General description of the machine and prime function

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 AT 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 300m to 700m, depending on customer request. (For longer remote control distances a camera system must be added.) The stated clearance width is 3,500mm.
Working methodology/Specifications

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 100mm shorter that those of the second. The front flail cuts vegetation and clears the ground to a depth of 150mm. The second flail is designed to clear down to 300mm. The total clearance depth of the system claimed by the manufacturer is 300mm. With a rotation speed of 300-400rpm, 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.

Engine, fuel and oil

The Scanjack has a six-cylinder John Deere 6081HTJ02 diesel engine with 220hp for the base unit. The hydraulic oil capacity is 190 litres.

The flail unit has a Scania DSI 14 turbo-charged V8 diesel engine with 570hp. 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 per cent guarantee that the unit works at the time of delivery.

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

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.

Maintenance and 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.

Test and evaluation

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

SWEDDEC tested and slightly changed a second machine in September 2001. Among others, dynamic blast tests were carried out with one 5.5kg AT metal-covered mine and one 10kg non-metallic AT 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 10kg of TNT under the front wheel did not cause any injuries to the driver (dummy). Four additional vehicles were ordered by the Swedish Army, being 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.


**Reported limitations and strengths**

**Strengths**

The unique double flail system ensures a high clearance rate (test reports are available from SWEDEC) of AP and AT mines.

The experience of 40 years with the base machine under hard conditions means that many problems have been rectified.

Operator safety.

Technical reliability.

**Limitations**

Vegetation cutting is limited to trees with trunks of approximately 15cm 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.

**Technical specification**
Machine

Model
Scanjack 3500

Machine Category
Mine clearance machine

Machine weight
Heavy (> 20'0000 kg)

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Dimensional data

Length without attachment
10300 mm

Length total
14000 mm

Width without attachment
3000 mm

Land clearance width
3500 mm

Height overall
3700 mm

Mass basic vehicle
29000 kg

Mass detachable unit(s)
8500 kg

Mass overall with wheels
36480 kg

Mass overall with tracks
37500 kg

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Operational data

Wheels
✔

Tracks
✔

Wheels and/or tracks description
8 tyres 650/65-26.5 and 4 tracks 750 mm wide

Ground bearing pressure back
0.6 kg/cm²

Ground bearing pressure front

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0.96 kg/cm²

Hill climbing ability (max grade slope degrees) 35

Number of chains 76 per rotor

Length of chains 697 and 793 mm

Rotation speed (rpm) From 300 rpm

Rotation speed (rpm) To 400 rpm

Clearance depth in varying terrain 20-29 cm

Working speed for light soil with medium vegetation (m²/h) To 1500

Working speed for medium soil with medium vegetation (m²/h) To 1200

Working speed for heavy soil with dense vegetation (m²/h) To 900

Control of clearance depth Manual by hydraulic pressure and ultrasonic sensor

Armour 12 mm ARMOX 500S thickened plate for the cabin and 41 mm protection glass windows.

10 mm ARMOX 500S for Hydraulic system and the rest of the machine.

Remote controlled ✔

Greatest distance 700 m

Transport method for short distances limitation 3.03 wide and 4.2 m high on low bed trailer

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System status and deployment

Machines in use 15

Other types no

Location of use Bosnia and Herzegovina, Croatia, Iran, Sweden, Sudan, USA, The Netherlands

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Engine
Engine description
John Deere, 6 cylinder diesel engine with 220 hp

Engine power at the flywheel
220 hp

Fuel capacity
300 ltr

Fuel consumption
60 - 80 ltr/h

Separate engine for working unit
yes, Scania V8 diesel engine with 580hp

Cooling system
water cooled

Hydraulic oil capacity (platform engine)
390 ltr

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Costs

Availability for hire
yes

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Other

Operator comfort
ergonomic chair and controls, radio

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