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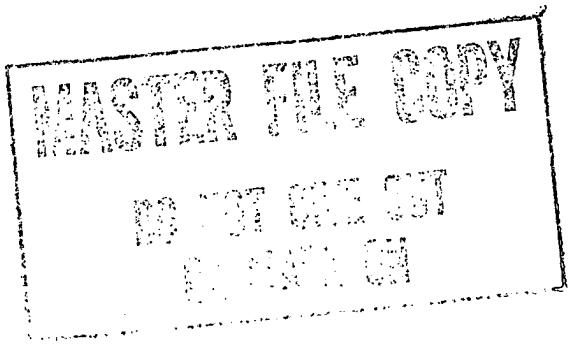

India: Arms Production and Prospects

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A Research Paper

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NESA 83-10338
December 1983

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India: Arms Production and Prospects

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A Research Paper

This paper was prepared by Office of Near Eastern and South Asian Analysis. It was coordinated with the Directorate of Operations.

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India: Arms Production and Prospects

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Key Judgments

Information available as of 1 November 1983 was used in this report.

New Delhi has grandiose ambitions to develop a defense industry capable of producing the advanced weapons required to satisfy the needs of its more than 1-million-man armed forces. These ambitions, however, exceed indigenous production capabilities, now and for the near term.

India's defense industry, which has developed into one of the largest among the Third World countries, produces weapons ranging from basic small arms to relatively modern fighters and warships. Even so, India's military leadership is dissatisfied with the quantity and quality of weapons manufactured, and New Delhi must import arms to modernize its forces and keep them combat ready.

India's industry lacks the advanced manufacturing technology and equipment as well as the skilled labor force necessary to meet, solely through its own efforts, the military's requirements for modern arms. Major deficiencies are in the fields of metallurgy, aeronautics, missile guidance systems, electronics, and engines.

New Delhi will strive to expand and modernize its defense industry throughout the decade with a goal of achieving self-sufficiency in arms production. A steady improvement in capabilities will permit the country to provide an increasing portion of its own military requirements.

Complete self-sufficiency in arms production, however, is beyond India's reach. Advances in the highly industrialized nations will continue to widen the technological gap despite Indian efforts to narrow it. Imports, licensed production, and technical assistance from leading arms producers will remain essential for equipping the armed forces with modern weapons and maintaining combat readiness.

India will continue to make limited purchases of high-technology items from the West for which adequate substitutes are not available from the USSR. Such purchases also serve to press the Soviets to grant India more advanced arms on favorable terms. Indian acquisitions of Western arms and technology are more likely to involve West European than US suppliers because of less restrictive licensing arrangements and export controls.

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Indian purchases of advanced Western weaponry and manufacturing technology could result in a diversion of classified information to the USSR. New Delhi's close military ties with Moscow include the presence in India of several hundred Soviet technicians in Indian defense industries

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India will rely more heavily on the USSR than in the past for upgrading and expanding its defense production capabilities because New Delhi can obtain more advantageous financial and technical concessions from the USSR than from Western nations. In addition to easier credit terms, the Soviets appear to be more willing to grant India the rights to assemble and produce modern weapons and have agreed to give New Delhi preferential treatment in the transfer of advanced Soviet technology abroad.

Increased Soviet cooperation in India's defense industries will deepen the existing military relationship between New Delhi and Moscow and may even lead to closer Indian relations with Warsaw Pact countries. The likely conclusion of a deal for India to manufacture aircraft parts for the USSR would further strengthen the military ties between the two countries. Moreover, only the selling of these parts to Moscow offers the near-term potential for New Delhi to make significant gains in revenues from its military exports, which probably would be used largely to finance additional weapons purchases from the Soviet Union.

A deepened military relationship would, at the very least, result in a larger Soviet presence in India and more training of Indian military personnel in the USSR. It could also lead to greater Indo-Soviet intelligence cooperation in monitoring developments in Pakistan, China, and the Indian Ocean.

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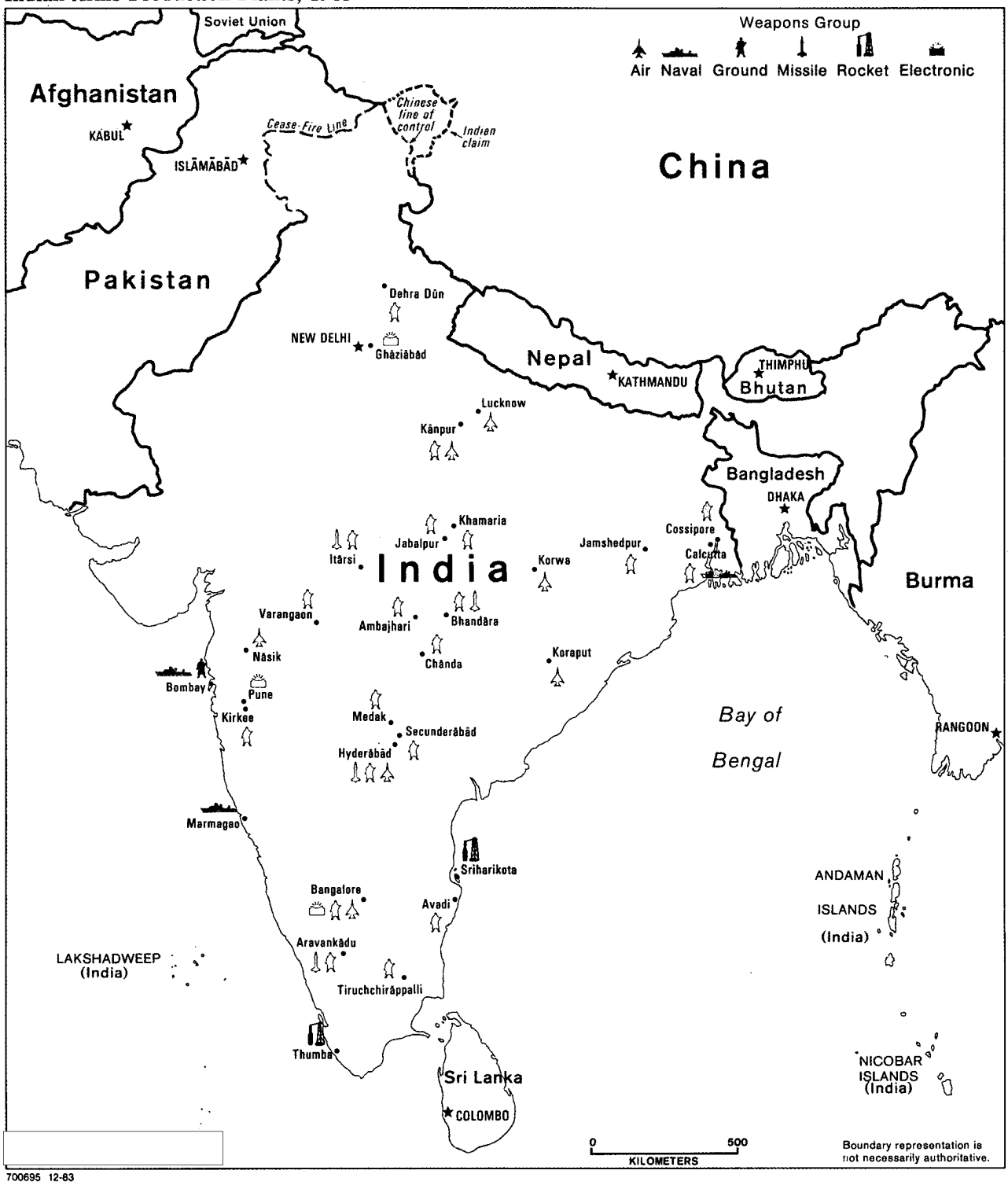
Indian Arms Production Plants, 1983



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India: Arms Production and Prospects

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Defense Industry

New Delhi views domestic production of arms as a vital component of its military capabilities and a key to the country's long-term security, according to public statements by Prime Minister Gandhi and senior Indian defense officials. Gandhi recently told the press that India needs to adopt the latest technology in increasing its military production. Such statements, coupled with the construction of new facilities and attempts to expand military research and development efforts, indicate that the government assigns a high national priority to the development of a defense industry capable of producing modern weapons.

Through the investment of considerable resources, the Indian arms industry already is one of the largest in non-Communist Asia, ranking second only to Japan. Although the industry can satisfy a sizable portion of the armed forces' requirements, senior Indian defense officials publicly stress the need for domestic production to provide a still larger share of the equipment needed for India's more than 1-million-man military force.

According to published government reports, the Ministry of Defense through the Department of Defense Production directs and coordinates the production of nine large public-sector corporations and 33 ordnance factories, two of which are currently under construction. (A list of the facilities and their major products is provided in appendix A.) These 42 major defense facilities are widely dispersed geographically (see map) and employ some 270,000 people, according to Ministry of Defense publications. The reports indicate that these firms currently produce some $2 billion in goods annually—about 1 percent of India's gross national product—of which roughly half comes from the nine public-sector undertakings. Approximately one-third of total output comprises nonmilitary goods, which permits the factories to use excess capacity for reducing fixed overhead costs of their military production programs and to maintain employment levels.

India's defense industry produces a range of weapons from basic small arms, artillery, and armored vehicles to more sophisticated fighters and guided-missile frigates (see table 1 and appendix B for more detail). The industry appears to us to lack a sufficiently advanced technological base to meet, solely through indigenous efforts, many of the armed forces' requirements for modern arms, particularly for air and naval systems. Our research indicates that no major Indian-manufactured weapon is completely original, and all have at least some imported components. Only through foreign licensing arrangements and technical assistance have the Indians been able to compensate for their limitations in designing, developing, and producing high-technology armaments, subsystems, and components.

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Status of Technology

Current Capabilities and Shortcomings

India, by Third World standards, has made substantial progress over the last two decades in expanding and improving its defense industry, but major deficiencies remain in the industrial base, the levels of manufacturing technology, and the availability of skilled manpower. The weakest areas, according to our research, are in the fields of metallurgy, aeronautics, missile guidance systems, electronics, and engines. (See appendix C for a more detailed discussion of the shortcomings in arms production.) Although the Indians appear capable of designing and producing a prototype of a weapon, we believe they lack the capability to produce large quantities of modern arms with a high reliability in performance. The problem is becoming more acute as India's arms industry attempts to move from a 1950s and 1960s technological base to one of the 1970s, which demands much greater precision in manufacturing to ensure weapons reliability.

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Table 1
India: Production of Major Weapon Systems

Equipment	Origin of Technology	Date of Initial Production	End of Production	Estimated Number Built	Remarks
Fighters					
Ajeet	UK	1976	1982	80	Improved version of the British Gnat, a light fighter built under license from Hawker-Siddeley from 1950 to 1974.
MIG-21					
FL	USSR	1966	1973	196	Assembled and produced under license.
M	USSR	1973	1981	160	Assembled and produced under license.
bis	USSR	1977	Continuing	100	Total of 250 to be assembled and produced under license. Entered series production in January 1983 after assembling 90 from kits.
MIG-27	USSR	1984	Unknown	0	Now tooling up for production under license. Scheduled production run of about 200. Initial aircraft probably will be assembled from kits.
Jaguar	UK	1982	Continuing	5	Total of 76 to be assembled from kits under license.
Helicopters					
Cheetah	France	1972	Continuing	170	French Lama helicopter built under license. Most parts made in India.
Chetak	France	1965	Continuing	300	French Alouette III helicopter built under license. Most parts made in India.
Tanks					
Vijayanta	UK	1966	1983	1,600	Tank production scheduled to stop in December 1983. We believe line will undergo modification to produce through retrofitting an upgraded Vijayanta with better armor protection, a more powerful engine, and improved fire-control and night-fighting systems.
MBT-80	India/West Germany/UK	Unknown	Unknown	1	First of at least six prototypes to be built is scheduled for field trials in December 1983. Series production not likely before 1990 if India decides to go ahead with program. Initial prototypes will be equipped with West German diesel engines and British 120-mm rifled main guns.
T-72	USSR	1984/85	Unknown	0	Tooling up for production under license. Initial tanks probably will be assembled from kits.
Artillery					
105-mm towed gun					
MK I	UK	1964	Continuing	800	Unclear when MK I production will cease.
MK II	UK	1983	Continuing	10	Designed to provide a lighter 105-mm variant for use by India's airborne and mountain units. Virtual duplicate of a British gun.
130-mm SP gun	USSR/UK	1983	Continuing	15	Placement of Soviet gun on light British-designed tank required lengthening vehicle and adding another road wheel to handle the weight and recoil.

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Table 1 (continued)

Equipment	Origin of Technology	Date of Initial Production	End of Production	Estimated Number Built	Remarks
Naval combatants					
Leander-class frigate	UK	1974 [a]	1981	6	Constructed with British technical assistance. Most equipment on last two frigates manufactured in India.
Godavari-class frigate and its follow-on	India/USSR/ Western Europe	1983 [a]	Continuing	1	Six guided-missile ships to be built. Three Godavaris will be steam powered. Three larger follow-on ships will have imported gas turbine engines. Armaments and most electronics for the six combatants also will be imported.
Submarine chaser	UK	1977 [a]	Continuing	8	Designed after British Ford-class submarine chaser. Of the eight built so far, six have gone to the Navy and two to the Coast Guard. Four additional ships are fitting out, and at least three more are under construction.
Missiles					
Atoll air-to-air	USSR	1968	Continuing	10,000	Produced under license.
SS-11-B1 antitank	France	1971	Continuing	7,000	Production under French license probably will cease in 1984 when the MILAN missile comes on line.
MILAN antitank	France/ Germany	1984	Unknown	0	Will be produced under license from Euromissile.

[a] Year first ship of class commissioned.

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Deficiencies in the arms industry have caused shortfalls in output, both quantitatively and qualitatively, and have also occasionally forced the government to import components or complete weapon systems to meet India's goals for modernizing the armed forces. Examples include the import of 105-mm gun barrels to equip Indian-made tanks, when the domestic industry failed to meet the production schedule, and the purchase of T-72 tanks, when it became apparent to New Delhi that a new main battle tank of its own design would not become operational before 1990.

India's success in indigenously designing and producing weapons, in our opinion, has been limited largely to small arms, field artillery, and small naval craft.

Ministry of Defense publications also indicate that the Indians have successfully developed electronic and communications equipment for each of the services. Indian Government and US defense attache reporting indicate that items such as high-performance aircraft, modern armored vehicles, and tactical missiles are either produced under foreign license or based on foreign design.

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Indian difficulties in producing modern weapons also result from efforts to meld differing Soviet and Western technologies and from the indecisiveness of the bureaucracy in selecting weapons for production, in

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our judgment. The Indians, for example, have experienced serious problems and delays in putting a Soviet 130-mm gun on a light British-designed tank chassis to make an "Indian" self-propelled field gun, [redacted] In addition, India has had difficulty in modifying Soviet T-55 tanks with 105-mm guns produced under British licensing. We believe that indecisiveness by senior Indian defense officials concerning whether to proceed with the development of a new Indian-designed tank or to approve the import and licensed production of a modern Soviet tank also has contributed to delays in India's domestic tank program. [redacted]

Technology Transfer

Despite improvement in its own capabilities, India remains dependent on foreign military technology to modernize its armed forces. New Delhi imports this technology in three ways: direct purchases of foreign equipment; licensed assembly or production of complete weapon systems; and imports of weapons or subsystems for installation on equipment of either Indian or foreign design. [redacted]

Such imports benefit India in several ways, according to our analysis. Major weapons imports have allowed India to stay well ahead of its principal military adversary, Pakistan. Moreover, licensed production of weapon systems has provided industrial technologies beyond domestic capabilities without the effort and expense of independent development. The technology found in imported weapon systems and industrial production methods also can be applied to other domestic military programs as well as to nondefense industries. In our view, the greatest gains would be in such high-technology areas as aeronautics, missile guidance systems, electronics, and engines. We believe the new technology, in theory, also would raise the level of India's own developmental work. [redacted]

In practice, India has been unable to take full advantage of the advanced technology available through weapons imports. The arms industry has experienced problems that reflect major difficulties in absorbing new technologies and production methods. For example, our analysis indicates that more than 15 years after the first MIG was built in India, components on the latest model are still imported, engines are returned to the USSR for overhaul, and Soviet on-site technical assistance is required at India's aircraft production facility. Largely because the Indians have been unable to successfully assimilate imported technology, they have repeatedly sought quick fixes through direct foreign purchases and licenses in an attempt to keep up with the development of advanced weapon systems by the USSR and the West. This process is clearly illustrated in India's prolonged efforts to field a new main battle tank. [redacted]

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When it is not technically or economically feasible for India's arms industry to develop and produce a particular weapon, we believe New Delhi prefers to acquire the item by purchasing the license to manufacture it domestically. Based on past practice, licensing agreements usually call for the supplier initially to provide a small number of the weapons, plus the necessary design information and equipment to permit domestic manufacture. The supplier thereafter provides parts and components as required while an independent capability is developed. India's arms industry presently does not produce all components of any weapon it manufactures under license, according to our research. [redacted]

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Economic Considerations and Constraints

Modernizing and maintaining India's 1-million-man armed forces absorb a large part of the government's resources. Defense expenditures have doubled since 1975 and account for about 17 percent of total central government outlays, according to Indian budget documents (see table 2). The Army receives more than half of the defense spending, although its share has been steadily declining over the past eight years as servicewide capital expenditures have increased. The Army's predominance in the defense budget reflects its large manpower and resultant high wage bill and its extensive equipment needs. Air Force expenditures have been slightly over 20 percent of defense outlays, while the Navy's share has risen only marginally to about 7 percent, according to the budget documents. [redacted]

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Research and Development

India's Defense Research and Development Organization (DRDO) employs some 30,000 people, who are engaged in more than 1,000 projects in areas of aeronautics, missiles and rockets, electronics, vehicles, armaments, naval oceanography, engineering, and general military stores and materials, according to a senior DRDO official and Ministry of Defense reports. Although research is conducted in all areas of weaponry, we believe that little new indigenous technology has been developed, and most projects undertaken involve the adaptation of foreign designs to Indian requirements. In 1980 DRDO underwent a major reorganization designed, according to Indian press analysis, to correct serious deficiencies in management and strengthen indigenous development efforts.

Despite some improvements since the reorganization, the capabilities of DRDO remain limited, in our judgment. India's research and development efforts, we believe, continue to be hampered by a shortage of trained engineers, scientists, and highly skilled production personnel; insufficient funding; and a lack of long-term defense planning. The willingness of planners to import a foreign-designed system as an alternative to a domestic arms program that has encountered major technical problems and delays has resulted in the early abandonment of projects—particularly in the guided-missile field—before the technical hurdles can be overcome.[a]

Expenditures on military research and development have steadily increased in absolute terms since the mid-1970s, according to Indian Government documents. As a percentage of the annual defense budget, however, we estimate that expenditures have remained at about 2 percent. For 1982 this would amount to more than $100 million. We do not know the current distribution of funds by service, but, based on past spending practices, we believe that more than 45 percent goes for Air Force projects, followed by about 40 percent for the Army and less than 10 percent for the Navy, with the remainder committed to interservice projects.

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One of the highest DRDO priorities,

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is the development of modern missiles under the direction of India's primary missile research center at Hyderabad. Information from US defense attaches and public statements by the Indian Defense Minister indicate that the Indians are working on a new surface-to-air missile, which we believe is based on the Soviet SA-6 system.

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a surface-to-surface missile with about a 150-kilometer range is under development.

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All three types of missiles, in our analysis, are far from ready for deployment.

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Another high priority, we believe, is the development of sophisticated electronics and optics. According to our research, development of advanced radars, various electronic warfare and night-vision devices, and secure communications equipment is being emphasized. The latter includes the development of a reliable, high-speed communications system.

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Table 2
India: Defense Expenditures [a]

	1975	1976	1977	1978	1979	1980	1981	1982	1983 Indian Estimate
Defense spending *(million US $)*[b]	2,857	2,866	3,076	3,495	4,155	4,898	5,210	5,556	5,971
Total central government spending *(million US $)*	14,550	15,469	18,405	23,191	23,766	30,632	30,023	35,562	34,846
Defense share of total *(percent)*	19.6	18.5	16.7	15.1	17.5	16.0	17.4	15.6	17.1
Share by service *(percent)*									
Army	61.7	60.9	60.4	58.5	55.6	55.0	54.5	52.8	53.5
Air Force	19.3	19.7	19.4	21.5	25.0	23.8	21.6	22.9	21.7
Navy	5.4	5.8	5.7	5.8	6.0	5.9	6.6	7.0	7.4
Other [c]	13.6	13.6	14.5	14.2	13.4	15.3	17.3	17.3	17.4

[a] Fiscal year beginning 1 April of year shown. Data based on Indian Government budget documents.
[b] Excludes spending on the nine public-sector defense industries and paramilitary forces. Includes spending on pensions.
[c] Includes pensions and capital expenditures, which we are unable to allocate by service. Capital expenditures include such items as acquisition of land; construction, expansion, and modernization of defense-related facilities; and the replacement of machinery and equipment in the ordnance factories.

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Through the import of foreign arms and technology from the USSR and Western nations, India can obtain a high-quality military arsenal at the expense of increased financial costs and operational difficulties. Such imports would permit a more rapid and comprehensive buildup of modern weapons and technical know-how for India's three services and large defense production sector. It also would reduce the impact on the armed forces' capabilities and readiness in the event of an arms or technology embargo by a single supplier.

Having a number of major arms suppliers, however, compounds existing financial, operational, maintenance, and training deficiencies found in fielding a large military force such as India's. Lack of equipment compatiblility—coupled with associated logistic problems—could lower operational readiness rates, particularly in times of major hostilities. In addition, the military's greater familiarity with Soviet weapons, together with their comparative ease of maintenance and lower costs, argues against large-scale purchases of higher priced Western arms and probably will limit Indian purchases from the West mostly to selected high-technology systems.

Recent and planned arms acquisitions for India's three services have virtually locked the nation into higher defense spending through the remainder of the 1980s, in our view (see table 3). Despite careful shopping and hard bargaining, we believe Indian hard currency payments for Western arms deliveries will double over the next five years if current acquisition patterns continue. The emphasis in purchases, however, will remain on Soviet equipment, and downpayments and debt servicing for Soviet military imports could become especially onerous by the mid-1980s. India's likely signing of several new arms contracts with Moscow will make matters worse. Payments to the Soviet Union appreciably add to India's balance-of-payments problems even though Moscow does not demand hard currency and offers generous credit terms. We believe New Delhi may be forced to reduce petroleum purchases from the USSR or divert exports from hard currency markets to meet its growing obligations to Moscow. In the event that New Delhi is faced with severe financial shortfalls, Moscow probably would grant India some relief in the form of debt extension, as it has to other favored clients.

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Table 3
Estimates of Annual Payments for Military Imports, by Supplier

Million US $

	USSR [a]	Other	Total
1975-79	150 to 225	25 to 100	175 to 325
Current	300 to 400	200	500 to 600
1985-89	500 to 1,000	300 to 500	800 to 1,500

[a] Accounts with the Soviet Union are maintained in rupees, and both countries have agreed to balance bilateral payments. India pays for military and commercial imports from the Soviet Union by exporting goods, some of which have few alternative markets. In the future, in order to meet the increasing burden of repayments to the USSR, India will probably have to offer goods that could have been sold in hard currency markets. As a result, the benefits from much-touted "rupee payment" agreements will diminish.

Judging from their modernization plans and pursuit of new arms, senior military leaders appear confident of receiving adequate funds to improve the combat readiness of the armed forces. We believe, however, that the Indian Government will be hard pressed to cope with the dual burden of large commercial and military imports. New Delhi, in our view, has only an even chance of avoiding a severe shortage of foreign exchange by the mid-1980s, a view shared publicly by some of Prime Minister Gandhi's advisers. Such shortages, when coupled with the rapidly rising military costs associated with advanced weapon systems, larger equipment inventories and maintenance requirements, and expansion of domestic military production capabilities, would place major strains on India's ability to import. Unless New Delhi discovers new crude oil deposits that permit reduced petroleum imports or greatly expands military and nonmilitary exports, it may have to tighten its liberalized import policy for industrial goods. In our judgment, New Delhi would be reluctant to reduce or delay military purchases or production endeavors in order to ease a general financial crisis, but it would do so if necessary to sustain adequate imports of essential food items.

Prospects for the 1980s

Efforts to expand and modernize India's defense industry will continue throughout the decade with a goal of achieving self-sufficiency in arms production, according to public statements by Gandhi and senior defense officials. We do not expect the outcome of India's national elections, which are likely to be held next year, to cause a dramatic change in the government's defense policies or in the planned level of spending to develop a stronger defense industry. 25X1

Because of the government's emphasis on improving domestic production, we believe the country will consolidate its position as one of the world's largest arms producers and provide an increasing portion of its own military requirements. Progress in enhancing the defense industries is likely to be steady rather than through a dramatic jump in production capabilities. 25X1 25X1

Our analysis indicates, however, that complete independence in arms production is beyond India's grasp. We believe that imports, licensed production, and technical assistance from other countries will remain indispensable elements for the manufacture of advanced arms in India. The Indians' inability to meet production schedules or to follow through from the design phase to series production of an advanced weapon system is likely to continue to plague the defense industry. In addition, we judge that the quality of Indian-produced equipment will remain below what major arms suppliers can provide. More important, we believe that advances in the highly industrialized nations are widening the technological gap despite Indian efforts to narrow it. 25X1

In our view, India will rely more heavily on the USSR than in the past for developing its defense industry because it can obtain more advantageous financial and technical concessions from the USSR than from Western countries. Not only do we expect Soviet assistance to increase, but we also believe the scope of

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Arms Imports and Exports

We estimate that India has purchased more than $14 billion in arms from the USSR and Western suppliers since 1970, nearly $10 billion of which has occurred since Gandhi's return to power in 1980 (see chart). The more recent purchases indicate, in our view, a strong government commitment to building a more modern and powerful military, concern about deficiencies in Indian defense industries, and a reaction to US arms sales to Pakistan. Imports have included aircraft, helicopters, air- and surface-launched missiles, armored fighting vehicles, artillery, warships, and sophisticated electronic equipment.

Although New Delhi remains willing to purchase limited quantities of selected high-technology arms from the West, our analysis indicates that India continues to rely on the USSR for the bulk of its military needs.[a] Of the nearly $10 billion in purchases since early 1980, 70 percent were from the Soviet Union, according to our estimates. *the Indians are negotiating with the Soviets for the procurement of a wide range of additional arms and increased defense cooperation, which we value at several billion dollars. Because of increased concerns over Indian purchases of Western arms, Moscow is offering New Delhi some of its most advanced military hardware and technology at favorable prices and repayment terms,* *With competition for funds among India's three services likely to become more intense, we believe that India probably will accept a number of the offers.*

Each military service has projected its import requirements for weapons through the 1980s to meet perceived threats. *the Army wants larger numbers of new tanks, infantry fighting vehicles, self-propelled artillery, mobile missile systems, and attack helicopters. Most of the equipment, in our view, probably will be purchased from the USSR or produced in India under Soviet license.* *the Air Force is seeking new fighters, missiles, transports, aerial refueling tankers, and AWACS surveillance aircraft from Soviet and Western sources The Navy's planned acquisitions emphasize larger ships with greater range and more sophisticated weapons and electronic equipment. According to US defense attache reporting, these include cruisers, destroyers, missile combatants, and submarines, most of which we expect will be bought from the USSR. The Navy also wants to enhance its air arm with additional strike aircraft for its carrier, antisubmarine helicopters, and maritime reconnaissance aircraft,*

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Indian military exports are small in absolute terms and in proportion to total exports. India's Minister of Defense recently told the press that foreign military sales in 1982 amounted only to about $28 million, which is less than 0.33 percent of all exports. Our research indicates that such sales consist largely of small arms and ammunition, light artillery, trucks, and various quartermaster supplies. Major export markets are the less developed countries in the Middle East, Africa, and South and Southeast Asia.

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Until recently New Delhi had not, in our view, aggressively sought to sell arms and military equipment abroad because of the high priority of satisfying large domestic defense needs, the low level of production, and the poor quality and reliability of many Indian products.

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New Delhi decided in late 1981, however, to try to increase India's military exports in view of its bleak foreign exchange prospects, according to Indian press accounts. A high-level committee has been established to look into ways to increase production and boost overseas sales. Potential new buyers are being sought largely from traditional markets in the Middle East, Africa, and South and Southeast Asia. As a result of these efforts, India's Defense Minister said publicly in August 1983 that he expects military exports to exceed $40 million this year—still, however, only a nominal amount.

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Potentially more important, New Delhi is seriously considering proposals by Moscow to develop India's aircraft industry for export of MIG-21 components and spare parts to the USSR and its clients, *For the Soviets, this would ensure an uninterrupted supply of spares to the numerous countries still operating MIG-21s, while for the Indians it could provide up to $500 million annually in added revenues, according to estimates in the Indian press. Such revenues could be used, in our view, to help defray a large part of the costs of new Indo-Soviet arms agreements.*

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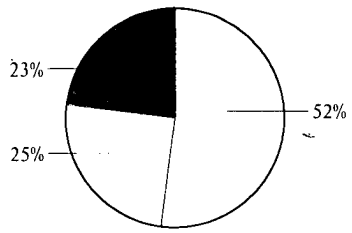
India: Value of Arms Purchases From the USSR and Western Suppliers, 1970-83[a]

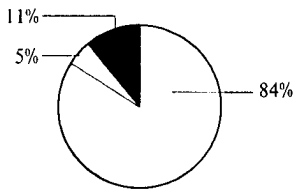
Air Force/Air Defense equipment
Ground Force equipment
Naval equipment

1970-79

USSR
Total: 2.9 billion US $

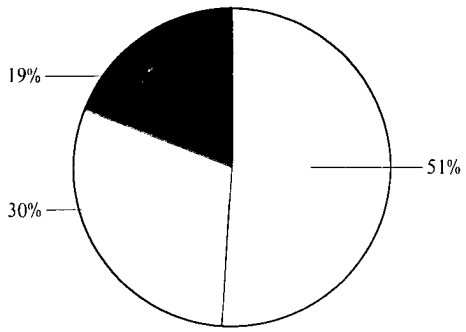


Western suppliers
Total: 1.6 billion US $

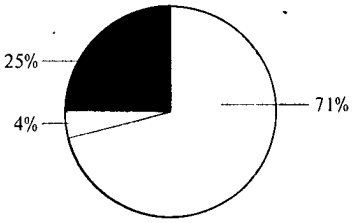


1980-83

USSR
Total: 6.8 billion US $



Western suppliers
Total: 2.9 billion US $



[a] Through October 1983.

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Soviet transfers of production technology abroad will widen over the next several years as India attempts to produce more sophisticated arms and Moscow continues to woo New Delhi away from purchasing Western weapons. India, however, is likely to continue making limited purchases of high-technology arms from the West, particularly for weapon systems unavailable from the USSR. Such purchases also serve to press the Soviets to grant India additional concessions.

The Soviets have already agreed to give New Delhi preferential treatment in the transfer of advanced Soviet technology abroad, Such transfers will reinforce India's unique position as a non-Communist licensed producer of major Soviet arms. It is the only non-Communist country to manufacture the MIG-21 fighter, and it will be the first one to produce MIG-27s, T-72s, and BMPs, which we estimate will begin series production in the mid-to-late 1980s. We also expect the Soviets to provide increased assistance in the design and manufacture of warships in India.

The likely conclusion of a deal for India to manufacture and sell MIG-21 spare parts to the USSR would further deepen the military relationship between the two countries. To the extent such an arrangement proves successful, we would expect it to be extended selectively to other military items produced in India under Soviet license.

Indian exports of domestically produced arms and military supplies will continue to be relatively small for the remainder of this decade, despite pressures from the government to increase foreign sales. New Delhi's paramount consideration, in our view, is replacing the considerable quantities of old equipment in the services with more modern arms. We expect that this will result in the services' continuing to monopolize the use of major domestically produced weapons. We also believe that restrictions imposed by licensing agreements probably will extend into the 1990s and limit the export of the most marketable military items. Only the selling of MIG-21 parts to the USSR, in our view, offers the potential for India to make significant gains in revenues from its military exports in the near term.

Implications for the United States

We believe a few new opportunities for closer Indo-US military cooperation may arise, but technology transfers and licenses for assembly of advanced weapons to help New Delhi upgrade and expand its defense production base will come largely from the USSR and, to a lesser extent, from Western Europe. Barriers to improving Indo-US relations, in our view, include India's suspicions of US intentions in the region, strong opposition to the US military presence on Diego Garcia and in the Indian Ocean, and unwillingness to accept US military sales and export control restrictions. According to US diplomatic reporting, India's Defense Minister is particularly upset over the US sale of the Harpoon antiship missile to Pakistan and charges that the Harpoon represents a qualitative escalation in US offensive weapons introduced into the region that are useful to Pakistan against only India.

We believe that increased Soviet cooperation in India's defense industries would further deepen the relationship between New Delhi and Moscow and may lead to closer Indian military relations with Warsaw Pact countries. At the very least, we would expect a larger Soviet presence in India and more training of Indian military personnel in the USSR. We believe, however, that India would stop short of granting the USSR special military privileges such as basing rights, even though India's increasing financial indebtedness to the USSR for technology transfers and arms will provide Moscow with new opportunities to exert pressure on New Delhi for such privileges. Low-keyed approaches by Moscow in the past for special access by its warships to Indian port facilities have been repeatedly rejected.

A deepened relationship, in our judgment, could lead to greater Indo-Soviet intelligence cooperation. Such cooperation could include the sharing not only of information on India's neighbors, but also possibly aerial surveillance duties in the Indian Ocean,

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If New Delhi purchases advanced US weaponry and manufacturing technology, we believe that the sale might result in a diversion of classified US military information to the USSR. Our research indicates that New Delhi's close military ties with Moscow include the presence in India of several hundred Soviet technicians in Indian defense industries

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We believe New Delhi would do its best to block Soviet efforts to acquire such technology, based on recent US Embassy reporting of the protective measures taken within India's defense industry to prevent illegal acquisition of technology or documentation by unauthorized foreign and Indian nationals. We believe India would have difficulty, however, thwarting a sustained, sophisticated espionage effort.

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Appendix A

Indian Defense Plants and Major Products

Plants	Major Products	Locations
Public-sector undertakings		
Bharat Dynamics, Ltd.	Antitank guided missiles	Hyderabad
Bharat Earth Movers, Ltd.	Earth-moving equipment, heavy-duty trailers, railroad coaches	Bangalore
Bharat Electronics, Ltd.	Radars and electronic, communications, and fire-control equipment	Bangalore Ghaziabad Pune
Garden Reach Shipbuilding and Engineers, Ltd.	Submarine chasers, utility landing craft, ocean survey vessels, oceangoing tugs	Calcutta
Goa Shipyard, Ltd.	Coastal patrol boats, utility landing craft, torpedo recovery vessels	Marmagao
Hindustan Aeronautics, Ltd.	Jet fighters, helicopters, trainers, transports, and aircraft engines, avionics, and accessories	Bangalore Hyderabad Lucknow Kanpur Koraput Nasik Korwa
Mazagon Docks, Ltd.	Frigates, corvettes, patrol boats	Bombay
Mishra Dhatu Nigam, Ltd.	Special metals and alloys for aeronautic and electronic industries	Hyderabad
Praga Tools, Ltd.	Machine tools	Secunderabad Hyderabad
Ordnance factories		
Avadi Heavy Vehicles Factory	Tanks, armored recovery vehicles, self-propelled artillery	Avadi
Aravankadu Explosives Plant	Propellants	Aravankadu
Bhandara Explosives Factory	Propellants	Bhandara
Bombay Motor Vehicle Assembly Plant	Jeeps, trucks up to 3/4 ton	Bombay
Chanda Ammunition Loading Plant	Ammunition	Chanda
Cossipore Arsenal Gun and Shell Factory	Mortars, ammunition	Cossipore
Dehra Dun Ordnance Factory	Optics, fire-control equipment	Dehra Dun
Ichapure Rifle Factory	Rifles, rocket launchers	Ichapure (Calcutta)
Itarsi Munitions Factory	Ammunition, rockets, missiles	Itarsi
Jabalpur Arsenal and Motor Vehicle Plant	Motors, howitzers, gun carriages, truck chassis up to 5 tons	Jabalpur

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Indian Defense Plants and Major Products (continued)

Plants	Major Products	Locations
Ordnance factories (continued)		
Jamshedpur Motor Vehicle Plant	3.5-ton trucks	Jamshedpur
Kanpur Ordnance Plant	Tank and field guns, howitzers, machineguns	Kanpur
Khamaria Ammunition Plant	Fuses, tank and artillery ammunition	Khamaria
Kirkee Ammunition Plant	Ammunition, mines, grenades, and fuses	Kirkee
Kirkee Explosives Factory	TNT, plastic explosives, initiators, primers	Kirkee
Nagpur Ammunition Components Plant	Mortar shells	Ambajhari
Sriharikota Propellant Plant	Rocket motors	Sriharikota
Tiruchirappalli Small Arms Plant	Rifles, carbines, machineguns	Tiruchirappalli
Varangaon Ammunition Plant	Ammunition	Varangaon
Vikram Sarabhai Space Center	Sounding rockets	Thumba
Eleven unidentified defense-related factories	Bridging equipment, telecommunications cables, clothing, leather goods, parachutes, rations, other general and non-lethal stores	Unlocated
Two new defense factories under construction	Will produce armored vehicles and engines.	Medak Avadi

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Appendix B

Major Defense Industry Programs

Aircraft

India's aerospace industry is dominated by a single government-controlled corporation—Hindustan Aeronautics Limited (HAL)—the largest firm in the defense sector. Its 11 plants, employing more than 40,000 people, produce high-performance jet fighters, trainers, helicopters, transports, aircraft engines, and a variety of avionics equipment and accessories, according to Ministry of Defense reports. The US defense attache reports that a 12th plant at Korwa is now under construction and will manufacture parts for the Jaguar and the Mirage 2000, which India is acquiring.

The largest single production program at HAL is the manufacture of MIG fighters under license from the USSR. Several MIG-21 variants have been built since the 1960s, the latest being the MIG-21bis. Indian press accounts indicate that HAL also has begun tooling up for the assembly and eventual indigenous production of some 200 MIG-27 aircraft, a ground attack derivative of the MIG-23 aircraft already operational with the Indian Air Force. The first Indian-assembled MIG-27 is expected to roll out of HAL next spring, according to the press.

A recent addition to HAL's product line is the Anglo-French Jaguar strike aircraft. The Indian press indicates that a total of 76 aircraft are to be assembled from kits, the first of which was test flown in March 1982. Indian-assembled Jaguars reportedly will differ from the 40 delivered by the United Kingdom in fly-away condition by incorporating improved avionics and progressively more Indian-manufactured components, including an Indian-designed IFF (identification friend or foe) system.

Until last year, HAL also produced a light combat day fighter, the Ajeet (Invincible), which is an improved version of the British Gnat that India built under license until 1974. The company is developing a combat-capable two-seat Ajeet trainer for the Air Force and Navy, but press reports of design and engineering problems, coupled with the crash in December 1982 of the first prototype built, have seriously set back the program, in our view. Although the Indian press reported that government plans for the trainer's production were canceled in May of this year, recent public statements by the Minister of Defense indicate that development of the two-seat aircraft is continuing. 25X1

Information from the US defense attache's office and the Indian press reflect Air Force intentions to replace Ajeets and Gnats with a new light combat aircraft of advanced design and equipped with the latest avionics. This aircraft would meet the requirements for air defense and close air support perceived by Indian military leaders for the late 1980s/early 1990s. 25X1 25X1

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New Delhi hopes to upgrade its helicopter program, according to press and US defense attache reporting. 25X1
HAL currently manufactures the Lama (Cheetah) and Alouette III (Chetak) helicopters under French license. Press accounts indicate that most components and parts are made in India, including castings and forgings, rotor blades, and most of the transmission system. The company is attempting to develop and produce its own advanced light helicopter, which eventually is to replace the two French-designed aircraft. According to the Indian press, the proposed twin-engined helicopter will be equipped with anti-tank weapons for the Air Force and Army and with 25X1
antisubmarine warfare equipment for the Navy. Although officially authorized by the government in 1976, the project is several years behind schedule

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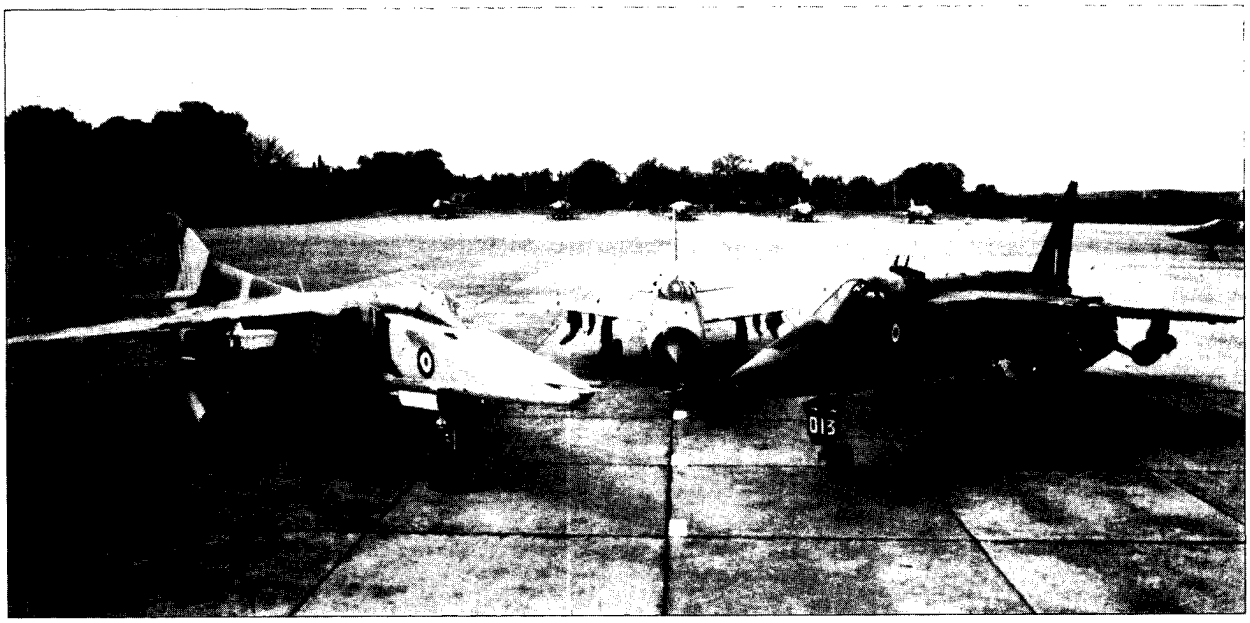

Latest combat aircraft in India's inventory—MIG-23BN, MIG-21bis, and Jaguar 25X1

Indian Ajeet trainer 25X1

because of bureaucratic, design, and technical problems, according to reliable information from the US defense attache's office. In our view, the first helicopter is unlikely to roll off the production line before the late 1980s, even with West European technical assistance that India is currently seeking, because of the long leadtime required to start up a new line.

Ground Force Equipment

India manufactures most types of ground force equipment. According to our analysis, most major items are based on foreign design, and a number of systems are produced under foreign license. Indian Government documents and press indicate that weapons production includes individual and crew-served weapons, 25X1

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Indian-built Cheetah and Chetak helicopters

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ranging from rifles, machineguns, mortars, and recoilless antitank weapons to air defense and field artillery. Indian press accounts also report that India has developed an air-portable, towed 105-mm field gun, which is scheduled to begin full-scale production later this year. The new gun, designed to replace the older, heavier 25-pounder, is a virtual duplicate of a British gun, according to US defense attache reports. Our research indicates that Indian defense factories also manufacture grenades, mines, and most ammunition used by the military from 7.62 mm to 130 mm. India also builds transport vehicles up to 7.5 tons, according to an official Indian military publication, but heavier trucks and special purpose vehicles such as tank transporters must still be imported.

One of the most important ground force weapons the Indians build is the Vijayanta tank designed by the British firm Vickers. We estimate that the Avadi Heavy Vehicles Factory has produced about 1,600 of the 37-ton armored vehicles. Although several key parts are still imported, India's Defense Minister stated publicly in August that the factory was now manufacturing about 95 percent of the tank's components, including the 105-mm main gun.

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the production of Vijayantas is to stop in December 1983, although we believe that Avadi will continue to build chassis for other armored vehicles and will produce through retrofitting an upgraded version of the tank.

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New Delhi plans to modernize its Vijayantas by giving them better armor protection, a more powerful engine, and improved fire-control and night-fighting capabilities.

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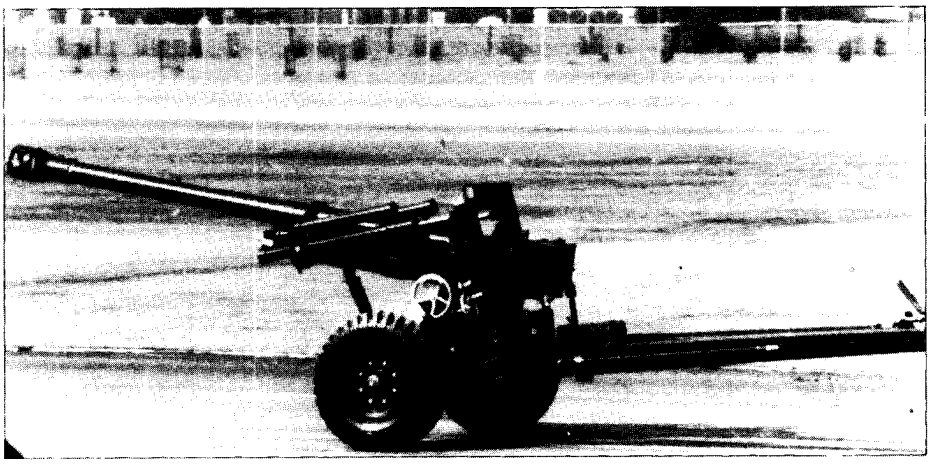
Indian MK II 105-mm field gun



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Indian Vijayanta tank

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The Indians also have been attempting for a number of years to develop a new indigenous 48-ton main battle tank, the MBT-80. The first prototype is to be completed by the end of the year, according to India's Minister of Defense. Because of serious technological difficulties encountered in the development of the tank, however, we believe that it probably could not enter series production before 1990. We question whether the MBT-80 as it is now envisioned will ever become India's main battle tank. In addition to the likely production of an upgraded Vijayanta, the Indians are proceeding with plans to manufacture a version of the Soviet T-72 tank under license at Avadi beginning in late 1984 or 1985,

India has an option with the USSR eventually to acquire a more advanced follow-on tank to the T-72.

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India also is producing other armored vehicles. Two are based on the Vijayanta chassis—an armored recovery vehicle and a 130-mm self-propelled gun, the latter of which we estimate began series production this year. According to the Indian press, the Indians are building a new plant at Medak in the state of Andhra Pradesh for the production of Soviet BMP infantry fighting vehicles under license.

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Imported Soviet T-72 tank

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Indian-built 130-mm self-propelled gun

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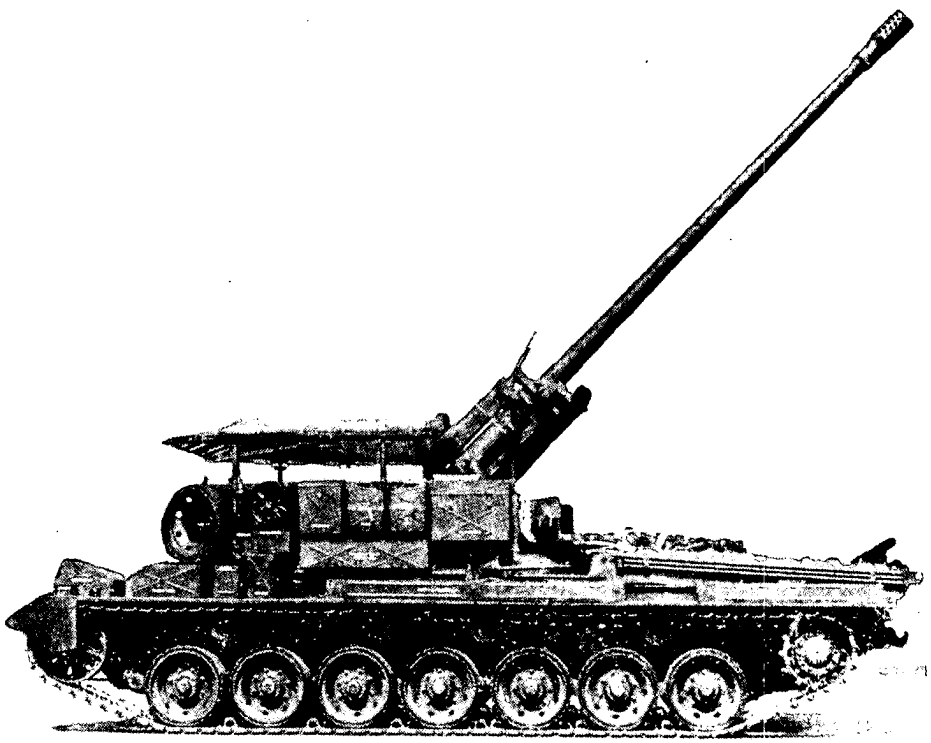

Naval Vessels

Construction of major naval combatants is done at India's Mazagon Docks Limited of Bombay—the largest and best equipped shipyard in the country. In 1981 India completed a 15-year program of building six steam-driven Leander-class frigates of 1950s design. Although technical assistance in constructing the ships was provided by the British, open-source reporting indicates that less help was required by India in building the last two Leanders. In addition, most equipment on these two ships—including the main boilers, turbine generators, radar, and fire-control equipment—was manufactured in India,

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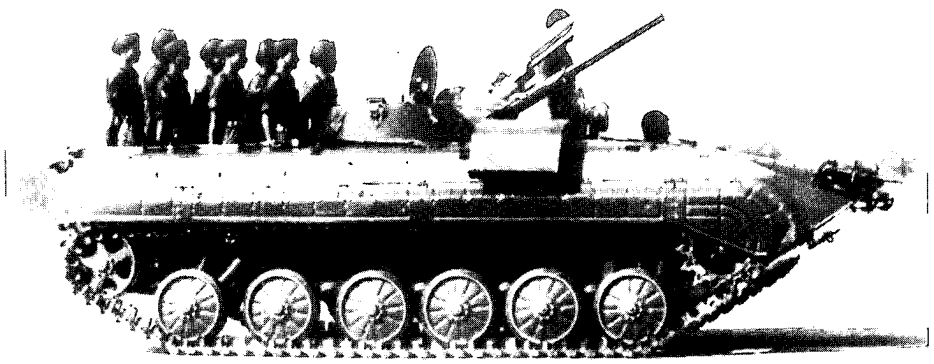
Imported Soviet BMP infantry fighting vehicle



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India is now building other naval ships at Mazagon, including three indigenously designed Godavari-class guided-missile frigates. According to overhead imagery and US defense attache reports, the first steam-powered Godavari is now undergoing sea trials and is scheduled to be commissioned by the end of the year, the second has been launched and is fitting out, and the third is still under construction.

US defense attache reporting that three other ships—a naval training vessel and two 1,000-ton corvettes—are being constructed at Mazagon Docks.

Smaller Indian shipyards also build and repair lesser naval vessels. According the Indian press, submarine chasers, coastal patrol boats, utility landing craft, torpedo recovery vessels, and ocean survey ships have been constructed at the shipyards at Calcutta and Marmagao. The naval dockyard at Vishakhapatnam performs repairs on Indian F-class submarines, but US defense attache reporting indicates that major overhaul work must still be done in the USSR. The other important Indian shipyard, Hindustan Shipyard at Vishakhapatnam, builds merchant ships up to 30,000 deadweight tons, according to international shipbuilding directories.

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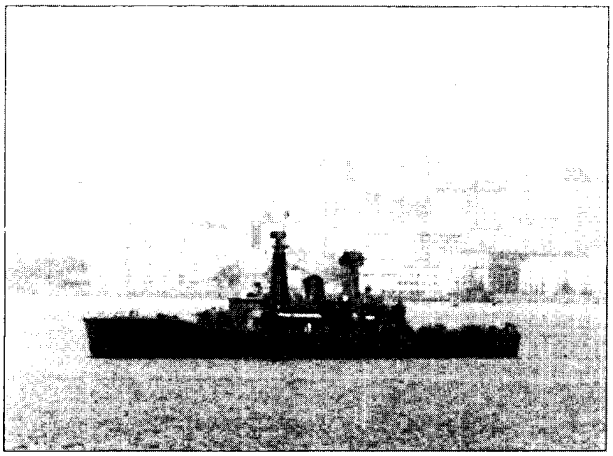

Indian-built Leander-class frigate

Jeep-mounted Indian SS-11 antitank missile

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Missiles

India manufactures air-to-air and antitank missiles under Soviet and French license agreements. Indian Government publications indicate that Hindustan Aeronautics Limited produces the Soviet AA-2 Atoll for Indian MIG aircraft, and Bharat Dynamics Limited builds the French-designed SS-11 antitank missile for the Indian Army. India is seeking to replace these old systems with newer generation French missiles.

a 15-year licensing agreement for the production of the wire-guided MILAN antitank missile system was signed by India and the Franco-German firm Euromissile in 1981, and production is scheduled to begin in 1984.

Electronics

India's growing military electronics industry produces an array of increasingly sophisticated equipment. According to our research, some of the more technologically advanced items are built under license, while many locally manufactured electronics remain dependent on imported components and raw materials. The largest manufacturer of electronic equipment is Bharat Electronics Limited, whose product line,

includes radars, fire-control systems, electronic countermeasure devices, transceivers, and troposcatter equipment. the firm also produces nearly all of the communications equipment used by the military, builds an indigenously designed IFF system for the Air Force, and plans to manufacture night-vision devices.

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Appendix C

Shortcomings in India's Defense Industry

Aircraft

India is capable of assembling and producing high-performance aircraft under foreign license, but we judge that a number of nontechnical and technical factors adversely affect the industry's capabilities. Our research indicates that these include government indecision on selecting aircraft types for production, financial constraints, and ambitions that often exceed the capabilities of both facilities and personnel. We believe HAL's designing and manufacturing activities also are handicapped by a shortage of experienced and competent designers and engineers.

India's ability to produce indigenously a high-performance fighter of Western quality, in our judgment, also is limited by technical shortcomings in the fields of metallurgy, aerodynamics, avionics, and engines. Our research indicates that the metal used in the fabrication of MIG airframes and engines contain more inclusions and porosity than metals used by Western manufacturers. In addition, we do not believe that the Indians are appropriately concerned about the effects of contact of dissimilar metals. The resulting poor metallurgical quality decreases the service life of Indian-built aircraft. Moreover, our analysis indicates that Indian machining is considerably less sophisticated and precise in cutting and forming metals than that in the West. We believe that these factors, coupled with India's lesser emphasis on clean aerodynamic design, probably result in considerable variations in performance by Western standards among MIG fighters coming off the production line. These considerations could prove to be a serious problem for India in producing Western-designed fighters but are not so critical, in our view, for the production of Soviet MIGs, which do not require so much precision machining.

Armored Vehicles

India manufactures much of its ground force equipment, but it has been unable to put its new MBT-80 tank into production despite more than 10 years of development work. In our view, the causes stem from both manufacturing and engineering problems. The technology for building advanced components and the ability to integrate these into a modern main battle tank appear to exceed current Indian capabilities. Moreover, although US defense attache reporting indicates that the Indians have developed the required advanced armor for the tank, our analysis indicates that the protection afforded by the new armor may not be as effective as claimed. India also has been unable to produce an engine powerful enough for the tank. the original specifications for the MBT-80 called for a 1,500-horsepower engine, but the Indians have been unable to develop one capable of producing more than about 400 horsepower. Other problems mentioned in the Indian press have been with the hydropneumatic suspension system and with the integrated fire-control system. The latter requires advanced microelectronics and optics that the Indians may not be able to produce reliably in quantity.

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In our view, the Indians also have had problems developing an armored personnel carrier (APC), which requires a lower level of technology and lesser manufacturing skills than those for a modern tank. Efforts during the 1970s to build an APC similar in appearance to the US M-113 failed because, we believe, the prototypes produced could not achieve the performance standards required by the Army. The APC program was shelved in 1976, and the Indian

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Indian-built armored personnel carrier

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Government has since decided to import the technology to manufacture the Soviet BMP under license,

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Warships

Indian naval shipbuilding capabilities also are limited, in our view, despite a number of successes. Although the Indians can build the hulls and superstructures of relatively large surface warships, we believe they are unable to design and produce indigenously the gas-turbine propulsion systems, electronics, and missile systems required to equip modern combatants, as evidenced by the import of this equipment. For submarines, we judge that the metallurgical and welding technology and skills necessary to fabricate pressure hulls, as well as the ability to design and produce the required hydraulic and pneumatic systems for diving, exceed India's current technological limits. Even with the licensed production of Type-209 submarines, we believe the Indians will continue to have problems in these areas and will require on-site West German supervision.

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Missiles and Electronics

These are the two weakest areas in India's defense production, in our opinion. Although India is capable of producing missiles and electronic systems, they are largely of foreign design and are mostly older generation systems. In our view, the development and manufacture of advanced missile guidance and control systems, air intercept radars, electronic warfare devices, and digital/multichannel communications equipment require more complex electronics, miniaturization, and performance reliability than Indian technology currently permits. We believe the high level of precision machining required for these systems, coupled with insufficient microelectronic skills, will continue to inhibit Indian efforts in these fields.

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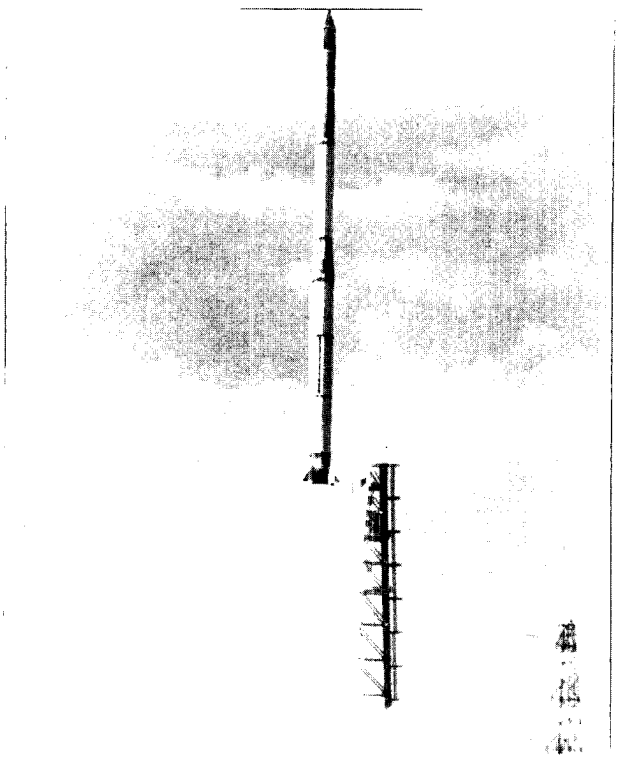

Indian SLV-3 booster launched [redacted] 25X1

We judge that India lacks the necessary guidance, reentry vehicle, and liquid-fueled rocket technologies to develop and manufacture a medium- or long-range ballistic missile during the 1980s. India's considerable investment in space technology, however, could lead to the eventual development of such a missile system, in our view. In July 1980 India successfully orbited its first earth satellite with an indigenous multistage launch vehicle, the SLV-3. The space booster technology involved in the lifting of satellites into earth orbit can be applied to the development of ballistic missiles. It is unclear [redacted] however, 25X1
whether India has begun development of the necessary guidance and reentry systems, although press accounts indicate that India has started work on developing a liquid-fueled rocket. [redacted] 25X1

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