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WORKING PAPER

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Montréal, 23 to 27 November 2009

Agenda Item 8: Civil aircraft on register and data collection on equipages and ground equipment

INVENTORY OF AIR NAVIGATION EQUIPMENT ON BOARD AIRCRAFT AND ON THE GROUND

(Presented by the Secretariat)

SUMMARY

Decisions involving the setting of international civil aviation standards and recommended practices, which may affect the design and use of air navigation equipment and avionics, often require the estimation of the resulting financial impact. Furthermore, planning of air navigation systems entails economic and financial studies. The effective development of these studies, both of which include cost estimation, necessitates the availability of current and complete data on air navigation equipment on the ground and avionics on board aircraft. This paper analyses the opportunity of integrating this type of data in the ICAO's statistics program.

Action by the division is in paragraph 4.

1. INTRODUCTION

1.1 A key task of ICAO, as the UN specialised Agency for international civil aviation, is to develop and adopt Standards and Recommended Practices (SARPS). In addition, this task is accomplished through the aim and objective of ICAO which is to foster the planning and development of international air transport and promote cooperation amongst member States.

1.2 The setting of SARPS may affect the design and use of air navigation equipment on the ground and avionics onboard aircraft. Besides, the implementation of Global Air Navigation Plan Initiatives (GPIs) may involve the installation of new air navigation equipment as well as the decommissioning of ones. Which are no longer fit for use. It has therefore become necessary to take into consideration the costs implied by such decisions which affect the various stakeholders (i.e. air navigation service providers, airspace users, aircraft and equipment manufacturers and passengers) as well as the expected benefits.

1.3 A thorough analysis of the costs and benefits and the development of business cases for both the implementation of SARPS and GPIs require the availability of data on the actual equipment on the ground and on board aircraft as well as the related future plans.

1.4 One example that could be cited is where, in 2008, the ICAO Flight Recorder Panel (FLIRECP) developed proposals for amendments to Annex 6, Parts I, II and III. The proposed amendments address a number of issues associated with technical requirements for flight recorders. An assessment of the cost impact on aircraft operators was made but its accuracy and reliability were limited by the lack of data on flight recorders currently installed on aircraft in service.

1.5 In the case of GPI, availability of this data allows air navigation planners to determine the costs associated with equipment on the ground and with avionics upgrades. The knowledge of equipment onboard aircraft, along with the airspace users' future plans in conjunction with air traffic data and forecasts, helps in the estimation of benefits. These analyses are meant to lay the ground for consultation between the air navigation service providers and the airspace users on the new initiatives.

1.6 The availability of such data is therefore essential to analyses related to the safety and efficiency of civil aviation.

2. EQUIPMENT CONCERNED

2.1 A tentative list of equipment concerned is provided in Appendix A.

3. COLLECTION PROCESS

3.1 It is important to note that the data collection addressed in this paragraph is limited to current equipment onboard aircraft and on the ground. It is proposed that information on the related future plans, of air navigation service providers and airspace users, be collected on an ad-hoc basis through a joint ICAO-industry working group whose main task would be to complement the data collected by ICAO for the benefit of global air navigation stakeholders.

Equipment on the ground

3.2 Some of the data on air navigation equipment on the ground are already publicly available. For instance, the Aeronautical Information Publications (AIPs) issued by States and air navigation service providers include, among other things, a wealth of data on air navigation equipment on the ground by location. However, these data are limited to certain equipment (mainly navigation aids) and do not provide all the information required.

3.3 The table in Appendix B proposes a new data collection Form. Data is collected on equipment by function (communication / navigation / surveillance) and by location along with the equipment identification (ID), Type, Model and installation date.

3.4 It is proposed that this data be collected on an annual basis through civil aviation authorities.

Avionics on board aircraft

3.5 Since avionics equipment are specific to each aircraft, data will have to be collected accordingly and it is noteworthy that currently there is no global and comprehensive source for this data.

3.6 ICAO does not collect data by individual aircraft and the current Air Transport Reporting Form H (Civil aircraft on register) serves only to collect the number of aircraft by category and weight class.

3.7 As for entities other than ICAO, the International Register of Civil Aircraft (IRCA) was set up in 1961 by the then UK Air Registration Board and now the UK Civil Aviation Authority (UK CAA), the Registro Aeronautico Italiano or RAI (now part of ENTE NAZIONALE PER L'AVIAZIONE CIVILE or ENAC) and BUREAU VERITAS (France) to gather in one common format, national registers of various countries. The aim of IRCA is to provide public and private aeronautical entities with an international database comprising information on national aircraft fleets and the information made available is directly provided by national civil aviation authorities. IRCA now gathers data of over 500,000 aircraft registered in over 40 countries but does not collect any data on avionics equipment.

3.8 In December 2006, the ICAO Council approved in principle the *Rules for the Provision of Pertinent Data Concerning Aircraft Registered in a State Pursuant to Article 21 of the Convention on International Civil Aviation*. By this action the Council set in motion the implementation of a new on-line database in ICAO concerning civil aircraft on register. In July 2006, IRCA agreed to expand itscooperation with ICAO within the scope of the existing arrangement, by developing the technology necessary to format the data they receive from States and provide this information to ICAO so that the data can be loaded into a common database. The new database is currently being tested and is expected to go into production by the end of 2009. Additional information on this database and the implications for Form H, civil aircraft on register, are discussed in STA10/WP18.

3.9 Eurocontrol’s PRISME (Pan-European Repository of Information Supporting the Management of EATM) database is a database listing all commercially operated aircraft including single engine turbo-props. PRISME currently covers around 100,000 individual airframes from around the world and its data is taken from various sources including flight plans (EUROCONTROL region only) and is updated daily. This database provides good coverage for aircraft flying through the airspace controlled by Eurocontrol.

3.10 Commercial databases (such as Airclaims, BACK and ACAS) comprising aircraft specific data, are available. The data covers aspects such as aircraft manufacturing and delivery information, engine type and model, seating configuration and capacity, operator/owner, technical specifications and activity. Only a few of these databases include data on avionics and their coverage is limited.

3.11 Although aircraft and avionics manufacturers have data on avionics onboard, this data is limited to their own products.

3.12 Given the absence of a comprehensive source of data on avionics on board aircraft, it is proposed that this data be collected by ICAO on a regular basis through the civil aviation authorities.

3.13 There are however major challenges to the collection of such data. Firstly, it is not sure that civil aviation authorities collect this type of data on a regular basis, in which case a new process will have to be introduced. This could impose an extra burden on States and may lead to delays in the collection process. Secondly, since the intended coverage of the data collection is to involve all aircraft on a contracting State's register, many small or private operators, many of which do not routinely report any data will be introduced. If collecting data from these operators is deemed problematic, they may be

excluded from the coverage. Thirdly, collecting such data on a regular basis and keeping it up to date and relevant is challenging since aircraft operators may change or upgrade avionics onboard.

3.14 STAP 14 noted that, while the need for the collection of these data was obvious, the feasibility of a successful and complete coverage would be difficult. As the Panel was of the view that there was potential value in further exploring this proposal, It agreed to establish a Working Group comprised of the ICAO Secretariat and Panel Members and Observers from the Unites States, United Kingdom, EUROCONTROL and IBAC. The comments that were provided on-time by some of the members of this Working Group have formed the substance of this Paper.

4. ACTION BY THE DIVISION

4.1 The division is invited to:

a) endorse the need to collect these data on air navigation equipment on board aircraft and on the ground ;

b) approve this collection, by ICAO, using the forms in appendices B and C;

c) recommend the establishment of a joint ICAO-industry working group as proposed in paragraph 3.1.

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APPENDIX A

TENTATIVE LIST OF EQUIPMENT CONCERNED

Equipment on-the ground

1. Conventional technology equipment include Voice Communications equipment (Voice communications (VHF RT, HF RT, ATIS and VOLMET)), Navigation equipment (NDB, VOR (CVOR/DVOR) and DME, ILS (including DME)), Surveillance equipment (All primary (ARSR, ASR, ASDE) and secondary radars (Mode A/C, Mode S).

2. New technology equipment include Communications (Data: VHF, HF, Mode S, Satellite, ATN and Voice: VHF and satellite), Navigation (GNSS, Augmentation systems), Surveillance (SSR, ADS-C (VHF, HF, Satellite), ADS-B)

Avionics on board aircraft

3. Communications, navigation and approach aid equipment and capabilities include: GBAS landing system, LPV (APV with SBAS), LORAN C, DME, FMC WPR ACARS, D-FIS ACARS, PDC ACARS, ADF, GNSS, HF RTF, Inertial Navigation, CPDLC ATN VDL Mode 2, CPDLC FANS 1/A HFDL, CPDLC FANS 1/A VDL Mode A, CPDLC FANS 1/A VDL Mode 2, CPDLC FANS 1/A SATCOM (INMARSAT), CPDLC FANS 1/A SATCOM (MTSAT), CPDLC FANS 1/A SATCOM (Iridium), MLS, ILS, ATC RTF SATCOM (INMARSAT), ATC RTF (MTSAT), VOR, RCP, PBN Approved, TACAN, UHF RTF, VHF RTF, RVSM Approved, MNPS Approved, VHF with 8.33 kHz channel spacing capability.

4. Surveillance equipment and capabilities include: Transponder — Mode A (4 digits — 4 096 codes), Transponder — Mode A (4 digits — 4 096 codes) and Mode C, Transponder — Mode S, including aircraft identification, pressure-altitude and extended squitter (ADS-B) capability, Transponder — Mode S, including aircraft identification, pressure-altitude and enhanced surveillance capability, Transponder — Mode S, including aircraft identification, but no pressure-altitude capability, Transponder — Mode S, including aircraft identification, pressure-altitude, extended squitter (ADS-B) and enhanced surveillance capability, Transponder — Mode S, including pressure-altitude, but no aircraft identification capability, Transponder — Mode S, including both pressure altitude and aircraft identification capability, Transponder — Mode S with neither aircraft identification nor pressure-altitude capability.

5. New technology surveillance equipment and capabilities include: ADS-B with dedicated 1090 MHz ADS-B “out” capability, ADS-B with dedicated 1090 MHz ADS-B “out” and “in” capability, ADS-B “out” capability using UAT, ADS-B “out” and “in” capability using UAT, ADS-B “out” capability using VDL Mode 4, ADS-B “out” and “in” capability using VDL Mode 4.

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APPENDIX B

COLLECTION OF DATA ON AIR NAVIGATION EQUIPMENT ON THE GROUND

Function	Equipment Location	Equipment ID	Equipment Type	Equipment manufacturer	Equipment Model	Quantity	Installation Date

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APPENDIX C

COLLECTION OF DATA ON AIR NAVIGATION EQUIPMENT ONBOARD AIRCRAFT AND CAPABILITIES

Aircraft Type:
Aircraft Serial Number:
Aircraft Registration Number:

Function	Equipment Type	Equipment manufacturer	Equipment Model	Quantity	Installation Date

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