

Countermine plc | United Kingdom

### GENERAL DESCRIPTION

The Oracle demining system was developed in Sweden in 1994. It is based on an armoured Caterpillar 973C TTL and is designed to clear both AP and AV mines as well as other explosive objects.

The main mine clearance tool is a rotating tiller drum fitted with replaceable heavy-duty steel teeth. The tool is designed to be easily repairable if it is damaged by a mine blast.

The machine comes with different tools for use depending on conditions. The choice of tool is determined by the depth at which mines are expected to be found, the types of mines on the site, and local soil conditions. Apart from the standard tool a “fine tool” is available to deal with very small mines and a “heavy duty tool” for very tough and rocky ground conditions.

The tiller drum on the standard tool has 252 bits; the drum on the fine tool has 490 bits. The staggered positioning of the digging tools on the rotor is designed to prevent AP mines passing between them. The tiller unit is powered by two commercial Caterpillar diesel engines and a hydraulic pump system, towed behind the prime mover on a trailer armoured to the same specification as the prime mover.



ORACLE II | In desert conditions

The Oracle II uses a standard Caterpillar track vehicle and the system (basic vehicle, hydraulic power unit and tiller tool) weighs 65 tons. Other attachments for the Caterpillar vehicle, such as a demolition bucket and a mine clearance rake, can be fitted. The Caterpillar mine rake is standard equipment for the US Army. Designed to rip mines from the soil, the rake has a clearance width of 366 cm to an average depth of 30 cm. The rake uses 35° tines, replaceable when damaged. The upturned soil, and any mines within it, is pushed to the right side of the unit in a windrow.

---

The system can be operated directly by an operator or by optional remote control. Operator comfort and ergonomics were priorities during the design. Controls are simple, needing minimum effort from the driver. The cab is pressurised with filtered air and air conditioned.

Oracle II main features are:

- > the driver is protected by Armox 370T Class 2 Armour plates with armour glass and polycarbonate at the same level of protection
- > the machine is protected by Armox 370T Class 2 Armour plates
- > automatic speed control system
- > automatic depth control
- > three escape routes for driver
- > automatic fire extinguisher system and manual fire extinguishers
- > designed to destroy both AP and AT mines
- > large size tiller machine
- > claimed maximum clearance speed is 15,000 m<sup>2</sup>/h
- > it can be transported by road on a low-bed trailer, or by rail, ship or large cargo aircraft

### **CLEARANCE METHODOLOGY**

The tiller drum rotates clockwise at nominally 200 rpm (depending on soil conditions) and achieves a penetration depth of 20-50 cm depending on required demining depth. A depth sensor fixed to the rotor regulates the clearance depth.

The action of the rotating steel teeth is intended to break up or detonate mines. The clearance width of the system is 322 cm. During demining, the maximum speed is 5 km/h.

Demining and vegetation cutting is done in one operation. Claimed maximum theoretical clearance speed is 15,000 m<sup>2</sup>/h in very light soil, but in practice between 4,000 to 8,000 m<sup>2</sup>/h under normal conditions. Vegetation has little negative effect on clearance speed.

### **MACHINES IN USE TO DATE**

One Oracle I machine has been operating in Croatia since 2000 with the demining company Terrafirma, a subsidiary of Countermine Technologies AB. Two Oracle II machines have been operating in Libya since 2008.

### ENGINE, FUEL AND OIL

The prime mover is powered by a 178 kw Caterpillar C9 diesel engine. The hydraulic system has two 522 kw Caterpillar C18 diesel engines and uses mineral hydraulic oil: fuel capacity for this attached unit is 1,800 litres. Normal fuel consumption for the prime mover is 40 litres per hour, for the hydraulic system 200 litres per hour.

### FACTORY SUPPORT

The Oracle II uses Caterpillar components, which are supported by Caterpillar's worldwide service, parts and logistical organisation. Caterpillar claims to deliver parts to almost any location within 48 hours.

Driver and mechanic training are available on request: drivers one week, mechanics two weeks. All documentation is in English and can be translated into any major language on request.



ORACLE II | In service on a minefield



ORACLE II | In action

### **MAINTENANCE AND SUPPORT**

Maintenance is according to Caterpillar standards for track loader machines. Maintenance of the tool depends on type of soil and type of mines. The system requires one operator and one mechanic, backed by a small workshop (in a small bus or container) with the necessary tools for servicing heavy equipment. Daily service: one to two hours. Weekly service: four hours. Service and maintenance schedules are provided.

### **TEST AND EVALUATION**

One test report on the Oracle I is available:

1. BRTRC Technology Research Cooperation, Area Mine Clearing System (AMCS), Study Report, by US Army Project Manager for Close Combat Systems (PM - CCS), 2002. The report is available at:  
[www.itcp.ws/pdf/AMCSStudyReport.pdf](http://www.itcp.ws/pdf/AMCSStudyReport.pdf)

### **REPORTED LIMITATIONS AND STRENGTHS**

No information yet available for the new Oracle II.

## DIMENSIONAL DATA

1. Length without attachment	6,094 mm
2. Length total	14,712 mm
3. Width without attachment	2,755 mm
4. Width total	3,898 mm
5. Clearing   Working width	3,220 mm
6. Height   Overall	3,650 mm
7. Mass   Basic vehicle	31,500 kg
8. Mass   Detachable unit(s)	Tool 8,000 kg   Hydraulic Power Unit 25,500 kg
9. Mass   Overall	65,000 kg

## OPERATIONAL DATA

10. Wheels   Tracks (description)	Tracks
11. Ground Bearing Pressure (kPa)	Prime Mover with tool: 88.2 kPa HPU: 107.4 kPa
12. Hill climbing ability (in degrees)	30°
13. Number of Chains   Chisels   Tools	252 on standard tool   490 on fine tool
14. Beat pattern (hits per m <sup>2</sup> ) at different operating speeds	<b>Standard tool</b> 695 hits/m <sup>2</sup> at 1 km/h 227 hits/m <sup>2</sup> at 4 km/h <b>Fine tool</b> 1,400 hits/m <sup>2</sup> at 1 km/h 450 hits/m <sup>2</sup> at 4 km/h
15. Length of Chains   Tools	N/A
16. Diameter of drum	1,450 mm
17. Rotation Speed	150 - 205 rpm
18. Clearance   Working depth in varying terrain	200 - 500 mm
19. Working Speed (m <sup>2</sup> /h)	
> Light Soil   Medium Vegetation	15,000 m <sup>2</sup> /h
> Medium Soil   Medium Vegetation	8,000 m <sup>2</sup> /h
> Heavy Soil   Dense Vegetation	4,000 m <sup>2</sup> /h
20. Control of Clearance   Working depth	Automatic
21. Additional attachable working tools	
22. Armour	ARMOX 370T Class 2 armour plates, protective glass and polycarbonate
23. Remote controlled	As option
> greatest distance	Not given
24. Transportation	
> short distances	Max. speed on tracks 10 km/h
> long distances	By low bed trailer or as per European railway profile or ship or large cargo aircraft
> sea transport	
> air transport	

## SYSTEM STATUS AND DEPLOYMENT

25. Machines in use	3 (1 type Oracle I, 2 type Oracle II)
26. Other types	Oracle (old type)
27. Location of use	Croatia (Oracle I), Libya (Oracle II)
28. Totally cleared so far (m <sup>2</sup> )	4,800,000 m <sup>2</sup> (End 2006)

## ENGINE | FUEL | OIL

29. Engine	Prime Mover 1xCAT C9 @178 kw
30. Engine power at the flywheel	1,044 kw
31. Sufficient power supplied to working tool	800 kw
32. Fuel capacity	Prime Mover 430 l, HPU 1,850 l
33. Fuel consumption	Prime Mover 40 l/h, HPU 200 l/h
34. Separate engine for working unit	2x CAT C18 @522 kw total 1,044 kw
35. Cooling system	Liquid cooled/air to air after cooled charge air (all engines)
36. Oil capacity (both engines)	Prime Mover 29 l, HPU 2x40 l
37. Hydraulic oil capacity (both engines)	Prime Mover 250 l, HPU 850 l

## COSTS

38. Cost of system	1.5 – 2 Million US\$
39. Other costs	
> training	On request
> spare part set chains   belts	Spare part kit 2.5% of system cost
> repair costs for one year	Approx 5,000 - 15,000 US\$ including maintenance
40. Availability for hire	Yes, on request

## OTHER

41. Operator comfort	Driver completely air suspended, 4-point safety belt, three escape doors, fire extinguisher automatic and manual, ergonomic controls
42. Air conditioning	Yes