

DOI: 10.32703/2415-7422-2022-12-1-114-132

UDC 623.437.46(091)(045)

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The front line transporter as the embodiment of the USSR military doctrine in the middle of the 20th century

Abstract. *The paper based on a source analysis of the history of creation, design, and production of LuAZ-967, LuAZ-967M, against the background of the processes of implementing projects of small tactical high mobility wheeled vehicles for the armies of European countries, shows that the developing, testing, and commissioning a front line transporter became a deepening of the process of motorization of the Soviet army. The designs of similar vehicles have been analyzed. An attempt to assess the degree of uniqueness of the front line transporter design and its place in the history of technology, as well as its potential as a reminder of science and technology has been made. The experience of using various civilian and military vehicles in the army required the creation of a special small transporter. In each of the countries, developing their designs, embodying new original or time-tested ideas, ones developed vehicles both for the army and for separate armed forced formations. Features of the automotive industry of the countries were reflected in the design of army vehicles. The works and operation Volkswagen Type 82, Volkswagen Schwimmer Type 166, DKW Munga, Volkswagen Type 181 in the armed forced formations in Germany had a significant impact on the spread of the concept of an army small transporter. In France, production of a licensed sample of Willys and the original Citroën Méhari was launched. The Steyr-Daimler-Puch vehicle (Austria) has become one of the most original, successful developments of a small transporter for difficult operating conditions. The development of a front line transporter in the USSR fully corresponded to the challenges of the time and it was carried out through similar stages. The first transporter projects developed by the Scientific Automotive Institute used heavy motorcycle engines mastered in production. It was the lack of the necessary engine for the vehicle that was the main reason for the long proof of the project. Only after the involvement of the designers of the automobile plant in Zaporizhzhia and the installation of units of the mass-produced ZAZ vehicle in the transporter made it possible to prove the design and to master small-scale production. The use of the most powerful engine of a production vehicle, which would correspond to the concept of a*



small army vehicle, had enabled to master mass production for the army and the development of vehicles for the civilian market. An analysis of the front line transporter design, its systems, compared with its foreign counterparts, suggests that it is a Soviet refinement of the concept of a small army vehicle, a more specific means directly for the battlefield. At the same time, it was developed taking into account foreign developments and similar designs, imitating individual designs, adapting to the capabilities of the USSR automotive industry.

Keywords: *history; museology; vehicle; transporter; design; Lutsk Automobile Plant*

Introduction.

Since the end of the 19th century, a wide variety of vehicle models have been created: high-speed, all-terrain, comfortable, and ascetic ones. But among them, there are not many vehicles that will remain in history, known not for popularity, but for their unique concept and its execution – those who amaze with their simplicity and refined pragmatism. A front line transporter (FLT) – *LuAZ-967* – just such a vehicle. The idea of its creation appeared in the 50s of the 20th century.

Analysis of recent research and publications.

To date, there are practically no scientific works on an objective, thorough study of the history of a front line transporter creation. Unfortunately, only in recent years there has been an increase in interest in objective coverage of the automotive technology history. The number of works is growing, which not only highlights the history of creation, the activities of engineers, but determines the significance of a particular vehicle in the history of the world automotive industry.

When researching the history of the creation of a vehicle, researchers often resort to simplification, arguing that this vehicle was not an independent development, but it was developed under the influence of some foreign vehicle, choosing the subject of copying at their own discretion (Bathory, 2016; Akppwiki, 2018). There are works where the FLT is called a completely Soviet original machine created independently, without taking into account foreign developments, based only on the needs of the Soviet army or, in particular, the airborne troops (Ryabinin, 2020). In most works of modern researchers, the issues of originality or copying of the design of a vehicle and its components are not the subject of research (Kharuk, 2019). More often, researchers pay attention to certain aspects of the FLT design, its original features, and compare it with Soviet cars (Homutinkin & Trigub, 1989; Kochnev, 2017; Kuts, 2018). Today, the research of technology from the standpoint of its museumification and the presentation of the history of the technology development are being updated. The topic is studied both by professional museum workers and monument historians (Griffen, 2014; Karpov, 2014; Honcharova& Pustovalov, 2019) and by collectors and restorers on the pages of periodicals, mainly electronic ones. In such works, questions of research, restoration, storage of equipment as museum artifacts are raised

systematically, but at the level of generalizations. The works of collectors, restorers, and researchers of the history of vehicles, on the contrary, are characterized by in-depth detailing, a narrow subject focus.

Research methods.

In the proposed work based on the experience of operating the *LuAZ* vehicle, analysis of the FLT design, its visual study, reports from open sources and a retrospective review of the development of military vehicles in European countries, an attempt to objectively determine the share of original ideas and borrowings has been made. Directions for further scientific research have been outlined in order to clarify the facts and to eliminate inaccuracies and lies. The main stages of the evolution of its design and introduction into serial production have been specified and systematized. Certain important aspects of the restoration and preservation of the FLT have been updated. The history of the development and modernization of a front line transporter, a description of the unique elements and components of the design will help researchers and collectors to restore and to store quite rare vehicles in museums and collections.

It should be noted that in the USSR, considerable attention was paid to the operational familiarization with the latest engineering developments in the field of automotive industry abroad. This was not in doubt and was constantly confirmed in the industry abstract journals, in specialized literature, and popular science publications. The publication was reported primarily to specialists about the latest developments. If it was necessary to study the development in depth, which had prospects for military use, they tried to purchase it directly from the manufacturer. In cases where it was impossible to do this, to purchase through third countries or to steal. A comparative analysis of the design, performance characteristics of the front line transporter and the same type of light vehicles from other countries will eliminate the errors of individual researchers who limited themselves to comparing purely external design features, design elements, finishes, and the vehicle configuration. The comparison of the process of implementation and use of light military vehicles in Europe and the USSR will reveal the features of domestic experience and the degree of compliance with the development of the global automotive industry. Comparison of the stages of the process of developing the concept of a light army vehicle of individual European countries and the Soviet FLT should take place only taking into account the specifics of the development of the automotive industry, engineering activities, taking into account the peculiarities of the historical development of countries.

Results and discussion.

By the beginning of the 30s, a special vehicle for the army (an army vehicle) was not created in the USSR, in accordance with the specific conditions of military operation. Unfortunately, army vehicles were not given due attention even in the second half of the 30s of the 20th century, during the years of the so-called “industrial mobilization”. The country tried to adapt civilian *GAZ* and *ZiS* vehicles for military

needs. However, in terms of cross-country ability, carrying capacity, maintainability in the field, simplicity, reliability, they were far from full-fledged military vehicles. That is why, during the Second World War, the Red Army moved in *Studebakers*, *Willys*, *Dodges*, *Fords*, transferred under Lend-Lease, and in captured vehicles.

The operation of such a variety of equipment has enriched the engineers with invaluable experience based on which, after the War, the development of systems for the motorization of the army was intensified. Developing the idea of motorization of different types of troops and armed forced formations, original ideas were embodied, in particular, those that did not pass the test of long-term operation. It was at that time, the end of the 40s – the beginning of the 50s, that the auxiliary-propelled gun *SD-44*, *SD-57* appeared (Skomorokhov, 2018). A motorcycle engine was mounted on the gun carriage with a drive to the wheels of the gun. The engine with a gearbox was supposed to allow the artillery crew to simplify the movement from the tractor to the combat position and its change. The extreme simplification of the design, asceticism, reliability, efficiency, the power of the artillery system – these criteria were difficult to combine in one vehicle.

In general, by the beginning of the 50s, the designs of various army vehicles were well known in the USSR, in particular, simple, ascetic, cheap and technologically sophisticated, powerful, original, floating, military vehicles. Moreover, the Red Army had experience in operating such vehicles (Aleksandrov, 2020). For example, military variants of the *Volkswagen Type 82* (Fig. 1) and *Schwimmer Type 166* (Fig. 2), which were not as massive as the *Willys* or *Dodge 3/4*, were used as long as ones could be repaired and spare parts were available.



Figure 1. *Volkswagen Type 82* (Volkswagen Kübelwagen, n. d.).

These small vehicles could go where it was difficult to go and, in some places, it was impossible. *Schwimmer 166* (German “float”) was the most massive amphibian of

its time (Volkswagen Kübelwagen, n. d.). These vehicles, due to their unique capabilities, were widely used by Wehrmacht intelligence.



Figure 2. *Volkswagen Schwimmer Type 166* (Volkswagen Schwimmwagen, n. d.).

Despite the post-war devastation in Europe, the trend towards increased mobility of armed forces formations has continued. Motorization had to be done with limited finances and resources. For this, there were two ways of implementation: the adaptation of serial civilian vehicles and the development of new original army vehicles. Each country chose its own path. Some countries have tried to go both ways.

In France, after World War II, licensed Willys were manufactured for the army (Varfolomeev, 2021). The same path was followed in Japan, South Korea, and India. Moreover, France also had original developments. The *Citroën Méhari* (1968–1987) (Fig. 3) vehicle is based on the *Citroën Dyane 6* with maximum simplicity and manufacturability (Citroën Origins, n. d.). The vehicle had a troughing plastic body with plastic hinged panels and a soft top (Citroën Origins, n. d.). It was driven by a 26–29hp two-stroke engine. In general, the vehicle was designed for recreation and had only front-wheel drive, but the farmers liked it, it was also used by the police and hunting services. In this regard, since the 70s, its all-wheel drive version has been produced (Voenteh, n. d.).

In the Federal Republic of Germany, invaluable experience in the production and operation of “pelvis” – or “float” –type vehicles (*Volkswagen Type 82*, *Schwimmer Type 166*) has led to the continuation of work on the development and implementation of a new army light vehicle. In 1956, the new all-wheel drive *DKW MUNGA* began to enter the army. Mehrzweck Universal Gelendewagen Allradantrieb is a multi-purpose, universal, off-road, all-wheel drive vehicle (Fig. 4) (Kanunnikov, 2013). Unlike its predecessors, which had a rear-engined layout (*Volkswagen Type 82*, *Schwimmer Type 166*), (Fig. 4) the engine in *MUNGA* was placed in its front part. The engine is a three-cylinder two-stroke one with a power of

38hp. It has four-speed gearbox with transfer case and center differential. This is a vehicle with a simple, angular body with corrugated stiffeners, a soft top, a folding windshield, and a canvas door on a tubular frame.



Figure 3. Citroën Méhari (Citroën Origins, n. d.).



Figure 4. DKW Munga (Kanunnikov, 2013).

The vehicle *DKW Munga* had a mass of 1,085kg and could carry a load of 385kg, overcome a ford of 0.5m without preparation, and reach a maximum speed of 98km/h. The engine power has been constantly increased and the latest models already had 44hp. In small quantities, a modification was made with an extended base, which

could already carry up to 690kg of a cargo. A total of 46,750 such vehicles were manufactured, about 31,000 units of which were sent to the army (Kanunnikov, 2013). The vehicle has been sold in the civilian market since 1957. Since 1958, the vehicle has been produced in Brazil for the local market (Kanunnikov, 2013). By the mid-60s, the vehicle no longer met the requirements of the military, primarily in terms of power, carrying capacity, and spaciousness.

In the mid-50s of the 20th century, NATO member countries, according to the adopted military concept, had to optimize the military-industrial complex and to solve the problems of military, defense doctrine to the maximum unify weapons and military equipment or to develop such models that would satisfy the armies of all members of the Alliance. Similar work was carried out in the direction of the development of small arms, aircraft, tanks, light armored vehicles, vehicles.

In the 1960s, France, West Germany, and Italy were building the *Europa Jeep*, a light all-wheel drive amphibian. Work on the project required a lot of time, so in Germany, ones decided to create a temporary replacement for the *DKW MUNGA*. The *Volkswagen Type 181* (Niedermeyer, 2010) continued the concept of the “pelvis” (Kubelwagen) in the layout of the main components (Fig. 5).



Figure 5. *Volkswagen Type 181* (Niedermeyer, 2010).

It was rear-wheel drive and rear-engined. The vehicle was developed with a wide use in the design of components, mechanisms, and parts mastered in mass production of vehicles. The design was based on the components of serial models: the *Beetle's* engine, the *Karmann Ghia's* bottom and the body part, the *Transporter's* rear suspension. Wheel reduction gears have been introduced into the transmission to increase ground clearance. The vehicle retained the concept of a simple body with longitudinal punching to strengthen the panels. The roof is soft, but the door is already a metal one. The vehicle has been produced in Mexico and Indonesia since the early

70s. The *Volkswagen Type 181* was purchased and used by the armies of Austria, Belgium, Denmark, France, Morocco, the Netherlands, Greece, and Turkey (Niedermeyer, 2010).

In 1979, the *Europa Jeep* project was closed and the Bundeswehr began to purchase new military light four-wheel drive vehicles *Volkswagen Type 183 Iltis* (Kutz, 2018).

In Austria, the Steyr-Daimler-Puch Company in the second half of the 50s created an army light vehicle called the *AP 700 Haflinger*, which, after testing, was put into service (Fig. 6) (Fedorov, 2020a). The vehicle embodied the concept of a cheap, reliable, simple army all-terrain vehicle for mountainous terrain.



Figure 6. *AP 700 Haflinger* (Fedorov, 2020a).

An open vehicle had a mass of 500kg and could carry 4 people or a cargo with a total mass of 500kg. The all-wheel drive vehicle was driven by a two-cylinder four-stroke air-cooled engine with a power of 27hp; its layout was rear-engined. The engine was located under the cargo platform. Under the platform, there are two throwback seats in niches. The front seats also throwback. As a whole, the design is more than ascetic in nature. The open vehicle provided for the installation of a canvas top and tubular doors covered with canvas – to improve the conditions of the movement. The windshield swung forward. The minimum comfort and heating of the windshield was provided by an autonomous gasoline heating system (All Oldschool, 2020). Despite the low engine power, the vehicle, due to independent wheel suspension and a 4- and later – 5-speed gearbox, had a high cross-country ability. Its maximum speed on the highway was 75km/h. However, due to the low placement of the engine, the maximum ford without preparation was 0.4m. The latter completely satisfied the military, because the vehicle was primarily intended for mountain infantry units. Its low center of mass increased durability. The vehicle overcame a slope of 65%. A large-caliber machine

gun or a 57mm open chamber gun, or a *Bantam* anti-tank missile system, was installed on the vehicle. Some samples were equipped with a winch with a force of 1.5 tons or a power take-off shaft to drive tools: a mechanical saw, a snow plow (Goll, 2003). During 1959–1974, 16,647 vehicles were manufactured. The equipment was used by the armed forces of Austria, Switzerland, Sweden, the Netherlands, Britain, and Australia.

The concept of the *Haflinger* developed in two directions. In the direction of increased power and all-terrain capability, the concept was embodied in the *Pinzgauer* all-wheel drive all-terrain vehicle, which has been mass-produced since 1971, in the direction of simplification, weight reduction – in cargo platforms and vehicles *Military M274 Truck Platform Utility* (USA), *FAUN Kraka-640* (Germany).

So, the creation of a light vehicle in Europe after the Second World War can be divided into stages. The first one is the development of a light military vehicle based on motorcycle components for maximum simplicity and low cost. The second one is the creation of an army vehicle using systems and components of serial civilian vehicles. With the development of military equipment and weapons, the requirements for army light vehicles have changed. However, the developed automotive industry made it possible to quickly develop and to mass-produce a new vehicle, in accordance with the requirements. The highly developed automotive industry allows to quickly adapt the design of a military vehicle to the needs of the civilian market. Conversely, a purely civilian vehicle that interested the military quickly received an army version.

The conflicts in China (1946–1949) and Korea (1950–1953) and the participation of the USSR in them revealed the need for small, simple, cheap high mobility wheeled vehicles that could both drive to advanced positions and take personnel and cargo out of them. For covert movement, the vehicle had to have a low silhouette; for cross-country capabilities on the battlefield, it had to be light, reliable, and, therefore, simple and effective. In order to increase mobility, the ability to swim was considered desirable. The probable theater of military operations for which the Soviet army was preparing included, first of all, Europe with a developed network of small lowland rivers. So, the ability of the vehicle to overcome the river on the move was incorporated into its concept.

A new light army vehicle began to be developed at the Scientific Automotive Institute (Moscow) in the second half of the 50s of the 20th century. After experimental work, the prototype was completed by Chief Designer Boris Futterman in 1957 (Fedorov, 2020a). According to other sources, the prototype was demonstrated to the military in 1958 (Kharuk, 2019, pp. 68–69).

A two-cylinder engine of a heavy motorcycle with a capacity of 22hp was installed on a low flat body in front and all-wheel drive was equipped. The concept of installing a motorcycle engine was known in Europe for creating the same type of vehicles and allowed to accelerate the development of a special vehicle, as well as the development of small-scale production, making it economically feasible. However, low engine power did not provide an opportunity to realize the constructive potential

of the vehicle and complicated its operation. In 1959, the development of the model was transferred to the Zaporizhzhia Automobile Plant. The vehicle has received its completed form due to the Zaporizhzhia designers and was first manufactured under the name ZAZ-967 (Fig. 7) (Fedorov, 2020a) since 1961.



Figure 7. ZAZ-967 (Fedorov, 2020a).

Without changing the general concept of the vehicle, the main components of the ZAZ-965 mastered in production were introduced into its design. So, the vehicle received a Melitopol air-cooled engine (MeMZ) that meets the specified criteria of simplicity and reliability. By the way, most military vehicles of this class were equipped exclusively with air-cooled engines by that time (see above). Such an engine has significant advantages in simplicity, reliability, and weight. A ZAZ gearbox was installed on the FLT, but its secondary shaft was lengthened to equip the drive to the rear wheels. The vehicle received its final form until December 1967, when its production was transferred to the Lutsk Automobile Plant (Fedorov, 2020b). Since 1968, a small-scale production of the vehicle has begun in Lutsk under the name *LuAZ-967*.

In 1969, *LuAZ-967* was put into service. In 1972, the vehicle received a more powerful 37hp engine and under the name *LuAZ-967M* it was introduced into mass production in 1975 (Fig. 8 and Fig. 9) (Akppwiki, 2018; Dvorzhak, 2020).

In addition to the engine, the braking system and individual body elements underwent minor changes. A step-down gearbox is attached to the gearbox by a separate unit, thus the cross-country ability of the vehicle at a “belly” speed has been increased. The reduced (“belly”) speed allowed moving only forward. Since, according to the concept, the engine was placed in front of one block with a gearbox, therefore, wheel reducers were introduced into the design. The engine and gearbox from the ZAZ vehicle have rear-engined layout. If these nodes were placed in the front-engine layout without modification, the vehicle would have 4 rear speeds and 1 front one. The introduction of wheel reducers is a forced measure in order to change the direction of the wheel rotation, but this is what has strengthened the all-terrain capability. Wheel reducers allowed to increase the ground clearance to 285mm, to improve cross-country ability and a torque transmission. At that time, army *GAZ* and later *UAZ* were made

with wheel reducers, but of a different design. The *LuAZ* torsion bar suspension is somewhat more difficult to manufacture, but it is extremely reliable, it is not for nothing that this type of suspension is used on most Soviet tanks, tracked armored vehicles, and armored personnel carriers.



Figure 8. *LuAZ-969M*, front view. (Author's photo).

An interesting solution was the rear-wheel drive in the *LuAZ-967*. The drive shaft rotated in the pipe “to create a rigid connection system – the power unit – the gearbox of the rear axle” (Homutinkin & Trigub, 1989, p. 135). The shaft in the pipe was placed on three bearings. The pipe was fixed rigidly through a threaded connection on four studs on the side of the rear axle and on the side of the gearbox. Grease is poured into the pipe to lubricate the bearings. The shaft transmits torque from the toothed shank through a compensating coupling with internal teeth. The design allows to place the power unit, the gearbox clutch, and the rear axle on only three supports, gives additional rigidity to the body. The design somewhat resembles the invention of Hans Ledwinka – a vertebral frame, which is used in the transmission of vehicles *Tatra* and *Pinzgauer* (Long, 2016, pp. 22–23). However, on the *LuAZ*, the body elements are not attached to the pipe. The pipe connects the gearbox engine and the bridge into one unit and reduces the load on the body. The system is implemented to facilitate maintenance and to repair, to reduce the number of cardan connections, and to improve reliability. The units are easy enough to replace even in the field. It is interesting that the introduction of the rear axle differential lock not only improved the vehicle’s cross-country ability, but also increased its reliability. In the event of a breakage of three cardan connections with gearboxes, the FLT could move on 1 surviving rear one with a locked differential.



Figure 9. *LuAZ-969M*, rear view. (Author's photo).

Separately, it is worth noting the design of the body of the neoclassical automobile type. The FLT driver was placed in the middle – a tribute to amphibiousness. Behind him, on the sides of throwback seats, which could be folded to free up space for cargo or install stretchers with the wounded along the sides. Such placement did not worsen the buoyancy of the low-sided body. In order to reduce the silhouette on the car, the windshield was thrown forward – this is often used on army equipment. The steering column could be folded, and the driver could drive the vehicle lying on his stomach – it was for the first time. The dashboard is located in such a way that even lying down, the driver can see the instruments. A searchlight was attached next to the steering column. The body liner for strengthening is corrugated with longitudinal blankings – at that time, very common for such vehicles. The body is waterproof. The output of the drive shafts is made through rubber cuffs. A water pump is installed to pump out water when it enters the body. After leaving the water, it was necessary to unscrew the body plugs and to drain the water. The same would have to be done with the wheel gears – to drain the water until the oil starts to flow out. An entrenching tool (an axe, a shovel) was fixed on the vehicle. Small ladders were attached to the sides of the body for the vehicle to leave the water or to move through funnels, trenches, etc. The ladders could serve as an additional container for 20 liters of fuel. A winch with a cable of 100 meters and a pulling force of 150kgf is mounted ahead. Quite often in the world, military vehicles were equipped with winches, which are designed to increase the cross-country ability of vehicles, to pull them out of the mud, to clear rubble, etc. To do this, the winches developed a significant traction force, for example, individual modifications of the *Haflinger-700-AP*. In *LuAZ*, this device was supposed to help pull up the

wounded on a stretcher, that is, it helped to do the work of an ambulance orderly. Consequently, it did not have the necessary effort for self-pulling. Additional equipment included a radio direction finder and radio beacons, through which the orderlies on the battlefield could quickly find the wounded. Radio beacons were distributed to the wounded during the first visit of the FLT for the wounded (Fedorov, 2020b). Thus, the vehicle could perform the widest range of work on the battlefield, fully consistent with the name of the front line transporter. It is interesting that the vehicle versatility was manifested even in the fact that the plates with a red cross on the sides were removable and fixed in special grooves.

Thus, the front line transporter concept evolved from a light motorcycle-powered vehicle to a machine using production vehicle components. With the improvement of the FLT design, its capabilities have improved, the equipment has improved quantitatively and qualitatively, and the range of its applications has expanded. The external elements of the body as blanking, the placement of auxiliary equipment was natural in terms of maximum simplicity, manufacturability, and strength of the structure and the specifics of use.

The FLT production began at the Lutsk Automobile Plant in 1961. Since 1967, the FLT has been completed (Fedorov, 2020b; Kochnev, 2017). On the basis of FLT 1965, a civilian version of the vehicle was developed under the name ZAZ-969V. In December 1966, a pilot batch of 50 pieces was made (Homutinkin & Trigub, 1989, p. 3). For about a year, the vehicle was produced under the name ZAZ-969V. On December 11, 1967, by order of the USSR Ministry of Automobile Industry, the Lutsk Machine-Building Plant was renamed into the Lutsk Automobile Plant (Homutinkin & Trigub, 1989, p. 4). Accordingly, the vehicles manufactured by the plant were called *LuAZ* instead of ZAZ while maintaining the model number.

The civilian vehicle developed on the front line transporter basis inherited the main systems and components from its military “brother”, but with the features inherent in a civilian vehicle (Fig. 10) (Polazhynets, 2019). Autonomous gasoline heating made it possible to warm up the engine for starting in the cold season, which was not the case on other civilian vehicles. There was no winch in the civilian *LuAZ*. The refusal of buoyancy made has led to equip the body with three doors (two on the sides and cargo one – at the rear part of the body). Cheapness in production is embodied in the angular outlines of the body. The body had a canvas top. Behind passenger seats could fold along the sides, turning the vehicle into a small truck.

The vehicle was offered for residents of the countryside and sold in the market in 1985 at a price of 5,100 rubles USSR (Polazhynets, 2019). Such a price is almost 1,000 rubles USSR more expensive than ZAZ 968M. By the way, the ZAZ-969V is the first domestic (within the former USSR) front-wheel drive vehicle. Index “V” meant “temporary” (Polazhynets, 2019). Due to difficulties with the manufacture of the rear axle, temporarily, during 1966–1968, the *LuAZ-969V* was produced with a drive to the front wheels only (Homutinkin & Trigub, 1989, pp. 3–4). After solving problems with

debugging the production of the required number of rear axles, the plant has launched the *LuAZ-969* into mass production.



Figure 10. ZAZ-969 vehicle, since 1967 – *LuAZ-969* (Polazhynets, 2019).

Thus, due to an attempt to organize mass production of the front line transporter, Ukraine has received another automotive plant in Lutsk.

LuAZ-969V and *LuAZ-969V* corresponded to the world trends of that time in the automotive industry – the production of military and civilian models in parallel. For example, at the Volkswagen plant, along with the production of a passenger vehicle for the military, the *Volkswagen Type 181*, its adapted civilian version was produced. Even outside the *LuAZ-969* body was very similar to the *Volkswagen Type 181*, which was produced since 1968 – similar blankings on sides to enhance the rigidity of the body, the same ascetic, angular shapes, and extreme simplicity.

Since 1979, the civilian, updated *LuAZ-969M* has been put into serial production (Homutinkin & Trigub, 1989, p. 5). Basically, the body has undergone changes, namely, the front part, and the brakes were upgraded. With the development at the *Tavria* mass production at ZAZ, the Lutsk Automobile Plant has started the production of *LuAZ-1302* with a water cooling engine and the corresponding reproduction of the underhood space and the passenger compartment.

The *LuAZ-967 FLT* was produced until 1991 and its civilian version – until 2002 (Kharuk, 2019, pp. 59-60). The FLT was used not only in the troops. After the withdrawal of the Soviet troops from Germany, a significant number of these transporters were sold to the market from warehouses and storage bases. After the collapse of the USSR and the reduction of the army in the former Republics, the FLT also went in the market as excess property. Adventure travellers, hunters liked them very much and over time, they began to replenish private vehicle collections. With the development of the vehicle design, with the growth of military and civilian requirements for them, with the improvement in the vehicle qualities in terms of comfort, power, speed, an acute discrepancy between the *LuAZ-967M* and the new

requirements has appeared. The FLT has moved into the category of “curiosities”, later – “rarities”, “exhibits”.

The *LuAZ-967 FLT* has exhibited in many museums of technology, both in Ukraine and abroad. The *LuAZ* army version can be seen more often than a civil one at various exhibitions and festivals of vintage cars, where they cause the interest of visitors.

The *LuAZ* was filmed in a feature movies: *Citizen Nikanorova is Waiting for You* (1978, Mosfilm, directed by Leonid Maryagin), *Men’s Company* (1992, Intercom, Tonis, directed by Andrey Rostoksky), *Okhlamon* (1993, Turkmenfilm, directed by Eduard Rejepov), *Nuclear Zone Ranger* (1999, Kinomost Film Company, directed by Vyacheslav Nikiforov), *Birthday of the Bourgeois 2* (2001, NTV-Profit Film Company and “1+1” Studio, directed by Anatoly Mateshko), *Love as an Accident* (2012, Media Trade Union, directed by Alexander Kananovych) – civilian version of *LuAZ*; *Resident’s Return* (1982, Gorky Film Studio, directed by Veniamin Dorman), *Oracle Reception* (1992, TO “Eurasia”, directed by Georgy Kuznetsov), *The 9th Company* (2005, PC “Slovo”, Art Pictures Group, CTC Channel, directed by Fedor Bondarchuk) – the FLT version.

Today, individual examples of the FLT are in military service. In 2014, one refurbished FLT was transferred to the battalion of the Patrol Service of the Ministry of Internal Affairs “Peacemaker” (Channel 5, 2014). In 2018, the 93rd Kholodnyi Yar SMBr operated the FLT with ATMS launchers installed (Censor, 2018), that is, mobility, cross-country ability, reliability, stealth movement of the FLT finds its scope today.

Conclusions.

Thus, the idea of creating a front line transporter is a practical embodiment of the military concept of the Soviet Army in the mid-50s and 60s, according to the probable theater of operations. The FLT development was carried out taking into account the development of the light army vehicle design in Europe, but without its copying. The FLT history includes the main stages of the development of a light army vehicle, characteristic of Western European countries. However, the development of the light army vehicle concept in Europe was embodied in different vehicles of several manufacturers for three decades. In national history, all this is embodied in one FLT. *LuAZ-967* and *LuAZ-967M* have no analogues in terms of performance characteristics. The front line transporter is the original USSR embodiment of a light army vehicle.

Funding.

This research received no funding.

Conflicts of interest.

The author declare no conflict of interest.

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Анотація. В статті на основі джерелознавчого аналізу історії створення, конструкції та виробництва “ЛуАЗ-967”, “ЛуАЗ-967М”, на фоні процесів реалізації проектів малих армійських автомобілів підвищеної прохідності для армій країн Європи показано, що розробка, випробування та впровадження у виробництво транспортера переднього краю стало поглибленням процесу моторизації радянської армії. Проаналізовано конструкції аналогічних автомобілів. Здійснено спробу оцінити ступінь унікальності конструкції транспортера переднього краю і його місце в історії техніки, та потенціал як пам’ятки науки і техніки. Досвід використання різноманітних цивільних та військових автомобілів у військах викликав потребу у створенні спеціального автомобіля малої вантажопідйомності. В кожній з країн розробляючи свої конструкції втілюючи нові оригінальні чи випробувані часом ідеї розробляли автомобілі для армії так і для окремих армійських підрозділів. Особливості автомобілебудування країн відображались у конструкції армійських авто.

Значний вплив на поширення концепції армійського автомобіля малої вантажопідйомності мали роботи в Німеччині та експлуатація в армійських підрозділах “Volkswagen Type 82”, “Volkswagen Schwimmer type 166”, “DKW Munga”, “Volkswagen Typ 181”. У Франції було налагоджено виробництво ліцензійного зразка “Willys” та оригінального “Citroën Méhari”. Автомобіль фірми “Steyr-Daimler-Puch” (Австрія) став однією з найбільш оригінальних, вдалих розробок автомобіля малої вантажопідйомності для важких умов експлуатації. Розробка транспортера переднього краю в СРСР цілком відповідала викликам часу і проходила аналогічні етапи. Перші проекти транспортера розроблені Науковим автотранспортним інститутом використовували освоєні у виробництві двигуни важких мотоциклів. Саме відсутність необхідного двигуна для автомобіля стала основною причиною тривалого доводження проекту. Тільки після залучення конструкторів автомобільного заводу в Запоріжжі та встановлення в транспортері вузлів масового автомобіля “ЗАЗ” дозволило довести конструкцію та освоїти малосерійне виробництво. Впровадження більш потужного двигуна серійного автомобіля який відповідав концепції малого армійського авто дозволило освоїти серійне виробництво для армії та розробку авто для цивільного ринку. Аналіз конструкції транспортера переднього краю, його систем порівняно з його іноземними аналогами дозволяє стверджувати, що він є радянським доопрацюванням концепції малого армійського автомобіля, більш специфічним засобом безпосередньо для поля бою. Водночас він розроблявся з оглядом на іноземні розробки та аналогічні конструкції з переймання окремих конструкцій, з адаптацією під можливості радянського автопрому.

Ключові слова: історія; музеологія; автомобіль; транспортер; конструкція; Луцький автомобільний завод

Received 12.11.2021

Received in revised form 05.02.2022

Accepted 11.03.2022