FlightSafety International

FALCON 900 PILOT TRAINING MANUAL

VOLUME 1
OPERATIONAL INFORMATION
SECOND EDITION

REVISION 1

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NORMAL PROCEDURES

NOTE

This Normal checklist is designed only for training purposes. Where checklist procedures differ from the *Airplane Flight Manual*, the *Airplane Flight Manual* takes preference.

NOTE

Items marked with an asterisk are to be accomplished on the first flight of the day with the same crew.

BEFORE START (POWER OFF)

1. *Preflight Checklist .... COMPLETE

   The aircraft exterior and interior preflight checks must be completed and the chocks removed before closing the door and starting the engines.

2. *Documents and Keys .... ON BOARD

   The aircraft flight, performance, weight and balance, and operating manuals must be on board before dispatch. The Certificates of Registration and Airworthiness must also be readily available at all times prior to flight. Any other documents as required by company policy must be on board at this time. Any keys and/or security items required for the flight should be on board as well.

COCKPIT CHECK

1. Park Brake .... INTERMEDIATE DETENT

OVERHEAD PANELS

1. Circuit Breakers .... IN

   Check that all circuit breakers are in before powering the aircraft. Circuit breakers are not to be used as switches, so as to preclude premature wear of these protective devices.

2. LH AV Master and RH AV Master .... OFF (IN)

3. FMS Master (LH and RH) .... OFF (IN)

   In order to save battery power when turning on the batteries later on in the checklist, these master switches should be placed off, ensuring that the switches are "in" or flush with the surrounding panel.

4. Bus-Tied Switch .... FLIGHT NORMAL

   By separating the buses, this allows an individual battery check when turning on the batteries later in the checklist. Separation of the buses allows for detection of low battery voltage and proper discharge rates.

5. APU Generator Switch .... DEPRESSED

   This action satisfies APU start interlock circuitry requirement and excites and APU generator field circuit.

6. BAT 1–BAT 2 Switches .... OFF

   This prevents the needless discharge of the batteries while the Power Off checklist is complete.

7. GEN 1–GEN 2–GEN 3 Switches .... ON

   The generator switches must be placed in the on position in order to provide engine start interlock circuitry.

8. *IRS1–IRS 2–IRS 3 Battery Voltages .... CHECKED

   These test buttons are depressed individually to test the voltage of the respective auxiliary batteries on the overhead panel left voltmeter. Minimum voltage is 24 volts.

9. *E BAT Battery Voltage .... CHECKED

   This test button is depressed to test the voltage of this optional battery. Minimum voltage is 24 volts.

10. APU Master Switch .... OFF (OUT)

    This limits battery discharge when they are placed on later in the checklist.

11. DC Power Selector .... NORMAL

    This two-position selector allows selection of an electrical power source for use in starting the engines. In this case, power would be supplied by the two aircraft batteries, connected in parallel, when the battery switches are on and the start is initiated.

12. CMPTR 1–2–3 Switches .... AUTO

    The engine computers must be in the auto position for proper starting of the engines. Ensure that the CMPTR lights on the master warning panel are out when electrical power is applied to the aircraft.

13. Start Selector Switches (All 3) .... GRD START

    These three-position switches must be placed in the GROUND START position in order to provide ignition and part of the proper electrical interlock for starting the engines.

14. XTK Switch.. NEUTRAL

    Ensure that the switch used to connect Group 1 fuel tanks with Group 3 fuel tanks is in the neutral position.

15. Booster (Pump) Switches (All 3)... OFF

    This limits battery discharge when they are placed on later in the checklist.

16. X-BP Rotary Switches (All 3) .... CLOSED

    These three rotary switches are closed to provide a direct tank-to-engine configuration for starting the engines and takeoff.

17. XTK 2 Switch (If Installed)... AUTO

    This switch, if installed, is placed to the AUTO position, allowing automatic operation of the valve between the forward and aft Group 2 fuel tanks.

18. HP and PRV Bleed Switches (3) .... AUTO

    These switches are placed in the AUTO position to ensure proper operation of the pneumatic systems for air conditioning, pressurization, and anti-icing requirements.

19. APU Bleed-Air Switch .... OFF

    It is required that the APU bleed-air switch be in the OFF position before APU start. This ensures proper loading of the APU after its start. Generator load, associated with the charging of the batteries, must be considered before selecting APU bleed on. It is recommended that a one-minute waiting period be observed before selecting bleed air on after APU is started and on speed.

20. Isolation Valve Knob .... HORIZONTAL

This switch is in the horizontal (open) position in order that the entire bleed-air manifold can be supplied by all three engines and the APU.

21. Crew and Passenger Air-Conditioning Valve Switches (2) .... AUTO

Placing these three-position switches to the AUTO position allows a logic circuit to automatically close the valves when takeoff power is applied, then open the valves slowly after takeoff.

22. BAG Switch... NORM

This three-position switch allows normal pressurization and ventilation of the baggage compartment.

23. Windshield Switches (3)... OFF

This position ensures that the demand on the batteries is at a minimum when they are turned on.

24. Anti-ice Switches (4)... OFF

This precludes unwanted anti-ice system operation after APU or engine start.

25. Pitot Heating Switches (3).. OFF

This position ensures minimal battery discharge when they are turned on and prevents overheating of the pitot static components.

26. Wiper Switches (2)... OFF

This position ensures minimal battery discharge when they are turned on and prevents wipers from operating on a dry windshield.

27. Exterior and Interior Lights Switches (7).. OFF

This position ensures minimal battery discharge when they are turned on.

28. Instrument and Panel Lighting Rheostats (8) .... FULLY CCW

These switches, four above each pilot, should be rotated fully counterclockwise to ensure minimal battery discharge when the batteries are turned on.

CONSOLE/OVERHEAD PANEL

LEFT CONSOLE

1. Data Loader .... OFF (OUT)

   The FMS data loader should be turned off until such time as the aircraft is powered by other than batteries and the data loader is needed for updating the flight management system.

2. Oxygen Mask.. CHECKED

   The pilot's oxygen mask must be checked as being in place, selected to 100%, and with both the hose and communications cable connected to the proper positions. Press the test button on the mask to ensure a flow of oxygen.

3. IRS 1 (and Optional IRS 3) .... OFF

   IRS 1 should be off until the aircraft is powered by other than batteries or unless the checklist calls for the IRS to be turned on for programming. If IRS 3 is installed, it also should be off.

4. Audio Control Panel .... SET

   a. SPK, ST Audio VHF 1 and VHF 2 .... DEPRESSED

   b. Microphone VHF and C'PIT.................... DEPRESSED

   c. All Other Pushbuttons .... RELEASED

   d. VOR–DME Potentiometer .... FULL HIGH

   Set the pilot's radio jackbox for the proper radio transmitter/receiver and mask communication positions.

PILOT INSTRUMENT PANEL

1. Clock.. CHECKED

2. EFIS Dim Controls (2) .... FULL BRIGHT

   The EFIS dim controls, located in the front of each pilot, should be turned fully clockwise to the bright position before powering the aircraft. The brightness of the instruments can be adjusted after the aircraft is powered by other than batteries and the master avionics, FMS, and switches are turned on.

3. Standby Horizon .... CAGED

CENTER INSTRUMENT PANEL

1. Radar (2) .... OFF

   If two radar control panels are installed, the master switches should be turned off until the checklist calls for the radar to be turned on. This action will save the batteries and prevent damage to equipment and/or injury to personnel.

2. Fuel Shutoff Switches (3) .... GUARDED

   These three switches should be in the guarded position to ensure a flow of fuel to the engines for starting. These switches are to be used only in the event of an engine fire.

3. Fire-Extinguisher Switches (5)..................................... ZERO/SAFETIED

   These five switches must be in the zero/safetied position to preclude inadvertent discharge of the fire bottles.

4. Normal L/G Control .... DOWN/LATCHED

   It is imperative that the normal landing gear handle be in its proper position to preclude the inadvertent retraction of the landing gear when power is applied to the aircraft.

5. Gear Pull Handle .... PUSHED IN

   This ensures normal electrical retraction sequencing of the landing gear and, when required and operated, allows landing gear extension.

6. Brake Selector Switch .... #1/ASKID ON

   This action ensures proper positioning of the brake selector valves before engine start.

7. ST-BY Pump Switch .... OFF

   This three-position switch must be placed in the OFF position to prevent a high draw on the batteries when the batteries are placed on, prior to starting the APU. This unit can draw 68 to 80 amps, depending on the hydraulic demand on the pump.

8. Temperature Controllers (2) Selector and Knob ..... AUTO/12 O'CLOCK

   The temperature controllers can be selected to AUTO and set to the desired temperature levels unique to individual user needs. Usually, a setting at 10 to 11 o'clock on the automatic controller is standard for most users.

9. Thrust Reverser Switch .... NORMAL/GUARDED

   This switch is usually kept in this position to allow normal operations of the thrust reverser while on the ground. The switch is used for emergency stowing of the thrust reverser either on the ground or in flight.

COPILOT INSTRUMENT PANEL

1. Automatic Cabin Pressure Controller.................................... PROG OR FL

   This three-position switch on the controller panel allows the operation of the pressurization system based on a predetermined schedule or normal barometric control.

2. DN/UP Knob .... FULLY DN

   The DN position (green index) allows that the cabin will be manually commanded to an increased pressure condition in the event of electrical failure of the automatic cabin pressurization controller. This position commands a cabin altitude rate of descent of approximately 1,000 feet per minute.

3. Auto/Manual Selector Switch.. AUTO

   This allows for the normal operation of the cabin pressurization controller.

4. NORM/EMERG Selector Switch.. NORM

   The NORM position permits full normal operation of the air-conditioning and pressurization systems. The EMERG selection is used only for abnormal and/or emergency checklist procedures.

5. Dump Switch .... OFF/GUARDED

   This switch is used to dump cabin pressure in the event of flight emergencies. The normal operation of the pressurization system is possible only with this switch in the off position.

6. Clock.. CHECKED

7. ELT Switch... AUTO/GUARDED

   This switch ensures proper operation of the emergency locator.

8. GPWS Flaps O'RIDE Switch .... GUARDED

   This switch, when not guarded and in the override position, disables the "TOO LOW FLAPS" warning given by the GPWS system. This warning usually occurs when on final approach and when the aircraft is not configured in the SLATS + 40° flaps configuration.

RIGHT CONSOLE

1. Passenger Oxygen Valve Selector .... NORMAL

   Placing the passenger oxygen valve in the normal position will allow automatic deployment of the passenger oxygen masks should the cabin altitude exceed 10,000 feet during flight.

2. Oxygen Pressure .... APPROPRIATE

   Minimum oxygen pressure with no passengers on board is 700 psi, assuming the flight stays under 10,000 feet altitude. This minimum covers the consumption requirements of each crewmember for two hours. It is recommended that if passengers are carried, the oxygen system be fully charged to its capacity. This is especially true if the flight is planned over oceanic areas or over desolate terrain. The aircraft performance manual can be used as reference as to the minimum pressure required for execution of a mission with passengers and is based on the following assumptions:

   - The flight is being flown either above or below 41,000 feet. If flying above 41,000 feet, one of the pilots must breathe oxygen.
   - An emergency descent to 10,000 feet is made with all occupants of the aircraft breathing oxygen on NORMAL.
   - Further flight is conducted at 10,000 feet or below with one passenger using first aid oxygen.

3. VHF 3 (If Installed) .... NORMAL/GUARDED

4. Audio Control Panel .... SET

   a. SPK, ST Audio VHF 1 and VHF 2 .... DEPRESSED

   b. Microphone VHF AND C'PIT .... DEPRESSED

   c. All Other Pushbuttons .... RELEASED

   d. VOR–DME Potentiometer .... FULL HIGH

   Set the copilot's radio jackbox for the proper radio transmitter/receiver and mask communication positions.

5. Autoload Shed Switch (If Installed) .... NORMAL/GUARDED

   This switch allows for the resumption of electrical supply to selected A bus items if a generator disconnects from its bus in flight.

6. IRS 2 .... OFF

   IRS 2 should be off until the aircraft is powered by other than batteries or if the checklist calls for IRS programming.

7. Oxygen Mask.. CHECKED

   The copilot's oxygen mask must be checked as being in place, selected to 100%, and both the hose and communications cable connected to the proper positions. Press the test button on the mask to ensure a flow of oxygen.

8. Cond Lever (If Installed) .... NORMAL

   This lever must be placed in the full forward position. This lever isolates the crew and passenger air-conditioning systems for normal operations. This lever has been removed on SN 165 and subsequent.

9. Nose Lever (If Installed).. NORMAL

   This lever connects the cabin with the nose compartment for ventilation of the nose cone in flight. On later aircraft (SN 70 and subsequent), the nose lever has been removed.

PEDESTAL

1. Power Levers (All 3) .... CUTOFF

   The power levers are placed in the cutoff position in order for the engines to be started.

2. Radios (VHF 1) .... OFF

   VHF 1 may be wired directly to the A2 electrical bus, bypassing the left avionics master switch, if a VHF 3 is not installed.

3. Airbrake Handle .... ZERO

   Ensure the airbrake handle is fully forward in the "0" detent.

4. Normal Tailplane Circuit Breaker .... ENGAGED

The mechanical circuit breaker, located aft of the emergency elevator trim switch, must be in the down position in order to provide electrical power for operation of the normal elevator trim system.

5. Flap-Slat Handle .... CLEAN

Ensure that the flap-slat handle is fully forward in the clean position prior to starting the engines or applying pressure to either the No. 1 or No. 2 system.

6. Emergency Slats Switch .... GUARDED

This switch controls the emergency operation of the outboard slats and should be used only in the event of a main system malfunction. Therefore, the switch should be kept in the off and guarded position.

7. MMO Switch (If Installed) .... GUARDED

This switch, if installed, allows adjustment of the M_{MO} overspeed aural warning based on aircraft gross weight.

8. Landing Gear Emergency Extension Handles (3) .... CHECKED

Check that the nose landing gear emergency extension handle, located on the left aft side portion of the center pedestal, is fully down and stowed in the clips provided. The main landing gear extension handles, located in the floor area to the right and left of the pilot and copilot seats respectively, must be stowed by pushing down on the handles and covered by their access doors.

BEFORE START (POWER ON)

NOTE

On aircraft without the electronic transfer valve XTK2, the overhead panel (Figure NP-1) does not feature the block diagram and XTK2 transfer switch.

1. Battery Switches (2) .... ON/CHECKED

a. BAT 1 BAT 2 Lights .... OUT

In order to start the APU or an engine, these two switches must be on to provide electrical power. The BAT 1 and BAT 2 lights on the master warning panel should be extinguished. Minimum battery voltage for APU start is 23 volts and 22 volts for engine start.

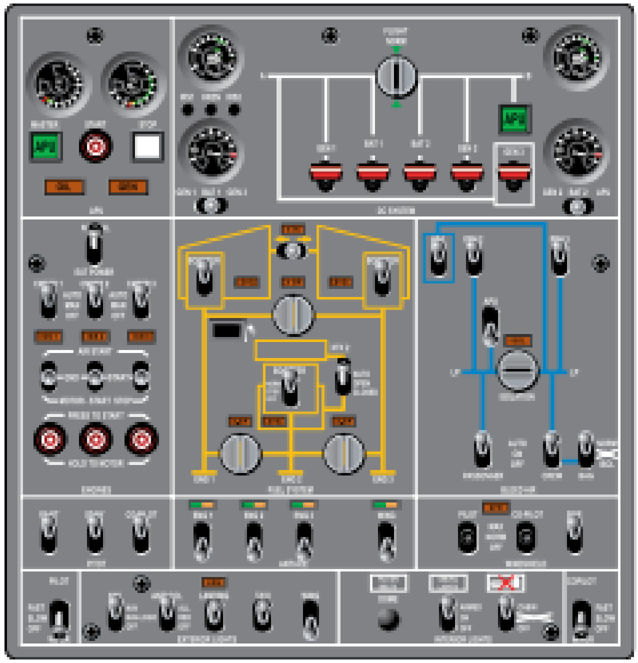


Figure NP-1. Overhead Switch Panel

CAUTION

Check the battery temperatures as follows:

- If either battery temperature is above 120°F and the amber WARM light is on, do not attempt a battery start. The APU/engines must be started using a ground power unit.
- If either battery temperature exceeds 120°F during starting, monitor temperature changes for a few minutes after starting.
- If either battery temperature exceeds 140°F during starting, wait until it drops to 120°F before takeoff.
- If either battery temperature reaches 150°F or 160°F on aircraft SN 132 and subsequent, and the red HOT BAT lights are on, the battery must be turned off, monitored while it cools, and replaced prior to takeoff.

NOTE

On the average, the rate of battery cooling on the ground is 1°F per minute.

2. Battery Voltages .... CHECKED

Minimum battery voltage for APU start is 23 volts and 22 volts for main engine start.

3. *HRZN Battery Voltage .... CHECKED

The standby horizon battery voltage test button is located beneath the left voltmeter on the overhead panel. The reading should be 24 volts minimum.

If the No. 2 emergency battery is installed, its voltage should be checked, and the reading should be 24 volts as well.

4. Bus-Tied Switch .... TIED

This rotary switch controls the bus tie relay, which in turn controls the BUS TIED light on the master warning panel. The switch is placed in the tied position to tie the left and right main DC buses together for engine start.

5. Park Brake/No. 2 Park Brake Light.............................. SET/ON STEADY

Pull the parking brake handle to the first detent, hesitate, and then, using three fingers, release the first detent lock and pull the parking brake handle to the second detent. This technique is recommended for all parking brake handle operations to preclude pulling the parking brake handle through the first detent when emergency stopping is required during landing or taxi operations. The No. 2 position allows 2,175 psi of No. 2 hydraulic system pressure to be applied to the brakes for holding the aircraft in position. The No. 2 position is recommended for use after the aircraft is brought to a complete stop. The No. 1 position of the parking brake handle applies 800 psi of the No. 2 hydraulic system pressure to the brakes and is not recommended for holding the aircraft. The #2 P BK light should be on and steady. If the light is flashing, there is less than 1,200 psi remaining in the parking brake accumulator, and is not sufficient for holding the parking brakes. Until the APU or another source of electrical power is available to the aircraft, the aircraft should be chocked until electrical power other than the batteries is available.

When other electrical power is available, use the standby hydraulic pump to charge the No. 2 hydraulic system, and reset the parking brake handle to the No. 2 position after the #2 P BK light stops flashing.

6. Fire Detection .... TESTED

Set the test control switch, located on the master warning panel, to the FIRE position. All detection and warning systems will be tested simultaneously and the aural warning will sound. If one of the systems is malfunctioning, the corresponding light will not come on. During the test, the test control must be held in the FIRE position until the FIRE BAG COMP smoke detection light comes on, that may require up to 4 seconds. Do not silence the aural warning until the FIRE BAG COMP light comes on. After silencing the aural warning, release the test switch back to the center. It may take up to a maximum of 10 seconds for the FIRE BAG COMP light to extinguish.

7. COND BAT Pushbutton Light (SB 125).................................. CHECKED

Aircraft with SB 125 will have a toggle switch and circular amber light normally located on the copilot's instrument panel. The valve controlled by the toggle switch must be closed before takeoff.

8. Navigation Lights .... AS REQUIRED

Although not a mandatory requirement, the FAA encourages all pilots to turn on the aircraft position or navigation lights any time electrical power is applied to the aircraft.

9. ENG 2 FAIL and T/O CONFIG Lights

and Wording "NO TAKEOFF".. TESTED

Move the No. 2 power lever from the cutoff position, and advance it toward the takeoff position. The T/O CONFIG and ENG 2 FAIL lights should illuminate. Move the power lever back to the cutoff position, and the lights should extinguish.

A—APU Start

1. Booster 2... ST-BY

FUEL 2 Light .... OUT

After placing the booster pump switch to ST-BY, observe that the FUEL 2 light on the master warning panel extinguishes.

2. APU Master .... DEPRESSED

Depress the APU master pushbutton on the overhead panel, and it should illuminate green.

3. APU Start Switch (1 Second) .... DEPRESSED

Do not hold the APU start pushbutton in for more than 1 second. The holding coil, if operating properly, should hold the starter engaged through the start sequence. The starter will stay engaged to 50% N_1. The OIL light should extinguish by 60% N_1. The GEN light should extinguish at 97% N_1 + 4 seconds, signifying the generator is on line. If the green APU master light should start blinking after the start button is pushed, one of the start interlock circuit requirements may not have been satisfied or the APU may shut down for activation of a protective circuit.

4. APU N_1-T_5 Indicators—APU Generator Volts/Amps .... CHECKED

After the APU is on speed and the generator has gone out, check that the APU voltage output is 28.5 volts. The amperage draw will normally peg out at the maximum of 350 amps. If desired, it may be advisable to turn off one of the batteries to ease the demand on the APU generator until the charge draw for the battery being charged is less than 75 amps. Then, the other battery may be turned on for charging. Closely monitor the battery charging and the APU generator load before proceeding further on the checklist. The load demand on the APU should be at 300 amps or less before performing an engine start.

CAUTION

Discontinue start (STOP PUSHBUTTON) if ITT does not rise within 10 seconds. Wait 5 minutes prior to attempting a second start.

5. APU Bleed-Air Switch .... AS REQUIRED

It is recommended that a 1-minute minimum waiting period be observed before turning on the APU bleed. If possible, wait until both batteries have charged to less than a 50-amp draw per battery. All these actions help preserve the life of the APU, which can be placed under some high demands when powering up for the first flight of the day. The 23-amp-hour batteries can be subjected to some very high loads when first turned on, if certain equipment items have not been turned off.

6. COND BAT Switch (SB 125) .... AS REQUIRED

This service bulletin, if installed, provides additional cooling air to the batteries in the rear compartment from the crew cold air system.

B—Ground Power Unit Connection

1. DC Power Selector .... EXT POWER

BAT 1 | BAT 2 Lights .... ON

A ground power unit providing 28.5 volts DC and 1,200 amps maximum must be connected at the receptacle, located on the lower right rear portion of the aircraft. Move the two-position switch from NORMAL to EXT POWER. The BAT 1 and BAT 2 lights on the master warning panel will illuminate, as well the BUS TIED light. The No. 1 and No. 2 batteries are completely isolated from the electrical system, and the left and right main DC buses are automatically tied together.

AFTER APU START OR ENGINE 2 START OR IF A GROUND POWER UNIT IS USED

1. LH AV Master and RH AV Master.............................. ON

   AV MASTER Light (LH and RH).............................. OUT

2. FMS Master (LH and RH).............................. ON

   FMS MASTER Lights (LH and RH).............................. OUT

   If all four switches are installed, turn them on at this time.

3. Maintenance Test Panel.............................. CHECK/RESET

   The test panel at the right side panel of the copilot should be opened and checked for any red indications at one or more of the magnetic indicators of the panel. Push the reset button at the center of the panel to clear any red indicators, or address the malfunction if the red indicator cannot be reset.

4. Voice Recorder.............................. TESTED

5. IRS (3)/FMS (2) VLF-Omega.............................. NAV/INITIATE

   POS Sensors.............................. CHECKED

   Database Validity.............................. CHECKED

   Initialization of the flight management and long range navigational systems should take place at this time. Flight plan programming and any other activity needed to program the navigational units should be accomplished as well.

6. Clocks.............................. CHECKED/SET

   Clocks should be checked and set as required by company policy. Flight time should be zeroed in preparation for the next flight.

7. Fasten Belt/No Smoking Lights .... ON

   These lights should be placed on in preparation for the arrival of passengers.

8. Emergency Lights .... ON/ARMED

   If on, turn off the cockpit dome lights, check that the overhead lights have two bulbs illuminated in each fixture, and check the cabin and exterior emergency lighting for proper operation. After the check is complete, move the switch to ARMED.

9. Exterior/Interior Lights .... AS REQUIRED

   Adjust the cockpit lights as required for a day or night flight. The cabin window valance, ceiling, and entry lights will not operate unless the CABIN–ENTRANCE–OFF switch, located on the bottom and extreme right of the overhead panel, is in the CABIN position.

10. Standby Horizon .... UNCAGED

    The standby horizon, located on the right top pilot's instrument panel, must be uncaged and adjusted.

11. Master Warning Panel .... TESTED

    Move the warning panel test switch to the left (LIGHTS position). This illuminates the lights on the warning panel, the hydraulic control and monitoring panel, the overhead panel, the side panels, reverse thrust and engine turbine temperature for each ITT indicator, and the FAULT lights on the fire panel. Check the BRIGHT–DIM control while holding the test switch to the LIGHTS position.

12. Landing Gear Panel .... TESTED

    Push the test button on the landing gear panel to test the landing gear panel lights, the aural "GEAR" warning, and the flashing light in the gear handle. The aural warning should be silenced during the test.

13. Fuel Quantity Indicators .... CHECKED

    If installed, the counters should be zeroed and set. The small knobs at the bottom of the fuel flow counters on the engine panel should be carefully pulled out from the instrument, about 1/2 inch, to zero the fuel flow counters. Pushing in on this knob will allow a digital readout of the actual fuel flow to the engines. This fuel flow readout will remain in view for approximately 30 seconds.

14. Fuel/Gross Weight Counters .... ZEROED/SET

If installed, the counters mounted below the landing gear panel should be zeroed and set.

15. Takeoff Data/Bugs... COMPUTED/SET

Takeoff data should be computed using the *Airplane Flight Manual*. The analog airspeed indicators, located to the left of the pilot and copilot EADIs, have four airspeed bugs attached to the bezel. These bugs should be set on V_1, $V_R = V_2$, V_{MFR} (V_2 + 25 knots), and V_{FS} (1.43 V_S). The indicated airspeed displays, presented on the pilot and copilot EADIs, should each be set to V_2 by adjusting the IAS knob on the two DC-820 display controllers, located on the center pedestal.

16. Cabin Pressure Controller... PROG OR FL/SET

The automatic pressure controller, located on the bottom right of the engine instrument panel, is normally selected to the PROG position for automatic operation of the pressurization system. Barometric setting should be adjusted to the local altimeter setting. The landing airfield altitude can be set if the landing airfield elevation is within 1,000 feet of the takeoff airfield elevation. Otherwise, it is recommended to leave the departure airfield altitude set until descent is begun from altitude for landing at the destination airfield, in conjunction with accomplishment of the Descent checklist. This is especially true when takeoff is made from high-elevation airports like Denver and the flight is to lower elevations like New York, or vice versa. In such a situation, the pressurization system is more compatibly set up in case of an emergency return.

If the FL mode is used, the automatic programming feature is disabled. The crew must set the flight level to which a clearance to climb is received, and must continue to do so each time such a climb clearance is received. When descending, the controller must be switched over to the landing mode, and the landing elevation must be set for the descent.

17. ST-BY Pump Light... OUT

Check that the ST-BY PUMP light on the hydraulic panel is out. If the light is on steady, then the standby pump is connected to the No. 1 hydraulic system by means of the hydraulic selector located in the rear compartment, near the No. 2 hydraulic reservoir.

CAUTION

Before changing the selector valve to the No. 2 hydraulic system, all hydraulic pressure must be depleted from both hydraulic systems.

18. HYDR Quantity No. 1 and No. 2 .... IN GREEN

At zero pressure, with the accumulators empty, the minimum indication on the gage should be above 3/4. After starting, the volume absorbed by the accumulators causes the levels to drop slightly. The quantities should read in the green in either case.

19. *Stabilizer Trim (Normal and Emergency)............. CHECKED/SET T.O.

This check starts with the stabilizer trim in the green range (4.5 to 7.5°). The captain trims nose down; upon the captain's call to stop, the copilot trims nose up and releases. After confirming the stabilizer has stopped, the captain trims nose up and repeats the above check. Activate the emergency stabilizer trim nose up and nose down, and observe that the stabilizer moves properly. Reset the trim circuit breaker, and set takeoff trim using the normal trim system. Split control wheel switches must be checked to confirm there is no stabilizer movement with only one switch activated in either direction.

NOTE

Whenever the stabilizer is in motion, an aural clacker will sound. The STAB TRIM indicator on the upper right side of the center instrument panel should also be checked for proper movement.

NOTE

The appropriate position within the this green band depends on the airplane CG location ie nose up (towards the FWD indication)if the airplane is balanced forward (which is the case if the fuel tanks are fully loaded) , nosed own (towards the AFT indication)if the airplane is balanced AFT .

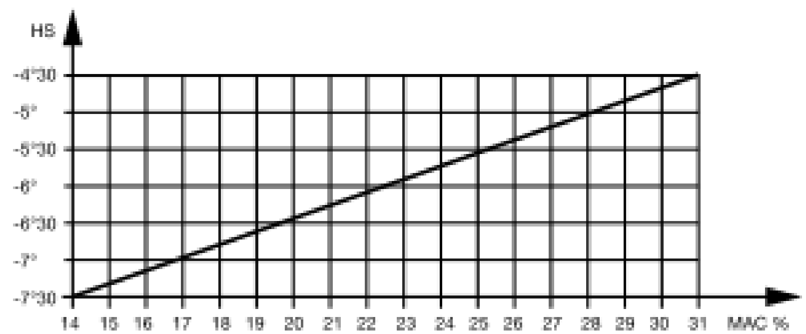


Figure NP-2. Take-Off Trim Setting for CG Position

20. *ST-BY Pump Switch/HYDR Press No. 2 ..... AUTO/1,500 TO 2,150 PSI

Move the three-position switch to the AUTO position. The standby hydraulic pump will now cycle between approximately 1,500 to 2,150 psi on the No. 2 hydraulic system pressure gage. Perform the following checks with the standby pump on.

21. *Emergency Aileron Trim................. CHECKED/LIGHT OUT/SET T.O.

Press the left emergency aileron button until the AIL ZERO light illuminates. Press the right emergency aileron button until the AIL ZERO light goes out and then again illuminates. Press the left emergency aileron button until the AIL ZERO light goes out.

NOTE

If there is hydraulic pressure on the flight control servos, the control wheel should not move during this check. However, if there is ***no*** hydraulic pressure on the flight control servos, it is normal to observe that the control wheel will move in the direction opposite to the emergency aileron trim input.

22. Rudder/Aileron Trim .... CHECKED/SET T.O.

Check the operation of the aileron and rudder trim in each direction by actuating the double switches on the center pedestal. Check trim travel by observing the trim indicators and movement of the ailerons and rudder in the direction in which the respective trim switches are moved. After checking movement, center the trim to zero for each surface. Additionally, check that the trim does not move when only one of the trim switches for each surface is actuated.

23. No. 2 Stall Test Pushbutton .... DEPRESSED

Depress the No. 2 stall button on the center pedestal to activate the No. 2 stall warning system. The following actions should be observed:

- The aural stall warning sounds and cannot be silenced.
- The IGN lights on the overhead panel illuminate.
- The outboard slats extend. A red light followed by a green flashing slat light should be observed on the slat/flap indicating panel.

24. Standby Pump Switch .... OFF

Place the standby hydraulic pump switch to the OFF position. This terminates the prestart hydraulic checks.

25. Cabin Pressure Controller .... TESTED/SET

Cabin Aural Warning .... CHECKED

Push the test button located on the bottom of the cabin pressure controller. The cabin altitude aural warning should be heard and then be silenced. The red CABIN light should illuminate. The cabin pressure controller window display should show:

- In PROG or LDG mode 18.800
- In FL mode .... FL 880
- QNH display 88.88

26. Battery Temperature Indicator .... TESTED

Push the test button at the bottom of the battery temperature gage. Observe an increase in both needles, the amber light illuminating at 120°F and the red light and HOT BAT annunciator illuminating at 150°F (SN prior to 132) or 160°F (SN 132 and subsequent).

CAUTION

Check battery temperatures:

- if either battery temperature is above 120°F and the amber WARM light is on, do not attempt a battery start. The APU/engines must be started using a ground power unit.
- if either battery temperature exceeds 120°F during starting, monitor temperature changes for a few minutes after starting.
- if either battery temperature exceeds 140°F during starting, wait until it drops to 120°F before takeoff.
- if either battery temperature reaches 150°F (SN prior to 132) or 160°F (SN 132 and subsequent) and the red HOT BAT lights are on, the battery must be turned off, monitored while it cools, and replaced prior to takeoff.

27. ADC 1, then ADC 2 Pushbuttons .... TESTED

V_{MO}/M_{MO} Aural Warnings .... CHECKED

Individually test ADC 1 and ADC 2 by depressing the test buttons on the center pedestal. These tests allow the various functions of the air data computers and the V_{MO}/M_{MO} aural warnings to be tested. When pushing the test buttons, the following should be observed as well:

- Predetermined values appear on the indicators associated with the air data computer:
  - Altitude—1,000 feet
  - VSI—5,000 feet per minute, or flag V/S and VS pointer goes out on A/C equipped with TCAS II COLLINS and two LCD VSI
  - IAS—350 knots, red color on EADI airspeed ribbon
  - V_{MO}—300 knots
  - Mach—0.79
  - TAT— –16°C
  - SAT— –45°C
  - TAS—466 knots
  - AUTO SLAT light illuminates on master warning panel

28. EFIS Annunciators/GPWS .... TESTED

Push and hold the PUSH TEST button on top of the DH knob, located on the instrument remote controller, which is located on the aft portion of the center pedestal. This tests the radio altimeter and EFIS systems. The test results in display of a height of 100 feet and appearance of the amber comparators for the first 4 seconds. The comparators will extinguish, followed by the flashing red illumination of all EFIS warning flags on both the EADIs and EHSIs. After 10 seconds, the flashing red will turn to steady red for all warnings, except for CAT II, which remains flashing. An amber TEST light is displayed on the EADI for the entire duration of the test. Release the test button to restore normal operation.

If the aircraft is in the air, only the radio altimeter is tested, displaying the red RA flag on the EADI. The EFIS system test is inhibited in the air. The RA test is inhibited after glide slope capture.

The GPWS system is tested by pushing the TEST pushbutton, located on either GPWS annunciator panel, located on the pilot's and copilot's instrument panels. Hold the button in for the duration of the test until the PULL-UP light goes out. The system will test annunciators and aural warnings.

29. Altimeters and ASEL .... SET

Four altimeters must be set to the local station altimeter setting: both the pilot and copilot altimeters, the standby altimeter, and the cabin pressure controller altimeter.

The ASEL box, located in each EADI, is set for departure altitude by adjusting the ALT SEL knob on the instrument remote controller, located on the aft portion of the center pedestal. To set 100-foot increments in altitude, pull up on the knob before turning it to the desired altitude. To set 1,000-foot increments in altitude, push down on the knob before turning it.

NOTE

It is highly recommended that, after setting the altitude in 1,000-foot increments, the knob be pulled up to the 100-foot increments position. This is done in case the ALT SEL knob is inadvertently hit or touched while climbing or descending to selected altitudes. In this way, the accidental knob altitude changes will be in 100-foot increments and should be more readily caught during an instrument crosscheck.

30. Radio Altimeter .... TEST AND DH SET

31. Radios/E. Bat 2 .... ON

Any radios that have not already been turned on by the avionics master switches should be turned on at this time.

Some aircraft have an option including an emergency battery No. 2 for additional electrical power capability in the event of a total loss of normal electrical power. The switch to turn on this emergency battery is located on the middle portion of the center pedestal, just behind the throttle quadrant.

32. VHF 1 .... ON

33. CABIN and REAR DOORS Lights .... OUT

The red CABIN and amber REAR DOORS lights, located on the master warning panel, should be out prior to taxiing the aircraft. If possible, it is recommended that the doors be closed prior to starting the engines. The CABIN light is wired to the main cabin door (two microswitches) and, if installed, the forward lavatory door (one proximity switch).

34. Seats and Rudder Pedals .... ADJUSTED/LOCKED

STARTING ENGINES

STARTING PROBLEMS

Discontinue a start whenever any one of the following conditions occurs:

- The ITT does not rise within 10 seconds after moving the power lever to idle.
- Oil pressure does not rise within 10 seconds after light off.
- N_1 remains close to zero when N_2 is 20%.
- The ITT rises rapidly and approaches the 952° (5AR) or 978° (5BR) limit.
- N_2 speed is not rising rapidly and smoothly after light off.

1. Power Lever.. CUT OFF

   The power lever is placed to cutoff to stop fuel flow to the engine and ignition.

2. Start Selector Switch .... MOTOR-START STOP

   This drops out the engaged starter.

NOTE

Perform a dry motoring whenever fuel is suspected to have accumulated in the tailpipe.

1. Power Lever.. CUT OFF

   This completes motoring circuit interlock requirements.

2. Start Selector Switch .... MOTOR-START STOP

   This allows engine motoring while the start button is depressed and prevents starter engagement after releasing the start button.

3. Start Button.............................. HOLD DEPRESSED 15 SECONDS

   The starter remains engaged as long as the start button is pushed to clear the exhaust pipe of fuel.

If the amber IGN light remains on, although N_2 speed is greater than 50%, and all idle parameters are within limits:

1. Start Selector Switch .... MOTOR-START STOP

   This allows the operator to manually disengage the start circuit if there is a failure of the aircraft's automatic dropout circuitry.

If the ignition light goes out:

2. Start Selector Switch .... GRD START

If the ignition light remains on:

2. Associated GEN Switch .... OFF

3. Associated Ignitor Circuit Breaker .... PULLED

START

Engine 2 Start

1. Anticollision Lights Switch .... RED

   Aside from FAR 91.33 and FAR 91.73 requirements, where anticollision lights are required for flight, AIM paragraph 246 prescribes an FAA voluntary safety program. This program, "Operation Lights On," is an enhancement of the "see and avoid" concept in aviation safety. Pilots are encouraged to turn on their anticollision lights any time the engine(s) are running, day or night. However, anticollision lights need not be illuminated when the pilot in command determines that, because of operating conditions, it would be in the interest of safety to turn off the lights, whether on the ground or in flight.

2. Booster 2 Switch.. ST-BY

   Place the No. 2 boost pump switch to the standby position. Check to ensure that the FUEL 2 light on the master warning panel goes out.

3. DC Power Selector .... AS REQUIRED

   a. Battery Start or APU Assist Start .... NORMAL

   b. GPU Start .... EXT POWER

   If starting the engines with the batteries or with an APU assist, place the DC power selector switch in the NORMAL position. If starting with a ground power unit, place the DC power selector switch in the EXT POWER position.

4. Start Button.............................. DEPRESSED LESS THAN 2 SECONDS

At 12 to 15% N_2 **and indication of N_1 rotation**, do not induce fuel without indication of LP spool (N_1) rotation.

5. Power Lever.. IDLE

This introduces fuel flow and ignition.

a. IGN 2 Light.. ON

6. ITT, N_1, Fuel Flow, and Oil Pressure.. RISE

When N_2 reaches 50%, IGN 2 Light.................................. OUT

With N_2 stabilized:

a. PUMP 2 Light.. OUT

b. Hydraulic Pressure No. 2 .... GREEN BAND

c. OIL 2 Light.. OUT

d. GEN 2 Light:

(1) If **Normal** Start.. OUT

(2) If **External Power** Start.. ON

7. Idle Speed Parameters .... CHECKED

8. Power Selector Switch.. NORMAL

Subsequent engine starts should be made using aircraft electrical power. Therefore, at this point, the DC power selector should be in the NORMAL position.

9. Ground Power Unit (As Applicable)....................................... REMOVED

GEN 2 Light.. OUT

Removing ground power from the ground power receptacle allows generator connection to the respective main bus(es).

Engine 3 and 1 Start

1. Booster Switch (3 or 1) .... ON

   FUEL Light .... OUT

2. GEN 2 Ammeter .... 300 AMPS MAX

   Use same starting procedure as used for engine 2.

   Engine Anti-ice .... AS REQUIRED

BEFORE TAXI

1. Circuit Breakers .... CHECKED

   After the engines are started and stabilized, check the circuit-breaker panels to ensure that no circuit breakers have opened during the starting process. Check the circuit breakers by running your hand across the panels to feel if any have opened. It is difficult to see an opened circuit breaker, especially at night.

2. Bus-Tied Switch .... FLIGHT NORM

   Turn this switch to FLIGHT NORM. Confirm that the BUS TIED light on the master warning panel is out. This position isolates the left and right main DC buses and prevents current or voltage variations on one bus from affecting the other bus. Check the voltmeters and ammeters on one side with those on the other side to ensure that the buses are not tied.

3. Battery Amps/Temperature .... CHECKED

   Check the battery amperage and temperatures are normal. The batteries will probably show a charge since they assisted in the starting of the engines.

4. Generators Volts/Amps .... CHECKED

   Check the bus voltage on each side by observing the two voltmeters and their output at 28.5 volts. Move each generator ammeter switch to the respective generator positions to read the amperage draw for each generator. The amperage should not exceed 95 to 100 amps for each generator. Normally, the amperage draw for the No. 1 and No. 3 generators is 110 to 125 amps for each generator, while the No. 2 generator provides 125 to 150 amps. After the check, place each ammeter switch to the BAT 1 and BAT 2 positions.

5. Booster 2 Switch.. NORM

   FUEL 2 Light.. CHECKED/OUT

6. *Isolation Valve Knob.. ISOLATION/NORM

   ISOL Light.. ON/OFF

   This rotary switch on the pneumatic section of the overhead panel is selected to the closed position and the ISOL light illuminates confirming closure of this valve. This confirms the operation of the valve that separates the bleed air from the No. 1 and No. 3 engines from the No. 2 engine and APU. This valve is then opened and the ISOL light goes out.

7. Compass Headings (5).. CHECKED

   Check the headings on the EHSIs, the RMIs, and the standby compass to be sure they are all the same and that the IRS systems have aligned.

8. Windshield—Pilot and Copilot .... NORMAL

9. Windshield Side.. ON

   Move the windshield heat switches on and observe that the standby compass may move away from the aircraft aligned heading. Only the normal position should be selected after starting the engines. Temperature control of windshield heating is maintained between 25 and 32°C.

10. Warning Panel Lights (7 or 8) .... CHECKED

   All warning panel lights (Figure NP-2) should be extinguished except for the following: L. AOA, R. AOA, L. PITOT, R. PITOT, ST BY PITOT, #2 P BK, and MACH TRIM. An eighth light on extra optional equipment such as the Teledyne AOA heater light may be illuminated.

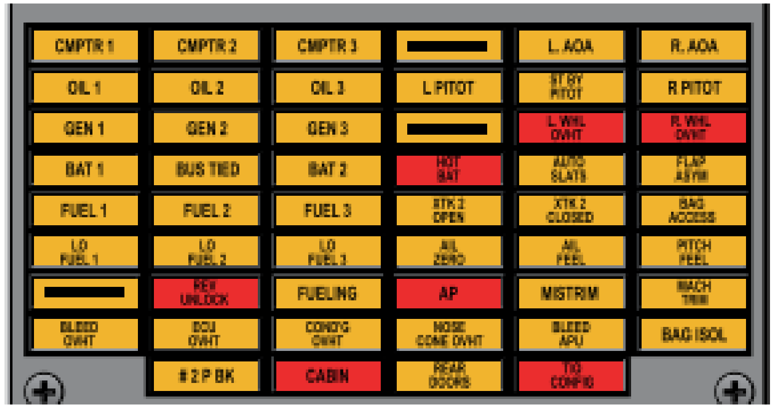


Figure NP-3. Warning Panel

NOTE

On aircraft without transfer valve XTK2 lights, the amber lights labeled "XTK 2 OPEN" and "XTK 2 CLOSED" are not used.

11. Hydraulic System 1 and 2 Pressure and Quantity .... IN GREEN

    Check the hydraulic quantities and pressures to ensure that there has been no loss of hydraulic fluid during activation of these hydraulic systems.

12. Standby Pump Switch.. AUTO

    Place the standby hydraulic pump switch in the AUTO position. On the ground, through the left main gear squat switch, the standby hydraulic pump will automatically operate to supply hydraulic pressure to the No. 2 system should the No. 2 engine-driven hydraulic pump fail.

13. Antiskid System.. TESTED

    The antiskid system is tested as follows:

    a. The brake selector switch should be in #1 ON.

    b. Depress and hold the brake pedals until the green L and R brake lights illuminate.

    c. Depress the antiskid test button until the green brake lights extinguish.

d. Release the antiskid test button, and after approximately 2.5 to 4 seconds, the green L and R brake lights will again illuminate.

e. Release the brakes and the green lights will go out.

14. *Airbrakes .... POSITION 2

The airbrake handle in the trim well on the center pedestal, moved to the No. 2 position, allows the extension of the center and lateral airbrake panels. Check the illumination of the AIRBRAKE light on the flap/slat configuration panel.

15. *No. 1 Stall System .... TESTED

Now that the No. 1 hydraulic system is powered by engine-driven pumps 1 and 3, the No. 1 stall system is tested to ensure that the outboard slats can be extended by the No. 1 hydraulic system. A flashing green slat extended light will be seen, the aural stall warning will sound, and the igniter lights for all three engines will illuminate. The airbrakes will automatically stow and the AIRBRAKE light will flash.

16. *Airbrakes .... ZERO/LIGHT OUT

Move the airbrake handle to zero to extinguish the flashing airbrake light and arm the system for deployment as required. The airbrakes must be retracted for takeoff.

17. Flaps/Slats.......................... SET FOR TAKEOFF

18. No. 1 and No. 2 Stall Systems .... TESTED

After the slats and flaps have extended to the proper setting selected above, depress the STALL 1 button. The aural stall warning will sound, the igniter lights will illuminate, and the inboard slats will retract as indicated by the flashing green slat light. After these indications have been seen and heard, release the test button, and allow the slats to return to the steady green indication. Then depress the STALL 2 button and ensure that the same test results occur. Release the test button and ensure that the slats return to the steady green indication.

19. Mach Trim .... ON

Depress the M TRIM button on the flight guidance controller to engage the Mach trim system. When it is properly engaged, the pointer on the left or right of the M TRIM button should illuminate. Additionally, the MACH TRIM light located on the master warning panel should extinguish.

20. Yaw Damper.......................... ON/OFF

21. AP Transfer by (LH FCS and RH FCS Pushbuttons on ID-802) .... CHECKED

22. COMM/NAV/Radar/IRS .... SET

    Before taxiing the aircraft, check that all the communication and navigation radios are on, the radar is in the standby position, and the IRS systems are fully aligned with the mode selector switches selected to the NAV position.

23. Flight Recorder .... CHECKED

24. EFIS/MFD Displays .... SET

    Select the desired mode(s) for the EHSI presentations and the multifunction display. Set the heading and course information, dependent upon the departure course to be flown.

25. All Flags .... OUT OF VIEW

26. COND BATT Switch (SB 125) .... OFF/LIGHT OUT

    Operators with this service bulletin must close the valve supplying cold air to the batteries in the rear compartment before takeoff.

TAXI

NOTE

The taxi check should be accomplished after leaving the blocks and when clear of congested areas. One pilot must maintain an outside watch at all times during taxi operations.

1. Taxi Light .... ON

   It is recommended that the taxi light be placed on for all taxi operations, day or night.

2. Parking Brake Handle .... FULLY FORWARD

   Release the parking brake handle and confirm that the #2 P BK light is out.

3. No. 1 and No. 2 Brakes .... CHECKED

   When moving the brake selector switch from one position to another, the pilot's feet should be removed from the brake pedals until after the brake position is selected and the check is to be made.

Check the No. 1 brakes simultaneously, and gently depress the left and right brake pedals until the green L and R lights come on. The lights indicate that a hydraulic pressure of at least 225 psi is being applied to the brakes. A slight feedback of pressure should also be felt in the brake pedals. Maximum pressure delivered to the brakes is as follows:

- 1,595 psi for aircraft SNs 1, 75 and subsequent, and those with AMD-BA SB F900-42 incorporated

- 2,175 psi for aircraft SNs 2 through 74, except for those with AMD-BA SB F900-42 incorporated

Check the No. 2 brakes individually, and gently depress the L and R brake pedals until each brake pedal is depressed enough to illuminate the #2 BK light. Release one brake check before checking the other brake. This light illuminates when the hydraulic pressure to the No. 2 brakes is at least 225 psi. A slight feedback of pressure should also be felt in the brake pedals. The maximum pressure delivered to the brakes by the No. 2 hydraulic system is 1,080 psi.

A general rule to be followed is that whenever a different brake system is selected, the brakes should be checked to ensure that the system is working properly.

4. Brake Selector.. #1/ASKID ON

After the foregoing brake checks have been made, select the brakes to the No. 1 system with the antiskid on.

5. Thrust Reverser... CHECKED/STOWED

With the No. 2 throttle at idle, pull the reverser lever to REVERSE IDLE and observe that the amber TRANS light illuminates, then goes out when the green DEPLOYED light illuminates. Place the emergency stow switch to STOW and observe the following: the green DEPLOYED light goes out, the red REV UNLOCK light illuminates, and the amber TRANS light illuminates. When the reverser is fully stowed, all lights should be out. Return the reverser lever to the stowed position and the emergency stow switch to the normal guarded position.

6. Engine Computers .... CHECKED/AUTO

This check should not be accomplished in congested areas or on slippery surfaces. It is highly recommended that this check be performed while the aircraft is stationary, in the event that an engine runaway occurs. The pilot performing this check should be prepared to shut the engine down should a runaway occur. With the parking brakes set in the No. 2 detent position, and while guarding the toe brakes, perform the check on one engine at a time. Place the engine computer switch to the MAN position.

The respective CMPTR light on the master failure warning panel will illuminate, and a fluctuation in the temperature, fuel flow, and rpm gages may be observed. Slowly advance the throttle forward to approximately 40% N_1 to ensure that manual control of the engine is possible. Return the throttle to idle, return the computer switch to AUTO, and repeat the check for all engines.

7. Pilot Window .... CLOSED/LOCKED

Slide the left direct-vision window forward and then outward to close the window. While holding the window closed against the frame, move the locking lever forward and downward to lock the window in position. Ensure that the green mark on the grooved tip of the locking button located on the end of the handle is in view.

8. APU Stop Button .... PUSHED

Push the APU STOP button, which simulates an overspeed signal and commands APU shutdown by closing the fuel solenoid valve.

9. APU Master (N_1 Zero) .... OFF (OUT)

When the APU low oil pressure light illuminates, the APU master switch may be turned off by pushing in on the switch. This action ensures shutdown of the APU by removing electrical power from the control circuits.

10. APU Bleed .... OFF

The APU bleed switch should be turned off before closing the pilot window to preclude any adverse pressure bumps due to the high volume of air supplied by the APU.

11. Engine Anti-ice/Wing (or Wing BRK) Anti-ice .... CHECKED (5 SECONDS MAX FOR WING)

Turn on the wing anti-ice switch on for a maximum of 5 seconds and observe a rise on the ITT instruments for the No. 1 and No. 3 engines. The amber light located above the switch should illuminate steadily. Turn the wing switch off, and observe a temperature drop on the two ITT gages while the amber light flashes momentarily and then goes out.

Turn the engine anti-ice switches on one at a time, and observe a rise on the ITT instruments for each respective engine. The respective amber lights located above the switches should illuminate a steady amber. Turn off each switch, one at a time while observing a drop in the respective ITT gages. Except for the No. 2 engine, the amber lights immediately extinguish. The No. 2 engine amber light will flash momentarily and then extinguish.

12. Engine Anti-ice .... AS REQUIRED FOR TAKEOFF

If visible moisture is present and the outside air temperature is below +10°C, the engine anti-ice system must be switched on. The wing anti-ice system must not be used on the ground. Wing anti-ice is not to be used until after takeoff when the landing gear is retracted. While advancing the engine power for takeoff, ensure that the green anti-ice lights located above each engine anti-ice switch have turned green before beginning takeoff roll.

13. Flight Controls .... CHECKED

Actuate all three primary flight controls over their full range. These controls should be completely free and automatically return to the neutral position when released. Normally, the copilot checks the ailerons and elevator, while the captain checks the rudder.

14. Takeoff Briefing .... COMPLETE

a. Confirm the V-speeds and N_1 to be used for takeoff. Check that the airspeed bugs are properly set.

b. Discuss the departure with respect to turns, initial altitude, and climb requirements for noise and/or obstacles as published for the airport being used.

c. The takeoff roll should be aborted if any of the following occur before V_1:

- Fire/overheat warning
- Engine malfunction
- Illumination of the ENG 2 FAIL light
- Illumination of any red light on the master failure warning panel
- Uncommanded horizontal stabilizer movement
- Any other condition prebriefed by the captain as dictated by company policy or environmental conditions

NOTE

The pilot observing the problem will say "Abort." It is important to note that the immediate use of antiskid braking is the most important part of the stopping procedure. Therefore, the aircraft will be stopped using the following simultaneous procedure:

1. Antiskid Braking .... MAXIMUM

2. Throttles .... IDLE

3. Airbrake .... EXTEND

4. Thrust Reverser .... AS NECESSARY

d. The captain starts the throttles forward, and the copilot trims the power to takeoff N_1 while calling "Power set."

e. The copilot calls "80 knots." At this call the captain normally moves his left hand from the nosewheel steering to the yoke. Above 80 knots, the rudder should be effective for directional control. However, if runway or wind conditions dictate otherwise, the nosewheel steering can be safely used up to rotation speed.

f. The copilot calls "V_1" as the charted speed is attained on the airspeed indicator. Any malfunction after V_1 will be treated as an inflight problem, with the proper actions and checklists applied after a safe altitude is reached. The captain's intentions as to the type of emergency return to be requested, if necessary, should be briefed at this time.

g. The copilot calls "Rotate" at the charted V_R/V_2 speed. The captain will then apply back pressure to the yoke to attain the charted rotation attitude.

BEFORE TAKEOFF

1. Radar (2)/Transponder.. ON

   The radar should be tuned and ready, especially if there is questionable convective weather in the area of the departure airfield. The transponder must be turned on with the appropriate code set.

2. Parking Brake Handle.. IN

   Disengage the parking brake handle by pushing in on the center button release while moving the handle to the full forward position. Ensure that the #2 P BK light on the master warning panel is extinguished.

3. Flaps-Airbrakes-Trims-Speeds (FATS) .... CHECKED/SET

   Check that each item is in its proper position by physically checking the control handles, switches, or dials. The respective indicators must be checked as well to ensure proper indications of the selected positions.

4. Anticollision Lights .... ALL

   This selection ensures the white wingtip strobe lights are activated, as well as the belly and tail red strobe lights.

5. Landing Lights .... ON

Place the landing lights on or, in the case of some aircraft, in pulse, day or night conditions dictating.

CAUTION

Do not use the landing lights for more than 15 minutes while on the ground, as damage may result. A 45-minute ground cooling period must be observed at the end of 15-minute ground operation. There is no time restriction for use of the landing lights in flight, as they are individually ventilated by ram-air scoops.

6. Start Selector Switches (3) (If Necessary) .... AIRSTART

Select the AIRSTART position for takeoff if the runway has any amount of water, snow or slush on it, or if the presence of birds is expected.

NOTE

It is advisable to use ignition for all takeoffs and landings, as it may provide an immediate relight of an engine should an inadvertent flameout occur during these critical phases of flight.

7. Pitot Heat Switches (3) .... ON

Just prior to beginning takeoff roll, turn on all three pitot heat switches to obtain anti-icing of the pitot probes, stall warning vanes, static ports, Rosemont probe, and, if installed, the Teledyne AOA probe.

CAUTION

Avoid placing these switches to the on position at too early a time before beginning the takeoff roll. Overheating of the probes may cause the loss of proper pitot-static and temperature data provided to the flight instruments and the ID-802 advisory display.

8. All Warning Lights .... OUT

All warning lights on the master warning panel, hydraulic panel, and fire warning panel must be out.

9. Heading and Bugs .... CHECKED

AFTER TAKEOFF

1. Landing Gear .... UP

   When a positive rate of climb is indicated on both the altimeter and vertical speed indicator, and upon the captain's command, the copilot places the landing gear selector up. Confirm the proper retraction of the landing gear until the gear is up and the door lights are out.

   After takeoff from a snow- or slush-covered runway, delay landing gear retraction 15 seconds, provided that obstacle clearance requirements are respected in case of an engine failure. If necessary, and at an airspeed below 190 knots, cycle the gear up and down prior to final retraction. However, gear cycling does not apply to aircraft equipped with a brake heating system (SB F900-32).

2. Wing Anti-ice Switch .... AS REQUIRED

   If the total air temperature is below +10°C and prior to entering visible moisture, place the wing anti-ice switch on after the gear has fully retracted.

   For aircraft equipped with a brake heating system (SB F900-32), and after takeoff from a snow- or slush-covered runway, the following procedure applies. Once the landing gear is retracted, switch on the brake heating system by selecting the WING-BRK position on the wing anti-ice switch. Leave the switch in this position for at least 10 minutes. After this time, depending on atmospheric conditions, the anti-ice switch should be set to WING or OFF.

3. Flaps-Slats .... CLEAN/HYDRAULICS CHECKED

   Flaps-slats are retracted at V_2 +25 knots, regardless of the takeoff configuration. Upon the captain's command, the copilot retracts the flaps-slats incrementally, one notch at a time. Confirm the proper retraction by referring to the flap-slat gage on the copilot's instrument panel. Check that the hydraulic pressures and quantities are normal at the end of the retraction cycle.

4. Start Selector Switches (3) .... GROUND START

   Select all three igniter switches to ground start unless conditions require that the ignition remain on.

5. Climb Power .... SET

6. Taxi Light .... OUT

   The landing lights may be turned off at this time unless company policy dictates leaving them on until a higher altitude is reached.

7. Fasten Belts/No Smoking Switches.................................. AS REQUIRED

   These switches may be turned off at any time the flight conditions permit.

8. Cabin Pressure and Temperature... CHECKED

   Check the cabin rate of climb, cabin altitude, and differential pressure indicator to confirm a normal pressurization schedule. Confirm there is airflow through the gaspers. Rotate the temperature control knobs for the desired temperature in the cabin and in the cockpit. If desired, and if there is a remote temperature control for the cabin, the remote position may be selected at this time for passenger convenience.

9. Entrance Curtain... AS REQUIRED

   It is recommended that the entrance curtain be closed to provide insulation from the cold and to reduce the noise level at this location.

After 10,000 feet:

1. Landing Lights.. OFF

   The landing lights may be turned off at this time unless company policy dictates leaving them on until a higher altitude is reached.

After 18,000 feet or transition level:

1. Altimeters 29.92/1013

   Set the altimeter to QNE to comply with the FARs.

2. Oxygen.. AS REQUIRED

   Recheck the oxygen quantity to ensure adequate quantity remains and that no oxygen has leaked since the Before Start checklist. Passenger oxygen should be in normal, and each pilot mask should be selected to 100%.

3. Station Check:

   a. Circuit Breakers.. CHECKED

   b. Electrical Panel.. CHECKED

   c. Engine Instruments.. CHECKED

   d. Hydraulic Panel .... CHECKED

   e. Fuel Panel and Quantities.. CHECKED

   f. Pressurization and Temperatures .... CHECKED

CRUISE

1. Fuel Management .... AS REQUIRED

   Check that all tanks are feeding properly and that a reasonable balance is maintained. If the takeoff was made with a full load of fuel, and upon reaching the filed altitude, open the boost pump 1 to 2 and 3 to 2 crossfeed valves. The No. 2 fuel boost pump must be selected to the normal position in order that both boost pumps in group 2 tanks operate, to crossfeed fuel from the group 2 tanks to all three engines. When group 2 fuel tanks have shown a decrease of approximately 900 pounds of fuel, or when all three tank groups show the same level, return the 1 to 2 and 3 to 2 crossfeed valves to the closed position. The No. 2 boost pump should be kept in the normal position during all phases of flight.

2. Station Check.. PERIODICALLY

   The station check should be performed at least once each 15 minutes to ensure that all aircraft systems are operating normally. It is further recommended that systems readings be kept at least once an hour to track systems operations, especially fuel consumption.

DESCENT

1. Cabin Pressure Controls .... SET

   Set the automatic pressure controller mode selector to PROG. Set the landing field elevation in the LAND ELV window. Set the QNH, the local altimeter setting for the field at which the landing will be made, in the QNH window of the controller.

2. Fasten Belt .... ON

   Set the seat belt sign to go on in the event turbulence is encountered during the descent.

3. Anti-ice Systems.. AS REQUIRED

   If icing conditions are expected during the descent (temperature below +10°C and visible moisture), the anti-ice systems for the engines and wings should be turned on prior to entering the icing conditions. Ensure that the minimum power settings prescribed for anti-ice operations are followed, especially when in icing conditions. It may be necessary to use the airbrakes to maintain speeds and rate of descent when anti-ice systems are on and higher power settings become necessary.

4. Altimeters .... SET/CROSSCHECKED

When passing the transition level in the descent, four altimeters should be set to the landing airfield's QNH; the pilot's and copilot's barometric altimeter, the standby altimeter, and the QNH on the cain pressure controller.

5. Landing Computations/Bugs .... COMPLETE/SET

Determine the landing weight, and compute the requirements for runway distance/field length, V_{REF}, and go-around for that weight. Set the V_{REF} on the EADI by rotating the IAS knob on the DC-820 display controller on the center pedestal. This V_{REF} setting should only be changed for additives regarding the final approach configuration of the aircraft, that is, for flap settings less than 40°, if the airbrakes are locked in the extended position or if there is a flight control problem requiring an airspeed additive (Table NP-1).

When landing with any wind, or especially if gusty wind conditions exist at the landing airport, add half the steady wind component, plus the full gust component, not to exceed a 20-knot additive. Do not change the V_{REF} bug setting to incorporate wind, but carry the wind additive as a target speed above V_{REF}. One of the analog airspeed indicator bugs may be set on this target speed for final approach to touchdown. Any other analog airspeed indicator bugs may be set on VFR and 1.43 V_S in the eventuality of a go-around.

Wind additives are to be carried as an additive all the way to touchdown.

Table NP-1. Landing Computations

WT/1,000 LB	24	26	28	30	32	34	36	38	40	42	44
V_{REF}	100	104	108	112	115	119	122	126	129	132	135
HOLDING	172	179	187	193	201	207	212	219	223	228	234

V_{REF} Correction for Configuration (New Bug)

Clean Wing	+ 30 KT	Outboard Slats Only	+ 25 KT
Slats Only	+ 20 KT	Outboard Slats + 7° Flaps	+ 20 KT
Slats + 7° Flaps	+15 KT	Outboard Slats + 20° Flaps	+ 10 KT
Slats + 20° Flaps	+ 5 KT	Outboard Slats + 40° Flaps	+ 5 KT

Wind correction: 1/2 V Headwind + V Gust (Max. 20 KT)

6. Approach Briefing .... COMPLETE

a. Confirm the V_{REF} and landing distance/field length.

b. Discuss the approach to be used:

(1) Type and runway direction

(2) Approach frequency and identification

(3) Airport elevation

(4) Minimum safe altitude

(5) Any transition altitude

(6) The inbound magnetic course

(7) The final approach fix altitude

(8) All missed-approach information

(9) The final approach speed to be used

(10) The missed approach point, timing, DME, etc.

(11) All added information to clarify the approach

(12) All lighting that is available

(13) All runway information: length, width, displaced threshold, touchdown runway remaining, etc.

c. The pilot not flying will make calls on final approach in accordance with the following:

(1) One dot left or right—"Localizer"

(2) One dot above or any below—"Glide slope"

(3) Any altitude deviation—"Altitude"

(4) Any vertical sink over 1,000 fpm—"Sink rate"

(5) Any bank over 30°—"Bank"

(6) +10/–0 knots from target speed—"Airspeed"

(7) 1,000 feet above DH or MDA—"1,000 above"

(8) 500 feet above DH or MDA—"500 above"

(9) 100 feet above DH or MDA—"Approaching minimums"

(10) At minimums:

- With runway in sight—"Minimums-land"
- With no runway in sight—"Minimums-go around"

Below 10,000 feet:

1. Landing Lights.. ON

   Turn the landing lights on or to pulse (those so equipped) to assist in being seen by other aircraft.

APPROACH

1. Entrance Curtain .... OPEN

   As soon as practical prior to entering the approach pattern, open the entrance curtain, as it is an FAA requirement that the main entrance be clear of obstructions prior to landing.

2. No Smoking Sign... ON

   Place the no smoking sign on prior to landing, as it is an FAA requirement that all smoking materials be extinguished before landing. This is also a signal to the passengers that landing is imminent.

3. Altimeters/Radio Altimeters................................. SET/CROSSCHECKED

   Once again, confirm all altimeters are set to the current station setting to ensure proper altimeter readings at the DA or MDA. Additionally, set the HAT/HAA on the radio altimeter for the approach to be flown. This RA setting is for backup information only and not to be used for determining decision altitude or minimum descent altitude. Its primary use if for determining the missed approach point for a Category II ILS approach.

4. Fuel Crossfeeds (3)... CLOSED

   The aircraft manufacturer requires that all three fuel crossfeed valves be closed and that the fuel system be in a tank-to-engine configuration for all normal operations.

5. Flaps-Slats .... +20° FLAPS + SLATS

   When the airspeed is below 200 knots, select the flap-slat handle to 7° FLAPS + SLATS. Confirm that the flaps move to the position selected and that the slats have properly extended by observing that the green slat light is steady. When the airspeed is below 190 knots, select the flap-slat handle to 20° FLAPS + SLATS. Confirm that the flaps move to the position selected.

CAUTION

Whenever moving the flap-slat handle in flight, move it one increment at a time to ensure the proper movement to the position selected.

BEFORE LANDING

1. Landing Gear .... DOWN/THREE GREEN

   Select the landing gear handle to the down position. Confirm proper operation of the landing gear doors and extension of the landing gear. Make a positive effort to watch the gear until all three are down and locked with the proper three green arrow light indications. The red gear door lights should be out as long as the gear was lowered in the normal manner.

2. Antiskid .... TESTED

   The brake selector switch must be in the #1 ASKID ON position. The landing gear control handle must be in the down position. Depress and **hold** the brake pedals. The green L or R brake lights should not illuminate. While holding the brake pedals depressed, momentarily depress and then release the antiskid test button. The green L and R brake lights will illuminate about one second after depressing the test switch and should then extinguish about one second later. Release the foot pressure on the brakes after the green lights extinguish. The lights should remain out.

NOTE

The antiskid test should be performed only when the gears are down and locked not during the gear transit.

3. Hydraulics.. CHECKED

   Check that the hydraulic pressure and quantity indications are normal after final activation of all the hydraulic components on final approach before landing. This is a final check to ensure that you have hydraulic pressure available for activation of airbrakes, brakes, and nosewheel steering during landing roll.

4. Airbrake Handle .... ZERO/LIGHT OUT

   The airbrakes must not be extended in flight when within 300 feet above ground level. Physically check that the airbrake handle is in the forward, or zero, position and that the amber AIR BRAKE light on the landing gear control panel is out.

5. Flaps-Slats .... +40° FLAPS + SLATS

   Normal approach conditions are as follows:

   - During a VFR approach, the flaps may be set to 40° upon turning from the base leg to final approach.
   - During an ILS approach, the flaps may be set to 40° when the instruments indicate you are one dot below the glide path.

- During a nonprecision approach, the flaps may be set to 40° when the aircraft is visual and in a position to land, usually when "breaking out" on final approach or at the visual descent point.
- When inside the final approach fix, with the flaps set at 40°, establish an airspeed of V_{REF} + wind correction. The demonstrated maximum crosswind component on a dry runway is 30 knots.

NOTE

Whether landing in steady or gusty wind conditions, V_{REF} must be increased by half the steady wind factor plus the full gust factor, not to exceed a 20-knot additive.

6. Start Selector Switches (3) .... AS REQUIRED

   It is recommended that the igniters be placed to the AIRSTART position if birds are present on final approach or if the runway is reported to be wet or covered with snow, slush, or ice.

7. Autopilot .... OFF

   The autopilot must be disconnected before landing the aircraft. The autopilot may be disconnected by any one of the following means:

   - Depressing the autopilot disconnect switch at the forward, lower, outboard position of either pilot's control wheel
   - Depressing the go-around switch at the top outboard position of either yoke
   - Depressing the normal elevator trim switches at the top outboard position of either yoke
   - Activating the emergency elevator control switch on the center pedestal
   - Depressing the AP button on the flight guidance controller on the center pedestal. This is the button used to engage the autopilot as well.

AFTER LANDING

1. Thrust Reverser .... STOWED

   TRANSIT and REV UNLOCK Lights .... OUT

   Confirm that the thrust reverser has stowed when the thrust reverser control lever is placed to the stow position.

2. Anti-ice—Wing (or Wing-BRK).. OFF

   Wing anti-icing must be turned off as soon as possible after landing. If icing conditions still exist after landing, engine anti-icing may be left on until parking the aircraft.

   CAUTION

   If wing anti-icing is inadvertently left on after landing, do not retract the slats until the wing leading edge has cooled sufficiently.

3. Pitot Heat Switches (3).. OFF

   In sequence with the preceding items, it is necessary to turn off all three pitot heat switches as soon as landing roll is complete to preclude overheating of the pitot-static components and errors in the air data systems.

4. Start Selector Switches (3).. OFF

   IGN Lights (3).. OUT

   If the igniters were placed to airstart for the approach and landing, they should be placed to the ground start position during taxi-in to the ramp.

5. Anticollision Lights.. RED

   Move the three-position anticollision light switch to the RED position, which turns off the white wingtip strobe lights. Only the red lights need be illuminated until the engines are shut down at the ramp.

6. Landing Lights.. OFF

   If the landing lights are not needed for taxi to the ramp, they should be turned off to prevent overheating of the housings and the lenses. The landing lights may be used for 15 minutes on the ground but require a 45-minute cooling period after that 15-minute use. There is no limit to the in-flight use of landing lights.

7. Taxi Light.. ON

   The taxi light should be left on for taxi-in to the ramp, day or night. During the day, the taxi light provides additional recognition potential for the aircraft to other taxiing aircraft, as well as for ground vehicles.

8. Radar (2)/Transponder.. STANDBY

   These units are no longer needed for ground operations and should be turned off before reaching the ramp.

9. Flap + Slats Handle .... CLEAN

Place the flap-slat handle to CLEAN to prevent possible damage to these surfaces while taxiing near or over obstacles.

10. Airbrake Handle .... ZERO

Select the zero position with the airbrake control handle.

11. Windshield Heat Switches (3) .... OFF

If not required for further flight, the windshield heat switches may be turned off.

12. Trims (3) .... TAKEOFF POSITION

Set all three control surface trims to the proper position for takeoff. The aircraft will be in proper trim for an ensuing takeoff.

13. Bus-Tied Switch .... TIED

If the APU is to be started, this properly arms the electrical interlock circuit for starting. This action also ensures APU electrical power is supplied to all the electrical buses when the engines are shut down.

14. APU .... AS REQUIRED

If the APU is needed for ground operations, or for subsequent engine starting during a short turnaround, start the APU as follows:

a. APU Master .... ON/GREEN

b. APU Generator .... ON/GREEN

c. APU Start Switch .... DEPRESSED 1 SECOND MAX

d. APU Bleed Switch .... AS REQUIRED

NOTE

As a minimum, the No. 2 and No. 3 engines should be kept running until parked at the ramp. The No. 1 engine may be shut down during taxi to the ramp, provided a 2-minute conditioning period at idle power is accomplished.

PARKING

1. Park Brake/No. 2 Brake Light .... INTERMEDIATE DETENT/ON STEADY

2. Flight Data (Fuel-IRS).......... RECORDED

3. AVIONICS/FMS/EFIS Masters .... OFF (IN)

   For those aircraft equipped with one, two, or three master switches, turn them off at this time. It is recommended that the communication and navigation radios be turned off at their respective control heads as well to save the LED from early failure when AVIONICS masters are turned on and off during ground operations.

4. Engine Anti-ice Switches (3).......... OFF

   Prior to shutting down the engines, the engine anti-ice switches should be turned off and the engines stabilized.

5. Taxi Light .... OFF

6. IRS (2 or 3) .... AS REQUIRED

7. Radar (2)/Transponder.......... OFF

8. Standby Horizon .... CAGED

   Pull the knob on the emergency horizon, and rotate it clockwise to cage the mechanism.

9. Standby Pump.......... OFF

   The standby hydraulic pump should be selected off.

10. VHF/No. 2 Emergency Battery .... OFF

11. Engines (3) (After 2 minutes at idle speed).......... CUT OFF

12. Booster Pump Switches (3) with APU (2).......... OFF

13. Anticollision/Navigation Lights .... OFF

    These lights may be turned off as long as the engines are not running or if there is no power being supplied to the aircraft.

14. Fasten Belt/No Smoking/Emergency Lights .... OFF

Turn the cabin warning and emergency exit lights off before removing electrical power from the aircraft. Although this does not affect the cabin warning lights, it does affect the emergency lights, as they will come on when power is removed from the main buses.

15. Interior Lights .... OFF

Turn off all extraneous cabin lights to prevent excessive drain on the main batteries when power is again applied to the aircraft.

16. APU/No. 2 Booster Pump .... STOP/OFF

Depress the stop button on the APU to shut it down, and turn off the No. 2 booster pump, as it is no longer needed. Turn the APU master switch off when the low oil pressure light comes on.

17. Batteries (2) .... OFF

As soon as possible after supplementary electrical power is removed from the aircraft, turn off both batteries to prevent an excessive drain of battery power.

18. Engine Computers (Last Flight) .... AS REQUIRED

19. Generator Switches (Last Flight)....................................... AS REQUIRED

20. Aircraft Chocked .... BRAKES OFF

The park brake should not be left on for extended parking periods. Ensure proper chocking before release of parking brake.

ADVERSE WEATHER CONDITIONS

OPERATING IN ICING CONDITIONS

NOTE

Icing conditions exist on the ground or for takeoff when OAT is 10°C (50°F) or below when operating on ramps, on taxiways, or runways where surface snow or slush may be ingested by the engines or freeze on engines, nacelles, or engine sensor probe.

Icing conditions exist in flight when TAT is 10°C (50°F) or below and visible moisture is present in any form (such as clouds, fog with visibility of one mile or less, rain, snow, sleet and ice crystals).

1. Engine anti-ice systems (ENG ANTI-ICE) should be switched on in flight or on ground when icing conditions exist or are anticipated, except during climb and cruise when the temperature is less than –40°C SAT or TAT more than +10°C (50°F).

   However, flying in vicinity or through a "cumuliform" cloud can result in rapid variation of SAT with SAT increasing above –40°C. In such case, anticipate icing conditions by selecting the anti-icing system on.

   Do not rely on airframe visual cues to turn anti-icing system on. Use the temperature and visible moisture criteria specified.

   Conclusion:

   During climb and cruise, the pneumatic anti-ice system shall be turned on:

   • Below +10°C (50°F) TAT and above –40°C

   • In visible moisture

   If both of these conditions are not met, the anti-ice should be turned off.

2. Wing anti-ice system (WING ANTI-ICE) should be switched on in flight prior to entering visible moisture whenever the TAT is +10°C or below.

3. Encounter with icing conditions is evidenced by the formation of ice on the non anti-iced area around the windshield panes. In night flight operation, lights switched on by WING (EXTERIOR LIGHTS) switch illuminate the wing leading edges to allow the detection of ice.

4. Comply with engine and wing anti-ice system operational limits and with minimum N_1 speed values.

5. If necessary during the approach , increase the approach speed and extend the airbrakes to help keep N_1 speed to no less than the specified value.

The N_1 speed of the operative engines must not be less than the minimum values as shown in table below.

Three Engines Operative

Table NP-2. Three Engines Operative

TAT	–30° to –20°C	–20° to –10°C	–10° to 0°C	0° to +10°C
Above 20,000 ft	80%	76%	73%	65%
From 20,000 ft to 10,000 ft	76%	73%	65%	58%
Below 10,000 ft	68%	65%	61%	58%

Two Engines Operative

Increase the values shown in Table NP-2:

- By 9% if N_1 is equal to or higher than 65%
- By 6% if N_1 is lower than 65%

Landing Gear Operation

In icing conditions, the failure of the red landing gear lights to go out when landing gear retraction is accomplished may be due to ice preventing locking of the main gear in up position.

- Maintain indicated airspeed lower than or equal to VLO (190 KIAS)
- After take-off from a snow (dry or wet) or slush covered runway, delay landing gear retraction for 15 seconds, provided that obstacle clearance requirements are respected in case of one engine failure (with gear extended, the second segment climb is 1.7% less). If necessary, and at airspeed below 190 kts, cycle the gear up and down prior to final retraction (gear cycling does not apply to aircraft equipped with a brake heating system (SB F900-32).
- During approach, if take-off was from a snow (dry or wet) or slush covered runway, proceed as follow:
    - Landing gear down and checked
    - Brake selector #1, anti-skid OFF
- Apply maximum brake pressure several times .
    - Re-active anti-skid system, brake selector #1, anti-skid ON
- Perform antiskid test as usual

Slat System Operation

Should the slats fail to fully retract when retraction is initiated in icing conditions (red transit light ON):

1. Maintain airspeed at V_{FE} (200 KIAS) or below.
2. Leave wing anti-ice system on and maintain engine power settings at or above minimum values.

Windshield Anti-Icing

Selection of the WINDSHIELD PILOT and COPILOT switches to the MAX position should be limited to those icing conditions encountered in flight such that the ice protection afforded in the NORM position is inadequate

When the aircraft has been left on the ground for several hours or one night in ambient temperatures of 5 °F (-15°C) or below , cockpit windows incorporating a heating network must be heated as follows:

- Place both WINSHIELD PILOT/COPILOT switches in the NORM position (medium heating)
- Also switch on the side window heating switch SIDE.
- Keep the heating ON for 15 minutes before leaving the ramp

COLD WEATHER OPERATION

Fuel Selection

Prior to prolonged parking in very low temperature conditions, ensure (by replacement if necessary) that the freezing point of the fuel used is lower than the anticipated minimum ambient temperature.

In-flight tank fuel temperature must be maintained at least 3°C above the freezing point of fuel being used. If necessary, increase mach number or decrease altitude to raise the total air temperature.

This should be achieved if the total air temperature is not more than 13°C (23°F) below the fuel freezing point .

As water may freeze as it settles out of the fuel when the aircraft is parked in the cold, draining must not be carried out until the aircraft has been parked on heated areas of the airfield or in a heated hangar.

While moisture in the fuel is not exclusively a cold weather problem, it does frequently cause trouble during engine starts in below freezing weather.

Water Servicing

On ground when cold temperatures are expected, water has to be drained properly to prevent any water circuit leaks.

Observe the procedure in the *Ground Servicing Manuel* (DTM 567, Water Section)

Operational Concniderations

During starting, taxing, after take off and prior to landing on a runway covered with snow or slush:

- Activate the airstart engine ignition system
- After take off, to get rid of the slush accumulated during taxi and take off, cycle the gear up and down prior to final retraction.
- Before landing, apply maximum brake pressure several times, using the anti-skid OFF. Reactivate and check the antiskid prior to landing.

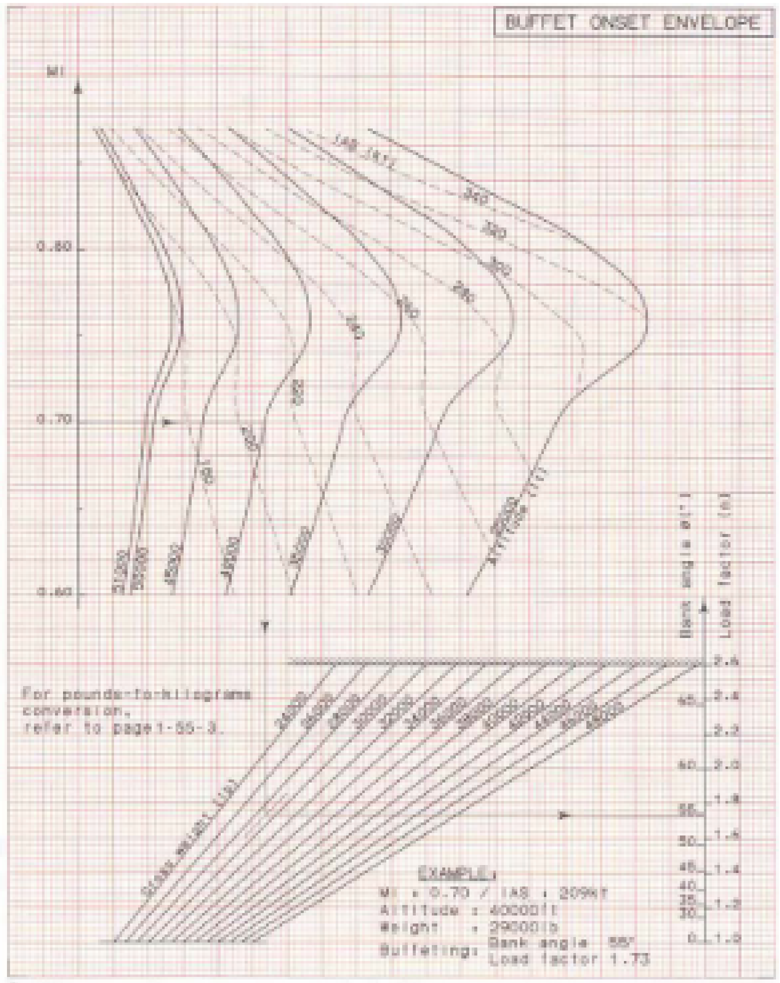


Figure NP-4. Buffet Onset Envelope

SEVERE TURBULENCE PENETRATION

Flights in severe turbulence should be avoided whenever conditions permit.

If necessary, reduce the speed to 280 KIAS max or MI 0.76 max, fasten the seat belts, decrease altitude to increase buffet boundary margin.

NOTE

Autopilot or yaw damper operation is permitted.

With the autopilot disengaged:
- Fly attitude
- Avoid using the stabilizer trim
- Do not chase altitude and speed

WINDSHEAR SITUATION

If windshear is anticipated:

- Do not take off—Wait
- Do not land—Wait or fly to an alternate airport

Pilot reaction time must be very low—3 to 5 seconds. If the pilot takes 15 seconds or more to understand the situation, it will be too late.

If a windshear encounter is imminently anticipated, decide to go around:

1. Go around pushbutton .... DEPRESSED
2. Level the wings.
3. Pull up to stall warning onset.
4. Power levers .... FULL FORWARD
5. AIRBRAKES handle.. POSITION 0
6. Slats-flaps handle.................................... SECOND NOTCH MAXIMUM

At pilot's discretion according to aircraft height and vertical speed:

7. Landing gear .... UP

Pilot must be aware that the landing gear must not be raised as long as a positive rate of climb and terrain clearance are not established. The following are two reasons for this:

- In case of contact with the ground, the gear will absorb most of the impact energy
- Although a small performance increase is available after landing gear retraction, initial performance degradation may occur when landing gear doors open for retraction.

ABNORMAL PROCEDURES

CONTENTS

ILLUSTRATIONS

TABLES

ABNORMAL PROCEDURES

NOTE

This abnormal procedures checklist is provided for training purposes only. Where checklist procedures differ from the *Airplane Flight Manual*, the *Airplane Flight Manual* takes precedence.

LANDING DISTANCE ADDITIONS

The following are additives to be made to the landing distances computed for a 40° flaps + slats landing under normal circumstances.

NOTE

LD—Landing distance.

EMERGENCY CHECKLIST

Loss of Both Hydraulic Systems

Clean configuration, V_{REF} + 30 knots. Twice the normal landing distance. Landing field length is not addressed.

Approach and Landing—Two Engines Inoperative

If using No. 2 brakes, add 50% to both the LD.

After making the additive for use of No. 2 brakes above and if landing with:

- 7° flaps + slats, fly V_{REF} + 20 knots; add 800 feet to LD.
- 20° flaps + slats, fly V_{REF} + 10 knots; add 400 feet to LD.

ABNORMAL CHECKLIST

Approach and Landing—One Engine Inoperative

If using:

- 7° flaps + slats, fly V_{REF} + 15 knots; add 600 feet to LD.
- 20° flaps + slats, fly V_{REF} + 5 knots; add 200 feet to LD.

Loss of No. 1 Hydraulic System

Add 60% to the LD.

Loss of No. 2 Hydraulic System

The following additions must be made to the landing distance (LD) computations.

- 0° flaps + slats, fly V_{REF} + 20 knots; add 800 feet to LD.
- 7° flaps + slats, fly V_{REF} + 15 knots; add 600 feet to LD.
- 20° flaps + slats, fly V_{REF} + 5 knots; add 200 feet to LD.
- 40° flaps + slats, land at V_{REF}.

After making the additions for flaps and slats add 10% to the LD for no airbrakes.

Inoperative Stabilizer

Use 20° flaps + slats, and fly V_{REF} + 20 knots; add 800 feet to LD.

Inoperative Elevator

Use 40° flaps + slats, and fly V_{REF} + 10 knots; add 1,800 feet to LD.

PITCH FEEL Light On (Arthur Unit Failed in Heavy Force Position)

Fly V_{REF} + 10 knots; add 800 feet to LD.

Flap Asymmetry

If using:

- Up to 7° flaps + slats, fly V_{REF} + 20 knots; add 800 feet to LD.
- 7° to 20° flaps + slats, fly V_{REF} + 15 knots; add 600 feet to LD.
- 20° to 40° flaps + slats, fly V_{REF} + 5 knots; add 200 feet to LD.

Landing with Slats or Flaps Malfunctions

If using:

- 40° flaps + outboard slats only, fly V_{REF} + 5 knots; add 200 feet to LD.
- Flaps/slats clean, fly V_{REF} + 30 knots; add 50% to LD.

Landing with Airbrake Malfunctions

If:

- Airbrakes are extended to position 1, fly V_{REF} + 10 knots; add 600 feet to LD.
- Airbrakes are extended to position 2, fly V_{REF} + 15 knots; add 600 feet to LD.
- Airbrakes do not extend, add 10% to the LD.

Landing with Antiskid Inoperative

Use brakes in #2 A/SKID OFF selected; add 50% to the LD.

Landing with Parking Brake Only

Add 50% to the LD.

ENGINES

NOTE

The warning of an engine failure on the ground during takeoff roll is given either by a yawing of the aircraft, if the No. 1 or No. 3 engine fails, or by illumination of the red ENG 2 FAIL light, if the center engine fails.

ENGINE FAILURE BEFORE V_1

Reject the takeoff:

1. Brakes .... MAXIMUM PRESSURE

   Use the brakes to their maximum pressure, depending on length of runway, during any aborted takeoff. The brakes, in No. 1 position with antiskid on, are the most important factor in stopping performance. They should be applied as other actions are taken to decelerate the aircraft.

2. Power Levers .... IDLE

   Immediately upon the abort call, retard the power levers to idle. Do not bring the power levers to cutoff; otherwise, hydraulic pressure for stopping the aircraft may be lost.

3. Airbrake Handle .... POSITION 2

   Ensure that the airbrake handle is placed to position 2. Extending the airbrakes decreases lift on the wings and makes braking more effective. While on the ground, if the failure was the No. 2 engine, the standby hydraulic pump will automatically operate when the hydraulic pressure in the No. 2 system drops to approximately 1,500 psi.

4. Thrust Reverser... DEPLOYED

   Use the thrust reverser as an added benefit to stopping performance. Before ordering reverser deployment, ensure that the aircraft is firmly on the ground on all three gears, the airbrakes are extended, and No. 2 engine is effectively at idle power. The thrust reverser can be used until normal taxi speed is achieved without risk of reingestion of gases and compressor stalls. The thrust reverser is most effective, however, at the higher speeds during deceleration. It should be used to slow the aircraft to at least a speed of 89 knots, which is the hydroplaning speed of a Falcon 900.

NOTE

Accelerate-stop performance is based on a 2-second time delay from initiation of the abort to being in the stopping configuration described in this procedure. Thrust reverser is not a performance consideration in stopping performance of the aircraft. Charted stopping performance is based on the use of antiskid braking and the deployment of airbrakes to position 2.

ENGINE FAILURE AFTER V_1

Continue the takeoff:

1. At V_R .... ROTATE NORMALLY

   Rotate the aircraft to the normal pitch attitude calculated from the flight manual charts, usually a minimum of 13.5° for a 20° flaps + slats takeoff or 14.5° for 7° flaps + slats takeoff. This will ensure a minimum climbout gross climb gradient of 2.7% in the second segment of climb.

2. Airspeed .... MAINTAIN V_2

   If possible, maintain a speed of V_2 for climbout to a minimum altitude of 400 feet AGL. If the speed is higher than V_2, maintain that speed, and do not allow the speed to increase further. Do not pull the nose up further to try to bring the speed back to V_2.

3. Positive Rate of Climb .... GEAR UP

   A positive rate of climb is defined as an indication of climb showing on both the altimeter and the rate-of-climb indicator.

4. Crew and Passenger Bleed-Air Switches .... OFF

   The performance charts for climbout in the second segment are calculated with these bleed systems turned off.

5. Wing Anti-ice .... AS REQUIRED

   If anti-icing conditions are present, turn on the wing anti-ice switch after the landing gear has been retracted. The performance charts do account for the use of wing anti-icing, if needed.

CAUTION

If the engine failure occurs at a speed above V_2, maintain the speed attained.

At no lower than 400 feet AGL and above safety altitude:

6. Level Flight Acceleration .... INITIATE

   Acceleration to flaps/slats retraction speeds may be accomplished while in level flight. ***Do not descend.*** However, the aircraft must be capable of climbing in this transition segment with a minimum gross climb gradient of 1.5%. If the aircraft meets second-segment climb requirements, it will automatically meet transition and final segment climb requirements.

7. ST–BY Hydraulic Pump Switch (If No. 2 Engine Failed) .... ON

   If the No. 2 engine has failed, there may not be enough windmilling rpm to operate the engine-driven hydraulic pump. In order to obtain operation of No. 2 hydraulic system components, position the standby hydraulic pump switch to ON. In flight, with the standby pump switch in AUTO, the standby pump will operate only when the airbrakes are selected to position 1 or 2.

8. At V_2 + 25 knots—FLAPS–SLATS Handle .... CLEAN

   When an airspeed of V_2 + 25 knots is achieved, regardless of the takeoff configuration, retract the slats and flaps incrementally to the clean position. Check that the flap position indicator on the configuration panel is at 0°.

9. Enroute Climb Speed .... ATTAIN

   Compute the enroute climb speed from the performance charts. This speed is 1.43 VS in the clean configuration. It is also the best rate-of-climb speed if on one engine, the maximum lift over drag speed, and the best speed to use for driftdown if all engines have failed and cannot be restarted.

10. Failed Engine .... IDENTIFIED

    Analyze all engine indications. Attempt an airstart on the failed engine unless a greater emergency exists with the engine. Both pilots must make a positive and confirmed identification of the affected engine before any further actions are taken. Shut down the inoperative engine (see "Engine Failure In Flight," this chapter).

Five minutes after brake release:

11. Crew and Passenger Bleed Switches .... AUTO

    At this point, it may no longer be necessary to leave these switches off to meet performance chart requirements. If required, they may be turned back on as soon as the final climbout segment has begun.

12. Maximum Continuous Thrust .... SET

    On the two remaining engines, change the thrust from the takeoff thrust power settings to the charted maximum continuous thrust power settings.

NOTE

It is the captain's responsibility to decide whether to continue the flight or interrupt it as soon as possible and apply the One Engine Inoperative Approach and Landing procedure.

NOTE

An attempt airstart may be tried on the failed engine (see "Airstart" section, this chapter). If an airstart is unsuccessful, complete the engine shutdown procedure (see "Engine Failure In Flight" section in this chapter).

ENGINE FAILURE IN FLIGHT

The OIL, GEN, and possibly PUMP lights illuminate.

Yawing tendency (failure of No. 1 or No. 3 engine):

Determine which engine has failed. Analyze all engine indications. Attempt an airstart on the failed engine unless a greater emergency exists with the engine. Both pilots must make a positive and confirmed identification of the affected engine before any further actions are taken.

Engine Shutdown

1. Power Lever.. RETARDED AND MAINTAINED ONE MINUTE TO IDLE (IF POSSIBLE)

   If the engine is still running, and a precautionary engine shutdown is necessary, if possible, allow the engine to cool at idle for one minute before shutdown.

2. Power Lever... CUTOFF

   After positive identification of the proper engine to be shut down, move the affected engine power lever to cutoff.

3. Booster Switch... OFF

   Unless needed for fuel balance operations, place the affected booster pump switch to OFF and check for corresponding fuel light on warning panel.

4. GEN Switch.. OFF

   The generator for the failed engine is no longer useful and should be turned OFF to preclude electrical anomalies associated with the electrical system.

5. Engine Anti-ice Switch.. OFF

   This closes the anti-icing valves (air intake and No. 2 engine S-duct).

6. Fuel Shutoff Switch (If Engine Cannot Be Restarted) .... OFF

CAUTION

If the engine cannot be restarted, switch the fuel shutoff valve off. In icing conditions, operate No. 2 engine anti-icing even with the No. 2 engine shut down. The isolation valve must be open.

This will allow bleed air from the bleed-air manifold to anti-ice the S-duct. If the No. 1 or No. 3 engine is shut down, turn off the engine anti-icing switch, even when in icing conditions.

If Engine Shutdown procedure was initiated due to engine failure during takeoff (after V_1) **5 minutes after brake release and if obstacle clearance permits:**

7. Crew and Passenger Bleed-Air Switches .... AUTO

8. Maximum Continuous Thrust.. SET

If required, see One Engine Inoperative Drift Down chart.

NOTE

After an unsuccessful airstart attempt of engine 1 or 3, select bus-tied switch to FLIGHT NORM and check that the BUS TIED light is out.

If the No. 2 engine is shut down:

8. Bus-Tied Switch .... TIED

   Since the No. 2 generator is no longer supplying electrical power to the right DC electrical buses, tie the buses to save the No. 2 battery from depletion. Check the volts and amps on the two operating generators and illumination of the bus-tied light.

9. ST-BY Hydraulic Pump Switch .... ON (AS REQUIRED)

   If needed to supply hydraulic power to the No. 2 hydraulic system, turn on the standby hydraulic pump switch. A windmilling engine, dependent upon its rpm, may not be able to supply enough hydraulic power to operate No. 2 system components..

CAUTION

Regardless of flight conditions, fuel in the center group of tanks must not be kept at a higher level than the side tanks to prevent problems caused by an aft CG location at the end of the flight.

10. Booster 2 Switch.. NORMAL

    This will allow normal booster pump operation and prepare the standby booster pump for automatic operation once X–BP 2–1 and or 2–3 crossfeed switches are selected to crossfeed.

11. X–BP 1–2 and/or 2–3 .... OPEN

    a. X–BP light(s) checked .... ON

       If tank 2 level is higher:

    b. BOOSTER 1 or 3 .... AS REQUIRED

       In this case, BOOSTER 2 also supplies the side engine.

       If tank 2 level is lower:

    c. BOOSTER 2.. OFF

       In this case, BOOSTER 1 or 3 also supplies the center engine.

ONE ENGINE INOPERATIVE—APPROACH AND LANDING

1. Hydraulic Implications .... CHECKED

   Depending on which engine is shut down and which hydraulic system is affected, the hydraulic implication and special requirements should be checked, evaluated, and applied before beginning the approach.

2. Electrical Implications.. CHECKED

   Depending on which engine is shut down and which DC electrical bus is affected, electrical implications and bus loading should be taken care of before starting the approach.

3. Fuel Implications .... CHECKED

   If necessary, fuel quantities should be equalized to prevent problems that might be caused by an aft CG location at the end of the flight. After shutdown of the No. 2 engine, and regardless of the flight conditions, fuel in the center group of tanks must not be kept at a higher level than in side tanks.

4. Landing and Climb Requirements.. CHECKED

   The landing distance and landing field length requirements, as amended for hydraulic implications, must be calculated for the landing. In the event of a go-around, the maximum gross weight limit, to meet the 2.4% gross climb gradient requirement, must be checked.

5. EGPWS FLAPS O'RIDE Switch .... ON

   The GPWS FLAPS O'RIDE switch prevents the TOO LOW FLAPS audio warning from sounding when a less than 40° flap landing is made.

6. Crew Briefing .... COMPLETE

   The crew should be fully briefed on all plans and contingencies for the approach and landing to be flown. Special consideration must be given to the special requirements dictated by the emergency or abnormal situation that caused the engine to be shut down. The crew has to decide the approach configuration. The approach speed and the LD have to be adjusted accordingly. With 20° flaps + slats, increase the LD by 200 ft and V_{REF} + 5 knots. When 7° flaps + slats, increase the LD by 600 ft and V_{REF} + 15 knots.

7. Approach Checklist .... ACCOMPLISH

   a. Passenger Door Curtain.. OPEN

   Open the passenger door curtain to permit use of the passenger door as an emergency exit if necessary, and also ensure that the passengers have attached their seat belts correctly and that the passenger seats are in the required position for landing.

   b. No Smoking Sign.. ON

   c. Altimeters .... SET

   Set QNH or QFE as instructed by local air traffic control. QFE can only be selected if the pressure altitude of the destination airfield is inside the altimeter setting limits.

   d. Radio Altimeter DH .... SET

   Set the decision height according to the local regulations (approach map, crew qualifications, etc.).

   e. X–BP (All 3) .... CLOSED

   The fuel crossfeed valves must be closed for landing.

   f. Landing Lights .... ON

   If the landing lights incorporate a pulse mode, ensure that the ON position is selected.

g. Approach with 20° flaps + slats:

- Flap/Slat Handle....................................... 20° FLAPS + SLATS

At the usual point on approach, as would be done on a normal approach flown with three engines, set the flap/slat handle to 20° flaps + slats incrementally.

- Landing Gear Control .... DOWN

At the usual point on approach, as would be done on a normal approach flown with three engines, place the landing gear down.

- Airspeed .... V_{REF} + 5 KNOTS

Fly the final approach at the normal 40° flaps + slats V_{REF} speed plus 5 knots. Increase the landing distance by 200 feet. The standard correction for wind must be applied.

OR

g. Approach with 7° flaps + slats:

- Flap/Slat Handle .... 7° FLAPS + SLATS

At the usual point on approach, as would be done on a normal approach flown with three engines, set the flap/slat handle to 7° flaps + slats.

- Landing Gear Control .... DOWN

At the usual point on approach, as would be done on a normal approach flown with three engines, place the landing gear down.

- Airspeed .... VREF + 15 KNOTS

Fly the final approach at the normal 40° flaps + slats V_{REF} speed plus 15 knots. Increase the landing distance by 600 feet. The standard correction for wind must be applied.

8. Landing Checklist.. ACCOMPLISH

a. Landing Gear .... DOWN/CHECKED

Check for proper indication of landing gear extension and door sequencing.

b. Hydraulic Pressure .... CHECKED

Check for normal operating pressure of approximately 3,000 psi. If the No. 2 engine is inoperative, required hydraulic pressure for the No. 2 hydraulic system operating components can be supplied from the standby hydraulic pump (1,500 to 2,150 psi).

c. Anti-Skid .... CHECKED

Ensure that the braking selector switch is selected to the #1/ASKID ON position. Depress the brake pedals and check that the L and R NORM brake lights remain out. Depress the test pushbutton and check that the L and R NORM brake lights come on after one second, then go out one second later and remain out after releasing the brake pedals.

d. Airbrake Handle .... IN

NOTE

Airbrakes may be used during landing approach provided airspeed is at least V_{REF} + 10 knots. Increase landing distance by 15%.

e. Start Selector Switches (If Necessary) .... AIRSTART

Check for appropriate IGN lights on.

f. CAT 2 Mode Armed .... AS REQUIRED

Depress the CAT 2 pushbutton on the AP control unit and check that the CAT 2 message appears on the ID 802.

g. FLAP + SLAT HANDLE .... 40° FLAPS + SLATS AS REQUIRED

NOTE

If landing with the No. 2 engine inoperative, operation time for flap extension from 7 to 40 degrees (standby pump in use) will be doubled.

h. AUTOPILOT .... DISENGAGED

i. INDICATED AIRSPEED .... V_{REF}

ONE ENGINE INOPERATIVE—GO AROUND

1. Engine Thrust (Full Power) .... SET

   Upon the decision to go around, immediately advance the two operating engine power levers to the computed takeoff N_1.

2. Pitch Attitude .... SET

   It is imperative that the landing climb attitude be attained to ensure that the descent is stopped and the climbout is begun. This action is simultaneous with the advancement of the power levers to takeoff N_1.

3. Airbrake Handle .... ZERO

   If the airbrakes were extended for some reason during the approach, they must be retracted as power is applied and the aircraft is rotated to the landing climb attitude.

After completing the above checklist items, follow Procedure A or B below, depending on the flap configuration flown on the approach:

Procedure A—If the Approach was Flown with 20° Flaps + Slats

1. Flap/Slat Handle .... 20° FLAPS + SLATS

   Ensure that the FLAPS–SLATS handle is set to 20° flaps + slats during the go-around.

2. Landing Gear Control .... UP

   As soon as a climb is indicated on both the altimeter and the rate-of-climb indicator, raise the landing gear.

3. Airspeed to 400 Feet AGL... V_{REF} + 5 KNOTS

   The best climb speed to maintain to a minimum altitude of 400 feet above ground level is V_{REF} + 5 knots. If a higher speed is achieved during the rotation, maintain that speed to 400 feet AGL. Do not overrotate the aircraft.

Procedure B—If the Approach was Flown with 7° Flaps + Slats

1. Flap/Slat Handle .... 7° FLAPS + SLATS

   Ensure that the FLAPS–SLATS handle is set to 7° flaps + slats during the go-around.

When a positive rate of climb is established:

2. Landing Gear Control .... UP

   As soon as a climb is indicated on both the altimeter and the rate-of-climb indicator, raise the landing gear.

3. Airspeed to 400 Feet AGL... V_{REF} + 15 KNOTS

   The best climb speed to maintain to a minimum altitude of 400 feet above ground level is V_{REF} + 15 knots. If a higher speed is achieved during the rotation, maintain that speed to 400 feet AGL. Do not overrotate the aircraft.

For all go-around configurations, when reaching 400 feet AGL and above safety altitude:

4. Level Flight Acceleration .... INITIATE

   At an altitude no lower than 400 feet above ground level, maintain level flight while accelerating to the slats-flaps retract speed.

5. At V_2 + 25 Knots—FLAPS–SLATS .... CLEAN

   This is the normal retraction speed for the FLAPS–SLATS. You can use V_{REF} as the base speed, which is a conservative speed. For a given gross weight of the aircraft, V_{REF} speed is 7 knots higher than the V_2 speed for a 20° flaps + slats takeoff. Moreover, for a given gross weight, the V_{REF} speed is equal to the V_2 speed for a 7° flaps + slats takeoff. Remember, there is only one V_{REF} for the aircraft at a given gross weight. V_{REF} is 1.3 V_S in the normal landing configuration, which is 40° flaps + slats, gear down.

6. Enroute Climb Speed.. ATTAIN

   Once the slats-flaps are retracted, accelerate to the enroute climb speed of 1.43 V_S. Reduce engine thrust to the maximum continuous power setting.

Table AP-1. Landing Data

LANDING DATA 40° FLAPS + SLATS— STANDARD TEMPERATURE UNCORRECTED									
G. W. X 1,000	V_{REF}	LANDING DISTANCE/LANDING FIELD LENGTH						V_{REF}	G. W. X 1,000
		SEA LEVEL	2,000′	4,000′	6,000′	8,000′	10,000′		
24	**100**	2,150/3,500	2,250/3,750	2,350/3,900	2,450/4,050	2,550/4,250	2,650/4,400	172	**24**
26	**104**	2,250/3,750	2,350/3,900	2,450/4,050	2,550/4,250	2,700/4,500	2,800/4,700	179	**26**
28	**108**	2,350/3,900	2,450/4,050	2,600/4,300	2,700/4,500	2,850/4,750	2,950/4,900	187	**28**
30	**112**	2,500/4,100	2,600/4,300	2,700/4,500	2,850/4,750	2,950/4,900	3,100/5,200	193	**30**
32	**115**	2,600/4,300	2,750/4,600	2,850/4,750	3,000/5,000	3,150/5,250	3,300/5,500	201	**32**
34	**119**	2,800/4,700	2,900/4,800	3,050/5,100	3,150/5,250	3,300/5,500	3,500/5,850	207	**34**
36	**122**	2,950/4,900	3,100/5,200	3,200/5,350	3,350/5,600	3,550/5,950	3,700/6,200	212	**36**
38	**126**	3,150/5,250	3,300/5,500	3,400/5,700	3,600/6,000	3,750/6,250	3,950/6,600	219	**38**
40	**129**	3,350/5,600	3,500/5,850	3,650/6,100	3,850/6,450	4,000/6,700	5,200/7,000	223	**40**
42	**132**	3,550/5,950	3,700/6,200	3,850/6,450	4,000/6,700	4,200/7,000	4,400/7,400	228	**42**

AIRSTART

General

WARNING

Do not attempt to relight an engine after an engine fire if the engine integrity is questionable, or if N_1 rotation is not observed (Figure AP-1).

CAUTION

Wait ten seconds between two consecutive airstart attempts. Do not make more than three successive airstart attempts.

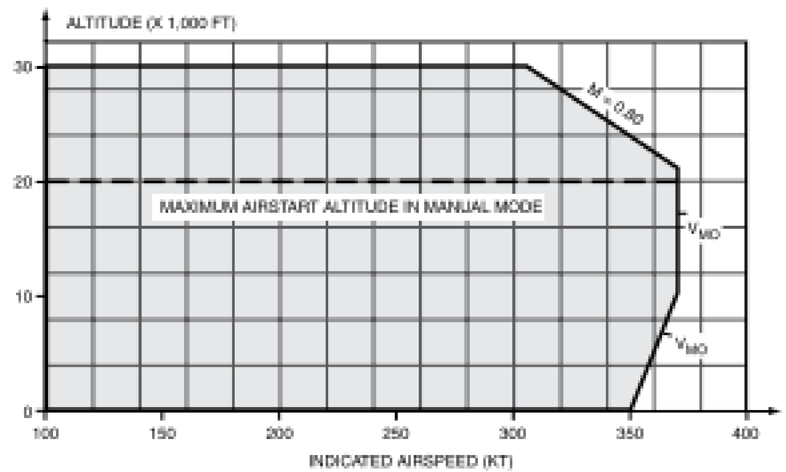


Figure AP-1. Inflight Relight Envelope

Engines Flameout and High Speed Airstart

N_2 rpm must be 15% or higher.

NOTE

This immediate airstart procedure may be attempted at high altitude, even at altitudes above the maximum start envelope.

The best technique is to apply this procedure in a timely fashion, as soon as it has been ascertained that the engine malfunction that caused the flameout will not present a danger if an airstart attempt is made. The power lever must be immediately set to idle and the airstart ignition selected in order to take advantage of the high rotational speed of the compressors.

If the relight attempt is unsuccessful, it is necessary to descend to an altitude which is within the normal airstart envelope.

1. Power Lever.. IMMEDIATELY TO IDLE

   The power lever must be immediately retarded to idle to minimize the input of fuel for an immediate relight, which might result in a hot start.

2. Start Selector Switch .... AIR START

   As soon as the power lever is retarded to idle, place the start selector switch to AIR START. The above two actions must be accomplished before the N_2 rpm decays to 15% or less to increase the probability for a successful start. This provides ignition for engine starting. Check IGN light on.

3. ITT Rise within 10 Seconds .... CHECKED

   This is the indication of a successful relight of the engine. Ensure the ITT rises normally, being careful the temperatures stay within the limitations envelope. All other engine instruments must be checked as well for their proper indications.

4. Power Lever.. ADVANCE

   If all engine instruments indicate that the engine is operating normally, the power lever may be advanced, as required, for normal flight.

After a successful relight:

5. Start Selector Switch .... GROUND START

   Place the start selector switch from AIR START to GRD START to shut off the ignition circuit and check that the IGN light is out.

6. Engine Instruments .... CHECKED

   Continually monitor the engine instruments for normal operations. Engine warning lights must be out.

If an airstart is unsuccessful, complete the ENGINE SHUTDOWN procedure in this manual.

Abnormal Airstart

Abort an airstart whenever any one of the following conditions occurs:

- The ITT does not rise within 10 seconds after moving the power levers to idle.
- The oil pressure does not rise within 10 seconds after light-off.
- The ITT rises rapidly and approaches the 952°C (TFE-731-5AR) or 978°C (TFE-731-5BR) limit.
- An N_1 remains close to zero when N_2 speed reaches 20%.
- N_2 speed is not rising rapidly and smoothly after light-off.
- If, during an airstart with the computer in manual mode, the N_1 exceeds 80% with the power lever at idle.

If any of the above are observed during the airstart, shut down the engine as follows:

1. Power Lever.. CUTOFF

   This is done to shut off the fuel at the engine fuel control and stop the start.

2. Start Selector Switch .... MOTOR–START STOP

   This action disengages the starter if it was used to assist in the airstart attempt.

3. Complete the Engine Shutdown checklist.

Airstart—Computer in Normal (AUTO) Mode

Preparation Phase

1. Airstart Envelope.. ESTABLISHED

   If an immediate relight was not possible, establish the aircraft within the airstart envelope as prescribed in Figure AP-1.

2. Power Lever.. CUTOFF

   The power lever must be placed in cutoff to prepare the engine for the airstart. Fuel is shut off at the fuel control.

3. Fuel Shutoff Switch .... GUARDED

If the fuel shutoff switch was placed off at some point during engine shutdown, place the switch, located on the fire panel, on. This will restore the fuel supply from the fuel tanks to the engine.

4. GEN Switch .... ON

Place the generator switch on, to provide a start interlock, if needed for an assisted airstart. This will also configure the generator to provide immediate electrical power to the buses when the engine comes on speed.

5. Engine Computer Switch .... AUTO

The engine computer switch, unless the computer is inoperative or was the cause of the engine shutdown in the first place, should be placed in AUTO. Check for CMPTR light out. If the computer is inoperative, apply the Airstart—Abnormal—Computer Off checklist, which follows this procedure.

6. Booster Switch.. ON

Place the booster pump switch on, checking that the fuel pressure light goes out, to supply fuel under pressure from the tank to the engine.

7. Engine and Wing Anti-ice Switches... OFF

Place the anti-ice switches off to prevent any unwanted tap-off of bleed air from the engine being started. The unwanted tap-off of bleed air might impede the start and/or cause an overtemperature on the engine being started.

8. Bus-Tied Switch .... TIED

The DC electrical buses must be tied together, especially if a starter-assisted airstart is necessary. This, along with other switch requirements, provides the proper start interlock in case the starter is needed. Confirm illumination of bus-tied light.

Select either procedure A or B below, based on N_2 rpm speed and N_1 other than zero.

Abort airstart when anyone of the abnormal conditions occur (see "Abnormal Airstart," this chapter).

Procedure A—Windmilling Airstart (N$_2$ more than 15% and Indication of N$_1$ Rotation)

NOTE

If N_2 speed is greater than 15%, a starter assist may not be required.

1. Start Selector Switch .... AIR START

   The start selector switch will provide ignition for relight when placed to AIR START in flight. Check IGNITION light on.

2. Power Lever... IDLE

   Move the power lever from cutoff to idle. This action allows fuel to be supplied through the engine fuel control to the injectors of the affected engine.

3. ITT Rise within 10 Seconds .... CHECKED

   This is the indication of a successful relight of the engine. Ensure that the ITT rises normally, being careful the temperature stays within limits. All other engine instruments must be checked as well for their proper indications.

4. Engine Acceleration to Idle .... NORMAL

   Monitor all engine instruments as the engine accelerates to idle. Ensure that all start limitations are observed as in a normal ground start.

Windmilling airstart when N_2 is above 50%:

5. Start Selector Switch .... GROUND START

   Place the START SELECTOR SWITCH from AIR START to GRD START to shut off the ignition circuit.

6. Bus-Tied Switch .... FLIGHT NORMAL

   Place the bus-tied switch to FLIGHT NORM to restore the electrical buses to an isolated operation, the normal in-flight configuration. The BUS TIED light should go out.

If the ignition light remains on after the engine is on speed:

7. Start Selector Switch .... MOTOR–START STOP

   This action disengages the starter if it was used to assist in the airstart attempt. Check that the ignition light on the overhead engine start panel is out.

8. Start Selector Switch .... GROUND START

   After the airstart attempt has been aborted, move the start selector switch back to its normal position of GRD START.

OR

If the BUS TIED light stays on after the bus-tied switch is moved to FLIGHT NORM:

This means the buses are still tied together. Attempt moving the rotary bus-tied switch in the opposite direction. If the BUS TIED light is still on:

7. Generators Volts and Amps... MONITOR

   Closely monitor the buses for proper power supply and loading. The buses are no longer isolated in case of generator, battery, bus or component malfunctions.

Procedure B—Starter-Assisted Airstart—N_2 less than 15%

1. Start Selector Switch .... AIR START

   The start selector switch will provide ignition for relight when placed to AIR START in flight.

2. Start Switch.................................... PUSH (TWO SECONDS MAXIMUM)

   Push the start button switch for a maximum of two seconds. This engages the starter to rotate the engine to the normal rpm for starting, as is done in ground starting of the engine.

At 10% N_2 and indication of N_1 rotation:

3. Power Lever.. IDLE

   Move the power lever from cutoff to idle. This action allows fuel to be supplied through the engine fuel control to the injectors of the affected engine.

4. ITT Rise within 10 Seconds .... CHECKED

   This is the indication of a successful relight of the engine. Ensure that the ITT rises normally, being careful that the temperature stays within limits.

5. N_1, Fuel Flow, and Oil Pressure .... RISING

   All other engine instruments must be checked as well for their proper indications.

When N_2 is above 50%:

6. Start Selector Switch .... GROUND START

   Place the start selector switch from AIRSTART to GRD START to shut off the ignition circuit.

   IGN–GEN–OIL–PUMP Lights .... OUT

   These lights go out when the normal starting sequence is complete.

7. Engine Instruments .... CHECKED

   Continually monitor the engine instruments for normal operations.

8. Bus-Tied Switch .... FLIGHT NORMAL

   Place the bus-tied switch to FLIGHT NORMAL to restore the electrical buses to an isolated operation, the normal inflight configuration. The BUS TIED light should go out.

If the ignition light remains on after the engine is on speed:

9. Start Selector Switch .... MOTOR–START STOP

   This action disengages the starter if it was used to assist in the airstart attempt.

   Ignition Light.. OUT

   Check that the ignition light on the overhead engine start panel is out.

10. Start Selector Switch .... GROUND START

   After the airstart attempt has been aborted, move the start selector switch back to its normal position of GRD START.

OR

If the BUS TIED light stays on after the bus-tied switch is moved to FLIGHT NORM:

This means the buses are still tied together. Attempt moving the rotary bus-tied switch in the opposite direction.

If the BUS TIED light is still on:

9. Generators Volts and Amps.. MONITOR

Closely monitor the buses for proper power supply and loading. The buses are no longer isolated in case of generator, battery, bus or component malfunctions.

Airstart—Computer in MANUAL Mode

Preparation Phase

1. Airstart Envelope.. ESTABLISHED

If an immediate relight was not possible, establish the aircraft within the airstart envelope as prescribed in the chart (see Figure AP-1).

2. Power Lever.. CUTOFF

The throttle must be placed in cutoff to prepare the engine for the airstart.

3. Fuel Shutoff Switch .... GUARDED

If the fuel shutoff switch was placed off at some point during engine shutdown, place the switch, located on the fire panel, on. This will restore the fuel supply from the fuel tanks to the engine.

4. Generator Switch .... ON

Place the generator switch on, to provide a start interlock, if needed for an assisted airstart. This will also configure the generator to provide immediate electrical power to the buses when the engine comes on speed.

5. Engine Computer Switch... MANUAL

The engine computer switch should be placed in MAN for this start attempt. It is assumed the computer is not operating, thus necessitating the use of this procedure. Engine instruments must be more closely monitored than before, as computer control of fuel input and protection of temperature is lost. Check CMPTR light on.

6. Booster Switch .... ON

   Place the booster pump switch on, checking that the fuel pressure light goes out, to supply fuel under pressure from the tank to the engine.

7. Engine and Wing Anti-ice Switches .... OFF

   Place the anti-ice switches off to prevent any unwanted tap-off of bleed air from the engine being started. The unwanted tap-off of bleed air might impede the start and/or cause an overtemperature on the engine being started.

8. Bus-Tied Switch .... TIED

   The DC electrical buses must be tied together, especially if a starter-assisted airstart is necessary. This, along with other switch requirements, provides the proper start interlock in case the start is needed. Confirm illumination of bus-tied light.

Abort airstart when any one of the abnormal conditions occur (see "Abnormal Airstart," this chapter).

Windmilling

After preparing the engine for the computer in manual mode, use the windmilling airstart procedure as used for the computer normal mode procedure. However, the N_2 speed must be greater than 15%, and the N_1 speed must be greater than 10%.

Start-Assisted Airstart—N_2 less than 15%

1. Start Selector Switch .... AIR START

   Move the start selector switch to AIR START to provide engine starting circuitry. Confirm IGN light is on.

2. Start Switch .... PUSH (TWO SECONDS MAXIMUM)

   Push in on the start button switch for a maximum of two seconds. This engages the starter to rotate the engine to the rpm necessary for starting with the computer off.

When N_2 speed is 15% and N_1 rotation is observed:

3. Power Lever .... IDLE

Move the power lever from cutoff to idle. This action allows fuel to be supplied through the engine fuel control to the injectors of the affected engine.

4. ITT Rise within 10 Seconds .... CHECK

This is the indication of a successful relight of the engine. Ensure that the ITT rises normally, being especially careful the temperature stays within limits since the computer is in manual mode.

NOTE

If any abnormal situations occur as described in the beginning of the airstart checklist, or if the N_1 exceeds 80% with the power lever at idle, abort the start.

When N_2 is above 50%:

5. Start Selector Switch (As Required).................... MOTOR–START STOP

Move the start selector switch to MOTOR–START STOP to disengage the starter function of the starter-generator, which causes the generator to come online to power its bus and stops the ignition to the engine.

IGN–GEN–OIL–PUMP Lights .... OUT

These lights go out when the starting sequence is completed.

6. Engine Instruments .... CHECKED

Continually monitor the engine instruments for normal operations and ensure that the CMPTR light remains on.

7. Start Selector Switch .... GROUND START

Move the start selector switch to GRD START, the normal inflight position of the switch.

8. Bus-Tied Switch .... FLIGHT NORMAL

Place the bus-tied switch to FLIGHT NORM to restore the electrical buses to an isolated operation, the normal inflight configuration. The BUS TIED light should be out.

If the ignition light remains on after the engine is on speed:

9. Start Selector Switch .... MOTOR–START STOP

This action disengages the starter if it was used to assist in the airstart attempt.

Ignition Light .... OUT

Check that the ignition light on the overhead engine start panel is out.

10. Start Selector Switch .... GROUND START

After the airstart attempt has been aborted, move the start selector switch back to its normal position of GRD START.

OR

If the BUS TIED light stays on after the bus-tied switch is moved to FLIGHT NORM:

This means the buses are still tied together. Attempt moving the rotary bus-tied switch in the opposite direction.

If the BUS TIED light is still on:

9. Generators Volts and Amps .... MONITOR

Closely monitor the buses for proper power supply and loading. The buses are no longer isolated in case of generator, battery, bus or component malfunctions.

FUEL CONTROL COMPUTER INOPERATIVE

CMPTR

NOTE

If the fuel control computer fails, check that the engine is operating within established limits. The computer no longer monitors the operating limits of the engine; therefore, the crew must closely monitor all engine instruments and warning lights to ensure operating limitations are not exceeded.

1. Power Lever of the Affected Engine .... IDLE

Retarding the power lever will assist in maintaining the engine within operational limits when attempting to reset the engine computer.

2. Engine Computer Switch .... OFF/AUTO

   Cycle the computer switch to MAN, to OFF, and back to AUTO to see if normal circuitry can be restored. Monitor the engine instruments and guard the power lever while cycling the computer switch.

If the CMPTR light stays on:

3. Engine Computer Switch .... MAN

   If the attempt to reset the computer fails, set the computer switch to MAN, and operate in that position for the remainder of the flight. Computer control circuits will be lost, except for N_1 and N_2 overspeed protection, necessitating close scrutiny of engine instruments and lights.

NOTE

Do not let the ITT indications of the affected engine exceed the operating ITT of the other engines.

Avoid rapid displacements of the power lever. The surge bleed valve cannot open completely, and compressor stalls might result.

CAUTION

Maximum thrust may not be attainable.

Idle thrust may be higher than normal. This should be taken into consideration, when landing, due to the increase in residual power of the engine.

The fuel flow on the affected engine may be approximately 5% higher when its N_1 speed is matched to the N_1 speeds of the other engines.

Acceleration time is longer in manual mode.

ENGINE OIL

OIL

NOTE

The OIL light illuminates at 25 psi if there is a loss of oil pressure. It will also illuminate if metal chips are detected in the oil system.

1. Oil Pressure Gage .... CHECKED

If the indicated oil pressure is greater than 25 psi:

Illumination of the OIL light is caused by the metal chip detector.The detection of a chip in the oil may indicate engine internal problems. In this case it would be prudent to reduce thrust on the engine to minimize the potential of further damage at high operation speeds and temperatures. Continue to monitor the oil pressure and temperature gages throughout the flight if the engine is kept running.

2. Engine Thrust (If Possible).. REDUCED

If the indicated oil pressure is less than 25 psi

3. Retard the power lever and shut down the affected engine as soon as possible.

4. Complete engine shutdown by check list .

Engine lubrication is no longer available and extensive engine damage may result.

CAUTION

In icing conditions, operate the No. 2 engine anti-ice even with the No. 2 engine shut down. The isolation valve must be open.

If the engine 2 is shut down, the bus B remains supplied by the BAT 2 during a limited period. The buses A and B have to be tied and the bus tied light checked illuminated.

NO. 2 ENGINE INLET DOOR OPEN

ENG 2 FAIL

If the ENG 2 FAIL light comes on in flight, it indicates that the inlet, or S-duct, door in the aft compartment is not properly fastened. Much damage can be done to the engine if the inlet door should unlock and open. The inlet door itself, or any loose equipment present in the aft compartment, might be ingested into the No. 2 engine.

1. Power Lever.. IDLE

Immediately retard the No. 2 engine power lever to idle to minimize damage to the engine if the door should actually be open.

If the engine surges or if any abnormal engine instruments indications are observed:

2. Complete the engine shutdown by checklist in the "Engine Failure In Flight" section in this chapter.

TAKEOFF CONFIGURATION

T/O CONFIG + AURAL WARNING "NO TAKEOFF"

This is a ground warning and is activated when at least one of the power levers is advanced above a position of 82° to 84° or greater and one or more of the following conditions have not been met:

1. Airbrakes .... RETRACTED

   The airbrakes must be fully retracted and the airbrake handle must be in the zero position.

2. Slats .... EXTENDED

   The flap/slat handle must be placed to the desired configuration for takeoff, and both inboard slats are not deployed to the fully extended position.

3. Flaps.. 22° OR LESS

   The trailing-edge flaps must not be extended beyond 22°.

4. Stabilizer Trim.. GREEN RANGE

   The horizontal stabilizer trim must be in the green range or positioned be-tween 4.5° and 7.5° on the trim indicator.

5. Flap + Slats Handle.. OUT OF CLEAN

   The flap/slat handle must be placed in the desired takeoff position. The aircraft is not certified for a no flap/slat takeoff.

6. PARK BRAKE Handle .... RELEASED

   On aircraft employing MOD 880, the PARK BRAKE handle must be fully retracted and the dual braking system must be deactivated.

HYDRAULIC SYSTEMS

LOSS OF NO. 1 SYSTEM

PUMP 1
PUMP 3
AND POSSIBLY
PITCH FEEL

1. Hydraulic Pressure and Quantity .... CHECKED

   A loss of the No. 1 system may also be indicated by a drop in pressure on the hydraulic pressure gage. The hydraulic fluid quantity may also read zero.

2. Airspeed .... 260 KNOTS/.76 MACH MAX

   This is the maximum speed for flight in the eventuality that all hydraulic pressure is lost to the flight controls.

3. New Bug Speed .... SET

   Set the appropriate bugs to V_{REF} plus additive, flap retracting speed, and 1.43, respectfully.

4. Flaps + Slats Handle (On Approach) .... 7° FLAPS + SLATS

   Ensure that the flaps + slats handle is selected to 7° flaps + slats on approach. This action will provide electrical circuit protection, which will prevent any flap operation until the outboard slats are fully extended, as a function of the emergency slat switch. Check for illumination of the red slat light.

5. Emergency Slats Switch .... ON

   This selection will provide for outboard slat extension from the No. 2 hydraulic system. Check for extinguishing of the red slat transit light and illumination of a green flashing slat light. Land with flaps extended to 40° and V_{REF} + 5 knots.

6. Brake Selector Switch .... #2 A/SKID–OFF

   Set the three-position selector switch to #2 A/SKID–OFF to achieve braking using the brake pedals supplied through the No. 2 hydraulic system; the anti-skid system is inoperative. Test system operation by pressing the left and right brake pedals in turn, and check that the #2 P. BK light comes on. Brake operating efficiency can be visually checked by monitoring the deceleration rate on the EADI, optimum deceleration on a dry runway being between 0.25 g and 0.30 g, increasing with weight.

7. Landing Gear (At Appropriate Time).. FREEFALL

   Complete the "Landing Gear—Emergency Extension" procedure, following the "Airbrakes Do Not Extend In Flight" procedure outlined later in this chapter.

System Status

Operative Systems

- Servoactuators barrel 2
- Flaps
- Airbrakes
- Emergency slats (add 5 knots to V_{REF})
- Aileron Arthur Q
- No. 2 brakes
- Nosewheel steering
- Parking brake
- Thrust reverser

Inoperative Systems

- Servoactuators barrel 1
- Pitch Arthur unit
- Normal slats (use EMERG SLATS control switch, land with outboard slats, flaps 40 and V_{REF} + 5 knots)
- No. 1 Braking system with antiskid (select No. 2 system)
- Landing gear—normal and emergency lowering (use free fall procedure)

NOTE

Increase the landing distance computations by 60%.

FAILURE OF A NO. 1 SYSTEM PUMP

PUMP 1

PUMP 3

This indicates failure of only one of the No. 1 hydraulic system pumps.

1. Hydraulic Pressure and Quantity .... CHECK

   Check both hydraulic system gages to ensure proper quantity and pressure. The other engine-driven hydraulic pump light should be out, with normal pressure and quantity indicated.

If the pressure and quantity are normal, expect longer operating times for No. 1 system components.

LOSS OF NO. 2 SYSTEM

PUMP 2 AND POSSIBLY AIL FEEL

A loss of the No. 2 system may also be indicated by a drop in pressure on the hydraulic pressure gage. The hydraulic fluid quantity may also read zero. This procedure differs from the No. 1 hydraulic system loss in that only one pump drives the No. 2 system. Illumination of the PUMP 2 light may simply mean the loss of the No. 2 engine-driven pump. The standby hydraulic pump is available if it was the engine pump that failed, provided hydraulic quantity is normal. Depending on airspeed, the AIL FEEL light may illuminate.

1. No. 2 Hydraulic Pressure and Quantity .... CHECKED

If the hydraulic quantity is normal and if the standby pump is to be used:

2. ST–BY Hydraulic Pump Switch.. ON

   The No. 2 hydraulic system pressure gage should cycle between 1,500 and 2,150 psi, indicating that the standby pump is operating. The No. 2 hydraulic system is usable but with an increase in the operating times of the components.

OR

If the quantity is low or if the standby pump is not used:

2. Airspeed.. 260 KNOTS/.76 MACH MAX

   This is the maximum speed for flight in the eventuality that all hydraulic pressure is lost to the flight controls.

3. ST–BY Hydraulic Pump Switch.. OFF

   If the hydraulic quantity is zero, turn off the pump to prevent overheating and possible damage. If the quantity is normal, use the pump sparingly or only for those key phases of flight.

4. New Bug Speed .... SET

   Set the airspeed bug to reflect the approach being flown without the benefit of flaps.

5. EGPWS FLAPS O'RIDE Switch .... ON

   This switch prevents the TOO LOW FLAPS audio warning from sounding if a less than 40° flap landing is made.

System Status

Operative Systems

- Servoactuators barrel 1
- Normal slats
- No. 1 brakes (antiskid)
- Landing Gear (normal and emergency control system)
- Pitch Arthur unit
- Thrust reverser (available if accumulator is charged)
- Parking brake (available if accumulator is charged)

Inoperative Systems

- Servoactuators barrel 2
- Emergency slats (use normal slats control)
- No. 2 braking
- Aileron Arthur Q (aircraft SN below 165)
- Nosewheel steering
- Airbrakes (see following note)
- Flaps (see following note)

NOTE

If the No. 2 hydraulic system is lost for landing, the following additives must be made to the landing distance and landing field length computations.

- 0° flaps + slats, fly V_{REF} + 20 knots; add 800 feet to LD and 1,335 feet to LFL.
- 7° flaps + slats, fly V_{REF} + 15 knots; add 600 feet to LD and 1,000 feet to LFL.
- 20° flaps + slats, fly V_{REF} + 5 knots; add 200 feet to LD and 335 feet to LFL.
- 40° flaps + slats, land at V_{REF}
- After making the additive for flaps + slats, add 10% to both the LD and LFL for no airbrakes.

UNWANTED OPERATION OF STANDBY PUMP

ST BY
PUMP

On the ground, the ST BY PUMP light may indicate that the hydraulic selector in the rear compartment is out of the IN-FLT detent.

CAUTION

Before correcting the situation by moving the handle to the IN-FLT position (No. 2 hydraulic system), ensure that all hydraulic pressure is removed from both the No. 1 and No. 2 hydraulic systems. Do not restore hydraulic pressure to either system until after the handle has been fully displaced from one position to the other. The handle must be safety-wired to the IN-FLT position for flight.

On the ground or in flight, illumination of the light may indicate that the standby hydraulic pump has been running in excess of one minute. In this case:

1. Standby Hydraulic Pump Switch.. OFF

   Turn off the pump to prevent overheating and possible damage.

FLIGHT CONTROLS

LANDING WITH INOPERATIVE STABILIZER

This condition is indicated by the inability to trim the horizontal stabilizer by either the normal or emergency trim system. The horizontal stabilizer will remain in the last position selected prior to the trim failure. Hold the control column and then perform the following procedures:

1. Autopilot.. DISENGAGED

   If the autopilot is engaged, and if it hasn't already been disconnected due to the loss of normal trim capability, disengage it from the aircraft controls by depressing the yaw damper pushbutton on the center pedestal. This action will disengage the autopilot and yaw damper and cause the AP light to come on and show a disengagement message on the ID 802.

NOTE

The failure of the horizontal stabilizer causes the elevator Arthur unit to lock in the position it is in at the time of failure. When the flaps and slats are extended, the Arthur unit returns to the low-speed position, which results in a significant, but very gradual, decrease of elevator feel force.

If the stabilizer is jammed in the +2 to –4° range:

2. Flaps + Slats Handle.. 20° FLAPS + SLATS

   This is the recommended final flap setting for approach and landing. This is a normal trim setting for a 20° flaps + slats landing, which provides sufficient elevator control for the pilot.

3. Airspeed.. V_{REF} + 20 KNOTS

   A final approach speed of V_{REF} + 20 knots will ensure sufficient elevator control.

4. GPWS FLAPS O'RIDE Switch .... ON

   The GPWS FLAPS O'RIDE switch cancels the "TOO LOW FLAPS" audible warning when landing with flaps less than 40°.

   Increase the landing distance by 800 feet.

CAUTION

Since the flaps will not be extended to 40° for approach and landing, ensure that all three landing gears are visually checked to be down and indicating properly by both pilots before landing. The landing gear warning horn, normally activated by the 40° flap position circuitry, will not sound if one or more of the landing gears are not fully extended and locked down.

If the stabilizer is jammed in the –4° to –10° range:

5. Flaps + Slats Handle .... 40° FLAPS + SLATS

   This is the normal range for the elevator trim when making a slats 40° flap landing. Make a normal approach.

6. Airspeed .... V_{REF}

LANDING WITH INOPERATIVE ELEVATOR

The elevator portion of the control column will be frozen in position. The pilot will be unable to control movement about the pitch axis, except by use of the horizontal stabilizer trim. Fly the approach and landing using the following procedures:

1. Flaps + Slats Handle .... 40° FLAPS + SLATS

   It is recommended that the normal 40° flap configuration be used for approach and landing. Check proper positioning on the configuration panel.

2. Airspeed .... V_{REF} + 10 KNOTS

   The extra speed will improve controllability of the aircraft with a jammed elevator.

3. Increase the landing distance by 1,800 feet.

4. Use very short pitch trim inputs to set the stabilizer trim.

   This method of trimming the aircraft is recommended over the use of long bursts of trim, which may cause the loss of aircraft control. Use several short bursts of trim to control pitch, making the pitch trim clacker sound much like several short bursts of a Gatling gun.

5. Make a shallow final approach.

   Make as shallow an approach as possible to minimize trim changes and landing flare actions during this phase of flight. If possible, hold the landing flare on final approach, using power and trim and keeping the airspeed additive and power on until touchdown.

ARTHUR UNIT INOPERATIVE

AIL FEEL OR **PITCH FEEL**

These lights illuminate when either of the Arthur unit monitoring systems detects a failure. Normally, the autopilot can still be used. If the PITCH FEEL light is on, reduce airspeed down to 260 KIAS or MI 0.76 maximum.

1. FASTEN BELTS Light Pushbutton .... ON

CAUTION

The pitch and/or roll control forces may be higher or lower than normal, depending on whether the Arthur unit has failed in the high- or low-speed position. Follow either procedure below, depending on the control forces experienced.

Light forces—Avoid large displacements and rapid movement of the flight controls.

High forces—Use normal or emergency trim systems. If the AIL FEEL light is on, execute an approach at V_{REF}. If the PITCH FEEL light is on, execute an approach at V_{REF} + 10 knots, and increase the landing distance by 800 feet.

FLAP ASYMMETRY OR JAMMED FLAPS

FLAP ASYM

This light illuminates when a flap asymmetry is detected by comparison of the relative position of the outboard portion of the left and right flaps. The outboard section of the left and right flaps contain potentiometer transmitters that provide flap asymmetry indications. Flap position indication is provided by only the left outboard flap transmitter. The flaps will stop movement immediately upon detection of an asymmetry, and the flap control circuit breaker will open.

With flaps extended up to 7°:

1. Approach Speed.. V_{REF} + 20 KNOTS

   This higher approach speed is flown to allow more controllability of the aircraft with any degree of asymmetry in this range of flaps. Trim the aircraft as well as possible under the circumstances.

2. EGPWS FLAPS O'RIDE Switch .... ON

   The EGPWS FLAPS O'RIDE switch cancels the "TOO LOW FLAPS" audible warning when landing with flaps less than 40°.

   Increase the landing distance by 800 feet.

With the flaps extended between 7° and 20°:

1. Approach Speed .... V_{REF} + 15 KNOTS

   This higher approach speed is flown to allow more controllability of the aircraft with any degree of asymmetry in this range of flaps. Trim the aircraft as well as possible under the circumstances.

2. EGPWS FLAPS O'RIDE Switch .... ON

   The EGPWS FLAPS O'RIDE switch cancels the "TOO LOW FLAPS" audible warning when landing with flaps less than 40°.

   Increase the landing distance by 600 feet.

With the flaps extended between 20° and 40°:

1. Approach Speed .... V_{REF} + 5 KNOTS

   This higher approach speed is flown to allow more controllability of the aircraft with any degree of asymmetry in this range of flaps. Trim the aircraft as well as possible under the circumstances.

2. Increase the landing distance by 200 feet.

CAUTION

Since the flaps may not be extended to 40° for approach and landing, ensure that three landing gears are checked to be down and indicating properly by both pilots before landing. The landing gear warning horn, normally activated by the 40° flap position circuitry, will not sound if one or more of the landing gears are not fully extended and locked down.

SLAT MONITORING SYSTEM

AUTO
SLATS

Illumination of this light indicates that information from the slat monitoring circuits (ground/flight proximity switches, angle of attack, airspeed) are in disparity.

If the light comes on after takeoff or at a speed lower than 280 knots:

1. Airspeed Envelope............................ BETWEEN 1.3 V_S TO 270 KNOTS

   Do not allow the airspeed to go outside of these limits. Avoid stall situations, as the stall warning system may not operate properly for indication of a stall and automatic deployment of the slats. Do not deliberately perform stall tests.

If the light comes on when at an airspeed of 280 knots or greater:

2. Reduce Airspeed... 270 KIAS OR LESS

   The airspeed must be limited to less than 270 knots. When flying above 270 knots, the safety systems that lock out the automatic deployment of the slats are not operational, and unwanted and untimely extension of the outboard slats could occur, causing damage to the slats and/or adverse aircraft control.

SLAT SYSTEM ABNORMAL OPERATION

If using the flaps + slats handle on the center pedestal, continuous illumination of the red arrow light on the gear/ flaps + slats indicator panel indicates that at least one of the four slats is being maneuvered, neither fully extended nor fully retracted. If using the emergency control or automatic operation, at least one of the two outboard slats is being maneuvered, neither fully extended nor fully retracted. The red light will also be illuminated.

Some normal slat system indications to consider:

- The green light is on steady when all four slats are extended.
- The green light usually flashes when only the outboard slats are extended and in conformity with the command.
- The red light remains illuminated during slat displacement.
- During slat extension by normal control, the red light comes on when the control handle is set to the 7° flaps + slats position. The red light goes out when all slats are extended, at which time the green light comes on steady.

- During slat retraction, when the FLAPS–SLATS handle is set to CLEAN, the green light flashes during retraction of the inboard slats and flaps. As soon as the inboard slats and flaps are retracted, the outboard slats retract, at which time the green flashing light goes out and the red light comes on. The red light goes out when the slats are fully retracted.

- During automatic or emergency extension of the slats, the red light comes on until the outboard slats are fully extended, at which time the red light goes out and the green light flashes. When the slats begin retracting after auto deployment, the green flashing light goes out, and the red light comes on until the slats are fully retracted.

- During automatic retraction of the inboard slats, when all slats are deployed and an AOA stall angle of 23° is detected, the green light goes from a steady state to a flashing state immediately upon receipt of the retraction signal. This really means that only the outboard slats are fully extended. When a stall angle below 16.5° is detected, the green flashing light goes out, and the red light comes on during extension of the inboard slats. When the inboard slats are fully extended, the red light goes out, and the green light comes on steadily, indicating that all four slats are fully extended.

- If the Bus A1 failure occurs in the cockpit, the outboard slats can be extended through the normal slats control handle (via the battery bus). In this case the green light flashes.

- Green and red light can never illuminate simultaneously except during test on the indication panel.

In Cruise

Normally, in the cruise regime of flight, the flaps + slats handle is kept in the CLEAN position. There should be no movement of the slats or flaps unless caused by selection of the handle or activation of the automatic stall system. If one or more of the slats fail to retract after the handle is placed to the CLEAN position, the red slat transit light will remain on. There may also be a tendency for the aircraft to roll. If either of these conditions is noted, the following procedures should be performed:

1. Airspeed.. 200 KIAS OR LESS

   It is imperative that this maximum operational speed, with the slats extended, not be exceeded.

2. Autopilot.. DISENGAGED

   Firmly hold the control wheel during disengagement of the autopilot. Disengage the autopilot by depressing the autopilot disconnect switch on the aft bottom portion of either control wheel. The AP light will illuminate and a disengagement message will be presented on the ID-802. These indications can be cleared by depressing the disconnect button once again.

During Approach

Depending on indications, follow the instructions for either case 1 or case 2 below.

Case 1

A flashing green slat light with the red light off indicates that only the outboard slats are extended. This is the indication that only the outboard slats are extended. At this time the power used to supply the outboard slats extension solenoid is from the battery bus.

Proceed as follows:

1. Flaps + Slats Handle .... 40° FLAPS + SLATS

   The flaps may be extended to 40° as long as the outboard slats are extended.

2. Approach Speed.. V_{REF} + 5 KNOTS

   Due to the loss of the lift normally provided by the inboard slats, 5 knots must be added to the V_{REF} speed to provide the proper margin from the stall speed.

3. Increase the landing distance by 200 feet.

Case 2

Assume that the flaps + slats handle has been placed in the 7° FLAPS + SLATS position. The green slat light off, the red slat light on, and a possible tendency for the aircraft to roll due to asymmetry indicate that one or more of the slats are not fully extended.

CAUTION

Emergency slat actuation is only authorized when a failure is experienced.

Proceed as follows:

1. Flaps + Slats Handle .... LEAVE IN 7° FLAPS + SLATS

   This selected position will provide electrical circuit protection which will prevent any inboard slats or trailing-edge flap extension until outboard slat extension is first satisfied.

   If outboard slats are visually extended and flaps 7°, go directly to section titled "Procedure B."

If outboard slats are visually not extended and flaps not at 7°, continue with the following item 2.

2. Emergency Slats Switch .... ON

The use of this switch will provide outboard slat extension provided from the No. 2 hydraulic system.

Note the slats indications after placing the switch on, and follow procedure A, B or C below, depending on the indications you observe.

Procedure A

If the green light comes on steadily, all slats extended.

1. Flaps + Slats Handle .... 40° FLAPS + SLATS

A normal full 40° flap approach and landing may be made without additive or penalty.

2. Approach Speed.. V_{REF}

Procedure B

If the red light stays on and only the outboard slats are visually checked extended, it can be assumed safe to use other flap configurations for approach and landing.

1. Flaps + Slats Handle .... 40° FLAPS + SLATS

The flaps may be extended to 40° as long as the outboard slats are extended.

2. Approach Speed.. V_{REF} + 5 KNOTS

Due to the loss of the lift normally provided by the inboard slats, 5 knots must be added to the V_{REF} speed to provide the proper margin from the stall speed.

3. Increase the landing distance by 200 feet.

Procedure C

If the red light stays on and neither inboard or outboard slats are extended:

1. Flaps + Slats Handle .... CLEAN

If the slats cannot be extended by any or all means, the wing must be clean of flaps for approach and landing.

2. EGPWS Flaps O'Ride Switch .... ON

3. Approach Speed.. V_{REF} + 30 KNOTS

To compensate for the loss of lift normally provided by the slats and flaps, the V_{REF} must be increased by 30 knots to ensure a proper margin from stall during final approach and landing.

4. Increase the landing distance and the landing field length by 50%.

The increased speed to be maintained on final approach necessitates an increase in runway requirements to allow for a longer stopping distance.

CAUTION

Do not change the emergency slats switch position.

The landing-gear-not-extended aural warning, normally activated by the 40° flap warning circuitry, may not sound if the gear is not fully down and the flaps are not selected to 40°.

UNWANTED OUTBOARD SLAT EXTENSION

AUTO SLATS AND IGN

The red slats transit light comes on and then goes out, indicating that the slats are in transit. The green slat light then comes on flashing, indicating outboard slats extension. The audio warning for stall warning sounds.

This warning may occur while in cruise at high altitude and while cruising at normal cruise speed/Mach number. It is usually due to an erroneous sensing by either the left or right stall warning vane.

1. RH AUTO SLAT Circuit Breaker (B1 Bus) .... PULLED

On primary bus B1, pull the RH AUTO SLAT circuit breaker to deactivate the right-side stall warning system. This should cause the slats to retract, and all warnings should cease.

If the slats do not retract:

2. LH AUTO SLAT Circuit Breaker (A1 Bus) .... PULLED

   On primary bus A1, pull the LH AUTO SLAT circuit breaker to deactivate the left-side stall warning system. This should cause the slats to retract, and all warnings should cease.

3. RH AUTO SLAT Circuit Breaker.. RESET

   If the warnings were stopped by pulling the left circuit breaker, then restore the right-side stall warning system to provide proper warning of stall.

   Continue the flight at an indicated airspeed of less than 270 knots, with the circuit breaker of the defective system pulled.

Depending on the final position of the circuit breakers, if the RH AUTO SLAT circuit breaker remains pulled:

- Manual action of the flap/slat handle remains operative
- Emergency slats switch is inoperative

If the LH AUTO SLAT circuit breaker remains pulled manual action of the flap/slat handle:

- Causes only extension of outboard slats. Inboard slats remain in retracted position and the slat green light is flashing.
- Has no action on flaps when flap/slat handle is selected to 7° position, but will operate flaps when selected to 20° and 40° positions. Add 5 knots to V_{REF} and increase landing distance by 200 feet and landing field length by 333 feet.

AIRBRAKE(S) DO NOT RETRACT

Illumination of this light means that at least one airbrake panel has not retracted. If in doubt about the actual position of the airbrakes, consider them to be extended to position 2.

For approach and landing:

1. Flaps + Slats Handle .... 40° FLAPS + SLATS

NOTE

Keep the flap/slat handle in this position for landing in order to preclude the possibility of airbrake asymmetry that can be particularly bothersome on final approach.

With the airbrakes extended to position 1:

2. Airspeed.. V_{REF} + 10 KNOTS

   To compensate for the loss in lift due to the airbrake being extended to position 1, add 10 knots to the normal V_{REF} to maintain the proper margin from stall.

3. Increase the landing distance by 600 feet.

With the airbrakes extended to position 2:

4. Airspeed.. V_{REF} + 15 KNOTS

   To compensate for the loss in lift due to the airbrake being extended to position 2, add 15 knots to the normal V_{REF} to maintain the proper margin from stall.

5. Increase the landing distance by 600 feet.

NOTE

Airbrakes may be used during landing approach, provided airspeed is at least V_{REF} + 10 knots. Increase landing distance by 10%.

AIRBRAKES DO NOT EXTEND IN FLIGHT

Airbrakes, as well as antiskid brakes, are considerations in the performance charts for computing landing distance and landing field length. Since the airbrakes cannot be extended, a penalty must be applied to these landing factors. Make the following additives:

Increase the landing distance by 10%.

The normal procedure provides for airbrake extension to position 2 immediately after touchdown.

LANDING GEAR

ABNORMAL LANDING GEAR EXTENSION

If, after the LANDING GEAR handle has been placed to the DOWN position, and one or more of the following indications occur, perform an EMERGENCY LANDING GEAR EXTENSION.

- One or more green gear down light is out
- The landing gear handle light is flashing
- Landing gear not extended GEAR voice warning may sound

NOTE

The Landing Gear Abnormal Extension procedure is to be applied as soon as one green light is missing. It gives no alleviation to any red indicator light/green gear symbol combination as long as one green gear symbol is off.

CAUTION

The landing gear handle must be maintained down.

Emergency Landing Gear Extension

1. EMERGENCY GEAR PULL Handle.. PULLED

   Unlatch and pull this T-handle, which is located next to the normal gear handle. Pulling this handle shuts off the electrical sequencing circuit, exposes the retraction side of the gear and door actuators to return, and allows No. 1 system hydraulic pressure to be ported directly to the extend side of the main doors and all three landing gear actuators.

   If all three green gear down lights illuminate and the landing gear handle light (red) is not illuminated, the landing gear is down and locked. Do not actuate any landing gear controls.

   If at least one green gear down light does not illuminate and the landing gear handle light is flashing, apply the FREE FALL EXTENSION procedure.

Free Fall Extension

1. Airspeed.. Not Less than KIAS

   Before actuating the main gear red unlocking handles, ensure that the normal gear handle is down and that the emergency hydraulic gear control handle is pulled. The main gear unlocking handles are located on the floor on either side of the center pedestal. A pull of about six inches should be sufficient. The speed shall be maintained between 160 KIAS and V_{LO}.

CAUTION

Rapidly alternating large rudder applications in combination with large side-slip angles may result in structural failure at any speed.

2. LH MAIN MANUAL GEAR RELEASE Handle............................ PULL

Gently apply up to full rudder to the left while accelerating (190 KIAS max) until the left green gear down light is illuminated.

Maintain wing level with appropriate aileron input .

NOTE

Illumination of the green gear down light may take more than 30 secs with full rudder deflection.

Gently come back to neutral rudder.

3. RH MAIN MANUAL GEAR RELEASE Handle .... PULL

Gently apply up to full rudder to the right while accelerating (190 KIAS max) until the right green gear down light is illuminated .

Maintain wings level with appropriate aileron input.

NOTE

Illumination of the green gear down light may take more than 30 secs with full rudder deflection.

Gently come back to neutral rudder.

4. NOSE GEAR MANUAL RELEASE Handle .... PULL

The nose gear manual release handle is located on the left aft side of the center pedestal. Pull the handle upward to unlock the nose gear. A pull of about 1 to 2 inches should be sufficient.

Accelerate until illumination of the nose green gear down light is achieved (190 KIAS).

CAUTION

Do not actuate any landing gear control once the three landing gears are locked down . The landing gear must be maintained down.

If, after applying all the methods possible to try to extend the landing gear, a problem with one or more landing gears still exists, plan on landing with the assumption that at least one landing gear is locked in the up position. Declare an emergency, and make a shallow approach and as soft a landing as possible.

If the nose gear is the one gear whose extension is in doubt, touch down on the main wheels as for a normal landing. Hold the nose off the ground for as long as possible and then bring it gently into contact with the runway while the elevators remain effective. Do not use the brakes, unless a greater emergency exists, until after the nose touches the ground. As soon as the nose touches the ground, begin normal, or differential, braking as necessary to maintain directional control. Use No. 1 brakes, No. 2 brakes or the parking brake handle, depending on the availability of hydraulic and/or braking systems.

If extension of either of the main landing gears is in doubt, touch down on the side of the runway corresponding to the extended gear. Hold the wings level for as long as possible. Control direction with the rudder pedals and nosewheel steering. When the wing touches the ground, brake with the brake pedals and counteract veering.

CONTROL HANDLE JAMMED IN DOWN POSITION

It is impossible to retract the landing gear.

1. Airspeed.. 245 KIAS MAXIMUM (V_{LE})

   Jamming of the landing gear control handle in the down position may be caused by misalignment of the nosewheels; consequently, do not attempt to free the control handle by pressing the red ground safety override pushbutton located above the control handle (or by pulling the control handle if the modification M1688 is installed). Damage could be incurred if the gear is retracted in this configuration.

   Keep the landing gear extended to the landing.

ABNORMAL RETRACTION

WARNING

At least one red light remains on.

Gear handle light blinking.

1. Airspeed.. AT OR BELOW 190 KIAS (V_{LO})

   In icing conditions or if takeoff was made through snow or slush on the runway:

a. If the red landing gear lights fail to go out upon retraction of the landing gear, ice may be preventing the main landing gear from locking in the UP position.

2. Cycle the gear down and up to get rid of the ice.

In nonicing conditions or if takeoff was made without snow or slush on the runway:

a. Extend and keep the landing gear down.

EMERGENCY RETRACTION ON GROUND

Emergency retraction of the landing gear on the ground must only be considered if it is imperative to stop the aircraft immediately (risk of collision with another aircraft or a large obstacle) and conventional means are not adequate.

Ground retraction of the landing gear is achieved using the following procedure, with the first two operations being performed simultaneously:

1. Ground Safety Override Pushbutton (If Installed) .... PRESS IN AND HOLD

   This is a red pushbutton located above the normal landing gear control handle. On aircraft with modification M1688, this pushbutton is no more installed. Unlocking of the gear control handle is performed by pulling it.

2. Landing Gear Control Handle .... UP POSITION

3. Power Levers .... CUTOFF

   Normal shutdown of engines.

4. FUEL SHUT OFF switches (all three) .... ACTUATED

   This closes the three shutoff valves and cuts off the fuel supply.

NO. 1 BRAKE SYSTEM OR ANTISKID INOPERATIVE

WARNING

Results of abnormal anti-skid test before landing.

The following brake system information is provided as a review:

- The L and R brake lights illuminate at 232 psi.

- The #2 P BK light illuminates at 232 psi.
- Brake pressure for the No. 1 brake system is:
  - 1,595 psi for SNs 1, 75, and subsequent, and those incorporating Service Bulletin F900-42
  - 2,175 psi for SNs 2 to 74, except for those with Service Bulletin F900-42

NOTE

Service Bulletin 42 provides a double-braking system, that assures a better brake-holding capability during pretakeoff, full-engine-power runups.

- Brake pressure for the No. 2 brake system is 1,080 psi.
- The first detent of the parking brake handle provides 800 psi of No. 2 hydraulic system pressure. This detent stops the aircraft gradually without locking the brakes.
- The second detent of the parking brake provides 2,175 psi of No. 2 hydraulic system pressure. This detent will lock the brakes.

This malfunction is indicated by an abnormal antiskid brake test. The green No. 1 system L and R brake lights do not illuminate when the brakes are tested in either the #1/ASKID ON or #1/ASKID OFF positions of the brake selector switch.

1. Brake Selector Switch .... #2/ASKID–OFF

   Set the three-position selector switch to #2/ASKID OFF. Braking is achieved using the pedals that are supplied through No. 2 hydraulic system; the antiskid system is inoperative. Test No. 2 hydraulic system braking by pressing the LH and RH brake pedals in turn, and check that the #2 P BK light comes on.

2. Brake progressively.

   Braking efficiency can be visually checked by monitoring the deceleration rate on the EADI optimum deceleration on a dry runway is between –0.25 g and –0.30 g, increasing with weight.

3. Increase the landing distance by 50%.

NOTE

For takeoff, operation of the aircraft on an exceptional basis with antiskid inoperative is described in annex 5 of the *Airplane Flight Manual*. Operation on this basis is subject to prior authorization defined in a Minimum Equipment List (MEL).

NO. 1 AND NO. 2 BRAKE SYSTEMS INOPERATIVE

Land on the centerline of the runway, and maintain directional control down the centerline by use of the rudders.

1. Runway Requirements.. CHECK

   Carefully calculate the normal runway landing requirements using the *Airplane Flight Manual*. Charted stopping performance is based on antiskid brakes and airbrakes.

2. Thrust Reverser.. APPLY MAXIMUM

   Use the thrust reverser to its maximum throughout the landing roll. The thrust reverser is most effective at the first portion of the landing roll, but should be used all the way to the stop in conjunction with the use of the parking brake in the intermediate detent.

3. Parking Brake .... INTERMEDIATE DETENT

   Pull the parking brake handle to the first or intermediate detent. **Do not cycle** the handle in and out of this detent. Select the first detent, and leave the handle there. Avoid pulling the handle to the second detent unless a greater emergency exists and it becomes necessary to lock the wheels. The parking brake accumulator can allow up to five applications of the parking brake using the second detent, if necessary.

   NOTE

   If the #2 P BK light is flashing, indicating a pressure of 1,200 psi or less in the parking brake accumulator, residual pressure remaining allows for only one brake application.

4. Increase the landing distance by 50%.

NOSEWHEEL STEERING INOPERATIVE

If a malfunction occurs with the nosewheel steering system:

1. Release the steering control wheel to neutral.

   If steering the aircraft with the control wheel, release it to remove electric control and hydraulic actuation of the nosewheel steering system. The nosewheel is now free to caster in either direction by use of differential braking.

2. Use differential braking to steer the aircraft.

NOSEWHEEL SHIMMY

Hold the nosewheel steering control depressed.

This applies hydraulic pressure to the nosewheel steering system to provide some shimmy dampening.

FUEL SYSTEM

LOW BOOST PUMP PRESSURE

Case 1

FUEL 2

(4.64 psi)

1. No. 2 Booster Switch.. ST–BY

   If the No. 2 booster switch was in the NORM position, move it to the ST–BY position to turn on the other boost pump in the group 2 tanks. Check the FUEL 2 light. If it goes out, continue the flight with use of the standby boost pump.

If the FUEL 2 light stays on:

2. Associated Fuel Quantity.. MONITOR

   Carefully observe the No. 2 fuel quantity. Check that the fuel quantity is dropping normally through normal engine consumption. Follow either procedure A or B below, depending on whether a fuel leak is or is not evident.

Procedure A

If a significant fuel loss is evident:

3. No. 2 Engine Power Lever .... CUTOFF

   Since the area of the fuel leak is unknown, an isolation process is begun by shutting down the engine. This action shuts off fuel to the engine at the fuel control.

4. No. 2 Engine Fuel Shutoff Switch.. ACTUATE

   Further isolation of the engine and fuel system is accomplished by this action. Check for illumination and then extinguishing of TRANS light. Continue to monitor the fuel quantity to see if the leak stops or continues. In any situation involving a fuel leak, a precautionary landing might be appropriate.

5. GEN Switch .... OFF

The generator for the shutdown engine is no longer useful and should be turned OFF to preclude electrical anomalies associated with the electrical system.

6. Engine Anti-ice Switch .... OFF

This closes the anti-icing valves (air intake and ENG 2 S-duct).

CAUTION

In icing conditions, operate the No. 2 engine anti-icing even with the No. 2 engine shutdown. The isolation valve must be open to allow air bleed from the bleed-air manifold to anti-ice the S-duct.

If the No. 2 engine is shut down:

7. Bus-Tied Switch .... TIED

Since the No. 2 generator is no longer supplying electrical power to the right DC electrical buses, tie the buses to save the No. 2 battery from depletion. Check the volts and amps on the two operating generators and illumination of the bus-tied light.

8. ST–BY Hydraulic Pump Switch .... ON (As Required)

If needed to supply hydraulic power to the No. 2 hydraulic system, turn on the standby hydraulic pump switch. A windmilling engine, dependent upon its rpm, may not be able to supply enough hydraulic power to operate No. 2 system components.

9. No. 2 Fuel Tank Fuel .... USE FIRST

Because the group 2 tank fuel is located mainly in the fuselage, it is desirable to use up the fuel in group 2 tanks first to preclude any center-of-gravity problems. To use group 2 fuel, follow the next steps to crossfeed the fuel to all engines.

10. No. 2 Booster Switch .... NORM

This turns on the normal pump in the group 2 tanks and arms the standby pump for operation when one of the X-BP 1-2 or 3-2 valves is open.

11. X-BP 1-2 and X-BP 3-2 .... OPEN

Open these two valves, which turns on the standby boost pump and allows feeding of fuel to all three engines, thereby using the fuel from the group 2 tanks first. Check for illumination of X-BP 1-2 and 2-3 lights.

To prevent an engine flameout, carefully monitor the fuel quantity gages during this operation. The goal is not to run out of fuel in the group 2 tanks before returning the fuel panel to a configuration, whereby all three engines can be kept running from the fuel supplied by group 1 and 3 tanks. See One Engine Inoperative Approach and Landing Procedure, this chapter.

Procedure B

If no leak is evident:

The flight may be continued as required by feeding fuel to the No2 engine by gravity, from the group 2 fuel tank only:

1. X-BP 1–2 and X-BP 3–2 .... OPEN

   Descent down to 31000ft (or 17000ft for JP4 or JETB)

   Continue flight keeping No 2 engine fed by gravity and from tank group No 2 only :

2. X-BP 1–2 and X-BP 3–2 .... CLOSED

CAUTION

Take into account the reduction in range.

Case 2

FUEL 1 OR **FUEL 3** (4.64 PSI)

1. X-BP 1–3 .... OPEN

   Rotate the X-BP 1-3 switch to connect group 1 and group 3 tanks-to-supply both lateral engines. The corresponding X-BP light should illuminate.

2. Associated Booster Switch .... OFF

   Turn off the boost pump switch that corresponds to the illuminated fuel pressure warning light.

If the fuel pressure light stays on after opening the X-BP valve:

3. X-BP 1–3 .... CLOSED

   Close the X-BP valve previously opened. The corresponding X-BP light should go out. There is no crossfeed between engines 1 and 3 fuel feed system. This may indicate that a fuel leak is present in the respective fuel feed system.

4. Associated Fuel Quantity... MONITORED

   Carefully observe the fuel quantity in the fuel tank associated with the illuminated fuel pressure light. Check that the fuel quantity is dropping normally through normal engine consumptionIf a fuel loss is evident:

If a fuel loss is evident:

5. Associate Engine Power Lever.. CUTOFF

   Since the area of the fuel leak is unknown, an isolation process is begun by shutting down the associated engine. This action shuts off fuel to the engine at the fuel control.

6. Associated Fuel Shutoff Switch .... ACTUATED

   Further isolation of the engine and fuel system is accomplished by this action. Continue to monitor the fuel quantity to see if the leak stops or continues. In any situation involving a fuel leak, a precautionary landing might be appropriate. Check for TRANS light on, then off indication.

7. GEN Switch... OFF

   The generator for secured engine is no longer useful and should be turned off to preclude electrical anomalies associated with the electrical system.

8. Engine Anti-ice Switch... OFF

   This closes the nacelle anti-icing valve.

OR

If the fuel pressure warning light goes out:

The flight may be continued using fuel management procedures commensurate with flight requirements.

3. XTK Switch Set to Low Level Side .... AS REQUIRED

   This selection will allow a transfer of fuel from the high-level wing tank to the low-level tank, as long as one of the later tanks booster pump is operational. Check illumination of the XTK light.

Case 3—Side Engines are Supplied with X-BP 1-3 Open

FUEL 1 AND **FUEL 3**

1. X-BP 1-3 .... CLOSED

   Close the X-BP 1-3 valve on the upper portion of the fuel panel to prepare for the crossfeed of fuel using different fuel plumbing.

2. X-BP 1-2 and X-BP 3-2 .... OPEN

   Crossfeed the lateral engines using the two X-BP switches located on the lower portion of the fuel panel. Check that the FUEL 1 and FUEL 2 lights go out.

If the FUEL 1 and FUEL 3 lights are out:

3. No. 1 and No. 3 Booster Switches .... OFF

4. Fuel Quantity Indicators .... MONITORED

   To consume fuel in side tanks when no leak is suspected:

5. Flight Altitude.. 31,000 FEET MAXIMUM

   Since gravity flow of fuel, assisted by air pressure, is now the only way fuel can be transferred from the tank groups to the engines, limit the altitude of the aircraft.

6. X-BP 1–3, X-BP 1–2, and X-BP 3–2 .... CLOSED

   FUEL 1 and FUEL 3 Lights .... ON

7. Fuel Quantity Indicators .... MONITOR

   The range of aircraft may be severely affected by flying at the lower altitude. Continually monitor the fuel gages for determination of range capability and for any abnormal consumption of fuel.

If the FUEL 1 or FUEL 3 light remains on (and FUEL 2 light may possibly come on):

3. X-BP 1-2 and X-BP 3-2.................................. CLOSE SUCCESSIVELY

According to result obtained:

4. X-BP 1-2 or X-BP 3-2 .... CLOSED

If a significant fuel loss is evident:

5. Associated Engine Power Lever .... CUTOFF

6. Associated Fuel Shutoff Switch .... ACTUATE

   Check TRANS light on, then off.

7. GEN Switch .... OFF

   The generator for the secured engine is no longer useful and should be turned off.

8. Engine Anti-ice Switch .... OFF

FUEL TRANSFER SYSTEM MALFUNCTION ON AIRCRAFT EQUIPPED WITH XTK 2 SYSTEM

Case 1

This light indicates that the XTK 2 valve is open when it should be closed. At times, this situation can be corrected by merely moving the XTK 2 switch through each of its respective positions, then back to AUTO. If this does not correct the indication, follow either procedure A or B below:

Procedure A

If group 2 fuel total quantity indicates approximately 4,400 pounds green range):

1. No. 2 Rear Tank Quantity .... CHECKED

   Depress the button next to the group 2 tank fuel gage and check the fuel quantity in the rear tank.

If the group 2 rear tank level is 3,300 pounds and steady, indicating that the rear tank is full:

2. XTK 2 Switch .... CLOSED

   By closing the XTK 2 valve, the fuel flow from the front to the rear tank is stopped.

3. XTK 2 OPEN Light .... CHECKED/OUT

Normally, the XTK 2 OPEN light should go out after the XTK 2 switch is moved to the close position. If the XTK 2 OPEN light does not go out and there is a possibility of reaching the rear CG limit:

4. Manual XTK Valve .... CLOSED, THEN NORM

   This manually positioned valve is located in the rear cabin area of the aircraft, in the floor on the left aisle, in line with No. 11 and No. 12 cabin windows. Lift the carpet cutout to gain access to the handle. Raise the flap of the valve and rotate it to the closed position. After turning the handle, return the flap to the stowed position. Now check the master failure warning panel.

5. XTK 2 OPEN Light... CHECKED/OUT

   The XTK 2 OPEN light should go out after the manually controlled XTK 2 valve has been closed. Fuel management of the fuel from the front to the rear tank must be carefully followed. It may become necessary to open the valve once the rear tank level has burned down to a reasonable level.

OR

Procedure B

If group 2 fuel quantity indicates approximately 2,200 pounds (amber range):

1. No. 2 Rear Tank Quantity... CHECKED

If No. 2 rear tank level is above 1,400 pounds:

2. XTK 2 Switch... CLOSED

   This is done to shut off the fuel transfer from the front to the rear tank.

   XTK 2 OPEN Light.. OUT

NOTE

If the XTK 2 OPEN light does not go out and boost pump 1 or 3 has failed, or if side tank interconnection has been used, the attitude shall be limited to 10° pitch up as long as the light remains illuminated.

Case 2

XTK 2
CLOSED

This light indicates that the XTK 2 valve is closed when it should be open. At times, this situation can be corrected by merely moving the XTK 2 switch through each of its respective positions and then back to AUTO. If this does not correct the indication, proceed as follows:

1. No. 2 Rear Tank Quantity.. CHECKED

   If the rear tank quantity is lower than 1,100 pounds:

2. XTK 2 Switch... OPEN

   Move the XTK 2 switch to the open position to allow a transfer of fuel from the front fuselage tank to the rear fuselage tank.

   XTK 2 CLOSED Light.. CHECKED/OUT

   Check to see that the light goes out when the XTK 2 switch is moved to the open position.

If the XTK 2 CLOSED light remains on:

3. Manual XTK 2 Valve .... OPEN, THEN NORM

   This manually positioned valve is located in the rear cabin area of the aircraft, in the floor on the left aisle, in line with No. 11 and No. 12 cabin windows. Lift the carpet cutout to gain access to the handle. Raise the flap of the valve, and rotate it to the open position. After turning the handle, return the flap to the stowed position. Now check the master failure warning panel.

4. XTK 2 CLOSED Light.. CHECKED/OUT

   The XTK 2 CLOSED light should go out after the manual control XTK 2 valve has been opened. Fuel management of the fuel from the front to the rear tank must be carefully followed.

NOTE

The manually controlled opening of the XTK 2 valve will cause the XTK 2 OPEN light to come on later on in the flight. The attitude shall be limited to 10° pitch-up as long as the light remains on.

TANK LEVEL ABNORMALLY LOW ON A/C WITHOUT XTK 2 SYSTEM

LO FUEL 1 OR LO FUEL 2 OR LO FUEL 3

This light indicates that a fuel level below 200 pounds is detected. Equivalent to a cruise flight time of 15 minutes at an altitude of 2,500 feet.

1. Associated Fuel Quantity Gage .... CHECKED

   Verify the indication given by the warning light by checking the respective fuel quantity gage. However, the warning light indication may be more accurate of the actual fuel quantity in the fuel tank.

2. Associated X-BP.. OPEN

   In order to supply fuel to the low-side engine, the crossfeed of fuel can be gained from a fuel tank containing more quantity. The X-BP light for the respective valve opened should come on.

3. Booster of Affected Tank .... OFF

   Turn off the low-side boost pump until it becomes absolutely necessary to use the fuel from that low tank.

TANK LEVEL ABNORMALLY LOW ON A/C WITH XTK 2 SYSTEM

LO FUEL 1 OR LO FUEL 2 OR LO FUEL 3

This light indicates that a fuel level below 200 pounds is detected. Equivalent to a cruise flight time of 15 minutes at an altitude of 2,500 feet.

1. Associated Fuel Quantity Gage .... CHECKED

   Verify the indication given by the warning light by checking the respective fuel quantity gage. However, the warning light indication may be more accurate of the actual fuel quantity in the fuel tank.

2. Associated X-BP.. OPEN

   In order to supply fuel to the low-side engine, the crossfeed of fuel can be gained from a fuel tank containing more quantity. The X-BP light for the respective valve opened should come on.

3. Booster of Affected Tank .... OFF

   Turn off the low-side boost pump until it becomes absolutely necessary to use the fuel from that low tank.

LO FUEL 2

If the LO FUEL 2 light and the No. 2 total quantity indicator is higher than the No. 2 rear tank quantity indication, this indicates a malfunction of front-to-rear tank transfer.

4. XTK 2 Switch .... OPEN

   If the rear tank quantity is still decreasing:

5. If necessary, MANUAL XTK 2 Valve.................. OPEN, THEN NORM

   Disregard illumination of the XTK 2 open light.

When the rear tank quantity has increased:

6. No. 2 Booster Switch .... NORM

7. X-BP .... CLOSED

   Check that the X-BP light is out.

FUEL ASYMMETRY

This condition is indicated by asymmetric fuel indications and/or by an abnormal application of aileron trim to one wing versus the other. Ensure that the asymmetry is not caused by a fuel leak. Follow either Case 1 or Case 2 below, depending on the type of asymmetry:

Case 1—Side Tank Asymmetry

1. X-BP 1-3 .... OPEN

   Open the crossfeed line between the No. 1 and No. 3 fuel tanks.

2. X-BP Light .... CHECKED/ON

   This light verifies that the X-BP 1-3 opened.

3. XTK Switch Set to Low Side .... AS REQUIRED

   Move the XTK switch from the center position to the low-side tank. This action, by opening the valve between the wing fuel tanks, will further assist in the balancing of fuel. The high-side boost pump will move fuel from the high-side tank to the low-side tank through jet pump action.

4. XTK Light .... CHECKED/ON

   If the XTK valve opened, the XTK light should illuminate.

If booster 1 and 3 switches are on:

5. Booster Switch on Low-Level Side.. OFF

Case 2—Tank 2 to Side Tank Asymmetry

1. X-BP 1-2 or 3-2 .... OPEN

   Move either rotary switch to the open position to allow a crossfeed from the high tank.

2. X-BP Light .... CHECKED/ON

   When either rotary switch is moved to the open position, the corresponding light should illuminate.

If group 2 tank fuel level is higher:

3. Booster No. 1 or No. 3 Switch.................................. AS REQUIRED/OFF

   Turn off either or both of these boost pumps to allow the group 2 tank fuel to be crossfed to the other engine(s). This will help achieve a balance in the fuel tanks.

If group 2 tank fuel level is lower:

4. Booster 2 Switch... OFF

   This allows the center engine to be fed from either the No. 1 or No. 2 fuel tank groups, whichever is higher in quantity.

FUELING LIGHT ON IN FLIGHT

FUELING

1. Airspeed (If Possible) .... REDUCE

   Reduce the speed of the aircraft to preclude structural damage to the aircraft should one of the fuel doors come open.

Avoid the following:

- High noseup or nosedown pitch attitudes
- Rapid changes in pitch or roll

2. Fuel Quantities.. MONITOR

   Monitor fuel quantity indicators to detect any fuel loss. Consider landing the aircraft as soon as possible in the event a fuel leakage occurs through the fuel tank vent system or if structural damage is suspect.

The FUELING light comes on if the following occurs:

- One of the two fuel tank vent valves is not closed.
- The defueling/refueling valve is not closed.
- The refueling connector door is not closed.
- The refueling control panel door is not closed.
- The gravity-fueling switch is on.
- The defueling switch is on.
- The vent valve lever is not stowed.
- The B2 bus is not powered.
- PRESSURE FUELING circuit breaker

ELECTRICAL SYSTEMS

ONE GENERATOR INOPERATIVE

Illumination of a generator light indicates that the corresponding generator is disconnected from its main DC bus system. When a generator malfunctions, the generator switch may or may not trip off. Determine the position of the generator switch for the inoperative generator, and then proceed following Case 1, Case 2 or Case 3 below, depending on the position of the respective generator switch.

Case 1—Any Generator Switch is Tripped

SWITCH OFF | GEN 1 OR GEN 2 OR GEN 3

1. Bus Voltages .... CHECKED

   Check that the voltages are within prescribed limits.

2. Batteries and Generators Load .... CHECKED

   Check the ammeter readings for each battery and generator to ensure bus and generator loading is within limits. Each operator should keep a running record of normal bus loading and have a knowledge of the normal power demands on the electrical system.

3. Shed the load, as necessary, to limit the load on the respective battery or operating generator.

CAUTION

Do not attempt to reset a tripped generator switch. Since the generator switch has tripped, an overvoltage condition will exist if a reset attempt is made.

If the No. 2 generator is inoperative and BATT 2 load is normal:

4. Bus-Tied Switch .... TIED

   This will allow a sharing of the load between the operating generators and will preclude abnormal demands on the No. 2 battery, as necessary. Check bus-tied light illumination and normal bus load and voltage.

5. Bus Load and Voltages .... CHECKED

Case 2—GEN 1 Switch is Not Tripped

GEN 1

1. Bus Voltages .... CHECKED

   Check that the voltages are within prescribed limits.

2. Batteries and Generators Load .... CHECKED

   Set the ammeter selector to the position corresponding to the generator concerned. On aircraft fitted with an auto-load system, a reduced load will be indicated on the generator still connected to the bus. Shed the load, if necessary, to keep the load on each remaining generator within limits on the aircraft without the auto-load feature.

If the left main bus voltage is normal:

The absence of an overvoltage condition for bus A is an indication that the online generator is the one associated with the extinguished GEN light.

3. GEN 1 Switch .... OFF, THEN ON (TWO RESET ATTEMPTS MAXIMUM)

If resetting cannot be achieved:

4. GEN 1 Switch .... OFF

OR

If the left main bus voltage is above the green range:

The existence of an overvoltage condition not high enough to cause the GEN switch to trip may prevent the associated generator from coming on line. In this case, the faulty generator is the one associated with the extinguished GEN light. Switching this generator off should cause the other generator to come back on line.

3. GEN 3 Switch .... OFF

   a. GEN 3 Light .... ON

   b. GEN 1 Light .... OUT

4. Left Main Bus Voltage within the Green Range .... CHECKED

5. Bus Load .... CHECKED

If voltage and amperage indications are normal, retain this configuration:

OR

If the GEN 1 and GEN 3 lights remain on, representing that a possible normal No. 1 generator did not automatically reconnect to the bus, then:

4. GEN 1 Switch .... OFF, THEN ON (TWO RESET ATTEMPTS MAXIMUM)

If resetting cannot be achieved:

5. GEN 1 Switch .... OFF

   The generator is no longer useful and should be turned off to preclude any electrical anomalies.

6. Left and Right Main Bus Volts/Amps .... CHECKED

   Never tie the buses together without previously checking that voltages and amperage are within limits.

   Check the volts and amps on the left main bus carried by the No. 1 battery for normal valves. Normal voltage and amperage carried by the No. 2 generator should be shown for the right main bus.

7. Bus-Tied Switch .... TIED

   Ensure that the left and right main buses are tied by monitoring equalization on voltmeters and ammeters, and that they are within prescribed limits. Check for bus-tied light illumination.

8. Bus Load and Voltage .... CHECKED

Case 3—GEN 3 Switch is Not Tripped

GEN 3

1. Bus Voltages .... CHECKED

   Check that the voltages are within prescribed limits.

2. Batteries and Generators Load .... CHECKED

   Set the ammeter selector to the position corresponding to the generator concerned. On aircraft fitted with an auto-load system, a reduced load will be indicated on the generator still connected to the bus. Shed the load, if necessary, to keep the load on each remaining generator within limits on the aircraft without the auto-load feature.

If the left main bus voltage is normal:

The absence of an overvoltage condition for bus A is an indication that the online generator is the one associated with the extinguished GEN light.

3. GEN 3 Switch .... OFF, THEN ON (TWO RESET ATTEMPTS MAXIMUM)

If resetting cannot be achieved:

4. GEN 3 Switch .... OFF

OR

If the left main bus voltage is above the green range:

The existence of an overvoltage condition not high enough to cause the GEN switch to trip may prevent the associated generator from coming on line. In this case, the faulty generator is the one associated with the extinguished GEN light. Switching this generator off should cause the other generator to come back on line.

3. GEN 1 Switch .... OFF

   a. GEN 1 Light .... ON

   b. GEN 3 Light .... OUT

4. Left Main Bus Voltage within the Green Range .... CHECKED

5. Bus Load .... CHECKED

   If voltage and amperage indications are normal, retain this configuration:

OR

If the GEN 1 and GEN 3 lights remain on, representing that a possible normal No. 1 generator did not automatically reconnect to the bus, then:

4. GEN 3 Switch .... OFF, THEN ON (TWO RESET ATTEMPTS MAXIMUM)

If resetting cannot be achieved:

5. GEN 3 Switch .... OFF

   The generator is no longer useful and should be turned off to preclude any electrical anomalies.

6. Left and Right Main Bus Volts/Amps .... CHECKED

   Never tie the buses together without previously checking that voltages and amperage are within limits.

   Check the volts and amps on the left main bus carried by the No. 1 battery for normal valves. Normal voltage and amperage carried by the No. 2 generator should be shown for the right main bus.

7. Bus-Tied Switch .... TIED

   Ensure that the left and right main buses are tied by monitoring equalization on voltmeters and ammeters, and that they are within prescribed limits. Check for bus-tied light illumination.

8. Bus Load and Voltage .... CHECKED

Case 4—GEN 2 Switch is Not Tripped

GEN 2

1. Bus Voltages.. CHECKED

   Check that the voltages are within prescribed limits.

2. Batteries and Generators Load .... CHECKED

   Set the ammeter selector to the position corresponding to the generator concerned. On aircraft fitted with an auto-load system, a reduced load will be indicated on the generator still connected to the bus. Shed the load if necessary to keep the load on each remaining generator within limits on the aircraft without the auto-load feature.

3. GEN 2 Switch.................................. TWO RESETS MAXIMUM

   Turn the GEN switch off and then on a maximum of two times to see if the generator will reset. If the generator cannot be reset:

4. GEN 2 Switch.. OFF

   Left and Right Main Bus Voltage............ NOT ABOVE GREEN RANGE

5. Check the right battery load for normal indications.

6. Bus-Tied Switch .... TIED

7. Limit the load on the operating generator.

TWO GENERATORS INOPERATIVE

Case 1—One or No Generator Switch Has Tripped

GEN AND GEN

Two generators have been disconnected from the main DC bus system. The respective generator switches may or may not be tripped. This procedure would assume a simultaneous tripping of the reverse current relay of the corresponding generator.

1. Bus Voltages.. CHECKED

   Check that the voltages are within prescribed limits.

2. Batteries and Generator Load .... CHECKED

Set the ammeter selector to the position corresponding to the generator concerned. On aircraft fitted with an auto-load system, a reduced load will be indicated on the generator and/or battery still connected to the left main bus and normal loading on the right main bus.

CAUTION

Shed the load on the bus, if necessary, to limit the load on the operating generator and/or battery. Never tie the buses together without previously checking that the voltage and amperages on each bus are within the prescribed limits.

CAUTION

Do not attempt to reset the generator that has the tripped switch, as an overvoltage condition will exist when a reset attempt is made.

On the generator for which the switch has not tripped and bus voltage is within the green range:

3. GEN Switch(es) .... OFF, THEN ON

Attempt two resets maximum of the generator(s) concerned by moving the GEN switch off, and then on, to see if the generator will reset. If the generator will not reset, and main bus voltages are not above the green range, then:

4. Both GEN Switches.. OFF

Check to see that amperage indications on both main buses are indicating normal loading. If the indications are normal:

5. Bus-Tied Switch .... TIED

Once the buses are tied, continually monitor the voltages and amperages for normal indications,

OR

On the generator(s) for which the switch has not tripped and main bus voltage is ***above*** the green range, comply with the following appropriate procedures A, B, and C.

Procedure A

The existence of an overvoltage condition not high enough to cause the GEN switch to trip may prevent the associated generator from coming on line. In this case, the faulty generator is the one associated with the extinguished GEN light. Switching this generator off should cause the other generator to come back on line.

1. GEN 3 Switch .... OFF

    a. GEN 3 Light .... CHECKED/ON

    b. GEN 1 Light .... CHECKED/OUT

2. Left Main Bus Voltage within the Green Range .... CHECKED

3. Bus Load .... CHECKED

    If GEN 1 and GEN 3 lights remain on, representing that a possible normal No. 1 generator did not automatically reconnect to the bus, then:

4. GEN 1 Switch .... OFF, THEN ON (TWO RESET ATTEMPTS MAXIMUM)

If resetting cannot be achieved:

5. GEN 1 Switch .... OFF

    The generator is no longer useful and should be turned off to preclude any electrical anomalies.

OR

Procedure B

The existence of an overvoltage condition not high enough to cause the GEN switch to trip may prevent the associated generator from coming on line. In this case, the faulty generator is the one associated with the extinguished GEN light. Switching this generator off should cause the other generator to come back on line.

1. GEN 1 Switch .... OFF

    a. GEN 1 Light .... CHECKED/ON

    b. GEN 3 Light .... CHECKED/OUT

2. Left Main Bus Voltage within the Green Range .... CHECKED

3. Bus Load .... CHECKED

   If the GEN 1 and GEN 3 lights remain on, representing that a possible normal No. 3 generator did not automatically reconnect to the bus, then:

4. GEN 3 Switch .... OFF, THEN ON (TWO RESET ATTEMPTS MAXIMUM)

If resetting cannot be achieved:

5. GEN 1 Switch .... OFF

   The generator is no longer useful and should be turned off to preclude any electrical anomalies.

OR

Procedure C

If GEN 2 light is on:

1. GEN 2 Switch .... OFF, THEN ON

   Turn the GEN 2 switch off and then on a maximum of two times to see if the generator will reset. If the generator cannot be reset:

2. GEN 2 Switch .... OFF

3. Left and Right Main Bus Voltage .... NOT ABOVE GREEN RANGE

   Check the right battery load for normal indications.

4. Bus-Tied Switch .... TIED

   Ensure the left and right main buses are tied by monitoring equalization on voltmeters and ammeters and that they are within prescribed limits. Check for bus-tied light illumination.

Case 2—GEN 2 and GEN 1 or GEN 3 Switches Have Tripped

GEN AND GEN

Two generators have been disconnected from the main DC bus system. The respective generator switches have tripped. This procedure would assume a simultaneous tripping of the reverse current relay of the corresponding generators.

1. Bus Voltages .... CHECKED

   Check that the voltages are within prescribed limits.

2. Batteries and Generator Load .... CHECKED

   Set the ammeter selector to the position corresponding to the generator concerned. On aircraft fitted with an auto-load system, a reduced load will be indicated on the generator and/or battery still connected to the left main bus and normal loading on the right main bus.

   CAUTION

   Shed the load on the bus, if necessary, to limit the load on the operating generator and/or battery. Never tie the buses together without previously checking that the voltage and amperages on each bus are within the prescribed limits.

3. Bus-Tied Switch .... CHECKED/FLIGHT NORMAL

   Ensure the buses are not tied when attempting to reset a generator whose switch has tripped. The objective is to protect the bus not associated with the generator being reset.

4. BAT Switch of Associated Side .... CHECKED/ON

   The respective battery will not only provide electrical power to the bus, but will also function as a buffer when attempting to connect the generator.

5. Power Lever of No. 2 Engine .... IDLE

   This will minimize the effects, should the reset attempt result in an overvoltage condition. Consequently, the reset attempt should not be performed during a critical phase of flight when engine thrust may not be reduced.

   Engine Idle Setting .... STABILIZED

6. GEN 2 Switch .... ON

   Perform only one reset attempt of generator 2. No more than one reset attempt should be made, for the reason that a failure to reset is an indication that the fault still exists, and a new attempt could have detrimental effects.

   Carefully observe the voltmeter/ammeter while placing the generator switch on. Be prepared to immediately return the switch to off should an overvoltage condition exist. In fact, the overvoltage condition should cause the switch to trip.

If No. 2 generator cannot be reset:

7. Left and Right Main Bus Volts/Amps .... CHECKED

If the volts and amps are normal (in the green range):

8. Bus-Tied Switch .... TIED

   Check that the bus-tied light is on and monitor to make sure the loads are kept within limits.

9. Bus Load and Voltage .... CHECKED

10. Power Lever of No. 2 Engine after Generator Reset Attempt .... NORMAL THRUST

Case 3—GEN 1 and GEN 3 Switches Have Tripped

GEN AND GEN

Two generators have been disconnected from the main DC bus system. The respective generator switches have tripped. This procedure would assume a simultaneous tripping of the reverse current relay of the corresponding generator.

1. Bus Voltages .... CHECKED

   Check that the voltages are within prescribed limits.

2. Batteries and Generator Load .... CHECKED

   Set the ammeter selector to the position corresponding to the generator concerned. On aircraft fitted with an auto-load system, a reduced load will be indicated on the No. 1 battery still connected to the left main bus and normal loading on the right main bus powered from generator 2.

CAUTION

Shed the load on the bus, if necessary, to limit the load on the operating generator and/or battery. Never tie the buses together without previously checking that the voltage and amperages on each bus are within the prescribed limits.

3. Bus-Tied Switch .... CHECKED/FLIGHT NORMAL

   Ensure the buses are not tied when attempting to reset a generator whose switch has tripped. The objective is to protect the bus not associated with the generator being reset.

4. BAT 1 Switch .... CHECKED/ON

   The battery will not only provide electrical power to the bus, but will also function as a buffer when attempting to connect the generator.

5. Power Lever of No. 1 Engine .... IDLE

   This will minimize the effects, should the reset attempt result in an overvoltage condition. Consequently, the reset attempt should not be performed during a critical phase of flight when engine thrust may not be reduced.

   Engine Idle Setting .... STABILIZED

6. GEN 1 Switch .... ON

   Perform only one reset attempt of generator 1. No more than one reset attempt should be made, for the reason that a failure to reset is an indication that the fault still exists, and a new attempt could have detrimental effects.

   Carefully observe the voltmeter/ammeter while placing the generator switch on. Be prepared to immediately return the switch to off should an overvoltage condition exist. In fact, the overvoltage condition should cause the switch to trip.

If No. 1 . generator cannot be reset:

7. Power Lever of No. 1 Engine .... NORMAL THRUST

   Since the reset attempt of the No. 1 generator was unsuccessful, an attempt to reset the No. 3 generator will be made. This reset attempt will require a thrust reduction on the No. 3 engine. To preclude two engines at reduced thrust at the same time, set normal thrust on the No. 1 engine.

8. Power Lever of No. 3 Engine .... IDLE

   This will minimize the effects should the reset attempt result in an overvoltage condition. Consequently, the reset attempt should not be performed during a critical phase of flight when engine thrust may not be reduced.

   Engine Idle Setting .... STABILIZED

9. GEN 3 Switch.. ON

   Perform only one reset attempt of generator 3. No more than one reset attempt should be made, for the reason that a failure to reset is an indication that the fault still exists, and a new attempt could have detrimental effects.

   Carefully observe the voltmeter/ammeter while placing the generator switch on. Be prepared to immediately return the switch to off should an overvoltage condition exist. In fact, the overvoltage condition should cause the switch to trip.

10. Power Lever of No. 3 Engine after
    Generator Reset Attempt .... NORMAL THRUST

If No. 1 and No. 3 generators cannot be reset:

11. Right Main Bus Volts/Amps ....CHECKED

    Check to see that the voltage and amperage are within limits as this bus and its associated No. 2 generator will pick up the entire electrical load when connecting the main buses. If the indications are normal:

12. Bus-Tied Switch .... TIED

    Check to make sure the bus-tied light is illuminated and the bus load and voltage are kept within prescribed limits.

BATTERY OVERHEAT

HOT
BAT

Additionally, the battery temperature indicator red light is on.

In flight:

Determine which battery is overheating by referring to the battery temperature gage and checking the individual battery temperature needles. After determining which battery is overheating:

1. Associated BAT Switch.. OFF

   This action disconnects the battery from the electrical system, which should reduce the load or charging action that may be causing the overheat condition.

If the battery temperature keeps rising:

2. Land as soon as possible.

NOTE

If required, the faulty battery may be switched back on for landing, provided the HOT BAT light has gone out. Closely monitor the battery temperature indicator.

On the ground:

If the batteries are warm (temperature higher than 120°F) and the amber light is on, a battery start must not be attempted. Use an external power cart for starting the engines.

If the temperature during engine start exceeds 120°F, monitor the temperature for a few minutes after starting to ensure that the temperature does not rise further and that it starts to cool.

If the temperature during engine start exceeds 140°F, wait for it to drop below 120°F before taking off.

If the temperature reaches 150°F with the red battery gage light and the HOT BAT light on, the battery must be switched off. Monitor the battery closely for cooling and have it removed for inspection.

NOTE

The average cooling time of a battery on the ground is 1°F per minute.

BATTERY FAILURE

BAT 1 OR BAT 2

The associated battery switch is tripped. If grounding upstream of a battery protection device occurs, or if a battery has an internal fault, the make-and-break switch trips open under the action of the reverse current, the corresponding BAT switch flips off, and the corresponding BAT light on the warning panel comes on.

If these indications occur:

1. Associated Battery Switch.. ON/RESET

   No more than two resets of any electrical system malfunction are allowed. Try to reset the associated battery by moving the battery switch to on. Loss of one or both batteries in flight will not have a serious effect on the operation of electrical systems. However, should the three engine generators fail, the emergency power normally supplied by the batteries will be lost if the batteries cannot be reset.

PITOT-STATIC SYSTEM

EITHER AIR DATA COMPUTER INOPERATIVE

Table AP-2. Pitot-Static System—Either Air Data Computer Inoperative

FUNCTION	LOSS OF	INDICATIONS	REMARKS
"On-side" EFIS	Airspeed scale	IAS flag on EADI	Data from other ADC recovered using XFR IAS/M
	ASEL	ASEL flag on EADI	Coupling to remaining source by "x" side CPLD
"On-side" AP-FD CPLD	Vertical modes	Reversion to basic mode MSG: CPLD DATA INVALID on ID 802.	Coupling to remaining source by "x" side CPLD
"On-side" flight instruments	Altimeter rate-of-climb indicators	Flags	Use the instrument of other instrument panel side
ID 802 CPLD "on-side"	SAT-TAT-TAS	Dashes on corresponding line	Data recovered using "x side" CPLD
Autoslats	Extension inhibition at high speed	Possibility AUTO SLATS light	See slat system malfunctions
Horizontal stabilizer trim	If ADC 1 has failed the –4° limitations at high speed or the overriding of the stop at low speed	Normal trim limited to –4°	Use the emergency trim control
"On-side" ATC XPDR	Altitude coding		Use the "x side" XPDR

NOTE:
If V_{MO}/M_{MO} warning sounds permanently, pull out inoperative air data computer circuit breaker.

BOTH AIR DATA COMPUTERS INOPERATIVE

Table AP-3. Pitot-Static System—Both Air Data Computers Inoperative

FUNCTION	LOSS OF	INDICATIONS	REMARKS
EFIS Mach	Airspeed scale ASEL Wind on EHSI	IAS flag on EADI ASEL flag on EADI	Use the standby Mach airspeed indicator
AP-M TRIM YD-FD	Autopilot, Mach trim, and yaw damper	AP flashing on EADI, command bars go out of view. AP on warning panel and MACH TRIM MSG: DADC DATA INVALID in ID 802	Coupling to remaining source by "x" side CPLD
Flight instruments	Altimeters, rate-of-climb indicators	Flags	Use the standby instruments
ID 802	SAT-TAT-TAS	Dashes on corresponding line	Avoid or leave icing conditions (see note 1 below)
Autoslats	Extension inhibition at high speed	AUTO SLATS light	See slat system malfunctions
Horizontal stabilizer trim	–4° limitation at high speed or stop over-riding at low speed	Normal trim limited to –4°	Use the emergency trim control
Aileron Arthur Q unit	Monitoring	AIL FEEL light	
Warnings	V_{MO}/M_{MO} landing gear not extended		Operative with flaps 40° + slats and gear up
FMS	V_{NAV} wind page data FLT TIME	Message in the SCRATCH PAD	
ATC XPDR	Altitude report		

NOTE:
If V_{MO}/M_{MO} warning sounds permanently, pull out inoperative air data computer circuit breaker.

(1) If icing conditions cannot be avoided, engine N1 speed MUST NOT be less than the figure corresponding to the coldest temperature of the N_1 anti-icing table.

FLIGHT WITH SUSPECTED BLOCKED PITOT PROBES

WARNING

- Frozen or abnormal pilot, copilot and possibly stand−by IAS / MI indications and possibly:
- AIRSPEED INDICATORS PERFORM LIKE ALTIMETERS (airspeed decreasing in descent and increasing in climb),
- Illumination of one or both following lights: MASTER + GONG: AIL FEEL , AUTO SLATS ,
- "AUTOPILOT" audio warning sounds,
- VMO /MMO audio warning sounds,
- MACH TRIM light on warning panel,
- Illumination of IAS comparison annunciator on EADI,
- AP disengagement and / or AP DISENGAGE on ID-802,
- Disagreement with standby IAS / MI indications,
- In cruise / level flight: unusual pitch trim activity.

CAUTION

Stall aural warning remains reliable.

AOA indexer and AOA instrument remain reliable.

1. Do not apply SLAT MONITORING SYSTEM procedure (see *AFM* page 3-15-6).
2. Do not apply IAS MISCOMPARE ANNUNCIATION procedure (see *AFM* page 3-80-4).

LEVEL FLIGHT

1. Pitch attitude..BETWEEN 1° AND 4° NOSE UP
2. Avoid large displacements or rapid movements of control surfaces.

Set N1 as indicated in the table below, corresponding to recommended long range cruise (assumed temperature is ISA −10 °C):

Flight level	Weight	N1	Pitch attitude
FL 490	27,000 lb	98 %	Between 1° and 4° nose up
	25,000 lb	95 %	
FL 450	35,000 lb	100 %	
	25,000 lb	90 %	
FL 410	43,000 lb	100 %	
	35,000 lb	93 %	
	25,000 lb	88 %	
FL 370	45,000 lb	94 %	
	35,000 lb	89 %	
	25,000 lb	86 %	

3. Rotactor XPDR / TCAS.. TA
4. Advise ATC that both displayed altitude and XPDR−reported altitude may be unreliable and closely monitor trajectory of closest airplanes.
5. When conditions permit, set N1 corresponding to recommended long range cruise Mach at current flight altitude and airplane weight, using TAT as reference or standard atmosphere temperature if TAT is not usable. (*Performance Manual* 4−10).
6. Limit attitude to less than 4° nose up.

NOTE

The IGN lights on overhead panel may be due to an excessive angle of attack and therefore a close−to−stall situation.

STATUS (3 BLOCKED PITOT PROBES):

INOPERATIVE/UNRELIABLE ITEMS	OPERATIVE/RELIABLE ITEMS
Basic flight parameters	
IAS / MI on both EADI and on stand-by airspeed indicator.	FMS Ground Speed in FMS CDU. IRS Ground Speed in FMS CDU. GPS Ground Speed in FMS CDU.
	Pitch and roll attitude on both PFD and stand–by horizon.
	AOA indexer and AOA instrument.
Altitude reported by XPDR mode C.	Both altimeters and stand–by altimeter (max. error +/– 600 ft). GPS altitude (FMS CDU). Both VSI.
SAT, ISA deviation.	TAT. Temperature data provided Uplink Weather / AFIS / Operational flight plan / Weather briefing.
	Heading and Track.
Wind direction and velocity on EHSI.	Wind data AFIS / Operational flight plan / Weather briefing.
Warnings	
VMO / MMO audio warning.	
Gear aural warning. **Stall** aural warning if AUDIO WARN C/Bs pulled.	
Flight Controls	
Automatic slats extension if IAS > 260 kt.	Stall protection: IGN, automatic airbrakes retraction.
For S/N < 164, pitch trim limited to -4 when IAS > 210 kt.	
Roll Arthur position inconsistent with actual flight condition.	Pitch Arthur (Arthur position is based on THS value).
Automatic Flight Control System	
AP and YD.	
Mach Trim.	
Flight Directors.	
Engine	
N1 max. cruise limit bug, N1 max. climb limit bug, N1 max. T/O limit bug on engines display.	Engine primary parameters (N1, ITT, N2, FF) and controls.
Airplane Systems	
	All systems controls and displays.

After a positive identification of the malfunction, continue the flight while complying with the following procedures for climb and descent phases:

CLIMB

1. AP ....DISENGAGED
2. YD ....DISENGAGED

CAUTION

Do not re−engage autopilot or YD before pitot probes unblocking.

3. Avoid large displacements and rapid movements of control surfaces.
4. N1 speed.. Climb power (see *AFM* 5-40)
5. Pitch attitude..BETWEEN 3° AND 4° NOSE UP

   If vertical speed drops below 100 ft / min:

   • Airplane...LEVEL OFF

   If VMO/MMO audio warning sounds:

   • AUDIO WARN A / AUDIO WARN B circuit breakers....................PULLED

CAUTION

All audio warnings (STALL included) are inoperative except TCAS aural warnings.

DESCENT

Initiating the descent earlier than scheduled to recover non icing conditions is left to pilot's discretion.

CAUTION

If IAS goes down to 30 kt due to blocked pitot probes, expect loss of airspeed display on both EADI:

- Do not apply ADC INOPERATIVE procedure (see *AFM* 3-35-2).
- Use EADI attitude and the stand-by altimeter until pitot probes unblocking.

1. AP...DISENGAGED
2. YD...DISENGAGED

CAUTION

Do not re–engage autopilot or YD before pitot probes unblocking.

3. Avoid large displacements or rapid movements of control surfaces.
4. Start selector switches (all 3).......................AIR START
5. ENG 1 and ENG 2 ANTI–ICE switches.......................ON
6. 30 seconds later:

   ENG 3 ANTI–ICE switch.......................ON
7. 30 seconds later:

   WINGS ANTI–ICE switch.......................ON
8. N1 speed.......................See table below

TAT	–20° C or below	–20° C to –10° C	–10° C to 0° C	0° C to +10° C
N1	80 %	76 %	73 %	65 %

9. AIRBRAKES handle .... POSITION 1

10. Pitch attitude .... BETWEEN 0° AND 2° NOSE DOWN

11. Vertical speed indicator .... BETWEEN -2,000 AND -3,000 FT/ MIN

NOTE

An indicated airspeed increasing in descent is a good evidence of the pitot probes unblocking.

NOTE

Descent should cause airspeed and total air temperature to increases thereby facilitating the pitot probes unblocking and a return to correct IAS indication after about 2 minutes.

NOTE

1 − Check airplane altitude frequently on the stand−by altimeter.

2 − If prior to the problems, flight was performed at a static temperature lower than the authorized minimum limit (see *AFM* 1−17−1), descend as soon as possible until air−data indications are back to normal.

1. After return to unblocked pitot probes situation, wait for 1 more minute then:

   Autopilot and YD .... AS REQUIRED

2. AUDIO WARN A / AUDIO WARN B circuit breakers .... RE-ENGAGED

3. Rotactor XPDR / TCAS .... TA / RA - CHECKED

4. Start selector switches (all 3) .... GRD START - AS REQUIRED

5. AIRBRAKES handle .... AS REQUIRED

ANTI-ICE:

6. ENG 1 ANTI–ICE switch .... AS REQUIRED

7. ENG 2 ANTI–ICE switch .... AS REQUIRED

8. ENG 3 ANTI–ICE switch .... AS REQUIRED

9. WINGS ANTI–ICE switch .... AS REQUIRED

PROBE ANTI-ICING MALFUNCTION

L. PITOT OR R. PITOT OR ST BY PITOT

Compare instrument readings with the readings of the other two systems. Check bus power and proper switch positioning.

ICE PROTECTION SYSTEMS

WING ANTI-ICE INOPERATIVE WITHOUT BRAKE HEATING

The following four cases, with procedures, assume that the wing anti-ice switch was turned on for anti-ice protection and the system malfunctioned.

Case 1

The wing anti-ice switch is on and the wing amber light comes on steady. This indicates an insufficient supply of bleed air is available for wing anti-icing.

1. No. 1 Engine N_1 Speed.. INCREASE UNTIL GREEN LIGHT ILLUMINATES

   Increase the thrust on the No. 1 engine to attempt to supply more high-pressure bleed air through the HP 1 valve.

If the light turns green:

2. No. 1 Engine N_1 Speed... MAINTAIN

If the light remains amber:

3. No. 3 Engine N_1 Speed... INCREASE

   While maintaining a higher rpm on the No. 1 engine, increase the thrust on the No. 3 engine to attempt to supply more high-pressure bleed air through the PRV 3 valve.

If the light turns green:

4. No. 3 Engine N_1 Speed .... MAINTAIN

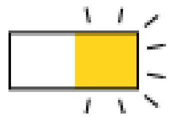
   Keep the thrust increased on both No. 1 and No. 3 engines, while in icing conditions, to keep the wing anti-ice light green and to ensure a sufficient anti-icing capability.

If the light still remains amber:

Set the N_1 No. 1 and No. 2 engines to the minimum rpm, according to Table AP-4 for operations in icing conditions.

Avoid or leave icing conditions as soon as possible. Since the wing anti-icing is no longer provided, structural icing may result.

Case 2



The wing anti-ice switch is on, and the wing amber light is flashing. This indicates a system malfunction in which there is too much bleed air sensed in the system.

1. No. 1 Engine N_1 Speed .... REDUCE

   Reduce the No. 1 engine N_1 rpm until the flashing amber light goes out and the green light illuminates. This action should reduce the high-pressure bleed-air supply to the wing surfaces.

If the light does not turn green:

2. No. 1 Engine N_1 Speed .... AS REQUIRED

3. No. 3 Engine N_1 Speed .... REDUCE

   While maintaining a required speed on the No. 1 engine, reduce the engine speed on the No. 3 engine to further reduce the high-pressure bleed-air supply to the wing surfaces.

NOTE

Do not go below the minimum engine speed prescribed for flight in icing conditions, corrected for temperature (Table AP-4).

Table AP-4. Flight in Icing Conditions

THREE ENGINES OPERATIVE—ANTI-ICING N_1				
TAT	**−30° TO −20°C**	**−20° TO −10°C**	**−10° TO −0°C**	**0° TO +10°C**
>20,000	80%	76%	73%	65%
>20,000 >10,000	76%	73%	65%	58%
<10,000	68%	65%	61%	58%
ONE ENGINE INOPERATIVE				
Increase the values of the above by the following: • 9% if N_1 is equal to or higher than 65% • 6% if N_1 is lower than 65%				
ON AIRCRAFT WITH WING-BRAKE HEATING				
When the heating system is used: • The minimum required N_1 speed with two or all engines operating **must be increased by 1%**.				

If the light turns green:

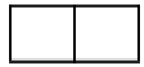
Maintain that engine speed on No. 1 and No. 3 engines when flying through icing conditions.

Case 3

The wing anti-ice switch is on, and both the amber and green anti-ice lights are on. It would be quite rare for such an indication as this to appear. However, the aircraft manufacturer feels that this is a coverall procedure in the event any other indescribable indications might be seen when you turn on the wing anti-icing switch. This indicates that the wing anti-ice system may be malfunctioning and you must:

If in icing conditions, not reduce N_1 speed below the specified value and avoid or leave icing conditions as soon as possible.

Case 4



The wing anti-ice switch is on, and the wing green light is out. This may indicate that the green wing anti-icing light is not operative for one reason or another. The corrective action to determine if it is an indication problem and not an operational problem is to:

1. Wing Anti-ice Switch .... OFF

   Turn off the wing anti-ice switch, and observe the off indications by watching the wing anti-ice lights. Normally, when turning the wing anti-ice switch off, the amber light will flash a couple of times and then extinguish. Turn the switch back on.

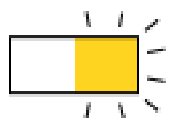
2. Wing Anti-ice Switch .... ON

   If you observe the normal indications of the amber light coming on and then going out, you can assume that the wing valves have opened and are being supplied sufficient bleed air for anti-icing purposes.

   If you do not observe these proper indications, the wing anti-icing system must be considered inoperative. You must:

3. Avoid or leave icing conditions as soon as possible.

WING ANTI-ICE UNWANTED OPERATION WITHOUT BRAKE HEATING



The wing anti-ice switch is off and the amber wing light is flashing. This may mean that some bleed air may still be going to the wings or an indication failure, even though the wing anti-icing switch is off. To try to correct this malfunction by the following procedure:

1. Wing Anti-ice Switch .... ON

   If the green wing light does not come on, it means a failure of the indicating system and there is no anti-ice pressurized air in the wings. Flight may be continued with:

2. Wing Anti-ice Switch .... OFF

OR

If the green light comes on, it means the operation of the wing anti-icing system is out of sequence. High-pressure bleed air may still be supplied to the wings even when the wing switch is off. This case is either untimely operation of the wing anti-ice system or seizing of the wing anti-ice system electrovalve in the open position. If the TAT is above +10°C, the following procedure must be followed to eliminate, or to limit, the flow of high-pressure bleed air to the wings.

2. Wing Anti-ice Switch .... OFF

The amber light may still be flashing.

3. Isolation Valve Knob .... ISOLATE

   Move the rotary switch on the overhead panel to the isolate position. The amber ISOL light should come on. This separates the bleed-air system so that the No. 1 and No. 3 engines feed one side while the No. 2 engine feeds the other side of the bleed-air manifold.

4. HP 1 and PRV 3 Switches .... OFF

   Moving these switches to off should keep any high-pressure airflow, from the No. 1 and No. 3 engines, from entering the bleed-air manifold. It is this side of the manifold from which the wing anti-ice system plumbing taps its air. Therefore, only low-temperature, low-pressure bleed air can be delivered to this side of the manifold. To minimize any adverse effects this low-pressure bleed air might have, perform the following:

5. Reduce No. 1 and No. 3 engines power settings as soon as possible.

WING ANTI-ICE INPERATIVE WITH BRAKE HEATING

The following three cases, with procedures, assume that the wing anti-ice switch was turned on to the position indicated for anti-ice protection and the system malfunctioned.

Case 1

The wing anti-ice switch is on as specified in Procedure A or B below, and the wing amber light comes on steady. This indicates an insufficient supply of bleed air is available for wing anti-icing.

Procedure A

Switch is in the WING position:

1. No. 1 Engine N_1 .... INCREASE UNTIL GREEN LIGHT ILLUMINATES

   Increase the power on the No. 1 engine to attempt to supply more high-pressure bleed air through the HP 1 valve.

If the light turns green:

2. No. 1 Engine N_1 .... MAINTAIN

OR

If the amber light remains on and steady:

2. No. 3 Engine N_1 .... INCREASE

   While maintaining a higher rpm on the No. 1 engine, increase the power on the No. 3 engine to attempt to supply more high-pressure bleed air through the PRV 3 valve.

If the light turns green:

3. No. 3 Engine N_1 .... MAINTAIN

   Keep the power increased on both No. 1 and No. 3 engines, while in icing conditions, to keep the wing anti-ice light green and to ensure a sufficient anti-icing capability.

OR

If the amber light remains on and steady:

3. WING–BRK Switch .... WING–BRK

   The purpose of this operation is to detect a brake heating valve not closed malfunction.

If the light turns green:

4. Maintain an N_1 rpm not less than 1% above the specified value for flight in icing conditions (see Table AP-4).

OR

If the amber light remains on and steady:

4. WING–BRK Switch .... WING

   If in icing conditions, do not reduce N_1 speed below the specified value (see Table AP-4).

5. Avoid or leave icing conditions as soon as possible.

   Wing anti-icing is no longer available.

Procedure B

Switch is in the WING–BRK position:

1. WING–BRK Switch .... WING

   If the green light comes on, it is an indication that the brake heating system is inoperative.

If the green light stays out:

2. WING–BRK Switch .... WING–BRK

   Increase the N_1 speed of the No. 1 engine until the green light comes on. If the attempt is unsuccessful, repeat similar N_1 speed increase on the No. 3 engine. Maintain this N_1.

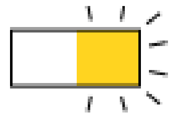
If the light does not turn green and if in icing conditions:

3. Maintain an N_1 rpm not less than 1% above the specified value for flight in icing conditions (see Table AP-4).

4. Avoid or leave icing conditions as soon as possible.

   Consider the brake heating system inoperative as well.

Case 2



The WING–BRK switch is in the position as indicated in Procedure A or B below, and the amber light is flashing with the green light out. This indicates excessive anti-icing to the wings.

NOTE

When reducing N_1 rpm as directed below, do not reduce the N_1 below the minimum speed required for operations in icing conditions.

Procedure A

Switch in the WING position:

1. Reduce N_1 speed of No. 1 engine until the amber flashing light goes out and the green light comes on.

If this does not correct the problem:

2. No. 1 Engine N_1 Speed.. AS REQUIRED

3. Reduce N_1 speed of No. 3 engine until the amber flashing light goes out and the green light comes on.

Procedure B

Switch in the WING–BRK position:

1. Reduce N_1 speed of No. 1 engine until the amber flashing light goes out and the green light comes on.

If this does not correct the problem:

2. No. 1 Engine N_1 Speed.. AS REQUIRED

3. Reduce N_1 speed of No. 3 engine until the amber flashing light goes out and the green light comes on.

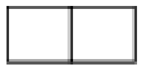
   Maintain an N_1 speed not less than 1% above the specified value for flight in icing conditions (see Table AP-4).

Case 3

The wing anti-ice switch is on, and both the amber and green anti-ice lights are on. It would be quite rare for such an indication as this to appear. However, the aircraft manufacturer feels that this is a coverall procedure in the event any other indescribable indications might be seen when you turn on the wing anti-icing switch. This indicates a general total malfunctioning of the system, and you must:

Avoid or leave icing conditions.

Case 4



The WING–BRK switch is in the position as indicated in Position A or B below, and the amber and green wing anti-ice lights are out.

Procedure A

Switch in the WING position:

1. WING–BRK Switch .... OFF

   The amber light should flash and then go out. This indicates that the wing anti-ice valves were open and that they closed normally.

2. WING–BRK Switch .... WING

   Carefully watch the indicator lights as the switch is moved to the WING position. The amber light should come on steady and then go out. This is a normal indication; however, the green light should come on. If the green light did not come on, there is a malfunction in the indicating system, and it can be assumed that the wing anti-ice system is working properly.

If the amber light did not come on steady and then go out:

3. Avoid or leave icing conditions as soon as possible.

   If in icing conditions, do not reduce engine rpm below specified values.

Procedure B

Switch in WING-BRK position:

1. WING–BRK Switch .... WING

If the green light stays out:

2. WING–BRK Switch .... OFF

   The amber light should flash and then go out. This indicates that the wing anti-ice valves were open and that they closed normally.

3. WING–BRK Switch .... WING–BRK

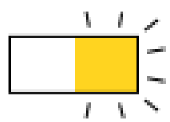
   Carefully watch the indicator lights as the switch is moved to the WING–BRK position. The amber light should come on steady and then go out. This is a normal indication; however, the green light should come on. If the green light did not come on, there is a malfunction in the indicating system, and it can be assumed that the wing anti-ice system is working properly.

If the amber light did not come on steady and then go out:

4. Avoid or leave icing conditions as soon as possible.

   If in icing conditions, do not reduce engine rpm below specified values.

WING ANTI-ICE UNWANTED OPERATION WITH BRAKE HEATING



The WING–BRK switch is off and the amber wing light is flashing. This may mean that some bleed air may still be going to the wings, or indication failure, even though the wing anti-icing switch is off. To try to correct this malfunction:

1. WING–BRK Switch .... WING

   If the green wing light does not come on, it means a failure of the indicating system and there is no anti-ice pressurized air in the wings. Flight may be continued with:

2. WING–BRK Switch .... OFF

OR

If the green light comes on, it means the operation of the wing anti-icing system is out of sequence. High-pressure bleed air may still be supplied to the wings even when the wing switch is off. The cause is either untimely operation of the wing anti-ice system or seizing of the wing anti-ice system electrovalve in the open position. If the TAT is above +10°C, the following procedure must be followed to eliminate, or to limit, the flow of high-pressure bleed air to the wings.

2. WING–BRK Switch .... OFF

   The amber light may still be flashing.

3. Isolation Valve Knob .... ISOLATE

   Move the rotary switch on the overhead panel to the isolate position. The amber ISOL light should come on. This separates the bleed-air system so that the No. 1 and No. 3 engines feed one side while the No. 2 engine feeds the other side of the bleed-air manifold.

4. HP 1 and PRV 3 Switches .... OFF

   Moving these switches to off should keep any high-pressure airflow, from the No. 1 and No. 3 engines, from entering the bleed-air manifold. It is this side of the manifold from which the wing anti-ice system plumbing taps its air. Therefore, only low-temperature, low-pressure bleed air can be delivered to this side of the manifold. To minimize any adverse effects this low-pressure bleed air might have, perform the following:

5. Reduce No. 1 and No. 3 engines power settings as soon as possible.

ENGINE ANTI-ICE INOPERATIVE

Case 1

ENG 1, ENG 2 or ENG 3 amber light on steady.

The associated engine anti-ice switch is on and the amber anti-ice light is on steady, indicating that the air intake (nacelle lip) anti-icing air pressure associated with engine 1 and/or engine 3, or that either the S-duct or the air intake (nacelle lip) anti-icing surfaces of engine 2, are not receiving enough air pressure for anti-icing purposes.

1. Increase power on the affected engine until the amber light goes out and the green light comes on.

If the amber light goes out and the green light illuminates:

2. Retain this thrust setting while in icing conditions.

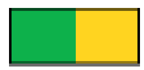
If the amber light does not go out:

3. In icing conditions, do not reduce N_1 below the specified value (see Table AP-4).

4. Avoid or leave icing conditions.

Case 2

ENG 1, ENG 2 or ENG 3 amber and green lights on.



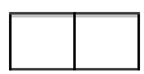
The engine anti-ice switches are on and both the amber and green anti-ice lights are on for one or more engines. It is quite rare for such an indication to appear. However, the aircraft manufacturer feels that this is a coverall procedure in the eventuality any other indescribable indications might be seen when you turn on the engine anti-icing switches. This indicates a general total malfunctioning of the system and you must:

1. If in icing conditions, do not reduce N_1 below the specified value (see Table AP-4).

2. Avoid or leave icing conditions as soon as possible.

   Since this is an unknown condition and impossible to troubleshoot, it is best to avoid or leave icing conditions.

Case 3



The No. 2 engine anti-ice switch is on, the amber light is out, but the green light did not come on. This may be a case where the indicating system is malfunctioning. If you see the amber light come on and then go out, you can assume that the system is working correctly. The procedure is to cycle the switch off and then on again to observe the other indications associated with the operation of No. 2 engine anti-icing.

1. No. 2 Engine Anti-ice Switch .... CYCLE OFF–ON

   Observe No. 2 Engine Amber Light .... ON–OFF

   As you cycle the switch off, carefully watch the light indications. Normally, the amber light should flash a couple of times and then extinguish. If this is observed, turn the anti-ice switch back on. Now you should observe that the amber light comes on and then goes out. You can assume the system is operating, but only with a green light indication malfunction.

If the amber light does not come on and then go out:

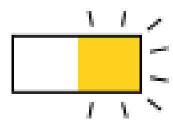
2. In icing conditions, do not reduce N_1 below the specified value (see Table AP-4).

3. Avoid or leave icing conditions as soon as possible.

   The No. 2 engine anti-icing system must be considered inoperative; therefore, you must leave or avoid icing conditions.

ENGINE ANTI-ICE OVERPRESSURE

ENG 1, ENG 2 or ENG 3 flashing amber light.



The associated engine anti-ice switch is on and the amber anti-ice light flashes on one or more engines. This indicates that the pressure in the air intake anti-ice system of the corresponding engines is too high.

1. Reduce the power on the affected engine until the flashing amber light goes out and the green light illuminates.

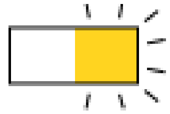
   By reducing the power on the affected engine, you reduce the temperature and pressure of the high-pressure bleed air being supplied the manifold and, in turn, the engine anti-ice surfaces.

2. Retain this power setting. Do not go below the minimum N_1 engine rpm prescribed for flight in icing conditions (see Table AP-4).

ENGINE ANTI-ICE UNWANTED OPERATION

Case 1

ENG 1 or ENG 3 amber light flashing.



The associated engine anti-ice switches are off and an amber light flashes. This may mean that some bleed air may still be going to an engine's anti-ice surfaces even though the engine anti-ice switch is off.

1. Associated Engine Anti-ice Switch .... ON

   If the green engine anti-ice light does not come on, it means a failure has occurred in the indicating system.

Flight may be continued with:

2. Associated Engine Anti-ice Switch .... OFF

If the green engine light comes on, it means the operation of that engine anti-icing system is out of sequence. High-pressure bleed air may still be supplied to the engine surfaces even when the engine anti-ice switch is off.

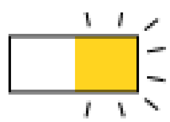
If the TAT is above +10°C, the following procedure must be followed to eliminate, or to limit, the flow of high-pressure, high-temperature bleed air to the engine anti-ice surfaces. Make sure the associated anti-ice switch is off and perform the following:

3. Associated Engine Power Thrust.. REDUCE

   Reduce the power on the associated engine to the minimum needed for operational purposes.

Case 2

ENG 2 amber light flashing.



The No. 2 engine anti-ice switch is off and the amber light flashes. This may mean that some bleed air may be going to the engine's air intake and S-duct surfaces even though the engine anti-ice switch is off.

1. No. 2 Engine Anti-ice Switch .... ON

   If the green engine anti-ice light does not come on, it means a failure has occurred in the indicating system.

The flight may be continued with:

2. No. 2 Engine Anti-ice Switch .... OFF

If the green No. 2 engine light comes on, it means the operation of that engine anti-icing system is out of sequence. High-pressure bleed air may still be supplied to the engine air intake and S-duct surfaces even when the engine anti-ice switch is off.

If the TAT is above +10°C, the following procedure must be followed to eliminate, or to limit, the flow of high-pressure, high-temperature bleed air to the No. 2 engine anti-ice surfaces:

3. No. 2 Engine Anti-ice Switch .... OFF

The amber light is now on steady.

4. Isolation Valve Knob .... ISOLATION

   Move the rotary knob on the overhead panel to the isolate position. The amber ISOL light should come on. This separates the bleed-air system so that the No. 1 and No. 3 engines feed one side while the No. 2 engine feeds the other side of the bleed-air manifold.

5. PRV 2 Switch .... OFF

   Moving this switch to off should keep any No. 2 engine high-pressure, high-temperature airflow from entering the bleed-air manifold. It is this side of the manifold from which the S-duct anti-ice system plumbing taps its air. Therefore, only low-temperature, low-pressure bleed air can be delivered to this side of the manifold.

If the amber flashing light does not go out and the TAT is above +10°C:

6. No. 2 Engine Thrust .... REDUCE

Reduce the thrust on the No. 2 engine to the minimum needed for operational purposes, which will reduce this anti-icing air temperature.

LATE ACTIVATION OF SYSTEMS

CAUTION

Before turning on the anti-ice systems, when it has been discovered that you are already flying in icing conditions, caution should be exercised due to the possible damage that could be caused by the engine ingestion of large pieces of ice. The following steps should be closely followed before anti-ice switches are turned on.

1. Start Selector Switches (3) .... AIR START

   This will help preclude the possibility of an engine flameout. It is also recommended that the rpm for each engine be reduced, one at a time, as engine anti-ice switches are turned on.

2. No. 1 and No. 2 Engine Anti-ice Switches .... ON

After waiting 30 seconds:

3. No. 3 Engine Anti-ice Switch .... ON

After waiting 30 seconds:

4. Wing or WING–BRK Anti-ice Switch .... ON

5. Start Selector Switches (3) .... GROUND START

   (When no longer required.)

AIR CONDITIONING

BLEED-AIR SYSTEM OVERHEAT

Light on steady.

BLEED OVHT

This light, on the master failure panel, illuminates when one of three temperature probes, located in the bleed-air manifold downstream from each engine, detects an excessive bleed-air temperature.

The following is a step-by-step identification process.

1. PRV 3 Switch .... OFF

After turning off the PRV 3 switch, carefully observe the BLEED OVHT light, and note any changes in its actions.

If the BLEED OVHT light starts blinking and then goes out, leave the PRV 3 switch off and continue the flight in this configuration. This was the faulty system.

OR

If the BLEED OVHT light starts blinking and keeps blinking **in icing conditions:**

2. Associated Engines Blinking Light .... IDLE

   Move the associated power lever to idle to lower the bleed-air temperature and pressure in the manifold. Set N_1 of other engines corresponding to one engine inoperative conditions (see Table AP-3) to ensure adequate air for anti-icing.

NOTE

If you are not in icing conditions, and to preclude having to reduce to idle on an engine, an alternate procedure is possible.

1. Turn the isolation valve knob to isolation.
2. Set the passenger air-conditioning valve switch to off if the overheat is from No. 2 engine bleed air.
3. Set the crew air-conditioning valve switch to off if the overheat is from the No. 1 or No. 3 engine.
4. Move the COND control lever, located on the copilot's right console, to the tied position.

If the BLEED OVHT light stays on and is steady:

3. PRV 3 Switch .... AUTO

   If the light stayed on and steady after turning the PRV 3 switch off, the PRV 3 system was not the problem.

If PRV 3 was not the problem:

4. Apply the above procedures with PRV 2 and HP 1, if necessary.

For the aircraft with AUXITROL EL 124 box (modification M1905 not applied):

- After a flight with a BLEED OVHT warning light illuminated in the cockpit, it is mandatory to check the LEDs in the rear compartment on EL 124 box before switching off electrical power.

For the aircraft with AUXITROL EL 137 box (modification M1905 applied):

- After a flight with a BLEED OVHT warning light illuminated in the cockpit, it is mandatory to check the LEDs in the rear compartment on EL 137 box. This information remains available after switching off electrical power, which makes maintenance of the bleed-air system easier.

Modification M1905 is applied in production since aircraft S/N 167 or in retrofit by changing boxes.

ECU OVERHEAT

ECU OVHT

This light indicates failure of the cold-air generation system.

1. Passenger Temperature Controller ...... MANUAL/MINIMUM 40% HOT

   Move the passenger temperature control toward the hot position, a minimum of 40% of the dial. This will decrease the amount of hot bleed air that is directed through the turbocooling unit compressor.

2. Passenger Air-Conditioning Valve Switch (If Required)..................... OFF

   If it is necessary to further limit the amount of air demand for cooling by the turbocooling unit, move the passenger air-conditioning valve switch to the off position. The air demand will quickly diminish, and the overheat light should go out.

3. COND Control Lever .... TIED

   If it was necessary to turn off the passenger air-conditioning system, to eliminate the ECU OVHT indication, you must connect the crew and passenger air-conditioning systems.

If the ECU OVHT light stays on, you must perform the following procedures:

4. Passenger Air-Conditioning Valve Switch...................................... AUTO

   This allows airflow from the passenger environmental circuit.

5. Crew Temperature Controller.............. MANUAL/MINIMUM 40% HOT

   Move the crew temperature control toward the hot position, a minimum of 40% of the dial. This again will decrease the amount of bleed air that is directed through the turbocooling unit. Perhaps the crew system was making a larger demand than the passenger system.

6. Crew Air-Conditioning Valve Switch (If Required) .... OFF

   If it is necessary to further limit the amount of air demand for cooling by the turbocooling unit, move the crew air-conditioning valve switch to the off position. The air demand will quickly diminish, and the overheat light should go out.

If the ECU OVHT light is still on:

7. Airspeed... LESS THAN 300 KNOTS TAS

   Reduce the airspeed of the aircraft to less than 300 knots true airspeed. This will allow the turbofan to operate and the air intake door on the bottom aft of the empennage to open to provide more ventilating air through the heat exchangers.

NOTE

If you are not in icing conditions, the HP 1, PRV 2, and PRV 3 switches may be turned off.

If the overheat warning persists:

8. Passenger Air-Conditioning Valve Switch (If Required).................... OFF

   If you are unable to control the overheat condition by the time you have reached this point in the checklist, control of the overheat condition may not be possible. The air-conditioning system should be isolated from operation, a descent should be initiated because you will be unable to pressurize the aircraft, and a landing should be made at the nearest suitable airport.

9. Land as soon as possible.

CABIN AIR-CONDITIONING UNIT OVERHEAT (ON AIRCRAFT WITHOUT TURBOCOOLING UNIT ANTI-ICING EMERGENCY CONTROL)

High air temperature occurs along with the light.

COND'G OVHT

This light indicates overheating in one of the passenger or crew air-conditioning ducts. Check the valve positions on both the passenger and crew temperature control panels.

1. Temperature Controllers .... MANUAL/COLD

   Move the mode selector switch on each panel from AUTO to MANUAL to turn off the automatic regulation system. Move the manual temperature control switch to the cold position.

If the light does not go out or if the temperature does not decrease:

2. Passenger Air-Conditioning Valve Switch .... OFF

   Move the passenger air-conditioning valve switch to the off position to eliminate some of the excess temperature coming through the air-conditioning ducts. However, in order to provide air circulation throughout the aircraft, you must perform the following procedure:

3. COND Control Lever .... TIED

   Move the COND control lever to the tied position to connect the two systems together. This will provide circulation of air from the cockpit air-conditioning unit, which will supply the entire interior of the aircraft.

CABIN AIR CONDITIONING OVERHEAT ON AIRCRAFT EQUIPPED WITH ANTI-ICING EMERGENCY CONTROL (SB-131)

COND'G OVHT

High air temperature occurs along with light.

This light indicates overheating in one of the cabin or cockpit air-conditioning ducts. Check the valve positions on both the passenger and crew temperature control panels.

1. Temperature Controllers .... MANUAL/COLD

   Move the mode selector switch on each panel from AUTO to MANUAL to turn off the automatic regulation system. Move the manual temperature control switch to the COLD position.

CAUTION

Since anti-icing on the turbine is no longer ensured, the amber ECU A/I pushbutton can only be used at high altitude (above 35,000 feet) where the water concentration is practically close to zero.

If altitude is below 35,000 feet:

See note below.

If the temperature is NOT decreasing:

2. ECU A/I Pushbutton .... DEPRESSED (AMBER)

   The turbocooling fan is no longer deiced. Check for amber illumination of the ECU A/I pushbutton.

If the temperature is still not decreasing after ECU A/I operation:

3. Passenger Switch .... OFF

   Move the passenger, or cabin, air-conditioning valve switch to the off position to eliminate some of the excess temperature coming through the air-conditioning ducts. However, in order to provide air circulation throughout the aircraft, you must perform the following procedure:

4. COND Control Lever .... TIED

   Move the COND control lever to the tied position to connect the two systems together. This will provide circulation of air from the cockpit air-conditioning unit, which will supply the entire interior of the aircraft.

OR

If the temperature is decreasing:

3. Temperature Controllers .... AUTO

   The temperature decrease confirms the source of overheat was from a malfunctioning turbofan anti-icing valve, which has now been closed as a result of the activation of the ECU A/I pushbutton.

At the beginning of descent:

4. Pressure Norm/Emergency Switch .... EMERGENCY

   This will simultaneously close the passenger air-conditioning valve and drive the crew temperature control valve to full hot. Check for proper position indication on the control panel.

5. ECU A/I Pushbutton .... RELEASED

   Check for extinguishing of light.

If temperature is too high and if not previously accomplished:

6. Crew Switch .... OFF

7. COND Control Lever .... TIED

NOTE

For operation below 35,000 feet with the amber COND'G OVHT light on, complete only the below listed items:

Passenger Switch .... OFF

COND Control Lever .... TIED

BATTERY CONDITIONING FAILURE (SB-125)

COND BATT light

1. COND BATT Switch .... OFF/CHECKED

   Aircraft with Service Bulletin 125 have a switch that controls a valve that provides crew cold air to the aircraft battery compartment. Takeoff is authorized provided the cold air battery conditioning duct is closed. If the valve will not close, the conditioning duct is blocked. In this case, the warning light stays on.

NOSE CONE OVERHEAT

NOSE
CONE OVHT

This light indicates that the nose cone temperature is too high.

1. Nose Control Lever (If Installed) .... CHECK/NORMAL

   Check that the nose conditioning lever, located on the copilot's right console, is in the normal, or forward, position. This allows cabin air to be used for inflight ventilation of the electronic components mounted in the nose cone.

2. Unnecessary Avionics .... OFF

   Check maintenance panel MINELCO indicators for indications of faulty equipment.

   EFIS and MFD symbol generators are located in the nose cone and do require ventilation. However, certain radios, a radar, and navigation units are also located in this area. This additional electronic equipment varies from aircraft to aircraft. It is recommended that an inventory of the components contained in the nose cone be made available on board each aircraft in the event that an electrical isolation becomes necessary.

PRESSURIZATION

IMPROPER CABIN VERTICAL SPEED

This is an erratic indication on the cabin vertical speed indicator when the cabin pressure should be maintaining a stable differential pressure. Certain steps are necessary to ensure that the controls and switches are in their proper position for flight.

As a review, remember that the automatic controller commands the electropneumatic outflow valve, and the pneumatic outflow valve is slaved to it. When not in automatic and in manual, the manual pressurization knob controls the pneumatic outflow valve, and the electropneumatic outflow valve is slaved to it.

1. Pressurization UP–DN Knob............. ALIGNED WITH GREEN INDEX

   Check the manual pressurization knob to be sure it is set in the green index on the dial. The automatic pressurization system is calibrated to maintain cabin pressure automatically with the manual pressurization knob in the green index. Here it commands a closed configuration on the pneumatic outflow valve. If the knob is not in this position, the system will not operate properly, as the automatic system will try to compensate for the knob being out of its proper calibrated position, commanding a change on the pneumatic outflow valve, thus causing an erratic vertical speed indication.

2. PRV 2 and 3 Switches .... CHECKED/AUTO

3. Bleed-Air Crew and Passenger Switches .... CHECKED/ON

   Ensure that the air-conditioning valve switches are in the auto position, or if that does not seem to correct the problem, move them to the on position. This will bypass the automatic opening circuit and allow the valves to go to full open. Check that the PRV 2 and PRV 3 switches are selected to auto to ensure a proper air supply to the bleed-air manifold for air-conditioning and pressurization purposes.

If normal operation is not restored:

4. Pressurization UP–DN Knob.................... 1- TO 2-O'CLOCK POSITION

   At this point, it is assumed the automatic pressurization system may be malfunctioning. By moving the manual pressurization knob to the 1- to 2-o'clock position, you command a level cabin altitude signal to the pneumatic outflow valve in preparation for manual pressurization control. You may notice a slight fluctuation in cabin vertical velocity when performing this step. This is normal, as the automatic controller tries to compensate for the manual knob being out of its compensated position.

   If you do not move the knob to the 1- or 2-o'clock position, a large pressurization surge may result when selecting manual pressure.

5. Auto/Manual Pressure Selector Switch .... MAN

   Move the two-position switch, located to the right of the manual pressurization knob, from the AUTO to the MAN position. This cuts out automatic pressurization control and allows manual control of cabin pressure through the use of the manual pressurization knob.

6. Pressurization UP–DN Knob.............................. ADJUST AS REQUIRED

   Use the manual knob to control cabin pressure. Moving the switch counterclockwise, from the 1- or 2-o'clock position, commands a cabin down signal to the pneumatic outflow valve. Moving the knob to its full counterclockwise position closes the pneumatic outflow valve and commands an approximate 1,500-foot-per-minute rate of descent for the cabin, thereby increasing pressure differential.

   Moving the knob clockwise, from the 1- or 2-o'clock position, commands a cabin up signal to the pneumatic outflow valve. This opens the pneumatic valve and allows a cabin rate of climb of up to 1,500 feet per minute when the knob is turned to the UP position on the dial. By moving the knob past the UP position to the end of the stop, a cabin rate of climb of 2,500 feet per minute is commanded.

TOO HIGH CABIN PRESSURE

The indication for this situation is seen on the cabin pressure triple indicator for altitude and differential pressure. An abnormally high cabin pressure can cause pressurization surges if the overpressure valve opens and closes as it reaches its preset relief values.

1. Cabin Pressure Controller.. FL

   Move the PROG–FL–LDG switch on the cabin pressure controller to the FL position. You can now select a flight level higher than the one you are flying, which increases cabin altitude and keeps the outflow valves from riding on the maximum differential limits.

2. Select a higher flight level.

If the cabin pressure does not decrease, the automatic regulation system may be inoperative. Take the following steps:

3. Pressurization UP–DN Knob.. 1 TO 2 O'CLOCK

   In the event the cabin pressure problem is connected to the automatic pressurization system, this step prepares the pressurization system for manual operation. This position of the knob approximates a level cabin altitude command on the pneumatic outflow valve.

4. AUTO/MANUAL Pressure Selector Switch..................................... MAN

   This is done to disable the automatic (electropneumatic) system and to enable manual (pneumatic) control of the pressurization system.

5. Pressurization UP–DN Knob..................................... UP, AS REQUIRED

   Moving the knob clockwise, from the 1- or 2-o'clock position, commands a cabin up signal to the pneumatic outflow valve. This opens the pneumatic valve and allows a cabin rate of climb of up to 1,500 feet per minute when the knob is turned to the UP position on the dial. By moving the knob past the UP position to the end of the stop, a cabin rate of climb of 2,500 feet per minute is commanded.

If cabin pressure keeps increasing:

6. Crew and Passenger Air-Conditioning Valve Switches .... OFF

   This closes the electric valves of the cockpit and passenger cabin air-conditioning system, shutting off the flow of bleed air into the aircraft. Without the flow of air, the pressure differential should decrease.

If flight requirements so dictate maintaining altitude, cycle the crew and passenger switches off to on periodically to maintain a cabin altitude no higher than 8,000 feet or a cabin differential pressure no greater than approximately 9 psi. Descend, as required.

TOO HIGH CABIN ALTITUDE OR SLOW DEPRESSURIZATION

CABIN

The aural warning occurs along with the light.

The red CABIN light will illuminate accompanied by the aural "cabin" warning as heard from the cockpit speaker system. This indicates that the cabin altitude has climbed higher than 10,000 feet. This is a loss of cabin pressure and should be dealt with in a timely manner. If climbing, the climb should be stopped until the problem is corrected. A descent may even be in order. If at a high altitude, immediate donning of the oxygen masks is mandatory by all occupants.

1. Bleed-Air Crew and Passenger Conditioning .... ON

1A. PRV 2 and PVR3 Switches .... CHECKED

Check that the crew and passenger air-conditioning valve switches are on and that air is coming into the aircraft. PRV 2 and 3 switches must be in auto. If these actions have not been taken, then air will not be able to enter the aircraft cabin. It is suggested that the crew and passenger air-conditioning valve switches be placed to the on position if it is thought that the automatic feature is not working.

2. BAG Switch.. ISOL

When placing the baggage switch to ISOL, you shut off the supply of hot air to the baggage compartment and close the isolation valve between the main passenger cabin and the baggage compartment. In the event there is a pressure leak in the baggage compartment area, it will be isolated by this step, thereby conserving main cabin depressurization. Check to see if the cabin altitude is still increasing or is too high, and confirm illumination of the BAG ISOL light on the warning panel and mechanics panel.

3. Nose Control Lever (If Installed) .... CLOSED

On the copilot's right console, pull the nose conditioning lever aft to the closed position. This isolates the nose cone from the main cabin of the aircraft, and preserves cabin pressurization should a pressure leak exist in the nose cone area.

4. Pressurization UP–DN Knob .... 1 TO 2 O'CLOCK

   In the event the cabin pressure problem is connected to the automatic pressurization system, this step prepares the pressurization system for manual operation. This position of the knob approximates a level cabin altitude command on the pneumatic outflow valve.

5. AUTO/MAN Pressure Selector Switch .... MAN

   This is done to disable the automatic (electropneumatic) system and to enable manual (pneumatic) control of the pressurization system.

6. Pressurization UP–DN Knob .... DOWN, AS REQUIRED

   Use the manual knob to control cabin pressure. Moving the switch counterclockwise, from the 1- or 2-o'clock position, commands a cabin down signal to the pneumatic outflow valve. Moving the knob to its full counterclockwise position closes the pneumatic outflow valve and commands an approximate 1,500-foot-per-minute rate of descent for the cabin, thereby increasing pressure differential.

If cabin pressure cannot be restored:

7. Isolation Valve Knob .... ISOLATION

   This action separates the bleed-air manifold. The ISOL light should come on. This is an attempt to see if there is a bleed-air leak in one side of the manifold or the other. If there is a leak, it will be isolated to one side, and bleed air will be available from the other side for air conditioning and pressurization.

If cabin pressure is restored:

8. Cycle the crew and passenger air-conditioning valve switches on and off alternately to determine which is the operating system for maintaining air conditioning and pressurization.

   Leave the operating system switch on, and turn the malfunctioning system switch off.

9. COND Control Lever .... TIED

   If it was necessary to turn off one of the air-conditioning systems, you must tie the crew and passenger air-conditioning systems together in order to provide complete interior air circulation.

OR

If cabin pressure is not restored:

8. NORM–EMERG Pressure Selector Switch .... EMERG

   Moving this switch to EMERG causes the closure of the passenger air-conditioning system electric valve and moves the electric valve of the crew air-conditioning system to the full hot position. This bypasses the total conditioning system and allows engine bleed air to be directed straight to the cabin of the aircraft, through the crew air-conditioning system. If the aircraft stays in this configuration for long, the air inside the cabin will begin to get warm.

THEN

If cabin pressure is restored:

9. Continue flight at the highest possible altitude.

   In the decision to continue flight or to descend and land at a suitable airport, take into account the source of the problem. Where the aircraft is flying, over land or water, should enter into the judgment.

10. Crew Temperature Controller.. AS REQUIRED

    As the temperature of the cabin gets warmer, select manual control on the crew temperature control panel, and move the temperature control toward cold. However, do not move the temperature control to less than 50% hot, i.e., less than half way of the dial. To go lower than 50% hot would mean that you could start losing pressure again as more air is channeled through the heat exchanger and other temperature-lowering devices.

If the temperature gets too high during the descent:

11. Crew Air-Conditioning Valve Switch .... OFF

    This will close off the flow of hot bleed air to the cabin. However, keep a vigilance on the pressurization needs of the aircraft relative to the altitude through which the descent is made.

OR

If cabin pressure cannot be restored:

9. Crew Oxygen Masks ....DONNED/NORMAL

   To prevent oxygen deprivation, immediately put on the oxygen masks and ensure 100% is selected.

10. Microphone Selector .... MASK

    Set the audio panels on each side console to MASK and C'PIT for hot mike communications in the cockpit.

11. No Smoking Sign .... ON

    Smoking and oxygen are not a good mix in an aircraft. A verbal directive over the loud speaker system might be appropriate as well.

12. Passenger Oxygen Masks .... DONNED

13. If necessary, execute an emergency descent to 14,000 feet or to the minimum safe altitude, as required.

DOOR UNLOCKED INDICATION

Case 1

CABIN

No aural warning occurs.

The red cabin light illuminates without any aural warning. If the aural warning were heard, it is another abnormal procedure for too high a cabin altitude.

This indicates that either the cabin access door is not fully closed or the forward toilet service door (for those aircraft so equipped) is not fully closed and latched.

If on the ground, proceed as follows:

1. Cabin Entrance Door .... CHECKED VISUALLY

   Visually check the position of the index marks on the handle and the two crankpins in their tracks on the doorframe.

If the door is properly secured:

2. Exit the aircraft and check that the forward toilet service door is properly latched closed.

If in flight:

1. FASTEN BELTS Sign .... ON

   Turn on the FASTEN BELTS sign and announce over the cabin paging system that passengers must take their seats.

2. Cabin Entrance Door .... VISUALLY CHECK

   Visually check the alignment of the index marks on the handle and the position of the two crankpins in their tracks on the doorframe. The two microswitches for cabin door warning indication are located in the bottom of each crankpin track.

If the door is, or seems to be, improperly locked:

3. Cabin Differential Pressure .... REDUCE, IF POSSIBLE

   Be cautious in the method of reducing cabin pressure. It is recommended that the way to reduce cabin differential is to begin a slow descent and let the normal automatic reduction of pressurization differential take place. A sudden rash reduction of pressure by dumping might prove detrimental.

4. Land as soon as possible.

Case 2

REAR DOORS

This light indicates that either the baggage compartment external door, or the rear compartment door, is not fully closed and latched.

Access to the baggage compartment is not permitted.

WARNING

> If the suspect door is the baggage compartment door, access to the baggage compartment must be denied in the event of a sudden decompression.

1. BAG ACCESS Light .... OUT

   This light should normally be out. If it is on, ascertain that the baggage compartment has been evacuated and that the baggage access door is closed and latched.

Case 3

BAG
ACCESS

This light should normally be out. This light comes on when a person opens the access door to the baggage compartment. Entry to the baggage compartment is permitted in flight to a maximum flight level of 410.

If the baggage compartment is not in use, visually check for proper closing of the baggage compartment access door.

Case 4

BAG
ISOL

This light illuminates if the baggage compartment electric isolation valve is not fully open. The baggage compartment may not be pressurized if the baggage access door is closed. Check the BAG selector switch on the overhead bleed-air panel.

OXYGEN—NO AUTOMATIC DEPLOYMENT OF MASKS

If the oxygen masks do not automatically deploy when cabin altitude reaches 11,500 ±750 feet:

1. Oxygen Controller .... OVERRIDE

   This emergency manual setting for the controller should deploy the masks if the automatic system fails.

2. Passenger Masks .... DONNED/CHECKED

APU BLEED LIGHT

BLEED
APU

This light illuminates if the APU bleed-air valve is not completely closed whenever the bleed switch is off or when one of the power levers is moved beyond 54° of power lever movement and the valve has not automatically closed.

Investigate the cause and correct the problem before takeoff.

WINDSHIELD

CRACK OR BUBBLES FORM

If a windshield gets fissured or cracked, the flight can be continued without danger. Pressurization integrity should be maintained.

1. Limit Airspeed.. 230 KIAS MAXIMUM

   By limiting airspeed, the adverse effects of heavy airloads on a cracked window are lessened.

2. Cabin Differential Pressure .... 7.5 PSI MAXIMUM

   Maintain this pressure differential as a maximum to preclude further cracking due to a high-pressure differential.

3. Associated Windshield Heat Switch... NORMAL

HEAT SYSTEM INOPERATIVE

XFR

This light illuminates when there is an electrical short or a stoppage in the left or right regulator probe. Heating regulation is automatically transferred to the operating regulator. System performance should not be affected.

1. Pilot and Copilot Windshield Heat Switches .... SAME POSITION

Pilot and copilot windshield heat switches should be selected to the same position.

If possible, before landing:

2. Windshield Heat Switches (Pilot and Copilot)...................................... OFF

AUTOMATIC FLIGHT CONTROL SYSTEM (AFCS)

AFCS Out-Of-Trim Condition

Case 1

MISTRIM

A message will also appear on the ID 802: PITCH MISTRIM NOSE or NOSE DOWN. This indicates that there is a permanent load on the pitch servomotor.

1. Hold the control wheel firmly.

   Before disconnecting the autopilot, grasp and hold the control wheel firmly to overcome any out-of-trim condition that might exist when the autopilot is disconnected.

2. Autopilot .... DISENGAGED

   Disengage the autopilot by pressing the disengage button located on the bottom aft portion of the control wheel. The autopilot can also be disconnected by pressing the go-around button, the elevator trim buttons, or the emergency elevator trim switch or by pulling the AFCS circuit breakers. Be ready for any unusual aircraft flight condition as the disconnect is initiated. The AP light will come on and the ID 802 will show disengagement. The AP light can be extinguished by pressing the autopilot disconnect button once again.

3. Manually trim the aircraft.

   In other words, hand fly the aircraft and retrim the surfaces.

4. Try to reengage the autopilot.

Case 2

MISTRIM

A message will also appear on the ID 802: RETRIM ROLL R WING DOWN or L WING DOWN. This indicates that there is a permanent load on the roll servomotor.

1. Retrim the aircraft without disengaging the autopilot.

MACH TRIM INOPERATIVE

MACH TRIM

This indicates a malfunction of the Mach trim device.

Do not exceed .80 Mach unless the autopilot is engaged.

ANGLE-OF-ATTACK STALL PROBE HEATING FAILURE

L. AOA OR R. AOA

Illumination of either light indicates a failure of the anti-icing system of the corresponding angle-of-attack stall probe.

1. Avoid icing conditions.

ANGLE-OF-ATTACK PROBE— HEAT SYSTEM INOPERATIVE

AOA PROBE

This indicates failure of the anti-icing system of the angle of-attack indicator probe.

The angle-of-attack indicator system must not be used in icing conditions.

FIRE PROTECTION SYSTEMS

FAILURE OF ENGINE DETECTION SYSTEM

FAULT

Illumination of this light indicates a defect in the fire protection monitoring circuit of the corresponding engine.

1. Land as soon as possible.

FAILURE OF APU FIRE PROTECTION SYSTEM

FAULT

Illumination of this light indicates a defect in the APU fire protection monitoring circuit.

1. APU .... SHUT DOWN

EFIS

NOTE

In the event of a failure of either CRT, the approach will be flown by the pilot who has both CRTs operational.

NOTE

In the event of the failure of the EHSI CRT, on aircraft so equipped with the multifunction display, the MFD controller may be selected to the HSI position, if required.

EITHER EADI CRT FAILURE

The CRT display on the EADI will go blank, or the color will be altered and difficult to interpret.

On the associated EFIS reversion controller:

1. EADI ON–OFF Dimmer Knob .... OFF/COMPOS

   Information that was formerly displayed on the EADI CRT will be transferred and will appear in a composite form on the EHSI CRT.

If a multifunction display is installed and if desired:

1. Place the mode selector switch in the EHSI position corresponding to the inoperative CRT.

   The EHSI display will now appear on the MFD. The composite on the EHSI will disappear, leaving the full EADI display that formerly appeared on the EADI CRT.

EITHER EHSI CRT FAILURE

The CRT display on the EHSI will go blank or the color will be altered and difficult to interpret.

On the associated EFIS reversion controller:

1. EHSI ON–OFF Dimmer Knob ....OFF/COMPOS

   Information that was formerly displayed on the EHSI CRT will be transferred and will appear in a composite form on the EADI CRT.

If a multifunction display is installed and if desired:

2. Place the mode selector switch in the EHSI position corresponding to the inoperative CRT.

   The EHSI display will now appear on the MFD. The composite on the EADI will disappear, leaving the full EADI display.

SIMULTANEOUS FAILURE OF EADI AND EHSI CRTS ON THE SAME SIDE

Both CRT displays go blank, SG flags appear on the EHSI and EADI or the color is altered and difficult to interpret. This indicates a malfunction in the respective symbol generator for that EFIS system.

On the associated EFIS reversion controller:

1. SG Pushbutton .... DEPRESS

   This will allow the good EFIS information that is presented on the other pilot's side to be transferred to the side that was experiencing a malfunction. White XSG annunciators will illuminate on the EADI and EHSI. One symbol generator supplies all four CRTs. The center CRT goes blank.

NOTE

The MFD symbol generator may be used in the backup mode for both the pilot and copilot symbol generators simultaneously. The crossover annunciation is an amber XSG flag on all four CRTs.

SUCCESSIVE FAILURE OF EADI AND EHSI CRTS ON THE SAME SIDE

In this situation, one CRT goes blank, soon followed by the other CRT going blank.

1. EADI/EHSI ON–OFF Dimmer Knobs............................... OFF/COMPOS

   Move both knobs to the counterclockwise position.

2. Place the mode selector switch in the EHSI position corresponding to the inoperative CRT.

3. Use the standby horizon.

4. The pilot whose CRTs are operating flies the aircraft.

LOSS OF ASCB CONTROL

XDATA flag appears on both EADIs.

Items that are lost:

- Cross-side data
- Glide-slope, localizer, and radio altimeter comparison annunciators.

NOTE

If the aircraft is equipped with a third IRS, IRS 3 may be used in the backup mode for both IRS 1 and IRS 2 simultaneously. The associated display is an amber IRS annunciator on all four CRTs.

INVALID ATTITUDE AND/OR HEADING DATA

IRS flag appears on EADI and EHSI, and loss of attitude and heading reference occurs.

On the associated reversion controller:

1. IRS Pushbutton .... DEPRESS

   Push the IRS button to cross over to the other side IRS. White XIRS flags will appear on the EADI and EHSI. Attitude data is supplied by the operational IRS.

NOTE

If the aircraft is equipped with a third IRS, IRS 3 may be used in the backup mode for both IRS 1 and IRS 2 simultaneously. The associated display is an amber IRS annunciator on all four CRTs.

IRS ATTITUDE COMPARISON ANNUNCIATION WITH OR WITHOUT A HEADING COMPARISON ANNUNCIATION

IRS comparison annunciators appear on both EADIs and a possible IRS data invalid message appears on the ID 802.

1. Standby Horizon .... CROSS-CHECK

   Compare the standby attitude indicator with the information displayed on the EADI.

2. Faulty IRS .... IDENTIFY

   Troubleshoot the electronic instrument systems to try to identify the faulty IRS.

When the faulty IRS is identified, on the EFIS reversion controller panel on the faulty side:

3. IRS Pushbutton .... DEPRESS

   To cross over the system, to put the operative side on the bad side, push the IRS pushbutton, and observe that an XIRS flag appears. Turn off the bad IRS.

IRS ATTITUDE COMPARISON ANNUNCIATION WITHOUT A HEADING COMPARISON ANNUNCIATION

IRS comparison annunciation appears on both EHSIs.

1. Standby Compass and RMI .... CROSS-CHECK

   Compare the readings on the standby compass and RMI against the readings on each EHSI. From this comparison, the faulty IRS can be identified.

2. Faulty IRS .... IDENTIFY

Follow either Procedure A or B below:

Procedure A

If the faulty IRS is in the NAV mode and the position indication is **correct**, on the reversion controller for the faulty side IRS:

1. IRS Pushbutton .... DEPRESS

   To cross over the system, to put the operative side on the bad side, push the IRS pushbutton, and observe that an XIRS flag appears.

OR

Procedure B

If the faulty side IRS is in the NAV mode, but the position indication is **incorrect**, on the mode select unit (MSU) of the faulty IRS:

2. Selector .... ATT

   Move the MSU knob from NAV to ATT. This eliminates the navigation computer and allows the IRS to become a basic attitude reference system.

3. FMS of Faulty Side IRS .... ENTER CORRECT HEADING

   To enter the correct heading for the FMS to track its IRS, you must select the POS SENSORS page on the FMS. When this page comes into view, select the status page of the IRS that is in ATT. Enter the heading in the space provided on this page. The heading may be obtained from the information provided by the other FMS or from the standby magnetic compass if straight and level and with the windshield heat off.

IAS/MACH DATA INVALID

IAS flag appears on EADI and loss of IAS and Mach data occurs.

On the associated faulty side reversion controller:

1. IAS/Mach Pushbutton.. DEPRESS

   This action will allow the crossover of IAS and Mach information from the good side. The XIAS annunciators in each EADI should illuminate.

IAS DISPARITY ANNUNCIATION

IAS comparison annunciation appears in each EADI.

It is possible that a DADC DATA INVALID message will appear in the ID 802 as well.

1. Standby Airspeed Indicator .... CHECK

   Cross-check the information given on the standby airspeed indicator with the information given on each EADI. The EADI having the same, or nearly the same, information as the standby airspeed indicator can be considered having the good DADC information.

After the faulty DADC has been identified, on the faulty side reversion controller:

2. IAS/Mach Pushbutton.. DEPRESS

   This action will allow the crossover of IAS and Mach information from the good side. The XIAS annunciators in each EADI should illuminate.

LOC OR GS DISPARITY ANNUCIATION

LOC or GS comparison annunciation appears in each EADI for any altitude below 1,200 feet AGL.

1. Faulty ILS .... IDENTIFY

   Check each navigation radio for proper identification of the facility, and try to determine which radio is malfunctioning. Turn the bad navigation receiver off and:

2. Proper ILS Radio for Each Side .... SELECT

FAILURE OF EITHER FMS

1. Cross-Check Position .... EVERY 30 MINUTES

   Continually cross-check the position given by one FMS and IRS with the position given by the other side FMS and IRS.

If one side FMS appears to have failed:

2. Select the FMS of the good side for navigation on its respective EHSI.

EMERGENCY PROCEDURES

CONTENTS

ILLUSTRATIONS

EMERGENCY PROCEDURES

GENERAL

Where these emergency checklist procedures differ from the *Airplane Flight Manual*, the *Airplane Flight Manual* takes precedence.

Compliance with the order prescribed for application of these procedures is recommended.

Where more than one phase for a procedure is specified:

- Phase 1 specifies immediate action to be accomplished without the need for reference to the checklist.
- **Phase 2** items shall be completed only after phase 1 items have been accomplished by checklist.
- **Phase 3** items shall be accomplished as soon as time permits.

Aural warnings shall be identified before being silenced. Eliminating these aural warnings will enable better coordination during accomplishment of the emergency procedures.

The *Airplane Operating Manual* prescribes the following procedure if the fire aural warning sounds without the presence of a FIRE light:

- Test the detection system by activating the test switch to FIRE.
- If a FIRE light does not come on, the fire corresponds to that light.
- If all the FIRE lights come on, the aural warning is a false alarm.

In all cases, carefully observe all other indications and instruments to confirm either a malfunction or a false alarm.

ENGINE FIRE

FIRE + AURAL WARNING

NOTE

The following procedure must be followed, whether or not the FAULT light is on.

Phase 1

After positively identifying the engine affected and silencing the aural warning:

1. Power Lever of Engine Concerned .... CUTOFF

   Moving the power lever cutoff closes the fuel supply to the engine at the fuel control.

2. Fuel Shutoff Switch of Engine Concerned .... ACTUATED

   Raise the guard on the fuel shutoff switch (Figure EP-1) and move the switch up to electrically close the fuel shutoff valve. The fuel shutoff valve is located in the crossfeed manifold downstream from the fuel tank system.

   Carefully observe that the amber TRANS light, located under the fuel shutoff switch, comes on and then goes out after the shutoff switch is actuated. This light will illuminate during the movement of the valve in order to confirm positioning of the valve with the position of the switch.

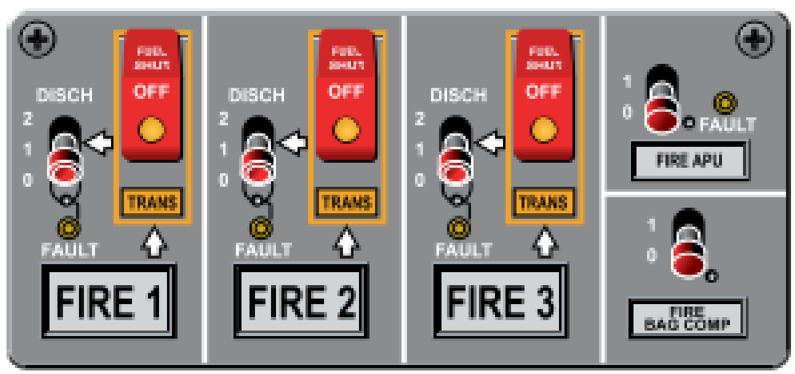


Figure EP-1. Fire Panel and Warning Lights

3. Airspeed.. BELOW 250 KNOTS

   The airspeed must be reduced to ensure that the fire-extinguishing agent, when discharged to the engine, stays within the engine cowling and is not siphoned overboard.

4. Fire-Extinguisher **DISCH** Switch .... POSITION 1

   Break the safety wire holding the fire-extinguisher switch in position 0. **Without pulling out on the switch,** carefully move the switch up to position 1. This is best done by placing only **one** finger under the switch and moving it upward from the bottom.

   Selecting position 1 discharges one fire-extinguisher bottle to a lateral engine or two fire-extinguisher bottles to the center engine.

If the fire warning persists:

5. Fire-Extinguisher **DISCH** Switch .... POSITION 2

   Position 2 is a lever-locked position, and the switch must now be pulled out and moved upward to select this position.

   Selecting position 2 discharges one alternate fire extinguisher bottle to a lateral engine and two alternate fire extinguisher bottles to the center engine.

Phase 2

Proceed with phase 2 items after phase 1 items have been verified by the checklist.

CAUTION

After the fire has been extinguished, do not attempt to restart the affected engine.

Engine Shutdown

6. Booster Switch.. OFF

   Move the respective engine booster switch to the off position, unless the pump is needed for fuel management purposes, and check for illumination of the corresponding fuel light on the warning panel. If the No. 2 engine is shut down, No. 2 system fuel must be consumed first in order to maintain a correct center of gravity.

7. GEN Switch .... OFF

   The generator switch should be placed off to remove the affected generator from the electrical circuitry.

8. Engine Anti-ice .... OFF

If the No. 2 engine is shut down:

9. Bus-Tie Switch .... TIED

   With the No. 2 engine shut down, generator power to the right side electrical buses is lost. To prevent the No. 2 battery from being depleted, tie the bus to supply the right-side bus from the No. 1 and No. 3 generators. Check the generator volts and amps to ensure the buses have been tied. A higher-than-normal bus load may be indicated on the remaining generators. This higher load may be caused by the No. 2 battery being charged after tying the buses. Continue to monitor bus loading until the No. 2 battery is fully charged.

10. Standby Hydraulic Pump .... ON/AS REQUIRED

    Consider moving the standby hydraulic pump switch to ON. The engine-driven hydraulic pump may not have sufficient windmilling rpm for normal operation of the No. 2 hydraulic system components. In flight, in the AUTO position, the standby pump cycles only to support airbrake operations.

    CAUTION

    If in icing conditions, operate the No. 2 engine anti-ice even with the engine shut down. The S-duct will continue to be anti-iced through bleed air supplied from the main manifold by the No. 1 and No. 3 engine.

11. Land as soon as possible.

    The aircraft must be landed at the nearest suitable airport for inspection and repair.

INTERNAL ENGINE FIRE ON THE GROUND

The best way to fight an internal engine fire is to rotate the compressor by means of the starter in order to cool the engine at the location of the fire. The purpose is to evacuate both excess fuel and any flames present.

If a fire breaks out during a starting attempt, or when shutting down the engine, the engine must be rotated, with the power lever set to cutoff, until the fire is out.

1. Power Lever.. CUTOFF

   Move the power lever to cutoff to shut off the fuel at the fuel control.

2. Fuel Shutoff Switch .... ACTUATED

   Move the fuel shutoff switch (Figure EP-2) up to shut off fuel at the fuel manifold for the engine affected.

3. Start Selector Switch .... MOTOR–START STOP

   This arms the start circuit for engine motoring.

4. Start Button.. DEPRESSED

   Hold the respective engine start button depressed until the fire goes out. This rotates the engine without the presence of fuel, an action that should evacuate any residual fuel, causing the fire to extinguish.

5. Crew and Passenger Bleed Switches.. OFF

   This is done to keep fumes from entering the cabin of the aircraft.

6. Evacuation .... INITIATED IF REQUIRED

   Initiate the evacuation when crew and passengers have been breifed. Fire brigade is also advised.

APU FIRE

See Figure EP-2 for location of the FIRE APU and FAULT indicator light.

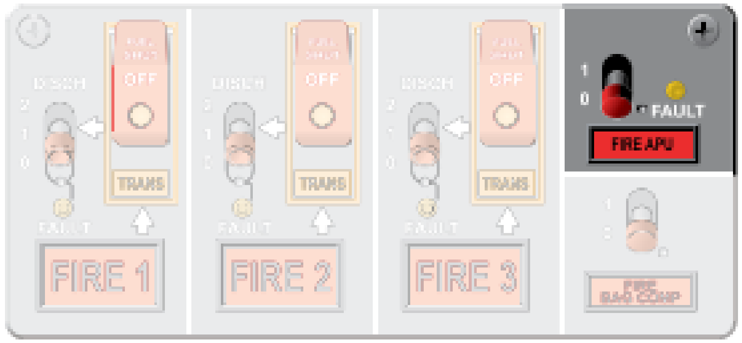


Figure EP-2. Fire Panel and Warning Lights—FIRE APU

APU FIRE + AURAL WARNING

NOTE

The following procedure must be followed, whether or not the FAULT light is on.

NOTE

If a fire or an overheat is detected and indicated, the APU stops automatically through closure of the fuel shutoff valve and removal of the electrical power supply.

1. APU Master Pushbutton Light .... SHUT DOWN

   This action is taken to ensure power is removed from the APU electrical control circuitry.

2. APU Generator Pushbutton Light.. OFF

   This is part of the cleanup procedure to disconnect any possible residual electrical circuitry.

3. Bleed-Air APU Switch .... OFF

   This action is necessary to close off any potential air supply to the cabin to prevent smoke or fumes from entering.

NOTE

Wait for ten seconds to allow the APU to come to a complete stop before discharging the fire extinguisher. This will ensure that the discharge agent stays within the APU compartment to increase the effectiveness of the agent.

4. APU Extinguisher Switch.. POSITION 1

   There is only one position on the APU extinguisher switch that fires one bottle to the APU compartment. This same bottle is used for protection of the baggage compartment.

If the fire warning persists:

5. No. 2 Engine Fuel Shutoff Switch.. ACTUATED

   The fuel supply to the APU is provided through the No. 2 engine fuel system. If the fire persisted, shutdown of the No. 2 engine is required to further attempt to isolate the cause of the fire. Check for illumination and then extinguishing of the TRANS light on the fire panel.

6. No. 2 Engine Power Lever .... CUTOFF

   The No. 2 engine must be shut down as well to permit access to the APU by firefighting personnel. This is the continuing cleanup procedure to ensure engine shutdown.

7. Booster 2 Switch.. OFF

   As it is no longer needed, the boost pump must be turned off.

8. No. 2 GEN Switch .... OFF

9. No. 2 Engine Anti-ice .... OFF

   If the anti-ice system was turned on for ground operations, it should be turned off as part of the cleanup procedure.

CAUTION

Do not attempt to restart the APU after it has been shut down, due to a fire or an overheat condition.

BAGGAGE COMPARTMENT FIRE

FIRE BAG COMP + AURAL WARNING

See Figure EP-3 for location of FIRE BAG COMP light.

Phase 1

1. BAG Switch.. HEAT

   Move the BAG switch from NORM to the HEAT position. This action shuts off the hot bleed-air supply to the baggage compartment. Because the isolation valve between the cabin and baggage compartment is still open, the pressure between the two compartments should remain equal, allowing the baggage access door to be opened for firefighting purposes.

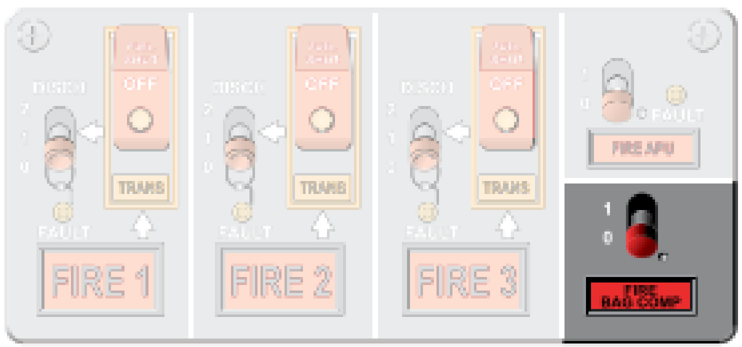


Figure EP-3. Fire Panel and Warning Lights—FIRE BAG COMP

NOTE

For aircraft registered in the United States, Australia, Italy, and the U.K., access to the baggage compartment is not authorized when the aircraft altitude is above 41,000 feet. Modifications to the following procedures must be made in order to comply with this restriction when above 41,000 feet.

2. If access to the baggage compartment is permitted, the copilot dons the smoke hood and fights the fire with the handheld fire extinguisher.

CAUTION

The lavatory door must be properly closed prior to opening the baggage compartment door to prevent smoke and fumes from entering the passenger cabin.

If access to the baggage compartment is not permitted because the compartment has depressurized, the aircraft is above 41,000 feet, the aircraft is in the takeoff or landing phase of flight, or the presence of both pilots is required in the cockpit.

1. BAG Switch .... ISOL

   This will close the isolation valve between the cabin and baggage compartment in order to keep fumes from entering the main cabin. Confirmation of valve closing is obtained by illumination of both the BAG ISOL light and ISOL light indications on the mechanic's panel. It may serve a secondary purpose by starving the oxygen supply to a fire existing in the compartment. Your judgment in evaluating this situation and applying the proper decision-making process is certainly very important.

2. BAG COMP Extinguisher Switch.................................... POSITION 1

   Break the safety wire on the baggage compartment fire-extinguisher switch and move the switch to position 1. This fires one bottle to the baggage compartment.

Phase 2

3. Land as soon as possible.

   The aircraft must be landed at the nearest suitable airport for inspection and repair.

MAIN WHEEL WELL OVERHEAT

L. WHL OVHT AND/OR R. WHL OVHT

Lights are on the master failure warning panel.

NOTE

There is no fire-extinguishing system for the wheel wells. The warning can originate from either wheel well, usually caused by overheated brake units. However, if the wheel well heating system has been installed, this system could be the cause of the warning.

1. Airspeed.. 190 KIAS OR LESS

   This is the maximum airspeed for landing gear operations (V_{LO}). Slow to this speed before extending the landing gear.

2. Landing Gear .... EXTENDED

   Place the normal landing gear selector handle down to extend the gear. Check for normal indications during the extension of the landing gear.

   Keep the landing gear down until the overheat warning light(s) is out, but not for less than ten minutes. Do not exceed 245 KIAS while the landing gear are extended.

3. Brake Heating System (A/C Equipped with this System).................... OFF

   This will close the respective brake heat valves and limit the introduction of heated air into the wheel well area.

CAUTION

The overheat condition may have caused brake and/or tire damage. Make a shallow final approach and as soft a landing as possible.

NOTE

Unless a greater emergency exists, it is advisable to leave the landing gear extended until landing at the nearest suitable airport is achieved, especially if tire or brake damage is suspected.

AIR-CONDITIONING SMOKE

The warning associated with this emergency may be smoke originating from the air-conditioning outlets and the gaspers.

Phase 1

1. Crew oxygen masks.................................Donned - 100% + EMERGENCY

   The crew oxygen masks must be put on immediately upon the detection of smoke. Be careful of eye glasses when putting on the masks to avoid personal injury or to avoid a poor fit of the mask around the glasses. The mask must fit tightly around the face to ensure smoke does not penetrate the mask and enter the breathing passengers. Ensure that the NORMAL -100% oxygen selector button on the front of the mask is in the 100% (pure oxygen) position .When the test button is held down by rotation (EMERGENCY), it enables oxygen overpressure to be created at any altitude and leveling of supplementary oxygen request due to the pressurization of the smoke goggles. This operation is carried out only when in 100 % oxygen position.

2. Smokes goggles ....DONNED - VENT VALVE OPEN

Remove the smoke goggles from their storage area and place them over the eyes with a tight fit to ensure proper vision during the smoke/fire emergency.

Open the vent valve on the oxygen mask, trapped smoke in the goggles during fitting will be evacuated by this way.

3. Microphone selector ....MASK - TESTED

For hot mike communications within the cockpit , speakers must be selected, and the mask and CPIT buttons on the pilot and copilot audio panels must be pushed on. To communicate to an outside agency , select the proper radio microphone button on the audio panel,and depress the MIC button on the top inside of either control wheel.

4. No Smoking Sign...ON

5. Passenger Oxygen Controller .... OVERRIDE

On the copilot's right console , move the selector switch on the passenger oxygen panel clockwise to OVERRIDE and check that the pneumatic PASS ON indicator is fully open. This position drops the passenger oxygen masks from their storage bins at each passenger position and allows a flow of oxygen when the passenger pulls the mask down and then dons it.

6. Passengers masks.. DONNED - CHECKED

Before takeoff on the first flight of the day , the passenger must be briefed on the location and proper use of the masks. A crew member must ensure that the passengers have properly donned their masks in the event of this emergency.

Phase 2

1. Crew Gaspers... OPEN

This action is designed to increase the airflow in the cockpit to expedite smoke evacuation as the checklist continues.

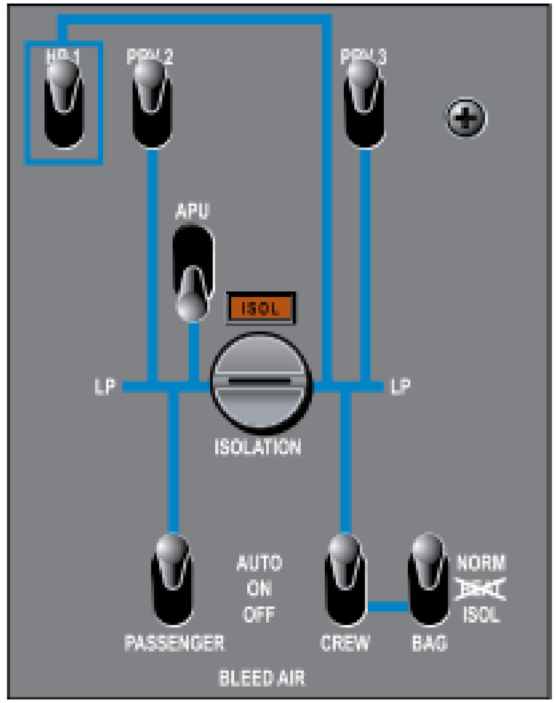


Figure EP-4. Bleed-Air Panel

2. Isolation Valve Knob (Figure EP-4).. ISOLATION

   On the overhead panel, move the isolation valve knob to a straight up and down position to isolate the bleed-air manifold into a left and right configuration. The amber ISOL light located above the knob should be on, indicating the valve is closed. Once the isolation valve is closed, carefully watch the cabin and crew air-conditioning outlets to see if there is a change in the smoke entering the aircraft.

If smoke is no longer observed to be coming through the crew air-conditioning system, ***there is no need to set the crew air-conditioning switch to OFF.***

3. Crew Bleed-Air Switch (If Smoke Persists).. OFF

   If the smoke decreases or disappears after this action, the smoke was coming from the No. 1 or No. 3 engine. There are two alternatives to consider. Follow alternative 1 or 2 below:

4. COND Control Lever .... TIED

   On the copilot's right console, move the cabin/cockpit interconnection control lever aft. This interconnects the ducting of the two air-conditioning systems. Clean conditioned air will now be supplied to the entire air-conditioning system by the passenger air-conditioning system using bleed air from only the No. 2 engine.

   OR

   Troubleshoot the system to determine which engine, No. 1 or No. 3, was causing the smoke. The air-conditioning systems can then be switched back to normal operations, provided the defective engine N_1 rpm is kept 3% below that of the other two engines. Sound judgment should dictate your choice in this emergency. It might be prudent to choose Alternative 1 above.

If smoke persists:

5. Crew Bleed-Air Switch .... ON

   The passenger bleed-air system becomes suspect at this point. To keep air coming into the aircraft before proceeding further with the checklist, move the crew bleed-air switch to ON.

6. Passenger Bleed-Air Switch .... OFF

   If the smoke decreases or disappears, continue the flight with the faulty bleed-air switch isolated. The smoke probably emanated from the No. 2 engine.

If the smoke persists, the cooling unit is suspect. Proceed as follows:

7. Crew Temperature Controller.................................. MANUAL/40% HOT

   Since the crew bleed-air switch is the only bleed on, an attempt to control the flow of cold air to a minimum will be made. Set the crew temperature controller to MANUAL, and hold the manual COLD–HOT selector to the HOT position until the indicator needle moves toward the H indication, about 40% away from the left side of the gage.

If the smoke disappears:

If the smoke decreases or disappears, continue the flight and use the crew temperature controller, as required, to establish the proper cabin temperature. Do not select a position lower than 40% HOT.

If the smoke persists:

8. Crew Bleed-Air Switch .... OFF

   The only remaining procedure is to turn off the entire bleed-air supply to the air-conditioning system. The aircraft will now begin to depressurize, yet may still be filled with smoke.

9. Descend to 14,000 feet or below or to the minimum safe altitude.

CAUTION

The following procedure must not be applied if flames are present in the cabin or cockpit.

At or below 14,000 feet:

10. Pressurization Dump Switch .... DUMP

    Lower the guard on the dump switch, and set the switch to the DUMP position. This action opens the outflow valves and dumps the cabin pressure at a rapid rate down to the cabin altitude limiter altitude of 14,000 ±500 feet. Smoke should be evacuated from the cabin during the dump operation.

At or below and indicated airspeed of 215 knots:

11. LH Direct-Vision Window .... OPEN

    If required to help eliminate smoke from the cockpit, the pilot's direct-vision window may be opened.

Phase 3

1. Descend to 10,000 feet or to the minimum safe altitude for the route flown.

   This is the maximum altitude for sustained flight, without oxygen, in an unpressurized aircraft.

If the smoke continues or if the fire is not visibly verified to be out:

2. Land as soon as possible.

   The aircraft must be landed at the nearest suitable airport for inspection and repair.

ELECTRICAL SMOKE OR FIRE

Phase 1

Smoke and Unusual Odors

1. Crew oxygen masks..............................DONNED - 100% + EMERGENCY

   The crew oxygen masks must be put on immediately upon the detection of smoke. Be careful of eye glasses when putting on the masks to avoid personal injury or to avoid a poor fit of the mask around the glasses .The mask must fit tightly around the face to ensure smoke does not penetrate the mask and enter the breathing passengers. Ensure that the NORMAL -100% oxygen selector button on the front of the mask is in the 100% (pure oxygen) position .When the test button is held down by rotation (EMERGENCY), it enables oxygen overpressure to be created at any altitude and leveling of supplementary oxygen request due to the pressurization of the smoke goggles. This operation is carried out only when in 100 % oxygen position.

2. Smokes goggles......................................DONNED - VENT VALVE OPEN

   Remove the smoke goggles from their storage area and place them over the eyes with a tight fit to ensure proper vision during the smoke/fire emergency. Open the vent valve on the oxygen mask, trapped smoke in the goggles during fitting will be evacuated by this way.

3. Microphone selector ....MASK - TESTED

4. No Smoking Sign..ON

Only if there are no flames in the cabin:

5. PASSENGER OXYGEN controller...OVERRIDE

   On the copilot's right console , move the selector switch on the passenger oxygen panel clockwise to OVERRIDE and check that the pneumatic PASS ON indicator is fully open .This position drops the passenger oxygen masks from their storage bins at each passenger position and allows a flow of oxygen when the passenger pulls the mask down and then dons it.

6. Passengers masks... DONNED - CHECKED

   Before takeoff on the first flight of the day , the passenger must be briefed on the location and proper use of the masks. A crew member must ensure that the passengers have properly donned their masks in the event of this emergency.

Phase 2

1. Crew Air Gaspers .... OPEN

   This action is designed to increase the airflow in the cockpit to expedite smoke evacuation as the checklist continues.

If the origin of the fire or smoke is evident:

2. Suspected Equipment .... ISOLATED

   If equipment has been malfunctioning, or if smoke is observed to be coming from a specific electrical component, turn off that equipment if it is the apparent cause of smoke or fire.

OR

If the origin of the fire or smoke is not evident, and if flight conditions permit a total electrical shutdown:

2. GEN 1, BAT 1, BAT 2, GEN 2, and GEN 3 Switches .... OFF

   If inflight situational conditions will permit such an action, turn off all BAT and GEN switches to shut off all electrical power supplied to the aircraft. After the fire/smoke has stopped, attempt to find the source of the fire/smoke by turning on the batteries, one at a time, to see which bus side causes the fire/smoke to recur. When the origin is known:

3. BUS TIED Switch .... FLIGHT NORMAL

   Confirm BUS TIED light out on the master warning panel.

4. BAT Switch (Affected Side) .... OFF

   Turn off the BAT switch for the bus which is causing the fire/smoke.

5. BAT and GEN Switches (Opposite Side)... ON

   In order to restore electrical power to at least some of the aircraft components, turn on the battery and generator for the bus not affected by the fire/smoke. Do not tie buses.

OR

If the origin of the fire or smoke is not evident, and if flight conditions do not permit a total electrical shutdown:

2. BAT 2 and GEN 2 Switches.. OFF

Move the BAT 2 and GEN 2 control switches to the OFF position. This action eliminates the electrical power supply to the right DC electrical buses. The amber BAT 2 and GEN 2 lights on the master failure warning panel will illuminate.

3. Bus-Tied Switch .... FLIGHT NORMAL

4. BUS TIED Light.. OUT

   Ensure that this normal flight configuration, one which isolates the right DC bus from the left DC bus, is maintained. This is necessary in order that the troubleshooting procedure be effective.

5. Passenger Temperature Controller .... MANUAL/COLD

   Set the passenger temperature controller to manual. Hold the COLD–HOT switches to the full cold position of the indicators.

If the smoke or fire persists:

6. AUTO–MAN Pressurization Selector Switch.................................... MAN

   Since the left DC buses are no longer supplied with electrical power, which includes control of automatic pressurization, the manual mode must be selected to control the cabin pressure. Adjust the manual pressurization control knob, as required, to control the cabin pressure within limits.

7. BAT 2 and GEN 2 Switches.. ON

   This action is taken to restore electrical power to the right DC electrical buses, prior to isolating the left DC electrical buses. It is assumed that the smoke or fire was not caused by a component on the right main bus.

8. GEN 1, BAT 1, and GEN 3 Switches.. OFF

   This action removes electrical power from the left DC electrical buses in order to further troubleshoot the cause of the problem.

9. Crew Temperature Controller... MANUAL/COLD

   Set the crew temperature controller to MANUAL. Hold the COLD–HOT switches to the full COLD position of the indicators.

If fire or smoke is visibly verified removed:

10. Continue the flight to the nearest suitable airport.

If fire or smoke is not visibly verified removed:

10. Land as soon as possible.

    The aircraft must be landed at the nearest suitable airport for inspection and repair.

If smoke persists:

11. Crew Air Gaspers .... OPEN

    This action is designed to increase the airflow in the cockpit to expedite smoke evacuation as the checklist continues.

12. Descend to 14,000 feet or below or to the minimum safe altitude.

CAUTION

The following procedure must not be applied if flames are present in the cabin or cockpit.

At or below 14,000 feet:

13. Pressurization Manual UP–DN Control .... UP

    Positioning of the manual knob control will ensure a decrease in cabin differential and cabin depressurization.

At or below an indicated airspeed of 215 knots:

14. LH Direct-Vision Window .... OPEN

    If required to help eliminate smoke from the cockpit, the pilot's direct-vision window may be opened.

Phase 3

1. Descend to 10,000 feet or to the minimum safe altitude for the route flown.

   This is the maximum altitude for sustained flight, without oxygen, in an unpressurized aircraft.

If the smoke continues or if the fire is not visibly verified to be out:

2. Land as soon as possible.

   The aircraft must be landed at the nearest suitable airport for inspection and repair.

SMOKE REMOVAL

Phase 1

1. Crew oxygen masks............................DONNED - 100% + EMERGENCY

   Be careful of eye glasses when putting on the masks to avoid personal injury or to avoid a poor fit of the mask around the glasses. The mask must fit tightly around the face to ensure smoke does not penetrate the mask and enter the breathing passengers. Ensure that the NORMAL -100% oxygen selector button on the front of the mask is in the 100% (pure oxygen) position.When the test button is held down by rotation (EMERGENCY), it enables oxygen overpressure to be created at any altitude and leveling of supplementary oxygen request due to the pressurization of the smoke goggles. This operation is carried out only when in 100% oxygen position.

2. Smokes goggles......................................DONNED - VENT VALVE OPEN

   Remove the smoke goggles from their storage area and place them over the eyes with a tight fit to ensure proper vision during the smoke/fire emergency. Open the vent valve on the oxygen mask, trapped smoke in the goggles during fitting will be evacuated by this way.

3. Microphone selector ....MASK - TESTED

   For hot mike communications within the cockpit, speakers must be selected, and the mask and CPIT buttons on the pilot and copilot audio panels must be pushed on. To communicate to an outside agency, select the proper radio microphone button on the audio panel, and depress the MIC button on the top inside of either control wheel.

4. No Smoking Sign..ON

If there are no flames in the cabin:

5. PASSENGER OXYGEN controller..OVERRIDE

   On the copilot's right console , move the selector switch on the passenger oxygen panel clockwise to OVERRIDE and check that the pneumatic PASS ON indicator is fully open. This position drops the passenger oxygen masks from their storage bins at each passenger position and allows a flow of oxygen when the passenger pulls the mask down and then dons it.oxygen masks from their storage bins at each passenger position and allows a flow of oxygen when the passenger pulls the mask down and then dons it. Before takeoff on the first flight of the day, the passengers must be briefed on the location and proper use of the masks. A crewmember must ensure that the passengers have properly donned their masks in the event of this emergency.

6. Passengers masks.. DONNED - CHECKED

   Before takeoff on the first flight of the day , the passenger must be briefed on the location and proper use of the masks. A crew member must ensure that the passengers have properly donned their masks in the event of this emergency.

Phase 2

1. Crew Air Gaspers .... OPEN

   This action is designed to increase the airflow in the cockpit to expedite smoke evacuation as the checklist continues.

2. Crew and Temperature Controllers .... MANUAL/COLD

   This action is intended to prevent the recirculation of smoke entrained air into the cabin and cockpit.

3. Descend to 14,000 feet or below or to the minimum safe altitude for the route flown.

CAUTION

The following procedure must not be applied if flames are present in the cabin or cockpit.

At or below 14,000 feet:

3. Pressurization Dump Switch .... DUMP (A1 BUS POWER REQUIRED)

   Lower the guard on the dump switch, and set the switch to the DUMP position. This action opens the outflow valves and dumps the cabin pressure at a rapid rate down to the cabin altitude limiter altitude of 14,000 ±500 feet. Smoke should be evacuated from the cabin during the dump operation.

At or below and indicated airspeed of 215 knots:

4. LH Direct-Vision Window .... OPEN

   If required to help eliminate smoke from the cockpit, the pilot's direct-vision window may be opened.

Phase 3

1. Descend to 10,000 feet or to the minimum safe altitude for the route flown.

   This is the maximum altitude for sustained flight, without oxygen, in an unpressurized aircraft.

If the smoke persists or if the fire is not visibly verified to be out:

2. Land as soon as possible.

   The aircraft must be landed at the nearest suitable airport for inspection and repair.

INADVERTENT THRUST REVERSER DEPLOYMENT IN FLIGHT

REV UNLOCK

AND POSSIBLY **TRANSIT** AND/OR **DEPLOYED**

The aircraft may experience a pitch-down moment, accompanied by abnormal noise and buffeting.

The REV UNLOCK light means the thrust reverser has deployed when it is supposed to be fully stowed. The clamshell doors of the thrust reverser may not be fully stowed and locked.

The TRANSIT light means the clamshell door claws are not locked.

The DEPLOYED light means the synchronizing bellcrank controlling the clamshell doors has moved to the deployed position.

Phase 1

1. No. 2 Engine .... IDLE

   Move the throttle on the No. 2 engine to idle to reduce the engine power loads on the deployed clamshell doors.

2. Thrust Reverser NORM/STOW Switch .... STOW

   On the center instrument panel, raise the guard on the switch and move the switch upward to the stow position. This causes retraction of the thrust reverser by overriding all other thrust reverser electrical circuitry, regardless of the flight conditions or the position of the thrust reverser lever or system microswitches.

3. Airspeed .... 230 KNOTS OR LESS

   This will additionally reduce the airloads on the clamshell doors.

Phase 2

If the thrust reverser stows:

1. Continue the flight with the NORM/STOW switch in the stow position.

   Do not actuate the thrust reverser handle. Leave the NORM/STOW switch in STOW to maintain a constant retraction signal with hydraulic pressure on the stow side of the actuator.

If the thrust reverser remains deployed:

2. Thrust Reverser NORM/STOW Switch .... STOW

   Keep the thrust reverser NORM/STOW switch in STOW to keep the emergency stow signal and hydraulic pressure on the retraction side of the actuator.

3. Land as soon as possible.

   Land at the nearest suitable airport for inspection and repair.

NOTE

The drag associated from an idling No. 2 engine, with the thrust reverser deployed, adversely affects the performance characteristics of the aircraft. It is recommended that the engine be shut down for approach and landing.

Follow the procedure for One Engine Inoperative—Approach and Landing found in the Abnormal Procedures section in this manual.

TWO-ENGINES INOPERATIVE— APPROACH AND LANDING

PREPARATION

Reduce the aircraft weight as much as practical. If the actual weight of the aircraft exceeds the maximum limits for landing weight, go-around or landing distance, burn off fuel, if practical.

Determine the weight limitation for enroute climb gradient. This chart is found in the *Flight Manual*, Section 5, subsection 60, page 2.

1. Fuel Supply to Remaining Engine .... CHECKED

   Check that the booster pumps and booster crossfeed valves are in the proper configuration to ensure an uninterrupted flow of fuel to the operating engine. A reasonable wing fuel balance should be maintained if conditions permit. Group 2 fuel should be used first for proper weight-and-balance maintenance of the aircraft center of gravity.

2. Bus-Tied Switch .... TIED

   Tie the left and right DC buses together to ensure the one operating generator supplies the electrical power requirements. The BUS TIED light should be on.

3. Limit Generator Load .... 300 AMPS OR BELOW

   Generator limitations of 300 amps, 350 amps for one minute, should be observed. Check the buses for proper load distribution by the operating generator. Turn off nonessential electrical equipment.

4. Crew and Passenger Bleed-Air Switches .... OFF

   This action eliminates the tap-off of bleed air from the operating engine, thus producing more power for flight.

If No. 1 and No. 3 engines are inoperative:

5. Brake Selector Switch .... #2/ASKID–OFF

   Move the brake selector switch to #2/ASKID–OFF to supply emergency braking from the No. 2 hydraulic system. This means no antiskid braking, and add 50% to the landing distance and 50% to the landing field length computations.

6. ST–BY Hydraulic Pump Switch.. ON

   The standby hydraulic pump is now available to back up the No. 2 engine-driven hydraulic pump, should No. 2 system pressure drop below 1,500 psi.

7. Avoid icing conditions.

   The one remaining engine may not be able to supply sufficient bleed air for anti-icing purposes without jeopardizing the power reserve required for flight of the aircraft.

APPROACH

1. Flaps + Slat Handle... 7° FLAPS + SLATS

   When in the traffic pattern, in preparation for the final approach, extend the slats and flaps to the first detent, provided aircraft control and power reserve permit.

2. Emergency Slats Switch (If Necessary and
   Inoperative Engines are No. 1 and No. 3) .... ON

   The No. 2 hydraulic system is available to provide extension of only the outboard slats at V_{FE} (200 KIAS).

3. Make the decision to land or go around at not less than 1,000 feet above ground level.

   The aircraft should be in a position to land at this point. If not, go around. A go-around is not recommended when below 1,000 feet above ground level. See the Two Engines Inoperative Go-Around checklist.

WHEN COMMITTED FOR LANDING

1. Landing Gear .... EXTEND

NOTE

If the No. 1 or No. 3 engine is the operating engine, the gear may be extended using the normal procedure.

If the No. 2 engine is the operating engine , it is necessary to perform an emergency extension as follows:

2. Normal Gear Handle.. DOWN

CAUTION

The landing gear handle must be maintained down.

3. EMERGENCY GEAR PULL Handle .... PULLED

The electrical sequence is bypassed . The No. 1 system residual fluid is routed straight to the gear uplock boxes and actuators.

If all three green gear down lights illuminate and the landing gear handle light (red) is not illuminated, the landing gear is down and locked. Do not actuate any landing gear controls.

If at least one green gear light does not illuminate and the landing gear handle light is flashing , apply the FREE FALL EXTENSION procedure .

Free Fall Extension Procedure

4. Airspeed.. Not Less Than 160 KIAS

CAUTION

Rapidly alternating large rudder applications in combination with large side-slip angles may result in structural failure at any speed .

Extend the main gear first, one at a time :

5. LH Main Manual Gear Release Handle .... PULL

   Gently apply up to full rudder to the left while accelerating (190 KIAS max) until the left green gear down light is illuminated. Maintain wings level with appropriate aileron input.

NOTE

Illumination of the green gear down light ↓ may take more than 30 seconds with full rudder deflection .

Gently come back to neutral rudder.

6. RH Main Manual Gear Release Handle .... PULL

Gently apply up to full rudder to the left while accelerating (190 KIAS max) until the left green gear down light ↓ is illuminated. Maintain wings level with appropriate aileron input.

NOTE

Illumination of the green gear down light ↓ may take more than 30 seconds with full rudder deflection.

Gently come back to neutral rudder .

7. Nose Gear Manual Release Handle .... PULL

Accelerate until illumination of the green gear light ↓ is achieved (190 KIAS max).

NOTE

Free fall extension of the three landing gear may take approximatelytwo minutes to complete.

8. Flaps/Slats (As Required)... 20° FLAPS + SLATS

At some altitude below 1,000 feet above ground level, after the landing gear is down and locked, extend the flaps to 20°, if performance will permit.

Airspeed on approach:

9. 7° Flaps + Slats.. V_{REF} + 20 KNOTS

If this is selected as the final flap setting for landing, fly the approach at this speed, plus the additive for the wind correction. **Increase the normal landing distance by 800 feet and the normal landing field length by 1,335 feet.**

10. 20° Flaps + Slats.. V_{REF} + 10 KNOTS

If this is selected as the final flap setting for landing, fly the approach at this speed, plus the additive for the wind correction. **Increase the normal landing distance by 400 feet and the normal landing field length by 670 feet.**

NOTE

With No. 1 and No. 3 engines inoperative, extend the slats using the emergency system. Extend the gear manually as described above.

AFTER TOUCHDOWN

1. Thrust Reverser (If Available).. APPLIED

   The normal deceleration devices, such as airbrakes and antiskid braking, should be applied, if available. The thrust reverser is most effective at the higher speeds of the landing rollout.

   If the No. 2 brake system must be used, use moderate braking, as antiskid braking is not available. Use the thrust reverser to slow the aircraft to more effective braking speeds. This is necessary to prevent skidding of the wheels and the possibility of tire failure.

   If No. 2 braking system is used, increase the landing distance, calculated above by 50%, due to the lack of antiskid brakes and the use of less than 40° flaps for landing.

TWO ENGINES INOPERATIVE—GO-AROUND

CAUTION

The decision to land or go around must be made at or above 1,000 feet above ground level. The altitude loss associated with this go-around procedure is approximately 500 feet.

ON THE GO-AROUND

1. Engine Thrust (Full Power).. SET

   Set maximum takeoff power on the operating engine as soon as the decision is made to go around.

2. Landing Gear (If Down)... RETRACTED

   Place the landing gear selector up as the power is being applied to the maximum. This is one case when you do not wait for a positive rate climb before retracting the landing gear.

CAUTION

The landing gear cannot be retracted if No. 1 and No. 3 engines are inoperative.

3. Accelerate the aircraft while in descent on normal slope.

At V_{REF} + 25 knots:

4. Flaps + Slat Handle.. CLEAN

   As soon as the airspeed reaches the 40° flap V_{REF} + 25 knots, retract the slats and flaps incrementally to clean.

5. Accelerate to and maintain the enroute climb speed, then begin to climb the aircraft.

   As soon as the airspeed of 1.43 velocity of stall in the clean configuration is achieved, begin to climb the aircraft to a safe altitude. Maintain the enroute climb speed until the assigned, or a safe, altitude is reached.

CAUTION

The altitude loss associated with this go-around procedure is approximately 500 feet.

ALL ENGINES INOPERATIVE

Phase 1

1. Communications.. VHF 1/ATC 1

   The VHC 1 and ATC 1 should be used to establish emergency communications and for identification with ATC. These radios may be powered through emergency battery packs on some aircraft or by the left main electrical bus on many aircraft.

2. Establish the aircraft within the airstart envelope (Figure EP-5).

3. Reduce the electrical load to the lowest possible.

   Reduce the electrical load by turning off nonessential radios and electrical equipment. Attempts to reduce the load on each battery to less than 50 amps.

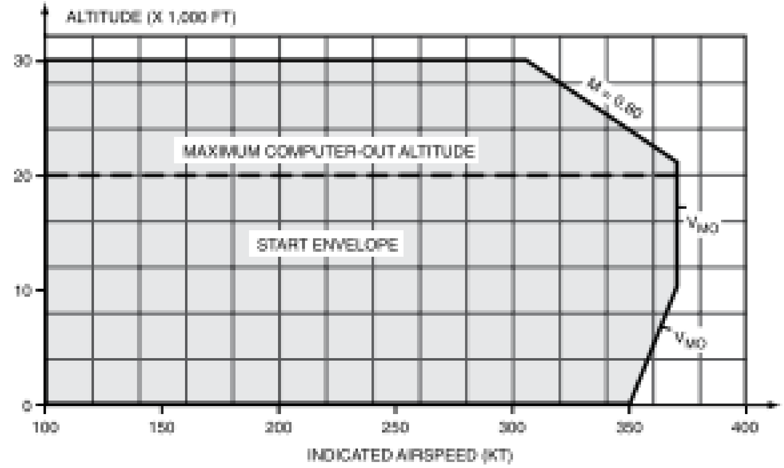


Figure EP-5. Inflight Airstart Envelope

NOTE

To load shed the electrical network, switch OFF the below listed items:

- Booster Pumps
- Windshield Heat
- Pitot
- RH Avionics Master
- Lavatory/Galley Master
- Unnecessary Lights.

4. Relight the engines using the airstart procedure.

   Attempt to airstart all three engines, one at a time, using the Airstart checklist found in the Abnormal Procedures section in this manual. Selection as to which engine is to be started first must be based on the factors that caused the engines to be shut down in the first place; that is, choose the best engine first.

   It is important to note that, if the airspeed is low, a starter assist may be necessary. This will place a high demand on battery power. Ensure that the generator switch is on for the engine being started and that the bus-tied switch is tied. Judicious and expeditious management of resources available is mandatory.

Phase 2

If no engine(s) can be started:

1. Prepare for a forced landing or a ditching.

   Refer to the Forced Landing or Ditching checklists found in this section of the manual.

2. ST-BY Hydraulic Pump (For
   Emergency Flaps + Slats Extension) .... ON

   Remember to use this pump carefully, as its power demands on the batteries will be great. Turn it on only when you are ready to deploy the emergency slats and the flaps to the desired configuration. Turn the pump off after the desired configuration has been achieved.

3. Extend the flaps/slats at V_{FE} (200 KIAS) using the emergency slat system, if necessary.

If a forced landing is anticipated:

4. Extend the landing gear.

   At V_{LO} (190 KIAS) if possible, and if necessary, perform a landing gear emergency (freefall) extension of the landing gear.

CAUTION

The landing gear should not be extended if a ditching is anticipated.

LOSS OF BOTH HYDRAULIC SYSTEMS

PUMP 1 PUMP 2

PUMP 3 AND POSSIBLY AIL FEEL AND PITCH FEEL

Hydraulic indicators show a pressure drop (Figure EP-6).

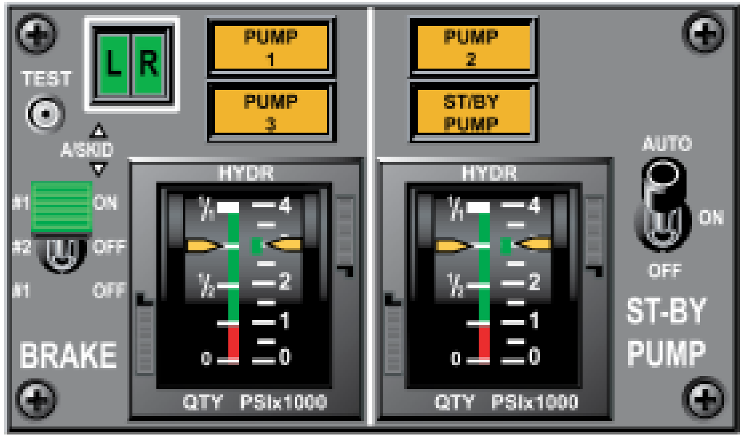


Figure EP-6. Hydraulic Panel

Phase 1

1. Autopilot and Yaw Damper.. DISENGAGE

   Hold the control column while the autopilot is being disengaged. Disengage the autopilot and yaw damper by depressing the yaw damper button on the center console. The AP light should come on. Press the autopilot button on the back of the control wheel to clear the AP light and the autopilot disengagement message on the ID 802.

2. Airspeed... 260 KIAS/.76 MACH MAXIMUM

   Whenever hydraulic power is removed from the flight control servos, reduce the airspeed or Mach number. Control of the aircraft will be easier when flown below these speeds.

Phase 2

1. Avoid high-pitch attitudes and zones of air turbulence.

   Very slight movements of the control surfaces are called for, making gentle bank and pitch changes. If at all possible, avoid any known areas of turbulence and high wind conditions.

LANDING PREPARATION

1. Flaps + Slats Handle .... CLEAN

   Since there is no hydraulic pressure to the systems, the flaps + slat handle must not be actuated.

2. Landing Gear .... FREEFALL

   With no hydraulic pressure available to lower the gear normally, freefall or manual extension of the gear is required.

3. Normal Landing Gear Handle .... DOWN

4. Emergency Hydraulic Gear Control .... PULL

   Push in on the latching mechanism to release the lock holding the handle against the panel, and pull the handle aft to its mechanical stop.

5. Airspeed .... 160 KNOTS MINIMUM

   Maintain an airspeed of 160 to 190 knots to facilitate manual gear lowering. Extend the main landing gear first.

CAUTION

Rapidly alternating large rudder applications in combination with large side-slip angles may result in structural failure at any speed .

Extend the main gear first, one at a time:

6. LH Main Manual Gear release handle.. PULL

   Gently apply up to full rudder to the left while accelerating (190 KIAS max) until the left green gear down light ↓ is illuminated. Maintain wings level with appropriate aileron input.

NOTE

Illumination of the green gear down ligh may take more than 30 seconds with full rudder deflection.

Gently come back to neutral rudder .

7. RH Main Manual Gear Release Handle .... PULL

Gently apply up to full rudder to the left while accelerating (190 KIAS max) until the left green gear down light is illuminated . Maintain wings level with appropriate aileron input.

NOTE

Illumination of the green gear down light may take more than 30 seconds with full rudder deflection .

Gently come back to neutral rudder .

8. Nose Gear Manual Release Handle .... PULL

Accelerate until illumination of the green gear light is achieved (190 KIAS max).

NOTE

Free fall extension of the three landing gear may take approximately two minutes to complete.

CAUTION

Do not actuate the landing gear controls, hydraulic or mechanical, once the landing gear is down and locked.

9. Approach Speed.. V_{REF} + 30 KNOTS

This is the minimum speed prescribed to maintain the safety margin from stall when flying the aircraft in the clean-wing configuration.

NOTE

In the likelihood where high lift devices are already extended, observe the following approach speeds:

- Slats only.............................. V_{REF} + 20 KNOTS
- 7° Flaps + Slats.................... V_{REF} + 20 KNOTS
- 20° Flaps + Slats.................. V_{REF} + 15 KNOTS
- 40° Flaps + Slats.................. V_{REF} + 10 KNOTS

10. Vertical Speed.. APPROXIMATELY 300 FPM

If possible, do not exceed a 300-foot-per-minute rate of descent on final approach for landing.

CAUTION

The landing distance will be twice the nominal charted 40° flaps + slats landing distance.

AFTER TOUCHDOWN

1. Full Reverse Thrust .... SET

In the event of a total hydraulic failure of the main systems, there may still be accumulator hydraulic pressure available for at least one deployment of the thrust reverser.

2. Parking Brake .... INTERMEDIATE DETENT ONLY

If the #2 P. BK light is not flashing, there should be hydraulic pressure stored in the parking brake accumulator circuit for up to five applications of the parking brake. Flashing of the #2 P. BK light indicates only one more brake application is possible. Be careful when deploying the parking brake handle to the first detent. Be sure the aircraft is aimed as straight as possible down the runway before pulling the brake handle. If possible, limit the number of pulls on the brake handle to one, for best effective use of the stored hydraulic pressure.

CAUTION

The hydraulic power-off condition requires greater pilot forces. Landing requires greater caution because directional control is available mainly by rudder and differential forward thrust.

NOTE

During actual flight without hydraulic power, aircraft maneuverability is reduced but remains sufficient in all three axes when flight is maintained within the prescribed flight envelope (260 KT/MI 0.76).

Pitch attitude is controlled essentially with the horizontal stabilizer.

Loss of hydraulic power causes an upward deflection of both ailerons, which produces a slight pitch-up moment that is easily counteracted with pitch control. If the aircraft is not perfectly trimmed in roll when hydraulic power is lost, it is difficult to keep the wings level while accelerating to 260 knots; in this case, it is best to decelerate, recenter the control, then reaccelerate.

The rudder is the most maneuverable control surface when hydraulic power is lost. The aircraft can be turned by induced roll using the rudders.

At speeds below 200 knots, the aircraft maneuverability improves.

Approach is made at a shallow angle to land in a clean configuration at V_{REF} + 30 knots.

LOSS OF ALL THREE GENERATORS

GEN 1 GEN 2 AND GEN 3

NOTE

Simultaneous illumination of these three lights indicates that the three engine generators have been disconnected from the main DC buses. The generator switches may be tripped off.

1. Bus Voltages .... CHECKED

   Check the voltmeter on each bus side to determine the voltage being supplied to the buses.

2. Generator and Battery Ammeters .... CHECKED

   Check the ammeters for each of the generators and batteries to determine which unit is supplying the bus and the load being supplied.

If the generators have tripped, and if the batteries are the only source of electrical power:

3. Battery Load .... SHED AS MUCH AS POSSIBLE

   Turn off nonessential electrical equipment to conserve battery power. Monitor the voltmeters and ammeters while attempting to reset the generators.

CAUTION

To limit the battery load, accomplish the following in the sequence shown:

a. Booster Pump Switches (3) .... OFF

b. Windshield Heat (3) .... OFF

In icing conditions, it is imperative to keep the following switches on:

- Pilot Windshield Heating System
- Engine and Wing Anti-icing System

4. Pilot and Copilot Pitot Heater.. OFF

Do not switch off the standby pitot heat.

5. Right Avionics Master.. OFF (IN)

6. Lavatory and Galley Master Circuit Breakers.................................. PULL

7. Unnecessary Lights.. OFF

Attempt to reset the last generator that failed:

8. Bus-Tied Switch .... FLIGHT NORMAL

   If not already in that position, ensure that the bus-tied switch is in the flight normal position to isolate the left and right electrical buses.

9. BAT Switch (On Side Concerned) .... ON/CHECKED

   On the side for which the generator is to be reset, ensure that the BAT switch is on and the volts/amps are checked.

10. Power Lever (of Engine Concerned) .... IDLE

11. Engine at Idle Setting .... STABILIZED

    The reset attempt should be deferred until the engine is operating at flight idle power to enhance the reset attempt.

12. GEN Switch (of Generator Concerned).. ON

    There are two alternatives to follow. Follow alternative 1 or 2 below.

    Carefully observe the voltmeter and ammeter while resetting the generator.

Alternative 1

If the voltmeter deviates to maximum attempting the reset:

1. GEN Switch (of Generator Concerned).. OFF

   Turn and leave the GEN switch off should an overvoltage condition exist.

2. Bus-Tied Switch .... TIED

   Before tying the buses, check the ammeter and voltmeter of each bus. Tie the buses together unless a short is detected on one of the buses and check that the bus-tied light is on. If a short is detected on one bus, do not tie the buses. The battery supplying that bus will be depleted rapidly and probably should be turned off.

3. Reduce the electrical load to the minimum required for flight.

   Switch off as many systems as possible to maintain a minimum demand on battery power.

4. FMS 2 .... OFF

5. IRS 2 .... OFF

6. Power Lever (of Generator Concerned) .... NORMAL THRUST

7. Avoid icing conditions.

   If at all possible, avoid icing conditions, as electrical control of some anti-icing valves is necessary for proper operation. Without this control, anti-icing capability will be lost, and the aircraft may begin to build ice on the wings and engines. Pitot-static heating may also be lost.

8. Land as soon as possible.

   Land at the nearest suitable airport for inspection and repair.

Alternative 2

If voltmeter is within the green band:

1. Power Lever (of Generator Concerned) .... NORMAL THRUST

2. Bus-Tied Switch .... TIED

   Before tying the buses, check the ammeter and voltmeter of each bus for normal values. Check that the bus-tied light is on.

3. Turn on previously shed items.

4. Monitor voltmeter and ammeter indications.

After load-shedding, the batteries in good condition will provide for:

- **40 minutes of operation with an average load of 25 amps per battery in nonicing conditions.**
- **20 minutes of operation with an average load of 45 amps per battery in icing conditions.**

NOTE

The following items are recommended for load-shedding to help prolong battery life even longer:

Cabin Entrance Light .... OFF
Anticollision Light... OFF
Landing/Taxi/Wing Lights.................................. OFF
Navigation Lights .... NAV INTERMITTENTLY
Unnecessary Instrument Panel Lighting .... OFF

Pull the following right-panel circuit breakers:

- All navigation section
- All radio section
- All miscellaneous section

CAUTION

Do not pull the fire warning circuit breakers. Pull the following left-panel circuit breakers:

- Navigation section:
  - AFCS 1, (4)
  - RAD ALT 1, ALT 1, FMS 1, CDU 1
  - IRS 3 BAT, IRS 3
  - R/T WR, MFD/WRD
  - SG 3
  - GPWS
- Radio section:
  - HF I (2)
  - FLITE FONE
  - ADF 1

Pull the following center-panel circuit breakers:

- Lights, miscellaneous section:
  - RH CABIN READING
  - LH CABIN READING

CAUTION

If in icing conditions, do not pull the circuit breakers for anti-ice of the engines and wing. Additionally, do not pull the circuit breaker for the pilot's windshield heat.

NOTE

Operation of the flaps and slats, airbrakes, and landing gear appreciably increase the electrical demand on the batteries.

REDUCED LOAD ON BATTERIES (SAFT 2376)

In Nonicing Conditions

The load corresponds to a total output from the batteries of 35 amps at 24 volts that ensures 59 minutes of operation with two 23-Ah batteries charged at 75% of their capacity.

In Icing Conditions

The load corresponds to a total output from the batteries of 82 amps at 24 volts that ensures 25 minutes of operation with two 23-Ah batteries charged at 75% of their capacity.

During Approach

During the last five minutes of flight, the load is increased. It can therefore be considered that two 23-Ah batteries, charged at 75% of their capacity, provide sufficient reserve power in the following conditions:

- In nonicing conditions, for 57 minutes of operation, including five minutes during approach

  or

- In icing conditions, for 24 minutes of operation, including five minutes during approach

RAPID DEPRESSURIZATION

Phase 1

1. Crew oxygen masks...DONNED - 100%

   The crew oxygen masks must be put on immediately upon the detection of smoke. Be careful of eye glasses when putting on the masks to avoid personal injury or to avoid a poor fit of the mask around the glasses. The mask must fit tightly around the face to ensure smoke does not penetrate the mask and enter the breathing passengers. Ensure that the NORMAL -100% oxygen selector button on the front of the mask is in the 100% (pure oxygen) position.

2. Microphone selector ....MASK - TESTED

   For hot mike communications within the cockpit, speakers must be selected, and the mask and CPIT buttons on the pilot and copilot audio panels must be pushed on. To communicate to an outside agency, select the proper radio microphone button on the audio panel, and depress the MIC button on the top inside of either control wheel.

3. FASTEN BELTS No Smoking Sign .... ON

4. PASSENGER OXYGEN controller.. OVERRIDE

   On the copilot's right console, move the selector switch on the passenger oxygen panel clockwise to OVERRIDE and check that the pneumatic PASS ON indicator is fully open. This position drops the passenger oxygen masks from their storage bins at each passenger position and allows a flow of oxygen when the passenger pulls the mask down and then dons it.

5. Passenger masks .... DONNED - CHECKED

   Before takeoff on the first flight of the day , the passenger must be briefed on the location and proper use of the masks. A crew member must ensure that the passengers have properly donned their masks in the event of this emergency.

6. Emergency descent .... INITIATED

   Simultaneously, as the airbrake is deployed and as the throttles are brought to idle, begin the descent by rolling the aircraft to a 45° angle of bank. This will expedite entry into the descent without adversely affecting G-loading of the aircraft. The initial descent angle should be approximately a 20° nosedown pitch attitude. After the 20° nosedown pitch attitude is achieved, remove all bank, hold the 20° pitch down until M_{MO}/V_{MO} is attained, and then adjust pitch to approximately 10° of nosedown pitch, which should maintain the aircraft at M_{MO}/V_{MO} in the descent.

EMERGENCY DESCENT

CAUTION

This procedure assumes normal structural integrity of the aircraft. If structural integrity is questionable, limit the airspeed to the lowest practical value, and avoid high maneuvering loads.

1. Autopilot .... DISENGAGED

   Disengage the autopilot, and hand-fly the aircraft throughout this procedure. Disengagement is achieved by pressing the AP pushbutton on the control wheel. Check for the AP light on. Press the AP pushbutton again to clear the disengagement message on the ID 802 and the AP light.

2. Power Levers .... IDLE

   It is advisable to turn on the airstart ignition for all three engines, to prevent an engine flameout, before retarding the throttles to idle. This is especially true when performing an emergency descent from high altitudes.

3. Airbrake Handle .... POSITION 2

   Position the airbrake handle to position 2 to assist in making as rapid a descent as possible while remaining within the M_{MO}/V_{MO} limits.

4. Descent .... INITIATE

   Simultaneously, as the airbrake is deployed and as the throttles are brought to idle, begin the descent by rolling the aircraft to a 45° angle of bank. This will expedite entry into the descent without adversely affecting G-loading of the aircraft. The initial descent angle should be approximately a 20° nosedown pitch attitude. After the 20° nosedown pitch attitude is achieved, remove all bank, hold the 20° pitch down until M_{MO}/V_{MO} is attained, and then adjust pitch to approximately 10° of nosedown pitch, which should maintain the aircraft at M_{MO}/V_{MO} in the descent.

5. Airspeed (Smooth Air) .... M_{MO}/V_{MO}

   Lead the desired level-off altitude by at least 2,000 feet. Reduce the rate of descent to a maximum of 2,000 feet per minute. Lead the final level-off altitude at an altitude which is 10% of the rate of descent. Descend to 14,000 feet, the assigned altitude, or to the minimum safe altitude for the route flown.

6. Transponder .... CODE 7700

   Advise ATC of your emergency and set the transponder to emergency to ensure identification, priority handling, and a safe airspace throughout this emergency.

FORCED LANDING

PREPARATION

1. Communications Transmission .... TRANSMIT MAYDAY

   On the most recently used communications radio, transmit "mayday" to the monitoring communications agency. If you haven't been talking to a communications agency on an assigned frequency, or if you do not know what the correct frequency is, change to 121.5 Mz and transmit your distress message on that frequency.

2. Transponder .... CODE 7700

   Unless directed otherwise, set the transponder to code 7700, the emergency distress code.

3. Passenger Emergency Briefing.. COMPLETE

   If carried, use the cabin attendant to prepare the passengers for this emergency. If a cabin attendant is not carried, use the PA system to instruct the passengers on their roles during this emergency. The passengers should have already been prebriefed, prior to departure, on the conduct of emergency procedures and the location and use of emergency equipment.

4. Fasten Belts/No Smoking Signs .... ON

   All cabin and cockpit occupants must have their seat belts tightly fastened and, where applicable, have shoulder harnesses properly fastened and locked. Smoking is prohibited throughout the aircraft.

5. AFT CABIN ISOL Light.. OFF

   On aircraft with the midcabin separation door, this door must be open and the AFT CABIN ISOL light must be out.

6. Cockpit Jump Seat (If Possible) .... UNOCCUPIED AND STOWED

NOTE

If possible, the jump seat should not be occupied in the event of a forced landing. It must be stowed to allow for the emergency egress of the pilots.

APPROACH

7. Wing Anti-ice .... OFF

   This is one of many procedures designed to close off the bleed-air systems of the aircraft before landing.

8. Crew and Passenger Bleed Switches .... OFF

   This is done to isolate the cabin from engine bleed-air sources and to prevent pressurization of the cabin.

9. HP 1, PRV 2, and PRV 3 Bleed-Air Switches .... OFF

   This is done to further isolate engine bleed-air systems.

10. Pressurization Switch .... DUMP

    On the emergency pressurization control panel, lower the guard on the DUMP switch and move the switch down to dump the cabin pressure. This has a dual purpose:

    - To release any residual pressure in the cabin that could prevent the opening of the emergency exits after landing
    - To release any residual pressure in the cabin in an attempt to keep the cabin intact upon landing. If residual pressure was present in the cabin upon touchdown, this pressure might cause more severe damage to the structure when subjected to the forces of landing and deceleration.

11. Landing Gear .... EXTENDED

    The landing gear should be extended either by normal, emergency or gravity means. This is intended to help cushion the landing when effecting a forced landing on any type of surface, **except water**. If all the landing gear cannot be extended, it is desirable that as many gear as possible be extended to help cushion the landing. A belly landing is the last resort.

12. Flaps + Slats.. 40° FLAPS + SLATS

    If possible, the maximum flap setting should be used to fly the aircraft as slow as possible for the landing.

13. Approach Speed.. V_{REF}

    With the flaps/slats set at 40° FLAPS + SLATS, fly the final approach at the charted V_{REF} speed.

JUST BEFORE TOUCHDOWN

14. Vertical Speed.. APPROXIMATELY 300 FPM

    If possible, control the rate of descent to a maximum of 300 feet per minute to minimize impact forces.

15. Fuel Shutoff Switches (3).. ACTUATED

    On the FIRE PANEL, raise all three guards and raise the fuel shutoff switches up to shut off the fuel supply to the engines at the respective fuel tanks.

16. GEN Switches (3).. OFF

    Move all three generator control switches to off to cut off the generated electrical power supply to the buses.

17. BAT Switches (2).. OFF

    This removes the remaining electrical power supply to the electrical buses to prevent electrical sparking and fire. The aircraft will no longer be powered except for any emergency battery power that, if possible, should probably be turned off as well to prevent any fire after landing.

18. Power Levers (3)... CUTOFF

    This ensures manual shutoff of fuel to the engines at the fuel control of each engine.

AFTER THE AIRPLANE HAS COME TO A STOP

19. Engine Fire Extinguisher Switches (3)................................... POSITION 2

Break the safety wire on the three engine fire extinguisher switches and move them up through position 1 to position 2. The battery bus will fire the four extinguisher bottles to the engines to extinguish any fire that may be started as a result of the impact of the forced landing.

20. Cockpit Jump Seat... STOWED

If it hasn't already been stowed, stow it to clear the way for cockpit evacuation.

21. Emergency Exit .... OPEN

Open the emergency exit located over the right wing and evacuate the aircraft. Be cautious for fire that may have erupted about the aircraft. Selection of the proper emergency exit should depend on a careful evaluation of the total situation.

NOTE

At night, it is recommended that the aircraft be evacuated by way of the wing emergency exit.

22. Main Cabin Door... OPEN

An alternate means of evacuating the aircraft is through the main cabin door. However, fully opening the main cabin door may not be possible, dependent upon where the aircraft came to rest or whether or not the nose landing gear is extended. Another alternative for evacuation is the pilot's direct-vision window. This should be used as a last resort if all other exits fail to open or are covered by fire.

23. Evacuate the aircraft.

DITCHING

PREPARATION

1. Communications Transmission .... TRANSMIT MAYDAY

   On the most recently used communications radio, transmit "mayday" to monitoring communications agency. If you have not been talking to a communication agency on an assigned frequency, or if you do not know what the correct frequency is, change to 121.5 Mz and transmit your distress message on that frequency.

2. Transponder .... CODE 7700

   Unless directed otherwise, set the transponder to code 7700, the emergency distress code.

3. Passenger Emergency Briefing.. COMPLETE

   If carried, use the cabin attendant to prepare the passengers for this emergency. If a cabin attendant is not carried, use the PA system to instruct the passengers on their roles during this emergency. The passengers should have already been prebriefed, prior to departure, on the conduct of emergency procedures and the location and use of emergency equipment.

4. Life Jackets .... DONNED/CHECKED

   Direct the passengers and crew to remove the life jackets from storage and put them on. Life jackets are not to be inflated until the crew and passengers evacuate the aircraft.

5. Fasten Belts/No Smoking Signs .... ON

   All cabin and cockpit occupants must have their seat belts tightly fastened and, where applicable, have shoulder harnesses properly fastened and locked. Smoking is prohibited throughout the aircraft.

6. AFT CABIN ISOL Light.. OFF

   On aircraft with the midcabin separation door, this door must be open and the AFT CABIN ISOL light must be out.

7. Cockpit Jump Seat (If Possible) .... UNOCCUPIED AND STOWED

NOTE

If possible, the jump seat should not be occupied in the event of a ditching. It must be stowed for safety and to allow for the emergency egress of the pilots.

8. Audio Warning A and B Circuit Breakers (2)............................... PULLED

   Pull out the AUDIO WARN A circuit breaker, located on primary bus A1, and the AUDIO WARN B circuit breaker, located on primary bus B1, to shut off the audio warning that would sound when the landing gear is left up and the slats-flaps are placed to 40° FLAPS + SLATS for landing.

APPROACH—PARALLEL TO THE MAJOR SWELL

9. Wing Anti-ice .... OFF

   This is one of many procedures designed to close off the bleed-air systems of the aircraft before ditching. This, and other bleed-air isolation actions, provides airtight systems and subsystems for enhancement of the flotation characteristics of the aircraft.

10. Crew and Passenger Bleed Switches... OFF

    This is done to further isolate the cabin from engine bleed-air sources and to prevent pressurization of the cabin.

11. BLEED AIR BAG Switch.. ISOLATE

    This will isolate the cabin and baggage compartment by closing the baggage compartment heating valve and the cabin isolation valve. Check BAG ISOL light on.

12. HP 1, PRV 2, and PRV 3 Switches .... OFF

    This is done to further isolate engine bleed-air systems.

13. Pressurization Switch .... DUMP

    On the emergency pressurization control panel, lower the guard on the DUMP switch, and move the switch down to dump the cabin pressure. This has a dual purpose:

    - To release any residual pressure in the cabin that could prevent the opening of the emergency exits after ditching.
    - To release any residual pressure in the cabin in an attempt to keep the cabin intact upon ditching. If residual pressure was present in the cabin upon contact with the water, this pressure might cause more severe damage to the structure when subjected to the forces of ditching and deceleration.

14. Landing Gear .... RETRACTED

    Ensure that the landing gear is retracted prior to ditching. Ditching with the gear down will cause immediate loss of aircraft control upon first contact with the water. The bottom of the aircraft should be kept streamlined for entry into the water for better aircraft control.

15. Flaps + Slats Handle .... 40° FLAPS + SLATS

    If possible, the maximum flap setting should be used to fly the aircraft as slow as possible for the ditching.

16. Approach Speed .... V_{REF}

    With the slats/flaps set at 40° FLAPS + SLATS, fly the final approach at the charted V_{REF} speed. Because the gear is not down and locked, the gear warning horn will sound and cannot be silenced unless the audio warning A and the audio warning B circuit breakers are pulled.

JUST BEFORE TOUCHDOWN

17. Rate of Descent .... APPROXIMATELY 300 FPM

    If possible, control the rate of descent to a maximum of 300 feet per minute to minimize impact forces.

18. Fuel Shutoff Switches (3) .... ACTUATED

    On the FIRE PANEL, raise all three guards and raise the fuel shutoff switches up to shut off the fuel supply to the engines at the respective fuel tanks.

19. GEN Switches .... OFF

    Move all three generator control switches to off to cut off the generated electrical power supply to the buses.

20. BAT Switches (2) .... OFF

    This removes the remaining electrical power supply to the electrical buses to prevent electrical sparking and fire. The aircraft will no longer be powered except for any emergency battery power which, if possible, should be turned off to prevent any fire after ditching.

21. Contact the water on the crest, parallel to the swell, and with a noseup attitude of 12° to 15.5°.

    If possible, fly into the wind at the lowest possible airspeed. Fly parallel to the main swell, and contact the water on the crest of the main swell.

AFTER TOUCHDOWN

22. Power Levers (3) .... CUTOFF

    The engines should be kept running until after touchdown to provide for controlled flight until the proper spot is picked for ditching. This ensures manual shutoff of fuel to the engines at the fuel control of each engine.

23. Cockpit Jump Seat .... STOWED

    If it has not already been stowed, stow it to clear the way for cockpit evacuation.

24. Emergency Exit .... OPEN

    Open the emergency exit located over the right wing, and evacuate the aircraft. Deploy the life line to the anchor point on the right wing next to the gravity-fueling cap. Inflate the life rafts only when they are outside the aircraft. The life raft may be secured to the ring holding the life line to the wing to keep it in place until all occupants are on board. Crew and passengers should not inflate their life vests until they are clear of the window or door.

    Selection of the proper emergency exit, either the emergency exit over the wing or the main cabin door, should depend on a careful evaluation of the total situation.

25. Main Cabin Door .... OPEN

    An alternate means of evacuating the aircraft is through the main cabin door, dependent upon the attitude of the aircraft in the water. Another alternative for evacuation is the pilot's direct-vision window. This should be used as a last resort if all other exits fail to open or are covered by water.

26. Evacuate the aircraft.

UNRELIABLE AIRSPEEDS AT HIGH ALTITUDE

WARNING

- Frozen or abnormal pilot, copilot and possibly stand−by IAS / MI indications and possibly:
- AIRSPEED INDICATORS PERFORM LIKE ALTIMETERS (airspeed decreasing in descent and increasing in climb),
- Illumination of one or both following lights: MASTER + GONG: AIL FEEL , AUTO SLATS ,
- "AUTOPILOT" audio warning sounds,
- VMO /MMO audio warning sounds,
- MACH TRIM light on warning panel,
- Illumination of IAS comparison annunciator on EADI,
- AP disengagement and / or AP DISENGAGE on ID-802,
- Disagreement with standby IAS / MI indications,
- In cruise / level flight: unusual pitch trim activity.

PHASE I

1. Autopilot ....DISENGAGED
2. YD ....DISENGAGED
3. Avoid large displacements and rapid movements of control surfaces.
4. Fly wings level.
5. Stabilize airplane altitude using, if necessary, the stand−by altimeter.
   - Pitch attitude ....BETWEEN 0° AND 4° NOSE UP
   - Engine power..........................SMOOTHLY FULLY FORWARD

CAUTION

Stall aural warning remains reliable.

AOA indexer and AOA instrument remain reliable.

PHASE II

1. Do not apply SLAT MONITORING SYSTEM procedure (see *AFM* page 3-15-6).

2. Do not apply IAS MISCOMPARE ANNUNCIATION procedure (see *AFM* page 3-80-4).

CAUTION

Do not re−engage autopilot or YD before pitot probes unblocking.

LEVEL FLIGHT

Set N1 as indicated in the table below, corresponding to MI = 0.75 (assumed temperature is ISA −10 °C):

Flight level	Weight	N1	Pitch attitude
FL 490	27,000 lb	98 %	Between 1° and 4° nose up
	25,000 lb	95 %	
FL 450	35,000 lb	100 %	
	25,000 lb	90 %	
FL 410	43,000 lb	100 %	
	35,000 lb	93 %	
	25,000 lb	88 %	
FL 370	45,000 lb	94 %	
	35,000 lb	89 %	
	25,000 lb	86 %	

3. Rotactor XPDR / TCAS.. TA

4. Advise ATC that both displayed altitude and XPDR−reported altitude may be unreliable and closely monitor trajectory of closest airplanes.

5. When conditions permit, set N1 corresponding to recommended long range cruise Mach at current flight altitude and airplane weight, using TAT as reference or standard atmosphere temperature if TAT is not usable. (*Performance Manual* 4−10).

6. Limit attitude to less than 4° nose up.

NOTE

The IGN lights on overhead panel may be due to an excessive angle of attack and therefore a close–to–stall situation.

CAUTION

VMO / MMO audio warning may be unreliable.

If it is certain that the VMO / MMO audio warning is inappropriate, do not modify flight parameters.

If VMO/MMO audio warning sounds:

• AUDIO WARN A / AUDIO WARN B circuit breakers....................PULLED

CAUTION

All audio warnings (STALL included) are inoperative except TCAS aural warnings.

After a positive identification of the malfunction, continue the flight while complying with the following procedures for climb and descent phases:

CLIMB

1. N1 speed...Climb power (see *AFM* 5-40)

2. Pitch attitude..BETWEEN 3° AND 4° NOSE UP

   If vertical speed drops below 100 ft / min:

   • Airplane...LEVEL OFF

DESCENT

Initiating the descent earlier than scheduled to recover non icing conditions is left to pilot's discretion.

CAUTION

If IAS goes down to 30 kt due to blocked pitot probes, expect loss of airspeed display on both EADI:

- Do not apply ADC INOPERATIVE procedure (see *AFM* 3-35-2).
- Use EADI attitude and the stand-by altimeter until pitot probes unblocking.

1. Start selector switches (all 3)........AIR START
2. ENG 1 and ENG 2 ANTI–ICE switches........ON
3. 30 seconds later:

   ENG 3 ANTI–ICE switch........ON
4. 30 seconds later:

   WINGS ANTI–ICE switch........ON
5. N1 speed........SEE TABLE BELOW

TAT	–20° C or below	–20° C to –10° C	–10° C to 0° C	0° C to +10° C
N1	80 %	76 %	73 %	65 %

6. AIRBRAKES handle........POSITION 1
7. Pitch attitude........BETWEEN 0° AND 2° NOSE DOWN
8. Vertical speed indicator........BETWEEN -2,000 AND -3,000 FT/ MIN

NOTE

1 – Check airplane altitude frequently on the stand–by altimeter.

2 – If prior to the problems, flight was performed at a static temperature lower than the authorized minimum limit (see *AFM* 1–17–1), descend as soon as possible until air–data indications are back to normal.

STATUS (3 BLOCKED PITOT PROBES):

INOPERATIVE/UNRELIABLE ITEMS	OPERATIVE/RELIABLE ITEMS
Basic flight parameters	
IAS / MI on both EADI and on stand-by airspeed indicator.	FMS Ground Speed in FMS CDU. IRS Ground Speed in FMS CDU. GPS Ground Speed in FMS CDU.
	Pitch and roll attitude on both PFD and stand–by horizon.
	AOA indexer and AOA instrument.
Altitude reported by XPDR mode C.	Both altimeters and stand–by altimeter (max. error +/– 600 ft). GPS altitude (FMS CDU). Both VSI.
SAT, ISA deviation.	TAT. Temperature data provided Uplink Weather / AFIS / Operational flight plan / Weather briefing.
	Heading and Track.
Wind direction and velocity on EHSI.	Wind data AFIS / Operational flight plan / Weather briefing.
Warnings	
VMO / MMO audio warning.	
Gear aural warning. **Stall** aural warning if AUDIO WARN C/Bs pulled.	
Flight Controls	
Automatic slats extension if IAS > 260 kt.	Stall protection: IGN, automatic airbrakes retraction.
For S/N < 164, pitch trim limited to -4 when IAS > 210 kt.	
Roll Arthur position inconsistent with actual flight condition.	Pitch Arthur (Arthur position is based on THS value).
Automatic Flight Control System	
AP and YD.	
Mach Trim.	
Flight Directors.	
Engine	
N1 max. cruise limit bug, N1 max. climb limit bug, N1 max. T/O limit bug on engines display.	Engine primary parameters (N1, ITT, N2, FF) and controls.
Airplane Systems	
	All systems controls and displays.

NOTE

Descent should cause airspeed and total air temperature to increases thereby facilitating the pitot probes unblocking and a return to correct IAS indication after about 2 minutes.

NOTE

An indicated airspeed increasing in descent is a good evidence of the pitot probes unblocking.

1. After return to unblocked pitot probes situation, wait for 1 more minute then:

   Autopilot and YD .... AS REQUIRED

2. AUDIO WARN A / AUDIO WARN B circuit breakers .... RE-ENGAGED
3. Rotactor XPDR / TCAS .... TA / RA - CHECKED
4. Start selector switches (all 3) .... GRD START - AS REQUIRED
5. AIRBRAKES handle .... AS REQUIRED

ANTI-ICE:

6. ENG 1 ANTI−ICE switch .... AS REQUIRED
7. ENG 2 ANTI−ICE switch .... AS REQUIRED
8. ENG 3 ANTI−ICE switch .... AS REQUIRED
9. WINGS ANTI−ICE switch .... AS REQUIRED

LIMITATIONS

CONTENTS

ILLUSTRATIONS

LIMITATIONS

LIMITATIONS

GENERAL

The limitations presented in this chapter focus primarily on the operational capabilities of the aircraft. Specific system limitations are provided in the individual systems' chapters with the exception of instrument markings which are presented in this chapter. Refer to the FAA-approved *AFM* for complete limitations listings.

WEIGHT—STRUCTURAL

Maximum ramp	45,700 lb (20,730 kg)
-5AR	45,700 lb or 46,700 lb (with SB 139)
-5BR	46,700 lb
Maximum takeoff	45,500 lb (20,639 kg)
-5AR	45,500 lb or 46,500 lb (with SB 139)
-5BR	46,500 lb
Maximum landing	42,000 lb (19,051 kg)
Maximum zero fuel	28,220 lb (12,800 kg)
-5AR	28,200 lb or 30,870 lb (with SB 139)
-5BR	30,870 lb
Minimum flight weight	20,700 lb (9,390 kg)

NOTE

Zero fuel weight may change based on SN of aircraft

WEIGHT—PERFORMANCE

General

The approved maximum weights indicated above may be reduced for compliance with certification performance requirements, as follows:

Takeoff

The takeoff weight is limited by the most restrictive of the following:

- Balanced field length

- Brake energy
- Climb gradients

Landing

The landing weight is limited by the following:

- Approach and landing climb gradients
- Available landing field length

CENTER OF GRAVITY

General

The center-of-gravity limits are expressed in percent of MAC (mean aerodynamic chord). The landing gear position has no effect on the center of gravity. Refer to the center-of-gravity limits chart in the "Limitations" section of the *AFM*.

Datum

Datum is 25% of MAC; it is marked on the aircraft exterior and coincides with fuselage station (FS) 420.43 inches (10,679 mm). FS 0 is the forward end of the aircraft nose cone.

Mean Aerodynamic Chord

Length is 113.69 inches (2,887.7 mm).

Zero percent MAC is at FS + 392 inches (9,957 mm).

LOADING

The aircraft must be loaded in compliance with the center-of-gravity limits chart in the "Limitations" section of the *AFM*. Information for control of the aircraft's weight and balance are included in *Loading Manual DTM9821*.

The following baggage compartment values must not be exceeded while loading the aircraft: 2,866 lb (1,300 kg), not to exceed 123 lb/sq ft (600 kg/sq m).

OPERATING LIMITATIONS

KIND OF OPERATION

This aircraft is certified in the transport category and is eligible for the following kinds of operations when the appropriate instruments and equipment required by the authorities and/or operating regulations are installed and approved and are in operable condition :

- Day and night VFR, if permitted by the regulations of the country over-which the aircraft is flying
- IFR and automatic approaches to category I and II weather minimums
- Extended overwater
- Icing conditions
- The overflight of polar regions is limited to north and south latitudes less than 85°
- The overflight of polar regions is authorized when SPERRY FMZ 800 FMS computer software is identified 9102 (or 9112)
- Flight in the former USSR airspace:
  - The aircraft is not allowed to fly on routes equipped only with ATC secondary radars operating in UVD mode.
  - For aircraft without M1846: the aircraft can fly only on routes equipped with VOR/DME . The VOR/DME ruptures are limited to one hour and 20 minutes on routes which are ±5 km (2.7 NM) width, and two hours and 40 minutes on routes which are ±10 km (5.4 NM) width.
  - For aircraft with M1846 (equipped with 2 GPS): if GPS system is inoperative, the aircraft can fly only on routes equipped with VOR/ DME. In that case, the VOR/DME ruptures are limited to 1 hour and 20 minutes on routes which are ±5 km (2.7 NM) width, and two hours and 40 minutes on routes which are ±10 km (5.4 NM) width.

Aircraft equipped with LASERREF II IRS :

- When crossing directly over the north or south pole, the IRS longitude requires 20 to 30 seconds to make the 180° transition.
- APU must be disengaged when crossing the pole . Fly across the pole with wings level until the FMS bearing pointer is stabilized at or near the desired FMS track.
- Do not use heading select or heading hold since these modes are subject to the 180° change of heading at the pole.

RVSM

Reduced vertical separation minimum (RVSM) requirements are met provided aircraft complies with SB F900-186.

In addition to SB F900-186, specific approval from the registration authority is needed prior to RVSM operation .

NOTE

In normal operation for RVSM areas, select ATC on the coupled side.

Minimum equipment list for RVSM operations is provided in F900 MMEL.

RNP 10

In accordance with FAA Order 8400.12 A, paragraph 12 B, RNP 10 airworthiness requirements are met provided aircraft is equipped with dual operative:

- FMS NZ2000 software 4.1 or later and either of the following modes:
  - GPS
  - IRS (6.2 hours after last aligment or 5.7 hours after radio updating)

OR

- FMS FMZ 800 series and the following mode:
  - IRS (6.2 hours after last aligment or 5.7 hours after radio updating)

OR

- FMS NZ 920 and the following mode :
  - IRS (6.2 hours after last aligment or 5.7 hours after radio updating)

NOTE

DME/DME and VOR/DME FMS navigation modes are B-RNAV/RNP5 approved and therefore are RNP 10 compliant under radio navaids coverage.

B-RNAV

Basic RNAV(B-RNAV) airworthiness requirements are met provided aircraft is equipped with:

- FMS HONEYWELL FMZ 800 or FMZ 920 or FMZ 2000, and no DR or DGRAD is present on FMS CDU, and either of the following navigation mode:
  - GPS type HG 2021 GB/GD
  - DME/DME
  - VOR/DME
  - IRS (two hour time limit after last IRS aligment)

NOTE

- When GPS remains the unique means of B-RNAV navigation source (GPS stand-alone), use of GPS integrity monitoring (RAIM) prediction program is mandatory before B-RNAV operation.
- GPS stand-alone not authorized for FMS FMZ 800 and FMZ 920.
- At least one VOR/DME must be available as NAV source (DC 820) on PFD.

P-RNAV

Precision RNAV (P-RNAV) airworthiness requirements are met according to JAA TGL 10 provided aircraft is equipped with:

- FMS HONEYWELL FMZ 920 or FMZ 2000 operating with no DR or DGRAD warning on FMS CDU and either of the following navigation mode:
  - GPS
  - DME/DME
  - VOR/DME
  - IRS (30 minutes time limit after last IRS aligment)

Compliance with TGL 10 has been shown only for Dassault Aviation installations.

Only GPS HONEYWELL HG2021GB01 and HG2021GD02 are TSO C 129() compliant.

NOTE

Select FMS approach procedure must not be manually modified.

US terminal and enroute area navigation (RNAV) operations (AC 90-100) and AC–100 airworthiness requirements are met provided aircraft is equipped with:

- FMS HONEYWELL FMZ 920 or FMZ 2000 operating in either :
  - GPS
  - DME/DME
  - VOR/DME
  - Navigation mode without any DR or DGRAD warning and all NOTAM navaid entered in the FMS NOTAM page.

R NAV airworthiness approval has not accounted for database accuracy or compatibility.

RNP flight operations are subject to GPS satellite availability and/or navaid coverage for the selected route. Navigation based on DME/DME or VOR/ DME updating modes is permitted but may be restricted by the availability or performance of the applicable ground navaid. Crew should deselect (NOTAM) ground navaids that are not to be used for navigation.

ALTITUDE

Maximum operating altitude is 51,000 feet (Figure LIM–1).

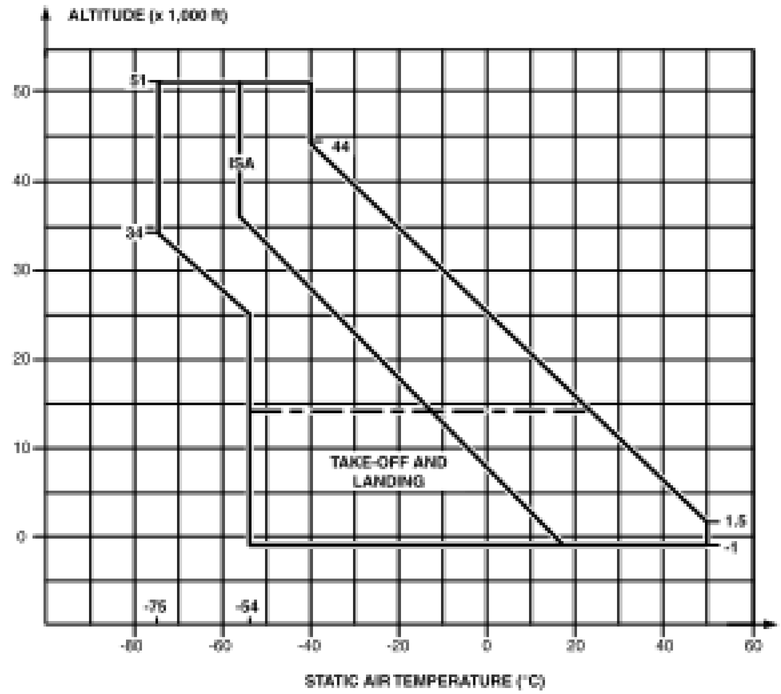


Figure LIM-1. Temperature and Altitude Limits

MANEUVERING FLIGHT LOAD FACTORS

Clean.. +2.53 to –1 g

Flaps extended .... +2.0 to 0 g

These load factors limit the angle of bank permitted in turns and limit the severity of pull-up maneuvers.

TAKEOFF AND LANDING

Weights.. See Weight—Structural

Airport pressure altitude.. –1,000 to 14,000 feet

Runway slope.. ±2.5%

Demonstrated crosswind .... 30 knots

Tailwind component at takeoff:

Aircraft fitted with tires for 210 mph:

Pressure altitude of airport from –1000 to 10,000 ft................. 10 knots

Pressure altitude of airport more than 10,000 ft .... 4 knots

Aircraft fitted with 6 tires approved for 225 mph .... 10 knots

Tailwind component at landing:

Aircraft fitted with tires approved for 210 and/or 225 mph.......... 10 knots

Ambient temperature... Refer to the temperature and altitude limitations chart in the "Limitations" section of the *AFM*

Runway surface... Paved and hard-surfaced

MINIMUM FLIGHTCREW

The minimum flightcrew is one pilot and one copilot.

MAXIMUM NUMBER OF PASSENGERS

The maximum number of passengers is 19.

AIRBRAKES

Airbrakes must not be extended in flight within 300 feet AGL.

AIRSPEED

General

Unless otherwise specified, airspeed limits are expressed in terms of indicated values. Instrument error is assumed to be zero.

Maximum Operating Speed Limit (V_{MO}/M_{MO})

V_{MO}:

Sea level to 10,000 feet .... 350 to 370 knots

10,000 to 25,000 feet.. 370 knots

M_{MO}:

Above 35,000 pounds:

25,000 to 33,000 feet .... 0.87 Mach

33,000 to 37,000 feet .... 0.87 to 0.84 Mach
Above 37,000 feet .... 0.84 Mach

Below 35,000 pounds:

25,000 to 37,000 feet .... 0.87 Mach
37,000 to 42,000 feet .... 0.87 to 0.84 Mach
Above 42,000 feet .... 0.84 Mach

CAUTION

The maximum operating speed limit (V_{MO}/M_{MO}) must not be deliberately exceeded in any regime of flight (climb, cruise, descent) unless a higher speed is authorized for flight test or pilot training.

For the purpose of crew training of flight test these limits may be exceeded with the instructions given in supplement No. 7 "Airworthiness Flight Test Data".

Maneuvering Speed (V_A)

Maximum maneuvering speed (V_A) is 228 KIAS.

CAUTION

Full application of rudder or aileron controls, as well as maneuvers that involve angle of attack near the stall must be confined to speeds below V_A.

NOTE

Rapidly alternating large rudder applications in combination with large side-slip angles may result in structural failure at any speed.

High-Lift Devices Operating or Extended Speed (V_{FE})

V_{FE} +7° flaps + slats .... 200 KIAS

V_{FE} +20° flaps + slats .... 190 KIAS

V_{FE} +40° flaps + slats .... 180 KIAS

CAUTION

Above 20,000 feet do not establish or maintain a configuration with the flaps or the slats extended.

CAUTION

Do not intentionally fly the aircraft slower than the initial stall warning onset.

Maximum Landing Gear Operating Speed (V_{LO}/M_{LO})

V_{LO} .... 190 KIAS

M_{LO} .... 0.70 M

V_{LO}/M_{LO} is the maximum speed at which it is safe to extend or retract the landing gear.

Maximum Landing Gear Extended Speed (V_{LE}/M_{LE})

V_{LE} .... 245 KIAS

M_{LE} .... 0.75 M

V_{LE} is the maximum speed at which the aircraft can be safely flown with the landing gear extended and locked.

Minimum Control Speed (V_{MCA})

V_{MCA} (A/C with TFE 731-5AR-1C) .... 83 KCAS

V_{MCA} (A/C with TFE 731-5BR-1C) .... 85.5 KCAS

Demonstrated Crosswind .... 30 KCAS

Miscellaneous Limit Speeds

Windshield wiper operating .... 215 KIAS

Direct vision window opening .... 215 KIAS

Tire speed:

With tires approved for 210 mph .... 182 KIAS (GROUND SPEED)

With all six tires approved for 225 mph .... 195 KIAS (GROUND SPEED)

Brake kinetic energy limit (per brake) .... 13,274,460 FT/LB (18,000 KJ)

Nosewheels must be equipped with chined tires.

SYSTEM LIMITATIONS

FUEL SYSTEM

The total usable fuel quantity is 2,845 U.S. gallons (10,769 liters), i.e., 19,065 pounds (8,648 kg) at a density of 6.7 pounds per U.S. gallon.

This total quantity is distributed as shown in the following chart.

	LITERS	KG	U.S. GAL	LB
Left wing and left centerwing tanks	3,422	2,748	904	6,058
Right wing and right centerwing tanks	3,422	2,748	904	6,058
Front and rear fuselage tanks	3,925	3,152	1,037	6,949

Pressure fueling maximum feed pressure: 50 psi/3.5 bars/350 Kpa

Fuel used ***must*** conform to the following specifications.
This following chart is representative of the fuel definition in the *Falcon 900 Airplane Flight Manual DTM20103, Revision 29.*

DESIGNATION	SPECIFICATION		FREEZING POINT (°C)	ADDITIVES		NATO CODE
	ALLIED-SIGNAL	EQUIVALENCE (for info.)		ANTI-ICE	ANTI-STATIC	
KEROSENE	EMS 53111	ASTM D 1655 Jet A CAN 2-3.23 Jet A	–40	* *	* with	— —
	EMS 53112	ASTM D 1655 Jet A1 CAN 2-3.23 Jet A1 DEF STAN 91-91 AVTUR DEF STAN 91-87 AVTUR/FSII	–47	* * without with	* with with with	— — F35 F34
		MIL-T-83133 JP8 AIR 3405C - AIR 3405C -	–50	with without with	* * *	F34 F35 F34
	No 3 Jet Fuel	NTSB GB6537-94 issue 2	–47	*	*	—
	No 3A Jet Fuel	NTSB GB6537-05	–47	*	*	—
WIDE-CUT-TYPE FUEL	EMS 53113	ASTM D 1655 Jet B CAN 2-3.22 Jet B	–50	* *	* with	— —
		MIL-T-5624 JP4 AIR 3407B - DEF STAN 91-88 AVTAG/FSII CAN 2-3.22 -	–58	with with with with	with * without with	F40 F40 F40 F40
HIGH-FLASH POINT-TYPE FUEL	EMS 53116	AIR 3404C - AIR 3404C - MIL-T-5624 JP5 DEF STAN 91-86 AVCAT/FSII CAN 3GP24 - CAN 3GP24 -	–46	without with with with without with	* * without without * *	F43 F44 F44 F44 F43 F44
CIS FUELS	GOST 10227-86	TS1 REGULAR TS1 PREMIUM RT	–60 –60 –55	without without without	without without without	— — —

*Check information with the fuel supplier.

POWERPLANT

Garrett TFE 731-5AR-1C Engine

Thrust Ratings (Uninstalled, Sea Level, ISA):

Takeoff .... 4,500 lb (2,002 daN)

Maximum continuous .... 4,500 lb (2,002 daN)

Thrust Setting

The engine low-pressure rotor speed N_1 is used as the thrust setting parameter.

- Takeoff thrust (5-minute time limit)

Maximum Engine Rotor Speeds—N_1 and N_2

CONDITION OF USE	N_1	N_2
Takeoff—Maximum continuous	100%*	101%*
Transient (5 seconds maximum allowable)	103%	103%

* 100% N_1 = 21,000 rpm
* 101% N_2 = 29,989 rpm

Maximum Interstage Turbine Temperature: ITT

Starting, ground/air	Normal	952°C
Takeoff (with increased thrust)	Normal (5 minutes maximum)	974°C
Takeoff (without increased thrust)	Normal (5 minutes maximum)	952°C
Takeoff Transient	Normal (5 seconds maximum)	984°C
Maximum continuous		924°C

Generator Load:

To 43,000 feet .... 300 AMPS

Above 43,000 feet .... 260 AMPS

One minute transient .... 350 AMPS

Starting Time

Fuel Control Computers

The engine fuel control computers must be operative for takeoff.

Groundstart and starter-assist airstart— from 10% N_2 speed to light-off	10 seconds maximum
Windmilling airstart— from windmilling N_2 speed to 60% N_2	45 seconds maximum
Groundstart— from light-off to idle	60 seconds maximum

Thrust Reverser

The thrust reverser is approved for ground-use only.

Garrett TFE 731-5BR-1C Engine

Thrust Ratings (Uninstalled, Sea Level, ISA):

Takeoff .... 4,750 lb (2,114 daN)

Maximum continuous .... 4,634 lb (2,062 daN)

Thrust Setting

The engine low-pressure rotor speed N_1 is used as the thrust setting parameter.

- Takeoff thrust (5-minute time limit)

Maximum Engine Rotor Speeds—N_1 and N_2

CONDITION OF USE	N_1	N_2
Takeoff—Maximum continuous	100%*	100.8%*
Transient (5 seconds maximum allowable)	103%	103%

* 100% N_1 = 21,000 rpm
* 100.8% N_2 = 30, 540 rpm

Maximum Interstage Turbine Temperature (ITT)

Starting, ground/air	Normal	978°C
Takeoff (with increased thrust)	Normal (5 minutes maximum)	996°C
Takeoff (without increased thrust)	Normal (5 minutes maximum)	978°C
Takeoff Transient	Normal (5 seconds maximum)	1,006°C
Maximum continuous		968°C

Generator Load:

To 43,000 feet .... 300 AMPS

Above 43,000 feet .... 260 AMPS

One minute transient .... 350 AMPS

Starting Time

Groundstart and starter-assist airstart— from 10% N_2 speed to light-off	10 seconds maximum
Windmilling airstart— from windmilling N_2 speed to 60% N_2	45 seconds maximum
Groundstart— from light-off to idle	60 seconds maximum

Fuel Control Computers

The engine fuel control computers must be operative for takeoff.

Thrust Reverser

The thrust reverser is approved for ground-use only.

LUBRICATION SYSTEM

Approved Oils

Type II oils are Aeroshell/Royco Turbine Oil 500 and 560, Castrol 5000, Exxon/Esso 2380 Turbo Oil, Mobil Jet Oil II and Mobil 254 in accordance with AlliedSignal Engines EMS 53110 type II.

These brands may be mixed.

Oil Pressure

THRUST SETTING	MINIMUM PRESSURE	MAXIMUM PRESSURE
Takeoff or maximum continuous	38 psi	46 psi
Idle	25 psi	46 psi
Transient		55 psi less than 3 minutes

NOTE

The OIL 1, OIL 2, and OIL 3 lights in the warning panel illuminate for an oil pressure below 25 psi.

Oil Temperature

SYSTEMS

AUXILIARY POWER UNIT (APU)

OPERATIONAL LIMITS	
From sea level to 30,000 feet	127°C maximum
Above 30,000 feet	140°C maximum
Transient all altitudes	149°C maximum, less than 2 minutes
Minimum for exceeding idle power	30°C

GARRETT GTCP 36-150 (F)

The APU must be operated on the ground only.

Operation of the APU with passengers in the cabin and no crewmember monitoring is not authorized.

Maximum N_1 speed.. 110%

EXHAUST GAS TEMPERATURE LIMIT (T_5)	
Starting	Between 870° and 985°C (1,600°F/1,805°F) maximum, less than 10 seconds
Stabilized	679°C (1,255°F)

NOTE

The duration of operation on amber range (679°C/732°C to 1,255°F/1,350°F) must be as short as possible.

Maximum generator output:

Transient (1 minute maximum).. 350 A
Stabilized .... 300 A

Refer to approved fuels and oils for the engine.

AUTOMATIC PILOT (SPERRY DFZ 800)

The autopilot must not be engaged for takeoff or landing.

The autopilot is certified to the minimum height as follows:

Mininum height radio altimeter operative .... 50 ft

Mininum height radio altimeter inoperative .... 150 ft

Minimum decision height .... 200 ft

Minimum height for autopilot operation, except during approach .... 1,000 ft

Minimum height for use during an FMS approach .... 300 ft

CAUTION

On aircraaft equipped with FMS computer software 9004, before use of the APP mode, the mode V_{NAV} must be disengaged before APP mode engagement.

ANTI-ICE

Icing Conditions

Icing conditions exist when the OAT on the ground and for takeoff, or TAT in flight is 10°C or below, and visible moisture in any form is present (such as clouds, fog with visibility of one mile or less, rain, snow, sleet, and ice crystals).

Icing conditions also exist when the OAT on the ground and for takeoff is 10°C or below when operating on ramps, taxiways or runways where surface snow, ice, standing water or slush may be ingested by the engines or freeze on engines, nacelles, or engine sensor probes.

Engine Anti-ice

Engine anti-ice systems (ENG ANTI-ICE) should be switched ON in flight or on ground when icing conditions exist or are anticipated, except during climb and cruise when the temperature is less than –40°C SAT or TAT more than +10°C (50°F).

However, flying in vicinity or through "cumuliform" clouds can result in rapid variation of SAT with SAT increasing above –40°C. In such case, anticipate icing conditions by selecting the anti-icing system ON.

Do not rely on airframe visual cues to turn anti-icing system ON. Use the temperature and visible moisture criteria specified.

Conclusion

During climb and cruise, the pneumatic anti-ice system shall be turned ON:

- Below +10°C (50°F) TAT and above –40°C

and

- In visible moisture.

If both of these conditions are not met, the anti-ice should be turned OFF.

Wing Anti-ice

The wing anti-ice system must not be used with total air temperature in excess of +10°C. It must not be used on ground except for maintenance checks conducted in accordance with *Maintenance Manual* instructions.

BAGGAGE COMPARTMENT

The lavatory-baggage compartment door must be closed and latched during any operation above 41,000 feet.

CABIN PRESSURIZATION

Maximum differential pressure............................. 9.6 psi/662 mbar/66.2 kPa
(pressure-relief valve setting)

HYDRAULIC

Hydraulic fluid approved for use must conform to MIL-H-5606 specification (NATO codes H515 for H520).

ELECTRICAL

Maximum voltage of DC system .... 32 V

Maximum generator output:

Transient (1 minute maximum).. 350 A
Up to 43,000 ft .... 300 A
Above 43,000 ft.. 260 A

Battery temperature:

Before SB F900-94-1:
Amber light (WARM) at or above .... 120°F (48.9°C)
Red light (HOT) at or above .... 150°F (65.5°C)

After SB F900-94-1:

Amber light (WARM) at or above .... 120°F (48.9°C)
Red light (HOT) at or above .... 160°F (71.1°C)

NOTE

Any popped CB can be reset only if it is less than 5 amps strictly rated.

INSTRUMENT MARKINGS

AIRSPEED INDICATOR MARKINGS

ENGINE INSTRUMENT MARKINGS

Instrument Color Codes

Maximum operating limit .... Red line

Precautionary range.. Amber or yellow range or arc

Normal operating range.. Green range or arc

N_1 RPM

Green arc .... 24% to 100%
Red trapezoid .... 100% to 103%
Blue test point.. 106%

ITT

Green arc:

TFE 731-5AR-1C....................... 250° to 924°C
TFE 731-5BR-1C....................... 250° to 968°C

Yellow arc:

TFE 731-5AR-1C....................... 924° to 974°C

TFE 731-5BR-1C .... 968° to 996°C

Red line:

TFE 731-5AR-1C .... 952° and 974°C
TFE 731-5BR-1C .... 978° and 996°C

Blue test point:

TFE 731-5AR-1C .... 1,000°C
TFE 731-5BR-1C .... 1,040°C

N_2 RPM

Green arc .... 48% to 100%
Red trapezoid .... 100% to 103%
Blue test point 106%

Oil Temperature and Pressure

Temperature

Green arc (sea level to FL 300) .... 30° to 127°C
Yellow arc (above FL 300) .... 127° to 140°C

Pressure

Red line (minimum at idle) .... 25 psi
Yellow arc (idle range) .... 25 to 38 psi
Green arc (normal operating range) .... 38 to 46 psi
Yellow arc (transient
[maximum < three minutes]) .... 46 to 55 psi
Red line (maximum < three minutes) .... 55 psi

MISCELLANEOUS INSTRUMENT MARKINGS

Fuel Quantity

Left and Right Quantity Indicators

Yellow arc... 0 to 1,000 lb

Center Quantity Indicator

Aircraft with electric transfer valve XTK2:

Yellow arc .... 0 to 1,000 lb
Yellow arc .... 2,200 to 2,400 lb
Green arc .... 3,100 to 3,500 lb
Green arc .... 4,300 to 4,500 lb

Aircraft without electric transfer valve XTK2:

Yellow arc .... 0 to 1,000 lb

Cabin Pressure

Cabin Rate of Climb

Green arc .... –495 to +715 ft/min

Cabin Altitude

Yellow arc.................................. 8,000 to 10,000 ft
Red arc...................................... 10,000 to 50,000 ft

Cabin Differential Pressure

Yellow arc... 9.4 to 9.7 psi
Red arc... 9.7 to 10 psi

Hydraulic System

Quantity

Green range.. 1/4 to 1/1
Red range... 0 to 1/4
Thick white line 1/1

Pressure

Green range................................. 2,800 to 3,200 psi

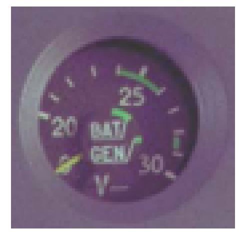
Electrical System

Battery Temperature

Green range....................................... 100° to 120°F
Yellow range..................................... 120° to 150°F
Red range... 150° to 190°F

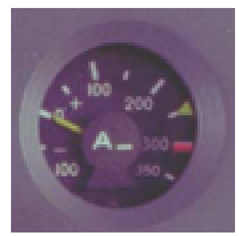
Aircraft above SNs 132 and aircraft below 132 with SB-94 applied:

Yellow range .... 120° to 160°F
Red range................................. 160° to 190°F



DC Voltmeter

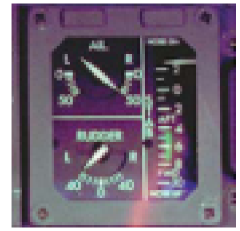
Green arc .... 24 to 26 volts
Green arc .... 28.2 to 28.8 volts
Maximum voltage .... 32 volts



Ammeter—Maximum Load

Yellow triangle .... 250 amps
Red line....................... Approximately at 300 amps

Flight Control Trim



Aileron

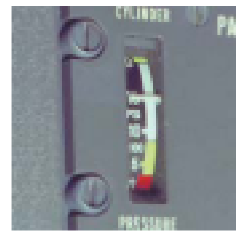
White range.. 0 to 5%

Rudder

White range... –5 to +5%

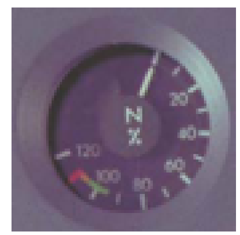
Stabilizer

Green range.............. –4° 30' aft to –7° 30' forward



Oxygen

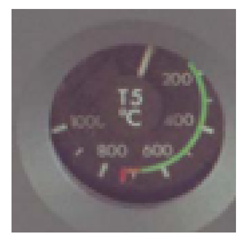
Red arc... 0 to 200 psi
Yellow arc.. 250 to 700 psi
White arc .... 700 to 2,000 psi
Yellow arc................................. 2,000 to 2,200 psi



APU

N_1 RPM

Green arc .... 95% to 105%
Yellow arc....................................... 105% to 110%
Red line.. 110%



T_5 Temperature

Green arc .... 150° to 679°C
Yellow arc.. 679° to 732°C
Red line... 732°C

Angle of Attack

Green arc .... 0 to 0.6
Yellow arc... 0.6 to 0.8
Red arc.. 0.8 to 1.0

MANEUVERS AND PROCEDURES

CONTENTS

ILLUSTRATIONS

MANEUVERS AND PROCEDURES

GENERAL PILOT INFORMATION

The following flight profiles show some normal and emergency operating procedures. They are designed as a general guide for ground training purposes. Actual in-flight procedures may differ due to aircraft configuration, weight, weather, traffic, ATC instructions, specific company directives, etc. Procedures outlined are consistent with the Aircraft Flight Manual (AFM). If a conflict should develop between these procedures and the AFM, the AFM procedures must be followed.

STABILIZED APPROACH

This training program uses the stabilized approach concept. The approach profiles are based upon achieving a stabilized approach. Configuration changes at low altitude are limited to those changes that can be easily accommodated without adversely affecting pilot workload. A stabilized approach must be established before descending below the following minimum stabilized approach heights:

- 500 feet above the airport elevation during VFR or visual approaches and during straight-in instrument approaches in VFR weather conditions
- MDA or 500 feet above airport elevation, whichever is lower, if a circling maneuver is to be conducted after completing an instrument approach
- 1,000 feet above the airport or TDZ elevation during any straight-in instrument approach in instrument flight conditions
- 1,000 feet above the airport during contact approaches

If a stabilized approach cannot be achieved before descending below the above minimum stabilized approach heights, immediate action will be taken to execute a missed approach or go-around.

FLIGHT MANEUVERS AND PROCEDURES

TAKEOFF — NORMAL

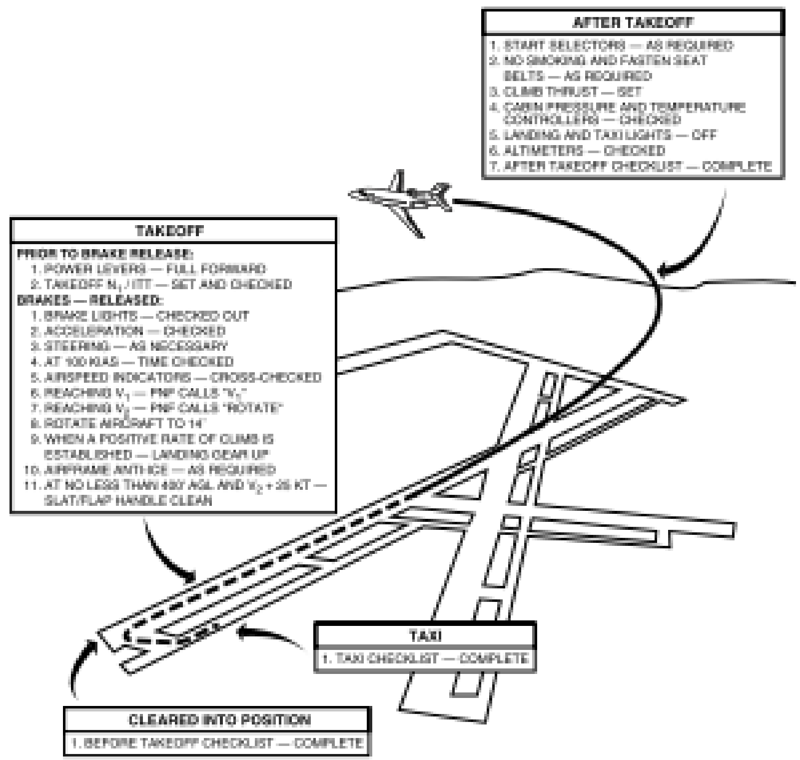


Figure MAP-1. Takeoff — Normal

TAKEOFF — REJECTED

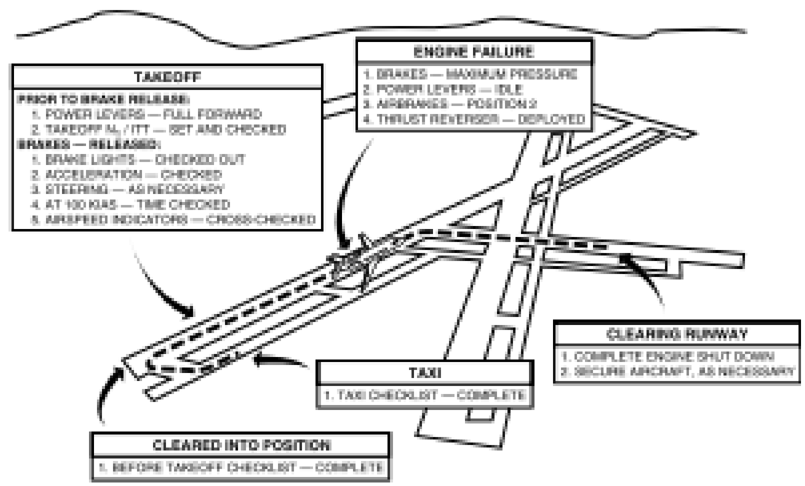


Figure MAP-2. Takeoff — Rejected

TAKEOFF — ENGINE FAILURE AT OR ABOVE V_1

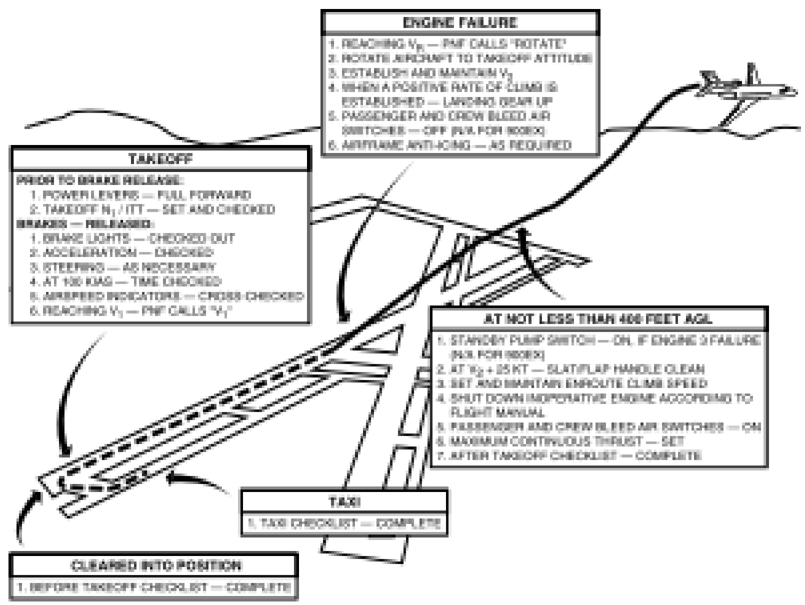


Figure MAP-3. Takeoff — Engine Failure at or Above V_1

STEEP TURNS

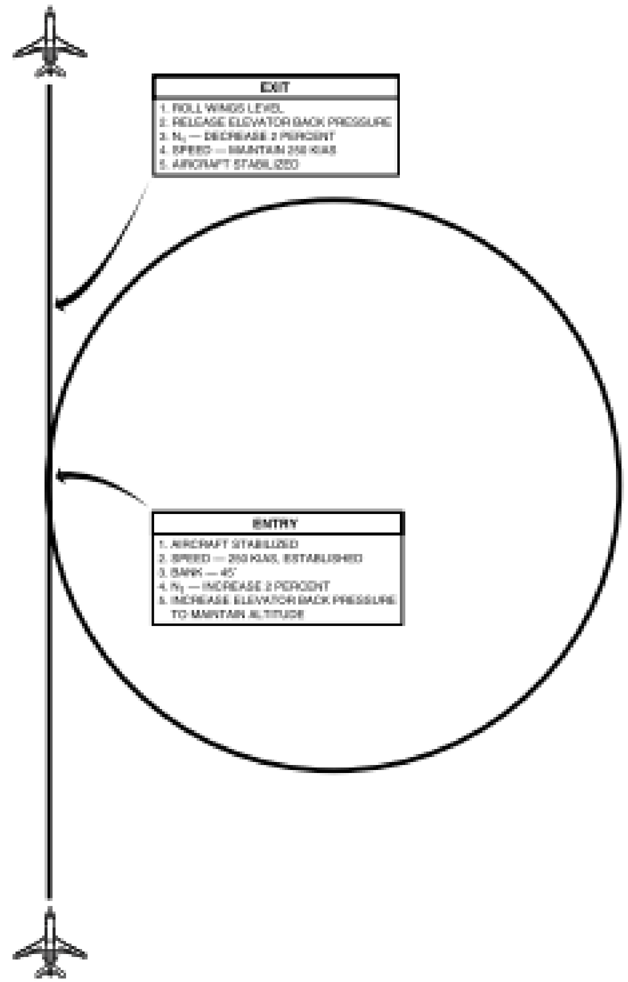


Figure MAP-4. Steep Turns

APPROACH TO STALL — CLEAN CONFIGURATION

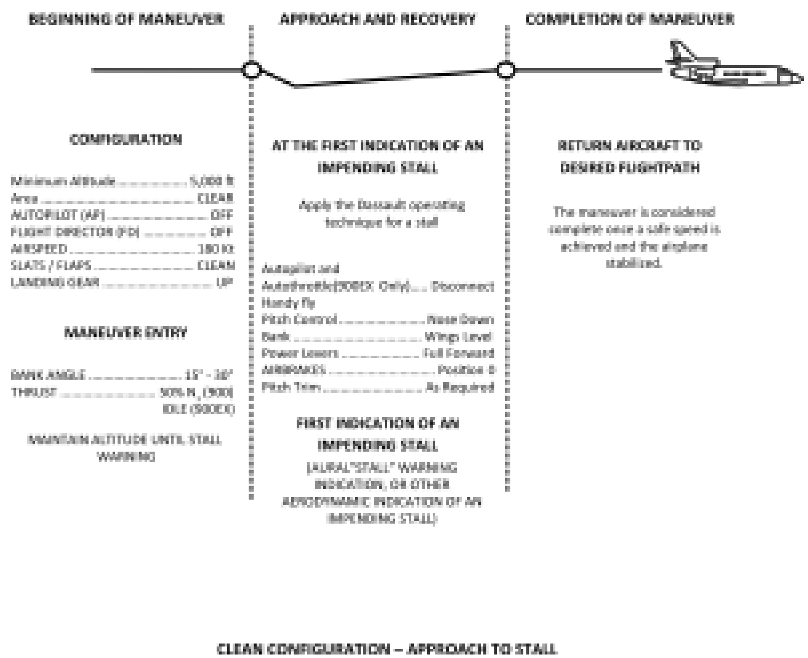


Figure MAP-5. Approach to Stall — Clean Configuration

APPROACH TO STALL — TAKEOFF CONFIGURATION

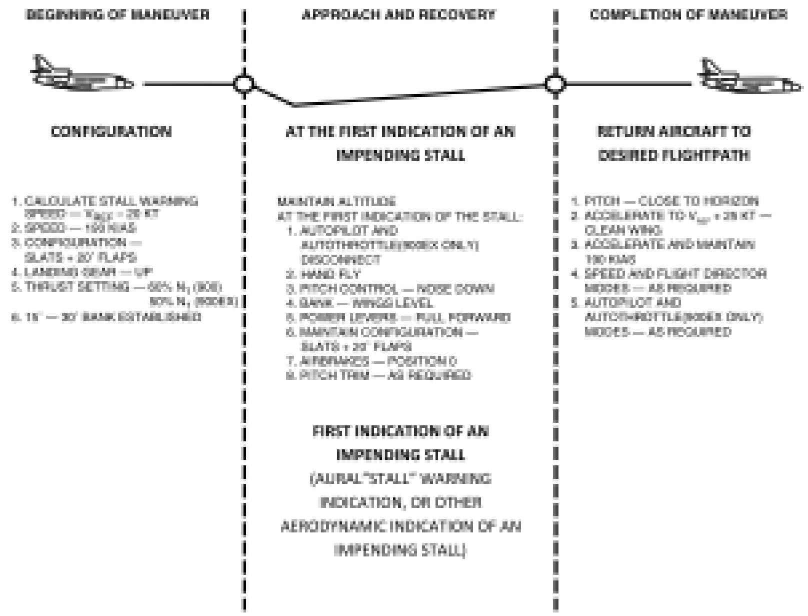


Figure MAP-6. Approach to Stall — Takeoff Configuration

APPROACH TO STALL — LANDING CONFIGURATION

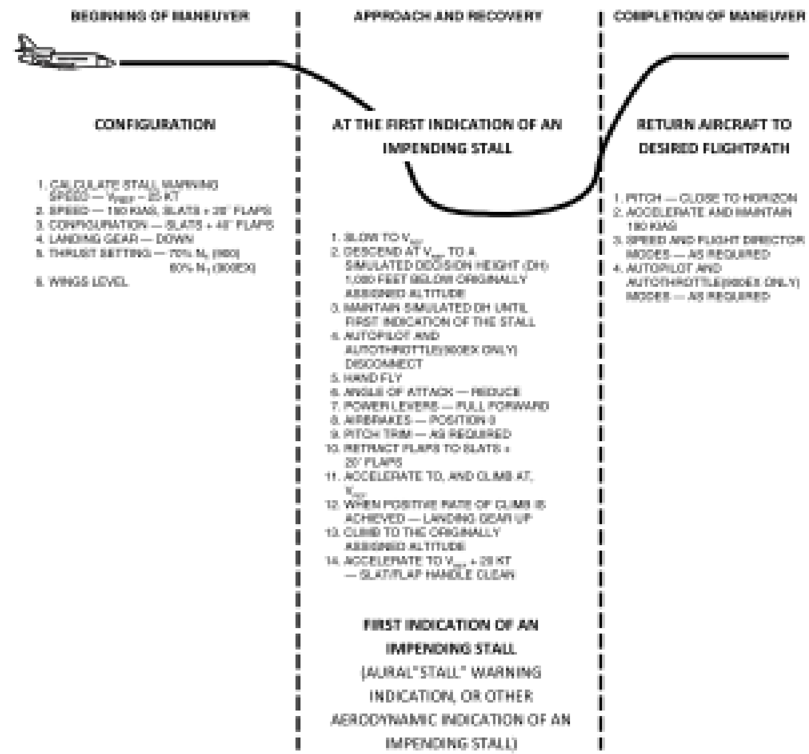


Figure MAP-7. Approach to Stall — Landing Configuration

EMERGENCY DESCENT

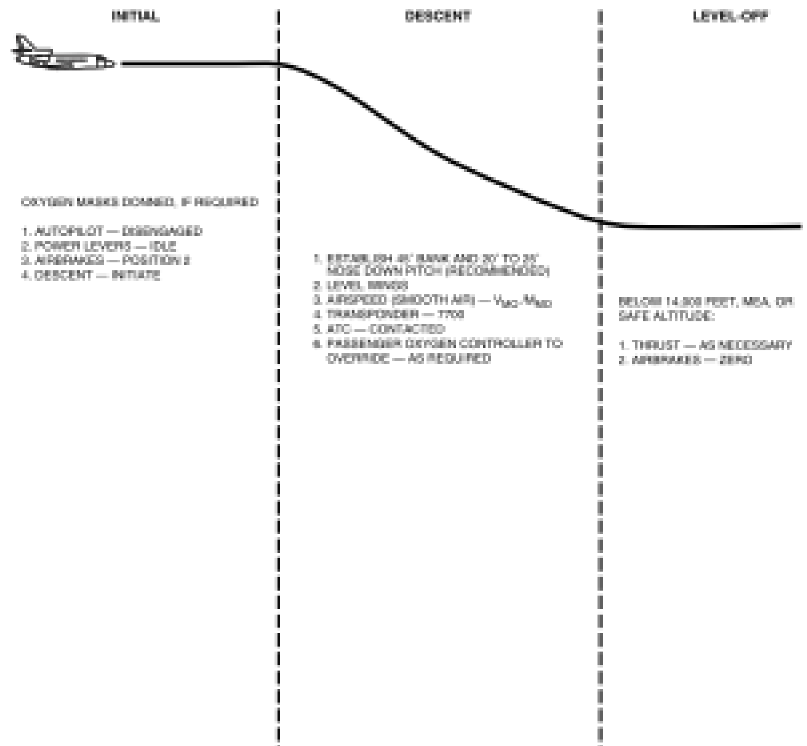


Figure MAP-8. Emergency Descent

VISUAL APPROACH — NORMAL

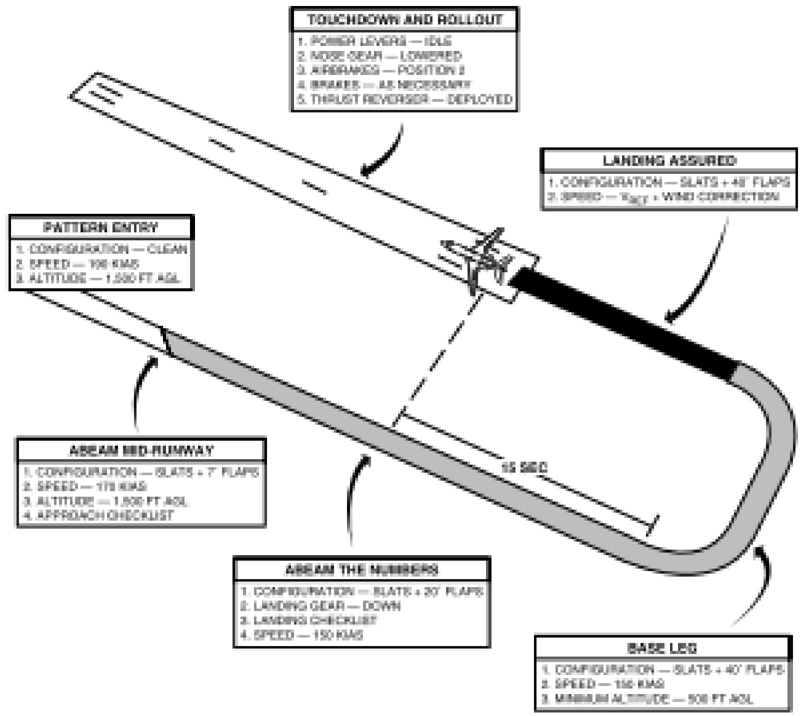


Figure MAP-9. Visual Approach — Normal

VISUAL APPROACH — ONE ENGINE INOPERATIVE

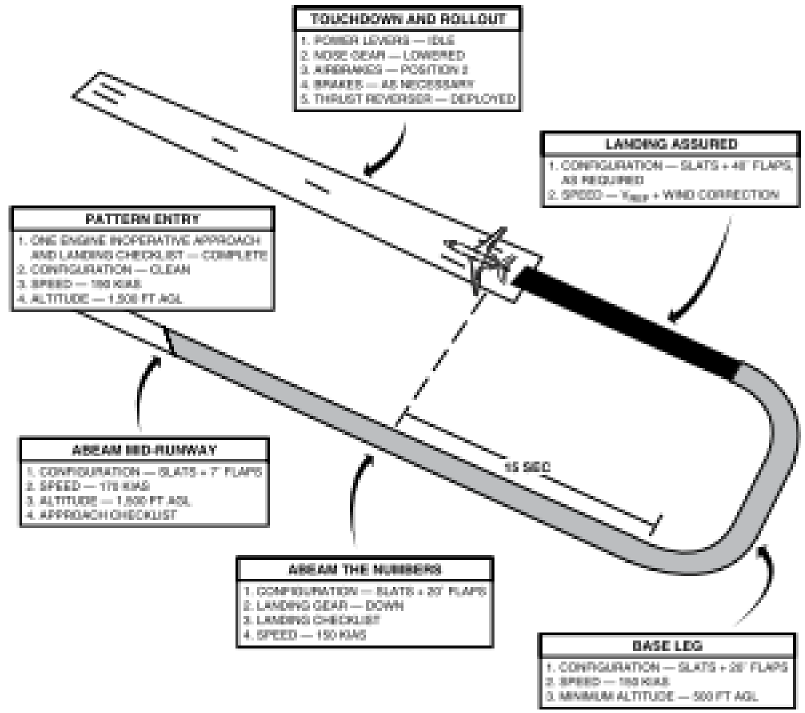


Figure MAP-10. Visual Approach — One Engine Inoperative
Slats + 20° FLAPS

APPROACH — FLAP/SLAT MALFUNCTION

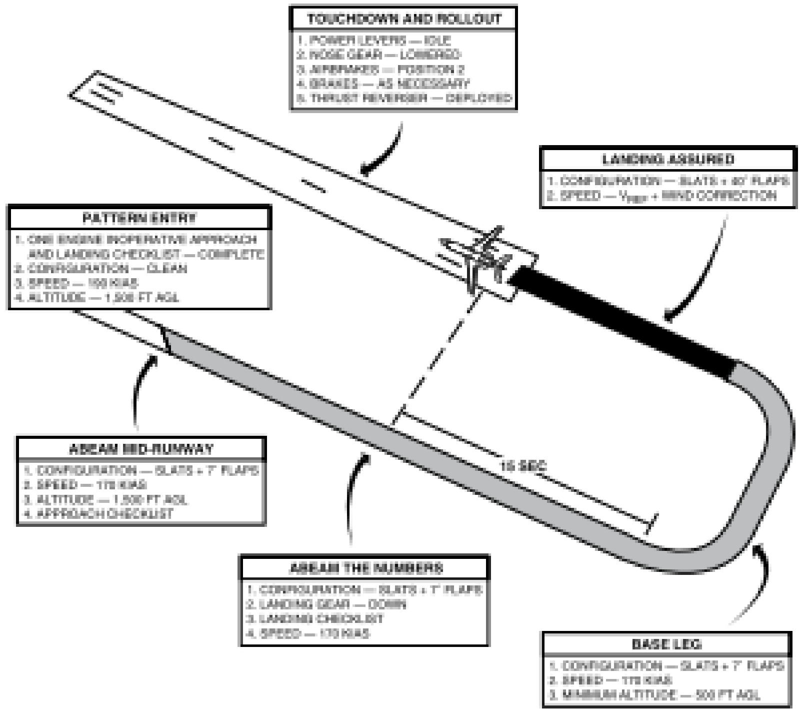


Figure MAP-11. Visual Approach — One Engine Inoperative Slats + 7° FLAPS

VISUAL APPROACH — ONE ENGINE INOPERATIVE

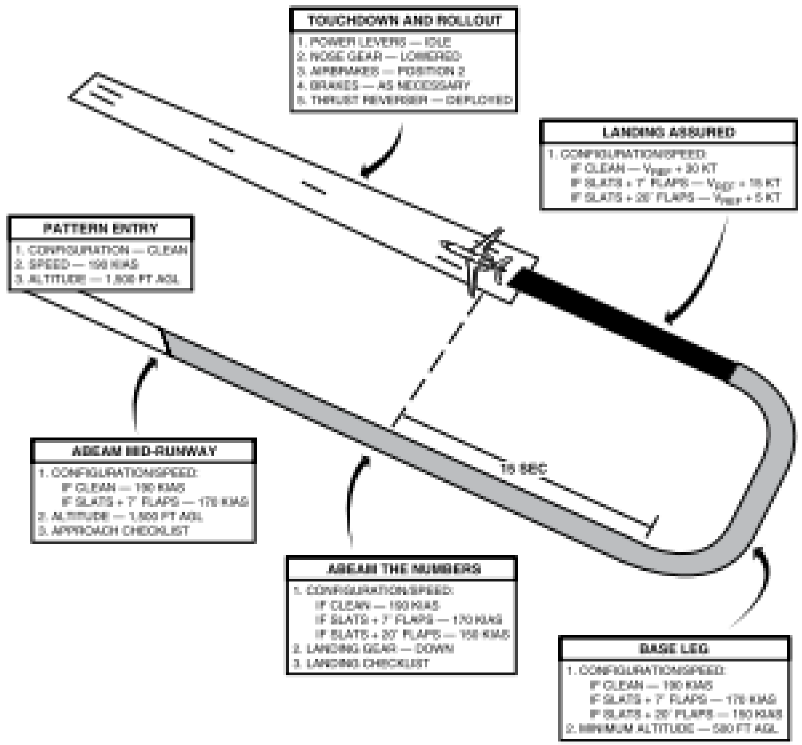


Figure MAP-12. Approach — Flap / Slat Malfunction

PRECISION APPROACH — NORMAL

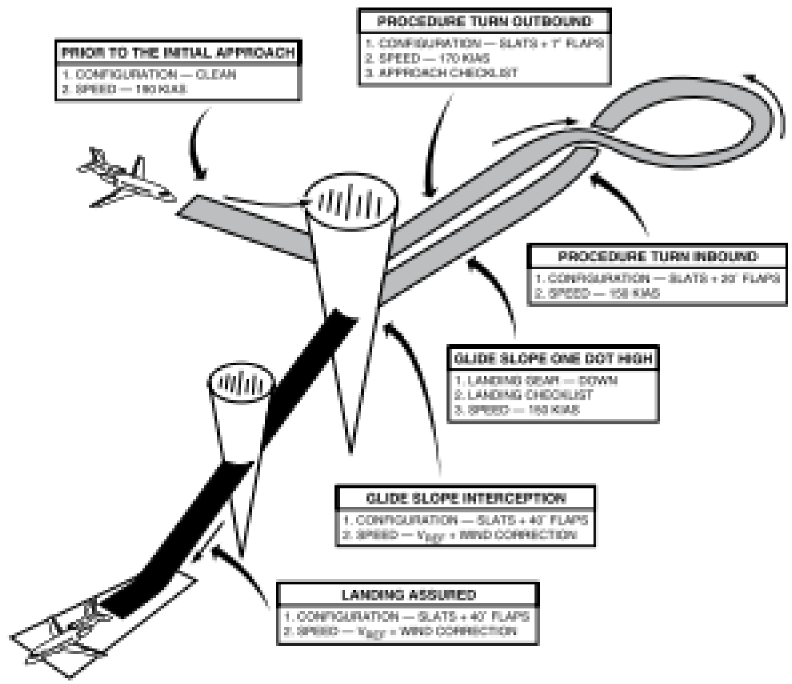


Figure MAP-13. Precision Approach — Normal

PRECISION APPROACH — ONE ENGINE INOPERATIVE

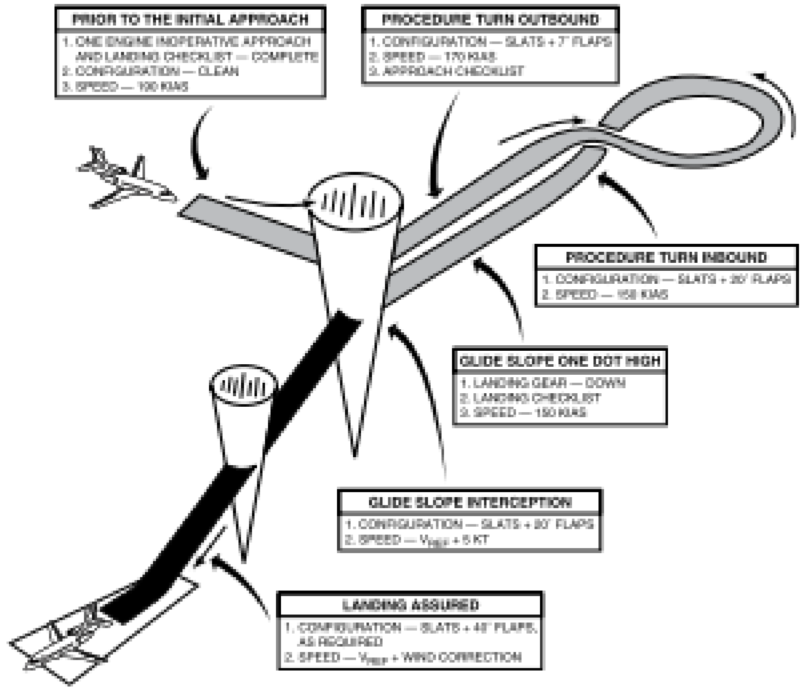


Figure MAP-14. Precision Approach — One Engine Inoperative
Slats + 20° FLAPS

PRECISION APPROACH — ONE ENGINE INOPERATIVE

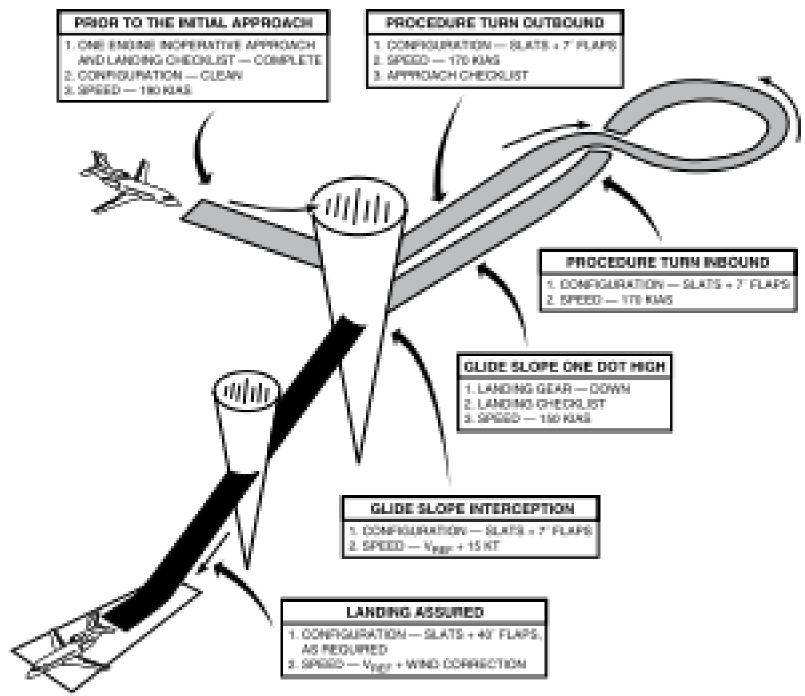


Figure MAP-15. Precision Approach — One Engine Inoperative Slats + 7° FLAPS

NONPRECISION APPROACH — NORMAL

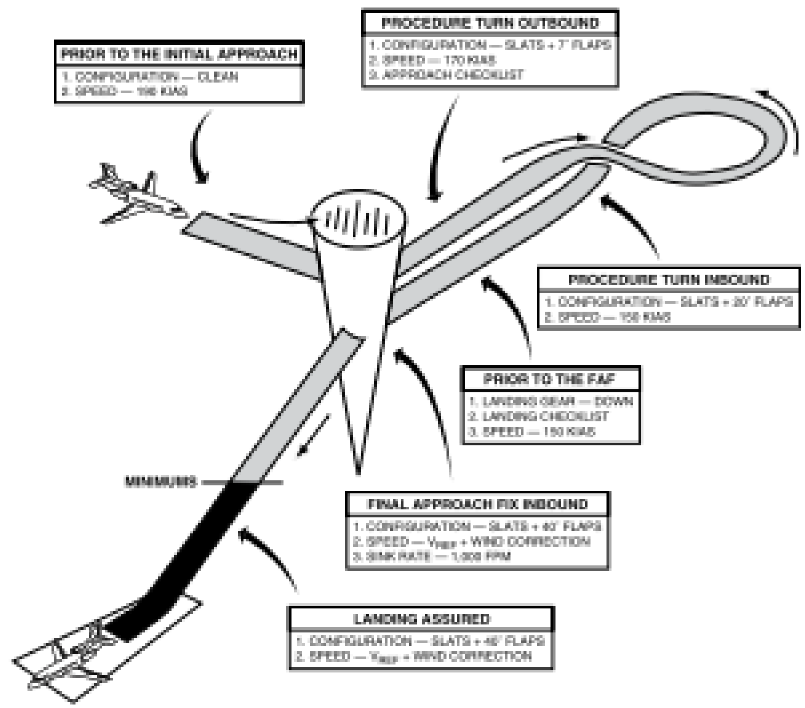


Figure MAP-16. Nonprecision Approach — Normal

MISSED APPROACH — FROM PRECISION APPROACH

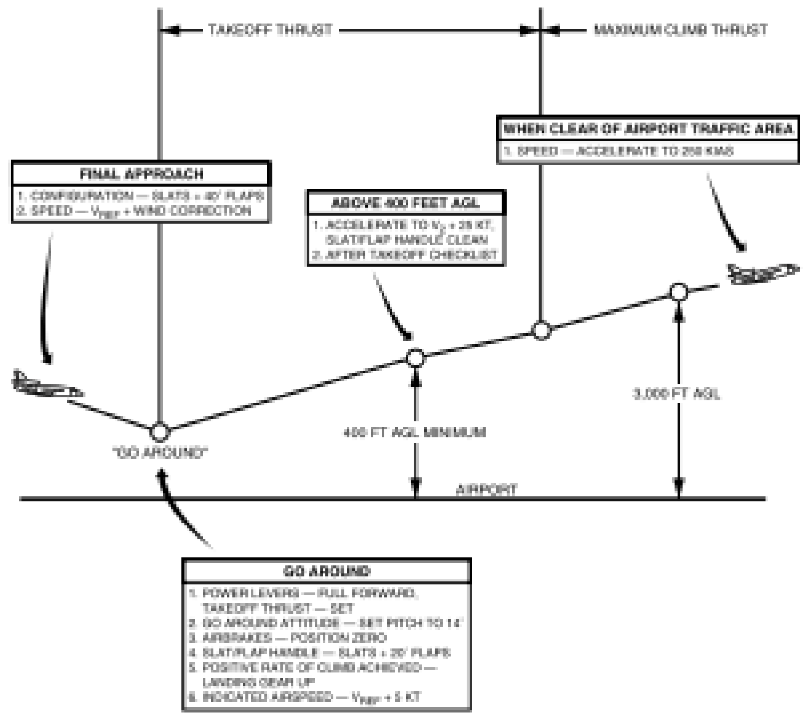


Figure MAP-17. Missed Approach — from Precision Approach

CIRCLING APPROACH

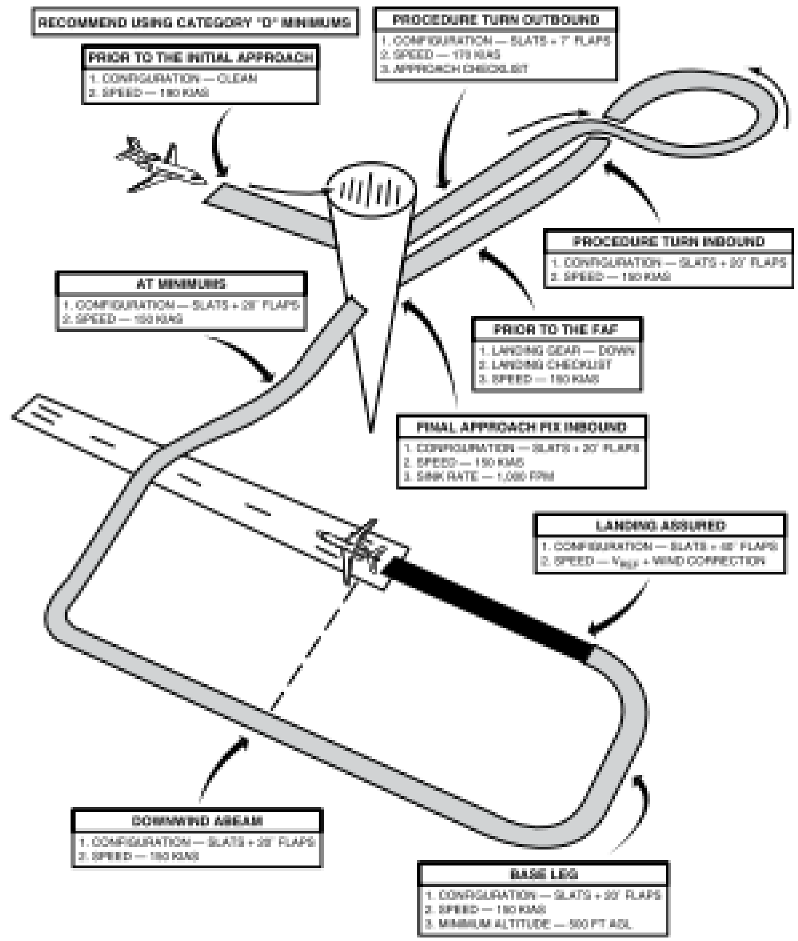


Figure MAP-18. Circling Approach

MISSED APPROACH — ONE ENGINE INOPERATIVE

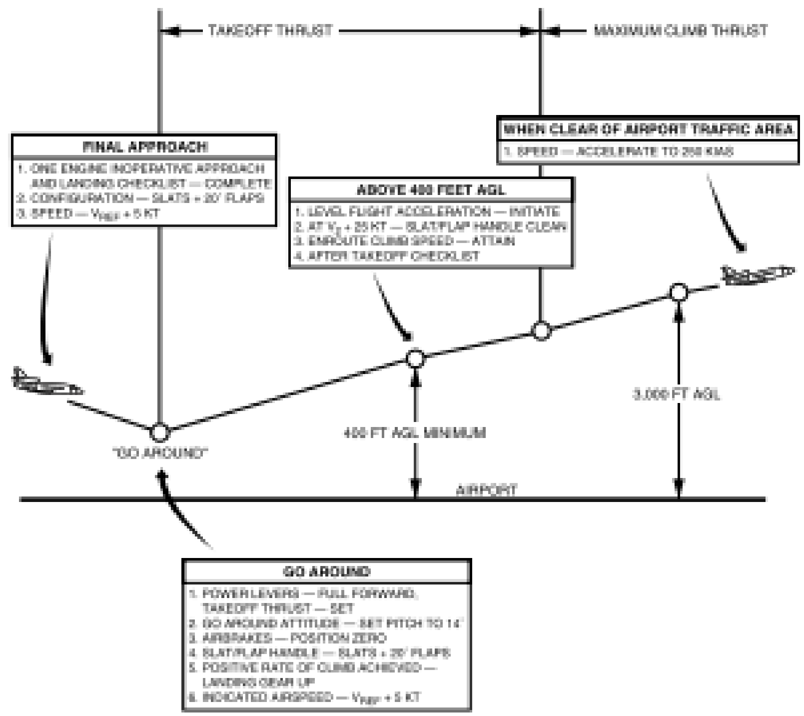


Figure MAP-19. Missed Approach — One Engine Inoperative
Slats + 20° FLAPS

MISSED APPROACH — ONE ENGINE INOPERATIVE

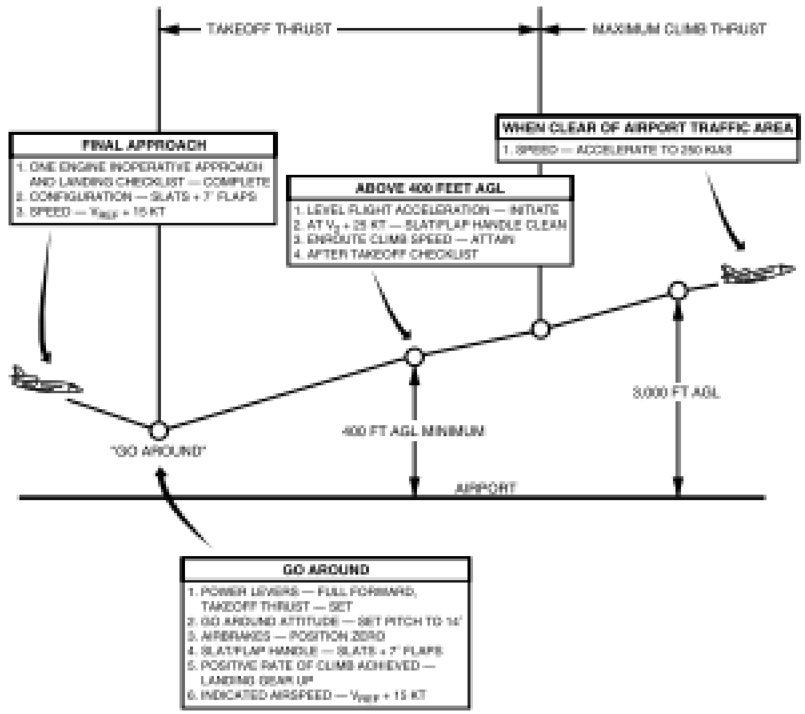


Figure MAP-20. Missed Approach — One Engine Inoperative Slats + 7° FLAPS

APPROACH AND LANDING— TWO ENGINES INOPERATIVE

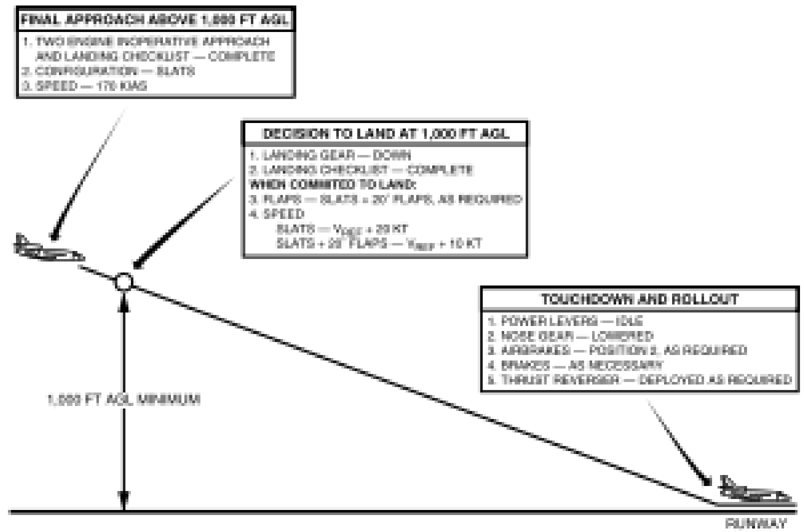


Figure MAP-21. Approach and Landing — Two Engines Inoperative

APPROACH AND MISSED APPROACH — TWO ENGINES INOPERATIVE

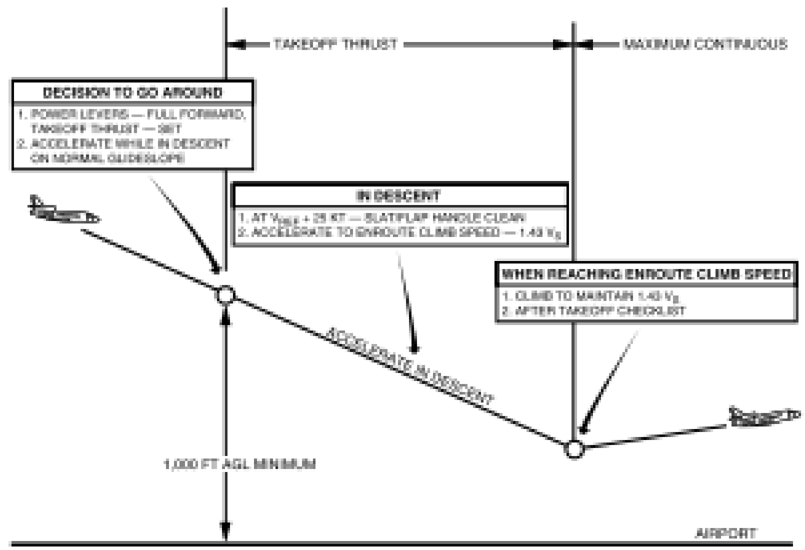


Figure MAP-22. Approach and Missed Approach — Two Engines Inoperative

WINDSHEAR

GENERAL

Definition

A windshear is a rapid variation of wind direction and velocity of wind at very low altitude. A windshear may or may not be come with a DOWNBURST or MICROBURST (violent downward blasts of air).

A MICROBURST with a low or zero wind variation may also be encountered. These phenomena are generally called windshear.

The main cause of windshear is thunderstorm cells.

Instructions

If windshear is anticipated:

Do not take off: wait. Do not land: wait or fly to an alternate airport.

If a windshear is encountered, 30 seconds to 1 minute maximum will be required to cross it. Pilot reaction time must be very low but no higher than 3 to 5 seconds as shown in accidents that have occurred. If the pilot takes 15 seconds or more to understand the situation, it will be too late. Survival or accident depends, therefore, on the pilot's reaction time: which makes a windshear warning system, with a very low reaction time, attractive.

PROCEDURE

Windshear CAUTION

This alert generally occurs when increasing performance windshear conditions happen (i.e., increasing headwind, decreasing tailwind, and/or updraft). This alert is generally considered advisory: the crew is warned that a significant airspeed loss and down draft conditions may happen subsequently. Coupled with other weather factors, the windshear CAUTION should be considered in determining the advisability of performing a go-around.

Windshear WARNING

- **During or After takeoff:**
  - If acceleration is much too low before V_1, abort the takeoff
  - If acceleration is too low above V_1, set maximum power and takeoff just before the end of the runway, at an IAS between V_1 and V_R if necessary, with the necessary pitch altitude.
  - The landing gear must not be raised as long as positive rate of climb and terrain clearance are not established
  - After takeoff, do not reduce power; increase, if possible

- Absolutely Do Not Let the Airplane Descend; even if the indicated airspeed should drop
- Respect the stall audio warning limit
- At the pilot's discretion, according to airplane height and vertical speed, landing gear up

TAKEOFF COMMENTS:

Monitor acceleration time; if a lag of 15 KT or more is noted, abort the takeoff.

During takeoff run, acceleration can be normal relative to the ground (accelerometer equal to ground speed) but too low relative to the air (indicated airspeed). Therefore, in situations with potential windshear, it is advisable to monitor the acceleration time.

During Approach and Landing:

As soon as WINDSHEAR is encountered, or imminently anticipated:

- Go-around Pushbutton—Depressed
- Level the Wings
- Pull Up to Stall Warning Onset
- Power Levers—Full Forward
- Airbrakes Handle—Position 0 (Zero)
- Slat-Flap Handle—20 (or Second Notch) Max
- At Pilot's Discretion, According to Airplane Height and Vertical Speed—Landing Gear Up

APPROACH AND LANDING COMMENTS:

Pilots must be made aware that the landing gear must not be raised as long as a positive rate of climb and terrain clearance are not established. Two reasons for this are:

1. *In case of contact with the ground, the gear will absorb most of the impact energy.*
2. *Although a small performance increase is available after landing gear retraction, initial performance degradation may occur when the landing gear doors open for retraction.*

In addition, the flaps setting must be kept at takeoff notch and retracted to Slats/Flaps 20 (or second notch) if the windshear is encountered on final with full flaps. being armed/captured.

WINDSHEAR COMMENTS:

Windshear is occasionally preceded by an opposite phenomenon consisting of a negative wind gradient of upward winds. In this case, the IAS increases abruptly and the airplane is found to be above the glide slope. The mistake not to make at this point is to reduce power while pitching the aircraft down. The airplane would then, in this case, be in a worse condition for a windshear encounter. ***It Is Preferable to Apply Thrust for Go-Around Immediately****. It only remains to prevent the airplane from descending, which would be catastrophic at very low altitudes. The comparison during approach of the IAS and GS can be helpful. With the EFIS, this comparison is made automatically; blue wind arrow on the HSI. In addition, the IAS evolution is given.*

WINDSHEAR

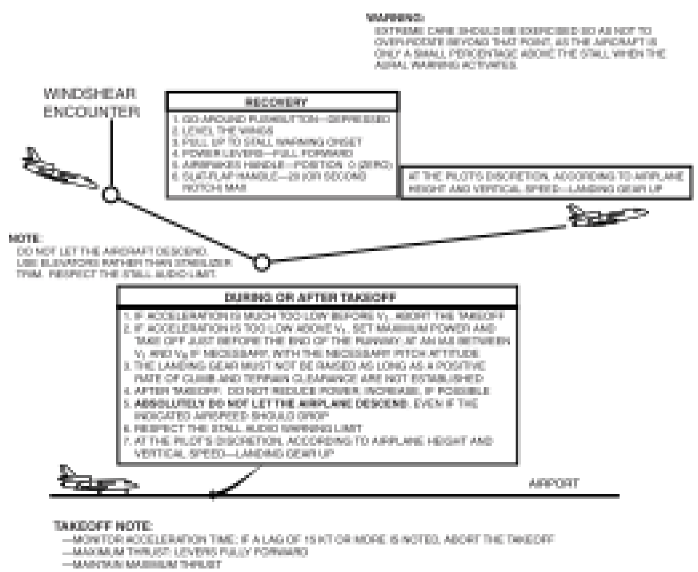


Figure MAP-23. Windshear

CONTROLLED FLIGHT INTO TERRAIN (CFIT)

The best CFIT avoidance procedure is prevention. Situational awareness is the best prevention tool.

In the event of a warning from the EGPWS system, immediate corrective action is required by the pilot.

The following EGPWS indications are imminent warnings of a CFIT potential. The pilot shall complete the appropriate escape maneuver.

For a Terrain Clearance Floor:

Warning Annunciator—On

TOO LOW TERRAIN—Voice Warning

1. Adjust the flight path/configuration until the warning light goes out and the voice warning stops.

For a Terrain Awareness Alert:

The TERRAIN AWARENESS ALERTING uses aircraft geographic position, aircraft baro altitude (QNH) and a terrain database to predict potential conflicts between the aircraft flight path and the terrain.

GNDPROX

Warning Annunciator—On

CAUTION TERRAIN—Voice Warning

1. Adjust the flight path/configuration until the warning light goes out and the voice warning stops.

PULL UP

Warning Annunciator—On

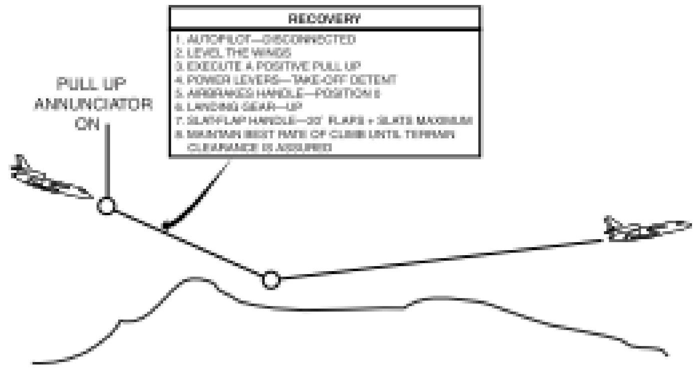
TERRAIN TERRAIN - PULL UP—Voice Warning

1. Autopilot—Disconnected
2. Wings Level
3. Execute a Positive Pull Up
4. Power Levers to TAKEOFF
5. Airbrakes—Position 0
6. Landing Gear—Up
7. Slat-Flap Handle—20° FLAPS + SLATS Maximum
8. Maintain Best Rate of Climb Until Terrain Clearance is Assured

NOTE

Only vertical maneuvers are recommended, unless operating in visual meteorological conditions (VMC), and the pilot determines, based on all available information, that turning in addition to the vertical escape maneuver is the safest course of action.

CONTROLLED FLIGHT INTO TERRAIN (CFIT)



NOTE:
ONLY VERTICAL MANEUVERS ARE RECOMMENDED, UNLESS OPERATING IN VISUAL METEOROLOGICAL CONDITIONS (VMC), AND THE PILOT DETERMINES, BASED ON ALL AVAILABLE INFORMATION, THAT TURNING IN ADDITION TO THE VERTICAL ESCAPE MANEUVER IS THE SAFEST COURSE OF ACTION.

REFERENCE:
DASSAULT AFM SUPPLEMENTS 1 [illegible], PAGE 3 THROUGH 10

Figure MAP-24. CFIT / Escape Maneuver

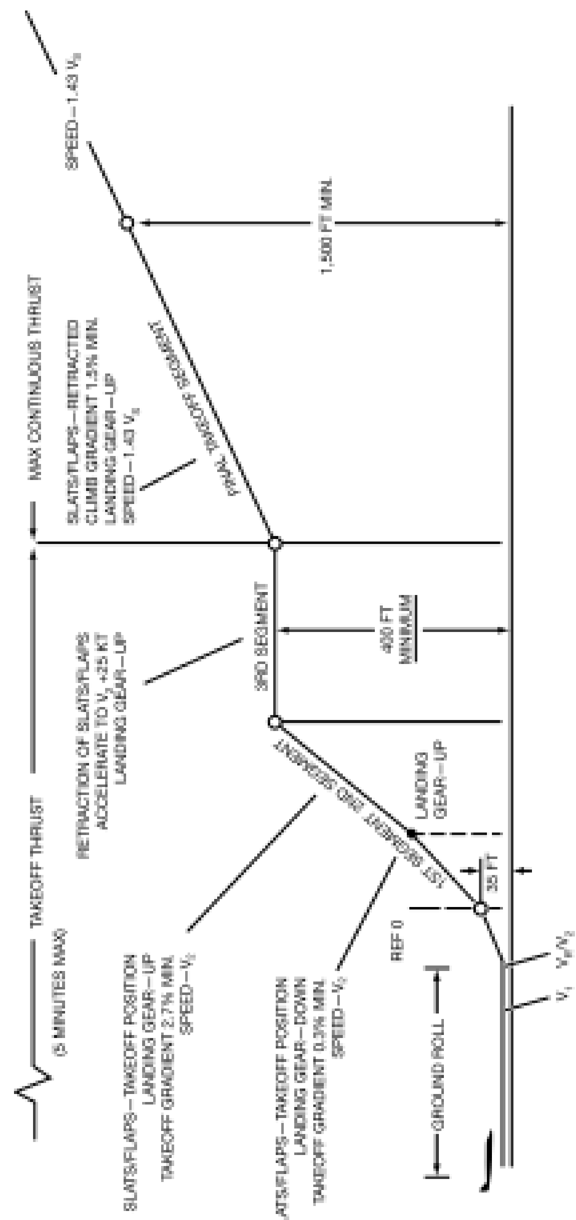


Figure MAP-25. Takeoff Flight Plan

WEIGHT AND BALANCE

CONTENTS

WEIGHT AND BALANCE

INTRODUCTION

It is the responsibility of the airplane operator to ensure that the airplane is properly loaded. At the time of delivery, the manufacturer provides the necessary weight and balance data to compute individual loadings. All subsequent changes in airplane weight and balance are the responsibility of the airplane owner and/or operator. Information in this chapter begins with weight and balance definitions.

The second portion of this chapter covers performance abbreviations and definitions and supplies acceptable performance guidelines.

WEIGHT AND BALANCE

DEFINITIONS

Maximum Gross Weight—The maximum gross weight to which the airplane has been certified in compliance with the Federal Air Regulations.

Payload—Weight of passengers, baggage, and cargo (does not include crew and usable fuel)

Center of Gravity (CG)—The point at which the mass of an object is considered to be concentrated

Arm (or Moment Arm)—The horizontal distance along the longitudinal axis from the datum to the point where a force is applied. Normally measured in inches, aft of the datum is plus (+), and forward of the datum is minus (–).

Moment—The product of a weight or force and its moment arm (M = W × A)

Datum—Arbitrary reference plane selected by the manufacturer from which all measurements are made for weight and balance computations. The F-900 Datum is 25% of the mean aerodynamic chord (MAC) which coincided with fuselage station (FS) 420.43 in (10,670 mm) (fuselage station +0 is the forward end of the airplane nose cone.

Mean Aerodynamic Chord (MAC)—An imaginary constant section airfoil that produces the same aerodynamic characteristics as the real airfoil. Due to its constant dimensions, the MAC can be assigned fuselage station numbers for its leading and trailing edges, and all calculations and measurements can be referenced from those points. The center of gravity is sometimes expressed as a percent of MAC. This defines the CG location as being the leading and trailing edge MAC at a certain percentage of the total distance.

Example

Although seemingly complex at times, all weight and balance problems are handled by use of the following moment equation.

(1) Moment = Weight X Arm

This equation is the basic equation used to find the center-of-gravity location of an airplane and/or its components. By rearrangement of this equation to the following forms,

(2) $\text{Weight} = \dfrac{\text{Moment}}{\text{Arm}}$, and (3) $\text{Arm} = \dfrac{\text{Moment}}{\text{Weight}}$

with any two known values, the third value can be found.

In the airplane weight and balance problem, the moment equation is used many times in calculating moments for each individual item. When all weights and moments have been totaled, the charts provided in the Performance section of this chapter should be used to determine CG.

PERFORMANCE

CONTENTS

PERFORMANCE

DEFINITIONS

Takeoff Path—Extends from a standing start to a point 1,500 feet above the takeoff surface

Takeoff Distance—The horizon distance along the takeoff path from the start to a point 35 feet above the takeoff surface following an engine failure, or 115% of all engines operating to a point 35 feet above the takeoff surface (this includes a legal clearway)

Accelerate Stop—The distance required to accelerate to V_1 and bring the aircraft to a full stop, assuming that one engine failed at V_1 plus a delay of two seconds (this includes a legal stopway)

Balanced Field—When the takeoff distance is equal to the accelerate stop distance

V_1—The speed at which, if an engine failure occurs, the aircraft will:

- Reach 35 feet above the takeoff surface, or
- Come to a full stop on the takeoff surface plus any legal stopway

V_R—The speed at which rotation is initiated; attains V_2 at or prior to reaching 35 feet

V_2—The takeoff safety speed selected by the manufacturer so that the required climb gradient is attained

V_{FR}—The minimum speed to initiate flap retraction, V_2 +25 knots

V_{MIN}—The minimum speed at which the takeoff may be continued. This speed is always greater than V_{MCG}.

V ENGINE OUT CLIMB—1.43 V_S and the speed used from the end of a transition segment

V_{REF}—1.3 V_S in the landing configuration

V_{MCA}—Minimum flight speed at which the aircraft is controlled, with a maximum of 5° bank, if one lateral engine suddenly becomes inoperative

V_{MBE} (Maximum Brake Energy Speed)—Maximum decision speed, V_1, at which the maximum demonstrated brake energy is not exceeded. V_{MBE} is not limiting for takeoff in the slats + flaps 20° configuration.

V_{MCG} — Is not stated for 900A or B models.

V_{MIN} — Replaces V_{MCG}

Landing Distance—The horizontal runway surface necessary to cross the threshold from 50 feet at V_{REF}, maintaining a steady 3° glide to the landing surface, and come to a full stop using brakes, and airbrakes

Landing Field Length—Landing distance multiplied by 1.67

ACCEPTABLE PERFORMANCE GUIDELINES

Steep turns—±100 feet, ±5° bank, ±10 knots, ±10° heading

Approach to stall—Recognize perceptible stall/warning device indication; recover at first indication, striving for minimum altitude loss.

Holding—±100 feet, ±10 knots

IFR approaches—Initial: ±100 feet, ±10 knots
Final: –0 +10 knots
DH/MDA: –0 +50 feet, +5 knots ± 1 dot ±5 knots

Circling—Not to exceed 30° bank, MDA –0 feet +100 feet

Missed approach—DH/MDA: –0 feet (except in instances when runway environment is in sight)

Engine failure—V_1: V_2 KIAS, runway heading, –0 +10 knots

Clean climb: V_{FS} KIAS, –0 +10 knots

In flight: Shutdown/restart ±20° heading, ±100 feet, or ±5 KIAS on driftdown

Landings—Traffic pattern: ±10 knots, altitude ±100 feet threshold:
V_{REF} –0 ±10 knots

CREW RESOURCE MANAGEMENT

CONTENTS

ILLUSTRATIONS

Figure	Title	Page

CREW RESOURCE MANAGEMENT (CRM)

CREW CONCEPT BRIEFING GUIDE

INTRODUCTION

Experience has shown that adherence to SOPs helps to enhance individual and crew cockpit situational awareness and will allow a higher performance level to be attained. Our objective is for standards to be agreed upon prior to flight and then adhered to, such that maximum crew performance is achieved. These procedures are not intended to supercede any individual company SOP, but rather are examples of good operating practices.

COMMON TERMS

PIC Pilot in Command

Designated by the company for flights requiring more than one pilot. Responsible for conduct and safety of the flight. Designates pilot flying and pilot not flying duties.

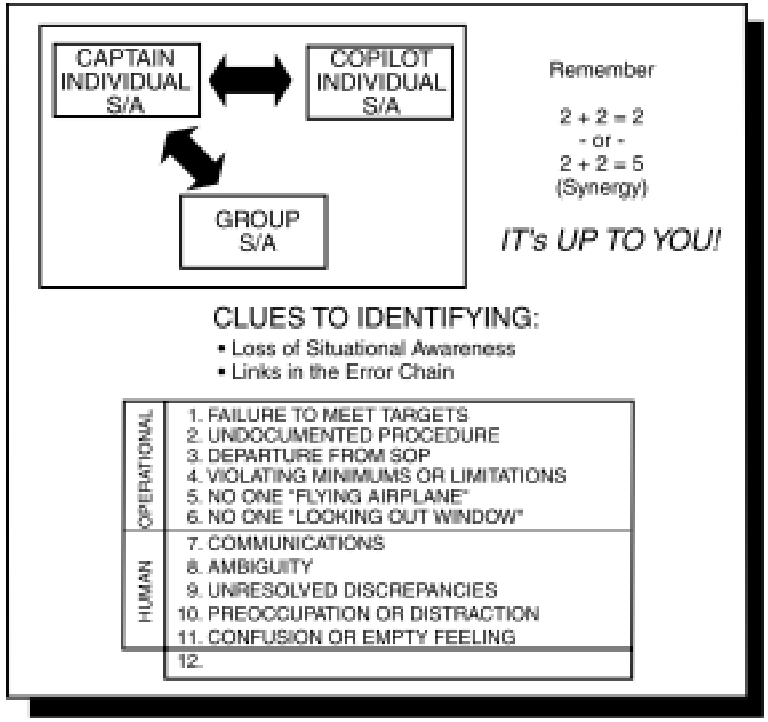
F Pilot Flying

Controls the aircraft with respect to assigned airway, course, altitude, airspeed, etc., during normal and emergency conditions. Accomplishes other tasks as directed by the PIC.

N Pilot Not Flying

Maintains ATC communications, copies clearances, accomplishes checklists and other tasks as directed by the PIC.

B Both



CRM-1. Situational Awareness in the Cockpit

CRM-2. Command and Leadership

PRETAKEOFF BRIEFING (IFR/VFR)

NOTE

The following briefing is to be completed during item 1 of the pretakeoff checklist. The pilot flying will accomplish the briefing.

1. Review the departure procedure (route and altitude, type of takeoff, significant terrain features, etc.)
2. Review anything out of the ordinary
3. Review required callouts, unless standard calls have been agreed upon, in which case a request for "Standard Callouts" may be used
4. Review the procedures to be used in case of an emergency on departure
5. As a final item, ask if there are any questions
6. State that the pretakeoff briefing is complete

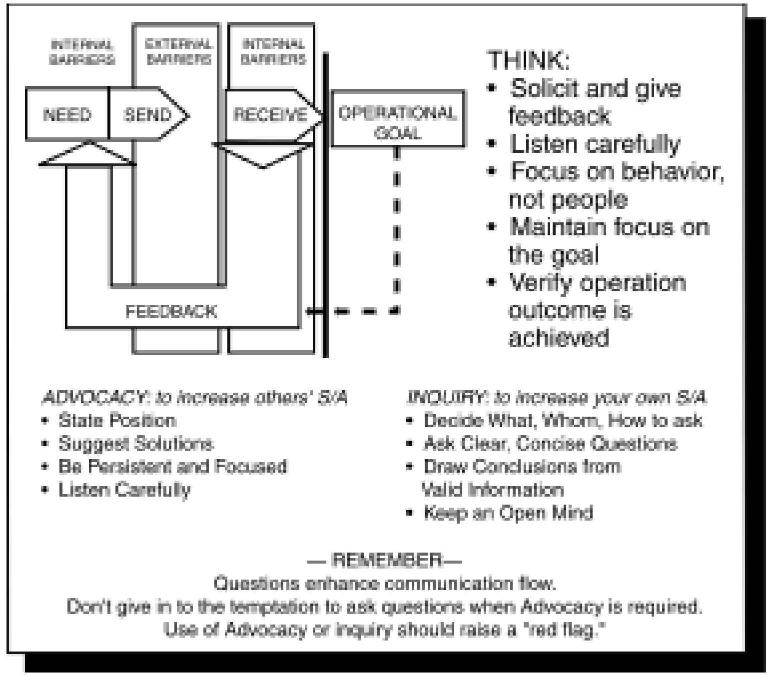
CREW COORDINATION APPROACH SEQUENCE

NOTE

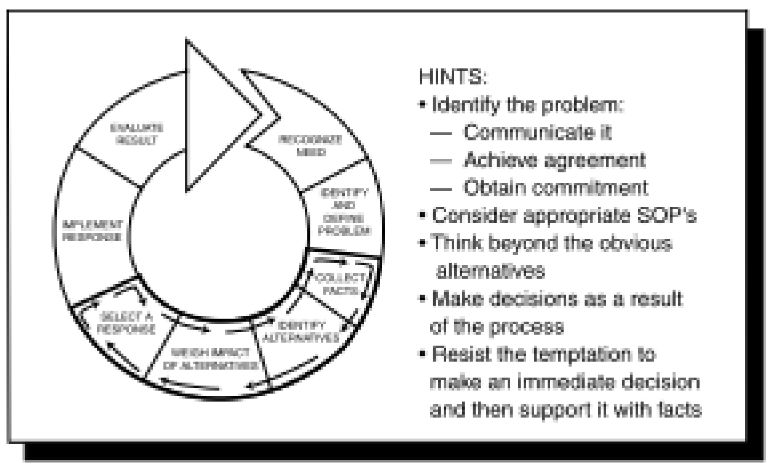
The following crew coordination approach sequence should be completed as early as possible, prior to initiating an IFR approach. These items are accomplished during the "APPROACH (IN RANGE)" checklist.

F—Requests the pilot not flying to obtain destination weather—Transfer of communication duties to the pilot flying may facilitate the accomplishment of this task.

N—Advises the pilot of current destination weather, approach in use, and special information pertinent to the destination



CRM-3. Communication Process



CRM-4. Decision-Making Process

F—Requests the pilot not flying to perform the approach setup

N—Accomplishes the approach setup and advises of frequency tuned, identified and course set

F—Transfers control of the aircraft to the pilot not flying, advising, "You have control, heading _________, altitude _________" and special instructions. (Communications duties should be transferred back to the pilot not flying at this point.)

N—Responds, "I have control, heading _________, altitude _________."

F—Advises, "Approach briefing."

F—At the completion of the approach briefing, the pilot flying advises, "Approach briefing complete."

F—Advises, "I have control, heading _________, altitude _________."

N—Confirms "You have control, heading _________, altitude _________."

F—"Before Landing checklist."

N—"Before Landing checklist complete."

NOTE

The above sequence should be completed prior to the FAF.

NOTE

During the above sequence, the terms F and N have not been reversed during the time that transfer of control occurs.

ALTITUDE CALLOUTS

ENROUTE

1,000 Feet Prior to Level-Off

N	F
State altitude leaving and assigned level-off altitude	"ROGER"
"100 above/below"	"LEVELING"

APPROACH—PRECISION

N	F
At 1,000 feet above minimums	
"1,000 feet above minimums"	"DH ________"
At 500 feet above minimums	
"500 feet above minimums"	"NO FLAGS"
At 100 feet above minimums	
"100 feet above minimums"	"APPROACHING MINIMUMS"
At decision height (DH)	
"Minimums, approach lights at (clock position)"	"CONTINUING"
OR	
"Minimums, runway at (clock position)"	"CONTINUING"
OR	
"Minimums, runway not in sight"	"GO AROUND"

APPROACH—NONPRECISION

N	F
At 1,000 feet above minimums	
"1,000 feet above minimums"	"MDA ___________"
At 500 feet above minimums	
"500 feet above minimums"	"NO FLAGS"
At 100 feet above minimums	
"100 feet above minimums"	"APPROACHING MINIMUMS"
At minimum descent altitude (MDA)	
"Minimums"	"LEVEL"
At missed approach point (MAP)	
"Approach lights at (clock position)"	"CONTINUING"
OR	
"Runway at (clock position)"	"CONTINUING"
OR	
"Runway not in sight"	"GO AROUND"

SIGNIFICANT DEVIATION CALLOUT

N	F
IAS ± 10 KIAS	
"V_{REF} ± _____"	"CORRECTING TO ______"
Heading ±10° enroute, 5° on approach	
"Heading _______ degrees left/right	"CORRECTING TO ______"
Altitude ±100 feet enroute, +50/−0 feet on final approach	
"Altitude ________ high/low"	"CORRECTING TO ______"
CDI left or right one dot	
"Left/right of course _______ dot"	"CORRECTING"
RMI course left or right ±5°	
"Left/right of course _______ degrees"	"CORRECTING"
Vertical descent speed greater than 1,000 fpm on final approach	
"Sink rate ________"	"CORRECTING"
Bank in excess of 30°	
"Bank _______ degrees"	"CORRECTING"

SYSTEMS REVIEW

ILLUSTRATIONS

TABLES

Table SR-1. Electrical Power Sources

LEFT CIRCUIT-BREAKER PANEL					
PRIMARY BUS A1					
	DESIGNATION	UTILIZATION		DESIGNATION	UTILIZATION
FIRE WARNING	AUDIO WARN A	Audio warning	RADIO	ATC1*	ATC 1
	WARN LIGHTS A PANEL	Warning panel		VOR1*	VOR-DME 1
				DME1*	VOR-DME 1
	WARN LIGHTS A EX	Light test D/N		ADF1*	ADF 1
	EXTING 1	Fire	NAVIGA-TION	DDRMI1*	Pilot-copilot RMI
	DETECT 1	Fire		ADC1*	Pilot ADC 1
	LIGHTS WARN A-B			SG1*	Pilot EFIS
				EADI LH*	Pilot EFIS
NAVIGA-TION	IRS 1 BAT	IRS 1 battery		EHSI LH* EFIS CTL1*	Pilot EFIS Pilot EFIS
	IRS 1	IRS 1			
	TEMP PROBE	Probe heating			
	HRZN ST BY	Standby horizon			
	LH AV MASTER	Left avionics			

*Isolated by the LH AV MASTER pushbutton

Table SR-1. Electrical Power Sources (Cont)

LEFT CIRCUIT-BREAKER PANEL (Cont)					
PRIMARY BUS A2					
	DESIGNATION	UTILIZATION		DESIGNATION	UTILIZATION
FIRE WARNING	EXTING 3	Fire	RADIO	HF 1 CONTROL*	HF 1
	DETECT 3	Fire		PHONE* SAT COM*	Option Option
	BAG COMP	Fire			
	BAT TEMP	Battery temperature	NAVIGA-TION	AFCS 1 CMPTR*	Pilot FGC*
				AFCS 1 ADVIS*	Servoactuator
	BLOWER LH	Ventilation		RAD ALT 1*	Radioaltimeter
	TEST WARN A-B			FMS 1*	Pilot FMS
				CDU 1*	Pilot FMS
NAVIGA-TION	IRS 3	IRS 3		SG 3*	MFD
	IRS 3 BAT (Option)	IRS 3 battery		MFD/WRD*	MFD
	ANNUNC LH	Radio nav lighting		R/T WR*	Radar
	AFCS 1 AP	Pilot FGC		GPWS	Option
	AFCS 1 YD	Pilot FGC			
RADIO	ICS LH	Intercom			
	VHF 1	VHF 1			
	HF 1 PWR	HF 1			

*Isolated by the LH AV MASTER pushbutton

Table SR-1. Electrical Power Sources (Cont)

CENTER CIRCUIT-BREAKER PANEL					
PRIMARY BUS A1					
	DESIGNATION	UTILIZATION		DESIGNATION	UTILIZATION
LIGHTS MISC	ANTICOL FIN	Anticollision lights	HYDR	L/G CONTROL	Landing gear control
	LH EXT LIGHT	External lighting		STBY PUMP	Standby hydraulic pump
	CKPT LH READING	Lighting		HYDR 1 INDIC	Hydraulic
	NAV	Navigation lights			
	STROBE	Strobe lights	ANTI- ICE COND'G	WSHLD FRONT LH	Windows
	CENTER	Lighting		LH PITOT HEAT	Probe heat
	INSTR LH	Instrument lighting		LH STATIC HEAT	Probe heat
	INV (115V/60 Hz) or 115-VAC master	Option		COND'G CREW	Conditioning
ENGINES	IGNTR AUTO	Starting		CABIN PRESS	Cabin pressure
	ENG FAIL 2	Takeoff warning		LH AOA HEAT	Probe heat
	N_2 1 N_1 ITT 2	Indicators Turbine temp		ENGINE 1 AIR FR	Anti-icing Wing anti-icing
	CMPTR	Engine Computer		HP BLEED 1	Wing anti-icing
	IGNTR 1 OIL 1	Start Engine control	FLT CONTROL	A/B CONTROL PITCH FEEL	Airbrakes Arthur
FUEL	BOOST 1 FUEL FLOW 1 XBP 2-3 GAGES LH LO FUEL	Fuel BP Flowmeter Fuel Qty indicators Tank level		STAB EMERG TRIM INDIC SLAT INDIC LH AUTO SLAT	Horiz stab Trim Slats Slats

Table SR-1. Electrical Power Sources (Cont)

CENTER CIRCUIT-BREAKER PANEL (Cont)					
PRIMARY BUS A2					
	DESIGNATION	UTILIZATION		DESIGNATION	UTILIZATION
LIGHTS MISC	BELTS NO SMK'G	Passenger signs	ANTI-ICE COND'G	ENGINE 3	Anti-icing
				DV WINDOW	Window
	ENTRY	Entrance lighting			
	SHIELD	Glareshield lighting		PRV 3	Wing anti-icing
	DRAIN HEAT	Drain anti-icing		CAB TEMP CONTROL	Temperature control
	LANDING LH	Lights		STBY PITOT	Probe heat
				WIPER LH	Wipers
ENGINES	N_2 3	Indicators			
	CMPTR 3	Engine computer	FLT CONTROL	FLAP A/B INDIC	Flaps
	IGNTR 3	Starting		TRIM AILERON TRIM RUDDER	Trim Trim
	OIL 3	Engine control		STICK SHAKER	Stick Shaker M889 Incorporated
	FUEL 2 SHUT OFF	Fire			
FUEL	STBY BOOST 2	Fuel			
	FUEL FLOW 3	Flowmeter			
	LEVEL	Tank level			
HYDR	ANTISKID	Brakes			
	L/G IND EMER	Landing gear indication M1406 incorporated			

Table SR-1. Electrical Power Sources (Cont)

CENTER CIRCUIT-BREAKER PANEL (Cont)					
PRIMARY BUS B1					
	DESIGNATION	UTILIZATION		DESIGNATION	UTILIZATION
FLT CONTROL	STAB NORMAL	Horiz stab	ENGINES	N_2 2	Indicators
	AIL FEEL	Arthur monitoring		N_1 ITT 1	Turbine temperature
	RH AUTO SLAT	Slats		CMPTR 2	Engine computer
				IGNTR 2	Starting
ANTI-ICE COND'G	ENGINE 2	Anti-icing		OIL 2	Engine control
	AFT SIDE WINDOW	Window		CMPTR 1 STBY PWR	Engine computer
	WIPER RH	Wiper	LIGHTS MISC	LAV MASTER	28-VDC system
	COND'G CABIN	Conditioning		OVERHEAD	Lighting
	BOOTSTRAP	Bootstrap		FWD CABIN INDIRECT	Cabin lighting
	RH AOA HEAT	Probe heat		RH CABIN READING	Reading lights
HYDR	L/G INDIC	Landing gear		CKPT RH READING	Lighting
	HYDR 2 INDIC	Hydraulic		TAXI	Lights
FUEL	NORM BOOST 2	Fuel			
	FUEL FLOW 2	Flowmeter			
	XBP 1-3	Fuel			
	GAGES RH	Qty indicators			

Table SR-1. Electrical Power Sources (Cont)

CENTER CIRCUIT-BREAKER PANEL (Cont)					
PRIMARY BUS B2					
	DESIGNATION	UTILIZATION		DESIGNATION	UTILIZATION
LIGHTS MISC	GALLEY MASTER	Galley	FUEL	BOOST 3	Fuel
	LANDING RH	Lights		GAGES CENTER	Qty indicators
	ANTICOL BELLY	Anticollision lights		XBP1-2	Fuel
	RH EXT LIGHT	Right external lights		PRESSURE FUELING	Refueling
	INSTR RH	Instrument lighting			
	PEDESTAL	Instrument lighting	HYDR	NOSE WHL	Steering
	VALANCE OR AFT CABIN INDIRECT	Cabin lighting			
	LH CABIN READING	Reading lights	ANTI-ICE COND'G	CKPT TEMP CONTROL	Temperature control
				BAG PRESS	Pressurization
ENGINES	APU	APU		WSHLD FRONT RH	Window
	N_1 ITT 3	Turbine temperature		RH PITOT HEAT	Probe heat
	FUEL 1 SHUT OFF	Fire		RH STATIC HEAT	Probe heat
	REVERSE CONTROL	Engine 2 reverser			
	REVERSE WARN		FLT CONTROL	ROLL EMERG	Trim
	FUEL 3 SHUT OFF	Fire			
				FLAP CONTROL	Flaps

Table SR-1. Electrical Power Sources (Cont)

RIGHT CIRCUIT-BREAKER PANEL					
PRIMARY BUS B1					
	DESIGNATION	UTILIZATION		DESIGNATION	UTILIZATION
FIRE WARNING	AUDIO WARN B	Audio warning	RADIO	VOR 2*	DME 2
	WARN LIGHT B PANEL	Warning panel		DME 2*	VOR-DME 2
				ADF 2*	ADF 2
	WARN LIGHTS B EX	Light testing D/N		ATC 2*	ATC 2*
				VHF 3*	VHF 3
	EXTING 2	Fire			
	DETECT 2	Fire	NAVIGA-TION	SG 2*	Copilot EFIS
	APU	Fire		EFIS CTL2*	Copilot EFIS
				EHSI RH*	Copilot EFIS
				EADI RH*	Copilot EFIS
NAVIGA-TION	IRS 2 BAT	IRS 2 battery		DDRMI 2*	Copilot and pilot EFIS
	IRS 2	IRS 2		ADC 2*	Copilot ADC 2
	RH AV MASTER	Right avionics			AOC 2
*Isolated by the RH AV MASTER pushbutton					

Table SR-1. Electrical Power Sources (Cont)

RIGHT CIRCUIT-BREAKER PANEL (Cont)					
PRIMARY BUS B2					
	DESIGNATION	UTILIZATION		DESIGNATION	UTILIZATION
MISC	NOSE FAN	Ventilation	RADIO	HF 2 CONTROL*	HF 2
	BLOWER RH	Ventilation		VHF 2*	VHF 2
	CREW SEATS	Crew seats		SELCAL*	Selcal
	EMERG LIGHTS	Emergency light batteries			
			NAVIGA-TION	AFCS 2 CMPTR*	Copilot FGC
RADIO	HF 2 PWR	HF 2		AFCS 2 ADVIS*	Copilot FGC
	PUBLIC ADDRESS	Public address		FMS 2*	Copilot FMS
	ICS RH	Intercom		CDU 2*	Copilot FMS
				OMEGA*	Omega
NAVIGA-TION	AFCS 2 AP	Copilot FGC		FLIGHT RECORDER*	Flight recorder
				VOICE RECORDER*	Cockpit voice-recorder
	AFCS 2 YD	Copilot FGC		RAD ALT 2*	Radio altimeter
	ANNUNC RH	Radio nav instrument lighting			

*Isolated by the RH AV MASTER pushbutton

Table SR-2. Start-Assist Logic

START → / GEN ↓		APU								2								3								1							
APU	OFF									X	X			X	X			X	X			X	X			X	X			X	X		
	ON											X	X			X	X			X	X			X	X			X	X			X	X
2	OFF	X	X			X	X											X		X		X		X		X		X		X		X	
	ON			X	X			X	X										X		X		X		X		X		X		X		X
3	OFF	X		X		X		X		X		X		X		X										X	X	X	X				
	ON		X		X		X		X		X		X		X		X													X	X	X	X
1	OFF	X	X	X	X					X	X	X	X					X	X	X	X												
	ON					X	X	X	X					X	X	X	X					X	X	X	X								
BAT LIGHTS		OFF	ON	ON	ON	ON	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON	ON	OFF	ON	ON	ON	ON	ON	ON	ON
START ASSIST											G3	APU	APU	G1	G3	APU	APU		G2	APU	APU	G1	G2	APU	APU		G2	APU	APU	G3	G2	APU	APU
MAIN BUS POWER		B1 B2	G3	G2	G2 G3	G1	G3 G1	G2 G1	G2 G3 G1	B1 B2	G3	APU	G3	G1	G1	G1	G3 G1	B1 B2	G2	APU	G2	G1	G1	G1	G2 G1	B1 B2	G2	APU	G2	G3	G3	G3	G2 G3

Table SR-3. Sequential Start-Assist Logic

START → / GEN ↓: APU

GEN									
APU	OFF								
APU	ON								
2	OFF	X	X			X	X		
2	ON			X	X			X	X
3	OFF	X		X		X		X	
3	ON		X		X		X		X
1	OFF	X	X	X	X				
1	ON					X	X	X	X
BAT LIGHTS		OFF	ON	ON	ON	ON	ON	ON	ON
START ASSIST									
MAIN BUS POWER		B1 B2	G3	G2	G2 G3	G1	G3 G1	G2 G1	G2 G3 G1

START → / GEN ↓: 2

GEN									
APU	OFF	X	X			X	X		
APU	ON			X	X			X	X
2	OFF								
2	ON								
3	OFF	X		X		X		X	
3	ON		X		X		X		X
1	OFF	X	X	X	X				
1	ON					X	X	X	X
BAT LIGHTS		OFF	ON	ON	ON	ON	ON	ON	ON
START ASSIST			G3	APU	APU	G1	G3	APU	APU
MAIN BUS POWER		B1 B2	G3	APU	G3	G1	G1	G1	G3 G1

START → / GEN ↓: 3

GEN									
APU	OFF	X	X			X	X		
APU	ON			X	X			X	X
2	OFF	X		X		X		X	
2	ON		X		X		X		X
3	OFF								
3	ON								
1	OFF	X	X	X	X				
1	ON					X	X	X	X
BAT LIGHTS		OFF	ON	ON	ON	ON	ON	ON	ON
START ASSIST			G2	APU	APU	G1	G2	APU	APU
MAIN BUS POWER		B1 B2	G2	APU	G2	G1	G1	G1	G2 G1

START → / GEN ↓: 1

GEN									
APU	OFF	X	X			X	X		
APU	ON			X	X			X	X
2	OFF	X		X		X		X	
2	ON		X		X		X		X
3	OFF	X	X	X	X				
3	ON					X	X	X	X
1	OFF								
1	ON								
BAT LIGHTS		OFF	ON	ON	ON	ON	ON	ON	ON
START ASSIST			G2	APU	APU	G3	G2	APU	APU
MAIN BUS POWER		B1 B2	G2	APU	G2	G3	G3	G3	G2 G3

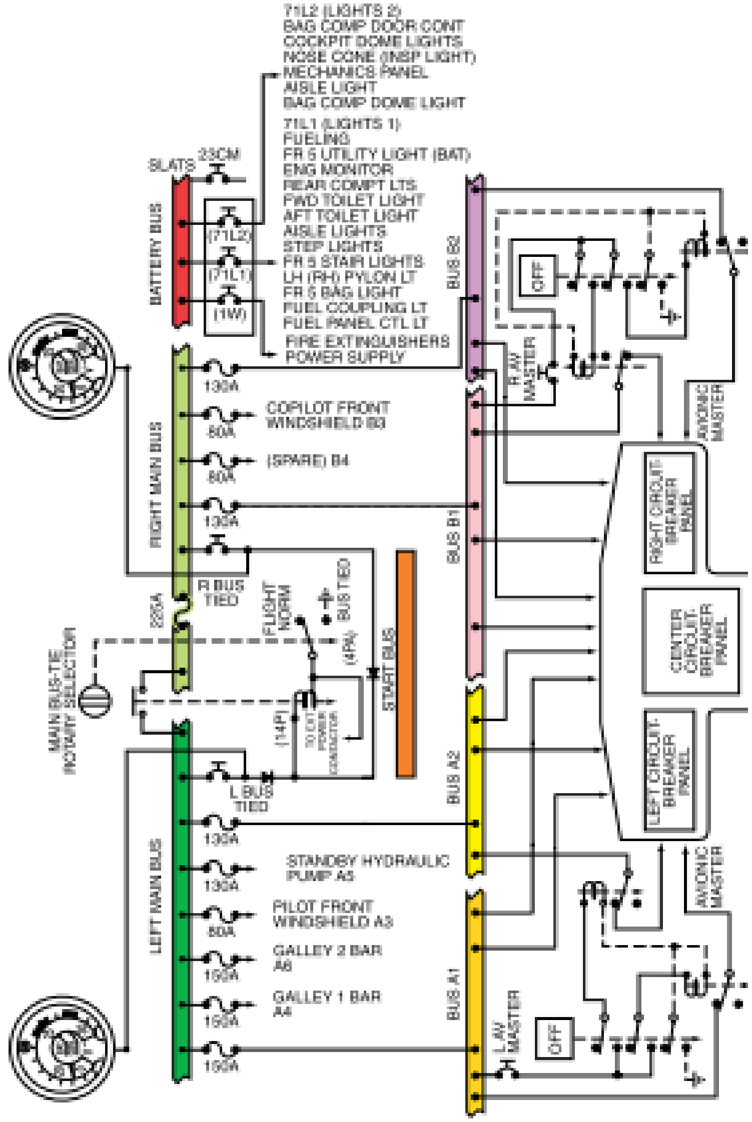


Figure SR-1. DC Distribution Buses

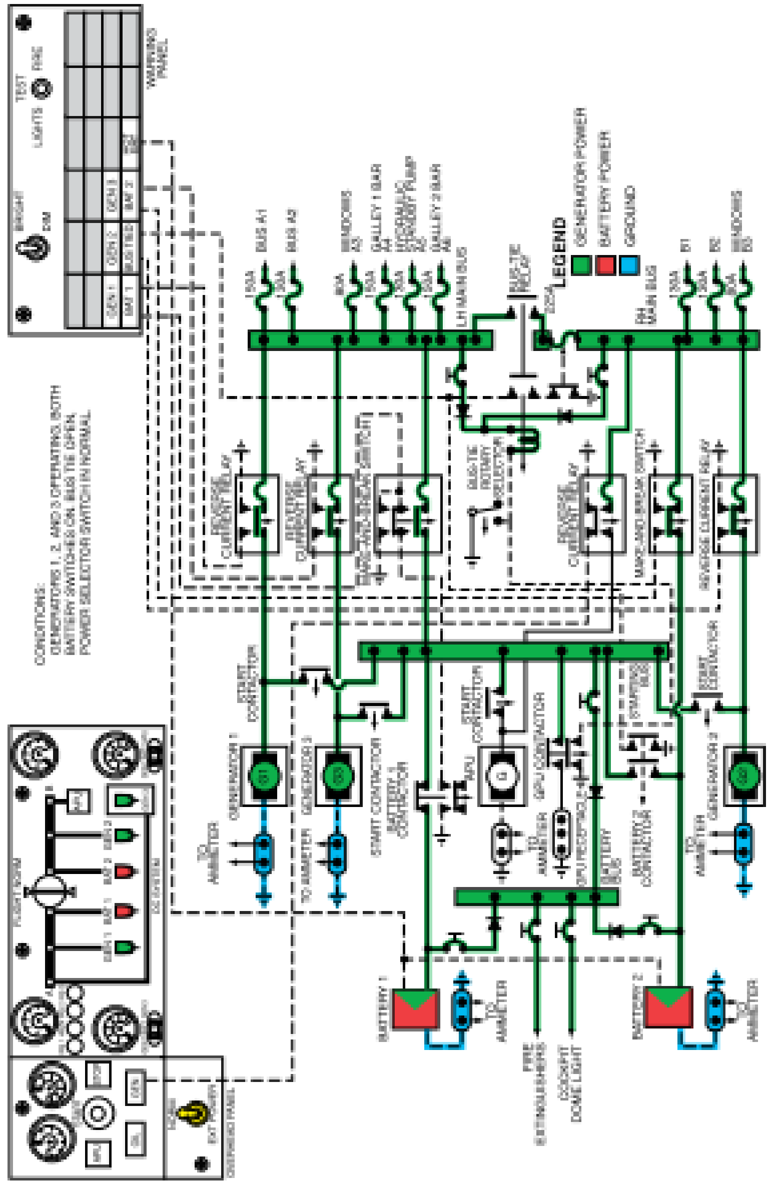


Figure SR-2. Normal Flight Configuration

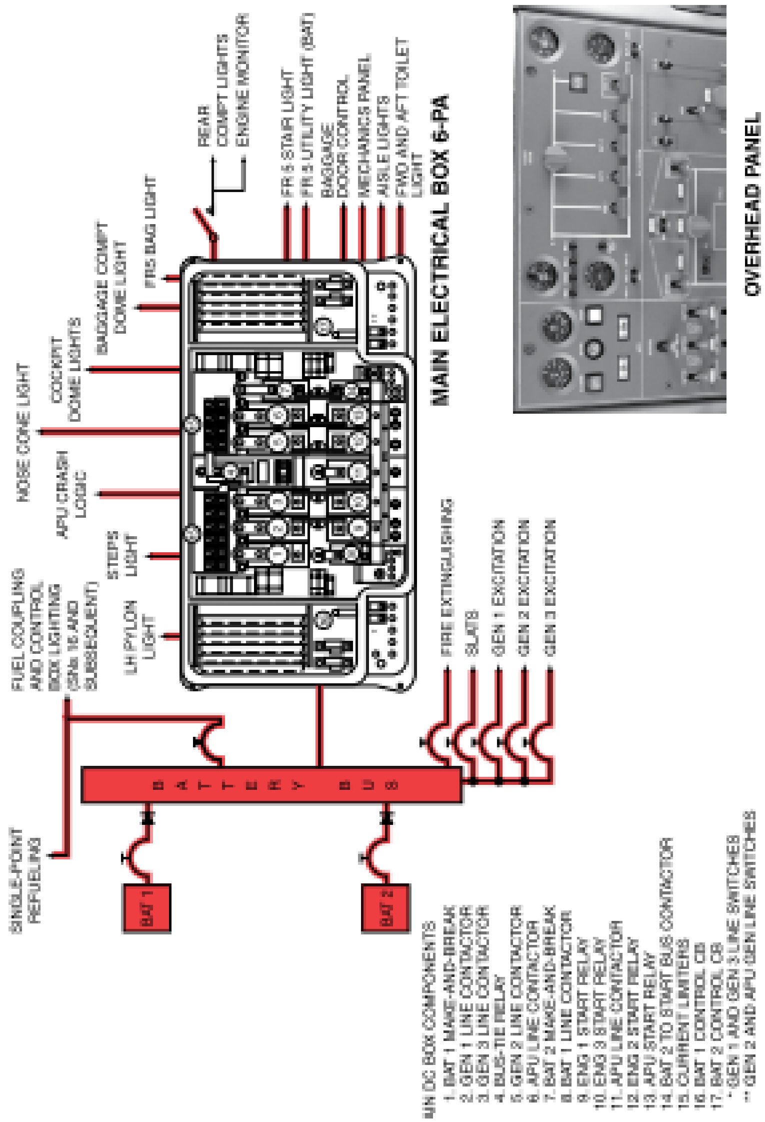
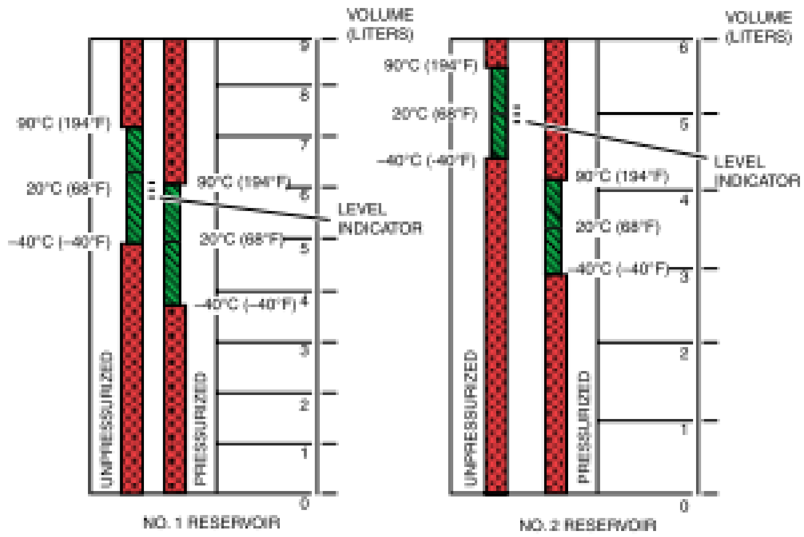


Figure SR-3. Battery Bus Circuits—Typical



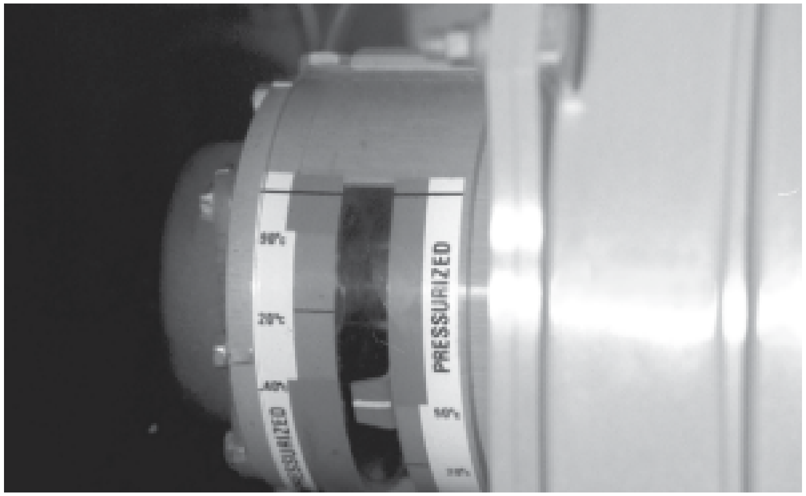


Figure SR-4. Reservoir Fluid Level Indication

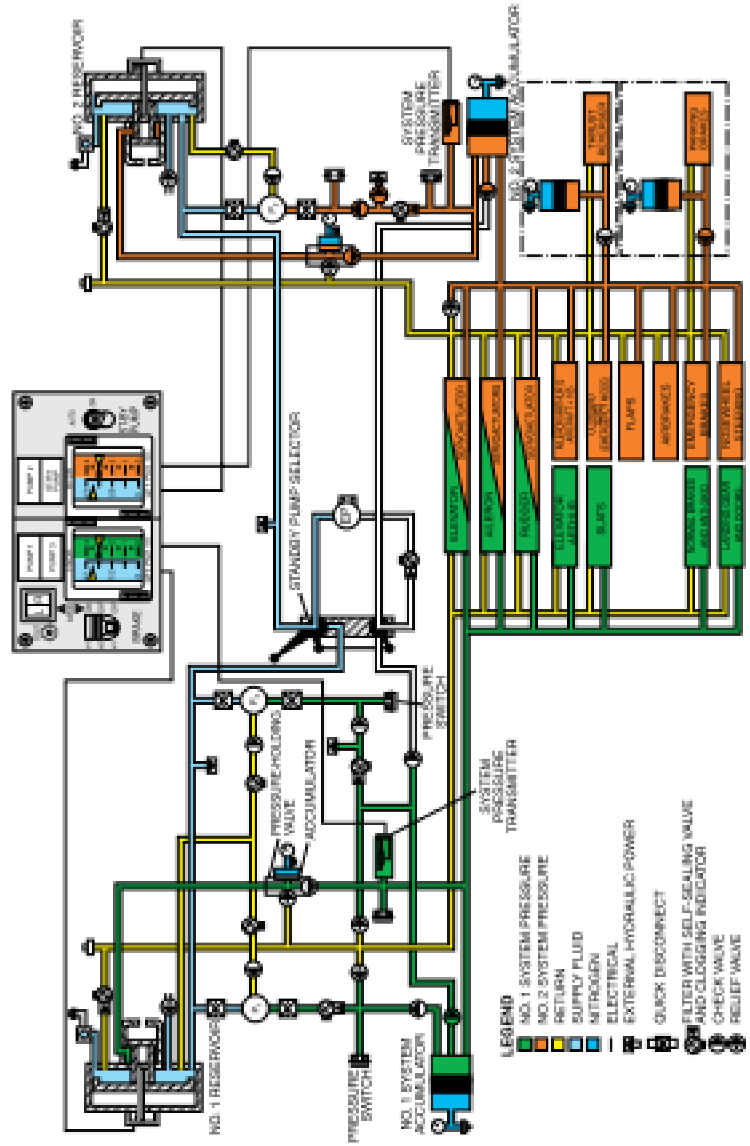


Figure SR-5. No. 1 and No. 2 Hydraulic Systems Operating

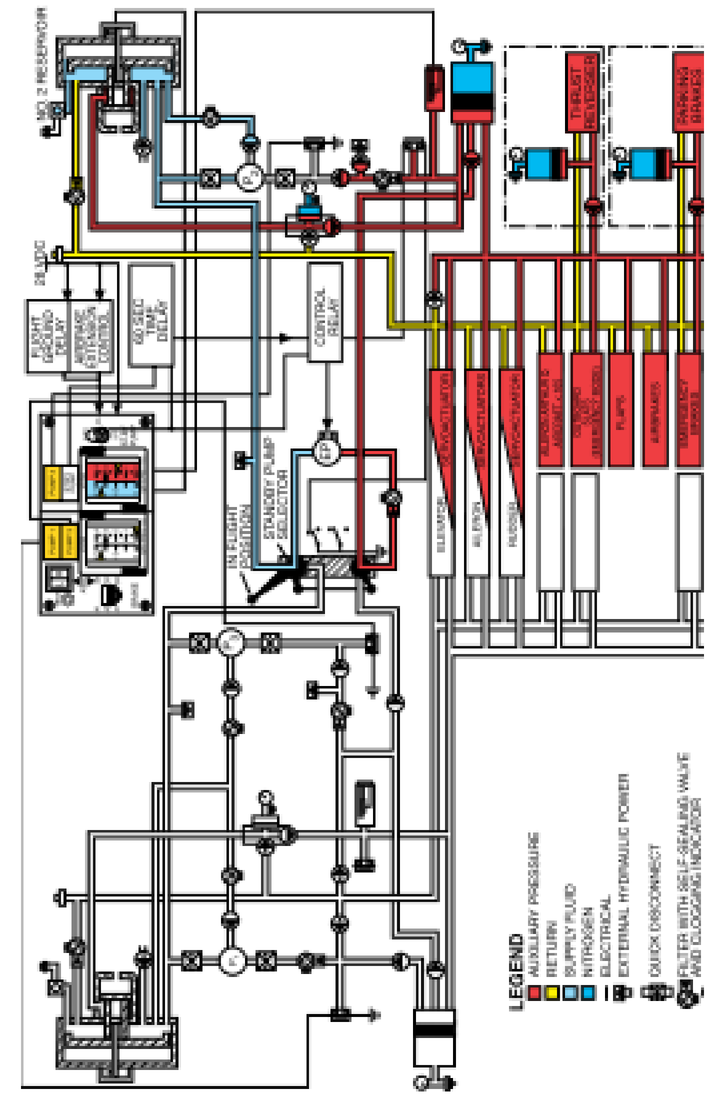


Figure SR-6. Standby Pump Pressurizing No. 2 System

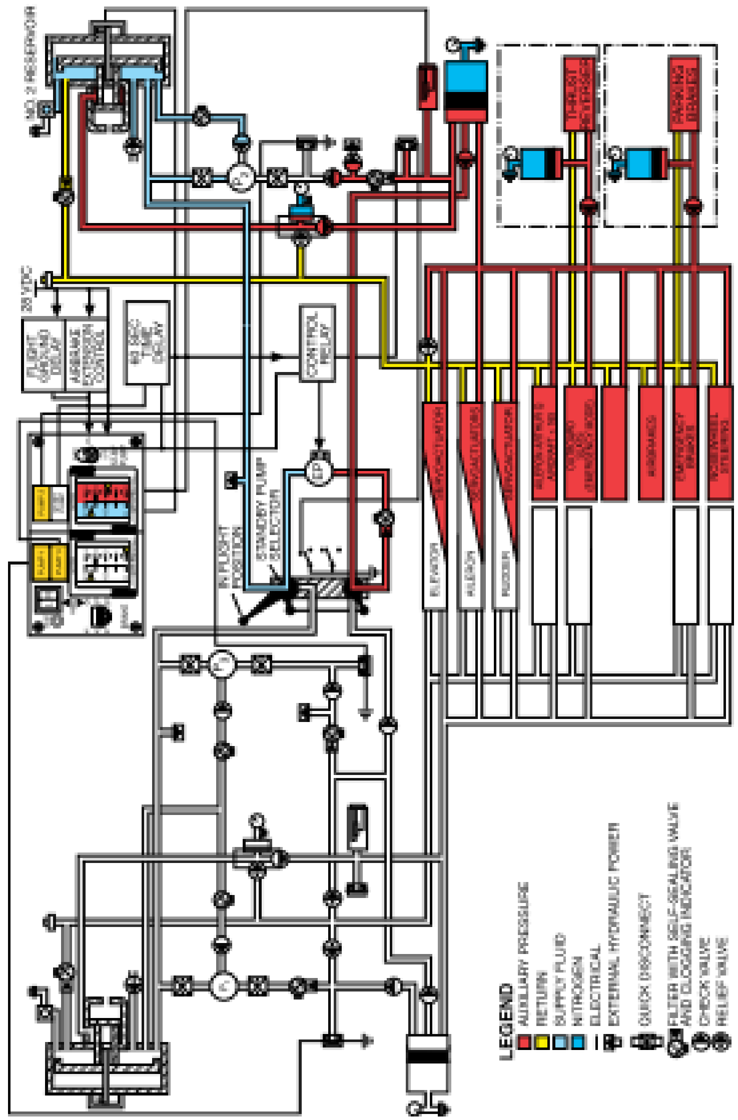


Figure SR-7. Standby Pump Pressurizing No. 1 System

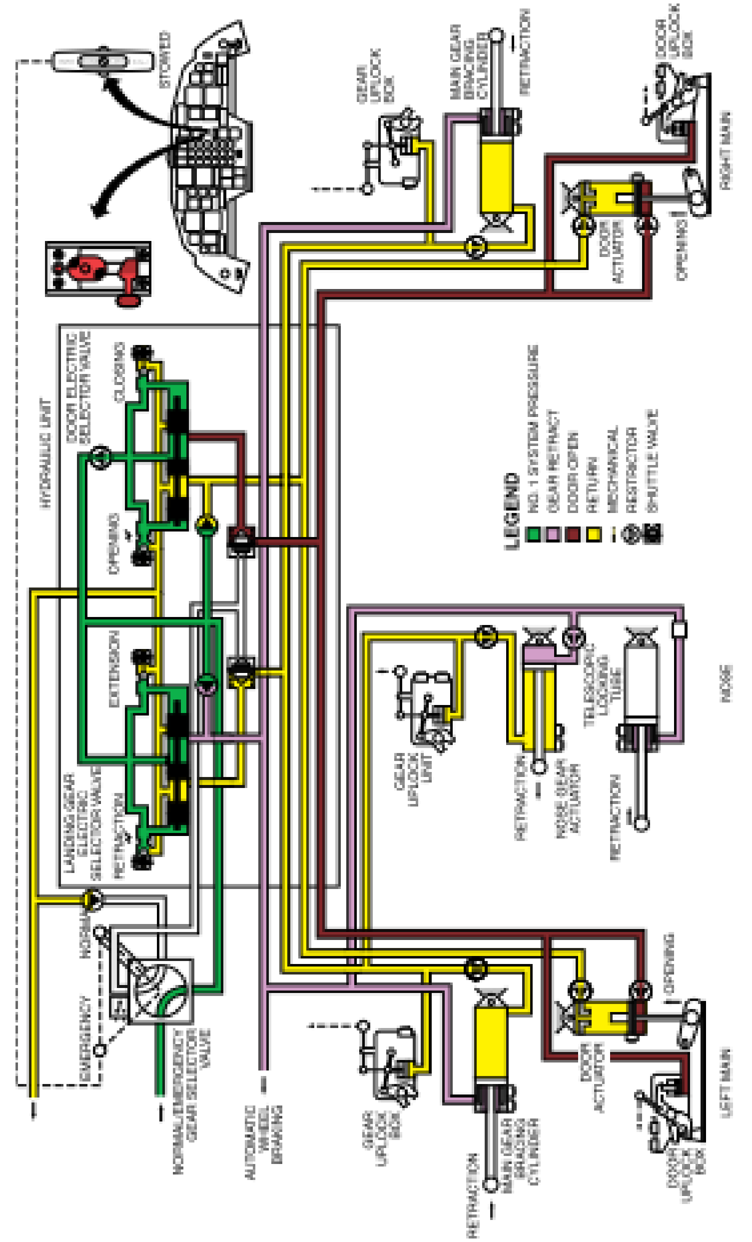


Figure SR-8. Landing Gear Retraction

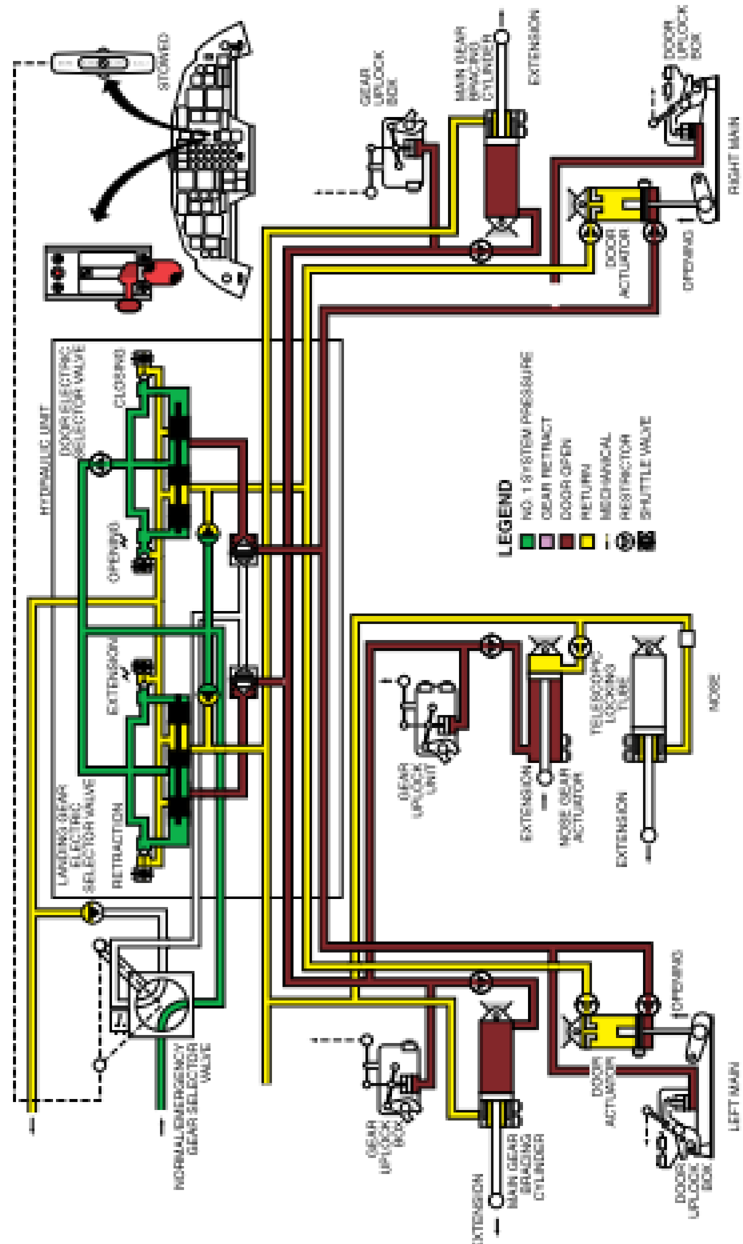


Figure SR-9. Landing Gear Extension

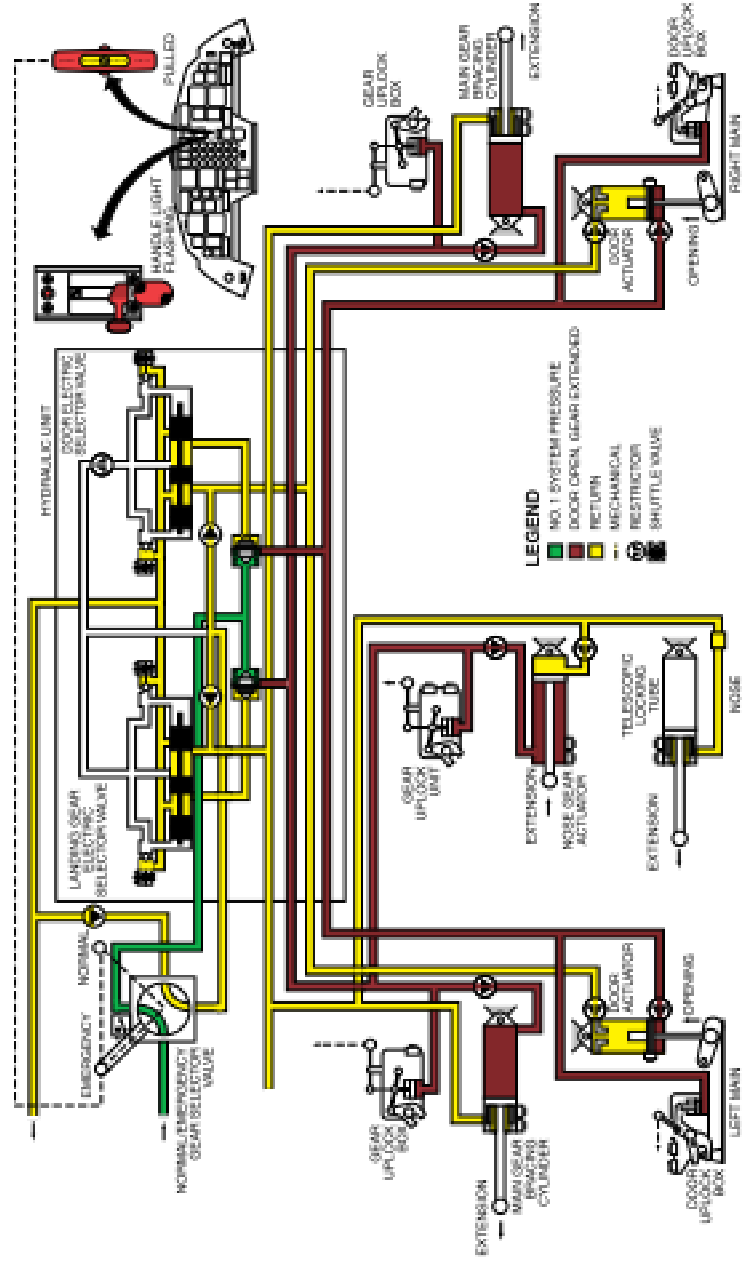


Figure SR-10. Gear Emergency Hydraulic Extension

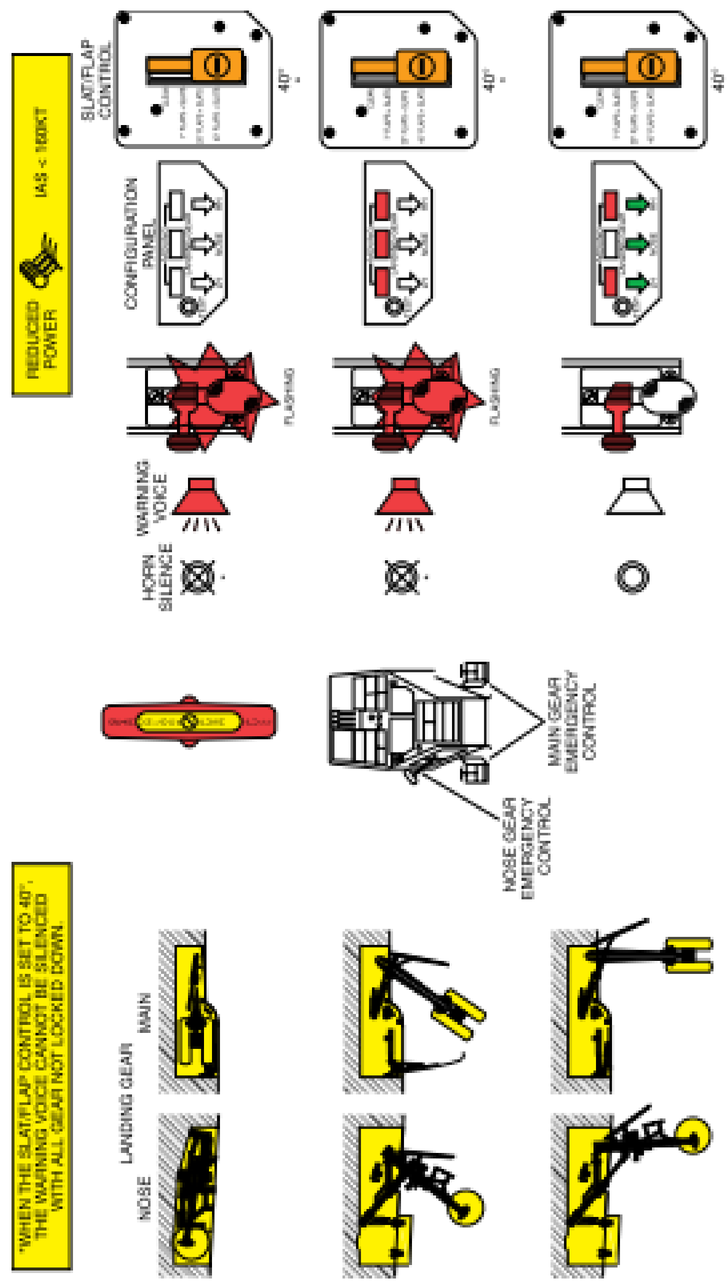


Figure SR-11. Position and Warning Indications—Emergency Hydraulic and Gravity Extensions

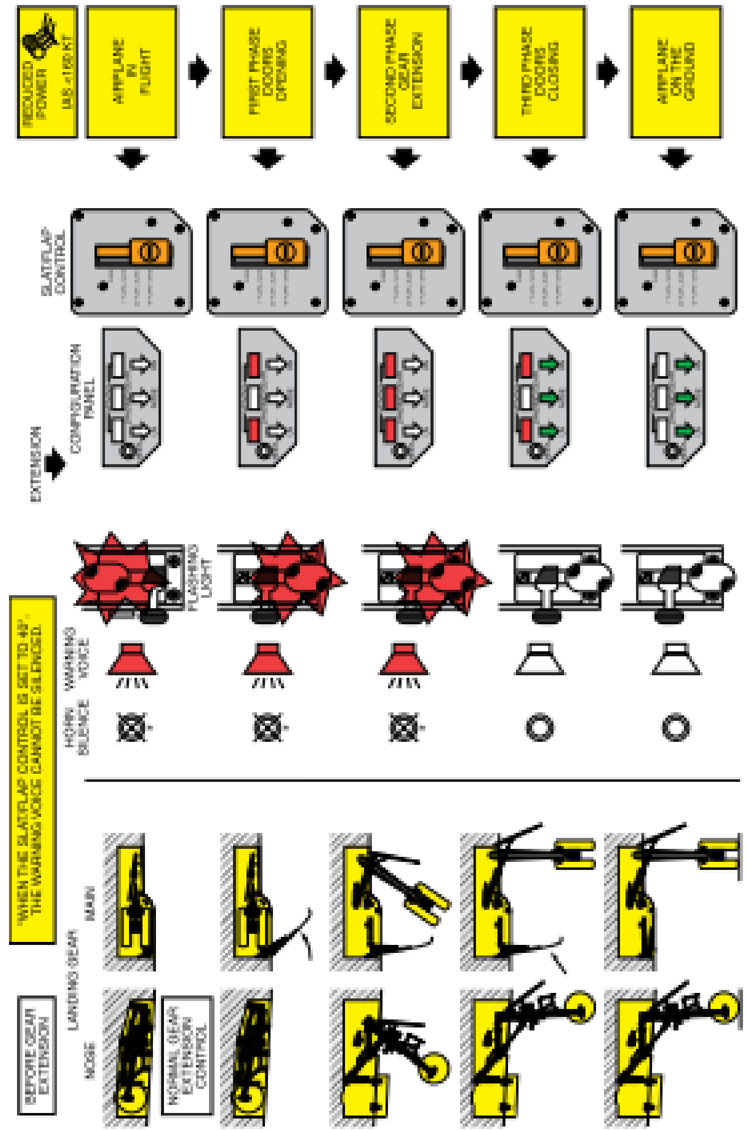


Figure SR-12. Displays and Warnings During Landing Gear Extension

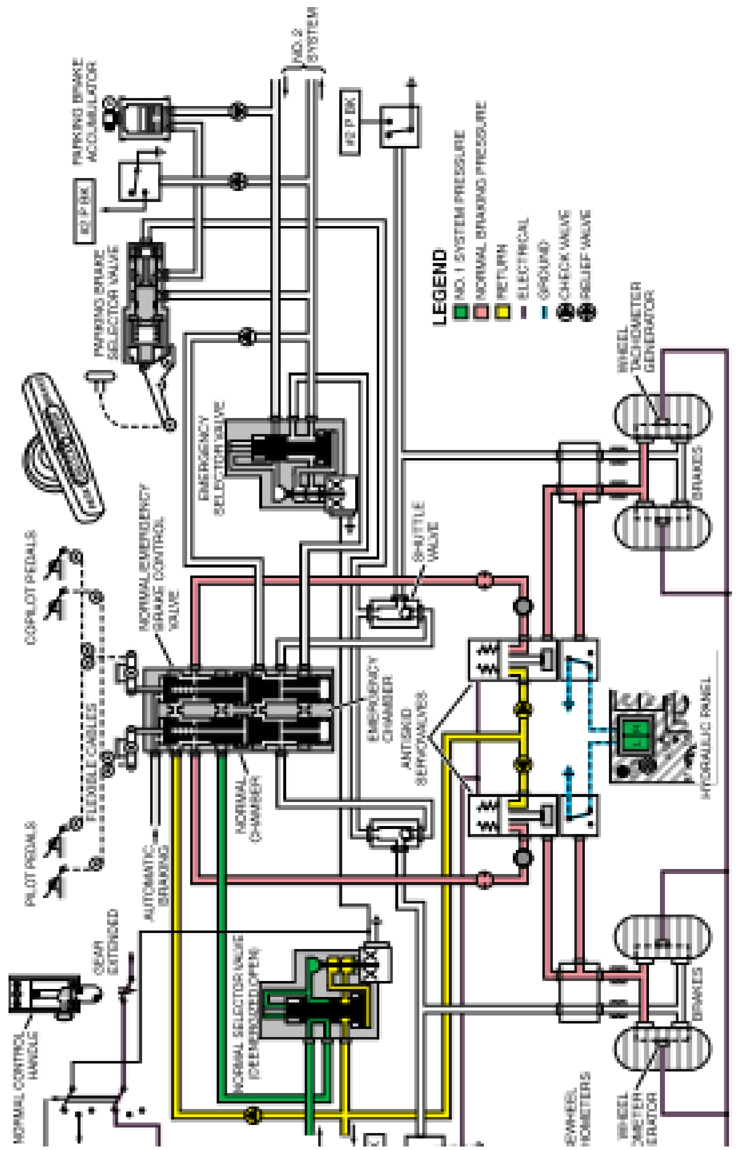


Figure SR-13. Normal Braking with Antiskid—Aircraft Without SB F-900-42

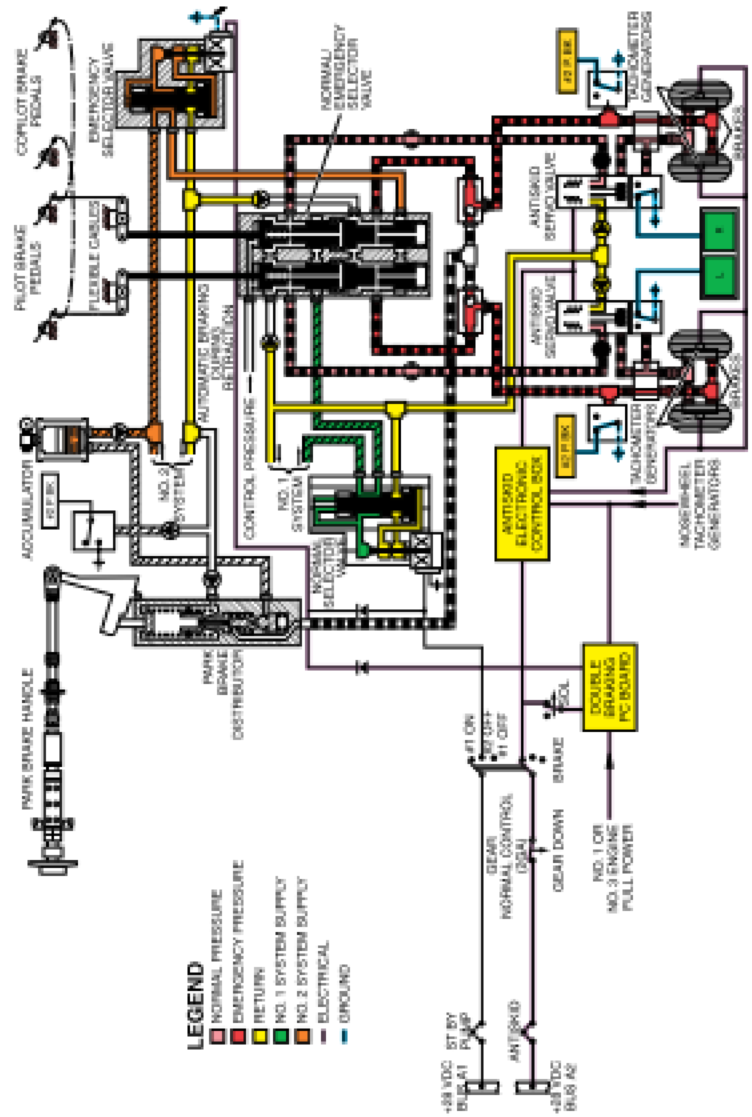


Figure SR-14. Normal Braking with Antiskid—Aircraft With SB F-900-42

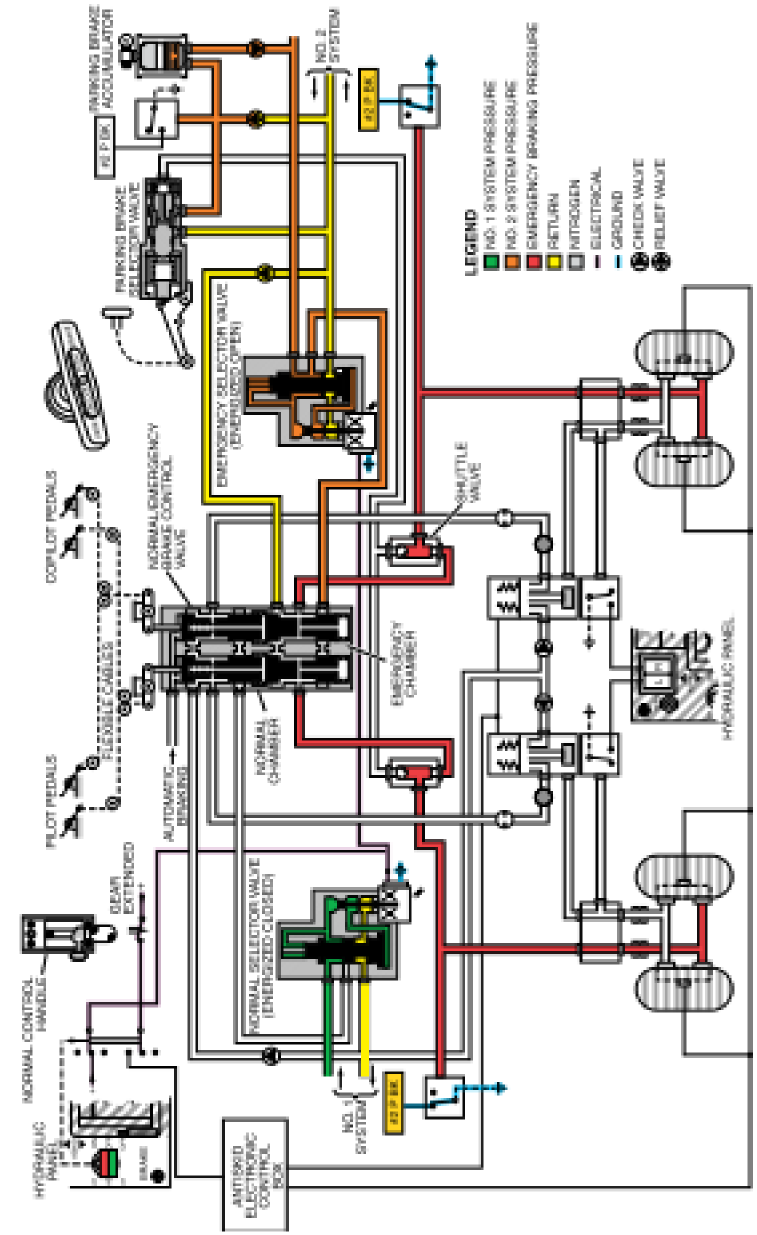


Figure SR-15. Emergency Brake Operation

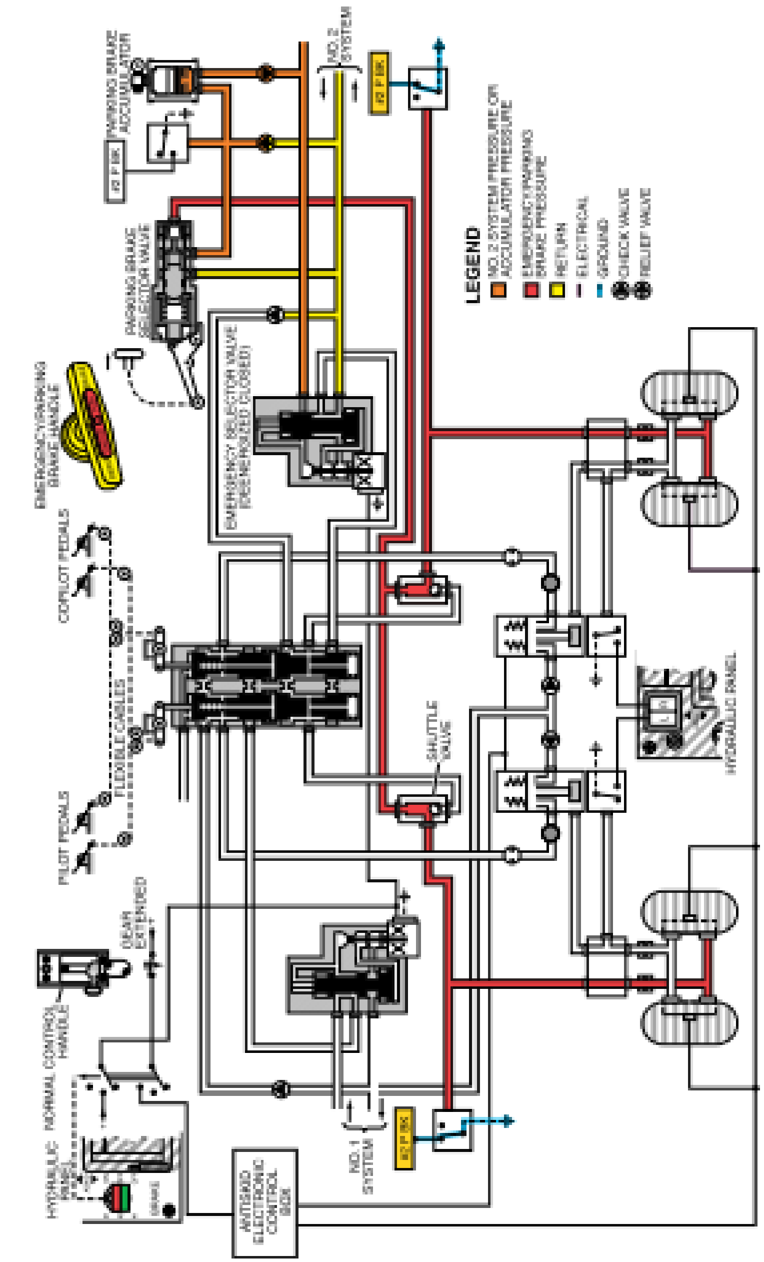


Figure SR-16. Emergency/ Parking Brakes

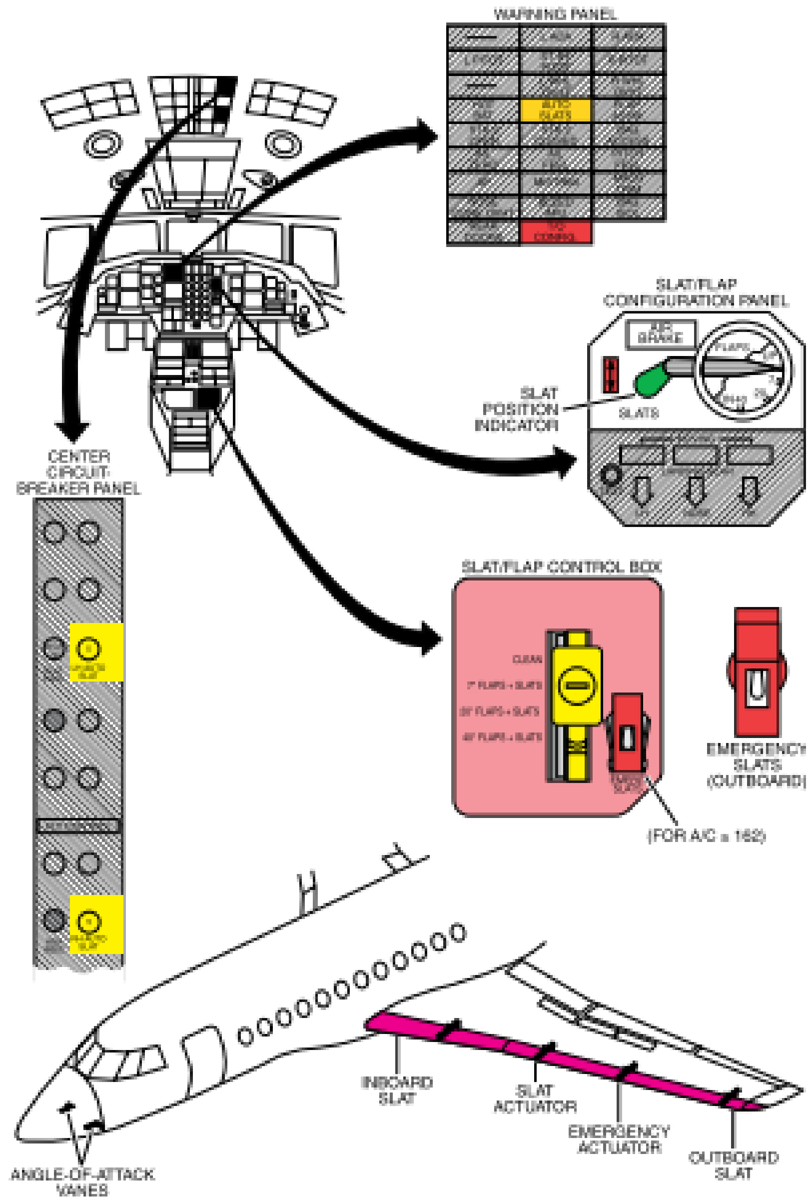


Figure SR-17. Leading-Edge Slats

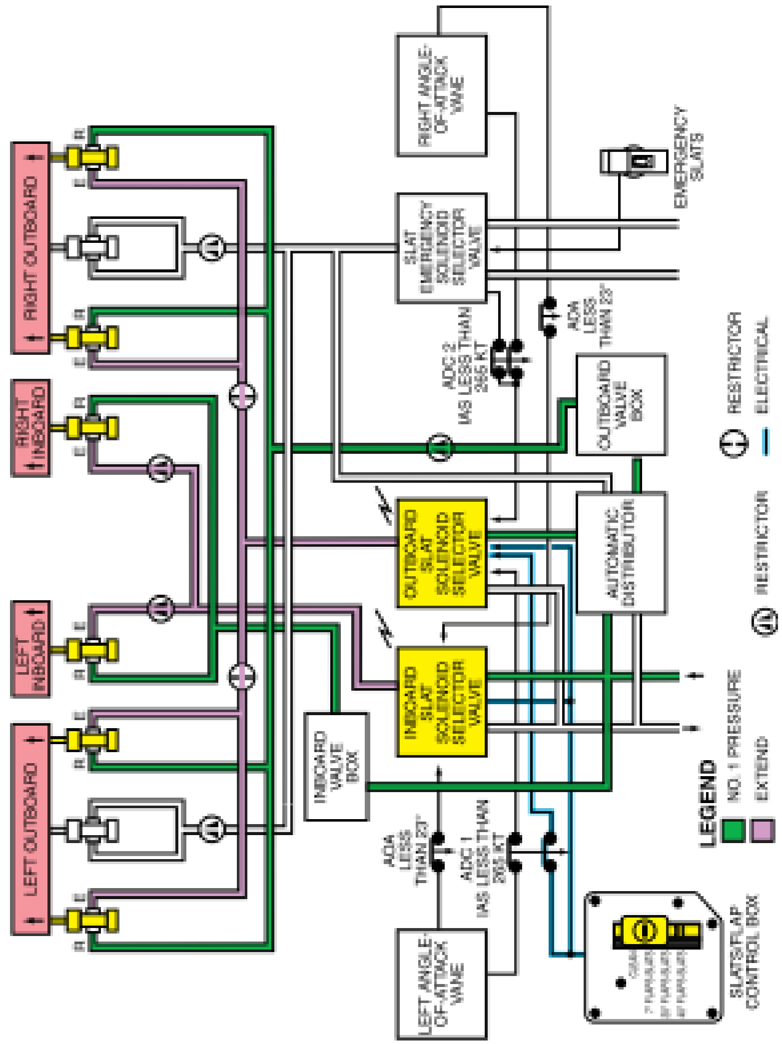
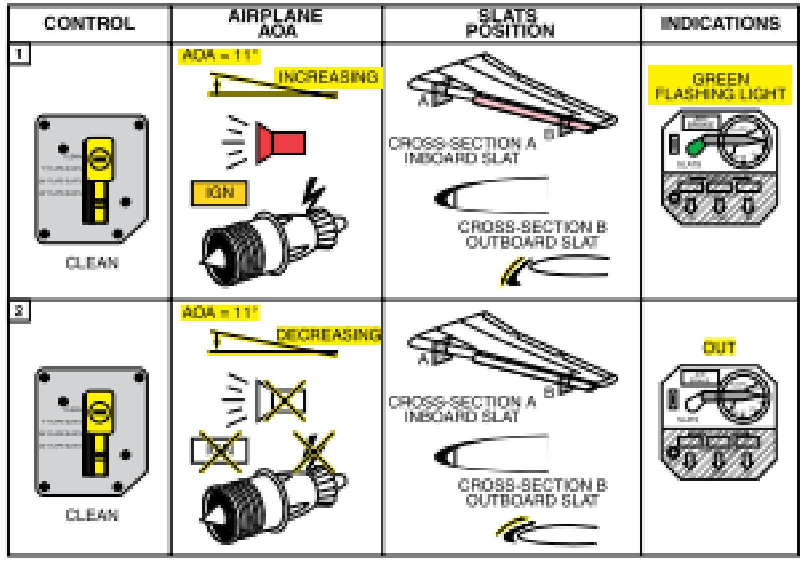


Figure SR-18. Normal Slat Extension



INITIAL CONFIGURATION \ AIRPLANE ANGLE OF ATTACK	1 AOA 11° (INCREASING)	2 AOA 11° (DECREASING)
AIRPLANE IN CLEAN CONFIGURATION, SLAT/FLAP HANDLE IN CLEAN	• EXTENSION OF OUTBOARD SLATS • RED SLAT-MOVING LIGHT ON • AUTOMATIC IGNITION, IGN LIGHT ON • AUDIO WARNING • WHEN OUTBOARD SLATS ARE EXTENDED, RED LIGHT GOES OUT; GREEN LIGHT FLASHES.	• RETRACTION OF OUTBOARD SLATS • GREEN FLASHING LIGHT OUT, RED LIGHT ON • AUDIO WARNING CUTS OFF • AUTOMATIC IGNITION CUTS OFF AFTER TEN SECONDS. • IGN LIGHT OUT • WHEN OUTBOARD SLATS ARE RETRACTED, RED LIGHT GOES OUT

Figure SR-19. Slats Controls and Indications in Flight—Handle in CLEAN

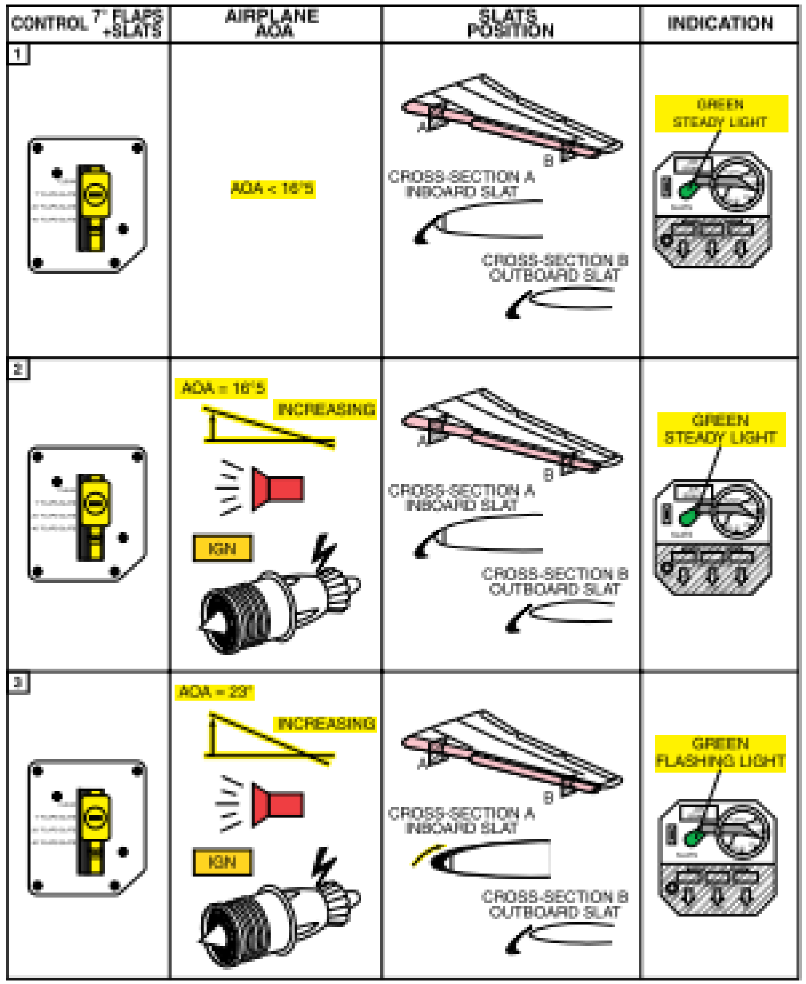
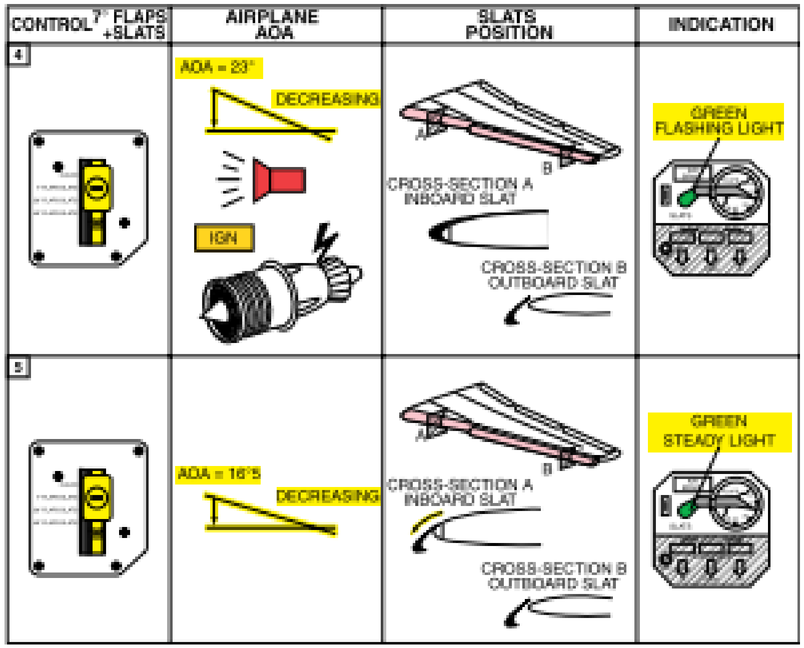


Figure SR-20. Slat Controls and Indications in Flight—Handle out of CLEAN (Sheet 1 of 2)



	AIRPLANE ANGLE-OF-ATTACK				
INITIAL CONFIGUR-ATION	1 AOA <16°5	2 AOA ≥16°5 (INCREASING)	3 AOA >23° (INCREASING)	4 AOA <23° (DECREASING)	5 AOA ≤16°5 (DECREASING)
SLAT/ FLAP CONTROL OUT OF CLEAN	• ALL SLATS EXTENDED • GREEN LIGHT STEADY	• ALL SLATS EXTENDED • AUDIO WARNING ON • GREEN LIGHT STEADY • AUTOMATIC IGNITION • IGN LIGHT ON	• RETRACTION OF INBOARD SLATS • AUTOMATIC IGNITION • IGN LIGHT ON • AUDIO WARNING ON • GREEN LIGHT FLASHING	• INBOARD SLATS RETRACTED • AUTOMATIC IGNITION • IGN LIGHT ON • AUDIO WARNING ON • GREEN LIGHT FLASHING	• INBOARD SLATS REEXTEND. • AUTOMATIC IGNITION CUTS OFF AFTER TEN SECONDS. • IGN LIGHT OUT • AUDIO WARNING OFF • GREEN LIGHT STEADY

Figure SR-20. Slat Controls and Indications in Flight—Handle out of CLEAN (Sheet 2 of 2)

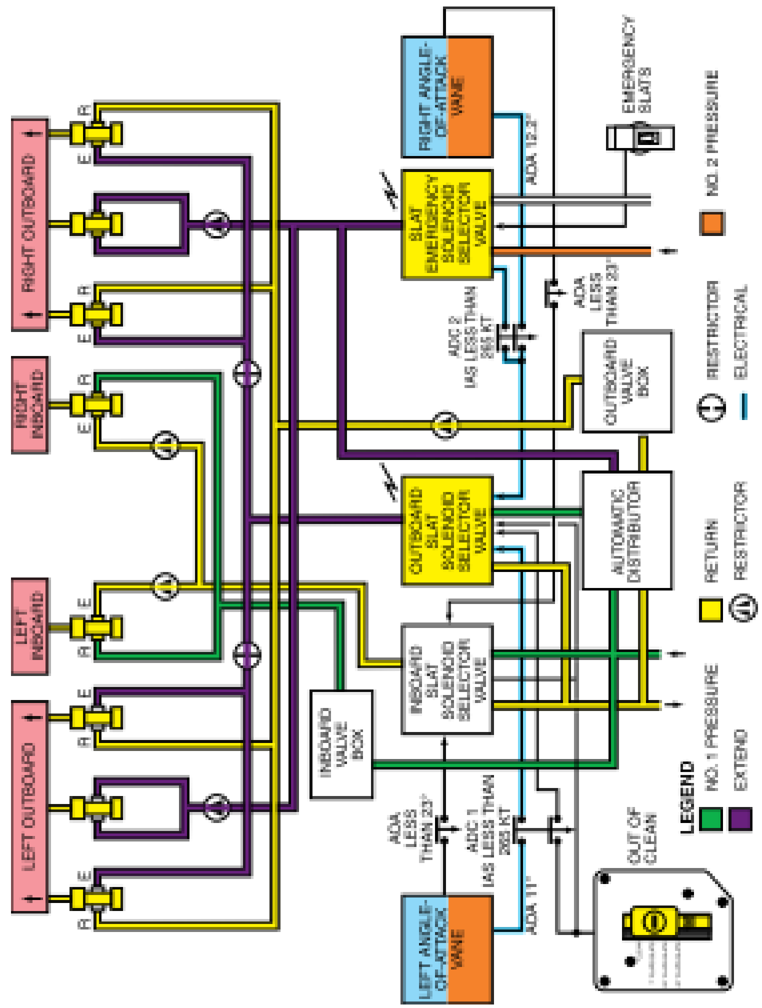


Figure SR-21. Automatic Extension of Outboard Slats—Handle in CLEAN

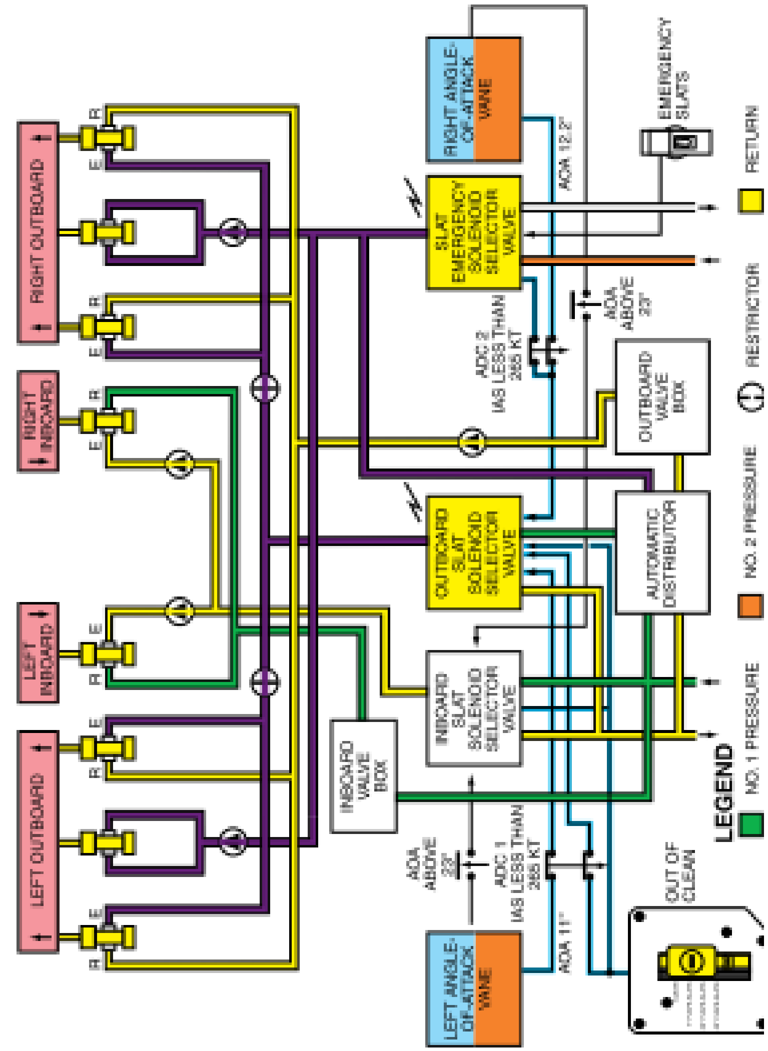


Figure SR-22. Automatic Retraction of Inboard Slats—Extended with Control Handle

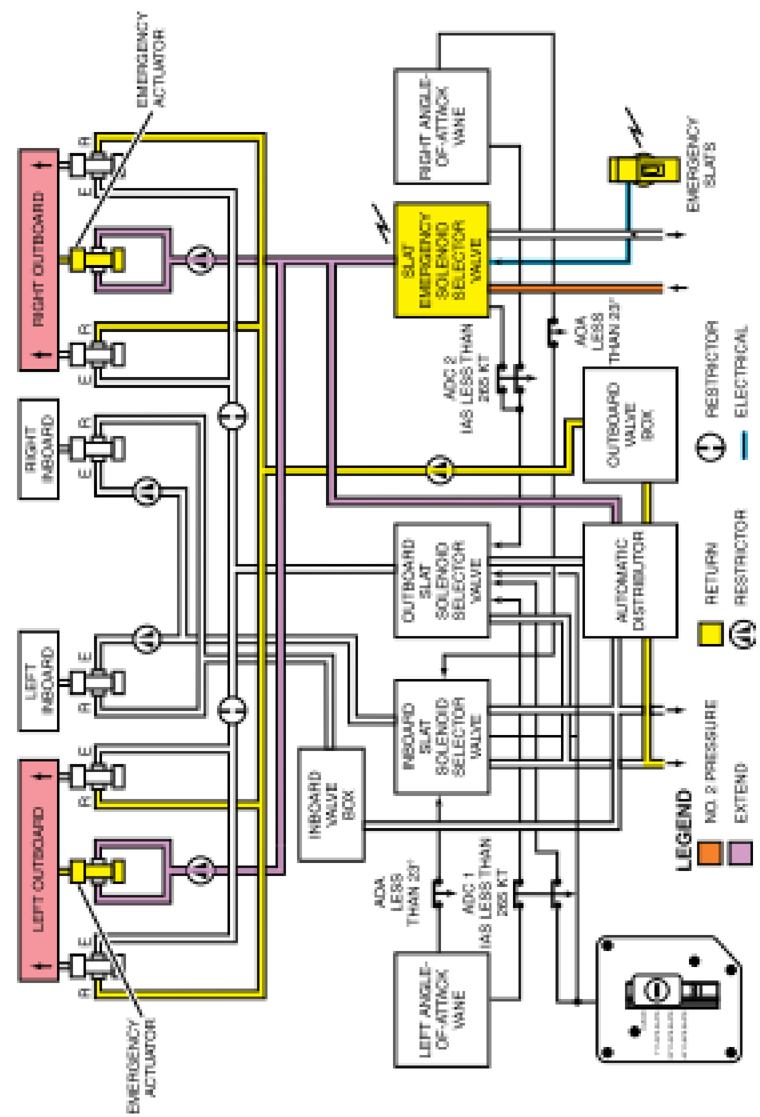
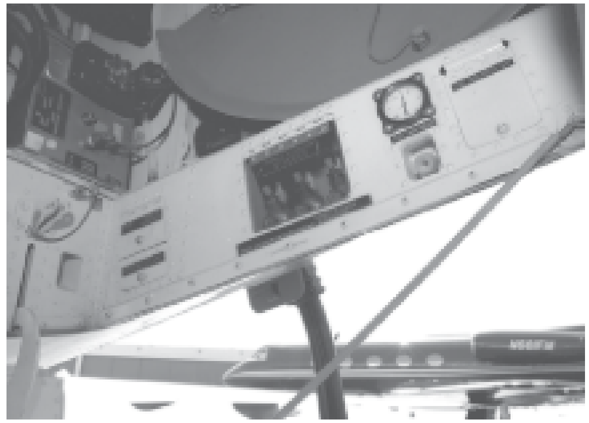


Figure SR-23. Emergency Extension of Outboard Slats



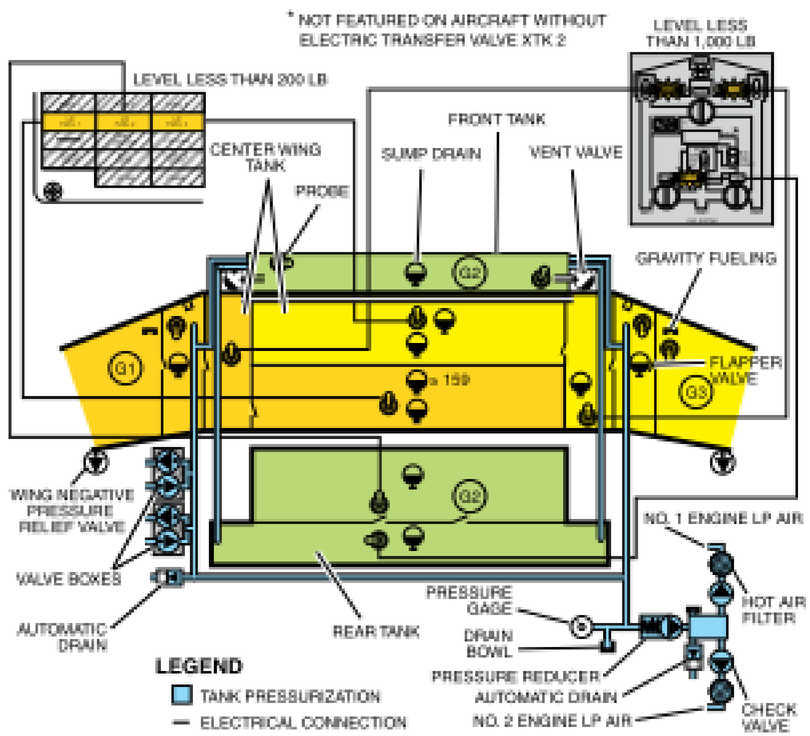


Figure SR-24. Tank Pressurization and Quantity Indication

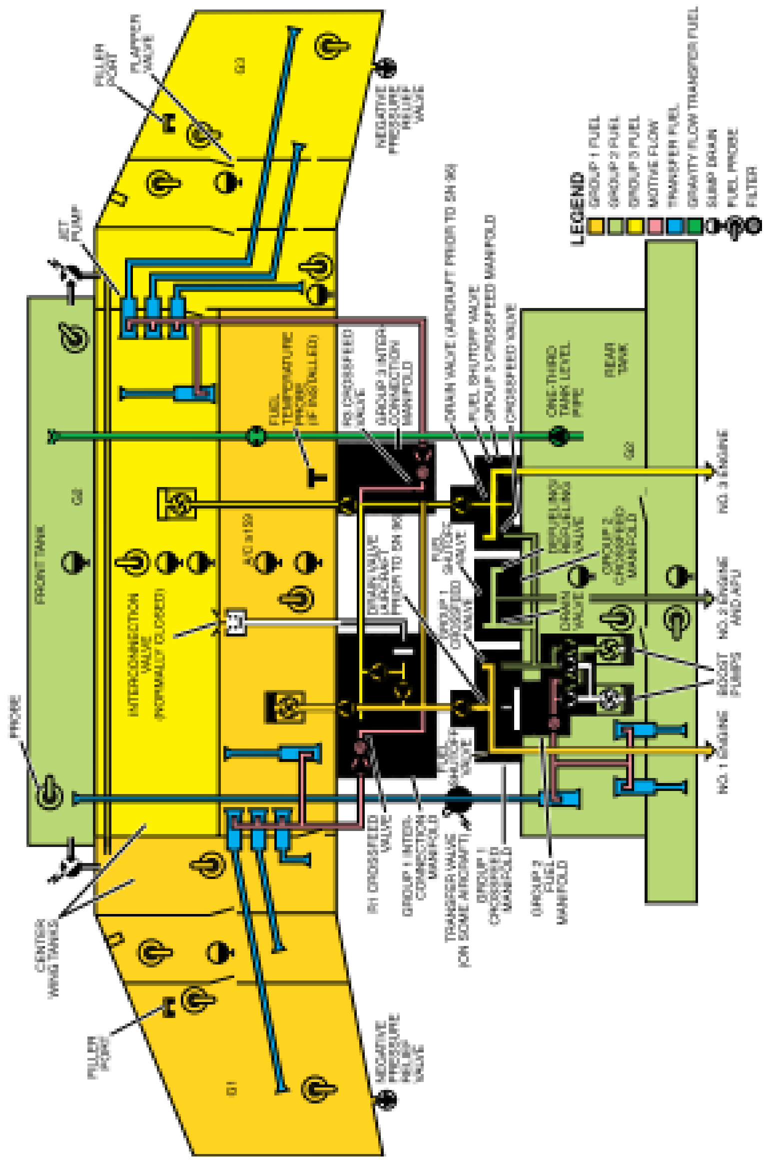
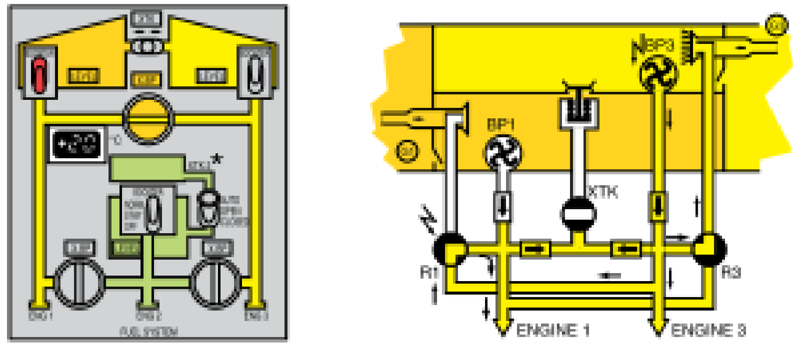


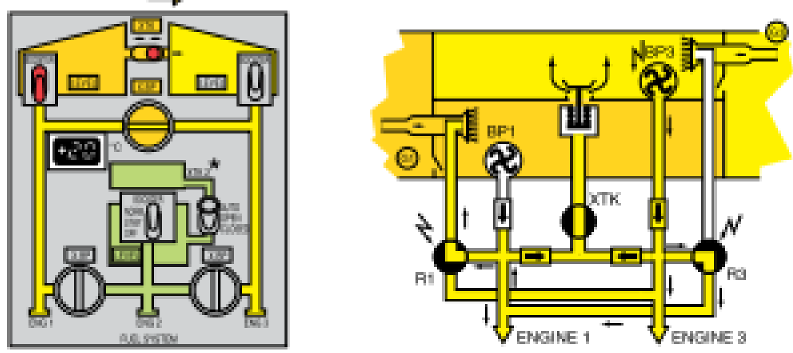
Figure SR-25. Fuel Distribution



POSITION OF THE CONTROLS	LIGHTS	TANK INTERCONNECTION	ENGINES 1 AND 3 SUPPLY
XTK → NEUTRAL X-BP → OPEN BP1 → OFF BP3 → ON	XTK → OUT X-BP → ON	NO INTERCONNECTION	→ ENGINE 3 → ENGINE 1

BOOST PUMP 1 FAILURE

FLOW



POSITION OF THE CONTROLS	LIGHTS	TANK INTERCONNECTION	ENGINES 1 AND 3 SUPPLY
XTK → RIGHT X-BP → OPEN BP1 → OFF BP3 → ON	XTK → ON X-BP → ON		→ ENGINE 3 → ENGINE 1

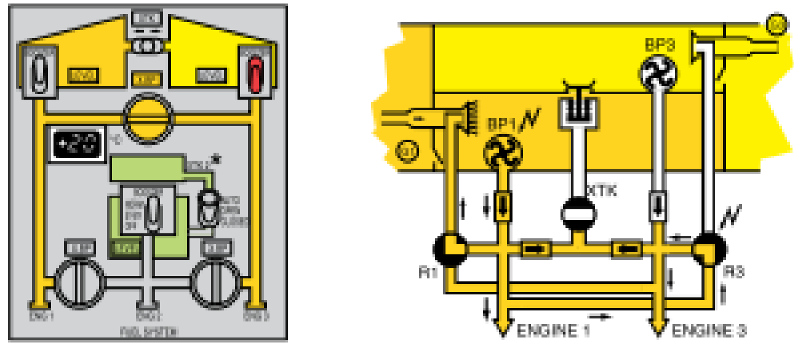
LEVEL EQUALIZATION

LEGEND

GROUP 3 BOOST

★ NOT FEATURED ON AIRCRAFT WITHOUT ELECTRIC TRANSFER VALVE XTK 2

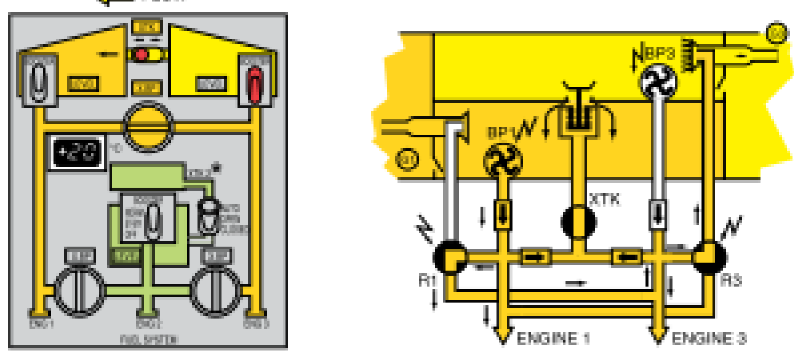
Figure SR-26. Crossfeed X-BP1 ←→ 3—Pump 1 Inoperative



POSITION OF THE CONTROLS	LIGHTS	TANK INTERCONNECTION	ENGINES 1 AND 3 SUPPLY
XTK → NEUTRAL X-BP → OPEN BP1 → ON BP3 → OFF	XTK → OUT X-BP → ON	NO INTERCONNECTION	→ ENGINE 1 → ENGINE 3

BOOST PUMP 3 FAILURE

FLOW



POSITION OF THE CONTROLS	LIGHTS	TANK INTERCONNECTION	ENGINES 1 AND 3 SUPPLY
XTK → LEFT X-BP → OPEN BP1 → ON BP3 → OFF	XTK → ON X-BP → ON		→ ENGINE 1 → ENGINE 3

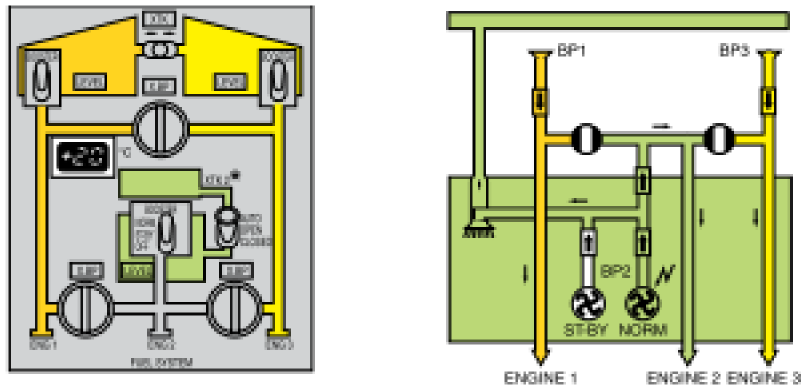
LEVEL EQUALIZATION

LEGEND

GROUP 1 BOOST

★ NOT FEATURED ON AIRCRAFT WITHOUT ELECTRIC TRANSFER VALVE XTK 2

Figure SR-27. Crossfeed X-BP1 ←→ 3—Pump 3 Inoperative



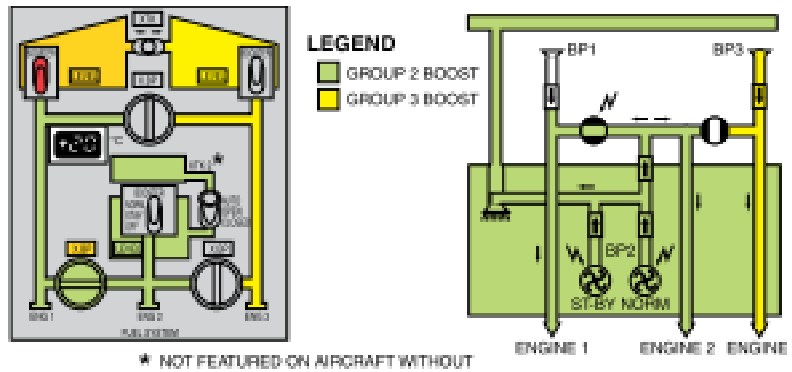
LEGEND

- GROUP 1 BOOST
- GROUP 2 BOOST
- GROUP 3 BOOST

* NOT FEATURED ON AIRCRAFT WITHOUT ELECTRIC TRANSFER VALVE XTK 2

POSITION OF THE CONTROLS	LIGHTS	TANK INTERCONNECTION	ENGINES 1, 2, AND 3 SUPPLY
BP1 → ON BP2 → NORM BP3 → ON X-BP 1–2 → CLOSED X-BP 2–3 → CLOSED	X-BP → OFF X-BP → OFF	NO INTERCONNECTION	→ ENGINE 1 → ENGINE 2 → ENGINE 3

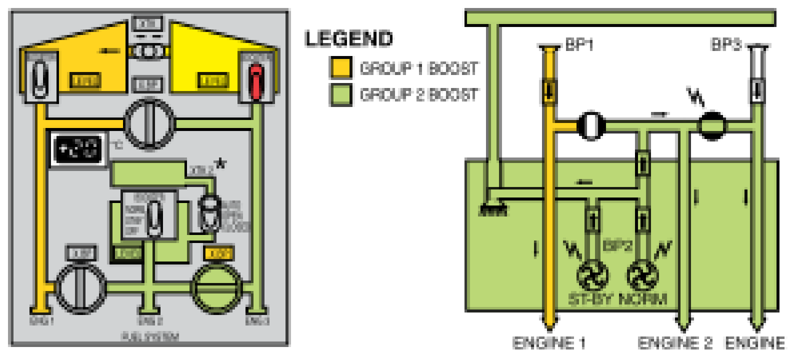
Figure SR-28. Crossfeed X-BP1 ←→ 2 and 3 ←→ 2—Normal Configuration



* NOT FEATURED ON AIRCRAFT WITHOUT ELECTRIC TRANSFER VALVE XTK 2

POSITION OF THE CONTROLS	LIGHTS	ENGINES 1, 2, AND 3 SUPPLY
BP1 → OFF BP2 → NORM BP3 → ON X-BP 1–2 → OPEN X-BP 2–3 → CLOSED	X-BP → ON X-BP → OFF	G2 → ENGINE 1, ENGINE 2 G3 → ENGINE 3

BOOST PUMP 1 FAILURE OR G1/G3 LEVEL EQUALIZING

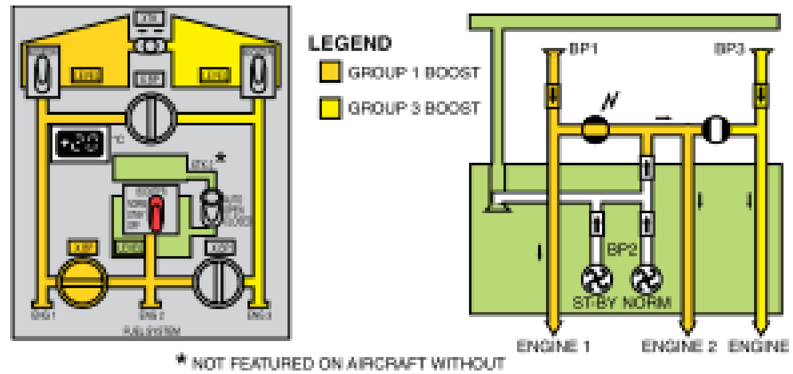


* NOT FEATURED ON AIRCRAFT WITHOUT ELECTRIC TRANSFER VALVE XTK 2

POSITION OF THE CONTROLS	LIGHTS	ENGINES 1, 2, AND 3 SUPPLY
BP1 → ON BP2 → NORM BP3 → OFF X-BP 1–2 → CLOSED X-BP 2–3 → OPEN	X-BP → OFF X-BP → ON	G1 → ENGINE 1 G2 → ENGINE 2, ENGINE 3

BOOST PUMP 3 FAILURE OR G1/G3 LEVEL EQUALIZING

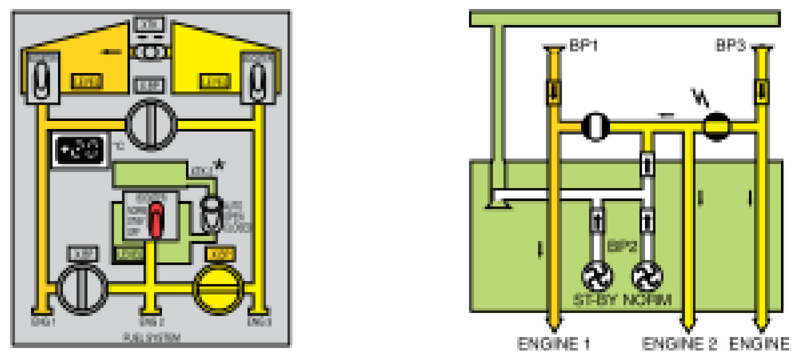
Figure SR-29. Crossfeed X-BP1 ←→ 2 and 3 ←→ 2— Pump 1 or 3 Inoperative



* NOT FEATURED ON AIRCRAFT WITHOUT ELECTRIC TRANSFER VALVE XTK 2

POSITION OF THE CONTROLS	LIGHTS	ENGINES 1, 2, AND 3 SUPPLY
BP1 → ON BP2 → OFF BP3 → ON X-BP 1–2 → OPEN X-BP 2–3 → CLOSED	X-BP → ON X-BP → OFF	ENGINE 1 ENGINE 2 ENGINE 3

BOOST PUMPS 2 FAILURE—ENGINE 2 FED FROM PUMP 1



* NOT FEATURED ON AIRCRAFT WITHOUT ELECTRIC TRANSFER VALVE XTK 2

POSITION OF THE CONTROLS	LIGHTS	ENGINES 1, 2, AND 3 SUPPLY
BP1 → ON BP2 → OFF BP3 → ON X-BP 1–2 → CLOSED X-BP 2–3 → OPEN	X-BP → OFF X-BP → ON	ENGINE 1 ENGINE 2 ENGINE 3

BOOST PUMPS 2 FAILURE—ENGINE FED FROM PUMP 3

Figure SR-30. Crossfeed X-BP1 ↔ 2 and 3 ↔ 2—Pumps 2 Inoperative

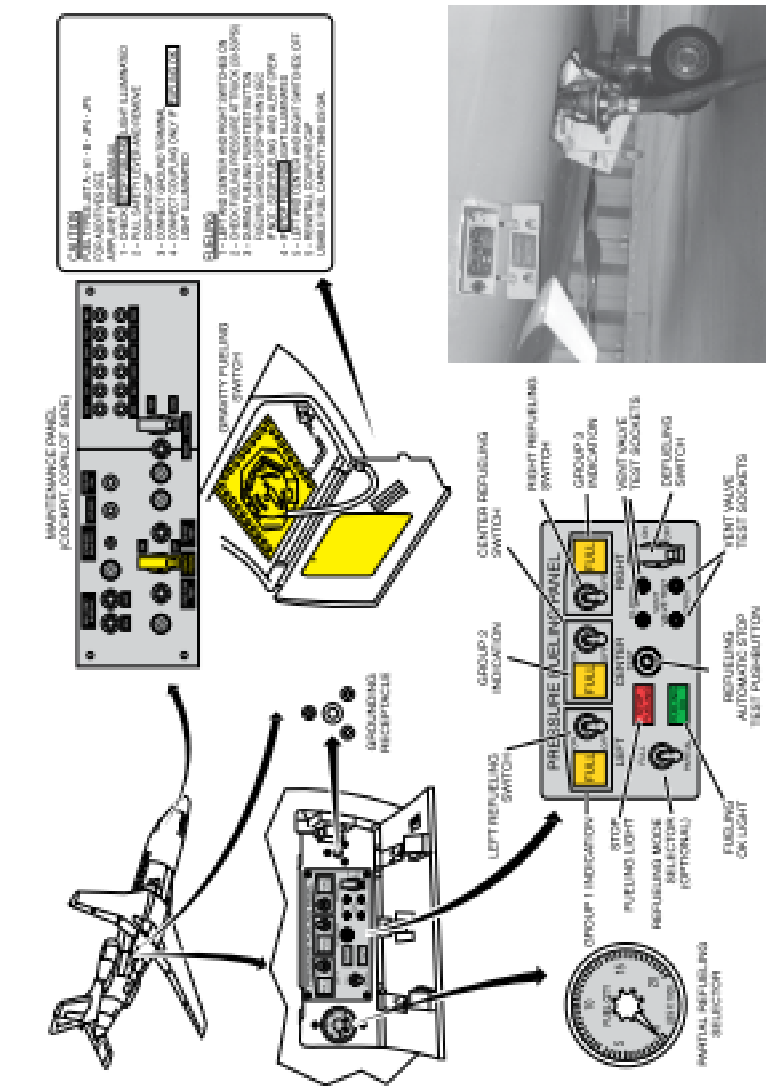


Figure SR-31. Refueling System Controls and Indicators

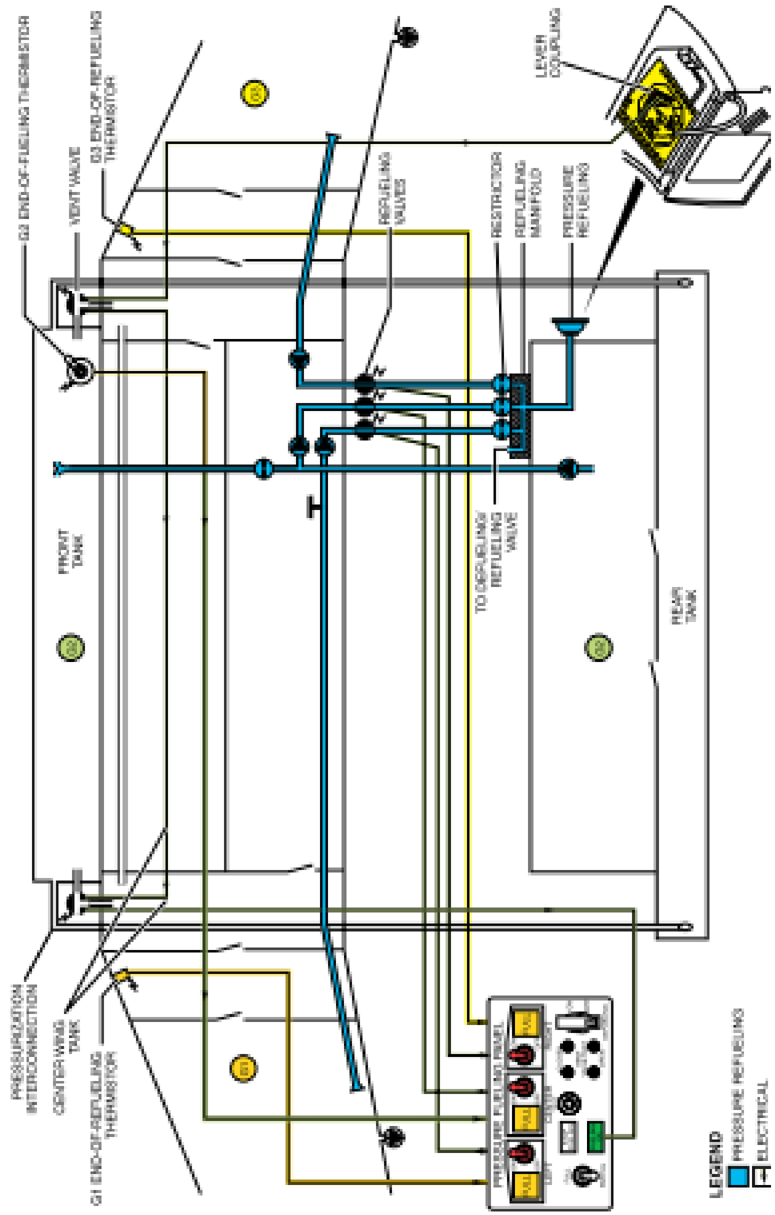


Figure SR-32. Pressure Refueling

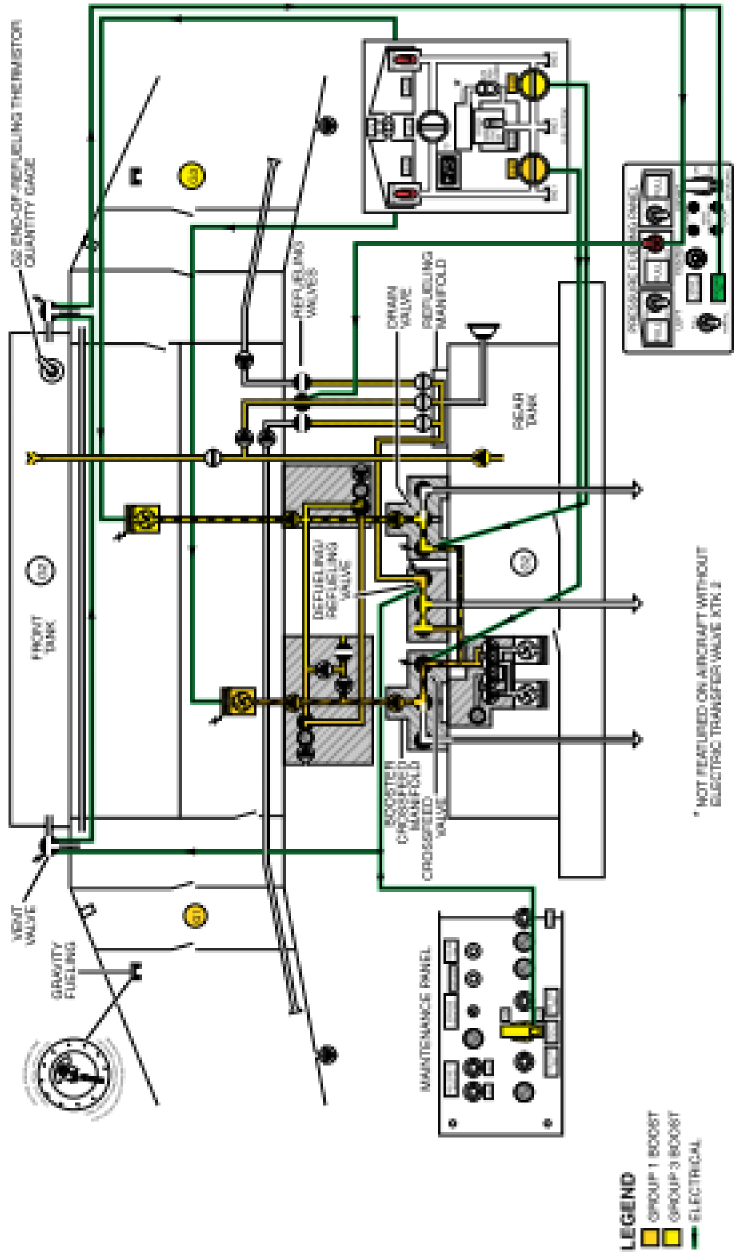


Figure SR-33. Gravity Distribution

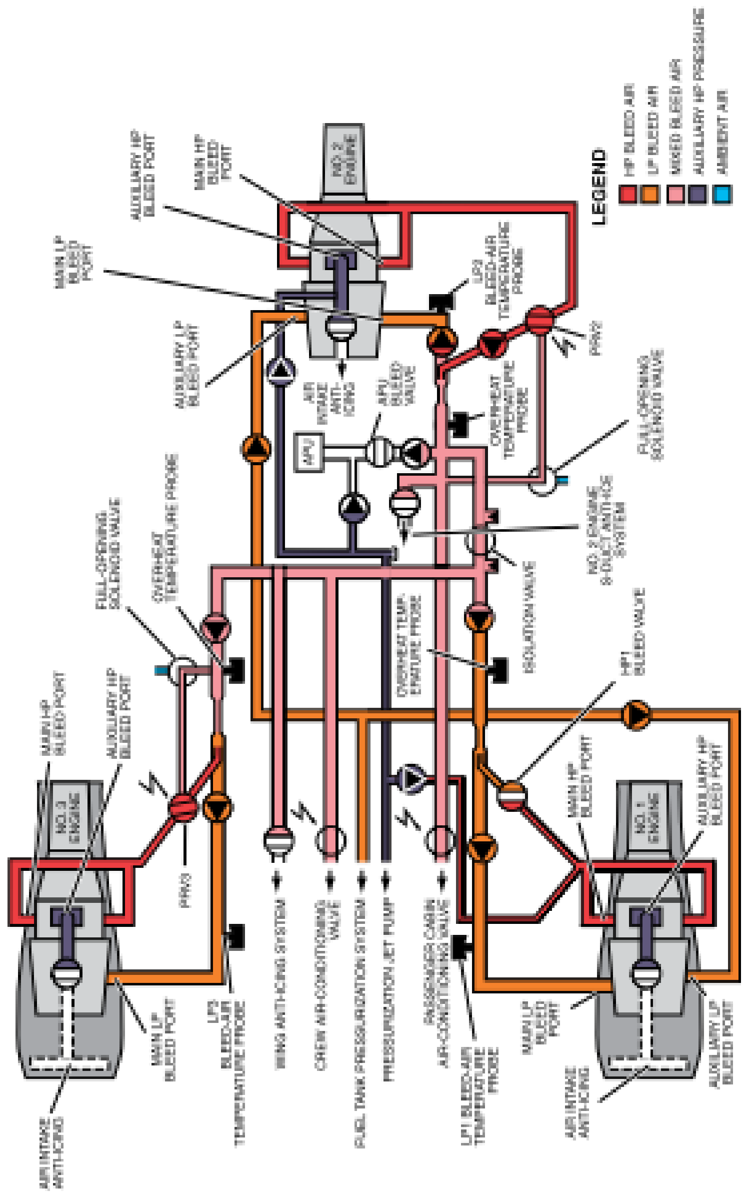


Figure SR-34. Bleed-Air Operation—Anti-icing Off

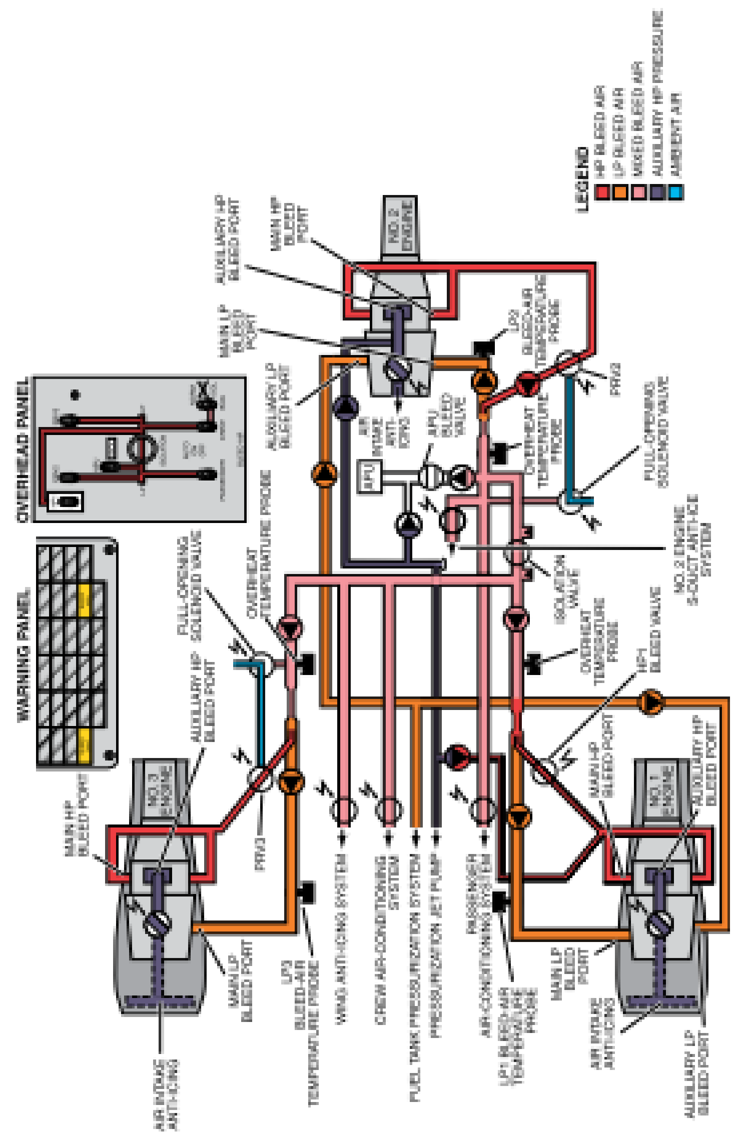


Figure SR-35. Bleed-Air Operation—Anti-icing On

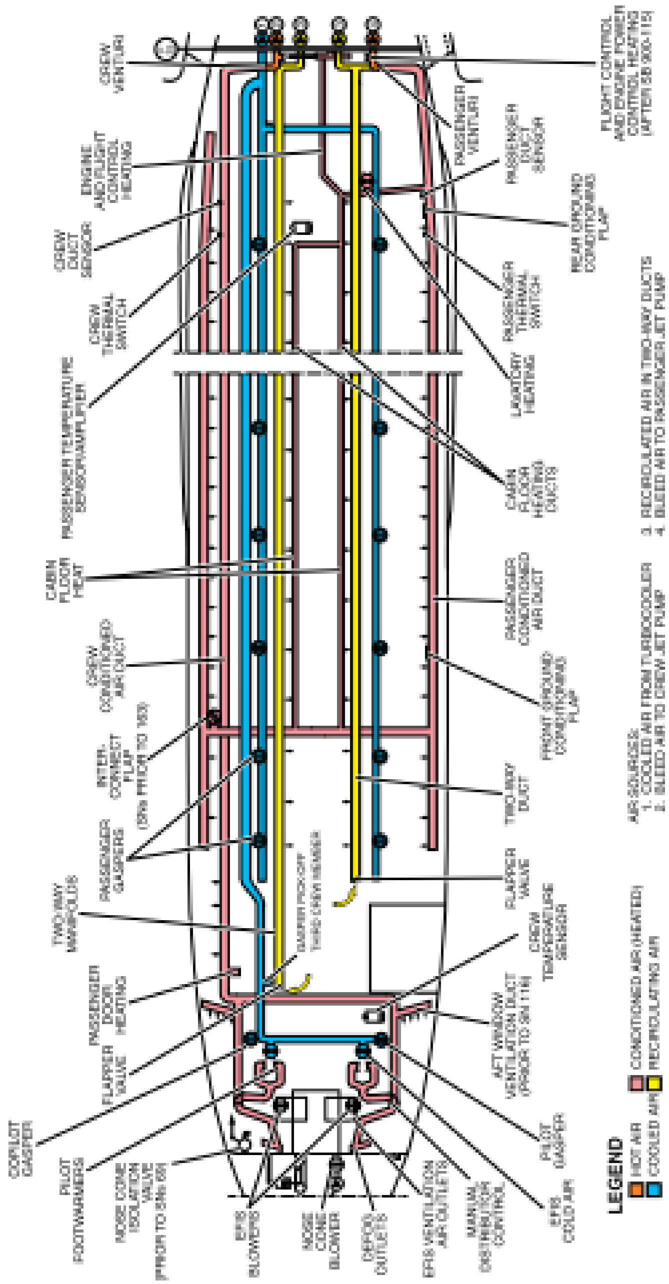


Figure SR-36. Distribution System Normal Operation—Flight (Heating)

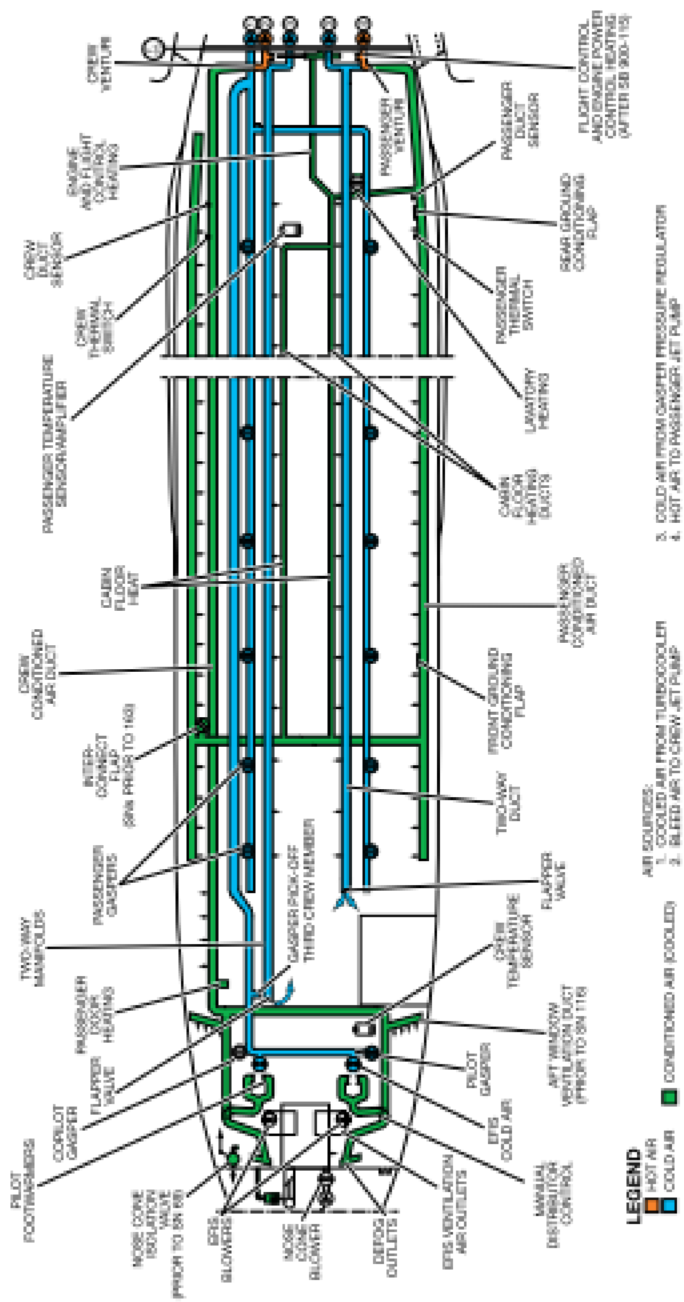


Figure SR-37. Distribution System Normal Operation—Flight (Cooling)

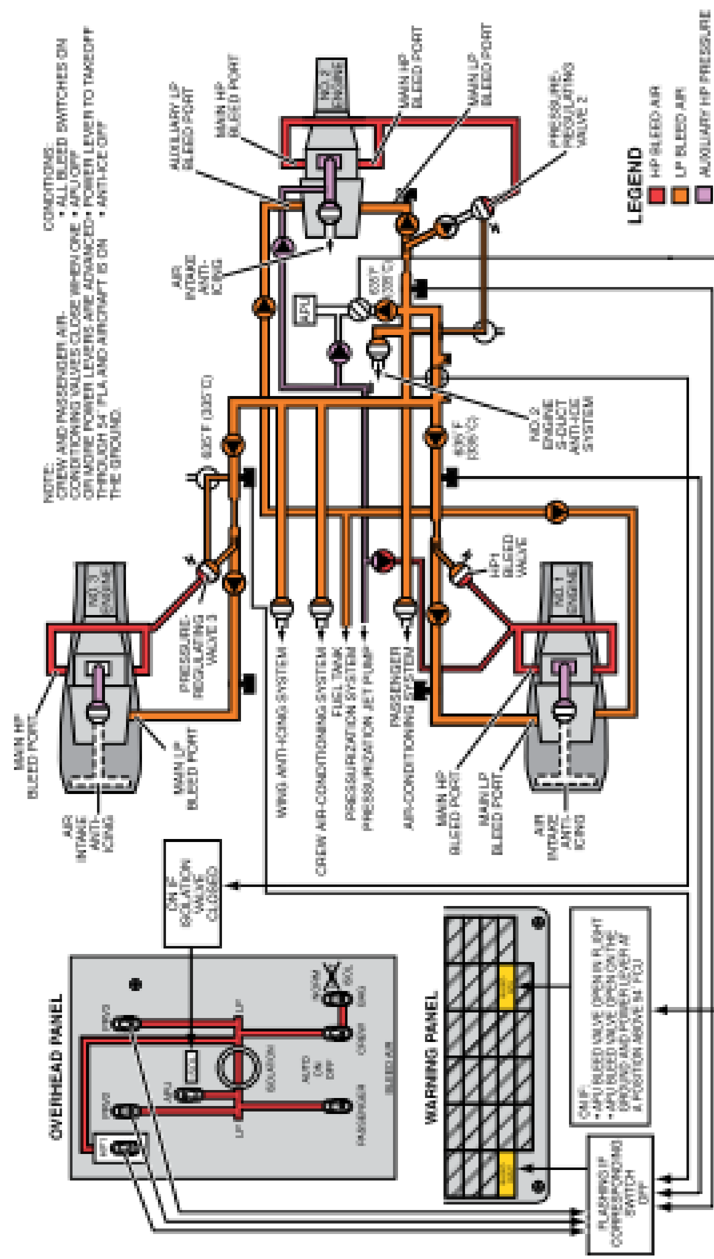


Figure SR-38. Bleed-Air System—Power Lever to Takeoff

Table SR-4. No. 1 and No. 3 Engine Nacelle Anti-Icing Logic System

ENG1/ENG 3 SWITCH	$P_{T2}T_{T2}$ SENSOR	AIR INTAKE ANTI-ICING PRV	LOW PRESSURE	HIGH PRESSURE	ENG1/ENG 3 LIGHT
		Initial Status			
Off	Not energized	Closed	None	None	Out
		Activation			
On On	Energized Energized	Opening Regulating	Lower than 4 psi Higher than 4 psi	Lower than 90 psi	Amber Steady Green
		Abnormal Conditions			
On On	Energized Energized	Regulating Fully open (no regulation)	Lower than 4 psi Higher than 4 psi	Higher than 90 psi	Amber steady Amber Flashing
		Switch to Off			
Off Off	Not energized Not energized	Closing Closed	Higher than 4 psi Lower than 4 psi		Amber (single flash) Out
		Abnormal Conditions			
Off		Not closed	Higher than 4 psi		Amber flashing

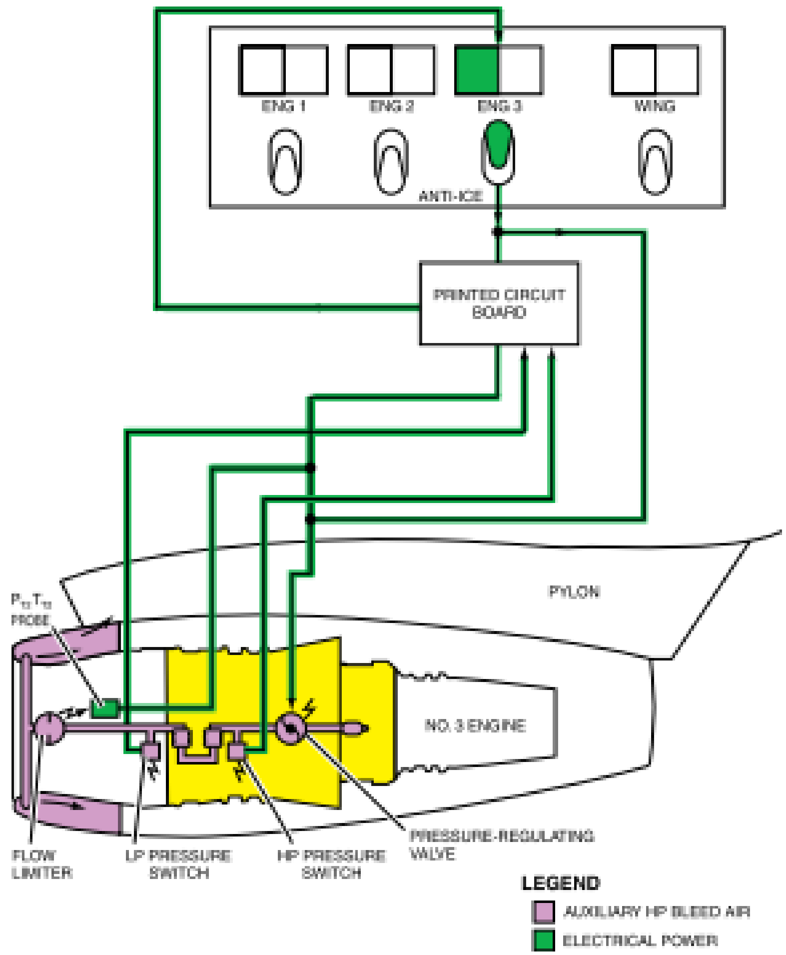


Figure SR-39. No. 3 Nacelle Anti-icing Operation

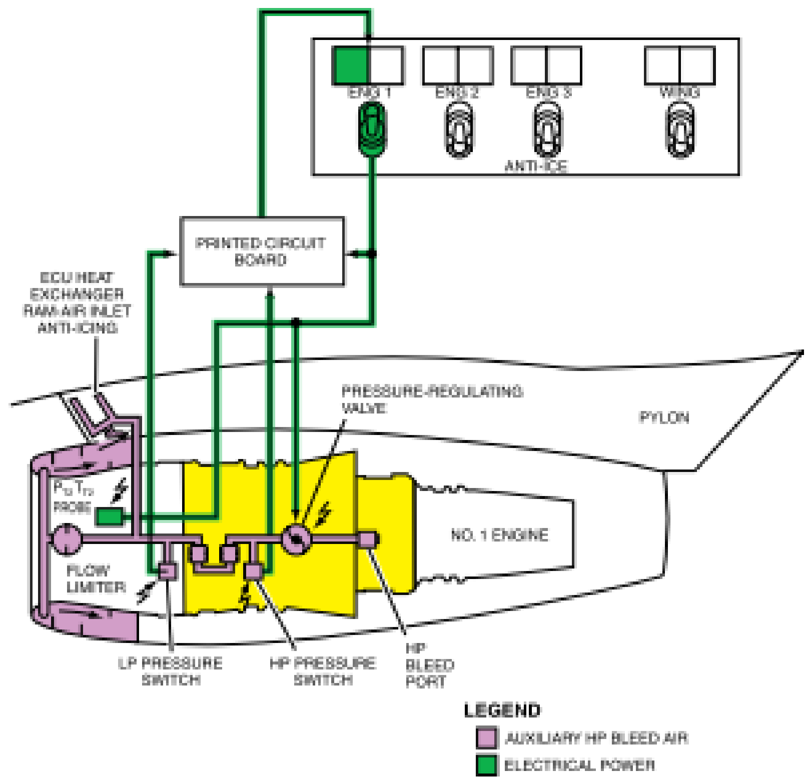


Figure SR-40. No. 1 Nacelle and Ram-Air Inlet Anti-icing Operation

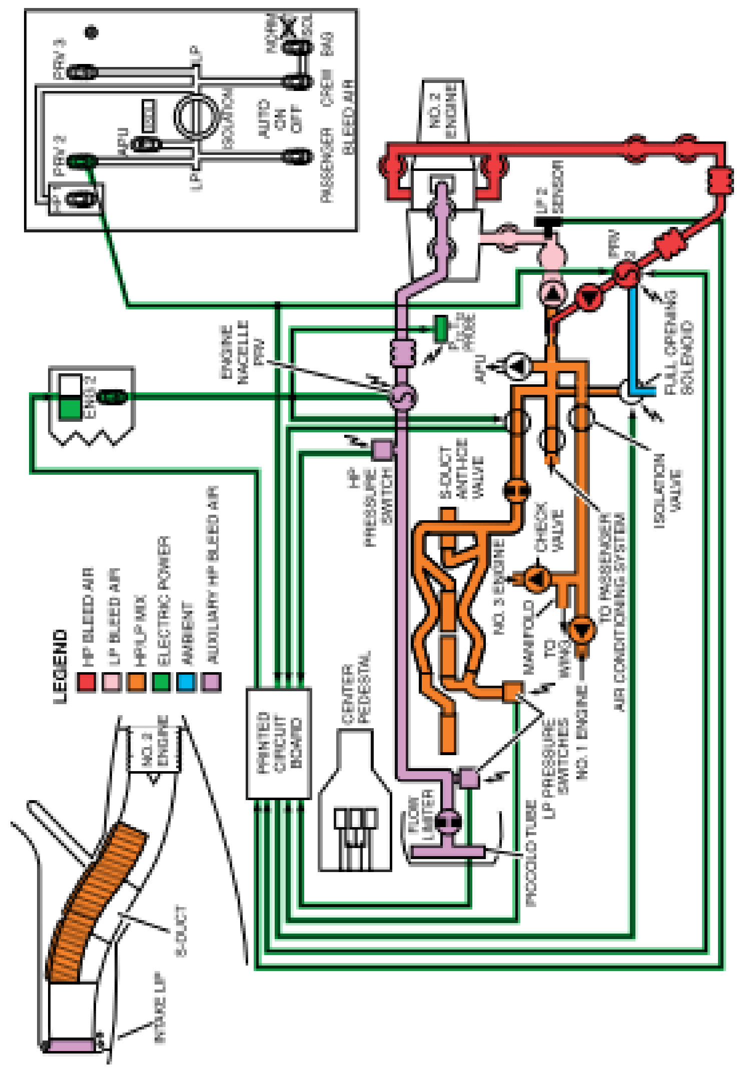


Figure SR-41. No. 2 Nacelle and S-Duct Anti-icing Operation

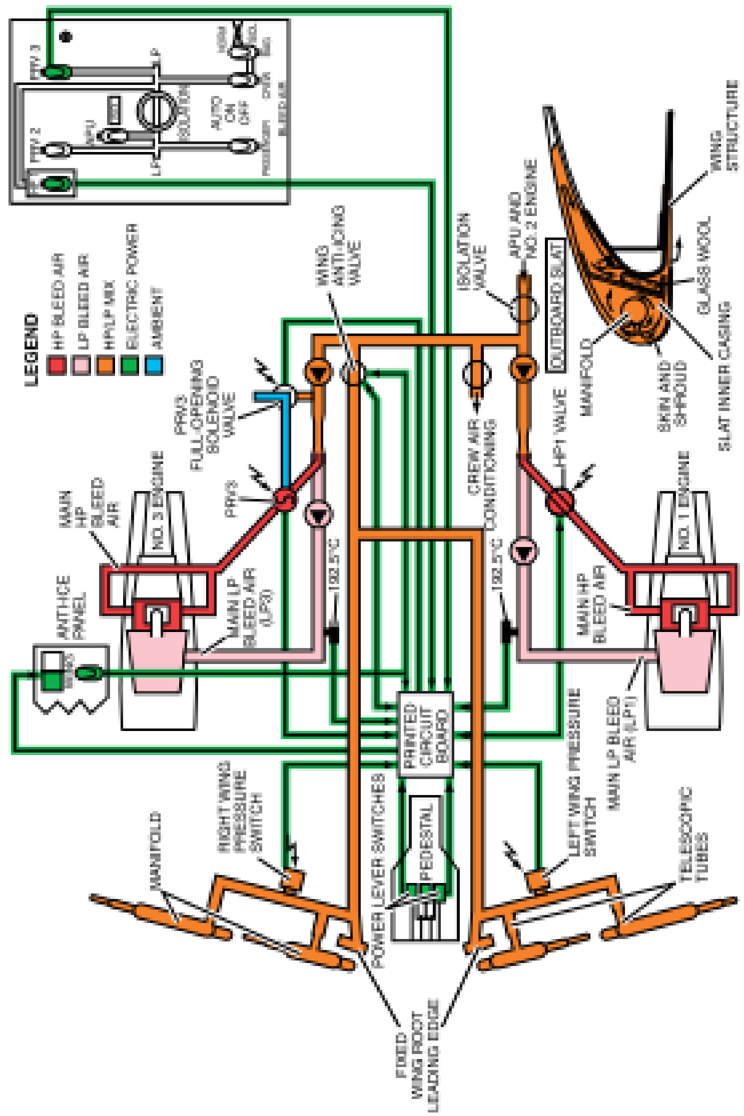


Figure SR-42. Wing Leading-Edge Slats Anti-icing Operation

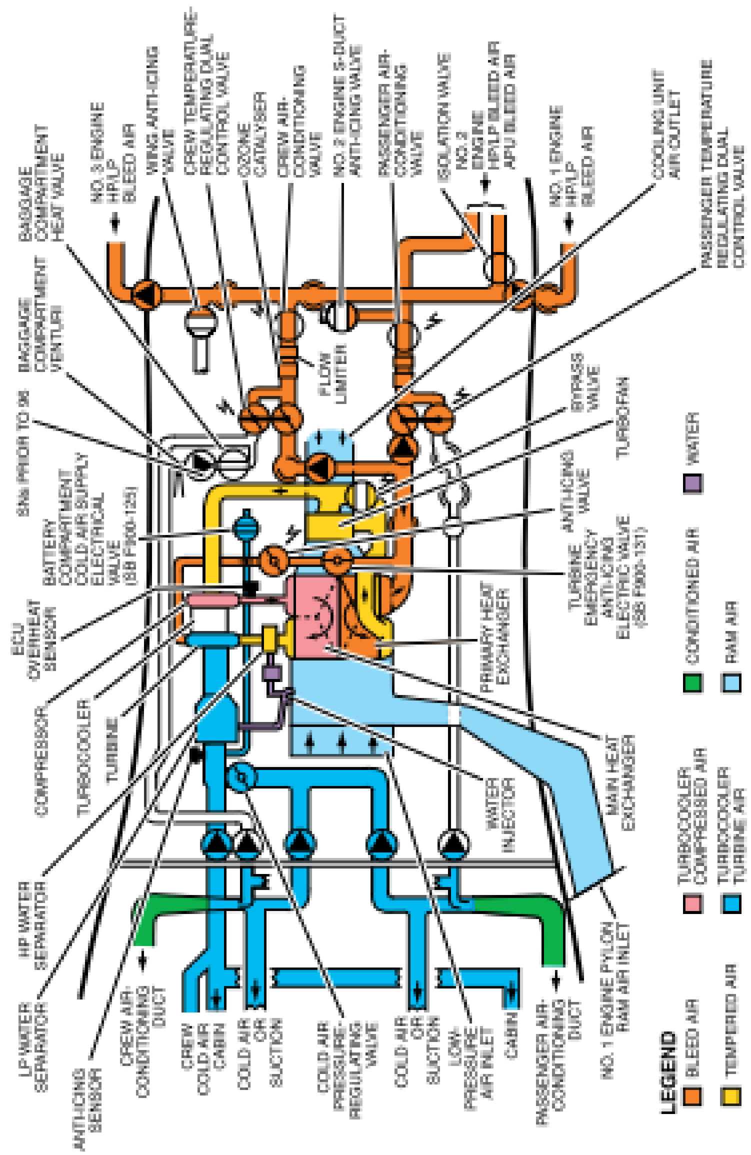


Figure SR-43. Normal Operation—Ground or Slow Flight (Cooling)

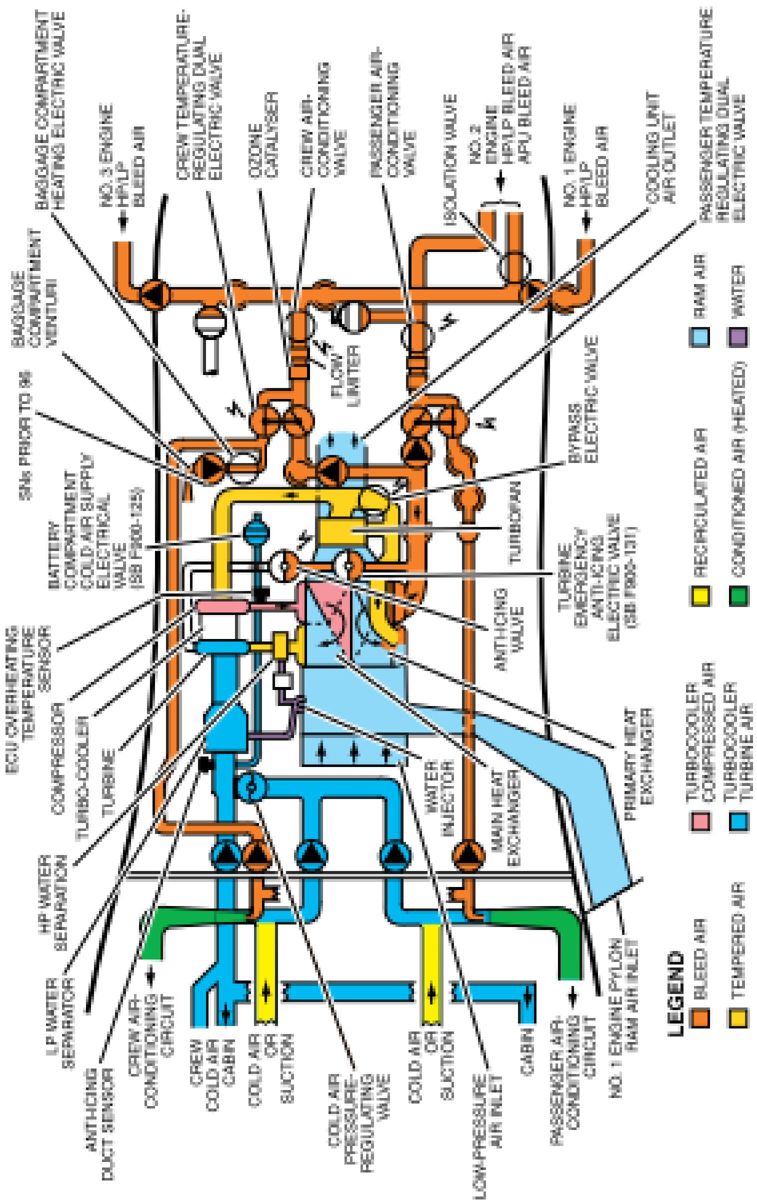


Figure SR-44. Normal Operation—Flight (Heating)

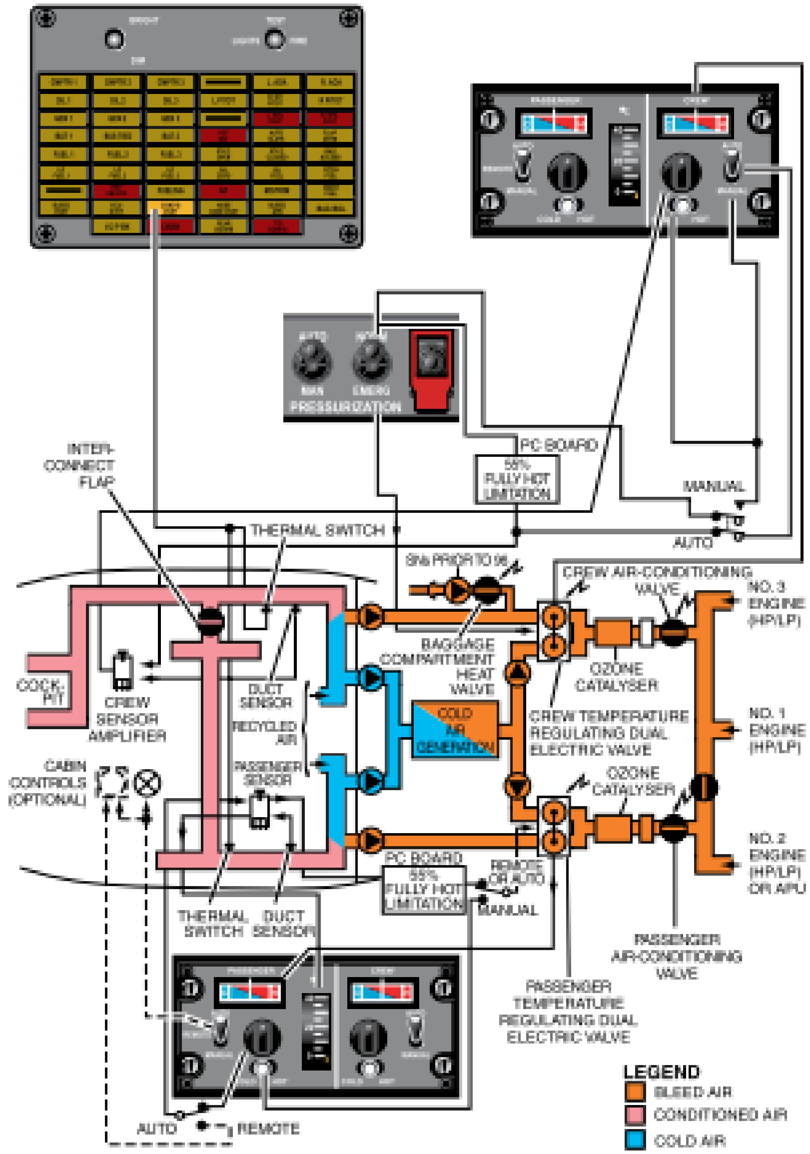


Figure SR-45. Temperature Control Operation

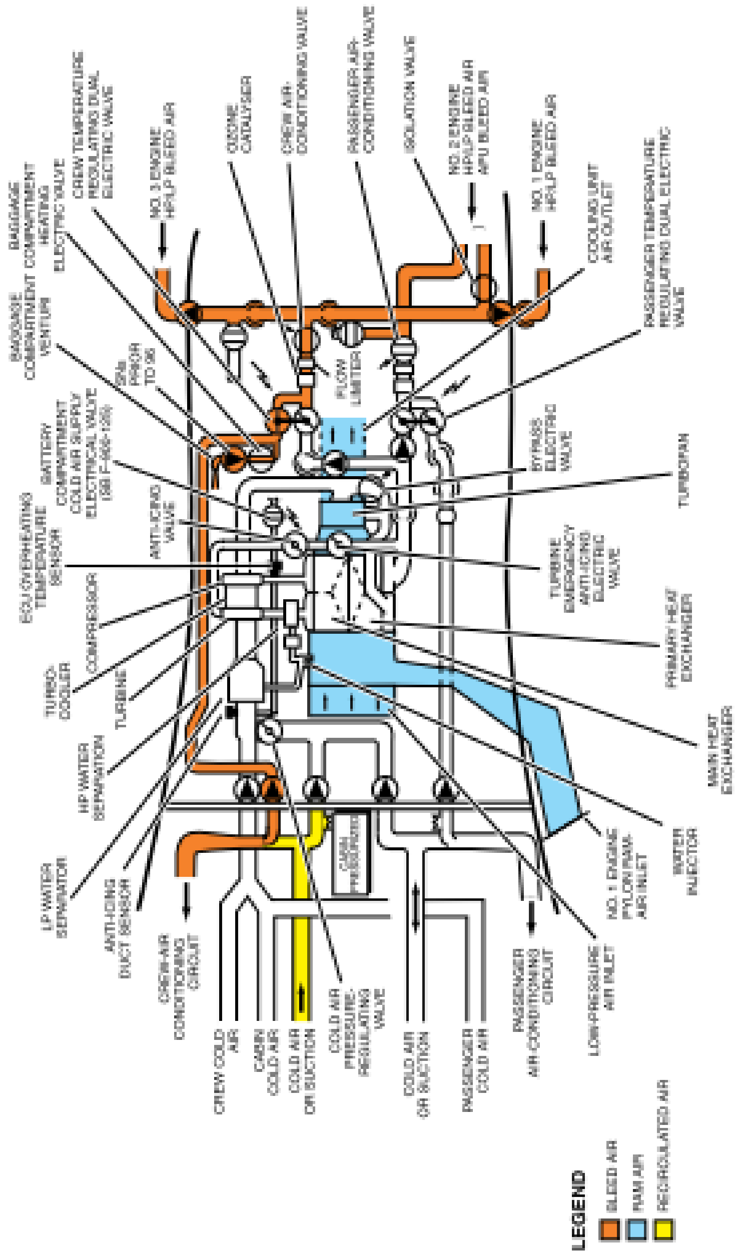


Figure SR-46. Air Source—Emergency Pressurization

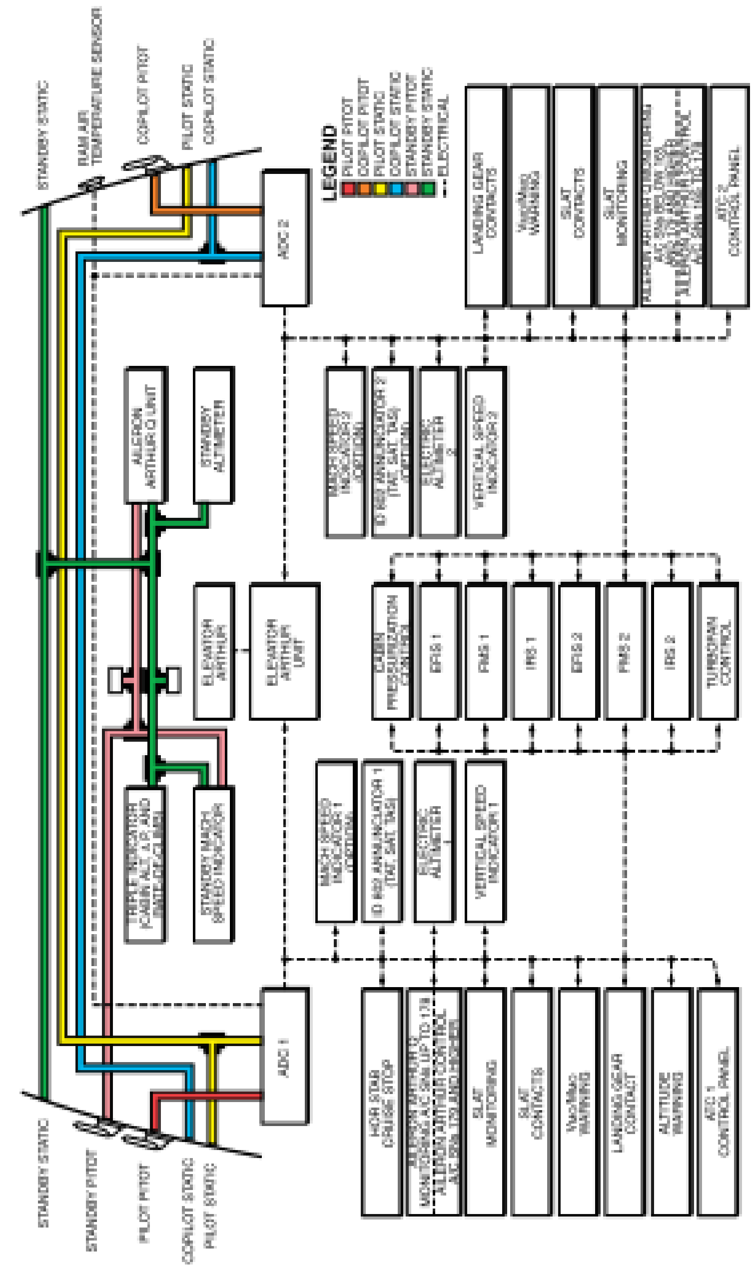
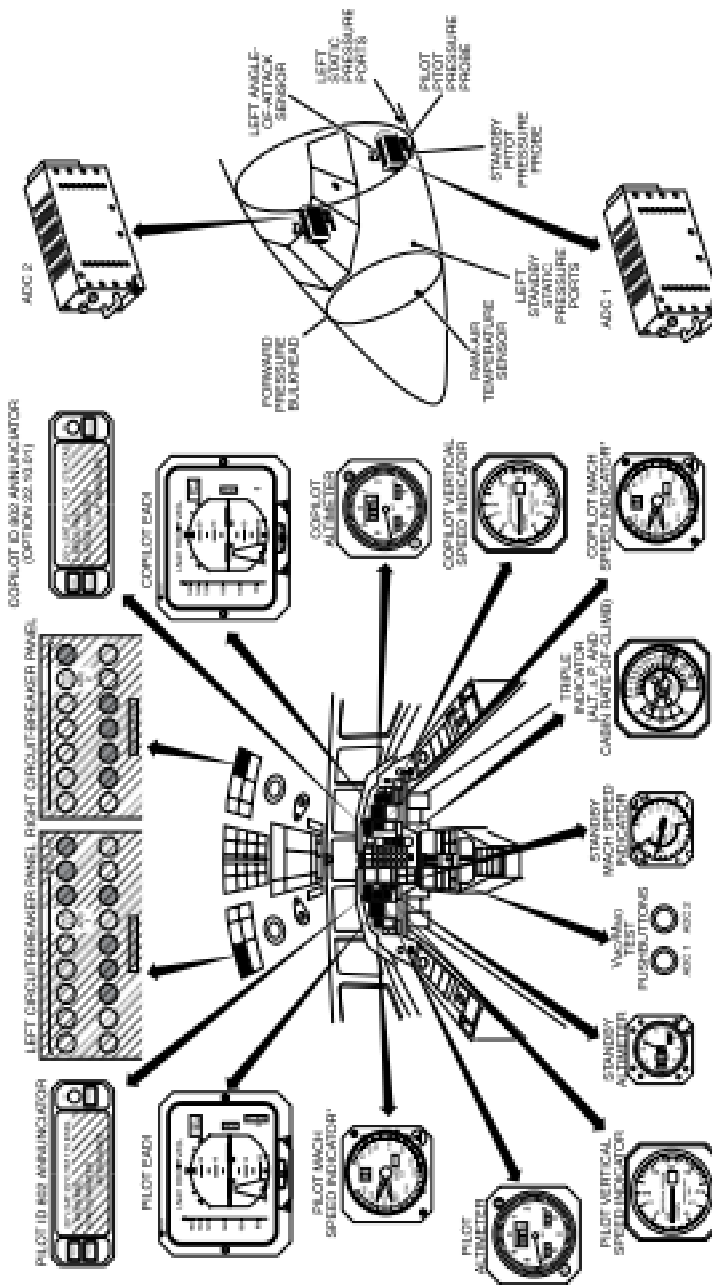


Figure SR-47. Pitot-Static System



* PILOT AND COPILOT ELECTRIC MACH SPEED INDICATORS ARE OPTION NO. 34.10.01.

Figure SR-48. Pitot-Static/Air Data Instruments Location

MASTER WARNING SYSTEM

TABLES

Table MWS-1. ANNUNCIATOR ILLUMINATION CAUSES

ANNUNCIATOR	CAUSE FOR ILLUMINATION
CMPTR 1 CMPTR 2 CMPTR 3	The control switch of the indicated computer is in the OFF or MAN position. The indicated computer has failed (electrical power supply failure, internal failure, or incorrect data).
FWD DOORS	The light comes on if: (Specific light to aircraft incorporating M880A modification). The main entrance door is not locked or the front lavatory compartment service door is not locked (on aircraft equipped with this lavatory compartment).
L. AOA R. AOA	The indicated heating systems are not on. Angle-of-attack heating has failed.
OIL 1 OIL 2 OIL 3	The oil pressure of the indicated engine is lower than 25 psi (1.72 bar). Chips are detected in the indicated engine oil system. Red light with M880A
L. PITOT R. PITOT	The indicated heating systems are not on. Pitot or static pressure probe heating has failed.
ST BY PITOT	The indicated heating system is not on. Standby pitot pressure probe heating has failed.
GEN 1 GEN 2 GEN 3	The indicated generator is not tied to the power system (the associated reverse current relay is open, or the start relay remains closed at the end of a start sequence). Red light with M880A

Table MWS-1. ANNUNCIATOR ILLUMINATION CAUSES (Cont)

ANNUNCIATOR	CAUSE FOR ILLUMINATION
L. WHL OVHT R. WHL OVHT	An overheat condition is detected in the left or right landing gear wheel well.
BAT 1 BAT 2	The indicated battery is not connected to the aircraft power system through its make-and-break switch.
BUS TIED	The main left and right buses are tied or the battery 2 paralleling contactor remains closed.
HOT BAT	The temperature of one of the batteries exceeds 150°F (65.5°C) for aircraft prior to SN 172 with SB-94 not applied. The temperature of one of the batteries exceeds 160°F (71.1°C) for aircraft SN 172 and subsequent, and aircraft prior to SN 172 with SB-94 applied. The HOT light located on the battery temperature indicator is illuminated.
AUTO SLATS	There is a discrepancy between the two slat control flight/ground contacts. There is a discrepancy between these two contacts and the nose and left landing gear flight/ground contacts, inhibiting gear retraction. The discrepancy between the two angle-of-attack sensors exceeds +5° (in-flight configuration only). One of the ADC contacts controlling the slats detects an IAS lower than 265 knots, whereas the ADC monitoring contacts detect an IAS of 280 knots.
FLAP ASYM	An asymmetry between the left and right flap position exists.

Table MWS-1. ANNUNCIATOR ILLUMINATION CAUSES (Cont)

ANNUNCIATOR	CAUSE FOR ILLUMINATION
FUEL 1 FUEL 2 FUEL 3	The pressure switch located on the indicated engine fuel supply LP line indicates a pressure drop (pressure less than or equal to 4.6 psi [approximately 320 mb]).
XTK 2 OPEN Aircraft with transfer valve XTK2.	The front-to-rear tank transfer valve is open when it should be closed.
XTK 2 CLOSED Aircraft with transfer valve XTK2.	The front-to-rear tank transfer valve is closed when it should be open.
BAG ACCESS	The cabin baggage compartment access door is not closed.
LO FUEL 1 LO FUEL 3	A fuel level below 200 pounds is detected in tank group G1 or G3.
LO FUEL 2	For aircraft SNs 1 to 11—A fuel level below 200 pounds is detected in tank group G2 (or below 1,100 pounds if booster pumps 2 are off). For aircraft SNs 12 and subsequent—A fuel level below 200 pounds is detected in tank group G2.
A/L ZERO	The emergency aileron actuator is not in the neutral position.
A/L FEEL	A discrepancy is detected between the IAS output of the air data computer and the position information supplied by the linear potentiometer on the aileron Arthur actuator.
PITCH FEEL	There is a discrepancy between the position of the elevator Arthur actuator and the position of the horizontal stabilizer, or there is an elevator Arthur box malfunction. Red light with M880A

Table MWS-1. ANNUNCIATOR ILLUMINATION CAUSES (Cont)

ANNUNCIATOR	CAUSE FOR ILLUMINATION
AFT CABIN ISOL (option 25-21-01)	The light comes on if: The foldable door of the partition at frame 16 is not latched open when the "No smoking" passenger call sign is activated.
REV UNLOCK	The thrust reverser clamshell doors are not locked in the stowed position. NOTE The light normally illuminates during the thrust reverser retraction phase.
FUELING	One of the two fuel vents is not closed. The defueling/refueling valve is not closed. The refueling connector access door is not closed. The refueling control panel access door is not closed. The GRAVITY FUELING switch is set to ON. Bus B-2 has failed. The DEFUELING switch is set to ON. The vent valve control lever is raised.
AP	The autopilot has failed or has automatically disengaged. On aircraft incorporating M880C, when this light flashes, the audio warning sounds.
MISTRIM	The AP trim coupler system has failed.
MACH TRIM	The Mach trim system is disengaged or has failed.
BLEED OVHT	An overheat of HP/LP bleed air is detected (temperature higher than or equal to 635°F [335°C], or 545°F [285°C] if anti-icing has been activated).

Table MWS-1. ANNUNCIATOR ILLUMINATION CAUSES (Cont)

ANNUNCIATOR	CAUSE FOR ILLUMINATION
ECU OVHT	An overheat (446°F or 230°C) is detected at the compressor outlet of the turbocooling unit. The turbofan bypass valve is not closed, and the airplane is on the ground or flight with the landing gear down and locked.
COND'G OVHT	Overheating is detected in one of the cabin or cockpit supply ducts (air temperature higher than or equal to 203°F [95°C]).
NOSE CONE OVHT	Overheat is detected in the nose cone (temperature higher than or equal to 158°F [70°C]).
BLEED APU	The APU bleed-air valve is not completely closed with the bleed switch off or one of the power levers positioned to 54° or greater.
BAG ISOL	The baggage compartment electric isolation valve is not open. In this condition the baggage compartment is not pressurized.
#2 P BK	Steady illumination: Hydraulic system No. 2 pressure is applied to the brakes (pressure higher than 261 psi [approximately 18 bars]). Flashing illumination: When the park brake accumulator pressure is between 1,305 to 1,102 psi or below, the brakes can be applied only once.
CABIN	With audio warning: • Cabin altitude is greater than or equal to 10,000 feet. Without audio warning: • The main entrance door is not locked. • The front lavatory compartment service panel door is not closed (if this option is installed). Light on only with audio warning on aircraft with M880A.
REAR DOORS	The baggage compartment outside door is unlocked. The rear compartment door is unlocked. Red light with M880A.

Table MWS-1. ANNUNCIATOR ILLUMINATION CAUSES (Cont)

ANNUNCIATOR	CAUSE FOR ILLUMINATION
T/O CONFIG	The light illuminates and the audio warning sounds if the aircraft is on the ground, with at least one of the power levers advanced beyond 82° and one of the following modes present: • The slat/flap control is in CLEAN. • Flap deflection is higher than or equal to 22°. • The airbrakes are not retracted. • The horizontal stabilizer is out of the authorized green takeoff range between –4° 30' and –7° 30'. • The slats are not extended. • On aircraft incorporating M880C, the park brake handle is pulled and the dual braking system is not activated.

Table MWS-2. FIRE PANEL ILLUMINATION CAUSES

ANNUNCIATOR	CAUSE FOR ILLUMINATION
FIRE 1 FIRE 2 FIRE 3	Fire is detected in the indicated engine compartment.
FIRE BAG COMP	Fire or smoke is detected in the baggage compartment.
FIRE APU	Fire is detected in the APU compartment.
FAULT	A fault is detected in the associated detection loop.
FUEL SHUT OFF TRANS	During fuel shutoff valve transit or if there is a discrepancy between the position of the valve and the position of the control switch.

Table MWS-3. HYDRAULIC CONTROL AND INDICATOR PANEL ILLUMINATION CAUSES

ANNUNCIATOR	CAUSE FOR ILLUMINATION
PUMP 1 PUMP 2 PUMP 3	The pressure of the indicated pump is lower than 1,500 psi (approximately 103 bars).
ST BY PUMP	The standby pump selector located in the rear compartment is not in the normal flight position. The standby pump cycle time is longer than 60 seconds.
L R	Pressure supplying the left or right brake units becomes higher than or equal to 232 psi (approximately 16 bar) increasing in system No. 1. The lights extinguish when the brakes are released and pressure becomes lower than or equal to 160 psi (11 bars) decreasing in system No. 1).

Table MWS-4. BATTERY TEMPERATURE INDICATOR ILLUMINATION CAUSES

ANNUNCIATOR	CAUSE FOR ILLUMINATOR
WARM	The No. 1 and/or No. 2 battery overheats. (The light illuminates when the battery internal temperature is higher than 120°F [48.9°C]).
HOT	The No. 1 and/or No. 2 battery overheats. The light illuminates when the battery internal temperature is: • Over 150°F (65.5°C) for aircraft prior to SN 172 with SB-94 not applied, or • Over 160°F (71.7°C) for aircraft SN 172 and subsequent, and for aircraft prior to SN 132, with SB-94 applied. NOTE This light is connected in parallel with the red HOT BAT light on the warning panel.
	On aircraft with SB-125, the aircraft on the ground, the MASTER APU switch set to ON, and the COND BATT switch on, this light illuminates when the battery cooling electric valve is fully open.

Table MWS-5. ENG 2 FAIL ILLUMINATION CAUSES

ANNUNCIATOR	CAUSE FOR ILLUMINATION
ENG 2 FAIL	The aircraft is on the ground and the No. 2 engine power lever is at the 84° setting and the No. 2 engine power is less than 85% N_1. The No. 2 engine S-duct access door is not properly closed. A second light is installed on the copilot instrument panel on aircraft with M880B incorporated.
ECU A/I	On aircraft with SB-131, this pushbutton light is illuminated when the turbine emergency anti-icing valve is closed.

Table MWS-6. ITT LIGHT ILLUMINATION CAUSES

ANNUNCIATOR	CAUSE FOR ILLUMINATION
	The light flashes if the associated engine ITT reaches 962°C on TFE-731-5AR-1C or 980°C on TFE-731-5BR-1C. If the power increase function is used, the light flashes at 974°C on TFE-731-5AR-1C or 996°C on TFE-731-5BR-1C.
PWR INC	The light indicates the correct operation of power increase system control relays for high altitude takeoff (approximately 5,000 feet) and hot weather conditions (over 18.5°C).

Table MWS-7. AUDIO WARNING CAUSES

WARNING	TYPE OF SOUND	SIMULTANEOUS WARNING OR INDICATION	CAUSE	HORN SIL
V_{MO}/M_{MO}	Continuous varying sound with frequency varying between 660 Hz and 3,330 Hz during a one-second period	Readings on both EFISs	V_{MO}/M_{MO} exceeded	No
Cabin pressure	Warning voice CABIN	Red CABIN light on warning panel and cabin altitude reading higher than 10,000 feet on cabin altimeter	Cabin altitude higher than 10,000 feet	Yes
Fire	Continuous two-pitch audiblbe 500-Hz tone for 150 ms and then 555 Hz for 150 ms	Illumination of at least one red FIRE light on the fire panel	Fire is detected by: • Engines 1, 2, and 3 fire detectors • APU fire detector • Baggage compartment smoke detector	Yes
SLATS NOT EXTENDED				
Stall	Intermittent 1,660-Hz sound (beep beep)—on for 100 ms and off for 100 ms	• Illumination of the three IGN lights on the overhead panel • Flashing of green slat light	Aircraft angle of attack is greater than 11°	No

Table MWS-7. AUDIO WARNING CAUSES (Cont)

WARNING	TYPE OF SOUND	SIMULTANEOUS WARNING OR INDICATION	CAUSE	HORN SIL
SLATS EXTENDED				
Stall	Intermittent 1,660-Hz sound (beep beep)—on for 100 ms and off for 100 ms	• Illumination of the three IGN lights on the overhead panel • Steady green slat light • Activation of stick-shaker on aircraft with M889	Aircraft angle of attack is greater than 16.5°	No
Altitude deviation	Warning voice ALTITUDE	• Illumination of the amber altitude warning light on the pilot and copilot altimeters • The altitude selected on the ASEL box of each EADI changes color.	From a given altitude, the aircraft flies to the altitude selected on the control unit. When within 1,000 feet of this altitude, the audio warning sounds, and the light on each altimeter illuminates. Once the preset altitude is reached, the audio warning sounds and the altimeter lights illuminate if altitude deviation exceeds 250 feet.	No
Horizontal Stabilizer in movement	Continuous clacker sound with pulse frequency at 12.5 Hz	Horizontal stabilizer position indicator needle is in movement on the trim panel.	Movement of horizontal stabilizer, whatever the operation mode.	No

Table MWS-7. AUDIO WARNING CAUSES (Cont)

WARNING	TYPE OF SOUND	SIMULTANEOUS WARNING OR INDICATION	CAUSE	HORN SIL
SLATS EXTENDED				
Landing gear	Warning voice GEAR	Red light on landing gear gear control handle flashes.	The control handle is in the gear downlocked or uplocked position, IAS is lower than 160 knots, at least one of the power levers is in the reduced power position (but not on STOP on aircraft with M881), and at least one of the three gears is not downlocked.	Yes
			The control handle is in the down-locked or uplocked position, the flaps are extended to 40°, and at least one of the three gears is not downlocked.	No
Decision height	Warning voice MINIMUM	Letters DH appear on both EADIs.	Preset decision height is reached.	Yes
Autopilot (Aircraft with M880C)	Warning voice AUTOPILOT	Illumination of the AP light on the warning panel	Failure or disengagement of the autopilot	No

Table MWS-7. AUDIO WARNING CAUSES (Cont)

WARNING	TYPE OF SOUND	SIMULTANEOUS WARNING OR INDICATION	CAUSE	HORN SIL
		SLATS EXTENDED		
Takeoff Configuration	Warning voice NO TAKE-OFF	Illumination of the T/O CONFIG light on the fire panel	The aircraft is on the ground, at least one of the power levers is advanced beyond 82°, and (one of the following conditions): • Flaps are out 22° or more • Flap/slat control is at CLEAN • Airbrakes are not retracted • Horizontal stabilizer is out of the –4° 30' to –7° 30' position • Slats are not extended • Park brake handle pulled and dual braking system not activated (aircraft with M880C).	Yes
Red lights on warning panel that do not have their own audio warnings and ENG 2 FAIL red lights (aircraft with M880C).	770 Hz gong for 0.4s.	Illumination of one of the red lights.	• Check possible causes of warning light concerned	No

Table MWS-8. AUDIO WARNING TESTING

ANNUNCIATOR	CAUSE FOR ILLUMINATION
V_{MO}/M_{MO}	Depressing ADC 1 or ADC 2 pushbuttons on the pedestal
Cabin altitude	Depressing the test pushbutton on the cabin pressure controller accompanied by illumination of the CABIN light on the warning panel
Fire	Setting the warning panel LIGHTS–TEST–FIRE switch to FIRE (all the FIRE lights on the fire panel illuminate)
Stall	On the ground depressing the STALL 1 or STALL 2 pushbutton
Horizontal stabilizer in movement	Action on the pitch trim control
Landing gear	Depressing the landing gear test pushbutton on the slat/flap landing gear configuration panel
Takeoff	On the ground, reproducing configuration the conditions that cause the warning panel T/O CONFIG light to illuminate

Table MWS-9. CONFIGURATION PANEL AND LANDING GEAR CONTROL HANDLE ILLUMINATION CAUSES

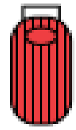
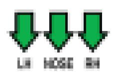
ANNUNCIATOR	CAUSE FOR ILLUMINATION
	The control handle is in the gearup position, and the three gears are not yet uplocked. The control handle is in the down position, and the landing gear is not fully downlocked. The control handle is in the up position, speed is lower than 160 knots, at least one of the power levers is at a reduced setting, but not on STOP for aircraft incorporating M881, and at least one of the three gears is not downlocked.
	Steady illumination At least one of the six airbrakes is not in the retracted position. Flashing After automatic retraction of the airbrakes, as long as the handle is in the extended position while the airbrakes are retracted.
	Steady illumination All the slats are extended. Flashing Only the outboard slats are extended.
	During any movement of the slats or if any one of the slats has failed to either extend or retract.
	The indicated landing gear is downlocked.
	Main gear: The corresponding door is not closed and locked. Nose gear: The gear is not uplocked. The gear is not downlocked while the doors are open. The landing gear is downlocked, and one of the doors is not fully open.

Table MWS-10. THRUST REVERSER INDICATOR LIGHTS ILLUMINATION CAUSES

ANNUNCIATOR	CAUSE FOR ILLUMINATION
TRANSIT	The clamshell doors are in movement or are not locked or reverser lock latches are released.
DEPLOYED	The synchronizing bell crank controlling the clamshell doors has reached the fully deployed position.

Table MWS-11. OVERHEAD PANEL LIGHT ILLUMINATION CAUSES

ANNUNCIATOR	CAUSE FOR ILLUMINATION
	APU PANEL
MASTER APU	Steady illumination: It is depressed to on. Flashing: In the event of automatic shutdown of the APU by flight/ground contact, ECU overheat, faulty generator regulation, or starting faults
OIL	The light illumination indicates low oil pressure or high oil temperature.
GEN	The APU generator is off the line.
	DC SYSTEM PANEL
APU	The APU generator has excitation voltage. The APU generator switch is on.
	ENGINES PANEL
IGN 1 IGN 2 IGN 3	The igniter unit of the indicated engine is energized.
	FUEL SYSTEM PANEL
XTK	The side tank group interconnection valve is not closed.
X.BP (CENTER AMBER LIGHT)	One of the 1–3 or 3–1 crossfeed valves is not closed.
LEVEL (3 AMBER LIGHTS)	The fuel level in the associated tank (left or right centerwing tank) is lower than 1,000 pounds or the fuel level in the rear tank is lower than 1,100 pounds.
X.BP (2 LH AND RH AMBER LIGHTS)	One of the associated crossfeed valves (1–2 or 3–2) is not closed.
	BLEED-AIR PANEL
ISOL	The bleed-air isolation valve is closed.

Table MWS-11. OVERHEAD PANEL LIGHT ILLUMINATION CAUSES (Cont)

ANNUNCIATOR	CAUSE FOR ILLUMINATION
	ANTI-ICING PANEL
	Green light: The ENG 1, ENG 2 or ENG 3 switch is in the on position, and all the required conditions for proper operation are satisfied (temperature and pressure for the No. 2 engine and pressure for the No. 1 or No. 3 engine). Amber light (steady): The ENG 1, ENG 2 or ENG 3 switch is in the on position, and a pressure drop is detected in the corresponding system. Amber light (flashes): Overpressure is detected in the No. 1 or No. 3 engine, or overtemperature or overpressure is detected in the No. 2 engine.
	Green light: The WING switch is set to on and all the required conditions for proper operation are satisfied. Amber light (steady): The WING switch is set to on and a pressure drop is detected in the system. Amber light (flashes): Overtemperature is detected in the system. NOTE On aircraft with wing-brake heating, the illumination conditions of the green and amber lights are the same, whether the switch is set to WING or WING-BRK.
	WINDSHIELD PANEL
	Either pilot or copilot regulation circuit is defective, and detection and regulation is transferred to the opposite system (pilot or copilot).
	EXTERIOR LIGHTS PANEL
	The LANDING switch is set to on.

Table MWS-11. OVERHEAD PANEL LIGHT ILLUMINATION CAUSES (Cont)

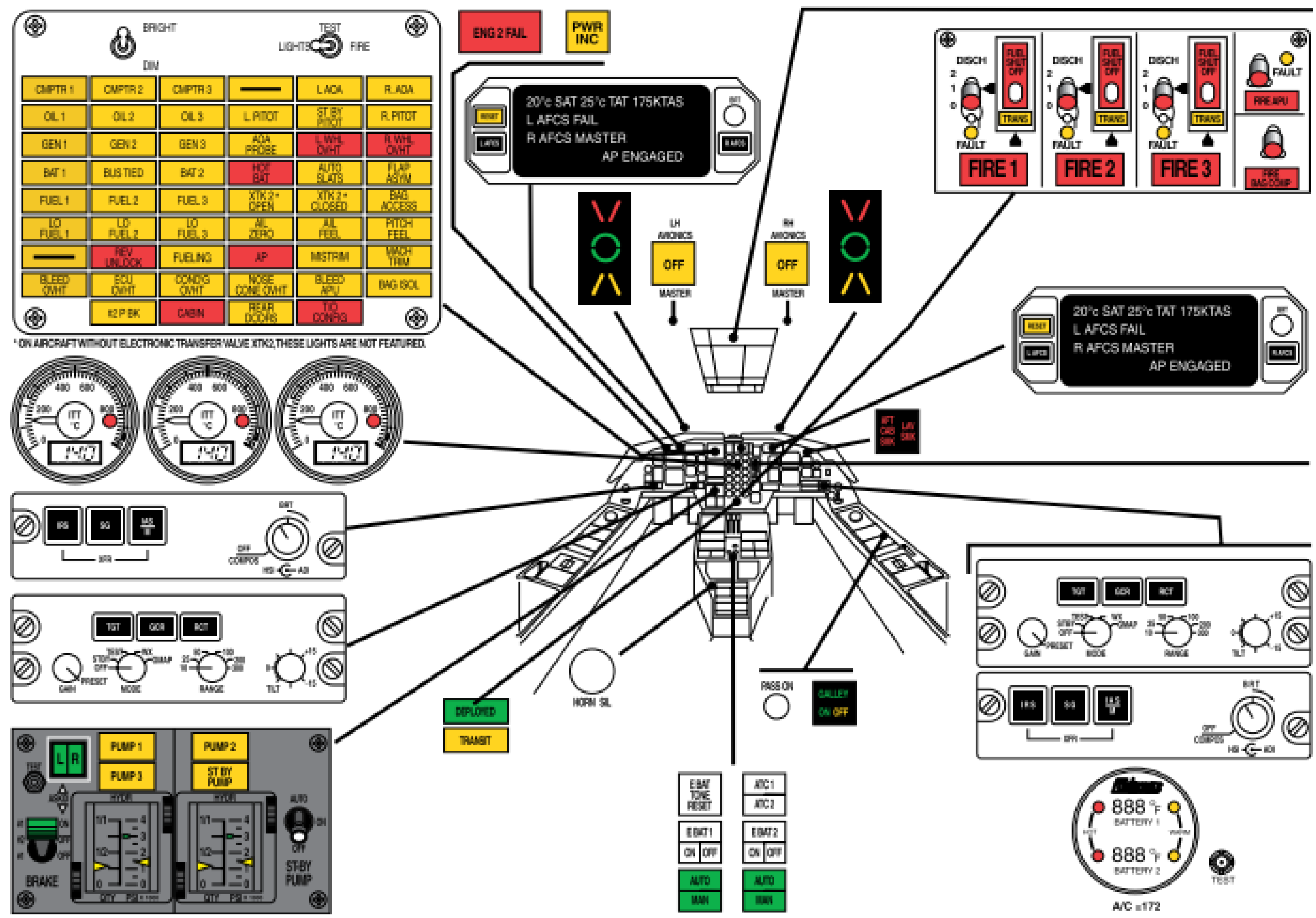
ANNUNCIATOR	CAUSE FOR ILLUMINATION
	INTERIOR LIGHTS PANEL
FASTEN BELTS	The FASTEN BELTS passenger ordinance sign is illuminated.
EMERG LIGHTS	The EMERG LIGHTS selector is in the ON or OFF position, and the aircraft is electrically powered.
	The no smoking ordinance sign is illuminated.
	AVIONIC MASTER SWITCHES
LH AVIONICS OFF MASTER / RH AVIONICS OFF MASTER	Switch illuminates when associated avionics is off.

ANNUNCIATORS

The Annunciator section presents a color representation of all the annunciator lights in the aircraft.

Please remove page ANN-3, align to the right of page ANN-1 and leave it open for ready reference as the annunciators are cited in the text.

FlightSafety international
FALCON 900 PILOT TRAINING MANUAL



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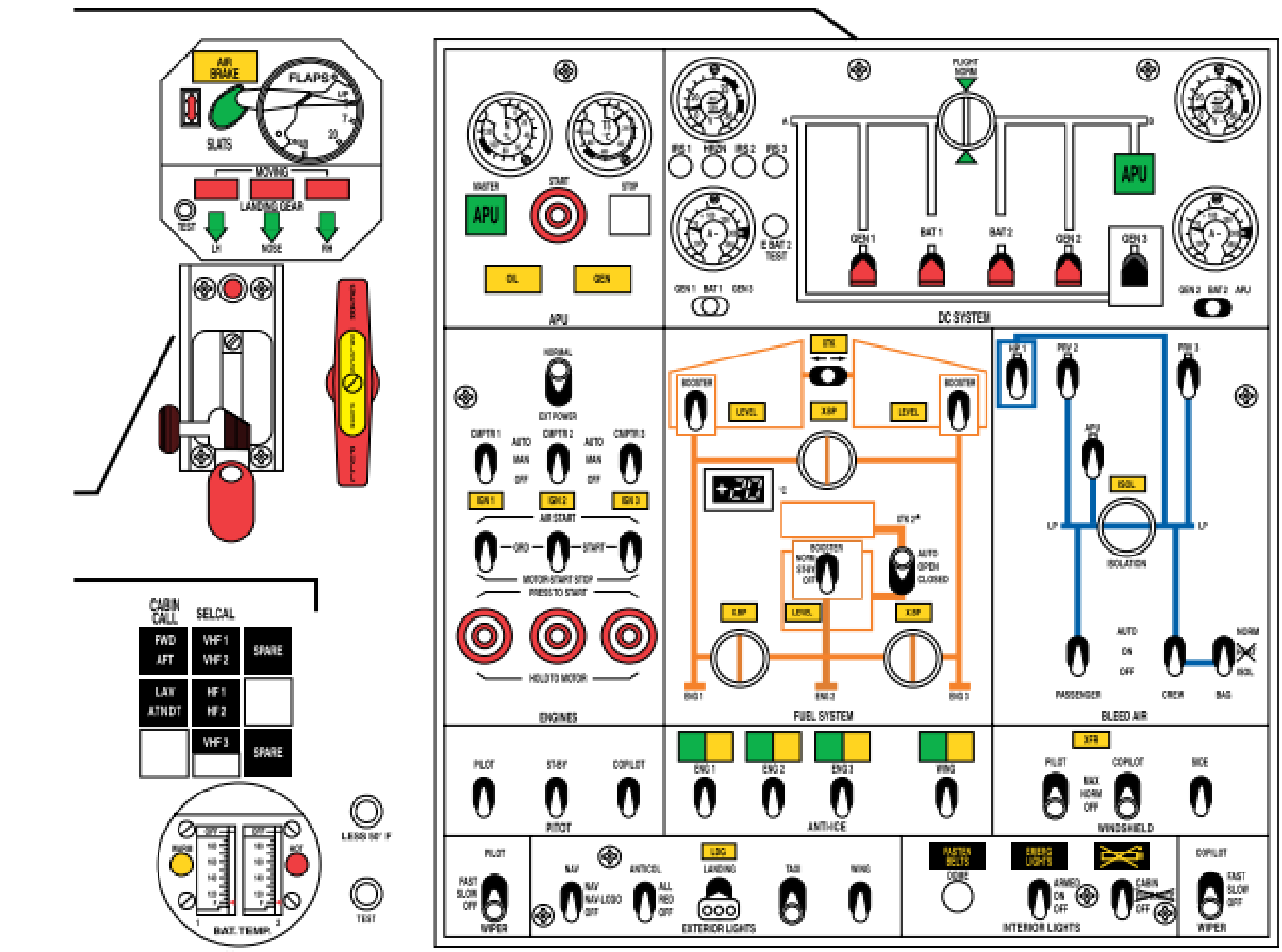

* ON AIRCRAFT WITHOUT ELECTONIC TRANSFER VALUE XTK2, THE OVERHEAD PANEL DOES NOT FEATURE THE BLOCK DIAGRAM AND XTK2 SWITCH.