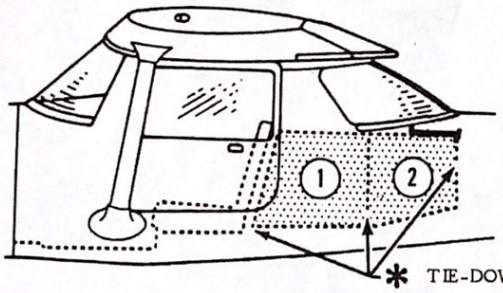
LOADING GRAPH AND CENTER OF GRAVITY MOMENT ENVELOPE

SAMPLE LOADING PROBLEM	SAMPLE AIRPLANE		YOUR AIRPLANE	
	Weight kg	Moment m.kg	Weight kg	Moment m.kg
1. Licensed Empty Weight (Sample Airplane)	485	402		
2. Oil *	5	- 1.5	5	- 1.5
3. Pilot and Passenger	154	153		
4. Fuel (Standard)	61	65		
5. Baggage - Area 1 (child's seat)	21	34		
6. Baggage - Area 2	0			
7. TOTAL WEIGHT AND MOMENT	726	652.5		

8. Locate this point (726 and 652.5) on the center of gravity moment envelope, and since this point falls within the envelope, the loading is acceptable.

* Full oil may be assumed for all flights.

BAGGAGE LOADING AND TIE-DOWN



BAGGAGE AREA
MAXIMUM ALLOWABLE LOADS

AREA (1) = 54 KG
AREA (2) = 18 KG
AREAS (1) + (2) = 54 KG

* TIE-DOWN NET ATTACH POINTS

* A cargo tie-down net is provided to secure baggage in the baggage area. The net attaches to six tie-down rings. Two rings are located on the floor just aft of the seat backs and one ring is located two inches above the floor on each cabin wall at the aft end of area (1). Two additional rings are located at the top, aft end of area (2). At least four rings should be used to restrain the maximum baggage load of 54 kg. If the airplane is equipped with an optional utility shelf, it should be removed prior to loading and tying down large baggage items. After baggage is loaded and secured, either stow the shelf or, if space permits, install it for storing small articles.

Figure 5

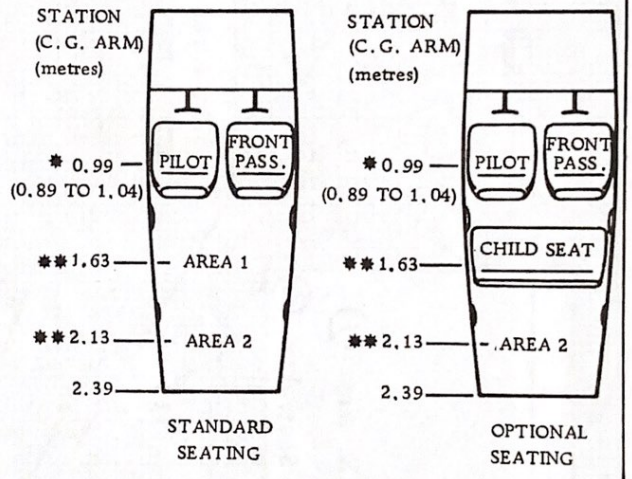
LOADING ARRANGEMENTS

* Pilot or passenger center of gravity on adjustable seats positioned for average occupant. Numbers in parentheses indicate forward and aft limits of occupant center of gravity range.

** Arms measured to the center of the areas shown.

NOTE

The aft baggage wall (approximate station 94) can be used as a convenient interior reference point for determining the location of baggage area fuselage stations.



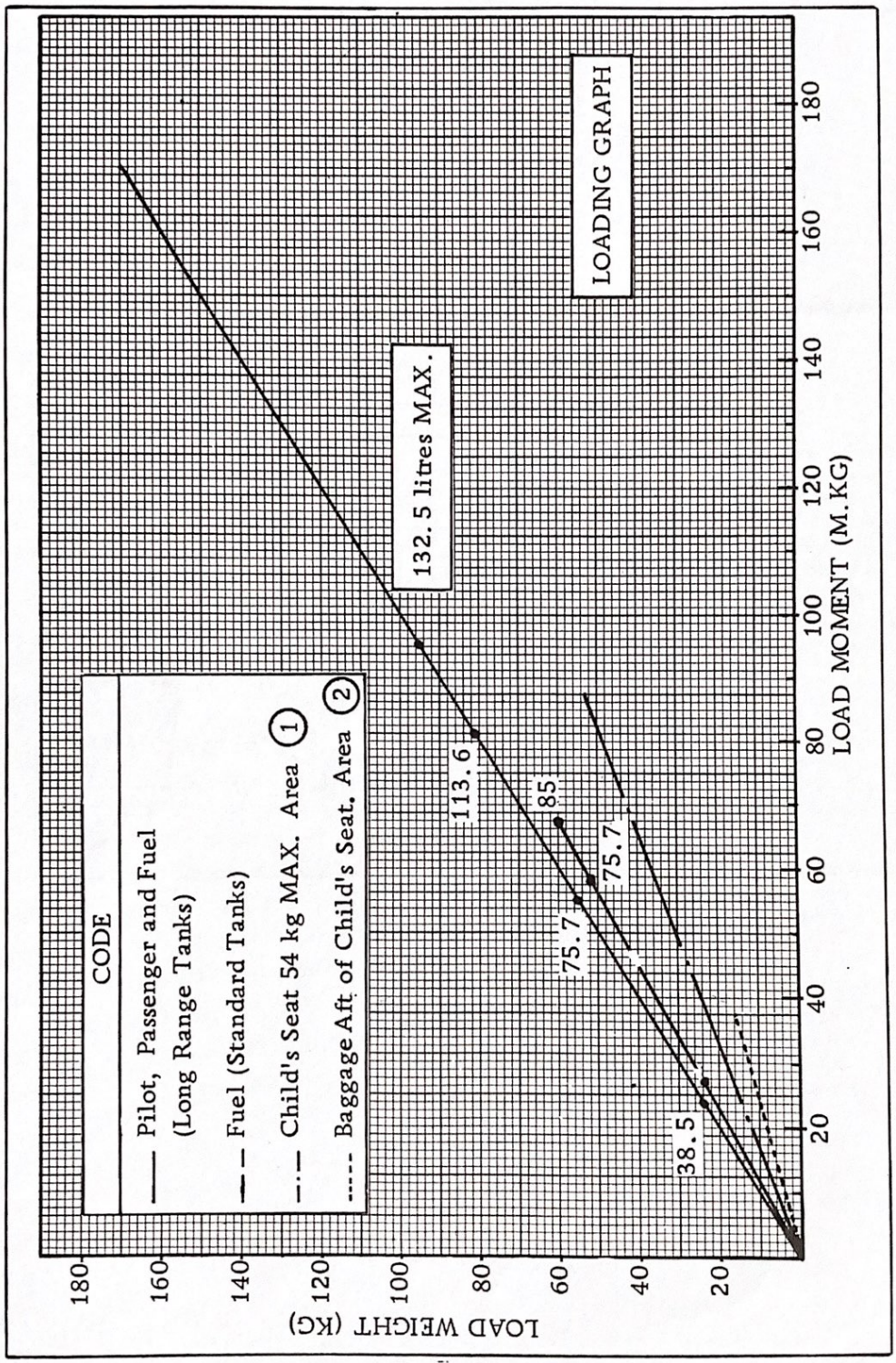

LOADING GRAPH
LOAD WEIGHT (KG)
LOAD MOMENT (M.KG)
20
40
60
80
100
120
140
160
180
CODE
Pilot, Passenger and Fuel (Long Range Tanks)
Fuel (Standard Tanks)
Child's Seat 54 kg MAX. Area (1)
Baggage Aft of Child's Seat, Area (2)
132.5 litres MAX.
113.6
85
75.7
75.7
75.7
38.5

FIGURE 6

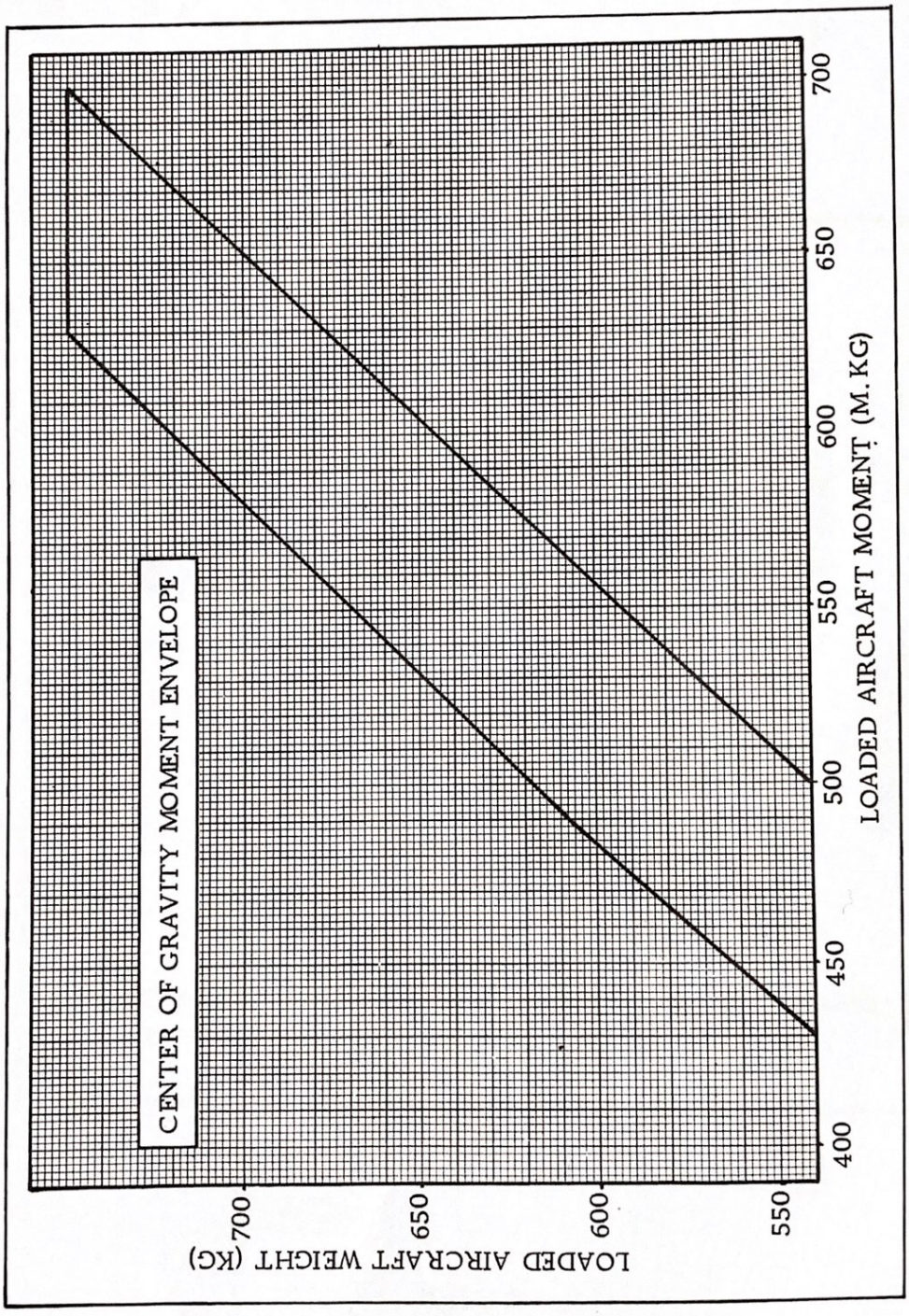
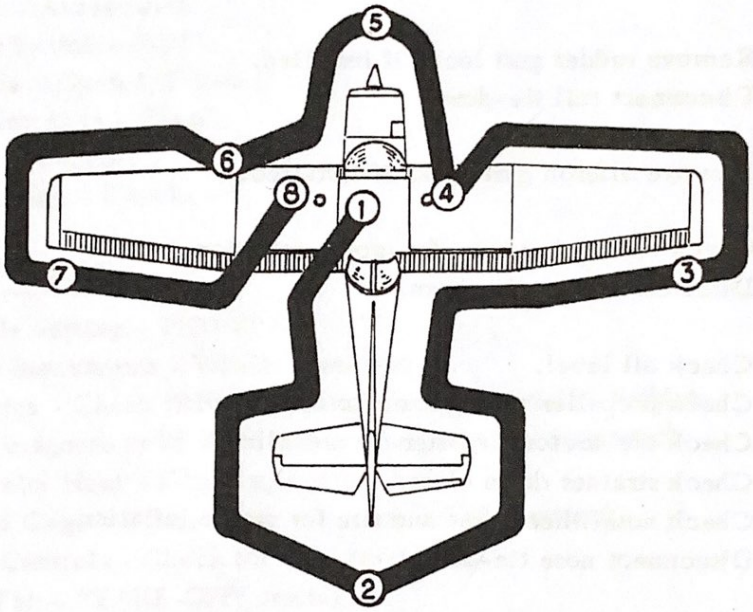

CENTER OF GRAVITY MOMENT ENVELOPE
LOADED AIRCRAFT WEIGHT (KG)
700
650
600
550
LOADED AIRCRAFT MOMENT (M. KG)
700
650
600
550
500
450
400

Figure 7

EXTERIOR INSPECTION

SGAC APPROVED

EXTERIOR
INSPECTION



NOTE

Visually check aircraft for general condition during walk-around inspection.

Figure 8

(1) a. Turn on master switch and check fuel quantity indicators, then turn master switch "OFF".
b. Check ignition switch "OFF".
c. Check fuel valve handle "ON".
d. Remove control wheel lock.
e. Before first flight of day, remove the wing tank drain plugs to clear the fuel system of possible water and sediment and pull out the fuel strainer drain knob (use the sampler cup in the map compartment).

(2) a. Remove rudder gust lock, if installed.
b. Disconnect tail tie-down.

(3) a. Remove aileron gust lock, if installed.

(4) a. Check main wheel tire for proper inflation.
b. Disconnect wing tie-down.

(5) a. Check oil level.
b. Check propeller and spinner for condition.
c. Check carburetor air filter for cleanliness.
d. Check strainer drain closed.
e. Check nose wheel strut and tire for proper inflation.
f. Disconnect nose tie-down.

(6) a. Remove pitot tube cover, if installed and check pitot tube opening for stoppage.
b. Check fuel tank vent opening for stoppage.
c. Check stall warning vent opening for stoppage.

(7) - Same as 3.

(8) - Same as 4 and inspect flight instrument static source opening on left side of fuselage for stoppage.

BEFORE ENTERING THE AIRPLANE

(1) Make an exterior inspection in accordance with figure 8.

BEFORE STARTING THE ENGINE

(1) Seats, Seat Belts - Adjust and lock.
(2) Brakes - Test and set.
(3) Fuel Shutoff Valve Handle - "ON".
(4) Radios and Electrical Equipment - "OFF".

STARTING THE ENGINE

(1) Carburetor Heat - Cold.
(2) Mixture - Rich.
(3) Primer - As required.
(4) Master Switch - "ON".
(5) Throttle - Open 1/2 inch (1 cm).
(6) Propeller Area - Clear.
(7) Starter - Engage.
(8) Oil Pressure - Check.

BEFORE TAKE-OFF

(1) Throttle Setting - 1700 RPM.
(2) Engine Instruments - Within green arc.
(3) Magnetos - Check (RPM drop should not exceed 150 RPM on either magneto or 75 RPM differential between magnetos).
(4) Carburetor Heat - Check operation.
(5) Suction Gage - Check (4.6 to 5.4 inches of mercury).
(6) Flight Controls - Check for free movement.
(7) Trim Tab - "TAKE-OFF" setting.
(8) Cabin Doors - Latched.
(9) Flight Instruments and Radios - Set.

TAKE-OFF

NORMAL TAKE-OFF

(1) Wing Flaps - Up.
(2) Carburetor Heat - Cold.

(3) Throttle - Full "OPEN".
(4) Elevator Control - Lift nose wheel at 88 km/h - 48 kts - 55 MPH.
(5) Climb Speed - 113 to 129 km/h - 61 to 69 kts - 70 to 80 MPH until all obstacles are cleared, then set up climb speed as shown in "NORMAL CLIMB" check list.

MAXIMUM PERFORMANCE TAKE-OFF

(1) Wing Flaps - Up.
(2) Carburetor Heat - Cold.
(3) Brakes - Hold.
(4) Throttle - Full "OPEN".
(5) Brakes - Release.
(6) Elevator Control - Slightly tail low.
(7) Climb Speed - 113 km/h - 61 kts - 70 MPH.

CLIMB

NORMAL CLIMB

(1) Airspeed - 121 to 137 km/h - 65 to 74 kts - 75 to 85 MPH.
(2) Throttle - Full "OPEN".
(3) Mixture - Rich.

MAXIMUM PERFORMANCE CLIMB

(1) Airspeed - 122 km/h - 66 kts - 76 MPH.
(2) Throttle - Full "OPEN".
(3) Mixture - Rich.

CRUISING

(1) Power - 2000 to 2750 RPM.
(2) Elevator Trim - Adjust.
(3) Mixture - Lean to maximum RPM.

BEFORE LANDING

(1) Mixture - Rich.
(2) Carburetor Heat - Apply full heat before closing throttle.
(3) Airspeed - 113 to 129 km/h - 61 to 69 kts - 70 to 80 MPH.
(4) Wing Flaps - As desired below 161 km/h - 87 kts - 100 MPH.
(5) Airspeed - 97 to 113 km/h - 52 to 61 kts - 60 to 70 MPH (flaps down).

NORMAL LANDING

(1) Touchdown - Main wheels first.
(2) Landing Roll - Lower nose wheel gently.
(3) Braking - Minimum required.

AFTER LANDING

(1) Wing Flaps - Up.
(2) Carburetor Heat - Cold.

SECURING THE AIRCRAFT

(1) Parking Brake - Set.
(2) Radios and Electrical Equipment - "OFF".
(3) Mixture - Idle cut-off.
(4) All switches - "OFF".
(5) Control lock - Installed.

OPERATING DETAILS

STARTING ENGINE

Ordinarily the engine starts easily with one or two strokes of primer in warm temperatures to six strokes in cold weather, with the throttle open approximately 1/2 inch (1 cm). In extremely cold temperatures,

it may be necessary to continue priming while cranking. Weak intermittent firing followed by puffs of black smoke from the exhaust stack indicate overpriming or flooding. Excess fuel can be cleared from the combustion chambers by the following procedure : Set the mixture control in full lean position, throttle full open, and crank the engine through several revolutions with the starter. Repeat the starting procedure without any additional priming.

If the engine is underprimed it will not fire at all, and additional priming will be necessary.

After starting, if the oil gage does not begin to show pressure within 30 seconds in the summertime and about twice that long in very cold weather, stop engine and investigate. Lack of oil pressure can cause serious engine damage. After starting, avoid the use of carburetor heat unless icing conditions prevail.

NOTE

When starting is performed using an external power source, turn the master switch "ON" only after the ground service plug has been disconnected.

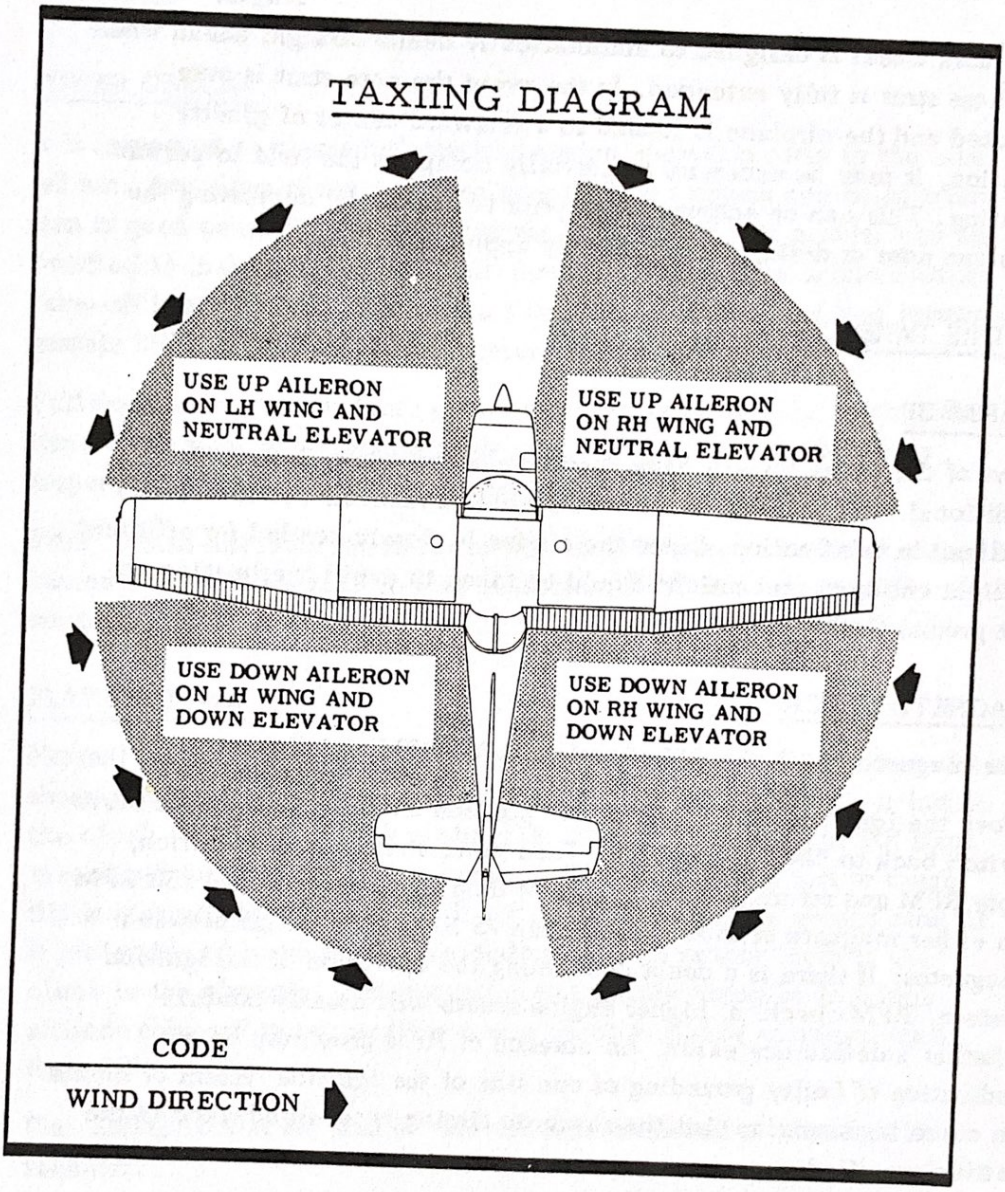


Figure 9

TAXIING

When taxiing, it is important that speed and use of brakes be held to a minimum and that all controls be utilized (see taxiing diagram, figure 9) to maintain directional control and balance. Taxiing over loose gravel or cinders should be done at low engine speed.

The nose wheel is designed to automatically center straight ahead when the nose strut is fully extended. In the event the nose strut is over-inflated and the airplane is loaded to a rearward center of gravity position, it may be necessary to partially compress the strut to permit steering. This can be accomplished prior to taxiing by depressing the airplane nose or during taxi by sharply applying brakes.

BEFORE TAKE-OFF

WARM-UP

Most of the warm-up will have been conducted during taxi, and additional warm-up before take-off should be restricted to the checks outlined in this Section. Since the engine is closely cowled for efficient inflight cooling, precautions should be taken to avoid overheating on the ground (2400 - 2500 RPM).

MAGNETO CHECK

The magneto check should be made at 1700 RPM as follows :

Move the ignition switch first to "R" position and note RPM, then move switch back to "BOTH" position. Then move switch to "L" position, note RPM and return to "BOTH". RPM drop should not exceed 150 RPM on either magneto or show greater than 75 RPM differential between magnetos. If there is a doubt concerning the operation of the ignition system, RPM checks at higher engine speeds will usually confirm whether a deficiency exists. An absence of RPM drop may be an indication of faulty grounding of one side of the ignition system or should be cause for suspicion that the magneto timing is set in advance of the setting specified.

ALTERNATOR CHECK

Prior to flights where verification of proper alternator and voltage regulator operation is essential (such as night or instrument flights), a positive verification can be made by loading the electrical system momentarily (3 to 5 seconds) with the optional landing light, (if so equipped), or by operating the wing flaps during the engine runup.

The ammeter will remain at zero if the alternator and voltage regulator are operating properly.

TAKE-OFF

POWER CHECKS

It is important to check full-throttle engine operation early in the take-off run. Any signs of rough engine operation or sluggish engine acceleration is good cause for discontinuing the take-off. If this occurs, you are justified in making a thorough full-throttle, static runup before another take-off is attempted. The engine should run smoothly and turn approximately 2500 to 2600 RPM with carburetor heat off.

Full throttle runups over loose gravel are especially harmful to propeller tips. When take-offs must be made over a gravel surface, it is very important that the throttle be advanced slowly.

Prior to take-off from fields above 1524 m (5000 feet) elevation, the mixture should be leaned to give maximum RPM in a full-throttle, static runup.

FLAP SETTINGS

Normal take-offs are performed with flaps up. The use of 10° flaps will shorten the ground run approximately 10 %, but this advantage is lost in the climb to a 50-foot (15 m) obstacle. Therefore, the use of 10° flaps is reserved for minimum ground runs or for take-off from soft or rough fields with no obstacles ahead. If 10° of flaps are used in ground runs, it is preferable to leave them extended rather than retract them in the climb to the obstacle. The exception to this rule would be in a high altitude take-off in hot weather where climb would be marginal with flaps 10°.

Flap deflections of 30° and 40° are not recommended at any time for take-off.

CROSSWIND TAKE-OFFS

Take-offs into strong crosswinds normally are performed with the minimum flap setting necessary for the field length. The airplane is accelerated to a speed slightly higher than normal, then pulled off abruptly to prevent possible settling back to the runway while drifting. When clear of the ground, make a coordinated turn into the wind to correct for drift.

CLIMB

For detailed data, see Maximum Rate-Of-Climb Data chart.

CLIMB SPEEDS

Normal climbs are conducted at 121 to 137 km/h - 65 to 74 kts - 75 to 85 MPH with flaps up and full throttle, for best engine cooling. The mixture should be full rich unless the engine is rough due to too rich a mixture. The best rate-of-climb speeds range from 122 km/h - 66 kts - 76 MPH at sea level to 113 km/h - 61 kts - 70 MPH at 3048 m - 10,000 ft. If an obstruction dictates the use of a steep climb angle, climb at an obstacle clearance speed of 113 km/h - 61 kts - 70 MPH with flaps retracted.
Steep climbs at low speeds should be of short duration to allow improved engine cooling.

BALKED LANDING (GO-AROUND)

In a balked landing (go-around) climb, the wing flap setting should be reduced to 20° immediately after full power is applied. Upon reaching a safe airspeed, the flaps should be slowly retracted to the full up position. In critical situations, the 20° flap setting can be approximated by holding the flap switch for approximately two seconds. This technique will allow the pilot to obtain the 20° setting without having to divert his attention to the flap position indicator.

CRUISE

Normal cruising is done between 65 % and 75 % power. The power settings required to obtain these powers at various altitudes and outside air temperatures can be determined by using your Cessna Power Computer or the PERFORMANCE DATA, Section 5.

The higher the cruise altitude, the higher the true airspeed for the same power.

This is illustrated in the following figure which shows performance at 75 % power at various altitudes.

MAXIMUM CRUISE SPEED PERFORMANCE
75 % POWER

ALTITUDE	RPM	TRUE AIRSPEED		
		km/h	kts	MPH
Sea Level	2525	177	95	110
1525 m - 5000 ft	2650	185	100	115
2133 m - 7000 ft	Full throttle	188	102	117

The use of full carburetor heat is recommended during flight in heavy rain to avoid the possibility of engine stoppage due to excessive water ingestion or to carburetor icing. The mixture setting should be readjusted for smoothest operation.

STALLS

The stall characteristics are conventional for the flaps up and flaps down condition. Slight buffeting may occur just before the stall with flaps down.

Stall speeds are shown in Section 5 for forward c.g., full gross weight conditions. They are presented as calibrated airspeeds because indicated airspeeds are unreliable near the stall.

With aircraft weights lower than the full gross weight, stall speeds are reduced. The stall warning horn produces a steady signal 8 to 16 km/h - 4 to 8.5 kts - 5 to 10 MPH before the actual stall is reached and remains on until the normal flight attitude is resumed.

In case of roll, use ailerons to return wings level, then neutralize aileron control.

LANDINGS

Normal landings are made with power-off and with flaps as required. Final approaches are performed at speeds of 113 to 129 km/h - 61 to 69 kts - 70 to 80 MPH with flaps up, and 97 to 113 km/h - 52 to 61 kts - 60 to 70 MPH with flaps down, depending on the air turbulence.

CROSSWIND LANDING

When landing in a strong crosswind, use the minimum flap setting required for the field length. Use a wing low, crab, or a combination method of drift correction and land in a nearly level attitude. Maintain directional control by using the nose wheel steering system and the brakes.

Excessive nose strut inflation can hinder nose wheel alignment with the airplane ground track. This can be counteracted by firmly lowering the nose wheel to the ground after initial contact. This action partially compresses the nose strut, permitting nose wheel swiveling and positive ground steering.

COLD WEATHER OPERATION

Prior to starting on cold mornings, it is advisable to pull the propeller through several times by hand. In extremely cold (- 18°C and lower) weather, the use of an external preheater is recommended.

Cold weather starting procedures are as follows :

With Preheat :

(1) Propeller Area - Clear.
(2) Master Switch - "ON".
(3) With ignition switch "OFF" and throttle closed, prime the engine four to ten strokes as the propeller is being turned over by hand.

NOTE

Use heavy strokes of primer for best atomization of fuel. After priming, check that the primer is in the locked position.

(4) Ignition Switch - "BOTH".
(5) Open the throttle 1/2 inch (1 cm) and engage the starter.

With outside air temperatures below freezing point, avoid using the carburetor heater. Partial carburetor heating may cause the air in the intake duct to reach critical icing temperatures.

Without Preheat :

(1) Prime the engine eight to ten strokes while the propeller is being turned by hand with throttle closed. Leave primer charged and ready for stroke.
(2) Propeller Area - Clear.
(3) Master Switch - "ON".
(4) Mixture - Full rich.
(5) Ignition Switch - "START".
(6) Pump throttle rapidly to full open twice. Return to 1/8 inch (1/2 cm) open position.
(7) Release ignition switch to "BOTH" when engine starts.
(8) Continue to prime engine until it is running smoothly, or alternately pump throttle rapidly over first 1/4 of total travel.
(9) Oil Pressure - Check.
(10) Pull carburetor heat knob full on after engine has started. Leave on until engine is running smoothly.
(11) Lock primer.

NOTE

If the engine does not start, it is probable that the spark plugs have been frosted over. Preheat must be used before another start is attempted.

IMPORTANT

Pumping the throttle may cause raw fuel to accumulate in the intake air duct, creating a fire hazard in the event of a backfire. If this occurs, maintain a cranking action to suck flames into the engine. An outside attendant with a fire extinguisher is advised for cold starts without preheat.

During cold weather operations, no indication will be apparent on the oil temperature gage. After a suitable warm-up period (2 to 5 minutes at 1000 RPM), accelerate the engine several times to higher engine RPM. If the engine accelerates smoothly and the oil pressure remains normal and steady, the airplane is ready for take-off. When operating in temperatures around - 20°C, avoid using carburetor heat, which would increase the temperature in the intake duct and restore critical icing conditions.

SPECIFIC OPERATION

SPIN

The spin is a prolonged stall that results in a rapid nose-down rotation, the airplane following a helical path. The rotation is the result of a sustained yaw that causes the slower moving wing to almost completely stall while the outer wing retains a portion of its lift. In essence, the rotation is a result of the relatively unstalled outer wing "chasing" the stalled inner wing.

Spins should be practiced at altitudes of 3000 feet (915 m) or more above the surface.

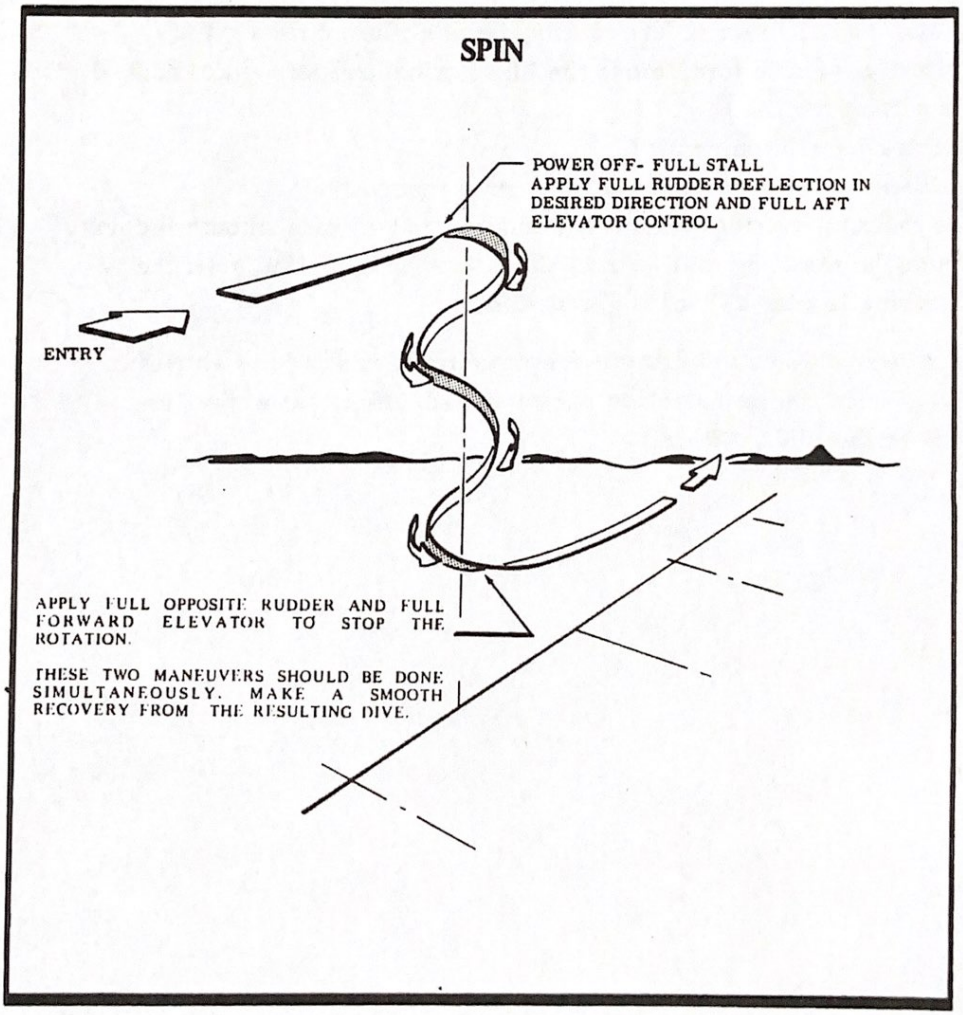


Figure 10

The normal entry is made from a power-off stall. As the stall is approached, the elevator control should be smoothly pulled to the full aft position. Just prior to reaching the stall "break", rudder control in the desired direction of the spin rotation should be applied so that full rudder deflection is reached almost simultaneously with reaching full aft elevator. Care should be taken to avoid using aileron control since its application can increase the rotation and cause erratic rotation.

Both elevator and rudder controls should be held full with the spin until the spin recovery is initiated. An inadvertent relaxation of either of these controls could result in the development of a nose-down spiral.

The normal spin recovery technique is as follows :

(1) Apply full opposite rudder against the direction of rotation.
(2) After one-fourth turn, move the elevator control forward of neutral in a brisk motion.
(3) Neutralize aileron control.

These three maneuvers should be done simultaneously.

(4) As the rotation stops, neutralize rudder, and make a smooth recovery from the resulting dive. Power should not be reapplied until the airplane is near a level flight attitude.

Partial power may be used to provide more rapid and precise entries. However, once the spin rotation is established, the throttle must be retarded to the idle position.