EUROPEAN ORGANISATION FOR THE SAFETY OF AIR NAVIGATION

EUROCONTROL

Guidelines for ATS Upgrade Training

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EUROPEAN AIR TRAFFIC CONTROL HARMONISATION AND INTEGRATION PROGRAMME

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Abstract

These guidelines propose processes to meet the training needs generated by the introduction of new Human Machine Interface (HMI) in Controllers Work Position (CWP) The attached Annexes report more specifically on national validations of such training programmes

Keywords

Training	Systems upgrades	Simulations	CBT
CWP	Training methods	OJT	Change-over

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

AUTHORITY	NAME AND SIGNATURE	DATE
Chairman of Training Sub-Group	J-P Majerus	25/06/96
Chairman of Human Resources Team	C P Clark	27/06/96
SDOE	W Philipp	03.07.96

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

EDITION	DATE	REASON FOR CHANGE	SECTIONS PAGES AFFECTED
0 1	20/07/95	Original version	all
0 2	01/09/95	Version dispatched to the Training Sub-Group (TSG3) for amendments	all
0 3	21/09/95	Version approved by the Training Sub-Group (TSG4)	all
1 0	28/06/96	Version approved by the Human Resources Team (HRT5) adopting EATCHIP Document Configuration Management requirements	all

TABLE OF CONTENTS

EXECUTIVE SUMMARY

This document is the first result of the work conducted by a group of five persons and endorsed by the Training Sub-Group and later on by the Human Resources Team

It satisfies the objectives of the Specialist Task "On-Site Training" (HUM ET1 ST05 4000) within the EATCHIP Human Resources Work Programme [Ref 1] in that guidelines for organisations and the training for air traffic staff to upgrades of Air Traffic Control systems have been defined

After explaining their own structures, the guidelines deal in Chapter 3 with the organisation of the training The variety of training structures and their size, limited the content of this chapter to underlining the problem and to identifying two possible options either a separated or an integrated training organisation

Chapter 4 explains the rationale for developing and executing a training plan An example, derived from the United Kingdom's experience, is described at Annex A This chapter gives the definitions of elements of the problem and links them It emphasises the importance for timely advance resource planning and in addition, informing the learner to know where he/she stands in the learning process

Chapter 5 deals with the different training methods and related media It explains their advantages and disadvantages in the context of system upgrade training A sample "Training Map" shows a broadly adopted scheme which includes, an information phase based on paper and video, a phase to understand the functions and acquire the ability to use them using Computer Based Training and demonstrations, a phase for consolidation on simulators and On-the-Job Training

Chapter 6 explains the importance of the training documentation and the need to structure it

Chapter 7 lists the courses and contents that have to be considered and the related parameters

The links to change-over procedures and to safety are explained in Chapter 8 and 9, as well as in Annex A

These guidelines will become reference material relating to the training of air traffic staff for upgrades of the Controller Work Position

These guidelines should also be accessible for the training of the Air Traffic Management technical staff responsible for the installation and maintenance of new Air Traffic Control systems and workstations, staff in charge of this training may be able to derive useful information from this document

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1. INTRODUCTION

1.1 Background

These guidelines were developed by the Institute of Air Navigation Services (IANS), with the support of experts and contributions of EUROCONTROL Member-States, on the request of the Training Sub-Group (TSG) of the Human Resources Team (HRT) within the European Air Traffic Control Harmonisation and Integration Programme (EATCHIP)

At it's first meeting in June 1994, the TSG issued the following recommendations

Taking into account the request by the HRT to conserve resources, it is proposed to avoid creation of Task Forces on this subject until the end of 1995 and to work according to the following processes

- Development of a training programme guideline

  Guidelines shall be produced by EUROCONTROL with the assistance of national experts involved in this type of training The experts shall not be involved in dedicated working sessions It is only scheduled to have bilateral or multilateral contacts during one day twice a year EUROCONTROL shall produce draft guidelines National experts shall validate the content and incorporate information which already exists in their own administrations and which does not have to be produced specifically
  When finished, guidelines shall be proposed to the TSG for endorsement and decision on future action

- Prototype course

  In order to prepare participants for Operational Display and Input Device (ODID) experiments, it is necessary to train them Future simulation training shall be handled partly through courseware built jointly by EUROCONTROL Experimental Centre (EEC) and IANS Out of this training, we propose to derive a prototype course The general objective shall be to enable an experienced controller to understand and to use basic principles of today's Controller Working Position (CWP)

- Next major upgrade

  Actions will have to be initiated to prepare other Air Traffic Management (ATM) changes The TSG will be consulted on the determination of appropriate actions after 1995

The task was conducted according to this policy, from June 1994 to May 1995 The contributing experts from France, United Kingdom (UK) and Switzerland amended the proposed draft documents according to their on-going preparatory phases, and detailed their own experiences in annexes

A draft version of this guideline was presented to the third TSG meeting in September 1995

1.2 Purpose

The purpose of this document is to provide information and possible lines of actions to prepare for the introduction of new CWPs

The main user of this document should be the person in charge of the preparation and training of operational staff to the CWP

Other users could include the different experts or managers that will deal with this training issue

This document should also be used as a source of information between the different categories of people involved in these training activities (training managers, course planners, instructors, manpower managers, operational heads)

1.3 Scope

The TSG recognised that system upgrade training is of great importance to many nations at present and will be of great importance to other nations in the future This document is based on the practical experience of planners of system upgrade training

2. GUIDELINES

2.1 Introduction

Throughout the coming years many Air Traffic Control (ATC) organisations will be re-equipped with new and possibly more sophisticated equipment This equipment is required to enable ever increasing traffic levels to be handled safely

Extensive training is a requirement for all system upgrades It was considered that a set of guidelines detailing methodologies and outline contents would assist organisations in planning such training

The contents of these guidelines have been drawn from people with experience in this area which will assist others undertaking this task

It is planned that these guidelines will be regularly updated in line with individual organisations' experiences Member States are requested to contribute their experiences to these guidelines Statistics obtained during training are particularly welcome, e g simulator time per person required

Emerging technologies may also mean a change to training methods and we plan to include such methodologies in these guidelines as they become available

Use this manual as you wish Remember it contains guidelines and may well have omissions in some of the areas in which you are interested Please help fill these areas and feel free to suggest changes to the existing contents

2.2 Contents

The contents is structured as follows

- Training organisation, detailing possible structures for the training organisation
- Training plan, detailing an outline structure to document the required training
- Training methodologies, briefly detailing training techniques that may be useful
- Provision of documentation, briefly covering documentation that may form part of the training programme
- Topics to be covered in training, outlining possible course titles and contents
- Procedures for change-over, outlining training actions that might be required
- Annexes, providing samples and details of actual training programmes

2.3 Change Procedure

2.3.1 Additions/Changes to the Guidelines

A form is provided in Annex D of these guidelines to report errors or suggest additions to these guidelines

The completed form should be sent to the Training Policy Team at IANS An acknowledgement will be sent with a comment on the action that is being taken

We would welcome a short digest of your own experiences to add to the annexes The form provided in Annex D of these guidelines can be used for this purpose

2.3.2 Amendment Service

In order to keep these guidelines current it is intended to update this document on a regular basis with information from EUROCONTROL Member States' training programmes

Amendments to this plan will be issued annually to registered holders of the document on the 1st of June

2.3.3 Periodic Review of the Guidelines

The Training Policy Team at IANS will organise a periodic review of these guidelines This review will be carried out at regular intervals

To assist in this review, personnel from administrations currently undertaking system upgrade training will be invited to attend a two day review of these guidelines

The results of such a group meeting will be included in the annual amendment

2.3.4 Registration

This document may be distributed freely within European Civil Aviation Conference (ECAC) States Amendments will only be provided to registered holders of the document

If you are registered, your name and details will be shown on the amendment sheet in this manual

Should you not be registered and wish to do so, please send your name and details to the Training Policy Team at IANS

3. TRAINING ORGANISATION

3.1 Organisational Options

It is not proposed to detail any particular organisational structure in these guidelines, merely to indicate that a structure is required and to give some suggestions as to how this might appear

All training requires some amount of organisation and it is a good idea to specify an organisational structure before commencement of training, this will probably be the first step

The scope of the training organisation will depend on individual circumstances but its establishment is important for the following reasons

- system upgrade training is an additional training task outside of the normal routine training requirements,
- routine training will still continue and will still require the training organisation that supports it,
- the additional task of system upgrade training may overload the existing organisational structure

Two basic options are available

1 The establishment of a training organisation separate from the existing training organisation Remember that the two organisations will have to work together in some areas and perhaps share resources

2 The establishment of a section within the existing training organisation with responsibilities for the upgrade training This will almost certainly require additional staff if the existing organisation is not to be overloaded

3. TRAINING ORGANISATION

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4. TRAINING PLAN

4.1 Reasons to Create a Training Plan

A training plan details an outline of the training requirements, methods of achievement and time scale for achievement

It is an essential part of the planning for an extensive training program It should enable everyone concerned in the training task to know their roles and the training that is to be given

A training plan will show

- WHO needs training,
- WHAT subjects you are going to train people in,
- HOW you are going to train them,
- WHEN you are going to train them,
- HOW LONG the training will take

One training plan may contain information for several different target groups of people It is important that each person be made aware of the training plan they are going to follow In some cases it may be easier to produce an overall training plan and then individual sub-plans for the various target groups

This Chapter contains an outline of the contents of a training plan An example from the UK CAA is included in Annex A of these guidelines

NOTE - The suggestions shown here are only guidelines and you will need to add or subtract other items to suit your own needs

4.2 Identify Who Requires Training

4.2.1 General

Identify the different target groups of people that will require training, e g

- Planning Controllers,
- Radar/Tactical Controllers,
- Flight Data Personnel

NOTE - In some cases a change of role may also be required and this must be identified

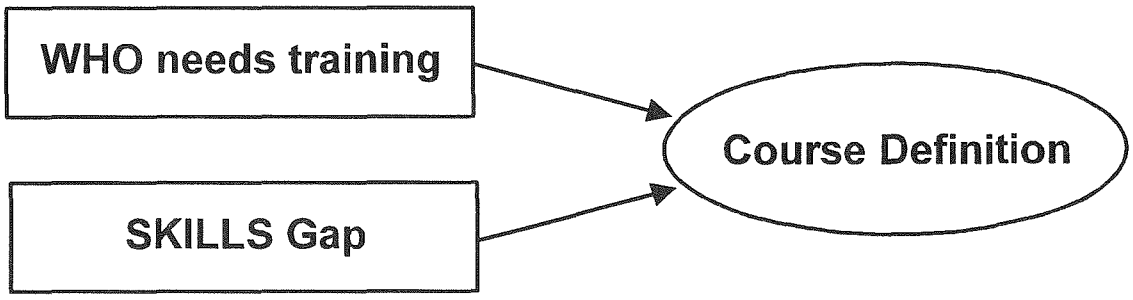
4.2.1.1 The Skills Gap

The "Skills Gap" identifies the training that is required, i e the gap between the current skills and the required skills, and identifies the training task

4.3 Define Required Courses

4.3.1 General

Use the information obtained from the identification of who needs training to define courses to fill the required skills gap



NOTE - Courses should be modular in nature, enabling the use of modules by one or more target groups to allow flexibility in the organisation of courses and removes much duplication of effort, e g

- a module on "The Electronic Flight Strip" may be required by radar and planning controllers,
- a module on "Short-Term Conflict Alert" (STCA) may only be required by radar controllers

4.3.1.1 Establish Course Objectives

Establish the objectives for each module and for the overall course

4.3.1.2 Establish Course Description

Produce a short description for each course/module detailing the

- contents,
- prerequisites,
- objectives,
- training methods,
- resources required,
- duration,
- location

NOTE - A sample course description is contained in Annex B

4.4 Training Methodology

For each of the objectives establish the best training method

NOTE - A section on training methodologies is contained in these guidelines The case histories given in the Annexes are provided as examples

4.5 Resources Required

4.5.1 General

Additional resources in the form of people and/or equipment may be required to enable the training to take place

It is necessary to involve the trainers at an early stage These people should be taken from the operational target groups and involved in the early stages of planning

4.5.2 Define Training Personnel roles

Identify personnel required to conduct the training

Produce detailed job descriptions for their tasks/roles and their participation (time) on the course, e g

- simulator pilot,
- required knowledge
  - ability to operate as a pseudo pilot on the simulator,
  - must have completed pseudo pilot course
- requires three weeks training prior to this period,
- required between weeks 23 and 52 of the training plan

4.5.3 Training the Trainers

Establish what training is required for the trainers

Establish HOW this training can be given

NOTE - In many cases of new equipment introduction, the trainers will need to form part of a core team taking part in initial equipment trials and Factory and Site Acceptance Testing (FAT and SAT) The actual functionalities of equipment may change significantly throughout the early stages of a project and the addition of a training specialist on the project team may assist in the early identification of training tasks

The following presents some examples of methods of training the trainers

- attendance at FAT/SAT,
- attendance on course with other organisations with similar equipment,
- manufacturers course,
- manufacturers self-teaching specifications

4.5.4 Production of Courseware

Establish the time and effort required to

- produce course material/Computer Based Training (CBT),
- produce simulation exercises when required,
- train simulator pilots when required

This can be a major project and the use of some form of project planning software can be advantageous Alternatively wall charts can be developed enabling the project progress to be viewed at any time Wall charts have a big advantage over computer displays in that the whole project can be viewed at a glance

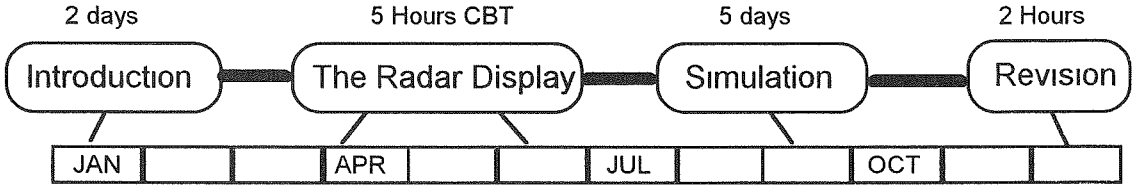
Establish training route maps

4.6 Training Route Maps

A training route map is a diagram showing the training required for any particular target group to reach a defined skill level

For each of the target groups, establish a description of the complete training programme that will be followed This is most easily assimilated if it is in the form of a diagram showing the progressive stages that they must pass through to reach the required skills level This diagram is referred to as a "Training Route Map"

EXAMPLE:



4.7 Standards (Competence) Procedures

Some form of check needs to be carried out that the personnel have reached the required standard of knowledge in the new equipment/procedures

The requirements for competence procedures should be clearly defined prior to commencement of training The actual check required will depend on the complexity of the new equipment and the number of changes in ATM procedures that may be implemented concurrently

Computer Based Examination (CBE) may prove useful for the testing of acquired knowledge

4.7.1 Standards to be Achieved in Training

Define success/fail criteria for training courses

4.7.2 Description of Checkout/Validation procedures to be used

Define success/fail criteria and validation procedures before use of the equipment in an operational environment

Define the assessment methods to be used These will normally fall into one of the following categories

- performance test,
- continuous assessment,
- written assessment,
- verbal assessment,
- no assessment

An example is described in Annex A

4.8 Other Considerations

4.8.1 Marketing

For members of staff a period of change always brings about uncertainty and concern It is important that the training plan is properly "marketed" to the staff members

At all times information and training courses must be presented professionally, a regularly produced newsletter or magazine helps to inform everyone of progress

4.8.2 Training Strategy

The success of system upgrade training will depend on thoroughness including the minimum of change to familiar practice Any alternative strategy may result in additional stresses being placed on ATC operations

Although it is inevitable that the introduction of new equipment will mean some changes to the existing method of operation, major changes to the ATC environment should be avoided

Major changes to the ATC environment could be introduced once controllers are familiar with the new equipment, or alternatively, could be introduced prior to commencement of system upgrade training

4.8.3 Impact on Other Training

4.8.3.1 Ab-Initio Training

During the system upgrade training, ab-initio training may have to be curtailed

Training resources may not be sufficient to handle both the upgrade training and routine training The impact on routine training may be severe and advance planning could be measured in years

4.8.3.2 On-the-Job Training

It may be unrealistic to continue extensive On-the Job-Training (OJT) throughout the system upgrade training period

The question of when OJT can resume, once control has been transferred to the new system, must be considered How long do existing qualified air traffic control staff need for consolidation before supervising trainees on OJT

4.8.4 Staff Numbers

The additional training roles and tasks will deplete the numbers of available staff This may result in a significant drop in the number of available staff

Solutions may be to

- employ contract staff,
- delay retirement dates,
- borrow staff from other areas

4.8.5 Training time required

It is difficult to give a firm estimate of the time required for training and it will depend on the level of system upgrade from previous equipments

Case histories, contained in the annexes to these guidelines, detail actual experiences and may assist in estimating the training time required

4.8.5.1 Refresher Training

A large number of people to be trained may mean that refresher training must be built into the programme

EXAMPLE:

150 people to receive 10 days simulator training over the period of a year prior to change-over

The first group will undertake training virtually a year before change-over They will obviously require refresher training nearer the change-over date

One solution would be to provide the 10 days training in periods of 5 days 3 days and 2 days spread throughout the year This may well be more expensive but may be considered essential to ensure an adequate level of competence

5. TRAINING METHODOLOGIES

5.1 General

The nature of system upgrade training requires the training of a large number of people over a one to two year period It may be that such training cannot be carried out completely in the traditional classroom environment Alternative methods have to be considered

This Chapter details some training methods and associated media that could be used It is by no means comprehensive, but should provoke thought

5.2 Classroom Training

5.2.1 Introduction

Classroom training can be regarded as the traditional training method It is still an excellent method of training people but may not be the most suitable for system upgrade training It enables the practice of several different training methods to be undertaken such as lectures, lessons, demonstrations, group discussions and case studies

5.2.2 Uses

Imparting knowledge to a group of people

Briefing groups of people prior to and after a simulator exercise

EXAMPLE:

Showing a group of controllers a new method of flight strip marking

5.2.3 Advantages

Allows the instructor to get direct feedback on the student's progress

Allows the students to clarify points by asking questions

Provides information to a reasonable number of people at the same time and can therefore be very cost-effective

Possible cross-fertilisation of the experiences of the members of the group

5.2.4 Disadvantages

Requires a reasonable class size to be cost-effective

May not be easy to release students from operational tasks

Does not normally provide one-to-one tuition on equipment

Requires dedicated instructor

5.3 Video

5.3.1 Introduction

Video is a useful tool for giving overviews of a subject It is also useful when showing learners an interaction between human beings, or helping them to learn how to participate in such interactions

5.3.2 Uses

Demonstrations

Explanation of systems and concepts

EXAMPLE:

Provision of an overview of a new ATC system

5.3.3 Advantages

Able to cover a broad range of topics in a limited time

Video equipment is standard and relatively inexpensive

5.3.4 Disadvantages

Initial cost of production

No student interaction

5.4 Computer Based Training (or Teachware)

5.4.1 Introduction

This Section will briefly outline the advantages and disadvantages of using CBT in system upgrade training

The term teachware is used to denote training material presented to a student through the use of a computer It is derived from TEACHing softWARE

Teachware provides guided learning to a student in a self study, self paced manner

Teachware may be divided into the two main types as described in the following paragraphs

5.4.1.1 Interactive Guided Learning

The student must follow a pre-determined path through the course

5.4.1.2 Interactive Exploration

The students are allowed to determine their own learning path through the course

5.4.2 Uses

May be used as a training tool in most cases

Is particularly suitable for training people in the use of new computer equipment and software

EXAMPLE:

Use of new HMI on radar and other ATC displays

5.4.3 Advantages

CBT provides a method of training people without the need for classroom sessions This has advantages if you are unable to release operational staff for classroom training sessions There are examples of CBT being used for system upgrade training where rearrangement of the operational rosters provide sufficient time within the normal working period for staff to undertake CBT training

Where training for computerised displays and equipment is being carried out, CBT provides an excellent training medium It is possible to replicate actual equipment displays and provide interactive learning

The training is self-paced Students can redo any section as often as they like Sections can be reviewed for revision as required

There may be cost advantages over conventional training Although the initial cost of CBT is high, the release of operational staff for traditional training requiring instructional staff may be considerably more expensive

Sound and video can be incorporated if required

5.4.4 Disadvantages

Initial cost of production The cost of producing CBT is quite high However, when compared to conventional training, it may well show a significant cost advantage Modern authoring tools enable more efficient production

5.4.5 Further Information

IANS is able to offer advice on the cost effective development of CBT

A manual entitled "Guidelines for the Production of Computer Based Training" [Ref 2] will be available as a draft in 1996 This manual details CBT methodologies and provides guidelines for the use and production of CBT

This manual and additional material such as common templates, are part of the EATCHIP aim to harmonise production of CBT within the ECAC area

5.5 Instructive Demonstrator - Part Task Trainer

5.5.1 Introduction

An instructive demonstrator provides the opportunity for the student to practice the functions in a free mode, whereas CBT provides knowledge acquisition

The following are various terms used to describe a similar function

- Emulation is a reproduction of the operational equipment on a Personal Computer (PC) based training device There may be limitations to some of the functions, particularly where interaction is required with other items of equipment The term emulation is generally used when the device is designed to allow free play
- A Part Task Trainer is a device designed to allow accurate practice of a particular part of a task Limited feedback may be incorporated but generally this is provided in a CBT unit that would precede the use of this training aid An example of a software package used in this role is available upon request from IANS

5.5.2 Uses

Provides a "free play" package to enable the student to explore the various equipment functions

Emulates a software package on a PC prior to the operational software being available in the operational equipment

EXAMPLES:

1 Software package emulating the Flight Plan (FPL) workstation, enabling practice of entry and handling of FPL and message data,

2 An operational communications panel connected to a device to enable the various functions to be practised

5.5.3 Advantages

Allows the student to explore the functions of the equipment in a relatively free manner without the requirement of the operational system

May be designed to be part of the CBT

Where new equipment is being installed, may provide people with practice before the real equipment is delivered

5.5.4 Disadvantages

Requires time and effort to be designed and produced

Prerequisites have to be carefully studied to avoid failure situations

5.6 Time Controlled Simulation

5.6.1 Introduction

Time controlled simulation is an interim stage between CBT and a simulator It enables the teaching of ATC procedures in pseudo-time

Time controlled simulation provides a method of combining ATC theory and procedures in a practical training device

It provides a method of gradually increasing a controllers knowledge without overloading the controller with information

Training on a time controlled simulator should reduce the amount of training required on a full simulation device It should also enhance the standard as it provides a programmed training method

A time controlled simulation

- presents problems to students in simple stages, in the correct sequence,
- removes time periods which are not significant to the problem,
- checks, by questioning and feedback, to ensure student understanding,
- displays realistic visual representations of radar displays,
- displays replicas of flight strip displays and/or FPL data displays where appropriate,
- shows accelerated display of radar picture during rapid time advances,
- provides audio where it would be used in reality, i e aircraft Radio/Telecommunication (R/T) calls

5.6.2 Uses

Teaching of new "tasks" Where a task is defined as an action, or series of actions, that controllers are required to perform to carry out their role

Developing and updating skills to a site specific application

EXAMPLE:

It is required to teach a radar controller a task for a new sector The task is the handling of an aircraft from transfer from an adjacent sector until transfer to Approach Control

Using time controlled simulation the trainee is provided with a computer display consisting of a reproduction of the radar display and a text dialogue area

The trainee is led through the procedure step by step

Where long periods exist with no significant events occurring, time is compressed, the radar display is updated in fast time, then the student is presented with teaching points covering the next significant event

5.6.3 Advantages

One to one tuition is possible

Student proceeds at own pace and can review the problem as often as required

The information is presented in small, easily understood segments

All the senses used in the operational environment are employed

May be designed as part of the CBT

5.6.4 Disadvantages

May require additional equipment

Requires the appropriate software

Requires development of problem scenarios

5.7 Real Time Simulation

5.7.1 Introduction

Real time simulation is the traditional method of teaching operational ATC procedures It is labour and time intensive

It is probably still an essential part of training for new radar display equipment

The simulator must accurately represent the operational equipment if it is to be of the greatest value

5.7.2 Uses

Practice of operational ATC situations following training in new tasks and equipment

5.7.3 Advantages

Allows risk-free practice of all required skills in real time

Shortens OJT

Incremental levels of difficulty are presented in a logical (and controlled) sequence

5.7.4 Disadvantages

Relative high cost

Resources such as pseudo pilots and controllers for feed sectors may be required

May introduce incorrect procedures and actions if it does not exactly replicate the operational equipment

5.8 Use of Operational Equipment

5.8.1 Introduction

Following installation of new operational equipment there is normally an extended period of testing before it can be used operationally

During this period, time should be allowed for use of the full system for final training

During the same period, the equipment may also be used for shadowing

5.8.2 Advantages

Allows practice on the new operational equipment

May reveal faults that were not previously apparent

NOTE - System testing inevitably does not reveal all the system problems Use of the full system for shadowing and final training can often reveal unforeseen problems

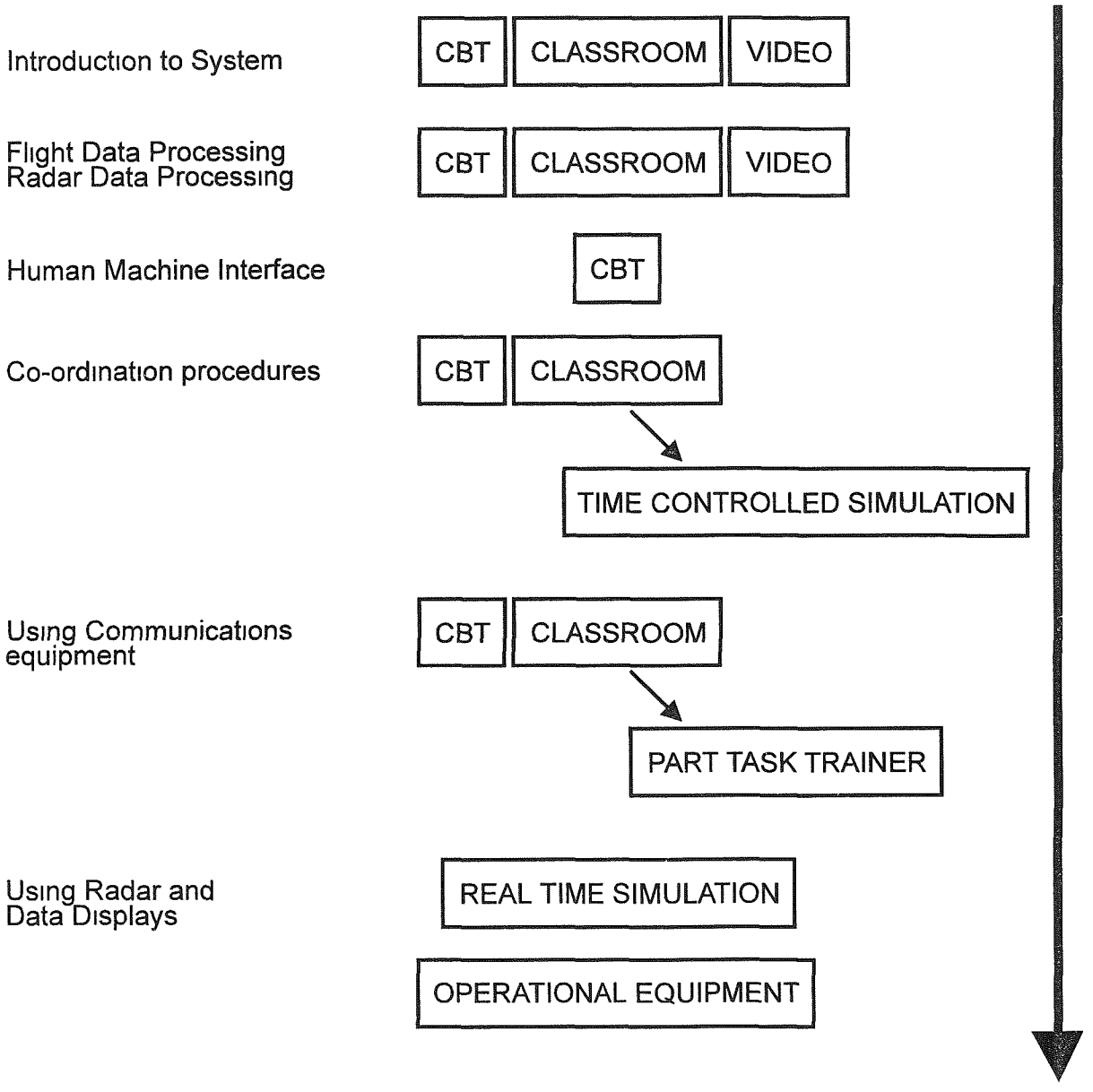
5.8.3 Disadvantages

May not be available due to installation and testing

5.9 Training Map

5.9.1 Outline

The following map presents suggestions as to the use of these various teaching techniques within a system upgrade training programme



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6. DOCUMENTATION

6.1 General

Extensive documentation will be required to support the training This Chapter briefly covers documentation that it may be necessary to provide It is not a comprehensive list

6.2 Training Plan

This will be a comprehensive document identifying all the training requirements and the methods of achieving them

For ideas on contents see the Chapter on the training plan in these guidelines

6.2.1 Checklist of Pages

As the contents of the training plan may change, it is suggested that a checklist of pages is established

Each page should be dated and a record kept on this checklist of the number of each page and the date of issue

Records should be kept of training plans issued and any issued amendments

6.3 Training Manual

The provision of an individualised training manual for every person involved is strongly recommended

Such a manual would contain all the required training notes and information for a particular person's training route map (see note 1)

Production of slightly different manuals for radar controllers, planning controllers, tower controllers etc , could be considered but adds to the administrative workload Alternatively, a comprehensive manual could be produced with clear guidelines as to which sections are applicable to which role/task

The contents of any manual will depend on the specific equipment and any operational changes being made The headings given in this manual are a guide and should be added to, subtracted from or modified to suit individual needs (see note 2)

NOTES

1) People are often apprehensive about new technology and the training they will receive The provision, at an early stage, of a manual showing what training they will receive may well allay apprehension It also shows that training has been planned, which can establish the credibility of programme

2) Much of the system information can be obtained from the manufacturers handbooks and specifications In many cases the information contained in these, although accurate, is in a format that makes study by an individual controller difficult This manual should thus contain the information in an easily readable format The information should also be limited to that directly required by the controller

6.3.1 Checklist of Pages

As with the training plan, the contents of this training manual may change and therefore it is suggested that a checklist of pages be established

Each page should be dated and a record kept on this checklist of the number of each page and the date of issue

Records should be kept of manuals issued and any issued amendments

6.4 ATC Procedures

Where new ATC procedures are being introduced along with the new equipment a document covering these should be produced This could form part of the Training Manual

6.5 Instructor Guides

To ensure consistency of training, instructor guides should be produced detailing lesson plans and techniques to be followed by instructions

6.6 Assessment Guides

A document detailing assessment criteria will ensure consistency in the assessment of students

6.7 Manufacturers Reference Manuals

In some cases reference manuals, produced by the manufacturer, may be required

6.8 Quick Reference Guides

With modern HMI there are some interactions that are carried out not frequently

A quick reference guide is therefore a useful device enabling people to refer rapidly to the detail of a particular function and how to use it

Quick reference guides could form part of the actual software (e g Windows HELP-files) or may be issued in the form of a small booklet

A sample quick reference guide is attached in Annex C

7. COURSES AND CONTENTS

7.1 General

This Chapter provides suggestions for training courses It also lists headings of contents on subjects that might be covered in these courses

The contents of the following Sections will require adaptation to suit individual systems

7.1.1 Courses

The following titles represent topics that could form course modules

- General Description of the System,
- Human Machine Interface,
- Flight Data Processing,
- Radar Data Processing,
- Using Radar and Flight Data Displays,
- Using the Voice Communication System,
- Co-ordination Procedures,
- Other Equipment Upgrades,
- Air Traffic Service (ATS) Procedures

7.1.2 Contents

Each course or module should include the appropriate documentation Generally speaking this will be

- a statement of who should attend the course,
- the course objectives,
- the course contents,
- the training methodologies to be used,
- where and when the course will be available,
- the training objectives for the course,
- the training notes or material for the course

7.2 General Description of the System

7.2.1 Target Audience

All persons involved with the new system This course may also be of use to non-ATS members of the organisation

7.2.2 Course Aim

This provides a general introduction to the system

This should provide a general overview of the complete system This should be kept very brief Most of the items will be covered in greater detail later in the manual

7.2.3 Course Contents

Only the broad headings of contents are given

The following represents items that could form course contents

- manufacturer of equipment,
- general system architecture,
- location and type of radar sensors,
- radar coverage,
- type of voice communication system,
- remote control and monitoring equipment,
- location and type of Radar Data Processing (RDP) equipment,
- the flight data processing system,
- radar controller workstations,
- planning controller workstations,
- flight data workstations,
- tower equipment,
- simulation equipment

7.2.4 Training Methodologies

Suggested training methods for this course are

- video,
- training notes,
- CBT

7.3 Human Machine Interface

7.3.1 Target Audience

All persons involved with handling the new HMI of the new system

7.3.2 Course Aim

To provide a briefing on why new HMI systems are essential in the future ATC environment

NOTE - Although this subject may not be require a long course, it is important that the role of the HMI is emphasised, as without it, most automated systems will not function efficiently

7.3.3 Course Contents

Only the broad headings of contents are given

The following represents items that could form course contents

- HMI principals,
- WHY is interaction with the computer so important,
- brief look at the system HMI

7.3.4 Training Methodologies

Suggested training methods for this course are

- video,
- training notes,
- CBT

7.4 Flight Data Processing

7.4.1 Target Audience

Controllers and ATC staff handling FPLs and flight data

7.4.2 Course Aim

A detailed explanation of FPL and flight data processing associated with the system

7.4.3 Course Contents

Only the broad headings of contents are given

The following represents items that could form course contents

- equipment used
  - computer system,
  - input terminals,
  - output devices,
  - strip printers, electronic data displays
- relation with RDP equipment,
- FPL reception,
- methods of inputting FPL data into the system,
- storage of FPLs,
- FPL phases and states,
- the different phases in the life of a FPL,
- terminology for these phases or states,
- FPL activation and subsequent handling (see note 1),
- how a FPL is activated,
- transfer of FPL data between sectors,
- transfer of FPL data between units,
- strip printing
  - when printed,
  - where printed,
  - types of strip
- FPL modifications allowed (see note 2),
- modifiable system parameters (see note 3),
- details of times when FPL actions take place,
- system failure procedures (detail the procedures to be followed when the automated system, or part of the automated system, fails),
- diversion and holding procedures

NOTES

1) A flow diagram would be useful here One idea being to produce a chart showing the passage of an aircraft through the system On this chart could be displayed the various FPL states, the activation times and the various messages that are sent at each stage Several such charts could be produced to cover the passage of different flight types through the system, e g overflight, arrival or departure

2) According to the state of the FPL and the operational position, the modifications that can be made will normally vary The inclusion here of a table detailing who can modify what and when, would assist clarity

3) A system contains a multitude of such parameters Those directly affecting the controller should be identified and detailed here As an example in a strip system one parameter would determine when the first strip is printed

7.4.4 Training Methodologies

Suggested training methods for this course are

- classroom instruction/training notes,
- CBT

7.5 Radar Data Processing

7.5.1 Target Audience

Radar and planning controllers

7.5.2 Course Aim

A detailed explanation of RDP system as it affects the controller

7.5.3 Course Content

Only the broad headings of contents are given

The following represents items that could form course contents

- computers and associated equipment,
- relationship with FPL functions,
- mono-radar tracking,
- multi-radar tracking,
- radar coverage,
- failure procedures,
- bypass procedures,
- radar source during bypass,
- system limitations during bypass,
- restoration of full system

7.5.4 Training Methodologies

Suggested training methods for this course are

- classroom instruction/training notes,
- CBT

7.6 Using Radar and Flight Data Displays

7.6.1 Target Audience

Radar and planning controllers, flight data staff

7.6.2 Course Aim

A detailed explanation of display systems and their HMI

7.6.3 Course Contents

Only the broad headings of contents are given

The contents of this section can be varied to suit the personnel requiring training As an example the control functions might only be required by the planning or radar controllers whilst the FPL functions might be required by flight data personnel as well

- equipment layout,
- setting up the display,
- general
  - range markers,
  - picture presets,
  - range,
  - brightness
- map displays,
- functions
  - selecting maps,
  - de selecting maps,
  - temporary maps,
  - restricted maps
- radar data label
  - contents,
  - functions,
  - displaying,
  - selecting,
  - moving,
  - label lines,
  - size
- control functions available using the display
  - tabular information/lists,
  - Secondary Surveillance Radar (SSR) filters,
  - altitude filters,
  - track filters
- handover/accept functions,
- transfer functions,
- STCA,
- Medium-Term Conflict Alert (MTCA),
- FPL functions
  - create,
  - modify,
  - delete,
  - activate
- co-ordination
  - co-ordination functions,
- procedures for the combining and splitting of sectors
- roller ball/mouse functions,
- information functions
  - route,
  - weather,
  - load
- message functions,
- AFTN Communications,
- On-Line Data Interchange (OLDI) Communications

  e g ACT, LAM

7.6.4 Training Methodologies

Suggested training methods for this course are

- CBT/training notes,
- emulation,
- simulation

A number of functions will be associated with the radar display These can be learnt on a simulator, if one is available However, this is generally not efficient usage of the simulator

The controllers should be familiar with these functions prior to attending simulation training CBT is an effective method of carrying out this training

7.6.5 Documentation

A manual containing a detailed description of each function and its use, illustrated wherever possible with sample screen displays, should form part of the training documentation

7.7 Using the Voice Communication System

7.7.1 Target Audience

Radar and planning controllers, flight data staff

In many systems the voice communications equipment is upgraded at the same time as CWP

It is important that training is given on these systems as they frequently contain many new features and facilities

7.7.2 Course Aim

A detailed explanation and practice of the use of the communication system

7.7.3 Course Contents

Only the broad headings of contents are given

The following represents items that could form course contents

- functions,
- telephone
  - answering calls,
  - forwarding calls,
  - auto dialling
- radio
  - selecting frequencies,
  - location of transmitters

7.7.4 Training Methodologies

Suggested training methods for this course are

- CBT/training notes,
- emulation,
- simulation

CBT is an effective method of carrying out this training as the telephone/radio control panel can be emulated on a PC screen An emulation of the operational panel could also be produced

7.7.5 Documentation

Where complex functions exist it may be necessary to provide a ready reference guide at each operational position This may be essential for some infrequently used functions

7.8 Co-ordination Procedures

7.8.1 Target Audience

Radar and planning controllers

7.8.2 Course Aim

A detailed explanation of the co-ordination procedures and techniques to be used with the new system

7.8.3 Course Contents

Only the broad headings of contents are given

The following represents items that could form course contents

- co-ordination procedures
  - automated procedures,
  - manual procedures
- hand-over procedures
  - automatic hand-over procedures,
  - semi-automatic procedures,
  - manual procedures
- modifiable system parameters (e g hand-over proposal, transfer of FPL estimates to adjacent units)

NOTE - A system contains a multitude of such parameters Those directly affecting the controller should be identified and detailed here

7.8.4 Training Methodologies

Suggested training methods for this course are

- classroom/training notes,
- time controlled simulation,
- CBT

7.8.5 Documentation

Co-ordination procedures should be accurately detailed in the Manual of Air Traffic Services (MATS) or such similar document Where procedures change at the time of new equipment introduction, it may be appropriate to include the new procedures in the Training Manual After operational implementation, they can then be transferred to the standard documentation

7.9 Other Equipment Upgrades

Detail any other related items of equipment that may be upgraded or installed at the time of the major ATC system upgrade

Examples of new items of equipment are

- information displays,
- self briefing systems

7.10 ATS Procedures

7.10.1 General

The introduction of automated systems normally requires a change to procedures to allow the automated system to function effectively

NOTE - Where it is possible to introduce new equipment without new procedures this may be preferable Ideally introduce the new equipment first and when the personnel are familiar with it, change the procedures

7.10.2 ATS-Manual Changes

During the system upgrade some changes to the MATS may be required It is suggested that draft amendments are included in this manual to be implemented when the system goes operational

- revised letters of agreement,
- revised separation standards,
- SSR code allocation,
- changes to operating procedures

7.10.3 Airspace Changes

- ensure updated charts are available,
- ensure information on new airspace layouts is available,
- ensure information on new navigational aids is available

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8. CHANGE-OVER PROCEDURES

8.1 General

The organisation of the procedures for the change-over is not directly a training task The following areas have close connections to the training task and training personnel should be involved in change-over planning

8.2 Dates and Time Scales

Training is directly connected to the implementation dates of the new/upgraded system Training personnel should be directly connected during planning of these implementation dates

8.3 Organisation

The organisation of the change over is not a direct function of training However the most experienced operational personnel on the equipment will almost certainly be training specialists

These people may well be useful in key positions during the actual change-over

8.4 Factory/Site Testing

Training may need to be given to people participating in FAT and/or SAT Some knowledge of the system will be required and they will also need to know about the procedures and organisation of such tests

Training specialists will benefit from being included in FAT and SAT In several cases FAT has been used to validate CBT

8.5 Shadowing

Training is required in any special provisions to be followed where shadowing is going to be conducted

8.6 Progressive Change-Over

Where a progressive change-over is to take place additional training may be required Supplementary procedures will be required to handle the interface between the new and the old systems

This can be significant where automated and manual systems are to be run in a progressive change-over mode

8.7 Reversion

Reversion to the old system following early system failures in the new system may be possible in some cases
Policy on reversion will have been established by the appropriate authority but there remains a training task to educate the people in the procedures These should be kept as simple as possible

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9. SAFETY

9.1 General

Safety must always be one of the overriding factors to be taken into consideration

With the introduction of significantly different HMI systems, previously unknown hazards could emerge In many cases the training period will be the first occasion that a particular HMI has been used and safety issues may be revealed during the training

As well as the new HMI systems, other equipment-related safety issues may be revealed during the training programme

To ensure that these points are not lost, a formal reporting system should be established

9.2 Safety Issues Reporting Scheme

Procedures to ensure that any safety issues that arise are reviewed to identify potential hazards need to be established

This will require the appointment of a person, or a team, to review these issue and a formal reporting structure to be established

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ANNEX

A . SAMPLE OF AN ATC TRAINING PLAN

A .1 INTRODUCTION

The contents of this sample training plan have been derived from the United Kingdom's Civil Aviation Authority (CAA) training plan used to train controllers for the UK New En-Route Centre (NERC)

The original document has been edited to remove information specific to the UK situation

A .2 CONTENTS

A suggested contents list is as follows

- Amendment List,
- Distribution List,
- Reference Documents,
- Applicable Documents,
- Glossary,
- Background,
- Purpose,
- Scope,
- Whom,
- Operations Staff Training,
- Assistant Training,
- Operational Support Staff Training,
- Military Training,
- Cross Training,
- Proving the Operational Conversion Training Courses,
- Course Approval and Assessment of Controllers,
- Licensing Issues,
- Administration,
- Assumptions,
- Summary

A .3 GENERAL

A .3.1 Amendment List

This page will be updated and reissued with each amendment to this document It provides an authorisation for the amendment and a checklist to the current amendment number for each page of the document

Page No	Version	Page No	Version

A .3.2 Distribution List

This page provides the originator of the document with a controlled distribution list

Copy No	Holder
1	Name/Organisation

A .3.3 Reference Documents

All documents referenced from the document are listed here (e g , Manual of Air Traffic Services)

A .4 APPLICABLE DOCUMENTS

All documents that are required for the reading of this document are listed here, e g ATC Organisation and Manpower Plan

A .5 INTRODUCTION

A .5.1 Background

The success of the transition from the old centre to the new centre operations will depend on thorough training involving a minimum of change to familiar practice Any alternative strategy would result in a risk to the safety of operations To achieve this there will be no major changes to the old centre sectorisation and procedures from the end of [date] It is planned that the new centre operations will commence on [date] requiring about [number] civil controllers, about [number] military controllers and about [number] civil and military assistants

The objective of the ATC training is to convert ATC staff from the old centre operations to the new centre operations There are some major differences between the two modes of operation However, some tasks remain almost unchanged

A .5.2 Purpose

The purpose of this paper is to document the training planned for the transition from the old centre to the new centre

A .5.3 Scope

This paper will identify the tasks and associated staff for whom training is required It will detail where and when this training is to take place in order to achieve the project date

A .5.4 Whom

Although the largest part of the training is for the core ATC staff, mainly the controllers who will perform the radar/tactical and planner tasks, there are many other functions to consider The preliminary work that has been carried out on the ATC Manpower Plan has identified the following staff who will require training

- controllers who will assist with systems acceptance and operational testing,
- simulation support specialists who will form the core team for the training and development unit,
- key trainers,
- On-the-Job Training Instructors (OJTI) who will assist in the operational work-up phase and then train the other ATC operational staff,
- civil ATC operations room supervisors,
- local area supervisors,
- specialist flow management staff,
- radar/tactical and planner controllers,
- ATC assistants,
- ATC briefing office staff,
- military ATC staff, including assistants,
- pseudo pilot operators/ blip drivers,
- controllers who will staff the feed sector positions

A .6 OPERATIONS STAFF TRAINING

A .6.1 General

The training of the ATC operations staff includes controllers working in non-operational positions who hold validations

The training of operations staff will be in two phases known as

- preparation for operational conversion training,
- operational conversion training

The learning of the new techniques and practices will take place during the preparation for operational conversion training The operational conversion courses at the new centre will be used to practise the techniques learnt on the earlier courses

A .6.2 Preparation for Operational Conversion Training

The preparation for operational conversion training will prepare controllers and assistants (civil and military) for the conversion training to be undertaken at the new centre during the last five months up to the "START" date It will consist of a number of courses to be conducted both at the old centre and the new centre Details of these courses are summarised in the table below

Course Title	Who	Where	When
Introduction to Human Machine Interface Course length - 0 5 day	All ATCO and assistants	Old centre	[date]
Key Trainers Course length - 2 courses of 14 days	Key trainers and OJTI	Old centre	[date]
Training the Trainer Course length - 10 days	OJTI Assistant trainers	Old centre	[date]
Introduction to the new centre Course length - 2 days	All ATCO	Old centre	[date]
Human Machine Interface Course length - 4 days	All ATCO	New centre	[date]
Senior Assistant Course length - 5 days	All senior assistants	New centre	[date]
Human Machine Interface Refresher, Planning and Procedures Course length - 5 days	All ATCO	Old centre	[date]
Introduction to new centre and workstation Human Machine Interface Course length - 5 days	All assistants	Old centre	[date]

The participants on the Key Trainer course will include

- training section trainers from the old centre,
- military trainers,
- ATC training staff from the new centre,
- a total of 10 sector controllers from the old centre

  NOTE - These controllers will form the nucleus of the team that will assist in the operational work-up phase and then become practical trainers at the new centre for the ATCO Human Machine Interface, and operational conversion training courses

The participants on the Training the Trainer course will be selected from sector controllers and assistant trainers who will then be trained on the system and procedures by trainers who attended the Key Trainer courses These controllers will then join the 10 sector controllers from the Key Trainer courses on the operational work-up programme and together will form the practical training team for operational conversion training

Controllers will be required to attend the HMI Refresher Planning and Procedures course in the four weeks prior to attending an Operational Conversion Training course at the new centre

The last day of the Assistant Introduction to the new centre and workstation HMI course will be an "induction day" at the new centre to obtain such items as headsets, security passes, etc

Computer Based Training (CBT), sited at the old centre, will be used extensively in the preparation for the operational conversion training phase

The table below summarises the courses, CBT lessons and the workstations required

Course Title	Planned Date	Number of Partici-pants	CBT Lessons	Number of CBT Work Stations
Introduction to Human Machine Interface	[date]	5	1 Introduction to CBT 2 New centre work-station components	5
Introduction to the New Centre (ATCO)	[date]	15	3 Keyboard and Mouse 4 Voice Communi-cation Panel 5 Main and Auxiliary Displays	15
Human Machine Interface Refresher Planning and Procedures (ATCO)	[date]	24	6 Repeat of Lessons 2 to 5 7 Electronic Strip Operation 8 Scenarios for Planner Controller Training 9 Different Civil Sector Procedures	24
Introduction to the New Centre and Workstation Human Machine Interface Courses (Assistant)	[date]	12	10 Repeat of Lessons 2 to 5	12
NOTE - Military modules will be required for CBT lessons 7 and 8				

A .6.3 Operational Conversion Training

The final phase to convert operations staff before transfer of operations is called operational conversion training and will be conducted at the new centre using operations room work-stations

The old centre will provide controllers and assistants for training at the new centre This will require OJTI and assistant trainers for each training session (1 Trainer per 4 participants) The other OJTI in the operational conversion training practical training team will provide relief and cover for the trainers returning to the old centre during the operational conversion training period to maintain the old centre sector validations

The proposed schedule is to conduct a number of 7 day courses at the new centre in the 5 months up to "START" date The training will be in a concentrated period requiring only travelling to and from local accommodation The training will be designed to match the validations held by course participants

The purpose of the operational conversion training will be to convert controllers holding old centre sector validations to at least one new centre sector group by "START" date

Some controllers will need to be trained additionally on some sectors of another sector group (known as cross training)

Each 7 day course will contain 4 one and a half hour practical exercises each day Each exercise would include time for briefing and debriefing course participants The exercise timings would be

- 10 30 hours,
- 12 30 hours,
- 15 00 hours,
- 17 00 hours

At the end of the course each participant will have received a minimum of 40 hours practical training of which, for the controllers 20 hours will be radar/tactical training and 20 hours planning training

In order to ensure controllers remain current on the new equipment and associated procedures the training course plan will include provision for "top-up" training for controllers on early training courses This will require an extra two day attendance for 6 hours further training This training will be carried out between 18 30 and 22 30 hours on the later courses of the training schedule

During the 5 month training period [number] old centre controllers will receive conversion training on at least one of the sector groups they will be working on after "START" date

At least 2 days will be planned between each course to allow time for setting up of the following 7 day course

During operational conversion training the new centre simulator will be manned from 08 00 until 22 30 hours each day to allow time outside the planned exercise times to sort out unexpected problems such as staff shortfalls and equipment failure It will also provide some contingency time each day if exercises have to be re-run and for cross training and "top-up" training on later courses in the training schedule

A .6.4 Assistant Training

Senior assistants will require training on the new centre Flight Information Service (FIS) furniture, the operation of the Operational System Management Position and how to edit the Support Information System

Civil and military junior assistants need to be trained on new centre equipment and associated procedures The assistants transferring to new centre for sector workstation duties (sector assistants) will require both classroom and practical training They will attend the CBT course entitled "An Introduction to Human Machine Interface" at the old centre, followed by a 4 day new centre introduction and workstation Human Machine Interface course After an induction day at the new centre they will participate in the 7 day operational conversion training courses

Assistants who will work in the new centre ATC briefing room and military assistants will also require training on how to edit the Support Information System

A .6.5 Operational Support Staff Training

Proposed support staff training is tabulated below

Support Staff	Who	When	Where	Notes
Site acceptance testing and operational testing team	20 civil and 3 military ATCO	[date]	New centre	
Simulator support specialists	6 assistants	3 x [date] 3 x [date]	Old centre New centre	See note below
Specialist flow management staff	t b d	[date]	New centre	Training required on flow management equipment, HMI and will attend other courses
Pseudo pilots/ Blip drivers	t b d	[date] [date]	New centre New centre	It is hoped to recruit experienced people from old centre Some may be locally recruited or may be student controllers See note below
Support information system data base manager	t b d	t b d	t b d	Comprehensive training required on Support Information System
Feed sector controllers	t b d (ATCO)	[date]	New centre	Will require HMI training courses Other training will depend on experience Possible recruitment will be retired ATCO, from other units and student controllers
ATC briefing office staff	t b d (assistants)	[date]	New centre	Training required on Support Information System editing and will attend Senior Assistant courses
NOTE - A new centre simulator preparation and management plan detailing the training of simulator support specialists and pseudo pilots/blip drivers is contained in a separate document				

A .7 MILITARY TRAINING

The military ATC staff will be included in the same training programme to be undertaken by their civilian colleagues

A key military trainer responsible for managing OJT training during the operational conversion training at the new centre will attend, with two further military trainers, the Key Trainer course in [date] These three military trainers will conduct military training at the new centre up to "START" date

A .7.1 Cross Training

In order for air traffic operations to have the necessary rostering flexibility at and after "START" date a number of controllers will require training on additional sectors This is known as cross training It should be noted that controllers cross training will only cross train on to the equivalent new centre sectors to old centre validations already held

There is some spare capacity in the evenings of the second half of the operational conversion training courses to provide conversion training on additional sectors These controllers will return to the new centre for a further seven days to receive 20 hours cross training on sectors of another sector group This training will be carried out between 18 30 and 22 30 hours

In order to provide the necessary rostering flexibility during the first year of operation additional cross training for further controllers will need to be carried out in the simulator at the new centre after a period of consolidation for the ATC operational staff at the new centre

Courses should be arranged for each morning and afternoon Monday to Friday and should be sector suite specific

The timetable below gives an example of how the courses could be scheduled

JANUARY nn

	SA SU					SA SU						SA SU					
	6 7	8 9 10	11 12	13 14	15 16	17 18	19 20	21	22 23	24 25	26 27	28 29	30 31				
AM	AAA(6)			BBB(4)			CCC(4)				DDD(8)						
PM	EEE(6)			FFF(4)			GGG(6)				HHH(6)						

FEBRUARY 1997

	SA SU			SA SU			SA SU			SA SU			
	1 2 3 4 5	6 7	8 9 10	11 12 13	14 15 16	17 18 19	20 21	22	23 24 25	26 27 28			
AM		AAA(6)		BBB(4)			CCC(4)						
PM		EEE(6)		FFF(4)			GGG(6)						

NOTES

1) The letters denote sectors
2) The numbers in brackets indicate the number of controllers that could be trained on each course

Morning and afternoon courses should each contain two 1½ hours practical training sessions each day with additional briefing and debriefing periods An example of how this could be scheduled is shown below

Morning Course		Afternoon Course	
Briefing	08 30-09 00	Briefing	13 00-13 30
1st practical session	09 00-10 30	1st practical session	13 30-15 00
2nd practical session	11 00-12 30	2nd practical session	15 30-17 00
Debriefing	12 30-13 00	Debriefing	17 00-17 30

The additional cross training will require use of the new centre simulator and permanent support staff (simulator support specialists and pseudo pilots/blip drivers)

Feed sector controllers will be required for all practical training sessions

The new centre ATC Training Section will provide the trainers required for the cross training and will be responsible for the organisation and management of the courses

A .7.2 Proving the Operational Conversion Training Courses

The simulation exercises to be used for operational conversion training will be adapted by the new centre simulator support staff from those used by the old centre training section for area control training Two weeks will need to be set aside during the operational testing and work-up period ([date] until the end of [date]) to prove the operational conversion training courses

It will be necessary to prove the organisation and management of the operational conversion training courses and to familiarise the OJTI and the assistant practical training teams with the course content and documentation they will be using

It is not thought necessary for the OJTI and assistants to see every practical exercise created for these courses but they should see a representative sample including the exercises on un-usual occurrences and sector combining

It is proposed that two proving courses should be scheduled, each of five days duration

The aims of the two weeks proving periods are

- to prove the organisation and management of operational conversion training courses,
- to familiarise the OJTI and assistant practical training teams with training course content and documentation,
- to test the quality of the briefing material and documentation,
- to confirm the method of assessing controllers and assistants during the operational conversion training,
- to determine the minimum length of time for change-over between training courses

The schedule should be as follows

Date	Sector
15-19 xx	AAA - GGG
22 - 26 xx	GGG - MMM

For each of the proving courses the following staff will be required

Staff	Source
25 civil controllers	OJTI practical training team
10 assistants	Assistant practical training team
6 military controllers	New centre military trainers
8 civil feed controllers	Retired controllers
2 military feed controllers	Old centre military
27 pseudo pilots/blip drivers	New centre simulator support staff
NOTE - It is assumed that the OJTI practical training team will hold the appropriate old centre validations	

The risks to the project in not carrying out this proving period is that the organisation and management of operational conversion training courses will not have been checked before the courses begin, the quality of the documentation will not have been assessed and the practical training team of OJTI and assistants will not be familiar with the course format and the exercise content

A .8 COURSE APPROVAL AND ASSESSMENT OF CONTROLLERS

A .8.1 General

In order to approve the preparation for operational conversion training courses, [State] Licensing Authority staff will need to see the following for each course

- the timetable of lessons and practical exercises, including details of self study arrangements (CBT),
- student and instructor guides including course objectives, lesson plans and visual aids,
- details of any practical exercises,
- forms to be used to record results of performance tests, verbal and written assessments

The operational conversion training courses will be assessed by continuous assessment and in order to approve these courses [State] Licensing Authority staff will need to see

- the timetable of lessons and practical exercises,
- student and instructor guides including course and terminal objectives, lesson plans and visual aids,
- details of practical exercises,
- assessment guide showing milestone assessment objectives and forms to be used to record results of milestone assessments

During the operational conversion training courses members of the OJTI practical training team, qualified as assessors, will carry out the milestone assessments The assessments will be verified by members of the old centre training section and moderated by the staff from the [State] Licensing Authority

The table below gives examples of the method of assessment and assessors required for each of the conversion courses

Course Title	Module	Method of Assessment	Assessors
Introduction to Human Machine Interface (based on CBT)	Module 1 - Introduction to CBT	Self assessment	--
	Module 2 - Introduction to Workstation Components	Self assessment	--
Key Trainer	Module 1 - New Centre System Overview	No assessment	--
	Module 2 - Human Machine Interface Training		
	• theory	Verbal assessment	ATC new centre
	• practical	Performance test	ATC new centre
	Module 3 - Documentation	No assessment	--
Introduction to the New Centre	Module 1 - New Centre System Overview	No assessment	--
	Module 2 - Introduction to Workstation Functionality (CBT)	Continuous assessment	--
Training the Trainer	Module 1 - New Centre System Overview	No assessment	--
	Module 2 - Human Machine Interface Training		
	• theory	Verbal assessment	Course trainers
	• practical	Performance test	Course trainers
	Module 3 - Administering Operational Conversion Training	No assessment	--

A .9 LICENSING ISSUES

A .9.1 General

Controllers transferring to the new centre will be required to have an exemption to provide a service at a place for which they do not hold a certificate of competence

To qualify for an exemption, the controllers will have to be assessed as competent at the end of the operational conversion training course by members of the OJTI practical training team qualified as ATC examiners certified to examine competence

Controllers who are undertaking cross training will, in addition to being issued with exemptions on the sectors within a new centre sector group, be required to be assessed as competent and issued with exemptions for the additional sectors they have been trained on

The exemption would be issued for a period of [x] months after "START" date

Following "START" date, the certified ATC examiners will be responsible for determining the competence of operational controllers at the new centre and issuing them with certificates of competence This competence may be determined by continuous assessment or a dedicated competence check

A .10 ADMINISTRATION

A .10.1 General

A course scheduler should be appointed on a short term contract to schedule old centre operations staff for ATC conversion courses, consulting with old centre ATC watch management as required This person will be the focal point at old centre for operational conversion training planning

A course administrator will be required at the new centre to manage course administration details such as accommodation arrangements for course participants

A .11 SUMMARY

The outline training plans described above will train [number] civil and military controllers and [number] civil and military assistants for operational duties at the new centre

Each operational old centre controller will receive at least [x] days training and assistants will receive at least [x] days training to convert to the new centre operations

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ANNEX

B . SAMPLE TRAINING COURSE

B .1 COMMENTS

The contents of this training course derived from the UK CAA training plan used to train controllers at NERC

The original document has been edited to remove information specific to the UK situation

B .2 ATCO INTRODUCTION TO THE NEW CENTRE

B .2.1 Introduction

These courses will be of 2 day duration The first day will be classroom based and will give an overview of the new centre and its systems The second day will utilise CBT to provide the course participant with interactive training on workstation functionality

B .2.2 New Centre Overview

B .2.2.1 Aim

This part of the course shall provide an overview of the new centre including systems, staff organisation and the ATC conversion training plan

B .2.2.2 Content

The course contents shall include

- the physical characteristics of the building and the system,
- purpose and function of sub-systems,
- staff organisation at the new centre,
- ATC conversion training plan

New centre overview	
Participants	All ATCO
Number	22 courses with 15 ATC staff on each course
Skill pre-requisites	None
Teaching method	Classroom based with use of slides and video
Location and duration	Old Centre, 1 day
Equipment resources	Classroom
Planned date	March and April 19xx
Course design	New system designers

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ANNEX

C. QUICK REFERENCE GUIDES

C.1 GENERAL

Quick reference guides to the HMI of modern ATC management systems may be required

Users of a system will be expected to access regularly used features without reference to documentation or on line help However, there are two areas where a quick reference guide or on line help may be desirable These are

- during training and initial simulation,
- to access infrequently used functions

C.2 FUNCTION OF A QUICK REFERENCE GUIDE

To provide quick access to information explaining how to carry out a particular function on a system

Such a guide should normally restrict itself to an explanation of "How to do" rather than "Why"

C.3 CHARACTERISTICS OF A QUICK REFERENCE GUIDE

A quick reference guide should

- be easily accessible,
- be able to provide easy and quick access to the desired function,
- have functions logically grouped,
- use graphics and short texts in preference to large textual explanations

C.4 FORMATS FOR QUICK REFERENCE GUIDES

Two basic formats are suitable for quick reference guides These are

C.4.1 Electronic

- This may or may not be practical as it depends on the type of computer display and software in use,
- Where electronic formats are possible there are a number of advantages including
  - electronic search facilities,
  - intelligent help may be provided to lead you through a function

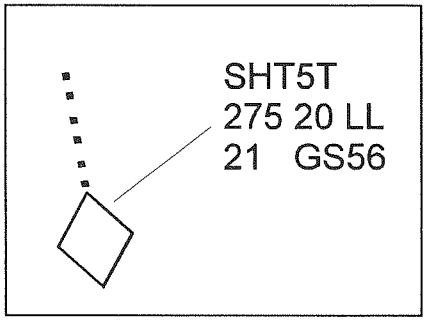
C.4.2 Paper

- Paper based guides provide an excellent format for quick reference,
- The following ideas may help
  - use A5 size paper to keep the book small as smaller books are easier to handle in an operational environment,
  - use tabs to enable quick access to a particular function or section,
  - use graphics and short texts

C .5 SAMPLE PAGE OF QUICK REFERENCE GUIDE

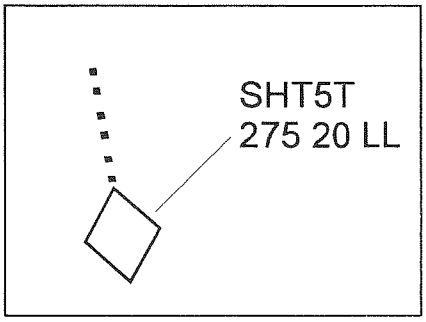
Hooking

Use:



Whole TDB
(Foreground Track)

or



Aircraft Target Symbol only
(Background Track)

1) Whole TDB — Foreground Track

Aircraft Target Symbol — Background Track

2) via the EPS, or

3) via the CALLSIGN LIST

Only ONE Aircraft at a time can be HOOKED.

Hooking another track automatically UNHOOKS any previous hooked track.

Hooking

ANNEX

D . REPORTING FORM

D .1 GENERAL

Please use the form attached to report any errors or changes that you would like to see made to these guidelines

Guidelines for ATS Upgrade Training - Reporting Form

Name/Title of Reporter	
Organisation/Address	
Occupation of Reporter	
Errors (Attach additional sheets if required)	
New Topics Suggested for Inclusion (Attach additional sheets if required)	
Outline of Training Carried Out (Attach additional sheets if required)	
Comments on These Guidelines	
Please return this form by mail or Fax to EATCHIP Support Bureau, EUROCONTROL, Institute for Air Navigation Services 31, Boulevard Konrad Adenauer Tel ++ 35 - 243 60 611 **L - 1115 Luxembourg** Fax ++ 35 - 243 86 69 E Mail ANDREW -JOHN DRAIN@EUROCONTROL BE	

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ANNEX

E. LIST OF PARTICIPANTS

Participants to the guidelines creation

Name	Organisation/Nation
Andrew DRAIN	EUROCONTROL
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Hans-Peter MOSER (Part-time)	SWITZERLAND
David COXON	UNITED KINGDOM

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ANNEX

F. REFERENCE DOCUMENTS

[Ref 1] EUROCONTROL, EATCHIP Work Programme Document, Human Resources Business Plan, Edition 3 0, 29/03/96

[Ref 2] EUROCONTROL, EWPD reference number HUM ET1 ST07 2000-GUI-01 (draft edition), Guidelines for the Production of Computer Based Training, EATCHIP Support Bureau, IANS Luxembourg, 1996

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ANNEX

G. DEFINITIONS AND ABBREVIATIONS

G.1 DEFINITIONS

Computer Based Examination (CBE)

Use of the computer to give and assess examinations Usually consisting of randomly selected multi-choice or similar type questions

Computer Based Training (CBT)

The use of a computer to provide guided learning to a student in a self-study, self-paced manner

Continuous Assessment

A method of assessment whereby the student is assessed whilst performing an extended series of exercises or tasks

Course

A term used to refer to a series of training designed to teach a particular subject or subjects

Emulation Exercise

A training method giving a group of students practice, in consolidating knowledge and applying it, in order to increase or develop understanding and skill

Factory Acceptance Test (FAT)

The testing, in the manufacturer's environment, of the equipment prior to delivery and site installation

Individual Coaching

A training method in which the instructor works directly with an individual student It may involve demonstration, guided practice, questioning or any combination of these

Instructive Demonstrator

A device that replicates most of the functions of the actual equipment being trained for Such a device allows a student to "play" with the various functions

Interactive Exploration

A training method used in CBT where the student is allowed to follow his/her own path through the training material There is extensive interaction between the student and the computer in the form of questions, feedback and participation

Interactive Guided Learning

A training method used in CBT where the student has to follow a predetermined path through the training material There is extensive interaction between the student and the computer in the form of questions, feedback and participation

Interactive Video

A learning system where video material is incorporated into a CBT system The user has some control over the material that he/she sees and hears depending on the design of the teachware

Lecture

An informative talk or exposition to an audience, possibly using visual or other aids, but without group participation other than questions, usually at the conclusion

Lesson

Training method incorporating a number of instructional techniques designed to ensure the participation of the students in reaching the specified behavioural objectives Instructor is able to ascertain whether material is being assimilated

Multimedia Learning

The integrated use of various communications media in the construction of a learning programme in such a way that each part of the information being taught is carried by the most appropriate medium

Multiple Choice Test

A type of test where the student has to choose the most appropriate response from a number of alternatives

On-the-Job Training (OJT)

The integration in practice of previously acquired knowledge and skills under the supervision of a qualified coach in a live situation

Part Task Training

A method in which the operation to be learnt is broken down into separate sections, each of which is taught and practised separately before bringing the parts together and practising in appropriate combinations until the whole operation has been mastered

Performance Test

A method of assessment whereby the student is assessed on their performance during a limited number of practical exercises, written tests or verbal assessments

Planning Controller

The person responsible for strategic planning and co-ordination

Pseudo Pilot

A person who plays the role of a pilot using a software package to generate synthetic targets on a radar simulator Also referred to as "Blip Drivers", "Aircraft Operators" etc

Radar Controller

The person responsible for tactical control using radar This will normally be the person speaking to the aircraft

Real Time Simulation

Global representation of real working conditions in real time to enable a student to practice skills, knowledge, judgements and attitudes (acquisition is preferably done before)

Shadowing

Used to refer to a period where the new equipment is operated in parallel with the existing equipment During this period live control is not carried out but all the control functions are followed

Simulator

A device which presents the student with a representation of the important features of the real situation and reproduces operational conditions which enable him to practise directly real time tasks

Site Acceptance Test (SAT)

The testing and acceptance of the equipment after site installation by the manufacturer

Skills Gap

The gap between the existing skills and the new skills required

Target Group

A specific group of people identified as requiring the same training

Task

This is an action, or a series of actions, that controllers are required to perform in order to carry out their role

Teachware

Training material that is presented to the student through the use of a computer

Time Controlled Simulation

This is an imitation of the conditions of particular significant situations that are presented to a student in simple stages in a time controlled sequence The situation is then handled by the student in real time until an event triggers a shift of time registering the next significant situation

Training Manual

A personalised manual issued to all people requiring training and containing the details of their training route map, student training notes and any other relevant documentation

Training Plan

A document detailing an outline of the training requirements, methods and time scales for achievement

Training Route Map

A diagram showing the training required for any particular target group to reach a defined skill level

Verbal Assessment

A method of assessment whereby the student is verbally questioned on their knowledge

G .2 ABBREVIATIONS

ACT	Actualisation Message (OLDI)
AFTN	Aeronautical Fixed Telecommunications Network
ATC	Air Traffic Control
ATCO	Air Traffic Control Officer
ATM	Air Traffic Management
ATS	Air Traffic Services
CAA	Civil Aviation Authority
CBE	Computer Based Examination
CBT	Computer Based Training
CWP	Controller Working Position
EATCHIP	European Air Traffic Control Harmonisation and Integration Programme
EEC	EUROCONTROL Experimental Centre
ECAC	European Civil Aviation Conference
EPD	EATCHIP Planning Division
ET	Executive Task
EWPD	EATCHIP Work Programme Document
EUROCONTROL	European Organisation for the Safety of Air Navigation
FAT	Factory Acceptance Test
FIS	Flight Information Service
FPL	Flight Plan
GUI	Guideline/Guidance Material
HMI	Human Machine Interface
HRT	Human Resources Team
HUM	Human Resources
IANS	Institute of Air Navigation Services
LAM	Logical Acknowledgement Message (OLDI)
MATS	Manual of Air Traffic Service
MTCA	Medium-Term Conflict Alert
NERC	New En-Route Centre
ODID	Operational Display and Input Device
OJT	On-the-Job Training
OJTI	On-the-Job Training Instructors
OLDI	On-Line Data Interchange

PC	Personal Computer
RDP	Radar Data Processing
R/T	Radio/Telecommunication
SAT	Site Acceptance Test
SDOE	Senior Director of Operations and EATCHIP
SSR	Secondary Surveillance Radar
ST	Specialist Task
STCA	Short-Term Conflict Alert
t b d	To be determined
TSG	Training Sub-Group
UK	United Kingdom
WP	Work Package

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