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JAS 39 GRIPEN IN AIR OPERATIONS²³

The Hungarian Defence Forces⁴ with the lease of the JAS 39 Gripen aircraft solved the problem of the MIG-29. Now, the HDF has an advanced, multi-role fighter, which is able to fulfill extensive range of air-to-air, air-to-surface and - after acquisition and integration certain equipments – air reconnaissance missions. It is necessary to highlight, that this version is able to operate together with other NATO aircraft as well. During the Operation Unified Protector in Libya the JAS⁵ 39 got the first operational experiences. In my article I would like to give an overview about the Libyan mission and about the Baltic Air Policing, where the Czech Republic used Gripens during their missions. At the end of the article I would like to present the electronic warfare system of the aircraft, as an important part of the electronic self-defence system.

JAS 39 GRIPEN LÉGI MŰVELETEKBEN

A Magyar Honvédség a JAS 39 Gripen eszközök lízingelésével megoldotta a MIG-29 típus problémáját. Most az MH egy fejlett, több szerepben is alkalmazható repülőgép típussal rendelkezik, amely képes levegő-levegő, levegő-föld és –bizonyos eszközök beszerzése és integrációja után - légi felderítési feladatok ellátására. Ki kell emelni, hogy ez a verzió képes együttműködni más NATO repülőgépekkel is. A Líbiában végrehajtott Operation Unified Protector küldetés során megszerezték az első műveleti tapasztalatokat. Cikkemben szeretnék egy rövid áttekintést adni a líbiai misszióról és a baltikumi légirendészeti feladatokról, ahol Csehország a Gripenjeit alkalmazta missziója során. A cikk végén szeretném bemutatni a repülőgép elektronikai hadviselési rendszerét, amely fontos része az elektronikai önvédelmi rendszernek.

INTRODUCTION

In the first part of the article I would like to give more information about the mentioned missions, where the Gripen pilots have real chance to meet enemy military fighters. Because of the possible danger, the pilots need different devices and systems to survive. One of these systems is the electronic warfare system, which can help the pilots to have an exact operational picture and can help to react in the proper way.

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⁵ JAS: Jakt (fighter), Attack (attack), Spaning (and reconnaissance) in Swedish



I. JAS 39 GRIPEN IN AIR OPERATIONS

OPERATION UNIFIED PROTECTOR IN LIBYA

In February 2011 the local people started to protest against Colonel Muammar Qadhafi and during several days the protest became violent, claiming the lives of dozens of protestors. The UN had grave concern because of the situation and created an arms embargo on the country. Because of the growing violence, NATO started a surveillance operation in the Mediterranean on 8 March 2011, deployed Airborne Warning and Control Systems (AWACS) aircraft to the area. Two days later NATO started to strengthen the monitoring function ships on the Mediterranean Sea as well. During this time, the UN Security Council adopted UN Security Council Resolution 1973 on 17 March 2011, condemned the “gross and systematic violation of human rights” and introduced active measures. The operation, based on the UNSCR⁶ 1973, was led by the United States and the needed military force was provided by the UN nations, as a multinational coalition. On 22 March 2011, NATO responded to the UN’s call to enforce the arms embargo against the country. On 24 March 2011 NATO forces started to enforce the UN-mandated no-fly zone over Libya in the air and NATO ships in the Mediterranean began to hinder the flow of weapons and mercenaries. [1]

NATO’s North Atlantic Council (NAC) in Brussels was responsible for the overall political direction, Supreme Headquarters Allied Powers Europe (SHAPE) carried out NAC decisions with military implementations through Joint Force Command (JFC) Naples. NATO Maritime Command Naples directed naval operations and the air campaign was conducted from NATO’s Combined Air Operations Centre Poggio Renatico. [2]

The Libyan operation was the first combat mission and therefore the first real test for the JAS 39 Gripen. The first mission was flown on 8 April 2011 and the fighters returned back to Sweden on 24 October 2011. The mission had two periods, in the first period 8 Gripen fighters (Unit FL01) and 130 personnel, in the second part (Unit FL02) 5 Gripen fighters and 110 personnel served there. [3]

The task of the Swedish aircraft was to provide air-reconnaissance for the NATO, an example is on the Figure 1. During the first part they completed 574 sorties creating 2271 reconnaissance reports for the Combined Air Operations Centre (CAOC). [4] During the second part the unit fulfilled 650 missions, almost 2,000 flight hours and provided more than 150,000 reconnaissance photos. [5]

The Swedish Gripens used the SPK 39 recce pod, which is able to detect individuals from an altitude of 21.000 feet. During their mission, 30% of the Allied coalition’s intelligence production was provided by them. In spite of the fact, that they did not have datalink between the pod and the base during the flights, they were able to provide data for the CAOC within 2 hours after landing. [6][7]

⁶ United Nations Security Council Resolution 1973



Fig. 1. Recon photo in Libya (provided by the Swedish Air Force) [8]

The Gripens were deployed to the Sigonella base, designed as a naval air force base. They met the first problem here concerning the fuel, because the US navy aircraft use different sort of fuel. [9]

They also had problems with the Have Quick” secure radios. It is important, that the radios were not tested earlier with regular NATO encrypted radios. The system could not connect to the NATO’s secure network, hence the pilots had to operate unsecured and use code words to exchange orders. In some cases, when the aircraft system recognized the operational security keys, the radio switched automatically to the operational network. [10][11]

The next serious problem was the increasing number of electronic signals in the air, causing electronic interference in their own systems. Among the military news we can find different stories about false radar warnings, unusable communication systems, that could be result of the electronic interference. [12] I would like to emphasize, that most nations faced with this problem, which should be controlled by the electronic support services.

I have to highlight the fact, that the core of this kind of problem is not the bad construction of the airplanes. Sweden is not a NATO member and they do not have experiences in connection with operation of aircraft in abroad. Important, that after returning to home, Sweden started to analyse the experiences and the needed technical improvements of the equipments and the processes for future deployments of the fighter. [13]

BALTIC AIR POLICING

In 2004 three baltic states (Estonia, Latvia and Lithuania.) became members of the NATO. The problem with these states is, that they do not have efficient air defence, thus they are not able to control their airspace from the direction of Russia and Belarus. To handle this situation, in

2004 NATO members got to solution, that an Air Policing duty is needed. Based on the announcement of U.S. President Barack Obama at the North Atlantic Council during the NATO Summit in Chicago, the Baltic Air Policing is “one of the most successful examples of NATO solidarity”. [14][15]

Russia has concern in connection with the NATO Baltic activity, because the major Russian cities are in a reach of NATO combat aircraft. As an answer, Russia deployed Iskander⁷ missiles to the area. [16] During the first Czech period a Russian plane suspected of carrying out spying mission was intercepted, hence the deterrent effect of the presence is a perfect solution to decrease the risk of these activities. [17]

“Air Policing is one of the key aspects of common security and defence for the Alliance. Preserving the integrity of NATO airspace is a collective task where NATO Joint Force Command Brunssum contributes with Baltic Air Policing as one of its Enduring Tasks. At the Chicago Summit 2012, NATO decided to extend its commitment to protect the Baltic airspace. The agreement is an example of Smart Defence, demonstrating how the Alliance can balance its political and military needs in an economically efficient way. Headquarters Allied Air Command Ramstein is designated to HQ JFC Brunssum and the Air Advisor to the Commander JFC Brunssum in matters of the Baltic Air Policing.” [18]

“The air assets deployed on the mission maintain a permanent readiness posture to scramble at short notice and take deterrent of other actions against the trespassers on 24/7 base.” In February 2013 the North Atlantic Council approved the lengthening of the Baltic Air Policing mission instead of the scheduled 2014 finishing. [19] Hungary announced in 2012, during the NATO meeting in Chicago, that between 2015 and 2018 the HUNAF can participate in this mission. [20]



Fig. 2: A two-ship formation of Czech Air Force JAS-39 over the Balticum. Photo by Czech AF. [21]

Until January 2013 the following nations took part in this task [22]:

- Germany five times;
- Denmark and Poland four times;
- France and the USA three times;

⁷ Iskander missile: truck-mounted, independently controlled ballistic missile, able to hit targets at distances of 50 to 280 km.



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- Czech Republic, Norway and Belgium twice;
 - Portugal, Romania, Spain, Turkey, the Netherlands and the United Kingdom once.

The deployed aircraft [23]:

- F-16AM Fighting Falcon and F-16C Fighting Falcon;
- F-4F Phantom II;
- Panavia Tornado F.3;
- MiG-29A;
- Mirage F1M;
- Mirage 2000C;
- MiG-21 LanceR 'C';
- F-15C Eagle;
- JAS-39C Gripen;
- Eurofighter Typhoon.

Generally, the deployed forces consist of 4 aircraft and 50 - 100 support personnel.

To control the flights a Control and Reporting Centre (Baltic CRC) was founded at Karmelava, Lithuania. Currently the Baltic CRC is jointly manned by staff from Estonia, Latvia and Lithuania. [24]

In connection with violations of the airspace the Russian representatives say, that Russian aircraft make their planned flights and there is no cross-border flight. Security experts agree, that the aim of the Russian flights is to test the NATO air policing forces. [25]

Some examples for the violations based on the open source information:

- “In 1992, a few years after Lithuania regained independence there were 2500 violations.” [26]
- During the first Belgian shift (April 2004 – June 2004) they had only one Alpha Scramble. On 2 June 2004, a Bombardier Learjet left Russian airspace and passed just north of Estonia without emitting the proper identification signals. Two Belgian F-16s were scrambled, but the Finnish Air Force was faster, the jet had already been intercepted by them. [27]
- In 2005, until November Estonian reported 5 violations. A significant incident happened on 15 September. During the German period (July 2005 - Sept 2005) a Russian Su-27 Flanker crashed into the ground. Before the accident the fighter had about 20 minutes in the Lithuanian airspace without any reaction from the NATO side. An interesting fact, that there were four air-to-air missiles on the aircraft. [28]
- During the second air policing Belgian mission (Dec 2006 - March 2007) the Belgian pilots fulfilled about 275 flying hours in exactly 100 scrambles, three of which were Alpha-scrambles. A light sports plane without proper IFF-code emission and 2 ultra-light aircraft. [29]
- During their first shift (May 2009 - August 2009) the Czech contingent achieved 404 flight hours in 336 sorties. They had eight Alpha scrambles, among them one civilian and seven military airplanes. [30]



- During the third Danish phase (Sept 2011 - Jan 2012) a Tu-22M bomber, escorted by a fighter, had penetrated the airspace. The QRA was alerted but they could not make contact with the Russian aircraft. [31]
- The German contingent in 2012. (Jan - Apr) had more than 12 Alpha scrambles, among them not only intruders but escort flights as well. Escort flight means, that an aircraft comes too close to the Baltic air space. [32] In March a Russian Su-27 jet fighter flew 12 kilometres (7.5 miles) in the Lithuanian airspace, before returning to the territory of Kaliningrad. The Russian ambassador got a protest note about the Lithuanian airspace violation. [33]
- In July 2012, during the fourth Polish mission (Apr 2012 - Aug 2012) two pairs of long-range, missile armed Russian bombers performed air patrols over the Black and Baltic seas. They practiced a number of tasks cooperating with the escort fighters (Su-27). In this case Russia stated again, that all flights were in line with the international regulations of international airspace above neutral waters and did not violate the airspace borders of other states. [34]
- From the start of the second Czech period (Aug 2012) until December the Gripen fighters had nine Alpha scrambles. [35]
- The Czech Republic was in a difficult situation, because the Gripens are not their property and the maintenance on Czech territory was provided by the Swedish experts. Because of the limited number of the fighters and the pilots, they had to coordinate the resources in a proper way to fulfill the tasks in the Baltic area and at home as well at the same time. On the scene, they divided the personnel into three shifts. The chief of the shifts was a pilot, members were technicians, operations duty officer, senior officer at the WOC (Wing Operations Center), drivers, FP soldiers. The Czech Republic deployed 4-4 Gripens twice to the area for the two periods, which were fitted with the AIM-9M Sidewinder short-range air-to-air missiles and typically around 100 gun rounds per aircraft. During their missions they had altogether 17 Alpha scrambles. Generally, these flights are not provocative, the aim of this activity is only to show the power of the Russian country. (36) Among the intercepted aircraft there was a Russian Air Force Il-38 'May' ELINT aircraft as well, which had special antennas, "looking like a hedgehog". (37)

II. JAS 39 GRIPEN ELECTRONIC WARFARE SYSTEM

JAS 39 Gripen EW system

As I mentioned in the Introduction, the pilots need different devices and systems to survive in dangerous situations. The advanced EW system (EWS-39) can help the pilots to have an exact operational picture.

Because the EWS-39 is an important part of the self-defence system thus the support personnel has to keep it updated. The EW system is the important part of the electronic system as well. We have to highlight, that the electronic systems of the aircraft have to operate together to avoid interference. [38][39]

“The electronic warfare system (EWS 39) is an integrated EW system, which consists of four elements:

- Electronic Warfare Central Unit – EWCU;
- Radar Warning Receiver – RWR;
- Internal Jammer – IJ;
- Chaff / Flares Countermeasures Dispensers.” [40]

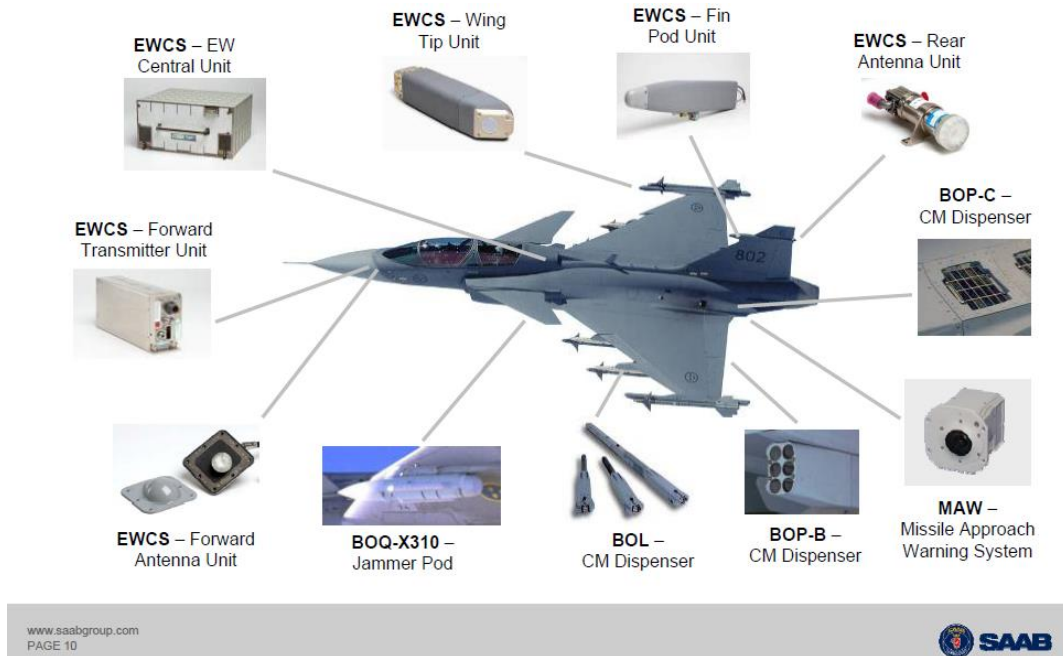


Fig. 3. Elements of the JAS 39 Gripen EW system [41]

The Radar Warning Receiver can detect the electronic signals in different frequency bands in the vicinity of the aircraft (in 360 degrees, from the air and from the ground as well). Based on the database in the system, it is possible to identify the emitters (friendly, enemy, unknown) and after it inform the pilot about the possible danger and the needed activity (e.g. manoeuvres, possible passive countermeasures provided by the system). [42]

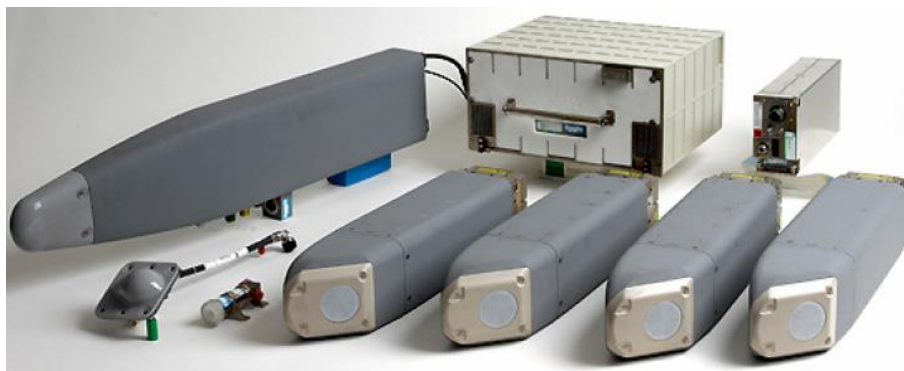


Fig. 4. Parts of the JAS 39 Gripen EW System [43]

The pilot has to take into consideration the recommendations and choose the appropriate countermeasure (e.g. jamming, dispersion of flare or chaff). The answer for the danger can be automatic (done by the system), semiautomatic or done by the pilot (choosing the countermeasure

manually). [44]



Fig. 5. Rear-antenna for the EW System [45]

The Hungarian JAS-39 version has an advanced Internal Jammer with forward and rear antennas and 4 passive counter-measures dispensers. The jamming system is able to provide different types of jammings. The dispensers are located on the upper and on the lower side of the aircraft to ensure the dispersion into the upper or lower airspace. The dispensers work based on the program, uploaded into the EWCU by the support team. Based on the possible danger, it is possible to load into the dispensers chaff and flare as well on the ground. The dispensers are manufactured based on the NATO standards and can be filled with different size of ammunition. [46][47]



Fig. 6: JAS 39 Gripen with flares [48]



IMPROVEMENT OF THE ELECTRONIC WARFARE SYSTEMS

Because of the modular system, the electronic warfare capability can be improved very effectively. The use of Laser Warning Receiver and Missile Approach Warning can be the next milestone in the improvement of the electronic warfare system. [49]

The exact and reliable electronic warfare information is the basis of the proper operation. The support team has to create, edit and reprogramme the threat and countermeasure libraries after the analysis of electronic-warfare data. If the basic information is not exact, the onboard EW libraries cannot be efficient and the warnings will not be right. As a consequence, the recommended action cannot be the best option and the pilots will have false sense of security.

To increase the efficiency of the EWS, we can find different offers, that can make the libraries more accurate. Saab offers e.g. an EW Support system, which is able to help us during the different processes (analysis, reprogramme of threat and countermeasure libraries). “This system significantly reduces the time needed for the reprogramming of threat libraries and analysis of recorded EW data, thereby enhancing crew survivability and the likelihood of mission success.” [50]

SUMMARY

The topic of the article may be interesting for everyone, who is interested in the application of the JAS 39 Gripen aircraft and in the electronic warfare systems of the fighters. The HDF, according to the announcement of the Ministry of Defence, will be involved in to the Baltic Air Policing. During this duty the self-defence has the highest priority and in this task the electronic warfare system has an important role. It is important to highlight, that with the Gripen fighters the HDF can respond to the different challenges.

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