A RAND NOTE

Global Arms Exports to Iraq, 1960–1990

Rachel Schmidt

RAND

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PREFACE

This Note documents the buildup of Iraq's arsenal since the 1960s and assesses the technological sophistication of its weapons. The Note was written before the start of the Persian Gulf war and revised in early 1991. The research was conducted under the RAND project entitled "New Realities in Global Arms Trade." The project seeks to determine the extent and nature of changing patterns in the development, production, and international trade of major high-technology weapon systems, and to assess their implications for U.S. interests and policy options.

Many countries, including new arms producers, turned to Iraq during the 1980s as a major market for their equipment. According to data from the Arms Control and Disarmament Agency, the combined purchases of Iran and Iraq during their eight-year war constituted, on average, about one sixth of the world's annual arms exports. Iraq alone imported an average of nearly 12 percent of the world total. Many foreign defense firms relied heavily on these two countries for their export sales. Some of these producers have questionable chances of economic survival if Iraq and other nations in the Middle East reduce their expenditures on weapons.

Rather than investing in original research and development by its own scientists and engineers, Iraq imported weapons components illicitly, reverse engineered and modified foreign equipment, and hired foreign specialists to conduct its research and development. Other developing countries have followed this strategy as well, and therefore the Iraqi case is an important one to review.

The research for this Note was sponsored by the Under Secretary of Defense for Policy. It was conducted by the International Security and Defense Strategy Program of RAND's National Defense Research Institute, a federally funded research and development center sponsored by the Office of the Secretary of Defense and the Joint Staff. The Note should be of interest to U.S. policy analysts seeking ways to counter the proliferation of weapons of mass destruction and to analysts of the Persian Gulf war.

SUMMARY

After the mid-1970s, Iraq diversified the countries from which it imported its weapons in an effort to lessen the leverage that suppliers could exert on it. Historically, the Soviet Union had been Iraq's primary supplier. During Saddam Hussein's presidency, however, Iraq collected a wide assortment of equipment from all over the world, including France, Brazil, and the Soviet Union. Although this diversification of sources may have produced a logistic nightmare, it gave Iraq access to highly advanced military technologies in several categories of weapons.

During the 1970s, Iran was the world's largest importer of weapons. Iraq replaced Iran as the leading arms importer during their 1980-1988 war, however, with nearly $63 billion (constant 1990 dollars) in total purchases over that period. Soviet sales constituted the major part of this value, but Iraq's ability to pay for its purchases with hard currency or through oil barter agreements made it an attractive market for many other countries as well.

In part, Iraq acquired more capable and technologically sophisticated equipment because of increased competition for arms sales. Baghdad's policy of diversification allowed it to shop for equipment that seemed more effective or appropriate for its operating environment. For example, displeased with the effectiveness of its air defenses in the early stages of the Iran-Iraq war, Iraq blamed Soviet surface-to-air missiles (SAMs), particularly SA-2s and SA-3s. It approached France about buying Crotale and Roland SAMs in late 1980. Similarly, Baghdad was able to buy advanced Austrian, South African, and even U.S.-made artillery through direct and indirect purchases to replace its vintage Soviet howitzers.

Many countries, including Western ones, were willing to arm Iraq because it opposed Iran and thereby restrained the spread of Islamic fundamentalist revolution. Additionally, the growing number of arms producers in the world gave Iraq access to various new and modified equipment.

The majority of Iraq's fighter aircraft were less capable than the combination of F-15s, F-16s, F/A-18s, and F-14s amassed by the United States and coalition members in Saudi Arabia and the Persian Gulf to counter them during the Persian Gulf war. Nonetheless, Iraq stockpiled a sizable inventory of aircraft. Soviet transfers of MiG-21s, Su-20 Fitter-Cs, MiG-23s, and MiG-27s—all fighter and/or ground-attack aircraft—accounted for the majority of supersonic aircraft that Iraq purchased between 1968 and 1978.

After 1978, when Saddam Hussein became president, Iraq purchased aircraft from a much broader list of countries, but still relied most heavily on Soviet transfers. These

included MiG-23s, MiG-27s, MiG-25s, and even 24 MiG-29 fighters in 1987. Baghdad took delivery of fewer Soviet fighters between 1979 and 1989 than it did during the previous decade, but it acquired more capable equipment. It also received over 120 Mirage F-1C (F-1EQ) fighter/interceptors from France, which it armed with Magic air-to-air missiles (AAMs) and Exocet antiship missiles (AShMs).

Between 1968 and 1978, virtually all of Iraq's land armament came from the Soviet Union: primarily T-55 and T-62 main battle tanks (MBTs), air defense vehicles, and towed guns delivered around the time of the 1973 Arab-Israeli war. After 1978, however, numerous other countries found the Iraqi market too profitable to ignore. For example, the Brazilian company Engesa sold a vast supply of Urutu armored personnel carriers (APCs) and Cascavel armored cars to Iraq both directly and indirectly through Libya. The Iran-Iraq war also became the major market for another Brazilian company, Avibras, with its Astros II multiple launch rocket system. Avibras sold SS-30, SS-40, and SS-60 rockets with the Astros II system; Iraq also produced the rockets locally.

During the late 1960s and throughout the 1970s, Iraq relied almost entirely on Soviet SA-2 Guideline and SA-3 Goa SAM systems for its air defenses. In 1977, Iraq received its first shipments of SA-6 Gainful SAMs, and around 1979-1980, it began negotiations to purchase Crotale and Roland SAM systems from France. Iraq additionally bought SA-8s, SA-9s, and Egyptian-made Sakr Eye portable SAMs during the 1980s. With these purchases, Iraq acquired air defense equipment to suit various contingencies. Some systems, such as the Crotale and Roland, have relatively advanced integrated acquisition and tracking equipment and, thus, much better accuracy than older Soviet missiles. They are also designed to deal with electronic countermeasures.

Iraq confiscated other advanced Western equipment when it invaded Kuwait on August 2, 1990. For example, Baghdad acquired U.S.-made improved tube-launched, optically tracked, wire-guided (TOW) missiles and added to its supply of high-subsonic optically teleguided (HOT) missiles—both effective antitank guided weapons. Some reports suggested that Iraq had experimented with Kuwait's air defenses, including U.S. homing-all-the-way killer (HAWK) antiaircraft missiles and radar—a system that had been modified in the mid-1980s to defeat electronic countermeasures. Baghdad also captured fast attack and coastal patrol boats from the Kuwaiti navy. Similar boats were used to lay mines and attack larger naval vessels during the oil tanker escort effort by the United States in the late 1980s.

Saddam's regime had some success in establishing Iraq's indigenous military production efforts. It took advantage of world export competition to purchase weapon components that it could not produce indigenously and hired foreign specialists to integrate

those components. However, in most categories of weapons—all aircraft, smaller tactical missiles, and most advanced armor and artillery—it imported its equipment. It also depended to a large degree on spare parts and technical assistance from abroad to keep its arsenal operational, a dependence that increased the importance of the UN embargo of Iraq.

Iraq was renowned for its ability to produce unconventional warheads, such as chemical and biological weapons, and fuel air explosives. Its stockpile of such weapons included aerosol anthrax, a disease that can cause hemorrhaging and death in humans, as well as mustard gas, tabun, and sarin, which are lethal nerve agents. Iraq was also widely acknowledged to have had a nuclear weapon research program, nine years after Israel bombed the Osirak reactor in Tuwaitha. Baghdad probably could not have manufactured a nuclear weapon for use in the Persian Gulf conflict. However, the Saddam regime did purchase centrifuge equipment from foreign companies, and it could have developed a uranium enrichment capability.

Iraq focused primarily on the ballistic missile as a delivery system, particularly modifications to the SCUD-B, which it originally received from the Soviet Union in the mid-1970s. The SCUD is plagued by poor accuracy, as most of the attacks on Tel Aviv, Riyadh, and Dhahran during the Persian Gulf war showed. Nonetheless, Saddam's regime modified SCUD-B missiles, extending their range to 375 miles in the al-Hussein version and 560 miles in the al-Abbas. Iraq also stunned the world when it tested a 1200-mile-range, three-stage rocket in December 1989, making it the first Arab nation to achieve intercontinental-range launch capability.

Liberal weapon components and arms export policies have many political and economic benefits for nations. Arms exports are a means of demonstrating special relationships between countries, enhancing the capability of allies to provide their own defense, and affecting regional stabilities. Export sales enable many nations to secure production scale economies for their own domestic procurement of modern weaponry. And exports are an important mechanism for strengthening the economic health of domestic industries.

However, as Iraq's global arms imports demonstrate, liberal arms export policies can have unintended consequences. The broad global competition for arms sales enhanced Iraq's military capabilities—capabilities that U.S. and coalition forces later faced in the Persian Gulf. Fortunately, the conflict resulted in few coalition casualties. For the future, arms exporting nations must balance the benefits derived from weapon sales against the risk that they may later have to fight an importer, such as the Saddam regime.

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ABBREVIATIONS AND ACRONYMS

AAA	antiaircraft artillery
AAM	air-to-air missile
AAV	antiaircraft vehicle
AC	armored car
ACU	acquisition and coordinating unit
AEW	airborne early warning
APC	armored personnel carrier
ARM	antiradar missile
AShM	antiship missile
ASM	air-to-surface missile
ASTT	antisubmarine torpedo tube
ASW	antisubmarine warfare
ATGW	antitank guided weapon
ATM	antitank missile
CAS	close air support
ECM	electronic countermeasures
FAC	fast attack craft
FAE	fuel air explosive
FPB	fast patrol boat
GCC	Gulf Cooperation Council
HAWK	homing-all-the-way killer [missile]
HOT	high-subsonic optically teleguided [missile]
ICP	Iraqi Communist Party
ICV	infantry combat vehicle
IQAF	Iraqi air force
IFF	identification friend or foe
IR	infrared
L	launcher
LT	light tank
MBT	main battle tank
MICV	mechanized infantry combat vehicle
Mk	mark [model number]
MRL	multiple rocket launcher
MLRS	multiple launch rocket system
MSC	coastal minesweeper
PRC	People's Republic of China
R&D	research and development
RCC	Revolutionary Command Council [Iraq]
recce	reconnaissance
SAM	surface-to-air missile
SC	scout car
ShAM	ship-to-air missile
ShShM	ship-to-ship missile
SPG	self-propelled gun
SPH	self-propelled howitzer
SShM	surface-to-ship missile
SSM	surface-to-surface missile
TD	tank destroyer
TG	towed gun
TH	towed howitzer
TOW	tube-launched, optically tracked, wire-guided [missile]
UK	United Kingdom of Great Britain and Northern Island

I. INTRODUCTION

When Saddam Hussein invaded Kuwait on August 2, 1990, much of the world united in opposition to his actions. The United Nations cooperated more than at almost any time in its history to condemn Saddam and impose economic sanctions against Iraq. Twenty-nine nations, led by the United States and members of the Gulf Cooperation Council, sent troops to the region and forced Iraq out of Kuwait in short order.

This conflict was due in part to Saddam Hussein's ability to amass a formidable arsenal of equipment, including chemical weapons, modern tanks and aircraft, and numerous missile systems. Iraq's stock of conventional and unconventional weapons gave Saddam the boldness to invade Kuwait. Although coalition forces were by all accounts superior, the casualties that Iraq might have inflicted made military opposition politically risky.

Ironically, many of the countries most vocal in their opposition to Saddam's recent actions sold weapons to Iraq over the past two decades. Often those arms transfers made strategic sense, as in the case of Middle Eastern nations that feared the spread of Islamic fundamentalism from Iran. And the enormous value of arms purchases by both Iran and Iraq during their eight-year war provided many countries with hard currency and oil in return for their weapons. But the sale of that military equipment, in turn, could have limited the military options of anti-Saddam forces. Which nations provided weapons to Iraq, and what types of equipment did Saddam's regime purchase?

After the mid-1970s, Iraq pursued a policy of diversifying the countries from which it bought its weapons in an attempt to reduce the leverage that its suppliers could exert over it. Historically, the Soviet Union had been Iraq's primary supplier. Changes in Soviet policy in the mid-1970s and again in the early 1980s, however, made supplies appear less reliable than suited Iraq. After Saddam's rise to the presidency in 1978, Iraq collected a wide assortment of equipment from all over the world, including French, Brazilian, and Soviet designs. Although this policy may have produced a logistic nightmare, it gave Iraq access to highly advanced military technologies in some categories of weapons.

Prior to the 1991 Persian Gulf war, Iraq possessed minimal self-sufficiency in the production of most types of arms. The launch of a three-stage rocket in December 1989 demonstrated, however, that Iraq could have overcome its dependence on foreign suppliers. Saddam's regime was allegedly able to double the range of its Soviet-supplied SCUD-B ballistic missiles for use during the 1988 "war of the cities" with Iran.

With the help of Egyptian, Argentine, Brazilian, and West European engineers, Iraq developed its own missile production capability. By reverse engineering and modifying Soviet equipment, it produced artillery systems—some capable of firing unconventional payloads. This degree of self-sufficiency has, of course, been stymied by the economic embargo and the war itself. With the damage inflicted on Iraq by coalition bombings, few of its weapon production facilities are likely to remain intact or to be rebuilt quickly.

This Note describes the flow of weapons to Iraq from the late 1960s until the start of the Persian Gulf war and assesses the technological sophistication of these systems. Because this research relies on open-source literature, the reader should approach data present here with skepticism. While information on the types of systems transferred is accurate, data on the number of units exported and their dollar value are estimates.

Section II provides background on Iraq's political alliances as context for historical information about its arms suppliers. Section III describes broad trends in the number and type of weapons that Iraq imported over time. Section IV addresses the level of technological sophistication Iraq obtained from its imports in two categories of weapons: fighter aircraft and surface-to-air missile systems. Section V describes Iraq's indigenous weapon production capability held before the Gulf war, and Sec. VI draws some conclusions about the role of global export competition in building Iraq's former military capabilities.

Appendix A lists Iraq's arms purchases since the 1960s, as given in the Stockholm International Peace Research Institute's *SIPRI Yearbook* series.[1] Appendix B shows Iraqi and Kuwaiti inventories of military equipment held prior to the war, as estimated by the International Institute for Strategic Studies. Finally, App. C gives U.S. government estimates of the dollar value of Iraq's arms imports.

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[1]*SIPRI Yearbook: World Armaments and Disarmament* (London: Taylor & Francis, various years).

II. TRENDS IN IRAQI ARMS SUPPLIES

The buildup of Iraq's arsenal over the past three decades needs to be understood in the broader context of its political development. Present-day Iraq contains a large portion of what is known as the Fertile Crescent, a region extending from the Mediterranean to the Persian Gulf through the valleys of the Tigris and Euphrates rivers (Mesopotamia). Historically, foreign powers have sought to control Iraq because of its proximity to Persian oil supplies and its warm water ports, which provided trade routes to India and Asia. These same conditions make it a region of economic and geostrategic importance today.

Over the course of its history, Iraq has been ruled by the Persians, Greeks, Romans, Arabs, Mongols, Ottomans; after World War I it fell under British mandate. Islam came to the region in the seventh century A.D., when followers of Mohammed defeated the Persian rulers. The majority of the area's people gradually accepted the conquerors' language and religion and have considered themselves Arab ever since.

Iraq was part of the Provinces of Baghdad and Basra in the Ottoman Empire from the sixteenth century until 1918. Ottoman rulers had difficulty establishing control over the indigenous tribes of this easternmost frontier of the empire, as well as fighting off incursions by Kurds and Shi'ite Persians. During the latter part of the Ottoman reign, the influence of West European countries and Russia began to grow and their economies became more industrialized. Britain, France, and the United States all wanted to tap into Middle Eastern oil resources, first in Persia and later in other Arab countries as well. Additionally, Britain wanted to maintain links to Iraq to ensure its access to India.

Kuwait, which had also been part of the Province of Basra, was made a British protectorate in 1899 and gained its independence in 1961. Iraq's territorial claims to Kuwait can be traced to its roots in the Ottoman Empire. Since 1899, several Iraqi leaders have argued that the British illegally drew and imposed boundaries and that Kuwait is actually a province of Iraq.

The Ottomans developed strong relations with Germany and eventually sided with it in World War I. After the defeat of the Germans, the Allied Powers arbitrarily drew borders dividing up the Ottoman Empire. Iraq and Palestine came under British mandate and Syria under French control. Iraq was set up as a Hashemite monarchy in 1921, and Prince Feisal, who traced his lineage to Mohammed, was made king—in part for his support of the British during World War I. As currently drawn, Iraq's borders contain diverse ethnic and religious groups, including the Kurds and Shi'as, often with antagonistic interests. Border disputes

and internal struggles for governmental legitimacy are two legacies of its origins that continue to drive Iraq's national security planning. Resentment of imperialism and foreign control is another legacy.

The British mandate ended in 1932 and Iraq established its independence. Britain agreed to this arrangement after it had been reassured of continued influence in the form of a mutual assistance pact, the Anglo-Iraqi Treaty of 1930. Close Iraqi ties to the West continued into the late 1950s, and British influence included every aspect of the Iraqi military—organizational structure, training, and equipment.[1] Iraq sent many of its officers to Britain for training, and its pilots to India.[2]

A series of military coups began in 1936, and by 1939 Iraqi governmental authority was in the hands of two rival blocs: one pro-British and the other pro-German. Rashid Ali al-Gailani, head of the pro-German group, established relations with the Axis Powers and took control of the monarchy in a 1941 coup. This prompted Britain to send troops to Basra and, despite popular support for the Iraqi army because of the intervention, Rashid Ali fled the country.

Britain withdrew all of its troops from Iraq by October 1947, but British airplanes were based at Habbaniyah as late as 1959.[3] As part of their mutual assistance treaty, Britain supplied Baghdad with de Havilland Venom and Hawker Hunter combat aircraft, as well as Centurion tanks. Iraq opposed the establishment of Israel in 1948, but nonetheless it maintained a pro-Western orientation until the late 1950s. In 1955, it reaffirmed this position by signing a mutual assistance treaty with Turkey, the Baghdad Pact, which Britain, Iran, and Pakistan later joined. During the same period, the United States sold Iraq five North American F-86 Sabre fighter aircraft and a small number of M-24 light tanks under a military assistance agreement.[4]

The 1950s brought the rise to power of the Free Officers' Movement in Egypt and the presidency of Gamal Abdel Nasser. Nasser sought to rid Egypt of British and French influence—a sentiment underscored by British and French support of Israel—and he criticized the Arab states that had joined the Baghdad Pact. In 1955, Nasser concluded an

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[1] Richard Nyrop, ed. *Iraq: A Country Study* (Washington, DC: Foreign Area Studies, The American University, 1979), p. 250.

[2] Nyrop, p. 250. The Indian Air Force also trained Iraqi pilots during the late 1960s and early 1970s. Major Ronald E. Bergquist, *The Role of Airpower in the Iran-Iraq War* (Maxwell AFB, AL: Air University Press, 1988), p. 20.

[3] *The Europa World Yearbook 1990, Vol. I* (London: Europa Publications, Ltd., 1990), p. 1360. Bergquist, p. 19.

[4] SIPRI, *The Arms Trade with the Third World* (New York: Humanities Press, 1971), pp. 554-555, 842-843.

arms agreement with Czechoslovakia for Soviet equipment worth between $90 million and $200 million.[5] This supply of weaponry, however, did not translate into as much leverage over Egyptian affairs as Moscow sought; for example, the regime was openly hostile to the Egyptian Communist Party. Nasser's nationalist movement and his ability to keep foreign influence in check was a strong inspiration to some members of the Iraqi military.

Under Nasser, Egypt ejected British forces, supported Algerian rebels who fought against French colonialism, and opposed Israel. Finally, the nationalization of the Suez Canal led to the Anglo-French-Israeli invasion of the Sinai in October 1956. Meanwhile, Iraq, under Prime Minister Nuri as-Sa'id, had been rivaling Egypt for influence over Syria, Jordan, and Lebanon. The actions of the British during the Suez crisis, however, undercut Sa'id's position, and support for the Baghdad Pact faltered within Iraq.

In the late 1950s, the Soviets supplanted British influence over Iraq. In 1958, General Abd al-Karim Kassem led a military coup against the Hashemites, benefiting from growing anticolonialist and antimonarchial sentiment within Iraq. However, Kassem's government suffered from frictions between Pan-Arab and pro-Nasser factions and the Iraqi Communist Party (ICP). Relations with the USSR were established during this period, and the Soviets quickly filled the void as Iraq's arms supplier, sending MiG-17 and Il-28 aircraft, as well as a military training mission, in November 1958.[6]

Also in 1958, Nasser persuaded Syria to join with Egypt in forming the United Arab Republic (UAR). Pro-Nasser factions in Iraq demanded that it join the UAR as well, but the ICP countered their influence. The extent of ICP influence led some to believe that the Kassem government was itself communist. This prompted a series of assassination attempts, including one in October 1959 in which Kassem was shot and wounded. It was conducted by pro-Nasser Ba'athist forces and included a young Saddam Hussein. Kassem survived, however, and hopes for a broader UAR were dashed when Syria seceded from it in 1961.

Kassem was finally overthrown in a 1963 coup staged by the Arab Socialist Renaissance Party (Ba'athists) with the support of pro-Nasser army officers under Colonel Abd as-Salem Muhammad Aref. Radical factions among the Ba'athists drew the ire of the Soviet Union in the early days of the new regime by killing thousands of members of the

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[5]Jon Glassman, *Arms for the Arabs: The Soviet Union and War in the Middle East* (Baltimore, MD: The Johns Hopkins University Press, 1975), p. 10.

[6]Andrew Pierre, *The Global Politics of Arms Sales* (Princeton, NJ: Princeton University Press, 1982), p. 193. Bergquist, p. 19.

ICP.[7] Moscow responded by suspending weapon supplies. Aref took over the government seven months later, and Soviet supplies were reinstated in June 1964.

Although Iraq continued to rely primarily on Soviet equipment, the Aref government sought other suppliers as well. The government subseqently negotiated with Britain for Hawker Hunter and Jet Provost aircraft for use against Kurdish insurgents through 1966.[8]

Iraqi forces did not fight in the six-day war of June 1967, but troops were stationed in Jordan and Syria on a long-term basis and anti-Zionism was used to justify increased arms purchases. Anger against Western allies of Israel moved the Aref regime to expropriate oil assets, including the North Rumaila oil field from the British-based Iraq Petroleum Company in 1966.

Despite anti-Western sentiment, France was able to maintain relatively good relations with Iraq. The basis of France's role as a major arms supplier to Iraq can be traced in part to its lack of ties with Israel and its policy in the late 1960s of paying higher prices for oil exploration rights. France submitted a proposal to develop the North Rumaila region, but was turned down in 1968 in order to let the Iraq National Oil Company do the work itself, after the Soviet Union promised technical assistance.[9] Iraq also explored the possibility of purchasing French arms in 1968, notably Mirage aircraft. The talks resulted only in the sale of helicopters, but they laid the groundwork for negotiations in the 1970s that led to other arms transfers, including Mirage F-1C fighter aircraft.

In 1968, ar-Rahman Muhammad Aref succeeded his brother, who had died in an air crash, but he was quickly replaced by a Ba'athist regime. Major General Ahmad Hassan al-Bakr was named simultaneously president, prime minister, and chairman of the Revolutionary Command Council (RCC), a body that has historically held supreme authority in Iraq. In 1969, Saddam Hussein was one of several civilian members added to the RCC as part of an effort to ensure civilian control over Iraq's military.[10]

In 1969, the shah of Iran abrogated a 1937 treaty governing the boundary along the Shatt-al-Arab waterway, cutting off Iraq's access to the Persian Gulf. According to the 1937 treaty, Iraq retained exclusive navigational rights to the Shatt-al-Arab with the exception of a few anchorage areas. Iran and Iraq had frequent disputes over this border, and Tehran

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[7]Francis Fukuyama, *The Soviet Union and Iraq Since 1968* (Santa Monica, CA: RAND, N-1524-AF, 1980), p. 25.

[8]Bergquist, p. 20.

[9]Peter R. Odell, *Oil and World Power* (New York: Penguin Books, 1979), p. 231.

[10]Fukuyama, p. 31.

argued for division at the midpoint of the river—a division that would allow Iraq shipping rights to the Persian Gulf.

As tensions rose between the two countries, Iraq situated the majority of its troops along their common border. Other troops were sent to quell Kurdish insurgents. And Iraq had other security contingencies to cover as well—four of its sixteen brigades were stationed in Jordan and Syria to counter Israel. These events led Iraq to believe that its military resources were inadequate to face its perceived threats.

A dramatic increase in Iraq's oil revenues, the arming of the shah of Iran with modern U.S. weaponry, and the October 1973 war led the Iraqi government to a closer relationship with Moscow and a subsequent buildup of its arsenal with Soviet equipment. Iraq signed a 15-year treaty of friendship and cooperation with Moscow in 1972 in which the two countries agreed to "continue to develop cooperation in the strengthening of the defense capabilities of each."[11] The Ba'athist regime expanded Iraqi military forces from 80,000 to 100,000 between 1968 and 1973 and then to over 200,000 by 1978.[12]

In mid-1975, however, Moscow decided to limit arms deliveries to Baghdad. Among other reasons, the Soviet Union was displeased with Iraq's rapprochement with Egypt at a time when Moscow sought to isolate Sadat,[13] as well as with Iraq's growing rivalry with the Ba'athist regime in Syria.[14] Iraq responded by negotiating a sizable purchase of French weapons. In 1976, Iraq also signed an agreement with France to purchase a thermal nuclear reactor to be built in Tuwaitha, near Baghdad.[15] The Soviet Union resumed its arms agreements with Iraq in mid-1976, probably because it realized that a longer embargo would further erode any leverage that it held over Baghdad.

In 1979, Saddam Hussein succeeded al-Bakr as president of Iraq and chairman of the RCC, although most observers had assumed that he already held ultimate power.[16] Also in 1979, Iraq's minority Sunni government became concerned about the Shi'ite fundamentalist

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[11]Nyrop, p. 250.

[12]Nyrop, p. 239. John Devlin, "Iraqi Military Policy: From Assertiveness to Defense," in Thomas Naff (ed.), *Gulf Security and the Iran-Iraq War* (Washington, DC: National Defense University Press, 1985), p. 132.

[13]Egypt began to establish ties with the United States after the 1973 war, and the Soviet Union feared that its influence in the region would be reduced if other Arab states followed suit.

[14]Fukuyama, pp. 46-51. Iraq later reversed itself on both accounts. It mended its relations with Syria after a visit from President Assad in 1978 and broke relations with Egypt after the Camp David Accord.

[15]Devlin, pp. 133-134. Israel bombed the Osirak reactor in 1981, following reports that Iraq was making weapon-grade plutonium.

[16]*Europa Yearbook 1990*, p. 1360.

revolution in Iran, as did most Arab states. Shi'ite Muslims constitute over half of Iraq's population, and the government feared that fundamentalist fervor would spread to them.

Iraq also became increasingly dissatisfied with the 1975 Algiers Accord, which it had signed with Iran and in which it acceded to Tehran's border claims over the Shatt-al-Arab waterway. Iran, in return, had agreed to cease support for Kurdish insurgents in northern Iraq. After a series of border skirmishes and failed diplomatic attempts, Iraq officially abrogated the Algiers Accord in September 1980 and moved ground forces to recover the Shatt-al-Arab two days later.

Initially, Saddam hoped to advance into Iranian cities and the oil-rich Khuzistan province so as to negotiate from a position of power over his claims to ownership of the Shatt-al-Arab. However, Iranian bombing of Iraqi oil assets made this tactic impossible. Iraq was fighting a war with limited strategic aims—primarily, control over access to the Gulf—while the Khomeini government's motives were ideological and it was willing to pay heavily to depose the Saddam regime.[17] Iraq made offers of conciliation from time to time, but Iran always made the removal of Saddam a precondition for cease-fire.

The war became one of attrition, pitting the larger Iranian force against the superior quality and quantity of Iraqi military equipment. A series of Iraqi military successes in the later stages of the war led to a cease-fire agreement in August 1988. The costs of this war were phenomenal in terms of human life, economic welfare, and the precedent-setting use of chemical weapons by Iraq.

As events leading to the Iran-Iraq war were unfolding, Soviet-Iraqi relations deteriorated dramatically as a result of the Soviet invasion of Afghanistan in December 1979. Saddam's regime feared that events in Kabul might repeat themselves elsewhere. It subsequently cracked down on the ICP and later severely criticized the Soviet intervention.[18] In January 1980, Iraq voted in favor of a United Nations resolution condemning the Soviet action and called for immediate removal of Soviet forces.[19]

Moscow, in turn, suspended arms shipments to Iraq, keeping the ban in place until 1982.[20] By this time, however, Iraq had cultivated alternative arms suppliers. In addition to purchases of French aircraft, attack helicopters, and missiles, Iraq began acquiring missiles and armored personnel carriers (APCs) from Brazil, naval vessels from Italy, Soviet-designed tanks and artillery from Warsaw Pact countries, including Poland and Romania.

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[17]Bergquist, pp. 29-39.

[18]Devlin, p. 147.

[19]Fukuyama, p. 69.

[20]Devlin, p. 147. *Europa Yearbook*, p. 1361.

Iraq's stance against Iran resulted in financial and military support from other Arab states, despite the fact that its earlier attempts at leadership of the Arab community had failed. Khomeini's insistence that a fundamentalist version of Islamic rule was the only acceptable type scared all of the regional Arab governments but Syria; it became a major motivation for the formation of the Gulf Cooperation Council (GCC) in 1981.[21] Many Arab states agreed to finance Iraq's war efforts through the sale of a portion of their oil production. Jordan supplied Baghdad with equipment, including artillery that it had purchased from the United States. Saudi Arabia and Kuwait transferred tanks and artillery from their arsenals to Iraq's.

Iraqi relations with Egypt underwent a dramatic reversal during the 1980s. After the Camp David Accord between Egypt and Israel of 1978-1979, Iraq led the Arab boycott against Egypt. It later reversed itself and helped initiate the reintegration of Egypt into the Islamic Conference Organization and the Arab League in 1984. Egypt showed signs of support for the Iraqi war effort during visits to Cairo of Iraqi military delegations, as well by early weapon sales.[22]

By the late 1980s Egypt was supplying Baghdad with APCs, Soviet main battle tanks (MBTs), surface-to-air missile (SAM) systems, and fighter aircraft. Egypt, along with Argentina, also supported Saddam's indigenous ballistic missile development program, known as the Condor II or Badr 2000.[23] In addition, thousands of Egyptian workers went to work in Iraqi oil and agricultural production, freeing Iraqi manpower for the war with Iran.[24]

Although the United States did not directly transfer weapons to Iraq, in the mid-1980s it supplied Baghdad with commodity credits and financial assistance totaling $2.5 billion to complete its oil export pipeline projects.[25] This followed a late 1983 visit to the United States by Baghdad officials, who argued that the Iraqi economy was near ruin because of Iran's closure of the Persian Gulf to its oil exports. The United States, which did not want to see an Iranian victory, finally reestablished full diplomatic ties with Iraq in 1984, 17 years after they were broken off during the 1967 war.[26]

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[21]Devlin, p. 148.

[22]Philip H. Stoddard, "Egypt and the Iran-Iraq War," in Thomas Naff (ed.), *Gulf Security and the Iran-Iraq War* (Washington, DC: National Defense University Press, 1985), p. 46.

[23]James Bruce, "Assessing Iraq's Missile Technology," *Jane's Defence Weekly* (23 December 1989), p. 1371.

[24]Stoddard, pp. 49-50. Some Egyptian workers were rumored to have been forcibly conscripted into the Iraqi army.

[25]*Europa Yearbook*, p. 1361.

[26]Harold Saunders, "The Iran-Iraq War: Implications for U.S. Policy," in Thomas Naff (ed.), *Gulf Security and the Iran-Iraq War* (Washington, DC: National Defense University Press, 1985), p. 72.

Table 1 summarizes key Iraqi political events and arms suppliers.

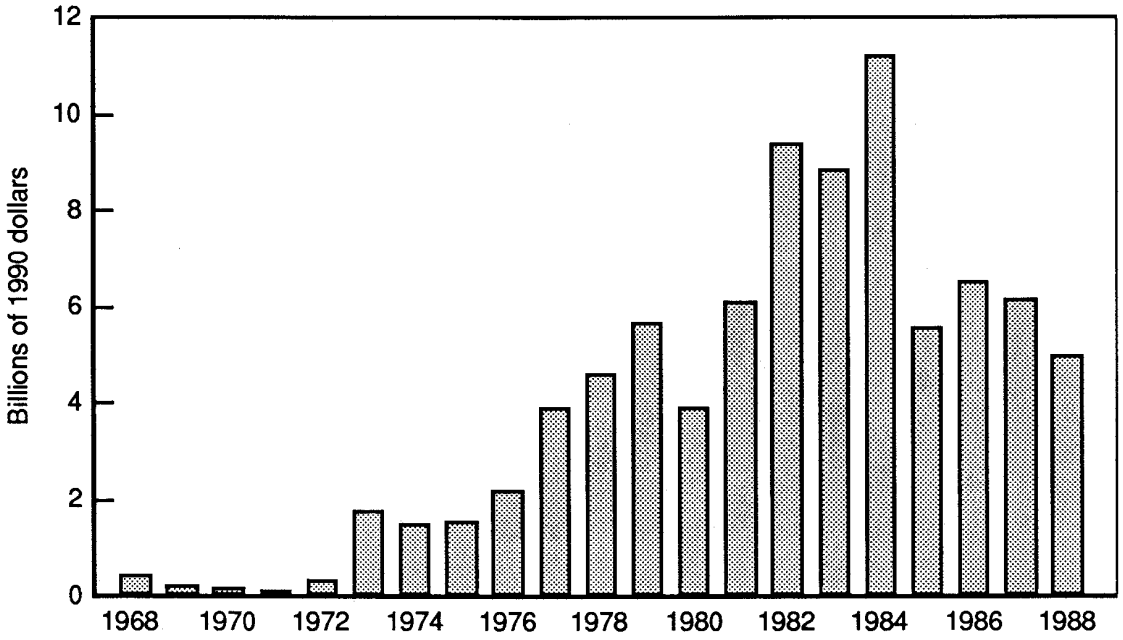
Table 1

KEY IRAQI POLITICAL EVENTS AND ARMS SUPPLIERS, 1920-1988

Year	Political Event	Arms Supplier(s)
1920	Iraq set up as a monarchy and administered by Great Britain under a League of Nations mandate.	Great Britain
1932	Iraq recognized as fully independent; British install Feisal as king. Anglo-Iraqi Treaty of Alliance signed in 1930.	UK
1955	Baghdad Pact reaffirms Iraqi ties to the West.	UK, U.S.
1958	Monarchy overthrown by military coup. Abd al-Karim Kassem head of nationalist regime.	USSR
1963-1966	Ba'athist element of the military stages a coup: Kassem killed. Abd as-Salem Muhammad Aref new head of government, later succeeded by his brother.	USSR, UK
1968-1972	Ba'athist Party seizes control in 1968. Ahmad Hassan al-Bakr becomes president and prime minister. Supreme authority vested in the Revolutionary Command Council (RCC). Substantial buildup of military forces and weaponry following the 1967 war.	USSR, France
1972-1975	Iraqi-USSR Treaty for Defense Assistance signed. Dramatic increase in oil revenues, October 1973 war, and Iranian purchases of U.S. arms lead to even faster military buildup, supplied primarily by USSR.	USSR, France
1975-1978	Moscow's embargo of weapons to Iraq leads to increased purchases of French arms. A policy of diversifying Iraq's arms suppliers articulated in 1978.	USSR, France
1979	Saddam Hussein succeeds al-Bakr as chairman of the RCC and president of Iraq. Shi'ite fundamentalist regime overthrows Pahlavi dynasty in Iran.	USSR, France, Brazil, Czechoslovakia, Egypt, FRG, Italy, Sudan, Switzerland
1980-1988	Iran-Iraq war. Broad use of weapons of mass destruction against civilian populations; heavy use of artillery and air power against strategic targets, such as oil production facilities. Wide diversification of arms suppliers.	USSR, France, Austria, Brazil, PRC, Czechoslovakia, Egypt, FRG, GDR, Hungary, Italy, Jordan, Kuwait, Libya, Poland, Saudi Arabia, South Africa, Spain, Switzerland, UK

III. VALUE AND TYPES OF ARMS TRANSFERS

Figure 1 shows the value of arms deliveries to Iraq, 1968-1988, as estimated by the U.S. Arms Control and Disarmament Agency (ACDA). Because these values represent actual deliveries of weapons rather than sales agreements or orders placed, buildups lag behind the political events outlined in Table 1, above. Nonetheless, the events are reflected in the data—post-1967 war purchases by the al-Bakr regime, a noticeable increase after the 1972 Iraqi-Soviet treaty, and even larger purchases during the late 1970s, when Iraq began diversifying its suppliers. And of course the 1980s, which were dominated by the Iran-Iraq war, show even further growth.



SOURCE: *World Military Expenditures and Arms Transfers* (Washington, DC: ACDA, various years). Values are estimated *deliveries* of weapon systems rather than the value of *orders* placed for arms. A distinction is drawn between the two because some weapon orders are not delivered.

Fig. 1—Value of Iraqi arms imports, 1968–1988

The value of arms deliveries did not always increase over the past decade, as evidenced by sizable drops in 1980, 1983, and 1988. However, deliveries over the 1980-1988 period average about $7 billion annually (in 1990 dollars); a comparable average for the 1970s was about $2.2 billion annually. The enormous value of deliveries to Iraq helped to make the

Middle East the largest arms-importing market throughout the 1980s, and Iraq was consistently the single largest importing country in both the region and the world.[1]

During the 1970s, when Iran was the world's largest importer of weapons, it received about 35 percent of the value of its imports from the United States. However, North Korea and the People's Republic of China (PRC) became Iran's dominant suppliers during the Persian Gulf war. Iraq replaced Iran as the world's leading arms importer in the 1980s with nearly $63 billion (in 1990 dollars) in total purchases from 1980 to 1988. Soviet sales constitute the majority of this value, but Iraq's ability to pay for its large purchases with hard currency or through oil barter agreements made it an attractive target for dozens of other countries as well. According to ACDA, France was Iraq's second largest arms supplier, followed by the PRC.[2] Although data are available only through 1988, newspaper accounts of illicit weapon shipments suggest that Iraq's large purchases continued past the Iran-Iraq war cease-fire.[3]

According to ACDA data, Iran and Iraq, during their war, together purchased about one sixth of the world's annual arms exports. Iraq alone imported an average of nearly 12 percent of the world total. The Congressional Research Service (CRS) reports that arms sales *agreements* with Iraq and Iran accounted for over one fifth of all arms trade agreements with the Third World from 1981 to 1988.[4] Thanks mainly to sales during the Iran-Iraq war, the PRC emerged as a leading arms supplier during the 1980s. In fact, Iran and Iraq accounted for over 61 percent of the value of all Chinese arms export agreements with the Third World. As is the case for Brazil and perhaps as many as 26 other countries, the PRC supplied weapons to both countries during their war, providing approximately 15 percent of the value of their collective arms import agreements from 1981 to 1988. The Soviet Union's share, sold almost exclusively to Iraq, was 32 percent.[5]

Figure 2 shows the value of total *deliveries* to Iran and Iraq from 1981 to 1988, as estimated by CRS. Because the data were published as aggregate figures rather than annual values, they have not been adjusted for inflation and are reported as current dollar totals. Clearly, the Soviet Union supplied the largest value of weapons to the combatants, and Iraq

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[1] *World Military Expenditures and Arms Transfers 1988* (Washington, DC: ACDA, 1988), pp. 7, 21.

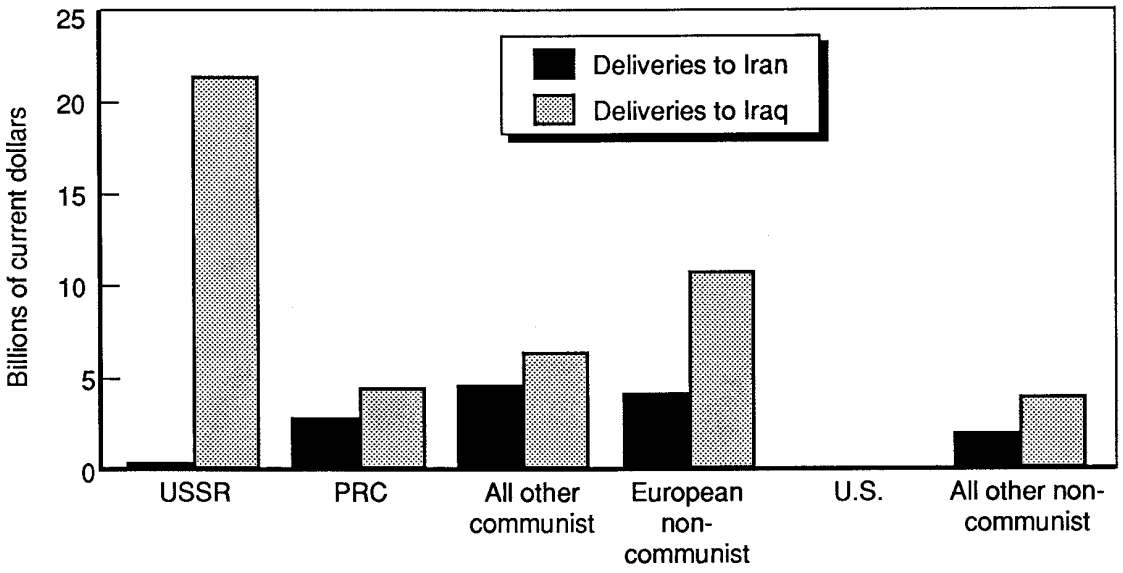
[2] *World Military Expenditures and Arms Transfers 1988*, p. 22.

[3] See, for example, Geraldine Brooks and Tony Horwitz, "Iraq Buying Spree on Arms Bodes Ill for Its Neighbors," *Wall Street Journal* (23 April 1990), p. 10.

[4] Richard Grimmett, *Trends in Conventional Arms Transfers to the Third World by Major Supplier, 1981-88* (Washington, DC: Congressional Research Service, 1989), p. 4. The Third World is defined as all countries other than those that belong to NATO, those that belong or formerly belonged to the Warsaw Pact, Europe, Japan, Australia, and New Zealand.

[5] Grimmett, p. 4.

imported far more arms than did its opponent. CRS reported deliveries from the United States as zero, a figure that did not include the covert export of missiles during the Iran-Contra affair in 1985-1986. According to the Tower Commission Report, however, approximately $35 million was paid to the United States and Israel for transfers of tube-launched, optically tracked, wire-guided (TOW) antitank and homing-all-the-way killer (HAWK) surface-to-air missiles, as well as HAWK spare parts.[6]



SOURCE: Richard Grimmett, *Trends in Conventional Arms Transfers to the Third World by Major Supplier, 1981–88* (Washington, DC: Congressional Research Service, 1989). Values of U.S. covert deliveries to Iran in 1985–1986 are not included.

Fig. 2—Value of arms deliveries to Iran and Iraq, 1981–1988

Estimates of the number of weapon systems exported to Iraq are difficult to find in unclassified sources. When available, these figures are typically aggregated for an entire region rather than country by country. For example, Figs. 3 and 4 depict the respective number of aircraft and land armaments exported to the entire Middle East over the 1983-1987 period, as estimated by ACDA.[7] Because these charts are presented in terms of units, current-generation U.S. main battle tanks, for example, are counted equally with post-World War II Soviet tanks despite large differences in the quality of equipment.

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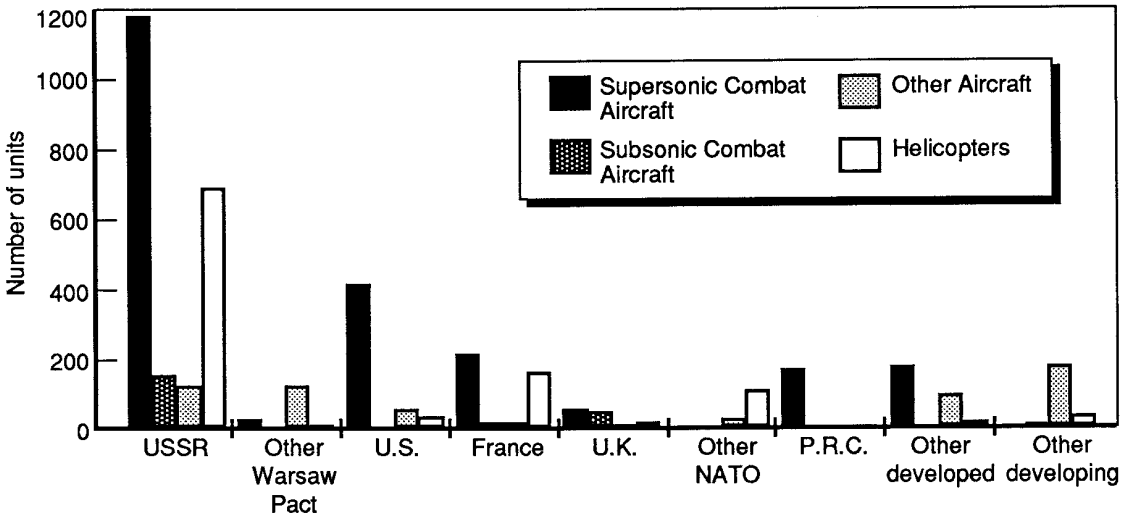
[6]John Tower, Chairman, *The Tower Commission Report* (New York: Bantam Books, Inc., and Time Books, Inc., 1987).

[7]The Middle East here includes Bahrain, Cyprus, Egypt, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syria, the United Arab Emirates, Yemen (Aden), and Yemen (Sanaa).

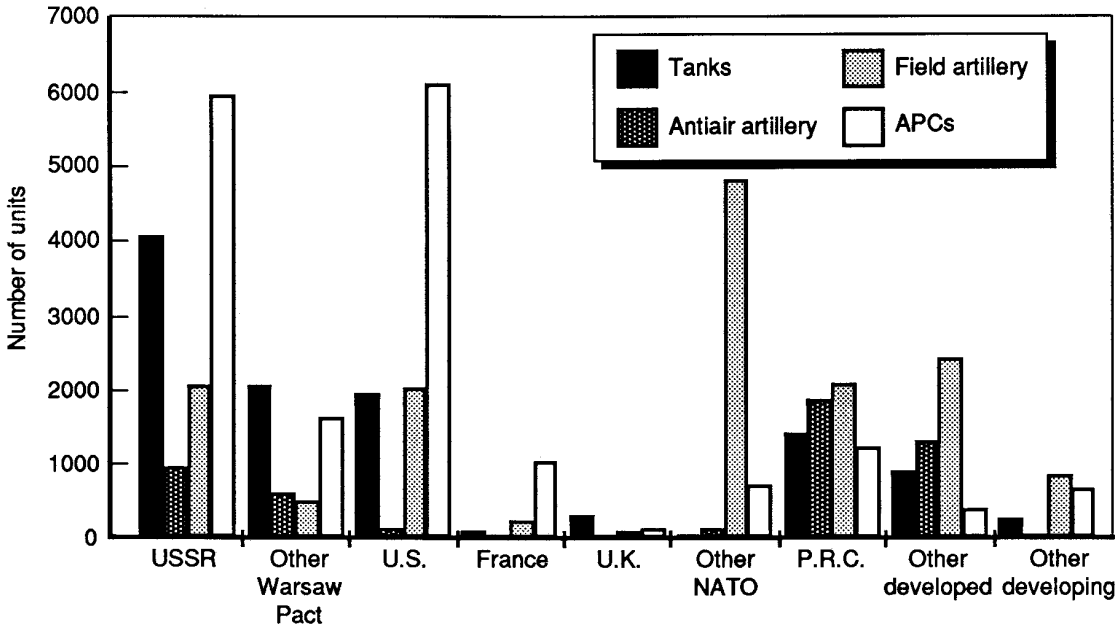


SOURCE: *World Military Expenditures and Arms Transfers, 1985 and 1988* (Washington, DC: ACDA, 1985 and 1990). Other aircraft include trainer, transport, reconnaissance, and communications/utility. Helicopters include both combat and transport types.

Fig. 3—Total aircraft delivered to the Middle East, 1979–1988

As Fig. 3 shows, the Soviet Union surpassed other suppliers in virtually all categories of aircraft: supersonic and subsonic combat; other aircraft (reconnaissance, training, transport, and utility); and helicopters. Other Warsaw Pact countries exported primarily trainers and transports. The United States supplied sizable numbers of supersonic aircraft, particularly to Israel and Egypt. France exported supersonic Mirage aircraft and attack helicopters to the region, while China began supplying its version of Soviet-designed MiGs (like its F-7) to Egypt during this period.

Among units of land armament, Fig. 4 shows that between 1979 and 1988 the Soviet Union and Warsaw Pact transferred large numbers of units, especially tanks and APCs. NATO countries other than the United States, France, and the UK accounted for the largest number of field artillery shipments. China was a surprisingly large supplier in all categories of equipment—tanks, antiaircraft artillery, field artillery, and APCs. The United States also exported a large number of tanks, field artillery pieces, and APCs to the region—again primarily to Israel and Egypt. Notice the large number of APCs, field artillery pieces, and even tanks transferred from developing countries other than the PRC.



SOURCE: *World Military Expenditures and Arms Transfers, 1985 and 1988* (Washington, DC: ACDA, 1985 and 1990). Tanks includle light and main battle tanks, self-propelled assault guns, and self-propelled artillery. APCs include armored and amphibious personnel carriers, armored infantry fighting vehicles, reconnaissance and command vehicles.

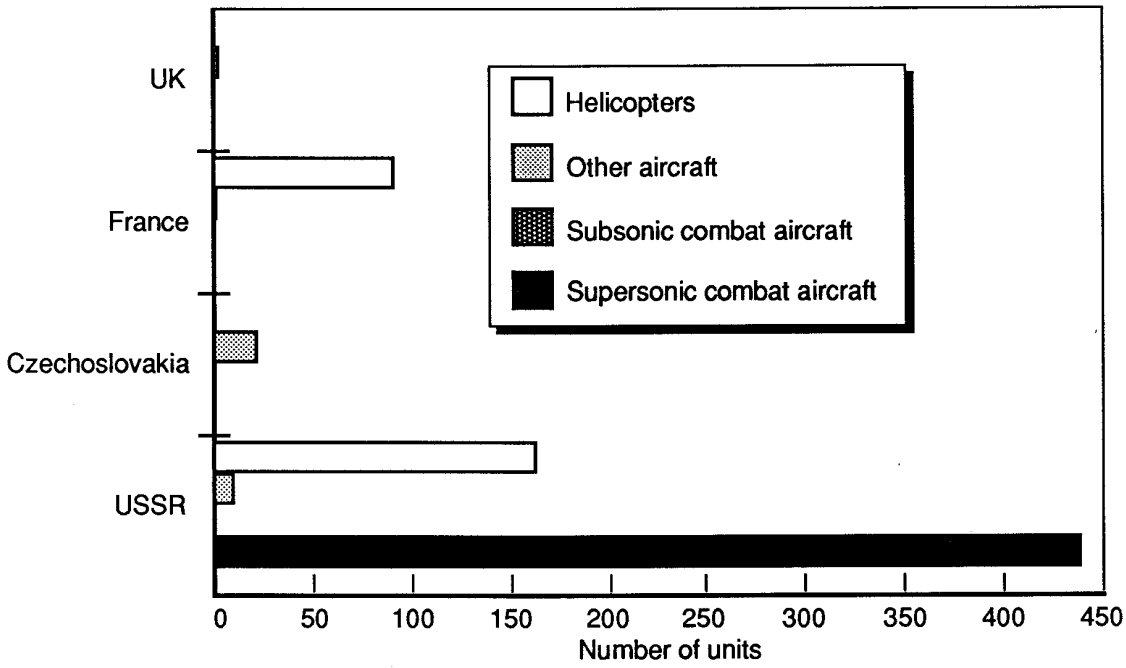
Fig. 4—Total land armament delivered to the Middle East, 1979–1988

Figures 5 through 8 graph data on arms deliveries to Iraq, taken from the *SIPRI Yearbook* series.[8] These four figures estimate the number of units delivered, rather than units agreed upon in sales contracts. Appendix A provides detailed tables on Iraqi imports of armored vehicles and artillery, fixed-wing aircraft, helicopters, missiles, naval equipment, and some radars. As the tables in App. A show, some deliveries shown in Figs. 5-8 were not confirmed.

Figure 5 depicts the number of aircraft units delivered between 1968 and 1978, according to SIPRI estimates. Soviet transfers of MiG-21Fs, MiG-21MFs, Su-20 Fitter-Cs, MiG-23BNs, and MiG-27s—all fighter and/or ground attack aircraft—constitute the majority of supersonic aircraft Iraq purchased during this period. With the exception of about 30 early 1960s-vintage Hunter fighter/striker aircraft received from the British, the USSR was Iraq's

[8]*SIPRI Yearbook*: *World Armaments and Disarmament* (London: Taylor & Francis, various years). SIPRI's Arms Trade Project, from which the charts are derived, is a large-scale data-collection effort on world arms transfers. Because SIPRI relies entirely on open publications and unclassified intelligence reports, many in the U.S. intelligence community question its accuracy and completeness. Nonetheless, the "Arms Trade Tables" published as part of the *SIPRI Yearbook* are one of the best unclassified sources for data on arms transfers.

sole supplier of fixed-wing combat aircraft prior to the 1980s.[9] Baghdad purchased a limited number of other aircraft from Czechoslovakia (L-39 Albatross trainers), the UK (BN-2A Islander transports), and France (Mystere-20 transports). Iraq bought Alouette III combat helicopters from France, as well as Mi-4s, Mi-6s, and Mi-8s from the USSR.



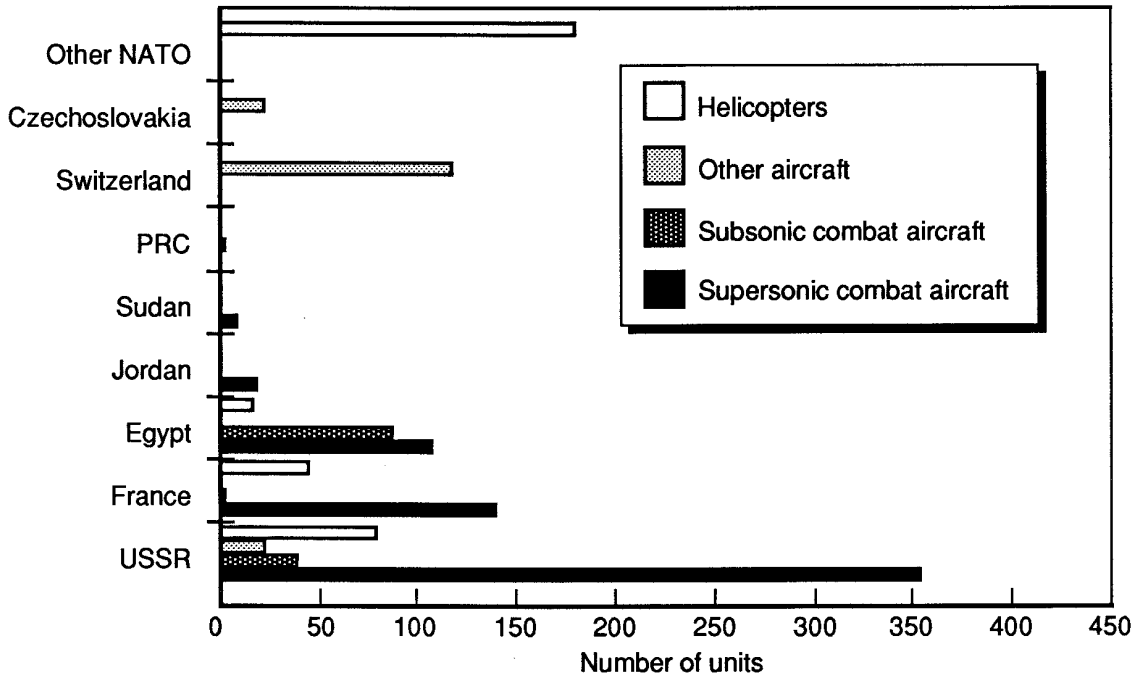
SOURCE: *SIPRI Yearbook: World Armaments and Disarmament* (London: Taylor & Francis, various years). Other aircraft include trainer, transport, reconnaissance, and communications/utility. Helicopters include both combat and transport types.

Fig. 5—Aircraft exports to Iraq, 1968–1978

After 1978, Iraq purchased aircraft from a much broader list of countries. As Fig. 6 shows, it still relied most heavily on Soviet transfers, which included MiG-23s, MiG-25s, MiG-27s, and even 24 MiG-29 fighters in 1987. Baghdad took delivery of fewer Soviet fighters from 1979 to 1989 than it did during the previous decade, but it acquired more capable equipment. After 1981, Iraq received over 120 Mirage F-1B and F-1C fighter/interceptors from France, which it armed with Magic air-to-air missiles (AAMs) and Exocet antiship missiles (AShMs). In 1987, Iraqi Mirage aircraft bombed the USS Stark, an

[9]Bill Gunston, ed., *The Encyclopedia of World Airpower* (New York: Crescent Books, 1985), p. 116.

American frigate on patrol in the Persian Gulf, killing 37 U.S. servicemen and demonstrating the formidable lethality of the Exocet missile.[10]



SOURCE: *SIPRI Yearbook: World Armaments and Disarmament* (London: Taylor & Francis, various years). The category Other NATO includes transfers from Canada, FRG, Italy, Spain, and U.S. Other aircraft include trainer, transport, reconnaissance, and communications/utility. Helicopters include both combat and transport types.

Fig. 6—Aircraft exports to Iraq, 1979–1989

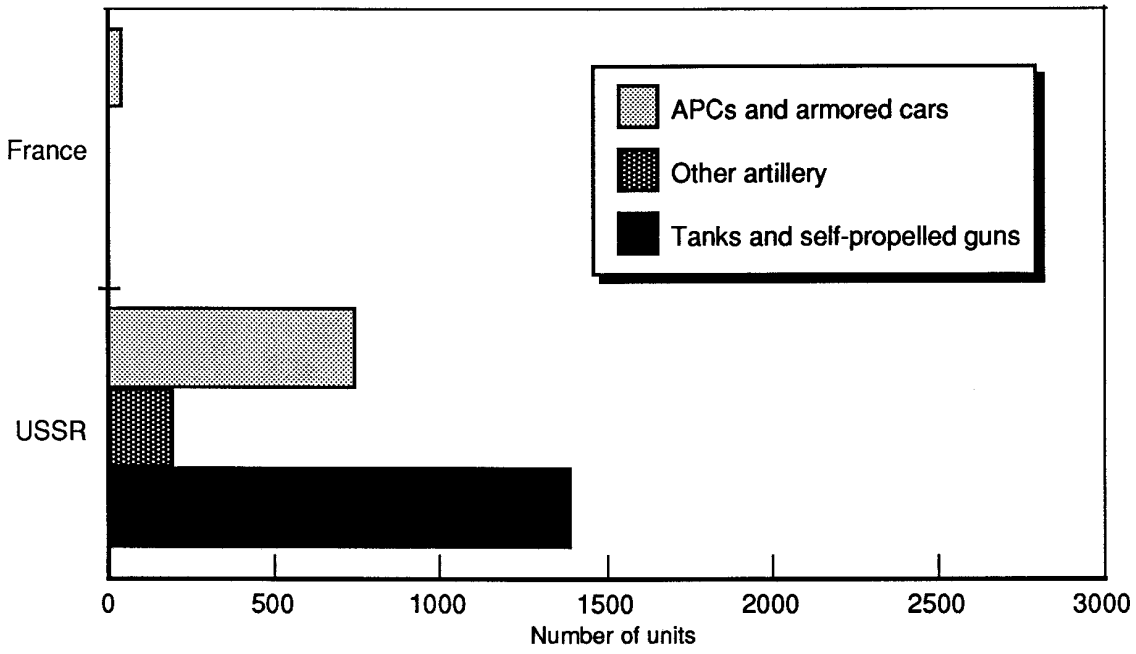
Iraq borrowed five Super Etendard fighter/striker aircraft from France in 1983, which it used to attack oil shipments in the Gulf in November and December of that year.[11] The aircraft were returned in September 1985. Baghdad also purchased a few F-6 and F-7 fighters, Chinese versions of the MiG-19 and MiG-21, respectively, from Egypt, where they were assembled under licensing agreements. Iraq's bomber purchases included Tu-22 Blinder As from the USSR and B-6s, Chinese versions of the Tu-16. Its helicopters include French Super Pumas and Dauphins; MBB-designed Bo-105s from Spain, FRG, and Canada; U.S.-made rotary aircraft, including Hughes 300Cs and 500Ds, and Bell Model 214s (ordered

[10]John Cushman, Jr., "Inside the Arsenals," *New York Times Magazine* (16 September 1990), p. 52. Iraq argued that the bombing was an accident.

[11]Harold Saunders, "The Iran-Iraq War: Implications for U.S. Policy," in Thomas Naff (ed.), *Gulf Security and the Iran-Iraq War* (Washington, DC: National Defense University Press, 1985), p. 72.

ostensibly for civilian use); Gazelles sold by Egypt, Agusta A-109s and AB212s from Italy; and Mi-24 Hinds from the Soviet Union.

Figure 7 shows deliveries of armored vehicles and artillery to Iraq from 1968 to 1978. Virtually all of its land armament came from the Soviet Union—primarily T-55 and T-62 MBTs, air defense vehicles, and towed guns—delivered around the time of the 1973 war. Although sales were concluded with France in the late 1970s for other equipment, the only delivery made prior to 1979 was AMX-10 armored cars.



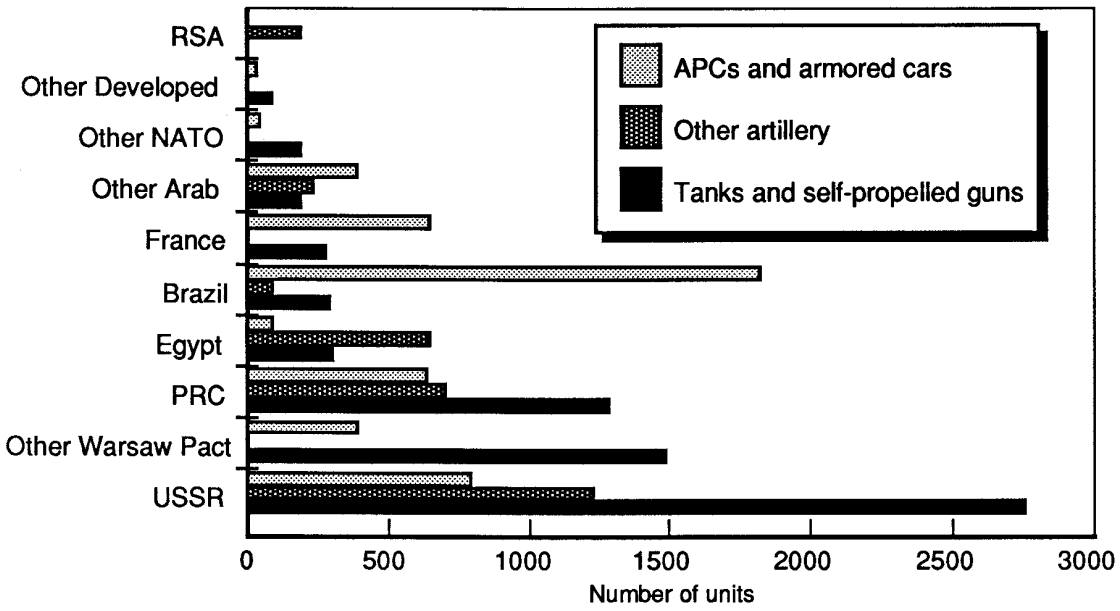
SOURCE: *SIPRI Yearbook: World Armaments and Disarmament* (London: Taylor & Francis, various years). Tanks include light and main battle tanks, self-propelled assault guns, and self-propelled artillery. APCs include armored and amphibious personnel carriers, reconnaissance and command vehicles.

Fig. 7—Land armament exports to Iraq, 1968–1978

After 1978, however, numerous other countries found the Iraqi market too profitable to avoid. For example, the Brazilian company Engesa sold a vast supply of Urutu APCs and Cascavel armored cars to Iraq both directly and through Libya. The Iran-Iraq war also became a major market for the new Avibras Astros II multiple launch rocket system (MLRS), which was completed in 1983 and immediately exported to Baghdad. Avibras sold SS-30, SS-40, and SS-60 rockets with the Astros II system, and the rockets are now reportedly being

made locally in Iraq. In part because Baghdad failed to pay for some of the Brazilian war sales, both Engesa and Avibras filed for bankruptcy in 1990.[12]

As can be seen in Fig. 8, Iraq's supply of tanks and self-propelled artillery from the 1980s came primarily from the USSR, other Warsaw Pact countries, and the PRC. It received T-55 tanks from the GDR, Poland, Romania, and Egypt; T-59s from China; T-72 and T-74 MBTs and PT-76 light amphibious tanks from the Soviet Union. Brazil was Iraq's largest supplier of APCs and armored cars, although the USSR, PRC, France, and Libya had sizable sales as well. South Africa sold Baghdad its G-5 155mm towed howitzer, considered by some to be the world's best.[13] Section IV reviews the capabilities of some of this equipment.



SOURCE: *SIPRI Yearbook: World Armaments and Disarmament* (London: Taylor & Francis, various years). Other Warsaw Pact includes Czechoslovakia, GDR, Hungary, Poland, and Romania. Other Arab includes Jordan, Kuwait, Libya, and Saudi Arabia. Other NATO includes Spain and the UK. Other developed includes Austria and Switzerland. Tanks include light and main battle tanks, self-propelled assault guns, and self-propelled artillery. APCs include armored and amphibious personnel carriers, reconnaissance and command vehicles.

Fig. 8—Land armament exports to Iraq, 1979–1989

[12]Christopher Foss et al., "Iraq's Arsenal: the Weapons Facing the West," *Jane's Defence Weekly* (18 August 1990), p. 230.

[13]Cushman, p. 52.

Figures 1-8, above, describe estimates of arms *transfers*, not *inventories* of Iraq's weapons holdings. Much of the equipment held by both Iran and Iraq was consumed during the course of their war, and little equipment escaped destruction by coalition forces in January to March 1991. Appendix B shows Iraqi and Kuwaiti arsenals prior to January 1991, as estimated by the International Institute for Strategic Studies. Accurate estimates of Iraq's current arsenal are necessarily problematic.

After the invasion of Kuwait, Iraq obtained other advanced Western equipment from Kuwait's arsenals. For example, Baghdad acquired U.S.-made improved TOW missiles and added to its supply of high-subsonic optically teleguided (HOT) missiles—both effective antitank guided weapons.[14] Some reports suggested that Iraq had been experimenting with Kuwait's air defenses, including U.S. HAWK antiaircraft missiles and radar—a system that was modified in the mid-1980s to defeat electronic countermeasures.[15] Baghdad also captured fast attack and coastal patrol boats from the Kuwaiti navy. Similar boats were used to lay mines and attack larger naval vessels during the oil tanker escort effort by the United States in the late 1980s.[16]

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[14]However, the TOW's optical sensors may have had trouble operating in the desert because of glare from sand. See Cushman, p. 52. The HOT missile uses a combination of optical aiming and infrared tracking systems. See Michael Taylor, *Missiles of the World* (New York: Charles Scribner's Sons, 1980), pp. 51-52.

[15]R. Jeffrey Smith, "Iraqis Learning to Use Captured U.S. Missiles," *Washington Post* (21 October 1990), p. 1.

[16]Eric Rosenberg, "Speedboats, Not Exocets, The Big Threat," *Defense Week* (13 August 1990), p. 3.

IV. TECHNOLOGICAL SOPHISTICATION OF IRAQI WEAPONS

Iraq did, in part, acquire more capable and technologically sophisticated equipment because of increased competition for arms sales.[1] Baghdad's policy of diversifying its weapon suppliers allowed it to shop for equipment that suited its operating environment. For example, displeased with the effectiveness of its air defenses in the early stages of its war with Iran, Iraq blamed Soviet SAMs, particularly SA-2s and SA-3s, and in late 1980 approached France about purchasing Crotale and Roland SAMs.[2] Similarly, Baghdad was able to buy advanced Austrian and South African equipment through direct purchases, and even U.S.-made artillery through indirect purchases, to replace its vintage Soviet howitzers.

The increased technological complexity of Iraq's equipment did not, however, translate into operational effectiveness on the battlefield. For example, Iraq took possession of Kuwait's air defenses and HAWK missiles, but this equipment did not keep coalition forces from taking quick control over its airspace. Prior to the conflict, military experts doubted that Iraq could readily operate the system without trained technicians.[3] Similar doubts were raised about the skill level of Iraqi pilots.[4]

Moreover, because it bought weapons from diverse suppliers, Iraq had difficulty supporting and maintaining its arsenal. Allegedly, Iraq had to return its Mirage F1-EQ fighters and their engines to France for repairs, despite the fact that it had some skill at maintaining its Soviet aircraft.[5] Because it had to acquire spare parts for a mixture of

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[1]Throughout the 1960s and most of the 1970s, Iraq discussed and/or concluded purchases of military equipment with seven countries. Its only imports of note, however, were from France (combat helicopters and armored cars) and the USSR (combat and transport aircraft, main battle tanks, artillery, missiles, and naval vessels). After 1978, the year in which Saddam Hussein became Iraq's president, it concluded purchases with some 34 countries. Approximately 12 of those countries had cumulative sales worth over $500 million to Iraq during the 1980s. See "High Costs of the Persian Gulf War," in *World Military Expenditures and Arms Transfers 1988* (Washington, DC: ACDA, 1988), pp. 21-23.

[2]Major Ronald E. Bergquist, *The Role of Airpower in the Iran-Iraq War* (Maxwell AFB, AL: Air University Press, 1988), p. 53.

[3]R. Jeffrey Smith, "Iraqis Learning to Use Captured U.S. Missiles," *Washington Post* (21 October 1990), p. 1. The HAWK system is allegedly difficult to maintain and therefore hard to keep operational. One Pentagon spokesman said that "the issue ... is not whether the Iraqis can aim and fire the missiles but whether they can maintain and repair them." Fred Kaplan, "Captured HAWKs Are Called Unreliable, Little Threat to U.S.," *Boston Globe* (25 October 1990), p. 26.

[4]Iraqi pilots are said to have little expertise in such important areas as air-to-air combat, close air support, and night missions. See David A. Fulghum, "Analysis Indicates Iraqi Air Force Weak on Innovation, CAS Role," *Aviation Week & Space Technology* (17 September 1990), p. 110. Also "Iraqi Air Force Disperses Aircraft to Sites Near Saudi Border, Doubles Night Missions," *Aviation Week & Space Technology* (24 September 1990), p. 20.

[5]"Iraq's Army: Hit Hard by Blockage," *Newsweek* (29 October 1990), p. 26.

equipment, the arms embargo against Baghdad was particularly painful. And even economic sanctions in categories other than arms apparently took their toll; reports suggested that Iraq had difficulty obtaining chemical additives used to produce the variety of oils and lubricants it needed for its assortment of high performance engines.[6]

This section addresses broadly the technological sophistication of two categories of Iraqi military equipment held prior to January 1991: fighter aircraft and surface-to-air missiles. It is not intended to provide an in-depth assessment of the former capabilities of the Iraqi arsenal.

FIGHTER AIRCRAFT

During the late 1960s and 1970s, the bulk of Iraq's fighter and ground attack aircraft were MiG-21Fs, MiG-21MFs, MiG-23MSs, MiG-23BNs and/or MiG-27s, Su-7 Fitters, and Su-20 Fitter-Cs. During the 1980s, however, it also obtained Mirage F-1Cs, MiG-21bis, MiG-25s, Su-25s, and MiG-29s, as well as some Chinese and Egyptian-assembled F-6s and F-7s. Refer to Table A.2 in App. A for Iraq's fixed-wing aircraft imports and corresponding dates of delivery. Appendix B includes estimates of its pre-1991 aircraft inventory.

The MiG-21F was developed in the late 1950s as the first modification of the original Fishbed configuration, incorporating an improved engine. However, the F version did not increase the amount of armament carried over that in the initial version—originally just two 30mm cannons and two Atoll AAMs—and it was considered so poorly armed as to be adequate only for point defense.[7] Iraq began receiving MiG-21Fs as early as 1968, and subsequently took delivery of MiG-21-MFs in 1974.

The MiG-21MF, introduced around 1969-1970, was several modifications beyond the F version. Thanks to a new Tumansky R-13 engine with increased thrust and titanium components for reduced weight, it could reach Mach 1.06 at sea level and its range was increased to 683 miles.[8] Unlike the MiG-21bis, which Iraq did not receive until 1984, the MiG-21MF did not have any avionics upgrades or significant structural changes. The bis version's avionics allowed it to use AS-7 air-to-surface missiles (ASMs); it also had one Tumansky R-25 afterburning turbojet with 16,500 pounds of thrust, as compared with the R-13's 14,500 pounds. Generally all versions of the MiG-21 have more limited ranges and

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[6]Andy Pasztor, "U.S. Sees Indications That Sanctions Are Seriously Hurting Iraq's Military," *Wall Street Journal* (22 October 1990), p. B7A.

[7]Bill Gunston (ed.),*The Encyclopedia of World Airpower* (New York: Crescent Books, 1985) p. 261. Anna Slomovic, *MiG-21 Fishbed: A Case Study in Soviet Weapons Acquisition* (Santa Monica, CA: RAND, P-7359-RGS, July 1987), pp. 13-14.

[8]Slomovic, p. 15.

payloads than the MiG-27, and they are considered to be in a lower maneuverability class than modern Western fighters.

The MiG-23 Flogger, an air superiority fighter, was designed to match the payload and range of F-104s and F-4 Phantoms with relatively short takeoff and landing capabilities.[9] It was first developed around 1963-1964, prior to most of the Arab-Israeli wars. The MiG-23MS is essentially the export version of the Flogger-B (MiG-23M), with a somewhat degraded radar (18 miles search range, 12 miles tracking) than that in Soviet service. It is armed with Atoll missiles and a twin-barrel GSh-23 gun.[10]

MiG-27 Flogger-Ds have similar airframes to the MiG-23, but are specialized for a striker role. A smaller Jaguar is probably the closest Western equivalent to this aircraft.[11] The export version of the MiG-27 Flogger-D is technically considered part of the MiG-23 series because it has variable geometry intakes and a single GSh-23 twin-barrel gun rather than the six-barrel cannon on the Soviet air force version. It does, however, have a forward fuselage similar to the Flogger-D: a slimmer nose, raised seat and canopy for better visibility from the cockpit, and additional armor on the cockpit sides. This export version is sometimes called the Flogger-F or MiG-23BN, and it has a less powerful R-27 engine than the Flogger-D.[12] The BN fighter-bomber version uses the same laser rangefinder as the Soviet air force's MiG-27, however, and has provisions for AS-7 Kerry ASMs.[13]

The swept-wing Su-7 Fitter was the standard strike fighter of the Soviet air force until it was replaced by Flogger-Ds and Su-17 Fitter-Cs in the 1970s. It is capable of Mach 1.1 at sea level. All versions use exclusively air-to-ground weapons, rather than AAMs. The Su-7's structure dramatically limits internal fuel capacity, and two ventral fuel tanks are typically carried to extend its range (to 900 miles). The standard export version is the Su-7BMK. It usually carries two 30mm NR-30 cannons and four wing pylons with ASMs, in addition to the two ventral tanks.[14] Soviet production switched from the Su-7 to the Su-17 series in the early 1970s.

The Su-20 was the Soviet Union's first export model of its Su-17 Fitter series of variable-sweep close-support fighters. The Su-20 may be powered by an AL-7 engine, an

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[9]Gunston, p. 266.

[10]*Jane's All the World's Aircraft 1988-89* (Surrey, UK: Jane's Information Group Ltd., 1988), p. 259. SIPRI reports that Iraq received the S version of the MiG-23 in 1977, along with the MiG-23BN. However, *Jane's All the World's Aircraft 1988-89* states that Iraq has the MS version.

[11]Gunston, p. 270.

[12]Gunston, p. 270. *Jane's All the World's Aircraft 1988-89*, pp. 259-260.

[13]*Jane's All the World's Aircraft 1988-89*, pp. 259-260.

[14]Gunston, p. 329.

older model than the Su-17's engine, the AL-21F-3. The Su-20's and Su-17's major advantage over the Su-7 lies in its ability to carry heavier loads and use a shorter runway, although it has the same range problems as its predecessor and also carries two external fuel tanks. The Su-20 is also outfitted with two 30mm NR-30 cannons and has a total of six hardpoints for rockets, missiles, or fuel tanks.[15]

During the 1980s, Baghdad took delivery of a combination of aircraft: some no more capable than those received during the previous decade, some substantially better equipped. But its acquisition of fighters as advanced as the MiG-29 Fulcrum and the Mirage F-1EQ is attributable in part to competition between France and the Soviet Union for Iraqi sales.

As already noted, Iraq began receiving the somewhat more sophisticated MiG-21bis in 1984. It has an improved power plant and avionics upgraded to accommodate AS-7 ASMs. It also received Chinese versions of the MiG-19 and MiG-21 that were assembled in Egypt under license, designated the F-6 and F-7, respectively, which are considered to be less capable aircraft.[16]

The F-6 (also called the J-6) is probably derived from the MiG-19SF, powered by two Tumansky-designed and Chinese-built RD-9 turbojets. It is used in various other countries for interception, close support, and tactical reconnaissance. The F-6 is armed with three 30mm NR-30 cannons and four pylons for bombs or AAMs.[17] The F-7 was originally derived from MiG-21Fs that China purchased from the Soviet Union in the late 1950s, but Chinese engineers upgraded the aircraft's combat performance and maneuverability in the early 1980s. Some of these aircraft may have been retrofitted with head-up displays and launchers for AAMs.[18]

In 1980-1981, Baghdad also received MiG-25 Foxbats—interceptor aircraft produced mainly for export by the USSR. The Foxbat is capable of achieving Mach 3 at medium and high altitudes. Its speed and maximum altitude of over 75,000 feet enables it to avoid most air defense systems. Because the Foxbat's two R-31 turbojets have poor efficiency and less lift support from the air intakes at low speeds, it has poor loiter capabilities and is considered to be rather inflexible among roles.[19] Its standard armament includes up to four AA-6 AAMs and an optional ventral gun. The export version Iraq received in the early 1980s is probably

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[15]Gunston, p. 332.

[16]John Cushman, Jr., "Inside the Arsenals," *New York Times Magazine* (16 September 1990), p. 52.

[17]Gunston, p. 317.

[18]*Jane's All the World's Aircraft 1988-89*, p. 34.

[19]Gunston, p. 268.

the Foxbat-A, which lacks a look-down shoot-down capability, although some Foxbats have been modified to include this.[20] MiG-25s are often used as reconnaissance aircraft.

The Su-25 Frogfoot, a close support aircraft used by the Soviet forces in Afghanistan, was exported to Iraq beginning in 1987. The export model is known as the Su-28, and is roughly a counterpart to the U.S. A-10 Thunderbolt II.[21] Powered by two R-195 turbojets, it is capable of reaching Mach 0.8 at sea level. It carries one twin barrel 30mm gun, along with eight pylons for AA-2 and AA-8 missiles.

Baghdad received Mirage F1-Cs and its two-seat version, the F1-B, from France beginning in 1981. The F1-C is an air superiority/ground attack aircraft; according to IISS's *1989-90 Military Balance*, Iraq holds the EQ5 and EQ5-200 versions, which are equipped to carry AM-39 Exocet AShMs and laser guided weapons like the AS-30L. They carry the Thomson-CSF Agave radar. The EQ5-200 version also has a fixed in-flight refueling probe for extended range—the first time Iraq has had this capability.[22] The F1-C is an improvement over Baghdad's previous acquisitions because of its high maximum speed for a multirole aircraft (Mach 1.2 at sea level, 2.2 at 39,000 feet), short takeoff and landing performance, inertial navigation system, head-up display, and fire control computer that supports a variety of missiles.[23]

In 1987, Iraq acquired the MiG-29 Fulcrum—the Soviet Union's newest fighter aircraft, which is roughly comparable in size to the U.S. F/A-18 Hornet. The MiG-29, one of the few Soviet-made fighters considered to be in roughly the same performance class as Western fighters, is used primarily as an air-to-air fighter but with attack capability. It is powered by two RD-33 turbofans and can achieve Mach 1.06 at sea level, Mach 2.3 at height. The Fulcrum has much improved maneuverability over previous Soviet fighters, and it is equipped with a Doppler look-down shoot-down radar, laser rangefinder, and IR search/track sensor. The MiG-29 can approach a target without emitting detectable radar or radio signals.[24] It carries six radar homing and/or close-range AAMs, and can also be outfitted for bombs and rockets in an attack role.

Most of Iraq's fighters were aircraft less capable than the combination of F-15s, F-16s, F/A-18s, and F-14s that were amassed in Saudi Arabia and the Persian Gulf to counter them. Nonetheless, Iraq had stockpiled a sizable inventory of aircraft—primarily MiG-21MF and

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[20]*Jane's All the World's Aircraft 1988-89*, p. 261.
[21]*Jane's All the World's Aircraft 1987-88*, p. 277.
[22]*Jane's All the World's Aircraft 1988-89*, p. 69.
[23]Gunston, p. 146.
[24]*Jane's All the World's Aircraft 1988-89*, pp. 262-263.

MiG-21bis and Chinese-built J-6 and J-7 fighters, MiG-23BN fighter/strikers, Su-20s and Su-25s for close air support, and MiG-25 interceptors. Over the past decade, it acquired nearly 100 Mirage F1-EQs and a smaller number of MiG-29 Fulcrums as air superiority and ground attack aircraft, which are of a caliber closer to U.S. equipment.

Under Iraqi doctrine, the role of the Iraqi air force (IQAF) has been as a strategic deterrent to enemy attacks, particularly against its oil assets.[25] The Iraqi army was considered the more decisive service because of its ability to physically occupy enemy territory. Consequently, the IQAF tended to be charged primarily with close air support (CAS). However, without a large stockpile of aircraft and spares, attrition from enemy air defenses or even fratricide due to inadequate identification friend or foe (IFF) systems has historically made the CAS role too costly for the IQAF. Instead, Iraq has used attack helicopters for CAS.[26]

In the early 1980s, Iraqi air power played a limited part in the war with Iran. Iraq sought to deter strategic attacks by the Iranian air force, but did not, for example, launch many successful air campaigns against enemy oil facilities.[27] Iraq had a preponderance of light, short-range aircraft and interceptors at the time, a situation that would also tend to reinforce a defensive stance.[28] After 1986, the IQAF took a more aggressive role—striking economic targets, such as oil refineries and loading terminals. By then Iraq had also gained experience at midair refueling, which allowed it to pursue more distant targets.[29] This change of strategy affected Iranian oil exports considerably during 1987 and proved to be one of the decisive factors in Iraq's ability to end the war.[30]

Despite a sizable arsenal, better avionics and improved maneuverability in some of its aircraft, the IQAF played almost no militarily significant role during the six-week Gulf war in 1991. Indeed, coalition air forces met little air opposition and therefore claimed air superiority after just two weeks into the conflict. Approximately 138 of Iraq's more advanced aircraft—primarily Mirage F1s and MiG-29s—flew to Iran to escape destruction by the coalition forces. The United States presumably does not know whether Iran will return these aircraft to Iraq or retain them for its own arsenal. Current estimates of the number of Iraqi

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[25]Bergquist, p. 42.

[26]Fulghum, p. 110.

[27]Bergquist, pp. 69-76.

[28]Bergquist, p. 76.

[29]Stephen C. Pelletiere et al., *Iraqi Power and U.S. Security in the Middle East* (Carlisle Barracks, PA: U.S. Army War College Strategic Studies Institute, 1990), p. 21.

[30]Pelletiere, pp. 18-23.

fixed-wing aircraft that were damaged or destroyed during the war range from 140 to 237.[31] These numbers will undoubtedly be revised after further battle damage assessment.

AIR DEFENSES AND SURFACE-TO-AIR MISSILES (SAMs)

Once the Gulf war began, coalition forces used their air power relentlessly, and by all accounts, the massive air strikes contributed critically to making the ground war short. Nuclear and other unconventional weapon production facilities were among the first targets, as were fixed and mobile surface-to-surface missile launching sites. These were followed by a wide assortment of other military targets, including communications facilities, hardened hangars for aircraft, and Iraqi ground forces.

The superior avionics and electronic deception equipment operated by coalition forces allowed them to locate Iraq's air defense sites and aircraft and then to destroy them with missiles.[32] Similarly, in 1982 Israel used drones to collect information about the positions and signals of Syrian antiaircraft systems and then destroyed 17 of its SAMs.[33] Prior to the outbreak of the 1991 war, reports suggested that both U.S. and Saudi forces had been trying to make Iraq activate its air defense radars with a similar purpose in mind.[34] Iraq, however, largely avoided doing so.

This subsection reviews the types of air defenses and SAMs that Iraq operated prior to its defeat. Refer to App. A, Table A.1, for Iraq's imports of antiaircraft artillery (AAA), and to Table A.4 for a list of Iraqi missile imports. Appendix B has estimates of its pre-1991 inventory of missile and air defense equipment.

Iraq's antiaircraft artillery was primarily 1970s or earlier vintage equipment that it purchased from the Soviet Union, including ZSU-57s and ZSU-23s. The ZSU-23-4 Shilka, with four 23mm radar-guided cannons, is mounted on a PT-76 light amphibious tank chassis. It was used extensively in the 1973 Arab-Israeli war. It typically fires 50 rounds per barrel per minute, but can fire a maximum of four or five times that amount.[35] The ZSU-57-2 has two 57mm guns mounted on a chassis similar to that of the T-54 tank, but with thinner

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[31]Brian Duffy and Kenneth Walsh, "The Gulf War's Final Curtain," *U.S. News & World Report* (4 March 1991), p. 29. Philip Elmer-Dewitt, "How Badly Crippled Is Saddam?" *Time* (4 March 1991), p. 32.

[32]Andy Pasztor and Bob Davis, "If War Comes, the U.S. Hopes to Make It Brief With High-Tech Blitz," *Wall Street Journal* (6 September 1990), p. 1.

[33]Malcolm W. Browne, "Foes Sharpen Tools of Electronic War in Persian Gulf," *New York Times* (23 October 1990), p. C1.

[34]Juan O. Tamayo, "U.S. Jets Try to Get Rise from Iraqi Radar," *Philadelphia Enquirer* (18 October 1990), p. 1. Browne, p. C1.

[35]*Jane's Weapon Systems 1988-89* (Surrey, UK: Jane's Information Group Ltd., 1988), p. 205.

armor. An earlier version antiaircraft gun, it is less effective than the ZSU-23 and is guided only by a gunner's line of sight.[36]

According to press accounts, most of Iraq's AAA lacked radar guidance. As a result, the artillery emitted no electronic signals to advertise them as targets for attack.[37] These pieces of equipment are usually truck-towed versions of the four-barrel 23mm cannons, and they are manually aimed and loaded. Iraq also had the older M-1939 37mm cannon, which is capable of firing 160-180 rounds per minute. Although this equipment may not seem to pose much of a threat to fast-flying aircraft, they could have been a formidable force because of the large number of rounds they fire. Antiaircraft guns accounted for more "kills" of U.S. aircraft during the Vietnam war than Soviet-made SAMs, albeit SAMs of an earlier era.[38]

During the late 1960s and throughout the 1970s, Iraq relied almost entirely on Soviet SA-2 Guideline and SA-3 Goa SAM systems for its air defense missiles. In 1977 it began receiving shipments of SA-6 Gainful SAMs.

The SA-2 Guideline is a land mobile tactical missile that was first developed by the Soviet Union in 1957. It has undergone many modifications since that time, and current versions are radar guided. The Guideline has a solid fuel two-stage design, high explosive warhead detonated by command or with a proximity fuse, a speed of Mach 3.5, a range of 40-45 km, and a maximum ceiling of 18 km.[39] Israel has been able to deflect SA-2s using electronic countermeasures. During the early stages of the Vietnam war, SA-2s were able to hit one out of 20 aircraft, but this level of effectiveness was reduced to one out of 500 targets after U.S. pilots began using a combination of countermeasures and evasive maneuvers.[40] Today it is considered largely obsolete, even with more advanced guidance radars, because of electronic countermeasure (ECM) technologies.[41]

The SA-3 Goa, a short-range land mobile missile, plays a role similar to that of the HAWK system—defense against close targets. It also has a two-stage solid propellant design and radio-command guidance with radar terminal homing.[42] Pairs of Goas can be transported on ZIL trucks or tracked vehicles. It travels at Mach 2 and has a ceiling of 13 km and a range of 30 km.[43]

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[36]*Jane's Weapon Systems 1988-89*, p. 203.

[37]Juan O. Tamayo, "Iraq's WWII Cannon Worry U.S. Pilots in Gulf," *Miami Herald* (23 October 1990), p. 6.

[38]Tamayo, p. 6.

[39]Michael Taylor, *Missiles of the World* (New York: Charles Scribner's Sons, 1980), p. 45.

[40]Kaplan, p. 26.

[41]*Jane's Weapon Systems 1988-89*, p. 177.

[42]Taylor, p. 42.

[43]*Jane's Weapon Systems 1988-89*, p. 177.

Somewhat larger than the Goa, the SA-6 Gainful serves a similar air defense role against low and medium altitude aircraft. It was used extensively in the October 1973 Arab-Israeli war and is considered to be much more effective than Goas or Guidelines. The SA-6 has a solid propellant ramjet and uses a combination of radar command guidance and semiactive radar terminal homing.[44] A complete system consists of five batteries, plus a search-and-acquisition radar and a tracking radar.[45] The SA-6 can travel at Mach 2.8 and has a ceiling of 18 km and a range of 30-60 km.

Baghdad was dissatisfied with the performance of its air defenses in the early stages of the Iran-Iraq war and turned to French equipment rather than Soviet. Iraq's defensive problems stemmed partly from its lack of an effective IFF system, a deficiency that kept it from sending interceptors to meet Iranian aircraft. Instead, Baghdad emphasized SAMs and AAA rounds, which it spent rapidly.[46] Iraq also argued that Iranian pilots were able to avoid SA-2s and SA-3s using maneuvers taught to them by the U.S. Air Force. As a result, Iraq spread its smaller supply of SA-6 SAMs around strategic targets, thus limiting their effectiveness.[47]

Around 1979-1980, Iraq began negotiations with France to purchase Crotale and Roland SAM systems. It first took delivery of the Crotale in 1981 and the Roland system in 1982. Iraq additionally purchased more SA-6s from the Soviet Union, as well as SA-8s, SA-9s, and Egyptian-made SA-7 portable SAMs during the 1980s.

The Egyptian version of the SA-7 Grail shoulder-fired SAM, which it calls the Sakr Eye, features optical detection with targeting by passive infrared (IR) homing; it is considered to be less reliable than the Soviet version.[48] It has a range of 4.4 km and carries a 5.5 pound high explosive warhead.

The Soviets developed the SA-8 Gecko, a short-range missile, as a counterpart to the Roland system; it was first observed in 1975. It has a dual-thrust solid propellant rocket motor, uses a high-explosive warhead with a proximity fuse, and can simultaneously fire two missiles with separate tracking. Two two-missile launchers and fire control equipment are typically mounted on a rotating turret of a wheeled vehicle.[49] A new version of the Gecko,

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[44]Taylor, p. 37.
[45]*Jane's Weapon Systems 1988-89*, p. 179.
[46]Bergquist, pp. 52-53.
[47]Bergquist, p. 53.
[48]*Jane's Weapon Systems 1988-89*, p. 212.
[49]Taylor, p. 41.

introduced in 1980, has two triple launchers.[50] The SA-8 uses radar command guidance and either semiactive radar or IR homing systems.

The Soviet-produced SA-9 Gaskin, a larger version of the SA-7, is tube-launched, and its two two-round launchers are mounted on armored amphibious vehicles. Its range is longer, 8 km, and its warhead heavier than those of the Grail.[51] The Gaskin utilizes visual target acquisition, aiming by optical systems, and IR homing guidance; it can be linked to search radars.[52]

According to IISS's *Military Balance*, Iraq also possessed SA-13 Gophers and SA-14 Gremlins. The Gopher is a mobile, low-altitude SAM developed to replace or supplement the SA-9. It has four canister launchers mounted on an amphibious vehicle with a radar dish placed between canisters. Its acquisition radar senses range only, but the missiles also have passive IR homing guidance. The SA-13 can achieve Mach 1.5, has a 10-km range and a 5-km ceiling. The Gremlin replaces the man-portable SA-7 Grail. Its missiles can engage aircraft head-on, as well as from the rear, and it uses laser beam-riding guidance.[53]

The Thomson-Matra R-440 Crotale was delivered to Iraq beginning in 1981. The Crotale is a low-altitude SAM that has more advanced electronics than most of Iraq's Soviet missiles, and it can be mounted on a variety of vehicles. Its complete system includes an acquisition and coordinating unit (ACU) linked with two or three fire units. The ACU is equipped with pulse-doppler surveillance radar with echo suppression, a data processing system that identifies the 12 most appropriate targets for acquisition, an IFF system, and a coordination system. Each fire unit has four containerized missiles and a tracking and guidance radar. Missiles can be guided by television in clear weather or under jamming conditions. Each missile has a single-stage solid-propellant motor, a directed-burst high-explosive warhead, and a capability of Mach 2.3 with a range of 8 km.[54] France sold a more powerful six-missile per fire unit version of the Crotale, known as the Shahine, to Saudi Arabia.[55]

The Roland II is a mobile antiaircraft system designed for medium to very low altitude. All equipment is contained within a single vehicle, including its two single-missile launch tubes and acquisition and tracking systems. Targets, detected with a doppler surveillance radar, can be tracked either by monopulse radar or optical line of sight. The

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[50]*Jane's Weapon Systems 1988-89*, p. 179.
[51]Taylor, p. 40.
[52]*Jane's Weapon Systems 1988-89*, p. 180.
[53]*Jane's Weapon Systems 1988-89*, p. 214.
[54]*Jane's Weapon Systems 1988-89*, p. 169.
[55]*Jane's Weapon Systems 1988-89*, p. 170.

Roland has the ability to transfer rapidly between optical and radar tracking. With a range of 6.3 km, it can travel up to a ceiling of 5.5 km, and it utilizes a two-stage solid propellant booster.[56]

Iraq confiscated six batteries of the U.S.-made HAWK missile system from Kuwait's air defenses after August 1990. The HAWK is considered to be particularly effective against medium and low-flying targets. Israel used an older version of the system to down more than 20 Soviet-built MiGs during the 1973 Arab-Israeli war.[57] The HAWK system utilizes semiactive all-the-way homing, and a standard battery has two firing platoons with their own tracking/illuminating radars and three triple launchers.[58] Kuwait upgraded its HAWK equipment in the mid-1980s to include a "Phase 2" radar, which uses electronic countermeasures to jam enemy radar.

U.S. forces also have the HAWK system, but with the more advanced "Phase 3" radar. Initial press accounts of the conflict suggested that U.S. forces had no means of protection against HAWK missiles.[59] However, the United States upgraded its combat aircraft equipment to jam HAWK illuminator radars.[60] Additionally, HAWKs can be outmaneuvered through evasive techniques.[61] Iraq experimented with the system prior to the war, but it is unclear whether they were able to operate it.

Prior to Saddam Hussein's rise to the Iraqi presidency, Baghdad relied upon SA-2s and SA-3s for its air defense missile needs—relatively ineffective systems that could be outmaneuvered or deflected with electronic countermeasures. Although it began acquiring systems like the SA-6 in the late 1970s, it was not until the 1980s that Iraq obtained more advanced equipment with acquisition and tracking systems that operated more flexibly between optical, IR, and radar modes. Some of its systems, primarily Western-built ones like the Crotale and HAWK, were designed to deal with electronic countermeasures. Additionally, Iraq relied on massive use of less accurate and avoidable missiles and vintage antiaircraft artillery.

None of these air defenses, however, appears to have been a formidable factor against coalition forces in their air campaign. Apparently, Iraq's emphasis on ground forces was a misguided strategy against coalition air power, and Iraqi air defenses were largely

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[56]*Jane's Weapon Systems 1988-89*, pp. 171-172.

[57]R. Jeffrey Smith, "Iraqis Learning to Use Captured U.S. Missiles," *Washington Post* (21 October 1990), p. 1.

[58]*Jane's Weapon Systems 1988-89*, pp. 187-189.

[59]See, for example, Smith, p. 1.

[60]Tony Capaccio, "U.S. Had Fix Ready to Thwart HAWKs," *Defense Week* (5 November 1990), p. 1.

[61]Kaplan, p. 26.

ineffectual. As information about the war continues to be released, perhaps we can understand whether Iraq's failure resulted from poor training and morale or from the technological superiority of coalition equipment.

V. INDIGENOUS PRODUCTION CAPABILITY

Historically, Iraq has relied on imports for its supply of most major categories of weapons—aircraft, most missiles, most armored vehicles, and naval vessels. The competition among a larger number of suppliers to Iraq over the last decade, however, appears to have helped Iraq's own indigenous production capabilities. It produced some conventional equipment under license, and it received help on producing other systems from foreign companies and individuals. Additionally, Iraq successfully diverted exports from Western nations to Baghdad. Hussein Kamil, minister of industry and military industrialization and Saddam Hussein's son-in-law, masterminded Iraq's concerted effort to develop its production capabilities and import the components that it cannot produce.[1]

Iraq particularly focused its efforts on producing weapons of mass destruction—unconventional warheads to be delivered by artillery, aircraft, or ballistic missiles. As the Persian Gulf crisis demonstrated, possession of chemical, biological, or nuclear warheads commands immediate recognition by other countries because of the ability to inflict what is generally agreed upon as an unacceptable amount of damage. Iraq's possession of unconventional weapons, rather than its large arsenal of conventional equipment, especially concerned the U.S. public.

CONVENTIONAL WEAPONS PRODUCTION AND MODIFICATIONS

Iraq produced a variety of munitions and artillery on its own, including the 210mm al-Fao self-propelled howitzer, with an estimated 57-km range, and a 155mm variant called the Majnoon with a 39-km range.[2] It was also known to produce antitank grenade launchers (designated RPG-7Z and al-Nasirah), Beretta-type pistols, and infantry weapons, and it assembled Chilean-designed cluster bombs. Iraq operated at least six artillery and ordnance plants under the auspices of a government umbrella organization known as the General Organization for Technical Industries.[3]

Iraq produced the T-72 main battle tank under license from the Soviet Union. It first displayed the indigenously produced T-72, which it called the Lion of Babylon, in a 1989

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[1]Mark Fineman, "Iraqi Army Could Put U.S. to Test," *Los Angeles Times* (18 September 1990), p. H7.

[2]Barbara Amouyal, "Isolated Iraqis Consider Domestic Arms Industry," *Defense News* (27 August 1990), p. 1.

[3]Amouyal, p. 1.

exhibition held in Baghdad.[4] Iraq also assembled T-55 tanks, two new versions of which were displayed at the same exhibition, one fitted with a 125mm gun and one with composite armor. It allegedly modernized other tanks in its inventory as well.[5]

With the assistance of Brazilian engineers and a former head of one of Brazil's leading aerospace companies, Orbita, Iraq sought to develop a short-range air-to-air missile based on the Piranha. The Piranha was previously being developed by Orbita, but was canceled by the Brazilian government because of budgetary constraints.[6] Another Brazilian firm, Avibras, supplied the Astros II multiple rocket launcher to Baghdad and agreed to let the Iraqis produce replacement rockets for the system under license. The locally made versions were designated the Sijeel 30, 40, and 60.[7]

Over the past decade, Baghdad demonstrated some ability to modify, mix, and match equipment from various countries. During the Iran-Iraq war, Pakistani technicians reportedly helped Iraq modify its MiG aircraft to carry Magic air-to-air missiles, which Baghdad purchased from France.[8] In the 1989 exhibition, Iraq displayed two types of equipment modifications that reflected a surprising advance in its capabilities. The first was a crude airborne early warning aircraft made by installing a French radar system in an Il-76.[9] Technicians also modified some of its aircraft for in-flight refueling, a capability Iraq did not have until it imported the Mirage F-1EQ.[10]

Table 2 reviews Iraqi production capabilities for various categories of weapon systems.

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[4]"After the War, the Exhibition," *Military Technology*, Vol. 13, No. 8 (1989), p. 60.

[5]"After the War, the Exhibition," p. 60.

[6]Thomas Kamm, "Brazilian Arms Experts Said to Upgrade Iraq's Missiles," *Wall Street Journal* (30 August 1990), p. 5.

[7]Christopher Foss et al., "Iraq's Arsenal: the Weapons Facing the West," *Jane's Defence Weekly* (18 August 1990), p. 230.

[8]Major Ronald E. Bergquist, *The Role of Airpower in the Iran-Iraq War* (Maxwell AFB, AL: Air University Press, 1988), p. 53.

[9]Foss, p. 230.

[10]Foss, p. 230.

Table 2

IRAQ'S ESTIMATED WEAPON PRODUCTION CAPABILITY

	Licensed Production	Modifications and/or Reverse Engineering	Indigenous Development with Foreign Assistance
Conventional weapons:			
Small arms, munitions	?	Yes	Yes
Artillery	?	Yes	?
Armored vehicles	Yes	Yes	No
Helicopters	No	No	No
Fixed-wing aircraft	No	Yes	No
Tactical missiles, rockets	Yes	Yes	Yes
Naval vessels	No	No	No
Unconventional weapons:			
Fuel air explosives	No	No	Yes
Chemical, biological warheads	No	No	Yes
Nuclear warheads	No	No	Yes
Ballistic missiles	No	Yes	Yes

SOURCE: Author's estimates based on open source literature.

EXPORT DIVERSION AND THE ROLE OF FOREIGN SPECIALISTS

Iraq's incipient production capabilities resulted from a two-point strategy: First, it took advantage of world export competition to purchase weapon components that it could not yet produce indigenously, and second, it hired foreign specialists to acquire production know-how.[11] This subsection discusses how Baghdad was able to carry out this strategy in the face of world export controls. The following subsection describes some of the strides Iraq made in the manufacture of ballistic missiles and unconventional warheads—the weapons it pursued most avidly.

Although many countries sold whole conventional weapon systems to Iraq over the past decade, nations often place controls on the export of components that could be used in the production of unconventional weapons. For example, the London Suppliers' Group, Missile Technology Control Regime, and Australia Group are all agreements whereby signatory countries attempt to restrict the flow of nuclear materials, ballistic missile components, and chemical weapons, respectively.

[11]Geraldine Brooks and Tony Horwitz, "Iraq Buying Spree on Arms Bodes Ill for Its Neighbors," *Wall Street Journal* (23 April 1990), p. 10.

Iraq managed to circumvent these regimes by smuggling components out of these countries, or by diverting exports bound ostensibly for other nations. It benefited from the fact that many weapon components are used in both civil and military production. And even the most stringent export controls can do little to restrain the travel of individuals who are often paid handsomely for their know-how in weapons production.

One case in which Iraq allegedly tried to smuggle components from the West received much attention in early 1990. British and U.S. customs officials seized a shipment of U.S.-made capacitors in London that was being sent to Iraq. The capacitors were reportedly not sophisticated enough to be used as trigger components in nuclear weapons, but could have been modified for such a use.[12] The London-based firm accused of importing the components for Iraq, Euromac Ltd., argued that they were to be used in air conditioning equipment.[13] After the story was reported in the media, Saddam Hussein claimed that Iraq was capable of manufacturing its own capacitors.[14]

During the Iran-Iraq war, Baghdad used a network of arms merchants to help it import complete weapon systems, spare parts, and critical components. For example, Carlos Cardoen, a Chilean entrepreneur, allegedly helped Iraq to purchase U.S.-made helicopters ostensibly for agricultural use; he also sold cluster bombs and fuses to the Saddam regime, as well as the technology to produce them.[15]

Iraq has also received the direct help of foreign firms. In a confidential briefing to the German Parliament in August 1990, Economics Minister Helmut Haussmann stated that German companies had widespread ties to Iraq's arms industry. Haussmann said, "From poison gas plants to rocket factories, from cannon forges to the nuclear sector ... the danger has already been spread."[16] Thirty German companies are currently being investigated for their links to Iraq, including some that allegedly assisted in chemical weapon production and extending the range of SCUD missiles.[17] Firms in many other countries are suspected of assisting Iraq as well.

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[12]Michael Isikoff and George Lardner, Jr., "Bomb Parts Seized on Way to Iraq," *Washington Post* (29 March 1990), p. 1. George Lardner, Jr., "Customs Secretly Blocked Iraq's 1989 Export Order," *Washington Post* (31 March 1990), p. 2.

[13]George Lardner, Jr., "U.S. Indicts Five in Iraqi Smuggling Plot," *Washington Post* (30 March 1990), p. 6.

[14]Nick Williams Jr., "Made Our Own Triggers, Iraq Says," *Los Angeles Times* (9 May 1990), p. A4.

[15]Fred Francis, transcript of NBC Nightly News report, (4 September 1990).

[16]Frederick Kempe, "Germans Had Big Role in Helping Iraq Arm, Internal Report Shows," *Wall Street Journal* (2 October 1990), p. 1.

[17]Heinz Schulte, "German-Iraqi Links Scrutinized," *Jane's Defence Weekly* (23 February 1991), p. 274.

Sometimes Iraq obtained the unwitting cooperation of foreign firms by setting up legitimate companies as front operations for their import efforts. Investigations by officials uncovered a number of legitimate firms owned or partly owned by the al-Arabi Trading Company of Iraq.[18] One such company was TMG Engineering Group, a London-based parent corporation that owned the Matrix-Churchill Corp., a machine tool production firm with plants in the UK and Ohio. U.S. customs officials seized the assets of Matrix-Churchill in September 1990.[19]

The Iraqi ownership of Matrix-Churchill was discovered because the firm received payments from an Atlanta, Georgia, branch of Italy's Banca Nazionale de Lavoro (BNL). In 1989, the U.S. Federal Reserve discovered that BNL had provided a credit line of nearly $3 billion to Iraq without notifying U.S. or Italian authorities.[20] Payments from BNL are also believed to have been sent to a consortium of European firms based in Zug, Switzerland, known as Consen, which allegedly procured components for Iraq's Technical Corps for Special Projects (Techcorp). Techcorp was set up by the Iraqi ministry of industry and military industrialization.[21]

According to a former director of West Germany's domestic intelligence service, numerous companies controlled by the Iraqi secret service continued to operate in Europe during fall 1990, even in the midst of the UN trade embargo against Iraq.[22] It was revealed that U.S., British, French, and German officials were investigating such a network in spring 1990, after British custom officials seized portions of an enormous gun barrel bound for Iraq. Companies involved with the export believed that the pipe sections were to be used in a petrochemical plant.[23] A Canadian ballistic expert, Dr. Gerald Bull, was assassinated after it was disclosed publicly that his Belgium-based company provided engineering assistance on the Iraqi long-range artillery project.[24]

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[18]Ed Blanche, "A Back Door Opens to Arms Technology," *Milwaukee Journal* (18 February 1990), p. 3J.

[19]Alan Friedman et al., "U.S. Seizes Key Iraqi-Controlled Company," *London Financial Times* (19 September 1990), p. 18. Michael Isikoff, "U.S. Seizes Iraqi-Owned Tool Company in Ohio," *Washington Post* (20 September 1990), p. 26.

[20]James Bruce, "Assessing Iraq's Missile Technology," *Jane's Defence Weekly* (23 December 1989), pp. 1371-1372. A 347-count indictment has been handed down by a federal grand jury against the officers of BNL's Atlanta branch. See Sharon LaFraniere, "Atlanta Bank Branch Officials, 4 Iraqis Indicted," *Washington Post* (1 March 1991), p. A10.

[21]Bruce, p. 1374. Blanche, p. 3J.

[22]Ferdinand Protzman, "German Terror Expert Says Iraqis Have Front Companies Across Europe," *New York Times* (30 October 1990), p. 14.

[23]Victor Mallet and David White, "Efforts by Iraq to Assemble a Super-Gun Have Gulf War Origins," *London Financial Times* (18 April 1990), p. 10.

[24]William Claiborne, "Slain Specialist Worked for Iraq," *Washington Post* (6 April 1990), p. 26.

Because many weapon components have widespread use in nonmilitary production, it is especially difficult to curb their export. U.S. high-technology exports to Iraq must first get approval from State, Commerce, and Defense department officials, among others. However, it is often difficult to determine what will be used for military rather than civilian applications. Government documents suggest that U.S. firms exported about $1.5 billion in high-technology goods to Iraq from 1985 to the middle of 1990, with the U.S. government's approval.[25] Exports from the U.S. to Iraq stepped up considerably after 1984, when the two countries reestablished diplomatic ties.

UNCONVENTIONAL WEAPONS AND BALLISTIC MISSILES

During the Iran-Iraq war, Baghdad used the threat of massive destruction by unconventional warheads against civilians as a deterrent. Furthermore, Saddam made that threat credible by using chemical weapons against both Iranian forces and Iraq's own Kurdish population—chemical weapons that it developed with West European help. Evidence suggests that Iraq had, or was in the process of developing, its capability to produce four types of unconventional warheads: biological, chemical, and nuclear weapons, and fuel air explosives.

Fuel air explosives (FAEs) are two-stage bombs composed of fuel and a time-delayed detonator. The first explosion disperses the fuel in the air, while a second explosion then ignites the oxygen-rich mixture. FAEs can have destructive effects similar to those of a small tactical nuclear weapon because of the fireball they create and the shock wave that follows it. FAEs can have potentially ten times the destructive capability of the same size of conventional explosive.[26]

Blast effect weapons, such as FAEs, can be dropped as bombs from aircraft or delivered by missiles. Hussein Kamil displayed one of three types of FAEs that he claimed Iraq could produce in Baghdad's 1989 military exhibition. It was of the aircraft-deliverable variety; military experts do not know whether Iraq was able to put FAEs on missiles. Iraq reportedly obtained FAE technology from German and U.S. firms.[27]

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[25]Stuart Auerbach, "American Sales to Iraq Totaled $1.5 Billion," *Washington Post* (1 November 1990), p. C1. According to some former Defense Department officials, U.S. exports included a computer designed for IR imaging enhancement, forges, and a computer that could be used in missile wind tunnel experiments. Alan Friedman, "U.S. Officials Ignored Objections to Dual-Use Exports to Iraq," *London Financial Times* (19 September 1990), p. 2. Douglas Frantz and Dan Morain, "U.S. Firms Sold Advanced Technology to Iraq," *Los Angeles Times* (18 September 1990), p. A5.

[26]Douglas Frantz and Melissa Healy, "Iraqi Bomb Gives Nuke-Type Blast, Pentagon Says," *Los Angeles Times* (5 October 1990), p. 18.

[27]Frantz, p. 18. Barbara Starr and Heinz Schulte, "Probe Urged Into FAEs for Iraq," *Jane's Defence Weekly* (20 October 1990), p. 739. Douglas Frantz, "Honeywell Factor in Iraq Bomb," *Los*

Central Intelligence Agency Director William Webster stated publicly in September 1990 that Iraq had a "sizable stockpile" of biological weapons. According to Representative Les Aspin, chairman of the House Armed Services Committee, Iraq's arsenal included aerosol anthrax, an airborne form of a disease that can cause hemorrhaging and possibly death if untreated. One of Iraq's largest production facilities for biological weapons was believed to be south of Baghdad at Salman Pak.[28]

In addition to evidence collected during the Iran-Iraq war, Saddam Hussein himself announced in April 1990 that Iraq has binary chemical weapons, and he threatened to use them against Israel if attacked.[29] According to reports, Iraq's chemical weapons stockpile included primarily mustard gas and smaller quantities of tabun and sarin, lethal nerve agents.[30] Warheads with these chemicals could have been lobbed by artillery shells or by multiple rocket launchers, dropped by aircraft, or delivered by missiles.

Although Iraq claims to possess chemical munitions for its SCUD missiles, experts are not certain that it has ever been able to deliver biological and chemical agents in this manner.[31] It is difficult to design the combination of a proximity fuse and burster charge that can withstand the heat and vibration of a missile and still disperse the payload.[32] None of Iraq's SCUD attacks against Israel and Saudi Arabia utilized unconventional warheads, a fact that makes this capability suspect.

French and German companies are suspected of supplying Iraq with the raw materials, equipment, and know-how to manufacture chemical warheads. Germany's economics minister recently revealed that several German firms helped to build six plants near Samarra, Iraq, where chemical weapons are produced. One firm claims that it thought the facility was for pesticide production.[33] Other German companies are being prosecuted for

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Angeles Times (26 December 1990), p. 1. Tom Hamburger and Sally Apgar, "Honeywell Says Bomb Data Sale Violated Policy," *Minneapolis Star-Tribune* (17 February 1991), p. 1.

[28]Molly Moore, "Iraq Said to Have Supply of Biological Weapons," *Washington Post* (29 September 1990), p. 1.

[29]Jamal Halaby, "Iraq Vows to Junk Chemical Arms if Israel Does," *Washington Times* (5 April 1990), p. 11. Saddam was likely referring to an attack similar to that launched by Israel in 1981, when it bombed Iraq's Osirak nuclear reactor, which Israel claimed was developing weapon-grade plutonium. One day after Saddam's disclosure, Israel launched its second Ofeq satellite into orbit to demonstrate, in part, that its rocket and space capabilities are more advanced than those of Iraq. See Hugh Carnegy, "Israeli Satellite Launch Illustrates Lead Over Iraqis," *London Financial Times* (4 April 1990), p. 8.

[30]David Morrison, "Poor Man's A-Bomb," *Baltimore Sun* (11 September 1990), p. 9.

[31]Elaine Sciolino, "The Dauntingly Expensive Task of Imposing Arms Control," *New York Times* (28 April 1991), p. E3.

[32]"No Chem SCUDS?" *Armed Forces Journal International* (March 1991), p. 23. "Saddam's Microbes," *The Economist* (1 March 1991), p. 23.

[33]Frederick Kempe, "Germans Had Big Role in Helping Iraq Arm, Internal Report Shows," p. 1.

providing Iraq with the machinery to convert rockets and grenades into chemical weapon delivery systems.[34] And French officials are investigating whether French firms supplied Iraq with the raw chemicals used in manufacturing nerve agents.[35]

Although it is a signatory to the Nuclear Non-Proliferation Treaty (NPT), Iraq was strongly suspected of having a nuclear weapon research program. In 1976, Baghdad purchased two French research reactors, the 70-megawatt Osirak and a scale-model 800-kilowatt reactor. Suspicions of military intentions arose in the late 1970s, when Iraq purchased from Italy "hot cells" that are used to reprocess plutonium from fuel plates.[36] Additionally, Iraq refused France's offer to substitute "caramel," a less-enriched form of fuel, for the reactor in 1981.

Israel bombed Tuwaitha in 1981, destroying the Osirak reactor. Some 39 fuel assemblies and 27 pounds of enriched uranium survived, and they have been inspected biannually by the International Atomic Energy Agency (IAEA) since the air raid.[37] Iraq's stock was last inspected in November 1990, at which time the IAEA verified that none of the uranium had been diverted to weapons production.[38]

According to nonproliferation specialists, however, IAEA inspections would not necessarily uncover a nuclear weapon research program unless Iraq were within weeks of being able to produce a bomb.[39] Other evidence suggests that since the Osirak bombing Baghdad had been importing key equipment to build a uranium enrichment facility based on gas centrifuges. For example, three German companies sold Iraq special steel, components, and machinery that could be used in gas centrifuges.[40] Other reports suggested that China may have assisted Baghdad with its ultracentrifuge technology.[41] Outside experts downplayed the importance of the enrichment program, however, noting that numerous

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[34]Frederick Kempe, "Two Germans Say Firms Made Iraqi Arms Sales," *Wall Street Journal* (10 October 1990), p. 14.

[35]Youssef Ibrahim, "French Reportedly Sent Iraq Chemical War Tools," *New York Times* (21 September 1990), p. 10.

[36]Kennedy Maize, "12.5 Kilos of Highly Enriched Uranium Nets Saddam a Down and Dirty A-Bomb," *Defense Week* (20 August 1990), p. 12. Kenneth R. Timmerman, "Will Iraq, With World Help, Drop a Nuclear Bombshell?" *Wall Street Journal* (26 September 1990), p. 16.

[37]Patrick E. Tyler, "Specialists See Iraq Unlikely to Build A-Bomb in Near Future," *Washington Post* (8 November 1990), p. 62.

[38]Malcolm Browne, "Inspectors Say Iraq's Nuclear Fuel Isn't a Weapon," *New York Times* (28 November 1990), p. 14.

[39]Robert S. Greenberger, "Bush's Desire to Peacefully Restrain Iraq's Weapons Program May Be Elusive," *Wall Street Journal* (17 September 1990), p. 10.

[40]Kempe, "Germans Had Big Role in Helping Iraq," p. 1. Timmerman, p. 16.

[41]James Dorsey," Iraq Gets Chinese Aid on A-Bomb," *Washington Times* (14 December 1989), p. 1.

centrifuges would need to operate for five years to produce sufficient quantities of weapon-grade uranium for bombs.[42]

With its supply of enriched uranium, Iraq might have had enough material to produce one small implosion bomb.[43] Most nonproliferation specialists, however, doubt that Iraq had the technological sophistication to manufacture a weapon. Moreover, one bomb probably would not have satisfied Saddam Hussein's military needs.[44]

Iraq also had been pursuing ballistic missile production technology, presumably to deliver its unconventional warheads, because missiles are a more difficult long-range delivery system to defend against than aircraft.[45] Iraq devoted most of its attention to the SCUD-B ballistic missile, originally provided to Iraq by the Soviet Union during the 1970s.

As most of the SCUD attacks on Tel Aviv, Riyadh, and Dhahran during the Persian Gulf war have shown, it has poor accuracy. Nonetheless, Saddam's regime modified SCUD-B missiles, extending their range to 375 miles in the al-Hussein version and 560 miles in the al-Abbas.[46] Modified SCUDs were used extensively in the 1988 "war of the cities" between Iraq and Iran, using conventional or sometimes no warhead. Saddam claimed that Iraq had a third version of the SCUD, the Hijara. Various versions of the modified missiles hit Israeli targets.[47] Iraq was believed to have some 200 SCUD-Bs and modified SCUDs prior to the outbreak of war.[48]

Baghdad also was involved in the Condor II, or Badr 2000, ballistic missile program for many years with the assistance of Argentine, Egyptian, and probably West European engineers. The Condor II was intended to be an SSM with a range of 1000 km, capable of carrying a 500-kg payload. It was a follow-on to Argentina's Condor I, a shorter-range space research rocket program that Iraq pursued with the help of Messerschmitt-Bölkow-Blohm of West Germany and the French firm Sagem.[49] Egypt withdrew from the program in 1989

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[42]Tyler, p. 62.

[43]Maize, p. 12.

[44]Tyler, p. 62.

[45]Morrison, p. 9.

[46]Arms Control and Disarmament Agency, *World Military Expenditures, 1988*, p. 18.

[47]Edward Cody, "Saddam Claims to Have New Missile That Can Hit Israel," *Washington Post* (10 October 1990), p. 19.

[48]Michael Gordon, "Iraq Said to Build Launchers," *New York Times* (30 March 1990), p. 6. Bill Gertz," Iraqis Deploying Special Missile Launching System," *Washington Times* (13 September 1990), p. 9.

[49]David White et al., "Growing Concern Over Western Aid for Third World's Missiles," *London Financial Times* (8 September 1989), p. 2.

under pressure from the United States, and the program was apparently disbanded almost entirely by early 1990.[50]

Iraq shocked the world in December 1989, when it successfully tested a satellite launching rocket called the Tammuz-1. The rocket, which had approximately a 1200-mile range, made Iraq the first Arab nation to develop an intercontinental launch capability.[51] Iraq also claimed to have tested two Aabed SSMs with a 2000-km range.[52] The launch indicated the ineffectiveness of the U.S.-initiated Missile Technology Control Regime (MTCR).[53] Western technology had supplied Iraq with some impressive facilities, including a large missile development plant called Saad 16 in the city of Mosul.[54]

Iraq's success at missile production prompted Israel to pursue its Arrow antitactical ballistic missile program, which is being developed by Israeli Aircraft Industries and Lockheed Missile and Space Company with U.S. financial support.[55] U.S.-manned batteries of the Patriot air defense missile also defended Israel against Iraqi SCUD attack. This was the same system U.S. forces used to shoot down missiles launched by Saddam against coalition forces in Saudi Arabia.[56] Although the Patriot was effective against SCUDs, these missiles took the lives of 28 U.S. servicemen and women, killed and injured a number of Israelis and Saudis, and terrorized the public.

In sum, the Saddam regime showed remarkable talent at hiring foreign specialists and importing weapon components from all over the world for Iraq's military production efforts. In most categories of weapons—all varieties of aircraft, most missiles, most of its advanced armor and artillery—Iraq continued to import complete systems. However, it developed production capability in some key areas, particularly unconventional warheads and ballistic missile delivery systems.

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[50]David Ottaway, "Egypt Drops Out of Missile Project," *Washington Post* (20 September 1989), p. 32. Andrew Slade, "Condor Project in Disarray," *Jane's Defence Weekly* (17 February 1990), p. 295.

[51]Caryle Murphy and David Ottaway, "Iraq Has Tested Satellite Rocket, U.S. Confirms," *Washington Post* (9 December 1989), p. 1.

[52]James Bruce, "Assessing Iraq's Missile Technology," *Jane's Defence Weekly* (23 December 1989), p. 1371.

[53]In fact, the missile launch coincided with an MTCR meeting in London.

[54]Douglas Frantz and Dan Morain, "U.S. Firms Sold Advanced Technology to Iraq," *Los Angeles Times* (13 September 1990), p. 6. Much of the work on the Condor program was reportedly conducted at the Saad facility.

[55]Mark Hosenball and Marie Colvin, "New Bid to Foil Arab Missiles," *London Sunday Times* (8 April 1990), p. 19. James Hackett, "U.S. Forces Lacking Missile Defenses?" *Washington Times* (30 August 1990), p. G-4.

[56]Jackson Diehl, "Israel Seeks Patriot Missile System," *Washington Post* (3 September 1990), p. 17. Cushman, p. 52.

VI. CONCLUSION

Iraq emerged as the world's leading arms importer during the past decade with over $63 billion (1990 dollars) in total purchases from 1980 to 1988. Most of this value was supplied by the Soviet Union, but Iraq's ability to pay for its large purchases with hard currency or through oil barter agreements made it an attractive target for other countries as well. France, the PRC, Brazil, Poland, West Germany, Bulgaria, Czechoslovakia, and Italy may be counted among its major suppliers.

After taking the presidency in 1978, Saddam Hussein continued to rely on the Soviet Union for the majority of its supersonic aircraft, combat helicopters, tanks, armored vehicles and artillery, and missiles. However, Iraq also pursued a policy of diversifying its arms suppliers. It turned to Western countries, including France, for more sophisticated fighter aircraft and missiles. Baghdad also continued to purchase large quantities of equipment with no greater capabilities than that obtained from the Soviet Union. In fact, many such weapons were reexported Soviet models or Soviet-designed equipment that was manufactured or modified in other countries.

The result of Iraq's spending spree during the 1980s was an amalgam of equipment with mixed levels of technological sophistication. Most of Iraq's fighters were less capable than U.S. aircraft amassed in Saudi Arabia and the Persian Gulf to counter them during the 1991 war. Its most sophisticated planes were the French-built F-1EQ and Soviet MiG-29 air superiority/attack fighters, but it also had a sizable stockpile of less capable Soviet fighters and strikers. Iraq obtained more advanced surface-to-air missile systems during the 1980s for its air defenses, including the French-built Crotale and Roland and U.S.-built HAWK systems that it took from Kuwait in August 1990. Iraq's air defenses included a large stockpile of Soviet-built SAMs and vintage antiaircraft artillery.

Coalition forces were able to render Iraq's arsenals ineffectual during the six-week war in January-February 1991. As yet, the United States does not know what factors contributed the most to Iraq's quick military defeat. The coalition certainly had technologically superior equipment, and better-trained troops. Additionally, coalition forces used air power incessantly, and then executed ground maneuvers. And perhaps Iraqi troops had difficulty mustering support for war on the heels of an eight-year conflict with Iran. Some have argued in hindsight that assessments exaggerated Saddam's military might. Seen from the perspective of August 1990, however, Iraq's arsenals were indeed formidable.

Iraq's military capabilities benefited from the increased global competition for arms imports that it experienced during the 1980s. It did not purchase the most technologically sophisticated equipment in the world; rather, it collected a mixture of some relatively advanced equipment with large quantities of less capable systems. This mixed arsenal did not guarantee high operational effectiveness for Iraq's forces—indeed, finding spare parts and repairing and maintaining equipment would have been a logistical nightmare even without the U.N.-sponsored trade embargo. Nonetheless, global imports enabled Iraq to acquire a large arsenal that posed a credible threat to the security of its neighbors.

The Iraqi ministry of industry and military industrialization, under the leadership of Hussein Kamil, took advantage of world competition for import sales to cultivate its indigenous weapons production capability. The ministry focused primarily on manufacturing ballistic missiles and unconventional warheads, but it also built small arms, munitions, some artillery, produced tanks under license to the Soviet Union, and developed tactical missiles with the help of Brazilian engineers, among other foreigners.

Baghdad took advantage of world export competition to purchase weapon components that it could not produce indigenously, and it hired foreign specialists for the know-how to integrate those components. With the help of West European and other engineers, Iraq was able to manufacture chemical and biological weapons, as well as fuel air explosives; moreover, it might have developed the ability to enrich uranium. It also obtained the unwitting help of foreign firms by setting up legitimate companies as fronts for its components import efforts.

Liberal weapon component and arms export policies have many political and economic benefits for nations. Arms exports are a means of demonstrating special relationships between countries, enhancing the capability of allies to provide their own defense, and cultivating leverage—all goals of the United States and the Soviet Union in their weapon shipments to the Middle East over the past 40 years.

Arms exports also affect regional stabilities, and as in the case of Saddam Hussein, they can have unintended consequences. Although the U.S. supplied complete weapon systems to Iraq more than 30 years ago, U.S. transfers to other Middle Eastern countries, such as Israel, have contributed to the region's arms race. In some respects, weapon transfers to the Middle East resulted from superpower rivalry, and Saddam's Iraq can, in part, be considered a lingering effect of the Cold War.

Additionally, exports are an important mechanism for strengthening the economic health of domestic industries. Many nations, including France, the UK, and new arms producers in the developing world, assert that export sales are crucial to securing production

scale economies for their own domestic weapon procurement. Defense production makes a particularly strong case for self-reliance. But self-sufficiency in armaments often leads to exports, and a country that sells arms or dual-use goods faces the benefits of exports as well as the risks of unintended consequences.

The United States has participated in export control regimes for the most destabilizing of weapons—biological, chemical, and nuclear warheads with ballistic missile delivery systems. However, the success of these regimes depends on a delicate balance of cooperation among signatories and pressure, given the strong incentives to evade controls. Exporting nations must debate the decision to sell conventional weapons within the broader context of the repercussions that such exports might produce. The recent war between Iraq and coalition forces must both serve as a deterrent to aggression by other regional powers and motivate the international community to consider the risks of their export decisions.

Appendix A
SIPRI REGISTER OF IRAQI ARMS IMPORTS

Appendix Tables A.1-A.6 provide detailed data from the *SIPRI Yearbook* for various years from 1968 to 1990 on Iraqi imports of armored vehicles and artillery, fixed-wing aircraft, helicopters, missiles, naval vessels, and some radars, mainly from 1968 to 1988. These tables complement data presented in Sec. III, above. Blank spaces in the tables indicate that deliveries have not yet been made or that information is unavailable. Abbreviations and acronyms used in the tables are explained in the list on p. xv, above.

Table A.1

IRAQI IMPORTS OF ARMORED VEHICLES AND ARTILLERY

Country	System	Description	Number Ordered	Order Year	Delivery Year	Number Delivered	Comments
			Ordered Before 1968				
USSR	BRDM-2	SC	250	1966	1967-73	250	
			Ordered Between 1968 and 1978				
France	AML-90	AC		1968	1970		
USSR	BTR-50P	APC	250	1968	1969-73	250	
USSR	BTR-60P	APC	250	1970	1971-75	250	
USSR	ZSU-57-2	AAV	100	1970	1971-73	100	
USSR	M-1955 100mm	TG	200	1973	1973-76	200	
USSR	ZSU-23-4 Shilka	AAV	200	1973	1973-76	200	
USSR	BMP-1	MICV	100	1973	1974-75	100	
USSR	T-55	MBT	300	1973	1974-75	300	
USSR	T-62	MBT	100	1973	1974-75	100	
USSR	T-62	MBT	600	1976	1977-80	600	
France	AMX-10P	AC		1977	1978	50	
France	AMX-10RC	recce AC	110	1978	1981	110	
France	ERC-90 Sagaie	AC	50	1978	1980	50	
France	VCR-6	APC	100	1978	1979-81	100	armed with HOT ATMs
France	AMX-30B	MBT	100	1978	1980-81	100	
USSR	BM-21 122mm	MLRS	100	1978	1979-80	100	

Table A.1 (cont'd)

Country	System	Description	Number Ordered	Order Year	Delivery Year	Number Delivered	Comments
			Ordered After 1978				
Brazil	EE-11 Urutu	APC		1979	1980-82	150	ordered in 3 batches
Brazil	EE-17 Sucuri	TD		1979	1979-82	300	number delivered unconfirmed
Brazil	EE-9 Cascavel	AC		1979	1979-82	750	number delivered unconfirmed
Egypt	Walid	APC	100	1979	1980	100	unconfirmed
USSR	M-1973 152mm	SPH	50	1979	1980	50	
USSR	M-1974 122mm	SPH	50	1979	1980	50	
USSR	T-72	MBT	50	1979	1979	50	
Czechoslovakia	OT-64	APC	200	1980	1981	200	
GDR	T-55	MBT	50	1980	1981	50	surplus; including some T-54s
Hungary	Fug-70	SC	200	1980	1981	200	
Jordan	M-109 155mm	SPH	100	1980	1981-83	100	seller unconfirmed
Jordan	M-114 155mm	TH	30	1980	1981	30	seller unconfirmed
Poland	T-55	MBT	300	1980	1981	300	sale approved by USSR; replacements for losses from war with Iran
Romania	T-55	MBT		1980	1981-84	150	
Switzerland	Roland	APC	50	1980	1981	50	seller unconfirmed
USSR	T-72	MBT	100	1980	1982-83	100	
Austria	Cuirassier	LT/TD	100	1981	1981	100	reportedly delivered via Jordan
China	Type 531	APC		1981	1982-88	650	unspecified number delivered
China	T-59	MBT		1981	1982-88	700	unconfirmed
Czechoslovakia	BMP-1	MICV		1981	1981-89	1000	may be from USSR
Egypt	T-55	MBT	250	1981	1981-83	250	several hundred delivered
France	AMX-30 Roland	AAV(M)	150	1981	1982-88	105	at least 30 delivered by 1983
France	ERC-90 Sagaie	AC	200	1981	1982-84	200	
France	M-3	APC	200	1981	1982-84	200	
China	Type 59/1 130mm	TG		1981	1982-88	720	
Spain	BMR-600	ICV		1981	1982-85	200	unconfirmed

Table A.1 (cont'd)

Country	System	Description	Number Ordered	Order Year	Delivery Year	Number Delivered	Comments
USSR	T-54	MBT	50	1981	1982-83	50	
USSR	T-55	MBT	100	1981	1982-83	100	transferred via Saudi Arabia; possibly also some T-54s
Brazil	EE-11 Urutu	APC	350	1982	1983-84	350	
Brazil	EE-3 Jararaca	SC	300	1982	1984-85	300	
China	T-69	MBT		1982	1983-88	600	1000-2000 ordered in early 1980s
France	AMX-30-155 GCT	SPG	85	1982	1983-85	85	
Jordan	GHN-45 155mm	TH/TG	200	1982	1983	200	
Jordan	Khalid	MBT	50	1982	1982-83	50	small number sent as military aid
Libya	EE-9 Cascavel	AC	400	1982	1983	400	
UK	Saboteur	APC	58	1982	1982-83	58	
USSR	MT-LB	APC		1982	1983-88	800	modified for 120-mm mortar
USSR	BM-21 122mm	MRLS	200	1982	1983-84	200	
USSR	BTR-40PB Gaskin	AAV(M)		1982	1982-87	30	on BRDM-2 vehicles
USSR	D-30 122mm	TH		1982	1982-88	576	
USSR	T-62	MBT		1982	1982-89	1000	
Brazil	Astros II SS-30	MRL		1983	1984-89	78	
Egypt	T-55	MBT	200	1983	1983-84	60	Romania built; Egypt transferred
USSR	PT-76	LT	200	1983	1984	200	
Brazil	EE-9 Cascavel	AC	26	1984	1985	26	
Jordan	GHN-45 155mm	TH/TG	200	1984			unconfirmed
Kuwait	Chieftain-5	MBT	50	1984	1984	50	unconfirmed
South Africa	G-5 155mm	TH	200	1984	1985-88	200	total package worth $400 million
USSR	T-55	MBT	200	1984	1984-85	200	part of May 1984 deal
Brazil	Astros II SS-60	MRL		1985	1987-88	20	
Egypt	BM-21 122mm	MRLS		1985	1985-87	150	numbers uncertain
Egypt	D-130 122mm	TG		1985	1986-88	90	
Egypt	D-30 122mm	TH		1985	1985-89	120	supplier uncertain

Table A.1 (cont'd)

Country	System	Description	Number Ordered	Order Year	Delivery Year	Number Delivered	Comments
USSR	T-72	MBT		1985	1985-88	700	modified in Iraq; eventual goal full Iraqi production
Brazil	EE-9 Cascavel	AC	250	1986	1987-89	250	Some with 25mm AA cannon
Saudi Arabia	FH-70 155mm	TH	12	1986	1986	12	unconfirmed
USSR	BTR-80	APC		1986			
USSR	BM-21 122mm	MRL		1986	1986-88	360	part of deal worth $3 billion
USSR	M-1973 152mm	SPG		1986	1987	40	
USSR	M-1974 122mm	SPH		1986	1987	40	
USSR	2S1 122mm	SPH		1986	1987-88	80	part of deal worth $3 billion
USSR	2S3 152mm	SPG		1986	1987-88	80	152- and 122-mm guns
USSR	T-74	MBT		1986			reportedly part of $3 billion deal
Brazil	EE-3 Jararaca	SC	200	1987			negotiating
Egypt	Sakr-30 122mm	MRL		1987	1987-89	300	Egyptian version of BM-21 MRS

Table A.2

IRAQI IMPORTS OF FIXED-WING AIRCRAFT

Country	System	Description	Number Ordered	Order Year	Delivery Year	Number Delivered	Comments
			Ordered Before 1968				
USSR	MiG-21F	fighter	36	1967	1968-71	36	
			Ordered Between 1968 and 1978				
France	Nord Atlas	transport		1968	1968		surplus
India	HS 748	transport			1968	1	gift; Indian assembled
UK	BN-2A Islander	transport	3	1970	1971	3	for photographic survey
USSR	Tu-124	transport	2	1970	1971	2	
USSR	Su-7 Fitter	fighter	12	1972	1973	12	
USSR	Tu-22 Blinder-A	bomber	12	1972	1973	12	
Czechoslovakia	L-39 Albatross	jet trainer	24	1973	1978-79	24	
USSR	MiG-21F	fighter	15	1973	1973	15	war replacements
USSR	MiG-21MF	fighter	40	1973	1974-75	40	
USSR	Su-20 Fitter-C	fighter/ground attack	80	1973	1974-81	80	
USSR	MiG-23	fighter/interceptor	20	1974	1976	20	
France	Mystere-20	transport	2	1975	1975-76	2	
USA	C-130H Hercules	transport	8	1976			US government provisionally authorized sale
USSR	An-12 Cub-A	transport	4	1976	1977	4	
USSR	An-24 Coke	transport	2	1976	1977	2	
USSR	An-26 Curl	lightplane	2	1976	1977	2	
USSR	MiG-23BN	fighter/ground attack	70	1976	1977-78	70	

Table A.2 (cont'd)

Country	System	Description	Number Ordered	Order Year	Delivery Year	Number Delivered	Comments
USSR	MiG-23S	fighter	138	1976	1977	35	based at naval base
USSR	MiG-27	fighter/ground attack	138	1976	1977-79	120	probably same order as previous sale
USSR	Tu-134	transport	2	1976	1978	2	for VIP transport
France	Mirage F-1B	fighter/interceptor	4	1977	1981	4	
France	Mirage F-1C	fighter/interceptor	32	1977	1981	32	first batch via Cyprus
Switzerland	MBB-223K	trainer		1977			
			Ordered After 1978				
Czechoslovakia	L-29 Delfin	jet trainer	24	1979	1980	24	
France	Mirage F-1C	fighter/interceptor	24	1979	1983-84	24	armed with Magic AAMs and Exocet AShMs
Sudan	MiG-21MF	fighter	10	1979	1979	10	purchased for spares
Switzerland	AS-202 Bravo	trainer	48	1979	1979-81	48	
USA	Jetstar-2	transport	6	1979			Lockheed received State Dept. permission to sell
USSR	Il-18	transport		1979			
USSR	Il-20	transport		1979			
USSR	MiG-23	fighter/ground attack	60	1979	1980-83	60	
USSR	MiG-25	fighter/interceptor	25	1979	1980-81	25	deliveries reportedly resumed in 1982
USSR	MiG-25R	recce	8	1979	1982	8	
USSR	MiG-27	fighter/ground attack		1979	1979-84	45	
USSR	Il-76 Candid	transport	16	1980	1980-84	16	12 in civilian markings
Spain	C-101 Aviojet	trainer/striker		1981			unconfirmed
Spain	C-212-200	transport	20	1981			part of $900 million 5-year program
Switzerland	PC-7	trainer	52	1981	1981-82	52	
France	Mirage F-1C	fighter/interceptor	29	1982	1984-85	29	6 trainers; armed with Magic AAMs

Table A.2 (cont'd)

Country	System	Description	Number Ordered	Order Year	Delivery Year	Number Delivered	Comments
USA	L-100-30	transport	6	1982			unconfirmed; US ban lifted April 1982
USSR	Su-7 Fitter	fighter	30	1982	1984	30	
Egypt	EMB-312 Tucano	trainer	90	1983	1985-88	90	from Brazil & Egyptian licensed production
Egypt	F-6	fighter	40	1983	1983	40	Chinese version of MiG-19 assembled in Egypt
Egypt	F-7	fighter		1983	1983-87	70	Chinese version of MiG-21 assembled in Egypt
France	Super Etendard	fighter/striker	5	1983	1983	5	diverted from French order; returned Sept. 1985
Jordan	F-6	fighter	20	1983	1984	20	Chinese F-6 assembled in Egypt, via Jordan
USSR	MiG-21bis	fighter	61	1983	1984	61	unconfirmed
USSR	Su-20 Fitter-C	fighter/ground attack	30	1983	1985	30	unconfirmed
France	Mirage 5D	jet trainer	8	1984	1984	8	
USSR	MiG-23BN	fighter/ground attack	50	1984	1984-85	50	guaranteed by Saudi Arabia
USSR	MiG-25	fighter/interceptor		1984	1984-85	30	part of May 1984 deal
France	Mirage F-1C	fighter/interceptor	24	1985	1986	24	
USSR	Su-25 Frogfoot	fighter/ground attack		1985	1987	40	
Argentina	IA-58A Pucara	counterinsurgency	20	1986			unconfirmed
France	Alpha Jet	jet trainer/striker		1986			negotiating; possible assembly in Egypt
Switzerland	PC-9	trainer	15	1986	1987-88	20	second order
USSR	MiG-23BN	fighter/ground attack		1986			
USSR	MiG-27	fighter/ground attack		1986			withheld by USSR due to payment difficulties
USSR	MiG-29	fighter	24	1986	1987	24	reported to have degraded electronics
China	B-6	bomber	4	1987	1988	4	first export of Chinese Tu-16
France	Mirage F-1C	fighter/interceptor	20	1987	1988	20	
France	Mirage F-1C	fighter/interceptor	10	1988			brings total orders to 143

Table A.3

IRAQI IMPORTS OF HELICOPTERS

Country	System	Number Ordered	Order Year	Delivery Year	Number Delivered	Comments
			Ordered Between 1968 and 1978			
France	SA-316B Alouette III	16	1969	1971	16	armed with AS-11s
USSR	Mi-4 Hound	25	1969	1970-71	25	
USSR	Mi-8 Hip	12	1970	1971	12	
USSR	Mi-6 Hook	15	1972	1973	15	
France	SA-316B Alouette III	44	1974	1975-77	44	armed with AS-12s
France	SA-330 Puma	3	1975	1976	3	for VIP transport
France	SA-342K Gazelle	20	1975	1976-77	20	armed with HOT ATMs
USSR	Mi-24 Hind-C	2	1975	1976	2	
USSR	Mi-8 Hip	90	1975	1976-79	90	
France	SA-321G Super Frelon	10	1976	1976-80	10	armed with Exocets
USSR	Mi-24 Hind-D	40	1977	1979-80	40	
France	SA-342K Gazelle	20	1978	1980-81	20	armed with HOT ATMs
FRG	Bo-105	23	1978	1979-83	23	
USSR	Mi-10 Harke		1978	1978	20	
			Ordered After 1978			
France	SA-330L Puma	20	1979	1980-81	20	
France	SA-321G Super Frelon	3	1980	1981	3	
Indonesia	Bo-105CB		1980			undisclosed number ordered
Italy	S-61A-4	6	1980	1982	6	for VIP transport
Spain	Bo-105CB	24	1981	1982-85	24	delivery from CASA

Table A.3 (cont'd)

Country	System	Number Ordered	Order Year	Delivery Year	Number Delivered	Comments
USA	Model 300C	30	1981	1983	30	
USA	Model 500D	30	1981	1983	30	
USSR	Mi-24 Hind-C	10	1983	1984	10	unspecified number delivered
USSR	Mi-8 Hip	30	1983	1984	30	unconfirmed
FRG	BK-117	6	1984	1984-85	6	refurbished electronics in Austria
FRG	Bo-105CB	6	1984	1984	6	
Italy	AB-212ASW	5	1984	1987-88	5	originally intended for Lupo class frigates
Italy	A-109 Hirundo	2	1984	1984-85	2	on 2 Wadi class corvettes
USA	Model 214ST	45	1985	1985-86	10	possibly for civil use
USA	Model 530MG	24	1985	1985	24	possibly for civil use
Egypt	SA-342L Gazelle	18	1986	1986-88	18	unconfirmed
USSR	Mi-24 Hind-D		1986			
Canada	Bo-105LS	6	1987	1988	6	may be for civilian use
Italy	AB-412 Griffon	6	1987	1988	6	
France	SA-332	6	1988	1989	3	
France	AS-365N	6	1989			to be delivered from 1991
FRG	BK-117	16	1989	1989	4	
Chile	Model 206		1990			

Table A.4

IRAQI IMPORTS OF MISSILES

Country	System	Description	Number Ordered	Order Year	Delivery Year	Number Delivered	Comments
			Ordered Before 1968				
USSR	AA-2 Atoll	AAM	918	1962	1963-73	918	arming MiG-21s
			Ordered Between 1968 and 1978				
France	AS-11	ASM	192	1969	1970-71	192	arming Alouette IIIs
USSR	SA-2 Guideline	landmob SAM	90	1970	1971	90	
USSR	SA-3 Goa	landmob SAM	108	1971	1972-73	108	
USSR	SA-3 SAM	mobile SAM system	6	1971	1972-73	6	on ZIL trucks
USSR	SSN-2 Styx	ShShM	24	1971	1972-74	24	for 6 Osa-1 class FACs
USSR	SSN-2 Styx L	ShShM launcher	6	1971	1972-74	6	for 6 Osa-1 class FACs
USSR	AS-4 Kitchen	ASM	36	1972	1973	36	for 12 Tu-22s
USSR	AA-2 Atoll	AAM		1973	1974-75		
USSR	SSN-2 Styx	ShShM	96	1973	1974-77	96	for 8 Osa-2 class FACs
USSR	SSN-2 Styx L	ShShM launcher	8	1973	1974-77	8	for 8 Osa-2 class FACs
France	AS-12	ASM/AShM	264	1974	1975-77	264	for Alouette-IIIs
France	SS-11	ATM		1974			
USSR	AT-3 Sagger	ATM	500	1974	1976	500	
USSR	SCUD-B	landmob SSM	81	1974	1975		
USSR	SCUD-B L	landmob SSM	12	1974	1975	12	
USSR	AA-2 Atoll	AAM	840	1975	1976-85	840	for MiG-23s
France	HOT	ATM	360	1976	1980-81	360	for SA-342 helo
USSR	SA-6 Gainful	landmob SAM	135	1976	1977	135	

Table A.4 (cont'd)

Country	System	Description	Number Ordered	Order Year	Delivery Year	Number Delivered	Comments
France	R-530	AAM	267	1977	1981-85	267	for Mirage F-1s
France	R-550 Magic	AAM	534	1977	1981-85	534	for Mirage F-1s
USSR	SSN-2 Styx	ShShM	60	1977	1978	12	
France	AM-39 Exocet	AShM	60	1978	1979-80	60	
USSR	SCUD-B	landmob SSM	6	1978			on order in addition to 12 in service
			Ordered After 1978				
France	R-440 Crotale	landmob SAM		1979	1981-82	100	
France	SS-11	ATM	200	1979	1980-81	200	
Italy	Seakiller-2	ShShM		1979			for Lupo class frigates
USSR	AA-2 Atoll	AAM	330	1979	1980-85	330	for MiG-21s and MiG-25s
USSR	SA-6 Gainful	landmob SAM		1979	1980-87	400	
USSR	SA-6 SAM	mobile SAM system		1979	1982-87	40	
Brazil	Cobra-2000	ATM	100	1980	1981	100	designation unconfirmed
Brazil	MAS-1 Carcara	ASM		1980	1981		various missiles reported delivered early 1981
Egypt	AT-3 Sagger	ATM		1981	1981	100	possibly Swingfire
France	HOT	ATM		1981	1981-88	1600	
France	Milan	ATM		1981	1981-88	4800	
France	Roland-2	landmob SAM	600	1981	1982-88	1050	
Italy	Aspide	AAM/SAM/ShAM	224	1981			delivery prevented by war with Iran
Italy	Aspide/Albatros	ShAM/ShShM L	10	1981			delivery prevented by war with Iran
Italy	Otomat-2	ShShM	60	1981			delivery prevented by war with Iran
Italy	Otomat-2 L	ShShM L	14	1981			delivery prevented by war with Iran
USSR	SA-8 Gecko	landmob SAM		1982	1982-87	432	
USSR	SA-8 SAM	mobile SAM system		1982	1982-87	24	

Table A.4 (cont'd)

Country	System	Description	Number Ordered	Order Year	Delivery Year	Number Delivered	Comments
USSR	SA-9 Gaskin	landmob SAM		1982	1982-87	240	on BRDM-2 vehicles
France	AM-39 Exocet	AShM		1983	1983-88	734	for Super Etendards and Mirages
France	ARMAT	ARM		1983	1983-88	600	up to 75% of French Armat production
USSR	AS-4 Kitchen	ASM	24	1983	1984	24	unconfirmed
France	AS-30L	ASM	586	1984	1985-88	1200	for Mirage F-1s
USSR	SS-21	SSM	18	1984	1985	18	
USSR	SS-21 L	mobile SSM system	6	1984	1985	6	
Brazil	SS-60	SSM		1985	1987-89	960	
Poland	SA-6 Gainful	landmob SAM	200	1985	1985-86	200	unconfirmed
USSR	AA-8 Aphid	AAM	160	1985	1987	160	
USSR	SCUD-B	SSM		1985	1986-88	350	
China	Hai Ying-2	ShShM/SShM		1986			for Osa-2 class FACs
USSR	AA-7 Apex	AAM		1986	1987	96	for MiG-29s
USSR	AA-8 Aphid	AAM	144	1986	1987	144	for MiG-29s
China	C-601	AShM		1987	1988	128	
Egypt	Sakr Eye	portable SAM		1987			unspecified number
Egypt	SA-6 Gainful	landmob SAM	40	1987			unconfirmed
Egypt	SA-6 SAM	mobile SAM system	4	1987			unconfirmed
USSR	AT-4 Spigot	ATM		1987			unconfirmed
USSR	AS-14 Kedge	ASM		1988	1988-89	40	
France	AM-39 Exocet	AShM	36	1989	1989	18	for AS-332 Super Puma helicopters
France	AS-15TT	AShM	48	1989			for SA-365 Dauphin helicopters

Table A.5

IRAQI IMPORTS OF NAVAL VESSELS

Country	System	Description	Number Ordered	Order Year	Delivery Year	Number Delivered	Comments
USSR	Osa-1 class	FAC	6	1971	1972-74	6	
USSR	Osa-2 class	FAC	2	1973	1974-77	2	ex-USSR
USSR	Yevgenia class	MSC	3	1974	1975	3	
USSR	Osa-2 class	FPB	10	1976	1978	2	
USSR	Polnocny class	light ship	4	1976	1977-79	4	one sunk in 1980
Yugoslavia	training ship	frigate	1	1979			
Italy	Sauro class	submarine		1980			includes training and setting up shipyard
Italy	Esmeraldas class	corvette	2	1981			
Italy	Lupo class	frigate	4	1981			delivery prevented by war with Iran
Italy	Stromboli class	support ship	1	1981	1984	1	commissioned Mar 1984
Italy	Wadi class	corvette	6	1981			delivery prevented by war with Iran

Table A.6

REPORTED IRAQI IMPORTS OF RADAR SYSTEMS

Country	System	Description	Number Ordered	Order Year	Delivery Year	Number Delivered	Comments
Brazil	Astros guidance	fire control radar		1983	1984-88	13	fire control system for Astros MRL
France	Tiger	point defense radar		1987	1988-89	10	trailer-mounted; some modified as AEW radar

Appendix B

INTERNATIONAL INSTITUTE FOR STRATEGIC STUDIES: INVENTORIES OF IRAQI AND KUWAITI MILITARY EQUIPMENT*

IRAQ

ARMY

MAIN BATTLE TANKS: Some 5,500, including 1,500 T-54/-55/M-77; 1,500 Chinese T-59/-69; 1,500 T-62; 1000 T-72; 30 Chieftain Mk 3/5, M-60; M-47.

LIGHT TANKS: 100 PT-76.

RECONNAISSANCE VEHICLES: Some 2,500, including 1,300 BRDM-2; 300 AML-60/-90; ERC-90 Sagaie; MOWAG Roland; 600 EE-9 Cascavel; 300 EE-3 Jararaca.

ARMORED INFANTRY FIGHTING VEHICLES: 1,500 BMP-1/-2.

ARMORED PERSONNEL CARRIERS: Estimated 6,000, including BTR-50/-60/-152; OT-62/-64; 1,500 MTLB; 1,000 YW-531; M-113A1/A2; Panhard M-3; EE-11 Urutu.

TOWED ARTILLERY: Some 3,000, including 105 mm—M-56 pack; 122mm—D-74, 100+D-30, 400+M-1938; 130mm—M-46, Type 59-1; 152mm—M-1937, M-1943; 155mm—100 G-5, 200 GHN-45, M-114.

SELF-PROPELLED ARTILLERY: Estimated 500, including 122mm—2S1; 152mm—2S3; 155mm—M-109A1/A2, 85 AUF-1 (GCT).

MULTIPLE ROCKET LAUNCHERS: 200, including 107mm; 122mm—BM-21; 127mm—60 Astros II; 132mm—BM-13/-16; 180mm—Astros SS-30; 262mm—Ababeel 50; 300mm—Astros SS-60.

MORTARS: 81mm; 120mm; 160mm—M-1943; 240mm.

SURFACE-TO-SURFACE MISSILE (launchers): 50 FROG-7; Sijil; 36 SCUD-B; al-Abbas; al-Hussein.

ANTITANK GUIDED WEAPONS: AT-3 Sagger (including BRDM-2); AT-4 Spigot reported; SS-11; Milan; HOT (including 100 VC-TH).

RECOILLESS LAUNCHERS: 73mm—SPG-9; 82mm—B-10; 107mm.

ATTACK GUNS: 85mm; 100mm towed.

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* *Military Balance 1990-91* (London: Brassey's Publishing for the International Institute for Strategic Studies, 1990).

ATTACK HELICOPTERS: 56 Bo-105 with AS-11/HOT; 40 Mi-24; 30 SA-316 with AS-12; 13 SA-321 (some with Exocet); 20 SA-342.

TRANSPORT HELICOPTERS: Heavy—15 Mi-6; medium—40 Bell 214 ST, 140 Mi-8/-17, 5 AS-61, 20 SA-330, 20 Mi-4; light—3 A-109, 5 AB-212, 30 Hughes 300C, 30 500D, 26 530F, 30 SA-342.

AIR DEFENSE GUNS: 4,000, including 23mm—ZSU-23-4 SP; 37mm—M-1939 and twin; 57mm, including ZSU-57-2 SP; 85mm; 100mm; 130mm.

SURFACE-TO-AIR MISSILES: 160 SA-2; 140 SA-3; about 300 SA-6/-8/-9/-14, plus SA-7/-14, 100 Roland.

NAVY

FRIGATES: 4 Hittin (Italian Lupo) with 1 AB-212 ASW helicopter, 2 x 3 ASTT; plus 8 x Otomat SSM, 1 x 127mm gun; 1 Khaldoum training frigate with 2 x ASTT.

CORVETTES: 2 Mussa ben Nussair (Italian Assad, helicopter version) 1 x AB-212 helicopter, 2 x Otomat SSM; 4 Abdulla ibn abi Sarh (Italian Assad) with 6 x Otomat, 2 x 3 ASTT.

MISSILE CRAFT: 8 Nisan 7 (Soviet Osa) with 4 x SS-N-2 Styx SSM.

TORPEDO CRAFT: 6 Soviet P-6 (with 2 x 533mm TT).

PATROL, INSHORE: 3 SO-1; 4 Nyrat II; 13 other.

MINE COUNTERMEASURE VESSELS: 2 Soviet T-43 coastal minesweepers; 6 inshore minesweepers.

AMPHIBIOUS: 3 al-Zahraa landing ships, tank, capacity 250 troops, 20 tanks, 1 helicopter; 3 Soviet Polnocny landing ships, medium, capacity 180 troops, 6 tanks.

SUPPORT AND MISCELLANEOUS: 1 Agnadeen (Italian Stromboli) AOR (tanker); 2 presidential yachts.

AIR FORCE

BOMBERS: 2 squadrons—1 with 8 Tu-22; 1 with 4 Tu-16, 4 Chinese H-6D.

FIGHTER/GROUND ATTACK: 22 squadrons—2 with 30 Chinese J-6; 5 with 90 MiG-23; 4 with 64 Mirage F-1EQ5/EQ5-200 (EQ5 with Exocet; 200 with in-flight refueling); 2 with 30 Su-7; 4 with 70 Su-20; 1 with 16 Su-24; 4 with 60 Su-25.

FIGHTERS: 17 squadrons with some 40 Chinese J-7; 150 MiG-21; 25 MiG-25; 30 Mirage F-1EQ; 30 MiG-29.

RECONNAISSANCE: 1 squadron with 5 MiG-21, 7 MiG-25.

TRANSPORT: 2 squadrons—10 An-2; 10 An-12; 6 An-24; 2 An-26; 19 Il-76.

TRAINERS: 35 AS-202; 88 EMB-312; 50 L-29; 40 L-39; 16 MB-233; 16 Mirage F-1BQ; 50 PC-7; 30 PC-9; Su-7B; 2 Tu-22; 10 Yak-11.

AIR-TO-SURFACE MISSILES: Exocet AM-39; AS-4; AS-5; AS-11; AS-12; AS-30 Laser; C-601.

AIR-TO-AIR MISSILES: AA-2/-6/-7/-8; R-530; R-550 Magic.

KUWAIT

ARMY

MAIN BATTLE TANKS: 245, including 70 Vickers Mk1 (in store); 10 Centurion; 165 Chieftain; 6 M-84 (training).

RECONNAISSANCE VEHICLES: 100 Saladin (in store); 90 Ferret.

ARMORED INFANTRY FIGHTING VEHICLES: 245 BMP-2.

ARMORED PERSONNEL CARRIERS: 200 M-113; 130 Saracen; 100 Fahd.

TOWED ARTILLERY: 105mm—16 M-101.

SELF-PROPELLED ARTILLERY: 155mm—36 M-109A2; 20 AMX Mk F-3.

MORTARS: 81mm; 120mm—40.

SURFACE-TO-SURFACE MISSILES: 12 FROG-7 launchers.

ANTITANK GUIDED WEAPONS: 120 AT-4 Spigot; 20 HOT; TOW/improved TOW (including 56 M-901 SP).

RECOILLESS LAUNCHERS: 84 mm—Carl Gustav.

SURFACE-TO-AIR MISSILES: SA-7/-14.

NAVY

MISSILE CRAFT: 2 Istiqlal (FRG Lürssen FPB-57) fast patrol craft with 2 x MM-40 Exocet SSM; 6 al-Boom (FRG Lürssen TNC-45) with 2 x MM-40 Exocet.

PATROL: 15 inshore.

AMPHIBIOUS: craft only; 4 landing craft, medium.

SUPPORT SHIPS: 3 coastal transports.

AIR FORCE

FIGHTER: 2 squadrons with 20 Mirage F-1CK, 4 F-1BK.

COUNTERINSURGENCY/TRAINERS: 1 squadron with 12 HAWK Mk 64.

TRANSPORT: 2 DC-9; 2 DHC-4; 4 L-100-30; used also in civil role.

TRANSPORT HELICOPTERS: 6 AS-332 (transport/search and rescue/ attack); 10 SA-330.

TRAINING HELICOPTERS: 17 SA-342 (12 can be fitted with HOT ATGW).

AIR DEFENSE: KAFAD (Kuwait Air Forces and Air Defense)—integrated air defense control system plus 1 SAM battalion (6 batteries each 2 x 12 improved HAWK); 1 aerostat-borne AN/TPS-63 radar.

AIR-TO-SURFACE MISSILES: AS-11/-12; HOT; AM-39 Exocet.

ANTIRADAR MISSILES: Armat.

AIR-TO-AIR MISSILES: AIM-9 Sidewinder; R-550 Magic; Super R-530.

Appendix C
VALUE OF IRAQI ARMS TRADE

Table C.1

VALUE OF IRAQI ARMS IMPORTS AND EXPORTS, 1968-1988

(Millions of then-year dollars)

Year	Arms Imports	Arms Exports	Arms As % of All Imports	Year	Arms Imports	Arms Exports	Arms As % of All Imports
1968	$130	$0	32.1%	1979	$3200	$0	44.6%
1969	70	0	15.9	1980	2400	20	17.2
1970	50	0	9.8	1981	4200	0	20.3
1971	40	0	5.6	1982	7100	0	33.0
1972	140	0	19.8	1983	7000	0	57.5
1973	625	0	69.9	1984	9200	0	83.0
1974	625	0	26.3	1985	4700	0	44.5
1975	675	0	16.0	1986	5700	0	55.9
1976	1000	0	28.8	1987	5500	5	74.2
1977	1900	0	48.7	1988	4600	80	37.1
1978	2400	0	57.0				

SOURCE: Arms Control and Disarmament Agency, *World Military Expenditures and Arms Transfers,* various years.

Table C.2

VALUE OF ARMS AGREEMENTS WITH AND DELIVERIES TO IRAQ, 1981-1988

(Millions of then-year dollars)

	Agreements			Deliveries		
Supplier	1981-84	1985-88	1981-88	1981-84	1985-88	1981-88
Soviet Union	15,960	4,690	20,650	10,820	10,550	21,370
PRC	3,640	1,880	5,520	2,840	1,540	4,380
Other communist	3,710	2,320	6,030	3,520	2,760	6,300
Total communist	23,310	8,890	32,200	17,200	14,850	32,050
European noncommunist	5,110	4,680	9,790	8,130	2,580	10,710
United States	0	0	0	0	0	0
Other noncommunist	2,720	2,540	5,260	2,140	1,760	3,900
Total noncommunist	7,830	7,220	15,050	10,270	4,340	14,610
Total	31,140	16,110	47,250	27,470	19,190	46,660

SOURCE: Richard Grimmett, *Trends in Conventional Arms Transfers to the Third World by Major Supplier, 1981-88* (Washington, DC: Congressional Research Service, 1989).

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