

The missile competition in South Asia is on the verge of a new and dangerous phase that threatens to disrupt the delicate strategic balance of the subcontinent. India and Pakistan already have stockpiles of ballistic missiles, along with the associated launchers and trained personnel necessary to deploy them at short notice.² Now reports have emerged that India plans to acquire a theater missile defense (TMD) system by 1998, based on Russian, Israeli, and indigenous technology and equipment.³ Pakistani defense officials have acknowledged that Pakistan would find such a development threatening and could respond by increasing its nuclear and missile capabilities.⁴

In 1996, negotiations between the Greek Cypriot government and Russia on the purchase of an advanced air defense system with an anti-tactical ballistic missile (ATBM) capability triggered a harsh reaction by Turkey, including threats of military strikes, and resulted in a significant increase in regional tension.⁵ The Cyprus crisis was temporarily defused in January 1997 when, after signing the contract with Russia for the missiles, the Greek Cypriot government agreed that no equipment would be transferred for at least 16 months.⁶ The introduction of an ostensibly defensive ATBM capability into South Asia by India has the potential to cause a crisis of far greater proportions: one that could derail America's nonproliferation policy in the region and spark a full-fledged nuclear and missile arms race. This essay will examine India's pursuit of an anti-missile capability, the impact of such an acquisition on the fragile security balance in South Asia, Pakistan's possible responses, and measures the United States might undertake to prevent this dangerous outcome.

INDIA'S QUEST FOR A MISSILE DEFENSE

India's recent interest in missile defenses appears to be driven primarily by Pakistan's acquisition of M-11 ballistic missiles from China in the early 1990s. Samir Sen, a former director of India's Defense Research and Development Organization (DRDO) believes that the value of an Indian TMD system is that it "will effectively neutralize Pakistan's missile capabilities."⁷ Although some

of China's missiles have the range to reach targets in India, China's capability to threaten India is diminishing as it moves to retire the DF-3 missile and cancel the follow-on DF-25 program.⁸

India has apparently been pursuing two methods to obtain an anti-missile capability: creating an indigenous

system and buying the capability off-the-shelf. Beginning in late 1993 or early 1994, DRDO began developing an improved version of the Indian-designed *Akash* (Space) system—a low-to-medium altitude surface-to-air missile (SAM)—to enable it to engage ballistic missiles.⁹ The first, less advanced *Akash* anti-aircraft unit

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THEATER MISSILE
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ASIA: A VOLATILE MIX**

by Gregory Koblentz¹

with its Rajendra phased array radar is expected to enter service in 1997.¹⁰ The Rajendra radar can reportedly track up to 64 targets at a range of 50 kilometers.¹¹ The stated goal of the eventual upgrade project is to be able to intercept missiles with ranges up to 2,000 kilometers. Given the difficulties the United States has experienced developing the Theater High Altitude Area Defense (THAAD), which is supposed to be able to engage missiles with ranges up to 3,500 kilometers, this goal is perhaps unrealistic. But the move could also be motivated by India's desire to develop a defense against the 1,800 kilometer-range DF-21s thought to be deployed in southwestern China.¹²

India has also shown an interest in Israeli technology applicable to missile defense, particularly the Arrow ATBM and Phalcon airborne early warning (AEW) aircraft.¹³ Former head of the U.S. Central Intelligence Agency (CIA) James Woolsey has stated: "Israel probably hopes to export [the] Arrow system or its associated technologies."¹⁵ India also is developing an AEW platform equipped with phased array radar technology, similar to that used by Phalcon, to cue its ATBM system.¹⁴ Due to America's significant technical and financial involvement in the Arrow program, however, its approval would be necessary for any legal exports of

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that system. (But there are apparently no similar restrictions on Phalcon.) While it is highly unlikely that the United States would permit Israel to export the Arrow to India, given long-standing U.S. concerns about India's missile program and its desire to prevent a missile race in South Asia, recent press reports indicate that India may be trying to acquire Arrow technology from Israel covertly—in order to provide the *Akash* with an ATBM capability.¹⁶ In 1993, the U.S. General Accounting Office (GAO), criticized American government agencies for not properly safeguarding technology and equipment transferred to Israel as part of the Arrow program, raising the specter of unauthorized transfers.¹⁷ A year earlier, Israel had been accused of providing sensitive Patriot ATBM technology to China without authorization.¹⁸ Although the State Department cleared Israel of these charges, the Pentagon did not. Then-Secretary of Defense Richard Cheney reportedly believed that the Israeli government was responsible for the illicit technology transfer.¹⁹

India's other option for obtaining an ATBM is to buy the missiles themselves, rather than trying to acquire the technology to make them. Negotiations between India and Russia have been underway since 1995 on the acquisition of an advanced air defense system with ATBM capability, either the S-300PMU-1 or the S-300V.²⁰ The Almaz design bureau's S-300PMU-1 is a highly mobile SAM system that has been upgraded to give it an inter-

cept capability against tactical ballistic missiles with ranges of over 300 kilometers.²¹ The Antey bureau's S-300V was the world's first operational, dedicated ATBM system.²² The S-300V actually is comprised of two different missiles, the dedicated anti-missile 9M82 (NATO code-name: SA-12b Giant), and the dual-role 9M83 (NATO code-name: SA-12a Gladiator). The entire system, which is also mobile, can intercept ballistic missiles with ranges of up to 1,000 kilometers.²³ The S-300V has reportedly shot down over 60 tactical ballistic missiles with ranges of up to 600 kilometers during tests and has demonstrated a single-shot kill probability of 40 to 70 percent.²⁴

An Indian delegation, led by the minister of defence, reportedly observed the testing of the S-300V system in August 1995 at Russia's Kapustin Yar firing range.²⁵ In addition, Russia displayed the S-300PMU-1 at India's second international military equipment exhibition in March 1996.²⁶ At the end of 1996, Oleg Sidorenko, Deputy Director General of Rosvoroozhenie, Russia's arms export agency, stated: "Negotiations are more than half way through and we expect to sell the systems to India very soon."²⁷ India would have no trouble integrating the Russian systems, since its entire air defense system is based on Soviet weapons and technology.²⁸ Obtaining a reliable supply of spare parts for Russian-supplied equipment has been a problem, but measures have been proposed to address this issue.²⁹ One pos-

Figure 1: India's Options for Anti-Tactical Ballistic Missiles

Name	ATBM Velocity (km/sec)	Target Velocity (km/sec)	Target Range (km)	Engagement Range (km)
Akash	5+	4.3	2,000	27 (vs. aircraft)
S-300P	2	1.3	170	25
S-300PMU-1	2+	2.8	800	40
SA-12A	1.7	2.3 (approx.)	600?	25
SA-12B	2.4	3	1,000	40
Arrow	?	3	1,000	100

Sources: Pravin Sawhney, "Anti-Missile Role Planned for Akash," *International Defense Review* (January 1997), p. 4; Steven Zaloga, "'Grumble': Guardian of the Skies-Part II," *Jane's Intelligence Review* (April 1997), p. 155; Steven J. Zaloga, "Russian Tactical Ballistic Missile Defence: The Antey S-300V," *Jane's Intelligence Review* (February 1993), p. 52; Nikolay Novichok and Michael Dornheim, "Russian SA-12, SA-10 on World ATBM Market," *Aviation Week & Space Technology*, March 3, 1997, p. 59; Tony Cullen and Christopher Foss, ed., *Jane's Land-Based Air Defence*, 1994, pp. 252.

sible solution is the formation of joint ventures between Indian and Russian firms, which would also facilitate future technology transfer.

The most immediate obstacle to India's acquisition of either S-300 system appears to be financial. Estimates of the costs of the systems vary from \$1 billion for six systems and production rights (\$160 million apiece) to \$230 million for three to four sets (about \$55 to 75 million apiece).³⁰ India's \$10 billion defense budget for 1997-98 does not have much room for such big-ticket purchases.³¹ However, with the current difficulties being experienced by Russia's defense industry, unorthodox financing arrangements could probably be worked out to facilitate arms deals. For example, China paid for 80 percent of its Su-27 deal with Russia with barter, and Malaysia paid 25 percent of the cost of its MiG-29s with palm oil.³²

STRATEGIC IMPLICATIONS OF AN INDIAN TMD SYSTEM

India's acquisition of a sophisticated air defense system with anti-missile capabilities could erode Pakistan's confidence in both of its main nuclear delivery systems, the M-11 ballistic missile and U.S.-supplied F-16 aircraft, to such a degree that it would no longer believe its nuclear capability provided a credible deterrent against India. Currently, the Indian and Pakistani nuclear deterrents are understood to include non-deployed, nuclear-capable missiles, a number of unassembled nuclear weapons, and a capability to build additional nuclear weapons quickly.

The leaders of India and Pakistan probably assume that the other side has the capability to deliver a nuclear strike against their country, although both countries have chosen to keep this capability "in the basement." Thus, India and Pakistan seem to have established a fragile, but workable, form of mutual "non-weaponized" deterrence. However, India's acquisition of an ATBM could destabilize this nuclear balance by depriving Pakistan of an assured strike capability. Pakistani leaders may fear that during a crisis they would be vulnerable to a disarming first strike by India, which would then rely on its missile defenses to intercept any Pakistani missiles not destroyed on the ground. This concern could drive Pakistan to adopt a "use it or lose it" strategy, calling for the early use of its nuclear forces in the event of a conflict in order to penetrate India's defenses. Islamabad may also worry that India's defensive systems would be able to

neutralize a nuclear strike by Pakistan, thus allowing India to engage in a conventional war without fear of nuclear retaliation from Pakistan. Given the large imbalance of conventional forces between India and Pakistan, the outcome of such a conflict is not really in doubt.³³ As one Pakistani analyst has noted, "A shield would allow [India] to wield its sword more menacingly."³⁴ In the past, Pakistan has reacted quite sharply to perceived threats from India. In 1990, during the last major crisis between the two countries, Pakistan reportedly armed its F-16s with nuclear bombs.³⁵

There are six Indian cities with populations greater than 500,000 within the range of Pakistan's M-11s, but only five would be suitable targets for Pakistani missiles (one in Kashmir would presumably be ruled out because its population is mostly Muslim).³⁶ Pakistan's ability to saturate India's missile defenses cannot be quantified at this time because it is dependent on the number of launchers it has acquired from China as well as on Pakistan's capacity to coordinate multiple, simultaneous launches under combat conditions from dispersed sites. The S-300PMU-1 and S-300V batteries are each able to engage up to six targets at once with two missiles apiece.³⁷ By using different missiles to provide upper and lower tier protection, an S-300V battery can also conduct multiple engagements against incoming missiles.³⁸ Instead of buying the required number of systems to protect all of its major cities from the largest possible Pakistani salvo, India apparently plans on complementing the S-300s purchased directly from Russia with models produced under license, plus its indigenous *Akash* system. The high mobility of the S-300 systems would also permit India to economize by buying fewer than required and then moving them around to prevent Pakistan from knowing which sites are undefended. In addition, India could use unmanned aerial vehicles, either indigenous ones or those purchased from Israel, to monitor Pakistan's missile force and shift its defenses accordingly.

POSSIBLE PAKISTANI RESPONSES

How might Pakistan respond to this new challenge? Pakistan's options would be either to match India's defenses with similar systems or to build up its offensive forces to overwhelm India's defenses. Pakistan's short-term prospects for either building or buying a similar defensive system are slim. Despite reports to the contrary, Pakistan's ability to produce its own TMD system is ex-

tremely limited.³⁹ To date, Pakistan has only succeeded in producing short-range, man-portable SAMs based on Chinese designs.⁴⁰ Pakistan's prospects for buying a missile defense capability in the near-term are poor because the United States and Russia, the only two countries which currently deploy ATBM systems, are either unwilling or unable to supply Pakistan with such a capability. The United States is currently barred from supplying Pakistan with any military equipment due to the Pressler Amendment, and Russia's close relations with India make major arms sales to Pakistan unlikely.⁴¹ Pakistan's long-term prospects of acquiring a missile defense system are better since China, which has a history of supplying Pakistan with missile technology, is believed to be working on its own ATBM capability.⁴² One missile analyst has noted that, with assistance from China, countries like Pakistan "might acquire missiles or the technologies to develop their own ATBM systems in the next five to ten years."⁴³

Unable to match India's defensive systems, Pakistan's initial response would probably be to increase the number of nuclear weapons and delivery systems available at short notice in order to restore its deterrent. This view was confirmed by a knowledgeable Pakistani defense official.⁴⁴ The options that Pakistan has in the nuclear sphere are outlined below, followed by activities that Pakistan could undertake to enhance its delivery capability.

NUCLEAR OPTIONS

In 1991, in a major concession to Washington that ranks as the United States' most important nonprolifera-

tion achievement in South Asia, Pakistan agreed to halt the production of weapons-grade uranium and nuclear weapons components.⁴⁵ Pakistan is believed to possess enough weapons-grade uranium for about 15 to 25 nuclear bombs with only a handful of complete, but unassembled, weapons in its inventory.⁴⁶ In order to fully equip the 36 M-11 missiles that Pakistan is believed to possess, it would have to increase its stockpile of weapons-grade uranium by about 50 to 100 percent.⁴⁷ Pakistan is believed to have continued to produce low enriched uranium (LEU) after 1991.⁴⁸ Nuclear experts estimate that it would take Pakistan about a year to enrich this LEU to weapons-grade, yielding about 20 bombs worth of material or enough to equip each of its M-11s with a nuclear warhead.⁴⁹ If Pakistan's leaders were especially fearful of India's potential to engage in a surprise attack under the cover of a TMD system, they might order the complete assembly of nuclear weapons to reduce Pakistan's reaction time to an Indian attack.

As part of a longer term nuclear build-up, Pakistan could begin operation of its 40 to 50 megawatt plutonium production reactor at Khusab that has been completed, but not yet loaded with fuel.⁵⁰ Since less plutonium than uranium is needed for nuclear weapons, plutonium is better-suited for compact missile warheads. China is believed to have been providing assistance to the Khusab reactor as well as an adjoining, unidentified nuclear facility and a plutonium separation plant at Chasma.⁵¹ Once Pakistan begins operating the reactor, approximately 10 to 14 kilograms of plutonium could be produced each year, enough for two to three bombs.⁵² Pakistan is believed to have a small-scale reprocessing capability, but

Figure 2: Pakistani and Chinese Ballistic Missiles

Name	Range (km)	Re-entry Velocity (km/sec)	Payload (kg)
M-11	280	1.5	800
Hatf-II	300	1.5	500
Hatf-III	600	2.5	500
DF-3A	2,800	5.3	2,150
DF-21	1,800	4.2	600

Sources: Department of Defense, *Proliferation: Threat and Response* (Washington, D.C.: Government Printing Office, April 1996); Duncan Lennox, "Ballistic Missiles," *Jane's Defence Weekly*, April 17, 1996, pp. 40-44.

it is not known to be operational.⁵³

In a worst-case scenario, Islamabad may feel compelled to conduct a nuclear test to validate its design for a missile warhead. Pakistan has never conducted a nuclear test, but its weapons are believed to be based on a Chinese design using weapons-grade uranium that China tested in the 1960s as a missile warhead.⁵⁴ According to a 1996 U.S. National Intelligence Estimate (NIE), the intelligence community believes “it is probable” that Pakistan has developed a warhead for the M-11.⁵⁵ If Pakistan starts the Khusab plutonium production reactor and develops a plutonium-based warhead design, its need to conduct a test would increase, since the Chinese design is believed instead to use weapons-grade uranium.

MISSILE OPTIONS

India’s acquisition of a sophisticated air defense system with anti-missile capabilities, such as the S-300PMU-1 or S-300V, will further reduce Pakistan’s ability to deliver a nuclear weapon by aircraft and for the first time threaten Pakistan’s ability to strike targets with missiles. Pakistan’s air force is currently outnumbered and outgunned by India.⁵⁶ In addition, India has begun an air force and air defense modernization program that includes the purchase and license production of Russian-made Su-30MKI fighter-bombers and the Tunguska low-altitude air defense system.⁵⁷ At the same time, Pakistan is barred from obtaining any additional advanced fighters from the United States due to the embargo. Moreover, its planned acquisition of French Mirage 2000 fighters has been held up by financial and political problems.⁵⁸ Even the head of Pakistan’s air force has admitted, “We are now losing the qualitative edge.”⁵⁹ According to the Pentagon, Pakistan’s missile programs “are driven by a desire to augment limited offensive air capabilities against India (which holds a nearly 3:1 advantage in combat aircraft) and to field a more effective delivery system.”⁶⁰ Therefore, without a credible aerial delivery capability, Pakistan will have to rely mainly on ballistic missiles to overwhelm India’s defenses.

According to the 1996 NIE, Pakistan’s M-11s could be operational within 48 hours.⁶¹ Although this is a fairly short interval of time, Pakistan’s leaders may feel compelled during a crisis to disperse the stored missiles or deploy them in the field in order to reduce their vulnerability to a first-strike. This move would enhance the survivability of its current missile arsenal, but would not

improve Pakistan’s ability to penetrate India’s missile defenses. For that objective, Pakistan would have to acquire additional missiles to saturate India’s defenses. China is unlikely to provide these missiles since it agreed in October 1994 to halt the sale of ballistic missiles inherently capable of carrying a 500-kilogram payload to a distance of at least 300 kilometers, a ban which China agreed prohibited further exports of the M-11.⁶² However, China has apparently not interpreted this pledge as barring the transfer of missile components or production technology. Since late 1995, Pakistan, with Chinese assistance, has been constructing an M-11 missile factory outside of Rawalpindi. The 1996 NIE estimated that the factory will become operational in one or two years, about the time that India plans on deploying a missile defense system.⁶³

CONSEQUENCES OF POSSIBLE PAKISTANI RESPONSES

By undertaking any of actions described above, Pakistan runs the risk of seriously damaging its relationship with the United States. In 1996, President Clinton signed into law the Brown Amendment, which allows the United States to transfer to Pakistan the military equipment it had paid for before the 1990 cut-off, except for the 28 F-16s. According to the State Department, “our ability to move ahead with partial implementation of the Brown Amendment is based on a continuation of Pakistan’s current voluntary restraint in its nuclear and missile activities.”⁶⁴ Pakistan’s more drastic options such as conducting a nuclear test or deploying its missile force, which would be harder to hide from U.S. intelligence, would also result in harsher penalties. Deployment of the M-11s or construction of additional ones would likely trigger U.S. missile proliferation sanctions on both Pakistan and China.⁶⁵ The 1994 Nuclear Proliferation Prevention Act requires the United States to cut off all military and economic assistance, deny certain export licenses, and oppose domestic and international bank loans to any non-nuclear weapon state that conducts a nuclear test. Therefore, Pakistan’s leaders would have to weigh carefully the possible costs of the responses described above against the benefits for Pakistan’s security and deterrent capability.

If Pakistan were to take any of these actions—enriching uranium to weapons-grade, increasing its nuclear weapons stockpile, conducting a nuclear test, commissioning the Khusab reactor, deploying the M-11, or build-

ing additional missiles—it is likely that India would reciprocate in a similar manner, if only for domestic political reasons. India is already on the verge of deploying the *Prithvi*, and the *Agni* still enjoys considerable support in India (although its development was recently put on hold).⁶⁶ Once India and Pakistan have embarked on an overt nuclear and missile arms race, it could be difficult to slow down or stop. An example of the potential for this type of spiraling escalation was demonstrated in early 1996. After reports emerged about India's nuclear test preparations in December 1995, John Deutch, then-head of the CIA, stated: "We are concerned India is considering the possibility of a nuclear test. We have judged that if India should test, Pakistan would follow."⁶⁷ Shortly after Deutch's statement, Pakistan's efforts to ready its own test site became public, and Foreign Minister Assef Ahmad Ali boasted: "If India wants to prove its manhood by conducting a nuclear test than we have the capability to prove our manhood."⁶⁸

ATBMS AND NONPROLIFERATION AGREEMENTS

The United States has reportedly expressed its concerns to Russia about the sale of missile defense systems to India.⁶⁹ However, the United States will find it difficult to block the sale for several reasons. First, Russia is eager to sell S-300 systems, which it has been marketing for many years. China, the United Arab Emirates, South Korea, Singapore, Egypt, and Iran have all expressed their interest in these systems, and Russia would not want to jeopardize future sales by bowing to U.S. pressure to halt a sale to India.⁷⁰ Second, India is a key market in Russia's drive to boost arms exports, and Russia cannot risk alienating New Delhi.⁷¹ In 1994, India signed a six-year military cooperation agreement with Russia, which signaled the political importance attached by both countries to establishing closer defense ties.⁷²

There are two nonproliferation agreements that deal with missile transfers, the Missile Technology Control Regime (MTCR) and the Wassenaar Arrangement on Export Controls for Conventional Arms and Dual-Use Goods and Technologies. The Wassenaar Arrangement, the successor regime to the Cold War-era COCOM, was agreed to by 33 countries, including Russia, on July 12, 1996.⁷³ Although this agreement regulates guided missiles with ranges greater than 25 kilometers, it excludes SAMs.⁷⁴

The MTCR, which Russia is a member of, does not

distinguish between offensive and defensive missiles, but its members have agreed to a "strong presumption to deny" the export of Category I missiles which are inherently capable of carrying a 500 kilogram payload to at least 300 kilometers. According to State Department officials, even the most capable Russian ATBM missile, the 9M82 (SA-12b Giant), does not appear to exceed the MTCR threshold.⁷⁵ However, if Russia allows India to produce the S-300V under license, this would raise the issue of whether the solid rocket engines could be used in a ballistic missile restricted by the regime.⁷⁶ This concern is well-founded since India has already proven its ability to adapt the liquid-fuel rocket engines of the SA-2 SAM for use in its 150 to 250 kilometer-range *Prithvi* missile. Under MTCR rules, the export of production technology that could be used in Category I missiles is prohibited.

CONCLUSION

India's acquisition of missile defenses could upset the delicate nuclear balance that now exists in South Asia. Instead of both sides maintaining a non-weaponized, largely untested, and non-deployed nuclear capability, South Asia could see the emergence of two hostile countries armed with nuclear-tipped missiles deployed on a hair-trigger alert.

Given Russia's strong incentives for selling the S-300 system to India and the lack of any kind of international arrangement to prevent such transfers, the United States will need to initiate a multi-pronged strategy to prevent, or at least significantly delay, the introduction of these missile defenses into South Asia. The most severe near-term threat is Russia's sale of advanced missile defense systems to India. For the reasons noted above, it will probably be difficult for the United States to persuade Russia to halt such a sale. As a sweetener, the United States could offer to drop its objections to Russia's sale of its S-300V to the United Arab Emirates and South Korea on the condition that the systems be used only in an ATBM mode.⁷⁷ This compromise would allow these two U.S. allies, which face immediate missile threats, to field defensive systems years before the United States' dedicated ATBM, the PAC-3, would be ready for export. In addition, by limiting the S-300V to operating only in a missile defense role, the oft-cited problem of friendly fire could be resolved, since the systems would only engage incoming ballistic missiles (which have speeds and trajectories unlike those of aircraft).⁷⁸ As a comple-

ment to this initiative, and to keep Russia from feeling that it was being singled out unfairly, the United States should try to reach an understanding with the other potential ATBM suppliers such as Israel, China, and the Europeans to keep these systems and the associated technologies out of South Asia.

However, it may only be possible to secure a postponement of the sale, similar to the case of Cyprus. If so, the United States should use the extra time to engage in diplomacy that could reduce regional tension and obviate India's perceived need for the weapons. One possible goal would be to secure an agreement by Pakistan and India to a non-deployment policy for both ballistic missiles and missile defenses. This measure would be a simple, yet symbolic, step that could be taken in the wake of their May 1997 bilateral peace talks as a confidence-building measure and as a demonstration of improved relations between the two countries. The United States should follow up such a proposal with renewed pressure on China to halt the transfer of missile production technology to Pakistan.

India and Pakistan seem to practice a unique form of deterrence, relying on non-deployed nuclear weapons and ballistic missiles. However, the stability of this mutually deterrent relationship could be threatened by the unilateral introduction of missile defenses, just as such systems threatened to destabilize superpower relations during the 1980s and still antagonize U.S.-Russian relations today. The primary goal of the United States should always be to prevent the spread of nuclear weapons and ballistic missiles, but, in instances where that policy fails, such as South Asia, the United States must prevent the introduction of missile defenses into the region. Once that line has been crossed, the ability of the international community to achieve significant reductions in the nuclear or missile arsenals of the opposing sides will be severely constrained.

¹ The author would like to thank Sandy Spector, Greg Webb, Richard Speier, Greg Gerardi, and Linda Fu for their comments on previous drafts of this article.

² Although the Clinton administration has not made an official determination that China has shipped entire M-11 missiles to Pakistan, credible reports have emerged that the United States has firm intelligence on the presence of these missiles at Pakistan's Sargodha airbase. R. Jeffrey Smith and David Ottaway, "Spy Photos Suggest China Missile Trade,"

The Washington Post, July 3, 1995; R. Jeffrey Smith, "China Linked to Pakistani Missile Plant," *Washington Post*, August 25, 1996, p. A1.

For details about India's Prithvi missile program, see Greg Gerardi, "India's 333rd Prithvi Missile Group," *Jane's Intelligence Review* (August 1995), pp. 361-364; Vivek Raghuvanshi, "India to Deploy Prithvi Despite Pakistani Concerns," *Defense News*, March 10-16, 1997, p. 34.

³ "Deployment of Missile Umbrella System All Set," *Indian Express*, December 20, 1996 in *Periscope Daily Defense News Capsule*, December 20, 1996; "India: Article Views Country's Air Defense System," *The Pioneer*, February 8, 1997; in FBIS-NES-97-027 (11 February 1997)(this and all subsequent FBIS citations are from electronic version); Pratap Chakravarty, "India Looks to Buy Mini 'Star Wars' From Russia," *Agence France Presse*, March 20, 1997; Rahul Bedi, "India Targets \$1b Russian Air Defence Capability," *Jane's Defence Weekly*, April 2, 1997, p. 4.

⁴ Author's interview with senior Pakistani defense official, March 14, 1997.

⁵ Lale Sariibrahimoglu, "Turkey Issues Warning as SA-10s Go to Cyprus," *Jane's Defence Weekly*, January 15, 1997, p. 4.

⁶ Kelly Couturier, "Tempers Cool Over Cyprus, but Issue Unlikely to Be Settled Soon," *The Washington Post*, January 20, 1997, p. A28.

⁷ Samir K. Sen, "View From India: The Future of Ballistic Missile Defense and Its Derivatives," *Comparative Strategy* 14 (April 1995), p. 224.

⁸ Eric Arnett, "What Threat? China's Missiles Are No Threat, and India Knows It," *Bulletin of the Atomic Scientists* (March 1997), p. 53.

⁹ Pravin Sawhney, "Anti-Missile Role Planned for Akash," *International Defense Review*, January 1997, p. 4; Christopher Foss, "India's Akash Missile Resembles 'Gainful'," *Jane's Defence Weekly*, February 26, 1994, p. 3.

¹⁰ Pravin Sawhney, "Anti-Missile Role Planned for Akash," p. 4.

¹¹ *Ibid.*

¹² Wyn Bowen and Stanley Shepard, "Living Under The Red Missile Threat," *Jane's Intelligence Review* (December 1996), p. 560; Jeff Erlich, "Fourth THAAD Intercept Failure May Stall Program," *Defense News*, March 10-16, 1997, p. 12.

¹³ Vivek Raghuvanshi and Steve Rodan, "India Begins Buying Spree in Israel," *Defense News*, February 17-23, 1997, p. 1; "India: Defense Team Off to Israel, Italy 'To Shop'," *The Pioneer*, February 5, 1997, p. 5; in FBIS-NES-97-025 (7 February 1997).

¹⁴ Pravin Sawhney, "Anti-Missile Role Planned for Akash," p. 4; "India Looks at Active Phased-Array AEW," *Flight International*, December 11, 1996. The Airborne Surveillance Platform (ASP) would be capable of tracking 300 targets at ranges up to 350 kilometers. Vivek Raghuvanshi, "Ukraine Offers India Warning Aircraft Alternative," *Defense News*, April 21-27, 1997, p. 70.

¹⁵ Quoted in Duncan Clarke, "Israel's Unauthorized Arms Transfers," *Foreign Policy* (June 1995), p. 106.

¹⁶ "India: Israeli Arms Procurement Via Russia To Avoid Irking Arabs," *The Hindustan Times*, February 13, 1997 in FBIS-NES-97-030 (14 February 1997); "India: U.S. Missile Technology Sought From Israel," *Business Standard*, February 25, 1997; in FBIS-NES-97-038 (27 February 27 1997).

¹⁷ John Morocco, "Israel Rejects Report Critical of Arrow Missile," *Aviation Week & Space Technology*, August 30, 1993, p. 56.

¹⁸ John Lancaster and Barton Gellman, "U.S. 'Looking Into' Patriot Report," *The Washington Post*, March 13, 1992, p. A18.

¹⁹ David Fulghum, "Defense Dept. Confirms Patriot Technology Diverted," *Aviation Week & Space Technology*, February 1, 1993, p. 26; Duncan Clarke, "Israel's Unauthorized Arms Transfers," p. 104.

²⁰ Vivek Raghuvanshi, "India Mulls Russian Air Defense Deal," *Defense News*, February 24-March 2, 1997, p. 6; "India: Article Views Purchases of Russian Anti-Missile Missile," *Navbharat Times*, February 24, 1997; in FBIS-NES-97-038 (27 February 1997); "India: Article Views Need for Russian Antimissile System," *Navbharat Times*, February 18, 1996; in FBIS-TAC-96-004 (21 March 1996).

There are two different Russian systems with ATBM capability: the S-300PMU-1 (SA-10d 'Grumble') and the S-300V (SA-12a Gladiator/SA-12b Giant). Less capable versions of the S-300 family are the S-300P (SA-10a), S-300PM (SA-10b) and S-300PMU (SA-10c).

- ²¹ Christopher Foss, "'Grumble' on Land—SA-10," *Jane's Intelligence Review* (May 1991), p. 203; Christopher Foss, "Update on SA-10b 'Grumble' Surface-to-Air Missile," *Jane's Intelligence Review* (December 1991), p. 562; Steven Zaloga, "'Grumble': Guardian of the Skies-Part I," *Jane's Intelligence Review* (March 1997), p. 113; Steven Zaloga, "'Grumble': Guardian of the Skies-Part II," *Jane's Intelligence Review* (April 1997), p. 153-156.
- ²² Steven J. Zaloga, "Russian Tactical Ballistic Missile Defence: The Antey S-300V," *Jane's Intelligence Review* (February 1993), p. 52.
- ²³ Craig Couvalt, "Russian SA-12 Missiles Eyed for European ABM," *Aviation Week & Space Technology*, September 13, 1993, p. 99.
- ²⁴ Nikolay Novichok and Michael Dornheim, "Russian SA-12, SA-10 on World ATBM Market," *Aviation Week & Space Technology*, March 3, 1997, p. 59.
- ²⁵ "Deployment of Missile Umbrella System All Set," *Indian Express*, December 20, 1996; in Periscope Daily Defense News Capsule, December 20, 1996.
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- ²⁸ See International Institute for Strategic Studies, *The Military Balance 1996-1997* (London: Oxford University Press, 1996), pp. 160-161.
- ²⁹ Vivek Raghuvanshi, "Spare Snag Stands in Way of Russia-India Arms Pact," *Defense News*, March 31-April 6, 1997.
- ³⁰ Vivek Raghuvanshi, "India Mulls Russian Air Defense Deal," *Defense News*, February 24-March 2, 1997, p. 6; "India: Article Views Need for Russian Antimissile System," *Navharat Times*, February 18, 1996; in FBIS-TAC-96-004 (21 March 1996). Neither of these articles indicates whether a set or system is a battery or brigade.
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- ³² Sergei Kazenov, "Are the Russians Coming?" *Defense News*, November 26-December 4, 1994. Also see Pyotr Yudin, "Russia Barter Down Debt," *Defense News*, September 30-October 6, 1996, p. 1.
- ³³ India's military comprises of 1,144,000 active duty personnel, 3,500 main battle tanks, and over 4,000 pieces of artillery. In comparison, Pakistan's armed forces are made up of 587,000 personnel, 2,000 tanks, and 1,800 pieces of artillery. International Institute for Strategic Studies, *The Military Balance 1996-1997*, pp. 159, 165.
- ³⁴ Dr. Nazir Kamal, "India's Missile Strategy," *Dawn*, January 19, 1997.
- ³⁵ Seymour Hersh, "On the Nuclear Edge," *The New Yorker*, March 29, 1993, p. 86; Douglas Jehl, "Assertion India and Pakistan Faced Nuclear War is Doubted," *The New York Times*, March 23, 1993.
- ³⁶ Andrew Koch, "Pakistan Persists With Nuclear Procurement," *Jane's Intelligence Review* (March 1997), p. 132.
- ³⁷ An S-300V brigade comprises four batteries and an S-300PMU-1 brigade has six batteries. Tony Cullen and Christopher Foss, ed., *Jane's Land-Based Air Defence*, 1994, pp. 123-125. Also see Steven Zaloga, "Russian Tactical Ballistic Missile Defence: The Antey S-300V," *Jane's Intelligence Review* (February 1993), p. 52.
- ³⁸ Steven Zaloga, "'Grumble': Guardian of the Skies-Part I," *Jane's Intelligence Review* (March 1997), p. 113; Steven Zaloga, "'Grumble': Guardian of the Skies-Part II," *Jane's Intelligence Review* (April 1997), p. 153-156.
- ³⁹ "Pakistan: 'Interceptor' Reportedly Developed To Counter Prithvi," *Jang*, February 8, 1996; in FBIS-TAC-95-005 (8 May 1996).
- ⁴⁰ Christopher F. Foss, "Pakistan Extends Its Missile Capabilities," *Jane's Intelligence Review* (March 1997), pp. 122-123.
- ⁴¹ In 1990, unable to certify that Pakistan did not have a nuclear explosive device, the United States cut off all military and economic assistance, including sales of military equipment, to Pakistan in accordance with the 1985 Pressler Amendment. In 1996, President Clinton signed into law the Brown Amendment which allows the United States to transfer to Pakistan military equipment it had paid before the 1990 cut-off, except for 28 F-16s. However, under the Brown Amendment, no new sales of military equipment can be made to Pakistan. Richard Cronin, *Pakistan Aid Cutoff: U.S. Nonproliferation and Foreign Policy Considerations*, Congressional Research Service, Issue Brief 90149, December 6, 1996.
- In January 1995, during a visit to New Delhi, Russian Prime Minister Viktor Chernomyrdin told Indian officials that Russia had neither sold nor intended to sell weapons to Pakistan. "India, Russia Sign on Military Co-operation," *Jane's Defence Weekly*, January 21, 1995, p. 16. Recently, Russia, at India's bidding, prohibited its military plants from selling parts to Ukraine that were going to be used in 300 T-80UD tanks being exported to Pakistan. Matthew Kaminiski, "Ukraine Tank Deal Upsets Former Russian Overlords," *The Washington Times*, March 11, 1997, p. A14.
- ⁴² David Hughes, "U.S. Army to Assess Russian SA-10 SAM System," *Aviation Week & Space Technology*, January 2, 1995, p. 60; Bill Gertz, "Moscow Again Builds Anti-Missile Missiles," *The Washington Times*, November 27, 1996, p. A1; Duncan Lennox, "ATBMS and Beyond," *Jane's Defence Weekly*, May 22, 1993, p. 21.
- ⁴³ Duncan Lennox, "ATBMS and Beyond," *Jane's Defence Weekly*, May 22, 1993, p. 21.
- ⁴⁴ Author's interview with senior Pakistani defense official, Washington, D.C., March 14, 1997.
- ⁴⁵ Leonard Spector and Mark McDonough with Evan Medeiros, *Tracking Nuclear Proliferation* (Washington, D.C.: Carnegie Endowment for International Peace, 1995), p. 97.
- ⁴⁶ *Ibid.*
- ⁴⁷ R. Jeffrey Smith and David Ottaway, "Spy Photos Suggest China Missile Trade," *The Washington Post*, July 3, 1995.
- ⁴⁸ David Albright, Frans Berkhout and William Walker, *Plutonium and Highly Enriched Uranium 1996: World Inventories, Capabilities and Policies* (SIPRI, 1997), p. 273.
- ⁴⁹ *Ibid.*, p. 278.
- ⁵⁰ "Pakistan: First Indigenously Developed Nuclear Reactor Completed," *Dawn*, March 7, 1996, p. 1.
- ⁵¹ Albright, Berkhout and Walker, *Plutonium and Highly Enriched Uranium 1996: World Inventories, Capabilities and Policies*, p. 281.
- ⁵² *Ibid.*, p. 279.
- ⁵³ Spector and McDonough with Medeiros, *Tracking Nuclear Proliferation*, p. 101.
- ⁵⁴ Leslie H. Gelb, "Pakistan Links Peril U.S.-China Nuclear Pact," *The New York Times*, June 22, 1984; Leslie H. Gelb, "Peking Said to Balk at Nuclear Pledges," *The New York Times*, June 23, 1984; R. Jeffrey Smith, "U.S. Aides See Troubling Trend in China Pakistan Nuclear Ties," *The Washington Post*, April 1, 1996.
- The missile was the DF-2A with a payload of 1500 kilograms. Robert Norris, Andrew Burrows and Richard Fieldhouse, *Nuclear Weapons Databook Volume V: British, French and Chinese Nuclear Weapons*, (Boulder, Colo.: Westview, 1994), p. 362. Therefore, it is unlikely that this design would be suitable for the M-11 which has a payload of only 800 kilograms.
- ⁵⁵ Bill Gertz, "Pakistan Deploys Chinese Missiles," *The Washington Times*, June 12, 1996; R. Jeffrey Smith, "Reports Cites China-Pakistan Missile Links," *The Washington Post*, June 13, 1996.
- ⁵⁶ According to a 1994 analysis by The Analytical Sciences Corporation (TASC), India had 700 combat aircraft, including 374 advanced systems, compared to Pakistan's total inventory of 336 aircraft, including only 160 advanced systems. Cited in General Accounting Office, *National Security: Impact of China's Military Modernization in the Pacific Region*, GAO/NSIAD-95-84, June 1995, p. 34.
- ⁵⁷ *Aviation Week & Space Technology*, December 9, 1996, p. 21; Vivek Raghuvanshi, "India Mulls Russian Air Defense Deal," *Defense News*, February 24-March 2, 1997, p. 6.
- ⁵⁸ For details on the Pressler Amendment, see endnote 41. The estimated cost of the deal for 30 Mirage 2000-5 fighters is \$2.4 billion. Farhan Bokhari and Philip Finnegan, "Economy Threatens Mirage," *Defense News*, September 2-8, 1996, p. 1; Ahmed Rashid, "Flying Into Flak," *Far Eastern Economic Review*, June 20, 1996, p. 15. The high cost of modern combat aircraft, in the tens of millions of dollars, mitigates against their use in high-attrition operations such as the penetration of heavily defended

airspace. The development of the S-300 systems by the Soviet Union were key factors in America's investment in stealth technology.

⁵⁹ "Pakistan Says Losing Air Force Edge Over India," *Reuter*, March 26, 1997.

⁶⁰ Department of Defense, *Proliferation: Threat and Response* (Washington, D.C.: Government Printing Office, April 1996), p. 36.

⁶¹ R. Jeffrey Smith, "China Linked to Pakistani Missile Plant," *The Washington Post*, August 25, 1996, p. A1.

⁶² Elaine Sciolino, "U.S. and Chinese Reach Agreement on Missile Export," *The New York Times*, October 5, 1994; Daniel Williams, "U.S. Deal With China Allows High-Tech Sales in Exchange for Pledge," *The Washington Post*, October 5, 1994.

⁶³ R. Jeffrey Smith, "China Linked to Pakistani Missile Plant," *The Washington Post*, August 25, 1996, p. A1.

There have also been unconfirmed reports that Pakistan is working on a missile, based on China's 600 kilometer-range M-9 and possibly designated the Hatf III, that will be built at a secret facility at Fatehjana, about 40 kilometers southwest of Islamabad. "China and Pakistan's Missiles," *Foreign Report*, May 2, 1996. "Pakistan to Have Hi-Tech Missile Facility Soon: Report," *The Times of India*, June 3, 1996; "India: Article Views Pakistan's Missile Program As Serious Threat," *The Telegraph*, September 2, 1996; in FBIS-NES-96-173 (6 September 1996); "Sources' Report China, Pakistan Working on New Missile," *The Hindu*, September 13, 1996; in FBIS-NES-96-180 (17 September 1996).

⁶⁴ Department of State, *Report to Congress: Update on Progress Towards Regional Nonproliferation in South Asia*, December 1996, p. 5.

⁶⁵ In 1991 and 1993, the United States imposed Category II sanctions on China and Pakistan for the transfer of M-11-related components, but apparently did not have enough evidence to impose the harsher Category I sanctions required for transfers of complete missiles or production equipment. Pakistan's deployment of the M-11 would constitute proof that China had indeed shipped entire missiles to Pakistan and trigger the required sanctions. Likewise, Pakistan's construction of new missiles should trigger Category I sanctions for China's role in supplying missile production technology.

⁶⁶ Vivek Raghuvanshi, "India to Deploy Prithvi Despite Pakistani Concerns," *Defense News*, March 10-16, 1997, p. 34; "India-Missiles," *Reuter*, March 5, 1997.

⁶⁷ Senate Select Committee on Intelligence, *Current and Projected National Security Threats to the United States and Its Interests Abroad*, (Washington, D.C.: Government Printing Office, February 22, 1996), p. 12.

⁶⁸ Raja Asghar, "Pakistan Vows Tit-For-Tat Nuclear Reply to India," *Reuter*, March 12, 1996.

⁶⁹ "India: Article Views Purchases of Russian Anti-Missile Missile," *Navbharat Times*, February 24, 1997; in FBIS-NES-97-038 (27 February 1997).

⁷⁰ David Borey, "China Seeks Purchase of Russian S-300Ps," *Defense News*, April 18-24, 1994, p. 29; Michael Georgy, "UAE Said Closer to Decision on Missiles," *Reuter*, March 5, 1997; "Korea Willing to Consider Buying Russia's S-300 Anti-Aircraft Missiles For US\$ 1.4 Billion Debt," *Korea Times*, March 10, 1997; "Singapore in Talk to Buy Russian Missiles," *Jane's Defence Weekly*, September 6, 1996, p. 3; "Buying Spree," *Aviation Week & Space Technology*, April 21, 1997, p. 21; *Flight International*, August 14-20, 1996, p. 21.

⁷¹ Ralph Bouton, "Russia Plans to Outflank U.S. in World Arms Sales," *Reuter*, February 3, 1997; Philip Shenon, "Russia Outstrips U.S. as Chief Arms Seller to Developing Nations," *The New York Times*, August 20, 1996, p. A3; Pyotr Yudin, "Russia Aims for World Arms Export Lead," *Defense News*, November 4-10, 1996, p. 3.

⁷² "India, Russia Sign On Military Co-operation," *Jane's Defence Weekly*, January 21, 1995, p. 16; Stephen Blank, "India's Arms Links With Russia," *Jane's Intelligence Review* (April 1996), p. 167.

⁷³ Andrew Pierre, "The Wassenaar Arrangement," *Strategic Comments* (August 1996).

⁷⁴ Wassenaar Arrangement on Export Controls for Conventional Arms and Dual-Use Goods and Technologies, *Initial Elements*, as adopted by the Plenary of July 11-12, 1996.

⁷⁵ Author's interview with State Department officials, March 19 and

March 20, 1997.

⁷⁶ Russia has made it a practice to allow license production of advanced weapons systems such as the Su-30 and Tunguska air defense system by India and the Su-27 by China. Pyotr Yudin, "Economic Woes Spur Russians to License Weapon Production," *Defense News*, December 16-22, 1996, p. 10. Also, Russia and India have bitter memories over the United States successful effort in 1993 to bar Russia from transferring cryogenic rocket technology to India.

⁷⁷ For reports of American objections to the proposed sales, see Barbara Starr, "Non-Patriotic Buy May Harm UAE, Warns USA," *Jane's Defence Weekly*, March 26, 1997, p. 3; Barbara Starr, "USA Urges S Korea to Buy Patriot Over S-300V," *Jane's Defence Weekly*, April 16, 1997, p. 3.

⁷⁸ The United States has already begun some limited cooperation with Russia on coordinating theater missile defense activities. "U.S., Russian Troops Set Missile Exercise," *Reuter*, April 25, 1996.