INTERNATIONAL CIVIL AVIATION ORGANIZATION

NORTH AMERICAN, CENTRAL AMERICAN AND CARIBBEAN OFFICE

CAR/SAM REGIONAL GUIDANCE MATERIAL ON

AIR TRAFFIC SERVICES

QUALITY ASSURANCE PROGRAMMES

Version 1.0

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AMENDMENTS

The issue of amendments is announced regularly by ICAO though regular correspondence with States, and the ICAO NACC web site, which holders of this publication should consult. The space below is provided to keep a record of such amendments.

RECORD OF AMENDMENTS AND CORRIGENDA

AMENDMENTS			
No.	Date applicable	Date entered	Entered by

CORRIGENDA			
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Foreword

At the Third Caribbean/South American Regional Air Navigation (CAR/SAM/3 RAN) Meeting held in Buenos Aires, Argentina (October 1999), the issue of air traffic services (ATS) quality assurance programmes was discussed. It was considered that one purpose of a quality assurance programme was to provide specific guidance on reporting, investigating and resolving various types of ATS incidents that impact the quality of ATS. The programmes should be designed to work in conjunction with ICAO Standards and Recommended Practices as well as with States' regulations. It was considered that each ATS organization/unit in the CAR/SAM Regions should develop an ATS quality assurance programme document. The document should outline the purpose, goals, objectives and responsibilities of the programme within the unit.

As a result of these discussions it was recommended that ICAO develop guidance material on ATS quality assurance programmes for worldwide use (CAR/SAM/3 Recommendation 5/36). This document is the first phase in the development of the guidance material and will initially be used as regional guidance material by States/Territories and International Organizations in the ICAO CAR/SAM Regions as approved by Conclusion 10/18 of the GREPECAS/10 Meeting held in Canarias, Spain from 22 to 27 October 2001.

Contents

Chapter 1. DEFINITIONS

Accident. An occurrence associated with the operation of an aircraft which takes place between the time any person boards the aircraft with the intention of flight until such time as all such persons have disembarked, in which:

a) a person is fatally or seriously injured as a result of:
- being in the aircraft, or
- direct contact with any part of the aircraft, including parts which have become detached from the aircraft, or
- direct exposure to jet blast,

except when the injuries are from natural causes, self-inflicted or inflicted by other persons, or when the injuries are to stowaways hiding outside the areas normally available to the passengers and crew; or

b) the aircraft sustains damage or structural failure which:
- adversely affects the structural strength, performance or flight characteristics of the aircraft, and
- would normally require major repair or replacement of the affected component,

except for engine failure or damage, when the damage is limited to the engine, its cowlings or accessories; or for damage limited to propellers, wing, tips, antennas, tires, brakes, fairings, small dents or puncture holes in the aircraft skin; or

c) the aircraft is missing or is completely inaccessible.

Note 1. – *For statistical uniformity only, an injury resulting in death within thirty days of the date of the accident is classified as a fatal injury by ICAO.*
Note 2. – An aircraft is considered to be missing when the official search has been terminated and the wreckage has not been located.
{Reproduced from ICAO Annex 13}

Aircraft proximity. A situation in which, in the opinion of a pilot or air traffic services personnel, the distance between aircraft as well as their relative positions and speed have been such that the safety of the aircraft involved may have been compromised. An aircraft proximity is classified as:

a) Risk of collision. The risk classification of an aircraft proximity in which serious risk of collision has existed.

b) Safety not assured. The risk classification of an aircraft proximity in which the safety of the aircraft may have been compromised.

c) No risk of collision. The risk classification of an aircraft proximity in which no risk of collision has existed.

d) Risk not determined. The risk classification of an aircraft proximity in which insufficient information was available to determine the risk involved, or inconclusive or conflicting evidence precluded such determination.
{Reproduced from ICAO Doc 4444}

AIRPROX. The code word used in an air traffic incident report to designate aircraft proximity.
{Reproduced from ICAO Doc 4444}

Air traffic incident. A serious occurrence involving air traffic such as a near collision or a serious difficulty caused by faulty procedures, or the lack of compliance with applicable procedures or the failure of ground facilities resulting in a hazard to aircraft.
{*Reproduced from ICAO Doc 9426****}***

ATC proficiency training. Training conducted to maintain and update the knowledge and skills necessary to apply air traffic control procedures in a safe and efficient manner. Proficiency training includes refresher, supplemental, skill enhancement, and remedial training.

ATS operational duties. Duties associated with the provision of an ATC service or the supervision of these duties.

Desk audit. A follow-up evaluation conducted off-site. This may be accomplished through telephone interviews with staff of the ATS unit and/or through reviews of recordings/data and documentation.

Follow-up ATS evaluation. An evaluation conducted either on-site or through desk audit to ensure that specific items detected during a full-unit ATS evaluation are corrected.

Full-unit ATS evaluation. An ATS evaluation conducted on-site utilizing the appropriate national checklist to assess the ATS unit's performance in all areas.

Human performance. Human capabilities and limitations which have an impact on the safety and efficiency of aeronautical operations.
{Reproduced from ICAO Annex 11}

Incident. An occurrence, other than an accident, associated with the operation of an aircraft which affects or could affect the safety of operation.
{Reproduced from ICAO Annex 13}

In-flight evaluations. Evaluations performed during flight that assess the services provided by ATS units. In-flight evaluations are conducted by an evaluator and other authorized personnel of the Civil Aviation Authority using airlines or other operators with which they have an agreement to conduct such observations.

Operational deviation. An ATS incident in which ATC did not ensure separation which resulted in one of the following:

a) less than the applicable separation minima existed between an aircraft and adjacent airspace without prior approval;

b) an aircraft penetrated airspace under the responsibility of another controller within the same ATS unit or adjacent ATS unit without prior coordination and approval; or

c) an aircraft, vehicle, equipment, or personnel encroached upon a landing area under the responsibility of another controller without prior coordination and approval.

Operational error. An ATS incident in which ATC did not ensure separation which resulted in one of the following:

a) the applicable separation minimum was not maintained between two or more aircraft;

b) the applicable separation minimum was not maintained between an aircraft and terrain or obstacles; or

c) an aircraft landed or departed on a runway closed to aircraft operations after receiving an air traffic control clearance.

Pilot deviation. The actions of a pilot that resulted in the violation of an aviation regulation or the non-compliance with an ATC instruction/clearance.

Refresher training. Recurring training conducted to maintain and update previously learned knowledge and skills.

Runway incursion. Any occurrence at an aerodrome involving an aircraft, vehicle, person, or object on the ground that enters the manoeuvring area without authorization.

Note. – *Runway incursions may result from one of the following four types of aerodrome surface occurrences: Pilot deviations, operational errors, vehicle operator/pedestrian deviations, and pilot/vehicle operator/pedestrian judgmental errors.*

Simulation training. Training conducted in a classroom/laboratory environment designed to allow the controller to apply basic skills and knowledge.

Skill enhancement training. Training designed to increase the proficiency of a controller in a skill on an operational position in which the controller is certified.

Special evaluations. Evaluations to assess specific areas or problems as directed by the ATS authority. These evaluations may be either scheduled or unscheduled.

Supplemental training. Training conducted when changes occur pertaining to new/revised procedures, regulations, or equipment.

Three-step closure process. The three-step closure process is the method by which less than satisfactory items of an evaluation are to be closed. The required responses should be available after 60 days and 180 calendar days and should describe the three steps as follows:

a) Corrective action. The initial action taken by the ATS unit to correct the discrepancy;

b) Follow-up action. The action taken over a period of time to validate that the initial action corrected the discrepancy. Include the date(s) when this was accomplished and the results; and

c) Management control. The action taken by the ATS Authority or ATS Unit that will remain in place to ensure the problem does not reoccur. The action should include identifying those posts within the ATS unit that have responsibility to periodically review the corrected discrepancy and when the review will be accomplished.

Chapter 2. BACKGROUND

2.1 It is important and of the highest priority that an air traffic services (ATS) quality assurance programme be prepared, with guidelines to assist States in the implementation of such a programme. Due to the heightened awareness of ATS incidents and their relation to safety in the regions, recommendations made by the Second Caribbean/South American Regional Air Navigation Meeting (CAR/SAM/2 RAN Meeting, Santiago, 1989), recommendations made by the eighth meeting of the CAR/SAM Regional Planning and Implementation Group (GREPECAS/8), and reports received by the regional offices on ATS incidents, the ICAO NACC/SAM Regional Offices began a work programme that will form the basis for an ATS quality assurance programme for the CAR/SAM Regions.

2.2 Over the last several years, the awareness about ATS incidents in the CAR/SAM Regions has been heightened. Reports of ATS incidents have increased by approximately 43 per cent between 1996 and 1998. This is based on reports received in the NACC/SAM Regional Offices.

2.3 The CAR/SAM/2 RAN Meeting (Santiago, 1989) discussed the reporting and investigation of ATS incidents. As a result, Recommendation 6/11 — Investigation of ATS Incidents and Recommendation 6/12 — Reporting of ATS Incidents were approved by the meeting.

2.4 The reporting and investigation of air traffic incidents are essential in order to ensure high standards of safety in the control of air traffic, by identifying actions to be taken to prevent recurrences. It is also important that the findings be made available to States, international organizations and ICAO, giving wide distribution of lessons learnt.

2.5 At the GREPECAS/8 Meeting (Dominican Republic, 1998), it was noted that the ATS Subgroup had centred its efforts on ATS incidents and their direct relationship to air navigation safety. The meeting also recognized that the occurrence of ATS incidents was a problem that affected air traffic services at a world-wide level, having a negative impact on the safety of international civil aviation. Also, it was noted that the increase of ATS incidents in the CAR/SAM Regions was a cause of concern to the aviation community, requiring that concrete measures be taken for the reduction of these incidents on both short-term and long-term basis. GREPECAS then analysed the most important aspects of ATS incidents and the corresponding corrective/preventive measures that could be taken. This resulted in the following conclusions:

Conclusion 8/7 — Actions to be taken by States to reduce ATS incidents in the CAR/SAM Regions.

Conclusion 8/8 — Actions to be taken by the users to reduce ATS incidents in the CAR/SAM Regions.

Conclusion 8/9 — Actions to be taken by the ICAO Regional Offices to reduce ATS incidents in the CAR/SAM Regions.

2.6 The work already accomplished and attention placed on ATS incidents by informal working groups, GREPECAS, CAR/SAM RAN Meetings, international organizations, and airlines, justifies the need for introduction of an ATS quality assurance programme. ATS quality assurance programmes would place safety at the forefront while expediting and maintaining an orderly flow of air traffic in the CAR/SAM Regions.

2.7 Quality assurance is a dynamic process used to continually improve an ATS system. Although the quality of the service will continue to be measured against historical data such as the number of ATS incidents, delays, employee and customer feedback; factors that cannot be measured readily must also be recognized. The willingness to function as a team, the training, and the actions taken to support the goal of zero ATS incidents, all factor into quality assurance. The success of the quality assurance effort is dependent on the recognition that all ATS providers of the CAR/SAM Regions, independently and collectively, must strive to provide the best service possible.

Chapter 3. ATS QUALITY ASSURANCE PROGRAMMES

3.1 INTRODUCTION

3.1.1 Quality assurance programmes should focus on identifying and correcting deficiencies before they result in an ATS incident or accident and should continually work towards improving the overall quality of air traffic services. This chapter contains some proactive quality assurance strategies that may be developed into a quality assurance programme.

3.2 SCOPE AND PURPOSE

3.2.1 One purpose of a quality assurance programme is to provide specific guidance on reporting, investigating and resolving various types of ATS incidents that impact the quality of ATS. The programme should be designed to work in conjunction with ICAO Standards and Recommended Practices as well as with States' regulations. However, the first objective of the programme should be to prevent ATS incidents from occurring. The second objective of a quality assurance programme should be to continually improve the overall quality of air traffic services being provided.

3.3 STRUCTURE

3.3.1 The structure of an ATS quality assurance programme depends on the size and composition of the ATS service provider. An acceptable and productive programme structure would normally involve an ATS manager designating or selecting an experienced air traffic control (ATC) expert to be the ATS unit quality assurance (ATS QA) specialist. The ATS QA specialist would assume the responsibilities of QA for the unit and report directly to the ATS manager. In the case of larger ATS units, the ATS manager could develop an ATS quality assurance department with several specialists and an assistant manager with extensive ATC experience who would assume the duties and responsibilities associated with quality assurance for the unit and who would report directly to the ATS manager.

3.4 IMPLEMENTATION

3.4.1 As a result of the CAR/SAM/3 RAN Meeting discussions on ATS quality assurance the following recommendation was approved:

Recommendation 5/38Implementation of an ATS quality assurance programme

That:

a) States/ATS service providers within the CAR/SAM Regions implement an ATS quality assurance programme with associated supporting documents. The programme should outline the purpose, goals, objectives and responsibilities of the programme within the State/ATS service provider; and

b) each ATS unit should establish such a programme.

3.5 RESPONSIBILITIES

3.5.1 The ICAO NACC and SAM Regional Offices will provide guidance and assistance to States/ATS Service Providers in the ICAO CAR/SAM Regions in the development of ATS quality assurance programmes.

3.5.2 All States/ATS service providers within the CAR/SAM Regions should implement an ATS quality assurance programme with associated supporting documents. The programme should outline the purpose, goals, objectives and responsibilities of the programme within the State/ATS service provider and each ATS unit should establish such a programme.

3.5.3 States/ATS service providers in the CAR/SAM Regions should ensure that National ATS QA programmes are maintained and evaluated for effectiveness.

3.5.4 ATS unit managers should maintain a level of awareness and involvement in their ATS unit's operations/programmes so as to ensure their maximum quality and efficiency.

3.5.5 All employees are responsible for maintaining the highest level of quality performance.

3.6 PROGRAMME CONTENT

3.6.1 ATS QA programmes should establish methods to identify and correct shortcomings and deficiencies and recognize successes in the following areas:

a) ATS Incident Prevention.

- ATS refresher training
- Aeronautical phraseology improvement
- English language proficiency
- Hear-back/read-back
- ATS surface incidents
- Incentive/recognition
- List of good operating practices
- Recordings monitor evaluation
- Simulation training
- Personal accounts of lessons learned
- Periodic quality assurance briefings in ATS units covering trends, customers input, evaluations, etc.
- Aggressive resolution of problems identified
- Incorporation of past ATS incidents scenarios into training
- Internal, national, and regional ATS evaluation

b) Teamwork

The following may be used to promote teamwork within the air traffic services organizations:

- Air traffic service teamwork training
- Teamwork incentive/recognition programmes

- Roles of different positions/jobs
- ATS operational supervisor training course
- Team meetings/briefings
- Expectations of all employees clearly communicated

c) Communications

The following that may be used to improve communications among all employees to create an atmosphere conducive to sharing information:

- Electronic bulletin board system
- Internet/intranet access to data
- National database containing national and local ATS QA data
- Newsletters
- ATS QA seminars, conferences and workshops
- All staff meetings
- Reports from international organizations, i.e. IATA, IFALPA, IFATCA, PAAST, etc., and other industry safety reports

d) Customer service/feedback

The following may be used to solicit employee and customer feedback (internal/external) regarding the quality of service provided by the ATS unit and the aviation organization's impact on other organizations, customers and individuals:

- Pilot education programmes
- Surveys of internal and external customers
- Interaction with other aviation organizations
- Air traffic controller/operational supervisor evaluation of shift performance
- All staff meetings
- Familiarization flights
- Contacts with customer organizations (i.e. local flying schools, airlines, aviation organizations, etc.)
- Pilot safety seminars and airport management workgroups

Chapter 4. CONTROLLER PROFICIENCY CHECKS

4.1 INTRODUCTION

4.1.1 To provide for the continuous enhancement of technical proficiency in the ATS environment, individualized training requirements for technical performance should be identified and accomplished.

4.1.2 Controller proficiency checks are intended to provide feedback by operational supervisors/ATS QA officers/specialist to operational controllers and supervisors regarding their proficiency, and used to develop plans to enhance their proficiency as appropriate.

4.2 RESPONSIBILITIES

4.2.1 It is the responsibility of the ATS unit manager to establish and maintain ATS unit proficiency standards. Guidelines specifying the required level of knowledge both theoretical and practical, should be formulated by the ATS authority.

4.2.2 All ATS unit operational personnel should be required to periodically demonstrate that their on-the-job performance meets the required proficiency standards. Controller proficiency checks should be accomplished on each controller and supervisor who is certified on at least one operational position.

4.2.3 At larger ATS units, ATS personnel especially trained in on-the-job supervision and personnel training and assessment (ATS quality assurance officers/specialist), should be employed to carry out this task for the unit. ATS QA officers/specialists should prepare controller proficiency check rosters so that all operational staff is screened on a regular basis.

4.2.4 It is recommended that, as a minimum, controller proficiency checks be conducted biannually. Operational air traffic controllers and supervisors should be given advance notice of a proficiency check so that adequate preparation, mentally and functionally, can be made. A sample checklist for conducting controller proficiency checks is contained at the **Appendix** to this chapter.

4.2.5 At smaller ATS units, the ATS unit manager or his/her designee should perform these duties. Where arrangements are less formal, by virtue of the size of the ATS unit and number of staff, it should nevertheless be ensured that controller proficiency checks are complete and thorough.

4.2.6 The operational supervisor/ATS QA officer should continuously assess the controllers' performance through both direct and indirect methods. Indirect methods may include remote monitoring, reviews of recordings, observations by other supervisors, ATS QA officers, etc.

4.2.7 If it is determined, as a result of conducting a controller proficiency check, that a controller would benefit from individualized proficiency training, the following references can be used as guide for determining the type of training needed:

a) CAR/SAM Regional Guidance Material on ATS QA Programmes, Chapter 9 – Proficiency Training;

b) ICAO Doc 9426, Air Traffic Services Planning Manual, Part IV, Section 1, Chapter 3 – Training and Proficiency Requirements

4.2.8 Controller performance issues include areas of technical performance that might benefit from technical refresher training. These issues may not necessarily be areas of deficiency. A controller may demonstrate overall acceptable technical performance, but might still benefit from proficiency training in a particular skill or task.

4.2.9 When a controller proficiency check is completed, the operational supervisor/ATS QA officer who conducted the check should discuss the results with the controller.

4.2.10 Although controller proficiency checks are not intended to be graded as pass/fail or satisfactory/unsatisfactory, there may be occasions where a controller's performance is found to be unsatisfactory. In these cases, their rating should be suspended and appropriate refresher training, followed by a re-certification process of the controller should be completed. Under no circumstances should any person assessed as unsatisfactory be permitted to continue on the job without supervision. If, after a reasonable period, a controller is unable to pass the proficiency check, all details pertaining to the unsatisfactory assessments should be assembled and sent to the administering authority.

4.2.11 Each ATS unit should conduct a review of all controller proficiency checks accomplished at least once a year with a view to identifying recurring and significant proficiency needs. The results of the review should be compiled in a report to the ATS unit manager in order to develop effective future unit training plans.

4.3 DOCUMENTATION

4.3.1 Each controller proficiency check conducted should be discussed with the controller and well documented in the controller's training record.

Appendix

Sample checklist for conducting controller proficiency checks

CONTROLLER PROFICIENCY CHECK				**ATS Unit Name**	
Name			Date	Position/Sector:	
Weather ☐ VMC ☐ IMC ☐ Other	Workload ☐ Light ☐ Moderate ☐ Heavy	Complexity ☐ Not difficult ☐ Occasionally difficult ☐ Mostly difficult ☐ Very difficult			
Purpose: ☐ Proficiency check ☐ Follow-up ☐ Other				Review period: From:	To:

Performance category	Performance indicator	Commendable	Satisfactory	Needs Improvement	Unsatisfactory
A. Separation	1. Separation is ensured.				
	2. Safety alerts are provided.				
B. Coordination	3. Performs handoffs/point-outs.				
	4. Required coordinations are performed.				
C. Control judgment	5. Good control judgment is applied.				
	6. Priority of duties is understood.				
	7. Positive control is provided.				
	8. Effective traffic flow is maintained.				
D. Methods and procedures	9. Aircraft identity is maintained.				
	10. Strip posting is complete/correct.				
	11. Clearance delivery is complete/correct and timely.				
	12. LOAs/directives are adhered to.				
	13. Additional services are provided.				
	14. Rapidly recovers from equipment failures and emergencies.				
	15. Scans entire control environment.				
	16. Effective working speed is maintained.				
E. Equipment	17. Equipment status information is maintained.				
	18. Equipment capabilities are utilized/understood.				
F. Communication	19. Functions effectively as a team.				
	20. Communication is clear and concise.				
	21. Uses prescribed phraseology.				
	22. Makes only necessary transmissions.				
	23. Uses appropriate communications method.				
	24. Relief briefings are complete and accurate.				
G. Other					

Comments:
Recommendation for Improvement:
Signature of person conducting check: Date:
Controller Comments:
This report has been Discussed with me Controller's signature _____ Date _____

Chapter 5. AIR TRAFFIC INCIDENT REPORTING, INVESTIGATIONS, AND INVESTIGATION TEAMS

5.1 INTRODUCTION

5.1.1 This chapter is concerned with incidents specifically related to the provision of ATS and known as air traffic incidents. The term air traffic incident is meant to mean a serious occurrence involving air traffic such as an aircraft proximity (AIRPROX) or a serious difficulty caused by faulty procedures, or the lack of compliance with applicable procedures or the failure of ground facilities resulting in a hazard to aircraft.

5.1.2 The specifications in ICAO Annex 13 — *Aircraft Accident Investigation* apply to activities following accidents and serious incidents. When the accident/serious incident investigation authority institutes an investigation of an incident, the procedures in ICAO Annex 13 and the ICAO *Manual of Aircraft Accident Investigation* (Doc 6920) should be followed. In such case the ATS investigation should be a part of the investigation by the accident/incident investigation authority.

5.1.3 Reporting of air traffic incidents and ATS investigating procedures should be established in order to ensure safety and high standards in the conduct and control of air traffic. For this purpose, ICAO has developed an air traffic incident report form for use by pilots and controllers when submitting or receiving a report regarding an air traffic incident. This form is reproduced in **Appendix A**.

5.1.4 Aircraft accidents and incidents are often reported through ATS air-ground communications channels. Such reports and any associated information should be recorded by the unit concerned and forwarded immediately to the appropriate ATS authority.

5.1.5 In order to assist States in their accident/incident investigations and accident prevention programmes, ICAO has developed an accident/incident reporting system, which is known as ADREP. In accordance with Annex 13, States are encouraged to submit details of accidents to aircraft above 2 250 kg and incidents, if investigated, to aircraft above 5 700 kg so that the information can be entered into the ADREP system for storage and automated retrieval. Details of the ADREP system are contained in the ICAO *Accident/Incident Reporting (ADREP) Manual* (Doc 9156) .

5.2 REPORTING PROCEDURE

5.2.1 General

5.2.1.1 Air traffic incidents are identified and designated in reports as follows:

Type of air traffic incident	Designation of incident
Aircraft proximity	AIRPROX
Serious difficulty caused by faulty procedures or lack of compliance with applicable procedures	Procedural
Serious difficulty caused by failure or ground facilities	Facility
Operational error	OE
Operational deviation	OD

5.2.1.2 The air traffic incident report form as shown in Appendix A was developed by ICAO for use when submitting or receiving a report on an air traffic incident. The purpose of the form is to provide investigation authorities with as complete information as possible on an air traffic incident in order to facilitate an investigation. The investigation authority should report back, with the least possible delay, to the pilot or operator concerned the result of the investigation and, if appropriate, the remedial action taken. The form is intended for use by:

a) a pilot for filing a report on an air traffic incident after arrival or to confirm a report made by radio;

Note.— *The form, if available on board the aircraft, may also be used for making the initial report in flight.*

b) an ATS unit for recording an air traffic incident report received by radio, telephone or teleprinter.

Note.— *The form may be used as format for the text of a message to be transmitted over the AFTN network.*

5.2.2 Reporting by pilots

5.2.2.1 A pilot involved in an incident should proceed as follows:

a) during flight, use the appropriate air-ground frequency for reporting an incident of major significance, particularly if it involves other aircraft, so as to permit the facts to be ascertained immediately; and

b) as promptly as possible after landing submit a completed air traffic incident report form:

1) for confirming a report of an incident made initially in accordance with a) above, or for making the initial report on such an incident if it had not been possible to report it by radio; and

2) for reporting an incident which did not require immediate notification at the time of occurrence.

5.2.2.2 An initial report made by radio should contain the following information:

a) aircraft identification;

b) type of incident, (AIRPROX, PROCEDURE, FACILITY, etc.;

c) date/time and position of incident (UTC);

d) heading and route, true airspeed, level and altimeter setting, climbing, descending or level flight;

e) any avoiding action taken;

f) the other aircraft type and call sign or, if not known, description;

g) the other aircraft climbing, descending or level flight;

h) avoiding action taken by the other aircraft;

i) distance to other aircraft;

j) aerodrome of first landing and aerodrome of destination.

5.2.2.3 The air traffic incident report form initially reported by radio should be submitted by the pilot to the ATS reporting office of the aerodrome of first landing. The pilot should complete sections 1 and 2 supplementing the details of the radio report as necessary.

Note.— *Where there is no ATS reporting office, the report may be submitted to any other ATS unit.*

5.2.3 Reporting by ATS

5.2.3.1 Following an air traffic incident the ATC unit involved should proceed as follows:

a) identify and designate the incident in accordance with the procedure detailed in 5.2.1;

b) if the aircraft is bound for a destination located within the area of responsibility of the ATS unit in whose area the incident occurred, arrangements should be made with the operator to obtain the pilot's report on landing;

c) if the aircraft is bound for a domestic destination, the ATS unit of destination should be requested to obtain the pilot's report on landing;

d) if the aircraft is bound for an international destination, the ATS authority at destination aerodrome should be notified and given full details of the incident (by AFTN) and requested to obtain the pilot's report;

e) the civil aviation authority of the State of Registry and the State of the Operator should be notified of the incident by the State of occurrence (by AFTN) together with all available details;

f) if the incident involves another aircraft, similar action should be taken in regard to both parties;

g) complete the air traffic incident form; and

h) ensure that the accident/incident authority and the national ATS authority are notified of all reportable incidents.

5.3 INVESTIGATION AND DOCUMENTATION

5.3.1 It is essential to determine the cause of an air traffic incident, with the minimum delay so that action can be taken to prevent a recurrence. Immediately following an air traffic incident all documents and recordings relating to the incident should be impounded. Controllers, supervisors and officers-in-charge of the ATS unit concerned should take all necessary measures to preserve relevant documents and to record as many details as possible while they are still fresh in their minds.

5.3.2 The initial ATS investigation is normally carried out by the ATS unit to which the incident has been reported or which noted it. The ATS unit should obtain the following information:

a) statements by personnel involved;

b) transcripts of relevant recordings of radio and telephone communications;

c) copies of flight progress strips and other relevant data, including recorded radar data, if available;

d) copies of the meteorological reports and forecasts relevant to the time of the incident;

e) technical statements concerning the operating status of equipment; and

f) unit findings and recommendations for corrective actions, if appropriate.

5.3.3 To give effect to the air traffic incident investigation process, an investigating team should be established. The team should include the officer-in-charge of the ATS unit, a senior ATS officer, or the ATS QA officer/specialist as team leader and ATS experts, other specialist officers from flight operations, flight calibration, telecommunications engineering or other fields, as required. In addition and when necessary, the controller(s) involved in the incident should be given the opportunity to nominate as a member of the team an experienced controller to represent him/her during the investigation. When two units are involved, the unit in whose area the incident has taken place should initiate action to convene the incident investigation team and invite the other unit to participate.

5.3.4 Should the pilot or the operator refuse to provide the information necessary for the proper investigation of an air traffic incident, the appropriate ATS authority should be informed. Should a civil aviation authority refuse to provide the information necessary regarding the ATS incident, the appropriate ICAO Regional Office should be advised. Notwithstanding, in both cases above, the State conducting the investigation should proceed with the investigation using available information.

5.3.5 The proceedings of an air traffic investigating team, as well as papers and records used by it should be treated as confidential material. Specific *prima facie* facts required by the team should be prepared by the unit and should include, as appropriate:

a) names and operating positions of ATS personnel involved;

b) full details of the sequence of events in narrative form;

c) names of pilots and operators, and details of aircraft involved;

d) reports from controllers involved as prepared before leaving the unit on the day of the occurrence;

e) reports from pilots involved, if necessary, through the operator's office; and

f) relevant voice recordings, flight progress strips and other flight data, including recorded radar data if available.

5.3.6 The report of the ATS investigating team should include a summary of the incident and the cause. The report should contain all relevant information, in chronological sequence where appropriate, and conclude with a list of findings, conclusions, causes and safety recommendations for the purpose of accident/incident prevention. Recommended corrective actions should also be included in the report. The fundamental objective of the investigation is prevention of accidents, not to apportion blame or liability. Therefore, the team should not make recommendations on personnel or disciplinary action in the event of controller error because the fundamental objective of the investigation is prevention of accidents, not to apportion blame or liability.

5.3.7 In addition, the following information should be submitted as appendices to the report:

a) statements by personnel involved;

b) transcripts of relevant recordings of air-ground and ground-ground communications;

c) copies of meteorological reports or forecasts relevant to the incident;

d) copies of flight progress strips and other data relevant to the incident, including recorded radar data, if available; and

e) any technical statements concerning the operating status of equipment.

5.3.8 On completion of the investigation, full details of the findings should be sent through appropriate channels to the operator and the civil aviation authority of the State of the operator.

5.4 ANALYSIS OF ATS INCIDENTS

5.4.1 The analysis of an incident should be considered in relation to system operation and take into account factors such as the following:

a) *Procedures* — Were the procedures and separation minima applied, correct for the situation?

b) *Data and display* — Were the displayed data correct and complete in terms of local unit instructions? Was the displayed information properly interpreted and utilized?

c) *Coordination* — Were the prescribed coordination procedures adequate and correct and were they correctly and fully applied?

d) *Communication* — Was correct phraseology used by all personnel involved? Were the communications clear and concise so as to not give rise to errors or misunderstandings? Was there any failure to note and correct any incorrect read back? Was there any failure to obtain acknowledgement of the receipt of information?

e) *Equipment* — Was the performance of relevant technical equipment adequate? (If any failure or malfunction of equipment caused or contributed to the incident, specialized technical advice or evidence should be sought.)

f) *Personnel performance* — Were any factors present which may have affected an individual's performance, e.g. fatigue, illness, personal problems, etc.? (While personnel errors may be established by the investigation team, degrees of negligence, carelessness or blame are not to be specified.)

g) *Task environment* — All aspects of the working environment should be considered which may have affected the performance of personnel, e.g. background noise, heating, ventilation, ambient light levels, etc.

h) *General operations* — Were all personnel familiar with the traffic situation and pertinent data before assuming responsibility for an operating position? Were the duties and responsibilities for the operating position(s) clearly defined? The adequacy of staffing in relation to traffic density should be considered as well as relief, and adequate rest periods. If applicable, was the level of supervision satisfactory?

5.4.2 Once the analysis of an ATS incident has been completed, the results, including conclusions and recommendations reached, should be made available to all concerned so that corrective action, etc. may be taken and all concerned are fully aware of lessons learnt and the final results.

5.5 RELEASE OF INFORMATION

5.5.1 In the interest of accident and incident prevention, the State conducting the investigation should publish the report as soon as possible. When the State considers that disclosure of records, described below, might have an adverse effect on the availability of information in that investigation or any future investigation, then such records shall not be made available.

5.5.1.1 Such records may include:

a) statements from persons responsible for the safe operation of the aircraft;

b) communications between persons having responsibility for the safe operation of the aircraft;

c) medical or private information regarding persons involved in the accident or incident;

d) cockpit voice recordings and transcripts from such recordings; and

e) opinions expressed in the analysis of information, including flight recorder information.

5.5.2 Members of the press and general public who make inquiries into occurrences should be referred to a person authorized to release information.

5.6 AIR TRAFFIC INCIDENT INVESTIGATION PROCESS (Step-by-step process)

5.6.1 There are several types of incidents that can adversely affect the capabilities of the air traffic services systems of States to provide a safe, orderly, and expeditious movement of air traffic. This section attempts to provide a step-by-step process for States to consider when investigating ATS incidents.

5.7 SUSPECTED ATS INCIDENT EVENT

5.7.1 It is very important that all deficiencies within the air traffic services system are identified and reported so that appropriate corrective actions can be taken to resolve the associated problems. ATS incidents (operational errors, operational deviations, etc.) should be reported for just that reason, so that those problems, either systemic or individual, can be corrected to enhance the ATS system integrity. The reporting of ATS incidents, without fear of reprisal, should be a requirement within States and should be a responsibility of all aviation personnel.

5.7.2 It is recommended that any person who is aware of an occurrence that may be an ATS incident should immediately report the occurrence to the ATS supervisor or the appropriate ATS administration official.

5.8 PRELIMINARY ATS INCIDENT INVESTIGATION

5.8.1 The preliminary ATS incident investigation is a fact finding exercise, designed to determine what occurred in the ATS system, and to report the occurrence of significant events to higher levels of management or the administration.

5.8.2 When an ATS incident is suspected, the ATS supervisor, ATS unit manager, or their designee should determine the validity of the suspected ATS incident, and if valid, should accomplish the following:

a) when information indicates that an ATS incident may have occurred in the area of responsibility of another ATS unit, promptly advise that ATS unit manager or supervisor;

b) provide relief to any controller who may be involved in the ATS incident from all ATS operational duties as promptly as operational and staffing conditions permit. This action allows controllers the opportunity to prepare statements while the circumstances are still fresh in their minds;

c) gather flight progress strips, meteorological reports, and other pertinent information. If another ATS unit is involved, that ATS unit should provide the requesting ATS unit's manager/supervisor with all the pertinent data necessary for the timely completion of the preliminary report;

d) review voice recordings and, as soon as feasible, prepare a cassette re-recording from the original to be used as a working copy;

e) review available computer data and radar data where available;

f) conduct preliminary interviews as appropriate;

g) notify the appropriate ATS management or aviation administration official of the occurrence of the ATS incident;

h) complete the model Preliminary ATS Incident Investigation Worksheet as contained in **Appendix B** to this Chapter. When writing the summary, be as clear and concise as possible using who, what, when, where, and how to describe the event; and

i) if the preliminary investigation reveals that certain controllers first believed to be involved were not, they should be returned to duty without further action. If these controllers have knowledge of the events, their views and recommendations should be obtained.

5.9 FOLLOW-UP INVESTIGATION

5.9.1 The manager of the ATS unit that was responsible for the aircraft at the time of the ATS incident should do the following:

a) ensure that ATS incident investigations are conducted in accordance with ICAO, National and ATS unit guidance, recommendations, and directives;

b) when the preliminary ATS incident investigation report indicates that another ATS unit is involved in the occurrence, confer with the other ATS unit chief as soon as feasible to determine the scope of the other ATS unit's investigation effort and how long it will take. If the two ATS units cannot concur in any phase of their respective investigations, their differences should be forwarded to a higher authority for resolution;

c) designate an ATS incident Investigator-In-Charge (ATS-IIIC). The ATS-IIIC may be designated on a rotational or permanent basis. The ATS-IIIC function should be performed by the ATS unit manager, a supervisor or the ATS unit QA specialist;

d) assemble an ATS incident investigation team to assist the ATS-IIIC in the investigation of each ATS incident. Each State or ATS unit should determine the size and composition of the ATS investigation team;

e) ensure that a complete, thorough, and objective investigation is completed in a timely manner; and

f) ensure that the ATS unit manager of any other involved unit be responsible for providing the first unit with information and assistance as requested. This may require an investigation on the same scale as the first unit, in which case the ATS unit manager should have the same responsibilities as defined above. The ATS unit manager of any other involved unit should also be responsible for retaining all pertinent original data as appropriate.

5.9.2 The ATS-IIIC should be responsible for conducting a complete investigation and forwarding the findings and recommendations to the ATS unit manager. In addition, the ATS-IIIC, should conduct the following:

a) ensure that all pertinent data has been collected and documented in the investigation report and forwarded to the ATS unit manager;

b) when other ATS units are involved, ascertain the scope of their investigation and coordinate the exchange of data and assistance as required;

c) assign duties to team members; and

d) ensure that interviews are conducted in accordance with national and local requirements.

5.9.3 The ATS incident investigation team should:

a) assist the ATS-IIIC by performing and completing all assigned tasks; and

b) remain under the guidance of the ATS-IIIC during the investigation process.

5.10 INVESTIGATION PROCESS

5.10.1 *Fact finding*. The investigation of an ATS incident should entail an in-depth inquiry into all causal factors. The following should be considered for a thorough investigation:

a) ATS unit procedures;
b) ATS unit training;
c) ATS unit supervision;
d) equipment;
e) control room environment;
f) external factors;
g) controller actions;
h) airspace configuration;
i) traffic flows;
j) pilot actions, including the consequence of any ACAS/TCAS event;
k) meteorological conditions;
l) control position configuration;
m) coordination procedures;
n) aerodrome environment;
   - runway markings
   - apron use
   - areas of poor visibility
   - runway configuration
   - congestion
o) human factors;
p) accuracy of the automated radar systems; and
q) radar data.

5.10.2 *Interviews*. Certain information which is necessary to complete the investigation must be obtained from the controllers involved. Since a number of the staff in the ATS unit, e.g. controllers, assistant controllers, supervisors, etc., may be knowledgeable of or a party to the incident, interviews with all possible involved personnel should be held. It is important that these interviews be conducted in an atmosphere of shared concern as to the events leading to and surrounding the incident. When conducting the interview, the following should be taken into consideration:

a) ensure that the person being interviewed understands the purpose and goal of the interview;

b) any national and local interview procedures or regulations to be followed;

c) the person being interview should be allowed to provide written comments and recommendations concerning the incident. The recommendations should concern corrective actions that can be undertaken to preclude a similar occurrence; and

d) interviews should be conducted by the ATS-IIIC, or the investigation team.

5.10.3 *Voice recordings*. Voice recordings of the ATS incident should be reviewed as follows:

a) as a minimum, one certified copy should be made of the original recording;

b) include the time track, if available, and all communications for a period of 5 minutes before initial contact to 5 minutes after the last contact with each control position involved in the ATS incident; and

c) it may not be necessary to conduct a complete written transcript of the communications unless specifically needed and requested by the Civil Aviation Authority.

Note. - *If the above voice recording exceeds 30 minutes, the ATS unit manager or Administration may approve, on a case-by-case basis, limiting the recording to the period pertinent to the incident.*

5.10.4 *Radar data*. Radar data may be used to validate the occurrence of an ATS incident. When using this concept, written procedures should be developed explaining how this can be accomplished. Automation and radar system capabilities and the accuracy of the data should be taken into consideration.

5.11 RECLASSIFICATION OF ATS INCIDENTS

5.11.1 If after the preliminary notification of the ATS incident is completed, it is found that a review of the data may indicate that a reclassification of the ATS incident is warranted, the incident may be reclassified.

5.12 RETURN TO OPERATIONAL DUTIES

5.12.1 In an effort to ensure complete and consistent handing of all ATS incidents, it is recommended that ATS unit managers remain involved in the post ATS incident process.

5.12.2 It is important to note that reasons for suspension of a controller's rating and the assignment of proficiency training are to assist and enhance the individual controller's performance to the best of his/her abilities and that minimum quality standards are met. It is not intended that this process be viewed as punishment toward any individual. This will also improve the overall performance and quality of the air traffic services.

5.12.3 Before returning a controller to operational duties, the following actions are recommended:

a) conduct an in-depth review of the controller's role in the ATS incident. The review may include the following:

- the events leading up to and surrounding the ATS incident
- the controller's statement
- the procedure or the separation minimum involved
- available voice recording of the ATS incident
- the controller's training record
- all applicable controller proficiency checks
- all applicable proficiency training received
- verification of currency on the control position
- applicable computer data
- controller involvement in previous ATS incidents

- the results of the interviews and recommendations from the ATS-IIIC/ATS incident investigation team. (If applicable and available in a timely manner so as to not unduly delay the controller from returning to ATS operational duties.);

b) identify all deficiencies in the controller's performance discovered during the ATS incident investigation;

c) determine whether to suspend the controller's rating in consideration of performance deficiencies identified in the above review. Suspension of the controller's rating should not be based solely on the involvement in the ATS incident, but rather the controller's performance identified during the investigation of the incident. Suspension of the rating may be appropriate if documentation of previous similar performance deficiencies exist or it the deficiencies denote a safety concern. Consideration should be given as to the suspension of the controller's rating in one, multiple, or all operational positions for the performance deficiencies identified;

d) determine the appropriate actions and refresher training necessary to return the controller fully to ATS operational duties in consideration of performance deficiencies identified in the review; and

e) after completion of the re-certification proficiency training, re-certify a controller through the conduction of a controller proficiency check on at least the control position where the controller was working at the time of the incident.

5.13 FINAL ATS INCIDENT REPORTS

5.13.1 The ATS unit manager should analyze the data submitted by the ATS-IIIC/ATS incident investigation team in the Final ATS Incident Investigation Report, sample form is contained in **Appendix C**, to determine and/or endorse the classification of the incident; i.e., near collision, operational error, operational deviation, pilot deviation, no occurrence, etc., and:

a) the categorization of the ATS incident; i.e., procedural, facility, human factor, or any combination thereof;

b) the causal factors of the ATS incident; and

c) the recommendations and corrective actions to be taken to prevent a recurrence of the incident.

5.13.2 The Final ATS Incident Report results should be completed within 30 days of the date the incident was reported.

5.14 ATS INCIDENT TRACKING PROCESS

5.14.1 ATS authorities should implement an annual (Calendar year) ATS incidents tracking process. This will assist the CAAs with the follow-up investigations and trend analysis. The following examples may be used by States for tracking purposes:

ATS Incident Report # XXXX-A-00-001
ATS Incident Report # XXXX-T-00-002
ATS Incident Report # XXXX-F-00-003

Legend: "XXXX" = ATS unit identification
"A, T, or F" = Type of ATS unit (A = Area (ACC); T = Approach (APP) and Aerodrome Control Tower; F = FIC, AFIS, etc.)
"00" = Last two digits of the year
"001" = ATS incident number in sequence by year for the unit

5.15 TRAINING AND PROFICIENCY RECORDS

5.15.1 It is recommended that training and proficiency records be appropriately documented when additional training is assigned as a result of deficiencies identified during an ATS incident investigation.

5.16 ATS INCIDENTS RECORDS RETENTION

5.16.1 Civil Aviation Authorities should determine the retention period for all original forms and investigative data involving an ATS incident. A retention period of 2 1/2 years is recommended, this may allow sufficient time for previous ATS incidents to be studied for trends and causal factors. These data can then be used to make recommendations to continually maintain and improve safety of the overall ATS system.

5.17 NATIONAL AIR TRAFFIC SERVICE AUTHORITY RESPONSIBILITIES

5.17.1 National Air Traffic Service Authorities should establish and maintain an analysis element within the Administration, which should conduct the following:

a) maintain a central source of ATS incident data;

b) review all Final Air Traffic Incident Investigation Reports for the purpose of identifying system wide deficiencies (i.e. human, facility, procedural, etc.) and based upon these reviews, initiate recommendations for corrective actions to reduce the number of ATS incidents;

c) develop and distribute, on an annual basis, an ATS incident analysis report. This report should, as a minimum, identify trends concerning deficiencies found as a result of the ATS incidents investigation reports. This information should be distributed to ATS units within the State and could be used as proficiency training material;

d) conduct periodic programme evaluations to determine the effectiveness and efficiency of this programme;

e) maintain liaison with ATS unit managers to provide continuity and follow-up on corrective action recommendations;

f) review and maintain oversight of all ATS incidents investigation reports; and

g) retain all Final Air Traffic Investigation Reports.

Appendix A

Air Traffic Incident Report Form

Appendix A

Air Traffic Incident Report Form

APPENDIX 4. AIR TRAFFIC INCIDENT REPORT

1. ICAO model air traffic incident report form

2. Instructions for the completion of the air traffic incident report form

A4-2 *Rules of the Air and Air Traffic Services (PANS-RAC)*

1. ICAO model air traffic incident report form

AIR TRAFFIC INCIDENT REPORT FORM

For use when submitting and receiving reports on air traffic incidents. In an initial report by radio, shaded items should be included.

A – AIRCRAFT IDENTIFICATION	**B – TYPE OF INCIDENT**
	AIRPROX / PROCEDURE / FACILITY[℘]

C – THE INCIDENT

1. General

a) **Date / time of incident** UTC

b) **Position**

2. Own aircraft

a) **Heading and route** _____

b) **True airspeed** _____ Measured in ( ) kt ___ ( ) km/h ___

c) **Level and altimeter setting** _____

d) **Aircraft climbing or descending**

( ) Level flight ( ) Climbing ( ) Descending

e) **Aircraft bank angle**

( ) Wings level ( ) Slight bank ( ) Moderate bank

( ) Steep bank ( ) Inverted ( ) Unknown

f) **Aircraft direction of bank**

( ) Left ( ) Right ( ) Unknown

g) **Restrictions to visibility (select as many as required)**

( ) Sunglare ( ) Windscreen pillar ( ) Dirty windscreen

( ) Other cockpit structure ( ) None

h) **Use of aircraft lighting (select as many as required)**

( ) Navigation lights ( ) Strobe lights ( ) Cabin lights

( ) Red anti-collision lights ( ) Landing / taxi lights ( ) Logo (tail fin) lights

( ) Other ( ) None

i) **Traffic avoidance advice issued by ATS**

( ) Yes, based on radar ( ) Yes, based on visual sighting ( ) Yes, based on other information

( ) No

j) **Traffic information issued**

( ) Yes, based on radar ( ) Yes, based on visual sighting ( ) Yes, based on other information

( ) No

k) **Airborne collision avoidance system – ACAS**

( ) Not carried ( ) Type ( ) Traffic advisory issued

( ) Resolution advisory issued ( ) Traffic advisory or resolution advisory not issued

[℘] Delete as appropriate

l) Radar identification

( ) No radar available ( ) Radar identification ( ) No radar identification

m) Other aircraft sighted

( ) Yes ( ) No ( ) Wrong aircraft sighted

n) Avoiding action taken

( ) Yes ( ) No

o) Type of flight plan **IFR / VFR / none**[℘]

3. Other aircraft

a) Type and call sign / registration (if known)

b) If a) above not known, describe below

( ) High wing ( ) Mid wing ( ) Low wing

( ) Rotorcraft

( ) 1 engine ( ) 2 engines ( ) 3 engines

( ) 4 engines ( ) More than 4 engines

Marking colour or other available details

c) Aircraft climbing or descending

( ) Level flight ( ) Climbing ( ) Descending

( ) Unknown

d) Aircraft bank angle

( ) Wings level ( ) Slight bank ( ) Moderate bank

( ) Steep bank ( ) Inverted ( ) Unknown

e) Aircraft direction of bank

( ) Left ( ) Right ( ) Unknown

f) Lights displayed

( ) Navigation lights ( ) Strobe lights ( ) Cabin lights

( ) Red anti-collision lights ( ) Landing / taxi lights ( ) Logo (tail fin) lights

( ) Other ( ) None ( ) Unknown

g) Traffic avoidance advice issued by ATS

( ) Yes, based on radar ( ) Yes, based on visual sighting ( ) Yes, based on other information

( ) No ( ) Unknown

h) Traffic information issued

( ) Yes, based on radar ( ) Yes, based on visual sighting ( ) Yes, based on other information

( ) No ( ) Unknown ( )

i) Avoiding action taken

( ) Yes ( ) No ( ) Unknown

[℘] Delete as appropriate

4. Distance

a) Closest horizontal distance _____

b) Closest vertical distance _____

5. Flight weather conditions

a) IMC / VMC*

b) Above / below* clouds / fog / haze or between layers*

c) Distance vertically from cloud _____ m / ft* below _____ m / ft* above

d) In cloud / rain / snow / sleet / fog / haze*

e) Flying into / out of* sun

f) Flight visibility _____ m / km*

6. Any other information considered important by the pilot-in-command

_____

_____

_____

_____

_____

_____

D – MISCELLANEOUS

1. Information regarding reporting aircraft

a) Aircraft registration _____

b) Aircraft type _____

c) Operator _____

d) Aerodrome of departure _____

e) Aerodrome of first landing _____ destination _____

f) Reported by radio or other means to _____ (name of ATS unit) at time _____ UTC

g) Date / time / place of completion of form _____

2. Function, address and signature of person submitting report

a) Function

b) Address

c) Signature

d) Telephone number

3. Function and signature of person receiving report

a) Function _____ b) Signature _____

E – SUPPLEMENTARY INFORMATION BY ATS UNIT CONCERNED

1. Receipt of report

   a) Report received via AFTN / radio / telephone / other (specify)* _____

   b) Report received by _____ (name of ATS unit)

2. Details of ATS action

   Clearance, incident seen (radar/visually, warning given, result of local enquiry, etc.)

_____

_____

_____

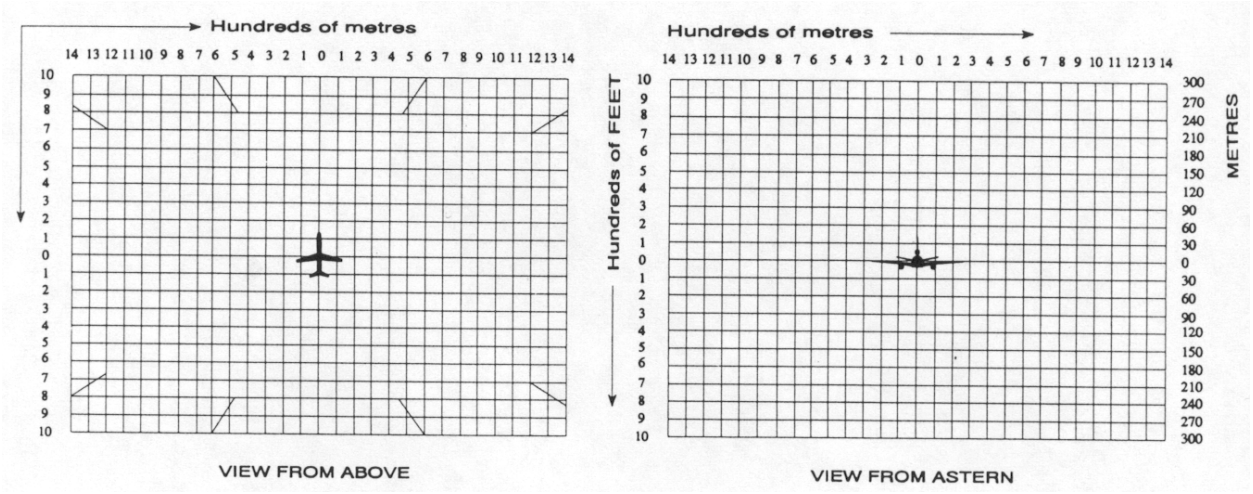
_____

_____

_____

DIAGRAMS OF AIRPROX

Mark passage of other aircraft relative to you, in plan on the left and in elevation on the right, assuming YOU are at the centre of each diagram. Include first sighting and passing distance.



2. Instructions for the completion of the air traffic incident report form

Item

A Aircraft identification of the aircraft filing the report.

B An AIRPROX report should be filed immediately by radio.

C1 Date/time UTC and position in bearing and distance from a navigation aid or in LAT/LONG.

C2 Information regarding aircraft filing the report, tick as necessary.

C2 c) E.g. FL 350/1 013 hPa or 2 500 ft/QNH 1 007 hPa or 1 200 ft/QFE 998 hPa.

C3 Information regarding the other aircraft involved.

C4 Passing distance — state units used.

C6 Attach additional papers as required. The diagrams may be used to show aircraft's positions.

D1 f) State name of ATS unit and date/time in UTC.

D1 g) Date and time in UTC.

E2 Include details of ATS unit such as service provided, radiotelephony frequency, SSR Codes assigned and altimeter setting. Use diagram to show the aircraft's position and attach additional papers as required.

Appendix B

Preliminary Air Traffic Incident Worksheet

REPORT NUMBER

PRELIMINARY REPORT OF ATS INCIDENT (WORKSHEET)

1.- CLASSIFICATION
□ OPERATIONAL ERROR □ AIRPROX
□ OPERATIONAL DEVIATION □ PILOT DEVIATION
□ PROCEDURAL □ FACILITY

2.- DATE AND TIME OF THE INCIDENT
DATE | TIME
DAY MONTH YEAR | UTC | LOCAL

3.- ATS UNIT ORIGINATING THE REPORT
IDENT.

4.- OTHER ATS UNITS INVOLVED
□ YES
□ NO
IDENT. IDENT.

5.- REPORT OF CLOSE PROXIMITY (AIRPROX) □ YES □ NO □ UNKNOWN

6.- INCIDENT REPORTED BY:
□ CONTROLLER □ SUPERVISOR □ PILOT

7.- METEOROLOGICAL INFORMATION □ AVAILABLE □ NOT AVAILABLE

8.- ALTITUDE OR FLIGHT LEVEL IN WHICH THE INCIDENT OCCURRED

9.- LOCATION OF THE INCIDENT

A. IN AIR			B. ON GROUND		
FIXED	DIRECTION	DISTANCE	INTERSECTION	RUNWAY	TAXIWAY

10.- CLOSEST PROXIMITY

□ IN AIR

VERTICAL	HORIZONTAL
FEET	□ FEET
	□ . MILES

□ ON GROUND (DESCRIPTION)

11.- AIRCRAFT INFORMATION	AIRCRAFT No. 1	AIRCRAFT No. 2
A. IDENTIFICATION		
B. TYPE OF AIRCRAFT		
C. LEVEL FLIGHT	□ YES □ NO □ UNKNOWN	□ YES □ NO □ UNKNOWN
D. CLIMBING	□ YES □ NO □ UNKNOWN	□ YES □ NO □ UNKNOWN
E. DESCENDING	□ YES □ NO □ UNKNOWN	□ YES □ NO □ UNKNOWN
F. EVASIVE ACTION	□ YES □ NO □ UNKNOWN	□ YES □ NO □ UNKNOWN
G. TAKEOFF ROLL	□ YES □ NO □ UNKNOWN	□ YES □ NO □ UNKNOWN
H. LANDING ROLL	□ YES □ NO □ UNKNOWN	□ YES □ INO □ UNKNOWN
I. UNDER RADAR CONTROL	□ YES □ NO □ UNKNOWN	□ YES □ NO □ UNKNOWN
J. RADAR VECTORED	□ YES □ NO □ UNKNOWN	□ YES □ NO □ UNKNOWN
K. TRANSPONDER FUNCTIONING	□ YES □ NO □ UNKNOWN	□ YES □ NO □ UNKNOWN
L. MODE C FUNCTIONING	□ YES □ NO □ UNKNOWN	□ YES □ NO □ UNKNOWN
M. RECEIVED TCAS/ACAS RA	□ YES □ NO □ UNKNOWN	□ YES □ NO □ UNKNOWN

O. AIRCRAFT AND OBSTRUCTIONS/OBSTACLES
□ TERRAIN □ VEHICLES □ PERSONNEL □ MANOEUVRE AREA □ OBSTRUCTION
□ EQUIPMENT □ CONTROLLED AIRSPACE □ NOT APPLICABLE □ OTHER (EXPLAIN)

12. - CONTROLLER INFORMATION

A. AREA OF SPECIALIZATION. _____

B. SECTOR/POSITION. _____

C. TIME (HRS/MIN) ON POSITION WHEN INCIDENT OCCURRED. _____

D. TIME (YEARS/MONTHS) SINCE LAST CERTIFIED ON POSITION. _____

E. NUMBER OF AIRCRAFT CONTROLLER HAD CONTROL RESPONSIBILITY FOR AT TIME OF INCIDENT. _____

F. WAS THE CONTROLLER PREVIOUSLY FAMILIARIZED WITH THE POSITION. □ YES □ NO (EXPLAIN)
_____

G. WAS THE POSITION/SECTOR COMBINED. □ YES (EXPLAIN) □ NO _____

REPORT NUMBER

PRELIMINARY REPORT
OF ATS INCIDENT (WORKSHEET)

13.- SUPERVISION

A.- WAS A SUPERVISOR ASSIGNED TO THE AREA/CONTROL ROOM?

☐ YES

☐ NO (EXPLAIN)

B.- WHAT WAS THE SUPERVISOR DOING WHEN THE INCIDENT OCCURRED?

14.- WAS TRAINING IN PROGRESS

☐ YES (EXPLAIN) ☐ OTHER

☐ NO

15.- TYPE AND CLASS OF AIRSPACE

☐ TERMINAL AIRSPACE	☐ CLASS A	☐ CLASS E
☐ ENROUTE AIRSPACE	☐ CLASS B	☐ CLASS F
☐ AERODROME SURFACE	☐ CLASS C	☐ CLASS G
☐ OCEANIC	☐ CLASS D	☐ OTHER

16.- PROCEDURES

A.- TYPE OF CONTROL	B.- SPECIFY THE MINIMUM SEPARATION APPLICABLE	
☐ RADAR ☐ TOWER	DIRECTIVE	REQUIRED SEPARATION (SPECIFY)
☐ MANUAL ☐ OCEANIC	PARAGRAPH	_____.

16.- EQUIPMENT

A.- TYPE	GOOD	NORMAL	POOR	OUT OF SERVICE	
RADIO COMMUNICATION					
	REMARKS				
COMMUNICATION POINT-TO-POINT					
	REMARKS				
COMPUTER					
	REMARKS				
RADAR					
	REMARKS				

B.- SYSTEM(s) IN USE

☐ PRIMARY RADAR ☐ SECONDARY RADAR ☐ ALPHA NUMERIC ☐ MODE-S

☐ BRITE/DBRITE ☐ OTHER

C.- WAS THERE A TRANSITION FROM MANUAL TO RADAR ☐ YES (EXPLAIN) ☐ NO

REPORT NUMBER

PRELIMINARY REPORT
OF ATS INCIDENT (WORKSHEET)

17.- MSAW / EMSAW (Complete if applicable)	18.- CONFLICT ALERT (Complete if applicable)
A. AVAILABLE □ YES □ NO (EXPLAIN)	A.- AVAILABLE □ YES □ NO (EXPLAIN)
B.- ACTIVATED □ YES □ NO (EXPLAIN)	B.- ACTIVATED □ YES □ NO (EXPLAIN)
C.- DEACTIVATED □ YES (EXPLAIN) □ NO	C.- DEACTIVATED □ YES (EXPLAIN) □ NO

18.- WERE NAVAIDS A FACTOR

□ YES (EXPLAIN)

□ NO

19.- SUMMARY OF PERTINENT INFORMATION (DESCRIPTION OF EVENTS)

20.- PERSON MAKING NOTIFICATION	DATE	TIME	NAME AND POSITION
21.- PERSON RECEIVING REPORT			SIGNATURE

Appendix C

Final Air Traffic Incident Investigation Report Form

FINAL ATS INCIDENT INVESTIGATION REPORT

REPORT NUMBER

PART I.
INVESTIGATION INFORMATION

SECTION A. GENERAL INFORMATION

1.- DATE AND TIME OF THE INCIDENT

DATE: ☐☐☐☐☐☐ (DAY MONTH YEAR) TIME: ☐☐☐☐ (U T C) ☐☐☐☐ (LOCAL)

2.- ATS UNIT ORIGINATING THE REPORT

A.- IDENTIFICATION	B.- TYPE	C.- CLASSIFICATION LEVEL
☐☐☐	☐ TOWER ☐ APP ☐ ACC ☐ FIS	☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

3.- WAS THERE ANOTHER UNIT INVOLVED ☐ YES ☐ NO

A.- IDENTIFICATION	B.- TYPE	C.- CLASSIFICATION LEVEL
☐☐☐	☐ TOWER ☐ APP ☐ ACC ☐ FIS	☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

4.- INCIDENT REPORTED BY

☐ CONTROLLER ☐ SUPERVISOR ☐ PILOT

5.- ALTITUDE OR FLIGHT LEVEL WHERE THE INCIDENT OCCURRED ☐☐☐

A.- WAS THE IMMEDIATE UPPER LEVEL OR ALTITUDE AVAILABLE
☐ YES ☐ NO

B.- WAS THE IMMEDIATE LOWER LEVEL OR ALTITUDE AVAILABLE
☐ YES ☐ NO

6.- METEOROLOGICAL CONDITIONS A FACTOR?

☐ YES (EXPLAIN)
☐ NO

7.- TYPE AND CLASS OF AIRSPACE:

☐ TERMINAL AIRSPACE	☐ CLASS A	☐ CLASS E
☐ ENROUTE AIRSPACE	☐ CLASS B	☐ CLASS F
☐ AERODROME SURFACE	☐ CLASS C	☐ CLASS G
☐ OCEANIC	☐ CLASS D	☐ OTHER

8.- LOCATION OF THE INCIDENT

A. ☐ IN AIR
FIX ☐☐☐☐☐ DIRECTION ☐☐☐ DISTANCE ☐☐☐

B. ☐ ON GROUND
INTERSECTION ☐☐☐☐☐ RUNWAY ☐☐☐☐☐☐ TAXIWAY ☐☐☐

REPORT NUMBER

9.- CHRONOLIGICAL SUMMARY OF EVENTS			
TIME (UTC)	TYPE OF DATA	CONTROLLER (A, B, C, ETC.)	EVENT

REPORT NUMBER

SECTION B. CONTROLLER INVOLVED COMPLETE FOR EACH CONTROLLER IF MORE THAN ONE

1.- PERSONAL DATA

OPERATING INITIALS: N A M E:

DATE OF BIRTH

DAY MONTH YEAR

2.- SENIORITY IN THE POSITION

DATE OF ENTRY

MONTH YEAR

C U R R E N T P O S I T I O N

SINCE

DAY MONTH YEAR

3.- CERTIFICATIONS

LICENSE No.

TYPE

LOCATION

R A T I N G

4.- CERTIFICATION IN THE POSITION

WAS THE CONTROLLER QUALIFIED IN THE POSITION? YES □ NO

NAME OF IMMEDIATE SUPERVISOR

5.- CONTROLLER PROFICIENCY CHECK

D A T E O F LAST CHECK

SECTION B. CONTROLLER INVOLVED COMPLETE FOR EACH CONTROLLER IF MORE THAN ONE

DAY MONTH YEAR

WAS A DEFICIENCY DETECTED YES □ NO □

EXPLAIN IF AFFIRMATIVE _____

_____

6.- TRAINING OR COURSES

HAS TRAINING BEEN CONDUCTED WITIN THE LAST 12 MONTHS THAT IS RELEVANT TO THE INCIDENT? □ YES □ NO

LIST TYPE OF TRAINING DATE OF THE LAST COURSE OR TRAINING

DAY MONTH YEAR

REPORT NUMBER

7.- MEDICAL CERTIFICATE

DATE OF LAST MEDICAL EXAMINATION DAY MONTH YEAR

a) PHYSICAL LIMITATION YES ☐ NO ☐

b) IF AFFIRMATIVE, EXPLAIN: _____

8.- WORK SCHEDULE

LIST THE WORK SCHEDULE OF THE PREVIOUS FOUR WEEKS OF THE INCIDENT BASED ON THE SIGN-IN SHEET, INCLUDING AREA WORKED (TOWER, ACC, ETC.) AND ANY LEAVE TAKEN.

MONDAY	***TUESDAY***	***WEDNESDAY***	***THURSDAY***	***FRIDAY***	***SATURDAY***	***SUNDAY***

9.- ACTIVITIES DURING THE SHIFT

DETAIL OF THE ACTIVITIES OF THE EMPLOYEE DURING THE SHIFT (USE LOCAL HOURS)

HOUR	FROM	TO	ACTIVITIES DESCRIPTION
1			
2			
3			
4			
5			
6			
7			
8			

10.- DID THE CONTROLLER REQUIRED ASSISTANCE BEFORE THE INCIDENT ☐ YES ☐ NO

a) WAS THE SUPERVISOR INFORMED OF THE VOLUME AND COMPLEXITY OF THE TRAFFIC ☐ YES ☐ NO

b) WAS THE SUPERVISOR AWARE OF ANYTHING INDICATING THAT THE CONTROLLER REQUIRED ASSISTANCE ☐ YES ☐ NO

c) GIVE DETAILS ON THE KIND OF ASSISTANCE PROVIDED: _____

11.- DID THE CONTROLLER ASKED FOR ASSISTANCE BEFORE THE INCIDENT YES ☐ NO

12.- WAS THE CONTROLLER AWARE THAT AN ATS INCIDENT WAS DEVELOPING?

YES ☐ (WHEN):

_____

NO ☐ (WHY): _____

REPORT NUMBER

13.- DID THE CONTROLLER CONSIDERED TAKING CORRECTIVE ACTION

YES □ NO □

EXPLAIN: _____

14.- DID THE CONTROLLER TRIED TO TAKE CORRECTIVE ACTION

YES □ NO □

EXPLAIN: _____

15.- BY WHOM WAS THE CONTROLLER INFORMED OF THE INCIDENT

_____

16.- DATE AND TIME IN WHICH THE CONTROLLER WAS INFORMED OF THE INCIDENT

HOUR (UTC) DAY MONTH YEAR

17.- DID THE CONTROLLER IDENTIFIED ANY DISTRACTION THAT OCCURRED DURING THE DEVELOPMENT OF THE INCIDENT?

YES □ NO □

EXPLAIN: (Consider the presence of visitors, repair or installation of equipment, volume of alarms, disturbing noises, etc.)

_____

_

_____

_

18.- WAS THERE A REASON THAT DISTRACTED THE CONTROLLER BEFORE OR DURING THE DEVELOPMENT OF THE INCIDENT?

YES □ NO □

EXPLAIN: (Consider training, meetings or inter-personal discussions, etc.)

_____

_

_____

_

REPORT NUMBER

SECTION C AIRCRAFT INFORMATION		
(COMPLETE ADDITIONAL INFO. IF MORE THAN TWO)	AIRCRAFT No. 1	AIRCRAFT No. 2
1.- IDENTIFICATION	☐☐☐☐☐☐☐	☐☐☐☐☐☐☐
2.- TYPE OF AIRCRAFT(S)	☐☐☐☐☐☐☐	☐☐☐☐☐☐☐
3.- DEPARTURE AIRPORT	☐☐☐☐☐	☐☐☐☐☐
4.- DESTINATION AIRPORT	☐☐☐☐☐	☐☐☐☐☐
5.- STAGE OF FLIGHT WHEN THE INCIDENT OCCURRED	☐ DESCENDING ☐ CLIMBING ☐ LEVEL FLIGHT ☐ LANDING ROLL ☐ TAKEOFF ROLL ☐ MANOEUVERING AREA ☐ ON RUNWAY ☐ ON TAXIWAY ☐ APPROACH ☐ RADAR VECTORS ☐ OTHER	☐ DESCENDING ☐ CLIMBING ☐ LEVEL FLIGHT ☐ LANDING ROLL ☐ TAKEOFF ROLL ☐ MANOEUVERING AREA ☐ ON RUNWAY ☐ ON TAXIWAY ☐ APPROACH ☐ RADAR VECTORS ☐ OTHER
6.- ROUTE OF FLIGHT		
7.- EVASIVE ACTION	☐ YES ☐ NO ☐ UNKNOWN	☐ YES ☐ NO ☐ UNKNOWN
8.- DID THE PILOT EFFECT ANY REPORT OF AIRPROX	☐ YES ☐ NO ☐ UNKONWN	☐ YES ☐ NO ☐ UNKNOWN
9.- UNDER RADAR CONTROL	☐ YES ☐ NO ☐ UNKNOWN	☐ YES ☐ NO ☐ UNKNOWN
10- TRANSPODER FUNCTIONING	☐ YES ☐ NO ☐ UNKNOWN	☐ YES ☐ NO ☐ UNKNOWN
11- MODE C FUNCTIONING	☐ YES ☐ NO ☐ UNKNOWN	☐ YES ☐ NO ☐ UNKNOWN
12.- RECEIVED TCAS/ACAS RA	☐ YES ☐ NO ☐ UNKNOWN	☐ YES ☐ NO ☐ UNKNOWN

13.- AIRCRAFT AND OBSTACLES/OBSTRUCTIONS

☐ TERRAIN ☐ VEHICULES ☐ STAFF ☐ MANOEUVER AREA

☐ OBTRUCTION ☐ EQUIPMENT ☐ CONTROLLED AIRSPACE ☐ NOT APPLICABLE ☐ OTHER

REPORT NUMBER

SECTION D PROCEDURES

1.- TYPE OF CONTROL USED:

□ RADAR □ MANUAL □ TOWER □ OCEANIC

2.- TYPE OF PROCEDURE: □ ICAO □ NATIONAL □ LOCAL □ OTHER

3.- SPECIFIC MINIMUM SEPARATION INVOLVED

DIRECTIVE |_|_|_|_| • |_|_|_| REQUIRED SEPARATION (SPECIFY)

PARAGRAPH |_|_|_|_| • |_|_|_| _____

4.- SEPARATION APPLIED (IF DIFFERENT FROM 3 ABOVE)

□ YES (EXPLAIN)

□ NO

5.- DESCRIPTION OF PROCEDURES USED

6.- WERE ANY DEFICIENCIES OF THE PROCEDURE IDENTIFIED.

□ YES (EXPLAIN)

□ NO

7.- WAS A SPECIAL PROCEDURE IN EFFECT AT THE TIME OF THE INCIDENT

□ YES (EXPLAIN)

□ NO

SECTION E. CLOSEST PROXIMITY

A.- □ IN AIR

VERTICAL : |_|_|_|_| FEET

HORIZONTAL : |_|_|_|_| FEET |_|_|_| • |_|_| MILES

B.- □ ON GROUND (DESCRIPTION)

REPORT NUMBER

SECTION F WORKLOAD

1.- TRAFFIC COMPLEXITY

A.- NUMBER OF AIRCRAFT UNDER CONTROL

B.- COMPLEXITY OF TRAFFIC

1 2 3 4 5

|----------|----------|----------|----------|----------|

LOW AVERAGE HIGH

C.- EXPLANATION OF THE COMPLEXITY OF TRAFFIC

2. POSITION / SECTOR OF OPERATION

A. ARE DUTIES AND RESPONSIBILIDIES OF EACH POSITION CLEARLY DEFINED

☐ YES

☐ NO

B. COMBINED SECTORS

(1) WERE SECTORS COMBINED ☐ YES ☐ NO

1.
2.
3.

INITIALS OF THE CONTROLLERS WORKING THE COMBINED SECTORS

1. 2. 3.

(2) DID THE SUPERVISOR AUTHORIZED THE COMBINATION

☐ YES ☐ NO

(3) DID TRAFFIC JUSTIFY THE COMBINATION

☐ YES ☐ NO

C. COMBINED POSITIONS

(1) WERE POSITIONS COMBINED ☐ YES ☐ NO

1.
2.
3.

INITIALS OF THE CONTROLLERS WORKING THE COMBINED POSITIONS

1. 2. 3.

(2) DID THE SUPERVISOR AUTHORIZED THE COMBINATION

☐ YES ☐ NO

(2) DID TRAFFIC JUSTIFY THE COMBINATION

☐ YES ☐ NO

3. SUPERVISION

a. WAS A SUPERVISOR ASSIGNED TO THE AREA/CONTROL ROOM?

☐ YES ☐ NO

b. WAS THE SUPERVISOR PRESENT IN THE OPERATIONAL AREA WHEN THE INCIDENT OCCURRED?

☐ YES ☐ NO

c. WAS THE SUPERVISOR AWARE OF:

TRAFFIC VOLUME	☐ YES	☐ NO	DISTRACTIONS	☐ YES	☐ NO
COMPLEXITY OF WORK	☐ YES	☐ NO	REQUEST OF ASSISTANCE	☐ YES	☐ NO

d. WHAT ACTIVITY WAS THE SUPERVISOR CONDUCTING AT THE TIME OF THE INCIDENT

☐ SUPERVISION ☐ ADMINISTRATIVE DUTIES

☐ COORDINATION ☐ TRAINING/BRIEFING

☐ WORKING POSITION/SECTOR ☐ OTHER (SPECIFY)

REPORT NUMBER

SECTION G. WORKING ENVIRONMENT

INDICATE IF ANY OF THESE FACTORS HAD AN INFLUENCED ON THE OCCURRENCE

☐ ENVIRONMENTAL (AIR/HEATING/COOLING) ☐ PILOT'S ACTION ☐ NOISE ☐ LIGHT

☐ CONTROL ROOM LAYOUT ☐ ERRONEOUS INFORMATION ☐ NOT A FACTOR ☐ OTHER (SPECIFY)

SECTION H. EQUIPMENT

1. DID THE DISTRIBUTION OR DESIGN OF THE EQUIPMENT HAVE AN INFLUENCED ON THE INCIDENT

☐ YES (EXPLAIN)

☐ NO

2. WAS ANY PERTIENT EQUIPMENT OPERATED BY THE CONTROLLER(s) REPORTED AS FUNCTIONING UNSATISFACTORY BEFORE THE INCIDENT?

☐ YES

☐ NO (PROCEED TO PARAGRAPH 3)

a. DATE OF REPORT	b. HOUR OF THE REPORT (UTC)	c. DESCRIBE THE PROBLEM THAT ORIGINATED THE REPORT
|_|_|_|_|_|_|	|_|_|_|_|	

d. WAS ANY ACTION TAKEN TO CORRECT THE PROBLEM?

☐ YES

☐ NO (EXPLAIN)

3. TYPE	GOOD	NORMAL	POOR	OUT OF SERVICE	OUT FOR MAINTENANCE
COMMUNICATIONS AIR – GROUND					
REMARKS					
COMMUNICATIONS POINT TO POINT					
COMPUTER					
RADAR					

4.- SYSTEM(s) IN USE

☐ PRIMARY RADAR ☐ SECONDARY RADAR ☐ ALPHA-NUMERICAL ☐ MODE S

☐ BRITE/DBRITE ☐ ASDE ☐ OTHER

5.- WAS THERE TRANSITION OF MANUAL OR RADAR ☐ YES (EXPLAIN) ☐ NO

REPORT NUMBER

SECTION I. SUMMARY OF INCIDENT

REPORT NUMBER

SECTION I. SUMMARY OF INCIDENT (CONTINUED)

☐ **COMPLEMENTARY PAGES ENCLOSED.**

SECTION J. LIST OF DOCUMENTS ENCLOSED

☐ STATEMENT(S)	☐ ATS ROUTES OR AIRPORT CHART.	☐ CONFIGURATION CHART
☐ FLIGHT PROGRESS STRIPS	☐ TRANSCRIPTIONS	☐ LETTERS OF AGREEMENT
☐ NOTAMS	☐ VOICE RECORDINGS	☐ OTHER (SPECIFY)

SECTION K. INVESTIGATORS

DATE	NAME	SIGNATURE OF ATS INCIDENT INVESTIGATOR IN CHARGE
DATE	NAME	SIGNATURE OF INVESTIGATOR
DATE	NAME	SIGNATURE OF INVESTIGATOR
DATE	NAME	SIGNATURE OF INVESTIGATOR
DATE	NAME	SIGNATURE OF INVESTIGATOR
DATE	NAME	SIGNATURE OF INVESTIGATOR

REPORT NUMBER

PART II.
ATS UNIT MANAGER ACTION

SECTION A. C L A S S I F I C A T I O N			
□ OPERATIONAL ERROR	□ OPERATIONAL DEVIATION	□ PILOT DEVIATION	□ NON-OCCURRENCE

SECTION B. C A T E G O R I Z A T I O N				
1. CATEGORY OF THE ATS INCIDENT	□ PROCEDURAL	□ FACILITY	□ HUMAN	
2. RATIONAL FOR THE CATEGORIZATION.				

REPORT NUMBER

SECTION C CAUSAL FACTORS ☐ CONTINUED PAGES ATTACHED								
	NO	YES (EMPLOYEE) INDICATE WITH A CHECK MARK						
		A	B	C	D	E		
1. DATA POSTING								
a. COMPUTER ENTRY								
(1) Incorrect input								
(2) Incorrect update								
(3) Premature termination of data								
(4) Other (EXPLAIN) _____								
b. FLIGHT PROGRESS STRIP								
(1) Not updated								
(2) Interpreted incorrectly								
(3) Posted incorrectly								
(4) Updated incorrectly								
(5) Premature removal								
(6) Other (EXPLAIN) _____								
2. RADAR DISPLAY								
a. Misidentification								
(1) Failure to reidentify aircraft when the accepted identity becomes questionable.								
(2) Overlapping data blocks								
(3) Acceptance of incomplete or difficult to correlate position information								
(4) Other (EXPLAIN) _____								
b. INAPPROPRIATE USE OF DISPLAY DATA								
(1) Mode C								
(2) BRITE								
(3) Conflict alert								
(4) Failure to detect displayed data								
(5) Failure to comprehend displayed data								
(6) Failure to project future status of displayed data								
(6) Other (EXPLAIN) _____								
3. AIRCRAFT OBSERVATION (TOWERS ONLY)								
a. ACTUAL OBSERVATION OF AIRCRAFT								
b. INPROPER USE OF VISUAL DATA								
(1) Landing								
(2) Taking off								
(3) Ground operation								
(a) Taxing across runway								
(b) Holding in position for takeoff								
(4) others (EXPLAIN) ANNEX PAPER								

REPORT NUMBER

	NO	YES (EMPLOYEE) INDICATE WITH A CHECK MARK						
		A	B	C	D	E		
4. COMMUNICATIONS ERROR								
a. PHRASEOLOGY								
b. TRANSPOSITION								
c. MISUNDERSTANDING								
d READBACK								
(1) Altitude								
(2) Clearance								
(3) Identification								
(e) ACKNOWLEDGMENT								
(f) OTHER (EXPLAIN) _____								
5. COORDINATION								
a. AREA OF INCIDENT								
(1) Intra-sector/position								
(2) Inter-sector/position								
(3) Inter-ATS unit ATS unit type _____ Level _____ Unit ID _____								
b. FAILURE TO UTILIZE/COMPLY UIT PRECOORDINATION INFORMATION								
c. IMPROPER USE OF INFORMATION EXCHANGED IN COORDINATION								
(1) Aircraft identification								
(2) Altitude/flight level								
(3) Route of flight								
(4) APREQS								
(5) Speed								
(6) Special instructions								
(7) Other (EXPLAIN) _____								
d FAILURE TO COORDINATE BETWEEN GROUND AND TOWER								
(1) Crossing active runway								
(2) Vehicle, equipment or personnel on active runway								
(3) Use of other than active runway for arrivals and departures								
(4) Runway closure								
(5) Other (EXPLAIN) _____								
6.- POSITION RELIEF BRIEFING								
(a) EMPLOYEE DID NOT USE POSITION RELIEF CHECKLIST								
(b) EMPLOYEE BEING RELIEVED GAVE INCOMPLETE BRIEFING								
(c) RELIEVING EMPLOYEE DID NOT MAKE USE OF PERTINENT DATA EXCHANGED AT BRIEFING								
(d) OTHER (EXPLAIN) _____								

REPORT NUMBER

SECTION D RECOMMENDATIONS AND CORRECTIVE ACTIONS		
		☐ CONTINUED PAGES ENCLOSED
DATE	NAME OF ATS UNIT MANAGER	SIGNATURE

PART III
ATS DIRECTOR / MANAGER

REPORT NUMBER

SECTION A CONCLUSIONS / RECOMMENDATIONS		
		☐ **CONTINUED PAGES ENCLOSED**
DATE	NAME OF THE ATS DIRECTOR / MANAGER	SIGNATURE

Chapter 6. AIR TRAFFIC INCIDENT PREVENTION PROGRAMMES

6.1 INTRODUCTION

6.1.1 ATS authorities should establish policies and programmes that result in quality incident-free air traffic control services in accordance with ICAO SARPs and procedures, Civil Aviation Authority and ATS unit directives and procedures. This effort requires the commitment of all ATS personnel to consistently perform their duties and responsibilities in accordance with the above and to accept responsibility for maintaining the highest levels of safe operational performance.

6.1.2 The goal is to maintain an ATS incident free-environment that delivers safe, orderly, and expeditious air traffic control services to the users of the system. ATS incident prevention is the responsibility of every individual.

6.1.3 To ensure that the air traffic services provided are ATS incident free, ATS personnel should know, apply, and adhere to the appropriate requirements in the performance of his/her operational duties and responsibilities.

6.2 ATS INCIDENT PREVENTION

6.2.1 There are many initiatives that can be pursued to prevent ATS incidents from occurring. However, there are five primary areas, which can directly contribute to the prevention of ATS incidents: **communications, phraseology, supervision, teamwork, and ATC proficiency**. In an effort to accomplish the goal of ATS incident prevention, the following objectives should be included in the ATS incident prevention programme:

a) identify activities and efforts which enhance individual, ATS unit, and system performance;

b) ensure that commendable activities and efforts are promptly recognized and acknowledged;

c) identify individual, procedural, and/or equipment deficiencies that detract from the quality of air traffic services;

d) promptly correct individual, procedural, and/or equipment deficiencies which detract from the quality and integrity of air traffic services. This can be achieved through counselling, training, performance improvement measures, increased and/or closer performance monitoring, procedural changes, and/or equipment corrections/modifications, as appropriate;

e) provide follow-up mechanisms to ensure that specific actions taken have corrected identified deficiencies or problems;

f) ensure that identified successes are shared with all concerned within the ATS authority;

g) initiate, develop, and/or review programmes that promote and ensure effective controller performance, teamwork, and communications;

h) communicate performance expectations to ATS supervisors and controllers;

i) ensure the ATS unit maintains a summary of ATS incidents, causal factors and trends, and incorporate them into training;

j) ensure that all ATS personnel are briefed on ATS incidents, including the causal factors, trends, and ATS unit corrective actions;

k) monitor and evaluate voice recordings (all ATS operational personnel);

l) review local, national, and regional ATS incidents, causal factors, and trends;

m) conduct annual ATS quality assurance reviews to evaluate the effectiveness of the ATS QA programme and implemented strategies;

n) conduct ATS unit staff meetings on a periodic basis. Topics should include local and national trends in ATS incidents, results of internal and external surveys, and other quality assurance issues;

o) ATS authorities/ATS units should take initiatives to improve communications among all ATS personnel to create an atmosphere conducive to sharing information;

p) the ATS authority should ensure that every effort is made to allow personnel of the quality assurance office to attend local, national, and regional quality assurance seminars and conferences, and participate in all other quality assurance related activities;

q) ATS supervisors should:

- communicate performance expectations to controllers, stressing the importance of operational control position discipline, awareness, teamwork, the use of proper phraseology, proper coordination procedures, control position relief briefings and utilization of a position relief checklist

- take prompt follow-up actions when controller performance does not meet with expectations, such as on-the-spot corrections, counselling, training, performance improvement measures, increased and/or closer performance monitoring, or other corrective actions as deemed appropriate

- address individual and team accountability, and the consequences for not meeting expectations

- provide efficient and consistent oversight of the ATS unit operation, and use effective resource management to ensure proper and timely assignment

of personnel to promote the safe, orderly, and expeditious handling of air traffic

- ensure that distractions and noise levels in the ATS unit are kept at a minimum

- require all personnel to maintain a high degree of professionalism, teamwork, control position discipline, and awareness at all times in the ATS unit environment; and require that each controller knows, applies, and adheres to the appropriate requirements in the performance of his/her operational duties and responsibilities

- promote an open flow of communications with all ATS personnel, allowing them to provide input to the ATS unit quality assurance programme

- conduct ATS unit team meetings. ATS unit team meetings should be used to provide an opportunity for explaining changes in unit practices, quality assurance issues, and to allow for team interaction away from the ATS operational environment (these meetings also build a sense of camaraderie and allow the supervisors to clearly communicate all expectations.)

- place emphasis on hear-back/read-back errors during team meetings

- inform the ATS unit manager and support staff on operational concerns, and provide suggestions and information that can be used to improve the operation;

r) ATS quality assurance officers/specialists should:

- conduct random reviews of voice recordings to help identify individual and facility performance problems and concerns that detract from an ATS incident free environment

- brief ATS unit personnel on trends and causal factors related to operational evaluations, random reviews, and ATS incidents

- maintain an awareness of the ATS operational environment and provide staff expertise and support

- participate and provide input that assists the ATS unit in ensuring that quality assurance goals and objectives are being consistently met

- ensure that scenarios involving hear-back/read-back errors be included in the training

- distribute a summary of all ATS incidents to operational ATS unit personnel as soon as practical after the occurrence of an ATS incident. The

summary will notify the ATS personnel that an ATS incident occurred and the circumstances around the ATS incident

- ensure that the ATS unit maintains a summary of ATS incidents, causal factors and trends, and ensure that they are incorporated into classroom and annual proficiency training;

s) ATC personnel should:

- keep ATS supervisors advised of traffic problems and equipment limitations
- make suggestions for ATS unit improvements and/or prevention of ATS incidents
- maintain situational awareness
- extend the extra effort to assist busier control position(s)
- continuously review their own operating techniques and ATS unit procedures to effect the highest quality of performance
- promptly report all ATS incidents to the operational supervisor or other appropriate ATS authority for proper follow-up investigation
- utilize memory aids.

6.3 VOICE RECORDING EVALUATIONS

6.3.1 Voice recording reviews should be conducted to ensure proper phraseology, good operating practices, and adherence to the standards set forth in ICAO provisions, and national/local directives and practices. Voice recording reviews should be conducted as follows:

a) the ATS unit should ensure that voice recording reviews are conducted at least semi-annually on all ATS operational personnel;

b) the ATS supervisor or quality assurance specialist should review the voice recording, document comments and develop an action plan for documenting performance deficiencies; and

c) the ATS supervisor or quality assurance specialist and the controller should review and discuss the voice recording.

6.4 REVIEW OF ATC PROCEDURES AND PRACTICES THAT MAY CONTRIBUTE TO ATS INCIDENTS

6.4.1 A constant review of ATC procedures and practices should be conducted to identify, report, recommend, and implement amendments to ensure the safety of aviation and prevention of ATS incidents.

6.5 ATS INCIDENT REVIEW GROUPS

6.5.1 ATS authorities should implement ATS incident review groups at the national and local ATS unit levels to conduct periodic reviews of ATS incidents. The composition of these groups should include the ATS unit manager, air traffic controllers, other ATS staff, the quality assurance specialist, and pilots/airlines when appropriate. The purpose of this group is to review prior ATS incidents and identify other potential problem areas to be reviewed in an effort to prevent ATS incidents from occurring in the future.

6.6 SAFETY INFORMATION SHARING NETWORKS AND INTERNATIONAL ORGANIZATIONS

6.6.1 There are several safety information sharing networks (national and international) established to facilitate the free exchange of information of actual and potential safety deficiencies. Many of these networks are expanding their focus to include air traffic control services. These incident reporting systems are established to collect data and share information with the goal of assisting with the identification and prevention of incidents and accidents. ATS authorities are encouraged to participate and report incidents/accidents information to the appropriate safety information sharing network systems available. Some of these systems/programmes are as follows:

a) ***ADREP***. ICAO has developed an accident/incident reporting system know as ADREP. Details of the ADREP system are contained in the ICAO ADREP Manual, Doc 9156;

b) ***Global Aviation Safety Plan (GASP)***. In response to a large number of aviation accidents that occurred in 1996, and in view of the expected growth in air traffic, the Air Navigation Commission (ANC) agreed that there was a need to reduce the accident rate, and in 1997 it proposed the establishment of an ICAO Global Aviation Safety Plan (GASP). The 32nd Session of the ICAO Assembly endorsed the establishment of the GASP. The concept underlying GASP is to concentrate on launching or continuing those safety initiatives that offer the best "safety dividend" in the terms of reducing the accident rate. Priorities will be determined by conducting annual reviews of accident statistics to identify important trends. The objectives of GASP are to provide the necessary leadership by ICAO and to gain a commitment from Contracting States and the aviation industry as a whole in a collaborative effort to enhance aviation safety, in order to:

- achieve a significant decrease in the world-wide accident rate
- enhance the identification of short comings and deficiencies in the air navigation field and to assist States to achieve a significant degree of improvement
- increase and improve ICAO's own capability to compile, assess and disseminate safety-related information.

c) ***Global Aviation Information Network (GAIN)***. The GAIN programme was initiated by the Federal Aviation Administration (FAA) of the United States in

1996 to encourage the sharing of aviation safety data world-wide in an effort to further reduce accidents. The responsibility of the programme has gradually shifted to the airline industry, away from the FAA. Plans are to expand the GAIN programme to include air traffic control. The GAIN website (www.gainweb.org) offers links to 100 sites with aviation safety information and also includes descriptions of 60 methods and analytical tools that can be used to analyze data;

d) ***Aviation Safety Reporting Programme (ASRP)***. The ASRP programme was implemented by FAA in 1975 as a result of a recommendation made by the NTSB for the FAA to create a reporting programme designed to identify unsafe operating conditions. The ASRP programme is designed to encourage the identification and reporting of deficiencies and discrepancies in the United States national airspace system. To encourage reporting, the ASRP provided limited immunity from certain types of enforcement action. The National Aeronautics and Space Administration (NASA) administers the programme. In summary the ASRP is a voluntary, confidential incident reporting system designed primarily to assist FAA and the aviation community in reaching the goal of reducing and ultimately eliminating unsafe conditions. The programme also ensures the anonymity of the reporter; and

e) ***PAN American Aviation Safety Team (PAAST)***. The PAAST is a multi-organizational team that pools essential resources to address priority safety areas and deliver practical products to the aviation community in the Latin American and Caribbean Regions.

Note. - *Participation in international organization study groups in regards to analyzing and recommending solutions to ATS incidents is encouraged.*

6.7 RUNWAY INCURSION PREVENTION PLAN

6.7.1 The number of runway incursions has been increasing over the years and although most runway incursions do not result in an accident, the potential is there. As the number of aircraft operations increases at aerodromes throughout the world, the potential for a runway incursion incident or accident also increases if no preventive programme is implemented.

6.7.2 This section describes strategies that should be implemented to prevent runway incursions. These strategies are essential components of the ATS quality assurance programme, and therefore, ATS authorities should include a runway incursion prevention plan within their ATS quality assurance programme.

6.7.3 The following strategies should be taken into consideration when developing a runway incursion prevention plan:

a) position relief briefings should be conducted and recorded (where equipment capabilities exist);

b) the position relief checklist should include the terms “unavailable”, “closed”, or “occupied,” and controllers on all positions should be required to verbally state whether the runway(s) are “unavailable”, “closed”, or “occupi
relief briefing;

c) proficiency training on the prevention of runway incursions and their associated causal factors should be conducted annually; and

d) a survey/comment sheet should be used to collect feedback from ATS personnel concerning the effectiveness of the plan in preventing runway incursions.

6.7.4 ***Memory aids***. The following memory aids and procedures should be implemented:

a) flight progress strips and flight progress boards with appropriate designators should be utilized by local and ground control positions;

b) a “runway in use” sign should be used; and

c) the usage of memory aids in ATS units should be reviewed on a semi-annual basis;

6.7.5 ***Procedures***. The following procedures should be considered when reviewing aerodrome movement operating practices:

a) designate runway crossing point(s);

b) ATS authorities should place special emphasis on safe runway crossings;

c) ATS supervisors and controllers should ensure proper procedures are utilized in runway crossings including interphone procedures and the “Runway in Use” sign;

d) tower and ground control positions are responsible for the integrity of the runways. When coordinating the crossing of a runway, clearances shall not be conditional and shall not be approved reference traffic except as authorized in ICAO SARPs and procedures. Although ICAO provisions permit certain conditional clearances, the practice of these procedures should be kept to a minimum, the exception rather than the norm should be practised, and under extreme caution;

e) runway check procedures should be described in a letter of agreement between the ATS unit and the appropriate aerodrome authority responsible for runway checks;

f) vehicular movements on the aerodrome movement areas should be defined in a letter of agreement and, whenever possible, vehicular movements should be restricted to perimeter roads and non-movement areas; and

g) description of closed runway procedures.

6.8 QUALITY ASSURANCE REVIEW (QAR)

6.8.1 It is essential to the effectiveness of the ATS system and prevention of ATS incidents that all incidents be investigated and deficiencies identified and corrected. Serious air traffic controller performance deficiencies may be involved in air traffic incidents that fall outside of the definition of ATS incidents. QAR's provide for the identification, investigation, and resolution of these incidents through corrective training of controller performance deficiencies.

6.8.2 To accomplish this goal, ATS unit managers should conduct a QAR for all of the following when air traffic control services are involved:

a) aircraft accidents;

b) other incidents that do not fall under the definition of ATS incidents;

Note. - *QAR's are not required for ATS incidents (Operational Errors/Deviations, etc.) as such reviews would be redundant to ATS incident investigative/corrective procedures (see Chapter 5).*

c) airborne collision avoidance system (ACAS/TCAS) resolution advisory (RA) reports;

d) other miscellaneous incident reports that involve a loss of separation;

e) aircraft go-arounds (review situation why action was taken); and

f) public inquiries regarding air traffic control services provided during a specific operation; e.g. flight crew, passenger, or media inquiries.

6.8.3 A QAR may also be conducted at the discretion of management personnel out of concern for controller performance identified through direct or indirect observations.

6.8.4 Determine in a QAR whether controller performance contributed to, increased the severity of, or unreasonably failed to mitigate the initiating incident.

EXAMPLE-
[1] In review of a pilot deviation resulting in a runway incursion, determine whether a tower controller's scanning of movement areas was adequate.
[2] In review of an aircraft accident, determine whether an in-flight specialist's weather briefing to the involved pilot was adequate.
[3] Determine whether a controller's radar vectors resulted in an instrument approach intercept inside the final approach fix.

6.8.5 The ATS unit manager should designate the supervisor or quality assurance specialist as the responsible person for the conduction of QAR's.

6.8.6 Conduct a QAR to enough depth so as to assess the involved controller performance with reasonable accuracy. The depth of a QAR may range from simply discussing the situation with the involved controllers, to reviewing voice recordings and recorded radar data when necessary.

6.8.7 Accomplish appropriate corrective training for all identified controller performance deficiencies.

Note.- *In cases of serious performance deficiencies, appropriate training may include de-certification and remedial training.*

6.8.8 Communicate the conclusions of the QAR, including those conclusions where no controller performance deficiency was found, to the ATS unit manager.

6.8.9 Record notification of the QAR initiating incident and conclusion of its review on ATS unit daily operations log.

Chapter 7. - ATS Evaluation

7.1 INTRODUCTION

7.1.1 Standardization of procedures and methods is essential in a service, which has international obligations and uses procedures involving more than one unit. The degree of standardization achieved is directly related to the proficiency with which individuals perform their duties. This in turn determines the efficiency of the service given to the users and to the travelling public.

7.1.2 Individual proficiency and standardization of procedures and methods are attained and maintained by a system of training, certification, proficiency checks and evaluations and inspections; and most essentially, by the deliberate and conscientious participation of all ATS personnel.

7.1.3 This chapter deals with the need for constant and continuous evaluation of individual ATS units and the over-all ATS system — a task normally undertaken by personnel specifically trained to understand all aspects of the organization and charged with the responsibility of evaluating personnel proficiency and critically assessing the over-all effectiveness of the ATS.

7.2 PURPOSE AND SCOPE OF EVALUATION

7.2.1 ATS evaluation includes examination of individual ATS units such as an area control centre (ACC), an approach control unit or an aerodrome control tower, flight information centre or other associated ATS activity, or a complete evaluation of several units or the entire national ATS system. The evaluation of ATS units is necessary to ensure that:

a) the provision of service is maintained at the highest standard; and

b) all units and personnel apply policies, standards, rules, procedures and separation minima in an approved manner.

Regardless of the scope of the evaluation certain common objectives are involved.

7.2.2 An ATS evaluation normally includes all or part of the following activities:

a) assessing the service provided to the users for standardization, quality and adequacy;

b) ensuring that operating procedures conform with national standards;

c) assessing operational requirements and making recommendations;

d) identifying any potentially unsafe procedures or operating practices so that immediate corrective action can be taken;

e) detecting problem areas or deficiencies and determining probable causes and recommended corrective measures;

f) examining the effectiveness of intra-unit and inter-unit communication and coordination; and

g) examining personnel utilization, position workload and unit establishments to ensure compatibility.

7.2.3 At the conclusion of an ATS evaluation, findings should be fully documented and recommendations made, as appropriate, where changes are required. Matters requiring urgent rectification should be notified and corrected as soon as possible, preferably before the formal report is submitted.

7.3 CONDUCT OF EVALUATION

7.3.1 Designated personnel should conduct routine ATS evaluations on a regular basis, with a recommended frequency of not less than once every two years. At those units where evaluation officers are permanently assigned, evaluation should be an on-going process particularly in respect to personnel proficiency. An interim evaluation may be conducted at selected units and, when necessary, approximately midway between routine evaluations.

7.3.2 Before commencing an ATS evaluation, it is usual to notify the officer-in-charge of the unit. This officer should arrange for whatever assistance is needed for the proper conduct of the evaluation, including arranging contact with other interested parties such as telecommunications, aerodrome management and flight operations. It may also be necessary to arrange for consultations with the operators, other civil aviation groups or with military authorities. In the latter case it is likely that some forewarning of the nature of the discussions will be needed.

7.3.3 On completion of an ATS evaluation, a meeting should be arranged and the officer-in-charge of the unit be informed of any significant findings and recommendations. The purpose of the meeting is to:

a) review the findings;

b) identify problem areas;

c) examine proposed alternative solutions;

d) designate responsibility for follow-up actions;

e) co-ordinate remedial actions; and

f) establish tentative target dates for completion of actions.

7.3.4 A special evaluation may be undertaken at any time to examine a specific aspect or function. Such special evaluations may include in-flight monitoring of clearances and procedures during the course of normal duties.

7.4 DOCUMENTATION

7.4.1 On completion of an ATS evaluation, the person responsible for the evaluation should:

a) compile a written report of each unit evaluated within the system;

b) compile a written in-flight monitoring report, as required; and

c) distribute evaluation reports to appropriate authorities.

7.4.2 ATC evaluation reports should be written in narrative form and include at least the following information for each routine observation or evaluation:

a) a description of deficiency or problem areas detected;

b) recommendations for correction;

c) agency or person(s) responsible for follow-up action, if appropriate; and

d) target dates for corrective action.

7.4.3 Relevant sections of the evaluation report should be sent to non-ATS units, as appropriate, for information and action as required.

7.4.4 The ATS unit should notify the appropriate authority of action taken with respect to an identified problem, preferably within 30 days of receipt of the report, and from then on at regular intervals until all outstanding items have been resolved.

7.5 AIR TRAFFIC SERVICES EVALUATIONS PROCEDURES

7.5.1 This section provides standardized procedures for evaluating compliance with ICAO SARPs and specified directives and procedures at the national and local ATS unit level within a State.

7.6 EVALUATION PROCESS

7.6.1 Full unit ATS evaluation.

7.6.1.1 *Preparation and notification*. A full unit ATS evaluation, using the checklist in the **Appendix** to this chapter, should normally be conducted once every two years at each ATS unit. The ATS authority may include additional items pertinent to the ATS unit to supplement the checklist. The ATS authority should notify the ATS unit manager at least 30 days prior to conducting a full unit ATS evaluation. This notification may request data for pre-evaluation review and will solicit special interest topics for assessment.

7.6.1.2 *In-briefing*. Introduction of team members, evaluation schedule, and evaluation activities should be discussed with the ATS unit manager and associated unit staff.

7.6.1.3 *Conducting the evaluation*. Evaluators shall conduct the full unit ATS evaluation through any or all of the following: direct observation, control position and/or tape/data monitoring, attendance at staff meetings, observation of training activities, review of administrative records, interviews/discussions, and a review of in-flight evaluation reports. If possible, items rated as not observed should be discussed with the ATS unit personnel to determine their knowledge of the item. If a satisfactory response is received, the item may be rated as satisfactory. If a satisfactory response is not received, the item may then be appropriately rated. Interviews will normally be conducted with ATS managers, watch supervisors, operational supervisors, ATS unit staff specialist, controllers, etc. Additionally, representatives from adjacent ATS units, other aviation offices, customers, (airlines, other operators, aerodrome offices, etc.) may be interviewed.

7.6.1.4 *Daily briefing*. The lead ATS evaluator will normally provide the ATS unit manager with a daily briefing on the progress of the evaluation.

7.6.1.5 *Out-briefing*. The ATS unit manager shall be briefed on the ATS evaluator/team's findings at the conclusion of the evaluation. Attendance by all available ATS unit personnel at the out-briefing is encouraged. A draft copy of the ATS evaluation report will be provided to the ATS unit manager at this time or as soon as practical thereafter.

7.6.1.6 *Evaluation critique*. The evaluation team leader should provide a critique form to be filled out by the ATS unit manager.

7.6.1.7 *Re-identified items*. Items that are re-identified as less than satisfactory from a previous ATS unit evaluation should be so noted.

7.6.2 Follow-up ATS evaluations.

7.6.2.1 *Preparation and notification*. Follow-up ATS evaluations should normally be conducted through an unannounced or minimum notification on-site evaluation, desk audit, or a combination of the two. These evaluations will normally be conducted no less than 6 months after the date of the full unit ATS evaluation out-briefing or as determined by the ATS authority. The ATS unit manager may be requested to provide data for pre-evaluation review. The on-site follow-up ATS evaluation should use the same process as outlined in paragraphs 7.6.1.2 to 7.6.1.6.

7.6.2.2 *Open items*. Items previously rated as less than satisfactory should be considered open if the three-step closure process has not been accomplished and/or the discrepancy can still be detected. Each item should be addressed in the evaluation report with an explanation as to why it was reopened.

7.6.2.3 *New items*. New items identified during the follow-up ATS evaluation should be appropriately documented.

7.6.2.4 *Closed items*. Items can be considered closed when the discrepancy can no longer be detected; and:

a) the initial action taken by the ATS unit to correct the discrepancy has been completed;

b) the action taken over a period of time to validate that the initial action corrected the discrepancy has been completed; and

c) an action and/or programme is in place to ensure that the problem does not reoccur.

7.6.3 In-flight evaluations.

7.6.3.1 ATS authorities should conduct at least two in-flight evaluations annually on each ATS unit within their area of responsibility. In-flight evaluations should be conducted by evaluators and other authorized personnel of the ATS authority using airlines or other operators with which they have an agreement to conduct such observations. ATS evaluators will normally assess the following air traffic services, when applicable, during the in-flight evaluations:

a) air traffic services reporting office;

b) automatic terminal information service;

c) aerodrome control service (clearance delivery, ground control, local control, etc.);

d) approach control service;

e) area control service;

f) air traffic advisory service;

g) flight information service; and

h) other services may be evaluated as deemed appropriate.

7.6.4 Special evaluations.

7.6.4.1 Special evaluation may be conducted when deemed necessary by the ATS authority or if requested by the ATS unit.

7.6.5 Evaluation reports

7.6.5.1 *Report completion*. The results of all evaluations should be documented to ensure that all offices concerned remain fully informed regarding the effectiveness of the air traffic services system. All final reports should be completed and distributed within 30 days of the date of the out-briefing.

7.6.5.2 Full unit ATS evaluation reports should:

a) contain the results of the evaluation pertaining to the areas assessed;

b) describe all reportable items; and

c) assign tracking control numbers to all items identified.

ATS unit evaluation tracking control number example: **00-A-XXXX-01D-FE**

Legend

"00" refers to the year of the evaluation	"A, T, or F" refers to the type of ATS unit "A" = Area (ACC). "T" = Approach (APP) and Aerodrome Control Tower. "F" = FIC, AFIS, etc.
"XXXX" refers to the identification of the ATS unit	
"01" refers to the item tracking control number and "D" is the rating	"U" = Unsatisfactory. "S" = Satisfactory.
"FE" refers the type of evaluation conducted	"FE" = Full unit ATS evaluation. "DA" = Desk audit "FU" = Follow-up evaluation "SP" = Special evaluation

7.6.5.3 Executive summaries. Executive summaries should be prepared on all ATS unit evaluations.

7.6.6 **Responses to ATS unit evaluations**

7.6.6.1 Responses to ATS unit evaluations are required for all items rated as less than satisfactory and should comply with the three-step dosure process (Corrective action, Follow-up action, and Management control). In addition, the following criteria apply:

a) **Action plan**. Action plans for all items that are rating less than satisfactory should be developed and forwarded to the appropriate ATS authority within 30 days of receiving the final ATS unit evaluation report;

b) **First response**. The first response should be completed and distributed by the ATS unit manager to the ATS authority 60 days after the date of the ATS unit evaluation out-briefing; and

c) **Second response**. The second response should be completed and distributed by the ATS unit manager to the ATS authority 180 days after the date of the ATS unit evaluation out-briefing and every 180 days thereafter until all items are closed.

Appendix

ATS evaluation checklist

ATS UNIT EVALUATION CHECKLIST

ATS Unit: _____

ITEM	TASK/QUESTIONS	STATUS	COMMENTS	ICAO Ref.
A. ADMINISTRATION				
Organization of ATS	1. What is the organizational structure its relationship with the Administration, ATS Units, and other offices? 2. Does the structure meet the needs of ATS?	☐ Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐ Not Rated		Doc 9426 (Part IV)
ICAO and State's documents	1. Check availability and amendment status (annexes 2 and 11, PANS RAC, Doc. 4444, Manuals and Circulars). 2. Are documents up-to-date?	☐ Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐ Not Rated		ICAO Regional Office Manual
Status of Differences from SARPS	1. Differences from Annexes 2 and 11 and Recommended Practices. 2. Has State notified ICAO of differences? 3. Are differences published in AIP?	☐ Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐ Not Rated		Annex 15 ICAO Regional Office Manual

ATS UNIT EVALUATION CHECKLIST

ITEM	TASK/QUESTIONS	STATUS	COMMENTS	ICAO Ref.
Air Navigation Plan	1. Check implementation status of the ATM Section in the CAR/SAM ANP.	☐ Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐ Not Rated		CAR/SAM ANP Doc. 9749
CAR/SAM/3 RAN	1. Check implementation status of CAR/SAM/3 RAN Recommendations and Conclusions.	☐ Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐ Not Rated		CAR/SAM/3 RAN Report Doc. 9749
Air Traffic Controller Licenses	1. Do controllers comply with the requirement of an ATC license?	☐ Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐ Not Rated		Annex 1 Doc 9426 (Part IV, Section I. Chap. 4)
Air Traffic Control Ratings	1. Do ATC controllers have all required ratings for their function? 2. Which ratings have been approved for this particular unit?	☐ Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐ Not Rated		Annex 1 Doc 9426 (Part IV, Section I. Chap. 4)

ITEM	TASK/QUESTIONS	STATUS	COMMENTS	ICAO Ref.
Medical Clearance	1. Do ATC Controllers take medical exams? 2. How often?	☐ Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐ Not Rated		Annex 1
B. OPERATIONS				
Operational Efficiency	1. Effectiveness and application of procedures; overall operational efficiency of ATS unit. 2. Are Repetitive Flight Plan used? 3. Is there a proper sectorization of the airspace? 4. Are separation standards used properly within the ATS unit?	☐ Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐ Not Rated		Doc. 4444 (part III) Doc. 9426 (part II, Sec. 3 Chap. 1)
Operational Teamwork	1. Does the ATC staff work as a team?	☐ Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐ Not Rated		Doc. 9426 (Part IV)
Operational Supervisor/Controller-in-Charge monitors the Operation	1. Is a operational supervisor or controller-in-charge designated? 2. Does the supervisor/Controller-in-Charge supervise the operations, monitor the operations and anticipates traffic flow, implements air traffic flow management initiatives, etc.?	☐ Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐ Not Rated		Doc. 9426 (part II, Section 1, Part IV)

ATS UNIT EVALUATION CHECKLIST

ITEM	TASK/QUESTIONS	STATUS	COMMENTS	ICAO Ref.
Air Traffic Flow Management	1. Does the unit have an Air Traffic Flow Management programme? 2. What are the responsibilities and procedures to be used?	☐ Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐ Not Rated		Doc 4444 Doc 9426 (Part 2, Section 1, Chap. 3)
ATFM Coordination/Delay Reporting	1. How does the unit coordinate ATFM initiatives? 2. How are delays recording and reported?	☐ Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐ Not Rated		Doc. 9426 (Part II, Section I)
Communications Procedure	1. Is aeronautical phraseology properly used? 2. Are communications' procedures properly used with aircraft and adjacent ATS Units?	☐ Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐ Not Rated		Annex 10 Doc. 4444 (Part X)
Flight Progress Strips	1. Are flight progress strips used correctly according to local, national and ICAO directives?	☐ Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐ Not Rated		Doc. 9426

ATS UNIT EVALUATION CHECKLIST

ITEM	TASK/QUESTIONS	STATUS	COMMENTS	ICAO Ref.
Coordination Procedures and Letters of Agreement	1. Are there any coordination procedures with adjacent ATS Units? 2. Are there any Letters of Agreement with adjacent ATS Units? 3. Are LOAs up to date?	☐ Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐ Not Rated		Doc. 9426 (Part IV, Chap. 4)
Controller operational currency	1. How does the ATS Unit ensures that controllers are kept operationally current? 2. How much time can they stop working as ATC before losing their rating (i.e., controller in extended leave status, etc.)	☐ Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐ Not Rated		Doc. 9426 (Part IV, Chap. 4)
Sector position relief briefings	1. Is there a standardized sector/position relief briefing checklist? 2. Are verbal briefings accomplished using the checklist?	☐ Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐ Not Rated		Doc. 9426 (Part IV, Chap. 1)
Weather	1. What weather does ATC have available? 2. Do they solicit pilot reports (AIREPs)? 3. What do they do with AIREPs? 4. SIGMETs? 5. Do they allow severe weather avoidance/rerouting? 6. What is done in the event of a volcanic eruption?	☐ Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐ Not Rated		#1 Annex 3 Ch 10 #3 DOC4444- II-16.1 #4. Annex 11 - 7.1.2.1 #6. Annex 11 7.5, DOC4444 -Appendix 1 - 2.

ITEM	TASK/QUESTIONS	STATUS	COMMENTS	ICAO Ref.
Operational Directives Controller reference material, [what is readily available?]	1. Are ICAO and State reference material readily available in the control room? Maps/charts, Charts with the minimum safe altitudes, Instrument procedures, Manual of Operations, Letters of Agreement, etc. 2. Are these documents up-to-date?	☐ Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐ Not Rated		Annex 11 Para 2.21
C. OPERATIONAL SUPPORT				
Customer Services/Coordination	1. General responsiveness to customer needs; conferences education, communications, seminars, users forum, etc.	☐ Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐ Not Rated		Doc. 9426 Part IV
Shift coverage	1. Is there a basic coverage for all shifts? 2. Is there enough staff to cover shifts during holidays, overtime, etc.?	☐ Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐ Not Rated		Doc. 9426 (Part IV)
Relations with other Aviation Organizations/Offices	1. What is the relationship with other ATS units, other States, Airports, etc.)	☐ Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐ Not Rated		Doc- 9426 (Part IV)

ATS UNIT EVALUATION CHECKLIST

ITEM	TASK/QUESTIONS	STATUS	COMMENTS	ICAO Ref.
Contingency procedures	1. What happens in the event of catastrophic failure of equipment? 2. Is there delegation of airspace to a neighboring ATS unit? 3. With Letter of Agreements? 4. Are there notification procedures?	☐ Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐ Not Rated		Doc. 9426 II-1-1.3.3 Doc. 4444 III-17
Emergency procedures	1. What does the controller do when a pilot declares an emergency? 2. Can the controller give IFR approach instructions (in Spanish or English) to pilot making an emergency landing at an unpublished airport? 3. What is management's role in emergencies? 4. Is there a standardized procedures/check list for emergencies, hijacks, or bomb threats? 5. Is 121.5 MHz monitored? 6. Are adjacent or expecting units notified? 7. Records, reports, debriefs?	☐ Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐ Not Rated		Annex 11 Ch5 #3. Annex11 2.20
Traffic counts	1. by time of day? 2. by airway? 3. by type? 4. other?	☐ Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐ Not Rated		Doc. 9426 (Part IV)

ITEM	TASK/QUESTIONS	STATUS	COMMENTS	ICAO Ref.
D. QUALITY ASSURANCE				
ATS Quality Assurance Programme	1. Does the ATS unit have an established ATS quality assurance programme? 1(a) Is there a directive outlining the programme? 1(b) Has an ATS quality assurance officer/specialist been designated?	☐ Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐ Not Rated		Annex 11 Doc. 4444 Doc. 9426
Loss of separation	1. What is the administrative process when a loss of separation occurs? 1(a). At Headquarters? 1(b). At the Regional headquarters? 1(c). At the ATS unit where the incident occurred?	☐ Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐ Not Rated		Annex 11, Doc. 4444, Doc. 9426
Handling of incidents/accidents.	1. How are pilot deviations handled? 1(a). What role does the military play? 1(b). What is ATC's military intercept procedure? 2. How are incidents handled? 3. What ATS data is recorded? 4. Are there reports? Who gets them? Are they reviewed? Is there feedback back to the unit? Recommendations made?	☐ Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐ Not Rated		#1(b). Annex 11 2.23, Doc. 4444, part III, para 19 #2 Doc. 9426 II-1-Ch3 #3. Doc. 9426 I-2-8.4 #4. Annex 13, DOC 9156 - 1.4
Evaluations	1. Is there a regional or national evaluation programme established? 2. If so what do they check? 3. How often does this happen? 4. Does this result in action plans and accountability?	☐ Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐ Not Rated		Doc 9426 II-1-Ch4

ITEM	TASK/QUESTIONS	STATUS	COMMENTS	ICAO Ref.
E. TRAINING				
Certification and recertification	1. What is the training and certification process? 2. Who determines this? 3. What constitutes loss of currency and recertification?	☐ Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐ Not Rated		Doc 9426 IV-1-3.2 and 3.3
Proficiency checks and proficiency training	1. Are controllers required to demonstrate job performance. (a) Are proficiency checks conducted? (b) If so how often? 2 Is proficiency training conducted? 2(a) Does the unit have a list of annual proficiency training requirements? 2(b) Who and how are the subjects determined?	☐ Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐ Not Rated		Doc 9426 IV, sec 1, Ch3
Controller workload	1. Who monitors this? 2. Is there a defined acceptable level of traffic? 3. If so, is this differentiated between domestic and international traffic?	☐ Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐ Not Rated		Doc 9426 II-1-1 APNDX C, also II, sec 3, Ch1
Controller briefings	1. How are controllers briefed concerning changes in procedures? 2. How and who ensures that all controllers have been briefed?	☐ Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐ Not Rated		Doc. 9426

ITEM	TASK/QUESTIONS	STATUS	COMMENTS	ICAO Ref.
English refresher training	1. Are proficiency tests given? 2. Who prepares the test (local, regional, or national)? 3. How often administered (is it systematic)? 4. What determines an acceptable level of competency? 5. Is there remedial training or loss of certification? 6. Is there refresher training?	☐ Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐ Not Rated		Doc 9426 IV-1-3.4
Communication with pilot	1. Are preflight briefings given? 2. When and how often is destination weather reports given to the pilot? 3. Are braking action reports given? 4. How do you issue and distribute NOTAMs?	☐ Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐ Not Rated		#1. Annex 3 Ch 9
Monitoring the airspace and advertised services	1. Are NAVAIDs monitored and status known both within the local and adjacent FIRs? 2. How are temporary flight restrictions or airspace reservations handled?	☐ Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐ Not Rated		#1. Doc 9426 I-2-10.3.1 #2. Doc 4444 II-6.3

ITEM	TASK/QUESTIONS	STATUS	COMMENTS	ICAO Ref.
F. EQUIPMENT AND FACILITIES				
Communications Systems	1. What is the reliability of communications? (ground-ground, air-ground) a) Aeronautical Fixed Service (AFS) - AFTN - ATS Speech Circuits b) Aeronautical Mobile Service (AMS) - VHF - HF 2. Are there procedures that compensate for deficiencies? 3. How are the ATS voice recordings handled and preserved?	☐ Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐ Not Rated		#1 Annex 11 Ch6
Navigation Systems	1. What is the reliability of the navigation system? 1(a) Ground-based systems? 2(b) Satellite based systems? 2. Are there contingency procedures in case of failure? 3. Is the performance of the navigation equipment monitored and checked? 4. Are flight checks of the system performed?	☐ Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐ Not Rated		Doc. 4444 (Part VI)
Radar Equipment	1. What is the reliability of the radar equipment? 2. Are there contingency procedures in case of radar failure? 3. Is the performance of the radar equipment checked? 4. Is the radar equipment alignment checked?	☐ Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐ Not Rated		Doc. 4444 (Part VI)

Participation in the evaluation Name _____ Organization _____

_____ _____ Original Signed by Date:

Chapter 8. QUALITY OF SERVICES IMPROVEMENT PROGRAMMES

8.1 INTRODUCTION.

8.1.1 ATS authorities should pursue initiatives that can improve the overall quality of the air traffic services being provided. This chapter contains several initiatives that should be taken into consideration by ATS authorities to improve the quality of ATS.

8.2 RANDOM VOICE RECORDING REVIEWS

8.2.1 The ATS unit quality assurance officer/specialist should complete several random voice recording reviews on a monthly basis to ensure the overall quality of air traffic services being provided is maintained.

8.3 ICAO PHRASELOGY IMPROVEMENT PROGRAMME

8.3.1 ATS authorities/ATS units should implement a phraseology improvement programme. The implementation of an ATS unit phraseology improvement programme can be of great benefit to controllers and pilots alike. The results of this programme can improve the quality of services and contribute to the prevention of ATS incidents. This can be accomplished through random voice recording reviews, voice recording monitor evaluations, or through direct observations. It is important to follow-up this programme with some type of recognition to those ATS unit personnel who demonstrate outstanding phraseology or a significant improvement in using standard ICAO phraseology.

8.4 ATS CUSTOMER SERVICE/FEEDBACK

8.4.1 It is very important to establish good communications between ATS authorities/ATS units and users of the ATS system. All users of the ATS system can offer valuable feedback whether they are commercial airlines, business aircraft or general aviation. Obtaining feedback from other aviation departments, e.g. aerodrome offices and ATS units, and from internal ATS personnel is just as important. This feedback can be obtained through surveys and used as one method to determine the quality of services provided by the ATS unit.

8.4.2 *ATS quality assurance survey*

8.4.2.1 ATS units should conduct on an annual basis an external and internal ATS quality assurance survey in an effort to obtain feedback of services being provided. A sample ATS quality assurance survey form for users of the system is contained in **Appendix A** and a separate survey form for ATS personnel is contained in **Appendix B** to this chapter.

8.4.2.2 The data collected from these surveys should be analyzed and validated, and the results should be shared with all ATS personnel. From the results of the review of the data collected, issues affecting the quality of services should then be identified and prioritized, and an action plan to address the issues should be developed and implemented. Surveys from previous years could be used as a baseline of how the ATS unit is performing in relation to the quality of air traffic services being provided.

8.5 PILOT/CONTROLLER USER FORUMS

8.5.1 ATS authorities should organize pilot/controller user forums at least annually. These forums can produce good relations and enhance communications between ATS authorities, pilots and controllers. The main objective of these forums is to bring together the people in the ATS system that work together on a daily bases, the pilot on the flight deck and the controller in the control room/tower so as to have a better understanding of each other's responsibilities and duties. It is recommended that these forums not be conducted in a meeting type format and no action items should be taken. These forums can also be used by the ATS authorities/units to present and explain information regarding the local or national ATS system and procedures.

8.6 PARTICIPATION IN PILOT SAFETY SEMINARS

8.6.1 ATS authorities should participate in pilot safety seminars in an effort to present information regarding the ATS system as it relates to ATS quality assurance and safety for controllers and pilots.

8.7 PILOT VISITS TO ATS UNITS

8.7.1 Pilots should be encouraged to visit ATS units (aerodrome control towers, approach control units, area control centres, etc.) and familiarize themselves with the ATC system. On rare occasions, ATS units may not be able to approve a visit because of ATC workload or other reasons. Therefore, pilots should contact the ATS unit prior to the planned visit and inform it of the number of persons in the group, the time and date of the proposed visit and the primary interest of the group. With this information available, the ATS unit can prepare a programme and make someone available to guide the group through the unit.

8.8 ATS SYSTEM FAMILIARIZATION/EDUCATION FOR PILOTS

8.8.1 It is recommended that ATS authorities consider developing an ATS system education programme for pilots. The programme objective would be to educate pilots in how to best utilize the ATS system, its functions, responsibilities, benefits and services available.

8.9 FAMILIARIZATION TRAINING FLIGHTS FOR ATS PERSONNEL

8.9.1 ATS authorities should establish a programme with airlines in order for ATS personnel to participate in familiarization flights. ATS supervisors and controllers should be encouraged to participate in these flights. This programme would allow ATS unit personnel to experience first hand the activities on the flight deck. This type of programme should be viewed as proficiency training for ATS supervisors and controllers.

8.10 RECOGNITION OF QUALITY PERFORMANCE

8.10.1 Recognition of positive, quality performance is as important as identifying deficiencies. ATS personnel, as individuals or as a team, should be recognized for providing a high standard of performance and quality of services. Therefore, it is recommended that ATS authorities/units develop a recognition programme with regards to quality performance.

8.11 ATS PERFORMANCE MEASUREMENTS

8.11.1 It is important that ATS providers find ways to continually improve the safety and efficiency of the air traffic system with a goal to improve the overall performance. This section outlines several ways the performance of ATS can be measured.

8.11.2 The following factors should be taken into consideration when measuring the performance and quality of air traffic services being provided:

8.11.3 Safety. As safety is the number 1 priority, the number of accidents and ATS incidents should not be the only measurements. Measurements should include the level of risk that actually exists.

8.11.4 Delay. Delays have traditionally been used as a measurement of air traffic performance. However, measuring flight delays against scheduled times in a congested system has become much less meaningful due to expected delays being built into the schedule by airlines in an effort to maintain operating integrity. Delays should be compared to actual flight times against baseline optimum flight times.

8.11.5 Predictability. Predictability is a measurement of the variability of a performance measurement. For example, as the variability of taxi-out time (a measurement of delays) increases, more and more disruption will be caused to an aircraft operator's schedule, with corresponding disruptions to flight connectivity. Predictability measurements should compare actual flight time to the schedule flight time or baseline optimum value.

8.11.6 Flexibility. Flexibility refers to the ability of ATS users to adapt their operations to changing conditions. Greater flexibility would permit them to exploit operational opportunities as they occur. This includes allowing users to obtain more favorable routes or minimizing impacts on passengers as a result of unplanned capacity-constraining events such as severe weather. Flexibility measurements should address how well the air traffic system allows users to make dynamic operating decisions as a result of changes in weather or operating conditions, either prior to or during flight.

8.11.7 Efficiency. Efficiency can be measured in terms of deviation of flight from an optimum flight routing. An efficient routing would reduce direct operating costs by optimizing flight path trajectory and by eliminating excess flight time, route distance, and fuel usage at non-optimum speeds and altitudes. Airlines fly millions of single operations per year and small incremental savings of direct operating costs on every flight can add up to significant savings. Efficiency measurements should compare the planned or actual flight path trajectory to an optimum baseline.

8.11.8 Availability. The availability of air traffic services is an indicator of the reliability and quality of the ATS provided. Disruptions to key systems can reduce system capacity, causing delay, flight diversion and cancellation. The results is an increase in user cost and increase in workload to the ATS provider. Availability measurements should include the frequency or likelihood that ATS systems crucial to maintaining the level of system capacity at current levels cannot be operated.

8.11.9 Access. Access to airport and airspace can increase the value to all performance measurements. As with trajectory efficiency, the value of access may be gained through the release of airspace currently inaccessible to air traffic operations due to a lack of ATS, reduction to airport or airspace constraints, and lessening of national security restrictions. Access measurements should include the ability of ATS users to fly through restricted areas, the availability and quality of preferred routings, and the ability of the ATS provider, ATS system and airport to meet capacity demands.

8.11.10 Cost of service. All ATS productivity and cost issues eventually emerge as components of the quality of ATS services received by ATS users or as a cost to the ATS provider and user. The cost of service to ATS users should be considered by the ATS provider whenever any proposal to improve ATS performance on any of the ATS quality performance measurements is considered.

8.11.11 ATS providers should determine the runway airspace capacity for each airport and ATS unit they provide service.

8.11.12 Runway capacity. In an effort to achieve maximum runway utilization, delays may be unavoidable. Controllers do a good job in sequencing arrivals and departures in an effort to obtain maximum runway utilization; however, this is only possible if a pool of aircraft are available to use the runways. Not all delays are caused by the ATS provider, delays can also result from the aircraft operator, the airport operator, etc. When determining runway capacity the following factors should be taken into consideration:

a) mix of arrival and departures
b) aircraft types
c) wake vortex separation minima
d) departure routes
e) arrival routes
f) runway occupancy time
g) ATC procedures
h) runway configuration
i) airport layout
j) weather conditions
k) noise abatement procedures

Appendix A

Sample ATS quality assurance survey form for users of the system

ATS QUALITY ASSURANCE SURVEY

(To be filled out by users of the ATS system)

"Name of ATS unit" QUALITY OF AIR TRAFFIC SERVICE SURVEY"

"Name of ATS unit" is very interested in obtaining your feedback on the quality of services provided to you by our ATS unit. Your comments are very important to us and we would like to thank you in advance for taking the time to complete this survey.

1. Please provide us with the following information (Optional):

Name:
Company:
Mailing address:
Phone number:
Fax number:
Email:

Note. This information may be used in the future to notify you of future events planned by the ATS unit and/or ATS authority.

2. How often do you use our services?

- ❑ Daily
- ❑ Several times a week
- ❑ Weekly
- ❑ Every other week
- ❑ Monthly

3. Please indicate type of pilot and aircraft you normally fly:

- ❑ Commercial pilot
- ❑ Instructor pilot
- ❑ Private pilot
- ❑ Student pilot
- ❑ Other

4. How do you rate the overall quality of air traffic services provided?

- ❑ Excellent
- ❑ Good
- ❑ Average
- ❑ Fair
- ❑ Poor

5. How do you rate the quality of the ATIS broadcast?

- ❑ Excellent
- ❑ Good
- ❑ Average
- ❑ Fair
- ❑ Poor

6. How do you rate the clarity of ATC instructions?

- ❑ Excellent
- ❑ Good
- ❑ Average
- ❑ Fair
- ❑ Poor

7. How do you rate the responsiveness to pilot request?

- ❑ Excellent
- ❑ Good
- ❑ Average
- ❑ Fair
- ❑ Poor

8. How do you rate the attitude of ATS personnel as it pertains to professionalism and friendliness?

- ❑ Excellent
- ❑ Good
- ❑ Average
- ❑ Fair
- ❑ Poor

9. How do you rate the use of proper aeronautical phraseology?

- ❑ Excellent
- ❑ Good
- ❑ Average
- ❑ Fair
- ❑ Poor

10. How do you rate the clearance delivery?

- ❑ Excellent
- ❑ Good
- ❑ Average
- ❑ Fair
- ❑ Poor

11. How do you rate the ground control?
- ❑ Excellent
- ❑ Good
- ❑ Average
- ❑ Fair
- ❑ Poor

12. How do you rate the tower control?

- ❑ Excellent
- ❑ Good
- ❑ Average
- ❑ Fair
- ❑ Poor

13. How do you rate the approach control?

- ❑ Excellent
- ❑ Good
- ❑ Average
- ❑ Fair
- ❑ Poor

14. How do you rate the area control center?

- ❑ Excellent
- ❑ Good
- ❑ Average
- ❑ Fair
- ❑ Poor

15. Please share with us any comments and/or suggestions pertaining to the ATS operational areas you believe that may need improvement.

Comments/Suggestions:

Appendix B

Sample ATS quality assurance survey form for ATS personnel

ATS QUALITY ASSURANCE INTERNAL ATS UNIT SURVEY

(To be filled out by ATS personnel)

"Name of ATS unit" QUALITY OF AIR TRAFFIC SERVICE EMPLOYEE SURVEY"

"Name of ATS unit" is very interested in obtaining your feedback on the quality of services that you provide to users of the system and if all the tools you need are available to provide these services. Your comments are very important to us and we would like to thank you in advance for taking the time to complete this survey.

1. Please provide us with the following information (Optional):

Name:
Position:

2. How do you rate the overall quality of air traffic services provided by your ATS unit?

- ❑ Excellent
- ❑ Good
- ❑ Average
- ❑ Fair
- ❑ Poor

3. How do you rate the quality of equipment that you work with?

- ❑ Excellent
- ❑ Good
- ❑ Average
- ❑ Fair
- ❑ Poor

4. How do you rate the type of training (includes proficiency training, refresher training, initial training, etc.) you received?

- ❑ Excellent
- ❑ Good
- ❑ Average
- ❑ Fair
- ❑ Poor

5. How do you rate the working environment?

- ❑ Excellent
- ❑ Good
- ❑ Average
- ❑ Fair
- ❑ Poor

6. How do you rate the attitude of ATS personnel as it pertains to professionalism and friendliness?

- ❑ Excellent
- ❑ Good
- ❑ Average
- ❑ Fair
- ❑ Poor

7. How do you rate the use of proper aeronautical phraseology in your ATS unit?

- ❑ Excellent
- ❑ Good
- ❑ Average
- ❑ Fair
- ❑ Poor

8. How do you rate the airspace and ATC procedures of your ATS unit?

- ❑ Excellent
- ❑ Good
- ❑ Average
- ❑ Fair
- ❑ Poor

9. How do you rate the availability and quality of local, national, and ICAO directives?

- ❑ Excellent
- ❑ Good
- ❑ Average
- ❑ Fair
- ❑ Poor

10. How do you rate the workload distribution (is the workload distributed evenly?)?

- ❑ Excellent
- ❑ Good
- ❑ Average
- ❑ Fair
- ❑ Poor

11. How do you rate the quality and timeliness of briefings (new procedures, changes to procedures, etc.)?

- ❑ Excellent
- ❑ Good
- ❑ Average
- ❑ Fair
- ❑ Poor

12. How do you rate the communications between ATS personnel (between controllers and controller, supervisors and controllers, management and controllers, etc.)?

- ❑ Excellent
- ❑ Good
- ❑ Average
- ❑ Fair
- ❑ Poor

13. How do you rate your job satisfaction in your current position?

- ❑ Excellent
- ❑ Good
- ❑ Average
- ❑ Fair
- ❑ Poor

14. Please share with us any comments and/or suggestions pertaining to your ATS unit you believe that may need improvement.

Comments/Suggestions:

Chapter 9. PROFICIENCY TRAINING PROGRAMMES

9.1 INTRODUCTION.

9.1.1 Proficiency training in each ATS unit is necessary to maintain and update the knowledge and skills necessary to apply air traffic control procedures in a safe and efficient manner. Proficiency training includes refresher, supplemental, skill enhancement, and remedial training.

9.1.2 Proficiency training may be accomplished in many different ways. Methods include external and internal (local proficiency training) programmes. The most practical and efficient way of accomplishing proficiency training would be to develop an in-house/local proficiency training programme. The concept may involve sending a limited number of staff for external training and once they return to the unit, they would train others to become instructors on the subject areas. This concept is called "train-the-trainer" and would be very helpful in assisting ATS authorities to complete their proficiency training programmes as required. Proficiency training may include training videos, discussions/briefings on operational procedures, emergency procedures, coordination procedures, separation minima, ATS incidents, contingency procedures, effects of volcanic ash to aviation, etc. Consideration should be given to preparing a room in the ATS unit to be used for proficiency training. The room should be provided with appropriate training equipment such as video cassette player, television, dry easer boards, aviation maps, ICAO, national and local reference material, etc.

9.2 PROFICIENCY TRAINING.

9.2.1 Proficiency training should be required for all operational personnel, and support personnel who are required to maintain operational currency. The purpose of this training is to maintain and upgrade the knowledge and skills necessary to apply air traffic control procedures in a safe and efficient manner.

9.2.2 Proficiency training needs will vary between different ATS units unit and, therefore, should be tailored to meet identified requirements.

9.2.3 Proficiency training may include mandatory briefing items distributed by the ATS authority and the local ATS unit.

9.2.4 The proficiency training programme should be described in an ATS unit directive.

9.2.5 ATS authorities/ATS units should ensure that an annual schedule of required proficiency training is maintained and that proficiency training is accomplished.

9.2.6 All proficiency training should be documented in the controller's training record.

9.3 *Refresher training*. Each ATS unit should establish an annual refresher training programme. ATS authorities, managers and supervisors should stress that refresher training is for proficiency improvement, not performance evaluation.

9.3.1 This program should include, but not be limited to, training on the following topics:

a) unusual situations, such as adverse weather, aircraft equipment failure, hijacking, and other types of emergencies. (Training on emergency situations should be based on real life incidents and aircraft accidents, stressing a lesson learnt approach.);

b) infrequently used procedures, e.g. transitioning to procedural (non-radar) separation and procedures for special flight handling, rescue coordination centre, etc;

c) safety alerts and traffic advisories; in ATS units that are required to provide these services.

d) wake turbulence information and application;

e) line up and hold procedures;

f) locally developed deicing operational procedures and review of national deicing programmes (if applicable);

g) bird activity information;

h) other topics identified and transmitted by ATS authority or local ATS unit;

i) strayed or unidentified aircraft orientation;

j) interception of civil aircraft;

k) all aerodrome control tower limited aviation weather observers should receive, at least annually, refresher training in the meteorology procedures;

l) en-route and terminal controllers required to maintain radar proficiency should receive the following refresher training:

- demonstrate the steps for transitioning from the primary source of radar information to the backup system and vice versa;
- primary backup mode: annually review control procedures associated with operation in the backup mode (e.g., letters of agreement, handoffs, unit directives, and transition checklists) or utilize the backup mode for actual separation and control of air traffic;

m) ATS contingency plan procedures. Annually ensure familiarity with procedures and airspace based on the ATS unit contingency plans (e.g., loss of radar, communications failure, etc.);

n) effects of volcanic ash to aviation;

o) coordination procedures;

p) civil/military coordination and joint use airspace procedures;

q) separation minima;

r) radar vectoring techniques;

s) speed control techniques;

t) situational awareness;

u) ATS incident reduction;

v) aircraft performance and characteristics;

w) ATC communications;

x) preventing runway incursions;

y) special VFR operations;

z) level assignment;

aa) local manual of operations;

bb) letters of agreement;

cc) arrival and departure procedures;

dd) weather;

- deicing procedures
- severe weather
- winter operations
- wind shear

ee) noise abatement procedures; and

ff) ATS unit fire/life safety procedures.

9.4 *Supplemental training*. Operational personnel should complete supplemental training prior to the implementation of new/revised procedures, regulations, or equipment.

9.5 *Skill enhancement training*. Training administered by the operations supervisor when it is determined that a need exists to increase the skill(s) of a controller in a position on which the specialist is certified. When so doing:

a) the controller should be advised in writing of the skill(s) that is targeted for training; and

b) the operational supervisor, in collaboration with the controller, is responsible for developing the training to be administered to the controller. The methods and contents will be tailored to meet the identified needs of the individual and may include laboratory scenarios, classroom instruction, computer based instruction lessons, and OJT (on-the-job training). The operational supervisor should determine the most effective method.

9.6 *Remedial training*. Training conducted to correct specific performance deficiencies such as;

a) a controller decertified as a result of a performance deficiency; and

b) training provided as a result of performance-related de-certification should be documented as remedial training. No references should be made to ATS incident in the training record.

9.6.1 The controller should be notified in writing of the specific subject areas to be covered and the reasons.

9.6.2 The controller should have a reasonable opportunity to provide input on the development of his/her remedial training.

9.6.3 The methods and contents should be tailored to meet the identified needs of the controller and may include laboratory scenarios, classroom instruction, computer based instructions, and OJT. Operational supervisors should determine the most effective method.

CHAPTER 10. ATS SAFETY MANAGEMENT

10.1 INTRODUCTION

10.1.1 States shall implement systematic and appropriate ATS safety management programmes to ensure that safety is maintained in the provision of ATS within airspaces and at aerodromes.

10.1.2 As of 7 November 2003 the acceptable level of safety and safety objectives applicable to the provision of ATS within airspaces and at aerodromes shall be established by the State or States concerned. When applicable, safety levels and safety objectives shall be established on the basis of regional air navigation agreement.

Note: the *acceptable level of safety may be specified in qualitative or quantitative terms. The following are examples of measures which could be used to express the acceptable level of safety.;*

a) as a maximum probability of undesirable event, such as collision, loss of separation or runway incursion

b) as a maximum number of accidents per flight hour;

c) as a maximum number of incidents per aircraft movement;

d) as a maximum number of justified short term conflict alerts (STCA) per aircraft movement

10.1.3 **Recommendation.-** The acceptable level of safety and safety objectives applicable to the provision of ATS within airspaces and at aerodromes should be established by the State or States concerned. When applicable, safety levels and safety objectives should be established on the basis of regional air navigation agreement.

10.1.4 An ATS safety management programme shall, *inter alia:*

a) identify actual and potential hazards and determine the need for remedial action;

b) ensure that remedial action necessary to maintain an acceptable level of safety is implemented; and

c) provide for continuous monitoring and regular assessment of safety level achieved.

10.1.5 Any significant safety-related change to the ATC system including the implementation of a reduced separation minimum or a new procedure, shall only be effected after a safety assessment has demonstrated that an acceptable level of safety will be met and users have been consulted. When appropriate, the responsible authority shall ensure that adequate provision is made for post-implementation monitoring, to verify that the defined level of safety continues to be met.

Note 1. When, due to the nature of the change, the acceptable level of safety cannot be expressed in quantitative terms, the safety assessment may rely on operational judgement.

Note 2 Attention is drawn to guidance material contained in the Air Traffic Services Planning Manual *(Doc* 9426) *the* Manual on Airspace Planning Methodology for the Determination of Separation Minima *(Doc 9689) the* Manual on Implementation of a 300 m (1 000 ft) Vertical Separation Minimum between FL 290 and FL 410 Inclusive *(Doc* 9574) *and the* Manual on Required Navigation Performance *(Doc* 9613).

10.2 GENERAL

10.2.1 States shall ensure that the level of air traffic services (ATS) and communications, navigation and surveillance as well as the ATS procedures applicable to the airspace or aerodrome concerned, are appropriate and adequate for maintaining an acceptable level of safety in the provisions of ATS.

10.2.2 The requirements in respect of services, systems and procedures applicable to airspaces and aerodromes should be established on the basis of regional air navigation agreement in order to facilitate the harmonization of ATS in adjacent airspaces.

10.2.3 To ensure that safety in the provision of ATS is maintained, the appropriate ATS authority shall implement formal and systematic safety management programmes for the air traffic services under its jurisdiction. Where appropriate, ATS safety management programmes should be established on the basis of regional air navigation agreement.

10.3 Objectives

10.3.1 The objectives of ATS safety management are to ensure that:

a) the established level of safety applicable to the provision of ATS within an airspace or at an aerodrome is met; and

b) safety-related enhancements are implemented whenever necessary.

10.4 ATS safety management activities

10.4.1 An ATS safety management programme should include, *inter alia*, the following with respect to the provision of air traffic services:

a) monitoring of overall safety levels and detection of any adverse trend;

b) safety reviews of ATS units;

c) safety assessments in respect of the planned implementation of airspace re-organizations, the introduction of new equipment systems or facilities, and new or changed ATS procedures; and

d) a mechanism for identifying the need for safety enhancing measures.

10.4.2 All activities undertaken in an ATS safety management programme shall be fully documented. All documentation shall be retained for such period of time as is specified by the appropriate authority.

10.5 Monitoring of safety levels

10.5.1 Collection and evaluation of safety-related data

10.5.1.1 Data for use in safety monitoring programmes should be collected from as wide a range of sources as possible, as the safety-related consequences of particular procedures or systems may not be realized until after an incident occurred.

10.5.1.2 The appropriate ATS authority should establish a formal incident reporting system for ATS personnel to facilitate the collection of information on actual or potential safety hazards or deficiencies related to the provision of ATS, including route structures, procedures, communications, navigation and surveillance systems and other safety significant systems and equipment as well as controller work loads.

Note.— Guidance related to both mandatory and voluntary State incident reporting systems is contained in the LCAO Accident Prevention Manual *(Doc 9422).*
(Note reproduced from Annex 13, 7.3}

10.5.2 Review of incident and other safety-related reports

10.5.2.1 Safety-related reports concerning the operation of air traffic services, including air traffic incident reports shall be systematically reviewed by the appropriate ATS authority in order to detect any adverse trend in the number and types of incidents which occur.

10.5.2.2 Reports concerning the serviceability of ATS facilities and systems, such as failures and degradations of communication, surveillance and other safety significant systems and equipment shall be systematically reviewed by the appropriate ATS authority in order to detect any trend in the operation of such systems which may have an adverse effect on safety.

10.6 **Safety reviews**

10.6.1 General requirements

10.6.1.1 Safety reviews of ATS units shall be conducted on a regular and systematic basis, by personnel qualified through training, experience and expertise, and having a full understanding of relevant SARPs, PANS, safe operating practices and Human Factors principles.

10.6.2 Scope

10.6.2.1 The scope of ATS unit safety reviews should include at least the following issues:

10.6.2.2 *Regulatory issues* to ensure that:

a) ATS operations manuals, ATS unit instructions and ATC coordination procedures are complete, concise, and up-to-date;

b) the ATS route structure, where applicable, provides for:

   1) adequate route spacing; and

   2) crossing points for ATS routes located so as to reduce the need for controller intervention and for inter- and intra-unit coordination;

c) the separation minima used in the airspace or at the aerodrome are appropriate and all the provisions applicable to those minima are being complied with;

d) where applicable, provision is made for adequate visual or radar observation of the manoeuvring area, and procedures and measures aimed at minimizing the potential for inadvertent runway incursions are in place;

e) appropriate procedures for low visibility aerodrome operations are in place;

f) traffic volumes and associated controller work loads do not exceed defined, safe levels and that procedures are in place for regulating traffic volumes whenever necessary;

g) procedures to be applied in the event of failures or degradations of ATS systems, including communications, navigation and surveillance systems, are practicable and will provide for an acceptable level of safety; and

h) procedures for the reporting of incidents and other safety-related occurrences are implemented, that the reporting of incidents is encouraged and that such reports are reviewed to identify the need for any remedial action.

10.6.2.3 *Operational and technical issues* to ensure that:

a) the environmental working conditions meet established levels for temperature, humidity, ventilation, noise and ambient lighting, and do not adversely affect controller performance;

b) automation systems generate and display flight plan, control and coordination data in a timely, accurate and easily recognizable manner and in accordance with Human Factors principles;

c) equipment, including input/output devices for automation systems, are designed and positioned in the working position in accordance with ergonomic principles;

d) communications, navigation, surveillance and other safety significant systems and equipment;

1) are tested for normal operations on a routine basis;

2) meet the required level of reliability and availability as defined by the appropriate authority;

3) provide for the timely and appropriate detection and warning of system failures and degradations;

4) include documentation on the consequences of system, sub-system and equipment failures and degradations;

5) include measures to control the probability of failures and degradations; and

6) include adequate back-up facilities and/or procedures in the event of a system failure or degradation; and

e) detailed records of systems and equipment serviceability are kept and periodically reviewed.

Note.— In the context above, the terms reliability and availability have the following meanings:

i) Reliability. The probability that a device or system will function without failure over a specified time period or amount of usage, and

ii) Availability. The ratio of percentage of the time that a system is operating correctly, to the total time in that period.

{Definitions reproduced from the Air Traffic Services Planning Manual *(Doc 9426), Chapter 1, 1.1.2}*

10.6.2.4 *Licensing and training issues* to ensure that:

a) controllers are adequately trained and properly licensed with valid ratings;

b) controller competency is maintained by adequate and appropriate refresher training, including the handling of aircraft emergencies and operations under conditions with failed and degraded facilities and systems;

c) controllers, where the ATC unit/control sector is staffed by teams, are provided relevant and adequate training in order to ensure efficient teamwork;

d) the implementation of new or amended procedures, and new or updated communications, surveillance and other safety significant systems and equipment is preceded by appropriate training and instruction;

e) controller competency in the English language is satisfactory in relation to providing ATS to international air traffic; and

f) standard phraseology is used.

10.7 Safety Assessments

10.7.1 Need for safety assessments

10.7.1.1 A safety assessment shall be carried out in respect of proposals for significant airspace re-organizations, for significant changes in the provision of ATS procedures applicable to an airspace or an aerodrome, and for the introduction of new equipment, systems or facilities, such as:

a) a reduced separation minimum to be applied within an airspace or at an aerodrome;

b) a new operating procedure, including departure and arrival procedures, to be applied within an airspace or at an aerodrome;

c) a re-organization of the ATS route structure;

d) a re-sectorization of an airspace;

e) physical changes to the lay-out of runways and/or taxiways at an aerodrome; and

f) implementation of new communications, surveillance or other safety-significant systems and equipment, including those providing new functionality and/or capabilities.

Note 1.— A reduced separation minimum may refer to the reduction of a horizontal separation minimum, including a minimum based on required navigation performance (RNP), a reduced vertical separation minimum of300 m (1 000 fti) between FL 290 and FL 410 inclusive (RVSM), the reduction of a radar separation or a wake turbulence separation minimum or reduction of minima between landing and/or departing aircraft.

Note 2.— When, due to the nature of the change, the acceptable level of safety cannot be expressed in quantitative terms, the safety assessments may rely on operational judgement.

10.7.1.2 The proposed change shall be implemented only when the assessment has shown that an acceptable level of safety will be met.

10.8 Safety-significant factors

10.8.1 The safety assessment shall take into account all factors determined to be safety-significant, including any of the below as relevant:

a) types of aircraft and their performance characteristics, including aircraft navigation capabilities and navigation performance;

b) traffic density and distribution;

c) airspace complexity, ATS route structure and classification of the airspace;

d) aerodrome lay-out, including runway configurations, runway lengths and taxiways configuration;

e) the type of air-ground communications and time parameters for communication dialogues, including controller intervention capability;

f) type and capabilities of surveillance system, and the availability of systems providing controller support and alert functions; and

g) any significant local or regional weather phenomena.

Note 1.— See also Part V. Section 11 concerning reductions in separation minima.

Note 2.— Guidance material on methods of expressing and assessing a safety level and on safety monitoring programmes is contained in Annex 11, Attachment B, the Air Traffic Services Planning Manual *(Doc 9426), the* Manual on Implementation of a 300 m (1 000 ft) Vertical Separation Minimum Between FL 290 and FL 410 Inclusive *(Doc 9574), the* Manual on Required Navigation Performance (RNP) *(Doe 9613) and the* Manual on Airspace Planning Methodology for the Determination of Separation Minima *(Doc 9689)*.

10.9 Safety-enhancing measures

10.9.1 Any actual or potential hazard related to the provision of ATS within an airspace or at an aerodrome, whether identified through an ATS safety management activity or by any other means, shall be assessed and classified by the appropriate ATS authority for its risk acceptability.

10.9.2 Except when the risk can be classified as acceptable, the ATS authority concerned shall, as a matter of priority and as far as practicable, implement appropriate measures to eliminate the risk or reduce the risk to a level that is acceptable.

10.9.3 If it becomes apparent that the level of safety applicable to an airspace or an aerodrome is not, or may not be achieved, the appropriate ATS authority shall, as a matter of priority and as far as practicable, implement appropriate remedial measures.

10.9.4 Implementation of any remedial measure shall be followed by an evaluation of the effectiveness of the measure in eliminating or mitigating a risk.

10.10 Reviews of airspace and ATC capacity

10.10.1 General

10.10.1.1 The number of aircraft provided with an ATC service shall not exceed that which can safely be handled by the ATC unit concerned under the prevailing circumstances. In order to define the maximum number of flights which can be safely accommodated, the appropriate ATS authority should assess and declare the ATC capacity for control areas, control sectors within a control area and for aerodromes.

10.10.1.2 ATC capacity should be expressed as the maximum number of aircraft which can be accepted over a given period of time within the airspace or at the aerodrome concerned.

Note.— The most appropriate measure of capacity is likely to be the sustainable hourly traffic flow. Such hourly capacities can be converted into e.g. daily or annual values.

10.11 Capacity assessments

10.11.1 In assessing capacity values, factors to be taken into account should include, *inter alia,* the following:

a) the level and type of ATS provided;

b) the structural complexity of the control area, the control sector or the aerodrome concerned;

c) controller workload, including control and coordination tasks to be performed;

d) the types of communications, navigation and surveillance systems in use, their degree of technical reliability and availability as well as the availability of back-up systems and/or procedures;

e) availability of ATC systems providing controller support and alert functions; and

f) any other factor or element deemed relevant to controller workload.

Note.— Summaries of techniques which may be used to estimate control sector/position capacities are contained in the Air Traffic Services Planning Manual *(Doc 9426).*

10.12 Regulation of ATC capacity and traffic volumes

10.12.1 Where traffic demand varies significantly on a daily or periodic basis, facilities and procedures should be implemented to vary the number of operational sectors or working positions to meet the prevailing and anticipated demand. Applicable procedures should be contained in local instructions. *(Relocated from Part VI}*

10.12.1.2 In case of particular events which have a negative impact on the declared capacity of an airspace or aerodrome, the capacity of the airspace or aerodrome concerned shall be reduced accordingly for the time period concerned. Whenever possible, the capacity pertaining to such events should be pre-determined.

10.12.1.3 To ensure that safety is not compromised whenever the traffic demand in an airspace or at an aerodrome is forecast to exceed the available ATC capacity, measures shall be implemented to regulate traffic volumes accordingly.

10.13 Enhancements of ATC capacity

10.13.1 The appropriate ATS authority should:

a) periodically review ATS capacities in relation to traffic demand; and

b) provide for flexible use of airspace in order to improve the efficiency of operations and increase capacity.

10.13.2 In the event that traffic demand regularly exceeds ATC capacity, resulting in continuing and frequent traffic delays, or it becomes apparent that forecast traffic demand will similarly exceed capacity values, the appropriate ATS authority should, as far as practicable:

a) implement steps aimed at maximizing the use of the existing system capacity; and

b) develop plans to increase capacity to meet the actual or forecast demand.

10.14 Flexible use of airspace

10.14.1 The appropriate authorities should, through the establishment of agreements and procedures, make provision for the flexible use of all airspace in order to increase airspace capacity and to improve the efficiency and flexibility of aircraft operations. When applicable, such agreements and procedures should be established on the basis of regional air navigation agreement.

10.14.2 Agreements and procedures

10.14.2.1 Agreements and procedures providing for a flexible use of airspace should specify, *inter alia:*

a) the horizontal and vertical limits of the airspace concerned;

b) the classification of any airspace made available for use by civil air traffic;

c) units or authorities responsible for transfer of the airspace;

d) conditions for transfer of the airspace to the ATC unit concerned;

e) conditions for transfer of the airspace from the ATC unit concerned;

f) periods of availability of the airspace;

g) any limitations on the use of the airspace concerned; and

h) any other relevant procedures or information.

Chapter 11. HUMAN FACTORS

11.1 In 1986, the ICAO Assembly adopted Resolution A26-9 on Flight Safety and Human Factors. As a follow-up to the Assembly Resolution, the Air Navigation Commission formulated the following objective for the task:

"To improve safety in aviation by making States more aware and responsive to the importance of Human Factors in civil aviation operations through the provision of practical Human Factors material and measures developed on the basis of experience by States, and by developing and recommending appropriate amendments to existing materials in Annexes and other documents with regard to the role of Human Factors in the present and future operational environments. Special emphasis will be directed to the Human Factors issues that may influence the design, transition and in-service use of the {future} ICAO CNS/ATM system."

11.2 One of the results of this initiative has been the incorporation of Human Factors-related Standards and Recommended Practices (SARPs) in several ICAO Annexes and documents such as PANS-OPS, Doc 8400, PANS-RAC,Doc 4444 and Annexes 10 and 11. The Human Factors-related SARPs in Annexes 10 and 11, and the conclusions and Recommendations of the Rio de Janeiro Conference (May 1998), underlie the development of the Human Factors Guidelines for Air Traffic Management Systems Manual, Doc 9758. The manual provides Human Factors guidance material that will enable global and regional planners and developers to ensure that Human Factors issues are properly considered at the appropriate stages of planning and development. The manual also provides guidance on Human Factors aspects to States and organizations that are about to acquire and implement CNS/ATM technology for the provision of air traffic services with the objective to facilitate a successful transition.

11.3 Incorporating human factors knowledge in air traffic management systems and practices plays an important role in the outcome of the overall goal of air traffic quality assurance. It is stated in the document "Human Factors in the Design and Evaluation of Air Traffic Control Systems, "Human error remains the most common contributing factor in aviation accidents and incidents, yet strategies for mitigating their impact are well known and widely documented.

11.4. There are three important concepts that need to be taken into consideration as it relates to the development, acquisition and implementation of ATM systems. These concepts are Human-centered Automation, Situational Awareness, and Error Management. Situational Awareness includes a listing of specific consequences for the design, implementation and operation of ATM systems. Human-centered Automation and Error Management include high-level conclusions, which should be borne in mind throughout the processes of development, acquisition and implementation of ATM systems.

Human-centered Automation

11.4.1 A technology-centered approach automates whatever functions it is possible to automate and leaves the human to do the rest. This places the operator in the role of custodian to the automation. The human-centered approach provides the operator with automated assistance that saves time and effort and therefore the operator's task performance is supported, not managed, by

the automation. The three high-level objectives for ATC automation are Usability, Operational Suitability and Workforce Acceptance.

Situation Awareness

11.4.2 The definition of Situational Awareness is the perception of the elements in the environment within a volume of time and space, the comprehension of their meaning, and the projection of their status in the near future. The elements of Situation Awareness in ATC are highly dynamic and present subtle to large changes that may occur at short notice, and that can or will influence the way a controller works at any particular moment.

- Personal factors
- Weather
- Airport infrastructure
- Individual differences
- Traffic
- Operators and pilots
- Environment
- Navigational aids
- Aircraft performance
- Equipment
- Adjacent units

Managing Error

11.4.3 Error management has two components: error reduction and error containment. Error reduction comprises measures designed to limit the occurrence of errors. Error containment measures are designed to limit the adverse consequences of the errors that still occur.

Error management includes the following:

a) Measures to minimize the error liability of the individual and team;

b) Measures to reduce the error vulnerability of particular tasks or task elements;

c) Measures to discover, assess and then eliminate error-producing factors within the workplace;

d) Measures to diagnose organizational aspects that create error-producing factors within the individual, the team, the task and the workplace;

e) Measures to enhance error detection;

f) Measures to increase the error tolerance of the workplace and system;

g) Measures to make latent conditions more visible to those who operate and manage the system; and

h) Measures to improve the organization's intrinsic resistance to human fallibility.

11.4.4 There is a relationship between the three concepts presented. The application of the Human-centered Automation concept will increase the Situational Awareness of the controller, which in turn becomes a component of the Error Management programme. Controllers who maintain a high degree of Situational Awareness are more likely to detect errors and contain their consequences. More information on these concepts is contained in the Human Factors Guidelines for Air Traffic Management Systems, ICAO Doc 9758.

11.5 In an effort to provide more human factor insights directly related to the work of the air traffic controller, an **Appendix** is included to this Chapter with an extract from a document entitled "Human Factors for Air Traffic Control Specialist: A User's Manual
the United States Federal Aviation Administration in November 1995. The document presents some findings of human factors research projects and other information useful to air traffic controllers in a succinct and easy-to-read format. The topics included are: controller-pilot voice communications, memory, fatigue, and the effects of stress on information processing. The recommended techniques are intended to help in reducing errors in voice communications, remembering specific information, identifying signs of stress that could affect performance, and reducing fatigue.

FAA – November 1995

1. Memory

1.1 Human memory is unreliable and needs all the help it can get. Observe the memory-joggers used by other controllers and use whatever cues work for you. Working with specific information helps memory for that information. Even the simple act of writing something down can help you to remember it. Some things, such as unusual circumstances that pose no danger or require no immediate action, are easier to forget than others. Even in low workload conditions, distractions can clobber short-term or "working" memory.

1.2 Get a situation back to normal while you're still thinking about it otherwise you might forget about it or think you already did something you only planned on doing. Do whatever you can to unclutter your screen and categorize information. For example, some facilities use different color strip holders for departures and arrivals. Another example of useful categorization is shortening the data blocks (or the leader line to zero) after switching an aircraft to another frequency.

2. Controller-Pilot Communications

2.1 Give pilots no more than three pieces of information in a single transmission. The complexity of the controller's transmission has a direct effect on the pilot's ability to remember it there are fewer readback errors and requests for repeats with short and simple transmissions. Many different studies show that, on the ground and in the air, cramming too much information in a single transmission can cause problems. In a study of incident reports submitted by pilots and controllers, multiple instructions given in the same ATC transmission were associated with 49% of altitude deviations and 48% of the potential altitude deviations. A study of en route (ARTCC[1]) voice tapes showed a 1-3% miscommunication rate (i.e., readback errors and requests for repeats) for clearances containing five or more elements. Clearances containing five or more pieces of information made up only 4 % of the messages examined, but accounted for 26% of the readback errors found in the study.

2.2 Almost two-thirds of the pilots who said they had difficulties in remembering ATC ground instructions said that ATC issues too much information too rapidly. Avoid issuing strings of instructions to different aircraft. A pilot's memory for an instruction is hindered by extraneous information presented before and after it. When issuing a clearance that is different from what the pilot was told to expect, EMPHASIZE that difference. A study of Aviation Safety Reporting System (ASRS) reports found that 33% of the communication errors between the cockpit and ATC that resulted in runway transgressions identified pilot expectations as contributing to the error.

[1] ARTCC – "Air Route Traffic Control Center"

2.3 We are all set up to hear what we expect to hear. This is one reason why catching readback errors is such a difficult task. Use the pilots' readbacks like you do any other piece of information. Actively listen to the readbacks and check them against any other information (such as strip notations). This will help to guard against hearback errors and serve as a check that you issued the clearance that you intended to issue. Studies of voice tapes from actual operations reveal that readback errors occur in less than one percent of all controller transmissions. On average, the controller corrects 66% of these readback errors, but the proportion of readback errors corrected by the controller varies widely with the ATC environment. While en route controllers corrected 89% of the readback errors, only 50% of the readback errors on the ground frequency were corrected. On the TRACON[2] and local control frequencies, controllers corrected 60% and 63%, respectively. To err is human. Unfortunately, to err repeatedly is also human. ALWAYS inform the pilot when there is a similar call sign on the frequency. This will alert the pilots to be particularly careful and will help to reduce the probability of a pilot accepting a clearance intended for another aircraft.

2.4 A study of reports submitted to the Aviation Safety Reporting System (ASRS) on pilot-controller communication errors showed that:

a) Over half (54%) of the reports describing incidents of pilots accepting a clearance intended for another aircraft involved similar call signs.

b) Similar call signs were also identified as a contributing factor in 43% of the reports of communication errors resulting in near mid-air collisions and 21% of the errors resulting in loss of standard separation.

2.5 Speaking slowly and distinctly gives any listener a better chance of correctly hearing what was said. However, it is especially important to speak S-L-O-W-L-Y and DISTINCTLY to foreign pilots. As we speed up our speech rate, we lose many of the cues that help us tell the difference between certain speech sounds. Those cues can mean the difference between understanding the clearance that was issued and needing to ask for a repeat, especially for pilots whose native language is not English. Pilots have been known to interpret what they were told to expect as the actual clearance. Issue "expect" clearances with caution and emphasize any differences between the actual clearance and what the pilot had been told to expect. Speaking quickly may seem like a timesaver, but it can backfire. In one simulation study, the rate of pilot readbacks errors doubled when the same controller issued the same complex clearances in a moderately faster speaking voice. Good microphone technique is critical to prevent clipping call signs; key the transmitter and then pause for a second before speaking. Even when it's not clipped, we often don't hear the first syllable of a message. Never issue negative commands (e.g., "Don't climb") and always be sure that the action word in your instruction is what you want the pilot to do. One of the early developmental versions of TCAS had negative resolution advisories (RAs) such as "Don't Climb" and "Don't Descend". Initial testing in simulators showed that pilots responded inappropriately (such as climbing in response to a "Don't Climb") fifty percent of the time a negative alert was presented. Consequently, all negative RA's were eliminated.

[2] TRACON – Terminal Radar Approach Control

2.6 A study of communication in the en route environment showed that maneuvers issued for traffic avoidance took almost twice as long to complete if the controller had to repeat part or all of the clearance. The time from the beginning of the controller's clearance to the end of the pilot's acknowledgement took an average of 19 seconds when a partial or full repeat was required, and nine seconds when the pilot responded correctly to the first transmission. Interestingly, less critical clearances (i.e., turns issued for any other reason but traffic avoidance) took about the same amount of time to successfully transmit. On average, 11 seconds elapsed between the controller's first ct acknowledgement. While things may seem to happen almost instantaneously, in reality, we must plan for these human response times just as we plan for aircraft response times.

3. Effect of Stress on Information Processing

3.1 High workload and stress can induce "tunnel vision", that is, focusing your attention on a small area. Force yourself to scan in a consistent manner to help ensure that no aircraft or situation is forgotten. Never assume that a pilot will follow the clearance that was issued. Keep up your scan and check. A study in the United Kingdom found that altitude busts were primarily caused by pilots not complying with ATC vertical clearances, which had been read back correctly. The study also found that twice as many busts occur during climb as during descent. Stress impairs memory and makes it easier to forget things. Take time to mentally step back, scan, and assess the situation.

3.2 Learn to recognize your own personal signs of stress and those of your colleagues. This may include: talking too fast or too loud, moving close up to the scope, sweating, increased heart rate, or other signals. Remember, air traffic control is a team effort. Call for help before the situation gets out of control. Treat other controllers as a resource. Encourage their feedback and consider what they have to say. It's a good idea to inform pilots whenever there is an aircraft in close proximity that the pilot might see, but not expect to see. Good information can go a long way toward preventing faulty perceptions. In October 1993, a near mid-air collision occurred in Washington Center airspace when a pilot misread his TCAS and descended in front of his traffic. Mistaking "800" for "000", the pilot thought he was at the same altitude as an aircraft that was actually almost 1,000 feet below him.

4. Fatigue

4.1 Optimal performance is impossible without adequate sleep. Sleep is necessary for both our physical and psychological well-being. Not getting enough sleep affects memory and our abilities to perform complex tasks (like the planning and problem-solving necessary to predict and resolve conflicts between aircraft). Working on a schedule that changes constantly presents serious challenges to getting adequate rest. In fact, studies show that while only 15% to 20% of day workers reports suffering sleep disturbances, up to 80% of shift workers who work night shifts report this problem. A critical step in maintaining alertness on the job is getting sufficient quantity and quality of sleep off the job. This means not only getting an adequate amount of sleep (for most people, 7-8½ hours), but it also means getting uninterrupted sleep. Interruptions to your sleep reduce the quality of your sleep. Sleep disruptions can also deprive you of the deep stages of sleep. All of this means that even an adequate amount of sleep may not make you feel rested when you wake up; quality is as important as quantity. Even a small sleep decrement can affect performance. Know your limitations. Did you know that: There is an increase in traffic accidents on the Monday after daylight-savings time begins and a decrease in accidents on the Monday after the return to standard time.

5. Sleep Busters

CAFFEINE - Everyone knows that drinking coffee near bedtime can make it difficult to get to sleep. What you may not know is that caffeine can also disrupt sleep even in people who fall asleep easily after consuming caffeine. For a better night's sleep, avoid caffeine for six hours before bedtime.

SMOKING -Nicotine is a stimulant and cigarette smoking can interfere sleep. If you are a smoker who has trouble sleeping, now you have one more reason to quit. And, if you are a smoker who would like to be a non-smoker, see your doctor. There are new and effective ways to help you quit for good.

ALCOHOL - Drinking alcoholic beverages may help you to fall asleep faster, but it will make the quality of sleep that you get worse than it would have been if you had no alcohol.

LIGHT, HEAT, and NOISE - Sleep in a cool, dark, and quiet place. Constant "white noise", like the hums produced by air conditioners and fans help to cover up other noises, making them less likely to disturb your sleep.

COUCH POTATO LIFESTYLE - A steady exercise program can help improve the quality of the sleep you get by increasing the percentage of time you spend in the restorative deep stage of sleep. Remember, even just one-half hour of moderate exercise three to five times a week can make a remarkable difference in the way you feel.

THE PROS AND CONS OF CAFFEINE - Caffeine can increase vigilance and decrease the feeling of fatigue. It can also postpone sleep (whether you want it to or not), impair the quality of the sleep that you get, and can increase heart rate and blood pressure. It is important to know that caffeine has its peak effects one to three hours after you consume it. People who have caffeine regularly develop a tolerance to it and eventually need more caffeine to feel the same effect. This makes it more difficult to use caffeine "strategically", because you will get less of an effect when you need it most. People who don't regularly consume caffeine will be more sensitive to its effects (and will find it easier to use caffeine strategically). Sensitivity to caffeine also changes with age so that as we get older, we get more of a "jolt" from the same amount of caffeine.

6. Tips to maintaining alertness on the job

6.1 Now that you know how to get a good night's (or day's) sleep, here are some other tips to help keep you alert on the job:

Spend break time under bright lights.
Stand up, stretch, and walk around as much as possible.

"Did You Know That":

Wearing sunglasses, eating green leafy vegetable, and not smoking can help protect your eyes by preventing macular degeneration—a leading cause of blindness in people over 55 that affects almost 30% of people over 75. You may see clear or opaque specks or threads that drift across your vision and move with your eyes (these are called "floaters") or flashes of light that aren
These can be perfectly harmless or an indication that a serious problem is developing (such as a tear in the retina). Only your eye doctor can tell the difference. Getting a problem taken care of early is easy and can help you save your sight. Adjusting the brightness on your color monitor will affect color appearance. For example, when the intensity of brightness on the monitor is dimmed, yellow can appear brown, gold, or green. Certain medications can affect your color vision. For example, Sildenafil can affect the ability to tell the difference between green and blue. For this reason, Dr. Donato Borillo, the Commander of Flight Medicine at Wright-Patterson Air Force Base, recommends that pilots allow at least six hours between taking Sildenafil and flying. Other drugs can also affect color vision—ask your doctor. Tower controllers—wearing sunglasses changes the appearance of colors on a monitor and can increase your chances of mistaking one color for another. The appearance of a color can change dramatically when the color is put on a different background. Want to protect your hearing? Then stay away from loud noises to guard against "noise-induced hearing loss". Noise-induced hearing loss can be the result of a one-time exposure to an extremely loud noise, repeated exposures to loud noise or extended exposure to moderate noise. This type of hearing loss is usually gradual, painless, and permanent. So turn down the loud music, use a headset instead of a speaker when flying, and wear noise-reducing earplugs when you're using power tools or in a noisy environment. Any sound louder than 80dB is potentially hazardous. Simply put, if you need to raise your voice to be heard over the noise, then the noise is loud enough to damage your hearing with long-time exposure. Tinnitus or "ringing in the ears" is the perception of any sound (ringing, buzzing, whistling, etc.) that isn't in the environment. Most people experience it at one time or another. Tinnitus may be a symptom of a problem—such as hearing loss, and ear infection, an obstruction, or other disorder—that requires medical attention. However, it can also be a side effect of some common medications such as pain relievers, certain antibiotics, or alcohol. It can also be caused by noise exposure, hypertension, anemia, or stress. If you wear glasses or contacts and your prescription isn't as strong as it should be, you could be suffering from headaches needlessly. An under correction can cause headaches, particularly if you spend a lot of time using a computer screen.