# CONCEPTION OF MILITARY VEHICLE CLASSIFICATION

**Robert Sosnowicz, Przemysław Wachowiak**
**Maciej Dorczuk**

*Military Institute of Armoured and Automotive Technology*
*Department of Tanks and Tracked Vehicle*
*Okuniewska Street 1, 05-070 Sulejówek, Poland*
*tel.:+48 22 8811122, fax: +48 22 6811073*
*e-mail: roberts@witpis.eu*

***Abstract***

*This study presents the vehicle classifications existing in various documents: "The Encyclopaedia of military Technology", The Polish Norm PN-V-01002: "Armoured Equipment. Parameters and comparative ratios. Terminology and classification", Structure of Car Transportation of Polish Armed Forces, The Defence Equipment Classification, The Allied Research Procedures Publication AVTP 00-07 "Military Vehicles Categories" (STANAG 4357 and 4358), The Common Procurement Vocabulary, established by the European Commission) and Fixed Assets Classification.*

*The authors of the article take note of the inaccuracies in existing classifications and point out the necessity to create new, logical error free classification. The conception presented in the article is an attempt to put this situation in order. Presented conception of classification vehicles used in the army, primarily as weapons carries, necessary combat and logistics equipment, and also as means of transport and protection of sub-units of infantry, in order to eliminate chaos in military vehicle nomenclature used in documents such us: acts, regulations, norms and instructions. The conception characterizes certain level of generalization. For further detailed division can be used criteria named in the article: general criteria and particular criteria.*

***Keywords:*** *classifications, military vehicles, conception, structure, combat vehicles, special vehicles*

## 1. Introduction

Vehicles operated in the army are primarily used as carriers of weapons, necessary combat and logistics equipment and as means of transportation and protection of sub-units of infantry. Conformity to all requirements placed on military vehicles in a single vehicle is impossible and results mainly from mutually exclusive requirements, e.g. high resistance of a vehicle to enemy fire (high weight) and its dynamic characteristics. Thus, depending on the predicted use of military vehicles, they have been given specific performance characteristics. The diversity of vehicle characteristics caused the creation of a multitude of such vehicles differing in, e.g. use, maximum acceptable total weight (combat), ability to overcome obstacles, level of resistance to fire and others. Military vehicles' diversity caused the need to classify them for various reasons. The effects of assumed different classifications of military vehicles are described in appropriate normative documents. It is often difficult to find a common part in the accepted classifications, which causes misunderstandings between interlocutors using different classifications. This results mainly from the possibility to classify a given military vehicle to different groups, types of adopted classification. Attempts to merge several classifications into one are also not uncommon, the fact of which speaks of the incomprehension of the problem, which often leads to unexpected effects. The difficulty of establishing an unequivocal terminology and classification of military vehicles had formed the base for this work.

## 2. Existing military vehicles classifications

There are several military vehicles' classifications in the Polish Armed Forces. The most up to date divisions have been presented below. Military vehicles protect their crew and equipment, thus it has become common to refer to them as armoured equipment.

The Encyclopaedia of military Technology classifies armoured equipment in relationship to the tasks it is supposed to realize on the field of battle, which has been presented on Fig. 1 [2].

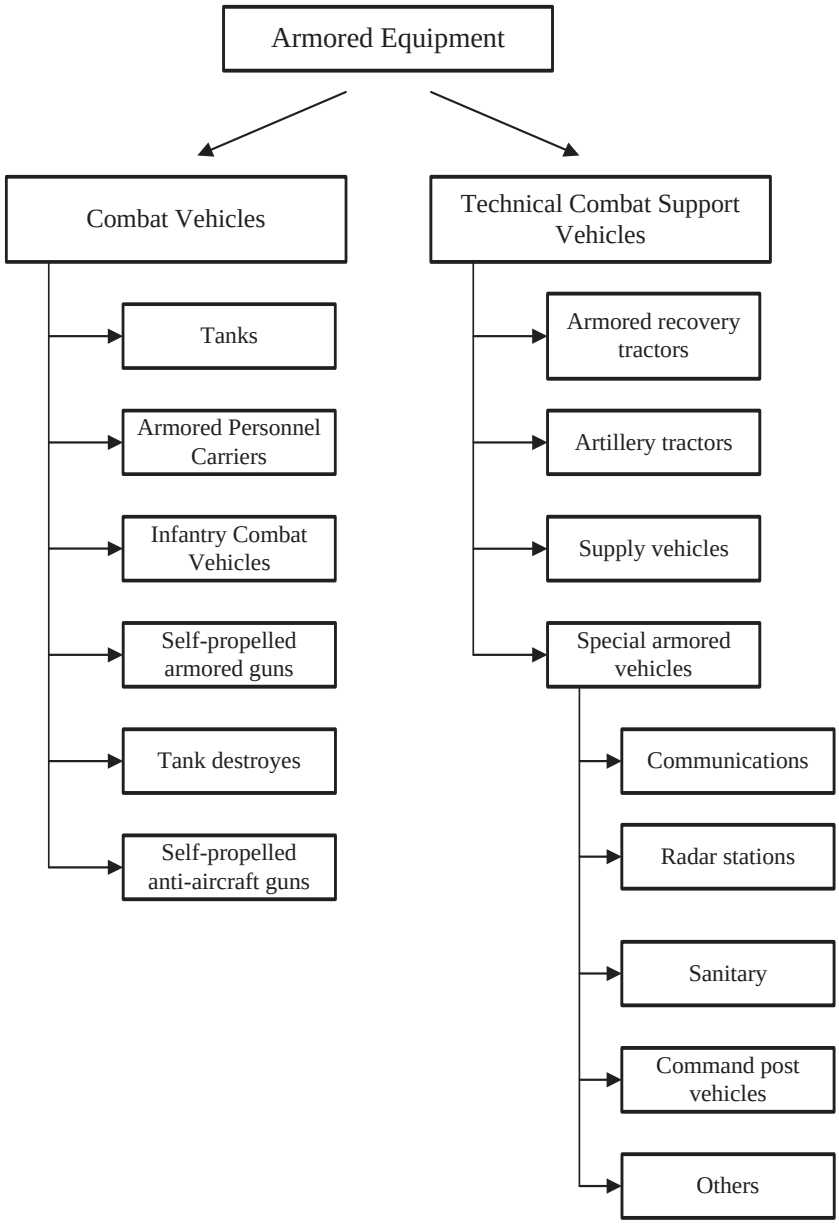



*Fig. 1. Division of armoured equipment*
*Source: Prepared on the base of [2]*

The Polish Norm PN-V-01002 "Armoured Equipment. Parameters and comparative ratios. Terminology and classification."(„Sprzęt pancerny. Parametry i wskaźniki porównawcze. Terminologia i klasyfikacja") classifies armoured equipment according to functions (tasks), groups, types and variations. The division of armoured equipment into groups and types has been presented on Fig. 2 [7]. What is more, armoured equipment has been divided into variations: tractor units, wheel units and tractor-wheel units.

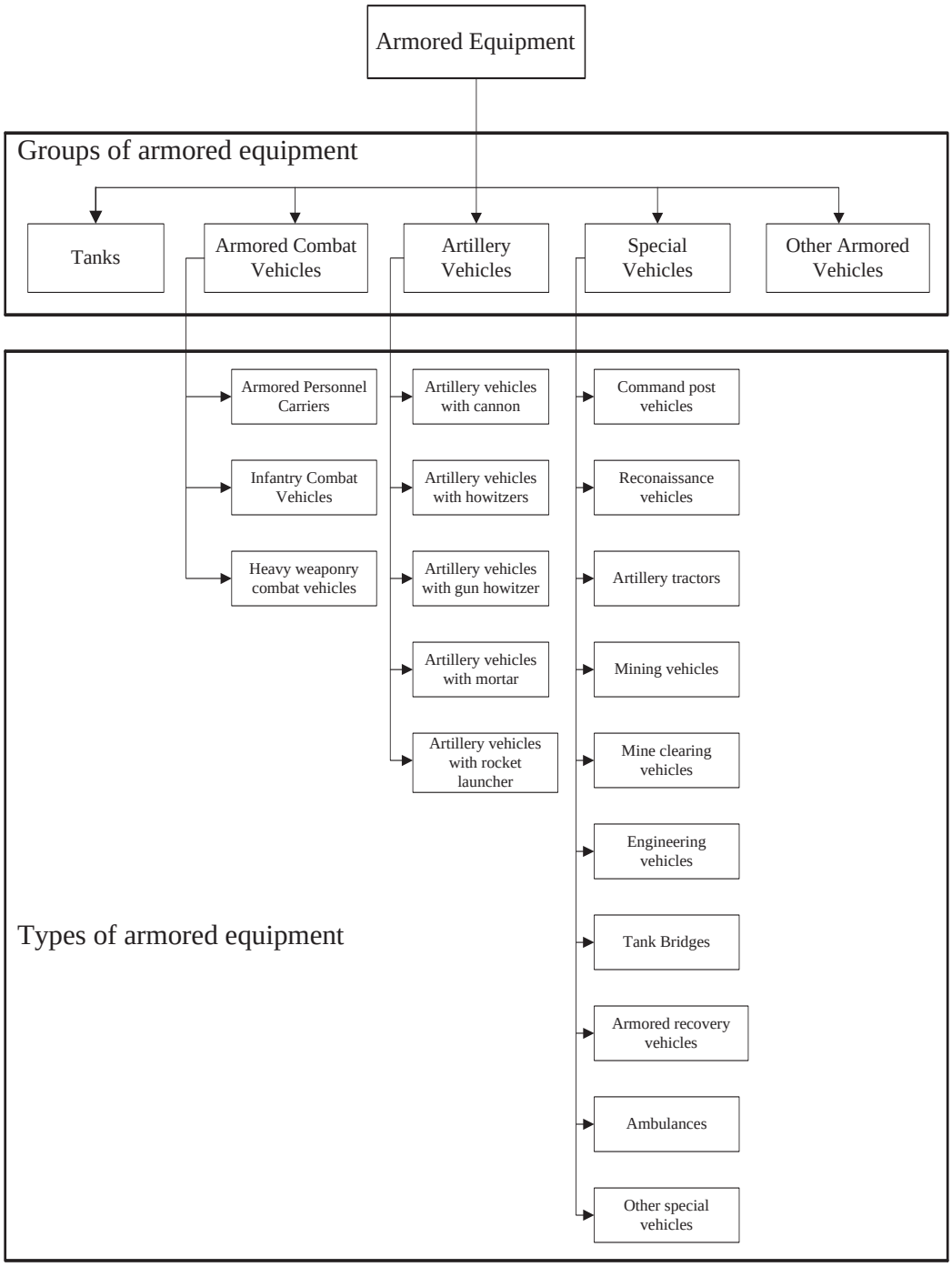
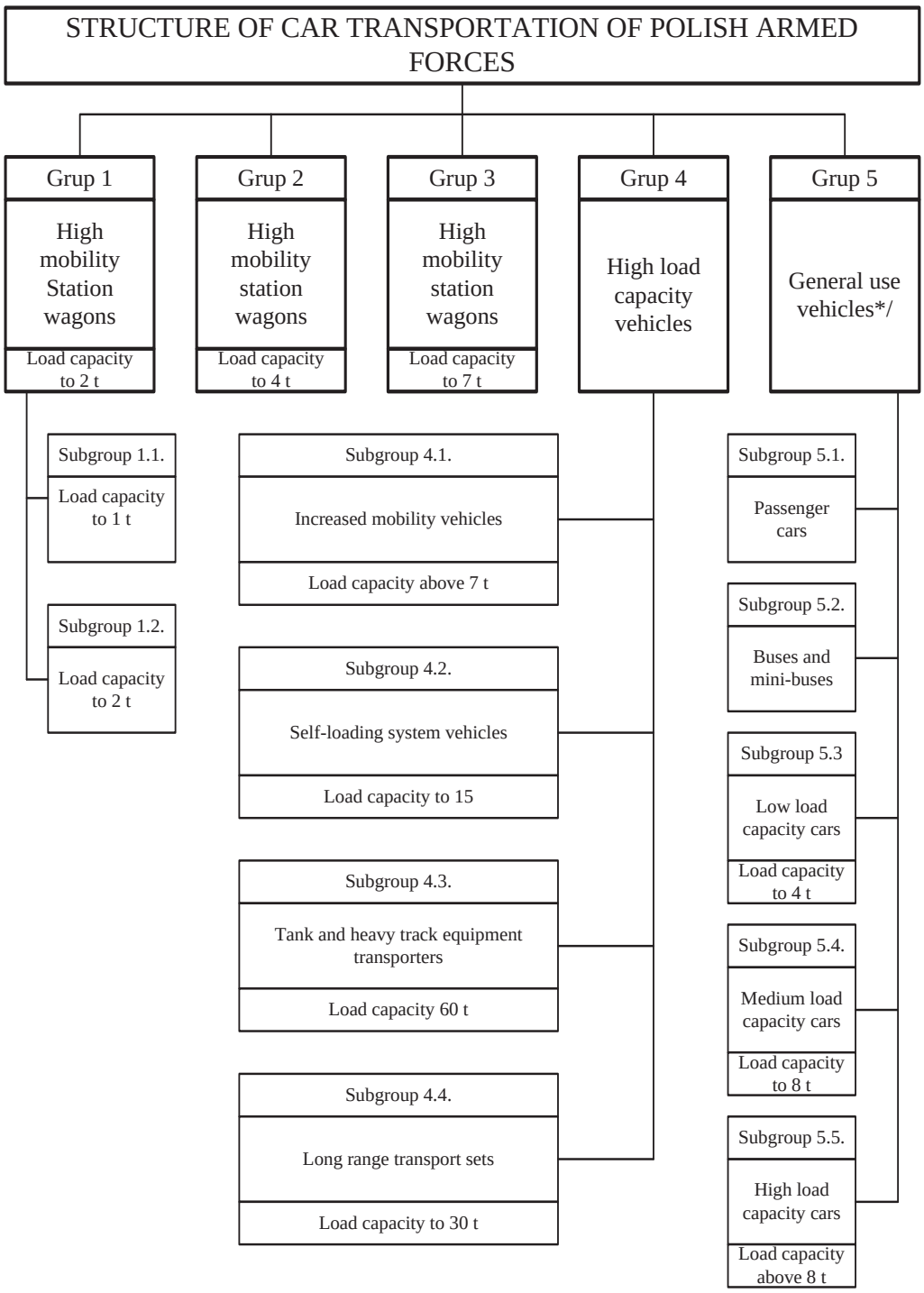



*Fig. 2. Groups and types of armoured equipment*
*Source: Prepared on the base of [7]*

In relation to effectiveness of protection, (armour) military vehicles can be divided into armoured and bullet-proof [2]. In relation to weight, tanks are divided into light (up to 20t), medium (20- to 40-50 t) and heavy (up to 100t) and super-heavy (above 100t) [5, 6, 12]. Infantry fighting vehicles are divided into light (up to 20t) and heavy (above 20t) [3]. Another criterion is the level of modernity of construction. A so, tanks and infantry lighting vehicles are divided into generations: first, second and third [3, 12]. Military vehicles can be amphibious and non-amphibious [3].

The ”Structure of Car Transportation of Polish Armed Forces” approved in 1999 by the Commander of the Polish General Staff provides five groups of cars. Detailed division shown on Fig. 3.




*/ Cars available generally in trade, not requiring special military requirements. In NATO armies such cars are placed in commercial cars section.

*Fig. 3. Structure of car transportation with systematics of vehicle groups and their load capacity*
*Source: Prepared on the base of [4]*

The Defence Equipment Classification (Klasyfikacja Wyrobów Obronnych (KWO)) [10] is made for purposes of defensive capability and national security and is another classification standard. It possesses a four digit code structure, in which the first two digits stand for the product group and the last – the class of the product in a given group. There are 78 groups of products specified in the classification structure, to which 645 classes are appropriately matched. The most appropriate groups for military vehicles are group 23 and 24.

The following classes have been specified in groups 23 ”Hovercraft, engine vehicles, trailers and one-track vehicles”:

- 2305 Hovercraft,
- 2310 Engine passenger vehicles,
- 2320 Trucks and truck-tractors, Wheeler tractors,
- 2330 Car trailers,
- 2340 Motorbikes, scooters and bicycles,
- 2350 Combat, attack and tactical track vehicles,
- 2355 Combat, attack and tactical wheel vehicles.

The following classes have been specified in group 24 “Tractors”:

- 2410 Slow-running caterpillar tractors,
- 2420 Wheel tractors,
- 2430 High Speer Caterpillar tractors.

The Allied Research Procedures Publication AVTP 00-07 ”Military Vehicles Categories” (STANAG 4357 and 4358) [1] classifies military vehicles according to their:

- Function F,
- Capabilities C,
- Types T,
- Military Load Classification MLC.

The devise on of vehicles according to the above criteria has been presented below:

**Function criterion:**

- Combat vehicles,
  - Main battle Tank F11,
  - Infantry Fighting Vehicles F12,
  - Self Propelled Artillery F13,
  - Reconnaissance Vehicles F14,
  - Others F15.
- Special Vehicles
  - Recovery Vehicles F21,
  - Mobile Crane F22,
  - Engineer Vehicles F23,
  - Bridge Layer Vehicles F24,
  - Mine Layer F25,
  - Mine Clearer F26,
  - Medical Vehicles F27,
  - Fuel Transport Vehicles F28,
  - Others F29.
- Transport Vehicles <Load Capacity>
  - Transport Vehicles ≤2t F31,
  - Transport Vehicles >2-10t F32,
  - Transport Vehicles >10-20t F33,
  - Transport Vehicles >20t F34.

**Capabilities Criterion:**

- Cross Country Mobility C1,
- Amphibious C2,
- Restricted to Roads/Tracks C3,
- Air Transportability C4.

**Types Criterion:**

- Tracked Vehicles T1,
- Wheeled Vehicles T2,
- Trailers T3.

**Military Load Classification Criterion:**

- Details of the Military load classification are specified in STANAG 2021 JAS (EDITION 6) – MILITARY LOAD CLASSIFICATION OF BRIDGES, FERRIES, RAFTS AND VEHICELS.

Examples of description of a military vehicle using the markings according to the above division:

- Leopard 2 Tank, Abrams, Leclerc – F11/C1/T1/MLC,
- Heavy Equipment transporter – F34/C3/T2, 3/MLC 100.

Another division can be seen in Fixed Assets Classification [9], which is a systematized collection of fixed capital objects serving, among others, evidencing. According to this classification, objects have been divided in 10 groups, of which group no. 7 concerns means of transportation. One of the subgroups (marked as 74) of the above group encompasses mechanical vehicles and divides them into the following types:

- 740 Motorbikes, trailers and motorbike carriages,
- 741 Passenger cars,
- 742 Trucks,
- 743 Special vehicles,
- 744 Car vehicles designer for transportation of nine or more persons, including the driver,
- 745 Trolley busses and electrical cars,
- 746 Tractors,
- 747 Semitrailers,
- 748 Trailers.

The Common Procurement Vocabulary [8], established by the European Commission, which is a unified system of classification used for public orders, timing at the unification of references used by institutions and ordering entities for the description of the ordered object, can be useful to working out a Universal division of military vehicles. According to this vocabulary, in part 35, concerning fire, rescue and safety equipment, there can be found group 40 – called military vehicles and their parts – which divides military vehicles into:

- Tanks;
  - Basic tanks,
  - Light tanks,
- Armoured combat vehicles;
  - Infantry lighting vehicles,
  - Armoured transports,
  - Armoured weapon carriers,
  - Reconnaissance and patrol vehicles,
  - Command and Communications vehicles.

The above presented military vehicle classifications are deprived of logical division rules, which causes difficulty in unequivocal determination of vehicles' position in the system they represent.

## 3. Proposed conception of military vehicles classification

Military vehicles classification of the first level has been conducted with consideration of the criterion of difference of construction resulting from specific construction characteristics. The division has been presented on Fig. 4.

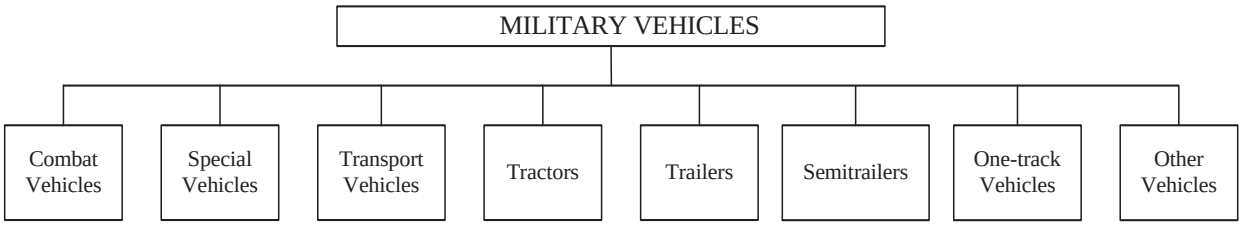



*Fig. 4. Basic division of military vehicles*
*Source: Author's studies*

Military vehicles of the Basic level can be divided into further levels with use of different criteria. Combat vehicles, meaning those, which have the ability to fire, are divided according to the specificity of conducted armed activities (Fig. 5).

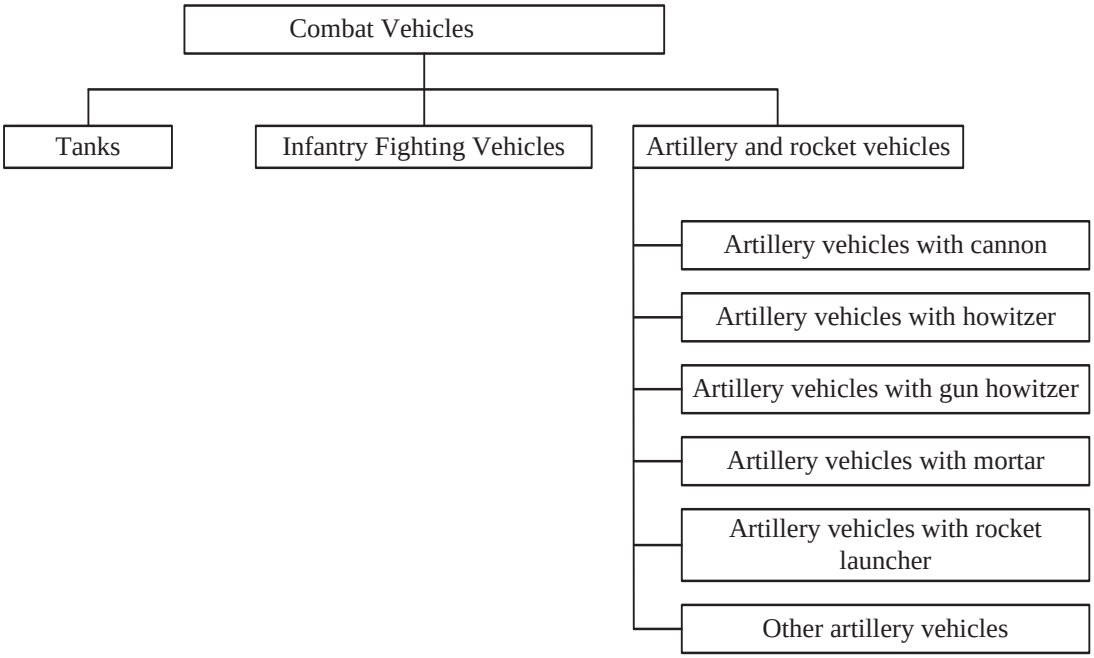



*Fig. 5. Division of combat vehicles*
*Source: Author's studies*

Special vehicles have been divided according to the character of conducted activities (Fig. 6). These activities have nothing in common with firing.

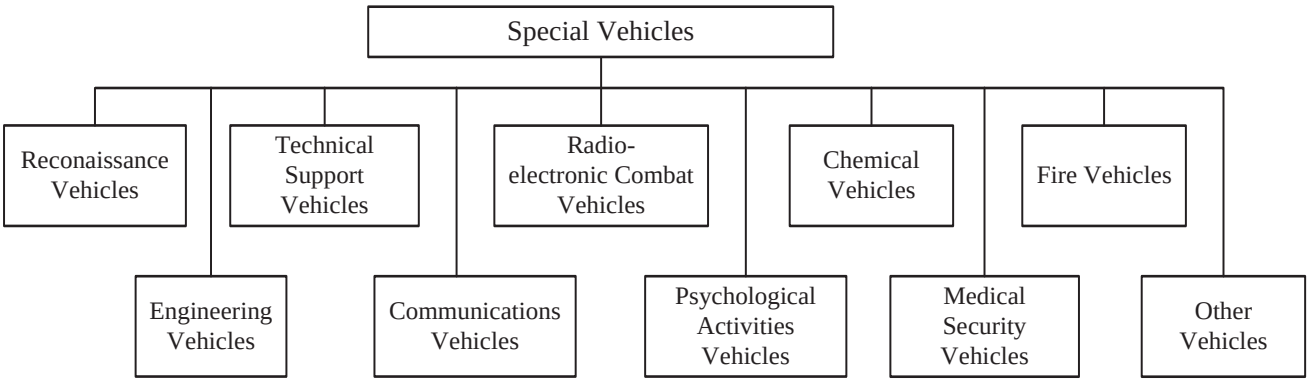



*Fig. 6. Division of special vehicles*
*Source: Author's studies*

The initial criterion of transport vehicles division was their adaptation for cargo and people transportation.

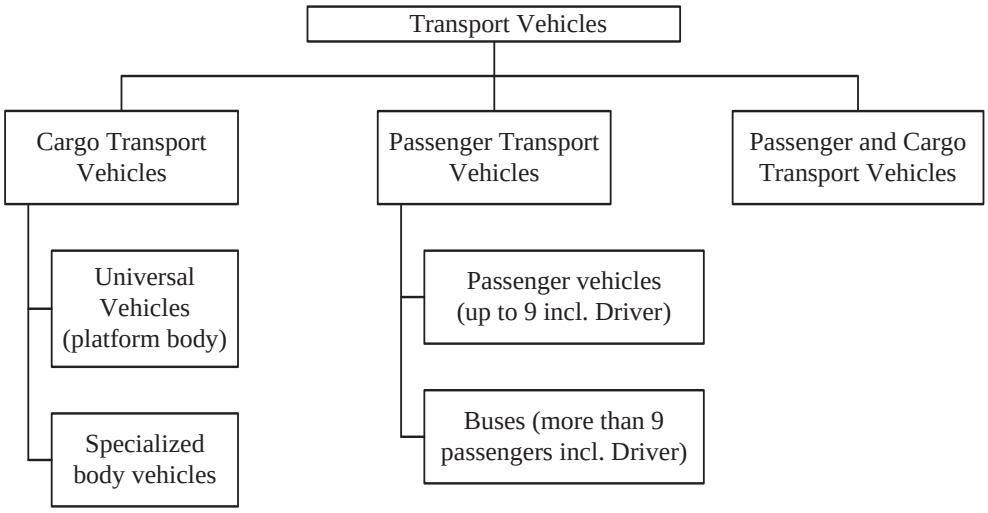



*Fig. 7. Division of transport vehicles*
*Source: Author's studies*

Division of tractors has been made with consideration of the criterion of coupling with the pulled element (Fig. 8).

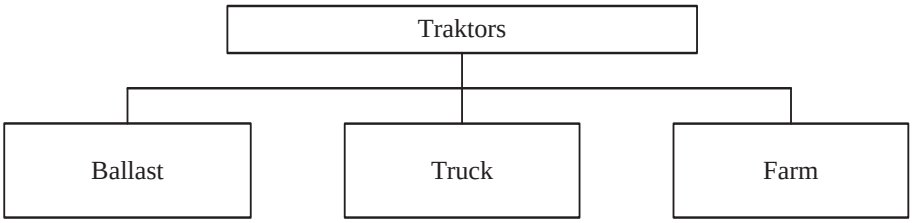



*Fig. 8. Division of tractors*
*Source: Author's studies*

One-track vehicles have been divided according to the difference of characteristics related to production of forces enabling movement.

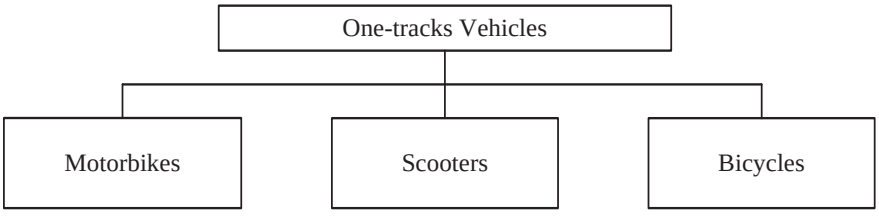



*Fig. 9. Division of one-track vehicles*
*Source: Author's studies*

The above presented divisions of military vehicles are characterized by a certain level of generalization. The following criteria can be used for further detailed division – general (possible to use for vehicles from the basic division) and special (possible to use for some vehicles from the basic division).

**Example general criteria:**

- Type of wheels and steering system,
- Adaptation to overcoming terrain obstacles,
- Maximum permissible Total weight (combat weight),
- Transport capacity,
- Speer of the vehicle,

**Example special criteria:**

- Existence of crew,
- Level of armour,
- Type of weaponry,
- Firepower,
- Calibre,
- Load capacity,
- Engine type and capacity,
- Type of wheels and steering system,
- Type of combated objects,
- Type of carried cargo;
- Type of rendered.

## 4. Final conclusions

Based on the conducted analysis of existing military vehicle classifications it can be Said that:

1. There are many vehicle classifications, which do not contain all vehicles used in the military,
2. Rules of logical division (e.g. condition of unequivocality) are not upheld in existing divisions.
3. The variety of vehicle divisions and the nomenclature used in the causes difficulties in defining their abilities,
4. There is a need of formulating a new division of military vehicles, which would aim at facilitating the formulating of records in documents such as Acts of law, decrees, norms and instructions,
5. A large freedom of use of existing classifications and their erroneous interpretation, which is the probable cause of chaos in military vehicle nomenclature used in documents enumerated in point 4,
6. The divisions presented above do not fully exhaust the problem, as a precise division according the accepted criteria is not always possible. Often, vehicles have a large number of common characteristics, which cause a given vehicle to be classified in several groups or types at the same time,
7. Along with the development of military vehicles, there are formulated new division criteria, and at the same time, others wither.

## References

[1] AVTP-1 (ALLIED VEHICLE TESTING PUBLICATIONS), STANAG 4357 i 4358. NATO AC 225 (PANEL II/WGE 3).

[2] *Encyklopedia Techniki Wojskowej*, Wydawnictwo Ministerstwa Obrony Narodowej, Warszawa 1987.

[3] Kajetanowicz, J., *Bojowe wozy piechoty*, Copyright by Wydawnictwo Bellona, Warszawa 1995.

[4] *Koncepcja nowej struktury transportu samochodowego SZ RP*, Sztab Generalny WP. Centralny Zarząd Logistyki, Warszawa 1999.

[5] Koszycki, T., Kraszewski, E., *Konstrukcja i obliczanie czołgu*, WAT, Warszawa 1970.
[6] Magnuski, J., *Wozy bojowe LWP 1943-1983*, Wydawnictwo Ministerstwa Obrony Narodowej, Warszawa 1985.
[7] Polish Norm PN-V-01002, *Sprzęt pancerny. Parametry i wskaźniki porównawcze. Terminologia i klasyfikacja*.
[8] Decree of the Council (EC) no 213/2008 from 28 October 2007 changing the decree (EC) no 2195/2002 of the European Parliament and Council on the Common Procurement Vocabulary and directives 2004/17/WE and 2004/18/WE of the European Parliament and Council on procedures of granting public orders in scope of CPV.
[9] Regulation of the Council of Ministers from 10 December 2010 no Classification of Fixed Assets (Dz. U. No 242, pos. 1622).
[10] Regulation of the Council of Ministers from 29 January 1999 on Classification of Defense Products (Dz. U. from 30 March 1999).
[11] STANAG 2021 JAS (EDITION 6) – MILITARY LOAD CLASSIFICATION OF BRIDGES, FERRIES, RAFTS AND VEHICELS.
[12] Użycki, D., Begier, T., Sobala, S., *Współczesne gąsienicowe wozy bojowe*, Wydawnictwo Lampart, Warszawa 1996.