

Modernizing India's Tank Fleet

by Lieutenant Colonel Mark A. Olinger

India's Army appears to have embarked on a major modernization effort. The Indian Army has one million soldiers organized into five regional commands (North, West, Central, South and East). It has separate divisional structures to manage threats for China and Pakistan, the former with nine mountain divisions and the latter with three armored and four mechanized divisions. Nineteen infantry divisions, 15 independent brigades, and other support units round out the current army force structure. In response to the Kargil crisis in the summer of 1999, new equipment is being purchased. While artillery fire control and mountain gear are at the top of the priority list, the major end-item is T-90 tanks.¹

Indian Main Battle Tank Fleet

It is estimated that the Indian Army main battle tank (MBT) fleet consists of 3,400 tanks, including those held in reserve. These include 1,170 Vijayanta (a British Vickers export model built for India), 1,530 T-72M1, and 700 T-54/T-55 MBTs. These are organized into 60 armored regiments, each of which has an authorized strength of 45 MBTs. Of the 60 regiments, it is estimated that 34 are equipped with the T-72M1 with the remainder being equipped with the Vijayanta. The T-54/T-55 MBTs are held in reserve.²

The Vijayanta: In late 1950, Vickers Defence Systems designed a new MBT specifically for export that used the standard 105mm L7 rifled tank gun, the same gun that was used on the U.S. M60 and early M1 tanks, with automotive components from the British Chieftain MBT. Following the evaluation of competing British and German designs to meet an Indian Army requirement for a new MBT, manufactured in India, an agreement was signed in August 1961 between Vickers Defence Systems and the Indian government. This agreement covered building prototypes in the United Kingdom, supplying 90 production tanks, and building a new tank facility at Avadi to undertake production of the Vickers

Mk 1 MBT. The Indian Army calls the tank the Vijayanta.³

The first two prototypes were completed in 1963. One was sent to India and the other remained in the United Kingdom for research and development work. In 1965, the first production models were delivered from Vickers. Indian production models rolled off the production line in January 1965. The initial Indian Vijayanta was built mainly from parts supplied by the United Kingdom. Progressively, India undertook production of the tank, and eventually, the majority of the tank was produced in India.⁴

By the mid-1980s, production in India was finished, by which time an estimated 2,200 had been built. The Vijayanta has a crew of four, 105mm rifled main gun, 7.62mm coaxial machine gun, 7.62mm machine gun for anti-aircraft defense, 12.7mm machine gun for ranging, and two sets of smoke-grenade launchers. The 105mm main gun is not fitted with a thermal sleeve. A Leyland L60 engine powers the tank and it has a welded turret.⁵

The T-72M1: India originally intended to order only a limited number of export T-72M1 MBTs from Russia until production could begin on the locally designed Arjun MBT. It was

decided to undertake local production of the T-72M1s at Heavy Vehicles Factory (HVF) at Avadi in Southern India. The first vehicles were completed in 1987 with delivery to the Indian Army the following year. In the Indian Army, the T-72M1 is known as the Ajeya.⁶

The first 175 tanks were produced with kits supplied by Russia. This was followed by progressive local manufacture in order to produce as much as 97 percent of the MBT's components in India. Production of the T-72M1 in India was running at an estimated 70 vehicles per year with the final tanks being delivered in March 1994.⁷

Ajeya T-72M1s have a 125mm smooth bore main gun with 45 rounds and six Svir anti-tank guided missiles, 7.62mm coaxial machine gun, and smoke grenade dischargers either side of the turret. Layout is conventional, with driver front, turret center, and engine and transmission rear. Commander sits left, gunner right. There is no loader as the 125mm main gun has an automatic carousel loader with charge above and projectiles below.⁸

Reserve T-54/55s: A limited number of the T-54/T-55s have been modernized at the Narsik ordnance facility with the installation of a 105mm rifled gun, driver's passive night vision peri-

TABLE 1: FIRE CONTROL COMPARISON

	<u>T-72BM</u>	<u>T-80U</u>	<u>T-90</u>
Fire Control	1A40	1A45	1A45T
Gun Stabilization	2E42-2	2E42	2E42-4
Gunner's Rangefinder Sight	1K13-49	1A42	1A43
Ballistic Computer	1V528	1V528	1V528-1
Wind Sensor	Crosswind	DVE-BS	DVE-BS
Guided Missile	Svir	Reflects	Reflects

Source: *Jane's Armour and Artillery 1998-99*, Nineteenth Edition

scope and the Bharat Electronics Limited Tank-Fire Control System similar to that fitted to the Vijayanta MBT.⁹

The Arjun MBT: In 1972, the Indian Army issued a requirement for a new MBT to replace the Vijayanta. Work began on the Arjun tank at the Combat Vehicle Research and Development Establishment (CVRDE) in 1974. By the time the first prototype of the Arjun was unveiled in April 1984, 300 million rupees had already been spent on the project.¹⁰

Between 1983 and 1989, India is reported to have imported 42 engines and transmissions for the prototypes at a total cost of U.S. \$15 million. By late 1987, ten prototypes of the Arjun MBT had been completed and six had been delivered to the Indian Army for extensive trials. The remaining four have been retained for further development work and trials at CVRDE.¹¹

In March 1993, it was reported that the Arjun MBT had successfully completed its firing tests. During a demonstration in the Rajasthan Desert in western India, two prototype Arjuns hit static and mobile targets at ranges between 800 and 1,200 meters, broke through concrete walls, climbed 60 percent slopes and maneuvered through depressions. The prototypes were built by HVF.¹²

The Arjun has a third-generation fire control system with a 120mm rifled main gun that will fire APFSDS, HE, HEAT, HESH (High Explosive Squash Head), and smoke rounds. All the 120mm rounds use a semi-combustible cartridge case. A 7.62mm machine gun is mounted coaxial with the main gun and a 12.7mm machine gun is installed for anti-aircraft defense. The gunner's main sight consists of day sight, thermal sight, laser rangefinder, and stabilized head common to all three channels. Turret traverse and weapon elevation are all-electric with prototype systems provided by FWM of Germany.¹³

It was intended that the production Arjun MBTs were to have had a locally designed 1,500-horsepower engine coupled through a locally designed semi-automatic transmission with four forward and two reverse gears working through a hydrodynamic torque converter, retarder, and integral system. The Arjun has a NBC system designed and built by Bhabha Atomic Research Center. To further enhance battlefield survivability, it has an automatic fire detection and suppression system. Am-

The Indian Army has used British tanks, Russian tanks, and some of their own...



The Vijayanta, a British Vickers export MBT of the 1960s, built in India.



India's own Arjun MBT project has been in development for many years.



The Indian Army may upgrade to Russian T-90s, above, after acquiring many T-72s, which are similar. This purchase might force cancellation of the Arjun project.

munition is stowed in watertight containers to reduce fire hazards.¹⁴

Two years ago, the Indian government approved the series production of 124 Arjuns, but little has been done at the HVF to produce them. The domestically produced Arjun MBT was intended to replace the Vijayanta MBT, but consideration has also been given to the purchase of either Russian T-80 or T-90 MBTs. India recently signed a contract to buy 310 Russian T-90S MBTs for an estimated U.S. \$600-\$800 million. The Indian Army will be the first export customer for the T-90, which has been in Russian Army service since the 1990s.¹⁴

The T-90 MBT: Developed by the Kartsev/Venediktove Bureau at the tank plant in Nizhnyi-Tagil southeast of Moscow, designated Obiekt 188, the T-90 was revealed in 1993 and believed to have entered low rate production in 1994 for the Russian Army. Based on the T-72BM MBT that was also designed and built at Nizhnyi-Tagil and incorporates some of the advanced features of the late production T-80 tank. Advanced features include the fire control; defensive aids systems and Kontakt-5 Explosive Reactive Armor (ERA) systems.¹⁶

The T-90 MBT was exhibited for the first time outside Russia in March 1997 in Abu Dhabi. By early 1998, production of the T-90 had reached more than 120 units and at least two Russian tank regiments had been equipped with them. As previously stated, the T-90 tank is a further development of the T-72BM but has the latest armor package and a new fire control system. A comparison of the fire control system installed in the T-72BM, T-80U, and T-90 MBTs is given in Table 1.¹⁷

Layout of the T-90 MBT is almost identical to that of the T-72 MBT, with the driver's compartment in the front, turret in the center, and engine compartment in the rear. The hull and turret of the T-90 is fitted with the latest Kontakt-5 ERA over the forward arc, providing protection against APFDS and HEAT type projectiles.¹⁸

The driver is seated at the front of the hull in the center and has a single day periscope that gives observation through the frontal arc and a single piece hatch cover that lifts and opens to the right. For driving at night, the day periscope can be replaced by a TVN-5 night vision device. The other two members of the crew are seated in the turret with the commander on the right and the

gunner on the left. The tank commander's contracting cupola has a single piece hatch cover that opens forwards with two rear-facing TPNA day vision blocks. In the forward part of the cupola is the TKN-4S Agat-S stabilized day/image intensification sight with a TNP-160 day periscope on either side.¹⁹

The gunner's hatch opens forward and has a circular mounting for the snorkel tube that allows deep fording. In front of the gunner's hatch is the TNPA-65 vision block while a TNPA-65 day vision block is fitted in the hatch itself. The gunner of the T-90 is provided with a day and thermal sighting system with the tank commander being provided a screen to monitor the thermal view seen by the gunner.²⁰

The T-90 has a computerized fire control system that allows the tank commander and gunner to lay and fire the main armament while the vehicle is stationary or moving under day or night conditions. The gunner's sighting system includes the 1A43 day sight with stabilized field of view in two planes and laser rangefinder, IG46 rangefinder with missile guidance channel, 1V528-1 digital ballistic computer, DVE-BS wind gauge, gunner's T01-K01 infrared vision equipment and TPN4-49-23 sight Buran-PA. The last can be replaced by the Agava-2 roof mounted stabilized thermal sight.²¹

Main armament is the 125mm 2A46M1 smoothbore gun fitted with a fume extractor and a thermal sleeve. This gun is stabilized in both planes by the 2E42-4 system and fed by an automatic loader. The 125mm gun fires ammunition of the separate loading type and it can also fire a special high explosive fragmentation projectile that can be detonated over the target using the tank's fire control system. It is estimated the T-90 has a maximum rate of fire of seven rounds per minute.²²

The 125mm main gun can also fire the 9K119 Refleks laser-guided projectile out to a range of 5,000 meters. This has the U.S./NATO designation of AT-11 Sniper. Weighing 17.2 kilograms, the AT-11 Sniper has four wraparound fins at the rear for stability when the missile leaves the launch tube and two towards the front for steering. The T-90 normally carries six AT-11 Sniper missiles. Only the gunner can launch the Refleks guided missile.²³

A 7.62mm PKT machine gun is mounted coaxially to the right of the main gun and a 12.7mm NVST machine gun is mounted on the commander's cupola.

Mounted either side of the turret is a bank of six electronically operated 81-mm smoke grenade launchers. The T-90 MBT can also lay its own smoke screen by ejecting diesel fuel into the exhaust outlet located on the left side of the hull.²⁴

To improve its battlefield survivability, the T-90 is fitted with the TshU1-7 Shtora-1 (which means "shutter" or "blind") countermeasures system, which is also fitted to some models of the T-80UD and the Ukrainian T-84 MBTs. The TshU1-7 Shtora consists of an infrared source, power supply, and control panel. The T-90 MBT has two infrared sources; one mounted either side of the 125mm main gun.²⁵

The V-84MS diesel engine is fitted with a pre-heater for use in cold weather. It is coupled to a mechanical transmission that consists of a primary reduction gear, two final gearboxes, and two final drives. The engine is also fitted with an effective two-stage cleaning system and a temperature-warning device. Although a diesel engine, it will also run on gasoline, kerosene, and benzene, blended or unblended. For trial purposes, T-90 MBTs have been fitted with other, more powerful engines, including the V-92 diesel which produces 950 horsepower and the V-96 producing 1,100 horsepower. A turbine has also been fitted to the T-90 similar to that fitted in the T-80U MBT.²⁶

Standard equipment includes NBC protection, fire detection and suppression system, nose-mounted dozer blade and a deep fording kit. To increase operational range, two fuel drums can be carried at the rear of the hull. The T-90E and T-90S are understood to be the export models of the T-90. The T-90 MBT remains in production and is currently in service with the Russian Army.²⁷

Procurement Controversy

The Russian's T-90 offer was made to Defense Minister Mulayam Singh Yadav during his September 1997 visit and, early in 1998, the Indian Government began negotiations with the Russians to add this MBT to its inventory. Dissenting Indian Army officers quickly claimed they did not need, nor could they afford this tank. An Indian Army technical evaluation team went to Russia in February 1998 to test the T-90 at one of Russia's proving grounds and came back praising the Russian tank. The Indian Army finally announced a decision to buy two regiments worth in

TABLE 2: MAIN BATTLE TANK COMPARISON

	T-72M1	T-80U	T-90
Crew	3	3	3
Combat Weight	44,500 kg.	46,000 kg.	46,500 kg.
Ground Pressure	0.90 kg/cm ²	0.92 kg/cm ²	0.91 kg/cm ²
Engine	840 hp diesel	1250 hp turbine	840 hp diesel
Fuel Capacity	1000 liters	1090 liters	1200 liters
Maximum Speed	60 km/hr	70 km/hr	60 km/hr
Range (without long range fuel tanks) (with long range fuel tanks)	480 km 550 km	335 km 440 km	450 km 550 km
Electrical System	24V	27V	24V
Gradient	60%	63%	60%
Side-Slope	40%	46%	40%
Vertical Obstacle	0.85 meters	1 meter	0.85 meters
Trench Crossing	2.28 meters wide	2.85 meters wide	2.8 meters wide
Armament (main) (coaxial) (anti-aircraft)	1 x 125mm gun 1 x 7.62mm MG 1 x 12.7mm AAMG	1 x 125mm gun 1 x 7.62mm PKT MG 1 x 12.7mm NSVT MG	1 x 125mm gun 1 x 7.62mm PKT MG 1 x 12.7mm NSVT MG
Gun Elevation/Depression	+14° to -6°	+14° to -5°	+14° to -6°
Smoke Grenade Launcher	8	8	8

SOURCES: *Jane's Armour and Artillery 1998-99*, Nineteenth Edition and 1LT Adam Geibel, "Updating India's T-72 MBT Fleet," *ARMOR*, May-June 1998.

early November 1998, to augment its armored forces on the western border with Pakistan.²⁸

The biggest surprise concerning the Russian T-90 came in late December 1998 when the Indian media announced that the deal would total 200 T-90S MBTs. In January 1999, the Cabinet Committee on Political Affairs approved the purchase of 310 tanks. This was enough to equip five regiments, with tanks left over for war reserves and spares.²⁹

Controversy has surrounded the T-90S purchase after former Prime Minister H.D. Deve Gowda questioned the motives behind senior army officers keen on acquiring the Russian tanks. Former Prime Minister Gowda claims that an upgraded version of the locally built T-72M1 (referred to as the T-72S) would be cheaper and as effective as T-90S. He also wanted the T-72S reevaluated; because he claims the T-90S is expensive and it had not been tested under Indian weather conditions.³⁰

In addition to trials at the Indian Armored Corps Center and School at Ahmadnagar, with hot weather tests in the Rajasthan desert, a limited number of the tanks were deployed during Exercise Shiv Shakti in November-December 1998. Shiv Shakti involved an estimated 66,000 soldiers, 700 combat vehicles, 300 tanks, and 200 artillery pieces.³¹

Other sources have indicated that it would be less expensive to produce a further development of the T-72 in India, for example the T-72S or T-80. Indian Army officers consider the T-90S to be superior to the Ukrainian built T-80UD MBT that entered service with the Pakistani Army in 1997. A comparison of the T-72M1, T-80U, and T-90 is given in Table 2.³²

Indian Army senior armor officers admit that the T-90S purchase will cause the cancellation of the domestic Arjun MBT project that began in the 1970s. The T-90S purchase will also render the Indian Army potentially vulnerable to an unreliable supplier of

repair parts and backup support. The 1,000 horsepower engine will not power initial Indian Army T-90S.³³

Under the agreement signed in New Delhi by Indian Ministry of Defense officials and representatives from Rosoboronexport, Russia's main export agency, the Nizhnyi-Tagil plant will deliver 124 completed MBTs with the remainder to be assembled by HVF at Avadi. HVF currently builds the T-72 MBT and is expected to eventually produce the T-90S under license.³⁴

The purchase was delayed for several months following Moscow's reluctance to provide financial guarantees to India in exchange for New Delhi making an advance payment of an estimated 55 percent. In February 2001, the contract was signed following talks between visiting Russian Deputy Prime Minister Ilya Klebanov and Indian Defense Minister George Fernandez. Deputy Prime Minister Klebanov indicated that Russia was interested in acquiring information technology and software development from India. During this visit, the



Strong concerns about the survivability of the Russian T-72 after Desert Storm seem to have eased with time.

two nations finalized the agenda for the newly instituted Indo-Russian commission on technical cooperation.³⁵

Cost is the key factor in Russian export success of both the T-80 and the T-90. Both tanks enjoy a significant cost advantage over the American M1A2, French Leclerc, and the German Leopard 2. In years past, buyers were concerned with the survivability of Russian tanks after seeing the poor performance of the T-72 in Desert Storm, but the passage of time has eased these concerns.³⁶

Current and Future Threats

Pakistan, China, extra-regional, internal separatist insurgencies, and acts of terrorism are the threats that India faces. In Pakistan, five infantry divisions have been added to the Pakistani Army, but manpower was increased by only 40,000. A majority of the 2,320 Pakistani tanks are obsolescent, with the exception of 310 modern T-80UDs. Mechanized forces have M113 armored personnel carriers. Pakistan's heavy forces appear incapable of sustaining offensive action. The real threat posed by Pakistan has shifted from mid-intensity conventional warfare to the two extremes on the conflict spectrum — nuclear and low-intensity conflicts.³⁷

The nuclear threat has become an established part of regional security affairs and Pakistani experts credit their nuclear deterrent with having prevented several Indian invasions. Pakistan also supports Kashmiri insurgents and Islamic volunteers, largely from Afghanistan, who want to fight India. This support included infiltration of Pakistani Northern light infantry as well as artillery support into Kargil in 1999. Analysts on both sides of the border anticipate further clashes in the border region. In early May 2001, India launched Exercise Complete Victory near its

border with Pakistan. This five-day exercise involved 50,000 soldiers and an estimated 100 combat aircraft.³⁸

China's conventional threat has declined notably since the crisis of 1986-1987. The Lanzhou military district, which includes most of its common border with India, has 220,000 soldiers organized into four infantry and one armored division. Its forces in the Chengu military district number 180,000 soldiers organized into four infantry and one artillery divisions. In 1990, there were 19 regular Peoples Liberation Army infantry divisions and one tank division between these two military districts.³⁹

China has also been undergoing modernization, so far concentrated in the southeast to threaten Taiwan. Beijing has participated in incidents that have troubled New Delhi, including development of intelligence assets in Myanmar, port facilities in Pakistan and intervening across the de facto boundary with India in 1999. Barring an outbreak of unrest in Tibet, it is unlikely that China will increase its forces in the region.⁴⁰

The extra-regional threat is notional at best. India has misgivings about use of international interventions to resolve human rights abuses and their implications for national sovereignty. This issue is particularly persuasive given the situation in Kashmir. The Indian armed forces are capable of deterring any adversary or coalitions from conducting sustained assaults on its territory and to defend against all but worst-case scenarios.⁴¹

Since 1990, the internal threat has diminished but remains the primary security concern for the near term. The resolution of the bloody revolt in the Punjab ends a major danger to stability. An insurgency in Kashmir continues and the northeast remains restless. Ethnic conflict rages in Sri Lanka and there will be concerns about the Tamils. Despite positive movement in the Punjab and the northeast, internal separatist movements remain a concern.⁴²

Conclusion

Modernizing India's MBTs does not suggest hostile intent toward neighbor-

ing states. Capabilities may be improved over time; but the pursuit of a domestically designed and produced MBT appears unlikely at best. There is no predictable threat that India's armor forces cannot manage with its existing or planned acquisitions and force structure. State of the art technological solutions are expensive. Indian Army tank acquisition policy demonstrates continuity with tradition rather than a vision to the future. India can be expected to maintain the initiative in obtaining new weapons and to retain a substantial conventional advantage.

Notes

¹Timothy D. Hoyt, "Modernizing the Indian Armed Forces," *Joint Forces Quarterly*, Summer 2000, pp. 17-18.

²Foss, Christopher F., editor, *Jane's Armour and Artillery 1998-99*, Nineteenth Edition, Jane's Information Group Limited, 1998, p. 44.

³Foss, Christopher F., *Jane's Tank and Combat Recognition Guide*, Harper Collins Publishers, 1996, p. 98, and *ibid.*, p. 46.

⁴Foss, *Jane's Armour and Artillery 1998-99*, p. 46.

⁵*Ibid.*, p. 46, and Foss, *Jane's Tank and Combat Recognition Guide*, p. 98.

⁶Foss, *Jane's Armour and Artillery 1998-99*, p. 46, and Geibel, Adam, 1LT, "Updating India's T-72 MBT Fleet," *ARMOR*, May-June 1998, p. 35.

⁷Foss, *Jane's Armour and Artillery 1998-99*, p. 46. It is understood that the 97 percent target was not achieved.

⁸Geibel, p. 35, and Foss, *Jane's Armour and Artillery 1998-99*, p. 46. Late in 1997, it was revealed that more than 30 125mm tank barrels had burst during gunnery and that efforts were being made to determine the cause of this problem.

⁹Foss, *Jane's Armour and Artillery 1998-99*, p. 44.

¹⁰*Ibid.*, p. 44.

¹¹*Ibid.*, p. 45.

¹²*Ibid.*, p. 45.

¹³*Ibid.*, p. 45. The Indian Explosive Research and Development Establishment at Pune in Maharashtra developed the main gun rounds.

¹⁴*Ibid.*, p. 45.

¹⁵Rahul Bedi, "India To Buy Russian T-90S MBTs," *Jane's Defence Weekly*, February 21, 2001.

¹⁶Foss, *Jane's Armour and Artillery 1998-99*, p. 85.

¹⁷*Ibid.*, p. 85.

¹⁸*Ibid.*, p. 85.

¹⁹*Ibid.*, pp. 85-86.

²⁰*Ibid.*, p. 86.

²¹Ibid., p. 86.

²²Ibid., p. 86.

²³Ibid., p. 86. The complete missile system is called the 9K119.

²⁴Ibid., p. 86.

²⁵Ibid., pp. 89-87.

²⁶Ibid., p. 87.

²⁷Ibid., p. 87.

²⁸For further details, see Defence Notes, "India's Latest Armour Addition – the T-90S," <http://www.defencejournal.com/apr99/t-90.htm>.

²⁹Ibid.

³⁰Rahul Bedi, "India To Buy Russian T-90S MBTs," *Jane's Defence Weekly*, February 21, 2001 and see Defence Notes, "India's Latest Armour Addition – the T-90S."

³¹For further details, see Defence Notes, "India's Latest Armour Addition – the T-90S."

³²Ibid., and Rahul Bedi.

³³Rahul Bedi.

³⁴Ibid.

³⁵Ibid.

³⁶COL James H. Nunn, and Paulson, John C., LTC, "Three Tanks Featured In Russian Arms Show," *ARMOR*, September-October 1999, p. 26.

³⁷Timothy D. Hoyt, "Modernizing the Indian Armed Forces," *Joint Forces Quarterly*, Summer 2000, pp. 20-21.

³⁸Ibid., p. 21, and "India's 'Complete Victory' Is Set for Pakistan Border," May 2, 2001.

³⁹Ibid., p. 21.

⁴⁰Ibid., pp. 21-22.

⁴¹Ibid., p. 22.

⁴²Ibid., p. 20.

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