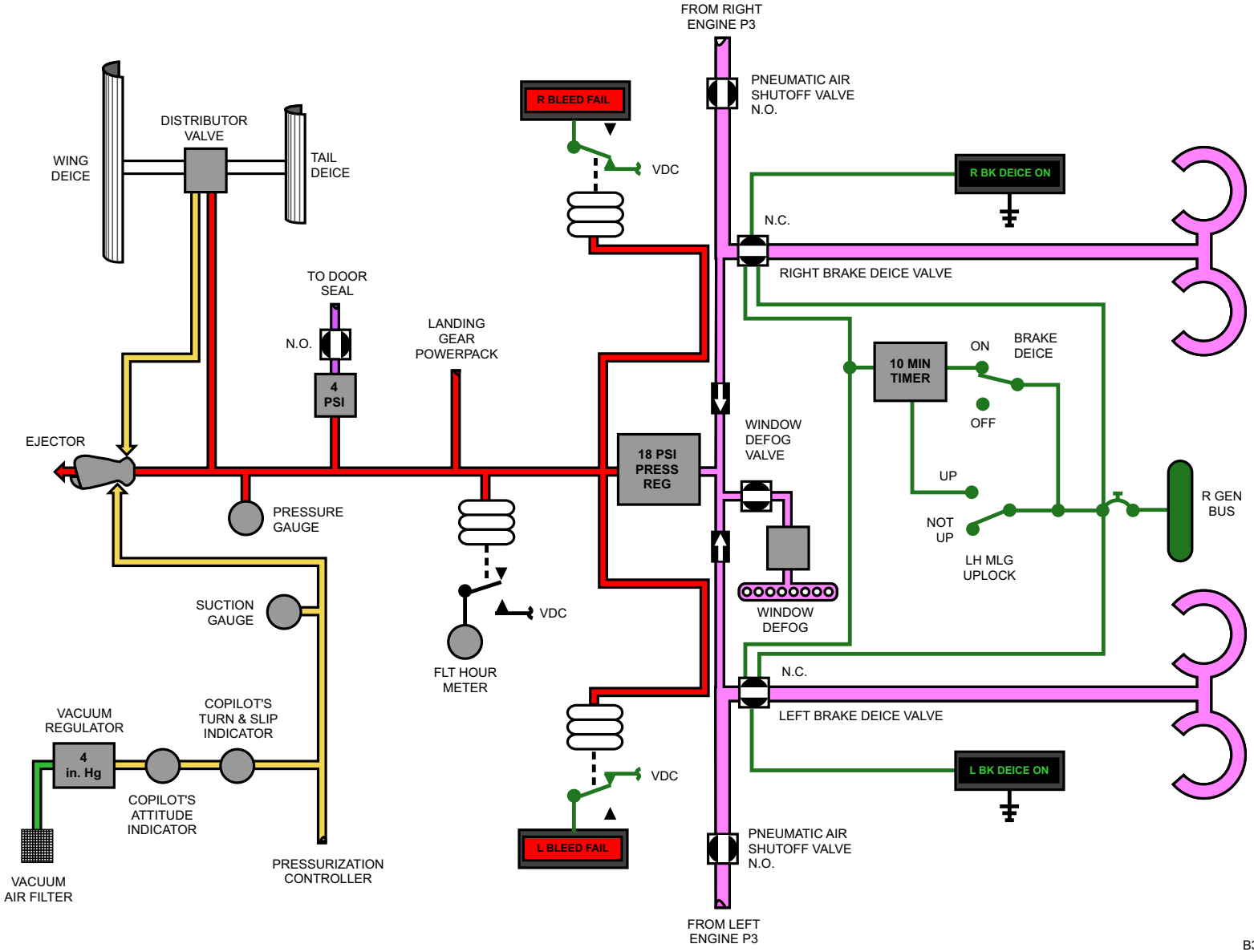
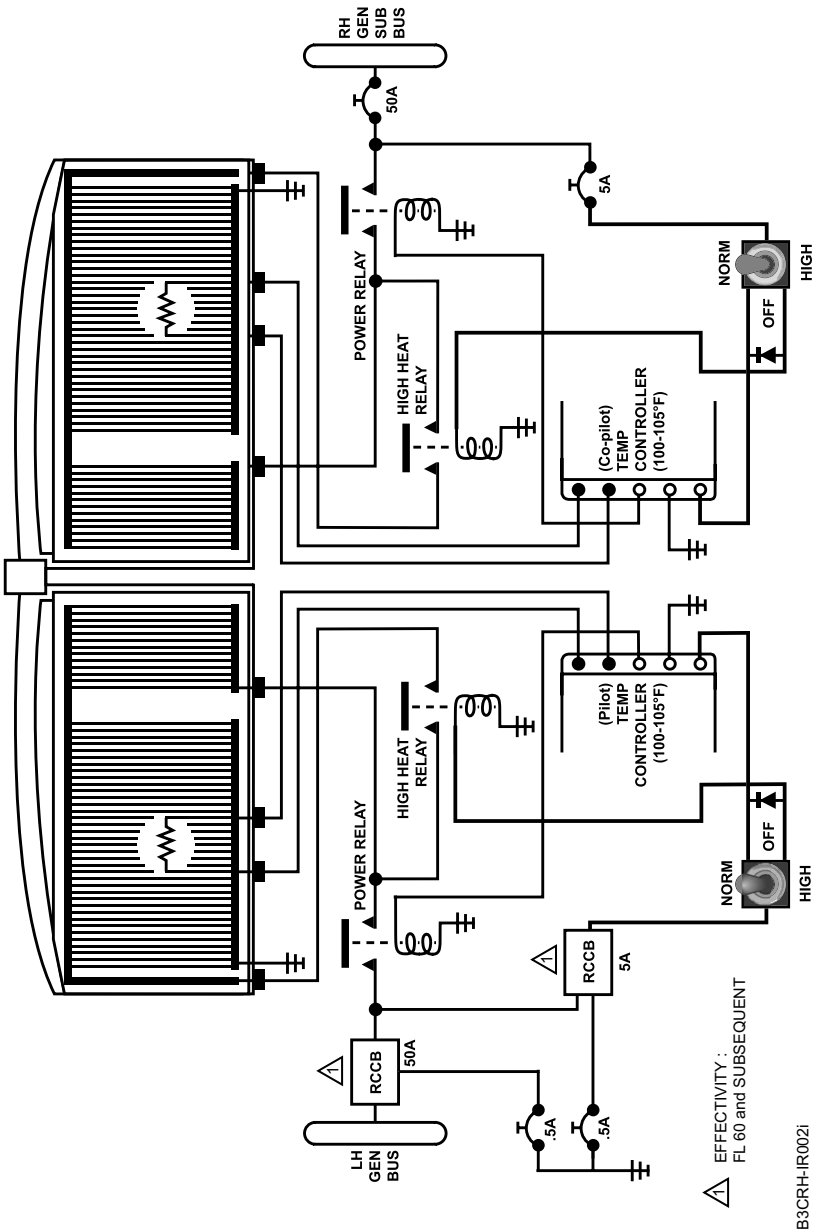
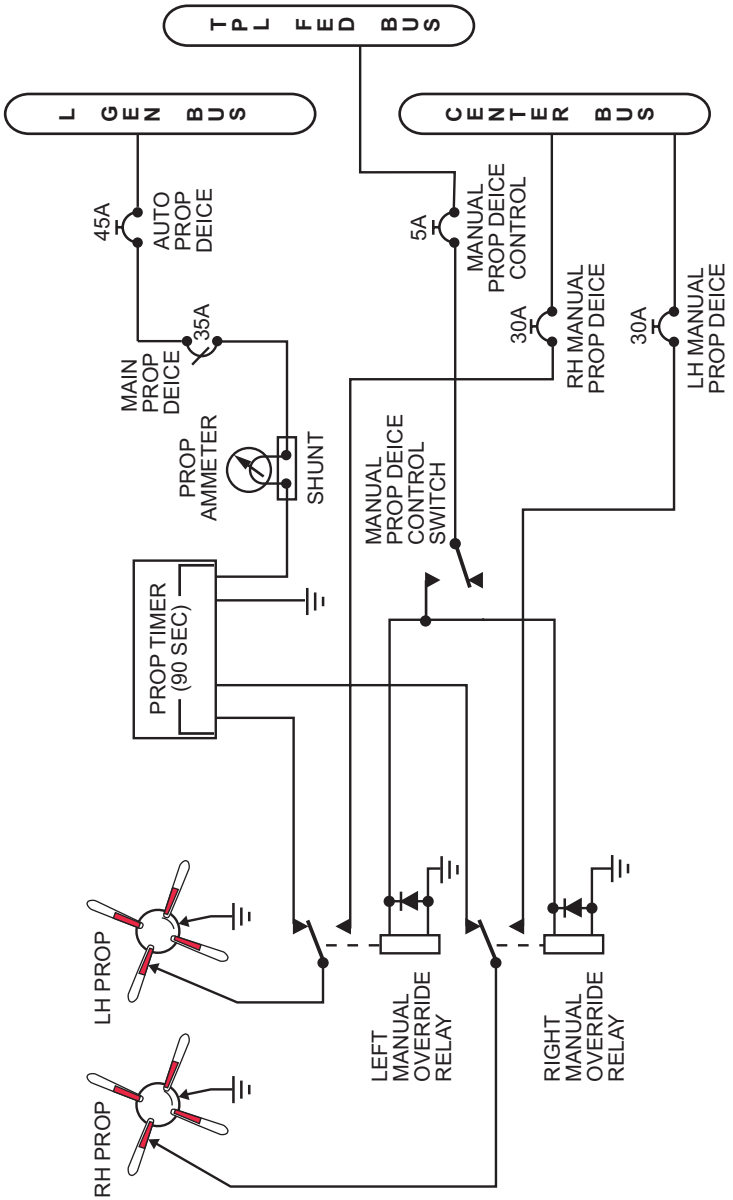
Surface and Brakes Anti-Ice Systems



Windshield Heating System



Propeller Deice System



Ice and Rain Protection

Ice and rain protection systems include:

- ice detection
- pitot anti-icing
- stall warning heat
- windshield protection
- airframe anti-icing
- air intake lip anti-ice
- inertial separation anti-ice system
- propeller deice
- brake deice.

Ice Detection

Ice detection is accomplished visually by the flight crew, from the flight compartment; wing inspection lights are installed for ice detection during night operation.

Pitot Anti-Icing

Two pitot tubes on the nose of the aircraft contain heating elements that protect against ice accumulation.

Stall Warning Vane Anti-Icing

The lift transducer is equipped with anti-icing capability on both the mounting plate and the vane. The heat is controlled by a switch located on the pilot's right subpanel, placarded STALL WARN. The level of heat is reduced for ground operation, but is automatically increased for flight operation through the left landing gear safety switch. Power for the stall warning vane heat is from the R Gen bus. Turn the stall warning vane heat on for all flights.

The heating elements protect the lift transducer vane and face plate from ice. However, a buildup of ice on the wing may change or disrupt the airflow and prevent the system from accurately indicating an imminent stall. Remember that stall speed increases whenever ice accumulates on the aircraft.

Windshield Protection

Electric heating elements in the windshield provide protection against the formation of ice, while air from the cabin heating system prevents fogging. Heavy duty windshield wipers provide improved visibility during rainy flight conditions.

Windshield Anti-Icing

The pilot's and copilot's windshields each have independent controls and heating circuits. The control switch allows the pilot to select a HI or a NORMAL intensity heat level. The windshields are composed of three physical layers. The inner layer is a thick panel of glass that is the structural member. The middle layer is a polyvinyl sheet that carries fine wire heating grids. The outer layer is a protective layer of glass bonded to the first two layers. The outside of the windshield is treated with a static discharge film, called a NESA coating.

Electrical heating elements protect the windshields against icing. The heating elements connect at terminal blocks in the corner of the glass to wiring leading to the control switches mounted in the pilot's right subpanel.

Each windshield has electrical connections for the resistive material and for temperature sensing elements. The resistive material is arranged to provide primary and secondary heated surfaces.

CAUTION: The practice of turning the windshield anti-ice on early in the flight is recommended if it is anticipated that it will be required later in the flight after the windshield has been cold-soaked. Activating the windshield anti-ice after the windshield has been cold-soaked may cause the windshield to crack.

Windshield Wipers

Separate windshield wipers are on the pilot's and copilot's windshield. The dual wipers are driven by a single electric motor, installed forward of the instrument panel.

The windshield wiper control is on the overhead light control panel. It provides the wiper mechanism with SLOW, FAST and PARK positions. The wipers may be used either on the ground or in flight, as required; however, they must not be operated on a dry windshield. The windshield wiper circuit breaker (CB) is on the copilot's right side CB panel in the WEATHER group.

Airframe Anti-Icing

The selector switch that controls the surface deice system permits automatic single cycle operation or manual operation.

The deice and vacuum system is operated with pressure obtained by bleeding air from the engine compressors. This air is routed through a regulator valve that is set to maintain the pressure required to inflate the deicer boots on the leading edge of each wing and the horizontal stabilizer.

CAUTION: Operation of the surface deice system in ambient temperatures below -40°C can cause permanent damage to the deice boots.

NOTE: For most effective deicing operation, allow at least 1/2 inch (1.27 cm) of ice to form before attempting ice removal.

Very thin ice may crack and cling to the boots instead of shedding. Subsequent cycling of the boots will then have a tendency to build up a shell of ice outside the contour of the leading edge, thus making ice removal efforts ineffective.

Engine Anti-Icing

Air Intake Anti-Ice Lip

Engine exhaust heat is utilized for heating the engine air inlet lips. Hot exhaust, picked up by a scoop inside the left exhaust stack, is ducted to the inlet lip. Exhaust flows through the inside of the lip and out through the right exhaust stack. The system operates whenever the engine is running.

Inertial Separation Anti-Ice System

An inertial separation system is built into each engine air duct to prevent moisture particles from entering the engine inlet plenum under icing conditions. The system includes dual actuators and controls.

During all ground operations, before icing conditions are encountered, or when operating at a temperature of +5ºC and colder and when flight free of visible moisture cannot be assured, the Engine Anti-Icing system should be deployed. When actuated, the forward vane is lowered into the inlet air stream and the aft vane is retracted. Repositioning these vanes causes the inertia of heavier moisture-laden or solid particles to continue along their path to be exhausted overboard through the lower nacelle area. Lighter particles and free air will turn abruptly to enter the engine inlet.

Propeller Deice

The propeller electric deice system includes: electrically heated deice boots, slip rings and brush block assemblies, a timer for automatic operation, ammeter, circuit breaker located on the right side panel for deice control circuit protection, and two switches located on the pilot's right subpanel for automatic or manual control of the system.

NOTE: The heating sequences for the deice boots noted in the following section are the sequences which are in evidence during the normal operation. However, due to the fact that the timer does not return to any given point when the power is turned off, it may restart at any sequence.

Brake Deice

The brake deice system uses hot air to melt ice from the main landing gear wheels. The hot air flows from each engine compressor through the pneumatic bleed air system to a tee fitting in each main gear wheel well. From there, the hot air flows through the brake deice line to a solenoid-operated shutoff valve, then through a flexible hose assembly along the aft side of the landing gear strut to a distributor manifold attached to the piston and axle assembly.