



# USE OF RADAR IN THE AERODROME CONTROL SERVICE

## 1. Introduction

The indications presented on the ATS surveillance system named radar may be used to perform the aerodrome, approach and en-route control service:

At IVAO, the ATS surveillance system is the software IvAc which simulates a secondary radar.

In this documentation, all items referred to as “ATS surveillance systems” in official regulations documentation is translated by the generic word “radar” as IVAO only provides a secondary radar system.

## 2. Radar in the air traffic control service

Direct pilot controller communications shall be established prior to the provision of radar services.

The number of aircraft simultaneously provided with ATS surveillance services **shall not exceed that which can safely be handled** in function of:

- the structural complexity of the control area and sector capacity
- the functions to be performed within the control area
- the controller workload
- the technical availability of the radar

The radar system can be used to help ATC perform his tasks:

- The information provided by the radar and presented on a situation display may be used to perform the function of air traffic control service:
- Provide radar services as necessary in order to improve airspace utilization, reduce delays, provide for direct routings and more optimum flight profiles, as well as to enhance safety.
- Provide vectoring to assist pilots in their navigation to or from a radio navigation aid and/or away from or around areas of adverse weather
- Provide separation and maintain normal traffic flow when an aircraft experiences communication failure within the area of coverage
- Maintain flight path monitoring of air traffic
- When applicable, maintain a watch on the progress of air traffic

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## 2.1. Real Life and IVAO differences

In real life, an ATS surveillance system provides:

- Conflict alert (available in IvAc)
- Minimum safe altitude warning (not available in IvAc)
- Conflict prediction (partially available in IvAc with VERA tool only)
- Duplicated SSR code (available in IvAc)
- Aircraft identification (available in IvAc)

In IvAc radar software, today, it is not possible to handle minimum safe altitude warning and extended conflict prediction like in the real ATS surveillance systems.

## 2.2. Radar identification procedure

Identification of aircraft consists of:

- Aircraft label on radar shall identify the aircraft : aircraft call sign or SSR transponder code (A,C,S or ADS-B) and if available pressure altitude derived level information
- Position indication

At IVAO, the radar label is automatically displayed on the IvAc radar screen if the transponder code is compatible with a controlled code.

The figure shows an identified aircraft plot.



When radar is not displaying an aircraft label, in order to identify an aircraft, ATC can:

- Correlate a particular radar position indication with the information known
- Correlate position with an aircraft which is known
- Instruct the pilot to execute one or more changes of heading of 30° or more and correlating the movements of one particular radar position indication
- Correlate the movements of a particular radar position indication with manoeuvres currently executed by an aircraft having so reported
- Change the transponder code and/or use the transponder IDENT procedure

The separation between aircraft is possible provided that:

- SSR transponder is mandatory in the area
- Identification of aircraft is established and maintained.

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## 2.3. Position report

An aircraft should be informed of its position under radar surveillance service in the following circumstances:

- Upon identification (before identification established when necessary)
- When the pilot requests this information
- When the pilot is instructed to resume own navigation after vectoring if the aircraft had been diverted from a previously assigned route
- Immediately before termination of ATS surveillance service, if the aircraft is observed to deviate from its intended route

Position information can be one of the following possibilities:

- A well-known geographical position
- Magnetic track and distance to a significant point, an en-route navigation aid, or an approach aid
- direction and distance from a known position
- distance to touchdown, if the aircraft is on final approach
- distance and direction from the centre line of an ATS route.

## 2.4. Speed control

A controller may, in order to facilitate sequencing or to reduce the need for vectoring, request aircraft to adjust their speed in a specific manner.

## 2.5. Transfer of control

The transfer point, the direction of flight, specified levels, transfer of communication points and agreed minimum separation between aircraft have are subject to specific instructions or specific letter of agreement between the 2 adjacent ATC units.

When the control of an identified aircraft is to be transferred to a control sector that will provide the aircraft with procedural separation, the transferring controller shall ensure that appropriate procedural separation is established between that aircraft and any other controlled aircraft before the transfer is effectuated.

# 3. Navigation assistance

An identified aircraft observed to deviate significantly from its intended route or designated holding pattern shall be advised accordingly. Appropriate action shall also be taken if such deviation is likely to affect the service of the controller.

The pilot of an aircraft requesting navigation assistance from an air traffic control unit shall state the reason.

An aircraft which has been informed that it is provided with ATS surveillance service should be informed immediately when the service is interrupted or terminated.

Pilots shall be informed by the air traffic controller about adverse weather well in time to permit the pilots to decide on an appropriate course of action to circumnavigate the adverse weather area, if so desired. When vectoring aircraft for circumnavigating an area of adverse weather, the controller should ascertain that the aircraft can be returned to its intended flight path.

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### 3.1. Emergencies

The progress of an aircraft in emergency shall be monitored and whenever possible plotted on the situation display until the aircraft disappears from the radar system coverage.

Its position information shall be provided to all air traffic services units which may be able to give assistance to the aircraft.

### 3.2. Collision hazard

When an identified controlled flight is observed to be on a conflicting path with an unknown aircraft deemed to constitute a collision hazard, the pilot of the controlled flight shall, whenever practicable:

- be informed of the unknown aircraft, and if so requested by the controlled flight or if, in the opinion of the controller, the situation warrants, a course of avoiding action should be suggested
- be notified when the conflict no longer exists

When an identified IFR flight operating outside controlled airspace is observed to be on a conflicting path with another aircraft, the pilot should:

- be informed as to the need for collision avoidance action to be initiated. A course of avoiding action should be suggested if the situation warrants
- be notified when the conflict no longer exists

Information regarding traffic on a conflict path should be given, whenever practicable, in the following form:

- Relative bearing of the conflicting traffic in terms of the 12-hour clock
- Distance from the conflicting traffic in nautical miles or kilometres
- Direction in which the conflicting traffic appears to be proceeding
- Level and type of aircraft or, if unknown, relative speed of the conflicting traffic

### 3.3. Aircraft radio transmitter failure

If two-way communication is lost with an aircraft, the controller shall determine whether or not the aircraft's receiver is functioning by instructing the aircraft:

- to make a specified manoeuvre and by observing the aircraft's track,
- to operate IDENT or to make SSR code and ADS-B (text communication for IVAO) changes.

When it has been established that the aircraft's radio receiver is functioning, continued control can be effected using SSR transponder code or ADS-B transmission (text communication for IVAO) change or IDENT transmissions to obtain acknowledgement of clearance issued to the aircraft.

When a controlled aircraft experiencing complete communication failure is operating or expected to operate in a controlled airspace, the controller shall continue to apply adequate separation to all aircraft.

Separation shall be applied between identified aircraft and all unidentified aircraft observed along the expected route of the aircraft with the communication failure.

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### 3.4. Radar failure

In the event of complete failure of the radar system where voice communication remains, the controller shall take the necessary action to establish procedural separation between the aircraft and, if necessary limit the number of aircraft permitted to enter the area.

## 4. Use of radar in the aerodrome control service

When authorized by country regulations and IVAO division air traffic control operation rules, a radar system may be used in the provision of aerodrome control service to perform the following functions:

- Flight path monitoring on final approach
- Flight path monitoring of other aircraft in the vicinity of the aerodrome
- Establishing separation between succeeding departing aircraft
- Providing navigation assistance to VFR flights

Special VFR shall not be vectored unless special circumstances, such as emergencies, require so.

Normal VFR should not be vectored unless special circumstances (emergencies, assistance requested by pilot) or specific regulations depending the airspace class require so. The controller shall ensure that the VFR aircraft vectored does not inadvertently enter instrument meteorological conditions (IMC).

In real life, the use of an ATS surveillance system like radar **will not be detrimental to visual observation of aerodrome traffic.**

But at IVAO, the radar simulated by IvAc software is today the primary method to control an aerodrome airfield due to the better performance provided by this system than the view created by a flight simulator system which simulates the external visual observation of the manoeuvring area.

The IvAc Radar can be used as surface movement radar and the controller uses it to assist in:

- Monitoring of aircraft and vehicles on the manoeuvring area for compliance with clearance and instructions
- Determining that a runway is clear of traffic prior to a landing or take off
- Providing information on the local traffic on or near the manoeuvring area
- Determining the location of aircraft and vehicles on the manoeuvring area
- Providing directional taxi information to aircraft when requested by the pilot or deemed necessary by the controller

## 5. Use of ATS surveillance systems in the flight information service

The radar information may be used to provide identified aircraft with:

- Information regarding any aircraft observed to be on a conflicting path with the identified aircraft and, suggestions or advices regarding avoiding actions.
- Information on the position of significant weather
- Information to assist the aircraft in its navigation when requested by the pilot or deemed necessary by the controller

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