

ELITE EXERCISES GERMANY

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When in 1991 Fighter Bomber Wing 32 and 34 (JBG-32/JBG-34) and Surface-to-Air Group 43 conducted a joint exercise in Lechfeld to prepare aircrews for the US exercise "Red Flag" one could not have guessed that this was the start of a new series of exercises resulting in the ELITE concept today. The participation in "Red Flag" itself generated the idea to set up training area in Germany with somehow similar possibilities. While Germany and some other European air forces contributed several times in the "Red Flag" series in the USA and the "Green Flag" series in Canada which both courses providing Electronic Warfare (EW) training, the knowledge how to do this increased, but so did the costs to send airplanes and crews over the ocean and deploy a few weeks somewhere in America. With initially involvement of German air force and navy wings, army units and signal intelligence units, the character of the exercise transformed to a multilateral series with several participants and observers from NATO and Partnership-for-Peace (PfP) countries.

Providing a less costly alternative in Germany may have been the key to the success. Today ELITE which stands for (Electronic Warfare Live Training Exercise) is a prestigious and sophisticated complex high-value live exercise for Electronic Warfare (EW), lasting 16 days. Of the original contenders JBG-34 from Memmingen was disbanded but JBG-32 based at Lechfeld is very much alive and plays host to the other participants with her Tornado ECR aircraft specialised for EW. Elite 2008 is not about winners or losers, but using own equipment within a mix and mass of electronic warfare including many debriefings. Difference between 2006 and 2007 Elite's is refining of known techniques, and using new experimental radar. Even while exercising new ways are discovered and tried out between for example the AWACS (datalink 16), the 'agressors' and the 'disturbers' (Learjets). Aeronautica & Difesa reports about the last three exercises of 2006, 2007 and this year and explains what it is all about.

OBJECTIVES

ELITE represents a high light in the operational and follow-on training of aircrews and GBAD (Ground Based Air Defence) operators especially the SAM Forces (Surface-to-Air Missiles). The tactical Air Command and control service unit within the framework of a complex scenario comes close to reality. The effectiveness of the latest jamming and deception techniques in combination with tactical procedures are verified and further developed. Germany itself plays an important role in this development with its Bundeswehr technical centres. Germany acts very well with these exercises! To give an impression: In 2006 the exercise lasts 16 day's and 11 countries deployed air assets and 10 countries deployed radar equipment and SAM units. Today 2008, 24 nations participated. 12 with GBAD, 6 with Jet Aircraft, 2 with transport aircraft, 1 with helicopter, 2 nations with support / jammer equipment, one Nato E-3A AWACS and in total there were nine nations that sent observers, amongst them Australia and South Africa.

The huge participation lead to an almost 'overkill' because from starting 2002 the number of planned flights was not possible to reach, the ELITE exercise is so to say on its ceiling. Units within the NATO Response Force (NRF) needing up-to-date capabilities in Electronic Warfare are predominant in these exercises but countries still in the learning process can benefit by joining in and improve their skills in EW. The training consists of testing

effectiveness of the Surface-to-Air systems and their electronic tracking systems, tactical procedures to avoid extermination and in the contrary Suppression of Enemy Air Defence (SEAD) by the striking aircraft. SEAD can be performed by either jamming or attacking with anti radiation missiles the latter resembling if succeed the principle of DEAD (Destruction of Enemy Air Defence). Secondary to this is there the combination with tactical manoeuvres by helicopters and troops delivery of transport aircraft in concerning areas.

MODERN SEAD PERFORMED BY SEVERAL AIRCRAFT

Suppression of enemy air defence is a very important issue in modern air warfare. The lessons learned from actions in the past like the raid on Benghazi in Libya and the actions in the Gulf War above Iraq in the early nineties decade showed the necessity of SEAD aircraft and influenced innovations in this type of warfare heavily. Nevertheless in the conflict around Kosovo there was still a shortage of SEAD aircraft. Strictly ordered not to launch attack forces without a dedicated SEAD aircraft this caused major organizing problems and many pilots of SEAD aircraft were tasked almost continuously. Above Libya the F-4G "wild weasel" played this role while above Iraq the job was done mainly by EF-111 Ravens and EA-6B Prowlers. Above Kosovo next to the EA-6B again (operating from Aviano) new SEAD systems were introduced in battle conditions. Still heavily depending on the old EA-6B which absorbed lots of fuel the additional German Tornado ECR with internal ELT-553 ECM system was mostly welcome and proved to be a highly effective system. For the USAF the General Dynamics F-16CJ wild weasel was designed in the mid nineties in an attempt to give the USAF a low cost high quality SEAD capability. Several F-16's of NATO-partners in Europe were configured in a similar concept for the SEAD role.

The F-16CJ uses HARM missiles in combination with a HTS-pod (HARM Targeting System) on the side fuselage of the engine. In addition the option of an AN/ALQ-131 ECM-pod under the belly gives the pilot the choice to choose for actively disturbing radar homing SAM's and consequently not to run out of missiles shortly. The HARM missile is also operated by German Tornado's and next to the special for EW designed Tornado ECR also in use with the Tornado IDS attack version which could be mounted with an AEG Cerberus IV Jamming pod for ECM at the starboard wing tip. The English Tornado Gr.4 is equipped with the ALARM rocket. Between the F-16CJ and the Tornado is a quality difference. Today the Tornado ECR is considered the worlds best weapon system for the SEAD role and has been judged as superior to other assets such as EA-6B, F-16CJ and Tornado IDS with anti radiation armament.

ANTI RADIATION ROCKETS

Within NATO the Raytheon AGM-88 High Speed Anti Radiation Missile (HARM) is widely used on USAF aircraft but also by a mixture of European F-16 users and by some other aircraft types in the European NATO inventory. Once aimed on a radar emitter and fired the principle of high speed (mach 2) gives the target no time to move from the spot. Good timing is essential in this manoeuvre. The HARM is cheap and it is cheerful enough to overwhelm enemy air defences but is also easily defeated by a clever SAM operator. It has several limitations. It needs an active emitter to home in and if the radar stops emitting the HARM is blind and either starts looking for other radars (with the probability that it goes to a friendly radar) or continues on the coordinates it was heading for depending how it was programmed. Next to this the missile has a small warhead and proved often not to be lethal. While enforcing no-fly zones above Iraq radar emissions were answered with HARM attacks and the SAM sites were after a hit sometimes reactivated the next day.

This implicates a little damage and gives without a hard kill the weapon only the status of suppression of air defence. The Air Launched Anti Radar Missile (ALARM) designed and manufactured by Matra/BAe Dynamics is a different kind of weapon. It covers a wide range of frequencies and can be programmed either on the ground or by the navigator. This leaves you the possibility of disabling by expectance of friendly radar using specific frequencies. The ALARM can be fired directly on the target but has no optimised rocket engine for such a manoeuvre boosting only some 50 seconds. The rocket is normally launched at medium altitude out of reach from triple A and then rapidly climbs to high altitude (12.000m) and deploys a parachute. The missile slows down and focus on the emitter and its side lobes. When the enemy radar is switched on it is automatically engaged by the ALARM which disengages automatically from its parachute and speeds straight down at the emitter. If the radar is turned off the ALARM remembers the location.

EFFICIENCY

The ALARM proofed far more lethal than the HARM in air raids over Iraq and Serbia. It is said that hundreds of HARM failed to put out a specific radar/SAM site in Serbia and once a British tornado tried his luck at this spot he scored a direct hit in one attempt using his ALARM. Off course the HARM rocket is subject of continuous improvement. The latest versions containing better programming abilities, improved warheads and new guiding technology based on GPS coordinates.

GBAD CAT AND MOUSE

The Heuberg training area provides a perfect location to train low level flights in a corridor and is by its landscape with partly forest in mountainous area perfect for hiding SAM-sites and perform CSAR scenarios. An Integrated Air Defence (IAD) is simulated and nowadays the SEAD concerning not only Soviet style SAM sites but the pilots has to focus increasingly on the own Western style radars and rockets as well. With an extend of combat areas outside Europe in multilateral operations the chance to engage with your own weapons is not an imaginary one. Both pilots and GBAD trains with the most advanced weapons and the latest techniques to see where they are standing and verifying these systems with the expectations. Tactics used by the Yugoslav air defence system in Serbia during Allied Force were highly affective against HARM rockets. The awareness of what the NATO attacking forces were doing was never lost. The most prominent SA-3 and SA-6 systems operated many times their acquisition and targeting radars only for brief periods and radar equipment was many times well away positioned from launch stations.

The SAM's were launched in small salvo's before the sites stopped transmitting and relocated. Sometimes a clever SAM operator started emitting when a fighter was almost there with no good angle left for a HARM attack while its vulnerability for the SAM was never lost. Tactics were developed to respond on this threat and it is considered very dangerous to fly single ships in hostile area. Sorties above enemy territory are flown in at least a two ship formation to respond secondary when one aircraft overshoots. This year Germany deployed Patriot, Stinger, Hawk, Sa-6, SA-8 and Roland systems in the field again. Even this year a brand new radar system is in use by the Dutch, a system of which the Dutch will receive five in total. The configuration that was used at Heuberg this year is still owned by the factory, but it was a splendid way to test it out in very realistic circumstances during ELITE 2008 ! Going through the GBAD 'Heuberg-collection' we meet several systems: Austria participated with RAC 3D (Target acquisition radar) and Mistral, a 'MANPAD'fire and forget infrared guided missile system with a range of 6 km and a ceiling of 3 km, and a SKYGUARD, a puls-doppler acquisition and tracking radar capable of discovering incoming low-level aircraft and missiles

within range of 15 km and finally a VHF COM jammer. Belgium brought the Mistral (comparable with the Hungarian version) the Czech Republic used 2 SA-6 'Gainful' short-range low and medium altitude SAM systems. For Finland it was their first active use of TUTSI GBAD weapon and radar systems, the ASRAD-R-FIN missile units (HARD, is Helicopter and Aircraft Radio Detection), and an Eriksson target Acquisition Radar. The Finnish ASRAD AIR system (Infrared laser guided missile, 4 tubes) has an automatic tracker, but the plane has to be optically visible. Radar will find the plane, but the gunner has to actually see the object. The Bolite missile weigh 30 kilograms, and the system is to be reloaded within 5 minutes. France used the CROTALE NG (Next Generation) all weather short range air defense system and the HAWK (Home All the Way Killer). The French radar system exists of four parts, one command-wagon and three different radars in the field. It can handle a region of 40 km (round) and 18 km ceiling. Hungary came with their SA-6 Gainful, SA-16 and Mistral systems. The Hungarian radar was updated by HM-Arsenal. Main modifications: improved receiver system, indicator system, and made more reliable, a part of the control system was replaced by a better one.

This system cannot be used directly with AWACS (datalink 16) but it sends local sensor made pictures to other systems to be processed. ('low radar cross section voor recce') The system can handle any kind of targets within an area of 300 km, with a ceiling of 15 km. The Netherlands used a brand new radar-system which they intend to buy, and were also represented by the 'Korps Mariniers' Stinger unit. The new Stinger is a wireless system on GPS. It's a new model, with an improved new camera system. Systems were used on planes that flew over sometimes at 500 feet! The 'radar-on-trial' is made by Telefunken and it is a TRML phase array radar system to be used in an area of 200 km, 360 degrees. There are different modes to be used, the system works 24 hours autonomic and is in service since 2006. Still tested, but to be purchased (5 examples) in 2009. Capable of link 16 and Link 11-Bravo (Nato counterparts). While the mix of systems was challenging enough to counter the use of the systems learned from the lessons of Iraq and Serbia brings the pilots really to the edge. Answers on increasing threats must be found for both aircraft and their crew and the GBAD units.

ATTACKING IS STRATEGY

The character of the followed exercises of 2006, 2007 and this year is to put joint forces in the battle theatre and look how they cooperate. The aircraft of different countries were working together in combined air operations (COMAO) with several airwaves and strike packages. While the attacking aircraft were preceded by SEAD airplanes consisting of Luftwaffe Tornado ECR or IDS/HARM, British Tornado/ALARM or Turkish F-16/HARM further airplanes followed in airwaves performed air sweeps and ground attacks. Most airplanes were equipped with CHAFF/FLARE dispensers to respond and mislead the IR homing missiles. It really is quite an experience to see flares launched at the Heuberg range. Attack forces were put in the theatre as a mixture during these years and planes consisting of German Tornado's, F/A-18's from Finland, Switzerland and Spain, Su-22 from Poland, F-16's from Greece and F-16's with F-4's from Turkey. Some of these using special equipment like LANTIRN systems (Low Altitude navigation and Targeting Infra-Red for Night System) by Turkish F-16's. In addition to this specialized ECM Da-20 Falcons (Norway) and this years Learjets carried out electronic suppression and an AWACS from Geilenkirchen directed the airplanes. After cleaning the area from threats Transall aircraft from the Luftwaffe dropped Supplies and Troops in the target area while helicopters moved into the scenery for CSAR in this case Heeresflieger CH-53G's, Dutch CH-47 and Cougar and Swiss Super Cougars. Low levels can be flown by the fighters to 30 m. above the range. Reconnaissance was

performed by AKG-51 with special pods under the belly.

EVALUATION AND FUTURE PROSPECTIVE

This years ELITE was not quite different from those before. It's about a collection of all possible electronic warfare means that we can find in Europe. Today are active in the exercise in the air or on the field; Belgium, Germany, Finland, France, Greece, UK, Italy,

Latvia, The Netherlands, Austria, Poland, Slovenia, Spain, Sweden, Czech Republic, Turkey, Hungary and the USA. Of this mix the USA, Germany, France, Italy and Turkey participants of the very beginning of existence of Elite. Involved air bases are Neuburg, Manching, Lechfeld, Landsberg and Laupheim. Totally 42 jets, 10 helicopters, 14 transport and support aircraft and 1500 personnel are participating on this airbases while 17 different ground based air defence systems and almost 1700 military personnel are at the Heuburg range. This year was the first appearance of German Typhoons and they were operating in the attack role.

Evaluation becomes much integrated by using ACMI techniques (Air Combat manoeuvrability Instrumentation) by carrying an ACMI-pod. This pod communicates directly with the ground and is linked with the aircraft-on-board avionics and weapon systems. Missions will be evaluated in very short time. A kind of standardization was achieved now 10 countries choose for the EHUD airborne pod. The future for ELITE is promising now the exercise is popular by European participating countries. The mixture of so many systems, different contenders and tactics generates a highly professional knowledge and skill for Electronic Warfare which air forces makes eager to join now and in future.

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