

Casspir Mine Protected Vehicle with Steel Wheels and VAMIDS



Figure 1 Casspir Mine Protected Vehicle with optional steel wheels

1. General Description

The Casspir Mine Protected Vehicle has been in service with a number of military forces for 20 years. For humanitarian mine action, it is currently in use with South African based Mechem and NPA in Angola.

Casspir is a versatile Mine Protected Vehicle (MPV), successfully adapted to support mine action. Casspir is able to integrate with technical attachments such as the Vehicular Array Mine Detection System (VAMIDS) vapour suction equipment (for REST sampling) and steel wheels. VAMIDS is used to detect the metal content of sub-surface land mines and UXO. VAMIDS can be mounted on a variety of vehicle platforms, but is currently used with one Casspir and one Tapir. Mechem have used both on mine action projects in Mozambique and conducted trials in South Africa since 1997.

Casspir is part of a series of mine protected vehicles adapted for military, peacekeeping and humanitarian operations. The monocoque hull is constructed from high grade alloy and armour plated steel. The hull has been proven against anti-tank mine blasts and some types of high velocity projectile.

For the demining role, Casspir can exchange rubber tyred road wheels for special steel wheels. The steel wheels are specifically designed to withstand detonation of most types of AP mines, but will take substantial damage from AT mine detonations. The steel wheels are attachable to Casspir and Tapir MPVs.

2. Specifications

- Casspir can be employed in multiple roles, e.g. provide safe access for REST sampling teams, personnel carrier, ambulance, utility freight carrier, tanker and recovery vehicle.
- Although the vehicle would be damaged, the crew is protected against up to three stacked AT mines (up to 21kg TNT).¹ Effective ballistic protection up to 7.62mm, as well as shrapnel.²
- Casspir can be equipped with VAMIDS.
- VAMIDS can detect zones of ground of 2-6m. Paint spray nozzles mark mines or UXOs (or areas of interest) while moving up to 10km/hr. The detection heads can be mounted at either side or at the rear of Casspir. Casspir is suited to area survey, route survey, area reduction and Quality Assurance (QA).
- The Casspir has been modified to accommodate the VAMIDS system. The vehicle dimensions and weight differ from the original specification.
- VAMIDS performs good scanning at the relatively high speed of 10km/hr.³
- The diagram below shows detection data collected at U.S. Army Fort AP Hill, Virginia, using a two metre flexible array at approx. 1m/sec.

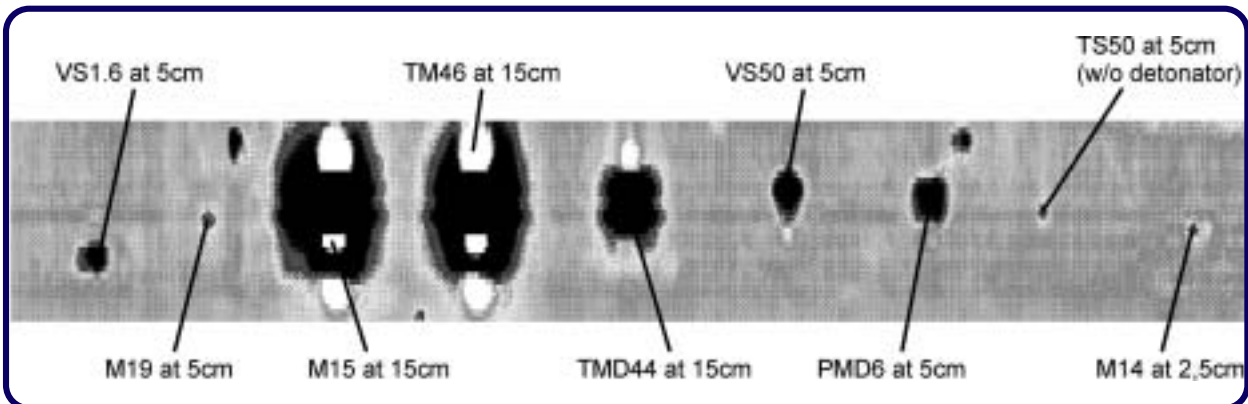


Figure 2 Detection performance

- VAMIDS converts the readings on each channel to a digital format. The data is read on a console, from which it can be recorded and stored. The data appears in a 'rolling map' format. The computer contains stored images of known mine types at different distances (from the detector to the ground). During operation, if the detector picks up a matching image, it will indicate a 'match'. The system can detect UXOs and mines with a large metal content such as TM 46 and TM 47 (down to approx. 1m depth). With user experience, false alarms can be reduced.⁴
- Technical data for VAMIDS system:

¹ According to the manufacturer

² According to the manufacturer

³ According to the manufacturer

⁴ According to the manufacturer

One Metre Flexible Array Segment

| | |
|--------------------------------|---|
| Effective detection width: | 1000mm (39.40") |
| Dimensions: | 1168mm (45.60") wide, 613mm (24.10") deep |
| Weight: | 27kg (59lbs) |
| Number of detection heads: | 8 |
| Bend angle per detection Head: | +/- 2° |
| Bend angle per segment: | +/- 14° |
| Operational temperature range: | -40°C to +85°C |
| Storage temperature range: | -55°C to +85°C |

The given weights and dimensions include the VAMIDS frame. For wider array of detector heads add 1m (39.40") in width and 27kg (59lbs) for each additional metre of segmented detector head.



Figure 3 Casspir with road wheels

3. Machines in Use to Date

- Mechem has 8 Casspir/Tapir vehicles fitted with steel wheels between Croatia and Mozambique.
- More than 10mil square metres of ground covered by steel wheeled Casspir. Over 10 years, more than 10000 AP mines have been detonated by steel wheels without crew injury.⁵
- Mechem has employed one Casspir and one Tapir equipped with VAMIDS in Mozambique, as well as trials in South Africa since 1997.
- NPA is using 3 Casspirs in Angola, mainly in a REST role but also as a platform for steel wheel clearance.

4. Engine, Fuel and Oil

- Casspir is equipped with a 6 cylinders-in-line turbo charged diesel engine with 124kW.
- The engine has a pressurized liquid cooling system.
- The auxiliary engine for the VAMIDS detection system requires diesel.
- The fuel capacity for the vehicle is 220 l.

5. Factory Support

For the VAMIDS system:

- Mechem can supply all spare parts. Many parts also available on international commercial market.
- Main spares for pneumatics by the international firm Festo.
- Technical and operator training manuals included in purchase price.
- Manuals available in English.
- 1 year warranty on complete VAMIDS system.
- The system with complete crew can be hired from Mechem.

⁵ According to the manufacturer

Steel wheels:

- Mechem can supply new or reconditioned steel wheels on order. Delivery period of 6-8 weeks from date of order.
- Manufacturer has not provided further information.

6. Maintenance and Support

Casspir vehicle:

- Main components are robust and commercially available. Time and money saved.
- Specialist mechanics not required.
- The vehicle is usually field repairable after a mine detonation incident.

VAMIDS:

- The VAMIDS system requires an operator familiar with Windows 95/98 or 2000. Basic knowledge of computer and software diagnostics, installing drives and software, Windows Explorer and E-mail. Basic knowledge of electronics and pneumatics.
- Basic hydraulic knowledge required for the system.

Steel wheels:

- Minor maintenance required.
- Simple to replace.

7. Test and Evaluations

VAMIDS:

- Mechem carried out significant evaluations of the system over 4 year period and assess it as a highly useful tool.
- Test reports of the system available from Mechem on request.

Steel wheels:

- Steel wheels have been used extensively in Angola, Mozambique, and Croatia.
- Technical tests have been conducted. Results available from Mechem on request.
- Manufacturer has not provided further information.

8. Known Limitations and Strengths

a. Limitations

Steel wheels and general aspects:

- Very heavy system requiring special equipment to be fitted to the vehicle. Requires special arrangements for transportation.
- Maximum speed is 10km/h.
- Special driver training required. Incorrect driving techniques could damage the drive train of the vehicle.

VAMIDS:

- Although the system can detect mines with minimum metal content, it became impractical when deployed to areas with high occurrence of metal debris.

b. Strengths

Steel wheels and general aspects:

- Unique axle construction facilitates fast and easy repair after AT mine detonations (rubber wheels).
- Robust.
- Good for most terrain.
- Claimed to detonate more than 80% of anti-personnel mines in area covered.
- Requires little technical support.

VAMIDS:

- The system is useful for QA, area reduction, surveying and detection of mines with higher metal content e.g. PMN, PMD and anti – group mines (fragmentation).



Figure 4 Early version of Casspir mounting steel wheels

9. Point of Contact

Mechem

P.O. Box 8322
Centurion
0046
South Africa

Tel: + 27 12 803 7290
Fax: + 27 12 803 7189
Web site: www.denel.co.za

10. Technical data sheet

Casspir as standard personnel carrier

a. Dimensional data

| | |
|---------------------------|-----------|
| 1. Length total: | 6 900 mm |
| 2. Width total: | 2 450 mm |
| 3. Height, overall: | 2 850 mm |
| 4. Weight, basic vehicle: | Not given |
| 5. Payload: | Not given |
| 6. Gross Vehicle Mass: | 10 800 kg |
| Ground clearance: | Not given |

b. Driving specifications

| | |
|---------------------------------|------------------------|
| 7. Wheels/tracks: | 4 wheels 1 400x20 |
| 8. Ground pressure, max weight: | Not given |
| 9. Hill climbing ability: | Up to 60% ⁶ |
| 10. Maximal speed: | 98 km/hr |
| 11. Turning circle diameter: | 18 360 mm |

c. System specifications

| | |
|-----------------------------|---|
| 12. Engine: | 6 cylinders in-line turbo charged diesel engine with 124 kW |
| 13. Fuel capacity: | 220 l |
| 14. Fuel consumption: | 25 l/hour |
| 15. Tracking: | 4x4 |
| 16. Cooling system engine: | Pressurized liquid cooling |
| 17. Oil capacity: : | Not given |
| 18. Hydraulic oil capacity: | Not given |
| 19. Vehicles in use: | 1 (with VAMIDS); 8 Casspir/Tapir with steel wheels; 3 Casspirs with NPA |
| 20. Location of use: | Angola, Croatia, Mozambique |

d. Comfort and security

| | |
|------------------------|-------------------------|
| 21. Air condition: | Only dual expeller fans |
| 22. Operator comfort: | Not given |
| 23. Armour: | Not given |
| 24. Remote controlled: | Not given |

e. Costs

| | |
|---------------------------|-----------|
| 25. Cost of system: | Not given |
| 26. Other costs: | Not given |
| 27. Possibility for rent: | Not given |

⁶ According to the manufacturer