Chapter 13

AUTOMATIC DEPENDENT SURVEILLANCE (ADS) SERVICES

13.1 GENERAL

The provision of air traffic services to aircraft, based on information received from aircraft via ADS, is generally referred to as the provision of ADS services.

13.2 USE OF ADS IN THE PROVISION OF AIR TRAFFIC CONTROL SERVICE

13.2.1 General

13.2.1.1 ADS may be used in the provision of an air traffic control service, provided identification of the aircraft is unambiguously established.

13.2.1.2 ADS ground systems should be capable of integration with other automated systems used in the provision of ATS and should provide for an appropriate level of automation with the objectives of improving the accuracy and timeliness of data displayed to the controller and reducing controller workload and the need for verbal coordination between adjacent control positions and ATC units.

13.2.1.3 Flight data processing of ADS data may be used in the provision of an air traffic control service, provided the correlation between the ADS data down linked by that aircraft and the flight plan details held for the aircraft has been accomplished.

Note 1- A combination of information received from the aircraft may be necessary to ensure unambiguous correlation, e.g. departure aerodrome, estimated off-block time (EOBT), and destination aerodrome might be used.

Note 2- Information pertaining to use of ADS and to system reliability, availability and integrity is contained in the Manual of Air Traffic Services Data Link Applications *(Doc 9694).*

Note 3. The capability and specifications of individual ADS ground systems are contained in MATS-2 of the respective airport.

13.2.1.4 Information provided by the ground system may be used by the controller to perform the following functions in the provision of air traffic control services:

a) enhance safety;

b) maintain an accurate awareness of the air traffic situation;

c) apply separation minima;

d) take appropriate action regarding any significant deviation by aircraft from the terms of their respective air traffic control clearances, including their cleared routes, levels and speed when appropriate;

e) provide updated position information regarding aircraft to other controllers when required; and

f) improve airspace utilization, reduce delays, as well as provide for direct routings and more optimum flight profiles.

13.2.2 Provision of ADS services

13.2.2.1 *General*

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

a) the complexity of the traffic situation and associated workload within the sector or area of responsibility of the controller;

b) the level of automation of the ADS ground system;

c) the overall technical performance of the ADS systems and communications systems, including possible degradations that would require use of back-up facilities;

d) the overall performance of the back-up surveillance and communications systems; and

e) the effect of loss of controller-pilot communications.

13.2.2.2 *Coordination and transfer of control of ADS aircraft*

13.2.2.2.1 Appropriate arrangements shall be made in and between any ATC units using ADS to ensure the coordination of ADS and non-ADS traffic and to ensure the provision of adequate separation between the ADS aircraft and all other aircraft.

13.2.2.2.2 Transfer of control shall be effected so as to facilitate uninterrupted provision of ADS services where ADS is available in adjacent ATC units.

13.2.2.2.3 The accepting ATC unit shall establish a contract with the affected aircraft prior to reaching the transfer of control point. Should the accepting ATC unit be unable to establish a contract, the transferring ATC unit shall be notified in order to provide ground forwarding of ADS data to permit an uninterrupted ADS service.

13.2.2.2.4 When an aircraft is in an emergency/urgency mode or is the subject of safety alerts or warnings, this information shall be provided to the accepting ATC unit, and the ADS contract shall not be terminated by the transferring ATC unit until appropriate coordination has been effected.

13.2.2.2.5 Transfer of control of aircraft between adjacent control positions or between adjacent ATC units may be effected as follows:

a) appropriate ADS transfer protocols are observed by:
   1) designation of the ADS position indication by automated means; or
   2) direct designation of the ADS position indication if two display systems are adjacent or if a common (conference) type of display is used; or
   3) designation of the ADS position indication by reference to a position accurately indicated on both display systems;
b) updated flight plan information on the aircraft about to be transferred is provided to the accepting controller prior to transfer;
c) when controllers are not physically adjacent, direct communications facilities are available between them at all times;
d) the transfer point or points and all other conditions of application have been made the subject of specific instructions or a specific letter of agreement; and
e) the accepting controller is kept current of all control instructions (e.g. level or speed instructions) given to the aircraft prior to its transfer and which modify its anticipated flight progress.

Note: The requirements of c) & e) above may be met by two-way direct speech facility or ATS inter-facility data communication (AIDC)

13.2.2.2.6 The minimum agreed separation between aircraft about to be transferred shall be as specified in letters of agreement or local instructions, as appropriate.

13.2.3 Communications

Controller-pilot communications shall be such that the possibility of communications failure or significant degradations is very remote. Adequate back-up facilities shall be provided.

13.3. General ADS procedures

13.3.1 *ADS contract management*

a) Only appropriate ATC units shall initiate ADS contracts with a given aircraft. Procedures shall ensure that non-current contracts are terminated in a timely manner.

b) The ADS ground system shall be able to identify the ADS capability of the aircraft and establish appropriate ADS contracts with ADS-equipped aircraft.

c) ADS contracts necessary for the control of the aircraft will be established with each aircraft by the relevant ADS ground system, at least for the portions of the aircraft flight over which that ATC unit provides air traffic services.

d) The contract may include the provision of basic ADS reports at a periodic interval defined by the ADS ground system with, optionally, additional data containing specific information, which may or may not be sent with each periodic report. The agreement may also provide for ADS reports at geographically defined points such as way points, in addition to other specific event-driven reports.

e) The aircraft must be capable of supporting ADS agreements with at least four ATC unit ADS ground systems simultaneously.

(f) When an ADS ground system attempts to establish an ADS agreement with an aircraft and is unable to do so due to the aircraft's inability to support an additional ADS contract, the aircraft should reply with the ICAO location indicators or eight-letter facility indicators of the ground systems with which it currently has contracts, in order for the ATC unit to negotiate a contract release. In the event that this information cannot be provided to the ground system, the ground system shall nevertheless alert the controller that an ADS agreement cannot be established. Coordination between the appropriate ATC units shall then be effected for the purpose of establishing priority for ADS connections with the aircraft.

(g) An ATC unit shall be capable of replacing or terminating its own ADS contract(s) as required. An existing contract shall remain in place until any new contract of the same type is accepted by the aircraft or until the contract type is terminated.

13.3.2 *ADS Termination*

a) ADS contracts may be terminated manually, or automatically by the ADS ground system, based on agreements between ATS authorities for aircraft crossing FIR boundaries.

b) ATS authorities shall establish procedures to ensure that ADS contracts are re-established as required when unplanned ADS termination occurs.

13.3.3 *ADS Agreements*

a) Initial ADS agreements shall be determined by the ATS authority. Subsequent modifications to individual contracts may be made at

the discretion of the controller based on the prevailing traffic conditions and airspace complexity.

b) When the application of specified separation minima is dependent on the reporting interval of periodic position reports, the ATC unit shall not establish periodic contracts with a reporting interval greater than the required reporting interval.

c) Where an expected position report is not received within a prescribed time parameter, action shall be taken, as appropriate, to ascertain the position of the aircraft. This may be achieved by the use of an ADS demand contract, CPDLC or voice communications, or receipt of a subsequent periodic report.

d) An ADS aircraft observed to deviate significantly from its cleared flight profile shall be advised accordingly. Appropriate action shall also be taken if, in the opinion of the controller, such deviation is likely to affect the air traffic service being provided.

13.3.4 *Performance Checks*

a) An ATC unit providing an ADS service to an aircraft, shall check the ADS three-dimensional position information received from that aircraft through pilot reports and/or flight plan conformance.

b) The pilot of the aircraft whose ADS-derived position information is within the approved tolerance value need not be advised of such verification.

c) If the displayed position information is not within the approved tolerance value, or when a discrepancy in excess of the approved tolerance value is detected subsequent to verification, the pilot shall be advised accordingly and requested to check the aircraft's navigation system.

d) The controller shall adjust the display(s) and carry out adequate checks on the accuracy thereof, in accordance with instructions prescribed in MATS 2 of the concerned airport.

e) The controller shall be satisfied that the functional capabilities of the ADS display system or integrated display system, as well as the information displayed, is adequate for the functions to be performed.

f) The controller shall report, in accordance with local procedures, any fault in the equipment or any incident requiring investigation or any circumstances which make it difficult or impractical to provide services on the basis of displayed ADS positions.

13.3.5 E*mergency and/or Urgency Reports*

Note.— To indicate that it is in a state of emergency, an aircraft equipped with ADS might operate the emergency and/or urgency mode as follows:

(i) emergency;
(ii) no communications;
(iii) unlawful interference;
iv) minimum fuel; and/or
(v) medical.

a) When an ADS emergency and/or urgency report is received, the controller with responsibility for the flight must acknowledge receipt of the information by the most appropriate means of communication.

b) In the event of an aircraft in, or appearing to be in, any form of emergency, all possible assistance shall be provided by the controller.

13.4 *Failure of Equipment*

Note.— It is not expected that the pilot will be made aware of any failure of ADS by means of on-board monitoring equipment.

13.4.1 *ADS airborne system failure*

a) On receipt of an airborne failure notification, the controller will:
   i) advise the pilot of the failure;
   ii) advise the pilot of the requirement for position reports via voice or CPDLC; and
   iii) take necessary action to establish alternative separation, if required.

b) When an aircraft experiencing ADS failure after departure is operating or expected to operate in an area where the carriage of functional ADS with specified capabilities is mandatory, the ATC units concerned should endeavour to provide for continuation of the flight to the aerodrome of first intended landing in accordance with the flight plan. However, under some circumstances, continuation of the flight may not be possible due to traffic or airspace configuration. The aircraft may then be required to return to the departure aerodrome or to land at the nearest suitable aerodrome acceptable to the operator concerned.

c) In the case of an ADS failure that is detected before departure from an aerodrome where it is not practicable to effect a repair, the aircraft concerned should be permitted to proceed, as directly as possible, to the nearest suitable aerodrome where repair can be made. When granting clearance to such aircraft, the air traffic control unit should take into consideration the existing or anticipated traffic situation and may have to modify the time of deparrture, flight level or route of the intended flight. Subsequent adjustments may become necessary during the course of the flight.

13.4.2 *ADS ground system shutdown*

a) When a planned shutdown of the ADS ground system occurs:
   (i) a NOTAM shall be published to inform all affected parties of the shutdown period;
   (ii) position reports via voice or CPDLC shall be stipulated; and
   (iii) alternative separation shall be established, if required.

b) In the event of an unplanned ADS ground system shutdown, the relevant ATS unit shall:
   (i) inform all affected aircraft and advise them of the requirement for position reports via voice or CPDLC;
   (ii) take necessary action to establish alternative separation, if required;
   (iii) inform the adjacent ATS unit(s) by direct coordination; and
   (iv) inform WSO/ATS Incharge so that all other relevant parties may be informed via the publication of a NOTAM, if appropriate.

13.5 ADS-related aeronautical information

Adequate information on the operating practices having a direct effect on the operations of air traffic services shall be published in aeronautical information publications. This shall include a brief description concerning the area of responsibility, requirements and conditions under which the ADS service is available, equipment limitations, ADS failure procedures, if required, and the initial address(es) for each ATC unit.

13.6 USE OF ADS IN THE APPLICATION OF SEPARATION MINIMA

13.6.1 General

The procedures and minima in this section are applicable when ADS is used in the provision of air traffic control services.

13.6.1.1. The use of ADS position reports to ensure separation shall only be applied when there is a reasonable assurance that the provision of ADS reports will not be interrupted.

13.6.2 Determination of level occupancy

13.6.2.1 The tolerance value which shall be used to determine that the ADS level information displayed to the controller is accurate shall be ± 200 ft in RVSM airspace. In other airspace, it shall be ± 300 ft.

13.6.2.2 If the ADS level information is not within the approved tolerance value, the information must be validated by voice or CPDLC. Where it has been established that the ADS level information is incorrect, the controller shall inform the concerned aircraft by voice or CPDLC. He shall not use ADS level information of the concerned aircraft for the separation purpose. Whenever level information from such aircraft is required, the control shall request by voice or CPDLC.

13.6.2.3 An aircraft cleared to leave a level is considered to have commenced its manoeuvre and vacated the previously occupied level when the ADS level information indicates a change of more than 300 ft in the anticipated direction from its previously assigned level, or verification has been made by receipt of a CPDLC or voice report from the pilot.

13.6.2.4 An aircraft that is climbing or descending is considered to have crossed a level when the ADS level information indicates that it has passed this level in the required direction by more than 300 ft or that verification has been made by receipt of a CPDLC or voice report from the pilot.

13.6.2.5 An aircraft that is climbing or descending is considered to have reached the level to which it has been cleared when verification has been made by receipt of the assigned level by CPDLC or a voice report from the pilot. The aircraft may then be considered to be maintaining this level for as long as the ADS level information remains within the appropriate tolerance values as specified in 13.3.2.1.

Note.— A level range deviation event contract may be used to monitor the continued compliance of the aircraft with the appropriate level tolerance values.

13.6.2.6 When CPDLC is to be used to verify that the aircraft has reached the level to which it has been cleared, the uplink message No. 129, REPORT MAINTAINING *(level),* or uplink message No. 200, REPORT REACHING, should be used.

Note.— Uplink message No. 175, REPORT REACHING (level), does not provide the same assurance that the aircraft has maintained the assigned level. On those occasions where the flight management system has been loaded by the pilot to reply automatically to this message, the reply may be sent when the aircraft reaches the assigned level, irrespective of whether the aircraft maintains the assigned level.