Chapter 9 ANTI-ICING SYSTEM

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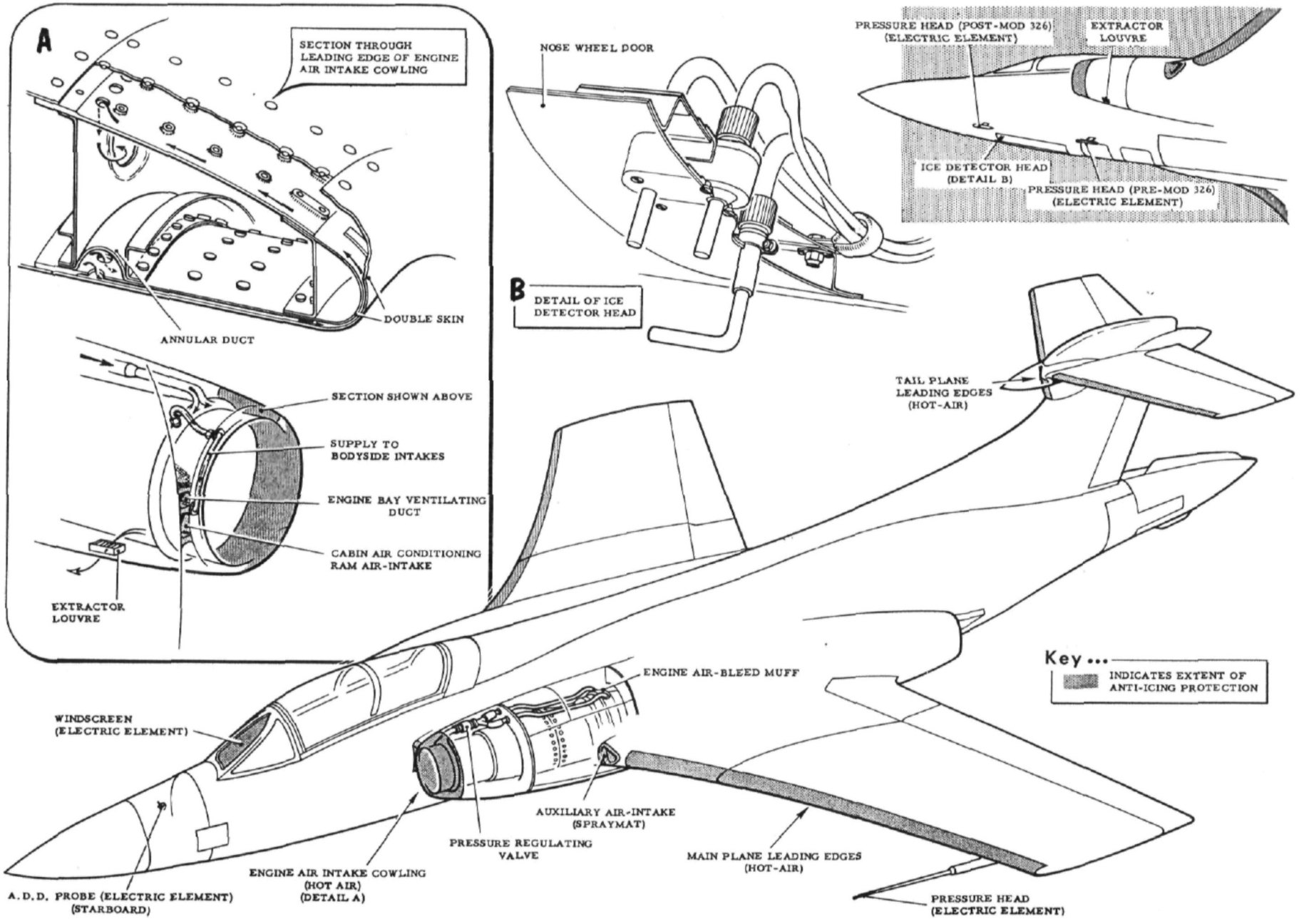
ILLUSTRATION

General

1. The anti-icing systems of this aircraft prevent the formation of ice around the engine air-intakes, engine air-intake cowlings, the leading edges of the main planes and tail plane, the windscreen, the auxiliary air-intakes, the pressure heads and the airstream direction detector probe. The engine air-intakes, engine air-intake cowlings and the leading edges of the aerofoil surfaces are heated by hot air from the engines, while the windscreen, the auxiliary air-intakes, the pressure heads and the airstream direction detector probe are heated electrically. Anti-icing of the engine air-intakes, engine air-intake cowlings, the auxiliary air-intakes and the aerofoil surfaces is controlled by one switch, while the anti-icing of the windscreen, the pressure heads and the airstream direction detector probe is controlled by two other switches. All three switches are mounted on the starboard switch panel at the pilot's station.

Engine air-intakes

2. To prevent ice forming in the engine air-intake and thus interfering with the operation of the variable-angle inlet guide vanes, hot air, bled from the rear of the engine compressor, can be directed through ducts to heat the inlet guide vanes, the streamlined spokes in the air intake, the outer surface of the starter fairing and the inlet guide vane temperature sensing probe. Selection of this anti-icing system is effected electrically by the same switch as that for the engine air-intake cowling (*para* 5). Detailed information on the engine anti-icing system is contained in ◀A.P. 4696B, Vol. 1.▶



BUCCANEER S MK. 1 AIRCRAFT
AIR DIAGRAM 7490/MIN.

PREPARED BY MINISTRY OF AVIATION FOR PROMULGATION BY

Fig. 1. Anti-icing system arrangement

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Engine air-intake cowling *(fig 1)*

3. The leading edge of the intake cowling (*detail* A) on each engine nacelle is heated with hot air taken from the air bleed muff at the rear of the engine combustion chamber, the supply of hot air being controlled by a pressure regulating valve mounted in the intake cowling. From the pressure regulating valve the hot air passes forward into an annular duct attached to the outside of the engine air-intake. The leading edge of the intake cowling is formed by a double skin, the two layers having a space between them to allow the hot air to circulate. Hot air passes from the annular duct to the hollow double skin through a series of radial holes, circulates around the leading edge and passes into the interior of the cowling through a further series of holes and escapes to atmosphere through an extraction louvre at the bottom of the cowling.

4. From a tapping in the annular duct on the engine air-intake, a supply of hot air is bled off and ducted through the cowling leading edge (*detail* A), to the cowling spigot locating hole on the bodyside. The hot air passes through the hollow locating spigot and into ducts around the leading edges of the engine bay ventilation duct and the cabin air conditioning ram air intake.

5. The valves controlling the flow of hot air to both the engine air-intakes and the engine air-intake cowlings are operated simultaneously, the selection being effected electrically by the switch, marked ANTI-ICING, ENGINE, AUX-INTAKE, SURFACES – ENGINE – OFF, mounted on the starboard switch panel. Detailed information on the electrical system is contained in Book 2, Sect. 6, Chap. 8, of this volume.

Main plane and tail plane leading edges

◀ Note...
This facility has been rendered inoperative on post-Mod 772 aircraft incorporating STI/Buccaneer/56. ▶

6. The leading edges of the main planes and the tail plane are heated by a supply of hot air bled from the rear of the combustion chamber on each engine. With the exception of the leading edges of the inner planes, the anti-icing system for the aerofoil surfaces utilizes the same ducting and control valves as the boundary layer control system. This anti-icing system becomes operative when the ANTI-ICING switch is selected to ENGINE, AUX-INTAKE, SURFACES (*para* 5). A further switch on the starboard switch panel, marked ENG. BLOW VALVES, OPEN – SHUT, must be selected OPEN at least 2 seconds before selection of aerofoil anti-icing. Conversely, the engine blow valves switch must not be selected to SHUT until at least 20 seconds after the anti-icing system has been selected OFF. Detailed information on the ducting and system operation is contained in Sect. 3, Chap. 13 and on the electrical system in Book 2, Sect. 6, Chap. 8 of this Volume.

Auxiliary air-intakes

7. The auxiliary air-intakes are heated electrically to provide anti-icing protection, the heating element consisting of a pattern of sprayed metal embedded between two layers of insulation, the whole being termed a spraymat. To protect the spraymat from damage caused by rain erosion or the impact of hail or stones, another layer of resin, loaded with stainless alloy particles, is applied on top of the spraymat to form a hard protective coating. This additional coating is termed a stoneguard. This system is controlled by the selection of ENGINE, AUX-INTAKE, SURFACES on the ANTI-ICING switch (*para* 5) although the spraymats do not become heated until the aircraft is airborne and attains a speed of 145 knots. Further information is contained in Book 2, Sect. 6, Chap. 8 of this Volume.

Windscreen

8. The windscreen is given anti-icing protection by electrically heating the glass to a temperature above 0 deg C. The heating elements consist of three films of gold which are sandwiched between the laminations of the windscreen, the thickness of the gold being such that vision is unimpaired. The heater is selected by a switch, marked WINDSCREEN HEATING, ON – OFF, mounted on the starboard switch panel. When selected ON, heating of the windscreen is controlled thermostatically, the elements being switched on automatically when the temperature at the windscreen falls below 0 deg C. Full voltage is not available to the elements until the aircraft is airborne. In the event of a fault of the control sensing element causing the windscreen temperature to rise to a level at which the windscreen would be damaged, an overheat sensing element operates to switch the system off. Mounted on the instrument panel, directly below the attack sight, is a three-position indicator marked W/S DE-ICING, which shows cross hatching when the heater is off, NORM when it is on and O/H if the overheat sensing element has operated. Detailed information on this system is contained in Book 2, Sect. 6, Chap. 8 of this Volume.

◀ **Pressure heads and A D D probe**

9. Two pressure heads, one located on the port outer plane and the other located at the forward end of the centre fuselage on the port side (pre-Mod 326) or at the forward end of the front fuselage on the port side (post-Mod 326), can be heated electrically by selecting a switch marked PRESSURE HEADS, ON – OFF to the ON position. This switch, located on the pilot's starboard switch panel, also controls a heating element in the A D D probe mounted on the starboard side of the folding nose. Detailed information on these systems is contained in Book 2, Sect. 7, Chap. 3 of this Volume. ▶

Ice detector

10. An ice detector is provided to give the pilot indication when icing conditions are imminent. The ice detector head is located on the forward end of the nose wheel door (*detail* B) and is controlled by a switch, marked ICE DETECTOR, ON – OFF, mounted on the starboard switch panel. An ice warning indicator is mounted on the instrument panel immediately below the attack sight; under normal conditions the indicator will show black but when the aircraft is approaching icing conditions it shows ICE. Detailed information on the system is contained in Book 2, Sect. 7, Chap. 8 of this Volume.