SECTION IV
NORMAL PROCEDURES

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SECTION IV

NORMAL PROCEDURES

INTRODUCTION

This section describes the recommended procedures for normal operation in abbreviated checklist form as well as in an amplified presentation. For normal procedures related to special optional equipment refer to Section IX of this Airplane Flight Manual.

AIRSPEEDS FOR NORMAL OPERATION

Phase of Flight	KIAS 2426 lbs (1100 kg)	KIAS 2977 lbs (1350 kg)	Airplane Configuration
TAKEOFF Full Throttle, 2400 RPM - Lift Off - At 50 ft Obstacle	 58* 72	 62* 74	Gear Down Wing Flaps 15° Cowl Flaps as required
CLIMB Max. Climb Rate V_Y Full Throttle, 2400 RPM	at Sea Level 92 at 5000 ft 89 at 10000 ft 85	 98 96 94	Gear Up Wing Flaps 0° Cowl Flaps as required
Best Angle of Climb V_X Full Throttle, 2400 RPM	at Sea Level 70 at 5000 ft 72 at 10000 ft 76	 76 81 85	Gear Up Wing Flaps 0° Cowl Flaps as required
LANDING - Approach at 50 ft - Touchdown	 75* 60*	 80* 65*	Gear Down Wing Flaps 30° Cowl Flaps as required
BALKED LANDING Climb Rate	at Sea Level 68 at Sea Level 730 ft/min	 72 620 ft/min	Gear Down Wing Flaps 30° Cowl Flaps as required
* In calm air only; increase speed by 10 to 15 kts in turbulence conditions.			

Fig. 4-1: Airspeeds for Normal Operation

NORMAL PROCEDURES CHECKLISTS

PREFLIGHT

PREFLIGHT CHECK

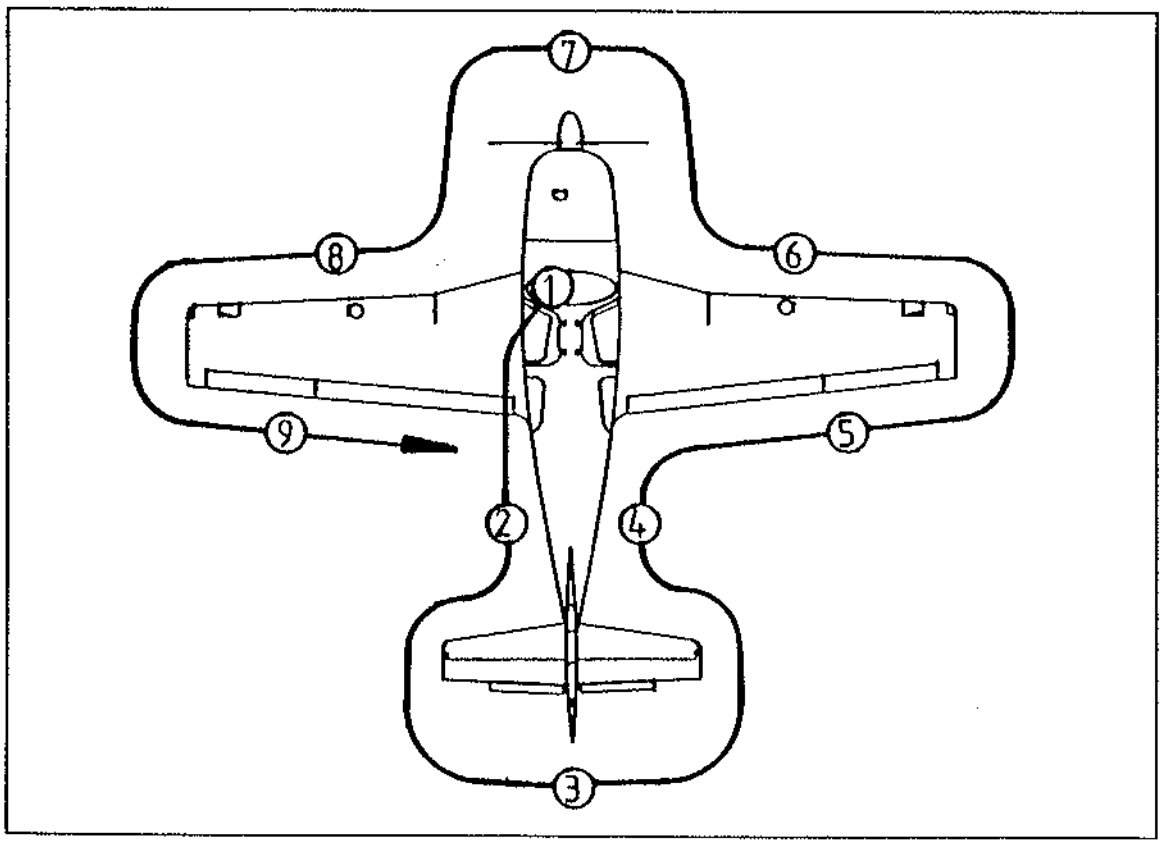

Fig. 4-2: Preflight Walk Around

CAUTION

Any accumulation of ice, snow, or frost has to be removed from the airplane before flight.

① INSIDE THE AIRCRAFT

1. Airplane Flight Manual and Documents - Check for availability and currency status
2. Control Lock Device - Remove
3. Ignition Switch - OFF
4. All Switch and Circuit Breakers - Engaged
5. Landing Gear Switch - DOWN
6. All Switches - OFF or normal position
7. Master Switch - ON
8. Landing Gear Position Indicator Lights - Check for safe indication
9. Fuel Gauge - Check
10. Fuel Selector Valve - Fullest tank
11. Elevator Trim - TAKEOFF range (START)
12. Pitot Heat - Check (Switch on, observe ammeter and annunciator light)
13. Static Source Selector - NORMAL

Note

For night flying, any lighting equipment has to be checked for proper function and a torch must be available and ready for use.

14. Master Switch - OFF
15. Both Fuel Tank Filler Cap Locks - Unlock
16. Cowl Flap - OPEN

② LEFT SIDE of FUSELAGE

17. Windows - Check for cracks and contamination
18. Baggage Compartment - Check and close door
19. Fuselage Side Wall - Check condition
20. Antennas - Check condition
21. Static Port - Clear
22. aft Fresh Air Inlet - Clear

③ EMPENNAGE

23. Horizontal Stabilizer and Elevator - Check
24. Elevator - Check for free movement
25. Elevator Trim Tabs - Check for excessive play, safe connections, condition and tab neutral position
26. Vertical Tail, Rudder and Discharger - Check
27. Position Light - Check
28. Anti-Collision Light - Check condition
29. Tail Skid Tie Down - Release

④ RIGHT SIDE of FUSELAGE

30. Fuselage Side Wall - Check condition
31. Static Port - Clear
32. Windows - Check for cracks and contamination

⑤ REAR PART of RIGHT WING

33. Wing Flap - Check
34. Aileron - Check for safe connection and free movement
35. Wing Tip and Dischargers - Check
36. Position and Anti-Collision Lights - Check

⑥ RIGHT WING LEADING EDGE

37. Fuel Tank Vent - Check for clogging
38. Landing/Taxi Light - Check glazing and condition
39. Wing Leading Edge - Check condition
40. Stall Warning Sensor - Check for free movement
41. Fuel Quantity - Check
42. Filler Cap - Check for tight fit, close cover
43. Wing Tie Down - Release and remove hook
44. Right Main Landing Gear and Wheel Well - Check
45. Main Wheel Tire - Check for correct inflation pressure, wear, and position of skid marking
46. Brake Disc, Caliper and Brake Hose - Check
47. Fuel Tank Sump - Drain. Check drain valve for tightness.

Note

Do not spill fuel to the ground. Only use the fuel sampler provided for draining.

⑦ POWERPLANT

48. Fuel Filter - Drain fuel sample

Note

Do not spill fuel to the ground. Only use the fuel sampler provided for draining.

49. Engine Cowling - Check closed and secured

50. Lower Cowling and Cowl Flaps - Check condition and safe attachment

51. Towing Bar - remove

52. Nose Landing Gear and Strut - Check condition and correct inflation pressure

53. Nose Wheel Tire - Check correct inflation pressure and wear

54. Engine Air Inlets - Remove protective covers

55. Propeller and Spinner - Check for blade play and oil leaks

56. Oil Filling Level - Check, minimum 8.5 l = 9 qts before flight

57. Front Window - Check for cracks and contamination

⑧ LEFT WING LEADING EDGE

58. Fuel Tank Sump - Drain fuel sample. Check drain valve for tightness

Note

Do not spill fuel to the ground. Only use the fuel sampler provided for draining.

59. Left Main Landing Gear and Wheel Well - Check
60. Main Wheel Tire - Check correct inflation pressure, wear, and position of the skid markings
61. Brake Disc, Caliper, and Brake Hose - Check
62. Wing Tie Down - Release and remove hook
63. Fuel Quantity - Check
64. Fuel Tank Filler Cap - Check for tight fit, close cover
65. Wing Leading Edge - Check condition
66. Pitot Tube - Remove pitot cover and check for clogging
67. Landing/Taxi Light - Check glazing and condition
68. Fuel Tank Vent - Check for clogging
69. Position and Anti-Collision Lights - Check
70. Wing Tip and Dischargers - Check

⑨ AFT PART OF LEFT WING

71. Aileron - Check for safe connection and free movement
72. Wing Flap - Check

BEFORE ENGINE STARTING

1. Exterior Check - Completed
2. Seats and Seat Belts - Check secured

Note

Safety belts are to be used during takeoff, landing and flights in turbulence. It is recommended to keep safety belts closed throughout the entire flight.

3. Avionics Master Switch - OFF
4. Cowl Flap - Closed
5. Landing Gear Switch - DOWN
6. Parking Brake - Pull
7. Doors - Closed and locked

Note

For takeoffs during nighttime, position lights must be switched on prior to engine starting.

ENGINE STARTING (COLD)

1. Mixture - Pull back (closed)
2. Propeller - HIGH RPM
3. Throttle - Open 0.5 in (1 cm)
4. Master Switch - ON
5. Anti-Collision Light - ON
6. Voltmeter - Check (~ 24 V)
7. Mixture - FULL RICH
8. Auxiliary Fuel Pump Switch - ON for 4 - 5 sec, then OFF
9. Propeller Area - CLEAR
10. Mixture - Pull back (closed)
11. Ignition Switch - START, then BOTH when engine is running.
12. Mixture - Speedily to FULL RICH when engine starts firing

Note

Cranking of the engine by means of the starter is limited to 30 sec. Allow five (5) min delay between starting trials for cooling down the starter.

13. Throttle - 800 to 1000 RPM
14. Oil Pressure - Check for oil pressure being indicated within 30 sec.

CAUTION

If no oil pressure indication appears within 30 sec shut down engine and investigate malfunction.

15. Ammeter - Check charging current

ENGINE STARTING (HOT)

1. Mixture - Pull back (Closed)
2. Propeller - HIGH RPM
3. Throttle - OPEN 0.5 to 1 in (1-2 cm)
4. Master Switch - ON
5. Anti-Colision Light - ON
6. Propeller - CLEAR
7. Ignition Switch - START, then BOTH when engine is running

When the engine starts firing:

8. Mixture - FULL RICH
9. Throttle - Pull back

Note

Cranking of the engine by means of the starter is limited to 30 sec. Allow five (5) min delay between starting trials for cooling down the starter.

10. Throttle - 800 to 1000 RPM
11. Oil Pressure - Check for oil pressure being indicated within 30 sec (see Page 4-12 CAUTION).
12. Ammeter - Check charging current

BEFORE TAXIING

1. Avionics Master Switch - ON
2. Lighting - as required
3. Directional Gyro - Set
4. Instruments - Check
5. Avionics - Check, select frequencies
6. Altimeter - Set
7. Fuel Selector - Check if engine runs on both tanks
8. Local Aerodrome Information and Taxi Clearance - Request

TAXIING

1. Parking Brake - Release
2. Brakes - Check during taxiing
3. Nose Wheel Steering - Check
4. Directional Gyro - Check when turning during taxiing
5. Turn and Bank Indicator - Check when turning during taxiing
6. Artificial Horizon - Stabilized

BEFORE TAKEOFF

Note

Longer delays with running engine might affect fuel planning.

1. Parking Brake - set
2. All Flight Controls - Check for free and correct movement
3. Elevator Trim - TAKEOFF range (START)
4. Fuel selector - Fullest tank
5. Cowl Flaps - as required
6. Mixture - RICH
7. Throttle - 1900 RPM
8. Check Ignition Magnetos as follows:

   a) Ignition/Starter Switch - from BOTH to R, record RPM

   b) Ignition/Starter Switch - from BOTH to L, record RPM

   c) Ignition/Starter Switch - BOTH

   Engine speed drop should not exceed 175 RPM at each magneto. The difference between the engine speed drop of the left and right magneto should not exceed of 50 RPM.

Note

If there is no engine speed drop the reason might be a defective ground connection or wrong ignition timing. In case of doubt, this check might be repeated at lean mixture and/or increased power in order to comfirm the problem.

9. Propeller - from HIGH to LOW RPM (appr. 1600 - 1700 RPM) and back to HIGH RPM (full forward)
10. Vacuum System - Check within green arc
11. Throttle - Idle
12. Wing Flaps - TAKEOFF (15°)
13. Radios and Avionics - Set
14. Flight Instruments - Check
15. Fuel Selector - Fullest tank
16. Safety Belts and Doors - Locked
17. Parking Brake - Released

TAKEOFF

Note

Closely observe full-power engine operation early in the takeoff run. Any distinct signs of rough engine operation or sluggish engine acceleration are good cause for discontinuing the takeoff.

CAUTION

If the takeoff is to be performed on gravel surface it is important that throttle action is smooth and slow in order to initiate airplane rolling before a high propeller RPM is reached. Gravel or other loose material is blown behind the propeller instead of being sucked into the propeller.

NORMAL TAKEOFF

1. Auxiliary Fuel Pump Switch - ON
2. Wing Flaps - 15°
3. Power - FULL THROTTLE and 2350 - 2400 RPM

Note

For takeoffs at a field elevation of more than 5000 ft, a lean mixture setting might be required in order to obtain a smooth running of the engine.

4. Elevator Control - Pull slightly
5. Lift Off - at 62 KIAS
6. Climb Speed - 76 KIAS
7. Landing Gear - Retract, after a safe positive rate of climb has been established
8. Wing Flaps - Retract, after all obstacles have been passed safely.
9. Climb Speed - 98 KIAS for best rate of climb

CROSSWIND TAKEOFF

Note

The maximum demonstrated crosswind component for takeoff is 16 kts.

1. Auxiliary Fuel Pump - ON
2. Wing Flaps - 15° or 0°
3. Power - FULL THROTTLE and 2350 - 2400 RPM
4. Aileron - Full aileron deflection into the wind. With increasing speed reduce aileron deflection.
5. Elevator Control - neutral
6. Lift-Off - Rapidly at 70 KIAS

Note

The airplane is to be pulled off rapidly to prevent possible settling back to the runway, which might be possible at smooth lift-off. Make a coordinated turn into the wind to correct for drift.

7. Climb Speed - 80 KIAS
8. Landing Gear - Retract, after a safe positive rate of climb has been established.
9. Wing Flaps - Retract, after all obstacles have been passed safely.
10. Climb Speed - 98 KIAS for best rate of climb

CLIMB

1. Airspeed - 92 to 98 KIAS
2. Manifold Pressure - FULL THROTTLE
3. Engine Speed - 2400 RPM
4. Mixture - FULL RICH at altitudes below 5000 ft; at altitudes above 5000 ft lean as necessary to obtain a smooth engine run.
5. Auxiliary Fuel Pump - OFF
6. Cowl Flaps - as required

CRUISE

1. Power - as required
2. Cowl Flaps - as required
3. Engine Speed - 1800 to 2400 RPM
4. Manifold Pressure - green or yellow arc (acc. to RPM)
5. Power - 85 % of Max. Continuous Power or less

Note

For detailed information on cruise power setting refer to Section V of this manual.

6. Mixture - for Best Power or Best Economy.

Note

Leaning of the mixture should be made according to the Exhaust Gas Temperature (EGT) indicator. If this is not possible, leaning may be performed according to the fuel flow data for cruise power provided in Section V of this manual. To obtain Best Power mixture determine the peak EGT first by appropriate leaning and then enrich the mixture again until the EGT is decreased to 100° F below peak EGT. To obtain Best Economy mixture simply set the mixture to peak EGT. Before increasing engine power, the mixture has to be enriched.

CAUTION

When operating at a continuous power of more than 80% the mixture may not be set to peak EGT.

7. Fuel Selector Valve - as required for balanced emptying of both tanks

CAUTION

The difference between lefthand and righthand tank may not exceed 50 l (13.2 US Gal) during flight.

DESCENT

1. Mixture - FULL RICH.

Note

If rough engine operation is observed with mixture full rich appropriate leaning is required to obtain smooth engine operation.

2. Throttle - as required
3. Engine Speed - as required

Note

Adjust manifold pressure and engine speed to maintain cylinderhead and oil temperature within the normal operating range.

4. Cowl Flaps - Closed

BEFORE LANDING

1. Seats and Seatbelts - Adjusted and secured
2. Fuel Selector Valve - Fullest tank
3. Auxiliary Fuel Pump Switch - ON
4. Landing Gear - Extend below 140 KIAS
5. Wing Flaps - 15° below 102 KIAS
6. Mixture - FULL RICH

Note

Maximum demonstrated crosswind component for landing is 16 kts.

LANDING

1. Power - as required
2. Mixture - FULL RICH
3. Approach Speed - 80 KIAS
4. Propeller - HIGH RPM
5. Wing Flaps - 30° below 102 KIAS
6. Airspeed at 50 ft above GND - 75 - 80 KIAS
7. Airspeed at Touchdown - 60 - 65 KIAS
8. Touchdown - Main wheels first
9. Brakes - as necessary

CAUTION

This approach speed constitutes the minimum speed in calm air. An appropriate increase in approach speed is required in case of turbulence or windshear. (typical values 5 to 15 KIAS).

BALKED LANDING

1. Power - FULL THROTTLE and 2350 - 2400 RPM
2. Landing Gear - Retract
3. Airspeed - minimum 72 KIAS
4. Wing Flaps - 15°
5. Cowl Flaps - OPEN

If safe positive rate of climb is established:

6. Airspeed - 80 KIAS
7. Wing Flaps - Retract

AFTER LANDING

1. Wing Flaps - Retract
2. Cowl Flaps - OPEN
3. Auxiliary Fuel Pump - OFF
4. Pitot Heat - OFF

BEFORE LEAVING THE AIRCRAFT

1. Parking Brake - Pull
2. Avionics Master Switch - OFF
3. Electrical Equipment - OFF
4. Mixture - IDLE CUT-OFF
5. Throttle - IDLE

Note

Shut down the engine by pulling the mixture control. Stopping the engine by means of the ignition switch is possible, but torching or backfiring when restarting the engine might occur.

6. Anti-Collision Light - OFF
7. Ignition Switch - OFF
8. Master Switch - OFF

CAUTION

It is incorrect to move the throttle lever forward at engine shutdown as this might cause a dangerous speed increase of the engine up to takeoff RPM when restarting.

PARKING

1. Control Stick - Attach control lock device
2. Pitot Tube - Attach protective cover
3. Engine Air Intake - Attach protective cover
4. Mooring - apply
5. Baggage Compartment Light - OFF
6. Cockpit and Baggage Compartment Doors - Lock

AMPLIFIED NORMAL PROCEDURES

PREFLIGHT

PREFLIGHT CHECK

Prior to each first flight of the day, especially when the aircraft has been parked outside, fuel has to be drained and checked for water and sedimentation. Draining has to be repeated until there is no more water or sedimentation.

A clean transparent container has to be used for fuel sampling. In no case fuel may be discharged to the earth.

The occurrence of condensed water in the fuel tanks can be reduced by always parking the airplane with full fuel tanks.

If the aircraft is frequently parked outside the intakes of the engine cowling should be checked thoroughly for foreign objects. Sometimes the engine cowling is a preferred place for birds to build their nests.

Another potential hazard are ichneumon flies or the larvas of other insects plugging in the pitot tube or static ports.

It is recommended to cover engine cowling and cockpit as well as the pitot tube.

ENGINE STARTING

As the engine does not have a manual primer pump, it is necessary to set the mixture control to full rich for a few seconds with the auxiliary fuel pump switched on before operating the starter. This serves for injecting fuel into the engine. Take care to not maintain the mixture control lever for too long in the forward position, to avoid that too much fuel will be injected and that the wet spark plugs will prevent the engine from firing. In this case, the engine has to be cranked several times with the mixture control in idle cutoff and the throttle full open (lever full forward) until it starts firing.

Note

Cranking of the engine by means of the starter is limited to 30 sec. Allow five (5) min delay between starting trials for cooling down the starter.

When the engine starts firing, turn the ignition switch to BOTH, move the mixture control to full rich and set the engine speed to 800 - 1000 RPM by means of the throttle lever.

TAXIING

Taxi slowly and limit the use of the brakes to a minimum. Use all control surfaces to maintain direction and balance (see Fig. 4-3).

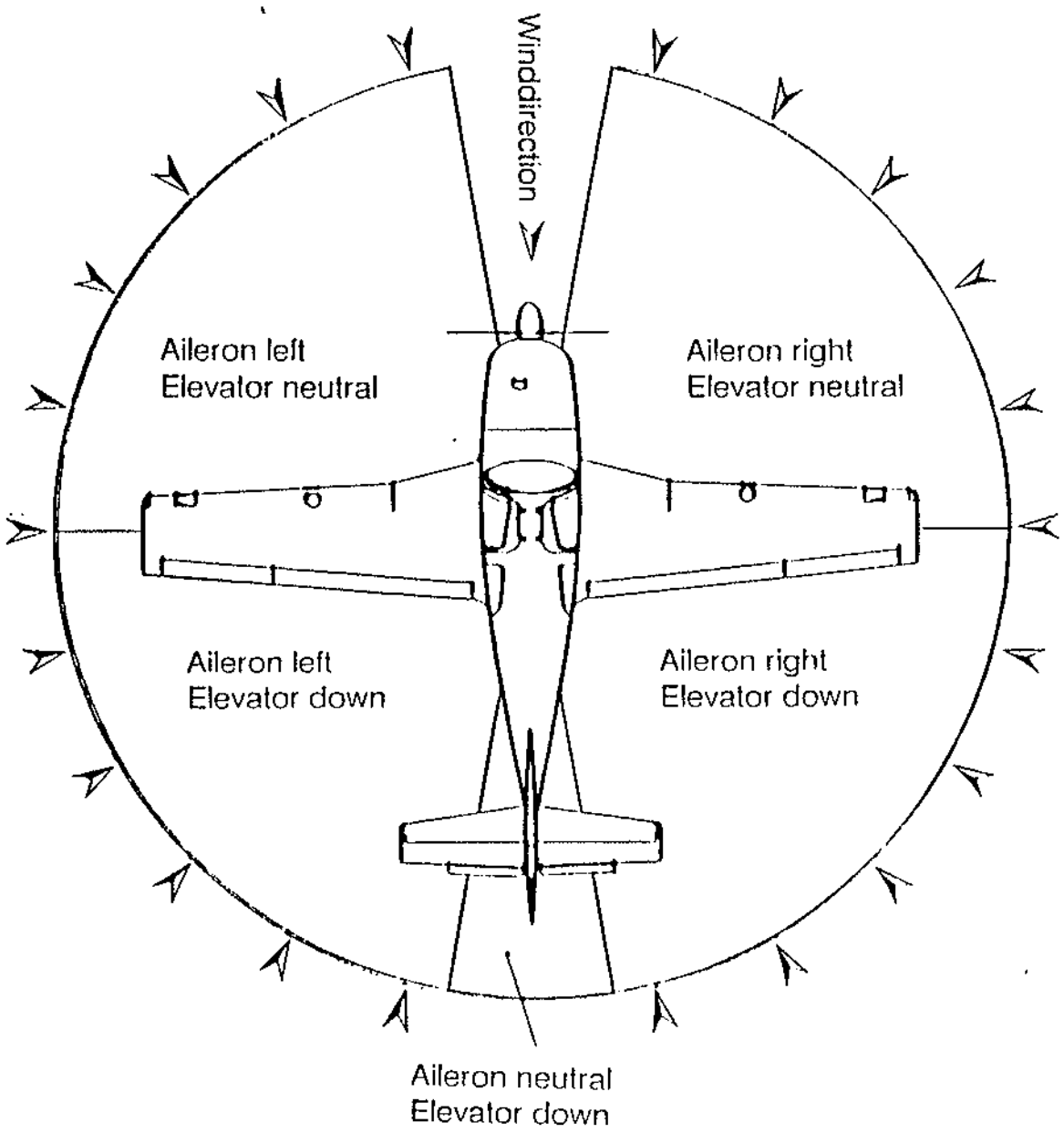

Fig. 4-3: Taxiing Diagram

Note

Use caution when taxiing in strong lateral tailwinds. Sudden throttle movement and heavy braking has to be avoided, when the aircraft is in this position. Use nose wheel steering and rudder to maintain direction.

Taxiing on gravel or cinders is to be performed at low engine speed to avoid abrasion and stone damage to the propeller blade tips.

RUN UP

Allow the engine to warm up until oil and cylinderhead temperature are in the yellow range before performing the runup. Check ignition system at 1900 RPM. The mixture control has to be set to FULL RICH. It is sufficient to limit single magneto operation to just a few seconds. Continued single magneto operation will cause heavy contamination of the spark plugs.

To check the magnetos turn the starter switch (ignition key) from "BOTH" to "R" and back to "BOTH". Maintain this position for a few seconds to allow the spark plugs to burn free. Then switch from "BOTH" to "L" and back to "BOTH". The drop in RPM may not exceed 175 RPM and the difference between "L" and "R" must be less than 50 RPM.

Then pull the propeller control lever to obtain a drop in propeller speed of appr. 300 RPM and return to high RPM. Check immediate response of the governor!

TAKEOFF

Check correct setting of fuel selector, elevator trim, propeller, and mixture control levers and proper functioning of the auxiliary fuel pump (green light).

Check engine speed and manifold pressure when moving the throttle lever. Manifold pressure is depending on density altitude of the airfield. Engine speed has to be approx. 2300 to 2320 RPM static or at low taxiing speeds respectively. During takeoff run, the engine speed will increase.

If sufficient runway length is available, full power should be set only after the first meters of the takeoff run have been passed. This prevents the propeller from sucking in sand or loose gravel. Not only engine speed and manifold pressure are indications of the engine delivering its full power, but also a correct fuel flow of approx. 18.5 - 22.5 US Gal/h (70 - 85 l/h). If there is any inconsistency concerning these indications takeoff has to be aborted.

The swirl of the airstream behind the propeller plane causes an aircraft with a clockwise turning propeller to drift or to veer off to the left. Therefore it is necessary to use right rudder during the takeoff run to countract this effect. Depending on the center of gravity position, the elevator remains in neutral position or slightly pulled.

FLAP SETTINGS

A deflection of the wing flaps increases lift, but also drag in any case. For the R 90-230 RG, only the flap positions 0°, 15° und 30° are selectable. The 15° position is provided for takeoff. This constitutes a good compromise with regard to the rise in lift and drag. There is no reason to use "0°" flaps for takeoff, except in strong crosswind conditions. A takeoff with 30° flaps is not meaningful due to the high drag associated with this configuration.

Flaps should not be retracted during takeoff until any obstacles have been cleared and a safe airspeed (approx. 75 KIAS) has been established.

At soft field takeoffs, lift the airplane off the ground as soon as possible (60 KIAS) in a slightly nose-up attitude. If obstacle situation allows accelerate the aircraft in horizontal attitude close to the ground to obtain a safe airspeed for climbing.

CROSSWIND TAKEOFF

The maximum crosswind component, demonstrated during flight test, is 16 kts.

Depending on field length it has to be decided whether to use a flap setting of 15° or 0° for takeoff. A flap setting of 0° will increase the takeoff run by approx. 20%.

Maintain the airplane as close as possible to the runway centerline by means of rudder and nose wheel steering. Elevator control neutral to slightly nose-down.

Deflect aileron into the wind during takeoff run. Pull off the airplane rapidly from the runway when 70 KIAS have been reached in order to prevent possible settling back to the runway while drifting. After lift-off, perform a coordinated turn into the wind to correct for drift.

CLIMB

For climbing as fast as possible to the intended cruising altitude, the best rate of climb speed V_Y is to be used (see page 4-4). This speed is depending on airplane weight and flight level. At a max. takeoff mass of 1,350 kg at sea level, the best rate of climb speed is 98 KIAS. Power: full throttle at 2400 RPM.

If obstacles ahead of you require a steeper climb gradient, it is recommended to use V_X, the best angle of climb speed, with flaps and landing gear retracted. At max. takeoff mass at sea level the speed is 76 KIAS. However, at this speed, engine cooling cannot be guaranteed in any case. Oil and cylinderhead temperature have to be monitored thoroughly.

To prevent the airplane from skidding during climb, the ball of the turn and bank indicator has to be centered by using the rudder.

Above 5000 ft, mixture should be leaned for best power. At lean mixture, cylinderhead temperature has to be observed carefully. A rich mixture will decrease temperatures.

Note

It is at the discretion of the pilot to perform the climb as required, with an airspeed above V_Y and/or reduced power. A reduction in engine speed to max. 2200 RPM at full manifold pressure will result in the lowest fuel flow. In this case, the data provided on pages 5-24 and 5-25 are invalid.

CRUISE

LEANING PROCEDURE

For economic cruise fuel flow, it is necessary to lean the mixture.

At a power setting of 85% (146 kW = 200 HP) mixture is leaned to Best Power mixture, i.e. 100 °F (4 scale divisions) below peak EGT on the rich side. At any power setting below 80%, mixture is leaned to Best Economy mixture, i.e. exactly to peak EGT.

In order to find the peak EGT point it is very important to move the mixture control lever backwards very slowly in small increments and to wait until the EGT indication has stabilized. If leaning beyond peak EGT, the EGT indication will decrease again. At partial load, i.e. below 75% power, leaning beyond peak EGT is acceptable as long as the engine runs smoothly and free from vibration. The benefit of a lean mixture during cruise is not only to save fuel but also to prevent deposits and sooting in the combustion chamber, at spark plugs, and valves.

CAUTION

Never forget to reset the mixture to FULL RICH for full throttle operation. This is especially important at low altitudes.

ENGINE SPEEDS

A low engine speed may help to considerably reduce the fuel burn. In addition airplane noise will be reduced.

The engine may be operated at speeds between 2200 and 2400 RPM with full manifold pressure at sea level (see page 2-6).

At economical cruise power (45 %), a speed of 1800 RPM is recommended (refer to pages 5-28 ff).

OTHER RECOMMENDATIONS

At the beginning of a cruise leg, it is recommended to always climb to approx. 200 to 300 ft above the intended cruising altitude and then to "dive" to the cruising altitude with some excess airspeed.

Carefully trim the aircraft for level flight. This includes switching from one tank to the other every 30 to 60 minutes, depending on power setting. The ball of the turn and bank indicator has to be centered.

CAUTION

Max. permissible difference between right and left tank is 50 l (13.2 US Gal).

WARNING

If the fuel capacity indication of one tank reads 0 (zero) during level flight, the residual fuel cannot be used safely.

STALLING

The stall characteristics of the airplane are conventional. Aural warnings are provided 5 to 10 kts above actual stalling speeds. Stalling is preceded by aerodynamic buffeting in the elevator control. The buffet is accompanied by a slight lowering of the aircraft nose. If the control stick remains pulled under these conditions a tumbling movement around the longitudinal axis is initiated which might result in a "diving" departure over the wing. During this maneuver, a loss of altitude of up to 400 ft may occur.

Stall demonstrations should not be performed at altitudes of less than 5000 ft.

The stalling speeds for different configurations, flight masses, and center of gravity positions are listed on page 5-4.

DESCENT

For cruising descent, use the data provided on page 5-40. The recommended airspeed is 150 KIAS and the descent rate 1000 ft. The cowl flap is closed. If required, other values within the operational limitations may be used.

The cylinderhead temperature may not fall below 130 °C. If necessary, insert phases of higher power setting to warm up the engine.

Airspeed limitations must be observed (see page 2-4).

CAUTION

Check mixture setting during descent. Below 5000 ft set mixture to FULL RICH.

LANDING

For approach speeds refer to page 4-4. Flaps 30°, landing gear down. On final, trim to 75 to 80 KIAS and a descent rate of approx. 500 ft/min.

Move propeller control lever to HIGH RPM and check mixture control is FULL RICH.

Recheck gear and flap positions on short final.

Shortly before touchdown reduce airspeed to 65 - 70 KIAS. Set throttle to IDLE.

Touch down with main wheels first. The nosewheel is gently lowered to the ground as soon as the airspeed is sufficiently reduced to prevent the nosegear from excessive loads. This procedure is of special importance when landing on rough surfaces.

CAUTION

If the approach speed is too high the airplane may have a long flare in the ground effect, thus consuming a lot of runway length. Never try to push the airplane to the ground.

CROSSWIND LANDING

As a strong crosswind usually is accompanied by turbulence the approach speed has to be increased, e.g. 90 KIAS on final. Flap setting 30°.

The drift is best corrected by a combination of wing low and crab method. Align the airplane to the runway direction shortly before touchdown. Reduce speed close to the ground. Touchdown attitude is slightly wing low. Maintain aileron deflection into the wind during the landing run. Use nose wheel steering and, if necessary, brakes to maintain direction during landing run.

The maximum demonstrated crosswind component for landing is 16 kts.

BALKED LANDING

Power setting FULL THROTTLE. Propeller and mixture control levers full forward. Lift-off at 60 KIAS. Retract landing gear and reduce flap setting from 30° to 15° when reaching 75 KIAS. Adjust trim for climb. After having passed all obstacles ahead of you, retract flaps at 80 KIAS.

CAUTION

Depending on trim setting during approach, a balked landing might require high nose down stick forces.

COWL FLAP

With the cowl flap closed, a cross-section for cooling air outlet remains open, which is sufficient for cruise at temperatures up to ISA +15 °C. At cold weather, the cowl flap may be closed even during climb.

If oil and cylinderhead temperature are reaching the yellow range during very hot weather, the cowl flap has to be opened totally or partially even at cruise.

An opened cowl flap will result in a reduction of cruise performance of approx. 4 %.

Under hot day operating conditions the cowl flap should be opened totally before takeoff, to avoid high engine temperatures from the beginning. The maximum demonstrated ambient temperature for sufficient engine cooling during climb (with cowl flap totally open) is ISA +23°C (ISA +41°F).

At low power or idle descents, the cowl flap has always to be closed.

Rapid temperature changes constitute high stress for every engine.

After engine shutdown on hot days, the cowl flap should be opened to expedite reduction of a localization of heat in the engine compartment.

REFUELING

WARNING

Always ground the airplane using the ground connecting point at the right side of the engine cowling before refueling. Exhaust tail pipes and landing gear are not appropriate for grounding the aircraft.

Each wing tank has a capacity of 33.0 US Gal (125 l).

As the tanks are separated by splash walls with discharge openings, refueling at high filling rates is not possible. From approx. 13.0 US Gal (50 l) onwards refueling has to be done slowly, to avoid early over-flowing.

Maximum filling capacity is reached, when the fuel level is at the bottom of the filler neck and does not change within the next 30 seconds.

Note

The fuel gauges in the cockpit already read "1" (full) at a capacity of 24.8 US Gal (94 l).

Within the range from 24.8 to 33.0 US Gal (94 to 125 l) (23.0 - 31.2 US Gal (87 - 118 l) usable) the gauge remains reading "1" (full). If the indication reads "0" the residual unusable fuel in each tank is 1.8 US Gal (7 l).

CAUTION

The fuel gauges in the cockpit do not provide precise information on the actual fuel capacity in the tanks. Deviations of up to 25 % between indicated and actual fuel capacity are possible.

COLD WEATHER OPERATION

- Engine

For frequent operation at cold weather the manufacturer (page 1-4) offers a "winterization kit" for engine cooling.

CAUTION

At very low ambient temperatures, engine and oil have to be preheated to at least -20°C (-4°F) before starting.

External power is recommended for starting. For operational instructions refer to page 7-65 "External Power Supply".

The engine operating limitations (see Section II) are applicable even at very cold weather. As soon as the oil temperature is within the yellow range and cylinderhead temperature above 130 °C the engine may be accelerated slowly to maximum power. If the oil pressure is steady and within the green arc the aircraft is ready for takeoff.

- Airframe

The airplane has to be cleaned thoroughly from any contamination of snow or ice before flight. Carefully check flight controls and flaps for free movement. Melted snow may enter the control surface gaps and freeze, blocking the controls.

To drain fuel samples is mandatory. If no fluid can be drained it is possible, that water is frozen in front of the drain valves. In this case the lower surface of the fuel tank has to be warmed up cautiously in an area around the drain valve. Afterwards the water must be drained carefully.

CAUTION

The surface of the aircraft may not become warmer than 162°F (72°C) during warming up.

- Flight Operations

After takeoff from slush, the landing gear should remain extended for another 30 seconds. Stopping the wheels by braking is not recommended in order to centrifuge residual slush.

CAUTION

Any slush, frozen in the wheel wells may preclude the landing gear from extension.

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