

Komatsu Ltd. | Japan

### GENERAL DESCRIPTION

The Komatsu company has been in business for more than 85 years and started to develop humanitarian anti-personnel demining equipment in 2003 with the aid of the Japanese Government.

The standard middle-size Komatsu Bulldozer D85EX-15 on tracks is used as the prime mover of the tiller system, and is partnered with Komatsu's CS210 soil-digging stabilising system. The CS210 and engine, transmission and controllers are all Komatsu-designed technology. The machine is suitable for operating in all kinds of terrain. The track system is equipped with an oscillation system to enable more ground contact on hard slopes or uneven terrain.

The machine can be driven by an operator or remotely controlled. With the specially developed filter and cooling system, the machine can operate in a broad range of climatic conditions. The operator cabin, engine and tanks for fuel and hydraulic oil are all protected by bullet-proofed material.

For longer journeys between worksites a flatbed trailer is required. It can be made lighter for transportation by separating the front attachment and rear counterweight. The overall weight of the system is 35,000 kg: separating the attachments reduces the weight to 27,400 kg or 22,300 kg.



KOMATSU | In action in different vegetation

### CLEARANCE METHODOLOGY

The tiller system penetrates the ground to a depth of 300 mm and performs well on vegetation cutting. The working tool rotates at about 200 rpm. It can be tilted, as well as raised and lowered. The machine's claimed maximum clearance rate is 1,000 m<sup>2</sup>/h. In Afghanistan and Cambodia, actual average clearance rates were between 400 and 600 m<sup>2</sup>/h. A blade can be attached to the bulldozer for dozing operations after clearing operations.

### MACHINES IN USE TO DATE

The first machine is in service with the Mine Dog and Detection Center in Afghanistan. The second machine belongs to the Cambodian Mine Action Center (CMAC). The third machine has been operated as a joint project by Japan Mine Action Service (JMAS) and CMAC in Cambodia. The fourth machine has been used as a joint project by JMAS and the National Institute for Demining in Angola.

### ENGINE, FUEL AND OIL

The diesel engine is Komatsu's own SA6D125E generating 179 kw (240 hp). Normal fuel consumption is around 40 litres per hour.

## FACTORY SUPPORT

- > Spare parts are available from the manufacturer.
- > Komatsu also offers two- or three-week factory training for operators and mechanics.
- > Operation manuals and field assembly manuals are available in English.

## MAINTENANCE SUPPORT

Daily maintenance and periodic changes for consumable parts are recommended.



KOMATSU | In action and ready for transport

## TESTS AND EVALUATIONS

Two test reports are available:

1. Project for Research and Development of Demining Related Equipment in Cambodia. Final Report of Komatsu - D-85EX (Komatsu) – 2007: [www.cmac.org.kh/menu\\_rd.asp](http://www.cmac.org.kh/menu_rd.asp)
2. Japan International Cooperation System (JICS), Final report (summary) for humanitarian mine clearance equipment in Afghanistan under the research project for developing mine clearance related equipment in Afghanistan, 2004-2005: [www.mineaction.org/downloads/1/Final%20Report%20\(Summary\).pdf](http://www.mineaction.org/downloads/1/Final%20Report%20(Summary).pdf)

They can also be found at [www.itep.ws](http://www.itep.ws)

## REPORTED LIMITATIONS AND STRENGTHS

### Limitations

- > The tiller system is not designed for clearance of AV mines.
- > Complete with the tiller attachment, the system weighs 35 tons. For transport over longer distances, a low loader is required.

### Strengths

- > The system can operate various terrains, including steep slopes, uneven ground, dry riverbeds and canal sides, and rocky sites.
- > Capacity to detonate or neutralise all AP mines.

## DIMENSIONAL DATA

1. Length without attachment	6,625 mm
2. Length total	8,620 to 9,000 mm
3. Width without attachment	2,510 mm
4. Width total	3,470 mm
5. Clearing   Working width	2,550 mm
6. Height   Overall	3,620 mm
7. Mass   Basic vehicle	28,000 kg
8. Mass   Detachable unit(s)	Not given
9. Mass   Overall	35,000 kg

## OPERATIONAL DATA

10. Wheels   Tracks (description)	Tracks
11. Ground Bearing Pressure (kPa)	1.1 kP/cm <sup>2</sup>
12. Hill climbing ability (in degrees)	30°
13. Number of Chains   Chisels   Tools	152
14. Beat pattern (hits per m <sup>2</sup> ) at different operating speeds	Not given
15. Length of Chains   Tools	Not given
16. Diameter of drum	Not given
17. Rotation Speed	200 rpm
18. Clearance   Working depth in varying terrain	300 rpm
19. Working Speed (m <sup>2</sup> /h)	
> Light Soil   Medium Vegetation	
> Medium Soil   Medium Vegetation	
> Heavy Soil   Dense Vegetation	Max 1,000 m <sup>2</sup> /h
20. Control of Clearance   Working depth	Not given
21. Additional attachable working tools	Blade
22. Armour	Yes
23. Remote controlled	Yes
> greatest distance	100 m
24. Transportation	
> short distances	
> long distances	Over long distances on a flat bed trailer
> sea transport	
> air transport	

## SYSTEM STATUS AND DEPLOYMENT

25. Machines in use	4
26. Other types	No
27. Location of use	Afghanistan, Cambodia, Angola
28. Totally cleared so far (m <sup>2</sup> )	Not given

## ENGINE | FUEL | OIL

29. Engine	Komatsu SA6D 125E-3
30. Engine power at the flywheel	(SAEJ1349) 179 kw (240 hp)/1900 rpm
31. Sufficient power supplied to working tool	Not given
32. Fuel capacity	490 l
33. Fuel consumption	About 40 l/h
34. Separate engine for working unit	No
35. Cooling system	Water
36. Oil capacity (both engines)	Not given
37. Hydraulic oil capacity (both engines)	Not given

## COSTS

38. Cost of system	On request
39. Other costs	On request
> training	On request (2-3 weeks)
> spare part set chains   belts	On request
> repair costs for one year	On request
40. Availability for hire	Not given

## OTHER

41. Operator comfort	Not given
42. Air conditioning	Yes