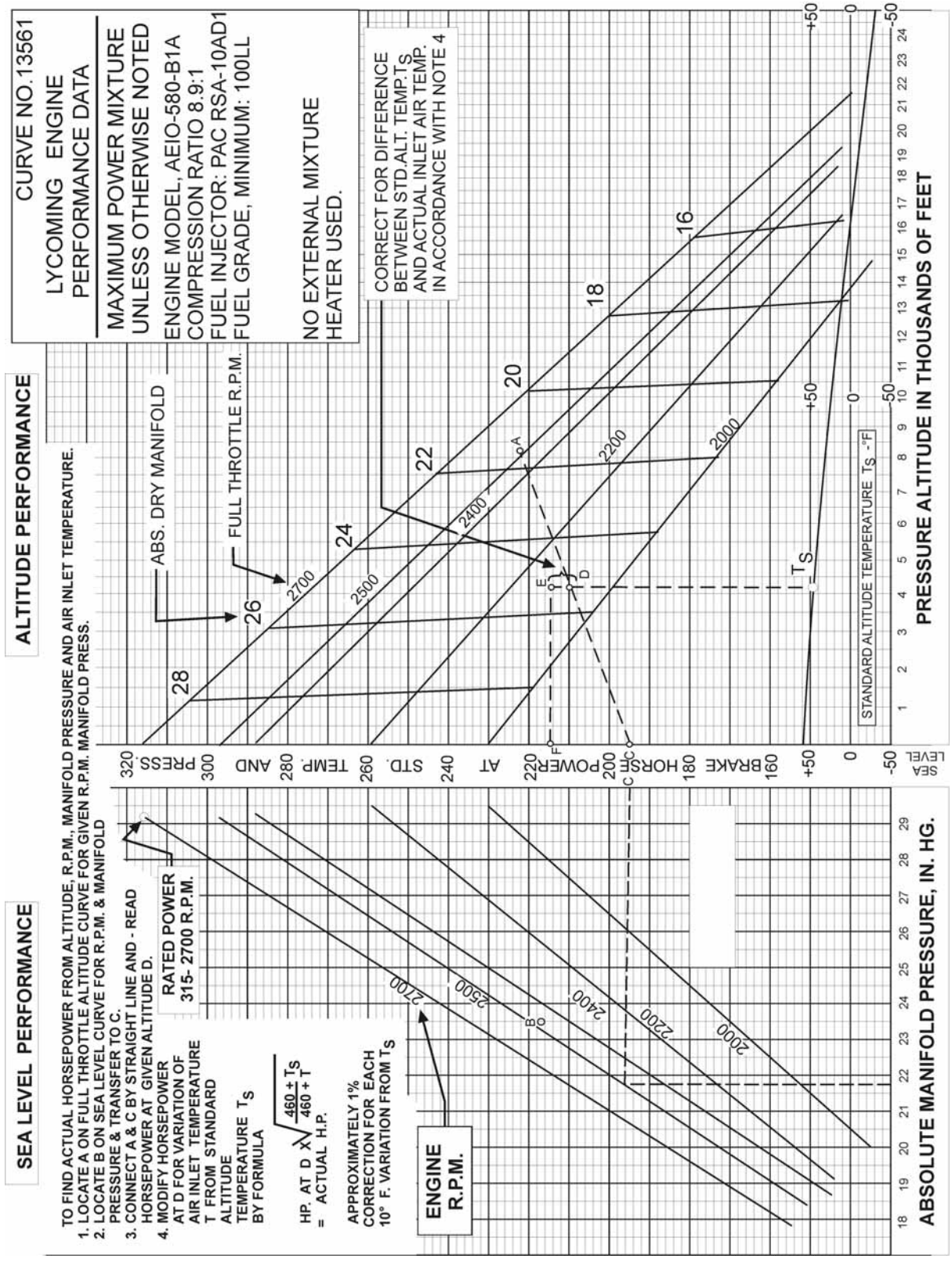

Figure 3-2. Sea Level and Altitude Performance Curve

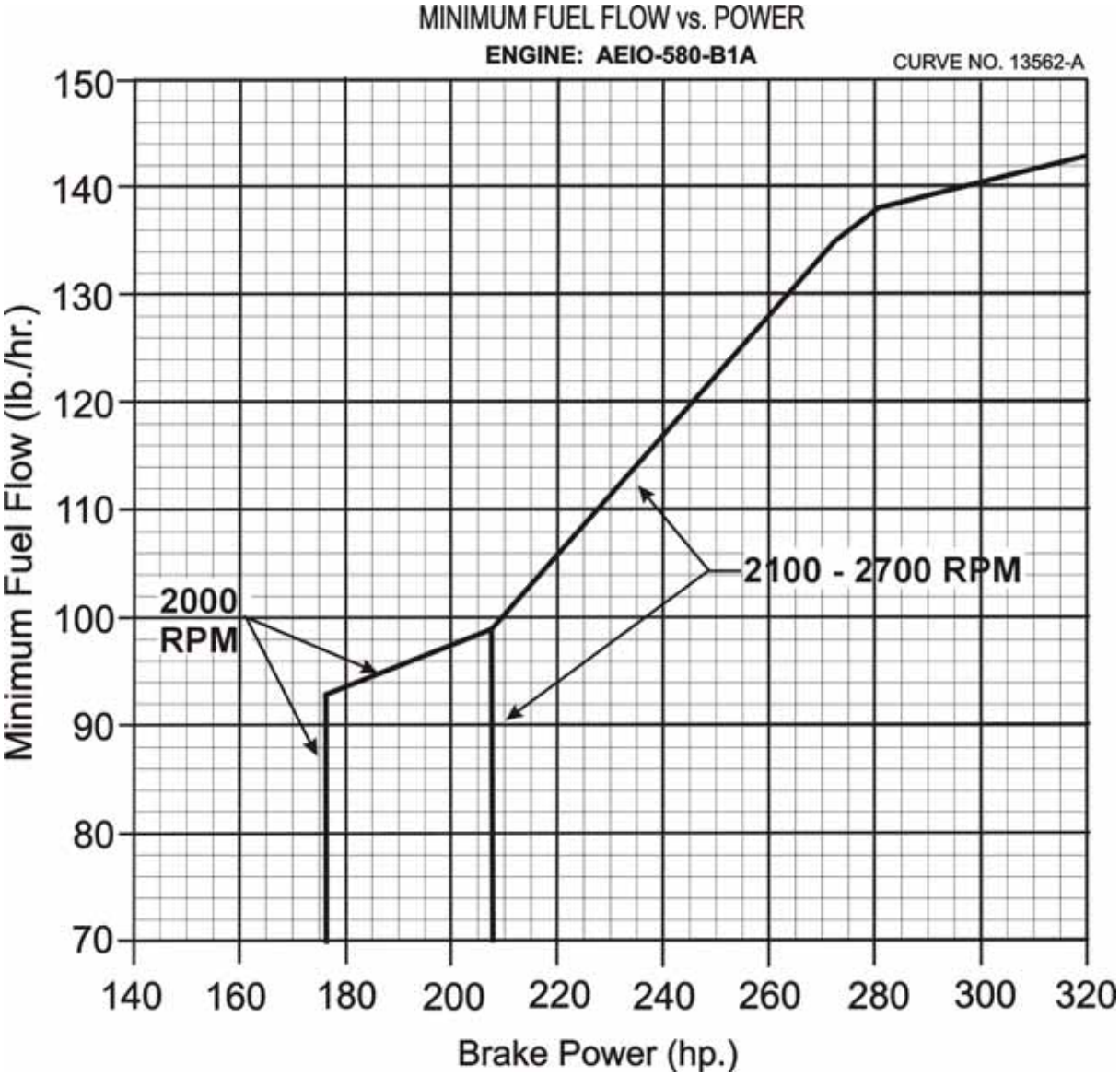

Figure 3-3. Minimum Fuel Flow vs. Power

SECTION II

INSTALLATION

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SECTION II

PART 1
PREPARATION

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SECTION II

PART 1
PREPARATION OF ENGINE FOR INSTALLATION

Each Lycoming engine undergoes a thorough preservative treatment before leaving the factory. To protect the cylinders and related parts, preservative oil is sprayed into each cylinder. Careful uncrating and uninhibiting of the engine is very important to prevent any of the preservative oil from entering the induction system.

1. UNCRATING.

The Lycoming AEIO-580-B1A engine has been carefully packed for shipment to prevent damage in transit and to ensure that the engine reaches its destination in perfect condition.

NOTE

Any engine that has been stored in a cold area must be brought into an area with a temperature of at least 70°F (21°C) for 24 hours before uncrating. If this is not possible, the preservative oil in the engine must be warmed to facilitate draining by heating the cylinders with heat lamps.

a. Remove the top of the crate and set it aside.

b. Lift and set aside any packing materials from on top of the engine.

c. Connect an engine lifting cable to a winch, hoist, or crane able to support a minimum load of 750 lbs.

d. Connect the engine lifting cable to the lifting lugs on the top of the engine.

e. Lift the engine from the crate.

2. UNIHIBITING ENGINE.

CAUTION

Do not rotate the crankshaft of an engine containing preservative oil before removing the bottom spark plugs. Engine damage will result.

CAUTION

Avoid contact of preservation oil with painted surfaces. If preservation oil does contact a painted surface, clean it off with a solvent as soon as possible.

a. Remove all the bottom spark plugs.

b. Turn the crankshaft three or four revolutions by hand.

c. Tilt the engine to one side until the spark plug holes on that side are oriented vertically.

d. Rotate the crankshaft at least two revolutions and allow the oil to drain out through the spark plug holes.

e. Repeat steps (3) and (4) for the opposite side of the engine.

f. Inspect the spark plugs before reinstalling them. If they are not clean, wash them in clean oil-based solvent. Dry them with compressed air.

g. Remove the oil sump plug and allow any preservative oil that has accumulated in the sump to drain.

h. Remove the oil screen and clean it with a hydrocarbon-based solvent such as Varsol or equivalent.

i. Reinstall the oil screen.

j. If a constant speed propeller is to be used, the expansion plug must be removed from the crankshaft. Pierce a 1/8 in. to 3/16 in. hole in the center of the plug to remove it.

k. Replace the oil sump plug and install a safety wire. Refer to Maintenance and Overhaul Manual for lockwire information.

l. Fill the sump with 16 quarts of aviation-grade oil. Refer to Section I, Part 2 for oil recommendations.

m. Inspect the induction riser to ensure that it is clean and dry. If a significant amount of preservative oil is noted, clean, reinspect, and reinstall the intake pipes.

3. PREPARATION OF FUEL INJECTOR.

a. Remove the fuel inlet strainer and clean it with a hydrocarbon-based solvent such as Varsol or equivalent.

b. Inspect the fuel supply lines, fuel manifold, throttle body, and “bullet nose” venturi to ensure they are clean and dry.

c. Reassemble the injector. Inject clean fuel into the fuel inlet connection with the fuel outlets uncapped until clean fuel flows from the outlets. Do not exceed 15 psi inlet pressure.

CAUTION

Dispose of used engine preservative and solvents in accordance with all applicable federal, state, and local environmental regulations.

NOTE

If a small amount of preservative oil remains in the engine, it will not be harmful; however, during the first oil change, drain the oil while the engine is hot. This will remove any residual preservative oil.

SECTION II

PART 2
PROCEDURES

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SECTION II

PART 2

1. INSTALLING ENGINE.

a. Refer to Figures 2-1 through 2-3 for dimensions and connection locations.

b. If the engine is to be installed in an airframe from which an engine has previously been removed, inspect the engine mounts to ensure they are not bent, misaligned, distorted, or damaged.

CAUTION

Distorted, misaligned, bent, or damaged engine mounts may cause engine or airframe damage or engine failure.

c. Refer to the airframe manufacturer's instructions for attaching the engine to the engine mounts.

2. CONNECTING EXTERNAL ACCESSORIES.

a. Refer to installation drawing, Figure 2-3. Remove cover plate and gasket. When installing the accessory, use the gasket and hardware specified by the airframe manufacturer. Torque to the value specified for the thread size in the Table of Limits, AEIO-580-B1A Maintenance and Overhaul Manual.

b. Connect oil and fuel supply lines and any reporting devices, sensors, and senders per the airframe manufacturer's instructions. Refer to Figures 2-2 and 2-3 for connection locations.

Table 2-1.

Accessory	Location	Thread Size
Accessory Pad 1	Upper Right Side of Accessory Housing	¼-20
Prop. Governor Pad	Upper Left Front of Crankcase	5/16-18

c. Installation of Inverted Oil System.

The location of each component, the routing of each hose, and the final selection and location of fitting must be planned carefully before commencing installation of the inverted oil system. Proper performance can be assured by following several general rules:

(1) The oil separator must be mounted as high as possible, and as far as possible toward the side of the engine opposite the oil return port on the sump. The bottom of the oil separator must be at least two inches above the top of the sump, and the centerline of the oil separator must be located at least 10 inches from the sump centerline on the side opposite the oil return port. The height requirement ensures rapid emptying of the oil separator following the transition from inverted to normal flight. The side location requirement prevents loss of oil during some types of maneuvers such as knife-edge flight; if the oil separator return port were located on the same side, oil could then run out of the oil return port, filling the oil separator, with consequent loss through the overboard breather line.

(2) The oil valve must be located such that its center port is horizontally aligned with the sump screen access port. See Figure 2-1. The oil valve itself is equipped with alternate ports to permit hose fittings to be attached either along its front of side (unused ports are blocked with plugs supplied).

(3) To maximize oil flow rates, avoid 90° fittings in oil lines. Exceptions: fittings in bottom of sump must normally be 90° because of clearance conditions; fittings at top and side ports on the oil separator are non-critical and may be the 90° type.

(4) To ensure rapid return of oil to the sump from the oil separator, the fitting at the bottom of the oil separator must be either straight, or 45° maximum. If a 90° fitting is used at this point, excessive oil losses may result.

(5) All hose lengths should be as short as possible.

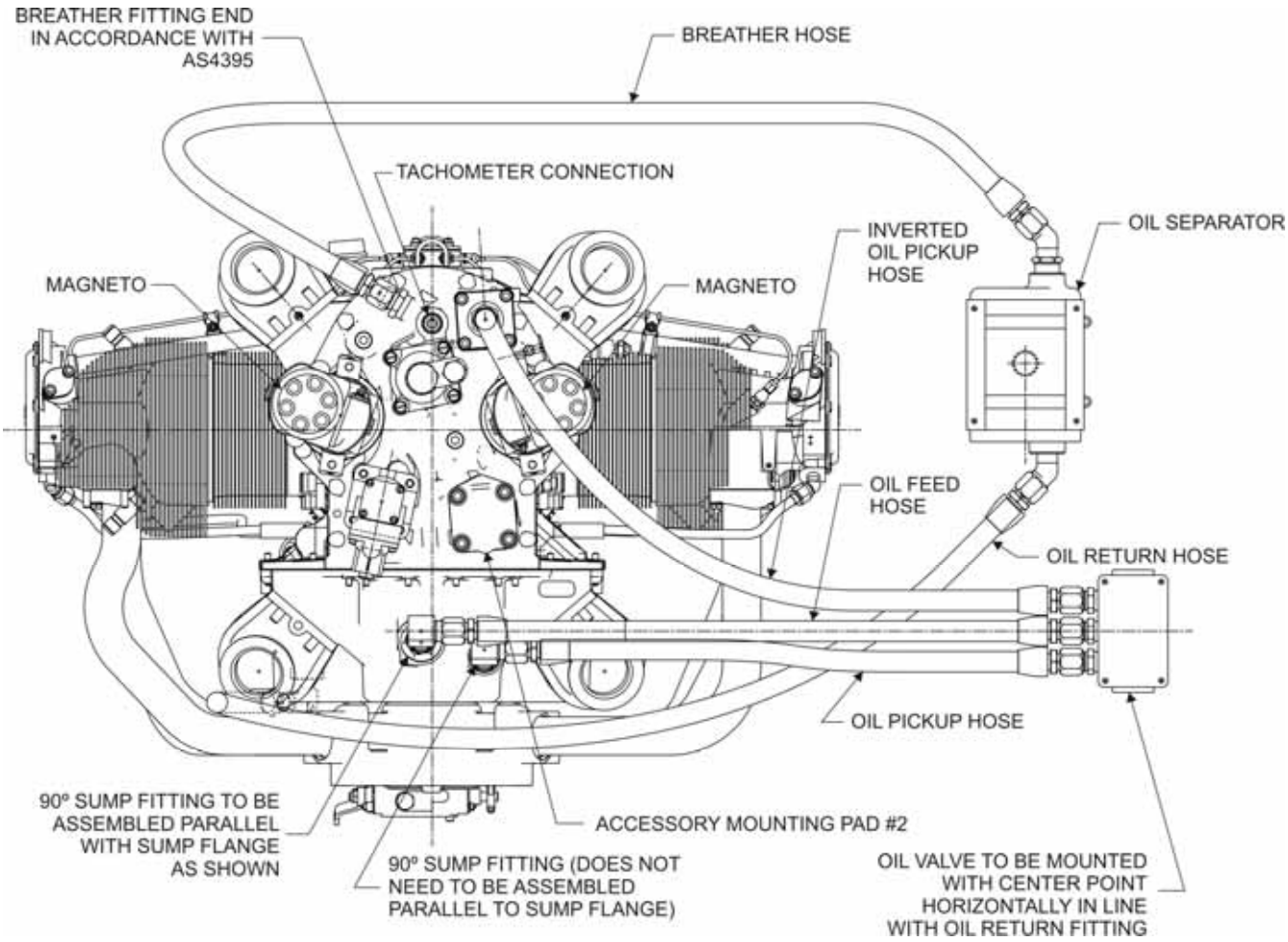

Figure 2-1. Rear View – AEIO-580

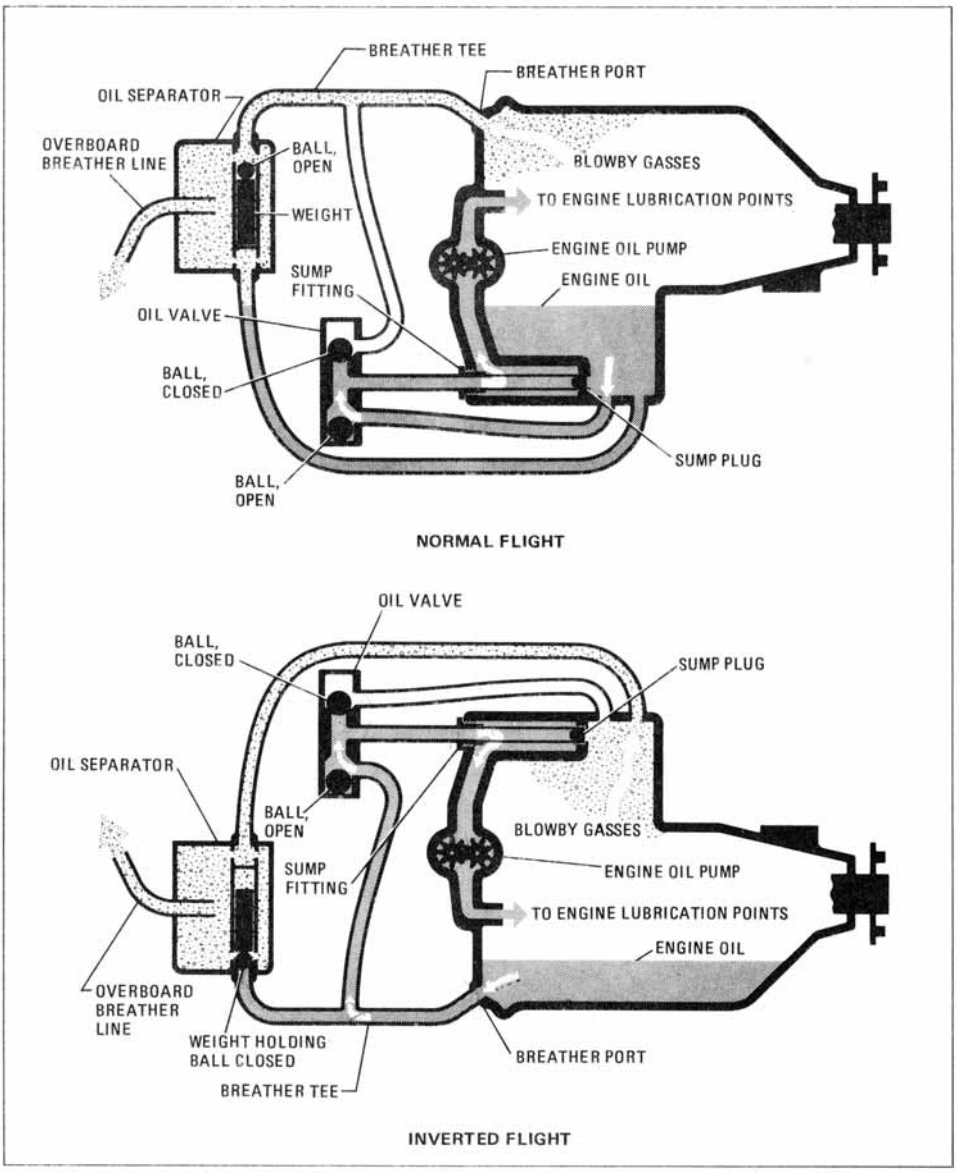

Figure 2-2. Schematic Section thru AEIO-580 Engine Showing Oil Circulation During Normal and Inverted Flight

(6) Aircraft equipped with constant speed propellers require evaluation before modification for aerobatic flight. During periods of zero oil pressure, some propeller types decrease pitch, while other types increase pitch. Momentary interruption of engine oil pressure during aerobatic flight, which normally occurs during certain maneuvers, may produce decrease pitch and cause engine overspeed if the propeller is of the decreasing pitch type. For safe engine operation during aerobatic flight, therefore, the propeller should be of the increasing pitch type.

(7) All hoses should be routed and clamped in positions which provide smooth, sweeping curves. Sharp bends should be avoided to prevent collapse of hose walls and restrictions to oil flow.

(8) The hose from the bottom of the oil separator must extend in a continuous downward slope to the bottom of the sump. An elevated section in this hose run may result in excessive oil loss.

(9) A breather fitting is provided to permit connection of hose to the crankcase breather port at the top rear of the crankcase. See Figure 2-1.

(10) The engine and engine compartment should be inspected for obstructions which may affect installation of the oil system. For engines equipped with accessories or parts which prevent normal installation, modifications will be required. Before proceeding with nonstandard modifications, be sure the modification plan is compatible with the operating principles of the system and that care is taken to ensure the mechanical integrity of the engine and airframe.

d. Installation Procedure.

When planning has been completed, proceed as follows for installation:

(1) Remove drain plugs from sump and thoroughly drain all engine oil.

(2) Loosen the setscrew in the side of the sump fitting and swivel the rear portion of the fitting to the required final angle. Considerable force may be required to swivel the fitting due to the friction of the internal o-ring seals and the clamping action against the sump screen. A hose fitting may be temporarily installed on the sump fitting to increase leverage. Tighten the setscrew to lock the angle.

(3) Securely mount the oil valve in position on the engine mount or firewall. Verity that the center port is horizontally aligned with the sump fitting. See Figure 2-1.

(4) Securely mount the oil separator in position on the engine mount or firewall. When mounting oil separator on a tubular engine mount using cushioned clamps, it may be necessary to drill additional holes in the oil separator mounting bracket.

CAUTION

Verify that the bottom of the oil separator is as high as possible and at least 2 inches above the top of the sump and as far as possible to the side opposite the oil return port. (Centerline of oil separator to be at least 10 inches from engine sump centerline.) See Figure 2-1.

(5) Securely mount the breather tee in position on the engine mount or firewall.

(6) Install required fittings in all engine and component ports.

NOTE

The breather hose must be of proper size to maintain not less than zero and not more than 5 inches water pressure in the crankcase.

(7) Measure, cut and install Aeroquip 601 for breather hose. See Figure 2-1

NOTE

Three hose lengths are required: crankcase breather to breather tee, breather tee to upper port of oil separator, and side port on oil separator to overboard breather line.

Use care during installation to ensure large radius curves without sharp bends or kinks. Observe hose marking stripes during installation to avoid helical twists.

(8) Measure and cut hose for remaining oil lines. Typical hose layout is shown in Figure 2-1. To determine exact cutting length for hose using Aeroquip 816-10D hose fittings, allow exactly 1 inch for each hose fitting.

NOTE

Four hose lengths are required: central sump oil outlet to lower oil valve port, sump fitting to center oil valve port, bottom of breather tee to upper oil valve port, and lower oil separator port to sump oil return port.

For steel braided hose, such as Aeroquip 601 hose, use abrasive cutting wheel to ensure clean, professional quality cuts. Hold the hose squarely across the cutting wheel, and slowly press the hose into the cutting wheel.

(9) Thoroughly clean each hose length and attach hose fittings. For Aeroquip 601 hose, attach Aeroquip 816-10D hose fittings as follows:

(a) Unscrew the hose and sections of the fitting (red anodized).

(b) Insert hose in socket with twisting, pushing motion until hose is in line with back of socket thread.

(c) Mark hose position at rear of socket using grease pencil or tape.

(d) Without getting oil in cutting spur of nipple, lubricate inside of hose and nipple threads using SAE 30 oil.

(e) Insert nipple and engage socket threads.

(f) Making sure hose is not pushed out of socket, tighten the assembly. The final allowable gap between nut faces is .031 inch.

(g) Verify that hose has remained in correct original position by checking mark on hose.

(10) When all hose fittings are attached, thoroughly clean each hose section and install as required. Be sure hose routing is as smooth as possible, free from sharp bends, and free from helical twisting. Securely tighten all fittings.

(11) Inspect all work for accuracy and mechanical integrity.

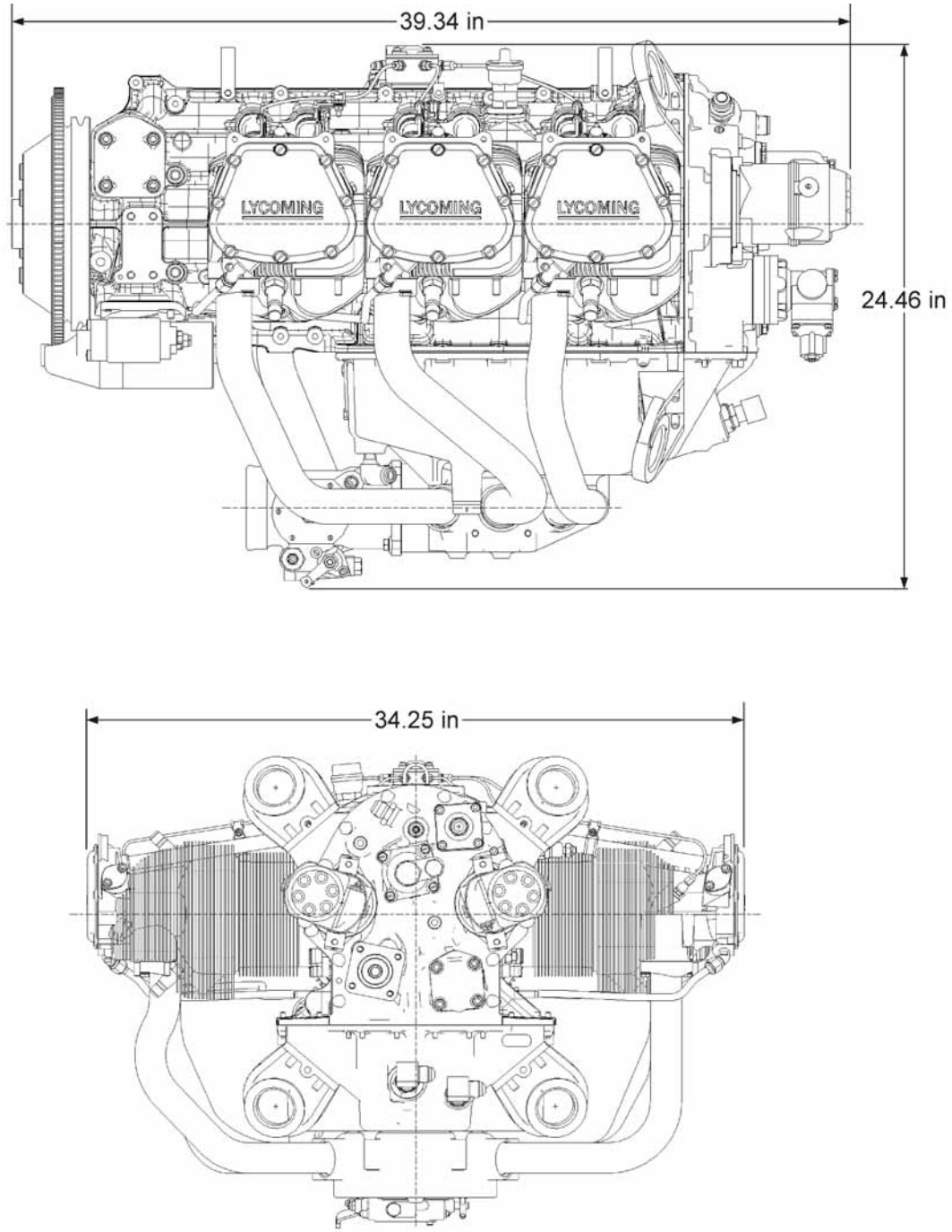

Figure 2-3. Dimensions

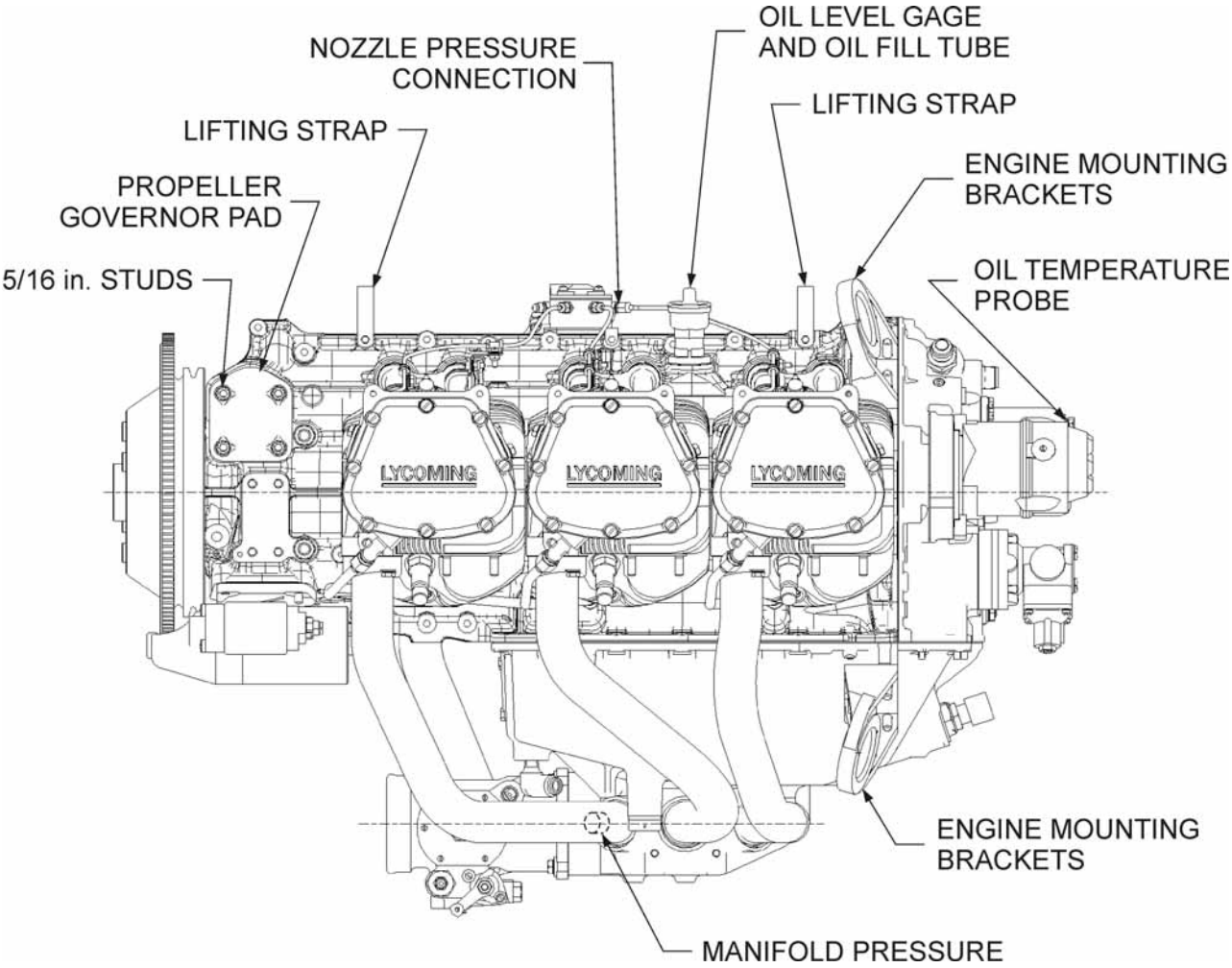

Figure 2-4. Installation, Left Side View

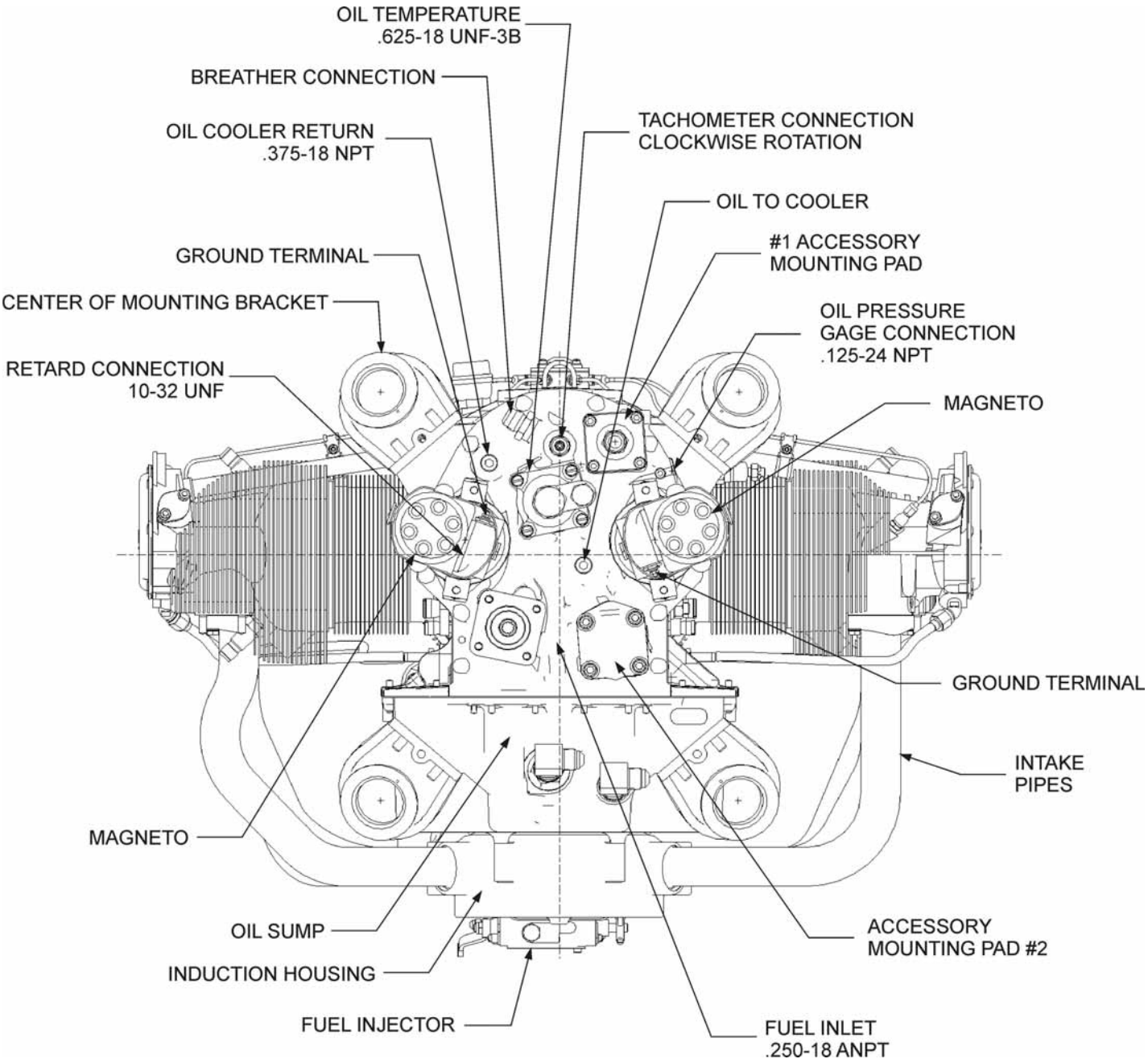

Figure 2-5. Installation, Rear View

3. PRE-OILING ENGINE PRIOR TO START.

CAUTION

To eliminate the possibility of high-speed bearing failure resulting from insufficient lubrication during initial starts, all aircraft engines must be pre-oiled after an overhaul, following oil cooler draining or replacement, or whenever the oil lines have been disconnected.

WARNING

If a propeller is installed, remain clear of the propeller turning arc. The propeller will turn during this procedure, and could cause injury.

a. Fill the oil cooler with oil.

b. Remove one spark plug from each cylinder of the engine.

c. If the aircraft is not equipped with an oil pressure gage, remove the STD-1102 allen plug from the upper left front of the main galley, aft of the propeller governor pad.

d. Place the mixture control lever in the "IDLE CUT-OFF" position and the fuel selector switch in the "OFF" position.

e. Turn the engine with the starter (or with an external power source, if available) until a minimum oil pressure of 20 lb. is indicated on the oil pressure gage or until there is a steady flow of oil from the opening on the engine.

CAUTION

Do not energize the starter for periods longer than 15 seconds. Allow the starter to cool after each energizing period. Refer to the starter manufacturer's instruction manual for additional information.

NOTE

If oil pressure is not determined after the first cranking of 10 to 15 seconds, allow the starter to cool and repeat the cranking/starter cooling sequence until 20 lb. is indicated on the oil pressure gage or oil flow is observed.

CAUTION

If there is no indication of steady oil pressure after five attempts, determine the cause and fix.

f. Turn the starter for an additional 10 seconds to verify that the oil pressure remains at least 20 lb.

g. Reinstall the spark plugs and proceed with normal starting procedures immediately. Refer to Section I, Part 3.

h. When the engine starts, observe the oil pressure gage. If there is no oil pressure indication, shut down the engine until cause is determined.

i. Allow the engine to run for approximately 3 minutes at 1000 rpm.

j. Shut down in accordance with Section I, Part 3, Step 10.