

THE SUPPORTING FEATURES OF COMMUNICATION, INFORMATION AND AIR NAVIGATION SYSTEM FOR COORDINATION AND CONTROL OF ALL THE ACTIVITIES CONCERNING PREPARATION, EXECUTION, AND THE ENDING OF THE FLIGHT OPERATION

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Communication, information and air navigation support for coordinator and control of all the activities concerning preparation, execution and the ending of the flight operation is one of the most important factor for the flight mission.

For an air flotilla communication, information and air navigation support is represented by a communication, information and air navigation system provided by communication and information compartments involved in planning, organizing, exploiting and controlling the system which have the task to plan, organize, exploit and control the system.

The communication, information and air navigation support is active provided in all flight stages from starting the preparation until the ending of the flight operation.

The communication, information and air navigation system, as a board technical support, is the main tool of the communication, information and air navigation support for the acquisition, dissemination, protection and diffusion of information regarding the flight.

Keywords: command and control system; command and control; communication; information and air navigation support; flight activity; command and control process; ground-air communications; flight control; air traffic control.

The air flotilla is involved in military aeronautical activities to accomplish specific missions in the Romanian air space or in the air operations where other states military aircrafts participate.

The aeronautical activities¹ gather all the activities regarding the execution of the flight missions.

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The planes and helicopters' flight from the air flotilla is achieved through the air traffic control on Special Instructions (SPINS), techniques, operating procedures and regulations with regard to the flight activity only.

The flight activity² contains all the actions regarding the flight starting with the flight preparation until the end of the flight operations.

The final object of all these actions is to create the technical and organized framework and the necessary conditions in total security according to the considered objects.

To the accomplishment of the flight missions in secured conditions at each level of flotilla's organization it takes specific measures to assure the right conditions and to dispose all the categories of resources to the command and control structures and the Air Traffic Controllers (ATC) as: technical, human, material and informational resources.

The process, the implementation and the logistic aid of the flight activity is accomplished through specific types of assurance³ which contain: navigation assurance, information and communication assurance, radar data assurance, weather forecast assurance, parachute assurance, engineering assurance, control assurance.

The communication, information and air navigation support of the flight activity consists in technical equipments kit, software, methods, procedures and specialized employees in order to assure the technical and functional interlinking of all proficient compartments regarding the flight activity, control and command structures and the Air Traffic Controllers in all the flight stages, starting with the flight preparation until the end of the flight operations.

The communication, information and air navigation support is a direct one which consists in the information and communication structures activity for the personnel's benefits having leading functions and competences regarding the flight activity to assure the communication technical support, the information and Terrestrial Air Navigation System necessary to coordinate and control the preparation, execution and the end of the flight operation.

The flight activity command and control process contains all the actions and measures to plan, organize, command, coordinate and control the flight preparation and execution in order to accomplish the settled objectives/missions in total security.

Regarding the command and control process to accomplish the settled missions, the flotilla's captain exercises the flight activity leading using the command and control system.

¹ *F.A. / Av. - I – Air Force Flying Rule, Air Force Staff*, Bucharest, 2005, p. 126.

² *Ibidem*, p. 63.

³ *Ibidem*, p. 106.

The flight command and control system is formed of all the personnel with leading functions on the flight line, the Air Traffic Controllers, logistic support structures, equipments and ways of communication, radio navigation and information, airfield facilities used by the captain to lead and streamline the flight activity.

The command and control system usually contains the following components:

- the chain of command formed of captain, flight lieutenant, major state chief, squadron captain, The Operations Center of the Air Flotilla. During the flight activities the flight control is exercised directly by: the flight director, the duty shift of the operations center of the air flotilla, the control tower, approaching control system (APP), air traffic controller on higher positions (FAC⁴);
- logistic and air navigation, information, communication support structures;
- facilities C2.

Air Flotilla Operations Center is the main command and control structure through which the commander exercises flight management act.

It is functionally subordinate to Air Operations Centre (AOC) and is responsible both planning and preparing flight activity and for air traffic and missions control.

The basic mission of the Air Flotilla Operations Centre is represented by command, control and management of current ground and flight operations, which include: current ground operations, flight planning and recording, receiving and disseminating orders and additional tasks in initial activities⁵ planning, aeronautical information / weather and routing, monitoring and coordination of flight activity in the area of responsibility.

Within Air Flotilla Operations Centre is ensured coordinated and / or independently on multiple management items and modules, technical communications, information and air navigation means are grouped into operational communications center that is part of the operations center. In peacetime it is usually ordered and organized at the aerodrome aviation unit deployment, in locations which enable the best technical and operational conditions, which enable the management, routing and coordination of flight in safe conditions. Through Air Flotilla Operations Centre are received the Air Tasking Order-ATO and the Airspace Control Order-ACO from Air Operations Center - AOC.

During the execution of missions that require deployment on other airfields or areas where logistical and communications support is insufficient,

⁴ FAC- Forward Air Controller.

⁵ *S.M.F.A. – 91 Disposition Establishing the Responsibilities of Operations with Attributes in Air Traffic Management in the Romanian Airspace*, Air Force Staff, Edition 2008, p. 1.

air flotilla is establishing their own operations centers using means of communication, information and air navigation equipment of its own or received as support from other units under the care of Air Force Staff.

In each AOC of an air flotilla must be three distinct information subsystems: operational, administrative and intelligence, completely separate physical or virtual. Due to real time work, exchange of operational information has a high priority level above other related domains, administrative and intelligence.

Support communication information and air navigation together with administrative support provided to the commander and Staff is vital to the continuity and effectiveness of command and control system.

The command and control system/C2 must meet, in the planning, organization, coordination and execution of flight activity, the following functions:

- collection, processing, transmission and data storage;
- the process of making decisions for flight performance;
- preparing flight activity and flight crew and ATC briefing regarding flight mission;
- managing, coordinating air traffic and directing aircraft during flight activity;
- constantly reception and updating data on air situation by spreading recognized air picture (Recognized Air Picture - RAP) and civil radar data.

Communication, information and air navigation support during flight activity is materialized through communication, information, air navigation and identification system and assured by communications and information structures from air fleet organic. For safely conduct flight activity communications and information staff performs organizational and technical activities that run all phases of flight from start preparing for flight, during flight activity and until the end of flight operations.

„Communications and IT management is an activity based on plan and special role in the execution of the management responsibility for communications and computing. Essential for the management activity is determining the desired dynamics, which requires detailed knowledge of the driving system based on accurate and complete informations.

Communications and IT management, evaluated the self-regulating process is based on information circuits which help determine the direction and trend factors outside influence. The number of link information is greater, the chances are greater organization”⁶.

⁶ Boaru Gheorghe, *Improving communications and computer management on major operational and tactical units of the Army*, Academy of High Military Studies Publishing House, Bucharest, 2002, p. 17.

Through communication and information, air navigation and identification system, command and control of the air flotilla integrates all structures with competence and responsibilities in the organization, coordination, control and execution of the flight, allowing them to operate in accordance with the proposed objectives and goals in all its stages: preparation, execution and conclusion (including restoration flight capacity and activity analysis).

For transmission of commands, reports and information for flight management and performance functions of the C2 system, communications, information and air navigation support include⁷:

- interconnection of the structures, components, technical and human, both horizontally and vertically, to exchange information at all levels of command and control⁸;
- informing the crew and ATC authorities regarding the operational status, working characteristics and procedures to use of the communication and information means and terrestrial air navigation systems;
- preparing terrestrial means of ground-to-ground and ground-to-air communications and terrestrial air navigation systems and information resources of the National Air Command and Control System (NACCS), the personnel which operates these means, as well checking them before the flight start;
 - receive real-time Recognized Air Picture;
 - checking the operation of audio recording means during the flight and quality records;
 - permanent monitoring of the operation of ground air navigation systems as well remediation in shortest time of possible their damages;
 - providing electricity from its own sources in an emergency;
 - maintaining the operational status of communication and information means and providing a reserve of ground air navigation means necessary to be used in the event of failure of the base ones;
 - fully execution in time and maintenance of all means of communication, information and Terrestrial Air Navigation System.

Base functionality of C2 system is information, continuously growing both in volume and importance. Information flow during the course of flight activity must be provided immediately, both vertically, within the hierarchical structure of command and control and horizontal cooperation in relations

⁷ *F.A. / Av. - 1 – Air Force Flying Rule*, Air Force Staff, Bucharest, 2005, p. 107.

⁸ *F.T. – 10 – Communications and IT Support Manual in Land Forces Operations*, Bucharest, 2005, p. 12.

across the whole organizational structure of air flotilla. All hierarchical levels of command must be able to extract the information they need to substantiate decisions and fluently and safe conduct of work on the airfield.

To ensure continuity of information flow and opportune processing of them, the air fleet has developed a system of communication and information, air navigation and identification based on the following principles:

- interoperability - to ensure success in joint and allied operations;
- flexibility – to solve rapidly evolving situations caused by complex operations;
- reliability – to be available when required to function as designed;
- redundancy – to provide alternative connection back-up systems and technical equipment to restore links in case of disturbances / interruptions;
- scalability – to allow a larger of data loading volume and to allow increase or its enlargement;
- opportunity – reducing the time required for reception and transmission of information;
- mobility – for continued support of deployable forces.

Exploiting the full potential of air flotilla and achieve full effectiveness to conduct safe flight missions require achieving and maintaining a national command and control system (C2) to ensure appropriate and rapid reaction of management factors for achieving the objectives and determined missions.

Taking in consideration that Air Force fulfilling specific missions involve a rapid exchange of data and voice communications throughout the national airspace was necessary to achieve a distributed nationwide command and control air system and interoperable with similar systems of NATO. It is therefore necessary to integrate, at least at the operational level of air flotilla's command and control system, within National Air Command and Control System (NACCS) which allows to reach the most important information where required, as requested, protected and in time.

National Air Command and Control System provides command and control capabilities of specific actions in the air, react capacity which allows synchronizing Air Force activities located in the territory / the airspace of Romania and other forces of the alliance actions under NATINADS⁹.

Achieving these goals is possible by designing and implementing of a unified communications system, reliable and flexible which provides specialized technical support to exercise command and control functions as part of National Air Command and Control System.

⁹ NATINADS - NATO Integrated Air Defence System.

„As part of Romania's Army Command and Control System, NACCS provides the command and control capabilities specific to airspace actions in order to achieve the collective defence objectives within NATO, national security and to solve airspace crisis. NACCS represents a combination of organizational structures, specialized personnel, specific procedures and equipment destined for the planning, conducting, controlling and coordinating military air actions”¹⁰.

In order to ensure the unity of forces specialized in carrying airspace military operations, NACCS must allow for the integration of Land and Naval Forces air surveillance and defence elements and means.

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¹⁰ Gheorghe Boaru, *The national air command and control system (NACCS)*, Annals series of military sciences, Volume 1, Number 1, Bucharest, year 2009, p. 88.

