



# DSIAC TECHNICAL INQUIRY (TI) RESPONSE REPORT

## SHERP Amphibious All-Terrain Vehicles

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A chief service of the DoD IACs is free technical inquiry (TI) research, limited to 4 research hours per inquiry. This TI response report summarizes the research findings of one such inquiry jointly conducted by DSIAC.

## ABSTRACT

Special Operations Forces (SOF) military personnel requested access to information on the SHERP vehicles located on foreign national systems. The Defense Systems Information Analysis Center worked with our information technology support department to access Ukrainian source materials, as well as materials from U.S. and Canadian sources. A report on characteristics, features, and specifications of the SHERP, SHERP Pickup, and SHERP the Ark vehicle variants was compiled. This report includes information on the powertrains/drivetrains, pneumocirculating suspension systems, articulated steering systems, all-wheel control systems, and automated water-pumping systems. Information on the various logistical support accessories and equipment, such as the cargo trailer, boat-type sled, medical module, dwelling module, universal loading platform, personnel transportation unit, and tank unit, is also included. Information was provided to combatant commands and other units associated with SOF operations for potential acquisition review to support military, domestic, and humanitarian assistance/disaster relief operations.

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## 1.0 TI Request

### 1.1 INQUIRY

What information is available on the various SHERP all-terrain vehicles (ATVs)?

### 1.2 DESCRIPTION

The inquirer was unable to access the website from U.S. Department of Defense systems because it is a Ukrainian-hosted company site. The vehicle was originally seen in a YouTube video. Information is requested for multiple combatant commands and services.

## 2.0 TI Response

### 2.1 SHERP VEHICLE BACKGROUND

Quadro International, headquartered in Kyiv, Ukraine, developed and manufactured the SHERP amphibious all-terrain vehicle (ATV), which includes the SHERP Pickup and SHERP the Ark. The company was awarded their ISO 9001 quality standards certification in 2015 [1, 2].

It took nearly 20 years for the company to develop reliable amphibian ATVs that can move on almost any surface (ice, peat bogs, rugged terrain, sand, scree, snow, and water) and overcome difficult natural obstacles up to 5 ft high and/or ditches/holes 6 ft wide. The market for SHERP ATVs includes geologists, oil workers, fishers, hunters, and explorers [2, 3].

SHERP's North American headquarters is in Manitoba Canada, with dealers located in the United States, Canada, Africa, Asia, Australia, Europe, and South America. U.S. dealerships can be found in Alaska, Arkansas, Florida, Georgia, Illinois, Minnesota, Missouri, Montana, New Hampshire, New York, North Carolina, South Carolina, Texas, Utah, Vermont, and Washington [4, 5].

Contact information for the North America Head Office (Manitoba Canada) is as follows:

All-Terrain Solutions Inc.  
Unit 2, 799 Kapelus Drive  
West Saint Paul, MB, R4A 5A4  
[info@sherp.ca](mailto:info@sherp.ca)  
(877) 349-4999

## 2.2 SHERP ATV AND SHERP PICKUP

The SHERP ATV, shown in Figure 1, is designed to carry two personnel in the front enclosed cabin and equipment/supplies in the back enclosed cargo area across rugged terrain that includes boulders, fallen trees, and other obstacles up to 28 inches high. It floats on water, allowing it to easily traverse marshes. The SHERP's large, ultra-low-pressure tires allow it to easily travel over deep snow, marshy areas, and ice (including that which is too thin for many other vehicles) and quickly move into and out of the water onto just about any terrain [6].



Figure 1: SHERP ATV (Source: SHERP).

The vehicle is powered by a reliable 44 hp, 4-cylinder Kubota diesel engine providing decent torque at both low and travel speeds. Load capacity is more than 2,000 lb. With a fuel capacity of nearly 18 gal and another 61 gal of storage onboard, low fuel consumption rate between 0.5 and 0.8 gal/hr, and a top gear speed of nearly 25 mph, the ATV should be able to support operations up to nearly 100 hours, with an operational radius in excess of 1,000 miles [6].

The SHERP Pickup (Figure 2) has the same characteristics, performance, and features as the SHERP, but with a removable rear cargo cover and a different style latching truck bed tailgate [7].



Figure 2: SHERP Pickup (Source: SHERP).



Key features of the SHERP ATV and Pickup include the following [6]:

- Reliable, lightweight diesel engine
- Ability to easily transition between land or ice and water
- High buoyancy (sealed body, 800-L volume wheels, and onboard tire inflation system)
- Ability to climb gradients up to 35 degrees
- Pneumatic circulating suspension and in-travel tire pressure adjustment for different terrains
- Unique low-pressure tubeless tires
- Continued operations on three and two wheels
- Smooth bottom aids travel over snow, rough terrain, and in water
- Low fuel consumption
- Fuel system that allows continuous operation in tilted position (no fuel starvation)
- Long-duration operations – 15.3-gal fuel tanks embedded in wheel disks (61.2 gal total)
- Extended operational radius
- Skid steering for tight turn radius (8.2 ft)
- Relatively small size that increases transport options
- Covered cabin with heating by the engine, vehicle heater, or WEBASTO autonomous heater
- Kingstons to drain water from the body
- Support for up to four full-size beds
- Under floorboard storage of 170 L to store equipment or install an additional fuel tank
- Rearview camera for added safety

Characteristics and specifications for the SHERP ATV and Pickup are provided in Table 1 [6].

**Table 1: SHERP ATV and Pickup Characteristics and Specifications**

Length, Overall	11.15 ft
Length, Rear Section	NA
Width, Overall	8.27 ft
Width, Rear Section	NA
Height, Overall	8.27 ft
Dry Weight	2,866 lb
Load Capacity	2,204 lb
Displacement	7,000 lb
Body Material	Cabin (Aluminum), Frame (—)
Engine Type	Kubota-V1505-T-E3B
Engine Displacement	—
Engine Cylinders	Four

Engine Environmental Protection Agency (EPA)/ European Union (EU) Emissions Certification	Tier 4 Final/Stage V
Fuel Type	Diesel
Fuel Tank Capacity	17.7 gal
Extra Fuel Can Capacity	61.2 (15.3 × 4) gal
Fuel Consumption	0.52 to 0.79 gal/hr
Steering	—
Transmission Type	Five-Speed Manual
Transfer Gearbox	—
Suspension	Pneumatic Circulating
Differential Locks	—
Tire Type	Tubeless, Ultra-Low Pressure
Tire Size	63 inches × 23–25 inches
Tire Volume	210 gal
Clearance	21.65 to 23.62 inches
Parking Brake System	Independent
Clutch	Sachs Performance GmbH
Seats in Main Cabin	Two
Sleeps	—
Maintenance Frequency	50 Running Hours
Power, Maximum	50 hp/37 kW
Engine Torque, Maximum	—
Speed, Maximum in Top Gear	24.5 mph
Speed, Maximum in Low Gear	0.9 mph
Speed, Minimum in Low Gear (mph)	—
Speed, Maximum on Water	3.7 mph
Climb Grade, Maximum	35 degrees/77%
Tilt, Maximum	—
Obstacle Climb-Over Height, Maximum	2.3 ft
Height of Obstacle via Vertical Step	3.25 ft
Trench/Crevice Crossing, Maximum	—
Operating Temperature	—

## 2.3 SHERP TRAILER

The SHERP Trailer, shown in Figure 3, is an all-terrain trailer designed to provide an additional 82.3 ft<sup>3</sup> of cargo space [8]. The trailer is made of steel and aluminum, weighs 992 lb, and is 11.65 ft long. It is simple in design, easily connects to the SHERP ATV with a tow bar, and can be towed through the same terrains as the SHERP ATV (water, rough soil, swamps, snow, etc.).



Figure 3: SHERP Trailer (Source: SHERP).

Specifications for the SHERP Trailer are provided in Table 2 [8].

Table 2: SHERP Trailer Specifications

Trailer Material	Steel and Aluminum
Length	11.7 ft
Width	8.3 ft
Height	6.3 ft
Volume	82.3 ft <sup>3</sup>
Weight	992 lb

## 2.4 SHERP BOAT-TYPE SLED (FOR THE SHERP AND SHERP PICKUP)

Quadro International produces a towable lightweight open boat/sled for the SHERP ATV (Figure 4) that can be used over snow and water. It is designed so it can be transported on one trailer attached to the SHERP ATV to provide a reliable system for securing and protecting goods. The delivery set includes a special tow hitch equipped with a cushioning mechanism for secure attachment. The boat hull, made of a hardwearing polymer material with a metal tow frame, is capable of withstanding severe frost [9]. The nylon fabric CORDURA in its base is well known for its resistance to abrasion, excellent tear strength, and water-repellent properties [10].



**Figure 4 SHERP Boat-Type Sled (Source: SHERP).**

Specifications for the SHERP Boat-Type Sled are provided in Table 3 [9].

**Table 3: SHERP Boat-Type Sled Specifications**

Length	8.7 ft; 15.6 ft, With Tow Frame Attachment System
Width	3.8 ft
Depth	1.3 ft
Weight	132 lb; 265 lb, With Tow Frame Attachment System

## 2.5 KUBOTA V1505-T-E3B ENGINE (FOR THE SHERP AND SHERP PICKUP)

The V1505-T-E3B (Figure 5) is a Kubota 05 series 1.5 L, four-cylinder, normally-aspirated engine providing a maximum 44 hp (at 3,000 rpm) and 117 ft-lb torque (at 2,000 rpm). The engine weighs 114 lb without fluids and is designed to provide economical high-performance solutions for small industrial machinery applications in the construction and farming industry, such as loaders, excavators, forklifts, tractors, and portable power devices. The V1505-T-E3B complies with U.S. EPA Tier 4 Final and EU Stage IIIA emission standards.



Figure 5: Kubota V1505-T-E3B – An Industrial 43-hp, Four-Cylinder, Indirect-Injection Engine (Source: Kubota).

Engine specifications are provided in Table 4 [11, 12]. Additional Information can be found in the Kubota V1505-T-E3B Data Sheet in the Appendix, Attachment 1.

Table 4: Kubota V1505-T-E3B Engine Specifications

Cylinders	Four
Displacement	91.4 in <sup>3</sup> /1.5 L
Power, Maximum	44.2 bhp
Power, Maximum	33 kW (44.9 ps) @ 3,000 rpm
Torque, Maximum	117 Nm (10.8 kg-m) @ 2,000 rpm
Aspiration/Combustion	Normally Aspirated, Indirect Injection
Bore × Stroke	78 mm × 78.4 mm
Dry Weight	114 kg
EPA/EU Emissions Compliance	Interim Tier 4 Final/Stage IIIA

## 2.6 SHERP THE ARK (THE ARK)

The manufacturer notes that the SHERP the Ark ATV (Figure 6) is designed to support travel and cargo transportation over very long distances in rugged and remote terrains (ice, sand, savannah grasses up to 3 ft tall, scree, snow, tundra, water, etc.) under extreme environmental conditions. The vehicle can climb grades up to 40 degrees, overcome obstacles 5 ft high and ditches 6 ft wide, and continue operations with multiple flat tires. The very large ultra-low-pressure tires support operations on thinner ice than vehicles of comparable size. If the ice breaks, the vehicle can continue operations through the water/ice debris [2, 13].

With an internal 63-gal fuel capacity and another 150 gal in the wheel storage canisters and low fuel consumption rate between 2 to 3 gal/hr, the Ark can support over 80 hr of continuous driving operations covering up to 2,000 miles while carrying a 7,500-lb load [2, 13]. Additional information can be found in Quadro International SHERP the Ark Overview and Specifications in the Appendix, Attachment 2.



Figure 6: SHERP the Ark Moving Over Water Ice (Source: SHERP).

Characteristics and specifications for SHERP the Ark are provided in Table 5 [13].

Table 5: SHERP the Ark Specifications

Length, Overall	31.67 ft
Length, Rear Section	15.75 ft
Width, Overall	8.33 ft
Width, Rear Section	7.25 ft
Height, Overall	8.5 ft
Dry Weight	10,500 lb
Load Capacity	7,500 lb (Front Section); 6,600 lb (Rear Section)
Displacement (lb)	—
Body Material	Cabin (Aluminum), Frame/Bottom (Hot-Dripped, Galvanized Steel)
Engine Type	Doosan D24
Engine Displacement	2.4 L/146 in <sup>3</sup>
Engine Cylinders	Four

Engine EPA/EU Emissions Certification	Tier 4 Final/Stage V
Fuel Type	Diesel
Fuel Tank Capacity	63 gal (8 in Front Section; 55 in Rear Section)
Extra Fuel Can Capacity	153 gal (15.3 × 10)
Fuel Consumption	2 to 3 gal/hr
Steering	Wheel, Multipower, Articulated Three Axis
Transmission Type	Five-Speed Manual
Transfer Gearbox	High/Low Range + Ability to Disconnect Front Section
Suspension	Pneumatic Circulating (Separate Adjustment for Front/Rear Sections)
Differential Locks	Front and Rear
Tire Type	Tubeless, Ultra-Low Pressure
Tire Size	63 inches × 23 inches × 25 inches
Tire Volume	—
Clearance	24 inches
Parking Brake System	Independent
Clutch	—
Seats in Main Cabin	Four
Sleeps	10 (2 in Front Section; 8 in Dwelling Module)
Maintenance Frequency	—
Power, Maximum	74 hp/55 kW
Engine Torque, Maximum	206.5 ft @ 1,600 rpm
Speed, Maximum in Top Gear	18.6 mph
Speed, Maximum in Low Gear	—
Speed, Minimum in Low Gear	0.6 mph
Speed, Maximum on Water	3.7 mph
Climb Grade, Maximum	40 degrees/88%
Tilt, Maximum	30 degrees/66%
Obstacle Climb-Over Height, Maximum	5 ft
Height of Obstacle via Vertical Step	4.9 ft
Trench/Crevise Crossing, Maximum	6.6 ft
Operating Temperature	−58 to 104 °F

## 2.6.1 Articulated Steering System

As shown in Figure 7, the Ark uses steering wheel control with a three-axis articulated steering system that allows the driver to go over multilevel obstacles with relative ease. The head unit of the Ark rises and rotates along the three-axis system, providing additional climbing capacity over rugged terrain and difficult obstacles. An electronic tablet with navigation and other information can be mounted in the center of the steering wheel [2, 13].

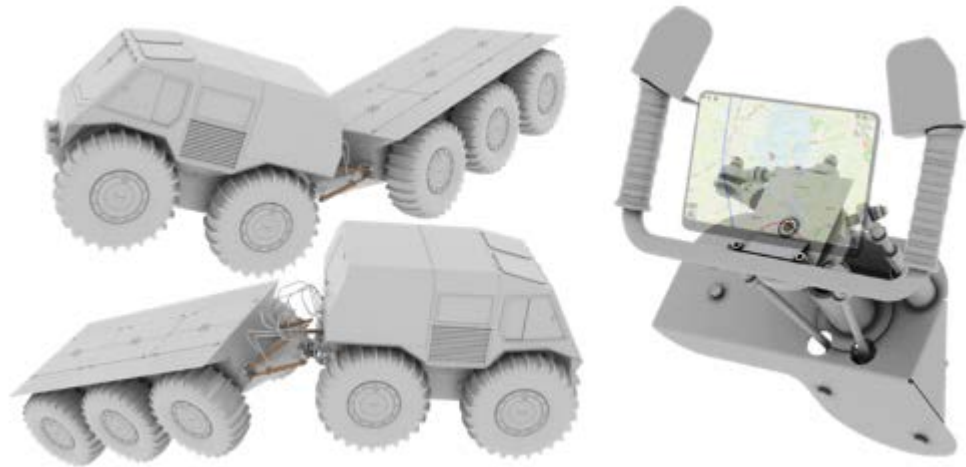


Figure 7: SHERP the Ark Articulated Steering System (Source: Quadro International).

## 2.6.2 Air Circulation and Tire Inflation Suspension System

The Ark is equipped with a “pneumocirculating” suspension composed of an air-circulation/tire inflation system that uses exhaust gases to inflate or deflate tires as required. Therefore, the system does not require the springs, shock absorbers, struts, and related elements of standard suspension systems. Fewer parts should increase reliability, reduce down time, and lower repair costs. The tires (Figure 8) are connected by a pneumatic circuit that allows the driver to adjust the tire pressure to different terrains and payloads. The system provides independent tire pressure regulation on the move and emergency shutoff for damaged wheels [2, 13].





Figure 8: SHERP the Ark Air Circulation/Tire Inflation System (Source: Quadro International).

### 2.6.3 All-Wheel Control System

The Ark has an all-wheel control system that allows the driver to switch between different driving modes. If necessary, the head unit drive can be turned off. The rear section drive is ideal for moving over difficult terrains. In all-wheel control mode, the powertrain provides power through both the front and rear driveline sections, applying torque through all front and rear wheels to improve traction, safety, and handling. The Ark is equipped with locking differentials in both front and rear main axels. Driveline transmissions and chains are placed in a closed oil bath to increase life of the system (Figure 9 [2, 13]).

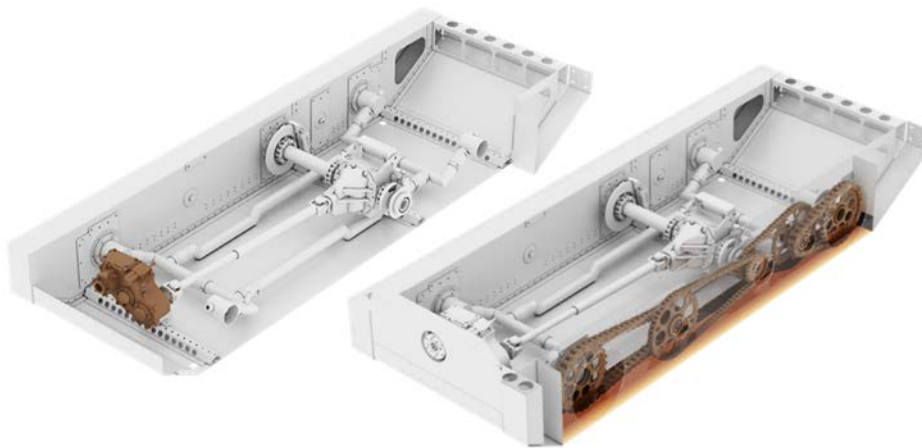


Figure 9: SHERP the Ark Front Section Driveline (Source: Quadro International).

### 2.6.4 Automated Water Pumping System

The Ark's front and rear sections have automatic pumps that will pump water out of them. The system is shown in Figure 10 [2, 13].

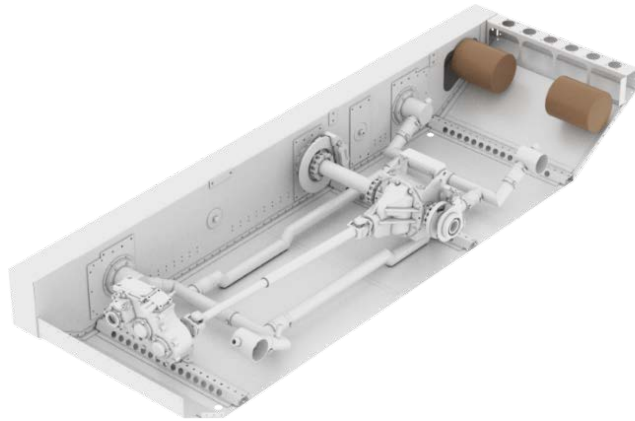


Figure 10: SHERP the Ark Water Pumps (Source: Quadro International).

## 2.6.5 SHERP the Ark Variants

Multiple configurations and equipment accessories are available for both the front vehicle and rear module; they are described next.

### 2.6.5.1 Universal Loading Platform

The Universal Loading Platform (Figure 11) is designed for transporting large and heavy cargo to difficult-to-reach and remote locations, including those that may not have ground logistics support equipment for unloading [2, 13].



Figure 11: SHERP the Ark Universal Loading Platform (Source: Quadro International).

### 2.6.5.2 Personal Transportation Unit

The Personal Transportation Unit (Figure 12) is designed to support activities such as search and rescue operations in remote locations and extreme environmental conditions. The unit can

comfortably accommodate up to 22 personnel (driver and 3 passengers in front vehicle; 18 passengers in rear section) [2, 13].



Figure 12: SHERP the Ark Personal Transportation Unit (Source: Quadro International).

### 2.6.5.3 Dwelling Module

The Dwelling Module (Figure 13) is designed to support longer duration expedition activities in hard-to-reach and difficult-to-logistically-support areas such as geological explorations or environmental research projects. The module is insulated to provide a comfortable living environment in most adverse conditions and can be equipped with sanitary and kitchen equipment/facilities [2, 13].

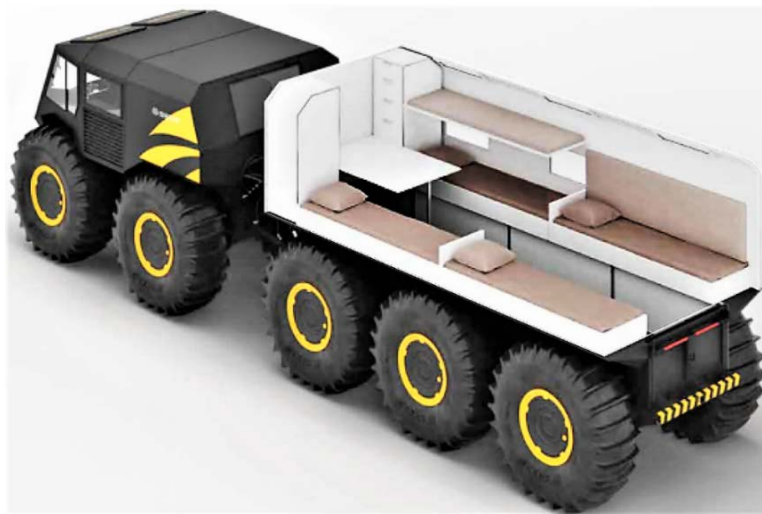


Figure 13: SHERP the Ark Dwelling Module (Source: Quadro International).

#### 2.6.5.4 Medical Module

The Medical Module (Figure 14) is designed to provide field medical and rescue operations support for victims of natural disasters, such as floods, wildfires, or earthquakes. The design facilitates first-responder medical care in difficult-to-reach and remote areas immediately upon arrival, without the need to set up a shelter [2, 13].



Figure 14: SHERP the Ark Medical Module (Source: Quadro International).

#### 2.6.5.5 Tank Unit

The Tank Unit (Figure 15) is designed to transport fuel, water, or any liquid, as needed, to remote locations. The unit can carry up to 7,500 lb [2, 13].



Figure 15: SHERP the Ark Tank Unit (Source: Quadro International).

### 2.7 DOOSAN D24 ENGINE (SHERP THE ARK)

The Doosan D24 (Figure 17) is a compact 2.4-L engine providing a maximum of 75 hp (at 2,600 rpm) and 145 ft-lb of torque (at 1,600 rpm). The engine is designed to provide

economical high-performance solutions for small industrial machinery applications in the construction and farming industry, such as loaders, excavators, forklifts, tractors, and portable power devices. The D24 complies with the U.S. EPA Tier 4 Final and EU Stage V emission standards [14–16]. Additional information can be found in the Doosan Compact Diesel Engine Lineup Catalogue and Doosan Diesel and Gas Engine Catalogue in the Appendix, Attachments 3 and 4.



**Figure 16: Doosan D24 Industrial 75 hp, Four-Cylinder, Turbocharged Engine (Source: Doosan).**

Specifications for the Doosan D24 engine are provided in Table 6.

**Table 6: Doosan D24 Engine Specifications**

Cylinders	Four
Displacement	145 in <sup>3</sup> /2.4 L
Power, Maximum	75 bhp
Power, Maximum	55 kW (75 ps) @ 2,600 rpm
Torque, Maximum	280 Nm (28.6 kg-m) @ 1,600 rpm
Aspiration/Combustion	Turbocharged, Intercooled (Ti)
Bore × Stroke	90 mm × 94 mm
Dry Weight	266 kg
EPA/EU Emissions Compliance	Tier 4 Final/Stage V



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## APPENDIX: Attachments

- [1] Kubota V1505-T-E3B Engine Data Sheet
- [2] Quadro International SHERP the Ark Overview and Specifications
- [3] Doosan Compact Diesel Engine Lineup Catalogue
- [4] Doosan Diesel and Gas Engine Catalogue