



APPENDIX 5.

FLIGHT RECORDERS

(Note — See Section II, Chapter 4, 4.3 and Section III, Chapter 4, 4.7)

The material in this Appendix concerns flight recorders intended for installation in helicopters engaged in international air navigation. Crash protected flight recorders comprise one or more of the following-systems: a flight data recorder (FDR), a cockpit voice recorder (CVR), an airborne image recorder (AIR) and/or a data link recorder (DLR).

1. General requirements

1.1 Non-deployable flight recorder containers shall:

- a) be painted a distinctive orange or yellow colour;
- b) carry reflective material to facilitate their location; and
- c) have securely attached an automatically activated underwater locating device operating at a frequency of 37.5 kHz. At the earliest practical date, but not later than 1 January 2018, this device shall operate for a minimum of ninety days.

Note.— Current industry practice is to phase out yellow flight recorder containers at the end of the service life of the flight recorder.

1.2 The flight recorder systems shall be installed so that:

- a) the probability of damage to the recordings is minimized;
- b) they receive electrical power from a bus that provides the maximum reliability for operation of the flight recorder systems without jeopardizing service to essential or emergency loads;
- c) there is an aural or visual means for pre-flight checking that the flight recorder systems are operating properly; and
- d) if the flight recorder systems have a bulk erasure device, the installation shall be designed to prevent operation of the device during flight time or crash impact.

1.3 The flight recorder systems, when tested by methods approved by the appropriate certifying authority, shall be demonstrated to be suitable for the environmental extremes over which they are designed to operate.

1.4 Means shall be provided for an accurate time correlation between the flight recorder systems functions.



1.5 The manufacturer usually provides the appropriate certifying authority with the following information in respect of the flight recorder systems:

- a) manufacturer's operating instructions, equipment limitations and installation procedures; and
- b) manufacturer's test reports.

2. Flight data recorder (FDR)

2.1 The flight data recorder shall start to record prior to the helicopter moving under its own power and record continuously until the termination of the flight when the helicopter is no longer capable of moving under its own power.

2.2 Parameters to be recorded

2.2.1 Flight data recorders for helicopters shall be classified as Type IV, IVA and V depending upon the number of parameters to be recorded.

2.2.2 The parameters that satisfy the requirements for Types IV, IVA and V FDRs, are listed in the paragraphs below. The number of parameters to be recorded shall depend on helicopter complexity. The parameters without an asterisk (*) are mandatory parameters which shall be recorded regardless of helicopter complexity. In addition, the parameters designated by an asterisk (*) shall be recorded if an information data source for the parameter is used by helicopter systems or the flight crew to operate the helicopter. However, other parameters may be substituted with due regard to the helicopter type and the characteristics of the recording equipment.

2.2.3 The following parameters shall satisfy the requirements for flight path and speed:

- Pressure altitude
- Indicated airspeed
- Outside air temperature
- Heading
- Normal acceleration
- Lateral acceleration
- Longitudinal acceleration (body axis)
- Time or relative time count
- Navigation data*: drift angle, wind speed, wind direction, latitude/longitude
- Radio altitude*.

2.2.4 The following parameters shall satisfy the requirements for attitude:

- Pitch attitude
- Roll attitude
- Yaw rate.



2.2.5 The following parameters shall satisfy the requirements for engine power:

- Power on each engine: free power turbine speed (Nf), engine torque, engine gas generator speed (Ng), cockpit power control position
- Rotor: main rotor speed, rotor brake
- Main gearbox oil pressure*
- Gearbox oil temperature*: main gearbox oil temperature, intermediate gearbox oil temperature, tail rotor gearbox oil temperature
- Engine exhaust gas temperature (T4)*
- Turbine inlet temperature (TIT)*.

2.2.6 The following parameters shall satisfy the requirements for operation:

- Hydraulics low pressure
- Warnings
- Primary flight controls
- pilot input and/or control output position: collective pitch, longitudinal cyclic pitch, lateral cyclic pitch, tail rotor pedal, controllable stabilator, hydraulic selection
- Marker beacon passage
- Each navigation receiver frequency selection
- AFCS mode and engagement status*
- Stability augmentation system engagement*
- Indicated sling load force*
- Vertical deviation*: ILS glide path, MLS elevation, GNSS approach path
- Horizontal deviation*: ILS localizer, MLS azimuth, GNSS approach path
- DME 1 and 2 distances*
- Altitude rate*
- Ice detector liquid water content*
- Helicopter health and usage monitor system (HUMS)*: engine data, chip detectors, channel timing, exceedence discretes, broadband average engine vibration.

2.2.7 The following parameters shall satisfy the requirements for configuration:

- Landing gear or gear selector position*
- Fuel contents*
- Ice detector liquid water content*.

2.2.8 *Type IVA FDR*. This FDR will be capable of recording, as appropriate to the helicopter, at least the 48 parameters in Table A5-1.

2.2.9 *Type IV FDR*. This FDR shall be capable of recording, as appropriate to the helicopter, at least the first 30 parameters in Table A5-1.



2.2.10 *Type V FDR*. This FDR shall be capable of recording, as appropriate to the helicopter, at least the first 15 parameters in Table A5-1.

2.2.11 If further recording capacity is available, recording of the following additional information shall be considered:

- a) additional operational information from electronic displays, such as electronic flight instrument systems (EFIS), electronic centralized aircraft monitor (ECAM) and engine indication and crew alerting system (EICAS); and
- b) additional engine parameters (EPR, N1, fuel flow, etc.).

2.3 Additional information

2.3.1 The measurement range, recording interval and accuracy of parameters on installed equipment is usually verified by methods approved by the appropriate certificating authority.

2.3.2 Documentation concerning parameter allocation, conversion equations, periodic calibration and other serviceability/maintenance information shall be maintained by the operator/owner. The documentation shall be sufficient to ensure that accident investigation authorities have the necessary information to read out the data in engineering units.

3. Cockpit voice recorder (CVR)

3.1 Signals to be recorded

3.1.1 The CVR shall start to record prior to the helicopter moving under its own power and record continuously until the termination of the flight when the helicopter is no longer capable of moving under its own power. In addition, depending on the availability of electrical power, the CVR shall start to record as early as possible during the cockpit checks prior to engine start at the beginning of the flight until the cockpit checks immediately following engine shutdown at the end of the flight.

3.1.2 The CVR shall record on four separate channels, or more, at least the following:

- a) voice communication transmitted from or received in the aircraft by radio;
- b) aural environment on the flight deck;
- c) voice communication of flight crew members on the flight deck using the interphone system, if installed;
- d) voice or audio signals identifying navigation or approach aids introduced in the headset or speaker; and
- e) voice communication of flight crew members using the passenger address system, if installed.



3.1.3 The CVR shall be capable of recording on at least four channels simultaneously. On tape-based CVR, to ensure accurate time correlation between channels, the CVR shall record in an in-line format. If a bi-directional configuration is used, the in-line format and channel allocation shall be retained in both directions.

3.1.4 The preferred channel allocation shall be as follows:

Channel 1 — co-pilot headphones and live boom microphone

Channel 2 — pilot headphones and live boom microphone

Channel 3 — area microphone

Channel 4 — time reference, main rotor speed or the flight deck vibration environment, the third and fourth crewmember's headphone and live microphone, if applicable.

Note 1.— Channel 1 is located closest to the base of the recording head.

Note 2.— The preferred channel allocation presumes use of current conventional magnetic tape transport mechanisms and is specified because the outer edges of the tape have a higher risk of damage than the middle. It is not intended to preclude use of alternative recording media where such constraints may not apply.

4. Airborne image recorder (AIR)

4.1 Classes

4.1.1 A Class A AIR captures the general cockpit area in order to provide data supplemental to conventional flight recorders.

Note 1.— To respect crew privacy, the cockpit area view may be designed as far as practical to exclude the head and shoulders of crew members whilst seated in their normal operating position.

Note 2.— There are no provisions for Class A AIRs in this document.

4.1.2 A Class B AIR captures data link message displays.

4.1.3 A Class C AIR captures instruments and control panels.

Note.— It may be considered as a means for recording flight data where it is not practical or prohibitively expensive to record on an FDR, or where an FDR is not required.

4.2 Operation

The AIR will start to record prior to the helicopter moving under its own power and record continuously until the termination of the flight when the helicopter is no longer capable of moving under its own power. In addition, depending on the availability of electrical power, the AIR will start to record as early as possible during the cockpit checks prior to engine start at the



beginning of the flight until the cockpit checks immediately following engine shutdown at the end of the flight.

5. Data link recorder (DLR)

5.1 Applications to be recorded

5.1.1 Where the helicopter flight path is authorized or controlled through the use of data link messages, all data link messages, both uplinks (to the helicopter) and downlinks (from the helicopter), shall be recorded on the helicopter. As far as practicable, the time the messages were displayed to the flight crew and the time of the responses shall to be recorded.

Note.— Sufficient information to derive the content of the data link communications message and the time the messages were displayed to the flight crew is needed to determine an accurate sequence of events on board the aircraft.

5.1.2 Messages applying to the applications listed below shall be recorded. Applications without the asterisk (*) are mandatory applications which shall be recorded regardless of the system complexity. Applications with an (*) are to be recorded only as far as is practicable given the architecture of the system.

- Data link initiation capability
- Controller–pilot data link communications
- Data link – flight information services
- Automatic dependent surveillance – contract
- Automatic dependent surveillance – broadcast*
- Aeronautical operational control*.

Note.— Descriptions of the applications are contained in Table A5-2.

6. Inspections of flight recorder systems

6.1 Prior to the first flight of the day, the built-in test features for the flight recorders and flight data acquisition unit (FDAU), when installed, shall be monitored by manual and/or automatic checks.

6.2 FDR systems or ADRS, CVR systems or CARS, and AIR systems or AIRS shall have recording system inspection intervals of one year; subject to the approval from the appropriate regulatory authority, this period may be extended to two years provided these systems have demonstrated a high integrity of serviceability and self-monitoring. DLR systems or DLRS shall have recording system inspection intervals of two years; subject to the approval from the appropriate regulatory authority, this period may be extended to four years provided these systems have demonstrated high integrity of serviceability and self-monitoring.



6.3 Recording system inspections shall be carried out as follows:

- a) an analysis of the recorded data from the flight recorders shall ensure that the recorder operates correctly for the nominal duration of the recording;
- b) the analysis of the FDR or ADRS shall evaluate the quality of the recorded data to determine if the bit error rate (including those errors introduced by recorder, the acquisition unit, the source of the data on the helicopter and by the tools used to extract the data from the recorder) is within acceptable limits and to determine the nature and distribution of the errors;
- c) a complete flight recording from the FDR or ADRS shall be examined in engineering units to evaluate the validity of all recorded parameters. Particular attention shall be given to parameters from sensors dedicated to the FDR or ADRS. Parameters taken from the aircraft's electrical bus system need not be checked if their serviceability can be detected by other aircraft systems;
- d) the readout facility shall have the necessary software to accurately convert the recorded values to engineering units and to determine the status of discrete signals;
- e) an examination of the recorded signal on the CVR or CARS shall be carried out by replay of the CVR or CARS recording. While installed in the aircraft, the CVR or CARS shall record test signals from each aircraft source and from relevant external sources to ensure that all required signals meet intelligibility standards;
- f) where practicable, during the examination, a sample of in-flight recordings of the CVR or CARS shall be examined for evidence that the intelligibility of the signal is acceptable; and
- g) an examination of the recorded images on the AIR or AIRS shall be carried out by replay of the AIR or AIRS recording. While installed in the aircraft, the AIR or AIRS shall record test images from each aircraft source and from relevant external sources to ensure that all required images meet recording quality standards.

6.4 Flight recorder systems shall be considered unserviceable if there is a significant period of poor quality data, unintelligible signals, or if one or more of the mandatory parameters is not recorded correctly.

6.5 A report of the recording system inspection shall be made available on request to regulatory authorities for monitoring purposes.

6.6 Calibration of the FDR system:

- a) for those parameters which have sensors dedicated only to the FDR and are not checked by other means, recalibration shall be carried out at least every five years or in accordance with the recommendations of the sensor manufacturer to determine any discrepancies in the engineering conversion routines for the mandatory parameters and to ensure that parameters are being recorded within the calibration tolerances; and



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- b) when the parameters of altitude and airspeed are provided by sensors that are dedicated to the FDR system, there shall be a recalibration performed as recommended by the sensor manufacturer, or at least every two years.



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Table A5-1. Parameter Guidance for Flight Data Recorders

Serial number	Parameter	Measurement range	Maximum sampling and recording interval (seconds)	Accuracy limits (sensor input compared to FDR readout)	Recording resolution
1	Time (UTC when available, otherwise relative time count or GPS time sync)	24 hours	4	±0.125% per hour	1 s
2	Pressure altitude	-300 m (-1 000 ft) to maximum certificated altitude of aircraft +1 500 m (+5 000 ft)	1	±30 m to ±200 m (±100 ft to ±700 ft)	1.5 m (5 ft)
3	Indicated airspeed	As the installed pilot display measuring system	1	±3%	1 kt
4	Heading	360°	1	±2°	0.5°
5	Normal acceleration	-3 g to +6 g	0.125	±0.09 g excluding a datum error of ±0.045 g	0.004 g
6	Pitch attitude	±75° or 100% of useable range whichever is greater	0.5	±2°	0.5°
7	Roll attitude	±180°	0.5	±2°	0.5°
8	Radio transmission keying	On-off (one discrete)	1	—	—
9	Power on each engine	Full range	1 (per engine)	±2%	0.1% of full range
10	Main rotor:				
	Main rotor speed	50-130%	0.51	±2%	0.3% of full range
	Rotor brake	Discrete		—	—
11	Pilot input and/or control surface position — primary controls (collective pitch, longitudinal cyclic pitch, lateral cyclic pitch, tail rotor pedal)	Full range	0.5 (0.25 recommended)	±2% unless higher accuracy uniquely required	0.5% of operating range
12	Hydraulics, each system (low pressure and selection)	Discrete	1	—	—
13	Outside air temperature	Sensor range	2	±2°C	0.3°C
14*	Autopilot/ autothrottle/AFCs mode and engagement status	A suitable combination of discrettes	1	—	—
15*	Stability augmentation system engagement	Discrete	1	—	—
<i>Note.— The preceding 15 parameters satisfy the requirements for a Type V FDR.</i>					
16*	Main gearbox oil pressure	As installed	1	As installed	6.895 kN/m ² (1 psi)
17*	Main gearbox oil temperature	As installed	2	As installed	1°C



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Serial number	Parameter	Measurement range	Maximum sampling and recording interval (seconds)	Accuracy limits (sensor input compared to FDR readout)	Recording resolution
18	Yaw rate	±400°/second	0.25	±1.5% maximum range excluding datum error of ±5%	±2°/s
19*	Sling load force	0 to 200% of certified load	0.5	±3% of maximum range	0.5% for maximum certified load
20	Longitudinal acceleration	±1 g	0.25	±0.015 g excluding a datum error of ±0.05 g	0.004 g
21	Lateral acceleration	±1 g	0.25	±0.015 g excluding a datum error of ±0.05 g	0.004 g
22*	Radio altitude	-6 m to 750 m (-20 ft to 2 500 ft)	1	±0.6 m (±2 ft) or ±3% whichever is greater below 150 m (500 ft) and ±5% above 150 m (500 ft)	0.3 m (1 ft) below 150 m (500 ft), 0.3 m (1 ft) + 0.5% of full range above 150 m (500 ft)
23*	Vertical beam deviation	Signal range	1	±3%	0.3% of full range
24*	Horizontal beam deviation	Signal range	1	±3%	0.3% of full range
25	Marker beacon passage	Discrete	1	—	—
26	Warnings	Discrete(s)	1	—	—
27	Each navigation receiver frequency selection	Sufficient to determine selected frequency	4	As installed	—
28*	DME 1 and 2 distances	0-370 km (0-200 NM)	4	As installed	1 852 m (1 NM)
29*	Navigation data (latitude/longitude, ground speed, drift angle, wind speed, wind direction)	As installed	2	As installed	As installed
30*	Landing gear and gear selector position	Discrete	4	—	—
<i>Note.— The preceding 30 parameters satisfy the requirements for a Type IV FDR.</i>					
31*	Engine exhaust gas temperature (T _e)	As installed	1	As installed	
32*	Turbine inlet temperature (TIT/ITT)	As installed	1	As installed	
33*	Fuel contents	As installed	4	As installed	
34*	Altitude rate	As installed	1	As installed	
35*	Ice detection	As installed	4	As installed	
36*	Helicopter health and usage monitor system	As installed	—	As installed	—
37	Engine control modes	Discrete	1	—	—
38*	Selected barometric setting (pilot and co-pilot)	As installed	64 (4 recommended)	As installed	0.1 mb (0.01 in Hg)



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Serial number	Parameter	Measurement range	Maximum sampling and recording interval (seconds)	Accuracy limits (sensor input compared to FDR readout)	Recording resolution
39*	Selected altitude (all pilot selectable modes of operation)	As installed	1	As installed	Sufficient to determine crew selection
40*	Selected speed (all pilot selectable modes of operation)	As installed	1	As installed	Sufficient to determine crew selection
41*	Selected Mach (all pilot selectable modes of operation)	As installed	1	As installed	Sufficient to determine crew selection
42*	Selected vertical speed (all pilot selectable modes of operation)	As installed	1	As installed	Sufficient to determine crew selection
43*	Selected heading (all pilot selectable modes of operation)	As installed	1	As installed	Sufficient to determine crew selection
44*	Selected flight path (all pilot selectable modes of operation)	As installed	1	As installed	Sufficient to determine crew selection
45*	Selected decision height	As installed	4	As installed	Sufficient to determine crew selection
46*	EFIS display format (pilot and co-pilot)	Discrete(s)	4	—	—
47*	Multi-function/ engine/alerts display format	Discrete(s)	4	—	—
48*	Event marker	Discrete	1	—	—

Note.— The preceding 48 parameters satisfy the requirements for a Type IVA FDR.



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Table A5-2. Description of Applications for Data Link Recorders

Item No.	Application type	Application description	Recording content
1	Data link initiation	This includes any applications used to log on to or initiate data link service. In FANS-1/A and ATN, these are ATS facilities notification (AFN) and context management (CM) respectively.	C
2	Controller/pilot communication	This includes any application used to exchange requests, clearances, instructions and reports between the flight crew and controllers on the ground. In FANS-1/A and ATN, this includes the CPDLC application. It also includes applications used for the exchange of oceanic (OCL) and departure clearances (DCL) as well as data link delivery of taxi clearances.	C
3	Addressed surveillance	This includes any surveillance application in which the ground sets up contracts for delivery of surveillance data. In FANS-1/A and ATN, this includes the automatic dependent surveillance — contract (ADS-C) application. Where parametric data are reported within the message they shall be recorded unless data from the same source are recorded on the FDR.	C
4	Flight information	This includes any service used for delivery of flight information to specific aircraft. This includes, for example, data link aviation weather report service (D-METAR), data link-automatic terminal service (D-ATIS), digital Notice to Airmen (D-NOTAM) and other textual data link services.	C
5	Aircraft broadcast surveillance	This includes elementary and enhanced surveillance systems, as well as automatic dependent surveillance — broadcast (ADS-B) output data. Where parametric data sent by the helicopter are reported within the message they shall be recorded unless data from the same source are recorded on the FDR.	M*
6	Aeronautical operational control data	This includes any application transmitting or receiving data used for aeronautical operational control purposes (per the ICAO definition of operational control).	M*

Key:

C: Complete contents recorded.

M: Information that enables correlation to any associated records stored separately from the helicopter.

*: Applications that are to be recorded only as far as is practicable given the architecture of the system.



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Table A5-3. Parameter Guidance for Data Recording Systems

N [*]	Parameter name	Parameter category	Minimum recording range	Maximum recording interval in seconds	Minimum recording accuracy	Minimum recording resolution	Remarks
1	Heading (Magnetic or True)	R*	±180°	1	±2°	0.5°	*If not available, record rotational rates
2	Pitch attitude	E*	±90°	0.25	±2°	0.5°	*If not available, record rotational rates
3	Roll attitude	E*	±180°	0.25	±2°	0.5°	*If not available, record rotational rates
4	Yaw rate	E*	±300°/s	0.25	±1% + drift of 360°/h	2°/s	*Essential if no heading available
5	Pitch rate	E*	±300°/s	0.25	±1% + drift of 360°/h	2°/s	*Essential if no pitch attitude available
6	Roll rate	E*	±300°/s	0.25	±1% + drift of 360°/h	2°/s	*Essential if no roll attitude available
7	Positioning system: latitude/longitude	E	Latitude: ±90° Longitude: ±180°	2 (1 if available)	As installed (0.00015° recommended)	0.00005°	
8	Positioning system: estimated error	E*	Available range	2 (1 if available)	As installed	As installed	*If available
9	Positioning system: altitude	E	-300 m (-1 000 ft) to maximum certified altitude of helicopter + 1 500 m (5 000 ft)	2 (1 if available)	As installed (±15 m (±50 ft) recommended)	1.5 m (5 ft)	
10	Positioning system: time*	E	24 hours	1	±0.5 s	0.1 s	*UTC time preferred where available
11	Positioning system: ground speed	E	0-1 000 kt	2 (1 if available)	As installed (±5 kt recommended)	1 kt	
12	Positioning system: track	E	0-360°	2 (1 if available)	As installed (±2° recommended)	0.5°	
13	Normal acceleration	E	-3 g to +6 g	0.25 (0.125 if available)	As installed (±0.09 g excluding a datum error of ±0.05 g recommended)	0.004 g	



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N [*]	Parameter name	Parameter category	Minimum recording range	Maximum recording interval in seconds	Minimum recording accuracy	Minimum recording resolution	Remarks
14	Longitudinal acceleration	E	±1 g	0.25 (0.125 if available)	As installed (±0.015 g excluding a datum error of ±0.05 g recommended)	0.004 g	
15	Lateral acceleration	E	±1 g	0.25 (0.125 if available)	As installed (±0.015 g excluding a datum error of ±0.05 g recommended)	0.004 g	
16	External static pressure (or pressure altitude)	R	34.4 hPa (1.02 in-Hg) to 310.2 hPa (9.16 in-Hg) or available sensor range	1	As installed (±1 hPa (0.3 in-Hg) or ±30 m (±100 ft) to ±210 m (±700 ft) recommended)	0.1 hPa (0.03 in-Hg) or 1.5 m (5 ft)	
17	Outside air temperature (or total air temperature)	R	-50° to +90°C or available sensor range	2	As installed (±2°C recommended)	1°C	
18	Indicated air speed	R	As the installed pilot display measuring system or available sensor range	1	As installed (±3% recommended)	1 kt (0.5 kt recommended)	
19	Main rotor speed (%)	R	50% to 130% or available sensor range	0.5	As installed	0.3% of full range	
20	Engine RPM (*)	R	Full range including overspeed condition	Each engine each second	As installed	0.2% of full range	*For piston-engined helicopters
21	Engine oil pressure	R	Full range	Each engine each second	As installed (5% of full range recommended)	2% of full range	
22	Engine oil temperature	R	Full range	Each engine each second	As installed (5% of full range recommended)	2% of full range	
23	Fuel flow or pressure	R	Full range	Each engine each second	As installed	2% of full range	
24	Manifold pressure (*)	R	Full range	Each engine each second	As installed	0.2% of full range	*For piston-engined helicopters



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N [*]	Parameter name	Parameter category	Minimum recording range	Maximum recording interval in seconds	Minimum recording accuracy	Minimum recording resolution	Remarks
25	Engine thrust/power/torque parameters required to determine propulsive thrust/power*	R	Full range	Each engine each second	As installed	0.1% of full range	*Sufficient parameters e.g. EPR/N1 or torque/Np as appropriate to the particular engine shall be recorded to determine power. A margin for possible overspeed should be provided. Only for turbine-engined helicopters.
26	Engine gas generator speed (Ng) (*)	R	0-150%	Each engine each second	As installed	0.2% of full range	*Only for turbine-engined helicopters
27	Free power turbine speed (Nf) (*)	R	0-150%	Each engine each second	As installed	0.2% of full range	*Only for turbine-engined helicopters
28	Collective pitch	R	Full range	0.5	As installed	0.1% of full range	
29	Coolant temperature (*)	R	Full range	1	As installed (±5°C recommended)	1° C	*Only for piston-engined helicopters
30	Main voltage	R	Full range	Each engine each second	As installed	1 Volt	
31	Cylinder head temperature (*)	R	Full range	Each cylinder each second	As installed	2% of full range	*Only for piston-engined helicopters
32	Fuel quantity	R	Full range	4	As installed	1% of full range	
33	Exhaust gas temperature	R	Full range	Each engine each second	As installed	2% of full range	
34	Emergency voltage	R	Full range	Each engine each second	As installed	1 Volt	
35	Trim surface position	R	Full range or each discrete position	1	As installed	0.3% of full range	
36	Landing gear position	R	Each discrete position*	Each gear every two seconds	As installed		*Where available, record up-and-locked and down-and-locked position
37	Novel/unique aircraft features	R	As required	As required	As required	As required	

Key:

E: Essential parameters

R: Recommended parameters