Section 7 ATS Surveillance Procedures

Note: *This chapter should be read in conjunction with Separation Methods and Minima (Section 6).*

1 ATS Surveillance Services

1.1 Provision of Services

1.1.1 ATS surveillance services comprise:

a) Separation of arriving, departing and en route traffic;

b) Vectoring;

c) Position information to assist in the navigation of aircraft;

d) Monitoring traffic to provide information to procedural units;

e) Assistance to aircraft operating within controlled and uncontrolled airspaces where there is ATS surveillance coverage.

1.1.2 Before a controller provides any of the above ATS surveillance services he shall either:

a) Identify the aircraft, using either secondary or primary methods; or

b) Have had the identity of the aircraft transferred from another controller.

The act of identifying an aircraft does not imply that an ATS surveillance service is being provided.

1.1.3 An ATS surveillance system may also be used to provide the following, whether or not the aircraft has been identified:

a) Information on the position of aircraft likely to constitute a hazard;

b) Avoiding action,

c) Information about observed weather for pilots and other controllers and

d) Assistance to aircraft in emergency.

1.1.4 ATS surveillance services shall be provided to the maximum extent practicable to cover the operational requirement subject only to workload, communications or equipment capability.

1.1.5 Regardless of the type of airspace, or the air traffic service being provided, nothing shall prevent a controller from taking action he considers appropriate if he believes a risk of collision exists.

1.16 When ATS Surveillance is being used in the provision of ATS traffic instructed to hold shall have their ATS Surveillance control service terminated prior to entering the holding pattern. When an aircraft is the only aircraft in that hold radar service may be retained.

1.2 **Type of Service**

1.2.1 The airspace within which the aircraft is flying determines the type of radar service available, as shown in the table below.

Type of Airspace	ATS surveillance service
Controlled Airspace.	Control Service.
* Outside controlled airspace, on Advisory Routes and within ATS surveillance Advisory service areas.	Advisory Service or Information Service.

* When providing a service to aircraft within these types of airspace it is important that no confusion exists, between the controller and the pilot, as to:

a) Whether or not a radar service is being provided; and

b) The type of radar service being given.

1.2.2 Outside controlled airspace it is the responsibility of the pilot to request the radar service he requires. However if the pilot fails to specify the type of service the controller shall ask the pilot which radar service he requires. The controller shall also obtain a readback of the service from the pilot.

1.2.3 The controller should endeavour to provide the radar service requested. If he cannot, then he should whenever possible, offer an alternative service.

1.2.4 Pilots shall be advised when a radar service commences, terminates or changes when:

a) They are operating outside controlled airspace; or

b) They cross the boundary of controlled airspace.

1.3 **ATS Surveillance Service**

1.3.1 An ATS surveillance service may be provided to aircraft operating IFR, SVFR or VFR. When providing this service, controllers shall issue instructions to which:

a) Pilots of aircraft operating IFR are required to comply; and

b) Pilots of aircraft operating SVFR or VFR will comply unless they advise the controller otherwise.

1.3.2 Before an aircraft enters controlled airspace the controller must ensure he knows under which flight rules the pilot will be operating.

1.4 **Radar Advisory Service**

1.4.1 A Radar Advisory Service (RAS) is an air traffic radar service in which the controller shall provide advice necessary to maintain prescribed separation between aircraft participating in the advisory service, and in which he shall pass to the pilot the bearing, distance and, if known, level of conflicting non-participating traffic, together with advice on action necessary to resolve the confliction. Where time does not permit this procedure to be adopted, the controller shall pass

advice on avoiding action followed by information on the conflicting traffic. Even though the service is an advisory one, controllers shall pass the 'advice' in the form of instructions. Under a RAS the following conditions apply:

a) The service shall only be provided to flights under IFR irrespective of meteorological conditions.

b) Controllers can expect the pilot to accept radar track information or level allocations which may require flight into IMC.

c) There is no legal requirement for a pilot flying outside controlled airspace to comply with instructions because of the advisory nature of the service. However, should a pilot choose not to comply with advisory avoiding action then he will become responsible for his own separation and any avoiding action that may subsequently prove necessary.

d) The controller will be advised before a pilot changes heading or level.

e) Controllers shall pass avoiding action instructions to resolve a confliction with non-participating traffic and, wherever possible, shall seek to achieve separation which is not less than 5 NM or 1000 feet, except when specified otherwise by the CAA. However, it is recognised that in the event of the sudden appearance of unknown traffic, and when unknown aircraft make unpredictable changes in flight path, it is not always possible to achieve these minima.

f) Controllers shall continue to provide information on conflicting traffic until the confliction is resolved.

g) ATSUs providing a RAS shall set a level or levels at or above which the aircraft will remain within the limits of radar cover and be provided with the requisite terrain clearance. Below this level or levels a RAS shall be refused or terminated.

1.5 Radar Information Service

A Radar Information Service (RIS) is an air traffic radar service in which the controller shall inform the pilot of the bearing, distance and, if known, the level of the conflicting traffic. No avoiding action shall be offered. The pilot is wholly responsible for maintaining separation from other aircraft whether or not the controller has passed traffic information. Under a RIS the following conditions apply:

a) The service may be requested under any flight rules or meteorological conditions.

b) The controller shall only update details of conflicting traffic, after the initial warning, at the pilot's request or if the controller considers that the conflicting traffic continues to constitute a definite hazard.

c) The controller may provide radar track information for the purpose of tactical planning or at the request of the pilot. However, radar track information shall not be provided to maintain separation from other aircraft, which remains the responsibility of the pilot. There is no requirement for a pilot to accept radar track information.

d) The controller will be advised before a pilot changes level, level band or route.

e) RIS may be offered when the provision of RAS is impracticable.

f) Should a pilot request avoiding action, this shall be treated as a request for a change of radar service.

g) Request for RIS to be changed to a RAS shall be accepted subject to the controller's workload; prescribed separation shall be applied as soon as practicable. If a controller cannot provide a RAS then he shall continue to offer a RIS.

h) For manoeuvring flights which involve frequent changes of heading or level, RIS may be requested by the pilot or offered by the controller. Information on conflicting traffic shall be passed with reference to cardinal points. The controller will be advised of the level band within which the pilot wishes to operate. The pilot is responsible for selecting the manoeuvring area, but may request the controller's assistance in finding a suitable location. The controller may suggest re-positioning on his own initiative, but the pilot is not bound to comply.

Note: *A manoevering flight can be considered as either training, aerial survey, operation of UAS etc.*

i) ATSUs providing a RIS shall set a level or levels at or above which the aircraft will remain within the limits of radar cover and be provided with the requisite terrain clearance. Below this level, or levels, vectors shall not be provided and the pilot becomes responsible for his own terrain clearance.

Note: *If a controller considers it appropriate to vector RIS traffic then this shall be done in accordance with the above procedures. However, controllers must always bear in mind that a pilot could well refuse a vector as it may conflict with the purpose of the flight and so reliance should not be placed on being able to solve all tactical conflictions by the use of headings.*

1.6 Limiting a Service

1.6.1 Outside controlled airspace in circumstances where controllers cannot continue to provide the following primary requirements:

a) Traffic information and traffic avoidance in respect of all conflicting unknown aircraft for a radar advisory service; and

b) Traffic information in respect of all conflicting unknown aircraft for a radar information service, controllers may elect to continue to give the service by limiting the extent to which it is provided.

1.6.2 Controllers must inform pilots when they limit the service and ensure that pilots are made fully aware of the implications of any limitation.

1.6.3 In particular the service should be limited when:

a) The aircraft is operating within 10 miles of:

i) The edge of the radar display;

ii) Weather clutter; or

iii) Permanent echoes.

b) The aircraft is operating in an area of high traffic density;

c) The aircraft is operating near to the limits of radar coverage; or

d) The service is being provided using secondary radar only.

2 Establishment of Radar identity

2.1 Before providing an ATS surveillance service to an aircraft, the identity of the aircraft shall be established and will be maintained until the termination of the service.

2.2 As soon as a controller has identified an aircraft he is to inform the pilot, according to the circumstances;

a) That his aircraft has been identified;

b) The type of radar service being provided where appropriate;

c) The position of the aircraft.

3 Identification using Primary Radar

3.1 One of the following methods can be employed when primary radar is used to identify aircraft. Direction finding equipment should be used to assist the identification provided it has been approved for such use.

3.1.1 **The Turn Method**

3.1.1.1 An aircraft may be identified by ascertaining its heading and, following a period of track observation, correlating the observed movement of a particular radar echo with:

a) The acknowledged execution of an instruction to alter heading by at least 30°,

b) One or more changes of heading of at least 30°, as instructed by another controller.

c) One or more changes of heading of at least 30° reported by the pilot.

3.1.1.2 A turn for identification does not constitute a radar service. However, controllers should take into consideration, terrain, other returns, radar coverage and the rules of the air before instructing an aircraft to alter heading.

3.1.1.3 In using the turn method the controller shall:

a) Verify that the movements of not more than one radar echo correspond with those of the aircraft.

b) Ensure that the manoeuvre(s) will not carry the radar echo outside the coverage of the radar display.

c) Exercise caution particularly when employing this method in areas where changes of aircraft heading are commonly made as a navigational routine.

3.2 **Identification Using either Primary or Secondary Radar**

3.2.1 **Departing Aircraft Method**

3.2.1.1 By observing and correlating the radar return of a departing aircraft to a known airborne time. Identification is to be achieved within one mile of the end of the runway unless otherwise authorised by the CAA.

3.2.1.2 Particular care should be taken to avoid confusion with aircraft over-flying the aerodrome, making a missed approach, departing from an adjacent runway or holding overhead the aerodrome.

3.2.2 **Position Report Method**

3.2.2.1 By correlating a particular radar return with a report from the pilot that the aircraft is:

a) Over an exact reporting point which is displayed on the radar map; or

b) At a particular radial and DME from a co-located VOR/ DME or TACAN (DME). The source facility must be displayed on the radar map; or

c) Over a notified visual reference point or prominent geographical feature, in either case approved for the purpose and displayed on the radar map, provided that the flight is operating with visual reference to the surface and at a height of 3000 ft or less above the surface.

3.2.2.2 The identification must follow a period of track observation sufficient to enable the controller to compare the movement of the radar echo with the pilot's reported route. The reported position and level of the aircraft must indicate that it is within known radar cover.

3.2.2.3 This method must be reinforced by an alternative method if there is any doubt about the identification because of:

a) the close proximity of other returns; or

b) Inaccurate reporting from aircraft at high level or some distance from navigational facilities.

3.3 **Identification using Secondary Radar**

3.3.1 Controllers should use secondary surveillance radar Mode A to identify aircraft whenever suitable equipment is available. One of the following methods shall be employed:

a) Observing the pilot's compliance with the instruction to select a discrete four digit code;

b) Recognising a validated four digit code previously assigned to an aircraft callsign. When code/callsign conversion procedures are in use, and the code/callsign pairing can be confirmed, the callsign displayed in the data block may be used to establish and maintain identity;

c) Observing an IDENT feature when it has been requested. Caution must be exercised when employing this method since simultaneous requests for SPI transmissions within the same area may result in misidentification. Aircraft displaying the conspicuity code are not to be identified by this method.

d) Observation of compliance with an instruction to change transponder mode.

4 Validation for Mode A Codes

4.1 A controller assigning any Mode A code must validate the code by checking as soon as possible, either by direct reference to his display or with the assistance of another controlling agency, that the data displayed corresponds with the code which has been assigned.

4.2 The code must be checked by one of the following methods:

a) Instructing the aircraft to squawk the assigned code and observing that the correct code numbers are associated with the radar return;

b) Instructing the aircraft to 'squawk IDENT' and simultaneously observing that the correct code numbers are associated with the radar return;

c) Matching a radar return already identified by primary radar with the assigned code for the flight.

4.3 If the code readout does not correspond to that assigned, the pilot is to be instructed to reset the assigned code. Where this fails to achieve display of the assigned code then the pilot is to be instructed to select code A0000. If a corrupt code still exists the pilot should normally be instructed to switch off the transponder. However, the corrupt code may be retained to assist identification and tracking provided the Mode C has been verified. Associated air traffic control units are to be informed of the retention of corrupt data.

4.4 Special Purpose Codes

Controllers should be aware of the special purpose codes which pilots may select such as the emergency codes 7500, 7600 and 7700.

4.5 Conspicuity Code

4.5.1 The conspicuity code, 2000, together with Mode C should be displayed by all suitably equipped aircraft unless:

a) They have been assigned a discrete code;

b) They are flying in an aerodrome traffic pattern below 3000 feet; or

c) They are transmitting on one of the special purpose codes.

5 Transfer of Radar Identity

5.1 If SSR is not available, a controller may transfer the identity of an aircraft to another controller by any of the following methods:

a) Direct designation (pointing) of the radar return where two displays are adjacent. If the information on the two displays is derived from separate radar heads the transferring controller must ensure that the returns on both displays correlate before using this method. If parallax is likely to cause an error, an alternative method is to be used;

b) Designation of the radar return in terms of a direction and distance from a common reference point (geographical position or navigational facility) accurately indicated on both displays. The radar return, as seen by the accepting controller, must be within 3 miles of the position stated. The distance between the aircraft and the reference point must not exceed:

i) 30 miles, if the aircraft is flying along a published ATS route or direction is given as a bearing in degrees;

ii) 15 miles in other circumstances.

c) Designation of the radar return by positioning an electronic marker or symbol so that only one radar return is thereby indicated and there is no possible doubt of correct identification.

6 Lost Identity

6.1 Except as described in paragraph 6.2 below, a pilot shall be advised whenever radar identification is lost. The pilot shall be informed accordingly and when applicable, appropriate instructions issued.

6.2 When using secondary radar, controllers may be temporarily unable to read the data blocks associated with aircraft due to overlapping or garbling e.g. in holding areas. Although this constitutes a loss of identification, the pilot need not be advised that identification has been lost if the controller anticipates that identification will be re-established immediately the overlapping or garbling ceases.

7 Position Information

7.1 Except if the pilot reports the position of the aircraft and this position correlates with the position according to Surveillance, aircraft should be informed of their position in the following circumstances:

a) On first identification;

b) When the pilot requests the information;

c) When the aircraft is flying off the correct track;

d) When an aircraft estimate differs significantly from the radar controller's estimate based on radar observation;

e) When the pilot is instructed to resume his own navigation following vectoring.

7.2 Position information shall be passed in one of the following forms:

a) A well known geographical position;

b) Bearing (using points of the compass) and distance from a known position;

c) Magnetic track and distance to a reporting point, an en-route navigational aid, or an approach aid displayed on the radar video map;

d) Lat. and Long. (Only when authorised in the station standing instruction manual);

e) Distance from touchdown when the aircraft is being vectored for final approach.

8 Termination of ATS surveillance service

8.1 When aircraft are being transferred from one ATS surveillance unit or sector to another, and there is reasonable assurance that an ATS surveillance service will be continued, radar service need not be terminated, provided that procedures for continued services are in place.

8.2 In the case of aircraft vectored for an ILS approach, radar service need not be terminated when such aircraft are released to the aerodrome controller.

8.3 Radar control service must be terminated in all other cases where:

a) Aircraft are to be transferred to a procedural unit;

b) Before they leave ATS surveillance cover;

c) When transferred to an adjacent FIR, where alternative procedures do not exist; or as stipulated in the AIP; or

d) Where radar control service has been completed.

8.4 Radar controllers must ensure that procedural separation is established before the termination of an ATS surveillance service.

9 Use of Mode C for Vertical Separation

9.1 Mode C Responses

9.1.1 When SSR is used to assess vertical separation the Mode C responses are to be continually monitored to ensure that the vertical distance is never less than the prescribed minimum.

9.1.2 Minimum vertical separation may be applied between verified Mode C transponding aircraft provided the intentions of both aircraft are known to a controller because either:

a) They are under his control;

b) They have been co-ordinated; or

c) They are operating in accordance with established agreements.

9.1.3 Vertical separation using Mode C is not to be applied against aircraft transponding Mode A0000.

9.2 Verification of Mode C

9.2.1 Controllers are to verify the accuracy of Mode C data, once the aircraft has been identified and the Mode A validated, by checking that the readout indicates the tolerance value as specified in paragraph 9.3.1 reported by the pilot. If the aircraft is climbing or descending, the pilot is to be instructed to give a precise report as the aircraft passes through a level.

9.2.2 Verification may be achieved with the assistance of an air traffic services unit with which the aircraft is in contact.

9.2.3 A Mode C readout can be assumed to have been verified if it is associated with a deemed validated Mode A code.

9.2.4 There is no requirement to monitor level readouts when Mode C information is not being used to provide vertical separation. However, if a controller observes a discrepancy the pilot is to be asked to confirm his altimeter setting and level. If the discrepancy remains, the pilot is to be instructed to switch off Mode C. If independent switching of Mode C is not possible the pilot is to be instructed to select Code A0000.

9.3 **Level Assessment using Mode C**

9.3.1 The following criteria apply when assessing the vertical position of a Mode C transponding aircraft:

a) An aircraft may be considered to be at an assigned level provided that the Mode C readout indicates 300 feet or less from that level;

b) An aircraft which is known to have been instructed to climb or descend may be considered to have left a level when the Mode C readout indicates a change of 400 feet or more from that level and is continuing in the anticipated direction;

c) An aircraft climbing or descending may be considered to have passed through a level when the Mode C readout indicates that the level has been passed by 400 feet or more and continuing in the required direction;

d) An aircraft may be considered to have reached an assigned level when three successive Mode C readouts indicate 300 feet or less from that level.

Note: *In RVSM airspace the vertical tolerance value shall be 200 feet.*

9.3.2 Mode C information is normally displayed as a flight level but on some ground equipment the vertical position of an aircraft flying below a pre-determined datum is displayed as an altitude.

10 Transfer of Control

10.1 The transfer of responsibility for an aircraft from one radar controller to another may be effected provided that:

a) Satisfactory two-way speech communication is available between them;

b) The radar identity has been transferred to the accepting radar controller, or has been established by him; and

c) The accepting radar controller is informed of any level or vectoring instructions applicable to the aircraft at the stage of transfer.

10.2 If the route of the aircraft is not known the transferring controller is to pass the observed track or reported aircraft heading to the accepting radar controller.

10.3 Silent Handover between ATS Surveillance Sectors

10.3.1 Silent Radar handover is to facilitate a reduction in ATC and pilot workload as a result of the radar coverage provided to the affected sectors where over-lapping radar coverage is provided by two or more independent radar sensors.

10.3.2 In the case of radar control transfers between sectors, acceptance of the electronic hand-off of the SSR label will serve as acceptance of radar separation between those flights which have been liaised as being under radar control between those two sectors, either via procedures contained in LOPs or directly liaised.

11 Vectoring

11.1 Responsibility

11.1.1 The controller has complete freedom to instruct an aircraft to turn in any direction as dictated by circumstances but when avoiding unknown aircraft the rules of the air should be observed if practicable.

11.1.2 Aircraft flying outside controlled airspace are not obliged to follow instructions given by air traffic control, but where the pilot of an aircraft accepts a radar advisory service, the radar controller can expect that his instructions will be followed.

11.1.3 Unless an aircraft has planned to leave controlled airspace, it is not to be vectored outside the horizontal or vertical limits, except:

a) When an emergency situation arises requiring the aircraft to be vectored outside controlled airspace;

b) When avoiding adverse meteorological conditions; the circumstances must be explained to the pilot before the aircraft leaves controlled airspace;

c) When specifically requested by the pilot.

11.1.4 When vectoring an IFR flight and when giving an IFR flight direct routing which takes the aircraft off an ATS route, the controller shall issue clearances such that the prescribed obstacle clearance will exist at all times until the aircraft reaches the point where the pilot will resume own navigation.

Note: *When an IFR flight is being vectored, the pilot may be unable to determine the aircraft's exact position in respect to obstacles in this area and consequently the altitude which provides the required obstacle clearance.*

11.1.5 Although aircraft operating in controlled airspace are deemed to be separated from unknown aircraft flying in adjoining uncontrolled airspace, the controller should aim to keep the aircraft under his control at least two miles within the boundary where possible. Unpredictable manoeuvres by unknown aircraft can easily erode separation.

11.2 General provisions for controllers'

11.2.1 Prior to, or upon commencement of, vectoring for approach, the pilot shall be advised of the type of approach as well as the runway to be used.

11.2.2 The controller shall advise an aircraft being vectored for an instrument approach of its position at least once prior to commencement of final approach.

11.2.3 When giving distance information, the controller shall specify the point or navigation aid to which the information refers.

11.2.4 The initial and intermediate approach phases of an approach executed under the direction of a controller comprise those parts of the approach from the time vectoring is initiated for the purpose of positioning the aircraft for a final approach, until the aircraft is on final approach and:

a) Established on the final approach path of a pilot-interpreted aid; or

b) Reports that it is able to complete a visual approach; or

c) Ready to commence a surveillance radar approach; or

d) Transferred to the precision radar approach controller.

11.2.5 Aircraft vectored for final approach should be given a heading or a series of heading calculated to close with the final approach track. The final vector shall enable the aircraft to be established in level flight on the final approach track prior to intercepting the specified or nominal glide path if an ILS or radar approach is to be made, and should provide an intercept angle with the final approach track of 45 degrees or less.

11.3 VOR/DME Holding

When an aircraft inbound to a VOR/DME holding pattern is vectored away from a standard VOR radial, the controller must either provide magnetic track and distance information on instructing the aircraft to resume own navigation or issue vectoring instructions to intercept the appropriate radial to the holding or routeing fix.

12 Navigational Assistance

12.1 An identified controlled aircraft observed to deviate significantly from its intended trajectory or designated holding pattern should be informed immediately. Appropriate action should be taken if, in the opinion of the controller, such deviation is likely to affect other controlled flights.

12.2 Except when transfer of radar control is to be effected, navigational assistance should normally be provided in such a manner as to ensure that the aircraft will not be less than 2.5 NM from the limit of the controlled airspace or sector unless local arrangements have been made so as to ensure separation minima will exist between radar-controlled aircraft operating in adjoining areas or sectors.

13 Weather Avoidance

13.1 Action by Controller

Whenever possible, controllers should offer the following advice and assistance to pilots when adverse meteorological conditions is observed on radar or reported by aircrew:

a) Advise the pilot when the radar display indicates that there is adverse meteorological conditions ahead of the aircraft;

b) Offer and supply circumnavigational assistance;

c) Advise the pilot if routeing around adverse meteorological conditions will take the aircraft outside controlled airspace. The pilot will decide whether to accept the re-routeing;

d) Provide navigational assistance if necessary;
e) Provide radar advisory service if required.

13.2 **Action by Pilot**

13.2.1 When operating in controlled airspace the pilot is required to obtain a clearance for any proposed detours due to adverse meteorological conditions.

13.2.2 If weather avoidance takes an aircraft outside controlled airspace, the pilot is required to obtain a clearance before rejoining.

14 Terrain Clearance

14.1 The objectives of air traffic services do not include prevention of collision with terrain except when an IFR flight is being vectored by radar.

14.2 Radar controllers shall at all times be in possession of full and up-to-date information regarding the elevation of terrain and fixed obstructions within their area of responsibility. Radar Terrain Charts shall be available to all ATSUs where a radar service is being provided, showing all outstanding terrain features and obstacles. Minimum radar sector altitudes/levels shall be promulgated in the station standing instruction manual.

14.3 Controllers are to ensure that levels or altitudes assigned to:

a) IFR flights in receipt of a radar control service,

b) Flights in receipt of a radar advisory service,

c) Controlled VFR flights in terminal areas, and

d) Flights in receipt of a ATS surveillance information service and receiving vectors; provide adequate terrain clearance for the phase of flight as shown in the table below.

Phase	Minimum Terrain Clearance
En-route	1,500 feet above any fixed obstacle which lies within 15 NM of the centre line of the airway or ADR. Provided that when an ADR is of a greater width than 30 NM, terrain clearance shall be provided as for 'other flights'.
Initial/intermediate Approach a) Distance greater than 15NM from the Radar Head.	1,500 feet above any fixed obstacle within 5 NM of the aircraft.
b) Distance 15NM or less from the Radar Head.	1,000 feet above any fixed obstacle within 5NM of the aircraft.
Departure	Radar terrain clearance shall be established as soon as possible after departure in accordance with the above minima. Under no circumstance should aircraft be vectored toward an obstruction unless the minima given for initial/intermediate can be achieved before the prescribed distances are reduced.
Other flights	1,500 feet above any fixed obstacle within 30 NM of the aircraft.

14.4 Radar controllers have no responsibility for the terrain clearance of, and shall not assign levels to, aircraft:

a) In receipt of a radar information service when not subject to radar vectors; or

b) Operating SVFR or VFR within controlled airspace which accepts radar vectors.

14.5 Air traffic control units providing a radar advisory service outside controlled and advisory airspace shall set a level, or levels, below which the service shall be refused or terminated.

15 Unknown Aircraft

15.1 A radar return which cannot be associated with an aircraft known by the radar controller to be operating within the airspace concerned shall be considered to represent an unknown aircraft.

15.2 Action to be taken by controllers to avoid unknown aircraft in various types of airspace is tabulated below:

Type of Airspace	Action to be taken by controller
Classes A to E. (Controlled Airspace)	Avoiding action or traffic information shall not be passed unless it is ATS surveillance system derived. In the case of an unknown, unidentified target, the minimum separation shall be 10 NM.
Class F and G	Under an Advisory Service, pass traffic information followed by advice on avoiding action.* When providing an Information Service, traffic information is to be passed but traffic avoidance is NOT to be offered.

*When, due to the sudden appearance of unknown traffic, there is no time to adopt this procedure, advice on avoiding action may be given first followed by traffic information. It is recognised that in this situation, and when unknown aircraft make unpredictable changes in flight path, it is not always possible to provide standard radar separation.

15.3 A pilot who does not wish to comply with the advice on avoiding action becomes responsible for his own separation and any avoiding action which may subsequently become necessary.

16 Traffic Information

16.1 Traffic information shall include the following:

a) Bearing from the aircraft in terms of the 12 hour clock (when the aircraft is turning, direction of the unknown aircraft by compass points);

b) Distance from the aircraft in miles;

c) Direction in which the unknown aircraft is proceeding, e.g. 'traffic is opposite direction/crossing left to right', etc.

d) Height information when available, this may include the unverified mode C of unknown aircraft;

16.2 Under some circumstances, controllers may consider it prudent to inform a pilot of other traffic which is separated from his aircraft. In such cases, to prevent any possible confusion, no reference should be made to the actual level of the other aircraft. If necessary, the pilot should be informed that the other aircraft is '(number) thousand feet above/below'.

17 Situation Display

17.1 A situation display providing surveillance information to the controller shall, as a minimum, include position indications, map information required to provide ATS surveillance services, and where available, information concerning the identity of the aircraft and the aircraft level.

17.2 The ATS surveillance system shall provide for a continuously updated presentation of surveillance information, including position indications.

17.3 Position indications may be displayed as:

a) Individual position symbols, e.g. PSR, SSR and ADS-B ***or MLAT*** symbols, or combined symbols;

b) PSR blips;

c) SSR responses.

17.4 When applicable, distinct symbols should be used for presentation of:

a) Unintentionally duplicated SSR codes and/or aircraft identifications that are unintentionally duplicated;

b) Predicted positions for a non-updated track; and

c) Plot and track data.

17.5 Where surveillance data quality degrades such that services need to be limited, symbology or other means shall be used to provide the controller with an indication of the condition.

17.6 Labels shall, as a minimum, include information relating to the identity of the aircraft e.g. SSR code or aircraft identification and pressure altitude-derived level information. This information may be obtained from SSR Mode A, SSR Mode C, SSR Mode S and/or ADS-B.

17.7 Labels shall be associated with their position indications in a manner precluding erroneous identification by or confusion on the part of the controller. All label information shall be presented in a clear and concise manner.

17.8 In the event of clutter being present on the ASD display, the controller shall decide as early as possible if the extent of the clutter is such that an ATS surveillance service should be terminated, or not provided. He shall advise all aircraft under his control and shall provide procedural separation between these aircraft before withdrawing ATS surveillance services.

17.9 In the case of an aircraft approaching to land, the controller shall decide whether:

a) An ATS surveillance approach is impracticable; or

b) An ATS surveillance approach could be carried out, but there may be a possibility of ATS surveillance contact being lost.

17.***10*** In the case of (a) he shall inform the aircraft that a radar approach is not possible owing to clutter.

17.***11*** In the case of (b) he shall inform the aircraft as early as possible that clutter is affecting the radar display and that missed approach instructions will be passed in good time if it becomes necessary to abandon the approach.

18 Situation Display Serviceability

Unit operations manual lay down the checks that a radar controller is to make to ensure the radar display is serviceable.

19 *ATS Surveillance System* Failure

19.1 In the event of complete failure of the ATS surveillance system where air-ground communications remain, the controller shall plot the positions of all aircraft already identified, take the necessary action to establish procedural separation between the aircraft and, if necessary, limit the number of aircraft permitted to enter the area.

19.2 As an emergency measure, use of flight levels spaced by half the applicable vertical separation minimum may be resorted to temporarily if standard procedural separation cannot be provided immediately, the controller shall re-identify all aircraft by an approved method using either primary or secondary radar and in accordance with the procedures described in paragraphs 3 and 4 of this chapter.

20 Limitations in the use of Radar

20.1 The number of aircraft simultaneously provided with radar services shall not exceed that which can safely be handled under the prevailing circumstances, taking into account:

a) The degree of technical reliability and the back-up facilities of the radar and the communication system in use;

b) The capabilities and skill of the radar controller;

c) The number of Individual position symbols observed on the radar display within the sector or area of responsibility of the radar controller;

d) When radar separation is applied, the possibility of a radar equipment failure or other emergency that would eventually require establishment of procedural separation.

20.2 A distinction should be made as to the application of a Radar service with regard to vectoring traffic and monitoring traffic. Controllers should take note that providing a Radar control service will require a higher level of concentration and effort than monitoring the traffic flow and as such, the amount of traffic placed under Radar control will depend on the ability of the controller and the capability of the equipment.

21 Combined Radar/ Procedural Control

21.1 The following procedures are laid down for the guidance of controllers who are required to combine the function of procedural control and radar control. They do not affect the radar procedures laid down elsewhere in this chapter.

21.2 The prime use of radar by Air Traffic Control is to expedite the movement of air traffic by using

radar separation to achieve better utilisation of existing airspace. When radar is used by the same controller who is providing procedural separation standards as well as radar separation it is imperative that pilots of aircraft are made fully aware of the occasions when they are under radar control and that radar separation and where appropriate terrain clearance is being applied. If pilots are not aware of the fact that they are being radar vectored it can lead to the belief that they are not separated when they see another aircraft in what they consider to be close proximity. It is equally important that the pilot be aware that he is not under radar control, particularly in respect of terrain clearance responsibility.

21.3 Where SIDs and STARs are dependant on radar services, the headings and tracks in such procedures are to be considered as vectors and therefore subject to terrain clearance considerations, with the exception of the phases of flight associated with take-off and landing (including missed approach) where the aircraft is below the radar terrain clearance limits which are accounted for in the procedure design.

21.4 **Monitoring**

21.4.1 Where procedural standard separation is being applied between controlled flights it need only be necessary to monitor such traffic to ensure compliance with ATC clearances.

21.4.2 Radar may also be used in this sense to establish that track separation or geographical separation has been achieved and is being maintained. The use of radar in this manner will reduce the number of R/T communications normally required to establish such separation. Monitoring of final approach spacing between arriving aircraft and arriving and departing aircraft is also another function.

21.5 **Procedural Clearance**

21.5.1 Whenever possible a procedural clearance, providing standard separation, should be issued to aircraft which will ensure the maintenance of standard separation until such aircraft have been positively identified and radar separation can be applied. When, however, the conflicting traffic is under radar control an unrestricted clearance may be given to an aircraft prior to identification provided that positive identification of such aircraft can be achieved before radar separation is reduced.

22 STRATEGIC LATERAL OFFSETs PROCEDURES (SLOP) IN OCEANIC AND REMOTE CONTINENTAL AIRSPACE

22.1 SLOP are approved procedures that allow aircraft to fly on a parallel track to the right of the centre line relative to the direction of flight. An aircraft's use of these procedures does not affect the application of prescribed separation standards.

Note 1.— Annex 2, 3.6.2.1.1, requires authorization for the application of strategic lateral offsets from the appropriate ATS authority responsible for the airspace concerned.
Note 2.— The following incorporates lateral offset procedures for both the mitigation of the increasing lateral overlap probability due to increased navigation accuracy, and wake turbulence encounters.
Note 3.— The use of highly accurate navigation systems (such as the global navigation satellite system (GNSS)) by an increasing proportion of the aircraft population has had the effect of reducing the magnitude of lateral deviations from the route centre line and, consequently, increasing the probability of a collision, should a loss of vertical separation between aircraft on the same route occur.

22.2 The following shall be taken into account by the appropriate ATS authority when authorizing the use of strategic lateral offsets in a particular airspace:
a) Strategic lateral offsets shall only be authorized in en-route oceanic or remote continental airspace. Where part of the airspace in question is provided with an ATS surveillance service, transiting aircraft should normally be allowed to initiate or continue offset tracking;
b) Strategic lateral offsets do not affect lateral separation minima and may be authorized for the following types of routes (including where routes or route systems intersect):
1) Uni-directional and bi-directional routes; and
2) Parallel route systems where the spacing between route centre lines is not less than 55.5 km, (30 NM);
c) In some instances it may be necessary to impose restrictions on the use of strategic lateral offsets, e.g. where their application may be inappropriate for reasons related to obstacle clearance;
d) Strategic lateral offset procedures should be implemented on a regional basis after coordination between all States involved;
e) The routes or airspace where application of strategic lateral offsets is authorized, and the procedures to be followed by pilots, shall be promulgated in aeronautical information publications (AIPs); and
f) Air traffic controllers shall be made aware of the airspace within which strategic lateral offsets are authorized.

22.3 The decision to apply a strategic lateral offset shall be the responsibility of the flight crew. The flight crew shall only apply strategic lateral offsets in airspace where such offsets have been authorized by the appropriate ATS authority and when the aircraft is equipped with automatic offset tracking capability.

22.4 The strategic lateral offset shall be established at a distance of 1.85 km (1 NM) or 3.7 km (2 NM) to the right of the centre line relative to the direction of flight.

Note 1. — Pilots may contact other aircraft on the inter-pilot air-to-air frequency 123.45 MHz to coordinate offsets.
Note 2. — The strategic lateral offset procedure has been designed to include offsets to mitigate the effects of wake turbulence of preceding aircraft. If wake turbulence needs to be avoided, one of the three available options (centre line, 1.85 km (1 NM) or 3.7 km (2 NM) right offset) may be used.
Note 3. — Pilots are not required to inform ATC that a strategic lateral offset is being applied.

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