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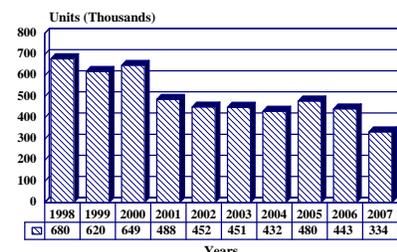
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Landmines (Europe) - Archived 3/99

Outlook

- Production of anti-personnel landmines in Europe now being greatly affected by the international efforts to control production, distribution and deployment
- Increased international controls on anti-personnel types are expected in the future
- Bar graph to the right is for both anti-personnel and anti-armor landmines

10 Year Unit Production Forecast
1998 - 2007



Orientation

Description. Ground-deployed anti-personnel, area denial and anti-tank mines

Sponsor. Development of the landmines covered in this report is funded and conducted by the respective governments' ministries of defense and/or privately by individual contractors.

Contractors

SPECIAL NOTE

As a result of the international efforts to control anti-personnel landmines, some of the firms and organizations listed below and covered in the main text of this report are no longer manufacturing anti-personnel and (in some cases) anti-armor landmines. However, due to the tremendous numbers of these landmines already existing, they are still listed. A review of each nations' standing regarding the international controls should be conducted in relation to this listing.

Societe d'Armement et d'Etudes Alsetex, Paris, France; Armaturen-GmbH, Schwanenstadt/Rüstorf, Austria; Bofors AB Weapon Systems Division, Karlskoga, Sweden; Bofors LIAB, Lindesberg, Sweden; BPD Difesa e Spazio, Rome, Italy; British Aerospace Public Limited Company/Naval and Electronic Systems Division, Bracknell, Berkshire and Royal Ordnance Public Limited Company, London, England, United

Kingdom; Bulgaria Ministry of Defense, State Ammunition Factories, Sofia, Bulgaria; Cenzin Foreign Trade Enterprise, Warsaw, Poland; Daimler Benz Aerospace/Messerschmitt-Bölkow-Blohm Gesellschaft mit Beschränkter Haftung, Munich, Federal Republic of Germany (since 1996 reformed as the Thomson-DASA Armements firm headquartered in Paris, France); Diehl Group Gesellschaft mit Beschränkter Haftung/Ammunition Division, Röthenbach, Federal Republic of Germany; Dynamit-Nobel Aktiengesellschaft Defense Division, Troisdorf, Federal Republic of Germany; Dynamit-Nobel Wien Gesellschaft mit Beschränkter Haftung, Vienna, Austria; Dynamit-Nobel Graz Gesellschaft mit Beschränkter Haftung, Graz, Austria; Elcoteq, Lohja, Finland; Electronintorg Limited, Moscow, Russian Federation; Elviemek Societe Anonyme, Athens, Greece; Explosivos Alaveses Sociedad Anonima, Madrid, Spain; GEC-Marconi Defence Systems Limited, Stanmore, England, United Kingdom (formerly Ferranti International/Ferranti Instrumentation Limited/Weapons Equipment Group) Giat Industries/Weapons and Ammunition Division, Versailles-Satory, France (includes the old Luchaire, Manurhin, and Poudres Reunies de Belgique firms); Hirtenberger Aktiengesellschaft, Hirtenberg, Austria; Hungary Ministry of Defense, Hungarian State Factories, Budapest, Hungary; Hunting Engineering Limited, Ampthill, Bedford, England, United Kingdom;

Intertechnik Gesellschaft mit Beschränkter Haftung, Linz, Austria; Policske strojirny, Policka, Czech Republic; Romanian Ministry of Defense, Romanian State Munitions Factories, Bucharest, Romania; Russian Federation Ministry of Defense, Russian State Munitions Factories, Moscow, Russian Federation; Sociedade Portuguesa de Explosivo, Lisbon, Portugal; Societe Etienne Lacroix Tous Artifices Societe Anonyme, Muret, France; Südsteirische Metall-Industrie Gesellschaft mit Beschränkter Haftung, Leibnitz, Austria; Tecnovar Italiana Societa per Azioni, Bari, Italy; Telecommunications Radioelectroniques et Telephoniques/Military & Avionics Equipment Division, Paris, France; THORN EMI Electronics/Defense Systems Division, Feltham, Middlesex, England, United Kingdom; Turkey Ministry of Defense, Makina ve Kimya Endustrisi Kurumu, Ankara, Turkey; Valsella Meccanotecnica Societa per Azioni, Castendolo, Italy; Yugoslavia (Serbia-Montenegro) Federal Directorate of Supply and Procurement, Belgrad, Serbia, Yugoslavia (Serbia-Montenegro).

In addition to the above listing, landmines have been or are manufactured by state-run organizations in Belarus, Bosnia-Herzegovina, Cyprus, Czech Republic, Denmark, Finland, Hungary, Poland, Romania, Slovak Republic, Switzerland, Ukraine, Yugoslavia (Serbia-Montenegro) and the former Soviet Union. In this latest update on the European landmines, we have been able to include some additional programs from many of these nations including some from the Czech Republic and Slovak Republic. However, due to the still confused conditions (at least as it pertains to landmines) in these two nations as well as others plus the chaos still prevalent in the nations that comprised the former Yugoslavia, the status of many of the landmine programs of the Eastern European nations is not known. Some programs may still be in serial production while others may have been terminated; indeed, some information indicates that a number of the organizations that were manufacturing these mines have been shut down altogether.

Licensees. A number of the landmines in this report are manufactured under license from firms or nations outside the scope of this report; there is also some cross-licensing by the firms within this report. Specifics of any license production effort are detailed in the pertinent section.

Status. Development through production. Current development is centered on the design of reduced signature mines, more advanced fuzing and enhanced anti-disturb devices.

As a result of the worldwide attention being directed to the international control of anti-personnel landmines, much development is being directed to making these mines self-destruct after a period of time. However, such developments still being ignored by some nations and, independently, by some manufacturers.

Total Produced. Since 1980 and through January 1, 1998, 267.497 million anti-personnel and 65.505 million anti-tank landmines had been manufactured by the organizations and firms covered in this report.

Application. To maim and kill personnel; to channel and/or immobilize tanks and other armored vehicles and for use as an area denial weapon.

Price Range. The landmines covered in this report range in price from \$3.08 for the PFM.1 to \$19,721 for the Panzerfaust 3 Off Route Mine with the Honeywell SIRA sensor equipment. These unit prices are in equivalent 1998 United States dollars and are based on data for "quantity" purchases of equivalent technology on the open market and other research for the PFM.1, and ten units of the Panzerfaust 3 Off Route Mine with the Honeywell SIRA sensor equipment. The latter system is reusable.

SPECIAL NOTE

As a result of the growing move to ban or at least limit the production and international trade in anti-personnel landmines, this market is presently in a state of confusion. Some nations have banned or are examining the possibility of banning the manufacture outright while others are studying the possibility of limiting the manufacture to certain types. Still others are examining the placing of severe export restrictions on landmines. Also being examined by several nations is the employment of various technological devices which would limit the active lifetimes of mines or ease in their detection following self-deactivation following a prescribed period of activity. Another avenue of technology being examined is where the mine would somehow be made to be easier to locate following self-deactivation which would follow a prescribed period of activity after deployment.

As of early 1998, the status of the European nations regarding the control of landmines is as follows; it is worthy of note that, since the United Nations has endorsed controls on anti-personnel landmines, all member nations have agreed to such controls in a de jure manner. However, as is the norm in international politics, the reality is somewhat different. In mid-1996, the United Nations Landmine Review Conference held in Geneva, Switzerland failed to ban outright the production, use and export of anti-personnel landmines although the members decided that anti-personnel

landmines should eventually be manufactured so as to be easily detectable and/or self-deactivating. The next meeting of the Landmine Review Conference is scheduled for 2001. However, in a turnaround probably induced by international pressure, in December of 1996 the United Nations Committee on Disarmament and International Security voted 141-0 (with ten abstentions) in favor of a resolution to "pursue vigorously" a legally binding international agreement to ban the development, production, stockpiling, export and use of anti-personnel landmines. However, Canada has long sought to speed up the process even further and, shortly before the United Nations Committee on Disarmament and International Security resolution, proposed an international meeting in Ottawa for December of 1997. A preliminary conference was held in October of 1996 during which 71 nations supported a total ban on anti-personnel landmines. The Canadian effort was supported by the Fourth International Conference of Non-Governmental Organizations which held its meeting in February of 1997 in Maputo, Mozambique. In September of 1997, Norway jumped on the bandwagon by hosting a conference aimed at the banning of production, use and export of anti-personnel landmines with the agreed upon document available for signature in Ottawa. While the Ottawa conference was duly held, the United States of America by and large decided to bypass this process, instead favoring the development and implementation of international controls through the United Nations. A total of 123 nations signed the Ottawa Treaty.

Despite this growing effort to control anti-personnel landmines, Belarus, Cuba, Democratic People's Republic of Korea, Israel, Pakistan, People's Republic of China, Republic of Korea, Russian Federation, Syria and Turkey abstained from voting support for the United Nations resolution. These nations did not sign the Ottawa Treaty.

Regarding the European nations' status on international controls on landmines, the following is accurate as of early 1998. In addition, the Economic and Social Committee of the European Union in 1997 went on record for a ban on the production, sale and use of anti-personnel landmines.

Albania - Did not sign the Ottawa Treaty.

Andorra - Signed the Ottawa Treaty.

Austria - Has enacted a moratorium on the export of anti-personnel landmines and supports a worldwide ban on the manufacture and export of anti-personnel landmines. Austria has also supported a ban on anti-personnel landmines not fitted with a self-destruct mechanism. Austria has objected that anti-personnel

landmines be made detectable. Signed the Ottawa Treaty.

Belgium - Has a ban on the manufacture, purchase, sale, or export of anti-personnel landmines. Advocates a total worldwide ban on the production and export of anti-personnel landmines. In conjunction with the Netherlands, in 1996, Belgium destroyed 213,000 M35 BG anti-personnel landmines out of its remaining total inventory of 313,000 anti-personnel landmines. Signed the Ottawa Treaty.

Belarus - Has enacted a moratorium on the export of anti-personnel landmines. But, as noted above, this nation failed to support the December, 1996 resolution related to anti-personnel landmines. Did not sign the Ottawa Treaty.

Bosnia and Herzegovina - Did not sign the Ottawa Treaty.

Bulgaria - Signed the Ottawa Treaty.

Croatia - Signed the Ottawa Treaty.

Cyprus - Signed the Ottawa Treaty.

Czech Republic - Has enacted a moratorium on the export of anti-personnel landmines. Signed the Ottawa Treaty.

Denmark - Has enacted a moratorium on the export of anti-personnel landmines. Advocates a comprehensive ban on anti-personnel landmines; has also advocated that anti-personnel landmines be detectable and that they have a self-destruct mechanism. Signed the Ottawa Treaty.

Estonia - Has enacted a moratorium on the export of anti-personnel landmines and advocates a total worldwide ban on the production, use and export of anti-personnel landmines. Did not sign the Ottawa Treaty.

Finland - Has enacted a limited moratorium on the export of anti-personnel landmines. Advocates that anti-personnel landmines be detectable and that they have a self-destruct mechanism. However, Finland did not sign the Ottawa Treaty.

France - Has a ban on the export of anti-personnel landmines. Proposes that anti-personnel landmines have a self-destruct mechanism and be detectable. France is reducing its inventory of anti-personnel landmines. Signed the Ottawa Treaty.

Federal Republic of Germany - Banned all export of anti-personnel landmines for three years in July of 1994. At the same time, Germany proposed that anti-personnel landmines be detectable. In 1996, Germany renounced the international trade in anti-personnel

landmines and made its own ban on their export permanent. In August of 1997, just before the Oslo conference, Germany stated that it would destroy all its anti-personnel landmines by the end of 1997 and supported a global ban on the production, use and international trade in anti-personnel landmines. Signed the Ottawa Treaty.

Georgia - Did not sign the Ottawa Treaty.

Greece - Has a ban on the export of anti-personnel landmines. Signed the Ottawa Treaty.

Holy See - Has long advocated a total ban on the development, use, production and export of anti-personnel landmines. Signed the Ottawa Treaty.

Hungary - Signed the Ottawa Treaty.

Iceland - Advocates a total worldwide ban on the production, use and export of anti-personnel landmines. Signed the Ottawa Treaty.

Ireland - Has a ban on the export of anti-personnel landmines. Advocates a total worldwide ban on the production, use and export of anti-personnel landmines. Signed the Ottawa Treaty.

Italy - In late 1994, Italy enacted a halt to the manufacture and export of anti-personnel landmines. Signed the Ottawa Treaty.

Latvia - Did not sign the Ottawa Treaty.

Liechtenstein - Signed the Ottawa Treaty.

Lithuania - Did not sign the Ottawa Treaty.

Luxembourg - Enacted a limited ban on the export of anti-personnel landmines in 1992. Advocates that anti-personnel landmines have a self-destruct mechanism and be detectable. Signed the Ottawa Treaty.

Macedonia - In December of 1997, Macedonia stated that it intended to sign the Ottawa Treaty.

Malta - Signed the Ottawa Treaty.

Moldova - Signed the Ottawa Treaty.

Monaco - Signed the Ottawa Treaty.

Netherlands - Has a limited ban on the export of anti-personnel landmines and in March of 1996, banned the use of anti-personnel landmines. In conjunction with Belgium, in 1996, this nation disposed 180,000 AP 22 landmines. An additional 220,000 Dutch anti-personnel (most the AP 23 type) and anti-tank landmines were subsequently disposed of, leaving approximately 220,000 landmines, mostly of the anti-armor type. Advocates that anti-personnel landmines have a self-destruct mechanism and be detectable. Signed the Ottawa Treaty.

Norway - This nation hosted the September, 1997 conference to ban the production, use and international trade of anti-personnel landmines. Previously, Norway had enacted a ban on the export of anti-personnel landmines and has long advocated a ban on anti-personnel landmines without a self-destruct mechanism. In itself, Norway has long advocated a total worldwide ban on the production, use and export of anti-personnel landmines. Signed the Ottawa Treaty.

Poland - Has enacted a moratorium on the export of anti-personnel landmines. Signed the Ottawa Treaty.

Portugal - Has enacted a moratorium on the export of anti-personnel landmines. Signed the Ottawa Treaty.

Romania - Has a moratorium on the export of anti-personnel landmines. Signed the Ottawa Treaty.

Russian Federation - In 1995, enacted a three year ban on the export of non-self destructing and non-detectable anti-personnel landmines. In early 1996, the United Nations identified the Russian Federation (including the former Soviet Union) as one of the primary suppliers of anti-personnel landmines found in Afghanistan, Angola, Cambodia and Mozambique. As noted above, this nation failed to support the December, 1996 resolution related to anti-personnel landmines. In a April 1997 statement, Russian Deputy Foreign Minister Georgiy Mamedov said that while Russia supported a ban on anti-personnel landmines, it could not "ban them altogether right now for military and economic reasons". Russia did not sign the Ottawa Treaty but President Yeltsin did sign a decree at Ottawa continuing Russia's moratorium banning the export of anti-personnel landmines.

San Marino - Signed the Ottawa Treaty.

Slovak Republic - Has enacted a ban on the export of anti-personnel landmines. Signed the Ottawa Treaty.

Slovenia - Has advocated a total worldwide ban on the production, use and export of anti-personnel landmines. Signed the Ottawa Treaty.

Spain - Has a ban on the export of anti-personnel landmines. The country has reserved the right to manufacture anti-personnel landmines with a self-destruct feature. Signed the Ottawa Treaty.

Sweden - Enacted a ban on the export of anti-personnel landmines. Advocates a total worldwide ban on the production, use and export of anti-personnel landmines without a self-destruct mechanism. In late 1996, the country began the destruction of its two million anti-personnel landmines. Signed the Ottawa Treaty.

Switzerland - Had previously enacted a limited moratorium on the export of anti-personnel landmines.

Subsequently, in December of 1995, this nation renounced the use of anti-personnel landmines and called for a comprehensive international ban on anti-personnel landmines. Signed the Ottawa Treaty.

Turkey - Has enacted no ban on the use of anti-personnel landmines. As noted above, this nation failed to support the December, 1996 resolution related to anti-personnel landmines. However, earlier in 1996, Turkey in itself enacted a moratorium on its export of anti-personnel landmines. Turkey did not sign the Ottawa Treaty but in late December of 1997 stated that it preferred a gradual prohibition of anti-personnel landmines through the efforts of the United Nations.

Ukraine - Has enacted a ban on the export of anti-personnel landmines but did not sign the Ottawa Treaty.

United Kingdom - In 1994, enacted a limited ban prohibiting the manufacture and export of non-self destructing and non-detectable anti-personnel landmines. Proposes that all anti-personnel landmines be detectable. The country has reserved the right to manufacture anti-personnel landmines with a self-destruct feature. In May of 1997, the United Kingdom enacted a plan to ban the manufacture, import, export or other transfers of all forms of anti-personnel landmines. All existing stocks of landmines are to be destroyed by 2005 or at the time determined by an effective international agreement. Signed the Ottawa Treaty.

Technical Data

ANTI-ARMOR MINES

Designation

Type

Manufacturer - Alsetex

Model 1951 MACI	Cast TNT mine with several fuze options; 300 kilogram actuation.
Model 1951 MACI(P)	Training mine fitted with a smoke marker.
Model 1952 MACI	Cast TNT mine with several fuze options; 300 kilogram actuation.
Model 1952 MACI(P)	Training mine fitted with a smoke marker.
Mitral	Plastic scatterable "bar" type mine for track destruction.
ACPR	Plastic mine with booby trap feature.

Manufacturer - Bofors

FFV 016	Off-route mine designed for use against lighter vehicles.
FFV 028	Advanced plastic non-magnetic mine.

Manufacturer - BPD Difesa e Spazio

SB-81	Plastic scatterable mine; 150-310 kilogram activation.
SB-MV/1	Plastic mine; seismic/magnetic activation; developed version of SB-MV/T.
SB-MV/T	Plastic mine; seismic/magnetic activation.
SBP-04	Plastic mine; 150 to 310 kilogram activation.
SBP-07	Plastic mine that is a heavier version of SPB-04.

Manufacturer - British Aerospace

Ajax-APILAS	Off-route mine based on APILAS anti-tank weapon; reusable.
Ajax/AT-4	Off-route mine based on AT-4 anti-tank weapon; reusable.

Note: The two weapons immediately above are joint efforts between British Aerospace and Giat Industries/Matra Manurhin and British Aerospace and Bofors of Sweden respectively. The Ajax-APILAS system, also known as APAJAX, has been further developed for the NATO Staff Requirement called the Aimed Controlled Effect Anti-Tank Mine; the developed version is called MINOS.

Designation**Type****Manufacturer - British Aerospace/Royal Ordnance**

L3A1	Plastic mine; 150 to 200 kilogram activation.
Mark 7	Metallic mine; 275 kilogram activation.
L9 Bar Mine	Plastic mine; single and double impulse pressure fuzing.

Manufacturer - Bulgaria State Ammunition Factories

PTM-80P	Plastic mine highly resistant to water; pressure activated.
TM.62B	Waterproof cardboard version of the TM.62.
TM.62D	Wooden case version of the TM.62.
TM.62M	Metallic mine developed from TM.57; 175-600 kilogram activation.
TM.62P2	Plastic case version of TM.62.
TM.62P3	Modified version of PM.62P2.

Manufacturer - Cenzin Foreign Trade Enterprise

MN-111	Scatterable mine; magnetic activation.
MN-121	Scatterable mine; magnetic activation.
MPP-B Wierzba	Plastic mine based on Russian TM.62
PMK.1	Metallic mine weighing 8.5 kilograms; used as a railway mine.

Manufacturer - Daimler Benz Aerospace/Messerschmitt-Bölkow-Blohm

Note: This firm has been spun off by the parent and reorganized with the Thomson-Brandt firm as Thomson-DASA Armements.

PARM/DM 12	Off-route mine that is a horizontally fired shaped charge projectile.
PARM 2/laser	Off-route mine that integrates laser activation with the PARM.
PARM 2/acoustic	Off-route mine that integrates acoustic activation with the PARM.

Manufacturer - Diehl

DM 11	Cast mine; 150 to 400 kilogram activation.
DM 18A1	Practice version of DM 11 with smoke marker.
DM 21	Metallic mine; heavily waterproofed.
DM 24	Metallic mine; 150 to 170 kilogram activation.
DM 30	Practice inert version of the DM 11 mine for training.

Manufacturer - Dynamit-Nobel

AT2 Medusa	Plastic scatterable mine for Raketenwerfer 110 SF system.
DM 1233	Plastic mine; the AT2 mine for hand emplacement.
DM 1274	Plastic scatterable mine for MiWS Skorpion system.
DM 1399	Plastic scatterable mine for Phase 2 MLRS warhead.
DYNAMINE - AT2	Plastic mine; member of a family of mines.
DYNAMINE - AM	Plastic mine; member of a family of mines.
Panzerfaust 3/SIRA	Off-route mine; integration of Panzerfaust 3 with sensor system.
Tarantel	Advanced version of AT2 with two sensors.

Manufacturer - Dynamit-Nobel Graz

AVM 100	Plastic directional fragmentation mine; advanced sensor/logic system.
AVM 195	Plastic directional fragmentation mine; advanced sensor/logic system.
unknown	Off-route mine.
ATM 2000E	Plastic shaped charge mine; electronic (acoustic/magnetic) activation.

Manufacturer - Dynamit-Nobel Wien

PM3000	Plastic mine; pressure or electric command detonation.
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Manufacturer - Elcoteq

Designation

Type

MSM MK2 Plastic mine; electronically aided acoustic/seismic activation.

Manufacturer - Explosivos Alaveses

C-3-A Plastic mine; plastic fuze and pressure plate.
 C-3-A (P) Practice mine fitted with smoke marker.
 C-3-A (I) Practice inert training mine.
 C-3-B Plastic mine; plastic fuze and pressure plate.
 SB-81 Plastic mine; pressure or command activation.
 SB MV Plastic mine; 140 kilogram activation.

Manufacturer - Explosivos da Trafaria

TC/3.6 Plastic, waterproof mine; 180 to 310 kilogram activation.

Manufacturer - GEC-Marconi Defence Systems

ATIS Advanced design plastic mine with intelligent fuzing.

Manufacturer - Giat Industries

AC DISP F1 Scatterable mine weighing 2.6 kilograms.
 MI AC AH MLE F1 Off-route mine firing a shaped charge.
 MI AC AH X F1 Practice mine fitted with marking cartridge.
 IRMAH MLE F1 Off-route mine; MI AC AH MLE F1 with infrared/acoustic sensor.
 HPD-X-1A Practice mine fitted with a red smoke marking cartridge.
 HPD-1A Plastic mine which can be fitted with an earth clearing charge.

Manufacturer - Giat Industries/Luchair

Note: In 1991, Giat Industries and Luchair entered into an agreement whereby Giat would increasingly absorb the operations of Luchair. The Luchair firm was subsequently completely absorbed as a component of the Euroimpact (now Weapons and Ammunition Division of Giat Industries). However, since the firm's mines are still widely encountered, we will continue to list them separately.

ACL 89/PIAF Off-route mine activated by acoustics and pressure.
 Model 1953 Metallic mine containing two 73 millimeter shaped charges.
 Model 1954 Metallic mine with one 73 millimeter shaped charge.

Manufacturer - Giat Industries/Manurhin In 1990, Giat Industries acquired the Manurhin Defense unit of the Matra organization and absorbed it under the then designated Euroimpact division.

Mazak Intelligent mine with seismic detection and two shaped charge warheads.
 APILAS-MINE Off-route mine based on APILAS anti-tank weapon; reusable.
 Ajax-APILAS Off-route mine based on APILAS anti-tank weapon; reusable.

Note: The weapon immediately above began as a joint effort between Giat Industries and Matra Manurhin and British Aerospace. The Ajax-APILAS system, also known as APAJAX, has been further developed for the NATO Staff Requirement called the Aimed Controlled Effect Anti-Tank Mine; the developed version is called MINOS.

Manufacturer - Giat Industries/Poudres Reunies de Belgie

Note: Giat Industries acquired the production facilities of the then-bankrupt Poudres Reunies de Belgie in mid-1990. The world-famous Poudres Reunies de Belgie name no longer exists as such, the firm and its products having been absorbed as a component of the Euroimpact (now Weapons and Ammunition Division of the Giat Industries organization). At least part of the old product line was absorbed into the new organization; due to this fact, plus the fact that millions of the Poudres Reunies de Belgie mines still exist, we continue to list these mines separately.

NR 141 Plastic mine; 250 kilogram actuation.
 NR 201 Plastic mine; fitted with boobytrap component.
 NR 408 Plastic mine; part of SUMMADE system; 250 kilogram activation.

<u>Designation</u>	<u>Type</u>
M3	Plastic mine; 250 kilogram actuation.
<u>Manufacturer - Giat Industries/Dynamit Nobel/Honeywell Regelsysteme/Hunting Engineering</u>	
ARGES	Off-route mine developed for Aimed Controlled Effect Anti-Tank Mine program.
<u>Manufacturer - Hirtenberger</u>	
ATM-6	Off-route mine that is no longer offered; replaced by ATM-7.
ATM-7	Off-route mine using a flat cone shaped charge.
<u>Manufacturer - Hungarian State Factories</u>	
UKA-63	Metallic mine using a high explosive shaped charge.
<u>Manufacturer - Hunting Engineering</u>	
Adder	Off-route mine that is a remotely fired LAW-80 anti-tank weapon.
Addermine	Off-route mine; a tripwire operated LAW-80 anti-tank weapon.
Addermine/AJAX	Off-route mine; an autonomous LAW-80 weapon with AJAX sensor system.
<u>Manufacturer - Intertechnik</u>	
ATM 2000E	Plastic mine; an advanced design using electronic sensors.
<u>Manufacturer - Policske strojirny</u>	
PD Mi-PK	Off-route mine; contact/trip wire activation with a horizontal shaped charge.
PT Mi-Ba	Plastic mine; 200-400 kilogram pressure activation.
PT Mi-Ba-II	Plastic mine; 200-450 kilogram pressure activation.
PT Mi-Ba-III	Plastic mine; 200 kilogram pressure activation.
PT Mi-U	Plastic mine; pressure or tilt rod activation.
<u>Manufacturer - Romanian State Munitions Factories</u>	
MAT-62B	Plastic mine; 200 kilogram pressure activation.
MAT-76	Glassfiber mine; 200 kilogram pressure activation.
MC-71	Plastic/metallic mine; tilt rod (10-20 kilogram) activation.
<u>Manufacturer - Russian State Munitions Factories</u>	
PDM.1	Metallic hemispherical river bottom mine.
PDM.1M	As PDM.1 but with booster in firing train.
PDM.2	Similar to PDM.1 mines but with different fuze.
PDM.6	Similar to PDM.1M but with four fuzes, one at bottom for anti-disturb.
PGMDM	Plastic scatterable mine; uses a liquid explosive charge.
PMK.1	Metallic mine weighing 8.5 kilograms; used as a railway mine.
POM.2	Metallic anti-materiel mine.
PTM.3	Metallic mine using shaped charges weighing five kilograms.
TM.46	Metallic mine; 210 kilogram activation.
TM.57	Metallic mine; improved version of TM.46.
TM.62B	Waterproof cardboard version of the TM.62.
TM.62D	Wooden case version of the TM.62.
TM.62M	Metallic mine developed from TM.57; 175-600 kilogram activation.
TM.62P2	Plastic case version of TM.62.
TM.62P3	Modified version of PM.62P2.
TM.62T	Plastic version (advanced filling) of TM.62; 200 kilogram or magnetic activation.
TM.72	Metallic mine using flat cone shaped charge technology.

Designation

Type

TM.83	Off-route mine; seismic and infrared activation with shaped charge technology.
TM.89	Metallic mine using flat cone shaped charge technology; advanced over TM.72.
TMD-B	Wooden mine; three pressure boards and 210 kilogram activation.
TMD.44	As the TMD-B but with two pressure boards.
TMK.2	Metallic cone shaped (shaped charge) mine; weighs 12.5 kilograms.
TMN.46	As the TM.46 but has anti-disturb device.

Manufacturer - Sociedade Portuguesa de Explosivos

M453	Metallic mine; 150 kilogram activation.
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Manufacturer - Societe Etienne Lacroix

ACPR LXT 542 (F2)	Plastic mine designed for mobility kills (tracks/roadwheels).
ACPR LXT 542L	Heavier version of ACPR LXT 542.

Manufacturer - Südsteirische Metall-Industrie

AVM 100	Plastic/metal directional type mine.
AVM 195	Plastic/metal directional type mine.
Panzermine 75	Plastic mine; a waterproof pressure activated mine.
22/7C Inert	Practice mine; a practice version of basic 22/7C.
22/7C	Off-route mine; a horizontally fired shaped charge.

Manufacturer - Technovar

ATIS	Plastic mine with advanced intelligent fuzing.
BAT/7	Plastic mine; an electronically activated belly attack mine.
BAT/7T	Practice mine; an inert version of the BAT/7 for training.
MATS/2.6	Plastic waterproof mine; pressure (180 to 310 kilogram) activation.
MATS/2.6T	Practice mine; an inert version of MATS/2.6 for training.
MAT/5	Plastic waterproof mine; pressure (180 to 310 kilogram) activation.
MAT/5T	Practice mine; an inert version of the MAT/5 for training.
MAT/6	Plastic waterproof mine; pressure (180 to 310 kilogram) activation.
MAT/6T	Practice mine; an inert version of MAT/6 for training.
TC/2.4	Plastic waterproof mine; 180 to 310 kilogram activation.
TC/3.6	Plastic waterproof mine; pressure (180 to 310 kilogram) activation.
TC/3.6T	Practice mine; an inert version of the TC/3.6 for training.
TC/6	Plastic waterproof mine; pressure (180 to 310 kilogram) activation.
TC/6T	Practice mine; an inert version of TC/6 for training.
TCE/3.6	Plastic mine; remote electronic arming and disarming feature.
TCE/3.6T	Practice mine; an inert version of TCE/3.6 for training.
TCE/6	Plastic mine; remote electronic arming and disarming feature.

Manufacturer - Telecommunications Radioelectroniques et Telephoniques

Type HPD F1	Plastic mine; seismic/magnetic activation.
Type HPD F2	Plastic mine; advanced version of HPD mine; more powerful.
Type HPD F3	Plastic mine; HPD F2 with manually activated life times.

Manufacturer - Turkey Ministry of Defense/Makina ve Kimya Endustrisi Kurumu

Model 4 Skg	Metallic mine; pressure (75 kilogram) activation.
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Manufacturer - Valsella

SATM	Plastic scatterable mine; has dual sensor fuzed linear shaped charge.
SH-55	Plastic mine; 185 kilogram activation.

<u>Designation</u>	<u>Type</u>
VS-1.6	Plastic scatterable mine, mobility kill pressure activated (180-220 kilogram) mine.
VS-1.6EL	Plastic scatterable mine, mobility kill electronically activated mine.
VS-1.6T	Practice mine; inert version of VS-1.6 for training.
VS-2.2	Plastic water resistant mine; pressure (180-220 kilogram) activation.
VS-2.2T	Practice mine; inert version of VS-2.2 for training.
VS-3.6	Plastic mine; pressure (180-220 kilogram) activation.
VS-3.6T	Practice mine; inert version of VS-3.6 for training.
VS-AT4-EL	Plastic mine with electronic/fuzing options; weighs six kilograms.
VS-HCT	Plastic mine; magnetic activation; ten optional self-neutralizations.
VS-HCT2	Plastic mine; combined electronic seismic/acoustic activation.
VS-HCT4	Plastic mine; combined electronic seismic/acoustic activation.
VS-SATM1	Plastic scatterable mine; has dual sensor fuzed flat cone shaped charge.

Manufacturer - Yugoslavia (Serbia-Montenegro) Federal Directorate of Supply and Procurement

PMA-1A	Plastic mine; 3-15 kilogram activation.
PT-56	Plastic mine with two top fuzes; 120-320 kilogram activation.
TMA-1	Plastic mine; 100 kilogram activation.
TMA-1A	Plastic mine; improved version of TMA-1; 100 kilogram activation.
TMA-2	Plastic mine with two top fuzes; 120 kilogram activation.
TMA-3	Fiberglass blast mine; three top fuzes; 180 kilogram activation.
TMA-4	Larger version of TMA-3; three top fuzes; 120 kilogram activation.
TMA-5	Plastic mine; 7-15 kilogram activation.
TMA-5A	Slightly different version of TMA-5.
TMD-1	Wooden blast type mine; 200 kilogram activation.
TMD-2	Wooden blast type mine; 200 kilogram activation.
TMM-1	Metallic mine; copy of German Tellermine; 130 kilogram activation.
TRMP-6	Plastic mine using pressure (150 kilogram) or tilt rod activation.
VTMA-1A	Practice version of TMA-1 and TMA-1A.
VTMA-2	Practice version of TMA-2.
VTMA-3	Practice inert version of TMA-3.
VTMA-4	Practice version of TMA-4.
VTMA-5	Practice version of TMA-5/TMA-5A with yellow smoke marker.
VTMM-1	Practice version of TMM-1 with yellow smoke marker.

ANTI-PERSONNEL MINES

Again, we wish to note that many of the following anti-personnel mines are no longer manufactured by many of the listed manufacturers due to the international controls being enacted. However, these type mines are often copied in an unlicensed manner by other organizations in other nations. It is for this reason plus the fact that these mines are still present in large numbers around the world in various nations' stocks, they are still listed.

Manufacturer - Alsetex

Model MAPED F1	Plastic directional shrapnel type mine.
Model MAPAD F1T	Training mine fitted with smoke marker.
Model 59	Plastic mine (the "inkstand mine") also called MiAPDV 59.
Model 59T	Practice mine fitted with smoke marker.
Model Mark 61	Plastic stake mine; tripwire activated.
Model Mark 61T	Practice stake mine fitted with smoke marker.
Model Mark 63	Plastic stake mine fitted with anti-lift device.
Model Mark 63T	Practice stake mine fitted with smoke marker.

Manufacturer - Armaturen

ARGES SpM75	Plastic bounding type anti-personnel mine.
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Designation

Type

ARGES SpM75 (S) Practice anti-personnel mine with smoke marker.
 ARGES M89 Plastic directional shrapnel type anti-personnel mine.

Manufacturer - BPD Difesa e Spazio

P-25 Plastic mine; tripwire activation.
 P-40 Plastic bounding type mine; tripwire activation.
 SB-33 Scatterable plastic mine; pressure (5-20 kilogram) activation.

Manufacturer - Bofors

FFV 013 Directional, shrapnel type area defense mine.
 FFV 013R Directional, shrapnel type area defense mine.

Manufacturer - Bulgaria State Ammunition Factories

MON.50 Directional fragmentation mine; tripwire or command activated.
 PM-79 Metallic type mine, similar to Russian PMN.
 PSM-1 Metallic bounding type fragmentation mine; tripwire or pressure activated.

Manufacturer - Cenzin Foreign Trade Enterprise

PSM-1 Metallic bounding type fragmentation mine; tripwire or pressure activated.

Manufacturer - Diehl

DM 11 Plastic anti-personnel mine, 5-10 kilogram activation.
 DM 18 Practice version of the DM 11.
 DM 31 Metallic bounding type anti-personnel mine.
 DYNAMINE - AP Plastic anti-personnel mine member of a family of mines.

Manufacturer - Dynamit-Nobel Graz

APM 19 Plastic directional fragmentation mine; advanced sensor/logic system.
 APM 29 Plastic directional fragmentation mine; advanced sensor/logic system.
 Giant Shotgun Metallic directional pellet mine.

Manufacturer - Dynamit-Nobel Wien

HM1000 Plastic directional shrapnel type anti-personnel mine.

Manufacturer - Electronintorg

MON.50 Directional fragmentation mine; copy of M18 Claymore.
 MON.90 Larger version of MON.50 weighing 23 kilograms.
 MON.100 Directional fragmentation mine; cylindrical-dish shaped.
 MON.200 Enlarged version of MON.100 weighing 25 kilograms.
 MON.500 Directional fragmentation mine of unknown characteristics.
 OZM.72 Larger version of basic OZM metallic bounding mines.

Manufacturer - Elviemek

EM 20 Plastic anti-personnel mine; the SB-33 manufactured under license.
 SB-33 Plastic anti-personnel mine; pressure (5-20 kilogram) activation.

Manufacturer - Explosivos Alaveses

P-4-A Plastic anti-personnel mine.
 P-4-A (I) Practice anti-personnel mine fitted with smoke marker.
 P-S-1 Metallic bounding type anti-personnel mine; tripwire activated.
 P-S-1 (I) Practice anti-personnel mine with white smoke marker.

Designation**Type**

SB-33 Plastic anti-personnel mine; pressure (5-20 kilogram) activation.

Manufacturer - Explosivos da Trafaria

MAPS Plastic blast type anti-personnel mine patterned after the NR 409.

Manufacturer - Giat Industries/Poudres Reunies de Belgique

Note: See the remarks under this manufacturer in the anti-tank mines section above.

NR 257 Metallic anti-personnel mine; 5-15 kilogram activation.
 NR 409 Plastic anti-personnel mine; 8-30 kilogram activation.
 NR 413 Plastic anti-personnel stake mine, tripwire activated.
 NR 430 Plastic blast type anti-personnel mine; part of SUMMADE system.
 NR 442 Metallic bounding type anti-personnel mine, pressure or tripwire activated.

Manufacturer - Hirtenberger

APM-1 Directional, plastic shrapnel type anti-personnel mine.
 APM-2 Directional, plastic shrapnel type anti-personnel mine.

Manufacturer - Hungarian State Factories

Gyata-64 Plastic mine weighing 0.45 kilogram.
 M49 Wooden mine weighing 0.33 kilogram; tripwire activated.
 M62 Metallic mine similar to the M49; weighs 318 grams.

Manufacturer - Lindesbergs Industri

Type L1-11 Rubber blast type mine; pressure (5-10 kilogram) activation.

Manufacturer - Poliske strojirny

PP Mi-Na 1 Plastic blast type mine; pressure activation.
 PP Mi-Ba Plastic blast type mine; 0.5-1 kilogram pressure activation.
 PP Mi-D Copy of Russian PMD.7 wooden blast mine.
 PP Mi-Sb Stake type fragmentation mine; tripwire activated.
 PP Mi-Sk Stake type fragmentation mine; tripwire activated.
 PP Mi-Sr Bounding type blast/fragmentation mine; tripwire activated.
 Cv PP Mi-Na 1 Practice version of PP Mi-Na 1; emits orange smoke.
 Sk PP Mi-Na 1 Inert training version of PP Mi-Na 1.

Manufacturer - Romanian State Munitions Factories

MAI-75 Plastic blast type mine; pressure activated.
 MAT-68 Plastic blast type mine; pressure activated.
 MS-3 Plastic blast type mine; six kilogram pressure release activation.
 unknown Plastic/metallic directional type mine; remote command activation.
 unknown Plastic blast type mine weighing 110 grams, pressure activated.

Manufacturer - Russian State Munitions Factories

MON.50 Directional fragmentation mine; tripwire or command activated (copy of M18 Claymore).
 MON.90 Directional fragmentation mine; tripwire or command activated.
 MON.100 Directional fragmentation mine; tripwire or command activated.
 MON.200 Directional fragmentation mine; tripwire or command activated.
 OZM.3/OZM.4 Metallic bounding type mine; several fuzing options.
 OZM.160 Metallic bounding mine based on a 203.2 millimeter artillery projectile.
 PFM/PFM.1/PFM.1S Plastic air delivered mine weighing 70 grams; uses liquid explosive.
 PMZ Area denial version of the PFM/PFM.1.
 PMD series Wooden blast type mine in various sizes; pressure activated.

Designation

Type

PMN	Plastic blast type mine; pressure activated.
PMN.2	Modified version of the basic PMN mine.
PMN.4	Small plastic blast mine; pressure activated.
PMN.6	Improved version of the PMN mine.
POMZ.2	Stake type fragmentation mine; tripwire activated.
POMZ.2M	Later production version of the POMZ.2.

Manufacturer - Sociedade Portuguesa de Explosivos

M411	Blast type mine; 2-10 kilogram activation.
M412	Blast type mine with anti-disturb device.
M421	Plastic blast/shrapnel type mine; 2-10 kilogram activation.
M432	Metallic bounding type mine; tripwire activation.
SB-33	Plastic anti-personnel mine; pressure (5-20 kilogram) activation.

Manufacturer - Societe Etienne Lacroix

SIM F1	Plastic illuminating mine weighing 2.2 kilograms.
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Manufacturer - Südsteirische Metall-Industrie

APM 19	Plastic directional shrapnel type mine.
APM 29	Plastic directional shrapnel type mine.
SMI 17/4C	Metallic directional anti-personnel/multi-purpose mine.
SMI 20/1C	Plastic directional shrapnel type mine.
SMI 21/3C	Plastic directional shrapnel type mine.
SMI 21/11C	Plastic directional shrapnel type mine.

Manufacturer - Technovar

BM/85	Advanced design plastic bounding type mine.
TS-50	Scatterable plastic mine; 12.5 kilogram activation.
VAR/40	Plastic button head mine; 12-13 kilogram activation.
VAR/40/T	Practice button head mine; inert.
VAR/100	Plastic button head mine; 12-13 kilogram activation.
VAR/100/T	Practice button head mine; inert.
VAR/100/SP	Metallic button head mine; push or pull activation.
VAR/100/SP/T	Practice button head mine; inert.

Manufacturer - THORN EMI Electronics

Ranger	Scatterable plastic mine.
Ranger Inert	Practice mine; inert.

Manufacturer - Valsella

VS-50	Scatterable plastic anti-personnel mine; pressure (10 kilogram) activation.
VS-50 (I)	Practice anti-personnel mine with white smoke.
Valmara 69	Plastic bounding type anti-personnel mine; tripwire activation.
Valmara 69 (I)	Practice anti-personnel mine fitted with colored smoke.
VS-APFM1	Plastic bounding type anti-personnel mine; improved Valmara 69.
VS-DAFM1	Plastic directional shrapnel type mine; 3.6 kilogram weight.
VS-DAFM6	Plastic directional shrapnel type mine; 18.2 kilogram weight.
VS-DAFM7	Plastic directional shrapnel type mine; 10.7 kilogram weight.
VS-ER-83	Metallic anti-personnel stake mine.
VS-JAP	Plastic bounding type anti-personnel mine; tripwire activation.
VS-Mark 2	Scatterable plastic anti-personnel mine; pressure (10 kilogram) activation.
VS-Mark 2-EL	Scatterable plastic anti-personnel mine; programmable; pressure (10 kilogram) activation.

<u>Designation</u>	<u>Type</u>
VS-SAPFM3	Scatterable plastic bounding type anti-personnel mine; tripwire activation.
<u>Manufacturer - Yugoslavia (Serbia-Montenegro) Federal Directorate of Supply and Procurement</u>	
MRUD	Plastic directional fragmentation type mine; command detonated.
MT-4	Cardboard blast type mine; multiple activation options.
PMA-1	Wooden blast type mine, pressure (3-15 kilogram) activation.
PMA-1A	Slightly different version of PMA-1 pressure (3-15 kilogram) activation.
PMA-2	Plastic blast type mine; pressure (7-15 kilogram) activation.
PMA-3	Plastic/rubber blast type mine; pressure (8-20 kilogram) activation.
PMD-1	Wooden blast type mine; pressure (1-9 kilogram) activation.
PMR-1	Metallic stake type fragmentation mine; tripwire activation.
PMR-2	Slightly heavier version of PMR-1 mine; tripwire activation.
PMR-2A	Metallic stake type fragmentation mine; tripwire activation.
PMR-2AS	As PMR-2A but incorporates illumination component when activated.
PMR-3	Metallic stake type fragmentation mine; pressure or tripwire activation.
PMRS-1	Metallic stake type fragmentation mine; tripwire activation.
PP-56	Plastic blast type mine; pressure (1.81-5.91 kilogram) activation.
PROM-1	Metallic bounding type fragmentation mine; pressure or tripwire activation.
TM-100	Plastic blast type mine, tripwire or pressure activation.
TM-200	Plastic blast type mine, tripwire or pressure activation.
TM-500	Plastic blast type mine, tripwire or pressure activation.
UDAR	Fuel-air explosive mine weighing 40 kilograms; remotely activated.
VPMA-1A	Plastic practice mine for the PMA-1A with grey smoke marker.
VPMR-2A	Metallic practice mine for PMR-2A.
VPMR-2AS	Metallic practice mine for PMR-2A; as VPMR-2 but with flash device.
VPMR-3	Metallic practice mine for PMR-1 and PMR-2.
VPRM-1	Metallic practice mine for the PROM-1.

In addition, the following anti-personnel mine and anti-tank mines were manufactured by the former German Democratic Republic Arsenals.

ANTI-PERSONNEL

PPM-2 Plastic blast type mine; pressure activated.

ANTI-TANK

PM-60 (K-1) Plastic mine; 200-500 kilogram activation.

Variants/Upgrades

This is generally not applicable in this market segment. When enhanced or modified designs are developed, in order to have a greater degree of product differentiation, the new mines are usually given new designations.

Program Review

Background. Landmines fall into two groups: anti-armor (most of the time, if somewhat improperly called anti-tank) mines, and anti-personnel mines. Anti-armor landmines are designed to stop armored vehicles so that they can be destroyed by direct fire; a fundamental principle of laying minefields is that they should always be covered by fire. Anti-armor minefields are also used to "channel" or direct enemy armor into friendly fields of fire. Anti-personnel landmines are usually designed to maim rather than kill. There are some exceptions - anti-personnel landmines designed to be used in ambushes are made as lethal as possible, for obvious reasons.

Before the individual countries and manufacturing firms and organizations are described, mention should be made of the major multinational cooperative mine program in Europe.

The Aimed Controlled Effect Anti-tank Mine Program. In 1987, the United Kingdom, French and German governments signed a Memorandum of Understanding covering the Aimed Controlled Effect Anti-tank Mine, a French-led project to develop a next-generation off-route anti-tank mine. The project, which grew out of a NATO Staff Target drawn up in 1980, had been delayed by funding problems in the British Ministry of Defence, which was reluctant to fund another anti-armor system with the same time scale as the PARS-3 next generation anti-tank missile, another venture between the same countries.

Development costs for the Aimed Controlled Effect Anti-tank Mine program will be equivalent to 34 million United States dollars and are being shared equally between the three participating nations. There is a total requirement for 50,000 (reduced from 100,000) systems (Federal Republic of Germany: 25,000; France: 15,000; United Kingdom: 10,000) at a unit price not to exceed the equivalent of 5,000 1991 United States dollars.

Following the signing of the Memorandum of Understanding, the French government issued a Request For Proposals for the Aimed Controlled Effect Anti-tank Mine (known in French as MACPED - Mine Anti-Char Par Effects Dirigees). This includes provision for concept demonstration and is expected to be followed by the award of a development contract. Four French-led consortia were competing for the contract:

Aerospatiale: with Marconi and Messerschmitt-Bölkow-Blohm (more recently a component of Deutsche

Aerospace and now part of the Thomson-DASA Armements firm)

Giat Industries: with Hunting Engineering, Dynamit Nobel and Honeywell Regelsysteme

Matra Manurhin Defense (now owned by Giat Industries): with the Societe d'Etudes de Realisation et d'Applications Techniques, British Aerospace and Rheinmetall Industrie

Telecommunications Radioelectroniques et Telephoniques: with Plessey, Shorts and Diehl, British Aerospace and Matra have already demonstrated to the British Army the Ajax/APILAS contender for the Aimed Controlled Effect Anti-tank Mine, which has been available for production since late 1989. The demonstration took place at the School of Infantry at Warminster in the United Kingdom on September 22-23, 1987.

In May of 1991, the Giat Industries consortium entrant, called Automatic Rocket Guardian with Electronic Sensor (ARGES), was accepted for the Aimed Controlled Effect Anti-tank Mine program. The Aimed Controlled Effect Anti-tank Mine ARGES is derived from the existing light anti-armor weapons LAW-80 Panzerfaust 3 and possibly APILAS. It is mounted on a stand about 50 centimeters above the ground and fitted with a sensor to detect passing armored vehicles and initiate a firing mechanism. The system incorporates a tandem dual hollow-charge warhead and should be able to destroy tanks from any angle. It is possible that other NATO nations could join the project once the development phase is complete. This program is covered in detail in the pertinent report in this section.

Austria

Armaturen GmbH: This firm has produced two types of anti-personnel landmines - the SpM75 Anti-personnel Bounding Mine and the M80 Horizontal Anti-personnel Mine.

Dynamit Nobel Wien: Dynamit Nobel Wien has produced the HM 1000 anti-personnel landmine, a Claymore type, and the PM 3000 Anti-tank landmine. The PM 3000 is a variable function mine which uses either pressure or electrical detonation. Both mines are in production on an as needed basis.

Dynamit Nobel Graz: In 1993, this firm took over the former Südsteirische Metall-Industrie organization including its product line. However, for the time being,

the firm's older products are still covered separately below.

Dynamit Nobel Graz has manufactured four different directional fragmentation type landmines. The APM 19 and APM 29 are intended for anti-personnel use while the larger AVM 100 and AVM 195 are intended for armored vehicles up to the armored personnel carrier class. These landmines are in serial production on an as needed basis for domestic and (the now limited) export orders. The Giant Shotgun weapon was originally developed (as the 17/4C by Südsteirische Metall-Industrie) for engineer troops to clear barbed wire and similar obstacles. However, the weapon has considerable application for deployment as an anti-personnel or anti-vehicular landmine. The development of the Giant Shotgun is complete and it is available for production orders. The firm is also developing an off-route anti-tank mine capable of perforating up to eight centimeters (3.15 inches) of steel at 30 meters (32.8 yards). In 1996, the development was complete but no sales have been reported although some sources cite some export sales. The ATM 2000E is an advanced design anti-tank landmine using a shaped charge as the lethal device. The mine uses advanced electronics in conjunction with acoustic/magnetic sensors; it can be laid on the surface or buried. The ATM 2000E can also be command detonated; it is in production for Austria.

Hirtenberger: In 1988, Hirtenberger started production of the ATM-6 and ATM-7 off-route anti-tank mines as well as the APM-1 and APM-2 anti-personnel landmines which are claymore type. In addition, Hirtenberger offers the HELKIR electronic fuze system which can be integrated with various directional type landmines. The firm also is manufacturing the DRAGON electronic fuze system which can be integrated with various anti-armor mines to yield an effective off-route mine.

Intertechnik: The Intertechnik ATM 2000E Anti-tank Mine is an advanced plastic-bodied mine that uses a microprocessor-based fuzing system. The landmine is in service with the Austrian Army.

Südsteirische Metall-Industrie: Before its take-over by Dynamit Nobel Graz, this famous firm produced several different anti-tank landmines. The Panzermine 75 Anti-tank Mine is a conventional plastic mine and, while out of production, is in service with the Austrian Army. The SMI 22/7C Off-route Anti-tank Mine supersedes the SMI 22/6 model. This mine has been evaluated by two potential customers. The old 20/1C, 21/3C and 21/11C mines, while no longer manufactured, remain in service in Austria as well as several other nations.

Belgium

Giat Industries/Poudres Reunies de Belgue: Before its financial problems led to its bankruptcy in early 1990, this world famous firm was manufacturing nine varieties of landmines. Four were anti-tank (models NR 141, NR 201, NR 408 and PRB M3) and five were anti-personnel landmines (models NR 257, NR 409, NR 413, NR 442 and U/1). The NR 408 anti-tank mine is a part of the SUMMADE (System Universal Modular Mine and Demolition Explosives System). The firm had provided landmines for the Belgian Army and to undisclosed nations. The latter nations are believed to be Portugal and several of the small African nations.

In mid 1990, Giat Industries acquired most, if not all the facilities of the then bankrupt Poudres Reunies de Belgue. While the world famous Poudres Reunies de Belgue name no longer exists as a distinct organization, and the entire product line has been absorbed into the then designated Euroimpact component of the Giat Industries organization, due to the fact that millions of the Poudres Reunies de Belgue mines still exist, we continue to list these mines separately.

Bosnia and Herzegovina

Little is known of this war-torn nation's development of landmines. Other than for the plethora of Yugoslav types, an indigenous anti-personnel mine has made its appearance. Called the "Gorazde Mine," this pressure activated mine is somewhat similar to the Canadian C3 Elsie.

Bulgaria

Bulgaria State Ammunition Factory: Through the Kintex marketing organization, Bulgaria has offered two anti-personnel landmines and one anti-tank landmine on the market. The PM-79 is similar albeit smaller than the Russian PMN while the PSM-1 is a bounding type mine of conventional design. Both landmines have been encountered in Southeast Asia and Afghanistan. The PTM-80P is a fairly conventional anti-tank landmine optimized for use in wet conditions. The PTM-80P is in service with Bulgaria and is offered for export. The Bulgarians have also manufactured the Russian MON.50 directional fragmentation landmine under license.

Czech Republic

Policske strojirny: This recently privatized firm manufactures several anti-armor and (previously) anti-personnel landmines. The PP Mi-Na 1 anti-personnel landmine has generated interest for its minimal content of metal. This mine is in service in both the Czech Republic and Slovak Republic and, prior to the international control efforts, was offered on the open market as are the similar PP Mi-Ba and PP Mi-D mines. The PP Mi-Sb and PP Mi-Sk mines are stake type

landmines of rudimentary design but high effectiveness. The PP Mi-Sr bounding anti-personnel landmine was previously sold in the Mideast to at least two nations. The PD Mi-PK off-route anti-tank landmine is noteworthy for its design, which incorporates five horizontally directed shaped charges. The mine can be activated by a contact cable, tripwire or by command. The PD Mi-PK is in production for undisclosed customers. There are at least four other anti-tank mines also presently manufactured.

France

Alsetex: Alsetex has manufactured a wide variety of landmines including (previously) anti-personnel types. Of the four types of anti-personnel landmines, the MAPED F1 is a claymore-type mine, while the Mark 61 and Mark 63 are simple stake landmines. The Model 59 MAPDV is a fairly powerful anti-personnel landmine that, like the other Alsetex anti-personnel landmines, is in service with the French and other armies.

Alsetex also produces anti-tank landmines: the Model 1951 and 1952 are undetectable mines, the MITRAL is a plastic mine designed to be scattered from helicopters, and the Anti-tank Track Mine ACPM is a non-metallic mine designed for mechanical laying. The MITRAL is still under development; the Model 1951 and 1952 as well as the ACPM are in production and are in service with the French Army as well as other nations.

Giat Industries: Before its acquisition of Poudres Reunies de Belgue, Luchaire and Matra Manurhin Defense, this recently privatized firm marketed only two models of anti-tank landmines - the Model F1 Horizontal Action Anti-tank Mine (an off-route mine) and the HPD-1A Anti-tank Mine. Both mines are made by Atelier de Fabrication de Toulouse, a portion of Giat Industries. The horizontal mine is in production and is in service with the British and French armies; the HPD-1A is still under development.

Giat Industries/Manurhin: Some time ago, Matra, in association with British Aerospace, has developed the Ajax-APILAS Off-Route Mine. This weapon more recently became a joint effort between Giat Industries/Manurhin and British Aerospace. The Ajax-APILAS system, also known as APAJAX, has been further developed for the NATO Staff Requirement called the Aimed Controlled Effect Anti-Tank Mine; the developed version is called MINOS. However, Giat Industries teamed with Dynamit Nobel, Honeywell Regelsysteme and Hunting Engineering for another system which won the competition in mid 1991. In 1990, Giat Industries acquired the Manurhin Defense unit of the Matra organization. Subsequently it was absorbed into the then Euroimpact (now Weapons and

Ammunition Division) component of the Giat Industries organization.

Giat Industries/Luchaire: The Luchaire ACL 89 Off-Route Mine has been developed to convert the LRAC 89 anti-tank rocket launcher into an off-route anti-tank mine by combining it with a new short-barreled launcher on a simple tripod and a PIAF sensor. The status of this program, which was still under development in 1991, is not known, but some research indicates that the development was suspended in 1994. Somewhat older than the ACL 89 is the Model 1953/1954 Shaped Charge Mine, which is no longer in production but is in service with the French and other armies.

Lacroix: The Lacroix Type F2 (also known as the LXT 542 ACPM or Anti-Char a Pose Rapide) is a plastic landmine designed to immobilize tanks and other heavy armored vehicles. Development of the mine (including a heavier, more potent version) was completed in 1991 and it is now in production. The SIM F1 is a stabilized illuminating landmine intended for ambush or the detection of intrusions. The 2.2 kilogram landmine can be used individually or in connection with several other landmines. The SIM F1 has several modes of activation. This mine has been sold to France and to several other export customers.

Telecommunications Radioelectroniques et Telephoniques: This firm produces only one type of anti-tank landmine, although it has several variants. The HPD Anti-Tank Mine Type was originally developed in 1974 for the French Army and is now in service with the French and Dutch armies. The more sophisticated and powerful HPD F2 and F3 entered production in 1987. In June of 1988, the Swiss Defense Ministry had placed a contract worth SFr472 million (equivalent to 314 million United States dollars) for the HPD F2 mine, under the designation Type 88. Manufacture of the explosive charge and final assembly is being done in Switzerland. Norway has also procured this landmine.

Finland

Elcoteq: This relative newcomer on the market has developed a highly effective anti-tank landmine. The non metallic mine uses advanced electronics in conjunction with acoustic and seismic sensors. A four kilogram (8.8 pound) shaped charge is the lethal mechanism. This landmine has been produced for Finland.

Federal Republic of Germany

Diehl: Diehl produces three anti-tank landmines and, before the international controls, two anti-personnel landmines. The DM11, DM21 and DM24 anti-tank landmines are circular mines which are all in service

with the German Army but are no longer in production. The anti-personnel landmines DM11 and DM31 are similarly in service but out of production.

Dynamit Nobel: The DYNAMINE family of mines includes the AT2 anti-armor landmine, an anti-personnel landmine, an anti-materiel landmine, a signal landmine and a shallow water mine. All versions are based on the technology of the well proven AT2 Mine, which was developed for delivery by multiple launch rocket systems. The Panzerfaust 3 Off-Route Mine is a standard Panzerfaust 3 anti-tank rocket with an infrared acoustic sensor (SIRA) developed by Honeywell Regelsysteme that converts the weapon into an off-route mine. Some of the components of this system are used in the winning entrant for the Aimed Controlled Effect Anti-Tank Mine program which is described elsewhere. The Tarantel is the latest mine concept from Dynamit Nobel; this landmine is a further advanced version of the AT2. Designed to resist various mine countermeasures, Tarantel has acoustic and fiber-optic tripwire activation. Once activated, the Tarantel launches a submunition which descends by a parachute. While descending, the ground is searched for targets. While the Tarantel is designed for dispensing from the M269 Multiple Launch System Rocket and the Skorpion ground scattering system, a hand-emplaced version is also being developed.

Thomson-DASA Armements (formerly Daimler Benz Aerospace-Messerschmitt-Bölkow-Blohm): In 1996, the integration of most of the munitions component of Messerschmitt-Bölkow-Blohm with Thomson-Brandt of France was completed; the new Thomson-DASA Armements firm is headquartered in France. The PARM (Panzerabwehr-Richtmine) is primarily used as an off-route mine and is in production on an as needed basis. The most recently revealed order has been for the German Army, placed in late 1990; the order was for 25,000 mines worth DM104.4 million. A PARM-2 is under development as is a form that can be dropped from a helicopter, but will still operate as an off-route mine.

Greece

Elviemek: The Elviemek EM 20 anti-personnel landmine is a general-purpose mine that can be laid mechanically or by hand. The EM-20 is the SB-33 from BPD Difesa e Spazio (formerly Misar) that was, prior to the international control efforts, manufactured under license.

Hungary

Hungarian State Factories: The UKA-63 anti-tank landmine is a metallic mine using a high explosive shaped charge. Either pressure or tilt rod fuzing can be used with this mine. While the M49 is an older design

wooded mine, the newer M62 and Gyata-64 are non-metallic mines. All three landmines have been exported to several nations of the old Warsaw Pact as well as to nations in the Middle East.

Italy

BPD Difesa e Spazio: In 1990, this firm acquired Misar, one of the more familiar names in the field. BPD Difesa e Spazio has manufactured a wide range of landmines for the Italian Army as well as export although this latter market is no longer available, at least for the anti-personnel types. This firm's mines were enhanced in several details stemming from a design project commenced in 1977 when the Misar company was established. The main design features are the increased effectiveness of the series and the use of non-metallic construction techniques. The P-25, P-40 general and SB 33 scatter-dropped anti-personnel landmines were produced in considerable numbers. Of the four anti-tank landmines produced, only the SB-81 is a scatter-dropped mine; the SB-MV/1, SBP-04 and SBP-07 are laid either mechanically from a vehicle or by hand. The firm's scatterable landmines have failed to attract government interest in Italy, with Tecnovar and Valsella receiving those contracts. Before the enactment of controls, the SB-33 was sold to Spain and other NATO armies, including Holland; details of the contracts have not been released. In itself, BPD Difesa e Spazio has more recently produced SB-MV/1 anti-tank landmines and ST-AT/V mine-laying trailers for Australia in conjunction with Thorn EMI Australia and the Australian Office of Defence Production (now Australian Defence Industries). This was Australia's first involvement in the production of an anti-tank landmine since the 1950s.

Tecnovar: Tecnovar has produced a large range of air-droppable and scatterable landmines for the Italian Army. These landmines are of the anti-tank and (previously) anti-personnel types similar in design and effectiveness to the current generation of mines from other nations. While the Italian Army has procured several types of Technovar landmines, the main sales have been on the export market, something that is no longer possible given the changed attitude toward the export of anti-personnel landmines. Several of the Technovar designs, such as the TC/6 and TC/3.6, are manufactured under license by other firms in other nations.

Valsella: Valsella has developed and placed into production a variety of non-metallic anti-tank landmines in the last few years; this includes a shaped charge mine for use with the FIROS 25 multiple launch rocket system. This firm is noted for its work in integrating advanced electronic components, including fuzing, with

its products. Of the product line, the VS-2.2, VS-3.6, VS-HCT anti-tank and VS-Mark 2, Valmara 69 anti-personnel landmines are in service with the Italian armed forces. These, as well as a number of the other landmines, both in anti-tank and anti-personnel types, are in service with numerous other nations including Portugal and Singapore although further exports (at least of the anti-personnel types) are not possible.

Poland

Cenzin Foreign Trade Enterprise: This firm manufactures the Russian pattern PMK.1 railway mine as well as the MPP-B plastic anti-tank landmine. The latter mine, also called Wierzba, is broadly based on the Russian TM.62 series mine but differs in detail. Two newer anti-tank mines are the MN-111 and MN-121, both scatterable anti-tank mines designed for dispensing from a variety of platforms. These landmines are in production for both domestic and export requirements.

Portugal

Explosivos da Trafaria: In the early nineties, this firm was absorbed by Sociedade Portuguesa de Explosivos. In itself, this firm has produced the Type TC/3.6 anti-tank landmine and the MAPS anti-personnel blast type landmine. The TC/3.6 has been manufactured under license from Tecnovar.

Sociedade Portuguesa de Explosivos: This firm is part of the INDEP group of companies and has manufactured the M412 anti-personnel landmine and continues to offer the M453 anti-tank landmine; both designs being under license from the Italian manufacturer BPD Difesa e Spazio (formerly Misar). In addition, this firm has manufactured the indigenously designed and developed M411 blast type anti-personnel and M421 fragmentation type anti-personnel landmines.

Romania

Romanian State Munitions Factories: This organization has developed and placed into production several interesting landmine designs. Among these are the MC-71, an anti-tank mine using a shaped charge with tilt rod fuzing and the effective MAT-62B, another anti-tank mine. Of the anti-personnel type landmines (which are no longer offered), the designation of three are known. The MS-3 is a small ambush type mine that operates by a pressure release device or as a booby trap. The MAI-75 and MAT-68 are non-metallic pressure activated blast type landmines. While export information is not available, at least two types of Romanian landmines have turned up in sub-Saharan Africa and the Middle East.

Russian Federation

Russian State Munitions Factories: Under the old Soviet leadership, the production of all types of landmines was

extensive and on a massive scale. As the Soviets used weapons as a major tool of foreign policy, the export of landmines was also extensive with Russian pattern landmines turning up in almost every geographic region of the world. While it is still not possible to sort out the types that are presently being manufactured, all the available evidence indicates that the manufacture of landmines continues in the Russian Federation, albeit at a much lower pace than what was previously undertaken. One organization that has been associated with the development and manufacture of landmines in the Russian Federation is the State Scientific Research and Engineering Institute.

Electronintorg: A new phenomenon in the Russian Federation is the appearance of a distinct firm playing in the international market for landmines. However, the slowly changing attitude by the Russians over the export of anti-personnel landmines may well truncate this form's presence in the export market. Electronintorg is offering several types of directional type mines of differing performances for different applications. Also offered is the OZM.72 bounding type mine. These landmines are in production for the domestic market.

Spain

Explosivos Alaveses: This firm has produced anti-personnel and still manufactures anti-tank landmines for the Spanish Army. The PS-1 is of an obsolete design and similar to the German S-mine of 1939-1945 War vintage. The P-4-A and C-3-A are of current-generation design, constructed of plastic with pressure fuzes. The P-4-A and the C-3-A have been identified in Argentine service. Both types were among landmines salvaged during the aftermath of the Falklands campaign by British Royal Engineer units involved in the clean-up of the islands. Argentina is now independent of Spanish suppliers for replacement of the vast stocks of landmines and related materiel lost following the surrender of the islands to the British. The firm also manufactures the SB-81 anti-tank mine which is a non-magnetic mine capable of being dispersed from the automatic helicopter-mounted SY-AT dispenser or from the SY-TT land based minelayer.

Sweden

Bofors: Following this firm's successful sale of its FFV 028 anti-tank landmines and mine-layers to the Bundeswehr at a value of SKr500 million, further orders for the mines were received by the Swedish company. The Royal Netherlands Army placed an order for 36,000 units in early 1986 at an estimated value of SKr365 million (including minelayers). Like the German order, the Dutch requirement was for both the self-destroying and long operational life models of the

FFV 028. The total value of exports of the FFV 028 now stands at well over SKr865 million. The FFV 028 was presented to the procurement officials of the far eastern nations during the Defense '86 arms fair in Kuala Lumpur. Interest was expressed by many of the nations with border problems arising from their proximity to the destabilizing events in Indochina. The FFV 013 area defense directional type landmine has also attracted interest on the export market. Aside from Sweden, sales have been made to Ireland, Japan, Norway and Switzerland. In September of 1990, it was announced that Japan would manufacture the FFV 013 under license from 1991 on. Bofors also produces two off-route anti-tank landmines. The firm has collaborated with the Finnish firm Hackmans in the production and development of the FFV 016 off-route mine which has been procured for their respective armies. Several other unidentified nations have expressed a desire to procure this mine. The weapon employs a flat cone shaped charge as the lethal mechanism; the mine can be attached to tree trunks. The Number 7 Anti-tank Mine (Strvmina 7) is a new mine, presently under development for the Swedish Army.

Bofors LIAB: Formerly known as Lindesberg Industri, this firm has more recently been absorbed by Bofors. In itself, Lindesberg has manufactured the light anti-personnel landmine Type LI-11; this mine is in service with the Swedish Army as the Truppmina 10.

Turkey

Turkey Ministry of Defense: Makina ve Kimya Endustrisi has manufactured the Model 4 Skg anti-tank mine, which is a basic anti-tank mine with a simple fuze. The Model 4 Skg is in service with the Turkish Army. There is also some evidence that Turkey has more recently become involved in the manufacture of at least three different anti-personnel landmines for domestic consumption.

United Kingdom

GEC-Marconi Defence Systems (formerly Ferranti Instrumentation): In the mid-1980s, the then Ferranti began the development of a new full width attack mine incorporating the latest in fuzing and logic technology. The related brochure listed the Italian firm Technovar as an associate contractor for the new mine. In 1990, the new landmine, called the Anti-Tank Influence Sensor or ATIS, was introduced. However, nothing has been heard of the ATIS program (including any sales or even if it is still offered on the market since that time).

Hunting Engineering: Hunting has been involved in the development of a lightweight infantry-laid anti-tank landmine, the IMP. Operated by an electro-magnetic pulse, the mine will be small enough to be easily transported by an individual infantryman but will be

capable of defeating the belly armor of all current and anticipated tanks. No in-service date has been released and, given the United Kingdom's changing attitude toward landmines in general, the future of this program is uncertain. The mine is expected to be simple to use, and capable of penetrating any known belly armor, while weighing less than one kilogram.

British Aerospace/Royal Ordnance: The L9/L17/L19 Bar Mine anti-tank landmine has proved to be a successful product for Royal Ordnance. It is in service with Abu Dhabi, Australia, Denmark, Egypt, Jordan, Kenya, Kuwait, New Zealand, Nigeria, Peru, Saudi Arabia, Spain and the United Kingdom. Over a million of these mines have been manufactured; further export orders are expected. Constructed of modern materials, the Bar Mine has a number of fuze options which are designed by Marconi to give the mine a greater effectiveness against clearance systems. The initial orders for the Full Width Anti-tank Mine fuzes now in production are for 83,600 mechanical and 41,800 electronic fuzes. The PADMINE anti-personnel mine was dropped by Royal Ordnance in 1989.

Thorn EMI: The Thorn EMI Ranger anti-personnel landmine has been produced for the British Army; production went dormant a number of years ago is will not be restarted.

The Mines In The New Century Program: In March of 1991, the United Kingdom Ministry of Defence issued a request for proposals for a new anti-armor landmine which is intended to eventually replace the L9 Barmine. A systems approach is being used in the program; it is not only to be comprised of the mine itself, but will address the minelayer, the command and control aspects and the associated logistics requirements. Even the training and maintenance of the new mine system are to be addressed. For this purpose, Hunting Engineering has teamed with Bofors of Sweden and Texas Instruments (Bedford); Royal Ordnance has teamed with HVR Consulting Services, Faber Design Consultancy, Marine Air Systems of New Zealand and Nea Lindberg of Denmark. Ferranti International has also expressed interest in bidding but no other information is available.

While a good deal of interest was initially expressed in the new mine program, the major geographic changes that have taken place in Europe have put the program on the back burner. By October of 1992, the Mines In The Next Century program was in suspended development and no significant work was being done on it by the Ministry of Defence or any of the above named contractors.

Yugoslavia (Serbia-Montenegro). This nation, still being affected by the unrest in the region is cited as the source for many of the mines found in various parts of the world today. Before it was dismembered, the former Yugoslavia was a prolific developer and manufacturer of landmines of all types. While many of these mines were copies or manufactured under license, before its

breakup, Yugoslavia had developed a number of indigenous designs including an advanced design scatterable anti-tank mine. It will be some time before the instability in the region subsides and a more accurate picture of the landmine manufacturing effort in the new Yugoslavia can be determined.

Funding

Funding for development of the landmines covered in this report is provided and conducted by the respective governments' ministries of defense and/or privately by individual contractors.

Recent Contracts

Other than those mentioned in a few contractor's paragraphs above as well as the ones immediately following, contract information is generally not available.

Timetable

A "totally plastic" landmine with absolutely no metallic content will soon be forthcoming, most likely in an anti-tank type. Increased integration with sophisticated sensors by a number of firms will result in a number of competing off-route mine systems by the turn of the century.

Worldwide Distribution

Countries. The distribution of the landmines manufactured by the firms and organizations covered in this report is worldwide, with a number of the designs manufactured under license in several non-European nations.

Forecast Rationale

The historical production figure in our forecast chart below presents a clear picture of the tremendous levels of production of landmines in Europe in the past. The forecast production in the chart also shows the precipitous drop in the levels of production that has recently taken place.

The ongoing efforts to control the international spread of landmines (especially the anti-personnel type) are paying off, albeit too slowly for many factions. While gaining momentum, these efforts will simply not be accepted by some nations for some additional time, hindering the overall effort. While most of the mine producing nations covered in this report have already controlled (or even banned) their manufacture and export of some types of landmines, a few others are continuing on as if nothing has happened, while others pay lip service to the controls but go on producing anyway, citing national needs. Even though the United

Nations and other international organizations will strengthen their efforts at banning outright anti-personnel landmines, it will most likely still be some time before the efforts bear full fruit. In fact, some observers feel that the total international control of landmines can never be achieved. Therefore, the European nations that have already implemented or will soon implement some type of control over their production and distribution of landmines (the majority of the producing nations covered in this report) will see their (albeit dwindling) export markets picked up by some other nation that places a lower priority on this humanitarian effort. The problem is that landmines of all types are unbelievably effective, and many nations still feel that they need them in their arsenal.

The following forecast chart is based on known requirements of the European nations for anti-tank and anti-personnel landmines, plus an estimate of the

replacement rate of mines currently in war stocks and reaching the end of their storage life. Also taken into consideration are the historical sales and other military transfer trends by the European firms on the export market. As a result of the major geo-political changes that have taken place in Europe, plus the accelerating efforts to limit the international trade in landmines (especially anti-personnel mines) as described above, the production levels are dropping in a dramatic manner and are expected to continue to drop in the coming ten-

year period. In addition to the above-mentioned factors, the major drop in the forecast number of anti-tank mines is due to the increased effectiveness of these mines (so fewer mines are required to accomplish the mission), as well as the advent of intelligent off-route anti-tank mines.

The numbers do not include the Aimed Controlled Effect Anti-tank Mine program, which is covered in a separate report in this section.

Ten-Year Outlook

ESTIMATED CALENDAR YEAR PRODUCTION

Designation	through 97	High Confidence Level				Good Confidence Level				Speculative			Total 98-07
		98	99	00	01	02	03	04	05	06	07		
European production of anti-tank mines(a)	65,505,000	161	156	177	181	151	145	129	162	191	173	1,626	
European production of anti-personnel mines(a)	267,497,000	519	464	472	307	301	306	303	318	252	161	3,403	

(a) Except for the through 1997 figure, all numbers are for units in thousands; the through 1997 figure represents production since 1980 inclusive.