ENR 1.7 ALTIMETER SETTING PROCEDURES

For Military Users:

1.7.1 ALTIMETER SETTINGS

1.7.1.1 Controllers **should** utilise the appropriate altimeter pressure setting for the provision of Air Traffic Services (ATS) and conducting Aerospace Battle Management (ABM) operations as defined in the UK Aeronautical Information Publication (AIP), except:

1.7.1.1.1 When providing ATS to UK Military Air Systems flying in the vicinity of a military Aerodrome, landing, taking off or flying in the visual circuit. The pressure setting to be used for these Air Systems is as follows:

1.7.1.1.1.1 On an Aerodrome without a designated Runway the QFE datum for all procedures **should** be the Aerodrome elevation (Aerodrome QFE).

1.7.1.1.1.2 In all other circumstances the QFE datum for all procedures **should** be the Touchdown Zone elevation for the Runway in use (Runway QFE). Where more than one Runway is in use for simultaneous instrument and visual procedures, the QFE relevant to the instrument Runway **should** be used. Mixed use of QFEs **should** not be used.

1.7.1.1.2 When providing services to Air Systems operating outside the UK Flight Information Region (FIR), local orders will dictate appropriate altimeter pressure settings to be used.

1.7.1.1.3 When controlling Air Systems within a defined Operational/Exercise (Op/Ex) area, controllers **should** use the Force QNH as defined in the relevant Op/Ex Order.

1.7.1.1.3.1 Where appropriate for the general conduct of the Op/Ex, Force QNH **should** be used at all times whilst clear of non-segregated Controlled Airspace (CAS). However, if a Force QNH is required for lower level flight, but airspace structure dictates that flight on Standard Altimeter Setting (SAS) at higher altitudes is also necessary, a 'Force Transition Altitude (TA) and Transition Level (TL)' (providing adequate terrain and airspace separation) **should** be set and promulgated within the same Op/Ex Orders.

1.7.1.1.3.2 Validity of Force QNH **should** be for as long a period of time as possible (up to 6-hr periods), preferably covering likely flying waves. As a minimum, and only for Operations with a C2 agency in communication with all participants, Force QNH **should** be issued and promulgated at least an hour in advance, valid for one hour (akin to current Regional Pressure Setting (RPS) procedures).

1.7.1.1.3.3 Force QNH **should** be promulgated through Met Office channels as agreed by Op/Ex planners.

1.7.1.1.4 When providing ATS in the maritime environment, the relevant QNH **should** be used in accordance with BRd 766, Embarked Aviation Operating Handbook.

1.7.1.2 Controllers **should** ensure the correct altimeter pressure setting, as defined in Force Command or local orders, is set on Air Traffic Management equipment being utilised to provide ATS or when conducting ABM operations.

1.7.1.3 Where QFE is below 950 Hectopascals (hPa), QNE information **should** be provided to pilots of Air Systems whose altimeters cannot be set to below 950 hPa. A QFE/QNE table **should** be held by Air Traffic Control (ATC).

1.7.1.4 When Aerodrome QNH is passed to Air Systems, the message **should** include Aerodrome elevation or touchdown/threshold elevation as determined by local orders. When operating in the maritime environment, the flight deck elevation should not be passed, unless specifically requested or required for Ship Controlled Approach.

1.7.1.5 **TL.** ATC units **should** establish the TL on the basis of the relationship between the Standard Altimeter Setting (SAS) pressure datum (1013.25 hPa) and the Aerodrome QNH. ATC **should** maintain an up-to-date readout of the TL and be prepared to pass it on request or in accordance with unit/local orders. Where 2 or more aerodromes are in close proximity, a common TL **should** be established.

1.7.1.6 The TL **should** be the lowest Flight Level available for use above the TA and should be at least 1000 ft above the TA to allow both the TA and the TL to be used for flight(Subject to terrain and airspace restrictions), whilst maintaining vertical separation. The TL **should** be determined using Table 1, as follows:

1.7.1.6.1 Within controlled airspace by the controlling authority, where it will normally be based on the QNH of the major aerodrome;

1.7.1.6.2 Outside controlled airspace by the aerodrome, where it will be based on the aerodrome QNH.

7.1.7 **TA.** The TA **should** be the altitude at or below which the vertical position of an Air System is controlled by reference to altitude.

7.1.8 **Transition Layer.** The Transition Layer **should** be the airspace between the TA and the TL and is at least 1000ft deep.

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1.7.1.9 **Hectopascals (hPa).** hPa are the notified unit for measurement of pressure for flying within UK airspace. Altimeter setting values will normally to be expressed in hPa, rounded down to the nearest whole hPa, but they can be given in inches of mercury (to the nearest hundredth of an inch) either on request or when it is known that the Air System is one in which the altimeter sub-scale is calibrated in inches (for conversion table see GEN 2.6 or Flight Information Handbook). When giving an altimeter setting below 1000 hPa, or in cases where confusion or ambiguity may result, "Hectopascals" will be appended to the figures passed.

1.7.1.10 **QFE.** QFE is the corrected barometric pressure for a specified datum. When QFE is set on an altimeter sub-scale, the altimeter will indicate the vertical distance relative to the QFE datum (height).

1.7.1.11 **Aerodrome QNH.** Aerodrome QNH is the observed pressure at an aerodrome elevation corrected for temperature and reduced to mean sea level, using the International Civil Aviation Organization (ICAO) formula. When Aerodrome QNH is passed to aircraft, the message will include aerodrome elevation or touchdown/threshold elevation as determined by local orders. When Aerodrome QNH is set on an altimeter subscale, the altimeter will indicate the vertical distance relative to mean sea level (altitude). Examples of where Aerodrome QNH can be used include:

1.7.1.11.1 For calculating the TL in the vicinity of an airfield.

1.7.1.11.2 For calculating Minimum Safe Flight Levels (MSFLs). c.As a landing datum for some foreign and civil aircraft.

1.7.1.11.3 For flights arriving, departing or flying in the vicinity of civil aerodromes.

1.7.1.11.4 For internal use within an Air System when requested by military aircrew.

1.7.1.12 **Altimeter Setting Regions (ASR).** The UK and its surrounding sea area are divided into a number of ASR, the boundaries of which, where possible, cut airways at 90° and at reporting points. The boundaries and names of UK ASRs are shown in RAF Military Flight Information Publications (Mil FLIPS) and the UK AIP.

1.7.1.13 **RPS.** The RPS is the lowest forecast QNH within a designated altimeter setting region, and is used as an altitude pressure datum for Air Systems flying at or below the TA, away from aerodrome circuit and approach patterns. It is available hourly for the period H+0 to H+1 and ATC units will maintain a record of the current pressure setting for their local and adjoining regions. The value for the period H+1 to H+2 is available on request from the meteorological office. The RPS is also used to calculate the MSFL for En-Route flying. When RPS is set on an altimeter sub-scale, the altimeter will indicate the vertical distance relative to the RPS datum (altitude).

1.7.1.14 **SAS.** The SAS assumes a mean sea level pressure of 1013.25 hPa (29.92 inches). It is used for all flying above the TA and when flying above 3000 ft AMSL in the UK outside CAS, except when:

1.7.1.14.1 Flying in conformity with instructions given by ATC, HM Ships or an Air Surveillance and Control System unit.

1.7.1.14.2 Completing manoeuvres requiring rapid changes of altitude or heading (eg aerobatics, spinning and air combat training).

1.7.1.15 **Force QNH.** Force QNH is the lowest QNH forecast for an Operation/Exercise area for a defined time-period. It is calculated by a suitably qualified MetO/Forecaster and promulgated to all participating units as directed by the Airspace Control Authority.

1.7.1.16 Pilots of Air Systems descending to fly at or below the TA may change from the SAS to the appropriate pressure datum when passing the TL. An exception to this rule has been made for military Air Systems making a continuous descent for entry into an established instrument pattern. In this case the appropriate QFE may be set before descent, providing that level flight will not be recommenced above the TA unless in conformity with instructions given by ATC.

1.7.1.17 **USAF Aerodromes.** At USAF operated aerodromes in the United Kingdom, QFE is not used. All procedures below the Transition Altitude are based on the aerodrome QNH, and all vertical displacements given as altitudes. Aerodrome QFE will be available on request. For further information on altimeter setting US Aircrew are to consult US publication 'Flying Operations conducted at USAF-Occupied Royal Air Force (RAF) installations in the United Kingdom' (7.1.18.1 - a).

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Table 1. PRESSURE SETTING TABLE FOR DETERMINING TRANSITION LEVEL (TL)

Aerodrome QNH (hPa)	Transition Altitude (feet)							
	3000		4000		5000		6000	
	TL *(1)*	Minimum IFR Crusing Level *(2)*	TL	Minimum IFR Crusing Level	TL	Minimum IFR Crusing Level	TL	Minimum IFR Crusing Level
1060 1050	30	30	40	40	50	50	60	60
1049 1032	35	40	45	50	55	60	65	70
1031 1014	40	40	50	50	60	60	70	70
1013 995	45	50	55	60	65	70	75	80
994 977	50	50	60	60	70	70	80	80
976 959	55	60	65	70	75	80	85	90
958 940	60	60	70	70	80	80	90	90

Remarks:
Note (1). Calculation of the TL is based upon:
a. A Standard setting (1013.25 hPa) from ICAO Doc 7488 Manual of the Standard Atmosphere and EASA Certification Specification - Definitions.
b. Assumed value of 27.3 ft per hPa derived from a linear correction which is applied to corrected barometric altitudes and confirmed as being utilised in aircraft and ATS systems, not the rounded value of 30 ft per hPa used in routine operating pressure calculations.
Note (2). Minimum IFR cruising level is in accordance with semi-circular flight rules.

1.7.1.18 Regulation And Governance

1.7.1.18.1 For further details see Military Aviation Authority (MAA) - Regulatory Article 3302 - Altimeter Settings. Additional guidance can be sourced from the following:

a. USAFE I11-101 (20 Jun 2017): www.e-publishing.af.mil

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