

RA 3302 – Altimeter Settings

Rationale

Aircraft use altimeters to assess vertical distance from a specified datum; inaccurate altimeter settings may present an increased Risk to Life by loss of separation between Aircraft and / or terrain. Provision of the appropriate altimeter setting ►◄ to Aircraft ► when providing UK Flight Information Services (UK FIS) or the North Atlantic Treaty Organization (NATO) Control Rules◄ helps reduce the Risk of loss of separation due to flight at the incorrect level.

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3302(1) ► Aviation Duty Holder-Facing Organizations, Accountable Manager (Military Flying)-Facing Organizations and Heads of Establishment (HoE) **shall** ensure that appropriate altimeter pressure settings are used when providing UK FIS or NATO Control Rules.◄

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1. ►◄ The appropriate altimeter pressure setting ►◄ as defined in the UK Aeronautical Information Publication (UK AIP) ► **should be utilized**◄, except:
 - a. When providing ► services◄ to ►◄ Aircraft flying in the vicinity of a ► MOD Aerodrome or unlicensed non-MOD Aerodrome¹◄, landing, taking off or ► conducting◄ visual circuits. ► Under these circumstances, the appropriate altimeter pressure setting, as defined by the HoE, **should** be used.
 - (1) The HoE **should**, in conjunction with permanently based Aviation Duty Holders / Accountable Managers (Military Flying), determine the most appropriate altimeter pressure setting (QFE or QNH) for the Aerodrome and ensure this is reflected in the UK Military AIP (Mil AIP), UK AIP (where appropriate), Defence Aerodrome Manual and unit / local orders.
 - (2) The simultaneous mixed use of QFE and QNH in the visual circuit **should not** be permitted, however this does not prevent an isolated approach or departure on the QNH at an Aerodrome that operates on QFE (or vice versa) provided the Aircraft is not intending to join the visual circuit.
 - (3) At Aerodromes operating on QFE, the QFE datum to be used is as follows:◄
 - (a) On an Aerodrome without a designated Runway the QFE datum for all procedures **should** be the Aerodrome Elevation (Aerodrome QFE).
 - (b) 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 permitted.
 - b. When providing services to Aircraft operating outside the UK Flight Information Region (FIR), ► the appropriate altimeter pressure setting, as defined by local, national and / or international requirements, **should** be used.◄
 - c. When ► providing services to◄ Aircraft within a defined Operational / Exercise (Op / Ex) area, ►◄ the Force QNH, as defined in the relevant Op / Ex Order, ► **should** be used.◄

¹ ► In the context of this RA, unlicensed non-MOD Aerodromes include Heliports and Helicopter Landing Sites.◄

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(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.

(2) Validity of Force QNH **should** be for as long a period of time as possible (up to 6 hour periods), preferably covering likely flying waves. As a minimum, and only for Operations with a **►Tactical Command and Control (Tac 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).

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

d. When providing **►services◄** in the maritime environment, the relevant QNH **should** be used in accordance with (iaw) BRd 766, Embarked Aviation Operating Handbook.

2. **►◄** The **►relevant◄** altimeter pressure setting, as defined in **►mid-level◄** or local orders, **►should be◄** set on **►the◄** Air Traffic Management Equipment being utilized to provide **►UK FIS or NATO Control Rules.◄◄**

3. Where QFE is below 950 Hectopascals (hPa), QNE information **should** be provided to pilots of Aircraft whose altimeters cannot be set to below 950 hPa. A QFE / QNE table **should** be held by **►units that provide UK FIS or NATO Control Rules.◄◄**

4. When Aerodrome QNH is passed to Aircraft, the **►◄** Aerodrome Elevation **►or threshold Elevation should only be passed if the Aircraft is suffering an emergency or it is requested by the pilot.◄** When operating in the maritime environment, the flight deck Elevation **should not** be passed, unless specifically requested or required **►◄**.

5. **Transition Level.** Air Traffic Control (ATC) units **should** establish the TL on the basis of the relationship between the 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 iaw unit / local orders. Where two or more Aerodromes are in close proximity, a common TL **should** be established.

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 flight² whilst maintaining vertical separation. The TL **should** be determined using Annex A, as follows:

a. Within CAS by the controlling authority, where it will normally be based on the QNH of the major Aerodrome.

b. Outside CAS by the Aerodrome, where it will be based on the Aerodrome QNH.

7. **Transition Altitude.** The TA **should** be the Altitude at or below which the vertical position of an Aircraft is controlled by reference to Altitude. **►In the UK, the Transition Altitude is usually 3000 ft³.◄**

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

9. **►Standard Altimeter Setting.** The SAS assumes a mean sea level pressure of 1013.25 hPa (29.92 inches) and **should** be used when flying above the TA and when flying above 3000 ft AMSL in the UK outside CAS, except when:

a. Flying in conformity with instructions given by ATC, His Majesty's (HM) Ships or an Air Surveillance and Control System (ASACS) unit.

² Subject to terrain and airspace restrictions.

³ **►Refer to UK AIP ENR 1.7.◄**

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- b. **Completing manoeuvres requiring rapid changes of Altitude or heading (eg aerobatics, spinning and Air Combat Manoeuvring⁴). ◀**

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10. **Hectopascals (hPa).** hPa are the notified unit for measurement of pressure for flying within UK airspace. Altimeter setting values will normally 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 Aircraft is one in which the altimeter sub-scale is calibrated in inches (▶see the **Flight Information Handbook for a conversion table** ◀). 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.

11. **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).

12. **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 ▶unit / ◀ local orders. When Aerodrome QNH is set on an altimeter subscale, the altimeter will indicate the vertical distance relative to mean sea level (Altitude). ▶ ◀

- a. ▶ ◀
- b. ▶ ◀
- c. ▶ ◀
- d. ▶ ◀
- e. ▶ ◀

13. **Altimeter Setting Regions (ASRs).** ▶ To make up for any lack of stations reporting actual QNH, the UK has been divided into a number of ASRs for each of which the meteorological office calculates the lowest forecast QNH for each hour. ◀ The boundaries and names of UK ASRs are shown in ▶ ◀ Military Flight Information Publications (Mil FLIPS) and the UK AIP.

14. **RPS.** The RPS is the lowest forecast QNH within a designated ASR, and is used as an Altitude pressure datum for Aircraft 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 ▶ ◀ 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. ▶ ◀ When RPS is set on an altimeter sub-scale, the altimeter will indicate the vertical distance relative to the RPS datum (Altitude).

- 15. ▶ ◀
 - a. ▶ ◀
 - b. ▶ ◀

16. **Force QNH.** Force QNH is the lowest QNH forecast for an Op / Ex area for a defined time-period. It is calculated by a suitably qualified ▶ **Meteorological Officer** ◀ / Forecaster and promulgated to all participating units as directed by the Airspace Controlling Authority.

17. Pilots of Aircraft 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 Aircraft making a continuous descent for entry into an established instrument pattern. In this case the appropriate QFE ▶ / QNH ◀ may be

⁴ Refer to RA 2327 – Air Combat Manoeuvring, Basic Fighter Manoeuvres and Basic Helicopter Manoeuvres.

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set before descent, providing that level flight will not be recommenced above the TA unless in conformity with instructions given by ATC, ► **HM Ships, or an ASACS unit.** ◀

ANNEX A

Figure 1 - Pressure Setting Table for Determining TL

Aerodrome QNH (hPa)	TA 3000 ft TL ▶◀	TA 3000 ft Minimum IFR Cruising Level ▶◀	TA 4000 ft TL	TA 4000 ft Minimum IFR Cruising Level	TA 5000 ft TL	TA 5000 ft Minimum IFR Cruising Level	TA 6000 ft TL	TA 6000 ft Minimum IFR Cruising 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

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 European Union Aviation Safety Agency (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 utilized in Aircraft and Air Traffic Service systems, not the rounded value of 30 ft per hPa used in routine operating pressure calculations.

Note 2. Minimum Instrument Flight Rules (IFR) cruising level is iaw semi-circular flight rules.

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