EUROPEAN ORGANISATION
FOR THE SAFETY OF AIR NAVIGATION

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Guidelines for a Common System/Equipment Rating Training for Air Traffic Safety Electronics Personnel

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Abstract

This document explains the principles supporting the Equipment/System Rating training for Air Traffic Safety Electronics Personnel (ATSEP). The purpose is to start the harmonisation of ATSEP Training throughout the European Civil Aviation Conference (ECAC) area within the frame of the 'European Air Traffic Management (EATM)'.

The Equipment/System Type Rating training phase of training for ATSEP, frequently abbreviated into "Rating training", follows the Basic and the Qualification training defined in the EATM 'Guidelines for a Common Basic Level of Technical Training for ATSEP' (EUROCONTROL, 2004b – T2, Ed. 2.0) and the EATM 'Guidelines for a Common Qualification Level of Technical Training for ATSEP' (EUROCONTROL, 2003 – T32).

This third phase is composed of trainings providing specific equipment/system-related knowledge and skills leading to a recognised competency. It is a set of different training modules, possibly in various locations with different and specific purposes. They include "Mentored training" and "On-site training" in order to consolidate these skills and knowledge through experience.

Keywords

Air Traffic Safety Electronics Personnel (ATSEP)	On-site Training	Training Harmonisation
Course Design	Rating Training	Assessment
Mentor	System/equipment	Competence

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DOCUMENT APPROVAL

The following table identifies all management authorities who have successively approved the present issue of this document.

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DOCUMENT CHANGE RECORD

The following table records the complete history of the successive editions of the present document.

EDITION NUMBER	EDITION DATE	INFOCENTRE REFERENCE	REASON FOR CHANGE	PAGES AFFECTED
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0.2	07.09.2005	N/A	Draft 1 (including amendments resulting from meeting 6)	All
0.3	20.10.2005	N/A	Draft 2 (including new material as proposed at meeting 7)	All
0.4	22.11.2005	N/A	Draft 3 (including various adjustments) for TFG24	All
0.5	15.12.2005	N/A	Draft 4 (including amendments resulting from TFG24) for document configuration	pp. 2, 7, 13 & 18 *(as in Edition 0.5)*
0.6	03.02.2006	N/A	Proposed Issue (including editorial, layout and style adjustments) for HRT25	All
TBA at RI Stage	TBA at RI Stage	TBA at RI Stage	TBA at RI Stage	TBA at RI Stage

CONTENTS

EXECUTIVE SUMMARY

This document is the final report of the Task Force ATM Technical Staff (TFATMTS) created by the Training Focus Group (TFG) of the EATCHIP\EATMP[1] Human Resources Team (HRT). It presents the training principles for Phase 3 of Air Traffic Safety Electronics Personnel (ATSEP) Training. This phase is called "System/Equipment Rating training", sometimes abbreviated into "Rating training").

The training need is defined as the acquisition of proficiency to perform a set of defined tasks on a specific technical system in a defined context.

Section 1, "Introduction", sets the context of this document in relation with other documents within EUROCONTROL, including EUROCONTROL Safety Regulatory Requirement 5 (ESARR 5 - see EUROCONTROL, 2002), and ICAO. It also defines and clarifies the terminology used.

The type rating phase is more accurately defined in Section 2, "System/Equipment Rating Training". In this section the process for the specification of the Rating training requirements is broadly defined. Three possible contexts in which this training could be provided are explained before the common adequate training processes are defined. This description is followed by consideration of the notion of a catalogue of Type Rating training.

Section 3 briefly defines the scope of "Continuation Training".

Section 4 covers "Developmental Training" and focuses on ATSEP Instructor training aspects particularly Mentored and On-Site Training (OST). Assessment training, including a programme outline, is covered. System Monitoring and Control (SMC) and special arrangements for SMC are then dealt with.

Section 5 deals with the "Principles of Assessment" applied to the measurement of abilities and competence, while Section 6 deals with the notion of operational competence.

A "Conclusion" can be found in Section 7.

Finally, "References", a list of the "Abbreviations and Acronyms" used in this document and the names of those who contributed to its development are provided at the end of the publication.

[1] In 1999 the 'European Air Traffic Control Harmonisation and Integration Programme (EATCHIP)' was renamed the 'European Air Traffic Management Programme (EATMP)'. Today it is known simply as the 'European Air Traffic Management (EATM)'.

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1. INTRODUCTION

1.1 Background

Under the auspices of the EATCHIP Programme and later the EATM(P) Programme, the Human Resources Team (HRT) delegated responsibility for the Air Traffic Services (ATS) training to its Training Sub-Group (TSG), now known as the Training Focus Group (TFG).

First, TSG initiated the creation of an international task force which, in 1996, produced the 'Guidelines for a Common Basic Level of Technical Training for ATM Technical Staff', now obsolete.

Then, in 1998 a second task force named 'Working Group for ATM Technical Staff (WGATMTS)', was created on the initiative of TSG. The words 'Air Traffic Safety Electronics Personnel (ATSEP)' replaced the words 'technical staff' to ensure consistency with other international working groups such as that one working under the auspices of the International Civil Aviation Organization (ICAO) in the ATSEP Training Manual (2004).

WGATMTS then developed the 'Guidelines for a Common Qualification Level of Technical Training for Air Traffic Safety Electronics Personnel', published in October 2003 (see EUROCONTROL, 2003 – T32).

Following the development of the 'qualification level' document, it became apparent that the original 'basic level' document required updating and this is what TFG instructed WGATMTS to do. Second edition was published in April 2004 (EUROCONTROL, 2004b - T2, Ed. 2.0).

After publication of these guidelines on Initial training phases HRT agreed with TFG's proposal to expand the Task Force's mandate for the period from January 2004 to December 2005.

1.2 Terms of Reference

Full Task Force Name:	**TASK FORCE ATM TECHNICAL STAFF**		
Acronym: (as in COFM)	**TFATMTS**	Associated Domain:	**HUM**
Associated Sub-Group:	**TRAINING FOCUS GROUP (TFG)**		
Associated Group:	**HUMAN RESOURCES TEAM (HRT)**		
Associated Programme/Service:	**HUMAN FACTORS DOMAIN**		
Re-activation Date:	**01.01.2004**	End Date: (if relevant)	**31.12.2005**
Chair Person:	**M. PISTRE**	Secretary:	**TBD**
Unit:	**IANS/TDH**	Unit:	**IANS/TDH**
TOR Approved by:	**TRAINING FOCUS GROUP (TFG)**	Date:	**10.12.2003**

TERMS OF REFERENCE

1. Mission

The Task Force is to analyse and develop best practices and, when possible, guidelines on the phases of ATSEP Training named Type Rating, Continuation and Development.

2. Authority

The TFATMTS reports to the Training Focus Group (TFG).

3. Participation

Agency staff: IANS/TDH training experts and ATM technical experts

ECAC Members: ATM technical training experts from ECAC States

Non-ECAC Members: IFATSEA

Observers: N/A

4. Tasks

The developments will be dealing with the following areas:

- structures and templates for Type Rating,
- development of guidance on the maintenance of ATSEP competency.

5. Occurrence of this WA per year

The Working Group will:

- Make an extensive use of the OneSky Team “ATM Technical Training” for exchange of information, discussions and Internet meeting. The maximum number of face-to-face meetings will be three times in 2004 and three times in 2005.
- Provide regular progress reports and relevant deliverables.
- Make recommendations to and seek guidance from TFG.

1.3 ICAO Training Manual

During the development of these guidelines ICAO was developing a Training Manual for ATSEP. Coordination between the two documents was ensured by a group mixing EUROCONTROL, ICAO and IFATSEA representatives.

On November 3rd 2004 ICAO made available on their Intranet the final draft of the Training Manual for ATSEP, i.e. the preliminary edition of the Document 7192-AN/857, Part E-2 (ICAO Doc 7192). It shall be approved by the ICAO Secretary General and published under his authority.

1.4 Air Traffic Safety Electronics Personnel (ATSEP) Principal Duties

The principal duties of ATSEP, as defined in ICAO Doc 7192, are:

a) Performing maintenance on Communication, Navigation and Surveillance / Air Traffic Management (CNS/ATM) system/equipment, which includes:

   1) Calibrating flight and ground radio navigation aids;
   2) Certification of CNS/ATM system/equipment;
   3) Modification of operational CNS/ATM equipment;
   4) Corrective maintenance;
   5) Preventive maintenance.

b) Performing installation of CNS/ATM system/equipment.

c) Management, monitoring and control of operational CNS/ATM system/equipment.

d) Developing, reviewing and modifying CNS/ATM system/equipment and/or maintenance procedures and standards.

Note: For the purpose of this document the locutions ‘technical staff’ or ‘engineering and technical personnel’ are both used to describe the same personnel, frequently abbreviated by the acronym ‘ATSEP’.

1.5 ESARR 5 Definitions

The following two definitions are included in Edition 2.0 of EUROCONTROL Safety Regulatory Requirement 5 (ESARR 5), “ATM Services’ Personnel” (see EUROCONTROL, 2002):

Within ESARR 5 Annex A:

“ATM Equipment Approved for Operational Use

> *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.*

Note: These comprise the systems, facilities and devices operated or supervised by the Operating Organisation and serving the purpose of air navigation, regardless of whether the products used to fulfil the tasks involved in air traffic management are generally available on the market or have been specifically developed to air traffic management requirements."

Within ESARR 5 Chapter 5.3.2.3:

"Engineering and technical personnel undertaking operational safety-related tasks

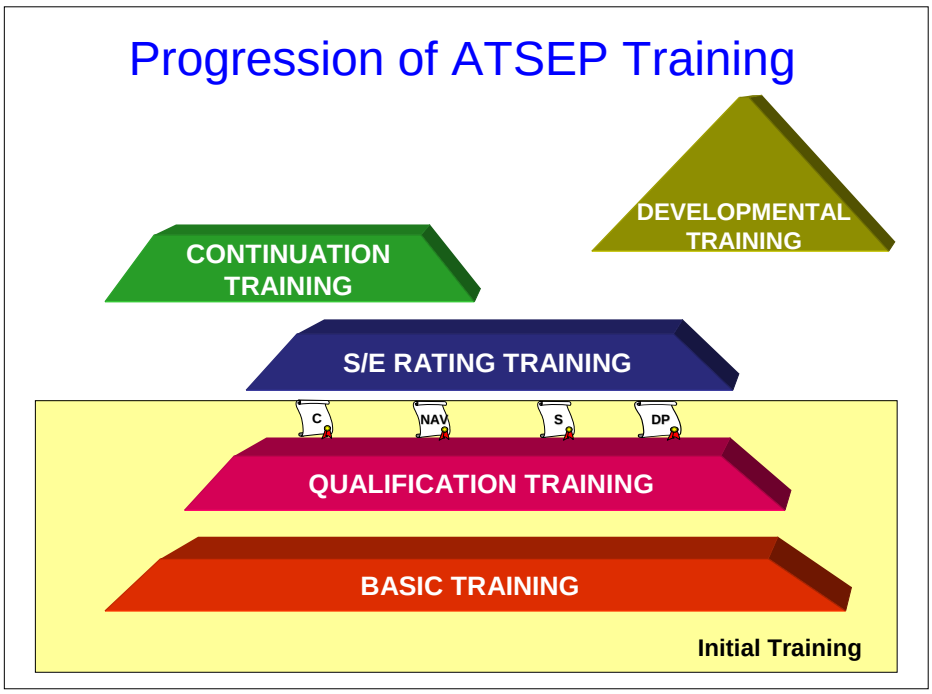
Personnel who operate and maintain ATM equipment approved for operational use.

Note: This definition is not intended to cover other equipment-related functions such as design, testing, commissioning and institutional training".

Not all the job descriptions of the technical staff fully match this definition. It is however beneficial to extend the use of this guidance, on an *ad hoc* base, to the other technical categories.

1.6 Phases in Technical Training

The progression of ATSEP training can be summarised by the following diagram:



The following detailed description in this document supersedes that available in the EUROCONTROL document 'EATM Training Progression and Concepts' (EUROCONTROL, 2004a – T38).

In this diagram the third phase of training (System/Equipment Rating training) is shortened to "S/E Rating training" and was formally named "Type Rating".

1.6.1 Initial training

Training preceding rating is referred to as 'Initial training'. It includes Basic training and at least one of the four modules of Qualification training.

1.6.1.1 Basic training

Fundamental knowledge and skills appropriate to the discipline to be pursued in the Communication, Navigation and Surveillance / Air Traffic Management (CNS/ATM) environment.

It is the mandatory step that enables to progress towards specialised training (e.g. Qualification). Basic training is designed in such a way that, for the foreseeable future, Continuation training can take place without major investment and with a minimum of basic retraining. It is the foundation on which any further training is going to be based and the basis of a proper understanding of the overall ATM system.

1.6.1.2 Qualification training

Job-category-related knowledge and skills appropriate to the discipline to be pursued in the CNS/ATM environment. Four disciplines have been identified through the four corresponding qualifications: Communication, Navigation, Surveillance and Data Processing.

When changing discipline (for instance from Navigation to Communication) the relevant part of the Qualification training needs to be provided to the trainees in a Conversion training. For efficiency the qualification modules may be reused.

1.6.2 (System/Equipment) Rating training

System/equipment-related knowledge and skills leading to recognised competency.

It can utilise Mentored training and OST, and include Degraded System training as appropriate (see definitions in Section 2.2). It is the final stage for the acquisition of competence following Basic and Qualification training.

1.6.3 Continuation training

Training given to personnel, designed to augment existing knowledge and skills and/or to prepare for new technologies. It includes Refresher, Emergency and Conversion training (Refresher and Emergency training are sometimes named 'Recurrent training').

- **Refresher training**: Training designed to review, reinforce or upgrade existing knowledge and skills (including team skills training such as TRM).

- **Conversion training**: Training designed to provide knowledge and skills appropriate to a change in either job category (new discipline or new system/equipment rating), environment (new maintenance or other procedures) or system (system upgrade or change of system, new project).

- **Emergency training**: See 'Degraded Systems training' in Section 1.7.

1.6.4 Developmental training

Training designed to provide additional knowledge and skills demanded by a change in job profile, e.g. System Monitoring and Control (SMC) supervisor, safety manager, instructor, training manager or any other career development.

The spelling 'Developmental' comes from ICAO and is a synonym for the EUROCONTROL 'development'.

1.7 Degraded Systems Training

Training including training in unusual situations, in degraded systems and, if suitable, in emergencies. Most of this training will be site-specific or may make use of incident or accident analysis.

Initial training, Rating training, Continuation training and Developmental training may include the appropriate Emergency, Unusual Situations and Systems Degraded training modules. For efficiency purposes the modules may be the same. This is why Degraded System training is not a specific training phase.

- **Emergency**

  A serious, unexpected and often dangerous situation requiring immediate action.

- **Unusual situation**

  A set of circumstances which are neither habitually nor commonly experienced. The essential difference from an emergency situation is that

a volatile situation exists and if an appropriate action is not taken, a major failure or emergency situation will result.

- **Degraded systems**

  Unusual situations resulting from a system failure or malfunction leading to a loss of system capability (e.g. reduced redundancy, compromised integrity or the loss of service elements).

1.8 Structure of the EATM Training Documentation

The structure of the training documentation is defined in the document "EATM Training Progression and Concepts" (EUROCONTROL, 2004a – T38). It is based on the combined use of the:

- objective-based training method,
- taxonomy and
- commonly agreed definitions of media, method and rate of learning and modes of delivery.

1.9 Purpose of this Document

The purpose of this document is to define the System/Equipment Rating training for ATSEP and to add a few topics on Continuation and Developmental training when these topics are closely linked to Rating training.

The expected benefits are:

- the reduction of time and effort invested in the training development,
- the possible reuse of off-the-shelf training materials,
- guidance for the demonstration of compliance with the guidelines.

To achieve these and according to the EATM training documentation definition, this document includes:

- a description of the processes to be followed in this training phase - the objectives are not detailed because they are specific to each System/Equipment Type Rating training;
- the concept of a catalogue of system/equipment type rating courses.

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2. SYSTEM/EQUIPMENT RATING TRAINING

2.1 Introduction

The definition of the System/Equipment Rating training is focused on the acquisition of competence regardless of the context of the acquisition. The circumstances in which an ATSEP will follow a Rating training course may be:

- the implementation of a new equipment;
- the consolidation of the ATSEP competence after Initial training in order to get his/her first Type Rating;
- the conversion of an ATSEP already experienced on other systems related to the same qualification to a new system.

The general features of the training are common to the three contexts.

This document does not define a system design policy or a maintenance policy. However, it is necessary to have in mind a background made of generally agreed principles to avoid misunderstanding.

2.2 Definitions

2.2.1 On-Site Training (OST)

“The integration in practice of previously acquired job-related routines and skills under the supervision of a qualified ATSEP in a working environment”.

The ATSEP Rating training is mainly on-site-based, but for safety reasons it is not always possible for the ATSEP to be trained on systems in current operational use.

However:

- ATSEP, while mainly trained on simulators, spare and standby equipment, may receive planned training on operational equipment under the supervision of a suitably qualified ATSEP;
- training on operational equipment in operational conditions is generally possible and effective in the case of SMC.

The Rating training frequently concludes with a supervised exercise of the job. The trainee performs the required task under the supervision of a qualified ATSEP. The focus is more on the transfer of skills and knowledge in an operational environment than on learning.

Note: The term ‘On-Site Training (OST)’ is preferred to ‘On-the-Job Training (OJT)’ because in the ATSEP activities training cannot be systematically associated nor with “qualified OJT Instructors” (whom are not defined in the technical domain) neither with “live traffic situation”.

2.2.2 Mentored training

During the whole Rating training process, and in particular during the OST phase, the ATSEP is under the guidance of qualified ATSEP (mentors). The mentors can either be instructors or experienced colleagues.

2.3 Contexts for the Provision of System/Equipment Rating Training

2.3.1 New equipment

When the implementation of new equipment is planned the personnel need to be trained to be competent on this equipment. For ATSEP this is in fact one of the most frequent training activities.

It is recommended to plan for this training as early as the project design phase of the equipment. The training plan should be reviewed during the project life cycle.

2.3.2 Learner’s first System/Equipment Rating training

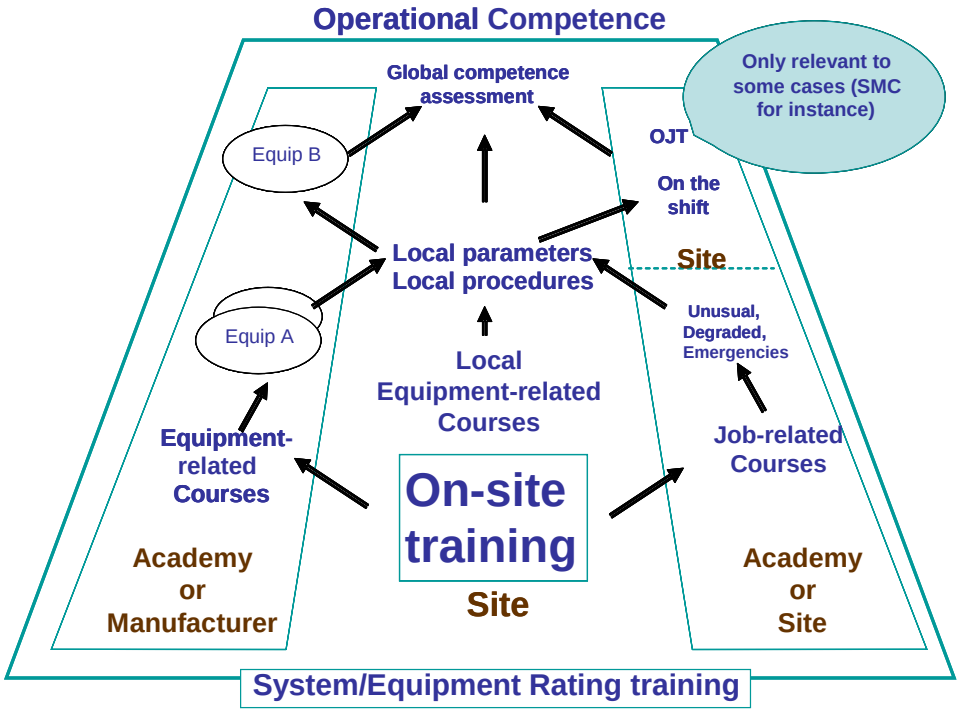
After succeeding in at least one ATSEP discipline qualification, the learner enters the first System/Equipment Rating training in order to acquire and demonstrate competence on this system/equipment.

2.3.3 ATSEP additional System/Equipment Rating training

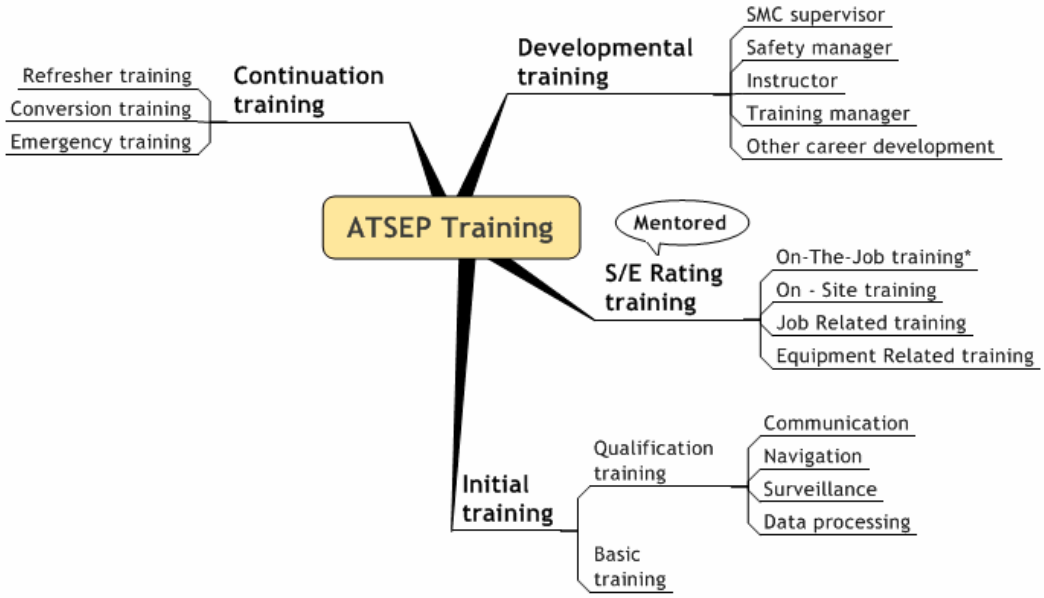
During Conversion or Development training the ATSEP will enter into additional System/Equipment Rating training to acquire and demonstrate new competence.

In practice the same training modules can be used in the three situations (new equipment, first system and additional system).

2.4 Type Rating Process



The type rating process is the training method used to reach competency for an ATSEP in order to perform a given level of maintenance on a particular equipment or cluster of equipments. The level of maintenance (A, B or C) for each equipment is defined by the criticality of the systems involved and related to the tasks the ATSEP are in charge of. In addition to the pure **On-site training**, the type rating process includes **equipment-related courses** (e.g. theoretical training of a certain type or brand of installation) but can also include **job-related** and behaviour-oriented courses when needed.



*(On-the-job training is relevant to a few specific rating only)

2.5 Catalogue

There is currently no simple access to the existing technical training available in Europe.

This may result into unwanted duplication of development efforts. Another consequence is that there is no immediate information on existing training offers matching Common Core Content (CCC) training.

As a first action it is therefore recommended to consider the addition to the EUROCONTROL Website of a simple portal managed by EUROCONTROL Institute of Air Navigation Services (IANS), similar to the portal of the PEGASUS Network (see www.pegasus-europe.org), in order to provide links to any training institution located in the ECAC area and offering relevant technical training.

On a later stage a structured training catalogue could be created. This catalogue will be structured on the CCC, thus offering training solutions according to the harmonised training objectives or process described in the EUROCONTROL EATM guidelines. However, the creation of a general matrix matching the CCC with the training modules offered by training providers requires first that each of these training providers investigates the matter by studying their own modules. Consequently, a significant collective action will be efficient only if started when this mapping exercise will be completed, probably within 18 to 24 months.

3. CONTINUATION TRAINING

Continuation training will be tackled later. It is again an area in which common features are limited to the processes. Here also the possible development of a catalogue will require time and efforts before reaching efficiency and accuracy.

4. DEVELOPMENTAL TRAINING

The spelling 'Developmental' comes from ICAO and is a synonym to the EUROCONTROL 'development'.

There are many different subjects covered in Developmental training.

As far as the ATSEP is concerned Development training is generally non-technical in nature and supports the career development of the ATSEP. As such most Development training is outside the scope of this document.

Among the many possible training this document focuses on three training: ATSEP Instructor training (Classroom, On-Site and Mentor), Assessment training and SMC.

The reason behind this choice is that Instructor training and Assessor training are essential enablers to establish the process of System/Equipment Rating training. The descriptions are extracted from the ICAO (2004) Training Manual with some terminology adjustments.

The SMC training is mentioned as a specific issue that may generate changes in the whole training structure.

4.1 ATSEP Instructor Training

4.1.1 Introduction

ATSEP Rating training described in this document requires the intervention of instructors. Therefore a requirement arises to train ATSEP in becoming ATSEP instructors. To describe the competency of these instructors a pragmatic way is to quote the training defined in the ICAO (2004) Training Manual. (Some editorial changes have been done to ensure terminology consistency.) This section provides the type of training that the instructor must complete in order to learn how to teach in a classroom and how to provide Mentoring and On-site training.

4.1.2 Classroom instructional techniques

This course is designed for Air Traffic Safety Electronic Personnel (ATSEP) who are, or will be, involved in classroom instruction. Each instructor should have specific training in the form of a practical course that aims to provide the basic instructional skills necessary for the efficient conduct of classroom training.

In a classroom simulation and a modern interactive training environment, the future instructor has to follow specific guidelines to plan, prepare and deliver presentations and lessons. During the course they will play alternatively the role of instructor and class participant. Their performance as an instructor is subsequently assessed.

The programme should include:

- quality of a good instructor,
- principle of adult learning,
- use and structure of a lecture,
- how to design and structure a lesson (lesson plan)
- questioning techniques,
- elements and formulation of training objectives,
- use of teaching aids,
- principle of student motivation,
- qualities and types of written tests,
- practical exercises presenting one lecture and lesson.

4.1.3 Mentoring and OST

The course is designed for ATSEP who are already, or will be, carrying out On-site training or Mentoring at a technical unit. The On-site training phase and practical exercises on equipment (standby or real equipment, or special equipment for development and training purpose) are well recognised as critical in the training of an ATSEP. It is necessary to give the instructor a series of teaching techniques and coaching practices which, if adopted, will increase the quality and efficiency of the OST, and will also increase the safety and decrease risk when dealing with equipment. The course should provide appropriate training for those involved in coaching and practical training on equipment, suggesting the appropriate means of carrying out this training. It should also provide and recommend a code of practice for the instructor.

The programme should include:

- safety precautions to take before teaching practical training on equipment;
- learning processes, cognitive aspects and motivation theories;
- effective verbal communication, non-verbal communication and effective listening skills;

- personal interactions, personal styles and attitudes, building positive relationships, the influence of recognition, interpersonal conflict;
- training practices such as briefing a student, monitoring the student's progress, intervention methods, feedback and debriefing;
- task training, how to build practical exercises and sessions dealing directly with equipment, measurement technique, etc.;
- progressive application of coaching theory with feedback;
- stress recognition and stress management.

4.2 Assessment Training

This course is designed for experienced engineers, technologists, instructors and mentors who will be required to act as a competency assessor.

The assessor should follow a course that focuses on procedures for evaluating the initial and continued operational competency of Air Traffic Safety Electronic Personnel (ATSEP).

The task of assessor is recognised as being difficult and essential to ensuring that competency standards are maintained. It is crucial for safety. Furthermore assessors may have to comment and take action upon the competency of colleagues, ATSEP and friends. This is not a task that everybody is capable of doing as it involves professional and personal criteria.

This particular course should endorse the use of both practical and oral assessments as a process to determine operational competency. It aims to provide its participants with the rationale, initial knowledge and techniques for the role of competency assessor. Such a course should not only help the assessors to fulfil their job, but also the Administration to establish the required infrastructure in order to meet the regulatory requirements.

Program outline:

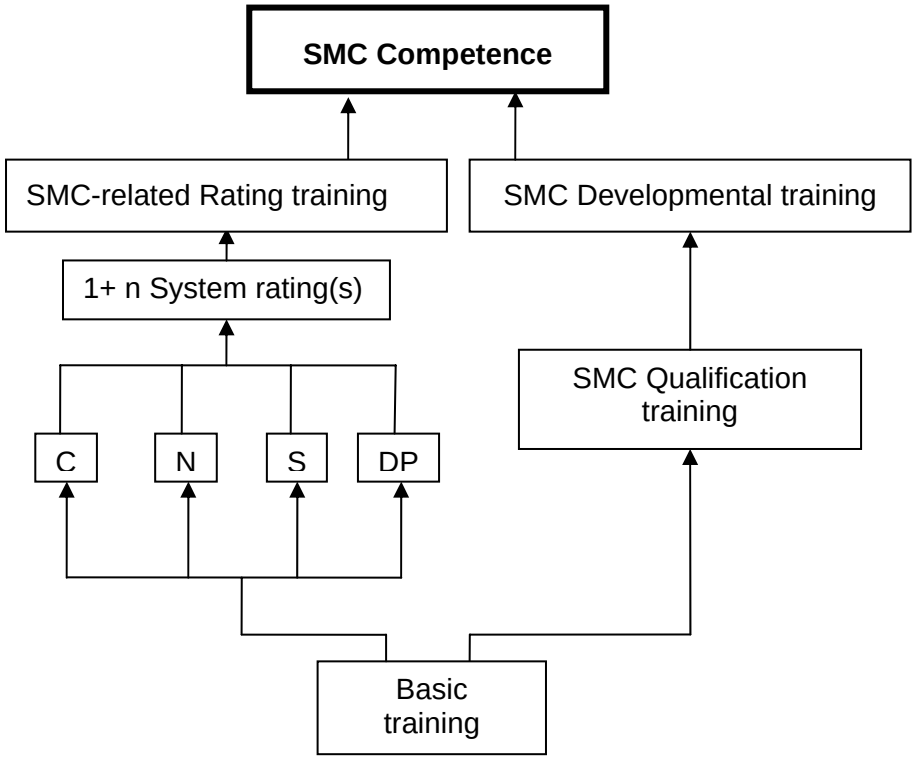
- role and task of assessor,
- international safety regulatory requirement,
- concept of assessment,
- human factors affecting assessment,
- the oral part of the assessment and the scenario of interview,
- the practical part of the assessment process and work on equipment,
- assessment for competency,
- maintenance of competency,
- competency assessment debriefing,
- exercises in practical and oral assessment.

4.3 System Monitoring and Control

System Monitoring and Control (SMC) training is defined in Section 1.6.4 as a Developmental training. This is consistent with Section 2.3 of the qualification document (EUROCONTROL, 2003 – T32) stating that "SMC tasks are not usually performed immediately after qualification training but later, when competence has been increased by the acquisition of experience…".

Consequently the SMC competence is obtained after a proper technical and human factors training with special focus on operational impact by an ATSEP who has any of the four qualifications (Communication, Navigation, Surveillance or Data Processing) and has acquired professional experience.

An option to train directly after Basic training for SMC duties is considered as possible and as matching a need by a part of the group. This is based on the arrangements in organisation according to which some SMC operators are limited to level A tasks, while level B or C tasks are delegated to appropriately qualified staff. Such an option will require the modification of the qualification document in order to define Qualification training for SMC personnel.



The relevant training scheme will be chosen according to the SMC arrangements for each organisation.

5. PRINCIPLES FOR ASSESSMENT

Assessment is an integral part of the training process.

5.1 Categories of Assessment

There are two broad categories of assessment:

- The formative assessment is a verbal or written factual assessment given for the purpose of personal development which should have an important and lasting influence on that person's abilities or attitudes. It should only be for that person's attention or use. The formative assessment is done through progress testing. In shorter terms, it is an assessment conducted as a part of the teaching. Questions and assignments are set to help the student to learn effectively, but are not used to determine the student's course results.

- The summative assessment is a verbal and written factual judgement which represents a summary of the trainee's attitudes and abilities over a period of time. The summative assessment is done through a mastery test. It is an assessment intending to determine a student's overall level of performance on the course. Questions, assignments, grades or scores of which are used in determining the student's course result.

5.2 Functions of Assessment

In the specific context of post-qualification training (Type Rating and Continuation (recurrent) training), ESARR 5 (EUROCONTROL, 2002) requires:

- (5.3.2.a): "Personnel to be properly trained and qualified to perform the assigned tasks", and

- (5.3.2. c): "competence, specialisation and recency of the operational personnel".

It is one of the functions of the summative assessment to establish the competence and qualification of the personnel.

5.3 Recommendations for Assessment

The criticality of the subject and the performance difficulties which can be encountered should give some indication as to when, how and what performance evaluation should be required. Generally speaking, performance measurement is undertaken to evaluate whether or not the trainees have understood and assimilated the material taught, gained experience and acquired skills to the desired level.

- Skills are best assessed by performance tests (the trainee performs the task described in the objective, under real or simulated conditions).
- Knowledge is best assessed by oral or written tests.
- Attitudes are the feelings and opinions concerning the job and other people, as well as personal conduct/responsibility. Therefore, attitudes are best assessed by observations of performance or by means of questionnaires.

6. OPERATIONAL COMPETENCE

6.1 Terminology

The specificity of ATSEP jobs and duties requires the creation of an adequate terminology for the recognition of the competence. This terminology provides for the guidelines to be used around the ECAC States that will establish or have established a competence scheme for ATSEP. The following terminology is proposed:

- **Qualification** indicates the discipline in which an ATSEP has been trained to provide the service, i.e. Communication, Navigation, Surveillance, or Data Processing.

- **Equipment/System rating** indicates explicitly the equipment/system on which an ATSEP will perform his safety-related tasks. Maintenance is preventive, adaptive or corrective. It deals with both hardware and software issues.

- **Level-rated tasks** represent the categorisation by complexity, knowledge, skills and operational impact. Three categories will usually suffice but could be further sub-divided for highly complex or diverse systems:

  - **Level A tasks:** Level A maintenance tasks are primarily associated with immediate service restoration or reconfiguration ("front-panel level"). They are appropriate for staff that has been trained to understand the elements of equipment or system, their interrelationships and functional purpose, but does not require an in-depth knowledge of these elements.

  - **Level B tasks:** Level B maintenance tasks involve in-depth fault analysis at the system/equipment level ("functional level"). They are usually carried out by staff that has been trained for the more complicated maintenance tasks on the equipment/system.

  - **Level C tasks:** Level C maintenance tasks involve the detailed diagnosis of a software problem, of a faulty Line Replacement Unit (LRU), Printed Circuit Board (PCB) or module ("component level"). They usually require the use of automated test equipment at a suitable location and are usually carried out by staff that has been trained in detailed fault diagnosis and repair techniques.

6.2 Towards Operational Competence

6.2.1 Introduction

ESARR 5 states that:

> *"Competence is taken to mean possession of the required level of knowledge, skills, experience and, where required, proficiency in English, to permit the safe and efficient provision of ATM services."*
>
> EUROCONTROL (2002)

ICAO uses the word "competency" and defines it in the Training Manual for ATSEP as:

> *"The combination of knowledge, skills and attitude to perform a task to the required standards in accordance with the State Regulatory requirements."*
>
> ICAO (2004)

The proposed EU (2005) directive on a community licence and the common requirements for the provision of air navigation services regulation on Single European Sky implementation details the requirement to ensure the competence. The directive and the regulation frequently refer to the EUROCONTROL guidelines but do not explicitly define competence.

Many definitions of competence are found in the literature. However they converge on five main topics:

- competence is linked to action;
- competence is valid in a context;
- competence combines knowledge, skills and attitudes;
- competence cannot be reduced to its simple components but "integrates" the components to a whole task-related measurement;
- competence is defined relative to some standards (standards on the task definition or on the competence evidence).

These main topics are partly identified in both the ESARR and ICAO definitions. A more accurate definition on the very nature of "competence" would lead to specialised debates on human sciences theories, beyond the scope of this document.

Consequently, our purpose is limited to a clear description of the contribution of training to the progression towards competence, some consideration on the

decision process to declare an ATSEP competent, and the statement that Continuation training is one of the requirements to maintain competence.

6.2.2 Progression towards competence

In EUROCONTROL training guidelines “Qualification training” is defined as “job-category-related knowledge and skills appropriate to the discipline to be pursued in the ATS environment”. “Rating training” is defined as “equipment/system-related knowledge and skills leading to recognised competency”.

So, implicitly Rating is defined as a recognised competency to perform safety-related tasks on one equipment/system while a Qualification is a prerequisite linked to a job category or discipline to start the preparation for a rating related to this discipline. This is consistent with the terminology defined in 6.1 above and excludes use of the word “qualification” with a different meaning.

Therefore we consider that the progression towards competence is performed through the acquisition of qualification (Basic knowledge plus any combination of any of the four disciplines) and the series of actions described as Rating training (additional academy or manufacturer training, On-site training, Mentoring and consolidation of experience).

6.3 Establishment of Competence

The establishment of competence shall be done according to a documented process.

The EUROCONTROL (2005 – L6, Ed. 2.0) “Guidelines for Competence Assessment”, and the ICAO (2004) Training Manual provide some technical information on how to assess performance.

The EUROCONTROL (unpublished – T44) “Guidelines for the Competence Assessment of Air Traffic Safety Electronics Personnel” provide a broader guidance on the generic process: how to assess a first competence, and how to ensure that ongoing competence is increased and maintained.

The assessment of the social impact of the process is the responsibility of the social dialogue domain. Some important developments will be necessary to adapt the general principles to each individual organisation.

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7. CONCLUSION

These guidelines provide guidance on how to develop training objectives, plans and materials related to Phases 3, 4 and 5 of the ATSEP Training.

The use of this guidance will:

- facilitate a common understanding of the training;
- enable training material exchanges and common developments;
- facilitate the institutional dialog between training providers, Air Navigation Service Providers, and National Supervisory Authorities;
- clarify the individual relations between the learner, the instructors and the assessors all along the process.

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ABBREVIATIONS AND ACRONYMS

For the purposes of this document the following abbreviations and acronyms shall apply:

ATCO	Air Traffic Controller *(US)*
ATM	Air Traffic Management
ATSEP	Air Traffic Safety Electronics Personnel
CCC	Common Core Content
CNS/ATM	Communication, Navigation and Surveillance / Air Traffic Management
EATCHIP	European ATC Harmonisation and Integration Programme *(now known as 'EATM(P)')*
EATM(P)	European ATM (Programme) *(formerly known as 'EATCHIP')*
ECAC	European Civil Aviation Conference
ESARR	EUROCONTROL Safety Regulatory Requirement *(SRC)*
EU	European Union
EUROCONTROL	European Organisation for the Safety of Air Navigation
HRT	Human Resources Team *(EATCHIP/EATM(P))*
HUM	Human Resources (Domain) *(EATCHIP/EATM(P))*
IANS	Institute of Air Navigation Services *(EUROCONTROL, Luxembourg)*
ICAO	International Civil Aviation Organization
IFATSEA	International Federation of Air Traffic Safety Electronics Associations
OJT	On-the-Job Training
OST	On-Site Training
SMC	System Monitoring and Control

TDH Unit	Training Development and Harmonisation Unit *(EUROCONTROL IANS)*
TFATMTS	Task Force ATM Technical Staff *(EATM/HRT/TFG)*
TFG	Training Focus Group *(EATM, HRT; formerly known as 'TSG')*
TSG	Training Sub-Group (*EATCHIP/EATMP, HRT; today known as 'TFG')*
WGATMTS	Working Group ATM Technical Staff *(EATCHIP/ EATM(P), HRT, TSG/TFG)*

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