FUEL

GENERAL

The Citation II Bravo fuel system is made up of two distinct, but essentially identical halves. Normal operation supplies fuel to the engine from its respective integral wing tank. Each half of the system holds approximately 360 U.S. gallons for a total airplane capacity of 720 gallons of usable fuel (approximately 4860 pounds). Crossfeed capability is incorporated, and when selected, enables both engines to receive fuel from a single tank.

System operation is fully automatic throughout the normal flight profile. Fuel system control and monitoring is available through the boost pump switches, crossfeed switch, fuel quantity and flow indicators, and annunciator panel lights which warn of abnormal system operation. A low fuel level warning system functions independently of the normal fuel quantity indicating system.

FUEL CELL

Each tank encompasses all internal wing area forward of the rear spar except for the gear well, inboard to the wing root and outboard to the wing tip fairing. A fuel sump area, electric boost pump, primary ejector pump, three transfer ejector pumps and six fuel quantity probe assemblies are internally incorporated. The sump area includes the electric boost pump, primary ejector pump and quick drains to preclude water and sediment buildup. The sump itself is designed to provide a minimum of five seconds fuel supply during negative gravity maneuvers not exceeding -.5 G. Fueling is accomplished through an overwing port in each cell.

A vent system ensures ambient pressure within the tank and fuel expansion overflow capability. A float-type valve restricts flow through the vent during inflight maneuvering. Design features of the vent prevent it from becoming blocked by inflight ice accumulation.

ELECTRIC BOOST PUMP

The electric boost pump provides fuel pressure for engine starting, crossfeeding and acts as a backup for the primary ejector pump. Operation is indicated by illumination of the L or R FUEL BOOST ON annunciator panel lights.

The pumps are controlled by a pair of three-position switches located on the left switch panel. The switches are marked OFF, NORM and ON. In the OFF position, the boost pump is deenergized except when activated by engine start, or selection of crossfeed from that tank. In NORM, function is also automatic for start and crossfeed, and is activated by the pressure switch should output from the primary ejector pump be insufficient. The respective boost pump when in OFF or NORM is disabled any time the throttle is in cut-off, to preclude pump activation by low pressure sensing during shutdown. The ON position causes the selected pump to operate continuously regardless of throttle position. The pressure switch which turns on the boost pump is located in the system just prior to the engine driven fuel pump.

To ensure uninterrupted fuel flow to the engines, the boost pump switches must be positioned ON when the low fuel lights illuminate or at 169 pounds or less indicated fuel.

FUEL SYSTEM SCHEMATIC

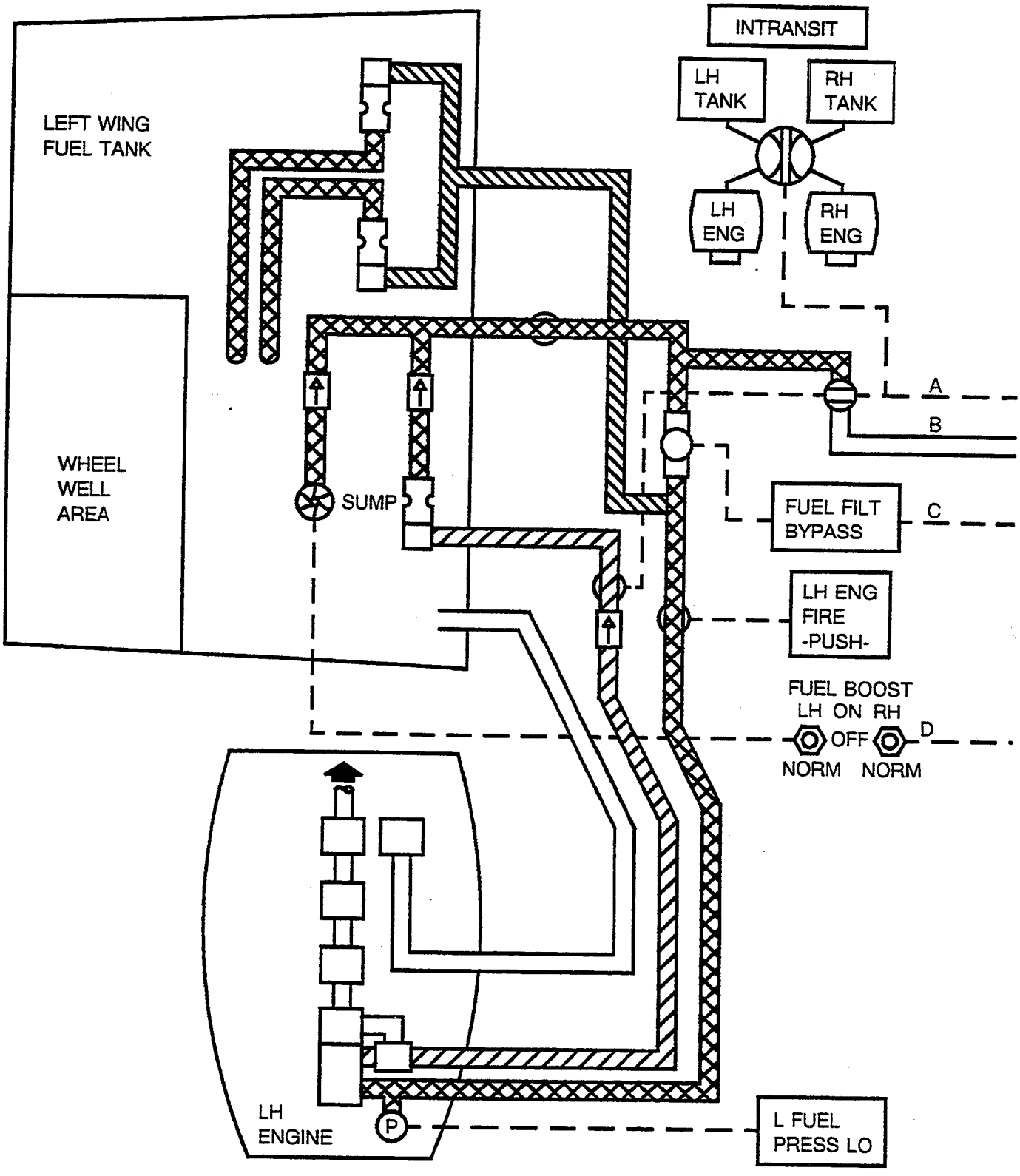

Figure 2-9 (Sheet 1)

6573C7012 (L)

FUEL SYSTEM SCHEMATIC

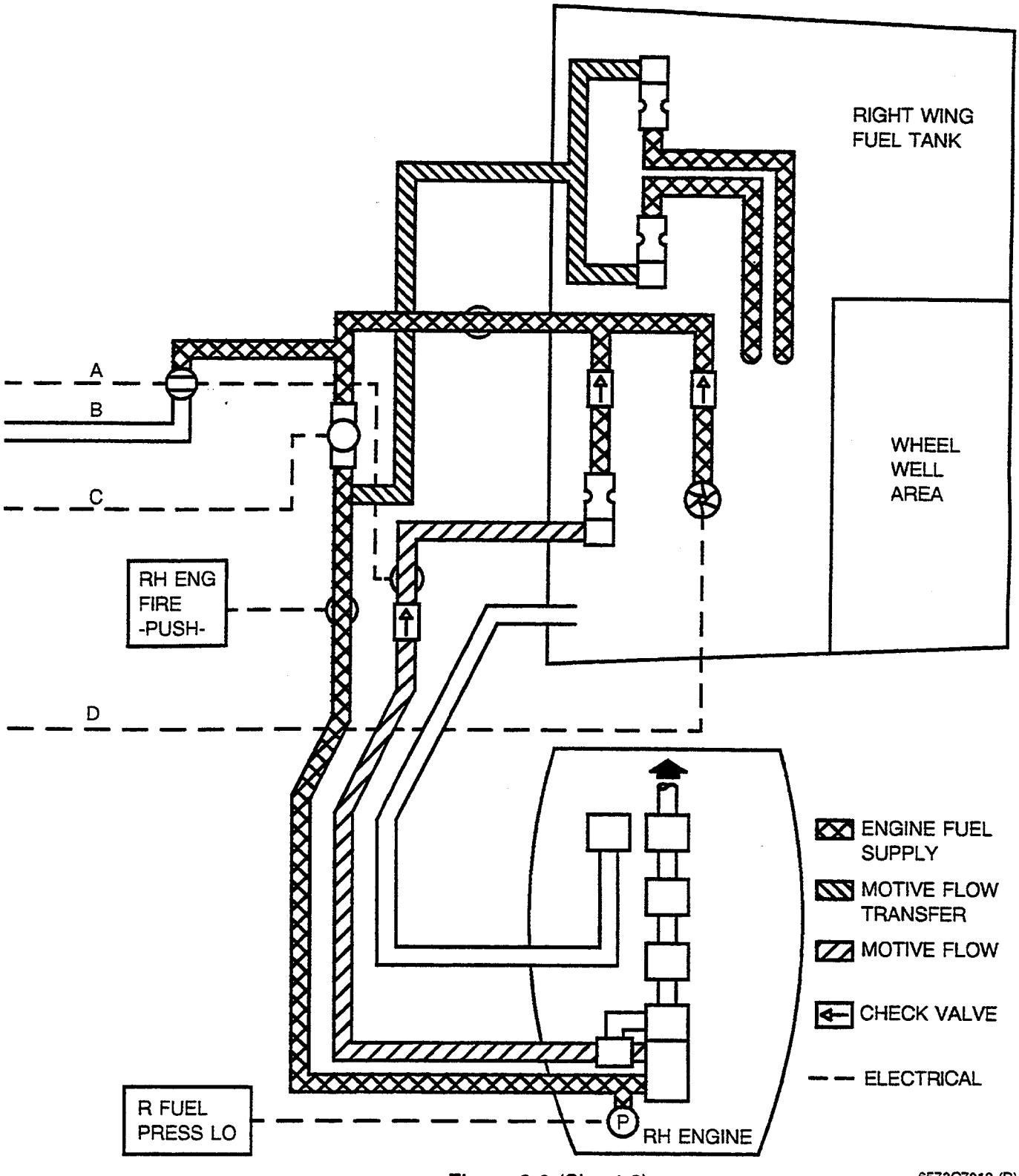

Figure 2-9 (Sheet 2)

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EJECTOR PUMPS

Four ejector pumps in each fuel cell utilize existing fuel pressure in conjunction with a venturi to produce a high-volume flow. As high pressure fuel is forced through the ejector orifice, a low pressure area is created at the pump inlet drawing in a comparatively large volume of fuel and pushing it out at low pressure.

The primary ejector pump uses bypass fuel from the engine-driven pump as its motive flow source to pick up fuel from the sump area and deliver it to the engine. Three transfer ejector pumps in each tank operate similarly except that they use bypass fuel from the main supply line as a motive flow source. Their function is to ensure a constant supply of fuel to the sump by scavenging from the lowest point in the cell.

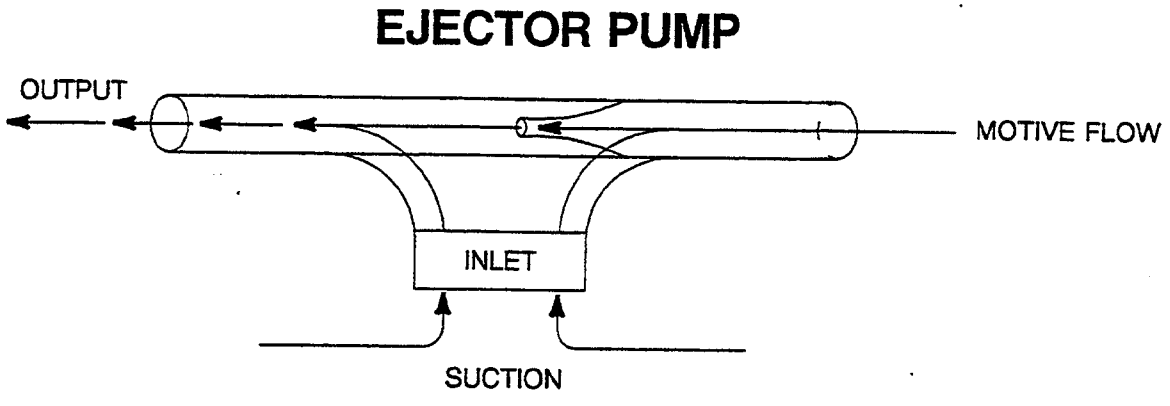

Figure 2-10

CROSSFEED

Controlled by a selector on the left switch panel labeled L TANK . . . OFF . . . R TANK, crossfeed allows both engines to be supplied from one fuel cell.

Selecting either tank automatically turns on the electric boost pump in that cell, opens both crossfeed valves and three seconds later closes the motive flow shutoff valve on the side not selected. Returning the selector to OFF reverses the sequence. A green INTRANSIT light above the selector illuminates any time the crossfeed valves are not fully closed or open, or do not coincide with switch position.

NOTE

- When selecting crossfeed, it is important to allow sufficient time for the cycle of events to be completed before returning the switch to OFF. Not allowing sufficient time can interfere with the normal operation of the time delay relays resulting in loss of control of the crossfeed system. If experienced, this condition can be corrected by placing the battery switch in EMER and turning both generators off. After several seconds, electrical power can be restored and crossfeed will function normally.

- During crossfeed, an oil temperature split may be evident due to differences in fuel flow through the fuel/oil heat exchangers. The oil temperature for the engine opposite the tank selected may be as much as 30°C warmer.

When crossfeed is selected, it is possible for a pressure spike to activate the fuel boost pump in the tank opposite the one selected. If this occurs, both fuel boost pumps would be

operating, causing equal fuel pressures on both sides, preventing crossfeeding. When initiating system operation, monitor the FUEL BOOST ON annunciator panel lights and if both illuminate, cycle the fuel boost switch for the nonselected tank to OFF and back to NORM. This deactivates the boost pump in the tank not selected and allows normal crossfeed.

Operationally, it is seldom necessary to balance the fuel load by crossfeeding unless single-engine operations have been conducted or an uneven load was acquired during fueling. Maximum allowable fuel imbalance is 200 pounds. In an emergency, 600 pounds is allowed.

ENGINE FUEL SYSTEM

The fuel control unit is mounted on the accessory gearbox; it has integral to it a two-stage, engine-driven fuel pump. The fuel pump supplies high pressure flow to the fuel control unit (FCU). Fuel enters the pump at approximately 30 PSI from the primary ejector pump. It exits the second stage pump outlet at from 200 to 600 PSI. The pressure of fuel entering and leaving the fuel control depends upon engine speed and power setting. Part of the pump output is bypassed through the motive flow valve to drive the primary ejector pump and the remainder is directed downstream to the fuel control. This positive pressure to the fuel control must be maintained by the engine-driven pump for the engine to continue to operate.

The fuel control unit determines the proper fuel schedule for all phases of engine operation.

A flow divider downstream of the fuel control unit provides proper fuel distribution to the combustion chamber by dividing the flow from the fuel control between the primary and secondary fuel manifolds. It also acts as a fuel shutoff valve, bypassing fuel back to the pump. When the throttle is closed, fuel flow is terminated at the flow divider and the fuel manifold is drained. A fuel canister assembly collects the fuel at engine shutdown and returns it to the main tanks during the next flight.

FILTER

Each side of the fuel system incorporates quick drains and a filter. The filter is mounted near the wing root.

A pressure differential sensing switch and a bypass valve alert the pilot and allow flow to continue should the filter become obstructed. The switch closes and illuminates the amber FUEL FLTR BP annunciator panel light if the difference between filter inlet and outlet pressure reaches 3.5-4.0 PSI. The bypass valve will open at 4.5-5.0 PSI differential. Illumination of the annunciator panel light indicates impending (within 1 PSI) or actual bypass of fuel around the filter.

FUEL SHUTOFF

Electrically operated firewall shutoff valves can be individually closed by depressing the L or R ENG FIRE button. Actuation of a shutoff valve will be indicated by illumination of the respective amber L or R F/W SHUTOFF annunciator panel light.

FLOW INDICATORS

Fuel flow rate is measured downstream of the fuel control and presented on a digital format gage in pounds per hour per engine.

QUANTITY INDICATORS

Six capacitance-type probes and one temperature compensator in each cell supply information to the vertical scale quantity gauge. The indicator converts these signals into fuel weight and displays it in pounds per cell.

A manual shutoff is located in each wing root for use by maintenance personnel.

LOW LEVEL WARNING

Low level warning functions independently of the normal quantity indicating system and provides a visual warning to the crew when a minimum amount of usable fuel remains in either tank. The system consists of a float switch in each fuel cell and amber L and R LO FUEL LEVEL annunciator panel lights. The system indicates fuel remaining in the respective tank is 190 ± 15 pounds (86 ± 6 kilograms) or less. When operating with light fuel loads, it is possible for the lights to illuminate momentarily in turbulent flight conditions or while taxiing on rough surfaces. The system is calibrated to give an accurate indication in level unaccelerated flight.