

PILOT VISIBILITY FROM THE FLIGHT DECK REQUIREMENTS  
FOR COMMERCIAL TRANSPORT AIRCRAFT

Issued 6-30-63  
Revised

1. INTRODUCTION:

The purpose of this standard is to assure that new transport type aircraft will provide adequate visibility from the flight deck.

A thorough evaluation of the flight deck visibility angles existing in transport aircraft produced up to 1963 was made by the members of SAE Committee S-7 who represent a good cross section of operations personnel of the airlines, the manufacturers, and executive aircraft operators. This evaluation formed the basis for the specifications set forth in this document.

Consideration was given to relaxing the visibility requirements for the SST (Supersonic Transport). However, since the SST must operate in the same environment as subsonic aircraft with the possible exception of maximum cruise flight levels, it was decided that the visibility requirements should remain unchanged and apply to the SST.

2. Flight deck visibility angles shall be measured from a single point located 41" above the Pilot's heel rest, 5" aft of the rearmost wheel position, and in a vertical plane parallel to the longitudinal axis and through the center of the Pilot's seat. With the longitudinal axis level the visibility angles shall be as follows:

- 2.1 20° forward and up between 20° left and 10° right allowed to diminish to 15° up at 30° right, this area unbroken.
- 2.2 15° forward and down between 20° left and 10° right allowed to diminish to 10° down at 30° right. This area unbroken.
- 2.3 35° above the horizon between 85° and 95° left. This area unbroken.
- 2.4 30° below the horizon between 85° and 95° left. This area unbroken.
- 2.5 20° up and 15° down from horizon 135° left.

3. Obstruction to vision shall be avoided in the areas indicated by subdivisions 2.1, 2.2, 2.3 and 2.4. Beyond 20° left the angles in subdivisions 2.1 and 2.2 should remain constant, or increase progressively until they reach the reference angles in subdivisions 2.3 and 2.4 at 85°. Beyond 95° left the angles may diminish gradually to the angles shown in subdivision 2.5. Beyond 30° right to the center line of the aircraft the angles above and below eye level may diminish due to the increased distance between the eye position and the windshield, but the windshield dimensions established at 30° right should be retained. The entire area described above and shown in Figure 1 shall be free of horizontal obstructions.

4. The above requirements shall be symmetrical about the longitudinal axis of the aircraft.

THIS DOCUMENT SUPERSEDES ARP 580, "A" REVISION DATED AUGUST 15, 1961, ORIGINALLY ISSUED MARCH 1, 1960

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5. No windshield posts shall cause an obstruction to the Pilot's binocular vision. Distance between the eyes shall be assumed to be 2.30".
6. The location of instruments, equipment, or structure shall not impair any of the areas of vision established in this standard. In addition, it is desirable to prevent flight deck equipment from obstructing a line of vision from a point two inches above the reference eye position to any point along the upper limit of the forward windshield panels, and similarly, a line of vision from a point two inches below the reference eye position to the lower limit of the forward windshield panels.
7. The windshields shall exhibit equivalent optical properties to those covered in MIL-G-8602 dated June 29, 1953, for flat panels, and MIL-G-7767, dated August 14, 1951, for curved panels or any applicable military specifications which may be published subsequent to this writing. In addition, the optical properties of the windshield should not deteriorate under pressurization loads.
8. Anti-icing and defogging facilities shall be provided for all windshield panels referred to in paragraph 2. This facility itself shall not reduce the visual qualities of the windshields. The windshield's de-icing and defogging systems should be effective during all operational conditions of the aircraft.
9. Precipitation clearing shall be provided for the windshield panels directly forward of each Pilot, and shall be effective, regardless of thrust setting, at all speeds up to, at least, 1.6  $V_S$  (clean), but need not exceed 230 kts. TAS.  
  
The minimum area to be cleared shall be a section of the forward windshield panels  $10^\circ$  up to  $15^\circ$  down between  $15^\circ L$  and  $15^\circ R$ , or equivalent area.
10. It is recommended that a windshield panel which may be easily opened be provided for each Pilot in a suitable location to provide visibility for landing the aircraft should the main forward panel be unuseable.
11. Angles specified in this document are referenced to the longitudinal axis of the aircraft and are considered adequate for aircraft produced up to 1963.

Should an aircraft be designed with a significantly greater angle between the flight path and the longitudinal axis in the take-off, climb, cruise, and approach regimes; then the visibility angles up or down should be increased proportionately to provide the same degree of visibility from the flight deck.