

Sarvatra | Sri Lanka

GENERAL DESCRIPTION

The *Arjun* is a track-driven, hydraulic excavator used as a mechanical asset for humanitarian demining. In addition to the rake and the vegetation rotary cutter as the ground preparation tools, available working tools are a sifter bucket, a dozer blade and a bucket for survey and construction tasks.

The operator's cabin is protected with reinforced steel plates and equipped with splinter-proofed glass windows. The engine compartment, hydraulic hoses and fuel hoses are protected by metal casings. In case of emergency the operator can escape by opening the inner latch of the cabin. The cabin also has a small fire extinguisher.

Speed control and contouring systems are provided for vegetation cutting in hydraulically operated travel mode.

Tests carried out using live P4 MK1 and Chinese Type-72 mines confirmed the survivability of the system against AP mine blasts. The system has not been tested against an AV mine blast but it is estimated that damage should only occur to the rake tool while the excavator should not be affected.

The *Arjun* is capable of winging and traversing the hydraulic arm simultaneously. It can rake and loosen ground up to 200 m²/hour for further follow-on clearance by manual deminers. Attachable working tools are designed to reach into and process small areas such as trenches, ditches, canals, bridges, culverts, dry river banks, shallow water, around trees and around destroyed buildings and rubble.

A "quick change" device at the end of the hydraulic arm makes changing the working tools simple and fast.

The *Arjun* moves independently within the working site. It can be transported over long distances by air, train or road (on a flat-bed trailer).



ARJUN

CLEARANCE METHODOLOGY

The machine is a non-intrusive system. The hydraulic arm of the machine reaches into the minefield/suspected hazardous area while the machine stays on safe ground. The machine removes dense undergrowth, scarifying the ground and raking it to a depth of 200 mm (beyond if required). Performance results show a 100% exposure of UXO, AV mines, fragmentation mines, IEDs and 80% of AP mines. When fitted with a vegetation rotary cutter, it can also remove high density vegetation.

The machine has always located pattern-laid mines. The machine is used for primary ground preparation, which is followed by manual deminers as the main clearance asset.

MACHINES IN USE TO DATE

There are a total of seven machines working in Sri Lanka.

ENGINE, FUEL AND OIL

The current model is based on the TATA 697 NA 80 hp, water-cooled diesel engine consuming an average of 10 litres of fuel per hour of continuous working.

FACTORY SUPPORT

Spares for fast-moving parts for 2,000 working hours are supplied with the machine. Training of operators can be arranged on request.

MAINTENANCE AND SUPPORT

Maintenance is required at every 250 hours of engine operation and at every 1,500 hours of the hydraulic system. Routine maintenance and servicing is carried out by the mechanic as per the operator's manual. Repair facilities are available all over the world. The Arjun requires one team leader, two operators and a mechanic during operation in the field.

TESTS AND EVALUATIONS

Operational performance and survivability tests to fulfil the requirements of UNDP and the National Steering Committee for Mine Action have been conducted in Sri Lanka.

REPORTED LIMITATIONS AND STRENGTHS

- > It cannot be operated at gradients of 35° or more.
- > It cannot be used in marshy and water-logged areas.
- > Ground preparation speed is limited to 200 m² per hour.
- > Softening the ground through watering is required for hard and dry soil.

Strengths

- > The Arjun can achieve from 40 to 60 m² clearance (REDS) per deminer/day.
- > The system exposes mines/UXO instead of detonating them as with other mechanical demining machines. This enhances the lifecycle of the machine and safety. No detonation has happened in six years of operation in Sri Lanka.
- > Use of the rake or the bucket enables survey of bunkers, embankments and fortifications.
- > It can also be used for construction of roads, drains, embankments and foundations.

DIMENSIONAL DATA

1. Length without attachment	3,790 mm
2. Length total	7,270 mm
3. Width without attachment	2,490 mm
4. Width total	2,490 mm
5. Clearing Working width	2,490 mm
6. Height Overall	2,690 mm
7. Mass Basic vehicle	11,000 kg
8. Mass Detachable unit(s)	Not given
9. Mass Overall	11,500 kg

OPERATIONAL DATA

10. Wheels Tracks (description)	Track mounted hydraulic excavator
11. Ground Bearing Pressure (kPa)	0.39
12. Hill climbing ability (in degrees)	35°
13. Number of Chains Chisels Tools	Two track chains
14. Beat Pattern (hits per m ²) at different operating speeds	Not given
15. Length of Chains Tools	3,340 mm
16. Diameter of drum	N/A
17. Rotation Speed	N/A
18. Clearance Working depth in varying terrain	200 mm, more if required
19. Working Speed (m ² /h)	Up to 200 m ² /h
> Light Soil Medium Vegetation	Not given
> Medium Soil Medium Vegetation	Not given
> Heavy Soil Dense Vegetation	Not given
20. Control of Clearance Working depth	Not given
21. Additional attachable working tools	Bucket, sifter, vegetation cutter
22. Armour	Not given
23. Remote controlled	No
> greatest distance	
24. Transportation	
> short distances	Not given
> long distances	
> sea transport	
> air transport	

SYSTEM STATUS AND DEPLOYMENT

25. Machines in use	7
26. Other types	No
27. Location of use	Sri Lanka
28. Totally cleared so far (m ²)	50,000,000

ENGINE | FUEL | OIL

29. Engine	Tata 697
30. Engine power at the flywheel	80 hp
31. Power at the working tool	Not given
32. Fuel capacity	250 l
33. Fuel consumption	10 l/h
34. Separate engine for working unit	No
35. Cooling system	Water
36. Oil capacity (both engine)	14 l
37. Hydraulic oil capacity (both engine)	Not given

COSTS

38. Cost of system	85,000 US\$
39. Other costs	
> training	10,000 US\$
> spare part set chains belts	5,000 US\$
> repair costs for one year	2,000 US\$
40. Availability for hire	No

OTHER

41. Operator comfort	Not given
42. Air conditioning	Optional

