



ICAO

International Civil Aviation Organization

**Twenty-third Meeting of the Communications/
Navigation and Surveillance Sub-group (CNS SG/23)
of APANPIRG**

Bangkok, Thailand, 2 - 6 September 2019

Agenda Item 9: Human Factors and Air Traffic Safety Electronics Personnel (ATSEPs) related training

**FACTORS ADDING STRESS AND FATIGUE TO ATSEP AND THE NEED FOR A STUDY
TO ADDRESS THE HUMAN FACTOR ISSUES OF ATSEP**

(Presented by International Federation of Air Traffic Safety Electronics Association (IFATSEA))

SUMMARY

To ensure the effective capacity of airports and airspace with safety and efficiency in a long-term approach, it is essential to study the human factor issues of Air Traffic Safety Electronics Personal (ATSEP) on their working environment, abilities, limitations and on other characteristics for evaluating their job and safety performance. This paper discusses about the stressful working environment that can lead to errors, lapses, latent or error-causing conditions that brings the invisible windows of opportunity for unsafe acts and discusses on the need for scientific study on their human factor issues and for closing all the windows of opportunity.

1. INTRODUCTION

1.1 Air Traffic Safety Electronics Personnel (ATSEP) is the recognized ICAO definition for personnel proven competent in the installation, operation and/or maintenance of a communications, navigation, surveillance/air traffic management (CNS/ATM) system. (*Procedures for Air Navigation Services — Training* [PANS-TRG, Doc 9868])

1.2 ATSEP comprise engineers, technicians, and computer hardware and software specialists who are responsible for the specification, procurement, installation, calibration, maintenance, testing and certification of ground ANS electronic systems used to help control aircraft movements.

2. DISCUSSION

Roles, Knowledge, Skill and competency

2.1 ATSEPs are responsible for any intervention to the hardware and software of CNS/ATM equipment and they are assigned with the tasks to perform installations, modifications, maintenance, configuration management, calibration, certification, monitoring and control of operational ground-based CNS/ATM equipment including while they are in operation.

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2.2 ATSEP provide and support the electronics and software which enable ATS systems to function at the required performance levels. The key responsibilities of ATSEP varies based on their level in the organization which includes both technical and managerial.

2.3 Updating of professional knowledge and the skill development of ATSEP is very essential as ATSEP have been entrusted the maintenance and operation of all the critical Communication, Navigation, Surveillance, Air traffic management automation systems.

2.4 Various types of communication and interconnecting media and systems are used in the aviation for bringing the signals and data from remote sites to main control center which emphasizes on the fact that ATSEPs need to upgrade their knowledge and skills continuously on the upcoming protocols, configuration and troubleshooting procedures of these devices in addition to the core competencies as defined in the *Manual on Air Traffic Safety Electronics Personnel Competency-based Training and Assessment* [DOC 10057].

2.5 So, learning about one stand-alone facility is not enough, ATSEPs need to upgrade their knowledge and skills on other facilities at system level, thus ensuring continuous, expeditious and cost-effective operations and their safety requirements.

Working environment

2.6 ATSEP usually work on a 24-hour shift basis and co-exist with the accountable equipment or systems. A typical working environment on which ATSEP perform, includes people, procedures and equipment. ICAO SHELL model referred in *Human Factors Training Manual* [DOC 9683] is well applicable to ATSEP.

Factors that add stress to ATSEP

2.7 Re-activation of unserved airports and connectivity: States invariably plan to enhance connectivity to unserved and under-served airports. States promote international connectivity from non-metro cities. These efforts add significant installation and maintenance tasks.

2.8 Dramatic increase in airport infrastructure: Public-private partnership in modern airport construction and operation brings dramatic increase in airport infrastructure and additional complex interconnected CNS/ATM systems.

2.9 Successive induction of unfamiliar technologies: States anticipates traffic increase by many folds, induct new technology and systems into ANS. Capacity realization is mainly driven by technology. There is no global defined means to make ATSEP to get familiar with the upcoming technologies like Augmented and Virtual Reality, Cloud Computing, Artificial Intelligence, Machine Learning, Block chain technologies, Remote digital ATC tower, mobile towers, Ground Based Augmentation System (GBAS) and Satellite Based Augmentation System (SBAS). But ATSEP are entrusted to ensure the safe operation with necessary intervention when these systems fail or malfunctions.

2.10 Growing complex interconnected systems of systems: Upper Airspace Harmonization (UAH) and Central Air Traffic Flow Management (C-ATFM) systems are added for making the airlines to have their preferred route, flight levels, carbon emission control and capacity management. These advanced interconnected systems bring enhanced safety in operation but adds challenges to ATSEP in ensuring the implementation and maintenance of these interconnected systems.

2.11 GOD's own acts: States are witnessing regular total shutdown of airports due to natural calamities in the recent past, which brought most challenging breakdown maintenance tasks for ATSEP.

2.12 Occupational hazards: Modern airport has large movement areas. Airport surveillance on these larger areas requires a greater number of rotating and or stationery antenna to be installed at high raised towers and masts to meet the coverage redundancies. To reduce the footprint of towers in the modern airport's operational area, un-safe steel structures are raised to install the systems. Working under stress without proper training and emergency backup, ATSEP are exposed to serious occupational hazards. With more wind and poor weather conditions, the occupational hazards and adverse consequences to the safety of ATSEP also increases.

2.13 Stress and fatigue due to non-availability of internationally defined duty time limits: ATSEP may have to perform and continue performing the tasks irrespective of the hours that they have already performed. Though there have been Duty Time Limitation (DTL) prevalent for most of the aviation professionals for some considerable time but no serious thought has been perceived in this area for ATSEP. The maintenance of these CNS/ATM system is heavily dependent upon ATSEP being able to perform their jobs reliably and efficiently. However, no standardized mechanism to avoid their stress progressing into fatigue.

2.14 In adequate human resources: There is no evident augmentation on the human resource front, though there are evidently visible pre-dominant growth in traffic, airport constructions and ANS systems induction. ATSEP are entrusted to handle the simultaneous operation of the existing systems as well as induction of the new systems in major airports. Very few ATSEP are deployed at new airports for taking care of the installation, testing, commissioning and operation of the ANS systems, The possibility of lapses and errors in such working environment can't be ruled out as ATSEP are under severe stress due to assignment of multiple tasks at a given period of time, where each task is time consuming and time bound.

2.15 Pre-occupation with non-core activities: Though the scope of activities is well defined for ATSEP in DOC 10057 along with the competency and skills sets, ATSEP are pre-occupied with the non-core activities in addition to the safety critical activities. The possibility of lapses on the essential activities due to pre-occupation on the other can't be ruled out. However, ATSEP are being held responsible for the safety critical ANS system operation and maintenance irrespective of their pre-occupation on non-core activities.

Impact of stress and fatigue

2.16 Under the prevailing conditions of insufficient human resources and with all stressful factors as listed above unresolved, there are possibilities of inadequate supervision, maintenance failures and procedural short cuts on essential operating procedures.

2.17 On most occasions, accident trajectories are halted by CNS/ATM systems' early warnings at the different levels of safety nets. However, the holes or windows of opportunity that occurs due to maintenance error could line up to allow the accident trajectory to breach all of these safety nets.

2.18 With the new technologies, unknown bugs or unknown manufacturing defects will also be added to the above latent conditions and could widen the windows of opportunity to unsafe acts, though they remain undetected.

2.19 There are incidents of traffic diversions, partial or full closer of airport operations due to non-availability of safety critical ANS systems. Serious, even fatal accidents can't be ruled out if the stress and fatigue issues of ATSEP are not addressed.

Need for studying the ATSEP safety performance

2.20 Given the unique nature of the job performance with zero tolerance for error and with the requirements of high levels of technical skills, there is a need to study and address the human factor issues of ATSEP proactively, before the stress and fatigue causes adverse events.

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2.21 Cost involved in these studies will be minimal when compared to the expenditure planned for capacity building in a long term.

2.22 ICAO safety objective is to achieve a consistent level of safety throughout the world but it is challenging to achieve due to the different levels of effectiveness in the control and oversight of aviation activities by State Authorities. So, there is a need for defining uniform standards on the roles, responsibilities, training requirements, duty time limitations and adequate human resources with regards to ATSEP those who are playing vital role in the safety chain.

2.23 With the limited human resources, less exposure in the upcoming technologies and on simultaneous time devotion on multiple contrasting tasks may not only contribute the delay in addressing the capacity demand but also could add to the safety threats. Possibilities of latent or error-causing conditions due to the human error and lapses at ATSEP tasks need immediate attention.

2.24 CNS/ATM systems play the defensive role for preventing unsafe acts in the sharp end. For closing the holes of windows of opportunity for unsafe acts, the International Federation of Air Traffic Safety Electronics Personnel (IFATSEA) which represents ATSEP from 70 member states, looking forward to collaborate with ANSPs in conducting the studies on human factor issues of ATSEP.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

- a) Discuss the paper and consider the **draft Conclusion/Decision** in below box; and
- b) Recommending in carrying out the study to address the human factor issues of ATSEP and to revisit the outcome of the studies in the CNS/SG 24 for further discussion.

Draft Conclusion/Decision CNS SG/23/XX - Need for Study Human Factor Issues of ATSEP	
What: The states are urged to study the human factor issues of ATSEP independently or collaboratively.	Expected impact: <input type="checkbox"/> Political / Global <input type="checkbox"/> Inter-regional <input type="checkbox"/> Economic <input type="checkbox"/> Environmental <input checked="" type="checkbox"/> Ops/Technical
Why: To understand the stress and fatigue levels of ATSEP and for resolving potential risks to ANS.	Follow-up: <input checked="" type="checkbox"/> Required from States
When: 2-Sep-19	Status: Draft to be adopted by Subgroup
Who: <input checked="" type="checkbox"/> Sub groups <input type="checkbox"/> APAC States <input type="checkbox"/> ICAO APAC RO <input type="checkbox"/> ICAO HQ <input type="checkbox"/> Other: XXXX	
