(6) Is located on the instrument panel in a position acceptable to the Administrator that will make it plainly visible to and useable by any pilot at his station; and

(7) Is appropriately lighted during all phases of operation.

(h) A gyroscopic direction indicator.

(i) A rate-of-climb (vertical speed) indicator.

(j) For Category A rotorcraft, a speed warning device when V_{NE} is less than the speed at which unmistakable overspeed warning is provided by other pilot cues. The speed warning device must give effective aural warning (differing distinctively from aural warnings used for other purposes) to the pilots whenever the indicated speed exceeds V_{NE} plus 3 knots and must operate satisfactorily throughout the approved range of altitudes and temperatures.

(Secs. 313(a), 601, 603, 604, and 605 of the Federal Aviation Act of 1958 (49 U.S.C. 1354(a), 1421, 1423, 1424, and 1425); and sec. 6(c), Dept. of Transportation Act (49 U.S.C. 1655(c)))

[Doc. No. 5084, 29 FR 16150, Dec. 3, 1964, as amended by Amdt. 29–12, 41 FR 55474, Dec. 20, 1976; Amdt. 29–14, 42 FR 36972, July 18, 1977; Amdt. 29–24, 49 FR 44438, Nov. 6, 1984; 70 FR 2012, Jan. 12, 2005]

§ 29.1305 Powerplant instruments.

The following are required powerplant instruments:

(a) For each rotorcraft—

(1) A carburetor air temperature indicator for each reciprocating engine;

(2) A cylinder head temperature indicator for each air-cooled reciprocating engine, and a coolant temperature indicator for each liquid-cooled reciprocating engine;

(3) A fuel quantity indicator for each fuel tank;

(4) A low fuel warning device for each fuel tank which feeds an engine. This device must—

(i) Provide a warning to the crew when approximately 10 minutes of usable fuel remains in the tank; and

(ii) Be independent of the normal fuel quantity indicating system.

(5) A manifold pressure indicator, for each reciprocating engine of the altitude type;

(6) An oil pressure indicator for each pressure-lubricated gearbox.

(7) An oil pressure warning device for each pressure-lubricated gearbox to indicate when the oil pressure falls below a safe value;

(8) An oil quantity indicator for each oil tank and each rotor drive gearbox, if lubricant is self-contained;

(9) An oil temperature indicator for each engine;

(10) An oil temperature warning device to indicate unsafe oil temperatures in each main rotor drive gearbox, including gearboxes necessary for rotor phasing;

(11) A gas temperature indicator for each turbine engine;

(12) A gas producer rotor tachometer for each turbine engine;

(13) A tachometer for each engine that, if combined with the applicable instrument required by paragraph (a)(14) of this section, indicates rotor r.p.m. during autorotation.

(14) At least one tachometer to indicate, as applicable—

(i) The r.p.m. of the single main rotor;

(ii) The common r.p.m. of any main rotors whose speeds cannot vary appreciably with respect to each other; and

(iii) The r.p.m. of each main rotor whose speed can vary appreciably with respect to that of another main rotor;

(15) A free power turbine tachometer for each turbine engine;

(16) A means, for each turbine engine, to indicate power for that engine;

(17) For each turbine engine, an indicator to indicate the functioning of the powerplant ice protection system;

(18) An indicator for the filter required by § 29.997 to indicate the occurrence of contamination of the filter to the degree established in compliance with § 29.955;

(19) For each turbine engine, a warning means for the oil strainer or filter required by § 29.1019, if it has no bypass, to warn the pilot of the occurrence of contamination of the strainer or filter before it reaches the capacity established in accordance with § 29.1019(a)(2);

(20) An indicator to indicate the functioning of any selectable or controllable heater used to prevent ice clogging of fuel system components;

(21) An individual fuel pressure indicator for each engine, unless the fuel system which supplies that engine does

not employ any pumps, filters, or other components subject to degradation or failure which may adversely affect fuel pressure at the engine;

(22) A means to indicate to the flightcrew the failure of any fuel pump installed to show compliance with § 29.955;

(23) Warning or caution devices to signal to the flightcrew when ferromagnetic particles are detected by the chip detector required by § 29.1337(e); and

(24) For auxiliary power units, an individual indicator, warning or caution device, or other means to advise the flightcrew that limits are being exceeded, if exceeding these limits can be hazardous, for—

(i) Gas temperature;

(ii) Oil pressure; and

(iii) Rotor speed.

(25) For rotorcraft for which a 30-second/2-minute OEI power rating is requested, a means must be provided to alert the pilot when the engine is at the 30-second and 2-minute OEI power levels, when the event begins, and when the time interval expires.

(26) For each turbine engine utilizing 30-second/2-minute OEI power, a device or system must be provided for use by ground personnel which—

(i) Automatically records each usage and duration of power at the 30-second and 2-minute OEI levels;

(ii) Permits retrieval of the recorded data;

(iii) Can be reset only by ground maintenance personnel; and

(iv) Has a means to verify proper operation of the system or device.

(b) For category A rotorcraft—

(1) An individual oil pressure indicator for each engine, and either an independent warning device for each engine or a master warning device for the engines with means for isolating the individual warning circuit from the master warning device;

(2) An independent fuel pressure warning device for each engine or a master warning device for all engines with provision for isolating the individual warning device from the master warning device; and

(3) Fire warning indicators.

(c) For category B rotorcraft—

(1) An individual oil pressure indicator for each engine; and

(2) Fire warning indicators, when fire detection is required.

[Doc. No. 5084, 29 FR 16150, Dec. 3, 1964, as amended by Amdt. 29–3, 33 FR 970, Jan. 26, 1968; Amdt. 29–10, 39 FR 35463, Oct. 1, 1974; Amdt. 29–26, 53 FR 34219, Sept. 2, 1988; Amdt. 29–34, 59 FR 47768, Sept. 16, 1994; Amdt. 29–40, 61 FR 21908, May 10, 1996; 61 FR 43952, Aug. 27, 1996]

§ 29.1307 Miscellaneous equipment.

The following is required miscellaneous equipment:

(a) An approved seat for each occupant.

(b) A master switch arrangement for electrical circuits other than ignition.

(c) Hand fire extinguishers.

(d) A windshield wiper or equivalent device for each pilot station.

(e) A two-way radio communication system.

[Amdt. 29–12, 41 FR 55473, Dec. 20, 1976]

§ 29.1309 Equipment, systems, and installations.

(a) The equipment, systems, and installations whose functioning is required by this subchapter must be designed and installed to ensure that they perform their intended functions under any foreseeable operating condition.

(b) The rotorcraft systems and associated components, considered separately and in relation to other systems, must be designed so that—

(1) For Category B rotorcraft, the equipment, systems, and installations must be designed to prevent hazards to the rotorcraft if they malfunction or fail; or

(2) For Category A rotorcraft—

(i) The occurrence of any failure condition which would prevent the continued safe flight and landing of the rotorcraft is extremely improbable; and

(ii) The occurrence of any other failure conditions which would reduce the capability of the rotorcraft or the ability of the crew to cope with adverse operating conditions is improbable.

(c) Warning information must be provided to alert the crew to unsafe system operating conditions and to enable them to take appropriate corrective