

## FLAIL SYSTEMS | MEDIUM FLAIL | AARDVARK MK 4

Aardvark Clear Mine Ltd | United Kingdom

### GENERAL DESCRIPTION

The Aardvark was introduced in 1985, since when approximately 240 machines of all variants have been sold worldwide. The latest model is the *Aardvark Mk 4* which has been in production since 2001 as a medium mechanical flail.

The latest Aardvark Mk 4-H is a chain flail system designed to destroy AP and AV mines while cutting vegetation.

The machine uses a half-track platform giving it greater traction and stability in difficult terrain but can be operated on wheels in suitable terrain accessible to wheeled vehicles.

Wheels can replace the tracks if the machine is required to transport itself over moderate distances. If the vehicle must move to a new location over a longer distance, it is better to transport it by low-loader.

Power to operate the flail is derived from the substantial vehicle engine/hydrostatic transmission system. The Mk 4 is controlled by one or two operators seated in a fully air-conditioned and armoured cab. The joystick steering control (dual steering) can be switched from one operator to the other. Dual steering enables an operator to switch position if wind direction and dust obscures sight. A situational awareness system is fitted to aid operation and training. The belly armour is angled for maximum blast deflection and the protective glass around the cab is strengthened with an internal polycarbonate liner and an external steel mesh.



AARDVARK MK 4

## **CLEARANCE METHODOLOGY**

During clearance operations, the vehicle moves rear-end-first into a suspect area. The flail component has an operational clearance width of 3 m, and to a maximum ground penetration depth of 600 mm. The ground penetration depth is adjusted by an automatic contouring and depth control system, with “lock-out” for hard surface clearance.

The system is designed to tackle 150 mm-diameter trees and dense vegetation.

The interchangeable flail/implement drum rotates at approximately 300 rpm. The manufacturer states that the flail unit will detonate or break up mines.

The flail can be rotated in either direction to aid in runway and other hard surface clearance operations. The flail is hydraulically driven.



AARDVARK MK 4

## **MACHINES IN USE TO DATE**

The manufacturer says that 180 Mk III and 40 Mk 4 machines are currently in use worldwide. Most have been bought by national armed forces, including those of Angola, Bangladesh, Canada, Egypt, France, Italy, Iran, Ireland, Jordan, Korea, Libya, Morocco, Pakistan, Saudi Arabia, Sweden, the UK and the US (Air Force, Army and Marines).

## **ENGINE, FUEL AND OIL**

The Aardvark Mk 4 has a single 350 hp turbocharged Caterpillar engine using standard diesel or JP8 fuel. Oil used in the engine and hydraulic systems is of a standard type used by agricultural/construction machines around the world. Reference tables are supplied for all major oil suppliers recommended by the engine/transmission manufacturers.

### **FACTORY SUPPORT**

Aardvark provides after-sales support to its customers. Manuals covering operation, maintenance and spare parts are supplied in English and other languages as required and are part of the sales package. Translation into the customer's language is possible if required.

A large parts inventory is maintained at the factory and spare parts can be shipped at short notice. The warranty covers one year from the date of delivery to final destination. Aardvark recommends a minimum of one-month's training for users and maintenance staff either in the UK or at a location chosen by the customer. The company also offers other support, including personnel for extended operations and long-term maintenance packages.

### **MAINTENANCE AND SUPPORT**

Regular maintenance comprises daily, weekly and monthly checks as laid down in the operating procedures. The company recommends a two-man crew to operate the vehicle. Aardvark claims that no special workshop facilities are required. According to the manufacturer, the machine is designed to be field-repairable by Aardvark and/or CAT technicians.

The British Defence Evaluation and Research Agency (DERA) has stated that a lot of effort has gone into making the Mk 4 more maintenance-friendly.

Daily preventive maintenance checks and service takes a maximum of 45 minutes with two staff.

## TESTS AND EVALUATIONS

Three test reports are available at [www.itep.ws](http://www.itep.ws):

1. Aardvark Mark IV Joint Services Flail Unit (MKIV), Capabilities Demonstration, United States Army Communications-Electronic Command Research, Development & Engineering Center, Fort Belvoir, Virginia 22060-5806, Night Vision & Electronic Sensors Directorate DoD Humanitarian Demining Research & Development Programme, USA, 2002:  
[www.itep.ws/pdf/aardvark.pdf](http://www.itep.ws/pdf/aardvark.pdf)
2. Area Mine Clearing System, Study Report, BRTRC Technology Research Cooperation, US Army, Project Manager for Close Combat Systems (PM - CCS), 2002: [www.itep.ws/pdf/AMCSStudyReport.pdf](http://www.itep.ws/pdf/AMCSStudyReport.pdf)
3. Evaluation of Aardvark Mk IV Flail, C.A Leach, Defence Evaluation and Research Agency (DERA), UK, 2001:  
[www.itep.ws/pdf/aardvark\\_trial\\_report.pdf](http://www.itep.ws/pdf/aardvark_trial_report.pdf)

## REPORTED LIMITATIONS AND STRENGTHS

### Limitations

- > The system creates huge dust clouds, as occurs with all flail systems in dry environments.
- > Visibility can become difficult for the operators.

### Strengths

- > The Aardvark Mk 4 is a mature product and incorporates all the lessons learnt from 24 years of safe operation.
- > Simple mechanism.
- > Spare parts readily available.
- > Air transportable in a Hercules C-130 aircraft when the flail and the air filter are removed.
- > High degree of operator safety.
- > Good manoeuvrability.

**DIMENSIONAL DATA**

1. Length without attachment	5,969 mm
2. Length total	8,769 mm
3. Width without attachment	2,580 mm
4. Width total	3,556 mm
5. Clearing   Working width	3,000 mm
6. Height   Overall	3,632 mm (2,670 mm without air intake)
7. Mass   Basic vehicle	11,284 kg
8. Mass   Detachable unit(s)	4,140 kg
9. Mass   Overall	15,694 kg

**OPERATIONAL DATA**

10. Wheels   Tracks (description)	Both (2 wheels/half-tracks, or 4 wheels)
11. Ground Bearing Pressure (kPa)	Not given
12. Hill climbing ability (in degrees)	35°
13. Number of Chains   Chisels   Tools	72
14. Beat pattern (hits per m <sup>2</sup> ) at different operating speeds	Every piece of ground will be struck at least twice
15. Length of Chains   Tools	100 cm
16. Diameter of drum	232 cm
17. Rotation Speed	Approx. 300 rpm
18. Clearance   Working depth in varying terrain	Up to 580 cm
19. Working Speed (m <sup>2</sup> /h)	
> Light Soil   Medium Vegetation	2,500 m <sup>2</sup> /h
> Medium Soil   Medium Vegetation	1,200 m <sup>2</sup> /h
> Heavy Soil   Dense Vegetation	300 m <sup>2</sup> /h
20. Control of Clearance   Working depth	Automatic contouring, with 'LOCK-OUT' override
21. Additional attachable working tools	
22. Armour	60 mm protected glass and 10 mm armoured steel
23. Remote controlled	Optional
> greatest distance	5,000 m
24. Transportation	
> short distances	Flat bed/plant trailer/drops truck,
> long distances	USAF CERTIFIED, C130, C17, C5 aircraft,
> sea transport	own wheels (4)
> air transport	

## SYSTEM STATUS AND DEPLOYMENT

25. Machines in use	220
26. Other types	No
27. Location of use	26 countries worldwide
28. Totally cleared so far (m <sup>2</sup> )	Not given

## ENGINE | FUEL | OIL

29. Engine	Caterpillar 6 cylinder in-line turbo diesel engine
30. Engine power at the flywheel	350 hp
31. Sufficient power supplied to working tool	Not given
32. Fuel capacity	500 l
33. Fuel consumption	42 - 62 l/h (circa 10 hours work)
34. Separate engine for working unit	No
35. Cooling system	Air and pressurised cooling system
36. Oil capacity (both engines)	25 l
37. Hydraulic oil capacity (both engines)	355 l (hydrostatic transmission and flail drive)

## COSTS

38. Cost of system	On request
39. Other costs	
> training	Yes, operators and mechanics
> spare part set chains   belts	Not given
> repair costs for one year	Not given
40. Availability for hire	Yes with full support package

## OTHER

41. Operator comfort	Blast attenuated seats, dust filtration, headphones, dual controls, situational awareness system
42. Air conditioning	Not given