INDIA

The Language of MISSILES

TO HAVE PUNCH PRITHVI MUST CARRY N—WARHEAD

by

Harwant Singh

The capping of Prithvi's trials has resulted in misgivings in many quarters, more so when the weapon system was expected to be introduced into service consequent to successful user trials, starting this month.

As part of the Integrated Guided Missile Development Programme (IGMDP), approved by the government in 1983-84, the work on Prithvi made satisfactory progress under the project director Maj-Gen V.J. Sundaram and the overall guidance of Dr. Abdul Kalam. The urgency in the development of Prithvi came into focus once Pakistan acquired Hatf-1 and Hatf-2 missiles and the suspected transfer of technology by China of the M-series of missiles to that country.

With the signing of the Missile Technology Control Regime (MTCR) in April, 1987, by seven leading industrialised countries, the sources of the supply of critical components for Prithvi started drying up. Consequently, greater reliance had to be placed on indigenous development of most of these sub-systems. This has obviously resulted in delay by about three to four years.

For developing technologies related to these missiles, the DRDL and its sister establishment, the RCI (Research Centre Imarat), sought and accepted help from 19 other government laboratories, seven universities and several other institutions and private sector corporations. This way special computer, guidance software aerospace quality aluminium, precision gyroscope, critical rocket components, special radar, etc. have been developed indigenously. By the time Prithvi goes into production, the imported components are expected to drop to about 5 per cent in terms of value.

Prithvi uses twin liquid fuel motors and carries a strap down inertial navigation system. Once the target coordinates are fed into the on board computer, it determines the predicted ballistic flight path. During the boost phase, the missile's movements are controlled by the on board computer through actuators which shift the thrust direction of the two independently gimbal mounted engines.

During the free ballistic phase (where the missile descends to the lower reaches of atmosphere) the missile is controlled aerodynamically by a slight movement of control surfaces (cruciform delta plan wings and stabilising fins).

According to the published material, the heart of the Prithvi's control and guidance system is the on board computer based on the simple Intel 8086 micro processor. The quality of the missile sensors (gyroes and accelerometers) is one of the critical determinants of the accuracy of the missile. But very sensitive sensors, however, are prohibitively expensive and difficult to procure. Therefore, Prithvi's guidance and control software takes into account the average error of sensors and cancels them out.

The value of a missile as a battlefield support system depends on its accuracy—that is, its circular error of probability (CEP), range, pay load, lethality of munitions it packs, alternate means available to deal with a wide range of targets and comparative cost effectiveness. Though Prithvi is not suitable for use against point targets, its claimed drift of 0.1 per cent of range makes it significantly more accurate than the improved Lance and Soviet series of missiles. Greater accuracy like that of Pershing-2 involves use of more expensive and difficult to engineer platforms, inertial navigation equipment and very costly terminal guidance system.

The accuracy of a battlefield support missile also greatly depends on the peripheral support systems. For example, there is the requirement of very accurate survey equipment for orientation of the missile and geodetic target details. Meteorological corrections for the boost as well as free ballistic phases have to be based on very precise meteorological data obtained through state of the art equipment. Prithvi's vertical launch demands very precise initial predictions.

While extremely accurate survey and meteorological equipment with the user is indispensable, the more critical area to Prithvi's effectiveness as a battlefield support system is the availability of real time information about the target(s). The current doctrine revolves around obtaining target information through remotely piloted vehicles (RPVs).The proposals for acquisition of these which were mooted years ago, are perhaps still finding their way through the bureaucratic maze at Delhi. These RPVs carry a wide range of extremely sophisticated electronic and optical equipment, including survey and meteorological data collection instruments, night vision devices and so on. As they "loiter" along predetermined flight path over the enemy territory, information about the targets and other details, including video coverage, is transmitted back to the controlling station, thus providing real time information.

The pay load of 1000 kg for ranges up to 150 km and 500 kg up to 250 km in terms of weight is satisfactory, but the lethality of the munitions so

carried by Prithvi needs to be carefully assessed in terms of cost effectiveness. The Prithvi's warhead packs cluster munition of prefragmented high explosive or shape charge type to deal with concentration of troops and armoured vehicles respectively. The warhead can also carry a single high explosive bomb for destruction of runways and hardened targets.

Concentration of troops and armoured vehicles, etc. within a restricted area is more likely to take place where enemy forces are "gathered together" to cross an obstacle or later contained by own forces in a bridgehead. Against these targets, medium artillery and multi-barrel rockets are not only more effective, but offer a far cheaper option.

For instance, 15 to 17 rounds of cargo ammunition of 155 mm Bofors gun pack the same lethality as Prithvi with 1000 kg pay load of cluster munition. The cost of 17 rounds of Bofors ammunition is only a fraction of the cost of Prithvi.

It is, therefore, the targets (troops and vehicle concentrations) which are farther back that need to be examined for engagement by Prithvi. Such concentrations are realy the reserves—tactical and strategic—in the Indo-Pak context. The current doctrine points to movements at night and dispersal during the day. So worthwhile targets for engagement at longer ranges by such a missile may not present themselves. To this if we add the inherent inflexibility in the weapon system (once fired) vis-a-vis an aircraft, the possibility of wasteful employment manifests itselfs. The damage to static installations (airfields, etc) through conventional munitions carried by Prithvi may not be extensive enough to prove cost effective, because dispersal and other-not-so costly protective measures in a war situation, would have been taken.

During World War II, Germany carried out missile (V-1 and V-2 rockets) attacks on London to terrorise the population. More recently, Iraq used Scud missiles against Iran and later in Desert Shield and Desert Storm. No worthwhile results were obtained in all these cases.

Prithvi is expected to cost anywhere between Rs. 3 to 5 crore a piece. This figure excludes the cost of peripheral equipment, including tractor, erector and launcher (TEL) and so on. Its cost effectiveness and even punch with conventional high explosive or shaped charge cluster bomblets or a single high explosive bomb against hard targets needs to be closely studied.

"Prithvi's potential as a decisive weapon of war is not when it carries conventional munitions load, but when tiped with a nuclear device. Therefore,

Prithvi packs a worthwhile punch only when it carries the "bomb" and therein lies its value as a weapon of deterrence".

The author was Director-General, Weapons and Equipment, of the Army.

—Courtesy daily INDIAN EXPRESS,
New Delhi (India)

INDIA FUELLING MISSILE RACE IN THE REGION?

by

a special correspondent

The successful test-fire of Prithvi missile by India on Saturday marks another quantum jump in its advancement in missile technology, to the great concern and apprehensions especially of its neighbours, according to political analysts here.

With the success, India has gone a long distance in its march in missile technology development which it launched in the 1960s. It started off with the acquisition of a large number of missile systems of various types worth over Rs. 500 crore from the former Soviet Union, France and the United Kingdom for its armed forces.

But it soon fanned out to the development of indigenous systems when its Defence Research and Development Organisation (DRDO) successfully designed and developed a portable anti-tank missile with a range of 1.6 Kms.

This was quickly followed up with a project envisaging indigenisation of medium range surface-to-air missile system, and gradually the DRDO built up the required expertise and laid out the necessary infrastructure in the areas of solid and liquid rocket propulsion, intertial and radio guidance and control, warheads, aerodynamics, structures, missile power supplies, instrumentations and precision technologies.

As of now, India has developed indigenously five major guided missile systems comprising surface-to-surface Prithvi and Agni, surface-to-air Trishul and Akash, and anti-tank guided missile Nag by funneling no less than 800 crore of rupees in the effort, the analysts point out.

Professor Abdul Kalam, chief of India's missile technology development establishment recently said; "The successful development and flight testing of five different missile systems within a short span of about 20 months indicates that India's missile development programme has come of age. The Indian defence scientists have successfully mastered the most important technologies like the heat shield and control and guidance systems of high precision."

Contrary to ludicrous Indian claims that the testing of its missile technology is intended only as a demonstration of its technological capabilities and that there are no plans for mass production of missiles, the Indian Prime Minister Narasimha Rao is on record saying: "SAARC is important to us. But we have got to break out of our regional straitjacket and assert ourselves. Our area of concern extends from Afghanistan to the Indian Ocean."

Similar ambitions were articulated by Indian Air Force Chief, Air Chief Marshal S. K. kaul recently. He said: "Developing them (missile) indigenously gives us a greater advantage. These would certainly upgrade our air defence capabilities and give us a wider range of options. And subsequently they could replace our current SAMs".

The Prithvi missile is said to be faster, more accurate with much greater destructive capability than the Soviet Scud-B, American Lance and the Chinese Tong Feng missile systems. It has the capability to deliver nuclear warheads. A test-launch from mobile launcher was conducted in May last as well, which successfully achieved its target goals. And now India is poised to embark upon mass-scale production of the Prithvi missiles.

India is now reportedly preparing to test also its another prestigious missile "Agni" at a far superior range than its existing one of 2500 Kms with a slight modification in the configuration of the vehicle. Confirming this to journalists in New Delhi, Project Director Dr. A. N. Agarwal said: "Now that the long range technology capability for re-entry and maneuverability to precision impact point had already been established it has been planned by the Indian scientists to increase its range. "Extensive data analyzing process was underway and the refinement of the developed technology would materialise once the analysis results had been examined" Dr. Agarwal said.

India first tested Agni on 22 May 1989 when it was targeted to land in the Bay of Bengal between Sri Lanka and Andaman Islands. The missile achieved the objective. It was again tested-launched on 29—May 1992, in an attempt to increase its range from 2,500 Km to 5,000 Km. Another test was carried out successfully on 19 February this year.

Even at 2500 Km. range, Agni can engage targets in the north upto Kazkhistan and major areas of China, in the east upto ASEAN, and in the west upto Iran, the Gulf and Saudi Arabia. Once it achieves 5000 Km capability, it will be able to hit targets as far as the whole of China and Kazkhistan in the north, upto Turkey, Egypt and the Horn of Africa in the west and south-west.

and Japan, ASEAN countries and some parts of Australia, depending upon the location from where it is fired, in the east and south-east.

It will also give India the capability to orbit spy satellites for surveillance of sensitive installations of the entire regional states. It is capable of carrying a pay load of one ton of nuclear warhead and is quite comparable in this respect to SS-22 which is multiple nuclear warhead IRBM, say the defence experts.

Says General Joshi, Indian Army Chief: "Agni has tremendous potential as it puts India in a totally different league. And as a technology demonstrator, the missile's success is of great significance to the country". Agni is expected to enter production phase by 1994-95.

The defence experts view this missile development by India on such a massive scale with great concern. "It will not only jeopardise the security of India's neighbours and distant countries alike but fuel a missile race in the region to the great detriment of the interests of its peoples who need not missiles but schools, hospitals, roads, factories and farms to emerge from the shackles of poverty, hunger and disease," said an analyst.

—Courtesty weekly HOLIDAY,
Dhaka (Bangladesh)

INDIAN MISSILES ENDANGER SOUTH ASIAN PEACE

Going by reports emanating from New Delhi, there is no change in the Indian plan for the deployment of Prithvi, the surface-to-surface missile, for the army. This process will begin, as scheduled, towards the end of the year.

India test-fire Prithvi on June 4 from a firing range in the Bay of Bengal. Its firing range is said to be 150 to 250 km. It was fired from a mobile launcher. Prithvi with a 150 km range has the capacity to carry 1000 kg warhead. Alternatively, its range can be increased to 250 km, but with a 450 kg warhead.

India entered the era of guided missiles in the early 1960s. Since then, she has purchased a large number of missile systems of various types for its armed forces mainly from the former Soviet Union, France and UK. The total cost of these systems is estimated at Rs. 500 crore. As far as indigenous development is concerned, a beginning was made in late 60s when Defence Research and Development Organisation (DRDO)successfully designed and developed portable anti-tank missile with a range of 1.6 km. this was followed by a project envisaging the indigenisation of medium range surface-to-air missile system. Both these projects were completed with the successful flight testing of the indigenous prototypes.

As a result of experience gained on the missile projects and other related R&R activities, DRDO has acquired the required expertise and established infrastructure in the areas of solid and liquid rocket propulsion, inertial and radio guidance and control, warheads, aerodynamics, structures, missiles power supplies, instrumentations and precision technologies.

In 1977, the Government of India constituted a Missile Policy Committee, with Scientific Adviser to the Defence Minister as its Chairman, and Deputy/Vice Chiefs of Staff of the three services as members. In pursuance of the recommendations of the Committee, a Perspective Plan for development of missiles was prepared and presented to the Committee on Defence Planning (CDP) in 1978. The plan was approved during 1979 as part of Defence Plan 1979—84. Subsequently, approved by the government in 1982 as part of Defence Plan 1980—85.

The plan envisaged undertaking development of the following missile systems by DRDO under an Integrated Guided Missile Development Programme (IGMDP):—

— Surface-to-Air
— Surface-to-Surface
— Tactical
— Third Generation Anti-Tank.

With the aim of breaking out of the regional confines and getting a foothold into the elite power club, India has developed a sophisticated and deadly missile programme. This arsenal includes five different missiles: Trishul, Nag, Aakash, Prithvi and Agni. The idea for a missile programme had been proposed as early as the mid-1960-s but was shelved in 1978 after the failure of several prototype systems. In July 1983, the Government of India embarked upon the Integrated Guided Missile Development Programme (IGMDP). Initially, an amount of Rs. 380 crore was allocated which has now been raised to Rs. 788 crore.

Trishul, the first missile developed by India, is a short-range surface-to-air missile. It has been test fired five times and is due to be deployed in the army this year. Aakash is a surface-to-air missile with a range of 25 km with the capability of destroying low-flying aircraft and Scud-type rockets. It was first test-fired on August 14, 1990. Nag is an anti-tank missile with a 4—6 km range. It is designed to pierce all armour and can be launched from an infantry combat vehicle. Nag was first testfired in March 1990. Prithvi, first test-launched in February, 1988, bears resemblance to tactical missiles manufactured by developed countries. Agni is a surface-to-surface Intermediate Range Ballistic Missile (IRBM) with an awesome range of 250 km and a payload capacity of one tonne. It was first launched on May 22, 1989. India describes Agni as a "technology demonstrator". It is yet to be inducted into the army and, therefore, remains a few stages behind Prithvi as far as actual preparedness is concerned.

Agni is, however, India's ticket to global power. With its range of 2500 km. (which the Indians are trying to increase to 5000 km). Agni is capable of delivering both conventional and nuclear warheads on targets in Pakistan, South China and parts of Central Asia and the Middle East. It is also being compared to American "Pershing" and "Cruise" missile.

The United States has been pressuring India to stop the deployment of these missiles, but to no avail. The Indian strategy is obviously to "engage the US, sounding reasonable, looking for limited common ground, but refusing to compromise on the core issues". And whereas India's missile programme is geared towards achieving global clout, Pakistan sees it as a direct threat to its own security.

After the second test-firing of Agni on June 2, 1992, Pakistan conveyed its concern to India through its High Commission in Islamabad. Two months later, during the sixth round of bilateral foreign Secretary-level talks, Pakistan conveyed to India its concern over the Indian missile programme and the

threat that it posed to regional stability. However, the Indian programme continued unabated.

In August 1993, the United States had put forward a proposal to curb missile proliferation in the region. According to this initiative both Pakistan and India were asked to stop developing flight testing and deployment of ballistic missiles and initiate talks for a regional missile arms control agreement. They were also expected to put all missile components in verifiable storage under the scrutiny of Americans.

During a visit to the United States in September 1993, Pakistan's Foreign Secretary Shaharyar Khan welcomed these proposals and forwarded Pakistan's own proposal of a "zero missile zone" in South Asia. However, he ruled out a unilateral implementation of this proposal. This was welcomed by the Americans but they asked Pakistan to put this proposal directly to the Indians.

Since then, American officials have been pushing India to stop missile production and deployment. In May 1993, US Acting Assistant Secretary of State for South Asian Affairs John Mallot visited Pakistan and India. In India, he tried to persuade officials that missile deployment would exacerbate security concern in the region and that it would fuel an arms race between Pakistan and India.

In November 1993, US Assistant Secretary of State Robin Raphel toured the region. She, too, was asked by the Pakistan Foreign Secretary to forward Pakistan's proposal for a "zero missile zone" to India. But Raphel insisted that Pakistan should convey it to India directly.

In April 1994, US Deputy Secretary of State Mr. Talbott visited the region and his agenda also included persuading Pakistan and India not to deploy ballistic missiles. He returned a disappointed man. The United States accuses Pakistan of importing M-11-missiles from China, a charge that both Pakistan and China vehemently deny. However, last summer the US clamped sanctions on Pakistan and China for violating the Missile Technology Control Regime (MTCR) which bars countries from exporting missile technology. India has so far escaped these sanctions because it has developed its missiles indigenously. Quite evidently, Prithvi and Agni missiles are not being developed to carry conventional weapons but as a vehicle to deliver weapons of mass destruction.

Visualising the future threats emanating from this development, it is incumbent on the US and the West to apply extreme pressure on India to make

her suspend and stop her missiles programme. All possible sanctions must be imposed against India to force her to respect international laws and desist from endangering the regional peace. Any lenient view, at this stage, would bring untold devastation to the region. The US and her western allies have to weigh the development impartially. India should not be given preferential treatment on this account. An indecisive and a compromising stance today could alarmingly imperil peace and stability in the South Asian region.

Courtesy Daily Berita Buana, Jakarta (Indonesia)

PRITHVI TO USE NUCLEAR WARHEAD

by

Mohammad Ali

When the US ambassador-designate to India, Mr. Frank Wisner, at his congressional confirmation hearing, virtually warned India of likely consequences should the Prithvi be deployed, he obviously reflected Washington's awareness of how these missiles would be employed and the threat these would pose to regional stability. And the Indian response in the shape of another test-firing of Prithvi on Saturday only demonstrates that New Delhi would succumb to no pressures or pursasion as far as its grandiose missile programme is concerned.

The full implications of Saturday's test-launch can however be comprehended only if one understands two important facts. First, Prithvi was test-fired at least a dozen times in the past. But those were the scientists' trials to test and perfect the technology of this missile. The Saturday's test was entirely different. This was the test carried out by the Indian Army to test the fitness of Prithvi for induction in its arsenal. That means the missile has transcended the stage of scientists' experimentation and the field for use for military purposes.

The second important factor are the characteristics of the Prithvi and the likely targets against which it can be used. No military expert on missiles would buy the Indian contention that Prithvi is meant for use against soft or hard military targets using conventional warhead. Prithvi unlike a "Tomahawk" cruise missile which can hit a pin-point target at extended ranges. It is also unlike the crude and inaccurate Scud missile which has been extensively used in the Iran-Iraq war, Gulf war, Afghan war and now in the Yemen war with little destructive potential. Prithvi is more like US Lance or other short range missiles which are only meant for use at short ranges with a nuclear warhead. In fact, nowhere in the world, missiles as expensive as Prithvi, costing three to five crore rupees a piece, have been used as conventional weapons of war.

Then, Prithvi has a circular error of probability (CEP) of 0.1 per cent of its range. That means at its maximum range of 250 km, Prithvi has 50 per cent chance of falling within 250 metres. The inaccuracy would further increase if the peripheral support equipment like the survey and meteorological devices do not have a compatible accuracy. Further, for effective employment a real

time information of the target is required. As the Indian capability on both these counts appears suspect, the accuracy of Prithvi may be much less than the claimed CEP based on the drift of the inertial navigation system alone.

The exorbitant cost, inadequate accuracy and localised destructive effect even with warheads such as cluster monition of pre-fragmented high explosive or shape charge (for use against troops or armoured vehicles respectively) limits the choice of targets against whichPrithvi can be employed. Against troops concentration close to border, as in the case when attacking troops have to perforce gather together to launch an assault across a water obstacle or across the obstacle in the bridgehead, the weapon is not cost effective. For, greater damage to the troops can be inflicted with conventional artillery at a very small fraction of the cost of Prithvi missile. The missile is also not cost-effective against concentrations in the rear areas, as the targets in these cases are dispersed and consequently the damage quite localised and limited. Against static military targets like air bases, ammunition dumps, supply points reinforcement camps and administrative areas, Prithvi will not be really cost effective due to its inherent inaccuracies.

Given these factors, Prithvi with a conventional warhead can be used most effectively against highly vulnerable targets like industrial complexes, nuclear plants and dams; or most importantly, civil populations in major cities, with devastating effects.

It would thus be naive to assume that the Indians would use such as expensive missile technology with conventional ammunition for limited gains. They would like to use it for greater destructive purposes. As Lt. Gen. (Retd.) Harwant Singh, former Director General of Weapons and Equipment of Indian Army, recently put it in a newspaper article: "Prithvi's potentional as a decisive weapon of war is not when it carries conventional munition load but when tipped with nuclear device. Therefore, Prithvi packs a worthwhile punch only when it carries the bomb, and therein lies its values as a weapon of deterrence." Given India's proven stockpile of nuclear weapons, Prithvi ultimately carrying a nuclear warhead is thus not a probability but a reality.

But Prithvi, whether carrying conventional warhead against highly vulnerable and sensitive targets or nuclear warhead against military targets, would either way plunge the entire region into an unimaginable disaster with global repercussions.

—Courtesy daily SAUDI GAZETTE,
Jeddah (Saudi Arabia)

INDIA: LANGUAGE OF MISSILES

by

Brigadier (Retd) A. R. Siddiqi

Project Director of India's Defence Research and Development Organisation (DRDO) and the father of the missile programme, Dr. A. P. J. Abdul Kalam is a man of genius—a scientist, art connoisseur and poet—rolled into one. Poetry is his other passion after missilery. He has a vision of India as the builder of a 'new order' through firepower best illustrated by the following lines of his:

> "Drains float on an impatient wind
> A wind that wants to create a new order
> And order of strength and thundering of fire."

Dr. Kalam's verse, succinctly sums up India's thrust towards military power based on an order of strength and thundering fire at the subcontinental and the regional levels. More than the broad masses, the craze has overtaken India's elitist fringe reflecting its best scientific and political brains. At a recent conference of experts organised to mark the 20th anniversary of the nuclear tests in May 1974, scientists, academics and state functionaries argued spiritedly in support of their missile programme. One of the speakers, a former scientific adviser to the Prime Minister, Dr. Vasant Gowarikar said: "All these programmes have triggered revolutions in their own areas with many spin-off technologies and benefits. How can we ignore them?" He said as long as it (NPT) was discriminatory, "we cannot sign it. Nuclear non-proliferation cannot be confined just to south-Asia".

Together with his colleague Dr. M.G.K. Menon, a former minister for science and technology, Dr. Gawarikar maintained: "If it is not our intention to productionise Agni (and Prithvi much in the same way. Parenthesis, mine) why are we spending tax-payer's money on these programmes....."The Kashmir problem would not disappear by pressing India on missile and nuclear programmes, "Prof. Menon would add.

In the Rajya Sabha (India's upper house) the 13th (lucky for some) usertest of Prithvi generated as much euphoria in India as the May 1974 nuclear bang. An excited leader of the opposition in Rajya Sabha, Mr. Sikander Bhakht (BJP) accused Prime Minister Narasimha Rao of having deferred, under American pressure, Prithvi's scheduled test early in the first week of May in anticipation of his official visit to Washington. The actual

reason for the deferment of the test might not have been so much Mr. Rao's desire to please America as his fear of the test not going according to the plan.

Mr. Bakht said first the Agni had been 'threatened' and now it was the 'turn' of the Prithvi programme. He drew loud applause for his spirited support of the missile programme and the denunciation of the government for going slow on that. Mr. Bakht expressed his concern over a reported letter from the Prime Minister's Office (PMO) addressed to Dr. A. P. J. Abdul Kalam, advising deferment of the scheduled test.

It is noteworthy how the 20th anniversary of the 'Smiling Buddhas', a cruel euphemism for India's maiden nuclear explosion in May 1974, had passed off practically unnoticed in Pakistan until the successful 'user-test' of surface-to-surfce tactical missile Prithvi (upto 300-km range) on June 4, 1994. By itself, the test, 13th since the mid-80s, would not make much of a news except for the fact that it had been the field trial of a weapon by the ultimate user, that is, the army, while the developers, the scientists and the technologists, stood by. The successful 'user test' is just as step short of the actual deployment of the missile subject to such variations in lead time as may inevitably occur between the prototype and the mass production of the finished, ready-to-deploy product.

Prithvi was first test-fired from the rocket launching centre at Sriharikota in Andhra Pradesh in 1988. Followig that there had been several other tests—two more recent ones being in February 94, said to be not a very successful one—and before that on November 29 at the Interim Test Range (ITR) at Chandipur—on sea 15 km from Balasore (Orissa).

Launched as far back as 1983, India's achievement-oriented integrated guided missile development programme (IGMDP) is now, at the take-off stage delivering the goods which, in due course, would be inducted into fighting formations after such modifications as may be required by the general staff.

India's missile programme is an integrated package of five missiles—Agni (2500 km), Prithvi, Akash (surface-to-air range: 425 km) Trishul (surface-to-air range: 500m—900 Km) and Nag (anti-tank range: 4 km). The implementation of the first-stage of the 'roll-on' programme makes India practically self-sufficient in missile technology and production. By the turn of the century Indian experts hope to make their country compete with the U.S. not only in missile technology but also in the area of satellite communications. Boasts an eminent Indian scientist: "The US is afraid that

once India attains capabilities to launch rocket or fire missiles, the technology will be five to ten times cheaper than theirs (US-West)."

About the likely deployment of Prithvi, an Indian commentator on the BBC said that initially it would be deployed along the Punjab and Rajasthan border and, in due course , along the line-of-actual-control in Jammu and Kashmir. No matter how much Prithvi apologists might try to explain it, its deployment would pose an imminent and major threat to Pakistan's population, command and control centres and such vital points as industrial areas, power houses, dams etc. The mere advent of the missile introduces a material change in the security environment of the sub-continent.

Indian High Commissioner to Islamabad, Mr. S.K. Lambha, would, however, maintain that Prithvi has not been 'handed over' to army. He also informs that the June 4 show was not the 'first user' test of the missile. "The decision to deploy the missile will be taken after the tests (several more tests, that is, to prove its cambat-worthiness—parenthesis mine)." According to Indian press reports, however, Prithvi was integrated into the newly raised artillery division as far back as November-December 1993. At the Republic Day on January 26, indeed the missile appeared as the piece de resistance in the family of several other indigenously-produced weapons. Operational control of Prithvi to be shared jointly by the army and the air force.

While Pakistan is the most likely prime target of Prithvi, India's other neighbours may also feel legitimately concerned with the development, no matter how remotely. An immutable geography makes India a neighbour to all its neighbours whereas one of its neighbours is a neighbour to the other. The special geographical mould, combined with its sheer size, places in a position of great advantage vis-a-vis its neighbours. Missiles deployment would give India greater strategic manoeuvrability and freedom of choice to deal with its neighbours according to its politico-strategic perceptions and preferences. After the prime target, Pakistan, a selection of secondary targets, that is, Sri Lanka, Nepal etc, would be available to India according to the varying geo-political compulsions. In case of countries other than Pakistan, Prithvi will act more as a deterrent (rather a terror weapon) than a tactical or operational weapon meant for actual use.

The question of the actual deployment and utilisation of the missile (together with its senior cousin Agni) is indeed engaging the serious attention of Indian defence experts. It is one thing to let the djinn out of the bottle but quite another to lure it back into the bottle and make it respond to one's command.

Prithvi—with its range, payload and accuracy—is said to have a 'tremendous war-escalating capability'. It is too dangerous a weapon in the hands of a rocket regiment commander, according to Indian defence analysts. Unless married to specified political goals, its military application would remain open to question both for fear of failure and impulsive misuse in a grave contingency overtaking too dramatically to leave much time for a sober judgement and calculated decision. Military thinkers agree that Prithvi, currently under production, is one of the 'most technologically advanced, missiles in its category. Its circular error of probability (CEP) is just about one per cent (around 250 m within a range of 250Km). Once that missile is deployed Pakistan's command and control installations, together with cities etc., would fall within its range. It is assumed that 'four' correctly targeted Prithvis can effectively blunt an enemy attack on the ground.'

—Courtesy Daily MUSLIM,
Islamabad (Pakistan)