


**RESOLUTION
 CITY OF SAINT PAUL, MINNESOTA**

Presented by _____

- 1 WHEREAS, Technical Support Working Group has selected the Saint Paul Police Department (SPPD) to
 2 participate in the testing and evaluation of a new attachment for one of our present robots and is used as
 3 a counter measure for person borne IED's; and
 4
 5 WHEREAS, this attachment has no inherent cost to our department and our testing and use of the
 6 product in real world applications is critical in developing tools within the Bomb Technician arena. This
 7 equipment will be ours to keep and;
 8
 9 WHEREAS, the value of the attachment is \$25,000; and
 10
 11 WHEREAS, the public purpose of this donation is in the best interest of the police department's bomb
 12 disposal unit and will provide the department with a cutting edge tool for our technicians; and
 13
 14 BE IT RESOLVED, that the city council accepts this donation and extends its sincere thanks to the
 15 Technical Support Working Group
 16

	Yeas	Nays	Absent
Bostrom			
Brendmoen			
Carter			
Lantry			
Stark			
Thune			
Toibert			

Requested by Department of:


By: _____

Approved by the Office of Financial Services

By: _____

Approved by City Attorney

By: _____

Approved by Mayor for Submission to Council

By: _____

Adopted by Council: Date _____

Adoption Certified by Council Secretary

By: _____

Approved by Mayor: Date _____

By: _____

Contents

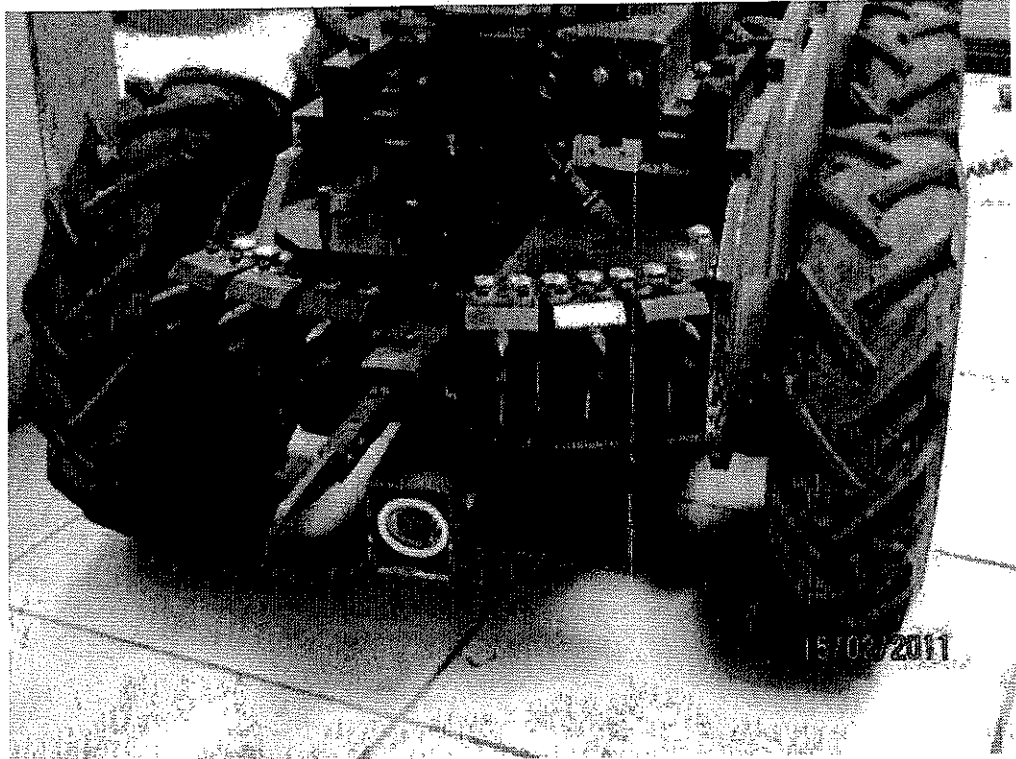
1. General	3
2. Technical data.....	4
3. Wolverine BBT description.....	6
4. F6A BBT description.....	9
5. Tools and functions.....	10
6. Connecting and disconnecting tools - Wolverine.....	28
7. Connecting and disconnecting tools – F6A.....	37
8. User safety rules.....	38
9. Resolving problems.....	39
10. Recommended tools and placement for scenarios	40
11. Appendix A - Israel training week HDS	43

1. General:

The Body Bomb Tool Kit developed by Israel National Police Bomb Disposal Division in cooperation with TSWG, is a tool kit to address the specific threat of PBIED's and other IED's. The kit is placed and operated with robotic platforms utilized by the Israel National Police bomb squads or US bomb squads (Remotec Wolverine and F6A). The tools are able to cut common clothing, straps, open backpacks and bags, and other common body bomb containers without having to return to the operator for more outfitting.

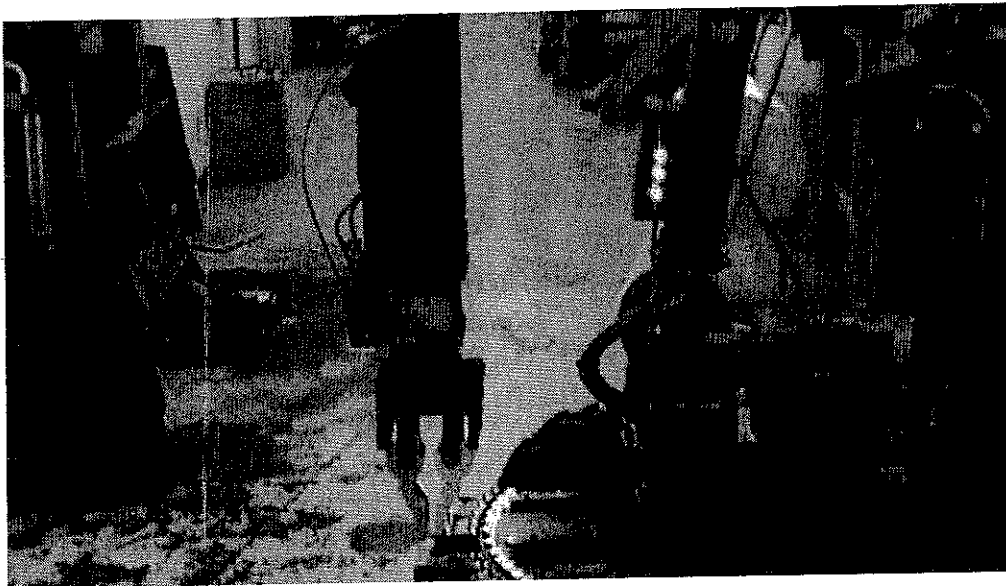
The common scenarios the tools address are: IED's, PBIED's including explosive vests and belts and some VBIED scenario operations.

The tool kit enables bomb techs to remotely neutralize explosive devices, by dismantling the device without the use of disruption, such enabling the bomb tech to collect the maximum evidence for investigation and legal purposes.

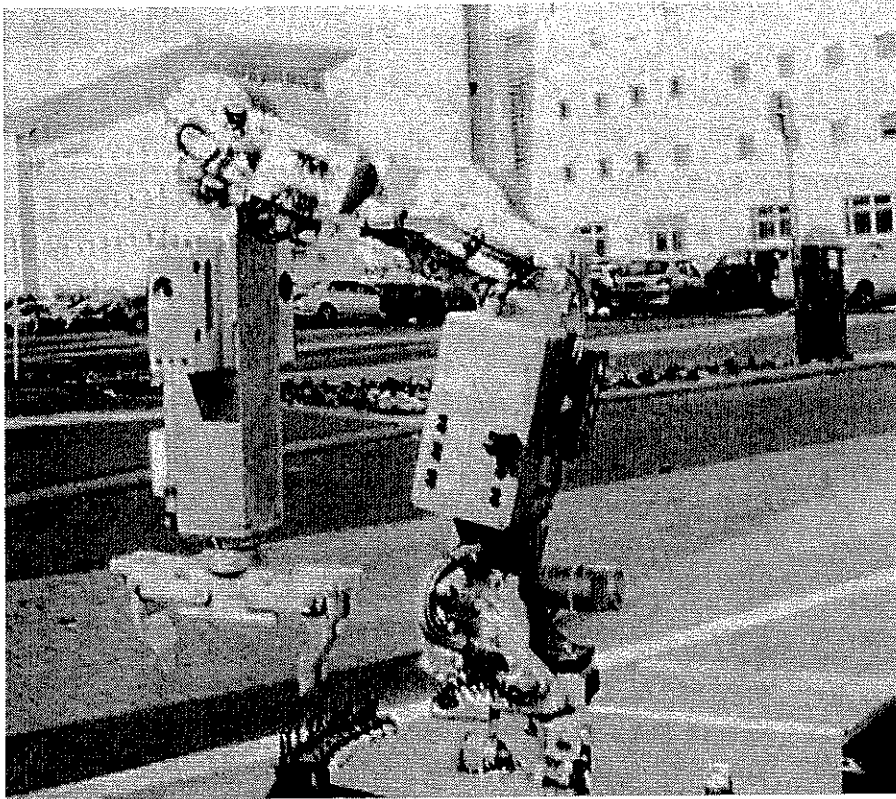


2. Technical data:

- Wolverine kit - estimated weight including tools – 45kg.
- F6A kit - estimated weight including tools – 15 kg.
- 15 tools – including wireless camera and receiver.
- A pinhole camera and LED lamp are positioned on the turret base to enable observation on the tools and mounts.
- F6A mount plate can hold 4 tools.
- Wolverine mount plate can hold 6 tools and contains a ripper knife.
- A tray can be assembled on the Wolverine mount plate, to hold different elements while driving, such as counter charge explosives, Boot banger etc².
- 3 LED lights indicate the arm and grippers in position for connecting and disconnecting from a tool.



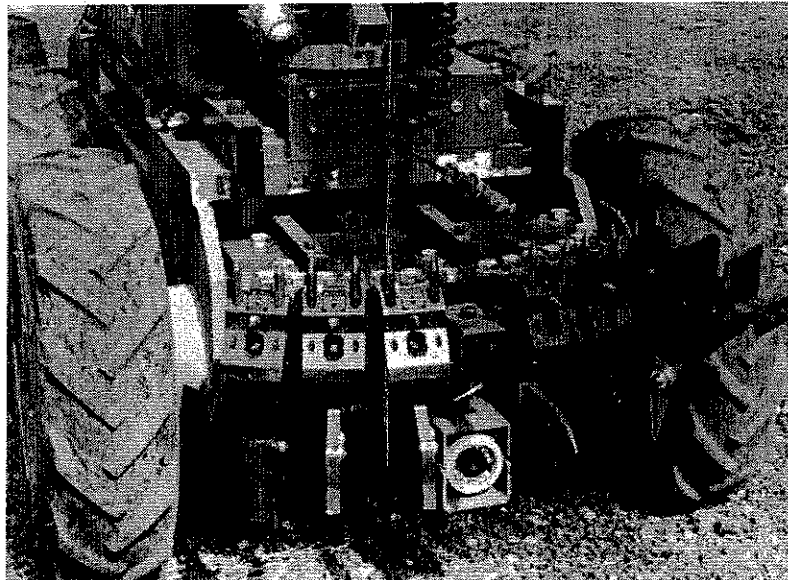
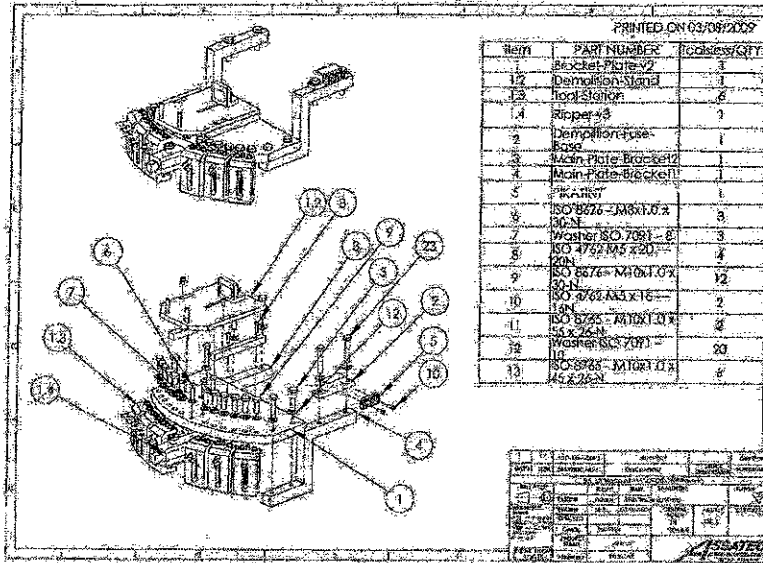
The LED indicator lights on the Wolverine lower arm, upper side



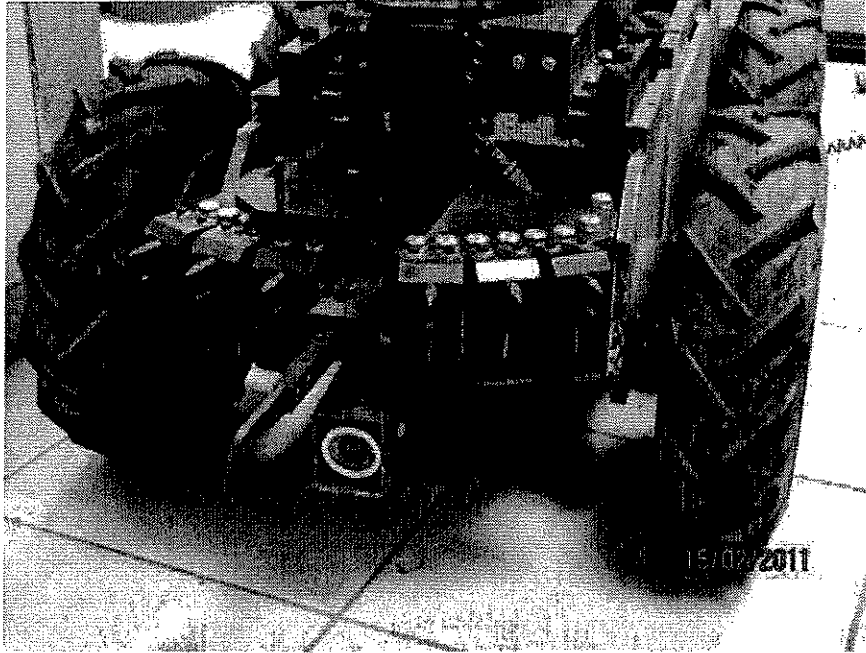
The LED indicator lights on the F6A lower arm, under side – opposite the camera

3. Wolverine Body bomb tool kit description:

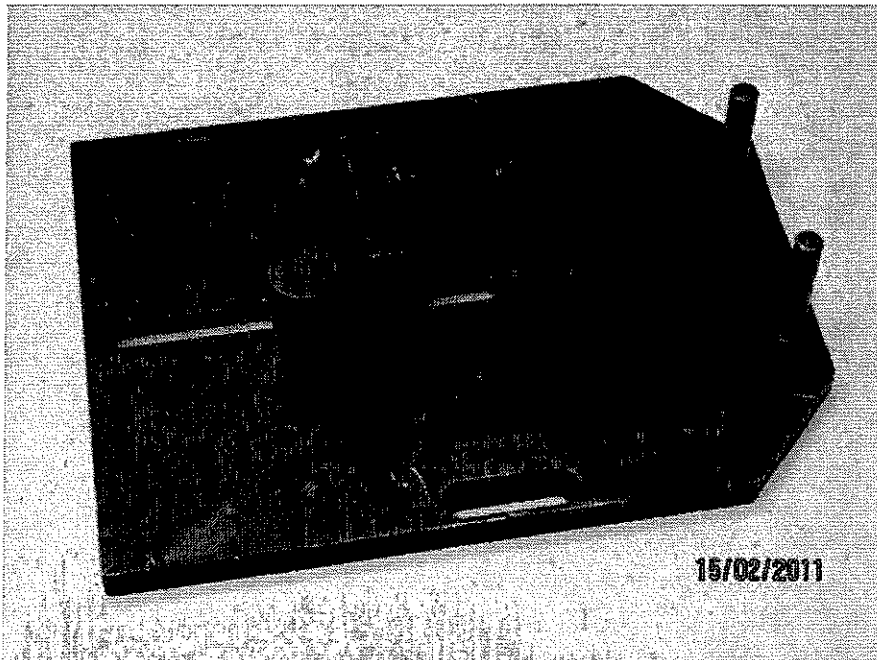
The Wolverine kit contains a mount plate for 6 tools, a front ripper knife and a carrying tray.



The kit including tool observation camera and lamp



The kit with carrying tray connected



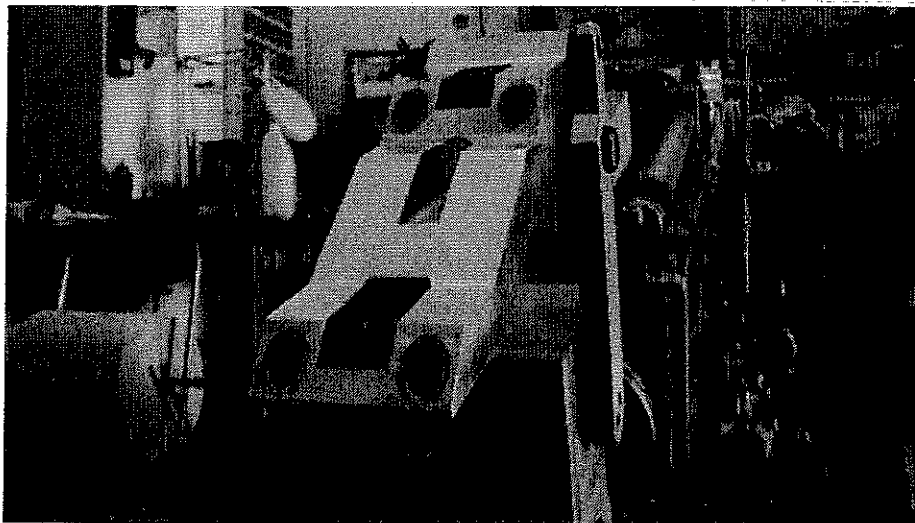
The carrying plate for counter charges

*** The tool observation camera and LED lamp (for night work) are located on the turret base. The front driving camera has been relocated underneath the mount plate. The positioning LED box is located on the lower arm pointing towards the search camera. The positioning LED's indicate the proximity switches located on the lower arm, the middle arm and gripper.



The LED position indicators

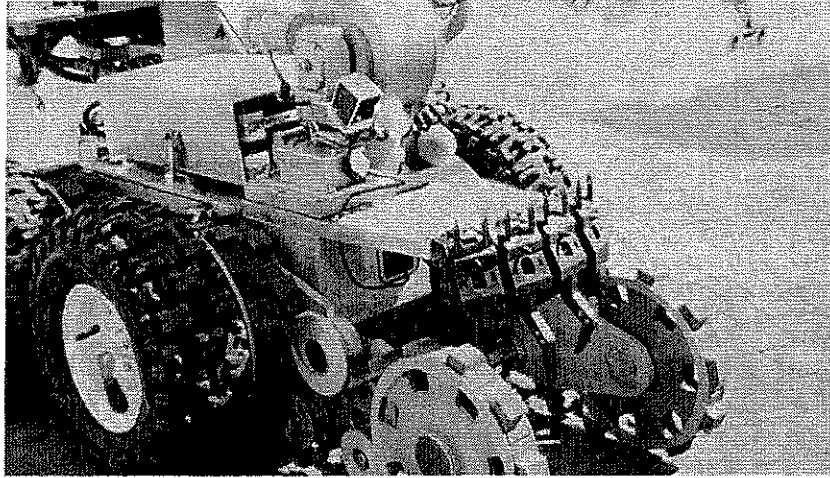
*** New grippers have been supplied with the kit, to enable connecting to the tools. The grippers have 2 sets of holes (upper and lower) for connecting to the tools, to enable wider opening of the grippers if needed.



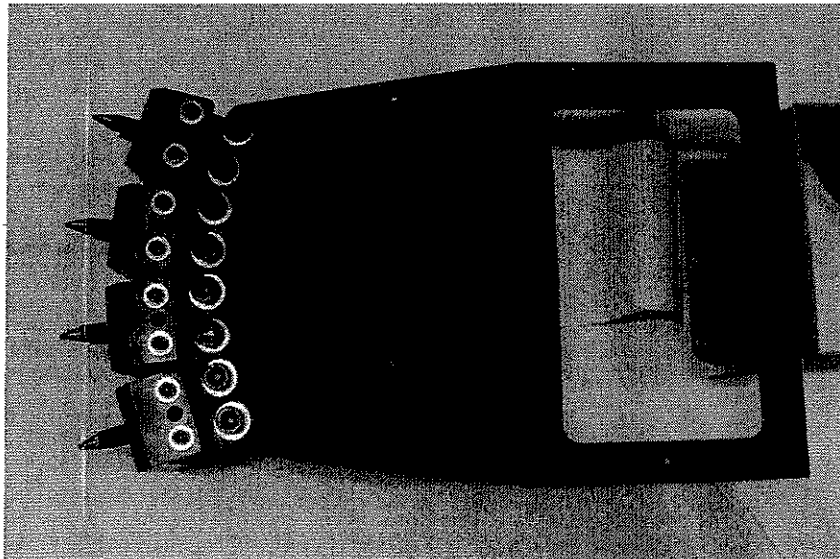
The new grippers with upper and lower tool connection holes

4. F6A Body bomb tool kit description:

The F6A kit contains a mount plate for 4 tools, without a ripper knife or an optional carrying tray. The tool camera and lamp are located on the turret base.

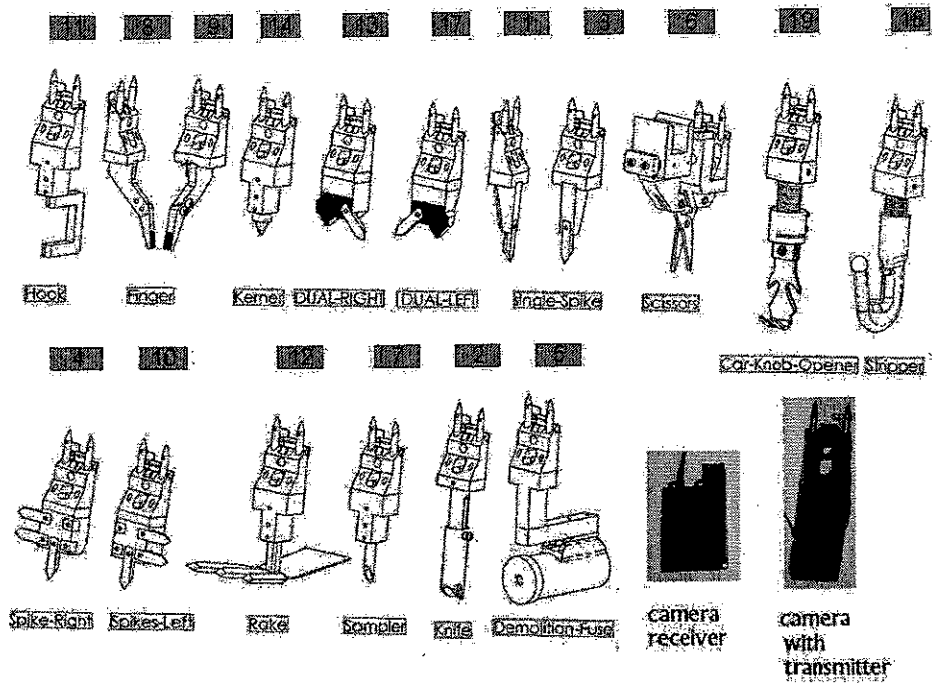


The tools and plate mounted on the F6A



F6A tool mount plate

5. Tools and functions:



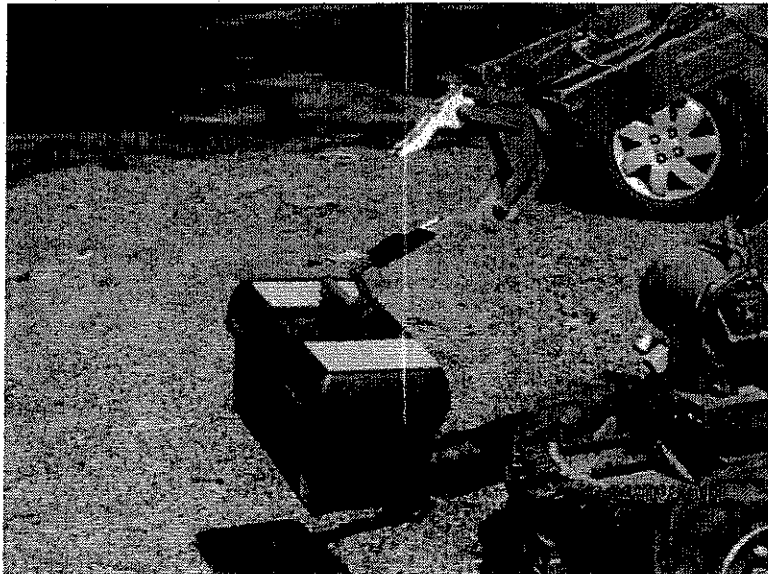
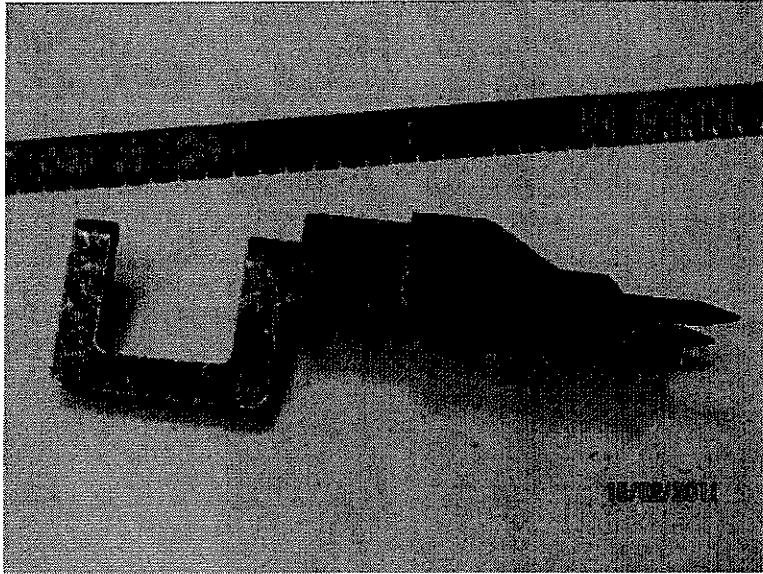
The tools numbered by place in storage case

- Ripper
- Stripper
- Car knob opener
- Scissors
- Single spike *2
- Dual left
- Dual right
- Kerner
- Spikes right
- Spikes left
- Fingers
- Hook
- Rake
- Sampler
- Knife
- Camera + transmitter

Lifting hook

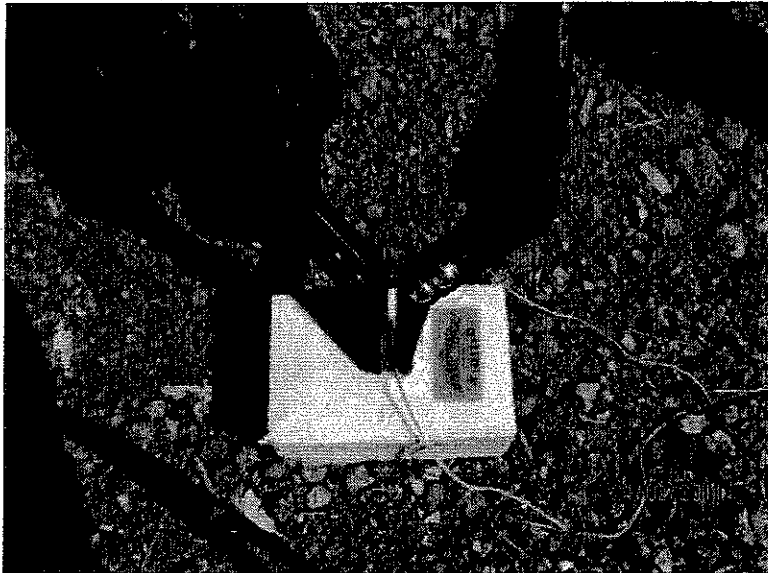
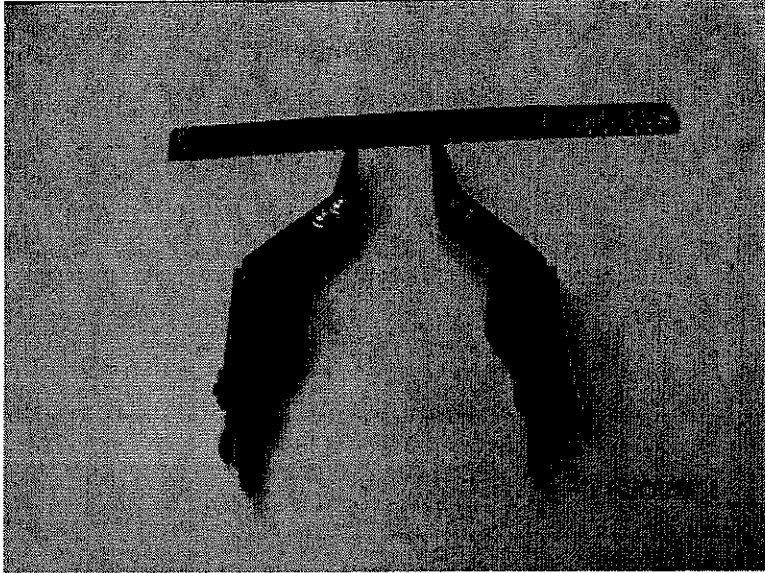
Functions:

- Lifting and carrying instruments – such as a Boot banger...
- Removing bags, suitcases and boxes with handles.
- VBIED's – opening doors, pulling containers, holding doors....



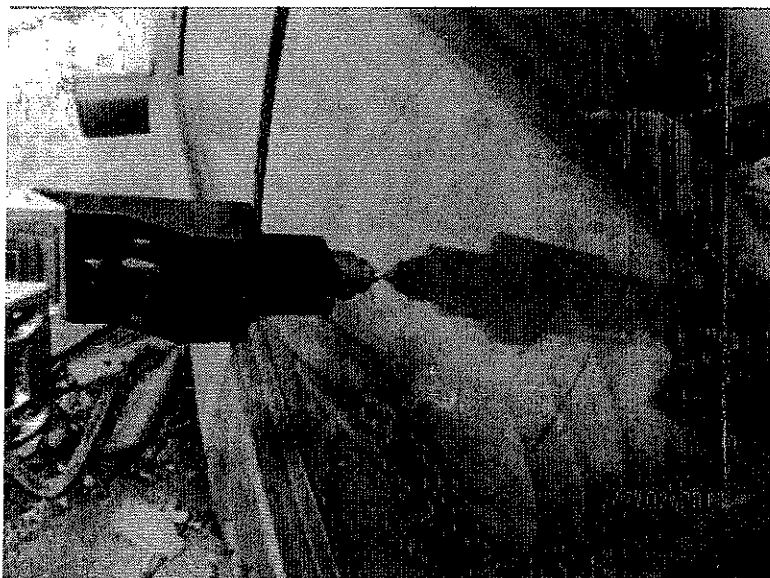
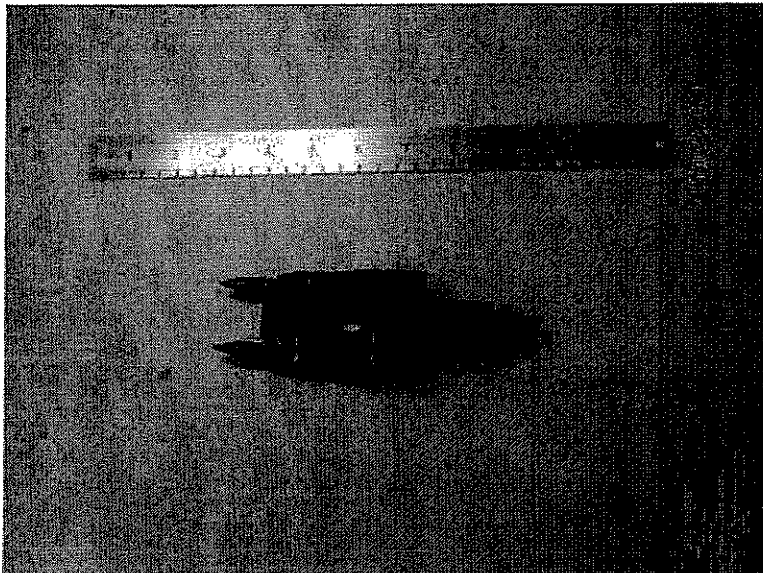
Fingers

For delicate actions, such as drawing out initiators, removing wires....



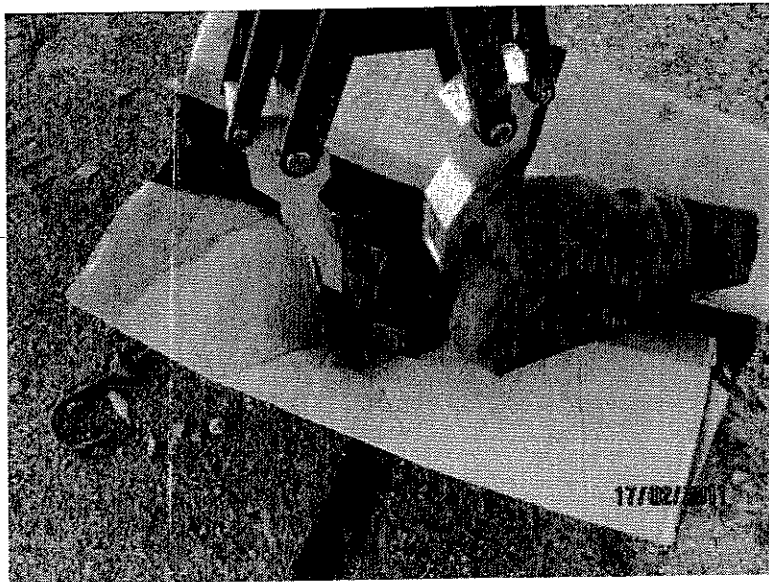
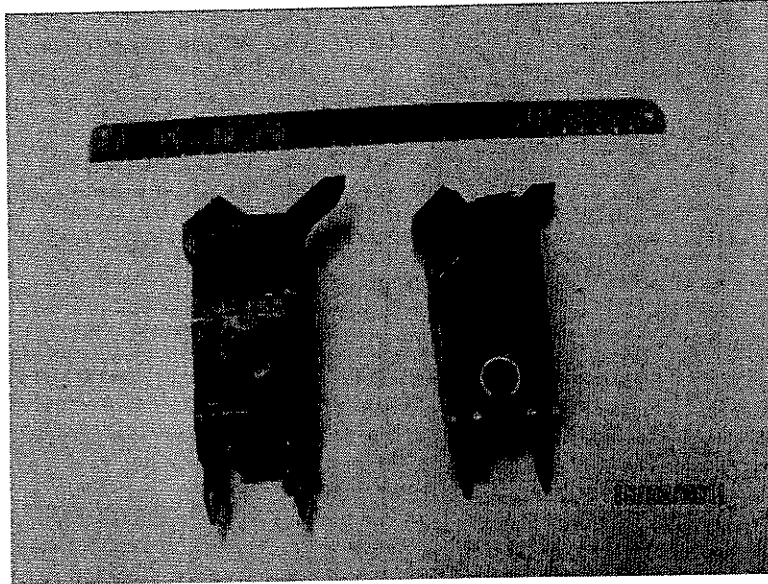
Kerner window punch

Function - accessing and gaining entry into vehicles by breaking windows.



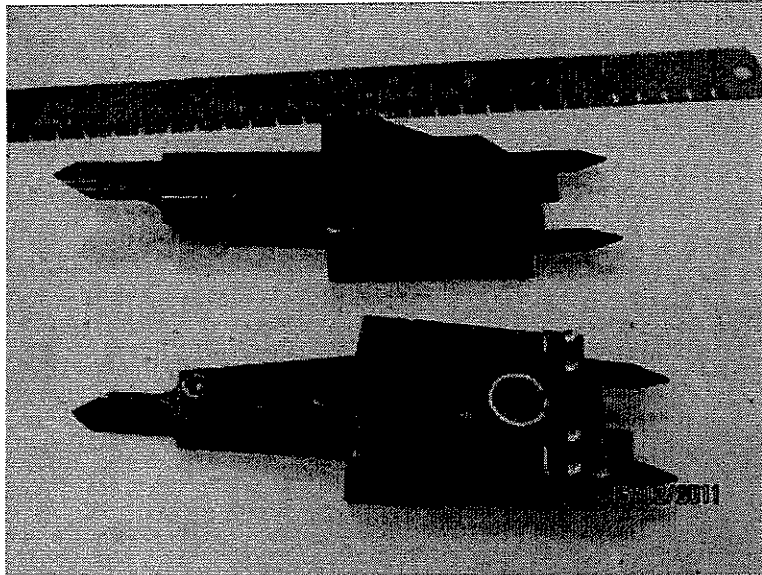
Dual purpose prick and grip – right/ left

Functions for pricking and tearing bags or soft outer cases, in addition enables gripping by rotating the tools.



Single spike:

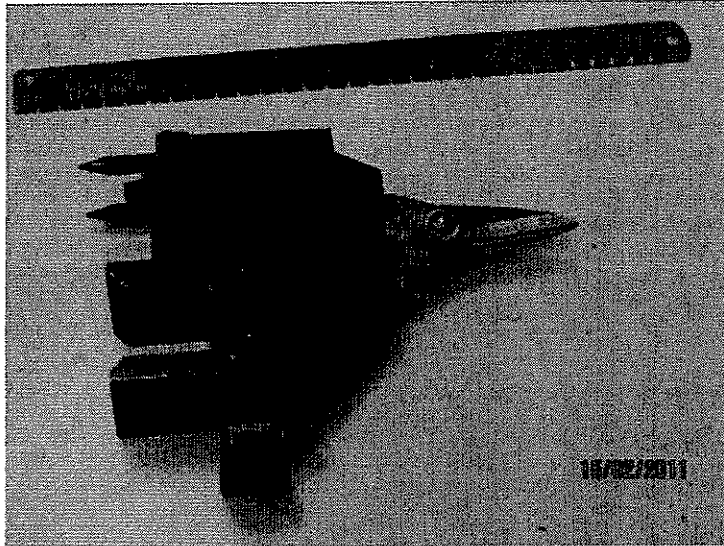
Function - for delicately penetrating soft surfaces and cloth bags.



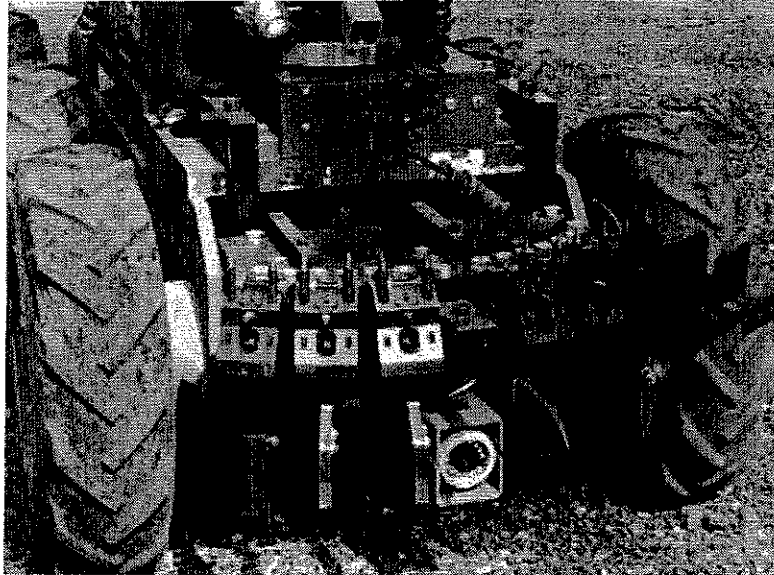
Scissors

Function - for cutting straps, cloth or wires.

*** Note – the scissors are the most complicated tool to connect or disconnect from the grippers and need the use of both the search and tools cameras. In connecting the tool to the gripper's position will be accordingly to holding the scissors and not like the connection position for the rest of the tools (Wolverine parallel, F6A wide open).



The scissors will always be mounted on the last left side mount, to enable viewing by both the tools and search cameras.



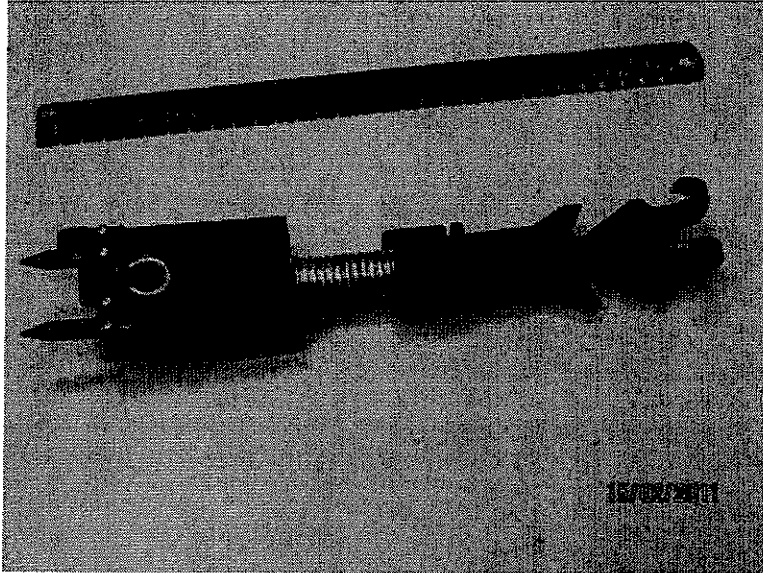
The scissors on the most left mount

*** Note – the size and shape of the scissors prevent supervision by the gripper camera. We recommend working with the tool vertically to enable supervision with the search camera or if possible gaining visual assistance from a second robot.

Car knob opener:

Functions: opening car doors and lifting car door locks.

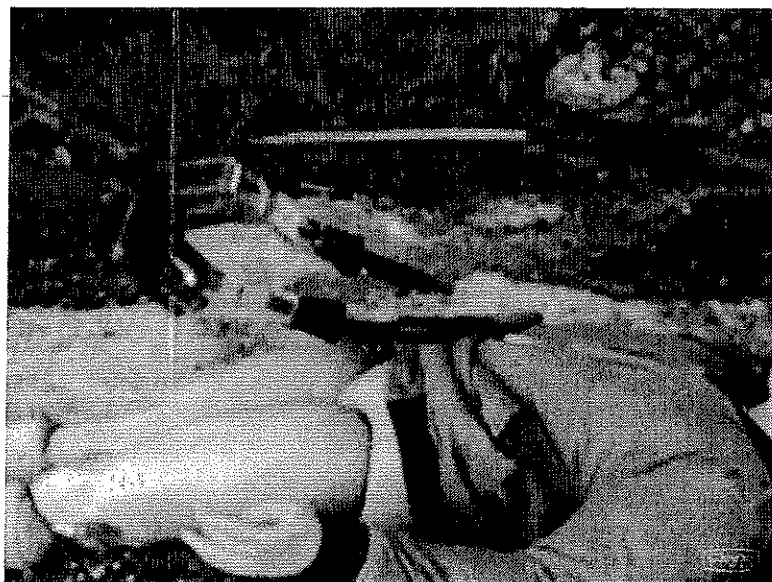
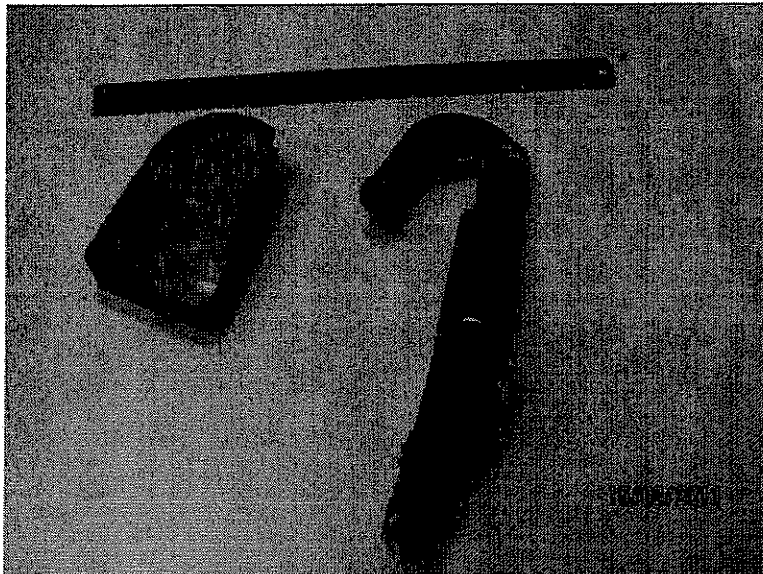
The spring on the tool enables freedom of action and counter momentum.



Stripper knife:

Functions: cutting straps and clothing of bodies.

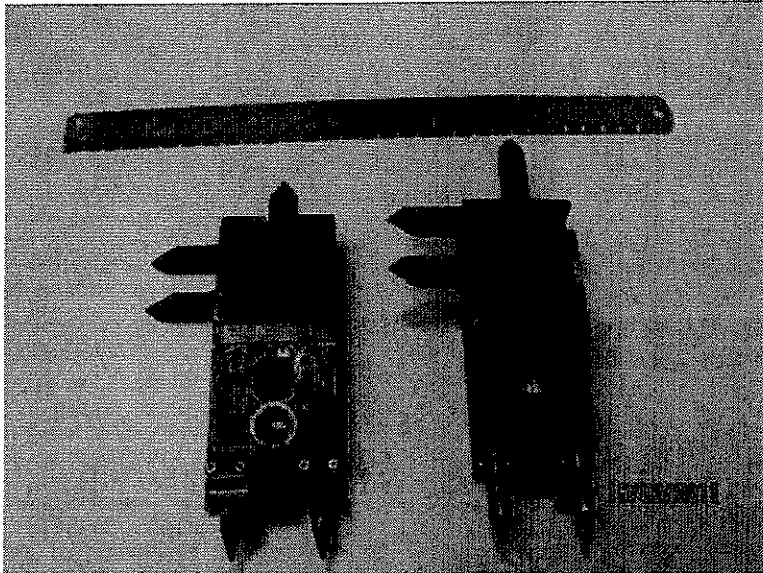
*** Note: this tool contains very sharp blades; extreme caution is required while assembling the blades with bare hands. When not operational, keep the knife cover on for safety to prevent injuries.



Dual direction spikes:

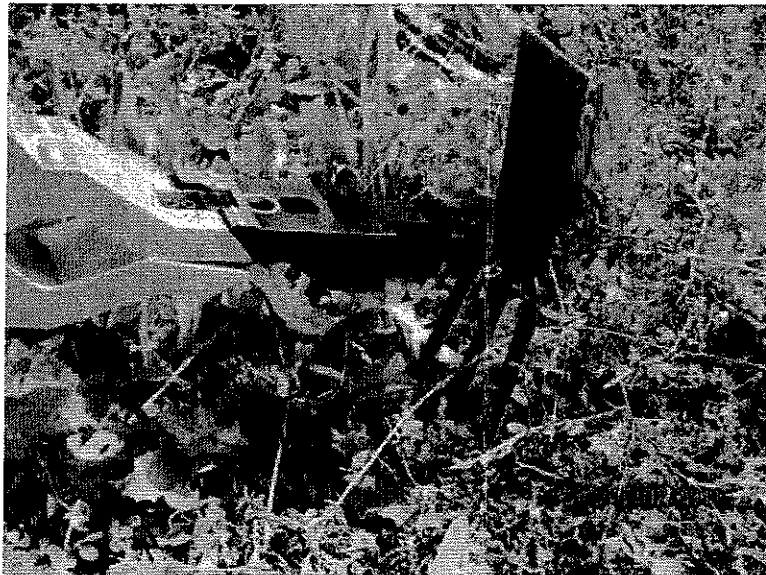
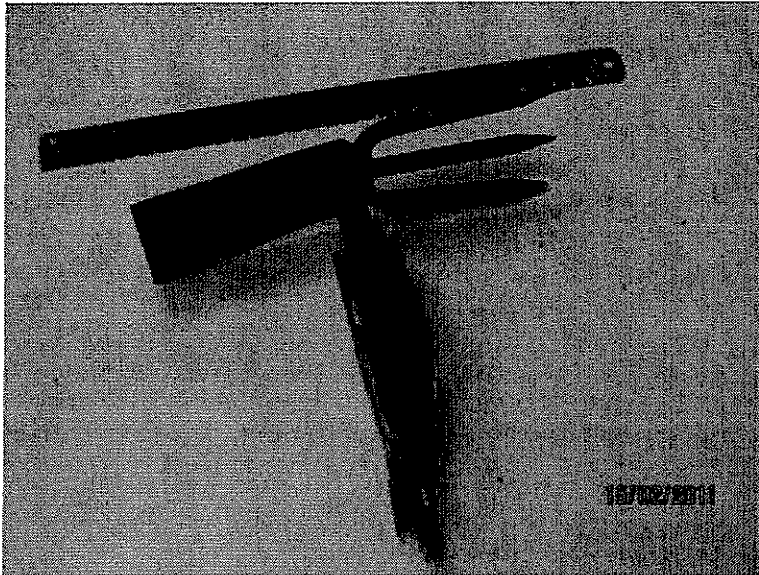
Functions:

- Tearing open plastic bags, cartons and cloth bags.
- Separating IED elements.
- Wrapping and tearing wires.



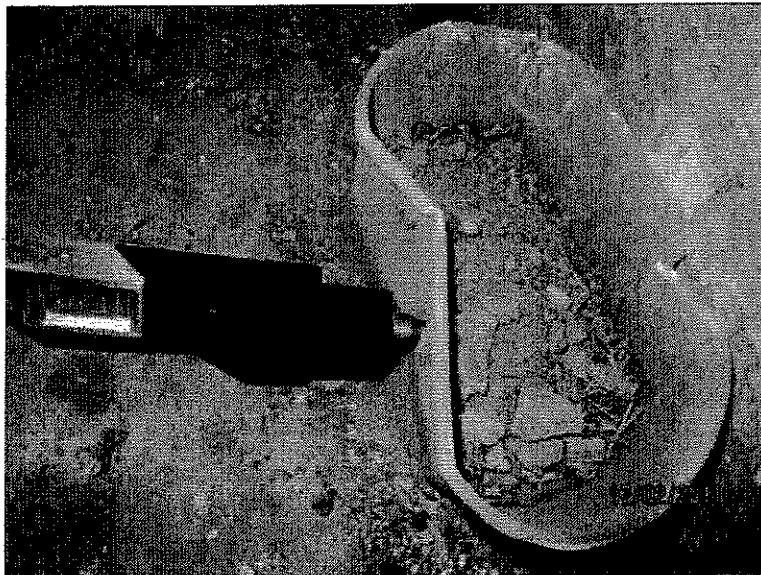
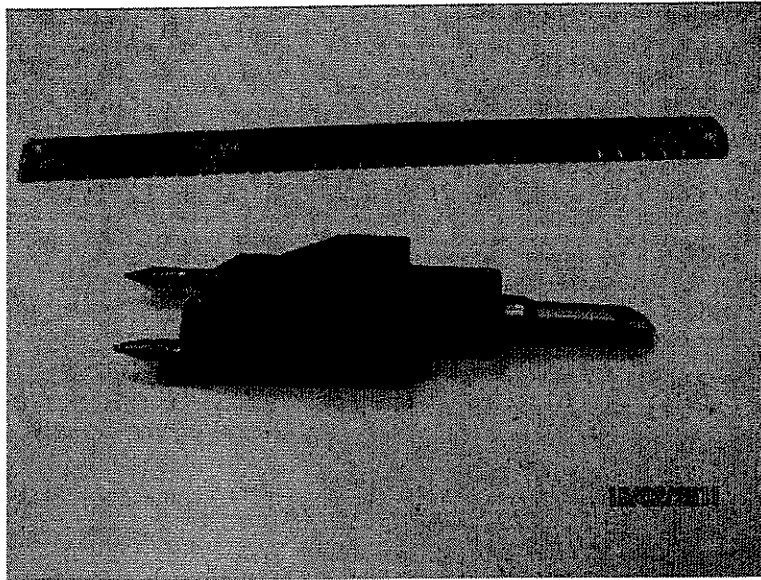
Rake and hoe:

Functions: digging and searching for buried devices, pressure plates or other elements.



Explosives sampler:

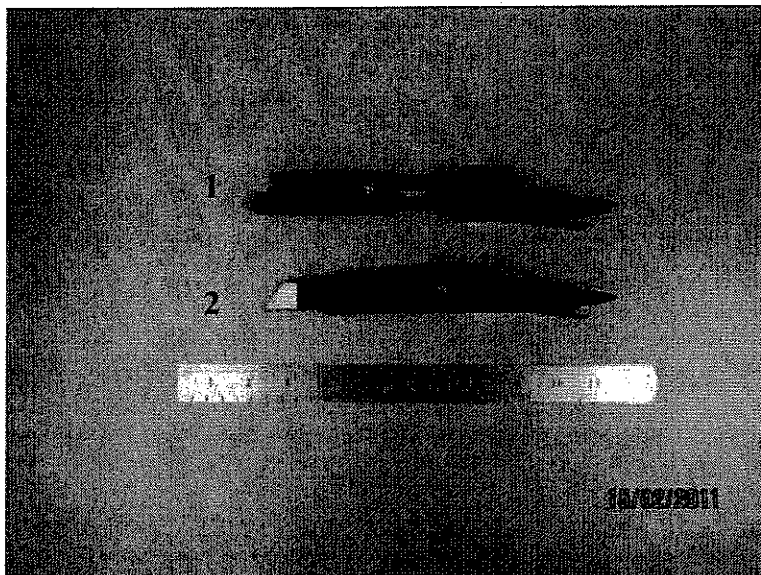
Functions: extracting samples of explosives from plastic containers, not for use for sampling liquid explosives. This tool can also be used for puncturing vehicle tires.



Cutting knife:

Functions: cutting open cloth bags and cutting explosive vests and belts straps.

*** Note: when not in operational use, always keep the blade cover closed.

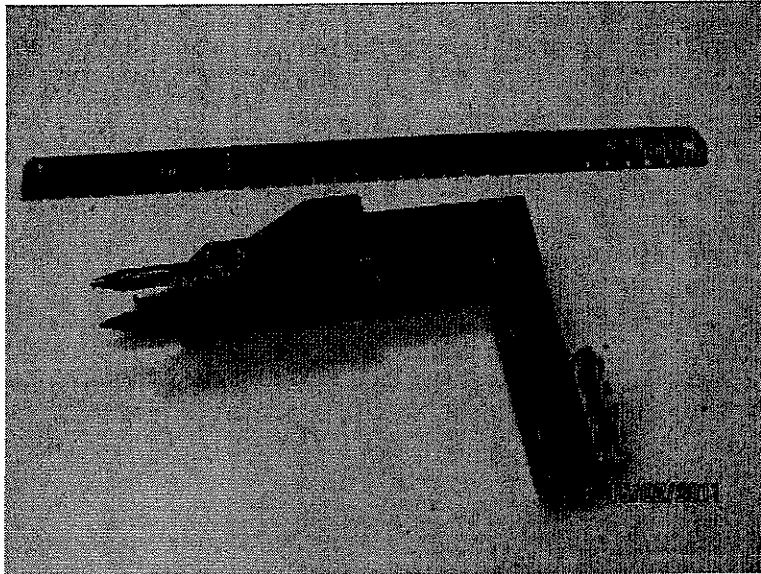


Cutting knife

1. Blade cover closed
2. Blade cover open

Picatinny adapter:

Functions: A rail system adapter for any other tool (future or existing), including Picatinny system tools from the earlier tools system versions. INP bomb techs use it for rapid wire deployment.



Ripper knife:

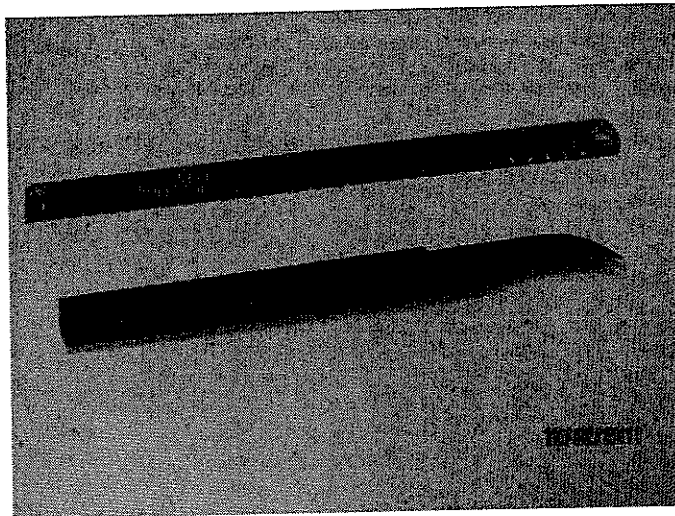
Functions: tearing and opening bags and soft cased containers. This tool is fixed permanently on the front of the Wolverine; the object is brought with the grippers to the knife for use.

The blade is always facing down.

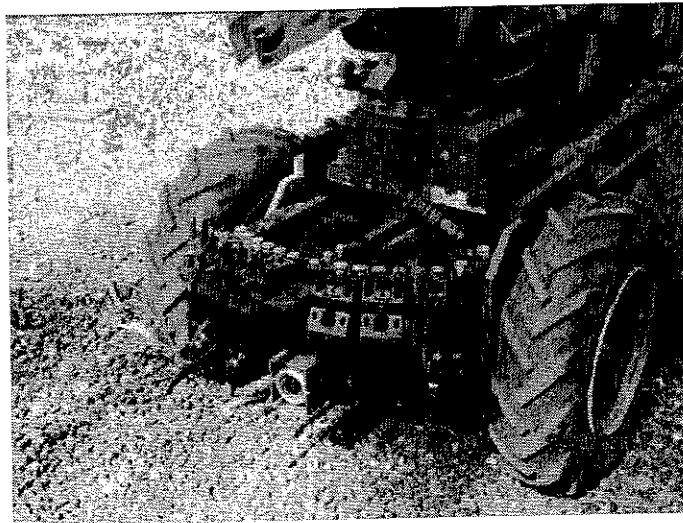
**** Note: When the knife is open (in work mode) it protrudes in front of the tool mounts and must be taken under consideration while changing to dual sided tools.

When not in use, always fold the knife back in to storage mode.

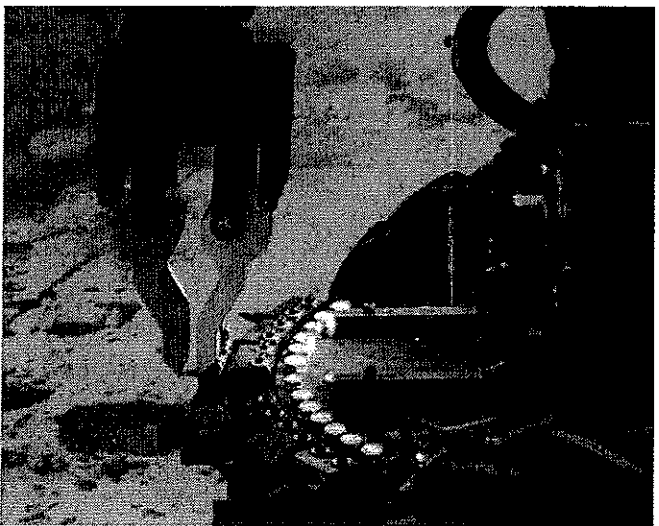
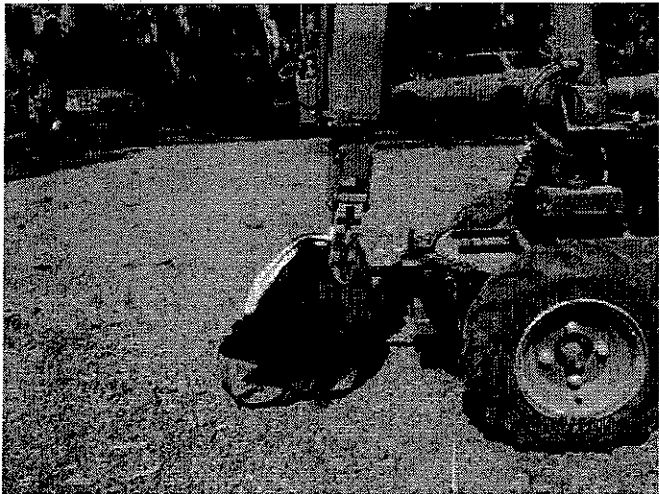
The safety pin must always be in safety hole (both in storage or work mode).



The knife



Open and locked knife



Ripper knife closed

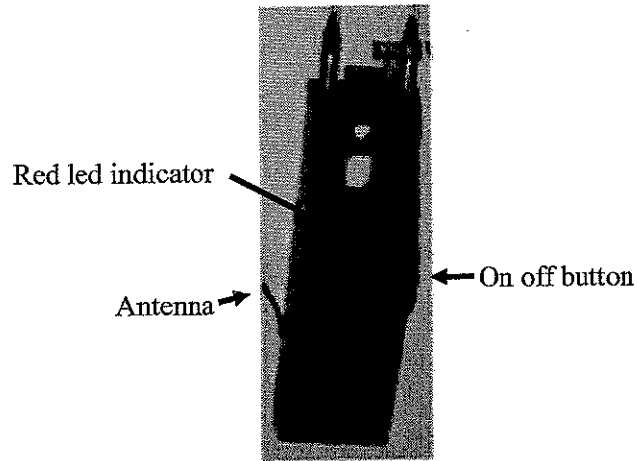
Wireless camera:

Functions: a separate camera on a separate video channel, to assist in viewing in to or under vehicles.

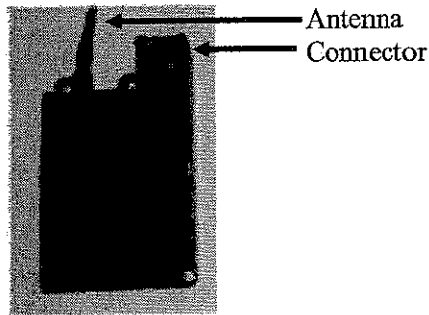
The receiver connects to the weapons camera.

The transmitter and receiver have protruding antennas.

The camera must be turned on manually before work; a red led will indicate functioning.



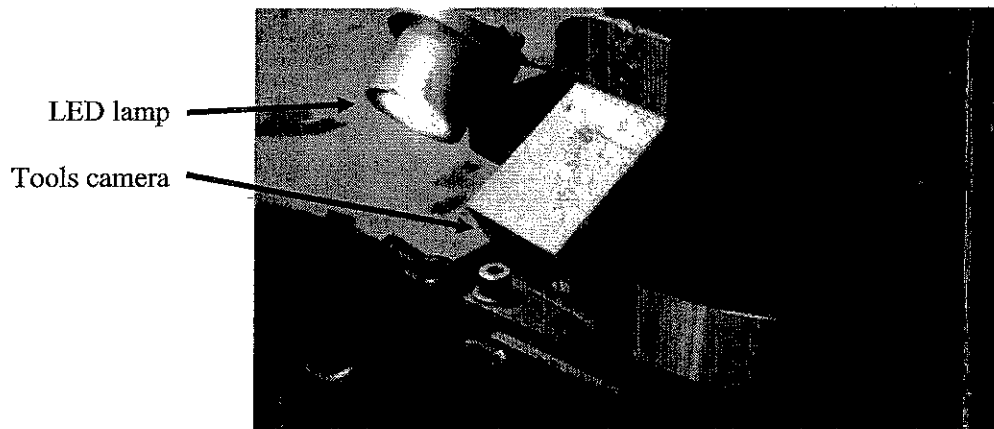
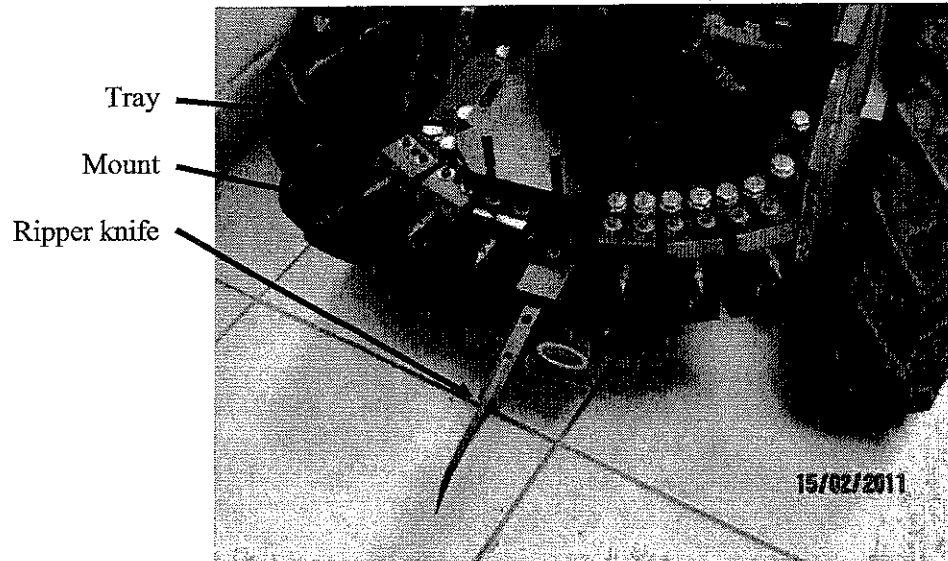
Camera with transmitter



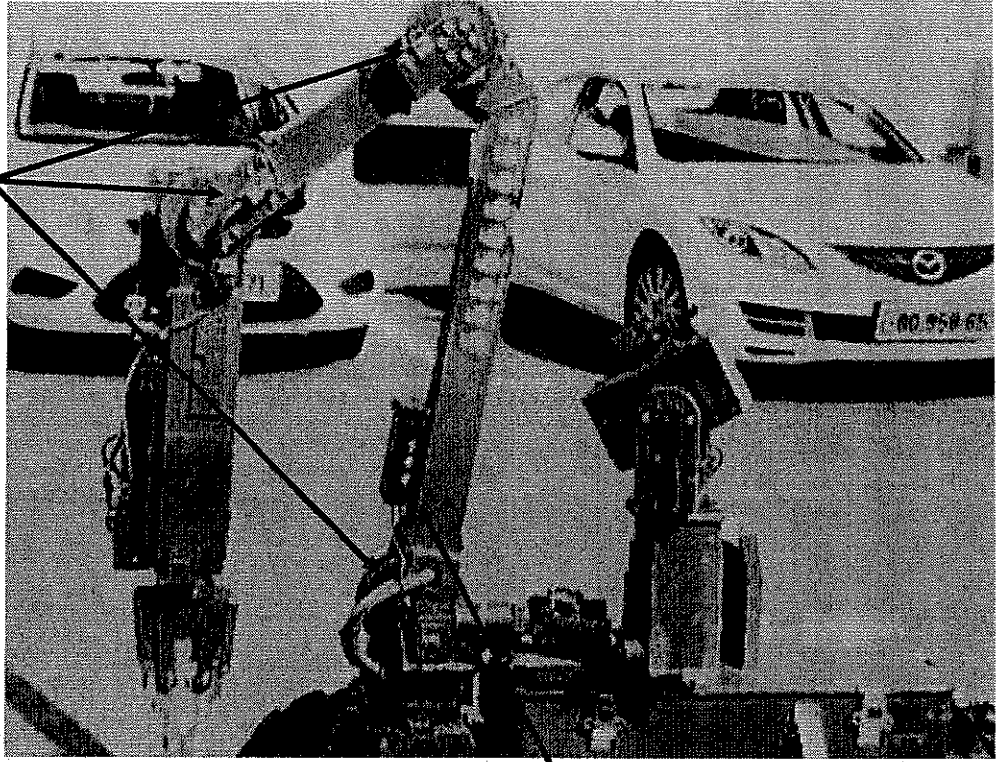
Camera receiver

6. Connecting and disconnecting tools – Wolverine

The Wolverine Tool kit has six mounts for tools, a front ripper knife, a tools camera, an LED lamp, an LED positioning set and an optional tray for carrying other elements such as counter charges.



Proximity position
switches



LED positioning box

A. Connecting:

- 1) Choose the tools needed for the specific scenario; suspicious object, VBIED, IED, PBIED....
- 2) If the ripper knife will be used, release the safety pin, open knife to work mode and lock with safety pin. The blade shall be facing down.
- 3) Use the search camera to observe the LED positioning indicator box.
- 4) While connecting to a tool change to tools camera and stay on search camera PIP (picture in picture).
- 5) Bring the robot arms to connecting position by order of

LEDS:

- a) Lift top arm, back joint 10 -15 degrees away from tool tray.
- b) Lift lower arm until lower LED indicates on.



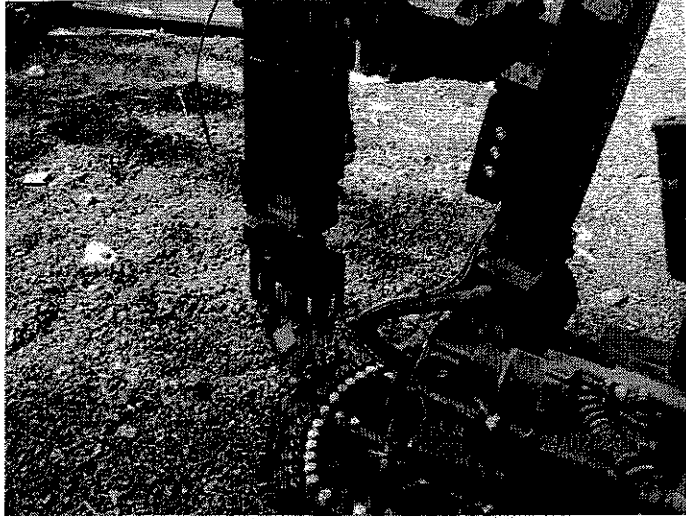
- c) Open/ close grippers until parallel and in line with gripper base.



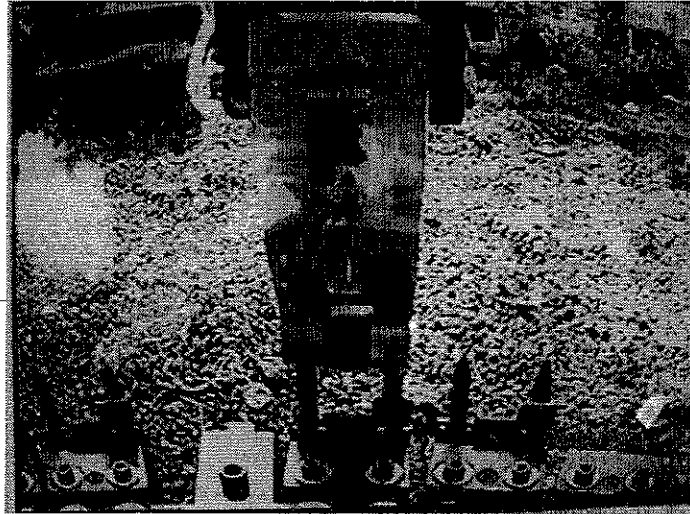
- d) Lift upper arm until middle LED indicates on.



- e) Rotate grippers parallel to the tool and to a 90 degrees angle, until the top LED indicator turns on.



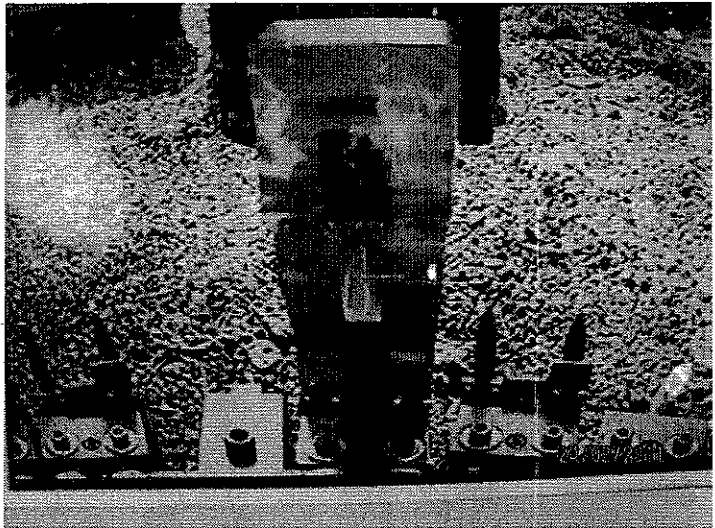
- f) Extend the grippers at least one half.
g) Bring the gripper to touch the chosen tool.



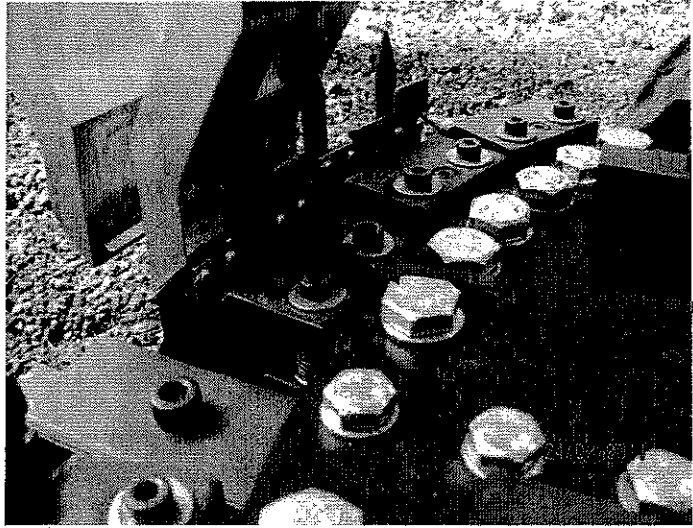
- h) Retract extender while sliding on the tool pins,
until the pins are opposite the holes.



- i) Extend gripper until the pins enter the holes.



- j) Extend the gripper slightly, pushing the mount down until the center screw projects about 1 cm².



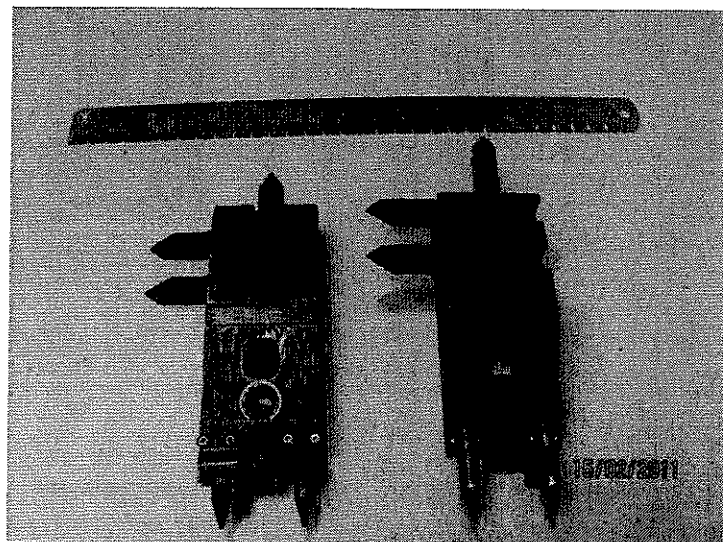
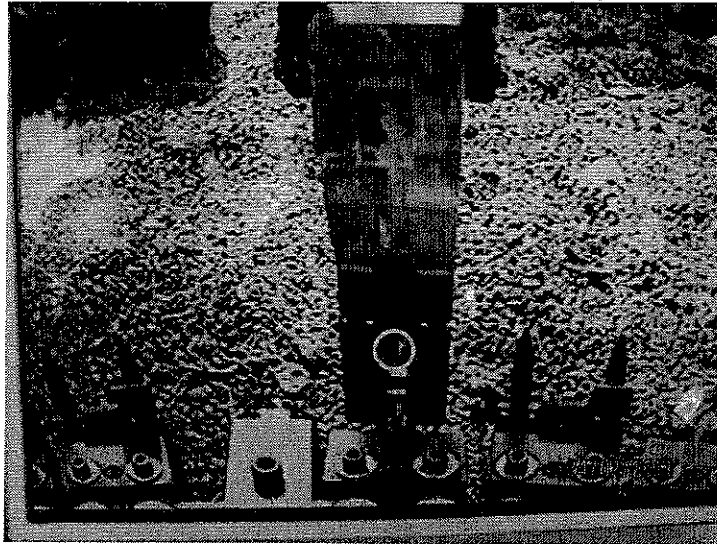
- k) Pull the tool out away from the robot.



- l) Caution is required from the ripper knife if open when extracting a tool. We recommend using the PIP search camera with the tools camera in particular if connecting to a second tool, in order to avoid damage from the ripper.
- m) For connecting a second tool on opposite gripper, use the same process.

B. Disconnecting from a tool:

- 1) Bring the arm and tool to connection position with the three LEDs indicating on.
- 2) Use the tools camera and search camera in PIP mode.
- 3) Position the tool and thread the yellow marked hole on the center mount's pin.

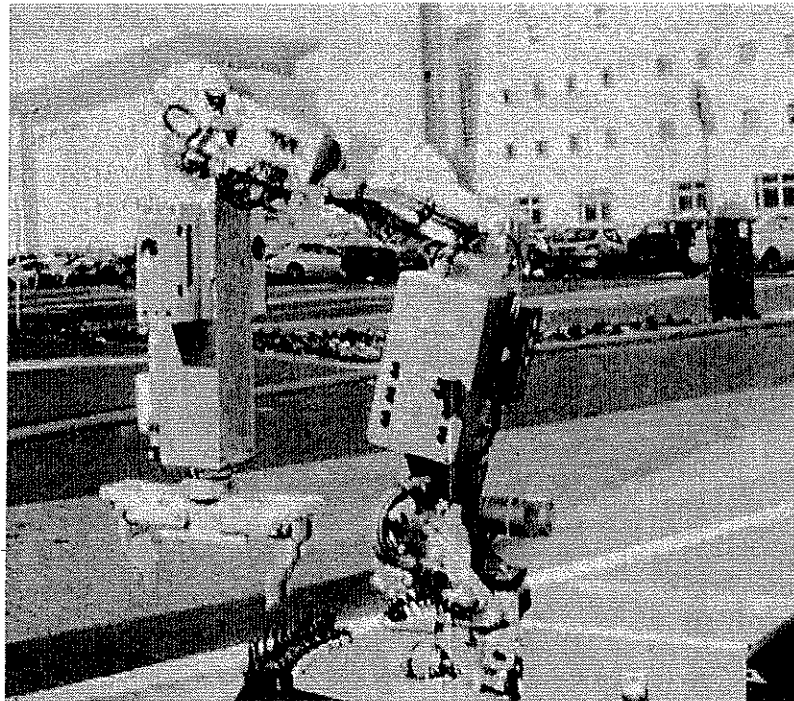


Yellow marked disengagement hole.

- 4) Lift/ return the extender and disengage from the tool. Do not use excessive force; this may cause the gripper to jump and damage the tools camera.

7. Connecting and disconnecting tools F6A:

- A. The connection and disconnection method is similar to the Wolverine method.
- B. The F6A plate has only four mounts for tools.
- C. There is no ripper knife (for now).
- D. Observation with the search camera is limited at times (because of the arm position), make more use of the tools camera.
- E. There is no carrying plate.
- F. Before connecting to a tool, open the grippers to their maximum.



8. User safety rules

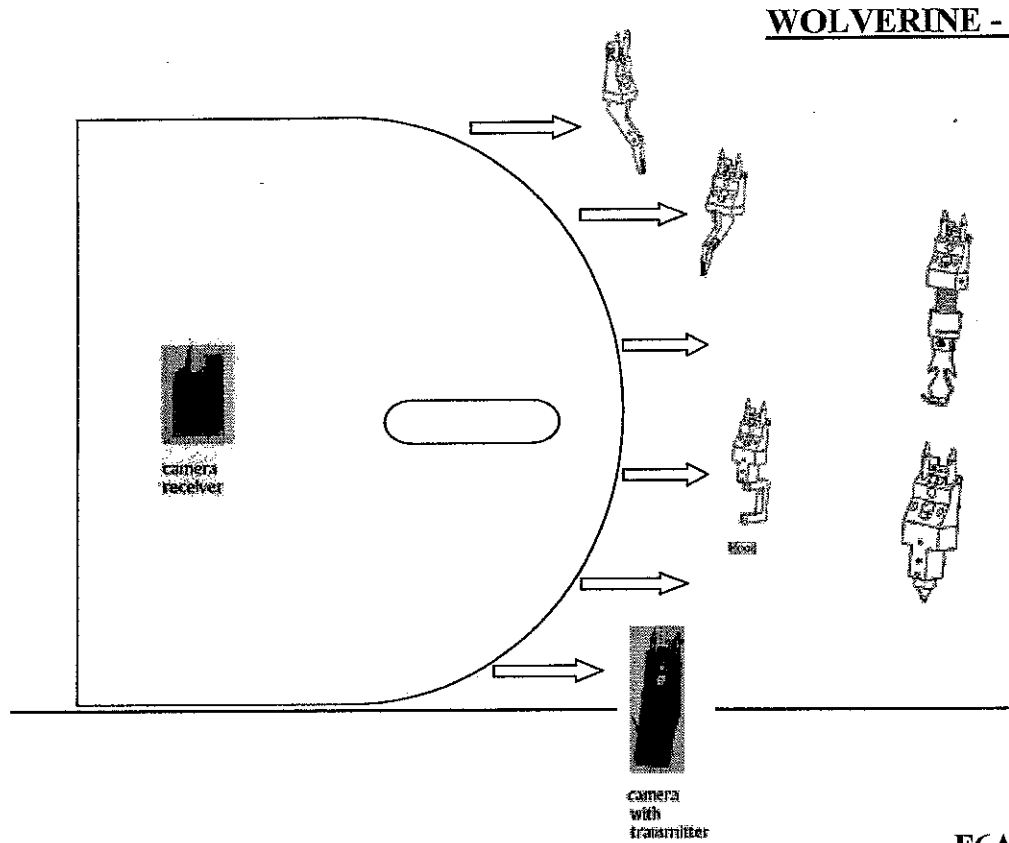
- A. The tools and plate protrude in front of the robot and down. Caution is advised in particular while overcoming obstacles and steps while using multiple cameras.
- B. The tool kit is heavy, when driving reverse and upwards express caution and slow down.
- C. Some of the tools are sharp – be careful.
- D. Knife tools shall be covered and closed when not in use.
- E. The front ripper knife shall always be with safety pin in and folded when not in use.
- F. Safety rules for HDS Israeli training:
 - All the training aids shall be inert, at all times of the training.
 - There shall be no use of live explosives or live ammunition.
 - For each training session a safety officer will be named.
 - Prior to each training session, safety rules will be read out.
 - All robot faults will be reported to instructors.
 - Caution is required from broken glass while training on vehicles.

9. Resolving problems:

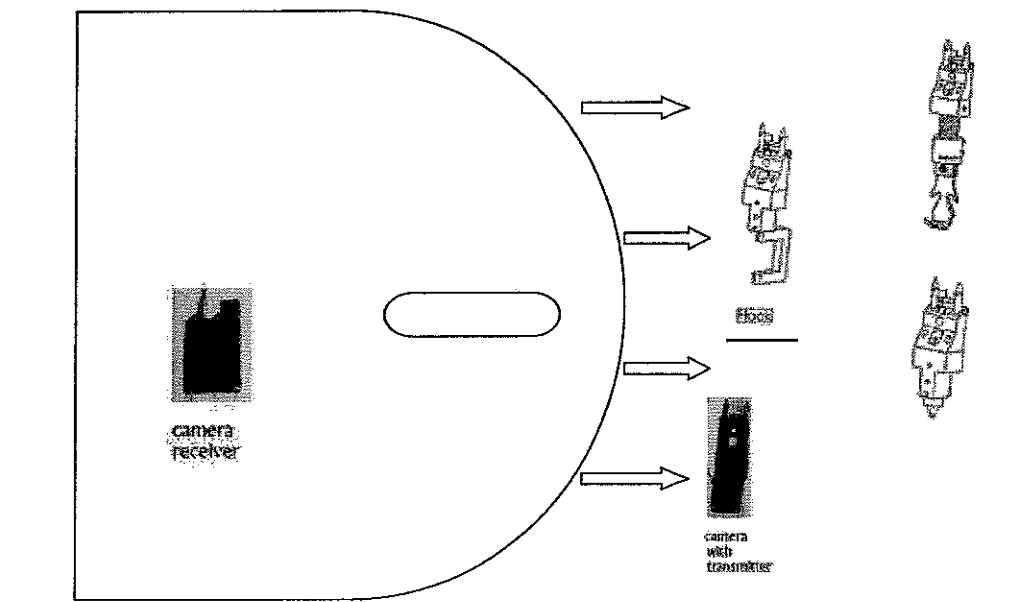
Problem	Solution	Remarks
Tool does not lock into mount	Fit the lock tab by unscrewing the Allen nut setting and tightening	
F6A cannot connect to tools though all LEDs are on	Check the gripper is fully open	
Wolverine cannot connect though all LEDs are on	Check the gripper is parallel.	
One of the LEDs does not turn on when in position	Check the proximity switch position	
Scissors won't connect	Open the grippers a little to fit the scissors	Use the search camera
Wireless camera doesn't work	Check the batteries and change	2 Lithium 3.7 v

10. Recommended tools and placement for scenarios:

VBIED

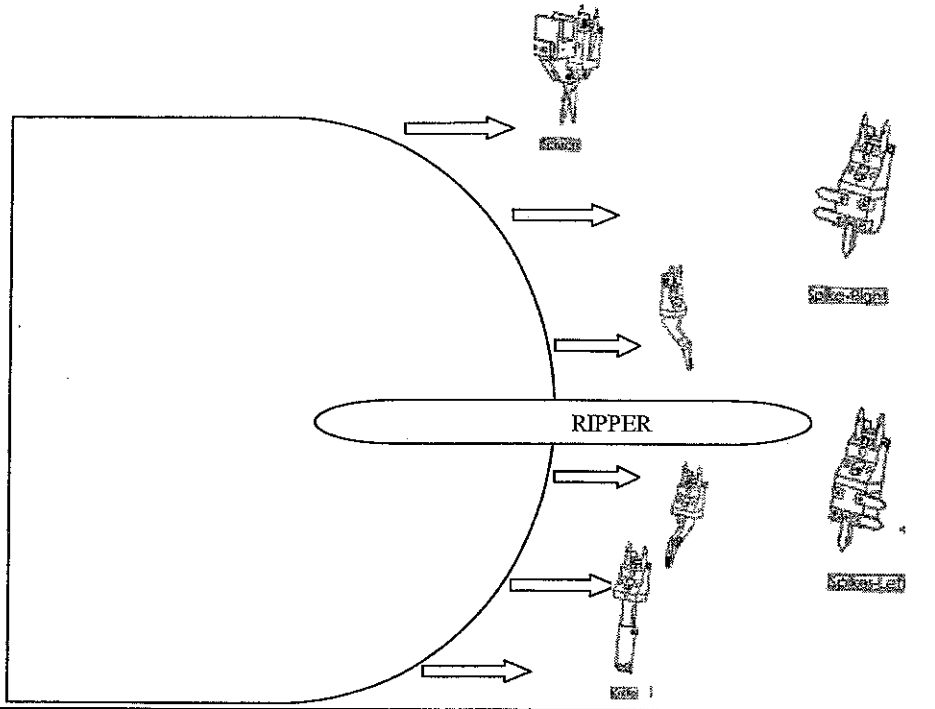


F6A



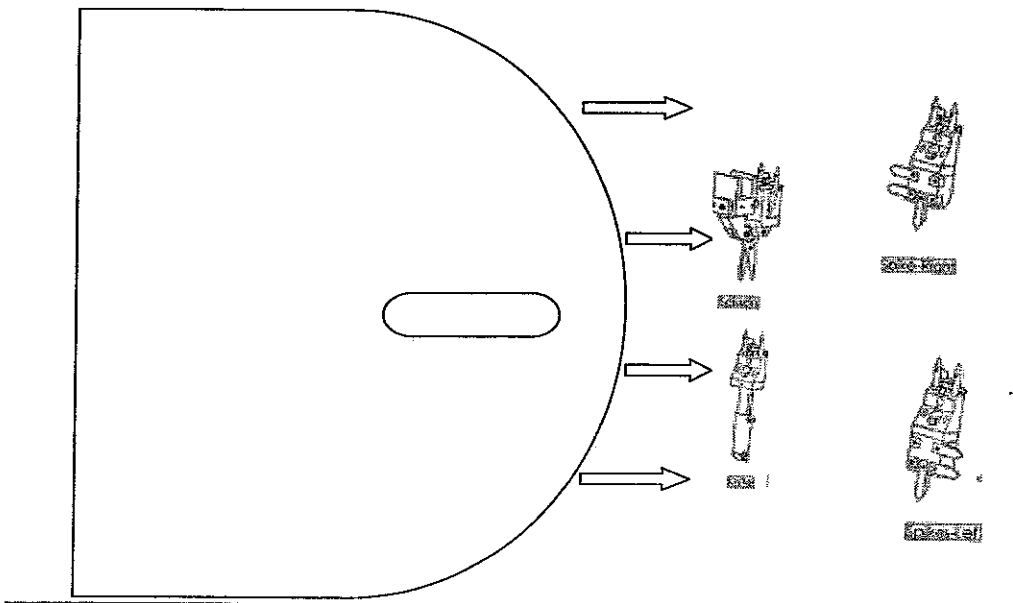
Suspicious object/ IED

Wolverine

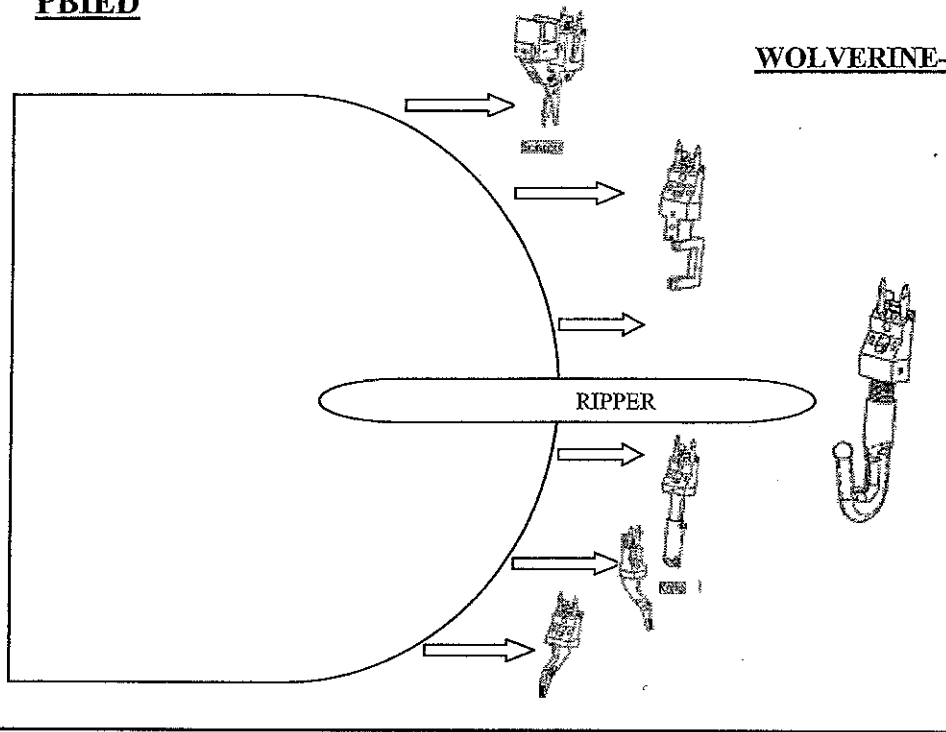


Note: With the ripper out, the spikes are difficult to connect, recommend to connect them prior down range, manually.

F6-A



PBIED



WOLVERINE-

F6-A

