



SYSTEMS DESCRIPTIONS
LANDING GEAR
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LANDING GEAR

LANDING GEAR OPERATION

DESCRIPTION

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GENERAL

The Landing Gear (LG) consists of two inward retracting main gears and a forward retracting nose gear. Doors enclose the landing gear bays. The LG is retracted and extended by hydraulic system 1. In the event of hydraulic system 1 failure, the LG can be extended by gravity.

Main Gear

When the LG is selected up or down the inboard LG bay doors are hydraulically unlocked and opened. When the doors are fully open the main gears will retract or extend. When the main gears are fully retracted or extended the inboard doors will hydraulically close and will be mechanically locked. The main gears are mechanically locked down. The downlocks are released hydraulically when the gear is retracted. The main gears are held in the retracted position by hydraulic pressure. In the event of loss of hydraulic pressure, the main gears will rest on the doors. Outboard doors are connected to the main gear struts, and open and close mechanically. Main wheel rotation automatically stops during LG retraction.

Nose Gear

When the LG is selected up the nose gear will hydraulically unlock and retract. When the nose gear is fully retracted the nose gear doors will hydraulically close and will be mechanically locked. Nose wheel rotation is stopped after retraction by a mechanical brake. The nose gear is held in the retracted position by hydraulic pressure. In the event of loss of hydraulic pressure the nose gear will rest on the doors. When the LG is selected down the nose gear doors are hydraulically unlocked and opened. When the doors are fully open the nose gear will extend and mechanically lock down. The doors will remain open.

CONTROL

Hydraulic Operation

Hydraulic operation is controlled by a two position (UP and DOWN) LG selector, located at the center main instrument panel.

The LG selector operates a selector valve which directs hydraulic system 1 pressure in accordance with UP and DOWN selection. Door sequence valves ensure that the LG doors open, and remain open, while the nose gear and main landing gears are in transit. Inadvertent UP selection on the ground is prevented by an electrical LG selector lock. The LG selector lock will release automatically when the aircraft becomes airborne. In the event of automatic lock-release failure, the lock can be released by depressing a LG lock override button.

NOTE: The use of the LG OVRD button is restricted; see chapters Abnormal Procedures, and System Operation.

Alternate Operation

The alternate LG selector is located at the rear of the pedestal on the right-hand side. Operation of the selector releases the locks of the LG doors, and dumps the LG hydraulic system pressure. The LG will then free-fall and mechanically lock down. The main-gear inboard doors will stay open and are protected, against serious damage on landing, by slide strips. Nose-wheel steering becomes inoperative after alternate gear extension.

INDICATIONS

LG Lights

LG position lights are located below the LG selector. The LG down and locked position is indicated by a green light for each respective gear. The lights will be out when the LG is fully retracted. A blue light incorporated in the LG selector knob will come on during retraction until all LG doors are closed and locked, and during extension until all landing gears are down and locked.

When the lights come on due to alternate LG extension it remains on until the LG selector is selected down.

LG level 2 alerts

A level 2 alert is presented when a disagreement between the position of the LG selector and the gears or the doors is detected.



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LG level 3 alert

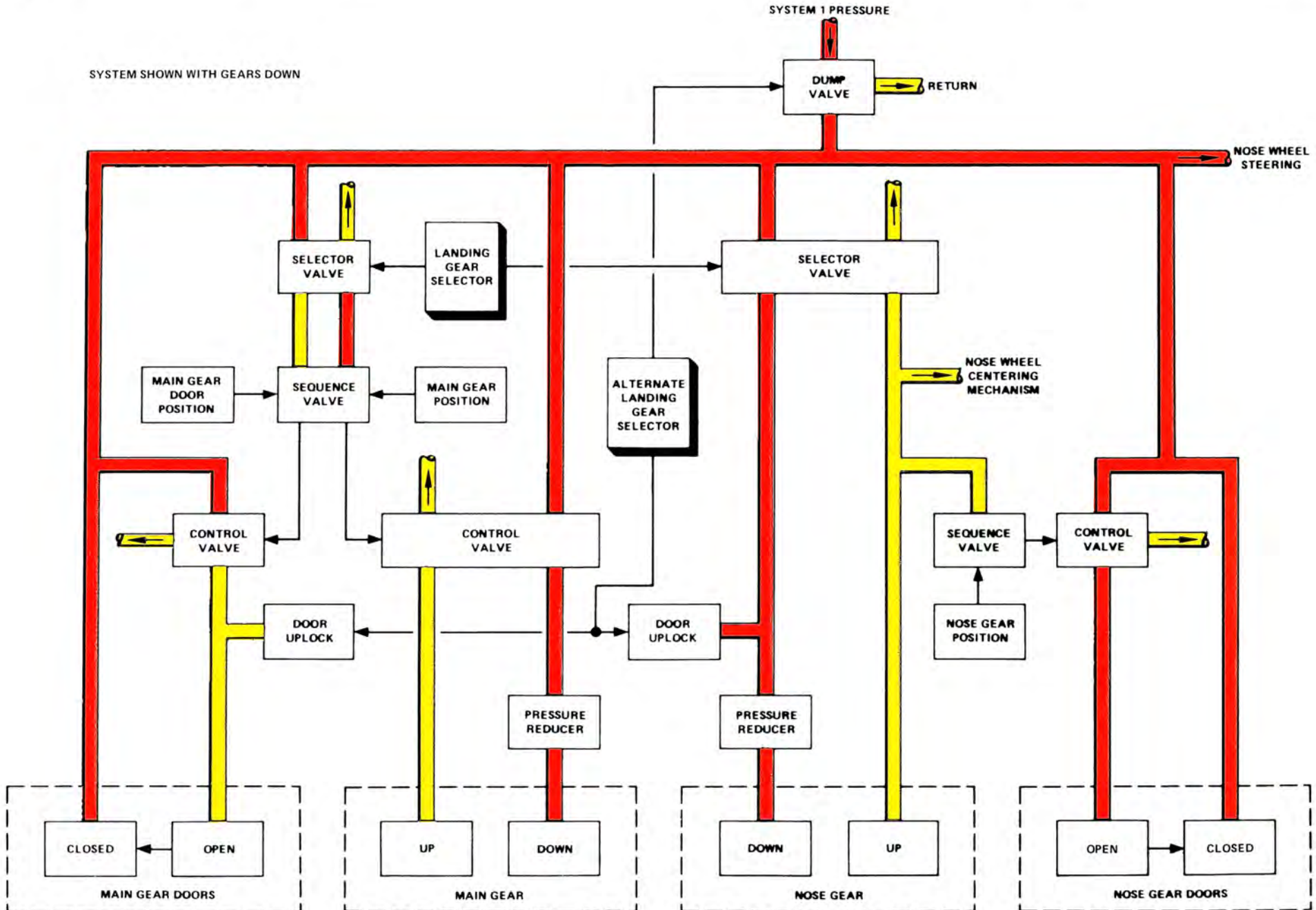
A level 3 alert is presented when the LG is not down and locked and the aircraft is in an approach configuration. The approach configuration is defined as a radio altitude less than 1000 ft and either a flap position greater than 23 degrees or a thrust lever position less than MIN TO. If radio altitude is not available, the alert will be presented by either flap or thrust lever position only. The LG-not-down alert cannot be cancelled by depressing the master warning lights. The alert is cancelled only when all LG is down and locked.

LANDING GEAR LANDING GEAR OPERATION FUNCTIONAL DIAGRAM

LANDING GEAR LANDING GEAR OPERATION FUNCTIONAL DIAGRAM

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SYSTEM SHOWN WITH GEARS DOWN



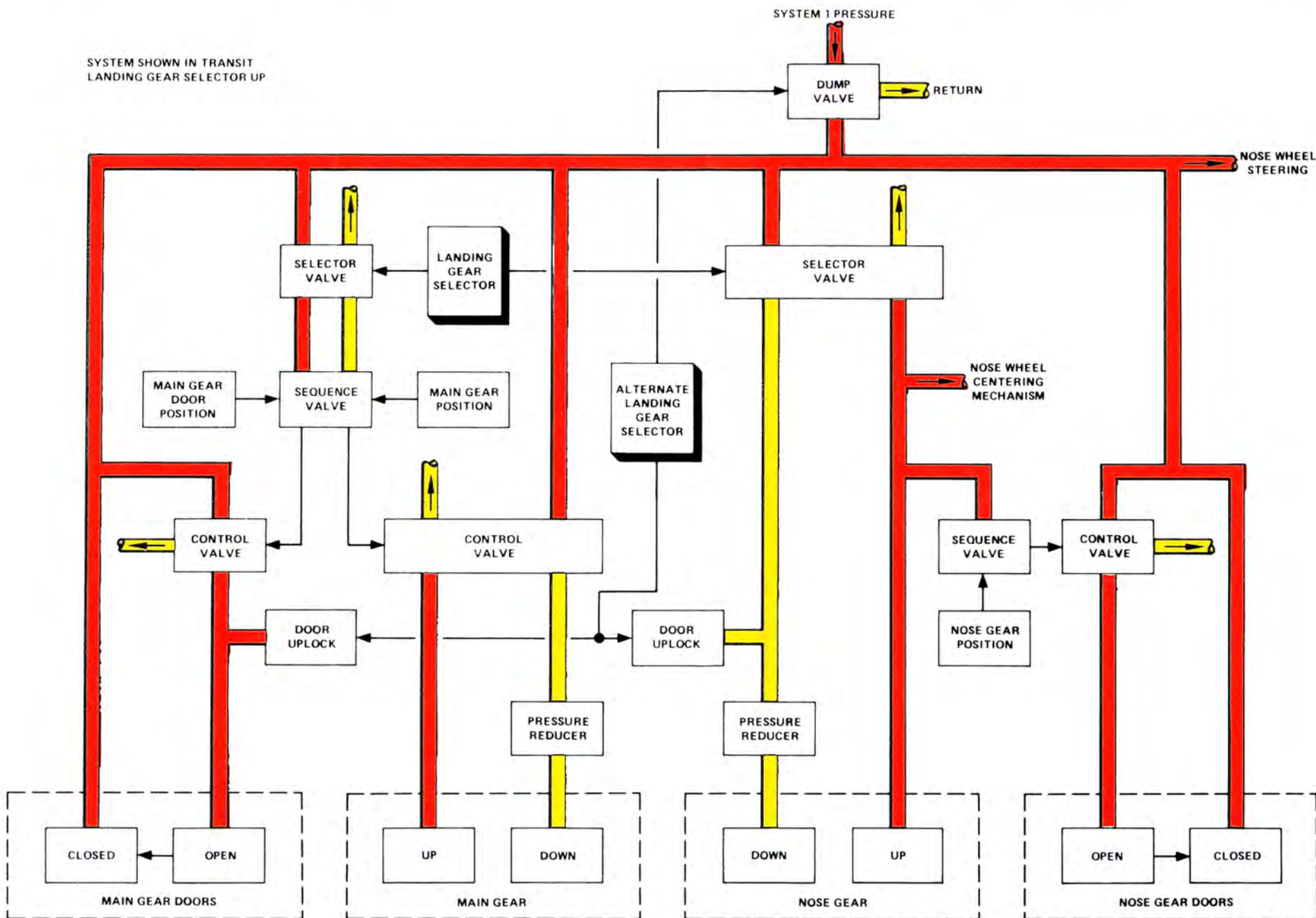
VD/OP - 13 - 101 A

LANDING GEAR LANDING GEAR OPERATION FUNCTIONAL DIAGRAM

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SYSTEM SHOWN IN TRANSIT
LANDING GEAR SELECTOR UP

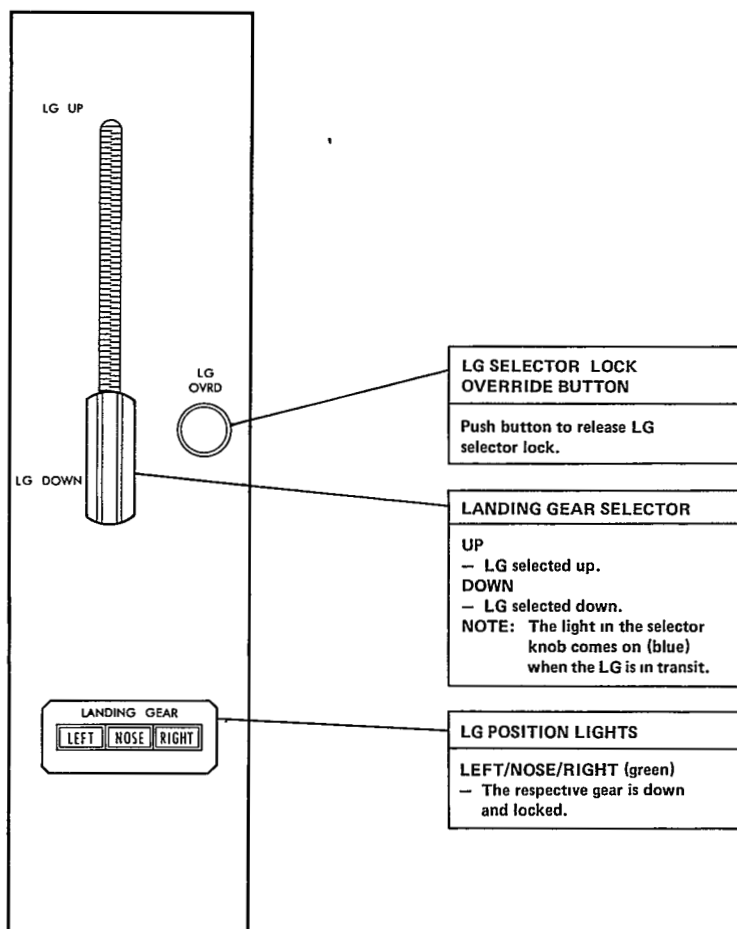
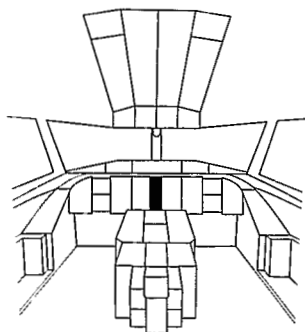


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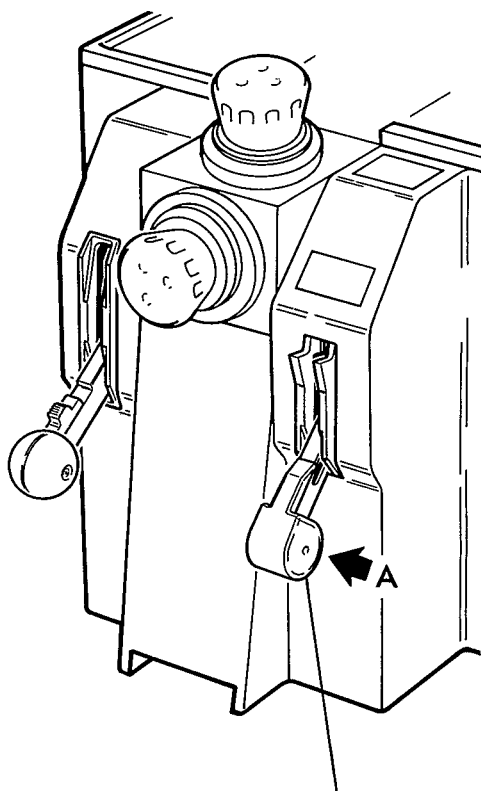
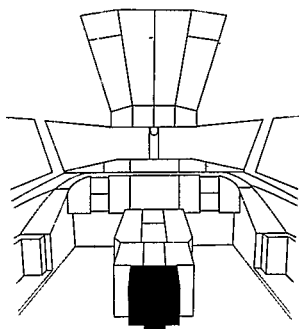


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VIEW A

SELECTOR RELEASE KNOB

Operate to unlock the selector.

ALTERNATE LG SELECTOR

Pull upwards to extend the LG by gravity.

NOTE: The alternate LG selector cannot be reset before the LG selector is in the DOWN position.

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| CONDITION(S)/LEVEL | | ALERTS | | | |
|--------------------|--|--------|---------|--------------------------------------|-------|
| | | AURAL | MWL/MCL | MFDU | LOCAL |
| A | LG NOT SELECTED DOWN + AIRCRAFT IN APPROACH CONFIGURATION 3 | | | LG NOT DOWN | |
| B | LG NOT DOWN AND LOCKED AND LG SELECTOR DOWN 2 | | | NOSE/ L MAIN/ R MAIN LG UNSAFE | |
| C | MAIN GEAR DOOR NOT CLOSED AND LOCKED AND LG SELECTOR DOWN 2 | | | L MAIN/R MAIN LG DOOR | |
| D | LG AND DOORS NOT UP AND LOCKED AND LG SELECTOR UP 2 | | | NOSE/ L MAIN/R MAIN LG | |

ALERT INHIBITION

| | ELEC PWR ON | FIRST ENG ON | TO PWR | 80 KT | LIFT OFF | 400 FT | 1000 FT | 1000 FT | 400 FT | TOUCHDOWN | 80 KT | LAST ENG OFF | 5 MIN LATER |
|---|-------------|--------------|---------|-------|----------|--------|---------|---------|--------|-----------|-------|--------------|-------------|
| | ENG OUT | TAXI | INIT TO | TO | TO | CLB | CRZ | DES | APPR | LAND | TAXI | ENG OUT | |
| A | | | | | | | | | | | | | |
| B | | | | | | | | | | | | | |
| C | | | | | | | | | | | | | |
| D | | | | | | | | | | | | | |

VD/OP-13-104/C

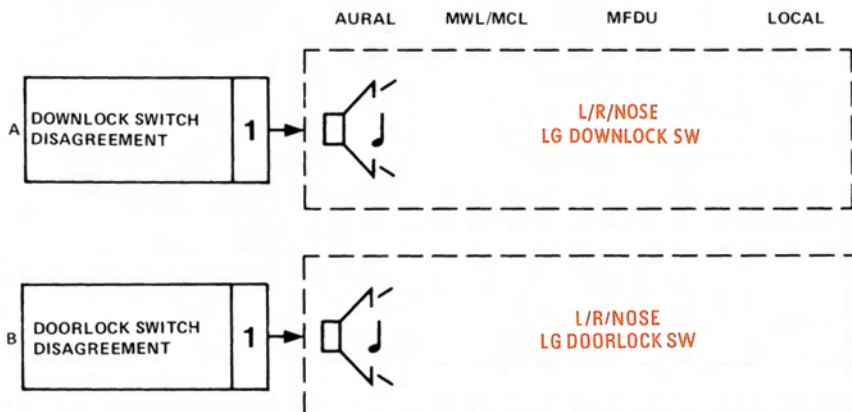


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CONDITION(S)/LEVEL

ALERTS



ALERT INHIBITION

| | ELEC PWR ON | FIRST ENG ON | TO PWR | 80 KT | LIFT OFF | 400 FT | 1000 FT | 1000 FT | 400 FT | TOUCHDOWN | 80 KT | LAST ENG OFF | 5 MIN LATER |
|---|-------------|--------------|---------|-------|----------|--------|---------|---------|--------|-----------|-------|--------------|-------------|
| | ENG OUT | TAXI | INIT TO | TO | TO | CLB | CRZ | DES | APPR | LAND | TAXI | ENG OUT | |
| A | | | | | | | | | | | | | |
| B | | | | | | | | | | | | | |

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LANDING GEAR NOSE-WHEEL STEERING DESCRIPTION

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The nose-wheel steering system provides directional control of the aircraft during ground operations via the rudder pedals and the steering tiller. The steering system receives hydraulic system 1 pressure via the dump valve in the landing gear system.

The steering tiller and both sets of rudder pedals provide inputs to the steering control valve which meters hydraulic pressure to the steering motor. The rudder pedals can be used to provide nose-wheel steering up to approximately 7 degrees nose-wheel steering angle. Full deflection of the steering tiller provides the maximum steering angle of 76 degrees. Towing angles are provided up to approximately 130 degrees. When the landing gear is selected up, the nose wheels are hydraulically centered.

Upon landing-gear-down selection, the steering system will be depressurized to prevent inadvertent steering angles while using the rudder pedals. Steering pressure will be restored approximately five seconds after touchdown of the LH main gear. If the landing gear has been extended using the alternate LG selector, nose-wheel steering will not be available as both landing gear and nose-wheel steering systems are depressurized.

NOTE: A towing switch, located at the external power receptacle, can be used to depressurize the nose-wheel steering system during maintenance ground handling.



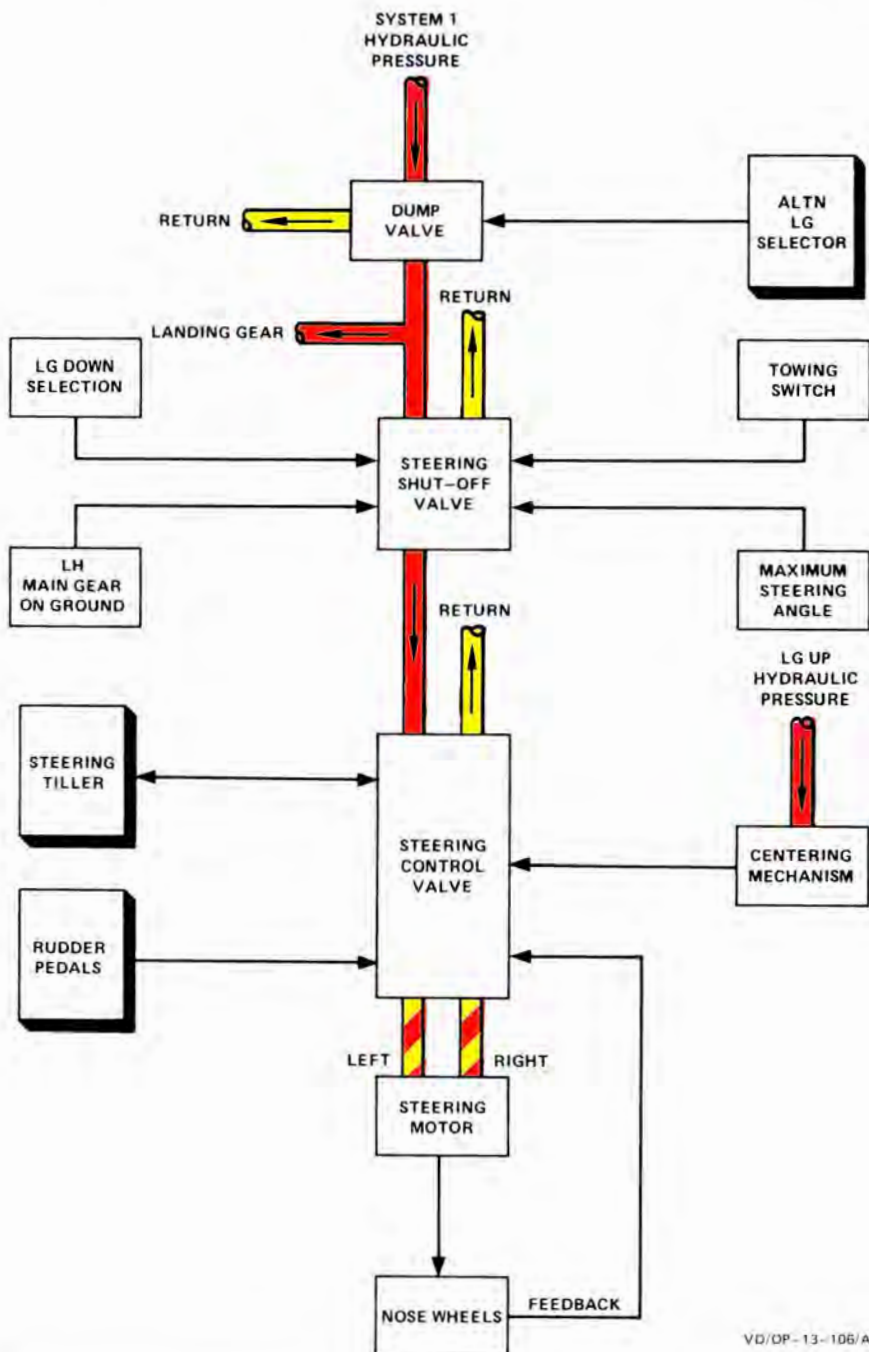
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LANDING GEAR
NOSE-WHEEL STEERING
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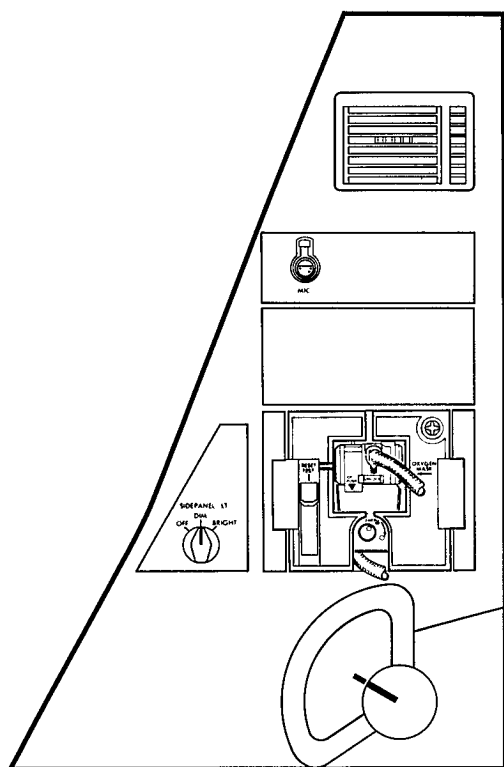
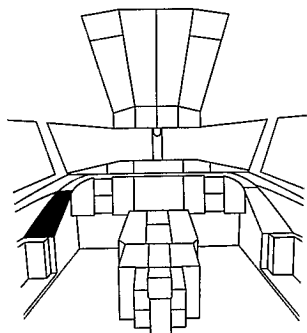
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NOSE-WHEEL STEERING TILLER

Enables steering provided hydraulic system 1 pressure is available.

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NOSE-WHEEL STEERING
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LANDING GEAR BRAKE CONTROL SYSTEM DESCRIPTION

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BRAKE PEDALS

General

The brakes, installed in the four main wheels, can be operated via the brake pedals. Both captain's and first-officer's brake pedals can be used for normal and alternate braking. A brake temperature indicating system is installed.

Anti-Skid

The anti-skid system provides locked-wheel protection at touchdown and skid protection during all brake operation. An anti-skid switch installed at the pedestal, normally guarded to ON, can be used to de-activate the system if required. The anti-skid system can be tested from the TEST panel when the landing gear is down and the wheel speed is below approximately 14 kt. If a failure is detected, an alert will be presented.

Normal Brake Operation

Normal brake operation provides for skid protection on all four wheels individually. Normal brake is provided when hydraulic pressure from system 2 is available.

Alternate Brake Operation

Alternate braking operates on pressure from hydraulic system 1. Automatic change-over to alternate brake operation occurs when the pressure of hydraulic system 2 drops below a preset value. Alternate brake operation provides for skid protection on paired wheels on either side. In the event of loss of system 1 pressure, the accumulator in the alternate brake system will provide a limited number of brake applications. An alternate brake system pressure indicator is located at the right-hand main instrument panel.

Brake Temperature Indicators

Two brake temperature indicators, one for each pair of main wheels, show the temperature of each individual brake. Both indicators are located at the right-hand main instrument panel.

PARKING BRAKE

A parking brake handle is located on the left-hand side of the pedestal. The parking brake can be engaged by depressing either set of brake pedals and pulling the parking brake handle. An accumulator in the alternate brake system provides hydraulic pressure for parking when hydraulic pressure from either system 2 or 1 is not available. Operation of the parking brake handle locks the pedals in the depressed position and closes the parking brake shutoff valve in the alternate system. The latter is relevant only if accumulator pressure is used. The parking brake, including parking brake handle, can be released by depressing either set of brake pedals. A memo message is presented by MFDS whenever the parking brake is set.

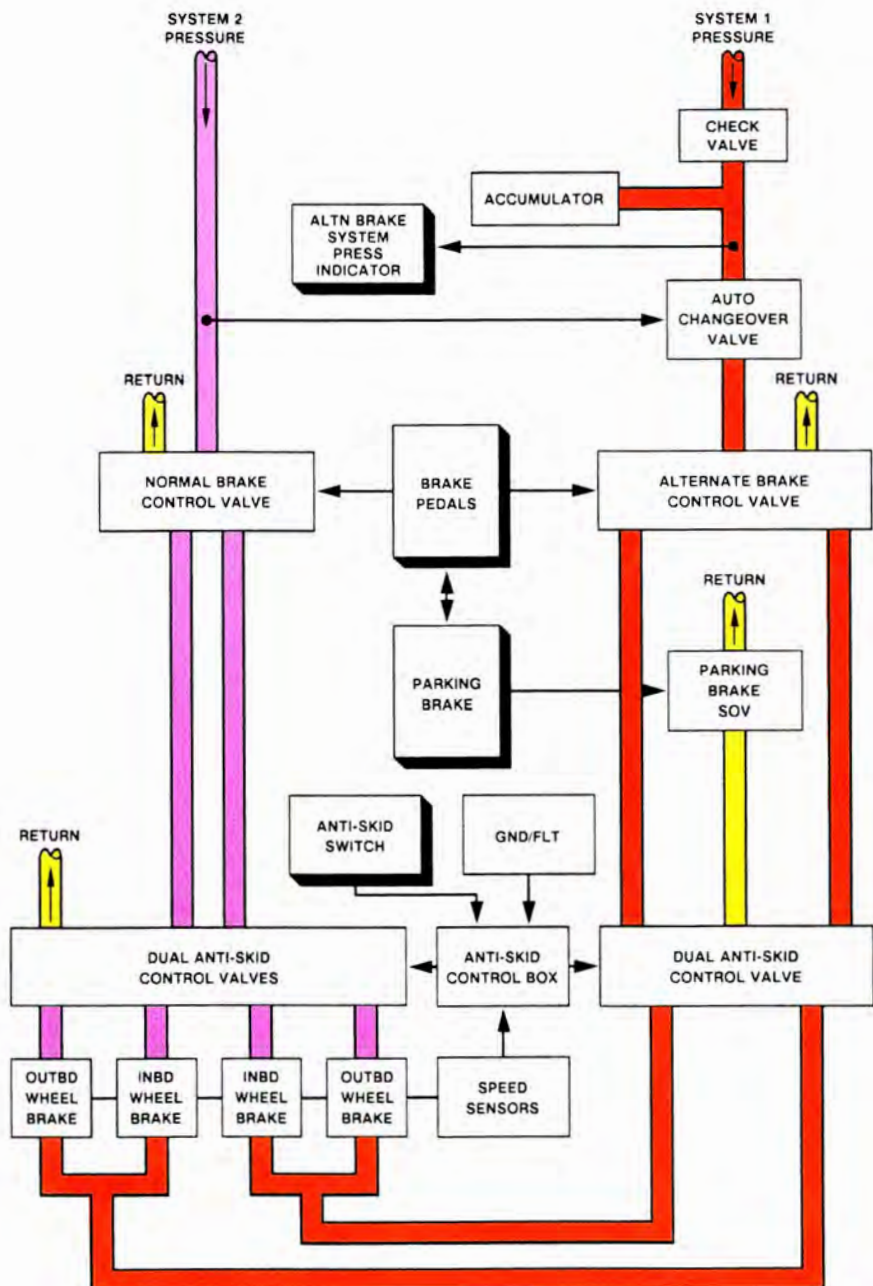


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LANDING GEAR BRAKE CONTROL SYSTEM FUNCTIONAL DIAGRAM



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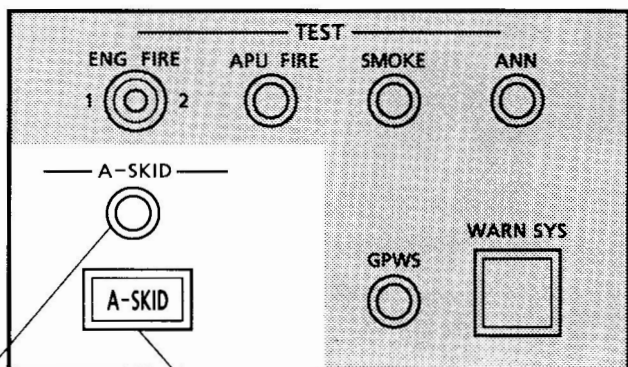
**LANDING GEAR
BRAKE CONTROL SYSTEM
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TEST PANEL

LOCATION: OVERHEAD PANEL



ANTI-SKID TEST BUTTON

Depress and release to test the serviceability of the anti-skid system.

ANTI-SKID TEST LIGHT

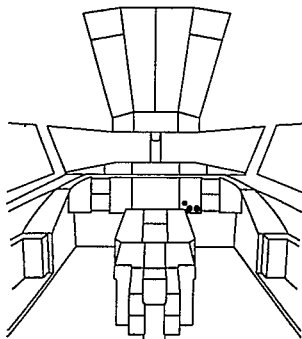
The anti-skid system is serviceable when:

- The light is on (white) with the test button depressed, and
- The light is out with the test button released.



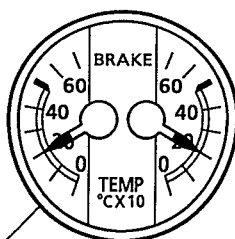
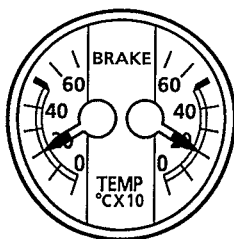
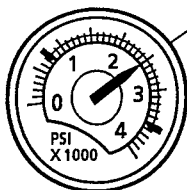
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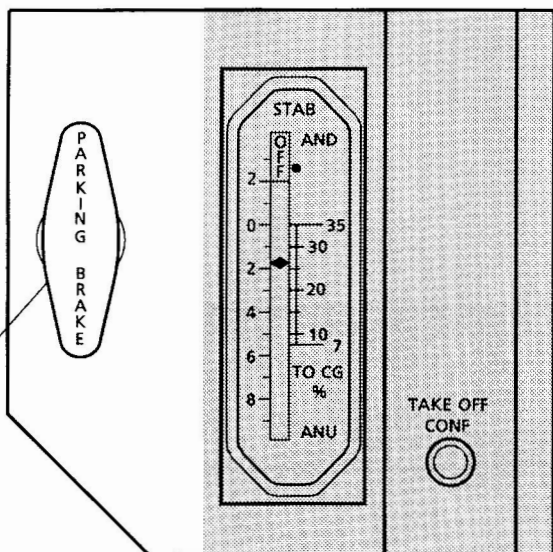
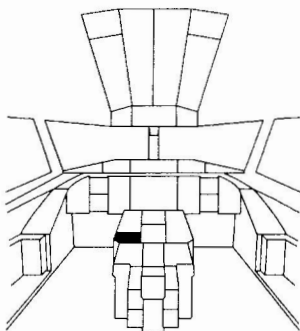
ALTERNATE BRAKE SYSTEM PRESSURE INDICATOR

Indicates alternate brake system pressure.



BRAKE TEMPERATURE INDICATORS

Indicate left and right individual wheel brake temperature.



PARKING BRAKE HANDLE

To set parking brake:

- Depress brake pedals.
- Pull handle up.
- Release brake pedals.

NOTE: Memo message PARK BRAKE SET is displayed at MFDU primary page.

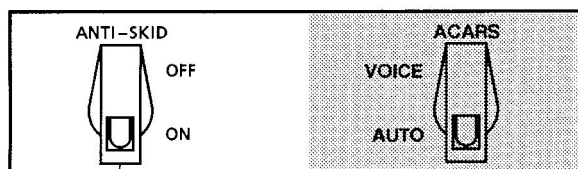
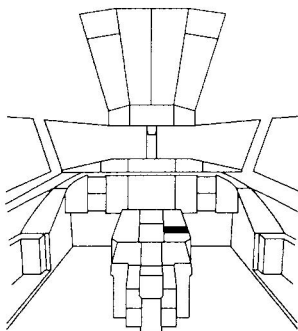
To release parking brake:

- Depress brake pedals.



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CONTROLS AND INDICATORS**

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ANTI-SKID SWITCH (guarded)

- ON**
– Anti-skid system operative.
- OFF**
– Anti-skid system inoperative.



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CONDITION(S)/LEVEL

ALERTS



 ALERT INHIBITION

| ELEC PWR ON | FIRST ENG ON | TO PWR | 80 KT | LIFT OFF | 400 FT | 1000 FT | 1000 FT | 400 FT | TOUCHDOWN | 80 KT | LAST ENG OFF | 5 MIN LATER |
|-------------|--------------|---------|---|---|--------|---------|---------|--------|-----------|-------|--------------|-------------|
| ENG OUT | TAXI | INIT TO | TO | TO | CLB | CRZ | DES | APPR | LAND | TAXI | ENG OUT | |
| | | |  |  | | | | | | | | |

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