SERVICING - GENERAL

1. Scope

A. This chapter provides instructions for the replenishment of fluids, scheduled and unscheduled servicing applicable to the entire airplane. Personnel shall observe safety precautions pertaining to the individual servicing application.

2. Definition

A. This chapter is divided into sections to aid maintenance personnel in locating information. Consulting the Table of Contents will further assist in locating a particular subject. A brief description of each section follows.

(1) The section on replenishing is subdivided into categories to group servicing information such as systems requiring hydraulic fluid or compressed gas. A brief description of the subdivision subjects follows.

(a) Replenishing charts for the liquids most commonly used to service the airplane are grouped together to aid maintenance personnel in servicing.

(b) The subdivision of fuel and oil provides maintenance personnel with general servicing procedures. Safety precautions and servicing procedures required by federal and local regulations may supersede the procedures described.

(c) The subject on hydraulic fluid servicing provides servicing procedures for the airplane hydraulic brake system, nose gear shimmy damper and nose gear strut.

(d) The remaining subject subdivisions provide service information on either a system, an assembly or a component.

(2) The section on scheduled servicing includes lubrication information, external cleaning and internal cleaning. The section is subdivided to provide individual system, assembly or component service information.

(3) The section on unscheduled servicing provides information on deicing an airplane or portions of an airplane.

REPLENISHING - DESCRIPTION AND OPERATION

1. **General**

   A. This section provides maintenance personnel with servicing information for replenishing fuel and oil.

2. **Description**

   A. For an illustration of service points located on the airplane, refer to Figure 1 . This illustration may be used in conjunction with replenishing tables to aid maintenance technicians in servicing the airplane.

   B. The following tables are provided to establish replenishment capacities of various systems:

      (1) Fuel Capacity (Table 1)

      (2) Approved Fuels (Table 2)

      (3) Engine Oil Capacity (Table 3)

3. **Fuel Capacity Table**

   A. The following table lists airplane fuel capacity.

WARNING: Only aviation grade fuels are approved for use.

Table 1. Fuel Capacity

	U.S.
Fuel Capacity	56.0 Gallons
Usable Fuel	53.0 Gallons

4. **Approved Fuel Table**

   A. The following table lists approved fuels for use in the airplane.

Table 2. Approved Fuels

TYPE OF FUEL	SPECIFICATION	COLOR
100 LL	ASTM-D910	Blue
100	ASTM-D910	Green

For other fuels that can be used in Russia, refer to Lycoming Service Instruction No. 1070M (or subsequently approved Lycoming Service Instruction revision).

5. **Engine Oil Capacity Table**

   A. The following table lists oil capacity for the airplane. For list of approved engine oil, refer to the Pilots Operating Handbook and FAA Approved Flight Manual.

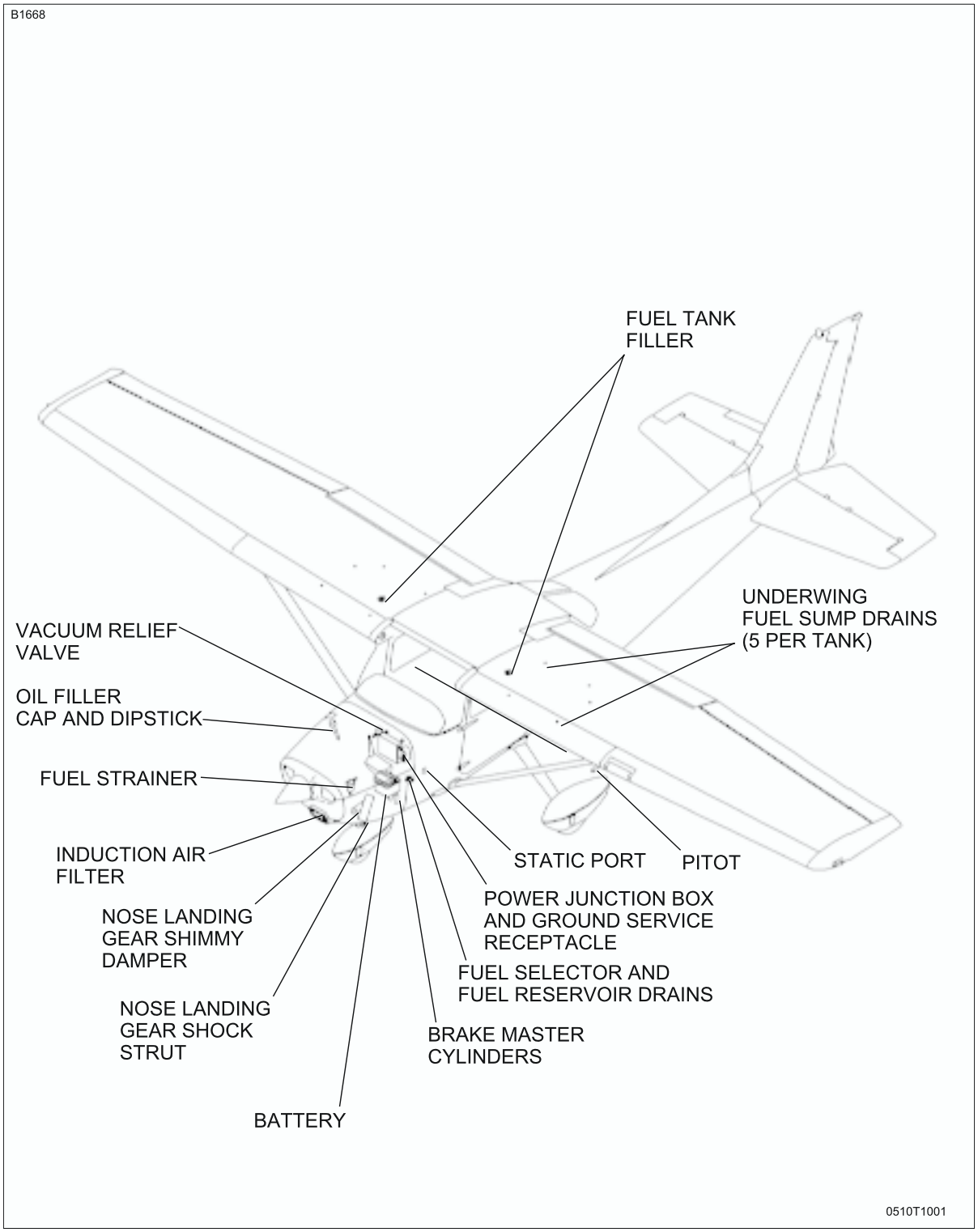
WARNING: The U.S. Environmental Protection Agency advises mechanics and other workers who handle oil to minimize skin contact with used oil and to promptly remove used oil from skin. In a laboratory study, mice developed skin cancer after skin was exposed to used engine oil twice a week without being washed off.

Substances found to cause cancer in laboratory animals may also cause cancer in humans.

Table 3. Engine Oil Capacity

	U.S. Quarts
Oil Capacity (total with filter, oil cooler and cooler hoses)	8.0 quarts

Figure 1. Airplane Service Points



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NOSE LANDING GEAR SHOCK STRUT - SERVICING

1. General

A. The nose gear shock strut requires a periodic check to make sure the strut is filled with hydraulic fluid and is inflated to the correct air pressure. The procedures give only replenishing and servicing instructions. For the disassembly and repair procedures, refer to Chapter 32, Nose Landing Gear - Maintenance Practices .

2. Shock Strut Servicing Procedures

A. The nose landing gear shock strut must be serviced every 100 hours.

B. To service the nose gear shock strut, proceed as follows:

(1) Raise airplane nose to remove pressure from shock strut.

(2) Remove valve cap and release all air.

(3) Remove valve housing assembly.

(4) Compress strut completely (stops in contact with outer barrel hub).

(5) Check and replenish oil level.

NOTE: Fluid used must comply with specification MIL-PRF-5606.

(a) Fill strut to bottom of valve installation hole.

(b) Maintain oil level at bottom of valve installation hole.

(6) Fully extend strut.

(7) Reinstall valve housing assembly.

(8) With strut fully extended and nose wheel clear of ground, inflate strut to 45 PSI.

NOTE: The nose landing gear shock strut will normally require only a minimum amount of service. Strut extension pressure must be maintained at 45 PSI. Machined surfaces must be wiped free of dirt and dust using a clean, lint-free cloth saturated with MIL-PRF-5606 or kerosene. All surfaces must be wiped free of excessive hydraulic fluid.

NOSE LANDING GEAR SHIMMY DAMPER - SERVICING

1. General

A. This procedure gives servicing instructions for the shimmy damper. To disassemble the shimmy damper, refer to Chapter 32, Nose Gear - Maintenance Practices .

2. Shimmy Damper Servicing (On Airplanes that do not have the Lord Shimmy Damper)

A. Service the shimmy damper every 100 hours.

B. Service the shimmy damper as follows:

(1) Remove the shimmy damper from the airplane. Refer to Chapter 32, Nose Landing Gear - Maintenance Practices .

(2) While you hold the damper in a vertical position with the fitting end pointed down, pull the fitting end of the damper shaft to its limit of travel.

(3) While you hold the damper in this position, fill the damper through the open end of the cylinder with hydraulic fluid.

(4) Push the shaft up slowly to seal off the filler hole.

(5) Clean the damper with solvent. Make sure that the shaft comes out through the filler hole until the damper is installed on the aircraft.

(6) Install the damper on the airplane. Refer to Chapter 32, Nose Landing Gear - Maintenance Practices .

C. Keep the shimmy damper clean.

(1) Clean the shimmy damper with a clean, lint-free cloth to prevent the collection of dust and grit.

(2) Make sure that the part of the damper piston shaft that you can see is always clean.

(3) Clean the machined surfaces of the shimmy damper.

(a) Use a clean, lint-free cloth soaked with hydraulic fluid to clean the machined surfaces.

(b) After the surfaces are clean, remove the remaining hydraulic fluid from them with a clean, lint-free cloth.

3. Shimmy Damper Servicing (On Airplanes with the Lord Shimmy Damper)

A. Lord Shimmy Dampers do not need special servicing. However, you must lubricate the nose wheel shimmy damper pivots with general purpose oil MIL-L-7870.

B. Keep the shimmy damper clean.

(1) Clean the shimmy damper with a clean, lint-free cloth to prevent the collection of dust and grit.

(2) Make sure that the part of the damper piston shaft that you can see is always clean.

(3) Clean the machined surfaces of the shimmy damper with a clean, lint-free cloth to prevent the collection of dust and dust.

C. If necessary, exercise a shimmy damper before installation.

(1) If a shimmy damper has been in storage for a long period, make sure that it moves freely before you install it.

CAUTION: Make sure that you do not push or pull on the shaft of the shimmy damper after it has reached its limit in either the up or the down position. If you continue to push a fully compressed, bottomed-out shaft, you can cause damage to the shimmy damper. If you continue to pull on a fully extended shaft, you can cause damage to the shimmy damper.

(2) If the shimmy damper does not move freely, push and pull the shaft through complete cycles until it does move freely. When the shimmy damper shaft has come to its limit of travel up and down as you push and pull, make sure that you do not continue to push or pull it beyond that limit of travel.

HYDRAULIC BRAKES - SERVICING

1. General

A. The brake master cylinders must be serviced every 100 hours.

B. The brake master cylinders are on the pilots rudder pedals and are filled with MIL-PRF-5606 hydraulic fluid.

NOTE: For bleeding procedures, refer to Chapter 32, Brakes - Maintenance Practices .

(1) Remove the filler plug on the top of each master cylinder to fill the brake master cylinders.

(2) Fill to the top of the internal reservoir with MIL-PRF-5606 hydraulic fluid.

FUEL AND ENGINE OIL - DESCRIPTION AND OPERATION

1. General

A. This section provides servicing procedures for the fuel and engine oil system. It is subdivided as follows:

(1) The fuel system section includes procedures for adding fuel, defueling the airplane and mixing anti-icing additives to the fuel.

(2) The engine oil section includes procedures for checking, adding and changing engine oil.

2. Fuel Precautions

A. Safety Precautions.

(1) The safety precautions on fueling and defueling may be superseded by local directives. However, following is a typical list of precautions.

(a) Ground, by designated grounding cables, the fueling and/or defueling vehicle to the airplane. Also, a static ground device shall contact the fueling or defueling vehicle and ground.

(b) Fire fighting equipment shall be immediately available.

(c) Wear proper clothing.

1 Do not wear clothing that has a tendency to generate static electricity such as nylon or synthetic fabrics.

2 Do not wear metal taps on shoes when working in areas where fuel fumes may accumulate at ground level.

(d) The airplane shall be in a designated fuel loading or unloading area.

(e) High wattage, pulse transmitting avionics equipment shall not be operated in the immediate vicinity.

B. Maintenance Precautions.

(1) Use designated equipment for fuel loading and unloading to prevent contamination.

(2) Use proper procedures when adding fuel inhibitors.

(3) Use specified type of fuel.

3. Oil Precautions

A. Maintenance Precautions.

(1) Use proper servicing procedures; do not overfill, do not mix manufacturers brands of oil.

FUEL - SERVICING

1. General

A. Fuel Tanks.

(1) Each wing contains an integral fuel bay, located between the front and rear spars, extending from WS 31.38 to WS 65.125. Fuel bays should be filled immediately after each flight to lessen condensation in the tanks and lines. A fuel filler cap is located on top of each wing and provides a fueling/defueling point for each fuel bay.

B. Fuel Drains.

(1) Fuel drains are located at various places on the underside of each integral fuel bay and throughout the fuel system. These drains are utilized to collect fuel samples for analysis. This sampling is accomplished by placing the fuel sample cup up to the drain valve, and depressing the valve with rod protruding from the cup.

NOTE: For detailed description and maintenance practices related to the fuel system, refer to Chapter 28, Fuel - General .

2. Safety and Maintenance Precautions

A. Safety Precautions.

WARNING: During all fuel system servicing procedures, fire fighting equipment must be available. Two ground wires from tiedown rings on the airplane to approved ground stakes shall be used to prevent accidental disconnection of one ground wire. Make sure battery switch is turned off, unless otherwise specified.

(1) Establish ground as follows:

(a) Ground airplane first.

(b) Ground vehicle (or hose cart) to the same ground as the airplane.

(c) Bond vehicle (or hose cart) to airplane.

(d) Bond refuel nozzle to airplane.

(2) Ensure fire fighting equipment is positioned and immediately available.

(3) Do not wear clothing that has a tendency to generate static electricity such as nylon or synthetic fabrics.

(4) Do not wear metal taps on shoes.

(5) The airplane should be in a designated fuel loading/unloading area.

(6) High wattage, pulse transmitting avionics equipment shall not be operated in the vicinity of the fueling/defueling operation.

B. Maintenance Precautions.

(1) Use designated equipment for fuel loading/unloading to prevent contamination.

(2) Due to the chemical composition of anti-ice additive, improper blending of fuel and anti-icing additive may cause the deterioration of the integral fuel tanks interior finish, thus promoting corrosion. It is very important that the proper anti-ice additive blending procedures be followed.

(3) Use authorized type of fuel and anti-ice additive.

(4) During defueling, ensure anti-ice additive blended fuel and unblended fuel are not mixed.

3. Fueling and Defueling

A. Fueling Procedures.

CAUTION: Make sure that the correct grade and type of fuel is used to service the airplane. Refer to Pilots Operating Handbook and FAA Approved Airplane Flight Manual for a list of approved fuels.

(1) Ground airplane and vehicle as outlined above.

(2) Ensure battery switch is turned OFF.

(3) Place protective mat around fuel filler area and remove fuel filler caps.

(4) Fuel airplane. Ensure correct grade of aviation fuel is used.

(5) Replace filler caps. Wipe up excess fuel from wing area.

(6) Remove grounding equipment.

B. Defueling Procedures.

(1) Ground airplane and vehicle as outlined above.

(2) Ensure battery switch is turned OFF.

(3) Remove fuel filler caps.

(4) Insert defueling nozzle into fuel bay and begin defueling.

(5) Remove as much fuel as possible with defueling nozzle.

(6) Drain fuel from drains located on underside of fuselage.

(7) Remove drain valves from bottom of fuel tank and drain remaining fuel.

(8) Remove grounding equipment.

4. Aviation Fuel Additive

A. When servicing fuel with anti-icing additive containing diethylene glycol monomethyl ether (DiEGME), remember that it is harmful if inhaled, swallowed or absorbed through the skin, and will cause eye irritation. Also, it is combustible. Before using this material, refer to all safety information on the container.

B. In cases of acute exposure, DiEGME is an eye and mucous membrane irritant, a nephrotoxin and central nervous system depressant. It is toxic by skin absorption. Inhalation may cause irritation to mucous membranes, although, due to its low volatility this is not an extreme hazard at room temperature or below. If DiEGME contacts the eye, it may cause pain and transient injury. It is absorbed through the skin in toxic amounts.

C. In the event DiEGME contact is experienced, the following emergency and first aid procedures should be used.

(1) If ingested (swallowed), drink large quantities of water. Then induce vomiting by placing a finger far back into the throat. Contact a physician immediately. If vomiting cannot be induced, take victim immediately to the hospital or a physician. If victim is unconscious or in convulsions, take victim immediately to the hospital or a physician. Do not induce vomiting or give anything by mouth to an unconscious person.

(2) If eye or skin contact is experienced, flush with plenty of water (use soap and water for skin) for at least 15 minutes while removing contaminated clothing and shoes. Call a physician. Thoroughly wash contaminated clothing and shoes before reuse.

5. Fuel Loading

CAUTION: Make sure that the correct grade and type of fuel is used to service the airplane. Refer to Pilots Operating Handbook and FAA Approved Airplane Flight Manual for a list of approved fuels.

A. Approved fuel for the Model 172 airplane may or may not contain an anti-ice additive. The additive incorporates a biocidal chemical which inhibits growth of fungal and bacterial organisms in fuel storage reservoirs. Mixing anti-ice additive and fuel during refueling involves the utilization of an aerosol or proportioned dispenser.

B. Mixing Icing Inhibitor Procedures.

NOTE: Equivalent procedures may be substituted.

(1) When using aerosol cans, utilize the following procedures.

(a) Insert the fueling nozzle and fuel additive nozzle into the fuel filler.

WARNING: Anti-icing additives containing DiEGME are harmful if inhaled, swallowed or absorbed through the skin and will cause eye irritation.

CAUTION: Ensure that additive is directed into flowing fuel stream and additive flow is started after fuel flow starts and is stopped before fuel flow stops. Do not allow concentrated additive to contact coated interior of fuel tank or airplane painted surface.

(b) Start refueling; then, direct the fuel additive into the fuel stream so as to blend the additive simultaneously with the fuel as it fills the tank. The additive concentration range shall be maintained in accordance with instructions in the Pilots Operating Handbook and FAA Approved Airplane Flight Manual.

ENGINE OIL - SERVICING

1. General

A. This section gives instructions to examine and replace the engine oil.

2. Oil Change Intervals

A. Oil Change Intervals.

NOTE: An inspection of the oil filter will help find unusual engine wear. Refer to the Lycoming Service Bulletin 480D or the latest revision.

(1) You must frequently do a check of the oil during the first 25 hours of engine operation and add oil as necessary. Use an aviation grade mineral oil of the required viscosity which agrees with SAE J1966. Refer to Engine Oil Check.

(2) After the first 25 hours, drain the engine oil and replace the oil filter. Fill the engine through the oil filler tube with aviation grade mineral oil of the required viscosity which agrees with SAE J1966. Refer to Engine Oil Change.

(3) Continue to use the aviation grade mineral oil until the airplane completes a total of 50 hours of engine operation or oil consumption is stabilized. You must then drain the engine oil, replace the oil filter and add ashless dispersant oil to the engine. Refer to Engine Oil Change.

(4) For more information on engine oil replacement intervals, refer to Chapter 5, Inspection Time Limits .

3. Engine Oil Level

A. Engine Oil Check (Refer to Figure 301).

(1) Make sure the airplane is in a level position for the best indication.

(2) Wait five to ten minutes after the engine has stopped, then examine the engine oil level on the dipstick.

(a) Open engine oil door on the top cowl.

(b) Remove the dipstick from the engine.

(c) Wipe the dipstick with a clean cloth.

(d) Fully insert the dip stick into the oil filler tube and remove the dipstick.

(e) Read oil level on dipstick.

CAUTION: THE AIRPLANE CAN OPERATE WITH SAE J1966 STRAIGHT MINERAL OIL DURING THE INITIAL BREAK-IN PERIOD OR AFTER AN OVERHAUL. AFTER THE BREAK-IN PERIOD, USE AN ASHLESS DISPERSANT OIL THAT AGREES WITH SAE J1899. MAKE SURE YOU USE THE CORRECT OIL TYPE WHEN YOU SERVICE THE ENGINE.

(3) If the oil is low, add the correct quantity and viscosity of aviation grade engine oil. Refer to Replenishing - Description and Operation .

(4) Insert the dipstick into the oil filler tube.

(5) Do a check for the correct fit of the dipstick to make sure it is not loose.

(6) Close engine oil door.

4. Engine Oil Change

A. Change the Engine Oil (Refer to Figure 301).

(1) Operate engine until oil temperature is at a normal operating temperature.

NOTE: Normal temperature operation is within the green arc of the oil temperature gage. The engine oil must drain while the engine is still warm.

WARNING: AVOID SKIN CONTACT WITH ENGINE OIL. ENGINE OIL THAT GETS ON THE SKIN MUST BE IMMEDIATELY REMOVED.

(2) Shut off the engine.

(3) The front of the airplane must be raised slightly to drain sludge that can collect in the engine oil sump.

(4) Remove the top cowl to get access to the oil drain plug and external oil filter. Refer to Chapter 71, Cowl - Maintenance Practices .

(5) Put a cover such as a plastic bag over the lower vacuum pump when you replace the oil or oil filter to prevent contamination of the vacuum pump.

(6) Remove and discard the safety-wire from the drain plug.

WARNING: YOU MUST PREVENT SKIN CONTACT WITH ENGINE OIL. ANY ENGINE OIL THAT GETS ON THE SKIN MUST BE REMOVED IMMEDIATELY.

(7) Remove the drain plug and let the oil drain into an applicable container.

(8) After the engine oil has drained, install the drain plug. Refer to the Lycoming SSP-1776 Table of Limits or latest revision, for the torque requirements.

(9) Attach safety-wire to the drain plug. Refer to Chapter 20, Safetying - Maintenance Practices .

(10) Remove suction screen from oil sump.

(a) Complete an inspection for metal particles.

1 If you see metal content, keep the material from the oil sump for identification. Additional investigation will be required to find the source of the metal and possible need for corrective maintenance. Refer to Lycoming SSP500 (or latest revision) and contact a Textron Lycoming representative.

(b) Install the suction screen with a new gasket. Refer to the Lycoming SSP-1776 Table of Limits (or latest revision) for torque requirements.

(c) Attach safety-wire to the suction screen. Refer to Chapter 20, Safetying - Maintenance Practices .

(11) Remove the external oil filter.

(a) Open the filter can and examine the oil from the filter for metal particles.

(b) Carefully remove and unfold the paper element. Do an inspection of the material in the filter.

1 If metal content is shown, keep the material from the filter for identification. Additional investigation will be required to find the source of the metal and possible need for corrective maintenance. Refer to Lycoming SSP500 and contact a Textron Lycoming representative.

(c) Install a new external oil filter.

(d) Attach safety-wire to the oil filter. Refer to Chapter 20, Safetying - Maintenance Practices .

(12) Fill the engine oil sump through the filler tube. Make sure you use the correct grade and quantity of oil. Refer to Replenishing - Description and Operation . Refer to Figure 302 for oil grade versus temperature chart.

(13) Install the dipstick and make sure of the correct fit on the filler tube.

(14) Remove the bag from the lower vacuum pump.

(15) Operate the engine until the normal operating temperature shows on the oil temperature indicator.

(16) Shutdown the engine.

(17) Examine the engine for oil leaks.

Figure 301. Engine Oil Service

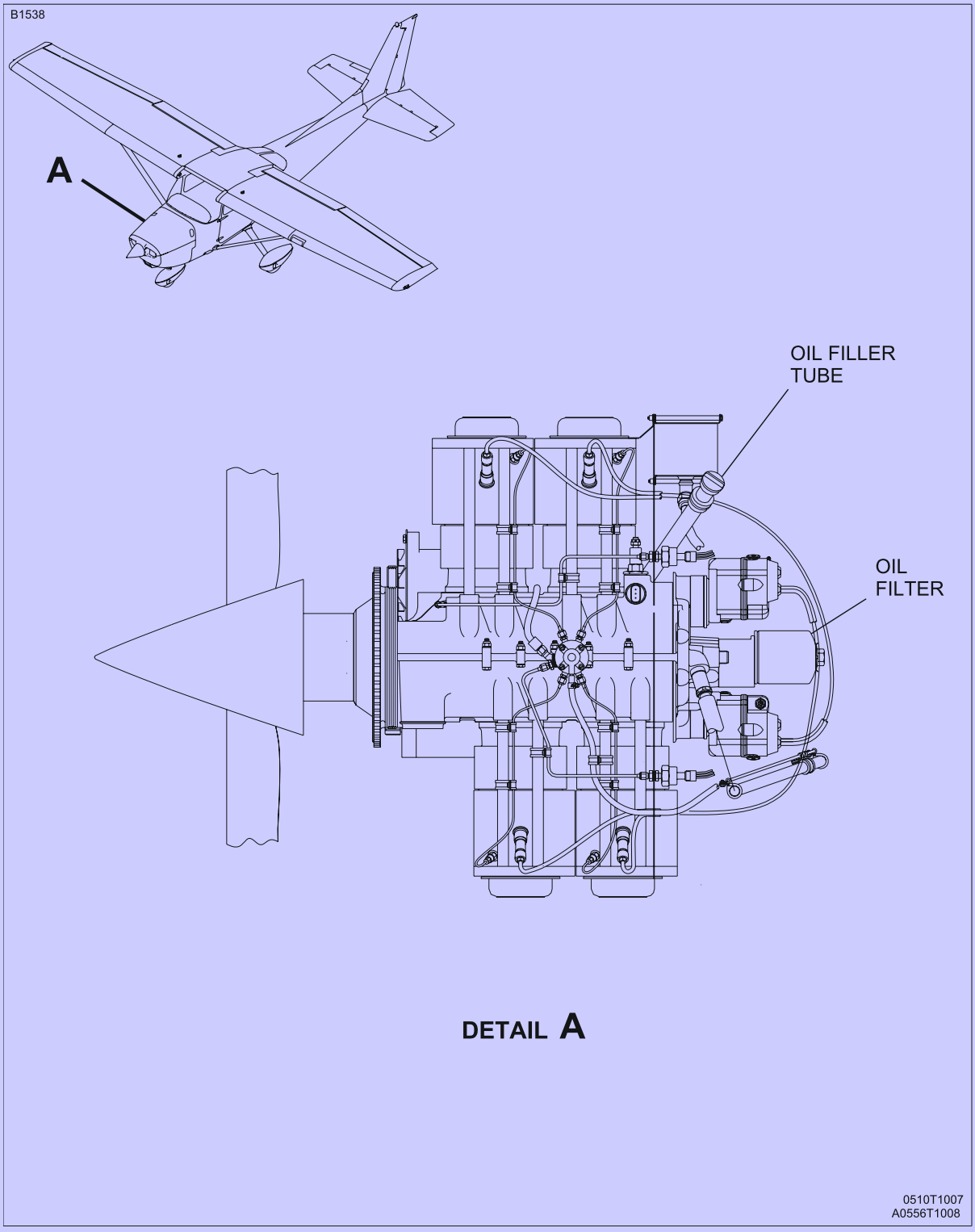

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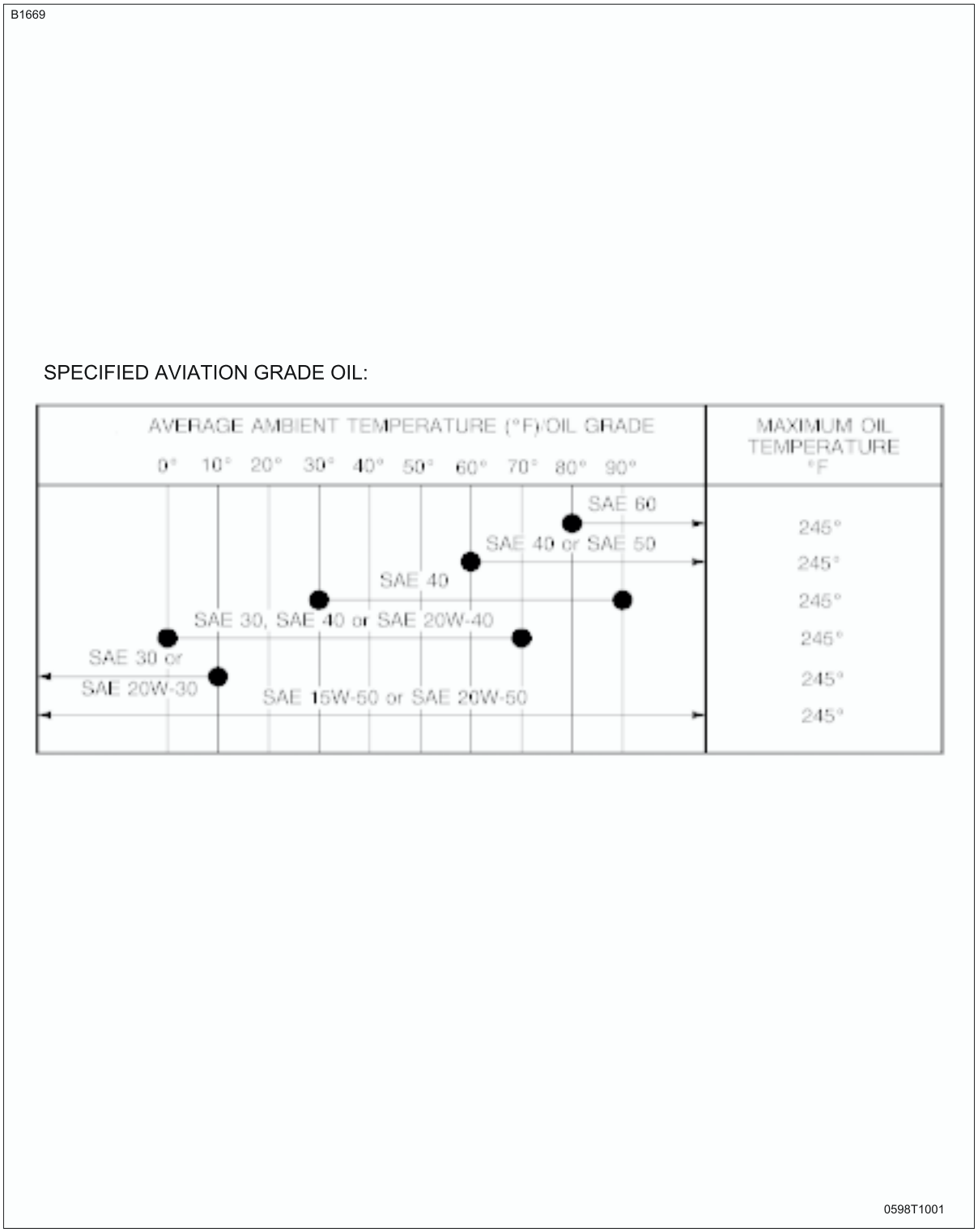
Figure 302. Temperature Versus Oil Viscosity



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INDUCTION AIR FILTER - SERVICING

1. General

A. The induction air filter helps make sure dust and dirt does not go into the induction system.

2. CA3559 Air Filter Service

A. CA3559 Air Filter (Refer to Figure 301).

(1) The CA3559 Induction Air Filter must be serviced at 50 hours, is life limited and must be replaced at 100 hours. Refer to Chapter 5, Component Time Limits .

B. Clean the CA3559 Air Filter (Refer to Figure 301).

(1) Remove the filter from the airplane.

(2) Replace the filter if it is damaged or split.

(3) If the filter is in serviceable condition, proceed with the steps that follow.

CAUTION: DO NOT USE MORE THAN 100 PSI COMPRESSED AIR TO CLEAN THE FILTER . USE CARE NOT TO CAUSE DAMAGE TO THE FILTER WHEN YOU CLEAN IT.

(a) Clean the filter from the opposite direction of the normal air flow with oil-free compressed air that is less than 100 psi.

(b) Make sure the air box is clean and free of debris before you install the filter.

(c) Install the filter.

3. P198281 Air Filter Service

A. P198281 Air Filter (Refer to Figure 301).

(1) The filter must be serviced at 50 hours, is life-limited and must be replaced at 500 hours. A new filter must be installed after using 500 hours of engine operating time or one year, whichever occurs first. Refer to Chapter 5, Component Time Limits .

B. Clean the P198281 Air Filter (Refer to Figure 301).

NOTE: The filter assembly can be cleaned with compressed air a maximum of 30 times or it can be washed a maximum of 20 times. Refer to the maintenance log book for a record of air filter service.

(1) Remove the filter from the airplane.

CAUTION: DO NOT CLEAN THE FILTER WITH COMPRESSED AIR THAT IS MORE THAN 100 PSI OR THE FILTER CAN BE DAMAGED.

(2) Clean the filter with oil-free compressed air that is less than 100 psi, from the opposite direction of the normal air flow.

NOTE: Arrows on the filter case show the direction of the normal air flow.

(3) Examine the paper pleats bond to the face screen.

(a) A new filter must be installed when the current filter is damaged. A damaged filter can have sharp or broken edges in the filtering panels, which will let unfiltered air to enter the induction system. Any filter that appears doubtful must have a new filter installed.

(b) Replace the filter if the face screen is loose or pulled away from the filter pleats. The bond holds the paper pleats in place. If the bond is broken the pleats are free to move, which will decrease filtration.

CAUTION: DO NOT USE SOLVENT OR CLEANING FLUIDS TO CLEAN THE FILTER. USE ONLY WATER AND HOUSEHOLD DETERGENT SOLUTION WHEN YOU WASH THE FILTER.

(4) After you clean the filter with air, the filter can be washed in a mixture of warm water and a mild household detergent. A cold water mixture is acceptable.

(5) After you wash the filter, rinse it with clean water until the rinse water that drains from the filter is clear.

(6) Let the water drain from the filter and dry with compressed air that is less than 100 psi.

NOTE: The filtering panels of the filter can twist when they are wet, but they will return to their original shape when they are dry.

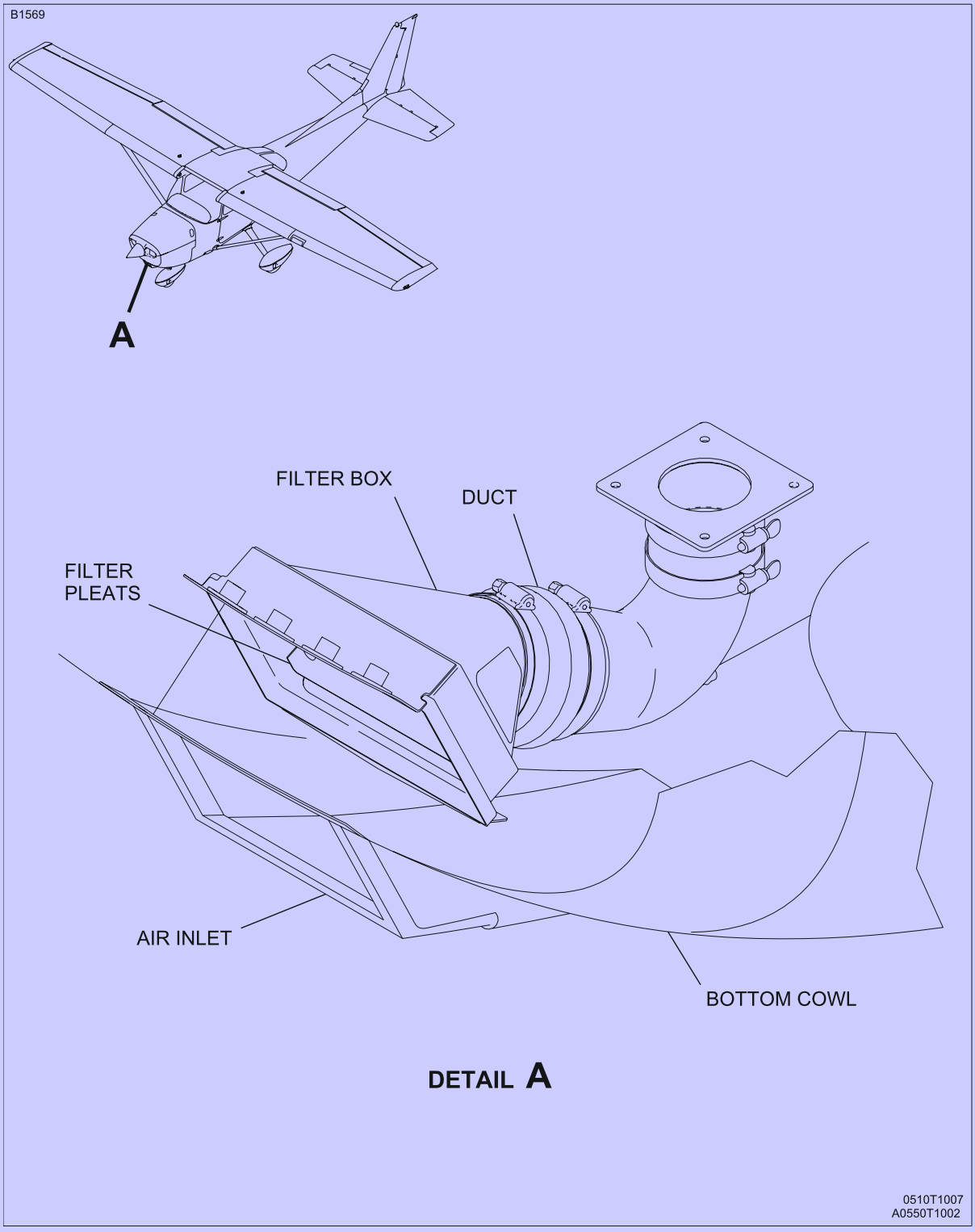
(7) When the filter is dry, exam it to make sure the filter is not damaged. If it is damaged, anew filter must be installed.

(8) Make sure the air box is clean.

(9) Install the filter with the gasket on the aft face of the filter frame and with the flow arrows on the filter frame pointed in the correct (normal air flow) direction.

(10) Make sure you update the maintenance log book to show the number of times the air filter has been cleaned for future reference.

Figure 301. Air Filter Service



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VACUUM SYSTEM FILTERS - SERVICING

1. General

A. The vacuum system has two filters for which servicing is necessary. The gyro filter is forward of the instrument panel on the pilot's side. The regulator valve filter is forward of the instrument panel near the firewall centerline.

B. An inspection of the gyro filter and the regulator valve filter must be done every 100 hours. Both filters must be replaced at life limits set in Chapter 5, Component Time Limits.

2. Gyro Filter Servicing

A. Servicing Procedures (Refer to Figure 301).

CAUTION: Do not operate the vacuum system with the filter removed or with a vacuum line disconnected. Foreign object debris can go into the system and cause damage to the vacuum-operated instruments.

(1) Remove the bolt and washer that attach the filter to the cover.

(2) Do an inspection of the filter for deterioration or damage.

(3) Clean or, if applicable, replace the filter.

(4) Install the filter in the cover and attach with the bolt and washer.

3. Regulator Valve Filter Servicing

A. Servicing Procedure (Refer to Figure 301).

CAUTION: Do not operate the vacuum system with the filter removed or with a vacuum line disconnected. Foreign object debris can go into the system and cause damage to the vacuum operated instruments.

(1) Do an inspection of the filter for deterioration or damage.

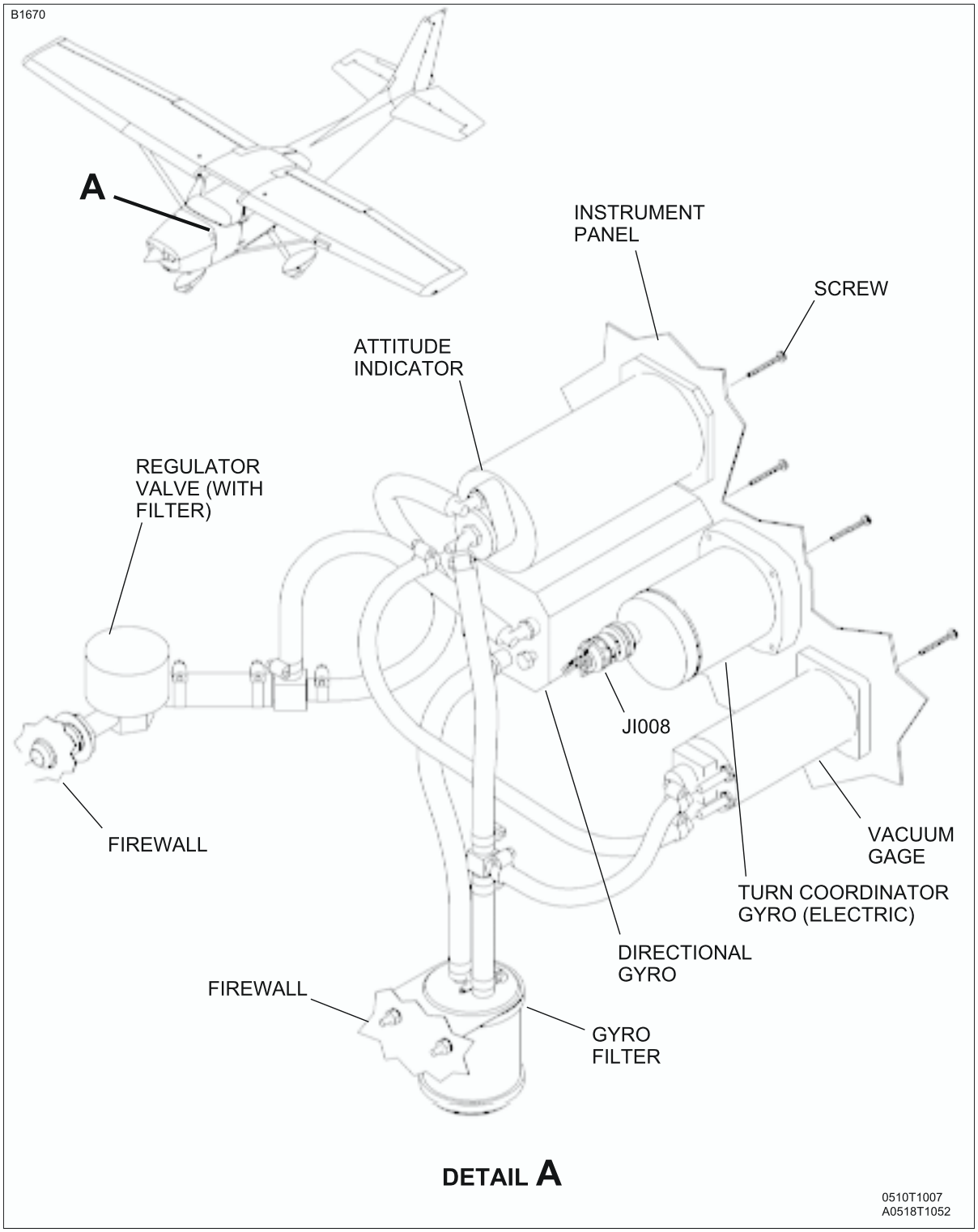
(2) If the filter is dirty, carefully remove it from the regulator valve.

(3) Use shop air to clean the filter.

(4) Replace damaged filter, if applicable.

(5) Install the filter on the regulator valve.

Figure 301. Vacuum System Filters



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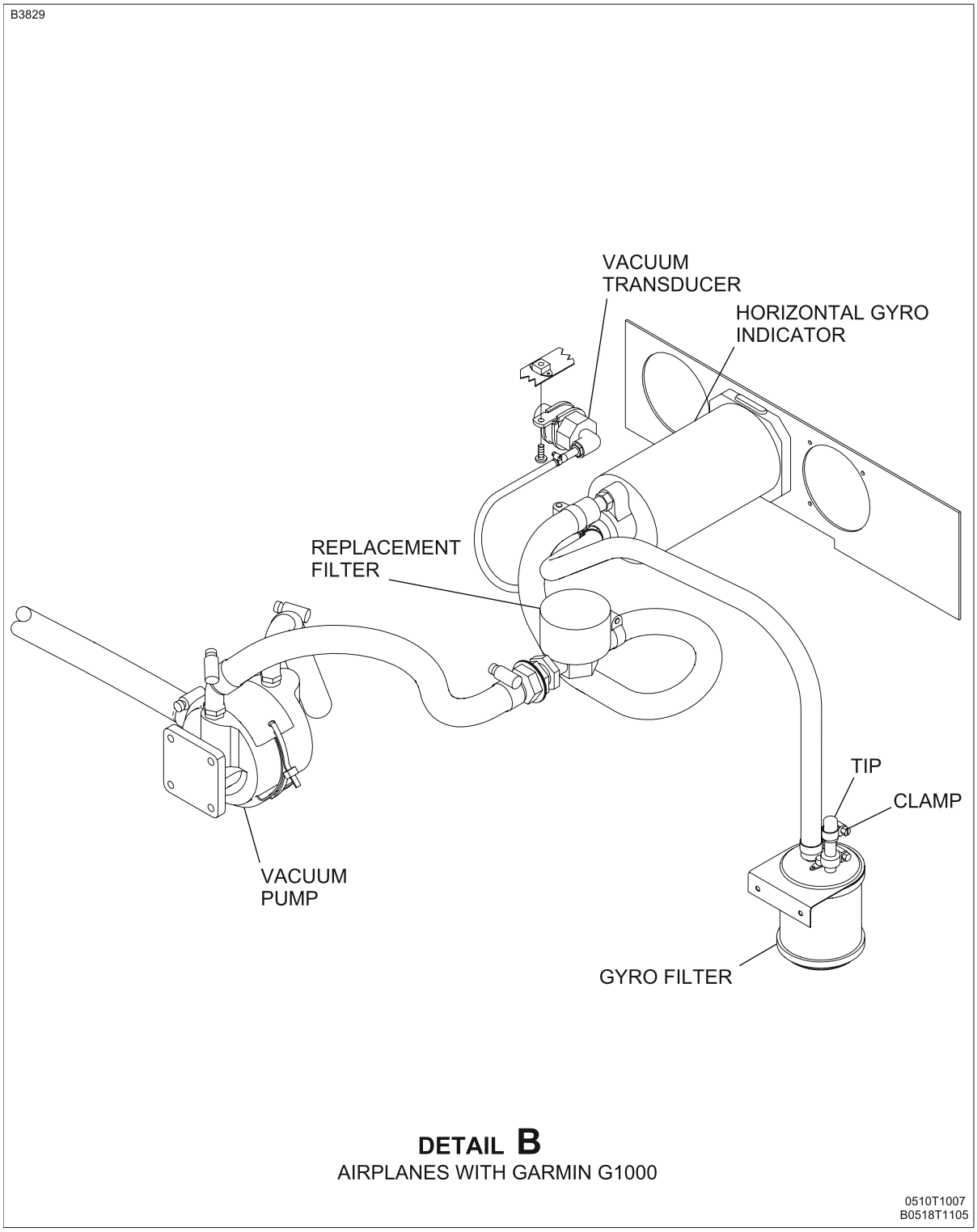

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BATTERY - SERVICING

1. General

A. This procedure provides instructions for adding water to the battery. For testing, charging and maintenance on the battery, refer to Chapter 24, Battery - Maintenance Practices .

2. Battery Servicing

A. The battery should be serviced every 100 hours.

B. Battery servicing involves adding distilled water to maintain the electrolyte even with the horizontal baffle plate at the bottom of the filler holes, checking the battery cable connections, and neutralizing and cleaning off any spilled electrolyte or corrosion. Use bicarbonate of soda (baking soda) and water to neutralize electrolyte or corrosion. Follow with a thorough flushing with a wire brush, then coat with petroleum jelly before connecting. The battery box should also be checked and cleaned if any corrosion is noted. Distilled water, not acid or "re-juvenators" should be used to maintain electrolyte level. Inspect the battery in accordance with time limits spelled out in Chapter 5, Inspection Time Limits .

TIRES - SERVICING

1. General

A. Servicing the tires by maintaining correct inflation pressure is the most important job in any tire preventative maintenance program. Improper inflation pressure causes uneven tread wear.

(1) Under inflation, indicated by excessive wear in the shoulder area, is particularly damaging. It increases the chance of bruising sidewalls and shoulders against rim flanges. In addition, it shortens tire life by permitting excessive heat buildup.

(2) Over inflation is indicated by excessive wear in the center of the tire. This condition reduces traction, increases tire growth and makes treads more susceptible to cutting.

2. Safety Precautions and Notes

A. Safety Precautions.

(1) Tire should be allowed to cool before attempting to service.

WARNING: Do not stand in front of the bead area. The tendency of a bursting tire is to rupture along the bead. Standing in any position in front of either bead area could cause injury if the tire should burst.

(2) Personnel should stand at a 90-degree angle to the axle along the centerline of the tire during servicing.

CAUTION: Applying a tire sealant to the tire may cause wheel corrosion.

(3) The use of tire sealant is not recommended.

B. Notes.

(1) A tube-type tire that has been freshly mounted and installed should be closely monitored during the first week of operation, ideally before every takeoff. Air trapped between the tire and the tube at the time of mounting could seep out under the bead, through sidewall vents or around the valve stem, resulting in an under inflated assembly.

(2) The initial stretch or growth of a tire results in a pressure drop after mounting. Consequently, tires should not be placed in service until the have been inflated a minimum of 12 hours, pressures rechecked, and tires reinflated if necessary.

(3) Inaccurate tire pressure gages are a major cause of improper inflation pressures. Ensure gages used are accurate.

3. Tire Servicing

A. Check tire pressure regularly.

(1) Tire pressure should be checked when tire is cold (at least 2 or 3 hours after flight) on a regular basis. Tire pressure should be checked prior to each flight when practical.

(2) When checking tire pressure, examine tires for wear, cuts, and bruises. Remove oil, grease and mud from tires with soap and water.

B. Use recommended tire pressure. Consult the table below.

NOTE: Recommended tire pressures should be maintained, especially in cold weather. Any drop in temperature of the air inside a tire causes a corresponding drop in air pressure.

	MODEL 172R	MODEL 172S
Main Gear Tire Type	6.00 x 6, 4-ply rated tire	6.00 x 6, 6-ply rated tire
Pressure	29 PSI	42 PSI

	MODEL 172R	MODEL 172S
Nose Gear Tire Type	5.00 x 5, 6-ply rated tire	5.00 x 5, 6-ply rated tire
Pressure	34 PSI	45 PSI

4. Cold Weather Servicing

A. Cold Weather Servicing.

(1) Check tires for excessive deflation.

NOTE: Tire air pressure will decrease somewhat as the temperature drops, but excessive deflation could indicate cold weather leakage at the air valve. Avoid unnecessary pressure checks.

(2) If it is necessary to pressure check tires in cold climates, always apply heat to air valves and surrounding areas before unseating valves.

(3) Continue application of heat during reinflation to ensure air valve seal flexibility when valve closes.

(4) Do not allow tires to stand in snow soaked with fuel, or on fuel covered ramp areas.

(5) If tires become frozen to parking ramp, use hot air or water to melt ice bond before attempting to move airplane.

SCHEDULED SERVICING - DESCRIPTION AND OPERATION

1. General

A. This section provides instructions necessary to carry out scheduled servicing as well as internal/external cleaning. It also includes instructions for lubricating specific points identified in periodic inspection and/or preventive maintenance programs. This section does not include lubrication procedures required for the accomplishment of maintenance practices.

2. Description

A. This section is subdivided to provide maintenance personnel with charts, text and illustrations to prevent confusion. Also included in this section is a table containing a list of lubricants.

(1) The subdivisions are separated according to airplane systems. This aids maintenance personnel in locating service information.

LUBRICANTS - DESCRIPTION AND OPERATION

1. General

A. This section is designed to assist the operator in selecting recommended lubricants. For best results and continued trouble free service, use clean and approved lubricants.

B. For a list of recommended lubricants, refer to Recommended Lubricants Table .

2. Lubrication Service Notes

A. Lubricant Application.

(1) Cleanliness is essential to good lubrication. Lubricants and dispensing equipment must be kept clean. Use only one lubricant in a grease gun or oil can.

(2) Store lubricants in a protected area. Containers should be closed at all times when not in use.

(3) Wipe grease fittings and areas to be lubricated with clean, dry cloths before lubricating.

(4) When lubricating bearings which are vented, force grease into fitting until old grease is extruded.

(5) After any lubrication, clean excess lubricant from all but actual working parts.

(6) All sealed or prepacked antifriction bearings are lubricated with grease by the manufacturer and require no further lubrication.

(7) Friction bearings of the porous, sintered type are prelubricated. An occasional squirt can oiling of such bearings with general purpose oil (MIL-PRF-7870) extends its service life.

(8) Lubricate unsealed pulley bearings, rod ends, pivot end hinge points and any other friction point obviously needing lubrication, with general purpose oil (MIL-L- 7870).

(9) Paraffin wax rubbed on seat rails will ease sliding the seats fore and aft.

(10) Do not lubricate roller chains or cables except under sea coast conditions. Wipe with a clean, dry cloth.

(11) All piano hinges may be lubricated using (PG) powdered graphite (SS-G-659) when assembly is installed.

(12) Lubricate door latching mechanism with MIL-PRF-81322 general purpose grease, applied sparingly to friction points, if binding occurs. No lubrication is recommended on the rotary clutch.

3. Definition of "As Needed"

A. In the following sections, time requirements for lubrication are presented in one of two formats. When specific time intervals for lubrication exist, those intervals are defined in Chapter 5, Inspection Time Limits. When no time limit has been established, lubrication is on an as needed basis. This leaves much of the decision making process in the hands of the airframe and powerplant mechanic, who has been trained to make these types of decisions.

B. In an effort to standardize the decision making process, the following guidelines may be considered to determine if a component needs lubrication. Any one of the following conditions would indicate a need for lubrication, and may additionally indicate the need for inspection:

(1) A visual inspection which indicates dirt or wear residue near the movement contact area.

(2) An audible inspection which indicates squeaks, grinding or other abnormal sounds.

(3) A tactile (touch and feel) inspection which indicates jerky or restricted movement throughout portions of the travel range.

4. Recommended Lubricants Table

NOTE: Equivalent substitutes may be used for the following items:

Table 1. Recommended Lubricants

SYMBOL	PROCUREMENT SPECIFICATION	LUBRICANT DESCRIPTION	PRODUCT PART NUMBER	SUPPLIER
GR	MIL-PRF-81322	Grease, wide temperature range.	Mobilgrease 28	Mobil Oil Corp. 150 E. 42nd Street New York , NY 10017
			Royco 22C	Royal Lubricants Co., Inc. River Road East Hanover , NJ 07936
			Aeroshell grease 22	Shell Oil Co. One Shell Plaza Houston , TX 77001
GH	MIL-PRF-23827	Grease, aircraft and instrument, gear and actuator screw.	Southwest Grease 16215	Southwest Petro- Chem, Inc. Division - Witco 1400 S. Harrison Olathe , KS 66061
			Aeroshell grease 7	Shell Oil Co.
			Royco 27A	Royal Lubricants Co., Inc.
			Supermil grease No. A72832	Amoco Oil Co. 200 East Randolph Dr. Chicago , IL 60601
			Braycote 6275	Burmah-Castrol, Inc. Bray Products Div. 16815 Von Karman Ave. Irving , CA 92714
			Castrolease A1	Burmah-Castrol, Inc.
			TG-11900 low temp grease EP	Southwest Petro-Chem,Inc.
			Brayco 885	Brumah-Castrol, Inc.
OG	MIL-PRF-7870		Royco 363	Royal Lubricants Co., Inc.

SYMBOL	PROCUREMENT SPECIFICATION	LUBRICANT DESCRIPTION	PRODUCT PART NUMBER	SUPPLIER
		Oil, general purpose		
OG (Cont.)	MIL-PRF-7870	Oil, general purpose	Petrotect 7870A	Penreco 106 South Main Street Butler , PA 16001
			Windsor lube L-1018	Anderson Oil & Chemical Co., Inc. Portland , CT 06480
			Octoil 70	Octagon Process, Inc. 596 River Road Edgewater , NJ 07020
PL	VV-P-236	Petrolatum technical		Available Commercially
PG	SS-G-659	Powdered Graphite		Available Commercially
GL	MIL-G-21164	High and Low Temperature Grease	Everlube 211-G Moly Grease	E/M Corporation Highway 52 N.W. West Lafayette , IN Box 2200
			Royco 64	Royal Lubricants Co., Inc.
GP	NONE	Number 10 weight, non-detergent oil		Available Commercially
OL	VV-L-800	Light Oil		Available Commercially
		Grease, general purpose	U000992	Cessna Aircraft Co. 1 Cessna Blvd. Wichita, Ks 67277-7704

BATTERY TERMINALS - SERVICING

1. General

A. It is recommended the airplane be secured in an area free of contamination from sand, dust or other environmental conditions that may contribute to improper lubrication practices.

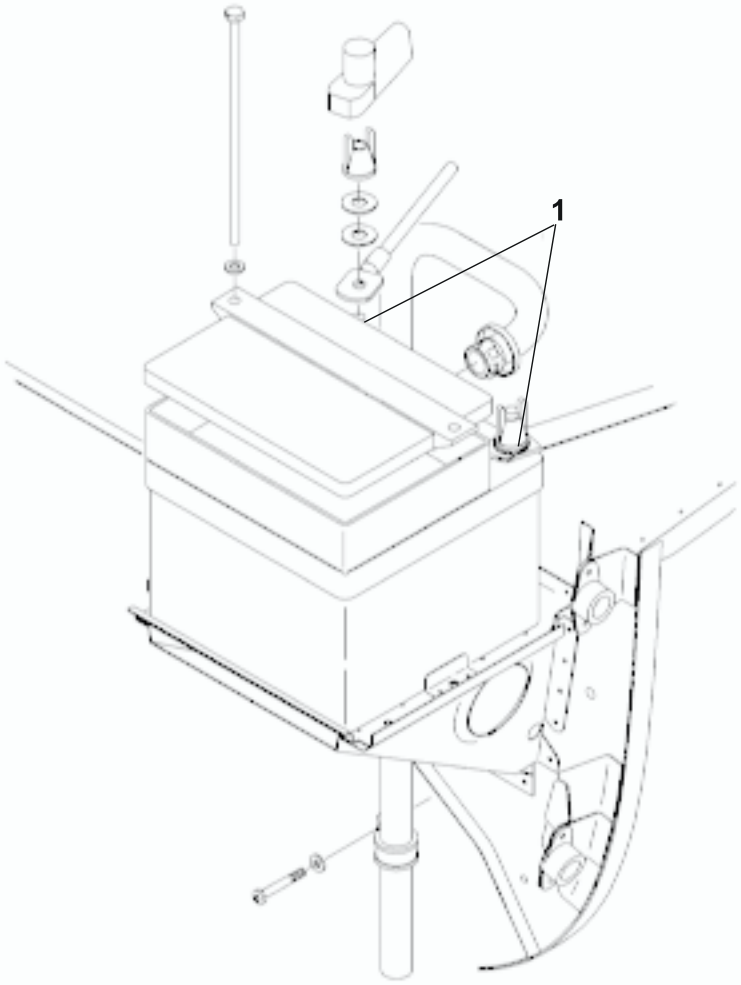
2. Battery Terminal Lubrication

A. Battery terminals should be lubricated when cables are installed to terminals.

B. Refer to Figure 301 for lubrication requirements of the battery terminals.

Figure 301. Battery Terminals Lubrication

B1671



ITEM NUMBER	ITEM DESCRIPTION	LUBE TYPE	APPLICATION
1	BATTERY TERMINALS	PL	HAND

PL - GREASE, PETROLATUM - VV - P-236

0518T1023

Sheet 1 of 1

LANDING GEAR AND PARKING BRAKE - SERVICING

1. **General**

   A. It is recommended that the airplane be secured in an area free of contamination from sand, dust or other environmental conditions that may contribute to improper lubrication practices.

2. **Wheel Bearing Lubrication**

   A. Wheel bearings should be lubricated every 100 hours.

WARNING: WHEN CLEANING WHEEL BEARINGS, USE LOW PRESSURE SHOP AIR TO DRY BEARINGS. DO NOT SPIN BEARING CONES WITH COMPRESSED AIR. DRY BEARINGS WITHOUT LUBRICATION MAY EXPLODE AT HIGH RPM.

   B. Refer to Figure 301 for lubrication requirements of the wheel bearings.

3. **Nose Gear Torque Link Lubrication**

   A. Nose gear torque links should be lubricated every 50 hours.

   B. Refer to Figure 301 for lubrication requirements of the nose gear torque links.

4. **Shimmy Dampener Pivots Lubrication**

   A. Shimmy dampener pivots should be lubricated on an as needed basis and when assembled or installed.

   B. Refer to Figure 301 for lubrication requirements of the shimmy dampener pivots.

5. **Steering System Needle Bearing Lubrication**

   A. Steering system needle bearings should be lubricated on an as needed basis and when assembled or installed.

   B. Refer to Figure 301 for lubrication requirements of the steering system needle bearings.

6. **Nose Gear Steering Pushrods Lubrication**

   A. Nose gear steering pushrods should be lubricated every 100 hours using OG lubricant applied with an oil can.

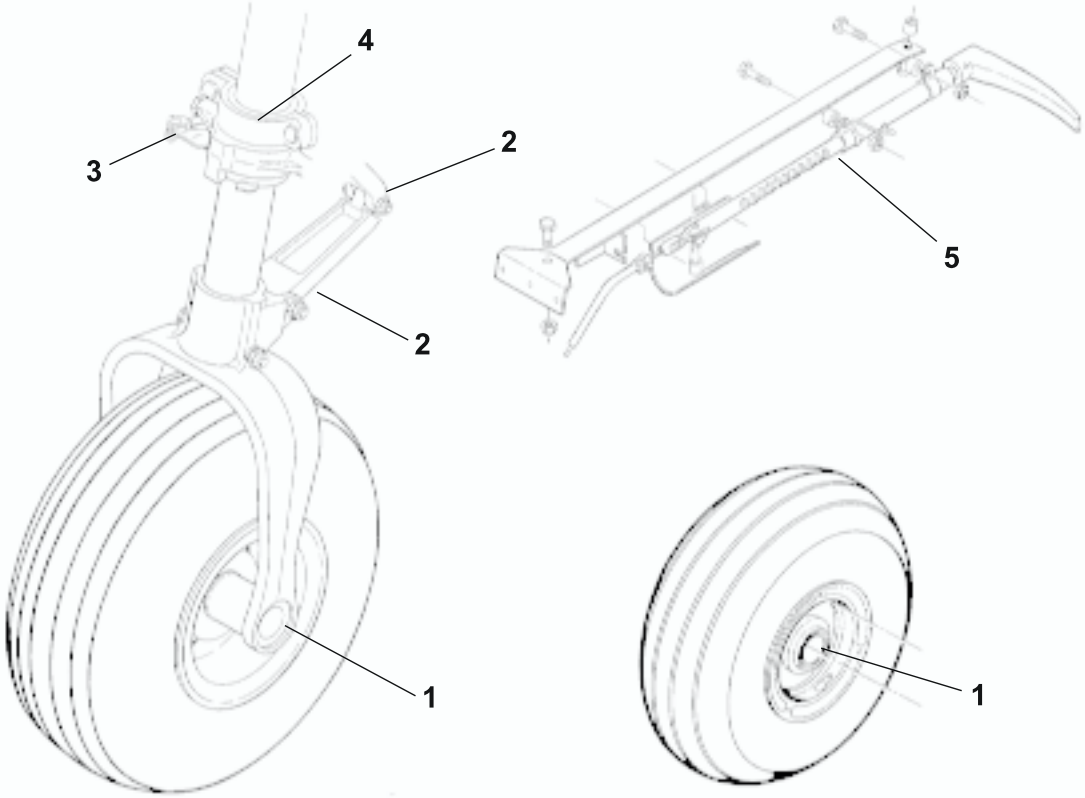
7. **Parking Brake Handle Shaft Lubrication**

   A. The parking brake handle shaft should be lubricated on an as needed basis and when assembled or installed.

   B. Refer to Figure 301 for lubrication requirements of the parking brake handle shaft.

Figure 301. Landing Gear Lubrication

B1672



NOSE GEAR

MAIN GEAR

ITEM NUMBER	ITEM DESCRIPTION	LUBE TYPE	APPLICATION
1	WHEEL BEARINGS	GR	HAND
2	TORQUE LINKS	GR	GUN
3	SHIMMY DAMPER PIVOTS	OG	OIL CAN
4	NEEDLE BEARINGS	GR	HAND
5	PARKING BRAKE HANDLE SHAFT	OG	OIL CAN

GR - GREASE, GENERAL PURPOSE - (MIL-G-81322)
OG - OIL, GENERAL PURPOSE - (MIL-L-7870)

0542T2001
0514T3001
0541T3001

Sheet 1 of 1

FLIGHT CONTROLS - SERVICING

1. General

A. It is recommended that the airplane be secured in an area free of contamination from sand, dust or other environmental conditions that may contribute to improper lubrication practices.

2. Aileron System Lubrication

A. Bearings in the control column should be lubricated on an as needed basis and when assembled or installed.

B. Piano hinges on the ailerons should be lubricated on an as needed basis and when assembled or installed.

C. Needle bearings on the aileron bellcrank should be lubricated every 1,000 hours.

D. Rod end bearings on the aileron bellcrank should be lubricated every 1,000 hours.

E. Refer to Figure 301 for lubrication requirements of the aileron system.

3. Flap System Lubrication

A. Flap motor screw jack threads should be lubricated every 100 hours. To lubricate the jack screw, operate flaps to full down position, clean screw threads with solvent rag, dry with compressed air and lubricate per Figure 302 .

NOTE: It is not necessary to remove actuator from airplane to clean or lubricate threads.

B. Needle bearings should be lubricated on an as needed basis and when assembled or installed.

C. Refer to Figure 302 for lubrication requirements of the flap system.

4. Elevator System Lubrication

A. Bearings in the trim wheel controls should be lubricated on an as needed basis and when assembled or installed.

B. Trim tab piano hinges should be lubricated on an as needed basis and when assembled or installed.

C. The trim tab actuator should be lubricated on an as needed basis. If trim tab inspection reveals excessive free play, the first item of recourse should be to lubricate and remeasure. Lubrication is accomplished by unscrewing the jackscrew and applying lubricant to the internal portion of the actuator. This lubrication may bring free play back with limits. If not, actuator should be overhauled.

NOTE: Carefully count and record the number of turns required to remove jackscrew from actuator. Upon reassembly, the jackscrew should be threaded into the actuator using exactly the same number of turns as recorded during disassembly.

D. Refer to Figure 303 for lubrication requirements of the elevator system.

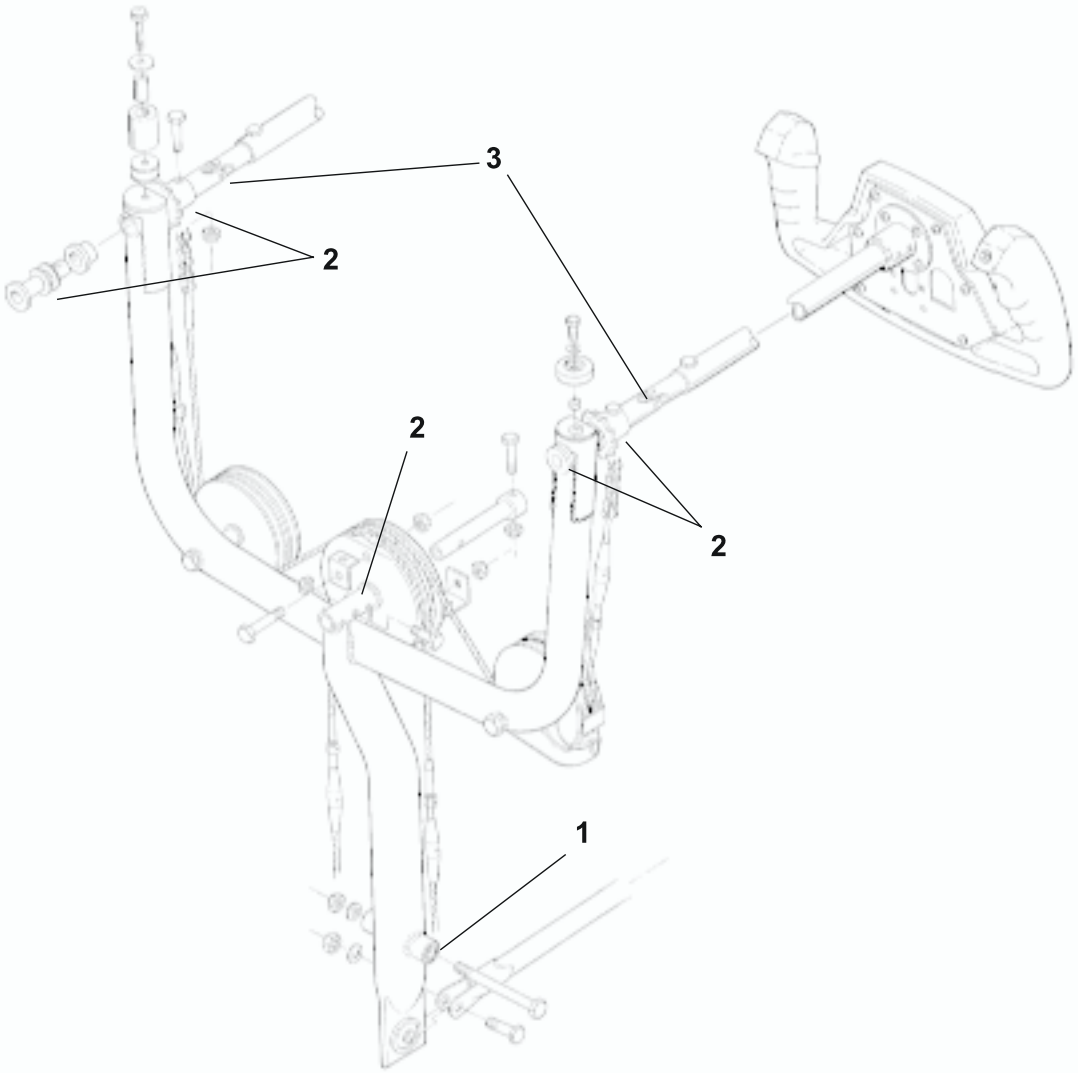
5. Rudder System Lubrication

A. The rudder bar bearings and linkage point pivots should be lubricated on an as needed basis and when assembled or installed.

B. Refer to Figure 304 for lubrication requirements of the rudder system.

Figure 301. Aileron System Lubrication

B1673

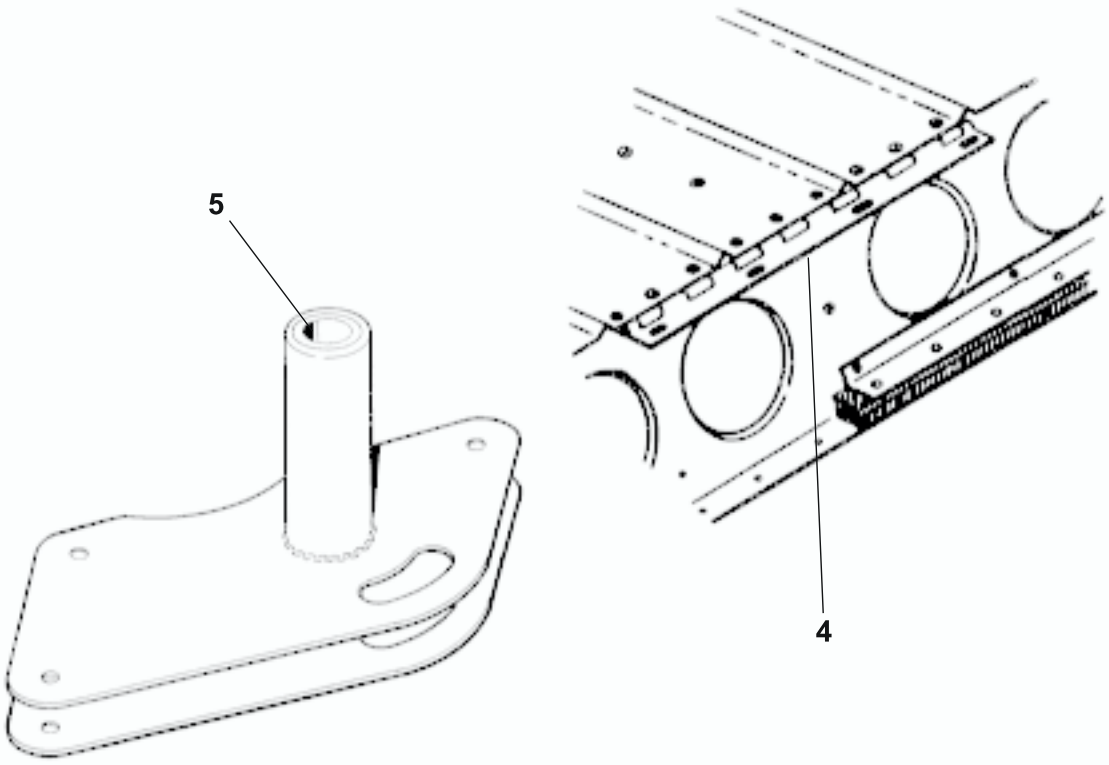


ITEM NUMBER	ITEM DESCRIPTION	LUBE TYPE	APPLICATION
1	NEEDLE BEARINGS	GR	HAND
2	BUSHINGS AND OILITE BEARINGS	OG	OIL CAN
3	CONTROL TUBE UNIVERSAL JOINTS	OG	OIL CAN

0560T3001

Sheet 1 of 2

B1674



ITEM NUMBER	ITEM DESCRIPTION	LUBE TYPE	APPLICATION
4	ALL PIANO HINGES	PG	SYRINGE
5	BELLCRANK NEEDLE BEARINGS	GR	HAND

GR - GREASE, GENERAL PURPOSE - (MIL-G-81322)
OG - OIL, GENERAL PURPOSE - (MIL-L-7870)
PG - POWDERED GRAPHITE - (SS-G-659)

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0561T1001

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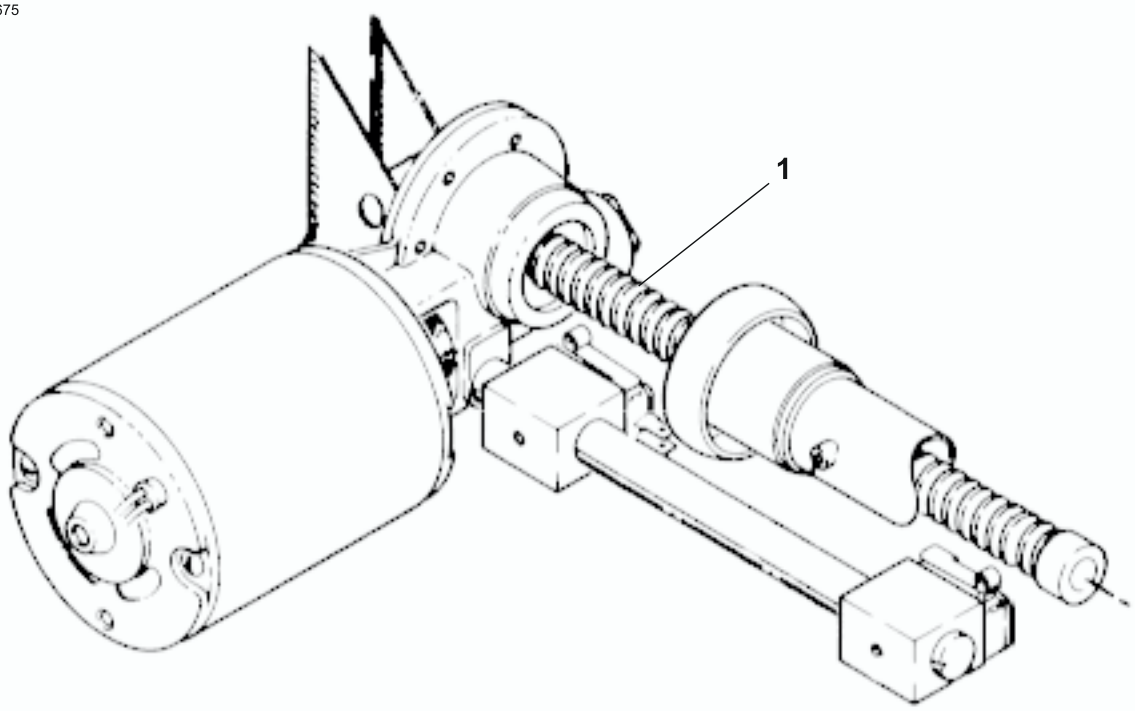
Figure 302. Flap System Lubrication

B1675



ITEM NUMBER	ITEM DESCRIPTION	LUBE TYPE	APPLICATION
1	SCREW JACK THREADS	GP	OIL CAN

GP - OIL, NO. 10 WEIGHT, NONDETERGENT

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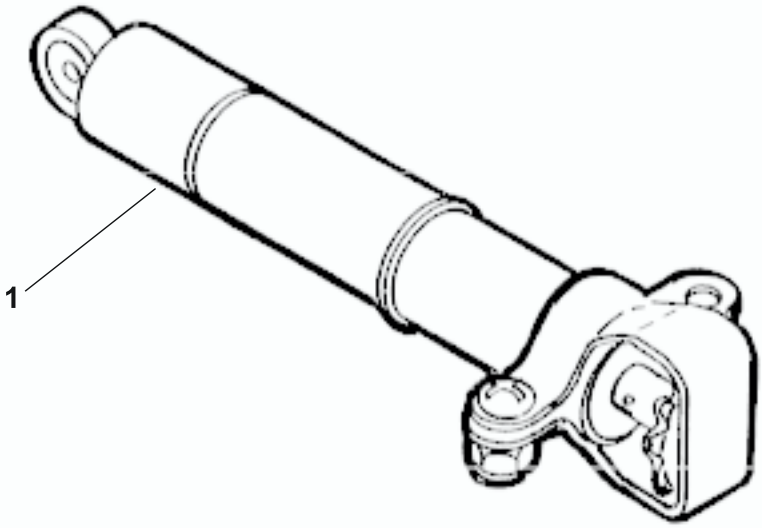
Sheet 1 of 1

Figure 303. Elevator Trim Lubrication

B1676



ITEM NUMBER	ITEM DESCRIPTION	LUBE TYPE	APPLICAITION
1	ELEVATOR TRIM TAB ACTUATOR	GL	HAND

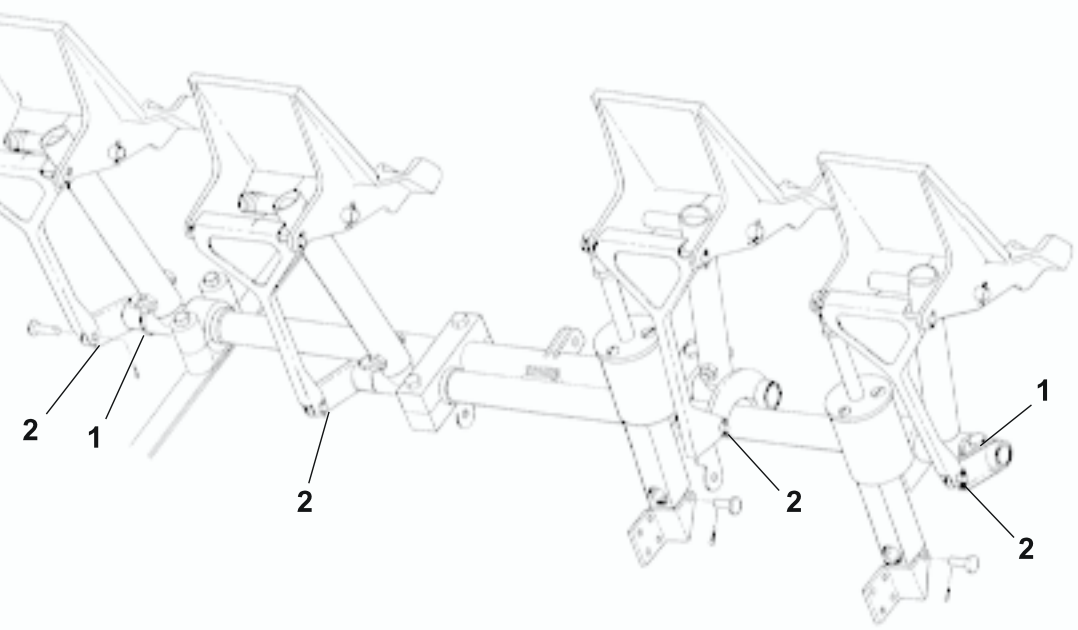
GL - MOLYBDENUM DISLULFIDE GREASE - (MIL-G-21164)

0563T1004

Sheet 1 of 1

Figure 304. Rudder Pedals Lubrication

B1677



ITEM NUMBER	ITEM DESCRIPTION	LUBE TYPE	APPLICATION
1	OILITE BEARING (RUDDER BAR ENDS)	OG	OIL CAN
2	ALL LINKAGE PIVOT POINTS	OG	OIL CAN

OG - OIL, GENERAL PURPOSE - (MIL-L-7870)

0562T2002

Sheet 1 of 1

ENGINE CONTROL CABLES - SERVICING

1. General

A. It is recommended that the airplane be secured in an area free of contamination from sand, dust or other environmental conditions that may contribute to improper lubrication practices.

2. Engine Control Cables Lubrication

A. All housed, pull-type, push-pull or vernier controls should have each outer housing lightly lubricated internally with VV-L-800 General Purpose Lube Oil.

HEATING AND VENTILATION CONTROL CABLES - SERVICING

1. General

A. It is recommended that the airplane be secured in an area free of contamination from sand, dust or other environmental conditions that may contribute to improper lubrication practices.

2. Heating And Ventilation Control Cables Lubrication

A. All housed, pull-type, push-pull or vernier controls should have each outer housing lightly lubricated internally with VV-L-800 General Purpose Lube Oil.

AIRPLANE EXTERIOR - CLEANING/PAINTING

1. General

A. The airplane should be washed frequently in order to maintain its appearance and minimize corrosion. The painted area of the airplane should be polished at periodic intervals to remove chalking paint and restore its gloss.

B. Water/detergent cleaning is the preferred method to clean the exterior surface of the airplane.

2. Precautions

A. Read and adhere to all manufacturers instructions, warnings and cautions on the cleaning/solvent compounds used.

B. Do not use silicone based wax to polish the airplane exterior. Silicone based wax, especially if buffed to produce a high shine, will contribute to the build up of P-static.

C. Do not park or store airplane where it might be subjected to direct contact with fluid or vapors from methanol, denatured alcohol, gasoline, benzene, xylene, methyl n-propyl ketone, acetone, carbon tetrachloride, lacquer thinners, commercial or household window cleaning sprays, paint strippers or other types of solvents.

D. Do not leave sun visors up against windshield when not in use. The reflected heat from these items causes elevated temperatures on the windshield. If solar screens are installed on the inside of the airplane, ensure they are the silver appearing, reflective type.

3. Preventive Maintenance

A. Keep all surfaces of windshields and windows clean.

B. If desired, wax acrylic surfaces.

C. Carefully cover all surfaces during any painting, powerplant cleaning or other procedure that calls for use of any type of solvent or chemical. Table 701 lists approved coatings for use in protecting surfaces from solvent attack.

Table 701. Approved Protective Coatings

NAME	NUMBER	MANUFACTURER	USE
Spray	MIL-C-6799, Type 1, Class II	Available Commerically	Protect surfaces from solvents.
Masking Paper	WPL-3	Champion Intl. Corp. Forest Product Division 7785 Bay Meadows Way Jacksonville , FL 32256	Protect surfaces from solvents.
Poly-Spotstick	SXN	Champion Intl. Corp.	Protect surfaces from solvents.
Protex 40		Mask Off Company 345 Marie Avenue Monrovia , CA	Protect surfaces from solvents.

4. Windshield and Window Cleaners

CAUTION: Do not use gasoline, alcohol, benzene, acetone, carbon tetrachloride, fire extinguisher fluid, deicer fluid, lacquer thinner or glass window cleaning spray. These solvents will soften and craze the plastic.

NOTE: Equivalent substitutes may be used for the following items:

Table 702. Windshield and Window Cleaners/Polishers

NAME	NUMBER	MANUFACTURER	USE
Mild soap or detergent (hand dishwashing type without abrasives)		Commercially Available	Cleaning windshields and windows.
Aliphatic Naphtha Type II	Federal Specification TT-N-95	Commercially Available	Removing deposits which cannot be removed with mild soap solution on acrylic windshields and windows.
Turtle Wax (paste)		Commercially Available	Waxing acrylic windshields and windows.
Permatex Plastic Cleaner No. 403D	Federal Specification P-P-560	Permatex Company, Inc. Kansas City , KS 66115	Waxing acrylic windshields and windows.
Soft cloth (cotton flannel or cotton terry cloth)		Commercially Available	Applying and removing wax and polish.

5. Cleaning Windshield and Windows

CAUTION: Windshields and windows are easily damaged by improper handling and cleaning techniques.

CAUTION: Do not use any of the following for cleaning windshields and windows: methanol, denatured alcohol, gasoline, benzene, xylene, methyl n-propyl ketone, acetone, carbon tetrachloride, lacquer thinners, commercial or household window cleaning sprays.

A. Refer to Table 702 for cleaning materials.

B. Windshield Cleaning Procedures.

(1) Place airplane inside hanger or in shaded area and allow to cool from heat of suns direct rays.

(2) Using clean (preferably running) water, flood surface. Use bare hands with no jewelry to feel and dislodge any dirt or abrasive materials.

(3) Using a mild soap or detergent (such as dish washing liquid) in water, wash surface. Again use only bare hands to provide rubbing force. (A clean cloth may be used to transfer soap solution to surface, but extreme care must be exercised to prevent scratching surface.)

(4) On acrylic windshields and windows only, if soils that cannot be removed by a mild detergent remain, Type II aliphatic naphtha applied with a soft clean cloth may be used as a cleaning solvent. Be sure to frequently refold cloth to avoid redepositing soil and/or scratching windshield with any abrasive particles.

(5) Rinse surface thoroughly with clean fresh water and dry with a clean cloth.

6. Waxing and Polishing Windshield and Windows

CAUTION: Do not use rain repellent on acrylic surfaces.

NOTE: Windshields and windows must be cleaned prior to application of wax. When applying and removing wax and polish, use a clean soft cloth.

A. Refer to Table 702 for polishing materials.

B. Hand polishing wax (or other polish meeting Federal Specification P-P-560) should be applied to acrylic surfaces. The wax has an index of refraction nearly the same as transparent acrylic and tends to mask any scratches on windshield surface.

7. Aluminum Surfaces

A. Aluminum surfaces require a minimum of care, but should never be neglected. The airplane may be washed with clean water to remove dirt and may be washed with non alkaline grease solvents to remove oil and/or grease. Household type detergent soap powders are effective cleaners, but should be used cautiously, since some of them are strongly alkaline. Many good aluminum cleaners, polishes and waxes are available from commercial suppliers of airplane products.

8. Painted External Surfaces

CAUTION: Do not let solvents come in contact with the external graphics. The external graphics can be easily damaged by contact with solvents. For care and cleaning of the external graphics, refer to Chapter 12, Exterior Graphics - Maintenance Practices .

A. Generally, the painted surfaces can be kept bright by washing with water and mild soap, followed by a rinse with water and drying with cloths or a chamois. Harsh or abrasive soaps or detergents which could cause corrosion or scratches should never be used. Remove stubborn oil and grease with a cloth moistened with Stoddard solvent.

B. To seal any minor surface chips or scratches and protect against corrosion, the airplane should be waxed regularly with a good automotive wax applied in accordance with the manufacturers instructions. If the airplane is operated in a seacoast area or other salt water environment, it must be washed and waxed more frequently to assure adequate protection. Special care should be taken to seal around rivet heads and skin laps, which are the areas susceptible to corrosion. A heavier coating of wax on the leading edges of the wings and tail and on the cowl nose cap and propeller spinner will help reduce the abrasion encountered in these areas. Reapplication of wax will generally be necessary after cleaning with soap solutions or after chemical deicing operations.

9. Engine and Engine Compartment Washing

A. Notes and Precautions.

(1) An engine and accessories wash down should be accomplished during each 100 hour inspection to remove oil, grease, salt corrosion or other residue that might conceal component defects during inspection. Also, periodic cleaning can be very effective In preventive maintenance.

(2) When working with cleaning agents, protective devices (rubber gloves, aprons, face shields, etc...) should be worn. Use the least toxic of available cleaning agents that will satisfactorily accomplish the work.

(3) All cleaning operations should be performed in a well ventilated work area.

(4) Adequate fire fighting and safety equipment should be available.

WARNING: Do not smoke or expose a flame within 100 feet of the cleaning area.

(5) Compressed air, if used to apply solvent or to dry components, should be regulated to lowest practical pressure.

(6) Use of a stiff bristle brush (as opposed to a steel brush) is recommended if cleaning agents do not remove excess grease and grime during spraying.

B. Cleaning Procedures.

(1) Remove engine cowling.

(2) Carefully cover the coupling area between vacuum pumps and engine drive shafts so no cleaning solvent can reach coupling or seal.

(3) Cover open end of the vacuum discharge tubes.

(4) If engine is contaminated with salt or corrosive chemicals, first flush engine compartment with fresh water.

CAUTION: Do not use gasoline or other highly flammable substances for wash down.

CAUTION: Do not attempt to wash an engine which is still hot or running. Allow engine to cool before cleaning.

CAUTION: Care should be exercised to not direct cleaning agents or water streams at openings on the starter, magnetos, alternator or vacuum pump.

(5) Apply solvent or cleaning agent to engine compartment. The following solutions (or their equivalent) can be used to satisfactorily clean the engine compartment:

(a) Stoddard Solvent (Specification P-D-680, Type II).

(b) Water alkaline detergent cleaner (MIL-C-25769 mixed 1 part cleaner, with 2 to 3 parts water and 8 to 12 parts Stoddard Solvent).

(c) Solvent based emulsion cleaner (MIL-C-4361 mixed 1 part cleaner with 3 parts Stoddard Solvent).

(6) After applying solvent, thoroughly rinse with clean warm water.

NOTE: Cleaning agents should never be left on engine components for an extended period of time. Failure to remove them may cause damage to components such as neoprene seals and silicone fire sleeves, and could cause additional corrosion.

(7) Completely dry engine and accessories using clean, dry compressed air.

(8) Remove protective cover over coupling area.

(9) Remove protective cover from vacuum discharge tube.

(10) If desired, engine cowling may be washed with the same cleaning agents, then rinsed thoroughly and wiped dry. After cleaning engine, relubricate all control arms and moving parts as required.

(11) Reinstall engine cowling.

WARNING: Ensure magneto switches are off, throttle is closed, mixture control is in the idle cutoff position, and the airplane is secured before rotating propeller by hand. Do not stand within arc of the propeller blades while turning propeller.

(12) Before starting engine, rotate propeller by hand no less than four complete revolutions.

10. Propeller

A. The propeller should be wiped occasionally with an oily cloth to remove grass and bug stains. In salt water areas, this will assist in corrosion proofing the propeller.

11. Tires and Wheels

A. Remove oil, grease, and mud from tires and wheels with soap and water.

AIRPLANE INTERIOR - CLEANING/PAINTING

1. General

A. Airplane Interior - Cleaning/Painting gives procedures for different types of cleaning agents and cleaning procedures for the interior of the airplane.

2. Interior Cleaning Materials

NOTE: Equivalent alternatives can be used for the items that follow.

NAME	NUMBER	MANUFACTURER	USE
Son Of A Gun		Commercially available	To give protection for interior components (does not include fabric materials).
Fantastic		Commercially available	To general purpose clean interior components and recommended to clean Morbern vinyl.
Aliphatic Naphtha	TT-N-95	Commercially available	To remove tar, asphalt, etc., from interior.
Rug Shampoo		Commercially available	To clean carpet.
Perchloroethylene Cleaning Solvent		Commercially available	To spot clean carpet and seats.
Stoddard Solvent		Commercially available	To clean nylon safety belts.
Ivory Liquid (White or colorless)		Commercially available	To clean seat fabric.
Cheer		Commercially available	To clean seat fabric.
Mr. Clean		Commercially available	Recommended to clean Morbern vinyl.

3. To Clean Interior Panels

A. Interior panels are made of a heavy vinyl and can have a softer Morbern vinyl cover. You can clean the interior panels with a mild detergent solution or with pre-mixed commercial cleaners. You can remove contamination that is not easily removed with aliphatic naphtha. Make sure the cleaners will work on the interior without damge. If it is not sure that the cleaner will cause damage to the interior, apply a small quantity of cleaner to a not visible location and do a test to see if it will cause damage.

4. To Clean Carpet

A. The carpet is made of a polypropylene weave put together with a fire retardant backing. The polypropylene gives stain resistant qualities and normally only minimal maintenance is required.

B. If the carpet becomes contaminated, it can be cleaned with a commercially available carpet cleaning agent.

5. To Clean Seats

A. Fabric seats of the 172R and some 172S are made of a flame retardant Trevira polyester fiber and have fire-retardant and stain-resistant properties. You must clean the seats regularly. Contamination and stains must be cleaned up immediately and the fabric cleaned before the stains set up in the fabric.

B. Table 701 (Procedures to Clean Trevira Fabric on Seats) and Table 702 (Procedures to Clean Morbern Vinyl on Cabin Panels) are given to help in stain removal. The tables have two columns; one with the stain and the other with the procedure to remove the stain. For example, coffee and tea stains are removed with processes 2, 4, 5 and 1. The first step is the application of process 2 (dishwashing liquid with warm water) to the stain. The second step is the application of process 4 (vinegar and water) to the stain. The third step is the application of process 5 (laundry powder and warm water followed by blotting) to the stain. The final step is the application of process 1 (dry cleaning solvent applied to the stain).

Table 701. Procedures to Clean Trevira Fabric on Seats

STAIN	PROCESS/SEQUENCE	STAIN	PROCESS/SEQUENCE
Antacid (Maalox)	1	Infant Formula	2,1
Betadine (Iodine)	2,3,4,6	Ink (ball point)	8
Blood	2,3,5	Motor Oil	1,2,3,4
Catsup	2,3,5	Mud	2,1
Chewing Gum	7,1,2	Petroleum Jelly	1,2
Chocolate Syrup	5,1	Pepto Bismol	6,1
Coffee/Tea	2,4,5,1	Urine	2,3,4
Cola	2,3,4	Suntan Lotion	1,2
Cough Syrup	2	Shoe Polish	1,2,3
Egg	2,3,5,1	Vomit	2,3,4,5
Grape Drink	2,3,4,5	Wax	7,1
Ice Cream	2,3,4,5,1		

1. Apply a small quantity of dry cleaning solvent to the stain. Do not smoke or use near an open flame. Use sufficient airflow.
2. Mix one teaspoon of white or colorless dishwashing liquid with a cup of lukewarm water.
3. Mix one tablespoon of household ammonia with half a cup of water.
4. Mix one part household vinegar with two parts water.
5. Mix a solution of laundry powder with water and leave on the stain according to the label directions. Flush with warm water and wipe dry.
6. Mix one part household bleach with nine parts water. Use a dropper to apply the solution to the stain. Flush with water and wipe dry.
7. Chill area with an ice cube wrapped in a plastic bag. Remove the gum or wax from the surface of the fabric.
8. Apply a small quantity of rubbing alcohol to the ink stain and blot to remove the ink. Continue until the ink is removed.

NOTE: All solutions must be cool when applied to the stain. Heat from the solutions will permanently set the stain.

Table 702. Procedures to Clean Morbern Vinyl on Cabin Panels

STAIN	PROCESS/SEQUENCE	STAIN	PROCESS/SEQUENCE
Blood	4	Mud	3,6
Candy, Ice Cream	14,6	Mustard	3,12,8,6
Chewing Gum	11,6	Paint, Latex	9,6
Crayon	3,12,8,6	Paint, Oil base	2,3
Fruit Stains	14,6	Shoe Polish	13,6
Ink (ballpoint)	1	Soft Drinks	14,6
Ketchup	3,12,8,6	Surface Mildew	8,6
Lipstick, Eyeshadow	13,6	Tar, Asphalt	10,3
Liquor, Wine	14,6	Urine	7,6
Motor Oil, Grease	13,6	Vomit	5,6

1. Apply a small quantity of rubbing alcohol to the ink stain and blot to remove the ink. Continue until the ink is removed.
2. Turpentine in a well ventilated area will remove fresh paint. Dried paint must be moistened carefully with a semi-solid gel-type stripper so that the softened paint can be gently scraped away.

CAUTION: Direct contact with paint strippers will remove the print pattern from vinyl. Paint strippers are very corrosive. Be careful to avoid skin and eye contact. Wear safety equipment, if applicable.

3. Flush with mild soap and water.
4. Rub out any spots with a clean cloth soaked in cool water. If spots remain, use household ammonia and flush with a clean, wet cloth.
5. Sponge the stained area with soapy water that contains diluted bleach until the stain is removed.
6. Flush thoroughly with clean, cool water.
7. Sponge with soapy water that contains a small quantity of household ammonia.
8. Wash with diluted bleach and use a soft brush for difficult stains.
9. Fresh paint can be wiped off with a damp cloth. Hot, soapy water will normally remove dried latex.
10. Remove immediately, as prolonged contact will result in a permanent stain. Use a cloth lightly dampened with mineral spirits or kerosene and rub the stain gently. Work from the outer edge of the stain towards the center in order to prevent the spread of the stain.
11. Scrape off as much as possible with a dull knife. Rub with an ice cube to help make it easier to remove the gum. The remaining gum can then be removed in a well ventilated area with a cloth saturated with mineral spirits. Rub lightly.
12. Flush with a mild detergent and water.
13. Apply a small quantity of mineral spirits with a clean soft cloth. Rub gently. Be careful to not spread the stain. Remove shoe polish as soon as possible, as it contains a dye which will cause a permanent stain.

14. Flush thoroughly with clean, lukewarm water. Repeat as necessary. Scrape the area gently with a dull knife to remove any loose material. Any soiled area remaining after the area dries can be gently rubbed with a cloth spotted with a small quantity of alcohol.

NOTE: All solutions must be cool when applied to the stain. Heat from the solutions will permanently set the stain.

6. To Clean the GDU 1040 Display Lens

NOTE: The Primary Flight Display (PFD) and Multi-Function Display (MFD) are the GDU 1040 displays in airplanes with Garmin G1000.

CAUTION: If possible, do not touch the lens. The GDU 1040 lens has a layer of anti-reflective material which is very sensitive to skin oils, waxes and abrasive cleaners.

CAUTION: Do not use cleaners that contain ammonia. Ammonia will cause damage to the anti-reflective material.

A. Clean the GDU 1040 Display Lens.

(1) Use a clean, lint-free cloth and an eyeglass lens cleaner that is specified as safe for anti-reflective material to clean the lens.

EXTERIOR GRAPHICS - MAINTENANCE PRACTICES

1. General

A. This section gives general instructions for removal/installation and preservation for the exterior graphics (decals) on the airplane.

2. Tools and Equipment

NOTE: Equivalent alternatives can be used from the list of items that follows:

Table 201. Graphics Application Tools

NAME	NUMBER	MANUFACTURER	USE
Isopropyl Alcohol	None	Commercially Available	To prepare airplane surface for graphics application.
Sharpline Primer	None	Sharpline Converting Inc. 1520 S. Tyler Road Box 9608 Wichita , KS 67277	To give additional adhesion of graphics to the airplane around the rivet heads.
Desothane	CA 8000/B900B	PRC-DeSoto International 5454 San Fernando Road (818) 240-2060 Glendale , CA 91209	To seal the edge of a graphic.
Primer Remover	Acti-Sol	Sharpline	To remove the primer.
Dense, closed cell foam block	1 X 2 X 2	Fabricate Locally	To help apply graphics around rivets.
Needle	None	Commercially Available	To puncture air bubbles.
Artists Paint Brush	None	Commercially Available	To apply the primer to the air-plane.
Squeegee	None	Commercially Available	To help apply graphics to the flat surfaces.

NOTE: The table that follows gives a list of paint and related chemicals used on the airplane.

Table 202. Interior and Exterior Paint

NAME	NUMBER	MANUFACTURER	USE
Fuel Bay Primer	Conventional 454-4-1 Base	AKZO Nobel Aerospace Coatings East Water Street Waukegan , IL 60085	Epoxy primer for the inner surfaces of the wing fuel compartments.
Activator	CA109	AKZO Nobel Aerospace Coatings	Used with fuel tank epoxy primer (conventional).
Fuel Bay Primer	High Solids 10P30-5 Base	AKZO Nobel Aerospace Coatings	Epoxy primer for the inner surfaces of the wing fuel compartments.
Activator	EC275		

NAME	NUMBER	MANUFACTURER	USE
		AKZO Nobel Aerospace Coatings	Used with fuel tank epoxy primer (high solids).
Thinner	TR115	AKZO Nobel Aerospace Coatings	Used with fuel tank epoxy primer (high solids).
Overall Primer/Sealer (Note 1)	483-928	Sherwin Williams 16116 E. 13th St. Wichita , KS 67230	Applied to the airplane before topcoat.
Hardener	120-828	Sherwin Williams	Used with Sherwin Williams primer/sealer.
Overall Primer (Note 2)	G2HC 4175	Omega Coatings Corporation PO Box 1319 El Dorado , KS 67042	Applied to the airplane before topcoat.
Hardener	G2HE0175	Omega Coatings Corporation	Used with Omega primer/sealer.
Topcoat (Note 3)	830 Series High Solids Acry Glo Color Code AO-150 (Matterhorn White)	Sherwin Williams	Topcoat overall color.
Hardener	830-081	Sherwin Williams	Used as a catalyst for Acry Glo.
Accelerator	830-H18	Sherwin Williams	Decrease cure time of Acry Glo.
Topcoat (Note 4)	AF3102 Imron High Solids (Matterhorn White)	Du Pont Du Pont Performance Coatings Willmington , DE 19898	Topcoat overall color.
Activator	194S	Du Pont	Used as a catalyst for AF3102 Imron.
Reducer	2165S	Du Pont	Used as a reducer for AF3102 Imron.
Pot Life Extender	TP31124	Du Pont	Extends potlife for AF3102.
Wash Primer	728-014	Sherwin Williams	Treatment of surfaces before the application of primer.
Adduct	702-701		
Heat Resistant Enamel (Gray)	521-520	Sherwin Williams	Engine mount and engine mount hardware in engine compartment.
Cloth	Cheese cloth	Commercially available	Used with solvent to clean airplane exterior.

Note 1: This product is for airplanes manufactured before June 2002.

Note 2: This product is for airplanes manufactured after June 2002.

Note 3: This product is for airplanes manufactured before January 2004.

Note 4: This product is for airplanes manufactured after January 2004.

3. Graphics Removal/Installation

A. Remove the Graphics (Refer to Figure 201).

(1) If you install a new graphic, you must show reference marks on the airplane before you remove the old graphic. The reference marks will help to position the new graphic on the airplane.

CAUTION: Do not heat the airplane surface more than 250F (121C) or damage to the paint will result.

(2) Apply heat with a heat gun to the surface of the graphic.

(3) Carefully separate a corner of the graphic from the airplane.

(4) Apply primer remover between the graphic and airplane to loosen the adhesive-backed graphic. Refer to Table 201 .

CAUTION: Do not pull the graphic out (perpendicular to surface) and away from the airframe. If you do not pull the graphic down (so it is parallel to the surface), you will remove paint from the airplane.

(5) Pull down on the graphic parallel to the surface with a firm, slow movement.

(6) Continue to apply primer remover to the glued side of the graphic as you remove the graphic from the airplane.

(7) Discard the old graphic.

(8) Use the primer remover to remove all adhesive from the airplane.

(a) Make sure all adhesive is removed from areas around the rivet heads.

B. Install the Graphics (Refer to Figure 201).

CAUTION: Install graphics only after the exterior paint is cured. If the paint is not cured, solvents will be left in the film that can cause damage to the graphics.

NOTE: The center hinge method will help to correctly set in position the large graphics.

NOTE: The graphic has a protective backing (paper liner), the adhesive-backed graphic (decal), and a protective outer film.

(1) Use isopropyl alcohol and primer remover as necessary to clean the surface of the airplane. Refer to Table 201 .

(a) Make sure any amount of old adhesive is removed from the airplane surface.

(2) Apply Sharpline Primer on and around each rivet approximately 0.25 inch (6.35 mm) beyond the head with a small artists paint brush. Let the primer dry for 15 minutes at 75F (24C).

(3) To help install large graphics, use reference marks from the old graphic and set the new graphic in position with a piece of masking tape installed vertically across the center of the graphic.

NOTE: The use of the masking tape set vertically across the center of the graphic is known as the center hinge method.

(4) Remove the paper liner from the back of the new graphic to show the adhesive. For large graphics that use the center hinge method, remove one half of the graphic paper liner.

(5) Apply the graphic to airplane.

(a) Use the reference marks from the old graphic to position the new graphic on the airplane.

(b) Use a squeegee to make sure that no wrinkles or bubbles show on the surfaces of the airplane. At the area where the graphic overlays on rivets, the graphic must be stretched over the rivet heads to prevent a wrinkle development.

(c) The graphic must adhere to the top of the rivet and to the area around the airplane structure. Air that has been trapped around the base of the rivets will be removed in a later step.

(6) For large graphics that use the center hinge method, remove the second half of the graphic paper lining.

(a) Use the reference marks from the old graphic to position the new graphic on the airplane.

(b) Use a squeegee to make sure that no wrinkles or bubbles show on the surfaces of airplane. At the area where the graphic overlays on rivets, the graphic must be stretched over the rivet heads to prevent a wrinkle development.

(c) The graphic must adhere to the top of the rivet and to the surrounding airplane structure. Air that has been trapped around the base of the rivets will be removed in a later step.

(7) Remove the premask (outer protective film) from the graphic when it has been fully applied to the airplane.

(a) Use Desothane as an edge sealer to minimize graphic delamination and peel at the vinyl leading edges. Desothane must also be used to promote graphic adhesion where rivets are 0.25 inch (6.35 mm) from the vinyl edges.

(8) Remove any air bubbles from rivets in the steps that follow.

(a) Puncture the air bubble 8 to 12 places around the rivet with a small needle.

(b) Use a heat gun to warm the graphic and structure around each rivet to approximately 125F (52C).

(c) Use a dense, closed cell foam block (Temperfoam or equivalent to work out all bubbles from around the rivet head).

(9) Use a needle to puncture any air bubbles from the flat areas of the graphic.

(10) Use a squeegee to smooth the graphic.

(11) When all bubbles have been removed, warm the full graphic for 10 minutes to 15 minutes at 125F (52C) to 130F (54C).

(12) Remove any primer with primer remover after the surface has cooled to room temperature.

(13) Trim the graphics to be flush with the areas of termination such as the doors and cowl.

(14) Adhesive cure time must be a minimum of 72 hours and recorded in the maintenance log.

4. Exterior Graphics Preservation

A. Clean the Exterior Graphics.

NOTE: The procedures that follow must be obeyed to make sure of the maximum service life for the graphic.

(1) Wash the graphic with soap and water.

(2) Rinse the graphic after you wash it.

(3) If you use a high pressure washer, keep the nozzle at least two feet from the edge of the graphic.

(4) Do not use acetone, methyl n-propyl ketone, toluene, paint thinner, lacquer thinner or other aromatic solvents to clean the graphic.

(5) Test other cleaning solutions on a small corner of the graphic before you use it.

(6) Do not overcoat the graphic with clear paint.

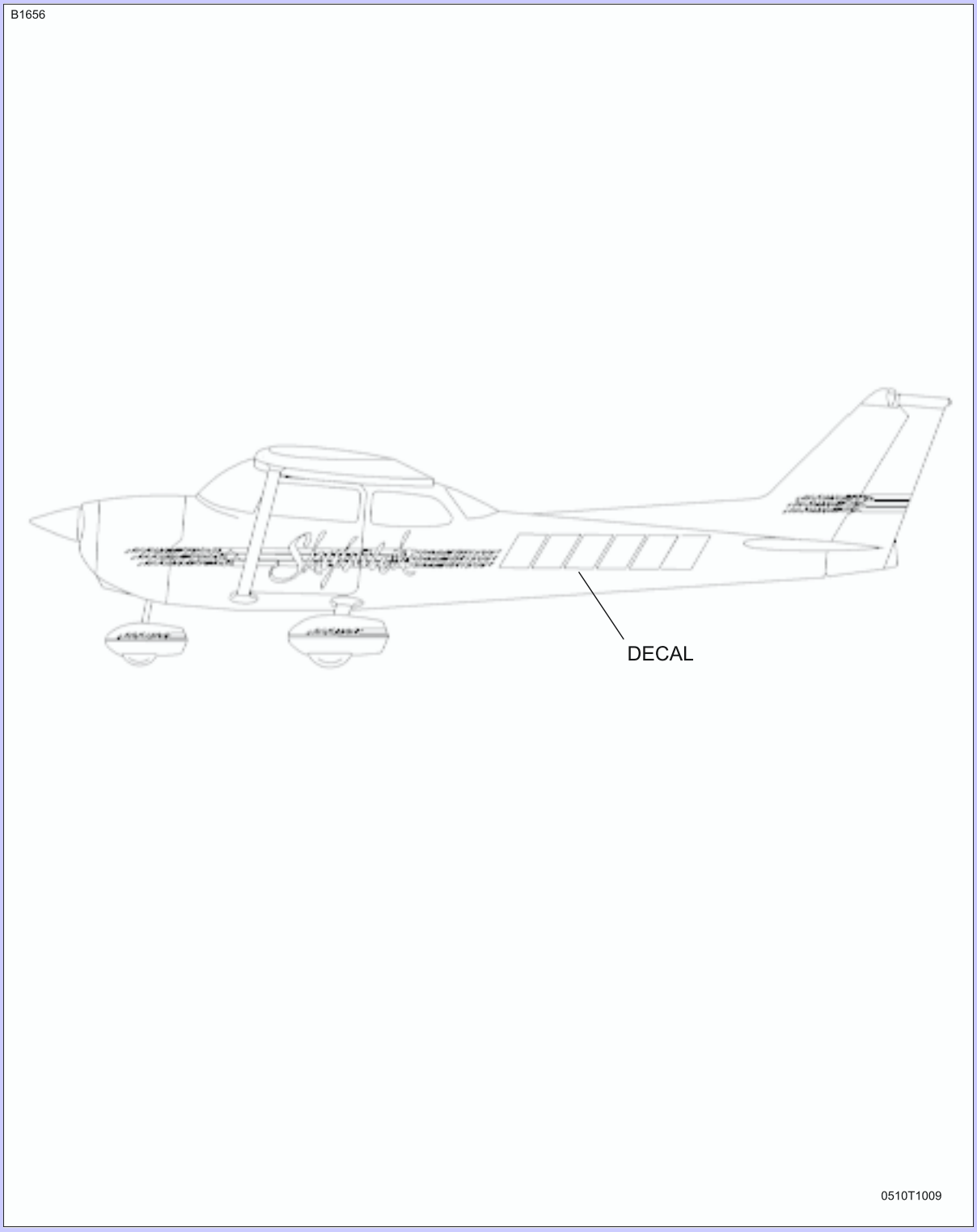
(7) Do not let fuel spill on the graphics.

(a) Wipe off and flush with water immediately if fuel spills on the graphics.

(8) Do not paint over the graphics.

(9) Do not apply wax over the graphics.

Figure 201. Decal Application



Sheet 1 of 1

UNSCHEDULED SERVICING - DESCRIPTION AND OPERATION

1. General

A. This section gives procedures and recommendations for normally unscheduled servicing.

B. Instructions are given in the Cold Soak procedures for operation of the airplane during very cold temperatures.

NOTE: During operation at outside air temperatures below International Standard Atmosphere (ISA) Standard, the engine can develop more than its rated power at normal-rated RPM. This occurs more at lower altitudes.

2. Extreme Weather Maintenance

A. Seacoast and Humid areas.

(1) In salt water areas, special care should be taken to keep engine, accessories, and airframe clean to help prevent oxidation.

(2) In humid areas, fuel and oil should be checked frequently and drained of condensation to prevent corrosion.

3. Cold Soak

A. If extended exposure to cold weather is expected, refer to this procedure to prepare the airplane for cold soak. If the airplane has cold soaked for more than two hours at temperatures colder than -10C (14F), refer to this procedure and the Pilots Operating Handbook and FAA Approved Airplane Flight Manual to prepare the airplane for flight.

(1) Cold temperatures have an effect on control cable tension. Refer to Chapter 27, Aileron Control System - Maintenance Practices , Elevator Control System - Maintenance Practices , Elevator Trim Control - Maintenance Practices , and Flap Control System - Maintenance Practices for flight control cable tensions.

(2) For information on lubrication and greasing of moving parts, refer to Chapter 12, Lubricants - Description and Operation .

(3) Refer to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual for the correct engine oil viscosity.

(4) Refer to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual for additional information on procedures for operation of the airplane in cold temperatures.

B. The engine must be preheated before an engine start when exposed to very cold temperatures. Preheat the engine as follows:

(1) Direct warm air into the engine cooling inlets behind the propeller.

CAUTION: Do not use air with a temperature of more than 120C (248F) when you preheat the engine. Air with a temperature of more than 120C (248F) can do damage to the exterior paint of the airplane.

(2) Make sure that the temperature of the warm air is no more than 120C (248F).

WARNING: Never bring open flames near the airplane. Use of a heater with an open flame to preheat the engine can cause damage to the airplane and injury to personnel.

(3) Do not use a heater with open flames to supply the warm air to preheat the engine.

(4) Preheat the engine before an engine start if the engine temperature is less than -6C (20F).

(5) When the temperature is less than 0C (32F), preheat the engine to more than 0C (32F) before you start the engine again after an engine start and stop.

NOTE: When the temperature is less than 0C (32F), water from combustion can freeze to the engine spark plugs if the engine does not continue to operate after it is started. This will prevent the engine from starting again.

C. The Garmin GDU 1040 PFD/MFD requires warm-up time when exposed to very cold temperatures.

(1) A warm-up time of up to 30 minutes is necessary when the GDU is exposed to down to -40C (-40F) for an extended period.

(2) A warm-up time of up to 15 minutes is necessary when the GDU is exposed to down to -30C (-22F) for an extended period.

D. Before takeoff, preheat the airplane cabin to more than -30C (-22F) for correct operation of the standby altimeter.

NOTE: If there is no warning that an instrument is not operating correctly, all other instruments will operate continuously until at the minimum temperature of the airplane.