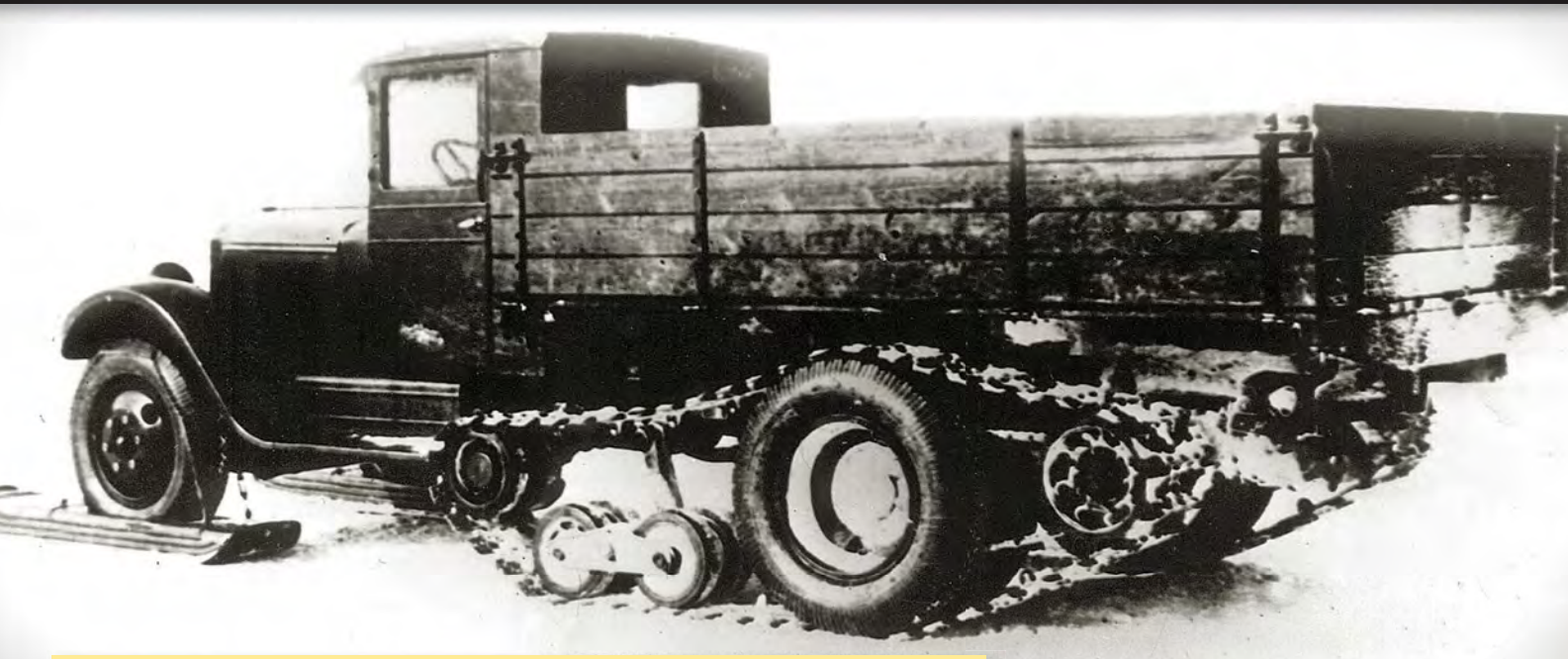
SOVIET HALF-TRACKS

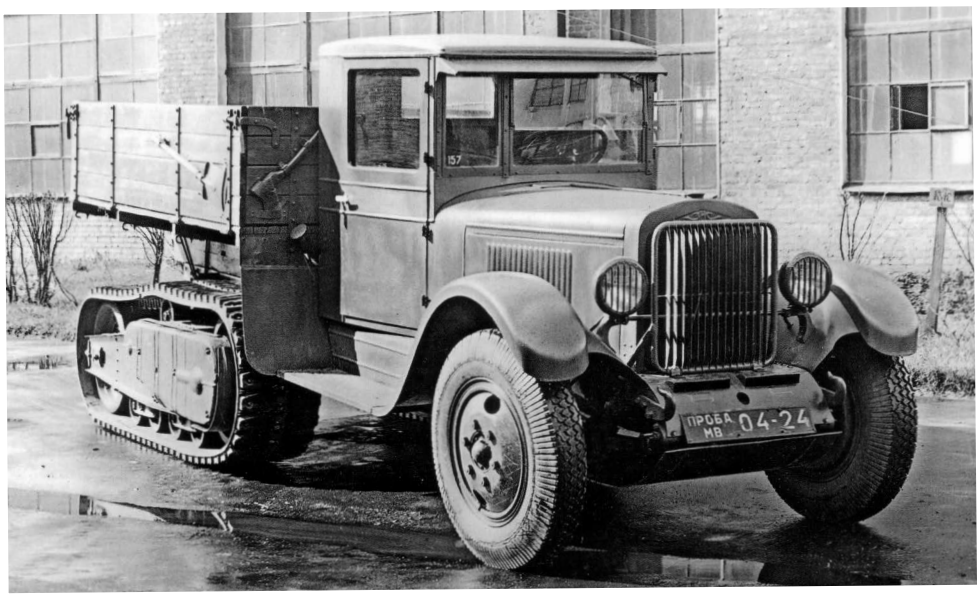
Jim Kinnear looks at the rarest of all Soviet military vehicle types



The ZiS-33 with its removable track system combined the all-terrain capability of a half-track with the better performance and fuel consumption of a wheeled vehicle.

Until 2011, the number of Red Army wartime half-tracks surviving in the world was relatively easy to calculate – it was none. By 2011 the number had risen to 1.5 – consisting of a fully restored ZiS-33 half-track and a ZiS-42 half-track in the midst of a similarly exacting restoration. The vehicles in their different stages of restoration were first exhibited in March of that year at the 17th Oldtimer Gallery exhibition in Moscow under the auspices of the entrepeneur Ilya Sorokin, whose commercial business in vehicle maintenance equipment is complemented by his hobby interest – the restoration and display of classic vehicles of all types.

The number of rare Red Army vehicles that have been located and dug out of the ground or removed from watery graves and lovingly restored to better than new condition in recent years in Russia is something of a revelation. In addition to the significant number of armoured vehicles recovered and restored of late, including T-34 medium and KV heavy tanks, a significant number of more fragile and long considered extinct soft-skin vehicles – or at least bits of them – have also been recovered, including several S-65 artillery tractors, GAZ and ZiS trucks; and more recently one of the rarest of all Soviet military vehicle types – two wartime half-tracks, rebuilt from the wrecks of two of them!



The pre-war ZiS-42 was a 'proper' half-track, based on the 3 tonne ZiS-5 4x2 truck.

SOVIET HALF TRACK DEVELOPMENT

Though the Soviet Union experimented with 4x4, 6x6 and even 8x8 all wheel drive all-terrain vehicles during the 1930s, none of the prototypes entered series production, and the Red Army relied heavily on tracked tractors such as the S-60 and S-65, and half-tracks such as the ZiS-42 and the GAZ-60 for heavy all-terrain artillery tractor and general service transport in the late 1930s and throughout WW2. The GAZ and ZiS plants both built half-tracks in limited quantities in the pre-war period, but they were not particularly manoeuvrable or reliable, while their fuel consumption was astronomical. Production of the wartime GAZ-60 and heavier ZiS-42 half-tracks was limited, and their application to economical post-war civilian use even more so, and consequently the likelihood of such vehicles surviving to the present day has always been remote. But despite the odds, the two half-tracks restored from salvaged parts and which made their public debut at the Moscow Oldtimer Gallery exhibition in 2011 shows that nothing is impossible with enough applied time and money.

The two rebuilt half-tracks, the ZiS-33 and a ZiS-42, represent different solutions to the problem of providing wheeled military vehicles with additional traction by means of half-track mechanisms. The ZiS-33 was an adaptation of the standard ZiS-5 4x2 cargo truck modified for all-terrain operation, while the ZiS-42 was a purpose built half-track.

The alternative Russian option to half-tracks was the fitment of removable 'overall' tracks, mounted over the tandem rear wheels of conventional 6x4 trucks and BA-6 and BA-10 armoured cars.

The wartime ZiS-42M was a modification of the original ZiS-42, introduced after re-establishment of production at ZiS after the earlier plant evacuation from Moscow in the dark days of late 1941.

ZIS-33

The ZiS-33 was an attempt at the end of the 1930s to develop a part time half-track variant of the ZiS-5, designed to allow a modified ZiS-5 truck to be converted to a half-track as required for operation on soft ground, but otherwise able to function as a standard wheeled load carrier, providing for the best combination of road speed, fuel economy and off-road all-terrain travel.

The track mechanism is driven by a separate drive sprocket as required, at other times the vehicle travelling as normal with the drive sprocket and track support mechanism disengaged and the track dismounted and transported in the rear cargo bed of the vehicle.

The ZiS-33 has an interesting political twist to its history, in that it was developed at the insistence of a Soviet apparatchik, a certain Nikita Khrushchev, who would later become famous as 1st Secretary of the Central Committee of the Communist Party of the USSR, and become better known for banging his shoe and declaring "nyet!" at UN meetings. In his earlier years looking after domestic agriculture however, he had apparently noticed how trucks were always getting stuck in the mud, and his driver had suggested the use of additional track assemblies; though Khrushchev himself is needless to say usually attributed with the idea.

Two ZiS-5s were converted to ZiS-33 half-tracks at the Kharkov Machine Building Plant and the two part-time half-track prototypes rushed through not entirely successful military testing, though with the idea supported by Khrushchev the testing was nevertheless considered successful! In 1939, Boris Fitterman at the ZiS plant in Moscow was appointed as lead designer, tasked with developing the idea to series production under the designation ZiS-33. Information on the ZiS-33 and its deployment remains sparse, and until Evgenniy Shamansky built such a vehicle from a ZiS-5 donor vehicle and using ZiS-33 track assemblies salvaged from a forest at the end of the first decade of the 21st century, none had survived to the present day.

The first pre-series ZiS-33 was completed on 18 January 1940, and testing immediately revealed some mathematical realities. At 1337kg, the weight of the track drive mechanism and track assemblies (which weighed 200kg each) was equal to half the load capacity of the standard ZiS-5, which correspondingly reduced load capacity by half and increased fuel consumption to 55-70 litres/100km on roads and 100-200 litres/100km cross-country, which was tank fuel consumption territory. Further, although the vehicle now weighed 4400kg, with a

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Below: A ZiS-42 crossing a pontoon ferry with artillery train in tow.

Above: A ZiS-42 on Red Square during a 7 November historical parade. (Andrey Aksenov) Left: Another ZiL developed post-war half-track prototype, with a remarkably Czech origin looking track assembly. Below: Post-war half-track concepts included this curious design based on a ZiS-151 6x6 chassis.

maximum gross vehicle weight of 6650kg, it retained the original 5555cc six-cylinder in-line engine developing 73hp used in the standard ZiS-5, such that maximum speed varied from 25-40km/h with high fuel consumption and consequently limited range.

The project was nevertheless pushed through, again not least due to its sponsorship, and by the beginning of 1940, 3500 sets of ZiS-33 track assemblies had apparently been built for the ZiS-5; though in service they would appear to have been used sparingly. Winter testing in 1940, conducted over 500km in tracked mode in snow, resulted in no outright mechanical failures, but with a large number of track teeth destroyed. Fuel consumption in snow with a 1500kg load reached as much as 4.5 litres/km! Further testing of the ZiS-33 the following spring was conducted against the three-axle ZiS-6 and the ZiS-22 'proper' half-track, where it was found that the 6x4 ZiS-6 truck fitted with 'overall' tracks was more effective in mud and light snow than either the ZiS-33 conversion or the full-time half-track ZiS-22. At Khrushchev's demand, track thickness on the ZiS-33 was reduced to 4.5mm to reduce weight, which in turn caused increased problems with track damage.

A number of ZiS-33s were dispatched to the Karelian Isthmus north of Leningrad and participated in the final stages of the 1939-40 Russo-Finnish Winter War. The ZiS-33 proved cumbersome in practice for the reasons detailed, and most ZiS-33s were ultimately modified back to standard ZiS-5 format by the removal of the ancillary mechanisms, though they were disengaged but left in place on some vehicles.

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ZIS-35

The ZiS-35 was a modern variant of the ZiS-33, with a second axle and drive mechanism mounted ahead of the main rear axle. It proved to be not particularly more effective, becoming stuck in 20cm of mud during trials, and now had so much weight at the rear of the vehicle that the cab and front axles lifted well clear of the ground as the vehicle cleared embankments.

Cast and stamped tracks were developed for the ZiS-35, and variants with these alternative assemblies were also tested for service, but the fact remained that converting the ZiS-33 or modified ZiS-35 from wheeled to tracked mode was time consuming, and resultant fuel consumption remained astounding, while the weight of the system severely detracted from overall load capacity, so the whole idea was quietly dropped.

ZIS-42

The first series produced ZiS half-track was the ZiS-22, which entered limited series production at ZiS in 1938, based on the NATI-V3 developed at the NATI design institute by a group of engineers under the direction of GA Sonkin. The ZiS-22 was effective at towing artillery and hauling ammunition in terrain impassable to wheeled vehicles, but was still fitted with a standard ZiS-5 petrol engine developing 73hp thereby limiting road speed to 35km/h, while the ZiS-22 also had high fuel consumption, tracks wore out quickly and it proved generally unreliable in service. The ZiS-22 was consequently removed from production after approximately 200 had been built to correct design faults revealed in service; the Red Army receiving its last batch of 19 vehicles on 10 April 1940, which were distributed to units in the Moscow, Amur and Odessa military districts.

At the same time as production of the original ZiS-22 was being wound down, engineers at the NATI design institute in Moscow in collaboration with engineers at ZiS in the spring of 1940 developed the NATI-V-32-52 (ZiS-22-52). Two prototype vehicles, fitted with a more powerful ZIS-16 engine developing 86hp, were built and tested at a military polygon, towing 76.2mm and 122mm guns and an ammunition load of 2000kg. The vehicles proved successful during field trials, achieving a speed of 14km/h while towing cross-country, 25km/h on roads and 40km/h on roads without load. The vehicles could traverse snow up to 0.6m when laden or up to 2m without load or towed load, while fording was an acceptable 0.6m and trench-crossing ability was 1m. Though successful during trials, the prototypes by all accounts remained capricious, and it was decided to incorporate the post-trial

The removable ZiS-33 track assembly.

The ZiS-33's winter progress was aided by the use of pontoons on the front steering axle.

The ZiS-33 as first displayed in public at the Moscow Oldtimer Gallery Exhibition in 2011.

improvements in the ZIS-22-52 prototype into a new design, re-designated ZiS-22M, with improvements to the track mechanism, reliability and fuel consumption again undertaken under the direction of the engineer GA Sonkin. A total of 250 modernised ZiS-22Ms with the original design faults rectified were ordered for the Red Army, with series production commencing in the late autumn of 1940, and the ZiS-22M being used by Red Army units in the Moscow, Amur and Dnepr regions. The original 1941 production target of 2000 ZiS-22Ms was severely disrupted by the outbreak of war, with most of the few ZiS-22/ZiS-22M half-tracks completed being destroyed during the opening months of Operation Barbarossa.

The modified ZiS-22M vehicle had been slated to enter series production as the ZIS-42, with the modified final pre-production variant having been in the final stages of testing when war broke out. Testing continued through to July 1941 but was curtailed due to the evacuation of ZiS plant and all other manufacturing capability from Moscow to Siberia. In the late summer of 1942, with Moscow successfully held, but the Red Army suffering shortages of all manner of equipment, artillery tractors included, half-track assembly was resumed at the original Moscow ZiS plant in September of 1942; the re-established ZiS plant now producing the ZiS-42, at a rate of seven vehicles a day. The first production batch of ZiS-42s was sent to the Stalingrad region.

In 1944, with the Eastern Front moving steadily west and pressure on Soviet manufacturing reducing, the modified ZiS-42M half-track entered series production, with an up-rated ZiS-16 engine developing 85hp as originally developed for the earlier ZiS-22M, and other minor changes including a new protective grille for the radiator and driving lights.

The ZiS-42 and later ZiS-42M were used as artillery tractors for medium artillery, proving very capable in soft ground but slow on roads, but with excessive fuel consumption remaining a perennial problem. The ZiS-42 used an all-wood cab as with the then concurrent ZiS-5V, the planking width differing between the ZiS-42 and the later ZiS-42M.

A total of 6372 ZiS-42 half-tracks of all models were ultimately built in the years to 1946. Variants included the semi-armoured ZiS-41 and ZiS-43 half-track vehicles developed in 1941-42 at Artillery Plant N°92, armed respectively with 57mm and 37mm armament, and the AT-14 and AT-8 half-track prototypes, developed in 1942-43, neither of which entered series production. The V-3 half-track APC was also developed in 1944, of which only five or six examples were produced.

Post-war the Soviet Union continued to investigate the use of half-track vehicles,

Below: The same ZiS-42 on Red Square, with a Studebaker US6 mounted BM-13 Katyusha rocket launcher in the background. (Andrey Aksenov)

This photograph could have been taken in 2012, or in 1945 (Andrey Aksenov)

The ZiS-42 towing a 37mm M-1939 anti-aircraft gun through Red Square. (Andrey Aksenov)

Above: The Soviet Union also developed several half-track armoured cars in the 1930s, such as this BA-30, mounted on the GAZ-60 chassis.

with several prototypes being built and evaluated for military service, some using captured German and Czech origin running gear; but none were accepted for service with the Red Army as the immediate post-war era saw the introduction of 4x4, 6x6 and latterly 8x8 wheeled all terrain vehicles, and the need for complex and ponderous half-tracks with high fuel consumption was eclipsed by these more nimble all-wheel-drive wheeled military vehicles.

THE RESTORATIONS

The ZiS-33 was abandoned as a vehicle type, and if any vehicles fitted with the original track mechanism survived the attrition of war this is to date undocumented in currently available sources. A single ZiS-33 was restored to full running order in 2011-12 by the Russian military vehicle restorer Evgenniy Shamansky, based on the ZiS-5 chassis and running gear and track components recovered from deep within a Russian forest.

The operational fate of the ZiS-42M was somewhat better. The ZiS-42 (latterly the ZiS-42M) was built in reasonable numbers during WW2, where it served the Red Army primarily as an artillery tractor. Post-war, a small number were used in the logging camps of the Russian Far North and Siberia. A set of track assemblies found in the Pskov region of north-west Russia served as the basis for the extensive rebuild featured in the accompanying contemporary photographs, also based on a standard ZiS-5 truck.

Left: The same ZiS-42 at speed during a very early morning rehearsal. (Andrey Aksenov)