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The Principles and Organization of Air Traffic in Military Operations: Experiences from the Mission in Iraq

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Abstract

This article analyzes the principles and organization of the operation of the military runways used by Polish and Allied aircrafts during missions in Iraq. The main goal of the article is to describe the organization and method of air traffic management by the Polish air traffic controllers (ATC). It depicts the method of planning and preparing aviation operations, the principles of air traffic organization, which were the responsibility of the Polish controllers, and the rules for the traffic above the airstrip. Among the particular problems that are discussed, there are the rules of airspace segmentation, the introduced solutions for air traffic control, and the use of airport infrastructure.
The experiences discussed include valuable information regarding the process of securing air traffic that can be helpful in the organization of landing pads and in preparation of both Polish and allied military contingent aviation personnel for future aboard operations. This paper presents the results of the research carried out with the ATC personnel performing tasks in Iraq.

Keywords: airstrips in Iraq, air traffic, defense, landing zone, military airport.

Introduction

The organization of airports and how to use them during peacetime are strictly regulated by ICAO[1] rules. In carrying out tasks in times of war (both by military aviation performing combat flights and civil aviation conducting contract flights, such as supply or transport flights), the rules may vary and depend on the area and the nature of the operations, as well as the equipment available at the airport (airstrip).

Therefore, the practical objective of this paper is to investigate the way in which flights are organized and operated, as well as to analyze the airstrip infrastructure that operates in combat conditions. The purpose of that diagnosis is to eliminate errors that may arise in the team work of the ATC staff (Charles, and Reads, 2018). The theoretical goal of this publication is to try to find an answer to the question: How do airstrips and military air traffic services operate in times of war?

The research problem initiated an attempt to address the following working hypothesis: Various conditions accompanying the process of building airstrips for military contingents translate into various working environments for the aircrafts of the Polish and allied armed forces. It is assumed that a different and ununiform way of organizing airstrips in the mission area generates difficulties to run them by the military air traffic services and the ground security personnel.

The answers to the posed questions and the verification of the hypothesis were sought with the use of the focus method, *ex post facto* experiment, literature research, observation, and interviews carried out in the studied environment.[2]

The Circumstances of Initiating Operations in Iraq

The situation in Iraq after the end of the First Gulf War in 1991 was still unstable. The hope that Saddam Hussein would be overturned by the Iraqi people turned out to be vain. There was a concern that he tried to rebuild the country's military capabilities, especially weapons of mass destruction. The UN Security Council and the U.S. government imposed a series of economic sanctions after the war to force Hussein to comply with the UN resolution banning the development of weapons of mass destruction (Williams, and Slusser, 2014). Initially, President George Bush's intention was to increase the number of U.S. ground troops stationed around Iraq (in Saudi Arabia, Kuwait, and Turkey) and to tighten diplomatic and economic pressure on the Hussein government in a way that he would be overthrown by the Iraqis. At the same time, however, a plan for the invasion of Iraq was commissioned in case diplomatic and economic pressure would not work.

A drastic tightening of policy towards Iraq came after the terrorist attack on September 11, 2001. A doctrine of "preventive strike" was developed as an aftermath, according to which the American government has the right to invade any country under the so-called "war on terrorism." At the end of 2002, a crisis began to escalate over the implementation of UN Security Council resolutions that ordered Iraq to dispose of weapons of mass destruction, and which, according to UN inspectors overseeing the processes, were not properly implemented by the Hussein government. In September 2002, the U.S. Senate and the U.S. House of Representatives adopted the "Joint Resolution to authorize the use of United States Armed Forces against Iraq." On March 20, 2003, U.S. troops and allies attacked Iraq. Due to the fact that preparations for the

[1] ICAO – International Civil Aviation Organization is responsible for the development and implementation of international air traffic regulations.

[2] The expert interviews were conducted with the Commander of the Independent Air Assault Group and the Commander of the military airport, who held these positions in the Polish Military Contingent in Iraq.

invasion took place earlier, namely on March 17, the President of Poland, Aleksander Kwaśniewski, at the request of the Prime Minister, Leszek Miller decided to transform the unit that operated in the Persian Gulf into an independent Polish military contingent. It consisted of a subdivision of special operation units of Grom and Formoza (that took part in the battles on the Iraqi coast), the decontamination platoon from the 4th Chemical Regiment, and O.R.P. R.A. Xawery Czernicki ship.

In April 2003, after the capture of Baghdad and the dismantling of almost all Iraqi forces, the Americans began to create the occupation authorities and divided the country into four stabilization sectors:

1. Northern Sector (proposed to Australia but governed by the United States);
2. Central-North sector (governed by the United States);
3. Central-South sector (multinational, proposed to Denmark, governed by Poland)[3];
4. The Southern Sector (multinational, governed by the United Kingdom).

In July 2003, an international division under Polish command was established.

The stabilization operation in Iraq was based on the legal decisions of the UN Security Council. Chapter VII of the Charter of the United Nations served as the basis for the adoption of Resolution 1483 of 22 May 2003, which sets out tasks for the international community, international organizations, and law enforcement organizations concerning the post-conflict regulation of the situation in Iraq. The Polish Armed Forces were incorporated into the stabilization forces in Iraq on the basis of the Order of the President of the Republic of Poland of 6 June 2003 on the use of the Polish Military Contingent (PMC) as part of the International Stabilization Forces in Iraq. The Minister of Defense and the Chief of the General Staff issued the relevant regulations and documents to prepare and define the rules for the functioning of the Polish Military Contingent.

The Polish Military Contingent in the Iraq emergency response mission was characterized by an unprecedented scale of involvement of the Polish Armed Forces. Poland, as the main organizer of the Multinational Division Central-South, had the task to reconcile the requirements, needs, and interests of all the countries involved in establishing the division and to secure the participation of the combat air element to support ground forces in a multinational environment. On September 3, 2003, Poland took the responsibility to secure five provinces (Babil, Wasit, An-Nadżaf, Al-Kadisijja, and Karbala) that covered 64 058 km² and 3.6 m of Iraqis (Fig. 1). During the mission, the PMC was to oversee the process of restoring order and security, rebuilding and securing infrastructure, protect important civilian and military points, patrol designated zones, help train the Iraqi Security Forces, and detect and destroy weapons of mass destruction (the existence of which has not been proven).

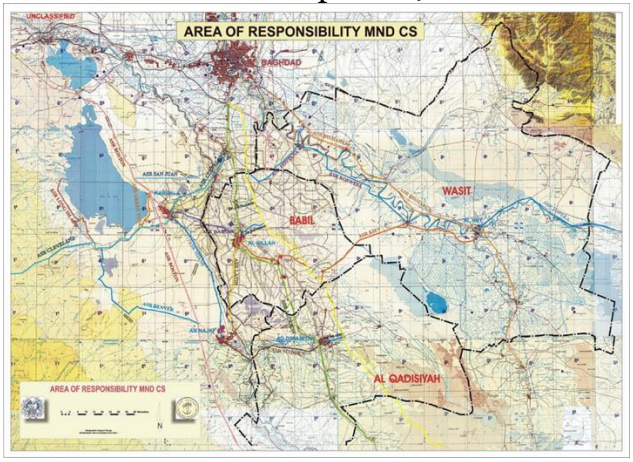


Figure 1. Multinational Division Central-South Responsibility Area.

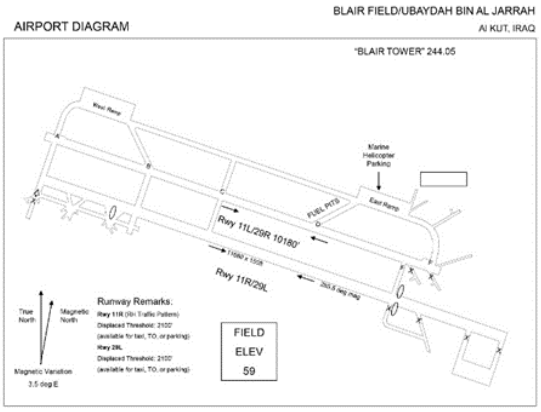
[3] After the refusal of the Danish Government to take control of the Central and Southern Area, it was proposed to Poland. Leszek Miller's government agreed hoping for, i.a., lucrative contracts during the process of rebuilding Iraq and strengthening Poland's international position.

Al Kut Airport – Camp Delta Base

In today's world, where the pace of life increases every day, solving problems related to fast and easy transport is the subject of attention of all interested parties. The transport industry is an important part of the economy and sustainable development of every country. Air transport is a key element of economic and social development, and demand for it continues to grow every year (Rezaee, and Yousefi, 2018). In the case of military operations, air transport plays a significant role in the logistic security of military forces. Moreover, aviation, apart from transport services, performs other supportive functions, such as, fire support. In order to carry out these tasks, it is necessary to keep airports and airport infrastructure in good technical condition. In Iraq, military had several airports at their disposal. One of them was the Blair Field Airport.

Al Kut Airport (Blair Field) was located in the central part of the Wasit District at Route 6 between Baghdad and Basra, in the south-west direction from the city of Al Kut, to the south from the bank of the Tigris river. The airport was a former air base of the Republic of Iraq Air Force called Ubaydah Bin Al Jarrah. It was an operational airport and base for MiG-25R and MiG-25 aircraft. The airport had two parallel paved runways (Fig. 2). Most of the airport's operational infrastructure under the control of military air traffic services was located on the north side of the runways.

(a)



(b)

Figure 2. Al Kut Airport: a) satellite image, b) diagram.

The dimensions of runways (DS) at Al Kut Airport were the following:

- Northern runaway (29 R): 3000m × 50m;
- Southern runaway (29 L): 3600m × 50m.

The roads were located on a geographical course of 289°. All taxiways were 16 meters wide (APG, 2003). The airport was equipped with:

1. aircraft accommodation areas,
2. flight control tower,
3. concrete bunker-hangars,
4. maintenance and repair hangars,
5. administrative buildings,
6. barracks.

Throughout the presence of Polish controllers, the technical condition of the air-

port allowed only to accommodate helicopters, turboprop and propeller aircraft, and unmanned aerial vehicles (UAVs). Special restricted operations zones were usually created for the latter ones. It entailed an additional problem of airspace demand for UAVs. Weather conditions was another factor that contributed to limitation of air operations. Due to the significant levels of dust and technical condition of the infrastructure (runways and taxiways), as well as the lack of proper equipment to keep them in good condition, only the jet aircrafts capable of taking off and landing in conditions of high dust level could be used.

During military operations, the main runway (29 L) was bombed. Although the damage was fixed over time, the lack of access roads and runaway cleaning machines made it mostly available for UAVs that were stationed there. Transport aircraft (C-130) and helicopters used the 3000 m shorter runway (29 R). The helicopters were kept in the eastern part of the airport.

The basic equipment of Al Kut Airport, which fully secured the take-offs and landings of the Independent Air Assault Group helicopters, both during the day and night in accordance with the visibility fight rules (VFR) consisted of:

- electro-light device (*Świetłuszka*);
- non-directional radio beacon KROKUS;
- FM/DMF R-839 radio station on the car;
- URC-200 Motorola air radio station;
- two APM mobile searchlight stations (Russian: *Ajerodromnaja Prozhektornaja Mashina*).[4]

It should be stated that the airport equipment differed from exemplary civil-military airports, where air operations are carried out in the peace zone. It was more similar to airports handing general aviation traffic. It had neither basic approach systems, nor precision approach system, nor an instrument landing system (ILS) (Diana, 2015).

The Al Kut Airport was located in the Baghdad's Air Information Area (FIR Baghdad). Control over Iraqi's territory was divided into three service sectors. In northern Iraq, the ACC service was provided by FREEDOM ACC, in southern Iraq – TALLIL ACC, and in the central part of the country – BAGHDAD ACC, where Polish controllers provided airport control services (Fig. 3). Securing IFR flights by the area control service was carried out by combining the radar (secondary radar or return from the IFF transponder)[5] and procedural methods. Airport control service provided by the Polish military authorities was conducted without radar coverage and it was limited by the sight range and means of communication.

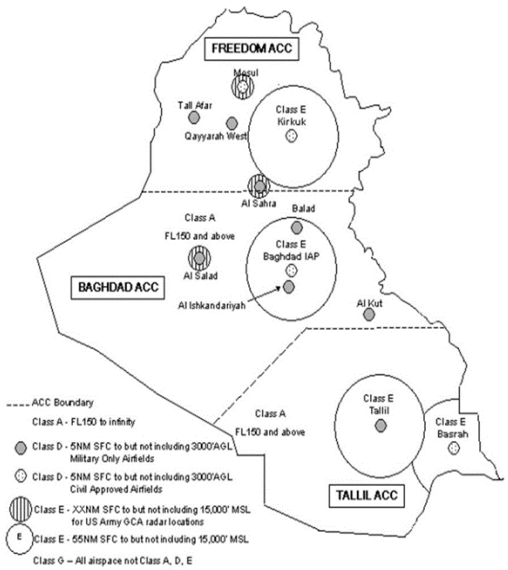


Figure 3. Division of Airspace over Iraq among the Area Control Centers (ACC); source: Al Kut Airport Operating Manual.

[4] APM is a searchlight mounted to a car of Soviet production. For full take-offs and landings service of other types of aircraft, such as communication and transport aircraft in worse visibility conditions, than during the day electronic on-ground support of air operations equipment that complies with ICAO requirements is required.

[5] IFF – Identification Friend or Foe – is a recognition system that is primarily used in military aviation to determine the type of nationality of an aircraft.

Entering the Iraqi airspace required establishing radio contact with the following area control authorities:

- from the Turkish border – with the unit codenamed "JUNKYARD" at 119.075 MHz (primary frequency) or at 118.875 MHz (secondary frequency);
- from the borders of Saudi Arabia, Jordan, Syria or Iran – with the unit codenamed "DEMON" at 119.675 MHz (primary frequency) or 112.875 MHz (secondary frequency);
- from the Kuwaiti border – with the "TROPICAL" unit at 119.125 MHz (primary frequency) or 123.250 MHz (secondary frequency).

These rules have been published to introduce orderly air traffic for all aircraft, both military and civilian, which were used for providing supply (food delivery, transport of people and military and civilian equipment). It stemmed from the fact that in the area of military airstrips in Iraq the ICAO and IATA (International Air Transport Association) regulations did not apply (Madas, and Zografos, 2006).

When establishing connection on the above listed frequencies proved impossible, the aircraft was obliged to try to establish communication on alarm frequencies: 121.5 MHz or 243.0 MHz and to continue the flight according to the last designated route and altitude (APG, 2003). In the event of onboard unlawful interference, the aircraft equipped with transponder[6] carried out set up procedures with the use of the proper transponder's "special codes" [7] in the 3A or C mode.[8]

The following airspace classes existed in the Iraqi Air Information Area (FIR BAGHDAD): A, D, E, and G. Proper air traffic services were offered in all controlled air spaces. In airspace class A, aircraft crews introduced a standard pressure of 29.92 inches of mercury (1013.25 hectopascals) on the altimeter. For flights below airspace class A, QNH pressure was set to crews by the military air traffic services (MATS). The transition altitude was 15.000 ft MSL and the transition level was set at the FL150.

At the secured by the Polish ATC Al Kut airport, air operations were carried out on the basis of ICAO regulations and Polish flight regulations (RL-2010) (*Regulamin Lotów Lotnictwa Sił Zbrojnych Rzeczypospolitej Polskiej* (RL-2010), 2010).[9] A team of Polish air traffic controllers worked at the flight control station in Al Kut under the "Blair Tower" codename on the basic frequency: VHF 135.500 MHz, and backup frequency: UHF 244.050 MHz. Air traffic security was carried out 24 hours a day, seven days a week. Flight planning, issuing plans[10] or informing military controllers about planned air operations were carried out 24 hours in advance. This procedure did not apply to MEDEVAC flights.[11]

[6] Transponder is a wireless communication device that automatically receives, modulates, amplifies, and responds to real-time incoming signal. The term comes from a combination of English words "transmitter" and "responder."

[7] Special transponder codes: 7700 – basic emergency alarm code, 7600 – transponder code set at the time of loss of radio communications, 7500 – code set when the aircraft was hijacked or another act of violence took place on board, 2000 – the flight compliant to IFR but not granted individual code, 7000 – the flight compliant to VFR but not granted an individual code.

[8] Aircraft transponders can operate in different modes. Each of them allows to send a different set of information. Mode 3/A – the so-called squawk code consists of a four-digit identification number of the aircraft allocated by the flight control service. It is used in civil and military aviation. Mode 3C transmits a 10-bit code with the information about the flight ceiling (pressure altitude) measured from the altimeter. It is used in civil and military aviation.

[9] The current version is RL-2017.

[10] Flight plans were sent by fax or submitted in person to the S-3 operation cell in accordance to ICAO regulations.

[11] Medical evacuation (MEDEVAC) flights consist in evacuation of the wounded

Information on the ATC service provided by military air traffic controllers and about the data regarding airports and airstrips were published via NOTAM air mail. Radio communication with ATC on the designated frequency was mandatory. The arriving aircrafts were required to establish communication with the airport controller before entering airspace class D. For the departing aircrafts, contact with ATC took place 10 minutes before take-off.

The Polish ATC team in Al Kut secured, in its responsibility zone,[12] the crews during take-offs, landings, taxiing, moving on access roads to the main lane and roads in close proximity to the airport. It also was responsible for securing safety during mortar shelling, controlled detonation, and other operations in airspace. In addition, military air traffic services provided information and were entitled to issue instructions to aircraft under their control in order to ensure safe, orderly, and fast traffic flow, as well as to assist air personnel in preventing collisions with other aircraft or obstacles at the airport.

Each use of the runway, taxiways and access roads had to take place after receiving permission from the airport controller. In the event of loss of communication during the execution of this operation, the personnel carrying out tasks had to turn attention to the ATC team, who, with the use of audible or light signals, ordered further steps. In order to improve air traffic, the pilots were obliged to declare in advance the will to start the engine to the Polish ATC authority. Before starting the engine or at the time of the launch, the crews were granted clearance to launch by the ATC team.[13] Other airspace users were informed of ongoing military operations in the Al Kut area and the possibility of an occurrence of a significant threat to civilian air traffic.[14]

VFR flyways were introduced at the Al Kut Airport to better organize air traffic. The flyways are depicted in fig. 4. The areas in the graphics scheme were published and sent to the involved cells, both Polish and allied. For security reasons, the names of sectors were changed irregularly, but at least every 14 days.

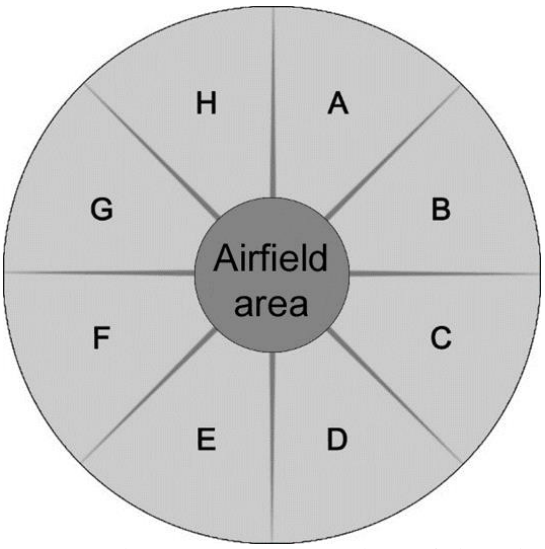


Figure 4. Airspace Segmentation of the Al Kut Airport.

from units with 2nd medical protection level to the units with the level 3 or 4 (hospital). MEDEVAC means the process of extraordinary evacuation of soldiers who are seriously injured or sick with all available means of transportation. Urgent cases may be evacuated by air (HELIMEDEVAC); less urgent by land. The published standard procedures established that MEDVAC from the theatre of operations must be carry out by air so there is no need to use the HELIMEDAVAC term.

[12] The responsibility zone of the military air traffic control at the Al Kut Airport was demarcated by the following dimensions: horizontal – a circle with a radius of 5 miles (approx. 9.3 km) and vertical – up to an altitude of 2700 feet (approx. 750 m). Flights carried out in the controllers' responsibility zone were conducted in accordance with class D flights regulations.

[13] ATC Clearance – permission for launch given by the airport control authority usually during or after starting the engine, which contains information on QNH pressure, wind force and direction, and the taxi to the runway threshold.

[14] There had been reports of unjustified missile and small arms attacks on aircraft flying in the FIR BAGHDAD zone and because of that civilian pilots used the airspace at their own risk.

There were two fire brigades equipped with two specialized vehicles stationing at the Al Kut Airport. Firefighters were on standby four hours a day, seven days a week, and they were the primary unit of the Airport Rescue Unit (ARU). The mobilization of the rescue group followed the signal of the airport controller, who, if necessary, coordinated its activities.

Babylon Landing Site – Camp Babylon

Another landing site used by Polish and allied aviation in Iraq was the Babylon airstrip. It was located in the center of the Babil Province, about 6.5 km north of the city center of Al Hillah. Among characteristic landmarks, to the west of the airstrip, there were ruins of the ancient city of Babylon in a proximity of about 200 meters away and a castle built in Saddam Hussein's time at a distance of about 800 meters. The Babylon airfield was prepared mainly to operate light and mid-size helicopters. There was a possibility to accommodate approximately 16 aircraft with sizes comparable to W-3 or UH-60 helicopters on a hardened landing area (partially covered with concrete). Maximum traffic on the landing site made it impossible to use it for emergency landing. The main landing direction was 260° but for armed aircraft the northern part of the landing zone was designated with a mandatory direction of 300° to 330°.

The control tower of the military airport (mobile, autonomous command and control unit (ACCU) fixed on the Star 266 truck was located 200 meters east of the landing site, in the proximity to the amphitheater, where the controllers were accommodated. Due to the lack of power aggregators and proper ACCU handling, controllers equipped with portable radios secured air traffic from a watchpoint at the amphitheater. This was because of the possibility of better visual observation of the landing site and a stronger range of the radio station. At the end of the first tour, the airport control authority acquired a generator and air conditioner, which allowed ATC staff to start working at the right location (ACCU).

The call sign of the control authority of the Babylon landing site was the codename "SCREWDRIVER." The controller worked at the VHF 128.600 MHz primary frequency and a 239.800 MHz UHF backup frequency. Additional frequency – 82.300 MHz – was used for the communication with:

1. fire brigade,[15]
2. marshaller,[16]
3. refueling point staff,
4. light team.

As part of good practice, arrivals at the Babylon airstrip were reported to the Polish airport authority 24 hours in advance. It was undertaken due to limited possibilities for basing helicopters. This prior permission requirement (PPR) for landing secured the place at the base and that air traffic services would be provided. The rule did not apply to MEDEVAC/CASEVAC[17] medical evacuation flights and aircrafts in EMERGENCY situations.[18]

These principles have been defined to harmonize air traffic procedures in the Babylon airfield, minimize risks, and improve safety in airspace the military air traffic services were responsible for. The Polish ATC in the Babylon landing zone was in charge of providing information to all aircraft

[15] Fire brigade unit was on stand-by 24 hours a day.

[16] The marshaler is a person working at the airport that is supervised by the controller. Marshallers are responsible for aircraft ground traffic, i.e., taxi, pushing, rebasing, and basing in the locations designated by the controller.

[17] CESEVAC or casualty evacuation means the medical evacuation of injured personnel under fire, from the location of injury/accident to the first medical point that possess the capability of surgical supplies.

[18] A situation when aircraft failures or damages affects and flight safety and can lead to a catastrophe (transponder code 7700).

crews in their responsibility zone.[19] The data provided by the controllers concerned the current movement of the arriving and departing aircraft, as well as the information about the situation on the ground. The information was provided 24 hours a day, 7 days a week. Communication was conducted in English and in an emergency cases in Polish with Polish crews. The aircraft traffic was organized on two go-arounds (right and left) to land with 270° course. The directions and contractual shapes of the go-arounds were determined in relation to the observed situation on the ground and in the air. The left circle was extended beyond the hill with the castle to avoid aircraft flights over the Babylon landing site – Fig. 5 (APG, 2003).

Figure 5. Air Traffic Organization in the Area of the Babylon Airport. Left and Right Patterns to Runways 27 and 09; source: based on Air Procedures Guide (APG, 2003).

There were no fixed arrival directions in the area of responsibility on the Babylon landing site. The crews provided position information using directions or values of courses 27 and 09 (270 and 090°). Cold refueling of helicopters was also provided after obtaining permission of the airport controller. Two Polish tanks (CN 33 and CD 45) were available at the airstrip. They could supply, in total, 36,000 liters of fuel. Refueling could take place after prior information from the crew in the process of obtaining PPR. There was also the possibility of hot refueling . This option was provided by the U.S. side after prior arrangements.

Ad Diwaniyah Landing Site – Camp Echo

Due to organizational changes, the Polish contingent stationing in the Camp Babylon was relocated to Ad Diwaniyah. From the 4th tour on, the control personnel was tasked with securing air traffic on the Ad Diwaniyah airstrip at the Camp Echo base (Fig. 6). The Polish ATC took over the duties, infrastructure, and procedures (ATS Update Data Instruction, 2003) from the Spanish controllers, who were responsible for air traffic in this area of Iraq during the first three terms.

Figure 6. Camp Echo – Ad Diwaniyah Airfield; source: author's private archives.

The town of Ad Diwaniyah is located in the center of the Al Qadisiyah Province, about 65 kilometers east of the city of An Najaf, 100 kilometers southwest of the city of Al Kut, and 170 kilometers south of the city of Baghdad. The landing site taken over by MATS personnel was located about three kilometers southwest of the city of Ad Diwaniyah. Under Polish administration, the

[19] The airspace was defined as a circle with a radius 5 nautical miles (approx. 9.3 km) and altitude of 1000 feet (approx. 300 m).

airfield was also called the Warsaw Landing Zone (LZ). There were three characteristic points in the proximity of the landing zone, namely, two water towers and a hangar. They constituted landmarks for the crews.

Warsaw LZ was adapted to receive only light and medium-sized helicopters. The hardened surface of the landing site was partially covered with concrete and could accommodate no more than 20 helicopters of W-3 or UH-60 types. In the case of maximum traffic, it was not possible to carry out an emergency landing on the landing site. The main landing direction was 350 and 170°.

The military airport control tower (mobile, autonomous command and control unit (ACCU) fixed on the Star 266 truck – fig. 7.) was located 100 meters southeast from the landing site. The ACCU was equipped with radio stations and Motorola and Harris portable radios. The call sign of ad Diwaniyah Airport's airport control unit was the codename "BUFFALO." The air traffic controller worked at the VHF 129.150 MHz primary frequency and the 240.000 MHz UHF backup frequency. Additional frequency – 82.300 served for the communication with:

- fire brigade;
- marshaler;
- refueling point staff;
- light team.

Following the good practices framework, similarly as it was the case at the landing site in Babylon, arrivals were reported to the Polish airport authority 24 hours in advance in two ways: by telephone to a liaison officer, or in writing by sending a PPR (ATS Update Data Instruction, 2003). Such a way of planning the arrival was determined by limited possibilities for basing helicopters. Hence, prior receipt of consent (PPR) to land guaranteed basing and that air traffic services would be provided. This rule did not apply to MEDEVAC/CASEVAC cases, or aircraft in EMERGENCY situations, which were operated on an ongoing basis or after arrangements with the liaison officer of the Multinational Division Central-South (MND-CS).

Figure 7. Mobile Command and Control Unit in Ad Diwaniyah as Control Tower (TWR).

In order to harmonize air traffic procedures, minimize risks, and improve safety in airspace in the Ad Diwaniyah airfield zone, which MATS[20] were responsible for, the following no over flight zones were established (fig. 8):

- the south-eastern part of the base due to residential buildings;
- the north-eastern part of the base where the air service hangars were located.

One should remember that for safety reasons airstrips were often located in mountainous terrain that generated additional difficulties in ensuring safe air traffic (aircraft waited for permission in the co-called holding areas) (Suau-Sanchez, and Voltes-Dorta, 2019).

[20] The Military Air Traffic Service (MATS) responsibility zone at the Ad Airport Diwaniyah airfield had the following dimensions: horizontal – a circle with a radius of 5 miles (approx. 9.3 km), and vertical – up to 1,000 feet (approx. 300 m).

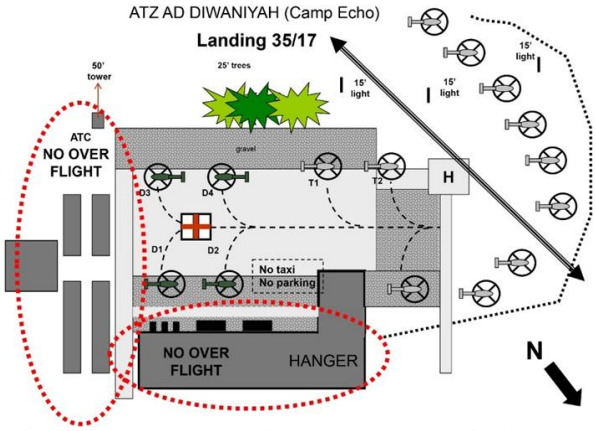


Figure 8. Non-Flight Zone over Ad Diwaniyah Airfield.

The Polish ATC in the Warsaw landing zone was responsible for providing all crews with the information regarding the current traffic of arriving and departing aircraft, as well as the data about the situation on the ground. The information was given 24 hours a day, 7 days a week. The communication was conducted in English and in emergency cases in Polish with Polish crews. In order to order air traffic above the Al Diwaniyah airfield, VFR arriving directions to the MATS responsibility area were defined. The traffic above the airfield was based on two landing circles with a course of 350° and 170° set at an altitude of 400 feet (approx. 120 meters) (AGL), with the exception of medical evacuation flights, which, due to the duration of the task, were given permission to fly through no over flight zones and intersect the runway axis – Figure 9.

Summary

The experiences of organizing and operating military airstrips during the missions in Iraq, presented in this paper, clearly indicate that they differ from the standard procedures for carrying out flights in times of peace. Flight tasks were launched and finished on airports/airstrips, which, depending on the area, were organized in a specific, individual way.

This was a consequence of a geographical location of the area where the operation were carried out, the terrain, meteorological conditions, and the specificity of the performed tasks. Understanding the very particular nature of MATS activities and the specificity of airstrips should translate into better preparation of air and ground personnel for future operations. In the author's opinion, it will also lead to a smoother and more efficient use of these airstrips (Androutsopoulos, and Madas, 2019).

The results obtained from the carried out studies allow to conclude that the described procedures and methods of operation are significantly different and inconsistent with the rules and standards that are in force during peace. These differences manifest in:

- air traffic control;
- on ground aircraft security practices;
- airstrip/airport infrastructure;
- logistics and hardware security practices;
- taking-off and landing procedures;
- arming/disarming helicopters;
- cooperation of security services;
- airspace organization (significantly more users, e.g. UAVs, MEDEVAC helicopters, coordination with artillery fire, etc.);
- aviation phraseology;
- variety of serviced aircraft types, their characteristics and capabilities.

On the basis of the collected experiences operational manuals were created, which helped new tours to better prepare for fulfilling their duties to control air traffic, organize the airspace, and deal with various aircrafts. Unfortunately, they were available only at the positions where the duties were carried out.

The problem that remained unsolved was the issue of specialized staff preparation for the non-standard aviation phraseology used in special situations occurring only during the mission, e.g., shelling of the base, and artillery fire over the airport area. Therefore, it is advisable to conduct simulator training (e.g., such as was provided to Czech and Hungarian personnel) for all staff members with a full presentation of real and not improvised situations.

The specialized training should include:

- teaching about the functioning of airspace in the mission area;
- teaching about the specifics of aircraft operations of all types of aircraft, including heavy helicopters of the SH 53 type, transport aircraft: C5, C17, C130, C160, An12, An24, An 72, An 22, An 124, An 225, Ił76, Tu134, and Airbus and Boeing passenger aircraft and others used worldwide;
- practicing situations presenting difficulties, such as: grass fire on approach caused by the use of thermal traps and the impossibility of extinguishing it due to mine risk;
- rapid collapse of weather conditions,
- specificity of the different types of aircraft;
- dynamic flight and landing of several helicopters at the same time in several locations;
- airspace restrictions related to the use of UAVs;
- activation of restricted operations zones (ROZ), special flights, artillery shootings, mine springing in the airport area.

The training should be carried out by means of a non-standard air phraseology in English. The course materials should be adapted to the nature of the mission and war conditions.

References

1. *Air Procedures Guide* - APG (2003). Al Kut.
2. Androutsopoulos, K.N., and Madas, M.A. (2019). Being fair or efficient? A fairness-driven modeling extension to the strategic airport slot scheduling problem. *Transportation Research Part E: Logistics and Transportation Review*, pp. 130, 37-60. DOI:10.1016J.tre.2019.08.010.
3. *Air traffic services* - Update Data Instruction, Al Kut (2003).
4. Diana, T. (2015). Is access to general aviation airports with precision approach and no instrument landing systems a club good? A study of six airports. *Case Studies on Transport Policy*, *3*(2), 238-242. doi:10.1016J.cstp.2015.04.007.
5. Rezaee, M.J., and Yousefi, S. (2018). An intelligent decision making approach for identifying and analyzing airport risks. *Journal of Air Transport Management*, p. *68*, pp. 14–27. doi:10.1016/j.jairtraman.2017.06.013.
6. Madas, M.A., and Zografos, K.G. (2006). Airport slot allocation: From instruments to strategies. *Journal of Air Transport Management*, *12*(2), pp. 53-62. doi:10.1016/j.j.j.jairtraman.2005.08.001.
7. *Regulamin Lotów Lotnictwa Sił Zbrojnych Rzeczypospolitej Polskiej (RL-2010)*. (2010). Warsaw.
8. Suau-Sanchez, P., and Voltes-Dorta, A. (2019). Drivers of airport scheduled traffic in European winter tourism areas: Infrastructure, accessibility, competition and catchment area. *Journal of Air Transport Management*, 81, 101723. doi:10.1016/j.j.jairtraman.2019.101723.
9. Charles, R., and Read, K. (2018). Understanding teamwork errors in royal air force air traffic control. *Safety Science*, p. 109, pp. 36-45. doi:10.1016/j.ssci.2018.04.030
10. Williams, D.M., and Slusser, S.R. (2014). Americans and Iraq, twelve years apart: Comparing support for the US wars in Iraq. *Social Science Journal*, *51*(2), 231-239. doi:10.1016/j.2013.09.004.