

Duro Dakovic Specijalna Vozila (DD Special Vehicles Inc.) | Croatia

GENERAL DESCRIPTION

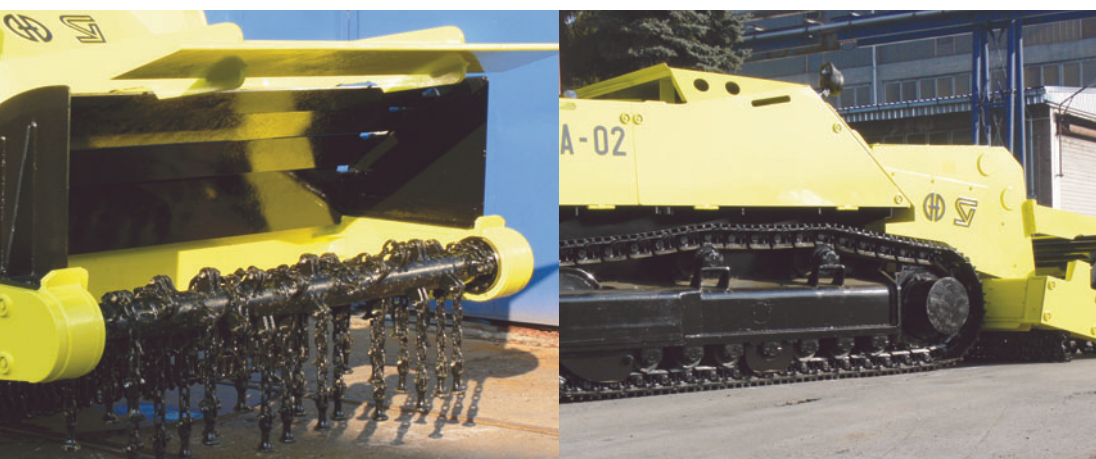
The *RM-KA-02* is a tracked demining machine with total weight of 14.5 tons. The remote-controlled medium flail is produced by the Duro Dakovic Specijalna Vozila company. The machine destroys all types of AV and AP mines as well as removing low, medium and high vegetation.

An operator using a joystick attached to a portable control panel remotely controls the system. The chassis is made of 20 mm steel plates. Vital parts of the machine are additionally protected from explosive blast by 10 mm Armox armoured steel plates. The armoured hood covering the flail unit uses a system of spring-mounted pipes designed to absorb explosive energy. When the flail detonates a mine, the blast passes between the pipes.

The remote control system is electric magnetic interference and radio frequency interference compliant and resistant to jamming. The machine is fitted with an automatic fire-extinguishing system.

Additional GPS, a video control system, a cable winch, a tiller unit and an escort vehicle are available as options.

Because of its small dimensions, the *RM-KA-02* can be easily transported by ordinary trailer and by plane as well as in a 20 ft container.



RM-KA-02 | Detailed view of the flail

CLEARANCE METHODOLOGY

The rotor turns the 36 chains of the flail unit at 600 rpm in both directions. A mushroom-shaped, strengthened steel hammer is attached at the end of each 30 cm long chain. As the machine works through a suspect area at between 0.3-1.2 km/h (depending on soil conditions) the chains will detonate or break up AP and AV mines. The system achieves an average ground penetration of up to 200 mm, measured on the whole cleaning width of 2,000 mm.

MACHINES IN USE TO DATE

An earlier version of the machine, *RM-KA-01*, has been in use by the Croatian Demin-ka company since 2001. Three *RM-KA-02* machines are operating in Croatia with Croatian demining companies.

ENGINE, FUEL AND OIL

The *RM-KA-02* is equipped with a Cummins 6CTA8.3-C diesel engine with 260 hp. The fuel tank capacity is 380 litres. Fuel consumption is 30 to 40 litres per hour (depending on working conditions). Hydraulic oil capacity is 260 litres. Oil capacity is 16 litres.

FACTORY SUPPORT

The manufacturer gives full after-sales support which includes: warranties, spare parts, servicing, training, technical documentation and integral logistical support (on request). User manual and spare parts catalogue are available in Croatian, English and any other language on request.

Two weeks training for operators and mechanics can be organised, on the manufacturer's own proving ground as well as on site.

The warranty covers the whole machine, except for consumables or wearing parts, as well as parts damaged in explosions. Subject to agreement, the manufacturer can organise local service support to assure full and effective maintenance.

MAINTENANCE AND SUPPORT

The manufacturer recommends a two-man team for operations. The RM-KA-02 needs daily and weekly checks, performed by the operators. The manufacturer recommends proper maintenance activities at defined intervals. The first three services in the warranty period are free of charge.

TESTS AND EVALUATIONS

The machine was tested by CROMAC and accredited in 2003 for both AV and AP mine clearance under all ground conditions. See also Croation Mine Action Centre (CROMAC), *Demining Machine Testing Committee: Possible Effects of Tested Demining Machines, Appendixes to CROMAC SOP 03.01: Efficiency Assessment of Technical Survey and Demining, 2007*. Test report available at the website: www.hcr.hr

The machine was tested against the criteria in the CEN Workshop Agreement (CWA) 15044 on Test and Evaluation of Mechanical Demining Machines by QinetiQ in June 2004 and by Defence Research and Development Canada in October 2004.

1. Leach C.A., Duro Dakovic RM-KA-02 Mine Flail assessment Phase 1. Farnborough, Hampshire:QinetiQ/FST/LDS/CR0461150/1.0, 2004 and
2. Coley G., Fall R., Danielsson G., Blatch P. and Wye L.. Duro Dakovic RM-KA-02 Flail Test and Evaluation. Suffield: Defence R&D Canada, 2005.

These reports and the CEN Workshop Agreement 15044 are available at www.itep.ws.

REPORTED LIMITATIONS AND STRENGTHS

Limitations

- > Difficult to operate with precision from greater distances. (This applies to all remotely controlled machines).
- > No automatic depth control or terrain following mechanism.
- > System creates huge dust clouds, as occurs with all flail systems in dry environments.

Strengths

- > Simple and rugged design.
- > For AV and AP mine clearance.
- > Good capability of the flail head "to dig... beyond the 15 cm depth of burial without any difficulty or evidence of skip zones in all but the most difficult soil conditions." (QinetiQ report.)
- > Good remote-control system.
- > Small and easy to transport.

DIMENSIONAL DATA

1. Length without attachment	3,980 mm
2. Length total	5,415 mm
3. Width without attachment	2,000 mm
4. Width total	2,500 mm
5. Clearing Working width	2,000 mm
6. Height Overall	1,900 mm
7. Mass Basic vehicle	13,000 kg
8. Mass Detachable unit(s)	1,500 kg
9. Mass Overall	14,500 kg

OPERATIONAL DATA

10. Wheels Tracks (description)	Tracks 400 mm width
11. Ground Bearing Pressure (kPa)	0.58 kg/cm ²
12. Hill climbing ability (in degrees)	Max gradient 35° Max grade slope 25°
13. Number of Chains Chisels Tools	36
14. Beat pattern (hits per m ²) at different operating speeds	Hammers overlay width 7 mm
15. Length of Chains Tools	350 to 450 mm
16. Diameter of drum	900 mm
17. Rotation Speed	Up to 600 rpm
18. Clearance Working depth in varying terrain	More than 250 mm
19. Working Speed (m ² /h)	
> Light Soil Medium Vegetation	2,000 m ² /h
> Medium Soil Medium Vegetation	Not given
> Heavy Soil Dense Vegetation	500 m ² /h
20. Control of Clearance Working depth	Manually
21. Additional attachable working tools	
22. Armour	Chassis plates 20 mm and armour plates 10 mm, ARMORX
23. Remote controlled	Yes
> greatest distance	Up to 800 m
24. Transportation	
> short distances	Easily transportable on a 15 tonne trailer
> long distances	
> sea transport	
> air transport	

SYSTEM STATUS AND DEPLOYMENT

25. Machines in use	3
26. Other types	No
27. Location of use	Croatia
28. Totally cleared so far (m ²)	Not given

ENGINE | FUEL | OIL

29. Engine	Cummins 6CTA8.3-C with 194 kw (264 hp)
30. Engine power at the flywheel	Not given
31. Sufficient power supplied to working tool	Not given
32. Fuel capacity	360 l
33. Fuel consumption	35 to 40 l/h
34. Separate engine for working unit	No
35. Cooling system	Water
36. Oil capacity (both engines)	—
37. Hydraulic oil capacity (both engines)	220 l

COSTS

38. Cost of system	Not given
39. Other costs	
> training	Included
> spare part set chains belts	Negotiable
> repair costs for one year	Negotiable
40. Availability for hire	Yes

OTHER

41. Operator comfort	N/A
42. Air conditioning	N/A