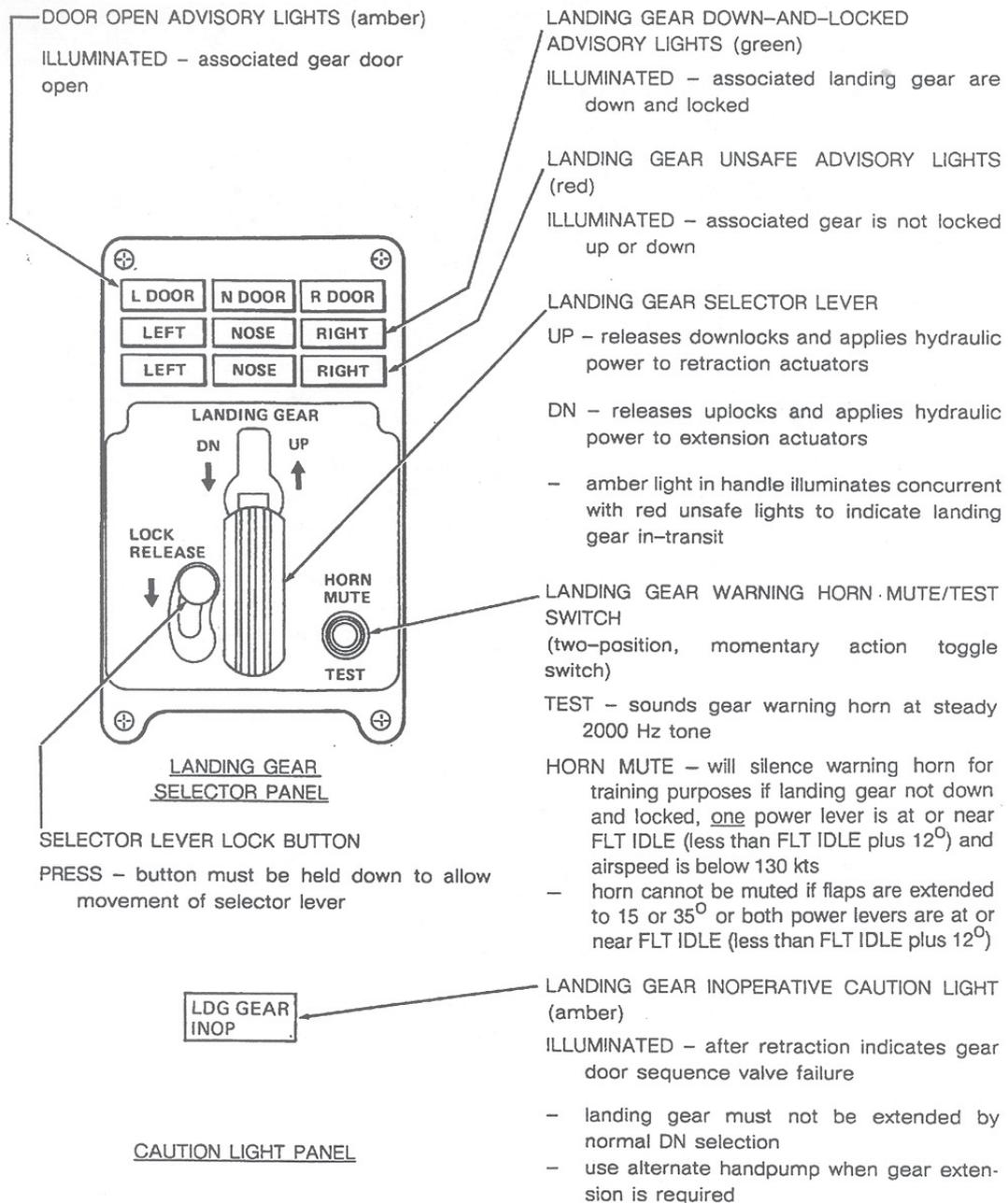
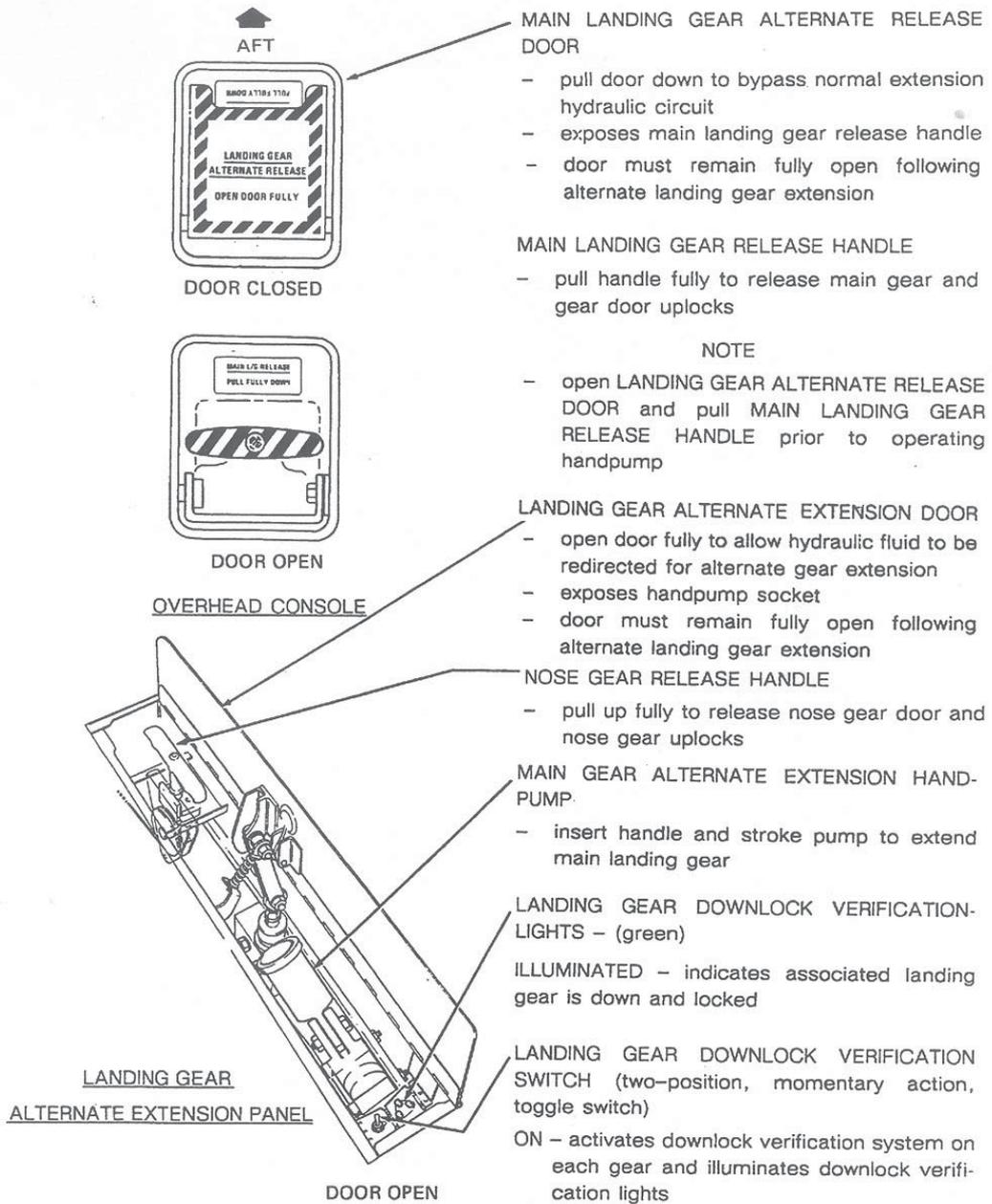


LANDING GEAR

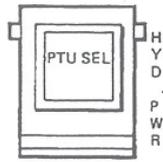
CONTROLS AND INDICATORS



Gear actuation and indication



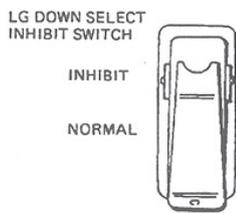
Alternate extension / downlock verification



HYDRAULIC CONTROL PANEL

MANUAL POWER TRANSFER UNIT SELECT SWITCH (guarded, alternate action switchlight)

- illuminates (green) and activates Power Transfer Unit (PTU) when pressed once
- light extinguishes and PTU deactivates when pressed again
- also illuminates during automatic operation of the PTU



OVERHEAD CONSOLE

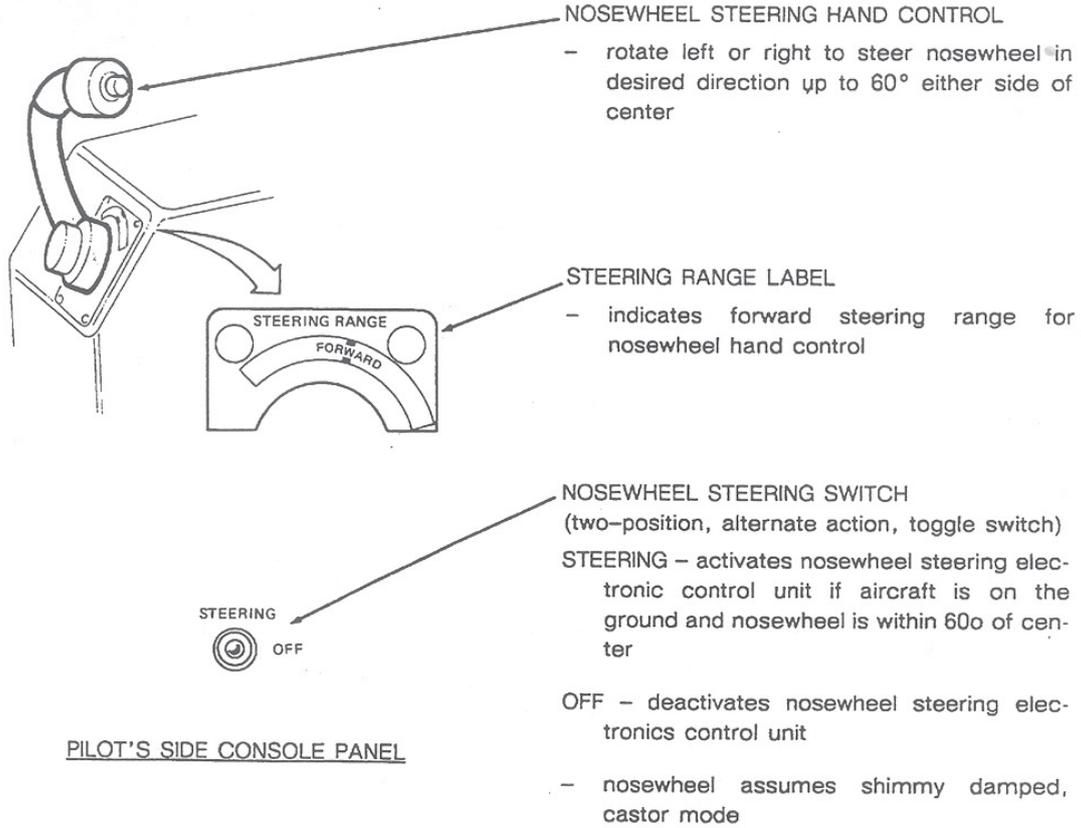
LANDING GEAR EXTENSION INHIBIT SWITCH (guarded, two-position toggle switch)

NORMAL - normal position for landing gear extension

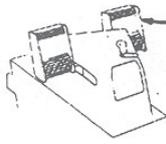
INHIBIT - disables normal landing gear extension and alternate extension using the PTU

- landing gear must be extended using the LANDING GEAR ALTERNATE RELEASE door, MAIN L/G RELEASE handle, emergency hand-pump and the NOSE L/G RELEASE handle

Manual PTU switch / landing gear extension inhibit switch



Nosewheel steering



RUDDER PEDALS – depress upper part of rudder pedals to apply brakes

PILOT'S/ COPILOT'S RUDDER PEDALS



BRAKE PRESSURE GAUGE

- indicates hydraulic pressure available to brake system
- normally indicates No. 2 hydraulic system pressure
- indicates brake accumulator pressure if No. 2 hydraulic system pressure is unavailable

HYDRAULIC CONTROL PANEL



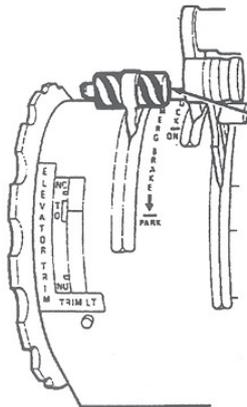
ANTI-SKID SWITCH

(three-position, alternate/ momentary action, toggle switch)

TEST – held in position, inboard and outboard anti-skid caution lights illuminate for three seconds if airborne or six seconds if on the ground and then extinguish to indicate serviceable anti-skid system

- ON – anti-skid system on
- OFF – anti-skid system off

COPILOT'S GLARESHIELD PANEL

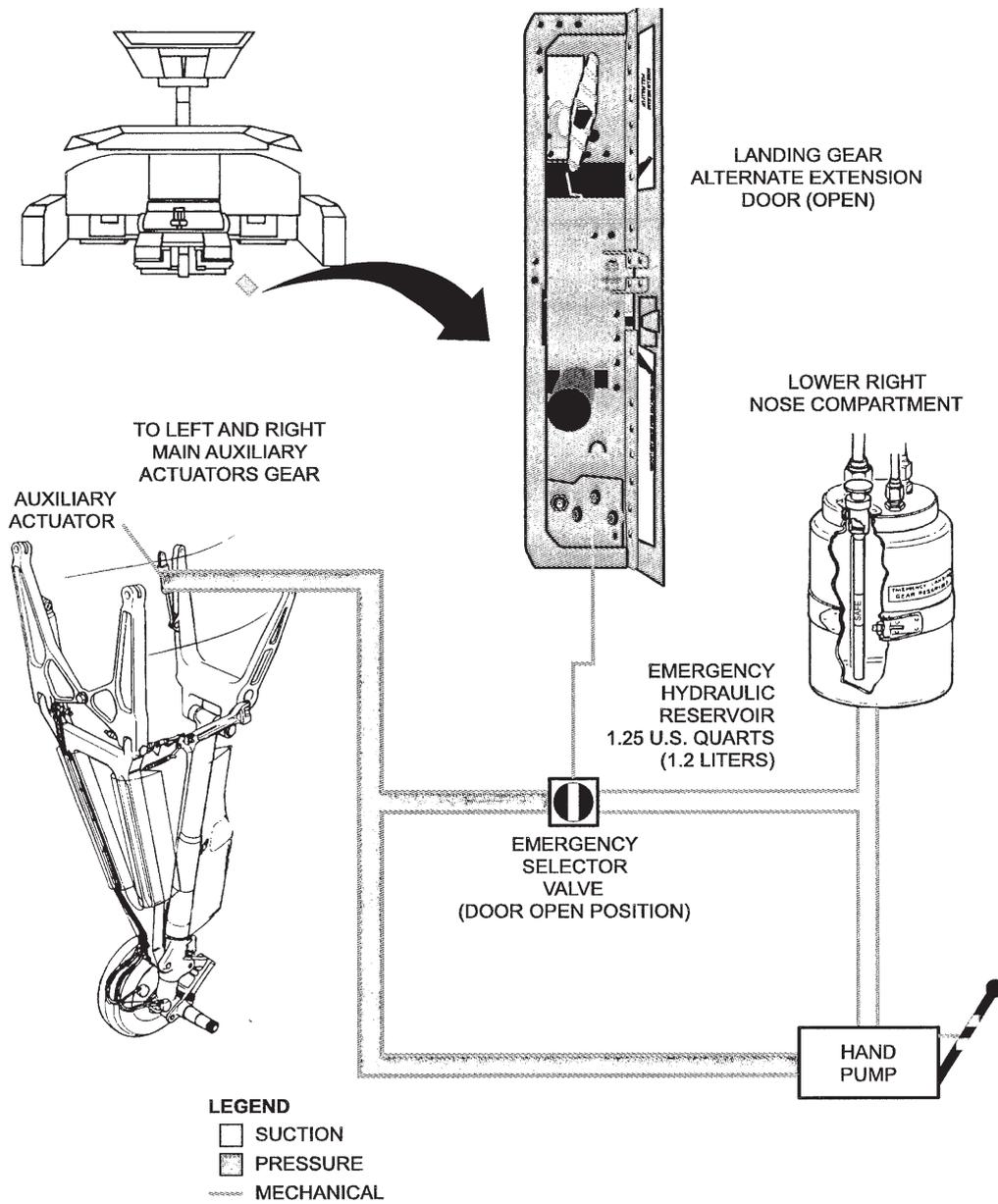


EMERGENCY/ PARKING BRAKE LEVER

- pull back to engage emergency brake
- pull fully back to PARK detent to engage parking brake
- press pushbutton on side of handle to release parking brake

ENGINE CONTROL QUADRANT

Brakes / antiskid



Emergency extension hydraulic system

SYSTEM DESCRIPTION

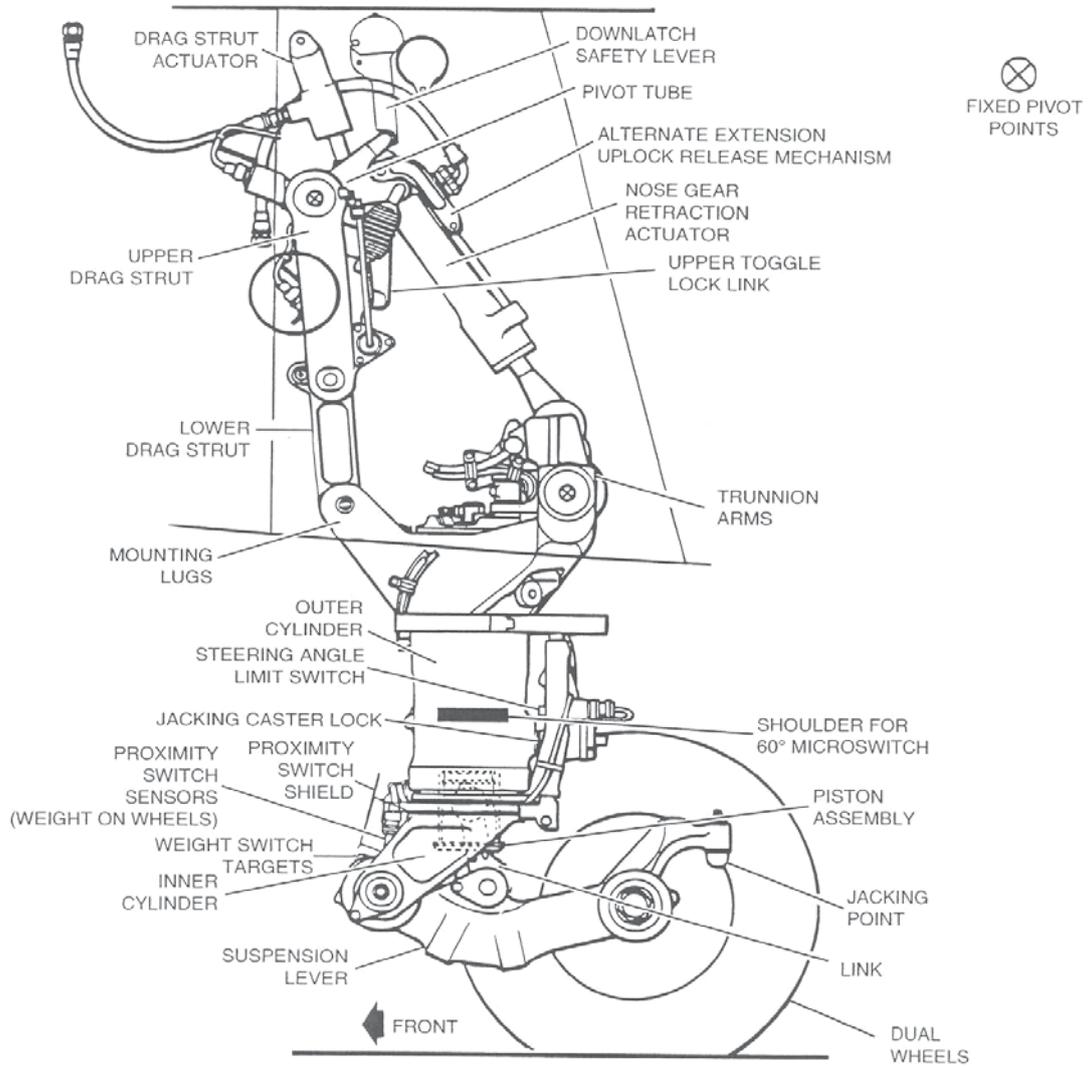
General

The aircraft has a conventional, retractable landing gear that is completely enclosed when retracted. The main gear is equipped with dual wheels and multi-disc brakes with an anti-skid system. The nose gear is equipped with dual wheels and is steerable from either the rudder pedals or a tiller located on the left pilot's side panel.

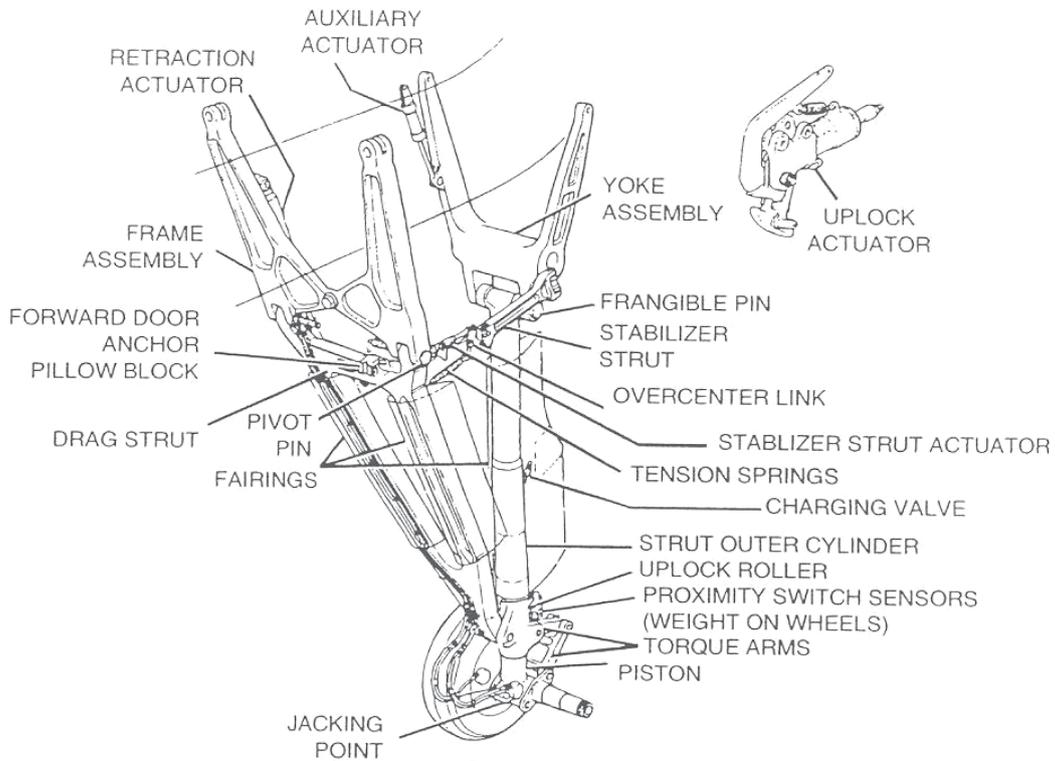
The landing gear is normally operated by number 2 hydraulic system and is controlled by a selector in the flight compartment. An alternate (emergency) means of extension is provided for the main landing gear. The nose gear has its own alternate (emergency) extension mechanism.

Advisory lights are provided to indicate extension/retraction status. An additional downlock verification system is also available. A landing gear extension inhibit switch simulates failure conditions as a convenience for flight crew training.

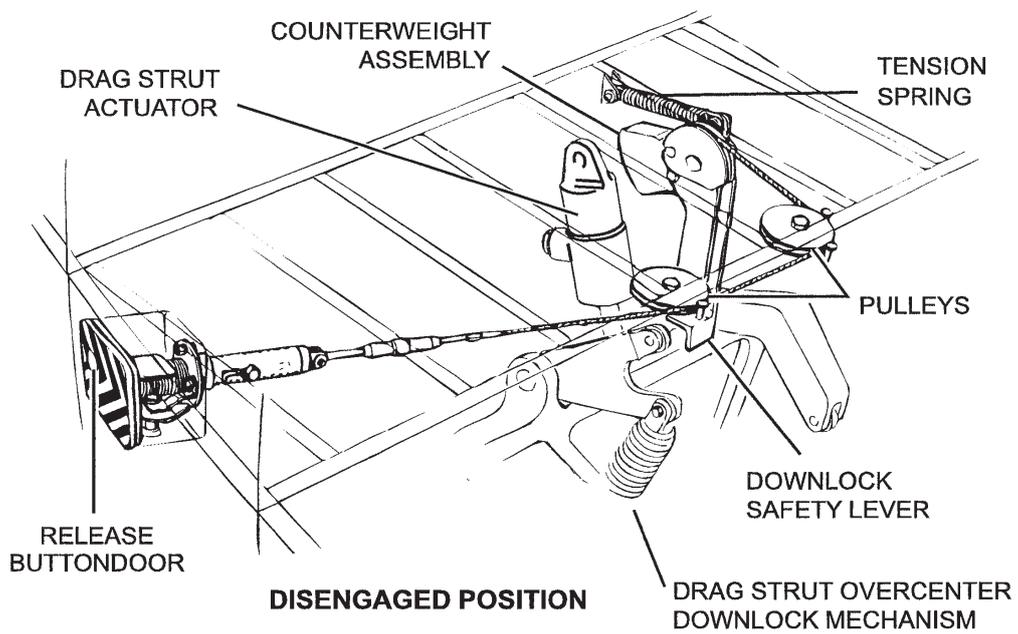
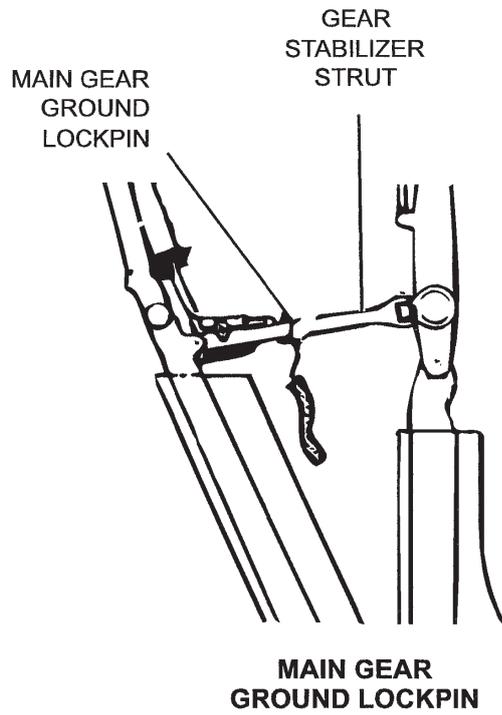
The nose landing gear is equipped with a ground locking mechanism accessible externally on the left side of the aircraft nose. Ground locking pins for the main gear are also available and are stowed in a compartment in the airstair door.



Nose landing gear



Main landing gear



Main gear safety pins / nose gear lock

Gear operation and indicators

Landing gear operation is controlled and monitored from the landing gear selector panel on the right side of the engine instrument panel. The panel has a gear selector lever, selector lever lock release, landing gear and gear door advisory lights and a gear horn mute/test switch. The landing gear is selected UP or DN (down) with the landing gear selector handle. The gear selector lever lock release button must be held down to allow the gear selector lever to be moved to either position. An amber light in the selector handle illuminates to indicate the gear is in transit when a gear selection is made.

Nine advisory lights are located at the top of the landing gear selector panel; three green lights indicate the respective LEFT, NOSE or RIGHT gear is down and locked; three red lights indicate respective LEFT, NOSE or RIGHT gear is unlocked (unsafe); three amber lights indicate that respective LEFT, NOSE or RIGHT gear doors are open.

The proximity switch electronics unit (PSEU), using inductance-type proximity sensors, controls the sequencing of landing gear and hydraulically operated gear doors during retraction and extension. The PSEU also controls the landing gear and gear door advisory lights. A weight-on-wheels (WOW) signal from proximity sensors in the landing gear prevents the gear from retracting while on the ground. The PSEU activates a warning horn to provide an audible warning when the gear has not been extended and the aircraft is in the landing configuration.

Retraction sequence

When the landing gear selector lever is selected UP, hydraulic pressure from number 2 system is applied to the 'retract' side of the system. Hydraulic pressure opens the main gear rear doors and mechanically linked centre doors. Hydraulic pressure retracts the main landing gear. Following main gear retraction, the forward, centre and rear doors close. Concurrent with the main gear retraction sequence, the hydraulic system opens the nose gear forward doors and retracts the nose gear. Following nose gear retraction, the forward nose gear doors close hydraulically. The aft nose gear doors are mechanically linked and close with the retracting nose gear leg.

The advisory light sequence during retraction of the landing gear commences with the green LEFT, NOSE and RIGHT lights extinguishing to indicate that the gear is no longer locked down. Concurrent with this, the LEFT, NOSE and RIGHT red lights and the amber selector lever handle lights illuminate. The amber door advisory lights illuminate to indicate the hydraulically operated gear doors are open. When the landing gear is retracted and locked in the up position, the red advisory lights extinguish. The selector handle light also extinguishes. Finally, the gear door advisory lights extinguish to indicate the doors have closed.

Extension sequence

When the landing gear selector is selected to DN, hydraulic power is applied to the 'extend' side of the system. Hydraulic pressure opens the main gear rear doors and mechanically linked centre doors. Hydraulic pressure extends the main landing gear. Following main gear extension, the centre and rear doors close. The forward main gear doors remain open. Concurrent with the main gear extension sequence, the hydraulic system opens the nose gear forward doors and extends the nose landing gear. Following nose gear extension, the nose gear forward doors close hydraulically. The nose gear rear doors remain open.

The advisory light sequence during extension commences with the LEFT, NOSE and RIGHT red lights and amber gear selector handle illuminating. The amber door advisory lights illuminate to indicate the hydraulically operated gear doors remain open when the landing gear is down and locked. When the landing gear is fully extended and locked in the down position, the red advisory lights extinguish and the green illuminate. The selector handle light also extinguishes. The gear door advisory lights extinguish when the hydraulically operated doors are closed.

Sequencing of the landing gear extension and retraction is accomplished with hydraulic sequencing valves, monitored by the PSEU. Failure of a sequencing valve is annunciated by illumination of the LDG GEAR INOP caution light on the caution light panel. Illumination of the LDG GEAR INOP caution light must always lead to the alternate landing gear extension procedure.

CAUTION: Failure to initiate the alternate landing gear extension procedure when the LDG GEAR INOP caution light is illuminated may cause structural damage.

Power Transfer Unit (PTU)

The PTU consists of a hydraulic motor driven by the number 1 system that drives a pump in the number 2 system. Hydraulic fluid is not transferred between the systems during PTU operation. The PTU provides hydraulic pressure in the number 2 system assuming that the number 1 system is operating and that no fluid loss has occurred in the number 2 system. The PTU provides hydraulic power to the entire number 2 hydraulic system.

The PTU activates automatically in response to loss of number 2 engine oil pressure and a landing gear UP selection. The PTU switches off automatically when the landing gear is fully retracted.

The PTU may also be selected manually at any time to raise or lower the landing gear. The PTU may be manually selected by pressing the guarded HYD PWR PTU SEL switchlight. The switchlight illuminates to indicate operation of the PTU.

Landing gear extension inhibit switch

The landing gear down select inhibit switch is installed in the flight compartment roof adjacent to the landing gear alternate release door above the right pilot's left shoulder. Operation of the switch to the INHIBIT position disconnects power from the landing gear selector valve, removing all hydraulic pressure from the landing gear system. During non-

normal operation the switch prevents hydraulic pressure from disrupting the emergency checklist sequence. The switch also provides a means to disable the regular landing gear down selection, thus providing the flight crew with realistic practice in using the alternate extension system during flight training.

Alternate extension

The alternate extension system provides a means of extending the landing gear when hydraulic power is not available from the number 2 hydraulic system. The alternate extension procedure must also be used when the LDG GEAR INOP caution light is illuminated.

Emergency handpump

An emergency handpump is installed to aid in extending the main landing gear when the alternate landing gear extension procedure is carried out. The handpump operates independently of the main hydraulic system. The handpump is located beneath the landing gear alternate extension door in the flight compartment floor, inboard and aft of the right pilot's seat. The extension handle is stowed on the right hand flight compartment aft bulkhead.

Emergency extension of the main landing gear is initiated by pulling the landing gear alternate release door on the overhead console. This bypasses the normal hydraulic extension system and exposes the main landing gear release handle behind the door. The landing gear alternate extension door must then be fully opened allowing hydraulic fluid to be redirected for emergency extension. When the main landing gear release handle is pulled, the main gear uplocks are released and the main gears extend from the wheel wells.

The extension handle can then be inserted into the pump handle socket and operated to complete main gear extension and subsequent downlock when needed. Both the landing gear alternate extension door and the landing gear alternate release door must be left fully open following alternate landing gear extension.

The nose landing gear release handle is located forward of the emergency hand pump. When the release handle is pulled, the nose gear doors uplock is released and the gear will free-fall to an extended and locked position.

The landing gear cannot be retracted after an alternate extension procedure.

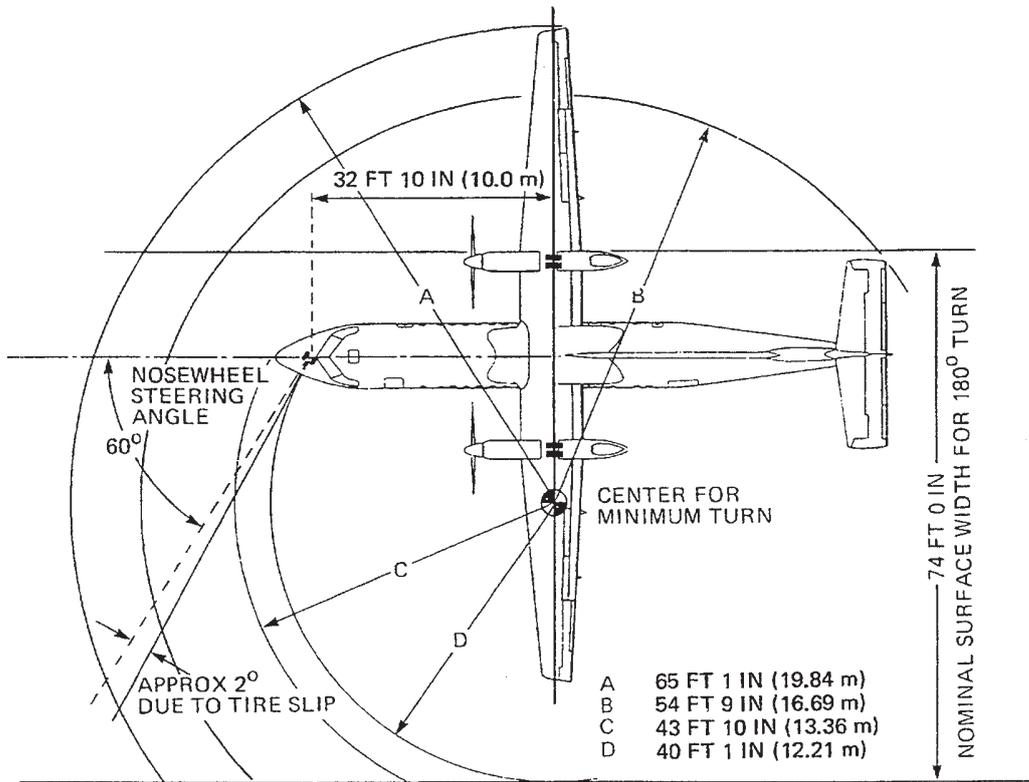
Nosewheel steering

Directional control of the aircraft on the ground is provided by the nosewheel steering system. Powered by the number 2 hydraulic system, control of the steering is through a nosewheel steering electronics controls unit (ECU) with inputs from either the nosewheel steering tiller or the rudder pedals. The nosewheel steering tiller turns the nosewheel up to 60° either side of centre and is intended for low speed taxiing. Nose wheel deflection when steering with the rudder pedals is limited to 7° either side of centre and is intended for high-speed taxi and directional control during the take-off and landing roll.

The tiller, located aft of the pilot's side console panel, is self-centring and is actuated by selecting STEERING on the nosewheel steering switch on the pilot's side console panel. The nosewheel must be within 60° of centre for the STEERING selection to be effective. An index mark on the tiller indicates the relative position of the nosewheel against a fixed steering range placard. Nosewheel steering using the tiller is limited to forward taxiing only. During reverse taxiing, the steering switch must be selected STEERING, but taxiing is limited to a straight-back motion with no turns.

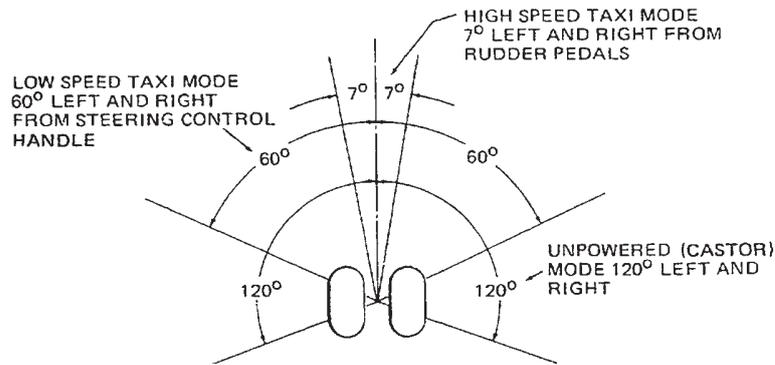
The nosewheel assumes a passive, shimmy-damped, castor mode with the steering switch in the OFF position, in the event of failure of the nosewheel steering ECU or if the limit of 60° is exceeded. In the passive mode, the nosewheel will castor up to 120° either side of centre. Directional control may be maintained by using differential braking and/or differential thrust. Failure of the nosewheel steering ECU or exceeding the 60° limit with STEERING selected illuminates NOSE STEERING caution light on the caution light panel.

Following an alternate gear extension, nose wheel steering is not available.



NOTES:

1. DIMENSIONS QUOTED ARE GIVEN FOR A DRY HARD LEVEL SURFACE AT THE RECOMMENDED TIRE PRESSURES FOR A STANDARD AIRCRAFT.
2. THE NOSE WHEEL STEERING LIMIT IS APPROXIMATELY 60° LEFT AND RIGHT.
3. THE 2° SLIP ANGLE IS APPROXIMATE ONLY AND MAY VARY DEPENDING ON AIRCRAFT CONFIGURATION, LOADING AND TIRE WEAR.
4. DIMENSIONS GIVEN FOR THE MANEUVERING CLEARANCE AND TURNING RADII ARE THE MINIMUM RECOMMENDED LIMITS.



Minimum steering radius diagram

Normal brake system

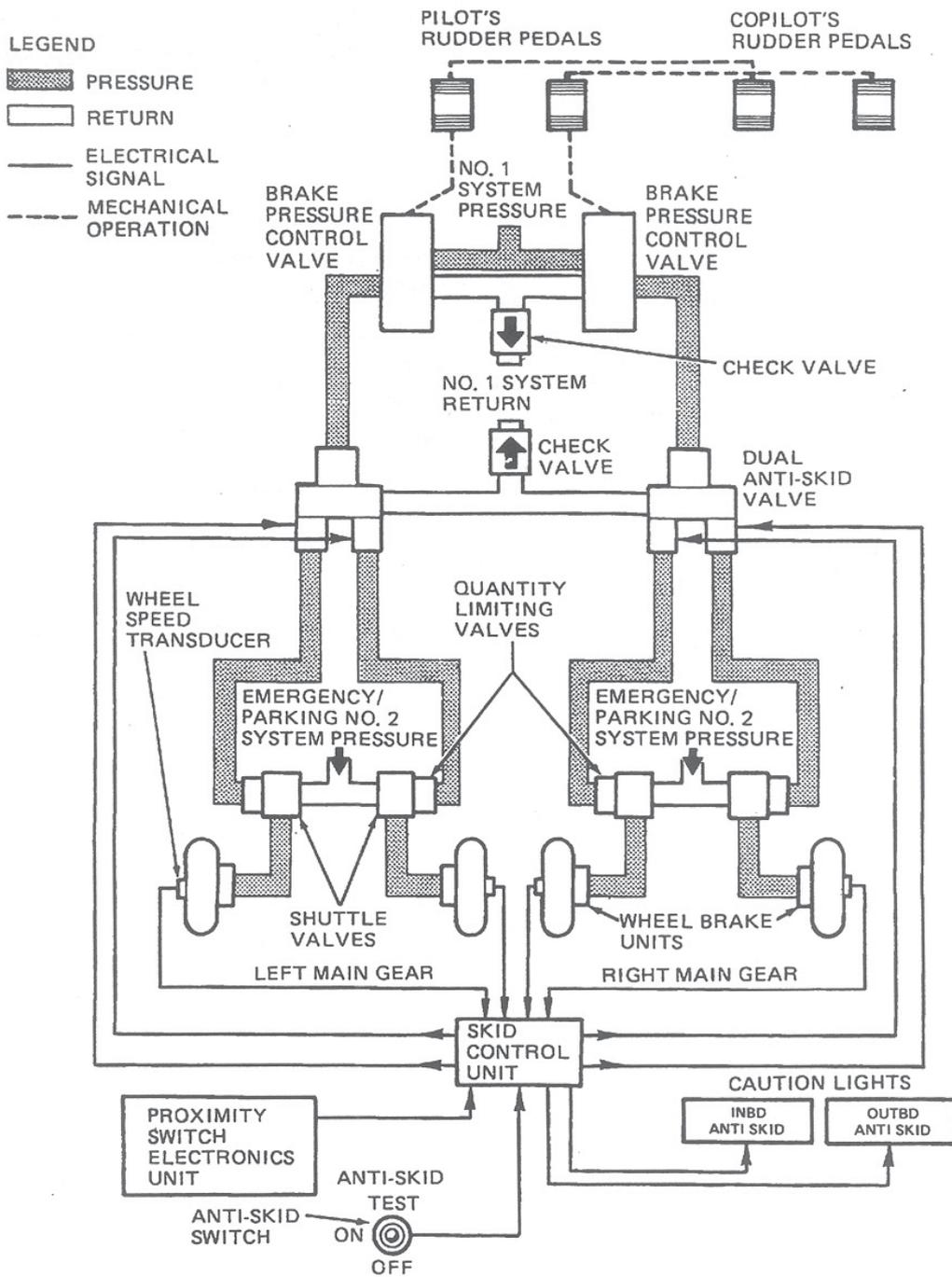
Each main wheel is equipped with a multi-disc brake unit powered by the number 1 hydraulic system. Brake units on each main gear are controlled independently through a variable-pressure control valve. An anti-skid system modulates the application of brake hydraulic pressure to each brake unit.

Brake pressure is applied by pressing either pilots' rudder (brake) pedals, which are mechanically linked to the brake control valve for each main gear. A spring-resistance arrangement simulates a brake feel proportional to the pressure applied to the brake pedals. The pilot's brake pedals are linked to the brake pressure control valves. The right pilot's brake pedals are linked to the left pilot's brake pedals with one-way cables. With this arrangement, pressing the right pilot's pedals also depresses the left pilot's pedals. However, pressing the left pilot's pedals does not affect the right pilot's pedals.

An anti-skid control unit monitors wheel speed, as sensed by a transducer in each main wheel, and modulates brake pressure applied to each brake unit to prevent wheel lock-up. The anti-skid control unit controls brake pressure through the skid control valve for each brake unit. As wheel rotational speed drops with the onset of a skid, the transducer generates a signal, which causes the skid control unit to reduce brake pressure adequately to prevent the skid. This permits the application of optimum braking at all levels of runway friction.

The anti-skid switch on the right pilot's glareshield panel activates the anti-skid system when selected to the ON position and when the wheel speed exceeds 17 knots. A self-test of the anti-skid control circuits is made when the switch is moved from the OFF position to the ON position or when the switch is selected to the momentary TEST position. A self-test, with the aircraft on the ground, causes the INBD ANTI SKID and the OUTBD ANTI SKID caution lights to illuminate for six seconds and then extinguish. A self-test in the air, with the landing gear extended and locked, will illuminate the caution lights for three seconds.

Failure of the skid control circuitry illuminates the appropriate caution light continuously. With the anti-skid system (partially) inoperative, the pilots should revert to braking intermittently. Excessive brake application can result in skidding and tire failure.



Brake and anti-skid system schematic

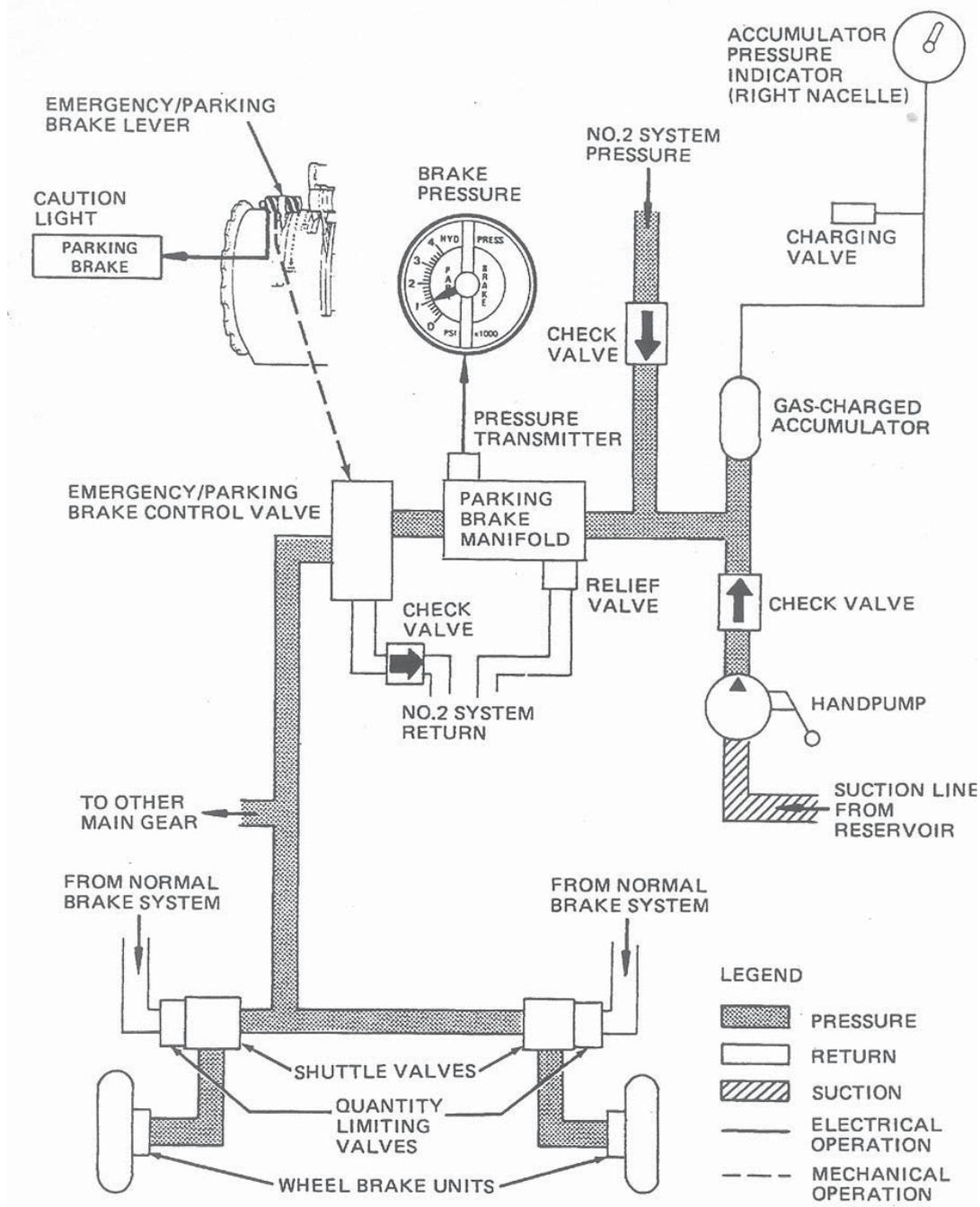
Emergency/parking brake system

The emergency/parking brake system provides a means for parking or for applying brakes should the normal brake system fail. An emergency brake lever located on the engine control quadrant operates the system. The lever is mechanically linked to an emergency/parking brake control valve, which directs hydraulic pressure to the brake units. The emergency/parking brake system is powered by number 2 hydraulic system, supported by hydraulic accumulator pressure in the event system hydraulic pressure is unavailable. Hydraulic pressure to the emergency/parking brake system is indicated on a park brake gauge on the co-pilot's instrument panel. Normally, the pressure indicated will approximate number 2 hydraulic system pressure.

The emergency brake lever operates against a spring to produce a resistance proportional to the brake pressure applied as the lever is pulled back. The emergency/parking brake system applies brakes on each gear equally. There is no provision for differential braking. The emergency/parking brake system has no anti-skid system and brake pressure must be modulated by hand to prevent skidding.

If the emergency/parking brake system is used with number 2 hydraulic system inoperative, brake pressure is supplied by the accumulator. Pumping the brakes with the emergency brake lever will rapidly deplete the available brake pressure. Brakes should be applied with a continuous pressure.

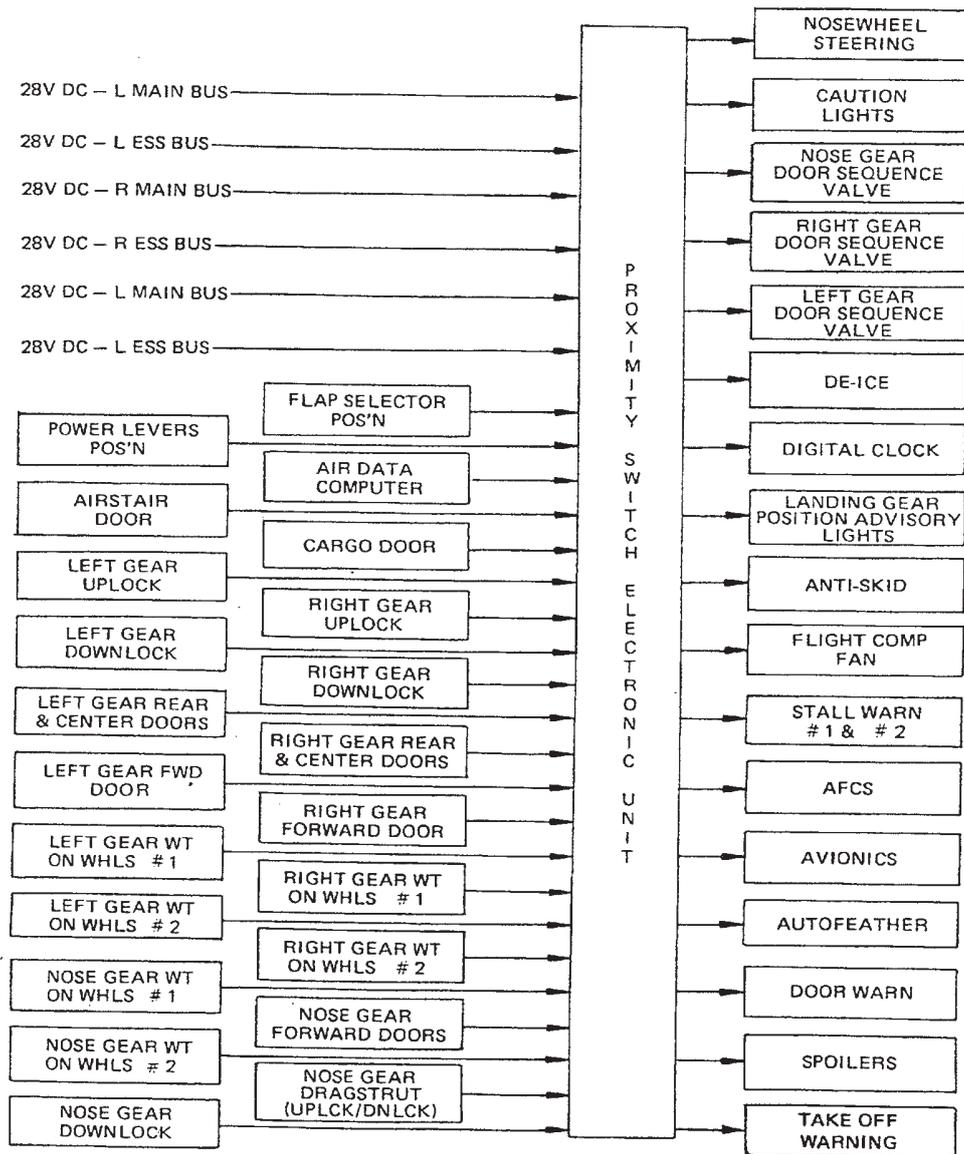
The parking brake is engaged by pulling the emergency brake lever all the way back to the detented PARK position. This illuminates a PARKING BRAKE caution light on the caution light panel. The button on the side of the handle must be depressed to release the lever from the PARK detent. Care should be taken when releasing the lever, as spring tension will force the lever forward.



Emergency/parking brake schematic

Proximity switch electronics unit (PSEU)

The proximity switch electronics unit (PSEU) receives input from various sources and, using internal logic circuits, controls the sequencing of the landing gear and gear doors in addition to providing output to other systems in the aircraft. Induction-type proximity switches are used to monitor the status of the landing gear uplocks and downlocks, gear doors, weight-on-wheels (WOW) and the passenger and cargo doors. Inputs are also received from the power and flap selector levers and the air data computer. Failure of a WOW sensor illuminates a WT ON WHEELS caution light on the caution light panel. Redundancy in the WOW signals and internal circuitry in the PSEU ensures a continuously valid WOW signal in the event of a failure.



Proximity switch electronics unit block diagram

NON-NORMAL INDICATIONS AND OPERATION

Caution lights

LDG GEAR INOP	Landing gear door sequence valve relay failed with aircraft airborne and gear UP.
Applicable ECL	LDG GEAR INOP CAUTION LIGHT
Remarks	Landing gear door of corresponding failed relay will not open before gear extends if normal extension is selected, resulting in structural damage. Landing gear must not be extended by normal DN selection. Use alternate landing gear extension procedure.
NOSE STEERING	Nosewheel steering electronic control unit failure.
Applicable ECL	NOSE WHEEL STEERING FAILURE.
Remarks	Nosewheel assumes shimmy damped, castor mode.
W/T ON WHEELS	Fault in a weight-on wheels sensing circuit within PSEU or sensor damaged.
Applicable ECL	WEIGHT ON WHEELS FAILURE
Remarks	Systems dependent on weight on wheels sensing circuits will remain operational because of redundancy of the weight on wheels sensors.
PARKING BRAKE	Parking brake set.
Applicable ECL	PARKING BRAKE CAUTION LIGHT.
Remarks	Caution light goes out when PARK/EMERG BRAKE lever is released
INBD ANTI SKID	Inboard (INBD) or outboard (OUTB) anti-skid system is unserviceable or system is selected OFF.
OUTB ANTI SKID	
Applicable ECL	INBOARD ANTI SKID FAILURE or OUTBOARD ANTI SKID FAILURE.
Remarks	With one light illuminated skid control reduced by 50%. Lights illuminate briefly during test.