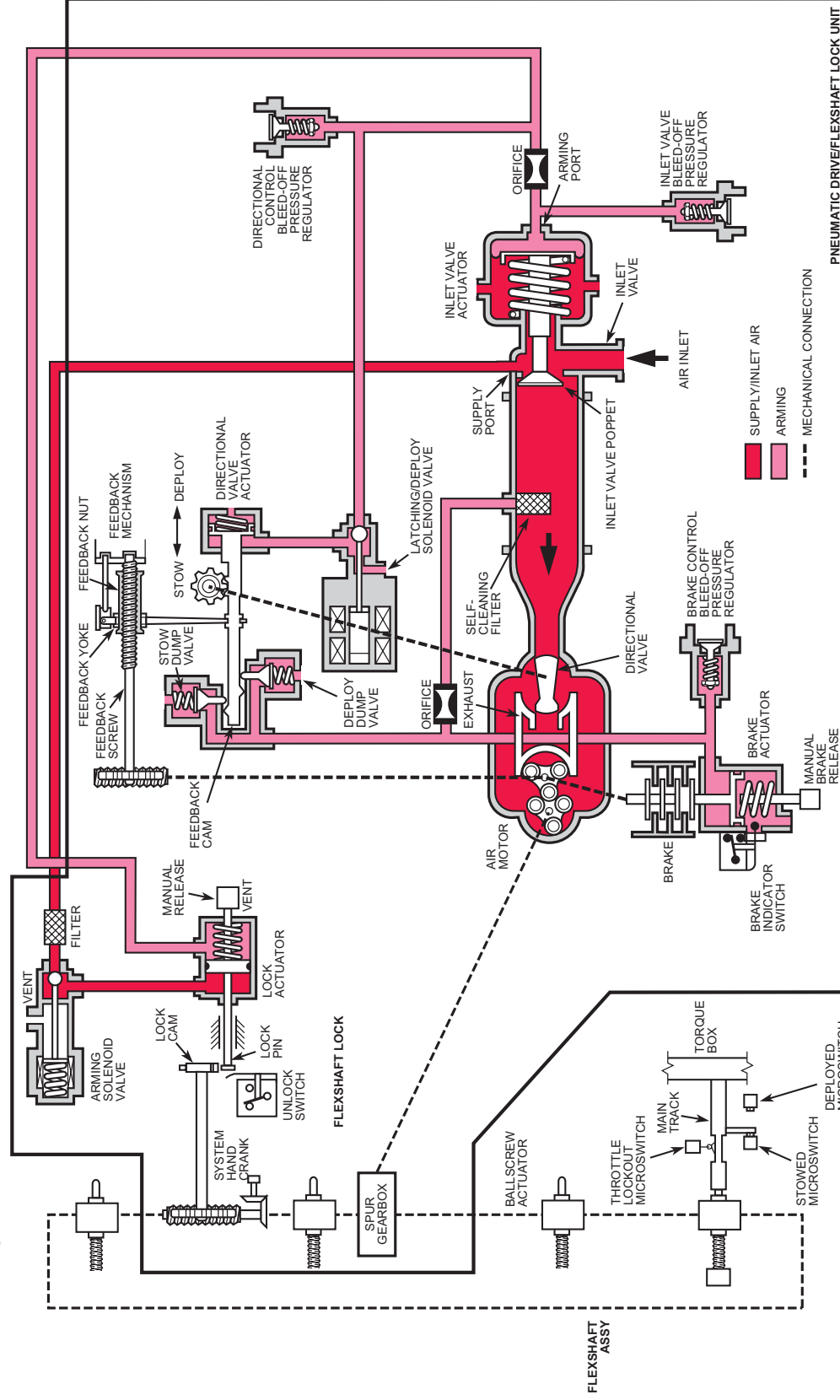
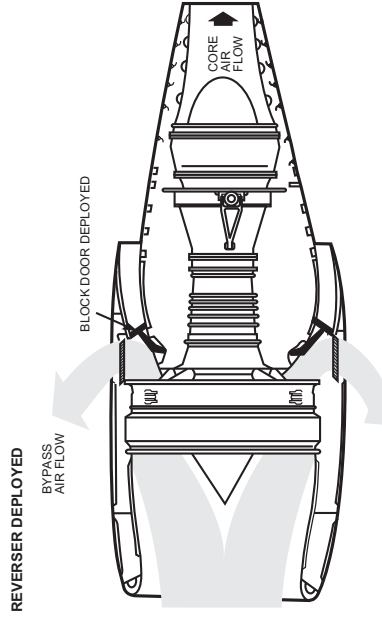
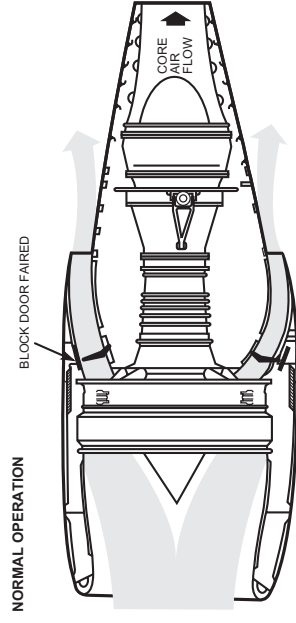


Thrust Reverser System



Thrust Reverser Normal Operation and Reverser Deployed



Thrust Reversers

The electrically actuated and pneumatically operated thrust reversers redirect fan thrust forward to shorten landing roll and reduce brake wear.

CAUTION: Do not shift or interrupt electrical power during thrust reverser operation to avoid damage.

Deploy

Pressing a REVERSE THRUST PUSH TO ARM switchlight supplies 28V DC from the DC Essential bus to open the 14th stage bleed air shutoff valve that supplies the thrust reverser system. The ARMED light illuminates.

Pulling a thrust reverser lever to the deploy position mechanically locks the throttle lever in the idle position and actuates the deploy switch. The deploy switch, in turn, completes a circuit to the weight-on-wheel (WOW) or wheel spin-up relays. On touchdown, the WOW or wheel spin-up relay closes to supply 28V DC from the DC Essential bus to energize the power drive unit (PDU) and flexshaft lock arming solenoid valves. The wing and engine anti-ice shutoff valves close.

With the arming solenoid valve open, bleed air flow from the inlet valve to the lock actuator retracts the lock pin. The REVERSER UNLOCKED light illuminates. The REVERSER UNLOCKED light also illuminates if the PDU brake releases or the translating sleeve is not fully stowed. Bleed air flow then continues to the directional and inlet valve actuators. A bleed-off pressure regulator for each directional valve actuator regulates arming pressure to prevent excessive loads on the valve's feedback mechanism.

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Arming pressure to the directional valve actuator shifts its feedback mechanism to the deploy position. The PDU directional valve then shifts to the deploy position; the stow and deploy dump valves close.

The inlet valve bleed-off pressure regulator controls the inlet valve actuator valve poppet to provide pressure to operate the PDU air motor. Engine 14th stage bleed air in the PDU air inlet enters the brake actuator through a self-cleaning filter. The brake releases so bleed air entering through the directional valve drives the PDU air motor.

Air motor rotation drives the thrust reverser ballscrews through gears and flexible shaft assemblies. The ballscrews, in turn, drive the translating structure (torque box and cowl doors) aft to expose the cascade vanes and deploy the blocker doors into the fan duct.

The air motor also rotates the feedback screw during thrust reverser deployment until its nut reaches the end of its travel where it contacts the feedback yoke. The feedback yoke then drives the PDU directional valve to the null position so the PDU air motor slows. Continued movement of the feedback mechanism contacts opens the deploy dump valve. The brake actuator then vents; the brake slows, then stops the thrust reverser. The thrust reverser locks in the deployed position, the REVERSE THRUST light illuminates, and the throttle lock releases. Pulling the thrust reverser lever increases reverse thrust with fan thrust deflected forward by the blocker doors.

The amber UNSAFE TO ARM switchlight illuminates as a warning when:

- an electrical fault occurs in the arming circuits
- a deploy switch fault occurs in flight
- either thrust reverser is not fully stowed
- thrust reverser levers actuated with weight-on-wheels and thrust reversers not armed.

Stow

Pushing the thrust reverser lever down to the stow position actuates the reverser deploy switch to the stow position. Once the deploy solenoid de-energizes, the arming and stow solenoids energize. The directional valve actuator loses operating pressure and drives the feedback mechanism to the stow position. The PDU directional valve rotates to the stow position. The stow and deploy dump valves close, then the brake actuator releases.

Bleed air rotates the PDU air motor that, in turn, drives the thrust reverser actuating mechanisms to the stow position. Initial movement of the thrust reverser from the fully deployed position extinguishes the REVERSE THRUST light. As the thrust reverser's translating structure continues moving forward, the blocker doors stow. Toward the end of thrust reverser stowing, the feedback mechanism and directional valve move to the null position. The PDU air motor slows.

When the ballscrews almost contact the stowed stops, the stowed switch de-energizes the arming solenoid valve that, in turn, vents lock actuator operating pressure to atmosphere. The lock actuator's spring then drives the locking pin to the locked position where it actuates the unlock switch. The lock actuator's arming port then vents to atmosphere. The thrust reverser continues moving toward the stowed position. When the ballscrews contact the stowed stops, the PDU air motor develops partial stall torque. The inlet valve closes, the brake applies, and the flexible shaft assemblies lock. Brake application extinguishes the REVERSER UNLOCKED switchlight. Pressing the PUSH TO ARM switchlight extinguishes the ARMED light, cuts power to the WOW relay, de-energizes the throttle lock solenoid, and the throttle levers unlock.

Auto Stow

If the thrust reverser inadvertently moves from the fully stowed position, the stowed microswitch energizes the arming solenoid. If the thrust reverser continues to deploy, the stow solenoid energizes. The directional valve shifts to the stow position so that bleed air powers the PDU air motor to drive the thrust reverser to the stow position.

Emergency Stow

If the thrust reverser fails to auto stow and the REVERSER UNLOCKED light illuminates, pressing the respective THRUST REVERSER EMERG STOW switchlight energizes the arming and stow solenoids and de-energizes the WOW solenoid. The directional valve then shifts to the stow position. Bleed air powers the PDU air motor to drive the thrust reverser to the stow position. The emergency stow circuit deactivates normal deploy signals. The 14th stage bleed air valve must be open for the emergency stow system to work.

After performing an emergency thrust reverser stow, the REVERSER UNLOCKED light remains illuminated because both the flexshaft lock and stow solenoid remain energized.

Thrust Reversers

Power Source	14th stage bleed air DC Essential bus
Control	REVERSE THRUST PUSH TO ARM switch Thrust reverser levers Stow and deploy switches THRUST REVERSER EMERG STOW switchlight
Monitor	UNSAFE TO ARM lights ARMED lights REVERSER UNLOCKED lights REVERSE THRUST lights
Protection	Stowed microswitches Arming solenoids Stow solenoids

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