CALGARY FLYING CLUB

Cessna T182T Aircraft Operating Manual

Contents

Introduction 4

182T Operational Limitations 5

Airspeed Limitations 5

Airspeed Indicator Markings 5

Powerplant Limitations 6

Weight Limits 7

Centre of Gravity Limits 8

Maneuver Limits 8

Flight Load Factor Limits 8

Fuel Limitations 8

Maximum Operating Altitude 8

Flap Limitations 8

Autopilot Limitations 9

Airport Runway Limitations 9

Operations on Contaminated runways: 9

Parking Limitations 9

Flight in IMC (Instrument Meteorological Conditions) 9

Wind Limitations 9

Standard Call-Outs 10

Autopilot Mode Change Call-Outs 10

182T Training Syllabus 11

Minimum Requirements for Rental 11

Ground Lesson Plans 11

Air Lesson Plans 12

Lesson Plan 1: Basic Aircraft Familiarization (Ground) 13

Lesson Plan 2: Basic Aircraft, Engine and Avionics Handling (Air) 14

Lesson Plan 3: Aircraft Emergencies, Specialty Takeoffs and Landings (Air) 15

Lesson Plan 4: Cross-Country Day VFR below 10 000 ft (Air) 16

Lesson Plan 5: Cross-Country Night VFR below 10 000 ft (Air) 17

Lesson Plan 6: Cross-Country VFR above 10 000 ft (Air) 18

Lesson Plan 7: Cross-Country IFR Below and Above 10 000 ft (Ground) 20

Lesson Plan 8: Cross-Country IFR Below and Above 10 000 ft (Air) 21

Recurrent Training 23

182T Normal Procedures 24

Normal Checklist 24

Amplified Normal Procedures 26
Cross Country Operations 36
Airspeed for Emergency Operation 39
Amplified Emergency Procedures 45
Cross Country Emergency Procedures 49

Introduction

This Aircraft Operating Manual is a summary of key aspects of the Pilot's Operating Handbook. It is not meant to be a replacement for the POH but rather a summary of key aspects of the Cessna T182T and an outline of the training requirements that the Calgary Flying Club will follow for pilots wishing to get checked out on the aircraft.

182T Operational Limitations

This section includes aircraft limitations from the POH as well as CFC limitations for the operation of CFC T182T aircraft. It is the responsibility of the Pilot-in-Command to ensure that the aircraft is operated in accordance with the limitations in this section as well as the POH of the aircraft.

Airspeed Limitations

SYMBOL	SPEED	KCAS	KIAS	REMARKS
V_{NE}	Never Exceed Speed	170	175	Do not exceed this speed in any operation.
V_{NO}	Maximum Structural Cruising Speed	137	140	Do not exceed this speed except in smooth air, and then only with caution.
V_A	Maneuvering Speed: 3100 Pounds 2600 Pounds 2100 Pounds	 110 101 92	 110 101 91	Do not make full or abrupt control movements above this speed.
V_{FE}	Maximum Flap Extended Speed: 0° to 10° Flaps 10° to 20° Flaps 20° to FULL Flaps	 137 119 100	 140 120 100	Do not exceed this speed with flaps down.
—	Maximum Window Open Speed	170	175	Do not exceed this speed with windows open.

Airspeed Indicator Markings

MARKING	KIAS VALUE OR RANGE	SIGNIFICANCE
White Arc	41 - 100	Full Flap Operating Range. Lower limit is maximum weight V_{SO} in landing configuration. Upper limit is maximum speed permissible with flaps extended.
Green Arc	51 -140	Normal Operating Range. Lower limit is maximum weight V_S at most forward C.G. with flaps retracted. Upper limit is maximum structural cruising speed.
Yellow Arc	140-175	Operations must be conducted with caution and only in smooth air.
Red Line	175	Maximum speed for all operations.

Powerplant Limitations

Engine

- Textron Lycoming TIO-540-AK1A
- 235 rated BHP at 32 in Hg and 2400 RPM

Engine Operating Limits:

- Take off and Max continuous Climb Power: 32 in and 2400 RPM
- Recommended Climb Power: 25 in and 2400 RPM (Set at 400 feet)
- Recommended Cruise Power: 24 in and 2300 RPM
- Maximum Cylinder Head Temperature (CHT): 500°F (260°C)
- Maximum Oil Temperature: 245°F (118°C)
- Oil Pressure :
    - Minimum 20 PSI
    - Maximum 115 PSI

Fuel Grade

- Aviation Grade 100LL (Blue)

Minimum Fuel Quantity: Minimum fuel required for the flight + 45 mins OR 46 U.S. Gallons – ***Whichever is greater.***

Oil Grade

- *All CFC T182T aircraft must use SAE 15W50 oil.*
- *Minimum Oil Quantity is 5 QT.*

MIL-L-22851 or SAE J1899 Aviation Grade Ashless Dispersant Oil: Oil conforming to Textron Lycoming Service Instruction No 1014, and all revisions and supplements thereto, **must be used** after first 50 hours or once oil consumption has stabilized.

Recommended Viscosity for Temperature Range:

Temperature	MIL-L-22851 Ashless Dispersant SAE Grade
Above 27°C (80°F)	60
Above 16°C (60°F)	40 or 50
-1°C (30°F) to 32°C (90°F)	40
-18°C (0°F) to 21°C (70°F)	30, 40 or 20W-40
Below -12°C (10°F)	30 or 20W-30
-18°C (0°F) - 32°C (90°F)	20W-50 or 15W-50
All Temperatures	15W-50 or 20W-50

NOTE

When operating temperatures overlap, use the lighter grade of oil.

Oil Capacity:

Sump: 8 U.S. Quarts
Total: 9 U.S. Quarts

Propeller

- McCauley Propeller Systems B3D36C442-C/80VSB-1.
- Propeller Diameter: 79 inches
- Propeller Blade Angle at 30-inch station:
    - Low: 15.3°
    - High: 35.4°

Powerplant Instrument Markings:

INSTRUMENT	RED LINE (MINIMUM)	GREEN ARC (NORMAL OPERATING)	RED LINE (MAX)
Tachometer	----	2000 - 2400 RPM	2400
Manifold Pressure 15,000 - 20,000 ft SL - 15,000 ft	----	 15-25 in. Hg 15-27 in. Hg 15-28 in. Hg	 32 in. Hg
Cylinder Head Temperature	----	200 - 500°F	500°F
Oil Temperature	----	100 - 245°F	245°F
Oil Pressure	20 PSI	50 - 90 PSI	115 PSI
Fuel Quantity	0 (2.5 Gal. Unusable Each Tank)	----	----
Fuel Flow	----	0 to 16 GPH 0 to 18 GPH	24 GPH
Vacuum	----	4.5 - 5.5 in.Hg	----
Turbine Inlet Temperature (T.I.T.) (°F)	----	1350 - 1685	1685

Weight Limits

Maximum Ramp Weight: 3112 lbs.
Maximum Takeoff Weight: 3100 lbs.
Maximum Landing Weight: 2950 lbs.
Maximum Weight in Baggage Compartment:
Baggage Area A - Station 82 to 109: 120 lbs. See note below.
Baggage Area B - Station 109 to 124: 80 lbs. See note below.
Baggage Area C - Station 124 to 134: 80 lbs. See note below.

NOTE

The maximum allowable combined weight capacity for baggage in areas A, B and C is 200 pounds. The maximum combined allowable weight capacity for baggage in areas B and C is 80 pounds.

Centre of Gravity Limits

Center of Gravity Range:

Forward: 33.0 inches aft of datum at 2250 lbs. or less, with straight line variation to 35.5 inches aft of datum at 2700 lbs. or less, with straight line variation to 40.9 inches aft of datum at 3100 lbs., continuing to aft limit at 3100 lbs.

Aft: 46.0 inches aft of datum at all weights.

Reference Datum: Front face of firewall.

Maneuver Limits

This airplane is certificated in the normal category. The normal category is applicable to aircraft intended for non-aerobatic operations. These include any maneuvers incidental to normal flying, stalls (except whip stalls), lazy eights, chandelles, and turns in which the angle of bank is not more than 60°.

Aerobatic maneuvers, including spins, are not approved.

Flight Load Factor Limits

Flight Load Factors:

*Flaps Up ..... +3.8g, -1.52g

*Flaps Down ..... +2.0g

* The design load factors are 150% of the above, and in all cases, the structure meets or exceeds design loads.

Fuel Limitations

Minimum Fuel Quantity: 46 U.S. Gal OR Fuel required for flight + 45 min, ***whichever is greater***

Total Fuel: 92.0 U.S. Gallons (46.0 gallons per tank.)

Usable Fuel: 87.0 U.S. Gallons

Unusable Fuel: 5.0 U.S. Gallons (2.5 Gallons each tank.)

Takeoff and land with the fuel selector valve handle in the BOTH position.

Operation on either LEFT or RIGHT tank limited to level flight only.

With 1/4 tank or less, prolonged uncoordinated flight is prohibited when operating on either left or right tank.

Maximum Operating Altitude

Certified Maximum Operating Altitude: 20 000 ft

Flap Limitations

- Approved Take off Range: 0° to 20°
- Approved Landing Range: 0° to FULL

Flap speed limitations

- 0° - 10° : 140 KIAS
- 10° - 20° : 120 KIAS
- 20° - FULL : 100 KIAS

Autopilot Limitations

Maximum Airspeed: 160 KIAS

Minimum Airspeed: 80 KIAS

Recommended Approach Speed: 100 KIAS

Maximum Flap Extension with AP engaged: 10°

Take off: Autopilot can be engaged after 800 feet AGL

Approach and Landing: Autopilot must be disengaged prior to 800 feet AGL on approach. The only exception to this is when the APR mode is active. With APR mode active, the autopilot must be disengaged prior to 200 feet AGL.

Airport Runway Limitations

All CFC T182T aircraft are permitted to land on paved (Asphalt) runways at registered aerodromes only. (Aerodrome must exist in the CFS)

Minimum runway length

- *2500 ft or as per calculated from the POH for the existing conditions, whichever is greater*

Operations on Contaminated runways:

A runway is considered contaminated when 25% or more of the required length and width of the runway is contaminated.

CFC T182T aircraft are permitted to take off and land on Dry, Wet and Trace contaminated runways. Trace contamination refers to any contaminant with a depth of 1/8in (0.13 in) or less.

Parking Limitations

When the OAT is below 0°C, It is the responsibility of the PIC to store the aircraft in a heated hangar. It is also the responsibility of the PIC to store the aircraft in a hangar when thunderstorms are forecast.

Flight in IMC (Instrument Meteorological Conditions)

An operational Autopilot is required for all flights in IMC.

Wind Limitations

Maximum Tailwind for Take off and landing operations: 10 knots

Maximum Crosswind Component for Take off and Landing: 15 knots

Standard Call-Outs

Phase of Flight	**Call-Outs**
Autopilot engage	"AUTOPILOT ON"
Autopilot disengaged	"AUTOPILOT DISENGAGED"
Approaching transition altitude/flight level	"TRANSITION ____ SET"
Altitude Change	" ____ FEET SET " OR "____ ALT ARM " (If AP is engaged)
1000 Feet above/below desired Altitude	"16000 FOR 17000" OR "16000 FOR 17000, ALT ARM" (if AP is engaged)
100 Feet above/below desired Altitude	"100 ABOVE/BELOW, LEVELLING"
Extending Flaps	"SPEED CHECKS ____ KTS FLAPS __"

Autopilot Mode Change Call-Outs

All Autopilot Mode changes must be called out.

Example: When switching from HDG to NAV mode, call "NAV"

When on vectors for an ILS approach and arming APR mode, call "APR armed"

182T Training Syllabus

Minimum Requirements for Rental

Day VFR Below 10,00ft:

- PPL
- 100 Hours Total Time
- 25 hours PIC X-Country Post PPL – Destinations outside of 100nm Radius

Day VFR Above 10,000ft:

- PPL
- 150 Hours Total Time
- VFR OTT Rating
- Mountain Checkout
- 35 hours PIC X-Country Post PPL – Destinations outside of 150nm Radius

Night VFR:

- PPL
- Night Rating
- 100 Hours Total Time
- 25 hours PIC X-Country Post PPL – Destinations outside of 100nm Radius
- 10 Night PIC X-Country – May count towards 25 PIC X-Country requirement

IFR

- PPL
- Night Rating
- IFR Rating – Group 1 or 3
- Mountain Checkout
- 150 Hours Total Time
- 20 Hours PIC IFR X-Country – Under IFR Flight Plan, actual or simulated IMC

Ground Lesson Plans

Ground lesson plans will be conducted as a ground school session that will cover the key components of flying complex constant speed single engine aircrafts and specifics of the C182T.

Completion of the ground lesson plans is required prior to moving onto the Air Lesson Plans.

Air Lesson Plans

The following lesson plans will cover the major differences in airframe, performance, procedures, equipment, capabilities and operation of the Calgary Flying Club's Cessna T182T.

What's Different about the T182T?

How is the Cessna T182T different from the Cessna 172s?

- G750 with HSI
- Turbocharged
- Oxygen
- Capable of operation up to 20 000 ft
- Constant speed propeller
- Cowl flaps
- Fuel-injected
- Faster, heavier, with higher wing loading
- Maximum landing weight less than maximum takeoff weight
- Higher horsepower and fuel consumption
- Different speeds and procedures to know
- Three-axis autopilot

The Lesson Plans follow a logical sequence of building and demonstrating increasing capabilities, leading from day VFR cross-country operation below 10,000 feet to day and night IFR operation to the full capabilities of the aircraft, as follows:

Lesson Plan 1: Basic Aircraft Familiarization (Ground)

Lesson Plan 1A: Basic Aircraft Powerplant Familiarization (Redbird Simulator)

Lesson Plan 2: Basic Aircraft, Engine and Avionics Handling (Air)

Lesson Plan 3: Aircraft Emergencies, Specialty Takeoffs and Landings (Air)

Lesson Plan 4: Cross-Country Day VFR below 10 000 ft (Air)

Lesson Plan 5: Cross-Country Night VFR below 10 000 ft (Air)

Lesson Plan 6: Cross-Country VFR above 10 000 ft (Air)

Lesson Plan 7: Cross-Country IFR below and above 10 000 ft (Ground)

Lesson Plan 8: Cross-Country IFR below and above 10 000 ft (Air)

Lesson Plan 1: Basic Aircraft Familiarization (Ground)

Estimated Duration: 6 Hours	**Note:** This could be done as a one-day session or as two individual sessions
Aim: To familiarize participants with the aircraft and its equipment. Particularly with respect to limitations, speeds, procedures, systems and equipment that are different from those C172 aircraft.	

Ground Review/Work	• Engine management and aircraft systems
	  o Constant Speed Propeller
	  ▪ Theory, system components and what they do
	  ▪ What extra performance this gives you
	  ▪ Changes in operation from fixed pitch
	  ▪ Limitations and precautions
	  o Turbocharging
	  ▪ Theory, system components and what they do
	  ▪ What extra performance this gives you
	  ▪ Changes in operation from normally aspirated
	  ▪ Limitations and precautions
	  o Engine operation
	  ▪ Fuel Injection
	  ▪ Cowl flaps
	  ▪ Leaning
	  ▪ Fuel Consumption
	  ▪ Alternate Air
	  ▪ High altitude flight
	  o Aircraft systems
	  ▪ Fuel and Auxiliary Fuel Pump
	  ▪ Flaps
	  ▪ Brakes
	  ▪ Doors and windows
	  ▪ Electrical
	  ▪ Lighting
	  ▪ Cabin heating, ventilation and defrost
	  o Aircraft Limitations
	  o Weight and Balance
	  ▪ Need to confirm compliance with max landing weight
	• Aircraft pre-flight inspection
	• Using performance charts
	• Normal procedures
	• Emergency procedures
	• G750 avionics with HSI – basics for communication, transponder, VFR navigation
	  o Touchscreen
	  o Checks, Alerts, Message
	  o Controls
	  o Communication controls
	  o Transponder controls
	  o Maps and navigation
	• Autopilot:
	  o Capabilities
	• Type Check Exam (open book)

Approval Criteria	• Full attendance at the lesson • Successful completion of type check exam

Lesson Plan 2: Basic Aircraft, Engine and Avionics Handling (Air)

Estimated Duration: 3 Hours *1 Hour Ground, 2 Hours Air*	**Note:** May be combined with LP3 if sufficient prior experience, and aircraft handling gives evidence of this.
Aim: To familiarize the participant with the basic procedures for operation of the aircraft	
Flight Route/Area: Cremona area, then Sundre Airport	
Ground Review/Work	• Supervised pre-flight inspection • Calculation of weight and balance • Calculation of aircraft takeoff and landing distances for current conditions • Review of speeds and procedures
Flight	Aircraft start-up and taxi • Use of checklist • Use of avionics Aircraft handling: • Climbs, descents, medium turns • Management of power (turbocharging), cowl flaps, leaning • Steep turns • Slow flight • Stalls • To Sundre for normal circuits (can use Springbank if you feel lucky) • Return to Springbank
Approval Criteria	• Acceptable pre-flight ground work • Acceptable handling of the aircraft and engine in flight

Lesson Plan 3: Aircraft Emergencies, Specialty Takeoffs and Landings (Air)

Estimated Duration: 4 Hours *1 Hour Ground, 1 Hours Sim, 2 Hours Air*	**Note:** May be combined with LP3 if sufficient prior experience, and aircraft handling gives evidence of this.
Aim: To familiarize the participant with emergency procedures, specialty takeoffs and landings and basic use of autopilot	
Flight Route/Area: Longview area, then High river Airport	

Ground Review/Work	• Basic autopilot usage:
	  o Wing leveler
	  o Heading Select
	  o Altitude hold
	  o KCS 55A HSI procedures
	  o malfunctions
	• Emergency procedures

Simulator	• Auto Pilot usage • Review Forced Approaches • Engine Failure After Takeoff
Flight	Review of: • Calculation of weight and balance • Calculation of aircraft takeoff and landing distances for current conditions Aircraft handling: • Monitoring of aircraft handling and power management • Demo use of autopilot, for wing leveling, heading and altitude holding, HSI usage • Review of steep turns, slow flight • Forced approaches • To High River for short and soft field circuits • Return to Springbank, practice use of autopilot and selected emergency procedures • Assessment of readiness for solo VFR
Approval Criteria	• Acceptable pre-flight ground work • Acceptable handling of the aircraft • Acceptable knowledge of emergency procedures

Lesson Plan 4: Cross-Country Day VFR below 10 000 ft (Air)

Estimated Duration: 4.5 Hours *1.5 Hour Ground, 1hour Sim, 2 Hours Air*	**Note:** Advanced Operations
Aim: To prepare the participant for day VFR non-mountain cross-country flights below 10 000 ft	
Flight Route/Area: Springbank Airport – Red Deer Airport-Rocky Mountain House Airport – Springbank Airport	
Ground Briefing/Work	Review of: • Flight Planning • calculation of weight and balance Briefing: • Garmin 750 use for VFR Cross-Countries: o Flight Plan Entry o Direct to basics o Using NRST o Waypoints o Traffic Awareness • Advanced autopilot usage: o Flight Plan Entry o VOR and GPS tracking o Vertical speed mode o Altitude pre-select, alerter and altimeter setting • Review flight planning: o Charts and route, planned altitudes, airspace considerations, procedures and communications o Weather o NOTAMs
Simulator	• Enroute emergencies: Electrical fire, Electrical malfunctions, Windshield damage, Comm failure, Pitot tube blockage, Magneto malfunction • Advanced Autopilot usage
Flight	• Monitoring of aircraft handling and power management • Demo use of autopilot, for altitude pre-select, GPS tracking • Proper VFR navigation procedures and situational awareness • Demo of direct to and NRST • Demo of groundspeed and wind info • Monitor proper communications and procedures into Red Deer • Monitoring proper aircraft handling for descent, approach and landing • Monitor proper ground work at Red Deer • Proper takeoff and departure procedures out of CYQF, including CYQF CFA procedures and communication • In-flight simulated emergencies: rough engine or partial power loss • Monitor for proper arrival procedures at uncontrolled aerodrome (CYRM) • Monitor for proper departure procedures from CYRM • Enroute emergencies: Electrical fire, Electrical malfunctions, Windshield damage, Comm failure, Pitot tube blockage, Magneto malfunction • Plan, but do not execute, diversion to Olds-Didsbury from north of Sundre • Arrive at CYBW
Approval Criteria (for approval of solo day VFR flights, limited to non-mountainous-area day VFR below 10 000 ft)	• Acceptable pre-flight ground work • Acceptable handling of the aircraft • Acceptable use of G750 and autopilot • Acceptable navigation ability and situational awareness demonstrated • Acceptable knowledge of emergency procedures

Lesson Plan 5: Cross-Country Night VFR below 10 000 ft (Air)

Estimated Duration: 4 Hours *1 Hour Ground, 1 hour Sim, 2 Hours Air*	**Note:** Advanced Operations
Aim: To prepare the participant for night VFR non-mountain cross-country flights below 10 000 ft	
Flight Route/Area: Springbank – Lethbridge Airport – Vulcan Airport – Springbank	
Ground Briefing/Work	• CFC night limitations and CFC and cars recency requirements • Night hypoxia discussion • Aircraft and Instrument Panel lighting • Garmin 750 use for night VFR Cross-Countries: o Display Brightness Control o Terrain Awareness o Review of flight planning Review • Flight planning o Charts and route, planned altitudes, airspace considerations, procedures and communications o Weather o NOTAMS o Night considerations for electrical failure of unexpected weather • Calculation of weight and balance • Night preparedness (flashlights, charts, portable radio?)
Simulator	• Night emergencies: Monitoring for higher than expected headwinds, Comm failure, Nav failure, Lighting failure, Flap failure: both up and down, Unexpected freezing rain
Flight	• Monitoring of aircraft handling and power management • Monitor use of autopilot • Monitoring of proper VFR navigation procedures and situational awareness • Review night emergencies: Monitoring for higher than expected headwinds, Comm failure, Nav failure, Lighting failure • Monitor proper communications and procedures into Lethbridge • Monitoring proper aircraft handling for descent, approach and landing • Monitor proper takeoff and departure procedures out of Lethbridge • In-flight simulated emergencies: o Fuel imbalance that is worsening o Vacuum system failure o Static system blockage • Monitor for proper arrival procedures at uncontrolled aerodrome for Vulcan, in particular, use of ARCAL and handling potential black hole effect • Monitor for proper departure procedures from Vulcan • Monitor proper navigation for Priddis Corner • Enroute emergencies: o Flap failure, both up and down o Unexpected freezing rain • Plan, but do not execute, diversion to CEN4 • Note High River lights are on all night • Monitor arrival procedures and navigation into CYBW
Approval Criteria (for non-mountainous area VFR Night Cross-Country below 10 000 ft)	• Acceptable pre-flight ground work • Acceptable handling of the aircraft • Acceptable night situational and risk awareness • Acceptable knowledge of emergency procedures

Lesson Plan 6: Cross-Country VFR above 10 000 ft (Air)

Estimated Duration: 4 Hours *2 Hour Ground, 1 hour Sim, 3 Hours Air*	**Note:** Advanced Operations
Aim: To prepare the participant for VFR cross-country flights above 10,000 feet, including mountainous areas	
Flight Route/Area: Springbank–Golden (VFR at 12,000') Golden–Revelstoke (VFR below peak tops) Revelstoke–Springbank (CVFR at 17,000')	
Ground Briefing/Work	<u>High Altitude Flight</u> • Hypoxia • Canadian regulations for oxygen use • Oxygen system: o Capacity o How to use o Monitoring o Cleaning <u>Canadian airspace above 10 000 ft</u> • Class A • Class B • Class C • Class E • Class G <u>Controlled VFR Flights</u> • LO charts • How to file • What equipment is required • How do you fly it o Communications failure o Weather Restrictions o Why having a VFR OTT makes sense <u>Aircraft Limitations</u> • Altitude limit • Power settings for cruise • Climb and descent planning <u>Review Flight planning</u> • Charts and route, planned altitudes: what's the best route at 12,000' to Golden • Airspace considerations, procedures and communications <u>Emergencies specific to high altitude flight</u> • Oxygen system malfunction • Communications failure in Class B airspace • Inability to maintain VFR <u>Review</u> • <u>Actual Route and flight planning</u> • <u>Confirm sufficient oxygen aboard</u> • <u>NOTAMS</u> • <u>Calculation of weight and balance</u> • <u>Weather</u> • <u>Flight plan filing</u>
Simulator	• Emergencies specific to high altitude flight: Oxygen system malfunction, Communications failure in Class B airspace, Inability to maintain VFR, Loss of GPS unit, Emergency descent, Engine failure
Flight	• Monitoring of aircraft handling and power management • Monitor climb to altitude and transit through Class C airspace • Monitor use of autopilot, for altitude pre-select, GPS tracking • Demo oxygen system usage and monitoring • Monitor navigation and communication and situational awareness through Class E airspace • Review plan in the event of oxygen system malfunction • Monitor weather and review plan if weather deteriorates • Review use of Direct To and NRST • Check groundspeed and winds in comparison to flight planning • Demo/Monitor proper descent planning into Golden

	• Review point to come off oxygen, and how to shut oxygen system off
	• Monitor proper communications and procedures into Golden
	• Monitoring proper aircraft handling for descent, approach and landing
	• Monitor proper takeoff and departure procedures out of Golden, including communication and ETA update with Pacific Radio
	• Monitor below peak flight procedures from Golden to Revelstoke, including flying on the right side of the valley where feasible, and making radio calls
	• Monitor for proper arrival procedures and communication at Revelstoke
	• Monitor for proper departure procedures from Revelstoke
	• Demo picking up CVFR clearance from Pacific Radio
	• Monitor proper autopilot usage for climb to altitude and proceeding on course
	• Monitor proper start of oxygen system usage
	• Monitor adherence to CVFR clearance
	• Monitor power plant management in level flight
	• Enroute emergencies:
	  o Communications failure
	  o Inability to maintain VFR
	  o Loss of GPS unit
	  o Emergency descent
	  o Engine failure
	• Monitor adherence to descent plan and procedures into CYBW
	• Monitor arrival at CYBW

Approval Criteria (for approval for VFR Cross-Country flights above 10 000 ft)	• Acceptable knowledge of airspace requirements demonstrated • Acceptable knowledge of hypoxia risks and oxygen requirements; oxygen system use and monitoring demonstrated • Acceptable power plant handling demonstrated • Acceptable knowledge of mountain flying demonstrated • Acceptable use of G750 and autopilot demonstrated • Acceptable knowledge of emergency procedures

Lesson Plan 7: Cross-Country IFR Below and Above 10 000 ft (Ground)

<table>
<tr><td>Estimated Duration: 4 Hours
3 Hour Ground, 1 Hours SIM</td><td colspan="2">Note: Advanced Operations</td></tr>
<tr><td colspan="3">Aim: To familiarize the participant with the features and usage of the GTN 750Xi for IFR flight. To familiarize the participant with the use of the autopilot for IFR procedures. To prepare the participant for IFR cross-country flight lesson plan</td></tr>
<tr><td colspan="3">Pre-requisites: Lesson Plans 1 through 6 completed & valid IFR rating</td></tr>
<tr><td colspan="3">Flight Route/Area:
1. Springbank–Golden (VFR at 12,000’)
2. Golden–Revelstoke (VFR below peak tops)
3. Revelstoke–Springbank (CVFR at 17,000’)</td></tr>
<tr><td>Ground Briefing/Work</td><td colspan="2"><u>IFR Operations</u>
• GPS status and alert
• LRU status
• Flight planning
o Creating
o Importing
• Enroute vertical navigation
• Autopilot usage for IFR
o ILS approaches
o GPS approaches
• Review flight planning
o Class A airspace riles
o Oxygen requirements
o Charts & routing, planned altitudes
o Minimum altitudes in uncontrolled airspace
o Airspace considerations, procedures and communications
o Weather
o NOTAMS
o Alternate selection
o Preffered routes
• RAIM predictions
• Fuel planning
• Procedures
o Departures
o Arrivals
o Approaches
• Review of aircraft limitations
o Altitude limit
o Power limitations
o Climb and descent planning
o Power settings for cruise
• Emergencies
o Oxygen system malfunction
o Avoiding forecast icing
o Communication failure</td></tr>
<tr><td>Approval Criteria (for approval for VFR Cross-Country flights above 10 000 ft)</td><td colspan="2">• Active participation in Lesson
• Acceptable performance in Simulator Session</td></tr>
</table>

Lesson Plan 8: Cross-Country IFR Below and Above 10 000 ft (Air)

<table>
<tr><td>Estimated Duration: 4 Hours
1 Hour Ground, 3 Hours Air</td><td colspan="2">Note: Advanced Operations</td></tr>
<tr><td colspan="3">Aim: To prepare the participant for IFR cross-country flights at up to FL180</td></tr>
<tr><td colspan="3">Pre-requisites: Lesson Plans 7 completed & a valid IFR rating</td></tr>
<tr><td colspan="3">Flight Route/Area:
1. Springbank – Pincher Creek
2. Pincher Creek – Cranbrook
3. Cranbrook – Springbank</td></tr>
<tr><td>Ground Briefing/Work</td><td colspan="2"><u>Review</u>
Route and flight planning, alternate selection
Review fuel available and endurance
Review plan for oxygen use
Confirm sufficient oxygen aboard
Weather
NOTAMS
Review of expected procedures based on forecast weather and NOTAMS
Review acceptability of required climb gradients out of Pincher Creek and Cranbrook, plan accordingly
Review comm failure procedures
Calculation of weight and balance
Flight plan filing (file FL190 for Cranbrook – Springbank)</td></tr>
<tr><td>Flight</td><td>Monitor proper pre-flight instrument and nav equipment checks
Monitor receipt of clearance and understanding thereof
Review comm failure on departure procedure
Monitoring of aircraft handling and power management
Monitor climb to altitude and adherence to clearance
Monitor proper GTN 750 usage
Monitor use of autopilot, for altitude pre-select, GPS tracking
Monitor proper oxygen system usage and checking
Monitor navigation and communication and situational awareness
Monitor weather and review plan if weather deteriorates
Review comm failure procedure
Review plan in the event of oxygen system malfunction
Check groundspeed and winds in comparison to flight planning
Demo/Monitor proper descent planning into Pincher Creek
Monitor proper approach selection and briefing</td><td>Monitor proper communications and procedures into Pincher Creek
Monitoring proper aircraft handling for descent, approach and landing
Monitor proper observation of MDA/DH
Monitor proper overshoot and departure procedures out of Pincher Creek to maintain proper ground clearance before reaching enroute airway structure
Ensure required communications are made and etas revised with ATC
Monitor use of autopilot, for altitude pre-select, airway tracking
Monitor proper oxygen system usage and checking
Monitor power plant management in level flight
Monitor progress and maintenance of proper altitude
Enroute emergencies:
Loss of GPS unit
Monitor for proper arrival procedures and communication at Cranbrook, including MF calls
Monitor point to come off oxygen, and how to shut oxygen system off
Demo/monitor autopilot usage for approach into Cranbrook</td></tr>
</table>

	• Monitor point to come off oxygen, and how to shut oxygen system off
	• Monitor power plant management at FL190
	• Enroute emergencies:
	  o Loss of Communication
	  o Emergency descent
	  o Engine failure
	• Monitor adherence to clearance, descent plan and engine management during descent into CYBW
	• Monitor coming off oxygen and proper securing of oxygen system
	• Monitor proper procedures on reaching Class A airspace
		• Land Cranbrook for short break, update flight plan, review weather, confirm no icing, review departure procedure and comm failure procedure, confirm alternate still good, review Class A airspace procedures; refuel if necessary
		• Monitor restart, clearance receipt
		• Monitor departure procedure to ensure adherence
		• Monitor proper autopilot usage for climb to altitude and proceeding on course
		• Monitor proper start of oxygen system usage
		• Monitor adherence to IFR clearance

Approval Criteria (for IFR, including above 10 000 ft)	• Acceptable knowledge of airspace requirements demonstrated • Acceptable knowledge of oxygen system uses and monitoring demonstrated • Acceptable power plant handling demonstrated • Acceptable use of G750 and autopilot demonstrated • Acceptable knowledge and performance of IFR procedures and communication demonstrated • Acceptable knowledge of emergency procedures	

Recurrent Training

Recurrent training is completed once a year and is dependant on the type of checkout the member is seeking.

VFR Below 10,000ft Day or Night

- **Lesson Plan 4 or 5** may be completed as part of the recurrent training dependant on Day or Night check.

VFR Above 10,000ft

- **Lesson Plan 6** may be completed as part of recurrent training. Weather permitting, alternative routes may be selected as long as the objectives for that lesson are completed.

IFR All altitudes

- **Lesson Plan 8** may be completed as part of the recurrent training. Destination may be adjusted to meet WX and altitude (below or above 10,000ft) requirements

182T Normal Procedures

Normal Checklist

Pre-Flight Inspection

Know Amplified Procedures
Fire Extinguisher
Seat Belts
No Smoking
First Aid Kit
Survival Equipment
POH and Documents

Passenger Briefing

Clear of Prop
Doors and Seatbelts
ELT
No Smoking
Emergency Procedures

Pre-Start

Flight Controls ..... FREE AND CORRECT
Trim ..... CHECK AND SET
Brakes ..... SET
Circuit Breakers ..... IN
Electrical Equipment .....OFF
Avionics Master .....OFF
Cowl Flaps .....OPEN
Fuel Selector Valve .....BOTH

Starting Engine

Throttle .....OPEN ¼"
Propeller ..... HIGH RPM
Mixture ..... IDLE CUT OFF
Propeller ..... CLEAR
Master Switch ..... ON
Beacon Light ..... ON
Auxiliary Fuel Pump ..... ON
Mixture ..... ADVANCE TO FULL RICH UNTIL THE FUEL FLOW STARTS TO RISE THEN IDLE CUT OFF POSISTION
Auxiliary Fuel Pump ..... OFF
Ignition Switch ..... START
Mixture ..... ADVANCE smoothly to RICH when engine starts
Oil Pressure ..... CHECK
Avionics Switch ..... ON
Radios ..... ON
Flaps .....RETRACT

After Start

Transponder ..... STBY
ATIS .....COPY
Altimeter ..... SET
Flight Instruments ..... SET
Nav Instruments ..... SET
Fuel ..... BOTH
Brakes ..... CHECK

Run Up

Brakes ..... SET
Nose wheel ..... STRAIGHT
Seats and Seat Belts ..... SECURE
Flight Controls .....FREE AND CORRECT
Fuel Quantity ..... CHECK
Mixture ..... RICH
Fuel Selector..... BOTH
Throttle .....1800 RPM
- Mag .....CHECK
- Prop ..... CYCLE X 3
- Vacuum Gauge ..... CHECK
- Engine Instruments .....CHECK
- Ammeter ..... CHECK
- Annunciator panel .....CHECK
- Throttle .....IDLE
- Throttle .....1000 RPM OR LESS

Pre Take Off

Throttle Friction Lock ..... CHECK
Radios ..... SET
Avionics ..... SET
Autopilot ..... OFF
Elevator and Rudder Trim ..... SET
Wing Flaps ..... SET
Cowl Flaps .....OPEN
T/O Briefing.....PROVIDE
Time Up .....RECORD
Transponder ..... ALT
Flight Plan ..... OPEN

Take Off – Normal

Power ..... 32” Hg and 2400 RPM
Mixture ..... 24 GPH
Rotate ..... 60 KIAS
Climb ..... 70KIAS (20); 80 KIAS (0)
Flaps ..... RETRACT

Climb

A/S ..... 90-100 KIAS
Power ..... 25”Hg 2400 RPM
Mixture ..... 16 GPH
Fuel ..... BOTH
Cowl Flaps .....OPEN

Cruise

Power ..... 24”, 2300 RPM
Elevator/Rudder Trim ..... ADJUST
Mixture ..... LEAN
Cowl Flaps ..... CLOSED

Descent

Power ..... 1”/min to 20” THEN AS REQUIRED
Mixture ..... ENRICHEN AS REQUIRED
Cowl Flaps ..... CLOSED
Altimeter ..... SET
NAV/GPS ..... SET
Fuel ..... BOTH
Flaps ..... AS REQUIRED

Pre-Landing

Seats ..... UPRIGHT
Seatbelts ..... SECURED
Fuel ..... BOTH
Mixture ..... RICH
Prop ..... HIGH RPM
Landing Light ..... ON
Autopilot ..... OFF

Approach Speeds

A/S 70-80 KIAS Flaps up
A/S 60-70 KIAS Full Flaps

After Landing

Radio ..... GROUND FREQ
Flaps ..... UP
Cowl Flaps ..... OPEN
Transponder ..... STBY
Timer ..... START
Radio .....CONTACT GROUND

Shut Down

Brake ..... SET
Throttle ..... IDLE
Avionics/Electrical ..... OFF
Mixture ..... IDLE CUT OFF
Ignition ..... OFF
Master ..... OFF
Control Lock ..... INSTALL
Oxygen ..... OFF

Balked Landing

Power ..... 32” Hg 2400 RPM
Mixture ..... 24 GPH
Wing Flaps ..... RETRACT TO 20
Climb ..... 55 KIAS
Wing Flaps ..... RETRACT SLOWLY
AFTER REACHING SAFE ALTITUDE AND 70 KIAS
Cowl Flaps ..... OPEN

Airspeeds

Vr ..... 60 KIAS
Va 3100 lbs .....110 KIAS
Va 2600 lbs .....101 KIAS
Va 2100 lbs ..... 91 KIAS
Vx ..... 66 KIAS
Vy ..... 82 KIAS

Flap Limitations

0-10 Degrees ..... 140 KIAS
10-20 Degrees ..... 120 KIAS
20-40 Degrees ..... 100 KIAS

Amplified Normal Procedures

Pre-Flight Inspection

CABIN

1. Pitot Tube Cover – Remove and check pitot tube for blockage
2. Parking Brake – Set
3. Control Wheel Lock – Remove
4. Ignition Switch – OFF
5. Avionics Master Switch – OFF
6. Master Switch – ON
7. Fuel Gauges – Check Quantity & Ensure LOW FUEL ANNUNCIATORS (L LOW FUEL R) are Extinguished
8. Avionics Master – ON

WARNING

WHEN TURNING ON THE MASTER SWITCH, USING AN EXTERNAL POWER SOURCE, OR PULLING THE PROPELLER THROUGH BY HAND, TREAT THE PROPELLER AS IF THE IGNITION SWITCH WHERE ON. DO NOT STAND, NOR ALLOW ANYONE ELSE TO STAND, WITHIN THE ARM OF THE PROPELLER, SINCE A LOOSE OR BROKEN WIRE OR A COMPONENT MALFUNCTION COULD CAUSE THE PROPELLER TO ROTATE

9. Avionics Cooling Fan – Check Audibly for Operation
10. Avionics Master Switch – OFF
    Static Pressure Alternate Source Valve – OFF
11. Annunciator Panel Switch – PLACE AND HOLD IN TST POSITION and ensure all amber and red annunciators illuminate
12. Annunciator Panel Test Switch – RELEASE Check that appropriate annunciators remain on

NOTE

When master switch is turned ON, some annunciators will flash for approximately 10 seconds before illuminating steadily. When panel TST switch is toggled up and held in position, all remaining lights will flash until the switch is released

13. Fuel Selector Valve – Both
14. Flaps – Extend
15. Pitot Heat – ON (warm to the touch within 30 seconds) (also check heated stall warning)
16. Pitot Heat - OFF
17. Master Switch – OFF
18. Trim Control – Neutral
19. Oxygen Supply Pressure – Check
20. Oxygen Masks – Check
21. Baggage Door – Check, lock with key

EMPENNAGE

1. Oxygen Overboard Discharge Indicator – CHECK for green oxygen high pressure relief disc
2. Rudder Gust Lock (if installed) – Remove
3. Tail Tie Down – DISCONNECT
4. Control Surfaces – CHECK freedom of movement and security
5. Trim Tab – CHECK security
6. Antennas – CHECK for security of attachment and general condition

RIGHT WING Trailing Edge

1. Aileron – CHECK freedom of movement and security

2. Flap – Check for security and condition

RIGHT WING

1. Wing Tie -Down – Disconnect
2. Fuel Tank Vent Opening – Check for blockage
3. Main Wheel Tire – Check for proper inflation and general condition (weather check, tread depth and wear)
4. Fuel Tank Sump Quick Drain Valves (5 drains on each tank) – DRAIN at least a cupful of fuel from each sump location to check for water, sediment and proper fuel grade before each flight and after each refueling. If sample is bad take further samples until clear and then gently rock wings and lower tail to the ground to move any addition contaminants to the sampling points. Take repeated samples from all fuel drain points until all contamination has been removed. IF contaminants are still present, refer to WARNING below and do not fly airplane
5. Fuel Quantity – Check VISUALLY for desired level
6. Fuel Filler Cap – SECURE and VENT UNOBSTRUCTED

WARNING

IF, AFTER REPEATED SAMPLING, EVIDENCE OF CONTAMINATION STILL EXISTS, THE AIRPLANE SHOULD NOT BE FLOWN. TANKS SHOULD BE DRAINED AND SYSTEM PURGED BY QUALIFIED MAINTENANCE PERSONNEL. ALL EVIDENCE OF CONTAMINATIOON MUST BE REMOVED BEFORE FURTHER FLIGHT

NOSE

1. Static Source Opening (right side of fuselage) CHECK for blockage
2. Fuel Strainer Quick Drain Valve (located on lower right side engine cowling) – DRAIN at least a cupful. Also check the two other drains under the forward fuselage.
3. Engine Oil Dipstick/Filler Cap – CHECK oil level, then check dipstick/filler cap SECURE. Do not operate with less than 5 quarts. Fill to 9 quarts for extended flight
4. Engine Cooling Air Inlets – CLEAR of obstructions
5. Propeller and Spinner – Check for nicks and security
6. Air Filter – CHECK for restrictions by dust or other foreign matter
7. Nose Wheel Strut and Tire – CHECK for proper inflation of strut and general condition (weather checks, tread depth and wear) of tire
8. Static Source Opening (left side of fuselage) – Check for blockage

LEFT WING

1. Fuel Quantity – Check VISUALLY for desired level
2. Fuel Filler Cap – SECURE and VENT UNOBSTRUCTED
3. Fuel Tank Sump Quick Drain Valves (5 on each tank) – DRAIN at lease a cup of fuel
4. Main Wheel Tire – Check for proper inflation and general condition

LEFT WING Leading Edge

1. Fuel Tank Vent Opening – Check for blockage
2. Stall Warning Vane – CHECK for freedom of movement
3. Wing Tie-Down – DISCONNECT
4. Landing /Taxi Lights – CHECK for condition and cleanliness of cover

LEFT WING Trailing Edge

1. Aileron – Check for freedom of movement and security
2. Flap – Check for security and condition

Amplified Pre-Flight Inspection

- *Flight controls and trim tab should be checked for free and correct movement and security*
- *Security of all inspection plates should be checked following periodic inspections*
- *Check external static pressure source hole for stoppage*
- *If has been stored outside check for accumulation of dirt/dust on air filter, obstructions in airspeed system lines, water contaminants in fuel tanks, insect/bird/rodent nests in any opening*
- *If stored in a windy area or near other aircraft inspect for any potential damage*
- *If has been operated in snow/mud/slush check main and nose gear fairings for obstructions and cleanliness*
- *Operation on gravel carefully inspect propeller for nicks*
- *Confirm fuel caps are secure*

BEFORE STARTING ENGINE

1. Pre Flight Inspection – Complete
2. Passenger Briefing – Complete
3. Seats, Seat Belts, Shoulder Harness – ADJUST and LOCK. Ensure inertial reel locking
4. Brakes – TEST and SET
5. Circuit Breakers – CHECK IN
6. Electrical Equipment – OFF

CAUTION

THE AVIONICS MASTER SWITCH MUST BE OFF DURING ENGINE START TO PREVENT POSSIBLE DAMAGE TO AVIONICS

7. Avionics Master Switch – OFF
8. Cowl Flaps – OPEN
9. Fuel Selector Valve – BOTH
10. Avionics Circuit Breakers – CHECK IN

STARTING ENGINE (With Battery)

1. Throttle – OPEN ¼"
2. Propeller – HIGH RPM
3. Mixture – IDLE CUT OFF
4. Propeller Area – CLEAR
5. Master Switch – ON
6. Auxiliary Fuel Pump Switch – ON
7. Mixture – ADVANCE to full rich until the fuel flow just starts to rise, then return to IDLE CUT OFF position
8. Auxiliary Fuel Pump Switch – OFF

NOTE

If engine is warm, omit priming procedure of steps 6-8 above

9. Ignition Switch – START (release when engine starts)
10. Mixture – ADVANCE smoothly to RICH when engine fires

NOTE

If engine floods, turn off auxiliary fuel pump, place mixture in idle cut off, open throttle ½ to full, and crank engine. When engine fires, advance mixture to full rich and retard throttle promptly

11. Oil Pressure – CHECK

12. Flashing Beacon and Navigation Lights – ON as required
13. Avionics Master Switch – ON
14. Radios – ON
15. Flaps – RETRACT

STARTING ENGINE (WITH External Power)

1. Throttle – OPEN ¼"
2. Propeller – HIGH RPM
3. Mixture – IDLE CUT OFF
4. Propeller Area – CLEAR
5. External Power – CONNECT to airplane receptacle
6. Master Switch – ON
7. Auxiliary Fuel Pump Switch – ON
8. Mixture – ADVANCE to full rich until the fuel flow just starts to rise, then return to IDLE CUT OFF
9. Auxiliary Fuel Pump Switch – OFF

NOTE

If engine is warm, omit priming procedure of steps 7-9 above

10. Ignition Switch – START (release when engine starts)
11. Mixture – ADVANCE smoothly to RICH when engine starts

NOTE

If engine floods, turn off auxiliary fuel pump, place mixture in idle cut off, open throttle ½ to full, and crank engine. When engine fires, advance mixture to full rich and retard throttle promptly

12. Oil Pressure – CHECK
13. External Power – DISCONNECT from airplane receptacle. Secure external power door
14. Ammeter – CHECK (See checklist Section 7, Ground Service Plug Receptacle)
15. Flashing Beacon and Navigation Lights – ON as required
16. Avionics Master Switch – ON
17. Radios - ON
18. Flaps – Retract

Starting Engine Amplified

Hot Start

- *Within 20-30 min after shutdown the fuel manifold is adequately primed and the empty injector nozzle lines will fill before the engine dies*
- *After 30 min the vaporized fuel in the manifold will have dissipated and some slight "priming" could be required*
- *Advance mixture control promptly to 1/3 open when the engine fires and then smoothly to full rich as power develops*
- *Should the engine die after starting, turn on the auxiliary fuel pump temporarily and adjust the throttle and/or mixture as necessary to keep the engine running*
- *If over prime or flood the engine, turn off the aux pump, open the throttle from ½ to full open and continue cranking with the mixture full lean. When engine fires, smoothly advance the mixture control to full rich and retard the throttle to desired idle speed*
    - *If Oil Pressure does not begin to indicate pressure within 30 seconds in the summer time and approx. 1 min in very cold weather, stop the engine and investigate*
- *Recommended Starter Duty Cycle:*

- *Crank starter for 10 sec followed by 20 sec cool down; Repeat **two additional times** followed by **10 min** cool down period before trying again; Crank starter again, 3 cycles of 10 sec each, followed by 20 seconds of cool down. If engine fails to start, an investigation to determine the cause is needed*

BEFORE TAKEOFF

1. Parking Brake – Set
2. Passenger Seat Backs – Most upright position
3. Seats and Seat Belts – Check secure
4. Cabin Doors – Closed and Locked
5. Flight Controls – Free and Correct
6. Flight Instruments – Check and Set
7. Fuel Quantity – Check
8. Mixture – Rich
9. Fuel Selector Valve – Recheck Both
10. Throttle – 1800 RPM
    a. Magnetos – Check (RPM drop should not exceed 150 RPM on either magneto or 50 differential between magnetos)
    b. Propeller – Cycle from high to low RPM; Return to high RPM (full in)
    c. Vacuum Gauge – Check
    d. Engine Instruments and Ammeter – Check
11. Annunciator Panel – Ensure no annunciators are illuminated
12. Throttle – Check Idle
13. Throttle – 1000 RPM or less
14. Throttle Friction Lock – Adjust
15. Radio and Avionics – Set
16. Autopilot (if installed) – Off
17. Elevator Trim and Rudder Trim – Set for takeoff
18. Wing Flaps – Set for takeoff (0 to 20 degrees)
19. Strobe Lights – As Desired
20. Cowl Flap – Open
21. Brakes – Release

Before Take Off Amplified

Warm Up

- *If engine idles (approx. 650 RPM) and accelerates smoothy the airplane is ready for take off*
- *Take off with turbo charged engine should not be started if indicated lubricating oil pressure due to cold temperature is above maximum*
    - *Excessive oil pressure can cause over boost and engine damage*

Magneto Check

- *Switch to R position and note RPM*
- *Switch to Both to clear the other set of plugs*
- *Switch to L position and note RPM*
- *Switch to Both*
- *RPM drop should not exceed 150 RPM on either magneto or show greater than 50 RPM differential between magnetos*
- *An absence of RPM drop may be an indication of faulty grounding of one side of the ignition system*

Alternator Check

- *Positive verification can be made by loading the electrical system momentarily (3-5 sec) with the landing light or by operating the wing flaps during the engine run up*
- *Ammeter will remain within a needle width of its initial reading if the alternator and alternator control unit are operating properly*

Elevator Trim

- *A neutral index mark is added to the pedestal cover which corresponds to the zero-degree trip tab position. As loadings vary towards the forward C.G. limit or aft C.G. limit, elevator trim settings towards the nose up and nose down ends of this takeoff range, respectively, will provide comfortable control wheel forces during takeoff and initial climb out*

TAKEOFF

NORMAL TAKEOFF

1. Wing Flaps – 0° to 20°
2. Power – 32" Hg and 2400 RPM
3. Mixture – Adjust to 24 GPH Fuel Flow
4. Elevator Control – Lift Nose Wheel (at 50-60 KIAS)
5. Climb Speed
   a. 70 KIAS (20° flap)
   b. 80 KIAS (0° flap)
6. Wing Flaps Retract

SHORT FIELD TAKEOFF

1. Wing Flaps – 20°
2. Brakes – Apply
3. Power – 32" Hg and 2400 RPM
4. Mixture – Adjust to 24 GPH Fuel Flow
5. Brakes – Release
6. Elevator Control – Maintain Slightly Tail Low Attitude
7. Climb Speed – 60 KIAS (until all obstacles are cleared)
8. Wing Flaps – Retract slowly after reaching 70 KIAS

Take Off Amplified

Power Check

- *Check power early in takeoff roll; any sign of engine roughness is good cause to abort*
- *Full power run ups over loose gravel are harmful to prop tips – advance throttle slowly*
- *On first flight of the day when throttle is advanced for T/O, manifold pressure will normally exceed 32" Hg and fuel flows will exceed 24 GPH if the throttle is opened fully*
- *On T/O the manifold pressure should be monitored and the throttle set to 32" Hg; then, for max engine power, the mixture should be adjusted as required, during the initial takeoff roll to 24 GPH fuel flow*

Wing Flap Settings

- *Normal take off flaps 0-20 degrees*
- *Using 20° flap reduces the ground roll and total distance over an obstacle by approx. 20%*
- *On short field, 20° are used for takeoff, they should be left down until all obstacles are cleared and a safe flap retraction speed of 70 KIAS is reached*
- *Soft or rough field takeoffs are done with 20° flaps*

Crosswind Takeoff

- *Under strong x-wind conditions minimum flap setting necessary for the field length, to minimize drift angle immediately after take off*
- *With ailerons into the wind the aircraft is accelerated to a slightly higher than normal speed and pulled briskly off to prevent possible settling back to the runway while drifting*

Enroute Climb

- *A CRUISE climb at 25" MP, 2400 RPM, 16 GPH and 90-100 KIAS is normally recommended to provide an optimum combination of performance, visibility, engine cooling, economy and passenger comfort*
- *BEST RATE OF CLIMB – max continuous power, 84 KIAS at SL decreasing to 80 KIAS at 20 000 ft*
- *BEST ANGLE OF CLIMB – max continuous power, 64 KIAS at SL increasing to 68 KIAS at 20 000 ft, flaps retracted. Monitor cylinder head and oil temperature.*

ENROUTE CLIMB

NORMAL CLIMB

1. Airspeed – 90-100 KIAS
2. Power – 25" Hg and 2400 RPM
3. Mixture – 16 GPH
4. Fuel Selector Valve – Both
5. Cowl Flaps – Open as required
6. Oxygen – ON as required. Check masks for proper flow and fit

MAXIMUM PERFORMANCE CLIMB

1. Airspeed – 84 KIAS at Sea Level to 80 KIAS at 20 000 ft
2. Power – 32" Hg and 2400 RPM
3. Mixture – Adjust to 24 GPH
4. Cowl Flaps – Open
5. Fuel Selector Valve – Both
6. Oxygen – On as required. Check masks for proper flow and fit

CRUISE

1. Set Power – 24" Hg (Sea Level – 18 000 ft), 2300 or 2250 RPM
2. Elevator and Rudder Trim – Adjust
3. Mixture – Lean
4. Cowl Flaps – Closed
5. Oxygen – Monitor quantity (if in use) and Check passengers for adequate supply periodically during flight

Amplified Procedures

- *Normal cruise is performed at 24" Hg and 2300 rpm at all altitudes. This gives approximately 75% of rated maximum continuous power (MCP)*
- *Cruise performance charts in Section 5 are for still air with optional speed fairings installed, maximum weight*

LEANING WITH THE T.I.T INDICATOR

- *T.I.T should be used for mixture leaning in cruising flight*

CAUTION

LEANING WITH A T.I.T INDICATOR IS PERMITTED ONLY WHEN USING POWER SETTINGS WITHIN THE GREEN ARC RANGES

- *Cruise performance data in handbook is based on a recommended lean mixture setting which may be established using the T.I.T indicator at powers of 88% MCP and below as follows:*
  1. Lean the mixture slowly until the T.I.T peaks and begins to drop or until reaching the T.I.T red line
  2. Enrichen the mixture 50F rich of peak T.I.T or red line (whichever is lower) for recommended lean

or

  a desired increment based on the data in Figure 4-4, T.I.T table

- *At maximum cruise power settings, the 1685 F limit (red line) T.I.T may occur before reaching peak T.I.T. In this case, enrichen the mixture from redline 50 F for Recommended Lean Mixture. Any change in altitude or power setting will require a change in the recommended lean mixture setting and a recheck of the T.I.T setting*

NOTE

OPERATION ON THE LEAN SIDE OF PEAK T.I.T IS NOT APPROVED

STALLS

- *Characteristics are conventional and aural warning 5-10 knot above the stall in all configurations*
- *Altitude loss during stall recovery may be as much as 300 ft*

DESCENT

1. Power – As Desired
2. Mixture – Enrichen as required
3. Cowl Flaps – Closed
4. Altimeter – Set
5. Fuel Selector Valve – Both
6. Wing Flaps – As desired (0° - 10° below 140 KIAS; 10° - 20° below 120 KIAS; 20° - full below 100 KIAS)

Amplified Procedures

- *Descent should be at approx. 500 ft FPM, using enough engine power to keep the engine warm*
- *Optimum engine RPM in a letdown is usually the lowest RPM in the green arc range that will allow cylinder head temperature to remain in the recommended operating range*

BEFORE LANDING

1. Pilot and Passenger Seat Backs – Most upright position
2. Seat and Seat Belts – Secured and Locked
3. Fuel Selector Valve – Both
4. Mixture – Rich
5. Propeller – High RPM
6. Landing/Taxi Lights – ON
7. Autopilot (if installed) – OFF

LANDING

NORMAL LANDING

1. Airspeed – 70-80 KIAS (flaps UP)
2. Wing Flaps – As Desired
   a. Below 140 KIAS – 0° to 10°
   b. Below 120 KIAS – 10° to 20°
   c. Below 100 KIAS – 20° to FULL
3. Trim – Adjust
4. Touchdown – Main Wheels First
5. Landing Roll – Lower Nose Wheel Gently
6. Braking – Minimum Required

SHORT FIELD LANDING

1. Airspeed – 70-80 KIAS (flaps UP)
2. Wing Flaps – FULL (below 100 KIAS)
3. Airspeed – 60 KIAS (until flare)
4. Trim – Adjust
5. Power – Reduce to idle as obstacle is cleared
6. Touchdown – Main Wheels First
7. Wing Flaps – Retract for maximum brake effectiveness
8. Brakes – Apply heavily as flaps retract.

BALKED LANDING

1. Power – 32” Hg and 2400 RPM
2. Mixture – Adjust to 24 GPH Fuel Flow
3. Wing Flaps – Retract to 20°
4. Climb Speed – 55 KIAS
5. Wing Flaps – Retract slowly after reaching a safe altitude and 70 KIAS
6. Cowl Flaps – Open

AFTER LANDING

1. Wing Flaps – Up
2. Cowl Flaps – Open

SECURING AIRPLANE

1. Parking Brake – Set
2. Throttle – Idle
3. Emergency Frequency - Check
4. Electrical Equipment, Avionics Master Switch, Autopilot (if installed) – Off
5. Mixture – Idle Cut Off (Pulled Full Out)
6. Ignition Switch – Off
7. Master Switch – Off
8. Control Lock – Install
9. Fuel Selector Valve – Left or Right to prevent cross feeding
10. Oxygen – Off

COLD WEATHER OPERATION

- The waste gate controller will not respond quickly to variations in manifold pressure when oil temperature is near the lower limit of the green arc. Therefore, under these conditions, throttle motion should be made slowly and care should be exercised to prevent exceeding the 32" Hg manifold pressure limit. In addition, the fuel flow indications may exceed 24 GPH on takeoff if the mixture is not leaned to compensate
- Winterization kit is not required

C182T Turbocharged Engine Operations

Takeoff

Takeoff power set to 32 in MP, 2400 RPM and Mixture at 24 gph. Manifold Pressure MP and Fuel Flow FF needles (same gauge – under the turn coordinator) should both be pointing to near the red line. RPM (under the VSI) should be near red line.

Climbs

Climb power should be set at 400 feet and set to 25 in MP, 2400 RPM and Mixture to 16 GPH, airspeed 95-100 KIAS. Throughout the climb, Manifold Pressure will have to be increased (1" per 1000') to maintain 25 in MP. 200 feet prior to level off, close the cowl flaps to reduce rapid cooling of the engine as it accelerates.

Cruise

Cruise power setting should be set to 24 in MP and 2300 RPM; 2250 RPM is also acceptable.

Cruise Mixture Leaning

Lean the mixture slowly until the T.I.T. peaks and begins to drop or until reaching the T.I.T. redline.

Enrich the mixture 50˚F rich of peak T.I.T. or 50˚F rich of red line (whichever is lower) for recommended lean mixture.

NOTE: Leaning with a T.I.T. indicator is permitted only when using power settings within the green arc ranges.

NOTE: Any change in altitude or power setting WILL REQUIRE a change in the recommended lean mixture setting and a recheck of the T.I.T. setting.

NOTE: Operation on the lean side of peak T.I.T. is NOT APPROVED.

Stage Cooling & Descent

Pre -descent planning: Five minutes prior to starting descent, reduce power 1" per minute until you reach 20 in MP. After initiating descent, continue to reduce MP by 1" per 1000' to maintain 20" MP.

Cowl flaps should be closed for descent.

Descent should be initiated far enough in advance of estimated landing to allow a gradual rate of descent (i.e., 500 FPM for passenger comfort) at cruising speed. Use this simple calculation – Cruising at 10,000' with Circuit at 5,000' will need to lose 5000'. At 500 fpm will need to start descent at least 10 min (2 min per 1000') prior to arriving in the circuit. Travelling at close to 2 ½ miles per minute in the descent, you will be starting your descent at least 25 miles prior to the airport. However, you will need

to start reducing from 24" cruise power four minutes before that, or about 35 miles away from the airport.

Enrichen mixture ½ turn every 1000' descent

NOTE: During all phases of flight, cylinder head temperatures and T.I.T. should be monitored. Use of cowl flaps, power and mixture settings should be determined in consideration of cylinder head temperatures and T.I.T.

CLASS B AIRSPACE OPERATIONS

NOTE: Class B airspace operations are conducted under IFR or Controlled VFR only. Any and all changes to the flight including but not limited to altitude and routing changes must be conducted only after the appropriate clearance from ATC has been obtained, or ATC must be immediately advised in the event of changes required due to an emergency.

Controlled VFR Requirements

Pilots intending to fly CVFR SHALL file a flight plan and obtain an ATC clearance PRIOR to entering Class B airspace.

CVFR flights must be conducted in accordance with procedures designed for use by IFR flights, except when IFR weather conditions are encountered, the pilot of a CVFR flight must avoid such weather conditions. This should be accomplished by:

- Requesting an amended ATC clearance which will enable the aircraft to remain in VFR weather conditions.
- Requesting an IFR clearance if the pilot has a valid Instrument Rating and the aircraft is equipped for IFR flight.

Equipment Requirements

Two-way radio communication equipment

- Radio navigation equipment to be used to navigate the flight planned route (GPS, VOR, ADF, etc)
- Transponder with automatic pressure altitude reporting equipment (Mode C or Mode S at minimum)

Communication Requirements

Continuous listening watch must be maintained by a flight crew member on a radio frequency assigned by ATC.

Except as otherwise authorized by ATC, when the aircraft is over a reporting point a position report is transmitted to the appropriate unit or, when so directed by ATC, to an FSS.

Weather Requirements

Flights conducted under IFR must be completed in accordance with an IFR clearance.

Flights conducted under VFR must be conducted in VMC at all times and under Controlled VFR.

If unable to comply with the above requirements:

- The aircraft must be operated in VMC at all times.
- The aircraft must exit Class B controlled airspace:
    - By the safest and shortest route, either horizontal or descending
    - An ATC unit must be informed of the actions taken as soon as possible

Airport Closures / Holding

VFR Holding Suggestions

- Maximum Endurance…ESTABLISH
- Fuel…CHECK

Note: Note the fuel endurance at the beginning of the flight and subtract the total flight time so far. Subtract the time required to continue to a suitable destination and land including required reserves to determine minimum required fuel when leaving the hold. Any remaining endurance will be available for holding.

IFR Holding Suggestions

- Hold as per IFR procedures.

Note: Pre-flight planning should indicate the amount of fuel required to fly to destination, then alternate, plus all reserves and allowances required for IFR flight. Any fuel carried in excess of this amount is available for holding. However, this amount must be reduced by the amount of fuel used by any delays already encountered during the flight or now expected due to unforeseen conditions.

Airspeed for Emergency Operation

Engine Failure After Takeoff	
Wing Flaps Up	75 KIAS
Wing Flaps Down	70 KIAS
Maneuvering Speed	
3100 lbs	110 KIAS
2600 lbs	101 KIAS
2100 lbs	91 KIAS
Maximum Glide	
3100 lbs	75 KIAS
2600 lbs	69 KIAS
2100 lbs	62 KIAS
Precautionary Landing with Engine Power	70 KIAS
Landing Without Engine Power	
Wing Flaps Up	75 KIAS
Wing Flaps Down	70 KIAS

EMERGENCY CHECKLIST

ENGINE FAILURES

ENGINE FAILURE DURING TAKEOFF ROLL

1. Throttle – IDLE
2. Brakes – APPLY
3. Wing Flaps – RETRACT

If unable to stop on runway:

4. Mixture – IDLE CUT OFF
5. Ignition Switch – OFF
6. Master Switch – OFF
7. Fuel Selector – OFF

ENGINE FAILURE IMMEDIATELY AFTER TAKEOFF

1. Airspeed
   a. 75 KIAS
   b. 70 KIAS (flaps DOWN)
2. Mixture – IDLE CUT OFF
3. Fuel Selector Valve – PUSHED DOWN and ROTATE TO OFF
4. Ignition Switch – OFF
5. Wing Flaps – AS REQUIRED (FULL recommended)
6. Master Switch – OFF
7. Cabin Door – UNLATCH
8. Land – STRAIGHT AHEAD

ENGINE FAILURE DURING FLIGHT (Restart Procedures)

1. Airspeed – 75 KIAS (Best Glide Speed)
2. Fuel Selector Valve – BOTH
3. Auxiliary Fuel Pump Switch – ON
4. Mixture – RICH (if restart does not occur)
5. Ignition Switch – BOTH (or START, if propeller is stopped)

NOTE

If propeller is windmilling, engine will restart automatically within a few seconds, If propeller has stopped (possible at low speeds), turn ignition switch to START, advance throttle slowly from idle, and lean the mixture from full rich, as required, to obtain smooth operation

6. Auxiliary Fuel Pump Switch – OFF

NOTE

If the fuel flow indication immediately drops to zero, signifying an engine driven fuel pump failure, return the auxiliary fuel pump switch to ON

FORCED LANDINGS

EMERGENCY LANDING WITHOUT ENGINE POWER

1. Passenger Seat Backs – MOST UPRIGHT POSITION
2. Seats and Seat Belts – SECURE
3. Airspeed
   a. 75 KIAS (flaps UP)
   b. 70 KIAS (flaps DOWN)
4. Mixture – IDLE CUT OFF
5. Fuel Selector Valve – PUSH DOWN and ROTATE TO OFF
6. Ignition Switch – OFF
7. Wing Flaps – AS REQUIRED (FULL recommended)
8. Master Switch – OFF (when landing is assured)
9. Doors – UNLATCH PRIOR TO TOUCHDOWN
10. Touchdown – SLIGHTLY TAIL LOW
11. Brakes – APPLY HEAVILY

PRECAUTIONARY LANDING WITH ENGINE POWER

1. Passenger Seat Backs – MOST UPRIGHT POSITION
2. Seats and Seat Belt – SECURE
3. Airspeed – 75 KIAS
4. Wing Flaps – 20 degrees
5. Selected Field – FLY OVER, noting terrain and obstructions, then retract flaps upon reaching a safe altitude and airspeed
6. Avionics Master Switch and Electrical Switches – OFF
7. Wing Flaps – FULL (on final approach)
8. Airspeed – 70 KIAS
9. Master Switch – OFF
10. Doors – UNLATCH PRIOR TO TOUCHDOWN
11. Touchdown – SLIGHTLY TAIL LOW
12. Mixture – IDLE CUT OFF
13. Ignition Switch – OFF
14. Brakes – APPLY HEAVILY

DITCHING

1. Radio – TRANSMIT MAYDAY on 121.5, giving location and intentions and SQUAWK 7700 (If installed)
2. Heavy Objects (in baggage area) – SECURE OR JETTISON (If possible)
3. Passenger Seat Back – MOST UPRIGHT POSITION
4. Seats and Seat Belts – SECURE
5. Wing Flaps – 20 degrees to FULL
6. Power – ESTABLISH 300FT/MIN DESCENT AT 65 KIAS

NOTE

If no power is available, approach at 70 KIAS with flaps up or at 65 KIAS with 10° flaps

7. Approach –
    a. High Winds, Heavy Seas – INTO THE WIND
    b. Light Winds, Heavy Swells – PARALLEL TO SWELLS
8. Cabin Doors – UNLATCH
9. Touchdown – LEVEL ATTITUDE AT ESTABLISHED RATE OF DESCENT
10. Face – CUSHION at touchdown with folded coat
11. ELT – Activate
12. Airplane – EVACUATE through cabin doors. If necessary, open window and flood cabin to equalize pressure so doors can be opened
13. Life Vests and Rafts – INFLATE WHEN CLEAR OF AIRPLANE

FIRES

DURING START ON GROUND

1. Cranking – CONTINUE to get start which would suck the flames and accumulated fuel into the engine

If engine starts:

2. Power – 1700 RPM for a few minutes
3. Engine – SHUTDOWN and inspect for damage

If engine fails to start

4. Throttle – FULL OPEN
5. Mixture – IDLE CUT OFF
6. Cranking – CONTINUE
7. Fuel Selector Valve – PUSH DOWN and ROTATE TO OFF
8. Auxiliary Fuel Pump Switch – OFF
9. Fire Extinguisher – OBTAIN (have ground attendants obtain if not installed)
10. Engine – SECURE
    a. Master Switch – OFF
    b. Ignition Switch – OFF
11. Parking Brake – RELEASE
12. Airplane – EVACUATE
13. Fire – EXTINGUISH using fire extinguisher, wool blanket or dirt
14. Fire Damage – INSPECT, repair damage or replace damaged components or wiring before conducting another flight

ENGINE FIRE IN FLIGHT

1. Mixture – IDLE CUT OFF
2. Fuel Selector Valve – PUSH DOWN AND ROTATE TO OFF
3. Auxiliary Fuel Pump Switch – OFF
4. Master Switch – OFF
5. Cabin Heat and Air – OFF (except overhead vents)
6. Airspeed – 100 KIAS (If fire is not extinguished, increase glide speed to find an airspeed – within airspeed limitation – which will provide an incombustible mixture)
7. Forced Landing – EXECUTE (as described in Emergency Landing Without Engine Power)

ELECTRICAL FIRE IN FLIGHT

1. Master Switch – OFF
2. Vents/Cabin Air/Heat – CLOSED
3. Fire Extinguisher – ACTIVATE (if available)
4. Avionics Master Switch – OFF
5. All Other Switches (except ignition switch) – OFF

!WARNING!

AFTER DISCHARGING FIRE EXTINGUISHER AND ASCERTAINING THAT FIRE HAS BEEN EXTINGUISED, VENTILATE THE CABIN

6. Vents/Cabin Air/Heat – OPEN when it is ascertained that fire is completely extinguished
    a. If fire has been extinguished and electrical power is necessary for continuance of flight to nearest suitable airport or landing area
7. Master Switch – ON
8. Circuit Breakers – CHECK for faulty circuit, do not rest
9. Radio Switches – OFF
10. Avionics Master Switch – ON
11. Radio/Electrical Switches – ON one at a time, with delay after each until short circuit is localized

CABIN FIRE

1. Master Switch – OFF
2. Vents/Cabin Air/Heat – CLOSED (to avoid drafts)
3. Fire Extinguisher – ACTIVATE (if available)

!WARNING!

AFTER DISCHARGE FIRE EXTINGUISHER AND ASCERTAINING THAT FIRE HAS BEEN EXTINGUISHED, VENTILATE THE CABIN

4. Vents/Cabin Air/Heat – Open when it is ascertained that fire is completely extinguished
5. Land the airplane as soon as possible to inspect for damage

WING FIRE

1. Landing/Taxi Light Switches – OFF
2. Navigation Light Switch – OFF
3. Strobe Light Switch – OFF
4. Pitot Heat Switch – OFF

NOTE

Perform a sideslip to keep the flames away from the fuel tank and cabin. Land as soon as possible using flaps only as required for final approach and touchdown

ICING

1. Turn Pitot Heat switch – ON
2. Turn Prop Heat switch – ON
3. Turn back or change altitude to obtain an outside air temperature that is less conducive to icing
4. Pull cabin heat control full out and rotate defroster control clockwise to obtain maximum defroster airflow
5. Increase engine speed to minimize ice buildup on propeller blades
6. Watch for signs of induction air filter icing. An unexplained loss of manifold pressure could be caused by ice blocking the air intake filter. Adjust the mixture, as required, for any change in power settings
7. Plan a landing at the nearest airport. With an extremely rapid ice buildup, select a suitable "off airport" landing site.
8. With an ice accumulation of ¼" or more on the wing leading edges, be prepared for significantly higher stall speeds
9. Leave wing flaps retracted. With sever ice buildup on the horizontal tail, the change in wing wake airflow direction caused by wing flap extension could result in a loss of elevator effectiveness.
10. Open left window and if practical scrape ice from a portion of the windshield for visibility in the landing approach
11. Perform a landing approach using a forward slip, if necessary, for improved visibility
12. Approach at 80-90 KIAS depending upon the amount of the accumulation
13. Perform a landing in level attitude

STATIC SOURCE BLOCKAGE

(Erroneous Instrument Reading Suspected)

1. Static Pressure Alternate Source Valve – PULL ON
2. Airspeed – Consult appropriate tables in Section 5 of the Pilot Operating Handbook
3. Altitude – Consult appropriate tables in Section 5 of the Pilot Operating Handbook

LANDING WITH A FLAT MAIN TIRE

1. Approach – NORMAL
2. Wing Flaps – FULL DOWN
3. Touchdown – GOOD MAIN WHEEL FIRST, hold airplane off flat tire as long as possible with aileron control
4. Directional Control – MAINTAIN using brake on good wheel as required

LANDING WITH A FLAT NOSE TIRE

1. Approach – NORMAL
2. Flaps – AS REQUIRED
3. Touchdown – ON MAINS, hold nose wheel off the ground as long as possible
4. When nose wheel touches down, maintain full up elevator as airplane slows to a stop

ELECTRICAL POWER SUPPLY SYSTEM MALFUNCTIONS

AMMETER SHOWS EXCESSIVE RATE OF CHARGE (Full Scale Deflection)

1. Alternator – OFF

!CAUTION!

WITH THE ALTERNATOR SIDE OF THE MASTER SWITCH OFF, COMPASS DEVIATIONS OF AS MUCH AS 25 DEGREES MAY OCCUR

2. Nonessential Electrical Equipment – OFF
3. Flight – TERMINATE as soon as practical
4. Be aware that the Heading Indicator (HSI) is electric and may fail.

LOW VOLTAGE ANNUNCIATOR (VOLTS) ILLUMINATES DURING FLIGHT (AMMETER INDICATES DISCHARGE)

NOTE

Illumination of "VOLTS" on the annunciator panel may occur during low RPM conditions with an electrical load on the system such as during a low RPM taxi. Under these conditions, the annunciator will go out at higher RPM. The master switch need not be recycled since an overvoltage condition has not occurred to deactivate the alternator system

5. Avionics Master Switch – OFF
6. Alternator Circuit Breaker (ALT FLD) – CHECK IN
7. Master Switch – OFF (both sides)
8. Master Switch – ON
9. Low Voltage Annunciator (VOLTS) – CHECK OFF
10. Avionics Master Switch – ON
11. If low voltage annunciator (VOLTS) illuminates again:
12. Alternator – OFF

!CAUTION!

WITH THE ALTERNATOR SIDE OF THE MASTER SWITCH OFF, COMPASS DEVIATIONS OF AS MUCH AS 25 DEGREES MAY OCCUR

13. Non-essential Radio and Electrical Equipment – OFF
14. Flight – TERMINATE as soon as practical
15. Be aware that the Heading Indicator (HSI) is electric and may fail.

VACUUM SYSTEM FAILURE

Left Vacuum Annunciator (L VAC) or Right Vacuum Annunciator (VAC R) Illuminates

!CAUTION!

IF VACUUM IS NOT WITHIN NORMAL OPERATING LIMITS, A FAILURE HAS OCCURRED IN THE VACUUM SYSTEM AND PARTIAL PANEL PROCEDURES MAY BE REQUIRED FOR CONTINUED FLIGHT

1. Vacuum Gauge – CHECK to ensure vacuum within normal operating limits.

Amplified Emergency Procedures

Engine Failure

- If occurs on take off roll **STOP** on the remaining runway
- If airborne prompt lowering of the nose to maintain airspeed and establish a glide attitude is the first response. LAND STRAIGHT AHEAD with only small changes in direction to avoid obstructions
- Remember Best Glide Speed
    - 3100 Ibs – 75 KIAS
    - 2600 Ibs – 69 KIAS
    - 2100 Ibs – 62 KIAS
- If time permits an engine restart should be attempted, if unsuccessful forced landing

Forced Landing

- Select a suitable field and prepare for landing
- Transmit Mayday message of 121.5 giving location and intentions
- Squawk 7700
- DO NOT turn off AVIONICS MASTER switch or MASTER switch until the landing is assured. Premature deactivation of these will disable the airplane electrical systems (radio and flaps)
- Activate the ELT transmitter by positioning the cockpit mounted switch to the ON position.

Landing without Elevator Control

- Trim for horizontal flight with an airspeed of approximately 80 KIAS by using the throttle and elevator trim controls.
- Then **DO NOT CHANGE THE ELEVATOR TRIM CONTROL SETTING**; control the glide angle by adjusting power exclusively
- At flare out, the nose down moment resulting from power reduction is an adverse factor and the airplane may hit on the nose wheel
- Consequently, at flare out, the elevator trim control should be adjusted toward the full nose up position and the power adjusted so that the airplane will rotate to the horizontal attitude for touchdown.
- Close throttle at touchdown

Fires

- Follow checklist and execute a force landing. DO NOT ATTEMPT TO RESTART THE ENGINE
- Initial indication of an electrical fire is usually the odor of burning insulation

Emergency Operation in Clouds

- If both vacuum pumps fail in flight the attitude indicator will fail and you will have to rely on the turn coordinator and HSI. If autopilot is installed it may also fail.
- **Executing a 180 turn in clouds**
    - Note compass heading
    - Using the clock, initiate a standard rate left turn, holding the turn coordinator symbolic airplane wing opposite the lower left index mark for **60 SECONDS**. Then roll back to level flight by leveling the miniature airplane

- Check accuracy of the turn by observing the compass heading which should be reciprocal of the original
- If necessary, adjust heading primarily with skidding motions rather than rolling motions so compass is more accurate
- Maintain altitude and airspeed by cautious application of elevator control. Avoid over controlling by keeping the hands off the control wheel as much as possible and steering only with rudder

Emergency Descent Through Clouds

- If can't establish VFR by a 180° turn, a descent through a cloud deck to VFR conditions may be appropriate
- If possible, obtain radio clearance for an emergency descent through clouds
- To guard against a spiral dive, choose an easterly or westerly heading to minimize compass card swings due to changing bank angles
- In addition, keep hands off the control wheel and steer a straight course with rudder control by monitoring the turn coordinator
- Occasionally check the compass heading and make minor corrections to hold approximate course
- Before descending into clouds, set up a stabilized letdown condition as follows
    1. Apply full rich mixture
    2. Reduce power to set up a 500-800 FPM rate of descent
    3. Adjust the elevator trim and rudder trim for a stabilized descent at 80 KIAS
    4. Keep hands off the control wheel
    5. Monitor turn coordinator and make corrections by rudder alone
    6. Adjust rudder trim to relieve unbalanced rudder force, if present
    7. Check trend of compass card movement and make cautious corrections with rudder to stop the turn
    8. Upon breaking out of clouds, resume normal cruising flight

Recovery from Spiral Dive in the Clouds

If a spiral is encountered in the clouds, proceed as follows

1. Retard throttle to idle position
2. Stop the turn by using coordinated aileron and rudder control to align the symbolic airplane in the turn coordinator with the horizon reference line
3. Cautiously apply elevator back pressure to slowly reduce the airspeed to 80 KIAS
4. Adjust the elevator trim control to maintain an 80 KIAS glide
5. Keep hands off the control wheel, using rudder control to hold a straight heading
6. Clear engine occasionally, but avoid using enough power to disturb the trimmed glide
7. Upon breaking out of the clouds, resume normal cruising flight

Inadvertent Flight into Icing Conditions

- Flight into icing conditions is PROHIBITED and extremely dangerous.
- These conditions can best be avoided by handled using the checklist procedure
- Best procedure, is to turn back or change altitude to escape icing conditions

Static Source Blocked

- If erroneous readings of the static source instruments (airspeed, altimeter and VSI) are suspected pull the alternate source valve
- With this pulled refer to the alternate static source airspeed calibration table in section 5
- Maximum airspeed and altimeter variation from normal are 5 knots and 50 feet over the normal operating range with a window(s) closed. See section 5

Spins

INTENTIONAL SPINS ARE PROHIBITED IN THIS AIRPLANE.
Should an inadvertent spin occur, the following recovery procedure should be used:

1. Retard throttle to idle position
2. Place ailerons in the neutral position
3. Apply and **hold** full rudder opposite to the direction of the rotation
4. Just **after** the rudder reaches the stop, move the control wheel **briskly** forward far enough to break the stall
5. **Hold** these control inputs until rotation stops. Premature relaxation of the control inputs may extend the recovery
6. As rotation stops, neutralize rudder, and make a smooth recovery from the resulting dive

NOTE

If disorientation precludes a visual determination of the direction of rotation, the symbolic airplane in the turn coordinator may be referred to for this information

Rough Engine Operation or Loss of Power

Spark Plug Fouling

- May be caused by a spark plug(s) becoming fouled by carbon or lead deposits
- Can be verified by turning ignition switch momentarily from BOTH to either L or R position. An obvious loss of power is evidence of spark plug or magneto trouble
- Assuming spark plug
    - Lean mixture to recommended lean setting for cruising flight
    - If problem does not clear up in several minutes, determine if a richer mixture setting will produce a smoother operation
    - If not, proceed to the nearest airport for repairs using BOTH position of the ignition switch unless extreme roughness dictates the use of a single ignition position

Magneto Malfunction

- Sudden engine roughness or misfiring is usually evidence
- Switching from BOTH to either L or R ignition switch position will identify which magneto is malfunctioning
- Select different power settings and enrichen the mixture to determine if continued operation on BOTH magnetos is practicable
- If not switch to good magneto and proceed to nearest airport for repairs

Engine Driven Fuel Pump Failure

- Will be evidenced by a sudden reduction in the fuel flow indication **immediately prior to a loss of power**, while operating from a tank that contains adequate fuel
- Immediately turn the auxiliary fuel pump ON to restore the engine power
- Flight terminated when practical and fuel pump repaired

Low Oil Pressure

- If low oil pressure annunciator (OIL PRESS) illuminates, check oil pressure gauge to confirm low oil pressure condition
- If oil pressure and oil temp remain normal, it is possible the oil pressure sending until or relief valve is malfunctioning
- However, land at the nearest airport to inspect the source of trouble
- If loss of oil pressure is accompanied by a rise in oil temperature, engine failure may be imminent
- Reduce engine power immediately and select a suitable forced landing field. Use only the minimum power required to reach the desired touchdown spot

Electrical Power Supply System Malfunctions

Excessive Rate of Charge

- After 30 min of cruising flight, the ammeter should be indicating less than two needle widths of charging current; if it remains above this value on a long flight the battery would overheat and evaporate the electrolyte
- The alternator control unit includes an overvoltage sensor, which normally automatically shuts down the alternator if the charge voltage reaches approx. 31.5 volts
- If overvoltage sensor malfunctions as evidenced by excessive rate of charge on the ammeter, the alternator should be turned off, non-essential electrical equipment turned off and flight terminated as soon as practical

Insufficient Rate of Charge

- Illumination of the low voltage annunciator (VOLTS) and ammeter discharge indications may occur during low RPM conditions with an electrical load on the system, such as during a low RPM taxi. Under these conditions, the light will go out at higher RPM
- May be a “nuisance” trip out so an attempt should be made to reactivate the alternator system
    - Turn avionics master switch off (be aware that this will cause loss of GPS flight planning)
    - Check alternator circuit breaker (ALT FLD) is in
    - Turn both sides of the master switch off and then on again
    - If problem no longer exists, normal alternator charging will resume and the low voltage annunciator (VOLTS) will go off
    - Avionics Master Switch may then be turned back on
    - If annunciator illuminates again a malfunction is confirmed
    - Flight should be terminated and or the current drain on the battery minimized

Windshield Damage

- If a bird strike or other incident should damage the windshield in flight creating an opening a significant loss of performance may be expected
- This may be potentially minimized by opening a window while the airplane is maneuvered for landing at the nearest airport

If airplane performance precludes landing at an airport, prepare for an “off airport” landing in accordance with the Precautionary Landing with Engine Power or Ditching checklists’

Cross Country Emergency Procedures

Weather Deviations Thunderstorms

> ***Note***
>
> *As per POH Supplement 23, the WX-500 Stormscope is approved for use only in avoiding hazardous weather (thunderstorms); use of the WX-500 to penetrate hazardous weather is prohibited.*

1. Stormscope…CONFIRM ON

> ***Note***
>
> *A yellow lightning bolt on a light blue background signifies that Stormscope data is being displayed.*

> ***Note***
>
> *A black lightning bolt on a grey background indicates that Stormscope data is not being displayed.*

> ***Note***
>
> *A black lightning bolt on a grey background with a red slash and circle (international "NO" symbol) indicates that there is a problem with the WX-500 unit.*

2. Stormscope…ADJUST AND CHECK AS REQUIRED

> ***Note***
>
> *Utilize stormscope information to assist with determining areas of thunderstorms to be deviated around.*

If deviation is required:

- ATC…ADVISE IF REQUIRED
- Deviation…COMPLETE
- Track Correction…COMPLETE
- Fuel…CHECK

> ***Note***
>
> *It is recommended to determine fuel utilized prior to the deviation and fuel utilized during the deviation and reassess the current fuel situation and compare it against the flight plan requirements.*

If diversion is required:

- Diversion Destination…DETERMINE
- Direction…DETERMINE
- Diversion to Alternate Aerodrome…INITIATE
- Distance…CALCULATE
- Time to Alternate…CALCULATE
- Altitude…ADJUST

> ***Note***
>
> *A safe altitude should be selected giving consideration to all important factors including but not limited to weather, obstacle/terrain clearance, and traffic.*

- Fuel…CALCULATE

Endurance + Takeoff Time = Fuel Exhaustion Time

Fuel Exhaustion Time less ETA at Alternate = Fuel at Alternate

Note

Fuel required to divert to an alternate aerodrome as well as applicable reserves and contingencies should be calculated.

- Fuel…CHECK

Note

It is recommended to determine fuel utilized and reassess the current fuel situation and compare it against the fuel required to divert as well as applicable reserves and contingencies.

- Gyros…SET
- FSS/ATC…ADVISE

Oxygen System, Hypoxia, and Emergency Descent

- Operations at altitudes above 10 000ft MSL for longer than 30 minutes require the use of oxygen.
- Operations at altitudes above 10 000ft MSL but below 13 000ft MSL require sufficient oxygen for all crew members for the duration of flight above 10 000 MSL and for 10% of the passengers onboard to a minimum of one.
- Operations at altitudes above 13 000ft MSL require sufficient oxygen for all persons on board.
- If Oxygen use is required:
    1. Assemble cannula to hose if not already attached.
    2. Adjust cannula to face.
    3. Delivery Hose…PLUG INTO OUTLET NEAREST TO THE SEAT YOU ARE OCCUPYING

Note

When the oxygen system is turned on, oxygen will flow continuously at the proper rate of flow for any altitude without any manual adjustments.

Note

For communications with mask on, plug the mask lead into the appropriate outlet in place of the headset microphone lead. A switch is incorporated on the left hand control wheel to operate the microphone.

4. Oxygen Supply Control Knob…ON
5. Adjust knob on delivery hose for the current altitude using the cannula scale on the hose flow indicator.

Note

Ensure the remote shutoff valve is not closed

When Oxygen is no longer required:

1. Delivery Hose…UNPLUG
   Unplug from outlet when discontinuing use of oxygen. This automatically stops the flow of oxygen
2. Oxygen Supply Control Knob…OFF

If Emergency Descent is required:

Suggested procedure given general practice in absence of published procedure

1. Safe Altitude…DETERMINE

> ***Note***
> *Selected safe altitude to descend to should be 10,000ASL or the minimum altitude that would permit safe flight with respect to weather and terrain avoidance (whichever is greater)*

2. Heading…TURN IF REQUIRED
3. Power…IDLE
4. Propeller Control…FULL FORWARD
5. Airspeed…HOLD Va
6. Transponder…7700
7. ATC…ADVISE
8. Desired Altitude…MAINTAIN
9. Destination…DIVERT OR CONTINUE AS REQUIRED

Severe Turbulence Encounters

During the turbulence:

1. Seatbelts…ENSURE FASTENED
2. Airspeed…REDUCE TO Va OR LESS
3. Attitude…MAINTAIN LEVEL ATTITUDE
4. Deviations…CONSIDER

> ***Note***
> *Changes to altitude or heading should be determined with consideration to factors such as but not limited to obstacle/terrain clearance, weather, aircraft loading.*

After completion of flight in which severe turbulence was encountered:

1. Journey Log…COMPLETE ENTRY IN DEFECTS COLUMN

> ***Note***
> *Encounters with severe turbulence require maintenance action and therefore require a snag entry in the Journey Log*

Inadvertent Icing Encounters

Note

This aircraft is not certified for flight into known icing conditions. As per POH

Supplement 17, installation of Propeller Heat does not change the limitations of the aircraft.

1. Master Switch…ON
2. Propeller Heat…ON
3. Propeller Heat…CHECK GREEN PROP HEAT LIGHT ILLUMINATED
4. Pitot Heat…ON
5. Turn back or change altitude…COMPLETE

*Turn back or change altitude to obtain an outside air temperature that is less conducive to icing

6. Cabin Heat and Defroster…FULL ON

*Pull cabin heat control full out and rotate defroster control clockwise to obtain maximum defroster flow

7. Engine Speed…INCREASE

*Increase engine speed to minimize ice build-up on propeller blades. If excessive vibration is noted, momentarily reduce engine speed to 2200 RPM with the propeller control, and then rapidly move the control forward

NOTE

Cycling the RPM flexes the propeller blades and high RPM increases centrifugal force, causing ice to shed more rapidly

8. Manifold Pressure…MONITOR

*Watch for signs of induction air filter icing. A loss of manifold pressure could be caused by ice blocking the air intake filter. Adjust the throttle as necessary to hold manifold pressure. Adjust mixture, as necessary, for any change in power settings.

9. Diversion…COMPLETE

*Plan a landing at the nearest suitable airport. With an extremely rapid ice build-up, select a suitable "off airport" landing site. When ice accumulates…

10. Flaps…LEAVE RETRACTED

*Leave wing flaps retracted. With a severe ice build-up on the horizontal tail, the change in wing wake airflow direction caused by wing flap extension could result in a loss of elevator effectiveness.

11. Left Window…AS DESIRED

*Open the left window and, if practical, scrape ice from a portion of the windshield for visibility during the approach.

12. Approach using forward slip…AS DESIRED

*Perform a landing approach using a forward slip, if necessary, for improved visibility.

13. Approach Speed…80-90 KIAS

*Approach at 80 to 90 KIAS depending upon the amount of the ice accumulation.

14. Landing Attitude…LEVEL

*Perform a landing in a level attitude

Missed approaches should be avoided whenever possible because of severely reduced climb capability.

Static Source Blockage (Erroneous Instrument Reading Suspected)

1. ALT STATIC AIR VALVE…PULL ON
2. CABIN HEAT and CABIN AIR knobs…PULL ON
3. VENTS…CLOSE
4. Airspeed…CORRECT

   *Refer to Section 5, Figure 5-1 (Sheet 2) Airspeed Calibration, Alternate Static Source correction chart.

5. Altitude…CORRECT

   *Refer to Section 5, Figure 5-2, Altimeter Correction, Alternate Static Source correction chart.