Army wheel vehicles in road rescue

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Abstract

This work gives an outline of the knowledge concerning army road rescue. Chosen vehicles and types of evacuation used in NATO countries have been characterized. The work also compares the technical potential of wheeled recovery tractors as well as new vehicles introduced in the Polish Armed Forces. The article comprises figures and images which graphically support the analyzed issue.

Keywords: procedures, wheeled tractors, methods of evacuation, new generation equipment.

1. Introduction

This is one of the branches in the army, directly connected with road traffic safety and which concerns the rescue of wheeled vehicles with recovery vehicles [3,6,10,12]. In Poland, it is closely connected with the State Fire Service (PSP) and the National Emergency and Fire System/Authority (KSRG), as well as with the cooperation between the PSP with the Armed Forces. As far as the support of own armed forces is concerned, these are also the duties coming from the so-called HNS – this meaning the support from the host country for armed forces of allied countries within the duties resulting from Poland’s NATO membership.

Appropriate adaptation of the possibilities of army vehicle evacuation done by recovery vehicles is a significant task, especially during joint operations.

2. Road rescue procedures

In order to unify the level of logistic supply within NATO forces, and their inside logistic procedures, periodic standardization exercises are carried out [5, 6], during which practical rescue operations are done, and during which one has a chance to familiarize oneself with the possibilities of wheeled recovery vehicles which are army equipment. Also, the degree of implementation into the army and the development of AEP 13 (a) – Battlefield Recovery/Evacuation Data (BRED), is checked, which is the basic document concerning making decisions connected with the evacuation of various types of damaged vehicles within the armies of the NATO countries.

Often, documentation is prepared for certain road rescue procedures, by participating in demonstrations of rescue operations by various civil companies producing such type of vehicles. In addition, specific accidents/catastrophes are analyzed and optimal procedures are developed. The photographs below show chosen evacuation-rescue tractors, along with their equipment, which are used by some NATO countries.

2.1. Chosen wheeled evacuation tractors used in NATO countries

Phot. 1. A German KCE 8x8 Faun during operations

Phot. 2. A Belgian KCE with a Renault Kerax transport platform
The chosen wheeled evacuation tractors presented below [10,12,13], photographs 1-3 [1], are examples of complete modern constructions and technical solutions, used as special and often also universal, evacuation-rescue tractors produced by leading automobile companies. An example showing such operations with using the KCE FAUN during the removal of a vehicle from the road, is presented in phot. 1 [1].

Phot. 3. A Czech KCE 8x8 from the Tatra Company, equipped with a front dozer

2.2. Exemplary methods of evacuation
The wheeled recovery vehicles presented above include a large amount of various types of equipment [10,12] used in evacuation and rescue, developed based on tests and the examination of systems and methods of evacuation.

Phot. 4. Evacuation with using a hydraulic jib with an adapter for the front axle of the towed vehicle and belts fastening the front wheels

In these types of wheeled recovery vehicles, special constructions allow for any type of evacuation, depending on the vehicle’s technical condition and on the type of damage.

The following methods of evacuation can be used as basic ones [6,10]:
- with a raised front of the vehicle (front support) - phot. 4 [1],
- with a raised rear of the vehicle (rear support),
- on a stiff connection (straight bar) - phot. 5 [1].

Phot. 5. Evacuation with a crane and stiff towline on the front bumper

As it was mentioned before, in order to carry out evacuation-rescue tasks, such types of vehicles have various equipment most often consisting of [6,10]:
- a crane used for temporarily lifting the evacuated vehicle with a high lifting capacity, steered mechanically or hydraulically,
- rear crane device with a retractable arm with a high lifting capacity, used for lifting one side of the evacuated vehicle and keeping it in this position during towing,
- a rear (often also front) winch with a special set of sheaves,
- a set of additional connectors and adapters enabling the connection and evacuation of the vehicles.

Most rescue vehicles are also equipped with:
- first aid kits,
- kits for cutting open damaged vehicles, such as scissors, saws, hammers,
- devices and tools for basic repairs of the damaged vehicle,
- gas welders,
- a load-carrying body for carrying spare parts and additional equipment.

Examples of technical parameters for chosen vehicles are presented in table 1 [1].

3. Wheeled tractors in the Polish Army
In our army, there are no typical wheeled evacuation-rescue vehicles, the wheeled recovery vehicles which are present can only tow vehicles on a stiff towline or on a line. Occasionally, half-carriage with additional evacuation carts is still used, carts of the WEW 1,5t type for passenger and delivery vehicles, as well as WEW 6t/8t carts mainly for vehicles from the Star group. These carts are slid under to front axle/suspension of the towed vehicles.

Vehicles of this type most often occur as permanent equipment within the tank and vehicle military service [3,4]. These most often include vehicles such as: Tatra 815, Kraz 255B, phot. 6 [1], Star 266, Ural 375.
Phot. 6. A view of CKE Kraz 255B

Table. 1. Chosen technical parameters of heavy technical evacuation vehicles

<table>
<thead>
<tr>
<th>Technical parameters</th>
<th>Renault Kerax France</th>
<th>Faun BKF 30.40 Germany</th>
<th>Oshkosh M984A1 USA</th>
<th>Tatra RV-20 SAS Czech Republic</th>
<th>Man HX-32.440 8x8 BB Hungary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base vehicle</td>
<td>Kerax 385.40</td>
<td>Man 32.422 VFAEG</td>
<td>Tatra T816</td>
<td>Man HX-32.440 8x8 BB</td>
<td></td>
</tr>
<tr>
<td>Steering</td>
<td>8x4</td>
<td>8x8</td>
<td>8x8</td>
<td>8x8</td>
<td></td>
</tr>
<tr>
<td>Cabin</td>
<td>1+4</td>
<td>1+1</td>
<td>1+1</td>
<td>1+3</td>
<td></td>
</tr>
<tr>
<td>Maximum weight</td>
<td>32 t as a unit 65 t</td>
<td>29,5 t</td>
<td>45,36 t</td>
<td>32,315 t as a unit 65 t</td>
<td></td>
</tr>
<tr>
<td>Length</td>
<td>10,15 m</td>
<td>9,957 m</td>
<td>12,588 m</td>
<td>11,245 m</td>
<td></td>
</tr>
<tr>
<td>Width</td>
<td>2,5 m</td>
<td>2,75 m</td>
<td>2,438 m</td>
<td>3,243 m</td>
<td></td>
</tr>
<tr>
<td>Height</td>
<td>To cabin 3,23 m</td>
<td>3,15 m</td>
<td>2,845 m</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clearance</td>
<td>0,3 m</td>
<td>0,33 m</td>
<td>0,38 m</td>
<td>0,34 m</td>
<td></td>
</tr>
<tr>
<td>Wheelbase</td>
<td>1,74+3,323+1,35</td>
<td>1,93+3,57+1,5 m</td>
<td>1,65+3,10+1,45</td>
<td>1,800+3,875+1,500 m</td>
<td></td>
</tr>
<tr>
<td>Entry/exit angle</td>
<td>37°/48&quot;</td>
<td>43°/45°</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum speed</td>
<td>86 [kph]</td>
<td>88 [kph]</td>
<td>100 [kph]</td>
<td>85 [kph]</td>
<td></td>
</tr>
<tr>
<td>Wading depth</td>
<td>0,8 m</td>
<td>1,219 m</td>
<td>1,25 m</td>
<td>0,75 m</td>
<td></td>
</tr>
<tr>
<td>Engine power</td>
<td>385 HP 281 kW 8,78 kW/t</td>
<td>414 HP 302 kW 10,24 kW/t</td>
<td>445 HP 325 kW 7,16 kW/t</td>
<td>400 kW 12,38 kW/t 324 kW 9 kW/t</td>
<td></td>
</tr>
<tr>
<td>Tire size</td>
<td>396/85 R20 XZL</td>
<td>16,00xR20 front 24R 20,5 rear</td>
<td>16.00R x20</td>
<td>16.00R x20 XZL</td>
<td></td>
</tr>
<tr>
<td>Crane</td>
<td>10,72 m – 7,9 t 2,89 m – 30 t = 84,7 tm 4,8 m – 15,3 t 73,44 tm 6,35 t 15 t</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Main winch</td>
<td>17 t</td>
<td>20 t 100 m</td>
<td>27,216 t 56,4 m 24,5 t 100 m front 13,25 t + sheave 2x20 t 60 m</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydraulic towing arm</td>
<td>Is present</td>
<td>Towing 30 t Supports 13 t Remote control</td>
<td>Towing 30 t, on ball ø 105 [mm] with 3 hydraulic cylinders Towing 85 t Supports 13,25 t</td>
<td>Towing 20 t</td>
<td></td>
</tr>
<tr>
<td>Usage</td>
<td>Belgium, France</td>
<td>Germany</td>
<td>USA, United Arab Emirates</td>
<td>United Arab Emirates Hungary</td>
<td></td>
</tr>
</tbody>
</table>

Source: Own elaboration.

Table. 2. Chosen data for wheeled evacuation vehicles

<table>
<thead>
<tr>
<th>Basic parameters</th>
<th>Tatra 815</th>
<th>Kraz 255B</th>
<th>Star 266</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crew</td>
<td>5 people</td>
<td>2 people</td>
<td>3 people</td>
</tr>
<tr>
<td>Engine power [kW]</td>
<td>265</td>
<td>176</td>
<td>110</td>
</tr>
<tr>
<td>Engine unit power [kW/t]</td>
<td>12.0</td>
<td>9.0</td>
<td>10.4</td>
</tr>
<tr>
<td>Own weight [t]</td>
<td>20.500</td>
<td>11.950</td>
<td>6.550</td>
</tr>
<tr>
<td>Total weight [t]</td>
<td>22.000</td>
<td>19.675</td>
<td>10.625</td>
</tr>
<tr>
<td>Road speed [kph]</td>
<td>75</td>
<td>71</td>
<td>82</td>
</tr>
<tr>
<td>Range [km]</td>
<td>1000</td>
<td>1040</td>
<td>-</td>
</tr>
<tr>
<td>Maximum weight of towed vehicle [t]</td>
<td>9,600</td>
<td>3,000</td>
<td>4,000</td>
</tr>
<tr>
<td>Winch, pulling strength [kN]</td>
<td>125</td>
<td>120</td>
<td>60</td>
</tr>
</tbody>
</table>

Source: Own elaboration.

Vehicles of this type – apart from winches – phot. 7 [1] and standard equipment do not have, at the same time, any specialist evacuation and rescue equipment.
Admittedly, in Poland, on the basis of construction solutions used in vehicles produced and used in several NATO countries, the work on a certain vehicle, called the Wheeled Technical Support Vehicle, has been developed. In this case, the Tatra 815 chassis was used. The vehicle, under the name KWZT-Mamut, was presented during several occasions, e.g. during the MSPO in Kielce.

3.1. The currently used generation of transport-evacuation vehicles

The structure of means of transport, as well as the evacuation-rescue ones and transshipment devices, has to be one that ensures the transportation of all material means used within the army and other equipment, meant for the transportation, this including e.g. evacuation or rescue [3,4,7,10]. Fig. 1 [1] below presents the current structure and naming of new vehicle groups entered into the normative documents, according to the concept of the aforementioned structure of vehicle transport by the General Staff of the Polish Armed Forces [4].

One has to remember, however, that such chosen means of transport have to be as unified as possible when concerning uniformity, types and makes/also manufacturers.

3.2. Examples of constructional solutions in vehicles

Currently within the Polish Armed Forces, new types of vehicles and equipment are introduced [5,6,7,9,10] – these are to enable quick loading and evacuation of the damaged wheeled vehicle – phot. 8 [1] – as well as tanks and armored personnel carriers – phot. 9 [1]. Such equipment is pulled up onto the loading area of the trailer by using winches powered from the engine of the tractor unit. Another solution is loading with the using of one’s own unit and a set of trailer redactors, sometimes making the vehicle drive onto this by itself. Chassis of companies which equip them with hook self-loading devices Multilift Mk IV, are often used within the army (they receive favorable opinions from their users), an example is shown in phot. 10 [1].
Loading platforms of the flatrack type (used to carry containers as well as light wheel and caterpillar transporters) are also used. Steering the loading takes place from the driver's cabin, which enables safe work and also working in e.g. contaminated environments. Such equipment is compatible and interchangeable with other logistic NATO equipment and fulfills the STANAG 2413 requirements. Vehicles of this type can be used both in terrain and normal road conditions, and they fulfill the national regulations concerning road traffic.

Two basic types of self-loading devices are used. The first solution enables loading a container from the side of the vehicle. In the second solution, loading the container is done from the rear of the vehicle with the assistance of the hook-handle connection. Such types of modern technical solutions make easier the evacuation of vehicles with damaged e.g. front suspension or power train, with the usage of towing or half-carriage. They are also used for the logistic security of carrying in units, as well as for technical security of columns. Depending on the field of operation, e.g. on Polish Military Quota, they appear only in versions with armored cabins, or fully armored.

Apart from the vehicles introduced into the army which have such applications, mainly built (as it was emphasized earlier) on Jelcz vehicle chassis, the army has not resigned from reliable solutions, which are buying and equipping army units with specialist wheeled vehicles for carrying/rescue in the place of the vehicles which have been used so far and which have far less possibilities when concerning such types of operation.

An example of such choice is the usage of low-chassis vehicles [8] in the army which are of the following make: Man 40.64 with a Goldhofer trailer – phot. 11 [1], Mercedes, Iveco Eurotraker – phot. 12 [1] and others, as well as the purchase of domestic vehicles such as Jelcz 6xx, 8xx with cranes, e.g. Atlas, Hiab, and many other cranes used for loading/unloading.

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4. Conclusions

The issues presented in this article, connected with the evacuation and rescue within the army, are a very important question for various reasons, e.g. the damage size, the speed and safety of evacuation, rescuing people (crews, drivers), scope of repairs and services occurring after an emergency/road accident.

The technical-exploitation analysis of chosen wheeled technical support vehicles presented in this article points out and emphasizes only the most important aspects in a typically practical approach.

Safe exploitation and proper usage of such army equipment requires high practical skills from the crews and drivers, as well as from the technical divisions in the logistics department who plan and supervise this usage.

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Wojskowe pojazdy kołowe w ratownictwie drogowym

Streszczenie

W artykule przedstawiono zarys wiedzy o wojskowym ratownictwie drogowym. Scharakteryzowano wybrane pojazdy i sposoby ewakuacji państw NATO. Porównano możliwości techniczne pojazdów KCE eksploatowanych, jak też nowowprowadzonych do eksploatacji w WP. W skład artykułu wchodzą rysunki i zdjęcia, które uzupełniają graficznie analizowane zagadnienie.

Słowa kluczowe: procedury, ciągniki kołowe, sposoby ewakuacji, nowa generacja sprzętu.

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