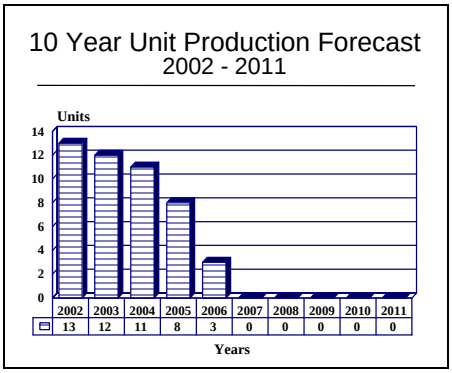
SAKR Series 122 and 325 mm Multiple Launch Rocket Systems - Archived 8/2003

Outlook

- Production of some of these launchers forecast to continue for a few more years
- Increased marketing on the export market expected, especially on a regional basis
- These systems have only minimal modernization or retrofit potential



Orientation

Description. Wheeled and tracked multiple launch rocket systems.

Sponsor. Development and Egyptian procurement of the SAKR multiple launch rocket systems are sponsored by the Egyptian Ministry of Defense & Military Production, the Ministry of Defense Armament Authority, and the Arab Organization for Industrialization.

Contractors. These multiple launch rocket systems have been developed and are manufactured by the SAKR Factory for Developed Industries, Cairo, Egypt. This entity is a part of the Arab Organization for Industrialization, an umbrella organization somewhat similar to Denel Limited of the Republic of South Africa. Abu Zaabal Company for Specialty Chemicals, El Maasara Company for Engineering Industries, and Helwan Machine Tool Company act as the major subcontractors. Components for the SAKR rockets are coproduced by Bayern Chemie of Germany (composite propellants); Simpa of France (proximity fuze); Societe Nationale des Poudres et Explosifs of France (rocket motor); and BAE Systems (Marconi Marine, Land and Naval Systems - Vickers Shipbuilding and Engineering) of the United Kingdom (rocket body).

Licensees. None

Status. The SAKR 21 (RL-21), SAKR 30 (RC-30), and SAKR 40 launchers for the SAKR 18 and SAKR 30 rockets are in serial production on an as-needed basis; the SAKR 80 system is in suspended development, with prototypes having been tested and evaluated.

Total Produced. As of January 1, 2002, a total of 402 SAKR 21-, 30-, and 40-round wheeled and tracked mobile launchers had been manufactured for the SAKR 18 and SAKR 30 rockets. In addition, two SAKR 80 prototype systems had been manufactured.

Application. A mobile rocket-based fire support system for the destruction of a variety of targets by means of multiple barrages.

Price Range. In equivalent 2002 United States dollars, the unit price of a fully loaded SAKR 21 truck-mounted launcher is $319,000; the SAKR 30 truck-mounted launcher has a unit price of $323,000, while the SAKR 40 truck-mounted launcher has a unit price of $331,000. In equivalent 1993 United States dollars, the projected unit cost of the truck-mounted SAKR 80 launcher was $392,000.

Technical Data

SAKR 30 (RL-21) Multiple Launch Rocket System

Crew. Three to five depending on platform.

Training & Elevation Mechanism. Electrohydraulic with manual backup.

Launch Vehicle. Mercedes-Benz 1222A/36 4x4 or ZIL-131 or Ural-4320 6x6 or similar truck; the system has also been mounted on the ATS-59G tracked carrier.

Dimensions. The following data are for the SAKR 30 (RL-21) launcher mounted on the ZIL-131 truck. The RL-21 for tracked applications (the Russian ATS-59G) is the same. The data for the 21-round launcher are similar except that it has 21 tubes and the complete system weighs a little less. The same is true for the 40-round launcher, except for the number of tubes and that it weighs a little more. All launchers are compatible with the SAKR 10, SAKR 18, and SAKR 30 rockets, as well as the Russian-pattern Grad rockets used in the BM-21 system. SAKR has also developed two lightweight launchers for these rockets that are designed for ground emplacement. The PRL-111 is a single-round launcher that is mounted on a tripod, while the PRL-113 is a four-round launcher, also tripod mounted. Both can be traversed 7° left and right; elevation is +40° and depression is -10°.

	SI units	US units
Launcher vehicle		
Launch tubes:	30	30
Length:	7.25 meters	23.78 feet
Width:	2.61 meters	8.56 feet
Height:	2.9 meters	9.51 feet
Combat weight:	11.25 tonnes	12.4 tons

The PRL-111 and PRL-113 systems use the SAKR 10 rocket which, while still a 122.4 millimeter diameter rocket, is shorter in length and lower in weight. The maximum range of the SAKR 10 is 10,800 meters (11,810 yards). The data for the SAKR 18 and SAKR 30 rockets follow.

	SI units	US units
SAKR 30 rocket		
Length:	2.58 meters	8.46 feet
Diameter:	122.4 millimeters	4.82 inches
Weight:	56.5 kilograms	124.3 pounds
SAKR 18 rocket		
Length:	3.25 meters	10.66 feet
Diameter:	122.4 millimeters	4.82 inches
Weight:	67.0 kilograms	147.4 pounds

Performance. The following data related to the launcher are for the latest production standard.

	SI units	US units
Launcher elevation:	+55°	+55°
Launcher depression:	0°	0°
Launcher traverse:	102° left/72° right	102° left/72° right
Maximum SAKR 30 range:	36,000 meters	39,369.6 yards
Maximum SAKR 18 range:	20,000 meters	21,872 yards

Propulsion. The SAKR 10, 18, and 30 rockets use unspecified solid-propellant motors. The SAKR 18 weighs 20.45 kilograms (44.99 pounds), and the SAKR 30 weighs 23 kilograms (50.6 pounds).

Warhead. The SAKR warheads are provided by Abu Zaabal Company for Specialty Chemicals (Factory number 18). The SAKR 10 uses a high-explosive warhead of 19.5 kilograms (42.9 pounds). The SAKR 18 rocket has two optional submunition-dispensing warheads, the anti-tank warhead having four submunitions and the anti-personnel warhead 77 submunitions; both weigh 28 kilograms (61.6 pounds). The SAKR 30 has three warhead options: the high-explosive warhead weighs 17.5 kilograms (38.5 pounds); the anti-tank submunition-dispensing warhead,

containing five submunitions, weighs 28 kilograms (61.6 pounds); and the anti-personnel warhead, containing 98 submunitions, weighs 61.5 kilograms (135.3 pounds).

Launcher Mode. The SAKR self-propelled multiple launch rocket systems use 21-, 30-, or 40-round launchers on ZIL-131 or similar capacity trucks. The 30- and 40-round launchers have also been integrated with the Russian ATS-59G tracked carrier. The launch tubes have a groove that imparts a spin to the rocket as it travels down the tube. Firing is accomplished electrically.

Control & Guidance. Four wrap-around fins pop out after the rocket exits the launch tube; these fins, plus the spin imparted by the launch tube, provide aerodynamic stabilization. Various ranges are achieved by varying the elevation of the launcher.

Fire Control. The fire control of this system is rudimentary, with orders coming from a central command vehicle. The launch vehicle is equipped with a radio or land-line link to the fire control officer.

SAKR 80 Multiple Launch Rocket System

Crew. Three

Training & Elevation Mechanism. Electrohydraulic with manual backup.

Vehicle. ZIL/BAZ-135L4 or similar class truck; this launcher can also be mounted on a variety of tracked vehicles.

Dimensions. The following dimensions are for the SAKR 80 system mounted on the ZIL/BAZ-135L4 truck.

	SI units	US units
Launcher vehicle		
Launch tubes:	3	3
Length:	10.25 meters	33.63 feet
Width:	2.8 meters	9.18 feet
Height:	3.25 meters	10.66 feet
Combat weight:	20.04 tonnes	22.09 tons

The following data are for the SAKR 80 rocket.

	SI units	US units
Length:	6.5 meters	21.32 feet
Diameter:	325 millimeters	12.79 inches
Weight:	700 kilograms	1,540 pounds

Performance. The following data related to the launcher are provisional.

	SI units	US units
Launcher elevation:	+50°	+50°
Launcher depression:	0°	0°
Launcher traverse:	42° left/42° right	42° left/42° right
Maximum rocket range:	80,0000 meters	87,488 yards

Propulsion. The SAKR 80 rocket uses an unspecified two-part, solid-propellant rocket motor of an unknown weight. The first stage, which burns for six seconds and produces 108.9 kilonewtons (12.1 tons) thrust, weighs 310 kilograms (704 pounds). The contractor for the complete motor is the French firm Societe Nationale des Poudres et Explosifs.

Launcher Mode. The SAKR 80 system uses a three-round launcher on a ZIL/BAZ-135L4 truck. The launcher has also been integrated with a modified T-55 tank chassis. The system is composed of three side-by-side launchers. Firing is accomplished electrically.

Warhead. The SAKR 80 rocket is equipped with four different warheads for different missions; all warheads weigh 200 kilograms (440 pounds). The high-explosive warhead is available in two types, fragmentation and hollow charge. The anti-armor submunition-dispensing warhead dispenses 65 submunitions, each weighing 2.5 kilograms (5.5 pounds). The anti-personnel/anti-vehicle warhead dispenses 950 hollow-charge submunitions which are stabilized in descent by a ribbon drogue. Other warhead options were in development for the SAKR 80; most of these were submunition-dispensing weapons with more sophisticated anti-tank and anti-personnel type submunitions.

Control & Guidance. Four fins at the rear of the SAKR 80 rocket provide aerodynamic stabilization, assisted by the use of a spin rotation solid rocket motor located at the forward part of the main motor. Different ranges are achieved by varying the elevation of the launcher.

Fire Control. The basic fire control of the SAKR 80 system is similar to that described above for the other SAKR systems; however, due to the range performance of the system, a higher level of command would be used. A more sophisticated command and control system was being developed for the SAKR 80 in use in Egypt. This system was to consist of a remotely piloted air vehicle with real-time datalink and automatic survey and fire control equipment for the launcher.

Variants/Upgrades

Variants. Other than for the various rockets and launch vehicle platforms, no distinct variants of the SAKR series of multiple launch rocket systems have been developed.

Modernization and Retrofit Overview. Other than for new or improved rocket munitions, the SAKR series of multiple launch rocket systems have no significant modernization or retrofit potential.

Program Review

Background. Following its licensed manufacture of the Soviet 122.4 millimeter BM-21 Grad multiple launch rocket system in 1978, the SAKR Factory for Developed Industries began the development of improved 122.4 millimeter rockets and launchers to fit a rocket of that diameter. This government-sponsored effort was part of the overall plan to reduce Egypt's dependence on weapons produced by other nations. Following the development phase, which lasted into the early 1980s, the newly developed rockets and launchers were placed into production. The Helwan Machine Tool Company was given the task of manufacturing the various launchers, the details of which are presented above. These launchers, in 21-, 30-, and 40-round configurations, have been integrated with several different tracked and wheeled vehicle platforms. The range of 122.4 millimeter rockets and launchers developed can meet almost any demand for this class system.

SAKR 80. In 1982, SAKR Factory for Developed Industries began the development of a new, much larger and more capable multiple launch rocket system. The SAKR 80 was designed to replace and complement other Russian design systems. The new system was designed to be integrated with the Russian ZIL/BAZ-135L4 truck, already in inventory and readily available. Because Egypt was not yet fully conversant in the development and manufacture of solid rocket motors, the French firm Societe Nationale des Poudres et Explosifs, a world leader in this area, was contracted to develop the new motor. In 1993, for unknown reasons, the SAKR 80 development program was suspended.

Description. Even though the SAKR program has been suspended, many details regarding the SAKR 80 are still sensitive. What is known is presented in the **Technical Data** section above. In addition to the ZIL/BAZ-135L4 truck mounting for the SAKR 80, the prime contractor, in conjunction with Helwan Machine Tools Company, developed a conversion of the existing FROG-7 launcher which is also mounted on the ZIL/BAZ-135L4 truck. The conversion allows three SAKR 80 rockets to be fired. In addition, a program to integrate a new four-round SAKR 80 launcher with the T-55 tank has been undertaken; however, the status of this program is not clear, and it may well be dormant. The hydraulically elevated and traversed launcher is mounted on a turntable that replaces the turret.

Funding

Funding for the development and Egyptian procurement of all the SAKR launchers and rockets has been provided by the Egyptian Ministry of Defense through the Arab Organization for Industrialization.

Recent Contracts

Not available, as contractual information is not released.

Timetable

The following timetable should be considered provisional.

Month	Year	Major Development
	1978	Development of a new range of 122.4 millimeter rockets and launchers
	1981-1983	Developmental testing of original SAKR 122.4 millimeter systems
	1982	Development of SAKR 80 program begun
	1983	Manufacture of SAKR 122.4 millimeter systems begun
July	1984	First deliveries of SAKR 122.4 millimeter systems
	1990	SAKR 80 ordered by Egypt
	1993	Development of SAKR 80 suspended
Mid	2002	Manufacture of SAKR 122.4 millimeter systems ongoing; development continues

Worldwide Distribution

Export Potential. Egypt is still a new and somewhat unknown player in the world's weapons market. Even though the SAKR multiple launch rocket program has done much to establish Egypt's self-sufficiency in weapons, it has yet to have a significant impact on the export market. Despite the fact that the long-proven multiple launch rocket technology of the former Soviet Union is used in the 122.4 millimeter systems, Egypt's relatively new offerings in this caliber have yet to be accepted by the market.

User Countries. **Egypt** (31 SAKR/AS-59G with 30-round RC-21 launcher, 101 SAKR 21-round launchers, 134 SAKR 30-round launchers, and 136 SAKR 40-round launchers plus two SAKR 80 prototypes); **Iraq** (15 SAKR 21-round launchers); **Sudan** (five SAKR 21-round launchers).

Forecast Rationale

Since we started covering the SAKR systems over 15 years ago, our research has continually been hindered by a lack of supporting data. What information is available indicates that serial production of the truck-mounted SAKR multiple launch rocket systems is ongoing at a slow pace.

Our production forecast is based on Egypt's projected inventory requirement. No additional export of the mobile SAKR systems is forecast, although we will continue to track this aspect of the program. There should be moderate export of the single-round and towed launchers, which are not included in our forecast.

Since the SAKR 80 program was effectively terminated in 1993, no production of this system is forecast.

Ten-Year Outlook

ESTIMATED CALENDAR YEAR PRODUCTION

			High Confidence Level				Good Confidence Level				Speculative			
Ordnance	(Engine)	through 01	02	03	04	05	06	07	08	09	10	11	Total 02-11
SAKR FACTORY FOR DEVELOPED INDUSTRIES													
SAKR 21 ROUND LAUNCHER (a)	ZIL-131	101	2	2	1	0	0	0	0	0	0	0	5
SAKR 30 ROUND LAUNCHER (b)	UNKNOWN	31	0	0	0	0	0	0	0	0	0	0	0
SAKR 30 ROUND LAUNCHER (c)	ZIL-131	134	3	3	2	0	0	0	0	0	0	0	8
SAKR 40 ROUND LAUNCHER (d)	ZIL-131 6 I	136	8	7	8	8	3	0	0	0	0	0	34
SAKR-80 MULTIPLE ROCKET S (e)	ZIL-375	2	0	0	0	0	0	0	0	0	0	0	0
Total Production		404	13	12	11	8	3	0	0	0	0	0	47

(a) All production shown is for vehicle mounted launchers for service deliveries only.
(b) This line is for the ATS-59G platform mounting only.
(c) All production shown is for vehicle mounted launchers for service deliveries only.
(d) All production shown is for vehicle mounted launchers for service deliveries only.
(e) The through 2001 production figure is for the developmental prototype systems. This developmental program was terminated in 1993.