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GOVERNMENT OF INDIA

OFFICE OF THE DIRECTOR GENERAL OF CIVIL AVIATION

TECHNICAL CENTRE, OPPOSITE SAFDARJUNG AIRPORT, NEW DELHI-110003

**CIVIL AVIATION REQUIREMENTS
SECTION-5 AIR SAFETY
SERIES 'F' PART II
ISSUE I, DATED 30.9.99**

EFFECTIVE : FORTHWITH

F. No. AV 15011/24/2017-AS

SUBJECT: MONITORING OF DFDR/ QAR/ PMR DATA FOR ACCIDENT/ INCIDENT PREVENTION.

1. OBJECTIVE

Decoding and analysis of the DFDR/ QAR/ PMR data is one of the major tools to identify the hazards and system deficiencies in aircraft operations before they may result in an accident. All scheduled operators and non-scheduled operators are therefore required to monitor DFDR/ QAR/ PMR data to determine deficiencies/ shortcomings in the operation of the aircraft. This CAR lays down the requirements and procedure in this regard.

FDR analysis programme is a proactive and non-punitive programme for gathering and analyzing data recording during routine flights to improve aviation safety. It shall contain adequate safeguard to protect the source of data.

It is issued under the provisions of Rule 29C and Rule 133A of the Aircraft Rules, 1937.

2. REQUIREMENTS FOR DATA MONITORING

All operators having aircraft equipped with DFDR, shall develop procedures, establish facilities and monitor DFDR/ QAR/ PMR data of all flights to determine exceedances in flight parameters from the stipulated limits as prescribed below:

Scheduled Operators of an aeroplane of certificated takeoff mass	In excess of 20,000 Kgs
Non Scheduled Operators of an aeroplane of certificated takeoff mass	In excess of 27,000 Kgs
Scheduled and Non-Scheduled operators of a helicopter of its certified takeoff mass	In excess of 4,000 Kgs

In addition Scheduled / Non Scheduled operators engaged in operation of aeroplane of certified takeoff mass in excess of 5700 Kgs and equipped with DFDR shall analyze one DFDR for each aircraft per quarter.

The operators shall lay down in their flight safety manuals detailed programme in this regard which shall be followed meticulously. The programme should be periodically reviewed to maintain its effectiveness.

3. INSTALLATION OF QUICK ACCESS RECORDERS (QAR)/ PERFORMANCE MONITORING RECORDERS (PMR)

All the aircraft installed with DFDR should be fitted with QAR/ PMR units for easy retrieval of the recorded data. Till this is achieved, manual downloading of the data from DFDR units shall be carried out regularly without loss of any flight data to ensure that the data of all the flights is analysed.

4. ESTABLISHMENT OF MONITORING FACILITIES

- 4.1 Dedicated monitoring cells with adequate number of trained personnel shall be established by the operators to ensure that data monitoring is carried out on continuous basis without any breakdown.
- 4.2 Suitable arrangements/ network shall be established for inflow & outflow of the QAR/ PMR / Downloaded data between various stations and the monitoring cell.
- 4.3 Adequate and suitable hardware and software shall be provided so that failure of any single unit does not lead to breakdown of the system.
- 4.4 Suitable software package shall be developed / procured which can give output in the form of digital data, graphical presentation & 3-D presentation of the recorded data.
- 4.5 Exceedance limits of various parameters shall be established by the operators for

each type of aircraft within the limits given in Annexure-A. These shall be stipulated in their Flight Safety Manuals.

- 4.6 There should be provision in the software package to change the threshold values of exceedances, as required.
- 4.7 Operators shall revise the threshold values of the exceedances from time to time & introduce new parameters based on the experience to make the monitoring system more stricter.
- 4.8 The exceedance values used for monitoring shall be submitted to the Air Safety Directorate of DGCA (Hqrs).

5. **ANALYSIS OF DATA & PREPARATION OF REPORTS**

- 5.1 Entire data of each flight shall be analysed to determine if any flight parameter had exceeded the laid down limit. If any exceedance is detected appropriate report for the same shall be generated in the format given in the Annexure 'B', giving the actual value of the parameter, the specified limit for the same, the time of the event and the other relevant flight details. Hard copy of the report shall be printed for further analysis and review.
- 5.2 For the flights in which the exceedances are detected, a detailed analysis of flight shall be carried out to check whether or not the flight was handled as per the Standard Operating Procedures. As there are more accidents during approach and landing phases, detailed analysis of the approach and landing phases of all flights shall be carried out, to detect any deviations from the normal approach profile and whether the approach was stabilized or not.
- 5.3 At the airfields where special take off procedure have been laid down, the data analysis should cover whether the take off profile of the flight was as per the special procedure or not.
- 5.4 Daily reports for the exceedances of parameters shall be generated for all the types of aircraft and put up for review and flight analysis by the dedicated senior officials.
- 5.5 Suitable corrective action to overcome the deficiencies / shortcomings observed during analysis of the data shall be taken.
- 5.6 Counselling of the crew members on the deficiencies observed shall be carried out by the operator.

- 5.7 A quarterly statistical report giving summary of general findings and suggested corrective measures shall be prepared covering all type of aircraft and circulated to its operational personnel.
- 5.8 During the refresher courses, the results and findings of the analysis will be discussed for the benefit of the crew members.
- 5.9 Proper records shall be maintained of all the findings and corrective measures taken.
- 5.10 The Flight Safety Division of the operator shall ensure effective functioning of the programme in coordination with the operations, training and other concerned Divisions.

6. **GENERAL**

While the Air Safety Directorate of DGCA Headquarters shall monitor the overall implementation of the programme, the Regional Air Safety and Airworthiness Offices, Flight Standard Directorate, Audit Teams, and other officers authorised by DGCA, shall also check implementation of the provisions of this CAR during the course of their checks. The programme should be reviewed to assess its effectiveness and amended, if necessary, in the light of the experience gained and the developments in the civil aviation sector.



**(B.S. Bhullar)
Director General of Civil Aviation**

ANNEXURE-A

GENERAL LIST OF PARAMETER EXCEEDENCES

<u>PHASE OF OPERATION</u>	<u>PARAMETERS</u>	<u>SUGGESTED ALERT VALUE/ TOLERENCE VALUE FOR TRIGGERING, FROM THE CRITICAL VALUE OF PARAMETER</u>
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A. GENERAL

- | | | |
|----|----------------------|-------------------------------|
| 1. | Max engine speed: | |
| | N1 | > Operating limit as per FCOM |
| | N2 | > Operating limit as per FCOM |
| 2. | EGT Start on ground | > Operating limit as per FCOM |
| | EGT in flight | > Operating limit as per FCOM |
| | EGT Max. Continuous | > Operating limit as per FCOM |
| 3. | EPR 1, 2, 3 & 4 | > Operating limit as per FCOM |
| 4. | Max. T/O Wt. | > Operating limit as per FCOM |
| 5. | Oil Temperature High | > Operating limit as per FCOM |
| 6. | Taxi Speed | > 22 Kts. |

B. TAKE OFF

- | | | |
|----|---|---------------|
| 1. | Pitch rate high on take off upto aircraft attitude from 10 to 13 degrees pitch up (depending upon type of aircraft) | > 3 deg/sec |
| 2. | Pitch rate low on take off | < 1.8 deg/sec |
| 3. | Speed of Rotation High | > Vr + 10 kts |

**CIVIL AVIATION REQUIREMENTS
SERIES 'F' PART II**

**SECTION 5
30TH SEPTEMBER 1999**

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|-----|--|---|
| 4. | Speed of Rotation Low | < Vr - 5 Kts |
| 5. | Unstick speed high | > V2 + 20 Kts |
| 6. | Unstick speed low | < V2 - 8 Kts |
| 7. | Pitch attitude high during take off | > Operating limit as per FCOM/
performance limitations |
| 8. | Total time for rotation to achieve target attitude | 6 to 7 secs. (Depending upon type of aircraft) |
| 9. | Tyre speed limit high on take off | > Operating limit as per FCOM/
Performance limitations |
| 10. | Abandoned take off event | >= 100 kts |
| 11. | Auto pilot engaged | < specified height as per FCOM |

C. CLIMB

- | | | |
|----|--|--|
| 1. | Excess Banking (> 500 ft.) | >= 30 deg. |
| 2. | Excess Banking (20 to 100 ft.) | >= 05 deg. |
| 3. | Early configuration change after T/O | < 800 ft. |
| 4. | Flap positions during take off | Operating limits as per FCOM/
Performance limitations |
| 5. | Initial climb height loss (<= 400 ft.) | > 20 ft. |

**CIVIL AVIATION REQUIREMENTS
SERIES 'F' PART II**

**SECTION 5
30TH SEPTEMBER 1999**

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| 6. | Initial climb height loss (400 - 1500 ft.) | > 100 ft. |
| 7. | Climb out speed low (35 ft Above Ground Level) | < V2 |
| 8. | Climb out speed (35 ft Above Airport Level to 400 ft Above Airport Level) | < V2 + 5 kts. |
| 9. | Climb out speed (400 ft Above Airport Level to 1500 ft Above Airport Level) | < V2 + 15 kts. |
| 10. | Excess Time to 1000 ft. | >= 35 secs. |
| 11. | Gears retraction speed | > Operating limit as per FCOM |

D CRUISE/DESCENT

- | | | |
|----|--------------------------------------|---|
| 1. | V _{Mo} exceedance | > Operating limit as per FCOM |
| 2. | M _{Mo} exceedance | > Operating limit as per FCOM |
| 3. | Max. Operating Altitude | > Operating limit as per FCOM |
| 4. | High vertical accn. | > 1.3 g |
| 5. | Exceedance of max operating Altitude | > Operating limit as per FCOM |
| 6. | TCAS event | If Audio calls & change of colour to RED. |

E. APPROACH & LANDING

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|-----|---|---|
| 1. | Excess Banking
(> 500 ft.) | >= 30 deg. |
| 2. | Excess Banking
(20 to 100 ft.) | >= 05 deg. |
| 3. | Flap Placard Speed
exceedance for
different flap/slat
positions. | > Operating limit as per FCOM
for different flap/slat
position/performance limitation |
| 4. | Exceedance of flap/
slat altitude | > Placarded value |
| 5. | Late landing flap
(Flaps not in landing
position) | Selected <= 600 feet |
| 6. | Gear down speed | > Operating limit as per FCOM |
| 7. | Gear down selected
speed | > Operating limit as per FCOM |
| 8. | Approach speed
high within 90secs
of touch down | > Operating limit as per
FCOM |
| 9. | Approach speed high
below 500 ft Altitude | > Operating limit as per
FCOM/ performance limitation |
| 10. | Approach speed
high below 50 ft
AGL | > Vapp + 15 kts. |
| 11. | Approach speed
high at touch DN | > Vapp + 10 kts. |

**CIVIL AVIATION REQUIREMENTS
SERIES 'F' PART II**

**SECTION 5
30TH SEPTEMBER 1999**

12.	Deviation below glide slope (< 600 ft. Alt.)	>= ½ dot
	Deviation above glide slope (< 600 ft. Alt.)	>= ½ dot
13.	Localiser deviation (Alt. < 1000 feet)	>= 1 dot
14.	Approach speed low below 1000 feet.	< Operating limit as per FCOM
15.	Pitch Attitude High at Touch down.	> Operating limit as per FCOM
16.	Pitch Attitude low at Touch down	< Operating limit as per FCOM
17.	Low on approach between 180 & 120 secs to touch down.	< 1200 ft. Above Airport Level
18.	Low on approach between 90 & 60 secs to touch down.	< 600 ft. Above Airport Level
19.	Speed exceedance below 10,000 ft.	>= 250 Kts
20.	High Normal acceleration on ground.	>= 1.3g
21.	High Normal acceleration on touch down.	As per the limit prescribed by Manufacturer
22.	Abnormal pitch landing (High).	>= Operating limit as per FCOM

**CIVIL AVIATION REQUIREMENTS
SERIES 'F' PART II**

**SECTION 5
30TH SEPTEMBER 1999**

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| 23. | Abnormal pitch landing (Low). | <= Operating limit as per FCOM |
| 24. | Go-around event. | < 200 feet |
| 25. | GPWS operation. | Any time triggered |
| 26. | Speed brake on approach. | < 800 feet AGL. |
| 27. | High ROD (1000-500 feet.) | > 700 to 800 feet/min |
| 28. | High ROD (500-100) feet. | > 600 feet/min |
| 29. | Late reverser deployment. | Deployed >= 30 secs. after touch down. |
| 30. | Long bounce event. | Event triggering |
| 31. | Speed low during landing flap selection. | <= Operating limit as per FCOM/ performance limitation |
| 32. | Low ROD (Below 1000 feet) | < 400 feet/min |
| 33. | Max. Landing Wt. | > Operating limit as per FCOM/ Performance limitation |

ANNEXURE B

REPORT ON EXCEEDENCES OF PARAMETERS

OPERATOR	QAR/PMR/ SSFDR NO.	TYPE OF THE AIRCRAFT/MODEL REGISTRATION	FLIGHT NO./ SECTOR/ Duration of flight/DATE
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EXCEEDENCE CHART

S.NO. PHASE OF FLIGHT	EVENT	ACTUAL VALUE	EXCEEDED VALUE
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TOTAL NO OF EXCEEDENCES :

SIGNATURE
DATE
DESIGNATION