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|  A340 SIMULATOR FLIGHT CREW OPERATING MANUAL | LANDING GEAR | | 1.32.00 | P 1 |
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DESCRIPTION

GENERAL

The landing gear consists of :

- two inboard retracting main gears
- a forward retracting nose gear
- a forward retracting center gear

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

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

All gear doors open during landing gear transit. The hydraulically operated doors close at the end of each retraction and extension sequence.

Gears and doors actuation are electrically signalled by two Landing Gear Control and Interface Units (LGCIs).

The LGCIs process gears and doors positions, sequencing control and gear lever selection. They also provide landing gear information on ECAM, and ground/flight signals for other aircraft systems.

MAIN GEAR

Each main gear is a four wheel, twin tandem bogie assembly having an oleopneumatic shock absorber.

Each main wheel is fitted with antiskid brake.

A shortening mechanism attached to the wing reduces main gear length by retracting the shock absorber into the main leg during retraction.

An hydraulically operated pitch trimmer on each bogie beam damps the movement and ensures return to normal position after lift off.

NOSE GEAR

The two wheel nose gear comprises an oleopneumatic shock strut and a nose wheel steering system. It retracts forwards into the fuselage.

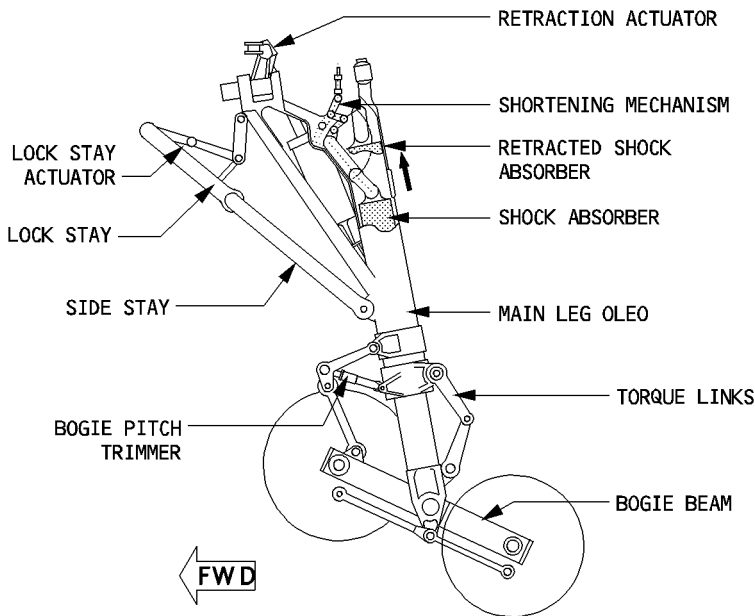
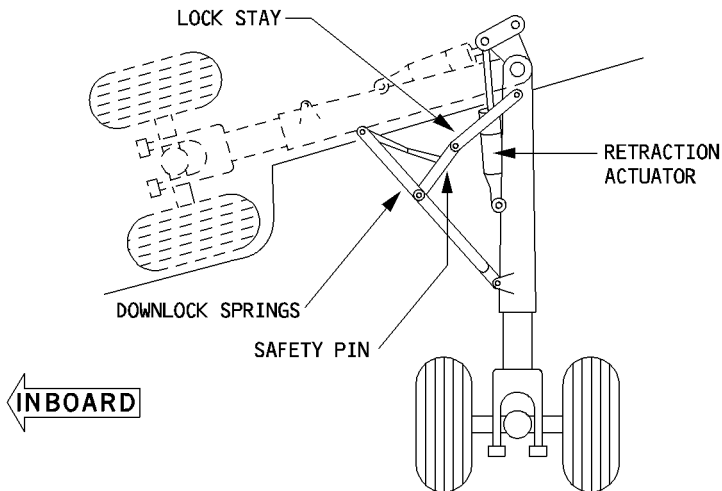
CENTER GEAR

The center gear is a two wheel assembly (identical wheels to those of the main gears) installed on the rear bulkhead in the main gearbay.

It comprises a two stage oleopneumatic shock absorber installed in the main fitting.

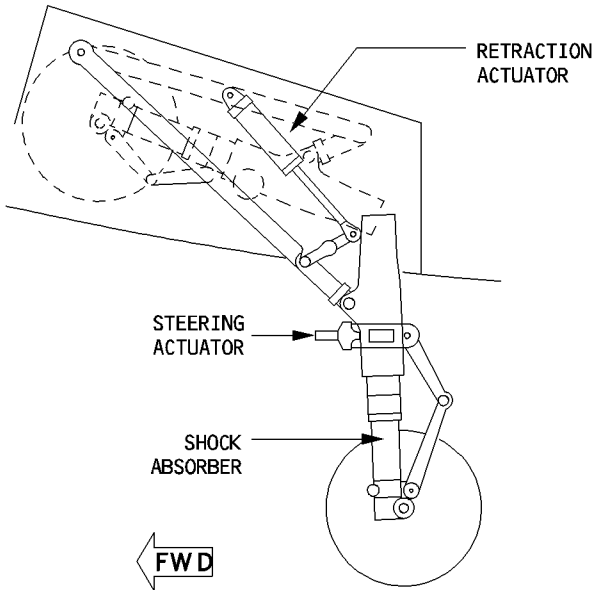
SCHEMATICS

MAIN L/G



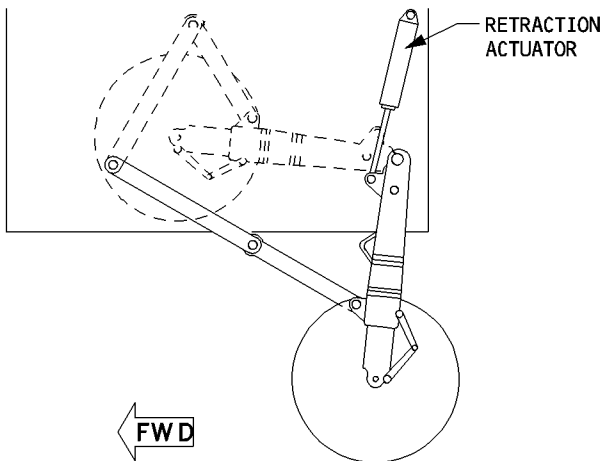
FFCS-01-3210-002-A001AA

NOSE L/G



FFCS-01-3210-003-A001AA

CENTER GEAR



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GEAR AND DOOR OPERATION

NORMAL OPERATION

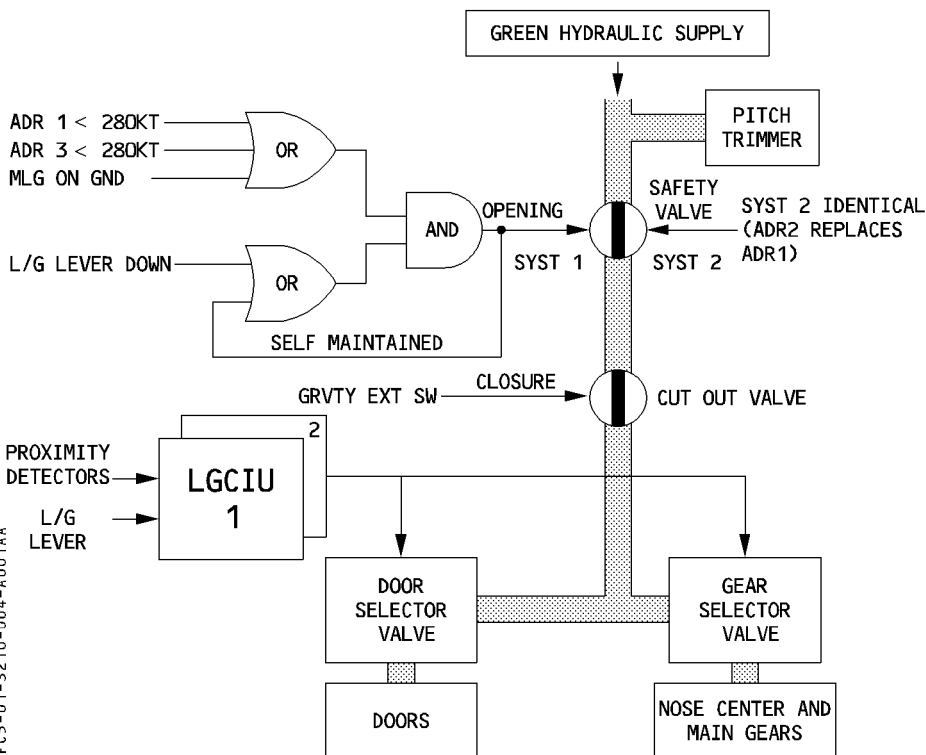
Landing gear normal operation is controlled by the lever located on the center instrument panel.

Gear and door sequencing is electrically-controlled by the LGCIUs. Each LGCIU controls one complete gear cycle and switches over automatically at each landing gear retraction cycle or in case of failure.

All gears and doors are hydraulically-actuated by the green hydraulic system. Hydraulic supply is automatically isolated by closing a safety valve above 280 knots. It is maintained closed until the landing gear lever is moved to the DOWN position and the aircraft speed decreases below 280 knots.

The center gear may be inhibited by ground maintenance action. Therefore, it will be mechanically-fixed in the uplock position while doors will continue to operate during the landing gear retract/extend sequence.

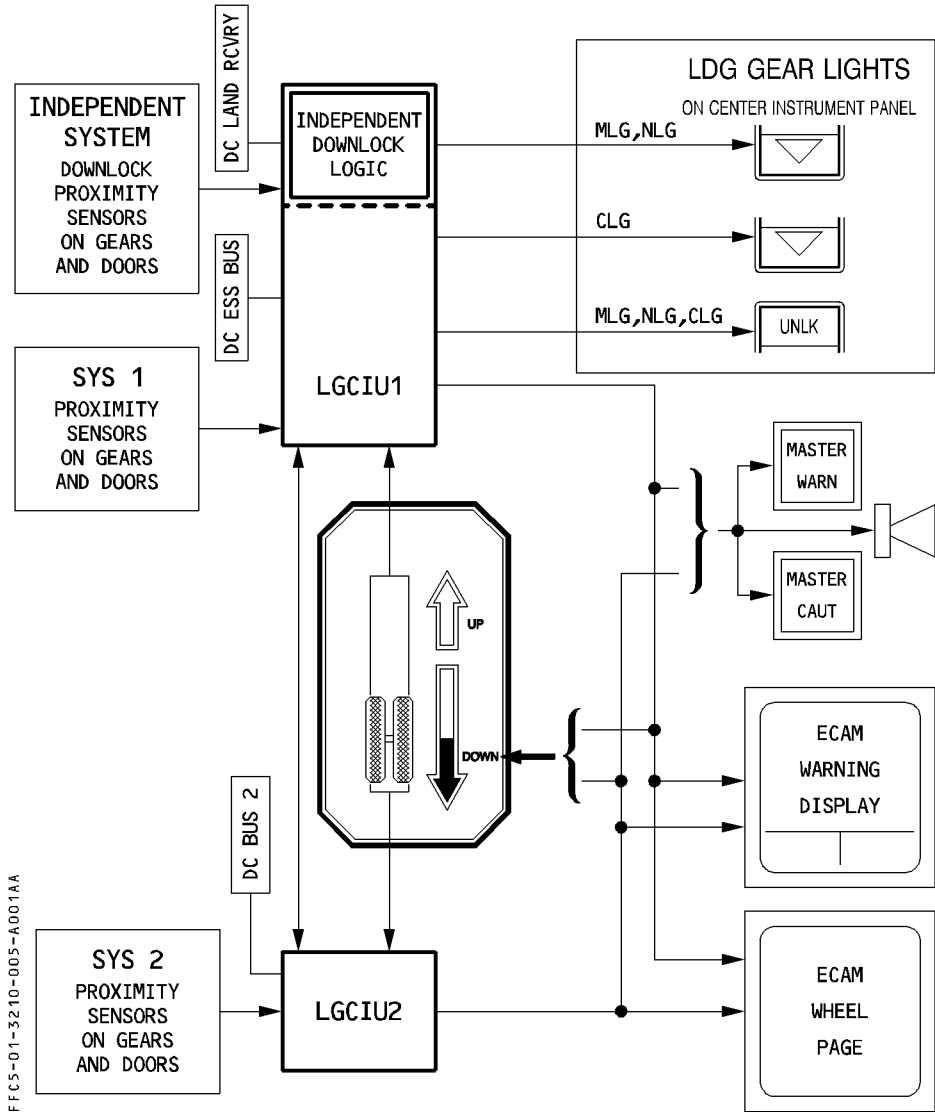
FOR INFO



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LANDING GEAR INDICATION AND WARNING ARCHITECTURE

R



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Note : The landing gear position indications on center instrument panel are still provided by LGCIU 1 even when LGCIU 2 is controlling gear cycle.

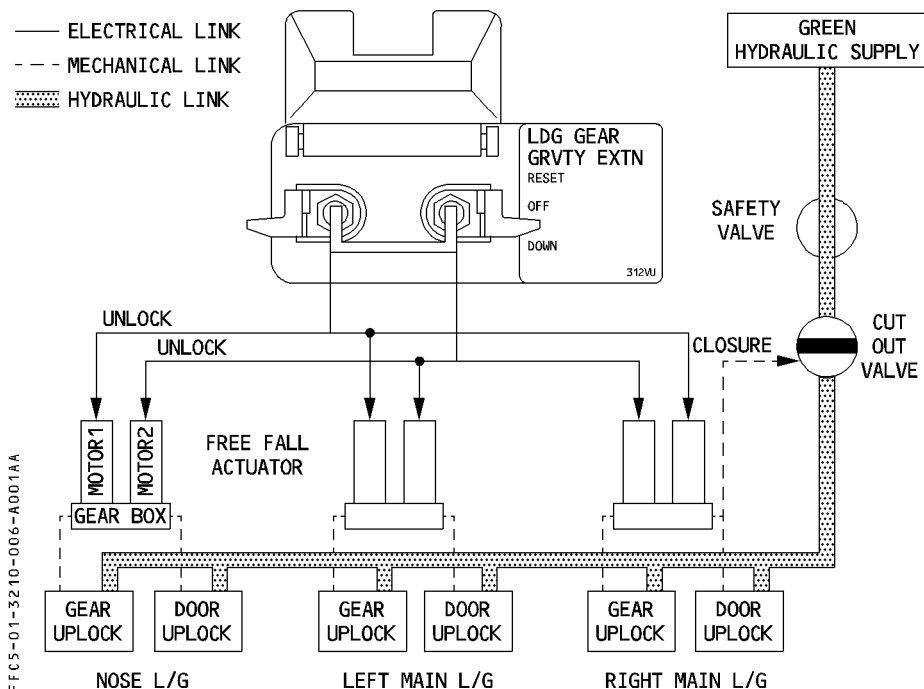
GRAVITY EXTENSION

The gravity extension system is an electromechanical system controlled through two selectors located on the center instrument panel. It permits the main and nose landing gear extension in case of normal extension system failure.

When the related electrical selectors are set to down :

- the landing gear hydraulic system is isolated from green hydraulic system
- the main landing gear and nose landing gear doors and gears electrically unlock
- main landing gear and nose landing gear extend by gravity
- locking springs assist the downlocking
- The main and nose landing gear doors remain open.
- The center gear stays retracted and doors are closed.

After a free fall extension, it is possible to restore normal operation provided the green hydraulic pressure is available.



The indications given in the cockpit are the same as those for normal extension and retraction (retraction indication for center landing gear).

R *Note : In case of landing gear gravity extension, the nose wheel steering is lost.*

L/G SYSTEM INTERFACE**LGCIU**

Two LGCIUs receive landing gear position information from the proximity detectors : landing gear downlocked or uplocked, shock absorber compressed or extended, door open or closed.

This information is sent by the LGCIUs to other aircraft systems.

Proximity detector failures :

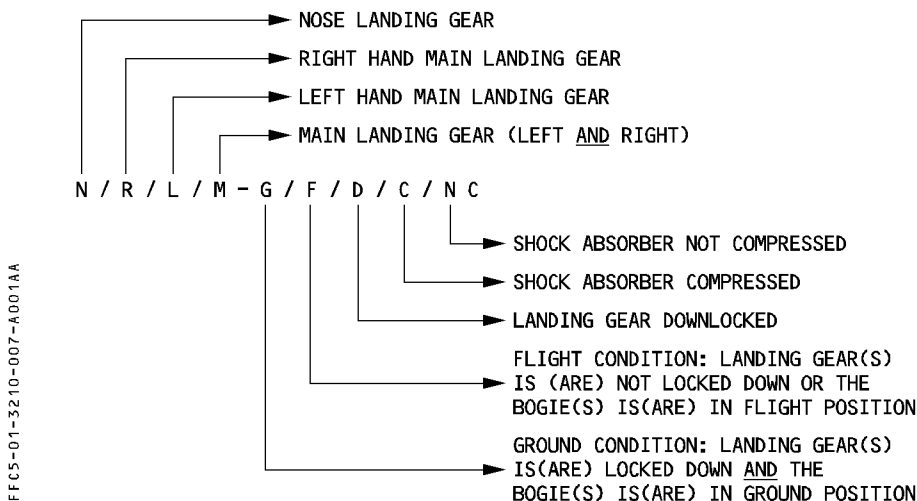
- electrical failure is detected by the LGCIU which signals the associated output to the flight position (shock absorber not compressed or landing gear uplocked). Landing gear operation is then automatically controlled by the non affected LGCIU.
- mechanical failure is not detected by the LGCIU. The effect on the interfaced system depends on which condition is incorrectly signalled.

In case of LGCIU electrical failure :

- The landing gear is controlled by the remaining healthy LGCIU
- The outputs of the failed LGCIU are not forced to the safe (flight) position : some users will see "flight" condition, some other will see "ground" condition.

LANDING GEAR-AIRCRAFT SYSTEM INTERFACE

The two LGCIUs provide following discrete logic signals to various aircraft systems.



A semicolon (;) separates different signals send to the same system.

Two additional discretés are provided by the LGCIUs.


OP : Applicable LGCIU is signalled operative as long as system is supplied by power.

E : External power connected.



| | SYSTEM | LGCIU 1 OUTPUT | LGCIU 2 OUTPUT |
|----------------|--|-------------------|-------------------|
| AIR COND | Packs bay ventilation | L-F | R-G |
| | Avionics equipment ventilation | R-G | L-G ; OP |
| | Fwd and aft cargo compartment vent. | | R-F |
| | Pressure control and monitoring | R-G | R-G |
| | Pack control and indicating | | L/R-G |
| | Cockpit and cabin temperature control | | R-G |
| FM | FMGS | N-C | N-C |
| COMMUNICATIONS | HF System | L-F | R-F |
| | VHF System | L-F | L/R-F |
| | Satellite communication | | R-F |
| | Cockpit to ground crew call system | N-NC | |
| | Audio management | L-F | |
| | CVR | N-C/NC | |
| | CIDS | N-C/D ; E | N-C/D ; E |
| | Radio management | L-F | L/R-F |
| ELEC | AC main generation | N-C | |
| | AC emergency generation | N-NC | |
| | ECMS | N-C | |
| | DC essential normal generation switching | N-NC | |
| | Battery DC generation | N-C | |
| | GPCU | N-C | |
| | Circuit breaker monitoring | N-C | |
| APU | Control and monitoring | L-G | |
| | APU generator (GCU) | N-C | |
| FIRE | Engine fire and overheat protection | L/R-G | L/R-G |
| | APU fire and cargo compartment overheat detector | M-G | M-G |
| | Cargo compartment smoke detector | N-C ; E | N-C ; E |
| | APU fire extinguishing | M-G | |

(Cont'd)

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(Cont'd)

| | SYSTEM | LGCIU 1 | LGCIU 2 |
|------------|---------------------------------------|-----------------------|-----------------------|
| FLT CTL | Flaps control and monitoring | M-G | M-G |
| | Slats control and monitoring | M-G | M-G |
| | EFCS | L/R-D ; N-C | L/R-D ; N-C |
| FUEL | APU fuel pump system | M-G | |
| | FCMS | L-D ; N-C | L-D ; N-C |
| HYD | Green main hydraulic power | M-G | M-G |
| ICE | Wing ice-protection | M-F | M-F |
| | Probe ice-protection | L/R-G ; E N-C ; OP | L/R-G ; E N-C ; OP |
| | Windscreen anti-icing and defogging | L/R-G | L/R-G |
| EIS | FWC - acquisition interface | R-G | L-G |
| | SDAC- acquisition interface | R-G | L-G |
| | DMC - acquisition interface | R-G | L-G |
| GEAR | Normal extension and retraction | R-G ; E | R-G ; E |
| | Normal braking | L/R-G ; N-C/D | R-G ; N-D |
| | Brake cooling | | L-D |
| LIGHTS | Runway turn off lights | N-D | N-D |
| | Taxi and take off lights | N-D | N-D |
| | Logo lights | | M-G |
| | Toilet system | | N-C |
| NAVIGATION | Sensors | N-C | |
| | Altitude and airspeed standby data | L-G | |
| | ILS | L-F | R-F |
| | Weather radar system | L-F | R-F |
| | Radio altimeter | L-F | L-F |
| | TCAS | L-G/D | |
| | GPWS | L-D | |
| | DME | L-F | R-F |
| | ATC/MODE S | L-G | R-G |
| | ADF | L-F | R-F |
| VOR/MARKER | L-F | R-F | |
| MAIN | CMS acquisition interface | N-C ; E | |
| | Up and down data loading system | R-G | |
| DOOR | Doors and escape slide control system | N-C ; E | N-C ; E |
| ENG | FADEC | L/R-G ; DP N-C | L/R-G ; DP N-C |



The following systems get landing gear position selection data from the landing gear lever

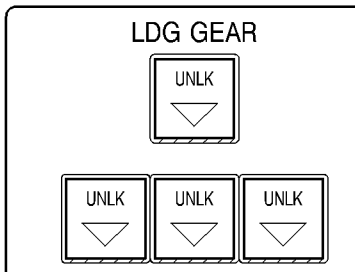
| SYSTEM | L/G lever position |
|--------------------------|--------------------|
| Refuel on battery | DOWN |
| FCMS | DOWN |
| Normal braking | UP |
| Cabin emergency lighting | UP |



CONTROLS AND INDICATORS

LDG GEAR INDICATOR PANEL

FFCS-01-3210-011-A001AA



Connected to LGCIU 1 which receives signals from proximity detectors.

UNLK light : illuminates red if the landing gear is not locked in selected position.

▽ lights : illuminate green if the landing gear is locked down.

Light off : indicates landing gear is retracted and locked up with landing gear lever selected up.

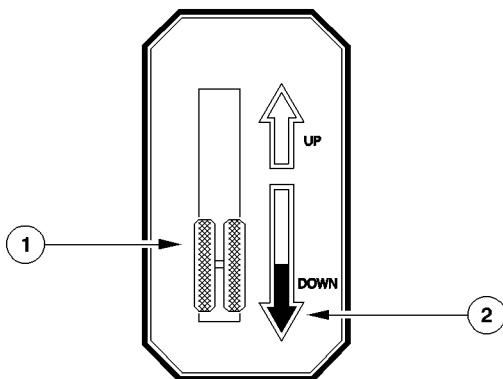
- R Note : ▽ lights on the LDG GEAR indicator panel light up as long as the LGCIU 1 is
 R electrically supplied, except for the center landing gear, which may not light up,
 R depending on the LGCIU failure.

LANDING GEAR SELECTOR LEVER

A two position selector lever provides electrical signals to the two LGCIUs which control green hydraulic supply by means of selector valves.

On selection of UP or DOWN and provided the airspeed is below 280 knots :

- all landing gear doors open then,
- landing gears move to the new selected position then,
- all doors close.



FFCS-01-3210-012-A001AA

① L/G LEVER

UP : The landing gear retraction is selected.

During gear door opening, main gear wheels are automatically braked by the normal brake system. The nose gear wheels are braked by a brake band in the gear well.

DOWN : The landing gear extension is selected.

An interlock mechanism prevents unsafe retraction by locking the lever in DOWN position when either

- both main landing gear bogies are not trailed (aircraft on ground)
- the center landing gear shock absorber is not fully extended
- the nose landing gear shock absorber is not fully extended and the nose wheels are not in the center position.

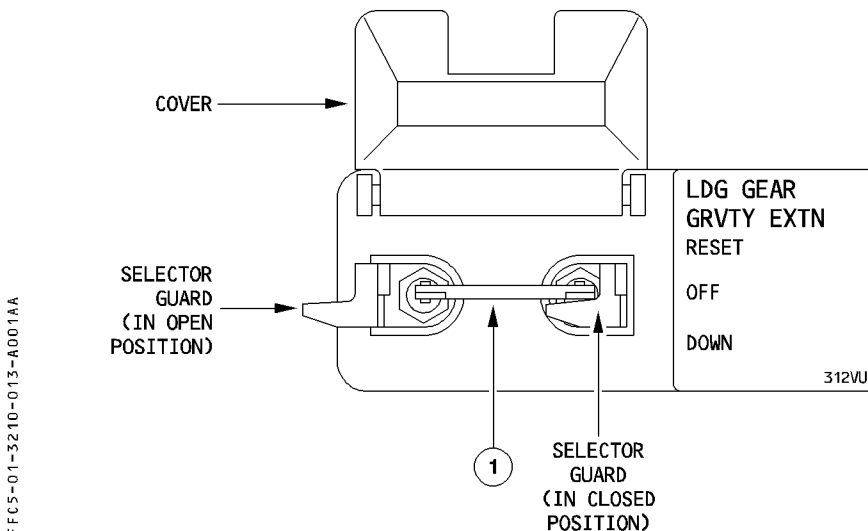
When the landing gear is extended the system remains pressurized (if green hydraulic pressure is available).

② RED ARROW

Illuminates red if the landing gear is not downlocked in landing configuration associated with a red ECAM warning. (Refer to WARNINGS and CAUTIONS section).



GRAVITY EXTENSION



The landing gear gravity extension selectors are locked-toggle type selectors. The selectors are connected together with a link so that both are operated at the same time. When the link is disconnected each selector can be operated independently.

① LDG GEAR GRVTY EXTN sel

Each selector has three positions :

DOWN : The two motorised actuators are electrically powered to close the hydraulic (guarded) cut off valve and to disengage door and gear uplocks which permit the nose and main gear to deploy by gravity and to automatically lock down.

OFF : Normal position. Landing gear operation is controlled by the LGCIU and the landing gear lever.

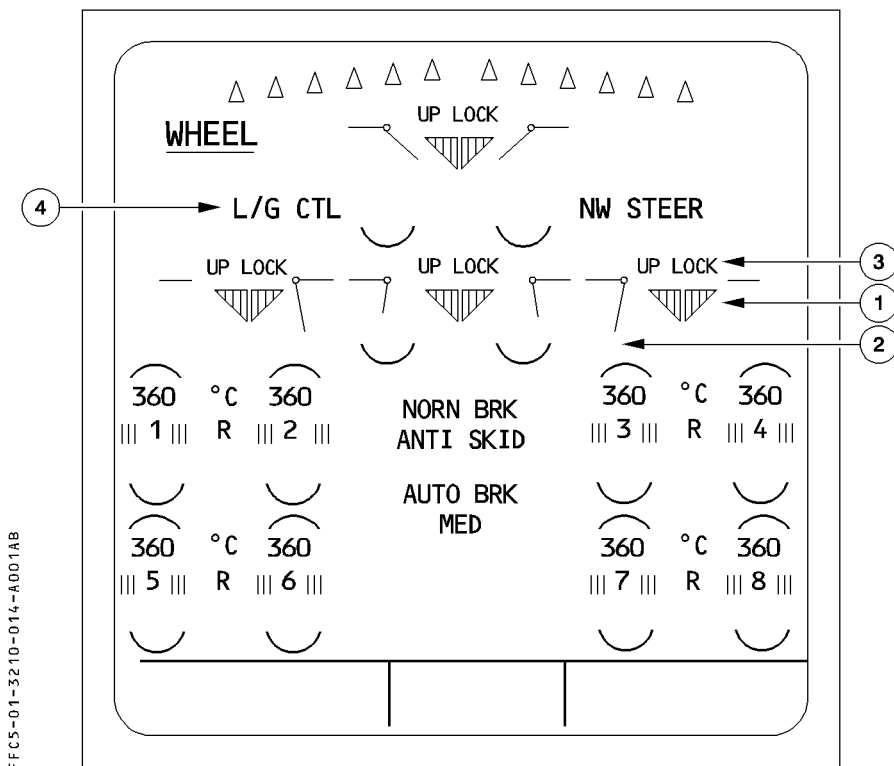
RESET : The actuators turn back to the initial position and automatically set the system back to the normal extension and retraction mode. The selectors are then set to off for normal operation.

Note : To select landing gear both selector guards have to be open.

ECAM WHEEL PAGE

The wheel page is automatically displayed :

- on ground before take-off with engine running (flight phase 2), it disappears at engine TO power application.
- in approach at landing gear down selection or below 800 ft radio altitude (flight phases 7, 8, 9), it disappears at engine shutdown.



FFCS-01-3210-014-A001AB

① Landing gear position indication

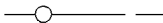
The landing gear positions are indicated by 2 triangles for each gear.

The left triangle is controlled by LGCIU 1, the right one by LGCIU 2.

- green triangle when LGCIU detects landing gear downlocked.
- red triangle when LGCIU detects landing gear in transit
- no signal when LGCIU detects landing gear uplocked
- amber crosses in case of LGCIU failure.

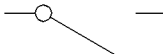


② Landing gear door position indication



: DOOR LOCKED UP (GREEN)

FFCS-01-3210-015-A001AA



: DOOR IN TRANSIT (AMBER)



: DOOR FULLY OPEN (AMBER)

③ UPLOCK indication

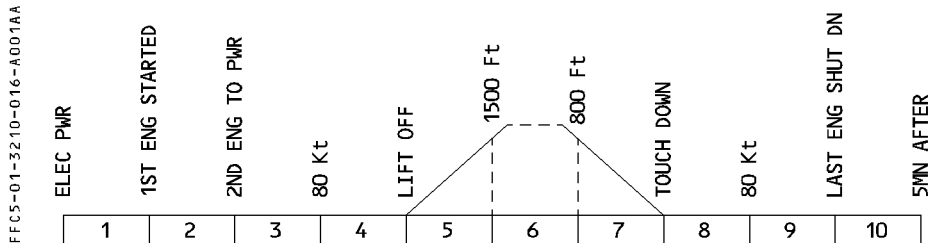
Appears amber associated with an ECAM caution if landing gear uplock is engaged when landing gear is downlocked.

④ L/G CTL indication

Appears amber with a 30 seconds time delay when position of any landing gear disagrees with lever position. Associated ECAM caution is triggered.



WARNINGS AND CAUTIONS



| E/W D : FAILURE TITLE conditions | AURAL WARNING | MASTER LIGHT | SD PAGE CALLED | LOCAL WARNINGS | FLT PHASE INHIB |
|---|---------------|---------------|----------------|--------------------------------|----------------------------|
| GEAR NOT DOWNLOCKED One or more gear(s) not downlocked and landing gear selected down | CRC | MASTER WARN | WHEEL | UNLK on LDG GEAR panel | 3, 4, 5 |
| GEAR NOT DOWN 1) Landing gear not downlocked and radio height lower than 750 ft and all engine not at TO power. or 2) Landing gear not downlocked and radio height lower than 750 ft and flaps 2, 3 or FULL or 3) Landing gear not downlocked and flaps at 2, 3 or FULL and both radio altimeters failed and all engines not at TO power NOTE : In the cases 2 above, the aural warning can only be cancelled by the emer canc pb. | | | NIL | RED ARROW It on LDG GEAR panel | 1 to 5 8 to 10 |
| DOORS NOT CLOSED One or more gear door(s) is not uplocked | SINGLE CHIME | MASTER CAUT | WHEEL | NIL | 1, 3, 4, 5, 8, 9, 10 |
| GEAR NOT UPLOCKED One or more gear(s) not uplocked and landing gear not selected down | | | | UNLK It on LDG GEAR panel | 3, 4, 7 to 10 |
| GEAR UPLOCK FAULT One gear uplock engaged with corresponding gear downlocked | | | NIL | NIL | 4, 7, 8 |
| RETRACTION FAULT L/G selected up and - the bogie beam not in correct position or, - the pitch trimmer not in correct position or, - nose or center landing gear shock absorber not in correct position | | | | | 1, 3, 4, 7, 8 |
| LENGTHENING (L)(R) FAULT Landing gear downlocked but shortening mechanism has not locked long position | | | | | 3, 4, 5, 8 |
| LGCIU 1 + 2 FAULT | WHEEL | 4, 5, 7, 8 | | | |



LANDING GEAR

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GEARS AND DOORS

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REV 09

| E/WD : FAILURE TITLE conditions | AURAL WARNING | MASTER LIGHT | SD PAGE CALLED | LOCAL WARNINGS | FLT PHASE INHIB |
|---|------------------|-----------------|----------------------|-------------------|-----------------------|
| LGCIU 1 (2) FAULT | | | | | |
| SYS DISAGREE Disagree between landing gear or door positions detected by the two LGCIUs | NIL | NIL | WHEEL | NIL | 3, 4, 5, 7, 8 |

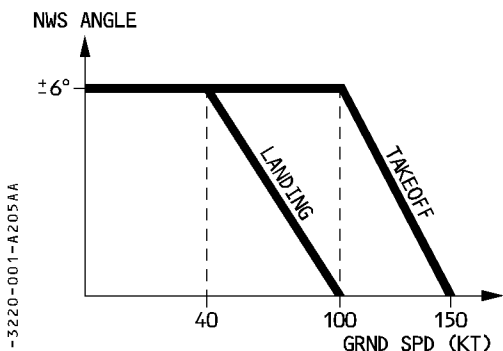
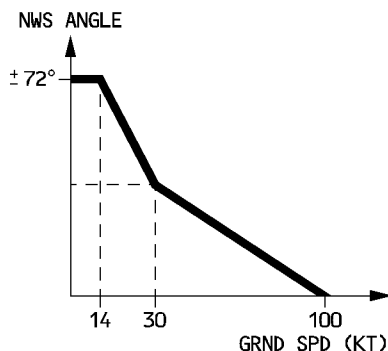
DESCRIPTION

Nosewheel steering is provided by two actuators, powered by the green hydraulic system and electrically-signaled by the Brake and Steering Control Unit (BSCU).

The BSCU has two independent channels. Only one is active at a time, while the other is on standby.

To control the steering, the BSCU receives inputs from the steering hand wheels, the rudder pedals, and the Auto Pilot.

The BSCU transforms the pilot's order into a nosewheel steering angle, by controlling the servo-valve to provide the requested flow for the hydraulic actuators. The following limitations apply :

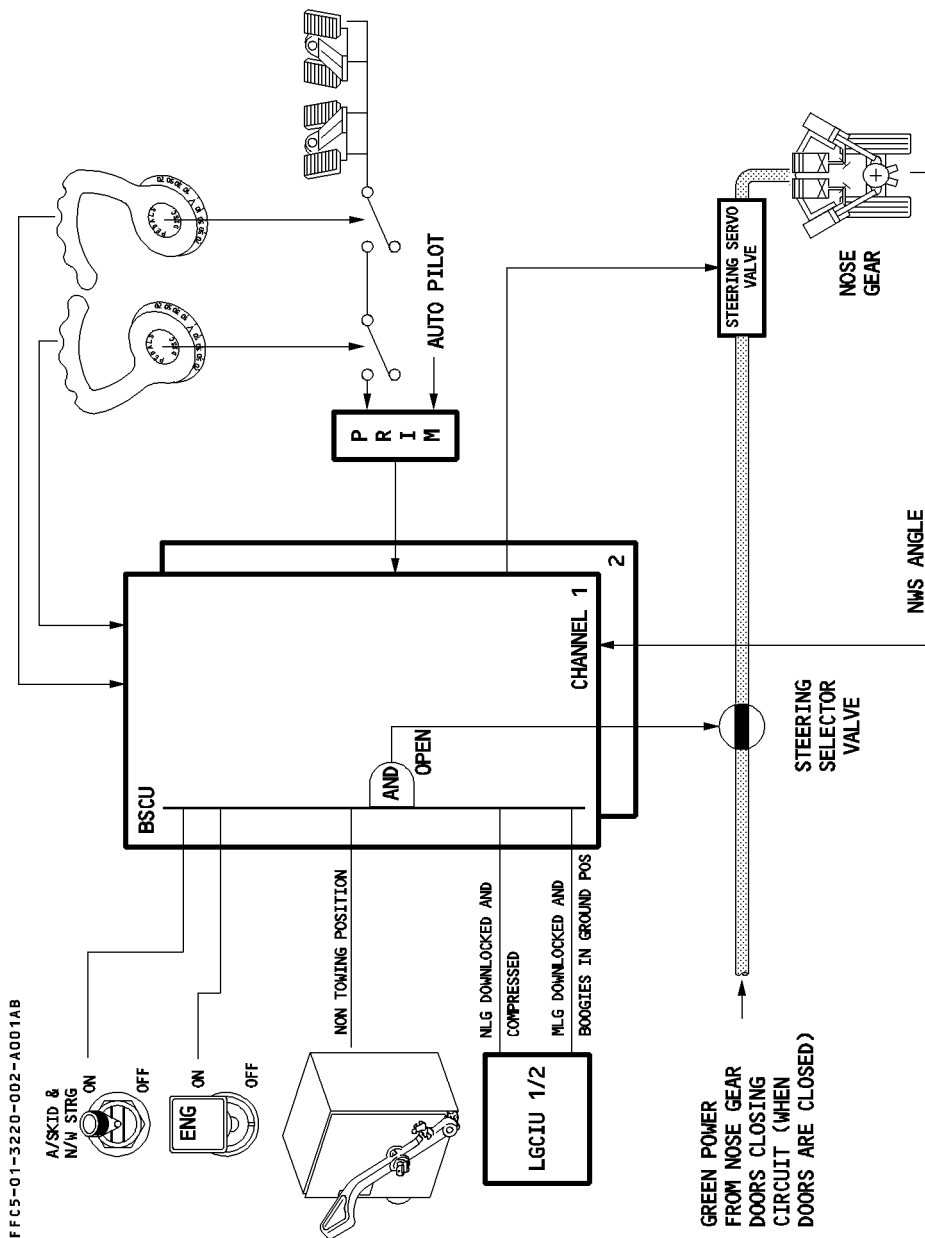
ORDERS FROM RUDDER PEDALSORDERS FROM HAND WHEELS

Hand wheel control provides up to a $\pm 72^\circ$ nosewheel steering angle. A lever on the towing electrical box (on the nose L/G) enables the steering system to be deactivated for towing purposes.

A visual red warning on the overhead panel indicates to the crew that an oversteer ($\pm 93^\circ$) has occurred.

Pilots can disconnect the rudder pedal order to the BSCU through a pushbutton located on each steering hand wheel.

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





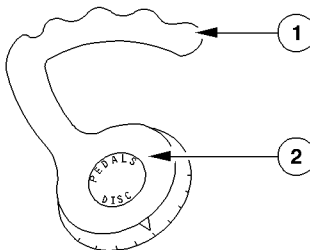
CONTROLS AND INDICATORS

RUDDER PEDALS

Rudder pedals provide nosewheel steering control below 100 knots. Control authority depends on aircraft speed. The nosewheel steering angle is a function of aircraft speed.

SIDE CONSOLES

FFCS-01-3220-003-A105AA



① STEERING HAND WHEELS

The steering handwheels control the nosewheel steering angle up to 72° in either direction.

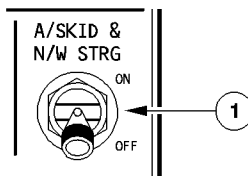
R *Note : Nosewheel steering centers itself (above 100 kt) for landing, and (above 150 kt)*
R *for takeoff.*

② RUDDER PEDAL DISC pb

When maintained depressed, the nosewheel steering control by the pedals is disconnected.

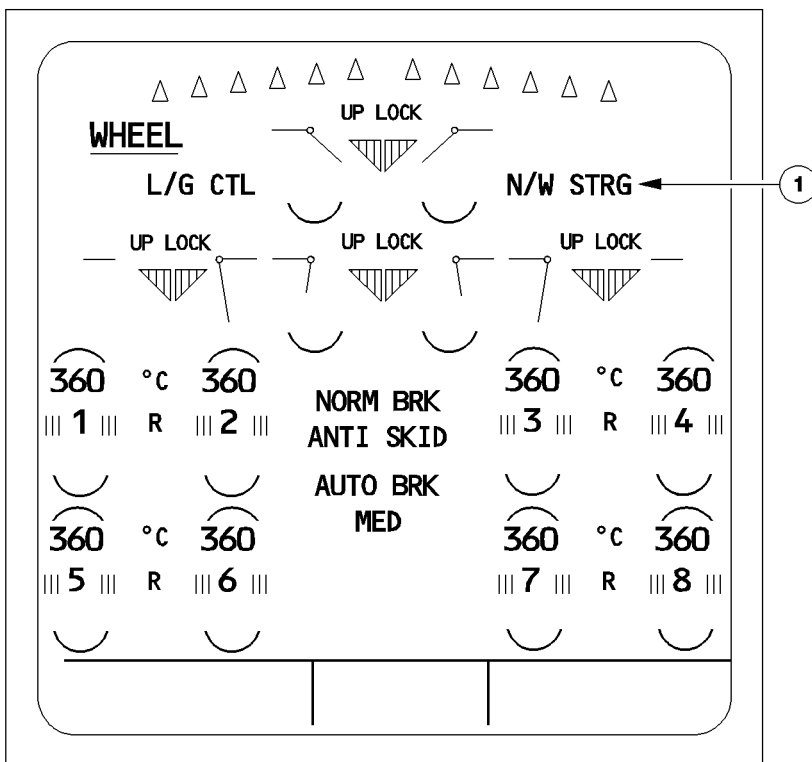
CENTER INSTRUMENT PANEL

FFCS-01-3220-003-B105AA



① A/SKID and N/W STRG sw

An ON/OFF switch activates or deactivates the Nosewheel Steering and Anti-Skid (Refer to BRAKES-ANTISKID section).

ECAM WHEEL PAGE**① N/W STRG indication**

Appears amber in case of :

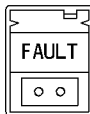
- nose wheel steering failure detected by the BSCU (associated with an ECAM caution)
- A/SKID & N/W STRG switch is at OFF
- failure of both BSCU channels (associated with ECAM caution).



OVERHEAD PANEL

FFCS-01-3220-005-A100AA

NWS
TOWING



PUSH TO RESET

NWS TOWING pb (guarded)

FAULT : On ground, it comes on red when the nosewheel steering has exceeded 93°. It is associated with the illumination of the red oversteer warning light, located on the nose landing gear. When pressed, the light goes out.

LANDING GEAR

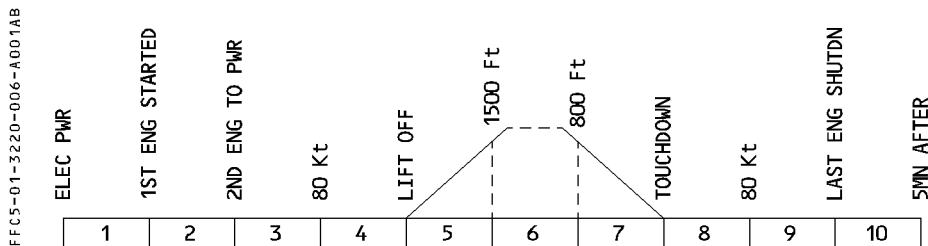
1.32.20

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NOSE WHEEL STEERING

SEQ 001

REV 20

WARNINGS AND CAUTIONS

R

| E/WD : FAILURE TITLE conditions | AURAL WARNING | MASTER LIGHT | SD PAGE CALLED | LOCAL WARNING | FLT PHASE INHIB |
|------------------------------------|------------------|-----------------|----------------------|------------------|-----------------------|
| N/W STRG FAULT detected by BSCU | SINGLE CHIME | MASTER CAUT | WHEEL | NIL | 3, 4, 5, 8 |

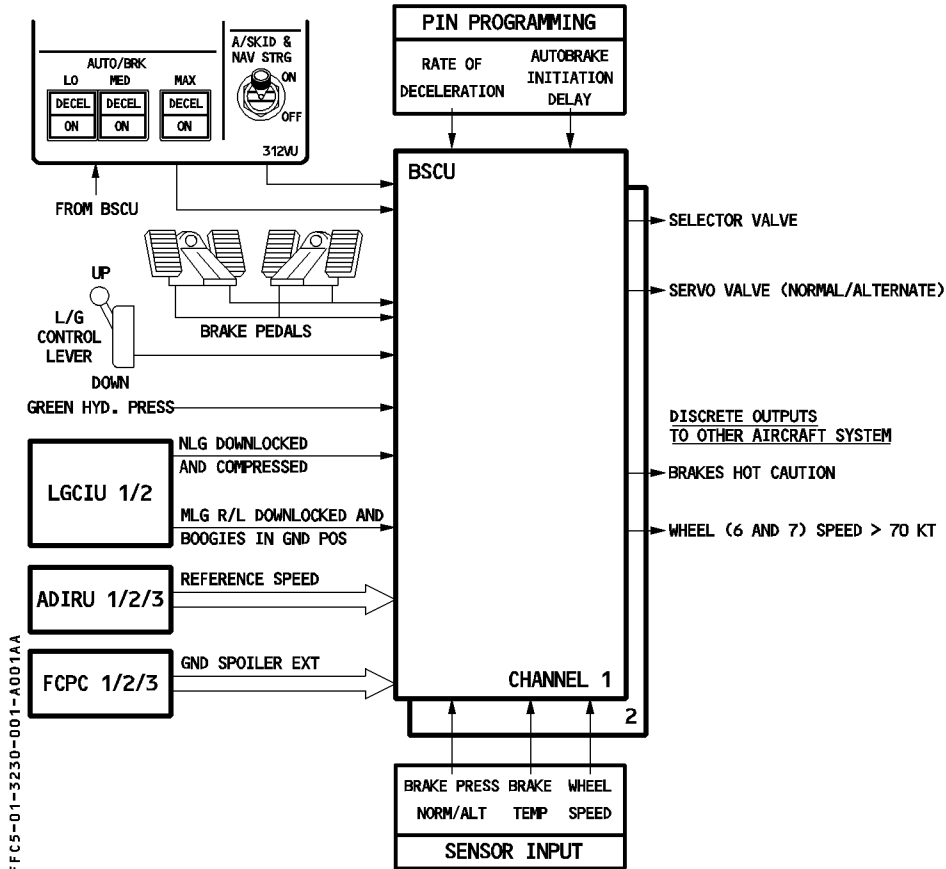
MEMO DISPLAY

If the nose wheel steering switch is in the towing position, the NW STRG DISC message is displayed in green. It becomes amber if two engines are running.

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 whilst the alternate system uses the blue hydraulic system backed up by hydraulic accumulator. An antiskid and autobrake system is also provided.





Braking commands come either from the brake pedals (pilot action) or the autobrake system (deceleration rate selected by the crew).

All braking functions (normal and alternate braking control, autobraking, antiskid control) are controlled by a dual channel Brake and Steering Control Unit (BSCU).

The BSCU performs 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 change over between the two systems takes place at each DOWN landing 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 brakes 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 to the alternate servovalves as well as to the ECAM system which displays the released brakes.

Full braking performance is achieved only with brakes pedals at full deflection.

The antiskid system is deactivated below 10 kt (ground speed).

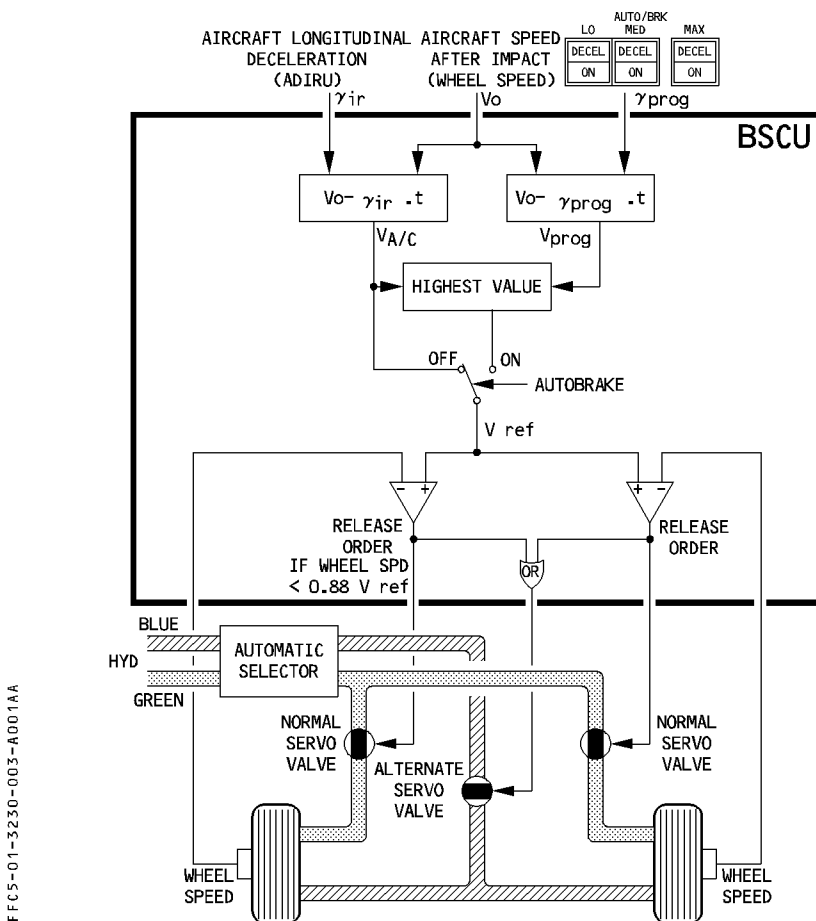
An ON/OFF switch activates or deactivates the antiskid system and nose wheel steering.

PRINCIPLE

The speed of each main gear wheel (given by a tachometer) is compared with the aircraft speed (reference speed). When the speed of a wheel decreases below 0.88 time 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 BSCU from the horizontal acceleration from ADIRU 1 or ADIRU 2 or ADIRU 3.

In case all ADIRUs are failed, reference speed equals the maximum of either main landing gear wheel speeds. Deceleration is limited to a default value of 2.5 m/s² (8.2 ft/s²).

FOR INFO



AUTOBRAKE

The aim of this system is :

- To reduce the braking delay in the event of an accelerate-stop to improve performance.
- To establish and maintain a selected deceleration rate during landing, to improve comfort and reduce crew workload.

SYSTEM ARMING

The crew may arm the system by depressing the LO, MED, or MAX pushbutton provided all the following arming conditions are met :

- Green pressure available
- Antiskid electrically powered
- No failure in the braking system.
- At least two PRIMs are available
- At least one ADIRU is available

Note : Autobrake may be armed with parking brake on.

SYSTEM ACTIVATION

- R Automatic braking activated by the ground spoiler extension command (Refer to 1.27). In addition for MAX mode the nose landing gear compressed signal is required.
- R Consequently in the event of an acceleration stop, if the deceleration is initiated with the speed below 72 kt, the automatic braking will not activate because the ground spoilers will not be extended.


R SYSTEM DEACTIVATION

- R The system deactivates :
- R – When it is disarmed (see below)
- R – When ground spoilers retract. However, it remains armed.

SYSTEM DISARMING

The system is disarmed by :

- Pressing the pushbutton, or
 - Loss of one or more arming conditions, or
- R – Applying sufficient deflection to one brake pedal when autobrake is active in MAX, MED or LO mode.
- R – After take-off/touch and go.

| | | | |
|---|---------------------|---------|--------|
|  AIRBUS TRAINING A340 SIMULATOR FLIGHT CREW OPERATING MANUAL | LANDING GEAR | 1.32.30 | P 5 |
| | BRAKES AND ANTISKID | SEQ 100 | REV 14 |

OPERATION

There are four modes of operation :

- Normal braking.
- Alternate braking with antiskid.
- Alternate braking without antiskid.
- Parking brake.

NORMAL BRAKING

Antiskid is operative and autobrake is available.

Braking is normal when :

- green hydraulic pressure is available
- main landing gear in ground condition
- A/SKID and N/W STRG switch is ON

The control is electrically achieved through the BSCU :

- either via the pedals
- or automatically
 - on ground by autobrake system
 - in flight by setting the landing gear lever to the up position

Anti-skid system is controlled by the BSCU via the normal servo valves.

No brake pressure indication is provided.

ALTERNATE BRAKING WITH ANTISKID

Autobrake is inoperative.

Active when green hydraulic pressure is insufficient and provided :

- blue hydraulic pressure is available
- A/SKID and N/W STRG switch is ON
- PARKING BRAKE is not ON

Note : *Alternate braking is also active in flight when the landing gear is up.*

The automatic switching between the green and blue system is achieved by an automatic hydraulic selector.

Control is achieved by the pedals through the auxiliary low hydraulic pressure distribution line acting on the dual valves. The BSCU controls antiskid system via the alternate servo valves.

The pressure delivered to the left and right brakes as well as the accumulator pressure are indicated on a triple indicator located on the center instrument panel.



ALTERNATE BRAKING WITHOUT ANTISKID

Auto brake and antiskid are inoperative.

The antiskid system is deactivated :

- electrically (A/SKID and N/W STRG switch OFF or power supply failure or BSCU failure)
- or hydraulically (B + G system low pressure, the brakes are supplied by the brake accumulator only).

Control is achieved by the pedals (acting on the dual valves).

Alternate servo valves are fully open.

Brake pressure has to be limited by the pilot by referring to the triple indicator to avoid wheel locking.

The accumulators are dimensioned to supply at least seven full brakes applications.

PARKING BRAKE

Brakes are supplied by blue hydraulic system or accumulator pressure via the dual shuttle valves. Alternate servo valves are open allowing full pressure application..

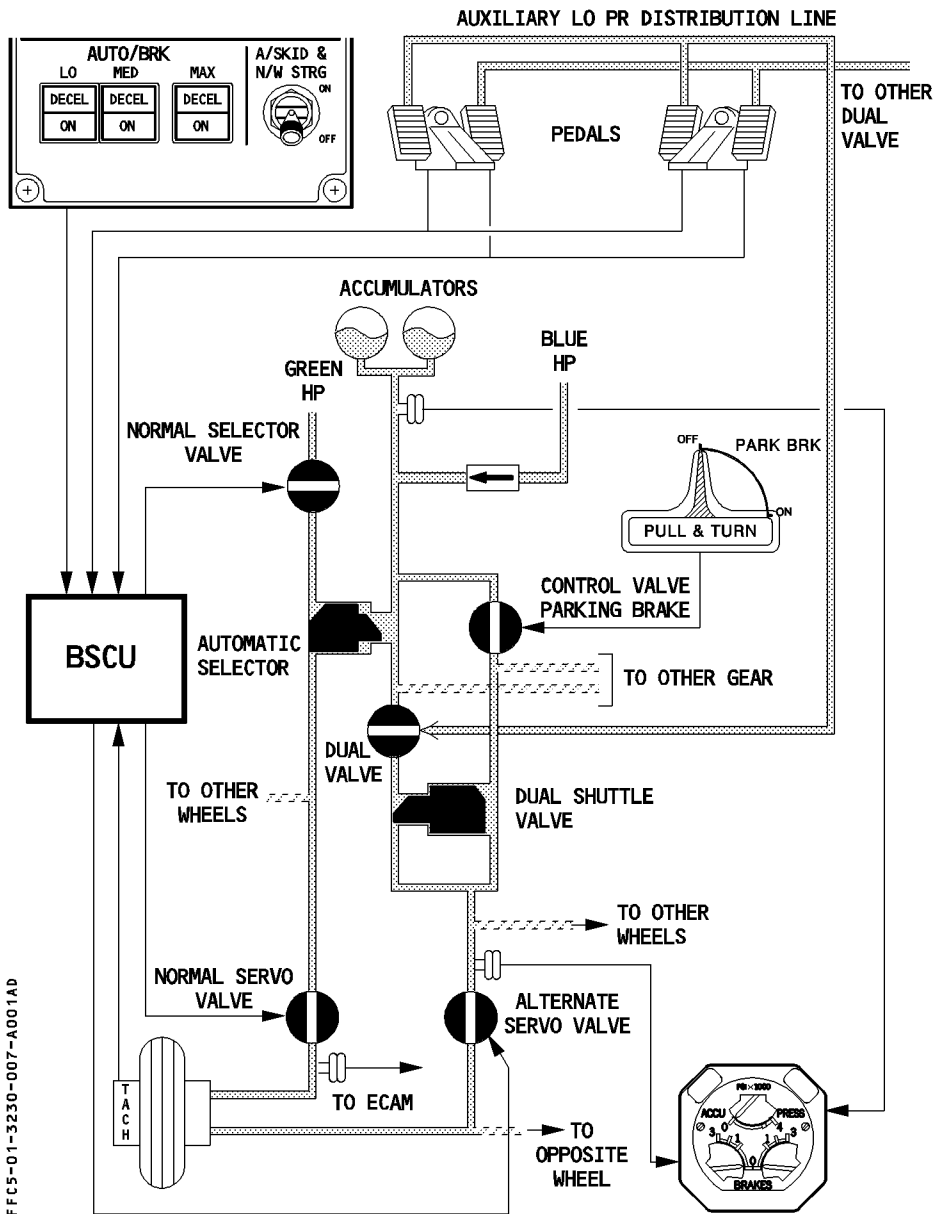
The accumulator maintains the parking pressure for at least 12 hours.

If the parking brake is activated and no blue hydraulic or accumulator brake pressure is available, then the normal braking system can be applied via the brake pedals.

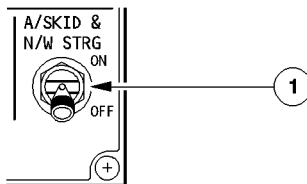
Blue accumulators can be pressurized by pressing the blue electrical pump switch.

Brake pressure indications are available on the triple indicator.

BRAKING SCHEMATIC



FFC5-01-3230-007-A001AD

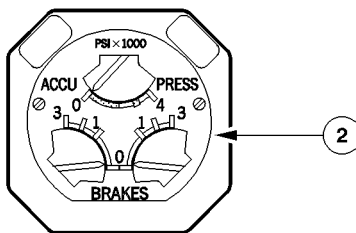
CONTROLS AND INDICATORS**CENTER INSTRUMENT PANEL****① A/SKID and N/W STRG switch**

ON : – If green hydraulic pressure available, antiskid and nose wheel steering are available.

- If green hydraulic pressure lost
 - Blue hydraulic pressure takes over automatically to supply the brakes
 - Antiskid remains available
 - Nose wheel steering is lost
 - Brake blue pressure is displayed on the triple indicator

OFF : – Blue hydraulic pressure supplies the brakes.

- Antiskid is deactivated. Brake pressure has to be limited by the pilot by referring to the triple indicator to avoid wheel locking
- Nose wheel steering is lost
- Differential braking remains available by pedals
- Brake blue pressure is displayed on the triple indicator.

**② BRAKE and ACCU PRESS indicator**

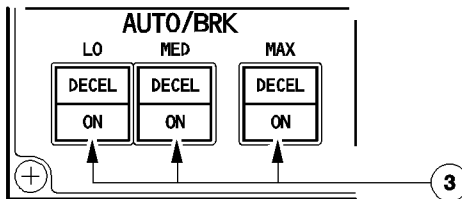
ACCU PRESS indication : – green band : allowed pressure area in the brake accumulators. Provides full pressure to the brakes.

- amber band : forbidden pressure area. Necessitates a repressurization of the accumulators.

BRAKE pressure indication : Indicates blue pressure delivered to left and right brakes measured upstream of the alternate servovalves.



FFCS-01-3230-009-A100AA



③ MAX, MED, LO pb sw (springloaded)

The pb controls the arming of the required deceleration rate.

- MAX mode is normally selected for take off.

In the event of an aborted take off, maximum pressure is sent to the brakes as soon as ground spoiler deployment order is present.

- MED or LO mode is normally selected for landing.

- When LO is selected, progressive pressure is sent to the brakes starting 1 second after ground spoiler deployment order to provide a 1.8 m/s^2 (5.9 ft/s^2) deceleration.
- When MED is selected, progressive pressure is sent to the brakes starting at ground spoiler deployment order to provide a 3 m/s^2 (9.8 ft/s^2) deceleration.

ON : The ON light illuminates blue to indicate positive arming.

The DECEL light illuminates green only if the autobrake function is active and when actual aircraft deceleration corresponds to predetermined rate. This occurs approximately 8 (5) seconds after activation for LO, (MED) using brakes alone. Predetermined rates could be achieved also by reversers alone or a combination of both reversers and brakes.

(In LO or MED : 80% of the selected rate ; in MAX : 2.65 m/s^2 (8.7 ft/s^2))

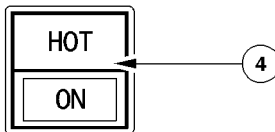
Note : On slippery runway, the predetermined deceleration may not be reached due to antiskid operation. In this case DECEL It will not illuminate. This does not mean that autobrake is not working.

Off : The corresponding autobrake mode is deactivated.



FFCS-01-3230-010-A100AA

BRK FAN

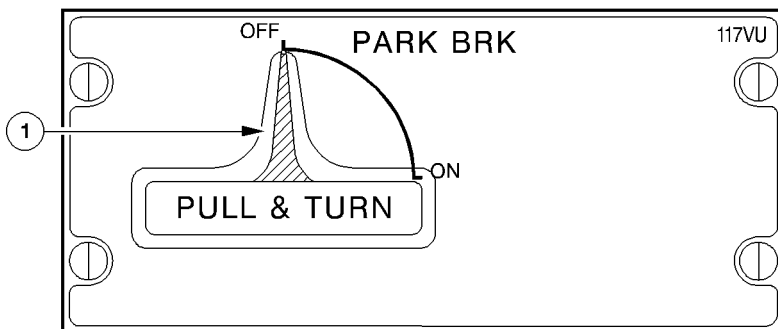


④ BRK FAN pushbutton ◀

ON : The brake fans run, provided the main landing gear is downlocked.
The ON legend comes on blue.

Off : The brake fans stop.

HOT It : Comes on amber, along with the associated ECAM caution, when one brake temperature exceeds 300°C.

PEDESTAL

① PARK BRK handle

Pull the handle, then turn it clockwise to apply the parking brake.

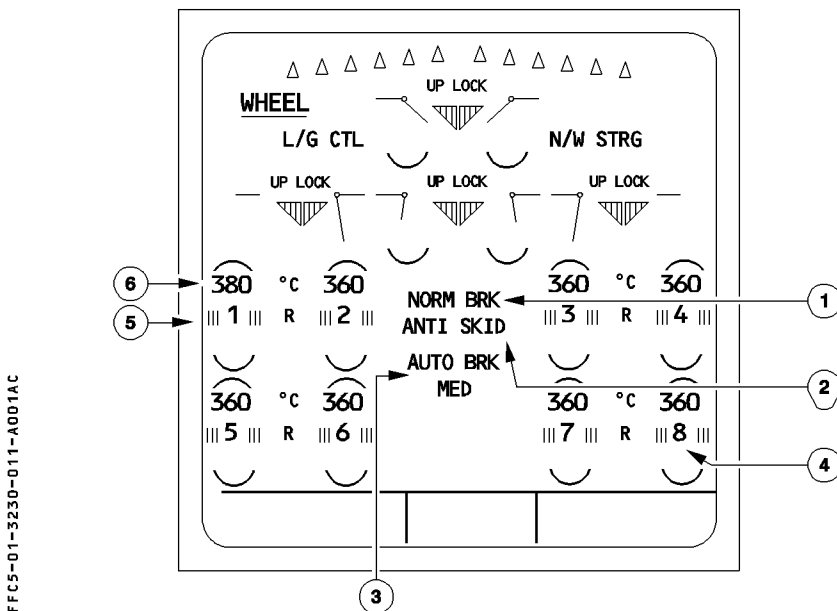
The «PARK BRK» message is displayed on the ECAM memo page.

CAUTION

As long as the handle is not in the «ON» position, the parking brake is not applied.



ECAM WHEEL PAGE



① NORM BRK indication

- R Appears in amber in case of :
- R – normal braking is failed
 - R – A/SKID & N/W STRG switch is at OFF (associated with ECAM caution)
 - R – both BSCU channels are failed (associated with ECAM caution).

② ANTISKID indication

Appears amber associated with an ECAM caution in case of total BSCU failure or when the A/SKID & N/W STRG switch is OFF or in case of antiskid failure detected by the BSCU or when green and blue systems are failed.

③ AUTO BRK indication

Displayed : – green when autobrake is armed
 – amber associated with an ECAM caution in case of autobrake system failure or failure of both BSCU channels.

MAX, MED or LO indicates the selected rate (green). Not displayed when autobrake is faulty.

**④** Wheel number identification

It is in white.

⑤ III indications

It appears in green when :

- In flight, the landing gear is extended, and the antiskid is valid, or
- On ground, when antiskid is activated and the brakes are released.

It is amber in case of :

- Residual pressure, or
- Brake release fault

The R (Release) indication is always in white.

⑥ Brake temperature indications

- It is normally green (minimum indication 0°C).
- A green arc appears on the hottest wheel, when one brake temperature exceeds 100°C.
- The amber light, and associated ECAM caution, come on when the corresponding brake temperature exceeds 300°C.
In addition, on the hottest wheel, the arc becomes amber.

Note : Below 100°C, the indicated brake temperature may be below the actual brake temperature. This difference can reach 25°C with an actual brake temperature of 30°C, and it decreases when the temperature increases.

**LANDING GEAR**

1.32.30

P 13

BRAKES AND ANTISKID

SEQ 001

REV 15

LEFT INTENTIONALLY BLANK

**LANDING GEAR**

1.32.30

P 14

BRAKES AND ANTISKID

SEQ 001

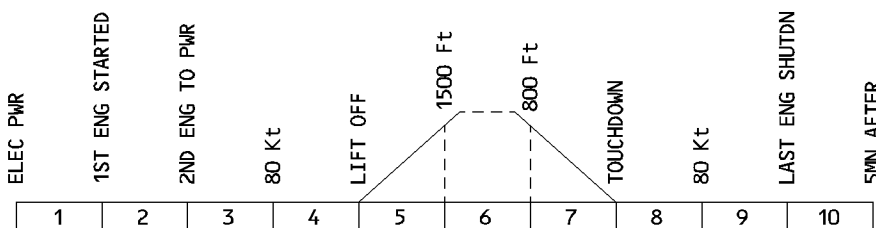
REV 15

LEFT INTENTIONALLY BLANK



WARNINGS AND CAUTIONS

FFCS-01-3230-015-A210AA



| E/WD : FAILURE TITLE conditions | AURAL WARNING | MASTER LIGHT | SD PAGE CALLED | LOCAL WARNING | FLT PHASE INHIB |
|---|------------------|-----------------|----------------------|--------------------|-----------------------|
| CONFIG PARK BRK ON Parking brake is ON when thrust levers are set at T.O or FLX T.O power position | CRC | MASTER WARN | NIL | NIL | 1, 2, 5 to 10 |
| PARK BRK LO PR | SINGLE CHIME | MASTER CAUT | WHEEL | BRK FAN HOT It< | 3 to 8 |
| BRAKES HOT One brake temperature higher than 300°C | | | | | 4, 8 |
| AUTO BRK FAULT A tachometer is failed, or a servo valve is jammed closed on one or two wheels. | | | | | 3, 4, 5 |
| A/SKID FAULT | | | | | 4, 5 |
| A/SKID NWS OFF Switch at OFF position | | | | | |
| RELEASED Brake of one wheel is released. It is detected when the landing gear is downlocked and at least one engine is running | | | | | 1, 4, 5 10 |
| RESIDUAL BRAKING (on ground) Brake pressure of at least one wheel is above 15 bar with pedals released | | | | | 1, 4 to 8, 10 |
| HYD SEL VALVE Failure or brake normal selector valve in open position. | | | | | 3, 4, 5, 8 |
| BSCU CH 1(2) FAULT One channel of the BSCU is failed | NIL | NIL | NIL | NIL | 3, 4, 5, 7, 8 |

MEMO DISPLAY

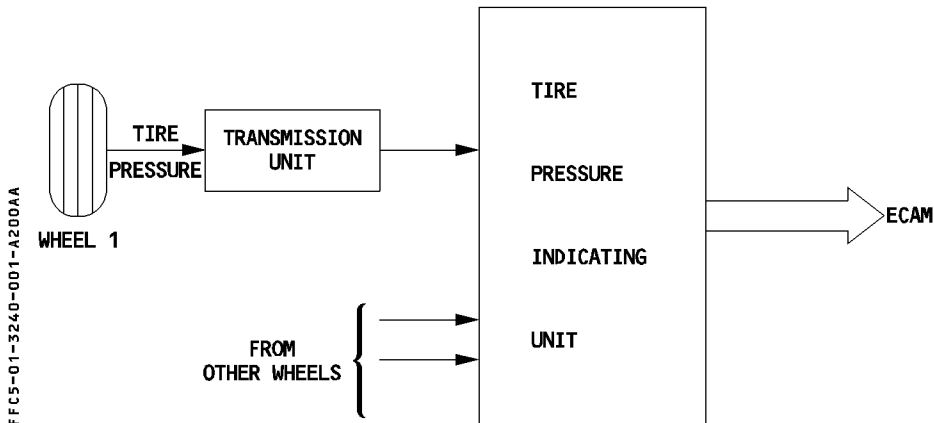
- If the parking brake is on, the PARK BRK message is displayed :
 - In green, in flight phases 1, 2, 9 and 10.
 - In amber, in other flight phases.
- The BRK FAN memo is displayed in green, if the BRK FAN pushbutton is ON.<



DESCRIPTION

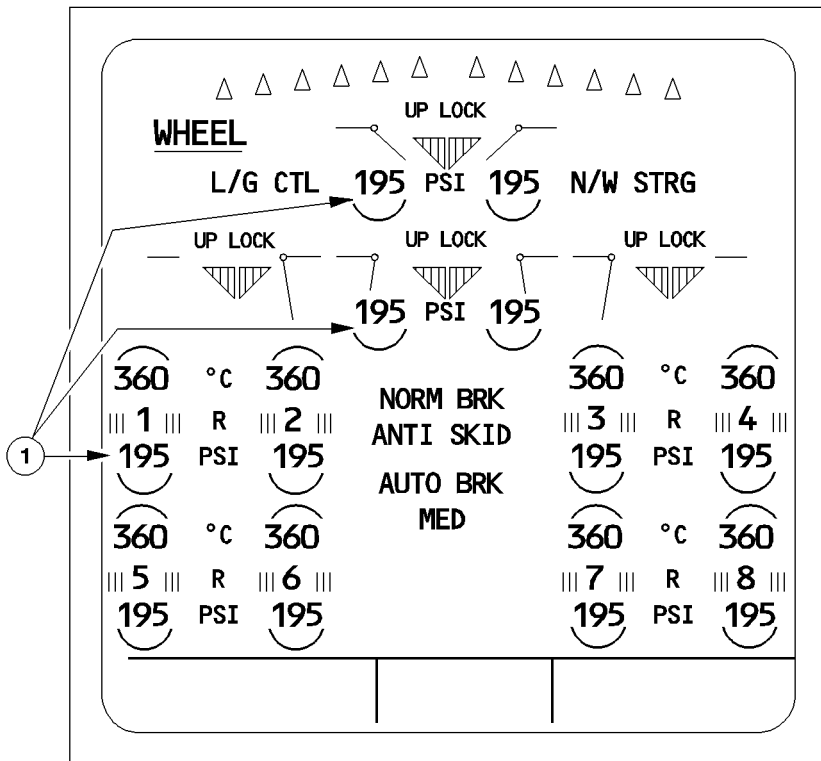
The Tire Pressure Indicating System (TPIS) includes :

- a sensor which measures the pressure of each tire
- a transmission unit which transmits the electrical pressure signal from the sensor to the computer
- a Tire Pressure Indicating Unit (TPIU) which sends informations to the ECAM for cautions and system page display.



CONTROLS AND INDICATORS

ECAM WHEEL PAGE



FFCS-01-3240-002-A200AA

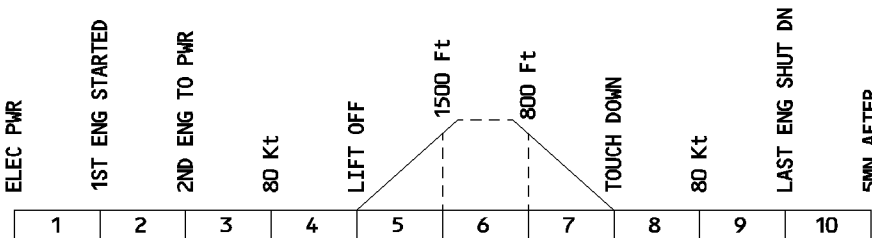
① Tire pressure indication

Indication is green.

Becomes amber associated with an ECAM caution when tire low pressure is detected.

WARNINGS AND CAUTIONS

FFCS-01-3240-003-A200AA



| E/WD : FAILURE TITLE conditions | AURAL WARNING | MASTER LIGHT | SD PAGE CALLED | LOCAL WARNING | FLT PHASE INHIB |
|---|------------------|-----------------|----------------------|------------------|-----------------------|
| <p>TYRE LO PR One tire pressure is lower than : - 74 % of nominal pressure from lift off to engines shut down - 89 % of nominal pressure in other cases. or 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</p> | SINGLE CHIME | MASTER CAUT | WHEEL | NIL | 4, 5, 8 |



| |
|---------------------------|
| BUS EQUIPMENT LIST |
|---------------------------|

R

| | | NORM | | | EMER ELEC | | |
|--------------|---------------------------------|-------|---------|--------|-----------|------------|-----------|
| | | AC | DC | DC BAT | AC ESS | DC ESS | HOT |
| LANDING GEAR | LGCIU 1 | | | | | LAND RECOV | |
| | LGCIU 2 | | DC2 | | | | |
| | SAFETY VALVE | | DC1/DC2 | | | | |
| | GRVTY EXT SYS 1 | | | | | | HOT 1 |
| | GRVTY EXT SYS 2 | | | | | | HOT 2 |
| | LDG GEAR INDICATOR PANEL | | | | | X | |
| NWS | OVERSTEER WARNING <1 | | DC1 | | | | HOT 1 (*) |
| BRAKES | BSCU CHANNEL 1 | | DC1 | | | | |
| | BSCU CHANNEL 2 | | DC2 | | | | |
| | PARK BRK CTL | | GND/FLT | | | | HOT 1 |
| | BRK FAN CTL<1 | | DC2 | | | | |
| | COOLING FANS WHEEL 1, 2, 3, 4<1 | AC2-3 | | | | | |
| | COOLING FANS WHEEL 5, 6, 7, 8<1 | AC1-2 | | | | | |
| TIRE PRESS | TIRE PRESS INDICATING UNIT<1 | | DC1 | | | | |

(*) : Or the tow tractor power supply.