



TRNG

IFATCA POLICY ON TRAINING

Guidance Material for Member Associations.

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MANUAL

IFATCA is the recognised international organisation representing air traffic controller associations. It is a non-political, not-for-profit, professional body that has been representing air traffic controllers for more than 50 years, and has more than 50,000 members in over 120 countries.

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IFATCA POLICY ON TRAINING

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1. INTRODUCTION

The International Federation of Air Traffic Controllers' Associations (IFATCA) lists among its objectives - "to promote and uphold a high standard of knowledge and professional efficiency among Air Traffic Controllers". To this end IFATCA is deeply concerned about the training of Air Traffic Controllers and in particular that the training received conforms to internationally recognised standards. The quality of training will be reflected in the safety and reliability of an Air Traffic Control (ATC) system.

An efficient training system will, in the long term, justify the initially large financial investment which is required for training facilities (classrooms, simulators, teaching aids etc.) and instructional staff by producing well qualified controllers who will provide a safe and expeditious service to air traffic thus encouraging all manner of aviation and ultimately benefiting the nation.

To support this philosophy IFATCA has produced policy on training in Air Traffic Control whereby people qualified in all aspects of recruitment and training supported by well designed training courses, provide the best possible education to those wishing to make a career in Air Traffic Control. The ideal is that a worldwide standardisation of training for Air Traffic Control becomes reality. IFATCA is working toward this goal.

It is not possible, nor is it intended, to go into every detail on training methods, training techniques, course design etc. Rather to observe the recruitment and training of Air Traffic Controllers and to indicate the relevant IFATCA policy (in bold).

Each aspect of the items in this paper is regarded from the training point of view and further information and explanation can be obtained from the appropriate IFATCA Working Paper or ICAO Annex or Manual (see Annex)

2. SELECTION

In looking at the training of Air Traffic Controllers it is worthwhile to review the selection process. Training is an expensive business and the return on initial capital expenditure may not be realized for some years. Some failures and dropouts during training can be considered as inevitable because of the high standard of proficiency required in the profession. Careful selection can reduce the likelihood of failure to an acceptable rate. If the selection process is unable to consistently produce candidates who possess the ability and aptitude to become good Air Traffic Controllers then it will be the ATC system and ultimately air safety which will be compromised. There is a side effect here in that the motivation of established staff can be adversely affected as they experience what they believe to be a lowering of standard. The quality of training must remain high but a craftsman cannot produce a masterpiece from poor materials.

Most countries recruit candidates from the age of 18 years who are expected to have obtained a good level of secondary education, preferably up to University entrance standard.

The training of young people for Air Traffic Control should be regarded as training for a profession. As his contemporaries may be obtaining law or medical degrees so the young controller after some years of study will obtain an Air Traffic Control License. The license attests to his proficiency and acknowledges his competency in a very responsible profession.

Applicants will be required to possess the academic qualifications required to enter a recognized post-secondary educational institution in their country.

Thus,

Applicants without previous aviation experience should be between 18 and 25 years of age.

That candidates should possess knowledge of aviation is desirable since one could reasonably expect that someone who wishes to make a career in Air Traffic Control would make aviation a basic interest. However, many candidates present themselves before a selection board knowing nothing about aviation or ATC. Do administrations make available to Schools' Career Officers sufficient information about Air Traffic Control?

Applicants for selection will be asked to complete a written application form detailing age, educational qualifications, previous experience etc. Some administrations are wary about accepting women for training as they see a risk in later "losing" these women when they wish to start families. However, there should be no reason why, as in many other professions, women cannot be re-admitted to the ATC service as controllers at a later time. A refresher course and re-validation may be necessary but the expensive training will not be totally wasted.

There should be no discrimination between the sexes in the selection of Air Traffic Controllers.

The written application can be followed by an initial interview which is held on an informal basis between the applicant and an ATC expert. This exploratory interview, particularly for school-leavers, should determine the applicant's motivation and basic suitability for the job and can serve to eliminate the obviously unsuitable.

Many administrations make use of various psychological and aptitude tests in order to further explore, on a more objective basis, the aptitude and ability of applicants for Air Traffic Control. The use of such tests specifically designed for ATC and used in the selection of Air Traffic Controllers is a relatively new practice. It is felt that the "paper and pencil" tests are, in themselves, not sufficiently adequate for effective selection in ATC. Practical exercises for determining the aptitude of people to perform tasks associated with Air Traffic Control are required and re- search is being carried out in this area.

Aptitude tests specifically designed for Air Traffic Controllers shall be included in the selection process for Air Traffic Controllers.

Member Associations, in consultation with the Administration, shall encourage the development of suitable static and dynamic aptitude tests for the selection of Air Traffic Controllers.

The result of these tests are followed, in some administrations by an interview with the psychologist whose responsibility it is to evaluate the test scores and to integrate all the information at hand into a comprehensive personality description followed by a rating of the applicant's suitability for ATC training.

Key factors emphasized in the personality assessment are:

- Personal maturity
- Degree of personal resource utilization
- Emotional stability
- Communication abilities
- Goal directedness
- Interests, motivation and level of aspiration
- Social skills and interaction patterns
- Stress resistance

The concluding appraisal operates with a continuous spectrum of suitability degrees (not just a pass/fail category) and the eventual "go/no go" decision is left to the Air Traffic Control administration.

It is worth noting that where aptitude tests are employed, the correct criteria for ATC must be described. To do this requires a detailed description of the performance one expects of an applicant after training, i.e. the theoretical knowledge he needs to know and the practical skills he needs to perform.

Obviously the psychologist involved in selection for Air Traffic Control must have a thorough understanding of the criteria required to perform the task of the Air Traffic Controller. These job criteria have to be carefully and objectively determined if the psychologist is to successfully design suitable tests and correctly analyze the responses of the applicants for Air Traffic Control.

In practice it has been observed that some of those selected, whilst able to perform the tasks of the Air Traffic Controller, fail in other areas (e. g. attitude toward colleagues and authority) or leave the service of their own accord because the job does not offer them the challenge which they expected. Other factors include social conditions of employment, remuneration etc.

Thus the selection process, taking into due consideration the criteria required for the job of Air Traffic Control in terms of tasks to be performed and the social skills of communicating, co-coordinating and integrating with other specialists, should also study carefully the attitudes of people toward the above criteria and their motivation for the job.

Well motivated applicants who demonstrate an interest in aviation and more especially toward Air Traffic Control will more readily accept the challenge of an arduous and demanding period of training for a job which may be partly routine yet which requires accurate decisions to be made within a very limited period of time with frequently insufficient information available and subject to technical and environmental

constraints. Social skills are equally important as the controller is part of a closely knit team. There is no place for ambiguity and misunderstanding to this exacting profession.

Applicants must pass the selection standards.

The members of the selection board should undergo training in interview and assessment techniques if the best in terms of suitable applicants are to go forward for ATC training. A qualified and experienced selection board can only contribute benefit to the training system.

The selection board will, as has been mentioned above, look at motivation, adaptability, flexibility, decisiveness, sound judgment, social skills, aptitude and attitude. The last, attitude, is important in determining how the controller will accept the restraints of the job, first during training and later with shift-work and working unsociable hours.

The Selection Board shall include a psychologist trained in, or familiar with, all aspects to Air Traffic Control, and a controller trained in selection methods and procedures.

It must be emphasized that only selection by qualified people who have received suitable training in interview and assessment skills, assisted by experts, will ensure that the candidates thus selected stand the best chance to successfully complete the training programme and substantially contribute to the maintenance of the high standards of the Air Traffic Control Service and air safety.

The final selection of prospective controllers should be made by trained ATC personnel together with professional assessors.

Member Associations should cooperate with those responsible for the selection of air traffic controllers in their country and obtain agreement on:

- a) the composition of the selection board, including representation by the M. A. where appropriate;
- b) on a definite list of criteria which would be sought by the selection board;
- c) the procedures of the selection process.

To do his task effectively the Air Traffic Controller must be in good physical and mental health with no obvious speech or serious sight and hearing defects.

Generally, the final stage of the selection process is for the so far successful candidate to pass the medical examination. Nearly all countries accept the ICAO recommendations as detailed in ICAO Annex 1 "Personnel Licensing and Training".

The ICAO medical requirements shall apply to all candidates for selection and other tests considered appropriate by respective Governments should be employed.

The selection process should be designed so as to consistently produce suitable candidates who possess the ability, aptitude and motivation to become good Air Traffic Controllers. The failure or drop-out rate during training has to be reduced without lowering the standards of proficiency.

3. FAMILIARIZATION

Before commencing the formal training at an ATC college we might perhaps consider the merit of giving some familiarization training to students.

A period of familiarization can give both student and training staff the chance to make an initial assessment of the student's aptitude for ATC in the light of practical experience.

Other forms of familiarization, which are usually spread over the two or three years of training, may include flying training to Private Pilot Licence (PPL) standard, route experience flights, aircraft simulator exercises etc. Whilst most students enjoy learning to fly, not many are able to maintain their licences once their training has ceased. A PPL gives basic knowledge and skills in flying but little experience of regular route flying with an airline. Whichever system is to be chosen is for the ATC administration to decide but some form of flying or in-flight experience is desirable for student controllers. As the controller needs to know something about flight operations so pilots could benefit from knowing something about ATC operations. Good understanding goes a long way toward solving problems.

Initial training should include:

A programme of familiarization flights, assignment for short periods of time, to commercial dispatch offices, aircraft maintenance shops, and aviation flying schools.

A programme of flight training including training exercises in multi-engine aircraft simulators.

Note: In discussion with controllers who possessed at least a Private Pilot Licence prior to becoming controllers, the general opinion was that exposure of flight deck operations during IFR flight and familiarization with other operations aspects of civil aviation was more meaningful prior to becoming a licensed controller than extended flight training.

4. FORMAL TRAINING (ATC College)

IFATCA advocates formal training courses for ATC students at ICAO approved training colleges as a way to achieve the standardisation of training throughout the world. The training of students at operational ATC units on a self-study basis is not to be recommended and should be discouraged. More scholarships should be made available to those students who find themselves in this situation so that they will be able to attend approved training courses. The standardisation of training is one way in which the basic quality of Air Traffic Services throughout the world can be actively promoted. It cannot be denied that there are variances in the quality of the services provided. Some of these may be caused by lack of funds failing to produce modern equipment or conditions of service of controllers may mean that Air Traffic Control is just one of two or even three jobs that the controller is holding down purely in order to make a decent living. Career advancement becomes non-existent and motivation suffers. IFATCA is working for the controller in all these areas but improvement in these areas alone is not sufficient if there is lacking a standardisation of training. If IFATCA can help to raise the basic standard of proficiency of the Air Traffic Control Service, through a real improvement in the efficiency of the training systems, then the safety of air traffic will be all the more assured.

It will be seen that the efficiency of a training system is brought about by a number of related factors i.e. proper selection, well designed courses, motivated and qualified instructors, suitable training aids and effective period of on-the-job training.

Some variations in course content and training methods are inevitable depending upon regional and national requirements but the basic standard of proficiency for Air Traffic Control remains. It is the responsibility of training units and instructors to see that these standards are reached and maintained.

Training will benefit from prepared objectives. It is helpful and motivating to a student to know, in terms of time and knowledge, goals ahead which must be achieved in order to qualify as an Air Traffic Controller. That there is a definite period of training and that each stage is outlined, helps the student to determine his learning rate and note his progress as each goal is passed. From the final goal of qualification as an Air Traffic Controller, objectives can be set for each stage of training, each phase of training right down to each learning unit. With the objectives in a logical progression the student is able to see his achievements and so increase his motivation.

Training in Air Traffic Control can be divided into three main stages which are: Aerodrome Control, Approach Control and Area Control. In addition, where radar equipment is used we may consider procedures and techniques relating to Approach Radar Control, Precision Approach Radar Control and Area Radar Control.

The design of training will depend to a great extent on the national airspace structure and airspace users. National policy may decide whether or not to train students to a specialisation e. g. either Approach or Area Control.

This paper does not propose to go into any detail regarding the duration of courses or course content. The ICAO Training Manual Part D-2 Air Traffic Control in conjunction with ICAO Annex 1 and the relevant Technical Assistance Guideline provides instructors and training officers with sufficient information on these matters. Local conditions such as airspace structure, air traffic requirements, climate etc, may dictate some slight variations in course length and content. In all cases emphasis should be placed on the practical application of the training given and the importance of developing the qualities, as distinct from the qualifications, required in an Air Traffic Controller.

Training Officers and Instructors should use the ICAO Training Manual Part D-2 in conjunction with Annex 1 and the relevant Technical Assistance Guidelines to assist them to organise the Training Courses. Variations dictated by local conditions should be borne in mind.

Students need to acquire knowledge, develop understanding and demonstrate proficiency in skills. Objectives should be set for each learning unit, for each aspect and subject, for each stage of training and for the overall training period. These objectives will state the amount of knowledge to be learnt, the degree of understanding to be developed and the standard of skill at which to be proficient. By setting these objectives in a logical sequence the student is able to progress successfully from learning unit to learning unit and from stage to stage of training. Awareness of established objectives by students and instructors alike, aids learning increases motivation and progress is easily monitored.

Formal training courses provide students with qualified guidance and the benefits of group working. A sense of competitiveness aids learning and the social skills required in Air Traffic Control can be developed. There is no room in Air Traffic Control for the pure individualist who cannot work either with or alongside his colleagues and is intolerant of their behaviour. Students gain a sense of identity with their group which increases motivation often to the extent that they strive to produce the best overall results when compared to other student groups. A good instructor will make use of this characteristic to improve learning. During the training there becomes noticeable a subtle change in the behaviour pattern or the group as they mature and become more aware of the responsibilities which lie ahead of them.

Where applicants have been selected from those who have little or no knowledge or experience of aviation, a basic or introductory course should be given. This course, which would precede the Aerodrome Control course, will introduce the students to navigation, meteorology, aircraft types and performance, ICAO, telecommunications, flight planning, Rules of the Air etc. Where possible, classroom presentations should be supported by suitable training films and educational visits to operational units. The students will be encouraged to research for themselves all aspects of aviation in order to obtain good background knowledge of their chosen profession and to maintain interest and motivation.

4.1. The Instructor

This is a specialist task demanding knowledge and experience of Air Traffic Control coupled with the desire and ability to teach. The post of instructor at an ATC college should be available to all controllers and not necessarily reserved to those who have been retired from operational duties. If accompanied by a management policy of limited term appointments (e. g. five years) then there should be no shortage of volunteers, all of whom will have had recent operational experience and be well motivated.

It should be appreciated that teaching techniques between college and on-the-job are quite different. During the more formal classroom and simulator phases of training students acquire knowledge, gain some understanding and accomplish BASIC controller skills. Operational controllers employed on a short term basis as college instructors, although fully conversant with all operational procedures, can- not help but consider the student's training in terms of the fully qualified controller. In today's cluttered airspaces nearly all ATC procedures are complicated and seemingly bear little resemblance to standard ICAO procedures. It can be argued that students are being trained for a specific function in a particular airspace so, why wasting time with simplified procedures which they will never use. But, such simplified procedures, with relatively simple air traffic situations will greatly increase the student's understanding of the basic principles of Air Traffic Control so that effective application of these principles can be made to the operational environment with confidence.

Controllers would therefore be selected for instructional duties on the basis of a reasonable operational experience, the desire to become an instructor and ability to teach. The job of ATC instructor should not be a permanent position nor seen as an end of career stop-gap. The instructor needs to be kept aware of operational developments in ATC and aviation.

The ATC school instructors should be given the opportunity to update their knowledge regularly in operational units.

Instructor technique in the classroom should favour an informal atmosphere where students are encouraged to ask questions and where the instructor leads discussions so as to develop the student's understanding of the subject. In generalisation, most facts and thus knowledge can be studied from suitable textbooks. The instructor can be best employed in explanations rather than quoting from the book. A few minutes spent at the beginning of each day can determine whether or not the previous day's work has been studied. Active participation of the whole class is important which means that the instructor will have to use his skill in restraining the "know-it-all" and encouraging the more introvert and those lacking confidence. It is vital for the instructor to establish a good working relationship with his students, if his teaching is to be effective. Regular tests, which force students to learn, can have meaning and be acceptable when followed by review sessions and assessments of progress. Students are always very keen to know how well they are doing. Such tests can help to identify weak points in the instruction or in the learning and revisions can be made easily.

The instructor should receive appropriate training to enable him to make full use of all available training aids in order to emphasise the teaching points. He will have learnt how to plan and prepare a lesson and how to question students effectively.

Classroom instruction is closely allied to practical training in that knowledge taught should be related to a skill. For example, when primary radar identification procedures are taught in the classroom the students will immediately thereafter practise these procedures in the simulator. The process will be repeated for other learning units so that theory and practice are soon related and understanding and appreciation are increased.

4.2. Simulation

Practical training on simulators will probably occupy about two-thirds of the training time on a course. It must be remembered that at the ATC training college basic techniques will be taught and that the finer points will be learnt during the operational training phase.

Using simulators, aspects of safety can be drilled until for the student all thoughts, all spoken phrases, all actions mirror safety in air traffic as second nature. Expedition follows later. There are advantages if all the students on a course come from the same country or even the same ATC unit. Practical simulation can be based upon the student's own area and procedures. The simulation does not have to re-produce faithfully every detailed procedure but the area, navigation aids, traffic samples and basic procedures would be as realistic as possible. Basic principles of Air Traffic Control and techniques in handling a limited number of aircraft in safety are taught at this stage. Exercises are graded progressively toward an agreed examination standard. It is important that operational training coaches should know what the students have been taught and the level of proficiency they are supposed to have reached before the students join an ATC unit.

For this reason, the assistance of operational coaches, under the supervision of college instructors, during simulation training can greatly assist the student in familiarization and thus make the transition from college simulator to ATC unit a smooth one. Basic principles become related to known environment making their acceptance and understanding easier.

On-the-Job Instructors – OJTIs (i.e. controllers trained to supervise trainees during on- the-job training) should assist in simulation training at the ATC School whenever possible.

An exchange of information on the performance of students should be maintained between ATC School and ATC unit.

Simulator displays for Tower training can vary from a mock-up of a control tower with "aircraft" being flown round a model airfield to more sophisticated ones.

Approach or Area Control (non-radar) simulators depicting a flight progress strip display are relatively simple and very effective. Depending on the number of students on the course, the students can act as "pilot" and adjacent units as well as controller and perhaps assistant controller. Acting as "pilot" in a non-radar simulation leads to a better understanding of R/T phraseology, types of approaches to be flown, pilot procedures and time keeping.

Radar simulators, being much more sophisticated pieces of equipment, are naturally a lot more expensive. However, careful analysis of the training requirements and future developments should ensure that a suitable simulator is purchased. Good co-operation between manufacturer and user should include technical and instructor training if the full potential of the chosen equipment is to be utilised.

Any simulator is safer than an operational experience and for this reason intensive training can take place and mistakes made which would not or could not be tolerated in real life. There is a limit to the amount of time that students will accept on simulators before the realism and challenge wears off and is replaced by boredom.

Particular airspace structures and specific procedures can be set up. Exercises are designed which whilst emphasising theoretical learning steps, increase understanding and allow for the practice and acquisition of skills. At the same time challenge is given to the student through set goals and objectives.

During the practical training session, the instructor guides the student providing assistance as necessary, ensuring that basic routine skills are quickly and successfully mastered before going on to finer points of technique. A good understanding of basic skills will provide for sound control in the operational environment.

Debriefing sessions after each practical training session are invaluable times during which instructor and student go over the exercise analysing and correcting. It is important that the instructor, who must often comment on faults, does not dwell on these but demonstrates to the student how improvement can be made.

A record should be kept of the student's progress which is available to the student himself. Weaknesses can be corrected before they become habits and students are motivated by success.

4.3. Examinations

Written examinations test knowledge, oral examinations test understanding and practical examinations test skill. To be effective, an examination must have at least validity (i.e. it measures what it is supposed to measure), reliability (i.e. it gives consistent results) and objectivity (i.e. it should not depend upon the subjective belief, opinion, interpretation or judgement of the examiner). Students should understand the reasons underlying the use of tests and assessments if results are not to be unfairly influenced by "examination nerves". Briefings to students on the conduct of examinations and on the various aspects at which the examiners will be looking will reduce the "unknown" and help students to be more relaxed and less likely to make uncharacteristic and needless errors. An examination system which has validity, reliability and objectivity should enable accurate information to be obtained about a student's achievement of the objectives set for the course. In addition, the information thus obtained could also be used to evaluate the effectiveness of the training system.

Whether formal examinations should be set or performance assessed over a period is a debatable point. Air Traffic Control is a responsible profession demanding high standards of proficiency and where a licence is issued this usually has to be obtained by the satisfactory passing of examinations.

It is suggested that:

During school training regular progress tests should be given on all theoretical subjects. Results should be analysed and discussed with the students.

The students should be regularly assessed and debriefed throughout the period of simulation training. A written report should be made by the instructor on a regular basis and should reflect the level attained by the students plus his overall course performance. Both the assessment and the final practical examination should contribute to the total marks.

Oral examinations allow assessing that knowledge and understanding which cannot be determined from the written examination. They also examine the ability of the student to express him in a clear and unambiguous manner.

A student that has failed an examination should, provided he has shown some signs of success and it can be determined that he has controller potential, after a suitable period of further training, be permitted a re- examination.

No student should be given unlimited training time but neither do all students reach the required standard in the same training time.

By now the student will have satisfied the basic requirements for obtaining an Air Traffic Control Licence but has yet to prove his ability to apply this knowledge and skill in the operational environment.

4.4. Summary

The total training time, depending upon requirements, will be between one and three years. For each phase (Aerodrome, Approach and Area) a study period of classroom lessons and simulation exercises at an ATC college will be followed by on-the-job training.

To improve on the overall quality of training and to assist in a smooth transition from college to operational unit it is desirable that operational coaches help in the simulation training whenever possible.

The task of the coach will be:

- i. To assist the instructor in making the simulation exercises as realistic as possible;
- ii. To give the students advice and guidance on the operational procedures which they will shortly be encountering;
- iii. To familiarise himself with the students' progress (i.e. identify specific weaknesses that may require attention during OJT).

It is not necessary for coaches to be involved in all stages of simulation training and most benefit is probably gained during the last two weeks of training prior to the examinations when the students have attained a reasonable standard of performance and are consolidating skills.

The requirement for close co-operation between ATC College and operational unit should extend beyond that of coaches assisting in simulation. ATC training is classroom / simulator and on-the-job.

It should be brought to the attention of ATC administrations that there is a requirement for close co-operation between ATC training schools and ATC units for which training is performed.

5. INFORMAL TRAINING (ON-THE-JOB)

At this stage the student really begins to feel like an Air Traffic Controller, crammed with knowledge and full of confidence. Yet for many this can be a daunting time. The full impact of the "responsibilities of the Air Traffic Controller" begins to become apparent. Few mistakes can be tolerated and then only minor ones. The situation is live, dynamic. No time to "stop clocks" and sort out the problem. More knowledge has yet to be learned; new skills and techniques to be acquired and practised. An important factor for the trainee controller, at this time, is his acceptance into the team by the other controllers. Unless the trainee feels settled and to some extent accepted in his new environment then there could arise problems during on-the-job training (OJT).

The task of the OJT coach is a demanding one. Not all controllers make good coaches nor do all controllers want to become coaches. The controller who coaches must want to teach. He must be proficient and confident in his own skills. He must be able to handle a traffic situation through another person, at the same teaching skills to that person and still have overall command of the situation. There are principles and techniques in coaching which all who coach should be aware of so that the coaching is efficient and the standard of Air Traffic Services is maintained.

The selection of controllers as OJT instructors should not only be made on the basis of experience but also on motivation and instructional aptitude.

All OJT instructors should attend a suitable course of training in order to increase their awareness of the techniques available in OJT and of the application of such techniques.

An efficient training organisation at an operational ATC unit employs qualified coaches and training officers - specialists. Close links are maintained with the ATC College, so that the previous performance is known and there is neither gap nor overlap as the trainee progresses through his training.

As in school training, the practical performance of a trainee can be assessed against specific objectives for a particular stage of training. Initial objectives might relate to strip marking, phraseology, management of strip display etc., (i.e. routine skills). Thereafter, basic techniques of controlling aircraft in light traffic situations, conflict detection etc. leading up to complex situations in heavy traffic, conflict resolution and traffic expedition. If objectives are set in this manner the trainee is able to judge his own performance, pace his work accordingly and on the successful completion of one phase move forward with confidence to the next.

For the coach also, regular assessments of objectives against trainee performance can identify weaknesses so that the correct action can be taken immediately before unsafe habits develop. Training then becomes a smooth progression toward check-out in an acceptable period of time.

Simulation exercises can be carefully graded so that students achieve maximum learning benefit. This situation is not entirely possible during OJT as the flow of air traffic cannot be adapted to suit individual student requirements. However, known traffic flows and peaks can be effectively utilised. Initially working periods of light traffic until the basic routine skills are mastered, the trainee controller progresses to medium level traffic (planning and analysis) and then on to heavy traffic (consolidation and experience). At times, when the traffic level is unsuitable for training, classroom instruction or discussion sessions can be held dealing with local procedures, new equipment, traffic analysis etc. Ideally the use of a simulator or off-line computer facility could supplement live traffic training for teaching unusual situations and more complex problems.

When the trainee controller has reached a standard regarded as being proficient and has satisfied requirements that he can work without supervision he is normally granted a licence permitting him to carry out the duties of an Air Traffic Controller for a specific task (Aerodrome Control, Approach Control etc.) at a particular unit.

Examination on local procedures, local area, letters of agreement etc., should be made.

During OJT regular assessments by OJT instructors should be provided. Reports on student progress should be forwarded to the training section. At all times the student should be kept informed and permitted to see his report.

If assessments are conducted controllers must have the opportunity of sighting these assessments and discussing them with the assessing officer. Additionally a controller must have the opportunity of registering, on the assessment form, his comments regarding the assessment and the manner in which it was carried out.

Experience has still to be gained and the prudent supervisor would permit the newly qualified controller only to work on those sectors where the traffic level is expected to be well within the capabilities of one lacking in experience. Gradually, as experience and confidence increase, the new controller works on busier sectors until considered to be fully integrated.

Coaching is a specialist task and one that is carried out in addition to controlling aircraft. For this reason, it will be seen that a certain amount of operational experience is necessary before a controller commences coaching. For a newly qualified controller this period may last three years. The first seasonal or summer peak gives an awareness of limitations and confidence is gained. During the second summer experience builds up and perhaps by the third summer the controller may feel able to accept the extra responsibility of coaching a trainee in light traffic situations having followed a course on coaching techniques.

A period of consolidation should follow a check-out. The previous experience of the student must be taken into account.

Apart from being validated on the position concerned, a controller should not be engaged in training student controllers unless he has at least two years operational experience.

6. CONTINUATION TRAINING REQUIREMENTS

The quality and efficiency of training is dependent upon the skills and expertise of those involved at all stages i.e. selection, classroom and simulation instruction, examinations, on-the-job etc, and their close co-operation with one another. They should be aware of the objectives relevant to their involvement and that of their predecessors and successors. These tasks rightly belong to the controller but they are specialist tasks and therefore require the development of specialist skills. Those who accept the challenge of training should first and foremost want to do it then they should be given the opportunity to follow suitable training courses. An efficient training system ensures that after careful selection the successful candidates are given formal and informal training by expert staff at ATC College and an operational ATC unit in order to reach the required standard, demonstrating thorough knowledge and comprehension of Air Traffic Control, in the optimum training time.

Three different types of Continuation Training are determined:

Continuation Training is a generic term indicating a training phase following licensing and rating training. Continuation Training can include Refresher Training, Additional Training and Development Training.

- Refresher Training: organised on a regular basis and forming part of a competency scheme (towards rating validation);

The process of further training in order to maintain current operational tasks requirements by refreshing knowledge and skills previously required. It will also apply to any training undertaken to maintain competency or retrain a controller prior to re-assessment of competency.

- Additional Training: organised when required, likely in conjunction with refresher training;

The process of further training in order to meet or enhance operational tasks requirements by learning new or changed procedures, upgraded systems and operational and / or environmental aspects of concern.

- Development Training: This is not site specific and aims to prepare an ATCO for new and/or extra tasks not reflected in the licence.

The process of further training where a licensed ATCO is prepared for ancillary tasks such as coaching, supervision, OJT instruction, etc.

6.1. Refresher Training

Refresher training for the Air Traffic Controller means a re-acquaintance with previously learned facts, a re-assessment of skills and an awareness of current specialist developments in aviation. Spectacular advances are being made in ATC in both technical equipment and the associated procedures, which must be developed so as to incorporate the new technology.

Refresher training courses, through discussions and simulator exercises, should permit controllers to review their knowledge and skills so as to identify areas of ambiguity and misunderstanding between written procedures and operational practice.

As a means of maintaining a world-wide Air Traffic Control Service of the highest standards, controllers should participate in a refresher course, which should not have a bearing on the test of the proficiency of the controller, (training and simulation designed to ensure maintenance of knowledge and abilities with respect to all standards, procedures, equipment and technique currently in use).

The requirement is emphasised for Air Traffic Controllers to regularly attend training courses which should not have a bearing on the test of proficiency of the controller.

Training before Competency Checks

Methods of checking the proficiency of the controller are desirable. The sophistication of modern equipment, the complexity of air traffic and airspace structure and the volume of air traffic demand that the Air Traffic Controller exercise his skills to the highest standards at all times if safety is to be preserved.

From the training point of view when a system of proficiency checking is to be set up and then implemented, all the staff concerned need to be educated on the purpose of the system, its aims and how it will be administered.

Specialist checkers will have to be selected and trained so as to reach a common standard of assisting and reporting. Specific training or refresher courses plus adequate facilities may have to be established whenever there is doubt about the ability of controllers to perform their tasks to the required standard. If controllers do not come up to the necessary standard then they must be given the chance to receive the re-training they need.

Before proficiency checking system is implemented adequate training facilities should exist to enable further training to take place where necessary.

Topics to be covered will include changes in local procedures, letters of agreement, revised phraseology, updating on new aircraft performance, ability to adhere to standard practices, ability to handle an unusual situation.

Emergency Training

An Air Traffic Controller may perform his task satisfactorily for many years without ever being faced with an emergency situation or flight emergency responses nor having handled unlawful interference situations and thus be not fully aware of the correct procedures to apply quickly, should such a situation develop.

Emergency training, including Flight Emergency Response (IFER) and coordination training and handling of Unlawful Interference situations should be part of the refresher training.

Special Circumstances Training

One aspect of training that should not be neglected is that relating to unusual situations i.e. ATC System malfunctions. It is felt that whilst such occurrences may be infrequent, when they do occur they do so without warning and often at a time that requires prompt and timely action by the controller if the situation is to remain safe. Controllers must know thoroughly the likely results of any system failure and the correct action to take to avoid a worsening of the situation.

Whatever the ATC environment, controllers should receive suitable, regular training on the published back-up procedures which would be put into operation in the event of a system failure.

Controllers need also to be aware of the limited service that can be provided by a modern computer-generated synthetic radar display when such a system is de-graded through technical failure.

It should be noted that many Air Traffic Control units who work with sophisticated and advanced automated radar systems do revert to non-radar methods of controlling aircraft when transferring flights from unit to unit. Whilst working aircraft within his own area of responsibility the controller may rely entirely on radar separation procedures but because of letters of agreement he will use other methods of separation when transferring aircraft to an adjacent unit. It is necessary that the controller in this situation be as familiar with non-radar as with radar procedures for the separation of aircraft.

Procedures in ATC

Topics to be covered will include changes in local procedures, letters of agreement, revised phraseology, updating on new aircraft performance, ability to adhere to standard practices, ability to handle an unusual situation.

6.2. Additional Training

English Language Training

The ICAO requirements are that ATCOs and Pilots meet 'Level 4' standards of English competency, and these are broadly described below, but MAs should note that the terminology used is predominantly that of expert linguists and is not meant for operational ATCOs to necessarily understand.

The requirements became operative in 2003 for new recruits, but will be implemented in 2008 for current ATC Licence holders operating International Services:

- **Pronunciation**

Pronunciation, stress, rhythm, and intonation are influenced by the first language or regional variation, but only sometimes interfere with ease of understanding.

- **Structure**

Basic grammatical structures and sentence patterns are used creatively and are usually well controlled. Errors may occur, particularly in unusual or unexpected circumstances, but rarely interfere with meaning.

- **Vocabulary**

Vocabulary range and accuracy are usually sufficient to communicate effectively on common, concrete, and work related topics. Can often paraphrase successfully when lacking vocabulary in unusual or unexpected circumstances.

- **Fluency**

Produces stretches of language at an appropriate tempo. There may be occasional loss of fluency on transition from rehearsed or formulaic speech to spontaneous interaction, but this does not prevent effective communication. Can make limited use of discourse markers or connectors. Fillers are not distracting.

- **Comprehension**

Comprehension is mostly accurate on common, concrete, and work related topics when the accent or variety used is sufficiently intelligible for an international community of users. When the speaker is confronted with a linguistic or situational complication or unexpected turn of events, comprehension may be slower or require clarification strategies

- **Interactions**

Responses are usually immediate, appropriate, and informative. Initiates and maintains exchanges even when dealing with an unexpected turn of events. Deals with apparent misunderstandings by checking, confirming or clarifying.

Sufficient training must be available for current ATCOs of all English language abilities so as to be able to meet the required ICAO level and subsequently to retain (or improve) that competency.

Staff who are unable to achieve and maintain the English language requirements must have their positions protected and given opportunities to reach the required ICAO level.

System Upgrade Training

Technical development in aviation is making a big impact on the Air Traffic Control systems of the world. Change is inevitable and the controller has to adapt himself to meet the challenge of the systems and new procedures. Training must be given in order to equip the controller with the knowledge and understanding that he requires to help him adapt to his new environment.

Suitable training will have to be given in due time so that when the new equipment and procedures are introduced operationally, all those concerned are familiar with and have confidence in the new system.

One of the greatest changes that have taken place in ATC in recent years has been the introduction of automation in varying degrees. Basic knowledge of computers and automatic data processing as applied to ATC will be a requirement for all controllers. Such background knowledge will be useful in helping the controller to understand the extent to which automation will affect his working life and how he may have to develop new skills. Further training will be necessary to familiarise controllers with new equipment and operating procedures. It is essential that training on the system be carried out not only on an individual basis but also on a team basis. Often faults and misunderstandings do not become apparent until the whole system is put to the test.

Training programmes will require careful planning as the new system will have to be integrated along with the old one and much training will probably have to take place during breaks and off-duty periods. As the automation of an Air Traffic Control system expands and further technological innovations is introduced the controllers will require more training in order to maintain confidence in the new system and the new skills that undoubtedly will have to acquire.

Controllers required to operate in an automated Air Traffic Control system should receive relevant instruction in automatic data processing for ATC.

Formal training should be established for all ATC personnel in the theoretical and practical procedures associated with the automated ATC system.

The above training should be carefully integrated with the implementation of each stage of the automated ATC system.

Flight Experience

It is important that the Air Traffic Controller be familiar with the environment in which he works. This includes having some knowledge and understanding of ATC from the airspace user's point of view. Such familiarity can be achieved by gaining flying experience.

The Federation (IFATCA) recommends to all authorities responsible for the operation of Air Traffic Services:

- 1) To provide for familiarisation flights in the cockpits of aircraft for Air Traffic Controllers, with combined facilities to visit adjacent and distant Air Traffic Control units.**
- 2) Licensed and trainee controllers should participate in familiarisation flights each year.**
- 3)**
 - a. To encourage air traffic controllers with flying experience to maintain their proficiency by offering special facilities, and**
 - b. To encourage air traffic controllers without flying experience to gain such experience by providing facilities for pilot-training to the level of the Private Pilot Licence, and**
- 4) To exploit the use of link trainers for the familiarisation of air traffic controllers with specific in-flight problems.**

ACAS/TCAS - GNSS

The use of ACAS in the form of TCAS has been implemented worldwide by air- lines. In most countries there is a lack of suitable ATC training as far the use of TCAS is concerned. Therefore, controllers are not familiar with TCAS dynamics, and particularly with reference to manoeuvres performed by pilots as a result of resolution advisories (RA).

Existing IFATCA policy emphasises that “the primary means of collision avoidance within a controlled airspace environment must continue to be the air traffic control system”. Therefore, controllers should be fully aware of their functions and responsibilities connected with the use of TCAS. Pilots, also, should be more conscious of all possible outcomes caused by aircraft not complying with as ATC clearance when following a TCAS advisory.

In most countries ACAS information is almost non-existent. This is not as adequate situation as far as the controller’s functions and responsibilities are concerned. Controllers should be provided with guidelines, familiarisation and training programme in the use of ACAS. This programme should cover the following subjects:

- a) Official Definition of ACAS (TCAS)
- b) Technical Description and Cockpit Displays
- c) Pilot Responsibilities and Reactions to Traffic Advisories and Resolution Advisories
- d) Controller Reactions and Legal Responsibilities
- e) Phraseologies used in TCAS Communications
- f) Experience of Simulated ACAS (TCAS) events either in a Simulator or on video.

Air Traffic Controllers require training in the technical and operational aspects of ACAS (TCAS) in order to fulfil their duties and responsibilities. Controller training packages should contain, at a minimum, the elements described above.

Other areas as GNSS, RVSM or other ‘new’ areas should be dealt with as well.

Environmental Aspects

Team Resource Management, Human Factors in ATC, Critical Incident Stress Management and other related ATC items are to be included in a total package of additional training.

Team Resource Management as a concept should be considered in the basic and continuation training of ATCOs as well as prior to an appointment as supervisor or management position.

Presentations by pilot representatives and aviation industry experts should also be included in the course. Items of interest could be aircraft performance, new type of aircraft, cockpit policies.

6.3. Development Training

OJT/Check Examiner

The OJT coach has a very responsible task to fulfil. It is rarely the case that the "best" controller makes a good coach. Also, many operational controllers obtain much satisfaction from using their skills in controlling aircraft and may be unwilling to become instructors. They do not wish to accept the additional responsibility of training whilst at the same time being more remote from the traffic situation. The OJT coach must be experienced in ATC and be able to get on well with people. Above all he must be highly motivated towards teaching and enjoy the job. Many coaches are unaware of the number and variety of training techniques so that consequently their own techniques are very restricted.

In contrast to simulation training OJT is difficult to plan and develop systematically. Safety always has priority. The objective of OJT is to train a student for operational status and unless some thought is given to matching the traffic load to the student's present ability; little or no benefit will be obtained. There are techniques to be learnt so that the coach and student can obtain the maximum benefit from training sessions. The interpersonal relationship between coach and student is very important in creating an optimum atmosphere for learning.

It is recommended that all OJT coaches attend a suitable course of training in order to increase their awareness of the techniques available in OJT and of the application of such techniques.

This training should be organised as part of the OJT-rating requirements.

Supervisor / Management and Second Career

Whenever controllers are promoted to operational or non-operational posts they should receive suitable training to enable them to carry out these new tasks effectively.

Senior career posts in Air Traffic Control are often very restricted and the nature of the job with its inherent stresses means that controllers are very frequently forced to retire from the job at an earlier age than is customary in other professions.

Administrations are not always able to absorb all the ex-controllers in supervisory, management or other non-operational posts. Therefore, assistance should be given, at an early stage, to provide second career opportunities for Air Traffic Controllers.

Prior to appointment to a supervisory or management position, controllers should be provided with suitable supervisory and management courses which meet the requirements of the new position.

Controllers should also be provided the opportunity to take courses which will prepare them for employment on other duties, including management positions.

Others

Before controllers take up any other tasks as may be in the field of airspace management, safety management, safety regulation, competency checker, any specialist task or a general management function, proper training should be provided.

7. CONCLUSION

This paper has attempted to show how careful selection followed by a well de- signed training programme can go a long way toward consistently producing Air Traffic Controllers qualified to the highest standards of operational performance required of the profession. It has outlined the necessity of having trained specialists at all stages of training.

Although theoretical and simulation training may appear to be totally divorced from on- the-job training they are only parts of the whole training which will be experienced by today's controller. It is important that the various objectives set during the different phases of training do relate to the overall objective which we might define as:

- to consistently produce Air Traffic Controllers trained to the same high standard thereby maintaining the high level of safety and quality of service expected from the profession of Air Traffic Control.

The theory learnt by the student in class is immediately taken into the simulation so that it can be fully understood, applied and the skills mastered. The effective instructor will combine his classroom work and practical exercises in this manner thus building up the student's knowledge, understanding and skill from learning unit objectives, step by step, as one builds a house brick by brick each supporting the other. The assistance of operational coaches during simulation training and the use of the students' own area and procedures reduces training time, eases the transition from formal (ATC college) to informal (OJT) training and assists students in settling into live traffic situations. All this requires close cooperation and co-ordination between all those involved in training but if the result is a shorter overall training time for the same high standard and consistent successes are achieved then the effort must be considered as being worthwhile.

Furthermore, it has been observed that training does not end with the check-out. Refresher training courses should be available on a regular basis and familiarization flights undertaken annually. A change in duties or the introduction of new equipment and new procedures necessitates further training.

Constant reviewing of the training system and an exchange of information and opinions between all those involved in training will help to promote a more thorough approach to training and possibly in a shorter and more economic time.

It is the task before all those involved in training in Air Traffic Control in today's rapidly changing world to make the ideal a reality and to be able to say in all honesty that we have a world-wide standard in training.

THOROUGH TRAINING PROMOTES SAFETY

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