

Combat rock: Singapore gears up for introduction of new 8x8 Terrex ICV

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Key Points

Singapore's Armed Forces to field Terrex ICV later this year

SAF has ordered 135 ICVs so far but more are expected

Singapore Technologies Kinetics (STK) has begun ramping up production of the Singapore Armed Forces' (SAF) new 8x8 Terrex infantry carrier vehicle (ICV) in preparation for it being declared fully operational in mid-2010.

Terrex's roots stretch back to 1999, when STK launched a prescient private project in anticipation of a future Singaporean requirement. At that time, the SAF infantry had no armoured personnel carriers and relied instead on trucks, which will remain the case until Terrex takes over.

The first prototype vehicle - referred to as the AV81 (Armoured Vehicle, eight-wheeled: the first wheeled vehicle developed by STK) - was designed and built in 18 months, in association with Ireland-based Timoney. It was first displayed in late 2001 and subsequently completed a series of successful automotive trials at the Leyland test centre in the UK.

AV81 was followed in mid-2003 by a second vehicle, known as the Terrex Yavuz (Y1), which was mainly designed by STK and built in Turkey by Otokar. It broke cover in September 2003 and subsequently completed over 16,000 km of road and cross-country mobility trials.

These trials flagged up a number of areas for improvements and a modified follow-on Y2 was designed and built in Singapore. This too completed extensive road and cross country trials, as well as mine-blast and amphibious serials. Altogether, the vehicle ran just over 10,000 km of reliability trials in Singapore and a further 3,800 km in Turkey.

This attracted funding from the SAF to further develop Terrex to meet what would become the specific requirements of the SAF and led in turn to the first production-standard vehicle being shown off for the first time in September last year. This vehicle looked different, with a redesigned front end and new hull, which is now easier to manufacture and fit with applique armour.

The SAF has so far ordered a total of 135 Terrex ICVs: enough to equip three infantry and guards battalions with 45 vehicles each. Additional vehicles are expected to be ordered to mechanise more infantry units in the future. Production is currently ramping up to about eight vehicles a month, but STK tells Jane's it has a built-in surge capability if required, and all of the SAF's vehicles will be delivered by mid-2011.

The baseline hull of the Terrex is made of all-welded steel, but protection can be boosted with applique armour, especially over the frontal arc. The armour package is of a modular design so that it can be upgraded as new armour technology matures or the threat changes. Its layout follows armoured vehicle convention, with the driver at the front left, commander to the immediate rear and the power pack to the driver's right. The latter consists of a 450 hpCaterpillar C9 diesel, driving the wheels through an Allison 4500SP automatic transmission to power the 26-tonne vehicle up to a top speed of 105 km/h and offering acceleration from 0 to 50 km/h in 13.5 seconds.

The troop compartment occupies the whole of the rear of the vehicle, with access for the 11 dismounts via a large powered rear ramp. The dismounts are seated down either side of the Terrex on individual inward-facing seats suspended from the sides and roof. Terrex has a total internal volume of 14.5 m³ and a total payload of 7,200 kg.

Each Singaporean vehicle is fitted with one of two configurations of the latest Australian EOS R-600 Remote Controlled Weapon Station (RCWS). Configuration 1 has a 7.62 mm machine gun (MG) and an STK 40 mm automatic grenade launcher (AGL), while Configuration 2 just has a .50 calibre MG, though various combinations are available.

Irrespective of variants fitted, the fitted right-hand side of the RCWS features a sensor pod that includes day/thermal sights and an eye-safe laser rangefinder. The weapons are fully stabilised to give a high first-round hit probability even crossing rough terrain.

The 40 mm AGL can fire STK-developed Air Bursting Munitions (ABMs) - with 60 rounds of ready-use ammunition being carried - which makes Terrex the first vehicle of its class to have this capability.

A supplementary manned 7.62 mm MG can be mounted on either side of the roof at the rear to provide suppressive cover for debussing troops and general all-round protection.

Design priorities

Situational awareness was a high priority for the Terrex designers and the All Round Surveillance System (ARSS) integrated camera package affords the driver, commander and troops with day/night observation through a full 360 degrees on flat panel displays. An acoustic small-arms detector is also mounted on the vehicle's roof to rapidly detect incoming small-arms fire. In addition, the driver has three standard day periscopes and three displays, which receive images from thermal cameras installed in protected positions at the front of the

vehicle, to aid driving in the closed hatch configuration.

Steering is power-assisted on the front four wheels and the fully independent suspension provides a high level of cross-country mobility. An automated central tyre inflation system and run-flat tyres ensure that it can keep rolling, and traction control is fitted as standard, as is a skid steer capability to reduce the turning circle.

The vehicle is fully amphibious, with a remotely-extendable front trim vane, three bilge pumps and two rear propellers low down at the rear, which can push it through the water at up to 10 km/h.

Standard equipment for SAF vehicles includes a fire detection and suppression system (with automatic and manual modes of operation) and air conditioning. Stowage baskets are provided externally for some troop equipment.

Terrex is a key element of the SAF's transformation toward a network-enabled capability and it also features a vehicle navigation system (VNS), battle management system (BMS), Blue-Force Tracking (BFT) and Red Force Marking (RFM) systems, as well as extensive communications equipment to network with other air and land-based SAF platforms.

The Terrex BMS is the heart of the Terrex Command, Control and Information System (CCIS) and comprises two computers and the vehicle commander (VC) and troop commander (TC) stations. This embodies the key link with higher echelons and the dismounting infantry who are equipped with the Advanced Combat Man System (ACMS).

The Terrex VNS consists of a GPS and a dead-reckoning module backup, for when GPS signals are lost. It can self-correct when the GPS signal is restored, and enables BFT and accurate navigation and sharing of positional information via the Terrex BMS.

Specialised versions

Beyond the ICV variant, STK is also developing a number of specialist vehicles, including an anti-tank missile carrier, command, medical, pioneer, RSTA (reconnaissance, surveillance and target acquisition) and Storm versions. Other potential variants include one fitted with the STK 120 mm Super Rapid Mortar System, which is already in service with the SAF and UAE.

The vehicles would have a large degree of commonality, though some may have a higher roof line for greater internal volume and payload for their specialised missions.

The current production Terrex has been optimised for the SAF's technology-heavy requirements, but export versions could well be to a more basic design which would lower unit costs but retain the potential for future upgrades.

If the customer did not require the amphibious capability of the Terrex then gross vehicle weight could be increased to 28 tonnes which could take the form of heavier weapons or a higher level of protection. For example, the standard vehicle could be fitted with a variety of turrets mounting weapons up to 30 mm in calibre.



Terrex ICV of the Singapore Armed Forces fitted with an EOS R-600 RCWS armed with 40 mm AGL and 7.62 mm co-axial MG. The latter has an ABM capability. (SAF) 1347972



Close up of the EOS R-600 RCWS from the rear armed with 40 mm AGL and 7.62 mm co-axial MG. (SAF) 1347973



This shot clearly shows the Terrex's wire-cutters, side cameras and equipment storage. (SAF) 1347974



Terrex ICV carries eleven dismounts. Note the acoustic small arms detector mounted on the roof at the left rear and the manned 7.62 mm MG pintle mount on the right. The propeller shrouds can be seen either side of the rear door. (SAF) 1347975



Terrex ICV has a Battle Management System which also includes a BFT and RFM. (SAF) 1347976

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