ANTI-SKID BRAKE SYSTEM (ABS)

General

An ABS Brake Control (L/R BRAKE CTRL) Module is inserted in the feed line from the master cylinder to the slave cylinder on each side. Each ABS Brake Control Module contains a hydraulic valve and a motorized pump. The ABS Brake Controller monitors and adjusts the pressure to each brake via the L/R ABS Brake Control Module

The ABS Brake Control Modules are installed in the forward portion of the wheel well. Shrouds are installed to protect the ABS Brake Control Modules from foreign objects which may be picked up by the tires.

The wheel speed transducer fits inside the hollow wheel axle. A drive cap fits to the wheel. The cap has a slot which captures the drive tab of the sensor. An electrical connector allows disconnection of the sensor without the need for sensor removal.

The ABS installation includes three new circuit breakers, one for the digital electronic control unit and one each for the control module pumps. The ABS interfaces to an ARINC-429 signal from the aircraft's GPS system.

Aircraft ground speed (derived from GPS data) and wheel speed are used to determine the difference between wheel speed and aircraft speed (tire slipping condition) as part of the ABS operation.

Operation

General

The ABS does not activate during normal ground and flight operations and is disabled during low speed taxi and flight operations. The L/R BRAKE CTRL module will activate and provide pressure (charge) the ABS system when the brakes are applied and ground speed is above 15kts - this motor operation may be heard in the cabin but does not indicate that the ABS is active. Once the brakes are applied during landing or taxi, and a skid is detected, brake pressure is relieved to that wheel, causing the tire to regain its speed. The system will continue this process, which effectively regulates the brake's fluid pressure to keep the tire rolling, and provides the maximum braking effect for the runway conditions under the tire.

For a runway with spots or strips of ice and snow-pack, or wet painted areas the brakes may occasionally release as the tires roll over these slick areas. For clear and dry pavement, the system will probably not operate unless the operator applies too much brake force in an aggressive stopping maneuver. In this case, the ABS will respond and save the tires from damage.

Under battery only load shed conditions the ABS is an automatically shed load and will not be operational.

Controls

Figure 7-96 provides a view of the upper left instrument panel where the ABS activation and indication switch is located. The switch provides system availability when depressed, which is shown by the illumination of the ARMED indication. This merely enables the ABS, which tells the controller to monitor the conditions for potential operation.

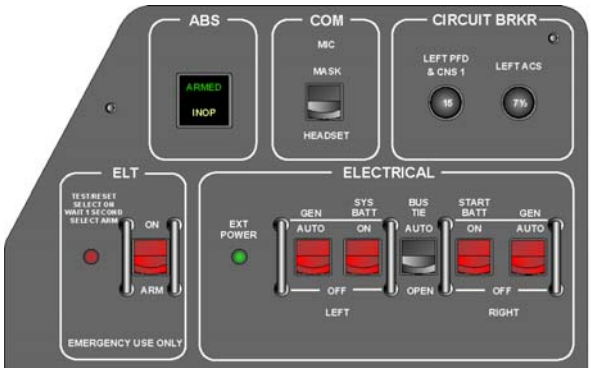

Figure 7-96. ABS Control Switch

The amber INOP indicator illuminates when any of the following faults are detected:

- GPS ground speed is out of range < 0kts or >500kts or unavailable
- Wheel speed is out of range >200kts or unavailable
- Controller Power is low <18VDC
- Controller Built-in-Test (BIT) has failed
- ABS Brake Control Module solenoid control line open circuit

The system will not function when the ground speed is less than 15 knots. The system will be powered whenever the landing gear is extended.

A time delay relay will illuminate the INOP indicator if the Brake Control Module pump operates for >120 seconds continuously.

ABS operation is routed through the ALL INTERRUPT switches on the side-stick controllers, (Figure 7-97). If emergency disablement of the ABS is needed, the pilot (or co pilot) may press and hold the ALL INTERRUPT switch which will command the ABS to discontinue its function and restore normal braking. If the ALL INTERRUPT switch is held during heavy braking, the ABS will be inoperative and tires may skid until brake pressure is reduced by the pilot. When the ALL INTERRUPT switch is released the previous ABS state will be restored.

Figure 7-97. All Interrupt Switches

Indication of the Electronic Circuit Breakers (ECB) used for the ABS (ABS, L BRAKE CTRL, R BRAKE CTRL) are provided on the ECB Synoptic Page of the MFD, as shown in Figure 7-98. The ECBs will be set to AUTO-OFF when the landing gear is retracted and set to AUTO-ON when the landing gear is extended. When the landing gear is extended in flight the ABS controller will power up and the lamp test will be activated.

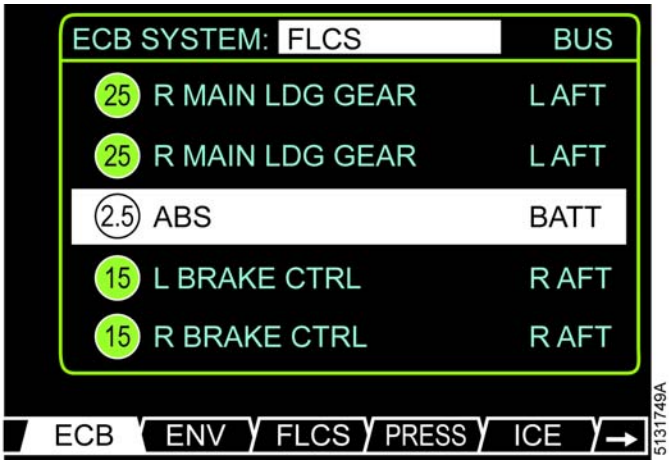

Figure 7-98. ECB Synoptic Page

The above FLCS ECB synoptic page appears when the All Interrupt switch is pressed and held.

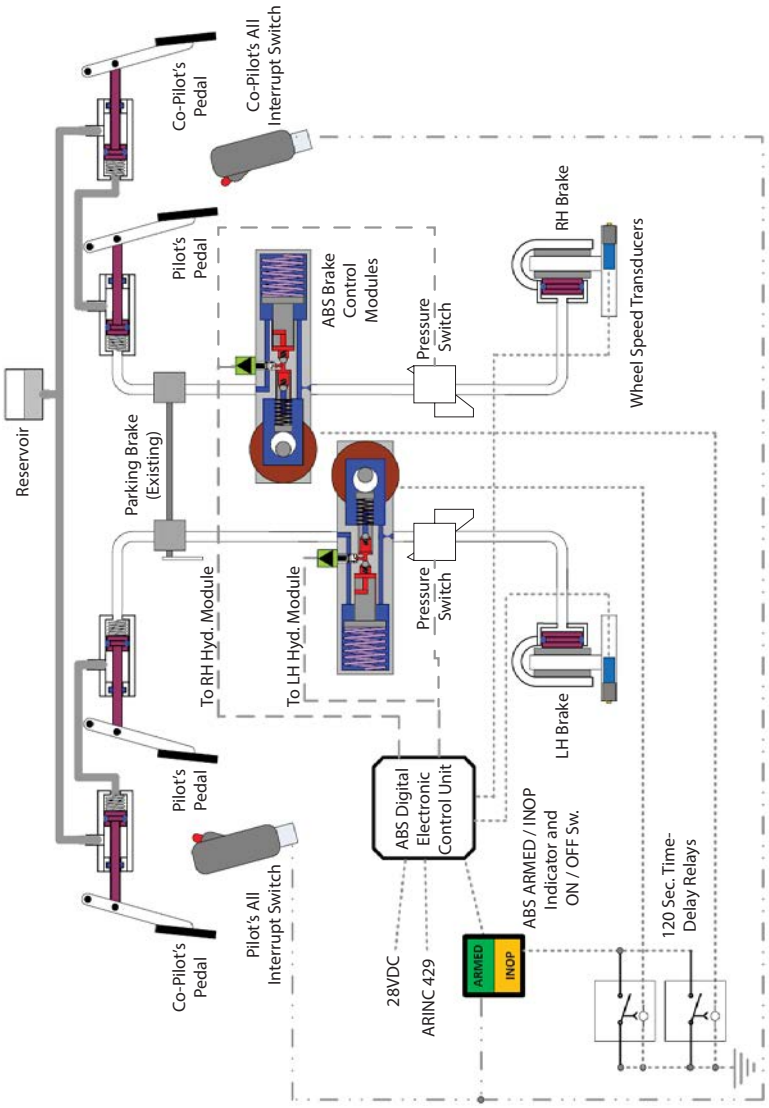

Figure 7-99. ABS System Diagram