



APU

APU Operation is **Prohibited**:

1. Until Test is Completed
2. Applying De-Ice Fluid
3. T/R more than 30 sec.
4. Unattended
5. Above FL300

APU Start **Prohibited**:

1. APU Fail Light Illuminated
2. Dual Gen Failure
3. Until 30 sec. Shutdown RPM indicates 0%
4. Above FL200

APU Starter Limits:

3 starts/30 min. 90 sec. rest period

9 APU start cycles per hour

*Main aircraft battery limit (*APU battery start counts as 1/3 of main engine start*)

200 amps/Ground

230 amps/Flight

APU Max N₁ 108%

Max ITT 690°

APU TEST

RPM 50 ± 5%

EGT 500 ± 10 degrees

Voltmeter 0

APU **FIRE** Light illuminated

APU **RELAY** Engaged

APU **FAIL**

BLEED VAL **OPEN**

READY TO **LOAD**

APU Relay Engaged Light - Illuminates then extinguishes prior to the READY TO LOAD light.

At 50% speed, the speed sensor signals the GCU to deenergize the start relay and the APU RELAY ENGAGED extinguishes.

READY TO LOAD Light - At 95% rpm +4 seconds (start is complete).

Ignition Terminates 99%

ECU maintains APU at 100% rpm
±1% (70,200 rpm)

APU **FIRE** Light - APU immediately shuts down. Pressing the button activates the extinguisher. Extinguisher automatically activates 8 secs. after the light illuminates if the button is not pressed.

Burns approx. 110 lbs/hr from the right fuel tank.

Low Oil: Add 300cc

Add Oil: 100cc at a time. Must monitor the light as it's serviced.

Check Oil Within 10 Minutes of Shutdown.

APU ON WHILE FUELING:

If refueling while operating the Aircraft Auxiliary Power Unit (APU), a crewmember must remain with the aircraft for monitoring purposes. APU's **shall not** be started during the fueling process. Except for emergency purposes, the APU must not be shut-down during the fueling process.

GMM Fueling Procedures

Section V

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ENGINE

Pratt & Whitney PW545A
3,804 pounds of thrust
@ 82° sea level (5 minutes)
3,767 pounds of thrust continuous

XLS PW545B
XLS 3,990 pounds of thrust
@ 82° sea level (5 minutes)

Bypass Ratio: 4.0:1

XLS 3.8:1

Intake and Fan
Compressor
Combustion
Turbine
Exhaust
Accessories
11 Fuel Nozzles
2 Ignitor Plugs (4 & 8 o'clock)
8 Thermocouples

Turbine Section - Single High-Pressure/Two Low-Pressure

Accessory Section
Fuel Pump
Oil Pump
Hydraulic Pump
Fuel Control
Starter/Generator

OIL: Check after 10 min. Engine Shutdown

1 QT over 10 hour period **XLS** 1QT over 8 hour period

THRUST REVERSERS:

Idle Reverse @ 60 KIAS
(Stowed at 40 KIAS)

Limited to 30 secs. with the APU operating

Max T/R setting limited to
75% T/O Power

FIRE LIGHT ON:

When ENG FIRE Light Pushed:
Fuel Firewall Valve - Closed
Hyd Firewall Valve - Closed
T/R Isolation Valve - Closed
Gen Field Relay - Open
Fire Bottle Squibs - Armed



Ignition Automatically Comes ON :

1. Start
2. Engine Anti- Ice Switch On
3. Available with EMER BUS when placed in Secondary Position

Ground Idle: 48-51% N₂

Flight Idle: 57-62% N₂

Bleed Off Valve (BOV):

Bleeds off excessive P2.8 air, preventing compressor stalls.

Electrically controlled; reverts to pneumatic mode with loss of EEC inputs.

EEC:

Electronic Engine Control

EEC Manual - Light On

EEC Auto - Light On Until Airborne

EEC Auto - Light On 8 secs. after takeoff

EEC Does Not Sync the engines, but enables the switch.

T^{T0} Probe 10 O'Clock (Backup Temp Input to FCU)

T⁰ Probe 12 O'Clock (EEC / RAT *right engine*)

T¹ Probe 1 O'Clock (ITT)

Anti-Ice Protected:

Nose Cone - Continuous

T¹ Probe - Continuous

Nacel Inlet - Anti-Ice On

Stator Vanes - Anti-Ice On

T⁰ Probe - Electrical

T^{T0} Probe - By Design (flush mount, won't ice up)



FUEL SYSTEM

6790 lbs useable
1006 gallons
(503 gallons each wing)

400 lbs max imbalance
800 lbs max (**emergency**)

Pressure Refuel
10 - 55 psig Pressure
-10 psig Defueling

Fuel Press switch on @ 5 psi off @ 7 psi
Normal Pressure 27 psi

Fuel Low Level Light
On @ 360 ± 20 lbs

Boost Pump 17-26 psi
On On
Off Off
Auto Start-Crossfeed-Low Pressure

Fuel Filter Light
4 psi pressure differential across the fuel filter
(*Bypass Capability*)

Fuel Drains:
4 Fuselage
1 Above Wheel Well

4 ejector pumps
One primary which receives motive flow from the engine driven fuel pump. The other three operate on motive flow from the primary ejector or boost pump, and transfer fuel from the lowest point in the tank to the "fuel hopper".

Primary Ejector Pump
8-22 psi
Motor-Driven Crossfeed valve

Engine Driven Fuel Pump is not a suction pump and must receive fuel under pressure from the wing tank. If this pump fails, the engine will flame out.

High Pressure Pump in the Fuel Control Unit (FCU)



FUEL SYSTEM *(cont.)*

11 Fuel nozzles - Form a precise atomized spray pattern.

Crossfeed 700-900 lbs/hr

Approx 10-12 min for 200 lbs

Normal Fuel Flow:

1st Hour 1700 lbs/hr

2nd Hour 1400 lbs/hr

Add'l 1300 lbs/hr *(with APU on)*

ELECTRICAL SYSTEM

Battery: 20 Cell, 44 ampere-hour nickel-cadmium 25 VDC Power

10 Minutes - Power to ALL Buses

30 Minutes - Hot Batt/Emer Bus

Starter Generator: 28.5 VDC, 300 amperes

Capable of 50% Overload to 450 amperes for 2 minutes

Generator Load - Shared Equally *(10% of total load)*

BATTERY BUS:

Taicone Baggage Light

Tailcone Access Light

Cabin Entrance Lights

Emer Exit Signs

APU Oil Light

Lav Service Overfill Light

X-FEED BUS:

Ignition in NORM/ON

Taxi Lights

Wemac Fan

Fwd/Aft AC Evap Fans

EMERGENCY BUS:

Comm 1

NAV 1

Standby Radio Control

Pilot's/Copilot's Audio Panel

AHRS 2 (airspeed/altitude)

Standby HSI

N₁ indicators

Standby Pitot Heat

Cockpit Flood & Glareshield Lights

Ignition *(SEC Position)*

Stabilizer Control

Hydraulic Control Valve

Flap Control

Gear Control

Gear Warning



EMER LIGHTS BATTERY PACK:

Emergency Lights

Located on Pilot's Side Panel and Aft Bulkhead Wall (forward of Lav)

Illumination of EMER Lights:

Loss of Main DC Power

5 "G" Impact Switch

Emer Light Switch - ON

EMER LIGHTS:

Every 3rd Bulb of the LH Fwd and RH Aft Isle Lights

Cabin Exit Signs

4 Reading Lights

Over Wing Exit Lights

Battery Pack

LEFT Nose Compartment

Good for max. 30 minutes (180 minutes XLS)

Standby HIS (Meggitt or BF Goodrich)

Back Lighting

N₁ Gauge

Battery Pack

RIGHT Nose Compartment

Backup Power for AHRS 2

Good for max. 30 minutes (180 minutes XLS)

BATTERY BUS:

Tailcone Baggage Lights

Tailcone Access Lights

Cabin Entry Lights

Voltmeter (*Batt Switch ON/EMER only*)

Emer Bus (*Batt Switch in EMER Only*)

GCU:

Regulates

Parallels

(within 10%) (30 amps)

Protects

* **Power Relay**

Undervoltage

Reverse Current

* **Field Relay**

Overvoltage

Feeder Fault

Fire Switch



BATTERY LIMITS

3 Engine Starts per Hour

Batt Start

1 Battery Debit

Gen Assisted

1/3 Batt Debit

GPU Start

0 Batt Debit

Air Start

1 Batt Debit

STARTER LIMITS

Battery:

3 starts/30 minutes 90 sec. cooling period

GPU:

800 - 1000 amperes

28 VDC

On/Running before it's plugged in

BATT Switch - ON

GEN Switches - OFF

During Start - Disconnect Generators so they don't participate in the start.

BATTERY OVERTEMP LIGHT:

On 145° C

Flashes 160° C

GCU regulates the 30V DC generator to 28.5 VDC

GCU parallel the generators to share the load; the generators must be within 0.3 volts and 10% of system load.

Gen Load Limit Flight:

300 Amps

Ground:

200 amps per Gen. (*transient up to 250 amps for 4 minutes*)



GEAR HORN

Radar Altimeter indicates less than 500 AGL
Throttles below 70% N₂
Gear not down and locked

Flaps extended beyond 15°
Throttles below 70% N₂
Gear not down and locked

A/S below 150 KIAS
Throttle below 70% N₂
Gear not down & locked *(If Radar Altimeter Inop)*

The audible warning system cannot be silenced until the situation is rectified

NO TAKEOFF

- * Flaps <7° or >15°
- * Stab Not In -2 Position
- * Trim Not In T/O Range
- * Speed Brakes Extended

ALTITUDE LIMITS

* 41,000'
1-3 Vortex Generators Missing

* 41,000' & 200 KIAS
Stab Mis-Compare

* 31,000' & 200 KIAS
Hyd Press Light Illuminated



BLEED AIR

SERVICE AIR (23 psi)

- De-Ice Boots
- Press Outflow Valve
- Cabin Door Seals
- Throttle Detents

Pre-Cooler

- In Flight - 475°C ($\pm 25^\circ$)
- Ground - 405°C

Bleed Air O'Heat Light

560°C

Cabin Air

- Dive Solenoid
- Hydraulic Brake Reservoir

35°F Temp Control

If the temp exiting the water separator falls below 35°F, the TCV modulates open to mix hot air with the cold air to prevent water from freezing the water separator. (The water is sprayed into the secondary heat exchanger)

EMER PRESS Illuminates:

- Selected Manually
- Cabin Alt Exceeds 14,500'
- NORM PRESS Circuit Breaker Popped/Pulled

* EMER PRESS is not available on the ground.



ROTARY TEST

- FIRE WARN - 2 Lights
- LDG GEAR - Three **Green**, One **Red**, Horn
- BATT TEMP - 160 Degrees, Flashing Annunciator, **Master Warning**
- AOA - 1.0 AOA, Shaker, Red Chevron
- T/REV - 6 Lights, **Master Warning**
- W/S TEMP - W/S O'Heat Annunciator On, Off
(*steady 3-4 sec. then off*)
- OVERSPEED - Red V_{mo} , .400 Mach, 5000 feet, VSI 2000 FPM, Aural Warning
- ANTI SKID - Annunciator Flashes, Off
(*6 sec. then off*)
- ANNU - All 8s, Lights Check
- AVN - Mode Selectors, Avionics Annunciators Lit

SQUAT SWITCH

Left Switch - Ground

- * Opens Outflow Valves (<85% N_2)
- * Pre-Press During T/O
- * Generator Assist Starts
- * Eng Bypass Valve for Pre-Cooler
- * Ground Idle (*w/EEC Operating*)

Left Switch - Flight

- * Flight Hour Meter
- * Digital Clock
- * Opens EMER Press Valve
- * Normal (Auto) Press Control
- * TAS Probe Heater (Rosemont)
- * Landing Gear Lock Solenoid
- * Enables Pre-Cooler Doors
- * Enables Flight Idle
(*w/EEC Operating*)

Left/Right Switch - Ground

- * T/R Deployment
(*either squat switch*)
- * Stick Shaker Test
- * Anti-Skid Lock Protection

Left/Right Switch - Flight

- * Stick Shaker Operation

HYDRAULIC SYSTEM



60 psi Open Center System
1500 psi Operating

LANDING GEAR

Electrically Activated - Hydraulically Actuated
Held Up - Mechanical Up-Locks
Held Down - Mechanical Down Locks
Freefall / Blowdown System

Check the Gear is Down:

- AOA Indexer on Glareshield
- Flaps Beyond Approach - No Horn
- Speed Below 150 KIAS - No Horn
- Altitude Below 500" - No Horn
- HYD PRESS Light Out
- Rotary Switch - Test
- Three Green Lights

SPEED BRAKES

Electrically Activated - Hydraulically Actuated
Held Up - Trapped Hydraulic Pressure
Held Down - Mechanically
Loss of DC Power - Blow to Trail
Loss of Hyd Press & Switch Moved to Retract - Blow to Trail

Retracted:

- Switch
- 80%- 85% (Throttle Position Angle)

THRUST REVERSERS

Electrically Activated - Hydraulically Actuated
Stowed - Overcenter Mechanical Lock
Deployed - Constant Hydraulic Pressure

FLAPS

Electrically Activated - Hydraulically Actuated
Complete (Includes EMER Bus) Loss of DC Power - Remain in Last Position
Loss of Hyd Press - Flap Handle Moved, Blow to Trail
Fowler Flap Design
Mechanical Interconnect - Prevents Asymmetrical Flap Condition

HORIZONTAL STABILIZER

Flaps Up - Stab Up (+1°)
Flaps Down - Stab Down (-2°)
If Flaps are selected down with airspeed >200 KIAS, airspeed switch will prevent STAB movement.
"STAB MIS COMP" light after 30 secs.



BRAKES

900-1300 psi normal press

750 psi low brake press light

ANTI-SKID LIGHT

* Batt Switch On

* A/Skid Switch Turned Off

* Rotary Switch (6secs)

* Anti-Skid Fault Detected

* Low Brake Pressure

Operates only above 10 knots

Reservoir is pressurized by cabin air.

EMERGENCY BRAKES

Nitrogen Air Bottle 1800 - 2050 psi

· Emergency Braking

(10 brake applications)

· Emergency Gear Extension

(5 brake applications if used to lower landing gear)

Hydraulic Pressure On:

Altitude and Airspeed restricted to a Maximum of FL 310 and 200 KIAS, to provide adequate cooling of the Hydraulic System under pressure.