



Civil Aviation Authority

# AIRWORTHINESS DIRECTIVE

Number: **G-2021-0001**

Issue date: 27 January 2021



This Airworthiness Directive (AD) is issued by the UK CAA as the National Aviation Authority (ICAO Annex 8 Authority of State of Registry for the affected product(s).

In accordance with Regulation (EU) 2018/1139, the following action required by this AD is mandatory for applicable aircraft registered in the United Kingdom. No person may operate an aircraft to which an AD applies except in accordance with the requirements of that AD unless otherwise agreed with the Authority of the State of Registry.

This AD is issued in accordance with Regulation (EU) 748/2012, Part 21.A.3B. In accordance with Regulation (EU) 1321/2014 Annex I, Part M.A.301, the continuing airworthiness of an aircraft shall be ensured by accomplishing any applicable ADs. Consequently, no person may operate an aircraft to which an AD applies, except in accordance with the requirements of that AD, unless otherwise specified by the Agency [Regulation (EU) 1321/2014 Annex I, Part M.A.303] or agreed with the Authority of the State of Registry [Regulation (EU) 2018/1139, Article 71 exemption].

Note: References to EU regulations in this AD are to those regulations as retained and amended in UK domestic law under the European Union (Withdrawal) Act 2018.

Design Approval Holder's Name: <b>THE BOEING COMPANY</b>	Type/Model Designation(s): <b>737-8 and 737-9 aeroplanes</b>
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TCDS:	EASA.IM.A.120
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Supersedure:	This AD supersedes EASA AD 2019-0051R1 dated 25 March 2019.
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ATA 22, 27, 31 and 34	<b>ATA 22 – Auto Flight – Flight Control Computer Software – Installation / Test</b> <b>ATA 27 – Flight Controls – Horizontal Stabilizer Trim Wire Bundle Routing – Modification / Stall Warning System Stick Shaker Circuit Breaker Buttons (Coloured Caps) – Installation</b> <b>ATA 31 – Instruments – Operational Program Software – Updates</b> <b>ATA 34 – Navigation – Angle of Attack Sensors – Test</b> <b>– Airplane Flight Manual – Limitations / Operating Procedures – Amendment</b> <b>– Master Minimum Equipment List – Amendment</b> <b>– Operational Readiness Flight / Pilot Training / Flight Simulation Training Devices</b>
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Manufacturer(s):	The Boeing Company
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Applicability:	Model 737-8 and 737-9 (commercially known as 'MAX') aeroplanes, all manufacturer serial numbers (MSN).
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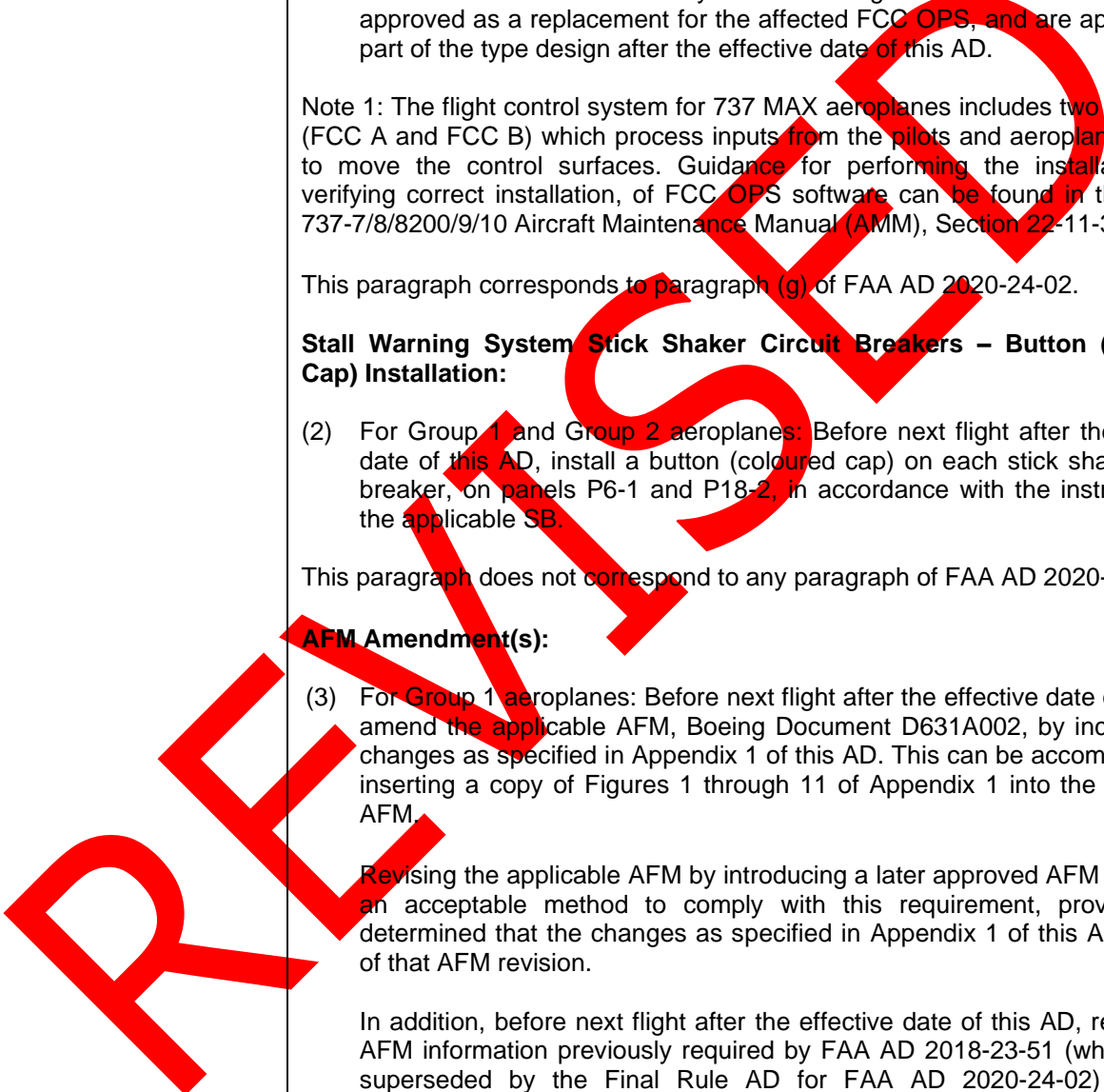
<p><b>Definitions:</b></p>	<p>For the purpose of this AD, the following definitions apply:</p> <p><b>Ferry flight:</b> Any non-passenger, non-commercial flight conducted after the effective date of this AD, operating with a permit-to-fly issued under Annex I (Part 21) of Regulation (EU) 748/2012, and under flight conditions approved by CAA.</p> <p><b>Affected FCC OPS:</b> Flight Control Computer (FCC) Operational Program Software (OPS) P11.1, (for model 737-8) and P.10.0 (for model 737-9), or earlier FCC OPS.</p> <p><b>Affected MDS DPC OPS:</b> MAX Display System (MDS) Display Processing Computer (DPC) Operational Program Software (OPS), Block Point (BP) 1.5, or earlier MDS DPC OPS/BP.</p> <p><b>Serviceable FCC OPS:</b> FCC OPS P12.1.2, Part Number (P/N) 2274-COL-AC2-26, or later FCC OPS and corresponding P/N.</p> <p><b>Serviceable MDS DPC OPS:</b> MDS DPC OPS, BP 1.5.1, P/N COL49-0078-0006, or later MDS DPC OPS/BP and corresponding P/N.</p>
	<p><b>The applicable SB:</b> Boeing Alert Requirements Bulletin (RB) 737-22A1342 RB, for the FCC OPS P12.1.2 introduction; Service Bulletin (SB) 737-27-1320, for the stick shaker circuit breakers button (coloured cap) installation; Special Attention SB 737-31-1860 (at any revision), for the MDS OPS update; Special Attention SB 737-27-1318 Revision 2, for the horizontal stabilizer trim wiring wire bundle routing modification; Special Attention SB 737-00-1028, for the angle-of-attack (AOA) sensor system test and operational readiness flight; as applicable.</p> <p><b>Groups:</b></p> <p><b>Group 1</b> aeroplanes are those MSN identified by line number in Boeing Special Attention SB 737-31-1860 original issue, dated 12 June 2020. Refer to Boeing Document D6-19567 Part 3 for the line number and the corresponding MSN.</p> <p><b>Group 2</b> aeroplanes are all other MSN.</p>

PRELIMINARY

<b>Reason:</b>	<p>EASA issued Proposed Airworthiness Directive (PAD) 20-184 on 24 November 2020 proposing an AD to supersede EASA AD 2019-0051R1 and requesting comments. This was published whilst EASA was the “competent authority” for aircraft design for the UK. Following the disposition of comments responding to EASA PAD 20-184, the content of this CAA AD is based on EASA’s technical findings in relation to the identified unsafe conditions.</p> <p>Prompted by two fatal accidents with Boeing 737-8 aeroplanes, EASA issued Emergency AD 2019-0051-E (later revised) to suspend all flight operations of the two affected models. EASA AD 2019-0051R1 allowed non-passenger, non-commercial ferry flights and defined the conditions for such ferry flights. (Note: These EASA ADs were applicable to UK registered aircraft as they were issued prior to 1 January 2021)</p> <p>Previously, FAA issued AD 2018-23-51, which was adopted by EASA. Since that AD was issued, FAA issued AD 2020-24-02, superseding FAA AD 2018-23-51 which is no longer valid. This CAA AD is the Authority’s decision not to adopt FAA AD 2020-24-02 for UK registered aeroplanes.</p> <p>The results of safety investigations conducted by the States where these events occurred, as well as EASA’s safety review, have confirmed that, with affected FCC OPS installed, a single erroneous high AOA sensor input to the FCC on an affected aeroplane during manual flight with flaps up may have prompted the Manoeuvring Characteristics Augmentation System (MCAS) to input incremental nose down trim. In this scenario, the flight crew may be unable to respond appropriately by applying opposing nose-up stabilizer trim, returning the aeroplane to a trimmed state, and by actuating the stabilizer trim cut-out switches.</p> <p>This condition, if not corrected, could lead to a stabilizer position that cannot be fully countered with elevator input, possibly resulting in loss of control of the aeroplane.</p> <p>Prompted by those findings, Boeing developed new OPS for FCC and MDS DPC and issued the applicable SB to provide instructions for OPS in-service installation. Boeing also updated the Airplane Flight Manual (AFM) to introduce new flight crew procedures and limitations, and the applicable flight crew training programme(s), introducing new training to ensure pilot understanding of the MCAS functions, the consequences of introducing the serviceable OPS, and the new ‘Airspeed unreliable’ procedure.</p> <p>EASA conducted a comprehensive review of the measures proposed by Boeing, including flight testing, and considers that these measures adequately address the above described unsafe condition. The CAA has coordinated with EASA, acting as its Technical Agent and concurs with this position.</p>
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	<p>For the reasons described above, this AD supersedes EASA AD 2019-0051R1, cancelling the ‘suspension of flight operations’ requirements of that AD. The affected Boeing 737-8 and 737-9 aeroplanes can be returned to service, provided that the actions required by this AD have been accomplished. To achieve this, this AD requires installation of serviceable FCC OPS and serviceable MDS DPC OPS, embodiment of certain modifications, including wiring changes, accomplishment of a sensor test, and installation of buttons (coloured caps) on the stick shaker circuit breakers. This AD also requires certain changes to the AFM to introduce the new flight crew procedures and limitations, including a prohibition to perform Required Navigation Performance - Authorization Required (RNP AR) approaches, until EASA AMC 20-26 compliance activities related to RNP AR approaches are completed. This AD also requires amendment of the EASA approved Boeing 737 MAX B 737-8/-9 Master Minimum Equipment List (MMEL) and the operator’s approved minimum equipment list (MEL) for certain items. Following all these actions, this AD requires an operational readiness flight to be conducted. Finally, this AD prohibits (re)installation of affected FCC OPS and affected MDS DPC OPS, as defined in this AD.</p> <p>EASA participated in a Joint Operational Evaluation Board (JOEB) meeting convened by the FAA, also including Agência Nacional de Aviação Civil (ANAC) of Brazil and Transport Canada Civil Aviation (TCCA). This JOEB evaluated the procedural changes and the pilot training proposed by Boeing for the 737-8/-9 (MAX). The JOEB validated Boeing’s proposed training changes, and Boeing embodied them in the Operational Suitability Data for Flight Crew (OSD FC), Boeing documents D626A014 and D626A014-1, both Revision NEW, as part of the EASA Boeing 737 validated type certificate, together with other changes. In particular, and in addition to initial type rating training, differences training from the Boeing 737-600 through 737-900ER series (NG) to the MAX has been improved with the addition of training elements, including new training areas of special emphasis (TASE). In order to support the new training elements, changes which are necessary for Flight Simulation Training Devices (FSTD) are described in the form of dedicated Simulator Data Bulletins (SDB), issued by Boeing Simulator Support. In order to ensure safe operation of the 737-8/-9 (MAX) upon return to service, this AD requires that “return to service” (RTS) training, including ground and flight training in a suitable full flight simulator (FFS), is performed prior to pilots operating the 737-8/-9 (MAX). The RTS training content is documented in a specific Appendix to the B737 OSD FC. Parts of the RTS training can also be done on a Boeing 737 NG FFS, being equivalent to the Boeing 737 MAX FFS for specific manoeuvres, as has been demonstrated during the JOEB process.</p> <p>In conjunction with this AD, the CAA has also issued Safety Directive (SD) <a href="#">2021/001</a>, containing requirements for UK and third country operators (TCO) to meet before conducting operations of their Boeing 737-8 and 737-9 aeroplanes into, within or out of UK airspace, or for UK operators anywhere.</p>
<b>Effective Date:</b>	<b>27 January 2021</b>

<p><b>Required Action(s) and Compliance Time(s):</b></p>	<p>Required as indicated, unless accomplished previously:</p> <p><b>Installation/Test of FCC OPS:</b></p> <p>(1) For Group 1 aeroplanes: Before next flight after the effective date of this AD, install serviceable FCC OPS, as defined in this AD, and accomplish a software installation test in accordance with the instructions of the applicable SB. During the installation test, if the serviceable FCC OPS P/N is not shown as being installed on FCC A and FCC B (see Note 1 of this AD), before further flight, accomplish applicable corrective action(s) until the serviceable FCC OPS P/N is installed on FCC A and FCC B. Later-approved FCC OPS versions are only those Boeing software versions that are approved as a replacement for the affected FCC OPS, and are approved as part of the type design after the effective date of this AD.</p> <p>Note 1: The flight control system for 737 MAX aeroplanes includes two FCC units (FCC A and FCC B) which process inputs from the pilots and aeroplane sensors to move the control surfaces. Guidance for performing the installation, and verifying correct installation, of FCC OPS software can be found in the Boeing 737-7/8/8200/9/10 Aircraft Maintenance Manual (AMM), Section 22-11-33.</p> <p>This paragraph corresponds to paragraph (g) of FAA AD 2020-24-02.</p> <p><b>Stall Warning System Stick Shaker Circuit Breakers – Button (Coloured Cap) Installation:</b></p> <p>(2) For Group 1 and Group 2 aeroplanes: Before next flight after the effective date of this AD, install a button (coloured cap) on each stick shaker circuit breaker, on panels P6-1 and P18-2, in accordance with the instructions of the applicable SB.</p> <p>This paragraph does not correspond to any paragraph of FAA AD 2020-24-02.</p> <p><b>AFM Amendment(s):</b></p> <p>(3) For Group 1 aeroplanes: Before next flight after the effective date of this AD, amend the applicable AFM, Boeing Document D631A002, by including the changes as specified in Appendix 1 of this AD. This can be accomplished by inserting a copy of Figures 1 through 11 of Appendix 1 into the applicable AFM.</p> <p>Revising the applicable AFM by introducing a later approved AFM revision is an acceptable method to comply with this requirement, provided it is determined that the changes as specified in Appendix 1 of this AD are part of that AFM revision.</p> <p>In addition, before next flight after the effective date of this AD, remove the AFM information previously required by FAA AD 2018-23-51 (which will be superseded by the Final Rule AD for FAA AD 2020-24-02) from the Certificate Limitations and Operating Procedures chapters of the applicable AFM.</p> <p>This paragraph corresponds to, <b>but is different from</b>, paragraph (h) of FAA AD 2020-24-02.</p>
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**MMEL Provisions for Inoperative Flight Control System Functions:**

- (4) For Group 1 aeroplanes: From the effective date of this AD, do not operate (dispatch) an aeroplane, unless the provisions specified in Figure 12 of Appendix 1 of this AD are incorporated into the EASA-approved Boeing 737 MAX B 737 8/ 9 MMEL, on the basis of which the operator's approved MEL must be amended. This can be accomplished by inserting a copy of Figure 12 of Appendix 1 into the applicable operator MEL.

The required changes are contained in EASA approved Boeing 737 MAX B-737-8/-9 MMEL, Boeing document D639A001-02, Revision 2. Revising the operator MEL by introducing that Revision 2, or a later EASA approved MMEL revision, is an acceptable method to comply with this requirement.

This paragraph corresponds to, **but is different from**, paragraph (i) of FAA AD 2020-24-02.

**Installation/Verification of MDS Software, Removal of INOP Markers:**

- (5) For Group 1 aeroplanes: Before next flight after the effective date of this AD, accomplish all applicable actions identified as "RC" (required for compliance) in, and in accordance with the instructions of, the applicable SB.

This paragraph corresponds to paragraph (j) of FAA AD 2020-24-02.

**Horizontal Stabilizer Trim Wire Bundle Routing Change**

- (6) For Group 1 aeroplanes: Before next flight after the effective date of this AD, accomplish all applicable actions identified as "RC" in, and in accordance with the instructions of, the applicable SB.

This paragraph corresponds to paragraph (k) of FAA AD 2020-24-02.

**AOA Sensor System Test**

- (7) For Group 1 aeroplanes: Before next flight after the effective date of this AD, accomplish all applicable actions identified as "RC" for the "AOA Sensor System Test" as specified in, and in accordance with the instructions of, the applicable SB.

This paragraph corresponds to paragraph (l) of FAA AD 2020-24-02.

**Operational Readiness Flight**

- (8) For Group 1 aeroplanes: Before next flight after accomplishment of the actions required by paragraphs (1) through (7) of this AD, accomplish all applicable actions identified as "RC" for the "Operational Readiness Flight" as specified in, and in accordance with, the instructions of the applicable SB. The CAA approved flight conditions, as specified in Appendix 2 of this AD, form the basis on which a Permit to Fly can be issued in accordance with Annex I (Part 21) of Regulation (EU) 748/2012 to accomplish the operational readiness flight required by this paragraph.

No additional CAA flight conditions approval is required for the operational readiness flight.

Before next flight after the operational readiness flight, any mechanical irregularities that occurred during the operational readiness flight must be rectified by the maintenance organisation and in consideration of the procedure for the management of defects of the organisation responsible for the continuing airworthiness of the aeroplane.

This paragraph corresponds to, **but is different from**, paragraph (m) of FAA AD 2020-24-02.

**Credit:**

- (9) Modification of an aeroplane in accordance with the instructions of Boeing Special Attention SB 737-27-1318 at original issue, dated 10 June 2020, or Revision 1 dated 24 June 2020, and 737-27-1318 AMOC 01 (ref. SB 737-27-1318 at R2), dated 25 November 2020, 737-27-1318 AMOC 02 (ref SB 737-27-1318 at R2) or 737-27-1318 AMOC 03 (ref SB 737-27-1318 at original issue or R1), dated 23 December 2020, as applicable, is an acceptable method to comply with the requirements of paragraph (6) of this AD for that aeroplane, provided the 14 Installation Deviation Records (IDRs) identified in paragraph 1.D., "Description," of Boeing Special Attention SB 737 27 1318, Revision 2, dated 10 November 2020, have been incorporated on the aeroplane. Accomplishment of FAA-approved Boeing IDRs not identified in paragraph 1.D., "Description," of Boeing Special Attention SB 737-27-1318 Revision 2, and 737-27-1318 AMOC 01 or 737-27-1318 AMOC 02, as applicable, is acceptable for compliance with the corresponding "RC" steps specified in Special Attention SB 737-27-1318, Revision 1, dated 10 June 2020, provided those IDRs include reference to Boeing Special Attention SB 737-27-1318, Revision 1, dated 10 June 2020.

This paragraph corresponds to, **but is different from**, paragraph (o)(2) of FAA AD 2020-24-02.

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Paragraphs (10) to (15) of this AD **do not correspond to any requirements** as specified in FAA AD 2020-24-02. Some of these actions are recommended by FAA Safety Alert for Operators (SAFO) [20014](#) and SAFO [20015](#).

**Return to Flight Operations:**

- (10) For Group 1 aeroplanes: Modification of an aeroplane by accomplishing all actions as required by paragraphs (1) through (8) of this AD, including software installation verifications/tests, implementation of all AFM and MMEL changes, an AOA Sensor System Test, and an operational readiness flight, cancels the suspension of flight operations as previously required by EASA AD 2019-0051R1 for that aeroplane.

For Group 2 aeroplanes: Installation of buttons (coloured cap) on the circuit breakers of the Stall Warning System Stick Shaker on an aeroplane, as required by paragraph (2) of this AD, cancels the suspension of flight operations as previously required by EASA AD 2019-0051R1 for that aeroplane.

**Pilot Training Requirements:**

(11) From the effective date of this AD, prior to any commercial or non-commercial flight, except ferry-flights, as defined in this AD, ensure that each pilot has performed the training as specified in paragraph (11.1) or (11.2) of this AD, as applicable. Ferry-flights, as defined in this AD, may be conducted by pilots who have not completed the additional training specified by paragraph (11.1) or (11.2), provided that specific flight conditions are approved by CAA for such ferry flights.

(11.1) For a pilot who already holds a type rating for any Boeing Model 737-600 through 737-900ER (inclusive), with privileges to operate a model 737-8 or -9 (MAX) aeroplane: RTS training outlined in Appendix 3 to the Operational Suitability Data – Flight Crew (OSD-FC) Boeing 737, Boeing document D626A014, and in Boeing 737 document D626A014-1, Operator Difference Requirement Tables, both Revision NEW, which contain elements constituting the training module to support the RTS of the Boeing 737-8 and -9 (MAX).

(11.2) For all other pilots: An initial type rating course for the Boeing 737-8/-9 (MAX), or differences (conversion from another model) training to the Boeing 737-8/-9 (MAX), as applicable, which includes the mandatory elements of the OSD-FC Boeing 737, Boeing document D626A014 Revision NEW.

**Full Flight Simulators (FFS) used for Pilot Training:**

(12) From the effective date of this AD, ensure that FSTD used to deliver training to pilots, as required by paragraph (11) of this AD, are capable to support the applicable OSD-FC TASE and the RTS Appendix, as applicable. Concurrently, liaise with the FSTD Operator to verify that the requirements of paragraphs (13) and (14) of this AD are complied with.

(13) From the effective date of this AD, ensure that on each Boeing 737 MAX FFS, used to deliver training to pilots as required by paragraph (12) of this AD, the instructions of the applicable Boeing SDBs related to the Boeing 737 MAX RTS are embodied. To this extent, the actions specified in paragraphs (13.1) and (13.2) are applicable.

(13.1) FSTD / FFS Binary Simulation Load must incorporate revision 3.23.4\_3, or later, as described in Boeing SDB-737-001 Revision G, or later revisions, and the FCC software revision P12.1.2 must be active.

Note 2: Regulation (EU) No 1178/2011 ORA.FSTD.110 Modifications require that the competent authority must be notified of the updated Binary Simulation Load. The FSTD documentation available to the user (qualification certificate and/or FSTD configuration control documents) must have a clear identification of the Binary Simulation Load installed.

(13.2) Evaluate the manual stabilizer trim system for proper control forces and travel as described in CS-FSTD(A) initial issue (and issue 2) Appendix 1 to CS FSTD(A).300 FSTD points g.1 and i.1. As described in g.1, system operation should be predicated on, and traceable, to the system data provided by the aeroplane manufacturer, original equipment manufacturer, or alternative approved data. The instructions of Boeing SDB-737-006 provide an acceptable method for FSTD Operators to validate manual stabilizer trim wheel forces. Whenever the forces are not adequate to meet the training objectives, the FSTD Operator must declare the FFS unsuitable to conduct training on manual stabilizer trim wheel.



(14) From the effective date of this AD, ensure that on Boeing 737 NG FFS, when used to deliver training to pilots as required by paragraph (11) of this AD, manual stabilizer trim system is evaluated for proper control forces and travel as described in CS-FSTD(A) initial issue (and issue 2) Appendix 1 to CS FSTD(A).300 FSTD Standards g.1 and i.1. As described in g.1, system operation should be predicated on, and traceable to, the system data provided by the aeroplane manufacturer, original equipment manufacturer, or alternative approved data. For previously qualified FFSs (those that have a qualification basis before CS-FSTD(A) initial issue became applicable), the FSTD operator should refer to the original FFS qualification basis Primary Reference Document standard (the standard under which the FFS was initially qualified), which contains similar requirements to evaluate control forces and travel.

The instructions of Boeing SDB-737-007 provide an acceptable method for FSTD operators to validate manual stabilizer trim wheel forces. Whenever the forces are not adequate to meet the training objectives, the FSTD operator must declare the FFS unsuitable to conduct training on manual stabilizer trim wheel.

**Prohibition to Install affected FCC OPS and affected MDS DPC OPS:**

(15) For Group 1 and Group 2 aeroplanes: From the effective date of this AD, do not install on any aeroplane affected FCC OPS or affected MDS DPC OPS, as defined in this AD.

REVISED

<p><b>Reference Publications:</b></p>	<p>Boeing Special Attention SB 737-00-1028 original issue dated 20 July 2020.</p> <p>Boeing Alert Requirements Bulletin 737-22A1342 RB dated 17 November 2020, or Revision 1 dated 23 December 2020.</p> <p>Boeing Special Attention SB 737-27-1318 original issue dated 10 June 2020, or Revision 1 dated 24 June 2020, and Revision 2 dated 10 November 2020.</p> <p>Boeing SB 737-27-1320 original issue dated 14 October 2020.</p> <p>Boeing Special Attention SB 737-31-1860 original issue dated 12 June 2020, or Revision 1 dated 02 July 2020.</p> <p>Boeing SDB-737-001 Revision G dated 09 November 2020.</p> <p>Boeing SDB-737-006 original issue dated 03 June 2019.</p> <p>Boeing SDB-737-007 original issue dated 13 June 2019.</p> <p>EASA approved Boeing 737 MAX B-737-8/-9 MMEL, Boeing document D639A001-02, Revision 2, dated 25 September 2020, EASA approved on 23 December 2020.</p> <p>Boeing 737 document D626A014 (Operational Suitability Data – Flight Crew) Revision NEW, dated 24 November 2020, EASA approved on 22 December 2020.</p> <p>Boeing 737 document D626A014-1 (Operator Difference Requirement Tables) Revision NEW, dated 24 November 2020, EASA approved on 22 December 2020</p> <p>Boeing 737 MAX B-737-8/-9 AFM, Boeing document D631A002 (operator-customised AFM applies) EASA approved on 22 December 2020.</p> <p>The use of later approved revisions of the above-mentioned documents is acceptable for compliance with the requirements of this AD.</p>
<p><b>Remarks:</b></p>	<p>[1]. This AD follows EASA PAD No.: 20-184 which was posted on 24 November 2020.</p> <p>[2]. Enquiries regarding this Airworthiness Directive should be referred to: <a href="mailto:Continued.Airworthiness@caa.co.uk">Continued.Airworthiness@caa.co.uk</a></p>

### Appendix 1 – AFM and MMEL Changes

In the Operating Procedures chapter, revise the General paragraph to include the information in

<b>Figure 1 to paragraph (3) of this AD</b>	
<b>Standard Operating Procedures</b>	<b>(Required by CAA AD 2021-0001)</b>
Flight crews should follow company specific Standard Operating Procedures (SOPs) for the handling of Non-Normal Situations. Company SOPs for handling Non-Normal situations must include at least the items mentioned below:	
As a general overview of how non-normal situations should be conducted, consider maximum use of autoflight system to reduce workload, if available and appropriate. The flight crew should recognize and announce the non-normal situation to be acknowledged by other pilot.	
Maintain airplane control: The Pilot Flying (PF) is to maintain airplane control and ensure that the flight path is under control. The Pilot Monitoring (PM) is to monitor the flight path.	
Analyse the situation and apply good CRM: The flight crew shall review all warning lights, caution lights, and other alert lights to identify the non-normal situation. Prioritize alerts and recommend course of action.	
Take the proper action: Do the NNC memory items based on each crewmember’s area of responsibility. Call for and complete the appropriate NNC. Review all warning lights, caution lights, and other alerts; complete other NNCs as required.	
Evaluate the need to land: Assess status of the airplane. Review options for diversion or continued flight.	
Definitions:	
Recall items are minimum immediate action items	
Reference items are accomplished after Recall items have been accomplished.	

This figure **does not correspond to any requirement** of FAA AD 2020-24-02.

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In the Operating Procedures chapter, replace the existing Airspeed Unreliable paragraph with the information in

<b>Figure 2 to paragraph (3) of this AD</b>	
<b>Airspeed Unreliable (E)</b>	<b>(Required by CAA AD 2021-0001)</b>
<b>Airspeed Unreliable</b>	
Airspeed or Mach indications are suspected to be unreliable:	
Recall:	
<ul style="list-style-type: none"> <li>• If autopilot is engaged, disengage.</li> <li>• If autothrottle is engaged, disengage.</li> <li>• Set both F/D switches to off.</li> <li>• Set the following gear up pitch attitude and thrust:</li> <li>• Flaps extended: 10° and 80% N1</li> <li>• Flaps up: 4° and 75% N1</li> </ul>	

**Figure 2 to paragraph (3) of this AD****Airspeed Unreliable (E)****(Required by CAA AD 2021-0001)**

Reference:

PROBE HEAT switches check on.

The following indications are reliable: attitude, N1, ground speed, and radio altitude.

**Notes:**

1. Stick shaker, overspeed warning and airspeed low alerts may sound erroneously or simultaneously.
2. The flight path vector and pitch limit indicator may be unreliable on the PFD and HUD (as installed).
3. If the AOA indicator option is installed, the stick shaker indicator may be unreliable. AOA digital readout, analogue needle, and approach reference band may be unreliable if the airspeed unreliable condition is caused by erroneous AOA.

Attempt to determine a reliable airspeed indication.

If a reliable airspeed indication can be determined:

Use the reliable airspeed indication for the remainder of the flight. If only the standby airspeed indication is reliable do not use autopilot, autothrottle, or flight directors. If the captain's or first officer's airspeed indication is reliable, turn on the flight director switch on the reliable side. If needed, engage autopilot on the reliable side. Do not use autothrottle.

**Note:** Autopilot may not engage or may disengage automatically.

If a reliable airspeed indication cannot initially be determined:

Using performance tables from an approved source, set the pitch attitude and thrust setting for the current airplane configuration and phase of flight. When in trim and stabilized, compare the captain, first officer, and standby airspeed indicators with the airspeed shown in the table. An airspeed indication that differs by more than 20 knots or 0.03 Mach from the airspeed shown in the table should be considered unreliable. If only the standby airspeed indication is reliable, do not use autopilot, autothrottle, or flight directors. If the captain's or first officer's airspeed indication is reliable, turn on the flight director switch on the reliable side, and autopilot if needed. Do not use autothrottle.

**Note:** Autopilot may not engage or may disengage automatically.

If a reliable airspeed indication cannot be determined using performance tables from an approved source:

Using the performance tables from an approved source, set pitch attitude and thrust setting for the airplane configuration and phase of flight as needed. Reference an approved source for landing distances.

**Notes:**

1. Maintain visual conditions if possible.
2. Establish landing configuration early.
3. Radio altitude reference is available below 2500 feet.
4. Use electronic and visual glideslope indicators, where available, for approach and landing. Attempt to determine a reliable altitude indication.

**Figure 2 to paragraph (3) of this AD****Airspeed Unreliable (E)****(Required by CAA AD 2021-0001)**

Use the most reliable altitude indication for the remainder of the flight. If the captain's or first officer's altitude indication is reliable:

The airplane may not meet RVSM requirements. Set transponder to reliable side and select traffic alerts only mode.

If captain's and first officer's altitude indications are both unreliable:

Turn off transponder altitude reporting.

**Note:** Airplane does not meet RVSM requirements.

A nuisance stick shaker may be deactivated at pilot's discretion. This improves recognition of a stall warning on the opposite side.

**Note:** Elevator Feel Shift may be active, resulting in increased control column forces. If deactivating stick shaker **is** needed: Only the active stick shaker should be deactivated. Deactivate erroneous stick shaker.

**Notes:**

1. When the circuit breaker is pulled, increased control column forces due to Elevator Feel Shift activation are removed.
2. The stick shaker on the opposite side is not deactivated.

If deactivating stick shaker **is not** needed: end of procedure except deferred items.

In addition to the normal descent, approach and landing checklists, complete the following deferred items:

For approach, only set the BARO minimums on the reliable PFD. Remove the BARO minimums from the unreliable PFD.

**Note:** If BARO minimums are set only on the First Officer's PFD, DH/MDA aural callouts are not provided. In the event of a go-around, do the normal go-around procedure except refer to the Flight with Unreliable Airspeed go-around table to determine the go-around pitch setting.

In the event of a go-around if either the Captain's or First Officer's airspeed indication is reliable, when TO/GA is pushed, the flight director pitch bar may be removed. Selection of an AFDS pitch mode change, such as LVL CHG, restores the flight director pitch bar.

In the event of a go-around and the standby airspeed indication is the only reliable airspeed, do not use TO/GA.

This figure corresponds to, **but is different from**, the requirements of Figure 2 to paragraph (h)(3) of FAA AD 2020-24-02.

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In the Certificate Limitations chapter, revise the Required Navigation Performance paragraph to include the information in

<b>Figure 3 to paragraph (3) of this AD</b>	
<b>Required Navigation Performance - Authorization Required</b>	<b>(Required by CAA AD 2021-0001)</b>
Conducting RNP AR operation is prohibited.	

This figure **does not correspond to any requirement** of FAA AD 2020-24-02.

\*\*\*\*

In the Operating Procedures chapter, replace the existing Runaway Stabilizer paragraph with the information in

<b>Figure 4 to paragraph (3) of this AD</b>	
<b>Runaway Stabilizer (E)</b>	<b>(Required by CAA AD 2021-0001)</b>
If uncommanded stabilizer movement occurs continuously or in a manner not appropriate for flight conditions:	
Recall:	
Firmly hold control column. Disengage autopilot if engaged. Disengage autothrottle if engaged. Use the control column and thrust levers to control airplane pitch attitude and airspeed. Use main electric stabilizer trim to reduce control column forces.	
If the runaway stops after autopilot is disengaged, do not re-engage autopilot or autothrottle; end of procedure.	
If the runaway continues after autopilot is disengaged, place both STAB TRIM cutout switches to CUTOUT.	
If the runaway continues, grasp and hold stabilizer trim wheel.	
Reference:	
Trim the stabilizer manually.	
Notes:	
1. A two-pilot effort may be used to correct an out of trim condition.	
2. Reducing airspeed reduces airloads on the stabilizer which can reduce the effort needed to manually trim. Anticipate trim requirements. Do not re-engage autopilot or autothrottle.	
In addition to the normal descent, approach and landing checklists, complete the following deferred item:	
Establish landing configuration and in-trim condition early on final approach.	

This figure corresponds to the requirements of Figure 3 to paragraph (h)(4) of FAA AD 2020-24-02.

\*\*\*\*

In the Operating Procedures chapter, replace the existing Stabilizer Trim paragraph with the information in

<b>Figure 5 to paragraph (3) of this AD</b>	
<b>Stabilizer Trim Inoperative</b>	<b>(Required by CAA AD 2021-0001)</b>
Loss of electric trim through the main electric stabilizer trim switches, or when directed by the Stabilizer Out of Trim procedure.	
Place both STAB TRIM cutout switches to CUTOUT. The autopilot is not available. Trim stabilizer manually. A two-pilot effort may be used and will not cause system damage.	
<b>Notes:</b>	
<ol style="list-style-type: none"> <li>1. Reducing airspeed reduces airloads on the stabilizer which can reduce the effort needed to manually trim.</li> <li>2. If the failure could be due to ice accumulation, descend to a warmer temperature and attempt again to trim manually.</li> </ol>	
If the stabilizer can be trimmed manually, anticipate trim requirements. If the stabilizer cannot be trimmed manually, expect higher than normal elevator forces during approach and landing. The thrust reduction at flare will cause a nose down pitch.	
Plan a flaps 15 landing. Set Vref 15+10 knots.	
<b>Note:</b> The maximum wind additive should not exceed 5 knots. Check the non-normal landing distance tables in an approved source.	
In addition to the normal descent, approach and landing checklists, complete the following deferred items:	
Review the normal go-around procedure. During a go-around, advance thrust to go-around smoothly and slowly to avoid excessive pitch-up.	
Establish landing configuration early on final approach.	

This figure corresponds to the requirements of Figure 4 to paragraph (h)(5) of  
FAA AD 2020-24-02.

\*\*\*\*

In the Operating Procedures chapter, add the information in

<b>Figure 6 to paragraph (3) of this AD</b>	
<b>Speed Trim Fail</b>	<b>(Required by CAA AD 2021-0001)</b>
The Speed Trim function and MCAS function are inoperative.	
Continue normal operation.	
<b>Note:</b> The Speed Trim System will not provide stabilizer trim inputs when deviating from a trimmed airspeed.	

This figure corresponds to the requirements of Figure 5 of paragraph (h)(6) of  
FAA AD 2020-24-02.

\*\*\*\*

In the Operating Procedures chapter, add the information in

<b>Figure 7 to paragraph (3) of this AD</b>	
<b>Stabilizer out of Trim</b>	<b>(Required by CAA AD 2021--0001)</b>
The STAB OUT OF TRIM light illuminates for the following conditions:	
On the ground: A partial failure of a Flight Control Computer.	
In-flight: the autopilot does not set the stabilizer trim correctly.	
If on ground, do not take off. End of procedure.	
In flight, during large changes in trim requirements, the STAB OUT OF TRIM light may illuminate momentarily. If the stabilizer is trimming, continue normal operation; end of procedure.	
In flight, if the stabilizer is not trimming, hold control column firmly. Disengage autopilot. Disengage autothrottle if engaged. Use main electric stabilizer trim as needed.	
If the stabilizer responds to electric trim inputs, do not re-engage the autopilot or autothrottle; end of procedure.	
If the stabilizer does not respond to electric trim inputs, accomplish the Stabilizer Trim Inoperative procedure.	

This figure corresponds to the requirements of Figure 6 of paragraph (h)(7) of FAA AD 2020-24-02.

\*\*\*\*

In the Operating Procedures chapter, add the information in

<b>Figure 8 to paragraph (3) of this AD</b>	
<b>AOA Disagree</b>	<b>(Required by CAA AD 2021-0001)</b>
When AOA DISAGREE appears on the PFD, this indicates the left and right angle of attack vanes disagree. Accomplish the Airspeed Unreliable procedure.	

This figure corresponds to the requirements of Figure 7 of paragraph (h)(8) of FAA AD 2020-24-02.

\*\*\*\*

In the Operating Procedures chapter, add the information in

<b>Figure 9 to paragraph (3) of this AD</b>	
<b>ALT Disagree</b>	<b>(Required by CAA AD 2021-0001)</b>
The ALT DISAGREE alert is displayed on the captain's and first officer's altitude tape on the PFD when the indications disagree.	
If the IAS DISAGREE alert is also shown on the speed tape of the PFD, accomplish the Airspeed Unreliable procedure.	
If the IAS DISAGREE is not shown, check all altimeters are set to correct barometric setting.	
If the ALT DISAGREE alert remains, do not use the flight path vector, and if a reliable altitude is determined, use the transponder for the reliable side.	



<b>Figure 9 to paragraph (3) of this AD</b>	
<b>ALT Disagree</b>	<b>(Required by CAA AD 2021-0001)</b>
<p>If a reliable altitude is not determined, set the transponder to not transmit altitude.</p> <p>In addition to the normal descent, approach and landing checklists, complete the following deferred items:                  For approach, only set the BARO minimums on the reliable PFD. Remove the BARO minimums from the unreliable PFD.</p> <p><b>Note:</b> If BARO minimums are set only on the First Officer's PFD, DH/MDA aural callouts are not provided.</p> <ul style="list-style-type: none"> <li>- Establish landing configuration early.</li> <li>- Radio altitude reference is available below 2 500 ft.</li> <li>- Use electronic and visual glideslope indicators where available for approach and landing.</li> </ul>	

This figure corresponds to the requirements of Figure 8 of paragraph (h)(9) of FAA AD 2020-24-02.

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In the Operating Procedures chapter, add the information in

<b>Figure 10 to paragraph (3) of this AD</b>	
<b>IAS Disagree</b>	<b>(Required by CAA AD 2021-0001)</b>
<p>When IAS DISAGREE appears on the PFD, this indicates the captain's and first officer's airspeed indicators disagree. Accomplish the Airspeed Unreliable procedure.</p>	

This figure corresponds to the requirements of Figure 9 of paragraph (h)(10) of FAA AD 2020-24-02.

\*\*\*\*

In the Certificate Limitations and Operating Procedures chapters, add the information in

<b>Figure 11 to paragraph (3) of this AD</b>							
<b>Autopilot Single Channel Operation / Malfunction</b>	<b>(Required by CAA AD 2021-0001)</b>						
<p><b>Limitations</b></p> <p>For single channel operation during approach, the autopilot shall not remain engaged below the Minimum Use Height (MUH).</p> <p>The following table defines the MUH for single channel operation as function of aircraft model:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Aircraft Model</th> <th style="text-align: center;">MUH (feet AGL)</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">737-8</td> <td style="text-align: center;">111</td> </tr> <tr> <td style="text-align: center;">737-9</td> <td style="text-align: center;">130</td> </tr> </tbody> </table> <p>Operating Procedures - Demonstrated Altitude Loss</p> <p>The demonstrated altitude loss due to a simulated hard-over single channel autopilot malfunction is:</p> <ul style="list-style-type: none"> <li>- Level Flight:</li> <li>- Flaps up when recovery was initiated 3 seconds after the recognition point:</li> </ul>		Aircraft Model	MUH (feet AGL)	737-8	111	737-9	130
Aircraft Model	MUH (feet AGL)						
737-8	111						
737-9	130						

<b>Figure 11 to paragraph (3) of this AD</b>							
<b>Autopilot Single Channel Operation / Malfunction</b>	<b>(Required by CAA AD 2021-0001)</b>						
<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: center;">Aircraft Model</th> <th style="text-align: center;">Demonstrated Loss (feet)</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">737-8</td> <td style="text-align: center;">259</td> </tr> <tr> <td style="text-align: center;">737-9</td> <td style="text-align: center;">230</td> </tr> </tbody> </table>	Aircraft Model	Demonstrated Loss (feet)	737-8	259	737-9	230	
Aircraft Model	Demonstrated Loss (feet)						
737-8	259						
737-9	230						
<p>Approach:</p> <p>(a) Within 1 second time delay between recognition point and initial recovery:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: center;">Aircraft Model</th> <th style="text-align: center;">Demonstrated Loss (feet)</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">737-8</td> <td style="text-align: center;">31</td> </tr> <tr> <td style="text-align: center;">737-9</td> <td style="text-align: center;">35</td> </tr> </tbody> </table>		Aircraft Model	Demonstrated Loss (feet)	737-8	31	737-9	35
Aircraft Model	Demonstrated Loss (feet)						
737-8	31						
737-9	35						
<p>(b) When a recovery was initiated without delay:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: center;">Aircraft Model</th> <th style="text-align: center;">Demonstrated Loss (feet)</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">737-8</td> <td style="text-align: center;">8</td> </tr> </tbody> </table>		Aircraft Model	Demonstrated Loss (feet)	737-8	8		
Aircraft Model	Demonstrated Loss (feet)						
737-8	8						

This figure **does not correspond to any requirement** of FAA AD 2020-24-02.

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In the EASA-approved MMEL, add the information in

<b>Figure 12 to paragraph (4) of this AD</b>	
<b>CAA MMEL Changes</b>	<b>(Required by CAA AD 2021-0001)</b>
<b>ATA 22 – Autoflight</b>	
<p>(1) <b>Autopilot Systems</b>                      2.22-10-01.1 Deleted MMEL dispatch option.                      Dispatch is not permitted with both autopilot systems inoperative.</p>	
<p>(2) <b>Autopilot Disengage Aural Warning System</b>                      2.22-10-02.1 Deleted MMEL item.                      The autopilot disengage aural warning system must be operative for dispatch.</p>	
<p>(3) <b>STAB OUT OF TRIM Light</b>                      2.22-10-03.1 Deleted MMEL item.                      The STAB OUT OF TRIM light must be operative for dispatch.</p>	
<p>(4) <b>Speed Trim Function</b>                      2.22-11-01.1 Deleted MMEL item.                      The speed trim function must be operative for dispatch.</p>	
<p>(5) <b>SPEED TRIM FAIL Light</b>                      2.22-11-02.1 Deleted MMEL item.                      The SPEED TRIM FAIL light must be operative for dispatch.</p>	

**Figure 12 to paragraph (4) of this AD****CAA MMEL Changes****(Required by CAA AD 2021-0001)****(6) Mode Control Panel Switches**

2.22-11-05.1 Deleted MMEL dispatch option.

Dispatch is not permitted with both A/P ENGAGE Command (CMD) Switches (A and B) inoperative.

**(7) Mode Control Panel Switch Lights**

2.22-11-06.1 Deleted MMEL dispatch option.

Dispatch is not permitted with both A/P ENGAGE Command (CMD) switch lights inoperative.

**(8) Autoflight Status Annunciator**

2.22-11-08.1 Added MMEL requirement for (O) procedure.

2.22-11-08.1 Added proviso.

2.22-11-08.1 Deleted MMEL dispatch option.

Dispatch is not permitted with both autopilot (A/P) disengage lights inoperative. Dispatch may be made with one A/P disengage light inoperative, provided the autopilot disengage aural warning is verified to operate normally before each flight.

**(9) Control Wheel Autopilot Disengage Switches**

2.22-11-10.1 Added MMEL requirement for (O) procedure.

2.22-11-10.1 Added proviso.

2.22-11-10.1 Deleted MMEL dispatch option.

Dispatch is not permitted with both Control Wheel A/P Disengage Switches inoperative.

Dispatch may be made with one control wheel A/P disengage switch inoperative provided the following conditions are met.

- a) Mode Control Panel A/P DISENGAGE bar is verified to operate normally before each departure.
- b) A/P is not used below 1,500 feet AGL, and
- c) Approach minimums do not require use of A/P.

**ATA 27 - Flight Controls****(10) Control Wheel Trim Switch Systems**

2.27-41-01.1 Deleted MMEL item.

Both control wheel trim switch systems must be operative for dispatch.

This figure corresponds to, **but is different from**, the requirements of Figure 10 of paragraph (i) of FAA AD 2020-24-02.

Note to Figure 12: The MEL provisions specified in figure 12 to paragraph (4) of this AD correspond to the changes introduced in EASA-approved Boeing 737 MAX B-737-8/-9 MMEL, Boeing document D639A001-02, Revision 2.

## Appendix 2


**CAA Form 18B - Approved Flight Conditions for a Permit to Fly – CAA AD G-2021-0001**
**3. Aircraft manufacturer/type Boeing 737-8, -9 “MAX”**
**4. Serial number(s) MSN:** 44593, 44595, 44597, 44648, 44599, 44600

**5. Purpose (i.a.w. 21.A.701(a))**

Flying an aeroplane for troubleshooting purposes or to check the functioning of one or more systems, parts or appliances after maintenance.

**Initial duration for Permit to Fly: From: 27 Jan 2021 Until: 31 Dec 2021**
**6. Aircraft configuration**

These Flight Conditions are approved only for the purpose of carrying out the 'operational readiness flight' required by paragraph (9) of CAA AD G-2021-00001. The holder of the Permit to Fly issued on the basis of these Flight Conditions shall ensure that, except for compliance with that AD and these flight conditions, the configuration of the aeroplane is compliant with the requirements of Annex I (Part-M) of Commission Regulation (EU) No 1321/2014.

**7. Substantiations**

The implementation of actions required by CAA AD G-2021-0001 ensures the correction of the unsafe conditions identified in EASA Emergency AD 2019-0051-E dated 12 March 2019. These Flight Conditions are required as CAA AD G-2021-0001 mandates an operational readiness flight to be completed before an affected aeroplane can be safely returned to service. However, until this operational readiness flight is completed, the AD cannot be recorded as being complied with and until that time, the aeroplane's Airworthiness Review Certificate (ARC) remains invalid. Therefore, these Flight Conditions enable the issuance of a Permit to Fly, under which the operational readiness flight can be safely performed in absence of a valid ARC. CAA has determined and is satisfied that an aeroplane meeting the configuration as specified in Field 6 can perform the intended operational readiness flight safely under the defined conditions and restrictions as specified in Field 8. Note: A flight conducted in accordance with these flight conditions meets the criteria of a "Level B" maintenance check flight, as defined in SPO.SPEC.MCF.100 - Levels of maintenance check flight (Commission Regulation (EU) No 965/2012, Annex VIII, Subpart E, Section 5 refers).

**8. Conditions/Restrictions**

The operational readiness flight must be conducted in accordance with the following conditions or restrictions:

- The flight shall be conducted in accordance with the Accomplishment Instructions of Boeing Special Attention SB 737-00-1028 dated 20 July 2020. The use of Appendix A of the SB is optional.
- The flight shall be a non-passenger, non-commercial flight.
- These Flight Conditions are valid for one (1) operational readiness flight only.

The approval of these flight conditions remains valid, provided the aeroplane remains in the configuration as specified in Field 6, and compliance with all applicable airworthiness directives, including CAA AD G-2021-0001, is ensured.

**9. Statement**

These flight conditions have been established and justified in accordance with 21.A.708.

The aeroplane as defined in Field 6 above has no features and characteristics making it unsafe for the intended operation under the conditions and restrictions as specified in Field 8.

**Form SRG1728B Issue01, October 2020**