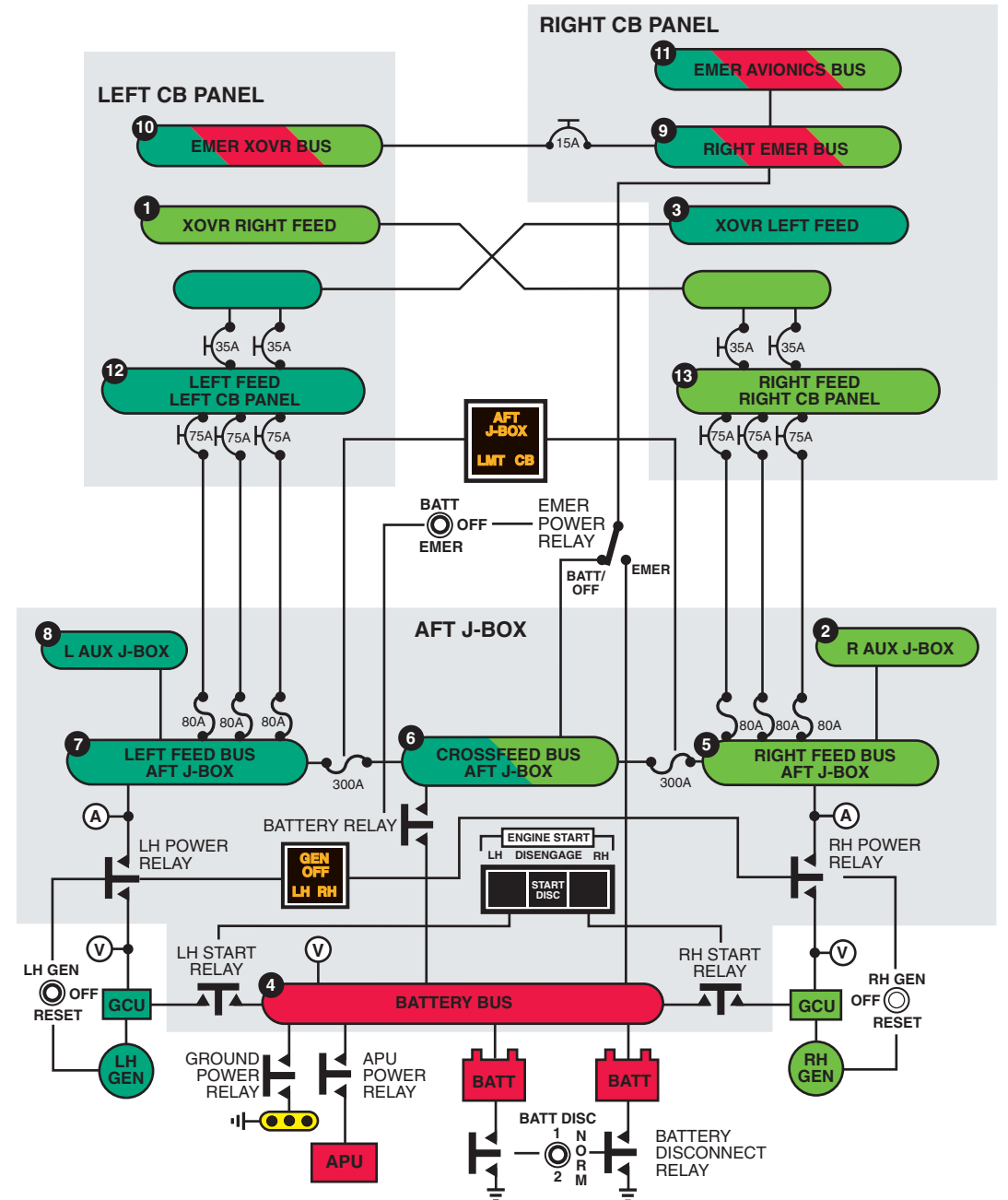


# DC Electrical System

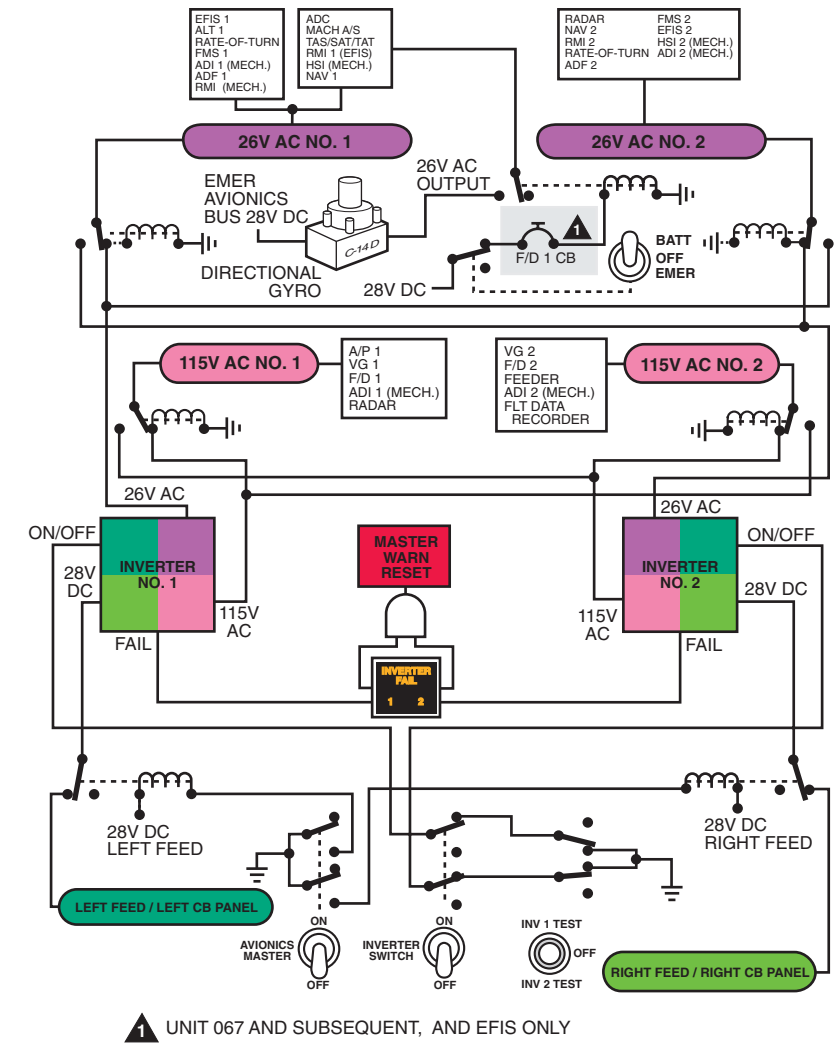


▲ UNIT 152 AND SUBSEQUENT, FOUND ON EMERGENCY CROSSOVER LEFT CB PANEL  
 ▲ UNIT 179 AND SUBSEQUENT, FOUND ON EMERGENCY CROSSOVER LEFT CB PANEL



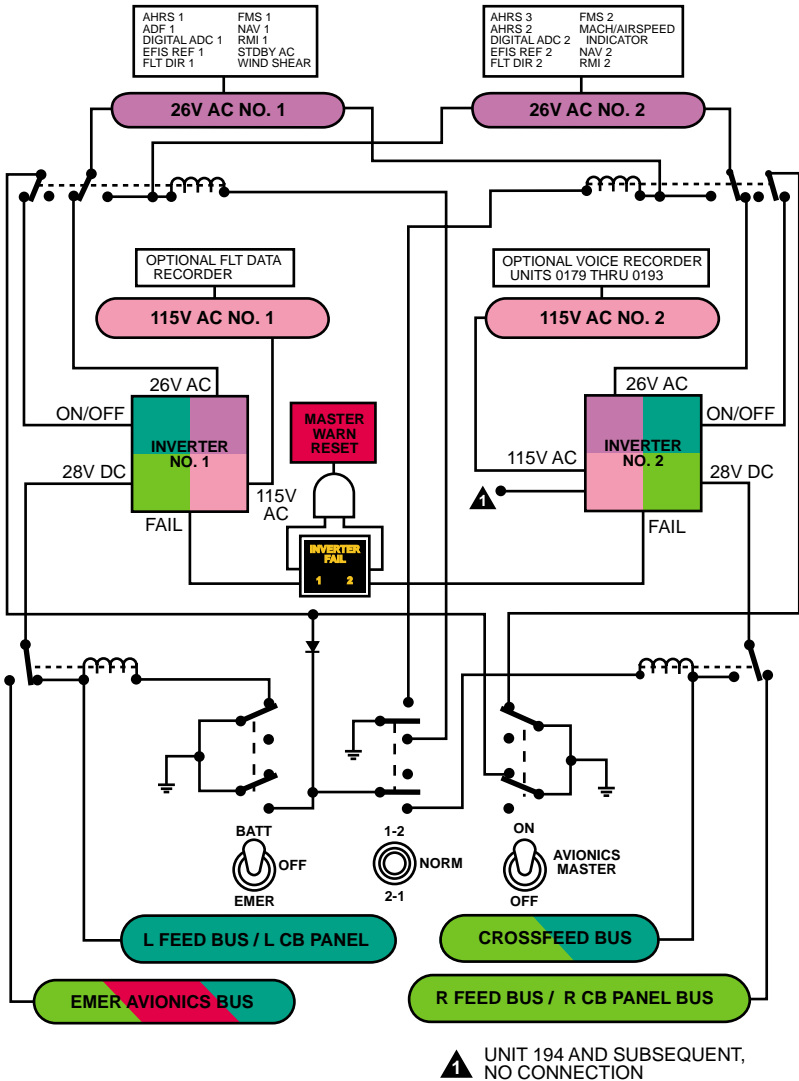
# AC Electrical System

## Units 001 to 178



# AC Electrical System

## Unit 179 and Subsequent





# DC System

Citation III/VI DC electrical system power sources include:

- one or two 24V batteries
- two engine-driven generators
- optional APU-driven generator
- external power system.

## Batteries

Depending on the aircraft, Service Bulletin compliance, and if the aircraft has an APU, battery number and capacity varies. Typical installations include:

- two 20 cell, 24V, 20 amp-hour (AH) batteries
- one 20 cell, 24V, 40 or 44AH battery
- two 20 cell, 24V, 40 or 44AH batteries.

Typically, most aircraft have two batteries.

With the battery master switch in BATT, the battery relay closes to supply power from the Battery bus to the Crossfeed bus. From the Crossfeed bus, power flows to the rest of the DC electrical system.

Placing the switch in the EMER position opens the battery relay to isolate the Crossfeed bus and closes the emergency power relay to supply power directly from the Battery bus to the Emergency bus. With the switch in OFF, the emergency power and battery relays are open to isolate the Battery bus from the rest of the electrical system. Items powered directly by the Battery bus remain operational.

On **aircraft with two batteries**, a three-position BATT DISC (1/NORM/2) switch individually disconnects the batteries from the Battery bus. With the switch in NORM, the battery disconnect relays close to connect the battery negative terminals to

electrical ground. Placing the switch in 1 or 2 opens the associated battery disconnect relay to isolate the battery from the Battery bus.

Connecting a ground power unit (GPU) automatically opens the battery disconnect relays to isolate the batteries. On **unit 44 and subsequent and prior units with SB650-24-16**: with the battery switch in BATT and a GPU connected, placing the GPU BATT CHARGE in CHG closes the battery disconnect relays to allow battery charging. Placing the switch in NORM (normal operating position) opens the battery disconnect relays when a GPU is connected.

A starter disable switch in the tailcone baggage compartment also controls the battery disconnect relays. Normally, the switch is left in the NORM position. If a starter relay hangs, lifting the guard and placing the switch in the ON position opens the disconnect relay to cut power to the starter.

If a battery overheats and temperatures reach 60°C (140°F), temperature sensors illuminate the BATT O'TEMP annunciator and trigger the master warning lights. If battery temperature exceeds 71°C (160°F), the annunciator flashes. Temperature sensors also drive the optional digital battery temperature gage. If battery temperature reaches 60°C, the temperature gage's yellow light illuminates. If temperatures reach 71°C, a red light illuminates.

## Starter/Generators

Two 30V, 400 amp engine-driven starter/generators are the primary source of DC electrical power. During engine starting they function as starters. When an engine reaches approximately 48% N<sub>2</sub> RPM, its generator control unit (GCU) enables the transition from starter to generator.

Each GCU provides:

- voltage regulation at 28.5V DC

- generator load sharing within 10% of load
- starter/generator field current control
- automatic starter shutoff
- overvoltage, overexcitation, and ground fault protection
- line contactor control and reverse current protection.

With an engine operating at 48% N<sub>2</sub> and its control switch in the GEN position, the GCU monitors Battery bus voltage. When Battery bus voltage is correct, the GCU closes the power relay to connect generator output to its Feed bus. If a fault occurs (i.e., overvoltage), the GCU opens the power relay to disconnect the generator from the electrical system. When the power relay opens, the respective GEN OFF LH/RH annunciator illuminates.

Placing the generator's control switch in RESET closes the generator field relay to rapidly build up voltage. If the electrical fault clears, the power relay closes and generator output connects to its Feed bus. Placing a control switch in OFF opens the power relay. The generator continues generating power by it does not connect to its Feed bus.

On **aircraft with an APU**, the APU-driven starter/generator supplies the aircraft's DC electrical system through the Battery bus. With the APU running and its generator on-line, power flows through its closed power relay to the Battery bus.

### External Power

With a 28V DC, 1,000 to 2,000A rated GPU connected to the external power receptacle, the ground power relay closes to supply 28V DC to the Battery bus and the rest of the electrical system. Connecting external power automatically isolates the batteries from the Battery bus by opening their disconnect relays. With the GPU BATT CHARGE switch (if installed) in CHG, the battery disconnect relays remain closed to allow external power battery charging.

If GPU voltage exceeds 32.5V DC or a generator switch is turned ON, the external power overvoltage controller energizes the external power control relay to de-actuate the external power relay and disconnect external power from the Battery bus.

## Distribution and Control

DC power from the batteries, engine-driven starter/generators, APU-driven starter/generator, or external power system supplies a multi-bus DC power distribution system. These DC buses include:

- Battery bus
- Left and Right Feed (aft junction box)
- Crossfeed bus
- Left and Right Feed (CB panel)
- Left and Right Crossover Feed
- Left and Right Emergency
- Emergency Crossover.

On **unit 174 and subsequent and prior aircraft with SB650-24-31**, placing the INTERIOR MASTER switch in the OFF position disconnects high current draw items powered from the aft junction box. These include the aft vanity, refreshment center, stereo, Wemac boost, flood cooling, cabin footwell lights, reading lights, window and overhead indirect lights, toilet, and closet lights. Normally, the switch is left in the NORM position.

## Battery Switch

With the battery switch in ON, pressing the starter button energizes the starter control relay and closes the start relay. Power flows from the Battery bus through the closed start relay to the starter; the starter begins turning. When the engine reaches approximately 48% N<sub>2</sub> RPM, the GCU terminates the start sequence and opens the start relay. When generator output



equals Battery bus voltage, the GCU closes the power relay to connect generator output to the associated Feed bus.

### **Cross Generator Start**

With an engine at a minimum power setting of 61% N<sub>2</sub> RPM, pressing the opposite engine start button closes both start relays. Power flows from the operating generator through the Battery bus to the opposite engine's starter to assist the batteries. Simultaneously, the battery relay opens to isolate the Battery bus from the DC electrical system to prevent power from finding a sneak circuit to the starter.

### **APU Assisted Start**

During an APU assisted engine start, power flows from the APU's generator to the Battery bus. From the Battery bus it reaches the engine's starter through the closed start relay.

### **External Power Start**

With the battery switch in ON, connecting the GPU energizes the external power relay and de-energizes the battery disconnect relays. During an external power start, the generator switches should be left off to prevent loss of external power as a generator comes on-line.

Power flows from the external power receptacle through the closed external power relay to the Battery bus. Pressing a start button closes the start control and start relays. Power flows from the Battery bus through the closed start relay to turn the starter. After the GCU terminates the start cycle at 48% N<sub>2</sub> RPM, the start relay opens to disconnect the starter from the Battery bus. If desired, the second engine can be started with external power or by a cross generator start.

After both engines are running, placing the generator control switches in ON closes the power relays to connect generator output to the Left and Right Feed buses. The external power relay also de-energizes to disconnect external power.

## AC System

Citation III/VI AC electrical power power sources include:

- two 115V/26V AC, 400 Hz inverters
- optional third 115V/26V AC, 400 Hz inverter
- two variable-frequency engine-driven alternators.

The engine-driven alternators provide AC power for the horizontal stabilizer anti-icing system (see Ice and Rain Protection).

## Inverters

**Units 001 to 178** have two 350 or 375VA static inverters in the nose compartment.

With DC power available, turning the avionics master switch to ON closes two relays that supply 28V DC from the Left and Right Feed buses to the inverters. Turning the inverter control switch to ON then brings both inverters on-line. AC power from the two inverters then feeds the 115V AC No. 1 and No. 2 and 26V AC No. 1 and No. 2 buses.

If an inverter fails, automatic switching relays direct 115V AC and 26V AC from the operating inverter to the failed inverter's AC buses. If an inverter's 115V AC or 26V AC output fails, the associated INVERTER FAIL 1/2 annunciator illuminates.

Holding the inverter test switch in the INV 1 TEST or INV 2 TEST position tests the automatic inverter switching system by cutting DC input to the selected inverter. During testing, the associated INVERTER FAIL 1/2 annunciator illuminates and the operating inverter assumes the failed inverter's loads.

Loss of both main inverters causes the Master Warning lights to illuminate.

**Unit 179 and subsequent** have two 250VA inverters. During emergencies, each of these inverters can supply 150% of rated power for five minutes and can supply the aircraft's entire AC power needs if an inverter fails.

With DC power available, turning the avionics power switch ON energizes two relays that supply 28V DC from the Left and Right Feed buses to the No. 1 and No. 2 inverters respectively. With the battery switch in the OFF or EMER positions, the No. 1 inverter receives power from the Emergency bus and the No. 2 inverter receives power from the Crossfeed bus.

When the inverters come on-line 115V AC and 26V AC from each inverter powers its set of AC buses. If an inverter fails and its INVERTER FAIL 1/2 annunciator illuminates, the operating inverter must be manually selected to power the failed inverter's 26V AC bus. Moving the AC XOVER switch from the NORM position to the 2 to 1 or 1 to 2 (depending on the failed inverter), cuts DC power to the failed inverter and connects the operating inverter's 26V AC bus to the failed inverter's bus.

Loss of both main inverters causes the Master Warning lights to illuminate.

On **all aircraft**, an additional inverter, if installed, in the pilot's C-14D directional gyro provides emergency 26V AC, 400 Hz power for the air data computer (ADC), pilot's altimeter and Mach/airspeed indicator, and horizontal situation indicator (HSI). The inverter only provides AC power if the battery switch is in OFF or EMER.

# Lighting

## Interior Lighting

Lighting System	Switch	Power Source
<b>Cockpit</b>		
Electroluminescent Panels	EL PANEL-LIGHT	Right Feed*
Engine/ Cockpit Flood	FLD LTS	Right Emergency Emergency Crossover
Left Panel Center Panel Right Panel	LH PANEL-LIGHT CTR PANEL-LIGHT RH PNL LT	Crossover Left Feed* Right Feed* Right Feed*
Map Lights	MAP LIGHTS (L/R)	Crossover Left Feed
<b>Passenger Cabin</b>		
Aft Vanity	Rheostat	Right Aux J-box
Cabin Reading	Individual Switches	Right Feed
Footwell	Footwell Light	Crossover Left Feed
Indirect Fluorescent	Individual Rheostats	Individual power supplies
Passenger Safety	SEAT BELT – PASS SAFE	Left Feed
Baggage and Tailcone	BAGGAGE LIGHT	Battery bus
Emergency Lighting	EMER LTG 5 “G” switch	Ni-cad battery packs

## Exterior Lighting

<b>Lighting System</b>	<b>Switch</b>	<b>Power Source</b>
<b>Anticollision</b>	ANTI COLL NAV	Right Feed bus
<b>Ground Recognition</b>	GND REC or TAIL FLD/GND REC	Right Feed bus
<b>Landing</b>	LH/RH LANDING LIGHTS	Crossover Left Feed bus Right Feed bus
<b>Navigation</b>	ANTI COLL NAV	Crossover Left Feed bus
<b>Recognition</b>	RECOG/TAXI WING INSP	Right Feed bus Left Feed bus
<b>Tail Flood</b>	TAIL FLD/ GND REC	Right Feed bus
<b>Taxi</b>	RECOG/TAXI WING INSP	Left Feed bus Right Feed bus
<b>Wing Inspection</b>	RECOG/TAXI WING INSP	Crossover Left Feed bus

## DC and AC Electrical Systems

<b>Power Source</b>	Batteries Two 20-cell, 24V, 40 or 44 amp-hour One 20-cell, 24V, 40 or 44 amp-hour (SB650-24-18) Engine Generators (2) 30V, 400A output APU Generator (optional) 30V, 400A or 300A, 150A (PATS) Inverters (2; 3 on <b>units 001 to 178 with SPZ-8000 system</b> ) 115V, 400Hz AC 26V, 400Hz AC Ground power 28V, 1,000 to 2,000A
<b>Distribution</b>	DC buses Battery Crossfeed Left/Right Feed (Aft J Box) Left/Right Aux J Box Crossover Left/Right Feed (CB panel) Right Emergency Emergency Crossover Emergency Avionics AC buses Avionics Feed 1: 115V AC Avionics Feed 1: 26V AC Avionics Feed 2: 115V AC Avionics Feed 2: 26V AC

Control, Monitor, and Protection data on following page.

<b>Control</b>	<p>DC Switches</p> <ul style="list-style-type: none"> <li>Engine generator (2)</li> <li>APU generator (optional)</li> <li>Battery</li> <li>Battery disconnect (dual battery installation)</li> <li>Engine fire</li> <li>GPU battery charge</li> <li>Starter disable</li> </ul> <p>AC Switches</p> <ul style="list-style-type: none"> <li>Avionics Master</li> <li>Inverter (<b>units 001 to 178 and Citation VI</b>)</li> <li>Inverter test (<b>units 001 to 178 and Citation VI</b>)</li> <li>AC XOVER (<b>Citation III units 179 and subsequent</b>)</li> </ul>
<b>Monitor</b>	<p>DC</p> <ul style="list-style-type: none"> <li>Voltmeter and ammeters</li> <li>GEN OFF LH/RH lights</li> <li>BATT O'TEMP 1/2 lights (dual installation)</li> <li>Battery temperature indicator (optional)</li> <li>AFT J BOX LMT/CB lights</li> </ul> <p>AC</p> <ul style="list-style-type: none"> <li>INVERTER FAIL 1/2 lights</li> </ul>
<b>Protection</b>	<ul style="list-style-type: none"> <li>Circuit breakers</li> <li>Current limiters</li> <li>Fuses</li> <li>Relays</li> <li>Generator control units</li> <li>Inverter monitor circuits</li> </ul>

## Lighting Systems

<b>Power Source</b>	Crossover Right Feed bus – 28V DC Gear warning Warning lights 2 Crossover Left Feed bus – 28V DC Footwell LH landing LH panel Map NAV Wing inspection Battery bus – 28V DC Baggage and tailcone Right Feed bus – 28V DC Ground recognition RH recognition RH taxi Left Feed bus – 28V DC LH recognition LH taxi Right Emergency bus – 28V DC Cockpit flood Right Feed bus – 28V DC Anti-collision Cabin reading Center panel Electrical panel RH landing RH panel Inverter – 40 to 60V AC, 400Hz Electroluminescent panels Inverters – 5V DC (3) Instruments (internally lighted) Emergency Ni-Cad batteries – charged by aircraft DC system (2)
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Control, Monitor, and Protection data on following page.



## Electrical Systems

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<b>Control</b>	Switches and rheostats Pilot's/copilot's light control panel Side consoles (L/R) Landing gear switch (taxi lights) Individual cabin and baggage interior DAY/NIGHT
<b>Monitor</b>	Switch positions Landing light extension (advisory light)
<b>Protection</b>	Circuit breakers

