# SECTION 8
AIRPLANE HANDLING, SERVICE, AND MAINTENANCE

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INTRODUCTION

This section contains recommended procedures for proper ground handling and routine care and servicing of your Liberty XL2. It also identifies certain inspection and maintenance requirements that must be followed to maintain aircraft performance and dependability. A planned schedule of lubrication and preventative maintenance is recommended, based on both required intervals and special climatic or operational conditions you may encounter.

IDENTIFICATION PLATE

Your Liberty XL2 is uniquely identified by information stamped into a metal plate permanently affixed to the left rear fuselage. This information includes the airplane, serial number, Production Certificate number, Type Certificate number.

LIBERTY OWNER ADVISORIES

Liberty Aerospace, Inc. is committed to continually advising owners and operators of Liberty airplanes to inform them about mandatory and/or recommended aircraft service requirements and product changes.

UNITED STATES OWNERS

If your airplane is registered in the United States, appropriate Liberty Owner Advisories will be mailed to you automatically according to the most current owner name and address under which the airplane is registered with the FAA. If you wish advisories mailed to an alternate (or additional) address(es), please contact Liberty Aerospace, by mail or via the internet at www.libertyaircraft.com.

INTERNATIONAL OWNERS

To receive ongoing Liberty Owner Advisories, please contact Liberty Aerospace, Inc., by mail or via the internet at www.libertyaircraft.com. Subscriptions to Liberty Owner Advisories are normally valid for one year, and can be extended by filling out an Owner Advisory Application or renewal notice.
PUBLICATIONS

Several publications are furnished with the airplane upon initial delivery from the factory. These include:

✓ This FAA Approved Airplane Flight Manual (AFM)
✓ Pilot Checklist
✓ An FAA Approved Maintenance Manual
✓ An Illustrated Parts Catalog

**NOTE**

An Airplane Flight Manual (AFM) which has been lost or destroyed may be replaced by contacting Liberty Aerospace, Inc. Since the AFM is identified for a specific airplane, an affidavit including the owner’s name, airplane serial number, and airplane registration number is required.
AIRPLANE FILE

Miscellaneous data, information, and licenses may be part of the airplane file. The file should periodically be checked to ensure that all documentation is present and current.

To be displayed (visible) in the airplane at all times:

✓ Aircraft Airworthiness Certificate (FAA Form 8100-2 or foreign equivalent)
✓ Aircraft Registration Certificate (FAA Form 8050-3 or foreign equivalent)
✓ For flights outside the USA: Aircraft Radio Station License (FCC Form 556 or foreign equivalent)

To be carried (not necessarily displayed) in the airplane at all times:

✓ FAA Approved Airplane Flight Manual (AFM)
✓ Current weight and balance information and associated documentation (including FAA Form 337, if applicable)

To be made available upon request:

✓ Airplane Logbook
✓ Engine Logbook

United States Federal Aviation Regulations (FAR) require most of these items. Regulations of other countries may require different or additional data, as well as mandating whether or not certain maintenance documentation must be carried in the aircraft or stored in a safe ground location. It is the responsibility of the aircraft operator and/or pilot to ensure compliance with individual requirements.
AIRPLANE INSPECTION PERIODS

All civil aircraft of U.S. Registry must undergo a complete inspection (annual) each twelve calendar months. In addition, aircraft operated commercially (for hire) must have a complete inspection every 100 hours of operation.

For operation of an aircraft in controlled airspace under IFR, there must also be a static pressure system check, to include the Altimeter, within the preceding 24 calendar months.

To operate within or near Class B airspace, a transponder must be installed in the aircraft and must have been inspected within the preceding 24 calendar months.

To operate an aircraft with a US registry there must also be an ELT inspection within 12 calendar months after the last inspection. This is to check for proper installation, battery corrosion, operation of the controls and crash sensor, and the presence of a sufficient signal.

The FAA may require additional one-time or recurrent inspections by the issuance of airworthiness directives (ADs) applicable to the airplane, engine, propeller, or other components. It is the responsibility of the owner/operator of the airplane to ensure compliance with all applicable ADs, and, if they are repetitive, take appropriate steps to prevent inadvertent non-compliance.

LIBERTY INSPECTION PROGRAMS

Liberty Aerospace requires that propeller mounting bolt torque be checked after initial 25 hours of operation. Also required is a somewhat abbreviated inspection of the airplane, engine, and engine components every 50 hours of operation.
PREVENTATIVE MAINTENANCE

A certified pilot who owns or operates an airplane not used as an air carrier is authorized (in the USA) by FAR Part 43, Appendix A, Paragraph C, to perform limited preventative maintenance procedures on the airplane.

A Liberty XL2 Maintenance Manual must be obtained prior to performing any preventative maintenance, and all such preventative maintenance shall be performed in accordance with the procedures specified in the Maintenance Manual. Refer to FAR Part 43 for a listing of permissible procedures and for logbook entry and other record-keeping requirements.

\[\text{NOTE}\]

Pilots operating airplanes of other than U.S. Registry should refer to the regulations of the country of certification for information on preventive maintenance that may be performed by the pilot.

ALTERATIONS OR REPAIRS

It is essential that both FAA and Liberty Aerospace, Inc. be contacted prior to any alterations to the airplane, or prior to any repairs not covered in detail in the Maintenance Manual, to ensure that the airworthiness of the airplane is not compromised or violated.

Licensed personnel, utilizing only FAA approved components and data, such as the Liberty XL-2 Maintenance Manual and/or Liberty Aerospace Service Bulletins, must perform all alterations or repairs to the airplane.
GROUND HANDLING

TOWING

A tow bar suitable for hand towing and positioning of the airplane is available from third party suppliers, should be standard equipment, and carried in the airplane. Use of locally fabricated vehicle tow bars is discouraged.

Towing / Positioning By Hand
1. Attach the tow bar to the nose landing gear
2. Remove chocks
3. Release parking brake, if necessary
4. Move airplane to desired position
5. Chock main wheels
6. Remove tow bar
7. Set parking brake (if necessary, and depending on operator policy)

![CAUTION]

When moving airplane backward, nose landing gear will tend to caster to “hard over” left or right position. Maintain a firm grip on the tow bar to prevent nose landing gear from contacting limit stops at 80-degree left or right position.

To lift the nose wheel of the aircraft manually, use body weight to push down on the vertical stabilizer where the strake meets the fuselage in front of horizontal stabilizer. Do not push on the horizontal stabilizer or rudder. Ensure the underside of fuselage does not touch ground during maneuver. Lower nose wheel gently back to ground, careful not to ‘drop’ the front end during release.

Towing / Positioning Using a Tow Vehicle
1. Attach the tow bar to the nose landing gear
2. Remove chocks
3. Release parking brake if necessary
4. Move airplane to desired position
5. Chock main wheels
6. Remove tow bar from airplane and tow vehicle
7. Set the parking brake. (if necessary, and depending on operator policy)
Due to the risk of damage to the nose landing gear, tow the airplane using a vehicle in the forward direction only. Do not attempt to move the airplane backward using a vehicle. If it becomes necessary to move the airplane backward, disconnect the tow bar from the vehicle and move the airplane backward by hand.

**PARKING**

**Short-Term Parking**

If wheel brakes are hot from prolonged taxi, allow brakes to cool before setting parking brake.

1. Taxi or tow airplane to desired parking position
2. Align nose of airplane into the wind
3. Ensure nose wheel is centered
4. In windy or gusty weather, moor (tie down) airplane.
5. Set the parking brake.
6. Place chocks in front of and behind main wheels.
7. Release the parking brake.
8. Secure the flight controls in neutral aileron position.
9. Retract the flaps.
10. Close and lock doors.

**Controls may be secured with ailerons neutral and horizontal stabilizers leading edge down by pulling the control stick aft as far as possible and fastening seat belt snugly around it.**

**Long-Term Parking**

In addition to all steps above, perform the following:

1. Tie airplane down (see below).
2. Install external rudder gust lock.
3. Install canopy and pitot covers.
TIE-DOWN

The airplane has three mooring points: one under each wing, and one under the tail. Two mooring rings (7/16 x 20 threads) are installed in the mooring points under each wing and one mooring hoop for under the tail. Attach tie-down ropes (minimum 700 lb tensile strength) to ground tie-downs and aircraft mooring rings.

JACKING

For purposes of changing or servicing a single main landing gear wheel, the airplane may be jacked up on one side only, using a single jack at the applicable main gear jack point. For purposes of changing or servicing the nose landing gear wheel, the airplane may either be jacked up using a single jack at the nose wheel jack point, or the tail may be held down and secured using a weighted tail stand attached to the tie-down ring. In either of the two latter cases, the main wheels remain on the ground.

CAUTION

The airplane should only be jacked up indoors, in an area free from major air currents.

CAUTION

If fewer than all three wheels are to be jacked up, all wheels remaining on the ground must be securely chocked.

NOTE

The fuselage belly panel must be removed to gain access to the main and nose gear jack points.
Jacking the Airplane (All Three Wheels)
1. Remove the fuselage belly fairing to gain access to jack points.
2. Place a suitable jack under each main gear jack point. Place a suitable jack under the nose gear jack point.
3. Operate all three jacks simultaneously to raise airplane from the ground.

Alternate Method
1. Place a suitable jack under each main gear jack point.
2. Secure a weighted tail stand (at least 300 lbs) to the tail tie-down point. Operate both main gear jacks simultaneously to raise airplane from the ground.

Lowering the Airplane
1. Ensure area below the airplane is clear.
2. Lower all jacks simultaneously until all wheels are on the ground.
3. Remove all jacks.
4. Replace fuselage belly fairing.
FLYABLE STORAGE

Airplanes placed in non-operational storage for not more than 30 days, or those that receive only intermittent use during the first 25 hours, are considered to be in flyable storage status.

Every seventh day during flyable storage, the propeller should be rotated by hand through five revolutions (ten blades) in its normal direction of operation (CCW as seen from in front of the airplane). This action “loosens” engine oil and maintains the oil film on the cylinder walls helping to reduce corrosion.

**WARNING**

_Before rotating propeller by hand, confirm that airplane is secured (tied down and/or all three wheels chocked) and that airplane master switch, and FADEC PWR A and B switches are off. Treat propeller as if it were “live” at all times and do not stand within propeller arc when rotating propeller by hand._

After 30 days, the airplane should be flown for a minimum of 30 minutes, or a ground run-up should be made just long enough to bring oil temperature into the lower green arc range. Avoid excessive ground running. Engine run-up also helps eliminate accumulations of water or water vapor in fuel lines and other spaces within the engine. Keep fuel tanks full to minimize condensation. Keep batteries fully charged to prevent freezing in cold weather. Refer to the Maintenance Manual for long-term storage.
SERVICING

In addition to the Preflight Inspection described in Section 4 of this manual, complete procedure for servicing, inspecting, and testing your airplane are detailed in the Liberty XL2 Maintenance Manual. The Maintenance Manual outlines all those items which require attention at specific internals and items requiring servicing, inspection, and/or testing at special intervals. Depending on country of registry and local operating conditions, local authorities may require additional service, inspections, or tests.

For quick reference, selected quantities, materials, and specifications for frequently used service items are given below.

OIL

The airplane was delivered from the factory with a straight mineral oil approved specifically for engine break-in. This oil should be drained and the filter replaced, after the first 25 hours of operation. Thereafter, only mineral oil, MIL-C-6529 TYPE II, or Ashless Dispersant Oils specifically approved by Teledyne Continental Motors for the IOF-240-B engine should be used. Mixing of oil brands, or types is not recommended. It is recommended that the brand, type, and grade of oil currently used is recorded and the information kept on board the airplane for reference by pilots and maintenance personnel.

Recommended Viscosity for Temperature Range

Multi-viscosity or straight grade oil may be used year around for engine lubrication. Refer to the following table for temperature vs. viscosity ranges:

<table>
<thead>
<tr>
<th>TEMPERATURE RANGE</th>
<th>MIL-C-6529 TYPE II SAE GRADE</th>
<th>ASHLESS DISPERSANT SAE GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Above 4°C/40°F</td>
<td>SAE 50</td>
<td>SAE 50</td>
</tr>
<tr>
<td>Below 4°C/40°F</td>
<td>SAE 30 or 15W50</td>
<td>SAE 30 or 15W50</td>
</tr>
<tr>
<td>All Temps</td>
<td>SAE 20W50 or 20W60</td>
<td>SAE 20W50 or 20W60</td>
</tr>
</tbody>
</table>
**ENGINE OIL SUMP CAPACITY**

The capacity of the engine oil sump is 6 US quarts. Up to one additional quart may be contained in the oil filter, external oil cooler and connecting hoses. Minimum oil quantity for flight is 5 US quarts. For extended flights, oil should be serviced to capacity.

**OIL AND FILTER CHANGE**

A full-flow oil filter is provided with the engine and is mounted on the side of the oil pump. Replacement filters must have a 20 micron filter rating and incorporate a bypass valve set to open at 12-16 psig at a flow of 70 lb/min using SAE 50 oil at 240°F. After the first 25 hours of engine operation, the sump should be drained and the filter should be replaced. Thereafter, replace the engine oil and filter element at intervals of 50 operating hours.

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*A note:
A complete 100-hour inspection of the engine must be performed after 25 hours of operation of a new, rebuilt, or overhauled engine (see Liberty XL2 Maintenance Manual and Continental Motors IOF-240-B Maintenance Manual, Part No. M-22, Section 5-6).

Only the following types and grades of oil are approved for use in the Liberty XL2 airplane:

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Oil type / Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>BP Oil Corporation</td>
<td>BP Aero Oil</td>
</tr>
<tr>
<td>Castrol</td>
<td>Castrol AD Aero Oil</td>
</tr>
<tr>
<td>Castrol Limited (Australia)</td>
<td>Castrol AD Aero Oil</td>
</tr>
<tr>
<td>Chevron U.S.A., Inc.</td>
<td>Chevron Aero Oil</td>
</tr>
<tr>
<td>Continental Oil</td>
<td>Conoco Aero S</td>
</tr>
<tr>
<td>Delta Petroleum Corp.</td>
<td>Delta Avoil Oil</td>
</tr>
<tr>
<td>Exxon Company, U.S.A.</td>
<td>Exxon Aviation Oil EE</td>
</tr>
<tr>
<td>Gulf Oil Company</td>
<td>Gulfpride Aviation AD</td>
</tr>
<tr>
<td>Mobil Oil Company</td>
<td>Mobil Aero Oil</td>
</tr>
<tr>
<td>NYCO S.A.</td>
<td>TURBONYCOIL 3570</td>
</tr>
<tr>
<td>Pennzoil Company</td>
<td>Pennzoil Aircraft Engine Oil</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>Oil type / Grade</td>
</tr>
<tr>
<td>--------------------------------------</td>
<td>------------------------------------------------------</td>
</tr>
<tr>
<td>Phillips Petroleum Company</td>
<td>Phillips 66 Aviation Oil, Type A</td>
</tr>
<tr>
<td>Phillips 66 X/C</td>
<td>Aviation Multi-viscosity Oil, SAE 20W50 or SAE 20W60</td>
</tr>
<tr>
<td>Quaker State Oil &amp; Refining Co.</td>
<td>Quaker State AD Aviation Engine Oil</td>
</tr>
<tr>
<td>Red Ram Limited (Canada)</td>
<td>Red Ram X/C Aviation Oil 20W50</td>
</tr>
<tr>
<td>Shell Australia</td>
<td>Aeroshell ® W</td>
</tr>
<tr>
<td>Shell Canada Limited</td>
<td>Aeroshell Oil W</td>
</tr>
<tr>
<td></td>
<td>Aeroshell Oil W 15W50, Anti-wear Formulation</td>
</tr>
<tr>
<td></td>
<td>Aeroshell Oil W 15W50</td>
</tr>
<tr>
<td>Sinclair Oil Company</td>
<td>Sinclair Avoil</td>
</tr>
<tr>
<td>Texaco, Inc.</td>
<td>Texaco Aircraft Engine Oil Premium AD</td>
</tr>
<tr>
<td>Total France</td>
<td>Total Aero DM 15W50</td>
</tr>
<tr>
<td>Union Oil Co. of California</td>
<td>Union Aircraft Engine Oil HD</td>
</tr>
<tr>
<td>Approved Mineral Oil:</td>
<td>MIL-C-6529 TYPE II</td>
</tr>
</tbody>
</table>
FUEL

APPROVED FUEL GRADES (AND COLORS)

✓ 100LL Grade Aviation Fuel (Blue)

FUEL CAPACITY

✓ 29.5 US Gallons/111 Litres Total (single tank) (28 US Gallons/106 Litres Usable)

Fuel contamination is most often caused by foreign material present in the fuel system, and may include water, rust, sand, dirt, or microbial or bacterial growth (“bugs” or “sludge”).

Before each flight and/or after each refueling, use a clear sampling container and drain fuel from both fuel tank sump and the fuel strainer (“gascolator”) drains to determine whether contaminants are present and to verify that the airplane has been serviced with the proper grade (color) of fuel. If the airplane has just been refueled or moved, wait 5 to 10 minutes to allow heavier contaminants to settle to the bottom of the tank and migrate to the fuel sump (low point).

If any contaminants are observed, continue draining and checking fuel samples until no further contamination is found. It is best to “work downstream,” i.e., continue draining the fuel tank sump until no further contamination is observed, then repeat the procedure at the fuel strainer drain. If necessary, rock or shake the airplane to allow all contaminants to reach the system low points, and then wait 5 to 10 minutes before repeating the draining and sampling procedure. If contamination is still observed, the entire fuel system should be drained and purged by maintenance personnel.

If improper grade or type of fuel is suspected, the entire fuel system must be drained and purged by maintenance personnel. Unless the presence of the improper grade or type of fuel can be absolutely and unequivocally ruled out by fueling personnel, drain and purge of the fuel system.

Whenever possible, the fuel tank should be fully serviced after each flight to minimize the air space above the fuel and the attendant possibility of condensation of ambient moisture.
LANDING GEAR

All three landing gear wheels use 5.00 x 5 tires. All three tires should be inflated to 50 psi.

The dual main wheel brakes utilize a common reservoir mounted in the engine compartment on the starboard side. Access to the reservoir is gained by removing the upper engine cowling. Remove upper cowling for access to service the reservoir with MIL-PRF-5606 or MIL-H-5606 type hydraulic fluid.

CLEANING AND CARE

WINDSHIELD AND WINDOWS

The best cleaner for acrylic transparencies is copious amounts of clear water. The best device for initial removal of dirt, insects, etc., is the palm of a bare (clean) hand. Remove wristwatches, rings, etc. to avoid scratches. Flood the transparency with water while rubbing gently by hand to remove dust, dirt, insects, etc.

If necessary, use a mild soap solution to remove stubborn deposits. Avoid the use of chemical cleaners, as they may lead to crazing of the material.

CAUTION

NEVER use any cleaning product containing solvents of any kind.
NEVER use any cleaning product containing abrasives of any kind.

Addition of a few drops of mild detergent solution to water used for transparency cleaning is permissible to promote “sheeting” and prevent water spots. Either allow transparencies to air-dry, or rub GENTLY with a CLEAN lint-free cloth or chamois.
**Painted Surfaces**

Painted surfaces can be washed with water and mild soap, then rinsing with water and drying with cloths or chamois. Avoid the use of harsh detergent soaps and all abrasives. Stubborn oil and grease stains may be removed using a cloth dampened with Stoddard solvent. Exercise caution to prevent solvent from contacting transparencies (windshield, windows). Avoid rubbing exterior graphics (registration numbers, etc.) with solvent.

The airplane should be waxed regularly with a good automotive wax applied in accordance with the wax manufacturer's instructions. A heavier coating of wax on leading edges will reduce abrasion.

Ideally, the airplane should be polished by hand after waxing, mechanical methods are not recommended. Exercise extreme care when using electric polishers or buffers to avoid overheating the composite fuselage and vertical stabilizer. Use minimum pressure and keep the polisher or buffer moving at all times.

**Propeller Care**

The propeller should be washed and waxed using the same products and procedures as for the painted surfaces of the airplane. Any significant scratches should be reported to maintenance. Pilots should never attempt to sand out scratches in the propeller.

**WARNING**

*The airplane must not be started or flown if any scratches are found that penetrate through the paint and into the wood or composite structure of the propeller.*

Detailed instructions for propeller care is obtained from the applicable propeller manufacturer's maintenance manual, website, or service department.


Operation and Installation Manual

E-112 (ATA 61-01-12)

MT-Wood-Composite

Fixed Pitch Propeller
ENGINE CARE

The engine may be cleaned with standard cold solvents (Stoddard solvent, etc.) using a low-pressure spray only. Ensure that all solvent has evaporated or dried before starting engine.

**WARNING**

ENSURE THAT ALL ENGINE AND ACCESSORY BREATHERS AND VENT OPENINGS ARE SEALED (TAPE, PLASTIC BAGS, ETC.) BEFORE CLEANING ENGINE. DO NOT SPRAY SOVENT DIRECTLY ON OR NEAR ANY ELECTRIC OR ELECTRONIC (FADEC) ACCESSORIES OR CONNECTORS WHEN CLEANING ENGINE.

INTERIOR CARE

Floor coverings, carpeted sidewalls, and (fabric) seat covers should be vacuumed at regular intervals. Leather seats may be treated with standard automotive leather upholstery conditioners as necessary.

Instrument panels, cockpit center console, and instrument panel glare shield may be wiped with a dampened soft cloth (water only). Ensure that no solvents or strong cleaning agents are used on interior surface.

SNOW AND ICE REMOVAL

If snow has collected on the airplane, it should be removed as soon as possible (ideally, before it has a chance to melt) to prevent melt water from refreezing on the airplane surface or in control surface gaps. Do not use sharp objects or scrapers to remove snow or ice accumulations from airplane. The best method for snow and/or ice removal is to place the airplane in a heated hanger.

**CAUTION**

To avoid melted snow or ice refreezing on or in the aircraft, do not remove aircraft from heated hanger until at least one half hour after all melt water has drained (all dripping has stopped).