

Scanjack AB | Sweden

GENERAL DESCRIPTION

The *Scanjack 3500* is a heavy flail based on a Finnish deforestation machine that has been on the market for several years. The first modified demining version was built in 1999.

The Scanjack 3500 employs a unique, front-mounted double flail system. Since 1999, the system has undergone several evaluations and tests, with good results. Since the first model, the Scanjack 3500 has been improved in more than 600 engineering tasks, including improvements to protection of the cabin, remote control and cooling capacity. The manufacturer says that most of the changes have resulted from experience in various operating theatres, as well as customer requirements for quality assurance and operator safety.

The Scanjack 3500 is designed to clear AP and AV mines. The machine is operated from an armoured cab. The level of armour can be varied at customer request. However, the most common level of protection corresponds, says the manufacturer, to the NATO STANAG 4569, (level 3 for ballistic protection). The machine can be optionally operated by a remote control system and the operating range is from 300 m to 700 m, depending on customer request. (For longer remote control distances a camera system must be added.) The stated clearance width is 3,500 mm.

The running gear of the Scanjack 3500 is a combination of wheels and tracks. Wheels provide for transport between locations. When the system is put to work in the minefield, removable environmental steel tracks are added to improve traction and manoeuvrability.



SCANJACK 3500 | Operating in Bosnia

CLEARANCE METHODOLOGY

The Scanjack 3500 drives forward into a mined area with both front-mounted flails rotating at the same speed. During testing, best results were achieved with the flails rotating clockwise, although it is possible to set rotation anti-clockwise. The flails can rotate concurrently in opposite directions.

The chains of the front flail are approximately 100 mm shorter than those of the second. The front flail cuts vegetation and clears the ground to a depth of 150 mm. The second flail is designed to clear down to 300 mm. The total clearance depth of the system claimed by the manufacturer is 300 mm. With a rotation speed of 300-400 rpm, the flail unit hits the ground approximately six times per second.

Both flails have 76 chains with weighted hammer tips. The chains are hardened and can be replaced when damaged. During testing and development, chains required replacement approximately once a month. Chain types other than those produced by the manufacturer can be used.

MACHINES IN USE TO DATE

- > Two machines have been operational in Croatia since 2000.
- > Five machines were delivered in 2003 to the Swedish Army.
- > One machine was delivered to Piper d.o.o. in August 2003 for use in Croatia.
- > One machine was delivered to the Swiss Foundation for Mine Action in October 2003 and is now operational in Sudan under WFP.
- > Two machines have been operational in Iraq since 2005.
- > One machine was bought by the Netherlands military.
- > The Swedish Army operated two machines in Bosnia and Herzegovina during 2007.

ENGINE, FUEL AND OIL

- > The Scanjack has a six-cylinder John Deere 6081HTJ02 diesel engine with 220 hp for the base unit. The hydraulic oil capacity is 190 litres.
- > The flail unit has a Scania DSI 14 turbocharged V8 diesel engine with 570 hp. The hydraulic oil capacity for this unit is 390 litres.
- > Mineral hydraulic oil is included in the standard equipment package.
- > The machine uses the same fuel tank for both engines.
- > The fuel capacity is 300 litres and the consumption is 60-80 litres per hour during flail operation, depending on conditions.

FACTORY SUPPORT

The standard equipment comprises tools, operator manual, spare parts catalogue, fire extinguisher, travel distance gauge and constant engine revolution regulator, stability brake, hydraulic steps and mineral hydraulic oil.

Training of operators and mechanics is offered during manufacturing until the end of the second month after delivery. Training costs are part of the purchasing package.

A one-year warranty for manufacturing faults in the complete system is included but there is no warranty on the flail unit itself, except a 100 % guarantee that the unit works at the time of delivery.

Service contracts ranging from one annual check-up to a full service are available.

MAINTENANCE SUPPORT

A one-year full service support includes non-consumable spares and on-site technical support once a month. Technician call-out can be ordered. The machine must be refueled every four hours and must be cleaned of dust and dirt at the same interval.

The manufacturer recommends daily and weekly preventive maintenance and cleaning as well as a service contract for monthly check-ups by the supplier.

The manufacturer recommends a three-man crew, preferably with all three trained as operators and one as a skilled mechanic. Non-specialist, mechanical workshop tools and crane support on-site are required.

TESTS AND EVALUATIONS

The first machine was tested and certified by CROMAC in Croatia, 1999.

SWEDEC tested and slightly changed a second machine in September 2001. Among others, dynamic blast tests were carried out with one 5.5 kg AV metal-covered mine and one 10 kg non-metallic AV mine. Only minor damage was found. In the first detonation, four chains were lost. In the second detonation, one chain was lost and two hammers required replacing. The test reports are available at SWEDEC.

During 2003 the Swedish Army ordered and verified one pre-series machine. All technical requirements were met. The detonation of 10 kg of TNT under the front wheel did not cause any injuries to the driver (dummy). Four additional vehicles were ordered by the Swedish Army and delivered in November 2003.

See Croatian Mine Action Centre (CROMAC), Demining Machine Testing Committee: Possible Effects of Tested Demining Machines, Appendixes A1 and A2 to CROMAC SOP 03.06-1: Efficiency Assessment Of Technical Survey and Demining, 2005. It was tested by US Army Night Vision and Electronic Sensors Directorate during 2005. Reports are available at the website: www.itep.ws and www.hcr.hr or www.ctro.hr.

Five test reports are available at the website www.itep.ws:

1. G. Danielsson, *Flail Hammer Head Test and Evaluation*, by SWEDEC, 2005.
2. U.S. Army Research, Development and Engineering Command, Communications, Electronics Research, Development and Engineering Command, Countermine Division, *Scanjack 3500 System Technical Test Report*, 2005.
3. FMV, *Verification of Mine Clearance Vehicle I/T Deep Mine Clearance Machine*, by Scandinavian Demining Group (SDG), 2003.
4. BRTRC Technology Research Cooperation, *Area Mine Clearing System (AMCS), Study Report*, by US Army, Project Manager for Close Combat Systems (PM - CCS), 2002.
5. SWEDEC, *Performance Test of Demining Machines Performed by SWEDEC*, by Scandinavian Demining Group (SDG), 2001.



SCANJACK 3500 | Operating in Sudan

REPORTED LIMITATIONS AND STRENGTHS

Limitations

- > Vegetation cutting is limited to trees with trunks of approximately 15 cm diameter.
- > It is a large machine that requires transporting over long distances on a trailer.
- > The flail unit is detachable and can be transported on a separate truck or lorry.
- > The system creates huge dust clouds as occurs with all flail systems in dry environments.

Strengths

- > The unique double flail system ensures a high clearance rate (test reports are available from SWEDEC) of AP and AV mines.
- > The experience of 40 years with the base machine under hard conditions means that many problems have been rectified.
- > Operator safety.
- > Technical reliability.

DIMENSIONAL DATA

| | |
|------------------------------|------------------------------------|
| 1. Length without attachment | 10,300 mm |
| 2. Length total | 14,000 mm |
| 3. Width without attachment | 3,000 mm |
| 4. Width total | 4,440 mm |
| 5. Clearing Working width | 3,500 mm |
| 6. Height Overall | 3,700 mm |
| 7. Mass Basic vehicle | 29,000 kg |
| 8. Mass Detachable unit(s) | 8,500 kg |
| 9. Mass Overall | 36,480 kg 37,500 kg with tracks |

OPERATIONAL DATA

| | |
|--|---|
| 10. Wheels Tracks (description) | 8 tyres 650/65-26.5 and 4 tracks 750 mm wide |
| 11. Ground Bearing Pressure (kPa) | Front 0.96 kg/cm ² Rear 0.6 kg/cm ² |
| 12. Hill climbing ability (in degrees) | 35° |
| 13. Number of Chains Chisels Tools | 76 on each rotor |
| 14. Beat pattern (hits per m ²) at different operating speeds | Not given |
| 15. Length of Chains Tools | First rotor: 697 mm Second rotor: 793 mm |
| 16. Diameter of drum | Not given |
| 17. Rotation Speed | 300 - 400 rpm |
| 18. Clearance Working depth in varying terrain | First rotor: up to 15 mm Second rotor: up to 30 mm |
| 19. Working Speed (m ² /h) | |
| > Light Soil Medium Vegetation | 1,500 m ² /h |
| > Medium Soil Medium Vegetation | 1,200 m ² /h |
| > Heavy Soil Dense Vegetation | 900 m ² /h |
| 20. Control of Clearance Working depth | Manual by hydraulic pressure and ultrasonic sensor |
| 21. Additional attachable working tools | |
| 22. Armour | 12 mm ARMOX 500S toughened plate for the cabin and 41 mm protection glass windows. 10 mm ARMOX 500S for hydraulic system and the rest of the machine |
| 23. Remote controlled | |
| > greatest distance | Optional remote control 300 m in line of sight 700 m |
| 24. Transportation | |
| > short distances | Limitation 3.03 m wide |
| > long distances | and 4.2 m high on low bed trailer |
| > sea transport | |
| > air transport | |

SYSTEM STATUS AND DEPLOYMENT

| | |
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| 25. Machines in use | 15 |
| 26. Other types | No |
| 27. Location of use | Bosnia and Herzegovina, Croatia, Iraq, Sweden, Sudan, USA, The Netherlands |
| 28. Totally cleared so far (m ²) | Not given |

ENGINE | FUEL | OIL

| | |
|---|--|
| 29. Engine | John Deere, 6 cylinder diesel engine with 220 hp |
| 30. Engine power at the flywheel | Not given |
| 31. Sufficient power supplied to working tool | Not given |
| 32. Fuel capacity | 300 l |
| 33. Fuel consumption | Max 60 - 80 l/h in operation |
| 34. Separate engine for working unit | Yes, Scania V8 diesel engine with 570 hp |
| 35. Cooling system | Water cooled |
| 36. Oil capacity (both engines) | Not given |
| 37. Hydraulic oil capacity (both engines) | 390 l for both engines |

COSTS

| | |
|---------------------------------|------------|
| 38. Cost of system | On request |
| 39. Other costs | Not given |
| > training | — |
| > spare part set chains belts | — |
| 40. Availability for hire | Yes |

OTHER

| | |
|----------------------|-------------------------------------|
| 41. Operator comfort | Ergonomic chair and controls, radio |
| 42. Air conditioning | Yes |