



# PIAP Multistriker pyrotechnic toolkit for a robot

By: Michał Sitarski Photo: PIAP

**For users of UGV or robots, which is a rather expensive tool, for tactical or search & rescue mission, the ability to carry different tasks is one of the priority requirements. Modern tactical robots often meet them but nothing stands on way of improving it further.**

The idea of making universal tool, which will improve operational abilities of robots, was born at the Industrial Institute of Automatics and Measurements PIAP after gathering opinions among law enforcement and military users which use robots delivered by PIAP. It started from the simple thing – users noticed there are problems when it is needed to brake car's windshield or do other thing which can't be done with standard remote manipulator with grapple.

Engineers from the PIAP decided to solve that problem. The task was to build an additional tool which could be used as a "puncher". Firstly, they considered making a tool similar to pyrotechnic extractors used in EOD operations to destroy suspicious packages for example. Unfortunately it turned out that this solution had its flaws. Firstly, that kind of equipment is classified as a weapon so the range of its use is narrower and trading it is regulated. Secondly, adjusting the amount of energy used on objects is complicated (you must select a projectile and propellant). Thirdly thing is reloading it takes at least few minutes. Fourthly, this device isn't so universal due to its "energetic" flaw and way of working. And last but not least – every, single shot is quite pricey, between \$30 to \$100.

According to all of the above, a device was designed to avoid all this problems. The final outcome is PIAP Multistriker – multipurpose pyrotechnic device. Yes, pyrotechnic because the working bits (more







about them below in the article) are moved by the energy of gases made in propellant burning. Despite the fact that this is nearly a definition of a firearm – PIAP Multistriker isn't one. It was managed by using as a propellant an ammunition for nailguns which can be bought in nearly every toolshop. It is a solution for the first part of a firearm definition but what about the second part? It says about striking with a projectile ejected from the barrel or its substitute. That problem was solved very easily – in PIAP Multistriker not a single tip separates from the tool during "shooting". In the moment of shot the tip slides from the guideway and comes back due to polymer springs.

The tool itself reminds of huge drillers and is adjusted to be mounted on the robots manipulator but it can be hold by the manipulator as well. The second option will of course reduce some functions (manipulator already



in use) or force to put the PIAP Multistriker after doing the job but it doesn't require adapting robots to mount it. PIAP Multistriker can be used as a typical pyrotechnic extractor – on the tripod. Massive, metal case protects the guideway with a working tip and the set of springs, electronic control units and electric executive mechanisms and a place for magazine with propellant ammunition – it holds 6 or 10 pieces and it is possible to use long (6,8 x 18mm) and short (6,8 x 11m) cartridges. By placing 3 long and 3 short cartridges the operator has a possibility of adjusting the energy of the tips. Interesting fact – for the price of the single shot of pyrotechnic extractor you can buy tens of nailgun's cartridges.

Out of the case is a place to mount an observational camera with an LED illumination light.

PIAP Multistriker is a remote controlled device. If it will be mounted on the PIAP robots it will act as plug & play device and for controlling it is used robot's control panel. If it will be mounted on the tripod or robot made by other company – it is controlled with a remote and connected to it 30 meter cable (it is possible to use wireless adapter). Remote control is equipped with a battery (that allows for 24h of continuous work) and impact and weather resistant case. It allows to control all of the functions of the PIAP Multistriker (excluding camera) and is constructed

in way preventing accidental, random use of the device. There is an option of emergency hand control but it is only for reloading or unloading the device, not making shots.

The tool is equipped with a manual and automatic safety switch so there isn't any possibility of accidental shot, e.g when the device will fall on the ground. There also exists a possibility of automatic reload without making a shot or after a misfire. What is more, on the back part of the case is a striker status indicator.

The primary set is equipped with some tips connected with nondetachable piston:

- 🔧 windshield striker ("sharp")
- 🔧 flat striker
- 🔧 tire puncturing tip
- 🔧 needle tip for puncturing, cable and wire scissors,
- 🔧 flat cutter 50mm,
- 🔧 flat cutter 50mm with guideway
- 🔧 STS/NDS/NONEL non-electric detonator.





On the rod of the tip the set of springs is placed. It is responsible for pushing the tip to starting position so it is possible to shot again if necessary. Springs have a long lifespan – the producer cannot provide information because after 3000 shots they still has no signs of wear. But if it will finally happen to broke, the new set costs less than \$150.

Striker hasn't got any problems with vehicle windshields and when using it on the glued glass (like front windshield) it is recommended to use flat cutter. Few shots with it make a hole that will allow to put the robot's manipulator inside and try to rip it away.

Cutter with guideway can be used to cut ropes or wires which are on hard surfaces.

Scissors allow to cut cables, wires and bars with diameter up to 20mm. They remind of guillotine than typical scissors. It is that because the makers want to prevent situations when material come between the blades skewing them and in fact – can't be cut. Everyone experienced such situation at least once.





Tire puncturing device was made as an answer for the LE user demands. Its construction cause that in moment of striking the tire it cut a hole in it, not only ripping it. It is similar to police spiker but in this case tip comes back and the striker blades stay in the tire. Flat striker can be used to knock out hinges or make holes in the partitions.

Needle tip also was made as an answer for LE/MIL EOD specialists. They needed a device that will allow them to check the contents of closed containers without opening them. Some of the explosives detonates at the attempt of opening the container but are invulnerable for short, violent and point directed impacts – it results from the way that their steams cup on the sides of the container.

Next function is possibility of initiating the charge with non-electric detonation impulse. It will come in handy in situation when it is needed to place the charge and detonate it without using a man.

Whole set (including tips, battery, tripod and the set of spare springs) comes with Pelican case.

PIAP engineers are currently working on the new working tips that will improve robot's range of usage. There will be for example a harpoon but in this case it is harder to construct as it mustn't detach from the guideway after the shot (but there are some ideas how to solve this). Remember, PIAP Multistriker isn't a firearm.

## PIAP Multistriker TECH SPECS:

Dimensions: (cm)	38 x 9 x 15
Max. dimensions: (cm)	48 x 12 x 20
Weight: (kg) (depends on the configuration)	4-5
Rate of fire: (shots per minute)	6/10
BUS: CAN	
Supply voltage DC: (V)	20-40
Amperage in the working cycle: (A)	1,5