



BL 8-2

Regulations on establishment and operation of a Flight Calibration Organisation (FCO) that may calibrate aeronautical installations by aircraft etc.*

Edition 1, 10 July 2001

In pursuance of § 52 and subsection (10) of § 149, of the Danish Air Navigation Act, cf. Consolidation Act no. 543 of 13 June 2001, the Civil Aviation Administration - Denmark hereby stipulates as follows on the authority of the Ministry of Transport, cf. Order no. 810 of 19 November 1998 of on delegation of authorities to the Civil Aviation Administration - Denmark and on publication of the Regulations issued by the Administration:

1. Reference documents

1.1 Annex 10 to the Chicago Convention, Aeronautical Telecommunications, Volumes I, II and IV, latest edition.

1.2 Annex 14 to the Chicago Convention, Aerodromes, Volume I, Aerodrome Design and Operation, latest edition.

1.3 ICAO Doc 8071, Manual on Testing of Radio Navigation Aids, Volumes I and III, latest edition.

1.4 ICAO Doc 8168, Aircraft Operations, Volume II - Construction of Visual and Instrument Flight Procedures, latest edition.

1.5 ICAO Doc 9157, Aerodrome Design Manual, Part 4, Visual Aids, latest edition.

1.6 CAP 670, Air Traffic Services, Safety Requirements, latest edition.

1.7 BL 3-2, Regulations on establishment of public IMC aerodromes, latest edition.

1.8 BL 3-3, Radio navigation and radio landing aids on ground, latest edition.

1.9 BL 5-50, Regulations on approval of air operators to carry out commercial air traffic in accordance with JAR-OPS 1 and/or JAR-OPS 3, latest edition.

1.10 BL 8-1, Regulations on calibration of aeronautical installations etc. from the air etc., latest edition.

1.11 The brochure "Quality Assurance" issued by the Civil Aviation Administration - Denmark, latest edition.

1.12 The documents mentioned in paragraphs 1.1-1.5 and 1.7-1.11 can be bought on application to

Civil Aviation Administration - Denmark
Aeronautical Information Service
Ellebjergrvej 50
DK-2450 Copenhagen SV

* The draft BL has been notified to the European Commission in accordance with the provisions in the European Parliament's and Council Directive 98/34/EEC (the information procedure directive) as amended most recently by Directive 98/48/EEC.

Phone: +45 3618 6000
Fax: +45 3618 6001

1.13 The document mentioned in paragraph 1.6 can be bought on application to

Westward Documedia Ltd.
37, Windsor Street
GB-Cheltenham GL52 2DG
England

Phone: 00 44 870 887 1410
Fax: 00 44 870 887 1411

2. Definitions

Flight Calibration Organisation (FCO):

An organisation approved by the Civil Aviation Administration - Denmark to carry out calibrations from the air by aircraft of installations where such calibration flights are required in accordance with BL 8-1.

NOTAM (Notice to Airmen):

A notification distributed by means of telecommunication about the establishment, status or change of aeronautical installations, services, procedures or danger activities, knowledge about which is of essential importance to the carrying through of flight operations.

Licence holder:

Licence holder in this BL shall mean any person having obtained a permission to establish and operate a public aerodrome or a civil area of a military aerodrome, or any person having obtained a permission to operate a flight control unit which is not attached to a specific aerodrome.

3. Applicability

This BL lays down regulations on establishment and operation of a flight calibration organisation (FCO) that may carry out calibrations from the air within Danish territory and within areas where Denmark according to international agreements is obliged to exercise air navigation services.

4. General

The responsible manager of an approved flight calibration organisation (FCO) shall ensure that the organisation is operated and calibrations carried out in accordance with the regulations in this BL and in accordance with the operations manual.

5. Approval of flight calibration organisation (FCO)

5.1 An FCO and its calibration equipment shall be approved by the Civil Aviation Administration - Denmark.

5.2 Application for approval of an FCO shall be submitted to the Civil Aviation Administration - Denmark. The Civil Aviation Administration - Denmark must have received the application not later than 3 months before the FCO wants to use the approval.

5.3 The approval is conditional on satisfactory documentation for the following being submitted:

- a. Operations manual containing a description of the organisation, the division of responsibilities and the quality assurance system as well as instructions for carrying out calibration etc.
- b. Information on the aircraft to be used in the organisation, including documentation for the range diagram of each individual aeroplane antenna.
- c. Information on the organisation's calibration equipment, including also the equipment's validation manuals, maintenance manual and documentation for the accuracy of the calibration instruments in proportion to the installations that are calibrated.
- d. Description of the calibration method for each individual installation.
- e. Examples of calibration reports, including preliminary calibration reports.

5.4 An approval is issued with a validity for 5 years. Conditions and limitations may be attached to the approval, including which types of installations the organisation may calibrate.

5.5 The Civil Aviation Administration - Denmark shall be notified of any changes in the conditions covered by paragraph 5.3.

6. Validation report

For all equipment to be used in connection with calibration a validation report shall be prepared containing the following:

- a. Detailed description of the equipment and its elements.
- b. The sub-contractor's declaration stating compliance with the specification requirements, including software.
- c. Description and result of function and load tests carried out.

7. Aircraft and crew

7.1 An aircraft used for calibration shall be operated by the flight calibration organisation itself or by an air operator approved for calibration by the Civil Aviation Administration - Denmark.

7.1.1 If the aircraft is operated by the flight calibration organisation itself, the organisation's flying activities shall be carried out in accordance with an operations manual approved by the Civil Aviation Administration - Denmark.

7.2 The aircraft to be used shall be suitable for the purpose, and it shall be possible to operate it in such a way that accurate calibration of parameters is ensured.

7.3 The aircraft shall be a multi-engined type with a capability of operating safely fully loaded in case of engine failure.

7.4 The aircraft shall be instrumented and approved for instrument flights.

7.5 The aircraft shall be operated by 2 crew members. The pilot-in-command shall have at least 3,000 flight hours of which at least 1,000 shall be on aircraft operated in accordance with performance class A, cf. BL 5-50 (JAR-OPS 1). The co-pilot shall have at least 500 flight hours of which at least 100 shall be on aircraft operated in accordance with performance class A, cf. BL 5-50 (JAR-OPS 1).

7.6 The cross-wind limitation of the aircraft shall be so that it allows the calibration accuracy to be within the requirements set forth. The limitation shall be stated in the operational instructions.

7.7 The aircraft shall have a stable electric system with sufficient capacity to supply the calibration equipment.

7.8 The propeller modulation of the aircraft shall be reduced to an acceptable level.

7.9 As regards supplementary installations in the aircraft, including antennas, intercom, consoles, power supply and seats, there shall be a supplemental type certificate.

7.10 Calibration flights shall be carried out so that noise nuisance around the aerodrome is limited to the greatest extent possible. When calibration flights are carried out, noise limiting regulations, if any, for the aerodrome in question shall be complied with, unless the Civil Aviation Administration - Denmark has exempted the flight calibration organisation.

Note: The aircraft shall be constructed to operate abnormal procedures during calibration flights. It is normal practice to add marking and/or lighting which increases the visibility of the aircraft in all normal weather conditions.

8. Calibration equipment

8.1 The purpose of calibration is to document that the parameters, including also the surveillance systems/monitors, meet the given specifications.

8.2 Calibration equipment must not interfere with the operation or accuracy of the

aircraft's normal navigation and radio equipment.

8.3 Calibration equipment shall be adequately protected against general EMC radiation internally or externally. Abnormal effects of interference shall be clearly evident from the control report.

8.4 The calibration equipment shall be capable of monitoring the identity modulation of the navigation aids.

8.5 The calibration equipment shall be capable of determining and registering the aircraft's position in the airspace relatively to a fixed reference point. The calibration accuracy shall be adequate in proportion to the calibrated parameter.

8.6 The calibration equipment shall be capable of registering the calibrated parameters of the navigation aids.

8.6.1 All recording shall be marked in such a way that they are brought in mutual proportion to the aircraft's position at the time of calibration.

Note 1: Guidance can be found in ICAO Doc 8071, Manual on Testing Radio Navigation Aids, Volume 1, Testing of Ground-based Navigation Systems.

Note 2: The calibration equipment and its antennas shall, if possible, be independent of the aircraft's operational equipment.

8.7 Antennas shall be installed so that they are not prevented from receiving signals under normal flying profiles.

Note: In order to secure this it may be necessary to use more than one calibration antenna for a special function. If a double calibration receiver is used, these shall be connected to a common calibration antenna.

8.7.1 Antennas used in connection with position determination equipment shall be placed in consideration of the aircraft's reference point. If antennas and reference point are not in close conformity, this deviation shall be included in the calculations for the calibra-

tion accuracy and in the fixing of the operational cross wind calculation. Alternatively the deviation shall be corrected by using the aircraft's attitude sensors and data regarding movement of the phase centre of the antennas.

8.8 The calibration accuracy for a given parameter shall be adequate in proportion to the operational requirements for the parameter.

8.8.1 The calibration accuracy within 95% probability shall be calculated for each of the calibrated parameters. The calculation method shall be clearly described.

8.8.2 If the calibration consists of a combination of receiver output and the aircraft's position, the total of all error contributions, including contributions from the aircraft's position, shall be calculated and stated.

8.8.3 If several calibrations are combined to produce on single result, the error contribution should be added by using the Root Mean Square (RMS) method to calculate the total calibration accuracy.

8.8.4 For calibrations than can only be read from registrations, the accuracy and resolution of the recording equipment shall be included in the total calibration accuracy.

8.8.5 When modifications are made that may influence the calibration accuracy of a given parameter, new calculations shall be made.

8.9 The temperature stability shall be so that the required calibration accuracy can be maintained under the actual conditions for the calibration. The operator shall define these conditions (temperature and humidity area).

8.9.1 Detailed information on the temperature dependence of the calibration equipment shall be available in the form of test results carried out by the operator or the manufacturer.

8.9.2 If the calibration equipment requires time to heat or refrigerate, this shall be clearly evident from the instruction.

Note: Temperature dependent equipment, shall, if necessary, be installed in temperature controlled surroundings. An indicator/alarm shall be installed to inform the flight inspector about any deviation in the temperature conditions.

9. Calibration and standards

9.1 Equipment used in connection with calibration shall be calibrated up to a defined standard.

9.2 Clearly defined calibration procedures shall be prepared for all equipment used for calibration.

9.3 It must be possible to trace equipment and standards used in the calibration process to national or international standards.

9.4 When, according to the information given, the equipment is self-calibrating, the internal process shall be described. This involves a presentation of how the internal standard of the equipment is used in connection with each parameter that can be measured or generated. It must be possible to trace the internal standard to a national or international standard.

9.5 Information on calibration intervals shall be included in the calibration journal.

10. Software

Any software used in connection with calibration shall be of such a standard that accuracy and integrity of equipment using software can be guaranteed.

Note: Guidance can be found in CAP 670, Air Traffic Services, Safety Requirements.

11. Operational instructions

11.1 The operational instructions shall ensure that all calibrations are carried out in accordance with defined and documented procedures.

11.2 The instructions shall contain precise details on:

- a. Flying profile used at each type of calibration.
- b. Pre-flight calibration of equipment.
- c. Setting up of all necessary equipment to determine and follow the position.
- d. Planned maintenance and calibration of equipment.
- e. Use of equipment.
- f. Preparation of calibration report.
- g. Certification.
- h. Methods to calculate all results not directly readable on equipment.

12. Training and qualification requirements for personnel engaged in calibration

12.1 Personnel engaged in calibration shall be adequately trained and qualified to carry out the actual job functions. Training and qualification requirements shall be described in the operations manual.

12.2 When calibrating precision landing aids it shall be ensured that the personnel has sufficient knowledge of each individual locality calibrated. The organisation's operations manual shall contain procedures so that the necessary knowledge is obtained.

13. Calibration report

13.1 A calibration report shall be prepared for each calibration carried out. The report shall clearly and accurately document the measured characteristics of the calibrated landing aids/flight procedures.

13.2 The format of the calibration report shall be approved by the Civil Aviation Administration - Denmark. The report shall at least have the contents appearing from Appendix 1 to this BL.

13.3 The calibration report shall be submitted to the Civil Aviation Administration - Denmark and to the licence holder. The original shall be filed for at least 5 years. As regards the commissioned calibration the report shall, however, be filed as long as the installation exists.

13.4 When a calibration has been carried out, a preliminary report shall be given to the licence holder. This preliminary report, the format of which shall also be approved by the Civil Aviation Administration - Denmark, shall contain a recommendation stating whether the calibrated installation may still be kept in operation or whether it shall be taken out of operation.

Note: The responsibility for taking an installation out of operation rests with the licence holder, cf. BL 8-1, paragraph 4.2.

14. Recordings and graphs

14.1 Recorded calibration data and figures shall be produced in such a way that the accuracy of the equipment can be separated from the measured values.

14.2 If recorded calibration data or graphs are used for figures in a control report, the scale shall be comparable with the permitted measuring margins.

Note: If recorded calibration data or graphs are only used to show that the results are within certain margins, they may be presented with a reduced scale.

14.3 Recorded calibration data used for presentation of recording and graphs shall be stored with an accuracy permitting magnified plots to be produced upon request.

14.4 For calibrations where parameters are evaluated by comparing receiver signal and output from the position determination equipment, it is only necessary to present this in the calibration report, cf. part 13. Position data and raw signal data shall be recorded and stored and must be presentable upon request from the Civil Aviation Administration - Denmark.

Note: The licence holder may require further data from the calibration presented.

14.5 Each recording and graph shall be clearly identifiable.

15. Cancellation

15.1 The Civil Aviation Administration - Denmark may cancel or change a granted approval of the Flight Calibration Organisation if the conditions for obtaining an approval is no longer met, and the circumstances are not adjusted within a period of time determined by the Civil Aviation Administration - Denmark.

15.2 The Civil Aviation Administration - Denmark may further cancel or change the approval if, in connection with the exercise of the activities, the provisions of the Danish Air Navigation Act or regulations contained in the approval or regulations otherwise applicable for such activities are violated, or it must be assumed that the licence holder is not able to maintain the approved activities in a proper way, cf. § 58 of the Danish Air Navigation Act.

16. Exemption

The Civil Aviation Administration - Denmark may in quite exceptional cases grant exemption from the regulations in this BL when it is deemed compatible with the considerations on which the regulations in question are based.

17. Punishment

17.1 Violation of the regulations in paragraphs 5.1, 5.5, part 7, paragraphs 8.2 - 8.9, parts 9, 10, 12, 13 and 14 is punishable with fine.

17.2 Criminal liability may be imposed on companies etc. (legal persons) under the rules of Chapter 5 of the Danish Criminal Code, cf. subsection 14 of § 149 of the Danish Air Navigation Act.

18. Implementation

This BL comes into force on 15 August 2001.

Civil Aviation Administration - Denmark, 10 July 2001

Ole Asmussen

/Karsten Theil

Contents of the calibration report

1. Name and identification of the installation.
2. Make, type and classification of the installation to be calibrated.
3. Date.
4. Report number.
5. Type of calibration.
6. Registration marks of the aircraft.
7. Weather.
8. Names and functional designation of persons participating in the calibration.
9. Result of the calibrations carried out.
10. Information about further appendices/supplements.
11. Information about operation of extra flights necessary for adjusting the installation.
12. Statement from the pilot-in-command regarding characteristics of the calibrated installation.
13. Remarks from Flight Inspector/Theodolite operator/Ground Inspector.
14. Information about any special observations.
15. Status whether the installation is satisfactory/not satisfactory.
16. Signature of the Flight Inspector.
17. Signature of the pilot-in-command.
18. Signature of the responsible manager of the FCO.