A319/A320/A321

Landing Gear
DESCRIPTION

GENERAL

The landing gear consists of:
— two main gear that retract inboard,
— a nose gear that retracts forward.

Doors enclose the landing gear bays. Gear and doors are electrically controlled and hydraulically operated.

The doors, which are fitted to the landing gear struts, are operated mechanically by the gear and close at the end of gear retraction.

All gear doors open while the gear is retracting or extending.

Two Landing Gear Control and Interface Units (LGCIUs) control the extension and retraction of the gear and the operation of the doors. They also supply information about the landing gear to ECAM for display, and send signals indicating whether the aircraft is in flight or on the ground to other aircraft systems.

A hand crank on the center pedestal allows the flight crew to extend the landing gear if the aircraft loses hydraulic systems or electrical power.

MAIN GEAR

Each main gear has twin wheels and an oleopneumatic shock absorber.
Each main wheel has an antiskid brake.

NOSE GEAR

The two-wheeled nose gear has an oleopneumatic shock strut and a nose wheel steering system.
MAIN LANDING GEAR

NOSE GEAR
OPERATION OF GEAR AND DOORS

NORMAL OPERATION

The flight crew normally operates the landing gear by means of the lever on the center instrument panel.
The LGCIUs control the sequencing of gear and doors electrically. One LGCIU controls one complete gear cycle, then switches over automatically to the other LGCIU at the completion of the retraction cycle. It also switches over in case of failure.
The green hydraulic system actuates all gear and doors. When the aircraft is flying faster than 260 kt, a safety valve automatically cuts off hydraulic supply to the landing gear system. Below 260 kt, the hydraulic supply remains cut off as long as the landing gear lever is up.
EMERGENCY EXTENSION

If the normal system fails to extend the gear hydraulically, the flight crew can use a crank to extend it mechanically.
When a crew member turns the crank, it:
– isolates the landing gear hydraulics from the green hydraulic system,
– unlocks the landing gear doors and the main and nose main gear,
– allows gravity to drop the gear into the extended position.
Locking springs help the crew to crank the main gear into the locked condition, and aerodynamic forces assist in the locking of the nose gear.
The gear doors remain open.
The flight crew can reset the emergency extension system in flight after using it for training (if green hydraulic pressure is available).
LANDING GEAR SYSTEM INTERFACE

LGCIUs

The LGCIUs receive position information from the landing gear, cargo door, and landing flap systems.

LANDING GEAR

The LGCIUs receive the following information about the landing gear from proximity detectors :
— gear locked down or up,
— shock absorbers compressed or extended,
— landing gear door open or closed.

Failure of a proximity detector :
— The LGCIU detects any electrical failure in a proximity detector, and signals the associated output to the flight position (shock absorber not compressed or landing gear uplocked).
— The other LGCIU then automatically takes over control of the landing gear operation.
— In case of mechanical failure, the LGCIU does not modify the associated output. The effect that such a failure has on the system depends upon which condition is signalled incorrectly.

Electrical failure of an LGCIU :
— The other (healthy) LGCIU takes control of the landing gear.
— The system does not force the outputs of the failed LGCIU to the safe (flight) condition.
  • Some users will see “flight” condition.
  • Some users will see “ground” condition.

CARGO DOORS

Sensors send to the LGCIUs the position of the following components :
— manuel selector valves,
— locking shaft,
— locking handle,
— safety shaft,
— door sills .

The LGCIUs detect electrical failures only in certain proximity switches in the cargo door system :
— locking shaft,
— locking handle,
— safety shaft.

When an LGCIU makes such a detection, it indicates the NON LOCKED condition for that component.
FLAPS

The LGCIUs process the signals from four flap disconnect proximity switches, then send them to the Slat/Flap Control Computers (SFCCs). The LGCIUs do not monitor failures in the SFCC system.

PROXIMITY DETECTOR OUTPUT SIGNALS
PROXIMITY DETECTOR OUTPUT SIGNALS (CONT'D)

LGCIU 1

FWD
- LOCKING HANDLE: LOCKED
- SAFETY SHAFT: LOCKED

AFT
- LOCKING HANDLE: LOCKED
- SAFETY SHAFT: LOCKED

LGCIU 2

CARGO DOORS

FWD
- MANUAL SEL. VALVE: OPEN

AFT
- MANUAL SEL. VALVE: OPEN

FWD
- LOCKING SHAFT: LOCKED

AFT
- LOCKING SHAFT: LOCKED

FWD
- DOOR SILLS: LOCKED

AFT
- DOOR SILLS: LOCKED
INTERACTIONS BETWEEN LANDING GEAR AND AIRCRAFT SYSTEMS

The following tables present the operational effects of the proximity detectors on aircraft systems.
How to read the tables:

<table>
<thead>
<tr>
<th>SYSTEM</th>
<th>LGCIU 1</th>
<th>LGCIU 2</th>
<th>A/C IN FLT</th>
<th>A/C ON GROUND</th>
</tr>
</thead>
<tbody>
<tr>
<td>SERVICE INTERPHONE</td>
<td>6</td>
<td>6</td>
<td>........</td>
<td>........</td>
</tr>
<tr>
<td>SFCC 1(2)</td>
<td>5</td>
<td>(5)</td>
<td>........</td>
<td>........</td>
</tr>
</tbody>
</table>

The above lines mean that the service interphone receives the output n° 6 from both LGCIUs, while SFCC 1 receive the output 5 from LGCIU 1 and SFCC 2 the output 5 from LGCIU 2.
The two additional columns give the system functioning when the aircraft is in flight and on the ground.
## PROXIMITY DETECTORS ON SHOCK ABSORBERS

<table>
<thead>
<tr>
<th>SYSTEM</th>
<th>LGCIU 1 OUTPUT</th>
<th>LGCIU 2 OUTPUT</th>
<th>A/C IN FLT</th>
<th>A/C ON GRND</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>GENERAL</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strobe lights</td>
<td></td>
<td>5</td>
<td>On when AUTO selected</td>
<td>Off when AUTO selected</td>
</tr>
<tr>
<td>Logo lights</td>
<td></td>
<td>5</td>
<td>Off when flaps retracted</td>
<td>On</td>
</tr>
<tr>
<td>Airstairs (if installed)</td>
<td>3</td>
<td>1</td>
<td>Control inhibited (1)</td>
<td>Control not inhibited (2)</td>
</tr>
<tr>
<td>Cargo door (5)</td>
<td></td>
<td>5</td>
<td>normal control not available</td>
<td>normal control available</td>
</tr>
<tr>
<td>Water filling</td>
<td></td>
<td>5</td>
<td>Preselect water servicing inhibited</td>
<td>Preselect water servicing available</td>
</tr>
<tr>
<td><em>AIR</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avnics cooling</td>
<td>5</td>
<td>5</td>
<td>⦵ Skin temp. &lt; 35°C : The system is in closed conf. (1) ⦵ Skin temp. &gt; 35°C : The system is in intermediate conf. (1)</td>
<td>⦵ Skin temp. &lt; 5°C : The system is in closed conf. (2) ⦵ Skin temp. &gt; 5°C : The system is in open conf. (2)</td>
</tr>
<tr>
<td>Ground cooling (if installed)</td>
<td>1</td>
<td>3</td>
<td>Inhibited (1)</td>
<td>Not inhibited (2)</td>
</tr>
<tr>
<td>Fwd cargo vent</td>
<td></td>
<td>5</td>
<td>Extract fan stopped when $\Delta P &gt; 1$ psi</td>
<td>Extract fan on</td>
</tr>
<tr>
<td>Cab press</td>
<td>5</td>
<td>5</td>
<td>⦵ Climb mode active (4)</td>
<td>⦵ Prepressurization active before T/O (3) ⦵ Depressurization active after LDG (3)</td>
</tr>
<tr>
<td>Pack 1 (2) temp control</td>
<td>3 (1)</td>
<td></td>
<td>Pack air inlet flaps opened.</td>
<td>Pack air inlet flap fully closed at T.O and LDG</td>
</tr>
</tbody>
</table>

(1) When either LGCIU indicates flight  
(2) When both LGCIU indicate ground  
(3) When either LGCIU indicates ground  
(4) When both LGCIU indicate flight  
(5) Valid from MSN 44.
## PROXIMITY DETECTORS ON SHOCK ABSORBERS

<table>
<thead>
<tr>
<th>SYSTEM</th>
<th>LGCU 1 OUTPUT</th>
<th>LGCU 2 OUTPUT</th>
<th>A/C IN FLT</th>
<th>A/C ON GRND</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>APU</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| APU AUTO SHUTDOWN       | 5             |               | In case of oil low press, automatic shutdown is delayed by 15.5 seconds | In case of oil low press, the automatic shutdown is delayed by:  
· 15.5 seconds if the oil temp \( < -4°C \)  
· 0.05 seconds if oil temp \( > -4°C \) |
| APU SPEED CONTROL       |               |               | Speed is controlled at 101%                    | Speed is controlled at 99% (101% for eng start or when ambient temp ≥ 30°C) |
| **COMMUNICATIONS**      |               |               |                                                |                                                |
| SERVICE INTERPHONE      | 6             | 6             | Inhibited (1)                                  | Available (2)                                   |
| PUBLIC ADDRESS          | 1             | 1             | P.A. increased level (1)                       | P.A. low level (2)                              |
| ADIRU and AVIONICS      | 1             | 1             | External horn and light inhibited (1)          | External horn and light not inhibited (2)       |
| ground warning          | 3             | 3             |                                                |                                                |
| FLT INTERPHONE          | 9             |               | Communication with ground mechanic inhibited   | Communication with ground mechanic available    |
| COCKPIT CALL LIGHT      | 9             |               | Inhibited                                      | Not inhibited                                   |
| ACARS (ACARS MU or ATSU)| 7             |               | Available                                      | Available                                       |
| CVR                     | 1             | 1             | Runs (1)                                       | Runs : (2)                                      |
|                         | 3             | 3             |                                               | · during the first 5 minutes following energization |
|                         | 7             |               |                                               | · with at least one engine running              |
|                         |               |               |                                               | Stops : (2)                                     |
|                         |               |               |                                               | 5 minutes after second engine shutdown          |
|                         |               | 5             |                                               | · ERASE function inhibited                      |
|                         |               |               |                                               | · No low frequency signal in the loudspeakers if test performed |
|                         |               |               |                                               | · ERASE function not inhibited                  |
|                         |               |               |                                               | · Low frequency signal in the loudspeakers if test performed |

(1) When either output indicates flight.  
(2) When all outputs indicate ground.
# PROXIMITY DETECTORS ON SHOCK ABSORBERS

<table>
<thead>
<tr>
<th>SYSTEM</th>
<th>LGCIU 1 OUTPUT</th>
<th>LGCIU 2 OUTPUT</th>
<th>A/C IN FLT</th>
<th>A/C ON GRND</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GENERAL</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strobe Its</td>
<td>5</td>
<td>5</td>
<td>On when AUTO selected</td>
<td>Off when AUTO selected</td>
</tr>
<tr>
<td>Logo Its</td>
<td>5</td>
<td>5</td>
<td>Off when flaps retracted</td>
<td>On</td>
</tr>
<tr>
<td>Airstairs (if installed)</td>
<td>3</td>
<td>1</td>
<td>Control inhibited (1)</td>
<td>Control not inhibited (2)</td>
</tr>
<tr>
<td>Cargo Door (5)</td>
<td>5</td>
<td>5</td>
<td>normal control not available</td>
<td>normal control available</td>
</tr>
<tr>
<td>Water Filling</td>
<td>5</td>
<td>5</td>
<td>Preselect water servicing inhibited</td>
<td>Preselect water servicing available</td>
</tr>
<tr>
<td><strong>AIR COOLING</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AvnCs Cooling</td>
<td>5</td>
<td>5</td>
<td>. Skin temp. &lt; 35°C : The system is in closed conf. (1)</td>
<td>. Skin temp. &lt; 5°C : The system is in closed conf. (2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>. Skin temp. &gt; 35°C : The system is in intermediate conf. (1)</td>
<td>. Skin temp. &gt; 5°C : The system is in open conf. (2)</td>
</tr>
<tr>
<td>Ground Cooling (if installed)</td>
<td>1</td>
<td>3</td>
<td>Inhibited (1)</td>
<td>Not inhibited (2)</td>
</tr>
<tr>
<td>Fwd Cargo Vent</td>
<td>5</td>
<td>5</td>
<td>Extract fan stopped when ΔP &gt; 1 psi</td>
<td>Extract fan on</td>
</tr>
<tr>
<td>Cab Press</td>
<td>5</td>
<td>5</td>
<td>Climb mode active (4)</td>
<td>Prepressurization active before T0 (3)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- Depressurization active after LDG (3)</td>
</tr>
<tr>
<td>Pack 1 (2) Temp Control</td>
<td>3</td>
<td>(1)</td>
<td>Pack air inlet flaps opened.</td>
<td>Pack air inlet flap fully closed at T.O and LDG</td>
</tr>
</tbody>
</table>

(1) When either LGCIU indicates flight
(2) When both LGCIU indicate ground
(3) When either LGCIU indicates ground
(4) When both LGCIU indicates flight
(5) Valid from MSN 44.
# PROXIMITY DETECTORS ON SHOCK ABSORBERS

<table>
<thead>
<tr>
<th>SYSTEM</th>
<th>LGCIU 1 OUTPUT</th>
<th>LGCIU 2 OUTPUT</th>
<th>A/C IN FLT</th>
<th>A/C ON GRND</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>APU</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| APU AUTO SHUTDOWN           | 5              |                | — In case of oil low press, automatic shutdown is delayed by 15.5 seconds | — In case of oil low press, the automatic shutdown is delayed by:  
  · 15.5 seconds if the oil temp < −4°C  
  · 0.05 seconds if oil temp > −4°C |
| **COMMUNICATIONS**          |                |                |                                               |                                               |
| SERVICE INTERPHONE          | 6              | 6              | Inhibited (1)                                 | Available (2)                                  |
| PUBLIC ADDRESS              | 1              | 1              | PA. increased level (1)                        | PA. low level (2)                              |
| ADIRU and AVIONICS ground warning | 1            | 1              | External horn and light inhibited (1)          | External horn and light not inhibited (2)      |
| FLT INTERPHONE              | 9              |                | Communication with ground mechanic inhibited   | Communication with ground mechanic available   |
| COCKPIT CALL LIGHT         | 9              |                | Inhibited                                      | Not inhibited                                  |
| ACARS (ACARS MU or ATSU)    | 7              |                | Available                                      | Available                                      |
| **CVR**                     | 1              | 1              | Runs (1)                                       | Runs : (2)                                     |
|                            | 3              | 3              |                                               |   · during the first 5 minutes following energization  
  · with at least one engine running  
  Steps : (2)  
  5 minutes after second engine shutdown |
|                            | 5              |                |                                               | · ERASE function inhibited  
  · No low frequency signal in the loudspeakers if test performed  
  · ERASE function not inhibited  
  · Low frequency signal in the loudspeakers if test performed |

(1) When either output indicates flight.  
(2) When all outputs indicate ground.
# PROXIMITY DETECTORS ON SHOCK ABSORBERS

<table>
<thead>
<tr>
<th>SYSTEM</th>
<th>LGCIU 1 OUTPUT</th>
<th>LGCIU 2 OUTPUT</th>
<th>A/C IN FLT</th>
<th>A/C ON GRND</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC</td>
<td>5</td>
<td>5</td>
<td>APU start on batteries only, is delayed by 45 seconds</td>
<td>No APU start delay when on batteries only</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Main galley not supplied when APU GEN only is supplying</td>
<td>Main galley supplied when APU GEN only is supplying</td>
</tr>
<tr>
<td>EIS</td>
<td>5</td>
<td></td>
<td>Display test inhibited when ANN LT TEST is selected</td>
<td>Display test not inhibited</td>
</tr>
<tr>
<td>FIRE</td>
<td>5</td>
<td></td>
<td>No APU fire automatic extinguishing</td>
<td>Automatic extinguishing not inhibited</td>
</tr>
</tbody>
</table>
| FLT CTL| SFCC 1(2)      | 5 (5)          | · For SFCC 1(2) : Slats alpha/speed lock function active  
                      · For SFCC 2(2) : No flaps movement inhibition if the cargo door is opened  
                      · For SFCC 2(2) : Flaps movement inhibition if cargo door is opened | |
| FLT INST| DFDR           | 1 3            | Runs (1) | |
|        | QAR (if installed) | 7 3          |             | Runs : (2)  
                      · during the first 5 minutes following energization  
                      · with one engine running  
                      · 5 minutes after second engine shut down |
| FUEL   | FQI            | 5              | FQI uses flight attitude correction due to wing bending | FQI uses ground attitude correction |

(1) When either output indicates flight  
(2) When all outputs indicate ground
# PROXIMITY DETECTORS ON SHOCK ABSORBERS

<table>
<thead>
<tr>
<th>SYSTEM</th>
<th>LGCIU 1 OUTPUT</th>
<th>LGCIU 2 OUTPUT</th>
<th>A/C IN FLT</th>
<th>A/C ON GRND</th>
</tr>
</thead>
<tbody>
<tr>
<td>BLUE and GREEN pumps</td>
<td>1/3</td>
<td>Blue or green pump “FAULT” light not inhibited when related pump is stopped (1)</td>
<td>Blue or green pump “FAULT” light inhibited when related pump is stopped (4)</td>
<td></td>
</tr>
</tbody>
</table>

| BLUE pump | 7 | Runs when electrical power is available | Runs when at least one engine is running |
| BLUE and YELLOW pumps | 1/3 | Blue or yellow pump “FAULT” light not inhibited when related pump is stopped (1) | Blue or yellow pump “FAULT” light inhibited when related pump is stopped (2) |

<table>
<thead>
<tr>
<th>HYD</th>
<th>PTU</th>
<th>7</th>
<th>PTU runs if green/yellow diff. press &gt; 500 psi</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTU runs if green/yellow diff. press &gt; 500 psi</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| ICE | CAPT, (F/O), (STBY) probes and CAPT, (F/O) windows heating | 4, (2) (8) | 4, (2) (8) | . CAPT, (F/O), (STBY) pitots and CAPT, (F/O) windows : high heating level applied.
. All other probes and windows are heated (1) | . With engines stopped : no heating (2).
. With at least one engine running :
. CAPT, (F/O), (STBY) pitots and CAPT, (F/O) windows are heated at low level (2) |

| RAIN | WING ANTI ICE | 3 | 1 | Wing anti ice valves open when the WING ANTI ICE pb is at ON (1) | Wing anti ice valves open for 30 seconds when the WING ANTI ICE pb is at ON (2) |

| PROT | RAIN REPELLENT | 1 | 1 | Not inhibited (1) | Inhibited if engines are stopped (4) |

| DRAIN MAST | (5) | 9 | High heating level is applied | Low heating level is applied |

(1) When either outputs indicates flight
(2) When both outputs indicate ground
(3) One valid output is sufficient
(4) When all outputs indicate ground
(5) Valid from MSN 22
PROXIMITY DETECTORS ON SHOCK ABSORBERS

<table>
<thead>
<tr>
<th>SYSTEM</th>
<th>LGCIU 1 OUTPUT</th>
<th>LGCIU 2 OUTPUT</th>
<th>A/C IN FLT</th>
<th>A/C ON GRND</th>
</tr>
</thead>
<tbody>
<tr>
<td>LANDING GEAR</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L/G SAFETY VALVE</td>
<td>6</td>
<td></td>
<td>Safety valve closes if aircraft speed &gt; 260 kt</td>
<td>Safety valve opened</td>
</tr>
<tr>
<td>L/G control</td>
<td>10</td>
<td>10</td>
<td>Retraction not inhibited (1)</td>
<td>Retraction inhibited (1)</td>
</tr>
<tr>
<td>TIRE PRESS</td>
<td></td>
<td>5</td>
<td>&quot;TYRE LO PRESS&quot; warning threshold set to its flight level</td>
<td>&quot;TYRE LO PRESS&quot; warning threshold set to its ground level</td>
</tr>
<tr>
<td>NAVIGATION</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>STAND BY ALTI</td>
<td>5</td>
<td></td>
<td>VIBRATION function active</td>
<td>Vibration function inhibited</td>
</tr>
<tr>
<td>ATC 1(2)</td>
<td>3</td>
<td>(1)</td>
<td>ATC 1(2) available in AUTO mode</td>
<td>ATC 1(2) inhibited in AUTO mode</td>
</tr>
<tr>
<td>ADIRU 1 (2)</td>
<td>7</td>
<td></td>
<td>No external horn when ADIRU supplied from batteries only</td>
<td>External horn not inhibited</td>
</tr>
</tbody>
</table>

(1) One valid output is sufficient
(2) Valid from MSN 22
# Proximity Detectors on Shock Absorbers

<table>
<thead>
<tr>
<th>System</th>
<th>LGCIU 1 Output</th>
<th>LGCIU 2 Output</th>
<th>A/C in FLT</th>
<th>A/C on GRND</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FADEC 1(2)</td>
<td>1 3</td>
<td>(1) (3)</td>
<td>On Eng 1(2) : (1) · Reverse inhibited · No automatic start abort · FADEC always supplied · FLEX not available · If installed, BUMP not selectable</td>
<td>On Eng 1(2) : (2) · Reverse available · Automatic start abort available · 5 minutes after eng-shut down FADEC 1(2) no more supplied · FLEX available · If installed, BUMP selectable</td>
</tr>
<tr>
<td>Plant</td>
<td></td>
<td></td>
<td>Modulated idle and approach idle are available (1)</td>
<td>Modulated idle only available (3)</td>
</tr>
<tr>
<td></td>
<td>1 3 8</td>
<td>(1) (3) (8)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. When either output indicates flight
2. When both outputs indicate ground
3. When all outputs indicate ground
### PROXIMITY DETECTORS ON UPLocks

<table>
<thead>
<tr>
<th>SYSTEM</th>
<th>LGCIU 1 OUTPUT</th>
<th>LGCIU 2 OUTPUT</th>
<th>L/G UNLOCKED</th>
<th>L/G NOT UNLOCKED</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ELEC</strong></td>
<td></td>
<td></td>
<td>In EMER ELEC config:</td>
<td>In EMER ELEC config:</td>
</tr>
<tr>
<td>DC gen.</td>
<td>18</td>
<td>18</td>
<td>· STBY GEN is in line when the RAT is extended</td>
<td>· STBY GEN not available</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>· APU start available</td>
<td>· APU start not available</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>· flight time is limited by batteries endurance</td>
<td></td>
</tr>
<tr>
<td><strong>LANDING</strong></td>
<td></td>
<td></td>
<td>If UP selected: (1) L/G doors will close</td>
<td>If UP selected: (1) L/G doors will not close</td>
</tr>
<tr>
<td>L/G control</td>
<td>19</td>
<td>19</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ECAM WHEEL</strong></td>
<td></td>
<td></td>
<td>If UP selected: (2) L/G unlocked indications</td>
<td>If UP selected: (2) L/G in transit indications</td>
</tr>
<tr>
<td>page</td>
<td>16</td>
<td>16</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>17</td>
<td>17</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>18</td>
<td>18</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>LANDING</strong></td>
<td></td>
<td></td>
<td>If UP selected: (2) no indication</td>
<td>If UP selected: (2) “UNLK” red indications</td>
</tr>
<tr>
<td>L/G indicator panel</td>
<td>16</td>
<td>16</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>17</td>
<td>17</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>18</td>
<td>18</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### DOORS PROX DET

<table>
<thead>
<tr>
<th>SYSTEM</th>
<th>LGCIU 1 OUTPUT</th>
<th>LGCIU 2 OUTPUT</th>
<th>DOORS FULLY OPENED</th>
<th>DOORS CLOSED</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LANDING</strong></td>
<td></td>
<td></td>
<td>L/G extension or retraction possible (1)</td>
<td>L/G extension or retraction inhibited (1)</td>
</tr>
<tr>
<td>L/G control</td>
<td>24</td>
<td>24</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| **ECAM WHEEL** |          |                | Doors fully opened indication | Doors closed indication |
| page          | 20         | 20             |                                 |                         |
|              | 21         | 21             |                                 |                         |
|              | 22         | 22             |                                 |                         |
|              | 23         | 23             |                                 |                         |

(1) One valid output is sufficient.
(2) When all outputs indicate the same position.
## PROXIMITY DETECTORS ON DOWNLOCKS

<table>
<thead>
<tr>
<th>SYSTEM</th>
<th>LGCIU 1 OUTPUT</th>
<th>LGCIU 2 OUTPUT</th>
<th>L/G DOWNLOCKED</th>
<th>L/G NOT DOWNLOCKED</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEN - TAXI/T.O. lights</td>
<td>15</td>
<td>15</td>
<td>lights not inhibited</td>
<td>lights inhibited</td>
</tr>
<tr>
<td>COMM - SIGNS</td>
<td>12</td>
<td>12</td>
<td>“NO SMOKING” and “EXIT” signs on when AUTO selected (1)</td>
<td>“NO SMOKING” and “EXIT” signs inhibited when AUTO selected (2)</td>
</tr>
<tr>
<td>FLT. INST. - WBS</td>
<td>15</td>
<td>15</td>
<td>active (3)</td>
<td>inhibited (4)</td>
</tr>
<tr>
<td>FMGS - FAC 1(2)</td>
<td>12</td>
<td>12</td>
<td>VLE indication displayed on PFD 1(2)</td>
<td>no VLE indication</td>
</tr>
<tr>
<td>L/G control</td>
<td>14</td>
<td>14</td>
<td>If DOWN selected : (5) L/G doors will close</td>
<td>If DOWN selected : (5) L/G doors will not close</td>
</tr>
<tr>
<td>ECAM WHEEL page</td>
<td>11</td>
<td>11</td>
<td>If DOWN selected : (6) L/G down indications</td>
<td>If DOWN selected : (6) L/G in transit indications</td>
</tr>
<tr>
<td>L/G INDIC panel</td>
<td>11</td>
<td>11</td>
<td>If DOWN selected : (6) L/G down indications</td>
<td>If DOWN selected : (6) L/G in transit indications</td>
</tr>
<tr>
<td>BRAKING STEERING</td>
<td>15</td>
<td>15</td>
<td>BSCU test operative (1)</td>
<td>BSCU test inhibited (1)</td>
</tr>
<tr>
<td>BRAKES COOLING</td>
<td>15</td>
<td>15</td>
<td>Cooling available when ON selected</td>
<td>Cooling inhibited when ON selected</td>
</tr>
<tr>
<td>NAV - GPWS</td>
<td>13</td>
<td></td>
<td>“TOO LOW-FLAPS” or “TOO LOW TERRAIN” warning operative</td>
<td>“TOO LOW-GEAR” or “TOO LOW TERRAIN” warning operative</td>
</tr>
</tbody>
</table>

(1) When either output indicates DOWNLOCK.
(2) When both outputs indicate NOT DOWNLOCK.
(3) When both outputs indicate DOWNLOCK.
(4) When either output indicates NOT DOWNLOCK.
(5) One valid output is sufficient.
(6) When all outputs indicate the same position.
# PROXIMITY DETECTORS ON UPLOCKS

<table>
<thead>
<tr>
<th>SYSTEM</th>
<th>LGCIU 1 OUTPUT</th>
<th>LGCIU 2 OUTPUT</th>
<th>L/G UPLOCKED</th>
<th>L/G NOT UPLOCKED</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>L/G control</strong></td>
<td>19</td>
<td>19</td>
<td>. If UP selected : (1) L/G doors will close</td>
<td>. If UP selected : (1) L/G doors will not close</td>
</tr>
<tr>
<td><strong>ECAM WHEEL page</strong></td>
<td>16</td>
<td>16</td>
<td>. If UP selected : (2) L/G uplocked indications</td>
<td>. If UP selected : (2) L/G in transit indications</td>
</tr>
<tr>
<td><strong>L/G indicator panel</strong></td>
<td>16</td>
<td>16</td>
<td>. If UP selected : (2) no indication</td>
<td>. If UP selected : (2) “UNLK” red indications</td>
</tr>
</tbody>
</table>

# DOORS PROX DET

<table>
<thead>
<tr>
<th>SYSTEM</th>
<th>LGCIU 1 OUTPUT</th>
<th>LGCIU 2 OUTPUT</th>
<th>DOORS FULLY OPENED</th>
<th>DOORS CLOSED</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>L/G control</strong></td>
<td>24</td>
<td>24</td>
<td>L/G extension or retraction possible (1)</td>
<td>L/G extension or retraction inhibited (1)</td>
</tr>
<tr>
<td><strong>ECAM WHEEL PAGE</strong></td>
<td>20</td>
<td>20</td>
<td>Doors fully opened indication</td>
<td>Doors closed indication</td>
</tr>
</tbody>
</table>

(1) One valid output is sufficient.
(2) When all outputs indicate the same position.
## PROXIMITY DETECTORS ON DOWNLOCKS

<table>
<thead>
<tr>
<th>SYSTEM</th>
<th>L/G DOWNSLOCKED</th>
<th>L/G NOT DOWNSLOCKED</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEN TAXI/TO lights</td>
<td>lights not inhibited</td>
<td>lights inhibited</td>
</tr>
<tr>
<td>COMM SIGNS</td>
<td>12</td>
<td>“NO SMOKING” and “EXIT” signs on when AUTO selected (1) “NO SMOKING” and “EXIT” signs inhibited when AUTO selected (2)</td>
</tr>
<tr>
<td>FLT INST. WBS</td>
<td>15</td>
<td>active (3)</td>
</tr>
<tr>
<td>FMGS FAC 1(2)</td>
<td>12</td>
<td>VLE indication displayed on PFD 1(2)</td>
</tr>
<tr>
<td>L/G control</td>
<td>14</td>
<td>If DOWN selected : (5) L/G doors will close</td>
</tr>
<tr>
<td>ECAM WHEEL page</td>
<td>11</td>
<td>13</td>
</tr>
<tr>
<td>L/G INDIC panel</td>
<td>11</td>
<td>13</td>
</tr>
<tr>
<td>BRAKING STEERING</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>BRAKES COOLING</td>
<td>13</td>
<td>Cooling available when ON selected</td>
</tr>
<tr>
<td>NAV GPWS</td>
<td>13</td>
<td>“TOO LOW-FLAPS” or “TOO LOW TERRAIN” warning operative</td>
</tr>
</tbody>
</table>

(1) When either output indicates DOWNSLOCK.
(2) When both outputs indicate NOT DOWNSLOCK.
(3) When both outputs indicate DOWNSLOCK.
(4) When either output indicates NOT DOWNSLOCK.
(5) One valid output is sufficient.
(6) When all outputs indicate the same position.
### PROXIMITY DETECTORS ON CARGO DOORS

#### LOCKING HANDLE OR SHAFT, DOOR SILLS

<table>
<thead>
<tr>
<th>SYSTEM</th>
<th>LGCU 1 OUTPUT</th>
<th>LGCU 2 OUTPUT</th>
<th>LOCKED</th>
<th>UNLOCKED</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRG DOORS</td>
<td>ECAM DOOR PAGE</td>
<td>30 (31)</td>
<td>Forward (aft) door symbol appears green</td>
<td>Forward (aft) door symbol appears amber, associated with “CARGO” amber.</td>
</tr>
<tr>
<td></td>
<td>CARGO DOOR OPERATION</td>
<td>34 (35)</td>
<td>Forward (aft) door normal opening inhibition</td>
<td>Forward (aft) door normal opening possible</td>
</tr>
<tr>
<td></td>
<td></td>
<td>36 (37) △</td>
<td>Forward (aft) door normal operation possible</td>
<td>Forward (aft) door normal operation inhibited</td>
</tr>
</tbody>
</table>

#### MANUAL SELECTOR VALVE

<table>
<thead>
<tr>
<th>SYSTEM</th>
<th>LGCU 1 OUTPUT</th>
<th>LGCU 2 OUTPUT</th>
<th>CLOSE</th>
<th>OPEN</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRG DOORS</td>
<td>CARGO DOOR OPERATION</td>
<td>32 (33)</td>
<td>Forward (aft) door normal opening inhibition</td>
<td>Forward (aft) door normal opening possible</td>
</tr>
</tbody>
</table>

#### PROXIMITY DETECTORS ON FLAP ATTACHMENTS

<table>
<thead>
<tr>
<th>SYSTEM</th>
<th>LGCU 1 OUTPUT</th>
<th>LGCU 2 OUTPUT</th>
<th>FLAP ATTACHMENT</th>
<th>FLAP ATTACHMENT FAILURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>FLT CTL</td>
<td>SFCC</td>
<td>28 (29)</td>
<td>28 (29)</td>
<td>L(R) FLAPS normal operation (1)</td>
</tr>
</tbody>
</table>

(1) When at least one SFCC detects normal operation
(2) When both SFCCs detect attachment failure
CONTROLS AND INDICATORS

LANDING GEAR INDICATOR PANEL

This panel is connected to LGCIU1, which receives signals from proximity detectors.

UNLK : come on red if the gear is not locked in the selected position.
▽ : come on green if the gear is locked down.

Note: The lights on the LDG GEAR indicator panel come on as long as the LGCIU1 is electrically supplied.
LANDING GEAR SELECTOR LEVER

A two-position selector lever sends electrical signals to the two LGCIUs. These control the green hydraulic supply to the landing gear system by means of selector valves. When the flight crew selects UP or DOWN (and if the airspeed is below 260 knots):
- All landing gear doors open.
- Each landing gear moves to the selected position.
- All landing gear doors close.

1 L/G LEVER

UP : This position selects landing gear retraction. While the landing gear doors are opening, the normal brake system brakes the wheels of the main gear automatically.

DOWN : This position selects landing gear extension. An interlock mechanism prevents anyone from accidentally retracting the gear while the aircraft is on the ground. It does so by locking the lever in DOWN position when the shock absorber on either main gear is compressed (aircraft on ground) or the nose wheel steering is not centered. The landing gear hydraulic system remains pressurized as long as the landing gear is extended (if green hydraulic pressure is available).

2 RED ARROW

This red arrow lights up if the landing gear is not locked down when the aircraft is in the landing configuration, and a red warning appears on ECAM.
EMERGENCY EXTENSION

To put the landing gear down by gravity, the flight crew must pull the gear crank out, then turn it clockwise for 3 turns.

When the flight crew operates the crank handle, the cutout valve shuts off hydraulic pressure to the landing gear system and depressurizes it.
1. **Landing gear position indication**

   The landing gear positions are indicated by 2 triangles for each gear. Each triangle is controlled by one LGCIU:
   - a green triangle indicates that one LGCIU detects a landing gear downlocked,
   - a red triangle indicates that one LGCIU detects a landing gear in transit,
   - no triangle indicates that one LGCIU detects a landing gear unlocked,
   - amber crosses indicates that one LGCIU is failed.

2. **Landing gear door position indication**

   ![Diagram showing door positions](image)
   - DOOR LOCKED UP (GREEN)
   - DOOR IN TRANSIT (AMBER)
   - DOOR FULLY OPEN (AMBER)

3. **UP LOCK**

   This legend appears amber along with a caution on the ECAM if the landing gear unlock is engaged when the landing gear is down locked.

4. **L/G CTL**

   This legend appears amber along with an ECAM caution if the landing gear lever and the landing gear position do not agree.
**ECAM WHEEL PAGE**

<table>
<thead>
<tr>
<th>WHEEL</th>
<th>UP LOCK</th>
<th>N/W STEERING</th>
<th>L/G CTL</th>
<th>ANTI SKID</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ALTN BRK</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>AUTO BRK</td>
</tr>
<tr>
<td>360 °c</td>
<td>360</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>MED</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TAT + 20°C</th>
<th>SAT + 25°C</th>
<th>16H34</th>
<th>G.W. 54400KG</th>
</tr>
</thead>
</table>

Page 27
1. **Landing gear position indication**

   The landing gear positions are indicated by 2 triangles for each gear. Each triangle is controlled by one LGCIU:
   - a green triangle indicates that one LGCIU detects a landing gear downlocked,
   - a red triangle indicates that one LGCIU detects a landing gear in transit,
   - no triangle indicates that one LGCIU detects a landing gear uplocked,
   - amber crosses indicates that one LGCIU is failed.

2. **Landing gear door position indication**

   - [Diagram: DOOR LOCKED UP (GREEN)]
   - [Diagram: DOOR IN TRANSIT (AMBER)]
   - [Diagram: DOOR FULLY OPEN (AMBER)]

3. **UP LOCK**

   This legend appears amber along with a caution on the ECAM if the landing gear uplock is engaged when the landing gear is down locked.

4. **L/G CTL**

   This legend appears amber along with an ECAM caution if the landing gear lever and the landing gear position do not agree.
## WARNINGS AND CAUTIONS

<table>
<thead>
<tr>
<th>E/W/O : FAILURE TITLE</th>
<th>AURAL WARNING</th>
<th>MASTER LIGHT</th>
<th>SD PAGE CALLED</th>
<th>LOCAL WARNING</th>
<th>FLT PHASE INHIB</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEAR NOT DOWNLOCKED</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One gear not downlocked and L/G selected down</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GEAR NOT DOWN</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. L/G not downlocked and radio height lower than 750 ft and both engines N1 lower than 75 % (or if engine shut down N 1 of remaining engine lower than 97 %) or</td>
<td>CRC</td>
<td>MASTER WARN</td>
<td>DOWN ARROW it on LDG GEAR panel</td>
<td>UNLK it on</td>
<td>3, 4, 5</td>
</tr>
<tr>
<td>2. L/G not downlocked and radio height lower than 750 ft and both engines not at T.O. power and flaps at 3 or FULL or</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. L/G not downlocked and flaps at 3 or FULL and both radio altimeters failed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NOTE :</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In the cases 2 and 3 above, the aural warning can only be cancelled by the emergency cancel pushbutton.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SHOCK ABSORBER FAULT</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One shock absorber not extended when airborne or not compressed after landing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DOORS NOT CLOSED</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One gear door is not unlocked</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GEAR NOT UNLOCKED</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One gear not unlocked and L/G not selected down</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GEAR UNLOCK FAULT</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One gear unlock engaged with corresponding gear downlocked</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LGCIU 1 (2) FAULT</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SYS DISAGREE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disagree between L/G positions detected by the two LGCIU's</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Diagram

<table>
<thead>
<tr>
<th>Time (sec)</th>
<th>Event</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>45</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>75</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>90</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>105</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>120</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>135</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>150</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>165</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>180</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Page 29
A hydraulic actuating cylinder steers the nose wheel. The green hydraulic system supplies pressure to the cylinder, and electric signals from the Brake and Steering Control Unit (BSCU) control it.

The BSCU receives orders from:
- the Captain’s and the First Officer’s steering hand wheels (orders added algebraically),
- the rudder pedals,
- the autopilot.

The BSCU transforms these orders into nose wheel steering angle. That angle has the following limits, which depend on ground speed and the origin of the orders.

The steering system receives actuating hydraulic pressure when:
- the A/SKID & N/W STRG switch is on and,
- the towing control lever is in normal position and,
- at least one engine is running and,
- the aircraft is on ground.

The nose landing gear doors must be closed in order for the green hydraulic system to apply pressure to the actuating cylinder.

The handwheel can turn the nose wheel up to 75° in either direction. A lever on the towing electrical box (on nose landing gear) allows ground crew to deactivate the steering system for towing. This then allows the wheel to be turned 95° in either direction.

The pilots can use a pushbutton on either steering handwheel to prevent rudder pedal orders or autopilot orders from going to the BSCU.

An internal cam mechanism returns the nose wheel to the centered position after takeoff.
DESCRIPTION

A hydraulic actuating cylinder steers the nose wheel. The green hydraulic system supplies pressure to the cylinder, and electric signals from the Brake and Steering Control Unit (BSCU) control it.

The BSCU receives orders from:
- the Captain’s and the First Officer’s steering hand wheels (orders added algebraically),
- the rudder pedals,
- the autopilot.

The BSCU transforms these orders into nose wheel steering angle. That angle has the following limits, which depend on ground speed and the origin of the orders.

```
±6°
```

```
±75°
```

The steering system receives actuating hydraulic pressure when:
- the A/SKID & N/W STRG switch is on and,
- the towing control lever is in normal position and,
- at least one engine is running and,
- the aircraft is on ground.

The nose landing gear doors must be closed in order for the green hydraulic system to apply pressure to the actuating cylinder.

The handwheel can turn the nose wheel up to 75° in either direction. A lever on the towing electrical box (on nose landing gear) allows ground crew to deactivate the steering system for towing. This then allows the wheel to be turned 95° in either direction.

The pilots can use a pushbutton on either steering handwheel to prevent rudder pedal orders or autopilot orders from going to the BSCU.

An internal cam mechanism returns the nose wheel to the centered position after takeoff.
GREEN POWER FROM NOSE GEAR DOORS CLOSING CIRCUIT (WHEN DOORS ARE CLOSED)
DESCRIPTION

A hydraulic actuating cylinder steers the nosewheel. The yellow hydraulic system supplies pressure to the cylinder, and electric signals from the Brake and Steering Control Unit (BSCU) control it.

The BSCU receives orders from the :

- Captain and First Officer’s steering handwheels (orders added algebraically)
- Rudder pedals
- Autopilot.

The BSCU transforms these orders into the nosewheel steering angle. This angle has the following limits, that depend on ground speed and the origin of the orders.

The steering system receives actuating hydraulic pressure, when :

- The A/SKID & N/W STRG switch is on
- The towing control lever is in the normal position
- At least one engine is running, and
- The aircraft is on ground.

The handwheel can turn the nosewheel up to 75° in either direction. A lever, on the towing electrical box (on nose landing gear), enables the ground crew to deactivate the steering system for towing. Then the wheel can be turned 95° in either direction.

To prevent rudder pedal orders, or autopilot orders, from going to the BSCU, the pilots can use the pushbutton on either steering handwheel.

An internal cam mechanism returns the nosewheel to the centered position after takeoff.
CONTROLS AND INDICATORS

SIDE CONSOLES

1. Steering handwheels

The steering handwheels, which are interconnected, can steer the nose wheel up to 75° in either direction.

*Note:* The steering system centers the nose wheel automatically after liftoff.

2. Rudder PEDAL DISC pb

Pressing this button on either handwheel removes control of nose wheel steering from the rudder pedals until the button is released.

CENTER INSTRUMENT PANEL

1. A/SKID & N/W STRG sw

This ON/OFF switch activates or deactivates the nose wheel steering and anti-skid. (Refer to 1.32.30, BRAKES AND ANTI-SKID).
1 STEERING

This legend appears along with an ECAM caution if either the nose wheel steering or the anti-skid feature fails.
CONTROLS AND INDICATORS

SIDE CONSOLES

1. Steering handwheels

The steering handwheels, which are interconnected, can steer the nose wheel up to 75° in either direction.

_Note_: The steering system centers the nose wheel automatically after liftoff.

2. Rudder PEDAL DISC pb

Pressing this button on either handwheel removes control of nose wheel steering from the rudder pedals until the button is released.

CENTER INSTRUMENT PANEL

1. A/SKID & N/W STRG sw

This ON/OFF switch activates or deactivates the nose wheel steering and anti-skid. (Refer to 1.32.30, BRAKES AND ANTI-SKID).
**N/W STEERING label**

It appears in amber, when nosewheel steering is lost, due to failure of the nosewheel steering system, or of both BSCU channels, or when the A/SKID & N/W STRG switch is OFF.
CONTROLS AND INDICATORS

SIDE CONSOLES

1. Steering handwheels

The steering handwheels, which are interconnected, can steer the nose wheel up to 75° in either direction.

*Note:* The steering system centers the nose wheel automatically after liftoff.

2. Rudder PEDAL DISC pb

Pressing this button on either handwheel removes control of nose wheel steering from the rudder pedals until the button is released.

CENTER INSTRUMENT PANEL

1. A/SKID & N/W STRG sw

This ON/OFF switch activates or deactivates the nose wheel steering and anti-skid. (Refer to 1.32.30, BRAKES AND ANTI-SKID).
**1 N/W STEERING label**

It appears in amber, when nosewheel steering is lost, due to failure of the nosewheel steering system, or of both BSCU channels, or in case of a yellow hydraulic system low pressure, or if the A/SKID & N/W STRG switch is OFF.

**R 2 N/W STEERING hydraulic supply indication :**

R Only when the N/W STEERING label is displayed:
- Y is displayed in green in case the yellow hydraulic system is not failed.
- Y is displayed in amber in case of yellow hydraulic system low pressure.
**WARNINGS AND CAUTIONS**

<table>
<thead>
<tr>
<th>E/WD : FAILURE TITLE conditions</th>
<th>AURAL WARNING</th>
<th>MASTER LIGHT</th>
<th>SD PAGE CALLED</th>
<th>LOCAL WARNING</th>
<th>FLT PHASE INHIB</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/W STRG FAULT detected by BSCU</td>
<td>SINGLE CHIME</td>
<td>MASTER CAUT</td>
<td>WHEEL</td>
<td>NIL</td>
<td>3, 4, 5, 8</td>
</tr>
</tbody>
</table>

**MEMO DISPLAY**

When the nosewheel steering selector is in the towing position, “NW STRG DISC” is displayed in green. The legend is in amber, if one engine is running.
DESCRIPTION

GENERAL

The main wheels have multidisc brakes that can be actuated by either of two independent brake systems. The normal system uses green hydraulic pressure: the alternate system uses the yellow hydraulic system backed up by a hydraulic accumulator. An anti-skid system and autobraking work through the brake system. Braking commands come from either the brake pedals (pilot action) or the autobrake system (deceleration rate selected by the crew).

Two units on each main gear monitor the temperature of the brakes. All braking functions (normal and alternate braking control, anti-skid control, autobraking, brake temperature indication) are controlled by a two-channel Brake and Steering Control Unit (BSCU).

The main wheels have fusible plugs that prevent the tires from bursting if they overheat. The main wheels may also have brake cooling fans.

ANTI-SKID SYSTEM

The anti-skid system produces maximum braking efficiency by maintaining the wheels just short of an impending skid.

When a wheel is on the verge of locking, the system sends brake release orders to the normal and alternate servovalves — and to the ECAM, which displays the released brakes. The anti-skid deactivates when ground speed is less than 20 knots.

An ON/OFF switch turns the anti-skid system and nose wheel steering on and off.

PRINCIPLE

The system compares the speed of each main gear wheel (given by a tachometer) with the speed of the aircraft (reference speed). When the speed of a wheel drops below 0.87 times the reference speed, the system orders brake releasing in order to maintain the brake slip at that value (best braking efficiency).

In normal operation, the BSCU determines the reference speed from the horizontal acceleration furnished by ADIRU1, ADIRU2, or ADIRU3. If all three ADIRUs fail, reference speed equals the greater of either main landing gear wheel speed. Deceleration is limited to 1.7 meters/second² (5.6 feet/second²)
ANTI-SKID PRINCIPLE

AIRCRAFT LONGITUDINAL DECELERATION (ADIRU) \( \gamma_{ir} \)  

AIRCRAFT SPEED AT IMPACT (WHEEL SPEED) \( V_o \)

\( V_o - \gamma_{ir} \cdot t \)

\( V_o - \gamma_{prog} \cdot t \)

\( V_{prog} \)

HIGHEST VALUE

OFF

ON

AUTO BRAKE

\( V_{ref} \)

RELEASE ORDER IF WHEEL SPD < 0.87 \( V_{ref} \)

GREEN

HYD

YELLOW

AUTOMATIC SELECTOR

ALTERNATE SERVO VALVE

NORMAL SERVO VALVE

WHEEL SPEED

Page 44
**DESCRIPTION**

**GENERAL**

The main wheels are equipped with carbon multidisc brakes, which can be actuated by either of two independent brake systems. The normal system uses green hydraulic pressure, whereas the alternate system uses the yellow hydraulic system (backed up by the hydraulic accumulator). An antiskid and autobrake system is also provided. Braking commands come from either the brake pedals (pilot action), or the autobrake system (deceleration rate selected by the crew). In normal operation, a dual channel Brake and Steering Control Unit (BSCU) controls normal braking and antiskid. Depending on the failure, braking may revert to:

- Alternate braking with antiskid. This braking mode is controlled by the Alternate Braking Control Unit (ABCU). The antiskid is controlled by the BSCU.
- Alternate braking without antiskid. This braking mode is fully-controlled by the ABCU.
- Alternate braking without antiskid on accumulator. This braking mode is fully-controlled by the ABCU.

All the normal and alternate braking components are fully-monitored. Any detected failure is signaled to the crew via ECAM warnings. The BSCU performs the following secondary functions:

- It checks the residual pressure in the brakes,
- It monitors the brake temperature,
- It provides discrete wheel speed information to other aircraft systems.

A changeover between the two BSCU channels takes place at each DOWN landing gear lever selection, or in case one channel fails. The main gear wheels are fitted with fusible plugs which protect against tire burst, in the event of overheat. Main gear wheels are also equipped with brake cooling fans, which permit a high speed cooling of brakes.

**ANTISKID SYSTEM**

The antiskid system provides maximum braking efficiency by maintaining the wheels at the limit of an impending skid. At skid onset, brake release orders are sent to the normal and alternate servovalves, as well as to the ECAM system which displays the released brakes. Full braking performance is achieved only with brake pedals at full deflection. The antiskid system is deactivated below 20 knots (ground speed). An ON/OFF switch activates, or deactivates, the antiskid and nosewheel steering systems.
ANTISKID PRINCIPLE

The speed of each main gear wheel (given by a tachometer) is compared to the aircraft speed (reference speed). When the speed of a wheel decreases below approximately 0.87 times (depending on conditions) reference speed, brake release orders are given to maintain the wheel slip at that value (best braking efficiency).

In normal operation, the reference speed is determined by the BSCU from the horizontal acceleration of ADIRU 1, 2 or 3.

In case all ADIRUs fail, reference speed equals the maximum of either main landing gear wheel speeds. Deceleration is limited to a default value of 1.7 m/s² (5.6 ft/s²).
AUTO BRAKE

The purposes of this system are:
– to reduce the braking distance in case of an aborted takeoff
– to establish and maintain a selected deceleration rate during landing, thereby improving passenger comfort and reducing crew workload.

SYSTEM ARMING

The system arms when the crew presses the LO, MED, or MAX pushbutton switch if:
– Green pressure is available.
– The anti-skid system has electric power.
– There is no failure in the braking system.
– At least one ADIRS is functioning.

*Note: Auto brake may be armed with the parking brake on.*

SYSTEM ACTIVATION

Automatic braking is activated at the command for ground spoilers extension (Refer to 1.27.10 SPEED BRAKES AND GROUND SPOILERS). Therefore, if the aircraft makes an acceleration stop and begins to decelerate when its speed is under 72 knots, the automatic braking will not activate because the ground spoilers will not extend.
For autobrake to activate, at least two SEC’s must be operative.

SYSTEM DEACTIVATION

The system deactivates:
– When it is disarmed (see below).
– When the ground spoilers retract. In this case it remains armed.

SYSTEM DISARMING

The system disarms when:
– Flight crew presses the pushbutton switch or,
– One or more arming conditions is lost or,
– Flight crew applies enough deflection to at least one brake pedal when autobrake is active in MAX, MED or LO mode.
– After take-off/touch and go.
OPERATION

There are four modes of operation:
– Normal braking,
– Alternate braking with anti-skid,
– Alternate braking without anti-skid,
– Parking brake.

NORMAL BRAKING

Braking is normal when:
– Green hydraulic pressure is available.
– The A/SKID & N/W STRG switch is ON.
– The parking brake is not ON.

During normal braking, anti-skid operates and autobrake is available.
Braking is controlled electrically through the BSCU:
– from the pilot’s pedals or,
– automatically
  · on the ground by the autobrake system,
  · in flight when the landing gear lever is up.

The anti-skid system is controlled by the BSCU via the normal servo valves.
There is no indication of brake pressure in the cockpit.

ALTERNATE BRAKING WITH ANTI-SKID

Braking uses this mode when green hydraulic pressure is insufficient and:
– Yellow hydraulic pressure is available.
– The A/SKID & N/W STRG switch is ON.
– The parking brake is not ON.

An automatic hydraulic selector changes from the green to the yellow system.
The pedals brake through the auxiliary low-pressure hydraulic distribution line acting on the
dual valves. The BSCU controls the anti-skid system via the alternate servo valves.
A triple indicator on the center instrument panel shows the pressure delivered to the left
and right brakes, as well as the accumulator pressure.
Autobrake is inoperative.
AUTO BRAKE

The purposes of this system are:
— to reduce the braking distance in case of an aborted takeoff
— to establish and maintain a selected deceleration rate during landing, thereby improving passenger comfort and reducing crew workload.

SYSTEM ARMING

The system arms when the crew presses the LO, MED, or MAX pushbutton switch if:
— Green pressure is available.
— The anti-skid system has electric power.
— There is no failure in the braking system.
— At least one ADIRS is functioning.

*Note: Auto brake may be armed with the parking brake on.*

SYSTEM ACTIVATION

Automatic braking is activated at the command for ground spoilers extension (Refer to 1.27.10 SPEED BRAKES AND GROUND SPOILERS). Therefore, if the aircraft makes an acceleration stop and begins to decelerate when its speed is under 72 knots, the automatic braking will not activate because the ground spoilers will not extend.
For autobrake to activate, at least two SEC’s must be operative.

SYSTEM DEACTIVATION

The system deactivates:
— When it is disarmed (see below).
— When the ground spoilers retract. In this case it remains armed.

SYSTEM DISARMING

The system disarms when:
— Flight crew presses the pushbutton switch or,
— One or more arming conditions is lost or,
— Flight crew applies enough deflection to at least one brake pedal when autobrake is active in MAX, MED or LO mode.
— After take-off/touch and go.
OPERATION

There are four modes of operation:
— Normal braking,
— Alternate braking with anti-skid,
— Alternate braking without anti-skid,
— Parking brake.

NORMAL BRAKING

Braking is normal when:
— Green hydraulic pressure is available.
— The A/SKID & N/W STRG switch is ON.
During normal braking, anti-skid operates and autobrake is available.
Braking is controlled electrically through the BSCU:
— from the pilot’s pedals or,
— automatically
  ∙ on the ground by the autobrake system,
  ∙ in flight when the landing gear lever is up.
The anti-skid system is controlled by the BSCU via the normal servo valves.
There is no indication of brake pressure in the cockpit.

ALTERNATE BRAKING WITH ANTI-SKID

Braking uses this mode when green hydraulic pressure is insufficient and:
— Yellow hydraulic pressure is available.
— The A/SKID & N/W STRG switch is ON.
— The parking brake is not ON.
An automatic hydraulic selector changes from the green to the yellow system.
The pedals brake through the auxiliary low-pressure hydraulic distribution line acting on the
dual valves. The BSCU controls the anti-skid system via the alternate servo valves.
A triple indicator on the center instrument panel shows the pressure delivered to the left
and right brakes, as well as the accumulator pressure.
Autobrake is inoperative.
AUTO BRAKE

The purposes of this system are:
- to reduce the braking distance in case of an aborted takeoff
- to establish and maintain a selected deceleration rate during landing, thereby improving passenger comfort and reducing crew workload.

SYSTEM ARMING

The system arms when the crew presses the LO, MED, or MAX pushbutton switch if:
- Green pressure is available.
- The anti-skid system has electric power.
- There is no failure in the braking system.
- At least one ADIRS is functioning.

Note: 1. Auto brake may be armed with the parking brake on.
       2. MAX autobrake mode cannot be armed in flight.

SYSTEM ACTIVATION

Automatic braking is activated:
- at the command for ground spoilers extension (Refer to 1.27.10), for LO and MED mode.
- at the command for ground spoilers extension and the aircraft speed is above 40 kt, for MAX mode.

Therefore, if the aircraft makes an acceleration stop and begins to decelerate when its speed is under 72 knots, the automatic braking will not activate because the ground spoilers will not extend.
For autobrake to activate, at least two SEC’s must be operative.

SYSTEM DEACTIVATION

The system deactivates:
- When it is disarmed (see below).
- When the ground spoilers retract. In this case it remains armed.

SYSTEM DISARMING

The system disarms when:
- Flight crew presses the pushbutton switch or,
- One or more arming conditions is lost or,
- Flight crew applies enough deflection to at least one brake pedal when autobrake is active in MAX, MED or LO mode.
- After take-off/touch and go.
OPERATION

There are four modes of operation:
- Normal braking,
- Alternate braking with anti-skid,
- Alternate braking without anti-skid,
- Parking brake.

NORMAL BRAKING

Braking is normal when:
- Green hydraulic pressure is available.
- The A/SKID & N/W STRG switch is ON.
During normal braking, anti-skid operates and autobrake is available.
Braking is controlled electrically through the BSCU:
- from the pilot’s pedals or,
- automatically
  - on the ground by the autobrake system,
  - in flight when the landing gear lever is up.
The anti-skid system is controlled by the BSCU via the normal servo valves.
There is no indication of brake pressure in the cockpit.

ALTERNATE BRAKING WITH ANTI-SKID

Braking uses this mode when green hydraulic pressure is insufficient and:
- Yellow hydraulic pressure is available.
- The A/SKID & N/W STRG switch is ON.
- The parking brake is not ON.
An automatic hydraulic selector changes from the green to the yellow system.
The pedals brake through the auxiliary low-pressure hydraulic distribution line acting on the
dual valves. The BSCU controls the anti-skid system via the alternate servo valves.
A triple indicator on the center instrument panel shows the pressure delivered to the left
and right brakes, as well as the accumulator pressure.
Autobrake is inoperative.
AUTO BRAKE

The purposes of this system are:
  – to reduce the braking distance in case of an aborted takeoff
  – to establish and maintain a selected deceleration rate during landing, thereby improving passenger comfort and reducing crew workload.

SYSTEM ARMING

The system arms when the crew presses the LO, MED, or MAX pushbutton switch if:
  – Green pressure is available.
  – The anti-skid system has electric power.
  – There is no failure in the braking system.
  – At least one ADIRS is functioning.

*Note:* 1. Auto brake may be armed with the parking brake on.
        2. MAX autobrake mode cannot be armed in flight.

SYSTEM ACTIVATION

R Automatic braking is activated:
R  – at the command for ground spoilers extension (Refer to 1.27.10), for LO and MED mode.
R  – at the command for ground spoilers extension and the aircraft speed is above 40 kt, for MAX mode.

Therefore, if the aircraft makes an acceleration stop and begins to decelerate when its speed is under 72 knots, the automatic braking will not activate because the ground spoilers will not extend.

For autobrake to activate, at least two SEC’s must be operative.

SYSTEM DEACTIVATION

The system deactivates:
  – When it is disarmed (see below).
  – When the ground spoilers retract. In this case it remains armed.

SYSTEM DISARMING

The system disarms when:
  – Flight crew presses the pushbutton switch or,
  – One or more arming conditions is lost or,
  – Flight crew applies enough deflection to at least one brake pedal when autobrake is active in MAX, MED or LO mode.
  – After take-off/touch and go.
OPERATION

There are four modes of operation:
— Normal braking,
— Alternate braking with antiskid,
— Alternate braking without antiskid,
— Parking brake.

NORMAL BRAKING

Braking is normal when:
— Green hydraulic pressure is available.
— The A/SKID & N/W STRG switch is ON.
During normal braking, antiskid operates and autobrake is available.
Braking is electrically-controlled through the BSCU:
— From the pilot’s pedals, or
— Automatically:
  · On ground by the autobrake system,
  · In flight when the landing gear lever is up.
The antiskid system is controlled by the BSCU via the normal servovalves.
There is no brake pressure indication in the cockpit.

ALTERNATE BRAKING WITH ANTISKID

Autobrake is inoperative.
Braking uses this mode when green hydraulic pressure is insufficient, and:
— Yellow hydraulic pressure is available.
— The A/SKID & N/W STRG switch is ON.
— The parking brake is not ON.
Braking inputs are made by the brake pedals and sent to the ABCU. Then, taking into account the brake pedal input, the ABCU:
— Energizes the alternate brake selector valve to pressurize the yellow hydraulic circuit,
— Electrically controls the Alternate Servo Valve to obtain the correct pressure for the related brakes.
Antiskid is controlled by the BSCU.
Brake pressure, as well as accumulator pressure, are indicated on a triple indicator located on the center instrument panel.
ALTERNATE BRAKING WITHOUT ANTI-SKID

The anti-skid system can be deactivated:
— electrically (A/SKID & N/W STRG switch OFF, or power failure or BSCU failure),
— hydraulically (low pressure in both green and yellow systems, brakes being supplied by the brake accumulators only).

The pilot controls the braking with the pedals (acting on the dual valves).
Alternate servo valves are fully open.
The pilot must refer to the triple indicator to limit brake pressure in order to avoid locking a wheel.
The accumulator can supply at least 7 full brake applications.
Autobrake is inoperative.

PARKING BRAKE

Putting on the PARKING BRK deactivates the other braking modes and the anti-skid system.
The yellow hydraulic system or accumulators supply brake pressure via the dual shuttle valves. Alternate servo valves open to allow the application of full pressure.
Accumulators maintain the parking pressure for at least 12 hours.
Crew members can pressurize the yellow accumulators by pressing the yellow electric pump switch.
The triple indicator shows brake pressure.
ALTERNATE BRAKING WITHOUT ANTI-SKID

The anti-skid system can be deactivated:
— electrically (A/SKID & N/W STRG switch OFF, or power failure or BSCU failure),
— hydraulically (low pressure in both green and yellow systems, brakes being supplied by the brake accumulator only).

The pilot controls the braking with the pedals (acting on the dual valves).
Alternate servo valves are fully open.
The pilot must refer to the triple indicator to limit brake pressure in order to avoid locking a wheel.
The accumulator can supply at least 7 full brake applications.
Autobrake is inoperative.

PARKING BRAKE

Brakes are supplied by yellow hydraulic system or accumulator via the dual shuttle valves.
Alternate servo valves open allowing full pressure application.
The accumulator maintains the parking pressure for at least 12 hours.
If the parking brake is activated and no yellow hydraulic or accumulator brake pressure is available, then the normal braking system can be applied via the brake pedals.
Yellow accumulators can be pressurized by pressing the yellow electrical pump switch.
Brake pressure indications are available on the triple indicator.
ALTERNATE BRAKING WITHOUT ANTISKID

Autobrake and antiskid are inoperative.
The antiskid system is either deactivated:
— Electrically (A/SKID & N/W STRG switch OFF, or power supply failure, or BSCU failure),
or
— Hydraulically (Y + G system low pressure, the brakes are supplied by the brake accumulator only).
Depending on the brake pedals’ demand, the ABCU controls the alternate brake selector and the alternate servovalves.
Brake pressure and accumulator pressure are indicated on a triple indicator, located on the center instrument panel.
To avoid wheel locking and limit the risk of tire burst, brake pressure is automatically limited to 1000 psi.
Accumulators are designed to supply at least seven full brake applications.

PARKING BRAKE

Brakes are supplied by the yellow hydraulic system, or by accumulator pressure via the parking brake control valve, which opens allowing full pressure application on the main gear wheel brakes.
The accumulator maintains the parking pressure for at least 12 hours.
If the parking brake is activated, and no yellow hydraulic or accumulator brake pressure is available, then the normal braking system can be applied via the brake pedals.
Yellow accumulators can be pressurized by pressing the yellow electrical pump switch.
Brake pressure and accumulator pressure are indicated on a triple indicator, located on the center instrument panel.
CONTROLS AND INDICATORS

CENTER INSTRUMENT PANEL

1 A/SKID & N/W STRG sw

ON : If green hydraulic pressure is available:
  - Anti-skid is available.
  - Nose wheel steering is available.
If green hydraulic pressure is lost:
  - Yellow hydraulic pressure takes over automatically to supply the brakes.
  - Anti-skid remains available.
  - Nose wheel steering is lost.
  - The triple indicator shows yellow system brake pressure.
OFF : Yellow hydraulic system supplies pressure to the brakes.
  - Anti-skid is deactivated. The pilot must refer to the triple indicator to limit brake pressure and avoid locking a wheel.
  - Nose wheel steering is lost.
  - Differential braking remains available through the pedals.
  - The triple indicator displays yellow system brake pressure.

2 BRAKES and ACCU PRESS indicator

ACCU PRESS : Indicates the pressure in the yellow brake accumulators.
BRAKES : Indicates the yellow pressure delivered to the left and right brakes, as measured upstream of the alternate servo valves.
AUTO BRK panel

The springloaded MAX, MED, and LO pushbutton switches arm the appropriate deceleration rate.

- MAX mode is normally selected for takeoff.
  In the case of an aborted takeoff, maximum pressure goes to the brakes, as soon as the system generates the ground spoiler deployment order.
- MED or LO mode is normally selected for landing.
  - LO mode sends progressive pressure to the brakes 4 seconds after the ground spoilers deploy, in order to decelerate the aircraft at 1.7 meters/second² (5.6 feet/second²).
  - MED mode sends progressive pressure to the brakes 2 seconds after the ground spoilers deploy, in order to decelerate the aircraft at 3 meters/second² (9.8 feet/second²).
- Lights:
  - The blue ON light comes on to indicate positive arming.
  - The green DECEL light comes on when the actual deceleration is 80% of the selected rate.

Note: On slippery runways, the predetermined deceleration may not be reached due to antiskid operation. In this case, the DECEL light will not come on. This does not mean that autobrake is not working.

R
- Off: The corresponding autobrake mode is not armed.
**CONTROLS AND INDICATORS**

**CENTER INSTRUMENT PANEL**

1. A/SKID & N/W STRG switch

   **ON** : If green hydraulic pressure is available, then antiskid is available.
   
   If green hydraulic pressure is lost, then:
   
   – Yellow hydraulic pressure automatically takes over to supply the brakes,
   – Antiskid and nosewheel steering remain available.
   – The triple indicator shows yellow system brake pressure.

   **OFF** : The yellow hydraulic system supplies pressure to the brakes.
   
   – Anti-skid is deactivated. The pilot must refer to the triple indicator to limit brake pressure and avoid locking a wheel.
   – Nosewheel steering is lost.
   – Differential braking remains available through the pedals.
   – The triple indicator displays yellow system brake pressure.

2. BRAKES and ACCU PRESS indicator

   Brake pressure is only indicated when the yellow hydraulic system controls the brake pressure, which means when the:
   
   – Alternate braking system is activated, or
   – Parking brake is applied.

   **ACCU PRESS** : Indicates the pressure in the yellow brake accumulator.
   **BRAKES** : Indicates the yellow pressure delivered to the left and right brakes, as measured downstream of the alternate servo valves.
The springloaded MAX, MED, and LO pushbutton switches arm the appropriate deceleration rate.

- **MAX mode** is normally selected for takeoff.
  - In the case of an aborted takeoff, maximum pressure goes to the brakes, as soon as the system generates the ground spoiler deployment order.

- **MED or LO mode** is normally selected for landing.
  - LO mode sends progressive pressure to the brakes 4 seconds after the ground spoilers deploy, in order to decelerate the aircraft at 1.7 meters/second\(^2\) (5.6 feet/seconds\(^2\)).
  - MED mode sends progressive pressure to the brakes 2 seconds after the ground spoilers deploy, in order to decelerate the aircraft at 3 meters/second\(^2\) (9.8 feet/seconds\(^2\)).

- **Lights:**
  - The blue ON light comes on to indicate positive arming.
  - The green DECEL light comes on when the actual deceleration is 80% of the selected rate.

*Note*: On slippery runways, the predetermined deceleration may not be reached due to antiskid operation. In this case, the DECEL light will not come on. This does not mean that autobrake is not working.

- **Off**: The corresponding autobrake mode is not armed.
4 BRK FAN pb sw

ON  : The brake fans run if the lefthand main landing gear is down and locked.
OFF : The brake fans stop.
HOT It : This amber light comes on when the brakes get too hot. (A caution appears on ECAM, also).

PEDESTAL

1 PARKING BRK handle

Flight crew pulls this handle, then turns it clockwise, to apply the parking brake. Applying the parking brake deactivates all the other braking modes. The ECAM memo page displays “PARK BRK”.

CAUTION
If the pointer is not at ON, the parking brake is not on.
1 Release indicators

These green lines appear temporarily after the landing gear has been lowered to indicate that the anti-skid function is ready. They reappear after touchdown, along with REL (blue), when the anti-skid is active.

2 A/SKID

This legend appears in amber, along with an ECAM caution, in case of total BSCU failure, or when the A/SKID & N/W STRG switch is OFF, or if the BSCU detects an ANTI-SKID failure.
4) **BRK FAN pb sw**

ON  : The brake fans run if the lefthand main landing gear is down and locked.
OFF : The brake fans stop.
HOT : This amber light comes on when the brakes get too hot. (A caution appears on ECAM, also).

**PEDESTAL**

1) **PARKING BRK handle**

Flight crew pulls this handle, then turns it clockwise, to apply the parking brake. The ECAM memo page displays “PARK BRK”.

---

**CAUTION**

If the pointer is not at ON, the parking brake is not on.
1 Release indicators

≡ These green lines appear temporarily after the landing gear has been lowered to indicate that the anti-skid function is ready. They reappear after touchdown, along with REL (blue), when the anti-skid is active.

2 A/SKID

This legend appears in amber, along with an ECAM caution, in case of total BSCU failure, or when the A/SKID & N/W STRG switch is OFF, or if the BSCU detects an ANTI-SKID failure.
BRK FAN

4 BRK FAN pb sw

ON : The brake fans run if the lefthand main landing gear is down and locked.
OFF : The brake fans stop.
HOT It : This amber light comes on when the brakes get too hot. (A caution appears on ECAM, also).

PEDESTAL

1 PARKING BRK handle

Flight crew pulls this handle, then turns it clockwise, to apply the parking brake. The ECAM memo page displays “PARK BRK”.

CAUTION
If the pointer is not at ON, the parking brake is not on.
1 Release indicators

These green lines appear temporarily after the landing gear has been lowered to indicate that the anti-skid function is ready. They reappear after touchdown when the anti-skid is active.

2 ANTI SKID

This appears in amber, along with an ECAM caution, in case of a total BSCU failure, or when the A/SKID & N/W STRG switch is OFF, or if the BSCU detects an ANTI-SKID failure.
### BRK FAN

<table>
<thead>
<tr>
<th>Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ON</strong></td>
<td>The brake fans run if the lefthand main landing gear is down and locked.</td>
</tr>
<tr>
<td><strong>OFF</strong></td>
<td>The brake fans stop.</td>
</tr>
<tr>
<td><strong>HOT</strong></td>
<td>This amber light comes on when the brakes get too hot. (A caution appears on ECAM, also).</td>
</tr>
</tbody>
</table>

#### PARKING BRK handle

Flight crew pulls this handle, then turns it clockwise, to apply the parking brake. The ECAM memo page displays “PARK BRK”.

**CAUTION**

If the pointer is not at ON, the parking brake is not on.
ECAM WHEEL PAGE

1. Release indicators
   - Ill: It appears in amber in case of brake released fault.

2. ANTI SKID indication
   - A → ANTI SKID 1 2 → B

A. ANTISKID label:
   - It appears in amber, along with an ECAM caution, in case of a total BSCU failure, or when the A/SKID & N/W STRG switch is OFF, or if the BSCU detects an ANTI-SKID failure, or in case of normal braking and yellow hydraulic system low pressure.
   - It appears in green in case of autobrake, normal braking, or alternate braking failure, and antiskid is still available.

B. BSCU channel indication
   - When ANTISKID label is displayed, the number of the failed system(s) is (are) displayed in amber, if any.
3 AUTO BRK

This legend appears:
– in green when auto brake is armed,
– flashing green for 10 seconds after autobrake disengagement.
– in amber, along with an ECAM caution, to indicate a system failure.
MED, LO, or MAX appears underneath in green to show which rate has been selected.

4 Wheel number

This white number identifies individual wheels of the main landing gear.

5 Brake temperature

– The temperature normally appears in green.
– The green arc appears on the hottest wheel when one brake temperature exceeds 100°C.
– The green arc becomes amber, and an ECAM caution appears, when the corresponding brake temperature exceeds 300°C.
ALTN BRK

This legend appears in green if the braking system is in alternate mode.
③ AUTO BRK

This legend appears:
— in green when auto brake is armed,
— flashing green for 10 seconds after autobrake disengagement.
— in amber, along with an ECAM caution, to indicate a system failure.
MED, LO, or MAX appears underneath in green to show which rate has been selected.

④ Wheel number

This white number identifies individual wheels of the main landing gear.

R ⑤ Brake temperature

— The temperature normally appears in green.
— The green arc appears on the hottest wheel when one brake temperature exceeds 100°C.
— The green arc becomes amber, and an ECAM caution appears, when the corresponding brake temperature exceeds 300°C.
6 NORM BRK indication

A NORM BRK label:
This indication appears in green when autobrake or alternate braking is failed, and normal braking is still available.
The legend appears in amber when normal braking is failed due to total BSCU failure, or to the loss of the green hydraulic pressure, or to the loss of antiskid.

8 NORM BRK hydraulic supply indication:
G is displayed when the NORM BRK label is displayed. It is green when green hydraulic pressure is available and amber, in case of green hydraulic low pressure.

7 ALTN BRK indication

A ALTN BRK label
This indication appears in green, if the braking system is in alternate mode and not failed, or in case autobrake or normal braking is failed and alternate braking is still available.
This indication appears in amber when alternate braking is failed.

B ALTN BRK hydraulic supply indication:
Y is displayed when the ALTN BRK label is displayed. It is green when yellow hydraulic pressure is available and amber, in case of yellow hydraulic low pressure.

C ACCU indications

Y ALTN BRK

* ACCU PR

* Appears in green, when the ALTN BRK label is displayed, and the yellow hydraulic pressure is available.
Appears in amber, with no arrow, when the yellow hydraulic system and the accumulator are in low pressure.

** Appears in green when the alternate braking is pressurized by the yellow accumulator.
## WARNINGS AND CAUTIONS

<table>
<thead>
<tr>
<th>E/WD : FAILURE TITLE condition</th>
<th>AURAL WARNING</th>
<th>MASTER LIGHT</th>
<th>SD PAGE CALLED</th>
<th>LOCAL WARNING</th>
<th>FLT PHASE INHIB</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONFIG PARK BRK ON parking brake is on when thrust levers are set at TO or FLX TO power position</td>
<td>CRC</td>
<td>MASTER WARN</td>
<td>NIL</td>
<td>NIL</td>
<td>1, 2 5 to 10</td>
</tr>
<tr>
<td>BRAKES HOT one brake temperature higher than 300°C</td>
<td></td>
<td></td>
<td></td>
<td>HOT it on BRK FAN pb sw</td>
<td>4, 8</td>
</tr>
<tr>
<td>AUTO BRK FAULT failure of autobrake when armed</td>
<td>SINGLE CHIME</td>
<td>MASTER CAUT</td>
<td>WHEEL</td>
<td>NIL</td>
<td>3 to 5</td>
</tr>
<tr>
<td>A/ SKID NWS FAULT • loss of normal brake system associated with Y HYD sys lo press or • failure of both BSCU channels</td>
<td></td>
<td></td>
<td></td>
<td>NIL</td>
<td>4, 5</td>
</tr>
<tr>
<td>ANTI SKID/NWS OFF switch at OFF position</td>
<td></td>
<td></td>
<td></td>
<td>NIL</td>
<td>4, 5</td>
</tr>
<tr>
<td>HYD SEL FAULT failure of brake normal selector valve or NWS selector valve in open position</td>
<td></td>
<td></td>
<td></td>
<td>NIL</td>
<td>3 to 5, 7, 8</td>
</tr>
<tr>
<td>SYS 1 (2) FAULT failure of one BSCU channel</td>
<td>NIL</td>
<td>NIL</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
MEMO DISPLAY

- If the parking brake is on, this display shows “PARK BRK”:
  - In green, in flight phases 1, 2, 9, and 10.
  - In amber, in flight phases 4 to 8.
  - It does not display this message in flight phase 3.
- If the autobrake is on, AUTO BRK LO, AUTO BRK MED, or AUTO BRK MAX appears.
- If the autobrake is faulty, AUTO BRK OFF appears.
- BRK FAN appears in green, if the BRK FAN pushbutton is ON ⚫️.
## WARNINGS AND CAUTIONS

<table>
<thead>
<tr>
<th>E/WD : FAILURE TITLE condition</th>
<th>AURAL WARNING</th>
<th>MASTER LIGHT</th>
<th>SD PAGE CALLED</th>
<th>LOCAL WARNING</th>
<th>FLT PHASE INHIB</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONFIG PARK BRK ON parking brake is on when thrust levers are set at TO or FLX TO power position</td>
<td>CRC</td>
<td>MASTER WARN</td>
<td>NIL</td>
<td>NIL</td>
<td>1, 2 5 to 10</td>
</tr>
<tr>
<td>BRAKES HOT one brake temperature higher than 300°C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4, 8 to 10</td>
</tr>
<tr>
<td>AUTO BRK FAULT failure of autobrake when armed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3 to 5</td>
</tr>
<tr>
<td>A/SKID NWS FAULT loss of normal brake system associated with Y HYD sys lo press or failure of both BSCU channels</td>
<td>SINGLE CHIME</td>
<td>MASTER CAUT</td>
<td>WHEEL</td>
<td>NIL</td>
<td>4, 5</td>
</tr>
<tr>
<td>ANTI SKID/NWS OFF switch at OFF position</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4, 5</td>
</tr>
<tr>
<td>HYD SEL FAULT failure of brake normal selector valve or NWS selector valve in open position</td>
<td>NIL</td>
<td></td>
<td></td>
<td></td>
<td>3 to 5, 7, 8</td>
</tr>
<tr>
<td>SYS 1 (2) FAULT failure of one BSCU channel</td>
<td>NIL</td>
<td>NIL</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
MEMO DISPLAY

– If the parking brake is on, this display shows “PARK BRK”:
  - In green, in flight phases 1, 2, 9, and 10.
  - In amber, in flight phases 4 to 8.
  It does not display this message in flight phase 3.
– If the autobrake is on, AUTO BRK LO, AUTO BRK MED, or AUTO BRK MAX appears.
– If the autobrake is faulty, AUTO BRK OFF appears.
– BRK FAN appears in green, if the BRK FAN pushbutton is ON ⦿.
## WARNINGS AND CAUTIONS

<table>
<thead>
<tr>
<th>E/WD : FAILURE TITLE condition</th>
<th>AURAL WARNING</th>
<th>MASTER LIGHT</th>
<th>SD PAGE CALLED</th>
<th>LOCAL WARNING</th>
<th>FLT PHASE INHIB</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONFIG PARK BRK ON</td>
<td>CRC</td>
<td>MASTER WARN</td>
<td>NIL</td>
<td>NIL</td>
<td>1, 2 5 to 10</td>
</tr>
<tr>
<td>parking brake is on when thrust levers are set at TO or FLX TO power position</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 to 5, 8 to 10</td>
</tr>
<tr>
<td>PARK BRK ON</td>
<td></td>
<td></td>
<td></td>
<td>HOT it on BRK FAN pb sw</td>
<td>4, 8 to 10</td>
</tr>
<tr>
<td>Parking brake is ON during flight.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BRAKES HOT</td>
<td></td>
<td></td>
<td></td>
<td>HOT it on BRK FAN pb sw</td>
<td>4, 8 to 10</td>
</tr>
<tr>
<td>one brake temperature higher than 300°C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AUTO BRK FAULT</td>
<td>SINGLE CHIME</td>
<td>MASTER CAUT</td>
<td>WHEEL</td>
<td>NIL</td>
<td>3 to 5</td>
</tr>
<tr>
<td>failure of autobrake when armed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4, 5</td>
</tr>
<tr>
<td>A/SKID NWS FAULT</td>
<td></td>
<td></td>
<td></td>
<td>NIL</td>
<td>3 to 5, 7, 8</td>
</tr>
<tr>
<td>· loss of normal brake system associated with Y HYD sys lo press or failure of both BSCU channels</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ANTI SKID/NWS OFF</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4, 5</td>
</tr>
<tr>
<td>switch at OFF position</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HYD SEL FAULT</td>
<td></td>
<td></td>
<td></td>
<td>NIL</td>
<td></td>
</tr>
<tr>
<td>failure of brake normal selector valve or NWS selector valve in open position</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SYS 1 (2) FAULT</td>
<td>NIL</td>
<td>NIL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>failure of one BSCU channel</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
MEMO DISPLAY

- If the parking brake is ON, the “PARK BRK” memo appears in green, during flight phases 1, 2, 9, and 10.
- If the autobrake is armed, AUTO BRK LO, AUTO BRK MED, or AUTO BRK MAX appears.
- If the autobrake is faulty, “AUTO BRK OFF” appears.
- “BRK FAN” appears in green, if the BRK FAN pushbutton is ON.

Page 82
## WARNINGS AND CAUTIONS

<table>
<thead>
<tr>
<th>E/WD : FAILURE TITLE condition</th>
<th>AURAL WARNING</th>
<th>MASTER WARNING</th>
<th>SD PAGE CALLED</th>
<th>LOCAL WARNING</th>
<th>FLT PHASE INHIB</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONFIG PARK BRK ON</td>
<td>CRC</td>
<td>MASTER WARN</td>
<td>NIL</td>
<td>NIL</td>
<td>1, 2 5 to 10</td>
</tr>
<tr>
<td>parking brake is on when thrust levers are set at TO or FLX TO power position</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 to 5, 8 to 10</td>
</tr>
<tr>
<td>PARK BRK ON</td>
<td></td>
<td></td>
<td></td>
<td>HOT it on BRK FAN pb sw</td>
<td>4, 8 to 10</td>
</tr>
<tr>
<td>Parking brake is ON during flight.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BRAKES HOT</td>
<td>SINGLE CHIME</td>
<td>MASTER CAUT</td>
<td>WHEEL</td>
<td>NIL</td>
<td>3 to 5</td>
</tr>
<tr>
<td>one brake temperature higher than 300°C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4, 5</td>
</tr>
<tr>
<td>AUTO BRK FAULT</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>failure of autobrake when armed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A/SKID NWS FAULT</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>· loss of normal brake system associated with Y HYD sys lo press or</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4, 5</td>
</tr>
<tr>
<td>· failure of both BSCU channels</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ANTI SKID/NWS OFF</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>switch at OFF position</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HYD SEL FAULT</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>failure of brake normal selector valve or NWS selector valve in open position</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3 to 5, 7, 8</td>
</tr>
<tr>
<td>SYS 1 (2) FAULT</td>
<td>NIL</td>
<td>NIL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>failure of one BSCU channel</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### E/WD : FAILURE TITLE condition

<table>
<thead>
<tr>
<th>Condition</th>
<th>AURAL WARNING</th>
<th>MASTER LIGHT</th>
<th>SD PAGE CALLED</th>
<th>LOCAL WARNING</th>
<th>FLT PHASE INHIB</th>
</tr>
</thead>
<tbody>
<tr>
<td>RELEASED</td>
<td>SINGLE CHIME</td>
<td>MASTER CAUT</td>
<td>WHEEL</td>
<td>NIL</td>
<td>4, 5</td>
</tr>
<tr>
<td>NORM BRK FAULT</td>
<td>NIL</td>
<td>NIL</td>
<td>NIL</td>
<td>NIL</td>
<td>3 to 5</td>
</tr>
<tr>
<td>ALTN BRK FAULT</td>
<td>NIL</td>
<td>NIL</td>
<td>NIL</td>
<td>NIL</td>
<td>3, 4, 5, 7, 8</td>
</tr>
<tr>
<td>ALTN L(R) RELEASED</td>
<td>SINGLE CHIME</td>
<td>MASTER CAUT</td>
<td>NIL</td>
<td>NIL</td>
<td>3, 4, 5</td>
</tr>
<tr>
<td>NORM + ALTN FAULT</td>
<td>SINGLE CHIME</td>
<td>MASTER CAUT</td>
<td>WHEEL</td>
<td>NIL</td>
<td>4, 5</td>
</tr>
<tr>
<td>BRK Y ACCU LO PR</td>
<td>NIL</td>
<td>NIL</td>
<td>NIL</td>
<td>NIL</td>
<td>3, 4, 5, 7, 8</td>
</tr>
<tr>
<td>BRAKES-N/W SMNOR FAULT</td>
<td>NIL</td>
<td>NIL</td>
<td>NIL</td>
<td>NIL</td>
<td>2 to 9</td>
</tr>
</tbody>
</table>

### MEMO DISPLAY

- If the parking brake is ON, the “PARK BRK” memo appears in green, during flight phases 1, 2, 9, and 10.
- If the autobrake is armed AUTO BRK LO, AUTO BRK MED, or AUTO BRK MAX appears.
- If the autobrake is faulty, “AUTO BRK OFF” appears.
- “BRK FAN” appears in green, if the BRK FAN pushbutton is ON <.

Page 84
The tire pressure indicating system includes:
- a sensor that measures the pressure of each tire,
- a transmission unit that transmits the electrical pressure signal from the sensor to the computer,
- a tire pressure indicating unit computer that sends information to the ECAM for cautions and the system page display.
Tire press indication

The normal indication is green. It becomes amber, and ECAM caution appears, if the tire pressure gets too low.

*Note*: The prescribed tire pressure depends on tire type and aircraft weight.
### WARNINGS AND CAUTIONS

<table>
<thead>
<tr>
<th>E/WD : FAILURE TITLE conditions</th>
<th>AURAL WARNING</th>
<th>MASTER LIGHT</th>
<th>SD PHASE CALLED</th>
<th>LOCAL WARNING</th>
<th>FLT PHASE INHIB</th>
</tr>
</thead>
<tbody>
<tr>
<td>TYRE LO PR</td>
<td>SINGLE CHIME</td>
<td>MASTER CAUT</td>
<td>WHEEL</td>
<td>NIL</td>
<td>4, 5, 8</td>
</tr>
</tbody>
</table>

One tire pressure is lower than:
- 74 % of nominal pressure from lift off to engines shut down
- 89 % of nominal pressure in other cases,
- difference of pressure between two wheels on the same axle is higher than:
- 21 % of nominal pressure from lift off to engines shut down
- 15 % of nominal pressure in other cases.
<table>
<thead>
<tr>
<th>BUS EQUIPMENT LIST</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th></th>
<th>NORM</th>
<th></th>
<th>EMER ELEC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AC</td>
<td>DC</td>
<td>AC ESS</td>
</tr>
<tr>
<td>LANDING GEAR</td>
<td>LGCIU 1</td>
<td>GRND/FLT</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>LGCIU 2</td>
<td>GRND/FLT</td>
<td></td>
</tr>
<tr>
<td>SAFETY VALVE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L/G INDICATOR PANEL</td>
<td></td>
<td></td>
<td>SHED (1)</td>
</tr>
<tr>
<td>BRAKES</td>
<td>BSCU CH 1</td>
<td>AC1</td>
<td>DC1</td>
</tr>
<tr>
<td></td>
<td>BSCU CH 2</td>
<td>AC2</td>
<td>DC2</td>
</tr>
<tr>
<td></td>
<td>PARK BRK CTL</td>
<td>GRND/FLT</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRESS INDICATOR</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>BRK FAN CTL</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>COOLING FANS (Wheels 1, 2, 3, 4)</td>
<td>AC2</td>
<td>DC2</td>
</tr>
<tr>
<td></td>
<td>COOLING FANS (bogie : Wheels 5, 6, 7, 8)</td>
<td>AC1</td>
<td>DC1</td>
</tr>
<tr>
<td>TYRE PRESS</td>
<td>TIRE PRESS IND UNIT</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(1) The AC STAT INV supplies the landing gear indicator panel when the main generators are lost and the emergency generator is not running.
### BUS EQUIPMENT LIST

<table>
<thead>
<tr>
<th></th>
<th>NORM</th>
<th>EMER ELEC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AC</td>
<td>DC</td>
</tr>
<tr>
<td><strong>LANDING GEAR</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LGCIU 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LGCIU 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SAFETY VALVE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L/G INDICATOR PANEL</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>BRAKES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BSCU CH 1</td>
<td>AC1</td>
<td>DC1</td>
</tr>
<tr>
<td>BSCU CH 2</td>
<td>AC2</td>
<td>DC2</td>
</tr>
<tr>
<td>ABCU</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PARK BRK CTL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PRESS INDICATOR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BRK FAN CTL &lt;&lt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>COOLING FANS &lt;&lt; (Wheels 1, 2, 3, 4)</td>
<td>AC2</td>
<td>DC2</td>
</tr>
<tr>
<td>COOLING FANS &lt;&lt; (bogie : Wheels 5, 6, 7, 8)</td>
<td>AC1</td>
<td>DC1</td>
</tr>
<tr>
<td>TYRE PRESS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TIRE PRESS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IND UNIT&lt;</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(1) The AC STAT INV supplies the landing gear indicator panel when the main generators are lost and the emergency generator is not running.