ENR 1.6 ATC SURVEILLANCE SERVICES AND PROCEDURES

1 SURVEILLANCE RADAR AND ADS-B

Name	Coordinates	Purpose	Range
Radar - 1	251419.90N 0513552.20E	PSR1/SSR1	200 NM
Radar - 2	251624.61N 0513513.56E	PSR2/SSR3	200 NM
Radar - 3	251541.70N 0513428.60E	SSR2	200 NM
Radar - 4	260621.10N 0511542.80E	PSR3/SSR4	250 NM
ADS - B1	251611.00N 0513401.00E	ADS-B	250 NM
ADS - B2	260621.10N 0511542.80E	ADS-B	250 NM

2 SUPPLEMENTARY SERVICES

2.1 GENERAL

2.1.1 Doha Radar operates as the primary air traffic control service within Doha FIR; it provides radar control service to the maximum extent practicable to meet the operational requirement. Many factors, such as radar coverage, controller workload and equipment capabilities may affect the service. Radar controller will determine whether it shall be provided, or continued to provide radar service in any specific way.

2.1.2 The pilot will know when and which radar service is provided, the radar controller uses one of the following ATS call signs **"DOHA RADAR"**, **"DOHA APPROACH"**, **"DOHA DIRECTOR" or "DOHA CONTROL".**

2.2 THE APPLICATION OF RADAR CONTROL SERVICE

2.2.1 Radar identification is achieved according to the provisions specified by ICAO.

2.2.2 Radar control service is provided in controlled airspaces to aircraft operating within Doha TMA and on airways within Doha Radar coverage (delegated by adjacent Area Control Centers as agreed in the Letter of Agreement). These services may include:

a) Radar separation of arriving, departing and en-route traffic;
b) Radar monitoring of arriving, departing and en-route traffic to provide information on any significant deviation from normal flight path;
c) Radar vectoring when required;
d) Assistance to aircraft in emergency;
e) Assistance to aircraft crossing controlled airspace;
f) Warnings and position information on other aircraft considered to constitute a hazard;
g) Information to assist in the navigation of aircraft;
h) Information on observed weather.

2.2.3 Minimum horizontal radar separation is provided as follows:

a) From the centre point of the radar coverage up to 40 NM - 3 NM radar separation.
b) Beyond 40 NM - 5 NM radar separation.

2.2.4 The altitude assigned to aircraft by a radar controller provides a minimum terrain clearance during the departure and arrival phase of the flight.

2.2.5 RE-CATEGORISATION WAKE TURBULENCE SEPARATION MINIMA (RECAT)

2.2.5.1 Within the Doha TMA an alternate application (RECAT) of the Wake Turbulence Separation Minima is applied. The alternate (RECAT) application distinguishes six (A to F) Wake Turbulence Groups (WTG) of aircraft based on wake generation and resistance characteristics of the aircraft depending primarily on maximum certificated take-off mass, wing characteristics and speeds.

2.2.5.2 The implementation of the alternate (RECAT) application of the wake turbulence scheme does not affect pilot procedures, flight management or changes to the format for completion or filling out a flight plan. The wake turbulence category (WTC) designator on the ICAO flight plan does not change. Pilots are to continue to fill in the flight plan WTC in item 9 with the ICAO aircraft category, H, M or L, and J for SUPER HEAVY category. While the ICAO flight plan remains unchanged, the alternate (RECAT) wake vortex aircraft grouping is displayed to air traffic controllers using the associated aircraft type information available in the flight data processing system.

2.2.5.3 For aircraft in the ICAO SUPER or HEAVY WTC, the suffix of 'SUPER' or 'HEAVY' does not change. On first transmission, the word 'SUPER' or 'HEAVY' shall still be included, as appropriate, immediately after the aircraft call sign in the initial radiotelephony contact between such aircraft and the ATS units.

2.2.5.4 The following wake vortex aircraft groupings, based on the allocation of aircraft types to six categories according to both maximum certificated take-off mass and wingspan, and associated separation minima should be used when applying RECAT:

1) 'SUPER HEAVY' - all aircraft types of 100,000 KG or more, and a wingspan between 72 M and 80 M;
2) 'UPPER HEAVY' - all aircraft types of 100,000 KG or more, and a wingspan between 60 M and 72 M;
3) 'LOWER HEAVY' - all aircraft types of 100,000 KG or more, and a wingspan below 52 M;
4) 'UPPER MEDIUM' - aircraft types less than 100,000 KG but more than 15,000 KG, and a wingspan above 32 M;
5) 'LOWER MEDIUM' - aircraft types less than 100,000 KG but more than 15,000 KG, and a wingspan below 32 M;
6) 'LIGHT' - all aircraft types of 15,000 KG or less (without wingspan criterion).

2.2.5.5 Aircraft types with maximum certificated take-off mass of 100,000 KG or more, and wingspan between 52 M and 60 M are included in one of the above categories since specific analyses.

2.2.5.6 A list of aircraft types for each alternative (RECAT) aircraft grouping, in particular with respect to new aircraft types, is maintained by EASA and is available at EASA website.

2.2.5.7 The system includes distance-based wake turbulence separation minima for aircraft being provided with an ATS surveillance service in the approach and departure phases of flight and time-based separations on departure for the take-off phase of flight.

2.2.5.8 The alternate (RECAT) wake turbulence distance-based separation minima for arriving and departing aircraft when ATS surveillance service is provided should be:

Alternate (RECAT) Application of Wake Turbulence Separation			**Follower**					
			Super Heavy	**Upper Heavy**	**Lower Heavy**	**Upper Medium**	**Lower Medium**	**Light**
			CAT-A	**CAT-B**	**CAT-C**	**CAT-D**	**CAT-E**	**CAT-F**
Leader	Super Heavy	CAT-A	3 NM	4 NM	5 NM	5 NM	6 NM	8 NM
	Upper Heavy	CAT-B	(*)	3 NM	4 NM	4 NM	5 NM	7 NM
	Lower Heavy	CAT-C	(*)	(*)	3 NM	3 NM	4 NM	6 NM
	Upper Medium	CAT-D	(*)	(*)	(*)	(*)	(*)	5 NM
	Lower Medium	CAT-E	(*)	(*)	(*)	(*)	(*)	4 NM
	Light	CAT-F	(*)	(*)	(*)	(*)	(*)	3 NM
(*) The separation minimum to be applied is the horizontal separation minimum based on an ATS surveillance system and should remain compatible with runway capacity.								

2.2.5.9 Wake turbulence time-based separation minima between departing aircraft should be applied by determining airborne times between successive aircraft. The alternate (RECAT) wake turbulence time-based separation minima between departing aircraft should be:

Alternate (RECAT) Application of Wake Turbulence Separation			**Follower**					
			Super Heavy	**Upper Heavy**	**Lower Heavy**	**Upper Medium**	**Lower Medium**	**Light**
			CAT-A	**CAT-B**	**CAT-C**	**CAT-D**	**CAT-E**	**CAT-F**
Leader	Super Heavy	CAT-A		100s	120s	140s	160s	180s
	Upper Heavy	CAT-B				100s	120s	140s
	Lower Heavy	CAT-C				80s	100s	120s
	Upper Medium	CAT-D						120s
	Lower Medium	CAT-E						100s
	Light	CAT-F						80s

2.2.5.10 An additional 60 seconds should be applied to all the wake turbulence time-based separation minima above when taking off from:

1) an intermediate part of the same runway; or
2) an intermediate part of a parallel runway separated by less than 760 M (2,500 FT).

2.2.5.11 If on departure pilots require more separation than the RECAT time-based standard, or extra time for any other reason, advise ATC early PRIOR to entering the runway, and NOT when on the runway. When informed, ATC may be able to make changes in the departure sequence, if necessary, to minimise delays to other succeeding departures.

2.2.5.12 Aircrew shall comply with published speed restrictions or specific speed control instructions assigned by ATC, particularly on final approach. If for any reason a speed instruction cannot be followed, pilots shall notify ATC as soon as possible. To benefit from this reduction of separation minima, pilots are to minimise runway occupancy time.

2.2.5.13 Wake turbulence separation minima shall not be infringed. In the event of unexpected speed variations between consecutive arrivals on final approach and ATC considers there may be a catch-up situation in which an erosion of the prescribed separation would result, one of the affected aircraft shall be instructed to break off the approach or initiate a missed approach before the prescribed minima is infringed.

2.2.5.14 In the event of consecutive missed approaches, the alternative (RECAT) will be applied to aircraft during the initial part of the standard missed approach procedure until another form of separation is established by ATC.

2.2.6 REPORTING OF WAKE TURBULENCE ENCOUNTERS

2.2.6.1 Pilots may encounter wake or other turbulence at different stages of flight, however the alternative (RECAT) application of reduced separation is only applied by ATC within the take-off or final approach segments of the flightpath.

2.2.6.2 Wake encounter reports will be validated by ATC if the aircraft reporting the encounter is:

1) in the final approach and landing phase of flight and is:
   a) 5000 FT AMSL or below; and
   b) 7 NM or less behind an aircraft of the same or higher wake turbulence category.

or;

2) in the take-off and climb out phases of the flight and:
   a) has departed behind an aircraft of a higher wake turbulence category within a period of 200s or less from the previous departure; and
   b) is below 5000 FT AMSL.

2.2.6.3 Pilots should use the following criteria for the classification of severity of wake turbulence encounters:

Severity	Description	Pitch Upset or Altitude Lost	Roll (Bank Angle) reported as angle deviation from ground
Light	Wake turbulence that momentarily causes slight erratic changes in altitude or attitude (Pitch, yaw, or - most usually - Roll). May include rhythmic attitude changes.	Less than 50 FT/minor	Less than 10°
Moderate	Wake turbulence that is similar to light wake turbulence, but of a greater intensity. Larger changes in altitude and/or attitude occur, but the aircraft always remains in positive control.	Less than 100 FT	Between 10-30°
Severe	Wake turbulence that causes large, abrupt changes in altitude and/or attitude (most typically large, uncommented roll rates and resulting bank angles, often followed by a reverse direction roll). Aircraft may be momentarily out of control.	More than 100 FT	Greater than 30°

2.2.6.4 Pilots should avoid reporting the encounter as a combination of severity (i.e. Light to Moderate) unless there were multiple encounters at different severities.

2.3 EMERGENCY PROCEDURES

2.3.1 Except when encountering a state of emergency, pilots shall operate transponders and select modes and codes in accordance with ATC instructions. In particular, when entering Doha FIR, pilots who have already received specific instructions from an Area Control Center concerning the setting of the transponder shall maintain that code setting until otherwise instructed.

2.3.2 All aircraft that are about to enter Doha FIR who have not received specific instructions from Doha Radar concerning the setting of the transponder shall operate the transponder on Mode A / 3 Code A2000 before entry and maintain that setting until otherwise instructed.

2.3.3 If an aircraft encountering a state of emergency which was previously been instructed by ATC to operate the transponder on a specific code, this code setting shall be maintained until otherwise advised.

2.3.4 In all other circumstances, the transponder shall be set to Mode A / 3 Code 7700. Notwithstanding the procedure in “ENR 1.6” item 2.3.1, a pilot may select Mode A / 3 Code 7700 whenever the nature of the emergency is such that this appears to be the most suitable course of action.

Note: Continuous monitoring of responses on Mode A / 3 Code 7700 is provided.

2.4 RADAR AND RADIO COMMUNICATION FAILURE PROCEDURES

2.4.1 Radar failure

2.4.1.1 In the event of radar failure or loss of radar identification, instructions will be issued to restore non-radar standard separation and the pilot will be instructed to communicate with the parent ATS unit.

2.4.2 Air-ground communication failure

2.4.2.1 The radar controller will establish whether the aircraft radio receiver is working by instructing the pilot to carry out a turn or turns. If the turns are observed, the radar controller will continue to provide radar service to the aircraft.

2.4.2.2 If the aircraft's is completely unserviceable, the pilot should carry out the procedures for radio communication failures in accordance with “ENR 1.6” item 2.4.3. If radar identification has already been established, the radar controller will vector other identified aircraft clear of its track until such time as the aircraft leaves Doha Radar area of responsibility or has landed.

2.4.3 Radio communication failure procedure

2.4.3.1 **General**

In the event of an apparent radio communication failure, the pilot of an aircraft should:

1) Maintain Terrain Clearance at all times;
2) Squawk 7600;
3) Contact appropriate alternate and secondary published ATS frequencies;
4) Check aircraft communications equipment;
5) Listen to ATIS;
6) Broadcast intentions (assuming aircraft transmitter is functioning) and prefix transmission with **"TRANSMITTING BLIND"**

2.4.3.2 **Visual Meteorological Condition (VMC)**

If a pilot of an aircraft is flying in VMC and is certain that VMC can be maintained, the pilot should:

1) Continue to fly in VMC;
2) Land at the nearest suitable aerodrome;
3) Report arrival by the most expeditious means to the appropriate ATC unit.

2.4.3.3 **Instrument Meteorological Condition (IMC)**

If the pilot of an aircraft is flying in IMC or is uncertain that a VMC can be maintained, the pilot should:

1) Maintain the last assigned speed and level, or minimum flight altitude if higher, for a period of three (3) minutes following:
   a) the last assigned level or minimum flight altitude is reached; or
   b) the last time the transponder is set to Code 7600;

whichever is later, and thereafter adjust level and speed in accordance with the filed flight plan; or

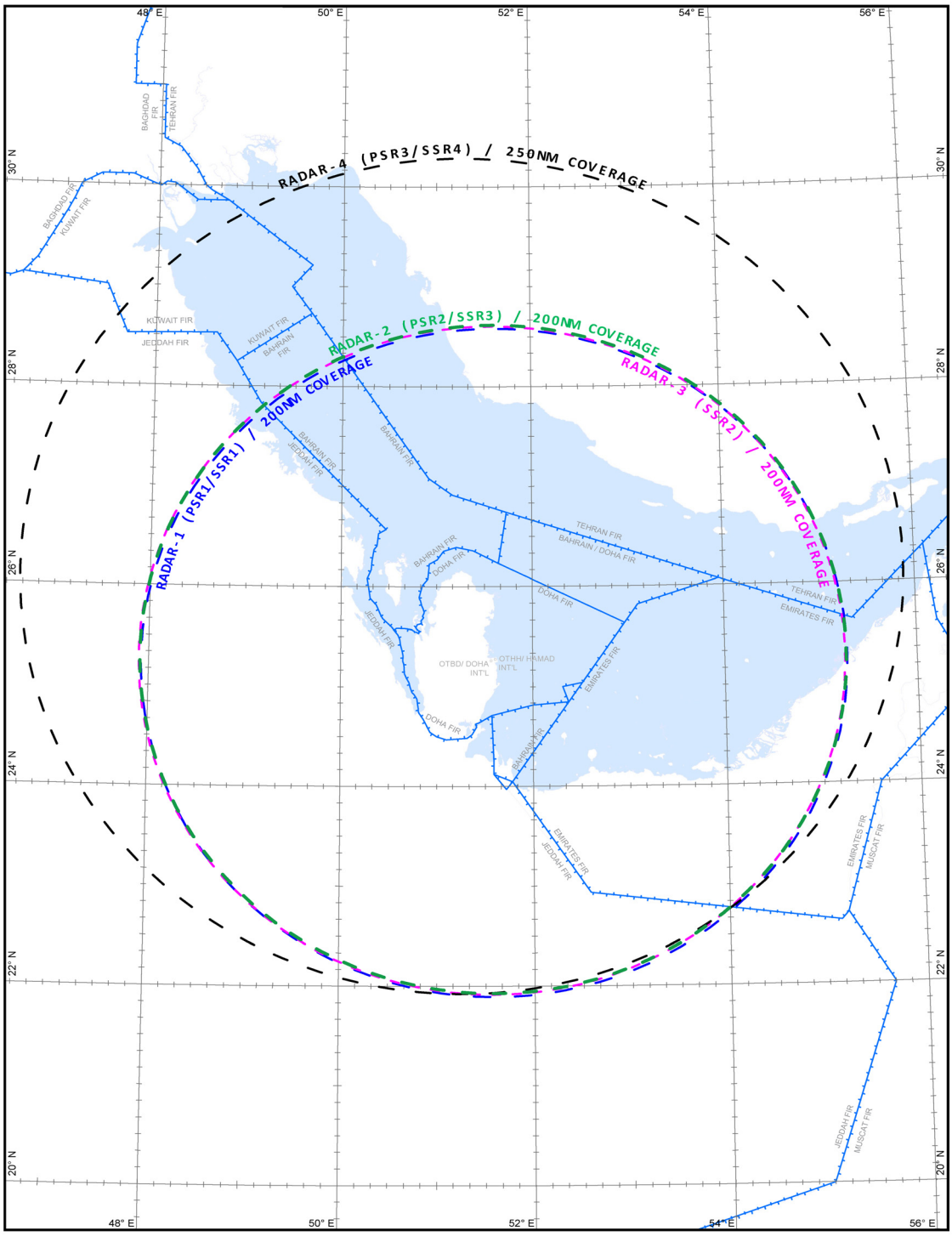
2) If being vectored, proceed in the most direct manner possible to rejoin the current flight plan route no later than the next significant point, taking into consideration the applicable minimum flight altitude;
3) When on arrival, follow (1) and (2) as applicable, then:
   a) proceed according to the current flight planned route to appropriate designated navigation aid or fix, if necessary, to ensure compliance with (b) below;
   b) if cleared on a STAR, commence descent from the holding fix associated with the STAR as close as possible to the Expected Approach Time (EAT) last received and acknowledged. If no EAT has been received, commence descent from the holding fix associated with the STAR as close as possible to the Expected Time of Arrival (ETA) resulting from the flight plan. Follow the Radio Communication Procedure shown on the relevant STAR chart;
   c) in the event a STAR clearance has not been issued, select code 7600 and follow the STAR most appropriate to the inbound route and last known landing runway.

2.5 UNLAWFUL INTERFERENCE PROCEDURES

2.5.1 Pilots of the aircraft in flight subjected to unlawful interference shall endeavour to set the transponder to Mode A Code 7500 to give indication of the situation, unless circumstances warrant the use of A / 3 Code 7700.

Note: Continuous monitoring of responses on Mode A / 3 Code 7500 is provided.

2.6 GRAPHIC PORTRAYAL OF SECONDARY RADAR COVERAGE AREAS



2.7 GRAPHIC PORTRAYAL OF ADS-B COVERAGE AREAS