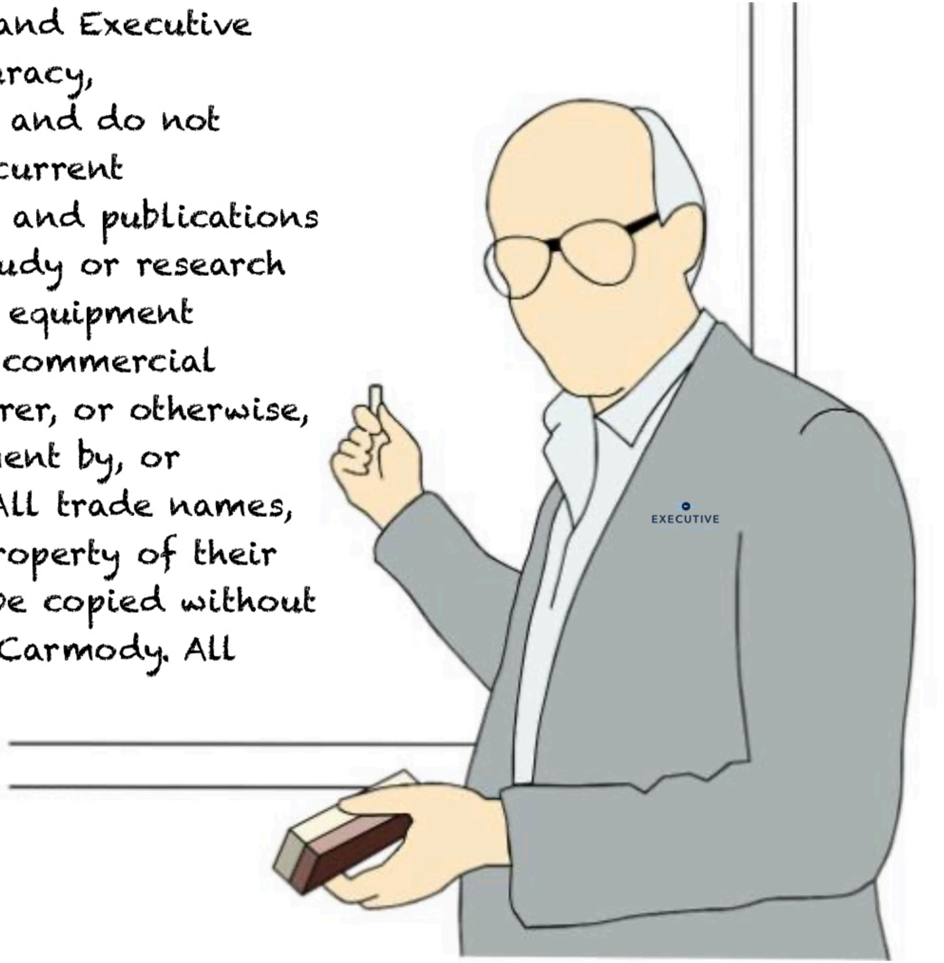
CESSNA 500 TRAINING GUIDE



SAFEPILOT
PUBLISHING

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LIMITATIONS - GENERAL

	UN 0001-0349	UN 0349-0689	UN 0689+
Engine Type	Pratt and Whitney JT15D-1	Pratt and Whitney JT15D-1A	Pratt and Whitney JT15D-1B
Engine Thrust	2,200 lbs.	2,200 lbs.	2,200 lbs.
Max Press Differential	8.0 psi	8.5 psi	8.8 psi
Seal Level Cabin To	22,040 ft.	22,040 ft.	22,040 ft.
8,000 ft. Cabin Altitude @	41,000 ft.	41,000 ft.	41,000 ft.
Max Operating Altitude	35,000 ft.	41,000 ft.	41,000 ft.
Typical Cruise Altitudes	FL 310 – 390	FL 250 – 410	FL 250 – 410
Maximum Take-off and Landing Altitude	14,000’	14,000’	14,000’
Minimum Crew	2 (Model 500)		1 (Model 501) Mandatory equipment operating: Autopilot with approach coupling Flight Director Boom microphone or headset microphone Transponder ident switch on pilot control wheel

LIMITATIONS - WEIGHT

	UN 0001 to 0302	UN 0303+
Max Ramp	11,650 lbs.	12,000 lbs.
Max Take-off	11,500 lbs.	11,850 lbs.
Max Landing	11,000 lbs.	11,350 lbs.
Max Zero Fuel, Standard	8,400 lbs.	8,400 lbs.
Max Zero Fuel, Optional	9,500 lbs. 10,500 lbs. (UN 0001-0349)	9,500 lbs.

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LIMITATIONS - SPEED

	UN 0001 to 0349	UN 0350+
VMCG	55 K	55 K
VMCA	Below Stall	Below Stall
VFE 15°	202 K	202 K
VFE Full Extension	176 K	176 K
VLO/VLE	176 K	176 K
VLO (extend)	176 K	176 K
VLO (retract)	176 K	176 K
VLE	176 K	176 K
VMO < 14,000’	262 K	262 K

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LIMITATIONS - SPEED

	UN 0001 to 0349	UN 0350+
VMO 14,000 to 26,000’	289 K at 8,400 lbs.	n/a
VMO 14,000 to 28,000’	277 K at 9,500 lbs.	277 K at 8,400 lbs.
VMO 14,000 to 30,500’	262 K at 10,500 lbs.	262 K at 9,500 lbs.
MMO > VMO	.705 Mach	.705 Mach
Best Glide	125 K (UN 1-0349	120 K (UN 0349+)
Max Tire Speed	165 K	165 K
Max Autopilot Speed	VMO/MMO	VMO/MMO
Min Speed in Icing	160 K	160 K

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LIMITATIONS - ENGINE

Bypass Ratio	3.3 to 1
Maximum Fan (N1): -1	99%
Maximum Fan (N1): -1A	102.1%
Maximum Fan (N1): -1B	103.4%
Maximum Fan (N2)	95%
Maximum ITT	
Start	500°C (5 sec)
Take-Off	700°C (5 sec)
Continuous	680°C (5 sec)
Cruise	670°C (5 sec)
Idle	580°C (5 sec)

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LIMITATIONS - GENERAL

Starter Limit	3 attempts in 30 min (30 sec rest between)
Battery Limit	3 engine starts / hour
Min Oil Temp	-40°C (max 85% N_2 until oil temp > 10°C)
Min Battery Voltage	24 VDC
Generator Load (<= 35,000’)	400 A
Generator Load (>35,000’)	325 A
EPU	28 VD 800-1,000-Amp max
Min OAT battery start	-18°C
Tailwind landing limit	10 K
Crosswind landing limit	25 K

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LIMITATIONS - GENERAL

Air Conditioner	OFF for Start
Anti-Ice Additive	Must use EGME anti-icing additive. 20 fl oz. per 104 US gallon (maximum) to 260 US gallon (minimum). Not to exceed . 06 to .15% per volume DIEGME anti-icing additive. 20 fl oz. per 104 US gallon (maximum) to 156 US gallon (minimum). Not to exceed . 06 to .15% per volume.
Max Fuel Imbalance	800 lbs.
Jet A	-29°C to +48°C
Jet A-1	-29°C to +48°C
Jet A-2	-29°C to +48°C
Jet B	-54°C to +48°C
Jet 4	-54°C to +48°C
Jet 5	-29°C to +48°C
Jet 8	-29°C to +48°C
Avgas	-54°C to +32°C

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LIMITATIONS - GENERAL

Avgas	Avgas is acceptable under the following conditions: Maximum 50 hours If fuel temperatures are within limits and Temperature does not exceed +32°C (89°F) Altitude does not exceed 18,000 ft. Boost pumps are on.
Low Fuel Level	170-284 lbs. + 15 lbs.
Max Fuel	UN 0214+ : 3,806 lbs. (564 gal) UN 0001-0040: 3,618 lbs. (536 gal) SB 21-9: 3,753 lbs, (556 gal) UN 0041-0213: 3,672 lbs. (544 gal) SB 21-9: 3,806 lbs. (564 gal)

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LIMITATIONS - GENERAL

Flap Position	Flap Angle	Ref	Minimum Maneuvering Speed
UP	0°	+15	VREF+30
TO/APR	15°	+10	VREF +20 (202 KIAS)
LAND	40°	Ref	VREF +10 (176 KIAS)

ELECTRICAL SYSTEM

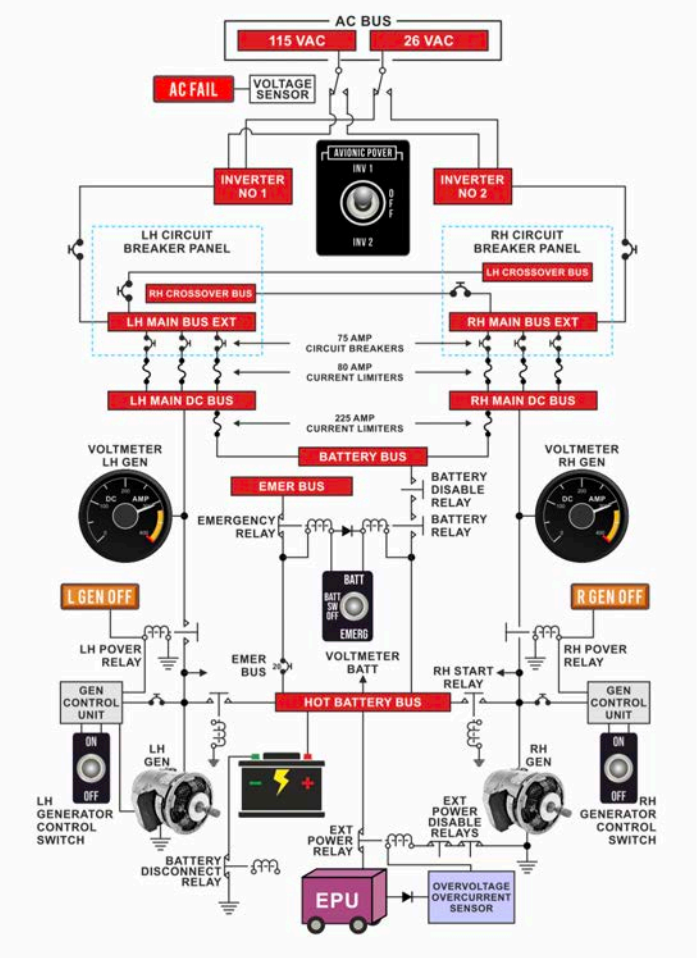
ELECTRICAL SYSTEM OVERVIEW

- The majority of the aircraft’s electrical systems use direct current.
- The avionics equipment use alternating current.
- Two engine-driven, air-cooled starter/generators provide primary DC power to their respective distribution buses.
- Each generator is rated at 28.5 volts and 400 amps
- The battery bus provides secondary power.
- Two static inverters convert DC to AC power.
- The single bus AC system has 2 distribution buses.
- The split bus AC systems have 4 distribution buses.
- The AC inverters convert DC electrical power into 26 VAC and 115 VAC, 400 HZ to power the autopilot, flight director and radar.

ELECTRICAL SYSTEMS - LIMITATIONS

- Starter limit is 3 attempts in 30 minutes with a 60 seconds rest between attempts.
- Battery limit is 3 engine starts per hour.
- Minimum battery voltage for start is 24 VDC.
- External Power Unit (EPU) settings: 28 VDC and 800-1,000 amps max.
- Minimum OAT battery start: -18°C.

ELECTRICAL SYSTEM



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ELECTRICAL SYSTEM – DC POWER

BATTERY

The battery is a 24 VDC, 22 amp-hour, Ni-Cad or lead acid battery located in the tail cone. During an EPU start, select the battery switch to BATT. This prevents the battery from discharging. The battery is limited to 3 starts per 30 minutes. A cross generator start counts as 1 and 1/3 battery starts, and using an external power cart does not count as a battery start. A good battery will power all the buses for 10 minutes or the emergency bus for 30 minutes. Disconnect the battery if the aircraft will not be used for more than 2 days. This prevents electrical devices from draining the battery.

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ELECTRICAL SYSTEMS – DC POWER

GENERATORS

The aircraft has two 30 volt DC starter-generators; one per engine mounted on the accessory gear box. Each acts as a starter during engine start, then becomes a generator. The air cooled generators are regulated by the GCU to 28.5 VDC and 400 Amps. They are capable of a 50% overload to 600 Amps for 5 minutes. The generator output is is paralleled and the loads should be within 10%. Either generator will charge the battery as long as the battery switch is in the BATT position. A generator assisted start is disabled during air starting procedures.

ELECTRICAL SYSTEMS – DC POWER

EXTERNAL POWER UNIT (EPU)

The EPU plugs into the aircraft below the left engine nacelle. The EPU power connects to the hot battery bus. The battery will charge regardless of the battery switch position.

PRIOR TO CONNECTION:

Set the EPU to 28 VDC and 800A to 1,000A. A normal engine start draws 1,000 amps.

CAUTION: Some EPUs do not have reverse current protection. If the EPU is turned off while still connected to the aircraft it will cause rapid discharge of the battery and damage it. If the EPU is not being used, it should be disconnected.

ELECTRICAL SYSTEM – DC POWER

EXTERNAL POWER UNIT (EPU)

For prolonged EPU connections of over 30 minutes, be sure to disconnect the battery to prevent it from overheating. When a generator comes online, the EPU relay disconnects automatically to prevent overloading the hot bus. The BATT switch must be in the BATT position to provide EPU power to the cross feed bus, emergency bus, left and right feed bus, and the battery relay. If using the EPU to charge the battery, exercise caution to prevent the battery from overheating.

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ELECTRICAL SYSTEMS – DC POWER

EXTERNAL POWER UNIT (EPU)

An overvoltage/overcurrent sensor removes EPU power if the voltage exceeds 32.5 VDC for 200 milliseconds or 1,200 amps for 2 seconds. To reset, recycle the EPU off and on.

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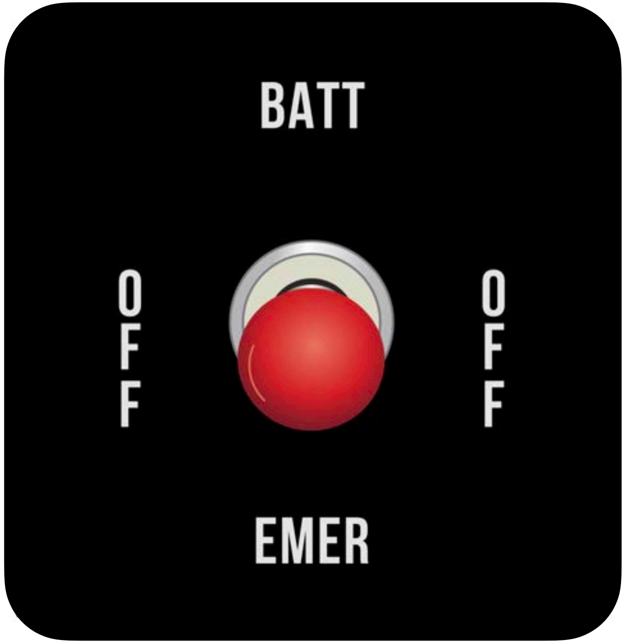
ELECTRICAL SYSTEMS – DC POWER

BATTERY SWITCH POSITIONS

Switch in BATT: Closes the battery relay and emergency relay and connects hot battery bus (battery and GPU) to DC buses.
Switch in OFF: Separates the hot battery bus and the battery from all buses. (including emergency bus).
Switch in EMER: Closes emergency relay. Connects hot battery bus to the emergency bus and isolates them from the rest of the system.When no GPU attached, removes battery from any charging source.



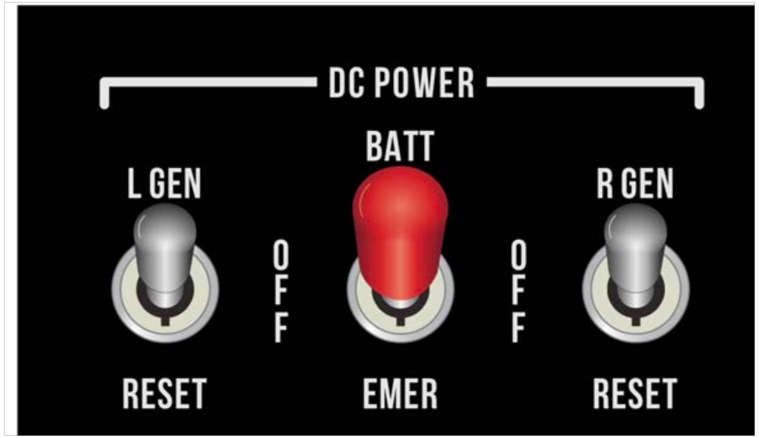
ELECTRICAL DC POWER SYSTEMS

CONTROL SWITCHES

L OR R GEN: Activates the generator control unit and may close the power relay to connect the generator bus to the battery bus. Ammeter indicates output.

OFF: Disables the generator control unit (GCU) and opens the power relay and disconnects generator; ammeter indicates 0.

RESET: Closes generator field relay if it was open - resets generator. Pressing the engine start button will have same effect.



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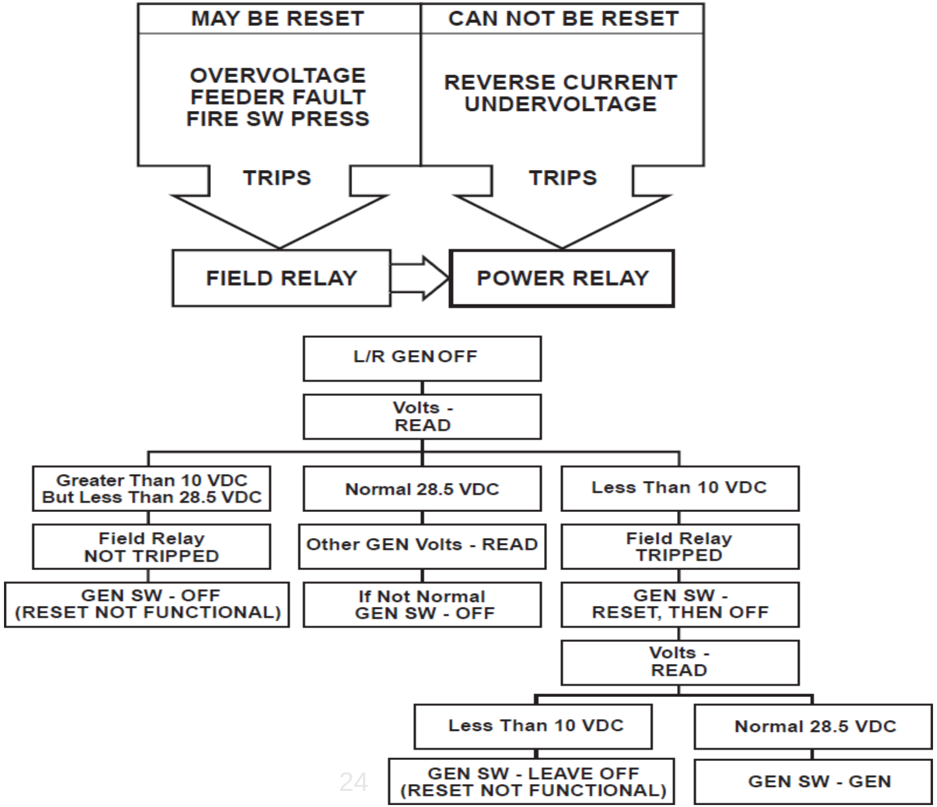
ELECTRICAL POWER SYSTEMS –
DC POWER

Generator Reset Decision Tree



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ELECTRICAL DC POWER SYSTEMS

Pressing ENGINE START button (L and R):

1. Closes the appropriate start relay and allows current from hot battery bus to excite the starter.
2. START DISENGAGE: This button manually stops the engine start process by disconnecting the electrical power.

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ELECTRICAL POWER SYSTEMS – DC POWER

MAIN JUNCTION BOX

Located in the tail cone and contains the following buses:

- L and R Main Bus
- L and R Main Extension Bus
- L and R Cross Feed Bus
- Hot Battery Bus
- Emergency Power Bus
- Battery Bus

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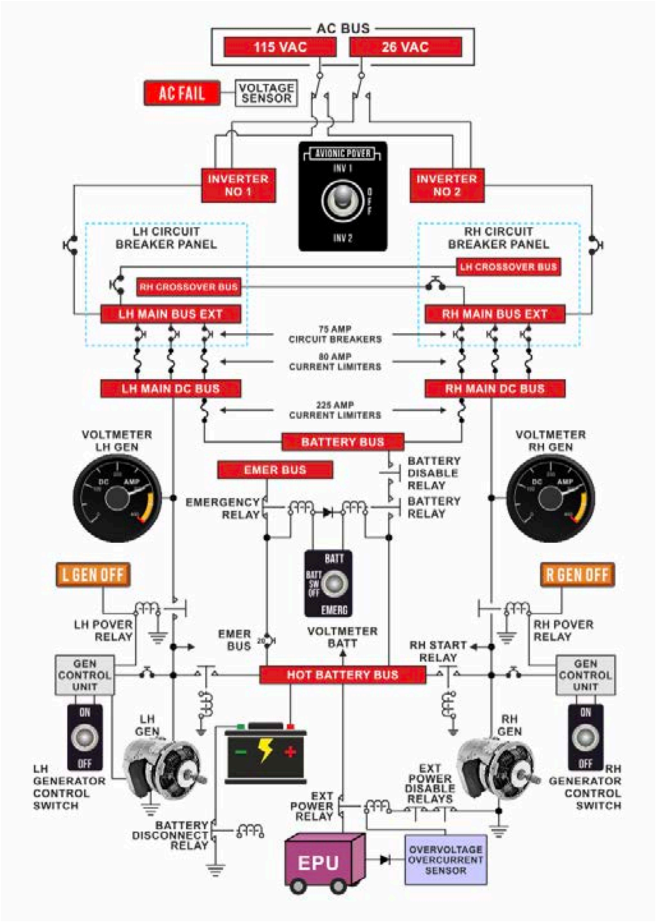
ELECTRICAL POWER SYSTEMS – DC POWER

MAIN FEED BUSES

The main feed busses are located in the tail cone. The L and R feed buses are powered by either the generator bus or cross feed bus. They are connected to the battery bus through 225A current limiters.

MAIN EXTENSION BUS

The L and R main extensions buses receive power from the L and R main bus. The extension busses power the #1 inverter, left instruments and systems and some copilot's items including the #2 inverter, right instruments, and avionics.



ELECTRICAL POWER SYSTEMS – DC POWER

CROSSOVER BUS

The L and R crossover busses are powered by the opposite side main extension bus. They connect to the main buses through a 35A current limiter. The crossover buses allow for logical grouping of corresponding left and right circuit breakers.

ELECTRICAL POWER SYSTEMS – DC POWER

HOT BATTERY BUS

The hot battery bus is connected directly to the battery. The hot battery bus can also be connected to a ground power unit. (GPU)

Hot battery bus items:

1. Lights
   a. Nose compartment. (optional UN 0001 to 0274)
   b. Aft baggage (Toilet) light. (UN 0071+)
   c. Cabin door and Emergency 'EXIT' light.
2. Voltmeter (BATT on).
3. Ignition for start.
4. ELT (optional).
5. Emergency battery pack.
6. Tail cone light.
7. Exit lights.
8. Engine Instrumentation illumination during starting.
9. Battery relay and emergency relay closing.

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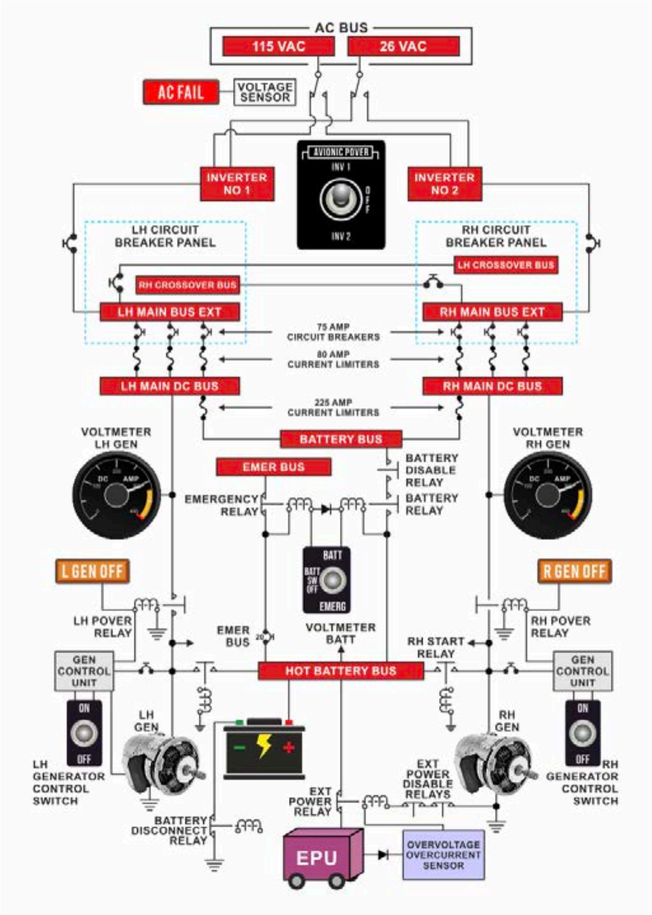
ELECTRICAL POWER SYSTEMS – DC POWER

BATTERY BUS

The Battery bus receives power from the battery or GPU via the hot battery bus if the battery switch is in the BATT position or from the left or right main DC bus if either generator is operating. It also functions as the tie bus between the left and right main buses when a generator is offline. It is connected to the left and right main buses by 225 amp current limiters.

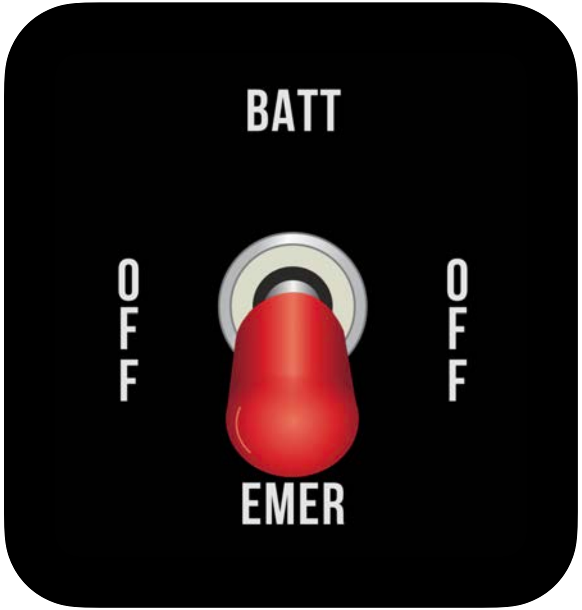


ELECTRICAL POWER SYSTEMS – DC POWER

EMERGENCY BUS

In the EMER position, battery or external power is only connected to the emergency bus. This supplies power to:

1. COMM # 1
2. NAV # 2
3. HSI # 2
4. Standby Gyro (battery pack)
5. Cockpit floodlights
6. Engine N1 tape (engine above 50% N1)



ELECTRICAL POWER SYSTEMS – AC POWER

SINGLE BUS AC

On unit # 500-0275 thru -0349, alternating current is provided by two 300 VA (or optional 600VA) static inverters that convert 24 or 28 volt DC into 115 and 26 volt, 400 Hz AC power. Only one inverter operates at a time as indicated by the position of the Avionic Power Switch in INV 1 or INV 2. Illumination of the AC FAIL annunciator indicates a failure of the selected inverter requiring repositioning the Avionic Power switch to the other inverter.

ELECTRICAL POWER SYSTEMS – AC POWER

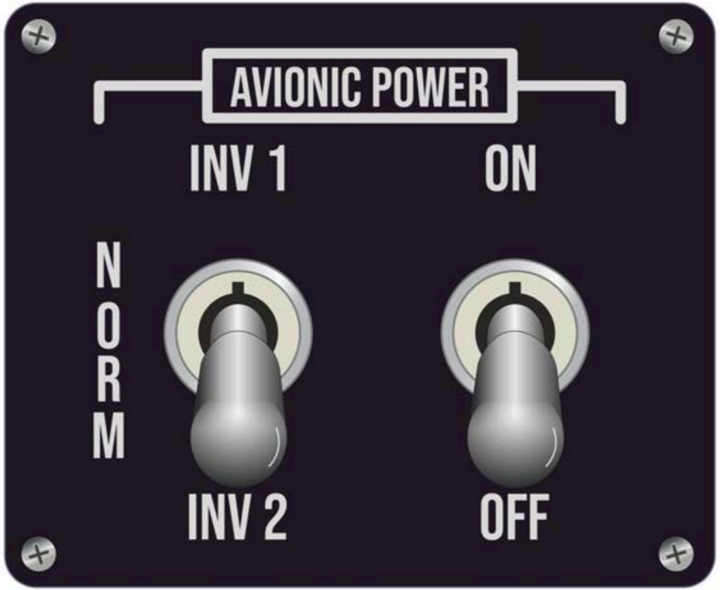
SPLIT BUS AC

The AC power distribution system consists of the AC POWER switches, two 115 VAC/26 VAC, 400 Hz static inverters, a Radar bus, a Flight Director bus, crossover circuitry and annunciator panel lights. Each inverter converts 28 volts DC into AC power, with a maximum output of 600 VA. Either inverter provide power for both sides if one fails. The No.1 inverter normally powers the flight director and autopilot through the Flight Director AC bus. The No. 2 inverter normally powers the weather radar and the optional radio altimeter, when installed, through the radar AC bus. Weather radar stabilization, however, gets its information from the flight director system vertical gyro.

ELECTRICAL POWER SYSTEMS – AVIONICS SWITCH

AVIONICS POWER

AVIONIC SWITCHES: ON/OFF routes power to avionics when in ON; and INV1/OFF/INV2 determines the inverter selected to receive DC power.



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ELECTRICAL SYSTEMS – ANNUNCIATOR INDICATORS

Annunciator	Color	Master Caution/ Warning	Description
	Red	Warning	Battery temperature over 145°F. Action: Battery Switch to EMER. If amperage drops, then relay opened and isolation occured. If no amperage drop; check Voltmeter - there should be a 1 volt drop in 30 seconds to 2 minutes. • If yes, battery relay opened and isolation happened. ✓ Turn battery switch to OFF. • If no voltage drop, relay is stuck or welded closed.

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ELECTRICAL SYSTEMS – ANNUNCIATOR INDICATORS

Annunciator	Color	Master Caution/ Warning	Description
	Red, flashes 3 x per second	Warning	Battery temperature over 160°F. Action: Battery Switch to EMER. If amperage drops, then relay opened and isolation happened. If no amperage drop; look at Voltmeter - there should be a 1 volt drop in 30 seconds to 2 minutes. • If yes, battery relay opened and isolation happened. ✓ Turn battery switch to OFF. • If no voltage drop, relay is stuck or welded closed.

ELECTRICAL SYSTEMS – ANNUNCIATOR INDICATORS

Annunciator	Color	Master Caution/ Warning	Description
L GEN OFF R GEN OFF	Amber	Steady Caution	Loss of one generator Check Voltmeter: Near 0 volts indicates tripped field relay • Might reset with Generator switch. • If voltage observed, generator reset is not likely.

ELECTRICAL SYSTEMS – ANNUNCIATOR INDICATORS

Annunciator	Color	Master Caution/ Warning	Description
L GEN OFF R GEN OFF	Amber	Steady Master Warning	Loss of both generator • If unable to restore generator, ✓ Follow Loss of Both Generators Checklist ✓ Place Battery Switch to EMER.

ELECTRICAL SYSTEMS – ANNUNCIATOR INDICATORS

Annunciator	Color	Master Caution/ Warning	Description
 	Red	Master Warning	Single Bus aircraft • If an inverter fails, AC Fail illuminates as well as the Master Warning • Switching inverters will extinguish AC Fail, but Master Warning needs to be manually reset.

ELECTRICAL SYSTEMS – ANNUNCIATOR INDICATORS

Annunciator	Color	Master Caution/ Warning	Description
RAD AC PWR FAIL	Amber		Loss of AC power from # 2 Inverter to the Radar.

ELECTRICAL SYSTEMS – ANNUNCIATOR INDICATORS

Annunciator	Color	Master Caution/ Warning	Description
	Amber	Master Warning	Units 554+ Will illuminate if DC power loss, overvoltage/under voltage Red AC Fail also illuminates. If both AC inverters fail, then red AC Fail remains lit even after pushing Master Warning Reset.

ELECTRICAL SYSTEMS – STARTING

1. **BATTERY START**: Set generator switches to GEN.
2. **EPU START:** Place generator switches OFF. Set EPU to 28V to 29V and 800A to 1,100A.
3. Battery switch set to BATT.
4. Voltmeter: 24V minimum.
5. Test all systems with Rotary TEST switch.
6. Test Inverters. Connect DC power supply (GPU or EPU).

- **Single Bus:** AC FAIL extinguishes, test for power in INV 1 and INV 2
- **Split Bus**: AC power on, AC FAIL light should go out. Inverter test switch in INV1 and INVERTER FAIL 1 should illuminate. Inverter switch to INV 2 and INVERTER FAIL 2 should illuminate. AC FAIL and MASTER WARNING should also illuminate.

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ELECTRICAL SYSTEMS – EMERGENCY PROCEDURES

Electrical Fire or Smoke **Bold** text indicates Memory Items.

1. **OXYGEN MASK: DON/ 100%**
2. **OXYGEN MIC SWITCH: MIC OXY MASK**
3. Press Source Selector: NORM
4. *CAUTION: If you can't determine source of the fire/smoke, land immediately at the nearest suitable airport.*

<u>*Known Source of smoke:*</u>

5. Faulty Circuit: ISOLATE
6. Land as soon as practical

<u>*Unknown Source of smoke:*</u>

7. Floodlights: FULL BRIGHT
8. Battery Switch: EMER
9. Generators: OFF
10. Windshield Bleed Air Manual Valves: OFF
11. DC Power RH Bus 1, 2, 3 Circuit breakers (On RH Panel): PULL
12. RH Circuit Breaker Panel Circuit Breaker (on LH Panel): PULL
13. AC Inverter No 1 circuit breaker (On LH Panel): PULL 11.
14. Land as soon as practical (Within 30 minutes)
15. Refer to Emergency Electrical Power Considerations

If severity of smoke warrants see Smoke Removal and/ or Emergency Descent Land as soon as practical

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ELECTRICAL SYSTEMS – EMERGENCY PROCEDURES CONTINUED

Electrical Fire or Smoke **Bold** text indicates Memory Items.
Unknown Source of smoke:

When landing Assured:

16. LH Generator: GEN
17. Landing Gear: DOWN
18. Flaps: LAND
19. Airspeed: VREF
20. If smoke or fire restarts
21. LH Generator: OFF
22. Landing: Plan for brake failure (multiple landing distance by 1.3) See Wheel Brake Failure

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ELECTRICAL SYSTEMS – EMERGENCY PROCEDURES FOR INTENSE SMOKE

Bold text indicates Memory Items. Intense smoke:

Use the following procedure if smoke is particularly intense.

1. **OXYGEN MASK: DON/100%**
2. **OXYGEN CONTROL VALVE/ PASSENGER**
3. Oxygen Masks: MANUAL DROP
4. Crew Oxygen Priority Valve: CHECK NORMAL
5. Passenger Oxygen: ENSURE USE
6. Oxygen Mic Switch: MIC OXY MASK
7. Cabin Overhead Fan: OFF
8. Defog Fan: OFF
9. Passenger Advisory Lights: PASS SAFETY
10. Cabin Altitude Selector: Set to Higher Altitude
11. Emergency Dump Valve: DUMP

    NOTE: Emergency Dump is not recommended at higher altitude
12. Use of Supplemental Oxygen (Unpressurized): ACCOMPLISH

    If smoke persists or it cannot be verified that there is NO fire:
13. Land as soon as possible

CAUTION: If you can’t determine source of the fire/smoke, land immediately at the nearest suitable airport.

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EMERGENCY PROCEDURES FOR BATTERY OVER TEMPERATURE

RED BOLD TEXT INDICATES MEMORY ITEMS

RED BATT O'TEMP. NiCad battery is over 71°C/160°F. If flashes, batt temp is between 63°C and 71°C (145°F and 160°F).

1. Amps: Check
2. BATT switch: EMER
3. Amps: Note decrease

NOTE: If battery amps decrease and battery voltage is 1 volt less than generator voltage within 30 seconds to 2 minutes, monitor the BATTERY O'TEMP annunciator.

IF BATTERY O'TEMP EXTINGUISHES

4. BATT switch: BATT
5. Land as soon as practical.

IF NO AMPERAGE DECREASE OR BATT O'TEMP ANNUNCIATOR FLASHES WITH BATT SWITCH IN EMER

6. Floodlights: FULL BRIGHT
7. Generators: OFF
8. Annunciator extinguishes immediately if battery relay is not stuck.

IF NORMAL DC POWER LOST (BATTERY RELAY NOT STUCK)

9. Generators: GEN. BATT O'TEMP illuminates until battery cools.
10. Battery Switch: OFF Voltmeter is inoperative. Emergency bus not powered.
11. Land as soon as practical.

IF NO DC POWER LOST (BATTERY RELAY STUCK)

12. Mic Selector: EMER COMM (headphones required)
13. Receiver Select: COMM 1 to HDPH
14. Windshield Manual Bleed Air Valves: OFF
15. DC Power RH Bus Circuit Breakers (3): PULL.
16. DC Power LH Bus Circuit Breakers (3): PULL
17. Land as soon as practical (30 minutes)

WHEN LANDING ASSURED

18. DC Power LH and RH Bus Circuit Breakers (6): Reset
19. Landing Gear: DOWN and LOCKED
20. Flaps: LAND

    Airspeed: VREF

    NOTE: if battery voltage is too low to operate systems for landing, place a generator switch in GEN.

ELECTRICAL SYSTEMS – EMERGENCY PROCEDURES

DUAL GENERATOR FAILURE

1. Flashing MASTER WARNING annunciator: RESET
2. Both Generators: CHECK Switches/ Voltages/Circuit Breakers (both generators); RESET as required.

If one Generator resets

3. Electrical Load: Reduce as Required. 400A Max to 35,500’
4. 325A max over 35,000’
5. Land as soon as practical

If Neither Generator resets

6. Floodlights: FULL BRIGHT
7. Battery Switch: EMER
8. Mic Selector: EMER COMM (headphones required)
9. Receiver Select: COMM 1 to HDPH (required only if Auto Select OFF)
10. Windshield Bleed Air Manual Valves: OFF
11. Land as Soon as Practical (within 30 minutes)

When Landing Assured

12. Battery switch: BATT
13. Landing Gear: DOWN and LOCKED
14. Flaps: LAND
15. Airspeed: VREF

AC POWER-ABNORMAL PROCEDURES

AC FAIL ANNUNCIATOR

AC Power Failure (AC PWR FAIL Light On)
1. Avionics Power - Select Opposite Inverter (INV 1 or INV 2 as appropriate). Either inverter will supply total AC requirements. Switching to the standby inverter will reinstate all power to equipment requiring AC.

If an inverter fails, AC Fail illuminates as well as the Master Warning light. Switching inverters will extinguish the AC Fail annuciator light, but the Master Warning must be manually reset.

SAFEPILOT PUBLISHING

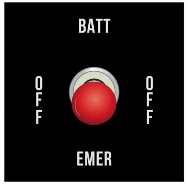
BATTERY SWITCH IN EMERGENCY POSITION

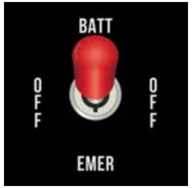
CAUTION WHEN LANDING WITH BATTERY SWITCH IN EMER AND BOTH GENERATORS OFF. THE FOLLOWING ARE NOT AVAILABLE:

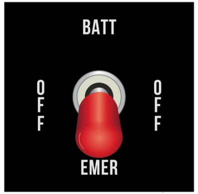
- The landing gear normal operation is not available. The landing gear must be lowered using the blow-down system and the landing gear warning lights will not illuminate.
- The flaps will not operate. If not previously in the landing position, a flap inoperative landing must be made.
- The optional antiskid/power brake system is inoperative. Only the emergency brake system is available if the antiskid/power brake system is installed.
- The engine anti-ice valves will be open. Refer to anti-ice on thrust charts.
- The outside air temperature gage is not reliable, so use caution when applying power (except for go-around where ground temperatures can be used).
- All engine instruments except the vertical tape N1 will be inoperative. The vertical tape N1 will indicate erratically below approximately 50% N1, but will give reliable indications above

BATTERY SWITCH IN EMERGENCY POSITION

CAUTION When landing with Battery Switch in EMER and both generators off. The following are not available:







- If crossfeed was in operation, the fuel system fails to Normal Fuel Transfer.
- Pressurization Controls fails to Normal Flow Control/Shutoff Valves open.
- If EMER/LH/RH was selected, Normal Pressurization resumes.
- Engine Cowl Ring and Stator Vanes are heated (for power settings refer to Engine Anti- Ice ON tables)
- Windshield Bleed Air ON with no Temp Control (Manual Valves only)
- Wing heat and Deice boots inoperative.
- Thrust Reversers Inoperative.
- Speed brakes inoperative.

ELECTRICAL SYSTEMS – ABNORMAL PROCEDURES

Single Generator Failure

1. Electrical Load: Reduce as Required
2. Freon Air Conditioner: OFF (or FAN)
3. Failed Generator: CHECK Switches/Voltages/Circuit Breakers (both generators); RESET as required.

If unable to Reset

4. Failed Generator: OFF

ELECTRICAL SYSTEMS – ABNORMAL PROCEDURES

SINGLE INVERTER FAILURE (UNITS 249+)

1. Avionics Power: SELECT INV 1 or INV 2 (as appropriate)

SINGLE INVERTER FAILURE (UNITS 554+)

1. MASTER WARNING annunciator: RESET
2. Inverter 1 or 2 Circuit Breakers: RESET

   NOTE: Operating inverter powers all AC powered equipment. Flight directors and autopilot may disengage; reengage to operate on the remaining inverter.

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ELECTRICAL SYSTEMS – ABNORMAL PROCEDURES

AC POWER FAILURE (UNITS 249+)

1. Avionic Power: Select Inverter 1 or Inverter 2 (As Appropriate)

ELECTRICAL SYSTEMS – ABNORMAL PROCEDURES

AC Power and/or Distribution Failure (Unit 1 to 248)

(F/D AC FAIL illuminates)

1. AC Power No 1: OFF
2. AC Power Crossover: XOVER
3. Radar: Off

(RAD AC FAIL illuminates)

4. AC Power No 2: Off
5. Radar: Off

NOTE: Any time inverter voltage > 130 VAC or < 90 VAC, a warning light illuminates. IT is not possible to tell if inverter failed or there is a high or low voltage condition. Turn off failed inverter before selecting XOVER.

FUEL SYSTEM

FUEL SYSTEMS – LIMITATIONS

- The fuel must be mixed with EGME/ DIEGME anti-icing additive (PRIST). Not to exceed .15% per volume.
- Max fuel imbalance is 800 lbs.
- Acceptable fuels include: Jet A, A-1, A-2, JP-5, JP-8 (-29°C to +54°C)
- Jet B, JP-4 (-54°C to +48°C)
- Avgas is approved for use.
- Low fuel level is 170 lbs.

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FUEL SYSTEMS – LIMITATIONS

The use of Aviation Gasoline, including all grades, is permitted for a maximum of 50 hours between overhauls under the following operating conditions:

1. The maximum fuel temperature and ambient air temperature of 32°C (90°F).
2. The boost pumps are ON.
3. Maximum operating altitude of 25,000'.
4. The hours used are entered in the aircraft log book.

Use of AvGas in partial concentrations is covered in the AFM.

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FUEL SYSTEMS – CAPACITY

UN 0001-0040……………….. 3,618 lbs (536 gal)
SB 21-9……………………….. 3,753 lbs (556 gal)

UN 0041-0213……………….. 3,645 lbs. (544 gal)
0214+ and SB 21-9………… 3,806 lbs. (564 gal)

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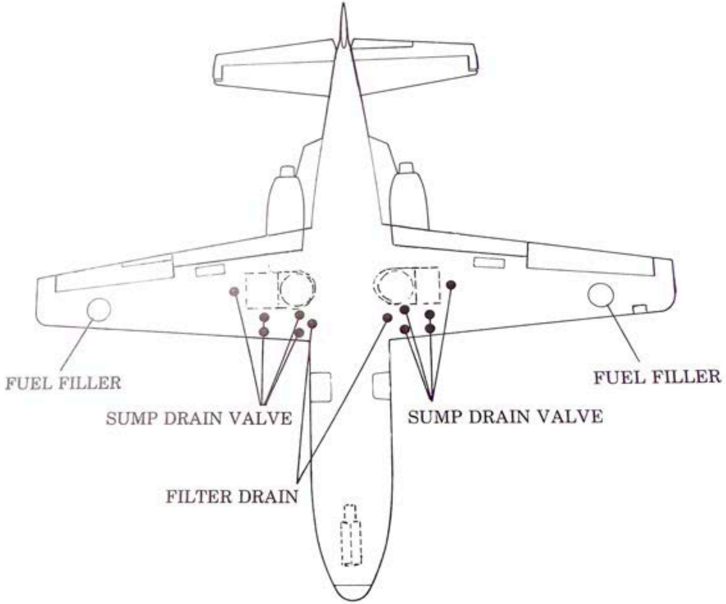
FUEL SYSTEMS – SUMP AREA

The sump area of the wing houses the electric boost pump, primary ejector pump, and five quick drains to remove water and sediment buildup. The sump area is designed to provide a minimum of five seconds fuel supply during negative gravity maneuvers not exceeding 0.5G. Fueling is accomplished through an filler port in each wing.



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FUEL CROSSFEED SYSTEM

The fuel system is comprised of identical left and right tanks. Normal operation supplies fuel to the engine from its respective integral wing tank. Crossfeed capability enables both engines to receive fuel from a single tank. Selecting either tank automatically turns on the electric boost pump in the supply tank, opens both crossfeed valves, and three seconds later closes the motive flow shutoff valve on the side not selected. Returning the selector to OFF reverses the sequence. A green INTRANSIT light above the selector illuminates any time the crossfeed valves are not fully closed or open, or do not coincide with switch position. When crossfeed is selected, it is possible for a pressure spike to activate the fuel boost pump in the tank opposite the one selected. If this occurs, both fuel boost pumps would be operating causing equal fuel pressures on both sides preventing crossfeeding. When initiating system operation, monitor the FUEL BOOST ON annunciator panel lights and if both illuminate, cycle the fuel boost switch for the non-selected tank to OFF and back to NORM. This deactivates the boost pump in the tank not selected and allows normal crossfeed.

FUEL SYSTEMS – COMPONENTS

Each tank includes:

SUMP DRAIN VALVES: Used to remove moisture and sediment from fuel. Operation is by a spring-loaded poppet valve. Push Up to obtain sample and then pull straight out to reseat. If leaking, report to maintenance. Check before 1st flight of day and after refueling. Let settle before checking.

FLAPPER VALVES: Allows fuel in the tank to flow inboard while preventing fuel from flowing outboard. Four tank quick drains per side.

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FUEL SYSTEMS – FUEL PUMPS

TRANSFER EJECTOR PUMPS: Constantly transfer fuel from forward and outboard areas of each wing tank to ensure feed bay is full. Motive force is provided by primary ejector pump or boost pump.

PRIMARY EJECTOR PUMPS: Provides fuel to the engine driven fuel pump. One in each tank. Uses a venturi principle and primary ejector pump gets its pressure from the engine-driven fuel pump.

ELECTRIC BOOST PUMP: A DC electrically powered fuel pump is located in each tank sump to supply fuel to the engine-driven fuel pump, and transfer ejector pump. Each booster pump supplies its own engine or the crossfeed fuel balancing system. The pilot controls this by switches on the CB panel or automatically.

FUEL SYSTEMS – FUEL DISTRIBUTION

FUEL TRANSFER VALVE: Allows transfer of fuel between wings. Fuel transfer is controlled by the L or R FUEL TRANSFER selector. The system energizes the supply side boost pump and transfers fuel into the opposite feed bay.

FIREWALL SHUTOFF VALVES: Shuts off fuel to engines in the event of an engine fire.

FUEL PRESSURE SWITCHES: Illuminates the Low Fuel Pressure annunciator if the fuel pressure drops below 4.65 psig.

FUEL FLOW TRANSMITTER: Indicates amount of fuel being used.

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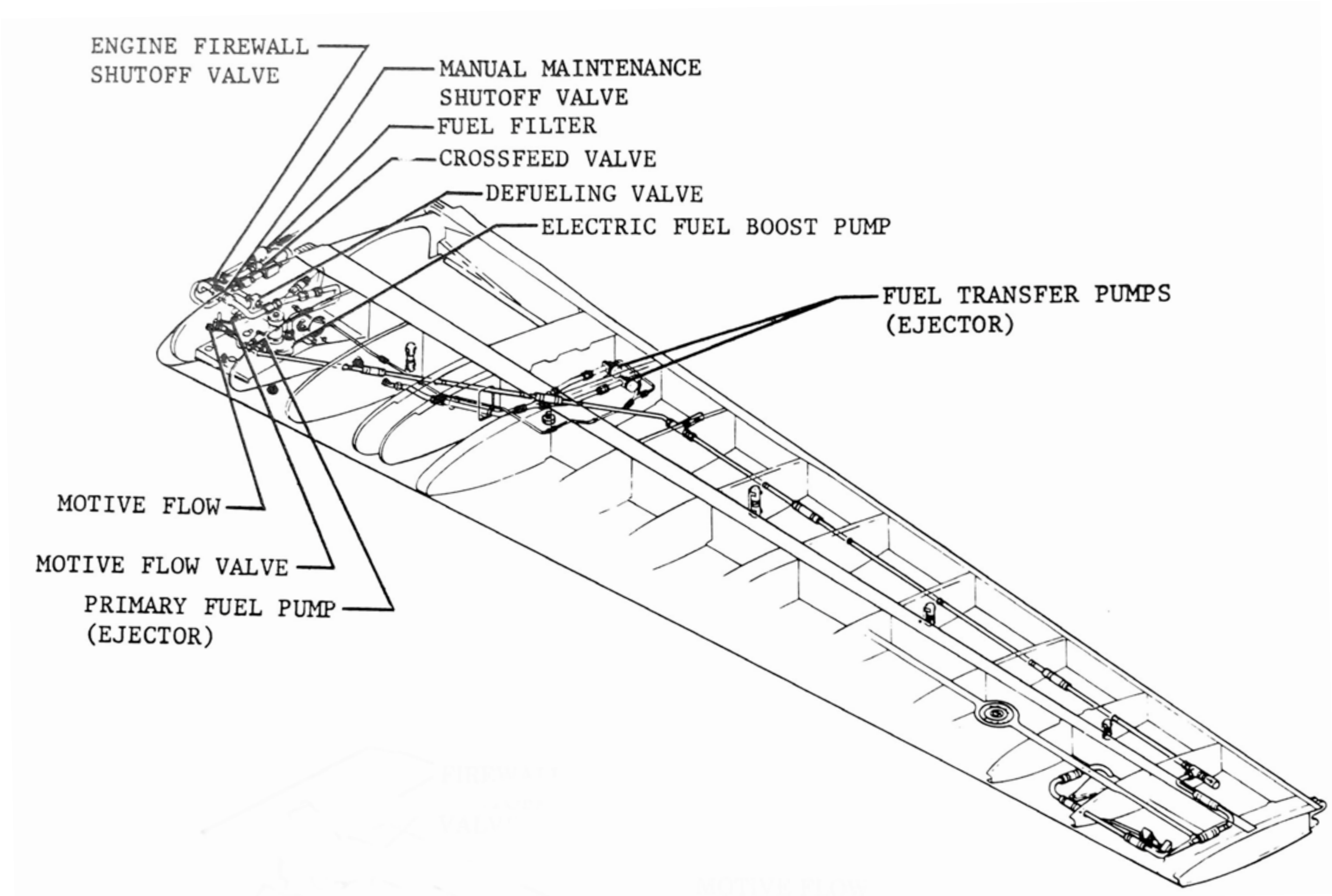
FUEL SYSTEM



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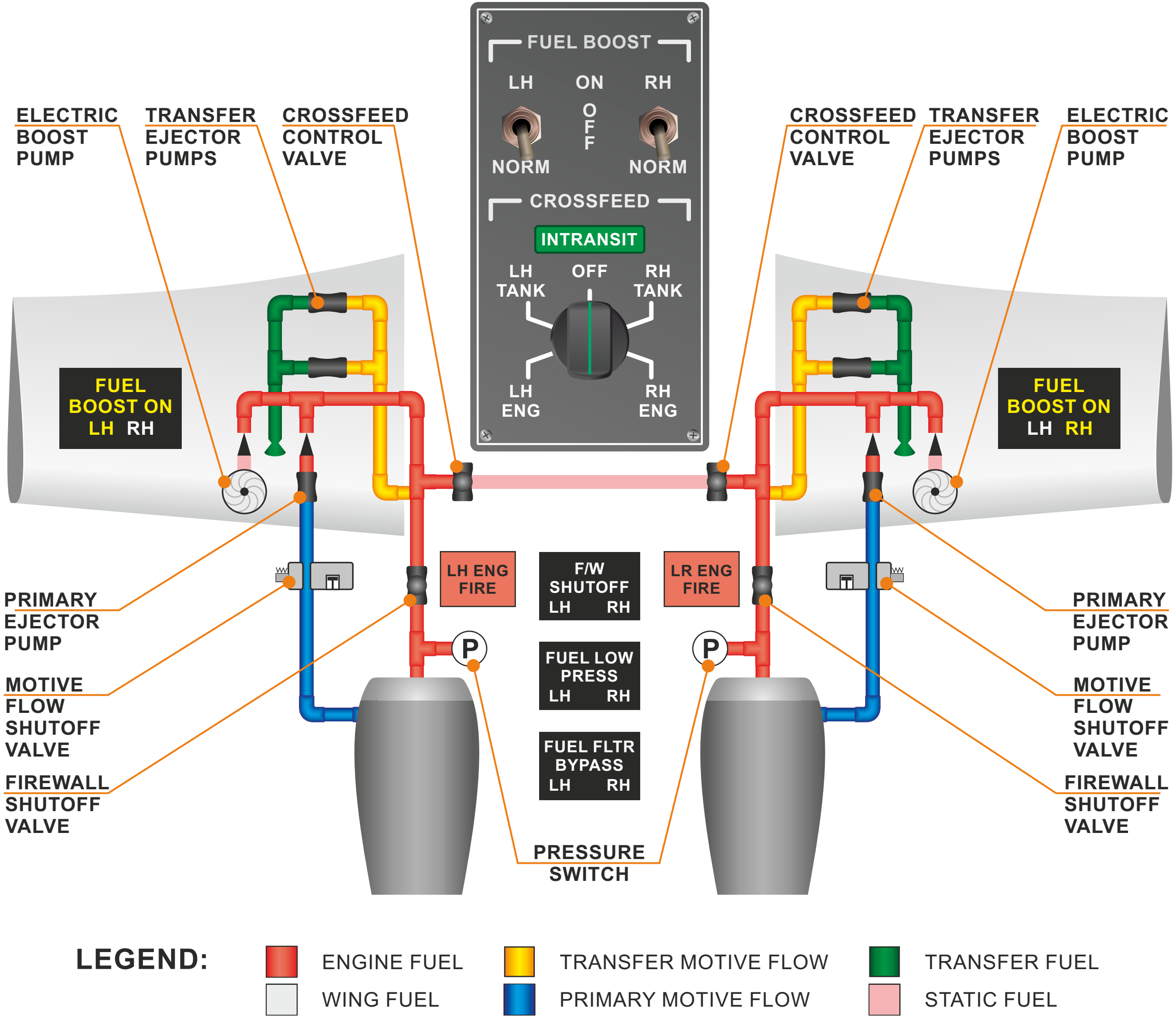
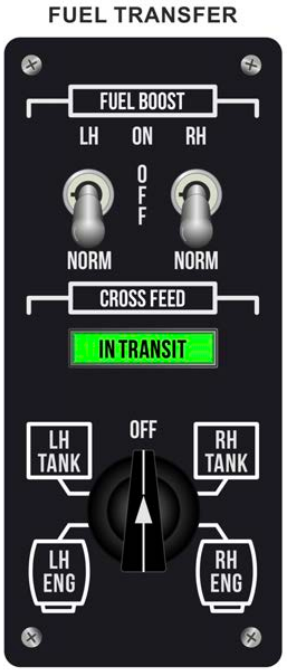

FUEL BOOST
LH ON RH
OFF
NORM NORM
CROSSFEED
INTRANSIT
LH TANK OFF RH TANK
LH ENG RH ENG
ELECTRIC BOOST PUMP
TRANSFER EJECTOR PUMPS
CROSSFEED CONTROL VALVE
CROSSFEED CONTROL VALVE
TRANSFER EJECTOR PUMPS
ELECTRIC BOOST PUMP
FUEL BOOST ON
LH RH
FUEL BOOST ON
LH RH
LH ENG FIRE
F/W SHUTOFF
LH RH
LR ENG FIRE
FUEL LOW PRESS
LH RH
FUEL FLTR BYPASS
LH RH
P
P
PRIMARY EJECTOR PUMP
MOTIVE FLOW SHUTOFF VALVE
FIREWALL SHUTOFF VALVE
PRESSURE SWITCH
PRIMARY EJECTOR PUMP
MOTIVE FLOW SHUTOFF VALVE
FIREWALL SHUTOFF VALVE
LEGEND:
ENGINE FUEL
WING FUEL
TRANSFER MOTIVE FLOW
PRIMARY MOTIVE FLOW
TRANSFER FUEL
STATIC FUEL

FUEL SYSTEMS – CONTROLS

- **L AND R FUEL BOOST** switch: Three positions - ON, OFF, and NORM. (NORM is automatically controlled)

- **FUEL CROSSFEED** selector: LH TANK, OFF, RH TANK. Energizes the supply side boost pump and opens fuels transfer valve.

- **IN TRANSIT** light: illuminates momentarily during crossfeed valve actuation.



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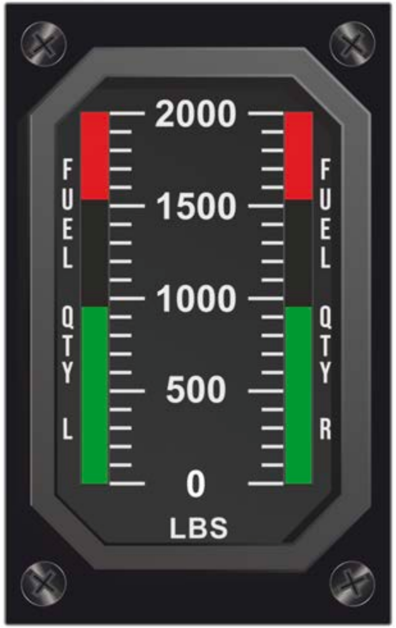
FUEL SYSTEMS – INDICATORS

Fuel Quantity L-R

5 fuel probes in each wing tank. Total aircraft fuel is the sum of the two indicators. Displayed as dual vertical tapes.



FUEL SYSTEMS – INDICATORS

Fuel Flow L-R

Displayed as dual vertical tape

FUEL SYSTEMS – FUEL OPERATIONS

Action	Other Settings / Indicators	Description
L and R FUEL BOOST in NORM		Normal operations
Press Engine Start	Amber FUEL BOOST L-R	Energized fuel boost pump, moves fuel through firewall shutoff valve to engine- driven fuel pump
Fuel Transfer	Green IN TRANSIT	
Low fuel pressure		Amber FUEL PRES LO L-R for a moment then Amber FUEL BOOST L-R, then as pressure increases, Amber FUEL PRES LO L-R goes out. Pilot may not even notice.

FUEL SYSTEMS – OPERATIONS

Action	Other Settings / Indicators	Description
Engine Start terminates	Fuel Boost On light goes out; cross feed valve closed; firewall shutoff valves open	Primary ejector fuel pump provides pressure from feed bay. Since transfer valve is closed, fuel is supplied from each respective wing.
Engine Fire; Press L or R ENG FIRE	F/W SHUTOFF illuminates	Firewall shut off valves closes.

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FUEL SYSTEMS – TRANSFER SYSTEM

The cross-feed switch on pilots left switch panel controls if both engines will be supplied from one tank or the other. Direction of line on FUEL CROSS-FEED selector indicates direction fuel is flowing.

Action	Other Settings / Indicators	Description
Begin Crossfeed Left Side to Right Side		
1. CROSSFEED switch placed in R Tank position		1. Opens transfer valve. Green IN TRANSIT illuminates. 2. Energizes LH boost pump. Amber FUEL BOOST L if boost pump is in ON or NORM. If boost pump set to OFF, no flow. 3. Left tank supplies fuel to left engine and right engine through transfer valve. 4. Right tank begins to fill at 10 ppm.

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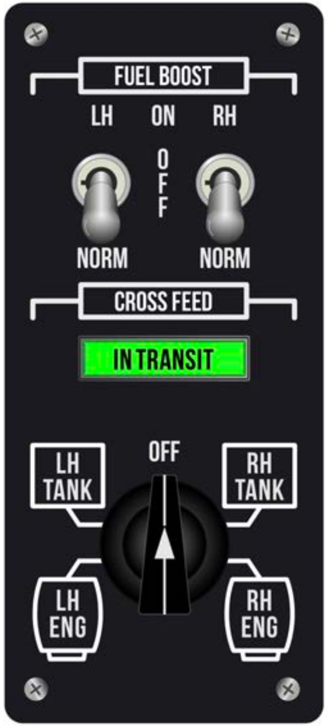
FUEL SYSTEMS – TRANSFER SYSTEM

Action	Other Settings / Indicators	Description
Begin Crossfeed Left Side to Right Side		
2. Ensure LH Boost Pump switch is ON and amber FUEL BOOST L	**NOTE:** If both LH and RH FUEL BOOST light illuminate, crossover will not occur. Cycle FUEL BOOST pump switch for the non-selected tank to OFF, then ON then back to NORM. This should de-energize the non-selected pump and allow crossover.	1. LH Boost pump energizes. Verify transfer by watching white tape indicators/pointers or digital indicators. (600 lbs. an hour). (Max normal imbalance is 800 lb.)

FUEL SYSTEMS – TRANSFER SYSTEM

Action	Other Settings / Indicators	Description
TERMINATE CROSSFEED		
Move CROSS FEED switch to OFF	Green IN TRANSIT light illuminates and extinguishes after 3 seconds.	1. Closes cross feed valve. FUEL CROSSFEED goes out. 2. De-energizes LH boost pump. 3. Each engine supplied from its own tank.

FUEL TRANSFER



FUEL SYSTEMS – ANNUNCIATORS

Annunciator	Color	Description
L F/W SHUTOFF R F/W SHUTOFF	Amber	On when fuel and hydraulic firewall shutoff valves are fully closed; Activated by L-R ENG FIRE switch. Depressing L-R ENG FIRE switch a second time opens valve and light goes off. May also appear after engine shutdown if normal engine shutdown valve fails.
FUEL FILT BYPASS	Amber	On when fuel filter is about to bypass or is bypassing (> 4.5-5.0 PSID). Land as soon as practical.
L FUEL LEVEL LO R FUEL LEVEL LO	Amber	On when fuel is < 169/185 lbs. (+/- 15 lbs.) (25 gal) fuel per side; Turn fuel boost pump to ON when this light comes on or fuel drops below 169/185 lbs.

FUEL SYSTEMS – ANNUNCIATORS

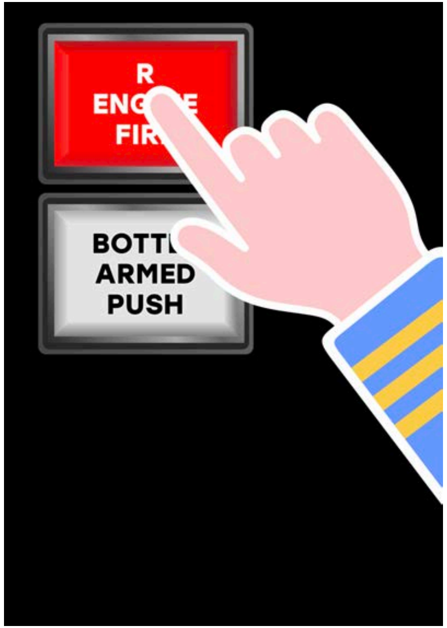
Annunciator	Color	Description
L FUEL PRESS LO R FUEL PRESS LO	Amber	On with fuel pressure < 4.65 psi; goes out when above 7 psi. If boost switches in NORM position and engine throttle NOT in CUTOFF, boost pumps automatically energize.
L FUEL BOOST ON R FUEL BOOST ON	Amber	On when boost pump is ON.
IN TRANSIT	Green	Comes on briefly when FUEL TRANSFER turned on and off. Does not stay illuminated during the whole transfer.

FUEL SYSTEMS – EMERGENCY PROCEDURES

ENGINE FIRE LIGHT

If the red L or R ENGINE Fire light illuminates:

1. Pressing the light shuts off firewall shutoff valve and illuminates amber F/W SHUTOFF L-R annunciator.



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FUEL SYSTEMS – ABNORMAL PROCEDURES

FUEL BOOST PUMP ON

1. Boost Pump (affected engine): ON then NORM.
   If affected FUEL LOW PRESS does not go out.
2. Boost Pump Switch (with pump running): Keep switch in NORM.
3. Refer to Low Fuel Pressure procedure.

FUEL SYSTEMS – ABNORMAL PROCEDURES

LOW FUEL PRESSURE

1. Boost Pump: ON/CHECK Circuit Breaker Set.
2. Fuel Quantity: CHECK.
3. Fuel Crossfeed: If required.

NOTE: Selecting crossfeed pressurizes the system and may extinguish the annunciator

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FUEL SYSTEMS – ABNORMAL PROCEDURES

FUEL FILTER BYPASS

1. Boost Pumps: ON
2. Land as soon as practical
3. Inspect Fuel filters after landing

CAUTION: Fuel Filter may be contaminated with ice. Monitor engine instruments carefully.

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FUEL SYSTEMS – ABNORMAL PROCEDURES

LOW FUEL QUANTITY

1. Boost Pump: ON/Check Circuit Break
2. Fuel Quantity: CHECK
3. Crossfeed: As required
4. Land as soon as practical

POWER PLANT

POWER PLANT – SPECIFICATIONS

The aircraft is equipped with two Pratt and Whitney's JT15D-1, or -1A.

Thrust 2,200 lbs. Bypass Ratio 3.3 to 1

Max Fan N1:

-1 99%

-1A 102.1%

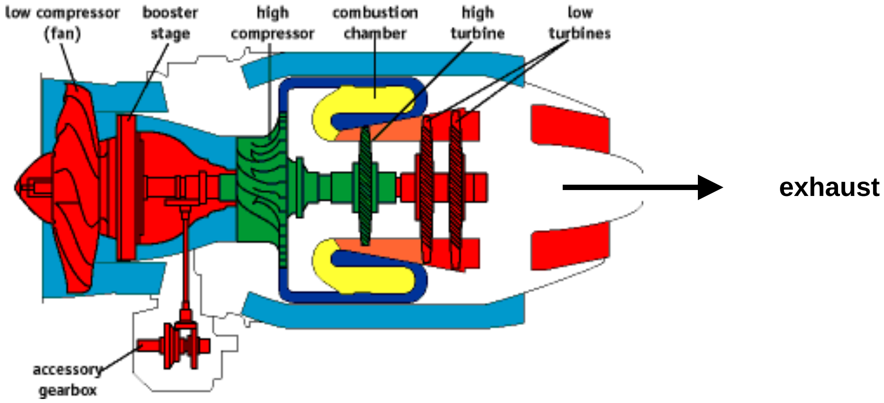
Max Fan N2: 95 %

- Limitations - Engine Temperature Max ITT
- Start 500°C (5 sec)
- Take-off 700°C
- Continuous 680°C
- Cruise 670°C
- Idle 580°C

POWER PLANT – COMPONENTS

The engine has six major sections

1. Intake and fan
2. Compressor
3. Combustion
4. Turbine
5. Exhaust
6. Accessory Gearbox



In the JT-15 turbofan engine, only a portion of the incoming air is used for combustion. The air used for combustion drives the low turbine which is connected by a shaft to the engine fan section. The fan accelerates a large volume of air at a lower velocity. This air is bypassed around the engine and is not mixed with fuel or combusted. The relation of the total mass of bypassed air, to the amount of air going through the combustion section is known as the Bypass Ratio.

ENGINE FAN SECTION

This section includes the fan, the booster disk, and the single-stage axial compressor and two sets of stator vanes.

- The low pressure rotor drives the fan (N1 Speed).
- The outer fan accelerates a large air volume at low speeds thru the bypass duct.
- The inner fan accelerates a small air volume to the compressor section through the inlet air duct.
- The fan nose cone continuously anti-iced by hot bleed air.

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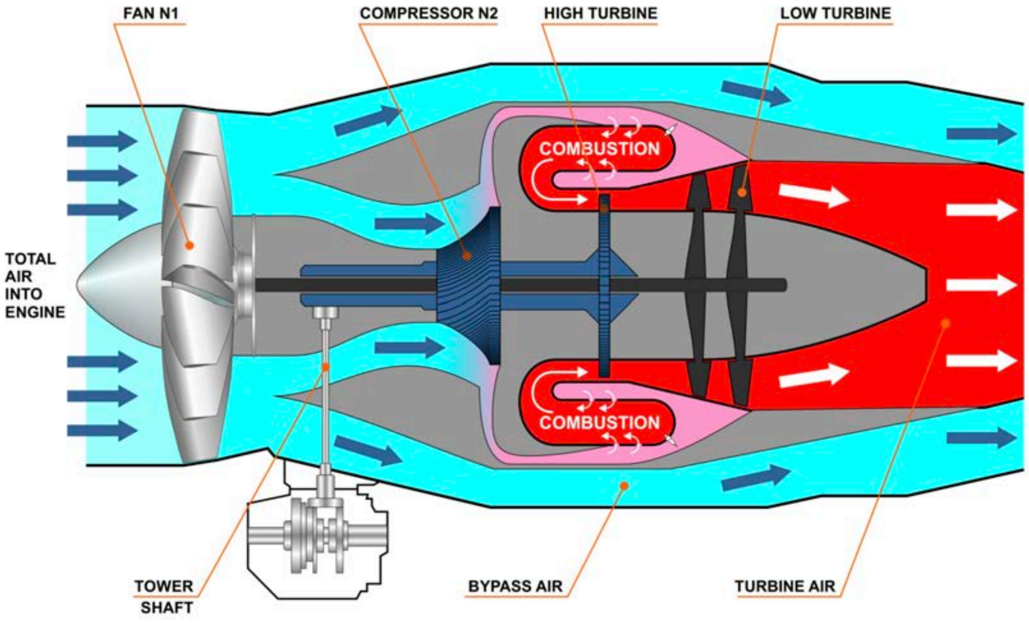
POWER PLANT – FAN

COMPRESSOR SECTION

- The low pressure compressor has 1 axial stage and is driven by the LP turbine.
- The high pressure compressor has 1 centrifugal stage and is driven by the HP turbine.
- The engine bypass ratio is 3.3 to 1.



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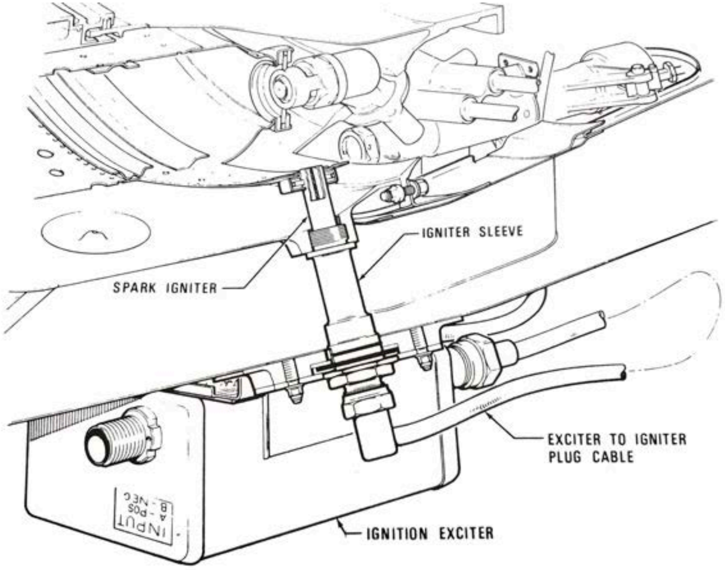
POWER PLANT – FAN

COMBUSTOR SECTION

The engine is equipped with a single annular flow, infusion cooled, combustion chamber. It has dual igniters for engine start. Once combustions begins, it is continuous so long as incoming air and fuel are available.



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POWER PLANT – FAN

THE TURBINE SECTIONS OF THE ENGINE

ONE STAGE AXIAL HP TURBINE:

Is directly connected to the HP compressor by a shaft. This is known as the HP spool. (Spool is shorthand for the combination of an engine compressor and high-pressure turbine that drives it using a connecting drive shaft.) The HP spool rpm is indicated by N2 (turbine speed) It extracts enough energy from combustion to drive the centrifugal compressor and the engine accessories.

TWO STAGE AXIAL LP TURBINE:

The fan is joined to the LP compressor by a shaft. This is known as the LP spool. The LP spool rpm is indicated by N1 (fan speed) The LP turbines extracts enough energy from combustion to drive the fan section.

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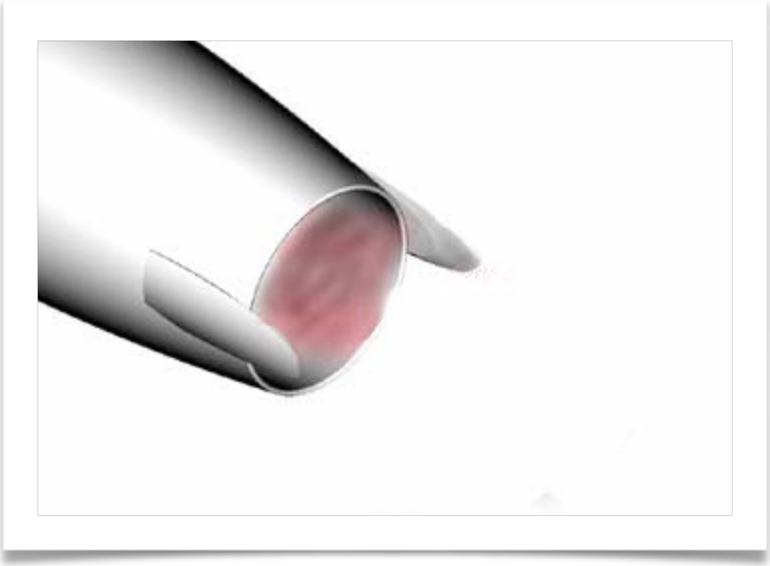
POWER PLANT – EXHAUST

The primary and bypass air exhaust ducts combine to exit the engine. The primary exhausts the combustion gases. The secondary exhausts the fan bypass air.



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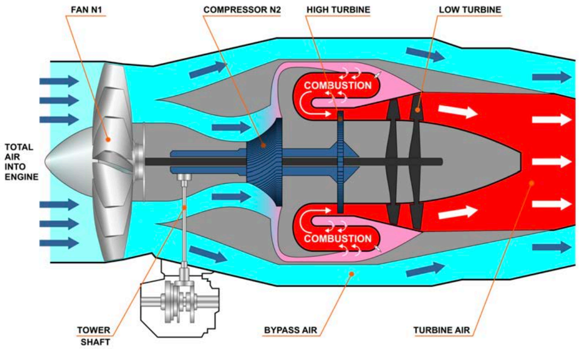
POWER PLANT – ACCESSORY SECTION

The HP spool drives the transfer and accessory gearbox through a tower shaft and bevel gear. The accessory gearbox drives: hydraulic pump, oil pump, fuel pump and its alternator, fuel control unit (FCU), DC generator/DC starter motor, TACH (N2) generator. Two ports extract bleed air for the environmental control system and the ice-protection systems. The starter drives the LP (N2) shaft for startup. Once the engine is operating, the N2 shaft spins the generator for DC power. The bleed valve actuator controls excessive pressure in compressor section.



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POWER PLANT – STARTING TIP

NOTE: Gusty wind or crosswinds may cause RPM fluctuations. Start the downwind engine first.

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POWER PLANT – SUBSYSTEMS

THE ENGINE SUBSYSTEMS CONSIST OF:

- The oil system.
- The fuel system.
- The fuel/oil heat exchanger.
- The ignition system.
- Engine Instrumentation.
- Turbine synchronization.

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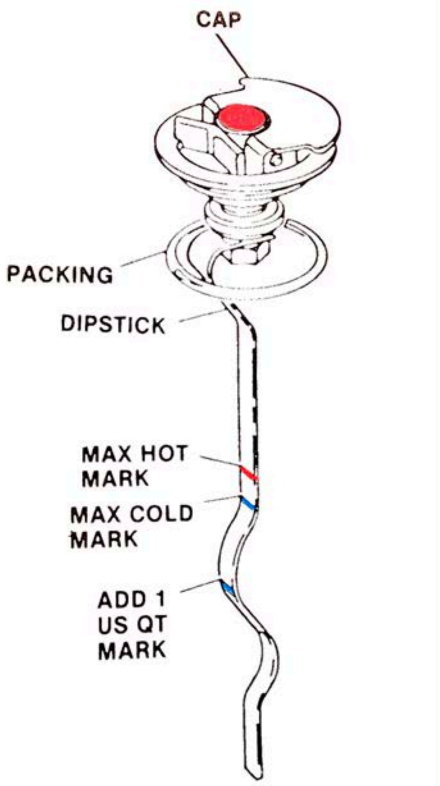
POWER PLANT – OIL SYSTEM

The oil tank holds 2.39 US gallons. Useable oil quantity in the JT-15D-1 is 1.5 gallons and in the JT-15D-1A it is 1.25 gallons. A dipstick indicates Max and Min quantity and how much to oil to add.

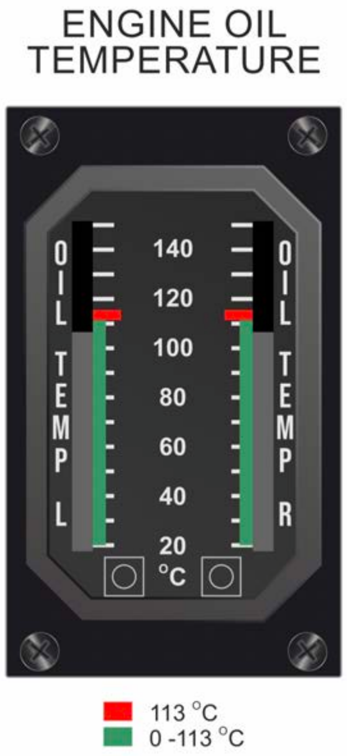


OIL PUMP:

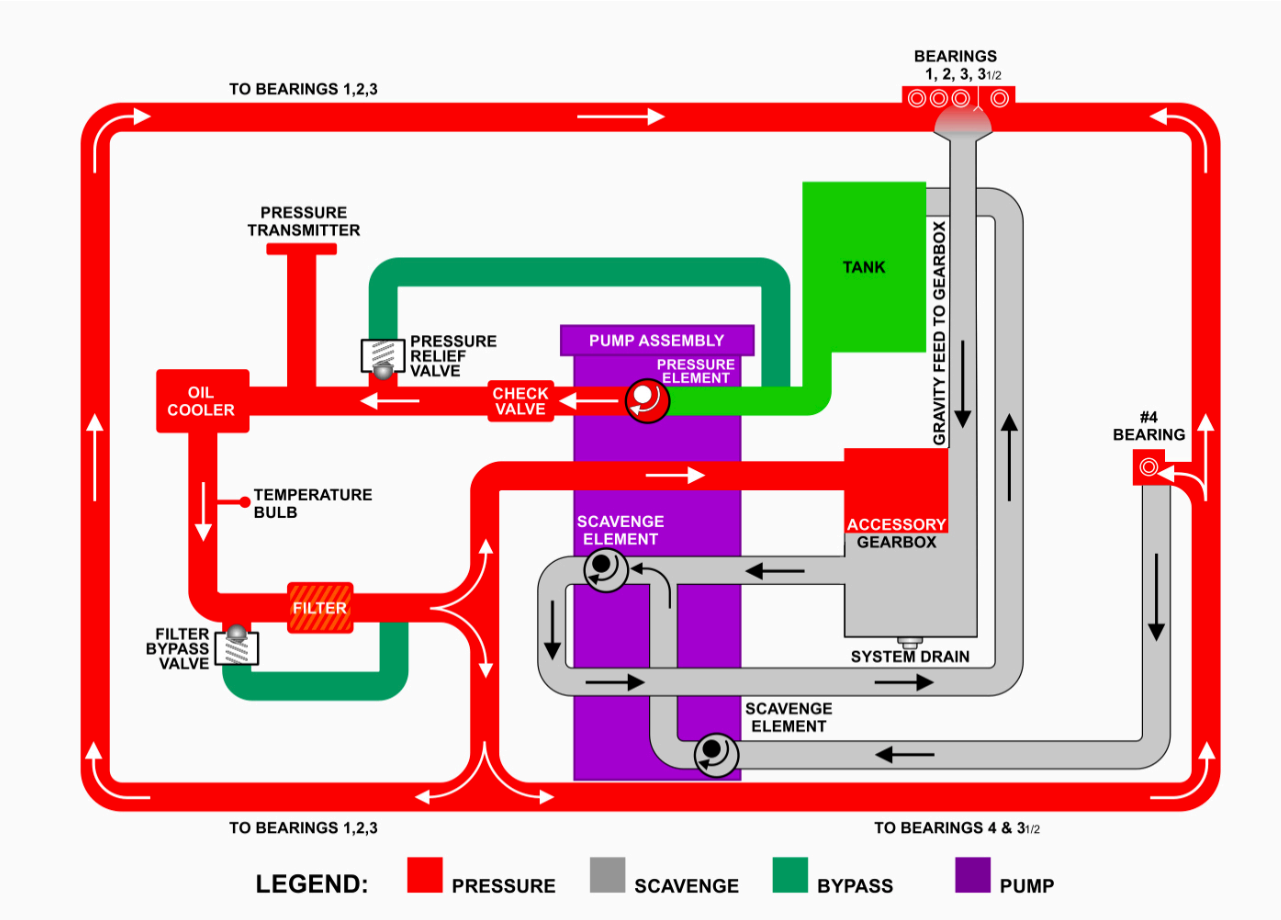
- Engine driven.
- Provides pressure for lubrication and cooling.
- Scavenge pumps collect oil and returns it to the oil tank.
- Oil-to-fuel heat exchanger cools oil and warms fuel to prevent icing.
- Oil filter has a bypass to prevent clogging.

POWER PLANT – OIL SYSTEMS

The oil system provides cooled, pressurized oil for lubrication and cooling of engine bearings and accessory drive gears and bearings. Oil is drawn from an integral oil tank by the pressure element of the three-element pump mounted on the accessory gearbox. It passes through a check valve, which prevents gravity flow when the engine is not running, and past a pressure relief valve enroute to the oil cooler. If system pressure becomes excessive, the relief valve reduces it by unseating and allowing oil to return to the pump inlet via a bypass line. From the cooler, which is a fuel-oil heat exchanger, it passes through a filter before being routed to the engine bearings and accessory gearbox. Should the filter become clogged, a bypass valve opens allowing lubrication to continue. Dual oil temperature gauges are mounted on the instrument panel. OIL PRESS WARN L-R comes on when oil pressure is under 35 psi. Normal pressure is 70-85 PSIG. An oil breather is installed to prevent over pressurization of the system.



POWER PLANT – OIL SYSTEM



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POWER PLANT – FUEL SYSTEMS

A single stage, engine driven pump delivers high pressure fuel flow to the fuel control unit. Fuel enters the pump at 20-30 PSI from the primary ejector pump. The engine-driven pump increases this pressure to 500-700 PSI. A portion of the pump output is bypassed through the motive flow valve to drive the primary ejector pump and the remainder is directed downstream to the fuel control. If the engine driven fuel pump fails, the engine will flame out. The fuel control unit is mounted on the engine-driven fuel pump and determines the proper fuel schedule for all phases of engine operation. A flow divider downstream of the fuel control unit provides proper fuel distribution to the combustion chamber by dividing the flow from the fuel control between the primary and secondary fuel manifolds. It also acts as a fuel shutoff valve, bypassing fuel back to the pump. When the throttle is closed, fuel flow is terminated at the flow divider and the fuel manifold is drained. On 500-0001 thru -0213 not incorporating SB71-2 a fuel canister is used which collects the fuel at engine shutdown.

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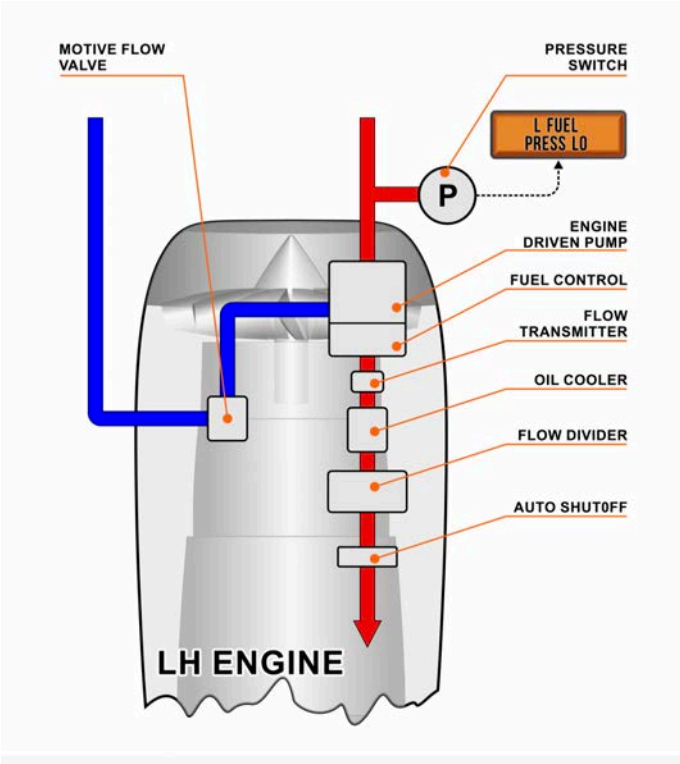
POWER PLANT – FUEL SYSTEMS

A single stage, engine driven pump delivers high pressure fuel flow to the fuel control unit. Fuel enters the pump at 20-30 PSI from the primary ejector pump. The engine-driven pump increases this pressure to 500-700 PSI. A portion of the pump output is bypassed through the motive flow valve to drive the primary ejector pump and the remainder is directed downstream to the fuel control. If the engine driven fuel pump fails, the engine will flame out.



POWER PLANT – FUEL SYSTEM

The fuel control unit (FCU) controls fuel flow based on:

- P3 (compressor discharge pressure)
- PA (ambient atmospheric pressure)
- Compressor inlet temperature
- N2 RPM
- Thrust lever position

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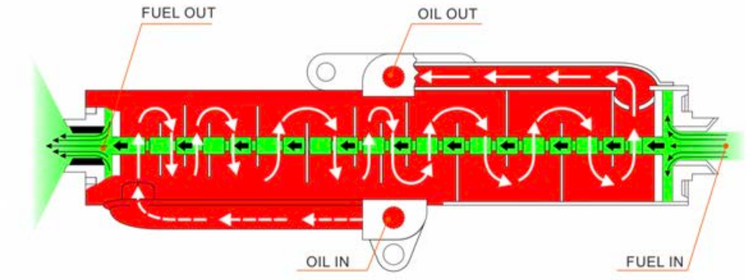
POWER PLANT – FUEL SYSTEMS

FUEL/OIL HEAT EXCHANGER

The fuel oil heat exchanger cools the engine oil and warms the fuel to prevent ice formation.



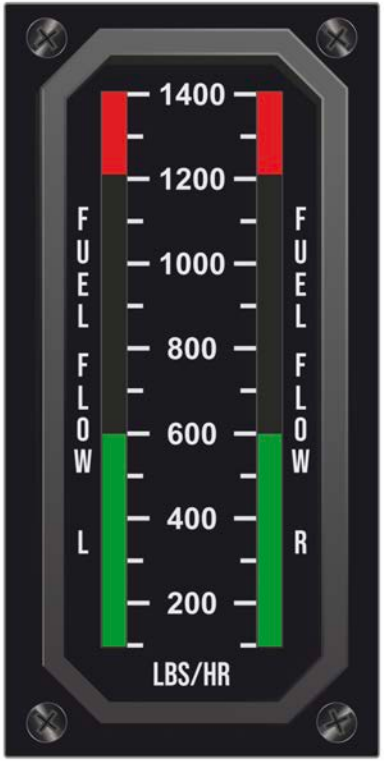
EMERGENCY FUEL SHUT-OFF VALVE

Shuts off fuel flow if N1 shaft moves aft > 0.050 inch. This feature prevents an uncontrolled overspeed of the N1 shaft.

POWER PLANT – ENGINE INDICATIONS

FUEL INDICATION

The Fuel Flow Meter reads in pounds per hour.
Fuel flow is not measured when throttle moves to cut off or engine drops below 10%.



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POWER PLANT – IGNITION

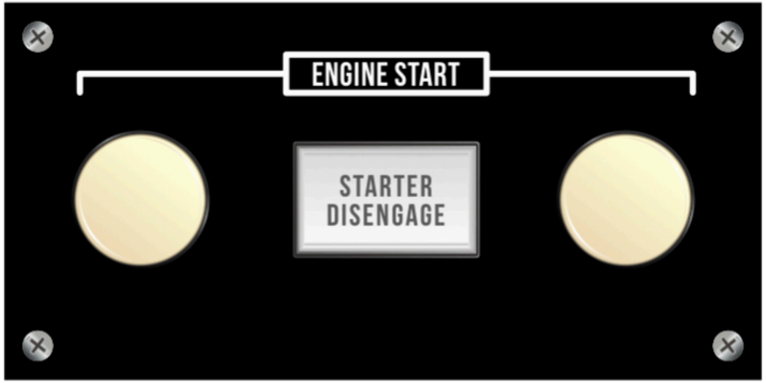
- The Ignition receives powered from the Hot Battery Bus.
- Ignition and starter are automatically terminated by GCU. (terminates the start sequence).
- Ignition selections are NORMAL or ON.
- Selecting engine Anti-ice ‘ON’, turns on ignition continuously.
- Ignition must be ON for takeoff, landing, air-starts, heavy rain, icing, practice stalls, or turbulent air.

POWER PLANT – ENGINE STARTING

L AND R ENGINE START: Press to start.
STARTER DISENG: Opens the starter relay if starter does not automatically disengage.

Abort the start for any of the following:

- **False Start:** No ITT/fuel flow within 10 seconds of advancing throttle to idle.
- **Hot Start:** ITT rapidly approaches 700^{0}C
- **No N1 rotation:** by 12% of N2
- **Hung Start:** slow or no rotation after ITT increases prior to reaching full idle rpm.



POWER PLANT – ENGINE SYNCHRONIZER

ENGINE SYNC:
Synchronizes:
N_1 (Fan) speed: Thrust is proportional to N_1 speed for passenger comfort.
-or-
N_2 (Turbine) speed: Slight asymmetrical thrust for crew comfort. Manually adjust N_2 within 1.5 % then engage

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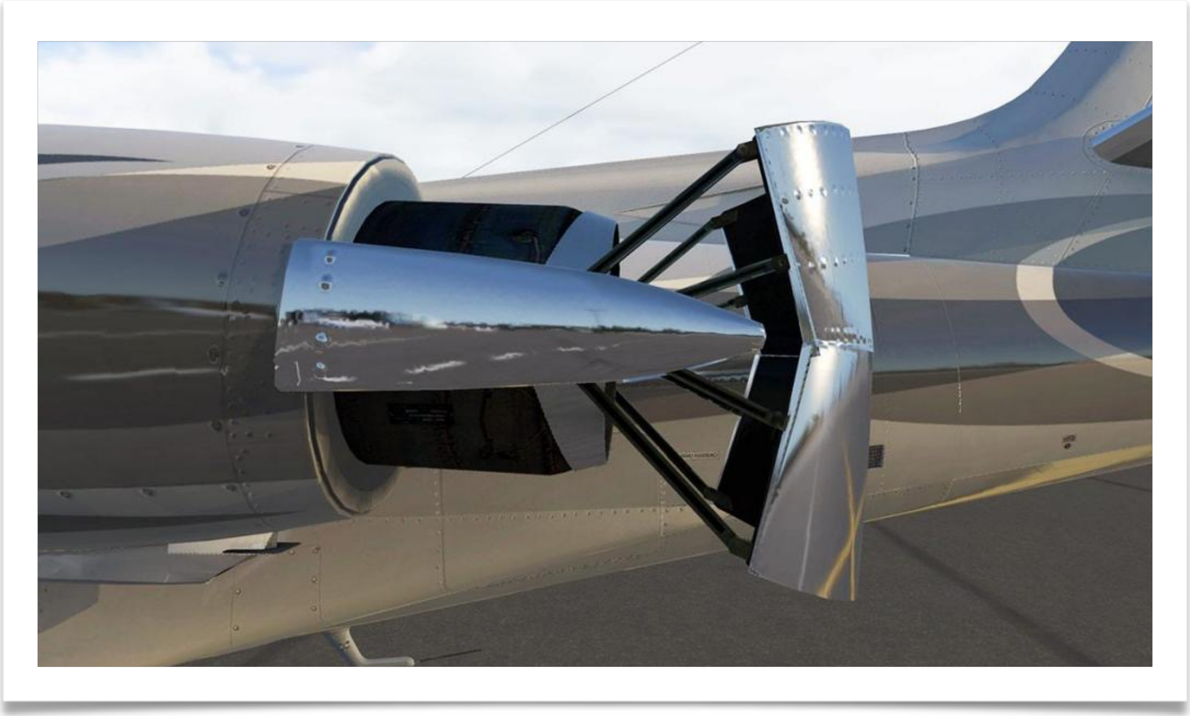
POWER PLANT – THRUST REVERSERS

The thrust reversers aid in deceleration by directing exhaust gases forward. Comprised of bucket-shaped doors that are normally flush with the engine nacelle and extend into the engine exhaust stream when deployed. The reversers are hydraulically actuated and electrically controlled by paddle switches on the throttles. The T/R’s will only deploy with the throttles in IDLE REVERSE, the aircraft is on the ground, and either main gear squat switch is completing the circuit. They are powered by the respective L and R crossover bus.

POWER PLANT – THRUST REVERSERS



POWER PLANT – THRUST REVERSERS

LIMITATIONS

- Place throttle in IDLE REVERSE at 60 KIAS on landing roll.
- Do not deploy thrust reversers on gravel, sod or dirt runways.
- Do not use thrust reversers during touch and go landings.
- Do not use thrust reversers if crosswinds exceed 25 Knots.

POWER PLANT – THRUST REVERSERS

CONTROLS

Moving the reverse thrust lever from the STOWED to the IDLE REVERSE position actuates the deploy switch. This electrically opens the isolation valve and pressurizes the hydraulic system illuminating the amber ARM light. The initial movement of the actuators activates the unlocked switches causing the amber UNLOCK light to illuminate. Further movement of the actuator unlocks the reverser through the overcenter linkage. The remaining travel of the actuators deploys the reverser doors. At full deployment of the reverser, the deploy switch is activated which in turn illuminates the white DEPLOY light and unlocks the pedestal-mounted throttle lock out cam. The purpose of the lock out cam is to prevent increasing engine thrust, once reverser deployment has been selected, until the reversers have fully deployed.

POWER PLANT – THRUST REVERSERS

An automatic system is incorporated in the installation to retard engine power to idle if an inadvertent deployment or stow of the reverser should occur. Anytime the reverser is in transit with the engine throttle control above idle, the system moves the fuel control approximately to idle. A spring-loaded overcenter bracket in each throttle system is designed to actuate allowing the fuel control to be moved to idle if the throttles are held above idle during an inadvertent deployment. Once the automatic retard system has actuated, the throttle system may be out of rig to the point that full throttle travel would produce considerably less than takeoff thrust and idle throttle position would shut down the engine. The same bracket actuation will occur if the main throttles are advanced while the reversers are being stowed during landing roll or normal taxi. For this reason, the thrust reversers should not be used on touch and go landings and a full stop landing should be accomplished once the thrust reversers are selected.

POWER PLANT – THRUST REVERSERS

DEPLOYMENT

1. On the ground with squat switch activated
2. Throttles to IDLE REVERSE: ARM indicator illuminates and HYD PRESS ON illuminates
3. Reverse Levers UP: UNLOCK indicator illuminates
4. Doors Extend.
5. When fully extended: DEPLOY indicator illuminates.

POWER PLANT – THRUST REVERSERS

STOWING

1. Thrust Reverse Levers DOWN (Stow): DEPLOY extinguishes when buckets begin to move.
2. Doors retract.
3. When in stowed position: UNLOCK extinguishes.
4. When hydraulics depressurized: ARM and HYD PRESS ON extinguish.

POWER PLANT – THRUST REVERSERS

EMERGENCY STOWING

The emergency stow switches are located adjacent to the reverse annunciators lights. Moving the emergency stow switch to EMER bypasses the normal system and sends electrical signals directly to the hydraulic valves. After the reverser stows, the DEPLOY and UNLOCK extinguish. The ARM and HYD PRESS ON lights remain illuminated until the emergency stow switch is moved from EMER to NORM. Power for emergency stowing comes from the opposite systems normal circuit breaker.

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POWER PLANT – THRUST REVERSERS

PREFLIGHT

Check thrust reversers for cracks, damage, and general security
Ensure thrust reverser lock-out tools not inserted
In cockpit, test system with rotary TEST turned to THRU REV, thrust reverser lights and MASTER WARNING illuminate.
During taxi, deploy thrust reversers normally. Actuate emergency stow switch (EMER) and observe thrusters stow. Return Emergency stow switch to NORM.

POWER PLANT – ANNUNCIATORS

Indicator	Master Caution/ Warning	Description
L OIL PRESS LO R OIL PRESS LO	WARNING	Oil pressure is too low. Value appears in Oil Pressure display. Immediate action required. See Emergency/ Abnormal procedures. Does not appear during startup or if engine shut down. Does not appear when battery switch on EMER power.

POWER PLANT – ANNUNCIATORS

Indicator	Master Caution/ Warning	Description
 	CAUTION	Stops fuel from going to engine. Illuminates when LH or RH ENG FIRE pressed. If ENG FIRE pressed second time, F/W SHUTOFF goes out. Only present on normal DC power.

POWER PLANT – ANNUNCIATORS

Indicator	Master Caution/ Warning	Description
	CAUTION	Fuel filter bypass soon or has happened. Fuel is likely contaminated and engine damage or failure or is imminent or occurring. Only available with normal DC power.

POWER PLANT – ANNUNCIATORS

Indicator	Master Caution/ Warning	Description
L FUEL PRESS LO R FUEL PRESS LO	CAUTION	Fuel pressure is below 5 PSI. Turns on Fuel Boost pump if engine out of CUTOFF. If throttles in Normal, Fuel Boost pumps turn on automatically. See emergency procedures. Only works with normal DC power and does not appear if engine shut down.

POWER PLANT – ANNUNCIATORS

Indicator	Master Caution/ Warning	Description
	Advisory	ARM: Thrust reverser hydraulics pressurized, not deployed. UNLOCK: Thrust Reverser not fully stowed. DEPLOY: Thrust Reverser is fully deployed.

POWER PLANT – EMERGENCY PROCEDURES

ENGINE FAILURE, OR FIRE, OR MASTER WARNING, OR ANY OTHER NON-NORMAL EVENT DURING TAKE-OFF
BOLD RED TEXT INDICATES MEMORY ITEMS.

Speed Below V1

1. Take-off: ABORT

a. **BRAKES: MAXIMUM PILOT EFFORT**
b. **THROTTLE: IDLE**
c. **SPEED BRAKES: EXTEND**
d. **THRUST REVERSES (UNAFFECTED ENGINE): DEPLOY**
e. **REVERSE INDICATOR LIGHTS: CHECK/ILLUMINATED**

IF ENGINE FIRE (ENGINE FIRE LIGHT)

2. Refer to **EMERGENCY PROCEDURES, ENGINE FIRE L OR R (LH-RH ENGINE FIRE)**
   NOTE: To obtain maximum braking performance from anti-skid system, apply continuous maximum effort (no pumping) to the brake pedals.The Take-off Field Lengths assume the pilot has applied maximum effort brakes at V1 speed during aborted take-off.

POWER PLANT – EMERGENCY PROCEDURES

ENGINE FAILURE, OR FIRE, OR MASTER WARNING, OR ANY OTHER NON-NORMAL EVENT DURING TAKE-OFF

BOLD RED TEXT INDICATES MEMORY ITEMS.

SPEED ABOVE V1 – TAKE-OFF CONTINUED

1. **AFTER ESTABLISHING A POSITIVE RATE OF CLIMB**
   a. **LANDING GEAR: UP (AFTER POSITIVE RATE OF CLIMB)**
   b. **AIRSPEED: V2 (SINGLE ENGINE) OR AS REQUIRED (MULTI-ENGINE)**
2. **AT 400 FEET AGL AND AT V2 + 10:**
   c. **RETRACT FLAPS**
   d. **ACCELERATE TO VENR**

IF ENGINE FIRE INDICATIONS ARE PRESENT (ENGINE FIRE LIGHT)

3. Refer to EMERGENCY PROCEDURES, ENGINE FIRE L OR R (LH-RH ENGINE FIRE)

IF ENGINE FAILURE

4. Refer to Abnormal Procedures, In Flight Restart - One Engine or Engine Failure/ Precautionary Shutdown

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POWER PLANT – EMERGENCY PROCEDURES

ENGINE FAILURE/PRECAUTIONARY SHUTDOWN

Reasons for shutdown: Abnormally high or low oil pressure, abnormal or rising ITT, engine vibration, fan/turbine RPM fluctuations, abnormal oil temperature, erratic fuel flow.

1. Throttle (affected engine): CUTOFF
2. IGNITION Switch (affected side): NORM
3. Engine Synchronizer: OFF
4. Generator (affected engine): OFF
5. Electrical Load: Reduce as required
6. FUEL CROSSFEED/TRANSFER Knob: As required.
7. If Engine anti-ice is ON (affected Engine): OFF

If Engine Fire Has Occurred (Fire Extinguished, Secure Engine)

8. Verify ENGINE FIRE switch (affected side) is pushed.
9. Land as soon as practicable.

NO ENGINE FIRE (Precautionary Engine Shutdown)

10. Verify ENGINE FIRE switch is not depressed and firewall shutoff is open.
11. FUEL BOOST Switch (affected side): On
12. Land as soon as practicable.

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POWER PLANT – EMERGENCY PROCEDURES

ENGINE FAILURE DURING COUPLED APPROACH

RED BOLD TEXT INDICATES MEMORY ITEMS.

1. Power (operating engine) INCREASE as required
2. Autopilot/Yaw Damper: OFF
3. Airspeed: VREF + 10
4. Rudder Trim: TRIM TOWARD operating Engine
5. Flaps: TO and APPR
6. Throttle (Affected Engine) CUTOFF
7. Autopilot as desired
8. If Engine Fire: Engine Fire Procedure:
9. Passenger Advisory Light: PASS SAFETY
10. Passenger Seats: CHECKED Full & Upright
11. Seats/Belts/Shoulder Harness: SECURE
12. Fuel Crossfeed:CHECK
13. Ignition (operating engine): ON
14. Landing Gear: DOWN and LOCKED
15. Anti-Skid: CHECK/ON
16. Annunciator Panel: CHECK
17. Landing Lights: As required.

WHEN LANDING ASSURED:

18. Flaps: LAND
19. Airspeed VREF
20. Pressurization: CHECK/ ZERO DIFFERENTIAL

Prior to 50 ft. AGL:

21. Speed brakes: Retract.

NOTE: Do not let N2 drop below 49%.

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POWER PLANT – EMERGENCY PROCEDURES

EMERGENCY RESTART – ONE ENGINE (FOLLOWING SHUTDOWN) STARTER ASSIST

RED BOLD TEXT INDICATES MEMORY ITEMS.

1. Throttles: CUTOFF
2. Generator: GEN
3. Firewall Shutoff: CHECK/OPEN
4. Ignition: ON
5. Either Engine START button: Press momentarily
6. Throttle (selected engine): IDLE at 8%-10% N2
7. Engine Instruments: MONITOR

After Engine Stabilizes

8. Ignition: NORM
9. ENGINE ANTI-ICE switches: As Required
10. As a precaution after inflight restart, consider leaving ignition and boost pump ON.AIR COND switch: OFF

If Start does not occur

11. Starter Disengage Switch: PRESS
12. Engine Failure/Precautionary Shutdown Procedure

POWER PLANT – EMERGENCY PROCEDURES

IN FLIGHT RESTART – ONE ENGINE (FOLLOWING SHUTDOWN) WIND MILLING

RED BOLD TEXT INDICATES MEMORY ITEMS.

Airspeed 200 KIAS Minimum (220 KIAS Preferred).

1. Throttle (affected engine): CUTOFF
2. Firewall Shutoff: CHECK/OPEN
3. Ignition: ON
4. Boost Pump: ON
5. Throttle: IDLE
6. Engine Instruments: MONITOR

After Engine Stabilizes:

7. Boost Pump/Ignition: NORM
8. Generator: GEN
9. Engine Anti-Ice: As Required

As a precaution after inflight restart, consider leaving ignition and boost pump ON. If start does not occur:

10. Complete Abnormal Procedures, Engine Failure/Precautionary Shutdown checklist.

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POWER PLANT – EMERGENCY PROCEDURES

EMERGENCY RESTART – TWO ENGINES

RED BOLD TEXT INDICATES MEMORY ITEMS.

1. **Ignition: BOTH ON**
2. **Boost Pumps: Both ON**
3. **Throttle: IDLE**

If altitude allows

4. **Airspeed: Increase to 200 KIAS**
5. **Firewall Shutoff: Check/OPEN**
6. All Anti-Ice Switches: OFF

IF NO START IN 10 SECONDS

7. Either Start Button: Press Momentarily

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POWER PLANT – EMERGENCY PROCEDURES

ENGINE FIRE L OR R (LH-RH ENGINE FIRE)

RED BOLD TEXT INDICATES MEMORY ITEMS.

1. Retard affected engine to idle to verify fire exists.

IF INDICATOR STILL ILLUMINATED:

2. Lift LH or RH cover and press ENG FIRE switch.
3. Either White BOTTLE ARMED light: PUSH
4. Ignition: NORM
5. Affected LH/RH engine to CUTOFF.
6. Electrical Load: REDUCE
7. Boost Pump switch LH/RH: OFF

ENGINE FLAMES OUT & SPOOLS DOWN.

If Engine Anti-Ice is ON: Engine Anti-Ice - OFF

IF ENGINE FIRE LIGHT REMAINS ILLUMINATED AFTER 30 SECONDS,

8. Remaining White BOTTLE ARMED Light: PUSH.
9. Land as soon as possible.

IF ENGINE FIRE LIGHT GOES OUT AND SECONDARY FIRE INDICATIONS ARE NOT PRESENT

10. Land as soon as practicable
11. Refer to Abnormal Procedures.

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POWER PLANT – EMERGENCY PROCEDURES

Emergency Evacuation – Fire Suspected

Red BOLD TEXT indicates Memory Items.

1. **Throttle – BOTH CUTOFF**
2. **Illuminated LH/RH Engine Fire Switches– Lift Cover, Both PRESS**
3. **LH/RH Fire Bottle Armed Switches– Both PRESS**
4. **Remaining Fire Switch: PRESS**
5. **Park Brake handle (if gear down): SET.**
6. **Advise ATC**
7. **Battery Switch – OFF**
8. **Evacuate Aircraft through appropriate exit**

If Thru Cabin Door

9. Cabin Door – OPEN
10. Move away from airplane

If Thru Emergency Exit/Escape Hatch

11. Emergency Exit/Hatch – REMOVE & THROW OUT OF AIRPLANE.
12. Move away from airplane.

POWER PLANT – EMERGENCY PROCEDURES

Emergency Evacuation – NO Fire Suspected

Red BOLD TEXT indicates Memory Items.

1. **Throttle – BOTH CUTOFF**
2. **Illuminated LH/RH Engine Fire Switches – Lift Cover, Both PRESS.**

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POWER PLANT – EMERGENCY PROCEDURES

INADVERTENT DEPLOYMENT OF THRUST REVERSERS DURING TAKE-OFF – BELOW V1: ABORT

RED BOLD TEXT INDICATES MEMORY ITEMS.

1. **Brakes: Maximum Pilot Effort.**
2. **Throttles: IDLE**
3. **Speed Brakes: EXTEND**
4. **Thrust Reversers: DEPLOY BOTH**
5. Thruster Reverser Lights: CHECK/ILLUMINATED
6. Thrust Reverser Levers: Reverse Power on Both Engines

   NOTE: To obtain maximum braking performance from anti-skid system, apply continuous maximum effort (no pumping) to the brake pedals.

   The Take-off Field Lengths assume the pilot has applied maximum effort brakes at V1 speed during aborted take-off.

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POWER PLANT – EMERGENCY PROCEDURES

INADVERTENT DEPLOYMENT OF THRUST REVERSERS DURING TAKE-OFF – ABOVE V1: CONTINUED TAKE-OFF.

RED BOLD TEXT INDICATES MEMORY ITEMS.

1. **EMER STOW Switch (Affected Engine): EMER**

   At positive rate of climb:

2. **Landing Gear: RETRACT**
3. **Airspeed: 125 KIAS maximum until Thrust Reverser Stows**

   NOTE: If thrust reverser stows, engine may be operated normally. Thrust reverser cannot be used during landing if emergency stowed.

   At 400 feet AGL and at V2 + 10:

4. **Flaps: RETRACT**
5. **Airspeed: ACCELERATE**

   If Reverser Stows:

6. **Airspeed: 200 KIAS Maximum**

   IF ARM ILLUMINATED AND UNLOCK/DEPLOY EXTINGUISHED

7. Land as soon as practical (within 15 minutes or hydraulic system may overheat and fail)

   IF REVERSER DOES NOT STOW:

6. Thrust Reverse circuit breakers: Check/Set
7. Throttle (affected engine): CUTOFF

   NOTE: Consider completing Engine Shutdown Procedures

8. Airspeed: 150 KIAS maximum

   WARNING: Capability of go-around with a thrust reverser deployed has not been demonstrated.

9. See Abnormal Procedures.

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POWER PLANT – EMERGENCY PROCEDURES

Inadvertent Deployment of Thrust Reversers During Flight

Red BOLD TEXT indicates Memory Items

1. **Associated ARM, LOCK, and DEPLOY lights illuminated**
2. **Control Wheel/ Autopilot: GRIP/ DISENGAGE (Aircraft will tend to pitch up and roll into deployed reverser)**
3. **Emergency Stow Switch: EMER (affected engine)**
4. **Affected Throttle: Check IDLE**
5. **Airspeed: 125 KIAS maximum until Thrust Reverser stows.**

If reverser stows (DEPLOY and UNLOCK lights OUT)

NOTE: If thrust reverser stows, engine may be operated normally. Thrust reversers cannot be used during landing if emergency stowed.

6. **Airspeed: 200 KIAS maximum.**
7. UNLOCK and DEPLY lights: Check/OUT
8. Land as soon as practical.
9. **If Reverser does not stow**:
10. Thrust Reverse circuit breakers: Check/Set
11. Throttle (affected engine): CUTOFF

    Note: Consider completing Engine Shutdown Procedures
12. Airspeed: 150 KIAS maximum.

    WARNING: Capability of go-around with a thrust reverser deployed has not been demonstrated.
13. See Abnormal Procedures

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POWER PLANT – EMERGENCY PROCEDURES

Approach/Landing With Thrust Reverser Deployed

Complete the following checklists:

1. Inadvertent Deployment of Thrust Reversers During Flight Procedure.
2. Single Engine Approach/Landing Procedure.

POWER PLANT – EMERGENCY PROCEDURES

THRUST REVERSER UNLOCK ANNUNCIATOR LIGHT IN FLIGHT

RED BOLD TEXT TEXT INDICATES MEMORY ITEMS.

1. **Emergency Stow Switch: EMER (affected engine)**
2. **Thrust Reverse Levers: Check/STOWED (Full forward)**

IF LIGHT DOES NOT EXTINGUISH:

3. Thrust Reverse circuit breakers: Check/Set
4. Airspeed: 200 KIAS maximum
5. Land as soon as practical (within 15 minutes or hydraulic system may overheat and fail)

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POWER PLANT – EMERGENCY PROCEDURES

MAXIMUM GLIDE – EMERGENCY LANDING

1. Airspeed

UN 1-349: Per Chart Below

Weight-lbs.	11350	11000	10500	10000	9500	9000	8500
KIAS	144	140	137	134	131	128	125

UN 350+: Per Chart Below

Weight-lbs.	11350	11000	10500	10000	9500	9000	8500
KIAS	138	135	132	129	126	123	120

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POWER PLANT – EMERGENCY PROCEDURES

MAXIMUM GLIDE – EMERGENCY LANDING (CONTINUED)

2. FLAP handle: UP
3. Speed Brakes: RETRACTED
4. Landing Gear Handle (if desired): UP
5. Transponder: Emergency 7700
6. ATC: Advise
7. Passenger Advisory Lights: PASS SAFETY
8. Shoulder Harness: SECURE
9. Gear/Speed Brakes/Flaps: As Required

POWER PLANT – ABNORMAL PROCEDURES

Single Engine Approach/Landing

NOTE: Do not let N2 drop below 49%.

1. Seats/Belts/Harness: SECURE
2. Avionics/Flight Instruments: CHECK/SET
3. Radar Altimeter: SET
4. VREF/Fan Speeds Settings: CONFIRM
5. Passenger Advisory Lights: PASS SAFETY
6. Passenger Seats: CHECK
7. Flaps: TO & APR
8. Engine Synchronizer: OFF
9. Fuel Crossfeed: OFF
10. Ignition (operating Engine): ON
11. Landing Gear: DOWN and LOCKED
12. Anti-Skid: Check/ON

    NOTE: Check PWR BRK PRESS LO and ANTI-SKID INOP annunciators extinguished.
13. Annunciator Panel: CHECK
14. Landing Lights: As Required
15. Airspeed: VREF + 10 (minimum)
16. Autopilot/Yaw Damper: OFF When landing assured:
17. Flaps: LAND
18. Airspeed: VREF Prior to 50 ft. AGL
19. Speed Brakes: RETRACT

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POWER PLANT – ABNORMAL PROCEDURES

SINGLE ENGINE GO-AROUND

1. Throttle (operating engine): TO POWER/GO AROUND. Go Around Mode Button: PRESS, HDG: ON, ALT SEL: ARM
2. Pitch Attitude: 7.5 NOSE-UP (Use Go around mode in flight director for reference)
3. Flaps: TO and APPR

NOTE: Landing Gear Warning horn cannot be silenced if landing gear retracted before the flaps reach the TO & APPR position.

At positive rate of climb:

4. Landing Gear: UP

When clear of obstacles (400 ft. AGL minimum)

5. Flaps: RETRACT
6. Climb Speed: VENR
7. Thrust: MAX CONTINUOUS

Consider Fuel Crossfeed

POWER PLANT – ABNORMAL PROCEDURES

ENGINE START MALFUNCTION (ENGINE DOES NOT LIGHT)

No increase in ITT and no continued increase in N2.

1. Throttle (affected engine): CUTOFF

After 15 seconds:

2. ENGINE START DISENG button: PRESS

POWER PLANT – ABNORMAL PROCEDURES

ENGINE STARTER DOES NOT DISENGAGE

1. Starter Disengage Button: PRESS

   If starter does not disengage and Start button remains illuminated (Start relay stuck)
2. External Power: Check/Clear
3. Battery Switch: OFF
4. Generator Switches: OFF
5. Battery Quick Disconnector (Tail Cone): DISCONNECT
6. Throttles: OFF

POWER PLANT – ABNORMAL PROCEDURES

LOW OIL PRESSURE – OIL PRESS WARN

If oil pressure gauge indicates

Above 65 PSI

1. Land as soon as practical.

Between 35 and 65 PSI

1. Throttle (Affected engine): REDUCE POWER
2. Land as soon as practical.

Below 35 PSI

1. Throttle (Affected engine): CUTOFF
2. Engine Failure/ Precautionary Shutdown Procedure.

POWER PLANT – ABNORMAL PROCEDURES

LOW OIL PRESSURE – OIL PRESS WARN GOES OUT

If oil pressure gauge indicates:

Between 35 and 65 PSI

1. Throttle (affected engine): Reduce Power

Below 35 PSI

2. Land as soon as practical.

POWER PLANT – ABNORMAL PROCEDURES

ENGINE FIRE DURING GROUND SHUTDOWN OR HIGH SUSTAINED ITT DURING GROUND SHUTDOWN

1. Throttle (affected engine): CHECK/CUTOFF
2. ENGINE START button (affected engine): Press momentarily.
   After 15 seconds:
3. ENGINE START DISENG button: Press

POWER PLANT – ABNORMAL PROCEDURES

SINGLE ENGINE REVERSING

Note: Reverse Thrust may need to be reduced during cross wind landings on wet or icy runways

1. Throttle (operating engine): IDLE
2. Brakes: APPLY
3. Speed brakes: EXTEND

AFTER NOSEWHEEL ON THE GROUND:

4. Thrust Reverser (operating Engine): DEPLOY
5. Reverser Indicator Lights: CHECK/APPROPRIATE
6. Reverse Power: AS Required

AT 60 KIAS

7. Thrust Reverser Lever (Operating engine): IDLE REVERSE

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POWER PLANT – ABNORMAL PROCEDURES

THRUST REVERSER ARM LIGHT ON IN FLIGHT

Thrust Reversers: Check/STOWED

2. EMER STOW Switch: Check/NORM

IF LIGHT STILL ILLUMINATED

3. Airspeed: 200 KIAS Maximum

4. HYD PRESS ON Annunciator: CHECK

If HYD PRESS ON annunciator illuminated:

5. Affected Thrust Reversers: PULL

NOTE: When a Thrust reverser circuit breaker is pulled, the emergency stow system of the opposite reverser is deactivated

6. Land as soon as possible. Affected thrust reverser is inoperable

IF HYD PRESS ON EXTINGUISHED

5. Land as soon as practical.

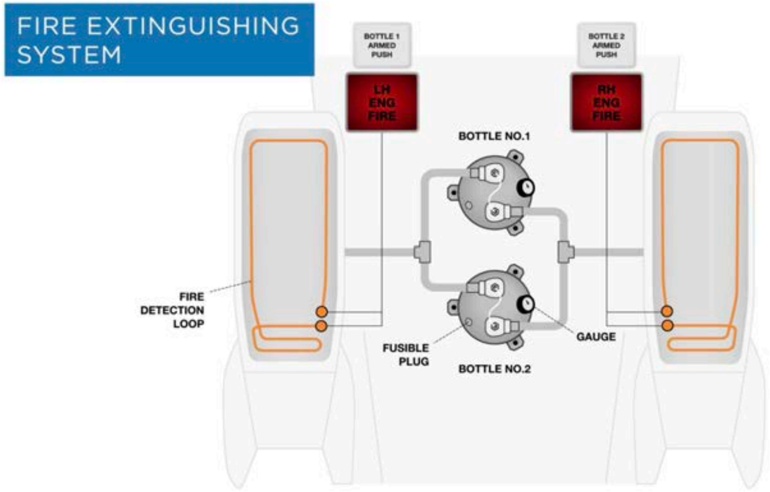
FIRE PROTECTION

FIRE PROTECTION – SYSTEM CONTAINS

- 1 sensing loops per side (engine)
- 2 fire extinguisher bottles (tail cone)
- 1 control unit per side (tail cone)
- 1 indicator light per side (cockpit)
- Fire detection test circuit (cockpit)
- 1 portable 2.5 lb. fire extinguisher for cabin (cockpit)
- Stainless steel firewall and fuel fittings

FIRE PROTECTION – SENSING LOOPS

The fire protection system contains one loop per engine located on the inner side of the engine cowling. Each loop is made of a flexible stainless-steel tube with an energized semiconductor inner wire. As the temperature in the cowling increases, the resistance in the wire decreases. At 260°C (500°F) electric current flows from the inner wire to the stainless steel outer tube completing the circuit and illuminating the ENGINE FIRE PUSH light. The Fire Control Unit distinguishes between a slow decrease in resistance caused by a fire and a rapid decrease in resistance caused by a short circuit. If a short, the ENGINE FIRE PUSH switch light does not illuminate.



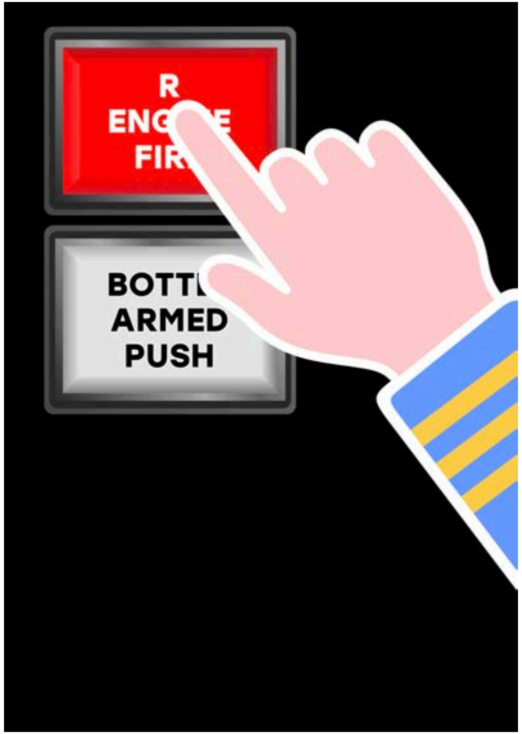
FIRE PROTECTION – EXTINGUISHER BOTTLES

The system incorporates two extinguishing bottles in the tail cone. It's a two shot system and the bottles can be fired to either engine. The system is activated by the BOTTLE ARMED PUSH switch.

FIRE PROTECTION – FIRE LIGHT SWITCH

A fire will cause the detection sensors on the fire loop to illuminate the ENG FIRE PUSH switch light. Lifting the cover and pressing the switch will:

- Close the fuel firewall shutoff valve.
- Close the hydraulic firewall shutoff valve.
- Trip the Generator relay.
- Arm the fire bottle.
- If thrust reversers are installed, the switch deenergizes the system.
- Pressing the switch a second time, reopens the valves.



FIRE PROTECTION – OPERATION

1. Red L and R ENGINE FIRE light on center instrument panel indicates fire or overheat MASTER CAUTION/ WARNING illuminates.
2. Retard Engines to idle to verify fire exists.
3. Lift LH or RH cover and press ENG FIRE switch
    a. Fuel and hydraulic firewall shut off valves close
    b. Field relay on generator tripped
    c. Fire bottles armed

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FIRE PROTECTION – OPERATION

4. Indicators that illuminate
   a. BOTTLE 1 and 2 ARMED
   b. F/W SHUTOFF
   c. FUEL PRESS LO
   d. FUEL BOOST ON
   e. HYD FLOW LOW
   f. GEN OFF
   g. OIL PRESS WARN (when it drops below 25 PSI)
   h. MASTER CAUTION/ WARNING
5. LH/RH engine to CUTOFF
6. FUEL BOOST switch (LH/RH: OFF then NORM
7. Engine flames out, spools down.
8. Press BOTTLE 1 or 2 ARMED PUSH switch light to fire bottle. BOTTLE 1 or 2 ARMED light goes out.
9. Land as soon as practical.

NOTE: Mechanical damage to sensor tube will not result in a false alarm.

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FIRE PROTECTION – TESTING

PREFLIGHT: Check pressure levels on fire bottles 600 +/- 75 PSI in tail compartment. Check for 125 PSI in handheld extinguisher.
Use Rotary test switch on pilot panel.
Turn selector to FIRE WARN:
    Both ENG FIRE switch lights should illuminate.

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FIRE PROTECTION – ANNUNCIATOR

Indicator	Master Caution/ Warning	Description
	CAUTION and WARNING	Fire in LH or RH engine. 1. Red L and R ENGINE FIRE light on center instrument panel indicates fire or overheat MASTER CAUTION/WARNING illuminates. 2. Retard Engines to idle to verify fire exists. 3. Lift LH or RH cover and press ENG FIRE switch a. Fuel and hydraulic firewall shut off valves close b. Field relay on generator tripped c. Fire bottles armed

FIRE PROTECTION – ANNUNCIATOR

Indicator	Master Caution/ Warning	Description
 	CAUTION and WARNING	4. Indicators that illuminate a. BOTTLE ½ ARMED b. F/W SHUTOFF c. FUEL PRESS LO d. FUEL BOOST ON e. HYD FLOW LOW f. GEN OFF g. OIL PRESS WARN (when it drops below 25 PSI) h. MASTER CAUTION/WARNING

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FIRE PROTECTION – ANNUNCIATOR

Indicator	Master Caution/ Warning	Description
 	CAUTION and WARNING	5. LH/RH engine to CUTOFF 6. FUEL BOOST switch (LH/RH: OFF then NORM 7. Engine flames out, spools down. 8. Press BOTTL ½ ARMED PUSH switch light to fire bottle. BOTTLE ½ ARMED light goes out. 10. Valves reopen, lights extinguish. Generator field relay needs manual reset of generator switch or engine restart.

FIRE PROTECTION – ANNUNCIATOR

Indicator	Master Caution/ Warning	Description
 	CAUTION and WARNING	11. Land as soon as practical. **NOTE:** Mechanical damage to sensor tube will not result in a false alarm. Instead, “NO TEST” will indicate.

FIRE PROTECTION – ANNUNCIATOR

Indicator	Master Caution/ Warning	Description
 	CAUTION and WARNING	1. Fire Extinguishing bottle armed. Depress to release contents of the bottle to engine fire.

PNEUMATICS

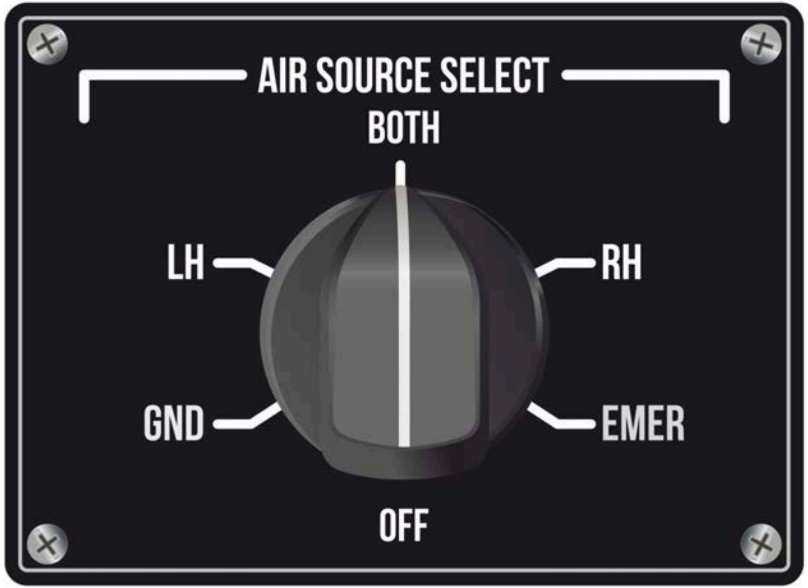
PNEUMATICS – BLEED AIR SOURCE

Engine bleed air provides the high pressure air to supply the cabin pressurization system. During normal operations, the bleed air passes through the air cycle machine for cooling before entering the cabin. Each engine has two ports from which compressor discharge air (bleed air) is bled off the engines. One is used for cabin pressurization, the other for engine anti-ice. Two control valves, one mounted in each pressurization bleed air line, limits the bleed airflow from the respective engine through the air conditioning system and into the cabin. A shutoff and pressure regulating valve installed in the right bleed line allows bleed air pressure to the air conditioner at a higher flow rate for ground operations. The emergency pressurization control valve installed in the left bleed air line is used to route uncontrolled bleed air to the cabin for emergency pressurization. The pressurization source selector switch is a six-position switch labeled OFF, GND, LH, BOTH, RH and EMER.

PNEUMATICS – SELECTING PRESSURE SOURCE

The Press Source Selector switch selects bleed air from the engine compressor.

- OFF
- GND
- LH
- BOTH
- RH
- EMER



PNEUMATICS – PRESSURE CONTROL

In the OFF position, both bleed air control valves, the ground shutoff and pressure regulating valve and the auxiliary pressurization valve are all closed. In this position, no bleed air is able to enter the cabin. In the GND position, with the right engine operating, the shutoff and pressure regulating valve is open allowing approximately 18 lbs./min. bleed air to flow through the air cycle machine to cool or heat the cabin. With this position selected, the BLEED AIR GROUND light on the annunciator panel will illuminate. In the LH position, the left flow control valve will open allowing left engine conditioned bleed air (6 lbs./min.) to enter the cabin. In the RH position the right flow control valve will open allowing right engine conditioned bleed air (6 lbs./min.) to enter the cabin.

PNEUMATICS – PRESSURE CONTROL

In the BOTH position, the left and right flow control valves will open allowing both left and right conditioned bleed air (12 lbs./min.) to enter the cabin. In the EMER position, the emergency pressurization valve opens allowing hot bleed air from the ***left*** engine to enter the cabin directly and the EMER PRESS ON annunciator light will illuminate. The air cycle machine is bypassed with emergency pressurization selected, cabin temperature will rise, and AUTO or MAN TEMP SELECT will be disabled. Cabin temperature can be controlled to some extent with the left throttle. Retarding the left throttle will lower bleed air temperature, but excessive reduction will allow the cabin altitude to climb. LH: Bleed air only from left engine

PNEUMATICS – COMPRESSED NITROGEN

A bottle of nitrogen is used for emergency landing gear extension. It is operated by the AUXILIARY GEAR CONTROL handle. This bottle is also used for the emergency brakes when pulling the EMERGENCY BRAKE handle.

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PNEUMATICS – ANNUNCIATORS

Messages	Master Caution/ Warning	Description
	CAUTION	Uses ram air from engine pylons For use on the ground or low-level flight.

PNEUMATICS – ANNUNCIATORS

Messages	Master Caution/ Warning	Description
EMER PRESS ON	CAUTION	Left and Right engine bleed air routed through the windshield bleed air system into the cabin @ 6ppm.

PNEUMATICS – ANNUNCIATORS

Messages	Master Caution/ Warning	Description
		Temperature in duct leading from ACM to Cabin exceeds 157 +/- (-13) °C (315 +/- 8°F).

ICE AND RAIN PROTECTION

ICE AND RAIN PROTECTION

The anti-ice systems prevent ice formation on the pitot tubes, static ports, windshields, angle of attack probe and protect against engine ice damage. The anti-icing equipment use electrical power or engine bleed air and are actuated by switches on the left switch panel and control knobs on the co-pilot's panel. The anti-ice systems should be turned on when operating in visible moisture with an indicated OAT between +4°C and -30°C (+40°F and -22°F). The electrically heated anti-ice systems include:

- Pitot tubes.
- Static ports.
- Angle of Attack (AOA) probe.
- Inboard section of the wing.

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ICE AND RAIN PROTECTION

Anti-ice systems that use engine bleed air include:

- Wings
- Windshield
- Engine
  - T1 probe
  - T2 probe
  - Nose cone
  - Inlet duct
  - Stator vanes

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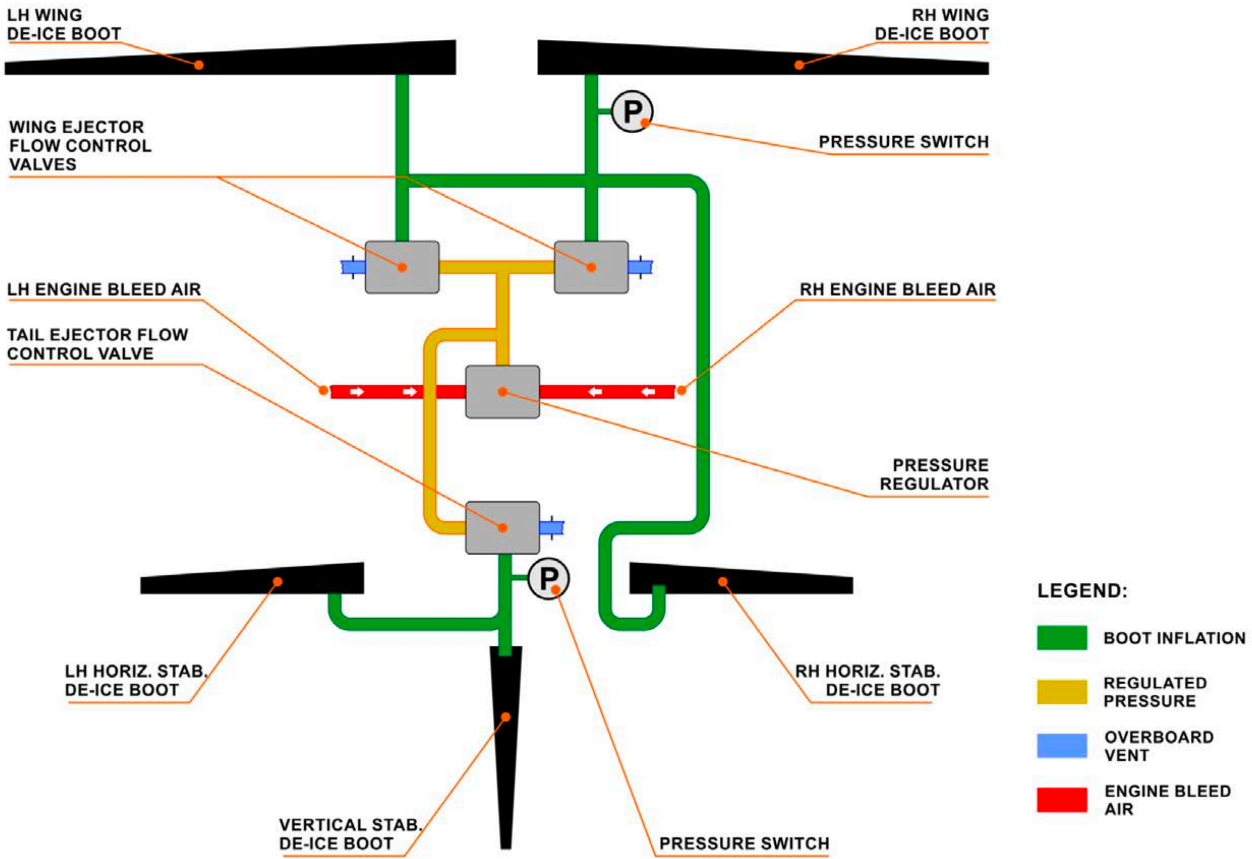
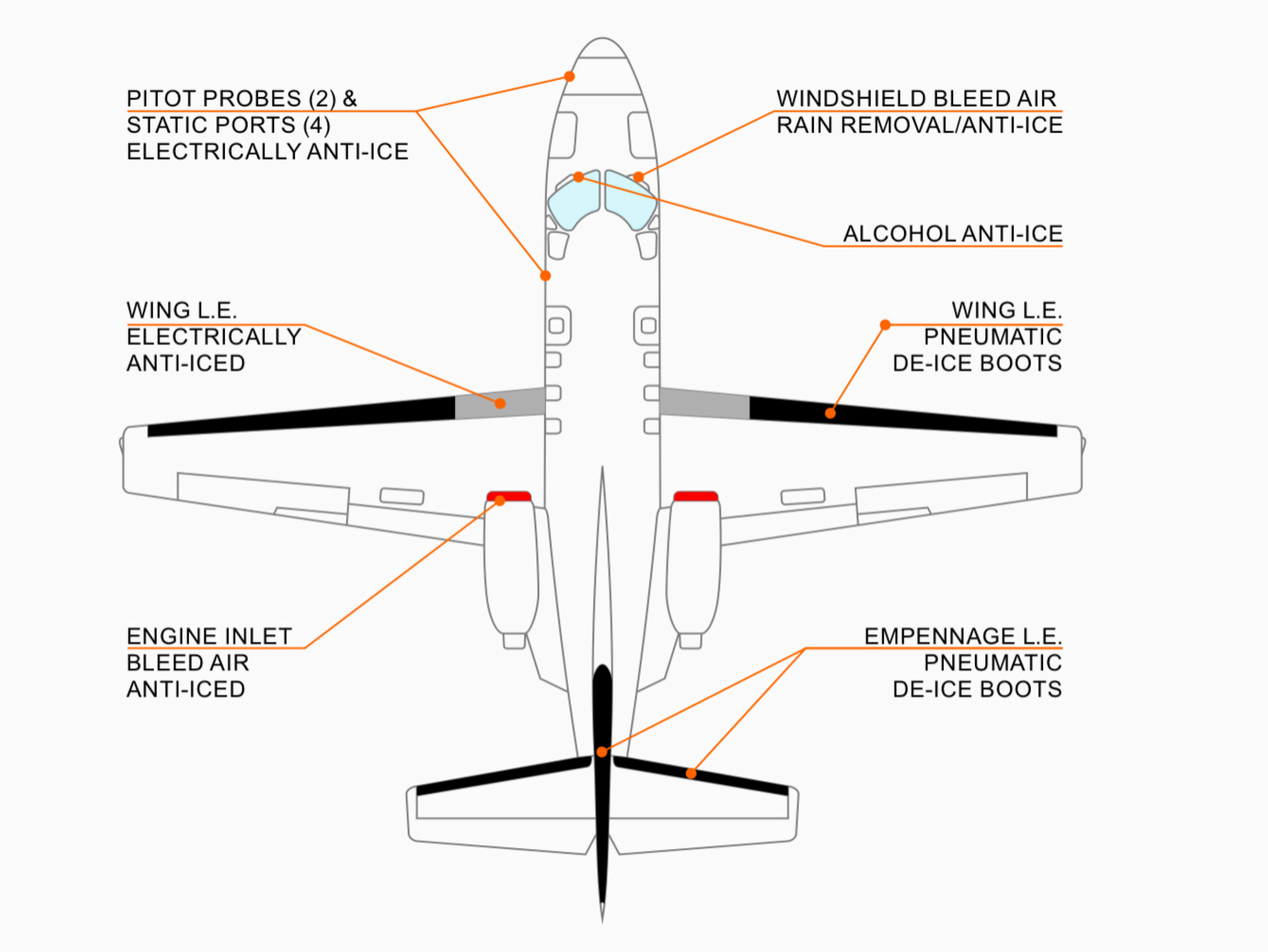
ICE AND RAIN PROTECTION

Pneumatic boots include:

1. Horizontal tail
2. Wings
3. Vertical Tail



ICE AND RAIN PROTECTION



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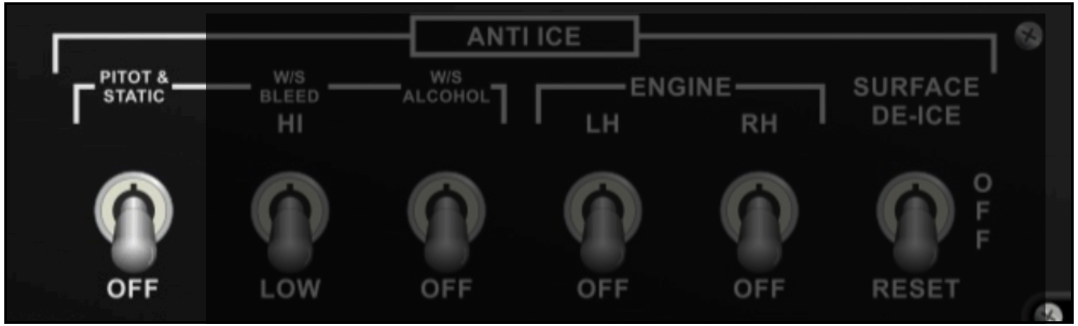
ICE AND RAIN PROTECTION – PITOT-STATIC SYSTEM



- Electric elements heat the pilot's and co-pilot's pitot tubes, the static ports, and angle of attack probe. The PITOT & STATIC anti-ice switch on the lower left receives power from the EMER bus.
- Should be in the PITOT STATIC position (on) during flight.
- On the ground, place to OFF to avoid overheating.
- During preflight, turn on for 30 seconds to check sensor are heating.
- L and R pitot tubes with 4 Static ports: 2 pilot, 2 copilot.
- Failure of pitot or static heaters: P/S HTR L-R OFF annunciator illuminates.

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ICE AND RAIN PROTECTION – HEATED DRAINS

Prevents ice buildup for drains to refreshment center and toilet relief tubes.

Controlled through SHAVER/TOILET circuit breaker

ICE PROTECTION – ICE DETECTION LIGHTS

TO DETECT ICE ON THE WING:
A light forward of the left wing shines on the wing's leading edge. It is turned on from the exterior light panel.

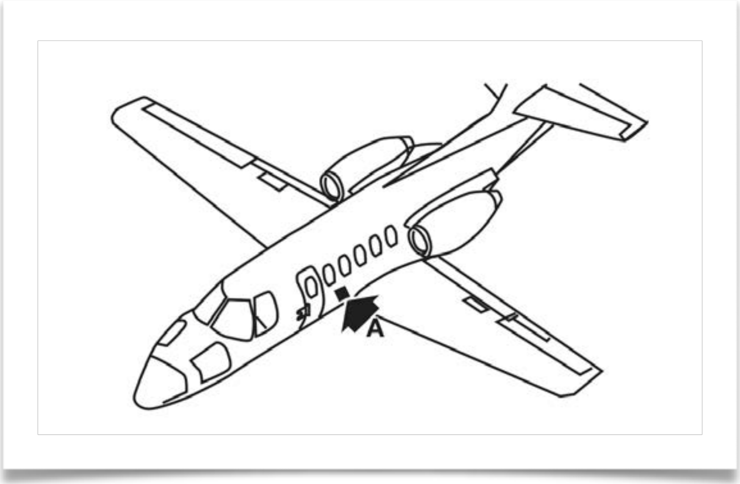

Fig A. Ice Detection Light

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ICE PROTECTION – ANGLE OF ATTACK PROBE

The AOA heater receives power whenever the PITOT STATIC switch is ON. There is no indication of heater failure. Indicates the angle of attack during approach and landing and warns the pilot of excessive angles.

ICE PROTECTION – ANGLE OF ATTACK PROBE

Indicator goes from 0 (no lift) to 1.0 (100% lift, but a stall)

Manufacturer	Arc Color	Arc Width	Indication
Teledyn	Green	0-0.55	Normal
	White	0.55-0.65	Approach and landing range
	Yellow	0.65-0.75	Caution, aircraft approaching critical AOA
	Red	0.75-1.0	Warning just prior to buffet stall
Safe Flight	No Color	0-0.57	Normal
	White	0.57-0.63	Approach and landing range
	Yellow	0.63-0.85	Caution, aircraft approaching critical AOA
	Red	0.85-1.0	Warning just prior to buffet stall

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ICE AND RAIN PROTECTION – ANGLE OF ATTACK PROBE

Approach Indexer: Indicates on heads up display when nose gear down and in flight.
Gives indication of direction to correct the AOA. Indicates as chevrons

AOA High	Red Top Chevron
AOA Slightly High	Red Top Chevron and Green Circle
AOA Correct	Green Circle
AOA Slightly Low	Green Circle and Yellow Bottom Chevron
AOA Low	Yellow Bottom Chevron

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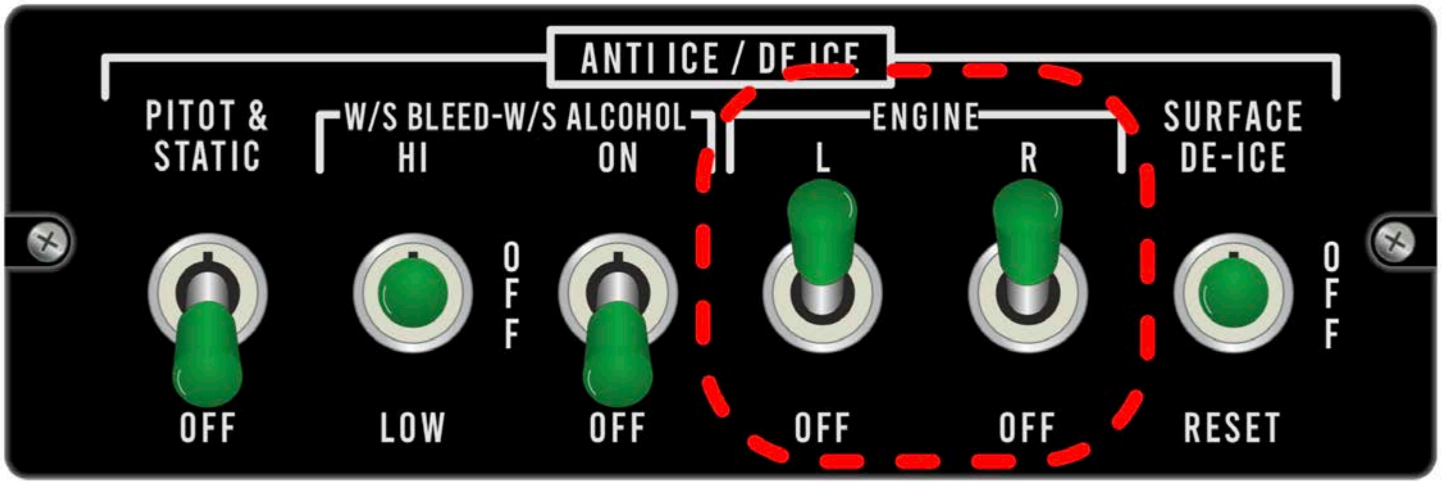
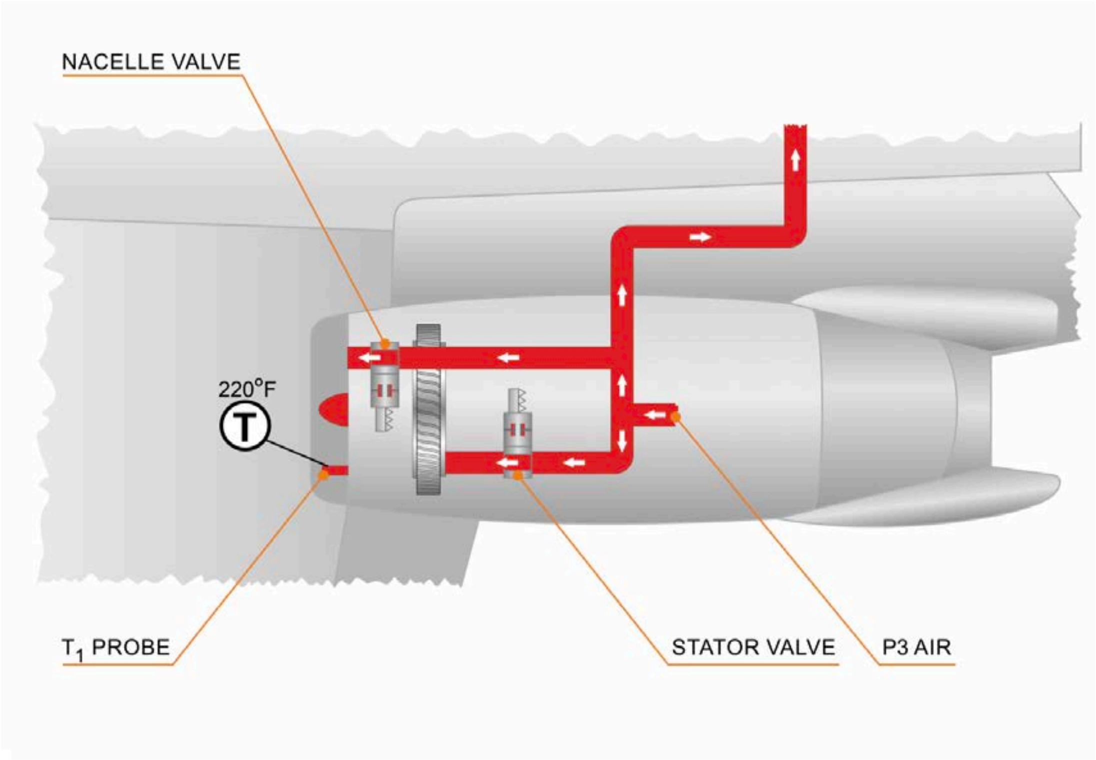
ICE AND RAIN PROTECTION – ENGINE INLET ANTI-ICE ASSEMBLY



Hot bleed air is used to deice the engine inlet leading edge. The heat is controlled by the L and R ENGINE ANTI-ICE switch on the AMTI ICE panel. Selecting the switch to ON will increase the engine RPM and ITT and automatically activate the ignition system.

ICE AND RAIN PROTECTION –
ENGINE INLET ANTI-ICE ASSEMBLY



ICE PROTECTION – ENGINE ANTI-ICE – BLEED AIR

Electrically heated elements and hot bleed air provide engine ice protection. During engine operation, hot bleed air flows continually to the nose cone and temperature probe forward of the fan in the engine inlet. Turning on an ENGINE ANTI-ICE switch (LH or RH) will route bleed air to the engine cowl leading edge and stator vanes just aft of the fan. Approximately 60% N2 is required to open these valves. Selecting ENGINE ANTI-ICE also electrically heats a 53" section of the inboard wing in front of the engine, and initiates continuous ignition. Each inboard wing section incorporates five heating elements and a thermal control switch. With engine anti-ice selected, each side will draw approximately 120 amps of electrical power until the section reaches 66°C (150°F) on 500-0001 thru -0213 , 78°C (172°F) on 500-0214 and on . The control switch then causes the elements to cycle off and on to maintain a temperature between 61° and 66°c (141° and 150°F) on 500-0001 thru -0213, 54° and 78° c (130° and 172° F) on 500-0214 and on.

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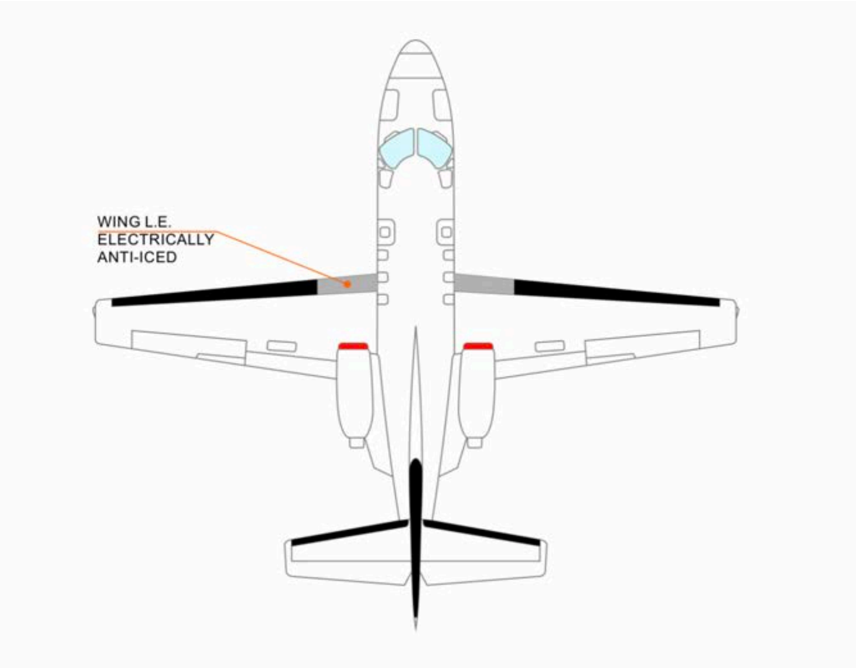
ICE AND RAIN PROTECTION – INBOARD WING LEADING EDGE ANTI-ICE

Five DC heating elements warm the inboard wing leading edge with ENGINE ANTI-ICE on. The auto system cycles on and off to keep wing at temperature of +- 54 to 78 (-14°C).



ICE PROTECTION – ENGINE ANTI-ICE ANNUNCIATOR

If the wing temperature is less than 15^{0}C (60^{0}F):

The L-R ENG ICE FAIL annunciator and MASTER CAUTION annunciator lights illuminate. They also come on while the system is warming up.

May need engine RPM > 70% N2 to provide adequate anti-ice and extinguish light. The wing overheat protection sensor illuminates at >74^{0}C.

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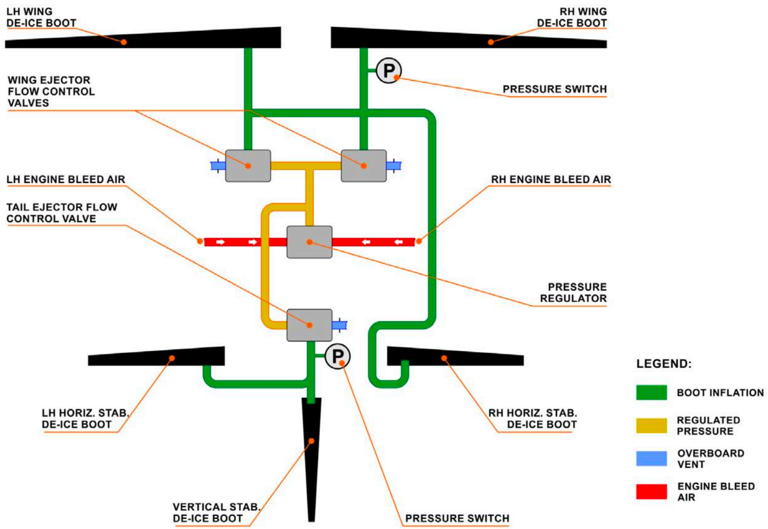
ICE AND RAIN PROTECTION – WING ANTI-ICE

23 PSI air from the engines inflate rubber boots on the leading edges of the wings, vertical stabilizer, and horizontal stabilizer during icing conditions. An electric timer controls the automatic inflate/deflate cycles. The tail boots inflates first for 6 seconds, followed by the main wings for 6 seconds. Inflate the boots when ice on outer wing leading edge appears to be ¼ to ½ inch thick. (AFM Guidance)



NOTE: DO not use pneumatic wing Anti-Ice when the temperature is -40^{0}C (-40^{0}F) or below. Boot cracking or shredding may occur.

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ICE AND RAIN PROTECTION – WING ANTI-ICE

SURFACE DE-ICE SWITCH:

- **SURFACE DE-ICE**: Provides power for one cycle of operation when selected.
- **OFF**: Spring loaded to the off position.
- **RESET**: Interrupts normal deicing cycle, deflates the boots, and resets timer.

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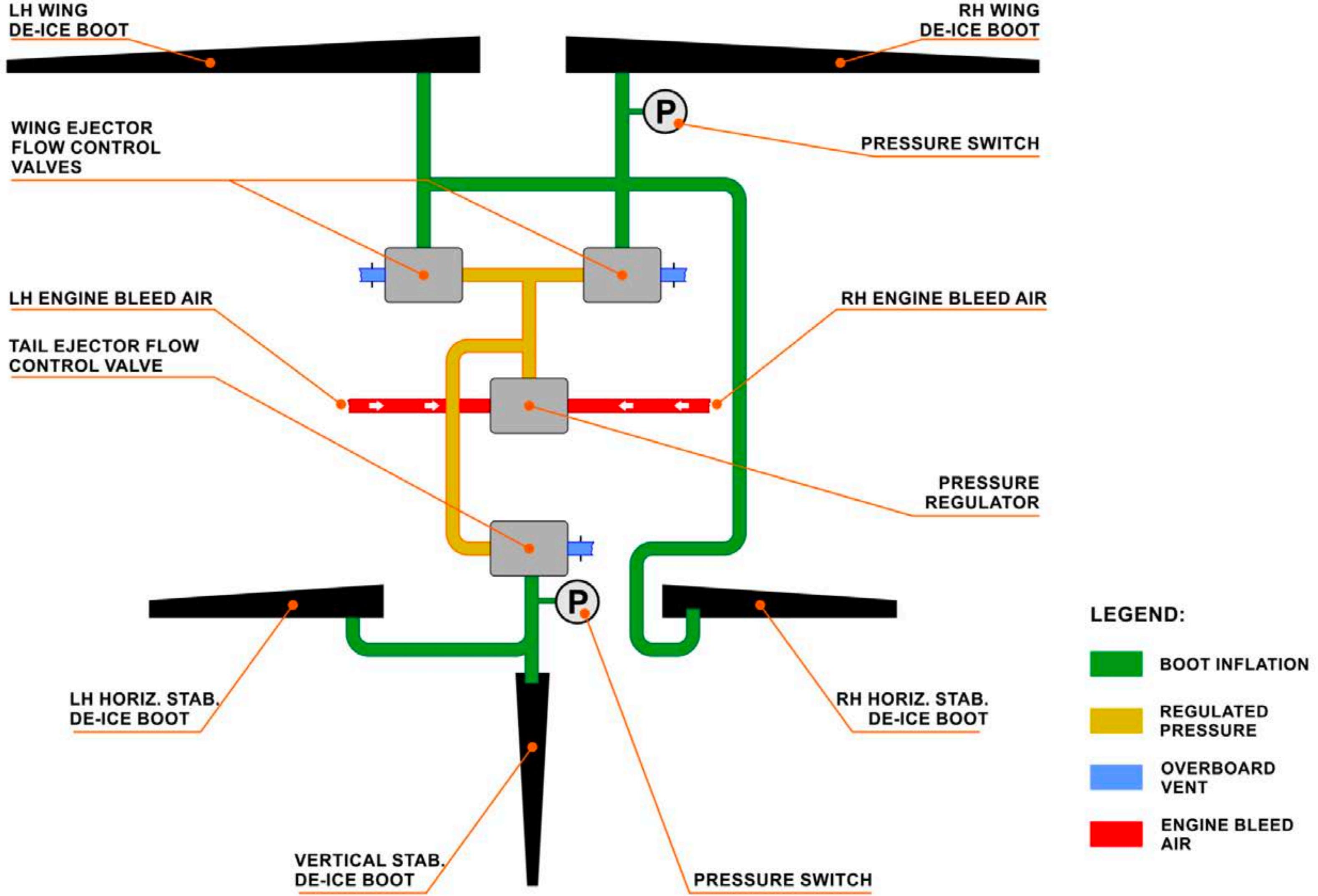
LH WING
DE-ICE BOOT
RH WING
DE-ICE BOOT
PRESSURE SWITCH
WING EJECTOR
FLOW CONTROL
VALVES
LH ENGINE BLEED AIR
RH ENGINE BLEED AIR
TAIL EJECTOR FLOW
CONTROL VALVE
PRESSURE
REGULATOR
LH HORIZ. STAB.
DE-ICE BOOT
RH HORIZ. STAB.
DE-ICE BOOT
VERTICAL STAB.
DE-ICE BOOT
PRESSURE SWITCH
LEGEND:
BOOT INFLATION
REGULATED
PRESSURE
OVERBOARD
VENT
ENGINE BLEED
AIR

ICE AND RAIN PROTECTION – WING ANTI-ICE

THE WHITE SURF DEICE INDICATOR WILL:

- Illuminate when pressure in the tail and wings is 20 PSI or greater.

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ICE PROTECTION – WING ANTI-ICE SYSTEM REVIEW

Power Source	Engine bleed air Main DC buses L/R
Distribution	Wing boots L/R Horizontal stabilizer boots L/R Vertical stabilizer boot
Control	SURFACE DE-ICE switch
Monitor	SURFACE DE-ICE annunciator (illuminates in two 6-second cycles when SURFACE DE-ICE switch is activated)
Protection	Circuit breakers Surface deice switch (reset)

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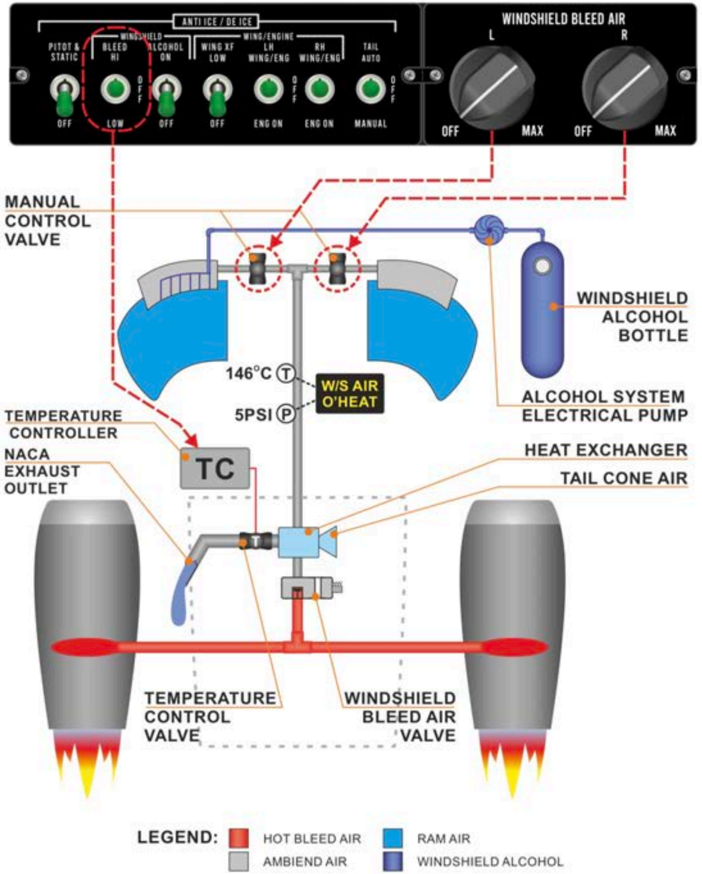
WINDSHIELD HEAT ANTI-ICE

The windshield bleed air system provides windshield anti-ice, external windshield defogging and rain removal. An electrically activated pressure regulating valve directs engine bleed air to the WINDSHIELD BLEED AIR valves. These manually controlled valves regulate air to each windshield. When windshield anti-icing is required, the WINDSHIELD BLEED AIR valves are turned to HI or LOW. Normal system operation is indicated by an increase in bleed air noise from the discharge nozzles.



ICE PROTECTION – WINDSHIELD HEAT ANTI-ICE

The three position W/S BLEED AIR switch controls the temperature:

HI: Select when temperature is less than -18^{0}C (-0^{0}F)

OFF: The system is off.

LOW: Select when temperature is above -18^{0}C (-0^{0}F)

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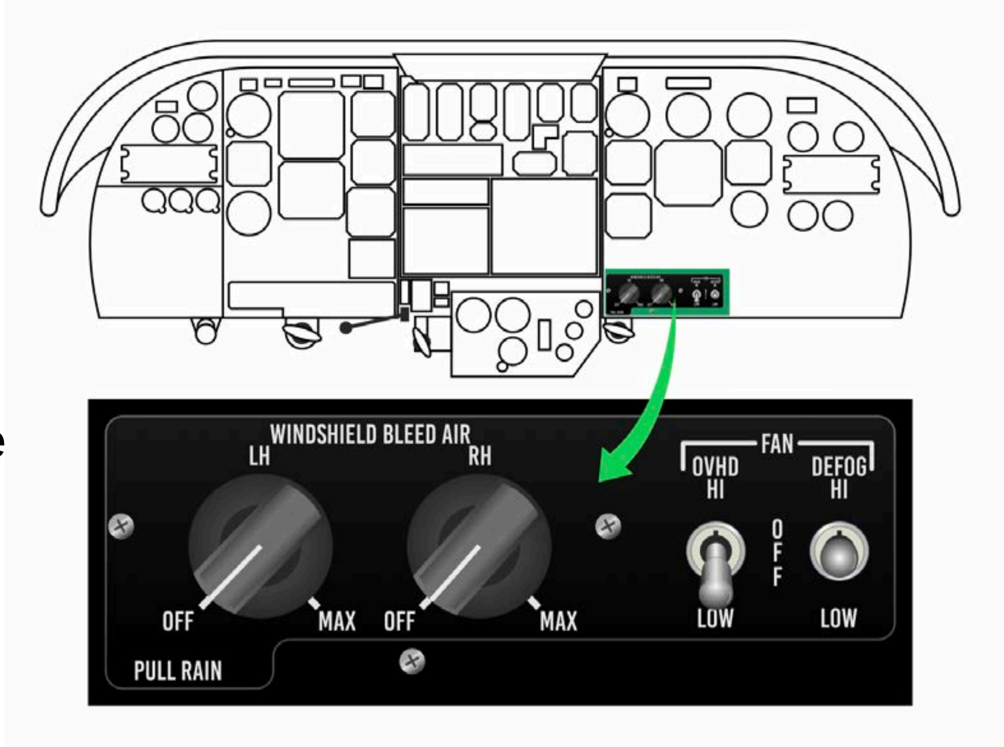
WINDSHIELD HEAT ANTI-ICE CONTROLS

The WINDSHIELD BLEED AIR knobs modulate air flow to the windshield anti-ice vents:

- OFF
- RH/LH variable positions
- MAX

A Defog and Overhead Fan increase airflow in the cockpit. (OVHD)

- OFF
- HI
- LOW



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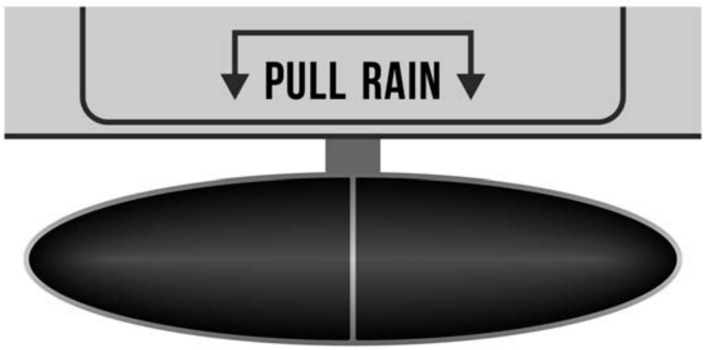
WINDSHIELD HEAT ANTI-ICE CONTROLS

THE W/S AIR O’HEAT ANNUNCIATOR WILL ILLUMINATE:

- If W/S BLEED ON, and the bleed air temp exceeds 146^{0}C (295^{0}F).
- If W/S BLEED OFF, and the pressure in the bleed air line is greater than 5PSI.

ICE AND RAIN PROTECTION – RAIN REMOVAL



The rain removal system utilizes normal windshield bleed air anti-ice with augmenter doors to provide increased airflow over each windshield in heavy rain. These doors are manually operated by pulling the PULL RAIN handle located under the WINDSHIELD BLEED AIR knobs on the co-pilot's panel. For rain removal, the manual bleed air controls on the co-pilot's panel should be turned to the MAX position, the PULL RAIN handle pulled out and the W/S BLEED switch positioned to LOW. Opening the rain door will be difficult if the W/S BLEED switch is on.

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WINDSHIELD HEAT ANTI-ICE- SYSTEM REVIEW

Power Source	Engine bleed air Main DC buses L/R
Distribution	Windshield bleed nozzles L/R Left side alcohol manifold
Control	W/S BLEED AIR switch W/S Temperature controller W/S ALC switch Manual bleed air control valves Rain removal door handle
Monitor	W/S AIR O'HEAT annunciator Bleed air noise
Protection	Circuit breakers Windshield bleed air valve – fail safe Overtemp transmitter

OPERATING IN SEVERE ICING CONDITIONS

STEPS FOR EXITING SEVER ICING CONDITIONS:

If ice is accumulating on upper surface of wing, aft of the protected area.

1. Disengage autopilot.
2. Keep N2 above 65% for best bleed air anti-icing (use speed brakes if necessary to decrease speed when at 65%)
3. Request priority handling from ATC to exit icing conditions
4. Leave flaps in current position (do not extend or retract).
5. Avoid abrupt or excessive maneuvering
6. If experiencing unusual or uncommanded rolling reduce the angle of attack.

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ICE AND RAIN PROTECTION – ABNORMAL PROCEDURES

WINDSHIELD AIR OVERHEAT WITH THE WINDSHIELD BLEED SWITCH OFF

W/S AIR O'HEAT illuminated briefly or continuously. Probable solenoid valve failure or leak. Windshield air temperature is not regulated. Windshield heat damage is possible. Maintenance required.

1. Windshield Bleed Air Manual Valves: CLOSED

NOTE: with windshield bleed air in OFF and manual valves Closed, the 5 PSI switch causes illumination. If manual valves opened, heat damage to windshield is likely. A cabin pressure leak in the windshield bleed air line can also cause windshield air to overheat.

ICE AND RAIN PROTECTION – ABNORMAL PROCEDURES

WINDSHIELD AIR OVERHEAT WITH THE WINDSHIELD BLEED SWITCH IN LOW, HIGH OR OFF

Momentary annunciator illumination with windshield bleed air is set to HIGH:

1. Windshield Bleed Air Switch: LOW
2. Windshield Bleed Air Valves: REDUCE

If continuous annunciator illumination with windshield bleed air set to LOW or HIGH:

1. Windshield Bleed Air Switch and Manual Valves: OFF (or minimum for clear vision through windshield)
2. Windshield Alcohol Anti-Ice: As required
3. Leave Icing Environment

NOTE: Only 10 minutes of alcohol available.

If windshield bleed switch is off:

1. Windshield Bleed Air Switch: OFF

ICE AND RAIN PROTECTION – ABNORMAL PROCEDURES

WINDSHIELD BLEED AIR FAILURE

Loss of the hot bleed air supply:

1. WS Bleed Air Switch and Valves: OFF
2. Windshield Alcohol: As required
3. Leave Icing environment.

NOTE: Only 10 minutes of alcohol available.

ICE AND RAIN PROTECTION – ABNORMAL PROCEDURES

ENGINE ANTI-ICE FAILURE

1. Throttle: Increase power to above 70% N2
2. Surface/Engine Anti-Ice: CHECK switch and circuit breakers.

If ENG ANTI-ICE remains ON longer that 2 minutes

3. Surface/Engine Anti-Ice controls: RECYCLE

NOTE: the surface switch must remain in OFF/RESET for at least one second to recycle the system.

If Anti-Ice remains ON for another 2 minutes:

4. Leave Icing Environment.

ICE PROTECTION – ABNORMAL PROCEDURES

SURFACE DEICE LIGHT REMAINS ON

1. Surface Deice switch: RESET
2. Surface Deice Circuit breaker: PULL

ICE PROTECTION – ABNORMAL PROCEDURES

PITOT/STATIC HEATER FAILURE

1. Anti-ice Switches and Circuit Breakers -CHECK.
   Check pitot heat switch on.
2. Determine Inoperative System.

On 500-0001 thru -0274, the autopilot references the co-pilot's pitot static system; therefore, the altitude hold function will be inoperative if the co-pilot's pitot static system fails. Angle-of-attack, if installed, will be available for airspeed reference in the event of a dual pitot-static failure. As an emergency altitude reference, cabin pressure can be dumped and the cabin altimeter utilized for a rough altitude reference.

AIR CONDITIONING

AIR CONDITIONING – OPERATION

Cabin air conditioning is accomplished by routing engine bleed air through the air cycle machine prior to distribution to the cabin. Air ducts located in the cabin overhead and under the floor distribute the conditioned air. The air cycle machine is located in the tailcone compartment. It cools engine bleed air to approximately 1°C (34°F). Bleed air enters the air cycle machine through any of the three bleed air ducts (left, right, both) and passes over the primary heat exchanger for initial cooling. The air is then compressed by a turbine driven compressor. This increases the temperature of the bleed air. The bleed air then goes through another heat exchanger before reaching the expansion turbine which extracts energy and cools the air further. This expanding air provides the final cooling.

AIR CONDITIONING – OPERATION

To maintain a comfortable cabin temperature, a mixing valve adds hot engine bleed air to the cold air from the air cycle machine. The mixing valve is controlled by the automatic or manual temperature control located on the pressurization environmental control panel. With the AUTO TEMP SELECT rheostat in the MAN position, the mixing valve can be controlled manually by the MAN HEAT /MAN COOL switch. The switch has three positions, spring-loaded to the center (OFF) position. When the switch is deflected toward MAN HEAT, the mixing valve is driven open, allowing more hot bleed air to mix with the cold exhausted air from the air cycle machine. When the switch is released, the mixing valve will remain at that position. Holding the switch toward MAN COOL will drive the mixing valve to the closed position. The mixing valve, when manually controlled, will travel from full open to full closed in approximately ten seconds. When the automatic temperature control rheostat is in any position other than manual, the cabin temperature will be automatically controlled. Two air duct temperature sensors linked to the automatic temperature control rheostat will drive the mixing valve to the desired position. Should the duct temperature become excessively hot, the AIR DUCT O'HEAT annunciator panel light will illuminate. This is an advisory light and corrective action, lowering the cabin temperature, should be accomplished to prevent system damage.

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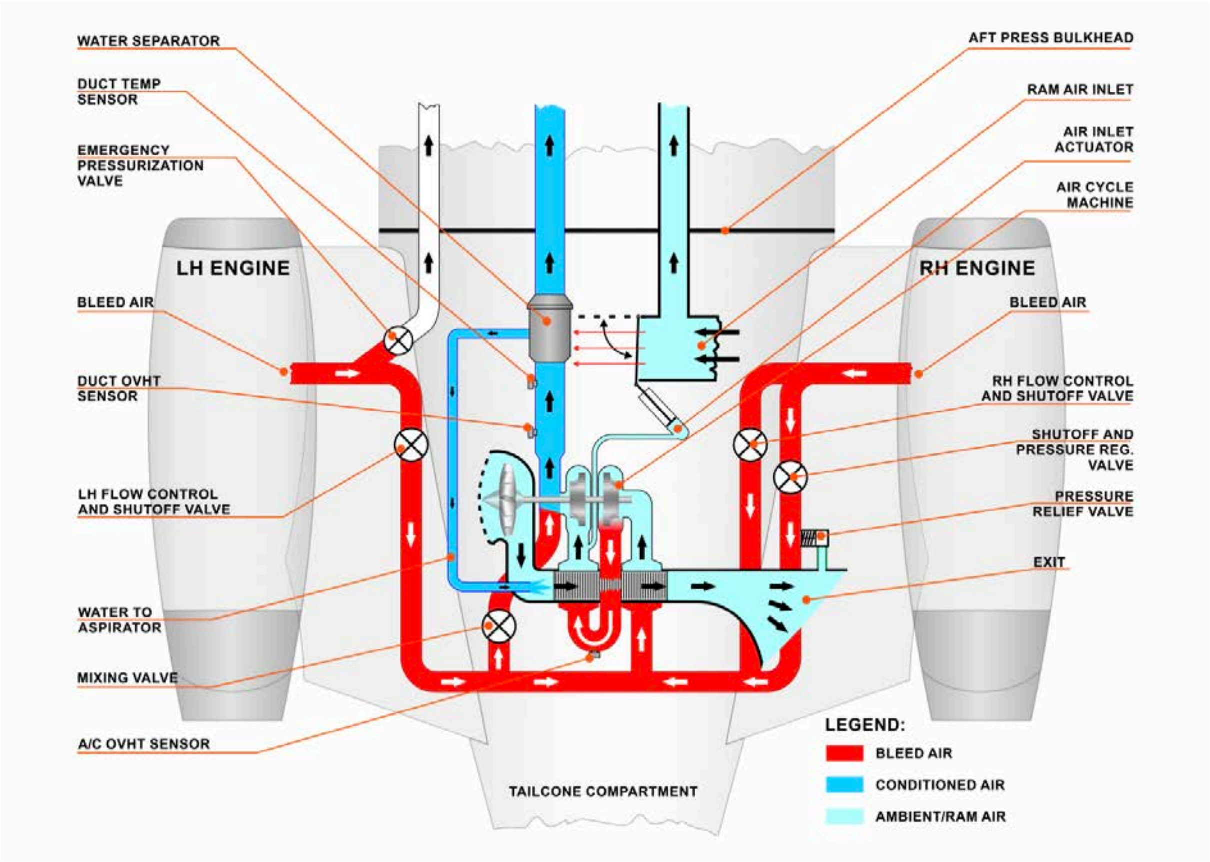
AIR CONDITIONING – OVERHEAT

An air conditioning overheat sensor is installed between the compressor and turbine section of the air cycle machine to prevent excessively hot air from entering the air conditioning duct. If this sensor indicates that the air that is too hot, it will close all shutoff valves in the bleed air ducts and open the emergency pressurization valve. This will shut off the air cycle machine and the emergency system will pressurize the cabin. The emergency pressurization system will illuminate the EMER PRESS ON annunciator light and cabin noise will increase as high velocity air enters the cabin. If the temperature sensor detects a drop within 12 seconds, the system will automatically return to normal operation. If the temperature does not decrease within 12 seconds, it will be necessary to rotate the pressurization source selector knob to the EMER position and then reselect LH, RH or BOTH, to reset the system for normal operation.

AIR CYCLE MACHINE



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FREON AIR CONDITIONING - CONTROLS

AIR COND: Compressor automatically cycles as needed to cool.

OFF: Turns off compressor and fan.

FAN: Turns on the fan only:

FWD HI/ OFF/EVAP LO: HI/LOW fan setting for cockpit

AFT HI /OFF/EVAP LO: HI/OFF/LOW fan setting for cabin

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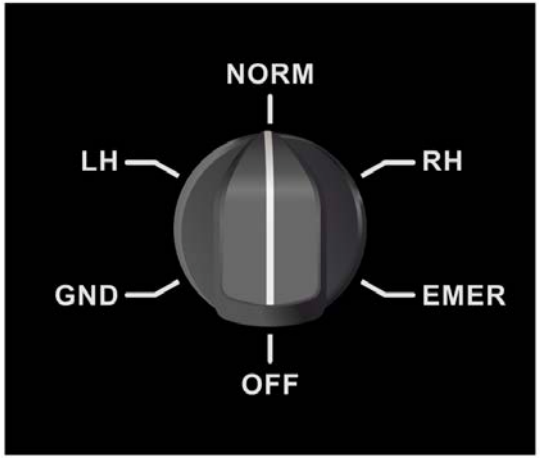
A/C – AIR SOURCE SELECT CONTROLS

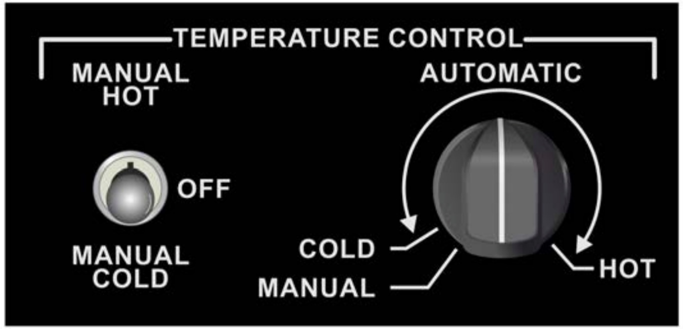
OFF: Left and right flow control shutoff valves closed.
GND: Left and right flow control shutoff valves closed. Ground shutoff and pressure regulating valve opens allowing 18 pounds per minute of bleed air flow. Intended for ground operation and low altitude only. Illuminates the MASTER CAUTION.
LH: Allows 6 pounds per minute of pressurized bleed air from LH engine.
NORMAL: Pressurized bleed air from LH and RH engines supplying 12 pounds per minute of bleed air to air cycle machine. This is the normal operating position.
RH: Allows 6 pounds per minute of pressurized bleed air from RH engine.
EMER: In the EMER position, the emergency pressurization valve opens allowing hot bleed air from the left engine to enter the cabin directly and the EMER PRESS ON annunciator light will illuminate. The air cycle machine is bypassed with emergency pressurization selected, cabin temperature will rise, and AUTO or MAN TEMP SELECT will be disabled. Cabin temperature can be modulated to some extent with the left throttle. Retarding the left throttle will lower the bleed air temperature, but excessive reduction will allow the cabin altitude to climb.



AIR CONDITIONING – TEMPERATURE CONTROL

AUTOMATIC MODE: The TEMPERATURE CONTROL system compares the temperature sensor's reading to the AUTOMATIC control setting and modulates the mixing valve to maintain proper temperature.

MANUAL MODE: The TEMPERATURE CONTROL knob in the MANUAL position allows manual selection of the cabin temperature by directly opening or closing the mixing valve with the MANUAL HOT/MANUAL COLD switch. Holding the switch in the MANUAL HOT position opens the bypass valve and increases cabin temperature. Selecting and holding the switch in the MANUAL COLD position closes the bypass valve and decreases cabin temperature. When released, the switch spring-loads to the OFF position with the bypass valve remaining at its last position.



AIR CONDITIONING – AIR DISTRIBUTION

The cabin air distribution system consists of overhead conditioned air ducts and outlets and the underfloor conditioned air duct supply the foot warmer manifolds and the window defog outlets. Air outlets are located below and above each seat. When the air temperature selected is cold, a butterfly valve directs the air through the overhead and underfloor air ducts. As the temperature selected becomes warmer the butterfly valve will close, reducing airflow through the overhead air duct. When a hot temperature is selected (over 38°C, 100°F), the butterfly valve will be fully closed, allowing all hot air to flow through the underfloor air duct.

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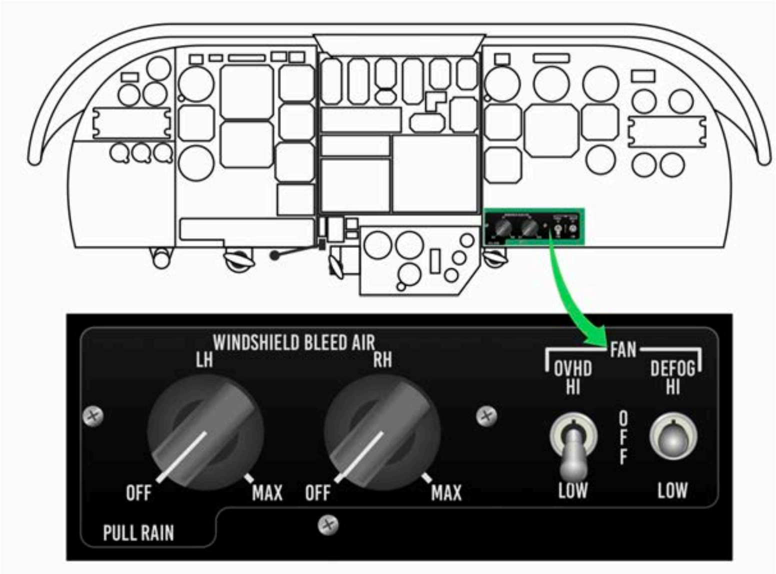
AIR CONDITIONING – AIR DISTRIBUTION

If increased air circulation is required, select HI or LOW on the cabin fan switch. This turns on the cabin fan, recirculating air through the overhead ducts. The co-pilot's panel contains the COCKPIT & DEFOG FAN control. This switch, which has three positions (HI, OFF and LOW), controls defog and ventilation airflow in the flight compartment.



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AIR CONDITIONING – OVERHEAT PROTECTION

An air conditioning overheat sensor is installed between the compressor and turbine section of the air cycle machine to prevent excessively hot air from entering the air conditioning duct. If this sensor indicates that the compressor section is producing air that is too hot, it will close all shutoff valves in the bleed air ducts and open the emergency pressurization valve when airplane is in flight. This will secure the air cycle machine and pressurize the cabin by the emergency method. This condition will be indicated by the illumination of the EMER PRESS ON annunciator light as well as the increased noise level associated with high velocity air entering the cabin. If the temperature drops within 12 seconds, the system will automatically return to normal operation. If temperature is not reduced within 12 seconds it will be necessary to rotate the pressurization source selector knob in the cockpit to the EMER position and then reselect LH, RH or BOTH, to reset the system for normal operation.

AIR CONDITIONING – ANNUNCIATOR

Indication	Master Caution/ Warning	Description
BLEED AIR GROUND	CAUTION	Uses ram air from engine pylons. For use on the ground or low-level flight.
EMER PRESS ON	CAUTION	Provides 49°C bleed air to windshield anti-ice and emergency pressurization to cabin.
AIR DUCT O'HEAT	CAUTION	At air temp > 300°F in the air duct between cabin heat exchanger and aft precooler.

AIR CONDITIONING – ABNORMAL PROCEDURES

Air Duct Overheat

Environment System Air Duct Overheat (AIR DUCT O'HEAT Light On)

1. Circuit Breakers -RESET. TEMP control circuit breaker on LH circuit breaker panel must be in for either manual or automatic temperature control.
2. Auto Temp Select -MAN.
3. Manual Heat/Manual Cool Switch -MAN COOL. Hold in this position until the overheat light goes out. Approximately 11 seconds are required for the mixing valve to travel from the full hot to the full cold position.

IF LIGHT DOES NOT GO OUT

4. Pressurization Source Selector -LH or RH. Reduce power on selected engine if necessary.

AFTER LIGHT GOES OUT

5. Control cabin temperature manually with MAN HEAT/MAN COOL switch. If the auto temp control has been at a very warm setting for ground operation, an overheat condition may occur when takeoff power is applied. Setting the auto temp control to the twelve o'clock position just prior to takeoff should preclude this. If an overheat does occur, cabin temp control can be returned to the automatic mode once the overheat light is out.

PRESSURIZATION

PRESSURIZATION

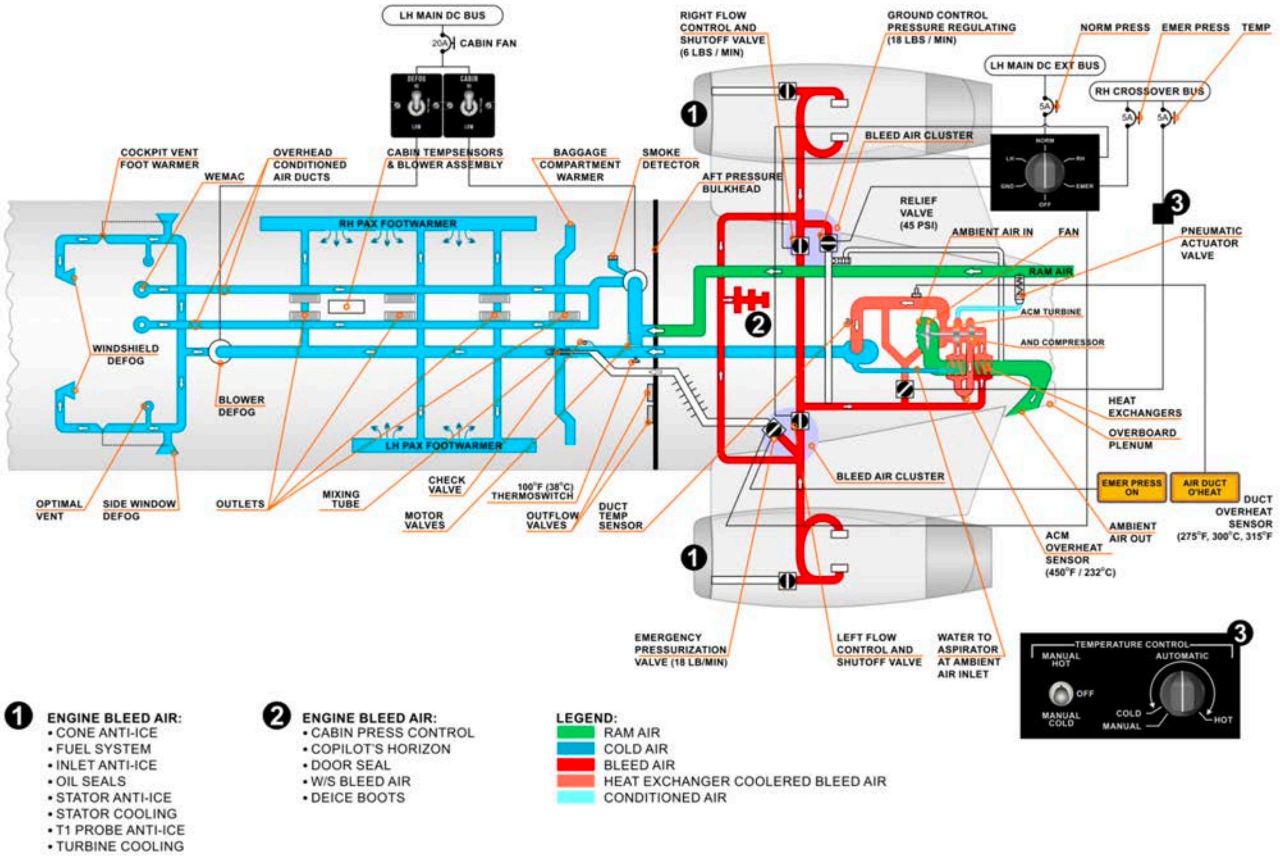
The pressurization system fills the cabin with conditioned bleed air. The cabin pressure is controlled by metering the amount of air exiting the outflow valves. There are two forces at work on the outflow valve at all times. The first is a spring which is always attempting to close the outflow valve and restrict the outflow of air which will cause the cabin to descend. Opposing this spring is a vacuum (control air) regulated by the cabin pressure controller. The vacuum pulls the outflow valve open allowing air to escape the cabin. This results in the cabin altitude climbing. In the event that control vacuum malfunctions, a cabin altitude limit valve is provided to prevent the cabin altitude from exceeding 13,000'. If the control vacuum exceeds the barometric reference in the cabin altitude limit valve, it will open and release cabin air into the control air line reducing the vacuum. This will cause the outflow valve to move toward the closed position and re-establish cabin pressure. An emergency dump valve located in the vacuum line can be utilized to route vacuum directly to the normal outflow valve and dump all cabin pressure.

PRESSURIZATION – GENERAL

The maximum pressure differential valves prevent over-pressurization (8.6 PSID UN 0214+) (8.0 PSID UN001-0213).
The normal cabin air pressure is 8.3 PSID
The pressurization system contains:

- Vacuum jet pump
- Pressure controller
- Two outflow valves venting to tail cone
- Max altitude limiting valve
- Max pressure differential
- Emergency dump valve

PRESSURIZATION – GENERAL



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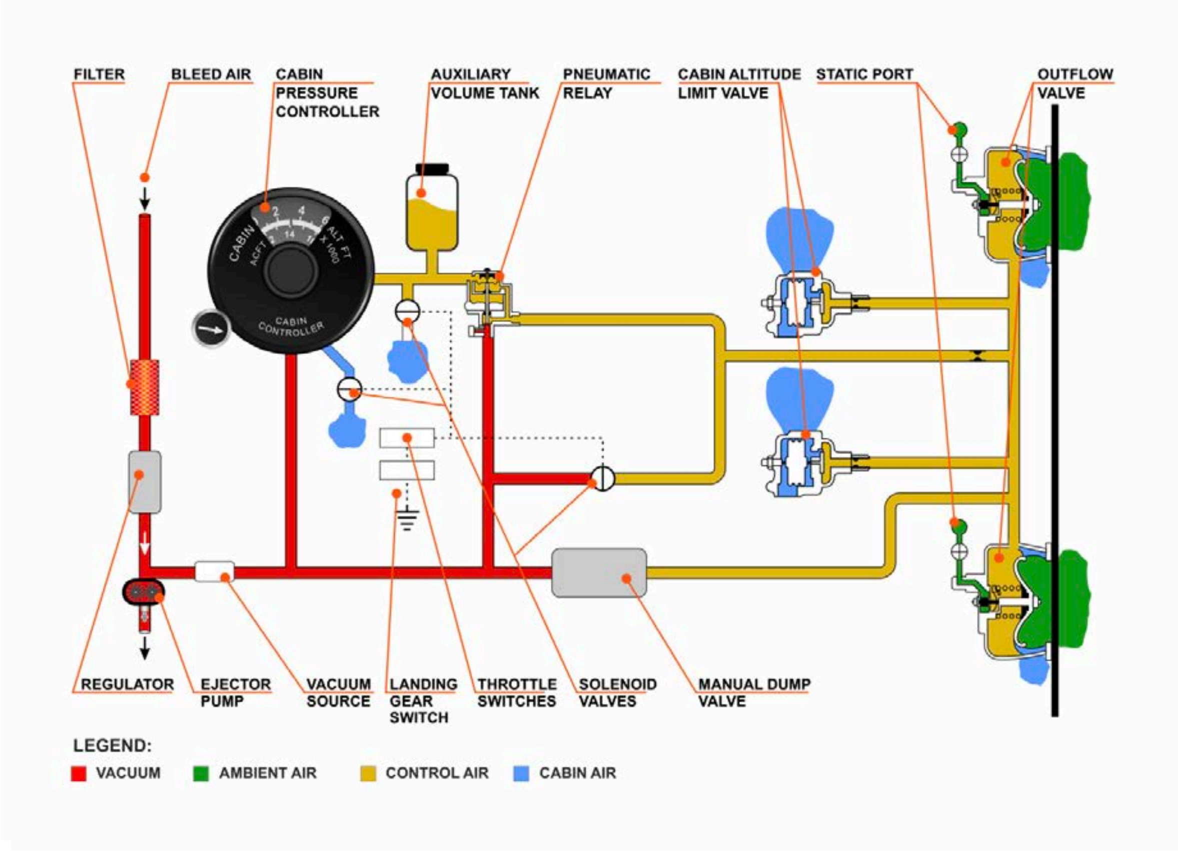
PRESSURIZATION – OUTFLOW VALVES



PRESSURIZATION – OUTFLOW VALVES

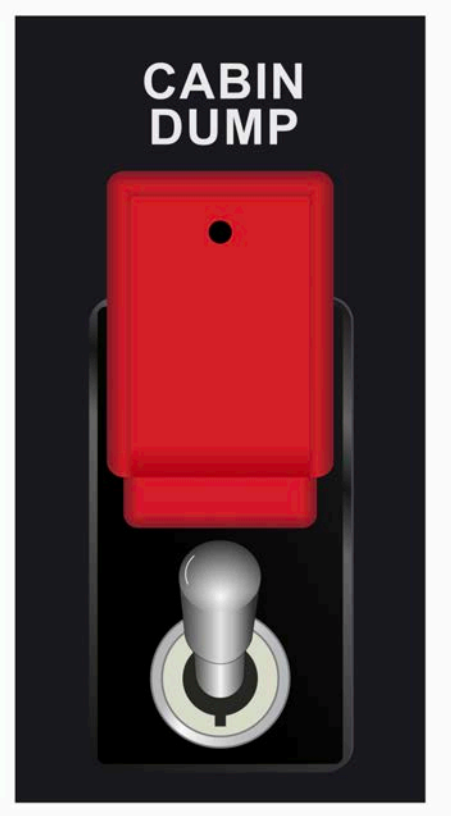
Max pressure differential limited to 8.6 PSID.
Three valves open automatically to provide positive pressure relief.
Each valve connects to a cabin altitude limit control that limits cabin altitude to 13,000’ +/- 1500’.
Climb and dive solenoids on primary valve allow 23 psi service air to control diaphragm.
Valves are connected by a port to allow equal pressures to let them operate together.

PRESSURIZATION – EMERGENCY DUMP VALVE

Vacuum can be routed directly to the outflow valves to dump all cabin pressure in the case of an emergency.

Max altitude limit valves will prevent cabin altitude from exceeding 13,000 ft.

The CABIN DUMP valve lever is covered by a guard to prevent accidental activation.



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EMERGENCY PRESSURIZATION

If the cabin altitude climbs to 10,000 ±350 ft, the CABIN ALT annunciator and Master Warning lights will illuminate.
Selecting EMER on the PRESS SOURCE selector will close the left and right flow control shutoff valves and open the emergency pressurization valve. This will illuminate the EMERG PRESS ON annunciator. Hot bleed air flows directly from the left engine into the distribution ducts to pressurize the cabin.

PRESSURIZATION – ANNUNCIATORS

Message	Indicator/ Color	Master Caution/ Warning	Description
	Red	CAUTION	Cabin has depressurized. RED if cabin pressure above 10,000’ when above 25,000’; disappears when it goes below 8,450’. RED if cabin pressure is above 15,000’; disappears when cabin pressure is below 11,000’. On the ground: no message AMBER when cabin altitude is between 10,000’ and 15,000’ for more than 30 minutes. White if cabin altitude between 10,000’ and 15,000’ under 30 minutes. Action: Deploy oxygen masks. Don oxygen masks. Descend to 10,000 ft. if unable to correct by 14,000 ft. Rotary Test: When in CABIN ALT, both red and amber CABIN ALT messages appear.

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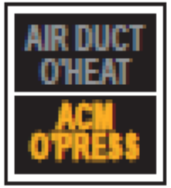
PRESSURIZATION – ANNUNCIATORS

Message	Indicator/ Color	Master Caution/ Warning	Description
EMER PRESS ON	Amber		Pressurization manually set to EMER or automatic activation due to ACM overheat.
BLEED AIR GROUND	Amber		High flow rate of bleed air is selected from the right engine for ACM ground operation. Must be extinguished prior to takeoff.
AIR DUCT O'HEAT	Amber		Temperature in the duct between the ACM leading to cabin exceeds 157°C.

PRESSURIZATION – ANNUNCIATORS

Message	Indicator/ Color	Master Caution/ Warning	Description
	Amber		ACM bleed air supply pressure > 42 PSI.
	Amber		Nose or Tail cone doors unlocked. Failure or improper position of one or more door switches. Possible disengagement of lower forward cabin door pin.

PRESSURIZATION

Aircraft	Maximum Operating Altitude	Maximum Cabin PSID
Citation 001 to 213	35,000	8.0 ±0.1
Citation 001 to 213 with SB 21-9, Citation 213 and subsequent; Citation I	41,000	8.5 ±0.1

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PRESSURIZATION – EMERGENCY PROCEDURES

RAPID DECOMPRESSION

RED BOLD TEXT INDICATES MEMORY ITEMS.

CAB ALT 10,000 FT WARNING Light ON

1. **OXYGEN MASKS: DON/100%**
2. **OXYGEN MASK MIC SWITCH: MIC OXY MASK**
3. Transponder: EMERGENCY 7700
4. Use of Supplemental Oxygen (Unpressurized) Procedure: Accomplish

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PRESSURIZATION – EMERGENCY DESCENT

RED BOLD TEXT INDICATES MEMORY ITEMS

1. **AP TRIM DISC: PRESS AND RELEASE**
2. **THROTTLES: IDLE**
3. **SPEED BRAKES: EXTEND**
4. **PITCH ATTITUDE: 15° NOSE DOWN**
5. Airspeed: VMO/MMO MAXIMUM (Use reduced airspeed if aircraft has structural damage.)
6. Transponder: EMERGENCY 7700
7. Passenger Advisory Lights: PASS SAFETY

If descent into icing conditions

8. Anti-Ice/Deice: As Required
9. Throttles: AS REQUIRED to maintain engine anti-ice lights out

PRESSURIZATION – EMERGENCY PROCEDURES

Environmental System Smoke or Odor

Red Bold text indicates Memory Items.

1. **OXYGEN MASKS: DON MASKS**
2. **OXYGEN MASK MIC SWITCH: MIC OXY MASK**
3. Oxygen Control Valve: MANUAL DROP
4. Cabin Overhead Fan: OFF
5. DEFOG fan: OFF
6. Freon A/C: OFF
7. Passenger Oxygen: ENSURE USE

Isolate Source:

8. Select single source of bleed air (LH or RH) and allow 10 seconds for purging.

If smoke continues, select EMER to maintain cabin pressure.

9. Cabin Pressure: Maintain with Left Engine
10. Land as soon as practical.

PRESSURIZATION – EMERGENCY PROCEDURES

SMOKE REMOVAL

RED TEXT INDICATES MEMORY ITEMS

1. Oxygen Mask -ON. Check oxygen selector is on 100%.
2. Pass oxygen Mask -MANUAL DROP.
3. Oxygen Priority Valve -CHECK NORMAL.
4. Ensure passengers are receiving oxygen. Visually check mask drop when cabin reaches 13,500. If masks are not down, drop them by PASS OXY manual switch on the left console. Check CREW OXY PRIORITY VALVE in NORMAL position.
5. Oxygen Mic Switches -MIC OXY MASK (500-0101 thru -0349). Switch must be in this position to use microphone in the oxygen mask.
6. Passenger Advisory Light -PASS SAFETY.
7. Emergency Dump Switch -DUMP.

IF SMOKE PERSISTS OR IT CANNOT BE VERIFIED THAT THERE IS NO FIRE.

8. Land As Soon As Possible.

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PRESSURIZATION – ABNORMAL PROCEDURES

CABIN ALTITUDE ABOVE SELECTED ALTITUDE

1. Cabin Altitude Selector: SET to LOWER ALTITUDE
2. Rate Controller: FULL INC

If cabin altitude continues to climb

3. Press Source Selector: EMER

If not stopped by 14,000ft. cabin altitude:

4. Oxygen Masks: DON/100%

PRESSURIZATION – ABNORMAL PROCEDURES

USE OF SUPPLEMENTAL OXYGEN (UNPRESSURIZED)

1. Crew Oxygen Masks:
   a. 100% at or above 25,000 ft. cabin altitude.
   b. NORMAL below 25,000 ft. cabin altitude.
   c. Ensure crew and passengers are receiving oxygen.
2. Cabin Altitude: CHECK
   a. Max 25,000 ft. with passengers.
   b. Max 34,000 crew only.
3. Oxygen: Check Endurance
4. Range: Compute (based on oxygen endurance and revise fuel flow and groundspeed).

PRESSURIZATION – ABNORMAL PROCEDURES

Use of Supplemental Oxygen (Unpressurized)

Cabin Altitude (FT)	1 CPT	2 CPT	2 CPT 2 CAB	2 CPT 4 CAB	2 CPT 6 CAB
8000	2:11	1:06	0:32	0:21	0:16
10000	2:23	1:12	0:34	0:22	0:16
15000	3:10	1.35	0:38	0:24	0:17
20000	4:29	2:15	0:44	0:26	0:19
25000	3:01	1:30	0:39	0:25	0:18
30000	4:00	2:00	0:44	0:27	0:19
34000	5:15	2:38	Passenger masks not certified above 25,000 ft. cabin altitude.		

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PRESSURIZATION – ABNORMAL PROCEDURES

VACUUM SYSTEM FAILURE

NOTE: Copilot's attitude gyro will not work (units 1 to 213 and 234 except aircraft with SB 21-9).

Emergency dump valve is inoperative. Cabin will go to maximum differential pressure.

1. Press Source Selector: OFF BEFORE LANDING.

Turning the pressurization source selector to OFF before landing will remove the pressurization air source, allowing the cabin pressure to leak overboard.

PRESSURIZATION – ABNORMAL PROCEDURES

EMERGENCY PRESSURIZATION ON (AUTO ACTUATION)

1. NORM PRESS Circuit Breaker: CHECK/SET
2. Temperature Control: Select Warning Setting

NOTE: A time delay relay locks the system into emergency pressurization if ACM temperature remains too high for 12 seconds or more: If ACM cools enough in less than 12 seconds, system retunes to previous mode.

3. Press Source Selector: EMER

   NOTE: Wait at least 1-minute pressurization source selector is set to EMER before making next selection.
4. Press Source Selector: RH/LH/NORMAL (as desired)

If EMER PRESS ON annunciator remains illuminated

5. Press Source Selector: EMER
6. Cabin Temperature: Control with left throttle

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PRESSURIZATION – ABNORMAL PROCEDURES

Bleed Air Ground

1. Press Source Selector: NORM

PRESSURIZATION – ABNORMAL PROCEDURES

Air Duct Overheat

1. TEMP circuit breaker: RESET
2. Auto Temperature Select: MANUAL
3. Manual Hot/Manual Cold Switch: MANUAL COLD. Hold in this position until overheat light extinguishes (10 seconds maximum).

NOTE: Above FL310 in MANUAL (cold mode) could result in ACM over temperature and shutdown. Refer to *Automatic Cabin Temp Controller Failure* procedure.

If annunciator extinguishes:

4. Auto Temperature Select: AUTO. Select a cooler temperature.

If annunciator illuminates again:

5. Auto Temperature Select: MANUAL
6. Use MANUAL HOT/MANUAL COLD Switch to control temperature.

If annunciator persists:

7. Pressurization Source Selector: LH or RH

If necessary:

8. Reduce Power on Selected Engine.

PRESSURIZATION – ABNORMAL PROCEDURES

OVER PRESSURIZATION

1. Cabin Altitude Selector: Select Higher Setting
2. Rate Control: INCREASE

If still over pressurized:

3. Press Source Selector: LH or RH
4. Cabin Pressure: Control with Throttle

If unable to control:

5. Oxygen Masks: DON/100%
6. Oxygen Control Valve: MANUAL DROP
7. Passenger Oxygen: Ensure Use
8. Oxygen Mic Switches: MIX OXY MASK
9. Passenger Advisory Lights: PASS SAFETY
10. Press Source Selector: OFF
11. Descend

If still over pressurized:

12. Emergency Dump Valve:

NOTE: Emergency dump not recommended at high altitude.

PRESSURIZATION – ABNORMAL PROCEDURES

Door Not Locked in Flight

Advisory: Indicates unlocked/unlatched nose or tailcone doors, failure or improper position of one of more door switches, and/or possible disengagement of the lower forward cabin door pin.

On the Ground:

1 . Correct condition prior to flight.

In Flight:

1. Cabin Altitude -SELECT to 9500 feet.
2. Airspeed -REDUCE.
3. Passenger Advisory Light -PASS SAFETY.
4. Cabin Door -KEEP CLEAR.
5. Descend to a lower altitude.
6. Land as soon as practical.

PRESSURIZATION – ABNORMAL PROCEDURES

Door Not Locked in Flight

1. Cabin Altitude: Select 9,500 ft.
2. Airspeed: REDUCE
3. Passenger Advisory Lights: PASS SAFETY
4. Cabin Door: KEEP CLEAR
5. Descend to a Lower Altitude
6. Land as soon as practical.

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PRESSURIZATION – ABNORMAL PROCEDURES

AUTOMATIC CABIN TEMP CONTROLLER FAILURE

1. Temp Control: Switch to MANUAL
2. Manual Switch: Select FULL COLD for at least 10 seconds, and then actuate switch for 3 seconds towards HOT.

NOTE: Above FL310 in MANUAL (cold mode) could result in ACM over temperature and shutdown. If this occurs, refer to **EMERGENCY PRESSURIZATION ON (AUTO ACTUATION).**

HYDRAULIC SYSTEM

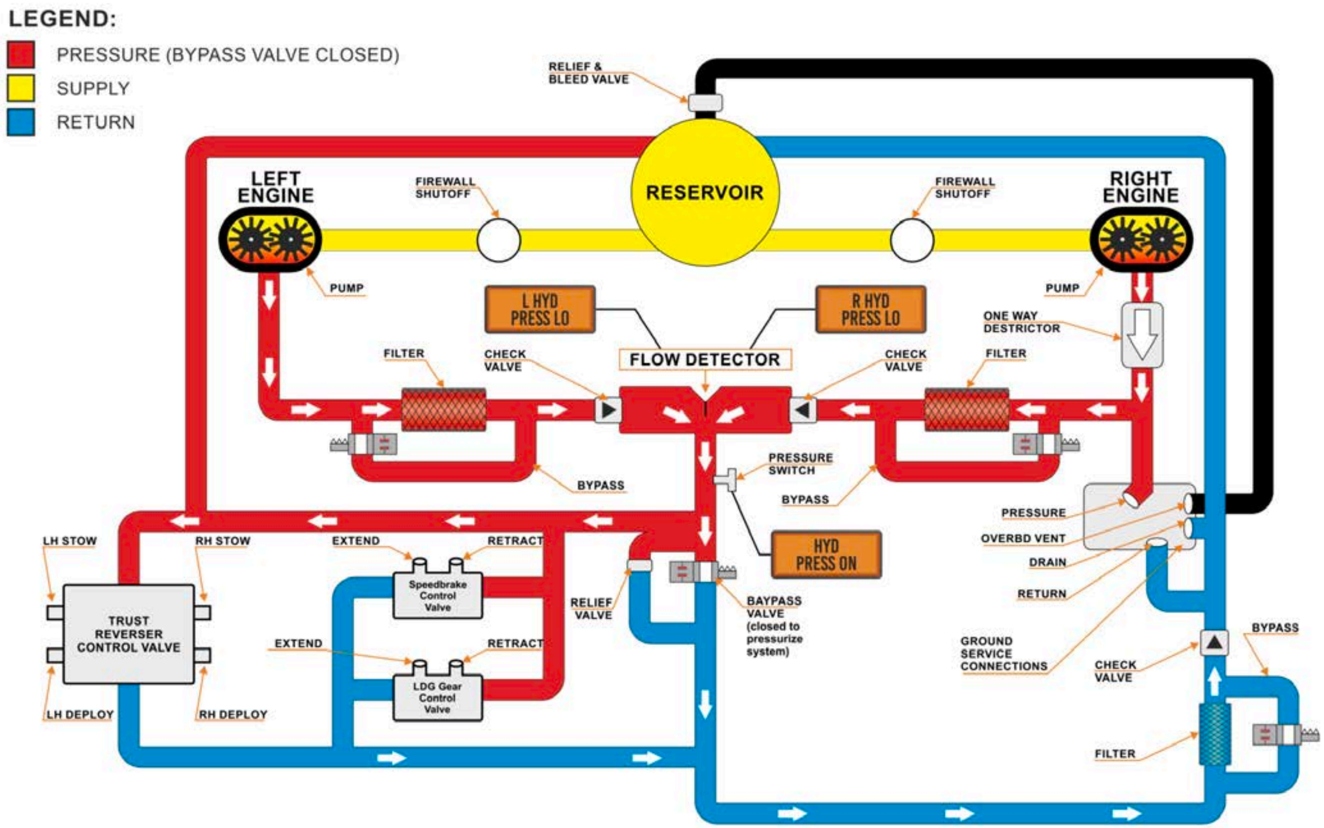
HYDRAULIC SYSTEM

The hydraulic system is an open center system. Two engine driven pumps provide a continuous flow of hydraulic fluid with a pressure of 60 PSI. Activating an hydraulic system closes the bypass valve and increases pressure to 1500 psi max. This results in the HYD PRESS ON light illuminating.

HYDRAULIC SYSTEMS:

- Landing gear
- Speed Brakes
- Thrust Reversers (15 Minute Limit)

HYDRAULIC SYSTEM



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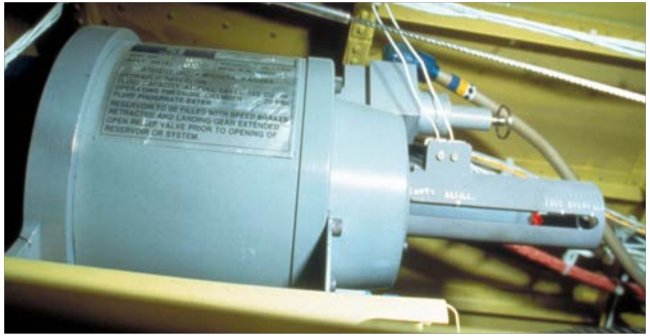
HYDRAULIC SYSTEM – RESERVOIR

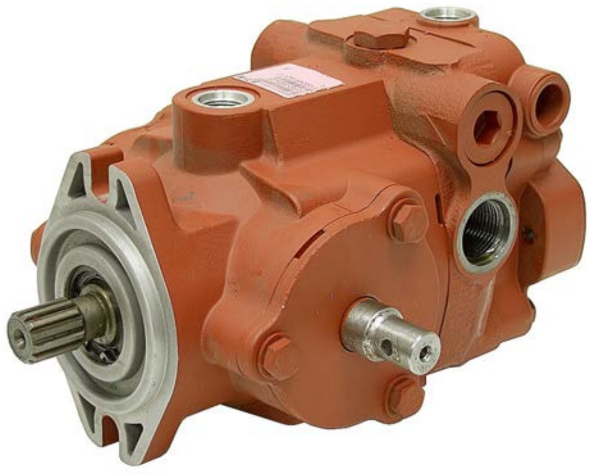
Hydraulic fluid is contained in an accumulator reservoir located in the aft tailcone area. The quantity of fluid is shown by a plunger-type sight gauge located on the aft side of the reservoir. The refill, full and overfill indications correspond to .2, .5, and .6 gallons respectively. A microswitch attached to the accumulator plunger will activate a HYD LEVEL LO annunciator panel light any time the fluid level drops below the refill position. Bleeding or relieving an overfill condition is accomplished by opening a drain valve located on the reservoir. Excess fluid is drained overboard through the underbelly vent mast.



Hydraulic Reservoir

HYDRAULIC SYSTEM – PUMPS

Hydraulic pressure is provided by two positive displacement engine-driven pumps, each mounted on the engine accessory case. Either pump is capable of supplying enough pressure to operate the gear, speedbrakes and reversers. From each pump, hydraulic fluid is routed through filters and bypass valves to the flow detector assembly. This consists of two check valves with a common outlet and a differential flow detector. If the individual pump pressures should differ by 25 p.s.i. or more, the respective HYD PRESS LO annunciator panel light will illuminate.



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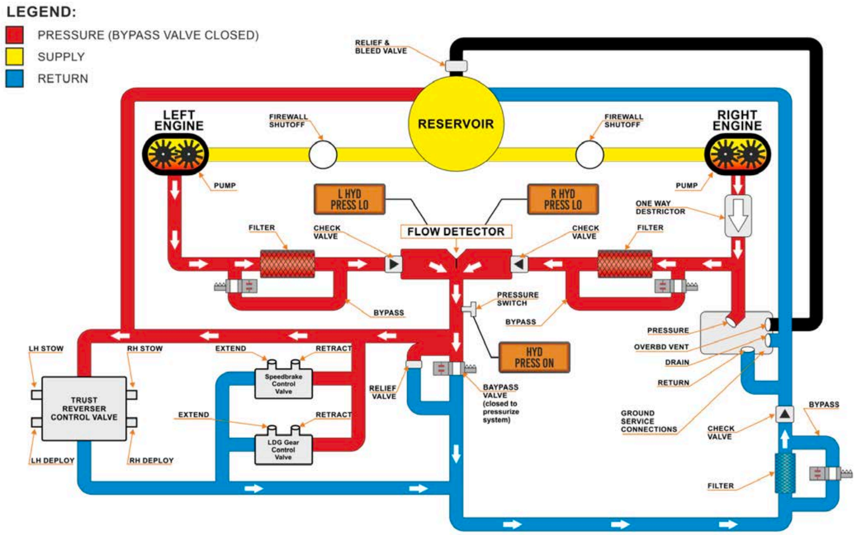
HYDRAULIC SYSTEM – HYDRAULIC FILTERS

A hydraulic filter is located downstream of each engine driven hydraulic pump. Another is installed in the return line before reaching the reservoir. Each filter has a bypass valve that opens at 100 psid.



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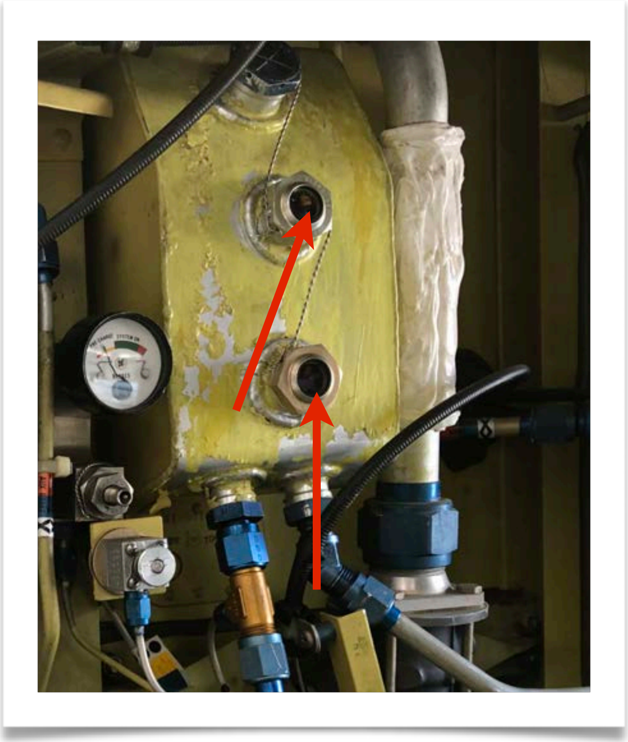
HYDRAULIC SYSTEM – OPERATION

PREFLIGHT

Hydraulic fluid is adequate (no air visible in lower sight gauge)



Hydraulic Fluid Site Gauge. (Cover removed)

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HYDRAULIC SYSTEM – ANNUNCIATORS

Indication	Master Caution/ Warning	Description
L HYD PRESS LO R HYD PRESS LO	CAUTION	Pump output less than .045 +/-0.10 GPM. Goes off when output above 1.33 GPM. Illuminates if a difference in 25 PSI between 2 pumps. Illuminates when in single engine operations. Cycle time increases. If both pumps fail, speed brakes, and thrust reversers may not operate. Landing gear may need emergency extension procedure.

HYDRAULIC SYSTEM – ANNUNCIATORS

Indication	Master Caution/ Warning	Description
HYD LEVEL LOW		Less than 0.2 US gallon of hydraulic fluid in reservoir. Speed brakes, thrust reversers, and flaps may not operate. Landing gear may need emergency extension procedure. Land as soon as practical.

HYDRAULIC SYSTEM – ANNUNCIATORS

Indication	Master Caution/ Warning	Description
		Illuminates when hydraulic pressure is above 185 PSI. As pressure decreases, extinguishes at 155 +/- 5 PSI. If light remains on after operation of speed brakes, and thrust reversers, then the bypass valve has failed in the closed position. Pull subsystem circuit breakers until you find the system causing the problem. Pulling the CB should cause the valve to reopen. If it does not reopen after pulling CBs, then valve has failed. Land as soon as practical. Reset subsystem circuit breakers before landing. In some cases, the light may not illuminate even when the bypass valve fails open and there is no pressure. Land as soon as practical.Landing gear may need emergency extension procedure.

HYDRAULIC SYSTEM – ANNUNCIATORS

Indication	Master Caution/ Warning	Description
		ENGINE FIRE PUSH causes Firewall valves to close and indicator illuminates. Activate ENGIE FIRE PUSH a second time to reopen firewall valves.

HYDRAULIC SYSTEM – ABNORMAL PROCEDURES

Loss of Both Hydraulic Pumps/Low Hydraulic Fluid Level

1. Land as Soon as Practical.

NOTE: Speed brakes, and thrust reversers may not work. Landing gear may not operate using normal procedure. Refer to ***Landing Gear Does Not Extend***.

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HYDRAULIC SYSTEM – ABNORMAL PROCEDURES

Low Hydraulic Pressure (HYD PRESS LO Light On)

1. Advisory: Appropriate HYD PRESS LO light will illuminate when pump output is abnormally low. Illumination of this light is common during single engine operation. During normal operation, illumination of either HYD PRESS LO light may indicate an inoperative hydraulic pump, in which case gear extension may be slower than usual.

Low Hydraulic Fluid Level (HYD LEVEL LO Light On)

1. Land as soon as practical. The speedbrakes and thrust reversers may not operate and the gear may not operate using normal procedures.

HYDRAULIC SYSTEM – ABNORMAL PROCEDURES

HYDRAULIC SYSTEM REMAINS PRESSURIZED

Hydraulic Pump On. The hydraulic pump has been operating for more than 60 seconds. Continuous use can result in overheating and shutdown of the pump. Isolate problem by pulling list circuit breakers one at a time in order of last system used. If system remains pressurized, reset before pulling next circuit breaker.

1. Speed Brake Control Circuit Breaker: PULL/RESET
2. Gear Control Circuit Breaker: PULL/ RESET
3. L/R Thrust Reverser Circuit Breaker: PULL/RESET one at a time.

NOTE: With a thrust reverser circuit breaker open, the emergency stow system of the opposite reverser is deactivated. If no Circuit Breaker relieves pressure and light remains illuminated:

5. Land as Soon as Possible (system may overheat and fail)

Before Landing:

6. Pulled Circuit Breaker: RESET
7. If Light Extinguishes
5. Leave affected Circuit Breakers Open
6. Land as soon as practical

Before Landing:

7. Pulled Circuit Breaker: RESET

LANDING GEAR

LANDING GEAR – GENERAL

The landing gear is electrically controlled and hydraulically actuated. Each landing gear assembly uses a single wheel assembly and an oil over air strut. The nose gear has a chined tire for water and slush deflection. The main landing gear doors are mechanically connected to the main gear struts and extend and retract with the individual gear assemblies. The nose gear utilizes three doors. The rear door is mechanically connected to the nose gear strut and extends aft, or retracts forward with the nose gear assembly. The two forward double-action doors are mechanically linked to the nose gear. These doors close with the nose gear fully extended or retracted. The landing gear actuators incorporate an internal lock to hold the gear in the extended position. They are held retracted by mechanical up-locks that are normally released hydraulically. The landing gear completes a retraction or extension cycle in approximately four seconds. The gear can be extended at airspeeds up to 176 KIAS.

LANDING GEAR – MAIN AND NOSE GEAR

- The landing gear is held in the up position by spring-loaded mechanical up locks.
- Hydraulic actuator unlocks for extension.
- The landing gear is locked in the down position by internal downlocks utilizing a locking ring held in a groove on the piston. The gear locks down after the hydraulic pressure is released.
- Hydraulic actuator unlocks for retraction.

LANDING GEAR – NOSEWHEEL STEERING

The nose gear is mechanically steered by cables connected to the rudder pedals to 20° either side of center. (On 500-0001 thru -0100 the mechanical steering limits are 11 ° either side of center). Steering is accomplished through mechanical linkage with a bungee that allows the nose gear to center before entering the wheel well on retraction. Additional castering of the nose wheel can be achieved against the bungee by application of differential power and braking. For ground handling and towing, maximum deflection of the nose wheel is 95° either side of center.

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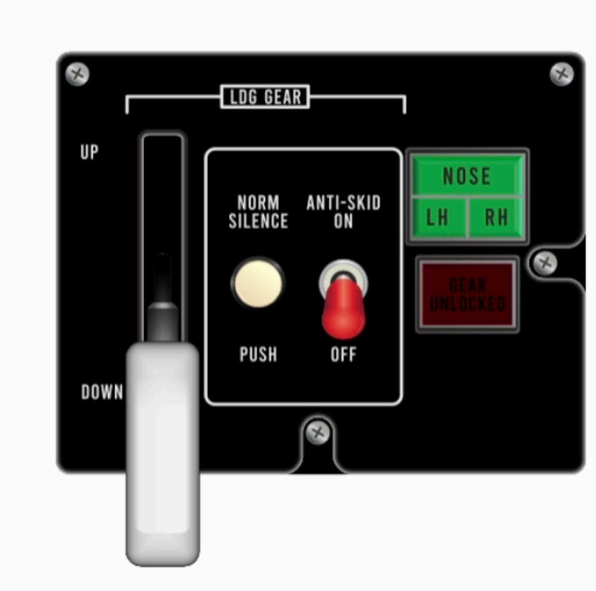
LANDING GEAR – LANDING GEAR CONTROL

The LANDING GEAR control handle is located on the left side of the center panel. The landing gear control panel contains the landing gear handle, an audible warning system and horn silence switch, three gear safe indicators and a red unlocked indicator. The landing gear handle has two positions, full down and full up. The gear handle must be pulled out to clear a detent before it can be repositioned. Operation of the gear and doors will not begin until the handle has been positioned in one of the two detents. A gear handle locking solenoid activated by the left main gear squat switch physically prevents inadvertent movement of the gear handle while on the ground. A squat switch prevents the plunger retraction on the ground.



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LANDING GEAR – LANDING GEAR CONTROL

When airborne, locking solenoid energizes to retract plunger.

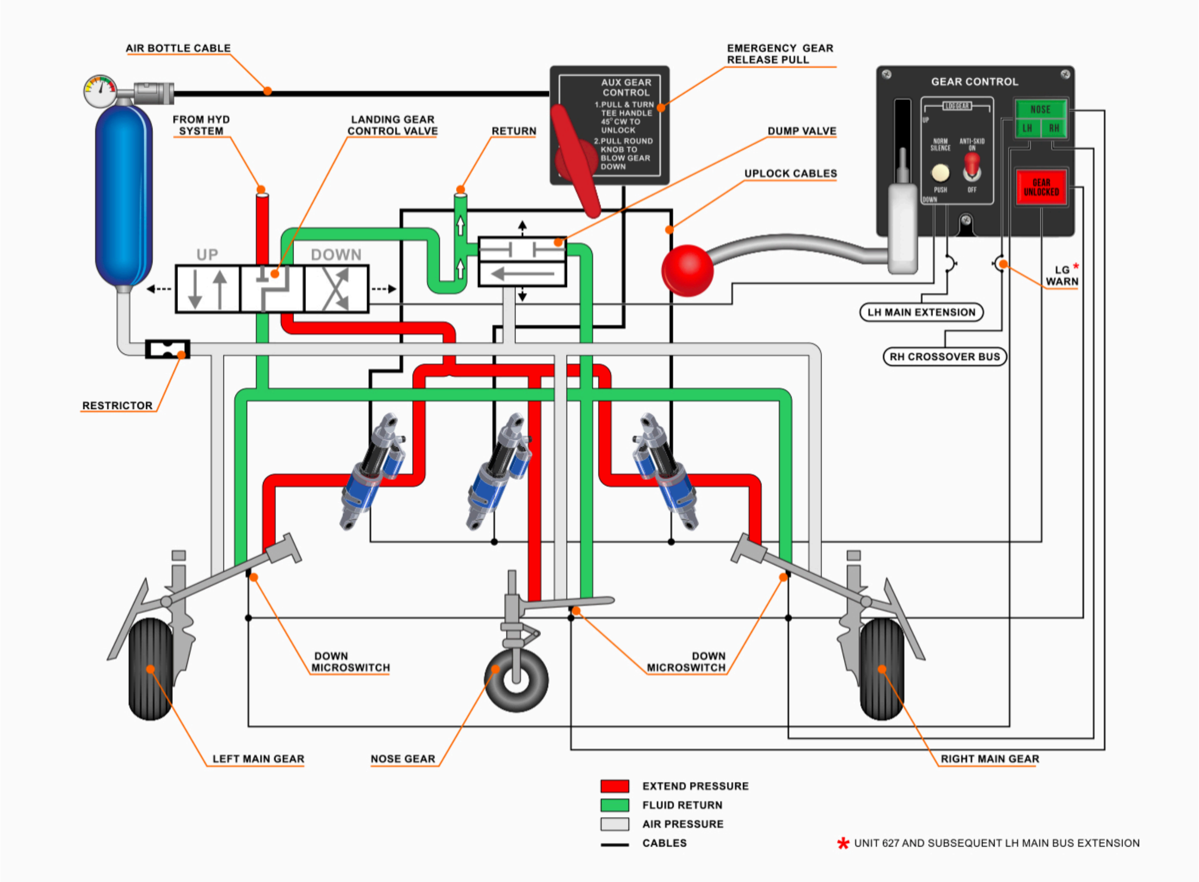
Solenoid failure or loss of DC power prevents movement of the gear handle.

Position indicated by one red and 3 green lights (one for each wheel) to indicate down and locked.

Warning horn for abnormal conditions.

During retract or extension cycles, HYD PRESS ON illuminates and red GEAR UNLOCKED (until it locks).

LANDING GEAR – LANDING GEAR CONTROL



NOSEWHEEL SPIN-UP SYSTEM (OPTIONAL)

Reduces gravel spray on gravel runways when touching down.
Uses engine bleed air from windshield and ram air.
To operate:

1. Move W/S BLEED to LOW or HIGH (-18°C (0°F) limit still applies)
2. Turn L and R WINDSHIELD BLEED AIR to OFF. (You can still use pilot windshield bleed air, it just increases spin-up time.)
3. Position Nosewheel Spin up knob to ON
4. Keep N2 above 52% for proper bleed air supply.
5. Within 90 seconds, N/W RPM MIN indicator illuminates green.
6. Maintain wheel speed by adjusting WHEEL SPIIN UP control if red N/W RPM MAX illuminates.

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LANDING GEAR – WARNING SYSTEM

A landing gear horn will sound if the gear is not down and:

1 - Flaps > 15° (Horn cannot be silenced)

or –

2 - Airspeed < 150 K and N2 < 70%.
(The horn can be silenced by pressing HORN SILENCE button on gear control panel.)

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EMERGENCY GEAR EXTENSION SYSTEM

The pneumatic bottle is charged to 1,800 - 2,050 psi. It uses dry air and nitrogen and is located in the nose compartment.

TO OPERATE:

Slow to 150 Knots.

Pull AUX GEAR CONTROL T-handle and rotate clockwise 45°.

Yaw the aircraft to lock gear in place. After the gear has extended, pull round knob behind T-handle to blow nitrogen bottle and lock the gear down.

LANDING GEAR – ANNUNCIATORS

Indication	Master Caution/ Warning	Description
		Red Gear unlocked illuminates when gear first unlocked. Goes out if three green lights illuminate Green gear lights illuminate when locked. If not illuminating, yaw aircraft to lock in place. If this not work, use emergency gear extension.

LANDING GEAR – ANNUNCIATORS

Indication	Master Caution/ Warning	Description
 	CAUTION	Pump output less than .045 +/-0.10 GPM. Goes off when output above 1.33 GPM. Illuminates when in single engine operations. Cycle time increases. If both pumps fail, speed brakes, thrust reversers, and flaps on SII may not operate. Landing gear may need emergency extension procedure.

LANDING GEAR – ANNUNCIATORS

Indication	Master Caution/ Warning	Description
		Illuminates when pressure above 185 PSI. As pressure decreases, extinguishes at 155 +/- 5PSI. In some cases, the light may not illuminate even when the bypass valve fails open and there is no pressure. Land as soon as practical. Landing gear may need emergency extension procedure.

LANDING GEAR – ABNORMAL PROCEDURES

Landing Gear Does Not Extend

1. LANDING GEAR handle: CHECK/DOWN.
2. Airspeed: 176 KIAS Maximum
3. Gear Control Circuit Breaker: CHECK/SET
4. Auxiliary Gear Control T-Handle: PUL HANDLE/ROTATE CLOCKWISE TO LOCK
5. Rudder: YAW as necessary

   CAUTION: The pneumatic system does not remove the gear from the uplock position. IF downlights do not illuminate, visually ensure, if possible, that all landing gear are released from the uplocks prior to using pneumatic air.
6. Auxiliary Gear Control Round Knob: PULL knob for positive lock of actuators.

   NOTE: Use pneumatic air to ensure positive lock of all 3 gears actuators.

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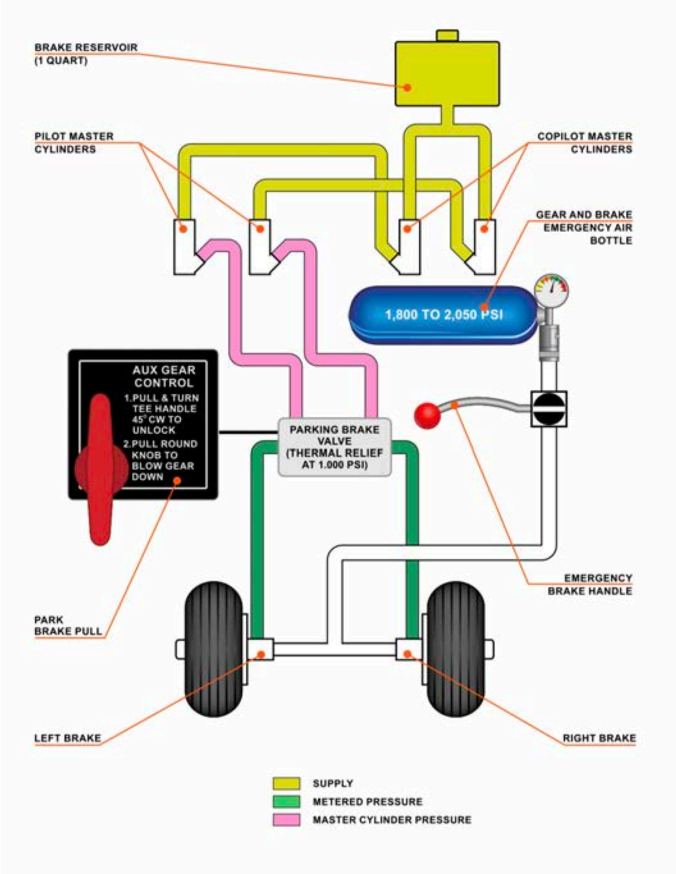
BRAKES

NORMAL BRAKES

Disc brakes are installed on the main gear wheels. Toe actuated braking can be accomplished by the normal brake hydraulic system. The normal brakes can be applied from either cockpit seat. If both pilots apply brakes simultaneously, the pilot exerting the most force on the pedals will be the one controlling the braking. The amount of pressure applied to the brakes is always proportional to the amount of force applied at the brake pedals.

NORMAL BRAKES

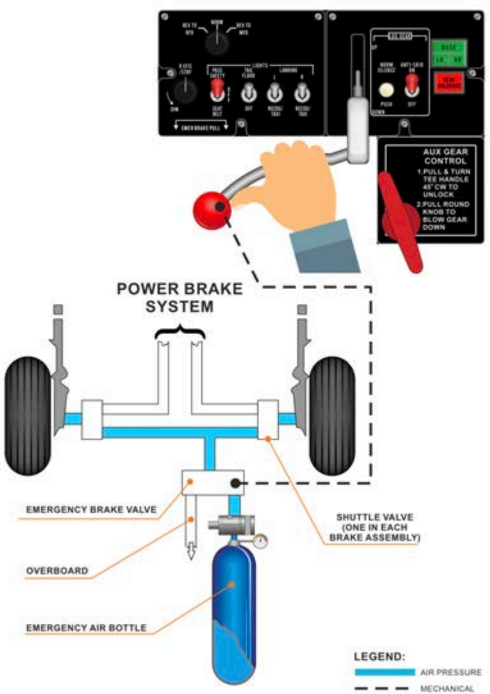


EMERGENCY BRAKES

If the normal hydraulic braking system fails, a pneumatic backup system is available. Nitrogen pressure is used to apply equal pressure to both main landing gear brake assemblies. A lever is used to modulated the braking rate, but differential braking will not be available. A full emergency nitrogen bottle contains sufficient pressure for ten brake applications or five applications if the landing gear have been extended pneumatically. When the handle is released, residual air pressure from the brakes is exhausted overboard, depleting the supply. Do not apply normal braking while using the pneumatic brakes. Depressing the pedals will keep the shuttle valves in the brake lines open allowing high pressure air from the pneumatic system to enter the brake hydraulic reservoir and possibly rupture it.

EMERGENCY BRAKES - OPERATION

To use of the emergency brakes, pull the lever slowly aft until sufficient pressure achieves the desired deceleration rate. Hold that pressure until the aircraft is stopped. The system uses dry air and nitrogen. The pressure gauge is located in nose compartment. Anti-skid and differential braking is not available with emergency brakes. Brake pedals usage while activating emergency braking can rupture the brake reservoir resulting in a total loss of braking. Do not taxi utilizing the emergency brakes after leaving runway.



ANTI-SKID SYSTEM (OPTIONAL)

The anti-skid system allows for maximum braking under all runway conditions. The system components include:

1. Electromechanical Wheel Speed Transmitters,
2. An Electronic Control Module,
3. A Power Brake and Anti-Skid Valve,
4. Hydraulic Pump,
5. Accumulator,
6. Reservoir,
7. Pressure and Control Switches,
8. Two Indicator Lights.

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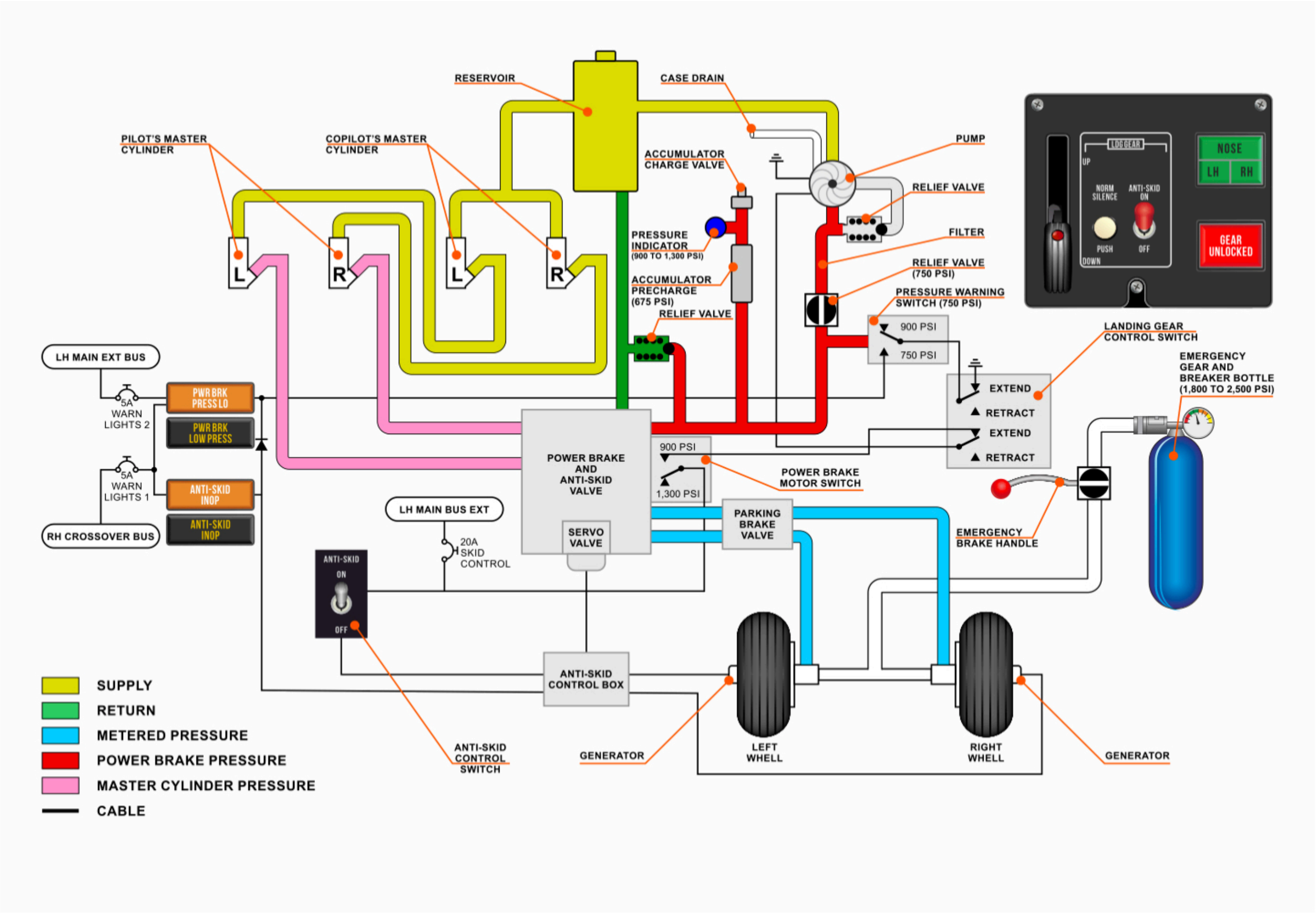
ANTI-SKID SYSTEM



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ANTI-SKID SYSTEM (OPTIONAL)

A wheel speed transmitter is connected to both main wheel. As the wheel spins, the transmitter sends a signal after each wheel revolution to the control module as a variable frequency. The control module converts these signals from each main wheel to a DC voltage output that is directly proportional to the wheel speed. The voltage from the left and right wheel are averaged to provide a reference voltage. Any significant variation between either wheel speed voltage and the reference voltage produces an error signal that activates the power brake and anti-skid valve which controls the amount of braking being applied to each wheel. At touchdown, the transmitter reaches maximum voltage as soon as the wheel spins up. As long as no skid occurs, the transmitter voltage tracks wheel speed and the reference voltage tracks the voltage of the transmitters. When excessive deceleration of a wheel occurs, transmitter voltage suddenly drops. This generates an error signal which modulates the braking effort being applied by the pilot to maintain transmitter voltage and reference voltage within the skid limits. This prevents the skid condition.

ANTI-SKID SYSTEM

When the airplane speed drops below ten knots the anti-skid function disengages. Hydraulic power for the anti-skid system is provided by an electrically driven hydraulic pump located in the left-hand nose of the aircraft. An accumulator is installed in the system to maintain system pressure when the pump is not running. The pump is controlled by a pressure switch that opens when the pressure reaches 1300 psi and closes when the system pressure drops to 900 psi. A switch on the instrument panel allows the pilot to select anti-skid ON or OFF.

Antiskid Failure

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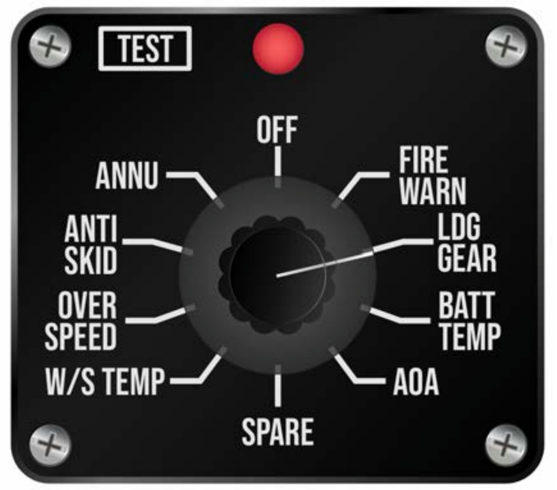
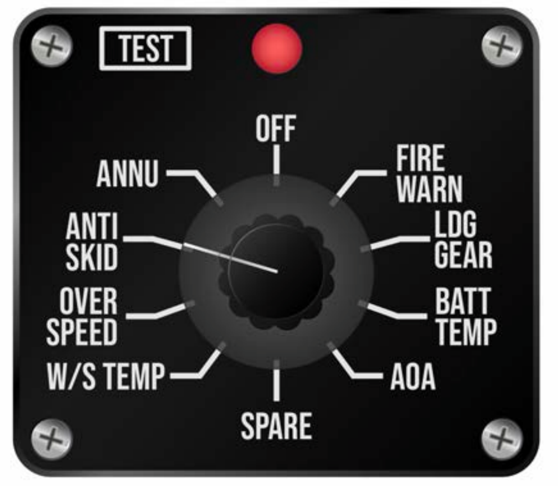
BRAKES - GROUND TESTING BRAKES

Place the rotary test switch to the LDG GEAR position. All landing gear lights illuminate and landing gear warning horn sounds. ANTI-SKID INOP annunciator light illuminates when the rotary test selector is positioned to ANTI-SKID.





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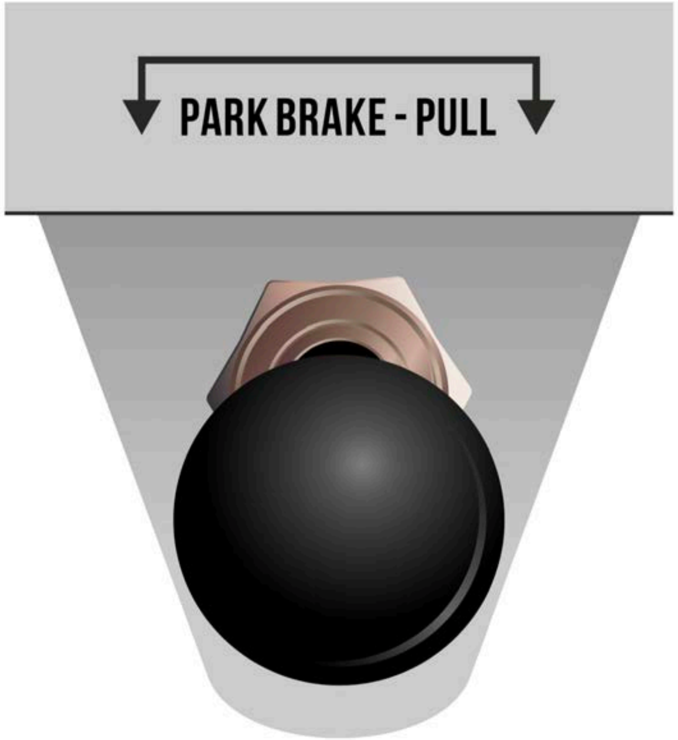
BRAKES - PARKING BRAKES

Set the brakes by pulling out the PARK BRAKE-PULL handle on the lower left side of the pilot's instrument panel. The parking brake utilizes check valves that prevent the return of fluid after the brake pedals have been released. Do not set the parking brakes after a hard stop. The heat radiating off the brakes may melt the fusible plugs and deflate the tires.



BRAKES – ANNUNCIATORS

Indication	Master Caution/ Warning	Description
		Failure in anti-skid system. (DC power is off/below operational levels, or shorts in anti-skid system wiring). Turn ANTI-SKID to OFF. (Turn on anti-skid before takeoff to have it available during take-off. Must be turned on while stationary so self-test can complete.) Message also appears when Rotary Test knob turned to ANTI SKID.
		Low hydraulic pressure (below 750 PSI). Use emergency braking after landing manually extended. 15 second delay while in flight.

BRAKES – ABNORMAL PROCEDURES

ANTISKID SYSTEM FAILURE

ANTISKID SYSTEM FAILURE (ANTI-SKID INOP LIGHT ON)

1. Antiskid Switch -ON.
2. Skid Control Circuit Breaker -RESET.

IF LIGHT REMAINS ILLUMINATED:

3. Antiskid Switch -OFF.

NOTE

Power brakes will still be operational with antiskid OFF and skid control circuit breaker in. Excessive braking can cause a wheel to lock, resulting in a blowout.

BRAKES – ABNORMAL PROCEDURES

POWER BRAKE SYSTEM FAILURE

1. SKID CONTROL circuit breaker: RESET.

If lights remain illuminated

2. Emergency Brake System: Use for landing.
3. Remove feet from brake pedals.
4. Emergency Brake Handle: PULL as required.
5. Landing Distance: Calculate.

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BRAKES – ABNORMAL PROCEDURES

WHEEL BRAKE FAILURE

1. Brake Pedals -REMOVE FEET FROM BRAKE PEDALS. If the brakes are depressed while the emergency air brakes are actuated, high pressure air will bypass the shuttle valve and possibly rupture the brake fluid reservoir.
2. Emergency Brake Handle -PULL AS REQUIRED. Pulling the emergency brake handle will apply equal pressure to both brakes. The emergency air bottle holds enough air for approximately ten full applications, but excessive modulation should be avoided. Best results are obtained using slow steady pressure until the airplane is stopped. Although differential braking is not available, directional control can be easily maintained utilizing nose gear steering, rudder and aileron. If the landing gear has been lowered by the emergency air method, emergency braking will continue to be available; however, the number of applications available will be reduced. NOTE The antiskid system does not function during emergency braking. Excessive pressure on emergency brake handle can cause both wheel brakes to lock, resulting in blowout of both tires.


FLIGHT
CONTROLS

FLIGHT CONTROLS

All the aerodynamic controls, with the exception of the flaps and speedbrakes, are mechanically actuated by cables. The ailerons, elevator, and rudder have trimmed control surfaces and cockpit trim position indicators.

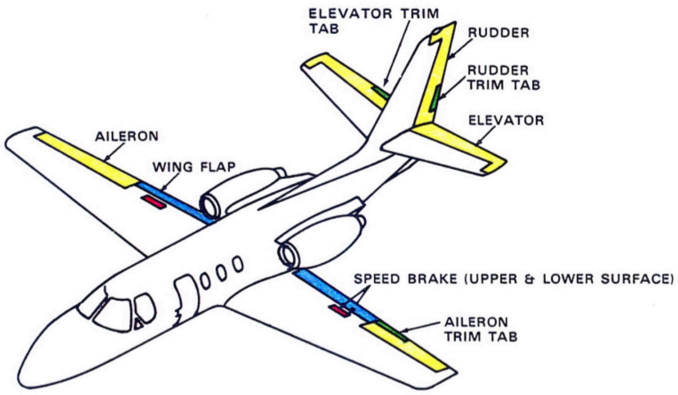
PRIMARY CONTROLS INCLUDE:

- Ailerons: Neutral position is 2° up; 21° +/- 1° up and 16° +/- 1° down Trim tab is 20° up and 20° down Left aileron only
- Rudder: interconnected with ailerons. Moves 22° +/- 1° either direction. Trim tab is 10° either side of center line
- Elevator: 20° +/- 0.5° up and 15° +/- 1° down Trim tab is 10° up and 19° down Right elevator only
- Controls locks (aileron/elevator lock and rudder lock) when on ground (lock control surfaces and throttle in CUTOFF). Protects control surface from wind gusts. Do not tow with locks in place or it will damage nose wheel steering system.

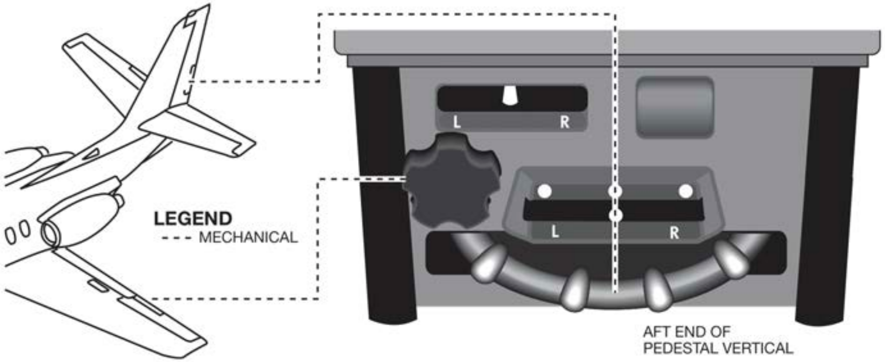
FLIGHT CONTROLS

SECONDARY FLIGHT CONTROLS

- Manual trim for elevator, aileron and rudder.
- Flaps
- Speed brakes

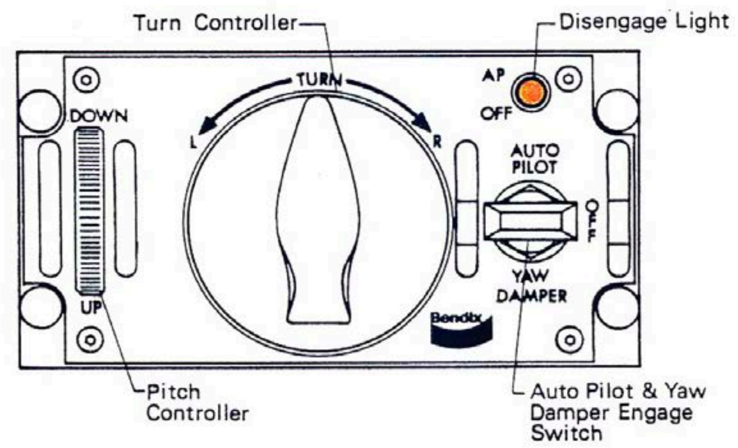


RUDDER AND AILERON TRIM



Use rudder trim wheel or aileron trim (left aileron) knob. Mechanical indicator beside trim wheel. Rudder tab. 10° +/- 1° left or right. Servo moves trim tab° ½ in the opposite direction for each degree of rudder movement.

YAW DAMPER



The Yaw Damper is used to reduce the undesirable tendencies of the aircraft to oscillate in a repetitive rolling and yawing motion. The yaw damper can be used independently of the autopilot.

YD ENGAGE CONTROL:

Press AP/TRIM DISC switch or go-around button to disengage yaw trim

FLIGHT CONTROLS - FLAPS

The trailing edge flaps are mechanically controlled and electrically actuated by two geared motors connected in parallel. The design of the drive system and parallel operation of the flap motors is designed to preclude the possibility of a split flap condition. Flap travel is from 0° to 40° and any intermediate position can be selected. A mechanical detent is installed at the T.O. & APPR. (15°) position of the flap lever. The full flap position is reached by pushing down on the flap lever when passing through the T.O. APPR detent. A warning horn will sound any time the flaps are selected past the T.O. & APPR. position with the gear not down and locked. In this configuration, the horn cannot be silenced.

SPEED BRAKES

The speed brakes are installed on the upper and lower surfaces of each wing. When extended they permit rapid rates of descent without exceeding VMo/MMo. In addition, they are used to decrease lift during landing roll. The angular travel for the upper speedbrake panels is 60° (+ 2°). The lower speedbrake panels deflect 83° (+ 2°).

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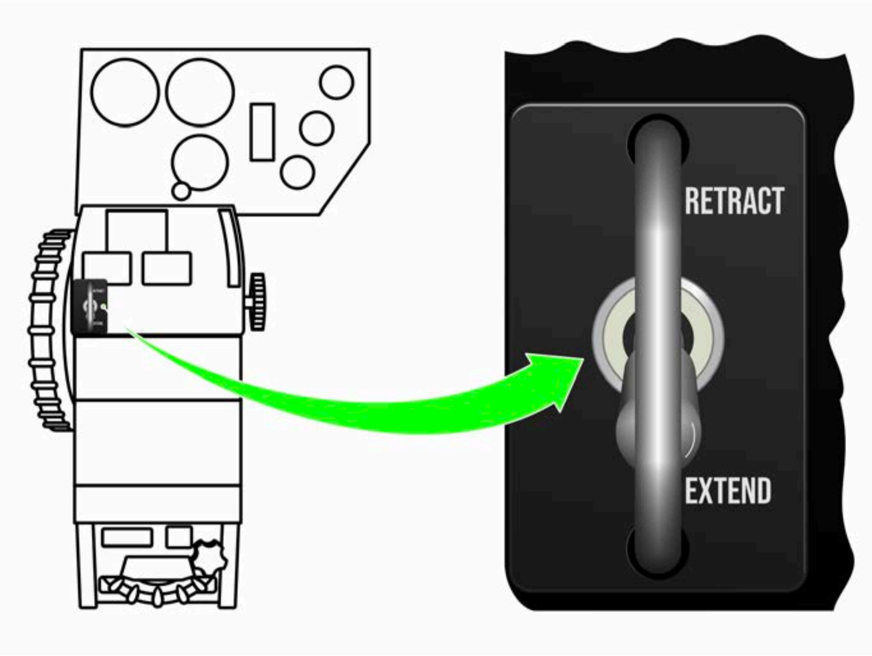
SPEED BRAKES

The speedbrakes are electrically controlled and hydraulically actuated by a guarded switch that is located on the throttle quadrant. The speedbrakes can only be fully extended or fully retracted. There are no intermediate positions.



FLIGHT CONTROLS - ANGLE OF ATTACK

The Angle of Attack gauge gives a visual indication of AOA. The angle of attack transmitter utilizes a sensor that detects the direction of airflow at the side of the fuselage by using a probe that extends into the airstream. The transmitter has a conical probe with slots in it, and rotates to achieve uniform airflow. The probe is heated for anti-icing by selection of PITOT & STATIC switch. The flap position sensor provides a signal to the unit so it is able to compensate for any flap position. The interface unit computes angle of attack from the transmitter signals and flap sensor and compensates for all configurations and weights and sends a signal to the angle of attack gauge.

ANGLE OF ATTACK (CONT.)

A full range indicator AOA gauge is calibrated from 0 to 1.0 and marked with red, yellow and green arcs. The indicator displays lift information with 0 representing zero lift and 1.0 representing stall. Lift is presented as a percentage, and with flap position information, the display is valid for all aircraft configurations and weights. The red arc on the indicator is a warning area and represents the beginning of low speed buffet to full stall. The yellow range is a caution area where the aircraft is approaching a critical angle of attack. The green arc is the normal operating range of the aircraft. The angle of attack gauge has reference indices at .8 where low speed buffet begins, and at .6 which is optimum approach speed. The AOA may be used as reference, but does not replace the primary airspeed indicator.

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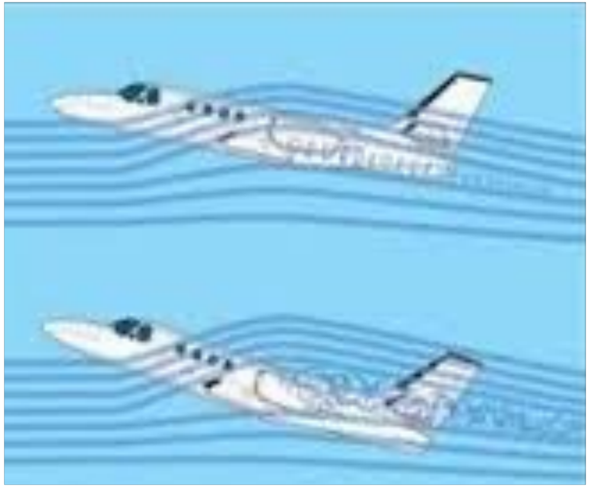
STALL

The stall warning system consists of a stall strip on the leading edge of each wing. These strips create turbulent airflow at high angles of attack, causing the elevator to buffet warning of an approaching stall condition. Buffet occurs prior to the actual stall at approximately VSI + 10 knots in the clean configuration and VSO + 5 knots in the landing configuration.



FLIGHT CONTROLS – ANNUNCIATORS

Indication	Master Caution/ Warning	Description
SPD BRAKE EXTENDED		Speed brakes not stowed.
HYD PRESS ON	No	Activating a system (landing gear, brakes, flaps, speed brakes) closes the system bypass valve to pressurize system.

FLIGHT CONTROLS – ANNUNCIATORS

Indication	Master Caution/ Warning	Description
		Autopilot disconnected followed by a 2 second tone. Momentary indication: Autopilot disengaged normally (AP/ TRIM DISC pressed, Go-around pressed, Electric elevator trim switch activated) STEDY indication: Autopilot disengaged by abnormal means (AC or DC power lost, vertical or directional gyro fail, A/P TEST pressed, vertical gyro switch (HI) actuated, L/R gyro slaving switch actuated. To extinguish: 1. AP/TRIM DISC Button: PUSH 2. Appropriate Circuit breakers: CHECK If desired 3. Autopilot: ATTEMPT TO RE-ENGAGE 4. NOTE: do not use autopilot if electric trim is not working

FLIGHT CONTROLS – EMERGENCY PROCEDURES

AUTOPILOT HARDOVER

RED BOXED TEXT INDICATES MEMORY ITEMS.

1. Autopilot/TRIM Disengage Switch: PRESS

Maximum altitude losses during autopilot malfunction are:

Units 0001 to 0213 and 234 except aircraft with SB21-9

Cruise, 500 ft. at 35,000 ft.
Climb, 60 ft. at 10,000 ft.
Maneuvering: 100 ft. at 35,000 ft.
ILS approach, 35 ft. (Autopilot must be off at 95 ft)

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FLIGHT CONTROLS – EMERGENCY PROCEDURES

INADVERTENT STALL (BUFFET, AND/OR ROLL-OFF)

RED BOXED TEXT INDICATES MEMORY ITEMS.

1. Autopilot: DISCONNECT
2. Pitch Attitude: REDUCE
3. Roll Attitude: LEVEL
4. Throttles: MAXIMUM THRUST

Note: Pitch attitude should be promptly reduced to at least 0-5° nose down. Prompt aileron input may be required to maintain wings level flight.

5. Airspeed: INCREASE
6. Altitude: RETURN to previous altitude
7. Throttle: As Required.

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FLIGHT CONTROLS – EMERGENCY PROCEDURES

RUNAWAY TRIM

RED BOXED TEXT INDICATES MEMORY ITEMS

1. Autopilot/Trim Disengage switch: PRESS/RELEASE
2. Pitch Trim Circuit Breaker: PULL
3. Manual Elevator Trim: As Required.

CAUTION: Do not attempt to use autopilot if electric trim is not working. The autopilot is not able to trim out servo torque; disengaging the autopilot could result in a significant pitch upset.

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FLIGHT CONTROLS – ABNORMAL PROCEDURES

ELECTRIC TRIM INOPERATIVE

1. Pitch Trim Circuit Breaker: CHECK
2. Pitch Trim Circuit Breaker (Units 0275+): PULL

If still inoperative:

3. Manual Elevator Trim: As required

CAUTION: Do not attempt to use autopilot if electric trim is not working. The autopilot is not able to trim out servo torque; disengaging the autopilot could result in a significant pitch upset.

FLIGHT CONTROLS – ABNORMAL PROCEDURES

JAMMED ELEVATOR TRIM TAB DURING CRUISE

1. Airspeed: Maintain trim airspeed if practical.
2. Flaps: Do not extend for approach/landing.
3. Flaps Inoperative Approach/Landing procedure: ACCOMPLISH

CAUTION: Do not attempt to use autopilot if electric trim is not working. The autopilot is not able to trim out servo torque; disengaging the autopilot could result in a significant pitch upset.

FLIGHT CONTROLS – ABNORMAL PROCEDURES

JAMMED ELEVATOR TRIM TAB - TAKEOFF OR GO-AROUND

1. Airspeed: 120 KIAS or less.
2. Flaps: Current Position. Do not change
3. Airspeed: MINIMUM Appropriate
   Flaps LAND: VREF
   Flaps TO and APPR°, VAPP
   Flaps UP: VREF + 20 KIAS
4. Landing Gear: DO NOT RETRACT. Takeoff on Go Around (If recognized after takeoff, restore flaps and gear to takeoff configuration.)
5. Flaps Inoperative Approach/Landing procedure: ACCOMPLISH
6. Land as soon as practical.

CAUTION:

Do not attempt to use autopilot if electric trim is not working. The autopilot is not able to trim out servo torque; disengaging the autopilot could result in a significant pitch upset.

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FLIGHT CONTROLS – ABNORMAL PROCEDURES

Flaps Inoperative: Approach/Landing

1. Seats, Seat Belts and Shoulder Harnesses -SECURE.
2. Approach Speed, V2, Fan Speed Setting -CONFIRM. Approach Speed: Flaps 15°, VREF +10 KIAS Flaps 0° or Unknown, V REF + 20 KIAS.
3. Airspeed -VREF +10 KIAS (Flaps 15°) or VREF +20 KIAS (Flaps 0°) If angle of attack is installed, fly "on speed" indication, cross checking with airspeed indicator. The airplane should be flown onto the runway, using only a slight flare to break the rate of descent. Touchdown attitude will be flatter than normal and speed should not be in excess of V REF + 20 KIAS. Landing field length increases approximately 40% for a no flap landing.
4. Flap Control and Flap Motor Circuit Breakers -CHECK IN. Check both of these circuit breakers on the left circuit breaker panel engaged.
5. Passenger Advisory Lights -PASS SAFETY.
6. Aft Facing Seat -CHECK FULL AFT and UPRIGHT.
7. Crossfeed -OFF. Check CROSSFEED Knob OFF and INTRANSIT and FUEL BOOST ON Lights extinguished.
8. Ignition -ON.
9. Landing Gear -DOWN and LOCKED.
10. Engine Synchronizer -OFF.
11. Autopilot and Yaw Damper -OFF.
12. Annunciator Panel -CLEAR.
13. Pressurization -CHECK ZERO DIFFERENTIAL.
14. Speedbrakes -RETRACTED PRIOR TO 50 FEET.

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FLIGHT CONTROLS – ABNORMAL PROCEDURES

FLAPS INOPERATIVE APPROACH/LANDING

V_{REF}: Units prior to 350

FLAPS	11350 lbs	11000	10500	10000	9500	9000	8500	8000	7500
Full	114	112	109	107	104	101	98	96	93
15°	124	122	119	117	114	111	108	106	103
0° or unkown	134	132	129	127	124	121	118	116	113
V_{app} 15°	121	116	116	111	114	108	105	102	99

FLIGHT CONTROLS – ABNORMAL PROCEDURES

FLAPS INOPERATIVE APPROACH/LANDING

V_{REF}: Units after 350

FLAPS	11350 lbs	11000	10500	10000	9500	9000	8500	8000	7500
Full	108	107	104	102	99	97	94	92	89
15°	118	117	114	112	109	107	104	102	99
0° or unkown	128	127	124	122	119	117	114	112	109
V_{app} 15°	115	113	111	108	105	103	100	97	94

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FLIGHT CONTROLS – ABNORMAL PROCEDURES

LANDING WITH FAILED PRIMARY FLIGHT CONTROL CABLE

RUDDER

1. Utilizer Rudder Trim
2. After Touchdown, lower the nose and deploy speed brakes as soon as possible.

NOTE: Use of thrust reversers during landing rollout is not recommended.

FLIGHT CONTROLS – ABNORMAL PROCEDURES

Landing with Failed Primary Flight Control Cable

AILERON

1. Use rudder for directional control limiting bank angle to 15° maximum. Do not use aileron trim except for large adjustments.
2. If possible, choose a runway with least possible crosswind.
3. After Touchdown, lower the nose and deploy speed brakes as soon as possible.

FLIGHT CONTROLS – ABNORMAL PROCEDURES

SPINS

Intentional spins are prohibited and were not conducted during flight tests of the aircraft. Should a spin occur:

1. Throttle (both): IDLE
2. Yoke: Neutralize
3. Rudder: FULL In opposite direction of spin.

At approximately ½ turn of spin after applying rudder:

4. Yoke: FORWARD

As Rotation slows:

5. RUDDER: Remove input when rotation stops.
6. Pull out of dive with smooth steady control pressure.

During pullout:

7. Airspeed/AOA: MONITOR and avoid a second stall.

FLIGHT CONTROLS – ABNORMAL PROCEDURES

TURBULENT AIR PENETRATION

Avoid flight through severe turbulence if possible. The following procedure is recommended for unavoidable flight in severe turbulence.

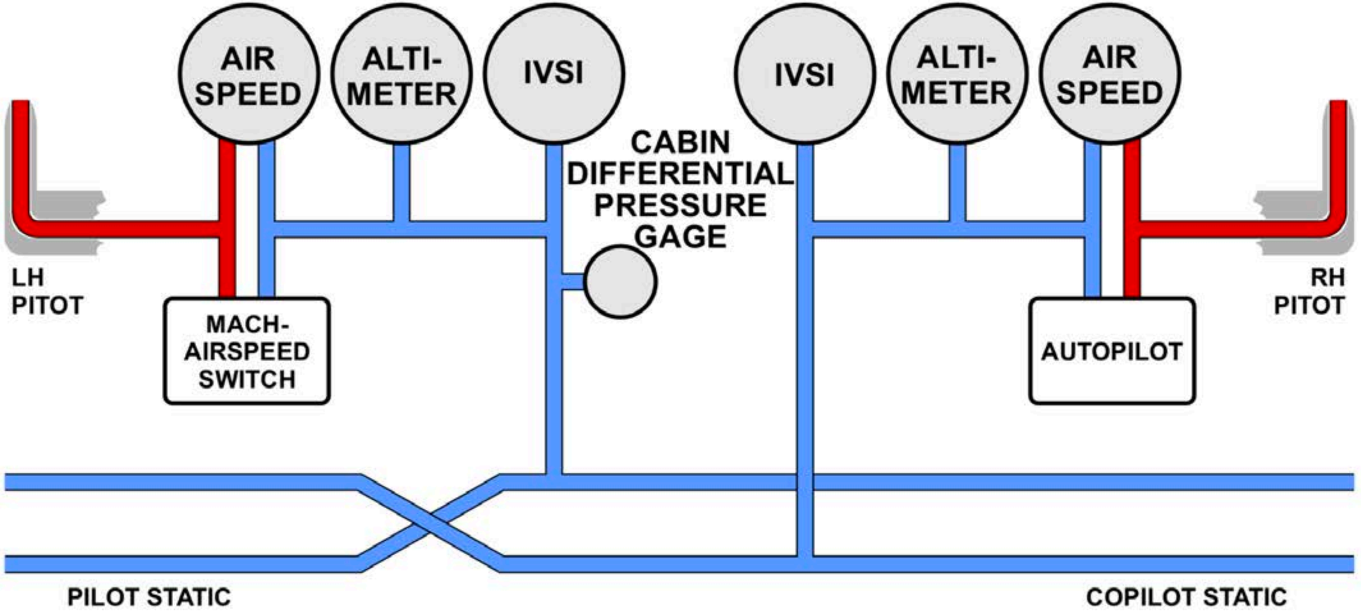
1. Ignition: ON
2. Airspeed: Approximately 180 KIAS. Do not chase airspeed.
3. Maintain constant altitude. Avoid sudden large control movements. Do not chase altitude.
4. Autopilot: Recommend use of Basic Pitch Mode and Lateral Modes only

INSTRUMENTATION

PITOT-STATIC SYSTEM

Separate airspeed indicators, vertical speed indicators, altimeters and turn and bank indicators are installed for use by the crew. Two independent pitot-static systems measure total pressure and static pressure. The two pitot tubes and four static ports are electrically heated for ice protection. The pitot tube on the left side of the aircraft supplies pressure to the pilot's airspeed indicator and the mach-airspeed limit switch. The pitot tube on the right side of the aircraft supplies pressure to the co-pilot's airspeed indicator and the autopilot. Two static ports are located on each side of the aircraft. One port on each side provides a static source for the pilot's airspeed indicator, altimeter, instantaneous vertical speed indicator, mach-airspeed limit switch, and the cabin differential pressure gauge. The second port provides a static source for the co-pilot's airspeed indicator, altimeter, instantaneous vertical speed indicator and the autopilot.

PITOT-STATIC SYSTEM



AVIONICS – AIR DATA COMPUTER

The air data computer (**ADC**) computes altitude, vertical speed, air speed, and Mach number from pressure and temperature inputs. This computer, rather than individual instruments, can determine the calibrated airspeed, Mach number, altitude, and altitude trend data from an aircraft's pitot-static system. These outputs are sent to the altimeters and autopilot system.

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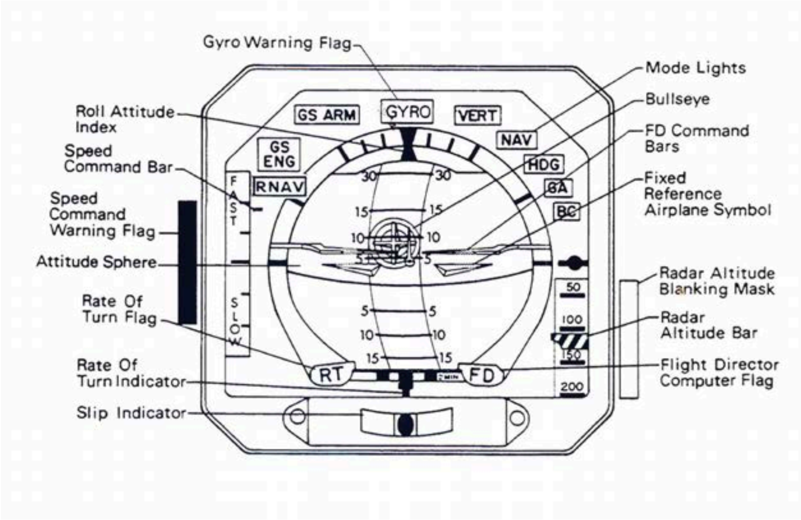
FLIGHT INSTRUMENTS

Analog Airspeed, altimeter, Instantaneous Vertical Speed Indicators (IVSI), Turn and Bank, attitude indicator, 24-hour clock, magnetic compass, Outside Air Temperature gauge (OAT), Flight hour meter, True Airspeed Indicator (TAS), Standby Attitude Indicator (optional)

AVIONICS – AVIONICS EQUIPMENT

- Flight Director
- Automatic Pilot
- Pilots' ADI
- Pilot Horizontal Situation Indicator (HSI)
- ADC
- Autopilot controller
- Touch Control Steering (TCS)
- Rate gyro
- Autopilot servos



ANGLE OF ATTACK INDICATOR

The angle of attack system is powered by 28 VDC from the left main DC bus and is comprised of four units. The angle of attack transmitter is the basic sensor which detects the direction of airflow at the side of the fuselage by means of a cone shaped probe extending into the airstream. The probe is heated by selection the PITOT & STATIC anti-ice switch ON. The flap position sensor provides a signal to the interface unit so it is able to compensate for any flap position. The interface unit computes angle of attack from the transmitter signals and flap sensor and compensates for all configurations and weights so as to give a standard readout on the angle of attack gauge. The gauge is calibrated from 0 to 1.0 and marked with red, yellow and green bands. The indicator displays lift information with 0 representing zero lift and 1.0 representing stall. Lift is presented as a percentage, and the display is valid for all aircraft configurations and weights.

ANGLE OF ATTACK INDICATOR

The red band on the indicator is a warning area and represents the beginning of low speed buffet to full stall. The yellow range is a caution area where the aircraft is approaching a critical angle of attack. The green arc is the normal operating range of the aircraft. The angle of attack gauge has reference indices at .8 where low speed buffet begins, and at .6 which is optimum approach speed (1.3 Vso). The index at .6 also represents the maximum value of Lift/Drag (L/D max.), which equates to maximum endurance and maximum angle of climb. A second angle-of-attack display is provided on the ADI as a vertical readout of the optimum approach angle-of-attack. This information is repeated from the primary indicator. An approach indexer, mounted on the windshield center post, provides a "heads up" display for approach reference.

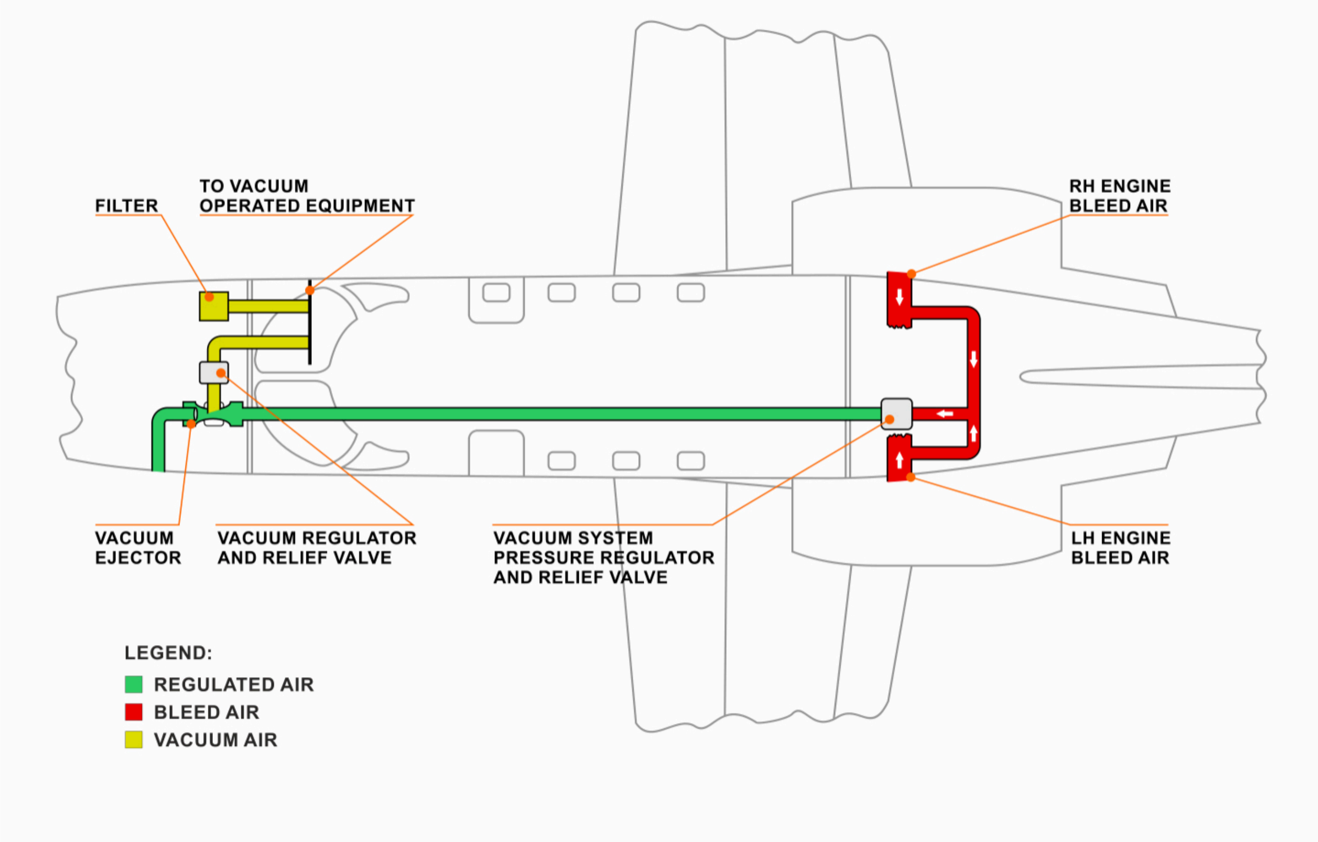
SAFEPILOT PUBLISHING

VACUUM SYSTEM

500-0001 thru -0213

Bleed air from the engines is used to create vacuum for cabin pressurization control and the co-pilot's gyro horizon. The system has no control valves and is operational whenever the engines are running. A gauge on the co-pilot's panel reads vacuum pressure in inches of mercury, and indicates 4.5 ± 0.5 when the system is operating normally. When either or both engines are operating, bleed air is directed through a pressure regulator and an air ejector. Air passing through the ejector creates a vacuum at an air inlet port, which is the pickoff point for the vacuum system. A filter in the system removes foreign particles from the air. In the event of a vacuum system failure, the co-pilot's attitude gyro will be inoperative as will the emergency dump valve. Cabin pressure will go to maximum differential since vacuum is not available to the pressurization outflow valves.

VACUUM SYSTEM



VACUUM SYSTEM

500-0214 THRU -0349 AND AIRCRAFT INCORPORATING SB 21-9

Bleed air from the engines is used to create a vacuum for cabin pressurization control. When either or both engines are operating, bleed air is directed through a pressure regulator and an air ejector. Air passing through the ejector creates a vacuum at an air inlet port, which is the pickoff point for the vacuum system. A filter in the system removes foreign particles from the air. A regulator is included which regulates the vacuum pressure between 3.75 and 4.75 inches of mercury. In the event of a vacuum system failure, the emergency dump valve will be inoperative and cabin pressure will go to maximum differential since control air (vacuum) is not available to the pressurization outflow valves.

OXYGEN SYSTEM

OXYGEN SYSTEM – GENERAL

The oxygen cylinder is located in the right nose compartment. It has a 22 or 60 (optional) cubic ft capacity and the system pressure is regulated to 1,600-1,800 psi. The system will provide approximately 15 minutes oxygen for the crew and six passengers. Duration for actual personnel aboard can be computed by assuming consumption at a rate of 4 liters per minute per occupant, and a usable full bottle output of 500 liters. The bottle assembly contains a pressure reducing valve, shutoff valve and provisions for external servicing. A green blowout disc is installed below the right nose baggage door. If this disc is ruptured, it indicates the bottle pressure has exceeded 2,500 p.s.i. and is empty.

OXYGEN SYSTEM – GENERAL

At cabin altitude over 13,500’ +/- 600’, altitude pressure switch energizes solenoid valve open and causes O2 to flow.

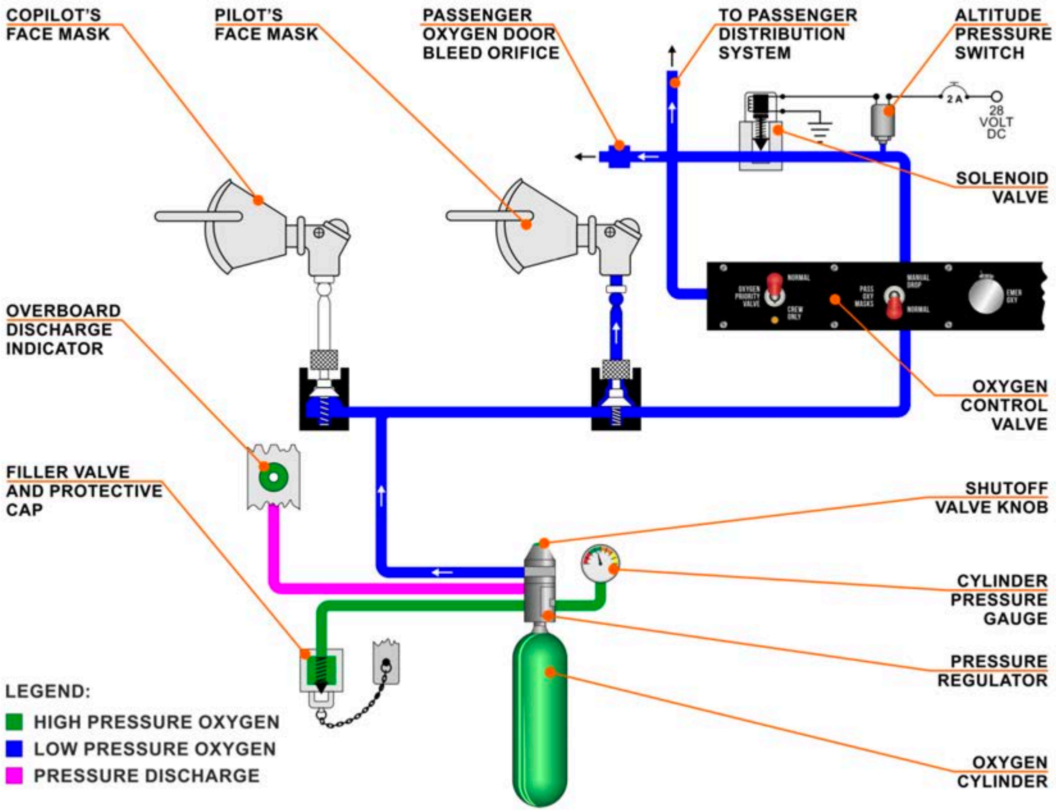
Passenger distribution system O2 flow causes passenger masks to drop.

Passengers don mask and pull lanyard to get oxygen to flow.

Solenoid is de-energized closed again at 8,000’ cabin altitude and shuts off flow to passengers.

Optional portable therapeutic oxygen container is located on the forward side of right aft cabin partition.

OXYGEN SYSTEM



SAFEPILOT PUBLISHING

OXYGEN SYSTEM – OXYGEN VALVE

OXYGEN PRIORITY VALVE:

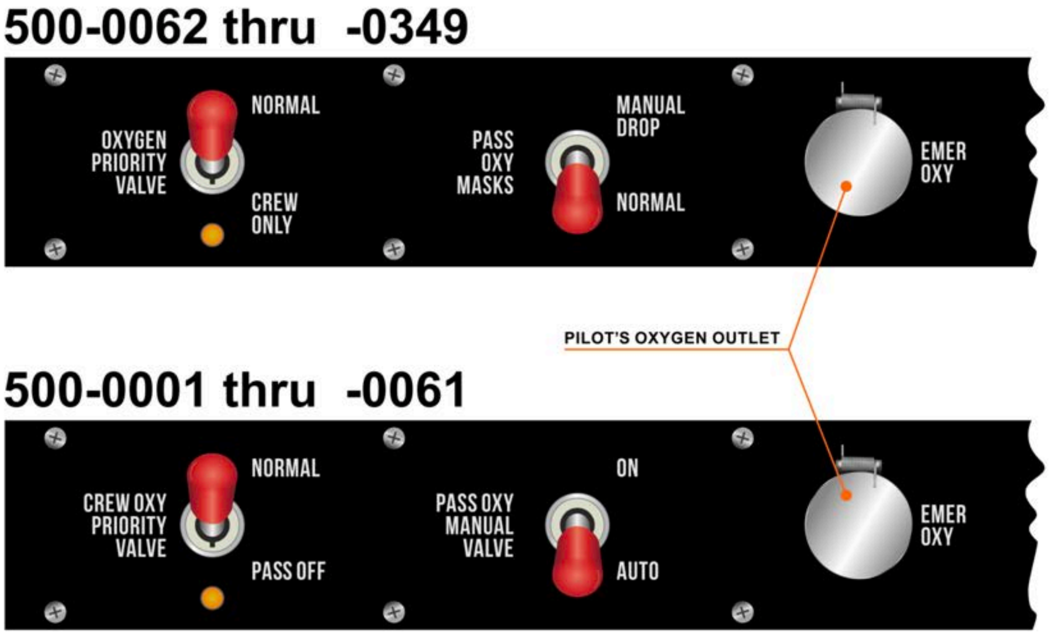
NORMAL: Oxygen to cabin and cockpit.

CREW ONLY: Prevents O2 flowing to passengers.

PASS OXYGEN SWITCH:

NORMAL: Oxygen to cabin and cockpit.

MANUAL DROP: Drops oxygen masks for therapeutic oxygen, smoke in cabin, or electrical power failure.



SAFEPILOT PUBLISHING

OXYGEN SYSTEM – CREW OXYGEN MASK

Mask in NORM:

Provides diluted O2 on demand but only below 20,000 ft. cabin altitude.

MASK IN 100%:

Provides 100% O2 on demand.

To qualify as a quick donning mask, it must be worn around the neck above 25,000 ft. and must be worn on the face above 35,000 ft. single pilot

SAFEPILOT PUBLISHING

OXYGEN SYSTEM – TIME OF USEFUL CONSCIOUSNESS

<15,000 to 18,000'	> 30 min
22,000'	5 - 10 min
25,000'	3 - 5 min
28,000'	2 1/2 - 3 min
30,000'	1 - 2 min
35,000'	30 - 60 sec
40,000'	15 - 20 sec
45,000'	9 - 15 sec

OXYGEN SYSTEM – ANNUNCIATORS

Indication	Master Caution/ Warning	Description
	CAUTION	Cabin has depressurized. Action: Deploy oxygen masks. Don oxygen masks. Descend to 10,000 ft. if unable to correct by 14,000 ft.

OXYGEN SYSTEM – ANNUNCIATORS

Indication	Master Caution/ Warning	Description
	CAUTION	Emergency Pressurization is on either by manual selection or automatic activation by ACM overheat. ACM shuts down.

MASTER WARNING SYSTEM

MASTER WARNING SYSTEM

Two MASTER WARNING light switches (Pilot and Copilot panel)

Illuminates for Red Warning lights or if both generator’s fail.

Two MASTER CAUTION light switches (Pilot and Copilot panel)

Illuminates for Amber Warning lights.

Crew alerts for autopilot, avionics, and engine fire suppression are displayed elsewhere and covered in respective chapters.

SAFEPILOT PUBLISHING

MASTER WARNING SYSTEM

ANNUNCIATOR WARNING LIGHTS:

- RED Light
- Failure requiring immediate action.
- Red warning lights cause MASTER WARNING RESET light to flash.
- Failure of both generators causes MASTER WARNING.
- LH/RH ENGINE FIRE lights do not trigger the MASTER WARNING.
- The red warning annunciator lights will flash until the MASTER WARNING light is reset.
- If problem is corrected prior to the MASTER WARNING light being pushed, the red warning light will extinguish. But the MASTER WARNING will remain steady red until it is reset.

SAFEPILOT PUBLISHING

MASTER WARNING SYSTEM – GENERAL

Annunciator lights are

CAUTION:

- Amber. (Except failure of both generators)
- Needs immediate attention, but necessarily immediate action.
- Causes MASTER CAUTION Reset light to come on steady
- When MASTER CAUTION is reset, amber lights go steady until condition solved

MASTER WARNING SYSTEM – GENERAL

Annunciator lights are

CAUTION:

If problems solved, MASTER CAUTION goes out automatically.
Wing and Engine anti-ice amber lights do not cause an immediate MASTER Caution light when under temperature or under speed, to give pilot time to correct. The anti-ice lights come on amber steady at 1-minute point. At 2-minute point, amber lights come on flashing and MASTER CAUTION is steady.

MASTER WARNING SYSTEM – GENERAL

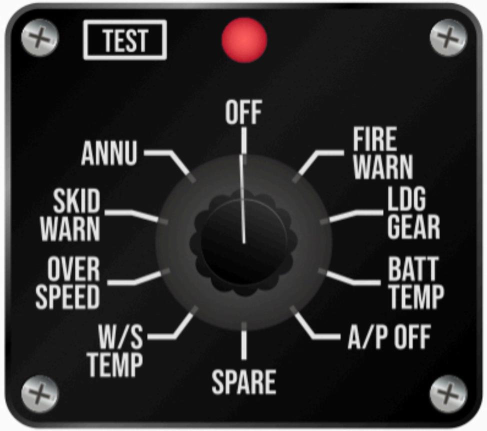
Annunciator lights are

ADVISORY:

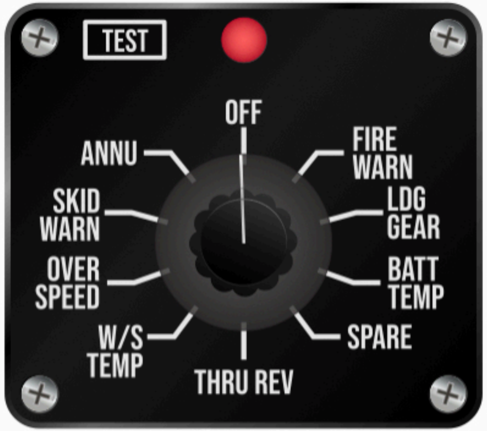
- White
- Do not trigger MASTER WARNING or MASTER CAUTION.
- May require checklist action.

ROTARY TEST SYSTEM

500-0001 thru -0040
TYPICAL



500-0041 thru -0274
TYPICAL



500-0275 thru -0349
TYPICAL

MASTER WARNING SYSTEM – ROTARY TEST

OFF: Red light above rotary TEST is off.

FIRE WARN: BOTH engine fire lights illuminate.

GEAR POS (UN 1-0040)/LDG GEAR (UN 0041+): 3 Green gear lights and 1 red UNLOCKED illuminate and gear horn sounds. Check that horn can be silenced pressing the horn silence button. Horn can only be silenced if flaps less than 15°.

BATT TEMP: BATT O'HEAT/BATT O'TEMP flashes. Battery temperature gauge shows 71°C (16°0F)

SAFEPILOT PUBLISHING

ROTARY TEST INDICATIONS

THRU REV (Optional): 6 Thrust reverser lights illuminate. MASTER WARNING illuminates.

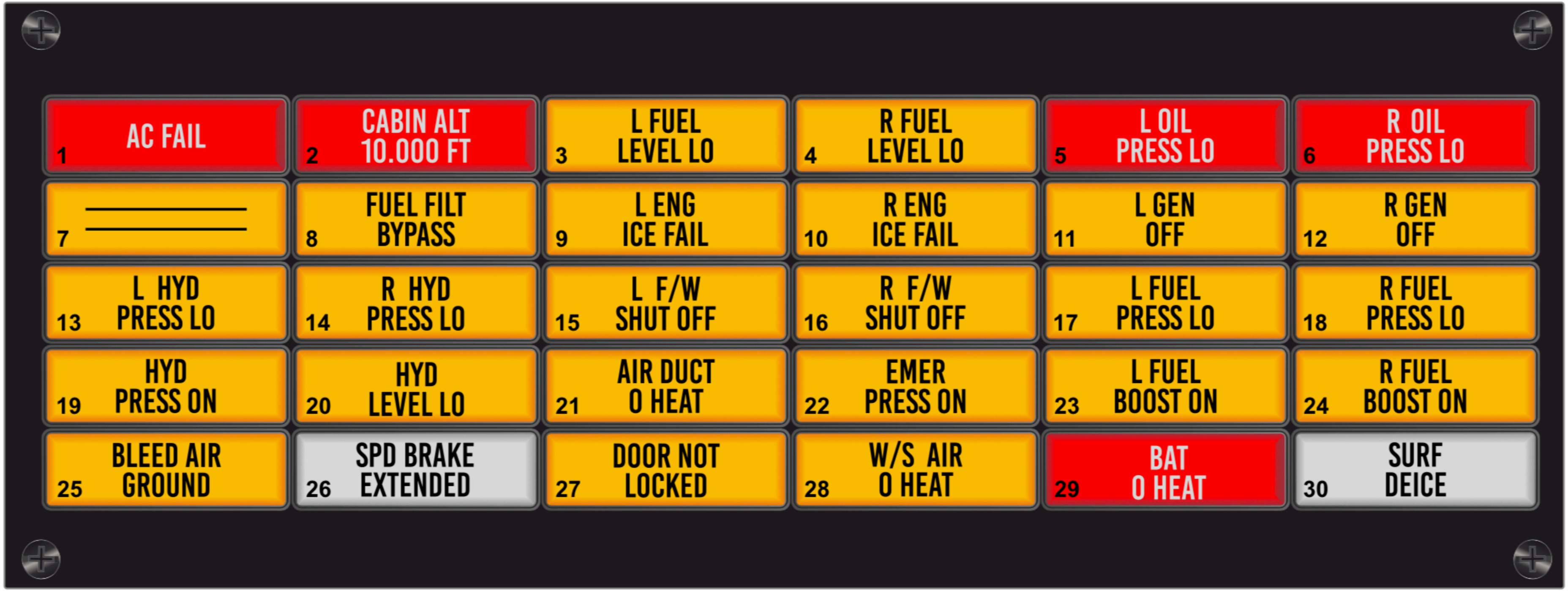
W/S TEMP: W/S AIR O'HEAT illuminates when LOW or HIGH selected on windshield bleed air switch.

OVERSPEED: Audible overspeed warning.

SKID WARN (Optional): Pilots rudder pedals vibrate and audible warning sound.

ANNU: All annunciators and MASTER WARNING illuminate. MASTER WARNING cannot be reset with rotary test in ANNU position.

MASTER WARNING SYSTEM – ANNUNCIATOR



ANNUNCIATOR INDICATIONS

INDICATIONS WARNING LIGHT (REFER TO NUMBERS ON APPROPRIATE ANNUNCIATOR PANEL)

1. Flight Director AC Power Failure -indicates high or low voltage or loss of power to flight director bus.

a. Inverter switch not on -normal during start.

b. Flight director bus voltage below 90 VAC or above 130 VAC.

c. Indicates inverter failure (number 1 or 2 depending on switch position).

2. Cabin altitude 10,000' -cabin exceeds an altitude of 10,000'.

3. & 4. Fuel Level Low -fuel quantity in respective tank reaches a level of 170-284 pounds. Retrofit on earlier aircraft places warning lights on co-pilot's side panel. Indications remain the same.

5. & 6. Oil Pressure Low -respective engine oil pressure below 35 p.s.i.. Normal indication prior to start.

ANNUNCIATOR INDICATIONS

7. Radar AC Power Failure - indicates loss of power to radar bus. (500-0074-0274) (500-275 and above: Blank)

a. Switch not on - normal during start.
b. Radar bus voltage below 90 VAC or above 130 VAC.
c. Indicates inverter failure (number 1 or 2 depending on XOVER switch position).

8. Fuel Filter Bypass - Either or both fuel filters approaching, or actually being bypassed due to fuel filter restriction.

9. & 10. Engine Ice Fail:

a. Engine inlet cowl anti-ice valve does not open or bleed air flow is insufficient to maintain a temperature above 1700F.
b. Engine stator anti-ice valve does not open.
c. Inboard wing leading edge temperature is below 600F.
d. Any one of the wing leading edge heating elements inoperative.
e. During five second delay after actuation or until inlet temperature reaches 1700F with over 60% turbine RPM.
f. Temperature controller has failed.

ANNUNCIATOR INDICATIONS

11. & 12. Generator Off
a. Placing respective generator switch to off -normal during external power starts.
b. Generator trip caused by: reverse current fire switch (engine shutdown) overvoltage .. feeder (differential) fault engine shutdown
13. & 14. Hydraulic Pressure Low - indicates below normal hydraulic pressure.
15. & 16. Firewall Shutoff - fuel and hydraulic firewall shutoff valves closed after fire switch actuation. Valves can be opened by resetting fire switch.

ANNUNCIATOR INDICATIONS

17. & 18. Fuel Pressure Low - low fuel supply pressure to engine-driven pump. Primary pump failure will automatically initiate boost pump operation as long as FUEL BOOST switch is in the NORM position. Light remaining on indicates failure of both pumps.

19. Hydraulic Pressure On - system is pressurized to 1,500 p.s.i. Normal during landing gear, speedbrake or thrust reverser operation.

20. Hydraulic Level Low - hydraulic reservoir fluid level below mInImum operating volume.

21. Air Duct Overheat - air temperature in cabin distribution duct above 135°C (275°F).

22. Emergency Pressurization On

a. Pressurization source selector in EMER position.

b. Air conditioning overheat with the pressurization source selector in GND, LH., BOTH or RH.

ANNUNCIATOR INDICATIONS

23. & 24. Fuel Boost On - normal indication during engine start, crossfeed or with FUEL BOOST switch ON. It should illuminate in conjunction with FUEL PRESS LO indicating light if FUEL BOOST switch is in NORM position.
25. Bleed Air Ground - pressurization source selector in GND position.
26. Speedbrake Extended - both sets of speedbrakes fully extended. HYO PRESS ON indicator should extinguish simultaneously.
27. Door Not Locked - cabin, nose baggage compartment, or aft compartment door not fully closed and locked.
28. Windshield Air Overheat - with the W /S BLEED switch ON, indicates bleed air to windshield too hot. With switch OFF indicates windshield bleed air shutoff has failed to the open position.
29. Battery Overheat - light will flash when BATT TEMP Is selected by rotary TEST switch or when battery temperature exceeds 71°C (160°F). A steady light indicates battery temperature is between 63° and 71°C (145° and 160°F).
30. Surface De-ice - illuminates twice during the 12 second surface de-ice boot cycle to indicate proper boot inflation pressure.

LIGHTING

LIGHTING – GENERAL

INTERIOR

Cockpit Floodlights
Pilot/co-pilot map light
Instrument panel lights
Instruments internally lit
Electroluminescent
Post lights Interior

EXTERIOR

Navigation
Anti-Collision (strobes)
Landing/Taxi
Wing Inspection
Flashing beacon
Recognition lights
Wing inspection light

LIGHTING – COCKPIT

The cockpit lighting is controlled by rheostats. Clockwise for dim; counterclockwise for bright.

CONTROLS:

- Switch Lights
- Oxygen gauge light
- Magnetic compass light
- Three standby instruments
- Landing gear position lights
- Audio panels and display bezels

LIGHTING – COCKPIT

Floodlight rheostats: Battery must be in BATT or EMER.

Map rheostats

Magnetic Compass light: LED. Controlled by Panel dimmer

During starting sequence, floodlights and panel control lights are fully lit by emergency battery pack in cockpit.

LIGHTING – CABIN

Entrance lighting: controlled by push button forward of the main cabin door and passenger safety switch in cockpit

Reading/Table/Cabin lights controlled from above each seat.

Indirect Fluorescent lighting. OFF/BRIGHT/DIM. Switch forward of the entrance door.

PAX Safety light turns on entry door flood light and flood light over emergency exit. 5-G switch also turns on these 2 lights (Maintenance must turn off lights when activated by 5-G.)

LIGHTING – CABIN

Lights controlled by PASS SAFETY switch on pilot's switch panel.

PASS SAFETY: Forward and Aft no smoking/fasten seatbelt sign and exterior/interior emergency exit signs illuminate.

SEAT BELT: only seat belt sign illuminates

OFF: lights off

LIGHTING – BAGGAGE COMPARTMENTS

Front compartment wired to hot bus; do not need BATT in ON position.

Tail cone and aft baggage wired to AFT/FWD COMP LT circuit.

Rocker switches illuminate when off.

Micro switch for automatic turn off when door closes.

LIGHTING – EXTERIOR LIGHTING

Controlled by ON/OFF switches on pilot switch panel.

Navigation (NAV): Normal Red, Green; White (on back of tail cone)

Recognition (RECOG): White halogen lights on each wingtip.

Landing/ Taxi (L-R LANDING LT): Below fuselage on landing gear.

Anti-Collision (ANTI-COLL): White strobes on wing tips.

Flashing Beacon (BEACON): If installed, red rotating beacon top of vertical stabilizer.

Wing Inspection (WING INSP): forward of left wing. Used to check for icing.

SAFEPILOT PUBLISHING

LIGHTING – EMERGENCY

Flood above main and emergency exits. 5-G switch also turns on these 2 lights (Maintenance must turn off lights when activated by 5-G.)

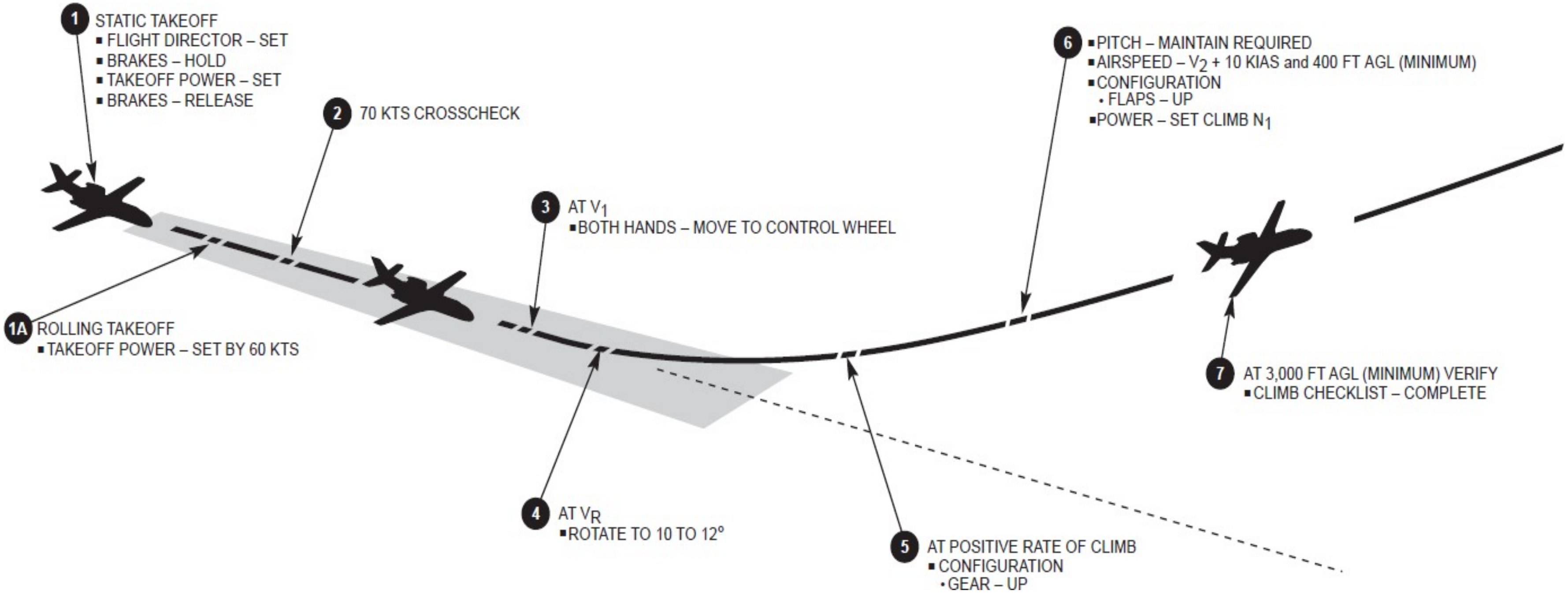
Alternate engine instrument flood light

The standby gyro horizon battery pack provides power for lighting:

- Standby gyro horizon
- Copilot attitude indicator
- Dual fan tach
- Copilot vertical speed indicator
- Copilot airspeed indicator
- Copilot altimeter

FLIGHT PROFILES

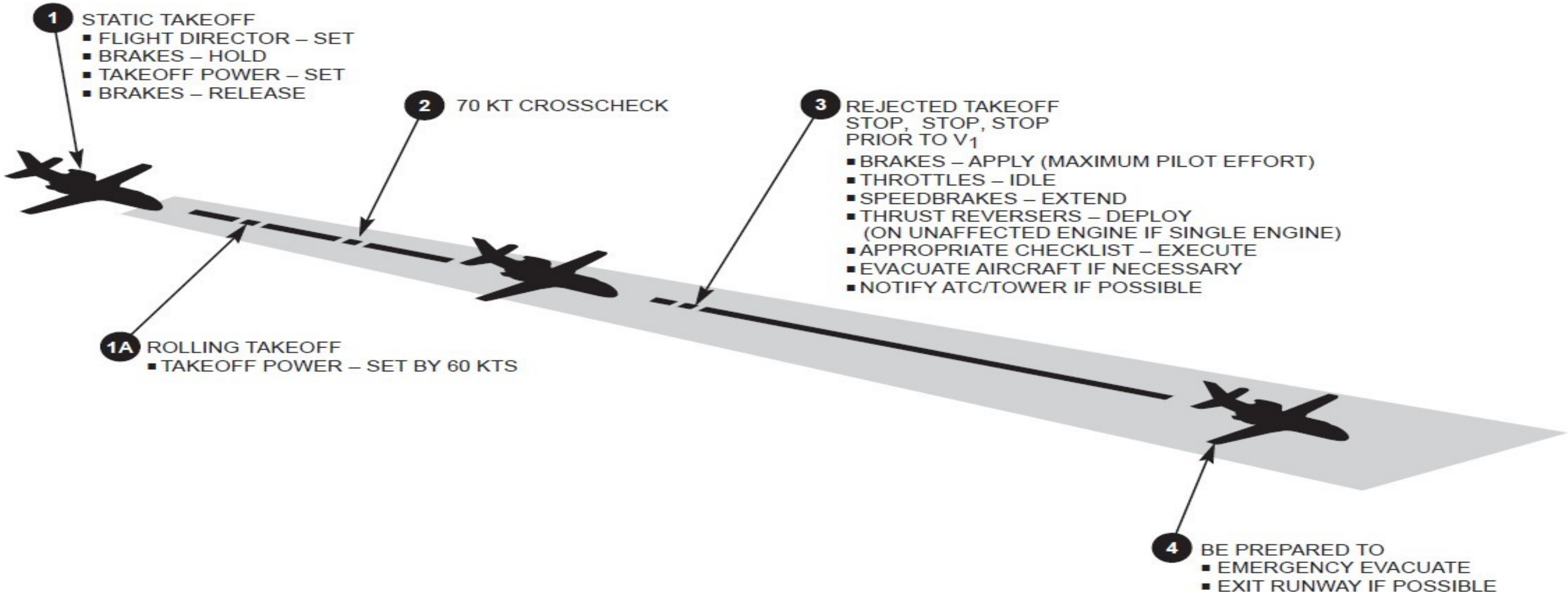
MANEUVERS



SAFEPILOT PUBLISHING

MANEUVERS

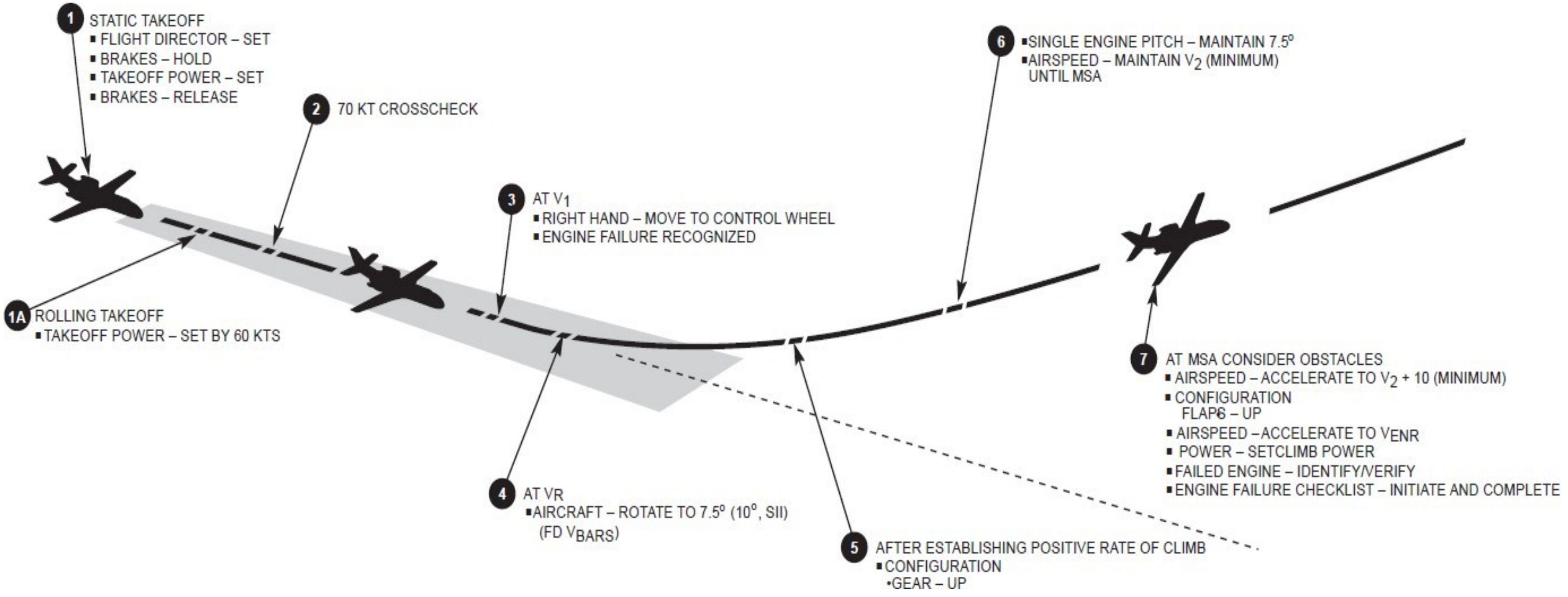
TAKEOFF – REJECTED TAKEOFF (SPEED BELOW V1)



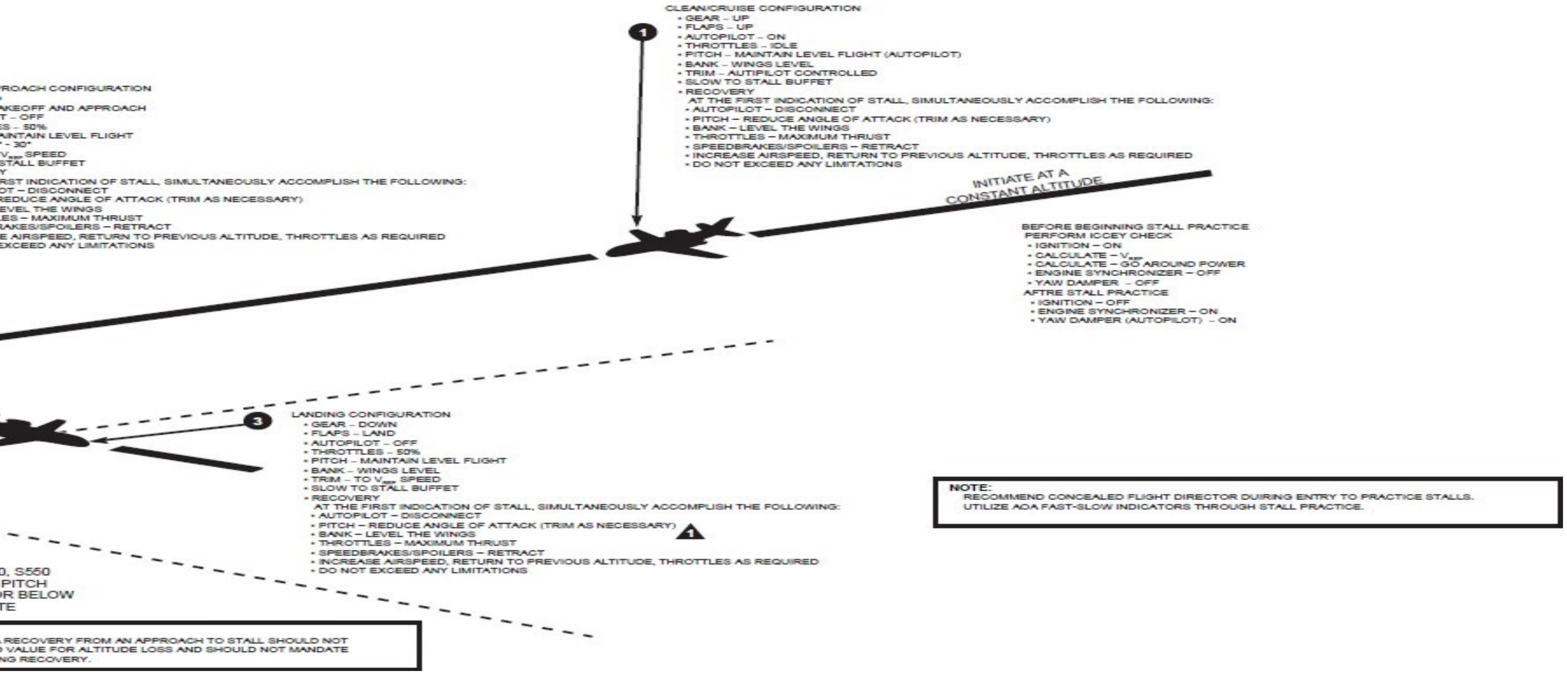
SafePilot Publishing

MANEUVERS

TAKEOFF - ENGINE FAILURE (AT OR ABOVE V1)



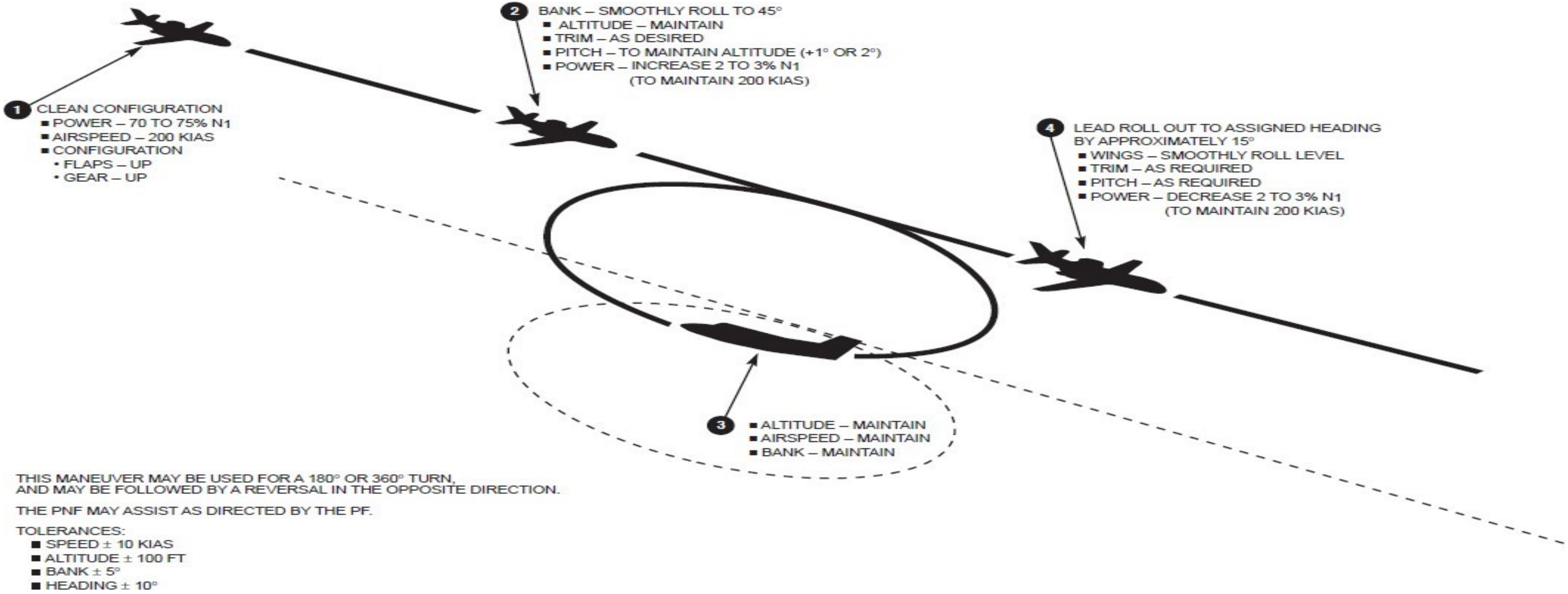
STALL



CLEAN/CRUISE CONFIGURATION
• GEAR – UP
• FLAPS – UP
• AUTOPILOT – ON
• THROTTLES – IDLE
• PITCH – MAINTAIN LEVEL FLIGHT (AUTOPILOT)
• BANK – WINGS LEVEL
• TRIM – AUTIPILOT CONTROLLED
• SLOW TO STALL BUFFET
• RECOVERY
AT THE FIRST INDICATION OF STALL, SIMULTANEOUSLY ACCOMPLISH THE FOLLOWING:
• AUTOPILOT – DISCONNECT
• PITCH – REDUCE ANGLE OF ATTACK (TRIM AS NECESSARY)
• BANK – LEVEL THE WINGS
• THROTTLES – MAXIMUM THRUST
• SPEEDBRAKES/SPOILERS – RETRACT
• INCREASE AIRSPEED, RETURN TO PREVIOUS ALTITUDE, THROTTLES AS REQUIRED
• DO NOT EXCEED ANY LIMITATIONS
1
PROACH CONFIGURATION
AKEOFF AND APPROACH
T – OFF
SS – 50%
AINTAIN LEVEL FLIGHT
° - 30°
V_{REF} SPEED
STALL BUFFET
Y
RST INDICATION OF STALL, SIMULTANEOUSLY ACCOMPLISH THE FOLLOWING:
OT – DISCONNECT
REDUCE ANGLE OF ATTACK (TRIM AS NECESSARY)
EVEL THE WINGS
LES – MAXIMUM THRUST
RAKES/SPOILERS – RETRACT
E AIRSPEED, RETURN TO PREVIOUS ALTITUDE, THROTTLES AS REQUIRED
EXCEED ANY LIMITATIONS
INITIATE AT A CONSTANT ALTITUDE
BEFORE BEGINNING STALL PRACTICE
PERFORM ICCEY CHECK
• IGNITION – ON
• CALCULATE – V_{REF}
• CALCULATE – GO AROUND POWER
• ENGINE SYNCHRONIZER – OFF
• YAW DAMPER – OFF
AFTRE STALL PRACTICE
• IGNITION – OFF
• ENGINE SYNCHRONIZER – ON
• YAW DAMPER (AUTOPILOT) – ON
3
LANDING CONFIGURATION
• GEAR – DOWN
• FLAPS – LAND
• AUTOPILOT – OFF
• THROTTLES – 50%
• PITCH – MAINTAIN LEVEL FLIGHT
• BANK – WINGS LEVEL
• TRIM – TO V_{REF} SPEED
• SLOW TO STALL BUFFET
• RECOVERY
AT THE FIRST INDICATION OF STALL, SIMULTANEOUSLY ACCOMPLISH THE FOLLOWING:
• AUTOPILOT – DISCONNECT
• PITCH – REDUCE ANGLE OF ATTACK (TRIM AS NECESSARY)
1
• BANK – LEVEL THE WINGS
• THROTTLES – MAXIMUM THRUST
• SPEEDBRAKES/SPOILERS – RETRACT
• INCREASE AIRSPEED, RETURN TO PREVIOUS ALTITUDE, THROTTLES AS REQUIRED
• DO NOT EXCEED ANY LIMITATIONS
0, S550
PITCH
OR BELOW
TE
RECOVERY FROM AN APPROACH TO STALL SHOULD NOT
VALUE FOR ALTITUDE LOSS AND SHOULD NOT MANDATE
NG RECOVERY.
NOTE:
RECOMMEND CONCEALED FLIGHT DIRECTOR DUIRING ENTRY TO PRACTICE STALLS.
UTILIZE AOA FAST-SLOW INDICATORS THROUGH STALL PRACTICE.

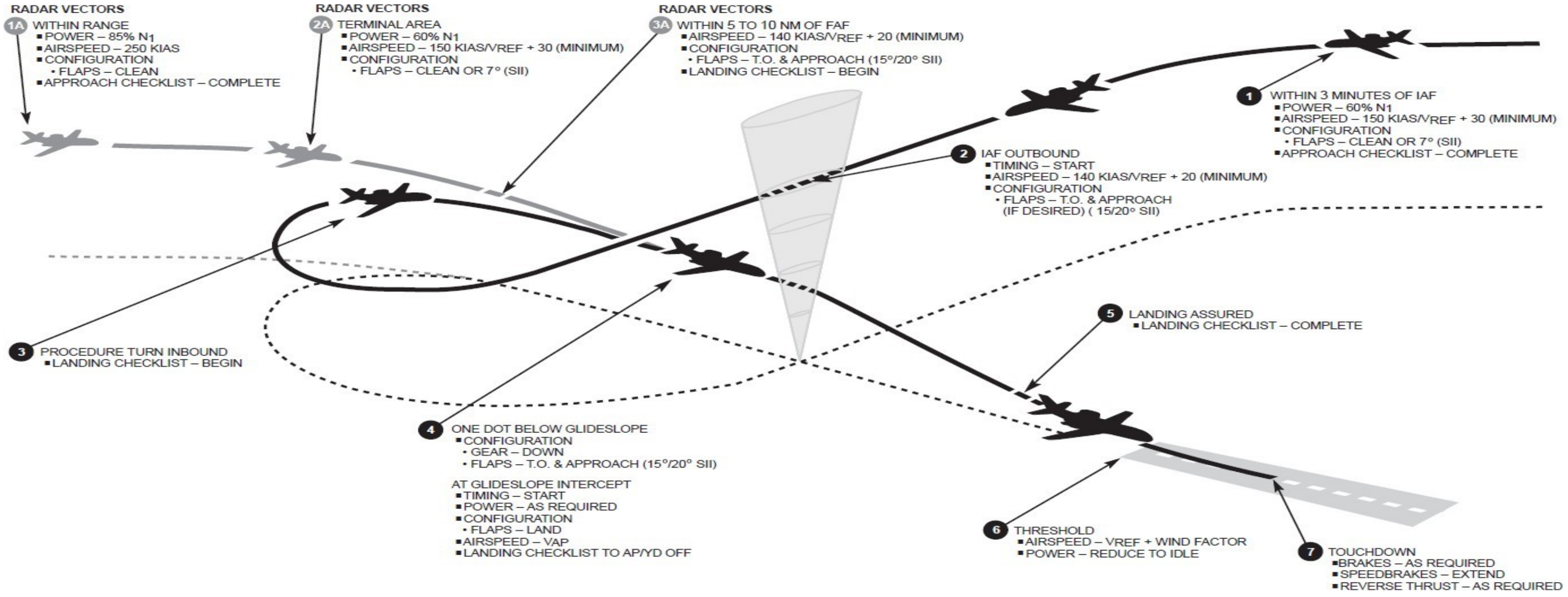
MANEUVERS

STEEP TURNS



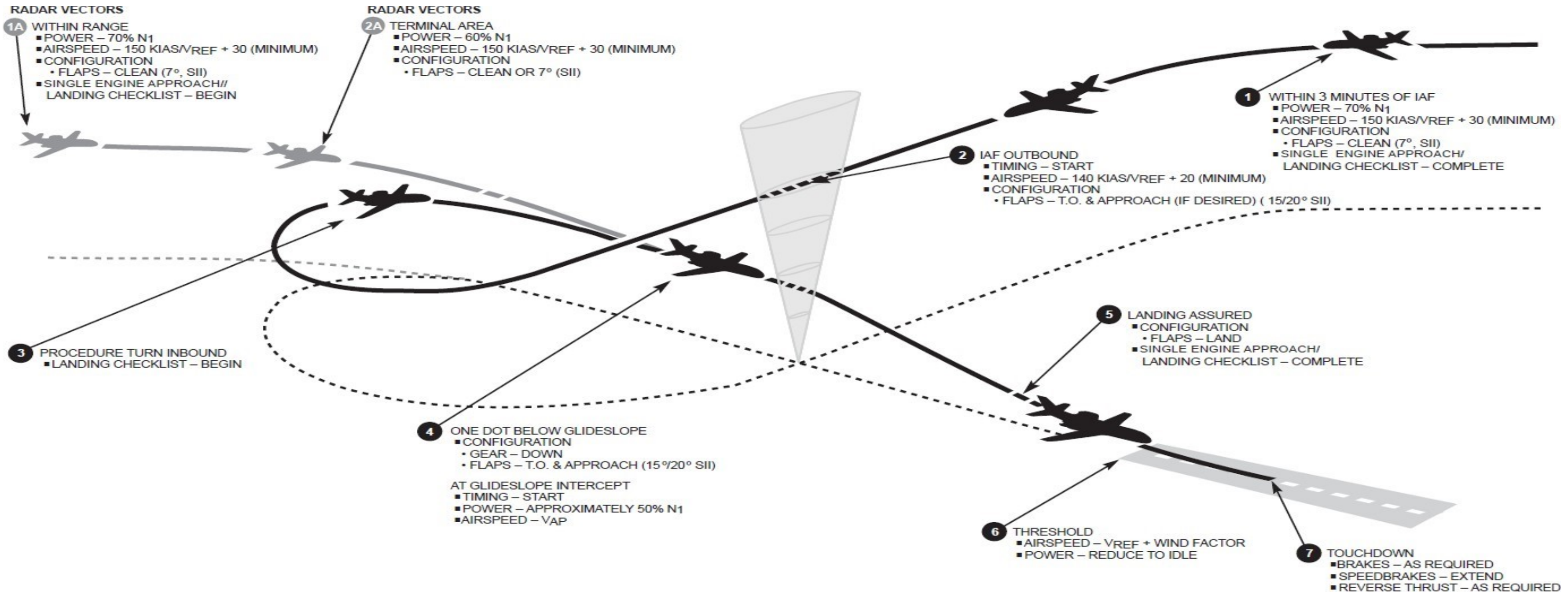
MANEUVERS

PRECISION APPROACH



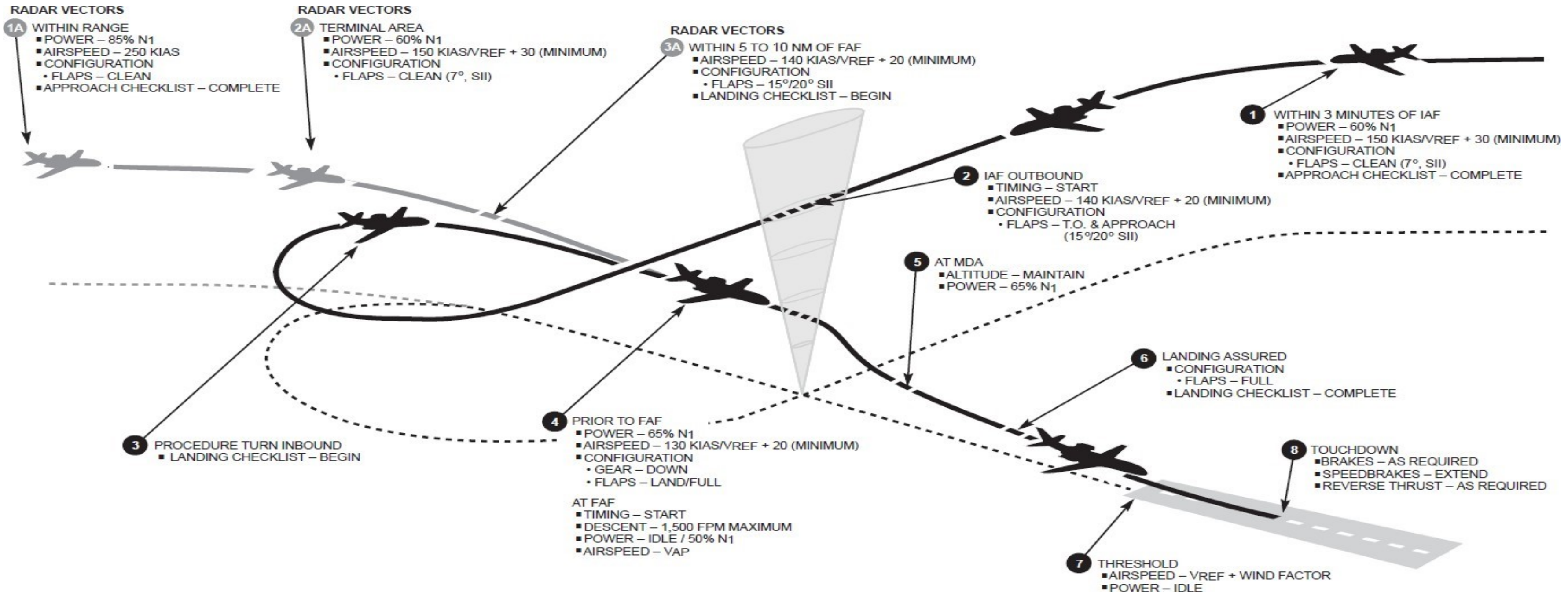
MANEUVERS

Single Engine Precision Approach and Landing



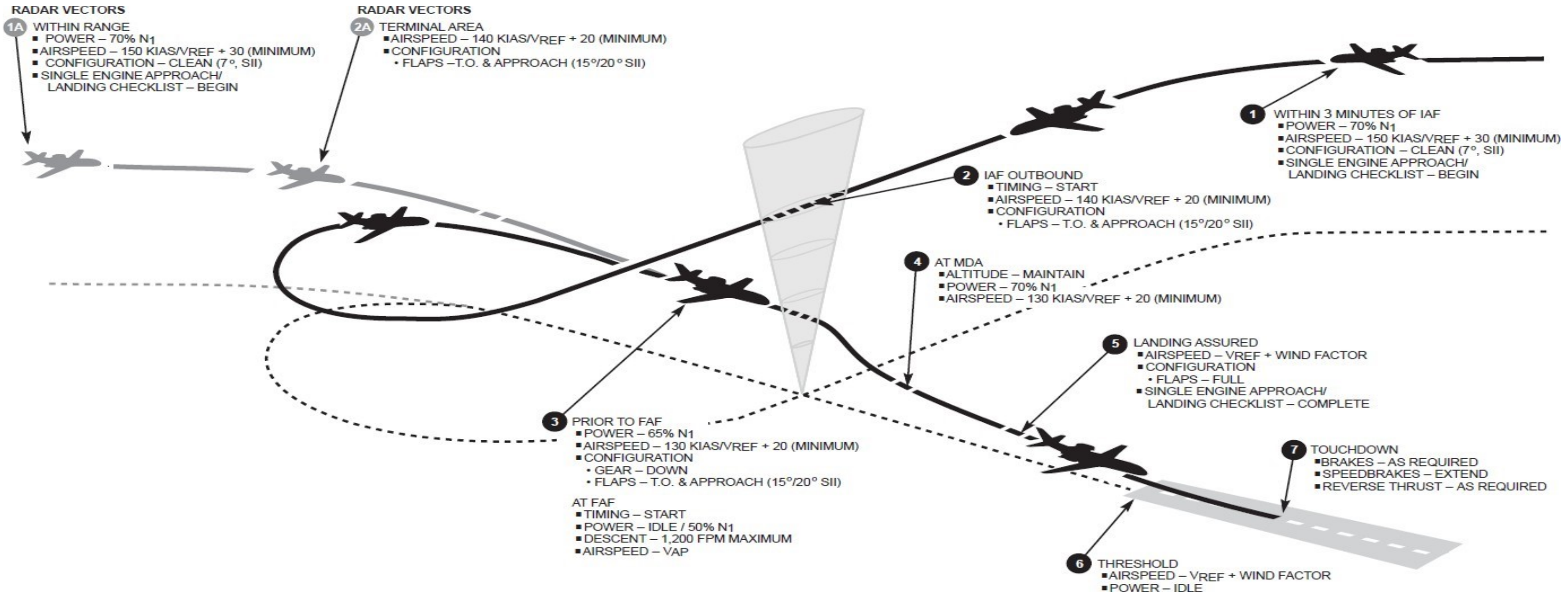
MANEUVERS

NON- PRECISION APPROACH AND LANDING - NORMAL



MANEUVERS

Non-Precision Approach on One Engine



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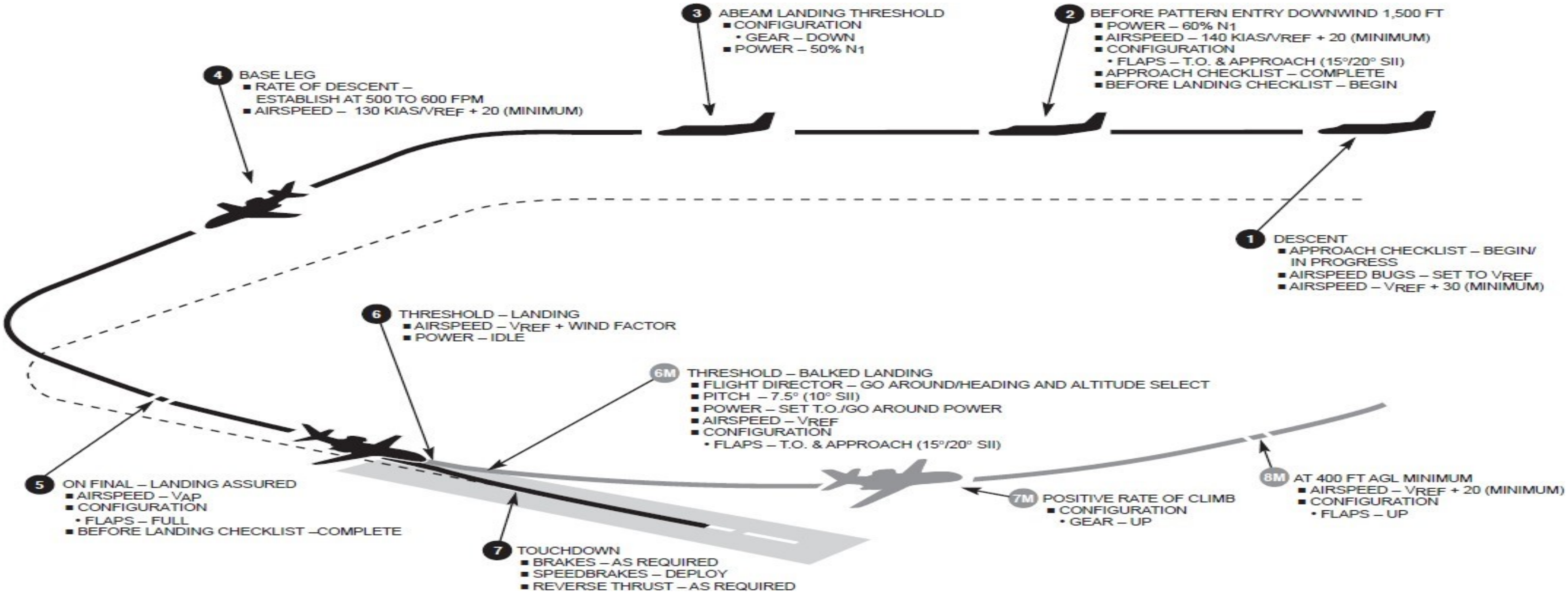
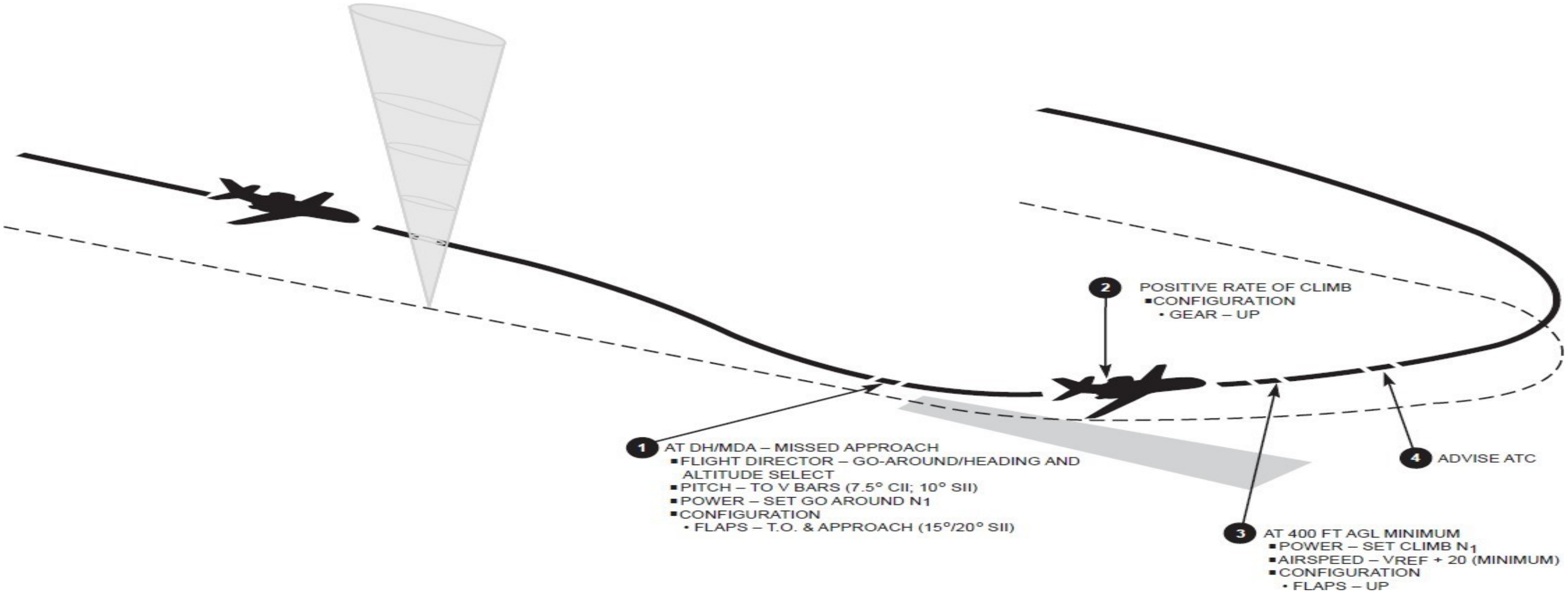
MANEUVERS

VISUAL APPROACH AND LANDING/BALKED LANDING



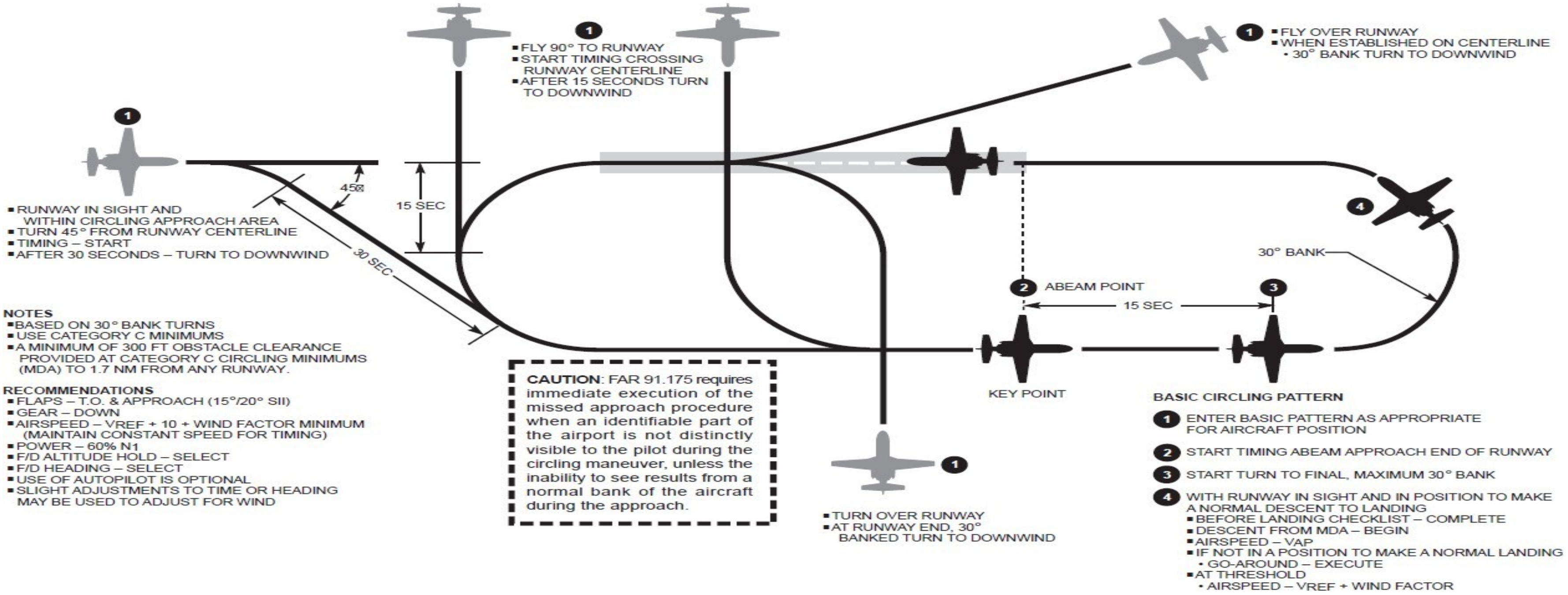
MANEUVERS

MISSED APPROACH - TWO ENGINE



MANEUVERS

CIRCLING APPROACH AND LANDING



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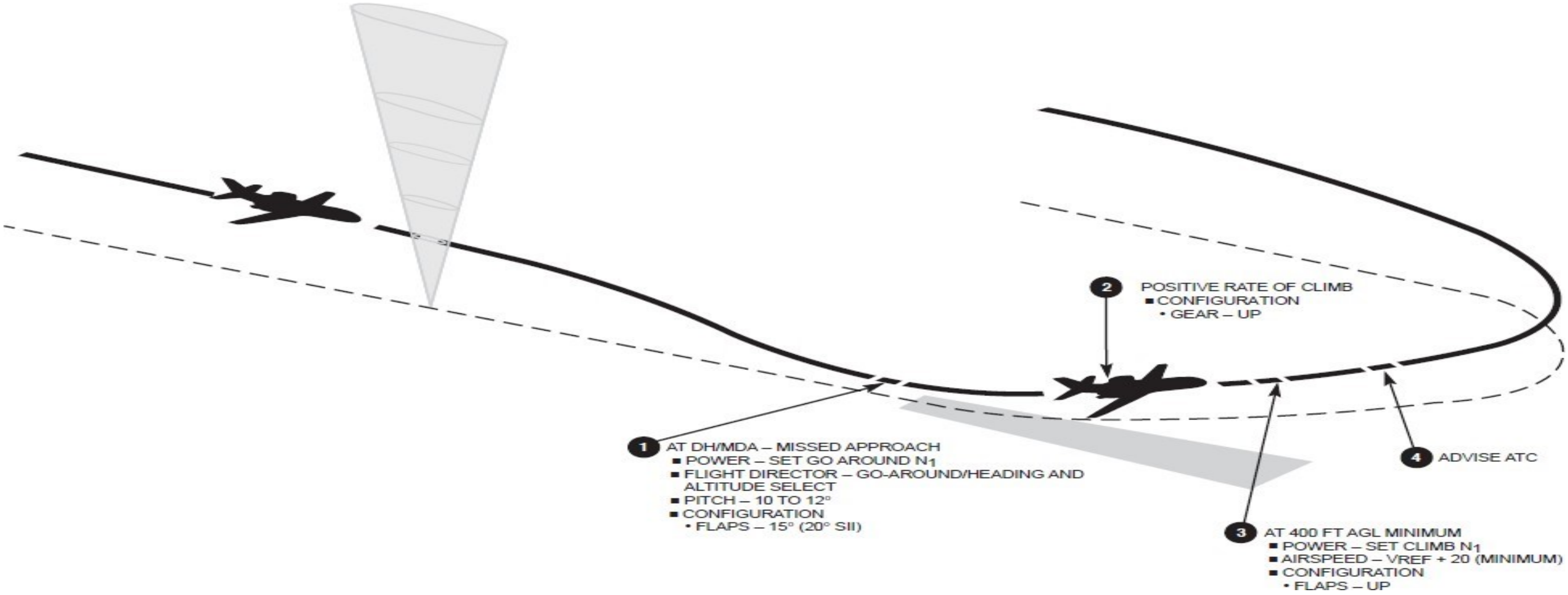
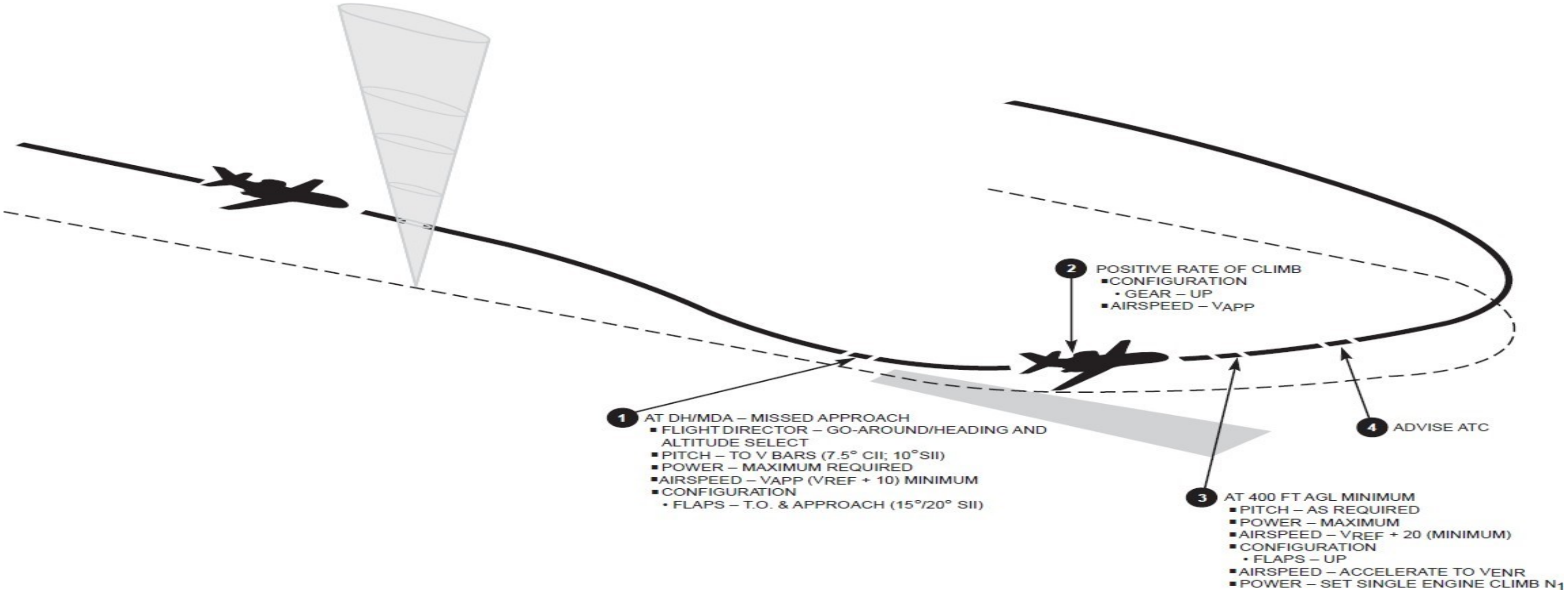
MANEUVERS

MISSED APPROACH - TWO ENGINE



MANEUVERS

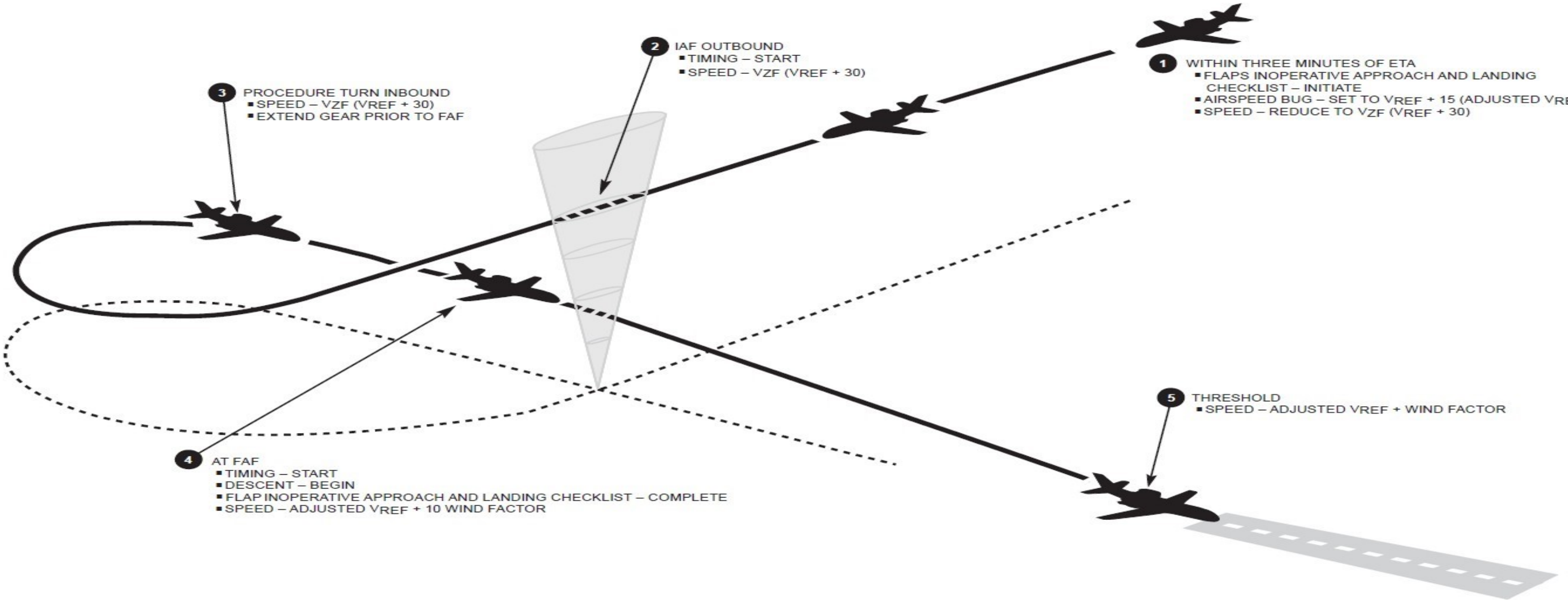
MISSED APPROACH - SINGLE ENGINE (PRECISION NON- PRECISION)



SAFEPILOT PUBLISHING

MANEUVERS

FLAPS INOPERATIVE APPROACH AND LANDING



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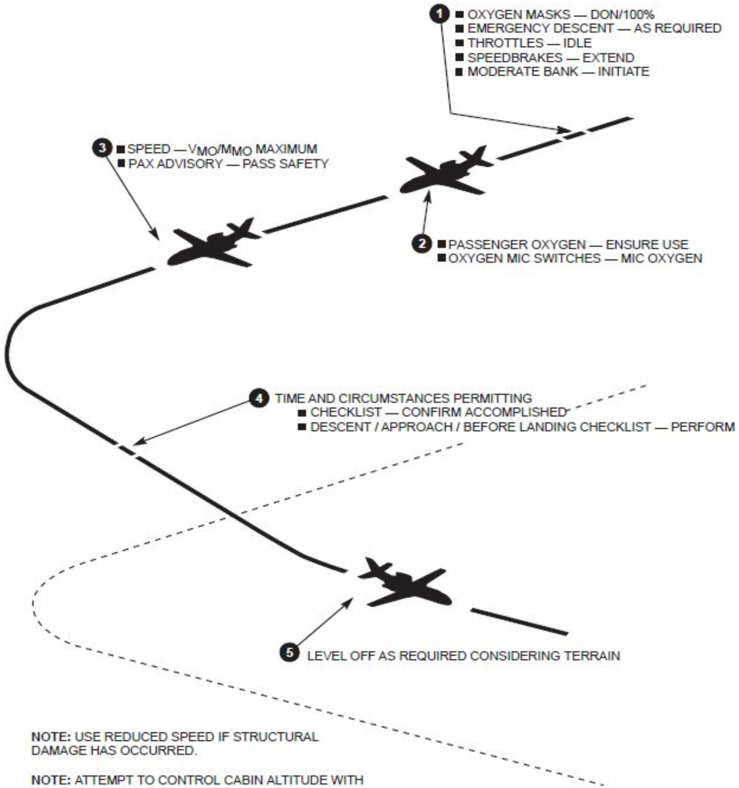
MANEUVERS

EMERGENCY DESCENT



NOTE: USE REDUCED SPEED IF STRUCTURAL DAMAGE HAS OCCURRED.

NOTE: ATTEMPT TO CONTROL CABIN ALTITUDE WITH PRESSURIZATION CONTROLS. IF UNSUCCESSFUL, MOVE SOURCE SELECT TO **EMER**.

MEMORY ITEMS

MEMORY ITEMS

ENGINE FAILURE, OR FIRE, OR MASTER WARNING, OR ANY OTHER NON-NORMAL EVENT DURING TAKEOFF

Engine Failure or Fire During Takeoff (without Thrust Reversers)

SPEED BELOW V_1 - TAKEOFF SHOULD NORMALLY BE ABORTED

1. Brakes - AS REQUIRED.
2. Throttles - IDLE.
3. Speedbrakes - EXTEND.

MEMORY ITEMS

ENGINE FAILURE, OR FIRE, OR MASTER WARNING, OR ANY OTHER NON-NORMAL EVENT DURING TAKEOFF

SPEED ABOVE V_1 - TAKEOFF SHOULD NORMALLY BE CONTINUED

1. After establishing a positive rate of climb, retract landing gear. Climb at V_2.
2. At 400 feet, retract the flaps at V_2+10 and accelerate to 140 KIAS.

SAFEPILOT PUBLISHING

MEMORY ITEMS

ENGINE FAILURE, OR FIRE, OR MASTER WARNING, OR ANY OTHER NON-NORMAL EVENT DURING TAKEOFF

Engine Failure or Fire During Takeoff (with Thrust Reversers)

SPEED BELOW V_1 - TAKEOFF SHOULD NORMALLY BE ABORTED

1. Brakes - AS REQUIRED.
2. Throttles - IDLE.
3. Speedbrakes - EXTEND.
4. Thrust Reverser - DEPLOY ON UNAFFECTED ENGINE.

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MEMORY ITEMS

Engine Failure During Coupled Approach

1. Power (operating engine) - INCREASE as required.

   Only a small power increase will be required to maintain approach speed and correct rate of descent.

2. Rudder Trim - TRIM toward operating engine.

   The yaw change will be relatively small since the operating engine is at an approach power setting.

3. Airspeed $V_{REF} + 10$.

4. Flaps - T.O. & APPR.

   Accelerate to $V_{REF} + 10$ before raising flaps.

MEMORY ITEMS

Emergency Restart - Two Engines

1. Ignition - BOTH ON.
2. Boost Pumps - BOTH ON.

   Engine ignition and boost pump switches must be selected ON since automatic sequencing and selection of these functions does not occur when the start button is not utilized.
3. Throttles - IDLE.

   Throttles remain at idle for attempted immediate light-off.
4. If Altitude Allows - INCREASE AIRSPEED TO 200 KIAS.

   Possibilities of immediate start are increased if airspeed is over 200 KIAS.

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MEMORY ITEMS

Engine Fire (Engine Fire Switch Illuminated)

1. Throttle (Affected Engine) - IDLE.

IF LIGHT REMAINS ON

2. Engine Fire Switch - LIFT COVER and PUSH.

   Cuts off fuel to engine, hydraulic fluid supply to engine-driven pump, trips the generator field, positions a valve to allow both bottles to be fired into the affected engine, and illuminates the bottle armed lights.

3. Either Illuminated Bottle Armed Light - PUSH.

MEMORY ITEMS

AIRPLANES WITH THRUST REVERSERS

Inadvertent Deployment During Takeoff

SPEED BELOW V_1 - TAKEOFF SHOULD BE ABORTED

1. Brakes - AS REQUIRED.
2. Throttles - IDLE.
3. Speed Brakes - EXTEND.
4. Thrust Reversers - BOTH DEPLOY.

SPEED ABOVE V_1 - TAKEOFF SHOULD NORMALLY BE CONTINUED

1. Emergency Stow Switch - ACTUATE ON AFFECTED ENGINE.
2. After establishing a positive rate-of-climb, retract landing gear. Do not exceed 125 KIAS until thrust reverser stows.

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MEMORY ITEMS

Thrust Reverser UNLOCK Light On In Flight

1. Emergency Stow Switch - ACTUATE ON AFFECTED ENGINE.
2. Thrust Reverser Levers - CHECK THRUST REVERSER LEVERS AT STOWED (FULL FORWARD) POSITION.

Inadvertent Inflight Deployment

1. Reverser Indicator Lights - CHECK ILLUMINATION of ARM, UNLOCK AND DEPLOY LIGHTS.
2. Affected Throttle - CHECK IDLE.
3. Emergency Stow Switch - ACTUATE ON AFFECTED ENGINE.
4. Airspeed - REDUCE TO 125 KIAS (115 KIAS WITH FLAPS EXTENDED) OR BELOW. AFTER THRUST REVERSER STOWS, DO NOT EXCEED 200 KIAS.

MEMORY ITEMS

Electrical Fire or Smoke

1. Oxygen Masks and Oxygen MIC Switches - DON OXYGEN MASKS, SELECT - 100%, MIC SWITCHES AS REQUIRED.

   Ensure selector is on 100% oxygen when masks are used. On 500-0101 thru -0349, ensure oxygen MIC switch is in MIC OXY MASK position. On Aircraft prior to 500-0101, removing mask from the stowage hook activates the mask microphone.

MEMORY ITEMS

ELECTRICAL

Battery Overheat Light On (Temperature between 145 and 160°F)

1. Battery Switch - EMER.

   In EMER position the battery will be disconnected from the generators and will no longer be charged by them. The DC voltmeter will now indicate the voltage of whatever power source is selected by the Voltage Selector (i.e., LH GEN, BATT, RH GEN). All electrical equipment will continue to receive power since the generators are still on the line and the Emergency DC bus is powered by the battery.

MEMORY ITEMS

ELECTRICAL

Autopilot Hardover

1. Autopilot Trim Disengage Switch - PRESS.

   Press switch on either yoke. Flight director modes will remain selected.

MEMORY ITEMS

ENVIRONMENTAL

Rapid Decompression

1. Oxygen Masks - DON and 100%.
2. Initiate EMERGENCY DESCENT Procedures - AS REQUIRED.
3. CREW OXY PRIORITY On 500-0001 thru -0061, OXYGEN PRIORITY VALVE On 500-0062 thru -0349 - CHECK NORMAL.
4. Ensure passengers are receiving oxygen.

   Visually check mask drop when cabin reaches 13,500 ± 600 feet. If masks are not down drop them by PASS OXY MANUAL on the left console.
5. Oxygen MIC Switches - MIC OXY MASK (500-0101 thru -0349).

   Switch to MIC OXY MASK in order to use microphone in oxygen mask. On 500-0001 thru -0101, removing mask from the stowage hook activates the mask mircrophone.

MEMORY ITEMS

Emergency Descent

1. Throttles - IDLE.
2. Speedbrakes - EXTEND.
3. Initiate Moderate Bank.

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WALK AROUND

WALK AROUND

No	Item	Action
Preliminary		
1	Battery	Connected
2	Engine Covers (4)	Removed
3	Pitot Covers (2)	Removed
4	Ground Power Unit	Not Connected

WALK AROUND

No	Item	Action
Left Nose		
1	Refreshment Center Drain Heater	Clear and Warm
2	L Static Ports (2)	Clear and warm
3	Baggage Door	Secured and Locked
4	Baggage Compartment	350 lbs (max)

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WALK AROUND

No	Item	Action
Left Nose		
5	Nose Gear, Doors	Condition and Secure Tires (120 +/- 5 PSI)
6	Nose Wheel and Strut	Condition and Secure, 5 in with full fuel load
7	L and R Pitot Tubes (2)	Clear and hot

WALK AROUND

No	Item	Action
Right Nose and Fuselage Right Side		
1	Ice Detector Probe	Condition
2	Windshield Alcohol Sight Gauge	Fluid visible at top of gauge
3	Emergency Gear and Brake Pneumatic Pressure Gauge	Check per Placard
4	Emergency Gear and Brake Pneumatic Pressure Gauge	In green arcs and sight glass shows purple tint/ball at top of sight glass

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WALK AROUND

No	Item	Action
Right Nose and Fuselage Right Side		
5	Baggage Door	Secured and Locked
6	GNSX True Airspeed Temperature Probe (if installed 627+)	Condition
7	Oxygen Blowout Disc (some aircraft)	Green disc in place. If missing, there is no oxygen. (In left aft fuselage for airplanes with tail-mounted bottles).

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WALK AROUND

No	Item	Action
Right Nose and Fuselage Right Side		
8	Overboard Vent Lines	Clear
9	Static Ports and Surrounding Fuselage Skin (2)	Clean and No Damage
10	AOA Probe or Vane (if installed)	Check for warm and range of motion. Cone type probe, slots should be unobstructed.

WALK AROUND

No	Item	Action
Right Wing		
1	Emergency Exit	Secure and handle flush with skin
2	Dorsal Fin Air Inlet	Clear
3	Pylon Tail Cone Air Inlet	Clear
4	Engine Fan Duct and Fan	Check for Bent Blades, knicks, blockage of fan stators and T1 sensor.

WALK AROUND

No	Item	Action
Right Wing		
5	Forward T1 Sensor	Condition
6	Generator Cooling Air Inlet	Clear
7	Wing Inspection Light (if installed)	Condition
8	Heated Leading Edge	Condition. Check Stall strip

WALK AROUND

No	Item	Action
Right Wing		
9	Fuel Quick Drains (5)	Drain and Check for Contamination
10	Fuel Filter Drain	Drain and Check for Contamination
11	Main Gear Visual Lockdown Indicator	Green band is visible
12	Main Gear Uplock Release Cable	Check Cable Tension

WALK AROUND

No	Item	Action
Right Wing		
13	Main Gear Door, Tire	Condition and Secure Unit 0001 to 051 without SB32-1: 79 +3/-1 PSI Unit 0052 to 0070 without SB 32-1: 90 +3/-1 PSI Unit 0071+ prior to SB32-1: 100 +/-5 PSI
14	Brake Wear Indicators	Bar extends beyond brake puck cap

WALK AROUND

No	Item	Action
Right Wing		
15	Main Gear Strut and Extension	SECURE, No Leaks, 1-2 in with full fuel load
16	Hubcap	Secure
17	Landing Light	Condition and Secure
18	Deice Boot	Check for cuts and delamination

WALK AROUND

No	Item	Action
Right Wing		
19	Stall Strip	Secure
20	Leading Edge Anti-Ice	Condition
21	Fuel Filler Cap	Secure
22	Fuel Tank Vent	Clear

WALK AROUND

No	Item	Action
Right Wing		
23	Recognition, Navigation, and Anti-Collision Lights	Check lens for cracks/integrity
24	Static Wicks	4 Static Wicks - 2 Aileron, 2 Outboard Wing Trailing Edge, 1 on Wing Tip. If Aileron Wick is Missing, Replace Before Flight to Ensure Balance.

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WALK AROUND

No	Item	Action
Right Wing		
25	Aileron and Flaps	Condition and Secure, Ensure Flap Position Matches Indicator
26	Speed Brakes (Upper and Lower)	Condition and Secure

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WALK AROUND

No	Item	Action
Right Engine/Nacelle		
1	Oil Level	Check while engine is still hot. If in doubt, run engine for 2 minutes, shutdown, and recheck. Accurate readings possible for 10 minutes after shutdown.
2	Oil Filler Cap and O Ring	Checked and Secure

WALK AROUND

No	Item	Action
Right Engine/Nacelle		
3	Oil Filler Access Door	Secure
4	Engine Fluid Drain Mast	Clear
5	Precooler Exhaust (002 to 482 and 484)	Clear
6	Engine T2 Sensor and Drain Lines	Clear

WALK AROUND

No	Item	Action
Right Engine/Nacelle		
7	Turbine Blades	Condition
8	Engine Exhaust and Bypass Ducts	Fuel leakage, Condition and Clear
9	Thrust Reverser (if installed)	Cracks, Damage, Security. Lock out tool not inserted.
10	ACM Overboard Exhaust	Clear

WALK AROUND

No	Item	Action
Right Engine/Nacelle		
11	Deice Boot Overboard Exhaust (CII)	Clear
12	Hydraulic Fluid Drain Mast	Clear and access door secure

WALK AROUND

No	Item	Action
Empennage/Aft Fuselage		
1	Deice Boot Overboard Vent	Clear
2	ACM Overboard Exhaust Tube	Checked and Clear
3	Hydraulic Fluid Drain Mast	Clear/No Fluid

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WALK AROUND

No	Item	Action
Empennage/Aft Fuselage		
4	Hydraulic Service Door	Clear
5	ACM Ejector Vent	Checked and Clear
6	Horizontal and Vertical Stabilizer De-ice Boots	Cuts and delamination. Ensure trim tabs match cockpit indication.
7	Horizontal Stabilizer Leading Edge Anti-Ice (SII)	Condition

WALK AROUND

No	Item	Action
Empennage/Aft Fuselage		
8	Static Wicks (Rudder, Vertical Stabilizer, Elevators)	Check for 8, replace before flight
9	Rotating Beacon (if installed)	Condition and Security
10	Tail Skid	Condition and Security

WALK AROUND

No	Item	Action
Empennage/Aft Fuselage		
10	Navigation and Strobe lights	Cracks and Security
11	Rudder	Freedom of movement, hinges for security, trim tab is opposite of rudder, 2 static wicks on rudder, replace if missing. SII, Check rudder/aileron interconnect. Ailerons move up on the side rudder deflects to and down on other side.

WALK AROUND

No	Item	Action
Empennage/Aft Fuselage		
12	Freon Air Conditioning Overboard Exhaust (if installed)	Clear
13	Oxygen Blowout Disc (some aircraft)	Green disc in place. If missing, there is no oxygen. (In left aft fuselage for airplanes with tail-mounted bottles).

WALK AROUND

No	Item	Action
Tail Cone		
1	Hydraulic Fluid Quantity Reservoir (located above fire bottle)	Check above REFILL mark.
2	Fire Bottle Pressure Gages	Check per Placard
3	J Box Circuit Breakers	In

WALK AROUND

No	Item	Action
Tail Cone		
4	Air Cycle Machine Oil	Oil level above fill line in plastic sump.
5	Throttle Load Limiting Brackets	If thrust reversers installed, check that brackets are deactivated by steel safety wire.
6	Baggage Compartment	Baggage secure and access door secure. Light switch off.

WALK AROUND

No	Item	Action
Tail Cone		
7	Access Door	Secure and Lock
8	External Power Receptacle	Secure
9	Battery Cooling Intake/Vent Lines	Clear
10	Windshield Heat Exchanges Overboard Exhaust	Clear of obstructions

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WALK AROUND

No	Item	Action
Left Engine/Nacelle		
1	Thrust Reverser (if installed)	Cracks, Damage, Security. Lock out tool not inserted.
2	Turbine Blades	Condition
3	Engine Exhaust and Bypass Ducts	Fuel leakage, Condition and Clear
4	Engine Fluid Drain Mast	Clear

WALK AROUND

No	Item	Action
Left Engine/Nacelle		
5	Engine T2 Sensor and Drain Lines	Clear
6	Generator Cooling Air Exhaust	Clear
7	Precooler Overboard Exhaust (002 to 484)	Clear

WALK AROUND

No	Item	Action
Left Engine/Nacelle		
8	Oil Level	Check while engine is still hot. If in doubt, run engine for 2 minutes, shutdown, and recheck. Accurate readings possible for 10 minutes after shutdown.
9	Oil Filler Cap and O Ring	Checked and Secure
10	Oil Filler Access Door	Secure

WALK AROUND

No	Item	Action
Left Wing		
1	Speed Brakes (Upper and Lower)	Condition and Secure
2	Aileron and Flaps	Condition and Secure, Ensure Flap Position Matches Indicator.
3	Static Wicks	4 Static Wicks - 2 Aileron, 2 Outboard Wing Trailing Edge, 1 on Wing Tip. If Aileron Wick is Missing, Replace Before Flight to Ensure Balance.

WALK AROUND

No	Item	Action
Left Wing		
4	Recognition, Navigation, and Anti-Collision Lights	Check lens for cracks/integrity
5	Fuel Tank Vent	Clear
6	Fuel Filler Cap	Secure
7	Leading Edge Anti-Ice	Condition

WALK AROUND

No	Item	Action
Left Wing		
8	Deice Boot	Check for cuts and delamination
9	Stall Strip	Secure
10	Main Gear Visual Lockdown Indicator	Green band is visible
11	Landing Light	Security

WALK AROUND

No	Item	Action
Left Wing		
12	Brake Wear Indicators	Bar extends beyond brake puck cap
13	Main Gear Door, Tire	Condition and Secure Unit 0001 to 051 without SB32-1: 79 +3/-1 PSI Unit 0052 to 0070 without SB 32-1: 90 +3/-1 PSI Unit 0071+ prior to SB32-1: 100 +/-5 PSI

WALK AROUND

No	Item	Action
Left Wing		
14	Main Gear Uplock Release Cable	Check Cable Tension
15	Main Gear Strut and Extension	SECURE, No Leaks, 1-2 in with full fuel load
	Hubcap	Secure
	Fuel Filter Drain	Drain and Check for Contamination

WALK AROUND

No	Item	Action
Left Wing		
16	Fuel Quick Drains (5)	Drain and Check for Contamination
17	Heated Leading Edge	Condition. Check Stall strip
18	Wing Inspection Light (if installed)	Condition
19	Generator Cooling Air Inlet	Clear

WALK AROUND

No	Item	Action
Left Wing		
20	Engine Fan Duct and Fan	Check for Bent Blades, knicks, blockage of fan stators and T1 sensor.
21	Pylon Tail Cone Air Inlet	Clear
22	Dorsal Fin Air Inlet	Clear
23	Cabin Door Seal	Rips, Tears, Folding

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PUSH
TO
TEST