Certified Flyers II

BE76 Duchess

Multi-Engine Study Guide

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The Certified Flyers Multi-Engine Study Guide is for reference only and is intended only to supplement, not replace, manufacturer and FAA publications such as the pilots operating handbook. All pilots must operate the aircraft in accordance with the Pilot's Operating Handbook and abide by Federal Aviation Regulations.

Contents

Section 1:
Engine-out Aerodynamics

TURNING TENDENCIES

The turning tendencies that affect a single engine aircraft (p-factor, torque, spiraling slipstream, gyroscopic precession) will also affect a multi-engine aircraft. Because a multi-engine aircraft has two engines many of these turning tendencies increase.

A twin engine aircraft where both engines are rotating the same direction is called a **conventional twin**. To combat p-factor and torque, aircraft with **counter-rotating** propellers have been developed (the BE76 Duchess has counter-rotating propellers). The p-factor and torque from counter-rotating propellers cancel each other out which results in less rudder needed to oppose their turning tendencies.

CRITICAL ENGINE

A **critical engine** is the engine which, if lost, will most adversely affect the performance and handling characteristics of the aircraft. The affect of the critical engine is most significant when the aircraft is operating at low airspeed with a high power setting (thus more p-factor and torque).

On a **conventional twin** with propellers rotating clockwise, the critical engine is the **left** engine. On an aircraft such as the BE76 Duchess with **counter-rotating** propellers there is **not a critical engine** because the yawing and rolling caused from losing either engine is identical.
There are four factors which determine if an engine is critical:

1. P-Factor
2. Accelerated Slipstream
3. Spiraling Slipstream
4. Torque

WHAT HAPPENS WHEN AN ENGINE FAILS?

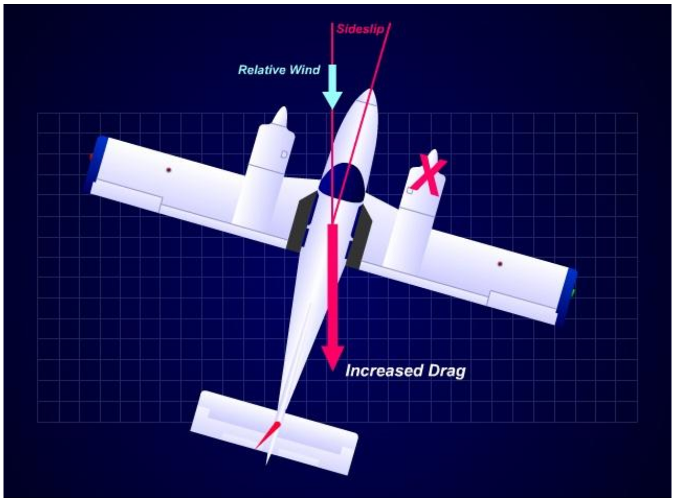
Two things happen when an engine fails: Yaw and Roll towards the dead engine because now lift, thrust, and drag act on your aircraft asymmetrically.

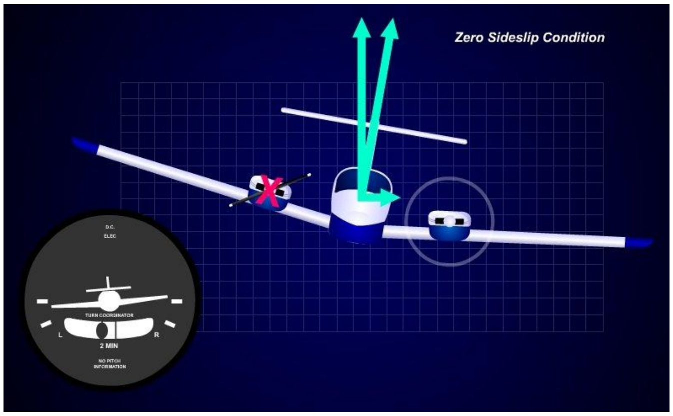
1. **Yaw**- Asymmetrical thrust will cause a yawing motion around the C.G. toward the inoperative engine.
2. **Roll**- Induced flow (**Accelerated Slipstream**- extra lift created by accelerated air over the wing) from the operating engine and lack of induced flow from the inoperative engine causes asymmetric lift on wings. This results in a rolling moment around the C.G. towards the inoperative engine.
3. **Roll**- Yawing moment from the asymmetric thrust will cause the operating engine to move faster through the air as the aircraft yaws. This causes faster velocity air to flow

over the operating engines wing causing more lift on that wing, thus roll towards the inoperative engine.

To counteract this roll and yaw, rudder pressure must be applied to the side of the operational engine to oppose these forces. Hence, "**Dead foot- Dead engine"**.

ZERO SIDESLIP CONDITION





The solution to maintaining aircraft heading and reducing drag is to improve performance using the **Zero Sideslip Condition.** When the aircraft is banked into the operating engine (2-5 degrees of bank), the dihedral of the wing will create a horizontal component of lift. The horizontal component of lift minimizes rudder deflection required to align the longitudinal axis of the aircraft to the relative wind. In addition to banking into the operating engine, the appropriate amount of rudder required is indicated by the inclinometer ball being "split" towards the operating engine's side. The zero sideslip condition must be flown for optimum aircraft performance.

CLIMB PERFORMANCE AND SERVICE CEILING

Climb performance is dependent on the excess power needed to overcome drag. When a twin-engine airplane loses an engine, the airplane loses 50% of its available power. This power loss results in a loss of approximately 80% of the aircraft's excess power and climb performance. Drag is a major factor relative to the amount of excess power available. An increase in drag (such as the loss of one engine) must be offset by additional power. This additional power is now taken from the excess power, making it unavailable to aid the aircraft in the climb. When an engine is lost, maximize thrust (full power) and minimize drag (flaps and gear up, feather prop, etc) in order to achieve optimum single engine climb performance.

Drag Factors:

1. Full Flaps- ~400 fpm approx.
2. Windmilling Prop- ~400 fpm approx.
3. Gear Extended- ~150 fpm approx.

Single-engine service ceiling- the highest altitude at which the airplane can maintain a steady rate of climb of 50 fpm with one engine operating at full power and one engine's propeller feathered

Single-engine absolute ceiling- the altitude where climb is no longer possible with one engine operating at full power and one engine's propeller is feathered

Vmc- MINIMUM CONTROL SPEED
Rudder is applied to counteract yaw and roll from an inoperative engine in a multi-engine aircraft. As airspeed decreases the rudder becomes less effective, eventually an airspeed will be reached where full rudder deflection is required to maintain directional control. At this point, any further airspeed reduction will result in a loss of directional control. This airspeed is Vmc, the airspeed at which it is still possible to maintain directional control with an engine inoperative.

§23.149 Minimum Control Speed
Vmc *is the calibrated airspeed, at which, when the critical engine is suddenly made inoperative it is possible to:*

1. *Maintain control of the airplane with the engine still inoperative*
2. *Maintain straight flight at the same speed with an angle of bank not more than 5 degrees.*

The method used to simulate critical engine failure must represent the most critical mode of powerplant failure expected in service with respect to controllability.
Vmc must not exceed 1.2 Vs1 at maximum takeoff weight.
Vmc must be determined with:

1. *Most unfavorable weight (not necessarily gross weight)*
2. *Most unfavorable center of gravity position*
3. *The airplane airborne and the ground effect negligible*
4. *Maximum available takeoff power initially on each engine*
5. *The airplane trimmed for takeoff*
6. *Flaps in the takeoff position*
7. *Landing gear retracted*
8. *All propeller controls in the recommended takeoff position*

When recovering from Vmc:

1. *The rudder pedal force required to maintain control must not exceed 150 pounds*
2. *It must not be necessary to reduce power of the operative engine(s)*
3. *The airplane must not assume any dangerous attitude*
4. *It must be possible to prevent a heading change of more than 20 degrees*

RECOGNIZING AND RECOVERING FROM Vmc
There are four warning signs that Vmc is occurring or about to occur:

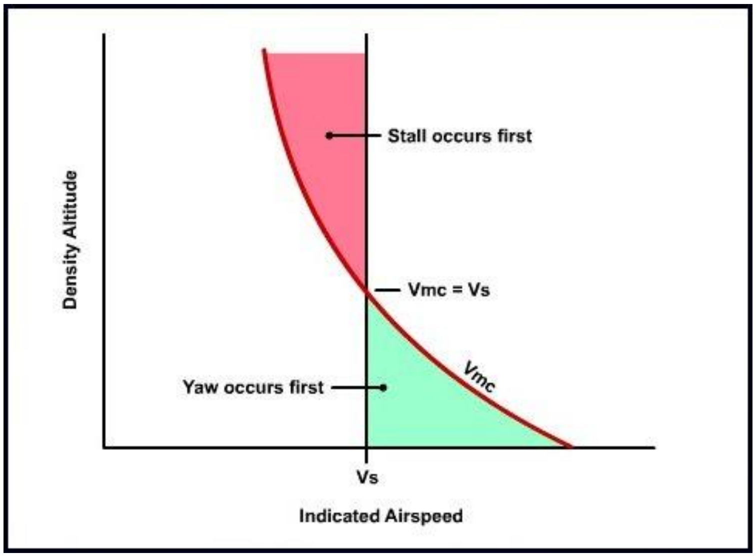
1. **Loss of directional control**- the rudder pedal is depressed to its fullest travel and the airplane is still turning towards the inoperative engine

2. **Stall warning horn-** a single engine stall may be just as dangerous as running out of rudder authority and could even result in a spin
3. **Buffeting before the stall-** same reason as the stall warning horn
4. **A rapid decay of control effectiveness-** any loss of control effectiveness could result in a loss of control of the aircraft

To recover from Vmc, these two actions **must occur simultaneously**:

1. **Reduce power on the operating engine-** this will reduce the asymmetrical thrust causing the Vmc in the first place (remember, reducing power all the way to idle may help stop the Vmc, but the loss of airspeed and power can lead to a stall)
2. **Pitch down-** lowering the nose of the airplane will increase the forward airspeed making the rudder more effective in regaining and maintaining directional control

V_{MC} AND IT'S RELATIONSHIP TO STALL SPEED



As density altitude increases, Vmc speed will decrease because as density altitude increases engine power will decrease (less engine power at higher density altitude→ less asymmetric thrus→ less yaw towards dead engine= lower V_{MC}). Stall speed is an indicated airspeed which will remain constant as altitude increases or decreases.

FACTORS AFFECTING Vmc AND SINGLE ENGINE PERFORMANCE

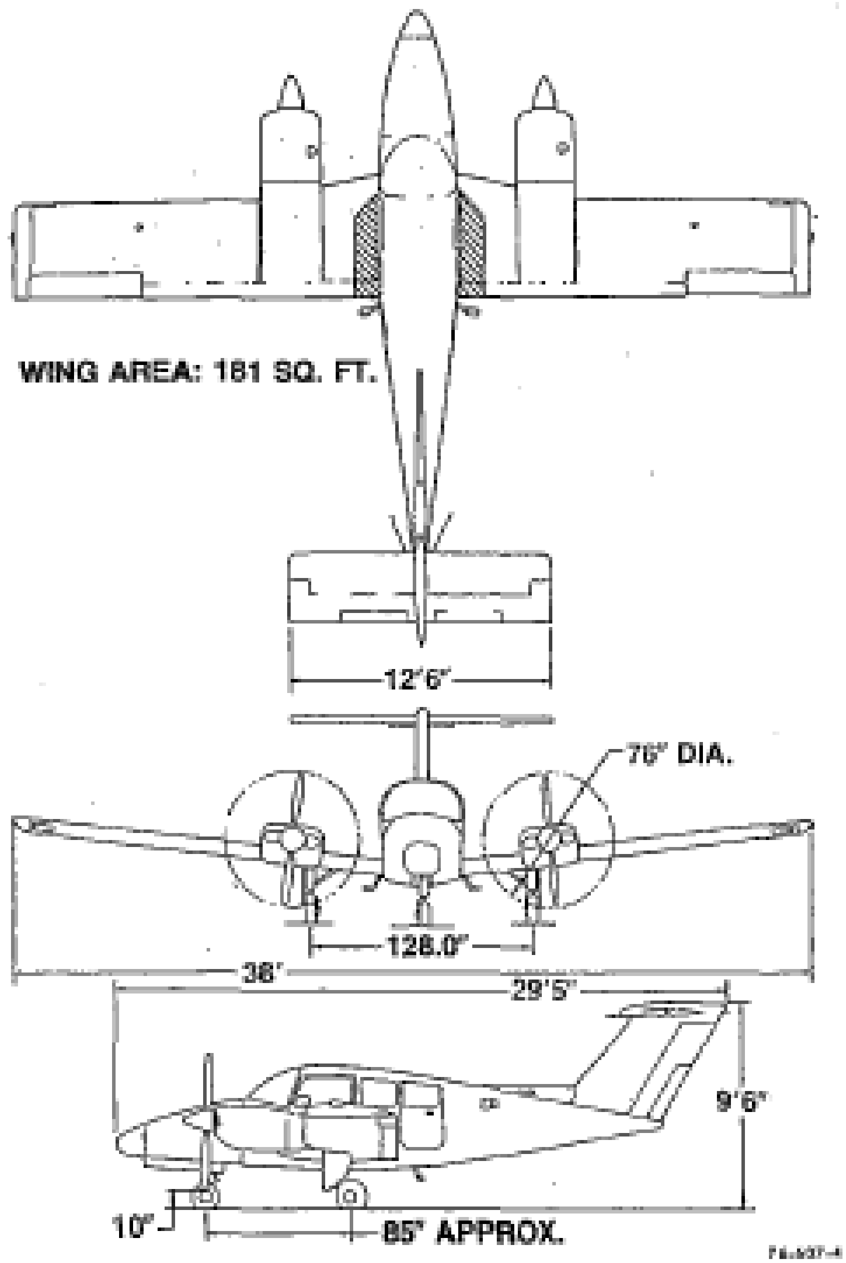
Vmc is defined using a very specific set of conditions, thus published Vmc and actual Vmc can be two very different numbers. Remember, Vmc only addresses directional control and is not related to aircraft performance. While controllability is important, the degradation of performance in a single engine situation also has serious consequences. A variety of factors affect both controllability and performance with one engine inoperative, such as aircraft configuration, flight conditions, and pilot action. In some cases, an element which provides an increase in controllability (translating into a decrease in Vmc) may actually hinder performance. Refer to the chart on the next page to review how certain factors affect both Vmc and performance.

EFFECT ON	Vmc	PERFORMANCE
Power Increase	**Up**- more yaw	**Up-** more power
Temp Increase	**Down**- less dense, less power, less yaw	**Down-** less dense, less power
Pressure Decrease	**Down**- less dense, less power, less yaw	**Down-** less dense, less power
Density Altitude Increase	**Down**- less dense, less power, less yaw	**Down**- less dense, less power
Bank Angle- 0 bank- no turn	**Up**- sideslip plane- less AOA on rudder because of sideslip airflow- less rudder effectiveness- more rudder needed	**Down**- more drag- slipping
Zero Sideslip- 2-3 bank- no turn	**Middle**- Use horizontal lift to stop turn- not slipping- more rudder effectiveness	**Up**- less drag- zero slip
Bank Angle- 5 bank- no turn	**Down**- plane turning toward good engine + rudder used to stop turn = slip toward good engine- high AOA on rudder	**Down**- more drag- slipping
Windmilling Propeller	**Up**- more drag, more yaw	**Down-** more drag
Feathered Propeller	**Down**- less drag, less yaw	**Up**- less drag
Aft CG	**Up**- less distance between rudder and CG- less rudder effectiveness	**Up**- less tail down force required less induced drag; Down- smaller arm on controls, less control effectiveness
Heavier Weight	**Down**- more lift needed in level flight- more horizontal lift available during turn- helps prevent turn	**Down**- more weight, more power required
Flaps Down	**Down**- more induced drag from good engine side prevents yaw towards dead engine	**Down**- more airflow over flap causes greater drag, increased yaw, increased roll, requiring more aileron to stop, creating more adverse yaw= more induced drag
Gear Down	Depends on location of CG to gear and direction of travel (Vmc down, keel effect)	**Down**- more parasitic drag
Critical Engine Fails	**Up**- P-factor, Accelerated Slipstream, Torque makes yaw worst	**Down**- larger control inputs
In Ground Effect	**Up**- less drag- more thrust available- more yaw	**Up**- less drag

Section 2:

Aircraft Systems and Limitations

This study guide is only to supplement the aircraft POH, not to replace it. Refer to aircraft POH for official operating limitations and systems information. It is the pilot's responsibility to be familiar with all information in the Pilots Operating Handbook.



THREE-VIEW

V-SPEEDS (KIAS)

Vr	Rotation Speed	71
Vx	Best Angle Climb	71
Vxse	Best Angle 1 Engine	85
Vy	Best Rate Climb	85
Vyse	Best Rate 1 Engine	85
Vso	Stall w/ Flaps	60
Vs1	Stall w/o Flaps	70
Vmc	Min Control 1 Engine	65
Va	Maneuvering (3000lb)	116
Va	Maneuvering (Max Gross)	132
Vno	Max Structural Cruise	154
Vne	Never Exceed	194
Vsse	1 Engine Intentional	71
Vlr	Max Gear Retraction	112
Vle/Vlo	Max Gear Speeds	140
Vfe	Flap Extension (20)	120
Vfe	Flap Extension (full)	110
Best Glide	3000lb	82
Best Glide	Max Gross	95
X-Wind	Max Demonstrated	25

MAXIMUM CERTIFICATED AND STANDARD AIRCRAFT WEIGHTS

Maximum Ramp Weight	3916lbs
Maximum Take-off Weight	3900lbs
Maximum Landing Weight	3900lbs
Maximum Zero Fuel Weight	3500lbs
Maximum Weight in Baggage Compartment	200lbs
Standards Empty Weight	2446lbs
Maximum Useful Load	1470lbs

CENTER OF GRAVITY

Forward Limits: 106.6 in aft of datum at 3240 lbs and under, then straight line variation to 110.6 in aft of datum at a weight of 3900 lbs.
Aft Limit: 117.5 in aft of datum at all weights. Datum reference: 129.37 in forward of the center of wing spar jacks.

MANEUVERS

This is a normal category airplane. Aerobatic maneuvers, including spins, are prohibited.
Maximum Slip Duration 30 seconds

LOAD FACTORS (3900 lbs)

Positive maneuvering load factors:

Flaps Up	3.8G
Flaps Down (DN)	2.0G

Negative Maneuvering load factor:

Flaps Up	~1.52G

KINDS OF OPERATION

Minimum Flight Crew	1 Pilot

1. VFR day and night
2. IFR day and night
3. FAR part 91 operations when all pertinent limitations and performance considerations are complied with

Warning: Flight into known icing conditions prohibited.

ENGINES

Two Avco Lycoming Engines are installed; one O-360-A1G6D (clockwise rotating) located on the left wing and one LO-360-A1G6D (counterclockwise rotating) located on the right wing. The engines are four-cylinder, direct drive, horizontally opposed, and each rated at 180 horsepower at 2700 rpm. The engines use a wet sump pressure type oil system with a maximum of 8 qts and a minimum of 5 qts.

The engine is equipped with a carburetor heat system which allows heated unfiltered air to enter the induction system to alleviate the possibility of induction ice. Cowl flaps are controlled by levers inside the cockpit; they allow the amount of engine cooling air to be controlled to maintain a desired cylinder head temperature. Engine ignition is provided through a dual engine driven magneto system which is independent of the electric system (if electrical power is lost, engine will continue to run).

Each engine is equipped with a fuel pressure gauge, oil pressure, oil temperature, cylinder head temperature, manifold pressure, rpm, and exhaust gas temperature.

Take-off and Maximum Continuous Power	Full Throttle, 2700rpm
Maximum Oil Temp	245 F
Maximum Cylinder Head Temp	500 F
Minimum Oil Pressure (idle)	25 psi
Minimum Oil Pressure	100 psi
Minimum Fuel Pressure	0.5 psi
Maximum Fuel Pressure	8.0 psi

Propellers
The airplane is equipped with two Hartzel 76 in, constant-speed, full feathering, two-blade propellers. Springs and dome air pressure, aided by counterweights, move the blades to the high pitch (feathered) position. Propeller rpm is controlled by the engine-driven propeller governor which regulates oil pressure in the hub. The propeller controls, on the control console, allow the pilot to select the governor's rpm range. Springs and dome air pressure, aided by counterweights, move the blades to high pitch. Engine oil under governor-boosted pressure moves the blades to the high rpm position.

Constant Speed- is the ability to vary propeller pitch to maintain a constant engine rpm. When the propeller control is moved forward, positive oil pressure, regulated by a propeller governor, drives a piston, which rotates the blades to a low pitch high RPM (unfeathered) position. When the propeller control is moved aft, oil pressure is reduced by the propeller governor. After an rpm is selected, the prop governor will automatically adjust oil pressure inside the propeller hub. This results in a constant propeller rpm regardless of flight attitude or manifold pressure setting.

Feathering- is when the propeller blades are in alignment with relative wind. Feathering reduces the amount of drag produced by the propeller windmilling by reducing its exposed area to the relative wind. This is accomplished by moving the propeller control to the low rpm (feather) position.

The propellers should be cycled occasionally during cold weather operations. This will maintain warm oil inside the propeller hubs.

If oil pressure is lost when the engine is operating above 950rpm's (it will be in any phase of normal flight) then the propeller will automatically go into the feather position.

Fuel
The BE76 Duchess uses aviation gasoline, grade 100 (green) or grade 100LL (blue). The fuel system is an "ON-CROSSFEED-OFF" arrangement and controlled by the fuel selectors located on the lower center floor panel. Total capacity is 51.5 gallons per wing tank with 50 gallons is unusable in each tank. Each wing fuel tank has a visual measuring tab with markings for 30 (28.5 useable), 40 (38.5 useable) and full at tank top.

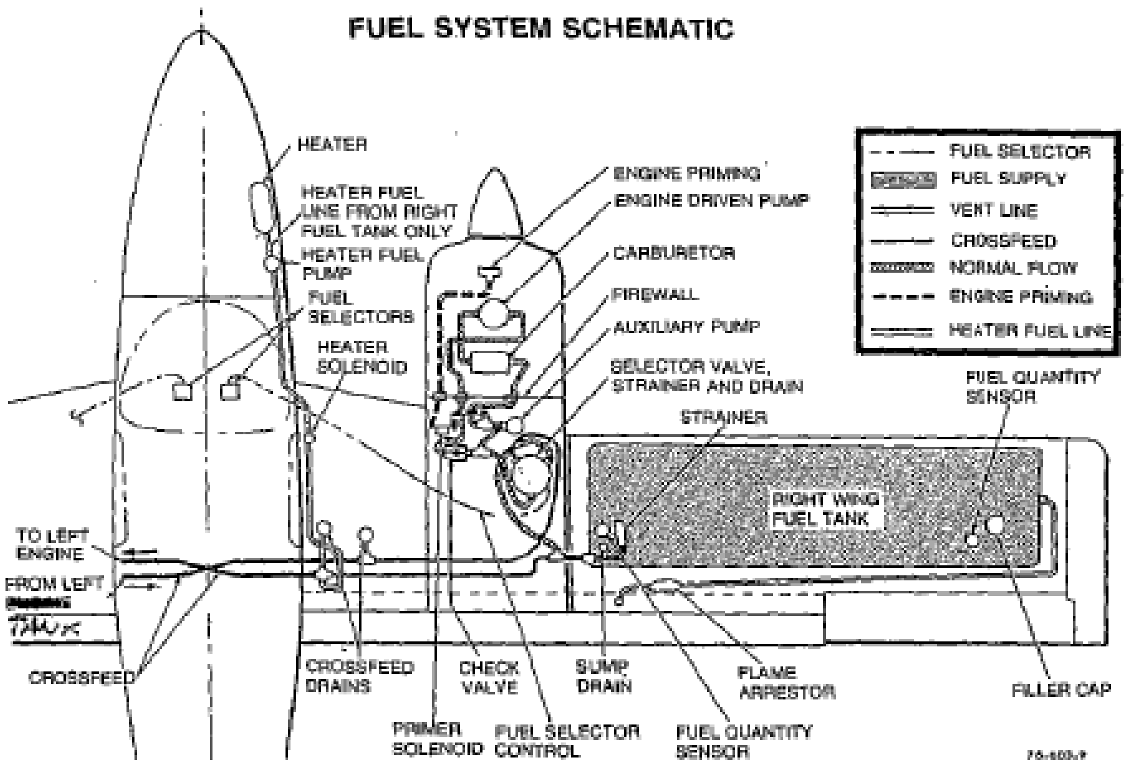
There are two engine-driven and two electrically driven auxiliary fuel pumps. The electric fuel pumps are used for engine start, takeoff, landing, and fuel selector changes. The fuel selector remains in the on position during normal operations, with each tank feeding its respective engine. Engine priming is accomplished by using the "PUSH TO PRIME" switch in accordance to normal procedures.

Fuel cannot be transferred from tank to tank; however, either tank may feed both engines in crossfeed mode. The cabin heater, located in the nose compartment uses approximately 2/3 gallon per hour from the right fuel system only.

The fuel crossfeed system is to be used during emergency conditions in straight flight only.

A min of 9 gal of fuel must be present in each wing tank prior to flight.

Total Capacity	103
Total Usable	100



FLIGHT CONTROLS

The control surfaces are bearing supported and operated through the conventional cable assembly using push-rods and bell cranks.

TRIM CONTROL

Aircraft trim is accomplished using either the manual or electric pitch trim system. An emergency disconnect button will disengage the trim motor when depressed allowing time to turn off the trim circuit breaker. The aileron trim is located in the lower center console; this is used to displace the ailerons for trimming through cable tension only.

FLAPS

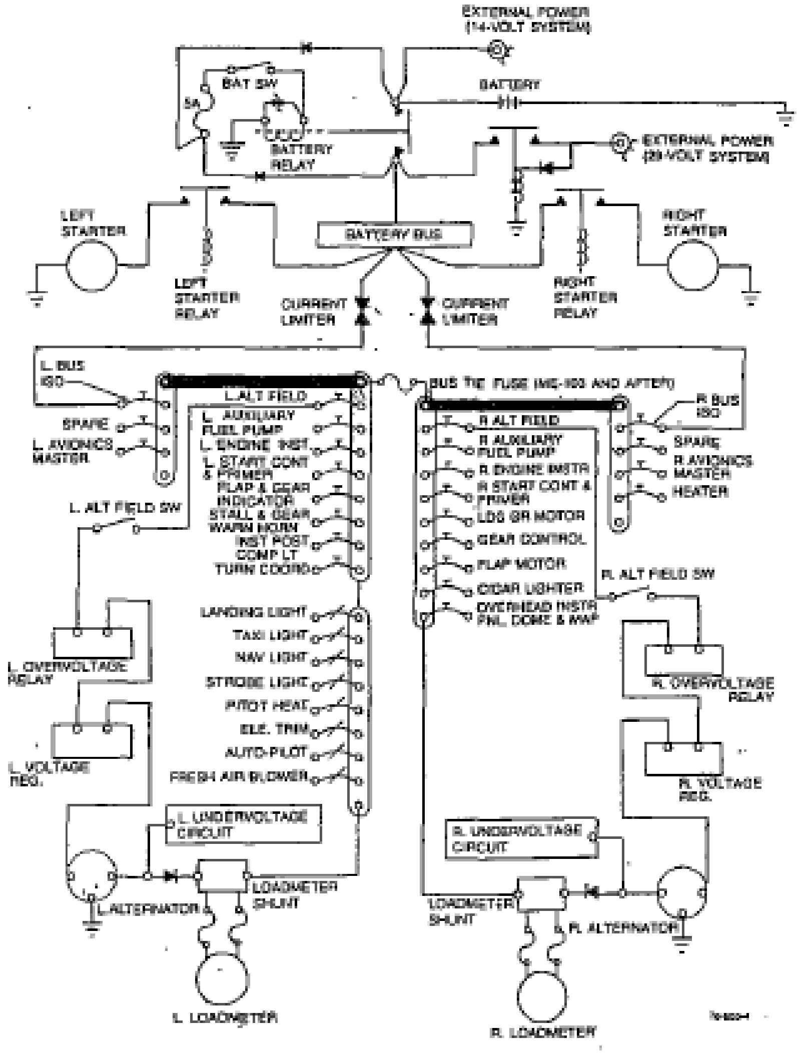
Wing flaps are operated by a three position switch with the UP, DOWN, and OFF position. The switch must be pulled out of detent in order to change position. There is an indicator gauge with UP, 10, 20, and DOWN (35). (Note: it takes 3 seconds for flaps to move from UP to 10 position, 1 second from 10 to 20, and 1 second from 20 to 35 respectively)

When flaps are positioned below 16 degrees the landing gear horn will sound if the gear is not down and locked (regardless of throttle position).

ELECTRICAL SYSTEM

Certified Flyers' BE76 Duchess is equipped with a 12-volt, 35 ampere-hour lead-acid battery installed in a battery box in the aft fuselage compartment. Two 60 ampere, 14-volt, belt-driven alternators provide charging. The output of each alternator is controlled by a separate voltage regulator. The alternator systems are completely separate, except for the BUS TIE FUSE, the mutual tie to the battery bus through two bus isolation circuit breakers, and the paralleling circuit between regulators. The aircraft uses a split bus system with each alternator powering its respective bus. The battery is used for engine start and emergency power. Overvoltage protection is provided.

There are two loadmeters, alternator out annunciators, and under/overvoltage annunciators. The alternator out annunciatior light and zero indication on the ammeter indicate an alternator failure. If one alternator fails the other alternator will provide adequate electrical power.



POWER DISTRIBUTION SCHEMATIC

LANDING GEAR

The Duchess is equipped with a tricycle gear, hydraulically actuated, fully retractable landing gear. Hydraulic pressure is provided by an electrically driven reversible hydraulic pump. There are two circuit breakers: one for the hydraulic pump, one for the control circuit. The gear is held up using hydraulic pressure and remains locked in the down position using over-center brace and spring. There is a time delay which will disengage the hydraulic pump after 30 seconds of continuous operation.

The aircraft is equipped with a gear warning system which will activate under the following conditions:

1. Gear is not in the down and locked position below apx. 16" of MP on either engine
2. Gear is not in the down and locked position with flaps extended below 16 degrees
3. Gear handle is in the up position on the ground

Gear retraction on the ground is prevented by the ground pressure safety switch located in the pitot system to deactivate the pump circuit when airspeed is below 59-63 KIAS.
(It should be noted that gear warning systems are no replacement for proper checklist usage and should not be relied on to prevent an inadvertent gear up.)
The gear system is equipped with a hydraulic bypass valve for manual gear extension in the event of an emergency. The valve is located beneath the floor panel in front of the pilot, by rotating 90 degrees hydraulic pressure is released and the gear is lowered manually. This can only be accomplished below 100 KIAS and the emergency checklist should be followed. In the event that hydraulic pressure is lost with gear retracted, gear will free fall to the down position.

ENVIRONMENTAL
The BE76 Duchess is equipped with a 45,000 btu Janitrol gas heater located on the right side in the nose compartment. This provides heated air for cabin warming and windshield defrosting. Fuel consumption of the heater is approximately 2/3 gal per hour from the right fuel tank and should be considered during flight planning. Operation of the heater is controlled by a three position switch on the pilots subpanel labeled "HEATER-ON, BLOWER ONLY, OFF." The "BLOWER ONLY" position is only for ground operations. Another switch labeled "CABIN AIR- PULL OFF" controls the amount of air entering the cabin from the heater. Pulling the knob more than half closed will deactivate the heater in order to prevent overtemp. The push-pull knob labeled "CABIN TEMP- PULL TO INCREASE" controls the temperature of air entering the cabin.

BRAKES
The Duchess has hydraulically actuated disk brakes on the main landing gear. The hydraulic system for the brakes is independent from the landing gear. The brakes are actuated by depressing the top of each respective rudder peddle. To set the parking brake, pressure must be applied to the top of the rudder pedal. The brake reservoir is located on the left side of the nose compartment.

PITOT-STATIC
The pitot tube is located on the left wing. There are two static ports on each side of the aft fuselage. There is an alternate static source located inside of the cockpit. The pitot tube is also equipped with a pitot heat system. The pitot-static system provides air pressure used for indications on the airspeed indicator, vertical speed indicator, and altimeter.

VACUUM SYSTEM

The Duchess is equipped with two engine-driven, dry, pressure pumps interconnected to form a single system. If either pump fails, check valves will automatically close and the remaining pump will continue to operate all gyro instruments. A pressure gauge is located on the pilot's subpanel and a no gyro annunciator light indicates loss of a pressure pump. The operational limits are 4.8-5.2 in of mercury.

Section 3:

Normal Flight Procedures

Certified Flyers BE76 Duchess operating guidelines should be studied in addition to the aircraft POH, they are intended to be used ***in addition to*** *the appropriate checklist.*

PASSENGER BRIEFING

1. Safety belt/harness usage
2. Cockpit door operation
3. Emergency exit operation
4. Fire extinguisher location/usage
5. No smoking
6. PIC authority/ training/ checkride

PRE-START

1. Verify gear extension tool is available, seatbelts, doors secure, avionics off, circuit breakers in, verify gear selector in down position
2. Exercise fuel selector valves for proper operation
3. Verify cowl-flaps open, carb heat off, electrical switches off, battery/alternator master switches on
4. Verify gear position lights and under voltage lights illuminated
5. Proceed with engine start, taxi, and run-up checklist

TAXI

1. Mixture should be leaned for ground operations, minimal power should be used for taxi, avoid use of excessive breaking
2. Use of differential power while the aircraft is at full stop will impose unnecessary side loads on the nose gear assembly and should be avoided

PRE-TAKEOFF BRIEFING

Engine Failure Action

- If an engine failure or fire occurs prior to rotation, I will abort. If not enough runway to stop turn master switch off, fuel selectors off, avoid obstacles, and evacuate aircraft.
- If an engine fails after rotation with the **gear down** and usable runway remaining, I will close throttles, land, and stop. *Think, "Stop, stop, stop."*
- If an engine failure occurs after rotation with the **gear up,** I will perform the IN FLIGHT ENGINE FAILURE CHECKLIST:
    1. Airspeed- Blueline
    2. Mixtures, props, throttles—full forward
    3. Flaps up
    4. Gear up

5. Identify "Dead Foot, Dead Engine"
6. Verify by closing throttle
7. Feather Prop
8. Mixture to cutoff

- I will evaluate aircraft performance, execute an emergency, make appropriate radio calls, and land on any suitable runway.

Departure Information

- I will make a ______ takeoff, have ______ amount of useable runway, and my initial heading is ______ and altitude is ______. (Brief instrument departure if applicable)

TAKE-OFF

1. Brief appropriate take-off checklist
2. Before take-off flow check (BLTTFFCC or "bacon, lettuce, tomato, french fries, cherry coke"):

1	Boost	On
2	Landing Light	On
3	Transponder	Set to appropriate code
4	Time	Start/Note
5	Fuel	Mixture set/ On both tanks
6	Flaps	Up
7	Cowl Flaps	Open
8	Carb Heat	Off

3. All available runway should be used for take-off, hold the breaks until approximately 75% power is achieved
4. Check engine gauges for normal operation before break release before break release to identify possible engine failure before take-off run has started
5. Positive rate of climb, end of usable runway, Gear-- UP

CLIMB

1. Reduce power to 25" MP, 2500 RPM at 600' AGL
2. Climb at 85 KAIS/Blueline (Vy) until 1000' AGL
3. Climb at 100 KAIS after passing through 1000' AGL (provides better visibility and engine cooling)
4. Perform Climb Check at 1000' AGL
   - Throughout climb monitor the engine gauges for any unusual indications.

CRUISE

- Refer to pilot operating handbook for appropriate power settings, complete cruise checklist

- Recommended cruise power setting is 24” MP, 2300rpm.

DESCENT

- Plan your descent well in advanced to avoid extended flights at power settings below 20” (plan 5 miles for every 1000’ to be lost for en route descent)
- Verify cowl flaps are closed, complete descent checklist, and monitor engine gauges for safe engine temperatures

TRAFFIC PATTERN ENTRY AND NORMAL LANDINGS

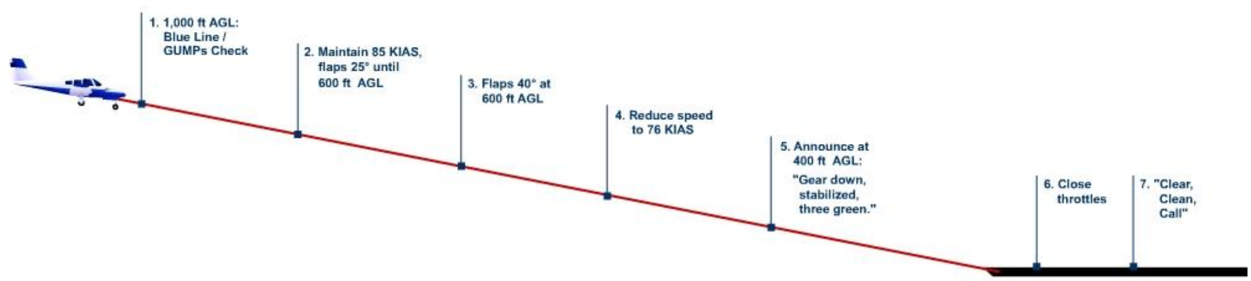
1. Brief before landing and landing checklist before entering the traffic pattern
2. Enter the pattern at or below 120 KIAS, apx 17” MP, 2300 PRM
3. Downwind abeam midfield extend gear and verify 3 green (no red), check visually
4. Downwind abeam landing aim point reduce power to apx 15”, extend flaps 10, pitch for 100 KIAS (begin descent apx 500 fpm)
5. GUMPS check
    - Gas (fuel selectors full forward, aux pumps on), Undercarriage (Verify gear down, 3 green and visual check), Mixture Full Rich, Prop (High RPM; Must be below **100** KAIS), Seat Belts
    - *The GUMPS check is a backup before landing checklist and must be demonstrated to insure pilots are familiar with its use when flying light complex aircraft*
6. Turn base, extend flaps 20, pitch for 90kts, GUMPS check
7. Turn final, extend full flaps, GUMPS check, maintain **85** KIAS (blue line) until short final—maintain constant power, airspeed, and angle of attack
    - Announce **“Blueline”/ “GUMPS”**
    - At 400’ AGL announce **“Gear Down, Stabilized”**; if not stabilized at any point, commence go-around before descending further
8. Reduce power gradually as you cross the threshold at your reference speed and power to idle as you begin landing flare

AFTER LANDING

1. “3 C’s: Clear, Clean, Call”
    a. Clear the runway—tail passed stop and hold short line
    b. Clean—flaps up, strobes off, landing light off, transponder SBY
    c. Call—ground control or announce clear on CTAF
2. Complete after landing checklist

SHORT FIELD VISUAL APPROACH AND LANDING

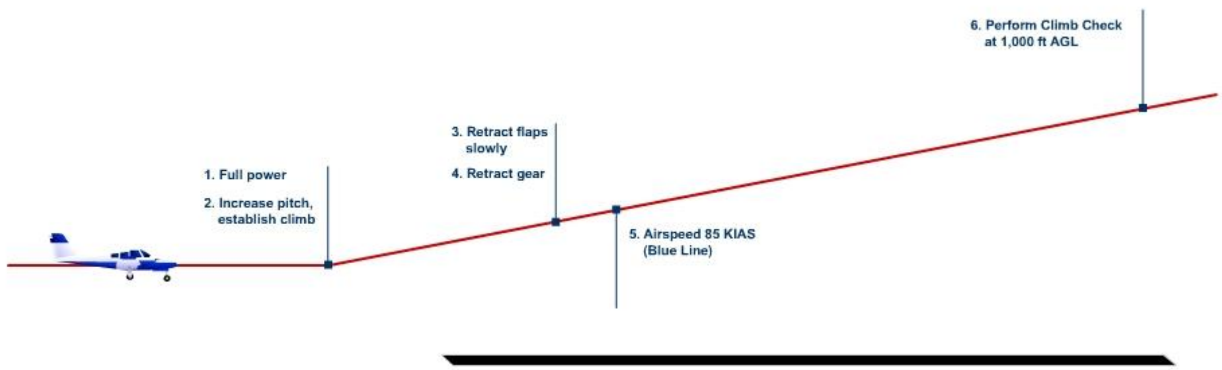
1. Brief before landing and short-field landing checklist before entering the traffic pattern
2. Enter the pattern at or below 120 KIAS
3. Downwind abeam midfield extend gear and verify 3 green (no red), check visually
4. Downwind abeam landing aim point reduce power to apx 15”, extend flaps 10, pitch for 100 KIAS (begin descent apx 500 fpm)
5. GUMPS check (Must be below **100** KIAS before moving props to high RPM)
6. Turn base, extend flaps 20, pitch for 90kts, GUMPS check
7. Turn final, extend full flaps, GUMPS check, maintain **85** KIAS (blue line)
    - Announce:**“Blueline”/ “GUMPS”**
    - At 400’ AGL announce: **“Gear Down, Stabilized”**; if not stabilized at any point, commence go-around before descending further
8. When stabilized on final, reduce airspeed to 76 KIAS—maintain constant power, airspeed, and angle of attack
9. Close throttles slowly in the flare-- touchdown with little or no floating
10. Maintain back pressure on control wheel to prevent slamming the nose wheel onto the runway
11. Retract flaps after touchdown
12. Simulate (on longer runway) by announcing max breaking for training purposes



GO-AROUND/ MISSED APPROACH

“Climb, Clean, and Stabilize”

1. **Smoothly** add full power
2. Increase pitch to establish climb/ stop descent
3. Flaps — UP incrementally
4. Gear-- UP when positive rate of climb is established
5. Climb at **85** KAIS until 1000’ AGL
    - Announce: **“Blueline”**
6. Cowl Flaps— Open
7. 6 T’s (missed approach) or Report Go-around
8. Perform Climb Check at 1000’ AGL for Missed Approach
9. Comply with ATC instructions/ Fly published missed/ Fly traffic pattern as appropriate



INSTRUMENT APPROACHES

The approach speed for the BE76 Duchess is 100 KAIS, this allows for better synchronization with other aircraft in the ATC system. Therefore, speed must be reduced between the DA/MDA before touchdown while "crossing the fence" whether flaps are used or not. Note, with a 100 KIAS approach speed, the BE76 fits into category B approach minimums (91-120 KIAS).

PRECISION APPROACH

1. En-route: Approach should be fully briefed/ NAV aids set/checked/ Instruments checked
2. Slow to 120 KIAS (18" MP) within apx. 3 mins from initial approach fix/ or while given vectors to approach
3. HSI Set and Checked
4. Before Landing Checklist
5. Within 2 miles from final approach
   1. Throttle-- 17" MP
   2. Flaps—10 (2 engines), **Flaps remain up on single engine approach**
   3. Maintain 100 KIAS, Trim
   4. GUMPS check
   5. Re-Brief approach mins and missed approach
6. Gear should be extended when within 1 dot from glideslope
   1. Verify gear down, 3 green, no red, check visually
7. At FAF
   1. 6 T's
   2. Announce: **"Gear Down, Before Landing Checklist Complete"**
   3. Descent 5-600 fpm using apx 15" MP
8. At 400' AGL, Announce: **"Gear Down, Stabilized"**
9. Announce 100' above minimums: **"100 to go"**
10. Decision Altitude, Announce: **"Minimum"**
11. Flaps—Full (2 engines), **No Flaps on single engine approach/landing**
12. Airspeed 85 (blueline) until landing is assured

13. Follow glideslope down to runway
14. Reduce power smoothly when landing is assured

NON-PRECISION APPROACH

1. En-route: Approach should be fully briefed/ NAV aids set/checked/ Instruments checked
2. Slow to 120 KIAS (18” MP) within apx. 3 mins from initial approach fix/ or while given vectors to approach
3. HSI Set and Checked
4. Before Landing Checklist
5. Within 2 miles from final approach
    1. Throttle-- 17” MP
    2. Flaps—10 (2 engines), **Flaps remain up on single engine approach**
    3. Maintain 100 KIAS, Trim
    4. GUMPS check
    5. Gear—Down, verify 3 green, no red, check visually
    6. Re-Brief approach mins and missed approach
6. FAF
    1. 6 T’s
    2. Announce: **“Gear Down, Before Landing Checklist Complete”**
    3. Descend apex 700 fpm when established, 13” MP, maintain 100 KIAS
7. Announce 100’ from MDA: **“100 to go”**
8. MDA
    1. Announce: **“Minimum”**
    2. Final GUMPS check
    3. Level off at MDA using apx 20” MP
9. Runway in sight, Announce: **“Gear Down, Stabilized”** before descending below MDA
10. Flaps—Full (2 engines), **No Flaps on single engine approach/landing**
11. Airspeed 85 (blueline) until landing is assured
12. Continue stabilize approach to runway (no more than 600 fpm descent)
13. Reduce power smoothly when landing is assured

CIRCLING APPROACH

Before reaching FAF brief plan for circling approach:

- From MDA circle ____ (left/right) for RWY ____. Remain within 1.5 nm from RWY. If lose visual of RWY execute missed approach. (turn to parallel approach course and execute published missed)

Continuing from Precision or Non-precision approach

1. Announce 100' from MDA: **"100 to go"**
2. MDA
    1. Announce: **"Minimum"**
    2. GUMPS check
    3. Level off at MDA using apx 20" MP, 100 KIAS (flaps 0°) or 90 KIAS (flaps 10°)
3. Commence circling approach procedures, maintain airspeed and stay within 1.5 nm from runway (category B minimums)
4. While turning base still above MDA
    1. Flaps—20 (2 engines), **No Flaps on single engine approach/landing**, Final GUMPS check
5. When abeam announce: **"Landing, leaving MDA"** before descending below MDA (must be able to make a stabilized approach to land on base or final before descending below MDA)
6. On final announce: **"Gear down, Stabilized"**
7. Flaps—Full (2 engines), **No Flaps on single engine approach/landing**
8. Slow to 85 KIAS (blue line)
9. Continue stabilized approach to runway (no more than 600 fpm descent)
10. Land at 85 KIAS

HOLDING

1. Slow to 100 KIAS holding speed 3 minutes to fix
2. Acquire EFC
3. Hold at 100 KIAS, apx 17" MP, established in hold when passing holding fix, 6 T's
4. Report altitude and time at holding fix

Section 4:

Emergency Procedures

*These are emergency **memory/review items only**, they do not encompass all the emergency procedures listed in the POH. In any emergency or abnormal condition the POH should be consulted.*

MEMORIZE!

IN-FLIGHT ENGINE FAILURE

1	Airspeed	Blue Line
2	Mixtures	Full FWD
3	Props	Full FWD
4	Throttles	Full FWD
5	Flaps	UP
6	Gear	UP
7	Identify	Dead Foot
8	Verify/ Throttle	Close (Slowly)
9	Troubleshoot *"Fix or Feather"*	If Alt Permits
10	Prop (bad engine)	Feather
11	Mixture (bad engine)	Cut Off
12	Emergency Checklist	Applicable
13	Declare	Emergency

Troubleshoot "Fix or Feather"

A) The Force – 4 Red
1. **Fuel Selector ON**
2. **Carb Heat ON**
3. **Fuel Mixture FORWARD**
4. **Fuel Pump ON**

B) The Source
1. **Magnetos BOTH**
2. **If oil on cowling or fire, NO restart**
3. **Limit restart to two attempts**

C) The Course – Do I Crossfeed?
1. **Yes if fuel imbalance > 10 gal**

D) Go to step 10 (Feather bad engine)

After going through the *in-flight engine failure flow*, a decision will be made to try to fix the dead engine or to immediately feather. (Hence, "fix or feather.") If an engine is lost below 1000ft AGL feather the prop on the dead engine. If an engine is lost above 1000ft AGL and there is sufficient time/ground clearance, "fix" and troubleshoot the dead engine. The zero sideslip condition should be established. (Hence, "raise the dead.") After going through the engine failure memory items always remember to consult the appropriate emergency checklist and declare an emergency.

REVIEW

ENGINE TROUBLESHOOT "FIX"

1	Trim	As Req
2	Fuel Selector	On
3	Throttle	Open 1/4"
4	Fuel Pumps	On
5	Primer	Check
6	Carb Heat	On
7	Mixture	Adjust
8	Magnetos	Check
9	Fuel Quantity	Check
10	Fuel Pressure	Check
11	Oil Pres/Temp	Check
12	Cowl Flaps	As Req

ENGINE FAILURE SECURE "Feather"

1	Trim	As Req
2	Magneto(inop eng)	Off
3	Fuel Pump(inop eng)	Off
4	Alternator(inop eng)	Off
5	Fuel Selector(inop eng)	Off
6	Cowl Flap(inop eng)	Closed
7	Fresh Air Fan	Off
8	Landing Light	Off

AIRSTART (continuing from engine troubleshoot checklist)

1	Fuel Selector	On
2	Throttle	1/4"
3	Aux Pump	On
4	Magnetos	Both
5	Prop	Move Forward
	Until engine windmills, then back to midrange, use starter momentarily if airspeed is below 100 KIAS.	
6	Mixture	
7	If engine fails to run, clear engine by allowing it to windmill with mixture in the FULL LEAN position. When engine starts, advance mixture to FULL RICH.	
8	When engine starts-- Adjust throttle, Propeller, and Mixture Controls	
9	Aux Pump	Off
10	Alt Switch	On
11	Oil Pres/Temp	Check
12	Warm Up engine	Apx 2000rpm, 15"
13	Power/Trim	Set
14	Cowl Flaps	Adjust

MANUAL GEAR EXTENSION

Pilots operating handbook should be referenced.

1	Nav Lights	Off
2	Circuit Breakers	Check
3	Ammeters	Check
4	Master Switch	On
5	Manual Extend	
a	Airspeed	100 KIAS
b	Gear Selector	Down
c	Emergency Extension Valve	Turn (open)
d	Indicator Lights	Green
e	Emergency Extension Valve	Leave Open

SPIN RECOVERY

1	Throttles	Close
2	Rudder	Opposite of Spin
3	Controls	Release Back Pres
4	Controls	Full Forward
5	Ailerons	Neutral
6	Rudder	Neutral

7	Recover-- Smooth Control Input	

DOOR OPEN IN FLIGHT

1	Airspeed	85 KIAS
2	Cabin Vents	Closed
3	Storm Window	Open
4	Upper Latch Open	Latch
5	Side Latch Open	Latch

EMERGENCY DESCENT

1	Throttles	Closed
2	Props	Full Forward
3	Mixtures	Rich
4	Gear	Down 140 KIAS
5	Descend and Turn	As Req

ALTERNATOR LIGHT ILLUMINATES

1	Ammeters	Check
	Zero output both alternators	
2	Reduce Electrical Load	As Req
3	Both Alternator Switches	Off
4	Circuit Breakers	Check
5	Each Alt Switch	On (1 at a time)
	Check ammeter with least output on	
6	Other Alternator	Off
7	Electrical Load (60 amps)	As Req

PROP OVERSPEED

1	Throttle	Retard
2	Oil Pressure	Check
3	Prop Control	Decrease to Detent
4	Airspeed	Reduce
5	Throttle (below 2700rpm)	As req
6	Engine Shutdown	If Necessary

Section 5:

Multi-Engine In-flight Maneuver Flow Checklists

Through study and practice, flow checks should be performed from memory. Refer to PTS for completion standards for in-flight maneuvers.

CLEARANCE TURNS FOR IN-FLIGHT MANEUVERS

Scan area visually for traffic and begin set-up for in-flight maneuver.

1	Maintain Altitude
2	Perform 90 clearing turn to right or left
3	Reduce power to 15" MP
4	Perform 90 clearing turn to original heading while performing GUMPS check and initial items in respective maneuver flow check

STEEP TURNS

For ATP bank is 45 degrees, for Commercial 50 degrees.

1	Breakers	Visually Checked
2	Trim	Set
3	Fuel Selectors	Both On
4	Cowl Flaps	Both Half
5	Carb Heat	Both Off
6	Throttles	18" MP
7	Props	2300 RPM
8	Landing Gear	Up
9	Aux Pumps	Both On
10	Mags/Masters	Both/ On
11	Flaps	0
12	Mixture	Both Full Rich
13	Throttles	As Req to Maintain 120 KIAS

SLOW FLIGHT

1	Breakers	Visually Checked
2	Trim	Set
3	Fuel Selectors	Both On
4	Cowl Flaps	Both Open
5	Crab Heat	Both Off
6	Throttles	15" MP
7	Landing Gear	Down Below **140** KIAS
8	Aux Pumps	Both On
9	Mags/Masters	Both/On
10	Flaps	Down in 10 Increments
11	Mixture	Both Full Rich
12	Props	Both High RPM Below **100** KIAS
13	Throttles	As Req to Maintain 80 KIAS

POWER OFF STALL

For ATP, recover at first indication of impending stall (stall warning horn). For commercial, recover at first indication of aerodynamic buffeting.

1	Breakers	Visually Checked
2	Trim	Set
3	Fuel Selectors	Both On
4	Cowl Flaps	Both Closed
5	Carb Heat	Both Off
6	Throttles	15" MP
7	Landing Gear	Down Below **140** KIAS
8	Aux Pumps	Both On
9	Mags/Masters	Both/ On
10	Flaps	Full Down in 10 Increments
11	Mixture	Both Full Rich
12	Props	Both High Below **100** KIAS
13	Throttles	Both Idle
14	Yoke	Relax Back Pressure (recover)
15	Throttles	Slow Advance to 71 KIAS
16	Throttles	Both Full Power After 71 KIAS
17	Flaps	UP Incrementally
18	Gear	Up(after pos rate of climb)
19	Climb	**85** (Blueline)

POWER ON STALL

For ATP, recover at first indication of impending stall (stall warning horn). For commercial, recover at first indication of aerodynamic buffeting.

1	Breakers	Visually Checked
2	Trim	Set
3	Fuel Selector	Both Open
4	Cowl Flaps	Both Open
5	Carb Heat	Both Off
6	Throttles	12" MP
7	Landing Gear	Up
8	Aux Pumps	Both On
9	Mags/Masters	Both/On
10	Flaps	0
11	Mix	Both Full Rich
12	Props	Both High RPM Below **100** KIAS
13	Throttles	Hold Power Back Until ~75 KIAS
14	Yoke	Pitch Up (apx 12)
15	Throttles	21" MP
16	Yoke	Pitch Down at Buffet(recover)
17	Climb	**85** (blueline)

Vmc DEMONSTRATION

Not required for ATP.

1	Breakers	Visually Check
2	Trim	Set
3	Fuel Selectors	On
4	Cowl Flaps	Left Closed/Right Open
5	Carb Heat	Left On, Right Off
6	Throttles	Both 15" MP
7	Landing Gear	Up
8	Aux Pumps	On
9	Mags/Masters	Both/On
10	Flaps	Up
11	Mixtures	Both Rich
12	Props	Both High RPM Below **100** KIAS
13	Throttles	Left Idle, Right Full Forward
	While maintaining directional control using rudder pressure with a max 5 degrees of bank towards good engine	
14	Establish	85 KIAS
15	Right Hand on Good (right) Throttle	
16	Increase back pressure slowly about 1 kt per second	
17	At first sign of loss of directional control, good (right) throttle back to idle, simultaneously relax back pressure to a negative angle of attack	
18	As airplane recovers from Vmc, advance good (right) throttle half way until reaching 71 KIAS (Vsse), then full forward as you recover to a straight and level flight; remember to increase rudder pressure as throttle is advanced	

Appendix 1:
BE76 Duchess Quick Reference Checklists

Normal Checklist – Beechcraft Duchess 76

INITIAL
Weather & Den. Alt.
Weight & Balance
Performance Req.
Flight Plan – File
Papers – A.R.O.W.
Mags – Off
Mixtures – Full Lean
Control Lock
Cowl Flaps – Open
Gear Lever – Down
BATT – On
Gear Lights – Green
Pitot Heat – Test
Stall Vanes – Test
Lights – Int. / Ext.
Fuel Gauges – True
BATT – Off

EXTERIOR SUMMARY
After Geographical Check

Fuel Quantity
Fuel Quality
Caps / Drains / Vents
Engines / Oil / Belt
Props / Air Intakes
Exhaust Systems
Cowl Flaps
Surfaces & Controls
Pitot & Static Ports
Gear / Tires / Brakes
ELT – Armed
Antennas
Baggage Doors
Ties / Chocks
Final Walk Around

INTERIOR
Passenger Brief
Hobbs / Tach Time
Fuel Selectors-Test/On
Oxygen
Alternate Static

START
Seat Track/Back-Lock
Emer. Ext.Tool-Stow
Circuit Breakers
Avionics – Off
Autopilot – Off
Carb Heat – Off
Cowl Flaps – Open
Beacon – On
--- 1st Engine Start ---
Mixture–Rich
Prop – High RPM
Throttle – ¼ Open
Brakes – Set
Prop – Clear
BATT – On
ALT-out, Low Volt Lts *(Verify Illuminated)*
Fuel Pump – On
Mags – Start *(Push To Prime)*
Oil Pressure
ALT – On
#2 Engine – Start
Lights – As Req.
Mixture – As Req.

PRE-TAXI / TAXI
Seat Belts / Harness
Heat / Vent / Defrost
Avionics – On / Set
Transpond – STBY
ATIS / AWOS
Altimeter – Set
Taxi Light – As Req.
Brakes – Test
Fuel Pumps–Off/On *(Verify Eng.Driven Pumps)*
Attitude Indic.–Test
Turn Coord. – Test
H.I. / Compass – Test

RUN-UP
Brakes – Set
Fuel Selector – On
Elec.Trim / Autopilot
Trim – Takeoff
Flight Controls
Flaps – Check Operation
Instruments
Annunciator Lights
Mixture – Best Power
2200 RPM
Props – Cycle
Mags (R & L) – Test
Carb Heat – Test
1500 RPM
Feather – Test
Gyro Pressure
Amps / Volts
Oil Pressure / Temp
Alternators
Idle – Check Closed
Friction Lock

PRE-TAKEOFF
Flaps – 0°
Props – High RPM
Mixture – Best Power
Carb Heat- Off *Or As Req.*
Fuel Pumps – On
H.I. To Compass
Doors / Windows
Pitot Heat – As Req.
Landing Light – On
Strobes–On
Transp – Alt + Sqwk
Time – Note
Brakes – Release
Abort Plan - Ready!

TAKEOFF
Full Throttle
2700 RPM *(Max)*
Oil Pressure
Rotate * 71 *(82)*
Vxse - 85 *(98)*
Gear – Up

CLIMB
100 *(115)*
Full Throttle
Props – 2600 RPM
Mixture – As Req.
Fuel Pumps – Off
Cowl Flaps–As Req.
Instruments
Taxi / Land Light – Off
Flight Plan – Open

CRUISE
Throttle
Props
Mixture
Cowl Flaps
Instruments
H.I. To Compass
Oxygen

DESCENT
Power – As Req.
Mixture – Richen
Fuel Selector – On
Carb Heat – As Req.
Cowl Flaps – Close
ATIS / AWOS
Altimeter – Set
Defrost / Pitot Heat
Instruments
H.I. To Compass

PRE-LANDING
Landing Light – On
Carb Heat – As Req.
Autopilot – Off
Gas....On / Pumps–On
Undercarriage....Down
Mixture....Best Power
Props........High RPM
Flaps............As Req.
Seatbelts...& Harness

LANDING
Gear – Down
Flaps – 35° *Or As Req.*
Speed * 76 *(87)*

GO AROUND
Power – Full
Carb Heat – Off
Positive Rate Climb
Flaps – Up
Gear – Up
Cowl Flaps – Open

AFTER LANDING
Flaps – Up
Carb Heat – Off
Cowl Flaps – Open
Strobes – Off
Landing Light – Off
Taxi Light – As Req.
Pitot Heat – Off
Heater – Off
Trim – Takeoff
Transpond – STBY

SECURING
ELT – Verify Silent
Fuel Pumps – Off
Avionics – Off
Mixture – Full Lean
Mags – Off
BATT / ALT – Off
Lights – Off
Cowl Flaps – Closed
Hobbs / Tach Time
Control Lock
Chocks
Tie Downs
Pitot Cover
Baggage Doors
Cabin Doors

Close Flight Plan

* *Adjust Speed As Needed For Conditions*

Vr • Rotation Speed – 71 *(82)*	V_{S0} • Stall with flaps – 60 *(69)*	Va • Max Abrupt *(3000 lbs)* – 116 *(133)*	Vlr • Max Gear Retract – 112 *(129)*
Vx • Best Angle Climb – 71 *(82)*	Vs • Stall w/o flaps – 70 *(81)*	Va • Max Abrupt *(Full Gross)* – 132 *(152)*	Vlo/Vle • Max Gear Speeds - 140 *(161)*
Vxse • Best Angle 1 Eng.– 85 *(98)*	Vmca • Min. Ctrl. 1 Eng.– 65 *(75)*	Vno • Max Structural Cruise – 154 *(177)*	Vfe • 20° Flaps – 120 *(138)*
Vy • Best Rate Climb – 85 *(98)*	Best Glide *(3000 lbs)* – 83 *(95)*	Vne • Never Exceed – 194 *(223)*	Vfe • Full Flaps – 110 *(127)*
Vyse • Best Rate 1 Eng.– 85 *(98)*	Best Glide *(Full Gross)* – 95 *(109)*	Vsse • 1 Eng. Intentional – 71 *(82)*	X Wind • Max Demo'd – 25 *(29)*

	KNOTS *(MPH)*	FLAPS °	– NOTES –
DEPARTURE			
Rotation *	71 *(82)*	0	Do Not Takeoff With Fuel Quanity Indicators In The Yellow Band
Best Angle Climb	71 *(82)*	0	
Best Rate Climb	85 *(98)*	0	Cabin Heater Uses Fuel From Right Wing Tank Fuel System Only
CRUISE *(TAS -8,000')*			
Economy	127 *(146)*	0	18.0" Hg – 2100 RPM – 12.4 GPH
Normal	155 *(178)*	0	21.9" Hg – 2300 RPM – 18.4 GPH
Maximum	160 *(184)*	0	21.9" Hg – 2500 RPM – 19.6 GPH
ARRIVAL			
Approach	87 *(100)*	10 - 20	17" MP – *(Initially)*
Short Final *	76 *(87)*	35	High RPM

Emergency Checklist – Beechcraft Duchess 76

POWER LOSS DURING TAKEOFF

THROTTLES – CLOSE BOTH IMMEDIATELY
BRAKES – AS REQUIRED / STOP STRAIGHT AHEAD
* *IF INSUFFICIENT RUNWAY REMAINS FOR STOPPING*
  * FUEL SELECTORS – OFF
  * BATTERY / ALTERNATOR & MAGS – OFF

ONE ENGINE IMMEDIATELY AFTER TAKEOFF
(Also One Engine Go-Around – Avoid If Possible)

AIRSPEED – 80 KIAS *(92 MPH) (Min.)* Go Around Min.– 85 KIAS
GEAR / FLAPS – UP *(Quality Landing Area Ahead?)*
DIRECTIONAL CONTROL – MAINTAIN
IDENTIFY
VERIFY – CLOSE THROTTLE *(Inop. Engine)*
PROP – FEATHER *(Inop. Engine)* *(5° Bank & ½ Ball) to Good Engine*
ACCELERATE TO 85 KIAS *(98 MPH)*

ONE ENGINE IN FLIGHT

CONTROL AIRPLANE – MAINTAIN SAFE AIRSPEED 85 KIAS *(98 MPH)*
INOPERATIVE ENGINE – IDENTIFY
OPERATIVE ENGINE – ADJUST
THROTTLE – AS NEEDED TO MAINTAIN CONTROL

AIR START / UNFEATHERING
Fuel-On, Throttle ¼, Fuel Pump-On, Mags, [Mixture-Rich After Starter]
Prop: w/Accumulators- *Full Forward, When Start Reduce To Low RPM Then Advance Prop Slowly to High, Starter-Briefly <100 KTS;*
Prop: w/o Accumulators - *Forward Of Feathering Detent To Midrange, Start & Push To Prime, If No Start Clear Engine By Windmill w/Mixture Off, When Engine Fires-Mixture Rich, Adjust Throttle/ Prop/ Mixture, Fuel Pump-Off When Reliable Power, Alternator-On, Oil Pressure, Warm Engine 2000 RPM / 15"*
IF NO RESTART – SECURE DEAD ENGINE
Retard Throttle, Feather Prop, Mixture-Idle Cutoff, Fuel Pump Off, Fuel Off, Mag/Alt Off, Close Cowl Flap

---

COWL FLAP *(OPERATIVE ENGINE)* – AS REQUIRED
FUEL PUMP *(OPERATIVE ENGINE)* – AS REQUIRED

ONE ENGINE LANDING

SECURE INOP. ENGINE – MAINTAIN SAFE AIRSPEED
LOWER GEAR – WHEN FIELD ASSURED
FINAL APPROACH – 85 KIAS *(98 MPH)* *(Minimum)*
FULL FLAPS – WHEN COMMITTED TO LAND

BOTH ENGINES OUT / LANDING

AIRSPEED – 95 KIAS *(109 MPH)*
PROPS – FEATHER
MIXTURE – FULL LEAN / IDLE CUTOFF
FUEL SELECTORS – OFF
SQUAWK 7700
DECLARE EMERGENCY *(TWR, APP, Unicom, 121.5)*
SEATBELTS / HARNESS
GEAR – DOWN *(Up If Very Rough or Soft Terrain)*
FLAPS – AS NEEDED *(Full Flaps When Field Assured)*
BATTERY / ALTERNATOR / MAGS – OFF
UNLATCH DOORS / PROTECT BODY

ELECTRICAL FIRE IN FLIGHT

ALL ELECTRICAL DEVICES + BATT / ALT – OFF *(Mags On)*
CABIN HEAT & AIR – OFF
IF FIRE OUT, BATT/ALT ON ONLY IF CRITICAL
THEN ONE ELECTRICAL DEVICE AT A TIME *(Isolate Defective Equipment)*
RESET CIRCUIT BREAKER(S) ONLY IF CRITICAL

ENGINE FIRE IN FLIGHT

FUEL SELECTOR – OFF TO AFFECTED ENGINE
MIXTURE – FULL LEAN / IDLE CUTOFF
PROP – FEATHER
AUX FUEL PUMP – OFF
ALTERNATOR / MAGNETOS / START SWITCH – OFF
INCREASE AIRSPEED TO EXTINGUISH – 140 KIAS *(161)*, LAND ASAP

ENGINE FIRE DURING START

MIXTURE – FULL LEAN / IDLE CUTOFF
CONTINUE CRANKING ENGINE
FUEL SELECTORS – OFF
BATTERY / ALTERNATOR – OFF
SHUTDOWN OTHER ENGINE
EVACUATE / FIRE EXTINGUISHER

ICING

PITOT HEAT – ON
CARBURETOR HEAT / ALTERNATE STATIC SOURCE – AS NEEDED
CABIN HEAT & DEFROST – MAXIMUM
STRONGLY CONSIDER 180° TURN
ATTAIN HIGHER OR LOWER ALTITUDE
INCREASE ENGINE SPEED
FULL FLAPS NOT RECOMMENDED FOR LANDING
LAND FASTER AS NEEDED

MANUAL GEAR EXTENSION

REDUCE AIRSPEED BELOW – 100 KIAS *(115 MPH)*
PULL LANDING GEAR MOTOR CIRCUIT BREAKER
LOWER LANDING GEAR LEVER
OPEN EMERGENCY EXTENSION VALVE
EXTENSION WRENCH – TURN COUNTERCLOCKWISE
IF ELECTRICAL SYSTEM OK – VERIFY GEAR LIGHTS & HORN

OTHER

UNICOM: 122.7, 122.8, 122.95, 123.0, 123.05
MULTICOM: 122.9 *(CTAF)* 122.75, 122.85 *(Air To Air)*
FLIGHT WATCH: 122.0
RADIO OUT: CHECK CIRCUIT BREAKERS & VOLUME
RECYCLE ALTERNATOR SWITCH
If IFR & Still Out, Set Transponder At 7600.
(Suggested For VFR If In B, C, D Airspace.)

TOWER SIGNALS	ON GROUND	IN FLIGHT
Steady Green	Cleared For Takeoff	Cleared To Land
Flashing Green	Cleared To Taxi	Return For Landing
Steady Red	Stop	Yield & Continue Circling
Flashing Red	Taxi Clear of Landing Area	Airport Unsafe - Do Not Land
Flashing White	Return To Starting Point	N/A
Alternating Red & Green	Use Extreme Caution	Use Extreme Caution

* *Every Plane Has A Different Empty Weight And Useful Load*

Beechcraft Duchess 76 (Lycoming O-360-A1G6D, LO-360-A1GD / 180 HP)

* Empty Weight: ____ LBS *(Specific Plane Weight)*
* Max. Useful Load: ____ LBS *(Including Fuel @ 6 lbs/gal)*

Max. Bag Area: 200 LBS *(Included In Useful Load)*
Max. T.O. Weight 3900 LBS
Zero Fuel Weight 3500 LBS

Fuel Type: 100 LL *(Blue)* / 100 *(Green)*
Usable Fuel: 100 Gallons
Oil Capacity: 8 Quarts Per Engine
Electrical: 24-28 VOLT, 55 AMP (ME-183 & After)
12-14 VOLT, 60 AMP (ME-1Thru ME-182)
Tire Pressure: Nose - 38 PSI / Main - 38 PSI

Appendix 2: Instrument Approach Briefing "5 Phases"

Transition	**Initial**
6 T's Course and Altitude Straight In or Full Approach **W**eather **I**nstruments **R**adios and Nav **E**verything Else -Review Approach -How low? -How long? -Which way?	6 T's Course and Altitude Slow to Approach Speed
Intermediate 6 T's Course and Altitude Before Landing Checklist Gear Down (2-3 Miles from FAF) Approach Flaps (2-3 Miles from FAF)	**Final** 6 T's Power Fly the Approach G.U.M.P.S. Check
Missed Autopilot Off Climb Clean Stabilize 6 T's -or- Power Attitude Drag	**6 T's** Turn Time Twist Throttle Talk Track