## **SECTION 8**

# HANDLING, SERVICING AND MAINTENANCE

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## 8.1 - GENERAL

This section contains the procedures recommended by the manufacturer for the proper ground handling and routine care and servicing of TBM 850 airplane. Also included in this section are the inspection and maintenance requirements which must be followed if your airplane is to retain its performance and dependability.

It is recommended that a planned schedule of lubrication and preventive maintenance be followed, and that this schedule be tailored to the climatic or flying conditions to which the airplane is subjected.

For this, see Manufacturer's Maintenance Manual.

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## 8.2 - IDENTIFICATION PLATE

Any correspondence regarding your airplane should include its serial number. This number together with the model number, type certificate number and production certificate number are stamped on the identification plate attached to the left side of the fuselage beneath the horizontal stabilizer.

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## 8.3 - PUBLICATIONS

When the airplane is delivered from the factory, it is supplied with a Pilot's Operating Handbook and supplemental data covering optional equipment installed in the airplane (refer to Section 9 "Supplements" and pilot's guides).

In addition, the owner may purchase the following:

- Maintenance Manual
- Wiring Manual
- Illustrated Parts Catalog (Bilingual)
- Illustrated Tool and Equipment Manual
- Catalog of Service Bulletins, Service Letters and Service Information Letters

#### CAUTION

PILOT'S OPERATING HANDBOOK MUST ALWAYS
BE IN THE AIRPLANE

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## 8.4 - INSPECTION PERIODS

Refer to regulations in force in the certification country for information concerning preventive maintenance to be carried out.

A maintenance Manual must be obtained prior to performing any preventive maintenance to make sure that proper procedures are followed. Maintenance must be accomplished by licensed personnel.

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## 8.5 - ALTERATIONS OR REPAIRS

It is essential that the Airworthiness authorities be contacted prior to any alterations or repairs on the airplane to make sure that airworthiness of the airplane is not violated. Alterations or repairs must be accomplished by licensed personnel.

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## 8.6 - GROUND HANDLING

#### CAUTION

## ONLY MOVE OR TOW THE AIRPLANE WITH SOMEONE IN THE COCKPIT

**TOWING** 

#### CAUTION

# USING THE PROPELLER FOR GROUND HANDLING COULD RESULT IN SERIOUS DAMAGE, ESPECIALLY IF PRESSURE OR PULL IS EXERTED ON BLADE TIPS

The airplane should be moved on the ground with a towing bar and a suitable vehicle in order not to damage the nose gear steering mechanism. Nose gear fork is equipped with an integrated towing fitting.

#### CAUTION

## DO NOT TOW THE AIRPLANE WHEN CONTROLS ARE SECURED

## WHEN TOWING WITH A VEHICLE, DO NOT EXCEED THE NOSE GEAR TURNING ANGLE, AS THIS MAY RESULT IN DAMAGE TO THE GEAR AND STEERING MECHANISM

(see Figure 8.6.1)

#### PARKING

When parking the airplane, head it into the wind. Do not set the parking brake when brakes are overheated or during cold weather when accumulated moisture may freeze the brakes. Care should be taken when using the parking brake for an extended period of time during which an air temperature rise or drop could cause difficulty in releasing the parking brake or damage the brake system.

Make sure that the fuel selector is set to "OFF".

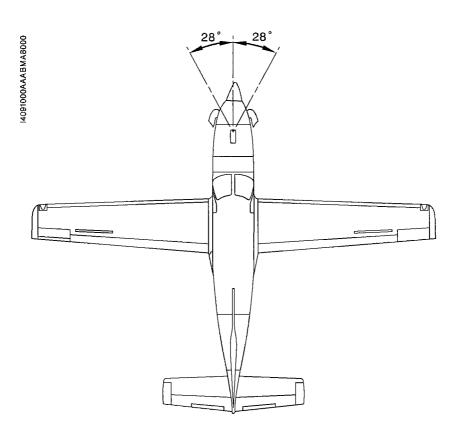


Figure 8.6.1 - TURNING ANGLE LIMITS

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## NOTE:

Do not use solar screens or shields installed on the airplane inside, or leave sun visors down against windshield when airplane on ground. The reflected heat from these items causes a temperature increase which accelerates the crack growth or crazing and may cause the formation of bubbles in the inner layer of multilayer windshields.

Beyond 24 hours parking, use windshield protection screen provided with lateral and underside straps.

For long term parking, blanking covers (static ports, pitot, engine air inlet), cockpit cover, tie-downs, wheel chocks and control lock are recommended.

In severe weather and high wind conditions, tie the airplane down as outlined in the following paragraph.

#### **TIE-DOWN**

Proper tie-down procedure is the best protection against damage to the airplane by gusty or strong winds. To tiedown the airplane securely, proceed as follows:

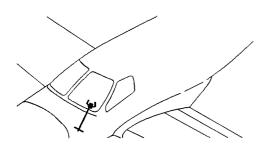
- Install control lock (see Figure 8.6.2).
- Chock all wheels.
- Tie sufficiently strong ropes or chains to hold airplane down; insert a rope in each tie-down hole located on flap hinge arm and in rear tie-down fitting, located under horizontal stabilizer; secure each rope to a ramp tie-down or to mooring rod.
- Check that doors are closed and locked.

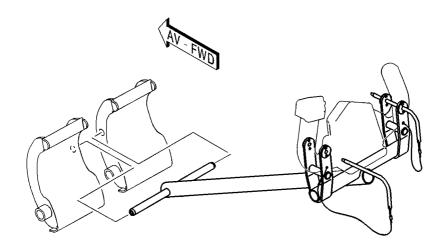
#### **JACKING**

When it is necessary to jack the airplane off the ground, refer to Maintenance Manual for specific procedures and equipment required.

#### LEVELING

Level the airplane as described in Maintenance Manual.





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Figure 8.6.2 - CONTROL LOCK DEVICE

#### FLYABLE STORAGE

Airplanes placed in storage for a maximum of 28 days are considered in flyable storage.

## Storage from 0 to 7 days:

- Engine: according to Maintenance Manual P & W C.

## Airplane fueling:

 Keep fuel tanks full to minimize condensation in the tanks. Keep the battery fully charged to prevent the electrolyte from freezing in cold weather.

Close oxygen cylinder isolation valve.

## Storage from 8 to 28 days:

- Engine: according to Maintenance Manual P & W C.

## Airplane fueling:

 Keep fuel tanks full to minimize condensation in the tanks. Keep the battery fully charged to prevent the electrolyte from freezing in cold weather.

Close oxygen cylinder isolation valve.

Battery (remaining in the airplane or removed):

- Disconnect battery and check its charge level at regular intervals.

## LONG TERM STORAGE WITHOUT FLYING

Refer to Maintenance Manual for the procedures to follow.

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## 8.7 - SERVICING

#### **MAINTENANCE**

In addition to the preflight inspection (refer to Section 4, "Normal Procedures"), servicing, inspection and test requirements for the airplane are detailed in the Maintenance Manual.

Maintenance Manual outlines all items which require attention at 100, 300 and 600 hour intervals (for airframe), 100 and 300 hour intervals (for GTP) plus those items which require servicing, inspection or testing at special intervals, first 100 flight hours and yearly inspection.

#### **ENGINE OIL**

## Type of oil:

#### CAUTION

#### DO NOT MIX DIFFERENT BRANDS OR TYPES

Nominal viscosity	US specification (US)	French specification (FR)	English specification (UK)	NATO code
Type 5cSt	MIL-L-23699C Amdt 1	MIL-L-23699C Amdt 1	DERD 2499 Issue 1	O.156

Figure 8.7.1 - RECOMMENDED ENGINE OIL TYPES (Reference : Service Bulletin P & W C. No. 14001)

## Oil capacity:

System total capacity:

12.7 Quarts (12 Litres) (oil cooler included)

Usable capacity:

6 Quarts (5.7 Litres)

The engine oil should be changed and the oil filter cleaned at intervals recommended in Pratt & Whitney Canada Service Bulletin No. 14001 which has been updated with revisions and / or Supplements.

Refill through the system filling inlet which is located on the engine upper rear part. A gage located on the filling cap indicates oil level and is calibrated in quarts to maximum level under cold conditions "MAX COLD" and to maximum level under hot conditions "MAX HOT". Normal oil level is approximately one quart below maximum level.

To avoid over servicing of oil tank and high oil consumption, check oil level within 10 minutes after engine shutdown.

If more than 10 minutes but less than 30 minutes have passed and the dipstick indicates that oil is needed, carry out a normal dry motoring cycle and reverify level before adding oil.

If more than 30 minutes have passed and the dipstick indicates that oil is needed, start the engine and run at ground idle (low idle) for 5 minutes. Reverify oil level before adding oil.

#### **FUEL**

Total capacity each tank: 145.3 us gal (550 l).

## NOTE:

To minimize condensation, it is recommended that airplane be refueled after each flight, respecting weight and balance limits.

## **CAUTION**

# NEVER FLY THE AIRPLANE WITH CONTAMINATED (WATER, SAND, RUST, DUST...) OR UNAPPROVED FUEL

Before each flight and after each fueling, using a sampler to bleed off some fuel through each tank and fuel filter drain to detect possible contamination and be sure that fuel used is the proper quality. If there is contamination present, continue draining through all draining points until fuel is free of contamination. If quality of fuel used is not correct, defuel airplane completely and refuel with proper quality fuel.

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#### CAUTION

DURING FUELING OPERATIONS, TAKE CARE NOT TO DAMAGE PNEUMATIC DEICER BOOTS LOCATED ON WING LEADING EDGE.

THE USE OF AVIATION GASOLINE (AVGAS) MUST BE RESTRICTED TO EMERGENCIES ONLY. AVGAS WILL NOT BE USED FOR MORE THAN 150 CUMULATIVE HOURS DURING ANY PERIOD BETWEEN ENGINE OVERHAUL

## **WARNING**

DURING ALL FUELING OPERATIONS, FIRE FIGHTING EQUIPMENT MUST BE AVAILABLE; ATTACH GROUNDING WIRE TO AN UNPAINTED METALLIC PART OF THE AIRPLANE.

DO NOT OPERATE ANY AVIONICS OR ELECTRICAL EQUIPMENT ON THE AIRPLANE DURING FUELING. DO NOT ALLOW OPEN FLAME OR SMOKING IN THE VICINITY OF THE AIRPLANE WHILE FUELING

NOTE:
Use of AVGAS must be recorded in engine module logbook

US Specification (US)	French Specification (FR)	English Specification (UK)	NATO Code	
ASTM-D1655 JET A ASTM-D1655 JET A1 ASTM-D1655 JET B	AIR 3405C Grade F35	DERD 2494 Issue 9	F35 without additive	
MIL-T-5624L Amdt1 Grade JP-4	AIR 3407B	DERD 2454 Issue 4 Amdt 1	F40 with additive	
MIL-T-5624L Amdt1 Grade JP-5	AIR 3404C Grade F44	DERD 2452 Issue 2 Amdt 1	F44 with additive when utilization	
MIL-T-83133A Amdt1 Grade JP-8	AIR 3405C Grade F34	DERD 2453 Issue 4 Amdt 1	F34 with additive S748	
	AIR 3404C Grade F43	DERD 2498 Issue 7	F43 without additive	

Figure 8.7.2 - RECOMMENDED FUEL TYPES (Reference : Service Bulletin P & W C. No. 14004)

## **Fuel additives**

Fuel used must contain an anti-ice additive conforming to MIL-I-27686D or E or MIL-I-85470A specification.

Strict adherence to recommended preflight draining instructions as called for in Section 4 will eliminate any free water accumulations from the tank sumps. While small amounts of water may still remain emulsified in the gasoline, it will normally be consumed and go unnoticed in the operation of the engine.

One exception to this can be encountered when operating under the combined effect of use of certain fuels, with high humidity conditions on the ground followed by flight at high altitude and low temperature. Under these unusual conditions, small amounts of water emulsified can precipitate from the fuel stream and freeze in sufficient quantities to induce partial icing of the engine fuel system.

While these conditions are quite rare and will not normally be a problem to owners and operators, they do exist in certain areas of the world and consequently must be dealt with, when encountered.

Therefore, to alleviate the possibility of fuel icing occurring under these unusual conditions, it is required to add an ethylene glycol monomethyl ether (EGME or DIEGME) compound to the fuel supply.

The introduction of an EGME or DIEGME compound into the fuel provides two distinct effects:

- it absorbs the dissolved water from the fuel
- alcohol has a freezing temperature depressant effect.

EGME or DIEGME must be carefully mixed with the fuel in concentration, it must be between a minimum of 0.06 % and a maximum of 0.15 % by volume. Figure 8.7.3 provides EGME or DIEGME / fuel mixing ratio information.

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#### CAUTION

DO NOT PERMIT THE CONCENTRATE OF EGME OR DIEGME TO COME IN CONTACT WITH THE AIRPLANE FINISH OR FUEL TANK

MIXING OF THE EGME OR DIEGME WITH THE FUEL IS EXTREMELY IMPORTANT. AN EXCESSIVE CONCENTRATION (GREATER THAN 0.15 % BY VOLUME MAXIMUM) WILL RESULT IN DETRIMENTAL EFFECTS TO THE FUEL TANKS BY DETERIORATION OF PROTECTIVE PRIMER, SEALANTS AND SEALS OF SYSTEM AND ENGINE COMPONENTS. USE ONLY BLENDING EQUIPMENT RECOMMENDED BY THE MANUFACTURER TO OBTAIN PROPER PROPORTIONING.

Prolonged storage of the airplane will result in a water buildup in the fuel which "leeches out" the additive. An indication of this is when an excessive amount of water accumulates in the fuel tank sumps. The concentration can be checked using a differential refractometer. It is imperative that the technical manual for the differential refractometer be followed explicitly when checking the additive concentration.

## Fuel and fuel additives in Ukraine and CIS countries

It is possible to use kerosene R.T. with addition of anti-icing liquid:

- liquid "И" - GOST 8313-88

Above-mentioned liquid is added in the quantity equal to 0.3 percent per volume (Reference: Service Bulletin P & W C. No. 14004).

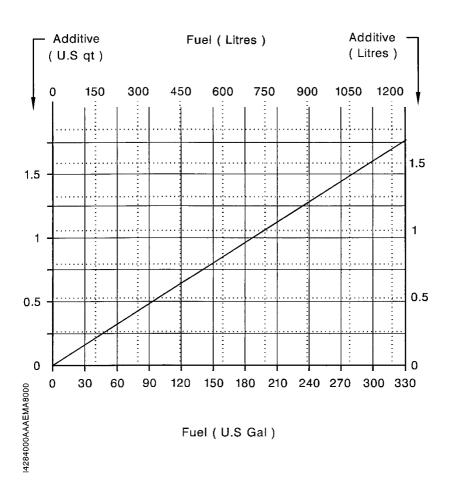


Figure 8.7.3 - ADDITIVE MIXING RATIO (EGME or DIEGME)

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#### LANDING GEAR

## Nose gear tire:

5.00-5 10 PR - Inflation pressure: 98 psi (6.7 bars) \*

## Main gear tires:

18 5.5 10 PR - Inflating pressure : 135 psi (9.32 bars) \*

## Nose gear shock absorber:

Fill with hydraulic fluid AIR 3520 B (MIL.H5606E); inflate with nitrogen to 87 psi (6 bars).

## Main gear shock absorbers:

Fill with hydraulic fluid AIR 3520 B (MIL.H5606E); inflate with nitrogen to 160 psi (11 bars).

## Hydraulic system:

Check every 100 hours and service with AIR 3520 B (MIL.H5606E) hydraulic fluid.

#### Brakes:

Service as required with AIR 3520 B (MIL.H5606E) hydraulic fluid.

#### NOTE:

A higher inflation pressure has to be applied to tires and shock absorbers when in very cold conditions (refer to Chapter 8.9).

(\*) Tire inflation pressures are given for an <u>airplane on ground</u> at 21 °C. An ambient temperature change of 3 °C produces approximately 1 % pressure change.

#### **OXYGEN**

The replenishment device of the oxygen cylinder is installed directly on the cylinder head. It consists of a charging valve and of a pressure gage graduated from 0 to 2000 PSIG. A chart – see Figure 8.7.4, located on the inside of the cylinder service door, gives the cylinder charge maximum pressure according to the environment temperature.

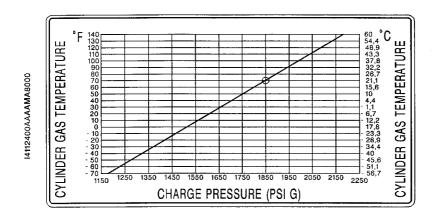


Figure 8.7.4 - Charge pressure chart

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## Replenishment procedure

## **WARNING**

MAKE SURE THAT THE AIRPLANE IS FITTED WITH A GROUDING CABLE AND IS PROPERLY GROUNDED.

THE OXYGEN CART MUST BE ELECTRICALLY BONDED TO THE AIRPLANE.

DO NOT OPERATE THE AIRPLANE ELECTRICAL SWITCHES OR CONNECT/DISCONNECT GROUND POWER DURING OXYGEN SYSTEM REPLENISHMENT.

DO NOT OPERATE THE OXYGEN SYSTEM DURING
REFUELING/DEFUELING OR PERFORM ANY OTHER SERVICING
PROCEDURE THAT COULD CAUSE IGNITION.

INTRODUCTION OF PETROLEUM BASED SUBSTANCES SUCH AS GREASE OR OIL TO OXYGEN CREATES A SERIOUS FIRE HAZARD. USE NO OIL OR GREASE WITH THE OXYGEN REPLENISHMENT EQUIPMENT.

ALWAYS OPEN SHUT-OFF VALVE SLOWLY TO AVOID GENERATING HEAT AND REPLENISH THE SYSTEM SLOWLY AT A RATE NOT EXCEEDING 200 PSIG (13.7 BARS) PER MINUTE

## CAUTION

## REPLENISHMENT OF THE OXYGEN SYSTEM SHOULD ONLY BE CARRIED OUT BY QUALIFIED PERSONNEL

#### NOTE:

The cylinder full charge is assured for a pressure of 1850 PSIG (127 bars) at a temperature of 70°F (21°C). If the cylinder temperature differs from 70°F (21°C), refer to Figure 8.7.4 which lists the required pressures according to the cylinder temperature.

Open the oxygen service door on the R.H. rear karman.

Measure the oxygen cylinder temperature.

Make sure the thermometer indication is constant. Note the indication.

Refer to the temperature/pressure chart for the correct oxygen cylinder pressure.

If the pressure on the oxygen cylinder gage is lower, fill the oxygen cylinder.

Make sure the area around the oxygen cylinder charging valve is clean. Remove the cap from the charging valve.

Make sure the oxygen supply hose is clean and connect it to the charging valve.

Slowly pressurize the oxygen cylinder to the correct pressure.

Close the oxygen supply and let the cylinder temperature become stable.

Monitor the oxygen pressure on the gage and fill to the correct pressure if necessary.

Release the pressure in the oxygen supply hose and disconnect from the charging valve.

Install the cap on the charging valve.

Make sure all the tools and materials are removed and the work area is clean and free from debris.

Close the oxygen service door.

Passengers' masks repacking instructions

## **WARNING**

DO NOT USE OIL OR OTHER PETROLEUM BASED LUBRICANTS ON PASSENGER OXYGEN MASK OR DEPLOYMENT CONTAINER. OIL BASED LUBRICANTS ARE A FIRE HAZARD IN OXYGEN-RICH ENVIRONMENTS

## **WARNING**

REPACKING PROCEDURES SHALL BE PERFORMED BY PERSONNEL FAMILIAR WITH THE INSTRUCTIONS AND WARNINGS IN THIS DOCUMENT. IMPROPERLY PACKED MASKS CAN DAMAGE THE MASKS OR RESULT IN FAILURE OF THE MASKS TO DEPLOY

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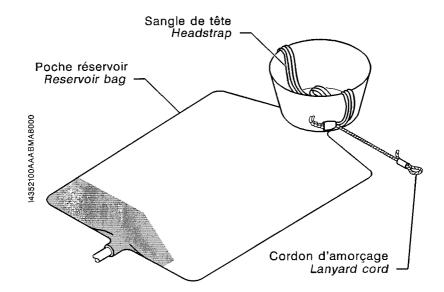
## WARNING

# MASKS SHALL BE REPACKED IN AN AREA FREE OF OIL, GREASE, FLAMMABLE SOLVENTS OR OTHER CONTAMINANTS

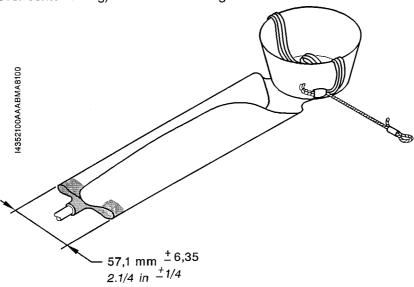
Inspect and disinfect mask and deployment container with an aqueous solution of Zephiran Chloride ("Scott Aviation" P/N 00-2572) or with disinfection cleaners ("EROS" P/N SAN50). After disinfecting and thoroughly drying the mask, lightly dust the outside of the facepiece with Neo-Novacite powder ("Scott Aviation" P/N 00-736). Contamination can be removed with mild soap and water solution.

Fold headstrap into facepiece. Pull lanyard cord out to side of facepiece so that it does not interfere with repacking.

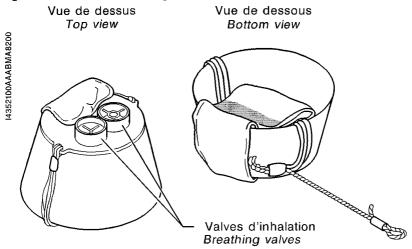
Lay reservoir bag on flat surface and smooth out wrinkles.



Gently fold reservoir bag lengthwise into thirds (outside edges folded inward over center of bag). Do not crease bag.



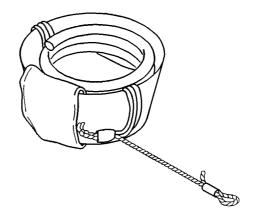
Fold reservoir bag away from breathing valves and into facepiece. Make sure bag does not cover breathing valves.



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Coil oxygen tubing inside facepiece over reservoir bag.





Connect oxygen tubing to manifold oxygen fitting.

## **WARNING**

MAKE SURE LANYARD PIN IS INSERTED INTO CORRECT CHECK VALVE FOR MASK BEING INSTALLED. CROSS CONNECTED PINS WILL RESULT IN PASSENGERS PULLING LANYARD CORDS ONLY TO INITIATE OXYGEN FLOW TO ANOTHER MASK

Insert lanyard pin into corresponding check valve.

Place mask facepiece – first in deployment container. Make sure that oxygen tubing and lanyard cord are free to deploy and are not caught between the container and lid.

Close and latch deployment container lid.

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## 8.8 - AIRPLANE CLEANING AND CARE

## WINDSHIELD AND WINDOWS

The windshield and windows should be cleaned with an airplane windshield cleaner.

#### NOTE:

Refer to the Maintenance Manual for products and procedures to apply.

Apply the cleaner sparingly with soft cloths and rub with moderate pressure until all dirt, oil scum and bug stains are removed. Allow the cleaner to dry, then wipe it off with soft flannel cloth.

#### CAUTION

DO NOT USE ANY OF THE FOLLOWING PRODUCTS ON, OR FOR CLEANING WINDOWS: METHANOL, METHYLATED ALCOHOL, GASOLINE, BENZENE, XYLENE, METHYL-ETHYL-KETONE, ACETONE, CARBON TETRACHLORIDE, LACQUER PAINT THINNERS, COMMERCIAL OR HOUSEHOLD WINDOW CLEANING SPRAYS. IN CASE OF DOUBT CONCERNING A PRODUCT, DO NOT USE IT.

DURING CLEANING OPERATION, AVOID WEARING OBJECTS SUCH AS RING, WATCH, BRACELET AND EXERCISE CARE TO PREVENT BUTTONS, BUCKLES AND ANY HARD OBJECTS FROM TOUCHING THE WINDSHIELD AND THE WINDOWS.

ADHESIF TAPES OTHER THAN MINNESOTA 3M TYPE 670 SHALL NOT BE USED ON ACRYLIC SURFACES.

# NEVER USE BUFFING MACHINES AS EXCESSIVE FORCES OR SPEEDS MIGHT PRODUCE REDHIBITORY DEFECTS

Follow by carefully washing with a mild detergent and plenty of water. Rinse thoroughly, then dry with a clean moist chamois. Do not rub the plastic with a dry cloth since this builds up an electrostatic charge which attracts dust. Waxing will finish the cleaning operation. A thin, even coat of wax polished out by hand with clean soft flannel cloth will fill in minor scratches and help prevent further scratching.

Do not use a canvas cover on the windshield unless freezing rain or sleet is anticipated since the cover may scratch the plastic surface.

#### PAINTED SURFACES

Refer to Maintenance Manual for the products and procedures to apply.

#### **PROPELLER CARE**

Preflight inspection of propeller blades for nicks and cleaning them occasionally with a cloth soaked with soapy water to clean off grass and bug stains will assure long blade life. Small nicks on the propeller, particularly near the tips and on the leading edges, should be dressed out as soon as possible since these nicks produce stress concentrations, and if not removed, may result in cracks. Never use an alkaline cleaner on the blades; remove grease and dirt.

### **ENGINE CARE**

Refer to Maintenance Manual for the procedures to follow.

#### INTERIOR CARE

To remove dust and loose dirt from the upholstery and carpet, clean the interior regularly with a vacuum cleaner.

For additional information, refer to Maintenance Manual.

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# 8.9 - UTILIZATION BY COLD WEATHER (- 0°C TO - 25°C) OR VERY COLD WEATHER (- 25°C TO - 40°C)

## NOTE:

Check pressure values in a hangar heated at about 15°C with control equipment at room temperature.

If a landing is foreseen by cold or very cold weather or in case of airplane prolonged operation in such conditions, it is recommended to prepare the airplane as follows:

- Smear with silicone grease the door and engine cowlings seals, as well as the leading edge deicers.
- 2 Apply engine oil on the engine cowling latches.
- 3 Inflate main landing gear shock absorbers to 247 psi (17 bars) at a room temperature of 15°C.
- 4 Position a 0.59 in (15 mm) shim at the bottom of the piston tube and against forward landing gear half-fork to reduce shock absorber travel. Refill with hydraulic liquid. Remove the shim and inflate shock absorber to 138 psi (9.5 bars) at a room temperature of 15°C.
- 5 Inflate main landing gear tires to 130 psi (8.96 bars) and nose tire to 102 psi (7 bars) at a room temperature of 15°C.

### NOTE:

See Table 1 hereafter to check pressure values and to inflate tires and shock absorbers.

Check pressure values and inflate, if necessary, according to following table 1 during operation in cold weather only:

	OAT (°C)	- 40°	- 30°	- 20°	- 10°	+ 15°
P R F	Main landing gear shock absorber	189 (13)	196 (13.5)	203 (14)	218 (15)	247 (17)
E S S U	Nose gear shock absorber	102 (7)	109 (7.5)	116 (8)	123 (8.5)	138 (9.5)
R E S	Main landing gear tire	144 (9.96)	144 (9.96)	130 (8.96)	130 (8.96)	130 (8.96)
psi (bars)	Nose gear tire	94 (6.5)	94 (6.5)	102 (7)	102 (7)	102 (7)

Table 1

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