



**Polish  
Chamber  
of National  
Defence  
Manufacturers**

# Polish Defence Industry

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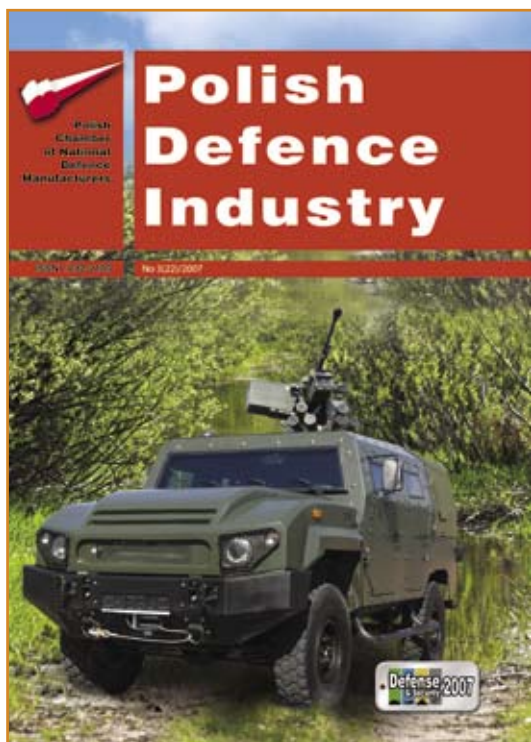


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## TUR Light Armoured Multirole Vehicle

**TUR** armoured vehicle is a response on Polish soldiers serving in Iraq, Afghanistan or Balkans needs. TUR is currently the most interesting alternative for Honkers or Scorpions, their armoured version, which are being in use in the war zone more due to necessity than their real destination. TUR complies with world construction trends and might be compared with IVECO LMV or MOWAG Eagle IV. TUR class vehicle won't fulfil all needs, but properly equipped and used might increase effectiveness and security of Polish soldiers. And also it might be another Polish export bestseller.

The vehicle was created basing on prototype chassis of commercial IVECO off-road vehicle and is able to carry 5 people and 1000 kg payload with its own mass of 5 tons (depending on armament, used armour or other equipment). Propulsion is Iveco Aifo 4-cylinders Common Rail engine with turbocharger and intercooler. The engine has 2998 cm<sup>3</sup> capacity and 122 kW (166hp) power, which allows for 120 kph max speed.

More see page 12-13

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Project part – financed by the European Union  
European Regional Development Fund

## Chasing Europe

**Will Europe buy Polish weapon? So far, our Armed Forces are the client of the powerful Western companies. It might be changed by the next reform of our defence industry and joining European R&D and production programmes by Polish companies.**

R&D Marine Technology Centre has big chance to equip strategic NATO harbours with systems detecting underwater intruders which were invented in Poland. It detects faultlessly even the smallest floating units and is able to detect even single enemy diver. Such sonar and electromagnetic barrier called KRYL are protecting main base of the Polish Navy in Gdynia.

Polish constructors and companies will take part in European Joint Force Protection Programme, which goal is to create new security systems for soldiers. Thales and Oerlikon are already looking for Polish partners, because there is a chance for European grants for international consortiums but as well as for small R&D units.

## RADMOR in ESSWOR programme

Radmor from Gdynia producing communication equipment for the Polish Armed Forces will coordinate activities of the Polish electronic companies included in construction of European radio as a part of ESSWOR programme. The goal of the programme is to create radio, which will be able to cooperate with other different radios.



TRC-9210

## Boeing orders in Mielec

**Wytwórnia Zespołów Kooperacyjnych Mielec signed 5-years contract with Boeing. As a part of the contract WZK will produce and deliver movable part of the airplane wing, so called Krueger flap, complicated element, responsible among the others for economic fuel consumption.**

For WZK Mielec the newest contract is some kind of reward for long cooperation in production of doors for Boeing 757. During that period factory has become dependent on Boeing. Orders from Boeing were 95% of all company's

sales. It was very painful when Boeing 757 was withdrawn from production. That is why WZK is looking for another clients now, even despite signing contract with Boeing.

WZK Mielec will start B777 flaps production next year and will deliver 3 pairs of them each month. Latterly the production will be increased.

Boeing 777 owns a record of non stop flight length among passenger planes. Is able to transport 300-400 passengers and is one of the Boeing bestsellers. Currently company has orders for over 300 planes. Up to now Boeing sold almost 1000 B777.

## ABG Ster-Projekt for NATO

**Informatics – ABG Ster-Projekt specialists in network security will take part in expanding and maintaining NATO cryptographic systems.**

The company won a tender organised by NAMSA (NATO Maintenance and Supply Agency) and will start realisation of the 3,6 mln EURO worth contract. It's 19th order of the company for NATO. In the first quarter of this year company's incomes exceeded 44,5 mln PLN (approx. 12 mln EURO) and profits were almost 1,8 mln PLN (approx. 490 000 EURO).

## LUBAWA competes for NATO contracts

**Lubawa, logistic and rescue equipment producer for the military, received government recommendation (so called declaration of authorisation), which authorises it to compete in NATO tender.**

Company competing for 2 mln EURO order for deliveries of bullet-proof vests and contamination protection suits. It's the first international tender for Lubawa in the field of security. Last year income of the company was outstanding and exceeded 38,3 mln PLN (approx. 10,4 mln EURO).

## Communication from DGT

**Special communication equipment of the private company DGT from Gdańsk is in use by soldiers on foreign missions from Balkans to Iraq and Afghanistan.**

Certified dispatcher units communicate operating personnel of nuclear power plants in Ukraine, spark-free exchange and switchboards work in Polish mines. DGT started from upgrading Polish civilian and military communication in the beginning of 90s. Today DGT tries to keep up with world leaders by creating equipment for new generation network with broadband internet access.

**DEFENCE & SECURITY 2007**  
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## Polish corvette

**Polish corvette, GAWRON class, type 621 construction is making progress. At the end of last year – Naval Shipyard Gdynia owned by the Polish Ministry of Defence – was transformed in to State Treasury Company and joined Industrial Development Agency.**

Since February 2007 company is led by Andrzej KOZNOWSKI, one of the most talented managers in shipyard sector. Effects of changes



are already visible. Mounting of ship propulsion is ongoing – Navy decided to place General Electric turbine. Italian company AVIO is responsible for integration and deliveries of the propulsion. If the pace of Gawron construction will be sustained than launching of the ship would take place in year 2009. Before that Polish MoD will finalise the tender for electronic battlefield system.

## Radwar flies with Rheinmetall

**Radwar from Warsaw and German Rheinmetall Defense will build light reconnaissance UAVs for the Polish Army.**

Rheinmetall has already had its own construction of the remotely controlled spy plane KZO, which is being in use by the Bundeswehr. Radwar as a part of the agreement would have to adapt German solutions to the Polish Armed Forces needs. Representatives of the Polish-German consortium announced that agreement signed between two companies is a chance for export of currently badly wanted UAVs to 20 countries.

## Tents from LUBAWA

**Over 44,5 mln PLN (approx. 12 mln EURO) Lubawa will earn on supplies for the Polish Army. It's the biggest ever contract signed with MoD in whole Lubawa history.**

Deliveries of several types of tents will end in 2010. Lubawa is currently the biggest Polish supplier of bullet-proof vests for the military, workers' protection equipment and logistics equipment for the uniformed services.

## Polish small arms export in 2006

**The biggest batch of 14 987 pcs of small arms different kinds (pistols, machine pistols, guns, machine guns etc.) was delivered to the United States.**

On the second place in term of quantity is a delivery of 5 360 pcs of 7,62mm automatic guns AK/AKM to Iraq.

Third place is the most interesting, because it shows that Poland is very active re-exporter of guns going e.g.: to Israel, Indonesia or Jamaica. In 2006 3350 pcs of 9mm Glock (for further sale on internal market) and 2 pcs of 9mm B&T MP-9 machine pistols (modified Steyr TMP) were delivered to Israel. What's interesting, 1146 pcs of the machine pistols such type were delivered to such exotic (for Poland) place like Jamaica, for its Ministry of Internal Affairs. Deliveries to Indonesia were also very interesting. Indonesian Air Force bought 22 pcs of 5,56mm SIG552 SWAT automatic guns and police bought 15 pcs of 12,7mm NSW heavy machine gun.

In 2006 54 pcs of 7,62mm PKT machine guns for tanks (bought in Slovakia as Poland stopped its production in the beginning of the 21st century) and 156 pcs of 12,7mm NSW heavy machine guns were exported to India.

Poland sold 330 pcs of 12,7mm DSzK wz. 38/46 heavy machine guns, 40 pcs of 73mm SPG-9 recoilless cannons (in Poland they are described as heavy antitank grenade launchers), 10 pcs of 82mm B-10 recoilless cannons and 119 pcs of 82mm wz 37 medium mortars to Bulgaria.



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- 12,7mm large bore sniper rifle - (WKW)

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- 40mm light grenade launcher "PALLAD-D" and "GS"
- 40mm automatic grenade launcher "GA-40"

Defender XII MSPO

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# POLISH WEAPON CONQUERS ASIA

By Sławomir KUŁAKOWSKI

**It comes another good year for export of Polish Defence Industry products. Value of signed and negotiated contracts, only that of BUMAR Group, exceeded 1 bln USD. The biggest successes of the Polish Defence Industry export in last year were MBTs for Malaysia, armoured recovery vehicles for India, planes for Vietnam and Indonesia, warships and helicopters for Indonesia.**

**J**ust couple years ago Polish arms export didn't exceed tens millions USD. It placed Poland on 20th place in the world, with less than 0,5% share in the market. Recent data shows that Polish Defence Industry passed the crisis.

Arms trade became the force for rebuilding defence industry in Poland. „Green light" for the export required elimination of many consequences. One of them was lack of proper state control over arms trading companies. Today in Poland concession for arms trade has about 120 companies, which is ten times less than before. However there is no administrative regulation of the market. Weapon is the same product as any other, but arms trade is more strictly controlled.

Big increase of arms export is effect of Polish Defence Industry development and restructurisation programme accepted by Poland and many years effort of defence companies in recent years supported by government promotional activities e.g. in form of presentation of arms for foreign delegations organised by MoD. The other important factor is the fact that Polish export offer is still very attractive (in case of price) for foreign partners. Establishing of two strong capital groups were also beneficent, because allowed to concentrate promotional activities on chosen directions. Example of it might be contract for supplying MBTs for Malaysia or armoured recovery vehicles for India.

## **Malaysia - the best choice**

Contract signed in 2003 by the BUMAR Group for supplying to Malaysia 48 PT-91M MBTs together with necessary additional equipment and training, 6 pcs of Armoured Recovery Vehicles (WZT-4), 5 self-propelled bridges PMC, 3 Engineering Tanks MID-M is worth over 370 mln USD. The contract is supposed to be realised till the end of 2008, and first MBTs with 1000 hp engine was delivered to Malaysia in August 2005 and took part in parade during the national holiday.

Negotiations of the contract were very difficult, but the result was satisfactory. Polish offer won with well known companies from Russia, Ukraine, Sweden or UK.

As a part of the contract Poland will receive (as a clearance) e.g. 300 000 tons of palm oil worth 111 mln USD. There is also offset connected with this contract. Value of the compensating agreements inclusive of technology transfer to Malaysia and placing order for Malaysian goods is about 70 mln USD.

## **India - strategic partner**

BUMAR Group successfully realised two contracts for supplying Armoured Recovery Vehicles WZT-3 (Indian description ARV-3) for armoured units to India worth over 100 mln USD and communication systems and parachutes for airborne units.

In March 2004 BUMAR signed another contract for supplying ARV-3 together with accompanying equipment worth 202 mln USD. 228 pcs. were delivered in years 2004-2007.

There is very interesting development of cooperation between Industrial Telecommunication Institute (PIT) and Indian Bharat Electronics (BEL) from Bangalore in production of radiolocation systems for Indian Army.

India is also interested in supplies of new tank engines and ordering Polish specialists modernisation of T-72 MBTs, missile systems PECZORA (110 mln USD), heavy technical equipment (30 mln USD), internal communication systems, fire control systems and optoelectronic equipment.

## **Indonesia - beginning of supplies**

Effect of eager marketing activities on the Indonesian market were signing many contracts by Polish companies, which value currently exceed 100 mln USD.

In November 2003 Polskie Zakłady Lotnicze (Polish Aviation Factory) from Mielec signed



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contract with National Police of Indonesia for deliveries of 4 passenger-transport planes PZL M28PI SKYTRUCK. First two planes were delivered in October 2004 and the last two in December the same year.

After introducing ships` exchanging programme, which are responsible for border defence, protection and economical zone control, Naval Shipyard signed in 2005, contract for deliveries of 5 patrol ships (until 2007) for Indonesian National Police.

Patrol ships were based on N-935 patrol ship project. Units for Indonesia are 1m longer and have slightly changed quarterdeck . The hull is made of ship steel. Armament will consist of three 12,7mm machine guns. One placed on a bow of the main deck, one on midship and one on quarterdeck just behind the mast. Using of other armaments` variants is also foreseen, including mounting a turret on the bow with 2 double 23mm Wróbel guns. The important part of the equipment is 6 people hybrid workboat, which is placed on the stern of the main deck, with ability to place on the water using small crane. There is an air-conditioning inside the ship.

Continuation of successes of the Polish aerospace industry was signing the contract for deliveries of 11 Mi-2 Plus helicopters for National Police of Indonesia by PZL ŚWIDNIK.

On July, 4th 2005 in Jakarta, during visit of the Polish Prime Minister Mr. Marek BELKA, Indonesian MoD signed a contract with Bumar for deliveries of the first modern anti-aircraft system integrated by CNPEP RADWAR (35 mln USD). 5 days earlier, Polish government completed procedures of formal acceptance of credit worth 29,75 mln USD, for financing 85% of the contract signed by Bumar. This money are the part of 145 mln USD credit, intended mostly for purchases of the naval and fly-ing equipment for Indonesian Police and Navy.

In years 2005-2007 Aster Mobile Integrated Anti-aircraft System was introduced into the Indonesian Army. Its main task is securing her-metical protection against air strikes. System composition was prepared with putting a pressure on high effectiveness in fighting of helicopters and light aircrafts.

Aster system consists products produced for some time by CNPEP RADWAR, ZM Tarnów, ZM Mesko. In some way they are, results of Strategic Government Programme initiated 10 years ago, which other results were construction of Loara and Grom.

Aster system consists of: light 3D S-band MMSR radar, with range of around 40km with high resist-ance on countermeasures, being development of the initial detection radar designed for Loara self-propelled anti-aircraft system; two WD-95 bat-tery command vehicles on Land Rover Defender

110 chassis modified by the Polish companies, allowing to manage ZUR-23-2KG Jodek-G artil-ery-missile sets with double short range missiles launchers made by ZM Tarnów and 2 Poprad self-propelled anti-aircraft sets (on the same chassis like the command vehicles) produced in CNPEP RADWAR.

There are big chances for selling 2 TRL-1235 airspace control radars produced by Telecommunication Research Institute (export version of TRL-1230/N-12M).

### **Vietnam – discovered again**

After over 20 years Polish companies signed in 2004 the first contract for deliveries 2 M28 Skytruck planes from PZL Mielec and 4 An-2 planes. They were delivered on 7th of January 2005. Skytrucks are being use for patrolling nearwater.

Vietnam confirmed decision about next pur-chases of 10 PZL-M28MPW Skytruck patrol planes with MSC-400 radar system offered by Telecommunication Research Institute.

Additionally, according to contract signed in January 2005, Vietnam wants to buy 8 MSC-400 radar systems, consist of ASR-400 radioloca-tion system and CCS-400 data processing and analysis system and 2-3 ground sector command centers integrating forces and means of border protection.

Vietnam is interested in buying 4 PZL W-3 WARM Anakonda Maritime SAR helicopters and at least 4 Sokół helicopters in passenger version (with higher comfort standard).

There are also big chances for the Polish companies for deliveries of Su-22M4 planes with-drawn from the Polish Armed Forces (even 40 pcs) together with necessary logistics base and armament and 150 pcs of T-72M/M1 tanks.

Total value of hitherto and contracted sup-plies of armament and logistics equipment from Poland exceeds 150 mln USD.

### **Philippines – time to start**

For the first time since establishing diplomatic relations in 1973, Polish Prime Minister came with official visit to Philippines in July 2005. After talks between Prime Minister - Mr. Marek BELKA and President of Philippines - Mrs Gloria Macapagal ARROYO, the green light was given for talks about future deliveries of armament and military equipment for army and police of Philippines.

As a part of promised governmental credit worth 140 mln USD, Philippinians are interested in buying SKYTRUCKS planes in patrol, passen-ger and transport version, SOKÓŁ helicopters, radiolocation systems, patrol ships and different equipment for the police. ■



## COMPLEX APPROACH TO AIR DEFENCE



# TUR



By Grzegorz CHUDEK

**AMZ-KUTNO Ltd. established in 1999, specialises in designing and production of special purpose vehicle buildings. However in the recent times it is better known as a producer of “Dzik” armoured vehicles. AMZ presented this year new vehicle protecting against mines and IED traps.**

**T**UR armoured vehicle is a response on Polish soldiers serving in Iraq, Afghanistan or Balkans needs. TUR is currently the most interesting alternative for Honkers or Scorpions, their armoured version, which are being in use in the war zone more due to necessity than their real destination. TUR complies with world construction trends and might be compared with IVECO LMV or MOWAG Eagle IV. TUR class vehicle won't fulfil all needs, but properly equipped and used might increase effectiveness and security of Polish soldiers. And also it might be another Polish export bestseller.

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ZUR-23-2 KG  
Antiaircraft and  
Missile system

# Light Armoured Multirole Vehicle

drive mechanism which is transmitted by central differential and through Kardan shaft.

TUR has body armour protecting crew against 7,62mm x 39 ammo according to STANAG 4569 Level 2 with ability to upgrade it to level 3. Additionally all windows protect against 7,62mm x 51 API /7,62mm x 54R B32 ammo. The construction of the vehicle also protects against explosion of 6 kg TNT centrally under the chassis. It's the first Polish product where crew blast protection was a priority. As producer underlines according to buyer requirement armour might be made of steel or steel and composites. It also might have additional composite anti-splinter protection of the chassis' bottom.

TUR's armament is currently unknown but it'll depend on the customer requirement. There were very interesting proposal of using ZSMU-127 "KOBUZ" with 12,7mm heavy machine gun presented at "EUROPOLTECH" police exhibition in Poland.

TUR prototype is equipped with FONET internal communication system (made by WB Electronics) for all carried soldiers and DD9620T-10 tactical command system terminal. Vehicle is also equipped with

miniature FLIR camera placed in the front bumper. The image coming from the camera is shown on screen placed next to driver. FLIR camera allows for observing area in front of the car during day and night.

Currently tests of the new car are ongoing, including tests of the armour protecting the crew.

According to "Rzeczpospolita" (Polish daily newspaper), Polish Ministry of Defence is interested in sending vehicle to Afghanistan to check it in real battle conditions.

Prototype of the vehicle was created thanks to AMZ-Kutno own initiative, which meets Polish Armed Forces expectations. It is worth to underline short time from idea to prototype. It took only 8 months.

TUR would be very useful for Polish soldiers, who don't have a vehicle which will at least have similar mine resistance (not counting Rosomak (Wolverine) AIFV, which is serving in Afghanistan). Now everything depends on MoD.

One is sure, TUR is not the last word of AMZ-Kutno. ■

## Technical Data

Gross Vehicle Weight Rating (GVWR)	6200 kg
Payload	1000 kg
Wheel base	2800 mm
Track width	1700 mm
Total length	4870 mm
Height	2350 mm (to the roof level)
Total width	2230 mm
Fording depth (without preparation)	700 mm
Crew	5 people



# Terrain Surveillance System from Air Force Institute of Technology



**New surveillance systems designed by Air Force Institute of Technology (AFIT) from Warsaw, in stationary and helicopter version will be used for increasing protection of the Polish military bases in Iraq and Afghanistan.**

**P**roject realised of funds of the Institute, received accept from MoD in June 2007. Stationary Terrain Surveillance System (SSOT) passed the tests in March on shooting range in Wędrzyn. Aerial Terrain Surveillance System (PSOT) more or less in the same time started his life circle in Świdnik. At the end both systems have to be parts of equipment of the 7th Command Battalion of the 25th Air Chivalry Division in Tomaszów Mazowiecki. At the end of July SSOT was airlifted to Iraq.

### **MM-36 with SeaFLIR III head**

SSOT is an element of the protection system of the coalition airfield near Al-Kut in Wasit province. Core of the system is SeaFLIR III, one of the most advanced electrooptic head produced by FLIR Systems. It was ordered through Aviation Service. Delivery was postponed by the American side due to necessity of finishing up some of the elements of the system requested by the Polish side. SeaFLIR III it's a head designed mainly for the Navy. It has 9 inch diameter, stabilised head with

modern thermal camera, digital camera of the visible light (CCD TV) for conducting observation during the day and in the poor lighting condition, it also has laser rangefinder. Optimalisation for ships meets expectations of the SSOT designers as they were looking for a device which will be able to work in continuously and in difficult conditions. Main region, where SSOT will be used is Middle East and Asia, which was mentioned in specification of the optical devices (IR detector works in range of 3-5  $\mu\text{m}$ , which is optimal for these regions). According to information of FLIR Systems, SeaFLIR III are delivered to US Special Forces and installed on their fast patrol craft.

In Poland, the head was installed on specially adapted MM-36 heavy mast. Originally it was designed for DGT communication company by Zakłady Hydrauliki Siłowej (ZHS) Hydromech from Lublewo. The weight is very characteristic for MM-36. It weights 16t and from the one side it was pointed as its main disadvantage (similar masts produced in Europe only by France and Germany are a bit lighter) but weight comes from functions the mast provides and which are necessary for



# AIR FORCE INSTYTUTE OF TECHNOLOGY

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Integration of avionics systems

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- Moving and rotary digital map
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- Digitally managed armament system extended with some selected components of simulated air weapons
- The whole system integrated with mil-std-1553b airborne digital data bus employed
- Remote flight monitoring system (including the on-line transmission of selected flight data to a ground station)
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The stationary terrain-surveillance system



Ultrasonic inspection of a helicopter structure

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fulfilling very high requirement related to stiffness of the device during strong wind (minimisation of vertical deviation during working heavy loaded with communication equipment). MM-36 mast is an autonomous device not requiring additional power supplies. It is installed on the trailer towed by the heavy truck (even on unsurfaced road).

SSOT was designed for detecting and identifying targets in range up to 10 km. During tests in Wędrzyn in Polish climate and in terrain partially covered by the forest the system was able to identify armed man on 3,5km distance without any problems. In real work conditions there shouldn't be any problems with achieving requested parameters.



Crew of the SSOT has its post and social room in 20-foot self-loading KDR.SC-03 command-social container, which was designed and produced by Armpol company from Sulejówek. There are two rooms in the container, but working post is located in part of the container which is being expanded during stop. Inside is protected from influence of mass destruction weapon (Armpol is the main supplier of the dust-ventilation systems and overpressure generator; it was responsible e.g. for creation of the special, mobile laboratory responsible for detecting biological weapon, which was part of the MIDAS system created for Centre of Contamination Analysis). Container is equipped with its own power generator and couch. It is adapted to build over communication equipment (in the sidewall autonomous, pneumatic, 7 meters mast was placed).

Due to the stationary nature of SSOT, in its head GPS wasn't placed (this fact reduced some of the construction problems with transferring appropriate signal to the operators' post). The location of the mast (head) is determined by mobile GPS receiver during preparing the post.

PSOT system is currently during introducing into service. Its air trial has started in May. System was placed on PZL W-3PPD Gipsówka meaning Sokół – platform for the command system, also

created in AFIT. Gipsówka module concept paid off. Without any problems elements of the system were replaced by the PSOT operator's post responsible for operating FLIR SAFIRE II head produced by FLIR Systems (and also delivered through Aviation Service) and data transmission system. For PSOT the most modern top version of the head, equipped with daylight camera, IR camera (also 3-5  $\mu\text{m}$ ), laser rangefinder and so called optical spotter, device for spot magnification of observed image for further identification. Head is equipped with the newest software (surveillance algorithms). During the test conducted by AFIT and Procurement Department of the Ministry of Defence near Świdnik, the device was able to identify object located 12 km from flying helicopter.

PSOT is able to cooperate with ground command post (in configuration practically the same as for SSOT, but both version are not exchangeable). Data from PSOT might be also transferred to mobile post designed for transportation in commanders' vehicle in convoy. In such case transmission range is 3-5 km, in the same time commander's container might be located 20-40 km from the helicopter.

Using PSOT opens new possibilities, but has also some threats for the crew. Profile of the mission will require flying on much higher altitudes than it was before. PSOT will have to be on altitude exceeding RPG-7 range. It might require placing devices defending helicopter against heat homing missiles. ■





# security engineering

# PIAP

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***RADMOR is the leading manufacturer of radio communication equipment in Poland. We offer equipment designed and manufactured according to the most modern world technologies. The quality of products and compliance with international standards are the important elements of today's market. All Radmor's appliances meet the requirements of the European Telecommunication Standards Institute (ETSI). In 1998 RADMOR S.A. was awarded its first ISO 9001 Certificate of Quality by ABS Quality Evaluations from USA. In 2000 RADMOR got the NATO Certificate AQAP-110 and in 2004 we obtained certificate AQAP 2110.***

**RADMOR** offers comprehensive services – from network design, to delivery, assembly and servicing of equipment. Radiotelephones produced by RADMOR operate in radio communication networks all over the country. They are used not only by policeman and fireman but also health services, taxi and sport events organizers. The devices produced in RADMOR can be used in already existing systems as well as for building new networks. Radmor's radiotelephones appear always in the places where reliable communication is needed for efficient work.

Our civil equipment is suitable for building both modern trunking networks and conventional dispatcher systems. Our radiotelephones operate in 40 MHz, 80 MHz, 160 MHz and 450 MHz frequency bands.

Military equipment offered by RADMOR enables building modern tactical digital radio communication systems. We do export our equipment and its technology to many countries. Our customers, apart from Polish Military Forces, are other armies such as: Lithuanian, Latvian, Czech, Slovak, Estonian, Iraqi, Malaysian, Indonesian and North African countries. Polish soldiers use our radios during peace missions in Kosovo, Afghanistan and Iraq.

Design modernity and production processes assure constant, high quality of the equipment. RADMOR has 60 years of experience (established in 1947) and is stable partner. Military equipment offered

by RADMOR meets MIL-STD-810E and STANAG 4204 specifications.

In 1996 RADMOR won a tender for Polish Army for supplying modern battlefield radios. The long-term contract includes handheld radios R3501 (designed and produced in Radmor) as well as manpack and vehicle radios of PR4G system produced under French license. The equipment enables building modern digital systems of tactical radiocommunication.

***Company products range includes:***

- military handheld, manpack and vehicle radios
- communication systems: conventional and trunking
- handheld, mobile and stationary radiotelephones
- repeaters
- radiomodems and data transmission modules
- accessories: power packs, selective call blocks, microphone/speakers and various types of antennas



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# New Radios

## from RADMOR SA.

*Radmor is the biggest manufacturer of radio communication equipment in Poland. We offer military and civil equipment suitable for building state-of-the-art different radio communication systems. This year Radmor is going to launch production of two new radios.*

### R3505 TACTICAL HANDHELD RADIO

Radio R3505 is a modern radiocommunication mean operating in a wide frequency band 20-520 MHz, equipped with a few kinds of analog and digital modulations.

It substitutes a number of classic radios and radiotelephones used by Armed Forces and civilian services, dedicated to operations in a single frequency band and adapted to one transmission mode.

#### Radio ensures:

- tactical communication in a frequency band 20-520 MHz according to STANAG 4203, 4204, 4205 standards
- modulation of AM, FM, FFSK, GMSK, QPSK
- interoperability among land, navy and air forces and communication with civilian services: the Police, Fire Departments, Medical Rescue, Crisis Management Centre

#### Radio 3505 integrates existing radio communication standards enabling:

- voice transmission
- data transmission
- GPS position reception and transfer
- signal conversion among radio networks (re-transmission)

#### Radio allows:

- programming voice and data transmission protocols by the user
- configuring radio parameters using build-in keypad
- programming system configuration and radio parameters using a Fill Gun
- cloning system configuration and radio parameters between radios
- configuring system and usable parameters over the air (OTAM - Over The Air Management)
- automatic transmission of alarm signals with report on present geographical position (GPS data)
- correspondent identification
- individual and group selective calling
- creating re-transmission sets
- creating vehicle sets
- connecting additional power amplifiers
- remote controlling with all functions from PC or tactical terminal

### R35010 PERSONAL ROLE RADIO

The R35010 radio is dedicated for operation in small area radio networks and enables two way half duplex communication at a distance of up to several hundred meters in an open terrain. The communication can be kept on 16 radio channels within the 2405 MHz ÷ 2480 MHz frequency

band. The radio is intended for use as soldier personal equipment.

#### The radio permits the following types of radio communication:

- half duplex digital voice: open and enciphered
- data transmission

R35010 radio co-operates with other radio of the same type in Direct Sequence Spread Spectrum (DSSS) mode with audio signal data packets burst transmission (in accordance with the modified 802.15.4 IEEE standard).

The transceiver unit co-operates with wireless headset (microphone and headphone) and with the wireless PTT switch using the Frequency Hopping Spread Spectrum (FHSS) system.

Each radio operating in the network has its own unique digital address and frequency hope pattern used in the FHSS communication between the transceiver unit and the wireless headset and wireless PTT switch.

To reduce probability of detection and interception of the radio operation, to save the energy and to eliminate mutual interference between individual units the transmitters of all radio equipment are being switched on periodically (burst operation) for possibly short time in the way excluding simultaneous transmission of two transmitters in one set.

#### The radio enables:

- co-operation of the transceiver unit with the wireless headset and switching the transmitter on by voice controlled PTT (VOX)
- handheld operation (without the headset and external PTT switch)
- co-operation of the transceiver unit with the headset and PTT switch using the cable connection
- full duplex operation in the TDMA mode with not more than four users speaking simultaneously
- connection to mobile object intercom network as an access point
- blocking of the radio over the air (OTAZ - Over The Air Zeroing)

**R35010 Personal Role Radio**



# ASTER

## Short-Range Modular Air Defence System

The present-day battlefield is characterised by growing number of air armament. Role of combat helicopters and UAV is growing. UAVs are already able to carry different kinds of armament and it is expected that their potential will even grow in the future. In the same time there is necessity to have air defence systems which will be transportable by air as a parts of rapid reaction forces.

**A**STER system was designed for easy, modular, complex, short range air defence.

### Typical ASTER battery consists of:

- 3D multi-beam search radar (MMSR)
- battery command vehicle (BCV)
- POPRAD mobile missile launchers - up to 6 units
- Guns (e.g. ZUR 23-2 KG) - up to 6 units

### SYSTEM ELEMENTS

**MMSR** is a 3D multi-beam search radar designed for detection and pointing air targets in medium and short range (up to 40 km) air defence systems. MMSR has quite strong average power of transmitter, which secures big enough coverage and high resistance in case of jamming.

MMSR might be place on any chassis fulfilling specific mechanical requirements.

Antenna in working position is hydraulically lifted up to 3,5 m above the surrounding terrain level and is folded for transport. 4 hydraulic jacks are used for leveling and stabilising vehicle during using MMSR. The vehicle is equipped with land navigation system, which combines counting navigation basing on precise gyroscope, and data from the GPS receiver. Thanks to that position of the radar is updated in real time and its orientation is possible right after arrival to the new place.

Radar uses mobile power plant, placed on trailer towed by the vehicle. Operator station is placed inside the cab and consist laptop and additional control panels. Operator has the ability to observe tracks of the targets and indicators of the equipment status. He could also have

ZUR-23-2 KG  
Anti-aircraft and  
Missile system





### 3D multi beam search radar (MMSR)

access to settings for checking or changing some parameters. Control panels on his left side are for raising the antenna and for communication equipment control.

**POPRAD** is designed for destroying air targets on small and medium altitude using guided missiles. The set is prepared for cooperation as a part of automatic air defence control system, which delivers data (using digital link) on the targets which have to be destroyed. High dynamic parameters of tracking head propulsion allow destruction of fast maneuvering targets. Thermal camera (FLIR) is used for tracking air targets. FLIR allows for fighting targets day and night. The set is equipped with IFF (identification friend or foe) device, which minimises possibility of friendly fire and rises autonomy of using POPRAD in the battlefield. Small size and weight assures easy transportation of the equipment for long distances in different ways.

#### Parameters of the set:

- Altitude of effective engagement of targets: 10 to 3500 m
- Range of effective engagement of targets: 500 to 5500 m
- Number of missiles on board: 8 (4 + 4 reserve)
- Crew: 2 (commander/operator and driver)

**ZUR-23-2 KG** it's a very deep modernisation of well known ZU-23-2 system. All electrical drives were

modified, and the whole station is controlled using joystick. The joystick is also used for conducting fire, thanks to electric triggers. Old opto-mechanical sight was replaced by modern CKE-2 telemetric sight. Old Striela-2M missiles were replaced with new GROM missiles with 5,5 km range. In combination with new sub-caliber ammo for the guns, we receive modern and effective short-range air defence weapon. Since year 2002, modernised gun under the name ZUR-23-2KG JODEK-G is being in use by the Polish army.

**ZGS-158 Opto-electronic Tracking Head** is a typical head with flexible mounting options for sensors and other devices. Producer underlines fact that the client can choose which equipment should be place on the head: FLIR camera, CCD camera, laser range finder, IFF interrogator, etc. ■



**POPRAD Mobile Missile Launchers**

# WR-40 LANGUSTA

For the first time the 122 mm BM-21 multiple rocket launcher was shown in USSR in November 1964. Since that time it was used by various countries even from outside the Warsaw Pact (by over than fifty countries). It has been used by Polish army since 1966. It appeared to be a very effective system especially at shorter ranges.

Unfortunately the time lag caused decline of the fighting force that fact was noticed in Poland and that is why modification of the BM-21 rocket launcher started in 90`s last century. It was planned to change the chassis, introduce a new types of ammunition and a new fire control system.

The first „fitting” was launcher on Star 1466 chassis with a long cab shown for the first time at MSPO Kielce in 1999. From different reasons it wasn't ordered by the army.

In September 2005 companies: Huta Stalowa Wola, WB Electronics and Jelcz-Komponenty signed a letter of intent related to realisation BM-21M programme, which was later named WR-40 Langusta. The missile launcher was placed on the Jelcz P662D35 chassis, which was created basing on P662D43 chassis already being in use by the Polish Army ( e.g. in Iraq).

The most important change is 4 - doors, 6 – people type 144 cab.

WR-40 Langusta has standard armour according to crew protection STANAG 4569 Level. The vehicle

is powered by IVECO Aifo Cursor 8 six- cylinder engine with 7,8 litres capacity and maximal power of 259 kW. Technical specification: 12 speed automatic gearbox and 2- speed transfer case. Gross vehicle weight is 13 000 kg and payload is 10000 kg.

Langusta received a fire control system made by WB Electronics based on solutions used in ZZKO Topaz, which software can be enriched with information coming from BMS Trop battlefield management system. DD9620T vehicle terminal was installed on the commander's post. The fire control system works with Honeywell TALIN 4000 land inertial navigation system. The communication is ensured by VHF RRC- 93 10P F@stnet radiostation from Radmor with Fonet IP vehicular intercom from WB Electronics.

Thus modified rocket launcher with Feniks-Z missiles family has approx. 42 km range.

After modernisation a new and very effective rocket launcher was created. Military was given credit for it and WR-40 Langusta was ordered by the Polish Army. Huta Stalowa Wola will deliver over 60 rocket launchers up to year 2010. ■





# Balt-Military-Expo

## 9. Baltic Military Fair



# Safety

## 9. Safety and Emergency Fair

**Gdańsk, Poland**  
**25-27.06. 2008**



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