

2050
reservoir

FRAME 37

The hydraulic shuttle valve, located on the aft end of the canopy actuating cylinder, has two intake ports. One port is connected to the normal hydraulic system and the other port, to the emergency air system. The hydraulic shuttle valve is so designed that in order to admit pressure from one intake port to the actuating cylinder, the other intake port is closed.

Pressure is admitted to the _____ by two ports. While the normal hydraulic port is opened, the emergency air port is _____.

canopy actuating cylinder
closed

FRAME 38

The external canopy manual release system consists of an external handle located on the left side of the fuselage slightly below the aft canopy, and a hydraulic bypass valve located adjacent to the canopy actuating cylinder. The manual control handle has two positions, the forward position opening the bypass valve and permitting the canopy to be moved manually in either direction, and the aft position opening the canopy by the emergency air system. The external handle physically engages the rear cockpit canopy handle inside the cockpit, and positions it either to MANUAL or EMERG OPEN.

By positioning the external handle in the forward position, the canopy may be opened or closed _____, while the aft position of the external handle allows only for _____ the canopy by means of the _____.

manually
opening
emergency air system

FRAME 39

Mechanical linkage from the canopy external control handle opens the canopy hydraulic bypass valve and permits free flow of hydraulic fluid between the two ends of the actuating cylinder. This permits the canopy to be positioned manually.

To position manually, the canopy external control handle must be _____, which permits _____ of the hydraulic fluid around each end of the actuating cylinder.

forward
free flow

FRAME 40

A high-pressure air system is provided as an alternate means for opening the canopy, should the normal hydraulic system fail to open the canopy in an emergency. This system is actuated by placing the canopy handle in the EMERG OPEN (full aft position).

With a loss of hydraulic pressure and fluid, the canopy _____ be opened by using the _____.

may
high-pressure air system

FRAME 41

The canopy emergency air pressure system is incorporated in the system to open the canopy in case of hydraulic or electrical failure or emergency conditions. The system consists of an air bottle, a recharge valve, a self-venting control valve, a pressure safety switch, and a canopy air pressure gauge.

With either a hydraulic or an electrical failure, the canopy may be opened by the _____ or by placing the canopy handle in the _____ position and manually moving the canopy.

emergency air system
manual (forward)

FRAME 42

The canopy emergency air bottle incorporates a self-opening valve and is pressurized to a maximum of 1980 p.s.i. The air control valve is mechanically actuated when either cockpit canopy control handle is placed in the EMERG OPEN position. It requires about 50 pounds of force to get the handle past the safety detent to this position. The pressure gauge is located on the left side of the baggage compartment and normally reads 1600 to 1800 p.s.i., with a 1300 p.s.i. minimum.

By placing the canopy handle in the _____ position, _____ opens the canopy. The pressure gauge should normally read _____ to _____ p.s.i.

EMERG OPEN
emergency air pressure
1600
1800

FRAME 43

The shuttle valve at the actuating cylinder separates the emergency air pressure system from the hydraulic system. The canopy pressure safety switch opens the circuit to the shutoff valve, which is de-energized and closes, isolating hydraulic pressure from the shuttle valve. Positioning either control handle to the EMERG OPEN position opens the air control valve and routes air through the shuttle valve into the actuating cylinder, which opens the canopy.

With an electrical failure, the canopy may be opened by placing the canopy handle in the _____ position or in the MANUAL position. In the _____ position, the hydraulic fluid is free flowing, while in the EMERG OPEN position, hydraulic pressure is replaced with _____ to open the canopy.

EMERG OPEN
MANUAL
emergency air pressure

FRAME 44

After the canopy has been blown open, air is in the actuating cylinder. To prevent canopy damage, this air must be removed. Associated with the air pressure control valve is a pressure relief line which vents the air over the side of the fuselage. However, to rid the system of this air, the canopy handle must be placed in the OPEN position, WITHOUT DEPRESSING THE CANOPY CONTROL BUTTON. If the button is depressed, sufficient pressures develop within the actuating cylinder to cause structural damage. With the canopy handle in the OPEN position, wait 30 to 45 seconds for the air to bleed out, then resume normal canopy operation.

In order to resume normal canopy operations after it has been blown, the first step is to place the _____ in the _____ position.

canopy handle
OPEN

FRAME 45

The main wheel brakes are of the manual, hydraulic, master-cylinder type, operated by toe pressure on the rudder pedals. No boost is supplied by the aircraft hydraulic system, but fluid from the hydraulic system reservoir supplies the master cylinders. Should all fluid be lost from the reservoir, adequate fluid remains in the standpipe and lines to supply hydraulic fluid for normal brake operation.

With a complete loss of hydraulic fluid through a leak in the reservoir, normal braking is _____.

possible

FRAME 46

The wheel brake system consists of four master brake cylinders, two transfer valves, provisions for parking brakes, and two wheel brake assemblies. The wheel brake system receives its fluid from the hydraulic system reservoir. Hydraulic pressure for the wheel brake system is produced and delivered when the master brake cylinder in either cockpit is manually actuated by depressing the top of the rudder pedals. No emergency brake capability is provided. (See figure 6.)

With a hydraulic pump failure, brake system pressure is supplied by _____.

depressing the rudder pedals

FRAME 47

The transfer valves separate the forward and the aft cockpit brakes system and allow independent operation of the brakes from either cockpit. The wheel brake assemblies produce the braking action at the wheels when the master brake cylinder is actuated in either cockpit. A parking brake valve has been incorporated in the wheel brake system to retain pressure in the forward cockpit brake lines and the compensators, housed in the brake valve, allows for thermal expansion when parking brake is applied.

The T-28 brake system receives its hydraulic fluid from the _____ and hydraulic pressure from the _____.

*system hydraulic reservoir
brake pedals*

FRAME 48

A force applied to the rudder pedals actuates the master brake cylinders through direct mechanical linkage and builds up pressure in the brake system. When the master brake cylinder in either cockpit is actuated, pressure is produced and applied to the shuttle piston in the transfer valve which closes off the port to either cockpit brake system. Pressure then builds up on the other side of the shuttle piston and applies a force to the brake assemblies. If both cockpit brakes are applied simultaneously, the pilot exerting the most pressure would be controlling the brakes.

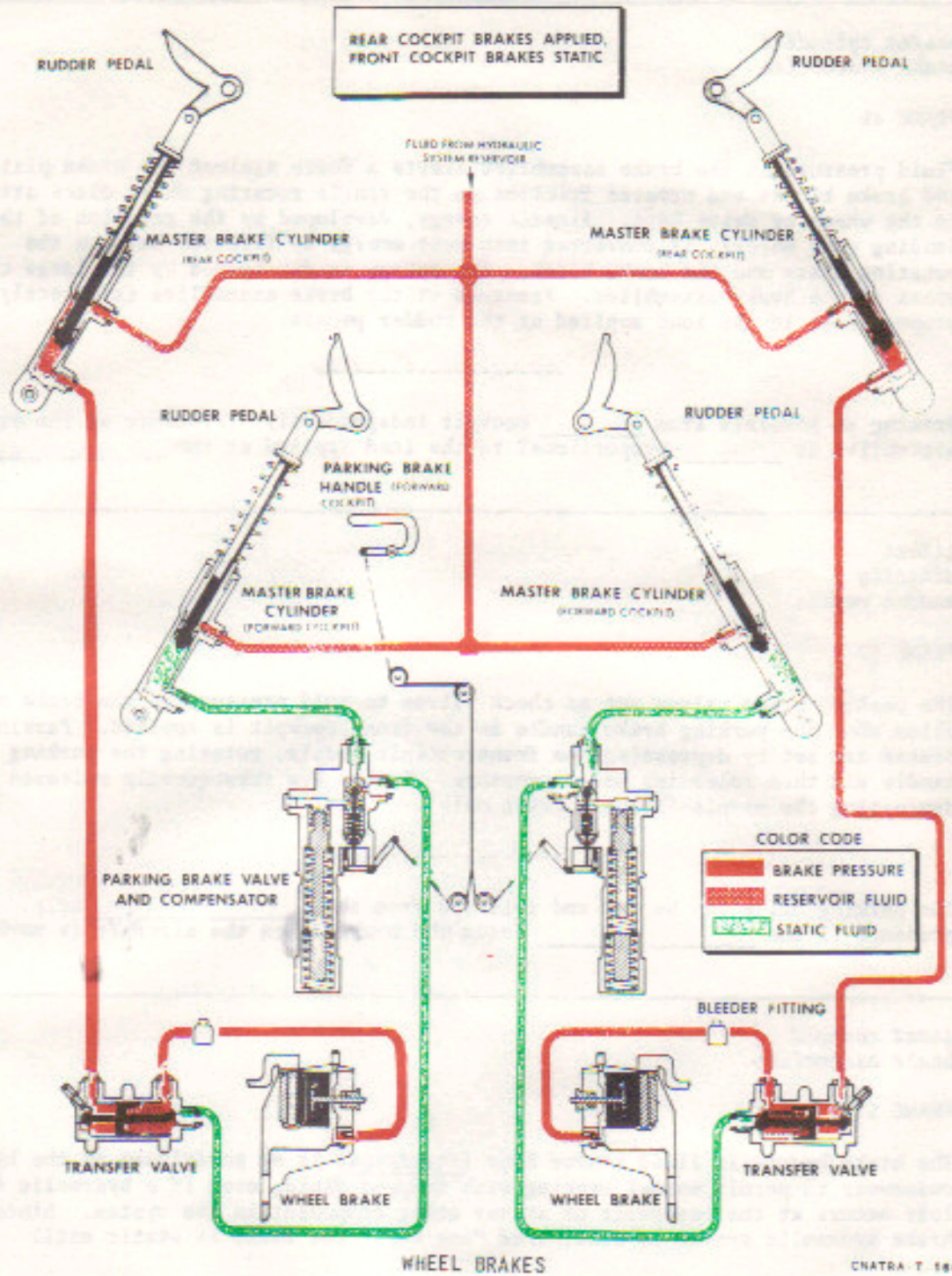


Figure 6

When the brake pedals are depressed, mechanical linkage actuates the _____
_____ and applies pressure to the _____.

*master cylinders
brake assemblies*

FRAME 49

Fluid pressure in the brake assemblies exerts a force against the brake pistons and brake blocks and creates friction on the single rotating wheel discs attached to the wheel by drive keys. Kinetic energy, developed by the rotation of the landing gear wheels, is converted into heat energy by friction between the rotating discs and the brake block. The energy is dissipated by the large cooling areas of the brake assemblies. Pressure at the brake assemblies is directly proportional to the load applied at the rudder pedals.

Braking is possible from _____ cockpit independently. Pressure at the brake assemblies is _____ proportional to the load applied at the _____.

*either
directly
rudder pedals*

FRAME 50

The parking brake valves act as check valves to hold pressure in the brake assemblies when the parking brake handle in the front cockpit is applied. Parking brakes are set by depressing the front cockpit pedals, rotating the parking brake handle and then releasing pedal pressure. Brakes are subsequently released by depressing the pedals (front cockpit only).

The parking brake can be set and released from the _____ only. Trapped pressure in the _____ holds the brakes when the aircraft is parked.

*front cockpit
brake assemblies*

FRAME 51

The brake hydraulic fluid source line (standpipe) is so positioned in the hydraulic reservoir to permit normal braking with trapped fluid, even if a hydraulic fluid loss occurs at the reservoir or at any other component in the system. Since the brake hydraulic system is considered "one way," the fluid is static until

pressurized by the brake pedals. If a leak occurs in the brake assembly, only the fluid in the brake system will be lost and the brakes will be inoperative. The remaining components in the hydraulic system will remain operational. There is no provision for emergency brakes.

With a hydraulic fluid leak at the canopy actuating cylinder, normal braking _____ be expected. In this situation, state two ways of opening the canopy.

1. _____
2. _____

may

1. Manually open
2. EMERG OPEN with the air bottle

FRAME 52

On the preflight inspection, considerable attention must be given to the brake components. The thickness of the brake pucks is critical, not to be less than the thickness of a dime (1/16 of an inch). If any fluid is visible around the brake lines or assemblies, the aircraft should be downed for further inspection and repair.

No response required

HYDRAULIC SYSTEM SUMMARY

1. The hydraulic pump on the engine is a variable-displacement, nine-piston rotary pump.
2. Control of pressurization and depressurization is accomplished through the solenoid bypass valve, held open electrically and spring-loaded to the closed position. With a generator failure or a loss of the secondary bus, this valve automatically closes, pressurizing the system.
3. With a complete fluid loss in the system, normal braking can be expected.
4. The landing gear is held in the up position by mechanical uplocks and in the down position by mechanical over-center downlocks and hydraulic system pressure. With a loss of the hydraulic pressure on the ground, the gear is held down by only the mechanical over-center downlocks.
5. The flaps are held up by mechanical and hydraulic locks, and down by a hydraulic lock.
6. The systems requiring electrical power for normal operation are the canopy and the speed brake. Although the canopy can be operated manually or on the emergency system, the speed brake must have electrical power from the secondary bus to be functional.
7. The hydraulic hand pump in the front cockpit must be utilized to lower the flaps with a hydraulic pump failure. The hand pump can be used to operate any component normally operated by the engine-driven pump, providing all hydraulic lines are intact.
8. With a windmilling engine, normal hydraulic system operation may be expected.

UC 09 03 03 08 ER

NAME & RANK _____

CLASS _____ DATE _____

SCORE

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____