

*Instruments: Installation*

12. *Arrangement and visibility.* Each instrument must meet FAR 23.1321 and in addition:

(a) Each flight, navigation, and powerplant instrument for use by any pilot must be plainly visible to the pilot from the pilot's station with the minimum practicable deviation from the pilot's normal position and line of vision when the pilot is looking forward along the flight path.

(b) The flight instruments required by FAR 23.1303 and by the applicable operating rules must be grouped on the instrument panel and centered as nearly as practicable about the vertical plane of each pilot's forward vision. In addition—

(1) The instrument that most effectively indicates the attitude must be in the panel in the top center position;

(2) The instrument that most effectively indicates the airspeed must be on the panel directly to the left of the instrument in the top center position;

(3) The instrument that most effectively indicates altitude must be adjacent to and directly to the right of the instrument in the top center position; and

(4) The instrument that most effectively indicates direction of flight must be adjacent to and directly below the instrument in the top center position.

13. *Airspeed indicating system.* Each airspeed indicating system must meet FAR 23.1323 and in addition:

(a) Airspeed indicating instruments must be of an approved type and must be calibrated to indicate true airspeed at sea level in the standard atmosphere with a minimum practicable instrument calibration error when the corresponding pitot and static pressures are supplied to the instruments.

(b) The airspeed indicating system must be calibrated to determine the system error, i.e., the relation between IAS and CAS, in flight and during the accelerate-takeoff ground run. The ground run calibration must be obtained between 0.8 of the minimum value of  $V_1$  and 1.2 times the maximum value of  $V_1$ , considering the approved ranges of altitude and weight. The ground run calibration is determined assuming an engine failure at the minimum value of  $V_1$ .

(c) The airspeed error of the installation excluding the instrument calibration error, must not exceed 3 percent or 5 knots whichever is greater, throughout the speed range from  $V_{MO}$  to  $1.3V_{S1}$  with flaps retracted and from  $1.3V_{SO}$  to  $V_{FE}$  with flaps in the landing position.

(d) Information showing the relationship between IAS and CAS must be shown in the Airplane Flight Manual.

14. *Static air vent system.* The static air vent system must meet FAR 23.1325. The altimeter system calibration must be determined and shown in the Airplane Flight Manual.

*Operating Limitations and Information*

15. *Maximum operating limit speed  $V_{MO}/M_{MO}$ .* Instead of establishing operating limitations based on  $V_{NE}$  and  $V_{NO}$ , the applicant must establish a maximum operating limit speed  $V_{MO}/M_{MO}$  as follows:

(a) The maximum operating limit speed must not exceed the design cruising speed  $V_C$  and must be sufficiently below  $V_D/M_D$  or  $V_{DF}/M_{DF}$  to make it highly improbable that the latter speeds will be inadvertently exceeded in flight.

(b) The speed  $V_{MO}$  must not exceed  $0.8V_D/M_D$  or  $0.8V_{DF}/M_{DF}$  unless flight demonstrations involving upsets as specified by the Administrator indicates a lower speed margin will not result in speeds exceeding  $V_D/M_D$  or  $V_{DF}$ . Atmospheric variations, horizontal gusts, system and equipment errors, and airframe production variations are taken into account.

16. *Minimum flight crew.* In addition to meeting FAR 23.1523, the applicant must establish the minimum number and type of qualified flight crew personnel sufficient for safe operation of the airplane considering—

(a) Each kind of operation for which the applicant desires approval;

(b) The workload on each crewmember considering the following:

(1) Flight path control.

(2) Collision avoidance.

(3) Navigation.

(4) Communications.

(5) Operation and monitoring of all essential aircraft systems.

(6) Command decisions; and

(c) The accessibility and ease of operation of necessary controls by the appropriate crewmember during all normal and emergency operations when at the crewmember flight station.

17. *Airspeed indicator.* The airspeed indicator must meet FAR 23.1545 except that, the airspeed notations and markings in terms of  $V_{NO}$  and  $V_{NH}$  must be replaced by the  $V_{MO}/M_{MO}$  notations. The airspeed indicator markings must be easily read and understood by the pilot. A placard adjacent to the airspeed indicator is an acceptable means of showing compliance with FAR 23.1545(c).

*Airplane Flight Manual*

18. *General.* The Airplane Flight Manual must be prepared under FARs 23.1583 and 23.1587, and in addition the operating limitations and performance information in sections 19 and 20 must be included.

19. *Operating limitations.* The Airplane Flight Manual must include the following limitations—

(a) *Airspeed limitations.* (1) The maximum operating limit speed  $V_{MO}/M_{MO}$  and a statement that this speed limit may not be deliberately exceeded in any regime of flight (climb, cruise, or descent) unless a higher