CNS SG/24 – **WP/13**
Agenda Item 5.3
30/11/20 – 04/12/20

International Civil Aviation Organization

Twenty Fourth Meeting of the Communications/ Navigation and Surveillance Sub-group (CNS SG/24) of APANPIRG

Web-conference, 30 November – 4 December 2020

Agenda Item 5: Navigation

5.3 Review outcomes of the Seminar on Flight Inspection and Procedure Validation;

OUTCOME OF THE SEMINAR ON FLIGHT INSPECTION AND PROCEDURE VALIDATION

(Presented by the Secretariat)

SUMMARY

This paper presents the outcome of the Seminar on Flight Inspection and Procedure Validation to this meeting for review and action.

1. INTRODUCTION

1.1 The Seminar on Flight Inspection and Procedure Validation (FIPV) was held in the ICAO APAC Regional Office, Bangkok, Thailand from 24 to 27 September 2019. It was conducted in accordance with the Special Implementation Project of ICAO for 2019.

1.2 The Seminar was attended by 96 participants from 24 States/Administrations and 12 industry partners including flight inspection/validation service providers and flight inspection equipment providers.

1.3 Mr. John Taylor, Aeronautical Spectrum Regulations and Air Traffic Management Specialist from Transport Canada and Mr. Liu Tong, Dy. Chief Engineer of Flight Inspection centre of CAAC were the facilitators of the Seminar. Messer Luo Yi and Ha Huho, Regional Officers of ICAO APAC Office in Bangkok and ICAO APAC Regional Sub-office located in Beijing provided the Secretariat support for the seminar. The seminar was alternately moderated by facilitators and the Secretariat.

1.4 There were 36 presentations and 1 flimsy that were presented to the Seminar and three working papers presented to ICAO Assembly 40th Session (WP/82, WP/188 and WP/478) were also suggested as reference for the seminar. A brief summary of each seminar presentation is provided in **Attachment A** to this paper The seminar presentations in PDF version were available at: https://www.icao.int/APAC/Meetings/Pages/2019-FIPV-Seminar.aspx

2. DISCUSSION

2.1 The seminar shared the experience gained, best practices in resolving issues, challenges faced and emerging technologies, it recognized the need and usefulness in organizing such a forum exchanging information on FIPV to enhance flight safety and regularity of air navigation. The outcome would facilitate States/Administrations in improving their capacity to conduct the critical FIPV activities in a more effective, efficient, safe and economical manner.

2.2 Combining different local geographical considerations with the general FIPV practices would result in development of a regional guidance material on implementation of ICAO requirements and provisions for FIPV while keeping abreast of the latest developments of associated emerging technologies.

2.3 The need was emphasized to update the *Catalogue of Asia and Pacific Flight Inspection and Flight Validation Service Providers* more regularly to reflect the latest information that would benefit potential new customers seeking flight inspection/validation services within the Region or beyond.

2.4 The seminar noted the development of FIPV technology, computer simulation analysis techniques which have been used in the prediction and analysis of navigation signals that can be further used to analyse the accuracy of the signals when a new navigation station is commissioned, or an existing navigation station environment changes.

2.5 Considering the useful updated information received and fruitful discussions among the participants, it was recommended that further seminars/workshops/symposia would be organized on regular or non-regular basis in order to keep abreast of the latest developments and timely information exchange in the fields of FIPV.

2.6 The need for development of guidance material on the regional best practices for undertaking flight inspection was identified, considering the typical need of States/Administrations without a national FIS provider and some recommended measures necessary for conducting flight inspection at night. The initial table of contents based on the flight inspection manual of Hong Kong China is provided. The guidance material will be presented to CNS SG for adoption and then will be posted on the ICAO APAC Website. The volunteering member of the group: Hong Kong CAD, CAAS, New Zealand Airways, CAAC FIC, FCS and Aeropearl (Hong Kong CAD acts as lead).

2.7 Further guidance from ICAO is expected on the use of UAS (RPAS) as a viable/supplementary solution to carry out the flight inspection including cost/effectiveness analysis for introducing this emerging technology.

2.8 Member States/Administrations in a position to do so are encouraged to continue conducting more research and trials using emerging technologies and best practices and provide regular reports to CNS SG of APANPIRG:

a. Assessment of UAS (RPAS) for Flight Inspection/Validation including the scenarios, advantages, limitations (such as FI range, UAV speed and payload, C3 etc.) and proposed processes and procedures for implementation;

b. Improved flight inspection efficiencies and operational risks of flight inspection at night;

c. Sharing PBN flight procedure validation methods and technologies, which can save cost, improve efficiencies, and facilitate PBN implementation; and

d. PBN vulnerability to GNSS Interference, and the need for spectral assessment.

2.9 States in APAC Region are urged to update the information in the Flight Inspection Catalogue (Catalogue of Asia and Pacific Flight Inspection and Flight Validation Service Providers, 10th Edition, April 2018). The new editions of the Catalogue should be published on a regular basis. States were also encouraged to incorporate into the catalogue any capability for ADS-B and other information involving the use of new technologies. As a follow up action, the State Letter Ref.: T 8/5.3 – AP098/20 (CNS) dated on 27 April 2020 was issued to States/Administrations, which is provided in **Attachment B** to this paper.

2.10 States/Administrations capable to do so are encouraged to further study the application of computer simulation technology and ground testing technology before flight inspection of navaids in order to facilitate the set up and best performance state of the navaids in order to improve the efficiency of flight inspection.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained in this paper;

b) provide information on the capabilities of their flight inspection and/or flight validation service providers to update the *Catalogue of Asia and Pacific Flight Inspection and Flight Validation Service Providers* as per the requirements stated in **Attachment B**; and

c) discuss any relevant matter as appropriate.

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SEMINAR ON FLIGHT INSPECTION AND PROCEDURE VALIDATION

Appendix A to the Report

SUMMARY OF PRESENTATIONS

Agenda Item 1: Overview of Today's Flight Inspection

SP101 – Regional Activities

Mr. Luo Yi: *Regional Officer CNS, ICAO APAC Office*

The presentation introduces the background information of the seminar, main outcome of 2009 event, ICAO main provisions on Flight Inspection and Procedure Validation, Oversight Responsibility, relevant Assembly Resolution, Regional Navigation Strategy, and IFP flight validation capability in the region.

SP102 – Overview of Today's Flight Inspection

Mr. Liu Tong: *Vice-Chief Engineer of Flight Inspection Center, CAAC, China*

The presentation presents a complete regional picture on flight inspection of ground-based radio navigation systems, compares satellite-based navigation systems and ground-based navigation systems employed in different flight phases, and briefs the future research topics of flight inspection. It also introduces the development and highlights in recent 10 years since last seminar, including updates in techniques and flight inspection management. Finally, it makes a prospection of the flight inspection in future.

SP103 – **Review of Annex 10 Criteria**

Mr. John Taylor: *Aeronautical Spectrum Regulations and Air Traffic Management Specialist*

The presentation outlined reference to where the specific navaids can be found and in which Volume of Annex 10. Most of the navaid systems also have extensive detail contained in Attachment C to this Annex. Its topics covers ILS, VOR, GNSS, GBAS, SSR, ADS-B, MLAT.

SP104 – **Review of Doc 8071**

Mr. John Taylor: *Aeronautical Spectrum Regulations and Air Traffic Management Specialist*

The presentation outlines a general overview of Doc 8071 procedures pertaining to ILS Localizer, Glidepath, DME and VOR, also Ch 8 and future technologies in flight inspection. It brings the understanding of the relationships of flight inspection, procedures, technical tolerances with the requirement for safety oversight and regulation using ICAO SARP's and Docs as the standards. In the end, the overall emphasis is on supporting a safe and efficient aviation industry infrastructure by adhering to Standards, established procedures and safety management practices.

Agenda Item 2: Experience on Flight Inspection

SP201 – FAA Flight Inspection

Mr. Edward W. Mesa: *FAA Airspace System Inspection Pilot, USA*

The presentation introduces the FAA's flight programme operations for flight inspection and the management system itself, and samples of FIS calibration and approval. It also introduces operational risk and management process of night flight inspection, impact to airport capacity by closing runway for flight inspection.

SP202 – **Challenges Faced by Nepal in Flight Inspection of Radio-navigational Aids**

Mr. Mukul Mishra: *Deputy Director, Civil Aviation Authority of Nepal, Nepal*

Nepal maintains a network of ground-based radio navigational aids, especially VOR/DMEs, despite the on-going phased implementation of GNSS based PBN. However, due to the presence of relatively smaller number of ground-based radio navigation aids, establishment of a flight inspection unit makes little economical sense for Nepal and therefore like many other Contracting States in the APAC region,

too, is dependent on foreign commercial flight inspection services providers (CFISPs) for flight inspection. However, the reporting format from the different CFISPs, especially the "due date" for the next inspection, has been creating challenges for Nepal.

Besides, more recently, during the installation of a new radar surveillance system, challenges were encountered during the flight inspection of the MSAW safety net, especially relevant in the backdrop of several fatal CFIT air accidents in the past. The presentation seeks to present the above issues from a flight inspection services "client state" perspective.

SP203 – **Flight inspection for New CNS system and the abnormal case of VOR**
Mr. Sungnam Kang: *Flight Inspector, Flight Inspector Center, MoLIT, Republic of Korea*
This presentation introduces the Organization of Korea Office of Civil Aviation office, the CNS system for en-route service, emergency backup system for Terminal approach control and shows the experience of flight inspection office.

Flight inspection office inspects and verifies the Ground CNS systems and PBN Procedures. There are 000 systems in the airports and 10 sites for en-route. Also it shares the analysis the graph from the AFIS system and normalization of VOR system.

SP204 – **Flight Inspection of instrument landing systems under Multipath (Natural or man-made) environment: challenges**
Mr. Krishan Kumar Sharma: *Joint General Manager (CNS-FIU), India*
As flight Inspector, the presenter intends to present the difficulties and challenges faced during the flight inspection of ILS installed at airports situated in difficult terrain in some parts of India. Despite having applied the various provisions given in Annex 10, still lot more to do to in order to evaluate Signal-in-space for such Installations.

The presentation includes, sharing some of the results of Localizer coverage obtained during Commissioning flight checks of Instrument Landing System installed at such Airports.

SP211 – The Flight Inspection Experience for ILS CAT III in China
Mr. Zhang Jiayi: *Flight Inspection, Flight Inspection Center, CAAC, China*
ILS Cat III has been operating at large airports around the world in many years. It can effectively improve the landing standards of aircraft and the operation standards of airports. Since 2000 in Shanghai Pudong airport, the first ILS Cat III has been used in China. From then on, we have accumulated nearly 20-year experiences of ILS Cat III flight inspection.

This presentation will introduce the flight inspection standard, tolerance and flight method of ILS CAT III in China, and then take the ILS Cat III of Beijing Second Airport as an example to share the problems encountered in flight inspection process and the methods to deal with them. Finally, it will show the new application of ILS cat III in China.

SP212 – **Enhancing Efficiency of Flight Inspections in Hong Kong International Airport**
Mr. Yung For Yan, Carl: *Electronics Engineer, Civil Aviation Department, Hong Kong, China*
This presentation shares the best practices of Hong Kong Civil Aviation Department in flight inspection, it covers the background about Hong Kong International Airport, preparation and coordination for routine flight inspection and challenges.

SP205 – **Singapore's Experience on Night Flight Inspection & Validation**
Mr. Thomas Schachtner: *On behalf of Singapore and AeroPearl*
This Paper presents Singapore's experience on flight inspection as provided by a flight inspection service provider and done at night, during early morning hours.

SP210 – **Flight Inspection at Night**
Capt. Thomas Wede: *FCS Flight Calibration Services GmbH, Braunschweig, Germany*
Capacity constraints, notably at busy international airports, put an ever increasing pressure on the Flight Inspection community to cope and come up with suitable solutions. Moving Flight Inspection missions to the night, for many years, has been a practical way forward to address these capacity shortfalls.

Based on the longstanding experience of his company and himself in executing Flight Inspection missions at night, the author highlights the prerequisites in embarking on such endeavour, touching on issues like customized training and the ever-important Fatigue Management. The paper continues to describe operational aspects and constraints to be considered, and closes by giving an outlook to future developments.

SP206 – **Introduction of Center Point RTX and Resolution of Issues**
Mr. Masaharu Nagahara: *Flight Inspector, Japan Civil Aviation Bureau (JCAB), Japan*

JCAB introduces Center Point RTX for CJ4 AFIS Reference position system. The presentation explains the outline of Center Point RTX and its effects. In addition, the presentation shares the problems discovered during the introduction process and the path to resolution.

SP207 – Flight Testing of GBAS in China
Mr. Song Xitong: *Flight Inspector, Flight Inspection Center, CAAC, China*
During the past 4 years, Flight Inspection Center of CAAC has made several flight testing of GBAS at Tianjin Int'l Airport, Shanghai Pudong Int'l Airport and Hong Kong Intl Airport. Therefore, we have accumulated some experience on the flight testing of GBAS. This presentation will introduce the flight testing Standards of GBAS, including international standards and domestic regulations. The flight testing Theory, Procedure and Methods of GBAS in China will also be introduced in the presentation. The flight testing case in Tianjing Intl Airport will be shared as an example and discussed in the seminar. The flight testing data analysis and conclusion will be described. At last we will provide some suggestions on the GBAS landing system operating.

SP208 – GBAS Inspection
Mr. Edward W. Mesa: *FAA Airspace System Inspection Pilot, USA*
The presentation introduces the FAA's method for restricting coverage and the impact on GLS approach procedures.

SP209 – Flight Inspection GBAS
Mr. Thorsten Heinke: *Senior Programme Manager, Aerodata, Germany*
The civil air traffic has increased tremendously during the last decade and a break of this steady rise is not foreseeable. The capacities on the main hubs are exhausted due to geographic restraints or through separation minima caused by the instrument landing procedures. The discrepancy between the escalating traffic and the limitations at the airports initiates the search for other applicable navigation systems.

Ground based augmentation systems are one of those newer navigation systems, which should help the global traffic solving those conflicts. Nearly all new multimode receivers installed in the cockpits of the commercial air transport have the capability to perform A/C's GBAS approaches. Those navigation devices are certified and the standards are almost set. The ground segment for GBAS is still "on the way". Several ground systems are installed in the United States and some are installed elsewhere. Those ground systems have been flight inspected with sophisticated flight inspection systems with GBAS capability to show that the systems fulfill their dedicated specification.

This presentation summarizes results and experiences regarding the flight inspection of ground based augmentation systems. Several trials have been flown either on test sides or at ground stations waiting on their approval to go into service. Is there a necessity to upgrade the current flight inspection systems for GBAS? Is GBAS a real alternative against the well-known instrument landing systems?

Agenda Item 3: Calibration and Operation of ILS

SP301 – ILS GP Flight Inspection Aiming Point
Doctor Thor Breien/Indra
How to obtain the correct ILS Glide Path Reference Datum Height?
The ILS glide path Reference Datum Height and glide path angle are important parameters decided at the commissioning flight inspection. It is a challenge to get these data correctly.

Incorrect reference point may lead to wrong glide path reference datum height and is a not uncommon reason for commissioning glide path out-of-tolerance. Further it is described why it is not correct to use the glide path antenna mast foot-point for reference point and where the correct reference point can be found.

The presentation focuses on the consequence of using wrong reference point / aiming point and describes a practical method how this can be established.

SP302 – Quantitative Analysis of Error Sources in Flight Inspection Measurements
Mr. Christopher Dean: *Chief Technical Services Engineer, AeroPearl Pty Ltd., Australia*
The potential to introduce unwanted errors in flight inspection measurements is high. There are many influencing factors in the end measurement result and many sources of errors. If not properly accounted for and addressed these errors will be presented in final measurement results and may lead to miscalibration of ground navigation aids. This presentation looks at the many potential sources of errors, evaluating and determining the influence each may have on final measurement results. Data from real measurements will be used and plausible errors introduced from each identified source to quantify and demonstrate the end effect they have on the flight inspection measurements.

The aim is to develop a better understanding in the community of the importance of reducing these errors and to assist in the identification of sources of errors when flight inspection results are not as expected.

SP303 – Brief History of Flight Inspection System Technology
Mr. Larry Brady: *President, Airfield Technology, USA*
This presentation provides a brief history of flight inspection system technology, beginning from the earliest days of analog instrumentation when timers and visual ground position checkpoints were used for positioning, and continuing through to today's modern systems with modern digital receivers and centimeter level positioning systems.

Agenda Item 4: PBN Implementation and Procedure Validation

SP401 – Instrument Flight Procedure Validation (IFPV)
Jim Rose: *Flight Procedures and Airspace Group (FAA Remotely)*

FAA presents its flight procedure implementation and oversight, including Instrument Flight Procedure Validation (IFPV) overview, three phases of IFPV, orders and advisory circulars, IFPV oversight.

SP402 – Regional PBN Implementation
Mr. Huho Ha: *Regional Officer, ATM (AOM-PBN), APAC – Regional Sub-office, Beijing*
Recognizing the benefits of PBN implementation, ICAO put PBN on the highest priority of Global Air Navigation Plan and has provided various supports to facilitate PBN implementation such as the publication of various guidance materials, conducting workshops and seminars, introducing more navigation specifications and functionalities. As a result of this, 73.7% of States has achieved the requirements of ICAO Assembly Resolution A37-11 and 59% of instrument runway ends used for international operations has PBN approach procedures. In addition, around 65% of international airports has published PBN arrival and departure procedures. However, Asia/Pacific region has not fully implemented PBN procedures yet because of some challenges and one of them is flight procedure validation.

PBN IFP based on GNSS signals are susceptible to GPS interferences. ICAO doc 8071 recommends to monitor GPS L1 spectrum during Commissioning flight prior to publication to make sure the spectral environment is free of arming signals and allows for appropriate navigation performance achievement. Due to their proximity to the ground, RNP Approaches and RNAV/RNP Departure procedures, though requiring the highest navigation accuracy, are the most susceptible to these interferences coming from the ground. The presentation will look over PBN implementation status and challenges at the regional level.

SP403 – Flight Validation – the final QA Check
Ms. Sophie Joshua: *Team Leader CNS Support, Air Navigation, Airspace and Aerodromes Branch Civil Aviation Safety Authority, Australia*
Australia's IFP context and regulatory requirements provide the framework for CASA's flight validation process. Recent implementation of PBN instrument flight procedures in Australia has been a significant validation exercise. CASA developed a methodology compliant with Australian regulations and ICAO Doc. 9906, utilizing software tools and simulators to improve accuracy and efficiency, while reducing costs and validation flight risks.

SP404 – Flight Validation in China
Mr. Yu Yachao: *Pilot, Flight Inspection Center, CAAC*
The presentation introduces the experience of the flight procedure validation of Flight Inspection Center, CAAC. The flight procedure validation system (FPV) is independently developed by China, which will be introduced.

Mainly job is the assessment of runway clearance, lighting systems and PBN flight procedures, and also we invented the new flight procedure validation system FPV and established a professionally trained technical team and inspection crew.

With the inspection equipment equipped in the aircraft, which can collect flight procedure validation data, it can record and retain the complete flight parameters, HUD video, EVS video and external flight environment video (including airport final clearance, lighting system) during the validation flight

inspection. And it can be reserved for the review of the Administration. FVP system is based on two concepts: quantification and visualization.

During flight, it can electronically display the deviation between the horizontal, vertical track and theoretical track. We can use this data to do the analysis and valuation.
This system benefits us a stable technical team and constantly accumulate technical experience with a relatively lower cost.

SP408 A –PBN Implementation and Flight Validation in India
Mr. Debotosh Moitra: *Joint General Manager, Airports Authority of India, India*
The short presentation is based on present status of PBN implementation and procedure validation. Agenda Item No 4. The process followed in India regarding Procedure validation and implementation vis-à-vis international practices for procedure validation and implementation. Process described in DOC 9906 and DGCA India Guidelines and the difference between the two. Road blocks and how can we move forward from present situation.

SP408 B Designing, validation, approval & promulgation of Instrument flight procedures in India
Mr. Ravinder Singh Jamwal: *Deputy Director of Operations (AS & ANSS), DGCA, India*
The presentation outlines the designing, validation, approval & promulgation of Instrument flight procedures in India. It also introduces the reasons for slow implementation and relevant solutions.

SP409 – Flight Validation of Instrument Flight Procedure
Capt. Thomas Wede: *FCS, Flight Calibration Services GmbH, Braunschweig, Germany*
The advent of RNAV / RNP procedures lent new impetus to the long-standing requirement of Flight Validation of new Instrument Flight Procedures. Based on his extensive experience in this field, the author describes in the following paper the prerequisites and introduces general aspects of this relatively new field of activity in our industry.

The paper highlights the holistic approach of Flight Validation, by taking into consideration the complete Procedure Design- to- Database-Path-Integrity. It touches on the importance of the quality assurance aspects of the required databases that build the foundation of any RNAV / RNP Procedure.
It continues to give a step-by-step account on how to execute Flight Validation projects, backed by training requirements and practical case studies.

SP406 – Detection of GNSS Interferences and Assessment of Impact on PBN Instrument Flight Procedures
Mrs. Florence Jacolot: *Senior Systems Engineer, DSNA, France*
Mr. Vincent Rocchia
PBN IFP based on GNSS signals are susceptible to GPS interferences. ICAO doc 8071 recommends to monitor GPS L1 spectrum during Commissioning flight prior to publication to make sure the spectral environment is free of arming signals and allows for appropriate navigation performance achievement. Due to their proximity to the ground, RNP Approaches and RNAV/RNP Departure procedures, though requiring the highest navigation accuracy, are the most susceptible to these interferences coming from the ground.

France has put a lot of efforts in achieving ICAO 37th Assembly resolution to publish APV approaches on all IFR runway ends by end of 2016, continued with RNAV departures implementation, thus considered seriously this interference topic. Systematic interferences assessment has been performed on any of the 215 RNP APCH approaches that were promulgated in France mainland and on the 45 in

Pacific Ocean (French Polynesia, New Caledonia and Wallis and Futuna). Along the years, spectrum analysis skills and techniques have been improved thanks to impact analysis and creation of Tasks Forces at National level to assess and fight against illegal usage of jamming devices. The presentation will explain the methods and process set up to deal with GNSS interferences at France level.

SP407 – Flight Verification Tool for Flight Validation
Mr. Atsushi Sakate: *Flight Inspector, Japan Civil Aviation Bureau (JCAB), Japan*
The presentation introduces flight validation process and flight simulation tool in Japan. The flight simulation tool (Flight Validation Device) is used for a part of flight validation process instead of full flight simulator or aircraft. JCAB has obtained valuable result from simulator evaluation.

SP405 – Flight Validation and Obstacle Verification Using Cameras
Mr. Andreas Kleffmann: *Project Manager, Aerodata AG, Germany*
Flight Validation represents many challenges like obstacle verification, approach light checks, assessment of the cockpit workload and flyability tests. The documentation of results and collection of evidence is difficult.

Aerodata presents a solution to document the workload of the pilots and improve the reporting standard and documentation for flight validation by the installation of external and internal cameras at the aircraft. The external cameras record the environment during flight with a field of view of 180° in flight direction on a dedicated camera computer. An internal camera records the cockpit to document instruments like MFD and PFD. The talk shows how Aerodata installed the cameras on the aircraft and how the data is presented and evaluated in the flight inspection system.

Agenda Item 5: Emerging Issues in Flight Inspection

SP501 – Flight Inspection Technologies in New Era
Mr. Yongchao Wang: *Manager, Beijing Sky Aviation Co., Ltd., China*
The presentation introduces the emerging issues in flight inspection operations and the solutions being implemented and considered by the joint FIS R&D team in China, including advanced system design, productive components, Interference detection and anti-interference measures, etc. The objectives and trial flight results of the RPAS-based flight inspection system prototype are summarized, with the risk assessment considerations. In addition, several future-oriented flight inspection technologies are outlined and discussed, including modular design, Air-Ground-Center (AGC) data communications, smart PNT reference station, flight inspection Big-Data mining etc.

SP502 – Experience in Performing Flight Inspection with Rotary Wing Aircraft
Mr. Andreas Kleffmann: *Project Manager, Aerodata AG, Germany*
Flights following instrument flight rules with rotary wing aircraft are growing in aviation. These flights could be private flights with helicopters, which raises in popularity these days, but more important are flights in regard to search and rescue, ambulance and other emergency situations. In addition, the commercial market for rotary wing flights to platforms, dedicated hotels, hospitals or different fixed heliports is increasing.

Aerodata presents solutions for the installation of flight inspection systems into rotary wing aircrafts depending to mission requirements.

SP503 – Simulation Analysis and Improved F/I Efficiency
Mr. Liang Fei: *Associate Researcher, Second Research Institute of CAAC, China*
The topic is presented as how to improve F/I efficiency by simulation and online test. Before, during and after flight inspection, the continuous and integral signal quality can be predicted by simulation and improved obviously by optimizing height and location of building planned, can be tested by ground online test system. The reason signal is not ok can be found and verified. In summary, problems can be identified and solutions can be provided by simulation, to save a lot of time and cost of flight inspection to improve flight inspection efficiency.

SP504 – ADS-B Experiences in Flight Inspection
Mr. Thorsten Heinke: *Senior Programme Manager, Aerodata, Germany*
New technologies in regard to safety requirements are arising due to expanding capacity in civil air traffic. One important and mandatory keystone is Automatic Dependent Surveillance Broadcast (ADS-B). It has been developed further and has been upgraded in the past years to fulfill more and more its intended function of supplying situational awareness for safety reasons. ADS-B is used in all new commercial air transport and most general aviation aircraft. The schedule for its mandatory use in aircraft is defined. The worldwide implementation of ADS-B ground stations for area-wide coverage is steadily increasing and the basic rules for it are set.

Although the deadline for the enforcement of ADS-B integration is defined, no common worldwide rules for possible necessary in-flight verification are stipulated. What can be tested and what are the possibilities to flight inspect such data in accordance to its sensitivity for flight safety during surveillance? Different types of flight checks are performed today depending on the dedicated authority in different countries.

This paper summarizes experiences, practices and requirements regarding flight inspecting ADS-B systems. It evaluates hard- and software requirements and discovers new possibilities for flight inspection missions in regard to the ADS-B technology.

SP505 – Second Generation Flight Inspection System
Mr. Per Anders Johnson: *Regional Sales Director, Norwegian Special Mission, Norway*
This presentation highlights what new technology can be expected in flight inspection systems on the marked today and in near future. Examples on how the operator interacts with the system, how modularity creates possibility for multi mission aircraft, how cutting edge technology can reduce the need for cockpit modifications and hence keeping the aircraft more standard will be shown. The paper will also shortly address how RPAS/drones can be used as a supplement to conventional flight inspection aircraft.

Agenda Item 6: Regulator's Perspective and Safety Oversight

SP601 – Quality Management of Flight Inspection in China
Mr. Song Xitong: *Flight Inspector, Flight Inspection Center, CAAC, China*
When our customer receives a flight inspection report, a sentence will be shown at a very important place of the report: Flight Inspection Center is a CNAS accredited laboratory with its calibration and testing system meeting the requirements of ISO/IEC 17025. So what is ISO/IEC17025? As a flight inspection agency, why we apply for this accreditation? In my presentation will introduce the implementing ISO/IEC 17025 of Flight Inspection Center of CAAC. After obtaining ISO/IEC 17025 accreditation, many improvements are achieved including traceability, calibration & testing items and uncertainty evaluation. The Uncertainty Evaluation procedure and method will be introduced. Finally I will take Course Alignment as an example, to explain the procedure and method of Uncertainty

Evaluation. The evaluation results show that all calibration items are within the requirements of ICAO Doc 8071 about uncertainty.

SP602 – Safety Oversight & USOAP
Mr. John Taylor: *Aeronautical Spectrum Regulations and Air Traffic Management Specialist*
The presentation covered the following topics: Safety oversight as it applies to flight inspection operations and requirement for ongoing internal analysis and validation; the importance of auditing results for compliance in a Safety Management process, also the oversight responsibilities; the technical skills and knowledge required in F/I to interpret airborne results for compliance to standards; an outline of the USOAP process and evolution to CMA;CAA responsibilities under the USOAP guidelines.

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International Civil Aviation Organization | Organisation de l'aviation civile internationale | Organización de Aviación Civil Internacional | Международная организация гражданской авиации | منظمة الطيران المدني الدولي | 国际民用航空组织

Ref.: T 8/5.3 – AP098/20 (CNS) 27 April 2020

Subject: To update the *Catalogue of Asia and Pacific Flight Inspection and Flight Validation Service Providers*

Action required: To return your completed form to the APAC Office **by 24 July 2020**

Sir/Madam,

The Seminar on Flight Inspection and Procedure Validation (FIPV) was successfully held in the ICAO APAC Regional Office, from 24 to 27 September 2019. The need was emphasized during the seminar to update the *Catalogue of Asia and Pacific Flight Inspection and Flight Validation Service Providers* more regularly to reflect the latest information that would facilitate coordination and cooperation between the potential customers and service providers to comply with the requirement of the flight inspection/validation services within the APAC Region or beyond.

States/Administrations are therefore requested to provide information on the capabilities of their flight inspection and/or flight validation service providers to update the *Catalogue of Asia and Pacific Flight Inspection and Flight Validation Service Providers*, *10th Edition*, which was posted on the ICAO APAC website at https://www.icao.int/APAC/Pages/edocs.aspx under NAV section. The APAC Office will gather the received information and update the current catalogue for review and adoption by CNS SG/24 meeting.

States/Administrations are also encouraged to incorporate into the catalogue any capability for inspection of ADS-B and other emerging facilities involving the use of new technologies. The form used to update the catalogue is attached herewith.

Please return the completed forms to the ICAO APAC Office through e-mail at apac@icao.int with copy to yluo@icao.int; bsirapongkosit@icao.int **by 24 July 2020** , and the new edition of the Catalogue is expected to be published by end of October 2020.

Yours sincerely,

Arun Mishra
Regional Director

Enclosure:
Capabilities of Flight Inspection / Flight Validation Service Provider

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Capabilities of Flight Inspection /Flight Validation Service Provider

1. Name, Country and Address of the service provider: *The name of State in CAPITAL*

   The name of flight validation/flight inspection service provider
   Address:
   Tel:
   Fax:
   E-mail:

2. Type(s) and number of flight testing aircraft available, associated charges and conditions:

Type of Aircraft & Aircraft Available		**Flight Time Charges per hour (USD)**		**Other co-ordinations**	**Used for Validation/ Inspection** (V/I)
		Positioning Flights	**Check Flights**		
Beach 350	*1*	*Negotiable*	*2,500*		*V or I or V/I*

3. Flight testing capability and estimated flight time:

Radio Navigation Aids	**Flight Check Capability (Y/N)**	**Estimated Flight Check Time**		**Type of Flight Check System**
		Routine	**Commissioning**	
VOR	*Y or N*			*Automatic, or*
DME				*Manual*
MLS				
ILS CAT I				
ILS CAT II				
ILS CAT III				
PAR				
SAR				
SRE				
NDB/LOC				
Marker Beacon				
PAPI				
VASIS				
RF Interference				
GNSS interference				*(in relation to item 8.)*

4. Flight validation capability for instrument flight procedures including PBN Navigation Specification

Type of Procedures	Flight Validation Capability (Y/N)	Estimated Flight Validation Time		Type of Flight Validation System
		Initial	Periodic Review	
RNP APCH (LNAV)	*Y or N*			*Automatic, or*
RNP APCH (LNAV/VNAV)				*Manual*
RNP APCH (LPV)				
SBAS CAT I				
GBAS CAT I				
GBAS CAT II/III				
RNAV/RNP SID				
RNAV/RNP STAR				

5. Type of Flight Management System which is used for flight data coding:

   - *Provide the type of FMS system*

6. Location and Type of flight simulators which is used for flyability check, if available:

   - *Provide the type of simulator and its location*

7. Charges per hour (USD, tax excluded) for simulation, including flight crew:

   - *Provide overall cost for using simulator*

8. GPS interference detection capability, if equipped:

   - *Provide the type of detection equipment and detection method.*

9. Languages possibly used by flight testing team:

   - *Provide available language for flight validation/inspection and report. If they are different, state separately.*

10. Estimated annual flight time available to assist other Administrations for testing radio navigation aids:

    - *Provide available time that can be used for other Administrations, e.g. 100 hours / Negotiable / etc.*

11. Advance notice expected before delivery of the service:

    - *Provide the time for prior coordination required, e.g. 15 days, 3 months, etc.*

12. State Regulation(s) commonly complied with when delivering flight inspection services:

    - *Provide State regulation(s) applied to the flight inspection and if available, referenced ICAO documents or criteria.*

13. State Regulation(s) commonly complied with when delivering flight validation services:

    - *Provide State regulation(s) applied to the flight inspection and if available, referenced ICAO documents or criteria.*

14. Provide a link for further information, if any:

    - *Website information, if available*

15. Other information:

    - *May include certification/approval from other States or organization, type of flight inspection/validation system, support experiences to other States, other services related to PBN implementation, etc.*

    - *May provide a point of contact for prior coordination.*

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