

## **778 Models – 1 GCP**

### **Experiences with the CCNS / AEROcontrol at the MSD**

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#### **ABSTRACT**

Since 1999, the Military Survey Department (MSD) of the United Arab Emirates is successfully operating a CCNS4 guidance and sensor management system of IGI, Germany together with a Zeiss RMK-TOP15 camera. In summer 2003, the AEROcontrol GPS/IMU option for the CCNS is installed in the MSD survey aircraft.

This paper describes briefly the used hardware and software configuration and shows preliminary results of the first AEROcontrol photo-project flown. The project was flown on 19<sup>th</sup>, 20<sup>th</sup> and 21<sup>st</sup> of June in the area around Abu Dhabi. The data evaluation has not been finished at the deadline of these proceedings; the final results will be available soon.

#### **1. INTRODUCTION**

Since 1999, the Military Survey Department of the United Arab Emirates is successfully operating a CCNS4 guidance and sensor management system of IGI, Germany together with a Zeiss RMK-TOP15 camera. Since then, the possibility to easily create an accurate flight plan in the office and to trigger the photos at exactly the planned positions, lead to a significant reduction of waypoints and flying time. The easy to use software for planning and documentation and the clearly arranged command and display unit in the aircraft made the workflow more efficient and save.

Since summer 2003, the AEROcontrol GPS/IMU option for the CCNS is installed in the MSD survey aircraft. From this investment, the MSD expects a significant reduction in the number of needed ground control.

#### **2. HARDWARE AND SOFTWARE CONFIGURATION**

The Beach KingAir 350 Aircraft of the MSD is equipped with an RMK-TOP 15 aerial camera with a T-AS stabilized mount.



**Figure 1: The Beach KingAir 350 Survey Aircraft of the MSD.**

The CCNS/AEROcontrol computers are fixed mounted behind the pilot seat, in front of the camera operators' seat. Both, the camera operator and the pilot have their own display unit. The camera operator uses a 5" display unit, for the pilot a 3" display unit is integrated in the panel. The AEROcontrol IMU-IIId is attached to the RMK-TOP with an aluminum interface on the left side of the camera.

The L1/L2 GPS antenna is mounted on the aircraft roof, nearly centered over the camera. The system uses an Ashtech Z-Xtreme L1/L2 GPS receiver which is operated via the CCNS.



**Figure 2: CCNS/AEROcontrol**



**Figure 3: IMU-IIId attached to the RMK-TOP**

The planning of the missions is done with the WinMP mission planning software and module UAE of IGI, the differential GPS calculation with GrafNav from Waypoint Consulting, Canada, and the GPS/IMU processing with AEROoffice of IGI. For aerial triangulation, e.g. of calibration fields and for simultaneous AT-GPS/IMU calculation the BINGO software of GIP, Germany is used.

### 3. DESCRIPTION OF THE PROJECT

As first project to be flown, a block of 778 photographs in the Abu Dhabi area has been chosen. Image scale was 1:30,000.

For the whole block, 12 GCP's have been signalized. During the flights on the 19<sup>th</sup>, 20<sup>th</sup> and 21<sup>st</sup> of June, 4 GPS base stations have been operated by the MSD. The number of visible satellites was between 8 and 12.

It is planned to process the image data and the GPS/IMU results simultaneously in BINGO ("Integrated Sensor Orientation"). The aim is, to reduce the number of GCPs to a minimum.

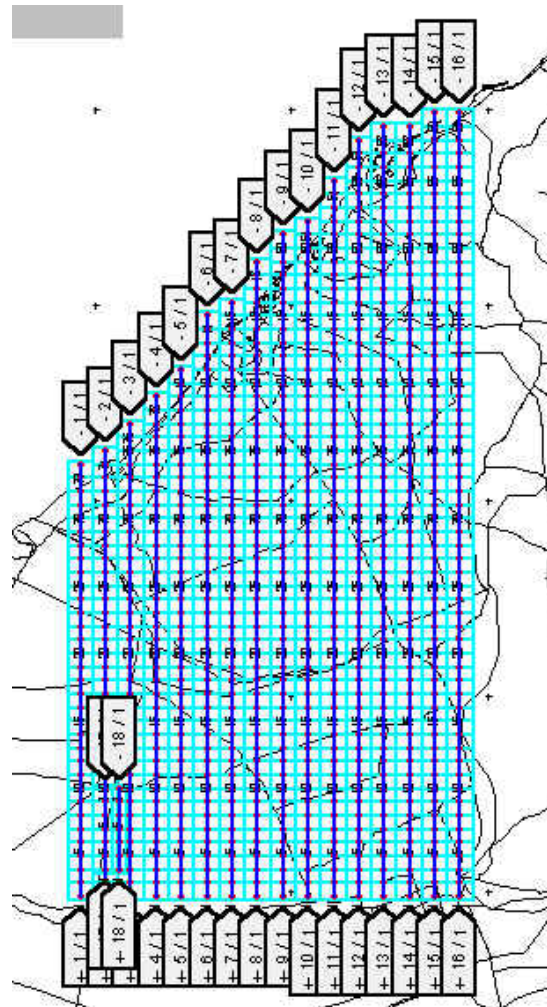


Figure 4: Flightplanning for the Mission

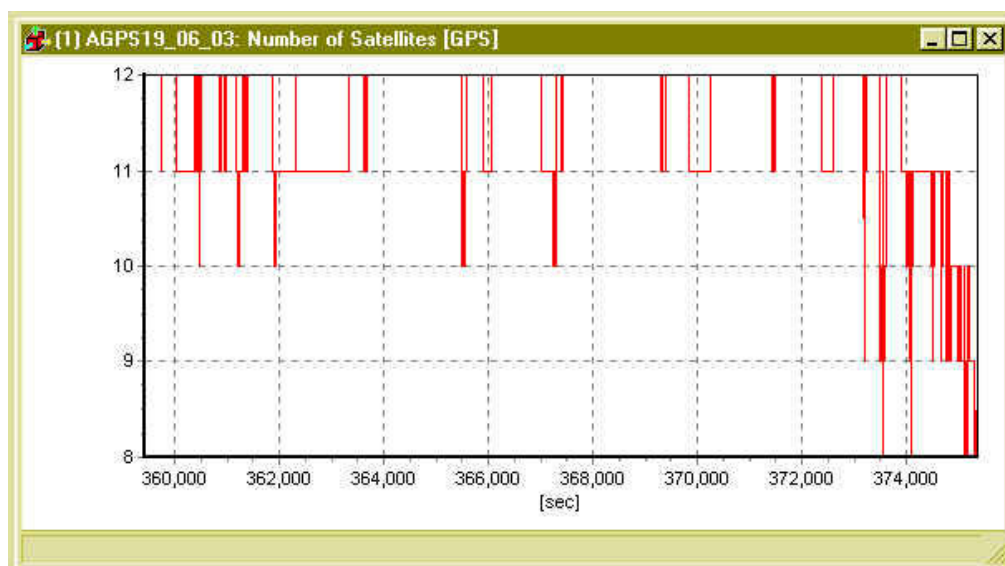


Figure 5: Number of Satellites during one the 3 Flight Missions

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