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QRH	Emergency	Abnormal Operations
PREFLIGHT INTERIOR	EMERGENCY LANDING	ENGINE START - FLOODED ENGINE
PREFLIGHT EXTEROR	ENGINE FAILURE IN FLIGHT	ENGINE START - USING EXTERNAL POWER
BEFORE START	ENGINE FIRE IN FLIGHT/DURING START	PITOT HEAT FAILURE ALERT
START	ELECTRICAL FIRE IN FLIGHT/WING FIRE	PFD/MFD FAN FAIL
BEFORE TAXI	ALTR FAIL	ENGINE ROUGNESS
RUN UP	LOST COMMUNICATION/OPEN DOOR IN FLIGHT	DUAL GPS FAILURE
AFTER TAKEOFF & CLIMB	FLIGHT INSTRUMENT FAILURE/PFD FAILURE	ADC/AHRS FAILURE
CRUISE	BRIEFINGS	CO LVL HIGH
SWITCHING FUEL TANKS	BEFORE TAXI BRIEF	OIL PRESSURE
PRE MANEUVER	DEPARTURE BRIEF	OIL TEMPERATURE
DESCENT	MISC	
BEFORE LANDING	COLD WEATHER OPERATIONS	
AFTER LANDING	LEANING PROCEDURES	
SECURING	PIVOTAL ALTITUDE	

EMERGENCY LANDING	ENGINE FIRE IN FLIGHT	ENGINE FAILURE IN FLIGHT	ALTR FAIL	HOME

Vr - 60 | Vy - 76 | Vx - 65 | Vs0 47 | Vs1 55 | Vfe 100 | Va 98-112 | Vno 121 | Vne 148

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PREFLIGHT

PREFLIGHT INTERIOR	
AIRWORTHINESS	VERIFY
INTERIOR LIGHTS	OFF
PANEL SWITCHES	OFF
MIXTURE	CUTOFF
MAGNETOS	OFF
BATTERY MASTER	ON
PITOT HEAT	N/A
FUEL QTY	CHECK
FUEL SELECTOR	FULLEST TANK
EXTERIOR LIGHTS	ON - CHECK
STALL WARNING	TEST
EXTERIOR LIGHTS	ALL DOWN
BATTERY MASTER	OFF
TRIM	NEUTRAL
FLAPS	DOWN

PREFLIGHT EXTERIOR	
CABIN DOOR	CLOSED
R WING FLAP/AILERON	CHECK
R WING FUEL	CHECK & DRAIN
R WING TIEDOWN	DISCONNECT
R MAIN TIRE/STRUT	CHECK
ENGINE OIL QTY	5 QTS MIN
PROP & SPINNER	CHECK
ENGINE INLETS	CHECK
NOSE TIRE & STRUT	CHECK
NOSE FUEL SUMP	DRAIN
L MAIN TIRE & STRUT	CHECK
L WING FLAP/ AILERON	CHECK
L WING TIEDOWN	DISCONNECT
L WING FUEL	CHECK
PITOT MAST	CHECK CLEAR
ANTENNAS	CHECK
FUSELAGE	CHECK
TRIM TAB	CHECK
STABILIZER	CHECK
RUDDER	CHECK
TIE DOWN	DISCONNECT
FLAPS	UP

EMERGENCY LANDING	ENGINE FIRE IN FLIGHT	ENGINE FAILURE IN FLIGHT	ALTR FAIL	HOME

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BEFORE START	
PREFLIGHT	COMPLETE
SEATS & SEATBELTS	ADJUST & LOCK
BRAKES	HOLD
PANEL SWITCHES	ALL DOWN
MASTER BATTERY	ON
CIRCUIT BREAKERS	CHECK IN
VOLTS	CHECK 12 MINIMUM
THROTTLE	OPEN ¼ INCH
MAGNETOS	BOTH
PROP AREA	CLEAR

START	
BEFORE TAXI BRIEF	
READ FIRST THEN EXECUTE	
FUEL PUMP	ON
MIXTURE	FULL RICH
IF (OIL TEMP <140°) = PUMP THROTTLE	IF (OIL TEMP >140°) = NEXT STEP
FUEL FLOW	STABLE
FUEL PUMP	STILL ON
STARTER	ENGAGE
AT FIRST SIGN OF START	RELEASE STARTER
OIL PRESSURE	GREEN
THROTTLE	1000 RPM
FUEL SELECTOR	FULLEST TANK
FUEL PUMP	OFF

EMERGENCY LANDING	ENGINE FIRE IN FLIGHT	ENGINE FAILURE IN FLIGHT	ALTR FAIL	HOME

Vr - 60 | Vy - 76 | Vx - 65 | Vs0 47 | Vs1 55 | Vfe 100 | Va 98-112 | Vno 121 | Vne 148

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BEFORE TAXI	
AVIONICS	ON
NAV LIGHT	ON
ROTATING BEACON	ON
LANDING/TAXI LIGHT	AS NEEDED
MIXTURE	LEAN
PFD	AHRS ALIGNED
BRAKES	VERIFY PRESSURE
GPS	VERIFY DATABASE
COMM FREQUENCIES	SET
XPNDR	VFR
WEATHER	OBTAIN
INSTRUMENTS	CHECK
FMS/NAV/CDI	SET & ACTIVATE
TAXI DIAGRAM	AVAILABLE
FLIGHT CONTROLS	FREE & CORRECT
TAXI ROUTE/HOTSPOTS	OBTAIN & BRIEF
TAXI	1000 RPM OR LESS

EMERGENCY LANDING	ENGINE FIRE IN FLIGHT	ENGINE FAILURE IN FLIGHT	ALTR FAIL	HOME

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RUN UP	
PARKING BRAKE	SET
COMM FREQUENCIES	SET
MIXTURE	RICH
BRAKES	VERIFY
THROTTLE	2000 RPM
MAGNETOS (175ea/50diff)	CHECK
CARB HEAT	CHECK
NO RED INDICATIONS	ENGINE MONITOR
	AMPS, VOLTS & ANNUNCIATORS
THROTTLE	IDLE - WAIT 3 SECONDS
THROTTLE	1000 RPM

BEFORE TAKEOFF	
DEPARTURE BRIEF	
SEATS	UPRIGHT
SEATBELTS	SECURE
DOORS & WINDOWS	LOCKED
FMS	BRIEF
MESSAGES	CONSIDER
FLAPS	0 OR 25 DEGREES
TRIM	NEUTRAL
WHEN ENTERING RUNWAY	
FUEL PUMP	ON
STROBES	ON
MIXTURE	RICH

EMERGENCY LANDING	ENGINE FIRE IN FLIGHT	ENGINE FAILURE IN FLIGHT	ALTR FAIL	HOME

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AFTER TAKEOFF & CLIMB (1000 AGL)	
FLAPS	RETRACTED
FUEL PUMP	OFF
CRUISE CLIMB	87 KTS

CRUISE	
THROTTLE	AS REQD
FUEL PUMP	OFF
LANDING LIGHT	OFF
FMS	BRIEF
MIXTURE	LEAN

SWITCHING FUEL TANKS	
FUEL PUMP	ON
FUEL SELECTOR VALVE	FULLEST TANK
FUEL PUMP	OFF
FUEL FLOW	MONITOR

PRE MANEUVER	
LANDING LIGHT	AS REQD
MIXTURE	SET
FUEL QTY	STATE
FUEL SELECTOR VALVE	FULLEST TANK
ESP OFF INSTRUCTION	
CLICK KNOB ON G5 STANDBY > SCROLL TO ESP > CLICK KNOB AGAIN UNTIL GREEN BAR TURNS GRAY	
AREA	CLEAR

EMERGENCY LANDING	ENGINE FIRE IN FLIGHT	ENGINE FAILURE IN FLIGHT	ALTR FAIL	HOME

Vr - 60 | Vy - 76 | Vx - 65 | Vs0 47 | Vs1 55 | Vfe 100 | Va 98-112 | Vno 121 | Vne 148

DESCENT & BEFORE LANDING	
5NM FROM THE AIRPORT	
WEATHER	OBTAIN
SWITCHES	UP
MIXTURE	RICH
MINIMUMS	SET
PARKING BRAKE	VERIFY RELEASED
IN THE PATTERN	
FUEL QTY	STATE
FUEL SELECTOR	FULLEST TANK
SEATS & SEATBELTS	UPRIGHT & SECURE
FLAPS	AS REQD
STABILITY CALL (200’ AGL)	GO AROUND/CONTINUE
AUTOPILOT (200’ AGL)	OFF
APPROACH	HEELS ON THE FLOOR

AFTER LANDING	
ONCE CLEAR OF RUNWAY	
RUN AS FLOW, CONFIRM AT NEXT STOP	
FLAPS	RETRACTED
TRIM	NEUTRAL
STROBE	DOWN
FUEL PUMP	OFF

EMERGENCY LANDING	ENGINE FIRE IN FLIGHT	ENGINE FAILURE IN FLIGHT	ALTR FAIL	HOME

Vr - 60 | Vy - 76 | Vx - 65 | Vs0 47 | Vs1 55 | Vfe 100 | Va 98-112 | Vno 121 | Vne 148

SECURING	
XPNDR	VFR
EXTERIOR LIGHTS	ALL OFF
FUEL PUMP	OFF
THROTTLE	IDLE
MIXTURE	CUTOFF
MAGNETOS (AFTER STOP)	OFF
INTERIOR LIGHTS	OFF
ENGINE TIMES	RECORD
BATTERY MASTER	OFF
AIRCRAFT	SECURED
POST-FLIGHT INSPECTION	COMPLETE

BOLD ITEMS ARE TO BE MEMORIZED AS A FLOW

ENGINE FIRE IN FLIGHT	
MIXTURE	**CUTOFF**
THROTTLE	**IDLE**
FUEL PUMP	**OFF**
FUEL SELECTOR	**OFF**
HEATER & DEFROSTER	**OFF**
AIRSPEED	**PITCH for VNO**
IF FIRE EXTINGUISHED	
EMERGENCY LANDING	EXECUTE

ENGINE FIRE DURING START	
STARTER	**HOLD**
FUEL PUMP	**OFF**
MIXTURE	**CUTOFF**
THROTTLE	**OPEN**
FUEL SELECTOR	**OFF**
IF FIRE CONTINUES	
AIRCRAFT	ABANDON
IF FIRE EXTINGUISHED	
STARTER	RELEASE
SECURING CHECKLIST	COMPLETE

EMERGENCY LANDING	
IF ABOVE 1500 AGL	
SQUAWK	7700
DECLAR	121.5
ALL ALTITUDES	
SEATS & SEATBELTS	UPRIGHT & SECURE
PANEL SWITCHES	ALL OFF
THROTTLE	IDLE
MIXTURE	CUT OFF
MAGNETOS	OFF
FUEL SELECTOR	OFF
LANDING ASSURED	
FLAPS	AS REQD
BATTERY	OFF
CABIN DOOR	UNLATCH

BOLD ITEMS ARE TO BE MEMORIZED AS A FLOW

ENGINE FAILURE INFLIGHT	
AIRSPEED	**69**
BEST PLACE TO LAND	**SELECT**
MIXTURE	**RICH**
FUEL PUMP	**ON**
FUEL SELECETOR	**FULLEST/SWITCH**
MAGNETOS	**CYCLE**
IF POWER NOT RESTORED	
EMERGENCY LANDING	EXECUTE
IF POWER RESTORED	
CRUISE CHECKLIST	COMPLETE

BOLD ITEMS ARE TO BE MEMORIZED AS A FLOW

ENGINE FAILURE AFTER TAKEOFF	
AIRSPEED	**69**
BEST PLACE TO LAND	**SELECT**
MIXTURE	**CUTOFF**
MAGNETOS	**OFF**
BATTERY	**OFF**
CABIN DOOR	UNLATCH
LAND	STRAIGHT AHEAD

BOLD ITEMS ARE TO BE MEMORIZED AS A FLOW

ELECTRICAL FIRE IN FLIGHT	
MASTER BATTERY	**OFF**
VENTS	**CLOSE**
HEATER/DEFROSTER	**OFF**
FIRE	EXTINGUISH
VENTS	OPEN
AIRSPEED INCREASE	IF NEEDED
EMERGENCY DESCENT	IF NEEDED
LAND AS SOON AS POSSIBLE	

WING FIRE	
EXTERIOR LIGHTS	ALL OFF
SIDE SLIP TO KEEP FLAMES AWAY FROM FUEL TANK	

ALTR FAILURE	
ALT & FIELD BREAKERS	IN/RESET
IF ALTERNATOR STILL FAILED	
NON ESS BUS BREAKER	PULL
LIGHTING BUS BREAKER	PULL
AVIONICS MASTER	OFF
FUEL PUMP	OFF
LAND	WHEN PRACTICAL
TO ENSURE 30 MINS OF BATTERY LIFE	
COMM RADIO	3 MINS MAX
FUEL PUMP	2 MINS MAX

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LOST COMMUNICATION	
RADIO	VERIFY FREQ
VOLUME/SQUELCH	ADJUST
PUSH TO TALK	VERIFY TX
COMMS	CYCLE COMM/FREQ
AUDIO MKR BREAKER	PULL
IF COMMS NOT RE-ESTABLISHED	
SQUAWK	7600
LAND	WHEN PRACTICAL
RECALL LIGHT GUN SIGNALS	

Color and Type of Signal	Movement of Vehicles, Equipment and Personnel	Aircraft on the Ground	Aircraft in Flight
Steady green	Cleared to cross, proceed or go	Cleared for takeoff	Cleared to land
Flashing green	Not applicable	Cleared for taxi	Return for landing (to be followed by steady green at the proper time)
Steady red	Stop	Stop	Give way to other aircraft and continue circling
Flashing red	Clear the taxiway/runway	Taxi clear of the runway in use	Airport unsafe, do not land
Flashing white	Return to starting point on airport	Return to starting point on airport	Not applicable
Alternating red and green	Exercise extreme caution!!!!	Exercise extreme caution!!!!	Exercise extreme caution!!!!

OPEN DOOR IN FLIGHT	
AIRSPEED	<87 KTS
CABIN VENTS	CLOSE
STORM WINDOW	OPEN
SIDE LATCH	CLOSE
UPPER LATCH	CLOSE

EMERGENCY LANDING	ENGINE FIRE IN FLIGHT	ENGINE FAILURE IN FLIGHT	ALTR FAIL	HOME

Vr - 60 | Vy - 76 | Vx - 65 | Vs0 47 | Vs1 55 | Vfe 100 | Va 98-112 | Vno 121 | Vne 148

FLIGHT INSTRUMENT FAILURE	
IF AFTER FAF & VMC	
LAND	WHEN PRACTICAL
IF AFTER FAF & IMIC	
MISSED APPROACH	CONSIDER
CALL OUT	CONTINUE/GOING MISSED
IF FUNCTION NOT RESTORED	
ASSISTANCE	CONSIDER
ATC	NOTIFY
APPROACH	CONSIDER

PFD FAILURE	
CIRCUIT BREAKERS	CHECK IN
IF FUNCTION NOT RESTORED	
ASSISTANCE	CONSIDER
ATC	NOTIFY

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BEFORE TAXI BRIEF	
SAFETY	
SEATBELTS	LOCATION, FUNCTION & WHEN TO WEAR
AIR VENTS	LOCATION, FUNCTION, MOTION SICKNESS
FIRE	FIRE EXTINGUISHER LOCATION & USE
EMERGENCY	FOLLOW MY INSTRUCTION. EXIT PROCEDURES
TALKING	STERILE COCKPIT & EXCHANGE OF CONTROLS
YOUR QUESTIONS?	
FUEL SELECTOR	
THE FUEL SELECTOR IS LOCATED HERE (POINT) THE POSITIONS ARE	
RIGHT TANK	POINTING FORWARD
LEFT TANK	POINTING UP
OFF	POINTING AFT
THE ONLY TIME WE WILL USE THE "OFF" POSITION IS IN AN EMERGENCY. TO TURN OFF, PRESS THE BUTTON, THEN TURN THE FUEL SELECTOR TO THE REAR. ***I WILL NOT PRESS THE BUTTON DURING NORMAL TANK SWITCHES***	

DEPARTURE BRIEF
ABORTED TAKE OFF
ABORT TAKEOFF FOR ANY FIRES, RED ANNUNCIATORS, OR LOSS OF DIRECTIONAL CONTROL
ENGINE FAILURE BELOW 1000 AGL
PITCH FOR Vg AND LAND ON REMAINING RUNWAY OR WITHIN 30 DEGREES OF HEADING
ENGINE FAILURE ABOVE 1000 AGL OR TURNED CROSSWIND
PITCH FOR Vg AND RETURN TO LAND ON RUNWAY, TAXIWAY, OR SUITABLE OFF-FIELD SITE

BEFORE TAXI

BEFORE TAKEOFF

EMERGENCY LANDING	ENGINE FIRE IN FLIGHT	ENGINE FAILURE IN FLIGHT	ALTR FAIL	HOME

Vr - 60 | Vy - 76 | Vx - 65 | Vs0 47 | Vs1 55 | Vfe 100 | Va 98-112 | Vno 121 | Vne 148

ENGINE START - FLOODED ENGINE	
THROTTLE	OPEN FULL
BATTERY MASTER	ON
FUEL PUMP	OFF
MAG	ON
MIXTURE	IDLE
CAS MESSAGES	CONSIDER
PFD ANNUNCIATIONS	CONSIDER
PROPELLER	CLEAR
STARTER	ENGAGE
MIXTURE (UPON START)	ADVANCE
THROTTLE	RETARD
OIL PRESSURE	CHECK

PITOT HEAT FAILURE ALERT	
IN-FLIGHT FAILURE IMC	
ATC	ADVISE
VECTOR TO NEAREST VFR	REQUEST
ICING CONDITIONS	AVOID
ALTITUDE	ADJUST TO MAINTAIN +10 CELSIUS
LOSS OF AIRSPEED INDICATIONS	CONSIDER
LAND AS SOON AS POSSIBLE	

EMERGENCY LANDING	ENGINE FIRE IN FLIGHT	ENGINE FAILURE IN FLIGHT	ALTR FAIL	HOME

Vr - 60 | Vy - 76 | Vx - 65 | Vs0 47 | Vs1 55 | Vfe 100 | Va 98-112 | Vno 121 | Vne 148

ENGINE START - USING EXTERNAL POWER	
BATTERY MASTER	OFF
MAGS	ON
ALL ELECTRICAL EQUIPMENT	OFF
EXTERNAL POWER	APPLY
THROTTLE	½ INCH OPEN
FUEL PUMP	ON
STROBE	ON
MIXTURE	PRIME 3-5 SECONDS THEN IDLE
CAS MESSAGES	CONSIDER
PFD ANNUNCIATIONS	CONSIDER
PROPELLER	CLEAR
STARTER	ENGAGE
MIXTURE (UPON START)	ADVANCE
THROTTLE	ADJUST
OIL PRESSURE	CHECK
BATTERY MASTER	ON
THROTTLE	LOWEST POSSIBLE RPM
EXTERNAL POWER	DISCONNECT

PFD/MFD FAN FAIL	
CREW AWARENESS ONLY	
POSSIBILITY OF PFD OR MFD OVERHEAT FAILURE	
AT THE END OF THE FLIGHT	REPORT TO MX

ENGINE ROUGHNESS	
CARB HEAT	ON
IF ROUGHNESS CONTINUES AFTER ONE MINUTE	
MIXTURE	ADJUST FOR MAX SMOOTH
CARB HEAT	OFF
FUEL PUMP	ON
FUEL SELECTOR	SWITCH TANK
ENGINE INDICATORS	CHECK
LEFT/RIGHT MAG	INDIVIDUALLY CYCLE (OFF/ON)
IF OPERATION IS SATISFACTORY ON EITHER MAG ALONE:	
SATISFACTORY MAGNETO	CONTINUE OPERATION
POWER	REDUCE
MIXTURE	FULL RICH
LAND AT NEAREST SUITABLE AIRPORT	

DUAL GPS FAILURE	
NAVIGATION	USE ALTERNATE SOURCE (ILS, LOC, VOR, DME, ADF)
IF ALTERNATE SOURCES OF NAVIGATION ARE NOT AVAILABLE	
NAVIGATION	USE DEAD RECKONING

ADC/AHRS FAILURE	
SYSTEM MESSAGES	CONSIDER
AHRS/ADC BREAKER	RESET
IF AHRS/ADC IS STILL INVALID	
FLIGHT IN IFR & ICING CONDITIONS	AVOID
FAILURE OCCURSE IN FLIGHT	
STANDBY INSTRUMENT	VERIFY NO FAILURE INDICATIONS
STANDBY INSTRUMENT	USE

CO LVL HIGH	
HEATER	OFF
FRESH AIR SOURCE	OPEN
LAND AS SOON AS POSSIBLE	

OIL PRESSURE	
LOW OIL PRESSURE	
THROTTLE	MINIMUM REQUIRED
IF ACCOMPANIED BY HIGH OIL TEMP	LAND AS SOON AS POSSIBLE
IF ACCOMPANIED BY NORMAL OIL TEMP	LAND AS SOON AS PRACTICAL
HIGH OIL PRESSURE	
THROTTLE	MINIMUM REQUIRED
LAND AS SOON AS PRACTICAL	
IF POSSIBLE, MAINTAIN GLIDE CAPABILITY TO SELECTED LANDING AREA IN CASE OF TOTAL ENGINE FAILURE	

OIL TEMPERATURE	
THROTTLE	MINIMUM REQUIRED
MIXTURE	FULL RICH
AIRSPEED	INCREASE IF PRACTICAL
LAND AS SOON AS POSSIBLE	
PREPARE FOR POWER OFF LANDING	
IF POSSIBLE, MAINTAIN GLIDE CAPABILITY TO SELECTED LANDING AREA IN CASE OF TOTAL ENGINE FAILURE	

*THIS DOCUMENT **DOES NOT** COVER EVERY OPERATION OR EMERGENCY PROCEDURE. FOR A MORE EXHAUSTIVE LIST OF PROCEDURES, REFER TO SECTIONS 1 - 3 OF PA-28-140 POH & THE G500 REFERENCE GUIDE*

COLD WEATHER OPERATIONS - OAT <35F

Do not leave the master on for extended periods while preflighting and if temperature is below 20 degrees omit dropping flaps and checking lights before start.

Starting:

- If airplane is very cold or has not started in a few days…
    - Increase Prime-time
        - Priming and then pulling the prop through a few Full rotations also helps get the oil moving before using the starter.
- Use minimal RPMs to start the engine (LESS THAN 1000RPM) and limit yourself to low RPM settings (~1400RPMs for Lycoming/Continental) on ground.

In-flight:

- No power idle descents
- Use higher RPM descents.
- If power idle descents are necessary…clear the engine with short gentle bursts of power periodically during the descent and keep the length of time you spend at idle to a minimum (practice it from 3,000ft instead of 5,000ft etc).

LEANING PROCEDURES

BEFORE TAXI

Taxi

- Lean until the onset of engine roughness - then slightly enrich until smooth. Set to full rich before Take-Off.

Cruise

- As a general rule of thumb, lean the mixture less than but close to a temperature of 1425 EGT.
- If engine roughness occurs before peak EGT, the EGT corresponding to the onset of engine roughness should be used as the peak reference value.
    - Enrich ~100 degrees cooler from this value to operate rich-of-peak.
- If you need to climb, enrich the mixture before adding power if at or above 75% power (~2500 RPM or greater), then lean again at your new altitude.

Maneuvers

- Set the mixture to full rich for maneuvering per the pre-maneuver checklist unless operating at about 4000 feet density altitude.

PIVOTAL ALTITUDE

Groundspeed		Approximate Pivotal Altitude
Knots	MPH	
87	100	670
91	105	735
96	110	810
100	115	885
104	120	960
109	125	1050
113	130	1130

Pivotal altitude (AGL) = groundspeed in knots^2/11.3