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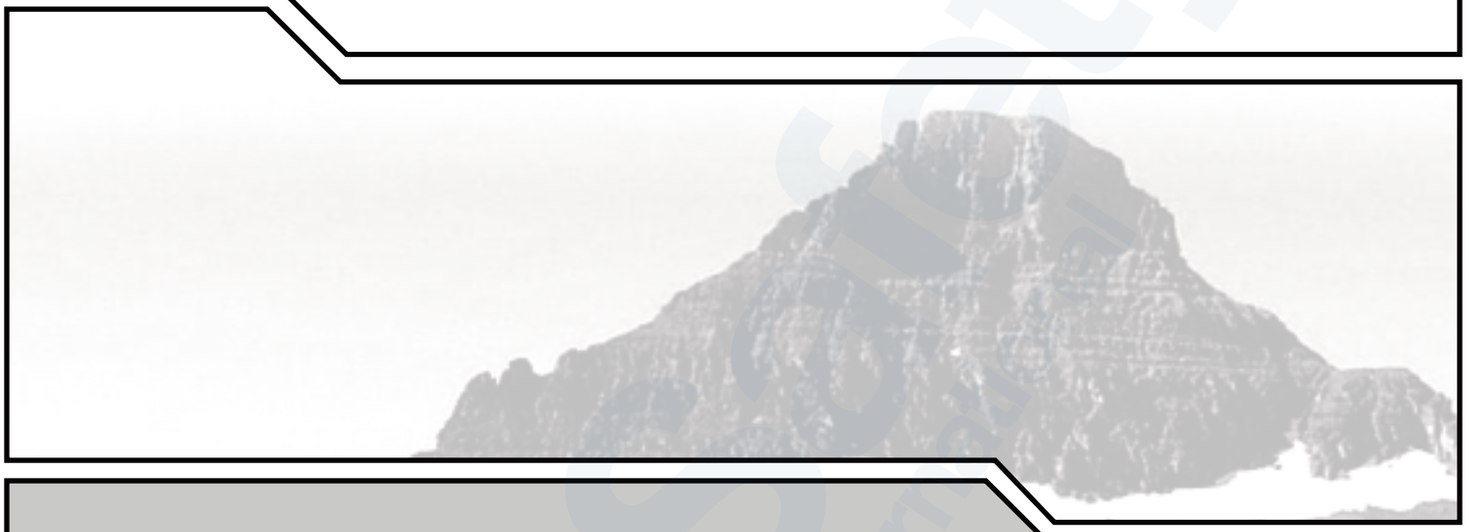
international



TWIN OTTER DHC-6

Client Guide

Courses for the Twin Otter aircraft are taught at the following FlightSafety learning center:

Toronto Learning Center
95 Garratt Boulevard
Downsview, Ontario
Canada, M3K 2A5
Phone: (416) 638-9313
Toll-Free: (877) 359-3274
Fax: (416) 683-3348

Twin Otter DHC-6 Client Guide List of Effective Pages

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1 – 3	July 18, 2006	5 – 16	October 4, 2010
1 – 4	July 18, 2006	5 – 17	October 4, 2010
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5 – 3	October 4, 2010	5 – 42	October 4, 2010
5 – 4	October 4, 2010	5 – 43	October 4, 2010
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Groundschool Worksheet

Weight Limitations

WEIGHTS

- Maximum Take-off Weight: _____ lb (_____ kg).
- Maximum Landing Weight: _____ lb (_____ kg).

BAGGAGE AND FREIGHT LOAD

Maximum permissible baggage compartment loads:

- Forward baggage compartment: _____ lb (_____ kg).
- Aft baggage compartment: _____ lb (_____ kg).
- Shelf: _____ lb (_____ kg).

Maximum floor loading:

- Cabin: _____ lb/sq ft (_____ kg/sq meter).
- Forward baggage compt: _____ lb/sq ft (_____ kg/sq meter).
- Aft baggage compt: _____ lb/sq ft (_____ kg/sq meter).

Center of Gravity Limitations

PHASE OF FLIGHT	FORWARD LIMIT	AFT LIMIT
Take-off	_____ in. (_____ m) aft datum (20% M.A.C.) at 11,600 lb (5266 kg)	_____ in. (_____ m) aft of datum (36% M.A.C.) at all weights
	_____ in. (_____ m) aft datum (20% M.A.C.) at 12,500 lb (5675 kg)	
Landing	_____ in. (_____ m) aft datum (20% M.A.C.) at 11,000 lb (4994 kg)	_____ in. (_____ m) aft of datum (36% M.A.C.) at all weights
	_____ in. (_____ m) aft datum (20% M.A.C.) at 12,300 lb (5585 kg)	

MEAN AERODYNAMIC CHORD

The Mean Aerodynamic Chord is 78.0 inches (1.921 meters) in length. Its leading edge is _____ inches (____ meters) aft of the center of gravity datum, and its trailing edge is _____ inches (____ meters) aft of the center of gravity datum.

Powerplant Limitations

ENGINES

- Manufacturer: _____
- Model: _____
- Fuel Specifications: _____
- Approved Engine Oils: _____

OPERATING CONDITIONS	OPERATING LIMITS						
POWER SETTING	SHP	TOURQE PSI	MAXIMUM OBSERVED ITT° C	N_g % RPM	N_P% RPM	OIL PRESSURE PSI	OIL TEMPERATURE °C
TAKE-OFF MAX CONT							
MAX CLIMB MAX CRUISE							
IDLE							
STARTING			(1)				
ACCELERATION		(1)	(1)				
MAX REVERSE							

Chart Reference:

(1) These values are time limited to ____ seconds

(2) Reverse thrust operation is limited to ____ minute maximum and is restricted to _____ use only.

When ground-running engines (except during maneuvering or taxing) in ambient temperatures of ____ ºC (____ºF) and above, the aircraft must be headed into wind and operation in other than forward thrust must be kept to a minimum and in no case exceed _____ minute. At temperature below 32 ºC, ground operation in reverse thrust with aircraft headed into wind is limited to ____ minute. These restrictions must be observed in order to prevent overheat damage to the internal nacelle and upper wing skin.

PROPELLERS

- Manufacturer: _____
- Model: _____
- Diameter: _____
- Pitch Settings: _____
  _____
  _____
  _____

Torque Pressure Indicator:
- Maximum (red radial) _____
- Normal (green arc) _____
- Acceleration (unmarked) _____

Turbine Temperature Indicator:
- Red segment _____
- Caution (yellow arc) _____
- Normal (green arc) _____
- Starting (white radial) _____

Propeller Tachometer:
- Maximum (red radial) _____
- Normal (green arc) _____

Gas Generator Tachometer:
- Maximum (red radial) _____
- Normal (green arc) _____

Oil Temperature Indicator:
- Maximum (red radial) _____
- Normal (green arc) _____
- Caution (yellow arc) _____

Oil Pressure Indicator:
- Maximum (red radial) _____
- Normal (green arc) _____
- Caution (yellow arc) _____
- Minimum (red radial) _____

Air Speed Limitations

SPEED		FLAP SETTING	KIAS
V_{mc}		Flaps 10º	
V_x		Flaps 0º	
V_y		Flaps 0º	
V_{yse}		Flaps 10º	
V_{fe}		0º - 10º	
V_{fe}		10º - Full	
V_{MO}	Sea Level to 6,700’		
	10,000 ft		
	15,000 ft		
	20,000 ft		
	25,000 ft		
V_A			
Gust Penetration Speed (V_B)			

MAIN MENU
PAGE UP
PAGE DOWN
PREVIOUS

Miscellaneous Limitations

MANEUVERING LOAD FACTORS

The maneuvering load factors which the structure has been designed to withstand without permanent deformation are + ____ g and - ____ g with flaps retracted, and + ____ g with flaps extended.

MINIMUM FLIGHT CREW

The minimum flight crew is _____ pilot.

MAXIMUM AIR TEMPERATURE

Operation of the DHC-6 is not permitted when the air temperature at take-off, forecast for the route, or for landing exceeds ISA + ____ºC.

SERVICE CEILING

The service celing of the DHC-6 airplane is _____ feet.

ELECTRICAL LIMITATIONS

The load limitations on each generator are as follows:

LOADMETER READING	MIN N_g	CONDITIONS
0 – 0.5		
0.5 – 1.0		
0.8		Ground – from ____ºC to ____ºC
1.0		Ground – from ____ºC to ____ºC
1.0		Flight – from ____ºC to ____ºC

ENGINE STARTER LIMITATIONS

- ____ seconds ON, ____ minute OFF
- ____ seconds ON, ____ minute OFF
- ____ seconds ON, followed by a ____ minute cooling off period.

ICING LIMITATIONS

a. For airplanes without airframe deicing equipment, which inadvertently fly into icing conditions, flap angles must not exceed ____° during or after flight in icing conditions.
b. For airplanes with airframe deicing equipment, flap angles must not exceed ____ ° during flight in icing conditions.
c. Engine intake deflectors must be _____ during flight in snow or icing conditions.

AUTOPILOT LIMITATIONS

a. During autopilot operation, pilot must _____.
b. Do not override the autopilot except for _____ checks, or momentarily to correct a hardover malfunction.
c. Maximum speed for autopilot operation is _____
d. Minimum speed for autopilot operation is _____
e. Pitch attitude limit is ____° nose up and _____° nose down.
f. The autopilot must be _____ in severe icing.

Memory Items

ENGINE FIRE ON GROUND

1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	
11.	

ENGINE FAILURE / FIRE / SHUTDOWN

1.	
2.	

POWER LOSS AFTER TAKE-OFF (AUTOFEATHER SYSTEM SELECTED ON)

1.	
2.	
3.	
4.	

OIL PRESSURE (CAUTION LIGHT) ON

1.	
2.	

OVERSPEED (GREATER than 101.5% N_g)

1.	

ABNORMAL ENGINE START

1.	
2.	

PROPELLER REVERSAL

1.	

TOTAL ELECTRICAL FAILURE

1.	
2.	
3.	
4.	
5.	
6.	

GENERATOR OVERHEAT

1.	
2.	
3.	
4.	

GENERATOR LIGHT FAILS TO ILLUMINATE AFTER START OR SHUTDOWN

1.	
2.	

BATTERY OVERHEAT

1.	
2.	

UNKNOWN SOURCE OF FIRE OR SMOKE

1.	
2.	
3.	
4.	
5.	
6.	
7.	

KNOWN SOURCE OF FIRE OR SMOKE

1.
2.
3.
4.

Flight Profiles

STEEP TURNS:

APPROACH TO STALL (CLEAN CONFIGURATION)

APPROACH TO STALL (TAKE-OFF CONFIGURATION)

APPROACH TO STALL (LANDING CONFIGURATION)

SERVICE LETTER

BOMBARDIER
AEROSPACE

Regional Aircraft
123 Garratt Blvd.
Downsview, Ontario, Canada M3K 1Y5

Product
Safety

DH6-SL-12-002B

ATA: 1230

DATE: 11 OCT 00

SUBJECT: Icing Precautions and Procedures

MODEL: Dash 6

APPLICABILITY: All

REFERENCE:
/A/ Service Letter DH6-SL-12-002 Rev. "A"
/B/ Boeing Airliner Newsletter – Fuel Conservation and Operations No. 36, October-December 1989.
/C/ Service Letter DH6-SL-12-001 Rev. "A" – Performance Adjustment for Ground Deicing/Anti-icing Fluid

PURPOSE:

The purpose of this Service Letter is to identify for de Havilland Dash 6 Operators some pre-cautions and procedures concerning the use of anti-icing and de-icing fluids.

DISCUSSION:

ICING PRECAUTIONS AND PROCEDURES

The following precautions and procedures regarding use of anti-icing/deicing fluids and icing precautions in general are drawn from the relevant Aircraft Flight Manuals with excerpts from the Boeing Airliner, Newsletter No. 36, dated October - December 1989. Operators should also refer to Service Letter DH6-SL-12-001 Rev "A" on the subject of Performance Adjustment for Ground Deicing/Anti-icing Fluid.

RAMP MAINTENANCE PRECAUTIONS

Deicing and anti-icing procedures in principle have not changed with the introduction of Type II fluids, Type III and Type IV. The final objective is still the same:

- An aircraft ready for flight must **NOT** have ice, snow, and/or frost adhering to its critical flying surfaces. The **MAKE IT CLEAN** and **KEEP IT CLEAN** rule still applies.

- **DEICING** is a procedure by which ice, snow and/or frost is **REMOVED** from the airplane by applying hot water or a hot mixture of water and deicing/anti-icing fluid.

- **ANTI-ICING** consists of the application of an anti-icing fluid or a mixture of anti-icing fluid and water to the airplane to protect against the accumulation and adherence of ice, snow and/or frost to airplane surfaces - **BEFORE THE CONDITION EXISTS**.

- **ONE-STEP DEICING/ANTI-ICING** consists of the application of ground deicing/anti-icing fluid either full strength or diluted with water. The fluid (mixture) may be heated as necessary taking into consideration the ambient temperature and weather conditions. The purpose of the application is to both **REMOVE** ice, snow and/or frost from the surface and to **PROTECT** the surface against the accumulation and adherence of ice, snow, and/or frost.

- **TWO STEP DEICING/ANTI-ICING** consists of deicing with hot water only or a hot mixture of water diluted deicing/anti-icing fluid, followed immediately by anti-icing with an overspray of anti-icing fluid. Care must be taken not to allow the aircraft surfaces to re-freeze between the deicing and anti-icing processes. To prevent re-freezing, the first mixture (deicing) fluid concentration may have to be increased appropriate to local conditions.

- **HOLDOVER TIME** is the estimated time anti-icing fluid will prevent ice, snow, and/or frost from forming or accumulating on the treated surfaces of an airplane. The protection time is dependent upon the temperature and type of visible moisture and fluid mixture selected. The hold-over time cannot be precisely pre-determined for each application, Therefore the expected protection time should ultimately be based on operator experience.

- Be sure to use equipment designated for the fluids being applied. Equipment suitable for the application of Type I fluids may not be suitable for the application of Type II, Type III or Type IV fluids. The protective properties of Type II, Type III or Type IV fluids can be seriously degraded by mechanical ***shearing*** that is inherent in the design of some dispensing equipment. Mechanical or equipment ***shearing*** of many Type II, Type III or Type IV fluids may reduce their viscosity and therefore, the estimated hold-

over time. Since Type I fluids are not similarly affected, be sure to refer to the fluid manufacturer's guidelines for the specific fluid being used.

- Type II, Type III or Type IV fluids require storage tanks to be made of materials not susceptible to corrosion, since a corrosive vapor develops above the fluid. For this reason, carbon steel tanks, which are commonly used for storage of Type I fluids, would not generally be recommended for the storage of Type II, Type III or Type IV fluids. Stainless steel or fiberglass tanks are generally recommended for storage of Type II, Type III or Type IV fluids. Carbon steel tanks can be used if lined with an appropriate material.

- Check deicing/anti-icing fluid concentration before application to airplane. To determine the mixture percentage of deicing/anti-icing fluid to water that should be used at a given temperature, refer to the manufacturer's specifications for the particular fluid.

- Operators that regularly use Type IV Fluids are recommended to periodically wash the aircraft with hot water or a diluted Type I Fluid to ensure that no residual Type IV Fluid accumulates in recesses or crevasses on the airplane.

- Avoid operating engines while deicing/anti-icing.

- Select bleed air off if engines or APU are running while deicing/anti-icing.

- Do not spray deicing/anti-icing fluid directly into engine or APU inlets, exhausts, probe inlets, scoops, vents, and drains.

- Do not spray fluid directly on cockpit windows.

- Do not spray hot fluid directly on cold windows.

- Do not force ice and snow into openings around flight control surfaces during removal procedures.

- Clear ice, which is difficult to detect, may be present below the layer of snow and slush. Visually check to ensure removal of all ice after deicing/anti-icing procedures. Some cases may require inspection by touch.

- Snow should be removed from **PARKED** airplanes at regular intervals to prevent a large build-up, and possible freezing to the airplane surfaces.

- Do not direct a solid stream of fluid perpendicular to airplane surfaces. A High pressure stream of fluid can damage airplane surfaces.

Both the right and left sides of the wing and the right and left sides of the horizontal stabilizer must receive **EQUAL** and complete deicing/anti-icing treatment.

Pre-taxi Precautions

- Determine/verify existence of icing conditions.

- Preflight the airplane to see that the airplane is free of snow, ice and frost. Ensure that all control surfaces are clean; that all protective covers are removed; that engine inlets are clear of snow or ice; that pitot heads, static ports, fuel tank vents, air conditioning inlets/exits and landing gear doors are clear of snow, ice and slush.

- If any doubt remains as to the aerodynamic **CLEANLINESS** of your aircraft, request deicing/anti-icing or proceed to a deicing/anti-icing facility. **NEVER** assume that snow will blow off, there could be a layer of ice under it. **DO NOT** underestimate the effect of even a thin layer of ice on wing surfaces. Data from the available literature suggests that ice roughness as small as .010 - .015 inches may negate takeoff stall margins altogether on commuter type aircraft.

Taxi Precautions

- During icing conditions, select intake deflectors down and ignition to **MANUAL** immediately after engine start.

- During taxi avoid using excessive power to prevent displacement of ground deicing/anti-icing fluids applied.

- During taxi avoid using reverse thrust on snow or slush covered runways, taxiways or ramps unless absolutely necessary. Reversing on snow/slush covered ground can cause slush and water to become airborne and adhere to wing surfaces. Using reverse to aid in gate push back in freezing conditions is not recommended.

- Maintain greater than normal distances between airplanes while taxiing to aid in stopping, turning and reduce the possibility of snow/slush being blown onto your airplane or engine inlets and re-freeze.

- Avoid hot exhaust gases from the aircraft in front of you. Hot exhaust gases can melt snow on your aircraft which may re-freeze.

- If taxi route will be through slush or standing water in low temperatures, taxi with flaps up. Do not accomplish take-off checklist until flaps are extended to take-off setting.

Takeoff Precautions

- Verify from the cockpit as best you can that the airplane is free of ice, snow and/or frost before moving into position for takeoff. If there is any doubt as to the **CLEANLINESS** of the airplane, an external inspection and/or re-spray must be conducted.

- Before brake release, check for stable engine operation. After setting take-off power check to see that cockpit indications are normal.

- Do not use autopilot VS mode in climb out.

In-Flight Precautions

- Do not use propeller anti-ice in a deicing mode (i.e. don't wait until ice has accumulated before selecting propeller anti-ice).

- Choose a propeller anti-ice timing cycle appropriate to OAT. If required, propeller de-icing may be enhanced by periodically selecting propeller condition levers to maximum (1200 Np).

- Disengage autopilot ALT VS or IAS mode if there is significant performance loss in icing conditions.

- Adhere strictly to the icing procedures in the AFM.

- Use 0° flap only for holding in icing conditions.

- Cycle de-icer boots before commencing hold, approach or landing, following flight in icing conditions (even if ice appears to be insignificant).

- Do not assume that, because there is no longer significant ice on parts of the aircraft you can see, the same is true of parts you cannot see.

- Use deicing boots in automatic (fast/slow) mode. The manual mode is intended primarily as backup.

- Use of landing approach lights, where practical, in icing conditions, minimizes ice accumulation on that portion of the wing leading edge.

- Remember that an accumulation of ice on the wing may change stall characteristics, stall speeds or stall warning margins and if unchecked, could ultimately negate stall warning.
- Be aware that even light icing can be hazardous.

- Anticipate the need for engine/nacelle propeller anti-ice and wing/tail deicing at all times, especially during low speed hold or approach in instrument meteorological conditions (IMC) or through precipitation.

Landing Precautions

- If landing flap selection is accompanied by stick force lightening, or stick force irregularities, immediately retract flap to a lesser setting. Cycle wing/tail de-icer boots several times and if possible, land using a smaller landing flap setting. (This condition, which is the Precursor to tail stall, will not occur on most commuter Aircraft if AFM icing procedures are followed).

- The airplane should be flown to a firm touchdown at the aiming point.

- Immediately after main wheel touchdown, lower the nose wheel to the runway to enhance directional control.

- Let the anti-skid system do its work. Do not pump brake pedals. The anti-skid system will monitor the onset of tire skidding and modulate brake pressures to achieve maximum braking.

- Avoid use of reverse thrust on icy or slippery runways.

- If reverse thrust is used in a crosswind, be prepared for a possible down-wind drift on slippery runways. To correct back to runway centerline, advance power levers to flight idle and reduce braking. After regaining directional control, increase braking and select disking. Do not select reverse thrust unless required.

- Do not attempt to turn off the runway until speed has been reduced to a manageable level.

One final word of advice on icing in general - "if you don't **HAVE** to be in it, you **SHOULDN'T** be in it. Play it **SAFE** - play it **CLEAN**!"

Further reference information can be obtained from:

Civil Aviation Administration (CAA)

- CAP 512 (Civil Aviation Publication) - 1985 -
Ground Deicing of Aircraft.

For information or to obtain a copy, contact:

Civil Aviation Authority
Greville House
37 Gratton Road
Cheltenham
Glosterschire GL502BN
England

Federal Aviation Administration (FAA)

- AC 20-117 (Advisory Circular) - 17 Dec 1982 -
Hazards Following Ground Deicing and Ground Operation in Conditions Condusive to Aircraft Icing.

For information or to obtain a copy, contact:

U.S. Department of Transportation
Utilization and Storage
Section M-443.2
Washington, D.C. 20590 U.S.A.

Please direct responses and any inquiries to the Bombardier Regional Aircraft Field Service Representatives or the Technical Help Desk in Toronto at telephone number (416) 375-4000 or facsimile (416) 375-4539.

Dave Fisher, Investigator, Product Safety and Jim Donnelly, Manager, Product Safety, Bombardier Aerospace Regional Aircraft.

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Performance Worksheet

Mission:

Fly _____ passengers averaging _____ LBS and _____ LBS of cargo from _____ to _____. There are two crewmembers on board averaging _____ LBS.
Trip length is _____ miles.

Departure:

Weather:_____
Field elevation _____ FT, active runway _____ , length _____ FT, runway gradient ____% _____, and Magnetic variation _____ °

Enroute:

Weather:_____

Arrival:

Weather:_____
Field elevation _____ FT, active runway _____ , length _____ FT, runway gradient ____% _____, and Magnetic variation _____ °

Basic Calculation:

Maximum Ramp Weight	_____	lb.
- Payload	_____	lb.
Basic Operating Weight	_____	lb.
Max Fuel Load		**_____ lb.**

SERIES 300 TWIN OTTER 18/19 PASSENGER COMMUTER

FOR TRAINING PURPOSES ONLY

GROSS WEIGHT COMPUTATION					
BASIC WEIGHT					
CREW					
CREWS BAGGAGE					
EXTRA EQUIPMENT					
OPERATIONAL WT EMPTY					
PASSENGERS					
BAGGAGE FREIGHT					
WEIGHT LESS FUEL					
FUEL					
TAKE OFF GROSS WEIGHT					
FUEL USED					
LANDING WEIGHT					

Location ROW	WT-LB		BASIC INDEX 2 4 6 8 10 12 14 16 18
NOSE		100	
CREW		100	
1		100	
2		100	
3		200	
4		400	
5		200	
6		100	
7		100	
BAGGAGE		100	
SHELF		100	
* FUEL FWD		100	
AFT		100	
UNIFORM DIST.		500	

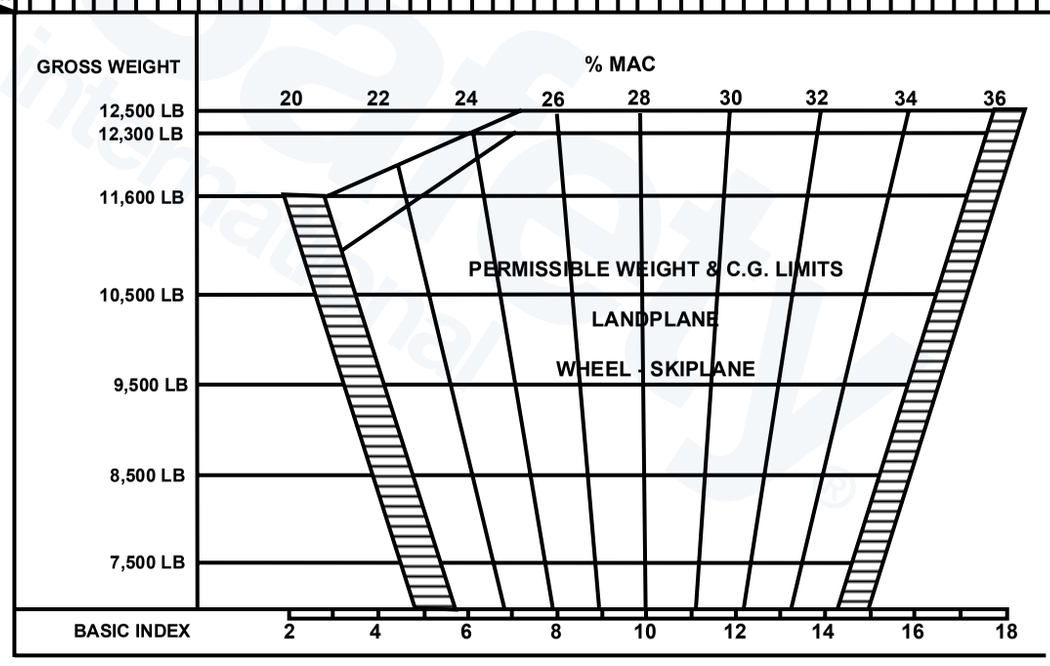
INDEX FORMULA

$$10 + \frac{(\text{BASIC WT (H.ARM-210)}}{10{,}0000}$$

$$\text{INDEX} = 10 + \frac{(\qquad - 210)}{10{,}000}$$

PASSENGERS	Standard WT - LB.
MALE	
FEMALE	
CHILD	
INFANT	

* FOR WING TANK FUEL USE UNIFORM FUEL DISTRIBUTION COLUMN



AIRCRAFT REGISTRATION:	DATE:	
FLIGHT NO:	FROM:	TO:
CAPTAIN:	FIRST OFFICER:	

Performance calculation:

- **Take off performance**

Flaps 10, Bleed air OFF, Intake Deflectors - Retracted.

- Decision Speed: _____ KIAS
- Speed at 50': _____ KIAS
- Ground Roll and T/O Total Distance to 50 feet: _____'
- Acc-Stop Distance to 35 Knot Final Speed: _____'
- Take-off Rate of Climb: _____
- Take-off Gradient of Climb: _____
- Take-off Rate of Climb – One Engine Inop.: _____
- Take-off Gradient of Climb - One Engine Inop.: _____

In order to meet IFR departure criteria take-off weight must be reduced by _____ lbs.
Take-off weight reduction is achieved by _____
_____

Corrected data:

- Decision Speed: _____ KIAS
- Speed at 50': _____ KIAS
- Take-off Rate of Climb – One Engine Inop: _____
- Take-off Gradient of Climb – One Engine Inop: _____

- **Climb performance**

Climb from departure airport elevation of _____' to a cruise altitude of _____' requires:

a) Time _____ minutes
b) Distance _____ NM
c) Fuel _____ LBS

- **Descent performance**

Descent from a cruise altitude of _____' to destination airport elevation of _____' requires:

a) Time _____ minutes
b) Distance _____ NM
c) Fuel _____ LBS

- **Cruse performance**

Remaining distance for cruse flight is _____ miles.

Scenario 1: Maximum Cruise Rating:

a) TAS: _____ KIAS
b) Calculated IAS is: _____ KIAS
c) Fuel burn is ____NM/lb _____ LBS
d) Time enroute is: _____ minutes
e) Power Setting is: _____ PSI

Scenario 2: Long Range Cruise:

a) TAS: _____ KIAS
b) Calculated IAS is: _____ KIAS
c) Fuel burn is ____NM/lb _____ LBS
d) Time enroute is: _____ minutes
e) Power Setting is: _____ PSI

Absolute and Service Ceiling – One Engine Inoperative:

a) Absolute Ceiling: _____ ‘
b) Service Ceiling: _____ ‘

Fuel calculation:

	Time	Fuel	Distance
Max. Fuel Load	N/A		N/A
Climb			
Cruise			
Descent			
Fuel Remaining	-		-

- **Landing performance**

Maximum Landing Distance:

a) Flaps 37.5°
   a. Vref: _____ KIAS
   b. Landing distance: _____’
b) Flaps 20°
   a. Vref: _____ KIAS
   b. Landing distance: _____’

FlightSafety international

3

Initial Simulator Sessions Outline

Simulator Session # 1

Session # 1 Scenario:

- Aircraft: DHC 6 – 300
- Call sign: _____ 100
- BEW: 8,160 lbs.
- Moment: 14.4
- Crew: 2, each 170 lbs.
- Passengers: 0
- Cargo: 0 lbs.
- Fuel: 800 lbs. per tank, 1,600 total lbs.
- Weight: 10,100 lbs.
- Cg: _____
- Route: _____ – _____ and local
- Weather: METAR _____ A041200Z Winds Calm 3SM OVC030 10/07 A2992

Normal Operations:

- Preflight / Prestart procedures
- Engine starting
- Taxi and before takeoff checks (Ground and 24-Hour Checks)
- Normal takeoff with area departures/arrivals, normal climb (V_y), descent and holding
- Navigation equipment and assigned radials
- Upper air work: slow flight, approach to stalls with stall recovery procedures (clean, takeoff and landing configuration), and steep turns
- Nonprecision and precision instrument approaches
- Missed approach from a precision approach
- Normal landing
- System procedures (normal): electrical, fuel, and powerplant
- After landing procedures, parking and securing of the aircraft

Non-normal Operations:

- Engine start malfunctions
- Inflight engine shutdown and inflight engine airstart
- System procedures (abnormal): electrical, fuel, and power-plant

CRM Objectives

- SOPs
- Crew coordination during normal, abnormal and emergency situations
- Situational awareness
- Decision making

MAIN MENU
PAGE UP
PAGE DOWN
PREVIOUS

Simulator Session # 2

Session # 2 Scenario:

- Aircraft: DHC 6 – 300
- Call sign: _____ 100
- BEW: 8,160 lbs.
- Moment: 14.4
- Crew: 2, each 160 lbs.
- Passengers: 6, each 170 lbs.
- Cargo: 400 lbs.
- Fuel: 800 lbs. per tank, 1,600 total lbs.
- Weight: 11,500 lbs.
- Cg: _____
- Route: _____ – _____ and local
- Weather: METAR _____ A041200Z 30^0 right crosswind at 15 1200RVR OVC001 15/15 A3000

Normal Operations:

- Prestart procedures
- Engine starting
- Taxi, ground checks and before takeoff checks
- Normal and crosswind takeoff with area departures/arrivals, normal climb (V_y), descent and holding
- Instrument takeoff
- Crosswind landings
- System procedures (normal): electrical, fuel, powerplant, flight controls and propeller
- After landing procedures, parking and securing of the aircraft

Non-normal Operations:

- Engine start malfunctions
- Rejected (aborted) takeoff
- Emergency evacuation
- Inflight powerplant shutdown
- Nonprecision and precision instrument approaches and landing with one engine inoperative
- Missed approach from nonprecision approach with one engine inoperative
- System procedures (abnormal): electrical, fuel, powerplant, flight controls and propeller

CRM Objectives

- SOPs
- Crew coordination during normal, abnormal and emergency situations
- Situational awareness
- Decision making

Simulator Session # 3

Session # 3 Scenario:

- Aircraft: DHC 6 – 300
- Call sign: _____ 100
- BEW: 8,160 lbs.
- Index: 14.4
- Crew: 2, each 160 lbs.
- Passengers: 7, each 180 lbs.
- Cargo: 260 lbs.
- Fuel: 1,000 lbs. per tank, 2,000 total lbs.
- Weight: 12,000 lbs.
- Cg: _____
- Route: _____ – _____ and local (_____ as alternate)
- Weather: METAR _____ A041200Z 30^0 left crosswind at 20 600RVR OVC001 20/20 A3025

Normal Operations:

- Prestart procedures – Quick turnaround
- Engine starting
- Area departures/arrivals
- Instrument takeoff
- System procedures (normal): electrical, powerplant, propellers, and hydraulic

Non-normal Operations:

- Engine start malfunctions
- Rejected (aborted) takeoff
- Emergency evacuation
- Windshear
- Takeoff with power loss at or above V_1
- Engine fire at V_1 with powerplant shutdown during climb
- Climb with one engine inoperative
- In-flight powerplant shutdown
- Nonprecision, precision instrument approaches and landing with one engine inoperative
- Rejected landing with one engine inoperative
- Landing with one engine inoperative
- Landing from zero flap approach
- System procedures (abnormal): electrical, powerplant, propellers, hydraulic, and engine fire

CRM Objectives

- SOPs
- Crew coordination during normal, abnormal and emergency situations
- Situational awareness
- Decision making

Simulator Session # 4

Session # 4 Scenario:

- Aircraft: DHC 6 – 300
- Call sign: _____ 100
- BEW: 8,160 lbs.
- Index: 14.4
- Crew: 2, each 160 lbs.
- Passengers: 7, each 180 lbs.
- Cargo: 360 lbs.
- Fuel: 1,200 lbs. per tank, 2,400 total lbs.
- Weight: 12,500 lbs.
- Cg: _____
- Route: _____– _____ (_____ as alternate)
- Weather: METAR _____ A041200Z 40^0 right crosswind at 15 600RVR OVC002 05/05 A3010

Normal Operations:

- Prestart procedures and engine starting – Quick turnaround
- Icing equipment (preflight inspection)
- Normal takeoff with area departures and arrivals
- Takeoff procedures in icing conditions
- Visual landing with full flaps
- Rejected landing from a visual approach with full flaps
- System procedures (normal): electrical, powerplant, propeller, anti-ice/deicing, avionics and flight instruments
- After landing procedures, parking and securing of the aircraft

Non-normal Operations:

- Takeoff with power loss of the critical engine at V_1
- Climb with one engine inoperative
- Recognition and recovery from unusual attitudes
- Emergency descent
- Nonprecision instrument approaches and landing with one engine inoperative
- Rejected landing from a visual approach with full flaps and engine failure at go-around
- Landing procedures in icing conditions
- System procedures (abnormal): electrical, powerplant, propeller, anti-ice/deicing, avionics and flight instruments

CRM Objectives

- SOPs
- Crew coordination during normal, abnormal and emergency situations
- Situational awareness
- Decision making

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Recurrent Simulator Sessions Outline

Simulator Session # 1

Session # 1 Scenario:

- Aircraft: DHC 6 – 300
- Call sign: _____ 100
- BEW: 8,160 lbs.
- Moment: 14.4
- Crew: 2, each 160 lbs.
- Passengers: 6, each 170 lbs.
- Cargo: 400 lbs.
- Fuel: 800 lbs. per tank, 1,600 total lbs.
- Weight: 11,500 lbs.
- Cg: _____
- Route: _____ – _____ and local
- Weather: METAR _____ A041200Z 30^0 right crosswind at 15 1200RVR OVC001 15/15 A3000

Normal Operations:

- Preflight / Prestart procedures
- Engine starting
- Taxi and before takeoff checks (Ground and 24-Hour Checks)
- Normal takeoff with area departures/arrivals, normal climb (V_y), descent and holding
- Upper air work: slow flight, approach to stalls with stall recovery procedures (clean, takeoff and landing configuration), and steep turns
- Nonprecision and precision instrument approaches
- Missed approach from a precision approach
- Normal landing
- System procedures (normal): electrical, fuel, and powerplant
- After landing procedures, parking and securing of the aircraft

Non-normal Operations:

- Engine start malfunctions
- Recognition and recovery from unusual attitudes
- Inflight engine shutdown and inflight engine airstart
- System procedures (abnormal): electrical, fuel, and powerplant

CRM Objectives

- SOPs
- Crew coordination during normal, abnormal and emergency situations
- Situational awareness
- Decision making

Simulator Session # 2

Session # 2 Scenario:

- Aircraft: DHC 6 – 300
- Call sign: _____ 100
- BEW: 8,160 lbs.
- Index: 14.4
- Crew: 2, each 160 lbs.
- Passengers: 7, each 180 lbs.
- Cargo: 260 lbs.
- Fuel: 1,000 lbs. per tank, 2,000 total lbs.
- Weight: 12,000 lbs.
- Cg: _____
- Route: _____ – _____ and local (_____ as alternate)
- Weather: METAR _____ A041200Z 30^0 left crosswind at 20 600RVR OVC001 20/20 A3025

Normal Operations:

- Pre-start procedures – Quick turnaround
- Engine starting
- Normal and crosswind takeoffs with area departures/arrivals, normal climb (V_y), descent and holding
- Instrument takeoff
- System procedures (normal): electrical, fuel, powerplant, flight controls and propeller
- Crosswind landings
- After landing procedures, parking and securing of the aircraft

Non-normal Operations:

- Engine start malfunctions
- Rejected (aborted) takeoff
- Emergency evacuation
- Takeoff with power loss at or above V_1
- Inflight powerplant shutdown
- System procedures (abnormal): electrical, fuel, powerplant, flight controls and propeller
- Nonprecision, precision instrument approaches and landing with one engine inoperative
- Missed approach from a nonprecision instrument approach with one engine inoperative.

CRM Objectives

- SOPs
- Crew coordination during normal, abnormal and emergency situations
- Situational awareness
- Decision making

Simulator Session # 3

Session # 3 Scenario:

- Aircraft: DHC 6 – 300
- Call sign: _____ 100
- BEW: 8,160 lbs.
- Index: 14.4
- Crew: 2, each 160 lbs.
- Passengers: 7, each 180 lbs.
- Cargo: 360 lbs.
- Fuel: 1,200 lbs. per tank, 2,400 total lbs.
- Weight: 12,500 lbs.
- Cg: _____
- Route: _____– _____ (_____ as alternate)
- Weather: METAR _____ A041200Z 40^0 right crosswind at 15 600RVR OVC002 05/05 A3010

Normal Operations:

- Prestart procedures – Quick turnaround
- Engine starting
- Icing equipment (preflight inspection)
- Instrument takeoff with area departures/arrivals, normal descent and holding with instrument departures
- Takeoff procedures in icing conditions
- After landing procedures, parking and securing of the aircraft

Non-normal Operations:

- Engine start malfunctions
- Rejected (aborted) takeoff
- Emergency evacuation
- Takeoff with power loss at or above V_1
- Windshear recognition and recovery
- Emergency descent
- Nonprecision and precision instrument approaches and landing with one engine inoperative
- Rejected landing with one engine inoperative
- Landing procedures in icing conditions
- Landing from zero flap approach
- System procedures (abnormal): electrical, powerplant, propeller, hydraulics, engine fire, anti-ice/deice, avionics and flight instruments

CRM Objectives

- SOPs
- Crew coordination during normal, abnormal and emergency situations
- Situational awareness
- Decision making

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5

Standard Operating Procedures (SOP)

TWIN OTTER STANDARD OPERATING PROCEDURES

INTRODUCTION

Overview

The Standard Operating Procedures, described herein, are intended to facilitate the safe and expeditious operation of the Twin Otter, in both an operational and training environment. It is essential that both crewmembers have a thorough knowledge of the SOP's. Adherence is mandatory unless the safety of the flight dictates otherwise.

The AFM is provided for the direction of the pilots when operating the Twin Otter. It is the responsibility of the pilots to be entirely familiar with the information contained in the AFM. The aircraft must be operated within the approved flight envelope at all times. In the event of a discrepancy between the SOP's and the AFM, the AFM always takes precedence.

This document consists of three sections:

General

Describes policies regarding crew coordination, checklist procedures, and use of the Flight Director (FD), standard calls, and pilot incapacitation.

Standard Operating Procedures (Two Parts)

Normal Operation SOP's for normal flight; and Non-Normal operation SOPs for emergency and abnormal situations.

Flight Procedures

This document supplements the Standard Operating Procedures by providing detailed information on how to operate the airplane. It also describes some flight maneuvers and procedures, which will be required for simulator and flight training.

GENERAL

Crew coordination

Crew coordination is an essential part of every successful flight. It is the responsibility of each crewmember to be familiar with his/her responsibilities and to execute them in a professional and timely manner. Each member of the crew must also be familiar with the responsibilities of the other crewmembers.

Pilot Duties

The in-flight duties of the pilots are interchangeable, therefore, the terminology Pilot Flying (PF) and Pilot Not Flying (PNF) will be used to distinguish pilot duties. When the First Officer is the PF, the Captain maintains control until the aircraft is lined up for takeoff, at which point the First Officer assumes the PF duties. Upon landing when the aircraft has decelerated to a safe taxi speed, the Captain will assume control of the aircraft.

Change of Pilot Control

The PF/PNF duties may be exchanged during flight. The pilot relinquishing PF duties will brief the PNF of the current status of the aircraft and announce; **"YOU HAVE CONTROL"**. The pilot assuming control will announce; **"I HAVE CONTROL"**.

ATC Communications

The PNF will normally handle all communications with ATC unless otherwise directed by the PF.

The following communication setup should be used unless an abnormal situation dictates otherwise:

- COM 1 - ATC frequencies (GND, TWR, DEP, ARR)
- COM 2 - Service (ATIS, FSS, OPS)

Chain of Command

In order of priority:

- Pilot-in-c ommand (CAPTAIN)
- Secon d-in-command (F/O)

Normal Checklists

During normal operations the PF will, as required, request specific checklists, e.g.: **"AFTER TAKEOFF CHECKLIST**"
When the required checklist has been completed, the PNF will announce the appropriate checklist completion, e.g.: **"AFTER TAKEOFF CHECKLIST COMPLETE"**.

When the response to a particular checklist item is **"As required"** the actual response will be positive and the action required would be stated, such as: **"ON"**, **"OFF"**, **"CLOSED"**, etc.

Table1: Checklist Conduct

Item	Action
ORIGINATING BEFORE START	Challenge and Response (C&R)
BEFORE START	Challenge and Response (C&R)
AFTER START	Challenge and Response (C&R)
TAXI Rea	d and Do
BEFORE TAKEOFF	Challenge and Response (C&R)
LINE UP	Read and Do except Configuration Items (C&R)
AFTER TAKEOFF	Silent
CRUISE	Read and Do except Configuration Items (C&R)
DESCENT	Challenge and Response (C&R)
APPROACH PROCEDURES FOR FLIGHT IN ICING CONDITIONS	Read and Do except Configuration Items (C&R)
APPROACH PROCEDURES AFTER FLIGHT IN ICING CONDITIONS	Read and Do except Configuration Items (C&R)
APPROACH	Challenge and Response (C&R)
LANDING	Read and Do except Configuration Items (C&R)
AFTER LANDING	Silent
SHUTDOWN	Challenge and Response (C&R)
LAST FLIGHT	Read and Do

Abnormal / Emergency Checklist

In the event of a non-normal situation, the crew will assess the problem. Once the nature of the problem has been established, the PF will call for the appropriate memory items if applicable. The PNF executes the memory items. When the memory items are complete, the PF will call for the appropriate emergency / abnormal checklist. The PNF executes the checklist items using the **"read and do"** method. Normally checklists are **"read and do"** except for configuration and/or irreversible items which should be completed as **"challenge and response"**.

Passenger Address During Abnormal / Emergency Situations

The passengers will also require reassuring as soon as practicable, although this is best left until after the problem has been addressed and decisions concerning the re-planning of the flight have been made. Avoid giving too much detail, in addition, avoid using the words *EMERGENCY*, or *FAILURE*, as this may further alarm the passengers. A brief announcement confirming that the problem has been solved ….. fasten seat belts ….. please read the safety briefing card is normally all that is required. If at all possible, the Captain should make this passenger address.

Use of Flight Director

The Flight Director should be used for most phases of the flight. When the Flight Director is being used, care must be taken to ensure it is providing correct commands.

Auto Flight Control Systems (Autopilot)

To reduce crew workload and improve safety, use of the Autopilot, if available, is recommended from initial climb out to final approach. When the Autopilot is engaged the PF should control all Flight Director modes.
If the PF controls the aircraft manually, the PNF may select the Flight Director modes as directed by the PF.
When the PF engages or disengages the Auto-pilot (AP) he or she should announce:
"AP ENGAGED" or **"AP DISENGAGED"**.

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Altitude Pre-Selector

Upon receiving the clearance for an altitude change, the PNF will place the new altitude in the pre-selector and verbally state the new altitude while pointing to the pre-selector. The new altitude is then verbally confirmed by the PF.

Standard Calls

Safety demands that crewmembers remain aware of aircraft position, altitude, and instrument indications during flight. One method of achieving this, is to adopt a system of standard calls, not only to reduce ambiguity, but to minimize conversation during critical phases of flight, i.e. take-off, approach and landing. It is recommended that crews refrain from all non-essential and distracting conversation during critical phases of flight.

Table 2, outlines a series of standard calls, which shall be utilized to enhance safety during VFR and IFR operations. The PNF shall make the appropriate call, based on instrument indications or observations for the condition outlined in the table, and the PF shall verify and acknowledge the call. If the PNF does not make the required call, then the PF shall make it.

Table 2: Standard Calls for all Phases of Flight

Observation	Call (PNF)	Response (PF)
Any time bank angle exceeds 30°	**"BANK ANGLE"**	"**CORRECTING**"
Heading deviation of 10°	**"HEADING"**	"**CORRECTING**"
Speed deviation of 10 KIAS	**"AIRSPEED"**	"**CORRECTING**"
ALT deviation of 100 Feet	**"ALTITUDE"**	"**CORRECTING**"

Table 3: Standard Calls for Climb and Descent with or without Auto Pilot

Observation	PNF	PF
New Altitude	**"4000 Set"**	**"Check 4000 Set"**
Altitude Change	**"ALTITUDE SET"**	"**LEAVING 1000 FOR 3000**"
Approaching transition altitude in climb	"**TRANSITION 29.92** or **1013 Set**"	**"29.92 or 1013 Set"**
Approaching transition altitude in descent	"**TRANSITION <Airport setting> Set**"	"**<Airport setting> Set**"
1,000 feet to go	"**8000 for 9000**"	**"ALTITUDE SET"**

NOTE:

If autopilot was used, at assigned altitude PF will engage ALT mode in order to maintain the altitude.

Table 4: Standard Call Procedure Final Approach Fix Inbound

Observation	Call (PNF)	Response (PF)
Speed deviation $V_{app} \pm 10$ KIAS	**"AIRSPEED" "**	**CORRECTING"**
Rate of descend exceeds 1000 ft./min.	**"SINK RATE"**	**"CORRECTING"**
First positive movement of localizer bar	**"LOCALIZER ALIVE"**	**"CHECK"**
½ dot localizer deviation	**"LOCALIZER" "C**	**ORRECTING"**
First positive movement of glide slope	**"GLIDESLOPE ALIVE"**	**"CHECK"**
½ dot glide slope deviation	**"GLIDESLOPE" "**	**CORRECTING"**
VOR approach – one half (1/2) DOT left or right	**"TRACK"**	**"CORRECTING LEFT / RIGHT"**
NDB approach – five (5) degrees left or right of track	**"TRACK"**	**"CORRECTING LEFT / RIGHT"**

Pilot Incapacitation (The two call rule)

Incapacitation occurs in many forms ranging from sudden death to subtle, or partial loss of mental or physical performance. Subtle incapacitation is the most dangerous, and is the most common type encountered.

One of the keys to early and effective recognition of pilot incapacitation is the strict adherence to standard operating procedures, call-outs and flight profiles.

Suspicion to some degree of incapacitation should be considered when a crewmember does not respond to verbal communication associated with a significant departure from a standardized procedure or profile. Failure of that crewmember to respond to a second request or challenge is cause for immediate action on the part of the challenging crewmember.

Whenever the PNF advises the PF of a deviation from the intended flight profile, the PF shall take immediate action and announce, **"CORRECTING"**. If the PF does not respond immediately, the PNF shall call the deviation a second time, and if there is still no response from the PF, the PNF shall assume pilot incapacitation, assume immediate control of the aircraft and announce, **"I HAVE CONTROL"**.

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STANDARD OPERATING PROCEDURES

NORMAL OPERATIONS

Preflight

Before each flight, the flight crew or maintenance personnel must perform an external inspection of the airplane to verify it is acceptable for flight. For the first flight of each day, complete the **COCKPIT PREPARATION CHECKLIST**. After the first flight of each day, the cockpit preparation may be omitted by completing **ORIGINATING BEFORE START CHECKLIST** only.

As the Captain prepares the flight deck (i.e. Obtains the ATIS and Clearance) the First Officer will greet the passengers as they board the aircraft. Once everyone is on board the First Officer will ensure that the main cabin doors are closed and that all carry-on baggage is safely stowed. The F/O will then brief the occupants in the emergency exit rows on the use of the exits. Care should be taken to ensure that these persons are physically able to operate the exit (i.e. no children or elderly).

Emergency Briefing

Prior to the first flight of the day or after a crew partner change an Emergency Briefing must be completed.
The crew can also opt to do the Emergency Briefing prior to any departure in order to address the specifics of the departing runway/departure procedures.

The Emergency Briefing is as follows:

PF: Any problem affecting safety prior to V_1, one of us will call **"ABORT"**
I will apply max braking, and reverse as required to stop the aircraft and set the parking brake.

PNF: I will advise ATC.

PF: In the event of a malfunction after V_1, we will continue and treat as in flight emergency with no actions below 400 feet except for a power loss which I will call "**MAX POWER, FLAP 10**"

PNF: I will confirm that the propeller is feathered.

PF: In the event of a power loss and propeller not feathering I will call for **"MANUAL FEATHER L/R"**

PNF: I will feather appropriate propeller on your command.

PNF: After passing 400 feet I will identify the malfunction.

PF: I will call for the appropriate actions.
Any questions?

Takeoff Briefing

The Takeoff Briefing, normally given by the PF, is a plan of action for takeoff and departure with emphasis placed on anticipated departure flight path and altitude restrictions. It assumes standard procedures; therefore, normal takeoff procedures will not be reviewed. If an Emergency Briefing has been completed the crew will then proceed directly into the Takeoff Briefing prior to engine start.

The Takeoff Briefing will normally be given by the PF and will consist of the following:

- Aircr aft Weight
- Flap Setting
- Torq ue Setting
- Intake Deflectors / Bleed Air (On or Off)
- V_1 / V_r and V_2
- D eparture Instructions

This is an example of an Takeoff Briefing:

This will be a 12 500 lb takeoff
Flap 10°
Torque 50psi
Intake Deflectors Extended
Bleed Air OFF
V_1/V_r – 75
V_2 – 79
SID departure is Runway Heading to 3000' for radar vectors

Any Questions?

Before Engine Start

Once the briefings have been completed the Captain will call for the:
"ORIGINATING BEFORE START CHECKLIST"

GPU Assisted Start

A Ground Power Unit (external power) start is the preferred method of engine start and it should be used any time external power is available.

Battery Only Start

A battery only start may have to be completed when a GPU is unavailable or unserviceable. Should this occur, the crew must still complete the required system checks prior to conducting the start. In order to save the battery from unnecessary discharging once the Battery Master is turned "ON", the emergency and takeoff briefings will be completed after engine start.

Start both engines on the main battery. Recharging between starts should only be attempted if the crew suspects the battery is unable to safely start the second engine.

Engine Start

The engines are started by the PIC who will communicate with the ground engineer.

The normal start sequence is the Right engine followed by the Left.

Table 5: Start Procedure

PIC	First Officer
"CLEAR LEFT / RIGHT"	Checks that area is clear **"CLEAR LEFT / RIGHT"**
"STARTING LEFT / RIGHT" Positions Start Switch Left or Right Position. Once N_G is stabilized and not below 12%; selects Fuel Lever to ON	Starts timer
Both crewmembers monitor engine gauges for normal indications until N_G stabilizes through 50% & T_5 drops. At that point PIC should disengage starter	
Once engine has stabilized and engine gauges indicate normal readings	
"STABLE START LEFT / RIGHT"	

NOTE

- During the engine start oil pressure should start to rise and "OIL PRESS" caution light should extinguish before engine reaches idle N_G
- Once the Starter Switch is released crew should confirm that the "GENERATOR" caution light is illuminated.
- Silent cockpit procedures require only that non-normal situations be announced during the start procedure.

After Engine Start

Once the engines have been started, the following actions are normally completed as a flow prior to calling for the "**AFTER START CHECKLIST":**

1. EXTERNAL / BATTERY switch to BATTERY
2. Signal to the ground crew to disconnect ground power and remove chocks.
3. Set the flaps to 10^0
4. Move the PROP levers to MAX RPM.
5. When the propellers stabilize advance the power levers to idle N_G plus 15%
6. One at the time select the GENERATOR switches to RESET, then ON.
7. Check the generator loads. Once the generator loads are equal to or less than 0.5, the power levers may be brought back to idle.
8. Select autofeather ON.

Taxi

Once the AFTER START checklist has been completed, the First Officer will automatically request taxi clearance or advise taxing for the active runway.

The Captain will operate the taxi light as required during night or reduced visibility operations.

The Brake check (PIC and F/O) will be accomplished by maintaining positive pressure on the pedals while the engine power is increased above idle power settings (approximately 10 psi will be required for the aircraft to start moving). If the aircraft does not move with the power levers above idle, the brake check is successful. This method will prevent any passenger discomfort that would be caused by first moving forward, then checking the brakes.

NOTE

Prior to Takeoff and once the airplane is clear of congested areas; the Captain will call for the "**GROUND CHECKS CHECKLIST"**.

During GROUND CHECKS, the following checks have to be completed prior to **each flight**:

- Autofeather system (during this test confirm that "RESET PROPS" caution light illuminates while the prop levers are at the min governing position prior to selecting them to manual feather).
- Beta Backup System and
- If flight in icing conditions is suspected: BLEED AIR – PNEUMATIC SYSTEM CHECK; INTAKE DEFLECTOR CHECK; and DEICE SYSTEM CHECK.

The Captain will call for the "**BEFORE TAKE OFF CHECKLIST"** prior to entering the active runway and the **"LINE UP CHECKLIST"** once cleared for takeoff.

Takeoff

Once the airplane has been cleared onto the active runway, the Captain will taxi to position. As the aircraft enters the active runway, the first officer will ensure that both taxi and anti collision lights are selected on. Cabin lights shall be selected to dim for take off.
When aligned, the PF will position one of his/her hands on the control wheel and the other hand on the power levers. The PF's hand must be on the power levers during takeoff until V_1 so that an aborted takeoff may be accomplished if necessary.

CAUTION

As airspeed increases, torque pressure will increase with a constant power lever setting because of the effect of ram air. Retard the power levers as required to avoid exceeding the takeoff torque setting.

NORMAL TAKEOFF

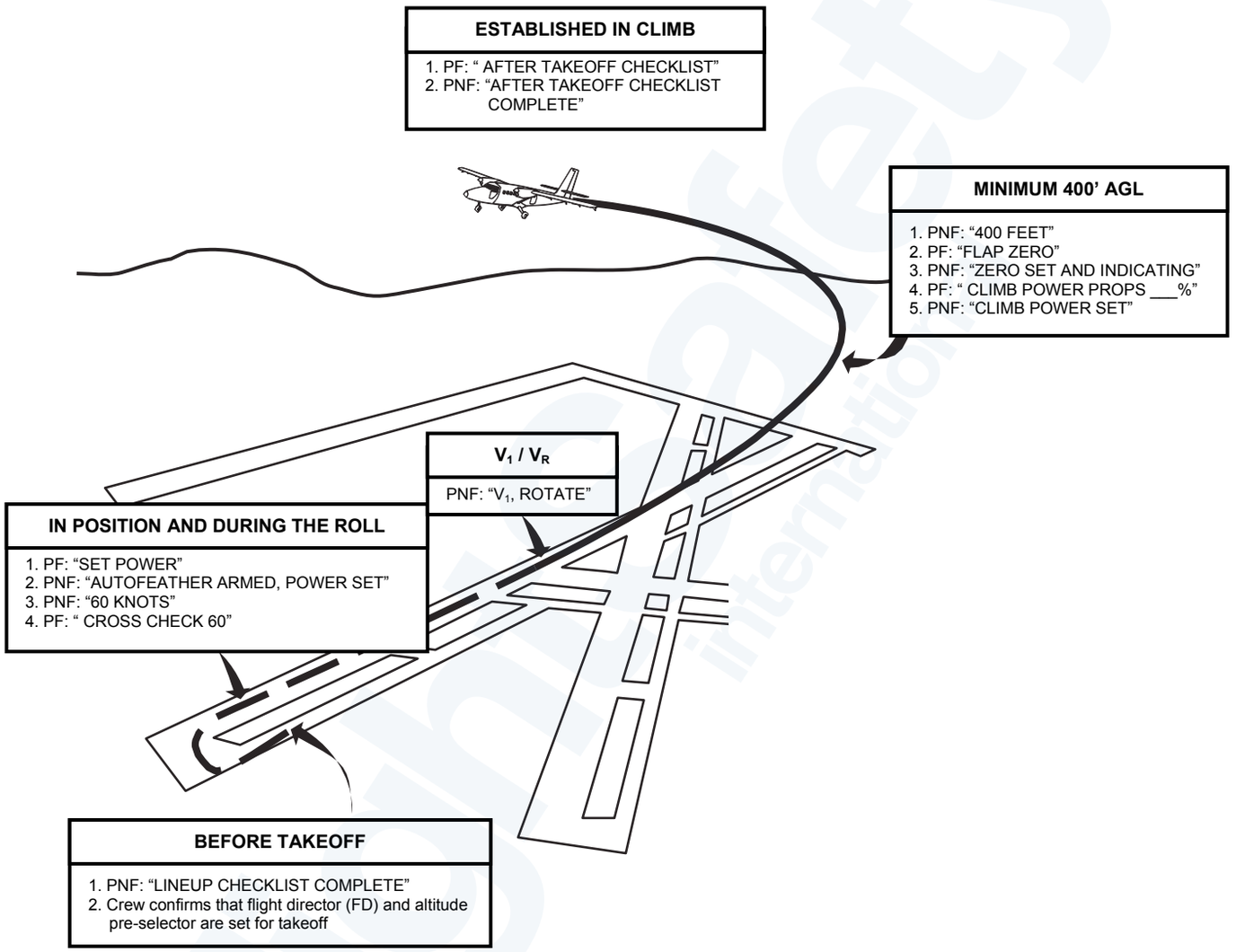

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Table 6: Takeoff Procedure

PF	PNF
	"LINEUP CHECKLIST COMPLETE"
While maintaining positive pressure on the brake pedals advances power levers to approximately 85 % N_G and before releasing the brakes confirms that T_5 has dropped and stabilized **"SET POWER"**	Places hand on upper portion of the power levers to set Takeoff Power. Observe Auto – feather ARM light illuminates and confirms that takeoff power has been set **"AUTOFEATHER ARMED – POWER SET"**
Confirms that airspeed indicator indicates 60 KIAS **"CROSS CHECK 60"**	At 60 KIAS **"60 KNOTS"**
Places both hands on control wheel and rotates 8 - 10° nose up attitude	At V_1/V_r **"V_1 ROTATE"**
Confirms speed V_2 or greater **" FLAP ZERO"** Select **HDG** and **CLIMB** mode on Flight Director	At 400 feet AGL or obstacle clearance height **"400 FEET"** or **<obstacle clearance altitude>** Confirms at or above V_2, selects Flap 0 **"ZERO SET AND INDICATING"**
Positions power levers toward climb power. **"CLIMB POWER, PROPS 91 <u>or</u> 75%"** **"AFTER TAKEOFF CHECKLIST"**	Selects climb power at 45 psi torque and stated RPM **"CLIMB POWER SET"** Completes the After Takeoff Checklist **"AFTER TAKEOFF CHECKLIST COMPLETE"**

NOTE

The PF will call for the AFTER TAKEOFF CHECKLIST at his or her discretion once the aircraft is established in the climb and clear of busy terminal airspace.

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Climb

During the climb, both pilots will monitor the power, however, it is the PNF's responsibility to set and maintain climb power. In order to achieve calculated flight planning data, propeller settings should be at 91% N_P. Based on flight planning data, 91% N_P is recommended for climb, however there is no restriction for the crew to use 75% N_P if they deem it safe.

Normal climb speed is 90 - 100 KIAS.

The TCAS, if installed should be selected to ***"Above"*** for the climb. If a ***"Range"*** option is available, a smaller scale should be utilized in terminal and other high-density traffic areas to improve situational awareness by reducing screen clutter.

Cruise

Table 7: Climb and Cruise Procedures

PF	PNF
At transition altitude **"TRANSITION, 29.92"** or **"1013mb"** Sets standard pressure on altimeter	Sets standard pressure on altimeter **"29.92 SET"** or **"1013 mb"**
After reaching cruise altitude and speed, positions power levers toward cruise power. **"CRUISE POWER, PROPS 75%"** **"CRUISE CHECKLIST"**	Once level, Sets the TCAS to *Normal* or *Below* Sets cruise power **"CRUISE POWER SET"** Completes the cruise checklist **"CRUISE CHECKLIST COMPLETE"**

Pilots should allow the aircraft to accelerate to the flight planned IAS prior to adjusting to cruise power settings. Doing so will allow the aircraft to fly at a constant state of trim rather than a prolonged period of acceleration. During cruise, the propeller setting is 75% N_P.

Descent

Prior to commencing the descent it is recommended that landing information be obtained through ATC (ATIS if available), and the approach and landing briefing be completed.

The DESCENT CHECKLIST is normally called for when initiating the descent for landing.

As the aircraft enters high-density traffic areas, the TCAS ***"Range"*** should be reduced to a smaller scale.

Table 8: Descent Procedures

PF	PNF
"DESCENT CHECKLIST"	Selects *Below* on the TCAS Complete the descent checklist **"DESCENT CHECKLIST COMPLETE"**
At transition level; sets current altimeter setting **"TRANSITION, <Current Altimeter Setting>"**	Sets current altimeter setting **"<Current Altimeter Setting> SET"**

Approach and Landing Briefing

The approach briefing is a plan of action for the approach, landing and possible missed approach. Proper planing will normally permit the approach briefing to be accomplished prior to descent into the terminal airspace.

The approach briefing will normally be given by the PF and should consist of the following:

- Type of approach and effective date
- Transition to the approach (STAR / Radar Vectors / Procedure turn)
- Frequencies and inbound course
- Altitudes
- Minimum s
- Missed approach point
- Missed approach procedures
- Special considerations

The landing briefing is also normally given by the PF and follows immediately after the approach briefing. The landing briefing will include the following:

- Airc raft weight
- Flap setting
- Go around power / Max power
- V_{ref} / V_2 and Approach speed

This is an example of an approach and landing briefing:

This will be an ILS 12 at Hamilton; Ontario approach dated 12 Aug 2003
The Localizer frequency is 110.90 with an inbound course set to 118 degrees
The FAF Ancaster NDB frequency 397 is set and the Binbrook NDB 266 is set for the missed approach.
The sector altitude is 2900 feet based on the Ancaster
Procedure turn altitude (if required) 2200 feet
Glide path check is 2020 down to ILS minimums of 980
Timing and MAP (if required)
In the event of a missed approach we will climb on the 118 track to 2800 feet to the Binbrook NDB
This will be an 11,000 lb landing
Flap 20
Go around power is 50 psi
V_{ref} is 68, V_2 is 75 and approach speed is 90
Set left / Set right

Any questions?

Stabilized Approach

Serious consideration should be given to abandoning an approach if the aircraft is not stabilized by 1000' AGL.
An approach is not considered stable if any one or more of the following parameters are exceeded:

- Airspeed + or – 5KIAS
- Loc or GS ½ dot deviation
- VS greater than 1000 fpm
- All checklists must be complete

Holding

There are many situations that arise as the aircraft approaches a busy terminal area that would cause a build up of traffic (i.e. weather, runway change, PIREPS …). In these instances, it is not unusual for ATC to issue holding instructions.

When a hold has been issued, flight crews will discuss the following information:

- ATC holding clearance
- R equired entry
- Fuel remaining
- Speed / Configuration

The recommended configuration and holding speed for the Twin Otter is clean and 120 KIAS. If decision has been made by crew to conserve the fuel while in hold, the holding speed should be adjusted based on aircraft weight as per FUEL CONSUMPTION AT MAXIMUM ENDURANCE (HOLD) SPEED CHART.

WARNING

Under <u>no circumstances</u> will flight crews hold in icing conditions with the flaps extended.

NOTE

Since the autopilot may mask tactile cues that indicate adverse changes in handling characteristics, it is recommended that the autopilot is turned off when entering into icing conditions or when unusual lateral trim requirements or autopilot trim warnings are encountered while the airplane is in icing conditions.

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VISUAL APPROACH AND LANDING

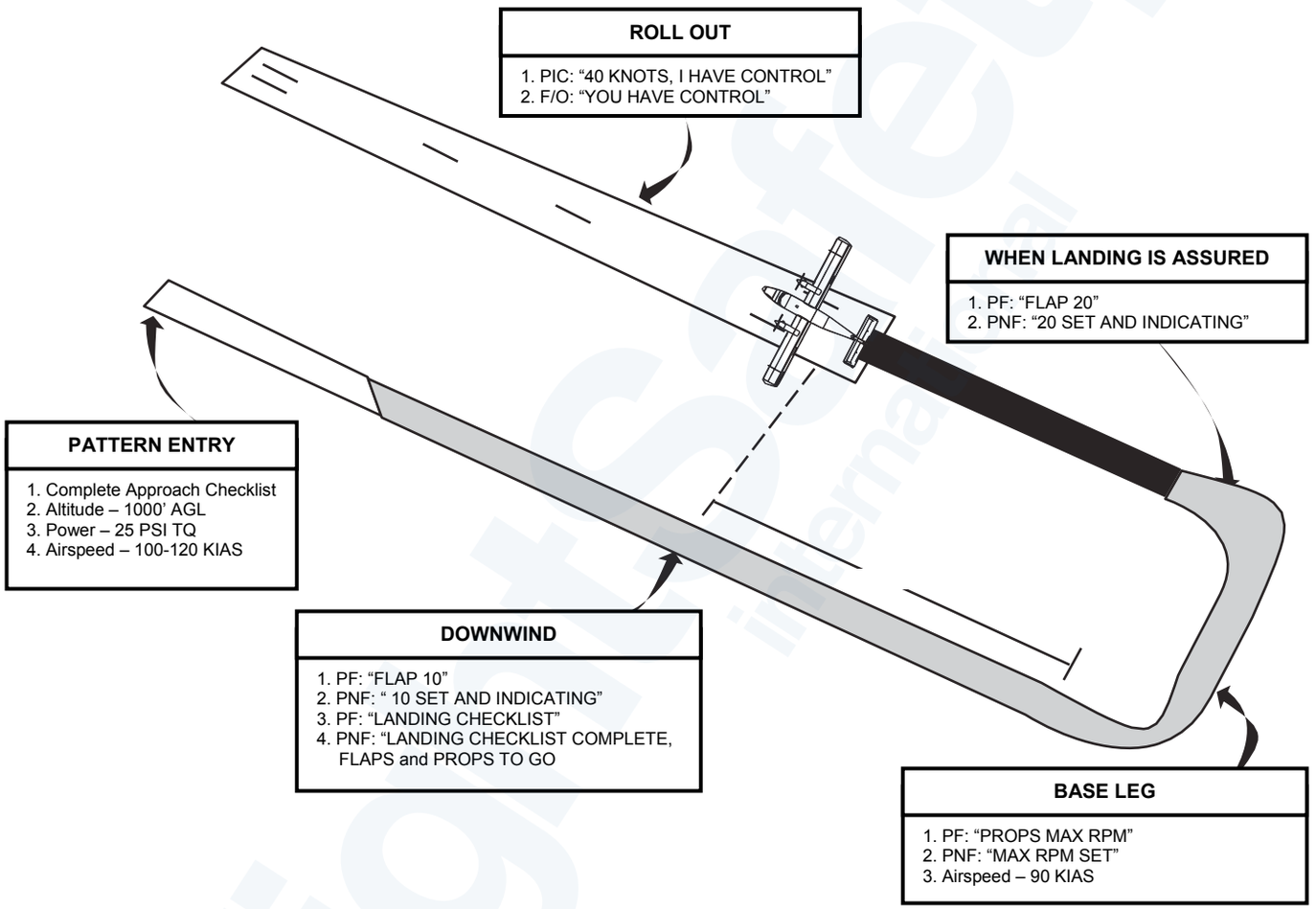

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Table 9: Landing Procedure

PF	PNF
"FLAP 10"	Confirms at or below V_{fe}, selects flap 10 **"10 SET AND INDICATING"**
"LANDING CHECKLIST"	Conducts the landing checklist **"LANDING CHECKLIST COMPLETE, FLAPS and PROPS TO GO"**
"PROPS MAX RPM"	Sets propeller levers to max RPM **"MAX RPM SET"**
When landing is assured **"FLAP 20"**	Confirms at or below V_{fe}, selects flap 20 **"20 SET AND INDICATING"**
After Landing	
PIC	**First Officer**
At approximately 40 KIAS and a safe taxi speed **"40 KNOTS, I HAVE CONTROL"**	**"YOU HAVE CONTROL"**
Once clear of runway **"AFTER LANDING CHECKLIST"**	Completes the After Landing Checklist **"AFTER LANDING CHECKLIST COMPLETE"**

NOTE

In order to reduce the runway landing length full flaps may be used. Adequate controllability during landing has been demonstrated using full flaps in crosswind components up to 20 knots measured at 6 feet (this is equivalent to 25 knots measured at tower height of 33 feet). This is the maximum crosswind experienced during crosswind trials and is not considered limiting.

PRECISION APPROACH

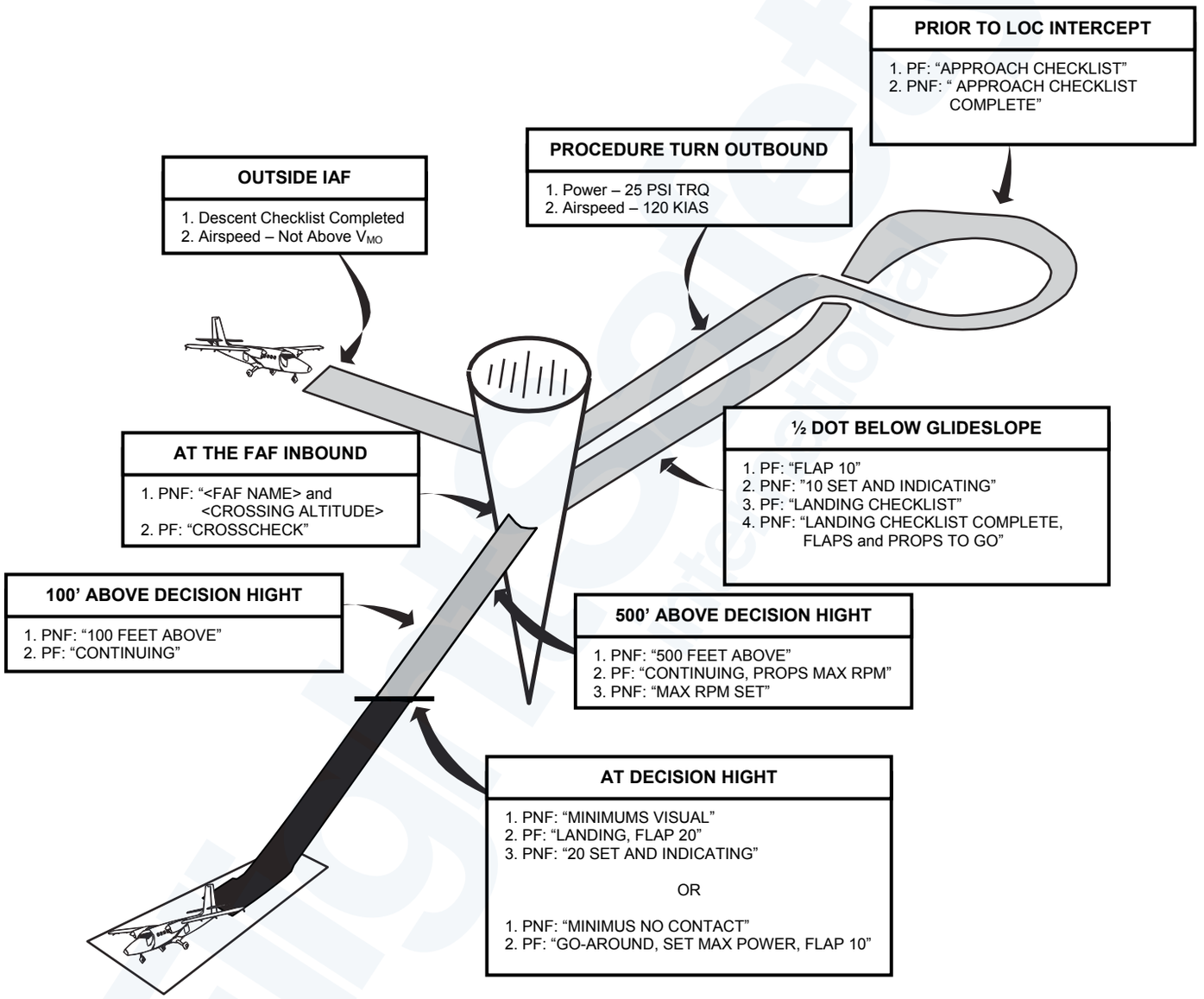

Table 10: Precision Approach and Landing Procedure

PF	PNF
After completion of the approach and landing briefing **"DESCENT CHECKLIST"**	Conducts the descent checklist **"DESCENT CHECKLIST COMPLETE"**
Prior to localizer intercept (localizer inbound)	
"APPROACH CHECKLIST"	Conducts the approach checklist **"APPROACH CHECKLIST COMPLETE"**
At approximately 1/2 DOT below glide path	
"FLAP 10"	Confirms at or below V_{fe}, selects flap 10 **"10 SET AND INDICATING"**
"LANDING CHECKLIST"	Conducts the Landing Checklist **"LANDING CHECKLIST COMPLETE, FLAPS and PROPS TO GO"** Sets Missed Approach Altitude
Outer Marker (or FAF) Inbound	
"CROSSCHECK"	**"<FAF NAME> and < CROSSING ALTITUDE>"**
Ensures one hand is on the power levers **"CONTINUING; PROPS MAX RPM"**	**"500 FEET ABOVE"** (minimums) Sets propeller levers to max RPM **"MAX RPM SET"** Quick review of missed approach procedure
"CONTINUING"	**"100 FEET ABOVE"** (minimums)
"LANDING, FLAP 20"	At decision height **"MINIMUMS VISUAL"** Confirms at or below V_{fe}, and selects flap **"20 SET AND INDICATING"**
If visual contact was not established	
"GO-AROUND, SET MAX POWER, FLAP 10"	**"MINIMUMS NO CONTACT"**

NON-PRECISION APPROACH

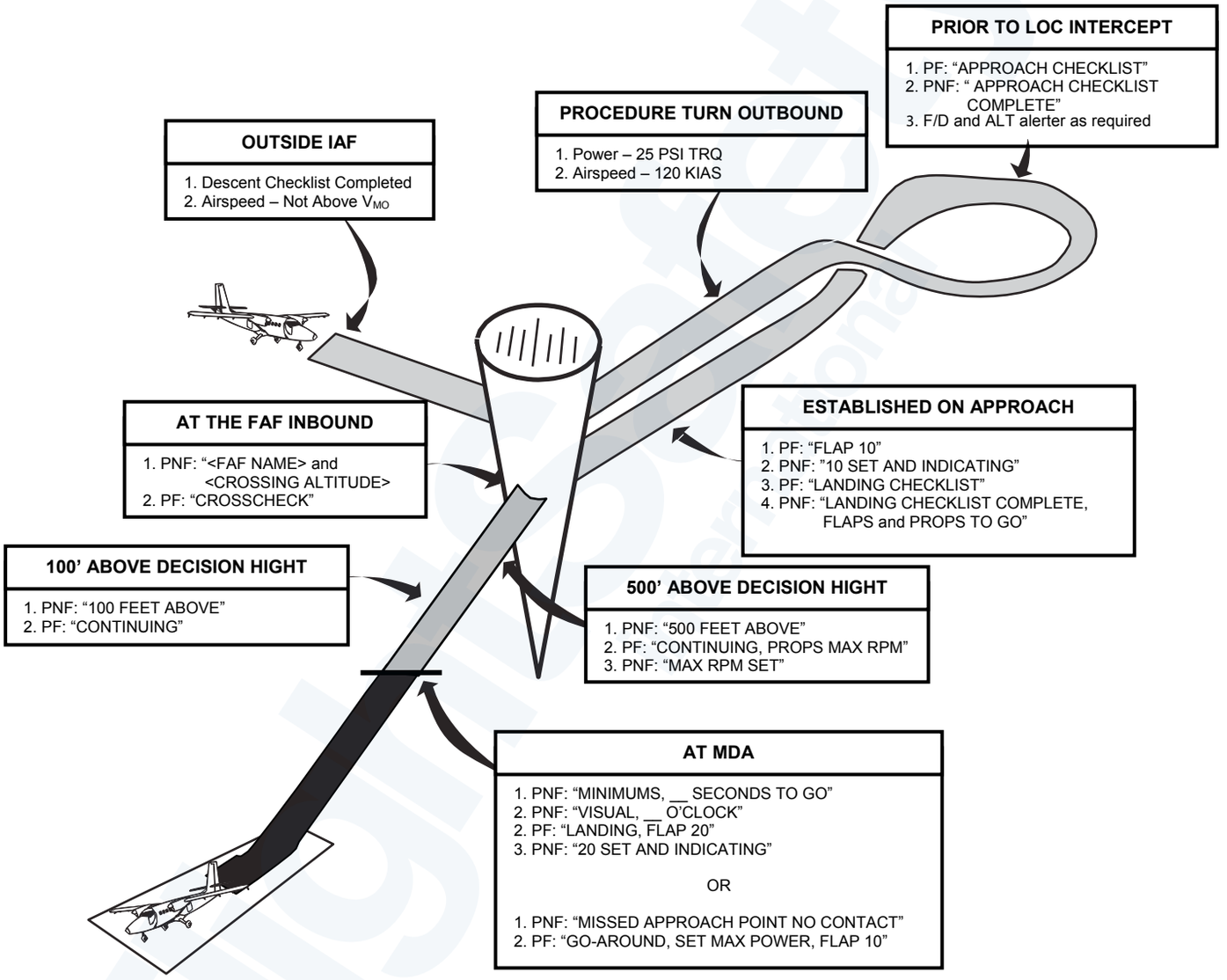

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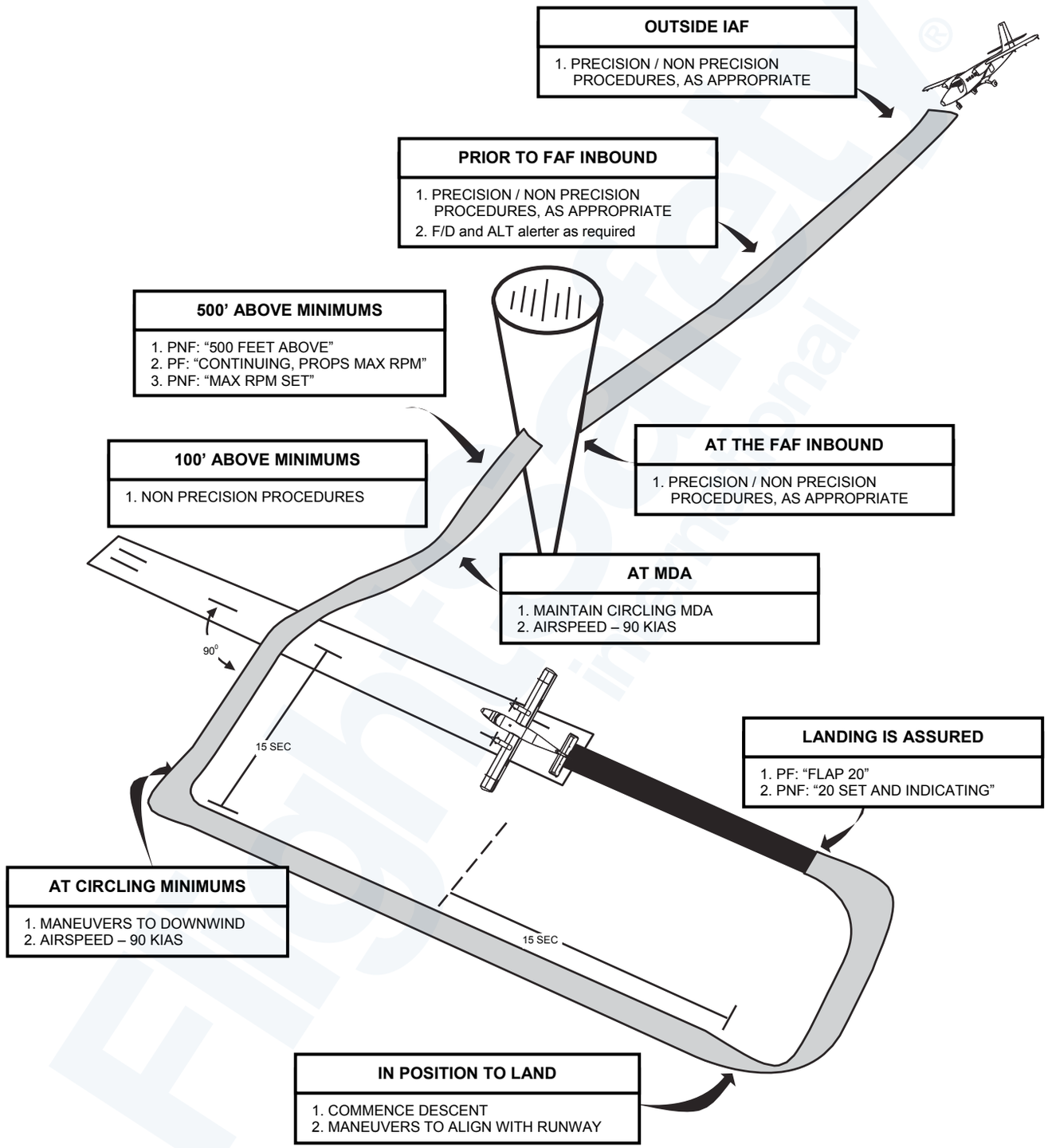
Table 11: Non-Precision Approach and Landing Procedure

PF	PNF
After completion of the approach and landing briefing **"DESCENT CHECKLIST"**	Conducts the descent checklist **"DESCENT CHECKLIST COMPLETE"**
Prior to intercepting course inbound	
"APPROACH CHECKLIST"	Conducts the approach checklist **"APPROACH CHECKLIST COMPLETE"**
Once established on approach and prior to crossing FAF	
"FLAP 10"	Confirms at or below V_{fe}, selects flap 10 **"10 SET AND INDICATING"**
"LANDING CHECKLIST"	Conducts the Landing Checklist **"LANDING CHECKLIST COMPLETE, FLAPS and PROPS TO GO"**
Outer Marker (or FAF) Inbound	
"CROSSCHECK"	Start timing if required **"<FAF NAME> and <CROSSING ALTITUDE>"**
Ensures one hand is on the power levers **"CONTINUING, PROPS MAX RPM"**	**"500 FEET ABOVE"** (minimums) Sets propeller levers to max RPM **"MAX RPM SET"** Quick review of missed approach procedure
"CONTINUING"	**"100 FEET ABOVE"** (minimums)
"LANDING, FLAP 20"	At MDA - Sets Missed Approach Altitude, and calls: **"MINIMUMS, __ SECONDS TO GO"** If runway environment is in sight **"VISUAL __ O'CLOCK"** Confirms at or below V_{fe}, and selects requested flaps **" 20 SET AND INDICATING"**
If visual contact was not established	
"GO-AROUND, SET MAX POWER, FLAP 10"	At the missed approach point **"MISSED APPROACH POINT NO CONTACT"**

CIRCLING APPROACH



Circling Approach Procedures

The PF shall brief the approach at the appropriate time with the addition of considerations to be taken for the specific circling approach to be conducted. Items to be addressed will include but are not limited to:

- Direction of circling
- Circling limitations or ATC instructions

Initial phase of the approach will be flown as per the SOP's for the particular approach.

Once at MDA with the runway environment in sight, the PF will look outside and maintain visual contact with the runway and the PNF will monitor the flight instruments and call any deviations in altitude, heading and airspeed.

It is recommended that the PF maneuver the aircraft for the circling procedure in such a manner as to keep the runway on the side of the PF.

At no time during the circling maneuver should both pilots be looking outside or inside at the same time.

Once the PF determines the aircraft is in a position to make a safe landing he/she will call **"LEAVING MDA"**.

Should the PF lose visual contact with the runway during the circling maneuver, the missed approach procedure will be immediately executed. If the maneuvering to landing has been initiated, and the crew is not in position to execute the published missed approach procedure, an initial climbing turn towards the center of the field is required. After initiating the climbing turn towards the center of the airfield, the crew can proceed with the published missed approach procedure.

MISSED APPROACH

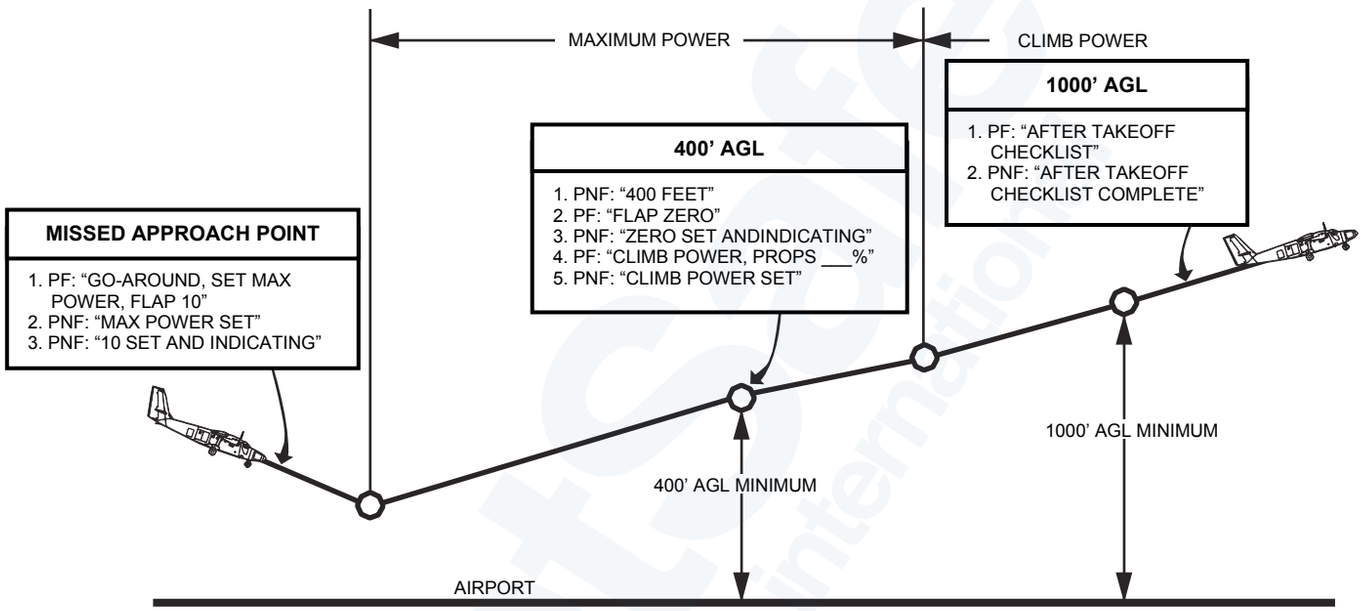


Table 12: Missed Approach Procedure

PF	PNF
At Missed Approach Point or at DH	
"GO-AROUND, SET MAX POWER, FLAP 10" Simultaneously advances power levers towards maximum power available, presses **GA** and rotates 8 - 10° nose up attitude	Sets prop levers to 96% N_P and sets power levers to maximum power **"MAX POWER SET"** Confirms flap at 10 **"10 SET AND INDICATING"**
Confirms speed V_2 or greater **" FLAP ZERO"** Select **HDG** and **CLIMB** mode on Flight Director	At 400 feet AGL or obstacle clearance height **"400 FEET"** or **<obstacle clearance altitude>** Confirms at or above V_2, selects Flap 0 **"ZERO SET AND INDICATING"**
Positions power levers toward climb power. **"CLIMB POWER, PROPS 91 <u>or</u> 75%"** **"AFTER TAKEOFF CHECKLIST"**	Sets climb power at 45 psi torque and stated RPM **"CLIMB POWER SET"** Completes the after takeoff checklist **"AFTER TAKEOFF CHECKLIST COMPLETE"**

NOTE

- During flaps retraction from 10° to 0 degrees, the PF should allow airspeed increase to 100 KIAS for best rate of climb or 87 KIAS for best angle of climb.
- The PNF will advise ATC of the missed approach once the aircraft is established in the climb.
- If carrying passengers the Captain will make a P.A. or request that the F/O complete it on his/her behalf.
- The PF will call for the AFTER TAKEOFF CHECKLIST at his or her discretion once the aircraft is established in the climb and is clear of busy terminal airspace.

BALKED APPROACH

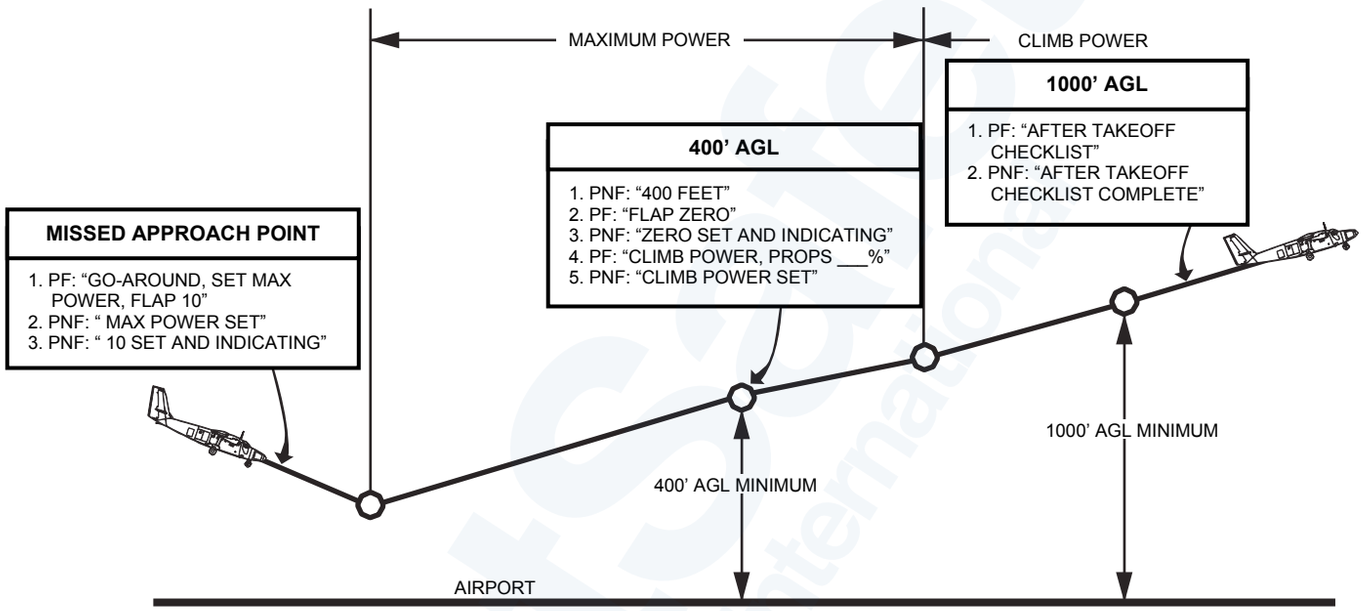


Table 13: Balked Approach Procedure

PF	PNF
"GO-AROUND, SET MAX POWER, FLAP 10" Simultaneously advances power levers towards maximum power available, presses **GA** and rotates to a nose up attitude in order to initiate climb	Sets prop levers to 96% N_P and selects flap lever to 10°. Immediately after moving flap lever, sets power levers to max power. **"MAX POWER SET"** **"10 SET AND INDICATING"**
Confirms speed V_2 or greater **" FLAP ZERO"** Selects **HDG** and **IAS** mode on Flight Director	At 400 feet AGL or obstacle clearance height **"400 FEET"** or **<obstacle clearance altitude>** Confirms at or above V_2, selects Flap 0 **"ZERO SET AND INDICATING"**
Positions power levers toward climb power. **"CLIMB POWER, PROPS 91 or 75%"** **"AFTER TAKEOFF CHECKLIST"**	Sets climb power at 45 psi torque and stated RPM **"CLIMB POWER SET"** Completes the after takeoff checklist **"AFTER TAKEOFF CHECKLIST COMPLETE"**

NOTE

- During flaps retraction from 10° to 0 degrees, the PF should allow airspeed increase to 100 KIAS for best rate of climb or 87 KIAS for best angle of climb.
- The PNF will advise ATC of the balked approach once the aircraft is established in the climb.
- If carrying passengers the Captain will make a P.A. or request that the F/O do it on his/her behalf.
- The PF will call for the AFTER TAKEOFF CHECKLIST at his or her discretion once the aircraft is established in the climb and is clear of busy terminal airspace.
- With flaps at 37 ½ °, pitch attitude in the go-around will be approximately 0° (level flight attitude).

CAUTION

With flaps at 37 ½ °, pitch in the go-around greater than 0° (level flight attitude) may cause a rapid decrease in airspeed and a possible stall.

After Landing

On the roll out the PIC will call 40 KIAS. If the First Officer is PF this call also indicates that the Captain is taking control of the aircraft.

Table 14: After Landing Procedure

PIC	First Officer
At approximately 40 KIAS and a safe taxi speed **"40 KNOTS, I HAVE CONTROL"**	**"YOU HAVE CONTROL"**
Once clear of runway **"AFTER LANDING CHECKLIST"**	Completes the After Landing Checklist **"AFTER LANDING CHECKLIST COMPLETE"**

Parking / Shut Down

While maneuvering in congested areas on the ramp the F/O will refrain from completing any paperwork until the aircraft is parked on the ramp.

As the aircraft approaches the ramp the Captain will request the taxi light OFF.

Once the aircraft is stopped, the Captain will set the parking brake on and call for the "**SHUTDOWN CHECKLIST".** After completion of the shut down checklist and after the last flight of the day, the Captain will call for the "**LAST FLIGHT CHECKLIST"**.

ABNORMAL / EMERGENCY OPERATIONS

The Abnormal / Emergency procedures checklist is designed to be used in conjunction with the Normal, Abnormal, Emergency Checklists and the AFM.

Each non-normal situation should be dealt with in the following sequence:

- Maintain aircraft control
- Identify the malfunction
- Complete memory items; written in the shaded box
- Complete checklist items specific to the malfunction
- Assess the status of the aircraft (warnings, cautions, notes and lost services)
- Determine landing precautions. This information is specific to the malfunction and is used to supplement the normal operations of the aircraft. The landing precautions must be reviewed as part of the approach briefing.
- Brief the passengers (avoid excessive details)

Following completion of the appropriate Abnormal or Emergency Checklist, the normal checklist will be used giving due regard to those items modified by the abnormality for the remainder of the flight.

NOTE

For failures not addressed in the abnormal or emergency checklist, refer to the Aircraft Flight Manual (AFM).

Ground Failures

Ground failures are defined as any malfunction that occurs on the ground prior to V_1 and after touchdown.

In the event of a ground failure, regardless of whether it happens while on the ramp, taxiing, or during takeoff, the primary objective of the crew is to stop the aircraft, assess the problem, take the appropriate action, and evacuate if required.

A takeoff shall be aborted for any Caution or Warning light prior to V_1. There are many reasons other than Caution or Warning lights for discontinuing a takeoff. It is therefore left to the discretion of the Captain as to what additional situations demand an aborted takeoff. At or above V_1, the takeoff will be continued regardless of the malfunction. If the PF believes the aircraft is not capable of attaining the required performance to safely fly, the decision to abort may be made above V_1 (this would be an absolute last resort).

If a rejected take-off becomes necessary, either pilot will make the call **"ABORT"**. The Captain will normally assume control below 40KIAS and bring the aircraft to a full stop. The PNF will advise ATC of the abort and the crew will then assess the situation. If the reason for the abort is an engine fire, the Captain will mute the fire bell first and then set the parking brake before completing the memory items for shutdown and evacuation. The F/O will advise ATC of the problem, request emergency equipment, state the number of persons on board and quantity of fuel.

ENGINE FAILURE/FIRE BELOW V_1

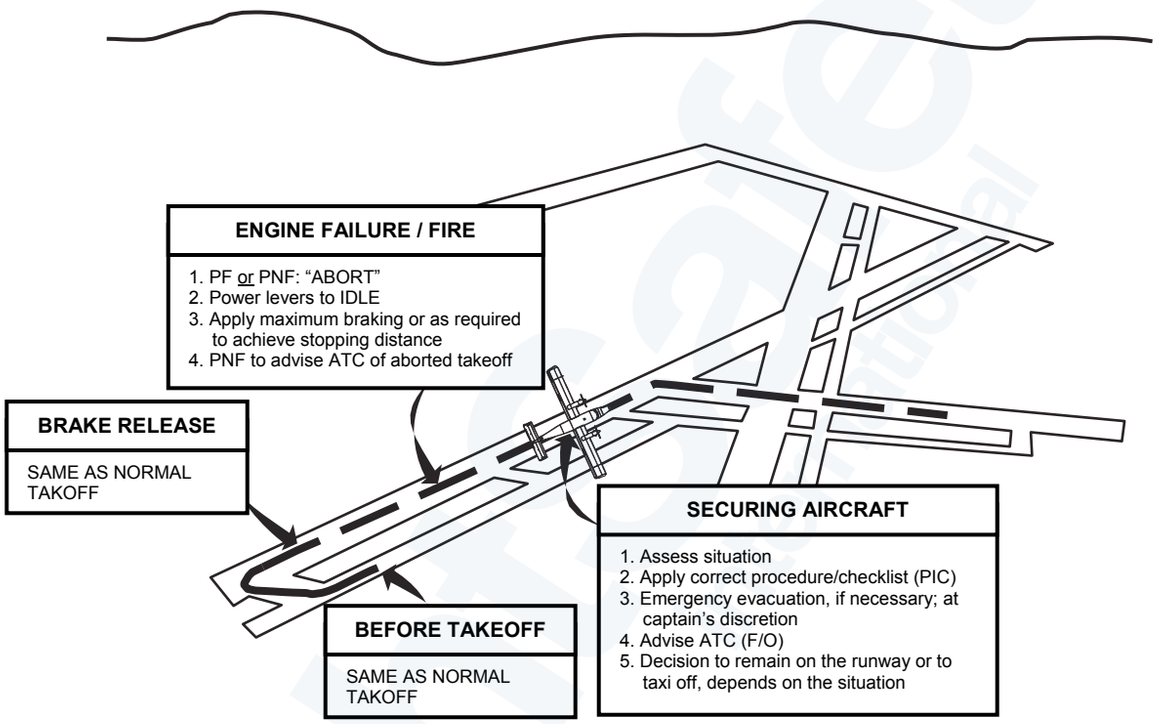


Table 15: Engine Failure/Fire Below V_1 Procedure

PF	PNF
Either Pilot will state **"ABORT"** and the Aborted Takeoff procedure is initiated	
Simultaneously **Power Levers**……**IDLE** **Brakes**…… **MAX (OR AS REQUIERD TO ACHIEVE STOPPING DISTANCE)**	Advises ATC of ABORT: **"<Aircraft Ident> ABORTING"**
Once the aircraft has stopped, the PIC will set the parking brake and the crew will assess the problem.	
If Engine Fire or Smoke is present	
PIC	**First Officer**
Fire Bell……MUTE **Parking Brake……...CONFIRM ON** **Power Levers……...BOTH IDLE** **Prop Levers……BOTH FEATHER** **Fuel Levers……...BOTH OFF** **Fuel OFF Switch (Affected Engine)……..OFF** **Fire Pull Handle (Affected Engine)…....PULL** **Boost Pumps……OFF** **DC Master Switch……..AS REQUIRED** **Fire Extinguisher……USE IF NEEDED** Confirms that ATC has been advised.	Advises ATC of: • Requirements for emergency equipment • Number of persons on board • Quantity of fuel • Any dangerous goods on board
PA – **"EVACUATE, EVACUATE, EVACUATE LEFT (or RIGHT) SIDE"** Once the cockpit is secure the PIC leaves the flight deck to assist with the evacuation	Leaves the flight deck to assist in the evacuation

Evacuation following Catastrophic Accident

If a catastrophic accident occurs which precludes any formal preparation of announcements any crewmember may initiate an evacuation.

When initiating an evacuation the following PA or shouted command will be made:

"EVACUATE EVACUATE EVACUATE LEFT/RIGHT SIDE"

This notifies other crewmembers and your passengers that you are initiating an evacuation.

Should the aborted Take-off or Abnormal / Emergency landing not require an evacuation, a PA stating **"LADIES AND GENTLEMEN THIS IS THE CAPTAIN SPEAKING - REMAIN SEATED - REMAIN SEATED"** shall be made immediately after the crew's assessment.

Flight Failures

Flight failures are defined as any malfunction that occurs at or above V_1 and prior to touch down.

During a flight failure, the primary responsibility of the crew is to control the airplane. Checklists must not be called for until the aircraft is under full control and in a steady state of flight. If a failure occurs at or above V_1, except if it is necessary for the safety of the flight, the crew will not execute any memory items or checklists until the aircraft has reached 400 feet or the obstacle clearance altitude.

In an extreme situation (such as an engine failure with the prop not feathering), the PNF will, as soon as posible, manually feather the affected propeller after confirmation from the PF. In any event, no action will be taken until the aircraft is under full control and in a steady state of flight.

If the PF states **"MAX POWER"**, the PNF will set or confirm the following settings:

- Prop levers 96% N_P; and
- Power levers - advance to the T_Q, T_5, or N_G limit (operating engine), whichever is reached first.

In the event of a flight failure, the crew will assess the problem. Once the nature of the problem has been established, PF will call for the appropriate memory items if applicable, e.g. **"RIGHT ENGINE FAILURE / ENGINE FIRE / SHUT DOWN CHECKLIST"**. The PNF will execute the memory items that are confirmed by the PF (**"challenge and response"**). When the memory items are complete, the PF will, at his/her discretion call for the appropriate emergency checklist. The PNF will execute the checklist items using the **"read and do"** method except for configuration and/or irreversible items which should be completed as **"challenge and response"**.

Once the checklist has been completed, the crew will advise ATC of the problem and declare an emergency if applicable. The Captain will advise the passengers of the nature of the problem and the intentions of the crew.

The PF must always be aware of the workload being place on the PNF. In any case the PF will conduct any necessary communications with ATC while the PNF is tasked with an abnormal situation such as a checklist or calculation.

Windshear Recognition and Recovery

Windshear is indicated by a rapid change in airspeed and/or vertical speed and it can be encountered at any phase of flight. The best windshear procedure is avoidance. Recognize the indications of potential windshear, then **AVOID**.

The key to recovery from windshear is to fly the aircraft so that is capable of a climb gradient greater then the windshear-induced loss of performance. Normally, the standard wind/gust correction factor (1/2 gust) will provide a sufficient margin of climb performance.

The windshear recovery maneuver is to be initiated when the crew determines that a substantial deviation in target airspeed and vertical speed poses a threat to the flight if immediate action is not taken.

Table 16: Windshear Recovery Procedure

PF	PNF
Upon Recognition of Windshear	
"WINDSHEAR, SET MAX POWER" Simultaneously advances power levers towards maximum power, presses **GA** and rotates to 8° - 10° nose up attitude	Sets prop levers to 96% N_P and sets power levers to maximum power **"MAX POWER SET"**
1. Do not change configuration if the vertical flight path is not under control. 2. If the aircraft is still descending, PF can request **"EMERGENCY POWER"** and smoothly increase pitch until descent is stopped and climb is established. Do not allow airspeed to decrease below SPEED AT 50 FT or BALKED LANDING CLIMB SPEED. If stall warning is encountered, immediately decrease pitch sufficiently to depart the stall-warning regime. 3. If required (i.e. ground contact is imminent) maintain the pitch attitude which extinguishes the STALL advisory light, until terrain contact is no longer a factor, then allow the aircraft to accelerate back to SPEED AT 50 FT or BALKED LANDING CLIMB SPEED. 4. Maintain the pitch attitude that achieves SPEED AT 50 FT or BALKED LANDING CLIMB SPEED. 5. When positively climbing through a safe altitude, complete the Balked Approach Procedure.	

NOTE

- The positive rate of climb should be verified on at least two (2) instruments.
- "**EMERGENCY POWER**" – is achieved by selecting prop levers to max and power levers full forward to the stop.

WARNING

Do not allow the airspeed to decrease below the target airspeed. Unlike a jet aircraft, it is not permissible to continue to increase pitch attitude until stall warning occurs. This is because at high power settings the propeller slipstream creates additional lift on the airframe, which is not accounted for in the stall warning activation point. As a result, the aircraft could reach a dangerously low indicated airspeed before the STALL advisory light illuminates.

IN-FLIGHT ACTIVATION OF TAWS WARNING

(TAWS Annunciator and Continuous “Pull Up, Pull Up” Voice Message)

1. Autopilot…… ……..DISENGAGE
2. Wings…… ……... .LEVEL
3. Power…… ……SET MAX
4. Airspeed…… …… 87 KIAS
5. Flaps…… ……RETRACT
6. Continue climb at 87 KIAS until all Visual and Aural Warnings cease or terrain clearance is assured.

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POWER LOSS DURING TAKEOFF (AT or ABOVE V1) – TAKEOFF CONTINUED

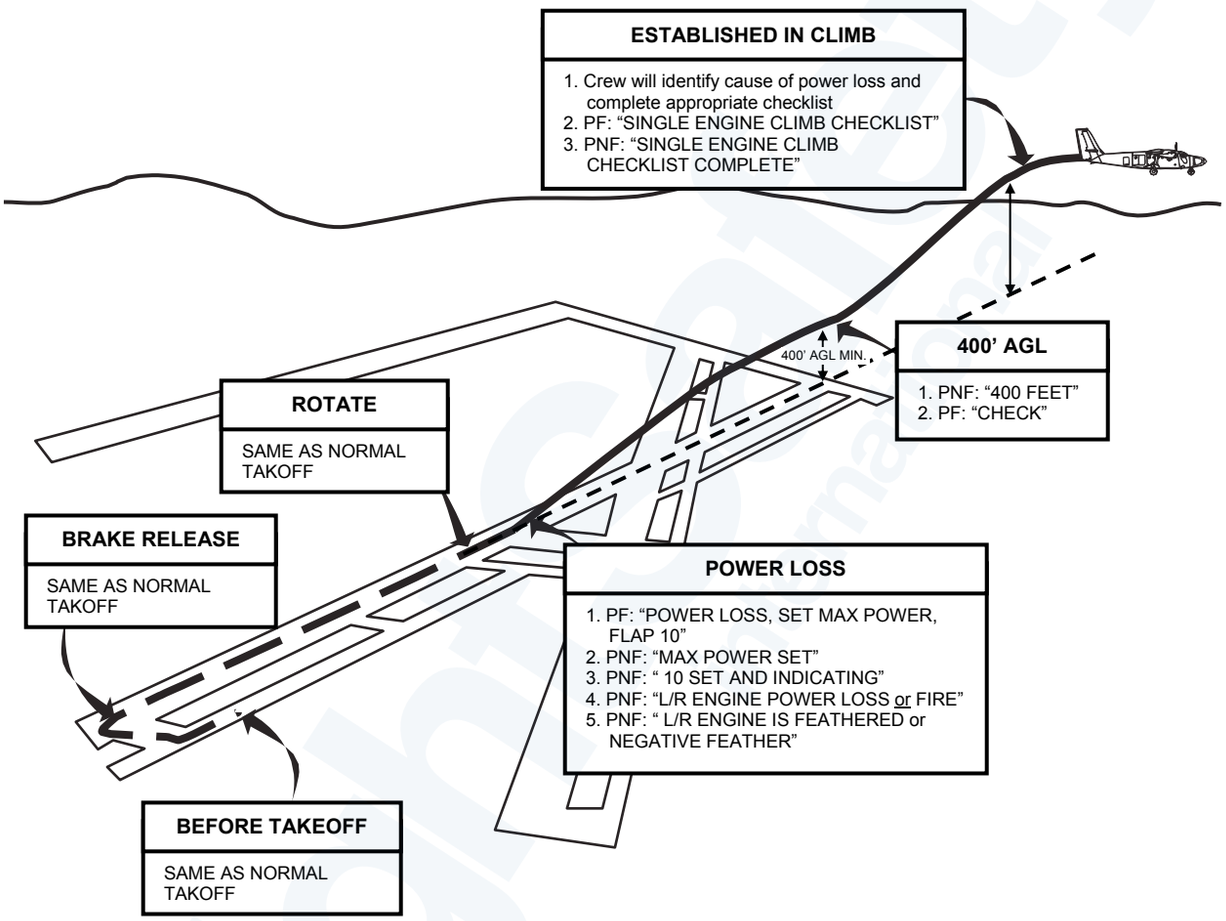

Table 17: Power Loss During Takeoff – Takeoff Continued Procedure

PF	PNF
At V_r rotates to approx. 8 - 10° nose up attitude	At V_1/V_r **"V_1 ROTATE"**
At first sign of power loss **"POWER LOSS, SET MAX POWER, FLAP 10"**	Confirms that prop levers are set to 96% N_P and power levers at maximum **"MAX POWER SET"** Confirms flap at 10. **"10 SET AND INDICATING"**
Establishes and Maintains **V_2**	**"L / R ENGINE POWER LOSS (or FIRE)"** Confirms that affected engine has feathered **"L / R ENGINE IS FEATHERED or NEGATIVE FEATHER"**
If propeller on affected engine did not feather	
"MANUAL FEATHER L/R" Confirms that PNF has selected correct lever **"CONFIRMED, FEATHER"**	Identifies failed propeller lever and positions his/her hand on it **"L / R PROP LEVER"** Moves selected lever to feather.
Confirms at V_2 speed **"CHECK"**	At 400 feet AGL or obstacle clearance altitude **"400 FEET"**
Crew will identify cause of power loss and complete appropriate checklist	
"SINGLE ENGINE CLIMB CHECKLIST"	Completes single engine climb checklist **"SINGLE ENGINE CLIMB CHECKLIST COMPLETE"**

CAUTION

Do not retard the power lever of failed engine until auto feathering is complete, otherwise, the propeller will unfeather.

NOTE

The PF will call for the SINGLE ENGINE CLIMB CHECKLIST at his/her discretion once the aircraft is established in the climb and is clear of busy terminal airspace.

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Table 18: Engine Failure, Fire or Shutdown in Flight Procedure

PF	PNF
At first sign of power loss **"POWER LOSS, SET _____ or MAX POWER"** If PF does not think that max power is needed he/she can request specific power with the prop setting at 96% N_P on the operating engine	Confirms that operating engine prop is set at 96% N_P and the power levers are set to requested setting **"_____ SET or MAX POWER SET"**
Once full control of the aircraft is established, the crew will identify the cause of power loss. If a decision was made to secure the affected engine the crew will proceed as follows:	
"ENGINE FAILURE/ENGINE FIRE/SHUTDOWN the L/R ENGINE"	Proceeds with Engine Fire Instructions, which are listed on emergency shut off panel
Confirms correct power lever **"CONFIRMED, IDLE"**	Positions hand on appropriate power lever **"L / R POWER LEVER"** Positions confirmed power lever to idle
Confirms correct prop lever **"CONFIRMED, FEATHER"**	Positions hand on appropriate prop lever **"L / R PROP LEVER"** Positions confirmed prop lever to feather
Confirms correct fuel lever **"CONFIRMED, OFF"**	Positions hand on appropriate fuel lever **"L / R FUEL LEVER"** Pulls confirmed fuel lever to OFF
Confirms correct fuel emergency switch **"CONFIRMED, OFF"**	Positions hand on appropriate fuel emergency switch **"L / R FUEL EMERGENCY"** Selects confirmed switch to OFF
Confirms correct fire pull handle **"CONFIRMED, PULL"**	If Engine Fire: Positions hand on appropriate fire pull handle **"L / R FIRE PULL HANDLE"** Pulls confirmed fire pull handle
Confirms correct boost pump switch **"CONFIRMED, OFF"**	Positions hand on appropriate boost pump switch **"L / R BOOST PUMP"** Turns OFF confirmed boost pump switch
Once the engine is shutdown and at a minimum safe altitude	
"ENGINE FAILURE / ENGINE FIRE / SHUTDOWN CHECKLIST"	Completes ENGINE FAILURE / ENGINE FIRE / SHUTDOWN CHECKLIST **"ENGINE FAILURE / ENGINE FIRE / SHUTDOWN CHECKLIST COMPLETE"**

NOTE

If there was no engine fire on the failed engine crew does not need to pull FIRE PULL HANDLE as this action will automatically discharge fire bottle.

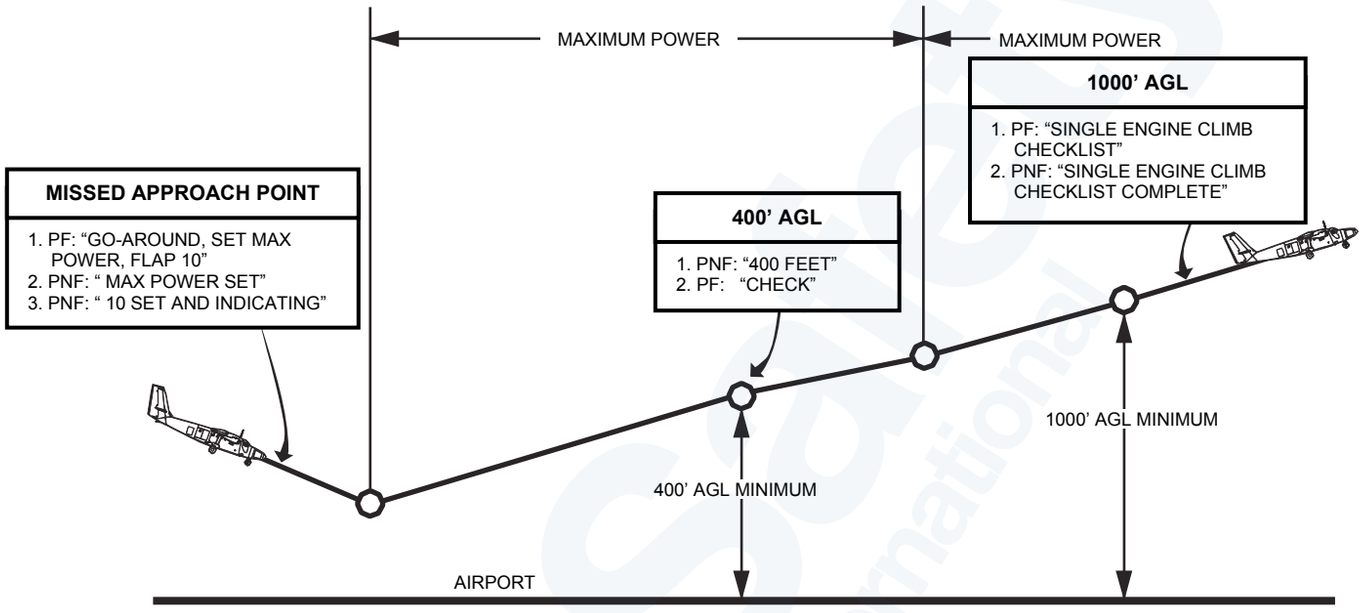
Table 19: Single Engine Approach and Landing Procedure

PF	PNF
After completion of the approach and landing briefing **"DESCENT CHECKLIST"**	Conducts the descent checklist **"DESCENT CHECKLIST COMPLETE"**
Once established on approach and prior to crossing the FAF	
"FLAPS 10"	Confirms at or below V_{fe}, selects flap 10 **"10 SET AND INDICATING"**
"SINGLE ENGINE APPROACH and LANDING CHECKLIST"	Conducts the S/E approach and landing checklist **"SINGLE ENGINE APPROACH and LANDING CHECKLIST COMPLETE"**
Outer Marker (or FAF) Inbound	
"CROSSCHECK"	**"<FAF NAME> and <CROSSING ALTITUDE>"**
Ensures one hand is on the power levers **"CONTINUING; PROPS MAX RPM"**	**"500 FEET ABOVE"** (minimums) Sets propeller RPM to max RPM **"MAX RPM SET"** Quick review of missed approach procedure
"CONTINUING"	**"100 FEET ABOVE"** (minimums)
"LANDING, FLAP 10"	At decision height for precision approach **"MINIMUMS VISUAL"** At MDA for non-precision approach **"MINIMUMS, ___SECONDS (or NM) TO GO"** If runway environment is in sight **"VISUAL ___ O'CLOCK"** Confirms flaps are indicating 10 **" 10 SET AND INDICATING"**
If visual contact was not established	
"GO-AROUND SET MAX POWER, FLAP 10"	**"MINIMUMS, NO CONTACT" or "MISSED APPROACH POINT, NO CONTACT"**

WARNING

Although DHC-6 is approved and capable of landing with full flaps during single engine operations, go-around on one engine must not be attempted at airspeeds below V_{MC} or if flaps are at an angle greater than 10°.

SINGLE ENGINE MISSED APPROACH



NOTE

Single Engine Max Continuous power is limited by 50 psi of torque or 725°C T_5.

Table 20: Single Engine Missed Approach Procedure

PF	PNF
At Missed Approach Point or at DH	
"GO-AROUND, SET MAX POWER, FLAP 10" Simultaneously advances power lever towards maximum power, presses **GA** and rotates 3-4° nose up attitude in order to maintain V_2 speed	Sets prop levers to 96% N_P and sets power levers to maximum power **"MAX POWER SET"** Confirms flaps at 10 **"10 SET AND INDICATING"**
Confirms at V_2 speed **"CHECK"** Selects **HDG** and **IAS** mode on Flight Director	At 400 feet AGL or <obstacle clearance altitude> **"400 FEET"** or **<altitude>**
"SINGLE ENGINE CLIMB CHECKLIST"	Completes single engine climb checklist **"SINGLE ENGINE CLIMB CHECKLIST COMPLETE"**

NOTE

- In order to achieve published climb performance PF should maintain V_2 with flaps left at 10 degrees. The AFM stipulates that single engine climb is achieved with flaps at 10°.
- The PNF will advise ATC of the missed approach once the aircraft is established in the climb.
- If carrying passengers the Captain will make a P.A. or request that the F/O do it on his/her behalf.
- The PF will call for the SINGLE ENGINE CLIMB CHECKLIST at his or her discretion, once the aircraft is established in the climb and is clear of busy terminal airspace.

MAIN MENU

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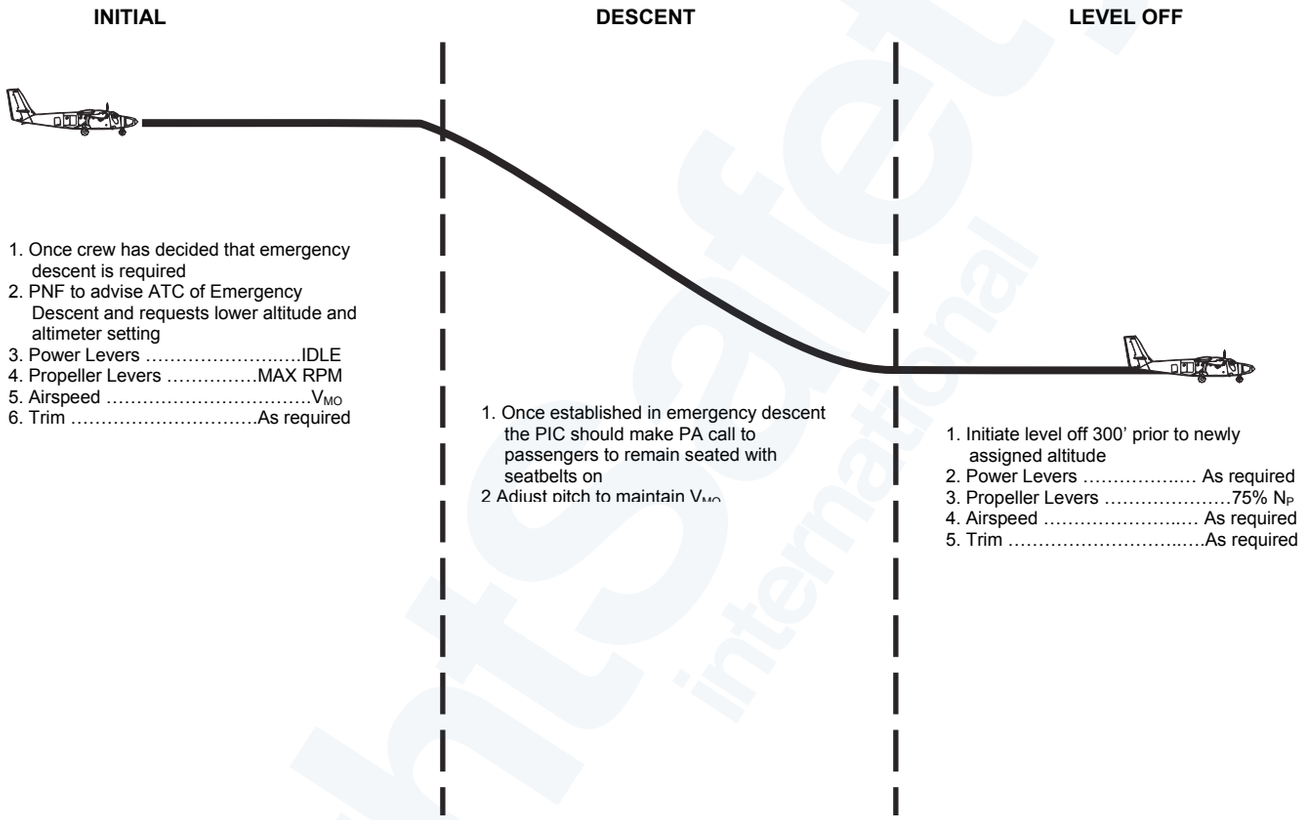
EMERGENCY DESCENT



NOTE

If structural integrity is in doubt, limit airspeed as much as possible and avoid high maneuvering loads.

Table 21: Emergency Descent Procedure

PF	PNF
Once crew has decided that emergency descent is required	
Power Levers ……..……..……**IDLE** **Propeller Levers**……...……...**MAX RPM** **Airspeed** ……..……V_{MO} **Trim**…..……..**As required**	Contacts ATC, to declare emergency and requests lower altitude and altimeter setting Sets altitude selector to assigned altitude
Once established in descent PIC should make PA to passengers to remain seated with seatbelts on	
Recovery	
At 300' prior to assigned altitude **Power Levers** ……..……..**As required** **Propeller Levers**……...……..**75% N_P** **Airspeed** ……...**As required** **Trim**…..……..**As required**	

Normal operating limit and Maximum Structural Operating Speed (V_{MO})	
Altitude Speed	
Sea Level to 6,700 ft	166 KIAS
10,000 ft	156 KIAS
15,000 ft	141 KIAS
20,000 ft	126 KIAS
25,000 ft	112 KIAS

CAUTION

Maximum Operating Speed shall not be deliberately exceeded in any regime of flight.

FLIGHT TRAINING PROCEDURES

Overview

The objective of these maneuvers are to familiarize the pilot with airplane handling characteristics and to help improve the instrument cross check.
The following exercises will be covered:

- Steep Turns
- Clean Configuration Stall
- Takeoff Configuration Stall
- Landing Configuration Stall

For the purpose of steep turns and stall exercises, it is recommended that pilots set 35 psi of torque and 75% N_P prior to start of the steep turn and after full recovery from each stall sequence.

It is not mandatory but is strongly recommended that prior to start of each maneuver PF brief the PNF on the plan of action for the exercise that he/she will be undertaking.

Steep Turns

Description

Steep Turns (45° of bank) will be practiced in both directions at 120 KIAS with the propeller levers set at 75% N_P. During practice, you will observe that bank angles of 30° or less require little or no backpressure to maintain level flight. Beyond 30° of bank, apply backpressure, as required to maintain altitude, and increase torque, as required to maintain airspeed.

Entry

Stabilize the airplane in trim at the desired speed, heading and altitude. Enter the steep turn with the same roll rate as a normal turn. As the bank angle is increased apply backpressure as required to maintain altitude. Through 30° of bank increase power as required to maintain airspeed (add approximately 5 to 8 psi of torque).

During Turn

Maintain a rapid scan so that deviations will be detected early enough to require only small corrections.

Rollout

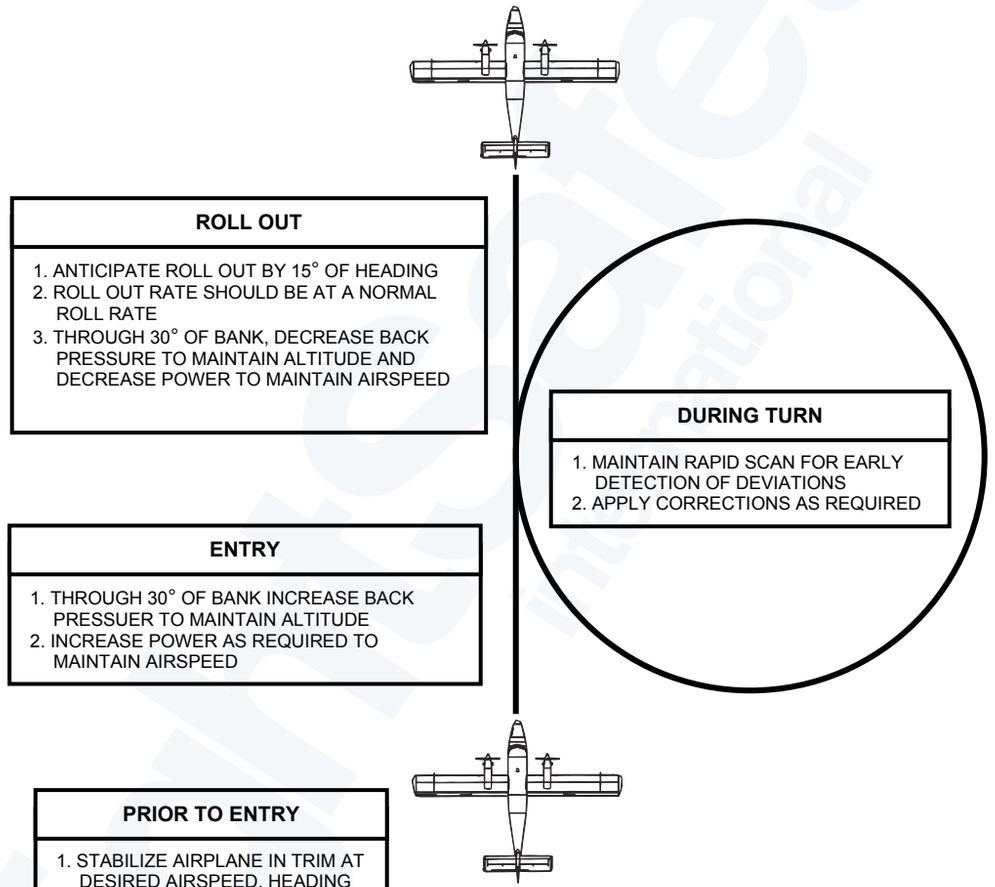
Rollout should be initiated 10° to 15° prior to the target heading. Roll out of the turn at the same rate as a normal turn. As the bank angle is decreased reduce backpressure as required to maintain altitude. Through 30° of bank decrease power as required to maintain airspeed.

Completion Standard

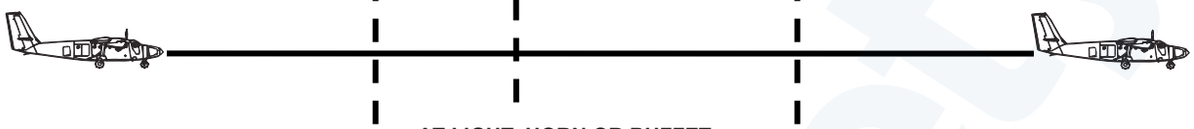
For the purposes of determining proficiency, two 360-degree steep turns (one in each direction) will be accomplished to the following standard:

	Airspeed (120 KIAS)	+/- 10 KIAS
	Angle of Bank (45°)	+/- 5°
Altitude	+/-	100 ft
H	eading +	/- 10°

STEEP TURN PROCEDURE



CLEAN CONFIGURATION STALL



AT LIGHT, HORN OR BUFFET

INITIAL CONDITION:

1. Set speed bugs 90
   120
2. Flaps 0°
3. Props 75%N_P
4. PWR IDLE
5. Maintain HDG and Altitude
6. Stop trimming once speed reaches V_{ref}

RECOVERY:

1. Props 96% N_P
2. PWR MAX
3. Flaps 10°
4. Maintain HDG and Altitude
5. Speed 90 KIAS
6. Flaps 0°

COMPLETION:

1. Maneuver complete at 120 KIAS
2. PWR 35 psi
3. Props 75% N_P
4. Maintain HDG and Altitude

MAIN MENU
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Figure 22: Approach to stall – Clean configuration

PF	PNF
Beginning of maneuver	
Upon completion of the briefing. Reduces power levers toward idle power. **"SET IDLE POWER"**	Places hand on the power levers to set 0 psi **"IDLE POWER SET"**
Maintains heading and altitude as the aircraft is slowing down. Stops trimming once speed reaches V_{ref}	Calls any deviation in heading and altitude
At first indication of stall	
Advances power levers towards maximum power **"STALL, SET MAX POWER, FLAP 10"**	Sets prop levers to 96% N_P and sets power levers to maximum power **"MAX POWER SET"** Sets flap lever to flap 10. **"10 SET"**
Flies the airplane out of the stall while maintaining present altitude and heading **"FLAP ZERO"**	Observes 90 KIAS on airspeed indicator **"SPEED 90"** Selects flaps zero **"ZERO SET AND INDICATING"**
Flies the airplane out of the stall while maintaining altitude and heading. Positions power levers toward cruise power. **"SET CRUISE POWER"**	Observes 120 KIAS on airspeed indicator **"SPEED 120"** Sets power levers to 35 psi and sets prop levers to 75% N_P. **"CRUISE POWER SET"**

NOTE

- Decrease speed approximately 1 KIAS per second during stall entry
- Stop trimming the aircraft once the speed is at or below V_{ref}. Trimming below V_{ref} speed will develop pitch up moment too great to control during the recovery.
- Pitch attitude prior to stall warning horn may be approximately 12º nose up
- Stall warning horn should sound approximately 4-9 KIAS above buffet

TAKEOFF CONFIGURATION STALL

INITIAL CONDITION:

1. Set Speed bugs 90
   120
2. Flaps 10°
3. Props 96%N_P
4. PWR 10 psi
5. TURN 20° Bank
6. Pitch to an attitude that will reduce airspeed by 1 Knot/Sec (approx 8°)
7. Stop trimming once speed reaches V_{ref}

RECOVERY:

1. Props 96% N_P
2. PWR MAX
3. Flaps 10°
4. Maintain HDG and Altitude
5. Speed 90 KIAS
6. Flaps 0°

COMPLETION:

1. Maneuver complete at 120 KIAS
2. PWR 35 psi
3 Props 75% N_P
4. Maintain HDG and Altitude

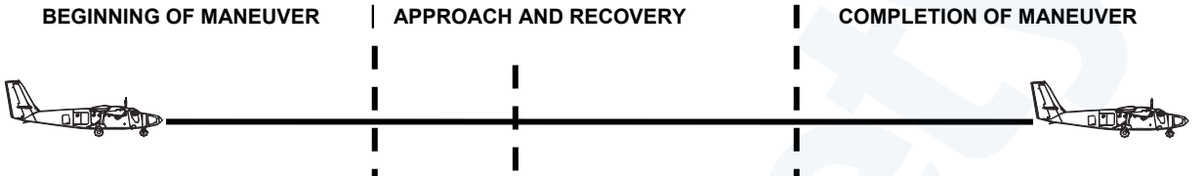
Figure 23: Approach to stall – Takeoff configuration

PF	PNF
Beginning of maneuver	
Upon completion of the briefing, confirms at or below 103 KIAS. **"FLAP 10"**	Confirms at or below 103 KIAS, selects flaps 10. **"10 SET AND INDICATING"**
"PROPS MAX RPM"	Sets prop levers to 96% N_P. **"MAX RPM SET"**
Reduces power levers toward 10 psi. **"SET POWER 10 psi."**	Places hand on the power levers to set 10 psi. **"POWER SET"**
Banks the aircraft in a 20° bank turn and pitches nose up into the attitude that will reduce airspeed by 1 Knot/Sec. (approx. 8°). Stops trimming once speed reaches V_{ref}	
At first indication of stall	
Simultaneously levels the wings and advances power levers towards maximum power. **"STALL, SET MAX POWER, FLAP 10"**	Sets prop levers to 96% N_P and sets power levers to maximum power. **"MAX POWER SET"** Confirms flaps set to 10. **"10 SET"**
Flies the airplane out of the stall while maintaining present altitude and heading. **"FLAP ZERO"**	Observes 90 KIAS on airspeed indicator **"SPEED 90"** Selects flaps 0. **"ZERO SET AND INDICATING"**
Positions power levers toward cruise power. **"SET CRUISE POWER"**	Observes 120 KIAS on airspeed indicator **"SPEED 120"** Sets power levers to 35 psi and sets prop levers to 75% N_P. **"CRUISE POWER SET"**

NOTE

Stop trimming the aircraft once the speed is at or below V_{ref}. Trimming below V_{ref} speed will develop pitch up moment too great to control during the recovery.

LANDING CONFIGURATION STALL



AT HORN OR BUFFET

INITIAL CONDITION:

1. Set speed bugs 90
   120
2. PWR 25 psi
3. Flaps 10°
4. Props 96%N_P
5. Flaps FULL
6. PWR IDLE
7. Maintain HDG and Altitude
8. Stop trimming once speed reaches V_{ref}

RECOVERY:

1. Props 96% N_P
2. PWR MAX
3. Flaps 10°
4. Maintain HDG and Altitude
5. Speed 90 KIAS
6. Flaps 0°

COMPLETION:

1. Maneuver complete at 120 KIAS
2. PWR 35 psi
3 Props 75% N_P
4. Maintain HDG and Altitude

Figure 24: Approach to stall – Landing configuration

PF	PNF
Beginning of maneuver	
Upon completion of the briefing Confirms at or below 103 KIAS **"FLAP 10"**	Confirms at or below 103 KIAS, selects flap 10 **"10 SET AND INDICATING"**
"PROPS MAX RPM"	Sets prop levers to 96%N_P **"MAX RPM SET"**
Confirms at or below 93 KIAS **"FULL FLAP"**	Confirms at or below 93 KIAS, selects full flap **"FUL FLAP SET AND INDICATING"**
Reduces power levers toward idle power. **"SET IDLE POWER"**	Places hand on the power levers to set 0 psi **"IDLE POWER SET"**
Maintains heading and altitude as the aircraft is slowing down. Stops trimming once speed reaches V_{ref}	Calls any deviation in heading and altitude
At first indication of stall	
Advances power levers towards maximum power **"STALL, SET MAX POWER, FLAP 10"**	Sets prop levers to 96% N_P and sets power levers to maximum power **"MAX POWER SET"** Sets flap lever to flap 10 **"10 SET"**
Flies the airplane out of the stall while maintaining present altitude and heading **"FLAP ZERO"**	Observes 90 KIAS on airspeed indicator **"SPEED 90"** Selects flaps 0 **"ZERO SET AND INDICATING"**
Positions power levers toward cruise power. **"SET CRUISE POWER"**	Observes 120 KIAS on airspeed indicator **"SPEED 120"** Sets power levers to 35 psi and sets prop levers to 75% N_P. **"CRUISE POWER SET"**

CAUTION

In a go-around with flaps extended, the nose will point below the actual flight path. Pilots should therefore maintain the recommended go-around airspeed (V_2).

NOTE

Stop trimming the aircraft once the speed is at or below V_{ref}. Trimming below V_{ref} speed will develop pitch up moment too great to control during the recovery.

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