ARIOS
Advanced Rotorcraft
IFR Operation in Switzerland

Newsletter

No. 6 | 18 July 2024

We are RNP-AR 0.3 (H)

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Consummatum est! The world's first RNP AR 0.3 helicopter approach and departure procedures have been established in Switzerland at the Interlaken Hospital (LSHK).

At the MAPt, the NAV SPEC changes from RNP AR 0.3 to RNP 0.3. The operational approval by the Swiss Federal Office of Civil Aviation (FOCA) is based on the capabilities of the AW109SP according to the Rotorcraft Flight Manual approved by the European Union Aviation Safety Agency (EASA).

Swiss Air-Rescue Rega is grateful to everyone involved for their support in achieving this unique result in an unprecedented team effort.

Special thanks (in alphabetical order) go to

- **AirNav Consulting**
- **Air Navigation Institute (ANI)**
- **European Union Aviation Safety Agency (EASA)**
- **Federal Office of Civil Aviation**
- **Flight Calibration Systems**
- **Genesys Aerosystems**
- **Jeppesen**
- **Leonardo Helicopters**
- **MeteoSwiss**
- **MeteoTest**
- **PildoLabs**
- **Skyguide**
- **Swiss Gliding Association**
- **Swiss Hang Gliding & Paragliding Association.**

Fig. 1: LSHK APCH RNP AR 0.3 (H) situational overview

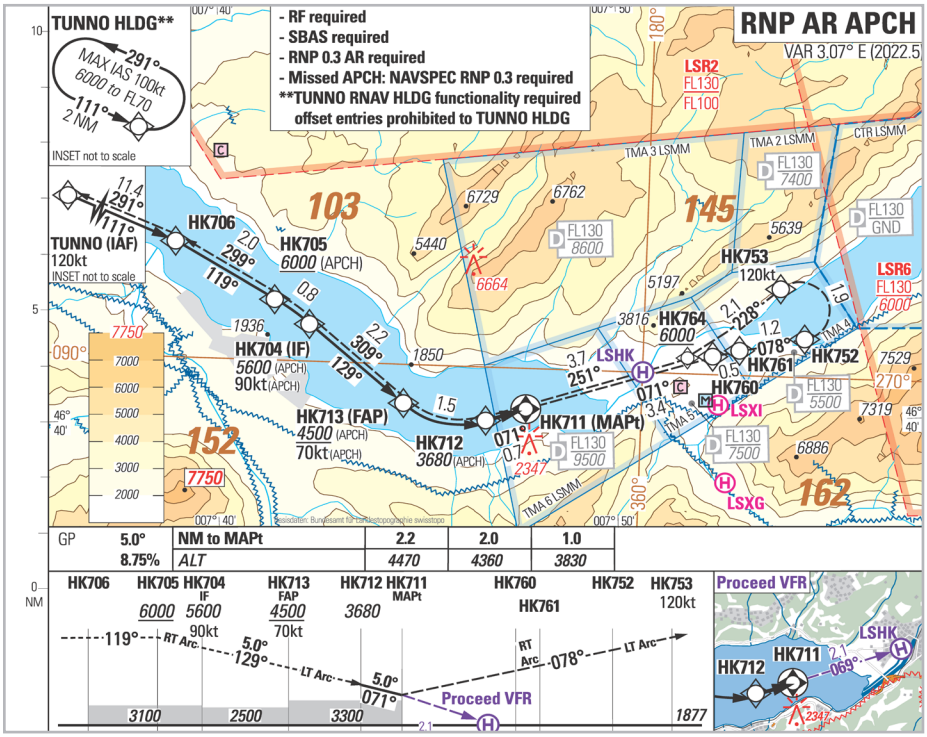

Fig. 2: LSHK APCH RNP AR 0.3 (H) [not for navigation purposes]

The journey will go on (Part 1)

Confidence and contentment prevent further development and progress. This is why the next goal for the successful ARIOS team has already been defined. After the world premiere, the RNP AR 0.3 (H) procedures developed for the AW109SP "DaVinci" will be adapted to the next navigation level: RNP AR 0.1 (H). This will make it possible to further improve flight procedures and approach minima in challenging environments. Rega's future helicopter fleet, consisting of 21 H145-D3 "Rega" helicopters, will be certified for RNP AR 0.1 (H) approaches and departures. And as a logical consequence of this, Rega's Level D Full Flight Simulator (FFS D) will also be upgraded to the RNP AR 0.1 (H) standard. Since the new helicopter fleet and the FFS D will be certified for this navigational precision and the procedures will be updated, it is only logical for Rega to apply to the FOCA for such an upgrade from RNP AR 0.3 to RNP AR 0.1 navigational precision.

We will keep you informed of developments.

Magnetic interferences at hospital landing sites

Several factors can cause magnetic interference at landing sites. Consider the following situation: You land the helicopter at a hospital heliport and shut down the helicopter to drop off or pick up a patient. When you return from the emergency room, you start the helicopter and plan to fly an instrument departure with a defined departure direction, e.g. track 030. After take-off and hover check, you turn to heading 030 degrees as this is the (exemplary) intended course. After the decision point you engage the autopilot. So far, so good. If there was magnetic interference at the hospital landing site, you will most likely have turned the helicopter in the wrong direction (e.g. 180 instead of 030) due to incorrect magnetic compass information. This creates two major risks: First, by flying in the wrong direction, you may no longer be in the designed obstacle-free area. When the autopilot is engaged, the avionics will detect this as you are likely to be out of the area of magnetic interference and/or the avionics will identify the incorrect course from the satellite navigation signals. As a result, the autopilot will immediately turn the helicopter in the correct direction, which could lead to abrupt flight manoeuvres and put the flight crew in a highly stressful situation due to the unexpected and potentially harsh course correction. All of this could happen in an area where there is no obstacle protection due to the wrong take-off direction.

To avoid such situations and to maintain flight safety at the highest level in accordance with Rega's principle of "Mission first - Safety always", we have implemented a solution that is both innovative and pragmatic. We have added signs on the final approach and take-off area (FATO) indicating the correct magnetic direction of take-off. The correct magnetic direction on the FATO enables the flight crew to identify potential magnetic interferences and to act accordingly to maintain flight safety. This is particularly important during the take-off phase at off-airport landing sites, where obstructions are often present. The implementation is effective, cheap and reliable, and the idea can be replicated at any (hospital) landing site.

Fig. 3a / 3b: Signs on the tarmac indicate the correct magnetic heading (here: 030) to imrpove situational awareness

Aircraft Radio Control of Aerodrome Lighting (ARCAL) with Loop Closure

Radio-controlled ARCALs are commonly used at many non-ATC-served airfields and landing sites to switch on approach and landing lights on the ground to ensure a safe landing at night or in low visibility conditions. While the existing system is generally effective, the pilot does not receive confirmation as to whether or not the lights and potential barriers to a safe landing have been activated. This could lead to improper approaches or unsafe airfield situations. In the case of operations in low visibility, a second approach would be necessary after the pilot has realised that the lights and barriers have not been activated and has tried to activate them a second time.

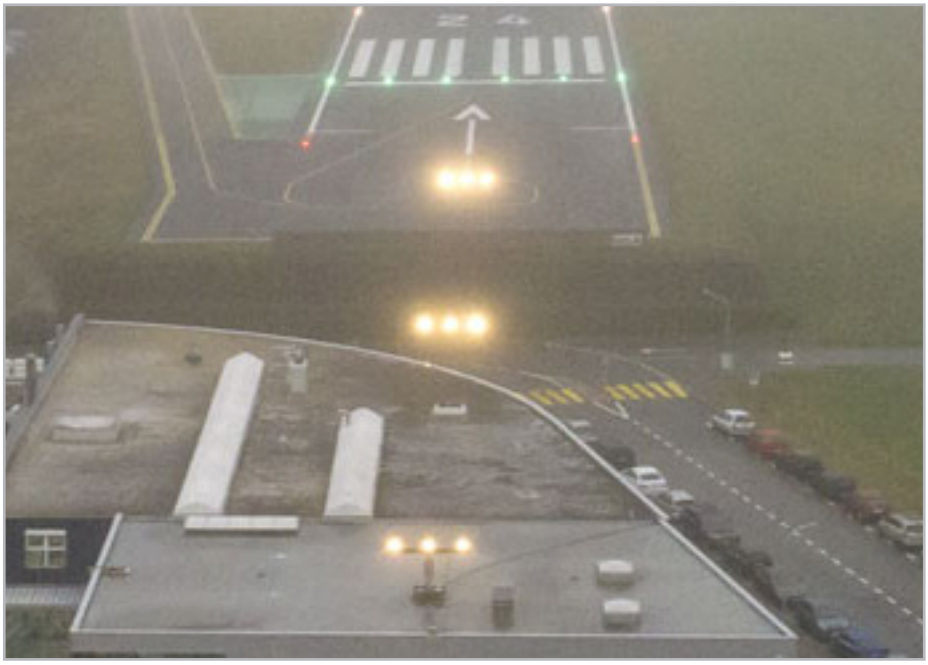

Fig. 4: APCH and RWY lighs at Les Eplatures airport (LSGC) activated by the advanced ARCAL

To avoid all this, Rega has implemented the first advanced ARCAL with active voice feedback at Les Eplatures airport (LSGC), to ensure that the loop is closed by indicating whether the necessary and desired actions are effective and whether the lights have been switched on and any barriers on the ground have been closed.

Effectively, the existing runway and approach lights can be activated on the company VHF/FM channel (rescue channel) 159.200 MHz and the assigned ZVEI-5 tone. The lights will remain activated for 15 minutes after the selective call has been made, or can be switched off by the crew. After power has been activated to the lighting system, the status of the beacon is confirmed by a voice message on the company frequency.

If necessary, the activation of the lighting system by selective commands can also be carried out from Rega's Mission Control Centre at Zurich Airport.

With this additional functionality, the pilot is always aware of the definitive status of the ground equipment. The feedback is also transmitted by radio from the ground station to the helicopter. One of the 4 voice feedbacks for RWY 23 could be *"Runway 23 lights midium brightness"*.

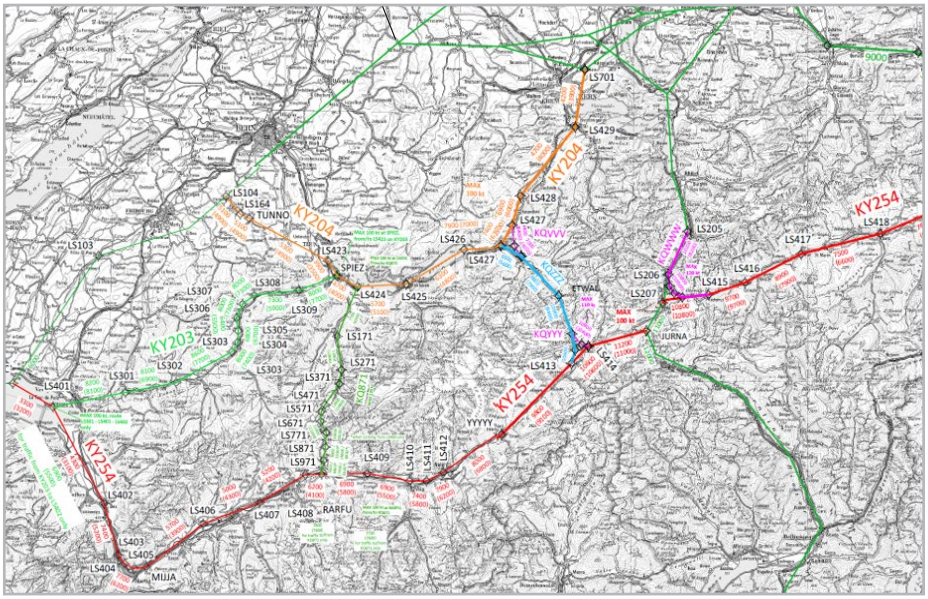

Fig. 5: Planned extension of the Low Flight Network (LFN) [not for navigation purposes]

The journey will go on (Part 2)

The LFN is extended to the cantons of Graubünden and Valais in order to optimise safe air rescue operations in bad weather conditions. RNP AR 0.1 (H) procedures are planned for Davos hospital (LSHD), Chur hospital (LSHC), Sion hospital, Glüringen village and Samedan airport (LSZS). The latter is the highest airport in Europe (5,600 ft MSL) with a LNAV MDH of 3,927 ft AGL and a visibility of 5,000 m and the application of ARIOS Helicopter RNP AR 0.1 design criteria for the same RWY 21 permits a MDH of 250 ft AGL.

A big "Thank you"

Once again, we would like to extend our gratitude to all the experts, supporters and friends whose invaluable contributions have made these globally significant results possible. We are aware of and grateful for the many extra miles that were necessary, and we are confident that all the efforts will pay off for the patients who can now benefit from the results and, last but not least, for the contributors and their organisations, authorities and companies.

We look forward to continuing this exciting journey with you to identify and implement new technologies to improve flight safety and operational reliability. Please stay tuned. ■