

GÆLICAM

CNS/ATM Training Portfolio

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1. PRESENTATION OF THE COMPANY: GAELICAM

1.1. GAELICAM TEAM EXPERTISE

GAELICAM Team has a very large experience developing and delivering CNS/ATM courses with a very clear ANSP orientation. This experience has been obtained during over 25 years working in multiple national and international projects regarding to Air Navigation systems in the following areas:

- ATM data communications: surveillance (radar, multilateration LAM/WAM, ADS-C, ADS-B), OLDI, EGNOS, Galileo, CFMU/NM, EAD, PENS, Voice over IP (VoIP), Voice Communications Systems (VCSs), Flight Plan Data Processors (FPDPs), ATIS, VOLMET, communications protocols (IPv4, IPv6, X.25, FR, ATM), ...
- Datalink systems: ATN concept, Air/Ground sub-networks based on VDL2, FANS Accommodation (Front-End Processors), CPDLC, ADS-C, ADS-B, D-ATIS, D-VOLMET, ...
- Aeronautical Messaging Networks (AFTN/CIDIN/AMHS).
- ATM satellite communications projects: European Space Agency program ARTES 10 called Iris program (HERMES consortium), ...
- Communications Transmission means: microwaves and optical fiber rings.
- Surveillance systems: ADS-B, ADS-C, Mode-S radar, Multilateration (LAM, WAM), A-SMGCS (Advanced-Surface Movement Guidance and Control System), TIS-B, ...
- Verification and Validation activities: Interoperability Regulation and Certification activities, European Operational Concept Validation Methodology (E-OCVM), ...
- Safety activities: ESSAR (Eurocontrol Safety Regulatory Requirement), SAM (Safety Assessment Methodology), ICAO's Annex 19 and the Global Aviation Safety Plan, Safety Management System (SMS), ...

Our team comprises a group of CNS/ATM technology experts able to link the analysis of technology and the management of strategic issues with the management of ANSPs CNS/ATM programs.

We have identified as follows a series of critical competencies to be staffed for your CNS/ATM Training project:

- Understanding of the ANSP business.
- Understanding of ATM / CNS.
- Understanding of the ATM communications business (legacy and VoIP).
- Large experience delivering CNS/ATM courses to ANSPs.
- Understanding of SESAR-related regulations, plans and objectives.
- Understanding of Safety and Certification issues.

Our team members covers collectively and individually these requirements in a very comprehensive and exhaustive way:

- Our team members have an extensive expertise and experience of the world-wide CNS/ATM environment.
- Our team members have extensive knowledge of the economic and technological issues associated with the evolution of CNS/ATM in different ICAO regions.
- Our team members have a detailed and extensive understanding of the management of technologies relevant to aviation.
- Our team members have a comprehensive knowledge about regulatory issues associated with CNS/ATM, and more specifically with the SES-II legislative package.
- Our team members have extensive and successful experience of supporting and advising strategic managers in the aviation domain.

They bring comprehensive experience of the management of technology in the CNS/ATM domain.

	Confirmed experience in performing...			Large experience delivering CNS/ATM courses to ANSPs.	Understanding of SESAR-related regulations	Understanding of Safety and Certification issues
	Understanding of the ANSPs	Understanding CNS/ATM	Understanding ATM communications			
GAELICAM Team	***	***	***	***	***	***

Table 1 - Skills, ability, knowledge and expertise for our team-members

2. CUSTOMERS

Our customers include:

- ANSPs: AVINOR (Norway), Belgocontrol (Belgium), ONDA and Aviation Civile (Morocco), ENNA (Algeria), Skyguide (Switzerland), Ukraine, CORPAC (Peru).
- ICAO CAR/SAM Office in Lima (Peru).
- ICAO African Office (Kenya).
- ICAO Asian office in Bangkok (Thailand).
- EUROMED project.
- SITA.
- Frequentis.

3. POINTS OF CONTACT

For further information, please do not hesitate to get in touch with us:

- E-mail: info@gaelicam.com
- Webpage: www.gaelicam.com

4. DELIVERY OF GAELICAM COURSES.

4.1. LANGUAGES.

GAELICAM courses are developed and delivered in English by default. Nevertheless, GAELICAM courses can be also delivered in other languages: French and Spanish.

4.2. TRAINING DELIVERY ALTERNATIVES.

GAELICAM courses can be delivered following any of the following alternatives:

4.2.1. OPTION 1: ON-SITE CLASSROOM TRAINING.

Your Organization is requesting GAELICAM for the delivery of any specific courses at your premises (Training Center, offices, ...). So, a well-trained and experienced GAELICAM professor is travelling for the delivery of the course to students belonging to your Organization.

The course material (students workbooks, CDs, ...) is generated by GAELICAM and submitted to the students.

This approach has all the advantages of a face-to-face course (physical presence of the professor) but allowing cost savings since the travel costs of students could be significantly reduced.

4.2.2. OPTION 2: VIRTUAL CLASSROOM TRAINING.

Students are using the GAELICAM e-learning platform (videos, chats, videoconferences, messages, ...) with a synchronous approach. That is to say, the full learning activity is remotely conducted by the GAELICAM professor in the same way that if it was delivered in the classroom.

The course is started by all the students at the same time and the GAELICAM professor is fully managing remotely the course defining times for each activity (lessons, exercises, ...), arranging the corresponding tools (videos, chats, videoconferences, ...) for further explanations answering students questions in real time.

The course material (students workbooks, CDs, ...) is generated by GAELICAM and submitted to the students.

This approach has most of the advantages of a classical classroom course since the professor is managing all the learning activities very closely as in a face-to-face one but allowing significant cost savings since students do not need to travel.

This method also provides high flexibility to students helping to make compatible responsibilities of students in their Organizations with the learning activity.

4.2.3. OPTION 3: E- LEARNING TRAINING.

Students are using the GAELICAM e-learning platform (videos, chats, videoconferences, messages, ...) with an asynchronous approach. That is to say, each student can decide when to start, how long to dedicate each day giving full flexibility to the student to complete the learning activity.

In any case, the professor is always monitoring the activities of each student being able to use learning tools (videos, e-mails, chats, videoconferences, ...) under demand.

The course material (students workbooks, CDs, ...) could be generated by GAELICAM and submitted to the students.

This approach gives the maximum flexibility to make compatible students responsibilities in their Organizations with the learning activity so as not incurring in travelling expenses.

5. TRAINING SPECIFICATION FOR AIR TRAFFIC SAFETY ELECTRONICS PERSONNEL (ATSEP).

5.1. INTRODUCTION.

This section collects the specification for Air Traffic Safety Electronics Personnel (ATSEP) training.

The term ATSEP is used to describe “engineering and technical personnel undertaking operational safety related tasks”.

Note – the term “learner” is the generic term for the person performing a learning activity without any reference to his/her status.

ATSEP training is divided into three phases:

- **Initial Training**: Training that precedes the System/Equipment Rating Training. It includes Basic Training and Qualification Training.
- **System/Equipment Rating Training**: Training designed to impart system/equipment-related knowledge and skills leading towards operational competence.
- **Continuation Training**: Training designed to augment existing knowledge and skills and/or to prepare for new technologies. This training is given to operationally competent personnel and it includes Refresher, Emergency and Conversion training.

The Progression of ATSEP Training is shown in the following figure:

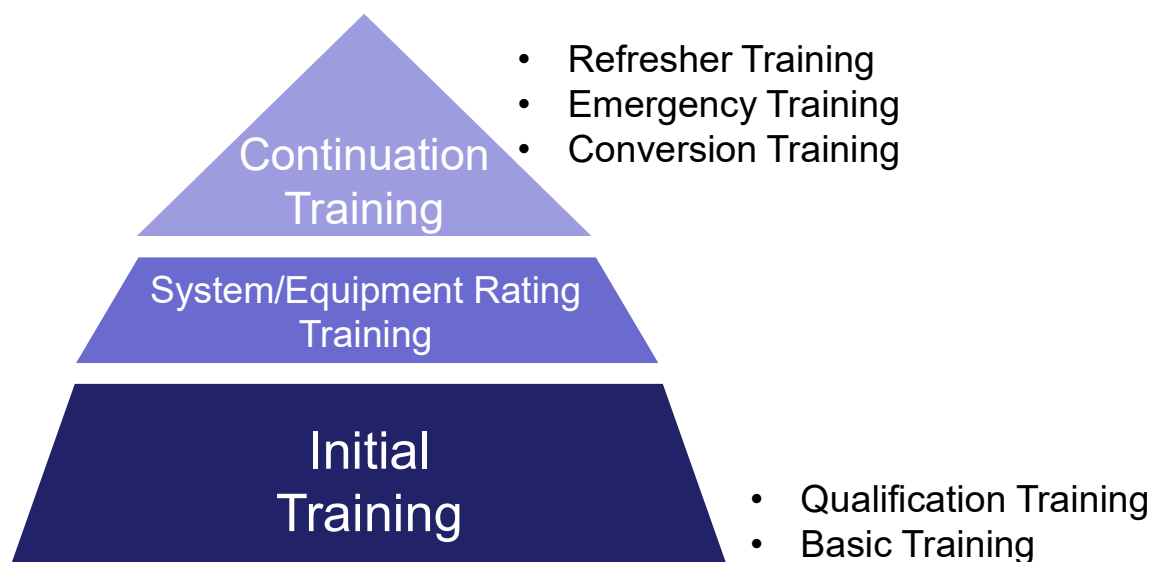


Figure 1: Progression of ATSEP Training

5.2. INITIAL TRAINING.

Initial Training precedes the System/Equipment Rating Training. It includes Basic Training and Qualification Training.

5.2.1. Basic Training.

Training designed to impart fundamental knowledge of the CNS/ATM environment and skills applicable to all learner ATSEPs.

5.2.2. Qualification Training.

Training designed to impart domain related knowledge and skills appropriate to the qualification stream to be pursued in the CNS/ATM environment.

Four specialised domains have been identified. They are Communication, Navigation, Surveillance and Data Processing. In addition a group of generic subjects were identified that are applicable to all ATSEPs.

13 streams have been identified and represent generic profiles built according to the ATSEP roles.

Note: - A stream is a cluster of training objectives that support a particular area of work within a domain.

The streams described in this document are:

- **COM** – Voice Stream
- **COM** – Data Stream
- **NAV** – Performance Based navigation
- **NAV** – NDB Stream
- **NAV** – DF Stream
- **NAV** – VOR Stream
- **NAV** – DME Stream
- **NAV** – ILS Stream
- **NAV** – GNSS Stream
- **SUR** – PSR Stream
- **SUR** – SSR Stream
- **SUR** – ADS Stream
- **DAT** – DP Stream

In a minimum of one specialized technical domain, ATSEPs are trained for one or more streams that correspond with the system/s and equipment that they will eventually work with.

At the end of Qualification Training a learner ATSEP shall have the ability to identify and solve generic but realistic problems related to an area of expertise. The learner ATSEP should be able to act efficiently when faced with a set of scenarios. These scenarios are mastered because the ATSEP has acquired the required knowledge and the ability to use this knowledge at an appropriate time and in a relevant manner.

5.3. SYSTEM/EQUIPMENT RATING TRAINING.

Training designed to impart system/equipment-related knowledge and skills leading towards operational competence.

This training is normally delivered by the manufacturer of a system/equipment.

With respect to the ATSEP role/s, training progression is performed through the completion of Initial Training and the series of actions described as S/E Rating training (additional academy or manufacturer training, On-site Training, mentoring and consolidation of experience).

5.4. CONTINUATION TRAINING.

Training designed to augment existing knowledge and skills and/or to prepare for new technologies. This training is given to operationally competent personnel and it includes Refresher, Emergency and Conversion training.

5.4.1. Refresher Training.

Training designed to review, reinforce or upgrade existing knowledge and skills (including team skills).

5.4.2. Emergency Training.

Training designed to broaden knowledge, skills and behaviour in the case of an emergency, unusual or degraded situation. Most of the training will be site-specific or may make use of incident or accident analysis.

5.4.3. Conversion Training.

Training designed to provide knowledge and skills appropriate to a change in domain (new stream or new S/E rating), environment (new procedures, new location) or system (system upgrade or change).

6. GAELICAM CNS/ATM TRAINING PORTFOLIO.

As commented, the specification for Air Traffic Safety Electronics Personnel (ATSEP) training identifies three phases:

- **Initial Training**: Training that precedes the System/Equipment Rating Training. It includes Basic Training and Qualification Training.
- **System/Equipment Rating Training**: Training designed to impart system/equipment-related knowledge and skills leading towards operational competence.
- **Continuation Training**: Training designed to augment existing knowledge and skills and/or to prepare for new technologies. This training is given to operationally competent personnel and it includes Refresher, Emergency and Conversion training.

GAELICAM courses have been developed by our specialists following this specification for Air Traffic Safety Electronics Personnel (ATSEP) training. Consequently, some specific courses have been developed for each of the training phases.

6.1. INITIAL TRAINING – BASIC TRAINING.

GAELICAM has developed a course titled '**CNSATM-INITIAL: Basic Training**' that covers all the modules identified in the specification for Air Traffic Safety Electronics Personnel (ATSEP) training:

DOMAIN	BASIC COURSES
CNSATM-INITIAL Duration: 4-6 weeks	Module 1: Introduction to ATM (Air Traffic Management).
	Module 2: Familiarization with ATC (Air Traffic Control).
	Module 3: Aeronautical Information Services (AIS).
	Module 4: Meteorology.
	Module 5: CNS services.
	Module 6: Communications (C).
	Module 7: Navigation (N).
	Module 8: Surveillance (S).
	Module 9: Data processing (DP).
	Module 10: Monitoring and control of CNS/ATM system.
	Module 11: Maintenance procedures.
	Module 12: Energy and air conditioning.

Table 2: CNSATM-INITIAL course modules

6.2. INITIAL TRAINING – QUALIFICATION TRAINING.

GAELICAM has developed several courses that covers the Qualification Training corresponding to the Initial Training in accordance with the specification for Air Traffic Safety Electronics Personnel (ATSEP) training.

These Qualification courses have been classified in the following domains (see sections below):

DOMAIN	QUALIFICATION COURSES	DURATION
COMMUNICATIONS	C-VOICE: ATS Voice over IP	1 week
	C-DATALINK: ATC and AOC Datalink services	1 week
	C-AMHS: ATS Message handling System	1 week
	C-DATA: Air Navigation Data Communications	1 week
	C-AFTN: the AFTN network	1 week
	C-TRANSMISSION: Transmission Means (Microwaves, Optical Fiber rings)	1 week
	C-RECORDER	1 week
NAVIGATION	N-GNSS: Global Navigation Satellite Systems (SBAS and GBAS)	1 week
	N-PBN: implementing Performance Based Navigation	1 week
SURVEILLANCE	S-GEN: Surveillance systems	1 week
	S-MLAT: Multilateration systems	1 week
	S-ASMGCS: Advanced-Surface Movement Guidance and Control System	1 week
	S-ADS: ADS systems	1 week
CNS/ATM	CNSATM-GEN: Air Navigation CNS/ATM systems	1 week
	CNSATM-DPS: Data processing systems in ATM	1 week
SAFETY, VERIFICATION, VALIDATION AND CERTIFICATION	SAF-SM: Safety Management	1 week
	CER-VVC: Verification, Validation and Certification processes	1 week

Table 3: GAELICAM Qualification courses

6.2.1. GAELICAM COMMUNICATIONS COURSES.

Aeronautical telecommunications are a core enabler for air traffic management.

Today, traditional voice communications are no longer sufficient to support modern operations. The introduction – in addition to voice – of a variety of data transfer systems for new and existing mobile and fixed communications systems, makes this a rapidly developing sector of the industry.

The courses offered provide a detailed understanding of current, short-term and future communications networks and applications, and also cover the planned migration steps as part of the ICAO strategies.

GAELICAM has developed the following communications courses:

6.2.1.1. C-VOICE: ATS Voice over IP.

This course provides a detailed view of aeronautical voice telephony and radio networks, largely focusing on the transition of current systems to the Voice over Internet Protocol (VoIP) based on EUROCAE WG67 standards.

It looks in detail at VoIP principles and its future use in aeronautical communications, including crucial migration issues for integrating VoIP into the ATM network architecture.

6.2.1.2. C-DATALINK: ATC and AOC Datalink services.

This course gives an overview on DATALINK understanding which are the main components of a Datalink system, which technologies support Datalink and what Datalink services are currently available and how they work.

The course explains the different technologies used to provide Datalink (FANS and ATN), addressing the differences between both technologies.

6.2.1.3. C-AMHS: ATS Message handling System.

This course covers AMHS messaging techniques and their applications in ATM. It provides a detailed explanation of how to migrate from the current AFTN/CIDIN to the new AMHS systems, and the latter's new capabilities from both technical and operational perspectives.

It also addresses related strategic developments in different ICAO Regions.

6.2.1.4. C-DATA: Air Navigation Data Communications.

This course provides a comprehensive overview of the data communication applications, technology and infrastructure used in ATM. The ATC IP Network Services are covered in detail, including Surveillance, OLDI/FMTP, Messaging, and others.

Related ICAO Global Air Navigation Plan issues are analysed, together with strategic developments.

6.2.1.5. C-AFTN: the AFTN network.

This course covers AFTN messaging techniques and their applications in ATM. It provides a detailed explanation of how to implement AFTN-based services from both technical and operational perspectives.

It also addresses related strategic developments in different ICAO Regions.

6.2.1.6. C-TRANSMISSION: Transmission Means (Microwaves, Optical Fiber rings).

This course provides a comprehensive overview of the transmission means that support communications relating to safety as the Aeronautical Fixed Services (AFS) and Aeronautical Mobile Services (AMS) defined by ICAO.

Regarding ISO model, these systems provides the physical layer for all Air Navigation communications covering such things as pulse amplitudes, line coding, transmission rates, modulation, electromagnetic spectrum, frequency bands, connectors, and anything else needed to transfer digits satisfactorily.

6.2.1.7. C-RECORDER.

This course covers different techniques to perform the ICAO Legal Recording in telephony and radio services for both legacy analogue voice and digital VoIP.

6.2.2. GAELICAM NAVIGATION COURSES.

The navigational performance of an aircraft is dependent on two main factors: the navigation aids, whether ground or space-based, that are used, their geometry relative to the aircraft and the capabilities of the aircraft's avionics.

The navigation domain addresses recent advances in navigation capabilities and the performance that can be delivered by the associated infrastructure. These advances include the development and introduction of performance-based navigation (PBN), which will enable improvements to be made in airspace design and will provide a far greater degree of flexibility in aircraft operations.

Ultimately, advanced navigation functionalities, with the support of appropriate ATM tools, will enable aircraft operators to conduct their flights in accordance with preferred trajectories, dynamically adjusted, in an optimum and cost-efficient manner.

GAELICAM has developed the following navigation courses:

6.2.2.1. N-GNSS: Global Navigation Satellite Systems (SBAS and GBAS).

This course explains GNSS systems comprising GPS, GLONASS, GALILEO and Beidou evolutions giving a general overview of signal processing in receiver, receiver performances (low-cost receiver vs. high-end receiver).

It also develops the signal structures and analyses system errors and augmentation.

6.2.2.2. N-PBN: implementing Performance Based Navigation.

Performance-based Navigation (PBN) is the most practical solution for the regulation of new navigation systems technology. This course explains the ICAO PBN concept and clarifies the differences between RNAV and RNP. PBN is based on Area Navigation, or RNAV, a method of navigation which permits aircraft operation on any desired flight path within coverage of station-referenced navigation aids or within the limits of the capability of self-contained aids, or a combination of these

It also provides detailed information on the 3 components of PBN: navigation applications, navigation specifications and navigation infrastructure. The course explains the concept, its enablers and provides detailed information on how to implement PBN.

6.2.3. GAELICAM SURVEILLANCE COURSES.

Surveillance is a key part of ATM. Radar, the mainstay of surveillance for many years, is now being supplemented by a variety of newer techniques such as ADS-B and multilateration. The key words for the future of surveillance are “performance” and “interoperability”.

GAELICAM offers courses covering the principles of both traditional and new surveillance techniques:

6.2.3.1. S-GEN: Surveillance systems.

This course provides an overview of all existing surveillance systems covering Primary Surveillance Radar (PSR), Secondary Surveillance Radar (SSR, MSSR), Surface Primary Radar (SMR), Mode-S radar, ADS and multilateration systems.

It also covers the Surveillance Data Distribution from detection to plot output

6.2.3.2. S-ADS: ADS systems.

This course provides an overview of ADS systems (Automatic Dependent Surveillance) contract mode (ADS-C) and broadcast mode (ADS-B out and ADS-B in).

ADS-C systems are used to send automatically requested information (aircraft position, identification,...) using datalink communications while ADS-B information (collected from the avionics) is transmitted to ground systems and other aircrafts using the 1090 MHz extended squitter.

6.2.3.3. S-MLAT: Multilateration systems.

This course provides an overview of multilateration systems (cooperative independent surveillance) covering both existing techniques (Local Area Multilateration - LAM and Wide Area Multilateration – WAM and the associated Surveillance Performance.

6.2.3.4. S-ASMGCS: Advanced-Surface Movement Guidance and Control System.

This course provides an overview of A-SMGCS (Advanced-Surface Movement Guidance and Control System) systems and the associated Surveillance Performance.

A-SMGCS systems provide traffic information about vehicle position in the area and identity of the cooperative vehicles. It also maintains the airport in a safely operation mode in all visibility conditions and even during the night.

6.2.4. GAELICAM CNS/ATM AND DATA PROCESSING COURSES.

GAELICAM has developed the following CNS/ATM and data processing courses:

6.2.4.1. CNSATM-GEN: Air Navigation CNS/ATM systems.

This course provides a high level overview of all CNS/ATM systems used by the Air navigation Service providers (ANSPs). The course describes and explains the main role of communications, navigation, surveillance and data processing systems used for the provision of Air Navigation services.

6.2.4.2. CNSATM-DPS: Data processing systems in ATM.

This course provides a knowledge and understanding of the principles used in ATM data processing (flight data processing, surveillance data processing,...) and an overview of their use in ATM systems.

The data processing domain addresses all systems which process flight data and environment data in support of integrated ATM operations. The domain is therefore one of the enablers for the achievement of integration and interoperability between systems, and contributes to the strategic objectives of uniformity and capacity.

6.2.5. GAELICAM CERTIFICATION, VERIFICATION, VALIDATION and SAFETY courses.

GAELICAM has developed the following certification, verification and safety related courses:

6.2.5.1. SAF-SM: Safety Management.

This training course addresses Safety from a wide perspective introducing the attendees the different concepts, policies and strategies to deal with this important matter. The training course starts with a general overview on Safety identifying the most important concepts, why Safety is so important and how it can be provided.

This training course pursues that attendees get familiarized with SAFETY concepts, ESSAR (Eurocontrol Safety Regulatory Requirement) requirements and SAM (Safety Assessment Methodology) to define a means for providing assurance that an Air Navigation System is safe for operational use.

The course also presents the attendees Safety Management Systems addressing global and key aspects like, for instance, Safety Policy and Objectives, Safety Assurance and implementation of Safety Management Systems.

It also covers the ICAO's vision on Safety through ICAO's Annex 19 and the Global Aviation Safety Plan.

6.2.5.2. CER-VVC: Verification, Validation and Certification processes.

The objective of this course is to introduce the attendees in the field of Validation and Verification within the ATM framework. The attendees will achieve a perfect understanding of the European Operational Concept Validation Methodology (E-OCVM). Additionally, the course will also focus on Certification allowing the attendees to understand and face any Certification process within his or her company.

6.3. SYSTEM/EQUIPMENT RATING TRAINING.

System/Equipment Rating Training has to be designed to impart system/equipment-related knowledge and skills leading towards operational competence.

This training is normally delivered by the manufacturer of the different CNS/ATM systems since the objective is to have the ATSEP personnel with the technical and operational competences to run one specific system in operation.

6.4. CONTINUATION TRAINING.

The continuation training is designed to augment existing knowledge and skills and/or to prepare for new technologies. This training is given to operationally competent personnel and it includes Refresher, Emergency and Conversion training.

GAELICAM courses developed and described in the ‘Qualification Training’ section of this document applied perfectly to cover also the ‘Continuation training’ requirements.

7. ATSEP TRAINING ITINERARY.

7.1. APPLICABILITY OF THE MINIMUM TRAINING REQUIREMENT.

This section first explains the complexities involved in determining an Initial Training minimum training requirement and then describes who this minimum training requirement shall apply to.

ATSEPs work on a wide range of CNS/ATM systems and equipment, each of which requires training to achieve specific skills that will eventually lead to operational competence.

However, the ways in which ATSEP functions and/or tasks are defined and assigned to individuals, will vary from one organisation to another.

These differences in the way the ATSEP job is characterized makes it impractical to prescribe a “one-size-fits-all” minimum training requirement that will satisfy all the various different organisational arrangements and, at the same time achieve a relevant and valid range of competences for all.

What is agreed is that all ATSEPs achieve a minimum required level of operational competence that allows them to perform safety related tasks with the specific equipment or systems they will be working with. These competencies apply to all ATSEPs, irrespective of the organisation they work for, their location or the composition of their functions. This competence is achieved at the end of S/E Rating Training. Initial Training is the phase prior to S/E Rating Training; therefore the minimum training received during Initial Training will not be sufficient to permit operational competence. It will however, be sufficient to prepare a learner to start the S/E Rating Training.

Furthermore, the minimum training requirement, as described in this document does not encompass all the possible roles and responsibilities that engineers and technicians may eventually be involved with. It is acknowledged that in some organisations, ATSEPs may have additional responsibilities that are outside the scope and applicability of this Specification.

For the purposes of this Specification, the term ATSEP is used to describe “engineering and technical personnel undertaking operational safety related tasks”, that is to say, personnel who operate and maintain ATM equipment approved for operational use.

ATM equipment approved for operational use is defined as all engineering systems, facilities or devices that have been operationally released to be used either by airspace users (e.g. ground navigation facilities) directly, or are used in the provision of operational air traffic management services.

The minimum training requirement, contained within the Initial Training, shall apply to all learner ATSEPs. This minimum training requirement (and how it is put into practice) is defined in the following section.

7.2. ATSEP MINIMUM TRAINING REQUIREMENTS.

The minimum training requirement is the minimum that learner ATSEPs shall satisfy.

The following sub-sections describe the minimum training requirement for the Initial Training i.e. Basic + Qualification Training.

In some instances, particularly where the learner ATSEPs have previously obtained technical or engineering-related qualifications (e.g. engineering degrees and/or other diplomas), the objectives contained within this Specification need not be re-taught. If it can be verified and/or demonstrated that a learner ATSEP has already satisfied the performance requirements of the appropriate objectives, then these need not be retaught. The verification and/or demonstration of performance requirements shall be recorded.

7.2.1. Basic Training.

The training objectives contained in the Basic Training syllabus are common to all learner ATSEPs undergoing Initial Training.

Completion of all Basic Training objectives is not a pre-requisite to starting Qualification Training. Basic Training objectives shall be satisfied by the end of Initial Training.

Nonetheless, for pedagogical reasons, it is recommended that the sequence of Basic then Qualification training is respected.

The basic training is composed of the following modules that compose the GAELICAM 'CNSATM.INITIAL' course:

- Module 1: Introduction to ATM (Air Traffic Management).
- Module 2: Familiarization with ATC (Air Traffic Control).
- Module 3: Aeronautical Information Services (AIS).
- Module 4: Meteorology.
- Module 5: CNS services.
- Module 6: Communications (C).
- Module 7: Navigation (N).
- Module 8: Surveillance (S).
- Module 9: Data processing (DP).
- Module 10: Monitoring and control of CNS/ATM system.
- Module 11: Maintenance procedures.
- Module 12: Energy and air conditioning.

7.2.2. Qualification Training.

The minimum training requirement is applied to learner ATSEPs during Qualification Training by determining which equipment and system/s the ATSEP will ultimately be working with. 'Domain', 'Subject' and 'Topic' columns in the Table 4 'ATSEP/Controller/Pilot Training Itinerary' represented as follows are going to be used for this purpose. Then, GAELICAM courses that satisfy the qualification training requirements for each ATSEP are identified with crosses (X) in the corresponding row of Table 4.

An ATSEP whose tasks and activities will require him/her to work with a combination of systems and/or equipment shall, during the Qualification Training, satisfy all the objectives in all the relevant streams.

ATSEP (Air Traffic Safety Electronics Personnel)	DOMAIN	SUBJECT	TOPIC	SUB-TOPIC	GAELICAM COURSES																	
					CNSATM-INITIAL	C-VOICE	C-DATALINK	C-AMHS	C-DATA	C-AFTN	C-TRANSMISSION	C-RECORDER	N-GNSS	N-PBN	S-GEN	S-ADS	S-ASMGCS	S-MLAT	CNSATM-GEN	CNSATM-DPS	SAF-SM	CER-VVC
COMMUNICATION	VOICE	Air/Ground	Transmission/Reception	X	X												X					
			Radio Antenna Systems	X	X												X					
			Voice Switch	X	X												X					
			Controller Working Position	X	X												X					
			Radio Interfaces	X	X												X					
		Ground/Ground	Interfaces	X	X												X					
			Protocols	X	X												X					
			Switch	X	X												X					
			Communication Chain	X	X												X					
			Controller Working Position	X	X												X					
	DATA	ATC Networks	Introduction to networks	X				X								X						
			External Network Services	X				X								X						
			Measuring Tools	X				X								X						
			Troubleshooting	X				X								X						
			Protocols	X				X								X						

GAELICAM CNS/ATM Training portfolio

Example: Minimum Training Itinerary for an ATSEP that is working with Transmission/Reception systems (Domain: Communications; Subject: Voice; Topic: Air/Ground) would be composed of the following courses:

- CNSATM-INITIAL (Basic Training)
- C-VOICE (Qualification Training)
- CNSATM-GEN (Qualification Training)

taken from the following ATSEP/Controller/Pilot Training Itinerary table:

y Electronics	DOMAIN	SUBJECT	TOPIC	SUB-TOPIC	GAELICAM COURSES																
					CNSATM-INITIAL	C-VOICE	C-DATALINK	C-AMHS	C-DATA	C-AFTN	C-TRANSMISSION	C-RECORDER	N-GNSS	N-PBN	S-GEN	S-ADS	S-ASMGCS	S-MLAT	CNSATM-GEN	CNSATM-DPS	SAF-SM
		VOICE	Air/Ground	Transmission/Reception	X	X												X			
				Radio Antenna Systems	X	X												X	X		
				Voice Switch	X	X												X	X		
				Controller Working Position	X	X												X	X		
				Radio Interfaces	X	X												X	X		
			Interfaces	X	X												X	X			

8. PILOT AND CONTROLLER TRAINING ITINERARY.

Pilots and Controllers need to receive a general training about CNS/ATM domains as an essential part of their whole training process to obtain the corresponding license.

For this purpose, the pilots and controllers training itinerary in CNS/ATM is composed of two courses identified in Table 4 ‘ATSEP/Controller/Pilot Training Itinerary’:

COURSE 1: ‘CNSATM.INITIAL’ composed of the following modules:

- Module 1: Introduction to ATM (Air Traffic Management).
- Module 2: Familiarization with ATC (Air Traffic Control).
- Module 3: Aeronautical Information Services (AIS).
- Module 4: Meteorology.
- Module 5: CNS services.
- Module 6: Communications (C).
- Module 7: Navigation (N).
- Module 8: Surveillance (S).
- Module 9: Data processing (DP).
- Module 10: Monitoring and control of CNS/ATM system.
- Module 11: Maintenance procedures.
- Module 12: Energy and air conditioning.

COURSE 2: CNSATM-GEN: Air Navigation CNS/ATM systems.

This course provides a high level overview of all CNS/ATM systems used by the Air navigation Service providers (ANSPs). The course describes and explains the main role of communications, navigation, surveillance and data processing systems used for the provision of Air Navigation services.

9. BROCHURES OF GAELICAM COURSES.

CNS/ATM INITIAL



CNS/ATM INITIAL

C-VOICE: ATS VOICE OVER IP (TELEPHONY AND RADIO)



C-VOICE

C-DATALINK



C-DATALINK

C-AMHS: ATS MESSAGE HANDLING SYSTEM



C-AMHS

C-DATA: GROUND DATA NETWORK IN ATC



C-DATA

N-GNSS: GLOBAL NAVIGATION SATELLITE SYSTEM



N-GNSS

N-PBN: PERFORMANCE BASED NAVIGATION



N-PBN

S-GEN: SURVEILLANCE SYSTEMS



S-GEN

S-ADS: AUTOMATIC DEPENDENT SURVEILLANCE



S-ADS

S-MLAT: MULTILATERATION SYSTEMS



S-MLAT

S-ASMGCS: ADVANCED SURFACE MOVEMENT GUIDANCE AND CONTROL SYSTEMS



S-ASMGCS

CNSATM-GEN: AIR NAVIGATION CNS/ATM SYSTEMS



CNSATM-GEN

CNSATM-DPS: DATA PROCESSING SYSTEMS



CNSATM-DPS

SAF-SM: SAFETY



SAF-SM

CER-VVC: VERIFICATION & VALIDATION&CERTIFICATION



CER-VVC

10. GLOSSARY.

ADS	Automatic Dependant Surveillance
ADS-B	Automatic Dependant Surveillance Broadcast
ADS-C	Automatic Dependant Surveillance Contract
AFTN	Aeronautical Fixed Communication Network
AMC	AMHS 'Off-line' Management Systems (AMC)
AMHS	Aeronautical Message Handling System
ANSP	Air Navigation Services Providers
AOC	Aeronautical Operational Control
APP	Approach Control Centre
ATCO	Air Traffic Control Operator
ATSEP	Air Traffic Safety Electronics Personnel
A-SMGCS	Advanced-Surface Movement Guidance and Control System
ATC	Air Traffic Control
ATIS	Automatic Terminal Information Service
ATM	Air Traffic Management
ATM	Asynchronous Transfer Mode
ATN	Aeronautical Telecommunications Network
ATS	Air Traffic Services
bps	Bits per second
CFMU	Central Flow Management Unit
CIDIN	Common ICAO Data Interchange Network
CM	Context Management
CNS	Communications, Navigation and Surveillance
COTS	Commercial off-the-shelf
CPDLC	Controller-Pilot Data Link Communications
CPU	Central Processing Unit
dB	Decibels
DME	Distance Measuring Equipment

DP	Data Processing
DVOR	Doppler VOR
EAD	European AIS Database
EGNOS	European Geostationary Navigation Overlay Service
EUROCONTROL	European Organisation for the Safety of Air Navigation
FANS	Future Air Navigation System
FIS	Flight Information Service
GHz	Gigahertz
GNSS	Global Navigation Satellite System
HF	High Frequency
HFDL	High Frequency Data Link
HMI	Human Machine Interfaz
Hz	Hertz
ICAO	International Civil Aviation Organization
ILS	Instrument Landing System
IP	Internet Protocol
ISO	International Standards Organization
ITU	International Telecommunications Union
kbps	Kilobits per second
KHz	Kilohertz
LAN	Local Area Network
Mbps	Megabits per second
MHz	Megahertz
MLAT	Multilateration
NDB	Non-Directional Beacon
NAV	Navigation
NOTAM	Notice To Airmen
OLDI	On Line Data Interchange
OSI	Open Systems Interconnection
PENS	Pan-European Network Service

PSR	Primary Surveillance Radar
RNAV	Area Navigation Concept
RX	Receptor o Recepción
SCV	Sistema de Comunicaciones Voz
SELCAL	Selective Calling
SITA	Société Internationale de Télécommunications Aéronautiques
SMR	Surface Movement Radar
SSR	Secondary Surveillance Radar
TCP	Transmission Control Protocol
TX	Transmitter
UAT	Universal Access Transceiver
UHF	Ultra High Frequency
VCS	Voice Communications System
VDF	VHF Direction Finder
VDL	VHF Digital Link
VGS	VDL Ground Station
VHF	Very High Frequency
VoIP	Voice over Internet Protocol
VOR	Very High Frequency Omnidirectional Range,