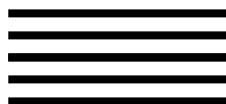


PROGRAMME FOR
HARMONISED AIR TRAFFIC
MANAGEMENT RESEARCH
IN EUROCONTROL



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EUROPEAN ORGANISATION FOR THE SAFETY OF AIR NAVIGATION, EUROCONTROL



PD/1 FINAL REPORT
Annex B
Controller Subjects and Training

PHARE/NATS/PD1-10.2/SSR;1.1



EUROCONTROL

EUROCONTROL
96 rue de la Fusée
B-1130 BRUXELLES

Prepared by: H Crouch

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1. PURPOSE OF THE TRAINING

The aim of the training period was to provide the controllers with sufficient expertise, as far as time permitted, in order that they could attain a level of confidence and proficiency in the use of the PD/1 system, and thus allow them to participate fully in the PD/1 experiment. The training focused on providing the controllers with an appreciation of the concepts involved and the use of the experimental HMI and associated tools.

2. PREPARATION OF THE TRAINING PACKAGE

2.1 OBJECTIVES

The Training Team, in consultation with the PD/1 Project Leader, established the following specific objectives for the training package:

- familiarise controllers with the new concepts in PD/1;
- teach the use of the aids provided in the Reference System (Organisation 0);
- teach the use of the 'advanced computer assistance tools' provided in the Advanced System (Organisations 1 & 2);
- teach the new roles of Tactical Controller and Planning Controller in an 'operational setting';
- teach the use of additional hardware (e.g. voice communications box) of the PD/1 system;
- prepare the controllers for the procedures to be used during the PD/1 trials.

2.2 CONSTRAINTS ON THE TRAINING

The primary constraint on the training phase was time. A majority of the subject controllers could only be made available for a two week period for both training and trials, thus constraining the available time for their training. With this constraint applied to the training programme, in order to achieve the aims of the PD/1 Programme it was essential to provide a comprehensive yet easily understandable learning package that could be presented to four controllers per week. There was also a need for the training package to be available for the PD/1 first Pilot Phase which commenced on 27 March 1995.

2.3 TRAINING ANALYSIS

With these objectives and within the constraints, the Training Team conducted a limited analysis of the training needs. This analysis covered system definition, the human-machine interface's (HMI's) function lists and function allocation etc.. The results of the analysis, together with the knowledge that the PD/1 system would be unlike most of the current systems used by the subject controllers, led the Training Team to conclude that the course should contain the following major phases:

- hands-on training;
- learning by instruction, trial and error, and discovery (allowing time for 'free play');
- use of the PD/1 stand-alone training facility on an individual basis;
- use of the full facility as part of the full controller team.

2.4 PHILOSOPHY AND TECHNIQUE

It was concluded that these phases would best be implemented through the philosophy of 'Building Blocks' or 'Stepping Stones'. That is where the first lesson becomes the

prerequisite knowledge for the second lesson, which in turn leads to the third lesson etc., thus continually reinforcing and building on the previous lessons learnt. The technique called 'Instruction Sets' was proposed as it fulfilled the requirements for the course characteristics and the suggested philosophy. In addition, this technique would best suit the following aspects:

- the complexity of the proposed ATM system and its HMI;
- the novel concepts to be introduced to the controllers;
- the different operational backgrounds of the controllers;
- that the first language of the controllers may not be English.

Instruction sets were developed based on the principal points outlined above. These sets provided the following:

- a statement of prerequisite skills and knowledge;
- a statement of objectives;
- clarification, scope and background of lesson;
- a theory section;
- a set of step-by-step instructions to be performed whilst using the training facility, which included a series of questions requiring written answers.

Each instruction set was accompanied by a traffic scenario tailored to the lesson.

To meet the requirements of PD/1, the training had to be biased towards practical sessions. It was therefore decided that a ratio of 1 instructor to 2 controllers would be the best achievable.

2.5 TRAINING COURSE

The Training Team had to design a one week course capable of taking controllers, with very little or no knowledge of the PD/1 Programme, to a level of competency that would provide the basis for obtaining meaningful results during the trials. The controllers' normal ATC procedures and their experience of ATC automated systems was wide and varied. So, the course had to be designed to accommodate these diverse levels of experience and expertise by giving the instructors the ability to adjust each instruction set according to their assessment of the aptitude, knowledge and capacity of each controller to absorb information.

In brief, the timetable for the one week training course was as follows:

- Monday: Introduction; briefing on the PD/1 Project; briefing on the week's training programme; controller experience questionnaire; briefing on the role of the controller in the PD/1 trials, followed by a tour of facilities; introduction to the Reference System (ORG 0), airspace, windowing environment and computer mouse.
- Tuesday: Completion of the training on the Reference System; briefing on the communications box; description of the role of tactical and planning controllers in the Reference System.
- Wednesday: Introduction to the Advanced System tools (ORG 1 & 2); specific training sessions on the Advanced System tools; discussions on the concepts.
- Thursday: Role of tactical and planning controllers in the advanced system; briefing on the validation team tools.
- Friday: Practical sessions only; course critique; End of Course presentations.

The programme for each day of what was necessarily an intensive course was punctuated by structured breaks in an effort to prevent controllers from becoming over tired (most especially when pursuing the demanding practical sessions). During these break times, and also at designated periods throughout each day, the Training Team was available to discuss any aspect of the training, trials, procedures, or to provide remedial training as requested. The Technical Team members were also available throughout the course to discuss any problems or comments on the PD/1 system, specifically the HMI.

2.6 INSTRUCTION SETS AND SCENARIOS

Sixteen instruction sets were written. Their contents were validated by several volunteers, whose task was to check the training manuals (see Section 4.1) for readability, accuracy, and achievement of the building block philosophy. Whilst none of the volunteers were current ATCOs (although one was a Fighter Controller), they were able to determine if the training manuals could fulfil the principal requirements as outlined above, leaving the ATC concepts to be discussed with the controllers during the first pilot phase. In addition, the volunteers' independence from the PD/1 system (they were however professionals in the computer and operational fields) provided the Training Team with valuable insight into the structure, usability and clarity of the training manual.

The preparation of the scenarios was dependent on the writing of the instruction sets. To save time, the Training Team made full use of existing scenarios, editing them to meet the specific training objectives. These scenarios were carefully vetted to make sure that they provided the correct level of traffic, and that they were of sufficient complexity, to support the teaching objectives for each instruction set. As with the instruction sets, these scenarios were validated by the volunteers.

After the volunteers had proved the instruction sets and their associated scenarios, the Training Team updated all of the training material and prepared the sets of training material needed by the instructors for each lesson.

2.7 TEACHING FACILITIES

The facilities available to the Training Team consisted of:

- a large office for use as a classroom;
- the training room;
- the full NRF room.

The large office was equipped with a conference table and chairs, and an OHP and screen. It was for use as the classroom, discussion room, coffee and meals room. The training room contained four workstations for use by the controllers when using the system in stand-alone mode. This facility was used when the full facility room was not available for training (i.e. if the full facility was being used by the Technical Team either for development or to run trials). The full facility provided two NERC sectors that could also be used in stand-alone mode (i.e. each of the four positions worked as independent units) for training purposes.

3. PILOT PHASES

3.1 FIRST PILOT PHASE

The first Pilot Phase lasted for four weeks and was attended by eight controllers, each present for two weeks. During the first week the controllers were trained using the first version of the training course. The controllers then took part in a series of trials during the second week. This was essentially a test of the facility rather than of the controllers or of their level of training. This proved to be an opportunity to test the viability of the methodology and techniques selected for training.

3.2 FINDINGS OF FIRST PILOT PHASE

At the end of the Pilot Phase the consensus of the controllers, Training Team and Technical Team was that the methodology and technique had proven a great success. However, the presentation of the course had to be reviewed in the light of observations by the Training Team and the controllers.

It was felt that the theory sections of the instruction sets needed to be taught in a more formal manner and that the controllers should not be allowed to commence the practical sessions until they fully understood the associated theory. In addition, several purely theory lessons were needed to expand on the background of the concepts underlying the simulation.

There was a requirement for the entire training manual to be updated to take account of the evolving system, so this opportunity was used: to integrate the extra theory lessons into the training course; to clarify those instruction sets that the controllers had found to be unwieldy; and to add more colour screen pictures and line diagrams to the training manual. In conjunction with the revision of the instruction sets, the scenarios required updating better to reflect the training objectives.

The Training Team also decided to add a course test to the timetable. It was decided that a short 20 question, open book test would assist both controllers and Instructors in assessing the level of knowledge attained during the training course.

3.3 SECOND PILOT PHASE

The second Pilot Phase took place ahead of the Main Training and Trials phase and was undertaken by the same controllers that had attended the first Pilot Phase. Its purpose was in the main to assist the Technical Team in testing the full NRF simulator in the trials configuration. This phase lasted for two weeks and during this period the Training Team updated and refreshed the controllers on changes since their last visit and also took the opportunity to try out the new course test.

4. MAIN TRAINING AND TRIALS PHASE

4.1 INTRODUCTION

The Main Training Phase required several different timetables so that the most complete training possible could be provided. Some of the controllers had attended the Pilot Phases and therefore did not need to attend the full five day course; some of the controllers had a considerable gap between their training and the trials; and yet more of the controllers could only attend the course during the actual trials period.

Therefore a series of courses was designed, all based on the training manual and original course concepts. For those attending prior to the trials period a full five day course was run; for those attending during the trials period a shortened intensive four day course was run (this included two evening sessions to provide time on the full NRF simulator) with an optional fifth day for extra tuition as required by the controllers; and for all controllers the first day of the measured trials week was set aside for refresher training.

Each controller was provided with their own training manual (loose-leaf file) at the start of their course. The manual contained:

- a course timetable;
- 16 instruction sets with colour and B&W figures;
- 4 theory sessions;
- two aide memoires: one for the Reference System; and one for the Advanced System;
- a controller questionnaire (name, work experience, qualifications, etc.);
- a course critique questionnaire.

4.2 INSTRUCTIONAL STAFF

Given the previously established requirement of one instructor to two controllers; the need to provide full training courses during the trials phase; the intensity and frequency of the courses; together with the extra training requirements caused by visitors, it was necessary to supplement the initial Training Team of 2 people. The team was assisted by several of the Technical Team members and an ex-civil controller on loan from EEC.

4.3 CONTROLLER SUBJECTS

The Main Phase Trials for PD/1 were carried out over an 8 week period with 4 controllers participating per week. The 32 controllers for the PD/1 Trials were made available by the following organisations:

UK	NATS	9
SWEDEN	LFV - CAA Sweden	4
DENMARK	LV - CAA Denmark	2
FRANCE	CRNA OUEST	2
GERMANY	DFS	5
CANADA	Transport Canada	4
THE NETHERLANDS	RNAF	4
MAASTRICT	EUROCONTROL	2

All participating organisations were permitted to send observers to the PD/1 Trials and some of these personnel also attended the Training Courses on an *ad hoc* basis.

4.4 EXECUTION OF COURSES

The execution of all of the courses as well as the supplementary training of observers and visitors proceeded according to the plans. A total of approximately 36 controllers were trained as there were several occasions where trained controllers could not ultimately attend the trials. There were approximately 20 observers and visitors trained to varying levels, from a few hours to several days of training all based on the courses given to the controllers. In some cases the observers or visitors used the training manual as a 'self-teach' learning package.

5. RESULTS OF TRAINING

5.1 INTRODUCTION

The training ensured that those controllers who went on to take part in the trials were all able to work with the equipment and had a degree of understanding of the ATM concepts involved in PD/1. At the conclusion of the training period the degree of competency of the controllers varied because of several factors:

- their perception of their abilities;
- the need to accept radical new concepts and equipment;
- the short period available to learn the system;
- their willingness to trial a concept and accept that it was not a fully-developed pre-operational system.

Certainly the first three of these factors had been anticipated by the Training Team. It is always necessary in any high pressured, time critical profession to persuade the participants of their ability to absorb and implement new strategies/equipment. This is particularly so in a profession where safety is a critical concern. The new concepts, the new equipment and the short training time were all well known obstacles to achieving this. However, the final point, that of the willingness to trial a concept in an experimental system was not a factor that had been anticipated by the Training Team. Such attitudes from the controllers could not be eliminated, but instead only reduced by constant reminders from all the Training and Technical staff of the status of the PD/1 experiment.

The remaining sections detail the results of the training. These fall into two distinct categories, those observations of the Training Team made during the courses and those from the course critique and course test.

5.2 TRAINING TEAM OBSERVATIONS

The intensity of the courses led to the instructors and controllers spending some considerable time in their teacher-student roles not only during the formally identified course time but during most of the breaks and some evenings. Hence the instructors were able to gain an insight into the attitudes of the controllers to the PD/1 objectives and its potential affect on future ATC. The attitude of the controllers proved to be an important factor throughout their training course and influenced their ability to absorb and implement the course content.

The instructors observed that throughout the training there were several factors common to all the courses which coloured the attitude of the controllers. These were that:

- Several countries represented were currently either designing or implementing new ATC systems. The controllers chosen from those countries all showed an openness of mind to test out the new PD/1 concepts.
- Where the PD/1 concepts were dramatically different from the controllers' current working practices and levels of responsibility, the controllers exhibited a degree of antagonism towards the experimental nature of the trials.

- The teamwork required by the PD/1 concepts tested, and sometimes exceeded, the controllers' natural faith in their working partnership. This lack of trust caused some controllers to attempt to perform both roles during the training in the full facility sessions, thus causing friction within the team.

These factors became quite evident to the Training Team after only a couple of training courses. The recognition of these problems led to the Training Team spending more time with the controllers explaining the concepts, the need for teamwork and constantly referring to the experimental nature of the PD/1 system. This approach appeared to have succeeded given the results of the course critique as shown in the next section.

The length of the course was adequate, although not ideal, to meet the objectives of the course. The acceptance of the concepts and the skill levels achieved were related to the recency of the controllers' operational experience and their age or their attitude to taking part in the trials. It was necessary to provide extra one-to-one instruction to several of the older students. Although some of this group had significantly more experience on the system by the time they entered the trials, it was evident that they still did not understand the underlying ATM concepts. Those controllers who did not agree with the concepts underlying the system tried to view the simulation as pre-operational validation rather than as a demonstration of the concepts. This meant that they were less inclined to accept the information the system presented and to work with the interface and tools provided.

It was noted that a small proportion of non-British controllers did not always write down answers to the open questions in the instruction sets, indicating that perhaps compiling and writing down answers in a foreign language is too difficult or too disruptive during training. When questioned on this point however, some controllers commented that they felt that writing down answers did not help them to understand the system any better. The training material has been subsequently used by several nationalities both in formal and informal training sessions. Most expressed their satisfaction with the techniques used in the training material and have stated that the format of instruction sets, most particularly the question and answer sessions, provided them with a clear understanding of the PD/1 system and its tools.

The preparation, writing and conduct of the courses has shown that training at this level is very labour intensive. In the first instance it requires at least one of the training staff to have a sound knowledge of course design in order to establish a realistic approach to the tasks. Secondly, PD/1 was an evolving experimental system, but it was not feasible to use technicians working on the system to assist in the preparation of training material. Hence, it was necessary to have instructors who were capable of fully understanding the system and its concepts, and who were also kept completely up to date with all changes to the system, however minor. Finally, whilst the technique of 'building blocks', facilitated by the instruction sets, was shown to provide a comprehensive course, it required a high ratio of instructors to controllers and a constant source of technical staff to satisfy the controllers during both planned and spontaneous discussions.

The general consensus of all those involved in the training was that, despite the intensity of the course, one week was not really sufficient for the controllers to assimilate all facets of both the new facility and the new concepts. This was especially true when both these aspects were distinctly different to the controller's current experience. However, the likelihood of obtaining operational controllers for periods of greater than one week for training followed by one week of trials is very slender.

To obtain meaningful results from an experimental system trial, it is necessary not only to provide well trained users, but also to ensure that they are well motivated. This proved to be a difficult requirement to achieve in all of the controllers. This was due in the main to the attitude of the controllers to the content of the PD/1 Trial. Controllers appeared to fall into 3 groups:

- Some controllers saw the novel concepts and new HMI as a challenge to be understood and used. Indeed this category of controller was often extremely interested in the technical aspects of the system as their nations were undertaking design or implementation of new ATC systems.
- Another group of controllers viewed the PD/1 system as a threat to their existing working practices and could not be persuaded to adjust their working methods.
- The final group of controllers were those who had not worked on an operational system for many years and found it extremely difficult to understand and grasp the new concepts even before being introduced to the new HMI.

It became apparent during the training (and subsequently during the trials) that for some controllers, most especially those from the latter two categories, that underlying concepts of PD/1 such as the time element of a 4-D trajectory or the co-ordination of such trajectories had not been fully recognised.

5.3 COURSE CRITIQUE

A 'course critique' was used to gather the controllers' opinions of the course. It is shown in Appendix B1. Typically, most aspects of the course were rated 4 out of 5 ('good value, some omissions'). By the end of the course, the two most popular of the PD/1 tools and features were the HIPS and the ADFL (also both rating 4 out of 5). On average, the controllers rated their skill in the ATC tasks they had been taught at 74%.

The controllers were asked to complete the course critique at the end of the course with all the information fresh in their minds. The results reflect their thoughts up to 8 weeks prior to the trials. The space left for comments was only used by 6 controllers. Two of these stated that the course had prepared them for the trials; one felt that all the results given could only be related to the tactical role as this was the only role that he had undertaken; and the remaining three (all from the same week of training) stated that they were not prepared for the trials. In the last case only one of the controllers rated his skill level and this was at 57%. He also commented that there were too many abbreviations used during the course.

5.4 COURSE TEST

The test presented to the controllers on the last day of their course is reproduced in Appendix B2. The test was given to consolidate the controllers' knowledge rather than to test their ability to recall information. It was an open book, open discussion test. There were no trick questions. The instructors allowed the controllers to complete the test without supervision, but were available to help if the controllers encountered any problems.

In marking the test, the instructors took into account that English may not be the first language of the controllers and gave credit where it was obvious that the technique was understood even if the terminology had not been remembered. Whilst in some cases it was clear that the controllers had conferred, in the main it appeared that they had attempted the paper on their

own. The average score was 87½%, ranging from 60% to 100%. Most of the controllers provided comprehensive answers, although those who scored 77½% or less tended to show either a lack of understanding of the system or had decided not to participate fully in the test process. A debrief was provided to the controllers and any areas of difficulty were discussed further. The reaction of the controllers to the results and debrief of the test ranged from intense rivalry with fellow controllers to complete disinterest.

6. CONCLUSIONS

6.1 SUMMARY

The start of this Annex gave the aim of the training to be: 'to provide the controllers with sufficient expertise, as far as time permitted, in order that they could attain a level of confidence and proficiency in the use of the PD/1 system, and thus allow them to participate fully in the PD/1 experiment'.

The results of the Pilot Phases, instructor observations, course critique and test, and general controllers' comments indicate that right methodology was chosen for the training. In most cases the controllers achieved a satisfactory level of competence in operating the system.

Lessons learned by the Training Team included (see Section 5.2 for more detail):

- At least one of the training staff needs a sound knowledge of course design.
- It was necessary to have instructors who were capable of fully understanding the system and its concepts, and who were kept completely up-to-date with all changes to the system.
- The teaching method chosen provided a comprehensive course, but required a high ratio of instructors to controllers and a constant source of technical staff to satisfy the controllers during both planned and spontaneous discussions.
- Although some controllers were interested in the technical aspects of the system, others had difficulty grasping the underlying concepts of PD/1.

The general consensus of those involved in the training was that, despite the intensity of the course, one week was not really sufficient for the controllers to assimilate all facets of both the new facility and the new concepts. However, it seems unrealistic to hope to obtain operational controllers for more than one week of training for an experimental system.

6.2 CONCLUSIONS AND RECOMMENDATIONS

The concepts and equipment of PD/1 are quite different to any current ATC practices and systems. The training for the PD/1 programme was designed, written and presented from a known teaching theory and the Training Team are aware that several areas could have been better directed. However, this would most likely require a longer training period which is not a feasible option when using operational controllers as trial subjects.

For training in future experimental system trials the PD/1 Training Team offers the following recommendations:

- start planning and designing the course as soon as possible;
- work closely with the technical team to establish a complete and continually updated knowledge of the system;
- if the concepts and the system are as radical as PD/1 then bring controllers on board as part of the training team to lessen any resistance from the controllers taking part in the trials;

- if selection of controllers is possible, take those younger staff who are computer literate but who are not yet set in today's practices.

7. GLOSSARY

ADFL	augmented dynamic flight leg
ATC	air traffic control
ATCO	air traffic controller
CAA	Civil Aviation Authority
CRNA	Centre Regional de la Navigation Aerienne
DFS	Deutsche Flugsicherung GmbH
FMS	flight management system
HIPS	highly interactive problem solver
HMI	human machine interface
LFV	Luftfartsverket
LV	Luftfartsvæsen
NATS	National Air Traffic Services Ltd
NERC	New En-Route Centre
OHP	overhead projector
ORG	organisation
PEL	planned entry level
PVD	plan view display
RNAF	Royal Netherlands Air Force
SIL	sector inbound list
TDB	track data block
TST	trajectory support tool
VAW	vertical aid window

APPENDIX B1: COURSE CRITIQUE

This appendix to Annex B reproduces the course critique, with an indication of typical answers where appropriate.

Questions indicated by * should be answered using the scale of 1 to 5 where:

- 1 = no use/ poor/ insufficient
- 2 = limited, some major omissions
- 3 = acceptable, no major omissions
- 4 = good value, some minor omissions
- 5 = great value/very good/perfect

1. Did you feel that your ATC experience and background were sufficient for you to benefit from this course?

YES NO

2. If you answered NO to Question 1 was it because: (tick all that are appropriate)

- you had not worked on a similar system.
 - you are not an En-Route Controller.
 - you had language difficulties.
 - other (please specify)
-

3. If you experienced any language problems, was it with the following: (tick all that are appropriate)

- introductory video.
 - instruction sets.
 - communication with instructors.
 - pseudo pilots.
 - screen presentation.
 - other (please specify)
-

4. Indicate how you found the following: (*)

	1	2	3	4	5
the windows/mouse concept.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
the absence of flight strips.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
the new roles of Planner and Tactical.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
the use of digital datalink instead of the radio.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
the General Toolbox.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
the Radar Toolbox.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
other (please specify)					

.....

5. How do you rate the following tools/features: (*)

	1	2	3	4	5
CRD (Conflict Risk Window).	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
CZW (Conflict Zoom Window).	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
VAW (Vertical Aid Window).	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
HAW (Horizontal Aid Window).	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
HIPS (Highly Interactive Problem Solver).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
ADFL (Augmented Dynamic Flight Leg).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

6. How do you rate the following aspects of the course: (*)

	1	2	3	4	5
timetable.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
breaks.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
time for discussion.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
sequence of Instruction Sets.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
background theory.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
content of the Instruction Sets.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

7. How do you rate the quality of the Instruction Sets: (*)

	1	2	3	4	5
were they clear in what you had to do?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
were they easy to follow?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
were the Instructions meaningful?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
was the layout adequate?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Do you have any suggestions for improving the Instruction Sets?

.....
.....

8. Did the traffic scenarios used contain realistic: (*)

	1	2	3	4	5
conflicts?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
workloads?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

How would you like to see the scenarios improved:

.....

9. Were you comfortable with the environment: (*)

	1	2	3	4	5
in which the lessons were taught?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
with the Facilities Room (equipment etc)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

10. How do you rate the value of the course as preparation for the PD/1 Trials? (*)

1	2	3	4	5
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

11. Do you feel prepared enough for the demonstrations?

YES NO

12. Use this space to add any further comments you may have.

PD/1 VALIDATION GROUP QUESTIONS

a. What skill level (0-100%) do you rate yourself on this ATC task? 74%

b. How well trained (0-100%) were the pseudo-pilots? 92%

Thank you for your time and effort in completing this questionnaire.

APPENDIX B2: COURSE TEST

This appendix to Annex B reproduces the course test.

1. How does the TDB indicate that an inbound aircraft can be assumed?
2. What does the tick sign in the SIL indicate?
3. What warning is being given when the pink TDB is surrounded by a pink box?
4. Is it possible to accept a proposal for a change in PEL from the previous sector in the Message In Window?
5. How is the VAW called up on the screen? (two answers possible)
6. Name the three software tools that are used by the ORG 1/2 system but not the ORG 0 system to calculate if errors are occurring with an aircraft trajectory?
7. Why is it necessary to provide an aircraft with a planned trajectory through the sector in the ORG 1/2 system?
8. When is a trajectory in the HIPS or ADFL white?
9. The TST provides the validate option. Why do you have to validate a working trajectory before you register it?
10. What options are available if you receive a proposed trajectory from another sector?
11. What are the two methods of registering a trajectory using the ADFL?
12. What does a blue trajectory represent?
13. What indication do you have on the PVD that you have proposed a trajectory to another sector?
14. How is a 4-D FMS datalink equipped aircraft displayed on the PVD?
15. Where are no-go zones displayed?
16. What does a represent on the HIPS?
17. Where are clearances to non datalink equipped aircraft displayed?
18. What basic manoeuvres can be planned with the HIPS that cannot be planned with the ADFL?
19. Which of the following should/should not be done with the HIPS?

• direct routing/parallel routing	YES/NO
• inspection of an already registered flight plan	YES/NO
• speed control	YES/NO
• implementing a tactical intervention	YES/NO
20. How are short term conflict alerts shown on the PVD?