

ENR 1.7 ALTIMETER SETTING PROCEDURES

1 INTRODUCTION

1.1 A common transition altitude of 11,000ft (3,350 metres) has been established in the Singapore Flight Information Region and airspace where ATS is provided by Singapore (see ENR 2.1). This will ensure uniformity in the transition altitudes for aerodromes within the territories of Brunei, Malaysia and Singapore, except for an area of radius 10 nautical miles centred on Mount Kinabalu where the lowest safe altitude will be 15,000ft (4,570 metres) and the lowest usable flight level will be FL170.

1.2 The maximum variation in QNH values in the Singapore FIR and airspace where ATS is provided by Singapore (see ENR 2.1) does not exceed 10hPa either side of the standard setting 1013.2hPa, representing a change of about 300ft on the altimeter from QNH to 1013.2hPa. To simplify ATC procedures, therefore, a transition level of FL130 has been established, thus providing a transition layer of 2,000ft and ensuring at all times the 1,000ft vertical separation between aircraft.

1.3 No aircraft should therefore flight plan to cruise at flight levels 115, 120 and 125 when operating in the Singapore Flight Information Region and airspace where ATS is provided by Singapore (see ENR 2.1).

1.4 AREA QNH

1.4.1 AREA QNH is the forecast value of the LOWEST mean sea level pressure within Singapore FIR and airspace where ATS is provided by Singapore (see ENR 2.1), valid for a period of 6 hours. e.g. AREA QNH valid 0600-1200.

1.4.2 AREA QNH as defined above, is one of the types of MET data required for the determination of the lowest flight level which will ensure adequate terrain clearance at any location within Singapore FIR and airspace where ATS is provided by Singapore (see ENR 2.1) during the period of validity.

1.4.3 Amendments are issued by MET when the mean sea level pressure at any location in Singapore FIR and airspace where ATS is provided by Singapore (see ENR 2.1) is expected to fall below the current AREA QNH by more than 2hPa, and units responsible for airspace in which aircraft could be operating on AREA QNH shall broadcast the amended value on all air/ground frequencies in use.

1.4.4 Change from LOCAL QNH (set for departure) to AREA QNH will be made on leaving the Aerodrome Traffic Zone after take-off.

1.4.5 Cruising within the transition layer is not permitted unless specifically cleared by the ATC.

2 BASIC ALTIMETER SETTING PROCEDURES

2.1 ALTIMETER SETTING PROCEDURES

2.1.1 For flight at or below the transition altitude, the altimeter reference will be the AREA QNH. Flight will therefore be conducted in altitudes.

2.1.2 Change from LOCAL QNH (set for departure) to AREA QNH will be made on leaving the Singapore/Johor Airspace Complex or Aerodrome Traffic Zone after take-off.

2.1.3 Change from AREA QNH to LOCAL QNH will be made on entering Terminal Control Area or Aerodrome Traffic Zone or on commencement of final approach to land.

2.1.4 For flight at and above the transition level, the standard altimeter setting of 1013.2hPa will be used.

2.1.5 Change from AREA QNH to 1013.2hPa will be made on climb through the transition altitude.

2.1.6 Change from 1013.2hPa to AREA QNH will be made on descent through the transition level.

2.1.7 Cruising within the transition layer is not permitted unless specifically cleared by ATC.

2.1.8 Vertical displacement of aircraft when at or below the transition is expressed in terms of altitude whereas such displacement at or above the transition level is expressed in terms of flight level. While passing through the transition layer, vertical displacement is expressed in terms of altitude when descending and in terms of flight level when ascending.

2.1.9 Flight Level zero is located at the atmospheric pressure level of 1013.2hPa. Consecutive flight levels are separated by a pressure level corresponding to 500ft in the Standard Atmosphere.

Note: Example of the relationship between flight levels and altimeter indications are given in the following table, the metric equivalents being approximate:

FLIGHT LEVEL	ALTIMETER INDICATION	
	Number	Feet
10	1 000	300
15	1 500	450
20	2 000	600
50	5 000	1 000
100	10 000	3 050
130	13 000	3 950
150	15 000	4 550
200	20 000	6 100
250	25 000	7 600
300	30 000	9 150
350	35 000	10 650
400	40 000	12 200
450	45 000	13 700
500	50 000	15 250

2.2 TAKE-OFF AND CLIMB

2.2.1 A QNH altimeter setting shall be made available to aircraft by Approach/Aerodrome Control in the routine take-off and climb instructions.

2.2.2 Vertical displacement of aircraft during climb shall be effected by reference to altitude until reaching the transition altitude above which vertical displacement shall be effected by reference to flight level.

2.2.3 A QFE altimeter setting will be made available on request but reports to ATC are to be made in altitudes.

2.3 VERTICAL SEPARATION - ENROUTE

2.3.1 Aircraft en-route in the Singapore FIR and airspace where ATS is provided by Singapore (see ENR 2.1), regardless whether IFR or VFR, shall be flown at flight levels or altitudes where appropriate.

2.3.2 It is the pilots' responsibility to select a flight level which will give adequate terrain clearance using forecast pressure information.

2.3.3 For the purpose of en-route vertical separation IFR and VFR flights within controlled airspace and flights in uncontrolled airspace of the Singapore FIR and airspace within the Jakarta FIR where ATS is provided by Singapore (see ENR 2.1), reference should be made to the following:

- a. Semi-circular system of cruising levels within all controlled airspace (IFR flights) (section ENR 1.7 para 4.2);
- b. VFR flights cruising levels up to FL150 within controlled airspace (section ENR 1.7 para 4.3);
- c. Quadrantal cruising levels in uncontrolled airspace of the Singapore FIR and airspace within the Jakarta FIR where ATS is provided by Singapore (see ENR 2.1) (section ENR 1.7 para 4.4).

2.4 APPROACH AND LANDING

2.4.1 A QNH altimeter setting shall be made available in the routine approach and landing instructions.

2.4.2 A QFE altimeter setting will be made available on request but reports to ATC are to be made in altitude.

2.4.3 Vertical displacement of aircraft during approach is effected by reference to flight level until reaching the transition level below which vertical displacement is controlled by reference to altitude.

2.5 MISSED APPROACH

2.5.1 The relevant portions of paragraphs 2.1, 2.2, 2.3 and 2.4 shall be applied in case of a missed approach.

3 PROCEDURES APPLICABLE TO OPERATORS AND PILOTS

3.1 FLIGHT PLANNING

3.1.1 The level(s) at which a flight is to be conducted shall be specified in a flight plan;

- a. In terms of flight level(s) if the flight is to be conducted at or above the transition level, and
- b. In terms of altitude(s) if the flight is to be conducted in the vicinity of an aerodrome and at or below the transition altitude.

Note: 1:

Short flights in the vicinity of an aerodrome may often be conducted only at altitude below the transition altitude.

Note: 2:

Flight levels are specified in a plan by number, and not in terms of feet as is the case with altitudes.

4 TABLES OF CRUISING LEVELS

4.1 SEMI-CIRCULAR SYSTEM OF CRUISING LEVELS WITHIN THE SINGAPORE FIR AND AIRSPACE WHERE ATS IS PROVIDED BY SINGAPORE (SEE ENR 2.1)

4.1.1 The pilot-in-command of an IFR flight at or above 3,000ft within controlled airspace and above FL250 in uncontrolled airspace shall select a level corresponding to the appropriate magnetic track as indicated in para 4.2. The Quadrantal Height Rule as contained in para 4.4 will continue to be used for all flights below FL200 in uncontrolled airspace of the Singapore FIR and airspace within the Jakarta FIR where ATS is provided by Singapore (see ENR 2.1).

4.1.2 FL250 in uncontrolled airspace will be held vacant to serve as a buffer.

4.2 IFR FLIGHTS - CRUISING LEVELS WITHIN THE SINGAPORE FIR AND AIRSPACE WHERE ATS IS PROVIDED BY SINGAPORE (SEE ENR 2.1)

T R A C K			
000° to 179°		180° to 359°	
Flight Level	Altitude (feet)	Flight Level	Altitude (feet)
30	3 000	40	4 000
50	5 000	60	6 000
70	7 000	80	8 000
90	9 000	100	10 000
110	11 000	140	14 000
130	13 000	160	16 000
150	15 000	180	18 000
170	17 000	200	20 000
190	19 000	220	22 000
210	21 000	240	24 000
230	23 000	260	26 000
250	25 000	280	28 000
270	27 000	310	31 000
290	29 000	350	35 000
330	33 000	390	39 000
370	37 000	430	43 000
410	41 000	470	47 000
450	45 000	510	51 000
490	49 000	etc.	etc.
etc.	etc.		

4.3 VFR FLIGHTS - CRUISING LEVELS WITHIN THE SINGAPORE FIR AND AIRSPACE WHERE ATS IS PROVIDED BY SINGAPORE (SEE ENR 2.1) IN CONTROLLED AIRSPACE

T R A C K			
000° to 179°		180° to 359°	
Flight Level	Altitude (feet)	Flight Level	Altitude (feet)
15	1 500	25	2 500
35	3 500	45	4 500
55	5 500	65	6 500
75	7 500	85	8 500
95	9 500	105	10 500
135	13 500	145	14 500

4.4 QUADRANTAL CRUISING LEVELS FOR FLIGHTS BELOW FL200 OPERATING IN UNCONTROLLED AIRSPACE PART OF AIRSPACE WITHIN THE JAKARTA FIR WHERE ATS IS PROVIDED BY SINGAPORE (SEE ENR 2.1) BETWEEN PANGKALPINANG TMA AND PEKANBARU TMA

4.4.1 The pilot-in-command of a VFR or IFR flight operating at or above 3,000ft and below FL200 between Pangkalpinang TMA and Pekanbaru TMA shall select a level corresponding to the appropriate magnetic track as indicated in the following Quadrantal Cruising Levels:

QUADRANTAL CRUISING LEVELS			
000° to 089°	090° to 179°	180° to 269°	270° to 359°
30	35	40	45
50	55	60	65

QUADRANTAL CRUISING LEVELS			
70	75	80	85
90	95	100	105
110	-	-	-
130	135	140	145
150	155	160	165
170	175	180	185
190	195	-	-

4.4.2 If compliance with VFR cannot be maintained at a quadrantal cruising level, the aircraft shall be flown at another quadrantal level where it is possible to comply with VFR.

4.4.3 The pilot-in-command shall ensure that the cruising level selected for an IFR flight is not below the lowest safe flight level applicable for the route to be flown.

Note: The provision of terrain clearance is not part of ATC service.

4.4.4 Except when taking-off or landing, or with the approval of the appropriate authority, aircraft shall be flown at least 1,000ft above the highest obstacle within 10km of the estimated position of the aircraft in flight.

4.5 TRANSIT PROCEDURES

4.5.1 The procedures to be followed by aircraft when transiting between areas where the Quadrantal System of cruising levels is in use and those where the Semi-Circular System is applicable, are indicated below.

4.5.2 Transition from the Quadrantal System to the Semi-Circular System

TRACK FLOWN	VFR FLIGHT	IFR FLIGHT
000-089	Climb to next ODD + 500ft level	Maintain ODD level
090-179	Maintain ODD + 500ft level	Descend to next ODD level
180-269	Climb to next EVEN + 500ft level	Maintain EVEN level
270-359	Maintain EVEN + 500ft level	Descend to next EVEN level

4.5.3 Transition from the Semi-Circular System to the Quadrantal System

TRACK FLOWN	VFR FLIGHT	IFR FLIGHT
000-089	Descend to next ODD level	Maintain ODD level
090-179	Maintain ODD + 500ft level	Climb to next ODD + 500ft level
180-269	Descend to next EVEN level	Maintain EVEN level
270-359	Maintain EVEN + 500ft level	Climb to next EVEN + 500ft level

Note: The terms "ODD + 500ft" level and "EVEN + 500ft" level have been used to designate those series of levels where, below FL290, flight levels ending with 75, 95, 115, etc. and 65, 85, 105 etc respectively are prescribed.

4.6 CHANGING LEVELS

4.6.1 ATC may clear aircraft to change level at a specific time, place or rate. The pilot-in-command must acknowledge receipt of ATC instruction to a change of level and shall effect a change of level immediately unless a later time or place for the commencement is specified or is approved, as a result of a request by a pilot. The rate of change of level shall be the specific rate, or if no rate has been specified, a rate suitable for the type of aircraft.

Note: A pilot may request ATC approval for a different rate of change of level or a different time or place for commencing change of level.

4.6.2 When required, the pilot-in-command may be instructed to reach an assigned level by a specified time or position. The pilot-in-command shall advise ATC immediately if he is doubtful whether the assigned level can be reached as instructed.

4.6.3 A pilot-in-command shall report:

- a) At the time of leaving a level for a newly assigned level;
- b) When leaving or passing through such other levels as may be specified by ATC;
- c) On reaching an assigned level.

4.6.4 A pilot-in-command shall read back level clearances.

4.7 UNIDIRECTIONAL ATS ROUTES LEVEL ASSIGNMENTS - SINGAPORE/JAKARTA SECTOR

4.7.1 The following Level Assignments for aircraft operating in the Singapore/Jakarta sector on the unidirectional ATS Routes B470 and G579 will be adopted by Singapore and Jakarta ACCs.

4.7.2 Level Assignments

4.7.2.1 Jakarta ACC shall assign:

- a. All even flight levels plus 500ft above the minimum enroute level up to and including FL185.
- b. Above FL185, starting at FL220 all even flight levels up to and including FL280.
- c. Above FL280, all flight levels at 1,000ft intervals starting at FL290 and up to FL410 (inclusive), except for flights beyond Singapore where only even flight levels shall be assigned.

4.7.2.2 Singapore ACC shall assign:

- a. All odd flight levels plus 500ft above the minimum enroute level up to and including FL195.
- b. Above FL195, starting at FL210 all odd flight levels up to and including FL290.
- c. Above FL290, all flight levels at 1,000ft intervals starting at FL290 and up to FL410 (inclusive), except for flights beyond Jakarta where only odd flight levels shall be assigned.

4.8 POSITION REPORTS

4.8.1 In so far as range permits, the pilot-in-command shall report position to the responsible ATC unit on the appropriate VHF RTF frequency. When outside VHF RTF range, the pilot-in-command shall report position on HF RTF.

4.8.2 The pilot-in-command shall report position as soon as possible after the aircraft has passed each designated reporting point or "on request" reporting point (when so required by ATC).

4.8.3 Where no designated or "on request" position report is required, the pilot-in-command shall report position hourly in latitude and longitude and shall report "operations normal" every 30 minutes in between.

Note: Operating companies may request approval to make fixed rather than hourly reports.

4.8.4 When reporting their positions, pilots shall transmit the word "POSITION" either immediately before or after the callsign of their aircraft.

4.8.5 A position report shall comprise Section 1 or Sections 2 and 3, or the AIREP form of report:

Section 1 (Position Information)

1. aircraft identification
2. position
3. time
4. flight level or altitude
5. next position and time over
6. ensuing significant point

Section 2 (Operational Information)

7. estimated time of arrival
8. endurance

Section 3 (Meteorological Information)

9. air temperature
10. wind direction
11. wind speed
12. turbulence
13. aircraft icing
14. humidity (if available)

4.8.6 Section 2 - Operational Information of an AIREP is not required for turbine powered aircraft operations.

4.8.7 Designated and on request reporting points for the various established routes are listed in section ENR 3.

4.9 HOLDING

4.9.1 An aircraft required to hold en-route or over the destination holding point shall do so in accordance with the holding pattern specified for the radio aid in subsection ENR 3.6.

4.9.2 Where no specified holding pattern is established and en-route holding is required by ATC, the pilot-in-command shall hold in accordance with the standard holding pattern as follows:

- a. Follow the specified track inbound to the holding point;
- b. On passing the holding point, make a 180° rate one turn to the right;
- c. Maintain a parallel track outbound from the holding point for 1 min if at or below FL140 and 1½ min if above FL140;
- d. Make a 180° rate one turn to the right; and
- e. follow the specified track inbound.

Note:

1) *NOTWITHSTANDING PARA 4.9 ABOVE, ATC may instruct an aircraft to execute a left hand turn and specify the direction in which the aircraft is to be held in relation to the reporting or holding point en-route.*

2) The pilot-in-command should adjust his holding pattern within the limits of the established holding area in order to leave the holding point as far as possible at the exact time specified.

4.10 FLIGHT IN CONTROLLED AIRSPACES

4.10.1 Within controlled airspaces ATC separate IFR flights:

- a. Vertically: by assigning them different levels or altitude;
- b. Longitudinally: by instructing two aircrafts to maintain a minimum time interval between them; and
- c. Laterally: by providing different flight paths;
- d. By use of radar to ensure a minimum horizontal separation.

4.10.2 Standard separation in accordance with PANS-ATM DOC 4444 shall be provided to all flights operating in controlled airspace, except when:

- a. Positive identification by radar of an aircraft's position is available to the appropriate ATC unit;
- b. Within the Singapore/Johor Airspace Complex and Airways at/below FL150 during daylight hours, reports received from opposite direction aircraft indicate they have definitely passed each other;
- c. In the vicinity of an aerodrome:
 - i. two or more aircraft are continuously visible to an aerodrome controller who can take positive action to ensure separation;
 - or
 - ii. all aircraft are continuously visible to one another and the pilots concerned indicate that they can maintain their own separation.

4.10.3 Within the Singapore/Johor Airspace Complex, standard separation is provided between all flights irrespective of whether they are operating on a VFR or IFR Flight Plan. All operations are required to obtain an Air Traffic Control Clearance.

Note: See ENR 3.6 Area Charts

4.10.4 All aircraft operating under IFR or VFR in controlled airspaces shall be equipped with appropriate two-way radio communication, suitable instruments and radio navigation apparatus appropriate to the route to be flown and the pilot shall hold an instrument rating.

4.11 TRANSFER OF COMMUNICATIONS

4.11.1 The transfer of air/ground communications contact to an adjoining Area Control Centre is normally made at the agreed transfer point.

4.12 ALERTING SERVICE

4.12.1 Alerting service is available for all notified aircraft movements in Singapore FIR and airspace where ATS is provided by Singapore (see ENR 2.1).

4.12.2 The pilot-in-command of an aircraft landing at an unattended landing ground shall notify arrival to ATC by the most expeditious means available.