FUEL

GENERAL

The Citation 525A 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 293 U.S. gallons for a total airplane capacity of 586 gallons of usable fuel (approximately 3960 pounds) when filled to the bottom of the filler standpipe. This is the maximum usable fuel for flight planning and should not be intentionally exceeded. It is possible to add approximately 16 U.S. gallons (110 pounds) in each wing if the wing is fueled to the top of the standpipe, however, this may not allow room for expansion and may result in fuel spillage through the vent. Transfer capability is provided, and when selected, fuel can be transferred from one tank to another through the crossfeed valve in the event of a lateral imbalance.

System operation is fully automatic throughout the normal flight profile. Fuel system control and monitoring is available through the boost pump switches, transfer 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 between the front and rear spar except for the gear well, inboard to the center rib, and outboard to a point 21 inches from the wing tip. A fuel sump area, electric boost pump, primary ejector pump, one transfer ejector pump and seven 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 10 seconds fuel supply during negative gravity maneuvers not exceeding -1.0 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, transfer and acts as a backup for the primary ejector pump. Operation is indicated by illumination of the LH or RH 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 NORM the boost pump function remains automatic for start and crossfeed, and is also activated by the low pressure switch should output from the primary ejector pump be insufficient (below 4.65 PSI). The respective boost pump, when in 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. During transfer operation, the supply tank boost pump must be selected ON or NORM. The receiving tank boost pump must be selected OFF or NORM. Transfer will not occur if both pumps are operating or if the boost pump in the supply tank is not operating.

Boost pump operation is not automatic during engine start with the pump switch OFF, however, in most cases the engine will start without the boost 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 185 pounds or less indicated fuel.

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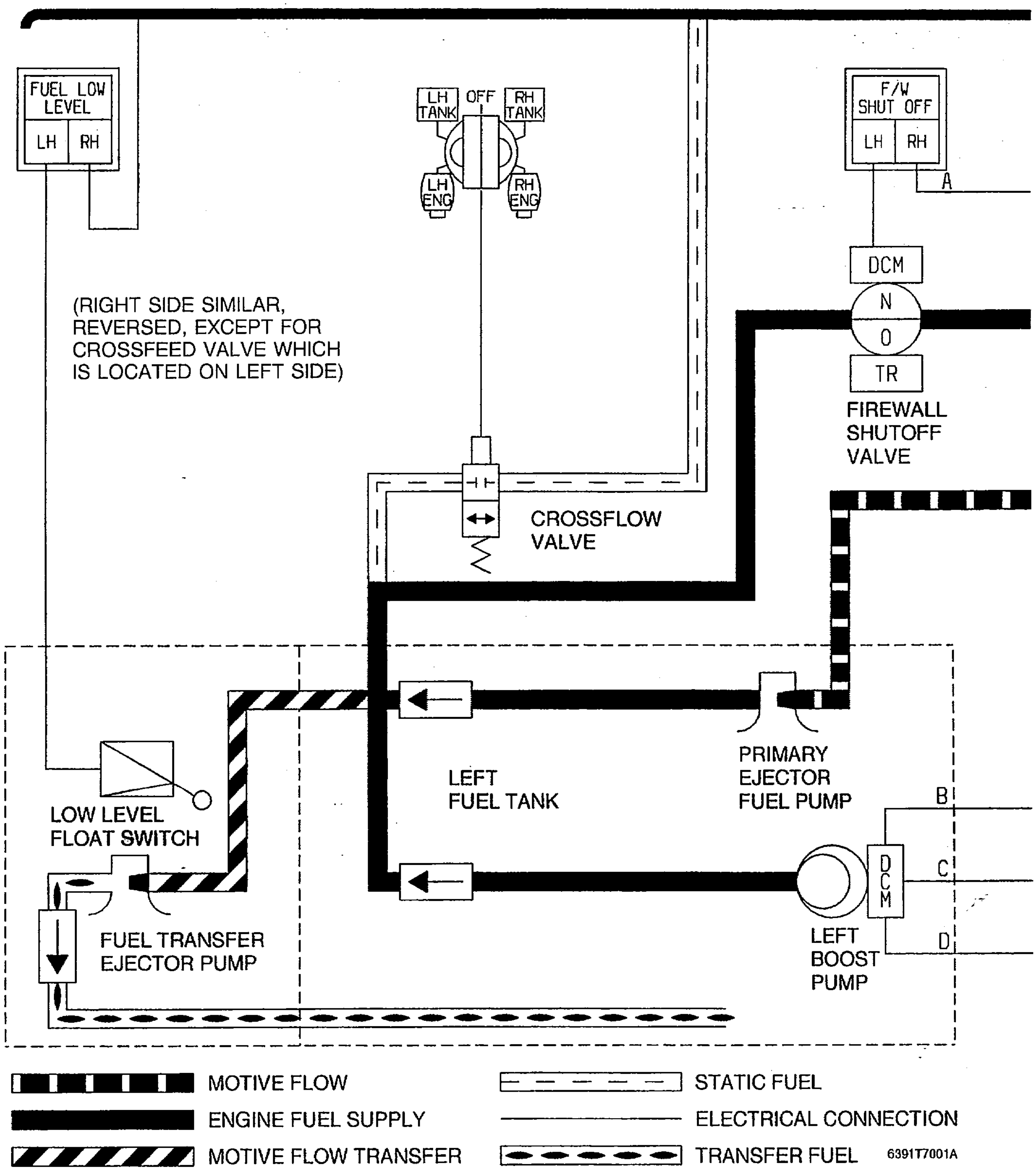

Figure 2-7. Fuel System Schematic (Sheet 1 of 2)

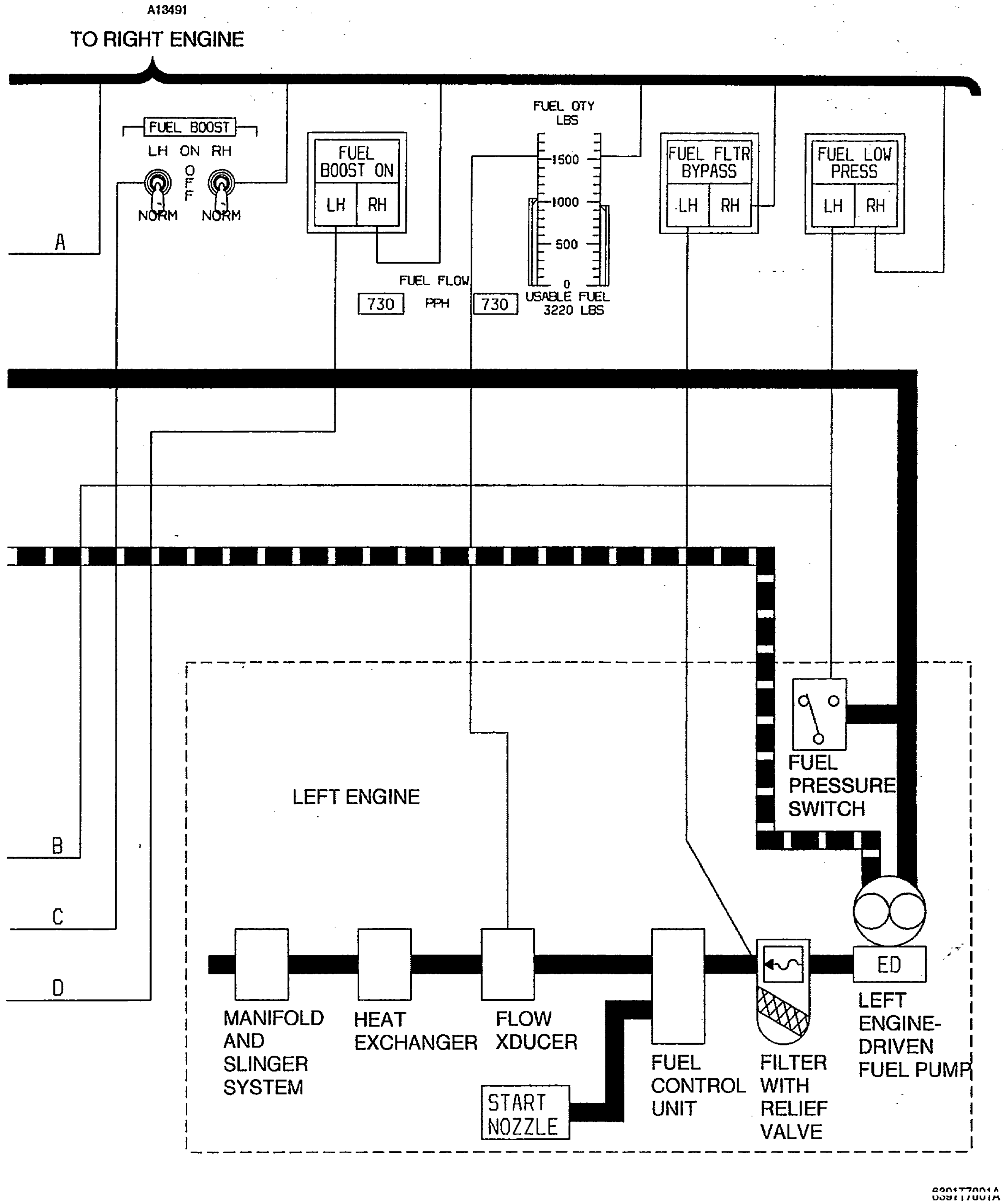

Figure 2-9. Fuel System Schematic (Sheet 2 of 2)

EJECTOR PUMPS

Two 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. A transfer ejector pump in each tank operates similarly except that it uses bypass fuel from the main supply line as a motive flow source. Its function is to ensure a constant supply of fuel to the sump by scavenging from the lowest point in the cell.

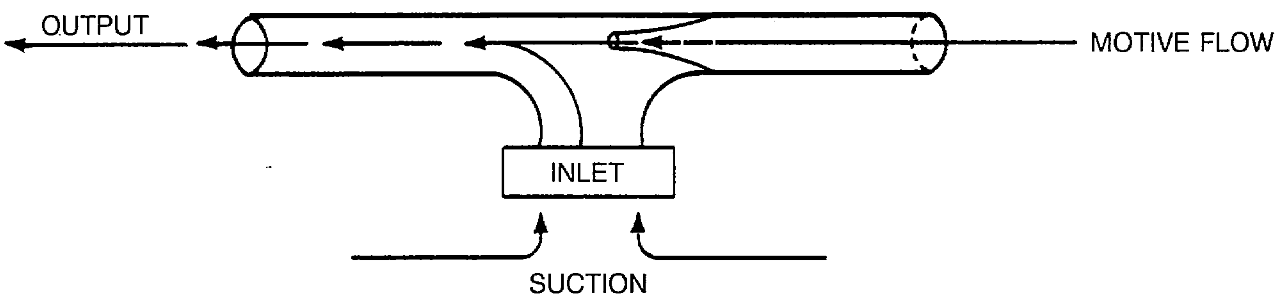

Figure 2-8. Ejector Pump

TRANSFER

Fuel transfer is controlled by a selector on the left switch panel. The selector is labeled with an arrow which indicates the direction of fuel transfer. The selector hsas three positions labeled L TANK L ENG / OFF / R TANK R ENG. When transfer is selected a white FUEL TRANSFER annunciator will illuminate when the crossfeed valve is open.

Selecting either tank automatically turns on the electric boost pump in the oppposite, cell, (if the boost pump switch is in NORM position), and opens the crossfeed valve. Returning the selector to OFF reverses the sequence.

Operationally, it is seldom necessary to balance the fuel load by transferring unless single-engine operations have been conducted or an uneven load was acquired during fueling. Maximium allowable fuel imbalance is 200 pounds. In an emergency, 600 pounds is allowed. If the receiving tank is at or near maximum capacity, care should be taken to ensure that fuel is not being lost through the fuel vents.

ENGINE FUEL SYSTEM

The dual-stage, engine-driven pump mounted on the accessory gearbox supplies high pressure flow to the fuel control unit. Fuel enters the pump at 6-8 PSI from the primary ejector pump. The engine-driven pump increases this pressure to 110-150 PSI. 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.

FILTER

Each side of the fuel system incorporates a 30-micron filter mounted between the boost and high pressure stages of the engine driven fuel pump.

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 FUEL FLTR BYPASS annunciator panel light and MASTER CAUTION RESET if the differential pressure across the filter reaches 10 PSI or if the filter becomes blocked. Illumination of the annunciator panel light indicates impending or actual bypass of fuel around the filter. Maintenance is required to investigate a restricted or blocked filter.

FUEL CONTROL UNIT

The fuel control unit determines the proper fuel schedule for all phases of engine operation. Metered (scheduled) fuel is supplied through the fuel flow transmitter and oil cooler heat exchanger to the fuel manifold and slinger ring. An additional nine pounds-per-hour of fuel per engine is constantly supplied to the start nozzle. The FJ44-2C engine incorporates a Integrated Fuel Control Unit that combines a hydromechanical metering unit and the fuel pump in a single housing. Fuel heating is provided by the oil cooler heat exchanger.

FLOW INDICATORS

Fuel flow rate is measured downstream of the fuel control and presented by the Engine Indicating System at the top of the multifunction display in pounds per hour or kilograms per hour for each engine.

NOTE

Indicated fuel flows include the nine pounds-per-hour per engine supplied to the start nozzles. Excess unmetered fuel is returned to the wing as motive flow fuel to operate the ejector pumps.

QUANTITY INDICATORS

The fuel gauging system is a compensated capacitance system. Seven capacitance-type fuel level sensors (probes) are located near the wing rib in each fuel cell. Each sensor has an integral electronic module that converts the capacitance of the probe into a current signal, which is then supplied to the dual channel signal conditioner. The signal conditioner provides signals to the Engine Indicating System which displays these signals in pounds or kilograms per fuel tank at the top of the multifunction display. Two fuel quantity pointers (analog) are used with the fuel quantity scale to show the quantity of fuel remaining for the left and right engines. The signal conditioner has a self-test and monitoring feature which will indicate sensor faults by illuminating the LH FUEL GAUGE or RH FUEL GAUGE annunciators on the annunciator panel. The MASTER CAUTION RESET light will also illuminate.

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 LH and RH FUEL LOW LEVEL annunciator panel lights and MASTER CAUTION. A usable fuel quantity of 185 ± 15 pounds in either tank will illuminate the associated light. When operating with low 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. A four second delay is incorporated into the MASTER CAUTION circuit to preclude nuisance momentary MASTER CAUTION illuminations in turbulence.

FUEL SHUTOFF

Electrically operated firewall shutoff valves can be individually closed by depressing the LH or RH ENG FIRE button. Actuation of a shutoff valve will be indicated by illumination of the respective LH or RH F/W SHUTOFF annunciator panel light. The hydraulic fluid flow and generator are also shut off.

HYDRAULIC

GENERAL

An open center hydraulic system operates the landing gear, speed brakes, flaps, and thrust attenuators. A separate independent system is used for the main wheel antiskid/power brake system. For both systems, only MIL-H-83282 hydraulic fluid is approved.

In the open center system, fluid continually circulates between the hydraulic lines and the reservoir at low pressure. This low pressure greatly reduces the quantity of hydraulic fluid required in the reservoir because there is minimum fluid heat buildup. Low pump wear and low system leakage rates are additional benefits of the open center system.

RESERVOIR

The fluid for the system is contained in a pressurized reservoir located in the right aft wing fairing. The reservoir is pressurized by the 23 PSI service bleed air system, which serves to prevent foaming. The quantity of fluid is shown by a sight gauge located on the side of the reservoir. The sight gauge is marked at the FULL and ADD levels. Fluid level is measured with the landing gear extended and the flaps, speed brakes, and thrust attenuators retracted. FULL capacity is 125 cubic inches, or two liters. The hydraulic fluid is filtered during its pressure stage and again upon its return to the reservoir. Servicing does not require equipment capable of delivering hydraulic fluid under pressure. Bleeding or relieving an overfill condition is accomplished when servicing the reservoir, by opening a relief valve located on the reservoir. Relieved excessive fluid is drained overboard through an overboard drain tube.

PUMPS

Hydraulic pressure is provided by two positive displacement engine-driven pumps, each mounted on the engine accessory case. Either pump is capable of supplying enough pressure to operate the gear, flaps, speedbrakes and thrust attenuators. From each pump, hydraulic fluid is routed through filters and flow switch check valve assemblies to the loading valve and and relief valve. In the event that either pump output should drop to a flow rate of between .35 to .55 gallons per minute the respective HYD FLOW LOW annunciator panel light will illuminate. The light will extinguish when pump reaches an adequate output.

(Refer to **NOTE** Next Page)