

SECTION VIII

UTILITY SYSTEMS

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8. UTILITY SYSTEM

A. BRAKE SYSTEM

The hydraulic brake system consists of the wheel brake assemblies, two master cylinders for the single brake system, four master cylinders for the dual brake system, and a parking brake assembly. Regular inspections of the brake system should include checking the fluid level in the master cylinder reservoirs, deteriorated hose assemblies, loose or damaged lines or fittings, worn brake linings, and proper parking brake adjustment.

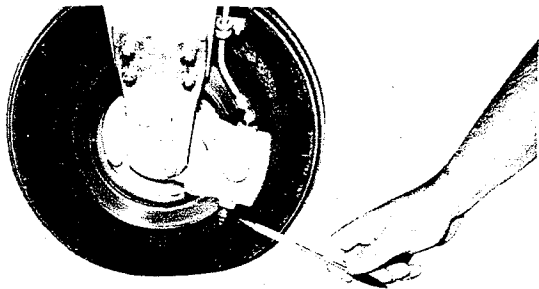


FIGURE 8-1 BRAKE ASSEMBLY BLEEDER VALVE

The optional dual hydraulic brake system used in the Yankee is unique in the fact it requires no additional reservoir. The system is designed for dual operation and incorporates two types of master cylinders. Pressure applied to the left master cylinder (1, Figure 8-4) passes through an integral piston by-pass port in the right master cylinder (3, Figure 8-4) and on to the left wheel brake assembly. Pressure applied to the right master cylinder (3, Figure 8-4) closes the port and applies the left wheel brake assembly. If pressure is applied to both cylinders simultaneously, the force from the left cylinder is applied to the top of the piston in the right cylinder, nearly doubling the pressure at the wheel brake assembly. Master cylinders 2 and 4 operate in the same manner. When the brake pedals for cylinders 3 and 4 are in neutral position, the ports are open for direct flow to the brake assemblies from cylinders 1 and 2.

The standard single brake system does not use cylinders 3 and 4. However, operation is essentially the same as above, except master cylinders 1 and 2 supply hydraulic pressure directly to the wheel brake assemblies.

The parking brake assembly consists of a cable control attached to locking levers on the master cylinder shafts. These are applied by depressing the top of the pedals and pulling out the parking brake control. Releasing the parking brake is

NOTE: When replacing or adjusting the parking brake cable or chain, be sure chain has adequate free length to prevent the parking brake being engaged when the rudder pedals reach full travel.

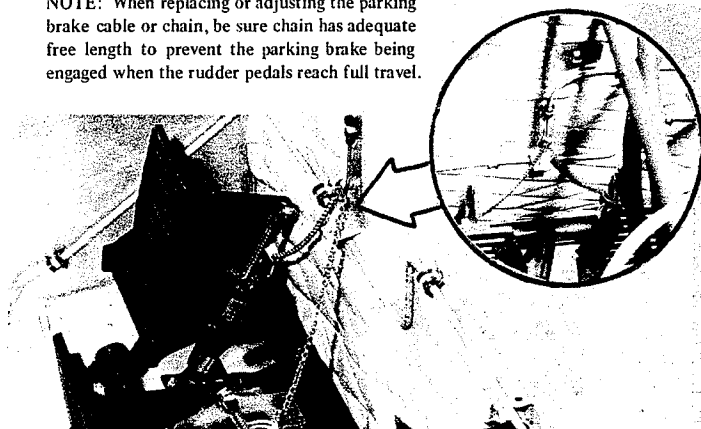
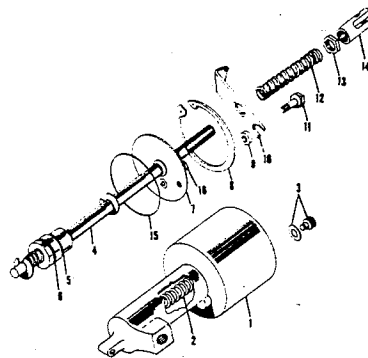
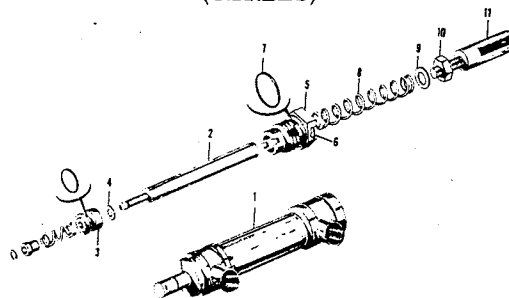


FIGURE 8-2 MASTER CYLINDERS AND PARKING BRAKE ASSEMBLIES



- | | | |
|------------------------------|-------------------------|----------------------------|
| 1. Brake housing | 6. "O" ring | 12. Spring |
| 2. Spring | 7. Cover plate assembly | 13. Lock nut |
| 3. Screw and washer assembly | 8. Snap ring | 14. Clevis |
| 4. Shaft assembly | 9. Spacer | 15. Square cut rubber seal |
| 5. "O" ring | 10. Parking brake lever | 16. Filler plug |
| | 11. Bolt | |

FIGURE 8-3A MASTER CYLINDER ASSEMBLY (GERDES)



- | | | |
|------------------------|------------------|--------------|
| 1. Cylinder assembly | 5. Gland packing | 8. Spring |
| 2. Piston rod assembly | 6. "O" ring | 9. Washer |
| 3. Piston assembly | 7. "O" ring | 10. Nut, jam |
| 4. Washer seal | | 11. Fork end |

FIGURE 8-3B MASTER CYLINDER ASSEMBLY (CLEVELAND AIRCRAFT PRODUCTS)



accomplished by depressing the top of the pedals and pushing the control in.

To remove the master cylinder:

1. Actuate the brake pedal corresponding to the master cylinder to be removed.
2. Bleed the fluid from the brake system by removing the bleeder valve in the bottom of the brake assembly (Figure 8-1).
3. Disconnect the flexible hose assembly at the master cylinder connection.
4. Remove the cotter pin and withdraw the clevis pin which connects the clevis on the master cylinder to the rudder pedal.
5. Remove the cotter pin and withdraw the clevis pin which attaches the mounting lug of the master cylinder to the mounting bracket.

Master cylinder repair:

Repair of the master cylinders is limited to replacement of parts, cleaning and adjustment. Figure 8-3A & B may be used as a guide during disassembly and assembly of the brake master cylinders. Use clean hydraulic fluid as a lubricant during assembly of the cylinders.

To install the master cylinder:

Install the master cylinder in reverse of the removal procedure.

NOTE

Do not overtighten the fittings in the master cylinders. Overtightening could crack the casting and cause a leak.

NOTE

Adjustment of the master cylinder for proper fit can be made by loosening the jam nut beneath the clevis and rotating the clevis.

To fill the brake system:

The following procedure applies to both single and dual brake installations.

1. Remove the vent plugs from master cylinders (1 and 2, Figure 8-4) and replace with overflow lines. Immerse the free ends of the overflow lines in a can containing enough hydraulic fluid to cover the ends of the lines.
2. Connect a clean hydraulic pressure source to the brake assembly bleeder valve.
3. Fill the system until the overflow line in the master cylinder being filled shows no more air bubbles. Remove the overflow lines.
4. Remove the source of fluid and pressure and allow the fluid to drain back through the system until the fluid level is approximately 1/4 inch from the top of the reservoir in the master cylinder.
5. Secure the bleeder valve and replace the vent plugs.

NOTE

Do not fill the reservoir higher than 1/4 inch from the top as this will result in spillage. If fluid is accidentally spilled on the rug, it can be removed with imperial cleaner.

CAUTION

Whenever the master cylinder is empty of fluid, avoid depressing the brake pedal to its extreme travel. Such action may result in permanent internal damage to the master cylinder.

NOTE

In servicing the hydraulic brake system, always use an approved hydraulic fluid conforming to MIL-H-5606.

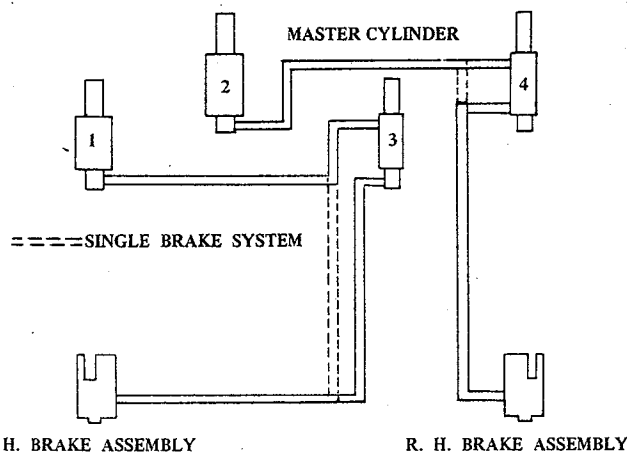


FIGURE 8-4 SCHEMATIC - HYDRAULIC BRAKE SYSTEM - DUAL



TROUBLE	PROBABLE CAUSE	REMEDY
BRAKE SYSTEM TROUBLE SHOOTING		
Little or no braking	Low or no fluid	Service with proper grade hydraulic fluid
	Leak in system	Check all lines and connections
	Air in system	Bleed system
	Defective master cylinder	Repair or replace master cylinder
Dragging Brakes	Worn linings	Replace linings
	Warped or scored brake discs	Replace brake discs (check linings)
	Defective master cylinder return spring	Disassemble master cylinder and replace spring. Check spring free length and replace if necessary.
	Bent master cylinder shaft	Disassemble master cylinder and replace shaft
	Wheel cylinder piston sticking	Remove, clean or replace
	Bent line restricting movement of cylinder	Repair or replace line
Floor and master cylinder covered with hydraulic fluid	Bent or dirty torque plate pins	Clean or replace pins as required.
	Master cylinders overfilled	Lower fluid level to 1/4-inch from top of reservoir
	Leaking fittings at master cylinder	Tighten or replace fittings
	Leaking o-rings in master cylinders	Remove, inspect, and replace o-rings
Parking brake locks one brake only	Cracked master cylinder casting	Replace master cylinder
	Control linkage disconnected or connected incorrectly	Connect linkage correctly
Parking brakes will not release	Master cylinder shaft notched	Replace shaft
	Bent parking brake links	Replace links
	Parking brake control rigged too light	Rerig parking brake control

B. CABIN HEATING AND VENTILATING SYSTEM

1. Heating System:

The cabin heating system is basically a controlled air flow in which air, entering the cockpit, passes over the muffler core. The amount of heated air is regulated by a valve mounted through the firewall. Cool air picked up by the nose cowl inlet serves two purposes, that of cooling the muffler, and providing heated air for comfort.

The valve mounted through the firewall is used to regulate the warm air by either ducting it overboard or into the cabin as desired. The amount the push-pull control is moved determines the amount of heat ducted into the cabin.

To provide for windshield defrosting, a flexible duct is connected to the valve and terminated just below the sliding door located on the forward panel deck. Operation of the defroster is accomplished by pulling the push-pull control out and opening the sliding door.

2. Ventilation System:

Cabin ventilation is provided by two ventilators, one in each wing root, and two optional

canopy air scoops. The wing root ventilators are controlled by sliding valves and the canopy scoops are controlled by adjustable valves for quantity and direction of air.

3. Troubleshooting

Most of the operational troubles in heating, ventilating and defrosting systems are caused by sticking or binding air valves or damaged air ducting. In most cases air valves can be freed by proper lubrication. Damaged or broken parts should be repaired or replaced. Be sure all valves move freely through the full range of travel and seal properly. Check that all heater and defroster ducting is properly attached. Replace any that are burned, frayed or crushed. If fumes are detected in the cabin, the heater shroud must be removed to allow a very careful inspection of the exhaust muffler and stack. Any holes or cracks may permit exhaust fumes to enter the cabin.

NOTE

Replacement of defective exhaust stacks or mufflers is imperative as exhaust fumes in the cabin constitute an extreme safety hazard.