Cessna®

FLIGHT MANUAL

FRA 150 M

AIRCRAFT

FLIGHT MANUAL

REIMS/CESSNA FRA150M

Manufacturer : REIMS AVIATION
Aérodrome de REIMS PRUNAY
51100 REIMS Marne FRANCE

French Type Certificate No. 38

Serial Number : Registration Number :

Ce manuel est la traduction en langue anglaise du manuel de vol français approuvé

Sections : 2 - 3 - 5

Pages : 2-1 thru 2-7
3-1 thru 3-8
5-5, 5-6 and 5-10

This is the exact translation of the FRA 150 M French Flight Manual approved by SGAC

This aircraft should be operated in accordance with the limits specified in this Flight Manual.

THIS DOCUMENT SHOULD BE CARRIED IN THE AIRCRAFT AT ALL TIMES.

Edition 1 - August 1974
D1035-13GB-RAND-150-12/74

Aircraft Serial No. FA15000262 on

TABLE OF CONTENTS

GENERAL

NOTIFICATION

This manual contains the instructions for use, and the list of Servicing and periodic inspections, as well as the performance data of the Model FRA150M.

DOCUMENTS AVAILABLE

The following is a check list of the data, information and licenses that are part of the aircraft file and required by Regulations. They should be made available at all times to relevant Authority.

(1) Airworthiness Certificate.

(2) Registration Certificate.

(3) Radio Installation License (if radio installed).

(4) Log Books.

(5) Flight Manual.

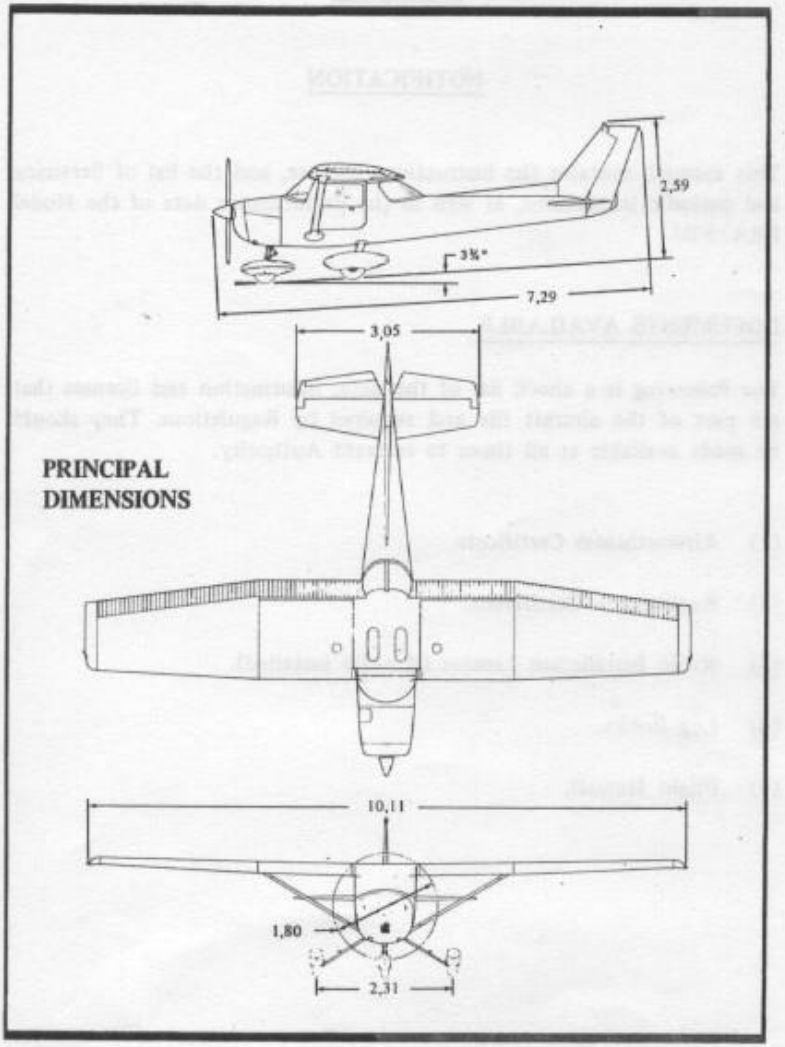


Figure 1

DESCRIPTION AND CHARACTERISTIC DIMENSIONS

OVER-ALL DIMENSIONS

Wing Span	10,11 m
Maximum Length	7,29 m
Maximum Height	2,59 m With Flashing Beacon and Nose Strut Depressed

WING

Airfoil Type		NACA2412
Wing Area		14,8 m2
Dihedral Angle		+ 1° (upper surface at 25 % chord)
Angle of Incidence,	Wing Root	+1°
	Wing Tip	0°

AILERONS *

Area		1,66 m2
Control Travel,	Up	20° + 2° − 0°
	Down	14° + 2° − 0°

WING FLAPS

Method of Actuation	Electric/Cable
Area	1,72 m2
Control Travel	0° to 40° ± 2°

* Cable control systems

HORIZONTAL STABILIZER AND ELEVATOR *

Stabilizer Area		1,58 m2
Angle of Incidence		− 3°
Elevator Area		1,06 m2
Control Travel,	Up	25° ± 1°
	Down	15° ± 1°

ELEVATOR TRIM TAB

Area		0,14 m2
Control Travel,	Up	10° ± 1°
	Down	20° ± 1°

VERTICAL FIN AND RUDDER *

Fin Area		0,83 m2
Rudder Area		0,65 m2
Control Travel,	Left	23° + 0° − 2°
	Right	23° + 0° − 2°

LANDING GEAR

Type		Fixed, Tricycle.
Shock Absorber,	Nose Gear	Air - Oil
	Main Gear	Tubular Spring
Tread		2,31 m

* Cable control systems

Nose Wheel Tire and Pressure 5,00 x 5	2,10 bars	30 psi
Main Wheel Tire and Pressure 6,00 x 6	1,45 bar	21 psi
Nose Gear Shock Strut Pressure	1,40 bar	20 psi

POWER PLANT

Engine	Rolls Royce O-240-E
	130 Rated HP (97 kW) at 2800 RPM (5 Minute Take-Off Rating)
	123 Rated HP (92 kW) at 2650 RPM (Maximum Continuous Rating) because of noise limitation
Fuel	100/130 Octane, Minimum Grade
Oil	SAE30 above 5°C SAE50 below 5°C
Carburetor Heater	Manually Operated

PROPELLER

Number	McCauley 1A135/BRM7150
Type	Fixed Pitch
Diameter	1,803 m

CABIN

Seating	2 (plus optional child seat)
Doors	2
Baggage compartment	

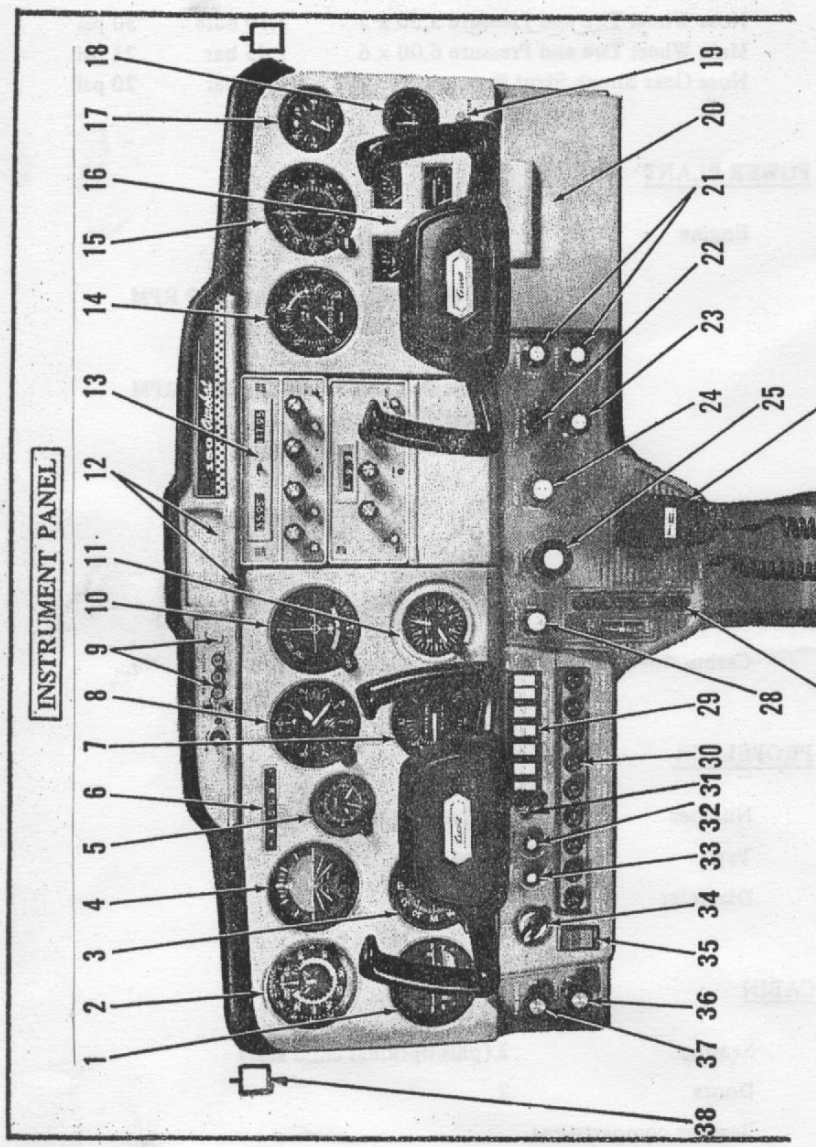

INSTRUMENT PANEL
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38

Figure 2

DESCRIPTION

1. Turn Coordinator (Opt).
2. Airspeed Indicator
3. Directional Gyro (Opt).
4. Gyro Horizon (Opt).
5. Clock (Opt).
6. Aircraft Registration Number
7. Vertical Speed Indicator (Opt).
8. Altimeter
9. Marker Beacon Indicator Lights and Switches/Radio Transmitter Selector Switch (Opt).
10. Omni Course Indicator (Opt).
11. Accelerometer (Opt).
12. Rear View Mirror and Control (Opt).
13. Radios (Opt).
14. Tachometer
15. ADF Bearing Indicator (Opt).
16. Fuel and Oil Gages
17. Suction Gage
18. Ammeter
19. Over-Voltage Warning Light
20. Map Compartment
21. Cabin Air/Heat Control Knobs
22. Wing Flap Switch
23. Cigar Lighter (Opt).
24. Mixture Control Knob
25. Throttle (With Friction Lock).
26. Microphone (Opt).
27. Elevator Trim Control Wheel
28. Carburetor Heat Control Knob
29. Electrical Switches
30. Fuses
31. Alternator Circuit Breaker
32. Radio Dial Light Rheostat
33. Panel Lights Rheostat
34. Ignition Switch
35. Master Switch
36. Primer
37. Parking Brake Knob
38. Jettison Door "D" Ring

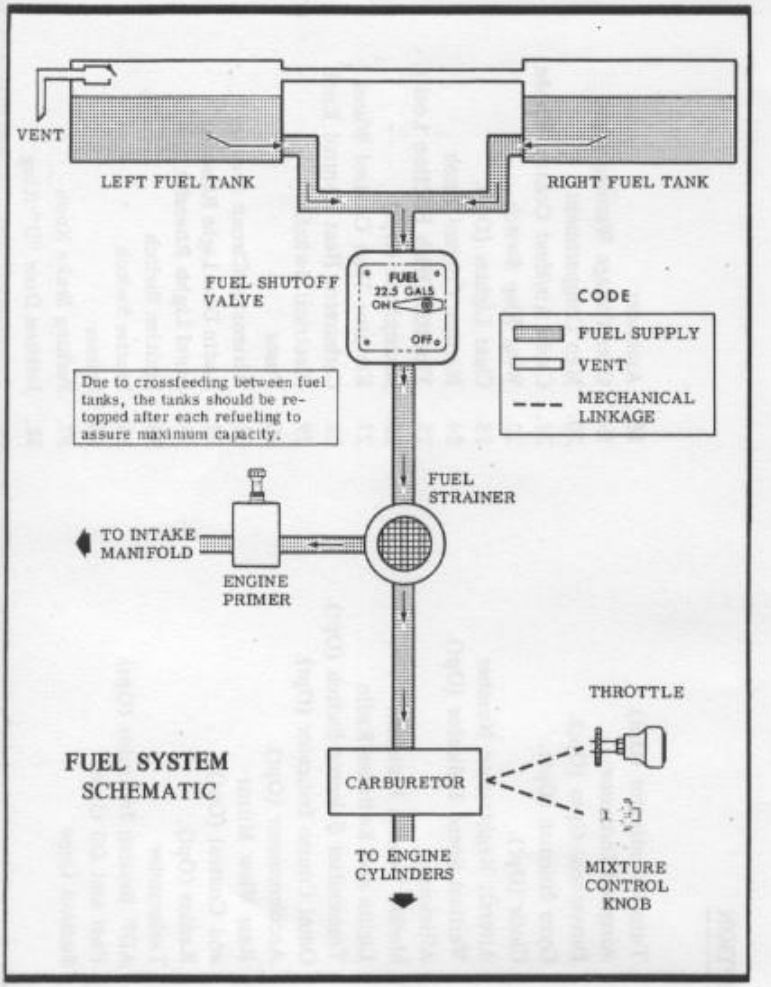

VENT
LEFT FUEL TANK
RIGHT FUEL TANK
FUEL SHUTOFF VALVE
FUEL
22.5 GALS
ON
OFF
CODE
FUEL SUPPLY
VENT
MECHANICAL LINKAGE
Due to crossfeeding between fuel tanks, the tanks should be re-topped after each refueling to assure maximum capacity.
FUEL STRAINER
TO INTAKE MANIFOLD
ENGINE PRIMER
THROTTLE
FUEL SYSTEM SCHEMATIC
CARBURETOR
TO ENGINE CYLINDERS
MIXTURE CONTROL KNOB

Figure 3

FUEL SYSTEM

Fuel is supplied to the engine from two tanks, one in each wing. From these tanks, fuel flows by gravity through a fuel shutoff valve and fuel strainer to the carburetor.

For additional information on lubrication and servicing procedures, refer to the Maintenance Guide of the aircraft.

FUEL QUANTITY DATA			
TANKS	USABLE FUEL ALL FLIGHT CONDITIONS	UNUSABLE FUEL	TOTAL FUEL VOLUME
TWO, STANDARD WING 49 litres each	85 litres	13 litres	98 litres
TWO, LONG RANGE WING 72 litres each	132,5 litres	11,5 litres	144 litres

FUEL TANK SUMP QUICK-DRAIN VALVES

Each fuel tank sump is equipped with a fuel quick-drain valve which extends through the lower surface of the wing just outboard of the cabin door. A sampler cup stored in the aircraft is used to examine the fuel for the presence of water and sediment. A «STRAINER DRAIN KNOB» is located inside the engine nose cap access door and is connected to the strainer quick-drain valve. After the knob has been released, make sure that strainer drain is closed.

OIL QUICK-DRAIN VALVE (OPTION)

An oil quick-drain valve is optionally offered to replace the drain plug in the oil sump drain port. The valve provides a quicker and cleaner method of draining engine oil. To drain the oil with this valve installed, slip a hose over the end of the valve, route the hose to a suitable container, then push upward on the end of the valve until it snaps into the open position. Spring clips will hold the valve open. After draining, use a screwdriver or suitable tool to snap the valve into the extended (closed) position and remove the drain hose.

ELECTRICAL SYSTEM

Electrical energy is supplied by a .14-volt, direct-current system powered by an engine-driven alternator. A 12-volt battery is located on the left, forward side of the firewall adjacent to the engine access door. A master switch controls power to all circuits, except the engine ignition system, optional clock and optional flight hour recorder (operative only when the engine is operating).

MASTER SWITCH

The master switch is a split-rocker type switch labeled «MASTER», and is «ON» in the up position and «OFF» in the down position. The right half of the switch, labeled «BAT», controls all electrical power to the airplane. The left half, labeled «ALT», controls the alternator.

Normally, both sides of the master switch should be used simultaneously, however, the «BAT» side of the switch could be turned «ON» separately to check equipment while on the ground. The «ALT» side of the switch, when placed in the «OFF» position, removes the alternator from the electrical system. With this switch in the «OFF» position, the entire electrical load is placed on the battery. Continued operation with the alternator switch «OFF» will reduce battery power low enough to open the battery contactor, remove power from the alternator field, and prevent alternator restart.

OVER-VOLTAGE SENSOR AND WARNING LIGHT

The aircraft is equipped with an automatic over-voltage protection system consisting of an over-voltage sensor behind the instrument panel and a red warning light, labeled «HIGH VOLTAGE», near the ammeter.

In the event an over-voltage condition occurs, the over-voltage sensor automatically removes alternator field current and shuts down the alternator. The red warning light will then turn on, indicating to the pilot that the alternator is not operating and the aircraft battery is supplying all electrical power.

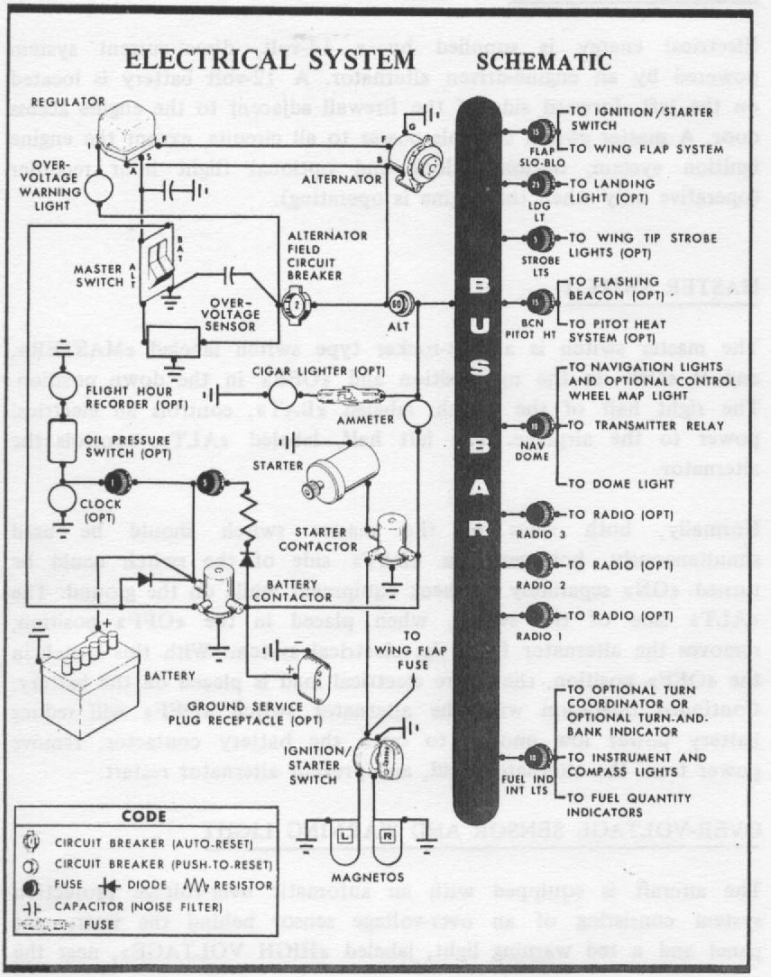

ELECTRICAL SYSTEM SCHEMATIC
REGULATOR
OVER-VOLTAGE WARNING LIGHT
ALTERNATOR
ALTERNATOR FIELD CIRCUIT BREAKER
MASTER SWITCH
OVER-VOLTAGE SENSOR
ALT
BUS BAR
TO IGNITION/STARTER SWITCH
TO WING FLAP SYSTEM
FLAP SLO-BLO
TO LANDING LIGHT (OPT)
LDG LT
TO WING TIP STROBE LIGHTS (OPT)
STROBE LTS
TO FLASHING BEACON (OPT)
BCN
PITOT HT
TO PITOT HEAT SYSTEM (OPT)
CIGAR LIGHTER (OPT)
FLIGHT HOUR RECORDER (OPT)
AMMETER
OIL PRESSURE SWITCH (OPT)
STARTER
CLOCK (OPT)
STARTER CONTACTOR
BATTERY CONTACTOR
TO NAVIGATION LIGHTS AND OPTIONAL CONTROL WHEEL MAP LIGHT
TO TRANSMITTER RELAY
NAV DOME
TO DOME LIGHT
TO RADIO (OPT)
RADIO 3
TO RADIO (OPT)
RADIO 2
TO RADIO (OPT)
RADIO 1
BATTERY
TO WING FLAP FUSE
GROUND SERVICE PLUG RECEPTACLE (OPT)
IGNITION/ STARTER SWITCH
TO OPTIONAL TURN COORDINATOR OR OPTIONAL TURN-AND-BANK INDICATOR
TO INSTRUMENT AND COMPASS LIGHTS
FUEL IND INT LTS
TO FUEL QUANTITY INDICATORS
MAGNETOS
CODE
CIRCUIT BREAKER (AUTO-RESET)
CIRCUIT BREAKER (PUSH-TO-RESET)
FUSE
DIODE
RESISTOR
CAPACITOR (NOISE FILTER)
FUSE

Figure 4

The over-voltage sensor may be reset by turning the master switch off and back on again. If the warning light does not illuminate, normal alternator charging has resumed ; however, if the light does illuminate again, a malfunction has occurred, and the flight should be terminated as soon as practical.

The over-voltage warning light may be tested by momentarily turning off the «ALT» portion of the master switch and leaving the «BAT» portion turned on.

AMMETER

The ammeter indicates the flow of current, in amperes, from the alternator to the battery or from the battery to the aircraft electrical system. When the engine is operating and the master switch is «ON», the ammeter indicates the charging rate applied to the battery.

FUSES AND CIRCUIT BREAKERS

Fuses on the left lower portion of the instrument panel protect the majority of electrical circuits in the airplane. Labeling below each fuse retainer indicates the circuits protected by the fuses. Fuses are removed by pressing the fuse retainers inward and rotating them counterclockwise until they disengage. Spare fuses are held in a clip inside of the map compartment.

NOTE

A special «SLO-BLO» fuse protects the wing flaps circuit. If this fuse is replaced, care should be taken to assure that the replacement fuse is of the proper type and capacity. A «SLO-BLO» fuse is identified by an integrally mounted spring encircling the fuse element.

Two additional fuses are located adjacent to the battery ; one fuse protects the battery contactor closing circuit, and the other fuse protects the optional clock and optional flight hour recorder circuits. The cigar lighter is protected by a 9 amp fuse contained in an in-line-fuseholder located adjacent to the back of the lighter.

The aircraft utilizes two circuit breakers for circuit protection. A «push-to-reset» circuit breaker (labeled «ALT») is located on the left side of the instrument panel near the fuses and protects the alternator circuit. The alternator field and wiring is protected by an automatically resetting circuit breaker mounted behind the left side of the instrument panel.

When more than one radio is installed, the radio transmitter relay is protected by the «NAV-DOME» fuse. It is important to remember that any malfunction in other systems protected by this fuse (navigation lights, dome light, or optional control wheel map light) which causes the fuse to open will de-activate these systems and the transmitter relay. In this event, the switches for these lighting systems should be turned off to isolate the circuits ; then replace the «NAV-DOME» fuse to re-activate the transmitter relay and permit its usage. Do not turn on any of the lights protected by the fuse until the malfunction has been corrected.

LANDING LIGHT (OPT)

Optional lighting includes a single landing light or dual landing/taxi lights in the cowl nose cap, controlled by a two-position switch.

FLASHING BEACON

The flashing beacon should not be used when flying through clouds or overcast ; the flashing light reflected from water droplets or particles in the atmosphere, particulary at night, can produce vertigo and loss of orientation.

WING FLAP SYSTEM

The wing flaps are electrically operated by a flap motor located in the right wing. Flap position is controlled by a switch, labeled «WING FLAPS», on the lower center of the instrument panel. Flap position is mechanically indicated by a pointer housed in the left front doorpost.

To extend the wing flaps, the wing flap switch must be depressed and held in the «DOWN» position until the desired degree of extension is reached by pilot reference to the flap position indicator. After the desired flap extension is obtained, releasing the switch allows it to return to the center off position. When flap retraction is necessary, place the switch in the «UP» position. The switch will remain in the «UP» position without manual assistance due to an over center design within the switch.

With the flaps extended in flight, placing the flap switch in the «UP» position will retract the flaps in approximately 6 seconds. Gradual flap retraction can be accomplished by intermittent operation of the flap switch to the «UP» position. Normal full flap extension in flight will require approximately 9 seconds. After the flaps reach maximum extension or retraction, limit switches will automatically shut off the flap motor. However, when the flaps have reached the fully retracted position, the wing flap switch should be manually returned to the center off position.

CABIN HEATING AND VENTILATING SYSTEM

The temperature and volume of airflow into the cabin can be regulated to any degree desired by manipulation of the push-pull «CABIN HT» and «CABIN AIR» knobs. Heated fresh air and outside air are blended in a cabin manifold ; this air is then vented into the cabin from outlets in the cabin manifold near the pilot's and passenger's feet. A separate adjustable ventilator near each upper corner of the windshield supplies additional outside air to the pilot and passenger.

PARKING BRAKE SYSTEM

To set parking brake, pull out on the parking brake knob, apply and release toe pressure to the pedals, and then release the parking brake knob. To release the parking brake, apply and release toe pressure on the pedals while checking to see that the parking brake knob is full in.

STALL WARNING HORN

The stall warning horn produces a steady signal 8 to 16 km/h - 4 to 8,5 kts - 5 to 10 MPH before actual stall is reached and remains on until the airplane flight attitude is changed.

LIMITATIONS

CERTIFICATION BASIS

The REIMS/CESSNA FRA 150M is certified in the Acrobatic Category under AIR 2052 regulations, with amendments dated 5 November 1965, with the limits indicated in this section.

AIRSPEED LIMITATIONS

Vne (Never Exceed Speed) . . . .311 km/h - 168 kts - 193 MPH

Vno (Maximum Structural Cruising Speed) . . . . . .225 km/h - 122 kts - 140 MPH

Vp (Maneuvering Speed) . . . . . .190 km/h - 103 kts - 118 MPH

Vfe (Maximum Speed, Flaps Extended) . . . . . 161 km/h - 87kts - 100 MPH

AIRSPEED INDICATOR MARKINGS

Red Line . . . . . .311 km/h - 168 kts - 193 MPH

Yellow Arc (Caution Range)
. . 225 to 311 km/h - 122 to 168 kts - 140 to 193 MPH

Green Arc (Normal Operating Range)
. . 90 to 225 km/h - 49 to 122 kts - 56 to 140 MPH

White Arc (Flap Operating Range)
. . 79 to 161 km/h - 43 to 87 kts - 49 to 100 MPH

FLIGHT MANEUVERING LOAD FACTORS AT GROSS WEIGHT

Flaps Up	+ 6,0 – 3,0	Flaps Down + 3,5

MAXIMUM GROSS WEIGHT FOR TAKE-OFF AND LANDING

Take-off : 750 kg

Landing : 750 kg

CENTER OF GRAVITY LOCATION

Leveling Means : Screws on outer side aft of cabin.

Center of Gravity Reference : Forward face of firewall.

Center of Gravity Range Limits at 750 kg Gross Weight :

Forward Limit : + 0,838 m Aft Limit : + 0,952 m

LOADING LIMITS (Utility Category)

Number of Occupants : Front Seats : 2

Minimum Crew : 1

Maximum Baggage : 120 lbs (54 kg)

LOADING LIMITS (Acrobatic Category)

Number of Occupants : Front Seats : 2

Minimum Crew : 1

NOTE

AEROBATIC MANEUVERS WITH BAGGAGE LOADINGS OR OCCUPIED CHILD'S SEAT ARE NOT APPROVED.

AUTHORIZED OPERATIONS

If equipped with good condition instruments described in the approved appendix of this manual, this aircraft is certified for day, night, VFR and IFR flight operations.

FLIGHT IN ICING CONDITIONS

Flight in icing conditions is strictly prohibited.

MANEUVERS-ACROBATIC CATEGORY

The REIMS/CESSNA FRA150M is certificated in the Acrobatic Category. However, aerobatic maneuvers with flaps extended and inverted flight maneuvers are not approved.

The following aerobatic maneuvers are approved :

MANEUVER	RECOMMENDED ENTRY SPEED
Chandelles	193 km/h - 104 kts - 120 MPH
Lazy Eights	193 km/h - 104 kts - 120 MPH
Steep Turns	177 km/h - 96 kts - 110 MPH

Loops	209 km/h - 113 kts - 130 MPH
Cuban Eights	233 km/h - 126 kts - 145 MPH
Immelmanns	233 km/h - 126 kts - 145 MPH
Aileron Rolls	209 km/h - 113 kts - 130 MPH
Barrel Rolls	209 km/h - 113 kts - 130 MPH
Snap Rolls	145 km/h - 78 kts - 90 MPH
Vertical Reversements	145 km/h - 78 kts - 90 MPH
Spins	Use Slow Deceleration
Stalls (Except Whip Stalls)	Use Slow Deceleration

During prolonged spins the engine may stop ; however, spin recovery is not adversely affected by engine stoppage.

ENGINE OPERATION LIMITATIONS

Power and Speed. . 97 kW (130 HP) at 2800 RPM (5 Minute Take-off)
92 kW (123 HP) at 2650 RPM (Max. Continuous)

ENGINE INSTRUMENT MARKINGS

OIL TEMPERATURE GAGE

Normal Operating Range	Green Arc
Maximum Allowable	240°F (116°C) red line

OIL PRESSURE GAGE

Minimum Idling	10 psi (0,69 bars) (red line)

Normal Operating .....30-60 psi (2,07-4,13 bars) (green arc)

Maximum .....100 psi (6,89 bars) (red line)

FUEL QUANTITY INDICATORS

Empty ..... E (red line)
(6,5 litres unusable each tank)

TACHOMETER

Normal Operating Range ..... 2000-2650 RPM (green arc)

Caution Range..... 2650-2800 RPM (yellow arc)

Maximum Allowable ..... 2800 RPM (red line)

PLACARDS

The following information is displayed in the form of composite or individual placards.

(1) In full view of the pilot :

This airplane is approved in the acrobatic category and must be operated in compliance with the operating limitations as stated in the form of placards, markings, and manuals.

MAXIMUMS

Maneuvering Speed		118 m.p.h. CAS (103 knots)
Gross Weight		1654 lb-750 kg
Flight Load Factor	Flaps Up	+ 6.0, − 3.0
	Flaps Down	+ 3.5

Aerobatic maneuvers with flaps extended are prohibited.
Inverted flight is prohibited.
Child's seat and/or baggage compartment must not be occupied during aerobatics.

Maneuver	Max. Entry Speed	Maneuver	Max. Entry Speed
Chandelles	120 m.p.h. (104 knots)	Lazy Eights	120 m.p.h. (104 knots)
Steep Turns	110 m.p.h. (96 knots)	Spins	Slow Deceleration
Barrel Rolls	130 m.p.h. (113 knots)	Aileron Rolls	130 m.p.h. (113 knots)
Snap Rolls	90 m.p.h. (78 knots)	Immelmanns	145 m.p.h. (126 knots)
Loops	130 m.p.h. (113 knots)	Cuban Eights	145 m.p.h. (126 knots)
Vertical Reversements	90 m.p.h. (78 knots)	Stalls (Except Whip Stalls)	Slow Deceleration

Spin Recovery : opposite rudder – forward elevator – neutralize controls.
Known icing conditions to be avoided. This airplane is certified for the following flight operations as of date of original airworthiness certificate :

(DAY – NIGHT – VFR – IFR) (As Applicable)

(2) In the baggage compartment :

120 lbs. maximum baggage and/or auxiliary seat passenger.
For additional loading instructions see weight and balance data.

(3) On the instrument panel :

Do not turn off alternator in flight except in emergency.

(4) Near fuel shut-off valve :

Fuel 22.5 gals. ON-OFF.

(5) On front door posts :

Emergency door release. a. Unlatch door. b. Pull "D" ring.

(6) On door near window latch :

Do not open window above 165 MPH.

(7) On the instrument panel near overvoltage light :

High Voltage

EMERGENCY PROCEDURES

SGAC APPROVED

ENGINE FAILURE

DURING TAKE-OFF

(a) Throttle – Idle.
(b) Apply brakes.
(c) Flaps – Retract.
(d) Mixture – Idle cut-off.
(e) Ignition Switch – «OFF».
(f) Master Switch – «OFF».

AFTER TAKE-OFF

(a) Glide Speed – 113 km/h - 61 kts - 70 MPH.
(b) Mixture – Idle cut-off.
(c) Fuel Shutoff Valve – «OFF».
(d) Ignition Switch – «OFF».
(e) Wing Flaps – As required (40° recommended).
(f) Master Switch – «OFF».

CAUTION

Perform the landing straight ahead, making only small changes in heading to avoid obstructions. Never attempt to turn back to the landing strip.

DURING FLIGHT

(a) Glide Speed – 121 km/h - 65 kts - 75 MPH (optimum

glide angle with propeller windmilling).

(b) Fuel – Verify that fuel shutoff valve handle is «ON».
(c) Mixture – Rich.
(d) Throttle – Cracked one inch (2,5 cm).
(e) Ignition Switch – «BOTH».

If the propeller is allowed to stop windmilling, the engine will have to be turned with the starter. If the engine will not start, select an unobstructed area to land in and secure the engine as follows :

(a) Mixture – Idle cut-off.
(b) Throttle – Closed.
(c) Ignition Switch – «OFF».
(d) Fuel Shutoff Valve Handle – «OFF».
(e) Leave master switch «ON» so that wing flaps can be extended and to keep use of the radio.

NOTE

Full flaps are recommended for emergency landings on unpaved surfaces.

FIRES

ENGINE FIRE ON GROUND

In case of fire in the intake duct during ground operations, proceed as follows :

(a) Starter – Crank.
(b) Mixture – Idle cut-off.
(c) Throttle – Full open.
(d) Fuel Shutoff Valve Handle – «OFF».

NOTE

If fire occurs in intake duct during

engine run-up, keep engine running for about 15 to 30 seconds. If fire persists, perform above steps (b), (c) and (d).

ENGINE FIRE IN FLIGHT

(a) Cabin Heat Control -- «CLOSED».
(b) Mixture – Idle cut-off.
(c) Throttle – Forward maximum.
(d) Fuel Shutoff Valve Handle -- «OFF».
(e) Ignition Switch -- «OFF».
(f) Airspeed – 161 km/h - 87 kts - 100 MPH. If fire is not extinguished, increase glide speed to find an airspeed which will provide an incombustible mixture.
(g) Wing Flaps – As required (40° recommended).
(h) Master Switch – «OFF».

NOTE

Do not attempt to restart the engine. Execute a forced landing.

CABIN FIRE

(a) Master Switch – «OFF».
(b) Cabin Heating and Ventilation Controls -- Closed.

NOTE

Use a portable extinguisher if available.

WING FIRE

(a) Master Switch – «OFF».
(b) Ventilating Controls – Closed.

NOTE

Perform a sideslip on the side opposite to the wing in fire in an

attempt to extinguish the flames. Land the aircraft as soon as possible with flaps retracted.

ELECTRICAL FIRE

(a) Master Switch – «OFF».
(b) All other switches – «OFF».
(c) Master Switch – «ON».

NOTE

Select switches «ON» successively, permitting a short time delay to elapse after each switch is turned on until the short circuits is localized.

LANDING

LANDING WITH ONE FLAT TIRE

Lower the flaps normally and land the airplane with nose up and wing tilted to hold the flat tire off the ground as long as possible. At touch-down, use rudder and the brake on the good wheel to maintain directional control, and shut down the engine.

LANDING WITHOUT PITCH CONTROL

Trim for horizontal flight (with an airspeed of approximately 97 km/h - 52 kts - 60 MPH and flaps lowered to 20°) by using throttle and trim tab controls. Then, do not change the elevator trim control setting ; control the glide angle by adjusting power exclusively.

At flareout, the nose-down moment resulting from power reduction is an adverse factor and the aircraft may hit on the nose wheel.

Consequently, at flareout, the control should be set at the full nose-up position and the power adjusted so that the aircraft will rotate to the horizontal attitude for touchdown. Close the throttle at touchdown.

FORCED LANDINGS

PRECAUTIONARY LANDING WITH ENGINE POWER

(1) Drag over selected field with flaps 20° and 113 km/h - 61 kts - 70 MPH airspeed.
(2) Seats, seat belts and shoulder harnesses – Adjust and lock.
(3) On downwind leg, turn off all switches except the ignition and master switches.
(4) Approach with flaps 40° at 104 km/h - 57 kts - 65 MPH.
(5) Master Switch – «OFF».
(6) Doors – Unlatch prior to touchdown.
(7) Ignition Switch – «OFF».
(8) Fuel Shutoff Valve – «OFF».
(9) Touchdown – Slightly tail low.
(10) Brakes – Apply heavily.

EMERGENCY LANDING WITHOUT ENGINE POWER

(1) Airspeed – 121 km/h - 65 kts - 75 MPH (flaps UP).
104 km/h - 57 kts - 65 MPH (flaps DOWN).
(2) Mixture – Idle cut-off.
(3) Fuel Shutoff Valve – «OFF».
(4) Ignition Switch – «OFF».
(5) Wing Flaps – As required (40° recommended).
(6) Master Switch – «OFF».
(7) Doors – Unlatch prior to touchdown.
(8) Touchdown – Slightly tail low.
(9) Brakes – Apply heavily.

DITCHING

(1) Prepare for ditching by securing or jettisoning heavy objects.

(2) Transmit Mayday message on 121.5 MHz giving location and intentions.
(3) Plan approach into wind if winds are high and seas are heavy. With heavy swells and light wind, land parallel to swells.
(4) Approach with flaps 40° and sufficient power for a 300 ft./min. rate of descent at 104 km/h - 57 kts - 65 MPH.
(5) Unlatch the cabin doors.
(6) Maintain a continuous descent until touchdown in level attitude.
(7) Place folded coat or cushion in front of face at time of touchdown.
(8) Evacuate airplane through cabin doors. If necessary, open window to flood cabin compartment for equalizing pressure so that door can be opened.
(9) Inflate life vests and raft (if available) after evacuation of cabin. The aircraft can not be depended on for floatation for more than a few minutes.

FLIGHT IN ICING CONDITIONS

Although flying in known icing conditions is prohibited, an unexpected icing encounter should be handled as follows :

(1) Turn pitot heat switch «ON».
(2) Change altitude to obtain an outside air temperature that is less conducive to icing.
(3) Pull cabin heat control full out for maximum defroster heat and air flow.
(4) Open the throttle to increase engine speed to minimize ice buildup.
(5) Apply carburetor heat.
(6) Plan a landing at the nearest airport.
(7) With an important ice accumulation, be prepared for significantly higher stall speed.
(8) Leave wing flaps retracted since wing flap extension could result in a loss of elevator effectiveness.
(9) Open left window and, if practical, scrape ice from a

portion of the windshield for visibility in the landing approach.
(10) Perform a landing approach using a forward slip, if necessary, for improved visibility.
(11) Approach at 113 to 129 km/h - 61 to 69 kts - 70 to 80 MPH, depending upon the amount of ice accumulation.
(12) Avoid sharp bank in the landing approach.
(13) Perform a landing in level attitude.

RECOVERY FROM A SPIRAL DIVE

If a spiral is encountered, proceed as follows :

(1) Close the throttle.
(2) Stop the turn by using coordinated aileron and rudder control to align the symbolic aircraft in the turn coordinator with the horizon reference line.
(3) Cautiously apply elevator back pressure to slowly reduce the indicated airspeed to 129 km/h - 69 kts - 80 MPH.
(4) Adjust the elevator trim control to maintain a 129 km/h - 69 kts - 80 MPH glide.
(5) Keep hands off the control wheel, using rudder control to hold a straight heading.
(6) Apply carburetor heat.
(7) Clear engine occasionally, but avoid using enough power to disturb the trimmed glide.
(8) Upon breaking out of clouds, apply normal cruising power and resume flight.

ELECTRICAL SYSTEM FAILURES

COMPLETE ELECTRICAL FAILURE

A complete electrical failure causes the loss of the turn coordinator, the fuel quantity indicators and the wing flaps.

Turn the master switch to «OFF» and land as soon as possible.

ALTERNATOR OR VOLTAGE REGULATOR FAILURE

The battery keeps supplying the aircraft electrical system.
Turn to «OFF» all equipment that is not essential for flight.
If applicable, wait 2 to 3 minutes and reset the alternator circuit breaker. In case it pops out again, do not insist and land as soon as possible.

ELECTRICAL POWER SUPPLY SYSTEM MALFUNCTIONS

Malfunctions in the electrical power supply system can be detected by periodic monitoring of the ammeter and over-voltage warning light.
If the ammeter indicates a continuous discharge rate in flight, turn the alternator switch to "OFF" and land as soon as possible.
If the charging rate were to remain above the normal value, the over-voltage sensor will automatically shut down the alternator and the over-voltage warning light will illuminate. Turn the master switch off and then on again. If the light comes on again, the flight should be terminated as soon as practical.
If the emergency occurs at night, turn the alternator switch back on for use of the landing light and flaps.

BAIL-OUT

If an emergency arises where bail-out is required, proceed as follows :

(1) Unlatch door.
(2) Pull emergency door release D ring.
(3) Push door clear of airplane.
(4) Release seat belt and shoulder harness.
(5) Bail-out.

The recommended bail-out procedure for the pilot is to grasp the forward doorpost with the right hand and to roll out the door opening head first. The left hand should be placed on the landing gear step and used as a support in pushing over the aft side of the landing gear.

Same symmetrical procedure for the front passenger.

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)	520	416		
2. Oil *	5	− 1,5	5	− 1,5
3. Pilot and Passenger	154	153		
4. Fuel (Standard)	61	65		
5. Baggage - 1 (child's seat)	10	15		
6. Baggage - 2	0			
7. TOTAL WEIGHT AND MOMENT	750	647,5		

8. Locate this point (750 and 647,5) 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.

Figure 5/1

BAGGAGE LOADING AND TIE-DOWN

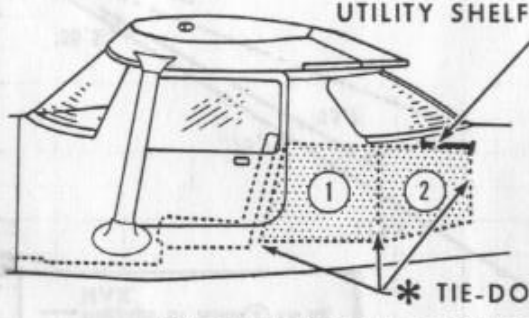


Figure 5/2

* 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. (Slide the tab of the locking clips on each end of the shelf to disengage the shelf from the aircraft structure.) After baggage is loaded and secured, either stow the shelf or, if space permits, install it for storing small articles.

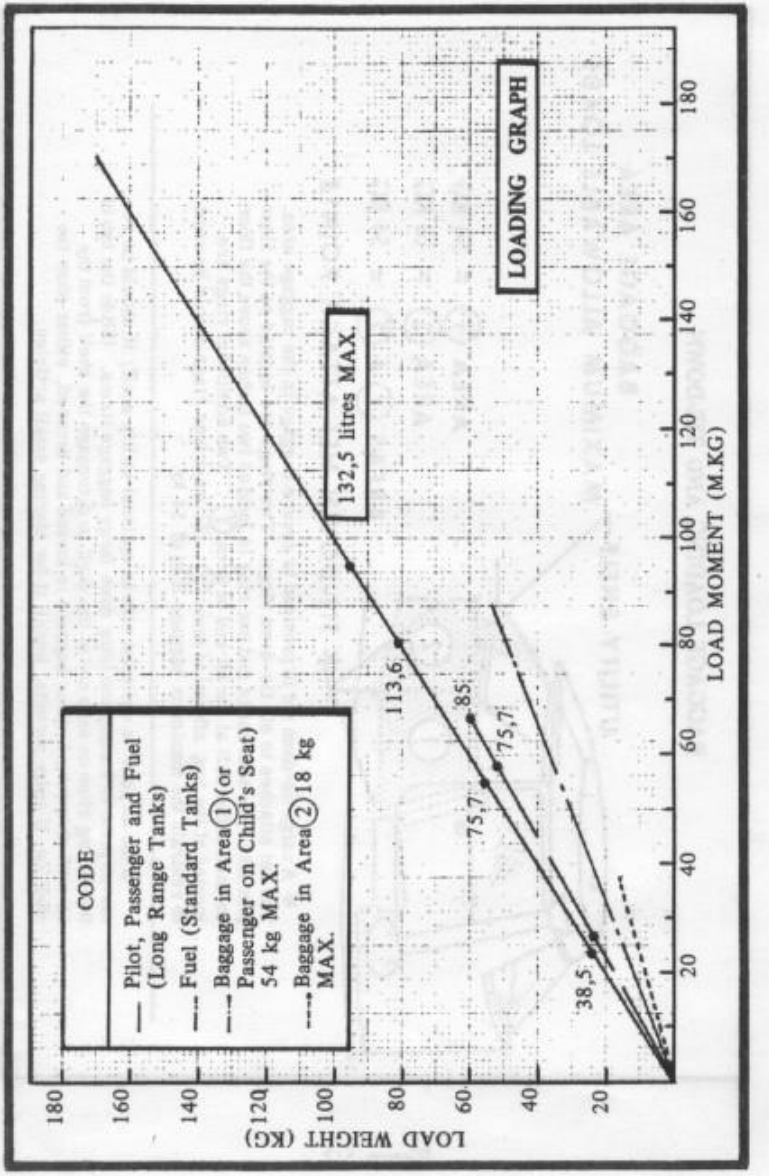

LOADING GRAPH
LOAD WEIGHT (KG)
LOAD MOMENT (M.KG)
132,5 litres MAX.
CODE
Pilot, Passenger and Fuel (Long Range Tanks)
Fuel (Standard Tanks)
Baggage in Area (1) (or Passenger on Child's Seat) 54 kg MAX.
Baggage in Area (2) 18 kg MAX.
113,6
85
75,7
75,7
38,5
180
160
140
120
100
80
60
40
20
20
40
60
80
100
120
140
160
180

Figure 6

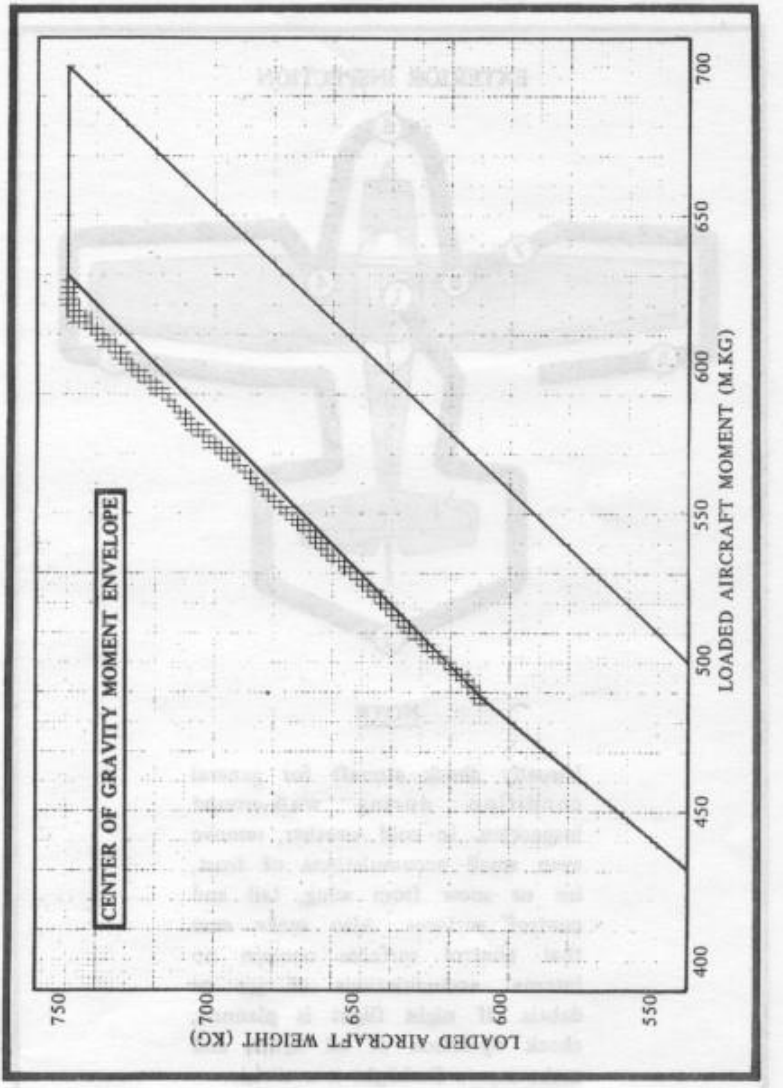
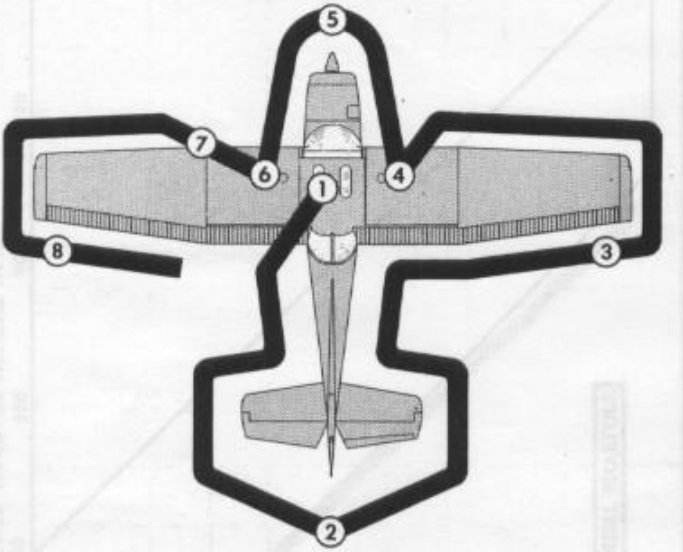

CENTER OF GRAVITY MOMENT ENVELOPE
LOADED AIRCRAFT WEIGHT (KG)
750
700
650
600
550
LOADED AIRCRAFT MOMENT (M.KG)
700
650
600
550
500
450
400

Figure 7

EXTERIOR INSPECTION



NOTE

Visually check aircraft for general condition during walk-around inspection. In cold weather, remove even small accumulations of frost, ice or snow from wing, tail and control surfaces. Also make sure that control surfaces contain no internal accumulations of ice or debris. If night flight is planned, check operation of all lights, and make sure a flashlight is available.

Figure 8

(1)
a. Remove control wheel lock.
b. Check ignition switch «OFF».
c. Turn on master switch and check fuel quantity indicators ; then turn master switch «OFF».
d. Check fuel shutoff valve handle «ON».
e. Check door release pins prior to aerobatic flight.
f. Inspect seat belts and shoulder harnesses for condition.
g. Remove seat insert cushions as necessary and securely stow prior to aerobatic flight.

(2)
a. Remove rudder gust lock, if installed.
b. Disconnect tail tie-down.
c. Check control surfaces for freedom of movement and security.

(3)
a. Check aileron for freedom of movement and security.

(4)
a. Disconnect wing tie-down.
b. Check main wheel tire for proper inflation.
c. Before first flight of day and after each refueling, use sampler cup and drain small quantity of fuel from fuel tank sump quick-drain valve to check for water, sediment and proper fuel grade.
d. Visually check fuel quantity ; then check fuel filler cap secure.

(5)
a. Check oil level. Do not operate with less than four quarts. Fill to six quarts for extended flight.
b. Before first flight of the day and after each refueling, pull out strainer drain knob for about four seconds to clear fuel strainer of possible water and sediment. Check strainer drain closed. If water is observed, the fuel system may contain additional water and further draining of the system at the strainer, fuel tank sumps, and fuel line drain plug will be necessary.
c. Check propeller and spinner for nicks and security.
d. Check landing light for condition and cleanliness.
e. Check carburetor air filter for restrictions by dust or other foreign matter.

f. Check nose wheel strut and tire for proper inflation.
g. Disconnect nose tie-down.
h. Inspect flight instrument static source opening on left side of fuselage for stoppage.

(6) Same as (4).

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

(8) Same as (3).

BEFORE ENTERING THE AIRPLANE

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

BEFORE STARTING THE ENGINE

(1) Seats, Seat Belts and Shoulder Harnesses – 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 – 105 km/h - 57 kts - 65 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 – 113 km/h - 61 kts - 70 MPH.

(2) Throttle – Full «OPEN».
(3) Mixture – Rich.

CRUISING

(1) Power – 2000 to 2650 RPM.
(2) Elevator Trim – Adjust.
(3) Mixture – Lean to maximum RPM.

NOTE

If a loss of RPM is noted, use the carburetor heater (refer to «CARBURETOR ICING» on page 4-22).

BEFORE LANDING

(1) Mixture – Rich.
(2) Carburetor Heat – Apply full heat before closing throttle.
(3) Indicated 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 IAS.
(5) Indicated Airspeed – 97 to 113 km/h - 52 to 61 kts - 60 to 70 MPH (flaps down).

BALKED LANDING

(1) Throttle – Full «OPEN».
(2) Carburetor Heat – Cold.
(3) Wing Flaps – Retract to 20°.
(4) Indicated Airspeed – 104 km/h - 57 kts - 65 MPH.
(5) Wing Flaps – Retract slowly.

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 strockes 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.

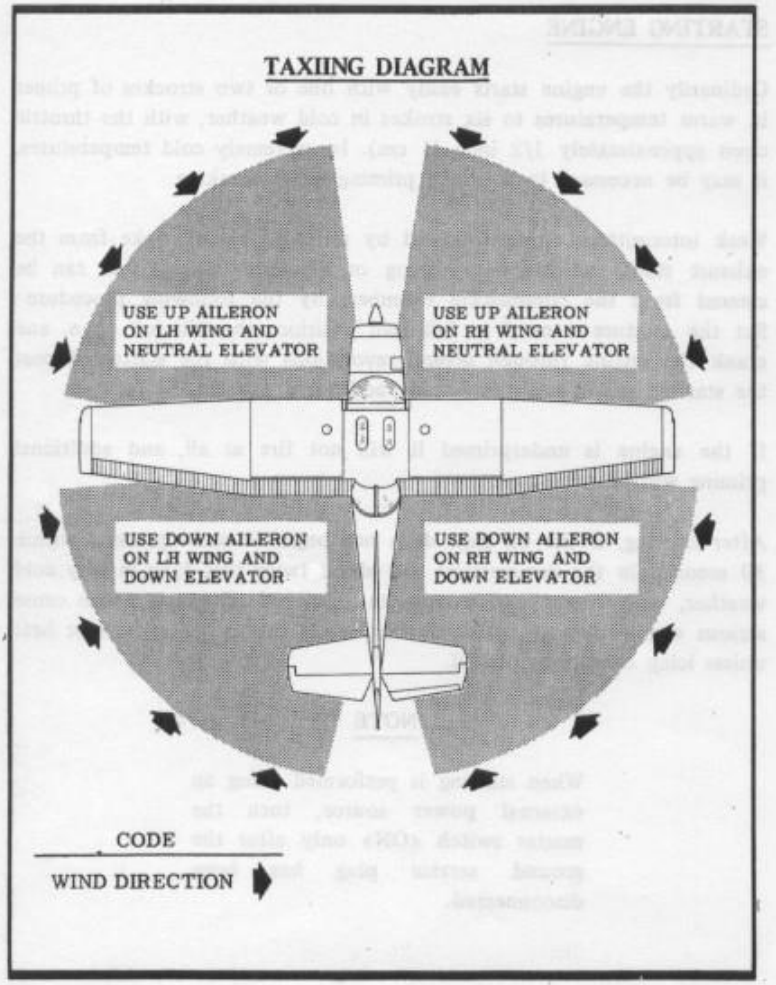

TAXIING DIAGRAM
USE UP AILERON ON LH WING AND NEUTRAL ELEVATOR
USE UP AILERON ON RH WING AND NEUTRAL ELEVATOR
USE DOWN AILERON ON LH WING AND DOWN ELEVATOR
USE DOWN AILERON ON RH WING AND DOWN ELEVATOR
CODE
WIND DIRECTION

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 sitting 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 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 2400 to 2500 RPM with carburetor heat off.

Ful 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 advandage 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 greater than 10° 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

CLIM DATA

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 speed is 113 km/h - 61 kts - 70 MPH at any altitude. If an obstruction dictates the use of a steep climb angle, climb at an obstacle clearance speed of 105 km/h - 57 kts - 65 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 at power settings up to 75 % of 130 HP (97 kW). The engine RPM and corresponding fuel consumption for various altitudes can be determined by using your Cessna power computer or the operational data in Section VI.

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

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.

The table 4 of Section 5 shows stall speeds versus flaps position and angle of bank.

With aircraft weights lower than the full gross weight, stall speeds are reduced. The stall warning horn produces a steady signal 5 to 10 MPH before the actual stall is reached and remains on until the airplane flight attitude is changed.

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

LANDING

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 LANDINGS

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.

(6) Ignition Switch – Start.
(7) Release ignition switch to «BOTH» when engine starts.
(8) Oil Pressure – Check.

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 six 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" 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 to 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 during the first few attempts, or if engine firing diminishes in strength, 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 $-20^{\circ}C$, avoid using carburetor heat, which would increase the temperature in the intake duct and restore critical icing conditions.

ROUGH ENGINE OPERATION OR LOSS OF POWER

CARBURETOR ICING

A gradual loss of RPM and eventual engine roughness may result from the formation of carburetor ice. To clear the ice, apply full throttle and pull the carburetor heat knob full out until the engine runs smoothly ; then remove carburetor heat and readjust the throttle. If conditions require the continued use of carburetor heat in cruise flight, use the minimum amount of heat necessary to prevent ice from forming and lean the mixture slightly for smoothest engine operation.

SPARK PLUG FOULING

A slight engine roughness in flight may be caused by one or more spark plugs becoming fouled by carbon or lead deposits. This may be verified by turning the ignition switch momentarily from «BOTH» to either «L» or «R» position. An obvious power loss in single ignition operation is evidence of spark plug or magneto trouble. Assuming that spark plugs are the more likely cause, lean the mixture to the normal lean setting for cruising flight. If the problem does not clear up in several minutes, determine if a richer mixture setting will produce smoother operation. If not, proceed to the nearest airport for repairs using the «BOTH» position of the ignition switch unless extreme roughness dictates the use of a single ignition position.

MAGNETO MALFUNCTION

A sudden engine roughness or misfiring is usually evidence of magneto problems. Switching from «BOTH» to either «L» or «R» ignition different power settings and enrichen the mixture to determine if continued operation on «BOTH» magnetos is practicable. If not, switch to the good magneto and proceed to the nearest airport for repairs.

LOW OIL PRESSURE

If low oil pressure is accompanied by normal oil temperature, there is a possibility the oil pressure gage or relief valve is malfunctioning. A leak in the line to the gage is not necessarily cause for an immediate precautionary landing because an orifice in this line will prevent a sudden loss of oil from the engine sump. However, a landing at the nearest airport would be advisable to inspect the source of trouble.

If a total loss of oil pressure is accompanied by a rise in oil temperature, there is good reason to suspect an engine failure is imminent. Reduce engine power immediately and select a suitable forced landing field. Leave the engine running at low power during the approach, using only the minimum power required to reach the desired touchdown spot.

SPARK PLUG FOULING

A slight engine roughness in flight may be caused by one or more spark plugs becoming fouled by carbon or lead deposits. This may be verified by turning the ignition switch momentarily from «BOTH» to either «L» or «R» position. An obvious power loss in single ignition operation is evidence of spark plug or magneto trouble. Assuming that spark plugs are the more likely cause, lean the mixture to the normal lean setting for cruising flight. If the problem does not clear up in several minutes, determine if a richer mixture setting will produce smoother operation. If not, proceed to the nearest airport for repair using the «BOTH» position of the ignition switch unless extreme roughness dictates the use of a single ignition position.

MAGNETO MALFUNCTION

A rough engine response or misfiring is usually evidence of magneto problems. Switching from «BOTH» to either «L» or «R» ignition will isolate the problem. For persistent roughness, single ignition operation at different power settings and leaning the mixture to determine if continued operation on «BOTH» magnetos is practicable. If not, switch to the good magneto and proceed to the nearest airport for repairs.

LOW OIL PRESSURE

If low oil pressure is accompanied by normal oil temperature, then is a possibility the oil pressure gage or relief valve is malfunctioning. A leak in the line to the gage is not normally cause for an immediate precautionary landing because an orifice in this line will prevent a sudden loss of oil from the engine sump. However, a landing at the nearest airport would be advisable to inspect the source of trouble.

If a total loss of oil pressure is accompanied by a rise in oil temperature, there is good reason to suspect an engine failure is imminent. Reduce engine power immediately and select a suitable forced landing field. Leave the engine running at low power during the approach, using only the minimum power required to reach the desired touchdown spot.

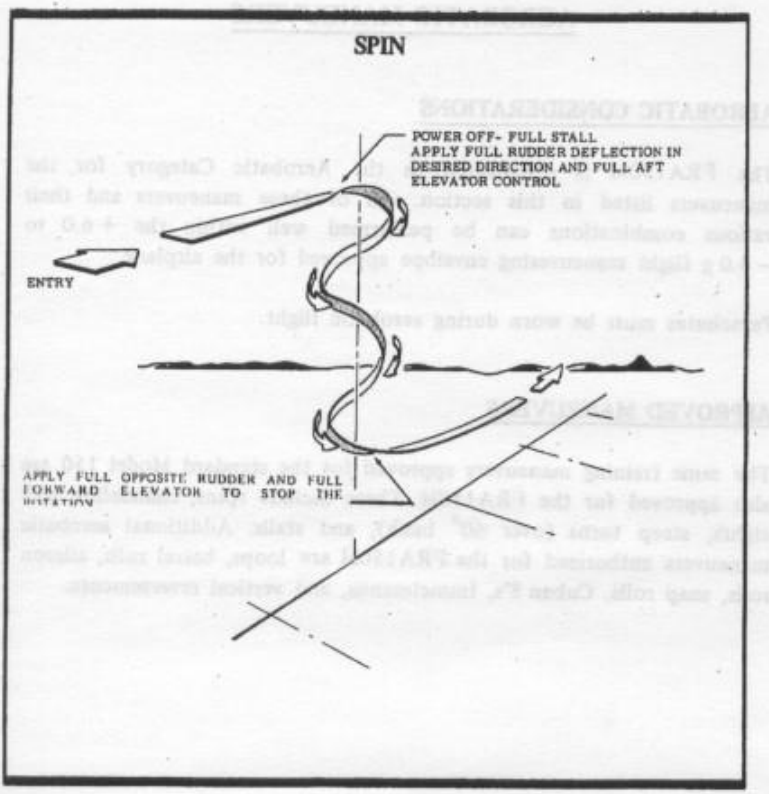


Figure 10

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

AEROBATIC MANEUVERS

AEROBATIC CONSIDERATIONS

The FRA150M is certificated in the Aerobatic Category for the maneuvers listed in this section. All of these maneuvers and their various combinations can be performed well within the + 6.0 to – 3.0 g flight maneuvering envelope approved for the airplane.

Parachutes must be worn during aerobatic flight.

APPROVED MANEUVERS

The same training maneuvers approved for the standard Model 150 are also approved for the FRA150M. These include spins, chandelles, lazy eights, steep turns (over 60° bank), and stalls. Additional aerobatic maneuvers authorized for the FRA150M are loops, barrel rolls, aileron rolls, snap rolls, Cuban 8's, Immelmanns, and vertical reversements.

above the surface. 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) Move the elevator control forward of neutral in a brisk motion.
(3) Neutralize aileron control.
(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.

NOTE

If a spin is entered inadvertently from an aerobatic maneuver, it is important to close the throttle promptly. The use of engine power in the spin will tend to flatten the spinning attitude and prolong the recovery.

During prolonged spins the engine may stop ; however, spin recovery is not adversely affected by engine stoppage.

After spin recovery, engine restarting should occur if the propeller is windmilling. If the propeller does not windmill or the engine does not start, accomplish starting procedure described on page 4-4.

During solo flights, it is advised that spins be performed on the side opposite to the pilot.

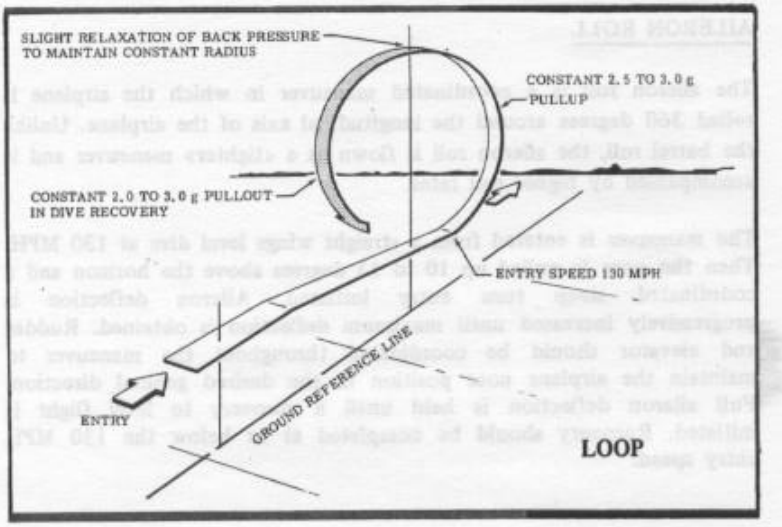


Figure 11

LOOP

The normal loop is basically a 360 degree turn executed in the vertical plane. The maneuver consists of a climb, inverted flight, dive, and recovery to straight and level flight conducted in a series. The entire loop should be conducted with a positive g level on the airplane and at maximum power (within 2800 RPM limits).

The loop is entered from a shallow dive at 209 km/h - 113 kts - 130 MPH. A 2.5 to 3.0 g pullup is initiated and a continuous elevator back pressure maintained throughout the inverted position. A slight relaxation of back pressure may be necessary to prevent stall buffeting from occurring through the downward side of the loop and to maintain the symmetrical pattern of the maneuver. Observation of landmarks through the skylight windows will aid in keeping the pilot oriented throughout the inverted portion of the loop.

Interesting variations of the basic loop may be performed by :

(1) including a quarter roll in the recovery dive and
(2) describing a clover-leaf pattern through a series of four consecutive loops with quarter rolls.

AILERON ROLL

The aileron roll is a coordinated maneuver in which the airplane is rolled 360 degrees around the longitudinal axis of the airplane. Unlike the barrel roll, the aileron roll is flown as a «tighter» maneuver and is accompanied by higher roll rates.

The maneuver is entered from a straight wings level dive at 130 MPH. Then the nose is pulled up 10 to 15 degrees above the horizon and a coordinated steep turn entry initiated. Aileron deflection is progressively increased until maximum deflection is obtained. Rudder and elevator should be coordinated throughout the maneuver to maintain the airplane nose position in the desired general direction. Full aileron deflection is held until a recovery to level flight is initiated. Recovery should be completed at or below the 130 MPH entry speed.

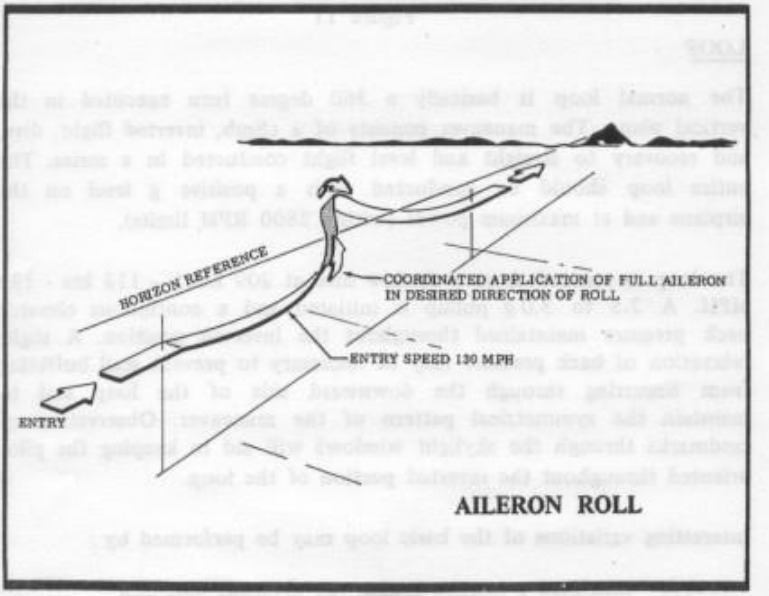


Figure 12

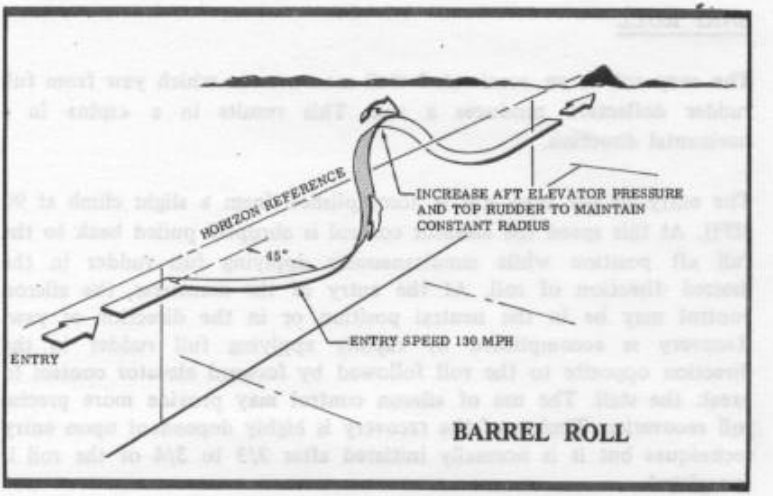


Figure 13

BARREL ROLL

The barrel roll is a coordinated maneuver in which the airplane is rolled 360 degrees around the longitudinal axis of the airplane while maintaining a constant radius around a point on the horizon. Particular emphasis is made on actually «flying» the airplane around the reference point.

The barrel roll is entered by diving the airplane to a 130 MPH speed while simultaneously turning to an entry point approximately 45 degrees off of a selected reference heading. During the entry, a gradual pullup is initiated and as the nose passes through the horizon a coordinated turn begun. After 45 degrees of turn, the airplane should be positioned in a 90 degree bank and the nose at its highest point. The roll is continued at a constant rate to the inverted position with the nose pointing 90 degrees from the original direction of entry. The nearly constant roll rate is continued until reaching the original entry heading in straight and level flight. A continuous elevator back pressure is required to maintain a positive g level throughout the maneuver. The recovery should be completed at or below the 130 MPH entry speed.

SNAP ROLL

The snap roll is an accelerated stall maneuver in which yaw from full rudder deflection produces a roll. This results in a «spin» in a horizontal direction.

The entry to the snap roll is accomplished from a slight climb at 90 MPH. At this speed the elevator control is abruptly pulled back to the full aft position while simultaneously applying full rudder in the desired direction of roll. At the entry of the maneuver, the aileron control may be in the neutral position or in the direction of yaw. Recovery is accomplished by rapidly applying full rudder in the direction opposite to the roll followed by forward elevator control to break the stall. The use of aileron control may provide more precise roll recoveries. Timing of the recovery is highly dependent upon entry techniques but it is normally initiated after 2/3 to 3/4 of the roll is completed.

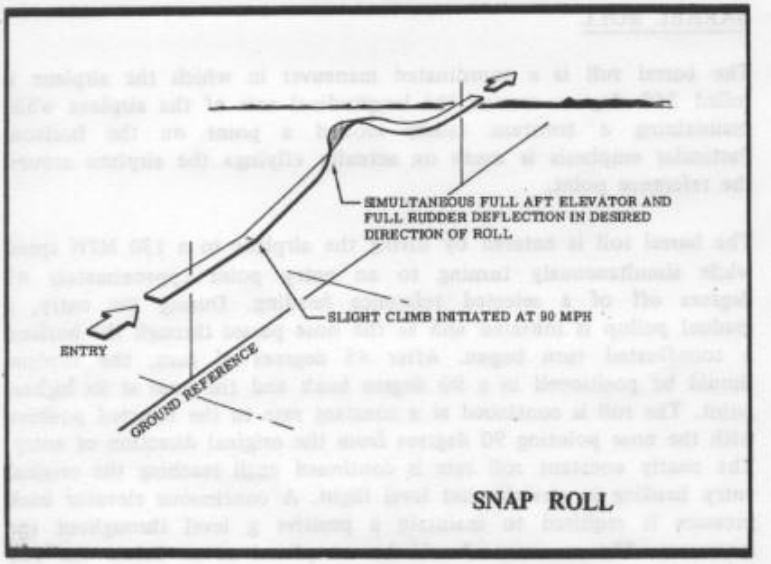


Figure 14

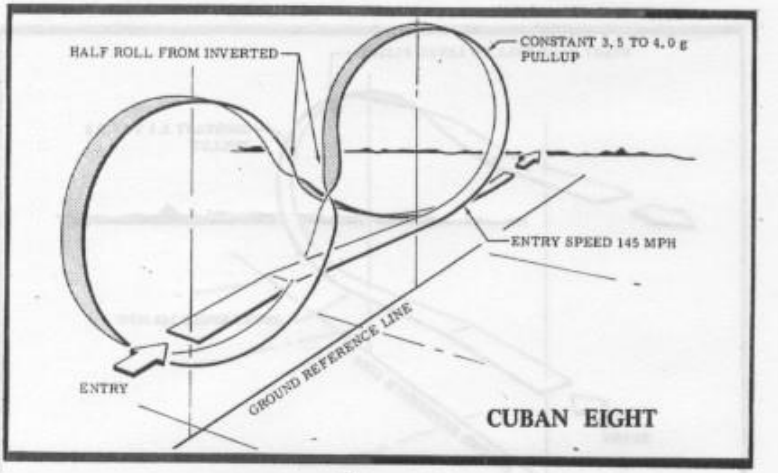


Figure 15

CUBAN EIGHT

The Cuban eight consists of approximately three-fourths of a normal loop and a diving half-roll followed in the opposite direction by another three-fourths of a loop and a half-roll.

The maneuver is entered from a dive at 145 MPH. During the entry, the throttle is gradually retarded to prevent engine overspeed. A 3.5 to 4.0,g pullup is initiated followed by a progressive throttle application to full power by the time a vertical position is reached. A positive g level should be pulled through the inverted portion of the maneuver to a point where the nose of the airplane is approximately 45 degrees below the horizon. At this point, the back pressure is slightly relaxed and a half aileron roll initiated.

A slight forward control pressure may be required on the last half of the roll to hold the nose on the desired heading and to help keep the airplane in a diving configuration. The dive is continued until the 145 MPH entry speed is again reached and the same procedure should be repeated in the opposite direction. The throttle should be retarded on the diving portion of the maneuvers in the same manner as was done on the initial entry. The maneuver may be completed by a dive recovery to level flight.

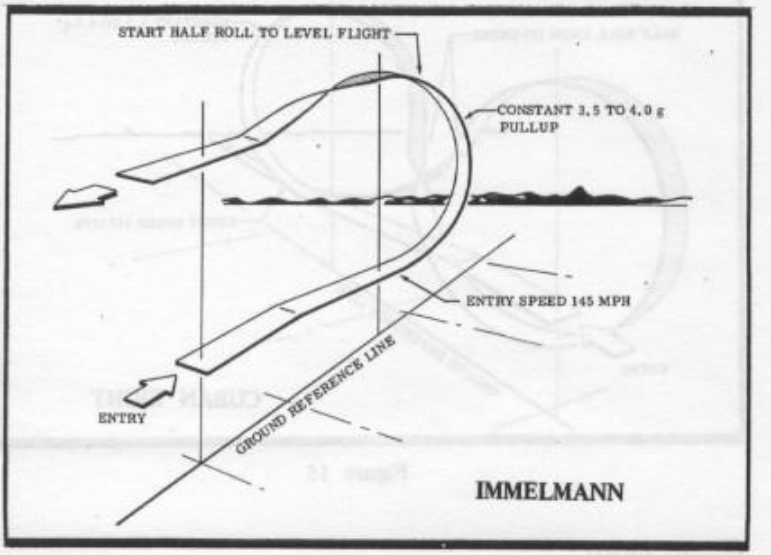


Figure 16

IMMELMANN

The Immelmann is a combination half loop followed by a half roll. A positive g level should be maintained throughout the maneuver.

The Immelmann is entered from a dive at 145 MPH. During the entry, the throttle is gradually reduced to prevent engine overspeed. A 3.5 to 4.0 g pullup is initiated followed by a progressive throttle application to full power by the time a vertical position is reached. As the airplane nears the inverted position, a slight relaxation of elevator back pressure should be accomplished and full aileron control deflection rapidly made in the direction of the desired roll. A smoother maneuver can be achieved by initiating the half roll with the nose approximately 30° above the horizon as viewed through the overhead skylight. As the half roll is executed, the nose is allowed to move smoothly down to the horizon. A slight forward pressure on the control wheel and bottom rudder are used initially followed by a smooth application of full top rudder in the final portion of the half roll.

VERTICAL REVERSEMENT

The vertical reversement is a half snap roll from a steep turn in one direction to a steep turn in the opposite direction.

Entry is accomplished from a 60 to 70-degree bank at 90 MPH. Full top rudder should be applied followed by an application of full aft elevator control. As the airplane snaps over the top, aileron control is added in the direction of roll. The control wheel should then be eased forward and appropriate rudder and aileron controls used to re-establish a steep turn in the opposite direction. On recovery, the airplane should smoothly resume a banked turn with no distinct break in the turning motion. This maneuver may be performed in a sequence by turning 180° between each vertical reversement.

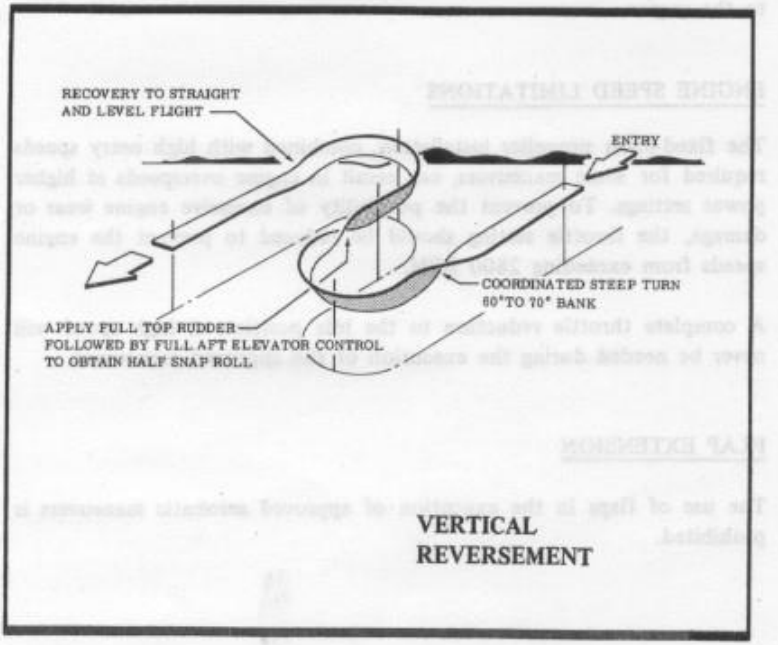


Figure 17

AEROBATIC LIMITATIONS

INVERTED FLIGHT

During training operations, momentary inverted flight may sometimes be encountered. Since it is conceivable that a slight amount of engine oil could be lost from the oil breather line, it is recommended that a minimum of 5 quarts (4,7 litres) of oil be carried as a matter of good operating practice (actual minimum allowable is 4 quarts – 3,8 litres). Continuous inverted flight maneuvers are not approved because the engine is not equipped with an inverted flight lubrication system and the gravity fuel system and conventional carburetor will not permit continuous engine operation in this negative g condition. In addition, the loss of oil pressure (with a windmilling propeller) and a loss of a quart (0,9 litre) or more of oil through the breather could be harmful to the engine.

ENGINE SPEED LIMITATIONS

The fixed-pitch propeller installation, combined with high entry speeds required for some maneuvers, can result in engine overspeeds at higher power settings. To prevent the possibility of excessive engine wear or damage, the throttle setting should be reduced to prevent the engine speeds from exceeding 2800 RPM.

A complete throttle reduction to the idle position at high speed will never be needed during the execution of the approved maneuvers.

FLAP EXTENSION

The use of flaps in the execution of approved aerobatic maneuvers is prohibited.

NOISE ABATEMENT

Increased emphasis on improving the quality of our environment requires renewed effort on the part of all pitots to minimize the effect of aircraft noise on the public.

We, as pilots, can demonstrate our concern for environmental improvement, by application of the following suggested procedures, and thereby tend to build public support for aviation :

1) Pilots operating aircraft under VRF over outdoor assemblies of persons, recreational and park areas, and other noise-sensitive areas should make every effort to fly not less than 2,000 feet above the surface, weather permitting, even though flight at a lower level may be consistent with the provisions of government regulations.

2) During departure from or approach to an airport, climb after take-off and descent for landing should be made so as to avoid prolonged flight at low altitude near noise-sensitive areas.

NOTE

The above recommended procedures do not apply where they would conflict with Air Traffic Control clearances or instructions, or where, in the pilot's judgment, an altitude of less than 2,000 feet is necessary for him to adequately exercise his duty to see and avoid other aircraft.

PERFORMANCE

NOTIFICATION

The tables appearing on the following pages result from actual tests with an airplane in good flying condition. They will be useful in flight planning ; nevertheless, it will be advisable to plan on an ample safety margin concerning the fuel reserve at arrival, since the data given does not take into account the effects of wind, navigational errors, pilot technique, run-up, climb, etc. All these factors should be considered when estimating the reserve required by regulations. Don't forget that maximum range increases by using a lower power setting. To solve these problems, consult the Cruise Performance table.

In the Table 2, range and endurance are given for lean mixture from 2,500 feet to 12,500 feet. All figures are based on zero wind, 85 and 132,5 litres of fuel for cruise, 750 kg gross weight and standard atmospheric conditions.

Remember that the charts contained herein are based on standard day conditions.

GROSS WEIGHT	750 kg
SPEED :	
Top Speed at Sea Level	198 km/h - 107 kts - 123 MPH
Cruise, 70 % Power at 5000 ft	197 km/h - 106 kts - 122 MPH
RANGE WITH 22,5 US Gal, (85 l), NO RESERVE	
Cruise, 70 % Power at 5000 ft	645 km - 348 NM
Endurance	3.3 hrs
Speed	197 km/h - 106 kts - 122 MPH
Cruise, Optimum Range at 10000 ft	837 km - 452 NM
Endurance	5.0 hrs
Speed	167 km/h - 90 kts - 104 MPH
RANGE WITH 35 US Gal, (132,5 l), NO RESERVE	
Cruise, 70 % Power at 5000 ft	1005 km - 543 NM
Endurance	5.1 hrs
Speed	197 km/h - 106 kts - 122 MPH
Cruise, Optimum Range at 10000 ft	1304 km - 704 NM
Endurance	7.8 hrs
Speed	167 km/h - 90 kts - 104 MPH
TAKE-OFF :	
Ground Run	174 m
Total Distance Over 50 ft Obstacle	316 m
RATE OF CLIMB AT SEA LEVEL	4,3 m/s - 846 fpm

SERVICE CEILING	4260 m - 14,000 ft
LANDING :	
Ground Roll	136 m
Total Distance Over 50-Ft Obstacle	328 m
EMPTY WEIGHT :	
With «Standard» Tanks	503 kg
With «Long Range» Tanks	504 kg
BAGGAGE	54 kg
WING LOADING	50,7 kg/m2
POWER LOADING	7,74 kg/kW
FUEL CAPACITY :	
«Standard» Tanks	26 US Gal. - 98 litres
«Long Range» Tanks	38 US Gal. - 144 litres
OIL TANK CAPACITY	6 qts - 6 litres
PROPELLER : Fixed Pitch (Diameter)	1,803 m
ENGINE : ROLLS ROYCE engine	Type O-240-E
130 rated HP at 2800 RPM, 97 kW (5 Minute Take-Off Rating)	
123 rated HP at 2650 RPM, 92 kW (Maximum Continuous Rating)	

Table 1

CRUISE PERFORMANCE

ALTITUDE m	ALTITUDE ft	RPM	% BHP	TAS km/h	TAS kts	FUEL CONSUM. (PER HOUR) Litres	FUEL CONSUM. (PER HOUR) US.Gal	ENDURANCE HOURS Std 85 l	ENDURANCE HOURS L.Range 132,5 l	RANGE km Standard 85 l	RANGE NM Standard 85 l	RANGE km Long Range 132,5 l	RANGE NM Long Range 132,5 l
762	2500	2650	76	197	106	28.0	7.4	3.0	4.7	599	322	932	502
		2600	71	193	104	26.5	7.0	3.2	5.0	628	339	974	526
		2500	63	185	100	23.5	6.2	3.6	5.6	668	361	1038	560
		2400	55	175	95	21,2	5.6	4.0	6.3	708	382	1102	595
		2300	48	167	90	18.9	5.0	4.5	7.0	748	404	1159	626
		2200	41	156	84	17.0	4.5	5.0	7.8	781	421	1215	656
		2100	34	143	77	15.5	4.1	5.5	8.5	789	426	1231	665
1524	5000	2650	70	197	106	25.9	6.9	3.3	5.1	645	348	1005	543
		2600	66	192	103	24.6	6.5	3.5	5.4	668	361	1038	560
		2500	58	183	99	22.0	5.8	3.9	6.0	708	382	1102	595
		2400	51	174	94	19.7	5.2	4.3	6.7	748	404	1159	626
		2300	43	163	88	17.8	4.7	4.8	7.5	781	421	1215	656
		2200	36	151	82	15.9	4.2	5.3	8.3	805	434	1255	678
		2100	30	138	75	14.8	3.9	5.8	9.0	805	434	1255	678

2286	7500	2650	65	195	105	24.2	6.4	3.5	5.5	687	371	1070	578
		2600	60	190	103	22.7	6.0	3.7	5.8	716	387	1110	600
		2500	53	182	98	20.4	5.4	4.1	6.4	748	404	1167	630
		2400	46	171	92	18.5	4.9	4.6	7.2	789	426	1231	665
		2300	39	159	86	16.7	4.4	5.2	8.0	821	443	1279	690
		2200	33	146	79	15.1	4.0	5.6	8.7	821	443	1279	690
3048	10000	2650	60	193	104	22.3	5.9	3.8	5.9	737	398	1148	620
		2600	55	188	102	21.2	5.6	4.0	6.2	756	408	1183	639
		2500	48	179	96	18.9	5.0	4.5	6.9	797	430	1239	669
		2400	41	167	90	17.0	4.5	5.0	7.8	837	452	1304	704
		2300	35	154	83	15.5	4.1	5.4	8.5	837	452	1304	704
3800	12500	2650	54	191	103	20.7	5.5	4.1	6.4	785	424	1223	660
		2600	50	185	100	19.7	5.2	4.3	6.8	805	434	1247	673
		2500	43	174	94	17.8	4.7	4.8	7.5	837	452	1295	700
		2400	36	161	87	15.9	4.2	5.3	8.3	861	465	1336	721

NOTES :
1. In the above calculations of endurance in hours and range, no allowances were made for take-off or reserve.
2. These performance data are computed for an aircraft without wheel fairings. Increase these performance data by 2 kts - 3 km/h when optional speed fairings are installed.

Table 2

AIRSPEED CORRECTION TABLE

FLAPS UP											
IAS	KM/H	80	97	113	129	145	161	177	193	209	225
	KTS	43	52	61	69	78	87	96	104	114	122
	MPH	50	60	70	80	90	100	110	120	130	140
CAS	KM/H	89	100	113	126	140	153	169	184	200	216
	KTS	48	54	61	68	76	82	91	99	108	116
	MPH	55	62	70	78	87	95	105	114	124	134
FLAPS DOWN											
IAS	KM/H	64	80	97	113	129	145	161			
	KTS	35	43	52	61	69	78	87			
	MPH	40	50	60	70	80	90	100			
CAS	KM/H	77	85	99	114	131	146	163			
	KTS	42	46	53	62	70	79	88			
	MPH	48	53	61	71	81	91	101			

Table 3

POWER OFF — STALL SPEEDS				km/h - kts MPH
	ANGLE OF BANK			
MAXIMUM GROSS WEIGHT 750 kg CONDITIONS	0°	20°	40°	60°
 FLAPS UP	90 km/h 48.5 kts 56 MPH	93 km/h 50 kts 58 MPH	103 km/h 55.5 kts 64 MPH	127 km/h 68.5 kts 79 MPH
 FLAPS 20°	80 km/h 43 kts 50 MPH	84 km/h 45 kts 52 MPH	92 km/h 50 kts 57 MPH	114 km/h 62 kts 71 MPH
 FLAPS 40°	79 km/h 42.5 kts 49 MPH	80 km/h 43 kts 50 MPH	89 km/h 48 kts 55 MPH	109 km/h 59 kts 68 MPH

NOTE : The stall warning horn is adjusted to operate at a speed 5 to 8 kts above stall speed.

Table 4

TAKE-OFF DISTANCE				FLAPS RETRACTED HARD SURFACE RUNWAY							
GROSS WEIGHT	IAS 15 m	HEAD WIND		AT SEA LEVEL AND 15°		AT 762 M - 2500 FT AND 10°		AT 1524 M - 5000 FT AND 5°		AT 2286 M - 7500 FT AND 0°	
		km/h	kts	Ground Run m	Total to Clear 15 m Obs m	Ground Run m	Total to Clear 15 m Obs m	Ground Run m	Total to Clear 15 m Obs m	Ground Run m	Total to Clear 15 m Obs m
750 kg	105 km/h	0	0	174	316	210	378	253	452	308	554
	57 kts	18.5	10	118	236	145	290	177	344	218	426
	65 MPH	37	20	73	167	93	204	114	248	145	310

NOTE : increase the distances by 10 % for each 20° increase in temperature above standard for the particular altitude.

For operation on a dry, grass runway, increase distances (both «ground run» and «total to clear 15 m obstacle») by 7 % of the «total to clear 15 m obstacle» figure.

Table 5

LANDING DISTANCE		FLAPS LOWERED TO 40° POWER OFF - ZERO WIND HARD SURFACE RUNWAY							
GROSS WEIGHT	APPROACH SPEED IAS	AT SEA LEVEL AND 15°C		AT 762 M - 2500 FT AND 10°C		AT 1524 M - 5000 FT AND 5°C		AT 2286 M - 7500 FT AND 0°C	
		Ground Roll m	Total to Clear 15 m Obs m	Ground Roll m	Total to Clear 15 m Obs m	Ground Roll m	Total to Clear 15 m Obs m	Ground Roll m	Total to Clear 15 m Obs m
750 kg	97 km/h 52 kts 60 MPH	136	328	143	346	151	364	158	383

NOTE : Decrease distances shown by 10 % for each 7.5 km/h - 4 kts - 6.4 MPH headwind.
Increase the distance by 10 % for each 3.5°C temperature increase above standard.
For operation on a dry, grass runway, increase distances (both «ground run» and «total to clear 15 m obstacle») by 20 % of the «total distance to clear 15 m obstacle» figure.

Table 6

MAXIMUM RATE OF CLIMB DATA

FLAPS RETRACTED

FULL THROTTLE

GROSS WEIGHT	AT SEA LEVEL AND 15°C			AT 1524 M - 5000 FT AND + 5°C			AT 3048 M - 10000 FT AND – 5°C		
	IAS	Rate of Climb	Fuel Used	IAS	Rate of Climb	Fuel Used	IAS	Rate of Climb	Fuel Used
750 kg	113 km/h 61 kts 70 MPH	4,3 m/s 845 ft/min.	3,0 litres	113 km/h 61 kts 70 MPH	2,9 m/s 580 ft/min.	7,2 litres	113 km/h 61 kts 70 MPH	1,6 m/s 315 ft/min.	13,2 litres

NOTE : Flaps retracted, full throttle, mixture leaned above 1524 m - 5000 feet.
Fuel used includes warm-up and take-off allowances.
For hot weather, decrease rate of climb 15 ft/mn (0,6 m/s) for each 5°C above standard day temperature for particular altitude.

Table 7

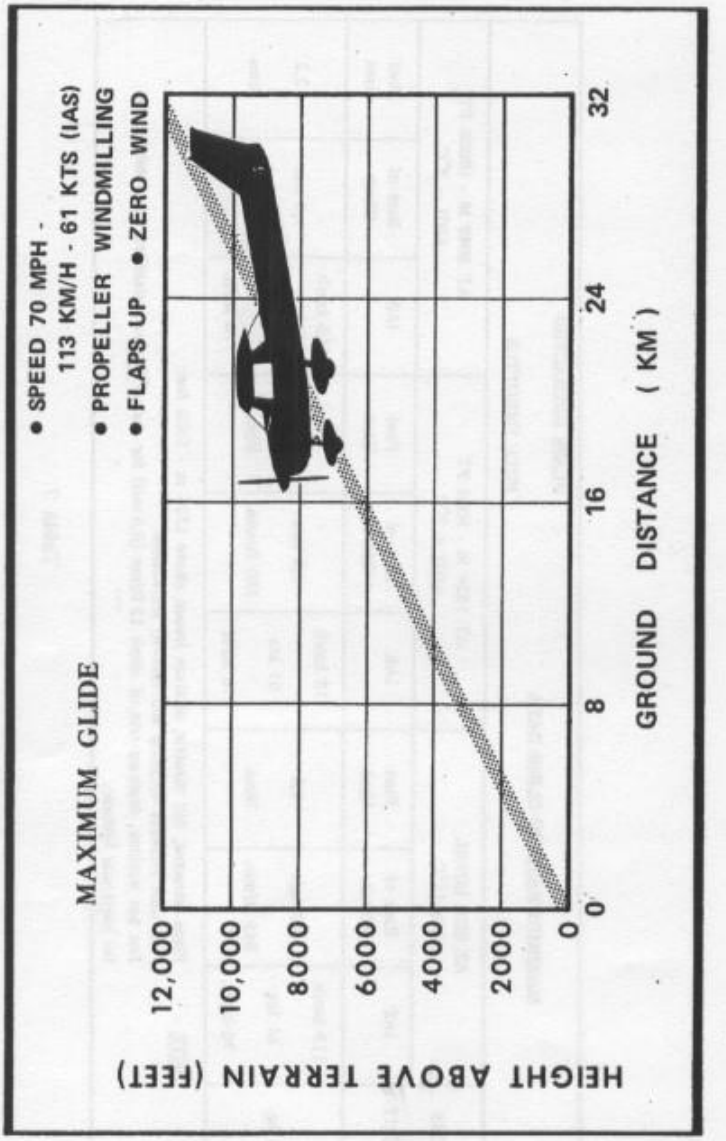

MAXIMUM GLIDE
• SPEED 70 MPH - 113 KM/H - 61 KTS (IAS)
• PROPELLER WINDMILLING
• FLAPS UP • ZERO WIND
HEIGHT ABOVE TERRAIN (FEET)
12,000
10,000
8000
6000
4000
2000
0
0
8
16
24
32
GROUND DISTANCE (KM)

Figure 18

SHORT FIELD LANDINGS

Make a power-off approach at 97 km/h - 52 kts - 60 MPH with full flaps and land on the main wheels first. Immediately after touchdown, lower the nose wheel and apply heavy breaking.

CROSSWIND LIMITATIONS

Take-off direct crosswind limitation 37 km/h - 20 kts.
Landing direct crosswind limitation 28 km/h - 15 kts.

SERVICING REQUIREMENTS

For quick and ready reference, quantities, materials, and specifications for frequently used service items (such as fuel, oil, etc.) are shown under Servicing Requirements on the following pages.

In addition to the EXTERIOR INSPECTION covered in Section 4, COMPLETE servicing, inspection, and test requirements for your aircraft are detailed in the aircraft Service Manual. The Service Manual outlines all items which require attention at 50, 100, and 200 hour intervals plus those items which require servicing, inspection, and/or testing at special intervals.

Since Dealers conduct all service, inspection, and test procedures in accordance with applicable Service Manuals, it is recommended that you contact your Dealer concerning these requirements and begin scheduling your aircraft for service at the recommended intervals.

The manufacturer Progressive Care ensures that these requirements are accomplished at the required intervals to comply with the 100-hour or ANNUAL inspection.

Depending on various flight operations, your local Government Aviation Agency may require additional service, inspections, or tests. For these regulatory requirements, owners should check with local aviation officials where the aircraft is being operated.

ENGINE OIL :

GRADE – Aviation Grade SAE 50 above 5°C (40°F.) and
Aviation Grade SAE 30 below 40°F.
Multi-viscosity oil is recommended for improved starting in cold weather. Detergent or dispersant oil, conforming to Continental Motors Specification MHS-24A, must be used.

NOTE

Your aircraft was delivered from the factory with a corrosion preventive aircraft engine oil. If oil must be added during the first 25 hours, use only aviation grade straight mineral oil (non-detergent) conforming to Specification No. MIL-L-6082.

CAPACITY OF ENGINE SUMP – 6 Quarts (5,7 litres).

Do not operate on less than 4 quarts (3,8 litres). To minimize loss of oil through breather, fill to 5 quarts (4,7 litres) level for normal flights of less than 3 hours. For extended flight, fill to 6 quarts (5,7 litres). These quantities refer to oil dipstick level readings. During oil and oil filter changes, one additional quart (0,9 litre) is required when the filter element is changed.

OIL AND OIL FILTER CHANGE –

After the first 25 hours of operation, drain engine oil sump and clean the oil pressure screen. If an optional oil filter is installed, change filter element at this time. Refill sump with straight mineral oil (non-detergent) and use until a total of 50 hours has accumulated or oil consumption has stabilized ; then change to detergent oil. On aircraft not equipped with an optional oil filter, drain the engine oil sump and clean the oil pressure screen each 50 hours thereafter. On aircraft which have an optional oil filter, the oil and oil filter element change interval may be extended to 100-hour intervals. Change engine oil at least every 6 months even though less than the recommended hours have accumulated. Reduce intervals for prolonged operation in dusty areas, cold climates, or when short flights and long idle periods result in sludging conditions.

FUEL :

GRADE – 100/130 Aviation Grade Fuel

CAPACITY EACH STANDARD TANK – 49 l (13 US Gallons)
CAPACITY EACH LONG RANGE TANK – 72 l (19 US Gallons)

NOTE

Due to cross-feeding between fuel tanks, the tanks should be re-topped after each refueling to assure maximum capacity.

LANDING GEAR :

NOSE WHEEL TIRE PRESSURE – 30 psi on 5.00-5, 4-ply rated tire.
MAIN WHEEL TIRE PRESSURE – 21 psi on 6.00-6, 4-ply rated tires.
NOSE GEAR SHOCK STRUT –
Keep filled with MIL-H-5606 hydraulic fluid and inflated with air to 20 psi. Do not over-inflate.

MAINTENANCE

GROUND HANDLING

The airplane is most easily and safely maneuvered by hand with a tow-bar attached to the nose wheel.

When using the tow-bar, never exceed the turning angle of 30° either side of center, or damage to the gear will result.

MOORING YOUR AIRPLANE

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

(1) Set parking brake and install control wheel lock.
(2) Install a surface control lock between each aileron and flap.
(3) Tie sufficiently strong ropes to wing and tail tie-down fittings, and secure each rope to ramp tie-down.
(4) Install a surface control lock over the fin and rudder.
(5) Install a pitot tube cover.

WINDSHIELD - WINDOWS

The windshield and windows should be kept clean at all times. Wash them carefully with plenty of soap and water, using palm of hand. Chamois or sponge may be used, but only to carry water to the surface. Rinse thoroughly, then dry with a clean, moist chamois.

Rubbing the surface of the plastic with a dry cloth builds up an electrostatic charge wich attracts dust particles in the air ; the use of a chamois prevents such a dust attraction.

Remove oil and grease with a cloth moistened with kerosene. Never use gasoline, benzine, alcohol, acetone, carbon tetrachloride, fire extinguisher, or anti-ice fluid, lacquer thinner, etc... These materials

will soften the plastic and may cause it to craze.

After removing dirt and grease, the surface may be waxed with a good grade of wax. Apply a thin, even coat of wax and bring it to a high polish by rubbing lightly with a clean, dry, soft flannel cloth. Do not use a power buffer ; the heat generated by the buffing pad may soften the plastic.

PAINTED SURFACES

The painted exterior surfaces of the aircraft require an initial curing period which may be as long as 15 days. During this curing period, some precautions should be taken to avoid damaging the finish. The finish should be cleaned only by washing with clean water and mild soap, followed by a rinse water and drying with chamois. Do not use polish or wax, and avoid flying through rain, hail or sleet during this period.

Once the finish has cured completely, wax or polish may be used, particularly on the leading edges, engine nose cap, and propeller spinner to reduce the abrasion encountered in these areas.

ALUMINIUM SURFACES

The clad aluminum surfaces of the aircraft may be washed with clear water to remove dirt ; oil and grease may be removed with gasoline, naphtha, carbon tetrachloride or other non-alkaline solvents. Dulled aluminum surfaces may be cleaned effectively with an aircraft aluminum polish.

After cleaning, and periodically thereafter, waxing with a good wax will preserve the bright appearance and retard corrosion. Regular waxing is especially recommended for airplanes operated in salt water areas as a protection against corrosion.

PROPELLER CARE

Preflight inspection of propeller blades for nicks, and wiping them occasionally with an oily cloth to clean off grass and bug stains will assure long, trouble-free service. Small nicks on the blades, 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 ignored, may result in cracks. Never use an alkaline cleaner on the blades ; remove grease and dirt with carbron tetrachloride.

INTERIOR CARE

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

Oily spots may be cleaned with household spot removers, used sparingly. Before using any solvent, read the instructions on the container and test it on an obscure place on the fabric to be cleaned. Never saturate the fabric with a volatile solvent ; it may damage the padding and backing materials.

The «royalite» trim, instrument panel and control knobs need only be wiped off with a damp cloth. Oil and grease on the control wheel and control knobs can be removed with a cloth moistened with kerosene.

Volatile solvents, such as mentioned in paragraphs on care of the windshield, must never be used since they soften and craze the plastic.

INSPECTION SERVICE AND INSPECTION PERIODS

With your airplane, you will receive an Owner's Service Policy. Coupons attached to the policy entitle you to an initial inspection and the first 100-hour inspection at no charge. Your Dealer will perform the initial inspection. Plan an inspection by your Dealer at 100 hours or 180 days after purchase, whichever comes first.

OPTIONAL EQUIPMENT LIST

DESCRIPTION	PAGE	APPROVAL
- Winterization Kit	6-1.1	
- Ground Service Plug Receptacle	6-2.1	
- Radio Transmitter Selector Switch	6-3.1	
- Boom Microphone	6-3.1	
- True Airspeed Indicator	6-4.1	
- Wing Leveler	6-5.1 and 6-5.2	
- BADIN CROUZET RG10B Automatic Pilot + Directional Gyro Coupling + Omni Coupling	6-6.1 thru 6-6.3	
- Glider Towing Hook	6-7.1 and 6-7.2	

WINTERIZATION KIT

For continuous operation in temperatures consistently below 20°F (-7°C), the winterization kit should be installed to improve engine operation. The kit consists of :

- Two shields to partially cover the cowl nose cap openings.
- The addition of heat ducting from the right exhaust manifold for additional cabin heat.
- A carburetor airbox heat outlet cap.
- An insulation for the engine crankcase breather line.

NOTE

Once installed, the crankcase breather insulation is approved for permanent use in both cold and hot weather.

GROUND SERVICE PLUG RECEPTACLE.

A ground service plug receptacle may be installed to permit the use of an external power source for cold weather starting and during lengthy maintenance work on the electrical and electronic equipment.

Just before connecting an external power source, the master switch should be turned "ON".

This is especially important since it will enable the battery to absorb transient voltages which otherwise might damage the transistors in the electronic equipment.

The battery and external power circuits have been designed to completely eliminate the need to "jumper" across the battery contactor to close it for charging a completely "dead" battery. A special fused circuit in the external power system supplies the needed "jumper" across the contacts so that with a "dead" battery and an external power source applied, turning the master switch "ON" will close the battery contactor.

RADIO TRANSMITTER SELECTOR SWITCH

Operation of the radio equipment is normal as covered in the respective radio manuals. When the aircraft is equipped with more than one radio having transmitter capabilities, a transmitter selector switch is installed to switch the microphone to the radio unit the pilot desires to use for transmission. The switch is located in the upper left portion of the instrument panel and is labeled «TRANS, 1 and 2». Placing the switch in the upper position, labeled «1», switches the microphone to the upper transmitter ; the lower position, labeled «2», switches the microphone to the lower transmitter.

BOOM MICROPHONE

A boom microphone may be mounted in the center of the cabin ceiling. Clips are provided just back of the upper edge of the windshield to stow the microphone when not in use.

The boom microphone allows radio communication without the necessity of releasing any controls to handle the normal hand microphone.

The microphone keying switch is a push button located on the left side of the pilot's control wheel.

TRUE AIRSPEED INDICATOR

A true airspeed indicator is available to replace the standard airspeed indicator in your airplane. The true airspeed indicator has a calibrated rotatable ring which works in conjunction with the airspeed indicator dial in a manner similar to the operation of a flight computer.

TO OBTAIN TRUE AIRSPEED, rotate ring until pressure altitude is aligned with outside air temperature in degrees Fahrenheit. Then read true airspeed on rotatable ring opposite airspeed needle.

NOTE

Pressure altitude should not be confused with indicated altitude. To obtain pressure altitude, set barometric scale on altimeter to «29.92» (1013 mb) and read pressure altitude on altimeter. Be sure to return altimeter barometric scale to original barometric setting after pressure altitude has been obtained.

WING LEVELER

GENERAL

A wing leveler may be installed to augment the lateral and directional stability of the airplane. The system uses the Turn Coordinator for roll and yaw sensing. Vacuum pressure, from the engine-driven vacuum pump, is routed from the Turn Coordinator to cylinder-piston servo units attached to the aileron and rudder control systems. As the airplane deviates from a wing level attitude or a given direction, vacuum pressure in the servo units is increased or relieved as needed to actuate the ailerons and rudder to oppose the deviations. The rudder action effectively corrects adverse yaw induced by the ailerons.

A separately mounted push-pull control knob, labeled «WING LVLR», is provided at the lower center of the instrument panel to turn the system on and off. A «ROLL TRIM» control knob on the Turn Coordinator is used for manual roll trim control to compensate for asymmetrical loading of fuel and passengers, and to optimize system performance in climb, cruise and let-down.

OPERATION LIMITATIONS

(1) The wing leveler system may be overpowered at any time without damage or wear. However, for extended periods of maneuvering it may be desirable to turn the system off.

(2) It is recommended that the system not be engaged during take-off and landing. Although the system can be easily overpowered, servo forces could significantly alter the manual «feel» of the aileron control, especially should a malfunction occur.

EMERGENCY PROCEDURES

If a malfunction should occur, the system is easily overpowered with pressure on the control wheel. The system should then be turned off. In the event of partial or complete vacuum failure, the wing leveler will automatically become inoperative. However, the Turn Coordinator used with the wing leveler system will not be affected by loss of vacuum since it is designed with a «back-up» system enabling it to operate from either vacuum or electrical power in the event of failure of one of these sources.

NORMAL PROCEDURES

TAKE-OFF

(1) «WING LVLR» Control Knob - Check in off position (full in).

CLIMB

(1) Adjust elevator trim for climb.
(2) «WING LVLR» Control Knob - Pull control knob «ON».
(3) «ROLL TRIM» Control Knob - Adjust for wings level attitude.

CRUISE

(1) Adjust power and elevator trim for level flight.
(2) «ROLL TRIM» Control Knob - Adjust as desired.

DESCENT

(1) Adjust power and elevator trim for desired speed and rate of descent.
(2) «ROLL TRIM» Control Knob - Adjust as desired.

LANDING

(1) Before landing, push «WING LVLR» control knob full in to the off position.

DIRECTIONAL + BADIN CROUZET RG10B AUTOMATIC PILOT

OMNI COUPLING + GYRO COUPLING

BREAKDOWN OF CES.RA.150.770 OPTION

A. BADIN CROUZET RG10B Automatic Pilot

This automatic pilot is intended for stabilization or control of the aircraft in roll and yaw through the roll control system.

The major components are as follows :

- A flight controller.
- A roll/yaw sensor.
- An air distributor.
- Two aileron control air-driven actuators.
- A vacuum source.
- Mechanical parts.

B. Directional Gyro Coupling and Omni Coupling

The above automatic pilot may be supplemented with the following equipment :

- A vacuum-driven directional gyro.
- A «HDG-VOR» navigation coupler.

OPERATION LIMITATIONS

The automatic pilot must not be used for take-off and landing.

Minimum operation altitude : 250 m (656 ft).

EMERGENCY PROCEDURES

Automatic Pilot Failure

- Take over manual control of the aircraft.
- Set autopilot «ON-OFF» switch to «OFF».
- Close «VIDE P.A.» («A.P. VACUUM») valve on the instrument panel.

Electrical Failure

- Any electrical failure will result in the failure of the automatic pilot and may be cause for residual forces to be overpowered.
- Apply the above procedure.

NORMAL PROCEDURES

Before Take-Off

- Set «TURN» and «TRIM» knobs to neutral.
- «STAB-HDG» selector switches - «STAB».
- Autopilot «ON-OFF» switch - «OFF».
- «VIDE P.A.» («A.P. VACUUM») valve - «OUVERT» («OPEN»).
- Suction gage - Check (4.6 to 5.4 inches of mercury).

Take-Off

- Autopilot «ON-OFF» switch - «OFF».

Automatic Pilot Engagement

(1) While holding the control wheel, set the following switches as follows :
- «STAB-HDG» selector switch - «STAB».
- Autopilot «ON-OFF» switch - «ON».

(2) Release the control wheel
- Adjust «TRIM» knob for zero rate.
- Maintain a steady climb angle with the manual flight controls without counteracting the transverse movements induced by the automatic pilot.
- To make turns, rotate «TURN» knob to «L» or «R» according to the desired turn direction.

GLIDER TOWING HOOK

CES-RA-FRA150.801

BREAKDOWN OF OPTION

- A structural reinforcement factory-installed on aircraft.
- A welded tube frame fitted with an AERAZUR AIR type 12A hook.
- A release control handle on upper side panel, to the left of the pilot.
- Two rear view mirrors on wing struts.
- An operating instruction placard.
- A probe and cylinder head temperature gage.

OPERATION REQUIREMENTS

- Maximum weight of towing aircraft : 670 kg (i.e. pilot + 75 litres fuel permitting 10 towing flights to 2000 ft).
- Maximum weight of towed glider : 400 kg.
- Minimum towing speed : 105 km/h - 57 kts - 65 MPH.

GLIDER TOWING PROCEDURE

BEFORE TAKE-OFF

In addition to normal operating procedures, functionally test aircraft and glider hooks.

TAKE-OFF

(1) Wing Flaps – Up.
(2) Carburetor Heat – Cold.
(3) Throttle – Full «OPEN».
(4) Elevator Control – Raise nose wheel at 88 km/h - 48 kts - 55 MPH.

CLIMB

(1) Speed – 105 to 121 km/h - 57 to 65 kts - 65 to 75 MPH.
(2) Power – Maximum.
(3) Mixture – Rich.
(4) Engine Instruments – Within green arc range and watch cylinder head temperature which should not exceed 460°F (238°C).

Between take-off and an altitude of 4000 ft, the average rate of climb is 1.85 m/s (365 ft/min) with a 400-kg glider.

LET-DOWN

(1) Throttle – Retard to 1700 RPM.
(2) Engine Instruments – Within green arc range and watch cylinder head temperature which should not drop below 300°F (149°C).
(3) Recommended speed – 177 km/h - 95 kts - 110 MPH.

GLIDER TOWING INSTRUCTION PLACARD

This placard which is located on the cabin LH side near the pilot shows the following indications :

- Maximum weight of towing aircraft : 670 kg
- Maximum weight of towed glider : 400 kg
- Minimum towing speed : 105 km/h - 57 kts - 65 MPH
- Total to clear 15-m obstacle on take-off – 750 m.

- Roll-out : Return «TURN» knob to neutral.
- «TRIM» knob must be readjusted from time to time to compensate for aerodynamic asymmetry.

NOTE

The automatic pilot is operative as soon as engaged.

Directional Gyro Coupling

- Select desired heading on the directional gyro compass card (aligned with magnetic compass heading).
- Set «HDG-VOR» selector switch to «HDG».
- Set «STAB-HDG» selector switch to «HDG» - The aircraft turns to the selected heading.
- «STAB-HDG» selector switch need not be set to «STAB» to change heading or to reset the directional gyro.

Omni Coupling Function

- Set the selected station frequency at the Omni control unit.
- Select desired heading on the directional gyro compass card and the Omni indicator.
- Set «HDG-VOR» selector switch to «VOR».
- Check «STAB-HDG» selector switch is set to «HDG».
- The selected heading is automatically maintained or corrected.

NOTE

If the aircraft is subjected to strong crosswind conditions, it is recommended to allow for a certain amount of drift upon heading selection on the directional gyro compass card, not altering the course selected on the Omni indicator.

Reims, 11 October 2011

AEROMAX
ESCUELA DE PILOTOS.
AEROPUERTO DE MADRID CUATRO VIENTOS
CARRETERA DE LA FORTUNA S/N
SECTOR A EDIFICIO MODULAR
SPAIN

To whom it concerns:

SALE AERO/TKA 11/10/11

1 ENGLISH FLIGHT MANUAL FRA150M 1975 MODEL S/N FRA1500271 ..... 225 Euros

NO VAT

T. KAZI
CESSNA AIRWORTHINESS REPRESENTATIVE
INDEPENDENT CONSULTANT
44 RUE MAZARIN
51100 REIMS

Reims, 11 October 2011

AEROMAX
ESCUELA DE PILOTOS.
AEROPUERTO DE MADRID CUATRO VIENTOS
CARRETERA DE LA FORTUNA S/N
SECTOR A EDIFICIO MODULAR
SPAIN

To whom it concerns:

CERTIFICATE OF CONFORMITY

This is to confirm that the enclosed Aircraft Flight Manual P/N D1035-13GB-RAND-150-12/74 of the REIMS/CESSNA FRA150 M 1975 Model is at its latest revision and is applicable to the FA1500271 a/c.

T. KAZI
CESSNA AIRWORTHINESS REPRESENTATIVE
INDEPENDENT CONSULTANT
44 RUE MAZARIN
51100 REIMS