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TopSky – ATC

FDP Overview

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25-28 February 2020

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TopSky — ATC

Overview of TopSky-ATC functions

Flight Data Processing function

Flight Plan Management

Error Prevention

RECAP: Importance of System Maintenance

Questions

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Surveillance Data Function

- Civil radars: primary + SSR Mode A/C/S
- Other surveillance sources: ADS-B, WAM, ADS/CPDLC
    - Transition Level now configurable to be fixed or calculated from Transition Altitude
    - Supports ADS-B Ed 2.1

NEW

Flight Data Function – more details in the later slides

Safety Nets and Monitoring Function

- Radar Alerts (7500, 7600, 7700, Mil, SPI, ACAS Resolution Advisory), STCA, MSAW, AFDA
- MTCD, DAIW/APW, AIW, RAM, CLAM, RVSM monitoring, DUPE, SSR Code miss-match warming, callsign/ACID miss-match warning
- Automatic track to flight plan correlation

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Human Machine Interface Function

- Multiple Air Situation displays with graphical tools
- On-line Map management
- Flight Lists
- Inter-sector transfer support
- Inter-FIR exchange of flight plan support
- Air Traffic Flow Management
- Operational Supervisor Functions

Monitoring and Control Function

Recording and Playback Function

- Continuous (24/7) process
- Automatically once daily plus manually if required
- Replay (passive or Interactive)
- Output to video

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TopSky — ATC Flight Data Processing Function

Flight Plan Creation

- Messages received via AMHS/AFTN line
- Repetitive flight from RPL database
- Stereo flight plan (routinely used route identified by a coded name e.g. ALPHA2)
- Splitting of an existing flight plan
- Flight data entered manually by the operator (Full or Abbreviated)

SSR Code Management

- Offline defined groups (domestic, departure, military, other) of SSR codes for automatic allocation

SID/STAR Management

- Offline defined associated to a specific runway for an airport.
- Automatically allocated and dynamically updated upon change of route or runway.
- Manual allocation possible (operator alerted upon route/runway changes)
- Alphanumeric points within SID/STAR

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Profile Computation

- From the list of points, profile calculation predicts the flight level and ETO for each point based on CFL/RFL, TAS and aircraft performance.

Flight Lists

- Arrival List
- Departure List
- Incoming List
- Sector Inbound List
- Active List,
- Non-Active List
- FIR Inbound List
- FIR Exit List
- Holding List
- Tower Strip Bay Window

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Arrival Sequencing

- Flights with assigned arrival runway are sequenced in order of ETA
- Delay added if necessary to achieve required arrival spacing
- Flight promotion

Paper Flight Strips

- Automatic printing based on off-line defined timer events
- Manual printing is possible (including blank strips)
- Strip formats off-line defined (for departure, arrival, domestic, over flight and template)

FPL Tracks

- A representation of the position of an aircraft not in surveillance sensor coverage based on information from the associated flight plan

Online Sectorisation

- Available at the Operational Supervisor position
- Read-only at other positions
- Open/Close sectors

Aeronautical Information

- METAR/SPECI
- Automatic/manual QNH update for up to 16 QNH areas
- NOTAM, BIRDTAM, SNOWTAM, ASHTAM, FCST and meteorological data (TAF, SIGMET)
- GRIB

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TopSky – ATC Flight Data Processing Function (cont.)

UPDATED

Statistics Output	MTCD	Queue Processing	Flight Plan History	EFS
- List of ACTIVE flight plans of the day for billing purposes	- Medium Term Conflict Detection, taking into account RVSM	- Manual correction of erroneous messages - Specify queue introduced for NAM **NEW**	- Log all flight plan transaction (received from external sources and from users) - Off-line Flight Plan History tool **NEW**	- Electronic Flight Strips, Racks and Bays - Many new "user fields " **NEW** - Auto time-stamping of event **NEW**

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AIDC

Misc NEW

- Per adjacent FIR, define AIDC protocol together with optional messages and optional fields within the messages.

- Departure messages to fixed AFTN addresses
- Extraction of F18 and F19 switches

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Upon Flight Plan creation and modification, following actions are performed

- Semantic checks for input data
  - Airport or the first two letters of each airport name (ADEP, ADES) known to the system,
  - Consistency checks are applied between the PBN information in field 18 and the equipment listed in field 10a:
    - If PBN/ switch is present, then an "R" must be included in Field 10 a,
    - If B1, B2, C1, C2, D1, D2, O1 or O2 are filed, then a "G" must be included in Field 10a,
    - If B1, B3, C1, C3, D1, D3, O1 or O3 are filed, then a "D" must be included in Field 10a,
    - If B1 or B4 is filed, then an "O" or "S" and a "D" must be included in Field 10a (i.e., "OD" or "SD" must appear in 10a),
    - If B1, B5, or C1 are filed, then an "I" must be included in Field 10a,
    - If C1, C4, D1, D4, O1 or O4 are filed, then a "D" and an "I" must be included in Field 10a (i.e., "D I" must appear in 10a).
  - Consistency checks are applied between entry of ZZZZ for TYPE against field 18 TYP/ switches
  - Consistency checks are applied between entries of ZZZZ for ADEP and ADES against field 18 DEP/ and DEST/ switches if field 18 is present in the message
  - Aircraft performances (consistent with aircraft type):
    - Flight levels,
    - Cruising Air Speed,
    - Wake turbulence
  - Uniqueness check: two flight plans cannot have the same CALLSIGN + ADEP + ETD + DOF.
  - For NAM messages, levels at or above 18,000 feet are preceded by "F" and below are preceded by "A"

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- Check against the Grounded Registrations list (if configured)
- Syntactic checks (either pre-FPL2012 or against FPL2012) of the input data (for received messages only)
- Route field validity check
- Extraction of the route concerned with the FIR/UIR
- Computation of the profile, estimate times, associated route, crossed sectors
- Determining flight plan attributes such as DEP/ARR/overflight/Domestic, Military, SSR code family, IFR/VFR/MIXT, RNP certification status

If an error is detected, the source information is stored in a message queue for manual processing

- Dedicated NAM queue

Flight plan fields are modifiable according to flight plan states

Configurable duplicate flight plan handling

- Process subsequent FPL updates, or
- Reject subsequent FPL updates, or
- Only process messages from off-line defined AFTN address(es)

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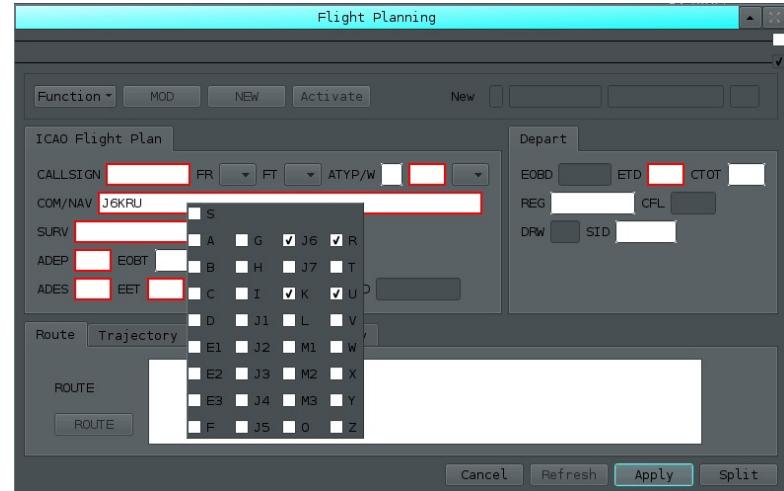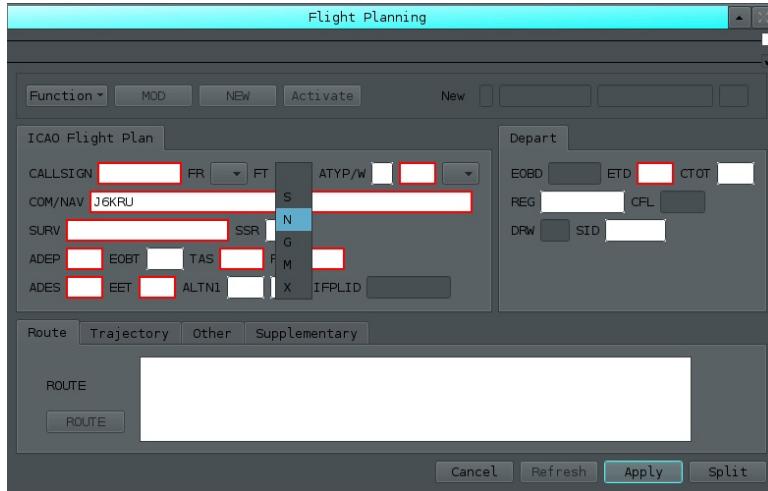
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Error prevention methods

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How does TopSky-ATC Database operate?

- Discussed through slides 7-9
- Centralized data distribution system

Important and basic parameters

- Keep your off-line data up to date
- System will automatically update flight plan data where possible from:
  - o surveillance data (beacon overfly updates ETOs hence more accurate flight profiles, ARCID/Mode 3A, Mode C)
  - o AFTN/AMHS messages,
  - o meteo data (GRIBII)
- Continuous ATCO interaction with the system to keep flight data as up to date as possible
  - o Input of CFLs, DCTs, route modifications

Impact in the operation of the System because of a bad configuration

- ATCO workload increases - can lead to compromised safety
- Error prevention (both off-line and on-line)

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Relation between AIDC operation and database configuration

- AIDC defines many optional messages and optional fields within a message format
  - o Leads to a complicated off-line database configuration
- Have a bi-lateral agreement with each adjacent FIR
  - o Agree the messages and contents to be exchanged
    - ▪ involve the supplier of the automation system
    - ▪ Missing ABI and/or containing bad route information
  - o Agree the messages and functionalities that your ANSP will NOT support
  - o Take care when transmitting AIDC messages manually when they should be transmitted automatically
    - ▪ Can lead to incorrect internal flight plan states

Why it is important that different ATC with AIDC connection have a correct and same database information ?

- Keep your off-line data synchronized with adjacent FIRs
  - o Main reason of messages being rejected is because route points are not know in transmitted messages

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Aircraft performance in the system

- TopSky-ATC holds a database of aircraft types together with its WTC and aircraft performances
- Keeping aircraft types database up to date ensures flight profile are calculated more accurately
  - incorrect manual inputs (e.g. a high CFL for a small aircraft) are rejected

What happen if the system does not have the correct aircraft configuration?

- Lead to poor and inaccurate flight profile calculations impacting boundary coordination estimates
- Controller work overload because the boundary conditions may be missed

Recommendations

- Manage your off-line tools to keep your environment data up to date
- Install a test platform so AIDC can be tested without impacting the operational system
- Plan AIDC testing with adjacent FIRs whilst our engineers are available on site
- Take time to understand the systems AIDC
  - configuration possibilities and
  - limitations

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Any Questions?

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Thank You !

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