

# NATIONAL AIR INTELLIGENCE CENTER



ISRAEL'S SATELLITES AND MISSILES



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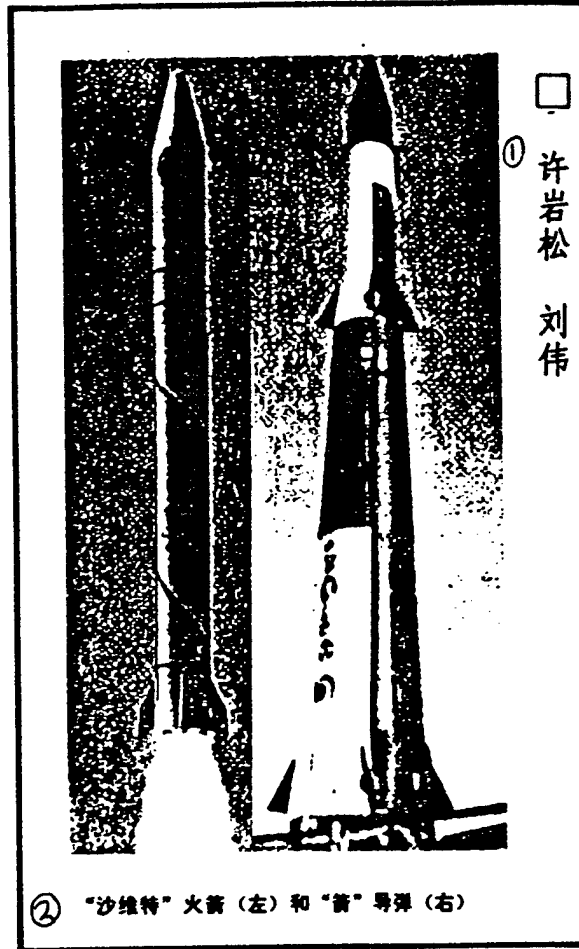
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GRAPHICS DISCLAIMER

All figures, graphics, tables, equations, etc. merged into this translation were extracted from the best quality copy available.



Key: (1). Xu Yansong Liu Wei [Authors]. (2) The Shavit [Comet] rocket (left) and Chetz [Arrow] missile (right).

### Israel's Satellites and Missiles

On April 5, 1995, Israel launched its first space-based missile early warning system satellite, the Ofteq [Horizon] 3. The satellite weighs 225 kilograms and can transmit 1-2 meter

resolution imagery. Offeq 1, launched in September 1988, and Offeq 2, launched in April 1990, were two experimental models.

Offeq 3, which was launched from a launch site south of Tel Aviv, is in an east-west retrograde orbit at an altitude of 500 kilometers and revolves around the earth once every 90 minutes, covering Iran, Iraq, and Syria. Western intelligence bureaus have revealed that Offeq 3 carries an experimental navigation system and a three-dimensional stabilization unit, as well as optical sensors and other payloads. Although technical problems caused launch delays, the satellite is now operating well. If the satellite can remain in good working order for its nominal one-year life span, it will speed up Israel's development of the most advanced defensive system in this region and greatly increase Israel's ability to identify nuclear missiles in real time.

Israel Aircraft Industries (IAI) has been engaged in development of reconnaissance satellites for at least eight years. At the same time, other companies have taken charge of developing optical and data transmission systems. Shortly after the Gulf War, then-defense minister Moshe Arens emphatically pointed out that wars and conflicts, especially Iraq's launching of missiles against Israel, proved the urgency of Israel's need for reconnaissance satellites.

Israel plans to spend US \$3000<sup>1</sup> in 1996 to launch the Amos 1 communications satellite using France's Ariane rocket at the Kourou, French Guiana launch site. This satellite will probably be positioned in a geostationary orbit over Zaire, its working life span will be ten to eleven years, and it will be controlled by Israel's ground station. US \$300 million has already been spent on this program. The satellite weighs 961 kilograms. Although it has an array of commercial applications, it is commonly believed that one of its main functions will be to monitor the communications networks of [Saudi] Arabia and Iran. Two high-ranking public figures participating in this project are former Director of Military Intelligence Mei'er Amite [Chinese romanization] and former Air Force Commander Amos Lapiduote [Chinese romanization]. Amos 1 was originally scheduled to appear publicly in 1989 and be launched in 1994. The satellite was jointly produced by Israel's SpaceCom Satellite Communication Services, German Aerospace, and France's Alcatel company. Its development cost was US \$350 million.

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<sup>1</sup> Figure probably too low. Character (*wan*<sup>4</sup>, ten thousand) may be missing. Actual amount may be US \$30 million.

At the beginning of April, 1995, Russia used a modified SS-25 missile as a rocket to launch the experimental scientific research satellite Gurwin 1 from the Plesetsk launch site. Because of a malfunction at an altitude of 670 kilometers, it was locked inside the rocket.

During the past several years, missiles have spread into the hands of nations considered hostile to Israel. The nucleus of Israel's response measures is the Arrow [Chetz] anti-missile program. This project is an important sign of the strategic relationship between Israel and the United States. The Clinton Administration had promised to help Israel maintain its scientific and technical advantage. Arrow and its subordinate projects give Israel a small-scale American-style air defense system, but may become an obstacle to the United States' efforts to promote peace in this region.

Despite internal opposition by Israel's military organizations, Israel is now still intensifying development of the two-stage solid rocket propellant Arrow 2, which is the actual combat model of the Arrow 1.

Arrow missiles will be kept on call to counter nations seeking to employ ballistic missiles.

In the near future, Israel will be seeking a dual defense system against tactical missiles. The long-range Arrow missile is the first line of defense, and the shorter-range American Patriot missile is the inner second line of defense. Wuzi Lubin [Chinese romanization, probably for "Uz Rubin"], director of the Israeli General Office of Missile Defense, declared that six live ammunition tests using the Arrow 2 missile would be carried out in the next 18 months. The first flight test of this 6.3-meter-long missile is scheduled for the middle of the year. The target for the first launch will be set at an altitude of 50 kilometers, and the target for the second launch will be set at an altitude of 8 to 10 kilometers. Afterwards, live ammunition tests will be carried out, lastly using two launch units with four rounds each. According to an official statement, this arrangement can ensure the security of 85 percent of the population of Israel. Each unit will be equipped with combat management and control departments, as well as

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combined phased array detection and fire control radar developed especially for this system. According to an estimate, the first launch units will be fully equipped in 1997. They will be set up near Tel Aviv and south of Haifa.

The Arrow missile has entered the most critical second stage [of testing]. On June 12, 1994, in a live ammunition flight test in the sky above the Mediterranean Sea, the Arrow 1 successfully intercepted and destroyed a target missile carrying a simulated chemical warhead. This launch was carried out on a modified offshore oil platform. This was the ninth test launch of the Arrow missile, and was the third launch using live ammunition against a target missile. The Arrow missile was launched four minutes after the target missile attained its ballistic acme. Its warhead detonated 40 kilometers away from the target missile at an altitude of 22 kilometers.

Development of the Arrow missile began in July 1988 as a joint effort between Israel's Ministry of Defense and the United States' Strategic Defense Initiative. The United States invested US \$158 million in initial development work. At present, close to US \$500 million has been spent on this project, three-quarters of which was invested by the United States. The first test took place on August 9, 1990. Iraq's launching of 49 Scud missiles into Israeli territory during the Gulf War strengthened [Israel's] determination to develop the Arrow missile.

The speed of the Arrow missile is Mach 9, three times that of the Patriot missile, and its interception radius is 100 kilometers, while that of the Patriot is only 18 kilometers. According to estimates, it would take 1200 missiles to protect all of Israel, and this project would cost approximately US \$1 billion. In addition, US \$1.25 billion would be required for a radar network and a command and control system. The first fire control radar was developed successfully by Israel's Elta Electronics Industries at the end of 1994, and was considered the most advanced radar system ever developed by Israel. At this rate of progress, it will be impossible for Arrow missiles to arrive at their positions before the year 2000.

Israel is attempting to develop a booster stage missile defense system which can strike enemy missiles at their weakest point, within one minute of being launched. This ensures that the missiles' debris falls outside [Israeli] territory. This defensive system involves tactical heat-sensitive seeker missiles which can be launched by cruising F-15 jet fighters or long-distance unmanned air vehicles. Israel has been in a leading position in the field of unmanned aerial vehicles, and has many products, such as the "Searcher," which can loiter in the air up to 24 hours and be fitted with sensors for reconnaissance of missile launches. The "Unmanned Aerial Vehicle Hunter-Killer Project" is being developed together with the Arrow missile program. This project has been praised by the Israeli Air Force, which has always opposed the Arrow missile program. The Israeli Air Force believes that the substantial funds used for developing the Arrow missile could better be spent on other, more effective projects. The Israeli Air Force has insisted

on launching anti-missile missiles from the air.

Other Israeli missile programs include the Jericho II medium-range missile, which was developed in secret jointly with South Africa in 1987 and is capable of carrying nuclear warheads. Jericho II is a modified military version of the Shavit rocket. It can send the Ofefeq 3 into orbit and has a launch range of 1500 kilometers and a payload of 500 kilograms.