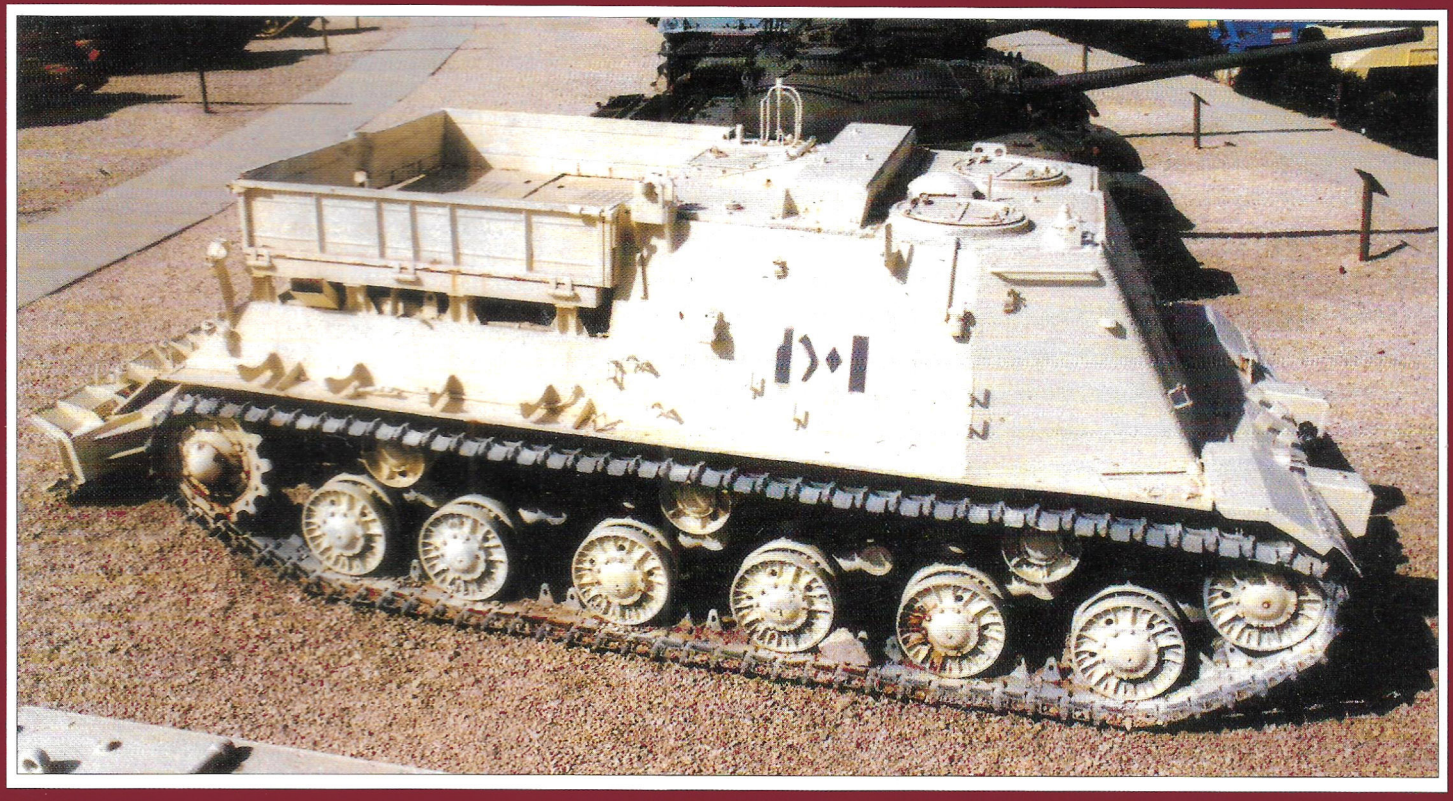
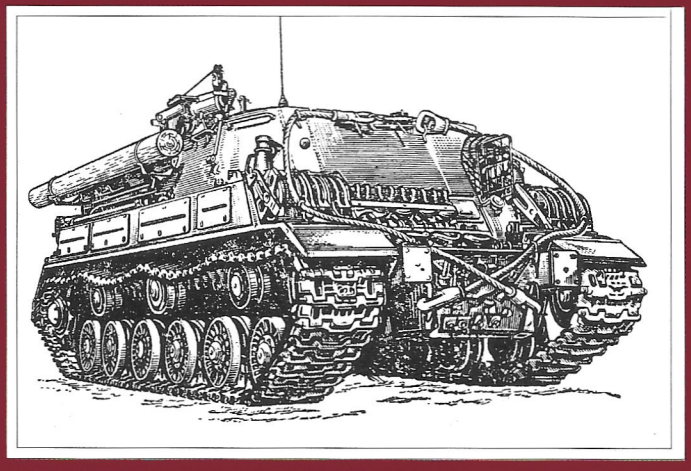
Tankograd Special N° 01

IS ARVs

The Tow Tractors and Armoured Recovery Vehicles based on the Iosif Stalin Heavy Tank Chassis



by Jochen Vollert



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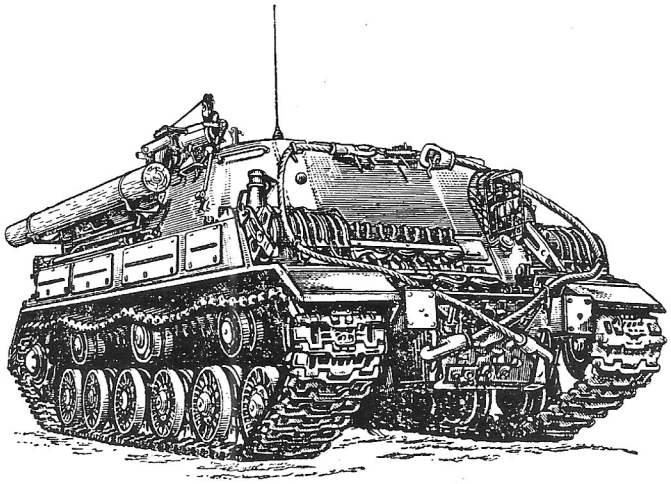

by
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Introduction

The Josef Stalin tank family - IS - has found widespread covering both in Western and Eastern publications during the last years. Beside the heavy battle tanks and assault guns on that chassis that fought in the Second World War - the IS-1, IS-2, the ISU-122 and 152 - the whole series of prototypes which lead to the standard heavy designs as well as the large number of post-WW2 prototypes and series production vehicles have been described very well both in writing and illustrations. Even such unique variants such as the "Obiekt 277", designed to survive in a nuclear battlefield, were covered very well.

One aspect of this vehicle family however was treated only in minor detail: The armoured recovery vehicles on the IS and ISU chassis´. This was basically influenced by the pure lack of information available. Although produced in series, the number of published information and pictures never reached beyond a few lines and some photographs. So I have used all photos that were available, despite their often weak quality.

Still the available facts are incomplete and often contradictionally. A good example for that are the NATO intelligence designations dating back to the 1970s:
The IS ARV variants were split up into six categories only (compare with the tabulated data below) :

- IS-2T for all vehicles on the IS-2 hull
- ISU-T A for the ISU-122/152 hull with the gun aperture plated over, winch mounted, no spade, no jib crane and no snorkel
- IST-T B similar to model A but with a cargo platform, jib crane and winch. No spade, snorkel or pushbar
- ISU-T C similar to model B with spade mounted, but without crane
- ISU-T D similar to model B but without spade or crane and including the pushbars and deep fording equipment and
- ISU-T D which was again similar to model B, with a spade, but no snorkel and equipped with a large A-boom crane.

Adding to these incorrect designations, the technical data are often pure guesswork.

This book now wants to lift the cloud of secrecy these vehicles remained in for too long. Based on sources from the Soviet Union, from Russia, Poland and East Germany plus the Western sources, I like to illuminate and clarify the history of these armoured recovery vehicles based on the best and most accurate information available. Whenever possible, I relied on the genuine Soviet/Russian sources and added logical additions. The total absence of a detailed description for the variants in these sources, however, made the development of a new designation system necessary (listed below).

Jochen Vollert
Germany, June 2000

All photographs and illustrations :
Jochen Vollert Archives, if not otherwise credited.

Thanks to Alain Dupoy/France, Janusz Magnuski/Poland and Esa Muikku/Finnland, for their providing of pictures for publication.
Also thanks to Brig.-General Menashe Inbar, IDF, for his support.

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- Jochen Vollert Archives

1970s Western Intelligence designations	Soviet designations	Technical designations	General Description
	IS-2T	**IS-2T Model 1944**	IS-2 hull, no turret ring aperture plate or field modification of the aperture plate
	IS-2T	**IS-2mT Model 1944**	IS-2m hull, no turret ring aperture plate or field modification of the aperture plate
IS-2-T	IS-2T	**IS-2T Model 1944/45**	IS-2 hull, turret ring aperture plate with cupola and hatches, some were equipped with an improvised stowage platform
	IS-2T	**IS-2mT Model 1944/45**	IS-2m hull, turret ring aperture plate with cupola and hatches,some were equipped with a stowage platform
	IS-2T	**IS-2T Model 1960**	IS-2 hull, turret aperture plate with cupola and hatches, Model 1945s and 1944/45s modernised to IS-2MT configuration
		CW-IS	Polish variant, identical to the IS-2T Model 1944/45
		IS-2T (P)	Polish conversion, with only the turret front removed
	IS-2T	**IS-2MT**	IS-2M hull, turret ring aperture plate with cupola and hatches
	IS-2T	**IS-2mMT**	IS-2mM hull, turret ring aperture plate with cupola and hatches
	ISU-T	**ISU-T Model 1945**	ISU hull, gun aperture plated over, field modification, no winch
ISU-T(A)	ISU-T	**ISU-T Model 1950**	ISU hull, gun aperture plated over, with winch, conversion with
IST-T(B)			different combinations of the following attachments: stowage
ISU-T(C)			platform, small jib crane, spade and pushbars.
ISU-T(D)	ISU-T	**ISU-T Deep Fording**	ISU-hull, gun aperture plated over, with winch, conversion with
			different combinations of the following attachments: stowage platform, small jib crane, spade, pushbars and with snorkel.
		ISU-152V	Finnish variant with additional armament
		CW-ISU	Polish variant with the crane mounted to the rear of the hull
	BTT-1	**BTT-1 Model 1960**	ISU hull with standardised recovery equiment, no winch
		BTT-1 Model 1962	ISU hull with standardised recovery equiment, with winch
	BTT-1T	**BTT-1T**	ISU-K hull, platform, crane, pushbars, but no spade
ISU-T(E)		**BTT-1K**	ISU hull, large A-boom crane, platform, spade, no snorkel
		IS-Bulldozer (CZ)	Czechoslovakian civilian conversion
		ISU-K	Command version, no ARV but similar in apearance.

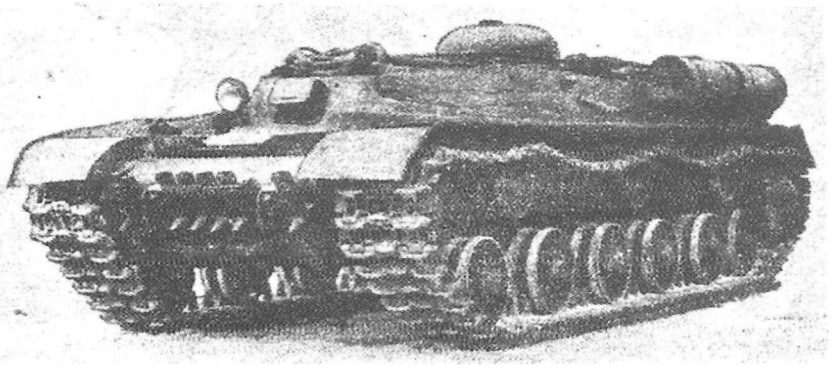
Development History

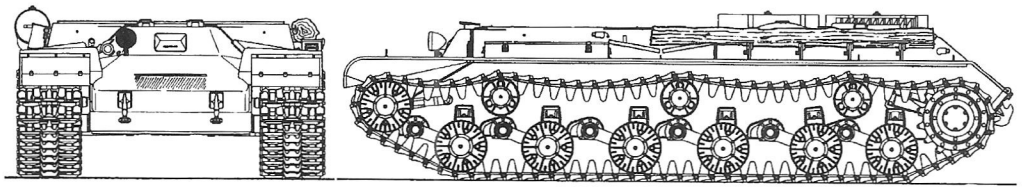
IS-2T Variants

At the beginning of the Second World War or, how the Soviets called it, The Great Patriotic War, the Red Army suffered heavy losses in tanks and military vehicles of every kind. The German "Operation Barbarossa", the attack on Russia, melted down the numbers of available fighting vehicles every day. The Soviet government under Iosif Stalin reacted quickly by concentrating on an increased production of vehicles, aircraft and ships to replace what was lost and built up new units, even better equipped and armed.

Unlike the German Army and the US Army for example, who always put significant engineering imagination into the development of armoured recovery vehicles, the Soviets never relied on that tactic, so many tanks had to be written off, because they simply could not be retrieved under combat conditions by the usually employed unarmoured caterpillar tractors such as the S-60. With the changing situation on the Eastern Front and the advance of the Red Army to the West, a lot more opportunities arose to make good use of tanks that had to be left behind. First small attempts were carried out by the tank units themselves by using battle tanks, unfit for combat due to damaged armament, as tow tractors. To increase the pulling capacity, the turrets were often removed and additional recovery equipment such as tow ropes, shackles, spare parts and a set of various tools was loaded onto the vehicle or into the now empty turret ring aperture. Very often a tarpaulin cover or a wooden roof was also fitted to protect the crew from the weather, especially in Winter. The more ingenius mechanics fitted a round steel plate over the turret ring aperture together with a small access hatch to have a more weatherproof solution. Some

Top : A IS-2mT Model 1944/45 is used after the Second World War by Kolkhos farmers to tow heavy loads. (Alain Dupouy)
Center : The IS-2T Model 1944/45, which is externally identical to the Polish CW-IS. (Janusz Magnuski)





IS-2T Model 1944

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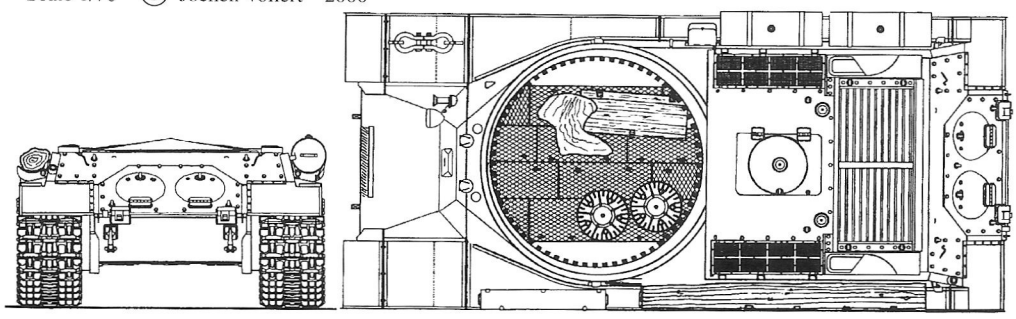

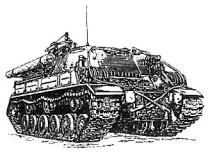

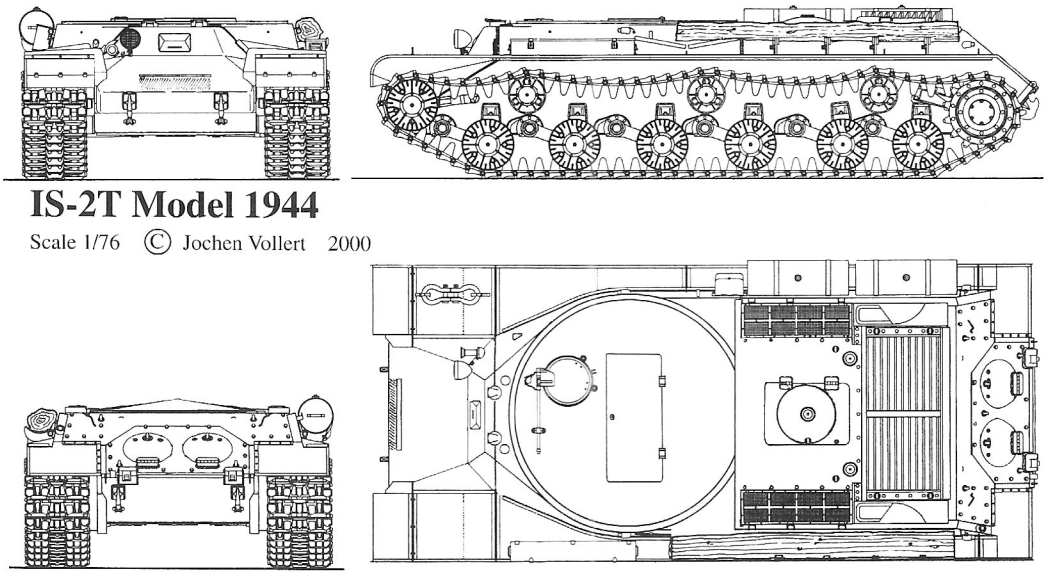

IS-2T Model 1944

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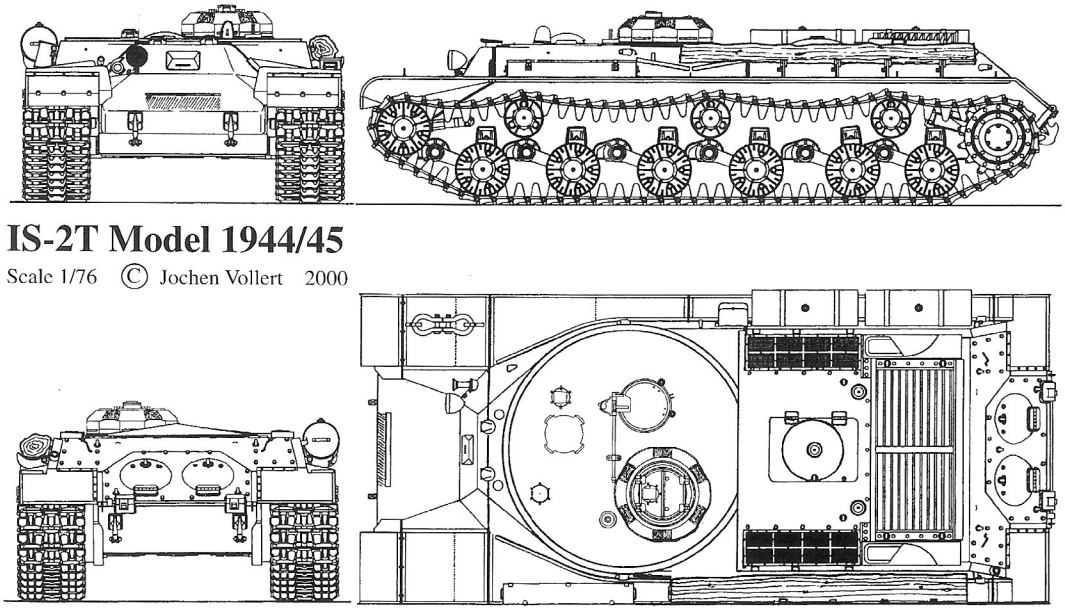
vehicles received a small stowage platform over the engine compartment. The units used the same type of tank that they were equipped with, a logical and economical solution in terms of trained crews and availability of spare parts.

Within the heavy tank units, equipped since February 1944 with the new IS-2 heavy tank, the recovery role was at first taken over by turretless KV-1 tanks, as most of these units were quipped with that type before receiving the new IS-2. The lifespan of such a tow tractor was, however, short, mostly due to the use of already worn out or partially damaged vehicles and the fact, that these were battle tanks and not primarily intented for towing, put not only stress to the hull in general, but especially to the power train and gearbox.

With the ongoing war and heavy losses on both sides, a number of IS-2 tanks became "available" for recovery operations. Already used to the conversion, the maintenance personnel within the tank units started to produce their own makeshift recovery tanks and used them in everyday work. Both versions of the first series of IS tanks were used: the IS-2 with the older, angled hull front layout, and the IS-2m with the newer, flat bow design. Both tanks were produced in 1944. The ARV field modifications never received an official designation and titled here IS-2T Model 1944 or IS-2mT Model 1944.

Imagination was replaced by standardisation by the end of 1944, when the Red Army High



IS-2T Model 1944/45

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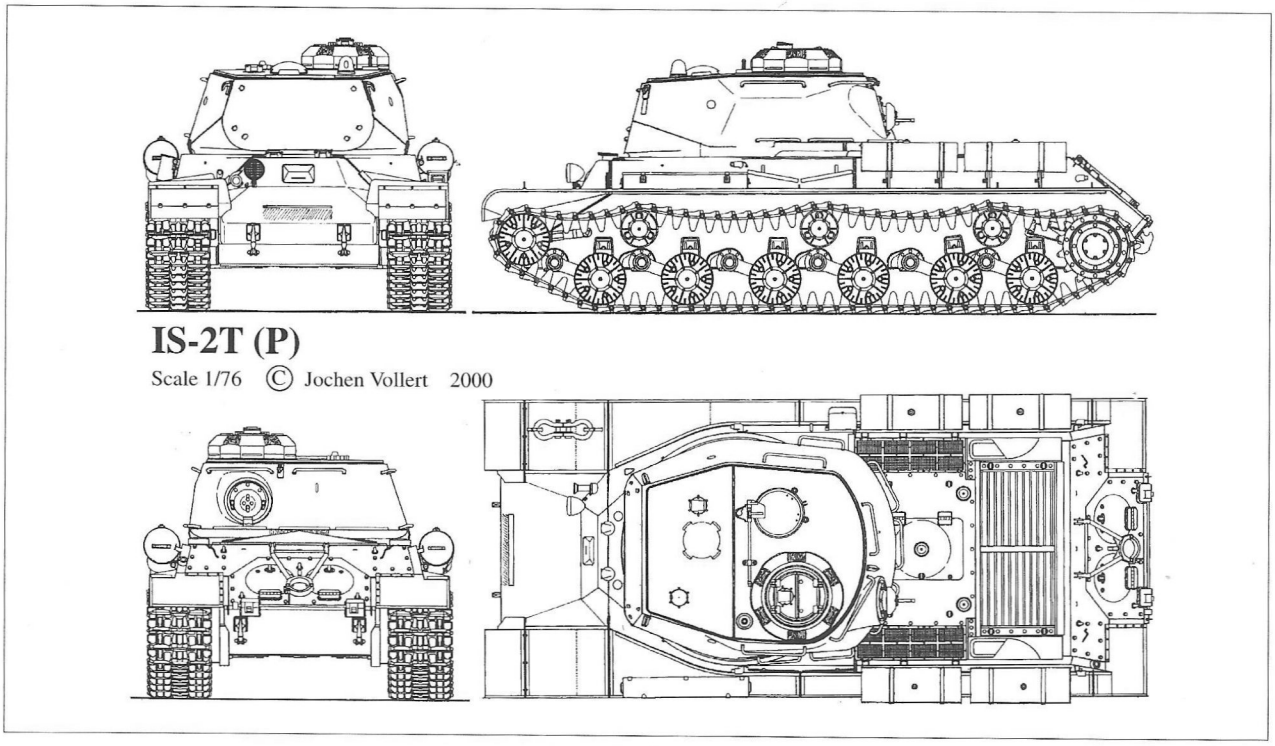
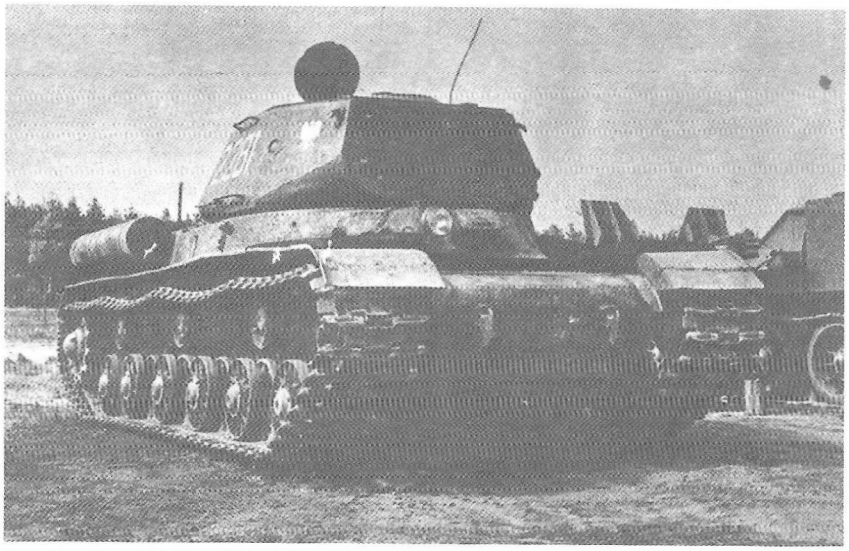
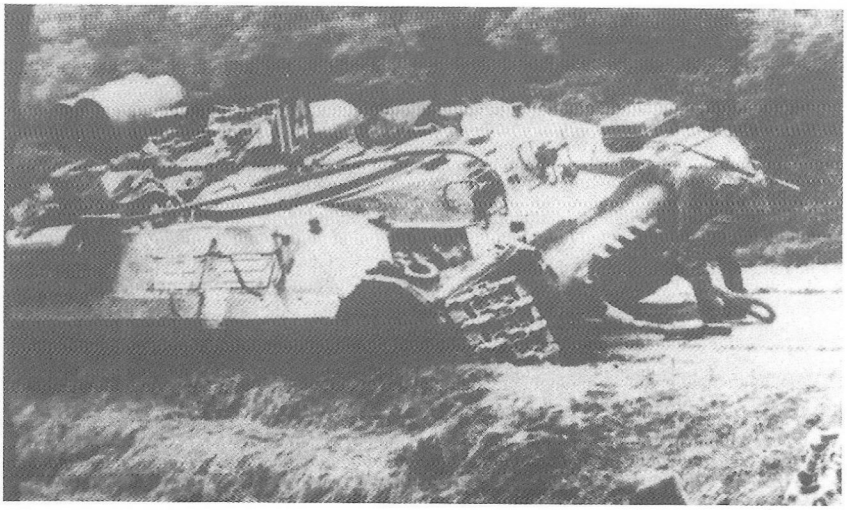


Command ordered the construction bureau at the Kirov Works of St. Peterburg, having already been responsible for the development of the IS heavy tanks, to design a recovery tank based on the IS-2 chassis. The design did not receive an "Obiekt" designation as it was no new development but a conversion and officially named IS-2T with the "T" standing for "Tjagatsh" - tow tractor. The new IS-2T was to be built on newly produced hulls or on vehicles that returned for general maintenance. The new parts were standardised and incorporated the best of the previous field modifications for series production:

° turret ring aperture plated over with a round steel plate
° loader´s hatch and commander´s cupola of the IS-2 mounted onto the steel plate
° incorporation of IS-2 optics on the armour plate for increased vision
° new internal seat arrangement for the crew of two (driver/commander)
° increased internal stowage space for equipment
° external fittings to secure tow ropes
° overall weight reduced to 35 tons
° ground pressure 0,62 kg /sqcm
° pulling capacity 28 tons

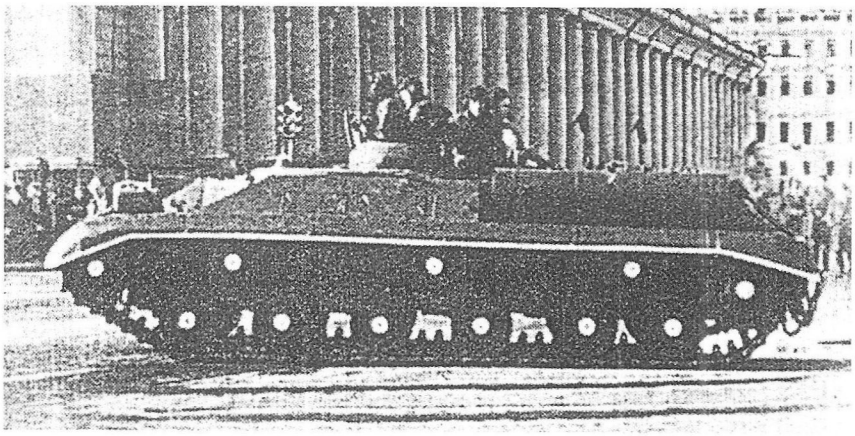
As this conversion was carried out parallel to the ongoing production of battle tanks,



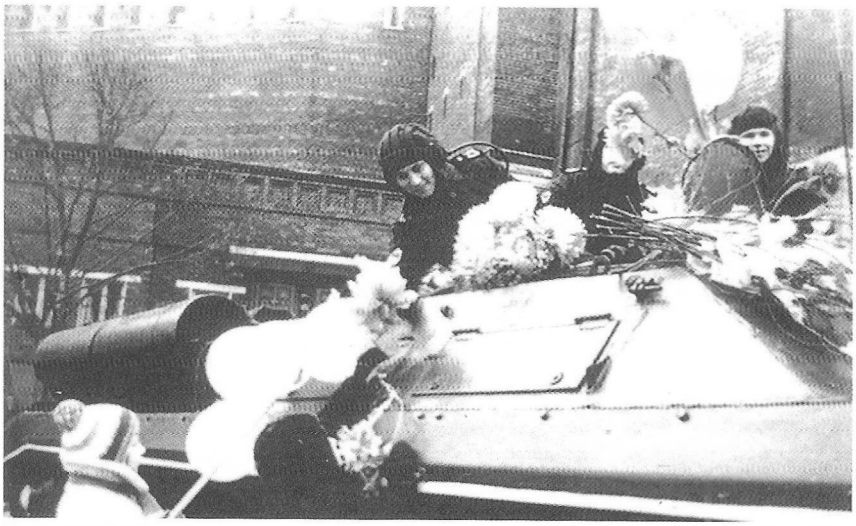


Center : The Polish Army´s own attempt to convert obsolete IS-2 tanks into armoured tow tractors : the IS-2T (P).
(Janusz Magnuski)

Below : A IS-2MT suffering a mechanical breakdown during the Soviet intervention in Czechoslovakia in 1968. Note the invasion markings in form of white stripes alongside and across the hull. Note the number of external fuel tanks.



Two IS-2MT armoured tow tractors on parade in the Soviet Union. The distinctive stowage boxes and side skirts along the hull are clearly recognisable. Note the parade "markings" - wheel hubs, return rollers and the lower part of the side skirts are painted white. (Alain Dupouy)



both the early and late version of the IS was used. So the technical designation of IS-2T Model 1945 and IS-2mT Model 1945 is used here. Production / conversion was continued until the early 1950s together with the production of more sophisticated IS-2 and IS-3 variants.

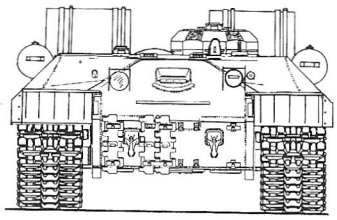
In 1954 a rebuilding program was installed to update the existing IS-2 / IS-2m heavy tank fleet to IS-2M standards.

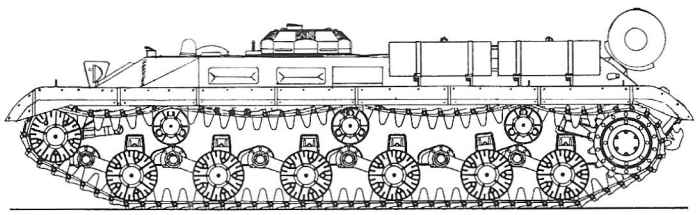
By the end of the 1950s, however, the whole range of IS-2 tanks was withdrawn from active service. Only the ARVs were kept in service for the tank units now equipped with the T-54 and T-55 medium tanks. As the IS-2T ARVs in service already reached a certain age, it was decided to modernise them to newest standard, resulting in the IS-2T / IS-2mT Model 1960 and to build a small series of recovery tanks based on the IS-2M, of which numerous chassis´ became now available. The IS-2MT incorporated all external/internal hull features of its battle tank counterpart, exept for the turret and armament improvements:

- Improved driver´s optics including night vision equipment
- An improved V-54K engine (V-54 K IS)
- Modernised engine cooling and air flow system
- New radio equipment and intercoms
- Increased external stowage by adding tool bins to the hull´s sides
- Dust skirts
- Several tanks seem to have received T-10 style road wheels

The ARV equipment remained the same as with its predecessor.

No IS-2 based ARV received an inboard winch or armament.





IS-2mMT

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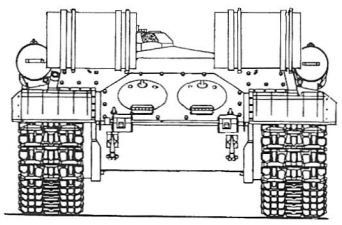
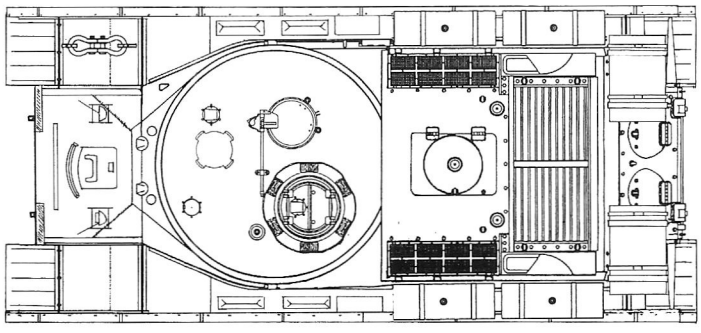
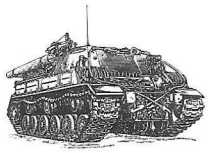






ISU-T variants

Basically the same philosophy as with the IS tanks was used with the recovery vehicles for the ISU-122 and ISU-152 assault gun units. The ISU hull offered several advantages over the IS hulls, mainly by the more spacious crew compartment, allowing more spare parts and equipment to be carried. Furthermore, no major reconstruction had to be carried out. Only the main gun assembly had to be removed and the rectangular aperture at the front of the superstructure covered with sheet metal or welded-on armour plate.The first of these ARVs appeared in 1945 and are here designated ISU-T Model 1945. Their number remained small, they were basically field modifications without standardised equipment. This, however, changed in 1950, when the ISU-122 assault guns were slowly withdrawn from active service and replaced by the ISU-152, making a significant number of ISU-122 hulls available for a basic conversion, carried out in several factories. Both versions of the ISU-122 hulls were used, cast and welded bow. These vehicles were officially designated ISU-T, here ISU-T Model 1950.

An excellent example of an ISU-T Model 1945, here shown as a Polish conversion. This particular vehicle uses a thinner gun aperture plate than on other models. The shape and thickness of these armoured covers varies from tank to tank, a result of the many field modifications. The view from the rear shows the missing opening for the tow rop, indicating that no internal winch is mounted.

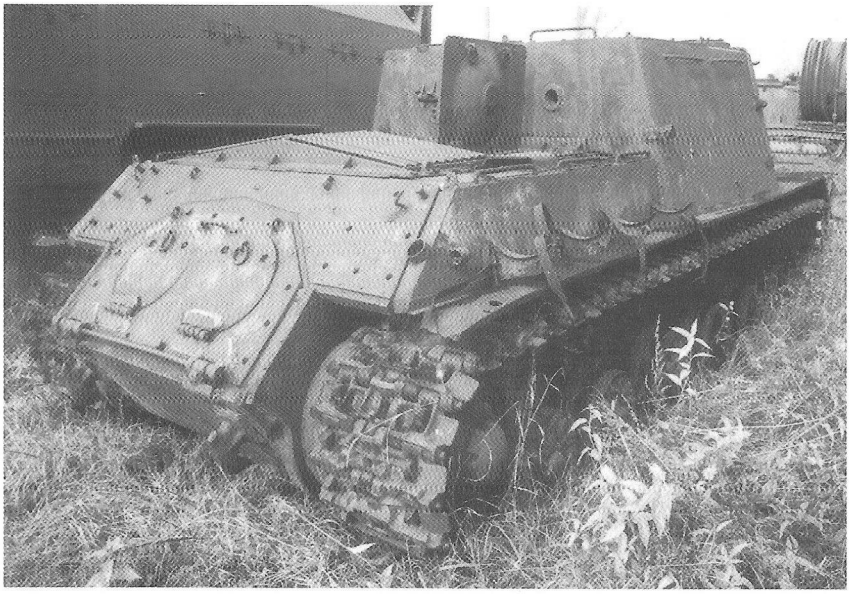
The ISU-T Model 1950 went through several improvement stages and was built with many variations by combining the following equipment, but an Army-wide modernisation program has never been carried out:

° cargo stowage platform
° tow rope mounts
° entrenching spade mounted to the rear of the hull
° pushbars welded to the front of the hull
° inboard winch
° light 3-ton jib crane fitted to the top of the superstructure
° enternal cable drums
° extra stowage boxes, fuel and oil canisters
° modernised external fuel tanks

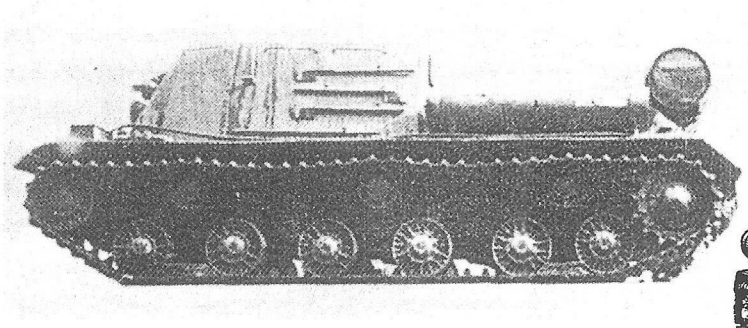
Several tanks were issued with OPVT deep fording equipment, for river crossing operations and are designated here ISU-T Model 1950 Deep Fording.

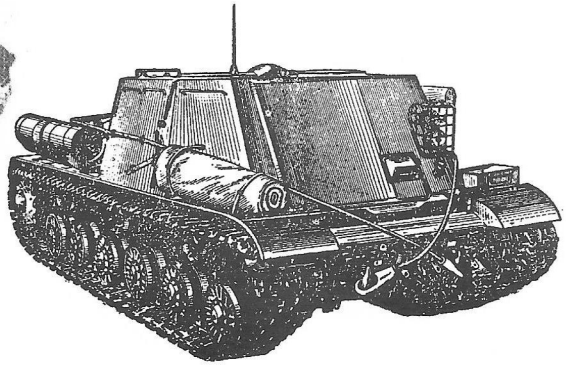
BTT Variants

In 1959 further ISU-122 hulls became available and were converted in the same

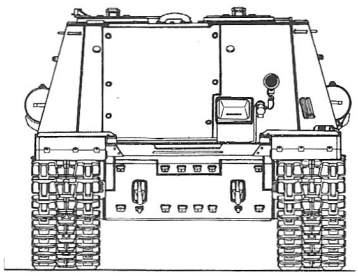


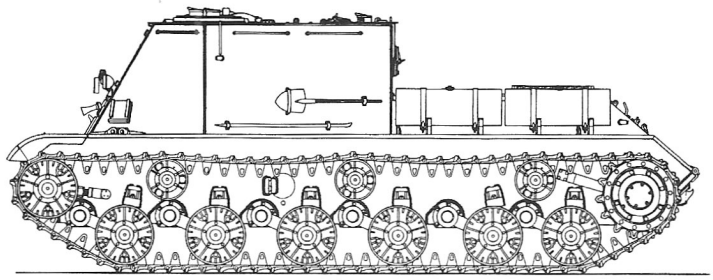
Below : The Soviet ISU-T Model 1945 as portrayed in the Technical Manual shows, besides the shape and thickness of the armour plate over the gun aperture, no differences to the Polish conversion illustrated above.





Center :
A very good view onto the left side of a Soviet ISU-T Model 1945 with the complete tool set fitted to the superstructure and a full supplement of six fuel drums (four on each side, two on the rear of the hull). The very clean outline of this design is obvious.
(Alain Dupouy)





ISU-T Model 1945

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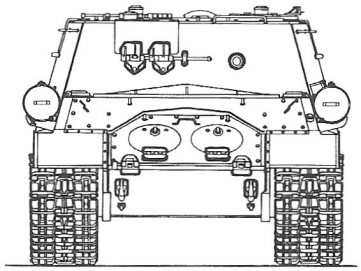
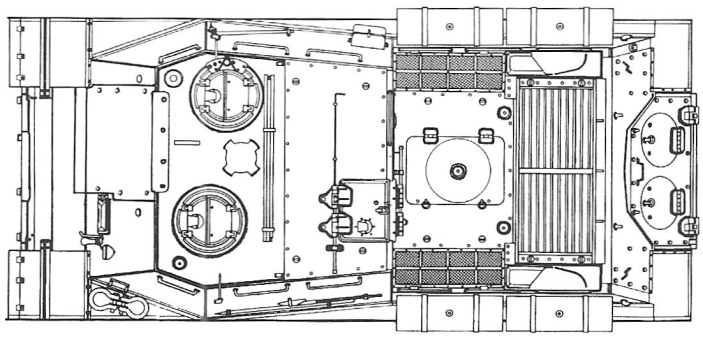
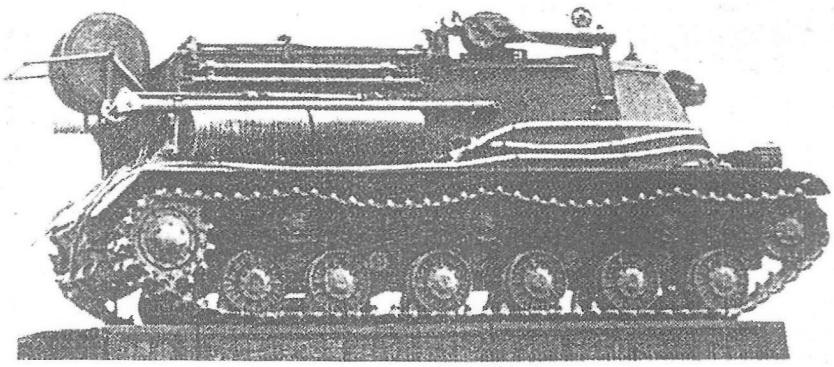
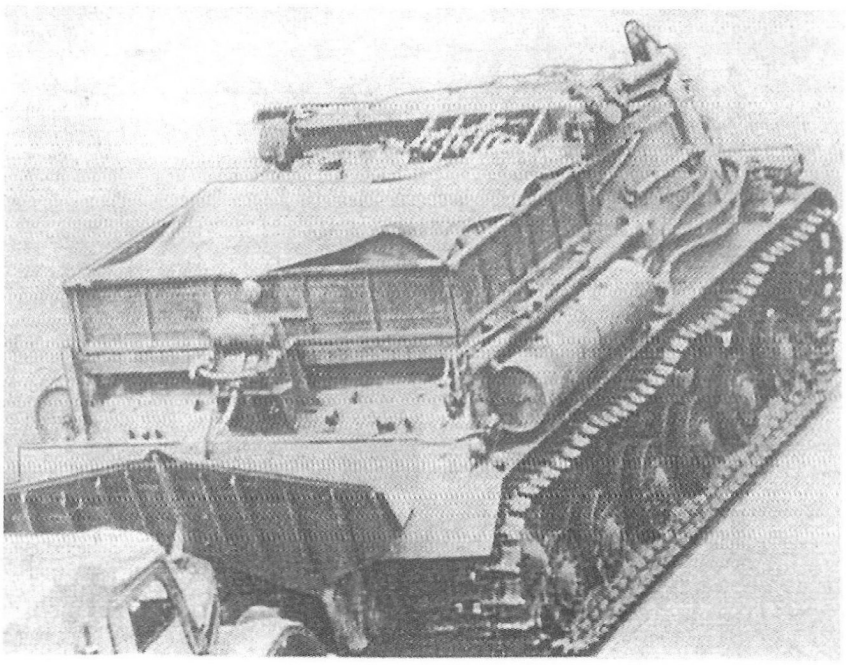




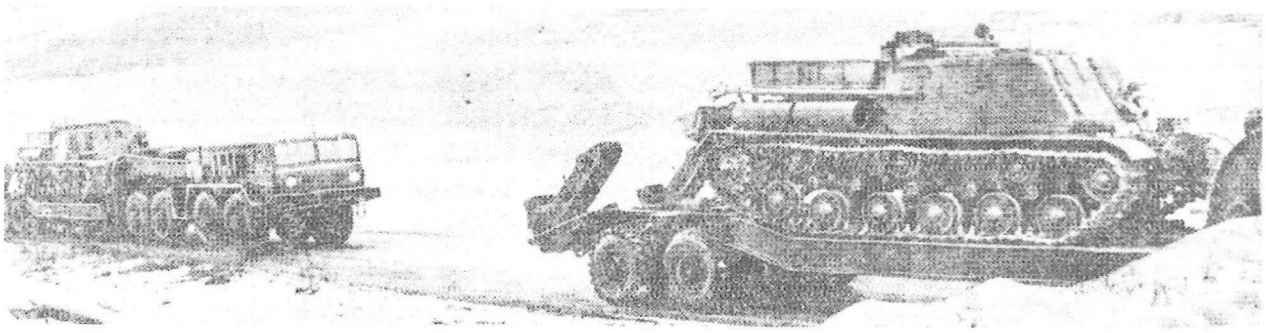




fashion as the ISU-Ts, mainly to support the growing fleet of T-10 and T-10M tanks in the Red Armys heavy tank units of the 1960s and 1970s. This design included a technically improved and now standardised range of mounts and accessories and the conversion was carried out as an Army-wide modernisation programm :

- a large platform with 3-ton capacity was mounted over the engine compartment
- an entrenching spade fitted to the rear hull to support and fix the vehicle during towing and winching operations
- on the frontal bow-plate two box-shaped hydraulic pushbars where welded to assist pushing operations in connection with the wooden log carried on the vehicle´s left side
- on the superstructure a dismountable, manually operated, light jib crane with 3-ton capacity and 3,100 mm cable was fitted
- on top of the superstructure a reinforcement frame was added to support crane operations
- the crew hatches´s mechanism was reinforced
- a heavy winch was installed in the central section of the crew compartment. The winch rope was guided through an opening in the rear superstructure. It had a pulling capacity of 25 tons, included 200 metres of towing rope and was directly driven by the main engine via a power take-off, operated by the driver and handled by means of two levers

The ISU-T Model 1950 ARVs carry most of the external recovery equipment which was later standardised in the BTT-1 design: Large stowage platform over the engine deck, small jib crane on the roof, entrenching spade on the rear of the hull. The vehicle in the center carries an unusually large cable drum on the rear of the stowage platform, which is not a standard issue. (Alain Dupouy)



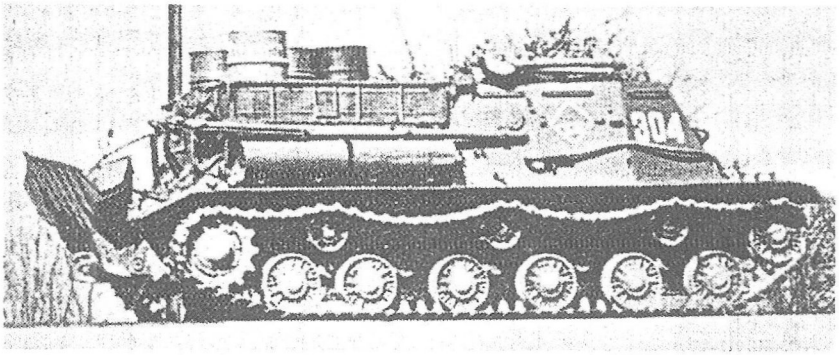
Top : For road transport over long distances, here two ISU-T Model 1950s, the Soviet Army employed MAZ 537 heavy tank transporters.
Right : An ISU-T Model 1950 with a full load of fuel drums. (Alain Dupouy)

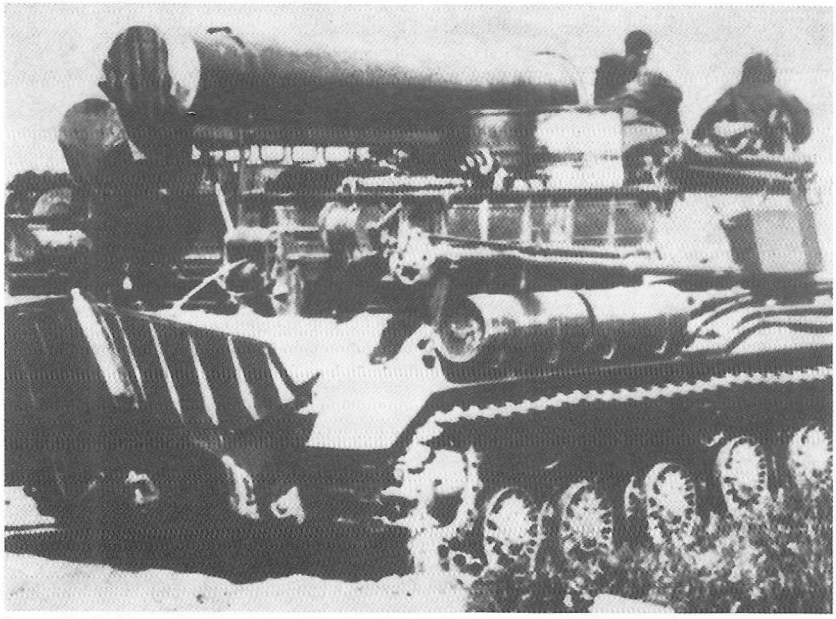
° the driver received a BVN night vision sight
° additional internal fuel tank of 150 ltr capacity
° R-113 radio set
° R-120 intercom set
° the vehicle was prepared for deep fording.

The new standardised version reveived the designation BTT-1 (Bronirovanniy Tjasholiy Tjagatsh - Armoured Heavy Tractor) and was powered by a V-54K-IS-T engine. Total weight now reached 42 tons and the crew still consisted of two soldiers, driver/operator and commander.

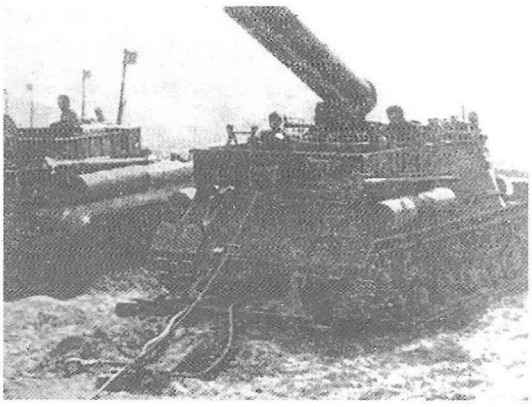
Confusingly enough, the production index of the Kirov Works in St. Peterburg lists a series production of the BTT-1, based on the ISU-122, in 1960, but without internal winch and a heavy tow tractor, also based on the ISU-122 hull, in 1962, now with winch. This leads to the conclusion, that there exist BTT-1s without winch and its latter addition into the BTT-1 design as a standard feature without changing the designation.

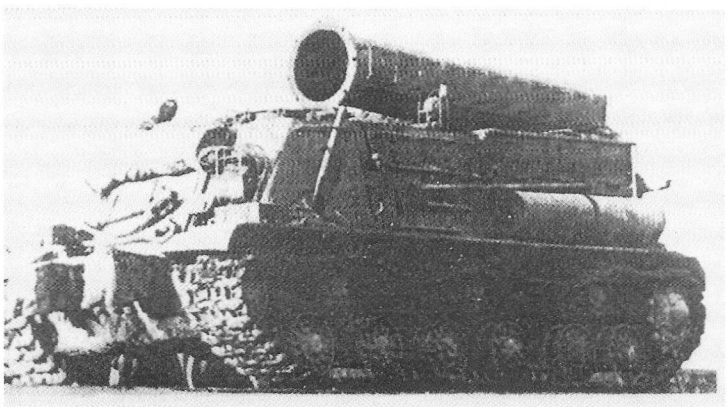
It is important to note, that one needs at least a view from the front and rear of an IS-ARV, to exactly identify the variant. While the BTT-1 incorporates all additions listed above, the ISU-T may have most of them, too. This makes exact evaluation of the rare pictorial evidence of that type of tank extremely difficult, if not in many cases virtually impossible. Furthermore, both the ISU-Ts and BTT-Ts were continually upgraded, for example with headlight protective guards, making them even more "look-alike".



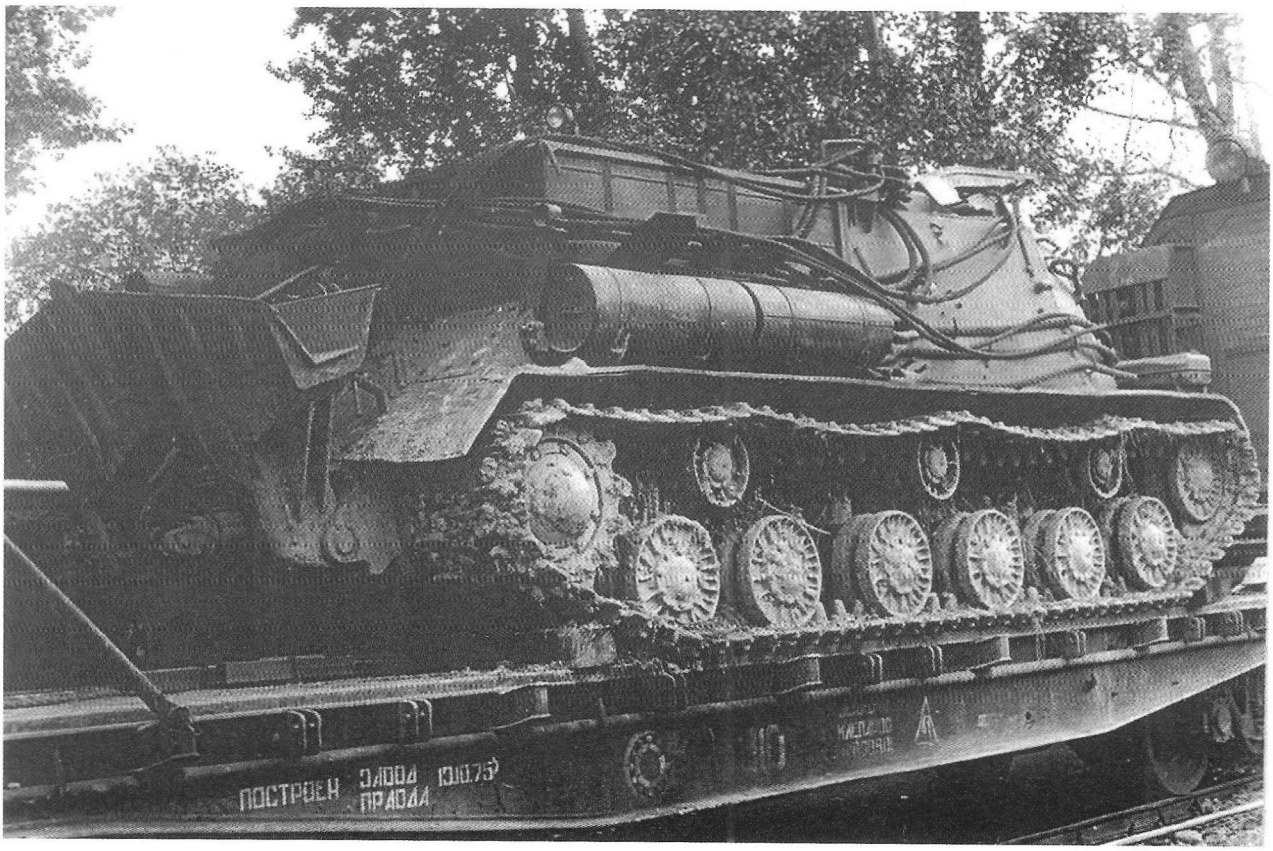


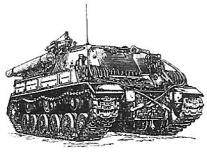
Several of the ISU-T ARVs were issued with OPVT deep fording equipment for river crossing operations. The tube was to be fitted to a new aperture, cut into the roof of the vehicle. (Photos below: Alain Dupouy)

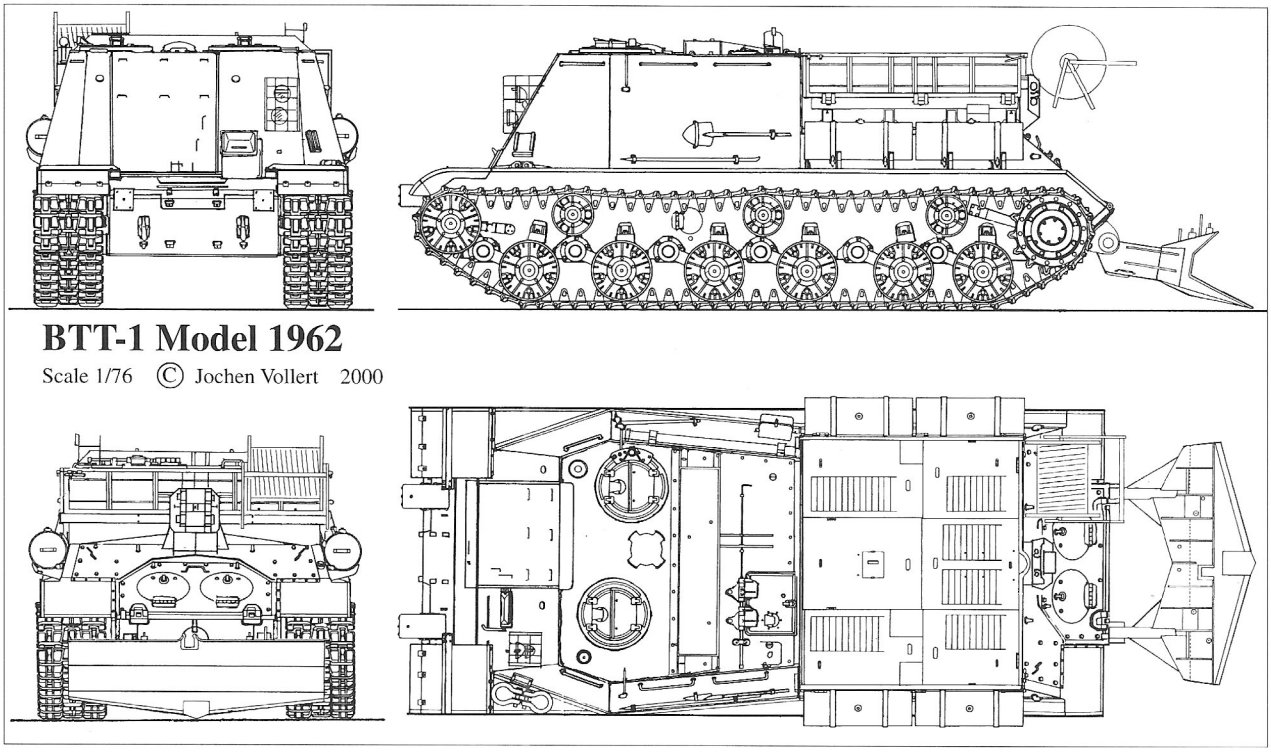




These excellent photographs of a BTT-1 on a flatbed trailer during railroad transport make identification of this ARV easy. All specialised equipment, such as the rear stowage platform, jib crane mount, rear spade, and frontal pushbars are fitted. Note the small oil canister and tool stowage box fitted to the right and left front fender, a usual application for the later versions of this vehicle. A number of tow ropes is fitted to the side and front of the superstructure, ready for quick use. (Alain Dupouy)







BTT-1 Model 1962

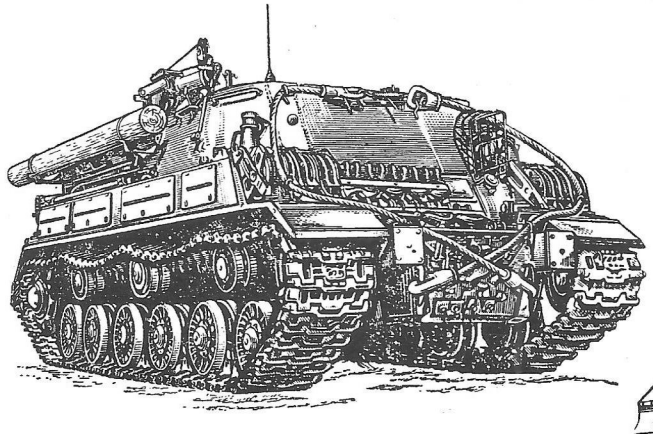
Scale 1/76 © Jochen Vollert 2000

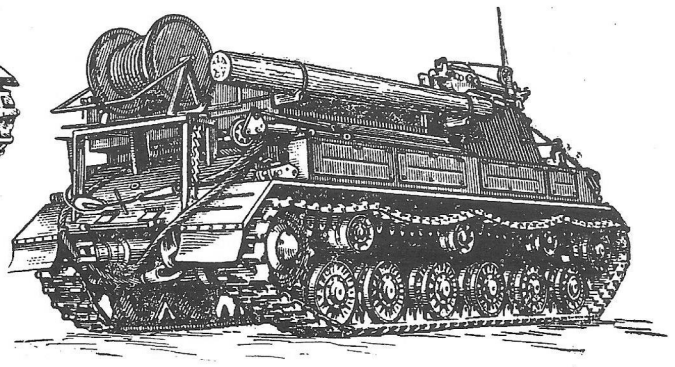
The most impressive vehicle in the ARV range based on IS and ISU tanks is certainly the crane vehicle BTT-1K. Basically a BTT-1 with the exception, that the small 3-ton jib crane was replaced by a huge A-frame rig with 15-ton capacity covering nearly the entire length of the upper hull. An additional generator was installed inside to assist the improved welding equipment.

A further variant within the BTT series of ARVs was the BTT-1T, introduced in 1962. Basically the same tank as the BTT-1, it incorporated the features of the ISU-152K assault gun, a variant of the ISU-152 assault gun, built in 1956.

The first modernisation of the ISU-152 fleet in 1956 made the ISU-152K the standard heavy assault gun within the Warshaw Pact. The modernisation included (except for the armament):

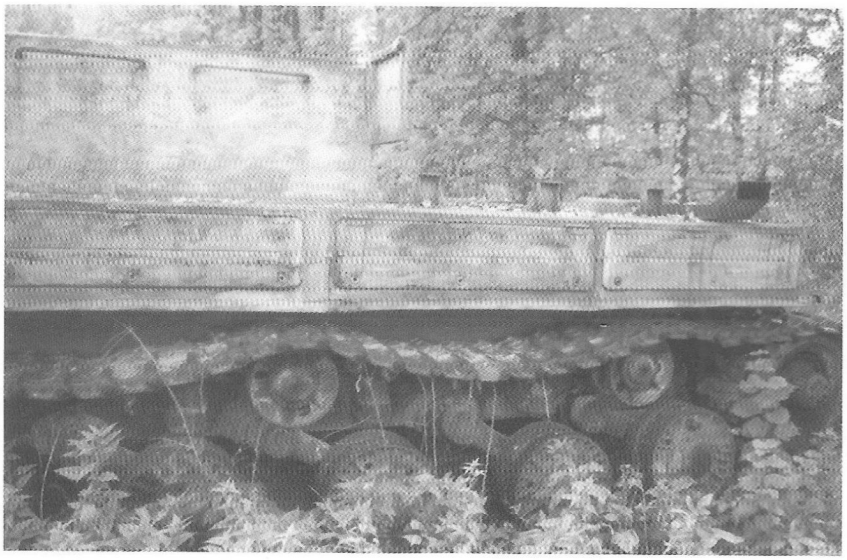
A BTT-1T in the storage area of the Kubinka Armour Collection in Russia. The rigging and external equipment equipment on this exhibit is gone.





The BTT-1T drawings as shown in the Technical Manual provide a good look on how the external equipment is stowed on a in-service ARV.

The right side of the upper superstructrue with the distinctive stowage box arrangement alongside the hull plus the small jib crane. The rear stowage platform is gone, but the mounts are still recognisable. Note the absence of the winch aperture on this variant.



Right side of the same BTT- 1T with the stowage box arrangement. Note the elongated exhaust at the rear of the engine compartment.

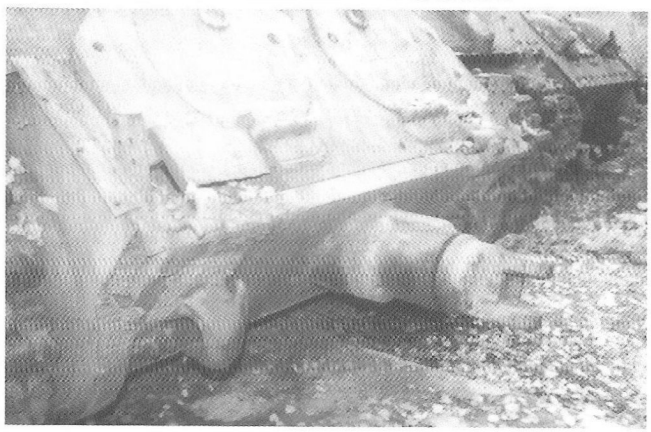
° New commander´s cupola with TPKU designator sight
° Ring mount for the 12,7mm DShK machine gun mounted
° Number of external fuel tanks increased from three to six
° Engine cooling system improved
° New radios introduced
° Headlight protection guards
° Sometimes additional stowage bins on both sides of the superstructure
° Additional 2-cylinder/8 hp UD-2 engine inside the crew compartment
° Mobile auxiliary generator with 220 W output, stored on the stowage platform
° The ISU-T also received a new engine, the V-54K-IS which incorporates minor differences to its predecessor such as the crankshaft.

The BTT-1T fielded most of the recovery components, already introduced in the BTT-1, except of the roof reinforcement, internal winch and rear entrenching spade.

After the 1956 modernisation program which led from the ISU-152 to the ISU-152K, the assault guns were again modernised in 1959 up to ISU-152M standard which included besides automotive improvements the addition of side-skirts. If there was an ARV based on that latest assault gun chassis is currently unknown.

The last intention of producing an ARV on a more modern hull was planned in 1959 with "Obiekt 811", a heavy 10-ton crane fitted to a T-10 hull with a crew of 3 and a total weight of 45 tons. This plan only resulted in one prototype and never reached series production.

With the concentration on the medium battle tanks such as the T-54/55, T-62 and the T-64/72, the concept of using hulls of the tank that has to be recovered for an ARV version, led to numerous recovery vehicles based on the T-54/55. The versions of the IS battle tanks still in Red Army arsenals in the late 1960s / early 1970s, mainly T-10s and T-10Ms, were put in storage or assigned to training units. With their final fate in the melting pot of international reduction of armed forces, and worn out by time and duty, the last heavy battle tanks and heavy ARVs met their fate in 1993.



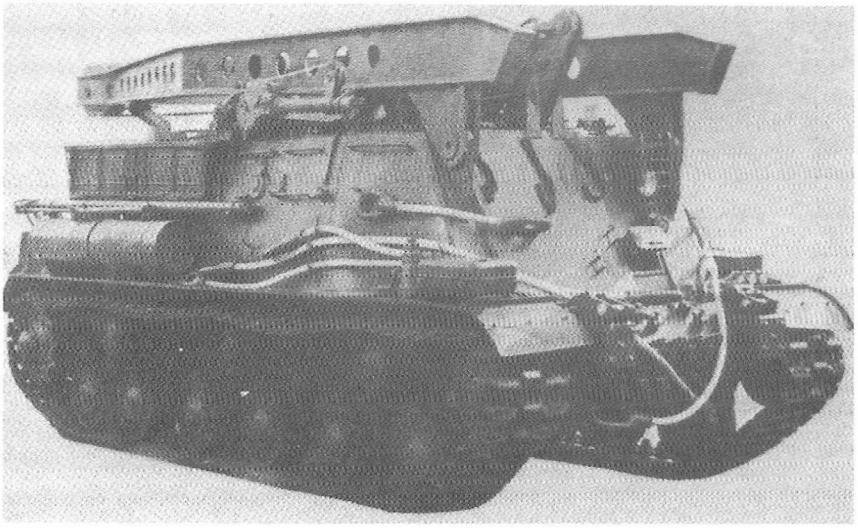
Left : The top of the superstructure of the BTT-1T with the new-type commander´s and loader´s hatch. The round welding seem behind them indicates an earlier attempt to mount deep fording equipment.

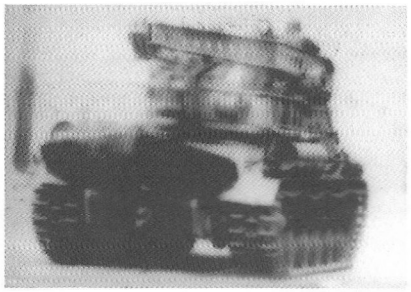
Right : The lower rear hull with the towing pintle. No attachment points for the mounting of a spade have been fitted.

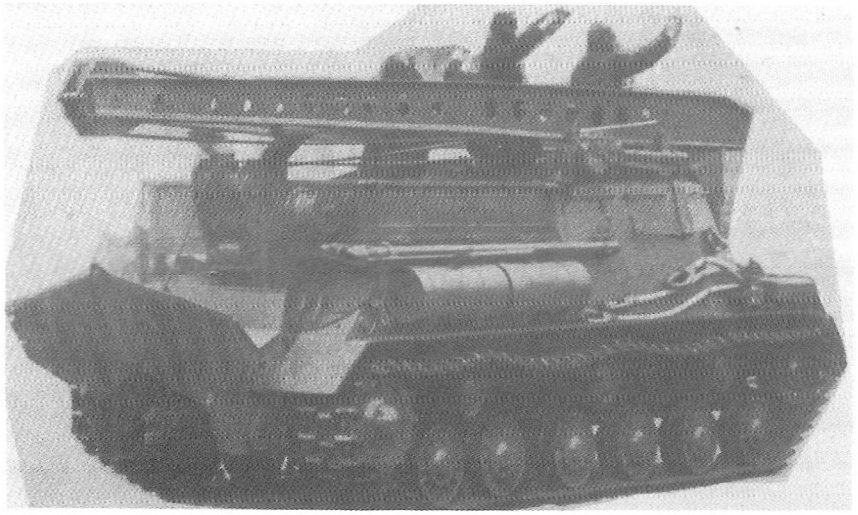
Armament
Generally the IS-Ts were not armed. On the ISU-Ts and BTTs a 12.7mm anti-aircraft machine gun could be fitted when the relevant cupola was mounted.

Export
The only country receiving significant numbers of BTT-1 ARVs was Egypt in the mid-1960s.

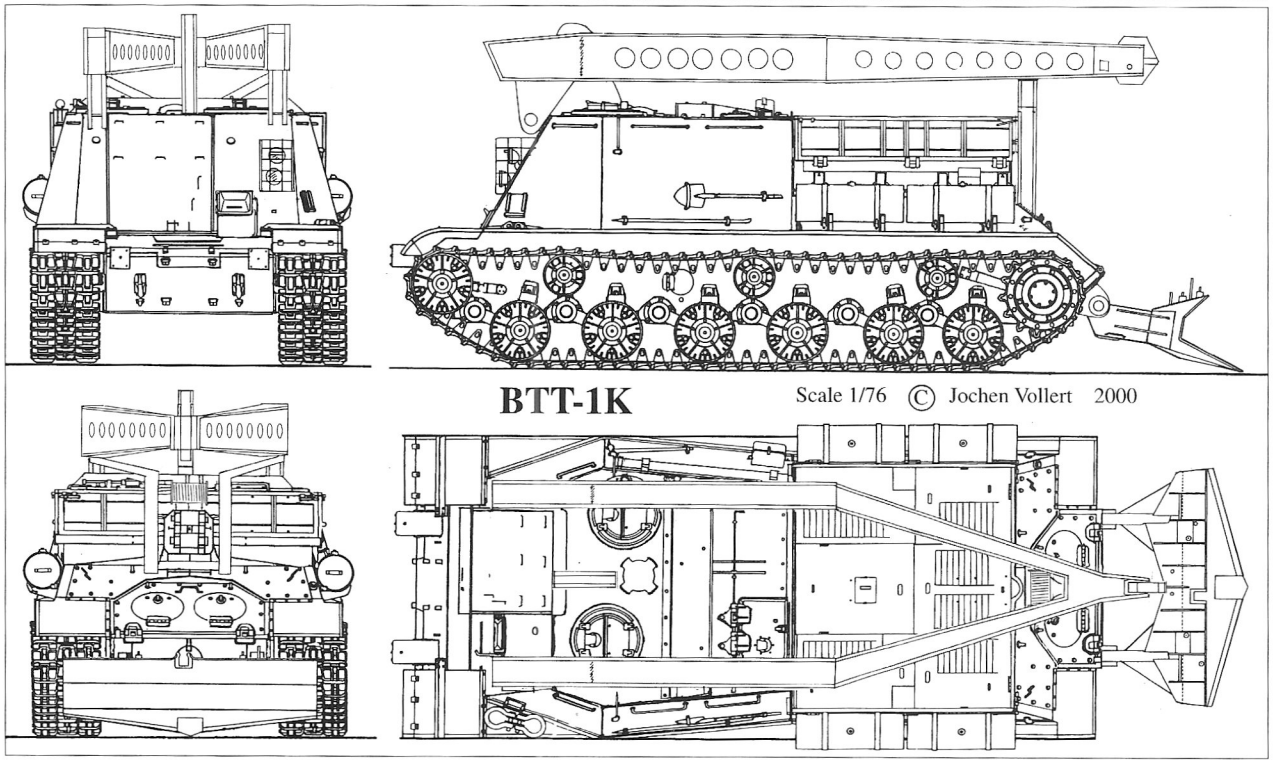
Foreign attempts
The Finnish Army made their own approach towards converting an ISU-152 assault gun into a recovery vehicle. The assault gun was modified in autumn 1945 by removing the main gun, gun mount and ammunition racks and the gun aperture was plated over. Besides the recovery equipment such as tools, rope and tow bars, it was armed with a Finnish 20 mm L-39 anti-tank rifle. Only one vehicle was built and received the designation ISU-152V. It remained in service until 1964 and was then refitted with the original gun.

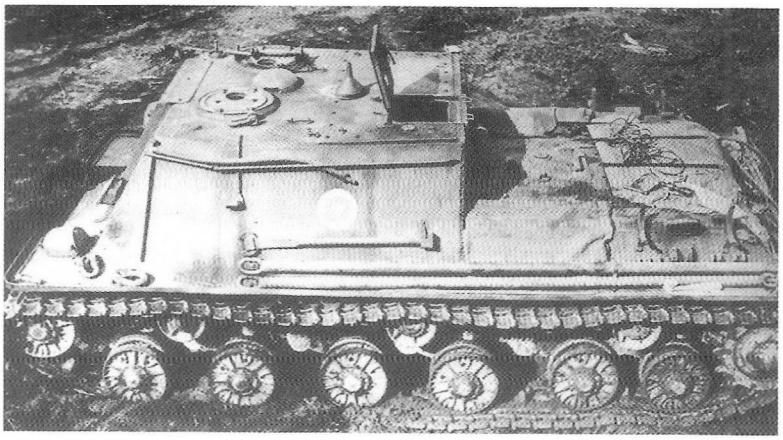






The BTT-1K crane vehicle with the prominent 15-ton A-Frame mounted to the top of the hull. Besides this crane the vehicle carries all features of a standard BTT-1 recovery vehicle. Only a few vehicles were converted into this variant.





The Finnish ISU-152V armoured recovery vehicle prototype. (Esa Muikku)

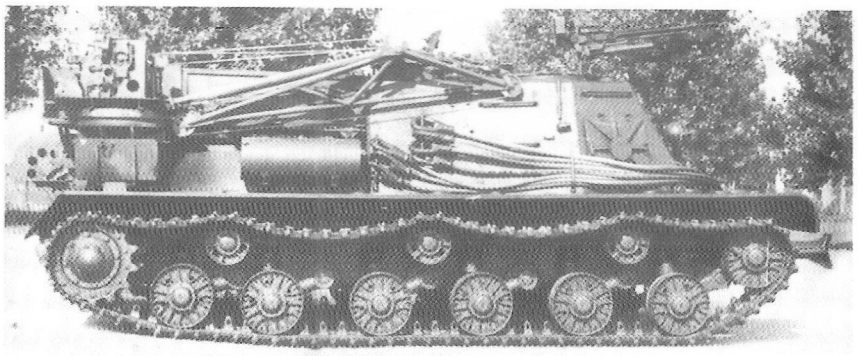
Poland built its own variants such as the CW-1S (identical to the IS-2T Model 1944/45) and the CW-ISU based on the ISU-122/152 hull. This vehicle differed in many ways from the Soviet BTT-1, such as having a large crane mounted on a pivot on the right rear side of the engine compartment. All of the vehicles built differed slightly in design.

ISU-K Command Vehicles

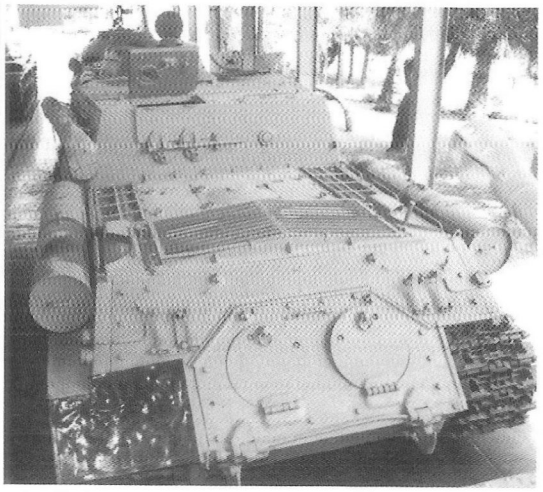
For command and control purposes, a command version on the ISU chassis was introduced and designated ISU-K. Although not an armoured recovery vehicle, it is externally similar to the ISU-T by having its gun aperture plated over. No recovery equipment and fittings are mounted, but the crew compartment contains an enlarged section of radio communication systems.

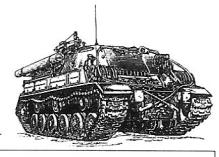
The ISU-152V, a Finnish Army prototype to construct an armoured recovery vehicle to the Finnish Army´s specifications. The general outline follows the ISU-T, but a 20mm L-39 anti-tank rifle was found necessary to be installed in the frontal armour plate for close quarter defence, thus making this ARV type the best armed of the whole series. The ISU-152V never went into series production and was later reconverted to ISU-152 status, in which it is today displayed in the Armour Museum of Parola, Finnland.

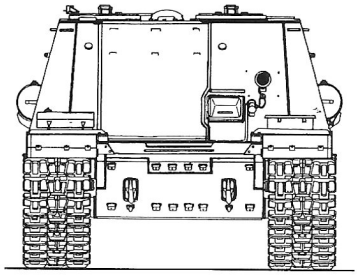
Right : The Polish Army´s trials to find a solution for an ARV based on the ISU-122/152 hull resulted in the CW-ISU variants. Most prominent feature here is the crane, mounted to the rear of the vehicle. The CW-ISU ARVs differed in layout from vehicle to vehicle. (Janusz Magnuski)

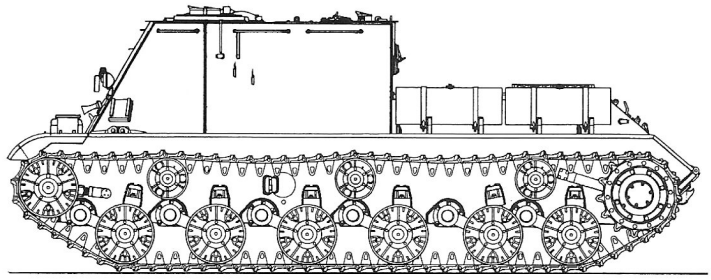


Below : An example for the ISU-K command vehicle. The basic external hull features are identical to the ISU-T ARV, only the recovery equipment is missing. The vehicle was equipped with increased radio communication equipment in the crew compartment. This ISU-K is displayed in the Army Museum of Jaffa, Israel.



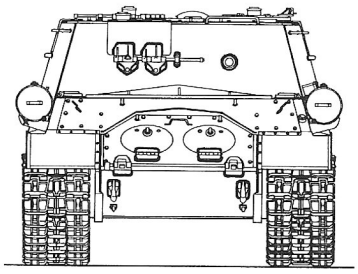


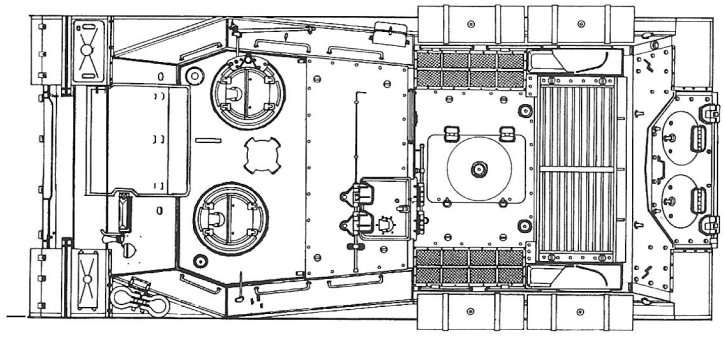


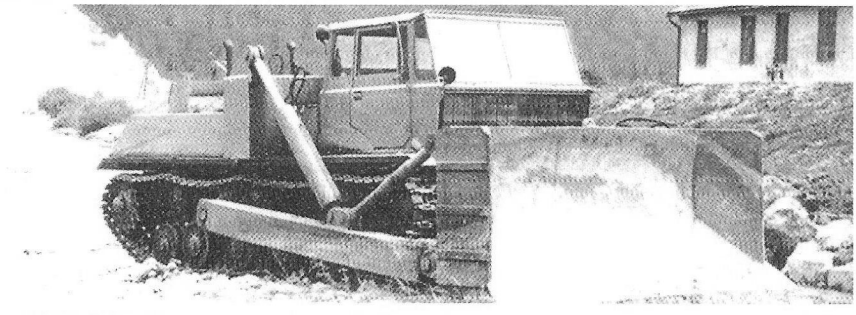


ISU-K Command Vehicle

Scale 1/76 © Jochen Vollert 2000







Civilian conversions

Several Soviet/Warsaw Pact tanks were sold to private users to be converted into fire fighting vehicles or to serve construction or breakdown purposes.

The ISU makes no exception: In Czechoslovakia a ISU-122/152 hull was converted into a bulldozer with a large cabin for the crew on top of the hull, a dozer blade at the front and the engine compartment covered with a stowage section. No information, however, is available if this vehicle ever made profit for the user, surely paying a lot of money for fuel !

IS ARVs in museums

Only four examples of recovery vehicles based on the IS/ISU have survived the times:

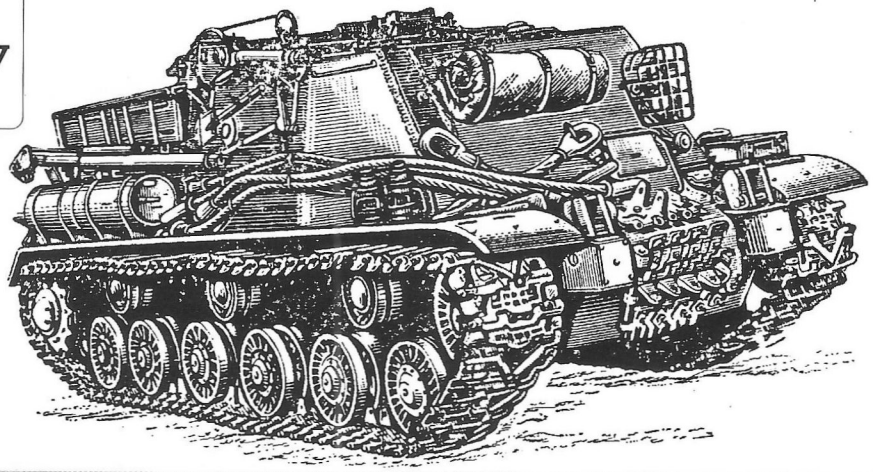
° a BTT-1 in the IDF Armour Museum, Latrun, Israel
° a BTT-1T in the storage area of the Russian Armour Museum, Kubinka, Russia.
° a ISU-T, Polish variant, in the Katynn Museum storage area, Warsaw, Poland and
° a ISU-152V in the Armour Museum, Parola, Finnland, although this vehicle was re-converted to assault gun status by fitting the armament again.

Two more examples of the ISU command vehicles can be found in:

° the IDF Armour Museum, Latrun, Israel and
° the Israeli Army Museum, Jaffa, Israel

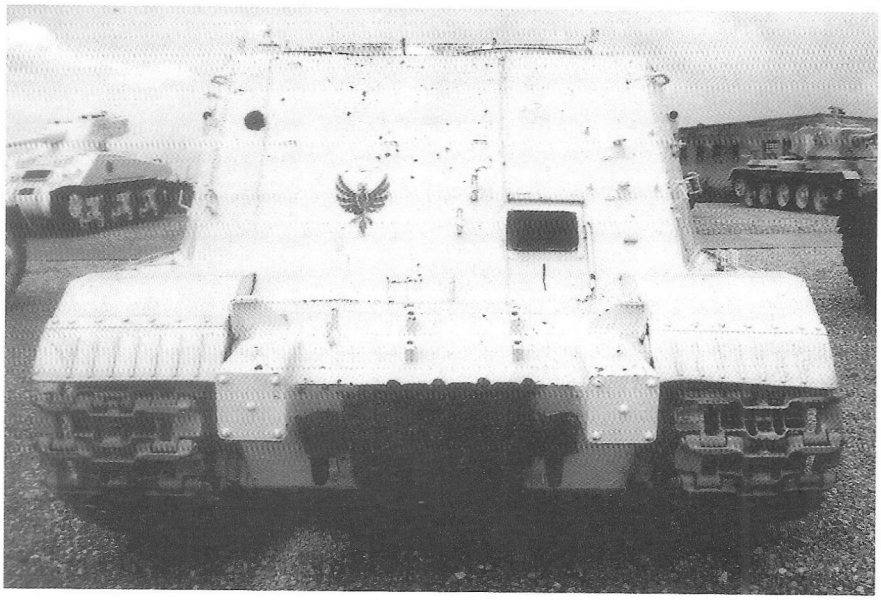
The Czechoslovakian attempt to make a civilian bulldozer out of a military armoured recovery vehicle.
(Alain Dupouy)

BTT-1
Armoured Recovery Vehicle in Close-up



The perspective drawing from the Technical Manual shows the BTT-1 fully geared up with crane in stowed position and the tow ropes ready for quick action.

The stowage platform over the engine deck is however not completely filled with the supplies for independent recovery operations over longer time periods.

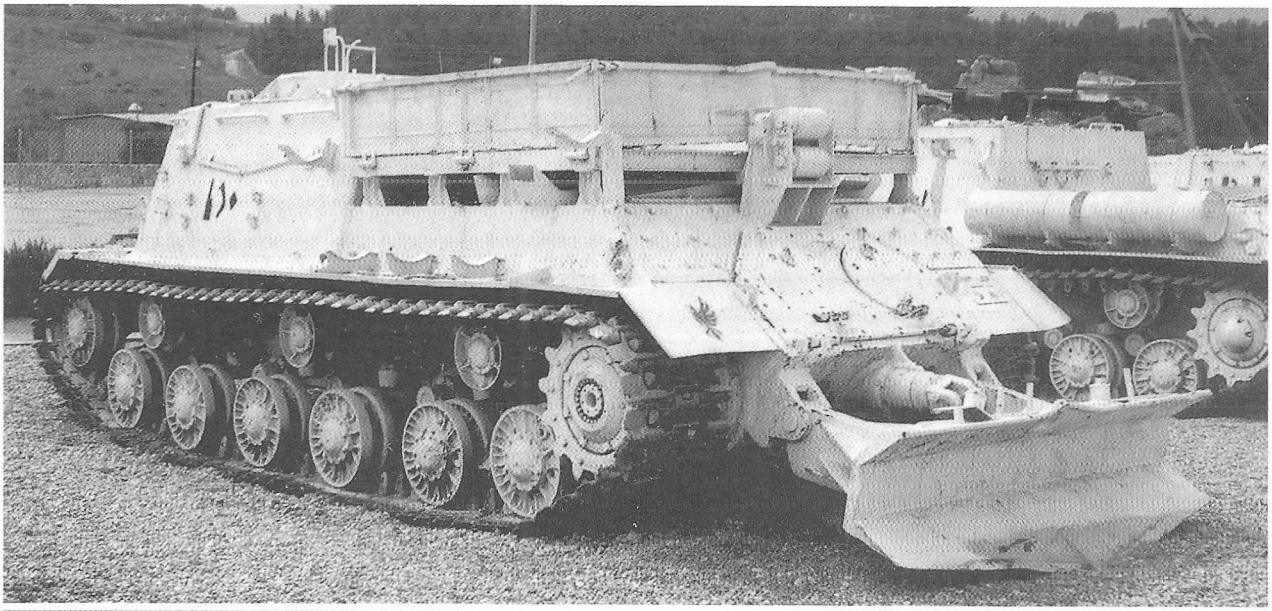


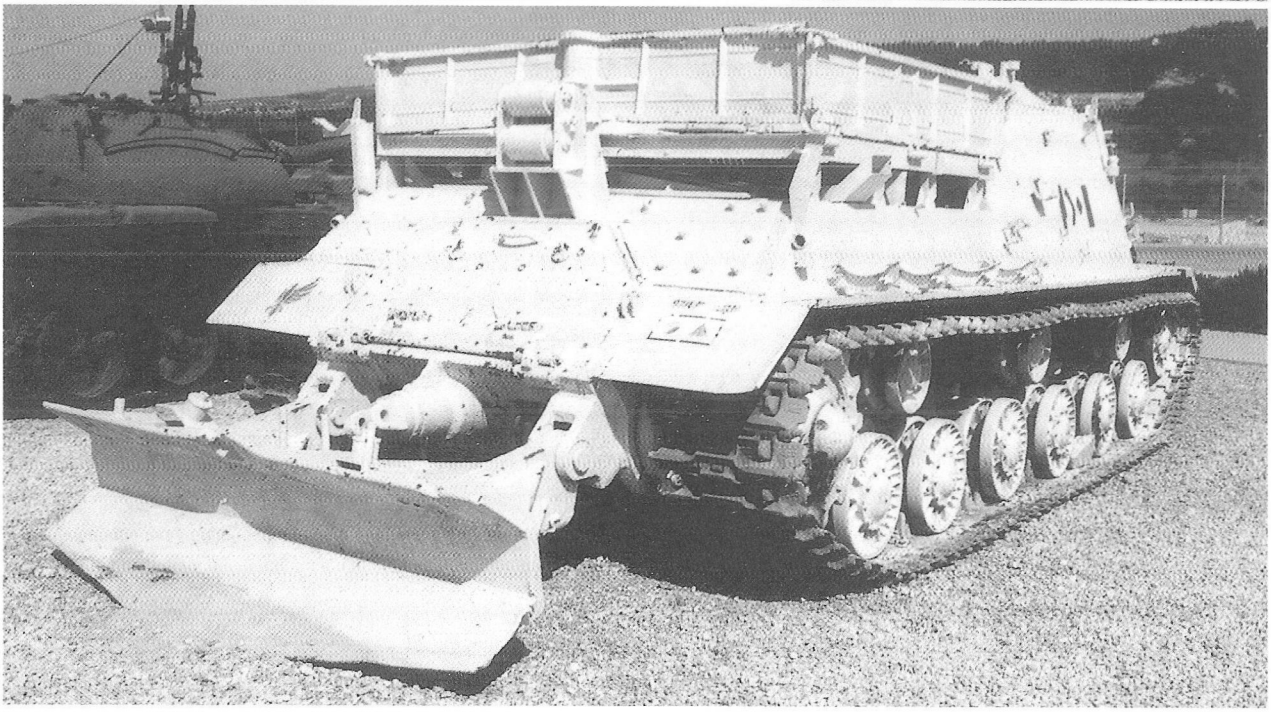
This BTT-1 was used by the Egyptian Army during the 1967 Six-Day-War and later captured by the Israeli Defence Forces. The vehicle is currently displayed in the Memorial Center and Armour Museum of Latrun, Israel.

Being the only IS-based recovery vehicle permanently on display in the whole world, and also the only one in relatively good and complete condition, this tank will be used here for closer evaluation.

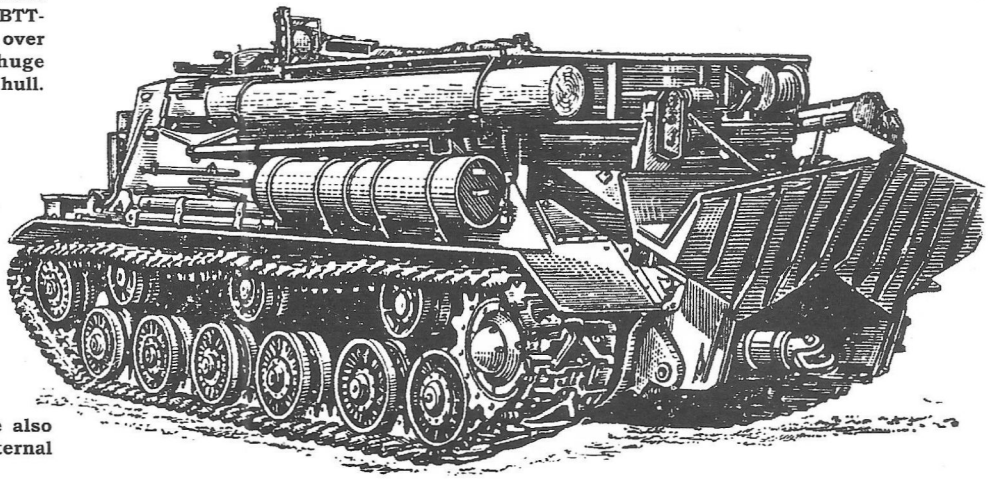
Several smaller items, such as the complete external stowage tools are gone. Unluckily the small crane on the superstructure´s roof is missing as well.

Only differences to a genuine Soviet BTT-1 are the partially-rubber frontal mudgards, a later Israeli addition, and the Egyptian markings.

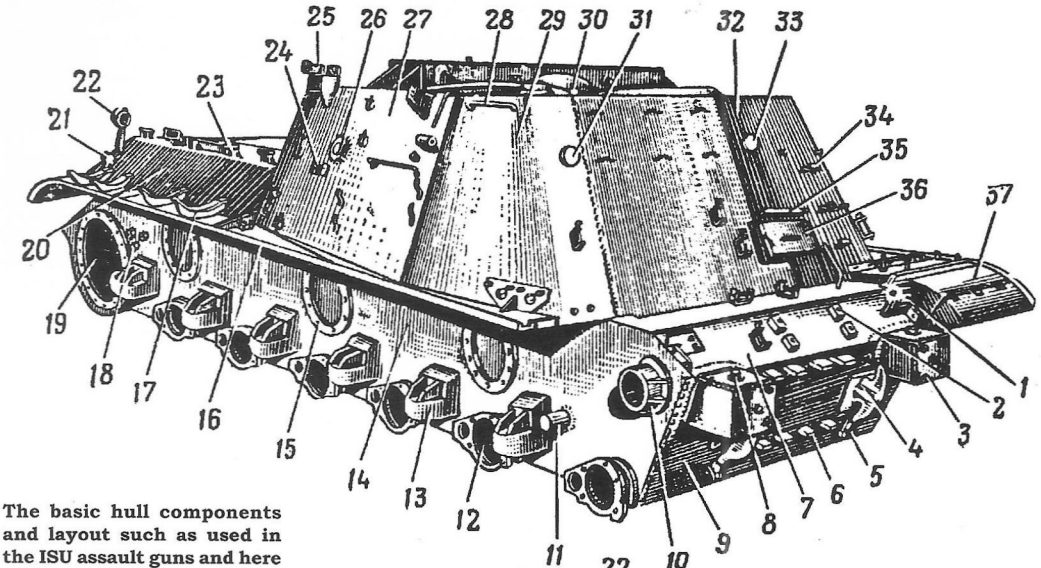




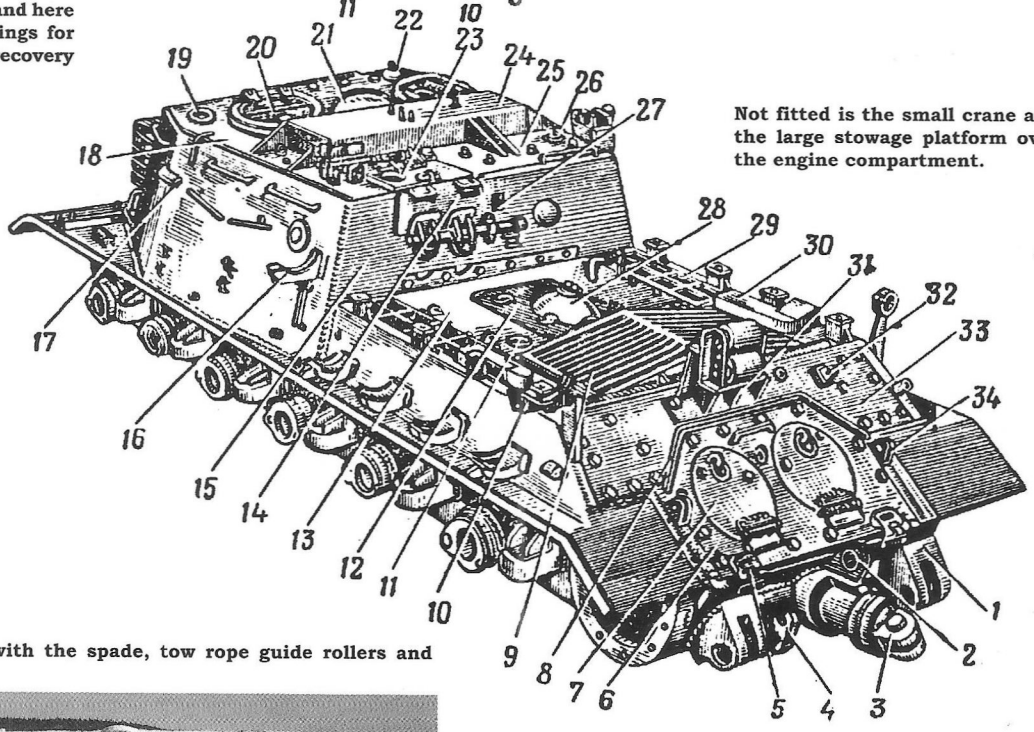
The rear view with the prominent identification features of the BTT-1, the large stowage platform over the engine deck and the huge spade fitted to the lower rear hull.



Again the drawing from the Technical Manual gives a good impression of how the many smaller parts of the equipment are stowed in travel configuration.
Note the standard Soviet wooden log used for pushing operations, and that a small cable drum is fitted to the rear of the stowage platform. The vehicle also carries the full set of four external fuel drums.

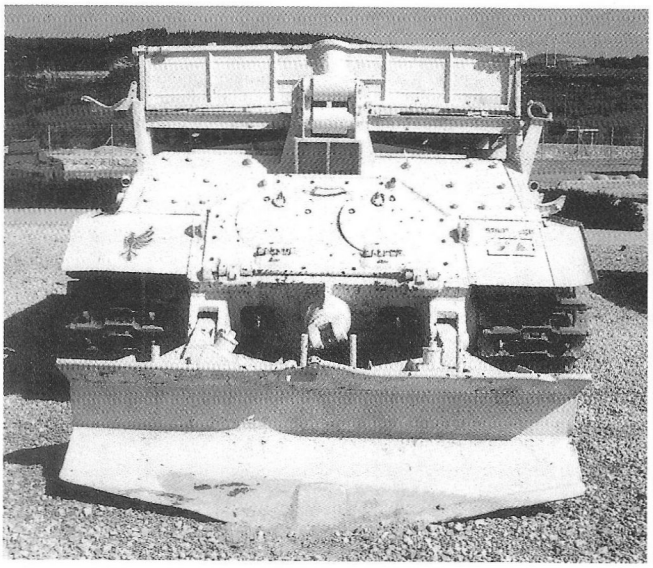


The basic hull components and layout such as used in the ISU assault guns and here with the special fittings for the BTT-1 armoured recovery vehicle.



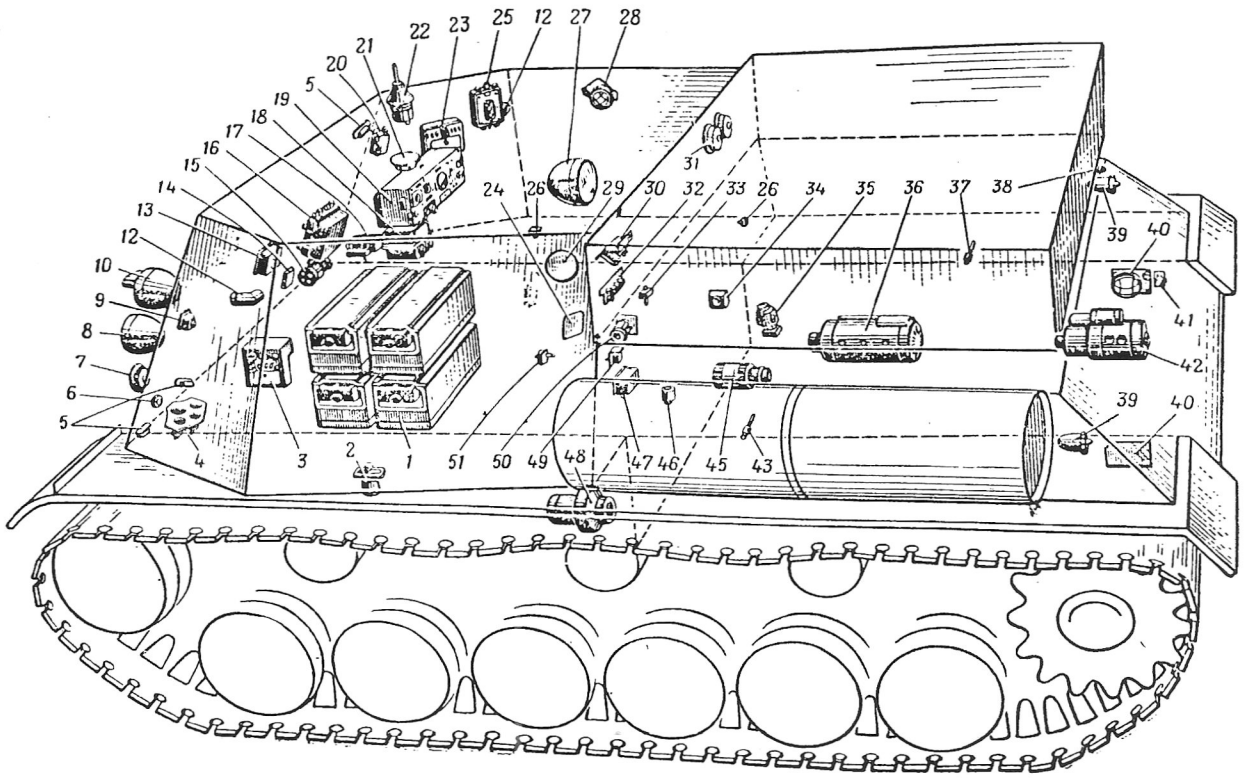
Not fitted is the small crane and the large stowage platform over the engine compartment.

Rear of the BTT-1 with the spade, tow rope guide rollers and stowage platform.



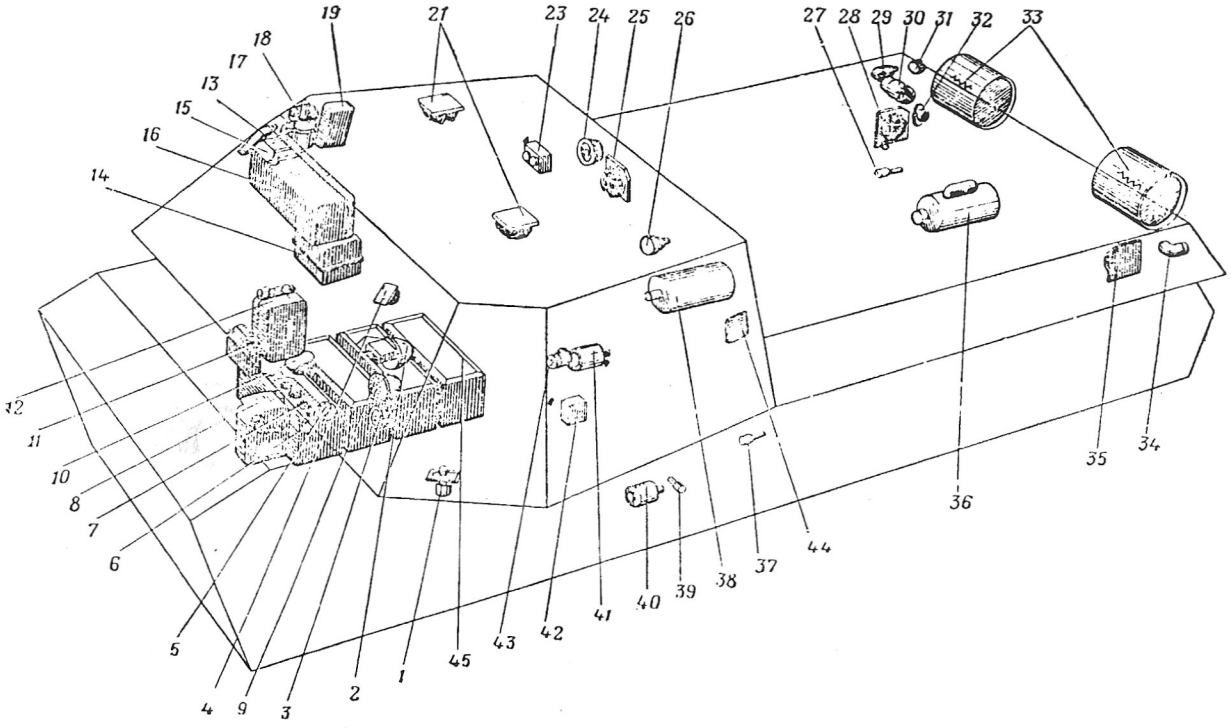
Overall view of the BTT-1.

Location of main electrical components

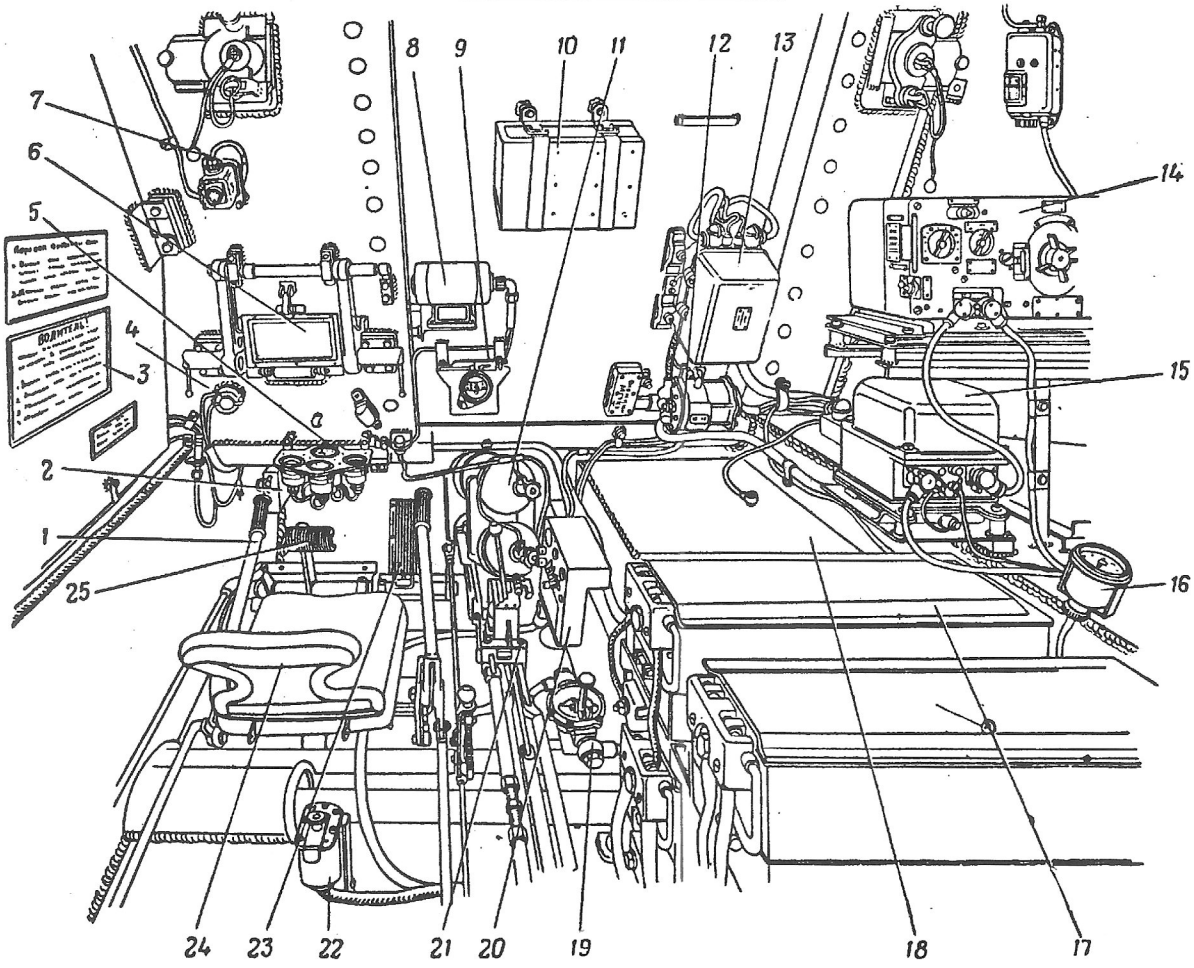


Top : 1 - batteries, 3+4 - driver´s instruments, 5 - internal lighting, 7 - horn, 8+10 - headlights, 12 - forward positioning lights, 16 - relais regulator, 19 - radio, 22 - antenna mount, 25 - control box, 27 - spot light, 28+29 - internal lighting, 36 - generator, 39 - rearward positioning lights, 40 - lights, 42 - starter, 48 - pre-heater, 51 - cable-length indicator.

Below : 1 - battery starter, 2 - headlight, 3 - horn, 7 - control instruments, 8 - driver´s dashboard, 9 - headlight, 10 - internal lighting, 11 - electrical filter, 14 - electricity supply for radio station, 15 - internal lighting, 16 - radio, 18+43 - forward positioning lights, 21 - ceiling lighting, 25 - internal lighting, 36 - starter, 37 - oil temperature indicator, 38 - generator, 45 - batteries.

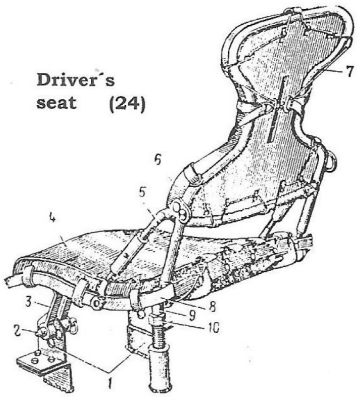


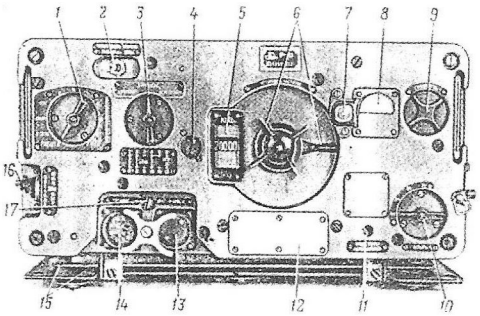
Driver´s compartment and radio station



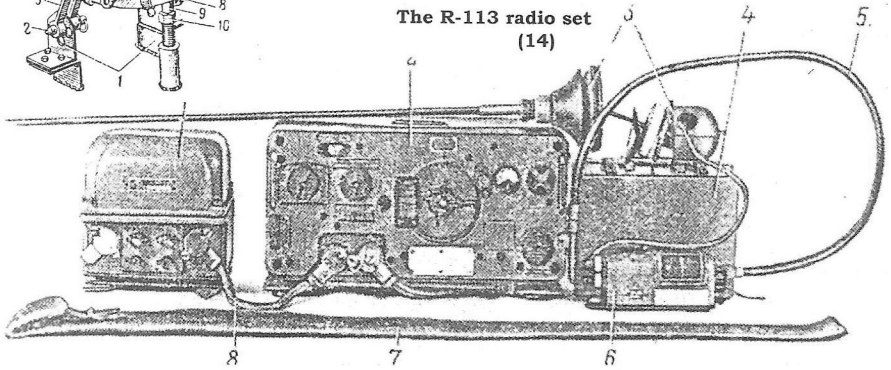
The driver´s station with : 1 - Driving lever, 4 - signalling lights, 5 - dashboard, 6 - vision port, 8 - electrical supply for gyrocompass, 9 - gyrocompass, 10 - spare vision blok, 11 - compressed air bottles, 12 - starter relais, 14 - radio station R-113, 15 - electrical supply for radio, 16 - speedometer, 17 - batteries, 18 - fuel tank, 20 - driver´s instruments and controls, 21 - transmission shift lever, 22 - battery control, 23 - accelerator, 24 - driver´s seat, 25 - clutch pedal.

Driver´s seat (24)

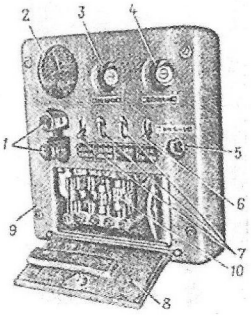




The R-113 radio set (14)

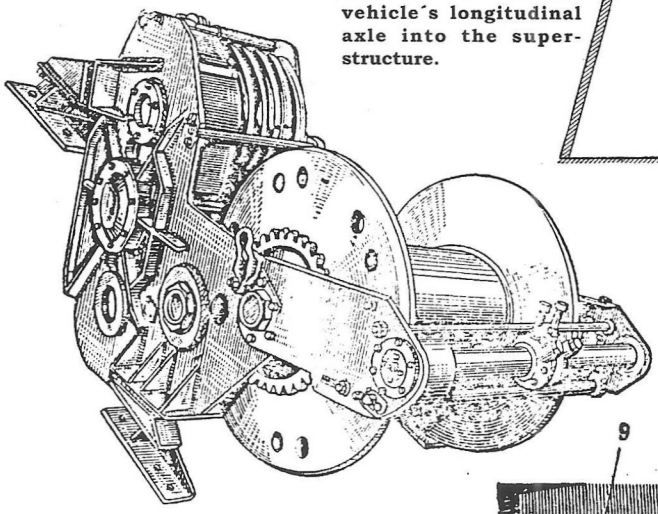


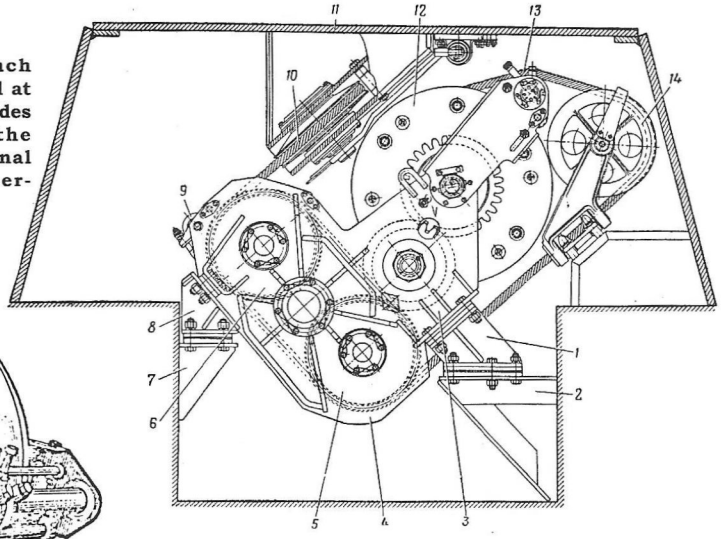
Driver´s controls and instruments (5+20)



Winch Layout

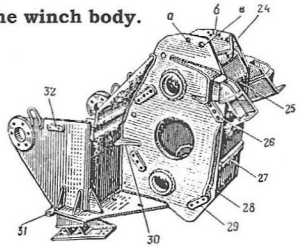
The whole winch assembly is mounted at 45° vertical angle insides and at 90° to the vehicle´s longitudinal axle into the superstructure.

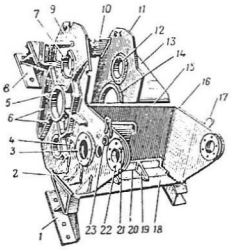


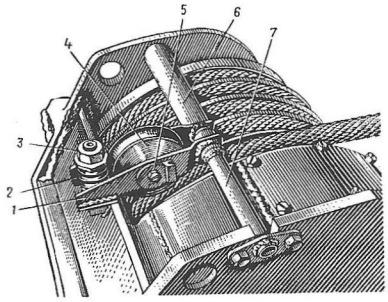


Perspective drawing from the Technical Manual, showing the winch assembly, consisting of the cable drum, wire rope control mount, rope guides, winch body and frame.

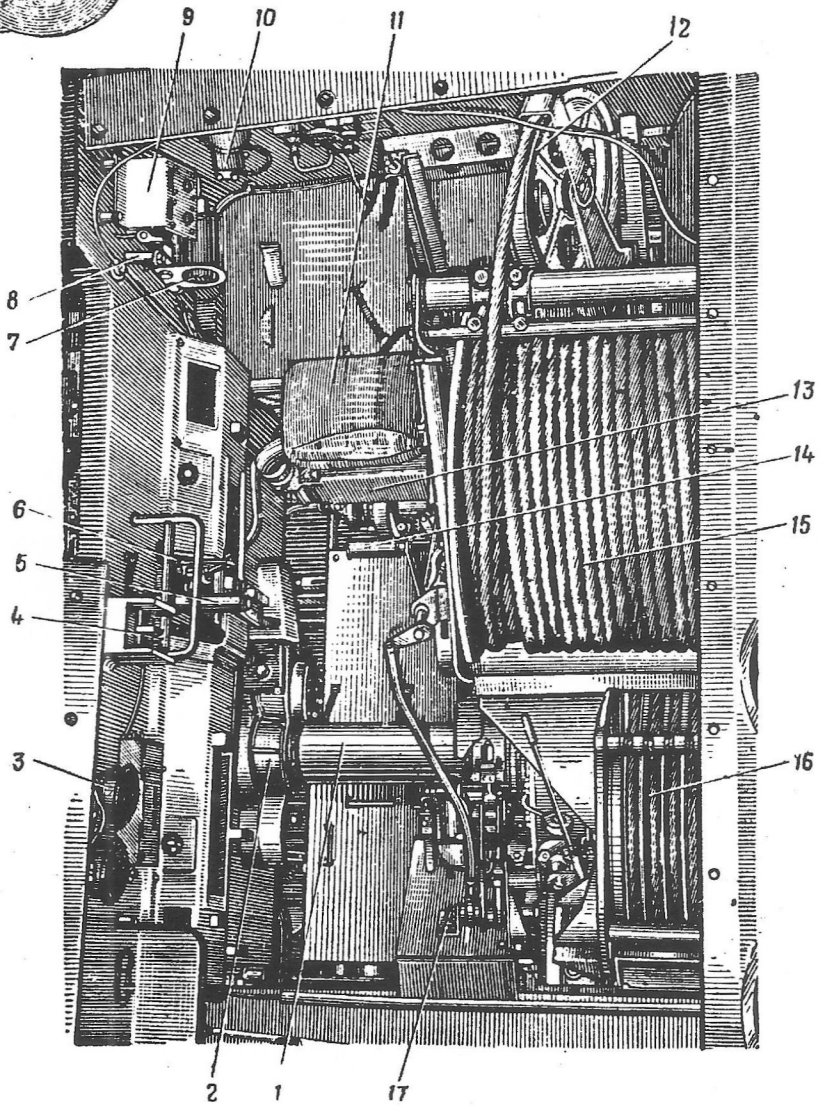
The winch body.





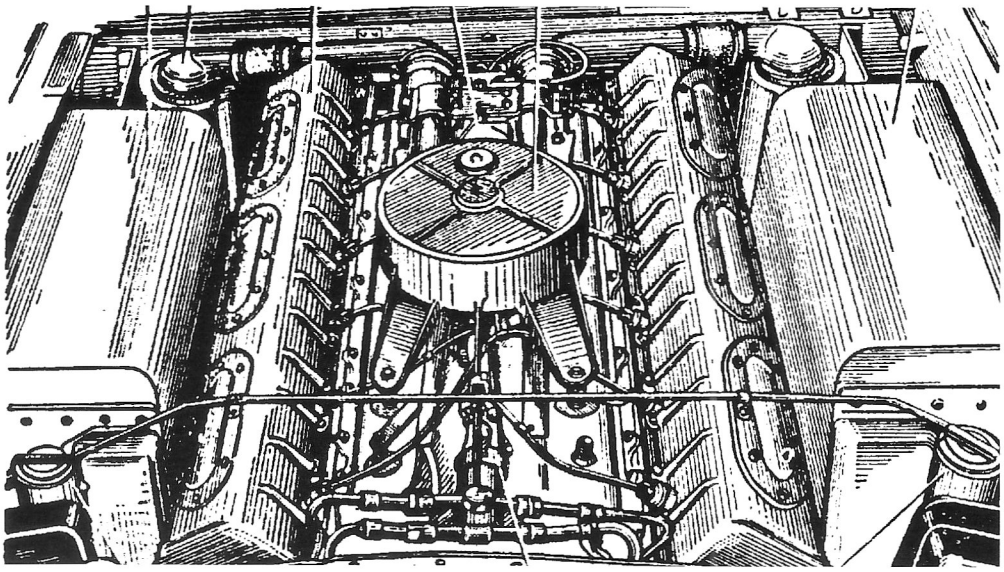


The tow rope control unit.



The winch as mounted inside the crew compartment. The vehicle´s front is to the right, the rear crew access hatch is recognisable in the upper left corner.
1 - power take off from the main engine, 4 - aperture for the rope, leading to the rear, 9 - winch starter box, 11 - operator´s seat, 12 - cable guide, 14 - winch control lever, 15 - cable drum, 16 - upper towing drum.

Engine Compartment

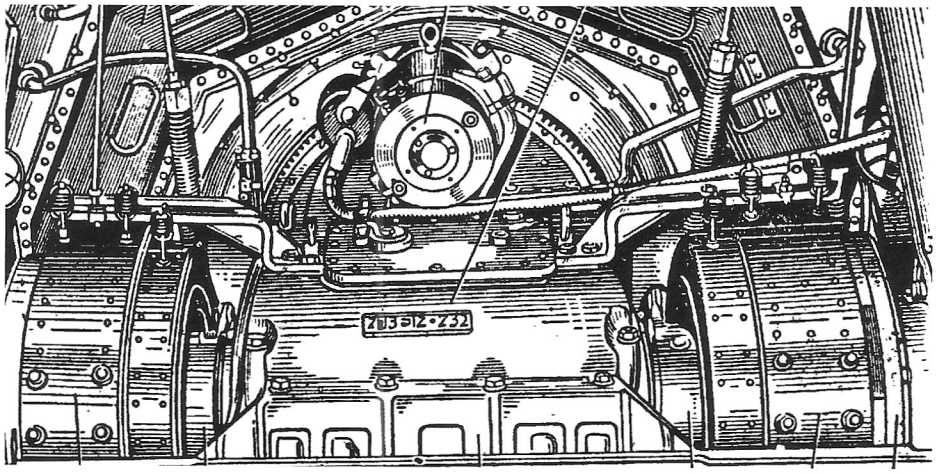


The engine compartment looking forward :

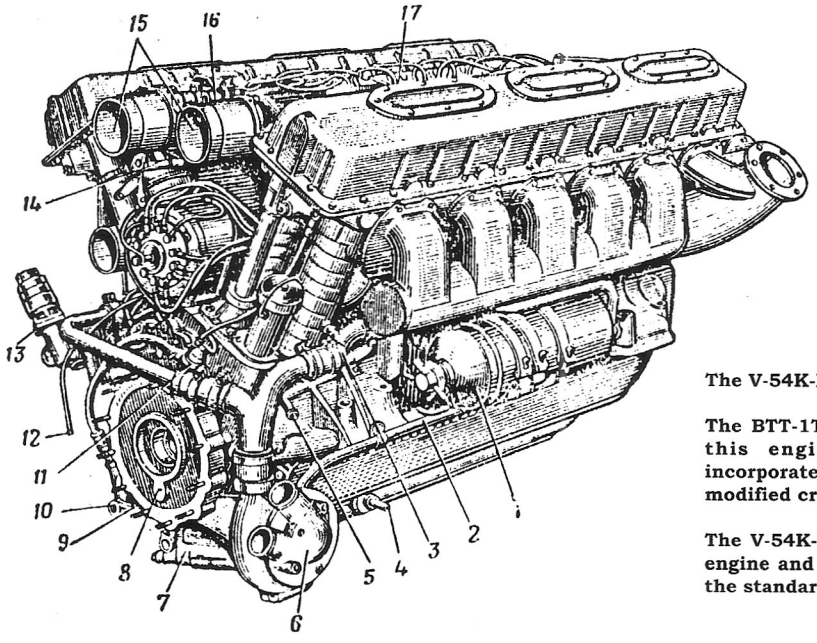
To the utmost left and right the liquid cooling system. In the upper left and right corner the air-cleaners.

Centrally the engine with the fuel filter on top of it.

In the front the fuel and oil tanks.



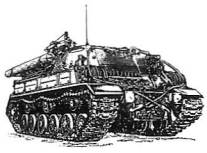
The power train with the liquid cooling system on the top, the starter unit in the center, the planetary gearboxes in the foreground, left and right, and the gearbox mounted centrally.



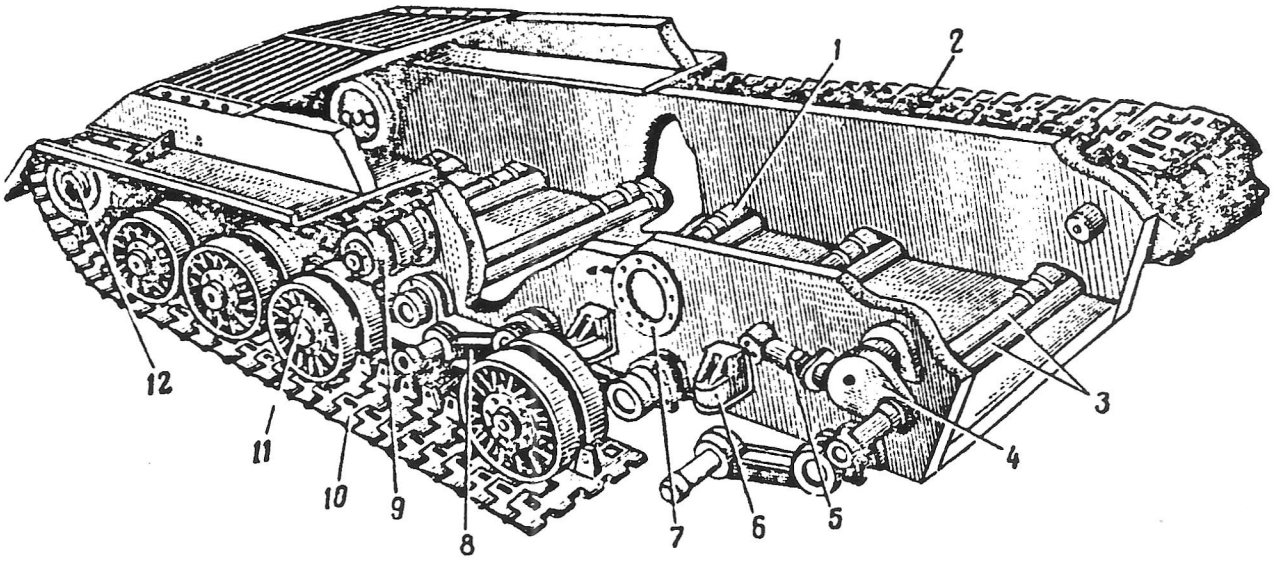
The V-54K-IS-T of the BTT-1.

The BTT-1T uses a modified version of this engine, the V-54K-IS which incorporates minor differences such as a modified crankshaft.

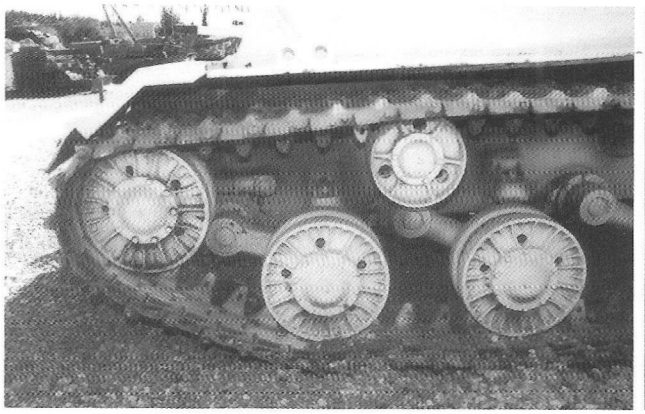
The V-54K-IS-T is a V-12 cylinder diesel engine and varies in several points from the standard V-54 variant.

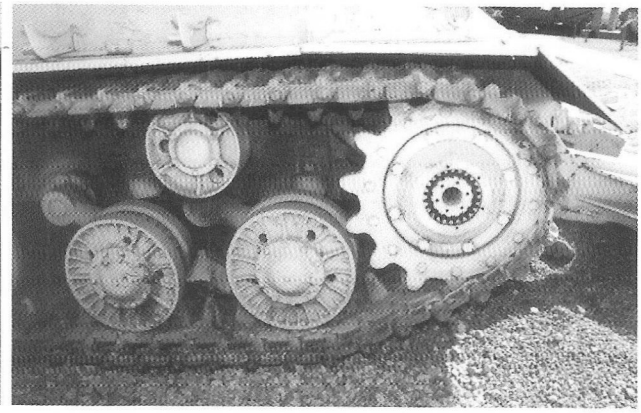


Chassis

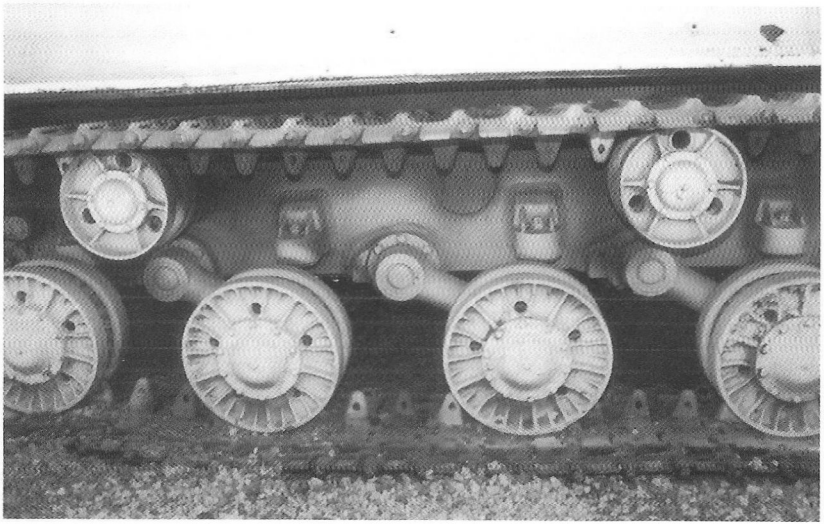


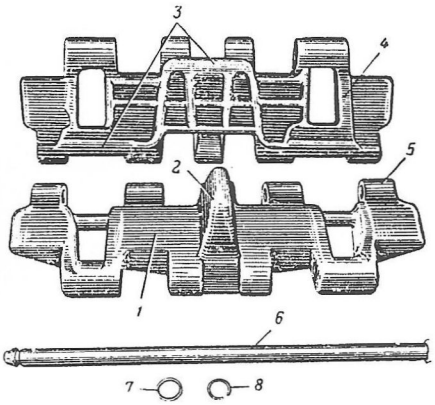
The chassis and running gear, consisting of :
1 - suspension, 2 - track, 3 - torsion bars, 4 - drive sprocket mount, 5 - track tension adjusting link, 6 - bumper springs, 7 - access aperture, 8 - shock absorbers, 9 - track return rollers, 10 - track, 11 - road wheels, 12 - idler wheel.





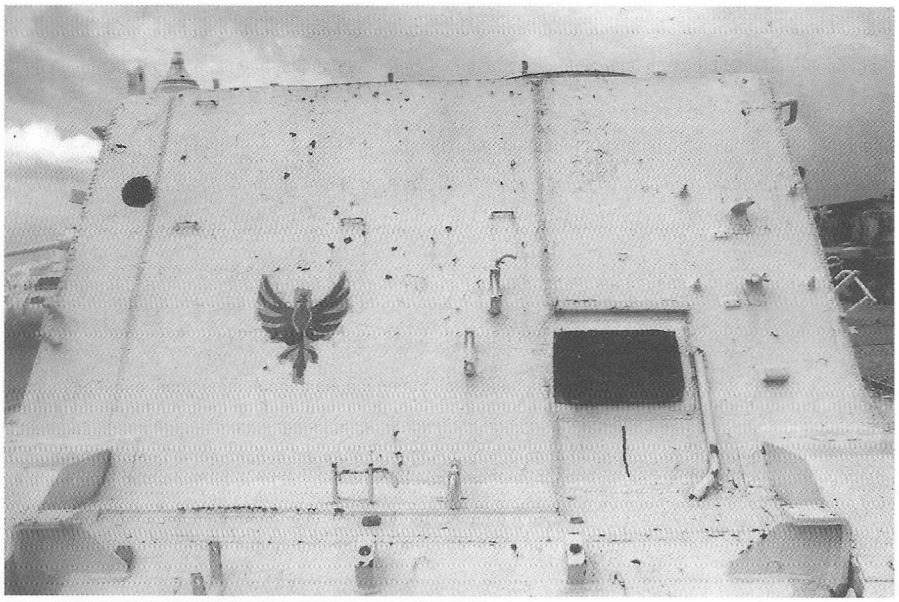
The running gear on the actual vehicle with the idler wheel and first road wheel station (center, left), the drive sprocket - note that the protective cap is missing - and rearmost roadwheel station (center, right) and the center section with the roadwheels and track support rollers, shock absorbers and bumper springs.





The IS-style tracklink which is used on all IS variants. Several types, differing in the shape of the grip pattern, form of the guidehorns and general design, are known.

The IS-ARVs use the later types, as shown here.



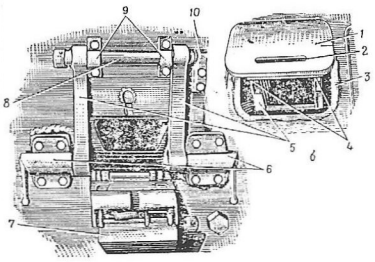
Vehicle´s Front

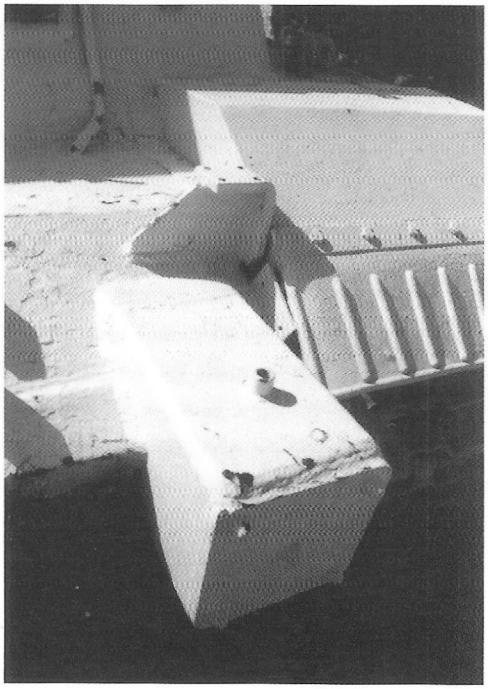
The driver´s front with the large armoured plate welded over the aperture for the former 152mm main gun.

The dimension of the plate:
108 x 122 cm without welding seams
114 x 122 cm with welding seams

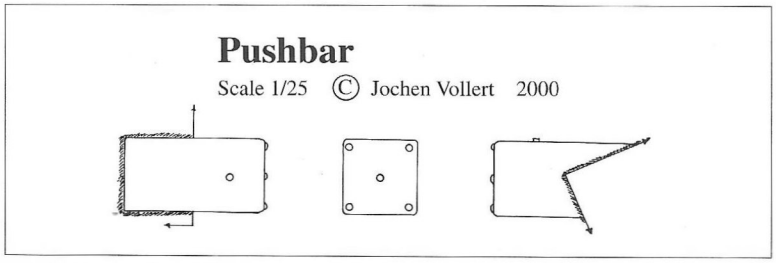
Several small mounts for external equipment and tie downs have been added.

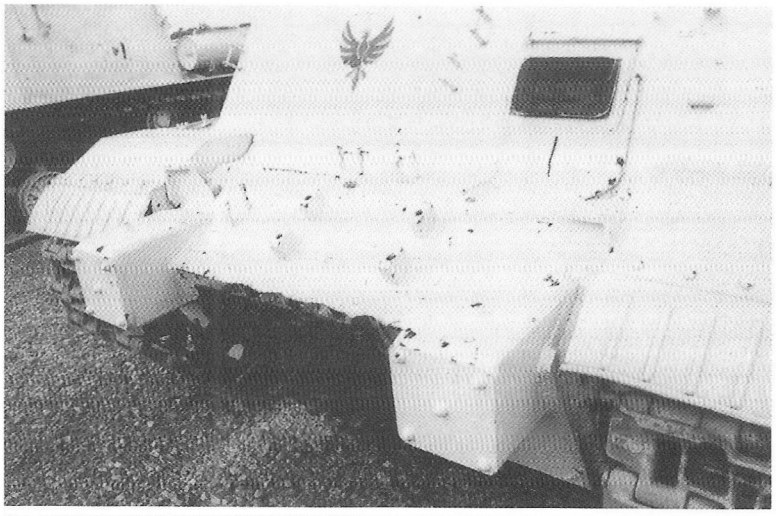
The headlight cluster with protective frame is gone, the attachment points are still fitted.





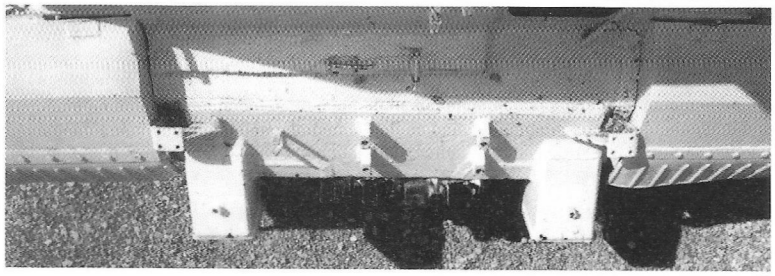
Right : The driver´s vision hatch from the outside and inside together with the operating mechanisms.





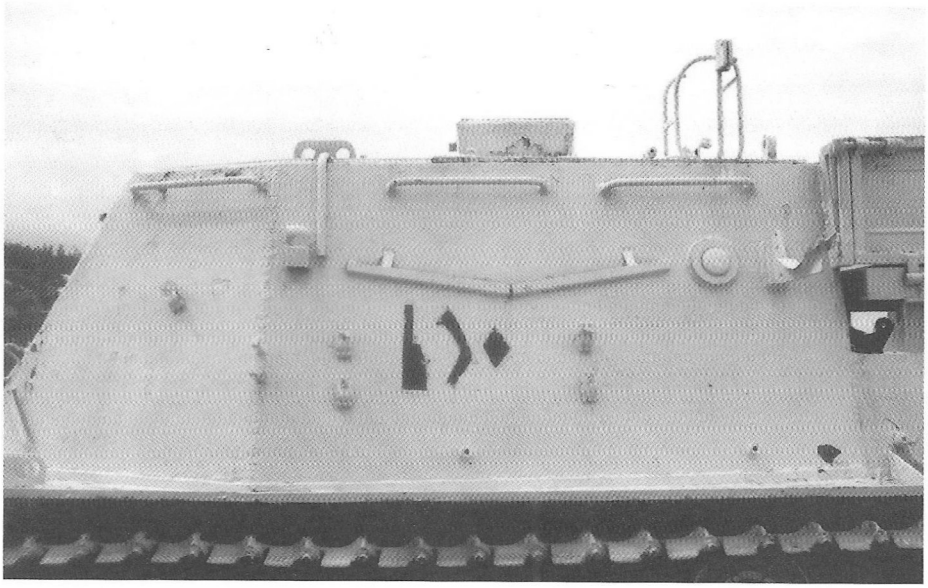
The two large pushbars on the front of the vehicle are used for pushing operations during vehicle recovery missions, enabling those without damaging the tanks.

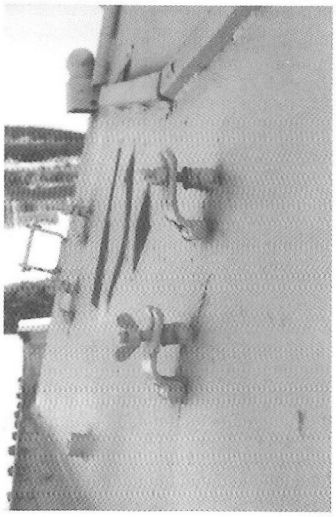
The markings on this vehicle are genuine Egyptian, the basic colour is, however, no more original as the vehicle was repainted shortly before these pictures were taken.



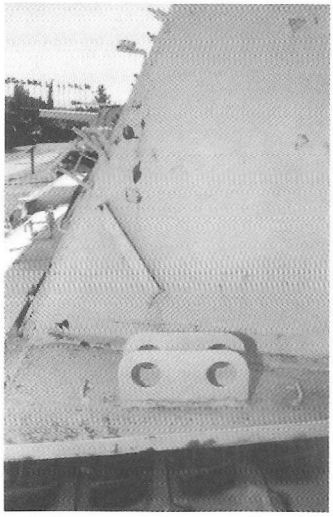
Note the partially-rubber mudguards which are an Israeli modification, identicating a use within the Israeli Defence Forces after the vehicle was captured in 1967.

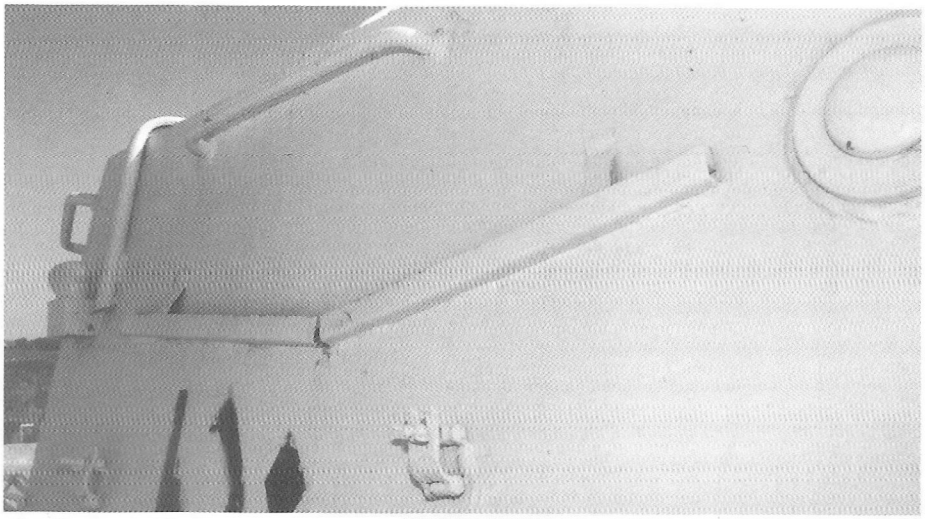
Superstructure - Side & Crane Assembly





The left side of the superstructure with the clamps for the spare tools, hand holds and close-quarter defence plug.

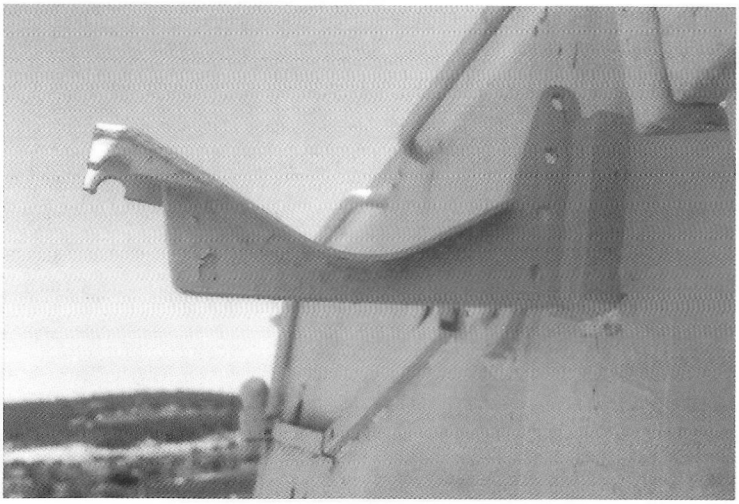


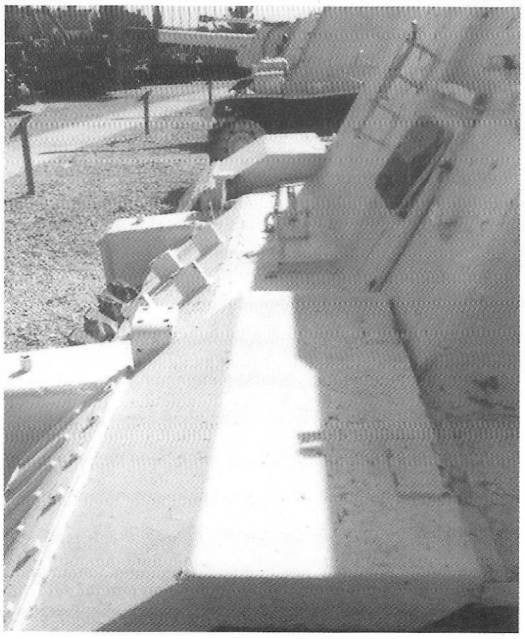


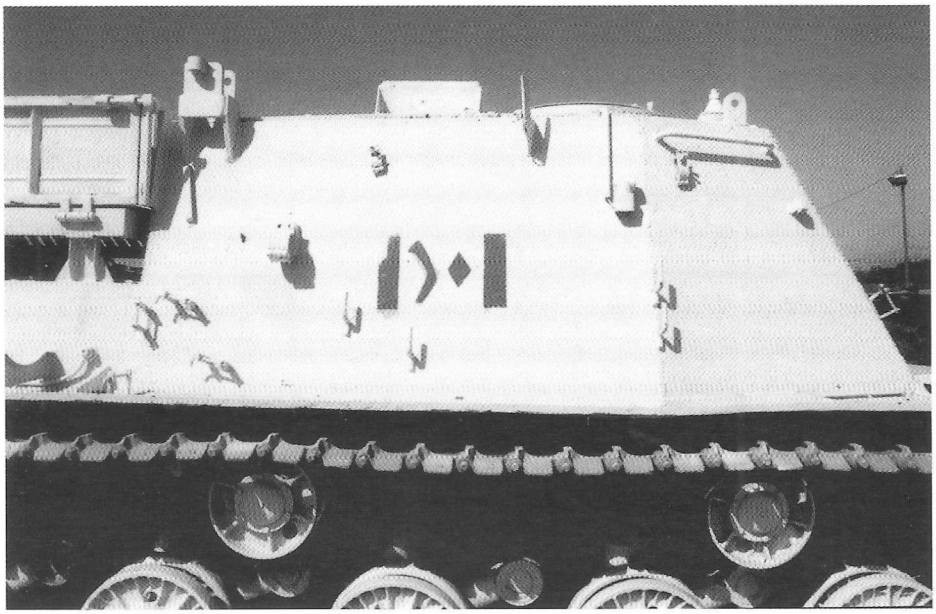
Details of the many smaller mounts for the externally stowed tools.

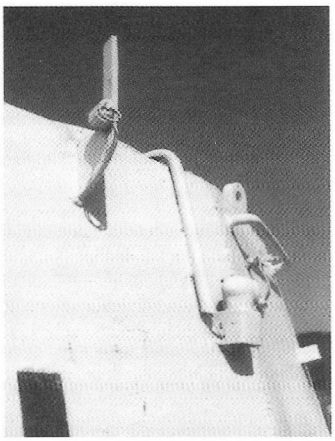
Center, right: The mount for the saw and below it for for the spade.

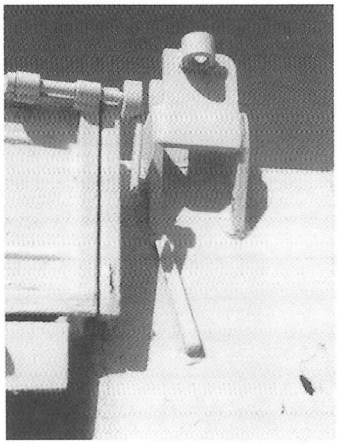
Below: One of the two supports for the pushing log.



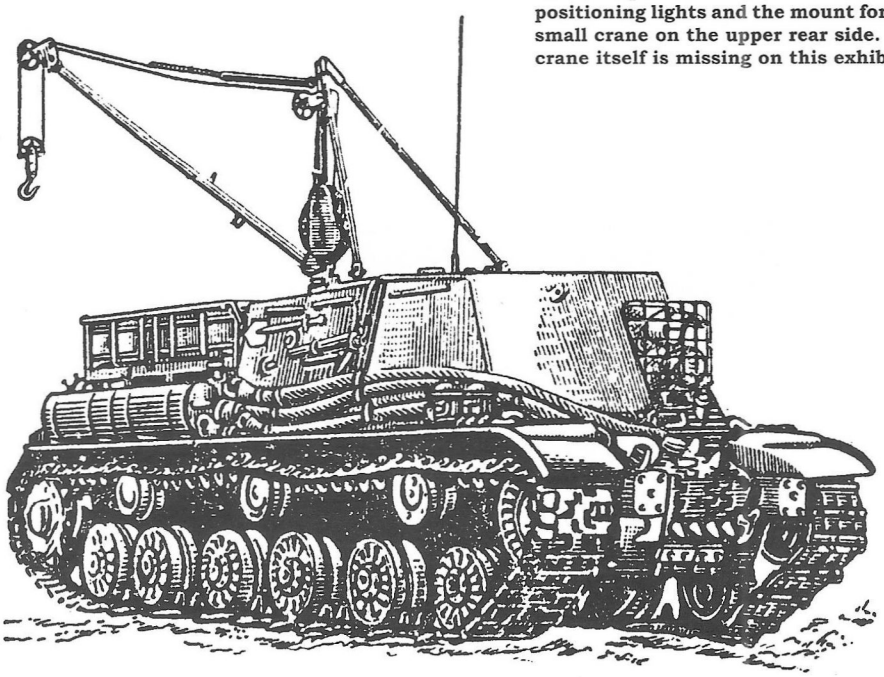




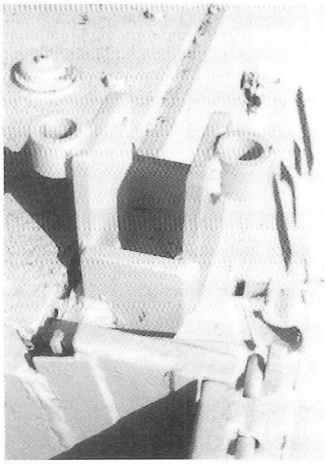




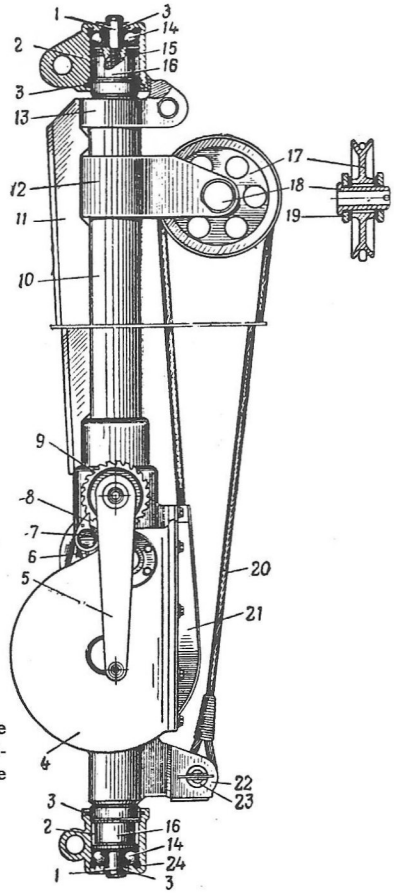
The right side of the superstructure with the clamps for the jib crane booms, positioning lights and the mount for the small crane on the upper rear side. The crane itself is missing on this exhibit.



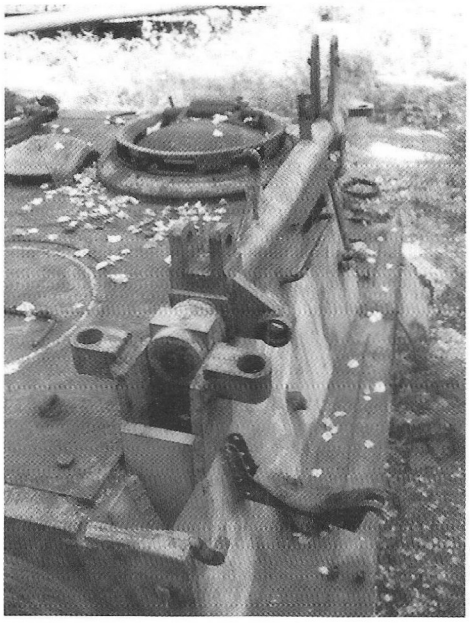
The drawing from the Technical Manual shows the exact location of the 3-ton crane when fully erected.

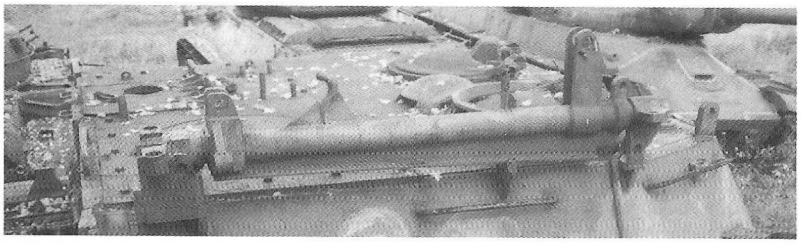


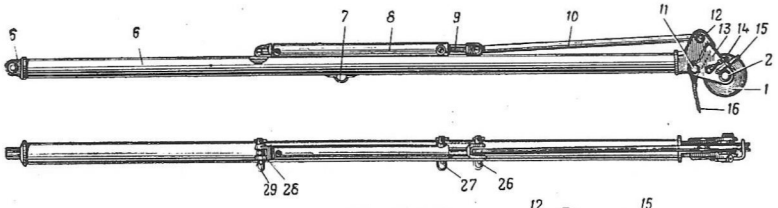
Close up of the crane mount on the superstructure.



The main frame of the crane boom with the hand-opera-ted wheels and wire rope.

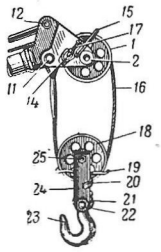




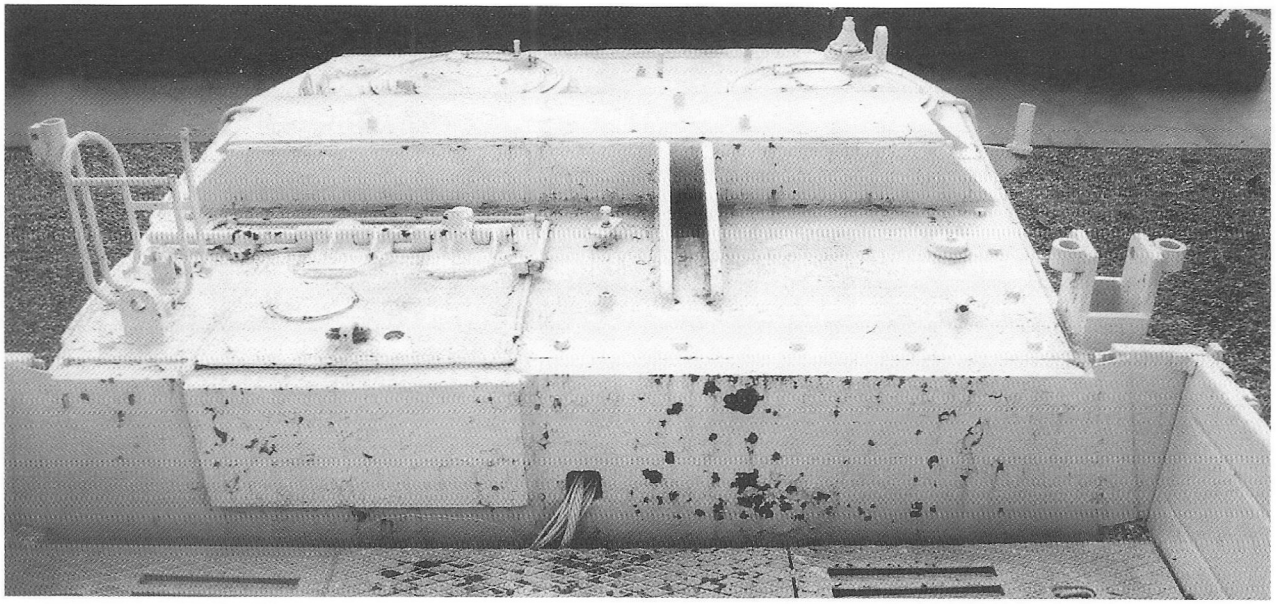


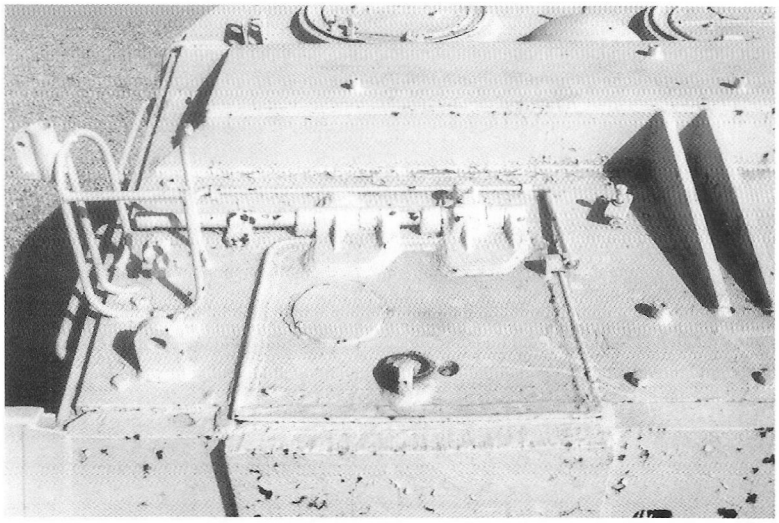
Top and left:
The light jib crane as mounted on a BTT-1T.

The hoisting boom with the sheave, cable guides and snatch block.

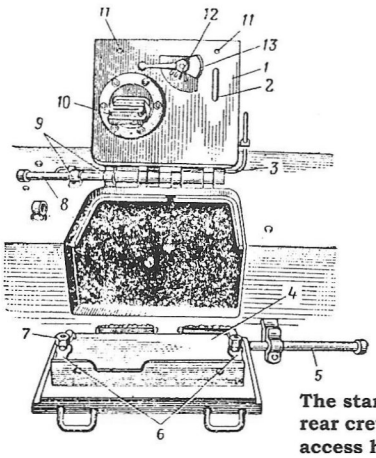


Superstructure - Top

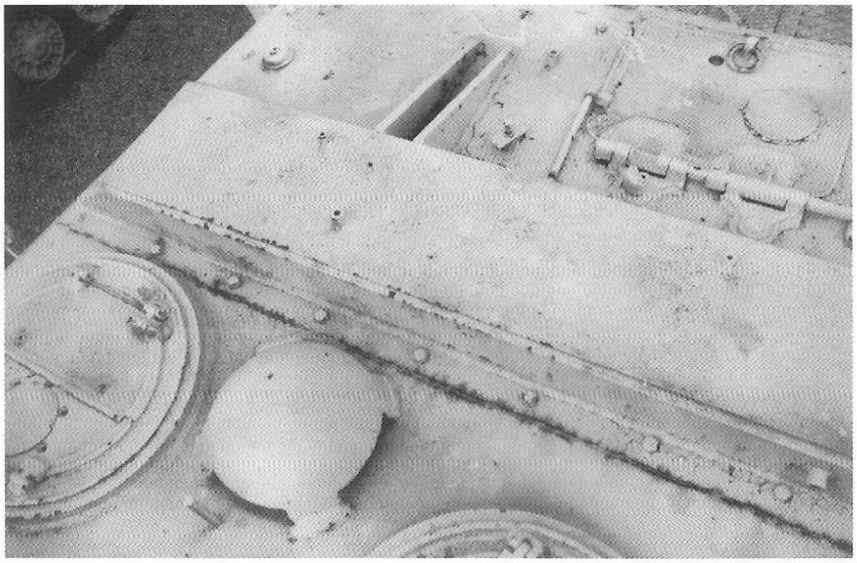


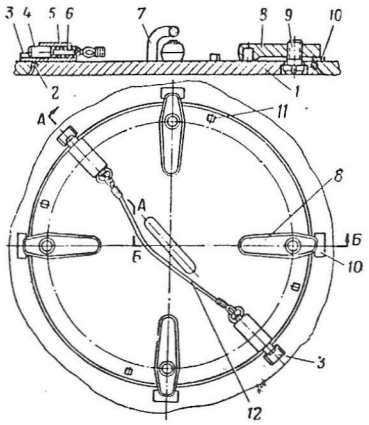


Note the winch rope aperture and that the vertical part of the crew´s hatch is welded shut.

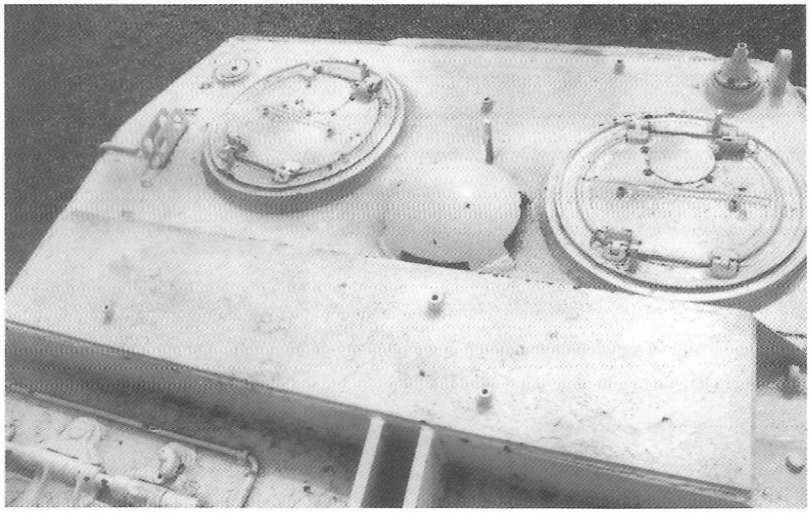


The standard rear crew access hatch.



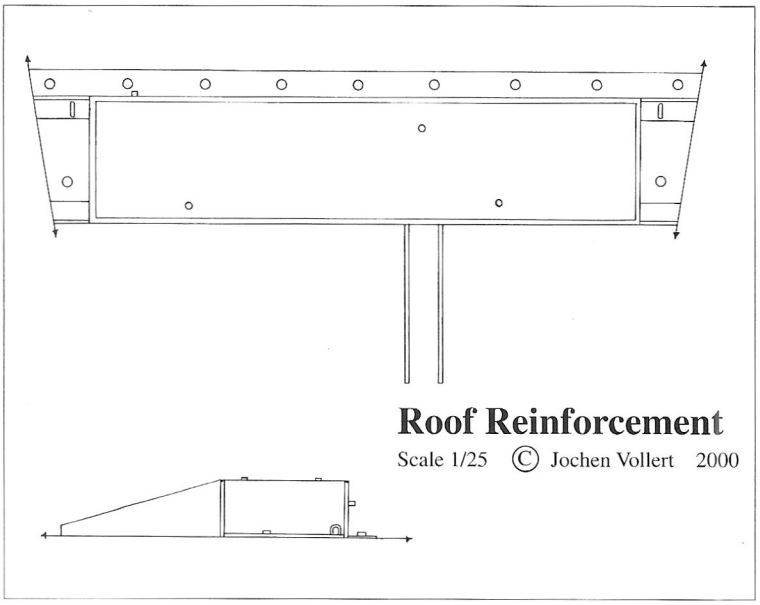


One of the crew access hatches on the top of the vehicle.

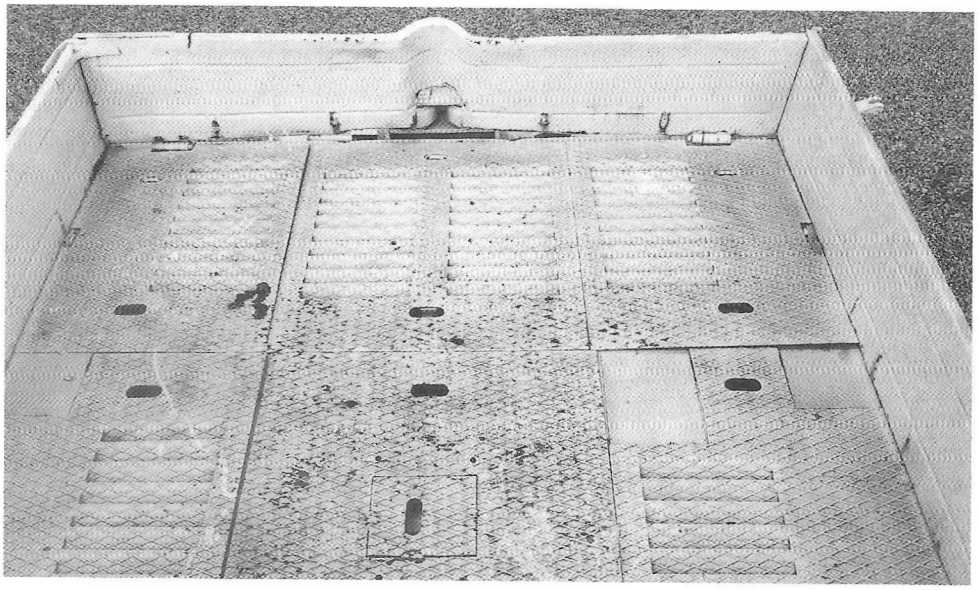


The large reinforcement frame on the roof, supporting crane operations, with attachment points on top of it. Note also the commander´s and loader´s hatch with the ventilation cupola inbetween.

Below: The protective frame for the searchlight (not mounted).



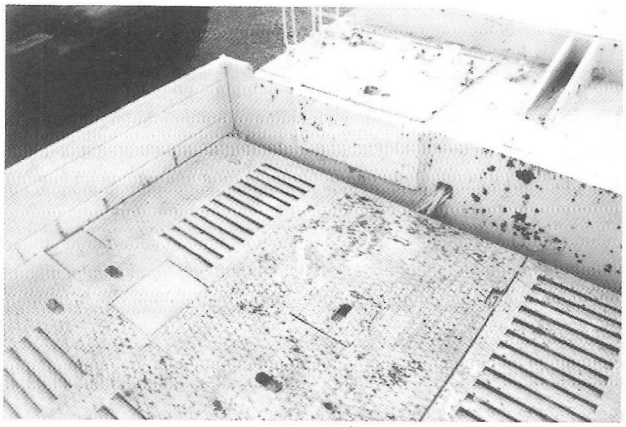
Stowage Platform

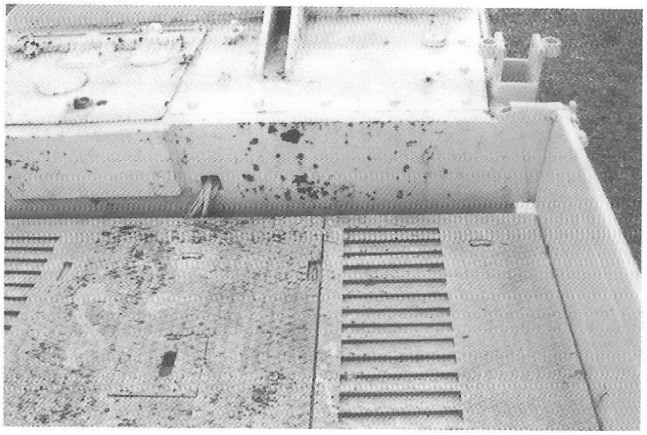


The large stowage platform is of very simple construction with foldable rear and sides.

The floor is made out of six panels, each enabling access to the engine deck when lifted. They also incorporate ventilation slits to ensure proper air flow for the engine compartment below. In the rear side an aperture for the tow rope is integrated, leading it from the aperture in the rear of the superstructure to the wire rope rollers mounted on the rear of the vehicle. This design is also simple, most of the stowage (such as spare parts, tools and the auxiliary generator), however, must be removed when using the winch.

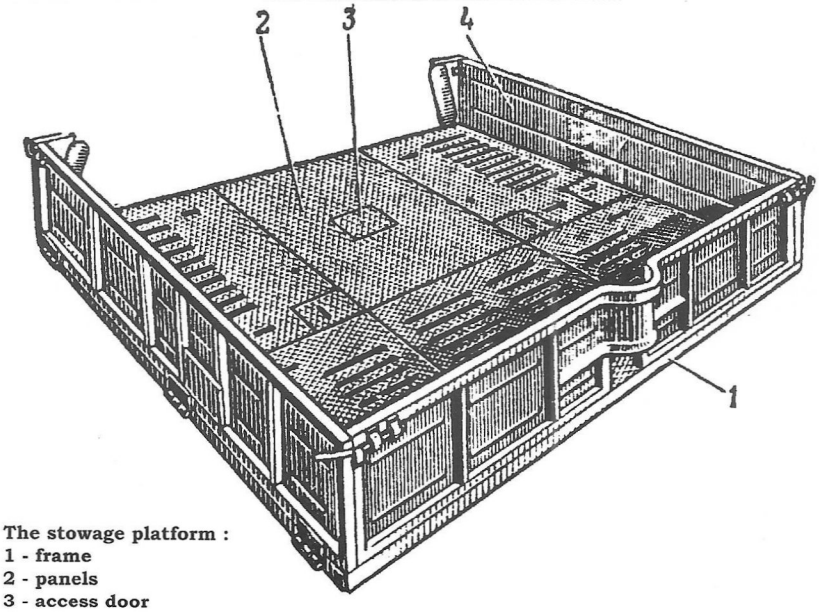
The left frontal side of the platform. Note the small aperture for the tow rope in the center of the rear superstructure.





Top; The frontal right side of the platform, looking forward.

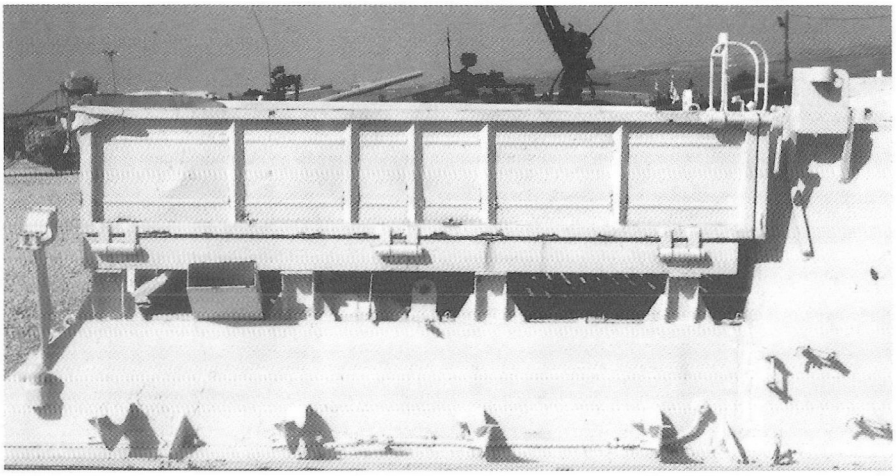
Below: The mount for the crane boom in travelling configuration.



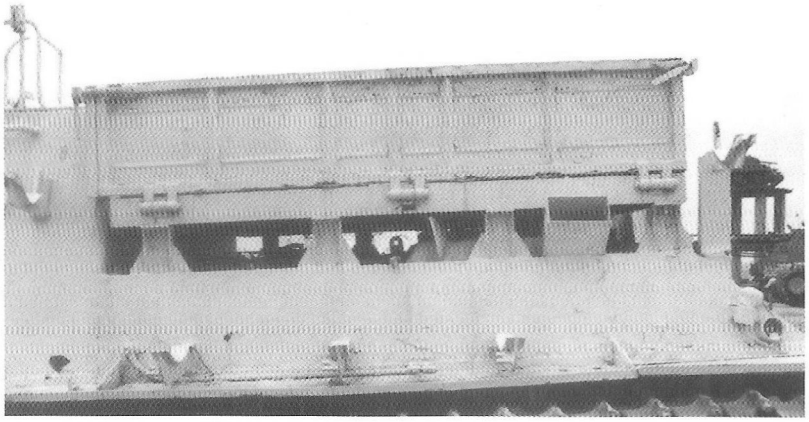
The stowage platform :
1 - frame
2 - panels
3 - access door
4 - sides

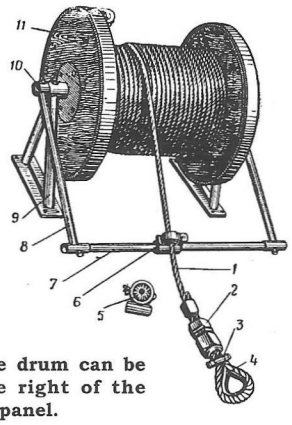
The view from the right (right), left (center) and rear (below).

The frame of the platform sits 17 cms above the edge of the engine compartment, thus leaving enough space for proper air-flow.

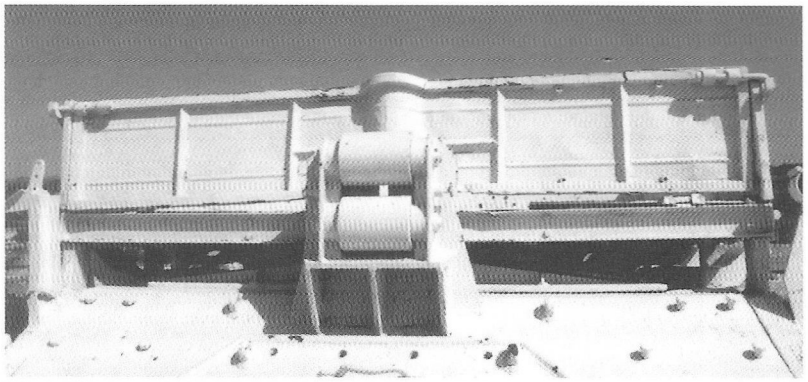


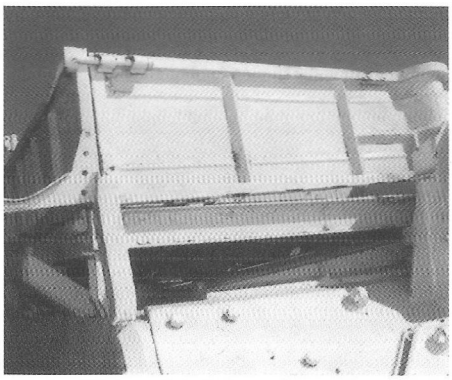
To avoid the metal platform to heat up by engine fumes, the exhausts had to be elongated on both sides. They are, however, not long enough to have the main engine running while the platform´s side panels are folded down.



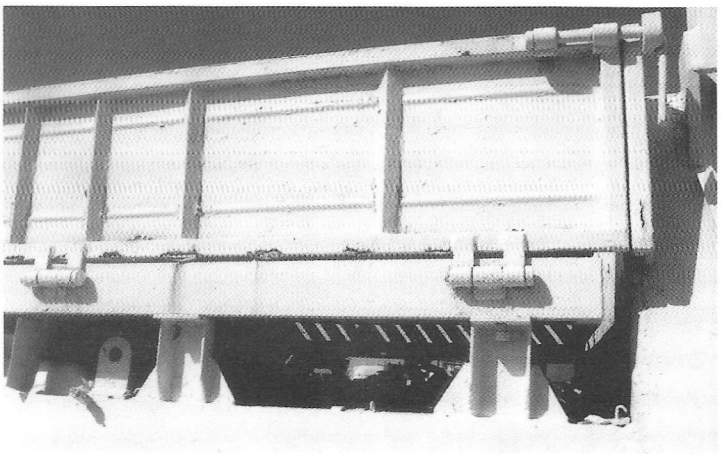


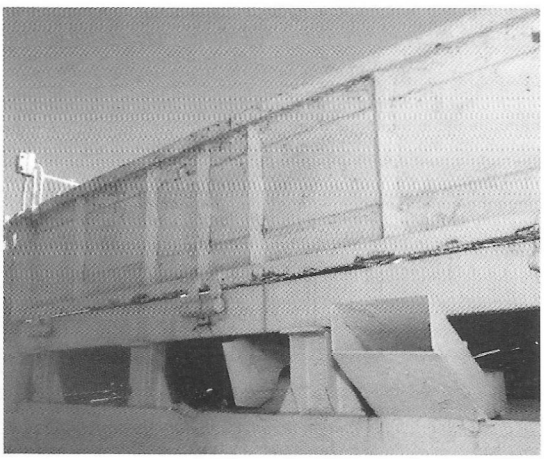
A small cable drum can be fitted to the right of the foldable rear panel.





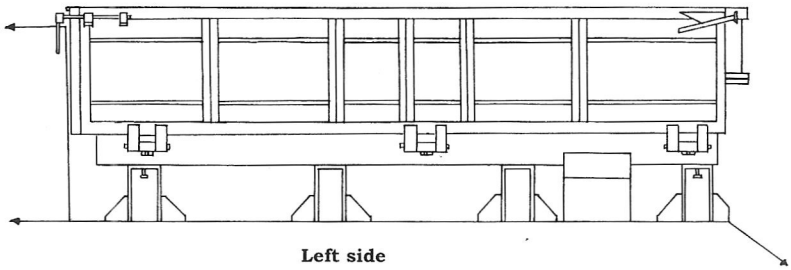
The walk around the stowage platform shows details such as the tow rope control rollers, side panels´s joints, the carrier frame, handles, reinforment ribs and smaller mounts for additional equipment.



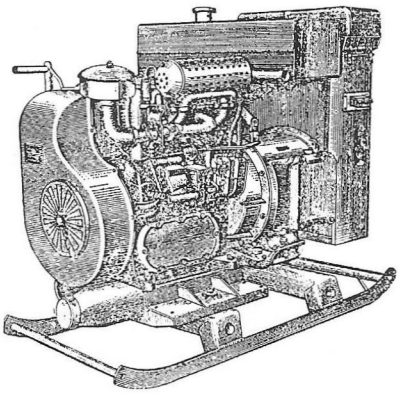


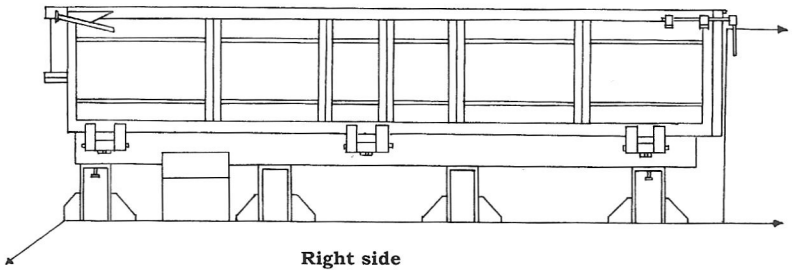
Stowage Platform

Scale 1/25 © Jochen Vollert 2000



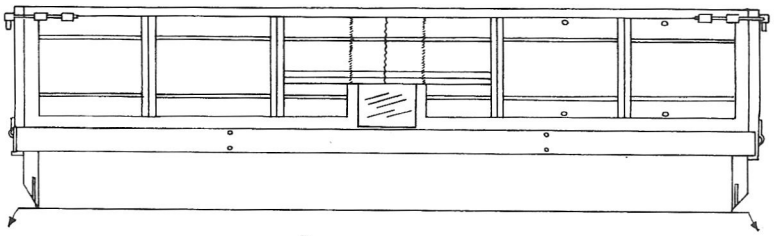
Left side



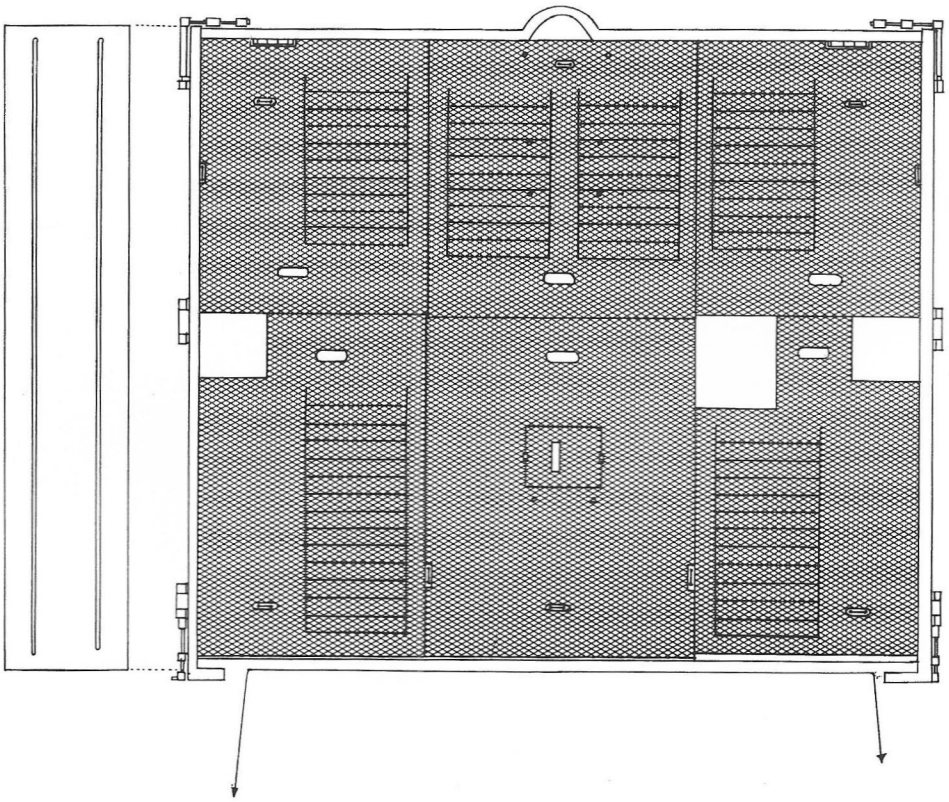


Right side

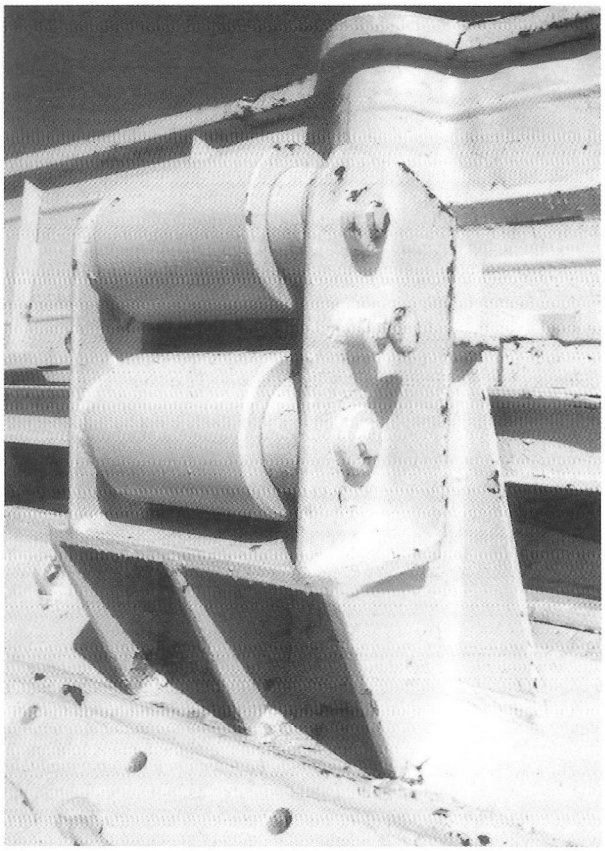
The portable AB-4T/230 generator engine which is located on the stowage platform on the rear of the vehicle during marches and used independently and dismounted from the tank.

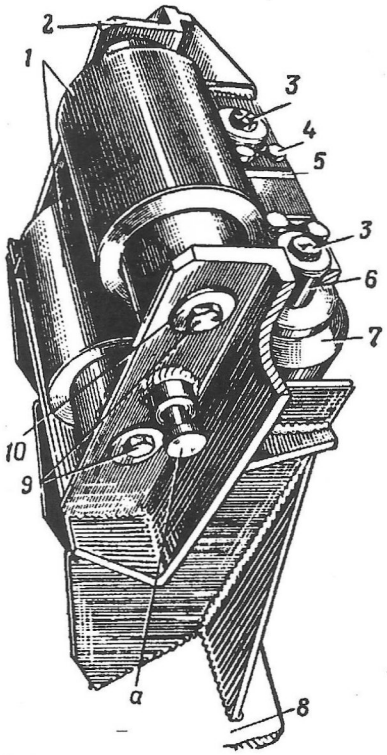


Rear

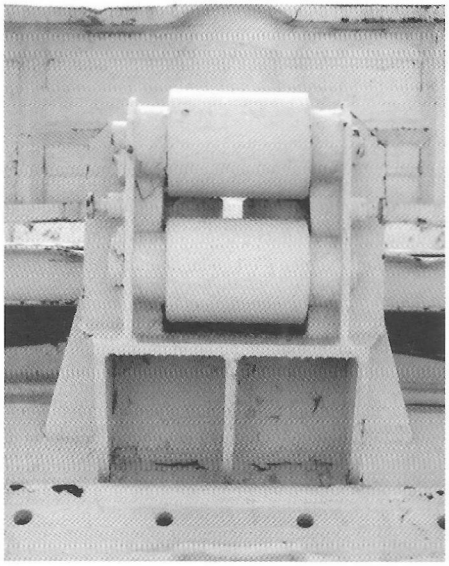


Tow Rope Control Rollers

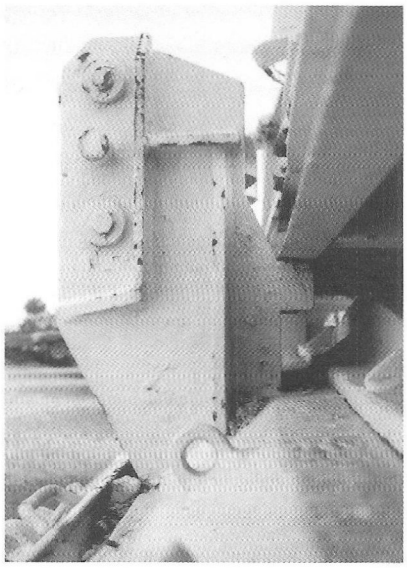


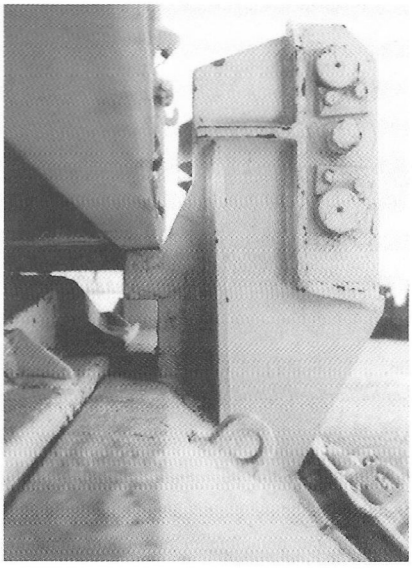


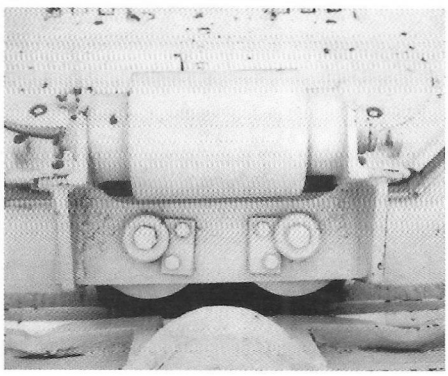
The tow rope roller adjustment, mounted on the rear of the hull, just aft the large stowage platform.



The whole design is of very strong but simple construction, able to withstand the enormous powers in heavy duty.

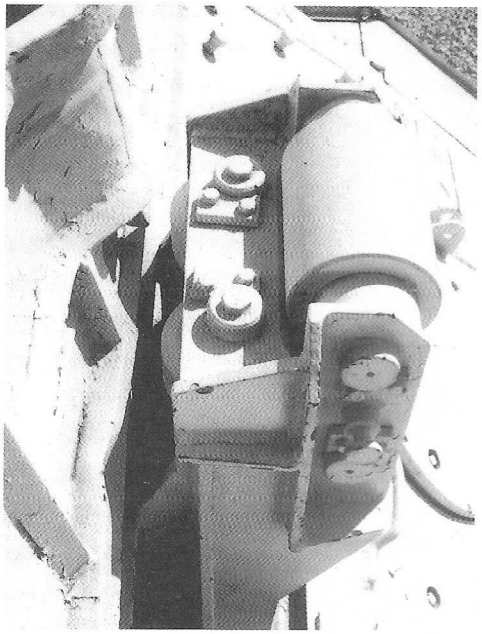


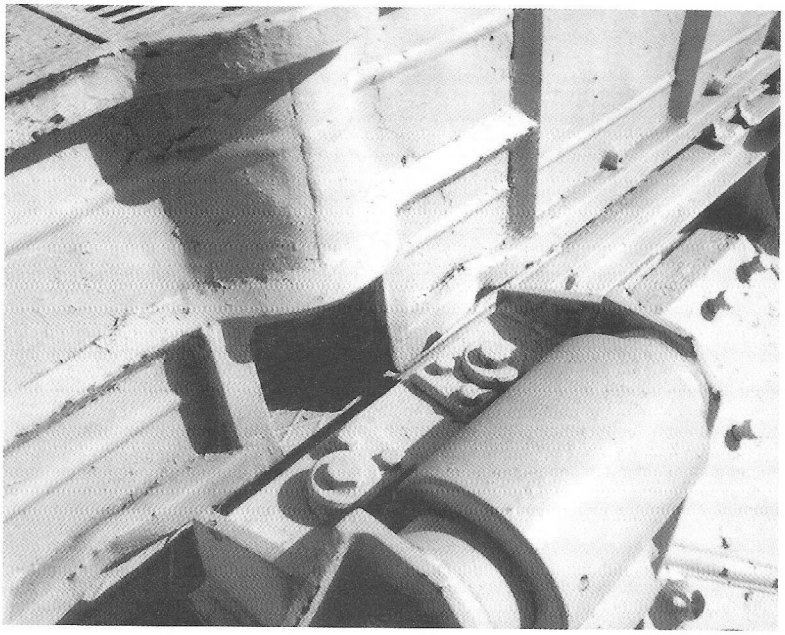




It uses a system of two vertical and two horizontal rollers to guide the tow rope in recovery operations.

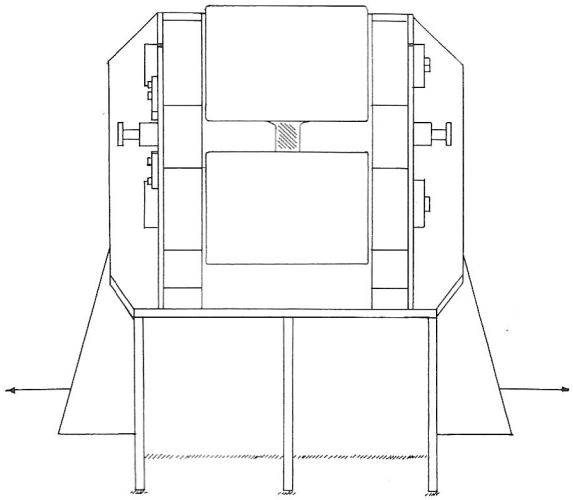
Clockwise :
View from the rear, left, top and right.

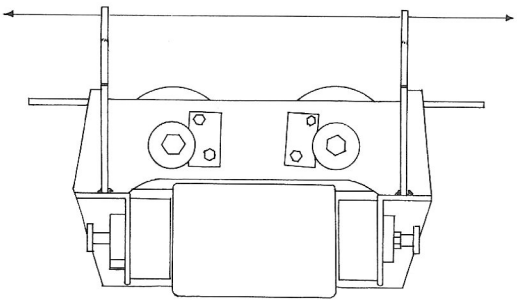




Tow Rope Rollers

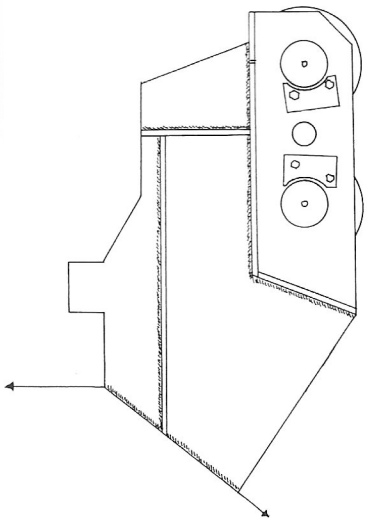
Scale 1/10 © Jochen Vollert 2000

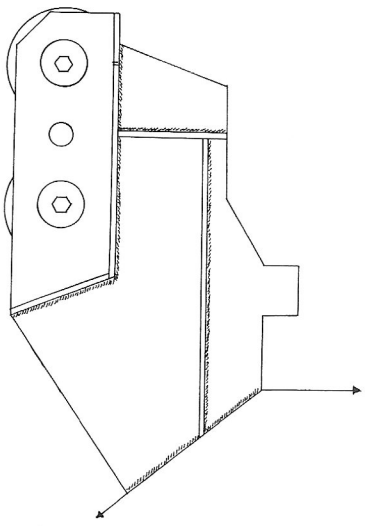


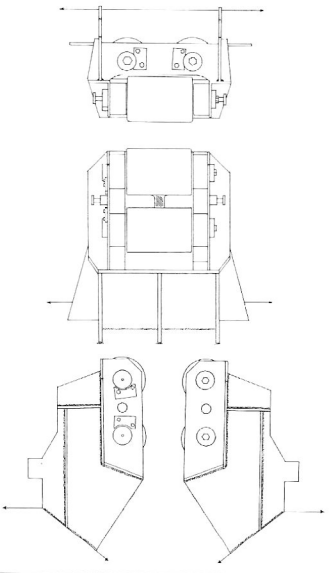


Tow Rope Rollers

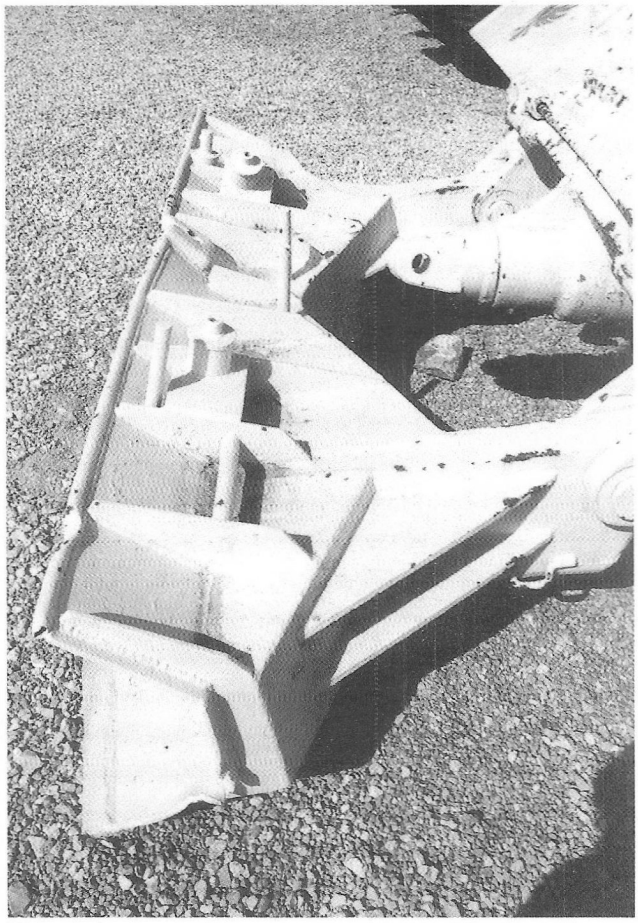
Scale 1/25



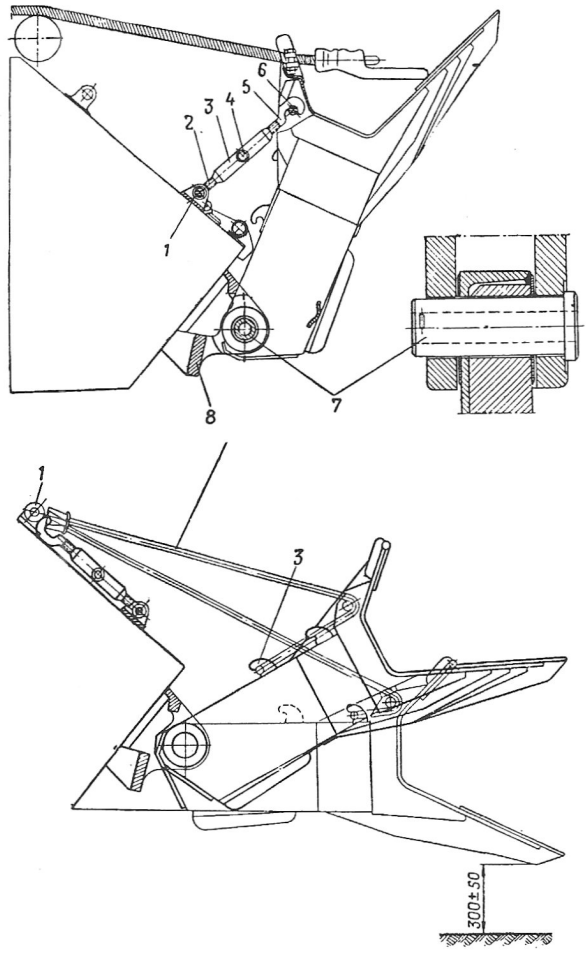




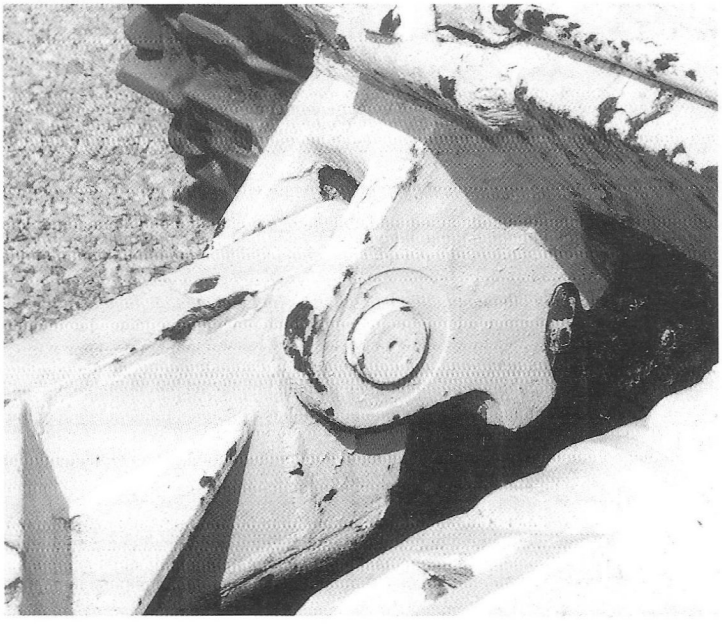
Spade & Towing Pintle



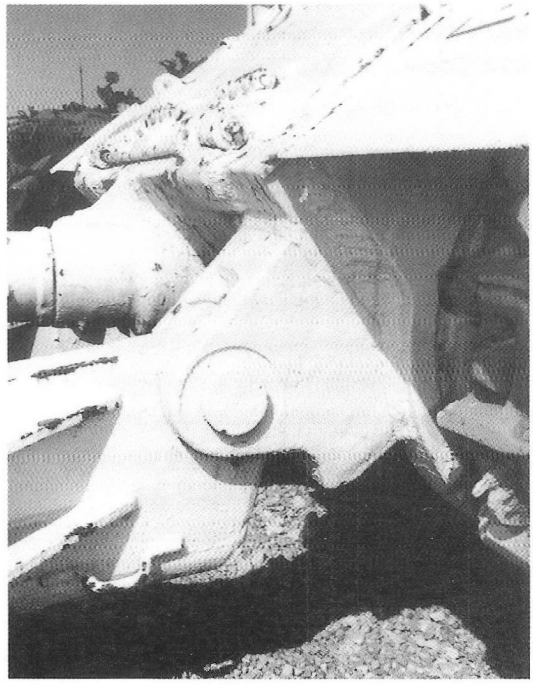
The spade as attached to the rear of the ARV. A number of reinforcement ribs allow heavy duty work.



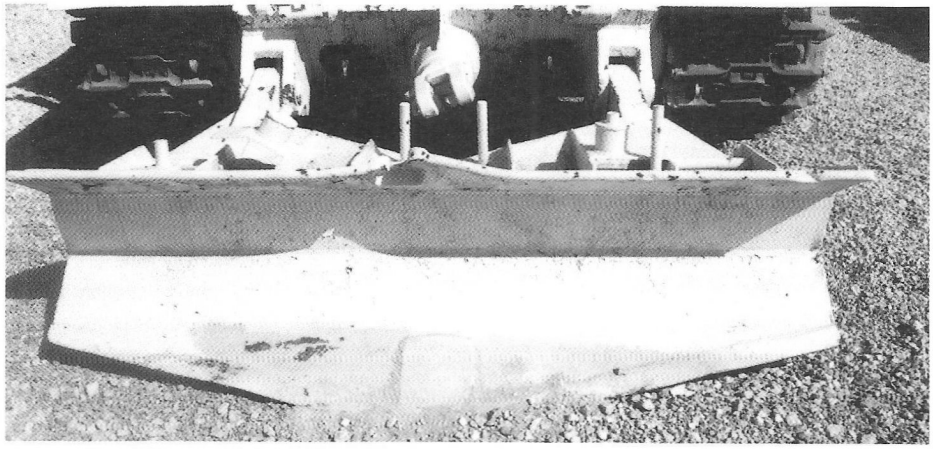
The spade in two travelling configurations fixed to the rear plate.



The spade mount fitted to the lower rear hull.

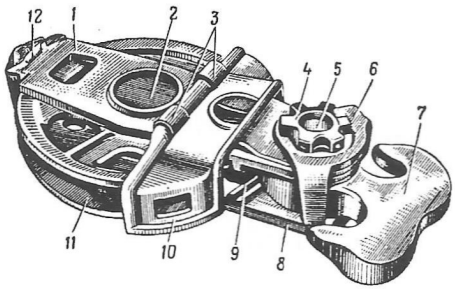


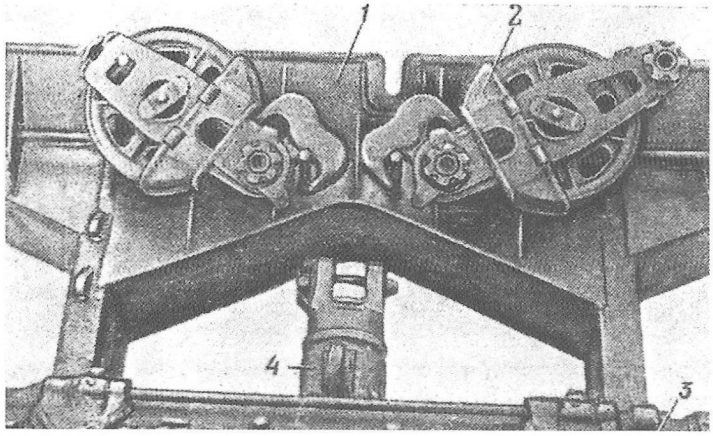
The heavy design of this part shows what enormous powers these mounts have to withstand under combat conditions. Note the handles : This is a manually operated device whose lifting can be supported by the inboard winch.



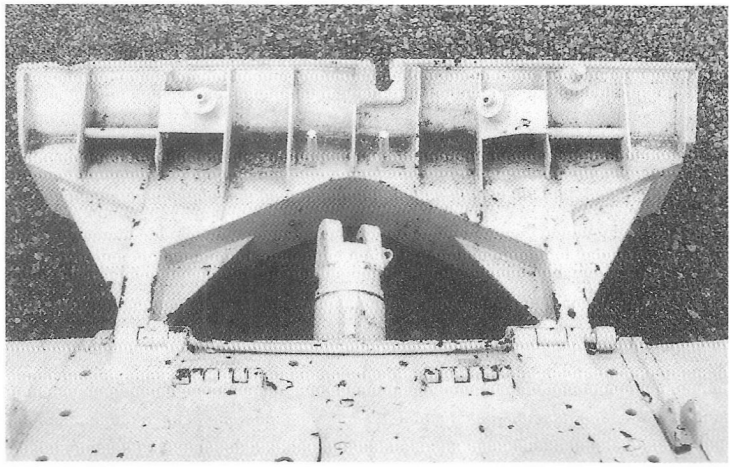
The business end of the spade, here lowered, but not yet digged in for a full recovery operation.

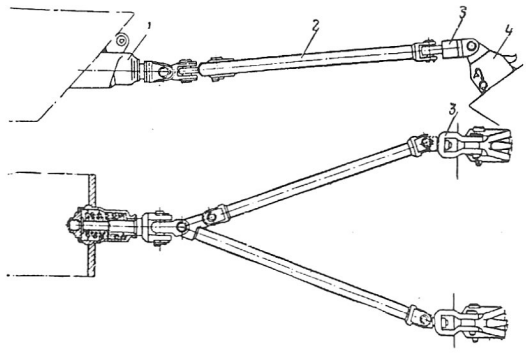
In the center, between the spade mounts, the towing pintle which can be seen in detail in the pictures below.



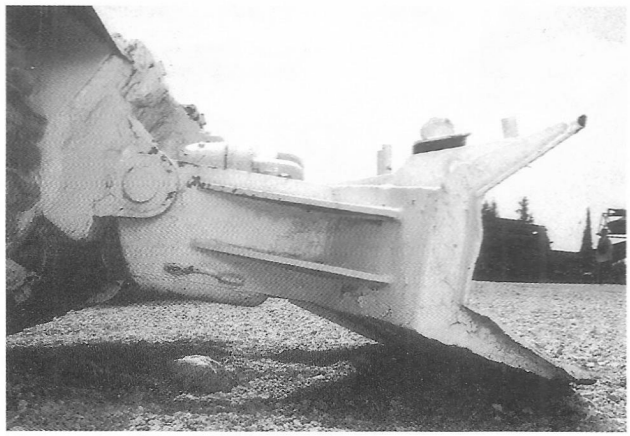


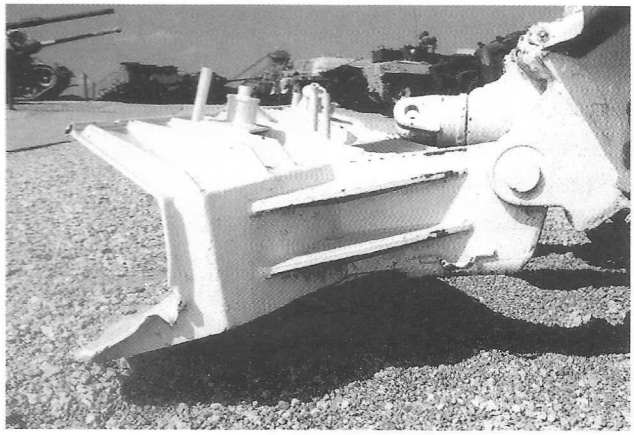
The pulleyes, guiding the tow rope between the ARV and the recovered vehicle. The mounts for the pulleyes can be clearly recognised on the picture below.

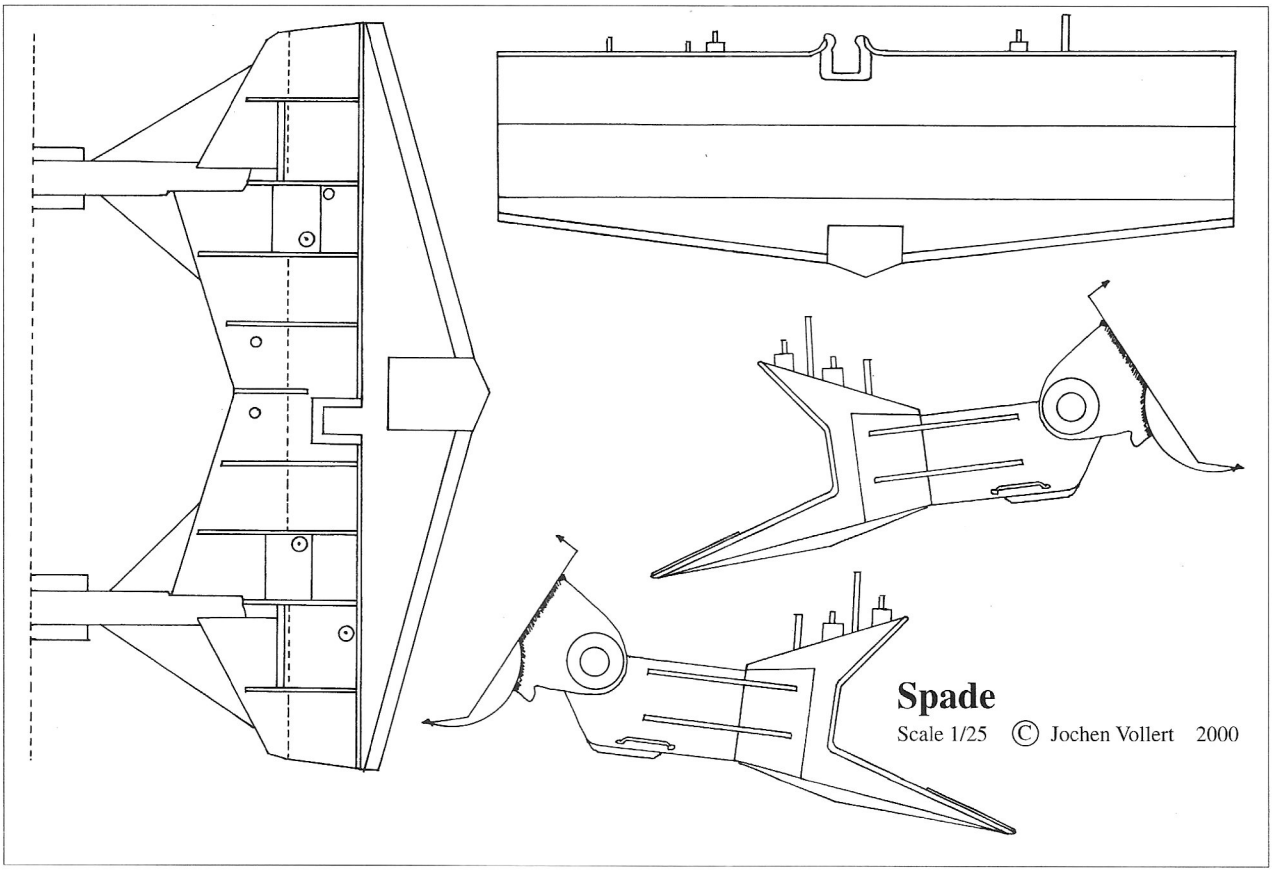




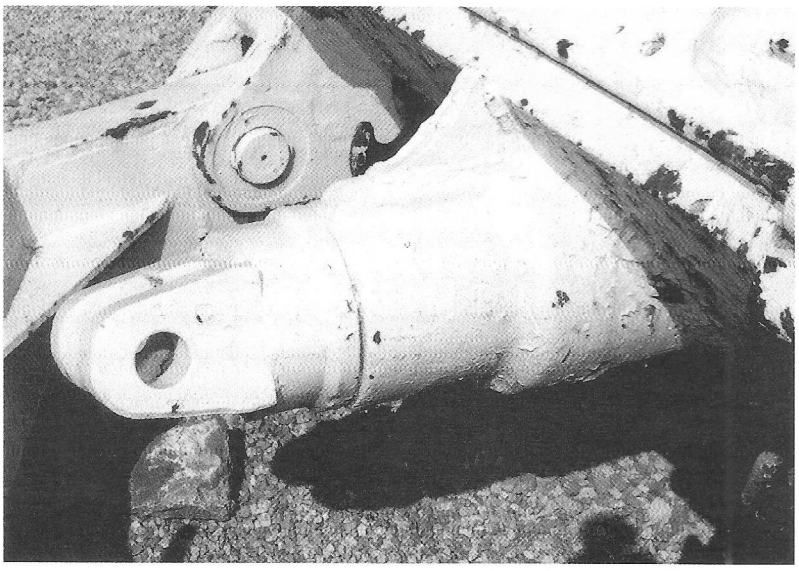
The tow bars, connecting the towing pintle of the ARV and the towing hooks of an armoured vehicle, in standard V-layout.

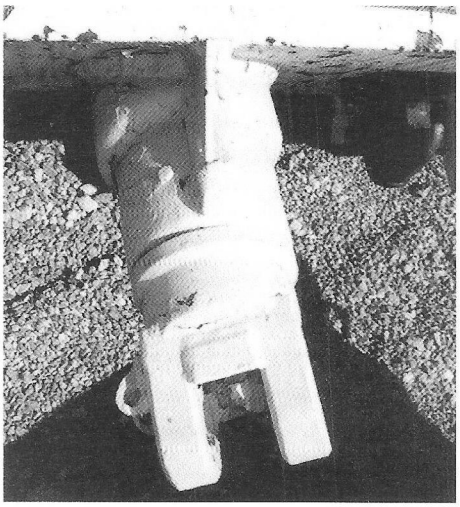




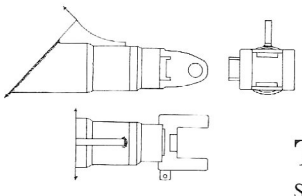


Spade
Scale 1/25 © Jochen Vollert 2000

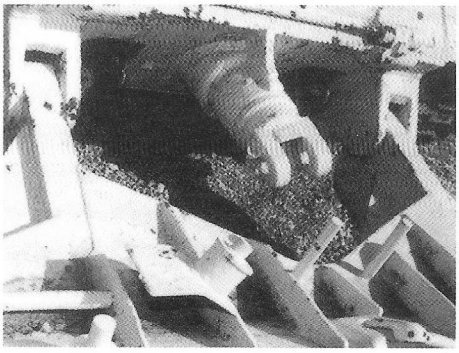




The towing pintle in close-up. It is mounted centrally to the lower rear hull.



Towing Pintle
Scale 1/25 © Jochen Vollert 2000



The History of the Tow Tractors and Armoured Recovery Vehicles on the IS Heavy Tank Chassis from the Second World War to the 1990s.

- Hitherto unpublished photographs
- Extracts from the Technical Manual
- 1/76 scale drawings of all major variants
- Highly detailed 1/25 scale drawings of the specific ARV components
- Complete written documentation based on Western and Russian sources