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ABC of Air Traffic Control

ABC of Air Traffic Control

Skyguide, the Swiss air navigation service specialist, welcomes your interest in the subject of air traffic control. This small compendium is designed to offer you a contribution towards a better understanding of this complex field.

The ABC of Air Traffic Control explains for you the most important concepts in the international terminology and gives you a basic knowledge. Processes and contexts in the high-tech world of air traffic control will become clearer to you thanks to this knowledge.

Skyguide has been working to ensure the safety of air navigation for over 80 years. In 2001, the Swiss Confederation issued it with the corresponding mandate for handling the safety of civil and military air navigation services alike. Every year, skyguide guides some 2 million flight movements through the airspace that it controls, constantly pursuing its aims of safety, efficiency and economy. Skyguide employs about 1400 staff, who are deployed at 12 bases.



AIB (Aircraft Accident Investigation Bureau) Reports on accidents or incidents involving Swiss aviation are investigated by this body. (www.bfu.admin.ch)

ACAS (Airborne Collision Avoidance System) Anti-collision system on board aircraft. It is activated when two aircraft fail to respect separation minima. (-> RA, TA, TCAS)

ACC (Area Control Center) Responsible for the safe flow of traffic along airways (-> En-route) and in certain portions of terminal control areas (-> APP). Significant horizontal and vertical growth in the areas to be controlled requires subdivision into various sectors of activity, either geographically or according to altitude, depending on traffic density.

ADDC (Air Defence and Direction Center, EZ or “Einsatzzentrale” in German). Skyguide’s military ATCOs based in the ADDC in Dübendorf are responsible for a variety of tasks: determining the general situation of airspace, airspace security, training formation flights for air forces (air defence) and providing ATC for all civil and military aircraft entrusted to it outside of the control area of military aerodromes. From an organisational standpoint, the fact that military ATC services are provided by a civil enterprise is unique in the West. (-> Integration)

ADS (Automatic Dependent Surveillance) An aircraft-mounted location system currently undergoing trials for use in European airspace. Each aircraft continually transmits its own position to ground stations via satellite in order to provide an overall picture of current airspace use.

Aerodrome Control (ADC) From the control tower (-> TWR) with its extended field of vision, the ADC issues clearance to start engines, to take off or to land, etc. It directs taxiing aircraft and manages airborne traffic in the immediate vicinity of the airport.

AIC (Aeronautical Information Circular) Used to provide administrative information which does not involve restrictions on aviation, for example, verification data for the awarding of a pilot’s licence, etc.

AIG (Aéroport International de Genève or Geneva International Airport) Air traffic control there is handled by skyguide. (www.gva.ch) (-> Geneva Cointrin)

AIM (Aeronautical Information Management) In accordance with Eurocontrol (->) recommendations, AIM handles the ever-increasing aviation information flow. As an enlarged redefinition of AIS (->), AIM allows for the provision of homogeneous, standardised and efficient digital information during all flight phases and for all European services involved. (aim@skyguide.ch)

AIP (Aeronautical Information Publication) Basic document for pilots, ATCOs, airlines, airports, etc. used to prepare and ensure safe flight operations. It contains the most important statistical data (->) and aeronautical charts for aviation. The Swiss AIP is published by skyguide.

Publication requests:

AIP Coordination Center

for AIP amendments can be reached via e-mail at datacoordination@skyguide.ch or by phone +41 22 417 44 28. Open during office hours.

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AIRPROX (Aircraft Proximity) A situation in which the separation minima required between in-flight aircraft for safe operations are not respected. (-> ATIR)

Airspace A three-dimensional space criss-crossed by airways. In keeping with ICAO (->) rules, worldwide airspace is subdivided into various classes. The provision of air traffic control is defined for each class, together with the applicable flight rules (-> DELTA, UAC). A distinction is made between civil and military airspace; each of these is primarily reserved for one user group. Since integration (->), skyguide manages all of Swiss and some foreign delegated airspace, and in so doing improves both flexibility of use and capacity.

Airspace management A system of management which takes into account user needs and optimises the use of airspace by improving its structure and by designating airways and specifying the ATM (->) procedures to be followed.

Air Traffic Control (ATC) A collective term for all the services provided to ensure the safe, orderly and cost-effective flow of air traffic through controlled airspace and to make sure that the separation minima between aircraft are respected. It is subdivided into aerodrome control (-> TWR), approach or terminal control (-> APP) and area control (-> ACC).

Air Traffic Controller (ATCO) Manages and monitors, from the airport of take-off to that of landing, all of the aircraft present in the portion of airspace for which he or she is responsible. Skyguide employs about 450 civil ATCOs and 90 military ATCOs. The profession of ATCO is open to both men and women. (-> STC)

Air Traffic Management (ATM) Service unit of ATC operations, the goal of which is to organise air traffic safely, smoothly and cost-effectively. Handles Airspace Management (->) and ATC procedures.

Airway The airways in which controlled flights fly are internationally agreed and represented by geographic coordinates. These coordinates are entered into the FMS (->), and help pilots to find their way. (-> Waypoint, Reporting point)

AIS/AIM (Aeronautical Information Service/Aeronautical Information Management) Central office providing information and advice to flight crews, airlines and general aviation. Receives data (-> Dynamic data, Static data) necessary to ensure the safe and orderly flow of traffic, and processes and transmits such data. Examples include airspace restrictions, weather information, NOTAMs (->), overflight or approach clearance, etc. Advises the flight crew or airline before the flight and assists both air traffic control and pertinent ground services. Skyguide operates an AIS at Wangen bei Dübendorf, and two AROs (->) at Geneva and Zurich Airports.

AIS Zurich

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Hours of operation: 24 hours a day, seven days a week

Alerting Service (ALRS) Skyguide-operated alert system which informs all the relevant services if an aircraft is in distress (-> Search and Rescue). ALRS is guaranteed by skyguide for all flights (-> IFR, VFR) which have filed a flight plan, or any other flights of which ATC services are apprised.

Alpnach Military airfield, centre of competence and main basis for military helicopters in Switzerland.

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AMIE (AIS MET Information Environment) **selfbriefing**

A selfbriefing facility in the form of an interactive computer terminal for general aviation flight crews which is located at aerodromes and is developed and maintained by skyguide. Pilots may file their flight plan at any time (-> ARO) and receive weather and ATC information.

ANSE (Air Navigation Services Employee) There are two kinds of ANSE. The ANSEs at the ACC (->) provide assistance to air traffic controllers in tactical and pre-tactical control operations. They receive, process and transmit notification of planned flights, update flight plan data and print them on flight progress strips (->); they are also responsible for determining time-slots (-> Slot). The ANSEs at the AIS (->) issue and evaluate data necessary for flight operations.

APP (Approach control) Directs flights arriving at and departing from an airport in a specific area of the control zone (-> CTR) and of the terminal control area, which is usually within a 50 km radius of the airport.

Approach and departure procedures There are standardised take-off and landing procedures (-> SID, STAR) at airports and aerodromes equipped to authorise IFR (->) traffic. These procedures have been developed jointly by skyguide and the airport operator to ensure maximum safety and improved traffic flow, as well as to reduce noise pollution. The procedures are verified and approved by FOCA (->).

Apron control Coordinates traffic on the tarmac (parking strips and taxiways) and assigns parking stands to aircraft. This is the responsibility of the airport operator.

Area Control Center -> ACC

ARN (Air Route Network) European network of air routes defined by Eurocontrol through its members.

ARO (Air Traffic Services Reporting Office) Skyguide counter at airports where pilots can file flight plans (->). The ARO is an important information platform for safety-related data. It functions in a similar manner to the AIS (->).

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ARTAS (ATM Surveillance Tracker and Server) System for processing radar data developed by Eurocontrol. It calculates an overall radar image on the basis of position references provided by several radar inputs. ARTAS enables the radar displays used by skyguide's air traffic controllers to be renewed every 4 seconds.

ASC (AIM Service Centre) Skyguide's Aeronautical Information Service (AIS) is the central source of information and advice for flight crews, air transport operators and other airspace users. The AIM Service Center or ASC is responsible for procuring, processing and disseminating the static and dynamic data – airspace restrictions, meteorological conditions, notices to air- men (NOTAMs), overflight and landing clearances and so on – that are so essential to ensuring safe, smooth and orderly air traffic flows. To its customers, skyguide serves as a single point of contact for these services, providing state-of-the-art call- centre facilities 24 hours a day, every day of the year. The ASC is also responsible for correctly transmitting and distributing

flight plan data to all the relevant services along a flight's intended route, especially those beyond European airspace; and it further provides optimum customer support through its help desk functions and by offering individual assistance and advice. (-> AIM, AIS)

ASMGCS (Advanced Surface Movement and Ground Control System) Traffic surveillance and guidance system on taxiways. Especially important at airports in the event of low visibility.

ATC -> Air Traffic Control

ATCO -> Air Traffic Controller

ATFCM (Air Traffic Flow and Capacity Management) Management of traffic flow and of capacity are two key operational processes. Traffic flow must be adapted to available capacity (->) in order to increase the safety and cost-effectiveness of air traffic. (-> CFMU, Slot)

ATIR (Air Traffic Incident Report) A report drawn up by the air traffic controller and/or the pilot after two aircraft do not respect separation minima (-> AIRPROX). All ATIRs are collected and analysed in minute detail both by skyguide and by the Aircraft Accident Investigation Bureau (-> AAIB).

B



Bern Belp Regional airport. Air traffic control service at Bern Belp regional airport is provided by skyguide's twelve or so employees stationed there. Alpar SA is the company that operates the airport. (www.alpar.ch)

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Buochs Skyguide is responsible for the civil air traffic at Buochs regional aerodrome.

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C

Call sign A code identifying a radio beacon or an aircraft using radio communications.

CANSO (Civil Air Navigation Services Organisation) An organisation based in Amsterdam which brings together air navigation service providers from around the world. Skyguide is a founding member of CANSO. (www.canso.org)

Capacity This term refers to the operations that can be handled by an ATC services management system. Capacity is dependent on a variety of parameters, such as airport capacity, the structure and density of airspace, traffic potential, ATCO (->) availability, weather conditions, and so on. It requires constant supervision and adjustment. (-> ATFCM)

CFMU (Central Flow Management Unit) Eurocontrol unit for regulating traffic flow in European airspace, based in Brussels. The CFMU coordinates and calculates the allocation of slots (->) for all of Europe. It plays an important role in capacity (->) planning. (-> ATFCM)

Clearance Authorisation issued to an aircraft by ATC. Examples include authorisation to start engines, to take off, to change heading, speed or altitude, or to fly a particular approach or departure route.

CNS (Communications, Navigation, Surveillance) Communications, navigation and surveillance systems are the three main technical service areas in air traffic control. More than 300 skyguide technicians and engineers work on the planning, development and maintenance of technical systems for air traffic control.

COMOS (Common Procurement of Mode-S) A programme run jointly by skyguide and its German and Dutch counterparts for the acquisition of radars capable of managing the new Mode-S functionalities. (-> Mode-S, Secondary radar)

Control zone (CTR) A clearly defined area in the immediate vicinity of an airport which aircraft may enter only with the authorisation/clearance of air traffic control services. It is measured from the ground to a specific altitude (Zurich 1,350 m; Geneva 1,200 m).

Cross-border ATC Increasingly, ATC service providers are offering their services beyond their national borders. On the basis of bilateral agreements, skyguide provides its services in southern Germany and in parts of the French, Italian and Austrian adjacent airspaces. By the same token, a portion of Tessin airspace is managed by Italian ATC. Efforts are currently underway in Europe to introduce multinational management of upper airspace. (-> Single European Sky)

CTR -> Control zone

DELTA A specific category of airspace (->). Only those aircraft which can communicate by radio, which have a transponder and have received specific authorisation/clearance from air traffic control can enter this airspace. DELTA is also the name given to the working position responsible for managing this airspace in the control room. (-> ACC)

Departure Clearance for take-off is issued to the pilot by the controllers in the control tower. (-> Aerodrome Control).

Direct routing Flying the shortest possible route to save time and fuel must be approved by air traffic control. Direct routing is not possible on a permanent basis due to considerations of capacity (->), safety and noise pollution.

DME (Distance Measuring Equipment) A device which tells a pilot how far their aircraft is from the ground station concerned.

Dübendorf Skyguide handles the military approaches and starts at Dübendorf aerodrome. (-> Wangen bei Dübendorf)

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Dynamic data As distinguished from static data (->), information on mobile objects, or data or information which is subject to change (weather data, aircraft data, flight plans (->), NOTAM (->), etc.), and is valid only temporarily.

D



Delay Delays occur when traffic volume exceeds capacity (->). The ATFM (->) office in Brussels compiles a register of delays in upper airspace which are generated by the various air navigation service providers. Skyguide strives to improve capacity and reduce delays.



EAD (European AIS Database) European database containing static data (->). Thanks to its high degree of automation, EAD helps to reduce errors and increase safety. It is an important element in the future Europe-wide AIM (->).

EATMP (European Air Traffic Management Programme) Eurocontrol-administered programme to harmonise and unite the various air traffic control systems in Europe.

ECAC (European Civil Aviation Conference) Interstate organisation founded in 1955 which deals with the safe, efficient and sustainable development of air traffic in Europe.

EGNOS (European Geostationary Navigation Overlay Service) European satellite navigation system in keeping with ICAO requirements, the goal of which is to improve the American Global Positioning System (-> GPS) and the Russian GLONASS (->). Available in ECAC airspace as of 2006, EGNOS will provide flights in approach and departure phases and those en-route (->) with the aid of satellite navigation (-> SBAS) beginning from the end of 2007, after certification.

Emmen Skyguide is responsible for military air traffic approaches and starts at Emmen aerodrome.

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En-route Transit, cruising or “en-route” air traffic uses upper airspace (-> UAC). Skyguide handles an especially demanding load of en-route traffic because two of the largest intersections in the European network of airways are located in Swiss airspace. En-route traffic generates almost 70% of skyguide’s revenues.

ESARR (Eurocontrol Safety Regulatory Requirements) Air safety requirements in force in all of Europe and which all Eurocontrol member states must implement. Each ESARR refers to a specific area:

- › ESARR 1 – National ATM Safety Regulatory Framework;
- › ESARR 2 – Reporting and Assessment of Safety Occurrences in ATM;
- › ESARR 3 – Use of Safety Management Systems by ATM Service Providers;
- › ESARR 4 – Risk Assessment and Mitigation in ATM;
- › ESARR 5 – Safety Regulatory Requirement for ATM Services Personnel;
- › ESARR 6 – Software in ATM Systems and in Communications, Navigation and Surveillance Systems.

(-> SRC)

Euro-Airport (Basel-Mulhouse-Freiburg Airport) The terminal control of this airport is managed by the French air navigation services. (www.euroairport.com)

Eurocontrol The European organisation for air traffic control, founded in 1960, which handles the implementation of ATC strategies, technical research and development programmes, training, the collection of payments and other tasks. Eurocontrol is based in Brussels. (www.eurocontrol.int)

Executive controller Responsible, together with the Planning Controller, for controlling the air traffic evolving in his or her control sector.



Feet (ft) The standard unit for determining altitude in civil aviation. One foot equals 30.48 cm.

FIC (Flight Information Center) The flight information center provides pilots in skyguide's airspace with information on air safety, such as the general air traffic situation, weather conditions and the state of ground-based installations.

Final approach The last phase of flight, just before an aircraft lands. Aircraft equipped with the appropriate on-board equipment (→ Navigation instruments) are assisted in this phase by the instrument landing system (→ ILS) or by another guidance system which allows the aircraft to land even in conditions of low visibility.

FIR (Flight Information Region) The airspace of a country, which does not necessarily correspond to national borders, in which flight information as well as search and rescue services are provided for those flights of which ATC has been informed.

Flight calibration Ground-based navigation aids must undergo regular inspections and be recalibrated. Flight calibration is handled by Flight Calibration Services GmbH, a joint venture between Deutsche Flugsicherung (DFS), Austrocontrol and skyguide. (www.flightcalibration.de)

Flight Level (FL) An isobaric area of constant air pressure used for aircraft separation at high altitudes. The flight level shows the altitude above standard air pressure, measured in hundreds of feet. Thus, flight level 200 is approximately 20 000 ft (6000 m) above sea level.

Flight movement A flight segment which is controlled by an air traffic control service. Each flight generates a number of movements. The number of flight movements handled by an ATC service is indicative of that service's workload, but not necessarily equal to the number of flights or of kilometres travelled in any given airspace. In Switzerland, more than two million flight movements are handled each year for slightly more than one million flights.

Flight Plan (FPL) A form given by the pilot to air traffic control services. The flight plan contains information such as the type of aircraft, the scheduled departure time, the flight level and speed desired, the route envisaged, the airport of destination, the number of passengers on board, the emergency equipment with which the aircraft is equipped, etc. In order for the flight to receive clearance, and for the purpose of informing the search and rescue (→) service in the event of difficulties, the Aeronautical Information Service (→ AIS) monitors the complete and accurate transmission of flight plan data to all ATC services involved worldwide. (→ Strip, Stripless)

FMS (Flight Management System) On-board computer into which important flight information is programmed, especially for current flight trajectories, flight plans, etc.

FOCA (Federal Office of Civil Aviation) Official Swiss aviation monitoring authority and skyguide regulator. It is part of the Federal Department of the Environment, Transport, Energy and Communications (UVEK, www.uvek.admin.ch). All procedures used by skyguide are subject to preliminary approval from FOCA. (www.aviation.admin.ch)

Free flight An innovative ATC concept for the future in which pilots could use advanced on-board equipment to determine (and keep to) their own route, speed and altitude. The first trials are now taking place in the United States.



G

Galileo Name of the nascent European satellite navigation system. As distinguished from other systems (→ GPS, GLONASS), Galileo is operated by a civil organisation and is thus available at all times. Some applications may be accessed free of charge, while others require payment.

Gate-to-gate strategy European concept designed to provide ATC services geared as closely as possible to clients' needs and to optimum processes. The ten-phase gate-to-gate strategy covers the optimisation of all contacts between users and ATC services, from the flight plan to the settlement of ATC charges and fees.

GBAS (Ground-Based Augmentation System) Accurate navigation system in the approach and landing areas of an airport which continually verifies the quality of GPS (->) and GLONASS (->) signals on the ground, enabling accurate landings.

General aviation A sector of civil aviation including all kinds of flights with the exception of airline-operated flights, charter flights and military aviation. This category includes training flights, hobby flying, private air transport (rescue services, crop-spraying, aerial photography, etc.).

Geneva Cointrin Airport Air traffic control services at Geneva International Airport (-> AIG) are provided by skyguide, which is based in Geneva. Currently, skyguide has 690 employees in Geneva. The Geneva air traffic control centre manages approximately 861 000 flight movements annually.

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Glide path (Descent alignment transmitter) Part of the ILS (->) which indicates the optimum angle of descent (generally 3%).

GLONASS (Global'naya Navigatsionnaya Sputnikovaya Sistema) Russian satellite navigation system which is the equivalent of the American GPS.

GNSS (Global Navigation Satellite System) A generic term used by ICAO (->) referring collectively to all satellite systems used for navigation in aviation.

GPS (Global Positioning System) A universal system of navigation satellites established by the United States which enables three-dimensional positioning and issues an accurate time reference.

GPWS (Ground Proximity Warning System) A system which warns the pilot that the aircraft is dangerously close to the ground. The corresponding land-based air traffic control system is the Minimum Safe Altitude Warning (-> MSAW).

Ground speed The speed of an aircraft relative to the surface of the Earth, taking the influence of headwinds and tailwinds into account.



Heading Every aircraft under ATC management may be assigned a direction or "heading" to fly. Headings are stated as degrees of the compass, measured from North in a clockwise direction.

Holding pattern If the number of aircraft approaching an airport is greater than the number of landings the airport can handle, the pilot will be asked to remain in a holding pattern while awaiting clearance to land.



ICAO (International Civil Aviation Organisation) UN-affiliated organisation based in Montreal. ICAO is concerned with all air transport matters and with the establishment of international norms. Switzerland is one of its 189 member states. (www.icao.org)

ICWS (Integrated Controller Work Station) A large radar screen equipped with display windows and a mouse at the work station allowing the controller to survey airspace. (->Stripless)

Identification Each aircraft can be identified on the radar screen through the unique transponder code attributed to it. (-> Transponder)

IFR (Instrument Flight Rules) Refers to the mode of aircraft flying in controlled airspace according to ATC rules and based on the aircraft's instruments rather than on visual orientations. In order to ensure that such flights are conducted in a safe and streamlined manner, they are guided by ATC services.

ILS (Instrument Landing System) With its high degree of precision, the ILS allows pilots to land their aircraft safely, even in conditions of poor visibility. The ILS sends out two signals, which are received by the pilot on a cockpit display: a glide path, enabling the pilot to judge the angle of approach and make corresponding adjustments, and a localizer, allowing the pilot to monitor and compensate for any deviations from the runway centreline.

Integration Refers to the merger of Swiss civil and military air navigation services. In 2001, the Federal Council conferred this responsibility upon skyguide. Until that time, military flight zones had been exclusively reserved for training flights for the air force, and civil flight zones were exclusively reserved for civil aviation. Today, civil and military airspaces have been inte-

grated to better adapt to user needs. This merger has led to a large increase in capacity and in the synergy between systems and infrastructure.



Knots The standard unit for measuring an aircraft's speed. 1 NM/h i.e. 1 knot = 1.852 km/h.

KOSIF Swiss national body for coordination between military firing exercises and ATC. From its base at the Zurich AIS (->), KOSIF produces precise daily charts which, in the interest of air traffic safety, show all areas of Swiss Air Force and Army firing exercises. These charts can be viewed on the skyguide website or on AMIE (->) selfbriefing facilities. Special maps are published on a sectoral basis for the needs of civil air traffic control.

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La Dôle Skyguide's radar facility at La Dôle in the Jura mountains (1677 m) is used to monitor and control air traffic in western Switzerland and adjoining foreign upper airspace.

Lägern Skyguide's radar facility on Lägern hill (866 m) near Baden, is used to monitor and control air traffic in eastern Switzerland and adjoining foreign upper airspace.

Licence A legal document authorising the holder to exercise the profession of air traffic controller. The licence is issued for a variety of specialised tasks, such as aerodrome (→) or area (→ En-route) control. It is issued by the FOCA (→).

Localizer One of the features of the ILS (→) which indicates to approaching planes how best to position themselves for the landing runway.

Locarno Skyguide is responsible for civil and military air traffic at Locarno regional aerodrome and at Lodrino military aerodrome.

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Lugano Agno Hub for air traffic in the Italian region of Switzerland. Air traffic control services at Lugano Agno airport are provided by skyguide's twelve or so employees based there.

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M



MAYDAY Internationally agreed radio message signalling an emergency, from the French “m’aidez” or “help me”, broadcast on the international emergency frequencies of 121.5 MHz and 243 MHz.

Meiringen Topographically, Switzerland's most exacting military aerodrome in a mountainous region, with approach and departure control as well as aerodrome control handled by skyguide.

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Mode-S Extended functionality of secondary radars allowing controllers to monitor a particular aircraft and, in so doing, eliminate sources of interference. Mode-S allows for the transmission of important information about the aircraft to the air traffic controller thanks to improved data exchange between aircraft and ground systems.

MRT (Multi Radar Tracker) Amalgamates the data from several radars (radar chain) to provide aircraft positions as accurately as possible on the radar screens of air traffic controllers.

MSAW (Minimum Safe Altitude Warning) A system indicating to the air traffic controller that an aircraft monitored by that controller has breached the minimum safe altitude prescribed, and that the controller must immediately inform the pilot of the problem. (→ GPWS)

N



Nautical mile (NM) The standard unit of distance used in civil aviation. 1 NM per hour = 1.852 km. (→ Knots)

Navigation aids Ground-based radio navigation facilities (such as VOR, DME), which enable pilots to find their way even under conditions of zero visibility.

Navigation instruments An aircraft can perform IFR (->) operations only if it has the appropriate on-board instruments, such as a radio compass or Automatic Direction Finder (ADF), a cockpit display for VOR (->) stations and for ILS (->) landings, etc.

Noise One of skyguide's concerns is to decrease aircraft noise. The noise caused by approach and departure procedures is a function of a variety of parameters, such as the type of aircraft, weather and wind conditions, the geographical situation of an airport, etc. The airport operator, whose landing charges include a fee for noise pollution, is responsible for responding to noise-related questions and complaints.

NOTAM (Notice to Airmen) Brief messages (-> Dynamic data) containing information on the construction of, condition of or changes to aviation infrastructure, services provided, flight procedures or risks related to the state of runways, flight restrictions, military firing exercises, etc. Air navigation services transmit these messages to flight crews during the flight planning stage. (-> AIS, AIM)

NOTAM OFFICE The international office in charge of NOTAMs for Switzerland is managed by skyguide and located at the AIS/AIM (->) in Zurich. It publishes global NOTAMs and SNOWTAMs (->), and processes and transmits data and information from around the world. In conformity with ICAO (->) rules, each country maintains an international office to handle NOTAMs.

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O

OJT (On-the-job training) It is during on-the-job training that future air traffic controllers and ANSEs, under the guidance of a qualified instructor, become familiar with the actual working conditions of their future posts. ATCO and ANSE training alternates theory, simulation exercises and OJT.



P

Payerne The major Swiss military aerodrome with air navigation services provided by skyguide.

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Phraseology The internationally agreed terminology used between pilots and ATC in order to avoid conflicts and misunderstandings.

PIB (Preflight Information Bulletin) Updated NOTAM (->) in the form of an information bulletin provided to flight crews before flights.

Planning controller -> Executive controller

Primary radar The electromagnetic impulses emitted by the radar (->) antenna are reflected by aircraft and then detected again by the antenna, which rotates on its own axis. Primary radar detects all aircraft, independently of whether or not there is a transponder on board. (-> Mode-S, Secondary radar)

Q



Q-Code A series of codes that have been in use since the earliest days of civil aviation. For example, QFE denotes current air pressure on the ground.

QMS (Quality Management System) According to Eurocontrol regulations, all air navigation service providers undertake to establish an efficient QMS. Skyguide's QMS, and the safety management system in which nearly 20 employees work, is under the direct control of the company's management. All the departments of skyguide have been certified ISO 9001:2000 since 2005.

R



RA (Resolution Advisory) A type of alert automatically issued on board an aircraft by the ACAS (->) or the TCAS (->) which recommends to the pilot to increase or decrease altitude in order to maintain sufficient distance from approaching aircraft. The pilot must urgently comply with the avoidance alert, which is preceded by a TA (->) or traffic advisory.

Radar (Radio Detecting and Ranging) A system based on the echo principle which uses radio electromagnetic pulses to detect air traffic. A distinction is made between primary (->) and secondary (->) radar.

Radar label A series of numbers and letters which appear on the radar screen indicating pertinent data for an aircraft, such as the call sign (->), flight altitude and speed. (-> Stripless)

Route charges The service provided by air traffic control is billed to airspace users in the form of route charges and/or approach fees. Route charges are calculated for overflights

or en-route (->) flights. These fees are calculated by taking into account, among other things, the maximum weight of an aircraft upon take-off, and the distance travelled within airspace managed by skyguide. Skyguide applies a flat rate for services provided to military flights. Since skyguide is a non-profit company, its positive financial results benefit users through a corresponding decrease in charges.

Reporting point Specific geographic location with respect to which the position of an aircraft can be signalled. (-> Waypoint)

RMCDE (Radar Message Conversion and Distribution Equipment) Reformatting and distribution system for radar data. (-> MRT)

Runway (RWY) Used for take-offs and landings, runways are identified at each end by two numbers chosen according to the compass angle in which they point. For example, a runway pointing west (270 degrees) will be known as Runway 27.

Runway lighting A visual aid for pilots, especially in low visibility and at night.



S

Safety Guiding principle and paramount priority of skyguide. All safety-related procedures in the operation of air traffic control services, as well as all technical systems, are constantly monitored, verified and improved if necessary by skyguide experts or by external specialists in risk management and safety management. (-> ESARR, Safety case, QMS)

Safety case An analysis performed to determine whether or not a system meets safety requirements.

Safety nets Systems of continual on-screen verification of the radar trace of an aircraft designed to ensure that aircraft keep to the trajectories allotted them by air traffic control, as well as that they respect the required distances between vessels in the air and those on the ground.

Satellite navigation A system that uses satellite observations to determine an aircraft's position and heading. In the near future, satellite navigation will largely supersede traditional ground-based navigation systems such as radio beacons. (→ EGNOS, Galileo, GLONASS, GNSS, GPS, SBAS)

SBAS (Space-Based Augmentation System) With the help of satellites, this system transmits corrective data to the GPS or to GLONASS. It covers larger regions than the GBAS, but is less accurate and can accordingly be used only for non-precision approaches. (→ EGNOS)

Search and Rescue (SAR) ATC services alert the relevant search-and-rescue services if an aircraft is in distress, and offer them any support they may require.

Secondary radar (SSR or Secondary Surveillance Radar) Secondary radar communicates actively with the transponder (→) of a detected aircraft, a feature not available in primary radar. It can provide air traffic control services with additional information, which appears on the radar screen in the form of a radar label (→), and the picture is renewed every 4 seconds.

Sector The airspace for which an air traffic controller, assisted by a coordinator, provides aircraft with altitude, heading and speed instructions to ensure that all separation minima are observed.

Selfbriefing → AMIE

Separation All aircraft are managed by ATC to ensure that the distances between them never fall below certain prescribed minima (→ AIRPROX). Vertical separation between two aircraft must be at least 1000 ft. Horizontal separation in Switzerland is normally 3 NM (→ Nautical mile) in the vicinity of airports, and 5 NM in other airspace.

SID (Standard Instrument/Initial Departure) Standard departure trajectory. Defines the flight trajectory which aircraft flying in the Instrument Flight Rules (→ IFR) mode must follow, from their departure from a specific airport until the first waypoint.

Simulation Skyguide owns sophisticated simulators which it uses for the basic training and subsequent instruction of air traffic controllers and ANSEs (→) in radar and tower operations. The skyguide simulators are also used to test new ATC procedures and proposed modifications to the structure of the airspace under the company's control.

Single European Sky (SES) A European Commission project to restructure European airspace in order to streamline air travel and increase its safety. Skyguide supports this project, in which it takes an active part. (→ Cross-border ATC).

Sion Skyguide is in charge of the civil and military air traffic at Sion regional airport.

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skyguide A Swiss limited company responsible for civil and military air navigation services. The company, based in Geneva, handles the airports at Zurich, Geneva, Bern Belp, Lugano Agno and the mainly military or civil-military aerodromes at Alpnach, Dübendorf, Emmen, Locarno, Meiringen, Payerne

and Sion. Staff have been gradually moving into the new air navigation service centre in Dübendorf since autumn 2005. In 2006 the staff of air navigation services in Buochs were integrated with skyguide. At the regional aerodromes at Grenchen (SO), St.Gallen Altenrhein and Les Eplatures, local air navigation services are still delegated by skyguide to the aerodrome manager. Skyguide exercises its air navigation services surveillance over these three regional aerodromes and has a right to impose service orders (Weisungsrecht).

Skymag English-language company magazine dedicated to air navigation service provision and published twice a year by skyguide. Skymag explains the ins and outs of an unusual business. A free subscription can be obtained by contacting skymag@skyguide.ch.

Slot A time allocated by ATC within which a flight must take off, land, or pass a certain point (→ Waypoint, Reporting point). Slot allocation is a key tool for managing traffic flows and enhancing the punctuality of flights. (→ CFMU)

SNOWTAM NOTAM (→) indicating the state of runways in winter (snowfall at airports and ice layer).

SRC (Safety Regulatory Commission) Commission created by Eurocontrol to regulate safety. The ESARRs (→) are drawn up by the SRC.

Stakeholder In Switzerland and in the adjacent airspace assigned to it, skyguide provides highly professional air navigation services which meet user needs and are in the public interest. Skyguide works closely with national partners (such as the Swiss Air Force and the Swiss weather service, MeteoSwiss) and with international partners, such as ICAO, Eurocontrol, CANSO, and air navigation service providers in neighbouring countries. Skyguide also creates consortia of clients with partner organisations. The company forms partnerships with providers, and offers its direct clients (such as airlines, airports, air forces, civil aviation, etc.) services for the benefit of its end users (passengers and freight operators).

STAR (Standard Arrival Route) Standardised approach trajectory. Defines procedures to be followed from the moment that an aircraft flying in the IFR (→) mode leaves an airway (→) until it lands.

Static data Data and information which are unvariable in the short term, or which refer to a fixed point on the Earth's surface (such as buildings, antennae, runways (→), approach and departure procedures, navigation aids (→), airways (→), etc.). They are expressed as coordinates on charts.

STC (Skyguide Training Center) Skyguide operates its own training center where future air traffic controllers (→) and air navigation service employees (→ ANSE) learn their craft. Training lasts approximately 3½ years for controllers and 2 years for ANSEs. For further information, please contact recruitment@skyguide.ch or go to www.skyguide.ch/en/Workingat/Ausbildung/.

STCA (Short-Term Conflict Alert) A warning system (→ Safety net) that produces an acoustic and visual signal on the ATC radar screen alerting the controller that two aircraft are closer together than allowed by the separation minima.

Strip Flight progress strip containing the most important information (identification, trajectory, flight level, etc.) about aircraft approaching or in the sector of an air traffic controller. (→ Flight plan)

Stripless Thanks to the digitisation of the controller work station, the information formerly recorded on the strips (→) now appears directly on the radar screen. This technological world first has been successfully operational in Geneva since December 2005.

T



TA (Traffic Advisory) An alert issued by the TCAS/ACAS (->) which informs the pilot that another aircraft is coming dangerously close to their aircraft. If the other aircraft does not immediately change its heading, this alert is followed by a Resolution Advisory (-> RA).

Take-off Clearance for take-off is issued by the control tower.

Taxiway Located between the apron area and the runways.

TCAS (Traffic Alert and Collision Avoidance System) An on-board anti-collision alarm system which warns pilots through use of visual and acoustic signals when two aircraft fail to respect separation minima (-> TA). The TCAS instructs the pilot to perform a vertical avoidance manoeuvre (-> RA) if the pilot fails to correct the aircraft's heading immediately (-> ACAS).

TMA (Terminal Manoeuvring Area) The area of controlled airspace around an airport in which approaches and departures follow specific routes.

Tower (TWR) -> Aerodrome control

Traffic routes Traffic routes are formed by especially busy airways. This is the case for North-South and East-West continental and intercontinental traffic. The airspace controlled by skyguide includes two intersections of routes which carry some of the heaviest traffic in Europe. These routes generate numerous overflights, climbs and descents, which make this airspace one of the most complex in Europe.

Transponder (or radar responder) On-board equipment which communicates with secondary radar (->) and transmits the aircraft's identification code to ground-based systems.

TRINET Trilateral audit organisation which forged a partnership between German, Austrian and Swiss (skyguide) air navigation services. TriNET performs independent analyses on the safety (->) of technical systems and operational procedures.

Turbulence Irregular airflow, usually occurring where airflows or air masses mix. Turbulence can also be created by the passing of another aircraft. (-> Wake turbulence)



U

UAC (Upper Area Control) ICAO has established the demarcation between lower and upper airspace at 24 500 ft or approx. 7357 m. (-> Airspace)

Uncontrolled airspace Skyguide does not offer services in airspace which is outside of its area of responsibility. All aircraft flying in this uncontrolled airspace must do so according to visual flight rules. (-> VFR)

Unique (-> Zurich Airport) Company which operates the largest Swiss intercontinental airport. (www.unique.ch)

Upper airspace -> UAC, Airspace

UTC (Universal Time Coordinated, formerly known as Greenwich Mean Time or GMT) All ATC services worldwide refer to UTC to indicate flight times. Local time is measured and stated in terms of UTC: Swiss Winter Time is one hour ahead of UTC (UTC + 1), while Swiss Summer Time is UTC + 2, or two hours ahead.

V



VASIS (Visual Approach Slope Indicator System) Optical alignment and descent system which indicates to the pilot by a visual signal whether the aircraft is on the correct glide path for landing.

VFR (Visual Flight Rules) Rules defining procedures to be followed by aircraft flying according to visual reference. During a VFR flight, the pilot is responsible for maintaining the necessary distance from other aircraft.

VOR (VHF Omnidirectional Radio Range) An ultrashort-wave navigation aid which delineates airways. VORs are also located in the approach/terminal area of an airport.

W



Wake turbulence The turbulence caused by the passing of an aircraft through a body of air. Greater horizontal separation must be provided behind wide-body aircraft approaching or departing from airports because of the greater wake turbulence they create.

Wangen bei Dübendorf About 350 employees of skyguide and of the Skyguide Training Center (-> STC, Unique) have gradually been moving from Zurich Kloten into this second skyguide location, the Skyguide Air Navigation Service Center Zurich, since autumn 2005. The transfer will take several years.

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Waypoint Pilots find their way in airspace thanks to virtual points, which are represented as geographical coordinates. These waypoints appear on aeronautical charts and give structure to airspace. (-> Airspace, Airway, Slot, Reporting Point)

Windshear Irregular airflows which can occur in stormy conditions and can make an aircraft difficult to handle, especially in the approach phase close to the ground.



Z

Zurich Airport Air traffic control at Zurich Airport is handled by skyguide. More than one million flight movements are controlled annually by the Zurich air navigation service centre.

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