

(d) The automatic pilot system shall be of such design and so adjusted that, within the range of adjustment available to the human pilot, it cannot produce hazardous loads on the airplane or create hazardous deviations in the flight path under any conditions of flight appropriate to its use either during normal operation or in the event of malfunctioning, assuming that corrective action is initiated within a reasonable period of time.

(e) The system design shall be such that a single malfunction will not produce a hardover signal in more than one control axis. When the automatic pilot integrates signals from auxiliary controls or furnishes signals for operation of other equipment, positive interlocks and sequencing of engagement shall be provided to preclude improper operation. Protection against adverse interaction of integrated components resulting from a malfunction shall be provided.

Part 3, 21 F.R. 3339, May 22, 1956; as amended by Amdt. 3-2, 22 F.R. 5560, July 16, 1957.)

3.668 Gyroscopic indicators. All gyroscopic instruments installed in airplanes shall derive their energy from a power source of sufficient capacity to maintain their required accuracy at all airplane speeds above the best rate-of-climb speed. They shall be installed to preclude malfunctioning due to rain, oil, and other detrimental elements. Means shall be provided for indicating the adequacy of the power being supplied to the instruments. In addition, the following provisions shall be applicable to multiengine airplanes:

(a) There shall be provided at least two independent sources of power, a manual or an automatic means for selecting the power source, and a means for indicating the adequacy of the power being supplied by each source.

NOTE: Power sources are not considered independent if both sources are driven by the same engine.

(b) The installation and power supply systems shall be such that failure of one instrument or of the energy supply from one source will not interfere with the proper supply of energy to the remaining instruments or from the other source.

(Part 3, 21 F.R. 3339, May 22, 1956; as amended by Amdt. 3-3, 23 F.R. 2589, Apr. 19, 1958; Amdt. 3-5, 24 F.R. 7065, Sept. 1, 1959.)

3.669 Flight director instrument. If a flight director instrument is installed, its installation shall not affect the performance and accuracy of the required instruments. A means for disconnecting the flight director instrument from the required instruments or their installations shall be provided.

(Part 3, 21 F.R. 3339, May 22, 1956.)

Powerplant Instruments

3.670 Operational markings. Instruments shall be marked as specified in section 3.759.

(Part 3, 21 F.R. 3339, May 22, 1956.)

3.671 Instrument lines. Powerplant instrument lines shall comply with the provisions of section 3.550. In addition, instrument lines carrying inflammable fluids or gases under pressure shall be provided with restricted orifices or other safety devices at the source of the pressure to prevent escape of excessive fluid or gas in case of line failure.

(Part 3, 21 F.R. 3339, May 22, 1956.)

3.672 Fuel quantity indicator. Means shall be provided to indicate to the flight personnel the quantity of fuel in each tank during flight. Tanks, the outlets and airspaces of which are interconnected, may be considered as one tank and need not be provided with separate indicators. Exposed sight gauges shall be so installed and guarded as to preclude the possibility of breakage or damage. Sight gauges which form a trap in which water can collect and freeze shall be provided with means to permit drainage on the ground. Fuel quantity gauges shall be calibrated to read zero during level flight when the quantity of fuel remaining in the tank is equal to the unusable fuel supply as defined by section 3.437. Fuel gauges need not be provided for small auxiliary tanks which are used only to transfer fuel to other tanks, provided that the relative size of the tanks, the rate of fuel transfer, and the instructions pertaining to the use of the tanks are adequate to guard against overflow and to assume that the crew will receive prompt warning in case transfer is not being achieved as intended.

(Part 3, 21 F.R. 3339, May 22, 1956.)