



US soldiers fire M-16 rifles
in Indiana in March 2003.
(© AP/Michael Conroy)

Continuity and Change: PRODUCTS AND PRODUCERS

1

INTRODUCTION

In a declining international small arms market, there are powerful forces for change in the global industry. Among the most visible aspects is the trend towards consolidation of major companies. In December 2003 two of the best-known small arms producers, Germany's Heckler & Koch (H&K) and Santa Barbara Sistemas, the Spanish subsidiary of General Dynamics, initiated a joint venture, which will manufacture a variety of new types of small arms (*Jane's Defence Weekly*, 2003d). The venture is similar to many initiatives launched in recent years, involving such companies as Belgium's FN Herstal, France's Giat, Germany's Dynamit Nobel, Switzerland's RUAG, and Alliant Techsystems in the United States. These firms and their counterparts in other leading producing countries, such as those of the Russian Federation, are investing heavily in new small arms and light weapons (SALW), partly in response to rearmament and procurement programmes.

Alongside this trend of change is another of continuity. In recent US-led military operations in Afghanistan and Iraq, high-tech armies continue to confront combatants using older types of small arms and light weapons. The coalition forces themselves still rely greatly on small arms technology that has changed little in the past decades. These conflicts and many others around the world reveal unchanged demand for staple weapons, such as high-powered rifles, medium and heavy machine guns, and other veteran designs such as rocket-propelled grenade launchers (RPGs).

What do these two contradictory trends tell us of the state of global small arms and light weapons production? The key findings of this chapter are as follows:

- At least 1,249 companies in more than 90 countries are involved in some aspect of small arms and light weapons production.
- The global market for small arms and light weapons is relatively stable, although producers from countries such as Australia, Brazil, Israel, Singapore, and South Africa are challenging established European and US producers.
- New small arms and light weapons designs are appearing, as armed forces in Europe and elsewhere begin major rearmament programmes. This development will boost global production in coming years.
- At least ten countries in Latin America have the capacity to produce small arms, light weapons, and/or ammunition. Brazil is Latin America's largest and most diversified small arms producer.
- Small arms and light weapons technology is changing rapidly, but the oldest and cheapest weapons will continue to be the most widespread.

Reflecting the themes of continuity and change, this chapter provides an annual update of trends and patterns in the global small arms and light weapons industry. It offers a comprehensive update on two of the world's major producers—the Russian Federation and the United States—and a regional survey, which examines small arms and light weapons production in Latin America. The chapter also examines some of the main technological and product developments

with respect to various categories of military-style small arms and light weapons. It focuses especially on the most popular and widely distributed of these, with a particular focus on RPGs.

What are the latest trends in the global small arms and light weapons industry? New information and research suggests that at least 1,249 companies worldwide are involved in some aspect of small arms and light weapons production. The latest available information suggests that there are slightly fewer countries with the capacity to produce small arms and light weapons than previously thought. In the Russian Federation and the United States, production of commercial firearms appears to be declining, but production of military-style small arms seems to be increasing. More than three million firearms were produced in the United States in 2001. The lowest level since 1992, this figure represents a considerable decline from the peak in 1994, when more than five million were produced. In recent years the Russian defence industry as a whole has experienced a significant increase in production, yet small arms and light weapons production decreased from around one million in 2001 to about 650,000 in 2002.

Producers from countries such as Australia, Brazil, China, Israel, Singapore, and South Africa are challenging established European and US producers.

As part of a rotating series of regional surveys that included the Middle East in 2002 and Eastern and Central Europe in 2003, this edition of the *Small Arms Survey* explores small arms production in Latin America.

What are the most popular or common small arms? This chapter also focuses on the most widely distributed weapons among armed forces worldwide. Pistols and revolvers are the most numerous and widely dispersed of all small arms. Assault rifles are now the most numerous and effective infantry small arm. The international market for mortars is the most stable of all small arms and light weapons markets.

Among small arms and light weapons technology, old and cheap is often preferable. The RPG-7 rocket-propelled grenade launcher, now over 40 years old, is a prime example of the extent to which such weapons undergo considerable modification and enhancement over time. With an estimated nine million or more units produced, the RPG-7 is exceptionally cheap, easy to use, and destructive over a wide area. For these reasons it has become a weapon of choice for developing world armies and non-state actors alike. With no easy countermeasures to undermine its effectiveness, the RPG-7 and its later variants are likely to remain standard light weapons for years to come.

Box 1.1 Definition of small arms and light weapons

The *Small Arms Survey* uses the term 'small arms and light weapons' broadly to cover both military-style small arms and light weapons as well as commercial firearms (handguns and long guns). When possible, it follows the definition used in the United Nations' *Report of the Panel of Governmental Experts on Small Arms* (United Nations, 1997):

- ▶ *Small arms*: revolvers and self-loading pistols, rifles and carbines, assault rifles, sub-machine guns, and light machine guns.
- ▶ *Light weapons*: heavy machine guns, hand-held under-barrel and mounted grenade launchers, portable anti-tank and anti-aircraft guns, recoilless rifles, portable launchers of anti-tank and anti-aircraft missile systems, and mortars of less than 100mm calibre.

The *Survey* uses the terms 'firearm' and 'gun' to mean hand-held weapons that fire a projectile through a tube by explosive charge. The terms 'small arms' and 'light weapons' are used more comprehensively to refer to all hand-held, man-portable, explosively or chemically propelled or detonated devices. Unless the context dictates otherwise, no distinction is intended between commercial firearms (such as hunting rifles) and small arms and light weapons designed for military use (such as assault rifles).

Government officials agreed to the UN definition through consensus. It was negotiated, in other words, to serve practical political goals that differ from the needs of research and analysis. While the UN definition is used in the *Survey* as a baseline, the analysis in this volume is broader, allowing consideration of weapons such as home-made (craft) firearms that might be overlooked using the UN definition. The term small arm is used in this chapter to refer both to small arms and light weapons, unless otherwise stated, whereas the term light weapon refers specifically to this category of weapons.

The material presented in this chapter is based on information obtained from open sources. These include official information, defence publications, the international press, corporate and non-governmental information services, defence exhibitions, and company promotional material, as well as research and analysis by small arms experts. These sources have been enriched by extensive field research and interviews in selected countries and regions.

THE GLOBAL SMALL ARMS AND LIGHT WEAPONS INDUSTRY: ANNUAL UPDATE

This section provides an update and new information on the state of the global small arms industry. It focuses on the distribution of production (i.e. the number of countries and companies that have the capacity to produce small arms, light weapons, or ammunition) and on general trends and patterns. In more detail, it reviews new information on small arms production in two of the world’s major producers—the Russian Federation and the United States—and a number of smaller producers in a regional survey of Latin America.

Distribution

How many countries have the capacity to produce small arms? Is the number of countries growing? The *Small Arms Survey 2003* estimated that 98 countries have the capacity to produce small arms, light weapons, or ammunition (Small Arms Survey, 2003, p. 11). New information and research suggest that at least 92 countries worldwide have the capacity to produce small arms or ammunition (Omega Foundation, 2003).

This estimate of the global distribution of small arms-producing countries should be treated with caution, however. In some countries, a lack of reliable information, both official and unofficial, makes it difficult to ascertain whether any small arms or ammunition is currently being produced and, if so, whether regularly or only on an *ad hoc* basis. Some countries produce only components rather than finished products; in others, small arms production involves relatively marginal activities, such as loading or filling ammunition cartridges.

Figure 1.1 Number of known small arms-producing countries, by region, 2003

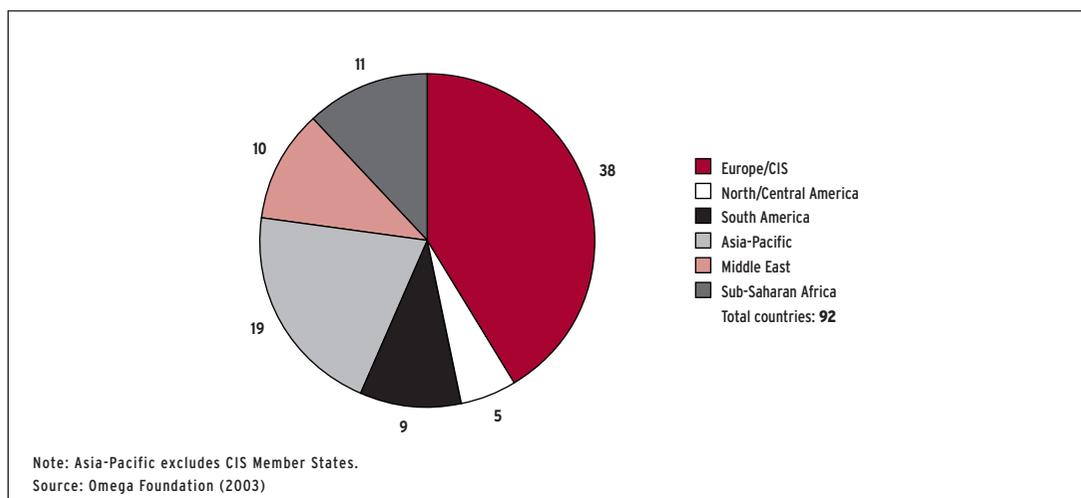
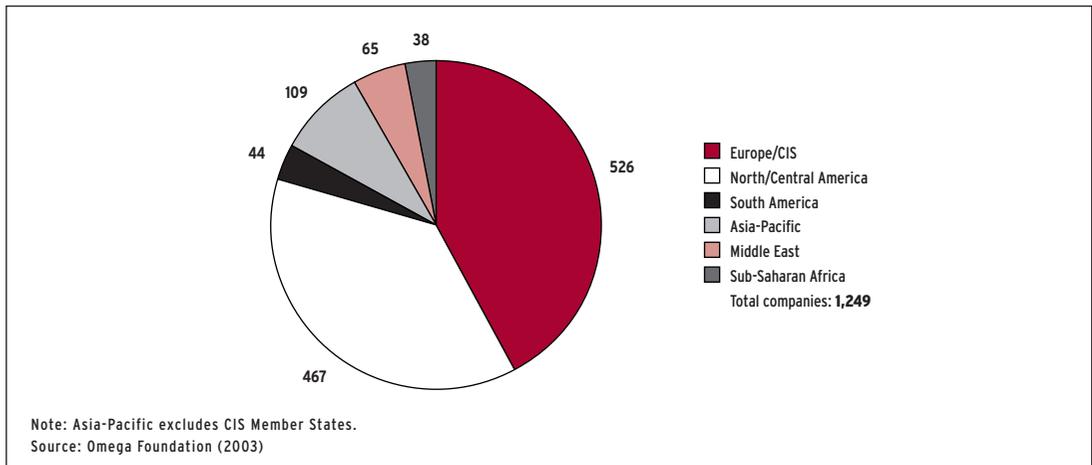


Figure 1.2 Number of known small arms-producing companies, by region, 2003



The *Small Arms Survey 2003* estimated that 1,134 companies produce the world's small arms and ammunition (Small Arms Survey, 2003, p. 12). New information and research reveal that at least 1,249 such companies worldwide are involved in some aspect of small arms production (Omega Foundation, 2003). While this research includes both intermediate and end producers, it excludes low-rate craft production by highly specialized or improvised manufacturers.¹

Nearly half of these companies (42 per cent) are located in Europe and the Commonwealth of Independent States (CIS) (see Figure 1.2). The United States remains the country with the largest number of producers. Smaller numbers of producers are found in Latin America, sub-Saharan Africa, the Middle East, and the Asia-Pacific region. Companies are extremely diverse, ranging from small family-owned businesses to subsidiaries or business units of large, multinational defence-industrial conglomerates and state-owned enterprises. Company sizes range from establishments with fewer than 10 to more than 1,000 employees—making reliable monitoring of at least smaller companies a difficult exercise.

At least 1,249 companies worldwide are involved in some aspect of small arms production.

Major producers: The United States and the Russian Federation

What are the trends in the world's three major small arms producers—China, the Russian Federation, and the United States? Our understanding is uneven and depends upon the degree of national transparency. There is still little detailed information about small arms production in China. In recent years, though, the amount of official and unofficial information about the value and volume of small arms production in the Russian Federation and the United States has increased. This development permits better analysis of production trends in the world's two largest small arms manufacturers.

Domestic production in both the United States and the Russian Federation exhibits contradictory trends, common to both. For each country, production of commercial firearms, by volume, appears to have declined in recent years. Together, the United States and the Russian Federation produced nearly four million commercial firearms in 2001. More recent information from both countries suggests that the figures for 2002 may be much lower (see Tables 1.2 and 1.5).

Production of military-style small arms, on the other hand, appears to be increasing, as a result of domestic demand as well as export sales. In 2002 the United States exported more than 50,000 military-style small arms (rifles, shotguns, and machine guns), more than double the number of the previous year. Two notable export increases were to South Korea and Kuwait, a possible function of international tensions in the past two years (Haug, 2003). In addition, the

US production of commercial firearms, by volume, appears to have declined in recent years.

demands of the US-led invasions in Afghanistan and Iraq have led to significant increases in domestic procurement of certain types of weapons, such as the M-4 carbine (Colt's Manufacturing), M-16 rifle (FN Manufacturing, Colt's Manufacturing), and the M-107 sniper rifle (Barrett Firearms Manufacturing). Both the Russian Federation and the United States are likely to adopt new weapons in the near future. The United States is currently testing the new XM8 rifle (Galloway, 2004). Military restructuring in the Russian Federation may result in some of its troops adopting the Izhmash AN-94 assault rifle (*Jane's International Defence Review*, 2002).

The US small arms industry produces more than 3 million commercial firearms per year and employs about 16,000 people. The total value of small arms production, including ammunition, was USD 2.5 billion in 2001 (the latest year for which official figures are available) (US Census Bureau, 2003). In contrast, the Russian small arms industry produces 500,000–1 million commercial firearms per year, employs about 50,000 people, and had total sales of small arms of about USD 220 million in 2002 (CAST, 2003). Despite employing more than double the number of employees, the Russian small arms industry produces only ten per cent of the value of its US counterpart.



© Israel Military Industries/AFP/Getty Images

In 2004 the Israel Defence Ministry purchased 15,000 new Tavor assault rifles, developed by IMI to replace the US-made M-16 rifles.

In addition to major producers such as the United States and the Russian Federation, a number of medium-sized producers have emerged as major challengers to the world's most established producers for certain products in the past five years (Small Arms Survey, 2003, p. 14). These include Israel Military Industries (IMI) (Israel), Forjas Taurus (Brazil), Denel/Vektor (South Africa), Singapore Technologies Kinetics (Singapore), and ADI (Australia).

The United States

The United States remains the world's most important small arms-producing country. It has the largest number of companies producing small arms and ammunition, is a major exporter of small arms (TRANSFERS), and is estimated to have the world's largest domestic market for small arms.

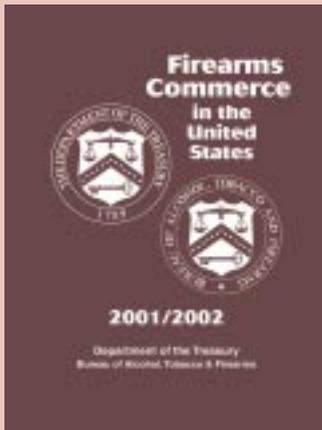
There is still uncertainty about the total number of small arms manufacturers in the United States. According to an independent assessment by the Omega Foundation (2003), 443 companies in the United States are currently involved in the production of small arms and ammunition. The 1997 US Manufacturing Census lists 311 establishments (firms) that are involved in the production of small arms and small arms ammunition (US Census Bureau, 1999). The US Bureau of Alcohol, Tobacco, Firearms and Explosives listed more than 1,700 licensed firearm manufacturers in the United States (US ATF, 2003b). As we have no way of verifying the figures from the Economic Census or the ATF, we rely on the figures from the Omega Foundation (2003).

Recent trends suggest that the overall value and volume of firearm production in the United States continues to decline. Nevertheless, anecdotal reports indicate that specific US and foreign manufacturers have benefited from operations in Afghanistan and Iraq. Colt's Manufacturing, for example, the producer of the M-4 carbine and the M-16 assault rifle, won increased contracts from the US Armed Forces (Forecast International, 2004). Winchester Ammunition, the

country's largest private manufacturer of small-calibre military ammunition, shared a USD 9.2 million US Army contract in December 2003 with Israel's IMI to meet increased US military ammunition demands for both training and combat (Galloway, 2004; *St. Louis Post-Dispatch*, 2004).

US production of military-style small arms appears to be increasing as a result of domestic demand as well as export sales.

Box 1.2 Disclosure under threat: US arms transparency derailed?²



Soon to be suppressed? The semi-annual *Firearms Commerce in the United States*.

© ATF

On 23 January 2004, President George W. Bush signed the Consolidated Appropriations Act (House Resolution 2673) into law. This act provides annual operating funds to several federal agencies, but it also threatens to end decades of public transparency regarding firearm commerce in the United States.

A healthy dose of public debate may have preceded the passage of this legislation, but a controversial amendment to the act went virtually unnoticed. The amendment restricts the operations of the Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF) and prohibits the US federal government from preserving records of background checks on gun buyers, which critics feared could be used as a form of gun registration. Now records must be destroyed immediately, unless they reveal criminal intent. The provision also limits the ability of the ATF to monitor individual gun dealers.

The same measure appears to allow the Justice Department—which now runs the ATF—the authority to cease disseminating a series of long-established reports on US firearm issues. Reports include the annual *Firearms Manufacturing and Export Report* and *Firearms Commerce in the United States*.

These publications have provided data on firearm manufacturing, imports, and exports, putting the United States at the forefront of transparency on firearm issues.

Given that the United States is the world's largest producer and exporter of firearms (TRANSFERS), this transparency has allowed observers to understand some fundamental trends in the global small arms market. The US reports have also encouraged some countries to open their firearm industries to public scrutiny, setting a precedent for openness that other governments are only now beginning to follow.

The newly passed Consolidated Appropriations Act may very well reverse the trend of growing transparency. Though designed to protect the privacy of individual gun owners and dealers, this policy may obstruct the disclosure of US gun industry figures, to the detriment of international small arms transparency.

Some commentators also suggest that figures for 2002 and 2003 will show increases in the domestic production of firearms in the United States. Such a trend might reflect post-11 September 2001 Homeland Security contracts, citizens' demands for self-protection, and a comeback in demand for recreational firearms. Actual figures will not be available, however, until 2004 and 2005 (Thurman, 2003).

Box 1.3 The XM-8: Limited innovation?

After relying on the M-16 and its descendants for almost 40 years, the US Army is finally expected to adopt a new standard infantry weapon. The basic XM-8 is intended to replace the US Army's current M-16. With similar performance to the M-16, the XM-8 should be 20 per cent lighter, thanks to the use of modern polymer and alloy technologies. The polymer reportedly can be coloured in virtually any standard military camouflage colour and the butt is adjustable to the person firing the weapon. The rifle will be produced in four configurations: a standard rifle; a short barrel and stock; a long-barrelled variety for trained marksmen; and a squad automatic rifle or light machine gun. Despite an innovative overall design, the XM-8 will fire the standard NATO 5.56mm ammunition employed in all NATO assault rifles.

Sources: *Jane's International Defence Review*, 2003a; 2003b

In 2001, the latest year for which official figures are available, as shown in Table 1.1, the value of firearms production, including ammunition, was USD 2.51 billion in current prices. Total employment in 2001 fell slightly from the previous year, to 16,360 jobs (US Census Bureau, 2003).

Table 1.1 US production of small arms and ammunition, employment, and value of production, 1997-2001

Year	Employment	Value of production (USD in billions)*
1997	16,976	2.22
1998	16,761	2.26
1999	17,061	2.48
2000	17,037	2.39
2001	16,360	2.51
Average	16,839	2.37

Note: *Based on value of shipments (current USD).
Sources: US Census Bureau (2003); Thurman (2003)

More than three million firearms were produced in the United States in 2001 (US ATF, 2003b). A significant decline compared to the peak in 1994, when more than 5 million firearms were produced, this figure also represents the lowest level since 1992 and a steep drop since 2000 (Thurman, 2003). More than 1.41 million firearms were imported (up from one million in 2000) and more than 190,000 firearms (including military firearms) were exported in 2001 (US ATF, 2003b). Thus, the US domestic market consumed roughly 4.2 million firearms in 2001 (down from more than five million in 2000). The total size of the US domestic market has declined by four per cent between 1997 and 2001 (Thurman, 2003).³

As shown in Table 1.2, the volume of total firearms production in the United States declined by more than 20 per cent in 2000–01, after a decline of five per cent in 1999–2000. The decline in domestic production has been linked to various factors, most notably increased imports, a difficult domestic economic climate, and a very competitive domestic market (Thurman, 2003). While production of handguns and long guns—particularly pistols and shotguns—has declined to its lowest level since the early 1990s, however, categories such as machine guns have showed sustained increases since the late 1990s.

More than three million firearms were produced in the United States in 2001, a significant decline since 1994, when more than five million were produced.

Table 1.2 US production and imports of firearms, 1998-2001

Production category	1998	1999	2000	2001
Pistols	960,365	995,446	962,901	623,070
Revolvers	324,390	335,784	318,960	320,143
Rifles	1,345,899	1,569,685	1,583,042	1,284,554
Shotguns	1,036,520	1,106,995	898,442	679,813
Machine guns	32,866	22,490	47,400	56,367
Other*	25,151	55,114	62,465	46,833
Total	3,725,191	4,085,514	3,873,210	3,010,780
Total imports	999,810	891,799	1,096,782	1,411,979

Note: *Based on value of shipments (current USD).
Sources: US Census Bureau (2003); Thurman (2003)

The top five manufacturers of firearms in 2001, based on the number of items produced, were: Remington Arms Co. (565,586), Sturm, Ruger & Co. (513,597), Smith & Wesson (364,051), Marlin Firearms (258,383), and O. F. Mossberg & Sons

(182,091). This is a significant change since 2000, with Remington Arms Company replacing Sturm, Ruger & Co as the country's top manufacturer. These five companies accounted for more than 60 percent of total domestic production.

Ranked in terms of types of weapons produced, the list of top US manufacturers has changed somewhat as well (Table 1.3). Although the same firms dominated the American market from 1998 to 2001, their ranking varies from year to year. In 2001 Sturm, Ruger & Co. surpassed Smith & Wesson to become the largest producer of revolvers. Remington Arms replaced Sturm, Ruger & Co. as the leading maker of rifles (US ATF, 2003b).

Table 1.3 Top US producers of selected types of firearms, 2001

Type	Company	1998	1999	2000	2001
Pistols	Sturm, Ruger & Co.	161,058	213,876	233,598	112,847
Revolvers	Smith & Wesson	139,583	152,724	130,587	92,325
	Sturm, Ruger & Co.	-	-	-	150,844
Rifles	Sturm, Ruger & Co.	332,538	426,226	309,017	242,166
	Remington Arms Company	-	-	-	289,470
Shotguns	Remington Arms Company	336,527	364,354	355,178	276,116

Note: Figures are for number of items produced.
Sources: US ATF (2002, 2003a, 2003b); Thurman (2003); US Census Bureau (2003)

Thus, while the overall volume of firearm production in the United States has dropped, the decline has been most pronounced for the civilian market. Military procurement is likely to boost production of military small arms in the coming years, and there is some evidence to suggest civilian small arms production may also increase. If imports of foreign small arms remain competitive and recent production trends are considered, however, it is unlikely that overall US civilian production will increase significantly.

In 2001 US production of handguns and shotguns declined to its lowest level since the early 1990s.

The Russian Federation

Recent improvements in the quantity and quality of both official and unofficial data have helped to provide a more accurate picture of Russian small arms production (CAST, 2003; Pyadushkin, Haug, and Matveeva, 2003). The Russian defence industry, as a whole, has experienced a significant increase in production as a result of increased exports and restructuring efforts (SIPRI, 2003).

Table 1.4 Number of people employed by Russian small arms and light weapons producers, 2001-02

Company, location	2001	2002
JSC Izhmash, Izhevsk	3,673	3,554
Ishevsky Mekhanichesky Zavod (IMZ), Izhevsk	15,200	13,231
JSC Tulskey Oruzheiny Zavod (TOZ), Tula	7,000	7,000
Kovrov Mechanical Plant (KMP), Kovrov	3,000	3,000
OJSC V.A. Degtyaryov Plant, Kovrov	15,000	15,000
'Molot' Vyatskiye Polyany Machine Building Plant, Molot	7,430	7,430
Total	51,303	49,215

Sources: CAST (2003)

In 2002, the value of production of small arms and light weapons in the Russian Federation was estimated at USD 221.8 million (see Table 1.5). This figure was slightly higher than in 2001, when it was estimated at USD 167.9 million. Total employment in 2002 was slightly lower than in 2001 (see Table 1.4).

As reported in the *Small Arms Survey 2003*, the Russian government has formulated a new policy for the country's small arms and light weapons producers (Small Arms Survey, 2003, p. 19). The aim is to consolidate all Russian producers and developers of small arms and light weapons into two major government-owned holding companies: the Small Arms and Cartridges Corporation and the High-Precision Weapons Corporation (SIPRI, 2003; CAST, 2003; Pyadushkin, Haug, and Matveeva, 2003).

By late 2003, the formation of the Small Arms and Cartridges Corporation had still not been completed (CAST, 2003). JSC Izhmash was intended to become its core company. The holding company was to include IMZ, Molot, TOZ, and the Russian Federation's six ammunition plants (Nozdrachyov, 2002b; Small Arms Survey, 2003, p. 19).

The formation of the High-Precision Weapons Corporation, planned for 2002, is also lagging behind schedule. The holding company was intended to bring together all manufacturers of light weapons, mainly man-portable air defence



A factory worker assembles part of an AK-47 assault rifle at the Izhmash plant in Izhevsk, the Russian Federation, in November 2002—55 years after the release of the inaugural Kalashnikov gun.

© Oleg Nishkin/Getty Images

systems, and includes the Tula-based KBP Instrument Design Bureau, the Kovrov Mechanical Plant, the Degtyaryov Plant, and the Kolomna Machine-Building Design Bureau (MANPADS).

The main difficulty in setting up these holding companies has been the absence of a mechanism for integrating government-owned and private companies into one corporate entity. The government's plan of lumping together facilities on formal grounds has also tended to overlook the established production cooperation ties between individual facilities.

Table 1.5 Estimated value of SALW production in the Russian Federation* (USD millions in current prices)

Company	Products	2001	2002
JSC Izhmash	Kalashnikov assault rifles, Nikonov assault rifle, Bizon sub-machine gun, Dragunov sniper rifle.	13.8	13.2
IMZ	90% of the Russian Federation's short-barrelled arms, including the Yarygin (Pya) pistol.	57.7	52
TOZ	Konkurs anti-tank weapon, PPS pistol, 9mm AS carbine, VSS sniper rifle, AKS-74 SMG.	13.4	29.2
KMP	Kalashnikov machine guns, RPG-7 grenade launcher, anti-tank missiles, AEK-971 SMG, AEK-919K Kashtan machine pistol.	19.8	2.5
V.A. Degtyaryov Plant	Heavy machine guns, grenade launchers, anti-aircraft guns, anti-tank missiles, MANPADS.	42	108.5
Molot	Metis anti-tank weapon, automatic grenade launchers, Kalashnikov light machine guns.	21.2	16.4
Total		167.9	221.8

Note: * Including civilian firearms.

Sources: CAST (2003); *Ekspert Vooruzheniy Journal* (2002); Kamakin (2003); Military News Agency (2000); Poroskov (2003); Tula (2003)

The total value of all reported small arms and light weapons production in 2001 was USD 221.8 million, up 32 per cent from the year before (see Table 1.5). As shown in Table 1.6, at least 650,000 units of civilian firearms were produced in the Russian Federation in 2002, down from around one million in 2001 (Small Arms Survey, 2003, p. 20). Production figures for 2002 account for civilian production at Izhmash, IMZ, and Molot; no production information for that year is available from TOZ and TsKIOB SOO.

Table 1.6 Production of civilian firearms (units) in the Russian Federation by major manufacturers, 1999-2002

Company	1999	2000	2001	2002
JSC Izhmash	70,000	76,607	87,672	82,887
IMZ	630,000	570,000	800,000	560,000
Molot	26,651	21,979	12,755	12,802
TOZ	n/a	n/a	60,000	n/a
TsKIOB SOO	n/a	n/a	18,000	n/a
Total	726,651	668,589	978,427	655,689

Sources: CAST (2003)



A Russian saleswoman presents a display of Kalashnikov assault rifles at the Russian stand of the International Defence Exhibition in New Delhi in February 2004.

© Raveendran/AFP/Getty Images

Domestic deliveries of small arms and light weapons may increase in 2004, when government spending on the procurement of new arms for the Russian armed forces is expected to grow by more than 50 per cent. For the first time in years, the government has announced that new types of small arms will be delivered to Russian troops (Safronov, 2003). The government has allocated about USD 33 million for the procurement of new small arms for the Defence Ministry, Ministry of Interior, and other Russian security agencies for 2004.

The Russian Federation's small arms industry is much more export-dependent than its US counterpart, largely because companies catering to the domestic market have often struggled to receive payment from government departments and have thus stagnated. This struggle to receive payment appears to be changing, as high oil revenues reduce Russian government debt burdens and facilitate renewed military procurement (*Jane's International Defence Review*, 2004a). The US and Russian small arms industries thus appear to display divergent trends. While the volume of production of US firms stagnates or declines as the domestic market shrinks or yields to imports, Russian exports appear to account for the industry's growth. The corresponding civilian market trends are not unrelated: Russian firms appear to have increased sales to the United States (TRANSFERS). Within their military small arms sectors, however, trends are more harmonious. Both countries are likely to expand production of at least some types of military small arms, as orders are placed for new weapons systems in the near future.

REGIONAL SURVEY: SMALL ARMS PRODUCTION IN LATIN AMERICA

To gain greater insight into global trends, this edition of the *Small Arms Survey* focuses on small arms production in Latin America, a region that illustrates the heterogeneity of the global small arms industry. While virtually every country in the region has some production capability, this capability ranges from very modest, state-run ammunition and

small arms assembly plants, to large-scale, private production of a full range of small arms for export. In this section we present a survey of the region, by country, with case studies of the most important arms-producing companies.⁴

In contrast to the United States and the Russian Federation, there is little pressure to develop new military weapons in Latin America. Most of the region's armed forces use older licence-produced European, and in some cases Israeli, weapons. Exports to the United States appear to have experienced consistent growth over most of the past five years (see Table 1.8). The civilian and law enforcement markets appear to be staples of the region's largest companies, located in Argentina, Brazil, and Mexico. Predictably, major producers in Latin America are not immune to global trends towards industrial consolidation and joint ventures.

At least ten countries in Latin America have the capacity to produce small arms, light weapons, or ammunition. Generally speaking, we can divide the countries of the region into major producers, medium-sized or growing producers, and minor producers. The vast majority of countries in the region are minor producers, with most production limited to state-owned factories or arsenals, often controlled or run by the armed forces. These countries occasionally export ammunition or even small shipments of small arms, but production runs tend to be sporadic and the quality of products is low.

The only major producer in the region is Brazil, whose arms industry is highly developed and diversified. In 2002, it exported at least ten times as many small arms and ammunition as its closest regional competitor, Argentina. Brazil is the second-largest producer in the Western hemisphere after the United States. It is the third-largest supplier, by value, of small arms—mainly handguns—and ammunition to the US domestic market.

Medium-sized producers include Chile, Mexico, and Argentina, based on the quality and variety of small arms production and the presence of consistent exports. Of these, Argentina has the most diversified industry and has the longest history of arms production.

Though its industry was hit hard by liberalization in the 1990s, it is showing signs of resurgence in the wake of currency devaluation. Mexico is not a major producer of firearms, but it has benefited from the North American Free Trade Agreement, becoming a major exporter of ammunition and parts to the United States, thanks to the *maquila regime*.⁵ Chile's production is still limited to a single state-owned company, but its licensing agreements and joint venture with Brazil's Taurus make it an important regional producer.

Most Latin American countries occasionally export ammunition or small arms, but production runs tend to be sporadic and the quality of products is low.

Map 1.1 Latin American countries producing small arms and light weapons



Table 1.7 Production of small arms and light weapons and ammunition in Latin American countries*

Country	Military small arms and light weapons	Civilian small arms	Ammunition (military and/or civilian)	Significant exporter of small arms and light weapons
Argentina	X	X	X	X
Bolivia		X	X	
Brazil	X	X	X	X
Chile	X	X	X	X
Colombia	X	X	X	
Ecuador	X		X	
Mexico	X	X	X	X
Paraguay			X	
Peru	X	X	X	
Venezuela	X	X	X	
Total (known)	8	8	10	4

Note. * Assessment of current production capabilities based on both primary and secondary sources.

Sources: Dreyfus and Lessing (2003); Omega Foundation (2003); Forecast International (2003); Gander and Cutshaw (2003)

Table 1.8 Latin American exports* of SALW and ammunition to the United States, 1996–2002 (current USD millions)

Country (ranking in 2002)	1996	1997	1998	1999	2000	2001	2002	Total
Argentina (19)	1.75	2.56	2.26	3.72	4.08	5.16	5.72	25.25
Brazil (3)	31.88	30.96	28.00	36.57	40.69	35.62	56.76	260.46
Mexico (15)**	8.81	11.33	12.13	14.76	12.47	22.22	16.09	97.80
Total imports from Latin America	42.44	44.84	42.39	55.05	57.24	62.99	78.57	383.51

* By customs value.

** Includes parts and air and blank pellet precision rifles, which are not classified as small arms according to the 1997 UN definition.

Source: International Firearms Trade (2003)

Argentina

Argentina is one of the most important and long-established small arms producers in Latin America. Its small arms industry comprises private companies and a state-owned military–industrial complex. Both sectors prospered in the 1970s and 1980s under the umbrella of protectionist import-substitution policies. Having undergone a serious crisis in the 1990s (Small Arms Survey, 2001, p. 28), the industry today faces an uncertain future.

The opening of the economy and the US dollar–Argentine peso (ARS) parity regime under President Carlos Menem (1989–99) and President Fernando de la Rúa’s neo-liberal policies (December 1999–December 2002) led to the closure or downsizing of several small arms companies. The reform of the country’s small arms control legislation in 1994 created new prerequisites for the purchase and possession of .22 and .32 calibre handguns and hunting rifles, which especially affected producers of low-quality handguns. Of the more than 20 private Argentine firms that produced small arms in the early 1980s, only five have survived.

The state-owned Dirección General de Fabricaciones Militares (DGFM) has also undergone restructuring. The Ministry of the Economy intervened in DGFM in 1996, suspending all its state-to-state exports of military weapons,

a policy that remains in effect to this day. DGFM has responded by reorienting its small arms production towards the civilian and police markets, emphasizing semi-automatic pistols and .22 rifles.

Since 2001, however, the industry has begun to recover. Three factors have contributed to its rejuvenation:

- Currency devaluation made exports internationally competitive, with a positive impact on the country's domestic industry as a whole, including the small arms sector.⁶
- The demand for small arms rose significantly in response to civil unrest after the December 2001 devaluation.⁷
- The government relaxed its policy on permits for small arms purchases and possession by civilians in 2002–03.⁸

These three factors led to increased sales by the well-established Argentine arms manufacturers. They also rescued a few small-scale, lower-quality producers that were on the verge of bankruptcy in the 1990s.

Although total production figures for small arms production in Argentina are not available, the evolution of exports provides an idea of the expansion of the industry since 2000. Between 2000 and 2002, exports grew by more than 40 per cent.⁹ The major component of small arms exports was pistols and revolvers. In 2002, Argentina was the 19th-largest supplier, by value, of small arms and ammunition to the United States, and the third-largest supplier from Latin America (after Brazil and Mexico). Total exports in



Police fire tear gas during civil unrest in December 2001 in Buenos Aires, Argentina.

© DYN-Greco/Getty Images

2002 were worth USD 5.7 million (USD 5.1 million in 2001) (International Firearms Trade, 2003).

DGFM/Fray Luis Beltrán (FLB): Until the early 1990s, DGFM was a large military–industrial complex of 12 factories whose production was directly and indirectly linked to meeting Argentina's national defence requirements (Small Arms Survey, 2001, p. 29). By 2003, all but four plants had been either closed or privatized; only two of them produce small arms.

The production of small arms and light weapons was, until the beginning of the 1990s, concentrated in three factories.¹⁰ These were the Portable Military Arms Plant (FMAP) Domingo Matheu (small arms), the Fábrica Militar ammunition plant FLB (small arms and ammunition), and the Fábrica Militar Río Tercero (FMRT) (light weapons).¹¹

In the late 1990s, FMAP Domingo Matheu was closed and merged with FLB. The production of small arms continues at FLB, together with the production of hand grenades and small arms ammunition. The plant currently produces small arms for civilian use and for the military, police, and security forces (gendarmerie and coast guard), as well as ammunition and hand grenades.

In 2000, FLB's prospects were extremely poor. The company was in the process of being dismantled and there were no prospects or plans for the remaining plants (Small Arms Survey, 2001, p. 29). The USD–ARS parity also made foreign handguns and ammunition, especially those from Brazil, a much cheaper and more attractive option for federal and provincial police and security forces, once a captive DGFM market of more than 150,000 personnel.

The demand for small arms in Argentina rose significantly in response to the general civil unrest after the December 2001 currency devaluation.

By early 2003 the situation had changed. The plant had set production records for the manufacture of .22 ammunition cartridges, mostly for export to Brazil, Paraguay, and the United States. There were plans for the launch of new pistol models and for recovering police and public security markets.¹² And although there were no changes in legislation regarding defence production, soon after President Néstor Kirchner took office in May 2003, he urged expansion of the state military–industrial complex as a development tool for the country (Braslavsky, 2003).

FLB's principal products for the civilian market include 9mm pistols and a .22 carbine. At present, the plant has the capacity to produce 20,000 pistols and 2,000 carbines per year. Although it has the licences to produce FN-FAL assault rifles and FMK-3 sub-machine guns, it is not currently doing so. The company now has 211 employees, down from 249 in 2000. Exports of products for both the civilian and military markets have increased in the wake of the devaluation, but no detailed information is currently available on the value, volume, or destination of exports.

The most important private sector small arms producers in Argentina include Bersa S.A., Lasserre S.A., F&L SRL, Azor, and FANAC, whose activities are briefly described below.

*Bersa S.A.*¹³ had consolidated its position as the leading Argentine private producer of pistols for the civilian market by the 1980s, by which time it had also begun exporting. In 1990, Bersa began producing 9mm and .380 pistols, which were well received by both domestic and foreign markets (especially the United States). In 1994, however, a change in US legislation limited the number of rounds semi-automatic weapons could hold in their magazines, and Bersa's Thunder 9 model pistols were excluded from the US market. Nonetheless, the company adapted very quickly, changing the features of its weapons and launching a number of new models in order to recover its former markets.

With the devaluation of the ARS in 2002, Bersa expanded its position in the international market. The company was responsible for nearly 70 per cent of Argentine exports of pistols and revolvers in 2003 (through April) and 77 per cent in 2002.¹⁴ Production is heavily influenced by, and responsive to, 'gun fashion' and market preferences. The company launched a .40 model in 2000, .40 and 9mm compact models in 2001, and .45 ('fashionable' again) models in 2002. In 2002 Bersa's exports were worth USD 3.5 million, compared to USD 3.6 million in 2001. The United States accounted for 80–90 per cent of the company's exports.

In 2002, the US
accounted for
80–90 per cent of
Bersa's exports.

By late 2002, Bersa was producing 20 different models of pistols in six different calibres. The majority of its production is exported, mostly to the United States. The company employs 70 people and produces an average of 40,000 pistols per year. Besides the civilian market, Bersa is an important supplier to the Argentine Armed Forces and Security Forces, as well as some provincial police, to whom it sells about 10,000 pistols a year (Casciotti, 2004). With new machinery acquired in 2002, Bersa expects to expand its production by 20 per cent in the coming years.

Lasserre S.A. (also known as Rexio) is a mid-sized company that concentrates its production on revolvers and shotguns. It produces 26 models of revolver in three different calibres as well as six models of shotgun. The company survived the crisis of the 1990s and has consolidated its position as a leading domestic producer of revolvers. Exports totalled USD 136,725 in 2002 (significantly down from USD 446,366 in 2001).¹⁵ The main external markets for its products are other Latin American countries and the United States.

F&L SRL is a small company that produces low-cost, low-price revolvers. It manufactures six models in three different calibres. The company reactivated its production after the 2002 devaluation. The principal destinations for exports are neighbouring Latin American countries. The value of exports in 2002 was in the range of USD 200,000–300,000.¹⁶

Azor and *FANAC* are two small companies that produce low-cost, low-priced revolvers. *FANAC* produces Forastero revolvers and shotguns, and reactivated its production after the devaluation of the ARS. *Azor*, which produces M99 model revolvers, was recently established.¹⁷

Bolivia

Bolivia has a small ammunition factory, the *Fábrica Boliviana de Municiones* (FBM). It produces various types of ammunition for the Bolivian armed forces (Forecast International, 2004). FBM is administered by the Armed Forces Corporation for National Development, known as COFADENA, which is linked to the Ministry of Defence. The factory reportedly also engages in limited production of shotguns for the civilian market.

Brazil

Brazil is one of the world's most important small arms producers (Small Arms Survey, 2003). It is by far Latin America's largest producer of small arms and military equipment. Its small arms industry is made up of both state-owned and private companies which have, in recent years, expanded into foreign markets, signed licensed production and joint venture agreements, and created foreign subsidiaries (Small Arms Survey, 2001, p. 30).

According to Brazilian government statistics, total sales of civilian small arms and related ammunition and parts in 2001 (the latest year for which data is available) were worth USD 100.3 million. The vast majority of this production was exported (TRANSFERS).

Like many countries in the region, Brazil's arms industry dates back to the country's independence and government efforts to supply its own armed forces. By the 1950s numerous private firms were producing handguns, hunting rifles, and shotguns for the domestic market, including the local Beretta subsidiary. Yet it was the staunchly protectionist economic policies of Brazil's military dictatorship (1964–85) that laid the foundations for the diversified, export-oriented industry that exists today. In 1974, the military government implemented the Military Equipment Export Policy (Política Nacional de Exportação de Material de Emprego Militar), a series of incentives for private and state-owned producers to export arms; in 1975, the armed forces reorganized their arms factories into a single company, Imbel; and throughout the decade, cooperation between military research institutes, industrial organizations, and the Brazilian Development Bank (BNDES) led to the development and consolidation of new arms-producing companies. In 1980, BNDES also provided capital funds for the repurchase by Brazilians of controlling shares in the *Companhia Brasileira de Cartuchos* (CBC), Brazil's only small arms ammunition producer (Purcena, 2003).

In the 1980s, Brazil's defence industry boomed as it exported heavy military equipment to the Middle East during the Iran–Iraq war. By the 1990s, Brazil was well established as a mid-sized global player in the international arms market, and in the two years that encompassed the Gulf War (1991–92), Brazil exported more than USD 300 million in small arms and ammunition, much of it to Saudi Arabia and other countries in the region.¹⁸ The following years registered a tapering off of exports—due in part to the pegging of Brazil's currency to the USD in 1994—but the subsequent devaluation of the Brazilian real from 1998 onward has led to a resurgence of exports. In 2002, exports nearly doubled, reaching USD 156 million.

The 1990s were also a time of consolidation. Today Brazil's small arms industry is concentrated in three large producers: Taurus, CBC, and Imbel. Though only Imbel is state-owned, CBC and Taurus both maintain intimate contacts with the Brazilian military; the result is a great deal of company influence over both domestic and foreign policy. The industry also has its own lobby group, which is publicly active in opposing domestic arms control legislation.

Brazil is the second-largest small arms producer in the Americas after the US.

Brazil's total sales of civilian small arms and related ammunition and parts in 2001 were worth USD 100.3 million.

Imbel (Indústria de Material Bélico do Brasil), established in 1974, is a state-owned company with ties to the Brazilian Ministry of Defence and specifically the Brazilian army. In addition to a wide range of heavy conventional weapons, the company also produces various small arms and light weapons. It manufactures FN-FAL assault rifles under licence for military use, as well as a line of pistol models based on the Colt .45 for military and police use. It also produces .38 calibre handguns for civilian sales (Imbel, 2004). Imbel has a joint venture with Royal Ordnance of the UK and Schahin Participações Ltda. of Brazil to distribute Imbel small arms and ammunition worldwide (South America Ordnance, 2004). Its small arms are especially popular among security forces across Latin America.

Taurus is Brazil's leading producer and exporter of handguns and one of the most successful Latin American small arms companies.

Forjas Taurus is Brazil's leading producer and exporter of handguns. In 2002, Taurus had sales of USD 43.9 million, making it one of the most successful Latin American small arms companies.¹⁹ It currently manufactures 24 models of revolver and 14 pistol models. Most of these are based on Beretta models, since Taurus purchased Beretta's Brazilian subsidiary in 1980 (Taurus, 2004). The Taurus name has become internationally recognized, particularly in the United States, where it has a major market presence. In Miami, Taurus has a factory that assembles arms especially for the US market. It also has a joint venture to produce guns in Chile. In 1997, Taurus purchased the patents, designs, and production rights for Amadeo Rossi handguns, making it the only Brazilian private supplier of pistols and revolvers for Brazil's domestic civilian market.²⁰

Companhia Brasileira de Cartuchos is the largest Brazilian producer of small arms ammunition. In addition to a wide range of ammunition for handguns and long guns, CBC produces 18 models of shotgun and four models of rifle (CBC, 2004). In 2002, CBC had total sales of USD 41.2 million, of which 34 per cent were from exports, 29 per cent from the Brazilian civilian market, and 37 per cent from the Brazilian police and military. Nearly 90 per cent of sales are from ammunition.²¹

Amadeo Rossi produces various shotguns and rifles, having sold its handgun business to Forjas Taurus in 1997. The company suffered a loss of USD 14 million in 2001, the last year for which data is available. In 2000, the company had total sales of USD 5.4 million and employed 1,354 people. Rossi exports 77 per cent of its production and 50 per cent of production is sold through Braztech Inc., its US distributor.²²

Five other Brazilian producers also manufacture some small arms and light weapons or ammunition. These include: *E. R. Amantino & Cia.* (hunting shotguns); *Companhia de Explosivos Valparaíba* (hand grenades and rifle grenade launcher adapters); *Mekanika* and *Bilbao*, both involved in producing Uru Model II 9mm sub-machine guns (Gander and Cutshaw, 2003); *Hydroar S.A.*²³ (mortars and portable rocket launchers); and *FN Herstal* of Belgium, which has a local subsidiary plant producing FN MAG light machine gun parts for export to Belgium (Amantino, 2004; Forecast International, 2003b).²⁴

Chile²⁵

Chile has a well-established domestic defence industry (Small Arms Survey, 2001, p. 30); however, there is virtually no domestic production of small arms for the civilian market in Chile. Domestic civilian demand for small arms is met almost entirely by imports, with products sold in authorized private gun shops. There is no private production of small arms in Chile, although one private company, *Metalnor* (*Industria Metalurgica del Norte Ltda.*), produces two types of hand grenade (Gander and Cutshaw, 2001, pp. 560–61).

Domestic production of small arms is concentrated in one state-owned company: *Fábricas y Maestranzas del Ejército* (FAMAE). Administered by the army, the firm primarily supplies the Chilean Armed Forces with arms and equipment. FAMAE has various divisions, including an Arms Division (specializing in the production of small arms); and an Ammunitions Division (specializing in the production of ammunition for small arms, light weapons, and major conventional weapons).

FAMAE has a staff of 134 working in its small arms plant, which produces about 5,000 arms per year at prices ranging from USD 500 to USD 900. Exports (which are not constant) represent about 15–20 per cent of the company’s sales.

FAMAE’s development was indirectly spurred by the Kennedy Amendment, passed by the US Congress in 1974 to prohibit US arms sales and security assistance to Chile (Dreyfus, 2000; USAID, 2004).²⁶ In 1984 FAMAE obtained a licence from SIG Arms AG of Switzerland (now Swiss Arms AG) to produce rifles. Production began in 1991 and continued until 2003 with the SG 540 series assault rifles, which are slowly replacing the old Swiss SG 510 in service with the Chilean Army. Production is now concentrating on newer models as part of an ongoing process of shifting all Chilean Armed Forces rifles from 7.62mm to 5.56mm calibre.²⁷

Most of FAMAE’s exports consist of versions of its SAF sub-machine gun based on the SG 540 rifle. Serial production began in 1993. This indigenous sub-machine gun has had a lot of success as a weapon for police forces and special military forces and has been sold to the National Police of Paraguay, the Police of the Province of Buenos Aires (Argentina), the National Police of El Salvador, the National Police of Panama, and the Portuguese Gendarmerie (FAMAE, 2002). In 2000, FAMAE entered into a strategic alliance with Forjas Taurus of Brazil to produce a version of the SAF sub-machine gun for the military police forces (uniformed security police) of the 27 states of Brazil, some 385,000 personnel in all (IISS, 2002).

Domestic production of small arms in Chile is concentrated in one state-owned company: FAMAE.

Colombia

Colombia’s constitution of 1991 establishes a state monopoly on the production and commerce in small arms and light weapons. Private producers, retailers, importers, and exporters are not permitted. Small arms production in Colombia is legally monopolized by *Industria Militar* (INDUMIL), operated by the Ministry of Defence.

INDUMIL’s main function is to supply Colombia’s Armed Forces and the National Police. Civilian customers are a secondary market, with private security companies accounting for most of the civilian purchases. In addition to being a manufacturer, INDUMIL is also the only authorized firearms and ammunition importer in the country. There are no legal private gunsmiths in Colombia. Commercial small arms can only be purchased from INDUMIL’s main commercial office in Bogotá and from its 30 retail offices located throughout the country. Besides its own revolvers and shotguns, the company also supplies the civilian market with imported small arms. As of July 2003, INDUMIL had a permanent staff of around 1,000.

The *General José María Córdova Small Arms and Ammunition Plant* is Colombia’s main firearms and ammunition production facility. Until Germany stopped small arms exports to Colombia in response to allegations of human rights violations by military and security forces, the official standard assault rifle was the H&K G-3.²⁸ Today the plant produces the Israeli Galil assault rifle, which was adopted in 1994 as the standard rifle of the Armed Forces and the National Police. To date, INDUMIL has manufactured some 37,500 Galil rifles to replace the old G-3s (which, according to authorities at INDUMIL, were destroyed after being taken out of service) and outfit newly created units. The company also manufactures hand grenades and mortar bombs.

INDUMIL monopolizes small arms production in Colombia.

INDUMIL produces various weapons for the civilian market and private security markets, including revolvers made under licence from the Spanish company Llama Gabilondo. The terms of the contract specify that the production of revolvers is now autonomous—i.e. INDUMIL may modify the original models and export them. INDUMIL produces 7,000 to 8,000 revolvers per year. As Colombia does not import revolvers, there is a captive market for this product. The company also produces various types of shotgun and a range of ammunition for both the military and civilian markets.

Box 1.4 Illicit production: FARC workshops and the underground war industry²⁹

Illicit, small-scale craft production of small arms, especially rudimentary single-shot weapons, is common in many parts of Latin America. The situation in Colombia is quite different. A large-scale, illicit underground arms industry is run largely by one particular insurgent group, the FARC (Fuerzas Armadas Revolucionarias de Colombia). The FARC's underground arms industry was established during the 1990s as a result of various factors, including a history of illicit craft production in Colombia and corruption among some INDUMIL workers. Today its products include sub-machine guns, mortars, and hand grenades manufactured using industrial machinery.

Illicit production for the FARC is organized into two main areas of manufacture: arms for urban militias and arms for rural FARC units. The arms for urban militias (mostly craft-made firearms for kidnapping, self-defence, and assassination) are produced in *talleres de armamento popular* (TAPs, popular arms workshops). TAPs first began operating in the late 1990s and are small enough to be installed in basements, homes, garages, and the like. Each workshop typically has 5-6 workers, supervised by a co-opted military officer or INDUMIL technician who earns a salary from the FARC. The most common weapons produced by the TAPs are single-shot, single-barrel shotguns or *changones* (derived from the English word 'shotgun'). The TAPs also produce copies of the Ingram 9mm machine gun, the preferred weapon for assassinations. The prices of these TAP-made Ingrams range from USD 70 to USD 140, compared to USD 1,400 for an original Ingram on the legal market. TAPs have also recently begun production of semi-automatic pistols based on Beretta models.

The arms for rural FARC units are produced in *talleres de frente de guerra* (TFGs, front-line workshops). The most common weapons are combat support light weapons such as mortars, ammunition for mortars, and hand grenades. Most of the material needed for these weapons is stolen from the oil industry. Machinery is imported through front companies. Mortars and hand grenades produced by the TFGs are copied from standard Colombian military weapons. Technical advice is provided by active or retired INDUMIL technicians. Most of the TFGs started to operate in the mid-1990s, and serial production of mortar bombs is now carried out using sand mould technology.

Ecuador

Ecuador is not a significant producer of small arms. A factory in Santa Barbara, run by the armed forces, produces small arms ammunition for internal use, recharges shotgun cartridges, and at times has turned out PAME-90 sub-machine guns. The production runs have never been large, and the (official) destination of such weapons has always been internal use by the armed forces or the police, though it is possible that ammunition has been sold to civilians. There is no record of official exports of these weapons.

Ecuador has significant craft production of *cartucheras*, usually single-shot pistols. These are inexpensive weapons of low quality and rustic appearance, made in small workshops without advanced industrial equipment. These workshops may be clandestine or legal. There are currently 96 of these manufacturers registered with the Army's Department of Arms Control.³⁰ Though not produced on an industrial scale, *cartucheras* are extremely common in Ecuador.³¹ They are widely available on the illicit market at prices accessible to the average Ecuadorean (USD 40-50) and are seen as a kind of 'people's gun', while imported handguns are bought by the middle class and wealthy individuals.

Mexico

Mexico has long produced various types of small arms, but has not developed a large or diversified defence industrial base. It remains a fairly significant small arms parts and ammunition producer in the Latin American context.³² All domestic small arms production is tightly controlled by the state, and it is almost impossible for any new private company to begin manufacturing, importing, exporting, or selling small arms and light weapons. Existing private companies, including Productos Mendoza, Industrias Ruiz Cabañas, and Industrias Tecnos, are only authorized to produce small arms parts and .22 rifles exclusively for export.

The only company manufacturing military-style small arms is the state-owned *Dirección General de Fábricas de la Defensa Nacional* (DGFND), which produces largely for the Mexican armed forces. The factory has around 1,000 employees and makes about 5,000 small arms per year. Since the late 1970s, DGFND has produced H&K G-3 rifles. Its current products also include pistols and MP-5 sub-machine guns, all produced under licence from H&K of Germany. There are no reported exports by DGFND. The company also produces mortars, hand grenades, and various calibres of ammunition for military small arms.

The only company manufacturing military-style small arms in Mexico is the state-owned DGFND.

Productos Mendoza is one of the few private companies in Mexico allowed to produce a 'lethal' weapon—a sub-machine gun, the HM-3S 9mm Parabellum—which is in use by Mexican police and security forces. The company employs 350 workers, makes an average of 100,000 weapons per year, and exports nearly 50 per cent of its production.

Industrias Ruiz Cabañas is a medium-sized private company producing .22 rifles exclusively for the export market.³³ The company's total sales are about USD 2.5 million, of which 30 per cent are exported, mainly to the United States. It has recently moved to larger premises and is looking for a strategic partner in Europe.

Mexico's main producer of small arms ammunition is a private company, *Industrias Tecnos* (Tecnos, 2004). In the United States, the main destination of Tecnos products, the company's wholly owned distributor, Centurion Ordnances, markets the company's products under the trademark 'Golden Eagle'.

Paraguay

Paraguay has a limited domestic capability to produce small arms ammunition. Under the direction of the Ministry of Defence, Paraguay Military Industries manufactures small arms ammunition at the Piribebuy facility, originally set up with assistance from Belgium in the mid-1980s. It has the capacity to produce significantly more ammunition than the country's domestic requirement, and an agreement has been reached to provide small arms ammunition to Chile (Forecast International, 2002).

Peru

Peru has a modest state-owned small arms industry aimed primarily at satisfying domestic military and police needs. There are no private small arms producers in Peru, although there is widespread, clandestine, small-scale craft production, principally of shotguns and hunting rifles.

Peru has a modest state-owned small arms industry to meet domestic military and police needs.

The Peruvian armed forces control two small arms and ammunition factories. The *Servicio Industrial de la Marina* (SIMA) operates the *Centro de Fabricación de Armas* (SIMA-CEFAR), located at the Callao Naval Base, near Lima. Renamed *SIMA Electronica* in 1996, this factory is the only one capable of producing small arms on an industrial scale in Peru. Its main product line has been a family of 9mm sub-machine guns (Hogg and Weeks, 2000). In addition to a range of 12-gauge shotguns for the civilian market, the factory has also produced Barracuda revolvers under licence from Colt's Manufacturing (United States) and FN Herstal (Belgium) made replacement parts for Argentine-made FMK-3 and FAL assault rifles, and assembled Browning HP-35 semi-automatic pistols (RENAR, 2002).

CEFAR produces 12-gauge shotguns in three model variants, as well as 9mm pistols and the MPG 79 sub-machine gun.³⁴ Production is often intermittent and deliveries include weapons not currently in production, such as the MPG-84.³⁵

The *Fábrica de Armas y Municiones del Ejército* (FAME), owned by the Peruvian Army, produced a range of ammunition for internal use and some export markets until it was deactivated in the mid-1990s. Reports differ as to the current status of FAME, though the factory seems to be intact and may have been reactivated to fulfil one or more orders (Olive, 1999).

Venezuela

Compared to major regional producers such as Brazil and Argentina, Venezuela is not an important producer of small arms. The only relevant company is the state-owned and -administered *Compañía Anónima de Industrias Militares* (CAVIM), established in 1975. CAVIM has four divisions, each with its own facilities and personnel. The metal-mechanical division, which includes the small arms and ammunition branch, is based in the city of Maracay, in Aragua province. With a staff of 50, this facility assembles small arms from imported and locally produced parts, under contract to a variety of foreign producers, including the Belgian firm FN Herstal, Taurus of Brazil, and SIG of Switzerland. The company has assembled pistols and automatic rifles for the military market, and pistols for the civilian market.³⁶

In 1997, CAVIM entered into a three-year agreement to assemble SIG-Sauer P226 9mm pistols, with the intention of replacing the old FN HP 9mm of the Armed Forces. The agreement was unilaterally rescinded by SIG in 1999 and production was discontinued following a series of disagreements. In 2002, CAVIM signed a strategic alliance with Glock (Austria) for the assembly of 9mm and .40 pistols.³⁷ CAVIM manufactures ammunition, producing about 50 million rounds per year. As a result Venezuela is largely self-sufficient in small arms ammunition (Forecast International, 2002). The main markets for these products are the domestic civilian market, national police and military forces, and Caribbean and Central American countries (CAVIM, 2004).

Three minor private companies produce small arms and ammunition: *Cartuchos Victoria S.A.* (ammunition); *Comercial Vasco-Venezolana* (ammunition and shotguns); and *Industrias Armaiola* (shotguns). None of these companies holds a significant share of the domestic market, which is basically dominated by imports and, particularly in the case of law enforcement and armed forces small arms and ammunition, by CAVIM.

Summary: Small arms production in Latin America

This regional survey of Latin America illustrates the diversity of production among a group of countries with a combined population of 457 million. Far from representing any uniform regional approach, Latin America's firms range from state-owned monopolies to large and small private companies. Some countries are dominated by a single national producer, while others are home to innumerable small-scale manufacturers. Some aggressively pursue industrial strategies and export opportunities, while others have very small domestic production and rely almost entirely on imports.

Among the most important factors tying the region together is dependence on foreign designs, whether formally licensed or informally copied. With the important exceptions of major exporters led by Argentina, Chile, Mexico, and above all Brazil, its small arms producers tend to be niche manufacturers, serving captive local markets.

These countries share a particular commitment to establish and maintain a national small arms production capability, even when it seems uneconomic and impractical. Beyond widely shared origins in nationalized industries run by the armed forces and a common technological foundation, the small arms and ammunition makers of Latin America have little in common. Their different trajectories—the result of specific economic circumstances, legal environments, domestic markets, and export ambitions—will diverge even more in the years to come.

The different trajectories of Latin American small arms producers will diverge even more in the years to come.

POPULAR MILITARY SMALL ARMS AND LIGHT WEAPONS

What are the most popular or common small arms? *The Small Arms Survey 2001* compiled a list of some of the world's largest producers and best-known small arms, updated here in Table 1.9. This section focuses on the weapons most

widely distributed among armed forces worldwide (STOCKPILES). Characterized by advanced materials (i.e. composites) as well as lighter ammunition, greater rates of fire, and increased lethality, the recent emergence of new designs of weapons is driven by major rearmament programmes in a number of countries, including China, France, the Russian Federation, Spain, and the United States (*Jane's Defence Weekly* 2003a, 2003b, 2003c; NTI, 2004; VIC, 2000).

Table 1.9 Major producers of SALW by weapon type, company, and country of manufacture

Weapon type	Producer company (country)
Sidearms	Beretta (Italy) FN Herstal (Belgium) Glock (Austria) Heckler & Koch (Germany) Smith & Wesson (United States)
Assault rifles (including carbines)	Colt's Manufacturing (United States) FN Herstal (Belgium) Heckler & Koch (Germany) Izhmash (Russian Federation) Norinco (China)
Sniper/anti-materiel rifles	Accuracy International (UK) Barrett (United States) Heckler & Koch (Germany) Izhmash (Russian Federation)
Sub-machine guns	Heckler & Koch (Germany) IMI (Israel) Izhmash (Russian Federation) KBP (Russian Federation) Norinco (China)
Machine guns	FN Herstal (Belgium) General Dynamics (United States) Heckler & Koch (Germany) IMI (Israel) Norinco (China)
Small arms ammunition	FN Herstal (Belgium) Nammo (Finland/Norway/Sweden) RUAG Ammotec (Germany/Switzerland/Sweden) Sellier & Bellot (Czech Republic) Winchester Olin (United States /Belgium)
Grenade launchers	General Dynamics (United States) Heckler & Koch (Germany) KBP (Russian Federation) Norinco (China) Singapore Technologies Kinetics (Singapore)
Anti-tank guided weapons	Euromissile (France) Norinco (China) Raytheon–Lockheed Martin (United States)

Note: Recoiless guns and mortars are not included.

Source: Gander (2003); Gander and Cutshaw (2003)

Sidearms (pistols and revolvers)

Pistols and revolvers are the most widely dispersed and numerous of small arms. By their very nature, being easily concealed, easy to handle, and inherently attractive to many, the main types vary from region to region and even within

each armed forces establishment. The FN Herstal 9mm Browning High Power and its predecessors were first produced in 1935, and the pistol is in service in nearly 70 countries. The Tokarev and Makarov pistols, both originally produced in the Russian Federation, are in service in more than 30 countries. No new military-specific pistol designs have appeared for years, other than in the Russian Federation, where production is limited by a lack of funding.

Pistols and revolvers are the most widely dispersed and numerous of all firearms.

The most common sidearms in military use are listed in Table 1.10. Few revolvers—handguns with ammunition stored in a rotating magazine—remain in military service. These are now largely confined to military police and similar organizations. Automatic pistols are now regarded as reliable, take up less space, and can carry more rounds (15 to 20 on some models) for immediate use. Revolvers remain in some military and paramilitary hands, however, due to the large numbers manufactured by commercial producers.

The global military market for pistols is relatively stable. For many years it has been dominated by established European producers such as Beretta (Italy), FN Herstal (Belgium), Glock (Austria), H&K (Germany), and SIG-Sauer (Switzerland/Germany). A number of firms, including IMI (Israel), Norinco (China), and Taurus (Brazil), are challenging these established European producers (Forecast International, 2004).

Unlike other areas of the military small arms market, sidearms have a significant parallel in civilian use as personal defence weapons. The distinctly personal nature of the sidearm tends to engender consumer loyalty in military procurement circles, often trumping technical innovation.

Assault rifles

Assault rifles (also known as automatic rifles) are the most numerous and effective type of infantry weapon. Few innovations have emerged over the last years, the category being dominated by the Kalashnikov series, both in 7.62x39mm and 5.45x39mm. These rifles may be encountered almost anywhere—they are manufactured in a number of countries and are in service in nearly 80 countries (see Table 1.10). It is estimated that between 70 and 100 million of these weapons have been produced since 1947. They are rugged, durable, easy to operate, and effective, even when maintenance is lacking.

Assault rifles are the most numerous and effective type of infantry weapon.

Other common assault rifles include the US M-16 and its derivatives, the H&K G-3 series, and the Austrian Steyr AUG. The M-16, which has been produced since 1962, and is in service in more than 60 countries, is still produced in Canada and the United States. It has also been produced under licence in South Korea, the Philippines, and Singapore (Gander and Cutshaw, 2003). The FN-FAL is becoming obsolete because of its 7.62mm full-power cartridge, and it is rarely deployed on a large scale, other than in India. Many other types continue in service to suit national preferences and local manufacturing facilities. Although new models continue to appear, the market is saturated. Even promising designs such as the FN Herstal 5.56mm F2000 have yet to attract any orders, while Singapore's 5.56mm SAR-21 or the resurrected Croatian 5.56mm APSA-95 are unlikely to do any better.

The most common types of assault rifle in military use include the following:

- 7.62mm AK-47 and AKM series (Russian Federation)
- 5.56mm M-16 series (United States)
- 7.62mm H&K G-3 (Germany)
- 7.62mm FN-FAL (Belgium)

A recent trend is that 5.45 and 5.56mm calibres, designed for ranges up to 400m, are increasingly being considered as underpowered. Recent operations by the US Army and Marines in Afghanistan and Iraq have demonstrated that infantry engagements

increasingly take place at much longer ranges. At such ranges small bullets not only lack destructive power, but they can also be highly vulnerable to adverse environmental conditions such as side-winds, vegetation, and extreme temperatures. In both Iraq and Afghanistan, such factors induced US forces to deploy at least 500 modified 7.62mm M-14 rifles—a rifle originally selected by the US Army in 1957 and largely decommissioned by the late 1960s (*Jane's International Defence Review*, 2002).

As many countries 'rearm', the assault rifle market may be in store for a temporary boost.

A number of nations are in the process of 'rearming' as part of their military modernization. This may give a temporary lift to the assault rifle market, including development of new models. The market cannot support the current scope of activity for long, however. Market conditions will probably force more corporate consolidation among major producers, particularly in Europe and the United States. European producers such as FN Herstal (Belgium) and H&K (Germany) dominate the assault rifle market, but other companies outside Europe such as IMI (Israel), Norinco (China), and Singapore Technologies Kinetics (Singapore) are emerging as important producers (Forecast International, 2004). The primary impetus for design and innovation tends to come from European producers such as H&K (Germany) and Izhmash (Russian Federation).

Rifles

The term rifle is applicable to bolt-action and semi-automatic models. *Bolt-action rifles* are increasingly rare, in national service only among the most impoverished armed forces or low-grade militia units. Otherwise they are kept exclusively for ceremonial use and as costly special weapons for sniping, trained marksmanship, and similar applications.

The most important development in this field, other than the gradual proliferation of the large calibre anti-matériel rifles, is the re-emergence of the trained marksman. Marksmen are trained to get the best results from their rifles yet remain an integral part of any infantry formation, whereas the more specialized snipers usually operate in small teams away from the usual command structures. Trained marksmen are employed to knock out enemy weapon teams or similar targets at distances of up to 800m—greater ranges than assault rifles can effectively engage—and are typically deployed one to a platoon and under platoon command. Specialized ammunition such as the 0.338 Lapua Magnum provides accuracy at extended ranges, while the 7.62x54R round, dating from 1895, is still highly regarded by many Eastern European forces.

The most common specialist rifles in military use include the following:

- 7.62mm SVD Dragunov (Russian Federation)
- 0.338 Accuracy International AWM (United Kingdom)
- 7.62mm M-40A1 (United States)

The *carbine* is a short-barrelled variant of a standard rifle. With the changeover to smaller calibre ammunition, usually 5.56mm or 5.45mm, it is possible to create shorter-barrelled assault rifles with greater firepower and combat ranges than the sub-machine gun, yet in a relatively compact weapon. In general, the use of these short weapons is a feature of special forces or non-commissioned officers (NCOs) and officers, due to ease of handling and carrying. It is noticeable, however, that the US Army has been using the M-4 Carbine increasingly with front-line units in its operations in Afghanistan and Iraq. The main reason is ease of use without loss of effectiveness at close combat ranges.

The most common carbines in military use include the following:

- 5.45mm AKS-74U (Russian Federation)
- 5.56mm Colt's M-4 Carbine (United States)
- 5.56mm H&K G-36K (Germany)

Each family of assault rifles includes a carbine variant, and assault rifles are now marketed as but one component of a range of mechanically similar weapons. A complete range now includes the assault rifle itself, a heavy barrelled squad fire-support model intended to deliver supporting fire to about 600m, and the short-barrelled carbine. Some ranges also include an ultra-short-barrelled carbine for special forces. The assault rifle still remains the main component within the range in sales terms.

Anti-matériel rifles are specialist weapons intended for use against high value military assets such as helicopters (while on the ground), radar, and communication installations. They are not normally anti-personnel weapons. The intention is to place a destructive heavy bullet with calibres of 12.7 (.50), 14.5 or even 20mm into a target at stand-off ranges of 2,000m or more. They are usually long and heavy bolt-action rifles (some are semi-automatic) with powerful optical sights. Their users have to be specially trained in their deployment and use, especially regarding target selection. They are therefore largely confined to special operations forces and are not normally part of the infantry's general inventory. The market for anti-matériel rifles is dominated by Barrett Firearms (United States) but numerous other manufacturers also produce large-calibre rifles, so that the market is fast being saturated in sales terms.

The most common types of anti-matériel rifles in military use include the following:

- 12.7mm Barrett Model 82 (United States)
- 12.7mm Accuracy International AW50 (United Kingdom)
- 12.7mm V-94 (Russian Federation)

The South African PMP NTW 14.5/20mm rifle in this category (it can have barrels for either 14.5x114mm or 20mm cannon ammunition) has been sold outside its home nation. Well over 300 examples of these rifles have been sold to India for deployment along the Kashmir borders. Sales of anti-matériel rifles on this scale are rare, most production batches being ordered and delivered in tens (at the most).



An Indian army soldier aims an anti-matériel rifle as a fellow soldier holds a stand-alone multi-shot grenade launcher in New Delhi in October 2003.

© Raveendran/AFP/Getty Images

Sub-machine guns

Sub-machine guns are small, light automatic weapons that fire pistol-calibre ammunition to short ranges—rarely more than 50m. They are now widely regarded as obsolete as a standard infantry weapon, largely because of their short combat ranges and lack of bullet power compared to carbines. Yet they continue in service with many regular, police, and special forces. In 2003 the Israeli military phased out the Uzi sub-machine gun, declaring that it was 'antiquated'. While revered for its hardiness and ease of operation—it is estimated that more than 1.5 million were produced—the Uzi is also inefficient and inaccurate, even at medium range. The Uzi was taken out of front-line units of the Israeli military two decades ago, but was still issued to some elite units, and soldiers carrying heavy gear who required a light weapon for self-defence (Keyser, 2003).

Although partly replaced by the carbine, the sub-machine gun can still deliver a high rate of fire. It is for this reason that designs such as the Uzi are increasingly popular within criminal organizations. The category also finds many applications with special forces. No innovations are anticipated in this weapon category, other than the growing use of armour-piercing ammunition to counter body armour.

The most common types of sub-machine gun in military use include the following:

- 9mm H&K MP5 (Germany)
- 9mm IMI Uzi (Israel)
- 9mm Ingram Model 10 and 11 (United States)
- 9mm Spectre M4 (Italy)

European producers now dominate the global sub-machine gun market—most significantly designs from Beretta (Italy) and H&K (Germany). While these weapons are now regarded as having limited utility, their mystique in popular culture continues to drive their popularity worldwide. Outside of Europe other important producers include IMI (Israel), ADI (Australia), and Norinco (China). Compact, intermediate-calibre assault rifles are gradually eclipsing sub-machine guns in military use (Forecast International, 2004).

Compact, intermediate-calibre assault rifles are gradually eclipsing sub-machine guns in military use.

Light machine guns

Light machine guns fall into two categories: squad fire support weapons and general-purpose machine guns (GPMG).

Squad fire support weapons are intended to provide supporting fire for an infantry squad of 9–12 soldiers. Operational ranges rarely exceed 600m. Few really new models have appeared of late, other than the H&K 5.56mm MP-43, which has yet to attract firm orders. The market leader is the FN Herstal 5.56mm Minimi, procured by the US Army under the designation M-249. The Minimi continues to be sold in significant numbers, one of the latest customers being the British Army (the initial order was for more than 600 weapons). The most common types of squad fire support weapons in military use include the following:

- 5.56mm FN Herstal Minimi (Belgium)
- 7.62mm RPD (Russian Federation)
- 5.45mm/7.62mm RPK-74 (Russian Federation)

The market for light machine guns is stable and dominated by established European producers and designs. European firms continue to dominate all three market segments (squad fire support, general-purpose, and heavy) of the machine gun market. FN Herstal's MAG general-purpose machine gun and the Minimi light machine gun are fast becoming the international standards in their respective market segments (Forecast International, 2004).

The production of GPMGs has changed little recently. The FN Herstal MAG, which is in service in more than 70 countries, and was first produced in 1955, also remains in production in Argentina, Egypt, India, the United Kingdom, and the United States. Other stalwarts, such as the RPD and the RPK, both originally produced in the Russian Federation, continue to serve on, increasingly as tripod-mounted weapons to provide fire support at platoon and company level. The most common types of GPMG in military use are listed in Table 1.10.

European firms continue to dominate all three segments of the machine gun market.

Heavy machine guns

Heavy machine guns have calibres of 12.7mm and upwards (see Table 1.10). They are intended as heavy fire support or air defence weapons, up to ranges as high as 2,000m. All weapons in this category are solidly built, have evolved little, and have a considerable lifespan. For instance, the 12.7mm M2, first mass-produced in 1933, and in service in more than 80 countries, remains an important weapon within the US inventory even though it is no longer manufactured there. It remains in production in the UK (Manroy) and Belgium (FN Herstal).

Machine guns with calibres of 12.7mm and upwards, intended as heavy fire support or air defence weapons, have evolved little over the years.

The Browning M2HB remains the foremost weapon in the heavy machine gun market, though aggressive marketing by a number of other producers, including Denel (South Africa), IMI (Israel), Norinco (China), and Singapore Technologies Kinetics (Singapore), is keeping the otherwise stable market active (Forecast International, 2004). The DShK-38 is widely deployed—in nearly 50 countries—but has been out of production within the Russian Federation for decades, although it is still produced in China, Egypt, Iran, Pakistan, and Romania. There have been few innovations in this category, the only new example to appear for many years being the Russian 12.7mm Kord, an update of the NSV.

The most common types of heavy machine guns in military use include the following:

- 12.7mm M2HB (United States)
- 12.7mm NSV (Russian Federation)
- 12.7mm DShK-38 (Russian Federation)

Grenade launchers

There are two main categories of grenade launcher, single-shot rifle-mounted examples and pedestal-mounted automatic examples, although a limited number of stand-alone launchers are also available. Among *rifle-mounted grenade launchers*, low velocity 40mm grenades predominate while the heavier, automatic pedestal-mounted models fire high-velocity 20–40mm grenades to a greater range. Although many examples of the rifle-mounted types have been introduced, the market is dominated by the single-shot 40mm M203 (United States) and the 40mm GP-25, originally manufactured in the Russian Federation by Tula Ordnance and KBP, and produced under licence by several other states.

Among *pedestal-mounted automatic grenade launchers*, two tendencies can be detected. One is a move to develop models that weigh no more than a GPMG while continuing to deliver the required fire rates and ranges of their heavier counterparts. Two main models have emerged, the 40mm SLWAGL (Singapore) and a lightweight 35mm grenade launcher from Norinco (China). Technopol (Slovak Republic) has tentatively marketed its 30mm RAG-30, while the 30mm AGS-30 (Russian Federation) has yet to appear in significant numbers. The second tendency is for more countries to produce their own weapons. The list of manufacturing countries now includes China, Germany, Pakistan, Poland, Romania, the Russian Federation, Serbia, Singapore, the Slovak Republic, South Africa, Spain, and the United States. In many of these countries the products are scarcely past the prototype stage, but more can be expected (Gander, 2003).

The most common automatic grenade launchers in military use include the following:

- 40mm MK-19 (United States)
- 30mm AGS-17 (Russian Federation)



A US soldier loads grenades into a US-made 40mm MK19 automatic grenade launcher south-west of Baghdad in January 2004.

© Marwan Naamani/AFP/Getty Images

Portable anti-tank and anti-aircraft weapons

Man-portable anti-tank and anti-aircraft guns have been largely replaced by anti-tank guided weapons (ATGW) and MANPADS. No new types of the former have appeared in years. Of those still in existence, air defence weapons are the more numerous of the two, most of them being some variant of the 14.5mm KPV heavy machine gun. These remain available from Bulgaria, China, North Korea, and Romania but are increasingly becoming ineffectual against any but the slowest and lowest-flying aircraft targets.

One partial exception to the decline in anti-tank guns remains the Swedish Saab Bofors Dynamics 84mm Carl Gustaf shoulder-fired recoilless rifle. Constant development and ammunition improvements have kept this highly portable system attractive to many who require an anti-tank gun system that can also be deployed in a more general infantry fire support role.

The market for ATGWs and MANPADS, however, is a growth area in the international arms industry, with a number of new designs recently accepted by some of the world's major armed forces (MANPADS). The Javelin ATGW is a case in point. Selected by the British Army in 2003, it has also been supplied to Australia, Jordan, Lithuania, New Zealand, and Taiwan (Army Technology, 2004).

Recoilless guns

The recoilless gun survives mainly by being able to deliver relatively heavy direct-fire projectiles from lightweight barrels and carriages. These guns have numerous drawbacks, such as an excessive firing blast, but remain favoured by many armies as their relatively light weight makes them very useful weapons, especially with airborne forces. Numerous models remain available for potential purchasers but few innovations have appeared recently. The 106mm M-40 series (United States), which is in service in more than 60 countries, is still licence-produced, or copied, in China, India, Iran, Pakistan, South Korea, and Spain. It remains the recoilless gun most likely to be encountered, the leading competitor being the 73mm SPG-9, produced by KBP in the Russian Federation and licence-produced in Bulgaria and Romania.

Mortars

The main trends in mortar production concern extending the range to which they can be used, and moving away from established medium-calibres (81mm or 82mm) down to 60mm. Through the use of longer barrels and streamlined projectiles, it becomes possible to deliver 60mm bombs to ranges of more than 6,000m without the weight penalties imposed by the 81mm and 82mm models.

There is no one leading producer or model of mortar. Virtually every country that wishes to do so manufactures its own local design, the result being that no two countries seem to field identical weapons. The United States does not currently produce mortars, but it uses mortars purchased from BAe (UK) and Soltam (Israel).

The international market for mortars is the most stable of all small arms and light weapons markets, and is dominated by European designs from producers such as TDA Armements SAS (France), Patria Vammass (Finland), and BAe Systems (UK). Other important producers include Denel (SA), Norinco (China), Singapore Technologies Kinetics Ltd. (Singapore), and Soltam Systems Ltd. (Israel). Even with the most important manufacturers, production runs are generally low, rarely reaching more than a few hundred per year. Mortar ammunition sales are more buoyant and are usually domestically manufactured.

An exception to this market stability is the new 98mm mortar calibre. This mortar was introduced to avoid the reporting thresholds of 100mm calibre stipulated in international disarmament treaties (excluding the UN Register of

There is no leading producer or model of mortar. Virtually every nation is capable of manufacturing its own local design.

Conventional Arms, which includes mortars over 75mm). To date only two countries, Poland and the Slovak Republic, have produced 98mm mortars.

Table 1.10 Selection of the most popular military small arms and light weapons, by category*

Type and model	Calibre	Designed in	Country of manufacture (selected)**	Countries in service	First mass-produced
Pistol					
Browning Hi-Power	9x19mm	Belgium	<i>Argentina, Belgium, Bulgaria, China, Hungary, India, Indonesia, Israel, Nigeria</i>	68	1935
Tokarev	7.62x25mm	Russian Federation	<i>China, CIS, Hungary, former Yugoslavia</i>	35	1930
Makarov	9x17mm	Russian Federation	<i>Bulgaria, CIS, China, Russian Federation</i>	30	1952
Assault Rifle*					
Kalashnikov AK series	7.62x39mm	Russian Federation	<i>Albania, Bulgaria, China, CIS, Egypt, Finland, Hungary, Kazakhstan, Iraq, North Korea, Poland, Romania</i>	78	1947
FN-FAL	7.62x51mm	Belgium	<i>Argentina, Australia, Brazil, Belgium, Canada, India, Mexico, South Africa, UK, USA, Venezuela</i>	74	1955
Armalite M-16 series	5.56x45mm	United States	<i>Canada, South Korea, Philippines, Singapore, USA</i>	60	1962
Light machine gun					
FN-MAG	7.62x51mm	Belgium	<i>Argentina, Belgium, Egypt, India, UK, USA</i>	77	1955
RPD	7.62x39mm	Russian Federation	<i>China, CIS, Egypt, North Korea</i>	42	1962
RPK	7.62x54mm	Russian Federation	<i>China, Kazakhstan, Poland, Romania, Serbia and Montenegro</i>	35	1964
Heavy machine gun					
Browning M2	12.7x99mm	United States	<i>Belgium, UK, USA</i>	84	1933
DShK-38/46	12.7x107mm	Russian Federation	<i>China, Iran, Pakistan, Romania, CIS</i>	48	1938
NSV	12.7x107mm	Russian Federation	<i>Bulgaria, India, Kazakhstan, Poland, CIS, Ukraine, former Yugoslavia</i>	24	1980
Anti-tank weapon (guided and unguided)					
RPG-7 Rocket-propelled grenade launcher	40mm	Russian Federation	<i>Bulgaria, China, Egypt, Georgia, Iraq, Pakistan, Romania, Russian Federation, Poland, Slovak Republic</i>	63	1962
M-40 Recoilless rifle	106mm	United States	<i>Austria, China, India, Iran, South Korea, Pakistan, Spain, USA</i>	63	1953
Aerospatiale/Matra Milan	125mm	International	<i>France, Germany, India</i>	31	1973
M20 Rocket launcher	89mm	United States	<i>Brazil</i>	41	1950

Notes: * Based on number of countries that weapon is in service

*Includes light support weapons and heavy barrelled assault rifles.

**Italics signify current production. Weapons listed include derivatives, both licensed and unlicensed.

Sources: Small Arms Survey (2001); Gander and Cutshaw (2003)

Numerous older models of weapons are currently in service around the world (see Table 1.10), but a number of them have been, or may be, upgraded to suit the demands of the modern user. Among these are the Saab Bofors Carl Gustaf recoilless rifle and the Kalashnikov series of assault rifles, carbines, and sub-machine guns. The RPG-7 is a prime example of the extent to which such weapons undergo considerable modification over time.

OLD TECHNOLOGY, NEW APPLICATIONS: THE RPG-7 AND ITS DERIVATIVES

Rocket-propelled grenade launchers have been produced in many countries, but the most widespread and recognizable variant is the Soviet designed *Raketniy Protivotankoviy Granatomet* (RPG) series. RPG-7s are probably the most common light anti-armour and general support weapon in service worldwide. Having been produced for more than 40 years, RPG-7s have seen service across the globe, from Angola to Zimbabwe, on the streets of Belfast and Baghdad. It has been estimated that nine million RPG-7s have been produced in various guises, although this figure may be an underestimate (Gander and Cutshaw, 2003). The RPG-7, which entered service in the Russian Army in 1962, and its subsequent variants, are produced by at least 12 companies in more than nine countries. Ammunition is produced by at least 17 companies in more than 14 countries. Craft production of parts of the weapon and warhead is widespread.

Developed from the US M1 'Bazooka'—the original light anti-tank weapon of WWII—the RPG-1 was initially manufactured in the 1940s. The design was upgraded to the RPG-2 when the Soviet army captured the blueprints of the German Panzerfaust reloadable anti-tank weapon from Hugo Schneider AG, of Leipzig, in 1945. The German design gave the RPG its distinctive shape—a narrow tube to house the solid-fuel rocket motor and a bulbous protruding 85mm warhead packed with 2.5kg of high explosive. The same basic format was kept when the Soviet army adopted the RPG-7 in the early 1960s.

The weapon was designed to be cheaply mass-produced. Its rudimentary design, pressed steel components, and reusable launcher ensure that the weapon stays in service for long periods of time. The RPG-7 can be upgraded with a variety of warheads, optical equipment, and other modifications to match the requirements of different services and combat conditions. The Russian Federation's *Kovrov Mechanical Plant* offers a modernization service for existing RPG-7s. Services on offer include upgrading sights, adding bi-pods, and making modifications to enable the use of more modern ammunition.



A Taliban fighter carries an RPG-7 rocket-propelled grenade launcher and two rocket-propelled grenades.

© AP/Zaheruddin Abdullah

Despite its intended role against tanks, the standard RPG is ineffective against modern armour. RPGs have, however, been devastatingly effective against 'soft' unarmoured vehicles and personnel. A normal RPG-7 grenade can penetrate 40–50mm of protective armour, making less-armoured vehicles, such as Jeeps, trucks, and aircraft, particularly vulnerable. Both of the US Blackhawk helicopters destroyed in Somalia in October 1993 were brought down with RPGs (Bowden, 2000). In Iraq RPGs have been used in attacks against coalition forces in non-armoured vehicles. Indeed, the impact of RPGs has prompted countries such as Namibia, the Russian Federation, and South Africa to develop specialized tactics for dealing with RPG-armed combatants.

Table 1.11 Producers of RPG-7 variants, derivatives, and ammunition

Country	Producer	Designation	Ammunition	Newly developed ammunition
Bulgaria	Arsenal	RPG-7V, RPG-7VM1, RPG-7VM2		
China	NORINCO	Type 69, Type 69-1	4x Anti-tank, 1x Air-bursting Anti-personnel, 1x Multipurpose, 1x Illuminating warheads	Air-bursting anti-personnel warhead, thermobaric warhead
	Vazov Engineering Plant	–	GTB-7G warhead	Thermobaric warhead
Egypt	Saqr	Saqr PG-7	Saqr Cobra warhead	–
Iran	Armament Industries Group	Saghegh	Nafez HEAT warhead	–
Iraq	Al-Nassira	RPG-7	Unknown	–
Israel*	Israel Military Industries	Unknown designation	Standard warhead	–
Pakistan	Pakistan Machine Tool Factory Ltd.	Chinese Type 69 variant		–
	Pakistan Ordinance Factories	RPG-7	HEAT warhead	–
Poland	Unknown	RPG-7V	PG-7VM warhead	–
Poland/Germany	Dezamet/ Dynamit Nobel	–	Panzerfaust warhead	Under consideration
Romania	Romarm SA	AG-7S, AG-7DS	PG 7VM HEAT warhead, incendiary warhead	–
Russian Federation	Bazalt State Research and Production Enterprise	RPG-7V	PG-7VL, PG-7VR, OG-7V, TBG-7V warheads	Thermobaric warhead
	Kovrov Mechanical Plant JSC	RPG-7	Various warheads	–
	FKN GknIPAS	–	PG-7VYA, MRAR warheads	Upgraded multipurpose warhead and anti-helicopter/anti-personnel warhead
Slovak Republic	Kon_trukta Defence	Unknown designation	PG-7M 110 anti-tank warhead	–
Switzerland/Bulgaria	RUAG Munition/ Vazovski Mashinostroitelni Zavod	–	VPG-7MEP warhead	High penetration warhead
Thailand	The Thai Arms Company	RPG-7	Unknown designation	–

Note: * Limited, possibly discontinued.

Sources: Forecast International (2002); Foss (2004); Foundation Hemus (2003); Gander (2001, 2003); Israeli Special Forces Homepage (2003); Pengelley (2002); Shields (1996); South-Asian Defence News (2003)

The RPG-7 series is probably the most common light anti-armour and general support weapon in service worldwide.

The RPG is a particular danger to unprotected personnel. Effective to a range of 300m, the weapon's standard anti-tank round explodes with a lethal burst of shrapnel to a radius of four metres (Grau, 1998). In recent years, more specialized ammunition has been developed. Available ammunition ranges from standard high-explosive anti-tank, or HEAT, warheads, to 'tandem' warheads, which feature a twin explosion to defeat reactive armour. Bulgarian producers are developing more specialized thermobaric rounds for urban warfare, a formula that hitherto was limited to larger conventional weapons—particularly in Chechnya. Developed by the *Vazov Engineering Plant* of Sopot, the contents of the 93mm-diameter thermobaric warhead are scattered in an aerosol form on impact and then ignited to create a rapidly formed, high-pressure blast wave, equivalent to that produced by the detonation of 2kg of TNT. The warhead was reportedly on offer for export in 2001 (Gander, 2001). The Russian Federation's Bazalt has also developed a thermobaric warhead, whose explosive power reportedly can be compared to a 120mm artillery shell or mortar bomb (Bazalt, 2001).

The existing weapon's relatively low cost—a new unit price of around USD 1,500 and old weapons for as little as USD 10—make it attractive to developing world armies and non-state actors alike (Forecast International, 2002; Brown, 2002). The RPG-7's relatively small size and its light loaded weight (8–13kg) also makes it the ideal weapon for guerrilla

warfare, especially in built-up areas. A case in point is Iraq, where more than 15 per cent of US soldiers killed in the seven months between 21 March and 21 October 2003 died in RPG-related incidents. The vast majority of these deaths—22 out of 23—occurred since major hostilities were declared over on 1 May 2003 (Bevan, 2004). Recent developments, such as Romania's *ROMARM SA*'s air-portable variant, the AG-7DS, which can be divided into two halves for ease of carrying, arguably make the weapon yet more desirable for future guerrilla usage. The sheer number of countries in which the weapon is in service is a key factor explaining why these weapons often end up in the hands of non-state actors, particularly since many of these countries have not been able to guarantee the security of state arsenals in times of war (STOCKPILES).

The RPG-7 is currently in service with at least 27 countries' national forces (Gander and Cutshaw, 2003). It is also used by a large number of non-state groups, such as Hezbollah and the Liberation Tigers of Tamil Eelam (Jain Commission, 1997). A number of countries manufacture variants of the RPG-7 (see Table 1.11). Many modifications have been instituted over the 40 years it has been in service, and the demands for new capabilities at a low cost suggest this trend will continue. With no easy countermeasures to undermine its effectiveness, the RPG-7 and its later variants are likely to remain a standard light weapon for years to come.

CONCLUSION

The global small arms industry continues to experience both continuity and change. Continuity in terms of the enduring popularity of certain types of weapons—from the Browning Hi-Power 9mm pistol to the RPG-7 grenade launcher. Various established European and US producers—including H&K (Germany), FN Herstal (Belgium), Izhmash (Russian Federation), and Colt's Manufacturing (United States)—continue to dominate many categories and sub-categories of the global small arms and light weapons market. The primary impetus for design and innovation is concentrated in many of these established producers.

Change has come in the form of new designs and products, and in challenges to established manufacturers from smaller producers. Despite a high degree of stability in many of the categories of the small arms market, in recent years a number of new designs have begun to appear, driven by rearmament programmes in many countries (e.g. France and Spain), and by major procurement efforts (e.g. the United States) in others. Many of these new designs have incorporated advanced materials (e.g. composites), and have aimed to produce weapons with greater rates of fire and increased lethality.

Despite the dominance of established European and US producers, a number of firms in Australia (ADI), Brazil (Taurus), Singapore (Singapore Technologies Kinetics), and South Africa (Denel/Vektor) have started to challenge the established producers in some of the various categories and sub-categories of the global small arms market. The success of these new producers, together with other factors, has continued the drive towards consolidation in the European small arms industry, as witnessed by the recent collaborative ventures between RUAG (Switzerland) and Dynamit Nobel (Germany), between H&K (Germany) and Santa Barbara (Spain), and between Giat (France) and FN Herstal (Belgium). The recent experience of Latin America's small arms producers, and the growing exports of companies in Brazil, Argentina, and Mexico, are testament to the ongoing changes in the global small arms industry, and how countries such as Brazil are able to increasingly dominate their 'regional market'.

An important and under-researched issue is the distinction between the commercial small arms market (firearms produced for recreational activities such as sport and hunting) and the military small arms market. On the basis of existing, albeit limited, information, it appears that the global commercial small arms market might be experiencing a significant decline in demand, as reflected in lower production volumes among the major commercial producers in the United States (e.g. Sturm, Ruger & Co.), the Russian Federation (e.g. IMZ), and elsewhere. But whether companies in other countries are filling the production vacuum is not clear. On the military side, some national rearmament programmes and the US-led military operations in Afghanistan and Iraq have contributed to the emergence of a number of new designs and products. These developments also appear to have had a positive impact on the volume of production of military-style small arms and light weapons, particularly among US and other producers (e.g. FN Herstal of Belgium) that have long-term contracts with the US armed forces.

1. LIST OF ABBREVIATIONS

ARS	Argentine peso
ATF	US Bureau of Alcohol, Tobacco, Firearms and Explosives
ATGW	Anti-tank guided weapon
BNDES	Banco Nacional de Desenvolvimento Econômico e Social (Brazil)
CAVIM	Compañía Anónima de Industrias Militares (Venezuela)
CBC	Companhia Brasileira de Cartuchos (Brazil)
CIS	Commonwealth of Independent States
DGFDN	Dirección General de Fábricas de la Defensa Nacional (Mexico)
DGFM	Dirección General de Fabricaciones Militares (Argentina)
FAMAE	Fábricas y Maestranzas del Ejército (Chile)
FAME	Fábrica de Armas y Municiones del Ejército (Peru)
FARC	Fuerzas Armadas Revolucionarias de Colombia
FBM	Fábrica Boliviana de Municiones (Bolivia)
FLB	Fray Luis Beltrán (Argentina)
FMAP	Fábrica Militar de Armas Portátiles (Argentina)
FMRT	Fábrica Militar Río Tercero (Argentina)
GPMG	General-purpose machine gun
H&K	Heckler & Koch
IMI	Israel Military Industries
INDEC	National Institute of Statistics and Census (Argentina)
INDUMIL	Industria Militar (Colombia)
MANPADS	Man-portable air defence system
NCO	Non-commissioned officer
RPG	Rocket-propelled grenade launcher
SALW	Small arms and light weapons
SIMA	Servicio Industrial de la Marina (Peru)
SIMA-CEFAR	SIMA Centro de Fabricación de Armas (Peru)
SMG	Sub-machine gun
TAP	Popular arms workshop (taller de armamento popular)
TFG	Front-line workshop (taller de frente de guerra)
USD	US dollar

1. ENDNOTES

- ¹ Small arms are often produced in divisions, subsidiaries, or plants that are part of larger companies. Thus the total number of end producers is likely to be much lower than the total number of producers involved in some aspect of small arms production, including intermediate producers (Omega Foundation, 2002; 2003).
- ² Personal communication with Garen Wintemute and Karen Rand.
- ³ The total number of weapons available to the US domestic market is equal to domestic production, minus exports, plus imports.
- ⁴ Information in this section on small arms production in Latin America is largely based on Dreyfus and Lessing (2003).
- ⁵ Under the *maquila regime*, a Mexican company is allowed to temporarily import the following goods into Mexico on a duty-free basis: machinery, equipment, materials, parts and components, and other items needed for the assembly or manufacture of finished goods for subsequent export.
- ⁶ Interview with the Director of Production of DGFm, Buenos Aires, April 2003.
- ⁷ Interview with the former Director of Operations of the National Arms Register (RENAR), Buenos Aires, April 2003.
- ⁸ Interview with the former Director of Operations of RENAR, Buenos Aires, April 2003.
- ⁹ Information from INDEC (2003). These figures exclude exports of parts for small arms and may exclude state-to-state exports of military small arms.
- ¹⁰ Information in this section obtained from Lt. Col. Jorge Ricardo Guido, Director of the Military Factory Fray Luis Beltrán, May 2003.
- ¹¹ Production of mortars and other light weapons at the FMRT is currently suspended.
- ¹² Interview with the Director of Production of DGFm, Buenos Aires, April 2003.
- ¹³ Information for this company analysis comes from a presentation given by Benso Bonadimani, president of Bersa, during the 'Firearms Industry and the United Nations Action Programme 2001 Conference', organized by the UN Centre for Peace, Disarmament and Development in Latin America and the Caribbean and the Government of Panama, Panama, 13–15 November 2002. See UN-LiREC (2002).
- ¹⁴ Percentage calculated from official customs information obtained via Urunet (2004).
- ¹⁵ Official customs information obtained via Urunet (2004). Information from company brochures.
- ¹⁶ Official customs information obtained via Urunet (2004). For more information, see F&L (2004).
- ¹⁷ For company information about FANAC, see FANAC (2004).
- ¹⁸ SECEX; see also Fernandes *et al.* (2001).
- ¹⁹ Ibid.
- ²⁰ Company information for Forjas Taurus filed with the Securities and Exchange Commission of Brazil (Comissão de Valores Mobiliários, CVM). All information taken from Annual Reports (Informações Anuais, IAN) and Standard Financial Reports (Demonstrações Financeiras Padronizadas, DFP). See CVM Brazil (2004).
- ²¹ Company information for CBC filed with the CVM of Brazil. See note above.
- ²² Company information for Rossi filed with the CVM of Brazil. See note above.
- ²³ Gander and Cutshaw (2003) and interview with the owner of the gunsmith company Gun Tec, Rio de Janeiro, December 2003.
- ²⁴ Interview with the owner of Gun Tec, Rio de Janeiro, December 2003.
- ²⁵ Unless otherwise noted, information for this section was gathered in an interview with employees of FAMAe, August 2003.
- ²⁶ The subsequent International Security Assistance and Arms Export Control Act of 1976 prohibits transfers more generally to any country that 'engages in a consistent pattern of gross violations of internationally recognized human rights', except under extraordinary circumstances (USAID, 2004).
- ²⁷ Interview with an employee of FAMAe, August 2003.
- ²⁸ Interview with Graciela Uribe de Lozano, retired official from the Colombian Ministry of Foreign Affairs, August 2003.
- ²⁹ Unless otherwise noted, this section is based on information presented by Colombian law enforcement officers during a conference entitled 'The Firearms Industry and the United Nations Action Programme 2001 Conference' (UN-LiREC, 2002).
- ³⁰ Interview with Col. Luis Cruz, Director, Departamento de Control de Armas, Comando Conjunto de las Fuerzas Armadas Ecuatorianas, 8 July 2003.
- ³¹ The Department of Arms Control does not collect data on the total output of these legal craft firearms producers, but such data theoretically exists in their applications for permit renewals.
- ³² Unless otherwise noted, information for this section comes from an interview with a company official of Industrias Ruiz Cabañas S.A. de C.V., Alpuyea, Xochitepec, Mexico, February 2003.
- ³³ Interview with Ruiz Cabañas.
- ³⁴ Interview with Danny Rios Guitierrez, Superintendente Comercial de SIMA-CEPAR, 20 July 2003.
- ³⁵ Ibid.
- ³⁶ Interview with CAVIM official, Caracas, July 2003.
- ³⁷ Interview with Marcos Tarre Briceño, president of the NGO Venezuela Segura and expert in public security issues, Caracas, July 2003; interview with Javier Mayorca, journalist in charge of the military and security section at the Caracas newspaper *El Nacional*, Caracas, July 2003.

1. BIBLIOGRAPHY

- Aleksandrova, Lyudmila. 2002. 'Budet sozdana korporatsiya strelkovogo oruzhiya.' *Udmurtskaya Pravda* (Izhevsk). 5 November.
- Altayskaya Pravda*. 2003. Interview with Barnaul Instrument-Building Plant general director Viktor Yashin. Cited in 'S veroy v budushchee.' 28 July.
- Amantino. 2004. Company Web site. <<http://www.eramantino.com.br/>>
- Army Technology. 2004. 'Javelin Anti-Armour Missile, USA.' <<http://www.army-technology.com/projects/javelin/>>
- Astkhov, Dmitry and Ekaterina Safarova. 2003. 'SOK sdaet patrony.' *Kommersant*. 18 September.
- Aviatsia i Vremya. 2002. 'Kosmos i oruzhiye Rossii.' 6 March.
- Bazalt. 2001. *RPG-7V Grenade Launcher: 40th Anniversary*. Moscow: State Research and Production Enterprise Bazalt. <http://www.bazalt.ru/articles/rpgbirthday_e.html>
- Bevan, James. 2004. *Analysis of US Casualties in Iraq*. Background Paper. Geneva: Small Arms Survey.
- BICC (Bonn International Center for Conversion). 2003. *BICC Conversion Survey 2003: Global Disarmament, Demilitarization and Demobilization*. Baden-Baden: Nomos Verlagsgesellschaft.

- Bowden, Mark. 2000. *Blackhawk Down*. London: Corgi.
- Braslavsky, Guido. 2003. *Resignación y escepticismo de los militares*. Clarín Periodismo en Internet. Vol. 7: 2655. 9 July. <<http://old.clarin.com/diario/2003/07/09/p-00603.htm>>
- Brown, John. 2002. Spokesman for the Defence Science and Technology Laboratory, UK Ministry of Defence. Cited in *New Age Electric Armour Tough Enough to Face Modern Threats*. Salisbury: Defence Science and Technology Laboratory. 8 June. <www.defesnet.com.br>
- Casciotti, Gino. 2004. 'Bersa Thunder: Pistola Bersa Thunder .22.' Montevideo: Gino Casciotti, Reparación y Restauración de Armas y Cuchillos. <http://www.ginocasciottiarmero.exactpages.com/pagina_nueva_8.htm>
- CAST (Centre for Analysis of Strategies and Technologies). 2003. *Small Arms Production in the Russian Federation*. Background paper. Geneva: Small Arms Survey.
- . 2001. 'The Indian contract of the Instrument Building Design Bureau.' Comment. 16 February.
- CAVIM. 2004. Company Web site. Maracay: Compañía Anónima de Industrias Militares. <<http://www.cavim.com.ve/>>
- CBC. 2004. Online catalogue. Rio de Janeiro: Companhia Brasileira de Cartuchos. <<http://www.cbc.com.br/catalogo/index.htm>>
- CVM Brazil. 2004. Institutional Web site. Rio de Janeiro: Securities and Exchange Commission of Brazil (Comissão de Valores Mobiliários). <<http://www.cvm.gov.br/ingl/indexing.asp>>
- Dreyfus, Pablo. 2000. *Small Arms Producers in the Southern Cone Countries of Latin America*. Background paper. Geneva: Small Arms Survey.
- , and Benjamin Lessing. 2003. *Production and Exports of Small Arms and Light Weapons and Ammunition in South America and Mexico*. Background paper. Geneva: Small Arms Survey.
- Ekspert Vooruzheniy Journal*. 2002. 'Ratings of Russian Defence Companies in 1999–2001.' Moscow: CAST. No. 3.
- FAMAE. 2002. 'Defensa: Description.' Santiago: Fábricas y Maestranzas del Ejército. <http://www.defensa.cl/paginas/public/industria/4_empresas_estado/3famae.pdf>
- . 2004. Company Web site. Santiago: Fábricas y Maestranzas del Ejército. <<http://www.famae.cl/>>
- FANAC. 2004. Company Web site. Lanus: Fabricación Nacional, armas civiles de Nicolás Colasanto e hijos. <<http://www.cazayarmas.com.ar/FANAC/fanacav.htm>>
- F&L. 2004. Company Web site. Buenos Aires: F&L Fábrica de Armas. <<http://www.fyl.com.ar/home1.htm>>
- Fernandes, Rubem César, Marcos de Barros Lisboa, and Ramon Stubert Aymore. 2001. *As Exportações Brasileiras de Armas Leves 1989–2000*. Rio de Janeiro: ISER. November. <http://www.iser.org.br/portug/segpub_texto_rubem.pdf>
- Foundation Hemus. 2003. *Bulgarian Defence Industry Products Catalogue*. <<http://www.hemusbg.org/>>
- Forecast International. 2002. *Ordnance and Munitions Forecast*. Newtown, Connecticut: Forecast International/DMS. September.
- . 2003. *Ordnance and Munitions Forecast*. Newtown, Connecticut: Forecast International/DMS. September.
- . 2004. *Ordnance and Munitions Forecast*. Newtown, Connecticut: Forecast International/DMS. January
- . 2003a. *Military Small Arms (United States)*. Newtown, Connecticut: Forecast International/DMS. January.
- . 2003b. *Sub-machine Guns (International)*. Newtown, Connecticut: Forecast International/DMS. January.
- Foss, Christopher. 2004. 'China Puts Thermobaric Weapons on the Market.' *Jane's Defence Weekly*. Coulsdon: Jane's Information Group. 4 February.
- Galloway, Joseph. 2004. 'Army Shooting Short on Small Arms Ammunition.' Washington, DC: Knight Ridder/Tribune News Service. 10 January.
- Gander, Terry. 2001. 'Thermobaric Warhead for RPG-7.' *Jane's Land Forces*. 5 January. <http://www.janes.com/defence/land_forces/news/jidr/jidr010104_2_n.shtml>
- . 2003. *Small Arms and Light Weapons*. Background paper. Geneva: Small Arms Survey.
- , and Charles Cutshaw. 2001. *Jane's Infantry Weapons 2001–2002*. Coulsdon: Jane's Information Group.
- . 2003. *Jane's Infantry Weapons 2003–2004*. Coulsdon: Jane's Information Group.
- Grau, Lester. 1998. 'The RPG on the Battlefields of Today and Tomorrow.' *Infantry Magazine*. May–August. Fort Benning: US Army, pp. 6–8.
- Haug, Maria. 2003. *US Small Arms Exports in 2002*. Background paper. Geneva: Small Arms Survey.
- Hogg, Ian and John Weeks. 2000. *Military Small Arms of the 20th Century*. Iola, Wisconsin: Krause Publications.
- IISS. 2002. *The Military Balance 2002–2003*. London: The International Institute for Strategic Studies.
- Imbel. 2004. Company Web site. Piquete: Indústria de Material Bélico do Brasil. <http://www.imbel.gov.br/ingles/i_imb_loca.asp>
- INDEC. 2003. Argentine National Institute of Statistics. Buenos Aires: Instituto Nacional de Estadística y Censos. <<http://www.indec.gov.ar/>>
- Interfax. 2003. 'V blizhishkiye tri goda obyom proizvodstva zavoda im. Degtyaryova uvelichitsya do 10–11 mlrd. Rub.' 20 February. *International Firearms Trade*. 2003. St. Johnsbury, Vermont: IFT. Vol. 2:7. 1 July.
- Israeli Special Forces Homepage. 2003. *Rocket Propelled Grenade 7*. Isaveret.com. <<http://www.isayeret.com/weapons/rockets/rpg/rpg7.htm>>
- Jain Commission. 1997. Interim report of the Jain Commission of Enquiry Headed by Justice M. C. Jain on the Assassination of Shri Rajiv Gandhi. Sriperumbudur. August. Art. 43:1.
- Jane's Defence Weekly*. 2003a. 'Russia announces 2003 allocations.' Coulsdon: Jane's Information Group. 24 January.
- . 2003b. 'Spain confirms USD 4.6bn procurement package.' Coulsdon: Jane's Information Group. 12 September.
- . 2003c. 'French Budget Continues Modernisation Process.' Coulsdon: Jane's Information Group. 26 September.
- . 2003d. 'Heckler & Koch, Santa Barbara set up arms venture.' Coulsdon: Jane's Information Group. 12 December.
- Jane's International Defence Review*. 2002. 'Infantry Weapons: The Way Ahead.' Coulsdon: Jane's Information Group. 1 July.
- . 2003a. 'XM8 Lightweight Assault Rifle.' Coulsdon: Jane's Information Group. 1 March.
- . 2003b. 'US M-16 Replacement Is Emerging.' Coulsdon: Jane's Information Group. 1 November.
- . 2004a. 'Reconstructing the Russian Military.' Coulsdon: Jane's Information Group. 1 March.
- Kamakin, Andrei. 2003. 'Ya dam vam Parabellum.' *Itogi*. 3 June.
- Keyser, Jason. 2003. 'Israeli Army Laying down Its Famed Uzi Weapons.' *Toronto Star* (Associated Press). 18 December.
- Nozdrachyov, Alexander. 2002a. General director of Russian Agency for Conventional Armaments. Statement. 29 May.
- . 2002b. General Director of Russian Agency for Conventional Armaments. Statement. Quoted in Izhmash press release. 28 October. <www.izhmash.ru>
- NTI. 2004. 'China's National Defense 2000.' Washington: Nuclear Threat Initiative. <<http://www.nti.org/db/china/engdocs/wpnd2000.htm>>

- Olive, Ronaldo. 1999. 'Subguns from the Inca Land.' Harmony, Maine: *Small Arms Review*. Vol. 2:5. February.
- Omega Foundation. 2002. *Global Survey of Small Arms and Light Weapons Companies*. Background paper. Geneva: Small Arms Survey.
- . 2003. *Global Survey of Small Arms and Light Weapons Companies*. Background paper. Geneva: Small Arms Survey.
- Pengelly, Rupert. 2002. 'Swiss Warheads for AT-3, AT-4 and RPG-7.' *International Defence Review*. 16 December. Coulsdon: Jane's Information Group.
- Purcena, Julio César. 2003. 'A indústria de Armas Pequenas e Munições e a Violência no Estado do Rio de Janeiro nos Últimos Vinte Anos.' Graduate Essay (Economics). Rio de Janeiro: Faculdade Moraes Júnior. November, pp. 11–15.
- Poroskov, Nikolai. 2003. 'Proshchaniye s Makarovym.' *Vremya Novosti*. 7 July.
- Pyadushkin, Maxim, Maria Haug, and Anna Matveeva. 2003. *Beyond the Kalashnikov: Small Arms Production, Exports, and Stockpiles in the Russian Federation*. Occasional Paper. Geneva: Small Arms Survey. August.
- RENAR. 2002. 'Fábricas de Explosivos, Armas y Municiones en América Latina: una visión actual sobre los principales establecimientos estatales de producción para la Defensa. Registro Nacional de Armas.' Buenos Aires: Ministry of Defense of Argentina. <<http://www.renar.gov.ar/cursos/expertos/notaa/fabricas.asp>>
- Safronov, Ivan. 2003. 'Mikhail Kasyanov vypolnil zakaz Minoborony.' *Kommersant*. 14 August.
- Shields, John. 1996. *Military Industries in the Islamic Republic of Iran: An Assessment of the Defense Industries Organization (DIO)*. Monterey: Center for Nonproliferation Studies. May.
- SIPRI (Stockholm International Peace Research Institute). 2003. *SIPRI Yearbook 2003: Armaments, Disarmament and International Security*. Oxford: Oxford University Press.
- Small Arms Survey. 2001. *Small Arms Survey 2001: Profiling the Problem*. Oxford: Oxford University Press.
- . 2002. *Small Arms Survey 2002: Counting the Human Cost*. Oxford: Oxford University Press.
- . 2003. *Small Arms Survey 2003: Development Denied*. Oxford: Oxford University Press.
- South America Ordnance. 2004. Venture Web site. Juiz de Fora: Imbel, British Aerospace, Schahin. <<http://www.southamerica.com.br/eng/princ.html>>
- South-Asian Defence News. 2003. 'Pakistan Ready for Joint Ventures in Defence Industry.' *PakistaniDefence.com*. January. <<http://www.pakistaniDefence.com/news/MonthlyNewsArchive/2003/Jan2003.htm>>
- St. Louis Post-Dispatch*. 2004. 'Army deal could add jobs at Olin plant: \$9.2 million for ammunition.' St. Louis. 16 February.
- Taurus. 2004. Company Web site. Porto Alegre: Forjas Taurus S.A. <<http://www.taurus.com.br/index.php>>
- Tecnos. 2004. Aguila Ammunition. Helotes, Texas: Centurion Ordnance. <<http://www.aguilaammo.com/aguila.htm>>
- Thurman, Russ. 2003. 'Firearm Production: Special Report to the Industry.' San Diego: Shootingindustry.com. <<http://www.shootingindustry.com/02pages/SpecRep1.html>>
- Tula*. 2003. 'Traditsii okrylyayut I obyazyvayut.' 5 March.
- United Nations (UN). 1997. Report of the Panel of Governmental Experts on Small Arms. A/52/298. 27 August.
- UN-LiREC. 2002. 'The Firearms Industry and the United Nations Action Programme 2001.' Conference organized by the UN Centre for Peace, Disarmament and Development in Latin America and the Caribbean (UN-LiREC) and the Government of Panama. Panama, 13-15 November.
- USAID. 2004. 'History of USAID Democracy and Governance Activities. Washington, DC: The United States Agency for International Development.' <<http://www.usaid.gov/democracy/office/history.html>>
- United States. 1999. ATF (Bureau of Alcohol, Tobacco, Firearms and Explosives). *Annual Firearms Manufacturing and Export Report 1997*. Washington, DC: Department of the Treasury.
- . 2000. *Annual Firearms Manufacturing and Export Report 1998*. Washington, DC: Department of the Treasury.
- . 2001. *Annual Firearms Manufacturing and Export Report 1999*. Washington, DC: Department of the Treasury.
- . 2002. *Annual Firearms Manufacturing and Export Report 2000*. Washington, DC: Department of the Treasury.
- . 2003a. *Annual Firearms Manufacturing and Export Report 2001*. Washington, DC: Department of the Treasury.
- . 2003b. *Firearms Commerce in the United States 2001/2002*. Washington, DC: Department of the Treasury.
- United States. Census Bureau. 1999. *1997 Economic Census: Manufacturing Industry Series*. EC97M-3329F. Washington, DC: Department of Commerce.
- . 2002. *Statistics for Industry Groups and Industries: 2000*. Washington, DC: Department of Commerce.
- . 2003. *Statistics for Industry Groups and Industries: 2001*. M01 (AS)-1. Washington, DC: Department of Commerce.
- Urunet (Montevideo). 2004. 'Análisis de Comercio Exterior del Uruguay.' Commercial database. <<http://www.urunet.com.uy/>>
- VIC. 2000. 'China's Defense Budget and Arms Procurement Priorities.' Virtual Information Centre. Hawaii: US Pacific Command. 12 December.

ACKNOWLEDGEMENTS

Other contributors

Philip Alpers, Michael Brzoska, Centre for Analysis of Strategies and Technologies (CAST), Pablo Dreyfus, Terry Gander, Lester Grau, Maria Haug, Aaron Karp, Emile LeBrun, Benjamin Lessing, David Mutimer, the Omega Foundation, Stéphanie Pézard, Elizabeth Sköns, and Ruxandra Stoicescu.