Abstract:
The telemax is a high sophisticated, small and versatile EOD designed to be operated by bomb disposal engineers. It is best suited for operation in confined spaces like airplanes, underground trains and coaches. The 4-track running gear system displays superior mobility. It can easily cope with inclines of 45°, overcome obstacles measuring up to half a metre in height or 600 mm wide gaps. Moreover it is the world’s first EOD robot that features a manipulator with TCP-Control.
1 The telemax

1.1 Less is Sometimes More

This adage applies particularly to operations which have to be carried out in narrow spaces. Anywhere where the EOD robot tEODor* cannot operate, its little brother the telemax (see Figure 1 and Figure 2) will make sure that the vital distance is maintained between the bomb disposal engineer and the bomb, for example, on planes, underground trains and coaches.

Highlights:

- Programmable manipulator arm with tool centre point (TCP) control
- Excellent mobility thanks to four-track running gear
- 7-Axis manipulator with turret and linear axis
- Outstanding reach owing to the telescopic arm and height-adjustable chassis
- Automatic tool changing system
- Deploying AQUASET, Neutrex 12.5 recoilless and Neutrex 20 recoilless, RE 70 and RE 12g Mini, and shotgun Benelli

* Another EOD robot manufactured by telerob.
1.2 The Running Gear

This is the first time a vehicle of this size has been equipped with a 4-track running gear system (see Figure 2). Compared to all other types of running gear, it displays superior mobility. For example, it can easily cope with inclines of 45° or 100%. Obstacles measuring up to half a metre in height can be overcome without difficulty, as can 600 mm wide gaps in the surface. Separately suspended and spring-mounted, each running gear units can be operated individually, in pairs, or all at once. At the touch of a button, an intelligent control system presets the running gear configuration to match the given situation. This makes the operator’s task much easier, especially when the vehicle has to negotiate a narrow stairwell or high steps.

Incline sensors ensure that the telemax always maintains its equilibrium. Slopes and uneven surfaces can be compensated for in every conceivable direction, transforming the vehicle into a stable platform. If a top speed of 3.7 km/h with all four tracks in operation is not enough, the wheeled variant runs along at a brisk 4.7 km/h (continuously variable). The wheels can be easily mounted to the drive axle in a matter of a minute.

Figure 2: Running gear
1.3 The Manipulator

In order to appreciate the remarkable advantages of the telemax manipulator, it is important to take a quick look at how conventional EOD robots work. When using one of these, approaching a suspicious object with the manipulator involves a separate moving of multiple individual axes, each of which must be selected by pressing a button.

By contrast, the telemax is little short of revolutionary. It is the world’s first EOD robot that features TCP-Control. TCP refers to an imaginary ‘tool centre point’ or – stated more simply – the gripper or disrupter. This imaginary point in space is approached by simultaneously moving a thumb and index finger joystick. The intelligent control system automatically computes the axes necessary for attaining the desired target point.

What does this mean for the bomb disposal engineer? First and foremost, he saves precious time – and the more complicated the route to the suspicious object, the more time he saves. Moreover, the vehicle’s integrated robot control system offers other major advantages: it is fully programmable. This way, routine manipulator movements or running gear positions can be learned, stored and called up by the operator whenever required.

The telemax is the only vehicle in its class to have two tool magazines integrated in the chassis. This means that up to two additional tools or weapons can be carried on an operation, eliminating the need to return to base to pick up new equipment. Once again, the operator saves valuable time, permitting him to concentrate on the actual task at hand. At the touch of a button, the manipulator arm automatically withdraws an extra tool from the magazine.
1.4 The Control System

The vehicle is operated via a laptop-sized control console (see Figure 3). Movement of the vehicle and the manipulator is activated using an ergonomically designed thumb-finger-joystick unit. The operator can directly communicate with the system via a touch screen whose control surface changes to match the current situation, displaying all relevant control elements. Signals from the five colour cameras are displayed on a foldable 10.4” monitor; a picture-in-picture function allows the situation to be monitored from two different perspectives.

The control console and the transmitter / receiver unit are separately stored in a robust Peli case. The control station can be easily set up anywhere. Fitted to a carrying frame, the two cases can be quickly turned into a fully portable system. This means that a single engineer can carry out operations in confined spaces.

1.5 Other Important Characteristics

1.5.1 Safety Clutches

Built-in safety clutches prevent overload of the mechanical assemblies and possible damage of the respective motor gearbox units. When a safety clutch is triggered, e.g. after inadvertent collision with an obstacle, the manipulator’s position is automatically recalculated and the system is ready for operation again.
1.5.2 Telescopic Upper Arm

Just like its big brother tEODor the telemax is equipped with an additional linear axis. This extends the system’s reach while keeping it compact and easy to transport. Moreover, it makes it much easier to set objects down. This is a big help in positioning a disruptor, for example, or when inserting a key into a lock or for operating underneath a car.

1.5.3 Diagnostic System

The telemax features the same diagnostic system as the tEODor. Making an important contribution to ensuring long-term operational readiness, the control unit is able to display the full range of system statuses on a laptop monitor. If malfunction occurs, a trained operator or a telerob service engineer can locate the defect based on the data displayed and take immediate corrective action. For a remote diagnosis, this service is also available via the internet.

1.5.4 Built-in-Test

When the main switch is activated the system always conducts an inertial self-test. Essential internal communications functions are automatically checked, as is the status of the system. The vehicle is not cleared for operation until all safety-related checks have been successfully completed. This prevents the deployment of any system which is not fully functional.

Subject to technical change without notice.