

## Montreal 1970 - WP11

### Terms of Reference - SC4 Human and Environmental Factors in ATC

1. SC4 is charged with the investigation of human environmental factors of the air traffic controller's profession.
2. SC4 will initiate action on essential matters through the Board of Officers.
3. SC4 will be informed by the Board of Officers about any useful information related to its work programme.
4. SC4 is supposed to prepare reports, proposals on recommendations to Conference either directly or, at their request, through the Board of Officers on all or specific items.
5. SC4 is requested to distribute, if possible in regular intervals, information of particular interest to Member Associations.
6. SC4 will - after approval by or through the 2nd Vice -President - present guiding material of IFATCA regarding trade union affairs and maintain effective liaison with international or national trade union organisations or staff associations.

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### Report of Standing Committee 4 Human and Environmental Factors in ATC

"...the efficiency of an air traffic control system is directly related to the conditions of employment of ATC personnel..." ILO 1963

#### Introduction

Throughout the world the majority of air traffic controllers are government employees and have the status of civil servants. The conditions and terms of their employment are similar to those which are in force for the whole civil service with some minor differences. Among these conditions and terms of employment the salary is the most important one, although we admit immediately that many alone is not sufficient to guarantee a 100% safe and efficient air traffic control service, but the same counts for a service whose major attentions is paid for technical improvements to keep pace with the growing air transport. However a good remuneration commensurate with the responsibilities of the controller will enable him to acquire the necessary compensation for the ever-returning pressures caused by the nature of his job. Various member associations of IFATCA were or are criticising the prevailing conditions of employment on their national level and in some cases, where negotiations failed, this resulted in a "go by book" attitude or even in a strike. Of course this will be the last and not the best argument used by the controllers, because they are dedicated to their profession and have their pride. But why do these negotiations fail?

There could be several reasons for that; let us mention two reasons of frequent occurrence:

- S the employer's concern that any major improvements in conditions and terms of employment and service given to the controllers in the interest of safety, will be used by other groups within the public service as a precedent for greater demands in their sector and thus creating a "ripple effect".
- S Some officials in influential positions within the management are far removed from active control and do not appear to appreciate the day to day problems of air traffic control and sometimes seem reluctant to "take the controller's word for granted", but are asking instead of that where they can find the academical origin of the statements.

We are curious whether ICAO have PEL/TNG/MED meeting in 1970 will remember the words of the President of the Council from a decade ago: "...unless satisfactory salaries and working conditions are given to personnel in charge of the technical ground services for air navigation the quality of these services is hampered ..." In our opinion these words have not lost their value since then. In the light of the above-mentioned the Committee saw it as its task to produce a report about the factors concerning the ATC profession. A report upon which, if accepted by the Federation, the different member associations can base their requirements in the national field.

German Air Traffic Controllers Association	Hannover
Belgian Guild of Air Traffic Controllers	Brussels
Netherlands Guild of Air Traffic Controllers	Amsterdam

## **Report About the Factors Concerning the ATC Profession**

### **1 Basic Requirements for the ATC Profession**

#### **1.1 Age**

The candidate controller should be at least 18 years old, owing to the fact that a certain degree of maturity is required because of the responsible task he is called upon with reference to the safety of human life and prove him fitness to exercise a function of command. The upper age limit should be not older than 30, so as to enable the applicant to mentally assimilate new techniques and to learn new concepts during the instructional course, keeping in mind that it is intended to keep up the instructional phase to the highest rating within air traffic control.

Notes:

1. The upper age limit could exceptionally be higher taking into account the aeronautical background of the candidate on which he can draw.
2. In certain countries the subject of age may need different consideration, taking into account the local necessities and the degree of development of aviation industry. Nonetheless, if at all possible the minima considered should be kept to, respecting the value of human life and the economic importance that are at stake at operational units.

3. It may be noticed that a general opinion prevails among all concerned with aviation, that most rigid age criteria are of real use and importance.
4. if exceptions are made to lower age limit, a pre-training may be suggested to reach maturity, awaiting the start of formal training.

## 1.2 Educational

It is evident that to become a holder of competency to perform duties in a special field, a minimum educational background is undisputed and a higher education certainly does not affect success rate. Considering that the candidate should have finished his secondary schooling, thus enabling him to be trained in aviation school to acquire the basic and technical knowledge required for future activities, is certainly a minimum. Some form of written and/or oral examination may in certain cases be of some practical use.

## 1.3 Psychological

The specialised duties the candidate is expected to perform, is inherent to his personality. This consciousness of the importance of air traffic control can be checked by means of an interview or aptitude test. This importance of his job together with his ability to exposure to pressure in air traffic control and logic rapid decision making, must determine the psychological fitness of the candidate. However, on-the-job-training may give an even greater insight of human behaviour. As an additional item it may be mentioned that the advantages of the ATC profession must be predominant and the disadvantages must be of minor importance when made attractive by the salary.

## 1.4. Medical

The candidate controller must meet the medical fitness requirements as laid down in ICAO document Annex 1.

## 2 Training

### 2.1 Basic Training

It is recommended that basic training will be in conformity with ICAO directions.

#### 2.1.1 ATC Academy

It has become a general opinion that the steady increasing complexity in the field of aviation , engendered with more than vague understanding of which, warrants the essential necessity of an ATC Academy. Besides the theoretical knowledge, suitable periods of integrated simulated exercises, preparing for on the job training, the importance of which need not be stressed as a means of initial familiarisation, must be undergone to obtain a complete cycle of basic training, whereas at the same time unusual situations can be simulated, thus giving the opportunity to analyse behaviour in such situations.

- Notes
1. Educational background will determine and affect the length of basic training.
  2. Economic level affects recruiting market

### 2.1.2 On the job training

In order to make the on the job training as effective and safe as possible, a progressive system is most suitable, covering the field of theoretical instruction the candidate has acquired at the ATC Academy and for which he had a minimum of simulated training. No candidate who failed the theoretical examination, or proved to be unfit for, or unaware of the importance of simulated exercises, should be allowed to practise on the job training, which in all cases must be done under the constant supervision of a qualified controller.

### 2.1.3 Licenses and ratings

The on the job training must be governed by a minimum and a maximum duration, depending on the importance of the facility in which the candidate will be appointed. Periodical reports of the supervising qualified controllers must show the head of the unit, at the end of the period of on the job training, whether or not a recommendation for granting the relevant local rating may be proffered and must enable him to report to the ATC Academy that the validity of a license may be submitted to be issued by the national administration.

Note: Exceptionally and if submitted by the head of the unit, the training may be extended if reasonable motives govern this extension.

## 2.2 Advanced Training

In respect of the basic training it must be acknowledged that the essential matter is governed by "What must be known." For the advanced training, however, this is shifted to "Nice to be known."

### 2.2.1 Refreshment Courses and Updating

The importance of refreshing such theoretical volume cannot be underestimated and is a practical preparation to update newly integrated techniques and procedures. Undoubtedly the result of updating will be of higher standard when a refreshment course has been made available. The advanced knowledge being the result of updating will facilitate contact with other support personnel.

Note: If owing to circumstances refresher courses and updating cannot be made available, self-study texts can be provided for as a substitute.

### 2.2.2 Proficiency Check

At the conclusion of refresher courses, when followed by a proficiency check, it will show its effectiveness and will in some instances give rise to fruitful discussions among controllers, resulting in solving management problems and, last but not least, lead to clearer understanding. It must be kept in mind that this presence of training personnel is at the same time the very suitable liaison between management and controllers...

### 2.2.3 Flying Experience

In order to be fully aware of the problems facing the pilot in flight, some flying experience will prove invaluable, giving the controller a good insight of every day and in some way of exceptional problems inherent to a better understanding of the demands of sound air traffic control. Private pilot license is the best way to be conscious of the needs of those who are flying as professionals. As a valuable substitute, duty flights together with link training may be considered, allowing advanced controllers a smooth intercourse with pilots.

#### 2.2.4 Exchange of Experience in ATC

In conjunction with duty flights, a visit paid to adjacent air traffic control units is certainly no loss of time. Difficulties in co-ordination and other mutual problems can most openly be discussed. This closer contact must no doubt result in a better understanding and ultimately solve existing mutual problems.

#### 2.2.5 Excursions to Industries

In too many cases it is forgotten that controllers have to perform their duties with new sophisticated installations and that too often their invaluable practical advice was not obtained in due time. Operational controllers' advice can be most important if made available before the final design is completed. On the other hand an equally great advantage will be won when controllers are sufficiently made aware of the expected capabilities of new concepts, thus overruling untimely objections due to ignorance.

### 3 Working Conditions

#### 3.1 Average hours of work per week

Because of the lack of general reference data in field of the profession of controllers, values were elaborated on the basis of the necessary requirements. Among other, the worldwide trend towards reduction of working hours was given due consideration. Particular attention was given to the fact that the safety of air traffic is closely connected with fatigue at the working position. After thorough consideration of all relevant components is concluded that working hours should not exceed 32 hours per week. This value includes breaks as well as study periods.

(Note: this policy was amended by policy 95.C.2, Working paper 95.C.125)

#### 3.2 Maximum Hours of Work Per Day

Considering the value required in 3.1., working hours per day should not exceed six hours. After a maximum of two hours on the job, controllers should be granted a break of 45 minutes; assistants should be granted a break of 45 minutes after three hours on the job.

#### 3.3 Maximum Time on Duty

Scientific tests indicate that even a break of 45 minutes is insufficient for complete regeneration, it merely delays the process of fatigue; therefore the maximum time on duty should not exceed 7 hours 30 minutes.

(Note: this was amended by policy 95.C.2, Working paper 95.C.125)

## 4 Minimum Time Off Duty

It is obvious that, depending on the amount of traffic and the resulting control problems, controllers suffer from differential fatigue phenomena during one shift on duty. Thus a value had to be found which ensures physical regeneration between shifts. An additional essential is the amount of time necessary to cover the distance between home and working position (i.e., the airport), and vice versa, which often is remotely situated; therefore the minimum time off duty should not be less than 12 hours.

### 4.1 Working Schedule

When planning the duty roster, it should always be considered that fatigue impairs the safety of air traffic; the value mentioned in 3.4. should be therefore be considered as a minimum value only.

The main aim of every employer should be to preserve qualified and highly specialised personnel as long as possible. The duty roster should be set up accordingly.

- (a) Working hours for controllers should not exceed 23.30 hours per week.
- (b) Working hours for assistants should not exceed 25 hours per week.
- (c) Within the limits of the a.m. 32 hours per week, two hours should be provided for study purposes.
- (d) in a turn of shifts, at least half the amount of working days should be granted at the end of the shift as "days off."

Note: Working time is the time spent at a control position.

### 4.2 Vacation Scheme

Scientific analyses have shown that vacations of less than three weeks, motivated by a large number of factors, lack the regenerative effect. It is generally known that the mere change of climate as well as the fact that man needs a certain amount of time to free himself from the influence of the everyday surroundings considerably delay the beginning of the "regenerative phase." Adequate vacations should be available in conformity with the strenuous requirements of the controllers' profession. The criteria for granting vacations should not so much be the age or number of years of employment of the controller concerned, but stress and responsibility. As conclusion, the yearly vacation allowance for a controller should not be less than 34 days and not less than 30 days for an assistant (Sundays and public holidays are not included).

### 4.3 Environmental Factors

As we know today, environmental factors, especially in the controllers' profession, play a role which no longer can be under-estimated. The controller/controller relationship is of particular importance as the problems of air traffic control are mainly solved by teamwork.

#### 4.4 Man/Machine Relationship

It is obvious that the increasing volume of air traffic can only be overcome by means of extensive automation. The determining factor with all future projects, however, will always remain man. Therefore automation, whatever it will look like, will always remain an auxiliary means for solving future problems. Man and machine will have to be adapted to these requirements accordingly.

#### 4.5 Interhuman Relationships

We all know from our experience that good relationships between the controller and his colleagues are of greatest importance as controlling traffic implies teamwork. If, however, relationships between, or connections among, colleagues are disturbed, this necessarily must have consequences on the proceeding of work and, accordingly, repercussions on the safety of air traffic. The following factors contribute to limit these tensions to a minimum:

- a. Equal treatment of the individuals according to equal standards.
- b. Equal pay for equal functions.
- c. Establishing of accommodations to promote interhuman relations.
- d. Appropriate considerations on adaptability when selecting applicants.
- e. Adequate training of the management of air traffic control services.

#### 4.6 Accommodation

The controllers' profession requires highest standards. At the moment, work must still be executed in dark rooms. This fact renders impossible sufficient ventilation simply by opening windows. Because of the number of equipment installed (radar consoles, etc.) control rooms are being warmed additionally by heat radiation. Many controllers are heavy smokers. All these factors add up to the effect that work becomes unbearable after only a short period of time. We know from evaluation of the IFATCA "Questionnaire" the situation, especially in this field, to be extraordinarily negative with all member nations. The minimum requirement for well-functioning air conditioning systems is self-evident. Air conditioning systems in control rooms should be constructed in such a way to ensure the supply of normal air humidity, sufficient fresh air and appropriate temperature constance. The same applies to control towers (greenhouse effect) as well as for daylight control rooms. The problem of air conditioning of CONTROL ROOMS IS NOT THE ONLY ONE: bad seating accommodations, non-existent or only inadequate conditions existing rest and leisure rooms, insufficient parking space, in some cases even at considerable distance. It is more than obvious that the best imaginable accommodations are an imperative for this profession of mental concentration and specialisations.

### 5 Medical Attention

#### 5.1 Medical Examination

The medical aptitude for air traffic control service employment should be stated or regularly checked by an appropriate local medical centre on the basis of the criteria contained in Annex 1 to the ICAO Convention. The Medical aptitude of applicants for employment in air traffic control services should be ascertained before such

employment. A national central medical authority should be established and be responsible for determining an occurring incapability for air traffic control functions. It should not be identical with a local medical centre.

## 5.2 Recreation

Because of the high rate of deficiency typical for the profession, so-called "regeneration cures" are to be introduced. They are to generally maintain and regenerate the efficiency of personnel. The medical attention during such cures should be ascertained. Locality and way of accommodation are to be in conformity with the aim of the cure. The time spent on such cures is not to be deducted from normal vacations. It should last for at least four weeks with two additional weeks for the so-called "after cure."

These regeneration cures should be undertaken regularly and independently from any other existing legal cures.

- a. Every three years for radar controllers.
- b. Every four years for any other personnel employed in air traffic control.

The expenses are to be met by the government concerned.

## 5 Retirement

### 5.1 Present Situation

In most countries the age of retirement for air traffic controllers is following the general pattern of the conditions of employment for all public servants. This results in a retirement legislation depending on the age of the controller and ranging from 60 - 65 years. There are a few exceptions giving the direction where to go, e.g. Yugoslavia, retirement at the age of 45 with 20 years of service.

### 5.2 Human Element

The rapid development of aviation is creating a lot of difficulties for the air traffic control services and not for a long time ago the appropriate authorities were generally concerned with modernisation of the air traffic control system, equipment and methods of control. The controller was considered as a closing entry and was therefore practically ignored, despite the fact that the controller (and he alone) is the heart of every air traffic control system, automated or not. Since a long time the controllers are convinced that the above mentioned attitude is unrealistic and dangerous. Fortunately there is coming a slight change in this policy since medical, psychological and ergonomical investigations have proved separately or together the strong and the weak points of an air traffic control system both combined in the human element: the air traffic controller. One of the most important factors concerning the human element is age.

### 5.3 Some aspects of the Controller and his age

There are some physical, psychological and technical factors influencing the performance of the job in a negative way and also aggravating with growing age.

#### 5.3.1 Physical factors

- a Short time memory.  
Decreasing with age and causing difficulties to keep the traffic - picture updated. This hampering the necessary speed reliability of digesting the lot of information and of taking decisions.
- b Eyesight.  
Decreasing with age and causing difficulties to read traffic presentation on flight progress board or radar and resulting in eyestrain, headaches, etc.

#### 5.3.2 Psychological factors

- a Stress.  
Caused by the constant anxiety in view of the serious consequences which may result from a mistake. This is increasing with the age due to the decreasing physical condition and also caused by the points listed under 5.3.3.
- b Varying working hours.  
Caused by rotating shifts to meet the requirement that 24 hours a day ATC is available. The older controller is more aware of the reductions in social contacts. Due to the decreased physical condition the older controller has more difficulties to adapt on the differences between early vs. late shift, or day vs. night shift.

#### 5.3.3 Technical or Professional Factors

- a Increase in rate, speed and size of traffic.  
The controller finds himself confronted with more problems, less time to solve them, and increasing rate of people involved.
- b Growing Complexity of the ATC System.  
To meet demands of the high density traffic area one is bringing in more controllers (if possible) dividing the airspace in sectors and subdividing the sectors in height-layers. Every controller in the system being nailed down on a mass of paper laws, regulations, procedures, etc. A deviation from this system may have serious consequences if the controller can't co-ordinate quickly enough.
- c Still faster changing procedures and equipment.  
This will mean, especially for the older controller, that no essential familiarisation with the (dis)advantages of new procedures and/or equipment is possible. While growing older one needs more time to learn something new and forget the old stuff. This is one of the greatest problems which can be solved by human engineering.

The factors mentioned in points 5.3.1., 5.3.2., and 5.5.3. have a close relationship and are influencing each other.

#### 5.3.4 Some ergonomic aspects.

Recent ergonomic-psychological investigations have proved that the frequency of a peak mental stress-period is variable and is closest connected to air traffic intensity. By a peak mental stress-period one understands a period of great mental stress, of being busy very concentrated. The regular appearance of such periods is only acceptable if there is enough recovery time between two periods because safety is directly involved. For the growing older controller the factors together result in mental overload causing damage to his mental or physical health. Therefore the controller is developing "manners" or "strategies" to ease his task or to make more recovery time with lesser attention than is required. This results in a shortcoming of the job performance and occurs unconscious (!) caused by an automatic self-protection of the brain. The controller finds himself still at peak performance, but actually he may not be. However a perfect performance of the job is the condition to guarantee safety of air traffic.

#### 5.4 Controllers' Dilemma: disability.

5.4.1 Controlling air traffic demands not ordinary safety but the highest possible degree of safety which is humanly speaking attainable. That is why the controller has to meet high requirements for this specialised job and each of these requirements is checked regularly. But now the \$64.000 question: when a controller finds himself unable to measure up to the peak-performance standard for whatever reason it may be (e.g.) his age, being unable to pass the regular examinations), what is he to do? Let us mention a few possibilities:

- S transfer to another position inside the CAD.
- S transfer to another position inside the civil service.
- S transfer to another position on the free market.
- S retire.

Unfortunately we find that these possibilities are in fact impossibilities because the conditions (that the other work must be appropriate to one of his standing and intelligence, and must have the same level of income and prestige in order to maintain an adequate standard of living and work satisfaction) generally would not be met! Therefore we must accept that the job of an air traffic controller is non-transferable one and we have to investigate what kind of measures are necessary to solve this situation.

5.4.2 The committee has only found a solution in the field of retirement and proposes the following:

- a for disability due to age:  
To put in force an insurance against the loss of license as an addition to the present regulations of disability retirement. The premium shall be paid by the employer.

## 5.5 Early retirement scheme

Unfortunately no scientific standards exist regarding the relation between age and admissible mental stress until so far. Although the committee admits that this situation is not everlasting, we have to make a proposal based on the present information and situation.

### 5.5.1 Early retirement by maximum age.

- a the maximum age of an assistant-controller in active control shall be: 55 years of age;
- b the maximum age of a controller in active control shall be: 50 years of age.

### 5.5.2 Early retirement of maximum years of service

- a the maximum years of service of an assistant controller meeting the demands of 5.5.1 (a) shall be: 35 years.
- b the maximum years of service of a controller meeting the demands of 5.5.1 (b) shall be: 30 years.

NOTE: Policies related to Early Retirement are updated in 1994 by WP138.

## 5.6 Epilogue

The committee appreciates to establish that in fact an earlier retirement is an unsatisfactory solution. If a task is so little adjusted to the capacities of the man who has to carry out this task it should be a better approach of the problem by trying to adjust the task on human capacities. Therefore, and for other reasons, we need a careful and continuing study of development of air traffic control with an input from different scientific sources.

## 6 Salary Scheme

6.1 If we talk about salary we have first to consider upon which standards a salary is based. Therefore we need the answers on two questions:

- a what involves the job of air traffic controller?
- b what achieves the controller while performing his duties (qualitative and quantitative).

### 6.1.1 What involves the job of air traffic controller?

To give an answer on that question one has to consider the following factors:

- S knowledge;
- S independence;
- S relationship to others, serviceability etc.;
- S authority;
- S skill of expression;
- S skill of exercise (reaction, accuracy, etc.);
- S feeling for material or equipment
- S difficulties connected with the job;

- S heaviness of the job (physical);
- S exerting attitude and one-sided movement;
- S aggravating attention;
- S working environment;
- S personal risk;
- S special demands;
- S detrimental risk.

These factors are subdivided again and together with other contributions as:

- S age of the employer;
- S geographic location;
- S duration and point of time;
- S economic position of the employer;
- S historical growth of the proportions;
- S temporary exceptional proportions of supply and demand;
- S social security;
- S changes for getting promotion (career planning).

A work classification will give the answer on the different subjects of this question.

#### 6.1.2 What achieves the controller while performing his duties (qualitative and quantitative)?

The answer on this question gives only an aid for valuation of activities not of people and besides that it isn't easy to answer this question at all. (see also point 8).

#### 6.1.3 Wages policy.

Unfortunately the answers on the questions 6.1.1. and 6.1.2. will not give any data especially not about the absolute top of the salary, neither about the amount counted as difference in remuneration of duties of different level.

This is all decided from wages policy (see also the introduction). Therefore the committee decided not to work out the different items of these questions. The answers are more or less complete and well known to controllers and employers and bringing in the final conclusion that the job of air traffic controllers is a high ranking one compared with other professions (especially inside the civil service). Instead of this we have tried to develop a salary scheme rather different from the existing situation and to translate the high rank from the viewpoint of requirements for the profession to a commensurate rank of remuneration.

### 6.2 Introduction of the salary scheme

The composition of the scheme is based on the following theses:

- S the job of air traffic controller is the heart of the air traffic control system;
- S the job of air traffic controller requires continuous high standards in the field of professional knowledge, performance and physical/psychological conditions; all being checked for safety reasons (e.g. 1., 2.1, 2.2.1., 2.2.2., 4.1. and 4.2.);

- S the job of air traffic controller has a relative short period of activeness or productivity;
- S the controller is almost non-transferable to another position in- or outside the civil service, due to the specialised nature of his job;
- S the job of air traffic controller is an international standardised as possible according directives given by ICAO.

It is in the opinion of the committee justified to ask for:

- S conditions and terms of employment for the job of air traffic controller itself and not being dependent on the kind of organisation the job is part of;
- S equal conditions and terms of employment for equal work with relation to duties and responsibilities.

### 6.2.2 Comparable jobs.

With laying down the conditions and terms of employment a comparison is being made in most countries between the demands of the job of air traffic controller and the requirements of another job inside the civil service. We cannot agree with this because the comparison must not be restricted up to the different functions inside the civil service. One is ruling out in such a way the profession of the airline pilot being a more reasonable and comparable profession for the air traffic controller. Between these two professions a lot of common factors can be found. i.e. educational requirements, training, skill, responsibility, detrimental risk, personal risk, regular examinations on medical/psychological condition, in technical knowledge, on job performance.

## 6.3 Parts of the salary scheme

### 6.3.1 Age.

Although a minor factor the difference between age (especially during the basic training period) of controllers should be pronounced in a difference of remuneration. Applicants of different age may have a different grade of maturity, may have a different and useful experience from outside the world of aviation. Thereby it can act as compensation for a shorter period of activeness due to the age limit.

### 6.3.2 Years of Service

Another minor factor and not so important as it is used nowadays. This part is meant as a compensation for the experience inside air traffic control. With a growing number of years the controller may represent a more useful employee for the employer he may be able to give a worthwhile contribution in developing new air traffic control procedures and systems, or training of recruits e.g. For career planning seniority should be a factor not the factor.

### 6.3.3 Function

The corner-stone of this proposal is the function, because this is, in our opinion a more reasonable parameter than seniority. Seniority is often deciding for a great

difference in remuneration of two controllers performing the same duties under the same circumstances. Therefore it is justified that from the very moment a controller performs the duties following from one of the basic functions his remuneration must be in correspondence with this new function and not used as possible career length. As basic functions we propose to follow Annex I of ICAO part 4 and so we get: aerodrome controller, approach controller, area controller (together with the non-radar or procedural controllers) and radar controller. For practical reasons we add the functions assistant-controller and recruit.

#### 6.3.4 Traffic Density

Traffic intensity is another minor factor because the consequence of more traffic problems, greater stress, complexity of procedures and cannot be compensated by a remuneration alone but more by means of working hours, vacation, e.g.

#### 6.4 Basic salary

6.4.1 The monthly basic salary (s) of an air traffic controller, an assistant controller or a recruit will consist of the following parts:

- S age element (A);
- S length of service element (L);
- S function element (F);
- S traffic density element (T).

where the salary per month is equivalent to the  $A + L + F + T$  elements.

6.4.2 The age element (A) to be fixed as follows:

- S persons with the rank of recruit shall receive ..... for every full year of their age;
- S persons with the rank of assistant controller shall receive .... for every full year of their age;
- S persons with the rank of air traffic controller shall receive .... for every full year of their age.

6.4.3 The length of Service Element (L) to be fixed as follows:

- S persons with the rank of recruit shall receive .... for every full year that he has been in service of air traffic control +);
- S persons with the rank of assistant-controller shall receive.... for every full year he has been in service of air traffic control +);
- S persons with the rank of air traffic controller shall receive ... for every full year that he has been in service of air traffic control +).

+ ) with mentioned service is meant the service in civil air traffic control. However in certain cases it would be justified to include also other (government) service in the field of aviation, which is determined by the appropriate authorities to warrant recognition as valuable experience, i.e. military air traffic control, military or civilian flight experience.

6.4.4 The maximum of  $A + L$  shall be fixed as follows:

- S for the assistant controller the total sum of  $A + L$  shall not extend above .....
- S for the air traffic controller the total sum of  $A + L$  shall not extend above .....

6.4.5 The function element (F) shall be fixed as follows:

- S .... if person involved is following an approved training for air traffic controller (recruit);
- S .... if person involved has no licence with one or more ratings entered thereon, and is therefore an assistant-controller;
- S .... if person involved is an assistant-controller but nevertheless is authorised to carry out privileges normally entrusted to the air traffic controller;
- S .... if person involved is holder of an air traffic controller licence with one of the undermentioned ratings entered thereon;
- S .... if person involved is holder of an air traffic controller licence with two of the undermentioned ratings entered thereon;
- S .... if person involved is holder of an air traffic controller licence with three of the undermentioned ratings entered thereon;
- S .... if person involved is holder of an air traffic controller licence with one or more of the undermentioned ratings entered thereon and is also in possession of (a) matching radar rating(s).

A rating is an authorisation entered on a licence and forming part thereof, stating special conditions, privileges or limitations pertaining such a licence (ICAO Annex I 1.1). The ratings mention in d. - g. are: aerodrome control, approach control, and area control ratings. The radar ratings mentioned in g. are: PAR-rating, SRE-rating for approach control, and SRE-rating for area control.

6.4.6 The traffic-density element (T) to be fixed according scales to be determined by the appropriate authorities. These scales should be based upon traffic density for aerodrome control, approach control and area control separately. The traffic density should be formulated by different levels:

low					giving traffic density element (T) max.....
medium	„	„	„	„	max.....
high	„	„	„	„	max.....

6.5 Additional parts of the salary

Besides the basic amount of the salary additional payments will be in force for:

- S instruction or training:  
This can be considered as an additional task of some controllers by adding more responsibilities to the function itself (i.e. on the job training).
- S overtime  
this can be considered as a most inconvenient factor for the job performance and we are not in favour for overtime at all.
- S insurance premium for loss of licence:  
see point 5.4.2

An allowance for cost of living or station is not mentioned as in most cases this will be included in the traffic density of the basic salary. All the above mentioned allowances shall be expressed in fixed amounts to be determined by the appropriate authorities. All the amounts from 6.4. and 6.5. are to be considered before deduction

of income taxes, pension premium, social premium etc. and before addition of children allowance, vacation allowance etc.

## 7 Pension Scheme

### 7.1 Basic Amount

The basic amount for pension shall be fixed as follows:  
for the assistant-controller and controller the accumulated sum of A + L + F + T, taking into account the suggested maxima in points 6.4.4.a. and 6.4.4.b.

### 7.2 Longevity Pay

After twenty years of service longevity pay shall cease.

### 7.3 Pension and years of service.

- a. An assistant controller may retire after 25 years of service and 50% of the basis amount (including accrued longevity pay).
- b. an assistant controller may retire after 35 years of service at 80% of the basic amount (including longevity pay).
- c. a controller may retire after 20 years of service at 50% of the basic amount (including accrued longevity pay).
- d. a controller may continue until 30 years of service (while remaining proficient) at which time he may retire at 80% of the basic amount (including longevity pay).
- e. retirement at more than 20 (25) years of service and less than 30 (35) years of service will cause a pension to be pro-rated between the two scales described.

## 8 Some Aspects of ATC and Economy

Of course it will be difficult to change the present organisation structure rather drastically in most countries that will make possible to indicate the uniqueness of air traffic control services amongst other service-rendering institutes. The economic consequences of an expensive air traffic control system, expensive for both technical and personal management policy, are becoming greater every year (according to ICAO the total costs were in 1955 \$62 million and were in 1965 \$156 million, with an expected growth of 10% or greater each year).

These total investments can hardly be brought in by national budget from public funds alone and one has to find other sources to get the necessary capital. Air transport is starting to become a mean of mass transportation and therefore air traffic control is not service rendering alone, but also becoming an important factor in the economy of air transport. At present the airlines have to pay only a very small part of the total expenditures of air traffic control services. They are paying for the use of ground facilities (landing - and parking fees) and some times for approach ground aids to the airports (owned by national or local government, by partnership or by private). Although it is very difficult to make an exact valuation of the rendered

services, it can be expected that reasonable fees for this service shall be gradually introduced despite the understandable opposition of airlines and also of many governments. From an economical point of view, it is justified that the users of an infrastructure with intent to make a profit shall contribute, at least partly, to the total expenditures of such a structure.

In 1967 the ICAO had a conference about this subject and although no important decisions were taken it will only mean a postponement but not a cancellation. In fact there is no alternative, because only an up to date ATC system, resulting from a good technical and personal management policy, will not endanger the safety and regularity of air traffic.

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