The time-delay relay does not affect the system if a failure occurs at any point after the left flap has left either the up or down limit switch. If a failure occurs in either flap system (when the left flap is not in contact with a limit switch) use the flap selector switch to bring the operable flap to a symmetrical configuration with the inoperable flap.

An electrical brake in the flap motor prevents the flaps from "coasting" when intermediate flap settings are selected.

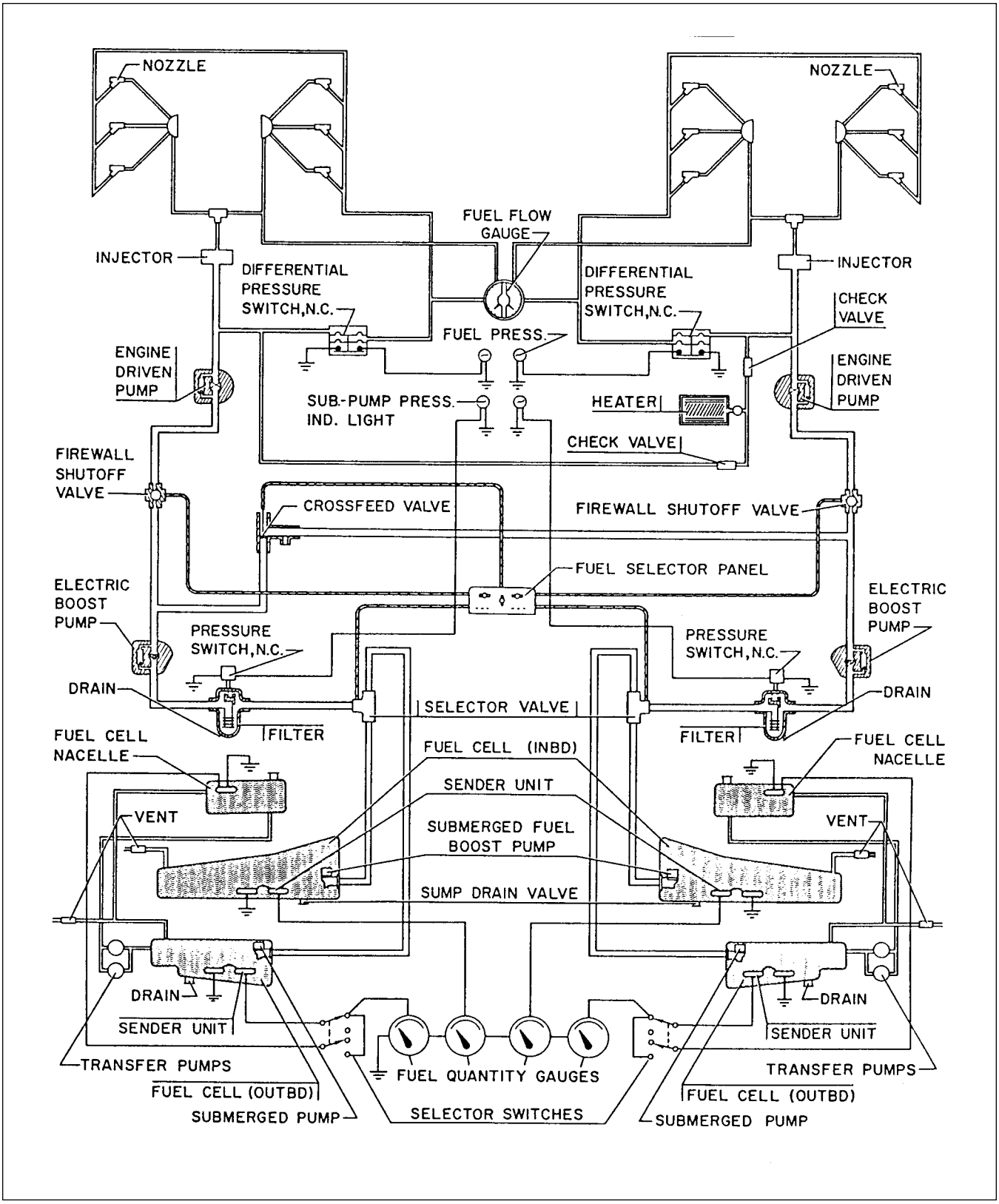
To preclude the possibility of encountering large asymmetric ("split") flap angles due to a failure in the flap actuating system, the following procedures should be followed for flap extensions and retractions:

1. Actuate the flaps only while the airplane is under manual control, not while the autopilot is engaged. The autopilot will mask the high control forces created by an asymmetric flap condition.
2. Extend or retract the flaps in a minimum of five steps of approximately one half second activation each. Do not initiate the successive extension/retraction step until a symmetric position is verified by a negligible change in aileron/rudder cockpit positions to hold straight flight.
3. Do not extend the flaps beyond 15° if the flap motor circuit breaker has a history of popping. A popped circuit breaker is indicative of excessive actuation loads on one or both flaps; such loads are most likely at flap angles in excess of 15°. The airplane should not be flown until the cause of the high loads is determined and repairs effected.

FUEL SYSTEM

Four bladder type fuel cells located in the wings and two bladder type fuel cells in the nacelles provide the fuel storage. The two inboard cells have a capacity of 56 gallons each; the outboard cells have a capacity of 40 gallons each and the two nacelle cells have a capacity of 25 gallons each. Fuel can be pumped from any of the wing cells to both engines through the use of the engine driven and/or electric fuel pumps. The fuel in the nacelles can be transferred to the outboard fuel cell in the wing when the fuel level of the outboard cells is less than 10 gallons. This is accomplished by the use of electric transfer pumps in each wing. A submerged electric boost pump in each wing fuel cell operates whenever the selector is set for the particular cell. There are two electric inline pumps for emergency use in case of failure of the engine driven fuel pumps. Warning lights will tell the pilot of any trouble in the system. The emergency pumps should be on during take-off and landing to preclude the possibility of fuel pressure loss at a critical time.

If one of the engine driven pumps or submerged electric boost pumps fail, a warning light will come on and the pilot can activate the emergency pump to supply the fuel.



Fuel System Schematic

The fuel valve controls and crossfeed control are located in the fuel control panel between the front seats. Emergency shut-off valve controls are located on their respective sides of the fuel control panel. Four electric fuel gauges in the overhead switch panel represent the four wing fuel cells. The outboard gauges normally indicate the fuel quantity in the outboard wing cells, but when a push-to-test switch next to each outboard gauge is depressed, the gauges switch to the nacelle tanks and indicate the fuel quantity there. These gauges are illuminated by the rheostat mounted on the right side of the same panel. The emergency fuel pump switches and transfer pump switches are also on the overhead panel.

ELECTRICAL SYSTEM

The electrical system includes a 24-volt, 25 ampere hour battery enclosed in a sealed stainless steel battery box. Installed are two 24-volt, 100 ampere alternators.

There are two voltage regulator systems installed in the Pressurized Navajo aircraft.

On aircraft up to and including serial number 31P-83 the alternators are paralleled by the use of one voltage regulator to control field voltage of both alternators. Also incorporated in the system is an overvoltage relay. Its function is to open and remove field voltage to the unregulated alternators in the event of a failure of the voltage regulator, thus preventing an overvoltage condition which could damage the electrical equipment. In the event of a failure of the voltage regulator, the auxiliary regulating system may be switched into the circuit.

Abnormal operation may be indicated by a zero output on both alternator ammeters and a discharge indication for the battery ammeter. To energize the auxiliary regulating system see the Flight Manual section.

On aircraft with serial number 31P-84 and up, the electrical system incorporates an alternator paralleling system. The system has two voltage regulators which control the alternators. The regulators are interconnected electrically to provide parallel outputs from their respective alternators under normal operating engine RPM's. Whenever the engines are operating at a high differential RPM, the alternator inoperative light for the slower engine may come on.

Alternator inoperative lights are located above the ammeters in the overhead panel. The lights illuminate when the respective alternator fails to provide voltage. The lights should be checked prior to starting the engines, to see if the bulbs are burned out, by turning on the master switch. If the bulbs do not illuminate the bulbs should be replaced.

A distinctive feature of the alternators paralleling system is the split rocker type master switch and the alternator inoperative lights.

NOTE

Refer to the Airplane Flight Manual Section for corrective action for an alternator failure.

The alternator circuit breaker switches, radio master switches, aircraft master switches and voltage regulator switch (on 31P-1 thru 31P-83) are located on the circuit breaker panel located at the left of the pilot's seat below the side window. The circuit breakers automatically open the electrical circuit if an overload should occur. To reset the circuit breakers, simply push the reset button IN. It may be necessary to allow approximately two minutes before resetting the breakers. Corrective action should be taken in the event of continual circuit breaker popping. It is possible to manually trip the breakers by pulling out on the reset button. The alternator circuit breakers, mounted at the bottom of the panel, are of the switch type.

The magneto, starter, lights, fuel pumps and various other system switches are located on the overhead switch panel. The starter switch is located in the center of the overhead panel and is a rocker-actuator style switch which is spring loaded to the center off position. To operate, push on the switch and hold until the selected engine is started, then release the switch and it will return to the off position.

ISSUED: April 1, 1970
REVISED: August 20, 1973