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THE AMERICAN ISRAEL PUBLIC AFFAIRS COMMITTEE

AIPAC MEMORANDUM

500 NORTH CAPITOL STREET, N.W. • SUITE 300 • WASHINGTON, D.C. 20001 • (202) 638-2256

Lavi: U.S.–Israel Cooperation

Israel's security

The Lavi is an Israeli-designed attack aircraft tailored to meet the unique needs of Israel's air force. The Lavi is intended as a short-range ground attack/trainer aircraft with self-defense air combat capability. It will replace the existing fleet of Israeli-built Kfirs and aging American-built A-4 Skyhawks.

Research and development contracts worth over $700 million dollars have been signed with 74 American companies located in 22 states. Lavi contracts are providing American aerospace firms an opportunity to sustain and enhance their technological capabilities at a time when no new combat aircraft are under development by the U.S. armed forces. This will render those companies better able to help the Department of Defense develop the Next Generation Fighter in the 1990s.

Since before the inception of the Lavi, Israel has been studying its aircraft needs with a careful eye. Israel is well-known for its ability to get the maximum military value out of its defense expenditures. The Israeli government has reviewed the Lavi program at several points and each time has determined that the program's benefits make the continuance of the program necessary. Likewise, the U.S. Department of Defense has done several studies of the program, and highlighted the project's contribution to Israel's security.

Development of the Lavi began in 1980; the first prototype is scheduled to fly in 1986. In order to minimize the risks and costs associated with new aircraft development, the engine and airframe of the Lavi are built from careful adaptations of existing technologies. Much of the development work is being done in the United States, as will much of the planned production. This blending of Israeli and American expertise and technology has allowed the development of an excellent plane optimized for Israeli needs and conditions, instead of having to transform an aircraft developed with other considerations in mind.

Production of the Lavi is scheduled to begin in 1990. A maximum of 30 aircraft will be built per year, with that level not being reached until the mid-1990s. After the plane enters production, it is estimated that an additional $2 billion will be spent on Lavi components in the United States, providing thousands of jobs. The Lavi aircraft are expected to cost about $14.5 million apiece, as compared with a cost to Israel of over $30 million for each of the F-16s it is now buying.

The Lavi is no threat to American aircraft export markets. The Israeli Air Force's requirement for 300 Lavi aircraft means that it will monopolize the entire production capacity until after the year 2000. In addition, the large-scale use of American components and technologies ensure that before any export of the aircraft could even be considered, American governmental approval would have to be forthcoming.

7/9/85

Lavi Contracts With U. S. Companies Detailed

Washington—*U. S. industrial involvement in the Israel Aircraft Industries Lavi fighter program to build 300 aircraft for Israel air force now totals 99 contracts worth $700,887,000* (AW&ST *Jan. 14, p. 17*).

Some contracts involve partial production, as is the case with Grumman Aerospace, which is developing and building 20 shipsets of wings and vertical tails of composite materials, and Pratt & Whitney, with its PW1120 engine.

The contracts reflect design, development and hardware for the prototype and production stages. Most are for a fixed price. An additional $15 million is contracted with U. S. firms on standard items, such as nuts and bolts and materials.

Following is a breakdown of contracts:

CONTRACTOR	STATE	COMPONENT	VALUE
Abex	California	Hydraulic Main Pump	$988,000
Aeroquip	Michigan	Bleed Air Ducting	4,164,000
Aeroquip	Michigan	Hydraulic Accessories	832,000
Aeroquip	Michigan	Coupling Ring Belts	99,000
Aerosonic	Florida	Flight Instruments	650,000
Allen Aircraft	Ohio	Jet Pump and Check Valves	44,000
Allen Aircraft	Ohio	Fuel Accessories	45,000
Amfuel	Kansas	Fuel Bladder	671,000
Avcron-ITT	New Jersey	Electronic Support Measures Modules	28,900,000
AVI	Ohio	Valves	253,000
Aydin Vector	Pennsylvania	Airborne Data Acquisition System	1,460,000
Circle Seal	California	Check Valve	65,000
Circle Seal	California	Hydraulic Valves	154,000
Collins	California	Linear Variable Differential Transformer	206,000
Condec	California	Air Refuel Components	660,000
Condec	California	Pressure Control Valves	904,000
Condec	California	Switches	116,000
Conrolex	New York	Push Pull Rods	19,000
Conrolex	New York	Throttle Cable	72,000
Crissair	California	Hyd./Fuel Accessories	259,000
Crissair	California	Environmental Control System Check Valves	31,000
Crissair	California	Snubber	12,000
Data Products	Connecticut	Fuel Amplifier	303,000
Delta Dynamics	Ohio	Low Speed Flutter Model	256,000
Dorne and Margolin	New York	VOR/ILS Antenna	374,000
DTI-Aerotech	New York	MuxBux Emulator	1,092,000
Explosive Technology	California	Escape System Components	1,316,000
F. C. P.	Pennsylvania	Integral Drive Generator Filter	13,000
FAAC	Michigan	Simulation Prog.	50,000
Fenwal	Mass.	Bleed Leak Detection	161,000
Garrett	California	Environmental Control System	38,000,000
Garrett	Arizona	Secondary Power Source	21,000,000
Garrett	Calif./Ariz.	Emergency Power Unit	12,700,000
Garrett	California/ Arizona	Anemometric Transducer	1,022,000
Goodyear	Ohio	Brakes, Wheels, Tires	7,089,000
Grimes	Ohio	External Lighting	1,829,000
Grimes	Ohio	Utility Light-Cockpit	12,000
Grimes	Ohio	24 v. Transformer	47,000
Grumman	New York/ Georgia	Wing and Tail Sections	151,600,000
Hartman	New York	Contactors	3,860,000
Haskon	Mass.	Canopy Inflatable Seal	38,000
HTL	California	Pneumatic Pressure Gauge	365,000
Hughes	California	Head-up Display	14,400,000
Hughes Treitler	New York	Fuel/Oil Heat Exchanger	367,000
Hydra Electric	California	ECS Gauge	63,000
Hydra Electric	California	Switches	450,000
Hydra Power	New York	Hydraulic Valves	2,690,000
ITT General	California	Valves	462,000
ITT Neodyn	California	Switches	107,000
J. C. Carter	California	Fuel Accessories	$1,070,000
Jay El	California	Warning Panel	592,000
JET	Michigan	Attitude Direction Indicator	1,489,000
Janco	California	ECS Select Switch	65,000
Kaiser	California	Adap. Cap Assy.	57,000
Kearfott	New Jersey	Eddy Current Damper	282,000
Lear Siegler	California	Flight Control Computer	28,900,000
Lear Siegler	California	Emergency Generator	1,486,000
Lear Siegler	California	D. C. Generator	837,000
Ligicon	California	Verification Validation Software	683,000
Marathon	Texas	Back-up Battery	611,000
Mason	California	Hotas Switches	334,000
MTS	California	Load System Iron Bird Flight Controls	150,000
Moog	New York	Servo Actuators	61,000,000
Micrograft	Tennessee	Wind Tunnel Model	404,000
Northrop	California	Rate Gyros	510,000
NTPS	California	Engineering and Pilot Course	229,000
Otto	Illinois	Hotas Switches	350,000
Parker	California	Accumulators and Fuel Accessories	80,000
PMC	New York	Adjustable CAM Switches	93,000
Pneudraulics	California	Hydraulic Actuators	880,000
Pneudraulics	California	Hyd. Bootstrap System	415,000
Pneudraulics	California	Hydraulic Valve	230,000
PSS	California	Software Development Tools	697,000
Raytheon	New Jersey	Mono Ctr.	950,000
Rosemount	Minnesota	Anemometric System	1,898,000
Rosemount	Minnesota	Angle of Attack Probe	800,000
Rosemount	Minnesota	Engine Ice Detector	840,000
Rosemount	Minnesota	Total Air Temp.	100,000
Saft	Georgia	Main Battery	580,000
SCI	California	Pneumatic Reservoirs	289,000
SEL/Gould	California	Computer	500,000
Stencel	N. Carolina	Antispin Rockets	263,000
Sterer	California	Valves	958,000
Sundstrand	Illinois	Leading Edge Flap Drive	10,400,000
Sundstrand	Illinois	Integral Drive Generator	2,300,000
Sundstrand	Washington	Accelerometers	554,000
System Donner	California	Fire Detection	1,268,000
Simmonds	Vermont	Fuel Quantity Measuring	850,000
Tavco	California	Relief Valve	26,000
Tektronics	Oregon	High-Speed Development Station	800,000
Teledyne	California	Escape Sys. Components	439,000
URDC	Utah	Battery Charger	294,000
Pratt & Whitney	Conn./Fla.	Engine	270,000,000
W. Kidde	N. Carolina	Halon Reservoir	845,000
Whittaker	California	Valves	1,342,000
Wiggans	California	Fuel Accessories	40,000
WEMAC	California	Air Vent Nozzle	52,000
AMG	Virginia	Automatic Test Equipment-Technical Assistance	1,500,000

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July 9, 1985

LAVI TALKING POINTS

WHAT IS THE LAVI?

* Israeli-designed short range ground attack/trainer aircraft
* To be produced in 1990s
* Replaces American-built A-4 Skyhawks and Israeli Kfirs

AMERICAN INVOLVEMENT

* 50% of research and development is being done in U.S.
* $700+ million in signed R & D contracts in U.S.
* R & D contracts with 74 firms in 22 states, 60+ congressional districts
* 50%+ ($2 billion) of production anticipated in U.S.

WHY THE LAVI?

* Designed in Israel for specific and unique Israeli needs
* Mixing of Israeli and American expertise and technology has allowed the development of the right aircraft for Israeli purposes
* Optimized as a short-range ground attack/trainer aircraft with self-defense capabilities, role not filled by any existing American aircraft
* Careful adaptation of existing technologies has minimized risks of developing a new plane
* No U.S. aircraft is as well-suited for the combined short range ground attack and trainer roles
* Cost of Lavi is expectd to be $15 million per plane; the cost of F-16s that Israel is curently buying is over $30 million per plane
* Most cost effective solution to Israel's aircraft problems

WHY MORE STUDIES?

* Israel has done several studies of the Lavi, over a number of years, and still concludes it is necessary

* There have been a number of Department of Defense studies done already, also pointing up the importance of the Lavi

BENEFITS FOR U.S.

* At least $2.7 billion in aerospace contracts in U.S., approximately 50% of the total

* Maintaining and enhancing of technological bases of numerous American aerospace companies

* Aerospace industry development contracts during a period of no U.S. warplane development

* Enhanced U.S. aerospace industry capabilities for Next Generation Fighter in 1990s

NO THREAT TO EXPORTS OF U.S. AIRCRAFT

* Israeli needs will take up full production until after year 2000

* American-built components necessitate U.S. government approval before any possible export

* Attuned to specific Israeli needs, not generalized like export-oriented aircraft

The Heritage Foundation Backgrounder

No. 521 | The Heritage Foundation 214 Massachusetts Avenue N.E. Washington, D.C. 20002 (202) 546-4400

July 7, 1986

Israel's Security

AMERICA'S SECURITY STAKE IN ISRAEL

INTRODUCTION

The United States and Israel, longstanding friends bound together by congruent national interests and shared value systems, have been engaging in increasingly close strategic cooperation. And in recent years, Israel's importance in American strategic thinking has been growing. One reason stems from the Iranian revolution, which destroyed one of the "twin pillars" of American security policy in the vital Persian Gulf region and demonstrated the political fragility of "one man, no vote" regional allies. Another reason is the hesitant Arab response to American requests for access rights for the U.S. Rapid Deployment Force following the Soviet invasion of Afghanistan. This reduced the perceived costs of U.S.-Israeli cooperation in terms of forgone Arab cooperation. Finally, the ominous Soviet-sponsored military buildup in Syria and the sobering American experience in Lebanon drove home the need for closer Israeli-American military coordination.

Although Washington and Jerusalem have cooperated informally for decades ad hoc, an operational framework for strategic cooperation was constructed only in 1983. Its aim is to counter the common threat posed by the Soviet Union in the Middle East, and it extends to the Arab states only when they toe the Moscow line. Both the U.S. and Israel stress the deterrent value of close cooperation. The U.S. gains a reliable regional partner, which constrains Soviet military planning in the eastern Mediterranean and Middle East. Israel gains the close support of a superpower to offset Syria's Soviet connection, which encourages Damascus to dream of a Greater Syria whose borders would include what now is Lebanon, Jordan, Israel, and parts of Turkey.

Although Israeli-American strategic cooperation falls short of a full-blown formal alliance, Israel is gradually being transformed into

a strategic anchor on the southern flank of the North Atlantic Treaty Organization (NATO). Israel's strategic assets include its pivotal geostrategic location (which makes it, among other things, an unsinkable aircraft carrier), its formidable military strength, and its reliable and stable pro-West political system. Israel also has much to offer the U.S. as a source of hard-earned intelligence about the combat capabilities of modern Soviet weapons systems and how to counter them.

Close Israeli-American cooperation enhances the stability of the Middle East by convincing radical Arab states that Israel cannot be dismembered by military means. This improves the prospects for a negotiated settlement to the Arab-Israeli conflict and buttresses U.S. influence in both camps.

Israel is now the largest recipient of U.S. aid, receiving this year $1.2 billion in economic and $1.8 billion in military assistance, plus $750 million in emergency economic assistance. This aid should be viewed not as a handout but as one element in a web of relationships creating a critically important U.S.-Israel strategic partnership. The U.S. serves Israel's interests and Israel serves those of the U.S. Now that the relationship rests on a solid base, each partner should evaluate how the relationship's benefits could be expanded. From the U.S. perspective, this means finding ways for Israel to provide more effective support for U.S. global strategic interests.

THE REAGAN ADMINISTRATION AND ISRAEL

Ronald Reagan entered the White House as a strong supporter of Israel and a proponent of closer U.S.-Israeli relations. In 1979 he wrote: "Israel's strength derives from the reality that her affinity with the West is not dependent on the survival of an autocratic or capricious ruler. Israel has the democratic will, national cohesion, technological capacity and military fiber to stand forth as America's trusted ally."[1] Secretary of State Alexander Haig shared the President's enthusiasm for Israel and sought to include it in the anti-Soviet "strategic consensus" that he attempted to forge in the Middle East.

During his September 1981 visit to Washington, Israeli Prime Minister Menachem Begin proposed a military pact between the two countries. The Reagan Administration responded with a Memorandum of Understanding (MOU), which both nations signed November 30, 1981. It was designed to meet the threats posed by the Soviet Union or Soviet-controlled forces introduced from outside the region. Although

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1. The Washington Post, August 15, 1979.

the 1981 MOU provided for joint naval and air exercises, a framework for cooperation in military research and development, American use of Israeli medical facilities, and up to $200 million of American purchases of Israeli military goods and services each year, it fell short of Israel's expectations. Some Israelis suspected that Americans viewed it as a political gift, perhaps to assuage Israel after the bruising October 1981 congressional battle over the proposed sale to Saudi Arabia of airborne warning and control system (AWACS) aircraft and F-15 enhancement packages. Then when the Begin government extended Israeli law to the occupied Golan Heights without consulting Washington, the Reagan Administration complained that the spirit of the MOU had been undermined. In retaliation, the U.S. suspended the agreement.

The nadir of U.S.-Israeli relations during the Reagan Administration came after the June 1982 Israeli intervention in Lebanon. While Washington accepted the limited goals initially proclaimed for Israel's operation, it could not accept the prolonged siege of West Beirut, which was under the control of the Palestine Liberation Organization. The Reagan Administration deployed U.S. Marines first as part of a multinational force (MNF) to separate the combatants and facilitate a PLO withdrawal and then in an attempt to restore order following the September 1982 assassination of Lebanese President-elect Bashir Gemayel. To preserve their neutrality in the eyes of the Lebanese, the Marines distanced themselves from the Israelis and avoided any cooperation that would mark them as occupiers rather than peacekeepers.

Despite the arms-length relationship between the Marines and the Israelis, the Marines came under increasing attack by Shiite fundamentalists and the Druze, both backed by Syria. Neither group, however, was motivated primarily by factors related to the Arab-Israeli conflict. Instead, the Shiite fundamentalists were incited by the Iranian Ayatollah Ruhollah Khomeini's brand of Islamic fanaticism, and the Druze were motivated by a desire to improve their position in Lebanon's sectarian struggles by increasing the territory that they controlled.

The U.S. experience in Lebanon was a costly but valuable lesson for Washington. By distancing itself from Israel, the U.S. reduced pressure on Syria to withdraw from Lebanon and allowed Damascus to play off the U.S. against Israel. The May 1983 Lebanese-Israeli withdrawal agreement reduced the strains in the U.S.-Israel relationship and exposed Syria as the chief roadblock to the reconstruction of an independent Lebanon. Washington grew increasingly impatient with Syrian duplicity, disenchanted with the failure of

Saudi Arabia to deliver a promised Syrian withdrawal, and frustrated with the bloody jousting of warring Lebanese factions.[2] Finally the October 23, 1983, bombing of the Marine compound at Beirut airport was the catalyst for a change in American policy.

On October 29, the President signed National Security Decision Directive 111, a classified document that calls for closer cooperation with Israel. In November 1983, Israeli Prime Minister Yitzhak Shamir visited Washington to discuss it with Reagan. Though the Reagan-Shamir talks did not yield a formal pact, they produced the Joint Political Military Group (JPMG), a forum for consultation about common threats posed by Moscow and its clients. The JPMG meets twice per year, or at the request of either side, to identify possible areas of cooperation and to monitor the ongoing strategic dialogue between Israeli and American officials. Subcommittees meet periodically to develop a response to military, logistical, and legal issues. Unlike the 1981 Memorandum of Understanding, which was an umbrella agreement made at the top but not taken seriously by mid-level U.S. officials, the JPMG is an institution to build cooperation from the bottom up. It is a nexus connecting the defense establishments of both countries that generates direct contacts between working-level officials familiar with the nuts and bolts issues required for practical cooperation.

Because the JPMG's activities are highly classified, little is known by the public about what it has accomplished or how it operates. The best available information was provided by Reagan at the close of his 1983 talks with Shamir. He said: "This group will give priority attention to the threat to our mutual interests posed by increased Soviet involvement in the Middle East. Among the specific areas to be considered are combined planning, joint exercises and requirements for prepositioning of U.S. equipment in Israel."[3]

POLITICAL DIMENSIONS OF STRATEGIC COOPERATION

Both Washington and Jerusalem are constrained by foreign policy considerations in setting the scope and nature of strategic cooperation. The U.S. is a global power with global responsibilities. It has many important strategic, political, and economic interests in the Middle East and South Asia. Washington seeks an arrangement that will strengthen the U.S. vis-a-vis the Soviet Union without undermining American influence in anti-Soviet parts of

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2. See James Phillips, "Standing Firm in Lebanon," Heritage Foundation Backgrounder No. 302, October 24, 1983.

3. President's statement on the departure of Israeli Prime Minister Yitzhak Shamir, November 30, 1983.

the Moslem world. This means that U.S.-Israel strategic cooperation must be presented clearly as anti-Soviet, not anti-Arab.

For its part, Jerusalem seeks to neutralize the Soviet backing enjoyed by Israel's chief adversary--Syria--without unduly antagonizing Moscow. Israel naturally does not want to be drawn into a Soviet-American crisis unless its own vital interests are at stake. Confronted with the constant threat of Arab attack, it cannot afford to increase the risk of a direct clash with a superpower. The prime threats to Israel's security come from the Arab confrontational states, not from the Soviet Union. Although the Soviets arm and train many Arab armed forces, they rarely have confronted Israel with direct military force.[4]

A formal Israeli-American defense treaty has not been needed because the primary Soviet threat to American security is a secondary threat to Israel's interests and the primary Arab threats to Israeli security are secondary threats to American interests. The Israelis, in any event, are wary of a formal treaty with the U.S. because they fear that it would constrain their freedom of action in blunting regional threats. Bold actions such as the preemptive Israeli airstrikes that assured Israel's victory in the 1967 Six-Day War, the 1982 airstrike on Iraq's nuclear reactor, and the 1982 campaign to oust the Palestine Liberation Organization from Lebanon would have required extensive consultations, if not hard bargaining, with Washington. Given the press leaks plaguing many American bureaucracies, such a necessity would heighten the already great risk involved in such actions, deprive Israel of the advantage of surprise, and narrow its effective options. Some Israelis, moreover, are concerned that an anti-Soviet treaty with Washington could complicate efforts to ease the plight of 400,000 Soviet Jews who have been unable to emigrate.

Both countries thus prefer low-key, low-profile strategic cooperation to a full-fledged defense treaty. Yet strategic cooperation also may create major problems. A common criticism is that close Israeli-American strategic cooperation precludes Arab-American strategic cooperation. This of course overlooks the historical record that Arab states have refrained from close cooperation with Washington even when the U.S. has held Israel at arms length. Inter-Arab rivalries, xenophobia, acute sensitivity to foreign military presences spawned by bitter experiences with Turkish, British, and French empires, and an exaggerated adherence to the shibboleth of nonalignment have diluted Arab willingness to cooperate openly with the U.S. on defense matters. The lesson is that shunning Israel would not earn Washington the close cooperation of Arab

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4. See: James Phillips, "As Israel and the Arabs Battle, Moscow Collects the Dividends," Heritage Foundation Backgrounder No. 291, September 20, 1983.

states. The Arab-Israeli conflict is not the only issue, nor necessarily the most important issue, in determining the closeness of bilateral Arab-American relations.

Paradoxically, Washington's ties to Israel have been an incentive for Arab leaders to improve relations with the U.S. Egypt's late President, Anwar Sadat, launched a rapprochement with the U.S. in part because he believed that Washington's influence with Israel gave it "99 percent of the cards" in any peace process. Jordan's King Hussein also has benefited from Washington's close ties to Israel, particularly in 1970 when, with U.S. and Israeli help, he rebuffed a Syrian-Palestinian challenge to his throne. Arab-American and Israeli-American strategic cooperation are not necessarily mutually exclusive because both are targeted at the Soviet Union and its regional allies. For this reason, Washington is right to seek strategic cooperation with such Arab states as Egypt, Jordan, Saudi Arabia, and Oman, among others.

Another criticism of Israeli-American strategic cooperation is that such cooperation would damage Washington's standing as a mediator between the Arabs and Israel. This danger could be minimized by reaffirmations of U.S. commitment to the 1982 Reagan peace initiative that called for self-government for the West Bank in association with Jordan. To shun cooperation with Israel, moreover, would harm the peace process enormously by encouraging Arab states, which reject negotiations, to cling to the chimera of a military solution in the mistaken belief that Washington might abandon Israel at some point in the future. On the other hand, close cooperation with Israel furthers the peace process by building trust between Israel and the U.S., making it easier for a secure Israel to risk territorial concessions in return for peace.

THE BENEFITS OF MILITARY COOPERATION

Medical Cooperation

The JPMG initially addressed the least controversial and complex issues, such as the medical field. The U.S. sought and gained access to Israeli medical facilities in the event of a crisis. This would reduce greatly the time needed to evacuate wounded American servicemen to modern hospitals. In a full-scale U.S.-Soviet clash in the Middle East, for example, estimated U.S. casualties would create a need for 17,000 hospital beds.[5] In June 1984 the U.S. and Israel staged their first joint exercise--a medical evacuation to practice the

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5. Christopher Madison, "Reagan Links Middle East Dispute to Global East-West Struggle," National Journal, January 28, 1984, p. 162.

transportation of casualties from Sixth Fleet ships to Israeli hospitals. Cooperation in the medical field also includes the pre-positioning of U.S. medical supplies in Israel and exchange visits of American and Israeli doctors.

Military Cooperation in the Eastern Mediterranean

Washington has shown interest in Israeli help in possible air and sea battles with Soviet forces in the eastern Mediterranean. The growing strength of the Soviet Navy and declining political reliability of Premier Andreas Papandreou's anti-American regime in Greece has increased the importance of Israeli cooperation in this vital area. Israel, meanwhile, depends on Mediterranean routes for virtually all exports and imports. The Israeli Air Force has had extensive combat experience over the Mediterranean and could play a dominant role in the area south of Turkey and east of Crete.

A U.S. Navy study reportedly has concluded that Israel's Air Force alone could destroy the entire Soviet Fleet in the eastern Mediterranean.[6] By one estimate, Israel could launch 20 times as many air attack sorties as an aircraft carrier air wing or 12 times as many air combat sorties.[7] Even if only 10 percent of the Israeli Air Force were committed to sea control missions, Israel could project more air power than could a U.S. carrier in the eastern Mediterranean. The Sixth Fleet itself rarely deploys more than two carriers at once in the entire Mediterranean.

The small Israeli Navy, meanwhile, is a modern force comprised of fast missile boats that pack considerable punch. Operating under Israeli air cover, the Israeli Navy could challenge Soviet naval forces up to three hundred miles from Israel's coast. To test this, in December 1984, Israel and the United State conducted joint anti-submarine warfare exercises. Given the large Soviet submarine fleet and Israel's limited experience in anti-submarine warfare, this is a promising area for cooperation.

Even if Israel sits out a military conflict with the Soviet Union, Jerusalem could make a major difference in the outcome by permitting U.S. warplanes to use Israeli air bases. This would extend the strategic depth of NATO's southern flank and help counterbalance Soviet access to Syrian and Libyan airbases.

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6. Citation of ABC News Report in Wolf Blitzer, Between Washington and Jerusalem (New York: Oxford University Press, 1985), p. 76.

7. W. Seth Carus, Israel and the U.S. Navy, AIPAC Papers on U.S.-Israel Relations, Washington, D.C., 1983, p. 9.

Israel offers other benefits to the U.S. Navy. For one thing, U.S. Navy fighter bombers can use Israel's bomb range in the Negev desert. For another, the U.S. Navy now makes an average of two port visits per month at the Israeli ports of Haifa, Ashdod, and Eilat. Although warships of the Sixth Fleet did not begin visiting Israel until 1977, Haifa has become an important source of fresh food for the U.S. Navy. Israeli harbors are now favorite ports for American sailors. Indeed, with the recent terrorist attacks on U.S. servicemen in Europe, Israel is one of the few places where uniformed Americans on shore leave do not have to fear terrorist attacks.

Another promising area for cooperation lies in Israeli maintenance of U.S. Navy vessels. Haifa offers dockyard and repair facilities that easily could be expanded to accommodate many classes of American ships. Aside from the greater flexibility and effective fighting strength that this would give the Sixth Fleet, the use of Israeli repair yards would strengthen American bargaining leverage over Greece. If Papandreou carries out his threats to terminate U.S. access to Greek naval bases in 1988, then Israel, along with Turkey, could replace the Greek bases.

Persian Gulf Contingencies

Jerusalem would play more of a role in eastern Mediterranean than in Persian Gulf contingencies. But in the event of a U.S.-Soviet clash in the Persian Gulf area, Israel could provide air cover for U.S. troops being airlifted on the initial leg of their journey, probably to Egypt. Given the lack of long-range American fighter escorts, an Israeli air umbrella would free U.S. tanker planes and fighters that would otherwise be needed to protect defenseless air transports.

Israel also could serve as a depot for pre-positioned U.S. ammunition, fuel, and weapons. By storing such heavy war material 6,000 miles closer to the prospective front, the U.S. could reduce significantly the Herculean logistical task of airlifting combat units to the Gulf theatre. These pre-positioned supplies could be flown to Egypt or some other Arab staging area, to be married to American troops arriving from the United States. While pre-positioned stocks also should be dispersed prudently in friendly Arab states, it would be unwise for Washington to concentrate them in any one Arab state, given the political volatility of many Arab governments and the limited capability of some Arab states to provide security against Soviet air attack and commando operations.

Israel offers other advantages as a pre-positioning site. The Israelis have developed a "dry storage" technique that enables them to store sophisticated weaponry indefinitely in airtight containment vessels without any degradation in performance. Israel's pivotal location also would enable it to provide pre-positioned supplies to a

swing force assembled for NATO contingencies, one of the many ways that Israel could enhance the strategic depth of NATO's southern flank.

The strongest argument against using Israel as a pre-position site is that Persian Gulf states may not accept assistance facilitated, however indirectly, by Israel. But if the U.S. quietly stores supplies in Israel without publicly admitting it, Persian Gulf governments would not be forced to rule out such assistance in advance. Even if domestic political pressures should force American friends in the Persian Gulf to decline such assistance publicly, there is often a wide discrepancy between what governments do in a crisis and what they say in peacetime. Finally, if Persian Gulf states are adamantly opposed to pre-positioning U.S. supplies in Israel, they always have the option of enlarging the scope of their own strategic cooperation with the U.S. to diminish their dependence on Israeli cooperation in a crisis. Having made American security planning more difficult by denying the U.S. local bases, Arab Gulf states cannot expect to dictate to Washington as to the source of American assistance.

Military Intelligence

The U.S. has been able to study the military lessons of the Arab-Israeli wars to glean information that may improve U.S. security. For two decades, Israel has fielded a modern military force equipped with state-of-the-art weapons to face Arab forces increasingly equipped with sophisticated Soviet weapons. Periodic Arab-Israeli clashes have made the Middle East the prime combat proving ground for Soviet and American military technology. Over time, Israel has gained extensive experience in defeating Soviet weaponry, countering Soviet tactics, improving American weaponry, and devising its own combat doctrines. The U.S. military has profited immensely from Israel's hard-earned combat experience in the past and should work to take full advantage of Israel's military expertise in the future.

Following each of its wars, Israel has made available to the Pentagon invaluable data on the performance capabilities, technical specifications, and electronics components of Soviet weapons encountered on the battlefield. Israel has provided intelligence bonanzas in the form of captured Soviet-made tanks, electronic equipment salvaged from the remains of Soviet-made warplanes, and even an entire Soviet radar station captured during the 1969-1970 war of attrition. Israel also provided the U.S. access to an intact MiG-22 delivered by a defecting Iraqi pilot. In many cases these Soviet-made weapons never before had been subject to detailed Western inspection.

Israel has contributed significantly to the evolution of U.S. military tactics. Following the 1967 war, the Israelis passed on

information on the Soviet high-altitude SAM-2 anti-aircraft missile, which enabled U.S. pilots to survive missile barrages over North Vietnam.[8] Israel later passed on intelligence on the low-altitude SAM-6 missile after the 1973 war and on other SAM systems after the 1982 war in Lebanon. Israeli experience has led to the decreased use of searchlights on tanks; the increased reliance on thermal sights for nightfighting; the greater use of tanks and armored personnel carriers in mixed formations; improvements in command, control, and communications between air, land, and sea units; the provision of electronic warfare capabilities to reconnaissance units; and improved aerial electronic countermeasures.[9]

In addition to influencing Western tactical doctrines, Israeli-supplied military intelligence has affected the evolution of American military technology. A joint Israeli-American analysis conducted after the 1973 war generated eight volumes of 200 to 300 pages each that affected the development of American weapons systems and eventually the U.S. defense budget.[10] The 1982 war in Lebanon yielded substantial electronic intelligence on Soviet SAM missile systems and information on the vulnerabilities of T-72 tanks that may spark the creation of new military tactics and technologies to defeat these threats.

Technical Cooperation

Israel has improved American weapons to increase their combat capabilities, survivability, and endurance. The Israelis have made 114 modifications of U.S. M-48 and M-60 tanks, many of which were adopted later by the U.S. Modifications also have been made to the A-4, F-4, F-15, and F-16 warplanes, M-113A armored personnel carriers, and M-109 self-propelled artillery. In 1975, Israelis discovered defects in U.S.-made armor-piercing ammunition and alerted the Pentagon, leading to changes in U.S. manufacturing procedures.[11]

Israel also has been a source of innovation in developing and applying new military technologies. The Israelis have been pioneers in fielding Remotely Piloted Vehicles (RPVs) to reconnoiter and strike heavily defended targets. The U.S. Navy has purchased the Israeli

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8. The New York Times, September 5, 1982.

9. Steven Spiegel, "Israel as a Strategic Asset," Commentary, June 1983, p. 55.

10. The New York Times, March 13, 1983.

11. Steven Spiegel, "The Defense Benefits of the U.S. Relationship with Israel," unpublished paper, 1985, pp. 10-15.

Mastiff RPV and has initiated a joint program with Israel to develop another RPV.[12] Israeli companies also have contracted to provide components for the SMAW-B-300 rocket launcher for the Marines, heavy duty air filters for U.S. helicopters, and an engineering vehicle for the Army Corps of Engineers.

In May 1986 Israel also became the third U.S. ally to join the research activities for the Strategic Defense Initiative (SDI). Israel's expertise in lasers, computer software, and command and control technologies are promising areas for bilateral cooperation in developing strategic defenses.

POLICY RECOMMENDATIONS

Washington should integrate Israel discreetly into the global anti-Soviet defense system to strengthen deterrence of the Soviet Union in the strategic area between NATO's southern flank and the Persian Gulf. Joint contingency plans should be drawn up secretly to keep Moscow and its regional allies guessing about the extent to which Israel is willing to commit itself to containing Soviet aggression in a crisis. The eastern Mediterranean region should be the focus of such joint contingency planning because Israel's vital interests and greatest capabilities vis-a-vis the Soviets are centered there.

The U.S. should seek access to Israeli air bases on a contingency basis. The Sixth Fleet should increase its use of Israeli ports and naval repair facilities to augment its flexibility and reduce its dependence on problematic Greek bases. Naval and air exercises should be held regularly to familiarize U.S. and Israeli naval and air forces with each other and enhance teamwork in the event of a crisis.

U.S. medicine, fuel, ammunition, and weapons should be secretly pre-positioned in Israel to facilitate rapid movement to the Persian Gulf or NATO's southern flank if needed. An active Israeli role in Persian Gulf contingencies should be minimized to ease Arab anxieties about Israeli involvement and Israeli anxieties about being drawn into conflicts in areas outside the bounds of its vital interests. On the other hand, active Israeli support of U.S. efforts to help Freedom Fighters in Central America and Africa would be a powerful demonstration to the American public of Israel's status as a special ally.

Military intelligence liaison and technical cooperation should be organized to promote the maximum degree of cross-pollination in the joint assessment and countering of the Soviet military threat.

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12. Aviation Week and Space Technology, January 13, 1986.

Israeli innovation in military technology should be adopted when practicable, including potential Israeli contributions to the Strategic Defense Initiative. In the Gramm-Rudman era, increased cooperation with Israel offers a cost-effective way to enhance the effectiveness of the American military establishment.

CONCLUSION

Israeli-American strategic cooperation is not a panacea that will blunt all Soviet threats in the Middle East, but without it, the world will be a more dangerous place. Such cooperation deters the aggressive action of Moscow and its regional clients, encourages Arab states to opt for a negotiated settlement rather than military action in the Arab-Israeli conflict, and strengthens NATO's southern flank. Israel has much to offer the U.S. in terms of military intelligence, technical innovation, access to air bases and naval facilities, and a pre-positioning site for fuel, medicine, ammunition, and weapons. Washington should work closely yet discreetly with Israel in order to transcend the zero-sum nature of the Arab-Israeli conflict.

James A. Phillips
Senior Policy Analyst

U. S. Companies Oppose Lavi Aid

Use of Foreign Military Sales credits in Israeli project sparks complaints of aircraft export market competition

By Clarence A. Robinson, Jr.

Washington—Mounting opposition by U. S. aerospace companies to the use of Foreign Military Sales credits by Israel for the development of the new Lavi fighter is causing the Reagan Administration to delay decisions that earlier appeared favorable to Israel (AW&ST Jan. 10, p. 20).

Claiming competition in the world marketplace to the U. S. FX international fighter program from the Lavi, Northrop's chairman of the board and chief executive officer, Thomas V. Jones, has asked Secretary of State George P. Shultz, and Defense Secretary Caspar W. Weinberger to become directly involved in the Lavi decision.

Jones has written both officials expressing opposition to U. S. funding being applied to Lavi development, and Northrop is being supported in this effort by General Electric, according to Reagan Administration officials.

The Lavi fighter program in Israel would establish a new tactical fighter in the world marketplace "in direct competition with U. S.-built aircraft, since the Lavi will be an aircraft in the same general performance category as the [General Dynamics] F-16," Jones wrote. "Contentions that it is merely a simple, low-cost tactical and training aircraft are incorrect, as comparisons of the Lavi, F-16 and [Northrop] F-20 vehicle performance show." He included performance comparison charts with the letter.

Israeli officials last week responded to the action by Northrop and General Electric by offering to sign an agreement with the U. S. that the Lavi would not be exported for at least 12 years. They said the development program would continue using U. S. composite materials technology, if the Reagan Administration will permit the transfer of technology to Israel.

The Administration was on the verge of releasing the composite materials technology, separating it from the decision on using Foreign Military Sales credits for Lavi development when objections to the Israeli fighter program began in late January.

Jones wrote Shultz that the FX program stipulated that the U. S. government would not provide funding for development of the FX aircraft and that aircraft companies would have to assume all financial and market risks.

"U. S. financial support now for development of a foreign aircraft destined for export is a direct contradiction of this policy and certainly will discourage fur-

U. S. Budgets $9.2 Billion for Security Aid

Washington—The Reagan Administration is seeking approximately $9.2 billion for security assistance programs to foreign nations in the Fiscal 1984 military spending request, an increase of 17.7% over the current fiscal year allocation.

Half of the funding being requested for security assistance would go to meet U. S. strategic objectives in the Middle East. More than half the Foreign Military Sales credit funding sought in the new budget would go to Israel and Egypt. The Defense Dept. has earmarked $1.7 billion for Israel and $1.3 billion for Egypt. All of the forgiven Foreign Military Sales credits would go to these two nations—$550 million to Israel and $450 million to Egypt.

Defense Dept.'s Fiscal 1984 security assistance programs include:

- **Military assistance program**—$650.8 million for use in 20 countries. This program was being phased out, but Congress made available funding in Fiscal 1982 and 1983 for economically hard-pressed nations. An additional $46 million is being asked for general costs, and another $55 million for reimbursement to the Defense Dept. for emergency grant assistance. A Fiscal 1983 supplemental request seeks $167 million for military assistance.
- **Foreign Military Sales**—Sales of military hardware directly to foreign governments on a cash basis. More than 100 countries are authorized to procure equipment on this basis.
- **Foreign Military Sales credit financing**—$5.4 billion in FMS credits, including the $1 billion in forgiveness to Israel and Egypt. FMS credit financing provides direct credits and guaranteed loans through the Federal Financing Bank. These latter transactions are guaranteed by the Defense Dept. and let at prevailing interest rates. These credits allow nations to procure equipment directly from the U. S. government or from contractors. The guaranteed credits are allocated with 84% going to seven nations—Israel, Egypt, Turkey, Greece, Spain, Pakistan and South Korea. The Defense Dept. is asking for an additional $525 million in a Fiscal 1983 supplemental request for guaranteed credits.
- **International military education and training program**—$56.5 million to fund training for students from 80 countries, an increase of $11.5 million from the Fiscal 1983 continuing resolution authority. An additional $1 million will be sought as part of the Fiscal 1983 supplemental request.

Subtracting the guaranteed loans from the request for $9.2 billion provides for a Fiscal 1984 budget authority request of $4.8 billion. The increase in the Fiscal 1984 funding for military grants—forgiven credits, military assistance and training—is a 20% increase over the current fiscal year.

The total Fiscal 1983 supplemental request for security assistance programs is $987.5 million, with $525 million applied to guaranteed loans. This request also would provide $251 million to assist Lebanon in modernization of its armed forces.

Other security assistance funding is related to that of the Defense Dept. but is administered by various agencies. It includes:

- **Economic support fund**—$2.9 billion in Fiscal 1984 and an additional $294.5 million in the Fiscal 1983 supplemental request. This money is used for direct cash transfers, commodity import transfers and project assistance. It can be designated for either grant or loan assistance.
- **Peacekeeping operations**—$46.2 million. This funding provides for observers in the Sinai, the multinational force in Lebanon and United Nations forces in Cyprus.

Turkey would receive approximately $950 million in the budget request, if approved in Congress. The funds earmarked for Pakistan include $300 million in FMS credits and $225 million in economic support funds to help deter Soviet Union forces in Afghanistan by continuing a military modernization program. Military assistance grants also would go to Sudan.

Morocco and Tunisia, which face threats from Libya or Libyan-equipped forces, would get military assistance grants.

More than half the Foreign Military Sales request for Pacific defense efforts would go to South Korea, with that nation getting $230 million. The Philippines would get $50 million, Indonesia $50 million and Thailand $94 million.

ther investments by U. S. industry at the very time the Administration is encouraging private initiatives to support our economic as well as national security objectives," Jones said.

He added that Northrop and its industrial supplier team accepted the conditions in the FX program, and that Northrop so far has spent more than $450 million of company funds to develop the F-20 and suppliers have spent additional significant funds in the program.

Priority Program

"The development of the Lavi fighter program, supported by U. S. technology and U. S. funds, clearly changes the market risks we were asked to take," Jones said. He explained that the Lavi is planned as a priority development program in Israel with the first flight in approximately two years.

"The initiation of this program with U. S. support on such an urgent basis could cause countries now considering the purchase of the F-20 to delay their decisions," Jones continued. "It certainly would cause these countries to question the U. S. commitment to the FX program."

Israeli government officials and Israel Aircraft Industries officials, Jones said, have stated that even with U. S. support the Lavi program is not economically viable without export sales. The Lavi will be competitive with U. S. aircraft, and particularly the F-20, in markets such as South America, Africa and other areas where Israel has been active as an arms supplier.

"While Israel would be expected to accede in principle to U. S. control over sales of the Lavi to third countries, such controls are often uncertain and have been voided by policy exceptions in the past," Jones said.

The U. S. support for the Lavi program would affect the ability of Northrop and its suppliers to proceed with the F-20 program, Jones said.

Technology Transfer

Administration officials said last week that while the government may agree to transfer technology for the Lavi development program, the political situation with Israel's failure to back the Reagan Middle East peace plan and delay in reaching an agreement to withdraw its troops from Lebanon is complicating the use of Foreign Military Sales credits to develop the Lavi.

State Dept. officials prepared a study on the Lavi program that states the original design of the Lavi as a low-cost aircraft to supplement McDonnell Douglas F-15s, F-16s and possibly Northrop F-18L fighters in the Israeli air force has changed considerably since the Lavi was announced in February, 1980.

The Israelis may now consider the Lavi

Israel to Boost Combat Aircraft Strength

Washington—Israel plans to increase its air force strength from 19 combat aircraft squadrons deployed at nine key air bases to 24 squadrons at 10 bases by the mid-1990s. While increasing its aircraft inventory, Israel plans to modernize its air force by replacing the Israel Aircraft Industries Kfir C-2s and McDonnell Douglas A-4s with the new Lavi tactical fighter. The nation also plans to replace McDonnell Douglas F-4Es with a combination of Northrop F-18L, General Dynamics F-16E or McDonnell Douglas F-15E all-weather tactical fighter aircraft.

The Israeli government has established the requirement for 600 high-performance combat aircraft to meet the perceived threats it will face through the 1990s.

U. S. officials believe, however, that the current inventory of 584 jet fighters is sufficient to meet the needs against any Arab force. But this force would be inadequate in the 1990s, Israel said, because 473 of the 584 aircraft, or 81%, are A-4s, F-4s and Kfir C-2s. These aircraft rely on technology that will be 30 years old by the mid-1990s.

Israel's air force operates three F-16, two F-15 and three Kfir squadrons in the fighter-interceptor role, one Kfir and five F-4 squadrons in fighter-bomber roles, and four A-4 squadrons and one Kfir squadron in the attack-bomber role.

By 1986, Israeli force levels will peak with 703 aircraft. This will drop steadily until 1989, when the first Israel Aircraft Industries Lavi fighters would join the inventory. Even then, the numbers would decline until they level at 600 aircraft.

Current fighters in the Israeli air force include:

- **F-15 aircraft**—39, with the number increasing to 49 by 1986.
- **F-16 fighters**—72, with the number increasing to 144 by 1986.
- **F-4 aircraft**—133, with the number declining to approximately 100 by 1991.
- **Kfir C-2**—163, with the number peaking at 220 by 1986 and dropping to 100 by 1995.

The Israeli air force plans to refit with one or a combination of F-18L/F-15E/F-16E or a reengined, modernized F-4E by 1991 with 12 new aircraft, climbing to 60 of these aircraft by 1995.

Deliveries of 11 F-15s and 75 F-16s to Israel will take place over fiscal 1984-88, and about 60 of the A-4s are in flyable storage and available for sale. Significant reductions in the active A-4 inventory are expected throughout the late 1980s because of anticipated sales, attrition and storage. It is estimated that only one squadron of A-4 aircraft will remain by 1995 as an operational training unit.

Kfir production is expected to remain at 18 aircraft a year through 1986, when production is scheduled to end. This is expected to be followed by a concerted effort to export the Kfir as phase-out from the inventory takes place in the early 1990s.

U. S. Administration officials said Israel has the capability to overcome any conceivable combination of Arab air power, and that Israel has a qualitative edge in every facet of air combat methodology.

A key to the Israeli air force's combat success is the air battle management system, which should be considered in any comparison of Israeli and Arab air power. A U. S. study said that without including the air battle management system any comparison is meaningless or misleading. The Israeli system ties together a variety of ground-based and airborne intelligence collection sensors as force multipliers in a responsive command, control and communications network to enhance use of tactical air power.

Assets in the air battle management system include Boeing RC-707 electronic warfare aircraft, Grumman E-2C Hawkeye early warning aircraft, RF-4E reconnaissance aircraft with modifications, remotely piloted vehicles, Grumman OV-1D Mohawks and near state-of-the-art electronic warfare assets. These include balloon-borne electronic intelligence sensors, and by the end of this year, communications intelligence collectors, Beech RC-12D signal intelligence collectors and ground-based signal intelligence centers. All the intelligence sensors are equipped with data links for near real-time intelligence flow directly to Israeli pilots.

The success of the air battle management system can be judged by results: Since 1979, the Israeli air force has destroyed more than 120 Syrian aircraft and 30 Syrian Soviet-built, surface-to-air missile installations, while incurring the loss of one F-4.

U. S. officials estimate that by the mid-1990s, most Arab nations bordering Israel will have modernized their forces with significant qualitative improvements in ground-based air defenses. These include the Raytheon Improved Hawk missile system in Egypt, Jordan and Saudi Arabia, and the Soviet-built SA-8 in Syria and Jordan.

Jordan already has taken delivery of the SA-8, and the Soviets also have started deployment of the high-altitude, long-range SA-5 Gammon missiles in Syria for the first time outside the USSR. Because of these improvements, Israel will need an advanced fighter-bomber force that can attack targets deep in hostile territory and fight its way back. Based on Israel air force doctrinal priorities, this is a requirement with great emphasis, U. S. officials said.

as a potential first-line fighter with performance characteristics that could compete eventually with those of the F-16. The projected development cost for the Lavi has "skyrocketed accordingly—$1.37 billion by Israeli estimate," the State Dept. study said. "The Israelis are seeking extensive U. S. financial and technical support for the program. Without this support, the Lavi program, as currently envisioned, would be placed in jeopardy."

No Objections

The U. S. response to the Lavi development plan has been to raise no official objections, and the previous Administration approved coproduction of the Pratt & Whitney PW1120 engine to power the Lavi. Funding and transfer limits have been established that include:

- Foreign Military Sales credits use would be limited to procurement of material in the U. S.
- No Foreign Military Sales credits would be approved for aircraft intended for third-country sales.
- Third-country sales would be approved by the U. S. on a case-by-case basis.

The first of these guidelines was established to reinforce U. S. policy prohibiting the use of Foreign Military Sales credits for offshore procurement by emphasizing that an earlier U. S. decision to allow $107 million in FMS funding to support production of the Merkava tank in Israel was not a precedent but a one-time exception.

The goal of the second guideline is to avoid any indication that the U. S. would be subsidizing development of a competitor for U. S. aircraft exports. The final guideline reflects the legal constraints over third-country sales of aircraft using U. S. components.

These guidelines were used last March, when the Administration agreed to allow Israel to use $180 million in FMS credits to procure the PW1120 engine components in the U. S. Pratt & Whitney is developing the PW1120 engine with its own corporate funds and has invested approximately $40 million in the program.

Israel selected the PW1120, an experimental engine, in competition with the General Electric F404 engine that powers the F-18 and the F-20, a 17,000-lb.-thrust-class engine in production. Israel selected the PW1120 to gain increased thrust for the Lavi—20,620 lb. sea level standard with maximum afterburner.

State Dept. officials said in the Lavi study Israel paid for the Kfir fighter with its own resources but the U. S. permitted Israel to procure components, materials and services in the U. S. using FMS credits. Applying these guidelines to the Lavi, they said, would be consistent with established policy.

Under these guidelines, Israel would have to use its own funds for development, although it would be authorized to procure components from the U. S. using FMS credit funds.

The recent visit to the U. S. by the Israeli Lavi team, headed by Gen. Amos Lapidot, chief of the Israeli air force, established that Israel "is totally committed to the production of the Lavi and that the Israeli air force will have a high-performance mixture of F-15s, F-16s and perhaps F-18s, with the Lavi as the workhorse on the low end replacing [McDonnell Douglas] A-4s and Kfirs," State Dept. officials said.

Lapidot estimated that the Lavi flyaway cost will be approximately $10.8 million per aircraft in Fiscal 1982 dollars. Including recoupment of research and development funding would bring the unit cost to approximately $17 million.

Comparable Cost

Israel, however, maintains that the Lavi will be less costly than most comparable U. S. aircraft bought off the shelf, mostly because of lower labor costs in Israel and a leaner administrative and engineering structure.

The first Lavi prototype would fly in 1985, production of the Mach 1.85 aircraft would begin in 1990 at the rate of 30 aircraft a year, and the Israeli air force requirement of 300 Lavis would be met in the year 2000.

Production of the Lavi would help Israel's economy by maintaining Israel Aircraft Industries—Israel's largest single employer. If U. S. aid to Israel remains at current levels, the government there will experience a financial gap—the sum of civilian goods and services deficit, self-financed military payments and debt repayment—almost doubled by 1985.

The Israeli financial gap in the current U. S. fiscal year is $5.1 billion. It is expected to be $6.6 billion in Fiscal 1984

Quick Reaction RPV Under Development by Boeing

Expendable remotely piloted vehicle, designed to attack high-priority targets, is being developed by Boeing Military Airplane Co., Wichita, Kan., under an Air Force quick reaction capability program designated Pave Tiger.

Pave Tiger is designed to assist tactical aircraft in nonnuclear theater-type warfare by carrying payloads that include electronic countermeasures systems, warheads or sensors. Mission flight paths would be preprogramed prior to ground launch. Boeing holds a $14-million contract from USAF Aeronautical Systems Div. for 14 vehicles, 12 of which are for testing and two for spares. The contract runs through this September and calls for flight demonstrations to start this spring.

Following flight testing, USAF expects to award a production contract aimed at near-term requirement for an operational system. Key to the program is its low cost, according to Lt. Col. Jack Colligan of Aeronautical Systems Div.'s Deputy for Tactical Systems. Until recently the costs of fielding unmanned expendable aircraft to supplement tactical fighters in high-risk missions have been prohibitive, he said.

Boeing Military Airplane Co. developed the vehicle with company funds with emphasis on low initial and life cycle costs. Vehicle design involves use of injection-molded composite materials including reinforced glass fiber, resins and polyurethane. The company-funded program included building a prototype, shown being flight tested on a Boeing test range.

The USAF/Boeing YCGM-121A is powered by an aft-mounted, two-cylinder 28-hp. engine built by Cuyuna Development Co., Crosby, Minn., turning a four-blade pusher propeller. Length is 6.9 ft. and span is 8.5 ft.

Kfir Proposed for U. S. Navy Aggressor Role

Washington—Israel Aircraft Industries Kfir C1 fighters would be used as adversary aircraft in U. S. Navy aggressor training under a turnkey lease program proposed to the service by Atlanta-based Flight International.

The Navy has embarked on a program to replace its Northrop F-5s and McDonnell Douglas A-4s now used in aggressor training squadrons on the East and West coasts (AW&ST Oct. 18, 1982, p. 34).

The Fiscal 1984 budget includes a Navy request to acquire four aircraft for $29.1 million, plus $3.2 million for initial spares. If the adversary training aircraft program survives the Defense budget debate, the Navy intends to ask for funds for eight aircraft in the Fiscal 1985 budget and 12 in Fiscal 1986.

Two aircraft also being considered by the Navy for the aggressor training role subject to their going into production are the Northrop F-20 Tigershark and the General Dynamics F-16 with the General Electric J79 engine installed. The Kfir C1 also is powered by the J79.

Under Flight International's proposal, the company would furnish 12 Kfir C1s to the Navy aggressor squadrons on each coast and then provide the support and maintenance for the aircraft.

"All the Navy will have to do under our proposal is provide the pilot to fly the Kfir," Douglas G. Matthews, president of Flight International, said.

Flight International already has an agreement with the Israeli air force to cover the purchase of the 24 Kfirs if the Flight International proposal is accepted by the Navy, Matthews said.

He said the company also has determined the cost of shipping the aircraft to the U. S. and the amount needed to provide maintenance and support for the aircraft and the General Electric J79 engines.

"We can provide the aircraft and all the support for less than the Navy's program costs," he said. "They will be hard pressed to even buy the aircraft with the money the Navy has, never mind support them, plus the fact that we can give them aircraft within months, not years."

The Navy's decision on whether to lease or purchase adversary aircraft is expected to be made within the next month. If the Navy chooses to purchase aircraft, as was its original intent, a request for proposals for the aggressor training aircraft could be issued this summer, Navy officials said.

Flight International provides various services to the Navy, including airborne electronic countermeasures training, target towing and radar operator training (AW&ST Mar. 30, 1981, p. 74).

and $7.5 billion by Fiscal 1985. U. S. aid pays for approximately $2 billion of the financial gap. Without this aid, Israel's gross national product would have declined by 4% instead of growing by 3.6% in 1982, according to State Dept. officials.

Israel must rely heavily on bank financing in the future, even if U. S. aid continues at current levels. Israel is, however, facing increasing difficulty in arranging new bank loans as more banks approach what they regard as the maximum prudent exposure in Israel. This resulted in depressed short-term borrowing last year.

Israel Exports

Administration officials point out that at the same time, Israel is giving what amounts to concessional loans to buyers of exported weapons. Israel's interest rates are competitive in world markets at a 2-3% rate.

The program costs of the Lavi fighter using current Israeli cost estimates would be approximately $6.4 billion for 300 aircraft, about the same as 300 coproduced F-16s, according to the State Dept. study.

General Dynamics has proposed 30% coproduction of the F-16 in Israel, and Israel has stated that 35-40% of the approximately $5 billion for the Lavi program would be spent in the U. S., and that a number of U. S. aerospace companies would benefit.

If 60% of the Lavi is produced in Israel and costs are held to the minimum, it is possible for Israel to procure 300 of the fighters for $4.8 billion versus $5.5 billion for 300 coproduced F-16s.

"However," according to State Dept.'s Lavi study, "given the uncertainty of the Lavi program and given the possibility of a higher Israeli portion of F-16 coproduction—40%—it cannot be asserted that the net cost of the Lavi would be less than the F-16."

General Dynamics, in addition, has offered Israel 12% coproduction of future F-16 sales, either to the U. S. Air Force or to other countries.

"Israel would be in better shape economically and in terms of long-term production employment with the F-16, depending on third-country sales," the study said.

"At this point, U. S. aircraft for the 1990s will be far more capable than the Lavi, although probably more expensive as well," the study said. "We have not yet heard any strong views on the competition point from any company. It may be indicative that General Dynamics, prime builder of the F-16, is one of the leading contenders for design contract for the Lavi wing and tail assembly." The study was completed before Jones' letters.

The Lavi project would link 12,000 jobs in Israel to the fighter, and 8,000-10,000 jobs are linked to F-16 coproduction. Israel now has 6% unemployment, and the government wants it reduced drastically by the end of the year.

Lapidot told the Reagan Administration that Israel wants to use FMS credits to design an aircraft using components already developed for other U. S. aircraft such as the F-15 and F-16. According to Lapidot, this would not be pure research and development but merely the purchase of finished goods. The use of FMS credits would, therefore, be consistent with U. S. policy and legislation. □

France Flight Tests Nuclear-Armed Mirage

Paris—Flight testing has begun with the first French air force Dassault-Breguet Mirage 2000 fighter designed for nuclear attack missions.

The Mirage 2000N made its initial flight from Istres, France, Feb. 3. Dassault-Breguet pilot Michel Porta flew the aircraft to a top speed of Mach 1.5. The mission also evaluated the aircraft's low-speed flight envelope.

The nuclear attack aircraft is a two-seat derivative of the basic Mirage 2000 and is equipped for all-weather, low-altitude penetration. It carries an Electronique Serge Dassault/Thomson-CSF Antilope radar for terrain following.

Aircraft systems have the redundancy required for high reliability when the Mirages are on their quick-response alert status. The N version Mirages will handle the nuclear attack mission now assigned to certain Mirage 3Es and Mirage 4s (AW&ST June 8, 1981, p. 77).

The Mirage 2000Ns will carry a single Aerospatiale ASMP supersonic missile with a thermonuclear warhead. The ASMP is powered by a ramjet engine and has a range of 30-60 mi.

Program officials said the second Mirage 2000N is in final assembly and is expected to fly this summer.

Merkava Mark 2

new version of a remarkable Israeli tank

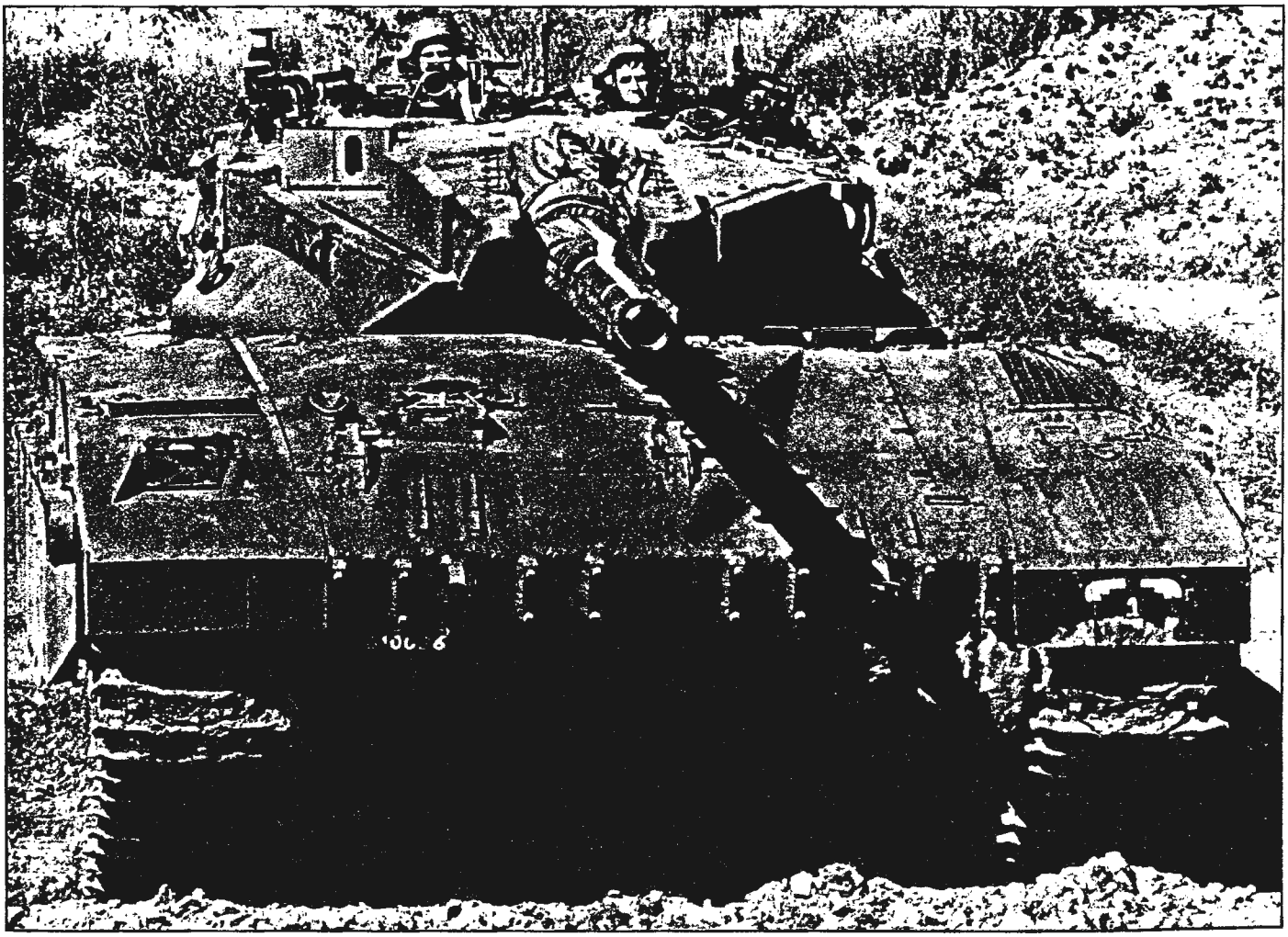
*by R.M. Ogorkiewicz**

There has been a good deal of talk recently about abandoning the traditional configuration of tanks in favour of novel designs. But while others are talking about it or, at most, building experimental vehicles, the Israel Defense Forces have put into service a radically new type of tank, the Merkava. *What is more, this unconventional tank has already proved itself in battle and its original version has been followed by an even more effective model, the* Merkava *Mk2. The Mk2 is now being issued to the IDF Armoured Corps and the writer was given a unique opportunity recently not only to see it being built but also to assess its performance under field conditions.*

To appreciate the *Merkava* fully it is necessary to consider, if only briefly, its origins. These stem from the refusal of other countries during the 1950s and 1960s to sell new battle tanks to Israel, which had to make do with second-hand vehicles. The situation appeared to change in 1966 when negotiations began with Britain about the procurement of the then new *Chieftain* tank. Two *Chieftains* were actually sent to Israel for trials but in 1969 the British government of the day went back on its offer. This forced Israel to consider whether it could design and produce a tank of its own and, what is more, whether this could be done economically. Economic questions became dominant and in the end it was the Ministry of Finance which decided, in August 1970, that the development of an indigenous tank should go ahead.

At the time Israel had no tank manufacturing industry, although the IDF had acquired some experience by upgrading the second-hand *Sherman, Centurion* and M48 tanks which it was able to acquire. In consequence, not only did the

▼ Front view of *Merkava* 2 showing the small hinged part of the glacis plate which can be opened for access to the engine compartment for routine maintenance. The gun travelling lock is mounted on the glacis, offset to the right. The driver's station is well set back and the driver has three vision blocks. It would appear that visibility over the right wing of the tank is limited by the slight bulge in the engine decking. The resilient mountings for the skirt plates can be seen on the right of the tank (left in photo). In this picture, the loader's and commander's machine guns are lowered on their mounts, thereby reducing even further the number of projections above turret-roof level. In front of the loader is the mount on to which his machine gun is swung when he wishes to fire, with the outer trunking and muzzle of the 60mm mortar immediately in front of the mount. The gunner's sight head, in front and just to the right of the commander, has an armoured cover for protection and to reduce reflection from the optics.



* The author is a lecturer in engineering at Imperial College, London, and a consultant and writer on armoured vehicles.

proposed tank have to be designed but the industrial infrastructure required for its production had to be created. This task was entrusted to a program management headed by Major General Israel Tal, who had carried out the feasibility study which preceded the decision to go ahead with what was to become the *Merkava* and who has led its development ever since.

If the task facing him was formidable, General Tal brought to it a wealth of experience, having been the Commander of the IDF Armoured Corps and of one of the three Israeli columns on the Sinai Front in the Six Day War of 1967, as well as being an accomplished tank gunner. His personal experience and that of his design team of IDF officers has been augmented to an increasing extent by detailed analyses of the hits sustained by Israeli and opposing tanks, which began to be made even before the Six Day War. These now cover several thousand cases and form a unique fund of the most up-to-date knowledge of what happens to tanks under fire.

All the experience and analysis led General Tal to conclude that a high degree of survivability could and should be achieved in the design of the proposed tank. In keeping with this he also opted for a high degree of tactical rather than strategic mobility. Survivability was redefined, however, in terms of the crew and the ammunition instead of the whole tank. In other words, General Tal and his team recognised that, no matter what was done, an equally high degree of survivability could not be achieved for all components of a tank but that a high degree of protection could be provided to its two most vulnerable parts, which are the crew and the ammunition.

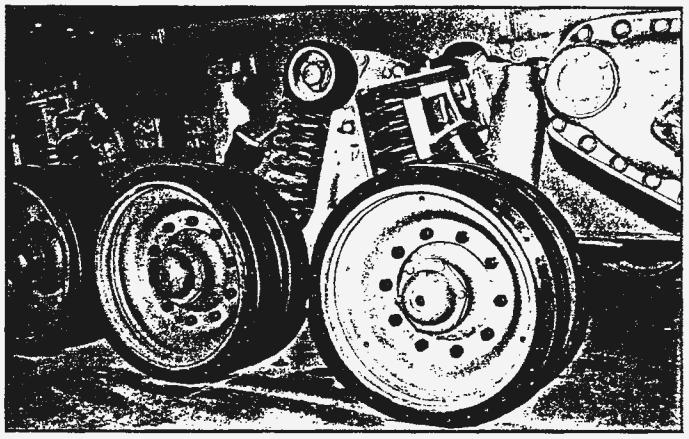
To this end, as many of the other components as possible were to be used to protect the crew compartment, which led to the location of the engine at the front of the hull and to the adoption of various other unconventional design features.

Rapid development

Once the decision to go ahead was taken, the development of the *Merkava* proceeded rapidly. The military requirements underlying it were settled only two months later and a full-size wooden mock-up was completed in April 1971. To test the concept of a front-engined tank, an experimental vehicle was improvised in 1972 from a much modified *Centurion* chassis and in December 1974 field trials began with the first of two prototypes. But even before the prototype trials had started a decision was taken to go into production and in April 1979 the first *Merkava* tanks were delivered to the IDF Armoured Corps.

The delivery of the first *Merkavas* less than nine years after the decision to produce an indigenous tank was a remarkable achievement and it puts to shame the time taken to produce new tanks in countries which have well established tank manufacturing facilities. The rapid progress made with the *Merkava* can be ascribed not only to the vigour and continuity of effort devoted to it but also to the concentration of authority in the program management. In consequence, the latter took all the decisions concerning it, with the result that the *Merkava* program was free of outside interference, and of the perturbations created by transitory occupants of senior government and military posts which bedevil development programs in other countries. There was also a notable absence of committees and of the elaborate bureaucratic procedures which consume so much time and paper elsewhere.

Instead, authority for all technical aspects of the tank was simply vested in the engineers working on it, while General Tal acted as the sole representative of the users and took decisions with the aid of a computer program set up specially to monitor costs and to bring out immediately the economic consequences of technical decisions. Risks

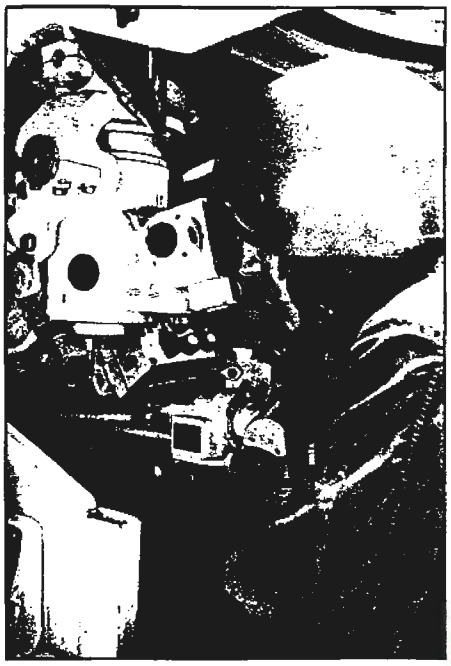


► Photo of a road wheel assembly on the *Merkava* showing the independent suspension with coil springs.

Merkava Mk2 technical data

Weights	
Combat loaded	60 tonnes
Unloaded	55 tonnes
Dimensions	
Length overall (gun forward)	8.63m
Length of hull	7.45m
Width overall	3.70m
Height to turret roof	2.66m
Height overall	3.00m
Ground clearance	0.50m
Track width	0.61m
Armament	
Main calibre	120mm
Gun type	M68
Elevation	+20°
Depression	-10°
Ammunition stowage	50 rounds
Coaxial machine gun calibre	7.62mm
Externally mounted machine gun (MG)	12.7mm
Ammunition stowage	1,000 rounds
Mortar calibre	60mm
Fire and gun control equipment	
Commander's periscope type	Vinten
Commander's periscope magnification	1 and 8
Gunner's sight type	Hughes helicopter
Gunner's sight magnification	1 and 8
Rangefinder type	Nd:YAG laser
Elevation and turret drive type	electro-hydraulic

Engine (interim model)	
Manufacturer	Teledyne Continental
Model	AVDS-1790-5A
Type	4-stroke diesel
Configuration	90° V-12
Bore and stroke	146mm × 146mm
Swept volume	29.3dm³
Supercharging system	two turbochargers
Maximum gross output	677kW (908hp) at 2,400rpm
Cooling	air
Running gear	
Road wheels, number per side	6
outside diameter	790mm
Suspension, type	independent
springs	coil, double
Dampers, type	hydraulic
number per side	4
Road wheel travel, bump	210mm
rebound	185mm (170mm on wheels 3 and 4)
Track, type	steel, single dry pin
links per track	110
Performance	
Gross kW per tonne, at combat weight	11.2
Maximum road speed	58km/h
Acceleration, 0 to 32km/h	12 seconds
Nominal ground pressure	0.96 bars
Maximum gradient	65% (33°)
Maximum side slope	38% (21°)
Trench crossing, maximum width	3.5m
Vertical obstacle, maximum height	1.0m
Fording depth, without preparation	1.38m
with preparation	2.00m
Range, on hard level ground	500km



▲ The gunner's station with the gunner looking through his sight.

were taken in placing production orders before all trials had been completed but this saved time, particularly when major industrial activities had to be initiated. One of the most important of them was the production of the large steel castings that make up much of the armour of the *Merkava*, which was undertaken by Urdan Industries Ltd in a foundry built specially for the purpose.

Machining and welding of the turret and hull, as well as the assembly of the whole tank, were entrusted to the Maintenance and Rebuild Depot of the IDF Logistics Command. The Depot had already overhauled and upgraded other tanks but, to produce the *Merkava*, entirely new and very well equipped facilities were established within it. Altogether about 200 different government and privately owned organizations became involved in Israel in the production of the *Merkava* and their contribution to it accounts for about 70% of the cost. The remaining 30% is accounted for by components imported from abroad, the most important of which have been the engine, rolled armour plate and, at first, the transmission.

Multi-layered protection

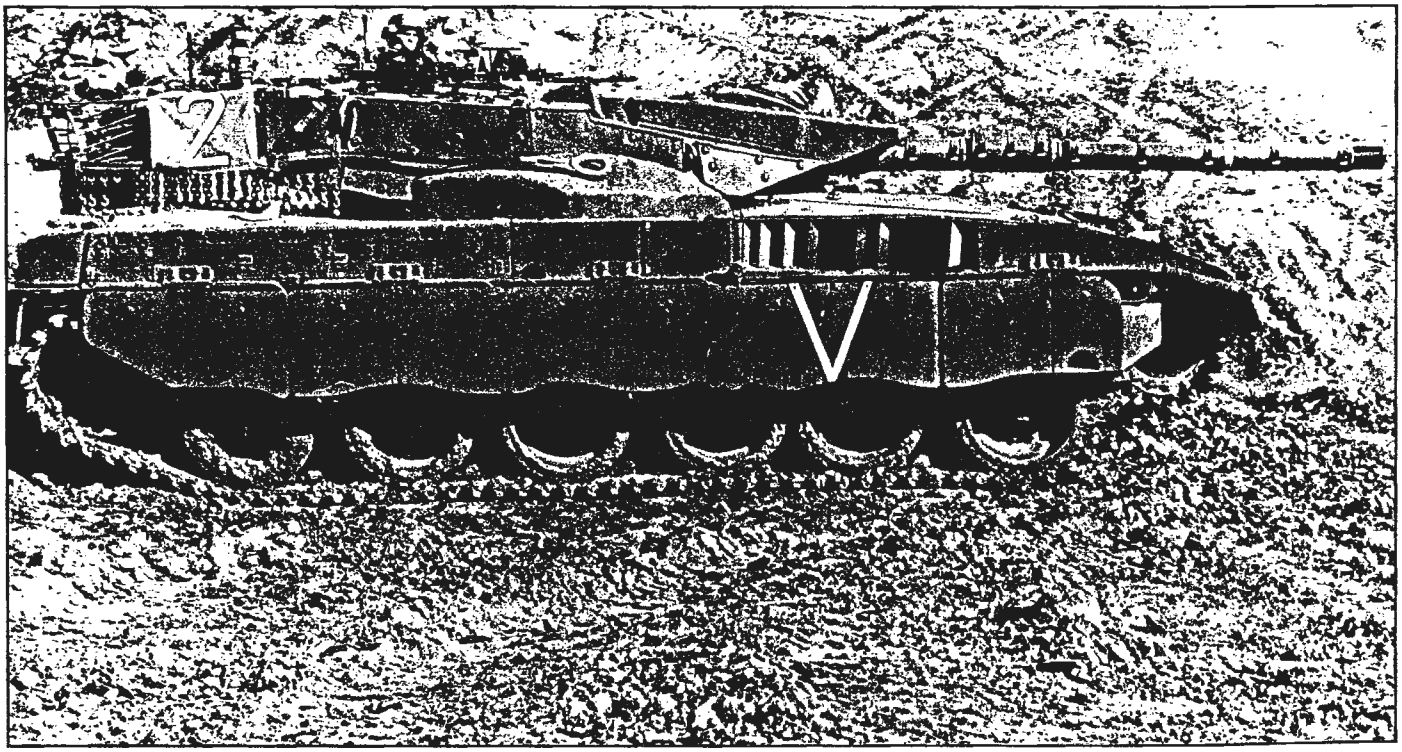
Of the various departures from convention in the design of the *Merkava*, the most obvious is the location of the engine compartment at the front of the hull. This was adopted so that the engine and the transmission could contribute to the protection of the crew from the most likely hits, namely on the front of the tank. The engine-transmission assembly is itself protected by a heavy cast hull nose and, some distance behind it, an armour plate bulkhead, the space between them being occupied by special armour and a fuel tank, which contributes to stopping penetrations, particularly by shaped-charge jets. There is another armour plate bulkhead behind the engine, so that the crew are protected from the front by three spaced layers of steel armour, a layer of special armour and the engine-transmission assembly.

The top of the engine compartment is covered by a large casting which forms part of the well sloped hull glacis. The casting is held down by bolts, so that it can be lifted off whenever the power pack has to be replaced. To lift the casting a crane is needed but this does not create any additional requirements since a crane is needed anyway to lift the power pack. For routine maintenance, access to the engine compartment can be gained by swinging open a small, hinged part of the glacis, which can be done manually with ease.

A unique and very commendable feature of the glacis is that it extends to above the level of the turret ring. In consequence it protects the joint between the turret and the hull, which is generally a vulnerable point in turreted tanks. The problem of ballistically weak spots in the glacis itself, which could have arisen from the need to cool the engine located under it, has been avoided by drawing cooling air through a grille above the left fender and expelling it sideways through louvres above the right fender. Combustion air for the engine is normally drawn through the crew compartment and engine exhaust is fed into the outlet of the cooling air, to mix with it and consequently to reduce the thermal signature of the tank.

The concept of protecting the crew by mechanical components as well as by more than one layer of armour has been carried round the sides of the hull. As part of it, the conventional torsion-bar suspension was rejected in favour of an

▼ The chains hanging from the rear stowage basket are designed to degrade the performance of hand-held anti-tank weapons, such as the RPG-7, before they can damage the rear of the turret ring by exploding in the shot trap formed between the turret bustle and the back decks. The combined cooling-air and exhaust louvres can be seen over the V symbol.



externally mounted coil-spring suspension. The latter bears a superficial resemblance to the Horstman suspension of the British *Centurions* and *Chieftains* but, apart from the fact that both are externally mounted, their only common feature is that the first, third and fifth road wheels on each side are mounted on leading arms while the other three are on trailing arms. Otherwise the suspension of the *Merkava* is basically different, as its road wheels are not sprung in pairs by interconnecting springs but are sprung independently, by pairs of concentric coil springs.

The springs together with the suspension mountings, which are cast from ballistic steel, form an almost continuous protective layer outside the hull side armour. Where there are gaps these are covered by additional armour plates, fixed away from the main armour to leave a space between them. Further protection at the sides is provided by steel skirts backed by special armour. In contrast to some other tanks, the special armour skirts cover the whole of the sides of the tank and not merely their front portions. As a result of all this, the sides of the *Merkava* hull are probably better protected than those of any other tank.

An interesting feature of the special armour skirts is that segments of them are not mounted rigidly but are hung in pairs on plate springs, which reduces the common risk of the skirts being torn off by obstacles. In addition, the skirt segments are hinged horizontally, for ease of access to the running gear.

In contrast to other tanks, the rear of the hull is also well protected. There are, in fact, two layers of armour at the rear and the space between them is filled on one side with batteries and on the other with the filters and blowers of a collective NBC protection system, all readily accessible through small, side-hinged doors.

There is also good protection against mine blast, not only because the bottom of the hull is relatively thick along its full length but also because there is an inner layer of spaced armour, which forms the floor plate.

Benefits of unconventional layout

The decision to locate the engine at the front made it possible to stow most of the ammunition at the rear of the hull, where it is least vulnerable to direct fire. To make the ammunition less vulnerable also to mine attack, one of the seven cells among which the fuel is distributed for greater safety has been located under the ammunition stowage area.

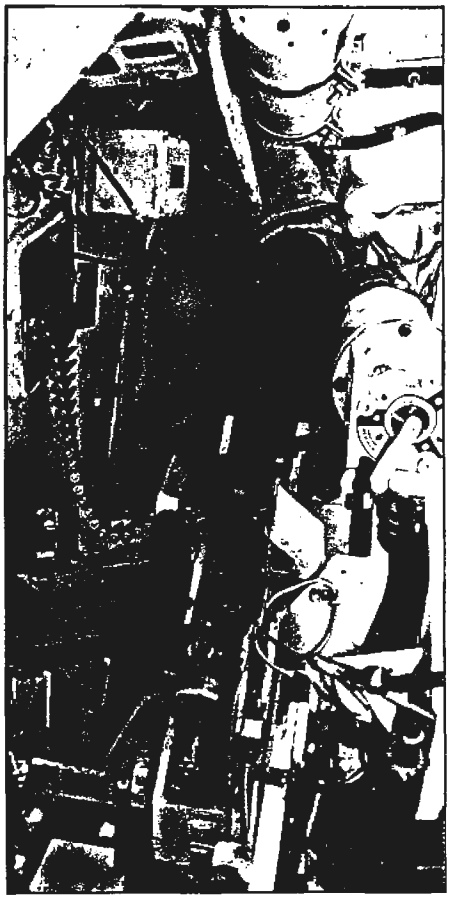
From above, the ammunition is protected not only by the roof armour but also by a tank of drinking water located under the roof plate. Under most circumstances the ammunition is also shielded from top attack by the turret bustle and the large stowage basket which is attached to it.

All the ammunition is stowed in special containers of resin-bonded glass fibre which are lined with an insulating material to protect it from heat in the event of a fire. In addition, the containers act as spall shields if the armour of the tank is pierced.

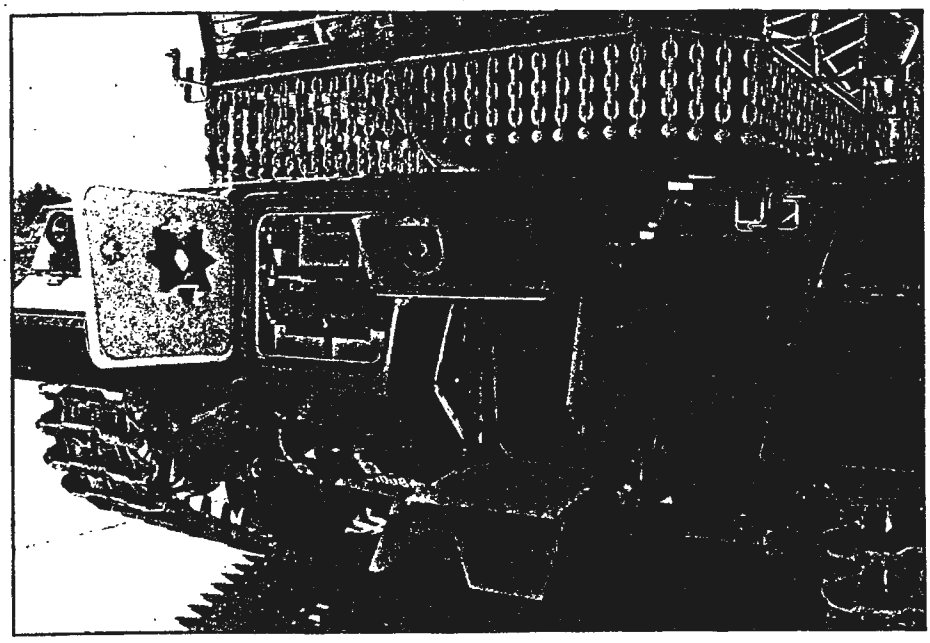
The front location of the engine also made it possible to provide a hatch in the rear of the hull, which is unique to the *Merkava* and has given rise to much ill-informed comment. The truth of the matter is that the rear hatch, together with a passage left between the stacks of ammunition containers, provides the crew with an alternative to the traditional mode of entering or leaving the tank through the top. A particularly important benefit of this is that the crew can evacuate the tank, if the need arises, much more safely than through the top hatches, which can be raked by enemy fire. Another important benefit of the rear hatch is that the *Merkava* can be reloaded through it with ammunition much more easily than more conventional tanks.

The ammunition containers are removable and, in conjunction with the rear hatch, this makes it possible to use the ammunition stowage space for other purposes. For instance, if the ammunition containers are removed from the rear of the hull, the space they occupied becomes available for a command team. Alternatively, the *Merkava* can carry four stretcher cases or up to ten infantrymen. However, the use of the ammunition stowage space for other purposes is only possible at the expense of part or most of the ammunition load. It is only justifiable therefore, and done, in special circumstances. In particular, the *Merkava* does not normally carry any infantrymen and it has not been designed as a kind of tank-cum-infantry carrier, which some people outside Israel believe it to be but which would make little sense.

What the *Merkava* normally carries is a full load of 62 rounds and a crew of four men. Of the four, the driver sits on the left of the hull behind the engine compart-



▲ Part of the loader's station in a *Merkava* 1 taken from the loader's hatch. In the centre is the coaxial 7.62mm machine gun, with an ammunition belt being fed from a container in the turret wall into what appears to be a modified feed tray. In the background, i.e. the mantlet, there is a heavy spall curtain. The breech closing lever is in the foreground on the right.



▼ Close-up of the rear of the *Merkava* showing the rear door that is unique among battle tanks. The open compartment at left houses the batteries. The closed hatch to the right of the rear access doors houses the NBC pack. Above this hatch is a folded stretcher. The thickness of the open rear doors gives a good indication of the importance given to protection of the rear of the vehicle.

ment. In contrast to some other recently designed tanks, one does not have to be a contortionist to enter or leave the driver's station through the hatch above it and the station itself is well laid out. For driving with a closed hatch there are three standard periscopes, and they give a reasonable view forward. When the vehicle is not being driven and the back of the driver's seat is laid flat, the station can be used by the crew, in turn, to rest in relative comfort. Movement between the driver's station and the fighting compartment is made easier than in other tanks by the absence of a turret basket and other clutter, and there is little of the potentially dispiriting sense of isolation which is common to tank drivers' stations.

Low-frontal-area turret

The design of the turret is also unconventional. Thus, much of its shell consists of two spaced layers of cast steel armour and the space between them is used for stowage, which adds to the protection. In addition, the turret of the Mk2 has a layer of special armour at the front and sides.

The turret also has an unusually small frontal area, which reduces its chances of being hit. In fact, when firing from behind cover the total exposed area of the turret is approximately 1 m^2, which is significantly less than that of any other battle tank.

To achieve such a low frontal area, the gun trunnions have been located closer than usual to the breech. This made it possible to keep down the height of the turret without reducing the depression of the gun and to locate the loader towards the rear and centre of the gun, which reduced the width of the turret on his side. Another feature contributing to the low frontal area of the turret is the highly commendable absence of projections above its roof, apart from machine-gun mountings and the heads of the periscopes. As a result, the overall height of the *Merkava* is less than that of most other tanks produced recently, in spite of its relatively deep hull and an exceptionally generous ground clearance of 0.53m.

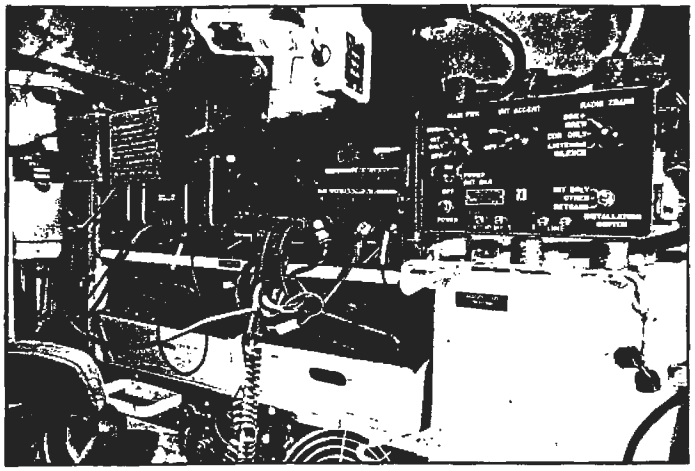
Because the engine compartment occupies the front of the hull, and to prevent the tank being nose-heavy, the turret is set well back. As a result, the gun protrudes far less beyond the nose than in other tanks, which reduces the risk of it digging-in and being damaged during the crossing of ditches and similar obstacles. The protrusion of the gun is so small in fact that the turret does not have to be turned to the rear, as in other tanks, for ease of non-tactical movement but can remain in its natural position with the gun locked pointing forward.

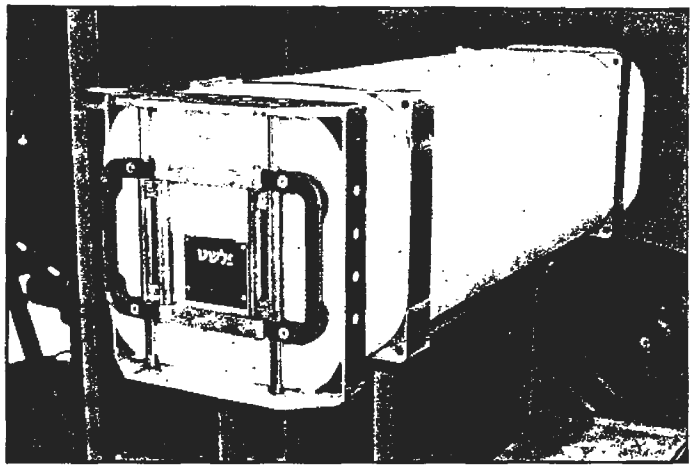
Apart from its modified mounting, the gun of the *Merkava* is the same as the 105mm M68 rifled gun mounted in the US M60 and M1 tanks, but it is made entirely by Israel Military Industries. It can be depressed 8°, which is considerably more than the depression of Russian tank guns but less than the 10° of US and British tanks. However, 8° has proved adequate, even in the hilly terrain of southern Lebanon.

Like those of other tanks, the gun is fitted with a sleeve to minimize any bending of the barrel resulting from thermal effects. The sleeve is unusual, however, in being designed to even out the temperature of the barrel rather than to act as a thermal jacket.

In addition to the customary "coaxial" machine gun, there are two others, mounted externally over the commander's and loader's hatches. All three are of the 7.62mm MAG type, the IDF having very wisely rejected the use by commanders of 12.7mm machine guns, to which some armies continue to be wedded in spite of the fact that they are more powerful than necessary against personnel and not powerful enough against most other targets.

On the other hand, the experience of the Yom Kippur War of 1973 led the IDF to fit its tanks with an entirely different weapon, in the shape of a 60mm mortar. This very unusual addition to the secondary armament of a tank was at first mounted externally, at the side of the turret. But *Merkava* Mk2 has an improved type of 60mm mortar which is served by the loader. The mortar can be used very





effectively to engage soft targets with high-explosive bombs, or to fire smoke or illuminating bombs, and thereby make more of the 105mm gun ammunition available for hard targets. As the number of the main armament rounds carried in the *Merkava* is more than in other tanks, this means that it can engage significantly more targets before it needs to be resupplied with ammunition.

The gunner is provided with a fixed periscopic sight with a pivoted head mirror and × 8 magnification. The sight also incorporates a unit-power channel and a laser rangefinder, produced by El-Op (Electro-Optics Industries Ltd). The inclination of the head mirror is controlled by the computer of the fire-control system which, in addition to the rangefinder, also includes a cant sensor as well as ambient temperature, barometric pressure and wind sensors mounted on a short telescopic mast. The computer installed in the Mk2 is much more advanced than that in the Mk1; other improvements include the replacement of the neodymium-glass laser by a neodymium-YAG laser and the use of an inertial traverse-rate sensor instead of a tachometer. The whole system has been developed by Elbit Computers Ltd and the accuracy achievable with it is of a very high order. This was vividly demonstrated to the writer when, among others, a *Merkava* engaged two different targets at much longer ranges than normal for tank guns and hit each with the first round.

There is no auxiliary gunner's sight but, in the event of an electrical failure, his sight can be set manually and the gun can also be laid using the commander's panoramic periscope, which can be locked to the gun in azimuth and made to pivot with it in elevation. The panoramic periscope has zoom optics with a magnification which the commander can vary by means of a foot pedal from × 4 to × 20. The rotatable head of the periscope is also linked to the turret traverse by a counter-rotation system, so that the commander can use it not only for all-round observation but also to bring the gun round quickly into alignment with his line of sight when he has acquired a target.

Panoramic periscopes are sometimes claimed to caused disorientation but this does not appear to have been a problem for the *Merkava* commanders.

In addition to the panoramic periscope, the commander is also provided with a ring of five fixed unit-power periscopes and a display connected to the gunner's night sight, which provides another means of aiming the gun by the gunner or by the commander.

The gun controls are electro-hydraulic and stabilized. To reduce the danger of fires arising in and spreading from high-pressure hydraulics in the event of a penetration, the hydraulic power pack is mounted behind a bulkhead in the turret bustle. Moreover, the *Merkava* is fitted with a fire and explosion suppression system, made by Spectronix Ltd. For maximum effect the Spectronix system uses detectors which respond to penetrations as well as explosions and fires, and it can suppress completely oil or fuel-vapour explosions within 80 milliseconds of a penetration by discharging *Halon* 1301 through squib-activated valves.

Automotive characteristics

As a temporary measure the Mk2 is fitted with the same AVDS-1790-5A engine as the Mk1. This air-cooled diesel, made by Teledyne Continental Motors, is a 675kW (900hp) development of the earlier, 560kW AVDS-1790 engine which has been produced in large numbers for US M60 tanks and which has been used also by the IDF to dieselize its *Centurion* and M48 tanks. The Mk2 is to be fitted in the future with a further development of these engines, which is to have an output of 895kW but without resorting to the variable-compression-ratio pistons used in an earlier 895kW development of the AVDS-1790, the AVCR-1790.

Its current engine gives the Mk2 a power-to-weight ratio of 11.2kW per tonne, which is not high by the standard of the US M1 or the German *Leopard* 2 but which is higher than the power-to-weight ratio of the British *Chieftain* and about the same as that of the US M60A3 and the Russian T-62. Moreover, the same power-to-weight ratio did not prevent the Mk1 from performing very successfully during the "Peace for Galilee" operations in the Lebanon in 1982.

Similarly, its weight did not prove a hindrance to the *Merkava*. Because it is so well armoured it is inevitably heavy, but at 60 tonnes it weighs no more than the new *Challenger* and is only a few tonnes heavier than the M1 and the *Leopard* 2. What is more, it proved better able to cope with the hilly terrain of southern Lebanon than some of the lighter tanks used there and, in spite of its weight, it can climb steep slopes as well as any tank.

The new, 895kW engine will obviously make the Mk2 more agile but its automotive performance is already better

◄◄ The tank's radio installation is situated in the loader's station.

◄ Each of the GRP ammunition containers contains four rounds. They are lined with an insulating material to protect them from heat in the event of a fire.

▼ Three-quarter view of a *Merkava* 2 showing the special armour, added to the sides and front of the turret. The 7.62mm general-purpose machine guns at the commander's and loader's stations are in the raised position. Note the protective flap over what appears to be a headlight on the right wing of the tank. A mine plough can be fixed to the bolt attachments on the bow plate.

than that of the Mk1. This is because it has a new, Israeli-built transmission in place of the Allison CD-850-6B, which is an uprated version of the venerable CD-850 transmission used in US tanks from the M46 to the M60A3. No details have been released of the new transmission but it is much more modern than the CD-850. In fact, it is as advanced as any tank transmission produced so far and makes the Mk2 not only easy but even pleasant to drive. It is also considerably more efficient than the CD-850 and this, together with a small increase in the capacity of the fuel tanks, has increased the range of the Mk2 by 25% compared with that of the Mk1.

The suspension of the Mk2 remains much the same as before, which it can well do in view of the sound features of the original design. These include 790mm-diameter road wheels, which are as large as those of any tank and help to reduce rolling resistance. They also include a vertical road wheel travel of 210mm from the static laden to the full bump position, which is as high as that of most tanks in service today. The only major suspension change has been the replacement of the front two volute bump springs by specially developed hydraulic bump stops.

The suspension provides a remarkably good ride over rough ground and the driver of the *Merkava* also benefits from being located much closer to the centre of mass than the drivers of other tanks. He is thus affected far less by any pitching of the vehicle. The suspension and the all-steel dry-pin tracks are also very robust, to stand up to the rock-strewn terrain that faces the *Merkava*. In fact, the *Merkava* appears to cope with such terrain very successfully and it may be doubted if some of its contemporaries would do equally well over it.

Battle-proven

The ultimate proof of the design of the *Merkava* came during the 1982 operations in the Lebanon, where it was exposed to enemy weapons ranging from RPG-7 to 125mm tank guns and HOT anti-tank guided missiles.

Since no tank can ever be made immune to all forms of attack, the armour of some of the *Merkavas* was, inevitably, pierced. But the percentage of them which suffered this fate was considerably smaller than that of the other tanks hit by enemy fire, showing the effectiveness of their protection. Moreover, the number of crew casualties per tank was only half of that suffered in other tanks, proving the concept of using as many of the components as possible to protect the crew. The precautions taken against fires also paid big dividends, which is shown most dramatically by the fact that no crewman was burnt to death — something that has probably not happened before in any major tank operation.

Even where some of the *Merkavas* were set on fire, all proved recoverable and the writer saw for himself battle-damaged tanks being rebuilt in the IDF Maintenance and Rebuild Depot. *Merkavas* which suffered less severe damage could be repaired in the field more easily and quickly than other tanks. This applied in cases of damage by, among other things, mines, largely because of the adoption of the externally mounted and easily replaceable suspension components.

By all accounts the *Merkavas* were also very successful at killing enemy tanks, which included not only T-62s but also T-72s. In Israeli eyes, therefore, they fully proved themselves, becoming the first and so far the only tanks developed since the 1960s to be battle-proven.

Since the Mk1 was successfully used in the Lebanon in 1982, it has been followed by the even more effective Mk2, which began to be issued to the IDF Armoured Corps in December 1983. For all that, a still better version is already under development. The new tank is to have even better protection and a new engine of 1,050 or 1,120kW. According to some reports, it is also to be armed with a 120mm gun. There is no official confirmation of this, but it would be very surprising if a future version of the *Merkava* were not armed with a larger-calibre gun in order to maintain the position it has gained as a remarkably effective battle tank. ✦✦

Israel's Lavi

The Lavi. (IAI Photos)

Gerald Green

"There is no learned man but will confess he hath much profited by reading controversies; his senses awakened, his judgement sharpened, and the truth which he holds much firmly established. In logic they teach that contraries laid together more evidently appear; and controversy being permitted, falsehood will appear more false, and truth more true."—John Milton (1608–1674)

If reading controversies is beneficial, one should certainly profit by reviewing the Lavi controversy. It has many elements and participants—fighter aircraft speed vs. maneuverability, U.S. analysts vs. Israeli analysts, high-technology vs. effectiveness, U. S. vs. Israeli labor rates, etc. In the final analysis, however, it all comes down to need vs. affordability.

Piecemeal accounts of the controversy have been reported previously in the public media. Information and views reported here, however, were obtained during a week of briefings and interviews in Israel, just before the Lavi roll-out, with Israel's leaders, including Minister of Defense Itzhak Rabin, cabinet member Moshe Arens, and Israel Aircraft Industries' president Moshe Keret.

The U. S. position is described based on information obtained during interviews with Dr. Dov Zakheim, U. S. Deputy Under Secretary of Defense for Policy and Resources, and other DOD spokesmen, following the roll-out. Zakheim heads a DOD team of engineers and cost analysts reviewing the Lavi program. The group visited Israel earlier this year to conduct the investigation. Although its findings are contained in a classified report, DOD criticism of the program has been reported widely.

The U. S. agrees that Israel has a clear need to replace many of its aging aircraft, especially U.S.-supplied A-4's and F-4's, and Israeli-

built Kfirs.

Israel designed the Lavi (Hebrew for lion) based on decades of combat experience and the knowledge that Israel would face more lethal threats in the future. Israel Aircraft Industries (IAI), the developer of the Lavi, enlisted some of the country's best fighter pilots to participate in the design of the aircraft, and their mark is very evident. The Lavi is designed and built to survive through a unique combination of advanced technologies in its airframe and system. The cockpit, for example, allows the pilot to concentrate on tactical situations, subordinating controls, and subsystems.

Using computer-aided design/computer-aided manufacture, IAI designed the Lavi as a small, lightweight, highly maneuverable, multimission fighter with emphasis on air-to-ground performance. (See Table 1 for technical data.) IAI believes it can also match and defeat any known or projected threats in air combat because of its unique airframe design and advanced weapon systems.

At first glance, the Lavi resembles the F-16. On closer inspection, its delta wing and canards suggest that the Israelis married the best features of the Kfir and the Mirage, as well as the F-16, into the Lavi's design.

Although Israel designed the Lavi, U. S. industry is participating heavily in the development phase of the program and, to a more limited extent, so are companies in Great Britain and France. (See Table 2 for major participants.) Other European companies are probably involved but are believed to have requested anonymity because of the threat of Arab boycott. About 70 Israeli companies and 111 companies abroad are participating in the development. About 40 percent of development funding is being spent in the U. S. If the program is allowed to transition into production, over 60 percent of the funding is expected to be spent in the U.S. Grumman, Pratt & Whitney, Garrett, and Lear Siegler lead the group of U.S. participants in the program.

Grumman Corp. has been awarded a $170 million development contract to provide graphite composite wings and tails for prototype aircraft. The wings include integral fuel tanks, hard points for ordnance or drop fuel tanks, and wingtip-mounted air-to-air missiles. The composite wing was chosen primarily to reduce weight. The use of composite material also permits aeroelastic tailoring. The orientation of the composite fibers limits the twisting of the wings and, therefore, improves control of the aircraft.

Lavi Armament

The Israelis point out the weapons of air warfare are changing from guns to missiles and bombs, and the Lavi reflects that theory. Although the Lavi is reported to contain one single barrel revolving cannon (due to the insistence of the pilots), the emphasis is on missiles and bomb load capacity. Weapons will be slung close to the fuselage to minimize drag. Bombs will be mounted on multiple hardpoints under the wing and fuselage.

The Lavi is reported to be capable of carrying a much heavier bomb load compared to the F-16 Falcon.

Pratt & Whitney is supplying its PW1120 engine. It is a 20,000-pound thrust turbojet derivative of the combat-proven F100 engine used in both the F-15 and F-16. Israel also plans to use the engine as part of its F-4 upgrade.

Garrett's initial contracts, valued in excess of $16 million, cov-

Lavi cockpit.

Lavi wing and fuselage under construction.

Aircraft type	**Light Multimission Fighter**
Missions	**Air-to-air, air-to-ground, training**
Crew	**1 (2 in training mission)**
Wingspan	**28.97 feet**
Length	**48.08 feet**
Height	**15.78 feet**
Wing area	**360 square feet**
Wing sweepback (leading edge)	**54 degrees**
Basic take-off wt.	**22,000 pounds**
Combat radius, Air-to-air (CAP)	**1,000 nm**
Combat radius, Air-to-ground	**na**
High-lo-high	**1,150 nm**
Lo-lo-lo	**600 nm**
Maximum speed	**Mach 1.8**
Combat thrust/weight	**1.07**

Table 1: Lavi Technical Data

er development of the environmental control system, emergency power unit, and secondary power system as well as production of the units for the prototype aircraft.

Lear Siegler has developed and is building the aircraft's digital fly-by-wire flight control system. Safety and survivability are major design requirements. The system is designed to provide full performance even after two failures or battle damage. The system will continue to function, allowing the pilot to fly back to base even after a third failure, or on analog backup after the loss of all of the digital processors.

Although Israel has successfully produced combat aircraft (like the Kfir), DOD officials continue to be skeptical that Israel can economically produce an advanced aircraft like the Lavi. There is no doubt, however, even among the skeptics, concerning Israel's capacity to develop and produce effective electronics. Israel's use of its indigenous electronics in combat is especially convincing.

Lavi's avionics (radar, communications, IFF, navigation, and electronic warfare gear) have been developed as an integrated system. IAI's Elta division has been assigned responsibility for the integration as well as development of the aircraft's radar, communications, and major electronic warfare elements. Elta will have plenty of help, however. Reference to the list of Lavi contractors (Table 2) reveals that at least six Israeli firms are contributing to the aircraft's avionics system. For example, Elisra has a proven capability in developing and producing radar warning receivers. The U. S. Air Force is currently considering use of an Elisra-developed kit to upgrade its widely used AN/ALR-69 warning receivers. EL-OP's advanced holographic helmet display has also attracted considerable attention. It is probably destined for use onboard the Lavi.

Although Elta closely guards details of its radar and other avionic equipment, some educated assumptions can be made. The radar, for example, is expected to operate in the I band and will probably emerge as an upgraded version of Elta's EL/M-2021 radar. The EL/M-2021 has frequency agility and uses a scanning planar array antenna. Lavi's ground attack role certainly will require the radar to have an advanced look-down/shoot-down capability.

The electronic warfare system is also being developed as an integrated system. It is expected to emerge as a scaled-down version of DOD's Integrated Electronic Warfare System (INEWS). INEWS is currently underway as a joint U. S. Air Force/Navy development effort. It is scheduled for use on the USAF's Advanced Tactical Fighter and the Navy's Advanced Tactical Aircraft.

Similarly, Lavi's core avionics system is expected, generally, to follow the development philosophy embodied in the U. S. Air Force Integrated Communications, Navigation, IFF, and Avionics system.

The Israelis believe that their advanced programmable, flexible, adaptable, modular, integrated systems will defeat Soviet-supplied threat systems of the 1990's. The Israelis are aware that they must also be able to counter weapon systems supplied by nations of the NATO alliance to enemies of Israel.

Because of its relatively small size and use of composites (about 22 percent of the airframe is of composite material), the Lavi will have inherent low-observable stealth characteristics. However, the pragmatic Israelis, working under severe cost constraints, will not be able to afford a full-blown low-observable stealth capability for the Lavi.

Infrastructure

Defense Minister Rabin, in an interview session just before the roll-out, indicated that Israel has a twofold purpose in continuing the Lavi program:

"The need to have a fighter/attacker that will serve the Israeli Air Force in the 1990's, and beyond, tailored to our (Israel's) operational needs.

"Israel, to maintain its quality edge on our neighboring Arab

countries, has to be a developed country and society. The meaning of it is not just any occasion but an infrastructure of industry, especially in the high-tech areas, that will engage a considerable number of our population."

The Pentagon's spokesmen say they have no problem with Rabin's reasoning. However, they believe Israel can satisfy its needs better by concentrating its high-tech efforts in electronics where it has a proven capability and its opportunities for success in the international marketplace is much greater, and installing its indigenous avionics in appropriate U.S.-produced aircraft.

Rabin repeated his contention that the advantages that would have been realized by installing Israel's electronics in U. S. aircraft have been overtaken by events and the option is no longer cost-effective. Furthermore, Israeli sources say that Israel's security depends on maintaining air superiority and the only way the country can be assured an adequate supply of aircraft would be by maintaining its own aircraft manufacturing capabilities.

Israel Aircraft Industries	Prime Contractor
Astronautics, Israel	Avionics, indicators
Avcron, U.S.	Avionics
Aydin Vector, U.S.	Telemetry
Beit Shemesh Engines, Israel	Engine
Elisra, Israel	Avionics
EL-OP, Israel	Avionics
Elta, Israel	Avionics
Garrett, U.S.	Environmental control, emergency power and secondary power
Goodyear, U.S.A.	Brakes, wheels, tires
Grumman Aerospace, U.S.A.	Wings, vertical tail
Hughes, U.S.	Head-up display
IMI, Israel	External fuel tanks, weapon pylons
Lear Siegler, U.S.	Flight control computer, generators
Martin Baker, Great Britain	Ejection seat
MBT, Israel	Flight control
Moog, U.S.	Flight control actuators
Pratt & Whitney, U.S.	Engine
Rada, Israel	Avionics
Rosemount, U.S.	Sensors
SHL, Israel	Landing gear, servoactuators
Sully, France	Cockpit transparencies
Sunstrand, U.S.	Leading edge flaps drive, generator
Tamam, Israel	Avionics
TAT, Israel	Fuel system, accessories
Teledyne, U.S.	Accessories
Teud, Israel	Technical publications

Table 2: Major Lavi Contractors

Alternatives

The Zakheim-led Lavi study group (from DOD) is preparing a report that will propose a number of alternatives to the Lavi program. The Report is expected to be ready in January 1987. Although Zakheim would not address any of the possible alternatives, he indicated that they would satisfy Israel's need for an effective fighter/attack aircraft for the 1990's and beyond and also meet the country's infrastructure requirements.

There is much speculation in the media and in U. S. and Israeli government circles concerning what the Pentagon's alternative list will include. Heading the list are sure to be at least three aircraft: an improved version of General Dynamic's F-16, probably the F-16C; a version of the McDonnell Douglas F/A-18; and Northrop's F-20.

Since Israel is very satisfied with its F-16's and is currently receiving an additional 75 under an existing order, the F-16 option probably heads the list. Rabin, however, is sticking to his "overtaken by events" objection. He reminds listeners that while he was Israel's prime minister in 1977, and again in 1980, he implored President Carter to allow Israel to manufacture F-16's under license from General Dynamics. Carter did not agree. Rabin says that arrangement would have made sense then but not now. In 1977 or 1980, such an arrangement would have allowed for a smooth transition of Israel's avionics into a U.S.-built aircraft. If adopted now, that option would prove more expensive than continuing with the Lavi program, according to Rabin.

The strength of the F/A-18 option is its fighter/attack configuration, the combination desired by the Israelis.

The F-20 alternative is attrac-

The author (right) with cabinet minister Moshe Arens (left) and Lavi Chief Engineer Blumkine.

tive to the U. S. and Northrop since the company is trying to find a market for the aircraft.

Another option could be a mix of aircraft. This could include a mix of improved F-16's, and A-7's or A-10's (as a stopgap), with the added possibility of providing Israel with Advanced Tactical Fighter technology to meet its needs in the late 1990's and beyond.

It seems clear that whatever options are offered would include the use of Israeli avionics. Although this would help heal some of Israel's wounds if it was forced to cancel Lavi and accept a U.S.-manufactured substitute, such an arrangement could require substantial aircraft modifications and associated cost.

One option that Israel would enthusiastically endorse would be a partnership with a major U. S. airframe company. Israel is pursuing this alternative and has already signed a memorandum of agreement with Grumman Aerospace to continue discussions that could lead to a partnership arrangement. The U. S. Department of Defense would look more kindly on continuing the Lavi program if such a partnership could be arranged.

Cost/Affordability

Although the cost of the Lavi program is at the heart of the controversy, there is no serious disagreement regarding the estimates of the cost of development. The Pentagon is somewhat embarrassed, however, by the initial out-of-sight U. S. Air Force estimate of a Lavi program cost of $10 billion. The Pentagon's current estimate is $2.6 billion and Israeli's is $2.2 billion.

Today the controversy centers on the cost of production and Israel's capability to manage money from foreign military sales. Israel estimates the fly-away cost of production Lavi aircraft at about $15.5 million each, based on a procurement of 300 aircraft. The Pentagon believes this figure is much too low and is estimating $22.5 million per aircraft. Arguments over production costs could be resolved by a Lavi cost study being conducted by the General Accounting Office. Results of this study are expected to be announced by January 1, 1987.

Regardless of the estimates, Israel will limit spending for production of the aircraft to $550 million annually, according to Rabin. Zakheim says the Pentagon intends to hold Israel to that ceiling if the program enters the production phase.

Although the Lavi controversy still contains a number of unresolved issues there are also many areas of agreement. There is no discernible argument about the need to replace Israel's aging aircraft and the realization that Israel's industrial technological base must be maintained. The remaining elements of the controversy center on the affordability and advisability of Israel's producing the Lavi aircraft and the viability of U.S.-proposed alternatives.

Israel appears to have a basis for claiming that modifications required to accommodate Israeli electronics within U. S. aircraft would overcome the benefit of using U.S.-produced aircraft in lieu of the Lavi. U. S. analysts must also consider the serious impact on Israel's economy if it is forced to abandon the Lavi. Thousands of Israel's scientists, engineers, and employees would be affected, as will many of their U. S. counterparts.

For its part, Israel owes the U. S. its serious consideration of U.S.-proposed alternatives. Israel must also consider the impact of a large share of its military budget going to the Lavi program. Its army and navy could be severely affected.

Regardless of the outcome of the Lavi controversy, U. S. and Israeli participants should consider the words of Robert Hall, an 18th century English theologian—"The evils of controversy are transitory, while the benefits are permanent." ■

The author is Washington editor of the Journal of Electronic Defense and is a frequent contributor to NATIONAL DEFENSE.

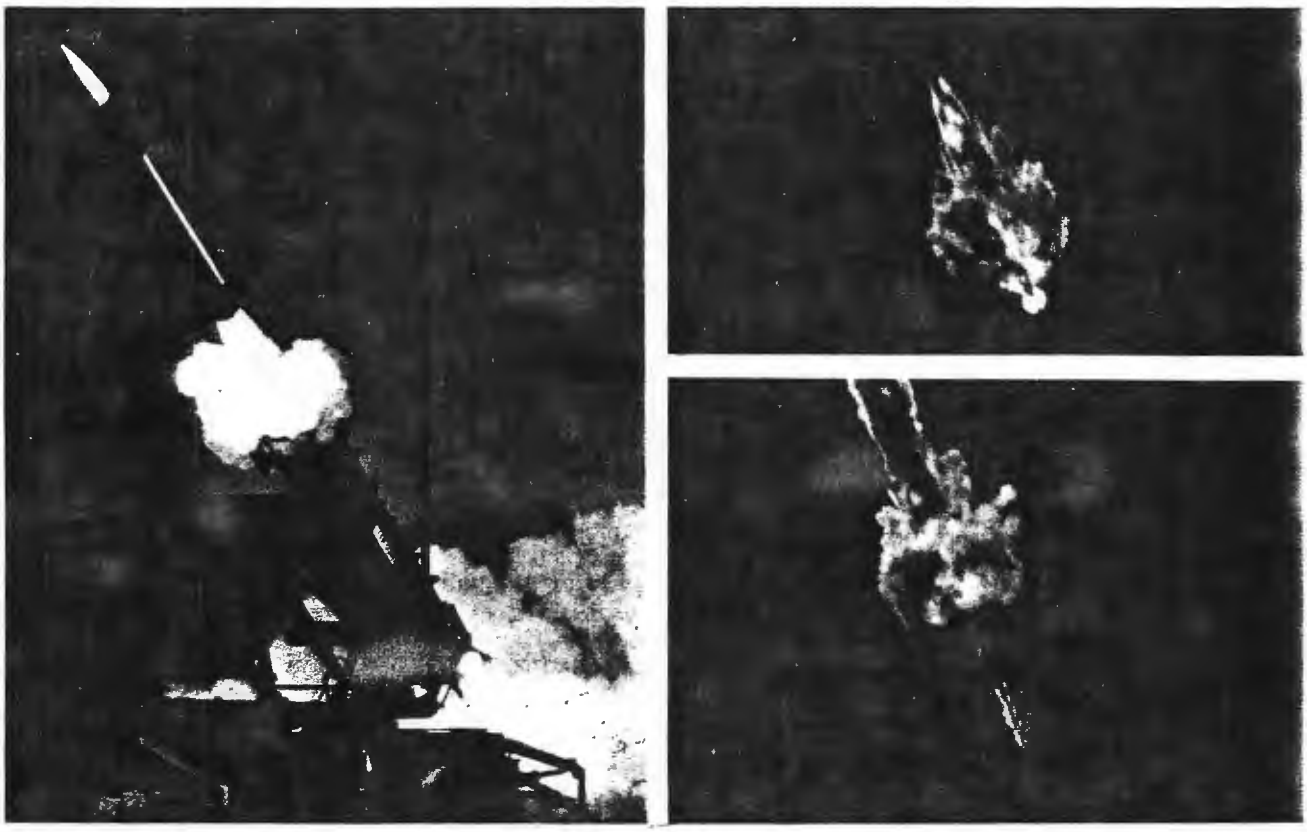
When questioned about the LAVI fighter program, the Defense Minister of Israel stated that during the four hour meeting with Secretary of Defense Weinberger, which occurred prior to his talk at the Heritage Foundation, the issue of the LAVI was not raised. In defending this program, Rabin pointed to the defense and equipment needs specific to Israel and that the LAVI would have features that were not carried on current U. S. combat aircraft. Without making a reference to the amount of U. S. aid money being used to develop the Israeli fighter, he made it a point to mention that 43 percent of the development money is being spent in the United States. If the LAVI finally goes into production 60 percent of those funds will be spent buying equipment from Grumman, Pratt & Whitney, Singer and several others.

Any alternative to the LAVI must take into account three factors, according to Rabin. The first, the aircraft that is finally recommended must meet the security needs specific to Israel. Second, there is the need for Israel to maintain the infrastructure necessary to maintain the qualitative edge over hostile Arab states. Finally, the cost of terminating the contracts that have already been signed that deal with the LAVI must be weighed.

During meetings in May with Secretary of Defense Weinberger, alternatives to the LAVI were discussed. In those meetings it was decided to put off any final decision on the LAVI until a study was completed that dealt with possible alternatives. The study is due before the beginning of the new year. When asked about his position on possible alternatives Rabin replied, "I cannot rule out what I have not seen or heard about."

In reviewing the possible threat posed by Syria, Rabin voiced concern over missiles the Soviet Union has or might supply. In June 1982, the SS-21 surface-to-surface missiles the Soviets delivered earlier in the year to Syria became operational. These missiles have a range of 100–120 kilometers and are very accurate. Syria had previously been equipped with the FROG series of missiles and then the SCUD series after the 1973 Yom Kippur War. There have been rumors that the SS-23, with a range of 500 kilometers, has been delivered to Syria. Rabin stated that these rumors have not been confirmed. The SS-23's would be able to strike deep inside Israel, something the Arab Air Forces have not been able to accomplish.

Israel has shown great interest in taking part in the Strategic Defense Initiative research that is going on. Several Israeli companies are interested in joining in the research effort. Because of the threat posed by tactical missiles, the anti-tactical ballistic missile program currently being discussed fits Israeli security needs. Rabin specifically referred to the ATBM program and why it is important to Israel.—VINCENT P. GRIMES



A LANCE tactical surface-to-surface missile target was successfully destroyed by the PATRIOT air defense missile system in a test conducted recently at White Sands Missile Range, NM. It marked the first time a PATRIOT was fired to intercept a tactical ballistic missile. It also demonstrated that PATRIOT can be used to counter short-range conventional missiles similar to those facing the Army and other NATO forces in Europe. The PATRIOT destroyed its missile target at a speed of greater than Mach 3 (about 2,200 miles per hour) and at an altitude of about 26,000 feet. According to an Army official, the success of the test can be attributed primarily to software changes in the computer-driven missile system. (Left) PATRIOT is fired to intercept LANCE. (Upper right) Detonation just after impact. (Lower right) Damaged LANCE trailing smoke starts its fall to earth.

THE AMERICAN ISRAEL PUBLIC AFFAIRS COMMITTEE

AIPAC MEMORANDUM

500 NORTH CAPITOL STREET, N.W. • SUITE 300 • WASHINGTON, D.C. 20001 • (202) 638-2256

July 9, 1985

LAVI TALKING POINTS.

WHAT IS THE LAVI?

* Israeli-designed short range ground attack/trainer aircraft
* To be produced in 1990s
* Replaces American-built A-4 Skyhawks and Israeli Kfirs

AMERICAN INVOLVEMENT

* 50% of research and development is being done in U.S.
* $700 million in signed R & D contracts in U.S.
* R & D contracts with 74 firms in 22 states, 60+ congressional districts
* 50% ($2 billion) of production anticipated in U.S.

WHY THE LAVI?

* Designed in Israel for specific and unique Israeli needs
* Mixing of Israeli and American expertise and technology has allowed the development of the right aircraft for Israeli purposes
* Optimized as a short-range ground attack/trainer aircraft with self-defense capabilities, role not filled by any existing American aircraft
* Careful adaptation of existing technologies has minimized risks of developing a new plane
* No U.S. aircraft is as well-suited for the combined short range ground attack and trainer roles
* Cost of Lavi is expectd to be $14.5 million per plane; the cost of F-16s that Israel is curently buying is over $30 million per plane
* Most cost effective solution to Israel's aircraft problems

WHY MORE STUDIES?

* Israel has done several studies of the Lavi, over a number of years, and still concludes it is necessary

* There have been a number of Department of Defense studies done already, also pointing up the importance of the Lavi

BENEFITS FOR U.S.

* At least $2.7 billion in aerospace contracts in U.S., approximately 50% of the total

* Maintaining and enhancing of technological bases of numerous American aerospace companies

* Aerospace industry development contracts during a period of no U.S. warplane development

* Enhanced U.S. aerospace industry capabilities for Next Generation Fighter in 1990s

NO THREAT TO EXPORTS OF U.S. AIRCRAFT

* Israeli needs will take up full production until after year 2000

* American-built components necessitate U.S. government approval before any possible export

* Attuned to specific Israeli needs, not generalized like export-oriented aircraft

11/2/83

THE ISRAEL AIRFORCE NEW AIRCRAFT - "LAVI"

I. BACKGROUND

1. After several years of extensive study and review the Israel Air Force, the Ministry of Defense and the Government of Israel agreed that there was an urgent need to replace the aging A-4 Skyhawk and Kfir aircraft in the IAF inventory beginning in the early 1990s.

2. The most cost effective solution was found to be an indiginous airplane which would incorporate the IAF's extensive combat experience. This airplane is the LAVI.

3. The Lavi program today is an on-going project on which approximately $500 million has already been spent. This program has been fully supported by several Ministers of Defense and the Knesset.

4. Alternative aircraft to meet Israel's aircraft security requirements would cost Israel $2.2 to $4 billion more than the Lavi.

5. First prototype is scheduled to fly in 1986 and the first production aircraft will be delivered to the IAF beginning in 1990. The IAF is planning to procure 300 aircraft with production reaching a maximum of 30 aircraft a year in 1993.

6. The financial feasibility of the Lavi development program is based soley on Israel Air Force needs.

7. The Lavi aircraft poses no competitive threat to any current American aircraft. The Lavi will not even be available for export for at least15 years and only then with U.S. Government permission.

8. In order to control costs and the risks normally assosciated with new aircraft development, the Lavi airframe and engine contain no new technologies.

9. Dozens of American aerospace companies will be working on the Lavi program. Approximately $1.3 billion will be spent with U.S. firms on the development and production of the Lavi. This will result on thousands of jobs being maintained or created in the U.S. Aerospace industry.

BENEFITS TO THE U.S. OF THE LAVI

MYTH:

The Lavi project does not benefit the United States.

FACTS:

1. The Lavi will provide jobs in the United States. It is estimated that more than $1.5 billion will be spent in the U.S. on the Lavi, creating an estimated 20,000 man-years of employment.

2. In some cases, work on the Lavi enables American companies to retain experienced development personnel during a period when the U.S. military is developing no new aircraft for its own use. For example, Lear Siegler, which will produce the flight control system for the Lavi, has indicated that the Lavi program will allow them to retain the integrity of their design team until the U.S. begins development of its next generation of aircraft.

3. In other cases, the Lavi project funds programs that otherwise could not have been started. It is funding from the Lavi that has enabled Pratt and Whitney to develop the P&W 1120 engine. This will result in Pratt and Whitney having a new product that could be sold for use on other aircraft besides the Lavi.

4. In still other cases, the Lavi program will help American companies extend their technology base. Thus, Grumman, which will provide the wing and tail assemblies for the Lavi, will acquire expertise in the development and production of composite materials that it currently does not have.

5. Other companies involved in the Lavi project include Moog Aerospace, which is making devices to move the elevons and rudder, Sundstrand, which is building the leading edge flap controls, and Garrett, which is responsible for the secondary power system and the environmental control system.

6. Some of the components for the Lavi are adapted from similar devices used on the F-15 and F-16 fighters. This commonality will increase the size of production runs, and should provide beneficial economies of scale. This will reduce the unit cost, making it cheaper for the U.S. military to buy those items.

7. In all cases, the U.S. government will ultimately benefit from the strengthening of the industrial base that will result from the program. When the U.S. begins development of its next generation of aircraft, it will find a large number of companies with experienced design teams. In addition, the U.S. will probably benefit from the close contacts with Israel, the only country in the world with an extensive knowledge of modern air combat backed-up by actual experience.

EXPORT OF THE LAVI

MYTH:

It has been said that Israeli production of the Lavi will create competition for the U.S. aerospace industry. Specifically, it is alleged that the Lavi will be a threat to the Northrop-built F-20 fighter.

FACTS:

1. Israel is building the Lavi to replace existing aircraft that will become obsolete in the 1990's. Until the requirements of the Israeli Air Force are met, Israel will be in no position to consider exports. It would not be until 1995 at the earliest that Israel could contemplate export of the Lavi, given that the Lavi will not enter production until 1990 and then only at an annual production rate of no more than about 30 planes. It will take a decade or more of production for Isreal to satisfy its domestic need for 300 Lavi.

2. When the Lavi becomes available for export in the mid-1990's, it will be at least one generation behind first-line aircraft being produced in the United States. The Lavi uses mainly existing technologies that will certainly not be state-of-the-art twelve years from now.

3. The Lavi certainly is not a potential competitor for the Northrop F-20. While the F-20 is flying today, the Lavi is still on the drawing boards. While the F-20 could be in production in another year, the Lavi will not enter production until 1990. While the F-20 will be immediately exported, the Lavi will probably not be available for export until a decade later in 1995.

4. The United States will, in any case, retain the right to veto proposed sales of Lavi to third countries, which ensures that possible sales are consistent with American foreign policy. The Carter Administration demonstrated that such restrictions can be effective when it prevented a proposed sale of Israeli-built Kfir aircraft to Ecuador in 1977. Moreover, Israel has restricted access to foreign markets, unlike U.S. firms.

5. Past experience provides no support for the contention that Israeli aircraft sales compete with American aircraft sales efforts. Israel has sold more than 55 supersonic fighter aircraft to three countries. In each case, the purchasing country had previously purchased French aircraft. Since Israeli aircraft often contain American components, while the French ones do not, the U.S. may actually have gained jobs as a result of the Israeli sales.

6. The Lavi could never be more than a minor factor in the international aircraft market. Israel will only build 30 Lavi per year. By comparison, NATO now builds some 900 supersonic combat aircraft a year.

PRECEDENTS FOR THE USE OF FMS FUNDS ABROAD

MYTH:

That the use of FMS funds in Israel is unprecedented and will lead to pressures from other countries to be treated the same way.

FACTS:

On several occasions the U.S. has permitted the expenditure of FMS money in Israel.

--In 1978, approximately $100 million of FMS funds were spent in Israel to expand the production capacity of the Merkava tank factory.

--In 1983, approximately $13 million was approved for expenditure in Israel to repair ammunition that arrived in Israel in a damaged condition.

--Currently, the U.S. has approved a proposal to allow an Israeli firm to take over development of an $80 million communications system when the American company originally involved in the program failed in its efforts.

Both the levels and terms of assistance to Israel are unique. The precedents described above did not lead to uncontrollable pressures for similar treatment from other countries.

STRENGTHENING THE ECONOMIC RELATIONSHIP

MYTH:

The United States should not send money abroad to help another country when we are having so many economic difficulties at home.

FACT:

1. Israel, as the closest U.S. ally in the Middle East and the largest recipient of U.S. aid, now faces one of the most serious economic crises in its history--a crisis facilitated by the heavy defense burden it must shoulder in response to the accelerated arms build-up by its enemies.

2. In addition to facing the highest per capita debt burden and one of the highest inflation rates (140%) in the world, Israel has just adopted severe austerity measures which have already had a major impact on the average citizen. The 10% cut in Israel's budget announced this week--coming in the face of other reductions-- could lead to an even higher rate of emigration from Israel, helping the Arabs in their War of economic attrition against Israel.

3. The Lavi program and the terms offered in the legislation will provide an important stimulus to the Israeli economy and enhance the long-term viability of Israel's aerospace high-tech industry. It will help Israel retain the highly skilled workers it needs for both its civilian and military sectors. It will also help lower Israel's growing defense burden by enabling it to replace its older planes and equipment, at a lower cost.

4. An Israel weakened by economic difficulties is an Israel unable to respond with confidence and strength to Middle East crises as they develop.

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common religious heritage, the connections between Judaism and Christianity. All of this provides an enduring basis for the closeness of the ties between the two countries.

Personally, I believe these elements are more important than our strategic relationships which has recently been receiving much belated recognition from U.S. policymakers. If those highly positive American perceptions of Israel were to change, then the strategic aspects of our relationship would take on a new, but not necessarily positive, importance. If Americans ever begin to perceive Israel not as a strong responsible Middle Eastern state with battle-tested armed forces arrayed for self-defense, but rather more as a reckless actor in a volatile and dangerous part of the world, then Israel's standing in American eyes would deteriorate. The wisdom with which the leaders in both capitals deal with each other, taking account of each other's not wholly identical interests will be an important determinant of how strong the relationship continues to be. For example, during the Carter Administration, and at times during the first Reagan Administration, Washington policy-makers, the media, the public, and in some members of Congress, began to question whether Israel's military power was being employed wisely for essential national survival purposes. They questioned whether Israel's leaders, while insisting that the U.S. support Israel's pursuit of its security interests, were taking adequate cognizance of broader American interests in the region. Such questions led to much unpleasantness between us. Today the American perception is radically different. Today, Israel is seen as anxious to find some way to proceed along the path toward peace, if only the right diplomatic formulae can be found. That perception helps reinforce Washington's appreciation of Israel as a strategic partner for the United States in this region. In recent years Washington has come to a greater understanding of the potential contribution Israel can make to American strategic interests in the Eastern Mediterranean.

The Eastern Flank of the NATO Alliance, responsible for defending against potential Soviet aggression in the region is composed of Turkey and Greece, plus the U.S. 6th Fleet and elements attached to it. Few would doubt Greek or Turkish resolve to defend their own homeland, but continuing discord between the two nations severely handicaps their cooperation within the NATO framework. Moreover, the Soviet Black Sea Fleet, the Soviet's increasing capacity to deploy sizeable airborne forces and Soviet bases in Syria present any American military planner with some rather complicated problems. Israel has a large, well trained and very experienced air force, army and navy and Israel occupies a very strategic piece of territory. Since the formulation of the U.S. – Israel Joint Political Military Group in January 1984, Israeli and American experts have identified some important complementary and overlapping interests between our two armed forces with respect to the Eastern Mediterranean region. Previously, there was little American military appreciation of the IDF's relevance to U.S. concerns in the theater. Today, however, U.S. defense planners are better aware of the possibilities of cooperating with Israel, *in extremis* against possible Soviet threats. Hence Israel has now become much more important to U.S. strategic thinking, although still hardly central.

Many people in Israel and the U.S. have looked into the possibilities of a formal treaty alliance between our two countries. They have generally concluded that Israel is much better off with an "unwritten" alliance which can be expanded almost infinitely, so long as both governments want it expanded. It can, of course, also retract. The North Atlantic Treaty, which underpins NATO as a treaty document, has unique features which our other mutual defense treaties do not exhibit. It is the only treaty which says that an attack on one member state is in effect an attack on the others. Such a provision, were it written into a U.S. – Israeli treaty, could give some additional reassurance to Israel. But one should be realistic. None of the alliances America has entered into since NATO have been that "self-executing." Moreover, it is obvious that the President of the U.S. retains the authority to decide on an appropriate military response, should the terms of the NATO treaty come into effect. No country in any alliance ever signs away its ultimate freedom of decision. Because the underlying foundation for U.S. relations with Israel are so strong, in many respects an "unwritten alliance" is more advantageous than any written treaty which the U.S. Congress would be prepared to ratify in today's diplomatic environment.

Israel is understandably sensitive about its security isolation and its excessive economic and political dependence on the U.S. Because of this, minor disagreements can be perceived in Israel as being more serious then they warrant. Recent disputes between Israel and the United States all fall within the within the normal range of arguments between close friends. The *Lavi* aircraft issue is a case in point. Although hotly debated, it is, after all, really a reflection of the fact that the U.S. is today financing such a large percentage of Israel's defense bill. The Reagan Administration is understandably worried about having to pay an even higher percentage at a time of real budget crises in Washington; it is also, however, genuinely anxious that other Israeli defense needs not be short changed by the large investment in the *Lavi*. The Pollard affair was potentially more damaging, but the Israeli Government's response was very forthcoming, and it is a mark of the closeness of our relationship that the damage has been well contained. We have all sorts of sharp disagreements with other allies – the British, the French, the Japanese, and yet nobody questions the fundamentals of those alliance relationships. We should perceive U.S. – Israeli friction in a similar light.

Israel receives a tremendous amount of information from the U.S. through normal channels; the U.S. also benefits significantly from the exchanges. Of course, our intelligence community does not give Israel everything Israel asks for, nor does Israel give the U.S. everything the U.S. wants. No government shares all of its sensitive intelligence with any other government. Our friendly relations with several Arab countries, for example, preclude sharing some kinds of intelligence with Israel.

Cooperation in the fight against terror has been extensive. Israel has furnished highly useful information to the U.S. on various terrorist groups and their operations. Washington perceives this cooperation very favorably and whenever there is a terrorist operation in the region, or sometimes outside it, looks to Israel to help us establish what is happening and what groups are responsible. Israel has intelligence sources on Middle East events which Washington does not possess.

As long as Israel and the U.S. deal with each other as friends and allies, yet as independent sovereign nations, there are few disadvantages to the closeness of the relationship. The oft-voiced fear in Israel that the great American colossus is going to descend and force Israel to sacrifice its vital interests for some American purpose is a paranoid delusion. The depth and breadth of political support for Israel in the U.S. public and Congress is such that no President could force Israel to do something which the majority of the Israeli people were convinced was suicidal. There are indeed some Americans who feel Israel pushes the U.S. around, and that American Administrations in recent years have "let Israel get away with too much." These are clearly minority views, but when Israeli leaders make serious mistakes these views are articulated and acquire temporary prominence.

Since the 1940s the U.S. has had a problem of balancing its special, increasing concern about Israel and its security, with its other geopolitical and geoeconomic interests in the area. This problem became more acute after 1967, and intensified further following the Yom Kippur War in 1973. Since the Lebanon war in 1982, however, there has been more sobriety in the Reagan Administration's assessment of its relations with certain Arab leaders. Moreover, the Administration has found a way to pursue its strategic interests with respect to both Israel and certain key Arab states with some success, even though peace remains elusive. Expanding military cooperation with both Israel and Egypt is the obvious example, but not the only one. It is clearly more difficult for the U.S. to have good relations with various moderate Arab states when they are not at peace with Israel. If peace reigned throughout the region it would be easier for America to pursue its strategic interests on both sides of this political divide. The Reagan Administration entered office in 1981 convinced that it should work closely with both Arab and Israelis. There was a conviction that America could develop strategic cooperation with certain Arab friends to checkmate potential Soviet moves in the Persian Gulf, and at the same time strengthen its strategic relationship with Israel in the Eastern Mediterranean. This theory was pursued with tenacity despite considerable difficulties, greatly intensified by the Lebanon war. By 1986, however, there seems to be a growing acceptance in the Arab world that the United States is going to have Arab friends, and Israeli friends, and perhaps that this is not such a bad thing after all.

The "Reagan Initiative" of September 1982 is not being actively pursued as a peace initiative at present. However, as a statement of American policy preference, it remains authoritative. It is interesting to note that since it was announced there have been many conflicting pressures on the President to modify it, to make it more attractive to the Arabs or more attractive to the Israelis. He and Secretary of State Shultz have quite stubbornly refused. If the day comes when the parties can be brought to the negotiating table, that 1982 Initiative will form the basis for the U.S. initial negotiating position, at least so long as President Reagan is in office. Obviously negotiations can change it, but it will not be modified in advance of negotiations. So the "Reagan Initiative" is very much alive. Moreover, since it is an outgrowth of the Camp David Agreement, with some refinements and additional elements added, a Democratic President would probably not change its substance very significantly, though he would undoubtedly change its name.This U.S. approach to Arab – Israeli peacemaking is not highly acceptable to some of the Arab players, or to some of the Israeli players, but there are a good many on both sides who see its virtues.

The achievement of a *modus vivendi* between Israel and its Arab neighbors is of primary concern to Israel and its Arab neighbors, but also important to the U.S. Since the 1967 war, for nearly 20 years, America has demonstrated its readiness to assist whenever Israeli or Arab leaders showed enough political will and were prepared to run political risks to negotiate either a temporary or a more far-reaching agreement. The U.S. has been ready to provide its "good offices," to mediate, to probe, to prod, to provide suggestions,to draft proposals, to push hard, but never naively believing it could impose an outcome. U.S. policy makers, whether Democratic or Republican, have long understood that no "American solution" can be imposed on either side and be expected to survive. For a negotiation to succeed, there has to be a conviction in both Israel and in the Arab states around Israel that this particular agreement is worth the risks. This was the case with the Camp David Accords and the Israel – Egyptian Peace Treaty. Unfortunately this was not the case with the Lebanon agreement of 1983. I am convinced it was a very good agreement, both for the Lebanese and for Israel, but there were other powerful parties which felt differently. To some extent, America's role in the Lebanon imbroglio, particularly in its earlier stages, was played poorly, hamstrung by uncertainty of purpose. In the later stage, 1983 – 84, with the U.S. and Israel too often working at cross-purposes, eroding U.S. public support for America's military involvement in the Lebanese cauldron finally doomed that product of American diplomatic mediation.

Whatever the future holds for this region, the U.S. will continue to try to nudge Arabs and Israelis toward peace, whenever the opportunity looks even mildly promising. How much energy American presidents devote to these problems will also be greatly conditioned by what crises erupt in the region. The record demonstrates, however, a remarkable U. S. persistence over the past five American Administrations in working for Arab – Israeli peace.The result is that the "unwritten alliance" is stronger than ever, and that never in its history as a modern state has Israel enjoyed so great a margin of military security over its foes.

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The above article is adapted from an exclusive interview Ambassador Lewis gave the IDF Journal.

THE LAVI AIRCRAFT:

AN ASSESSMENT OF ALTERNATIVE PROGRAMS

EXECUTIVE SUMMARY

OFFICE OF THE DEPUTY UNDER SECRETARY OF DEFENSE
(Planning and Resources)

21 DECEMBER 1986

EXECUTIVE SUMMARY

(U) The LAVI aircraft, conceived in the late 1970s as a low-cost indigenously produced replacement for Israel's aging fleet of Kfir and A-4 Skyhawk fighter attack aircraft, has developed over time into a highly complex and costly multi-role fighter. Growing U.S. concern about the program's costs led to a major review of the plane's mission, technical content and cost, which was completed in February 1986. The U.S. study indicated large disparities between the U.S. and Israeli cost estimates; in the U.S. view, LAVI's cost growth threatened to unbalance both Israel's military program and the U.S. military assistance program for Israel. Israel's recent imposition of a $550 million annual cap on LAVI-related expenditures underlines the gravity of the issue, and demonstrates that unless Israel's estimates prove entirely correct--an unlikely circumstance given delays that have already afflicted the program--the impact on Israel's overall defense program and posture is likely to be severe.

(U) This follow-on study examines potential alternatives to the LAVI program. It was structured to address not only Israel's military performance requirements, but also its larger economic concerns relating to the health and growth of its defense industrial base. Like the earlier LAVI report, this study is an inter-agency product, conducted under the direction of the Deputy Under Secretary of Defense for Planning and Resources, with much of the technical work produced by the U.S. Air Force and U.S. defense contractors, and with the active participation of the Office of the Secretary of Defense, the Department of State, the National Security Council and the Office of Management of Budget. The Government of Israel, while not a participant in the study, was exceedingly helpful in supporting the effort, providing both information and comments to the study team, as well as senior observers to the study's Inter-Agency Steering Group.

(U) In preparing their submissions of potential alternatives to the LAVI program, contractors were instructed to:

-- develop options that did not exceed $475 million (1984 dollars) annually;
-- base cost and schedule estimates on a program for 300 aircraft, with a 20 year life cycle;
-- base cost projections on most probable cost, of a quality commensurate with Letters of Offers and Acceptance for Foreign Military Sales;

-- assume a 1 January 1987 contract signature;
-- maximize opportunities for indigenous Israeli production of components and sub-systems;
-- consider airframe production and co-production opportunities.

(U) These instructions were designed not only to assure that Israel could find alternatives within its self-imposed cost limitations, but also to minimize any impact on the current Israeli work force as a result of restructuring the LAVI program, which is currently estimated to demand 96 million man-hours if no new hires are assumed.

(U) A total of nineteen options were put forward by defense contractors. This report analyzes five of those in detail (Appendixes outline the remainder).

(U) The five proposals are:

-- Foreign Military Sale of the McDonnell Douglas AV-8B Harrier, a significantly improved version of the British close air support and interdiction fighter. The program would incorporate maximum Israeli content, including co-development of a new avionics system, and result in an estimated 39 million man hours of work for Israel. Per unit flyaway cost of the plane is $20.8 million; program cost totals $7,428.3 million.

AV-8B
FUNDING/DELIVERY PROFILE
(in millions of fiscal year 1985 dollars)

Fiscal Year	87	88	89	90	91	92	93	94	95
	342.9	292.7	255.7	284.2	460.6	518.8	486.0	495.5	494.1
Deliveries(units)				3	9	24	24	24	24

Fiscal Year	96	97	98	99	00	01	02	03
	488.7	499.4	524.7	534.2	533.0	532.0	484.0	201.8
Deliveries(units)	24	24	24	24	24	24	24	24

-- Foreign Military Sale of a combination of 250 AV-8B and 50 deep attack variants of the McDonnell Douglas F-15, the U.S. Air Force's front line air superiority fighter. The F-15 would be a modified version of the U.S. deep strike F-15E, including improved radar, propulsion, and flight control systems, as well as a heavier air frame. Some additional Israeli work would be available under this option, resulting in 40 million man-hours in all. Per unit flyaway cost of the AV-8B is 21.4 million; and of the F-15, $27.6 million. The program's total cost amounts to $8,194 million.

AV-8B/F-15
FUNDING/DELIVERY PROFILE
(in millions of fiscal year 1985 dollars)

Fiscal Year	87	88	89	90	91	92	93	94	95
	400.8	475.5	505.1	417.3	399.4	439.6	460.7	466.0	440.7
Deliveries(units)			2	12	10	11	19	19	15

Fiscal Year	96	97	98	99	00	01	02	03	04
	492.4	504.1	536.6	547.1	545.1	544.0	526.0	371.8	121.7
Deliveries(units)	23	24	24	24	24	24	24	24	21

-- Licensed production in Israel of the General Dynamics F-16 Peace Marble aircraft. The F-16 is the U.S. Air Force's lightweight multi-role fighter/attack plane. This option would have Israel Aircraft Industries, the LAVI's prime contractor, as F-16 prime contractor, with all but the center fuselage manufactured in Israel. The program would result in 43-55 million man-hours of work, with the actual total determined by how much offsetting work General Dynamics is willing to provide to the European Participating Governments (EPG), how much less than 15 percent the EPG is willing to accept, and how much work Israel is willing to give up to the EPG. The flyaway unit cost of the program amounts to $14.6 million, and program cost totals $4,671.8 million. The F-16 could be delivered at a rate as high as 36 planes per year, a rate that is half-again better than the LAVI's 24 per year maximum.

F-16 Baseline
FUNDING/DELIVERY PROFILE
(in millions of fiscal year 1985 dollars)

Fiscal Year	87	88	89	90	91	92	93	94	95
At 24/Yr	156.8	177.1	239.8	275.7	307.8	346.5	375.7	387.6	387.7
Deliveries(units)				3	21	24	24	24	24
At 36/Yr	157.5	180.6	244.2	320.4	409.8	522.4	560.2	569.7	560.5
Deliveries(units)				3	21	33	36	36	36

Fiscal Year	96	97	98	99	00	01	02	03
At 24/Yr	387.8	382.6	381.3	332.4	250.0	160.9	94.4	27.6
Deliveries(units)	24	24	24	24	24	24	24	
At 36/Yr	470.0	372.1	232.4	83.5				
Deliveries(units)	36	36	36	27				

-- Israeli Licensed Production of the F-16, with all LAVI avionics. This alternative would involve the same arrangements as the preceding one, but with greater Israeli industrial involvement, resulting in 68-80 million man-hours of Israeli work, with the actual total determined by how much offsetting work General Dynamics is willing to provide to the EPG, how much less than 15 percent the EPG is willing to accept, and how much work Israel is willing to give up to the EPG. The per unit flyaway cost of this alternative totals $16.9 million, while the estimated program cost is $5,842 million. This variant of the F-16 could also be delivered at a rate higher than that of LAVI, namely, 30 aircraft annually, resulting in completion of the program four years ahead of the estimated date for LAVI.

F-16 Option 8
FUNDING/DELIVERY PROFILE
(in millions of fiscal year 1985dollars)

Fiscal Year	87	88	89	90	91	92	93	94	95
At 24/Yr	379.0	365.3	353.9	339.5	355.7	400.8	432.9	445.7	446.3
Deliveries(units)				3	21	24	24	24	24
At 30/Yr	380.1	367.4	359.8	380.4	455.4	529.3	559.5	562.1	559.4
Deliveries(units)				3	21	28	30	30	30

Fiscal Year	96	97	98	99	00	01	02	03
At 24/Yr	476.3	439.8	437.5	384.1	288.8	185.9	109.2	31.9
Deliveries(units)	24	24	24	24	24	24	24	12
At 30/Yr	545.6	477.1	362.3	233.7	92.9			
Deliveries(units)	30	30	30	30	30	8		

-- Foreign Military Sale of the McDonnell Douglas F-18 Hornet, the most modern U.S. Navy multi-role fighter/attack aircraft, with maximum Israeli content, including co-production of selected components such as avionics doors, gun loader doors, and aileron/aileron shroud. This alternative would provide an estimated 31 million man hours of work for Israel, and would entail a per unit flyaway cost of $27.1 million, with a program cost of $9,494.6 million.

F/A-18
FUNDING/DELIVERY PROFILE
(in millions of fiscal year 1985 dollars)

Fiscal Year	87	88	89	90	91	92	93	94	95
	227.0	279.0	538.9	529.3	540.0	552.6	540.0	526.2	500.8
Deliveries(units)				3	7	18	22	22	22

Fiscal Year	96	97	98	99	00	01	02	03	04
	489.2	472.3	473.3	513.5	535.7	534.7	531.4	530.4	518.8
Deliveries(units)	22	20	20	22	22	22	22	22	22

Fiscal Year	05	06
	441.7	219.8
Deliveries(units)	12	

(U) None of the alternative aircraft displays characteristics and capabilities identical to those of the LAVI. In particular, LAVI appears to possess superior range in the air-to-ground role. Nevertheless, all candidate aircraft at least approximate LAVI's purported capabilities, which have yet to be demonstrated. In particular, all candidate aircraft have demonstrated reliability and maintainability, as well as operational effectiveness, that will not be finalized for LAVI for several years to come.

(U) Mission capability is but one factor in the choice among LAVI and alternative programs. Economic factors have been assigned equal, if not greater, importance by Israel's leaders, and each of the alternatives provides considerable work for Israeli industry and labor while ensuring that the annual expenditure cap will not be breached. As noted above, such an assurance cannot apply to LAVI, even if U.S. cost estimates do not prove entirely correct (and most certainly if they do).

(U) Moreover, the lower cost of the alternative programs affords Israel the opportunity to remedy other priority program requirements that currently cannot be fully funded. These requirements include: More adequate funding for follow-on systems support, out-year funding for Saar-V and Dolphin submarine programs to support early initiation of naval modernization, initiation of attack and transport helicopter programs and acquisition of the Global Positioning System.

(U) Israel could undertake still another approach if it deems aircraft acquisition to be higher than the aforementioned priorities. It could acquire additional aircraft well before a full squadron of LAVI might become available. Such procurement would be possible without a breach of the $550 million cap on annual expenditure for aircraft modernization. The AV-8B and both F-16 alternatives would permit acquisition of 24 F-16 Peace Marble II aircraft for delivery by late summer 1991, when Israel could at best hope for delivery of eight LAVI aircraft. The F-18 alternative would also permit such an additional program, if forward financing of the program is entertained. Of course, since the Peace Marble II program incorporates a significant Israeli component, pursuit of this program would yield some additional work for the Israeli labor force.

(U) Finally, any of the above programs, with the exception of the F-15/AV-8B combination, could make funds available within the $550 million annual

expenditure cap for development of current Israeli initiatives in the realm of defense against tactical ballistic missiles. These weapons and architecture programs would require $140 million between fiscal years 1987 and 1989, with approximately $48 million required in fiscal year 1987 alone. Israel would have to assign higher priority to these efforts over its plans for more adequate funding for follow-on systems support, supporting the naval modernization program with adequate out-year funding, and initiating helicopter and/or the Global Positioning System programs. Should it do so, such sums are easily available within the $550M annual cap if any but the F-15/AV-8B option is pursued. Indeed, both the additional Peace Marble acquisition program and the ATBM effort could be funded simultaneously with funding of the F-16 options or of the AV-8B alternative, without breaching the $550 million cap. Moreover, the F-18 alternative would support an ATBM effort and a somewhat reduced additional F-16 Peace Marble buy.

COST OF ADDITIONAL PROGRAMS
(in millions of fiscal year 1985dollars)

Fiscal Year	87	88	89	90	91
PM II F-16 Buy	71.0	104.7	104.8	104.7	90.4
ATBM	48.0	62.2	23.2		

TOTAL COST OF ADDITIONAL PROGRAMS AND AIRCRAFT ALTERNATIVES

Fiscal Year	87	88	89	90	91
AV-8B	461.9	459.6	383.5	388.8	551.0
F-16 Baseline (36/Year)	276.5	347.5	372.2	425.1	500.2
F-16 (Opt 8) (30/Year)	499.1	534.3	487.8	485.1	545.8
F/A-18 *	298.0	383.6	643.6	634.0	630.3
F/A-18 **	275.0	341.1	562.1	529.3	539.9

* Additional PM II F-16s Only / Requires Forward Financing

** Additional ATBM Only

(U) As noted above, Israel has identified numerous priority programs that it cannot currently fund. The accelerated F-16 and the ATBM program are, therefore, only examples of efforts that would be made possible by the lower cost of the LAVI alternatives. They demonstrate that any consideration of alternatives cannot be limited to performance--which in any event cannot yet be demonstrated by LAVI--but also to the budgetary and programmatic flexibility, as well as industrial opportunity, that each alternative affords. None of the alternatives will provide Israel with independence from reliance upon foreign sources for its Air Force needs, but then again, neither will the LAVI, whose content has been variously estimated as between 33 and 50 per cent of foreign origin.

(U) Further, it should be noted that given the overall U.S. federal budget situation and the limitations imposed by the Gramm-Rudman-Hollings legislation, it is highly unlikely that there will be any increase in the $1.8 billion annual military assistance funding in the next several years.

(U) In an era of budget constraints, it is necessary to choose among competing programs. Ultimately, the decision as to whether to pursue LAVI remains with the Government of Israel. But, as this report demonstrates, that decision is by no means foreclosed, nor is pursuit of LAVI unequivocally the only one that protects Israel's military and economic interests.

to produce thousands of airplanes, with enormous sales potential overseas. General Dynamics' single-engine YF-16 (the Y prefix identifies a prototype airplane) won and became the F-16 Fighting Falcon. Northrop's entry, the twin-engine YF-17, rebounded later as the Navy/Marine F/A-18 Hornet, on which Northrop partnered with McDonnell Douglas.

But the lightweight fighter had to clear still more hurdles: within Pentagon circles where wrangles over weapon systems are conducted, proponents of the agile fighter charged that between the YF-16 and the F-16, the Air Force "heavied up" the fighter too much with extra electronics, particularly radar, so that the F-16 could do more work. The "fighter mafia" (the name given to the group of lightweight fighter zealots) regarded the changes with scorn. But the radar stayed and has even been enhanced over the years.

The "multiple role" F-16 that finally emerged represents a fusion of competing doctrines. But the argument about the best way to build a fighter has become moot because the airplane is clearly more than just a better fighter; in fact, it has

nullified the debate by redefining the way a fighter flies. The F-16 is a remarkable conceptual leap for the Air Force. It embodies a wholly new approach to aircraft control and maneuverability made possible only by computers. Computers actually determine how the airplane flies; indeed, without their electronic supervision the F-16 cannot be flown.

The aerodynamics of maneuverability is at once a black art, depending on the designer's taste and intuition, and a fearfully mathematical enterprise that can gobble weeks of time on the fastest computers available. Yet the fundamental concepts, including those that make the F-16 unusual, can be comprehended without a lot of math.

A good fighter should turn like a sports car and be faster than a bullet. You'd therefore think it should have maximum lift and thrust with a minimum of drag. But the design of any fighter is a product of trade-offs because of the way the airplane's desirable qualities tend to work against each other. For example, lift by its very nature produces drag: if you give an airplane large wings that provide lots of lift at low speeds and also provide a lot of surface to grab the air for tight turns, you get too much drag at high speed. If you use movable wings that can vary their sweep to obtain the best lift characteristics for a given speed—as the B-1, F-111, and F-14 do—the airplane's weight goes up sharply. Even more frustrating, airplanes behave quite differently at supersonic speeds, so that an airplane

designed for good subsonic performance may have excessive drag at supersonic speeds. So engineers compromise.

One of the most important factors affecting maneuverability is how fast an airplane's control surfaces can move it around its axes of motion. In the Korean war, pilots made the unwholesome discovery that Soviet MiGs were superior to the North American F-86 Sabre at some aspects of combat maneuvering. However, the Sabre could "transition"—go from a left turn to a right turn—more rapidly, in part because it had hydraulically assisted control surfaces. Sabre pilots learned that if they could force their adversaries to change direction rapidly, the Sabre could outmaneuver them.

Most aircraft have mechanical linkages—cables are typical—to move the control surfaces as the pilot moves the controls in the cockpit. The *distance* the pilot moves the control stick or pedals directly determines how far a control surface will deflect. Pilots may not be strong enough to move the surfaces of very fast or very large aircraft against the force of the passing airflow, so hydraulic systems are added to multiply their strength and help pull on the cables.

The F-16 departs from traditional mechanical controls. It is controlled with a "fly-by-wire" system in which electronics sense the *force* of the pilot's pushing and pulling on the controls and send electrical signals to hydraulic actuators that move the control surfaces. Replacing mechanical linkages with electrical circuits reduces weight. More importantly, it allows a computer to be inserted in the electrical circuit—the perfect place for supervising the pilot and preventing his doing things that might lead to loss of control. For example, if a pilot were to pull up too sharply at a low speed, the aircraft would "stall"—lose lift and go out of control. To avoid stalls in an older-generation fighter, the pilot had to watch an instrument that displays the "angle of attack" between the wing and the passing air—and pilots don't like to watch instruments when they're in a dogfight. By contrast, an F-16 pilot can maneuver with abandon, knowing the control computers won't let him pull the nose up enough to cause a stall. The computers also automatically adjust the flaps on the leading edge of the wings according to speed and angle of attack so that the airflow remains smooth and the wing won't stall.

But a more important peculiarity of the F-16 is that it is inherently unstable in flight. Making an airplane uncontrollable by humans seems to be a mistake, but there are good reasons for it, and all future fighters will probably be intentionally designed to be unstable.

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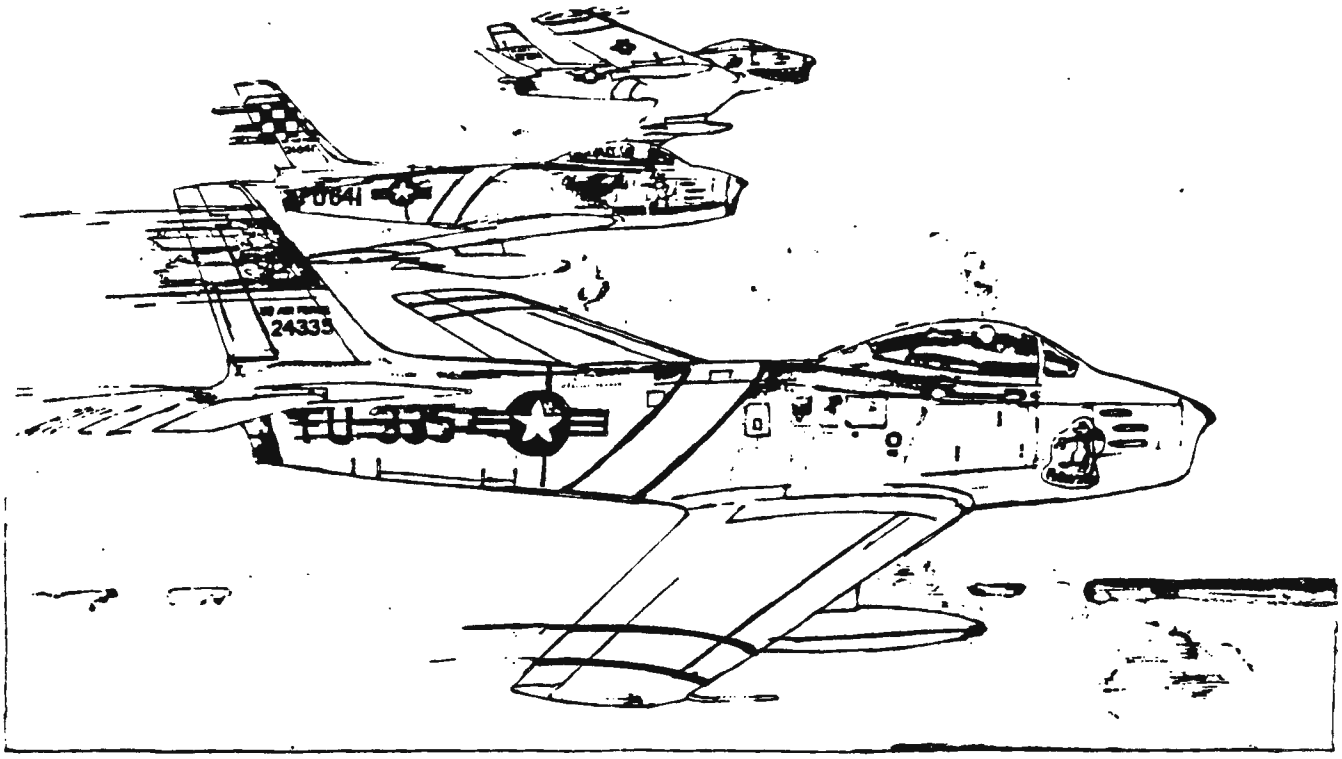
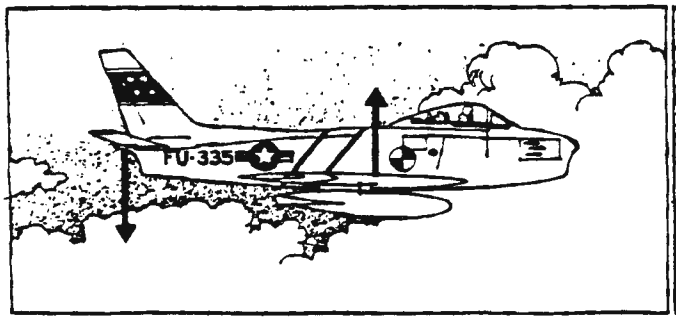
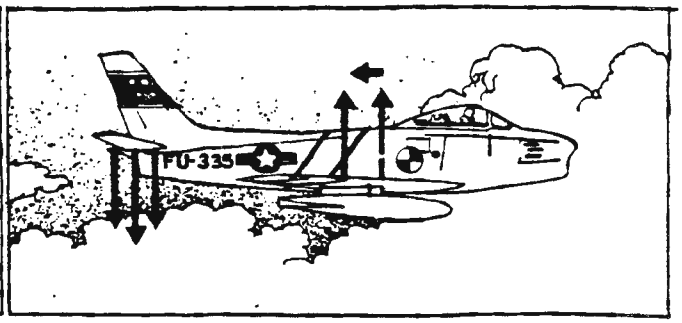


Illustrations by Ken Callison





Subsonic in the 1940s—a piece of cake

The North American F-86 Sabre typifies post-World War II design in a single-seat fighter. Its wing and tail arrangement follows traditional practice in order to achieve aerodynamic stability: the effective center of lift (symbolized by an arrow pointing upward from the wing) is located aft of the center of gravity (symbolized by the circled cross). To balance the airplane in flight, the Sabre's horizontal tail surfaces produce a force acting downward; the combined forces keep the fighter stable.

Supersonic in the Sabre—a handful

When the Sabre exceeds the speed of sound—Mach 1—the conventional design becomes a handicap despite its inherent stability. At supersonic speeds, the center of lift shifts rearward. Now the airplane has a strong tendency to pitch nose down, and to compensate, the horizontal tail must work harder to produce a balancing downward force to keep the nose level. To create this increased force, the tail deflects more of the passing air, which creates drag and slows the Sabre down.

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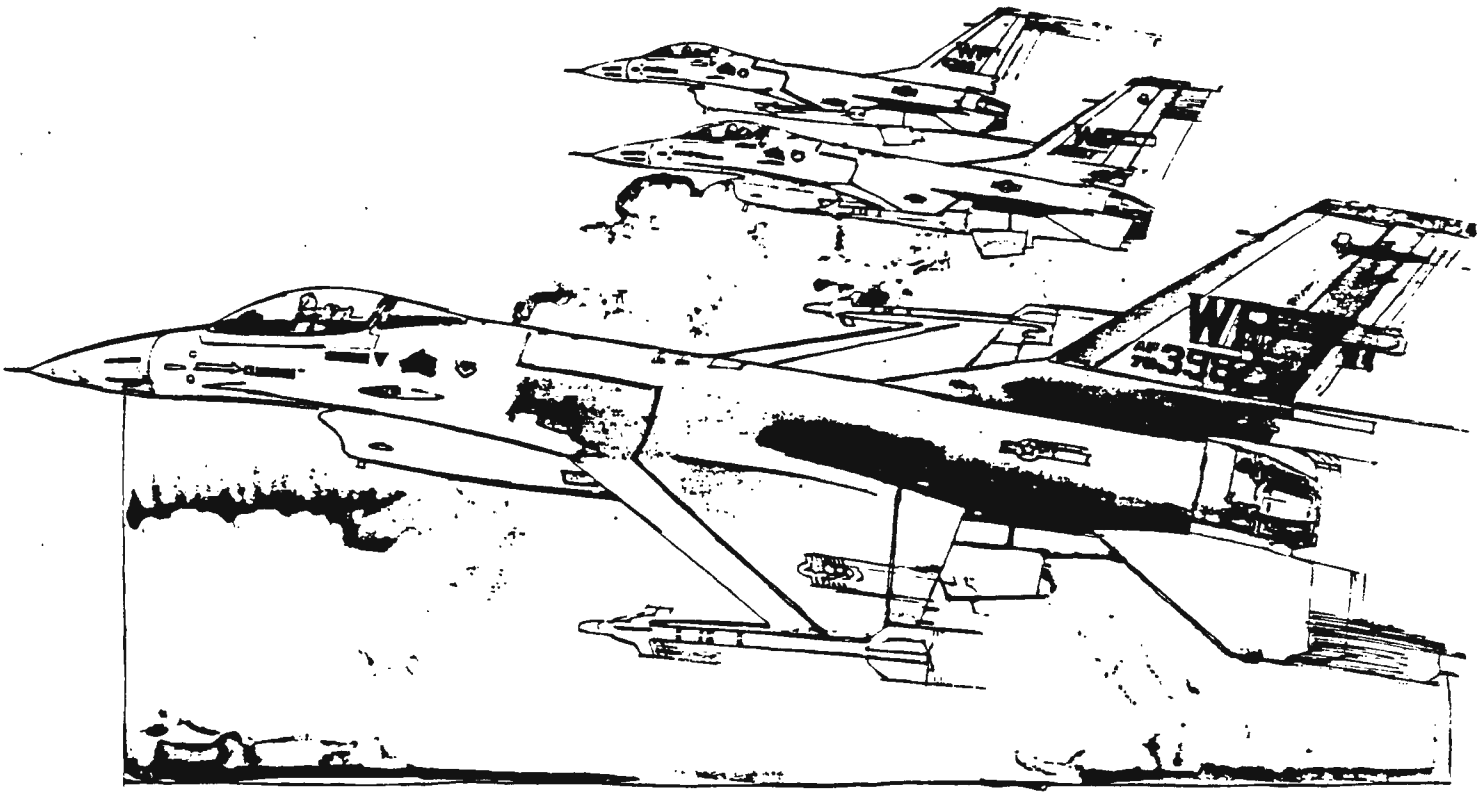
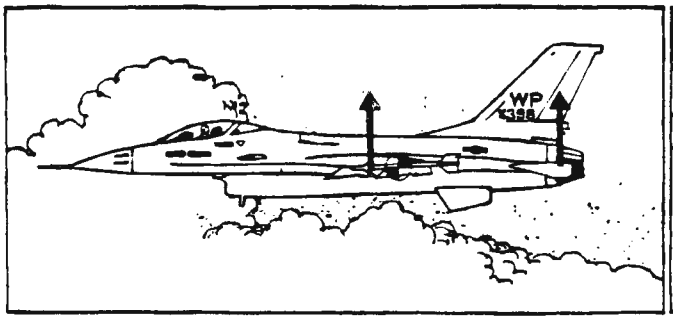
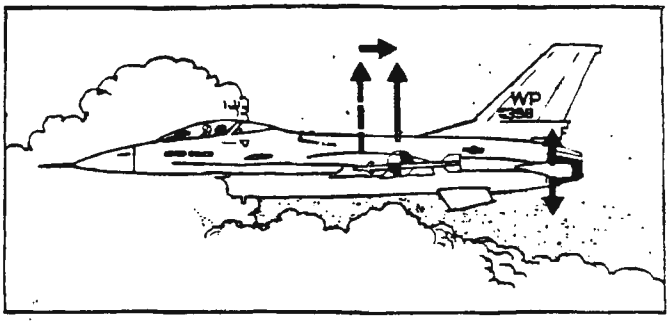
...F-16 Fighting Falcon







A new arrangement—the Fighting Falcon

The F-16's design benefits from years of experience with supersonic aerodynamics. Its wing is arranged so that the center of lift is forward of the center of gravity, which tends to lift the airplane's nose. To balance that, the horizontal tail creates a lifting rather than downward force. Making both wing and tail surfaces create lift is inherently efficient—but unstable. A computer restores the stability artificially, and the airplane's configuration now confers an overall plus: improved maneuverability.

Today's technology—even happier at Mach 1

When the F-16 transitions to supersonic speed and its center of lift moves rearward—just as it does on the F-86—that rearward shift acts to reduce the work the horizontal tail must perform. With the lift now acting through a point closer to the center of gravity, the airplane has less tendency to pitch upward. In turn, the tail has less work to do keeping the airplane in balance. Less work means less drag to slow the fighter down when it's flying faster than the speed of sound.

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Life at Six Gs

Five hundred feet over South Carolina at 500 knots. Below us, isolated farms and patches of forest whip past. A mile to the right, our wing man hangs in space, hardly seeming to move. The oxygen mask presses against my face like the heel of a clammy hand and, I know from experience, will shortly begin itching unreachably. The cockpit is small, the canopy large and very close around my shoulders. The effect from where I sit is one of flying *on* the airplane rather than in it.

Flying the F-16 is brutal. Accelerative G-forces, generated whenever this nimble airplane maneuvers, are crushing if you are not accustomed to them. The seats recline at a 30-degree angle to increase the pilot's tolerance to Gs, but the improvement is marginal. Aeromedicine says the best angle is perhaps 65 degrees, but it is not clear how to fly or use the ejection seat when you're lying down.

We are wearing G-suits—"speed jeans," to the fighter jocks. The worst effect of G-forces is to force blood from the head into the lower extremities, causing blackout. The suit's legs are therefore very tight and cinched with elaborate laces to make sure they stay that way. Their pressure makes it difficult for blood to drain into the legs. This suit, fitted to me this morning, is almost painfully tight at flight time. "People who don't fly much get psyched up," the sergeant had told me. "Adrenaline dilates blood vessels and your legs swell. Really." That's how tight they are.

The G-suit also has a rubber bladder that lies firmly against your abdomen, and a hose connects the bladder to an air outlet near the seat. When a sensor detects increasing G-forces, the bladder inflates, keeping blood from pooling in the abdomen. It is becoming clear that the limit to the F-16's maneuverability is the pilot.

Our biggest worry on this mock bombing mission is hitting a bird. At over 500 mph, an encounter with one duck would knock the fighter out of the air. The pilot, Air Force Major Greg Robinson, keeps a sharp lookout for anything dressed in feathers. He also monitors the HUD, or Head-Up Display, which projects data onto a glass plate on top of the glare shield so that he doesn't have to look down at his gauges. The HUD provides all sorts of great information—speed, altitude, bearing, where the bad guys are, the Dow-Jones averages.

If the F-16's radar detects an airplane ahead, a small green box appears on the HUD. The pilot just looks through the box, and when the airplane is close enough to see, that's where he'll find it. The radar is good, but it won't pick up ducks.

The ride is smooth, maneuvers effortless. Whatever the engineers did with this airplane, it worked. The F-16 can attack from an altitude of 300 or even as low as 100 feet to avoid hostile radar and ground fire. This requires a very good pilot, which Greg is. Would that I were a braver passenger—looking down at trees is one thing; looking up at them is another.

The electronics are a gadgeteer's dream. The computers provide every conceivable bit of information: ranges, bearings, time-to-target, when to turn, and lots more. The bombing system consistently wins in competition. Pilots say they were initially suspicious of the complexity but aren't now.

The screen says we are approaching the target: time to hold on tight. We are going to pop up briefly to find the target and then dive to bomb it—a standard maneuver. Maneuvers in the F-16 are sharp and crisp, which means violent and uncomfortable. The miles-to-target counter goes to zero. "Popping up," says Greg as casually as if we were doing something reasonable. Pilots are . . . "self-confident" is an inadequate description. They divide the world into fighter pilots and people to be treated courteously despite their inadequacies.

The nose shoots up sharply, a great weight falls on me from nowhere, and the Earth recedes. "There—rolling in!" The airplane leaps on its side, turning hard and down, and suddenly the Earth sails over the cockpit: because G-forces push you into the cockpit, "down" is sensed in relation to the airplane. More weight, several Gs. I tighten my stomach muscles and grunt hard—standard behavior to hold the blood high, but not calculated to add to the dignity of the enterprise. This stuff is physical. The ground comes charging up at us.

Unnh! Five or six Gs as we bank hard to avoid imaginary ground fire and scream down toward the forest to escape at low level. A concrete truck parks on my chest. My arms won't move. I force my head back. It weighs 75 pounds at five Gs, and if I lean forward, it will land in my lap and I won't be able to lift it.

We finally straighten out, flying smoothly, once again alert for birds. South Carolina is lovely in the bright sunlight.

—*Fred Reed*

ARTICLE CONTINUED NEXT PAGE

Stability depends directly on how the airplane is balanced in flight and has a lot to do with maneuverability. An airplane's center of gravity—engineers shorten it to CG—is a theoretical point at which all its mass is concentrated and which can be thought of as its balance point. All maneuvering motion takes place around the CG, as if it were a kind of central pivot. For example, when the pilot pulls back on the stick to raise the nose, everything in front of the CG rotates upward and everything behind it rotates downward.

Every airplane also has a center of lift, which is not as easy to visualize as the CG. The center of lift is the point at which all the lift acts as if it were concentrated. On most airplanes, all the lift comes from the wings. But on the F-16, both the wing and fuselage contribute; the engineers use the term "wing-body lift." The single point through which the sum of all the lift appears to act is the center of lift. Whereas the CG is fixed by the airplane's mass, maneuvers and variations in speed cause the center of lift to move around.

The relative positions of the center of gravity and the center of lift affect how the airplane is balanced in flight and are absolutely crucial to stability. On a conventional airplane with its horizontal stabilizer in back, the center of lift, acting upward, is behind the CG's pivot, and the downward force of the tail balances the airplane. If a gust of wind should disturb the airplane and cause it to pitch up and climb, it will slow down. Now the balancing force of the tail decreases because the air flowing over it has slowed. The force of the wing's lift, acting behind the center of gravity, pitches the airplane's nose down and restores it to level flight. This airplane is easily controlled, but it doesn't want to maneuver sharply. It likes sedate, steady flight, and engineers describe it as stable.

Now consider the situation in which the center of lift is in front of the CG. If the nose rises even slightly, the wing's lift, which is ahead of the CG's "pivot," can't restore it to level flight; instead, the lift pushes the nose even higher, rotating it upward around the CG, so that the airplane, left to its own devices, would flip over backward, out of control. In theory, the pilot could use the controls to bring the nose back down, but in practice his reflexes aren't fast enough. The airplane is unflyable. It wants to maneuver sharply but overdoes it—catastrophically. Older books on airplane design say this "static instability" is unequivocally bad.

The advent of small, powerful, reliable computers changed things greatly. "Aha!" engineers said in effect a few years back, "computers think very quickly indeed. Suppose we put computers into the control system together with sensors so they could tell what the airplane was doing. The computers could move the control surfaces almost instantaneously to correct for the airplane's tendency to diverge from normal at the slightest touch. Then the pilot could get the very quick turns that result from instability, but the computers would keep the airplane from going out of control—the best of both worlds." Being engineers, they rushed off for their pliers and wire and things, and discovered that the idea worked. And the F-16 was the first fighter to take advantage of it.

The F-16's three computers (a fourth acts as a spare) manage the controls, judging what the pilot wants to do from the forces on the stick and rudder pedals. Sensors measure the pressure of the passing air against the airplane, which allows the computers to calculate its speed. Other sensors measure the angle of the airflow, from which the computers derive the airplane's attitude with respect to the relative wind passing it. In short, the pilot's commands and the airplane's performance information are resolved in the computers.

This method is more radical than it would first appear. With the computer helping out, the pilot has much less to think about. For example, the F-16's cannon is mounted off to one side, so its recoil tends to skew the airplane slightly off course. In the heat of combat, considerable skill and attention would be needed to offset that sideward kick. When the F-16's computer senses that the trigger has been depressed, it automatically deflects the rudder to offset the recoil. Should the airplane be carrying external bombs or fuel tanks that change its response to the controls, the computer can adapt to keep the airplane within safe handling limits. In effect, the computer determines the airplane's handling qualities, which means that it can make the F-16 fly more like a fighter when it is stripped for action or more like an attack bomber when it is laden with ordnance. The role the airplane fills is no longer defined by its design but by what the computer says it is. And that's what has blurred the definition of it as a "fighter."

Because the F-16's center of lift is ahead of its CG throughout the subsonic speed range where it spends most of its time, the airplane's horizontal tail balances the airplane by producing its own upward lifting force, similar in effect to a small wing. On traditional fighters with conventional stability, the CG is ahead of the center of lift, and the tail pushes downward—in an airplane trying to stay *up*, a most counterproductive direction—to maintain the airplane's balance. The picture gets even worse when the traditional fighter goes supersonic. The center of lift invariably moves rearward, and now the fighter gets really nose-heavy. It takes a considerable amount of extra work by the horizontal tail to maintain balance. In the process, the tail creates lots of drag. But when the F-16 goes supersonic, the center of lift shifts rearward—closer to the CG—and the tail's job is made easier as drag is reduced.

Although the computers confer advantages, the obvious worry is that they might fail, leaving the airplane uncontrollable. But the engineers thought about that, too, and designed a system in which all the computers "vote." If one computer goes awry and comes up with a different answer, the other two override it and call the back-up computer into action. Despite all the precautionary built-in duplication, some people still worried that unreliability of the electronics might lead to accidents. In fact, reliability has not been a problem for the F-16.

Just tinkering with stability isn't enough to achieve maximum maneuverability, however. Two important though less obvious factors are the airframe's weight and strength. In turns, an airplane is subjected to "G force" that has the apparent effect of increasing its weight. In a two-G turn, an airplane's apparent weight doubles; in a four-G turn, it quadruples. The wings have to support the increased weight; if they can't, they may simply break off.

The more sharply an airplane turns, the greater the loads imposed and, therefore, the greater the penalty imposed by extra weight. In a nine-G airplane like the F-16, every extra pound of weight translates into nine pounds that the wings have to support in hard turns. The ratio of total weight to the surface area of the wings is called "wing loading," and it should be as low as possible. One way to reduce the ratio is to increase the wing area, but that produces increased drag; the only other way is to lighten the airplane.

Another factor important to maneuverability is the engine's thrust: a light, powerful airplane can climb and accelerate faster. The F-16's big engine confers what might be called "vertical maneuverability"—the airplane has more thrust

CONTINUED NEXT PAGE

than weight and can therefore climb straight up. If an enemy fighter gets behind you and you can climb at a higher speed and angle than it can, then it can't follow.

Further, "excess power"—meaning power above that needed to maintain speed in level flight—permits sustained turns. High-G turning requires a lot of lift to oppose the greatly increased weight, but that same lift creates drag that bleeds off speed rapidly. Consequently a moderately powered craft may be able to turn briefly at eight Gs, but it slows down so much that it has to straighten out quickly or fall out of the air. Slow-moving airplanes also make easy targets, so a pilot who finds himself at low airspeed wants to "get his energy up"—*now*. This, not a desire for high maximum speeds, is why fighters have large engines. (A fighter may be able to reach Mach 2.5 but will drink enormous amounts of fuel doing so, and most combat takes place at "transonic" speeds—a little above and below the speed of sound.)

The F-16 uses an afterburner-equipped turbofan, the Pratt & Whitney F-100-PW-200, which has 23,840 pounds of thrust—a lot of engine. Soon it may get an even more powerful engine: the General Electric F-110-GE-100, a modification of the 30,000-pound-thrust engine used on the B-1B bomber. Given that the F-16 weighs only 22,000 pounds at combat weight, it is well-powered. The little fighter will hold a nine-G turn without losing altitude until it runs out of fuel—a horrible thought to anyone who has tried prolonged high-G flight.

The F-16 has been an extremely successful fighter, performing well in combat. And its performance may never be improved upon, because its maneuverability already pushes the limits of human tolerance. Pilots cannot stand acceleration forces much in excess of nine Gs, at which point a 200-pound man weighs 1,800 pounds. Looking at it another way, he is supporting the weight of eight other men like himself. Aircraft can be strengthened, but pilots can't, and the point eventually comes at which internal organs begin to tear loose. Pilots are beginning to suffer hematomas, small purple spots on the skin caused by bursting of blood vessels. There will be no piloted 15-G airplanes.

However, the principle of unstable flight is being extended, at least for research purposes. The Grumman Corporation has successfully flown its X-29, a strange-looking craft with wings swept sharply *forward*. It is intuitively obvious to almost anyone looking at the X-29 that it would be uncontrollable without some help, and its dependence on computers will be even greater than the F-16's. The X-29 is still experimental, but Grumman reports promising results.

Computers are doing more and more of the work of flying these new breeds of aircraft, and some critics say that pilots are in danger of becoming mere advisors to the electronics. The next step in aviation may be even more revolutionary: unmanned fighters flown by remote control. Pilots don't like the idea at all, and argue, correctly for the moment, that technology can't produce an unmanned airplane as effective as a manned one. Yet such airplanes could be far smaller, lighter, and stronger, and maneuver far more sharply. That way, sooner or later, lies the future. —✓

The Electric Jet. ***Fred Reed*** is a syndicated military columnist with Universal Press. He has also written on military and general subjects for *Harper's* and *National Review*. He wrote "Dark Flight" in *Air & Space/Smithsonian*, June/July 1986.

Further Information: The General Dynamics F-16 Fighting Falcon by Jay Miller (Aerofax, Austin, Tex., 1982).

FLIGHT INTERNATIONAL 30 July 1983 Pgs.236-237

IAI Lavi: custom-built for Israel

TEL AVIV

Israel Aircraft Industries' first prototype Lavi fighter is scheduled to fly in late February 1986, reports our Israeli correspondent Charles Fleming. Five prototypes are planned, and production deliveries are to begin in 1990, reaching 30 a month. Some 300 Lavis are required to replace Israeli Air Force Skyhawks and Kfirs. The single-seat, single-engine Lavi is being designed for high-speed penetration, first-pass bombing, manœuvrability, and survivability. A two-seat variant will be developed for advanced training.

"Lavi will be a superior aircraft" to the F-16 and Mirage 2000, believes Menachem Eine, head of the Lavi programme, "but the most important point is that the Lavi will be a custom-made aircraft, designed and built for IAF requirements". All of Israel's considerable combat experience will go into the design of the Lavi. "We are looking for something that combines our experiences together in one aircraft," says Eine.

When the US Air Force or Navy develops an operational requirement for a new combat aircraft, Eine explains, the threat they have to consider is the best of current and future Soviet equipment. When the Israeli Air Force formulates an operational requirement "we have to consider a threat that consists of the best of Soviet weapons *and* the best of American weapons, in the air and on the ground.

"F-15s are flying in Saudi Arabia; F-16s are flying in Egypt and, in the not-too-distant future we believe, with other countries in the Middle East. Ground defences are also heavily accumulated in this area, Soviet and American." The Lavi will have to face a much higher threat than the current F-16 or any future US Air Force development, Eine concludes.

The Lavi will have almost the same role as Israel's F-16s: "a multi-mission aircraft and an excellent air-to-air fighter" says Eine. Why develop a new aircraft? Apart from the opportunity to incorporate combat experience in a new design, there is an economic advantage, Eine claims: "We strongly believe we can make the Lavi cheaper than the F-16 . . . its life-cycle cost will definitely be less, and we are still hoping to make the Lavi's price tag lower than the F-16's.

"One of the reasons for the Lavi's importance is to increase Israel's technological manufacturing abilities. We want a modernised industry with the technical ability in Israel, otherwise we will stay a developing country forever. We want to be a developed, not a developing, country," Eine emphasises.

Lavi's canard-delta layout reflects current thinking worldwide. IAI is familiar with the delta, and the canard, from its work on the Kfir, which was developed from Dassault's Mirage. The delta provides low weight, important in a single-engine design, ample fuel volume, low gust response for a smooth low-level ride, and directional stability at high angles of attack. The all-moving canard, particularly on a longitudinally unstable aircraft such as the Lavi, adds lift and provides positive control at high AoA.

The chin intake is based on that of the F-16: "a very beautiful technical solution" to some of the problems of inlet design, says Eine. The forward fuselage helps to direct air into the inlet at high angles of attack, there is no intake blanking with sideslip, and duct design is simplified, all combining to provide low distortion and high pressure recovery at the engine.

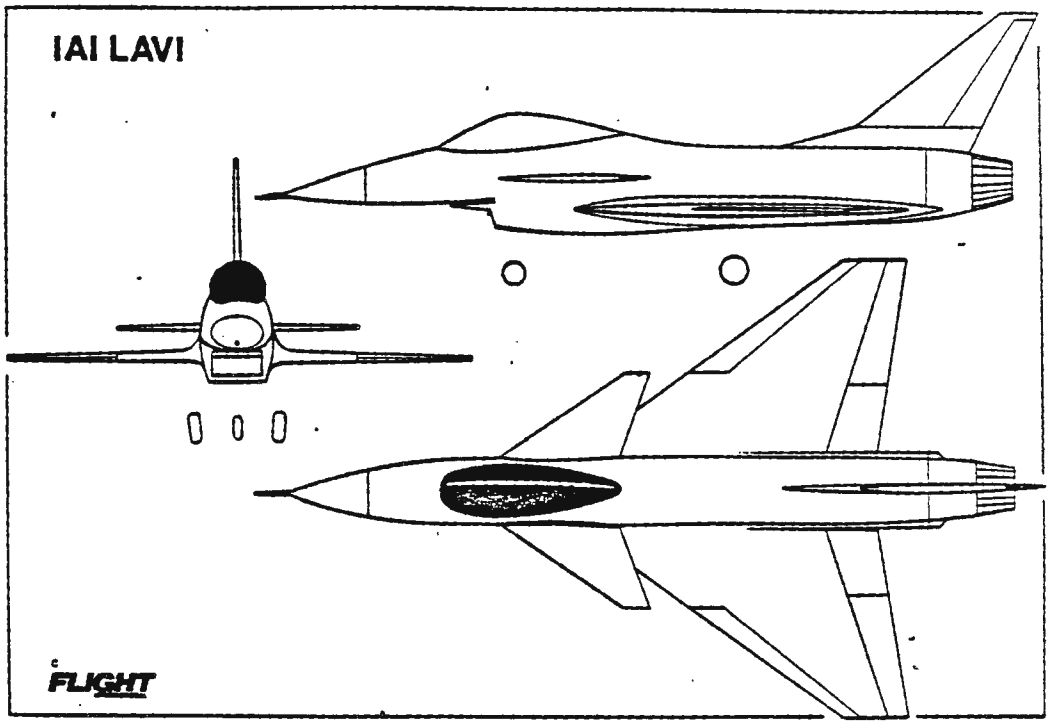
There are few surprises in the airframe, Eine admits. "At present we see that the future of aircraft development is in the systems, not in the platform." The breakthrough in airframe design came with the F-15 and F-16, he argues, although the demand for low Lavi structure weight requires a composite wing with carbonfibre substructure as well as skins, "and this is pushing technology a step further", Eine admits.

Grumman is responsible for the design, development, and initial production (20 ship-sets) of the carbonfibre wing and vertical fin. "We initiated a programme in Israel [to develop these components]", says Eine, "but we realised that it would cost us some eight months in time, and probably a bit more money. What was important was the eight months, which is a long delay, almost unacceptable to the programme."

Where the Lavi will be an advance over existing aircraft is in the integration of its avionics and electronics. "We have to fight more sophisticated weapon systems and in heavily defended areas, so we have put much more emphasis on defence systems in the aircraft, better warning systems . . . a better picture of what is going on in the area," says Eine.

IAI subsidiary Elta Electronics Industries is responsible for the electronic-warfare self-protection system, which provides rapid threat identification and automatic flexible response using passive and active countermeasures including power-managed noise and deception jamming. The Lavi will have internal and podded jamming systems.

The Lavi will make extensive use of distributed,



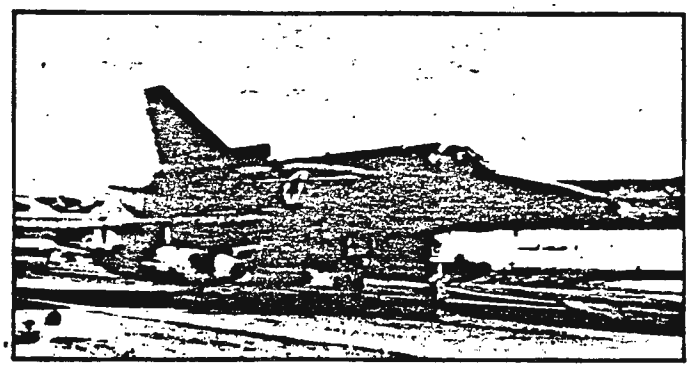
With a length overall of 47·2ft and a wing span of 28·6ft, Lavi is only slightly smaller than the F-16

embedded computers. "This aircraft is more computerised than any other system in the world," Eine believes. "One warning system will give input to other active systems—more than one active system. This is unique in this aircraft."

Israel is developing a new weapon delivery computer for the Lavi because earlier computers were "too small [in capacity], too slow, and too heavy. We are talking about a physically smaller computer, much bigger in capacity and much faster." Although the operational requirement does not call for bombing accuracy greater than the F-16's, a better computer and more accurate inertial navigation will provide greater accuracy "even without asking for it".

The Lavi cockpit has three head-down TV displays, one coloured, and IAI plans to incorporate a wide-angle diffractive-optics headup display. "We are in the middle of negotiating with Hughes on this system, and we have a proposal from Marconi that we are seriously considering", says Eine. A US consortium led by Astronautics is also competing. "Holographic display is more than nice to have, but it is not a must", says Eine, who would like a wide-angle Hud in the Lavi, "but not if it is too risky to develop or too expensive".

The aircraft will have a quadruplex-redundant digital flight control system, to be developed by Lear Seigler in co-operation with Mabat in Israel. "Like the F-16, the Lavi will be a fly-by-wire, unstable aircraft", Eine confirms. There will be no mechanical flight controls, only limited analogue electrical backup. Eine believes that quadruplex provides good redundancy, and says that Lavi will be the first operational aircraft with fully digital flight control.



IAI is currently building the Kfir C7 both for Israel and for export

All of the avionics will be developed in Israel, including the radar. Elta is responsible for the coherent, pulse-Doppler radar, which will be a development of the company's multimode EL/M-2021. Air-to-air modes will include look-down search and track-while-scan. Air-to-ground modes will include terrain-avoidance and high-resolution mapping. The radar will have a programmable signal processor.

Three of the five Lavi prototypes will be two-seaters. "One of the most important missions we see for the Lavi is advanced training", says Eine. The Israeli Air Force currently uses Skyhawks and F-4s for this task, but these will be phased out by 1995. The F-16 has a force-stick sidearm controller in place of the conventional joystick, and this is not optimal for training, says Eine. As Lavi will be in service in large numbers "it is obvious that this aircraft will be used as our advanced trainer". Of the aircraft 60 will be trainers.

To reduce the time, risk, and cost involved in developing a new combat aircraft, Israel is subcontracting a sizeable part of Lavi development to overseas companies. Many of the aircraft systems will be developments of well-proven US equipment. "We do not have the American complex of not being invented here, and we will buy the F-18's system if it is better than the F-16's, even though one is a Navy aircraft and the other Air Force." These systems will require some development, "but it will always be cheaper than starting from scratch", Eine concludes.

IAI will buy off-the-shelf the environmental control system, secondary power system, emergency power unit, electrical generation, etc. In most cases development and initial production will take place in the USA, after which manufacture will move to Israel. "It is very important to have the production, and the production knowhow, in Israel", says Eine, although he acknowledges that there are areas of technology to which the manufacturer, or the US Government, will not allow Israel access.

Despite this, Eine believes that the only area where Israel is dependent on the USA is the engine. The 20,260lb-thrust Pratt & Whitney PW1120 is derived from the F100 which powers Israel's F-15s and F-16s, but for some parts of the engine "the technology is a secret to prevent it going outside of the USA and Pratt & Whitney".

The engine will be built by Beth Shemesh Industries, apart from these sensitive parts, and Israel is already buying new technology to produce the compressor blades. Development of the PW1120 is being paid for by Pratt & Whitney, with Israel funding Lavi-specific modifications. The PW1120 is unique to Lavi, notes Eine, "although we hope that some other countries will buy the same engine".

Development of the Lavi will cost $1,500 million, says Eine. A unit flyaway price of $11 million gives a production-run total of more than $3,000 million, he adds. About one-third of the development and production total will be spent in the USA. "This is huge business, and companies are willing to sell... They understand, and we know, that there is no real competition between us", Eine maintains, adding that "what is now well-kept technology will in five years be common technology... that is why, in the end, I hope that 100 per cent of the Lavi will be built in Israel".

In final justification of the Lavi, Eine notes that Israeli experience in the Yom Kippur War was shared with the USA and incorporated in the F-15 and F-16 "and now we see those aircraft flying on the other side, the enemy side. This is a big dilemma.

"On one hand we want to share our experience with the US forces, and this is easier, but we also want to share this experience with US industry because, in the end, we are flying their aeroplanes and we are benefiting from our experience. On the other hand, this technology is going to the other side."

Eine himself negotiated the purchase of extended-range conformal fuel tanks for Israeli F-15s. "We were the first country to buy them, and the US Air Force followed. We paid for the development of these tanks, we set the requirements and did the tests." For a time the tanks were produced only in Israel. "But these tanks were sold to the Saudi Arabian Air Force—and the Saudis are our enemies, no doubt about that. So, though we hope it will not happen, Saudi F-15s could be fighting Israeli F-15s." With the Lavi, Israel can benefit from all of its unique combat experience and not have to share it with its Arab enemies.

Lavi performance detailed

The primary mission of Israel Aircraft Industries' Lavi combat aircraft is ground attack, both short-range close air support and medium-range interdiction. Powered by a 20,260lb-thrust Pratt & Whitney PW1120, the Lavi will have a maximum take-off weight of 37,500lb, including an estimated 6,000lb of internal fuel and 16,000lb of weapons and external fuel. Maximum speed will be Mach 1·85.

Carrying eight 750lb bombs, the Lavi will have a combat radius of almost 250 n.m. Carrying two 2,000lb bombs, the Lavi will have an interdiction radius of at least the Kfir's 650 n.m. and a 600kt penetration speed. With a 1·1:1 combat thrust-to-weight ratio and a 350ft² wing, Lavi will be a 9g aircraft. Self-defence armament carried on all missions will include two beat-seeking missiles.

U.S. Assigns Israel, Egypt Bulk Of Foreign Military Financing

Washington—Israel and Egypt will receive the bulk of U.S. foreign military financing this year in amounts larger than those sought by the Reagan Administration but with less provided by Congress for other countries (AW&ST Mar. 29, 1982, p. 22).

Under last month's catch-all funding bill adopted at the close of the 97th Congress, $1.1 billion in Foreign Military Sales (FMS) credits was approved—$750 million for Israel, $425 million for Egypt. These credits will be forgiven. Israel will receive Fiscal 1983 Foreign Military Sales loans of $950 million; Egypt probably will receive $875 million.

Total aid for each nation is what the White House recommended (AW&ST Apr. 26, 1982, p. 22). But Congress changed the mix of forgiven credits and loans—it provided greater forgiven amounts despite Administration objections that this would deplete resources for other countries and imperil U.S. diplomatic efforts toward a Mideast peace settlement.

The Reagan Administration recommended $500 million in forgiven credits and $1.2 billion in loans for Israel. Instead, Congress earmarked $750 million in credits, subtracting $250 million from the loan column. Congress also boosted the forgiven amount for Egypt from $400 million to $425 million.

Military aid had to be addressed in the stopgap funding bill, which will sustain federal spending until the end of the current Fiscal year next Sept. 30, because Congress last year failed to adopt a foreign aid appropriations bill (AW&ST May 3, 1982, p. 18). The stopgap measure ordered U.S. troops in Western Europe for Fiscal 1983 held to the planned 1982 level of 315,600 (ashore only), overruling a Senate Appropriations Committee recommendation to keep to the planned 1980 level of 309,400 (AW&ST Dec. 6, 1982, p. 22). The planned 1983 level was 320,300 troops.

The same committee had recommended cutting funds for the ground-launched cruise missile to be deployed in Western Europe beginning next December, and the stopgap bill went along with that. The White House budget request of $490.3 million was cut to $431.5 million. A House staff member said this would allow purchase of 84 missiles, compared with the 120 called for under the current contract with General Dynamics.

Other countries earmarked by Congress for military financing assistance included:

- **Turkey**—$290 million in loans and $110 million in Military Assistance Program (MAP) funds. MAP provides defense articles and related services, other than training, on a

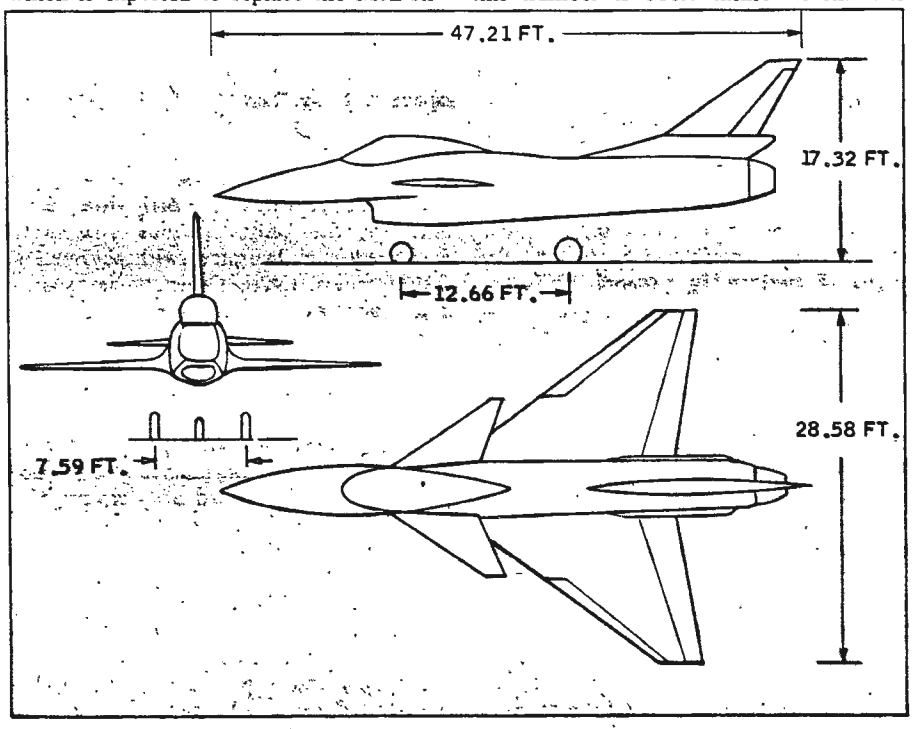
U.S. Nears Lavi Transfer Approval

Washington—The Reagan Administration is moving toward approval of U.S. aerospace technology transfer to Israel to develop the Israel Aircraft Industries Lavi tactical fighter aircraft. It also plans to separate the technology transfer issue from requests to Congress for Foreign Military Sales credits to fund developing and procuring the Lavi fighter.

The development cost for the Lavi, which is expected to replace the McDonnell Douglas A-4 and the Kfir C2 aircraft in the Israeli air force, is estimated to be $1.37 billion in Fiscal 1982 dollars.

Israel also plans to develop the Lavi as a trainer and will build five prototypes with three of the aircraft configured with two seats.

Israel plans to buy more than 300 of the Lavis for its air force. The estimated unit flyaway cost of the aircraft based on this number is $10.8 million each. The cost estimate by major systems includes: airframe, $4.75 million; engine, $2.6 million; radar and self-defense systems, $1.75 million, and avionic systems, $1.7 million.



Design characteristics of the Israel Aircraft Industries Lavi fighter are depicted in drawings with aircraft dimensions. The Lavi will be powered by the Pratt & Whitney 1120 engine.

In planning the development program for the Lavi, Israel expects to take advantage of U.S. research and development programs for the McDonnell Douglas F-15 air superiority fighter, the General Dynamics F-16 and the Northrop/McDonnell Douglas F-18 by adapting existing hardware for the new aircraft.

Modifications would be made to components of these fighters so that they could be used in Lavi development, eliminating most of the research associated with aircraft development programs. Examples of systems that are expected to be modified for the Lavi are:

- Pratt & Whitney PW1120 derivative of the F100 engine developed for the F-15 and F-16 fighters already in Israel's inventory.
- Jet fuel starter developed by Sundstrand/Garrett AiResearch.
- Emergency power system developed by Garrett AiResearch.
- Electrical power system developed by Sundstrand/Lear Siegler/General Electric.
- Environmental control system developed by Hamilton Standard/Garrett AiResearch.
- Leading edge flaps by Garrett/Sundstrand.
- Oxygen system by Bendix.
- Wheels, brakes and tires by Goodyear/B. F. Goodrich.
- Fuel and hydraulic system components by a number of U.S. companies.

grant basis to eligible countries. The Reagan Administration requested $465 million in FMS financing for Turkey to be used for tanks, ship and Nike missile modernization and for search and rescue helicopters.

■ **Portugal**—$52.5 million in loans and $37.5 million in MAP funds. The Administration asked for $90 million in FMS financing.

■ **Morocco**—$75 million in loans and $25 million in MAP aid. This equals the Administration request of $100 million.

■ **Spain**—$400 million in loans. This also is in line with the Administration's request.

Under the International Military Education and Training (IMET) program, the Reagan Administration requested $53.7 million for Fiscal 1983 to train personnel from 87 countries. Congress approved $45 million.

The Special Defense Acquisition Fund, authorized by Congress in 1981 to stockpile defense equipment that might be needed on short notice for transfer overseas, received $125 million in the stopgap funding bill.

The government of Israel already has invested $198 million in the Lavi through fiscal 1982 and plans to spend another $210 million for the fighter development in fiscal 1983 funding. The Lavi concept is for a lightweight advanced attack aircraft to become the workhorse of the Israeli air force.

The Lavi design is based on medium and close-range, air-to-ground sorties for close air support. This design also provides a secondary mission as an air defense interceptor and doubles as a two-seat trainer.

The technical requirements that are influencing the Lavi design are high-speed penetration to the target, high maneuverability and low drag stores.

The Lavi, powered by a single PW1120 engine, would penetrate to a target armed with two infrared-guided, air-to-air missiles and eight Mk. 117, general-purpose 750-lb. bombs at a speed of 538 kt. Configured with two AIM-9L Sidewinder missiles and two Mk. 84 2,000-lb. bombs the penetration speed would be 597 kt. The ground attack range of the Lavi armed with eight Mk. 117 bombs would be 244 naut. mi.

The PW1120 engine for the Lavi at sea level standard with maximum afterburner is designed to provide 20,620 lb. thrust for the fighter and a specific fuel consumption of 1.86.

The maximum takeoff weight of the Lavi is 37,500 lb., with the basic takeoff weight of 21,305 lb. The aircraft is designed to carry 6,000 lb. of fuel internally and 9,180 lb. externally.

The Lavi's wing area is 350 sq. ft., with air combat parameters that include: wing loading, 534 psf.; thrust-to-weight ratio, 1.10; maximum load factor, 9g, and maximum speed, Mach 1.85.

The design of the Lavi, which approximates the F-16 in size, provides specific excess power at Mach 0.8 at 15,000 ft. of 540 fps. pulling lg.

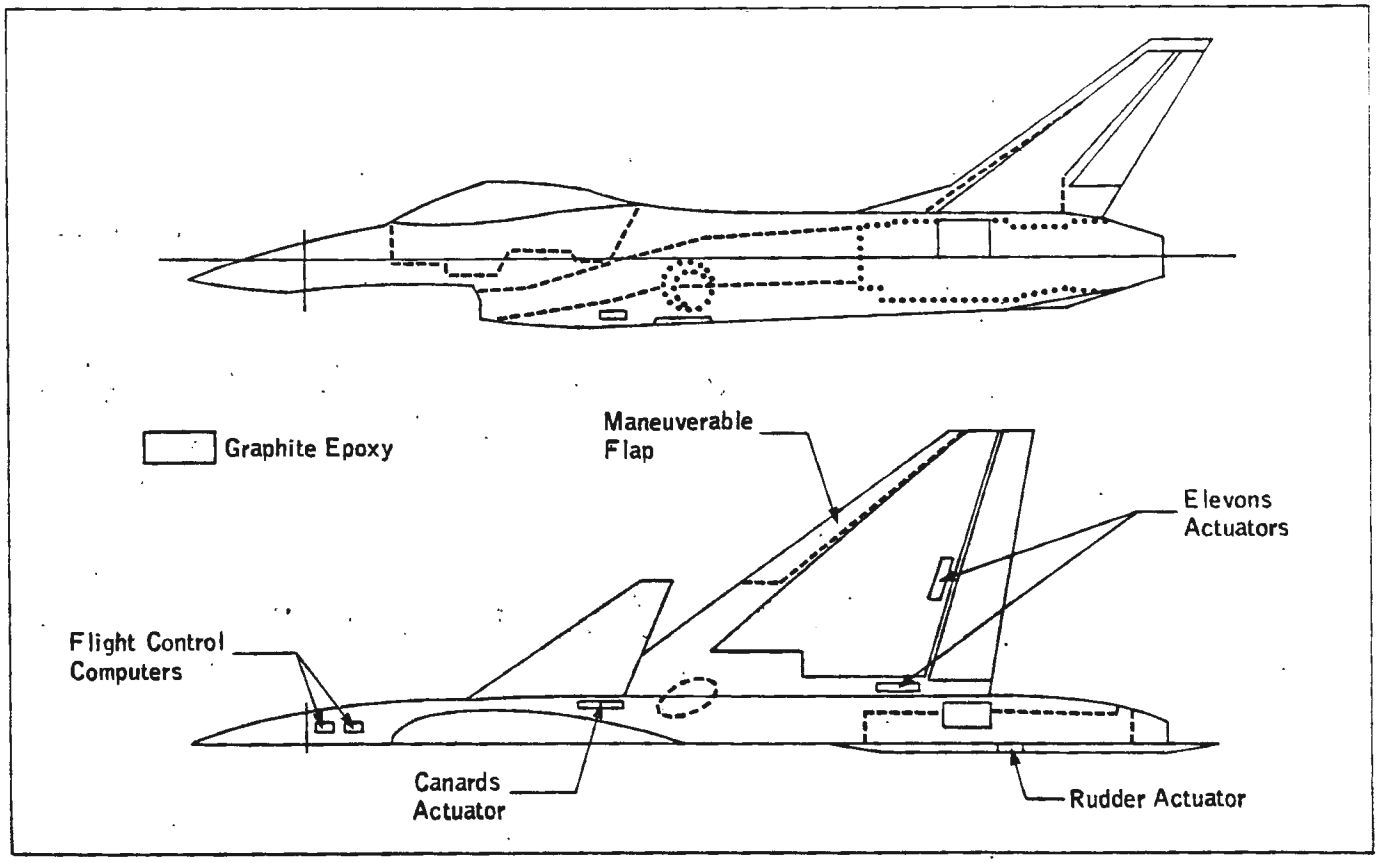
This compares with specific excess power for the F-15C under similar flight conditions of 623 fps. It also compares with the F-16's specific excess power of 708 fps. at Mach 0.9 at 15,000 ft.

The sustained turning rate for the aircraft is designed to be 13.2 deg./sec. at Mach 0.8 at 15,000 ft., and the maximum turn rate under the same flight conditions is predicted to be 24.3 deg./sec. This compares with a sustained turning rate of 11.8 deg./sec. for the F-15C, and 12.8 deg./sec. for the F-16A.

Israel's Lavi team, which visited the U. S. in late 1982, made a case to the State and Defense departments that the fighter development program will pose no immediate competition to the U. S. fighter programs, especially the Northrop F-20, where foreign sales are pending.

The Israeli team emphasized that McDonnell Douglas F-4s will have to be replaced by 1995 for Israel's air force. Candidates to replace that aircraft, the officials said, are the F-15E, the F-16E and the F-18 fighter.

The Israeli representatives also explained that the Lavi will replace several hundred aircraft in the Israeli air force, reminding the U. S. that Israel still bought the F-15 and the F-16 after the Kfir was



Graphite epoxy composite structures for the Israeli Lavi tactical fighter to be codeveloped with U. S. industry are depicted with flight control systems for the aircraft. Flight control will be digital fly-by-wire with analog backup. First flight of a prototype is scheduled for late 1985.

British Design Mach 2 VTOL Fighter

London—British Aerospace has designed an advanced, Mach 2 supersonic vertical takeoff and landing fighter aircraft, designated the P. 1216, and has completed a full-scale mockup at its Kingston production facility.

Decision to build a mockup was made after extensive wind-tunnel testing by the company's Kingston-Brough Div. Wind tunnel tests on the model and several other configurations have been under way for several years (AW&ST Dec. 8, 1980, p. 51).

The P. 1216 design is powered by an uprated Rolls-Royce Pegasus engine, rated at more than 30,000 lb. and employing plenum-chamber burning in the two forward ducts for added thrust. The engine has a single rear vectorable duct through which the engine's hot section exhausts, rather than two rear ducts as in the existing Harrier family.

The P.1216 is larger than current AV-8B aircraft. A new wing has been designed for the Mach 2 role.

developed and manufactured in that nation.

The Lavi, the team said, would not compete with the new U. S. advanced tactical fighter, adding that the first prototype Lavi will not be available until November, 1985, with first production aircraft scheduled for delivery in 1990. Israel plans to buy the first 300 aircraft for its inventory and could not begin export sales of the Lavi until 1995, according to Defense Dept. officials..

There is a debate within the Administration on whether to allow Foreign Military Sales credits to be used for Lavi development. There is no real problem with using the credits for fighter production, only for development, one Defense Dept. official explained. He said, however, it is likely Foreign Military Sales funding will be used for the development program.

Funding for the Lavi is less certain than release of component composite technology and will depend on the meeting scheduled in February between President Reagan and Israel's prime minister, Menachim Begin, and the position Israel takes on West Bank settlements.

A licensed production contract for the PW1120 engine has been signed, and the engines for the Lavi will be produced at Bet Shemesh Engines, Ltd., near Tel Aviv. The PW1120 will share a common core with the F100-PW100/200 engines and have 60% commanality in parts. No change is expected in hot-section life for the engine.

The PW1120 is being developed with improved operational capability, especially at low-speed and high-altitude regimes. No change is expected in distortion handling, and a 12% lower fuel consumption is anticipated in aerial combat.

The State Dept. has delayed transfer of composite materials technology to Israel from three major U. S. companies—Grumman Aerospace Corp., Vought Corp. and General Dynamics—for the Lavi, but that restriction may be lifted in the next few weeks (AW&ST Sept. 13, 1982, p. 31).

There are still interagency differences within the Administration over the development of the aircraft, but there also is a consensus that the composite technology will be permitted, with contracts for the structure development.

The wing and vertical tail for the Lavi would be codeveloped by subcontracting to the three U. S. companies by Israel Aircraft Industries for composite structures. Composite technology also will be applied to the all-moving canard and control surfaces and to structural doors, panels and air brakes. This composite material application is expected to yield advantages in reduced assembly work, lower operating costs, higher structural efficiency and higher design flexibility.

Israel expects to codesign and coproduce the Lavi fighter in Israel and has alloted $100 million to codesign and adapt the PW1120 engine to it, with an additional $300 million budgeted for engine production in that country. Other codeve-

Measures Urged to Stem Tide Of Sensitive Data to Soviets

San Francisco—U. S. should sanction the wider use of lie detector tests by the Defense Dept. and revise both the Freedom of Information Act and its procedures for declassifying defense-related material to stem the flow of sensitive technological information to the USSR, an intelligence official said here last week.

One of the means by which the Soviets have acquired valuable information in recent years has been through adroit use of the Freedom of Information Act, according to Rear Adm. Edward A. Burkhalter, U. S. Navy, director of the Intelligence Community Staff.

"Just by asking the right questions, the Soviets are able to pull from federal government files reams of technical data not otherwise available to the public, much of it only recently declassified," he said at an Armed Forces Communications and Electronics Association meeting (AFCEA).

Industry, rather than government, however, is the front line in the struggle against Soviet industrial espionage. Industry must exercise its responsibility to help deny sensitive technology to the USSR and other Eastern bloc nations, Burkhalter said.

No high-technology company is free from the threat of Soviet infiltration or theft, but the many small companies developing emerging technologies, whose applications are only now being explored, are vulnerable. Because the applications are still indefinite, this work is not subject to security classification and protection.

The Soviet appetite for U. S. technology is not indiscriminate, Burkhalter said. Rather, at the highest level of government, the Soviet State Committee for Science and Technology considers the needs of the Soviet military and, to a lesser extent, the civilian scientific and industrial communities and formulates these needs into acquisition requirements.

About 30% of these requirements can be met by such legal, open means as subscribing to such periodicals as AVIATION WEEK & SPACE TECHNOLOGY, Burkhalter said, or by attending international conferences, sending scientists to do research at U. S. universities, or buying equipment that is available for unrestricted international sale. For the 70% of its technology acquisition requirements that it can not obtain legally and openly, the committee turns to the Soviet intelligence services—the KGB and the military intelligence unit, the GRU. Former KGB officers and agents now in the West have said that this technology acquisition has been assigned the highest priority for KGB and GRU collection, and the two services compete strenuously for the recognition that follows success in acquiring high-value technology, Burkhalter said.

Open and covert acquisition of Western technology saves the Soviets billions of dollars in research and development costs, and years in research and development time. Burkhalter set the value of the information that the Soviets obtained over a three-year period from one source, former Hughes Aircraft radar engineer William Holden Bell, at hundreds of millions of dollars (AW&ST May 10, 1982, p. 24; July 6, 1981, p. 25).

He said Bell was paid $110,000 for classified information about the USAF/McDonnell Douglas F-15 look-down/shoot-down radar, B-1 and Stealth radar, an all-weather tank radar, the Navy Hughes Phoenix missile, Army/Raytheon Patriot and Improved Hawk missiles, and a towed-array submarine sonar.

"In cost versus benefit terms, the KGB is

lopment and coproduction funding includes:

- Wing and vertical stabilizer—$60 million and $100 million, respectively.
- Flight control computer with Lear Siegler already under subcontract for $60 million in codevelopment, and $100 million planned for coproduction.
- Airframe systems with $20 million and $100 million for codevelopment and coproduction with U. S. industry.
- Materials procurement for coproduction estimated at $500 million in Fiscal 1982 dollars.

The Lavi concept as presented by the Israeli briefing team is built around the use of proved materials and processes, adapting systems already developed whenever possible. This approach uses state-of-the-art technology and is low risk in approach. It also provides cost-effective qualification testing of the aircraft, Defense Dept. officials said.

The avionics system for the fighter is planned to operate with advanced digital systems with interactive multifunction display and controls, fire control integrated with internal and external sensors, and enhanced active and passive self-defensive systems.

Computer embedded systems for the Lavi would be built to comply with U. S. military specifications. The flight control system for the aircraft would be a fly-by-wire system with relaxed static stability. It will have an analog but no mechanical backup system.

Boeing Power System

Los Angeles—Supplemental type certificate has been issued by the Federal Aviation Administration for an engine power trim system (EPTS) designed to adjust automatically Boeing 727 engine power during climb and cruise.

The EPTS is expected to reduce the transport's total fuel consumption by more than 2% by optimizing climb and cruise performance. The system also provides protection against engine overtemperature and excessive engine pressure ratios.

Garrett's AiResearch Manufacturing Co. and United Airlines will jointly hold the supplemental type certificate for the Boeing 727. AiResearch and several carriers are considering joint certification of the EPTS on other aircraft.

The avionics systems for the Lavi would involve a number of U. S. contractors. Israel has issued a request for proposal to Teledyne for the 1750A computer emulator system. Other avionics action by Israel includes:

- Wide-angle head-up display with a draft request for proposal issued to Hughes and Marconi for $3 million for a development and procurement cost goal of $100,000 per unit in production. The HUD would not be built in Israel.
- Software and support with partial delivery already accomplished by the Aeronautical Systems Div., Wright Patterson AFB.
- Programmable signal processor emulator by Westinghouse that is under study contract.
- Electronic countermeasures components by ITT in the detail design stage for tradeoff decisions.

In presenting its development plan to the Reagan Administration, Israel overcame doubts that the aircraft could be developed for $1.3 billion by detailing the development costs. They are: airframe, $453 million; engine, $110 million—this is the cost to adapt the PW1120 to the Lavi; avionics, $235 million; flight control and electromechanical systems, $109 million; test and evaluation, $200 million, and instrument landing system, $53 million.

The development costs for these major systems total $1.1 billion, with an additional $210 million for production tooling—$110 million for the airframe and $100 million for the engine.

Israel's position on developing and producing the Lavi is that its industry has the basic infrastructure required to undertake the development of an advanced military aircraft. Israeli manufacturers operate in accordance with U. S. military standards and many are approved vendors for U. S. aircraft companies.

The Lavi program would provide a capacity for manufacturing and assembly of the airframe and engine to take up the slack in phasing out the Kfir program. □

far and away the most efficient, economically productive element of the Soviet economy, because of its contribution in the foreign technology area," Burkhalter said.

The benefits to the Soviet Union do not stop there. "With our best technology in hand, they can develop countermeasures to our systems before we ever deploy them. And Soviet industrial espionage imposes new, ever-increasing costs as we struggle to overcome technology we have developed that is now in Soviet hands."

Soviet technological dependence on the West does not condemn them to permanent inferiority. The Soviets are able to learn more from our mistakes, select the best from both technological worlds, and focus their research and development capital on areas where we are weakest, he said.

Much is made at times of safeguards surrounding equipment that has civilian as well as military uses, but these have proved to be ineffectual, Burkhalter contended. He cited the case of two floating drydocks built in Japan for Soviet civilian use, but now supporting the Soviet Navy's Pacific and Northern fleets. They are being used to repair Kiev-class aircraft carriers, nuclear-powered ballistic missile submarines and other warships, and no doubt will be used for the new generation of Soviet aircraft carriers projected for the 1990s, the admiral said.

This diversion of ostensibly civilian hardware for military use should have come as no surprise, for the Soviet military has first choice of any new technology acquired in the West, he added. It is part of the system and not a surreptitious, backdoor arrangement.

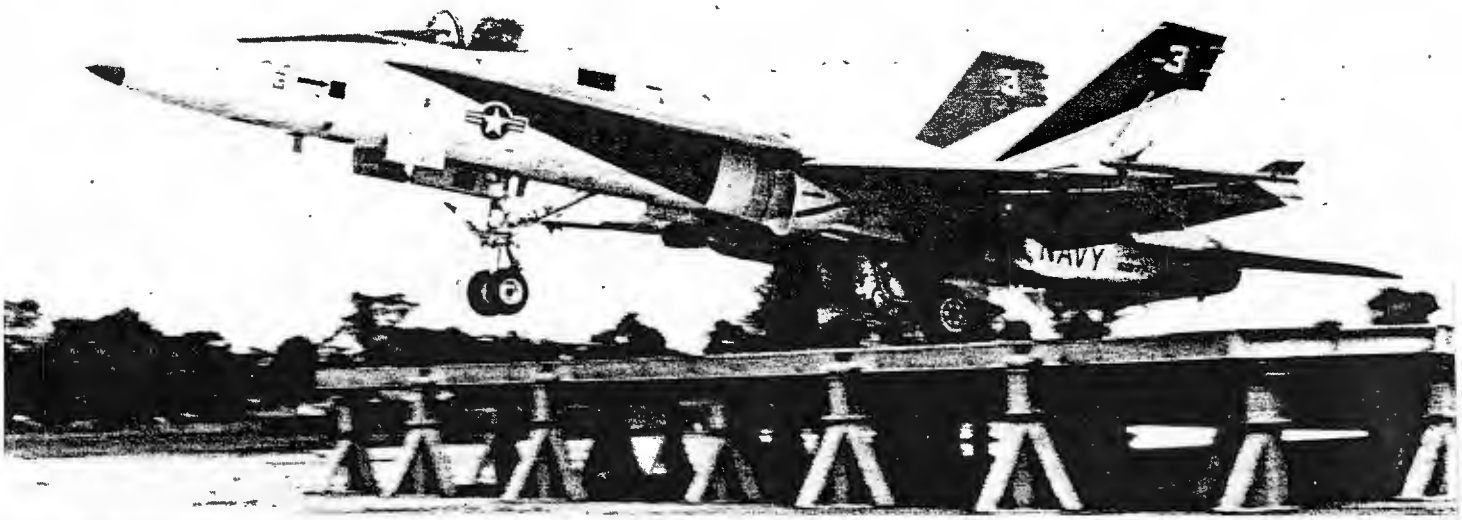
The U. S. government has taken steps to counter Soviet industrial espionage, including the following, Burkhalter said:

- The Commerce Dept. has strengthened its Compliance Div., including the opening of new field offices in San Francisco and Los Angeles.
- The Customs Service in early 1982 began its Operation Exodus to detect and prevent illegal exports of technology. Although it already has produced a number of prosecutions, the program only now is moving into full operation.
- The U. S. Attorney General established a Critical Technologies Task Force in California to coordinate with state and local police and high-technology businesses in this area "to stem the hemorrhage of critical technology to our adversaries."
- The U. S. intelligence community is redoubling its efforts to learn what items are on the Soviet's shopping lists so that industry and law enforcement agencies can take defensive measures.
- Counterintelligence efforts are being strengthened for better monitoring of Soviet and East European agents in the U. S., Western Europe and elsewhere. Burkhalter stressed the close relationship between the intelligence services of the USSR and its satellites. "They respond to Soviet collection tasking, and the USSR benefits from everything of value that they collect," he said. Bell, for example, was paid by Marian Zacharsky, West Coast manager of Polamco, an overt, legal, Polish machinery importing company.
- Intelligence is being passed to the Justice and Commerce departments, the FBI and other elements of the government to help them in their countermeasures.

In the policy area, the U. S. is working to strengthen CoCom, the Coordinating Committee for Multilateral Export Controls, and technology export restrictions are being updated. Additionally, the activities of Soviet and East European citizens in the U. S. are being restricted.

The Administration is asking Congress for modifications to the Freedom of Information Act to prevent the public release of sensitive technological information, especially that relating to U. S. weapons systems.

F: Lavi



F/A-18 Flies Takeoff Tests From 6-Deg. Ramp

McDonnell Douglas F/A-18 is being tested on the 6-deg. ski jump at the Naval Air Test Center at Patuxent River, Md., by the U. S. Navy. In the first week of testing, more than 24 takeoffs were made at gross weights of 32,800 lb. and 37,000 lb. using both intermediate and combat rated thrust. The Navy was able to achieve a takeoff distance of 925 ft. during takeoffs on the 122-ft.-long ramp. Testing on the Navy/Marine Corp. strike fighter will continue through October with plans to elevate the angle on the ski jump to 9 deg.

State Dept. Notifies Congress Of Composites Sale for Lavi

Washington—The Reagan Administration has sent Congress plans for the first major sale of composite parts to Israel for the Lavi fighter bomber, 50 sets of wings and 50 vertical tail assemblies built by Grumman Aerospace Corp.

Senate officials confirmed last week that the State Dept. had formally notified Congress that it was granting a license to Grumman to begin delivery of the assemblies by 1990. Congress now has 30 days for both houses to pass a resolution to disapprove the sale, or it will automatically occur.

Senate officials took the notification as a sign the Administration wants to give Israel more support to develop the aircraft, but they also said the request does not deal with the most controversial aspect of the Lavi development plans. That calls for asking Congress for foreign military sales credits for Israel to develop the aircraft.

In this case, they said, the request deals only with a contract between Grumman and Israel and not with the foreign military sales issue.

The sale is in the $100-million range.

Earlier, Grumman had competed with General Dynamics and Vought Corp. for the contract (AW&ST Sept. 13, 1982, p. 31).

A Grumman official said Israel selected the Grumman design three months ago. He said the design calls for the wings and tail sections to be made with composite materials with metal hardware for fitting attachments to them.

Senate officials directly involved with the sale proposal said it signals a willingness from the Reagan Administration to give Israel most of what it wants to develop the aircraft.

One said, "I think this is a good sign that [the Administration] is now committed to the Lavi. The real fight will come over granting the military sales credits. The U. S. defense contractors will oppose that very strongly."

An official at Northrop said, "We think it is wrong for the U. S. taxpayers to be subsidizing the development of a foreign aircraft."

The development cost for the Lavi, which is expected to replace the McDonnell Douglas A-4 and the Kfir C2 aircraft in the Israeli Air Force, is estimated to be $1.137 billion in Fiscal 1982 dollars.

Israel plans to buy more than 300 Lavis for its air force, and the aircraft would be made from modified components from several U. S. manufacturers (AW&ST Jan. 10, p. 20).

The Lavi design is based on medium close-range, air-to-ground sorties for close air support.

This design also provides a secondary mission as an air defense interceptor and doubles as a two-seat trainer.

When Israeli representatives visited the U. S. in late 1982, they claimed the fighter development program would pose no immediate competition to U. S. fighter programs, especially the Northrop F-20, where foreign sales are pending.

They said the first prototype of the Lavi would not be available until November, 1985, with the first production aircraft scheduled for delivery in 1990. □

Advanced Ejection Seats

Los Angeles—U. S. Air Force has issued a request for proposals for development of advanced ejection seat technology for USAF aircraft.

The 60-month crew escape technologies (CREST) program is aimed primarily at future Air Force aircraft, but ejection seats already in the inventory could be upgraded with technology developed under CREST. The program is being managed by the Aerospace Medical Div. of USAF Systems Command.

CREST is a follow-on to the McDonnell Douglas advanced concept ejection seat (Aces 2), widely used by the Air Force. Performance of the Aces 2 seats within the 0-600-kt. equivalent airspeed escape envelope has been satisfactory, according to Air Force Maj. A. Michael Higgins, program manager. But an increased reliance on high-speed, low-level tactical and strategic flight operations has created the need for an advanced ejection seat that can meet the requirements of this type of flying.

cruise missile deployment, the Soviets did not begin deployment of the SS-20 missiles in order to counter or negate anything that NATO had already done.

"The SS-20s were created and deployed for their [the Soviets] own purposes and not as a counter to a NATO move," Heseltine said. "Therefore we must have the cruise missiles as a counter force to get the Soviets to talk. If we did not have them, what would you say to the Soviets to get them to negotiate?"

Heseltine also raised the possibility that the number of U. S. troops in Britain might increase because more would be needed to defend U. S. bases there.

"There is no perception on our part of the need for a change in the status of U. S. bases in Britain," he said. "The defense of the U. S. and the defense of Western Europe are linked and the alliance that has been created to perform this task is an alliance of mutual advantage."

To defend Western Europe and, by inference, the U. S., a physical U. S. presence was needed in Western Europe, he said.

The number of U. S. troops in Britain is a technical issue, he added, and while there is no significant change foreseen in the present basing arrangements, the manning levels may increase in order to provide adequate protection to the existing bases.

U. S. aircraft bases would remain in Britain, he said, after the deployment of cruise missiles in the country.

Base Readiness

At Greenham Common, the most nearly complete of the bases that will house the modernized NATO theater nuclear force, the U. S. Air Force's 501st Tactical Missile Wing has been activated and is supported by the 501st Combat Support Group.

The wing has a full complement of airmen assigned to it, and some of the support equipment for the missiles has arrived, but no missiles have as yet been moved on-site.

Major facilities were already in existence at Greenham Common before it was selected as a cruise missile base, since it previously had been operated as an auxiliary U. S. airfield. Aircraft hangars, dormitories, warehouses and supply facilities were kept in good repair for use in any emergency.

Work on hardened shelters for the cruise missile transporter launcher trucks and some associated administrative buildings that have been built since the base was selected are now nearing completion and the first missiles are expected to arrive in the next few months.

At Comiso, Italy, work is under way on dormitories and other support facilities, which did not exist prior to the selection of the base as a missile site. □

IAI Bases Lavi Fighter Project On 300 Aircraft Procurement

Washington—Israel Aircraft Industries is basing its Lavi attack fighter program on a 300-aircraft procurement program, 60 of which will be two-seat advanced trainers. First flight will be Feb. 25, 1986.

In addition, Israeli Air Force plans to reengine its McDonnell Douglas F-4 fleet with the Lavi engine, the Pratt & Whitney P1120, as part of a commonality drive within the air force inventory. The F-4 is scheduled for replacement in 1995.

The IAF General Dynamics F-16s and McDonnell Douglas F-15s are powered by the Pratt & Whitney F100 engine. The core is the basic design of the P1120.

The Air Force is considering acquiring a sophisticated fighter, probably the McDonnell Douglas F-18 or the Northrop F-18L (AW&ST Jan. 10, p. 20). The Air Force is evaluating the General Dynamics F-16XL fighter and the McDonnell Douglas F-15E upgrade project. The aircraft selected will replace the F-4 fleet.

Unit cost of the Lavi fighter, which will replace Kfir C2s and McDonnell Douglas A-4s, will be about $11 million in 1982 dollars. Its wing and vertical tail section will be built by Grumman Aerospace Corp. using composite technology, some of which is applicable to Grumman's forward-swept-wing fighter, the X-29.

Grumman has signed a $100-million contract to build an initial 20 shipsets, and this may increase to 50. At some point in this initial order, technology for production in Israel is expected to be transferred to IAI's plant at Ben Gurion airport, Tel Aviv., according to retired Navy Adm. G. E. R. (Gus) Kinnear 2nd, vice president-Washington operations for Grumman International, Inc.

The Lavi is planned for the 1990s timescale. Five prototypes will be built. Kinnear said the aircraft will be stressed for 9g, and the program is aimed at commonality with other Israel Defense Force equipment, primarily the Kfir C2 fighter, which is still in production.

Kinnear emphasized that the entire program is based on low-risk technology. Extensive wind tunnel testing has been completed, including data collection on the Lavi's maneuvering canards. Production rate will be set at about 30 aircraft per year.

Grumman composite production will be assigned to its Milledgeville, Ga., facility where other composite projects involve the E-2C, the A-6 and F-14.

Maintaining Schedule

The engine, which is 60% common with the F100 powering the F-15 and F-16s, is on schedule and within budget. Codevelopment and coproduction programs on the engine, wing controls, systems and materials are worth $1.25 billion to U. S. firms. Based on a 300-aircraft production run, Lavi development and tooling costs will be $1.5 billion. It will cost $3.27 billion to produce that number.

Spares will add $2.2 billion and when fuel and land maintenance costs are considered, the program will cost about $10.96 billion over a 15-year period.

Contracts have now been signed by 14 U. S. companies, four more have signed memorandums of understanding and six more have MOUs in preparation.

IAI is negotiating with B. F. Goodrich and Bendix Aerospace on tires, wheels and brakes. Other systems being negotiated are pneumatics and hydraulics with Goodyear, Arkwin Industries and Purolator; exterior lighting with Grimes Div.; gunsight cameras with Edo Corp., Fairchild Weston Systems and Teledyne Camera; chaff and flare dispensing with Tracor Aerospace; video cameras with TEAC Corp. and Photo-Sonics, Inc., and ejector release unit with Edo and Western Gear.

First prototype is scheduled to roll out in June, 1985, and first production Lavi is to roll out in 1987. The Israeli Air Force has either spent or committed $185 million to the program. Kinnear said no U. S. Foreign Military Sales credits will be spent on Lavi research and development, one reason why the program is being kept to low-risk technology. □

Lavi Specifications

Wing Area	**350 sq. ft.**
Engine:	
1 PW1120 max. thrust (sea level, afterburner)	20,620 lb.
Specific Fuel Consumption	1.86
Weights:	
Basic Takeoff Gross Weight	21,305 lb.
Maximum Takeoff Weight	42,000 lb.
Fuel Capacity—Internal	6,000 lb.
Fuel Capacity—External	9,180 lb.
Air Combat Parameters:	
Combat Weight (50% internal fuel + two infrared missiles)	18,695 lb.
Wing Loading	53.4 lb./sq. ft.
Thrust to Weight Ratio	1.10
Maximum Load Factor	9g
Maximum Speed	Mach 1.85

F: Lavi

Reagan Approves Credits to Israel for Lavi

Washington—An emergency spending bill that includes approval of Israel using $550 million in U. S. foreign military sales credits to finance development of the Lavi fighter/bomber has been signed by President Reagan.

The Lavi FMS program received congressional approval in early November with a House vote of 262-150, but the funding bill containing the provision was later voted down for other reasons (AW&ST Nov. 14, p. 35).

Because some legislation was needed to keep the federal government funded, Congress again took up the bill and passed a provision containing the Lavi FMS credits in a $316-billion spending measure that also included $11.8 billion for foreign aid programs. The vote was 173-136 in the House, and the measure passed by voice vote in the Senate. In total, Congress provided $1.7 billion in aid for Israel in Fiscal 1984, including the $550 million in FMS funds for the Lavi. Of that, $300 million may be spent in the U. S. and $250 million may be spent in Israel.

The congressional vote came days after State Dept. officials had informed Israeli Prime Minister Yitzhak Shamir that the Reagan Administration had decided to allow the use of foreign military sales credits for the Lavi, and the congressional vote was viewed by Israeli representatives as a codification of the Administration's action.

Backing FMS credits for the Lavi in the House were Reps. Clarence Long (D.-Md.), a supporter of Israel, and Charles Wilson (D.-Tex.), a frequent supporter of closer U. S. ties to Egypt and Jordan. Earlier, Long and Wilson convinced the House Appropriations Committee to vote by 43-5 to earmark the FMS credits for the Lavi.

The total development cost for the Lavi, which is expected to replace the McDonnell Douglas A-4 and Israel Aircraft Industries Kfir C2 aircraft in the Israeli Air Force, is expected to be $1.37 billion in Fiscal 1982 dollars. Israel plans to buy more than 300 Lavis for its Air Force, and the aircraft would be constructed with modified components from several U. S. manufacturers (AW&ST Jan. 10, p. 20).

As part of the composite parts program, the Administration recently asked Congress to approve a contract under which Grumman Corp. would sell Israel 50 sets of wings and 50 tail assemblies at $100 million for the Lavi.

An Israeli industry representative said after the final vote approving the FMS credits that Israel plans eventually to buy 300 sets of wings and vertical tail assemblies from Grumman.

He said the $250 million Congress approved for Lavi development in Israel could be spent on several types of components made there, including electronics and avionics. He said Israel had not made a final decision on what parts to manufacture there.

Israel also plans to sell the aircraft in the international market after satisfying its Air Force's needs. This has been opposed by Northrop Corp.'s board chairman and chief executive officer, Thomas V. Jones. Jones wrote Defense Secretary Caspar W. Weinberger opposing U. S. funding for the Lavi, saying it would be in direct competition with U. S. aircraft, including the Northrop F-20 (AW&ST Feb. 14, p. 16).

Israeli representatives have contended that the Lavi will not be competition for the F-20 since the Israeli aircraft will not be available for export until the 1990s. This view was also expressed by Wilson on the House floor.

cial observations early," Beichman said. "Of course, you develop new ideas of what is crucial as you go along, but I don't think any particular class of object will be not represented in the science—either in the survey or additional observations.

"The last months of the mission would have been devoted to a continuation of studying galaxies and regions of star formation in more detail based on what we have learned," he said. "I think one thing we will regret is that we have been just starting to learn enough about the kinds of sources IRAS was finding to intelligently use the satellite to make follow-up observations."

Project officials reported that the depletion of the helium was within 10% of the predicted date—which they characterized as a reasonable range considering the lack of experience with this type of system in space.

Gael F. Squibb, IRAS project manager at Jet Propulsion Laboratory, said there had been no problems with the detectors in space during the system's 10 months of operation, and no degradation was encountered with the telescope's optics or electronics during operations.

Project officials considered the mission successful, noting that IRAS had pinpointed the location and intensity of more than 200,000 infrared objects in space. The system also detected a ring of solid material around the star Vega, discovered five comets and located a band of dust around the Sun between the orbits of Mars and Jupiter.

The satellite was to be used for engineering tests last week, during which cryogenic valves would be tested and the reliability of electronic systems would be evaluated. The telescope system also will be studied as system temperatures increase to gather data that might aid in the design of future satellite systems. □

Swedes Seize More Soviet-Bound Equipment

Swedish authorities have stopped shipment of Digital Equipment Corp. VAX 11-782 computer equipment to the Soviet Union after U. S. Customs Service and the Justice Dept. asked them to block its transfer. The U. S. federal agencies had earlier determined the equipment could be used in military systems.

The seizure was made at the port of Halsingborg after it arrived by ship from South Africa by way of West Germany, according to a U. S. Customs Service official.

The equipment was part of a shipment that included a VAX 11-782 seized Nov. 9 by West German authorities in Hamburg after the U. S. government notified Germany of the final destination in the Soviet Union (AW&ST Nov. 21, p. 24).

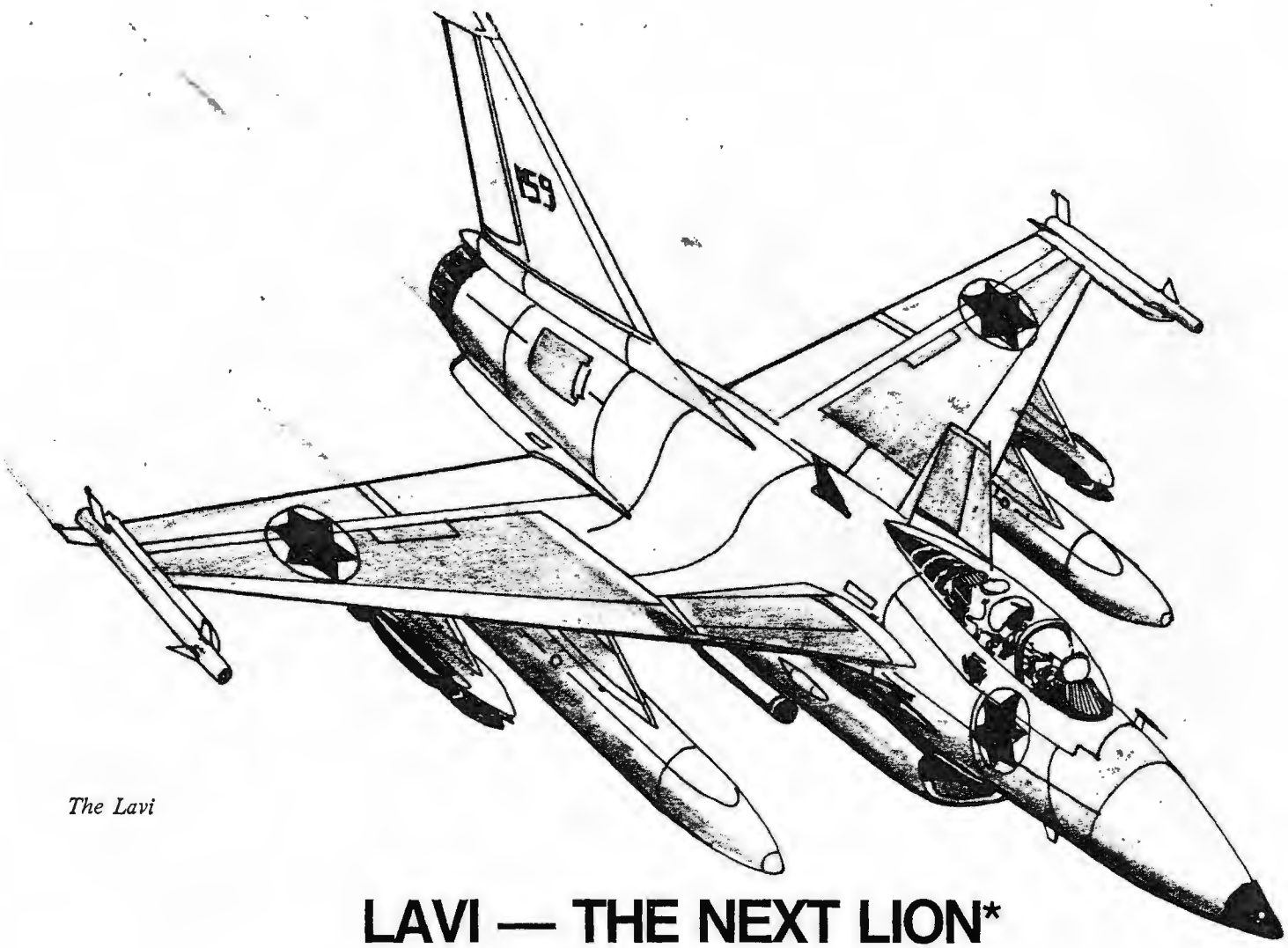
The official said that Richard Mueller, who was involved in the German computer transfer, also was behind the Swedish transfer. Mueller is a federal fugitive as a result of a 1979 indictment for Export Administration Act violations.

Swedish customs officials opened four containers on the same ship from which three containers were seized earlier by West German officials.

Swedish officials said the incident has put Sweden in a delicate position. Swedish officials wanted to avoid action that could give the Soviets cause to challenge Sweden's neutrality. At the same time, the Swedish government wants to avoid jeopardizing future purchases of high-technology equipment from the U. S.

Among equipment currently being received by Sweden from the U. S. is the General Electric F404 turbofan engine, which powers the new Saab JAS 39 Gripen multirole combat aircraft under development for the Swedish Air Force (AW&ST Oct. 24, p. 59).

Soon after the containers were opened, Sweden imposed a ban on all military imports from South Africa. A ban on exports of military equipment to South Africa has long been in effect.



The Lavi

LAVI — THE NEXT LION*

Israel Aircraft Industries is now developing the Lavi, a new-generation combat aircraft for the 1990s. It will be designed for short- to medium-range air-to-ground missions while incorporating air-to-air combat capabilities.

The Lavi will be a natural evolutionary step for IAI. The present production aircraft, the Kfir C7, was IAI's first production jet fighter. The general design was based on the French Mirage V, but after a relatively short development period through several models, the Kfir emerged very much an original aircraft. This gave IAI designers the expertise, experience, and confidence to embark upon a totally new design concept based on nothing else already in existence. In short, the Lavi will be a small, relatively low-cost/high-technology fighter, which, aside from forming the backbone of the IAF, should have wide overseas marketing potential.

Aircraft Description

The Lavi will have a swept delta/canard configuration and will be powered by a single 20,620lb (wet) thrust Pratt & Whitney 1120 jet engine fed through a ventral intake. The manufacturers say its performance will be top rate. Its maximum speed will be Mach 1.85, and it will have low altitude penetration speeds of up to 600kt. It is expected to have a very high sustained turn rate. The Lavi will have a maximum takeoff weight of 37,500lb, and will be able to carry up to 16,000lb of ordnance and external fuel in addition to its two IR air-to-air missiles.

Structurally stressed for 9g (as compared to the Kfir's 7g abilities), the aircraft will include many components made of graphite epoxy composite materials, including parts of the wings, vertical stabilizer, the all-moving canards, control surfaces and various doors and panels.

The Lavi's avionics will be of the "home grown" variety. Elta Electronics Industries Ltd., a subsidiary of IAI, will be prime contractor for the aircraft's EW/ECM systems. These systems will permit rapid threat identification and automatic flexible response, using jamming and deception techniques and other EW resources. A new Elta multi-mode radar will be fitted,

* This article based on various foreign sources.

This is what the Lavi mockup might look like, a mix of the F-16 and Kfir.

giving the Lavi reliable look-down capabilities over a broad band of frequencies, as well as high-resolution mapping.

The avionics systems will be built around a main mission computer which will coordinate the various devices in harmony. The various computerized systems, connected by multiplex bus, will interact among themselves and with the pilot. An INS (Inertial Navigation System) will contain the primary sensors for flight navigation and control. The INS will be augmented by a pulse doppler, lookdown-capable AA/AG radar which will allow sharp ground mapping together with all other modes. In fact, the radar will be capable of exceptionally high performance, as it will be programmable for new modes as they are developed, through software rather than hardware changes, thanks to its built-in PSP (Programmable Signal Processor). The radar will be built with Westinghouse participation, for which the U.S. company has already started studies.

The various systems will continuously feed the pilot with valuable data needed for the flight. Due to the demanding task of carrying out sharp evasive manoeuvres in low-level flight over well-defended targets, no time can be wasted on reading the conventional displays and gauges which are a traditional part of all existing aircraft. The Lavi, like many of the new generation aircraft, will have an advanced cockpit with three head-down CRT displays (two black/white and one colour), capable of displaying any information requested by the pilot and available on the aircraft (such as weapons availability, engine parameters, radar, EW warning signals, navigation and location, communications, etc.). The most vital information such as navigation, target cues and radar, with the most important flight data, will also be displayed on the HUD in the pilot's line of sight.

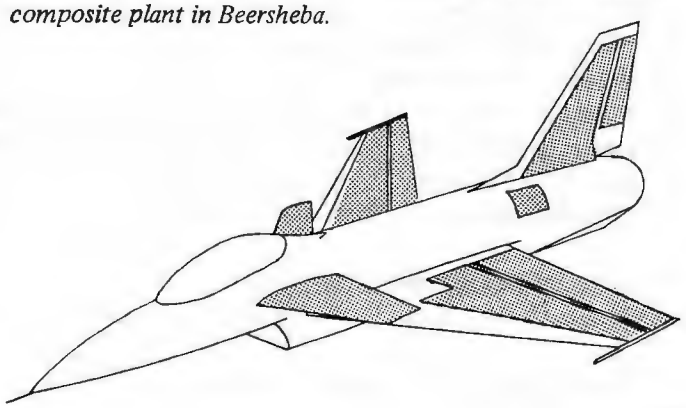
Another innovation in the Lavi will be synthetic voice messages. These will be generated by a special voice synthesizer with a limited vocabulary which will further extend the pilot's information input capability during combat conditions, while his uninterrupted attention must be given to the target.

Other systems will be automatically operated, such as the EW system which will be installed internally. It will be highly sophisticated, locally developed, with a few imported components (ITT). The system will have a fast response to electronic threats in real time with a jamming system controlled by a power management computer for multi-threat situations.

The entire flight control will be performed through a computerized "fly-by-wire" system which will automatically control the aircraft according to the pilot's command.

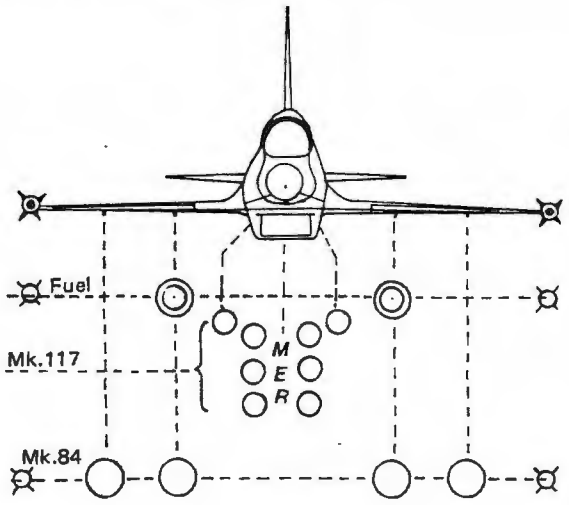
As the Lavi will have relaxed static stability, which means that the aircraft will hardly be flyable if an FBW malfunction occurs, the system will have only analogue backup (also computerized) to the digital

The Lavi's light weight will be achieved by a substantial use of composite materials. The Grumman company is main subcontractor for composites, but after the first 50 aircraft are completed, the parts will be locally produced at IAI's new composite plant in Beersheba.



system, but no mechanical backup, as this would be of no use with the pilot unable to control the aircraft manually. The analogue system is more resistant to damage but less rapid in its responses.

Most of the computer software used in the Lavi is compatible with U.S. military specifications and will be able to accept future U.S. systems.



SPECIFICATIONS

Type:	ground attack fighter
Designation:	Lavi
Manufacturer:	Israel Aircraft Industries
Dimensions	(ft):
Length:	47.21
Wing span:	25.58
Height:	17.32
Wing area (sq.ft):	350.00
Weight (max. T/O):	42,000lb
" (T/O basic):	21,305lb
Combat weight:	18,595lb
Wing loading:	53.4lbs/ft^2
Thrust/weight ratio:	1.10
Fuel capacity (int.):	6,000lb
" " (ext.):	9,180lb
Specific fuel consumption:	1.86
Engine type:	P&W1120
" thrust (max.):	20,620lb
Max. speed at low level:	600kt
Max. speed:	1.85 Mach
Range (operational):	244 n.m
Max. load factor:	9g
Stores (not including fuel):	6,000lb
(Total external stores:	15,180lb)

Including IR missiles, iron and "smart" bombs, EW pods, etc.

Other types: two-seater fully combat-capable trainer.

Economic Impact

Costs for the Lavi project, originally set at about $1 billion, are estimated to have doubled in the past few years, with a corresponding increase in unit fly-away cost, now estimated at $20+ million. The Lavi project is seen by some to be a dangerous undertaking, given Israel's 800+% rate of inflation. The defence budget is scheduled for cuts amounting to between $250 million and $300 million for fiscal years 84/85 and 85/86; however, the cuts will not affect the Lavi. The U.S. has agreed to permit use of $250 million in aid earmarked for Lavi development to be completely spent in Israel.

In the prototype hangar at IAI the full mockup of the new fighter has been completed, as well as models of its PW-1120 engine and of test equipment for electrical and avionics systems – work continues apace. The date for first deliveries of the fighter to the IAF has been moved up one year to 1989. Already, many Israeli subcontractors are tooling up – some are actually producing – for this project that is considered a key element in Israel's economic recovery.

For example, Iscar Blades Ltd. is now manufacturing blades for the low pressure compressor turbine of the PW-1120 engine, to be produced under license by Bet Shemesh Engines Ltd., and Golan Industries is getting ready for production of the Martin-Baker ejection seat under license. Some other Israeli companies involved in the project are: El Op, building a wide-angle HUD under license from Hughes; SHL, landing gear and flight control systems in cooperation with Moog; Elbit, mission computer, stores management system, multifunction displays and standard modules for other computers; Astronautics, air data computer and flight instruments.

American companies besides Pratt & Whitney involved in the Lavi project include: Grumman, building composite material wings and tail sections; Goodyear/Goodrich, wheels and brakes; Bendix, oxygen system; Sundstrand/Garrett Air Research, jet fuel starter, leading edge flaps, emergency power and environmental control systems.

There can be no doubt that the Lavi has importance far beyond defence considerations: thousands of jobs in Israel and in the U.S. depend on the continuation and successful conclusion of the project. The transfer of technologies accompanying the Lavi project will result in the more rapid development of Israel's high-tech infrastructure, which will have a positive, growth stimulating effect on the hard-pressed economy.

srael Lavi plane project is cash and job bonanza for U.S. too

By WOLF BLITZER
Jerusalem Post Correspondent

ASHINGTON. — The produc-
n of Israel's new Lavi fighter will
ovide at least 12,000 jobs in Israel
d another 37,000 jobs in the U.S.,
er the next 20 years.

This was revealed last week at a
int news conference in
ashington held by Israel Aircraft
dustries (IAI) and Grumman Cor-
ration, the U.S. firm contracted
manufacture the aircraft's wing
d tail section.

Retired U.S. Admiral George
innear, a Grumman vice-
esident, who has become deeply
volved in the Lavi project, said
e development and initial produc-
n contract for Gumman alone
ıs expected to be in excess of $100
illion.

Another 25 major U.S. defence firms, he continued, have signed contracts with IAI in connection with the Lavi. In the end, he added, some 100 American companies may be involved.

Most of this work, IAI's Washington representative, Marvin Klemow, said, will initially be done in the U.S., although Israel eventually hopes to transfer most of it for co-production in Israel itself.

The Israel Air Force is already committed to the purchase of 300 of the new aircraft, designed to replace older A-4 Skyhawks and Kfirs. Kinnear and Klemow strongly denied that the Lavi would be able to replace the more sophisticated F-4 Phantoms in the 1990s. Israel's existing fleet of F-4's, they said, will have to be replaced by the purchase of additional U.S.-made F-15s, F-16s or F-18s. "The Lavi can't do it," Kinnear said.

Anong the other U.S. companies already involved in the Lavi are:

- Pratt and Whitney, which is manufacturing the engine.
- Lear Siegler, which is providing the digital flight control system.
- Moog, which is making the flight control actuators.
- Vought which is involved in wind tunnel testing.
- Sunstrand Aviation which is making the integrated drive generators and other related drive systems.

For U.S. industry, Kinnear said, the Lavi project means not only some 37,000 jobs — "and maybe as many as 50,000" — but an infusion of $1.5 billion in contracts.

In addition, he said, there are other significant benefits for America. He said that new technological gains learned from the Lavi would automatically be "applicable to next generation U.S. efforts" in aircraft development.

Israel already has spent and committed $185 million on the Lavi. It is still awaiting permission to use some of the annual U.S. foreign military sales (FMS) credits to Israel for the initial research and developnent of the plane.

Israel has informed the U.S., however, that it is committed to going ahead with the plane even if the FMS request is denied.

Northrop, the maker of the F-20, has actively lobbied against providing U.S. assistance for the Lavi, claiming it eventually will compete in world markets against its own plane. That led to a recent news story in *Aviation Week and Space Technology* which said that U.S. industry opposed the Lavi.

Grumman, Pratt and Whiteney and the other U.S. firms financially involved in the Lavi are now taking the offensive in countering that argument, explaining the benefits to the U.S.

Kinnear and Klemow said that the Lavi represented the "most viable operational and lowest cost solution" to Israel's future air force needs. They cited statistics showing that the projected manufacture of 300 Lavis — in 1982 dollars — would cost $10,960b., as opposed to the $13,039b. it would cost Israel to purchase the same number of F-16s.

The completion of the first of five Lavi prototypes has been scheduled for June 1985, Kinnear said. The target date for the first test flight of that prototype, he added, was set for February 25, 1986, in Israel.

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F;Lav.

THE $10b. DILEMMA

Hirsh Goodman

WHEN THE LAVI fighter-jet project was first brought before the Knesset Foreign Affairs and Defence Committee for approval, only two of the 25 members voted against it. One of them was Yitzhak Rabin.

Rabin, who as defence minister is waging a head-on battle with the Treasury to limit the cuts demanded in his budget, now supports the Lavi and he does so despite the fact that the plane is going to be much more expensive, much more sophisticated and much more dependent on American help, both financial and technological, than the one he originally voted against.

Listening to the defence minister explain himself on television and in other forums, one is led to understand the following:

□ Even if the Lavi project were to be cancelled tomorrow, it would not relieve the current burden on the defence budget. Almost all the development funds are being provided by the United States under an Act of Congress.

□ There are over 3,000 people working on a project on which more than $800m. has already been expended.

The aircraft is best suited to Israel's needs, given the systems the confrontation states will be receiving by the year 2000, and has been specifically designed by the Israel Air Force to synthesize Israel's battle experience.

□ Maintaining a project like the Lavi will give birth to spin-off technologies and products that will enable Israel to maintain its qualitative edge over the Arabs.

□ To postpone or limit the project now would mean that hundreds of millions of dollars have been thrown down the drain; would accelerate the unemployment in the industrial defence sector (which employs some 100,000 workers); would damage Israel's credibility with the U.S. that has invested almost $1b. in the project to date; and would leave Israel with a huge gap in its defence capabilities in the last decade of this century.

THE TRUTH IS that for each one of Rabin's arguments, there are many military and other experts in Israel, who could present equally convincing counter-arguments.

People like former air force chiefs Motti Hod and Ezer Weizman, and former financial adviser to the chief of the general staff, Zvi Schur, now an adviser to the finance minister, feel that the Lavi, in its present form, is a project Israel cannot afford. According to the initial data, the development of the fighter will cost at least $1.5b. Production costs over the next 15 years will be at least $500m. per annum, making the total projected cost to the Israeli budget around $9b., and probably more by the time everything is taken into account.

It is ironic that one of the people who now opposes the Lavi is Ezer Weizman. It was he, as defence minister, who initiated the project. But it must be remembered that when he finally gave the O.K. for research and development to begin, he had a very different plane in mind. The version he approved had a GE-404 engine which limited not only the plane's thrust and operational capabilities, but above all its cost.

The original Lavi was envisaged as a low-grade fighter designed to replace Israel's aging fleet of Skyhawks and Kfirs, as well as some older Phantoms, by the year 2000. There was no intention to create a close equivalent of the F-16. But the new Lavi with a PW-1120 engine, makes it bigger, better and far more expensive both to build and maintain.

After Weizman, each succeeding defence minister – Begin, Sharon, Arens and Rabin – gave his individual approval to the project. Ariel Sharon even kept it on ice for several months while he re-examined every single aspect of it. It was during his stint as defence minister that the decision was made to change the engine – a decision that was reinforced and actively promoted by Moshe Arens, who has made no bones about his unequivocal support for the Lavi.

* making the total...

BUT THE FACT that this is, perhaps, the most widely approved project in the history of Israel, does not mean that it should not be examined again, says Zvi Schur. And since, in his recent position as chief financial adviser to the CGS he had access to all the background information, his opinion is worth listening to.

The Israeli economy was not in the position in 1981-82 (when the decisions were made) as it is now; the defence budget was not under the same strains, Schur points out. The budget for 1983 was $3.2b. as opposed to a projected $2.5b. to $2.7b. for this fiscal year. Something that is ultimately going to cost the country well over $10b. deserves to be re-appraised, he claims.

Hod, Weizman and Schur, and many others feel that the air force has run away with itself. Of course generals want better weapons, but the economy cannot always afford them, *The Jerusalem Post* was told recently.

The Israeli air force has historically maintained an inventory of fighters which includes both highly sophisticated, "front-line" planes and lower-grade aircraft, designed for limited tasks in limited arenas. By changing the specifications on the Lavi, the air force has *de facto* changed that ratio, and come up with a formula which may be what the generals want, but not what the country can afford.

The larger engine that leads to a larger airplane means higher fuel consumption and more training hours. The larger engine means a higher generating capacity which in turn leads to the acquisition of higher-grade and hence more expensive electronics and avionics. Increased sophistication and a multiplication of systems mean more and higher grade maintenance.

"The air force has worked its way into getting a Cadillac air force when this country can't even afford a Volkswagen one," said one of the Lavi's opponents this week.

Analysts in the defence establishment, however, claim that these charges are "sheer uninformed demagogy." Whereas an F-16 costs close to $40m. (prices of systems are elastic, depending on what they comprise) the Lavi will cost between $13m. and $15m. fly-away, and slightly over $20m. if non-recurrent research and development costs are added. A squadron of Lavis will, over a period of 15 years, cost 30 per cent less in operational expenditure and amortization than a squadron of F-16s.

Moreover, they claim, even taking into consideration that there will be no exports of the plane or any of its satellite products, the Lavi is the cheapest, most efficient and most productive means for Israel to meet its needs in the air over the coming 25 years.

WHAT BOTHERS the defence establishment is that the more the debate is fuelled in Israel, the more doubts the Americans have about the viability of the project. Moshe Arens, when he was defence minister, scored an incredible coup by convincing the Americans to pick up most of the tab for the development of the fighter, and probably much of the production costs as well.

But there is no guarantee that money will be as readily forthcoming under a new administration, or even under a Reagan administration that may face economic or political pressures later on. And it should be noted that one of the largest American producers, Northrop, has pumped some $2.34b. of its own money into the development of the Lavi's potential rival in the skies, the F-20.

Arens succeeded in doing what has never been done before (except for a one-time payment to help the Merkava tank project) – getting the U.S. to agree that a sizeable portion of its defence aid to Israel need not be spent in the U.S., as required by law, but in this country. Thus far the U.S. has made two payments of $250m., with a third on the way, to finance the plane here, as well as making available another $150m. a year to subsidize Lavi technology and products being purchased in the U.S.

In short, thus far the U.S. has picked up almost the entire development costs on a project that has not only provided Israel with thousands of jobs for engineers, scientists, technicians and industrial workers, but also with another link in the chain of hi-tech infrastructure that will serve Israel well into the 21st century.

"If they had enough faith in the project to do this – and you can rest assured that they checked it through a thousand times – why should we be facing so much flak here?" one defence official lamented last week.

The claim that if the Lavi were cancelled, the Americans would divert the $250m. a year into other projects in Israel is "contentious rubbish," according to key people in the defence establishment who have been involved in the ongoing talks with the U.S. They point out that when Israel tried to write into the agreement that the $250m. would be used "principally for the Lavi," the Americans changed it to read "to be used for the Lavi."

Not only would the Americans not divert this money to other projects in Israel, says one of these sources, but "we can imagine what their attitude to giving us anything at all will be when they find out that we just threw away around $1b. of their money. The damage to our credibility as a serious partner would be irreparable."

THE LAVI will fly; it is too late to stop it. But this does not settle the argument over whether the grandiose version of the plane currently in development should be the model the air force will have at its disposal by the end of the century.

Experts in the field claim that it is now impossible to go back to the drawing board. The air frame has been cast, and hundreds of millions of dollars have been invested in making sure that it is going to operate efficiently. "To go back now and design a smaller, different version, could land up costing more," a defence source protested.

"There is nothing easier than to claim that it is too late to turn the clock back," one of the plane's detractors retorted, "without stopping to think of the long-range repercussions of what is expedient now."

The problem is not a simple one. The project could boomerang on Israel: of that there is no question. If the Americans decide somewhere alone the line to stop the grant – and it comes up for annual review – or impede the technology, Israel could be sitting with an economic yoke around its neck that could strangle the country.

If, on the other hand, it pays off, Israel will possess not only a homemade, ultra-sophisticated weapon that will guarantee its air superiority in a growing hostile arena, but a high-technology infrastructure that could prove to be the economic salvation of the state.

It is no wonder that, given the dimension of the dilemma, five successive defence ministers, all with different ideas about the need to produce weapons locally, re-examined the issue from every possible aspect. And one supposes that it is no accident that, in the ultimate analysis, they all came out in support of it.

ther investments by U. S. industry at the very time the Administration is encouraging private initiatives to support our economic as well as national security objectives," Jones said.

He added that Northrop and its industrial supplier team accepted the conditions in the FX program, and that Northrop so far has spent more than $450 million of company funds to develop the F-20 and suppliers have spent additional significant funds in the program.

Priority Program

"The development of the Lavi fighter program, supported by U. S. technology and U. S. funds, clearly changes the market risks we were asked to take," Jones said. He explained that the Lavi is planned as a priority development program in Israel with the first flight in approximately two years.

"The initiation of this program with U. S. support on such an urgent basis could cause countries now considering the purchase of the F-20 to delay their decisions," Jones continued. "It certainly would cause these countries to question the U. S. commitment to the FX program."

Israeli government officials and Israel Aircraft Industries officials, Jones said, have stated that even with U. S. support the Lavi program is not economically viable without export sales. The Lavi will be competitive with U. S. aircraft, and particularly the F-20, in markets such as South America, Africa and other areas where Israel has been active as an arms supplier.

"While Israel would be expected to accede in principle to U. S. control over sales of the Lavi to third countries, such controls are often uncertain and have been voided by policy exceptions in the past," Jones said.

The U. S. support for the Lavi program would affect the ability of Northrop and its suppliers to proceed with the F-20 program, Jones said.

Technology Transfer

Administration officials said last week that while the government may agree to transfer technology for the Lavi development program, the political situation with Israel's failure to back the Reagan Middle East peace plan and delay in reaching an agreement to withdraw its troops from Lebanon is complicating the use of Foreign Military Sales credits to develop the Lavi.

State Dept. officials prepared a study on the Lavi program that states the original design of the Lavi as a low-cost aircraft to supplement McDonnell Douglas F-15s, F-16s and possibly Northrop F-18L fighters in the Israeli air force has changed considerably since the Lavi was announced in February, 1980.

The Israelis may now consider the Lavi

Israel to Boost Combat Aircraft Strength

Washington—Israel plans to increase its air force strength from 19 combat aircraft squadrons deployed at nine key air bases to 24 squadrons at 10 bases by the mid-1990s. While increasing its aircraft inventory, Israel plans to modernize its air force by replacing the Israel Aircraft Industries Kfir C-2s and McDonnell Douglas A-4s with the new Lavi tactical fighter. The nation also plans to replace McDonnell Douglas F-4Es with a combination of Northrop F-18L, General Dynamics F-16E or McDonnell Douglas F-15E all-weather tactical fighter aircraft.

The Israeli government has established the requirement for 600 high-performance combat aircraft to meet the perceived threats it will face through the 1990s.

U. S. officials believe, however, that the current inventory of 584 jet fighters is sufficient to meet the needs against any Arab force. But this force would be inadequate in the 1990s, Israel said, because 473 of the 584 aircraft, or 81%, are A-4s, F-4s and Kfir C-2s. These aircraft rely on technology that will be 30 years old by the mid-1990s.

Israel's air force operates three F-16, two F-15 and three Kfir squadrons in the fighter-interceptor role, one Kfir and five F-4 squadrons in fighter-bomber roles, and four A-4 squadrons and one Kfir squadron in the attack-bomber role.

By 1986, Israeli force levels will peak with 703 aircraft. This will drop steadily until 1989, when the first Israel Aircraft Industries Lavi fighters would join the inventory. Even then, the numbers would decline until they level at 600 aircraft.

Current fighters in the Israeli air force include:

- **F-15 aircraft**—39, with the number increasing to 49 by 1986.
- **F-16 fighters**—72, with the number increasing to 144 by 1986.
- **F-4 aircraft**—133, with the number declining to approximately 100 by 1991.
- **Kfir C-2**—163, with the number peaking at 220 by 1986 and dropping to 100 by 1995.

The Israeli air force plans to refit with one or a combination of F-18L/F-15E/F-16E or a reengined, modernized F-4E by 1991 with 12 new aircraft, climbing to 60 of these aircraft by 1995.

Deliveries of 11 F-15s and 75 F-16s to Israel will take place over fiscal 1984-88, and about 60 of the A-4s are in flyable storage and available for sale. Significant reductions in the active A-4 inventory are expected throughout the late 1980s because of anticipated sales, attrition and storage. It is estimated that only one squadron of A-4 aircraft will remain by 1995 as an operational training unit.

Kfir production is expected to remain at 18 aircraft a year through 1986, when production is scheduled to end. This is expected to be followed by a concerted effort to export the Kfir as phase-out from the inventory takes place in the early 1990s.

U. S. Administration officials said Israel has the capability to overcome any conceivable combination of Arab air power, and that Israel has a qualitative edge in every facet of air combat methodology.

A key to the Israeli air force's combat success is the air battle management system, which should be considered in any comparison of Israeli and Arab air power. A U. S. study said that without including the air battle management system any comparison is meaningless or misleading. The Israeli system ties together a variety of ground-based and airborne intelligence collection sensors as force multipliers in a responsive command, control and communications network to enhance use of tactical air power.

Assets in the air battle management system include Boeing RC-707 electronic warfare aircraft, Grumman E-2C Hawkeye early warning aircraft, RF-4E reconnaissance aircraft with modifications, remotely piloted vehicles, Grumman OV-1D Mohawks and near state-of-the-art electronic warfare assets. These include balloon-borne electronic intelligence sensors, and by the end of this year, communications intelligence collectors, Beech RC-12D signal intelligence collectors and ground-based signal intelligence centers. All the intelligence sensors are equipped with data links for near real-time intelligence flow directly to Israeli pilots.

The success of the air battle management system can be judged by results: Since 1979, the Israeli air force has destroyed more than 120 Syrian aircraft and 30 Syrian Soviet-built, surface-to-air missile installations, while incurring the loss of one F-4.

U. S. officials estimate that by the mid-1990s, most Arab nations bordering Israel will have modernized their forces with significant qualitative improvements in ground-based air defenses. These include the Raytheon Improved Hawk missile system in Egypt, Jordan and Saudi Arabia, and the Soviet-built SA-8 in Syria and Jordan.

Jordan already has taken delivery of the SA-8, and the Soviets also have started deployment of the high-altitude, long-range SA-5 Gammon missiles in Syria for the first time outside the USSR. Because of these improvements, Israel will need an advanced fighter-bomber force that can attack targets deep in hostile territory and fight its way back. Based on Israel air force doctrinal priorities, this is a requirement with great emphasis, U. S. officials said.

as a potential first-line fighter with performance characteristics that could compete eventually with those of the F-16. The projected development cost for the Lavi has "skyrocketed accordingly—$1.37 billion by Israeli estimate," the State Dept. study said. "The Israelis are seeking extensive U. S. financial and technical support for the program. Without this support, the Lavi program, as currently envisioned, would be placed in jeopardy."

No Objections

The U. S. response to the Lavi development plan has been to raise no official objections, and the previous Administration approved coproduction of the Pratt & Whitney PW1120 engine to power the Lavi. Funding and transfer limits have been established that include:

- Foreign Military Sales credits use would be limited to procurement of material in the U. S.
- No Foreign Military Sales credits would be approved for aircraft intended for third-country sales.
- Third-country sales would be approved by the U. S. on a case-by-case basis.

The first of these guidelines was established to reinforce U. S. policy prohibiting the use of Foreign Military Sales credits for offshore procurement by emphasizing that an earlier U. S. decision to allow $107 million in FMS funding to support production of the Merkava tank in Israel was not a precedent but a one-time exception.

The goal of the second guideline is to avoid any indication that the U. S. would be subsidizing development of a competitor for U. S. aircraft exports. The final guideline reflects the legal constraints over third-country sales of aircraft using U. S. components.

These guidelines were used last March, when the Administration agreed to allow Israel to use $180 million in FMS credits to procure the PW1120 engine components in the U. S. Pratt & Whitney is developing the PW1120 engine with its own corporate funds and has invested approximately $40 million in the program.

Israel selected the PW1120, an experimental engine, in competition with the General Electric F404 engine that powers the F-18 and the F-20, a 17,000-lb.-thrust-class engine in production. Israel selected the PW1120 to gain increased thrust for the Lavi—20,620 lb. sea level standard with maximum afterburner.

State Dept. officials said in the Lavi study Israel paid for the Kfir fighter with its own resources but the U. S. permitted Israel to procure components, materials and services in the U. S. using FMS credits. Applying these guidelines to the Lavi, they said, would be consistent with established policy.

Under these guidelines, Israel would have to use its own funds for development, although it would be authorized to procure components from the U. S. using FMS credit funds.

The recent visit to the U. S. by the Israeli Lavi team, headed by Gen. Amos Lapidot, chief of the Israeli air force, established that Israel "is totally committed to the production of the Lavi and that the Israeli air force will have a high-performance mixture of F-15s, F-16s and perhaps F-18s, with the Lavi as the workhorse on the low end replacing [McDonnell Douglas] A-4s and Kfirs," State Dept. officials said.

Lapidot estimated that the Lavi flyaway cost will be approximately $10.8 million per aircraft in Fiscal 1982 dollars. Including recoupment of research and development funding would bring the unit cost to approximately $17 million.

Comparable Cost

Israel, however, maintains that the Lavi will be less costly than most comparable U. S. aircraft bought off the shelf, mostly because of lower labor costs in Israel and a leaner administrative and engineering structure.

The first Lavi prototype would fly in 1985, production of the Mach 1.85 aircraft would begin in 1990 at the rate of 30 aircraft a year, and the Israeli air force requirement of 300 Lavis would be met in the year 2000.

Production of the Lavi would help Israel's economy by maintaining Israel Aircraft Industries—Israel's largest single employer. If U. S. aid to Israel remains at current levels, the government there will experience a financial gap—the sum of civilian goods and services deficit, self-financed military payments and debt repayment—almost doubled by 1985.

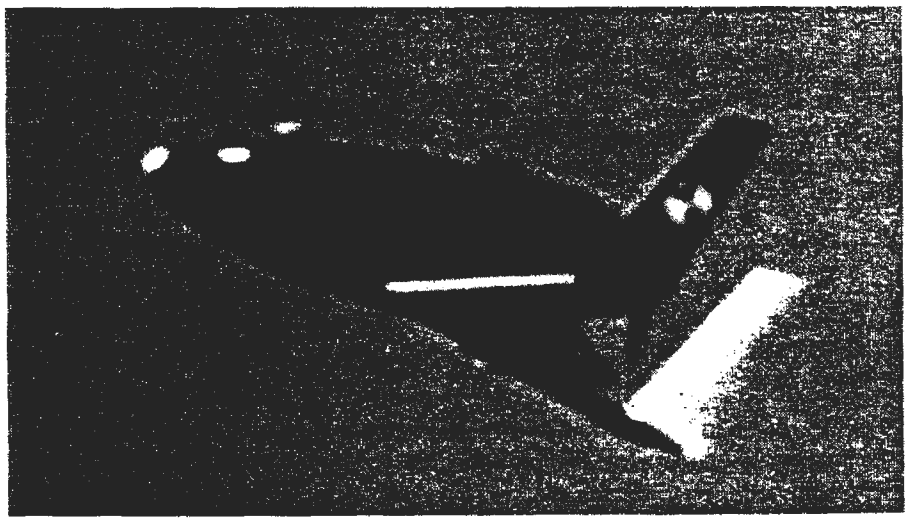
The Israeli financial gap in the current U. S. fiscal year is $5.1 billion. It is expected to be $6.6 billion in Fiscal 1984

Quick Reaction RPV Under Development by Boeing

Expendable remotely piloted vehicle, designed to attack high-priority targets, is being developed by Boeing Military Airplane Co., Wichita, Kan., under an Air Force quick reaction capability program designated Pave Tiger.

Pave Tiger is designed to assist tactical aircraft in nonnuclear theater-type warfare by carrying payloads that include electronic countermeasures systems, warheads or sensors. Mission flight paths would be preprogramed prior to ground launch. Boeing holds a $14-million contract from USAF Aeronautical Systems Div. for 14 vehicles, 12 of which are for testing and two for spares. The contract runs through this September and calls for flight demonstrations to start this spring.

Following flight testing, USAF expects to award a production contract aimed at near-term requirement for an operational system. Key to the program is its low cost, according to Lt. Col. Jack Colligan of Aeronautical Systems Div.'s Deputy for Tactical Systems. Until recently the costs of fielding unmanned expendable aircraft to supplement tactical fighters in high-risk missions have been prohibitive, he said.



Boeing Military Airplane Co. developed the vehicle with company funds with emphasis on low initial and life cycle costs. Vehicle design involves use of injection-molded composite materials including reinforced glass fiber, resins and polyurethane. The company-funded program included building a prototype, shown being flight tested on a Boeing test range.

The USAF/Boeing YCGM-121A is powered by an aft-mounted, two-cylinder 28-hp. engine built by Cuyuna Development Co., Crosby, Minn., turning a four-blade pusher propeller. Length is 6.9 ft. and span is 8.5 ft.

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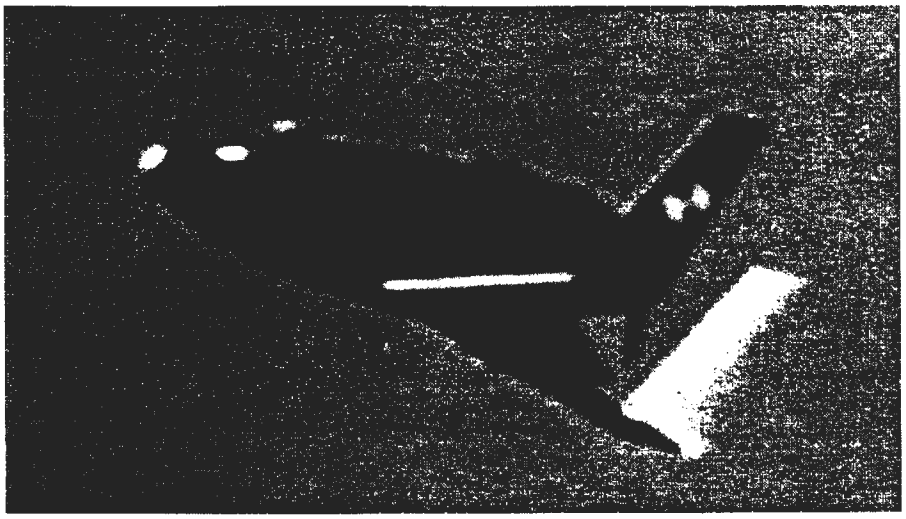

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Kfir Proposed for U. S. Navy Aggressor Role

Washington—Israel Aircraft Industries Kfir C1 fighters would be used as adversary aircraft in U. S. Navy aggressor training under a turnkey lease program proposed to the service by Atlanta-based Flight International.

The Navy has embarked on a program to replace its Northrop F-5s and McDonnell Douglas A-4s now used in aggressor training squadrons on the East and West coasts (AW&ST Oct. 18, 1982, p. 34).

The Fiscal 1984 budget includes a Navy request to acquire four aircraft for $29.1 million, plus $3.2 million for initial spares. If the adversary training aircraft program survives the Defense budget debate, the Navy intends to ask for funds for eight aircraft in the Fiscal 1985 budget and 12 in Fiscal 1986.

Two aircraft also being considered by the Navy for the aggressor training role subject to their going into production are the Northrop F-20 Tigershark and the General Dynamics F-16 with the General Electric J79 engine installed. The Kfir C1 also is powered by the J79.

Under Flight International's proposal, the company would furnish 12 Kfir C1s to the Navy aggressor squadrons on each coast and then provide the support and maintenance for the aircraft.

"All the Navy will have to do under our proposal is provide the pilot to fly the Kfir," Douglas G. Matthews, president of Flight International, said.

Flight International already has an agreement with the Israeli air force to cover the purchase of the 24 Kfirs if the Flight International proposal is accepted by the Navy, Matthews said.

He said the company also has determined the cost of shipping the aircraft to the U. S. and the amount needed to provide maintenance and support for the aircraft and the General Electric J79 engines.

"We can provide the aircraft and all the support for less than the Navy's program costs," he said. "They will be hard pressed to even buy the aircraft with the money the Navy has, never mind support them, plus the fact that we can give them aircraft within months, not years."

The Navy's decision on whether to lease or purchase adversary aircraft is expected to be made within the next month. If the Navy chooses to purchase aircraft, as was its original intent, a request for proposals for the aggressor training aircraft could be issued this summer, Navy officials said.

Flight International provides various services to the Navy, including airborne electronic countermeasures training, target towing and radar operator training (AW&ST Mar. 30, 1981, p. 74).

and $7.5 billion by Fiscal 1985. U. S. aid pays for approximately $2 billion of the financial gap. Without this aid, Israel's gross national product would have declined by 4% instead of growing by 3.6% in 1982, according to State Dept. officials.

Israel must rely heavily on bank financing in the future, even if U. S. aid continues at current levels. Israel is, however, facing increasing difficulty in arranging new bank loans as more banks approach what they regard as the maximum prudent exposure in Israel. This resulted in depressed short-term borrowing last year.

Israel Exports

Administration officials point out that at the same time, Israel is giving what amounts to concessional loans to buyers of exported weapons. Israel's interest rates are competitive in world markets at a 2-3% rate.

The program costs of the Lavi fighter using current Israeli cost estimates would be approximately $6.4 billion for 300 aircraft, about the same as 300 coproduced F-16s, according to the State Dept. study.

General Dynamics has proposed 30% coproduction of the F-16 in Israel, and Israel has stated that 35-40% of the approximately $5 billion for the Lavi program would be spent in the U. S., and that a number of U. S. aerospace companies would benefit.

If 60% of the Lavi is produced in Israel and costs are held to the minimum, it is possible for Israel to procure 300 of the fighters for $4.8 billion versus $5.5 billion for 300 coproduced F-16s.

"However," according to State Dept.'s Lavi study, "given the uncertainty of the Lavi program and given the possibility of a higher Israeli portion of F-16 coproduction—40%—it cannot be asserted that the net cost of the Lavi would be less than the F-16."

General Dynamics, in addition, has offered Israel 12% coproduction of future F-16 sales, either to the U. S. Air Force or to other countries.

"Israel would be in better shape economically and in terms of long-term production employment with the F-16, depending on third-country sales," the study said.

"At this point, U. S. aircraft for the 1990s will be far more capable than the Lavi, although probably more expensive as well," the study said. "We have not yet heard any strong views on the competition point from any company. It may be indicative that General Dynamics, prime builder of the F-16, is one of the leading contenders for design contract for the Lavi wing and tail assembly." The study was completed before Jones' letters.

The Lavi project would link 12,000 jobs in Israel to the fighter, and 8,000-10,000 jobs are linked to F-16 coproduction. Israel now has 6% unemployment, and the government wants it reduced drastically by the end of the year.

Lapidot told the Reagan Administration that Israel wants to use FMS credits to design an aircraft using components already developed for other U. S. aircraft such as the F-15 and F-16. According to Lapidot, this would not be pure research and development but merely the purchase of finished goods. The use of FMS credits would, therefore, be consistent with U. S. policy and legislation. □

France Flight Tests Nuclear-Armed Mirage

Paris—Flight testing has begun with the first French air force Dassault-Breguet Mirage 2000 fighter designed for nuclear attack missions.

The Mirage 2000N made its initial flight from Istres, France, Feb. 3. Dassault-Breguet pilot Michel Porta flew the aircraft to a top speed of Mach 1.5. The mission also evaluated the aircraft's low-speed flight envelope.

The nuclear attack aircraft is a two-seat derivative of the basic Mirage 2000 and is equipped for all-weather, low-altitude penetration. It carries an Electronique Serge Dassault/Thomson-CSF Antilope radar for terrain following.

Aircraft systems have the redundancy required for high reliability when the Mirages are on their quick-response alert status. The N version Mirages will handle the nuclear attack mission now assigned to certain Mirage 3Es and Mirage 4s (AW&ST June 8, 1981, p. 77).

The Mirage 2000Ns will carry a single Aerospatiale ASMP supersonic missile with a thermonuclear warhead. The ASMP is powered by a ramjet engine and has a range of 30-60 mi.

Program officials said the second Mirage 2000N is in final assembly and is expected to fly this summer.

Requiem for a Fighter

Engineers disparage it, air-force officers don't want it, economists say it costs too much and the defense minister seems to want the Americans to take it off his hands. The Lavie fighter may not get off the ground, as Philip Ross reports.

The Lavie fighter, a $2-billion-plus investment project more ambitious than any other ever attempted in this country, may have to be cancelled. No other big item in the defense budget is so expendable, and the defense budget must be slashed.

Every year the Lavie project consumes $250 million in foreign currency made available for that purpose by the US military-aid program. This is half again as much as Israel earns from citrus exports. The cost of the 300 aircraft to be bought by the Israel Air Force is estimated at $12 billion; even if that estimate is fair (and military-industrial estimates rarely are), it represents an enormous burden for a country with a Gross National Product of about $24 billion. True, US-made jets cost at least as much; but they are paid for by the US government, which cannot be expected to pay for Israeli-made jets.

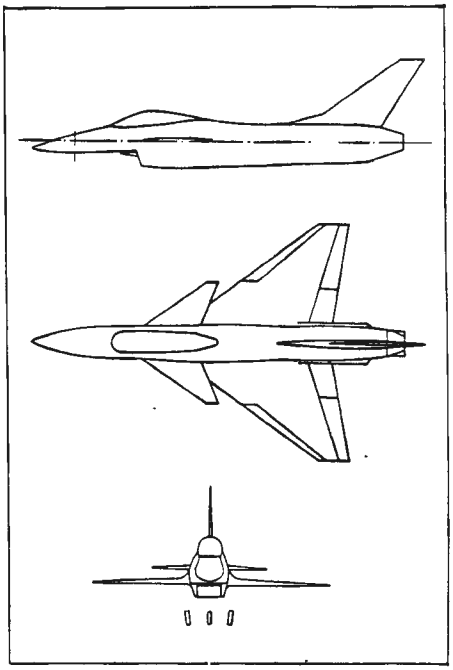
The Lavie is not the first Israeli jet. For years Israel Aircraft Industries (IAI) has been building the Fouga trainer under license from France, and for about 10 years it has been building the Kfir fighter, which is loosely based on a French design but pays no royalties: the plans that served as a starting-point for Israeli engineers' own ingenuity were stolen by a Swiss spy.

The Lavie began as a successor to the Kfir and to the aging fleet of Phantoms and Skyhawks — it was conceived as a support and ground-attack system, not as a high-performance fighter. But the appetite grew with the eating and it was scaled up a bit; at least that is what its backers claimed. In any case, it is not expected to compete with the best that the rest of the world will have to offer in the 90s, which is the earliest the Lavie can be operational.

Nor can a compromise be struck between all-out development and outright cancellation. Slowing down a project of this kind makes the product old before its time: the Lavie must go on the market, if not abroad then at least at home, as soon as possible — or not at all.

Subject to a US veto

The Lavie's supporters claim it would sell well in the Third World, which would lengthen the production run, lower unit costs and earn back some of the foreign exchange that must be invested in it. But critics say that since the Lavie, like the Kfir before it, would use an American engine and other American technology, the US would have a veto over any export deal, as was the case with the Kfir.



Even if there were no political reason for the US Administration to block this or that deal, commercial considerations would probably keep the Lavie at home. The US aviation lobby is very effective, and it has already begun to prepare for the fight. Israel Aircraft Industries is fully aware of this, and that is why it tried to co-opt one of the big US aircraft manufacturers into the Lavie project. It did not succeed.

Another argument for the Lavie has been that it would help develop Israel's industrial infrastructure, for both civilian and military purposes. According to the plane's advocates, a big project like the Lavie attracts and keeps top brainpower, encourages *aliya* and produces valuable spin-offs.

But where is this top brainpower to be found? If it is taken from other Israeli enterprises, both civil and military, then the Lavie cannot be making a net contribution; if it is to be imported in the form of foreign experts, who would leave the country after their contracts expire, then neither the labor force nor the country's military-industrial independence stands to gain. Indeed, this reporter knows of instances of non-Jewish technicians being hired in England to work on the Lavie; their salaries are extremely good and their net cost to the defense budget is higher still, if one takes into account the cost of moving, housing, and insuring them, and of educating their children in private schools. It might be said that by hiring them Israel is subsidizing Britain's aerospace industry in the long run.

More troubling still is the fate of the infrastructure that will remain after the Lavie project ends. Will it be a beached whale, which only another big project can keep afloat? Thousands of highly specialized workers, scores of subcontractors, and the whole panoply of services they require will suddenly be underemployed the day the Lavie is done. By building the Lavie, we might be saddling ourselves with a cash-eating monster.

Spin-off industries are supposed to prevent this from happening by employing Lavie project veterans. Supporters of the project compare it to the government-subsidized electronics industry in the 60s and 70s, which also was criticized for being a dead weight on the defense budget, but which now earns its keep in both its military and civilian incarnations.

But spin-offs are a chancy business. Ten or twenty years ago Israel had more slack in its defense budget, more elbow-room for experimentation. Furthermore, electronics was then a newer and less crowded field than aviation is today; it was easier to get in on the ground floor.

Who needs the "wagon"?

There is a simpler argument against the Lavie, which has not been rebutted: it is technically unadvantageous to build high-performance jets in Israel. Nehemia Strassler, the economics editor of *Ha'aretz*, pointed out last month that Israel has no special economic advantage in that field, and that just because we can build something is no reason to divert great resources to it:

"Engineers at Israel Aircraft Industries . . . do not conceal their disapproval of the [decision to] build the aircraft itself, as opposed to its electronic systems. They say that perhaps we have a comparative advantage in electronics, but that we don't have to build the 'wagon', which is what they call the airframe."

According to Hebrew University Prof. Dan Horowitz, even the Lavie's main buyer is disenchanted with it. "I know that the Air Force itself is opposed to the Lavie," he told *The Israel Economist*. "It wants a first-class plane at the best possible price, and the Lavie is a second-stringer and too costly."

In mid-November the government was set for a budget fight. Finance Minister Yitzhak Moda'i's plan for a $500-million cut was fiercely opposed by the affected ministries, and, as always, the Defense Ministry was leading the counter-attack. If it is able to resist a $150-million cut, then the other ministries will be able to resist the cuts in their budgets too.

Defense Minister Yitzhak Rabin articulated the fears of his ministry by saying that further cuts would hit at muscle, not fat. Prof. Horowitz demurred, saying that "plenty of superfluous positions and cushy benefits could be eliminated". But

he agreed on one point: firings of Defense Ministry employees and of IDF personnel could be kept to a minimum if the $250-million US aid to the Lavie were diverted to other uses, like 20.000 salaries.

"Half the defense budget goes to the Air Force," said Prof. Horowitz. "This is the branch that can most easily sustain cuts, and the Lavie is the obvious place to start."

Veiled plea to the US?

So far no one in the Defense Ministry has given voice to these ideas. But their currency there can be divined from the faint praise with which the Lavie project is now being damned. Defense Minister Rabin recently said that if "the US does not fund [the Lavie], as it says it will, then there will be no choice but to cancel the project." No clearer plea for the US to take the thing out of his hands could have been made; surely this is not the way an experienced and stolid Israeli politician like Mr. Rabin talks when he wants to prevent the US from doing something.

No one in Israel seriously denies that there are great strategic, political and economic advantages in attaining a certain degree of self-sufficiency in arms manufacture. For one thing, having the nucleus of a weapons industry allows a country to build up such an industry quickly if it should become necessary. For another, having a resourceful cadre of weapons designers can come in handy during a war, when disabled equipment must be repaired quickly and sent back to the battlefield, and when new enemy weapons demand an immediate technological answer. In-house expertise is also useful in deciding which systems to buy from foreign suppliers, and what alterations to specify in the final product.

Striving after wind

But the search for total autarky, or strategic independence, is a striving after wind. A country like Israel, which is well-endowed with technical and military talent, can build just about any single weapon it sets its mind to, but it cannot build everything; it will never be able to keep up with the leading edge of the technological race in all its aspects. This means Israel must concentrate on developing a few home-grown weapons systems, and learn to live with a certain amount of dependence.

Even if military self-sufficiency were attainable, it would not give Israel *economic* independence. This country would still have to import raw materials, and it would still need credit. Thus, even if Washington were no longer in a position to withhold crucial weapons, it would still have strong influence on Israeli policymakers. By sacrificing economic rationality to military independence, we could end up with less room for maneuvering than before. Sovereignty is more than tanks and planes. ■

A Modest Proposal

A senior government economist says that Israel cannot bear the cost of its defense and suggests that the US finance it directly, just as it does the American troops and bases in Europe, Japan and South Korea. Philip Ross reports.

"We are getting a raw deal from the US," says a senior government economist who asked not to be identified. "They fund only a small proportion of our total defense costs but get two important things in return: a last-resort military base and a nuclear-free Middle East. Left to its own resources, Israel would have no choice but to go nuclear, as the conventional arms race is simply too costly in the long run."

In Israel's first dozen years the US was content to leave it to its own devices. It imposed an "evenhanded" arms embargo on the region, which did not affect the Arabs, who got their weapons from the Soviets, but put Israel in an almost desperate position: it had to buy its weapons on the international market, particularly from France, which for its own reasons was interested in complying.

"It's no accident that the embargo ended in the early 60s with the sale of Hawk anti-aircraft missiles," the economist said. "That was when the Americans learned of the existence of a nuclear reactor in Dimona that could produce enriched uranium. In fact, the Hawk missiles were meant to defend that reactor from Egyptian air assault and prevent Israel from going to dangerous lengths to protect its deterrent."

Israel has never announced that it has nuclear weapons, but it has for long been one of the few countries that both face an unambiguous threat to their survival and have the capability to produce nuclear weapons, which are cheaper, though far riskier, than the conventional variety.

US aid: real money or peanuts?

US aid in all its forms comes to about $2.8 billion a year gross, and $1.8 billion net after debt service. This may seem like what the late Senator Dirksen once called "real money", but according to the economist it is "peanuts compared to what the US gives NATO, Japan or South Korea".

The US net aid covers only about a third of the real cost of Israel's defense, which is broken down roughly as follows: $3.6 billion spent locally, $1.6 billion spent on defense imports, and probably at least a billion spent on hidden costs such as reserve duty. That comes to a total of some $6.5 billion, about a quarter of the GNP.

"We cannot support a defense burden that is proportionally five or six times as heavy as in any other Western country," says the economist. "Our economic crisis stems from a lot of factors, some of which could have been prevented by wiser policy. But the overriding factor is an impossibly high defense burden.

"Israel does not get the aid it gets because the Americans like the color of my eyes," says the economist, "but because it wants to prevent the Middle East from going nuclear. Over the years the US has given us more and more advanced weapons, peeling away one export limit after the other: first World War II surplus, then support equipment, then front-line tanks and planes; now it gives us full access to high technology and involves us in current R&D."

The economist says Israel should make the case that its defense budget, like those of NATO, Japan and South Korea, is indissolubly linked to America's. "Unlike the other allies of the US, Israel pays in blood for its defense. It also provides extremely valuable services and constitutes an important last-ditch base for US military planning. The Americans understand this and would surely be forthcoming."

But why do they give us less money than we ask for in our annual aid requests? "It's simple: we never make our case forcibly, by telling the Americans we simply cannot go on building and buying conventional weapons. One reason for this reluctance may have been our leaders' tendency in recent years to take a Polish aristocrat's view of national pride," he said, in clear reference to fomer Prime Minister Menahem Begin.

"The US likes to justify its aid to Israel on the basis of the two countries' cultural affinities: we are both open societies, where people may come and go, we are both democracies, we are both heirs to the Judeo-Christian tradition. But Pakistan is neither open, nor democratic, nor Judeo-Christian, nor particularly friendly to the US; it is merely on the point of building an atomic bomb, and that is more than enough. The US said it was giving Pakistan conventional weapons for the express purpose of dissuading it from resorting to the nuclear option."

Israel's economic woes may ground jet program

DALLAS MORNING NEWS Dec. 9, 1984

By Michael Precker
Mideast Bureau of The News

TEL AVIV, Israel — Israel's mounting economic crisis is endangering plans to build the Lavi fighter plane, leaving its most ambitious military project ever dependent on American largesse.

At least $600 million already has been sunk into developing Israel's "workhorse" jet fighter for the 1990s. At stake are thousands of jobs and the continued development of the sophisticated defense industry, which Israel regards as crucial to maintaining military superiority over the Arabs.

But while defense industry officials insist the plane will be built, nearly all of its funding now comes from U.S. military aid. And as the government grapples with painful budget cuts necessary to control 800 percent inflation and to stave off bankruptcy, doubts are growing about whether the multibillion-dollar project is still feasible and justified.

"Just because $600 million has been invested in a project that will cost us 13 to 14 billion dollars before we see the 300 planes that are supposed to come out of it, is that a reason for excluding it from consideration on budget cuts?" said Assaf Razin, a prominent economist at Tel Aviv University.

Finance Ministry officials who have argued for some time that the economy cannot afford the project are picking up support as Israel's financial situation deteriorates.

Danny Rosalio, head of the holding company that controls industrial and financial concerns owned by the Histadrut National Labor Federation, said he favored delaying or scrapping the project.

"I admit only half a year ago I said the exact opposite, but the situation has changed since then and we adjust," he said. "It is putting too great a burden on the state finances and drawing thousands of trained engineers away from other branches of industry, which need them badly."

On the other side, Israel's defense establishment and its political allies are mounting a lobbying effort to assure the Lavi's survival.

The board of directors of Israel Aircraft Industries, the government-owned company developing the airplane, issued a statement reaffirming "the necessity to continue the program, which is vital to the economy of the state of Israel and its security."

Health Minister Mordechai Gur, a former army chief of staff, said the Lavi "puts Israel in the top echelon of the developed nations and it is absolutely unthinkable to damage that."

Other proponents warn that canceling the Lavi would cost 3,000 jobs, cripple Israel's aeronautical industry and cause a brain drain of skilled engineers forced to work abroad.

Caught in the middle, the government is faced with an unpleasant decision encompassing security, economics and national pride.

Minister without portfolio Ezer Weizman, who as defense minister spearheaded initial approval for the Lavi in 1980, said the Cabinet should review its position.

"The defense ministry should submit an analysis of the significance, functions and costs for the next 10 years," he said. "And it must recommend, within the framework of the defense budget, is it possible to carry this out or not?"

That the Lavi's future should still be open to question after six years of development work reflects the project's troubled history.

The Lavi, Hebrew for lion, was initially proposed as the successor to the Kfir, the Israeli-built fighter developed from the French Mirage series and powered by an American engine.

It was envisioned as a small, fast warplane that would be cheaper than U.S.-made fighters, offering great export potential and preserving the considerable infrastructure built up during the Kfir years.

But while the project was reviewed and approved by four successive defense ministers, debate over its viability never stopped. Israeli military planners have argued for years whether the country should develop its own weapons or buy them abroad for less money. As the largest project, the Lavi was often accused of sapping resources that could be diversified into many smaller programs.

Meanwhile, development costs rose from an initial estimate of $700 million to about $2 billion, and target dates were pushed back. The first prototype is now set to fly in 1986, with the first combat squadron operational in 1992.

"The Lavi we presented originally was different from the Lavi of today," Weizman said. "Today it's a little bigger, fatter and more expensive."

Most significantly, even though Israel hoped the Lavi would make it more independent from foreign arms suppliers, the project has become heavily dependent on the United States.

The plane is to be powered by a Pratt & Whitney engine, and Israel has turned to other U.S. defense contractors for advanced materials and technology.

Israel also won approval to spend $250 million a year of its U.S. military aid package for the Lavi's development. The October 1983 decision represented an important victory for Israel's lobby in Washington.

U.S. law ordinarily requires that military aid be used to buy U.S. equipment, except in emergencies, and officials in the Defense Security Assistance Agency, which runs U.S. arms aid programs, still fear the waiver granted Israel for the Lavi will prove a troublesome precedent, according to a source close to the agency.

U.S. weapons manufacturers resent the fact that U.S. funds are subsidizing an aircraft that is a potential competitor for their foreign aircraft sales. They also see the Lavi as absorbing U.S. aid funds that Israel might otherwise have used to buy their equipment.

But neither Pentagon nor industry officials expect Congress to change its mind. "The Lavi," said one official in Washington, "is a *fait accompli*."

"Any of the foreign arms producers have to sell outside their own country to afford to fill their own orders," this industry official said. Unlike the United States, he said, most foreign nations lack armed forces and economies of the size required to support efficient aircraft production lines on their own.

If Israel and the U.S. government stick with the project, another issue over the horizon, one industry official said, is whether U.S. laws that forbid other nations to resell or otherwise transfer U.S.-made weapons to third countries will apply to Israel's inevitable effort to export the Lavi.

"Yet to be addressed is, when this plane hits the ground and is finally ready to go, what leverage will we have to say, 'Hey, we don't want you selling this airplane to country X or country Y because we've got our products on board,' " the official said.

For their part, Israeli officials were unhappy for a time because the Pentagon was refusing to release for export some advanced technology items Israel had ordered from U.S. manufacturers to build a Lavi prototype.

But that changed in October, when Defense Secretary Caspar Weinberger agreed while visiting Israel to release the items, including a tail assembly and details of the composition of a special material to be used in the wings. The wings are to be built in the United States, but Israel needed the information about them for other aspects of the aircraft.

Any U.S. resistance to the concessions granted Israel appears to have died at this point, industry officials said. "The only question now is, what's going to happen in Israel," said one.

In an interview last weekend, Defense Minister Yitzhak Rabin refused to disclose his position regarding the Lavi but acknowledged its fate rests with Washington.

"Today it's clear to us, and to the U.S. government as well, that they will have to carry 99 percent of development and building costs for at least 10 years," Rabin said.

Asked about suggestions that the Lavi aid could be transferred to other projects, he replied, "It will be very difficult to tell the Americans we made a mistake, we want to change it, now give us the money for other things."

Washington bureau staff writer Richard Whittle contributed to this report.

DALLAS MORNING NEWS Dec. 9, 1984

Some U.S. aerospace firms were irked by decision to fund Lavi development

By Richard Whittle
Washington Bureau of The News

WASHINGTON — The 1983 move to permit Israel to spend $250 million in U.S. military aid to develop the Lavi fighter plane came as a "bolt out of the blue" — and an unpleasant one — to Pentagon officials and to U.S. weapons companies, say aerospace and military sources.

The concession was agreed to by President Reagan in October 1983, when U.S.-Israeli relations had been strained. Among those who pushed it in Congress were Rep. Charles Wilson, D-Lufkin, of the House Appropriations subcommittee on foreign operations, and Sen. Robert Kasten, R-Wis., chairman of the Senate's equivalent subcommittee. With the powerful American-Israel Public Affairs Committee lobby pushing the measure, it whisked through Congress quickly.

"It got adopted in committee and on the floor, and it all happened so quickly and with such force that, when we looked at it, we decided, 'Don't try to stop the stampeding buffalo,' " said an industry official who opposed it.

But some U.S. firms have backed the arrangement, because they will benefit from production of the Lavi. Grumman Corp., for example, has a contract to provide wings and tail assemblies for the plane. The Pratt & Whitney Aircraft division of United Technologies Corp. is to supply engines.

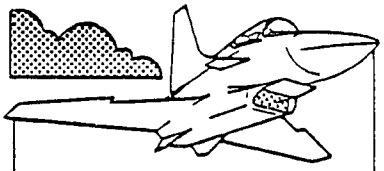
The main industry opponent was Northrop Corp., which has invested more than $700 million of its own funds in developing the F-20 Tigershark fighter plane for export and has yet to make a sale.

Northrop officials largely blame the F-20's failure to sell on the fact that the Pentagon has nothing invested in the plane and therefore does little to promote it. The sight of the U.S. government subsidizing Israel's effort to build a competing product was therefore especially rankling to them.

Officials from other companies also resented the move as one that robbed them of potential sales. "They could have bought a hell of a lot of (General Dynamics) F-16s. They could have bought more (McDonnell Douglas) F-15s," said one official, referring to aircraft already used by Israel's air force.

The Defense Security Assistance Agency, which runs U.S. arms aid programs, opposed the move for two reasons: fear that other nations would clamor for equal treatment, and fear of undermining a key argument for foreign aid — that it is spent in America.

But Texas Rep. Wilson argued at the time that funneling U.S. aid into the Lavi was a way of providing more "practical assistance" for Israel's economy.



THE ISRAELI LAVI

TYPE: Single-seat close air support and interdiction aircraft; secondary capability for air defense.
DESIGN: Delta main wings and canard surfaces, incorporating proven state of the art technology.
ORDINANCE: Air-to-surface and air-to-air missiles, bombs and rockets.
PERFORMANCE: Maximum speed, 1,221 mph. Maximum low altitude speed when loaded, 619 mph.
FIRST FLIGHT: Expected in early 1986.

SOURCE: Jane's All the World's Aircraft

U. S. Companies Oppose Lavi Aid

Use of Foreign Military Sales credits in Israeli project sparks complaints of aircraft export market competition

By Clarence A. Robinson, Jr.

Washington—Mounting opposition by U. S. aerospace companies to the use of Foreign Military Sales credits by Israel for the development of the new Lavi fighter is causing the Reagan Administration to delay decisions that earlier appeared favorable to Israel (AW&ST Jan. 10, p. 20).

Claiming competition in the world marketplace to the U. S. FX international fighter program from the Lavi, Northrop's chairman of the board and chief executive officer, Thomas V. Jones, has asked Secretary of State George P. Shultz, and Defense Secretary Caspar W. Weinberger to become directly involved in the Lavi decision.

Jones has written both officials expressing opposition to U. S. funding being applied to Lavi development, and Northrop is being supported in this effort by General Electric, according to Reagan Administration officials.

The Lavi fighter program in Israel would establish a new tactical fighter in the world marketplace "in direct competition with U. S.-built aircraft, since the Lavi will be an aircraft in the same general performance category as the [General Dynamics] F-16," Jones wrote. "Contentions that it is merely a simple, low-cost tactical and training aircraft are incorrect, as comparisons of the Lavi, F-16 and [Northrop] F-20 vehicle performance show." He included performance comparison charts with the letter.

Israeli officials last week responded to the action by Northrop and General Electric by offering to sign an agreement with the U. S. that the Lavi would not be exported for at least 12 years. They said the development program would continue using U. S. composite materials technology, if the Reagan Administration will permit the transfer of technology to Israel.

The Administration was on the verge of releasing the composite materials technology, separating it from the decision on using Foreign Military Sales credits for Lavi development when objections to the Israeli fighter program began in late January.

Jones wrote Shultz that the FX program stipulated that the U. S. government would not provide funding for development of the FX aircraft and that aircraft companies would have to assume all financial and market risks.

"U. S. financial support now for development of a foreign aircraft destined for export is a direct contradiction of this policy and certainly will discourage fur-

U. S. Budgets $9.2 Billion for Security Aid

Washington—The Reagan Administration is seeking approximately $9.2 billion for security assistance programs to foreign nations in the Fiscal 1984 military spending request, an increase of 17.7% over the current fiscal year allocation.

Half of the funding being requested for security assistance would go to meet U. S. strategic objectives in the Middle East. More than half the Foreign Military Sales credit funding sought in the new budget would go to Israel and Egypt. The Defense Dept. has earmarked $1.7 billion for Israel and $1.3 billion for Egypt. All of the forgiven Foreign Military Sales credits would go to these two nations—$550 million to Israel and $450 million to Egypt.

Defense Dept.'s Fiscal 1984 security assistance programs include:

- **Military assistance program**—$650.8 million for use in 20 countries. This program was being phased out, but Congress made available funding in Fiscal 1982 and 1983 for economically hard-pressed nations. An additional $46 million is being asked for general costs, and another $55 million for reimbursement to the Defense Dept. for emergency grant assistance. A Fiscal 1983 supplemental request seeks $167 million for military assistance.
- **Foreign Military Sales**—Sales of military hardware directly to foreign governments on a cash basis. More than 100 countries are authorized to procure equipment on this basis.
- **Foreign Military Sales credit financing**—$5.4 billion in FMS credits, including the $1 billion in forgiveness to Israel and Egypt. FMS credit financing provides direct credits and guaranteed loans through the Federal Financing Bank. These latter transactions are guaranteed by the Defense Dept. and let at prevailing interest rates. These credits allow nations to procure equipment directly from the U. S. government or from contractors. The guaranteed credits are allocated with 84% going to seven nations—Israel, Egypt, Turkey, Greece, Spain, Pakistan and South Korea. The Defense Dept. is asking for an additional $525 million in a Fiscal 1983 supplemental request for guaranteed credits.
- **International military education and training program**—$56.5 million to fund training for students from 80 countries, an increase of $11.5 million from the Fiscal 1983 continuing resolution authority. An additional $1 million will be sought as part of the Fiscal 1983 supplemental request.

Subtracting the guaranteed loans from the request for $9.2 billion provides for a Fiscal 1984 budget authority request of $4.8 billion. The increase in the Fiscal 1984 funding for military grants—forgiven credits, military assistance and training—is a 20% increase over the current fiscal year.

The total Fiscal 1983 supplemental request for security assistance programs is $987.5 million, with $525 million applied to guaranteed loans. This request also would provide $251 million to assist Lebanon in modernization of its armed forces.

Other security assistance funding is related to that of the Defense Dept. but is administered by various agencies. It includes:

- **Economic support fund**—$2.9 billion in Fiscal 1984 and an additional $294.5 million in the Fiscal 1983 supplemental request. This money is used for direct cash transfers, commodity import transfers and project assistance. It can be designated for either grant or loan assistance.
- **Peacekeeping operations**—$46.2 million. This funding provides for observers in the Sinai, the multinational force in Lebanon and United Nations forces in Cyprus.

Turkey would receive approximately $950 million in the budget request, if approved in Congress. The funds earmarked for Pakistan include $300 million in FMS credits and $225 million in economic support funds to help deter Soviet Union forces in Afghanistan by continuing a military modernization program. Military assistance grants also would go to Sudan.

Morocco and Tunisia, which face threats from Libya or Libyan-equipped forces, would get military assistance grants.

More than half the Foreign Military Sales request for Pacific defense efforts would go to South Korea, with that nation getting $230 million. The Philippines would get $50 million, Indonesia $50 million and Thailand $94 million.

U. S. Assigns Israel, Egypt Bulk Of Foreign Military Financing

Washington—Israel and Egypt will receive the bulk of U. S. foreign military financing this year in amounts larger than those sought by the Reagan Administration but with less provided by Congress for other countries (AW&ST Mar. 29, 1982, p. 22).

Under last month's catch-all funding bill adopted at the close of the 97th Congress, $7.1 billion in Foreign Military Sales (FMS) credits was approved—$750 million for Israel, $425 million for Egypt. These credits will be forgiven. Israel will receive Fiscal 1983 Foreign Military Sales loans of $950 million; Egypt probably will receive $875 million.

Total aid for each nation is what the White House recommended (AW&ST Apr. 26, 1982, p. 22). But Congress changed the mix of forgiven credits and loans—it provided greater forgiven amounts despite Administration objections that this would deplete resources for other countries and imperil U. S. diplomatic efforts toward a Mideast peace settlement.

The Reagan Administration recommended $500 million in forgiven credits and $1.2 billion in loans for Israel. Instead, Congress earmarked $750 million in credits, subtracting $250 million from the loan column. Congress also boosted the forgiven amount for Egypt from $400 million to $425 million.

Military aid had to be addressed in the stopgap funding bill, which will sustain federal spending until the end of the current Fiscal year next Sept. 30, because Congress last year failed to adopt a foreign aid appropriations bill (AW&ST May 3, 1982, p. 18). The stopgap measure ordered U. S. troops in Western Europe for Fiscal 1983 held to the planned 1982 level of 315,600 (ashore only), overruling a Senate Appropriations Committee recommendation to keep to the planned 1980 level of 309,400 (AW&ST Dec. 6, 1982, p. 22). The planned 1983 level was 320,300 troops.

The same committee had recommended cutting funds for the ground-launched cruise missile to be deployed in Western Europe beginning next December, and the stopgap bill went along with that. The White House budget request of $490.3 million was cut to $431.5 million. A House staff member said this would allow purchase of 84 missiles, compared with the 120 called for under the current contract with General Dynamics.

Other countries earmarked by Congress for military financing assistance included:

- **Turkey**—$290 million in loans and $110 million in Military Assistance Program (MAP) funds. MAP provides defense articles and related services, other than training, on a

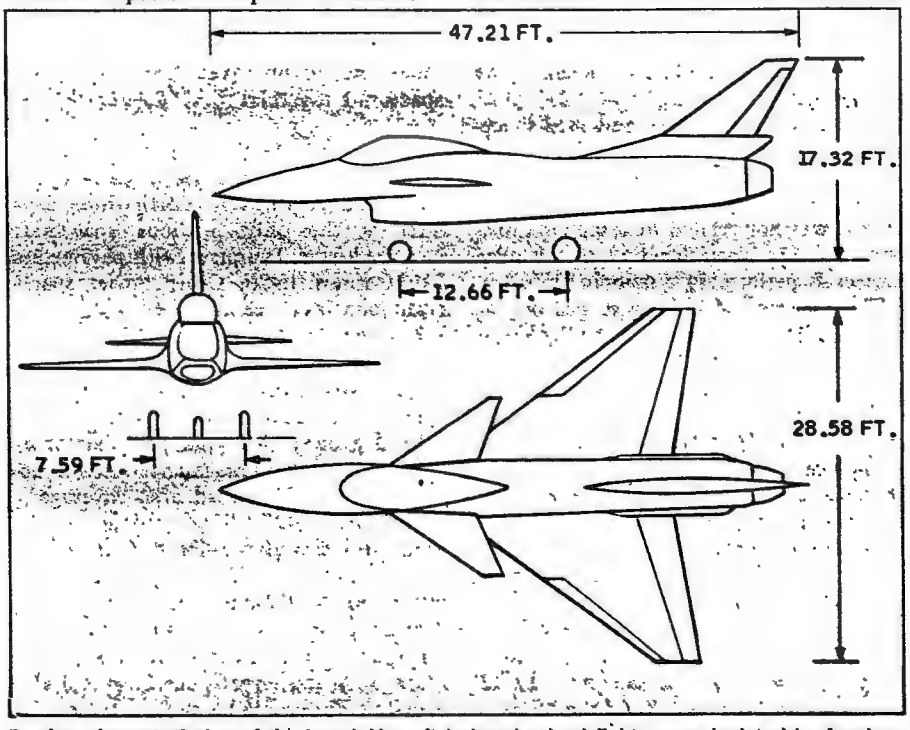
U. S. Nears Lavi Transfer Approval

Washington—The Reagan Administration is moving toward approval of U. S. aerospace technology transfer to Israel to develop the Israel Aircraft Industries Lavi tactical fighter aircraft. It also plans to separate the technology transfer issue from requests to Congress for Foreign Military Sales credits to fund developing and procuring the Lavi fighter.

The development cost for the Lavi, which is expected to replace the McDonnell Douglas A-4 and the Kfir C2 aircraft in the Israeli air force, is estimated to be $1.37 billion in Fiscal 1982 dollars.

Israel also plans to develop the Lavi as a trainer and will build five prototypes with three of the aircraft configured with two seats.

Israel plans to buy more than 300 of the Lavis for its air force. The estimated unit flyaway cost of the aircraft based on this number is $10.8 million each. The cost estimate by major systems includes: airframe, $4.75 million; engine, $2.6 million; radar and self-defense systems, $1.75 million, and avionic systems, $1.7 million.



Design characteristics of the Israel Aircraft Industries Lavi fighter are depicted in drawings with aircraft dimensions. The Lavi will be powered by the Pratt & Whitney 1120 engine.

In planning the development program for the Lavi, Israel expects to take advantage of U. S. research and development programs for the McDonnell Douglas F-15 air superiority fighter, the General Dynamics F-16 and the Northrop/McDonnell Douglas F-18 by adapting existing hardware for the new aircraft.

Modifications would be made to components of these fighters so that they could be used in Lavi development, eliminating most of the research associated with aircraft development programs. Examples of systems that are expected to be modified for the Lavi are:

- Pratt & Whitney PW1120 derivative of the F100 engine developed for the F-15 and F-16 fighters already in Israel's inventory.
- Jet fuel starter developed by Sundstrand/Garrett AiResearch.
- Emergency power system developed by Garrett AiResearch.
- Electrical power system developed by Sundstrand/Lear Siegler/General Electric.
- Environmental control system developed by Hamilton Standard/Garrett AiResearch.
- Leading edge flaps by Garrett/Sundstrand.
- Oxygen system by Bendix.
- Wheels, brakes and tires by Goodyear/B. F. Goodrich.
- Fuel and hydraulic system components by a number of U. S. companies.

grant basis to eligible countries. The Reagan Administration requested $465 million in FMS financing for Turkey to be used for tank, ship and Nike missile modernization and for search and rescue helicopters.

■ **Portugal**—$52.5 million in loans and $37.5 million in MAP funds. The Administration asked for $90 million in FMS financing.

■ **Morocco**—$75 million in loans and $25 million in MAP aid. This equals the Administration request of $100 million.

■ **Spain**—$400 million in loans. This also is in line with the Administration's request.

Under the International Military Education and Training (IMET) program, the Reagan Administration requested $53.7 million for Fiscal 1983 to train personnel from 87 countries. Congress approved $45 million.

The Special Defense Acquisition Fund, authorized by Congress in 1981 to stockpile defense equipment that might be needed on short notice for transfer overseas, received $125 million in the stopgap funding bill.

The government of Israel already has invested $198 million in the Lavi through fiscal 1982 and plans to spend another $210 million for the fighter development in fiscal 1983 funding. The Lavi concept is for a lightweight advanced attack aircraft to become the workhorse of the Israeli air force.

The Lavi design is based on medium and close-range, air-to-ground sorties for close air support. This design also provides a secondary mission as an air defense interceptor and doubles as a two-seat trainer.

The technical requirements that are influencing the Lavi design are high-speed penetration to the target, high maneuverability and low drag stores.

The Lavi, powered by a single PW1120 engine, would penetrate to a target armed with two infrared-guided, air-to-air missiles and eight Mk. 117, general-purpose 750-lb. bombs at a speed of 538 kt. Configured with two AIM-9L Sidewinder missiles and two Mk. 84 2,000-lb. bombs the penetration speed would be 597 kt. The ground attack range of the Lavi armed with eight Mk. 117 bombs would be 244 naut. mi.

The PW1120 engine for the Lavi at sea level standard with maximum afterburner is designed to provide 20,620 lb. thrust for the fighter and a specific fuel consumption of 1.86.

The maximum takeoff weight of the Lavi is 37,500 lb., with the basic takeoff weight of 21,305 lb. The aircraft is designed to carry 6,000 lb. of fuel internally and 9,180 lb. externally.

The Lavi's wing area is 350 sq. ft., with air combat parameters that include: wing loading, 534 psf.; thrust-to-weight ratio, 1.10; maximum load factor, 9g, and maximum speed, Mach 1.85.

The design of the Lavi, which approximates the F-16 in size, provides specific excess power at Mach 0.8 at 15,000 ft. of 540 fps. pulling lg.

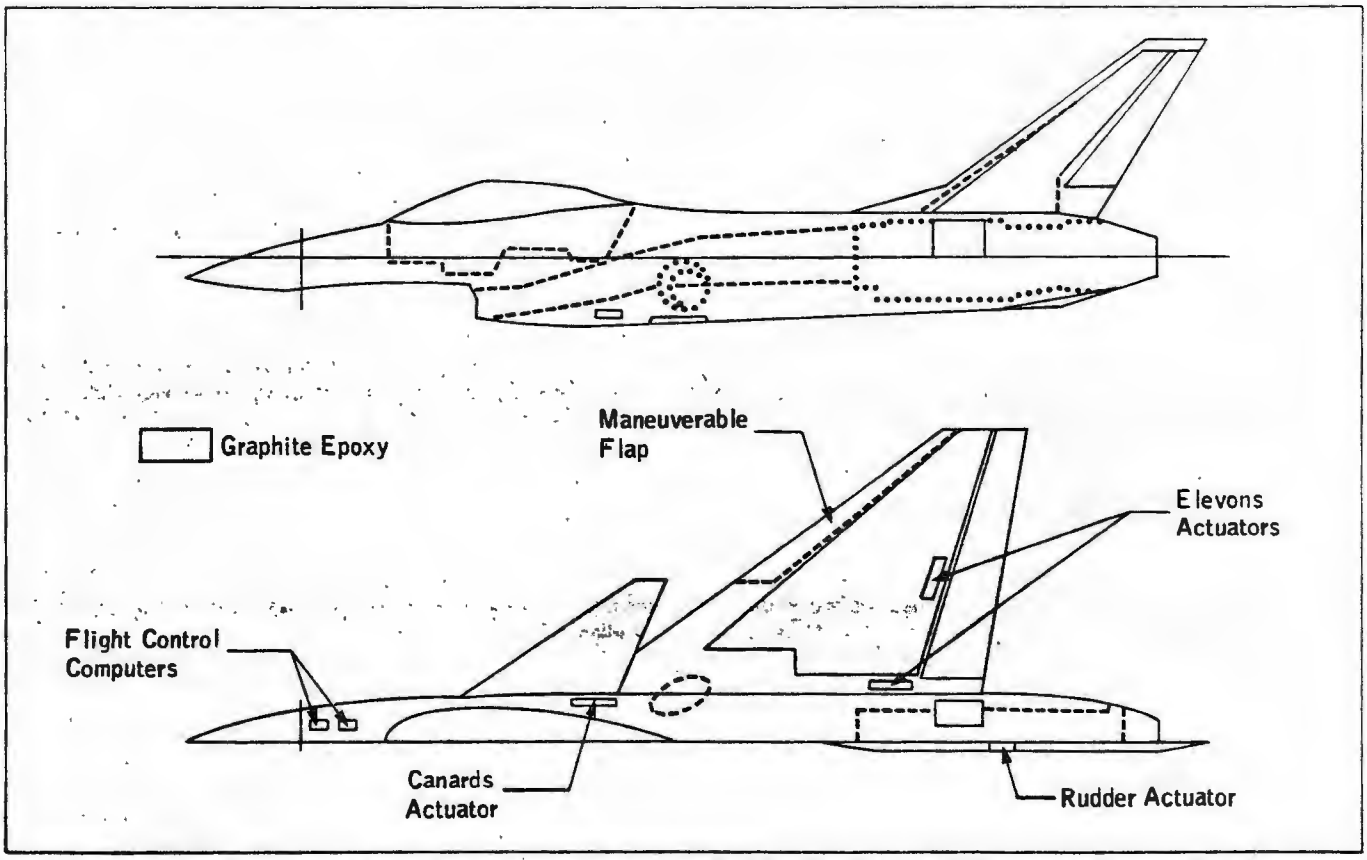
This compares with specific excess power for the F-15C under similar flight conditions of 623 fps. It also compares with the F-16's specific excess power of 708 fps. at Mach 0.9 at 15,000 ft.

The sustained turning rate for the aircraft is designed to be 13.2 deg./sec. at Mach 0.8 at 15,000 ft., and the maximum turn rate under the same flight conditions is predicted to be 24.3 deg./sec. This compares with a sustained turning rate of 11.8 deg./sec. for the F-15C, and 12.8 deg./sec. for the F-16A.

Israel's Lavi team, which visited the U. S. in late 1982, made a case to the State and Defense departments that the fighter development program will pose no immediate competition to the U. S. fighter programs, especially the Northrop F-20, where foreign sales are pending.

The Israeli team emphasized that McDonnell Douglas F-4s will have to be replaced by 1995 for Israel's air force. Candidates to replace that aircraft, the officials said, are the F-15E, the F-16E and the F-18 fighter.

The Israeli representatives also explained that the Lavi will replace several hundred aircraft in the Israeli air force, reminding the U. S. that Israel still bought the F-15 and the F-16 after the Kfir was



Graphite epoxy composite structures for the Israeli Lavi tactical fighter to be codeveloped with U. S. industry are depicted with flight control systems for the aircraft. Flight control will be digital fly-by-wire with analog backup. First flight of a prototype is scheduled for late 1985.

British Design Mach 2 VTOL Fighter

London—British Aerospace has designed an advanced, Mach 2 supersonic vertical takeoff and landing fighter aircraft, designated the P. 1216, and has completed a full-scale mockup at its Kingston production facility.

Decision to build a mockup was made after extensive wind-tunnel testing by the company's Kingston-Brough Div. Wind tunnel tests on the model and several other configurations have been under way for several years (AW&ST Dec. 8, 1980, p. 51).

The P. 1216 design is powered by an uprated Rolls-Royce Pegasus engine, rated at more than 30,000 lb. and employing plenum-chamber burning in the two forward ducts for added thrust. The engine has a single rear vectorable duct through which the engine's hot section exhausts, rather than two rear ducts as in the existing Harrier family.

The P.1216 is larger than current AV-8B aircraft. A new wing has been designed for the Mach 2 role.

developed and manufactured in that nation.

The Lavi, the team said, would not compete with the new U. S. advanced tactical fighter, adding that the first prototype Lavi will not be available until November, 1985, with first production aircraft scheduled for delivery in 1990. Israel plans to buy the first 300 aircraft for its inventory and could not begin export sales of the Lavi until 1995, according to Defense Dept. officials..

There is a debate within the Administration on whether to allow Foreign Military Sales credits to be used for Lavi development. There is no real problem with using the credits for fighter production, only for development, one Defense Dept. official explained. He said, however, it is likely Foreign Military Sales funding will be used for the development program.

Funding for the Lavi is less certain than release of component composite technology and will depend on the meeting scheduled in February between President Reagan and Israel's prime minister, Menachim Begin, and the position Israel takes on West Bank settlements.

A licensed production contract for the PW1120 engine has been signed, and the engines for the Lavi will be produced at Bet Shemesh Engines, Ltd., near Tel Aviv. The PW1120 will share a common core with the F100-PW100/200 engines and have 60% commanality in parts. No change is expected in hot-section life for the engine.

The PW1120 is being developed with improved operational capability, especially at low-speed and high-altitude regimes. No change is expected in distortion handling, and a 12% lower fuel consumption is anticipated in aerial combat.

The State Dept. has delayed transfer of composite materials technology to Israel from three major U. S. companies—Grumman Aerospace Corp., Vought Corp. and General Dynamics—for the Lavi, but that restriction may be lifted in the next few weeks (AW&ST Sept. 13, 1982, p. 31).

There are still interagency differences within the Administration over the development of the aircraft, but there also is a consensus that the composite technology will be permitted, with contracts for the structure development.

The wing and vertical tail for the Lavi would be codeveloped by subcontracting to the three U. S. companies by Israel Aircraft Industries for composite structures. Composite technology also will be applied to the all-moving canard and control surfaces and to structural doors, panels and air brakes. This composite material application is expected to yield advantages in reduced assembly work, lower operating costs, higher structural efficiency and higher design flexibility.

Israel expects to codesign and coproduce the Lavi fighter in Israel and has alloted $100 million to codesign and adapt the PW1120 engine to it, with an additional $300 million budgeted for engine production in that country. Other codeve-

Measures Urged to Stem Tide Of Sensitive Data to Soviets

San Francisco—U. S. should sanction the wider use of lie detector tests by the Defense Dept. and revise both the Freedom of Information Act and its procedures for declassifying defense-related material to stem the flow of sensitive technological information to the USSR, an intelligence official said here last week.

One of the means by which the Soviets have acquired valuable information in recent years has been through adroit use of the Freedom of Information Act, according to Rear Adm. Edward A. Burkhalter, U. S. Navy, director of the Intelligence Community Staff.

"Just by asking the right questions, the Soviets are able to pull from federal government files reams of technical data not otherwise available to the public, much of it only recently declassified," he said at an Armed Forces Communications and Electronics Association meeting (AFCEA).

Industry, rather than government, however, is the front line in the struggle against Soviet industrial espionage. Industry must exercise its responsibility to help deny sensitive technology to the USSR and other Eastern bloc nations, Burkhalter said.

No high-technology company is free from the threat of Soviet infiltration or theft, but the many small companies developing emerging technologies, whose applications are only now being explored, are vulnerable. Because the applications are still indefinite, this work is not subject to security classification and protection.

The Soviet appetite for U. S. technology is not indiscriminate, Burkhalter said. Rather, at the highest level of government, the Soviet State Committee for Science and Technology considers the needs of the Soviet military and, to a lesser extent, the civilian scientific and industrial communities and formulates these needs into acquisition requirements.

About 30% of these requirements can be met by such legal, open means as subscribing to such periodicals as AVIATION WEEK & SPACE TECHNOLOGY, Burkhalter said, or by attending international conferences, sending scientists to do research at U. S. universities, or buying equipment that is available for unrestricted international sale. For the 70% of its technology acquisition requirements that it can not obtain legally and openly, the committee turns to the Soviet intelligence services—the KGB and the military intelligence unit, the GRU. Former KGB officers and agents now in the West have said that this technology acquisition has been assigned the highest priority for KGB and GRU collection, and the two services compete strenuously for the recognition that follows success in acquiring high-value technology, Burkhalter said.

Open and covert acquisition of Western technology saves the Soviets billions of dollars in research and development costs, and years in research and development time. Burkhalter set the value of the information that the Soviets obtained over a three-year period from one source, former Hughes Aircraft radar engineer William Holden Bell, at hundreds of millions of dollars (AW&ST May 10, 1982, p. 24; July 6, 1981, p. 25).

He said Bell was paid $110,000 for classified information about the USAF/McDonnell Douglas F-15 look-down/shoot-down radar, B-1 and Stealth radar, an all-weather tank radar, the Navy Hughes Phoenix missile, Army/Raytheon Patriot and Improved Hawk missiles, and a towed-array submarine sonar.

"In cost versus benefit terms, the KGB is

lopment and coproduction funding includes:

- Wing and vertical stabilizer—$60 million and $100 million, respectively.
- Flight control computer with Lear Siegler already under subcontract for $60 million in codevelopment, and $100 million planned for coproduction.
- Airframe systems with $20 million and $100 million for codevelopment and coproduction with U. S. industry.
- Materials procurement for coproduction estimated at $500 million in Fiscal 1982 dollars.

The Lavi concept as presented by the Israeli briefing team is built around the use of proved materials and processes, adapting systems already developed whenever possible. This approach uses state-of-the-art technology and is low risk in approach. It also provides cost-effective qualification testing of the aircraft, Defense Dept. officials said.

The avionics system for the fighter is planned to operate with advanced digital systems with interactive multifunction display and controls, fire control integrated with internal and external sensors, and enhanced active and passive self-defensive systems.

Computer embedded systems for the Lavi would be built to comply with U. S. military specifications. The flight control system for the aircraft would be a fly-by-wire system with relaxed static stability. It will have an analog but no mechanical backup system.

Boeing Power System

Los Angeles—Supplemental type certificate has been issued by the Federal Aviation Administration for an engine power trim system (EPTS) designed to adjust automatically Boeing 727 engine power during climb and cruise.

The EPTS is expected to reduce the transport's total fuel consumption by more than 2% by optimizing climb and cruise performance. The system also provides protection against engine overtemperature and excessive engine pressure ratios.

Garrett's AiResearch Manufacturing Co. and United Airlines will jointly hold the supplemental type certificate for the Boeing 727. AiResearch and several carriers are considering joint certification of the EPTS on other aircraft.

The avionics systems for the Lavi would involve a number of U. S. contractors. Israel has issued a request for proposal to Teledyne for the 1750A computer emulator system. Other avionics action by Israel includes:

- Wide-angle head-up display with a draft request for proposal issued to Hughes and Marconi for $3 million for a development and procurement cost goal of $100,000 per unit in production. The HUD would not be built in Israel.
- Software and support with partial delivery already accomplished by the Aeronautical Systems Div., Wright Patterson AFB.
- Programmable signal processor emulator by Westinghouse that is under study contract.
- Electronic countermeasures components by ITT in the detail design stage for tradeoff decisions.

In presenting its development plan to the Reagan Administration, Israel overcame doubts that the aircraft could be developed for $1.3 billion by detailing the development costs. They are: airframe, $453 million; engine, $110 million—this is the cost to adapt the PW1120 to the Lavi; avionics, $235 million; flight control and electromechanical systems, $109 million; test and evaluation, $200 million, and instrument landing system, $53 million.

The development costs for these major systems total $1.1 billion, with an additional $210 million for production tooling—$110 million for the airframe and $100 million for the engine.

Israel's position on developing and producing the Lavi is that its industry has the basic infrastructure required to undertake the development of an advanced military aircraft. Israeli manufacturers operate in accordance with U. S. military standards and many are approved vendors for U. S. aircraft companies.

The Lavi program would provide a capacity for manufacturing and assembly of the airframe and engine to take up the slack in phasing out the Kfir program. □

far and away the most efficient, economically productive element of the Soviet economy, because of its contribution in the foreign technology area," Burkhalter said.

The benefits to the Soviet Union do not stop there. "With our best technology in hand, they can develop countermeasures to our systems before we ever deploy them. And Soviet industrial espionage imposes new, ever-increasing costs as we struggle to overcome technology we have developed that is now in Soviet hands."

Soviet technological dependence on the West does not condemn them to permanent inferiority. The Soviets are able to learn more from our mistakes, select the best from both technological worlds, and focus their research and development capital on areas where we are weakest, he said.

Much is made at times of safeguards surrounding equipment that has civilian as well as military uses, but these have proved to be ineffectual, Burkhalter contended. He cited the case of two floating drydocks built in Japan for Soviet civilian use, but now supporting the Soviet Navy's Pacific and Northern fleets. They are being used to repair Kiev-class aircraft carriers, nuclear-powered ballistic missile submarines and other warships, and no doubt will be used for the new generation of Soviet aircraft carriers projected for the 1990s, the admiral said.

This diversion of ostensibly civilian hardware for military use should have come as no surprise, for the Soviet military has first choice of any new technology acquired in the West, he added. It is part of the system and not a surreptitious, backdoor arrangement.

The U. S. government has taken steps to counter Soviet industrial espionage, including the following, Burkhalter said:

- The Commerce Dept. has strengthened its Compliance Div., including the opening of new field offices in San Francisco and Los Angeles.
- The Customs Service in early 1982 began its Operation Exodus to detect and prevent illegal exports of technology. Although it already has produced a number of prosecutions, the program only now is moving into full operation.
- The U. S. Attorney General established a Critical Technologies Task Force in California to coordinate with state and local police and high-technology businesses in this area "to stem the hemorrhage of critical technology to our adversaries."
- The U. S. intelligence community is redoubling its efforts to learn what items are on the Soviet's shopping lists so that industry and law enforcement agencies can take defensive measures.
- Counterintelligence efforts are being strengthened for better monitoring of Soviet and East European agents in the U. S., Western Europe and elsewhere. Burkhalter stressed the close relationship between the intelligence services of the USSR and its satellites. "They respond to Soviet collection tasking, and the USSR benefits from everything of value that they collect," he said. Bell, for example, was paid by Marian Zacharsky, West Coast manager of Polamco, an overt, legal, Polish machinery importing company.
- Intelligence is being passed to the Justice and Commerce departments, the FBI and other elements of the government to help them in their countermeasures.

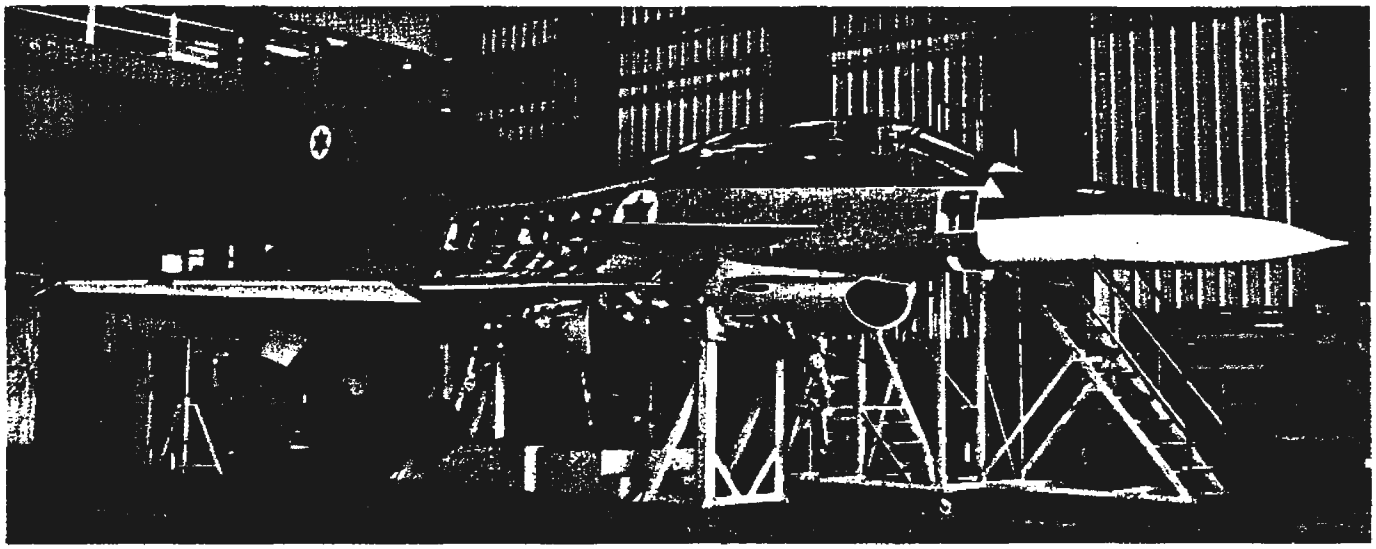
In the policy area, the U. S. is working to strengthen CoCom, the Coordinating Committee for Multilateral Export Controls, and technology export restrictions are being updated. Additionally, the activities of Soviet and East European citizens in the U. S. are being restricted.

The Administration is asking Congress for modifications to the Freedom of Information Act to prevent the public release of sensitive technological information, especially that relating to U. S. weapons systems.

F:Lavi

LAVI FIGHTER FINANCING

Israelis Stress Need for U. S. Aid To Complete Lavi Development



Full-scale engineering mockup of the Israel Aircraft Industries Lavi multirole combat aircraft is shown with wings, canards and twin ventral strakes in position (AW&ST Jan. 14, p. 17). Wings will be made of composite material by Grumman in the U. S. IAI is building six flying prototypes and one non-flying structural test airframe. A cockpit and avionics mockup of the fuselage also has been built. The first 30 production aircraft will be two-seat trainer versions of the aircraft, which also will be built in a single-seat version.

By David A. Brown

Tel Aviv—Completion of development of the Israel Aircraft Industries Lavi multirole combat aircraft will depend on continued strong financial support from the U. S., according to senior Israeli government and industry officials.

The Lavi program, which is the largest aircraft project ever organized in Israel, is on schedule. The first prototype will fly in about 18 months.

While the Lavi program has retained its domestic political support, Israeli officials are aware that to put it into production, more than half of the aircraft will have to be manufactured in the U. S. Completion of the development program will depend almost totally on U. S. financial support, senior Defense Ministry officials said.

Ministers in the Israeli government, senior officers in the air force and Lavi program planners and engineers emphasized the determination of the country to carry out the project, coupled with a realization that it will be possible only with U. S. technology and money.

Israeli Defense Minister Yitzakh Rabin said that while there were no formal commitments as yet from the U. S., beyond the present fiscal year, the Israeli government was hopeful of receiving at least $1.8 billion in military assistance funding in fiscal 1987 and 1988.

Some of this could be devoted to the Lavi project, but much of it already has been committed to other programs, including additional General Dynamics F-16s.

Former Defense Minister Moshe Ahrens—now minister without portfolio in the present coalition government—said he believed the Lavi program had advanced too far to be canceled for political reasons.

"There are 25 ministers in this government, and I have talked to all of them about the program, and they all support it," he said.

"I don't think any [Israeli] government would have the power to cancel the program at this late date," he said. "Too many people are involved in it. I don't know of any organized opposition within the Knesset [parliament], but even if there were some I don't think it would have any effect on the program."

Aircraft Evolution

Gen. Amos Lapidot, commander of the Israeli air force, told AVIATION WEEK & SPACE TECHNOLOGY that the Lavi evolved from a study conducted about five years ago by the air force to determine its needs in the 1990s. The study recently was redone and showed "no big change" in requirements as far as the air force's equipment needs were concerned.

But he added that the current economic situation in Israel is likely to dictate changes in procurement plans for new equipment. Exactly what these changes will be has not been decided, he said.

Ahrens, who advocated development of the Lavi while he was defense minister, acknowledged that much of the aircraft would have to be funded by and built in the U. S. If the aircraft were to be totally built in Israel, he said, the cost would have to be paid by the Israeli government—and this would be beyond the nation's capability.

Israel will need some U. S. assistance in funding the development of the aircraft, and a "sizable portion" will have to be built in the U. S. using funds provided under the foreign military sales (FMS) program, he said. Ahrens also expects that there would be additional U. S. financial aid for that portion of the aircraft built in Israel. He foresees no possibility of a stretchout occurring in the development phase because that would only increase the total cost of the Lavi.

Ahrens defended the Lavi program against charges by critics who have contended that Israel was using the Lavi program as a means of extracting technology from the U. S. to accelerate development of the country's aerospace capability. He said the Israeli aerospace industry's technological capability will be increasing in any event and that "it is important to both countries to have interaction between the two industries."

He noted, for example, that the design of the General Dynamics F-16 was influenced to a degree by the combat experience of the Israeli air force in the late 1960s and early 1970s. Grumman will gain from its participation in the Lavi program, in which it is providing the com-

posite wing, and "it's possible this will develop into cooperative development on future projects," he said.

S. N. Ariav, Israel Aircraft Industries president, said the Lavi program is taking about 15% of the company's manpower—most of it from the engineering field. He anticipates this will grow to a maximum of about 20% and will shift gradually from engineering to production.

He also acknowledged that more than half of the aircraft would have to be built outside Israel Aircraft Industries with about 30% of the airframe being built by U. S. firms under subcontract to IAI.

"There are no serious development problems," he said, "but monetary constraints are going to hamper the program. We just won't be able to afford to build more than about half in Israel."

The main problem IAI has at the moment is getting trained operators in some fields. The systems that are being put into the Lavi are "software-ridden," Ariav said, and will require highly trained people to install, operate and repair. With only 18 months to go to first flight of the first prototype, the aircraft's flight control software development is the pacing item, according to Moshe Blumkine, IAI vice president-engineering.

"We are fabricating the front and rear fuselage sections and are about on schedule," Blumkine said, "but our critical path is through the flight control software."

The Lavi will have a digital quadruplex flight control system that will be tested on the first two of six flying prototypes. These aircraft will not have the complete avionics system that will be installed in the last four aircraft.

The first two aircraft will be used to evaluate the Lavi's aerodynamics, flight control system, flutter response, takeoff, landing and handling characteristics.

"Then we will put in the avionics system," Blumkine said. "It is a very extensive integrated system, and we plan to gradually build up to full capacity."

The system is heavily dependent on software integration. "We may have to go abroad for some of the work," he said. Some of the flight control system software already has been subcontracted to developers outside Israel.

All of the hardware/software interface work will be done in Israel, as will all system architecture, validation and dynamic simulation.

"Overall, there have been a few minor slippages," he said, "but nothing critical that will hurt the program. We've had some ups and downs with U. S. vendors, but on the whole, the relationships have been satisfactory," he said.

The company is preparing its recommendations for suppliers, both in Israel and in the U. S., he said, and these recommendations will be screened and approved by a joint committee composed of ministry of defense and IAI representatives.

The six Lavi flying prototypes and one nonflying structural test aircraft are being built in three sections by different departments of IAI, according to Yacov Ben-Bassat, vice president-production.

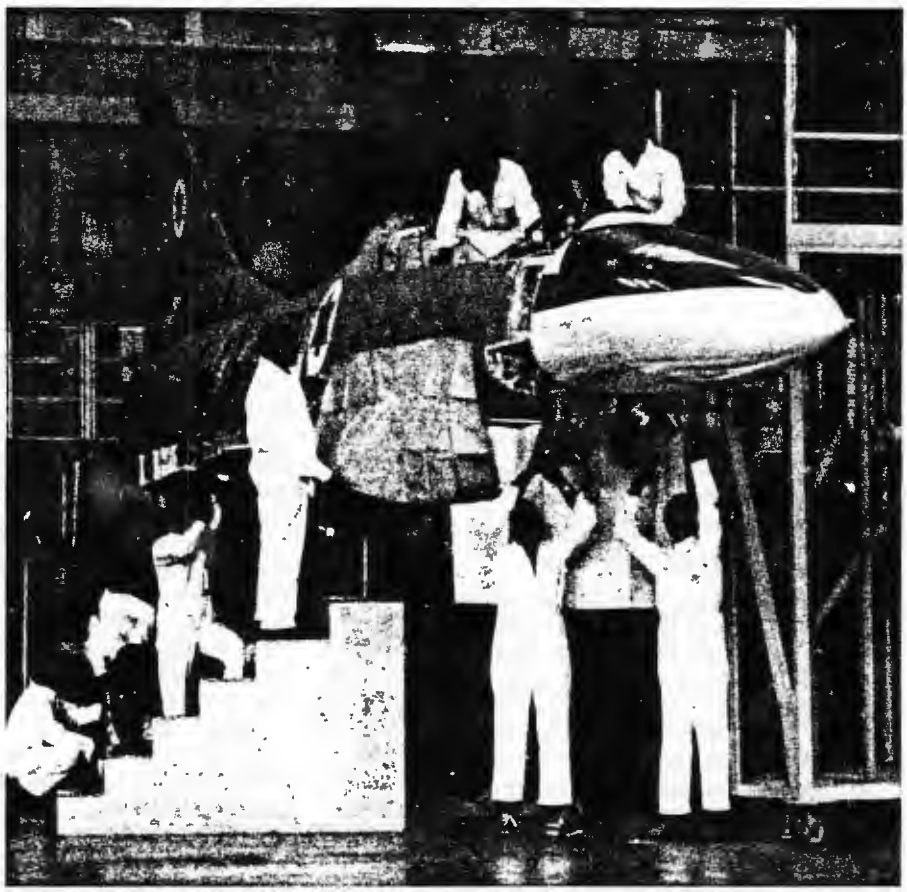
The aft fuselage section, which includes

IAI Plans Initial Two-Seat Trainer Configuration

Tel Aviv—First 30 Israel Aircraft Industries Lavi multirole combat aircraft will be configured as two-seat aircraft and used primarily as trainers, officials here said. They will replace the subsonic McDonnell Douglas A-4 Skyhawk aircraft used for operation and tactical training, and will give the Israeli air force a supersonic trainer capability for the first time.

The Lavi will be used primarily as an air-to-ground attack aircraft with a short- to medium-range capability, according to Gen. Amos Lapidot, commander of the Israeli air force. "It will have a secondary mission as an in-country air defense aircraft," he said. "It will not be a long-range interceptor, but rather a point-defense aircraft."

Gen. Lapidot would not comment on when the Lavi would enter squadron service with the Israeli air force, except to say, "We hope to beat the Swedes." Sweden's Saab-Scania JAS 39 Gripen fighter is scheduled to enter squadron service in 1992, the Swedish defense ministry has said (AW&ST Feb. 11, p. 30).



IAI technicians work on the engineering mockup of the Lavi multirole combat aircraft prior to wing installation. The aircraft will be powered by the Pratt & Whitney PW1120 engine, which is expected to be assembled in Israel by Bet Shemesh Engines, Ltd. The Lavi will have a digital quadruplex flight control system and an integrated data display and weapon aiming system.

the wing and engine attach points, is being built by the company's manufacturing division, while the forward fuselage section is being built by the company's engineering division. This phases in to the production program by allowing the manufacturing division to build some production tooling for the prototype aircraft.

Wings are being built by Grumman and shipped to Israel, where they will be attached to the fuselage after the two fuselage sections are mated.

A production decision is expected before the end of the planned three-year flight test program.

Manpower Lacking

"We can't compress our production planning the way a U. S. company could," Blumkine said. "We simply don't have the manpower. A U. S. company could wait for as much as two years longer than we can before making a production decision."

Blumkine said logistics planning, tooling and production engineering already are under way. However, he added, this is not as great a jump as it might seem.

"Structurally and aerodynamically, this will be a state-of-the-art aircraft—but no more," he said.

"The wing is not very different from the wings on existing aircraft, and the Lavi will operate in the Mach 1.6-1.7 region. It won't be a high Mach number aircraft," he said. "There will be no great technical risk in going ahead.

"The heart of the Lavi will be in the avionics system and software package, which will permit us to continuously update the aircraft configuration as we go along," he said. □

Israel's Flight Test Program Will Define Weapons Complement For Multirole Combat Aircraft

Tel Aviv—Three-year flight test program for the Israel Aircraft Industries Lavi multirole combat aircraft is being devised to qualify it to deliver a wide variety of weapons. Israeli air force pilots will participate in the test program from the start.

The first two prototype aircraft—out of six flying prototypes under construction—will not have the Lavi's integrated avionics system, and will instead be used to develop the Lavi's advanced quadruplex digital flight control system.

In addition to flight control system work, the first two prototypes will be used for aerodynamic studies, flutter testing, takeoff and landing tests and general handling characteristics.

After the first prototype flies in the autumn of 1986, succeeding prototypes are scheduled to enter the test program at about three- to six-month intervals. There will be a seventh, non-flying prototype, which will be used for structural and fatigue testing.

All of the flight test work will be done in Israel, where the weather is good and where there are a number of instrumented test ranges, according to Moshe Blumkine, IAI vice president-engineering.

Over a period of slightly more than three years, IAI hopes to complete the basic flight test work and extensive weapons clearance testing. A follow-on test program will concentrate on weapons delivery work and avionics software update.

A number of the development engineers are also reserve pilots in the Israeli air force and are using their experience in flying that service's current aircraft to help develop the Lavi.

One of the decisions made after considering the opinions of pilots current in the McDonnell Douglas F-15, the General Dynamics F-16 and the IAI Kfir was to reject a side-stick configuration in favor of a traditional center-mounted control stick.

The Lavi also will have the pilot's seat inclined backward 18 deg., less than the F-16 and more like the F-18, Blumkine said.

Another basic decision was to make the Hughes wide-angle holographic head-up display the primary information system in the aircraft. "Everything else will be secondary," Blumkine said.

A complete cockpit and avionics mockup has been built in addition to the standard engineering mockup to permit unobstructed work on the development of the avionics system.

In addition to the HUD, there will be one color cathode ray tube presentation for integrated data display and two monochromatic CRT displays for other data.

The fifth and sixth prototype aircraft will be the first to have the complete avionics system installed before they fly.

Beginning with the third aircraft, portions of the system will be installed before first flight and other sections will be added on a retrofit basis. □

Israel Aircraft Industries Modernizing Production

Tel Aviv—Israel Aircraft Industries has begun a manufacturing modernization program to enable it to produce the Lavi multirole combat aircraft and the Astra business jet economically while using the latest design and production technology.

A new machining shop to support Lavi and Astra production is in operation, [illegible] manufacturing, said, "It already is fully loaded. We are operating three shifts now in it, and the old shop also is still operating."

Machining requirements are especially high at IAI because the Astra wing is entirely machined and the Lavi airframe will have a high percentage of machined parts in it.

The new machine shop has five Japanese-built profiler machines in operation, each capable of accepting components greater than approximately 100 × 10 ft. wide. Two of the machines have been installed at opposite ends of the same machining bench, nearly doubling the largest pieces that can be machined.

A full computer-aided design/computer-aided manufacturing (CAD-CAM) system has been partially operational since the beginning of the year. Complete system operation is expected by midyear. The system directly links the engineering computer system and the manufacturing computers so that, for example, the profilers can be loaded for a new job from the engineering computer in 2-3 min. Under the old system, it took up to 40 min. to load a new job into one of the machines.

Preproduction work on the Lavi has included building the first production tooling for the aft section of the fuselage. This has included only small subassembly tooling.

[illegible] for the aft fuselage will be only partially usable for production [illegible] later.

The aft section of the fighter's fuselage is being built by the IAI manufacturing division, while the front section of the prototype aircraft is being made by the engineering division.

None of the tooling used for the front fuselages of the aircraft will be usable on the production aircraft, but since the aft fuselage section will carry both the wing and engine attach points, the involvement of the manufacturing division in the prototype program will help save time and cut costs in moving into the production program.

The Astra program is the first that IAI has done in which the certification and production programs overlapped. The first production version of the Astra is due to fly later this month, and the second production aircraft will be flying by September. The third production Astra is on the assembly line here. The production rate will build over the coming 18-24 months to two aircraft per month.

HARTFORD COURANT 2 Jul 85(3) Pg. D1

P&W Share in Lavi Fighter May Rise

By ROBERT WATERS
Courant Staff Writer

Israeli co-production of a new Pratt & Whitney jet engine to power its controversial Lavi fighter may be cancelled because engine production in Israel would be too costly, aerospace industry sources say.

The reports, if confirmed, could lead to a greater share of Lavi work for Pratt & Whitney since Israel would be forced to buy all its Lavi engines from the East Hartford-based unit of United Technologies Corp.

Neither Israel nor Pratt & Whitney have commented on the reports which have been circulating widely in industry trade publications.

However, an industry expert noted that the reports were a major subject of backstage talk at last month's Paris Air Show. "And Israel hasn't denied them," he said.

Pratt & Whitney said Monday it is merely a subcontractor working for Israel on the Lavi fighter project and therefore is not in a position to comment. The company is continuing its work on the Lavi engine, the PW1120, in accordance with the terms of its original 1982 contract with Israel, a spokesman said.

The Lavi, which means Lion, is planned as a home-built 1990s replacement for the aging Kfir C-2 and U.S.-built F-4 fighters in the Israeli Air Force. Israel wants to build a fleet of 300 single-engine Lavis. It also is expected to offer the Lavi to other nations after the builder, Israeli Aircraft Industries Ltd., has met Israeli Air Force requirements.

But the proposed fighter has drawn heavy fire from some American aerospace firms, notably Northrop Corp. Northrop opposes U.S. financial support for the Israeli fighter because it fears the Lavi will compete in the international arms marketplace with its own export fighter, the new F-20 Tigershark.

Israel has countered this criticism by noting that the Lavi will depend heavily on U.S.-built parts. Israel says it has awarded 99 contracts worth $700.8 million with U.S. firms for Lavi development. Pratt & Whitney and Grumman Aerospace, which will build composite wings and tails for the aircraft, are the largest subcontractors.

Pratt & Whitney's PW1120 engine, a 20,000-pound-thrust turbofan, was selected for the Lavi in 1982 after a competition with General Electric's F404 engine. Ironically, the Navy, which uses twin F404s to power its F-18 Hornet fighter, currently is negotiating with Pratt & Whitney to build the General Electric engine in East Hartford. The F404 also powers the Northrop F-20.

The original Lavi contract to Pratt & Whitney called for engine assembly and production of some PW1120 parts at Bet Shemesh Engines Ltd., near Tel Aviv. Pratt & Whitney is widely reported to hold a 40 percent interest in Bet Shemesh as its ticket to participation in the Lavi program. The alliance has never been confirmed by Pratt's corporate parent, UTC. Industry sources say public comment might touch off objections from Arab nations.

However, signs of open Arab hostility to the Lavi project are increasing. Last month, the National Association of Arab Americans, a Washington-based lobby, charged in a newspaper advertisement that American aerospace workers have lost nearly 13,000 jobs while the United States has contributed an estimated $1 billion for Lavi development.

The Bet Shemesh engine plant, according to Aerospace Daily, a trade newsletter, is alleged to have more than $50 million in debts. Plant production schedules reportedly are lagging as much as three years behind schedule. Analysts say that Israeli officials have concluded it would be "cheaper if Pratt & Whitney (built the PW1120) in the U.S.," the newsletter reported.

Production costs for the PW1120 have not yet been disclosed. However, similar engines cost about $2 million. Manufacturing 300 engines plus the usual additional 20 percent for spare engines could mean more than $700 million in production contracts for Pratt & Whitney.

FORT GORDON...from Pg. 9

the Army to take over the maintenance of the buildings, according to a news release from Barnard.

The dramatic change in scope came in 1980 when foundation members went to industrial leaders for financial backing.

"They found many leaders, especially those in the communications-electronics area, who were enthusiastic. But they also were told, 'Hey, guys, we've got a much bigger problem,'" said Lt. Col. Jeff Wells, head of Fort Gordon's special task force that works with the foundation.

"As we researched the problem, we found a very significant percentage of young people who were turned off by technology," he said. "From industry's standpoint, they were concerned about not getting enough people with the proper background to fill the jobs they knew would be opening up in the coming years.

"And they were also concerned that the nation's leadership in an area we have led for so long might quickly slip away."

As for the Army, Wells said, "There are almost 34,000 troops a year coming through the Signal Corps schools here, so there is a lot of opportunity to use any enhancement we can get. The center would have the ability to teach special principles about electronics and communication. Enrichment is a good way to look at it.

"You know, it used to be that we got a lot of people off the street who were already into radio and electronics, but we don't get that many any more. We need to rekindle some of that interest that kids seem to have lost."

Plans for a major part of the center focus around interactive exhibits contained in nine galleries: the basics of electronics; transmission; telephones, telegraph and switching; radio, television and photography; information systems (computers); electronics in everyday life; military communications and electronics; medical electronics; and one called "Toward the Future."

Wells said planners hope the facility would attract tourists as well as students. "We think it will draw folks from all over Georgia and the Southeast, maybe the entire country."

The planned Learning Information Center would be an "effort to make the information here exportable through a telecommunications system," said Wells.

While Wells said the center is "still very much in the developmental stage," it would allow a hookup with both military and industry classrooms all over the country.

LOS ANGELES TIMES
2 Jul 85(3) Pg. 4

Two Dead in AF Jet Crash

KANOPOLIS, Kan. (AP)— An F-4 fighter jet on a training mission crashed near Kanopolis Lake in central Kansas on Monday, and the Air Force said the pilot and navigator were killed. The cause of the crash has not been determined.

built Kfirs.

Israel designed the Lavi (Hebrew for lion) based on decades of combat experience and the knowledge that Israel would face more lethal threats in the future. Israel Aircraft Industries (IAI), the developer of the Lavi, enlisted some of the country's best fighter pilots to participate in the design of the aircraft, and their mark is very evident. The Lavi is designed and built to survive through a unique combination of advanced technologies in its airframe and system. The cockpit, for example, allows the pilot to concentrate on tactical situations, subordinating controls, and subsystems.

Using computer-aided design/computer-aided manufacture, IAI designed the Lavi as a small, lightweight, highly maneuverable, multimission fighter with emphasis on air-to-ground performance. (See Table 1 for technical data.) IAI believes it can also match and defeat any known or projected threats in air combat because of its unique airframe design and advanced weapon systems.

At first glance, the Lavi resembles the F-16. On closer inspection, its delta wing and canards suggest that the Israelis married the best features of the Kfir and the Mirage, as well as the F-16, into the Lavi's design.

Although Israel designed the Lavi, U. S. industry is participating heavily in the development phase of the program and, to a more limited extent, so are companies in Great Britain and France. (See Table 2 for major participants.) Other European companies are probably involved but are believed to have requested anonymity because of the threat of Arab boycott. About 70 Israeli companies and 111 companies abroad are participating in the development. About 40 percent of development funding is being spent in the U. S. If the program is allowed to transition into production, over 60 percent of the funding is expected to be spent in the U.S. Grumman, Pratt & Whitney, Garrett, and Lear Siegler lead the group of U.S. participants in the program.

Grumman Corp. has been awarded a $170 million development contract to provide graphite composite wings and tails for prototype aircraft. The wings include integral fuel tanks, hard points for ordnance or drop fuel tanks, and wingtip-mounted air-to-air missiles. The composite wing was chosen primarily to reduce weight. The use of composite material also permits aeroelastic tailoring. The orientation of the composite fibers limits the twisting of the wings and, therefore, improves control of the aircraft.

Lavi Armament

The Israelis point out the weapons of air warfare are changing from guns to missiles and bombs, and the Lavi reflects that theory. Although the Lavi is reported to contain one single-barrel revolving cannon (due to the insistence of the pilots), the emphasis is on missiles and bomb load capacity. Weapons will be slung close to the fuselage to minimize drag. Bombs will be mounted on multiple hardpoints under the wing and fuselage.

The Lavi is reported to be capable of carrying a much heavier bomb load compared to the F-16 Falcon.

Pratt & Whitney is supplying its PW1120 engine. It is a 20,000-pound thrust turbojet derivative of the combat-proven F100 engine used in both the F-15 and F-16. Israel also plans to use the engine as part of its F-4 upgrade.

Garrett's initial contracts, valued in excess of $16 million, cov-

CONTINUED NEXT PAGE

Aircraft type	**Light Multimission Fighter**
Missions	**Air-to-air, air-to-ground, training**
Crew	**1 (2 in training mission)**
Wingspan	**28.97 feet**
Length	**48.08 feet**
Height	**15.78 feet**
Wing area	**360 square feet**
Wing sweepback (leading edge)	**54 degrees**
Basic take-off wt.	**22,000 pounds**
Combat radius, Air-to-air (CAP)	**1,000 nm**
Combat radius, Air-to-ground	**na**
High-lo-high	**1,150 nm**
Lo-lo-lo	**600 nm**
Maximum speed	**Mach 1.8**
Combat thrust/weight	**1.07**

Table 1: Lavi Technical Data

er development of the environmental control system, emergency power unit, and secondary power system as well as production of the units for the prototype aircraft.

Lear Siegler has developed and is building the aircraft's digital fly-by-wire flight control system. Safety and survivability are major design requirements. The system is designed to provide full performance even after two failures or battle damage. The system will continue to function, allowing the pilot to fly back to base even after a third failure, or on analog back-up after the loss of all of the digital processors.

Although Israel has successfully produced combat aircraft (like the Kfir), DOD officials continue to be skeptical that Israel can economically produce an advanced aircraft like the Lavi. There is no doubt, however, even among the skeptics, concerning Israel's capacity to develop and produce effective electronics. Israel's use of its indigenous electronics in combat is especially convincing.

Lavi's avionics (radar, communications, IFF, navigation, and electronic warfare gear) have been developed as an integrated system. IAI's Elta division has been assigned responsibility for the integration as well as development of the aircraft's radar, communications, and major electronic warfare elements. Elta will have plenty of help, however. Reference to the list of Lavi contractors (Table 2) reveals that at least six Israeli firms are contributing to the aircraft's avionics system. For example, Elisra has a proven capability in developing and producing radar warning receivers. The U. S. Air Force is currently considering use of an Elisra-developed kit to upgrade its widely used AN/ALR-69 warning receivers. EL-OP's advanced holographic helmet display has also attracted considerable attention. It is probably destined for use onboard the Lavi.

Although Elta closely guards details of its radar and other avionic equipment, some educated assumptions can be made. The radar, for example, is expected to operate in the I band and will probably emerge as an upgraded version of Elta's EL/M-2021 radar. The EL/M-2021 has frequency agility and uses a scanning planar array antenna. Lavi's ground attack role certainly will require the radar to have an advanced look-down/shoot-down capability.

The electronic warfare system is also being developed as an integrated system. It is expected to emerge as a scaled-down version of DOD's Integrated Electronic Warfare System (INEWS). INEWS is currently underway as a joint U. S. Air Force/Navy development effort. It is scheduled for use on the USAF's Advanced Tactical Fighter and the Navy's Advanced Tactical Aircraft.

Similarly, Lavi's core avionics system is expected, generally, to follow the development philosophy embodied in the U. S. Air Force Integrated Communications, Navigation, IFF, and Avionics system.

The Israelis believe that their advanced programmable, flexible, adaptable, modular, integrated systems will defeat Soviet-supplied threat systems of the 1990's. The Israelis are aware that they must also be able to counter weapon systems supplied by nations of the NATO alliance to enemies of Israel.

Because of its relatively small size and use of composites (about 22 percent of the airframe is of composite material), the Lavi will have inherent low-observable stealth characteristics. However, the pragmatic Israelis, working under severe cost constraints, will not be able to afford a full-blown low-observable stealth capability for the Lavi.

Infrastructure

Defense Minister Rabin, in an interview session just before the roll-out, indicated that Israel has a twofold purpose in continuing the Lavi program:

"The need to have a fighter/attacker that will serve the Israeli Air Force in the 1990's, and beyond, tailored to our (Israel's) operational needs.

"Israel, to maintain its quality edge on our neighboring Arab

CONTINUED NEXT PAGE

countries, has to be a developed country and society. The meaning of it is not just any occasion but an infrastructure of industry, especially in the high-tech areas, that will engage a considerable number of our population."

The Pentagon's spokesmen say they have no problem with Rabin's reasoning. However, they believe Israel can satisfy its needs better by concentrating its high-tech efforts in electronics where it has a proven capability and its opportunities for success in the international marketplace is much greater, and installing its indigenous avionics in appropriate U.S.-produced aircraft.

Rabin repeated his contention that the advantages that would have been realized by installing Israel's electronics in U. S. aircraft have been overtaken by events and the option is no longer cost-effective. Furthermore, Israeli sources say that Israel's security depends on maintaining air superiority and the only way the country can be assured an adequate supply of aircraft would be by maintaining its own aircraft manufacturing capabilities.

Israel Aircraft Industries	**Prime.Contractor**
Astronautics, Israel	**Avionics, indicators**
Avcron, U.S.	**Avionics**
Aydin Vector, U.S.	**Telemetry**
Beit Shemesh Engines, Israel	**Engine**
Elisra, Israel	**Avionics**
EL-OP, Israel	**Avionics**
Elta, Israel	**Avionics**
Garrett, U.S.	**Environmental control, emergency power and secondary power**
Goodyear, U.S.A.	**Brakes, wheels, tires**
Grumman Aerospace, U.S.A.	**Wings, vertical tail**
Hughes, U.S.	**Head-up display**
IMI, Israel	**External fuel tanks, weapon pylons**
Lear Siegler, U.S.	**Flight control computer, generators**
Martin Baker, Great Britain	**Ejection seat**
MBT, Israel	**Flight control**
Moog, U.S.	**Flight control actuators**
Pratt & Whitney, U.S.	**Engine**
Rada, Israel	**Avionics**
Rosemount, U.S.	**Sensors**
SHL, Israel	**Landing gear, servoactuators**
Sully, France	**Cockpit transparencies**
Sunstrand, U.S.	**Leading edge flaps drive, generator**
Tamam, Israel	**Avionics**
TAT, Israel	**Fuel system, accessories**
Teledyne, U.S.	**Accessories**
Teud, Israel	**Technical publications**

Table 2: Major Lavi Contractors

Alternatives

The Zakheim-led Lavi study group (from DOD) is preparing a report that will propose a number of alternatives to the Lavi program. The Report is expected to be ready in January 1987. Although Zakheim would not address any of the possible alternatives, he indicated that they would satisfy Israel's need for an effective fighter/attack aircraft for the 1990's and beyond and also meet the country's infrastructure requirements.

There is much speculation in the media and in U. S. and Israeli government circles concerning what the Pentagon's alternative list will include. Heading the list are sure to be at least three aircraft: an improved version of General Dynamic's F-16, probably the F-16C; a version of the McDonnell Douglas F/A-18; and Northrop's F-20.

Since Israel is very satisfied with its F-16's and is currently receiving an additional 75 under an existing order, the F-16 option probably heads the list. Rabin, however, is sticking to his "overtaken by events" objection. He reminds listeners that while he was Israel's prime minister in 1977, and again in 1980, he implored President Carter to allow Israel to manufacture F-16's under license from General Dynamics. Carter did not agree. Rabin says that arrangement would have made sense then but not now. In 1977 or 1980, such an arrangement would have allowed for a smooth transition of Israel's avionics into a U.S.-built aircraft. If adopted now, that option would prove more expensive than continuing with the Lavi program, according to Rabin.

The strength of the F/A-18 option is its fighter/attack configuration, the combination desired by the Israelis.

The F-20 alternative is attrac-

CONTINUED NEXT PAGE

tive to the U. S. and Northrop since the company is trying to find a market for the aircraft.

Another option could be a mix of aircraft. This could include a mix of improved F-16's, and A-7's or A-10's (as a stopgap), with the added possibility of providing Israel with Advanced Tactical Fighter technology to meet its needs in the late 1990's and beyond.

It seems clear that whatever options are offered would include the use of Israeli avionics. Although this would help heal some of Israel's wounds if it was forced to cancel Lavi and accept a U.S.-manufactured substitute, such an arrangement could require substantial aircraft modifications and associated cost.

One option that Israel would enthusiastically endorse would be a partnership with a major U. S. airframe company. Israel is pursuing this alternative and has already signed a memorandum of agreement with Grumman Aerospace to continue discussions that could lead to a partnership arrangement. The U. S. Department of Defense would look more kindly on continuing the Lavi program if such a partnership could be arranged.

Cost/Affordability

Although the cost of the Lavi program is at the heart of the controversy, there is no serious disagreement regarding the estimates of the cost of development. The Pentagon is somewhat embarrassed, however, by the initial out-of-sight U. S. Air Force estimate of a Lavi program cost of $10 billion. The Pentagon's current estimate is $2.6 billion and Israeli's is $2.2 billion.

Today the controversy centers on the cost of production and Israel's capability to manage money from foreign military sales. Israel estimates the fly-away cost of production Lavi aircraft at about $15.5 million each, based on a procurement of 300 aircraft. The Pentagon believes this figure is much too low and is estimating $22.5 million per aircraft. Arguments over production costs could be resolved by a Lavi cost study being conducted by the General Accounting Office. Results of this study are expected to be announced by January 1, 1987.

Regardless of the estimates, Israel will limit spending for production of the aircraft to $550 million annually, according to Rabin. Zakheim says the Pentagon intends to hold Israel to that ceiling if the program enters the production phase.

Although the Lavi controversy still contains a number of unresolved issues there are also many areas of agreement. There is no discernible argument about the need to replace Israel's aging aircraft and the realization that Israel's industrial technological base must be maintained. The remaining elements of the controversy center on the affordability and advisability of Israel's producing the Lavi aircraft and the viability of U.S.-proposed alternatives.

Israel appears to have a basis for claiming that modifications required to accommodate Israeli electronics within U. S. aircraft would overcome the benefit of using U.S.-produced aircraft in lieu of the Lavi. U. S. analysts must also consider the serious impact on Israel's economy if it is forced to abandon the Lavi. Thousands of Israel's scientists, engineers, and employees would be affected, as will many of their U. S. counterparts.

For its part, Israel owes the U. S. its serious consideration of U.S.-proposed alternatives. Israel must also consider the impact of a large share of its military budget going to the Lavi program. Its army and navy could be severely affected.

Regardless of the outcome of the Lavi controversy, U. S. and Israeli participants should consider the words of Robert Hall, an 18th century English theologian—"The evils of controversy are transitory, while the benefits are permanent." ■

The author is Washington editor of the Journal of Electronic Defense *and is a frequent contributor to* National Defense.

TESTIMONY OF
THOMAS DINE, EXECUTIVE DIRECTOR
DOUGLAS BLOOMFIELD, LEGISLATIVE DIRECTOR
AMERICAN ISRAEL PUBLIC AFFAIRS COMMITTEE (AIPAC)
BEFORE THE
SUBCOMMITTEE ON STRATEGIC AND THEATER NUCLEAR FORCES
SENATE ARMED SERVICES COMMITTEE
JANUARY 30, 1986

Mr. Chairman, the American Israel Public Affairs Committee appreciates the opportunity to submit testimony to the Armed Services Subcommittee on Strategic and Theater Nuclear Forces. The subject of this hearing, the threat of tactical ballistic missiles and the need to examine possible defenses against them, is of particular interest to those concerned about the supply of tactical missiles by the Soviet Union to its client-states in the Middle East. These missiles threaten American security interests and the security of our only reliable, consistent and democratic ally in that part of the world, Israel.

Israel's enemies are now being armed by the Soviet Union with a new generation of highly lethal surface-to-surface missiles, more accurate and more deadly than any previously available weapons. Unfortunately, there are no comparable defensive systems available today that Israel could obtain to protect its vulnerable cities from bombardment.

To further examine the increasing problems that these missiles pose for the security of Israel, we have prepared a detailed paper for submission to the committee on "The Threat to Israel from Tactical Ballistic Missiles." I request that it be included in the record of the Committee's proceedings on this subject.

The Threat to Israel from Tactical Ballistic Missiles

W. Seth Carus*

Circumstances have made Israel particularly sensitive to the dangers posed by tactical ballistic missiles. For more than two decades, Israel's leaders have recognized that their country could be attacked by hostile states using short range surface-to-surface missiles. In the early 1960s, Egypt launched a massive effort to design and build its own force of short and medium range ballistic missiles. Although this program failed, the Soviet Union stepped into the breach and supplied Arab armies with FROG and SCUD missiles. At least thirty of these missiles were fired at Israeli targets during the 1973 Arab-Israeli War. The Syrians fired about twenty-five FROG-7 missiles at sites in Israel, mainly against Ramat David and other Israeli air bases. The Egyptians reportedly fired a small number of FROGs and at least three SCUD-B missiles at Israeli targets.

Arab armies currently possess more than 200 Soviet-supplied SCUD-B, FROG-7, and SS-21 launchers, probably supported by an inventory of at least 1,000 surface-to-surface missiles. These missiles are now treated as conventional weapons and are routinely used in conflicts with other countries. Iraq has fired a substantial number of FROG and SCUD missiles against Iran, and Iran has recently reciprocated using missiles provided by Libya.

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* The author is the senior military analyst for the American Israel Public Affairs Committee.

The Threat of Surface-to-Surface Missiles

Based on their experience in 1973, Israeli military planners came to believe that the FROG and SCUD missiles did not endanger the security of their country. Although it was recognized that cities were vulnerable to attacks by such weapons, it was believed that the threat of retaliatory strikes would deter attacks on civilian targets and that the missile launchers could be destroyed before serious damage was inflicted. Also, with the warheads then available to the Arabs, damage to civilian targets would be limited. At the same time, it was recognized that the FROG and SCUD missiles could not destroy hardened military targets. Thus, the missiles could temporarily prevent Israeli aircraft from landing at an air strip, but could not destroy an air base.

The threat from tactical ballistic missiles is far greater today. The decision of the Soviet Union in 1983 to supply Syria with the new SS-21 surface-to-surface missile is largely responsible for the heightened awareness in Israel of the potential threat posed by such weapons. Unlike the FROG and the SCUD, the SS-21 has the range, accuracy, and lethality to destroy hardened targets deep inside Israel.

The SS-21 is part of a new generation of Soviet-built surface-to-surface missiles have appeared in the past few years that correct the weaknesses of the weapons they replaced. These new weapons, the Soviet SS-21, SS-22, and SS-23 family of missiles, are extremely accurate and can be armed with cluster munitions. Thus, unlike the SCUD-B and FROG-7 systems, they pose a considerable threat to all but the most mobile or best protected military targets.

Normally, the SS-21 is considered a tactical weapon, because of its relatively short range, but because of Israel's small size, strategically important targets are within close proximity to enemy ground forces. This

lack of strategic depth transforms short-range surface-to-surface missiles, like the SS-21, into strategic weapons able to strike targets throughout Israel, including air bases, command posts, equipment storage depots, surface-to-air missile batteries, radars, and other vital facilities.

Syria now has as many as 24 SS-21 missiles, and additional numbers are reported to have gone to Iraq. The 120 kilometer range of the SS-21 allows it to be used against targets that the FROG-7 cannot reach. When fired from Syria, the SS-21 can reach targets throughout northern Israel, including one of Israel's main air bases, Ramat David. If deployed in Jordan, however, all of Israel would be brought within range.

Currently, there are only a few SS-21 missiles in the Middle East, but even this small quantity is of concern to Israeli military planners. Past experience indicates that the Soviet Union will provide more of these weapons as time passes and Arab armies want to replace their existing FROG-7s. Similarly, it is highly probable that SS-23 missiles will begin to appear in the region before the end of the decade. Thus, by 1990 Israel will be faced by Arab arsenals containing large numbers of highly accurate surface-to-surface missiles armed with sophisticated warheads.

It is likely that in the 1990s Arab armies will acquire tactical ballistic missiles from other sources. Brazil is looking into building a medium range ballistic missile, with the development funded by foreign countries. Past experience indicates that Arab countries, Iraq or Libya, would be the likely sponsors and beneficiaries of such a project. Similarly, European countries are developing sophisticated weapons payloads that could be added to a tactical ballistic missile, providing further improvements in accuracy and lethality.

The increasing emphasis given to chemical weapons by Arab countries

makes even older missiles more of a problem for Israel. Iraq has used chemical weapons in battle, and Syria is known to have an extensive and sophisticated chemical warfare capability. Ballistic missiles armed with chemical warheads pose an obvious threat to Israeli population centers, but they also could effectively suppress Israeli air bases and other military installations and significantly reduce Israel's retaliatory capabilities.

The Lack of an Effective Response to the SS-21

Israel can defend against surface-to-surface missiles only by destroying their launchers before surface-to-surface missiles are fired. This was not a serious weakness when the missiles were inaccurate. If inaccurate missiles were used against civilian targets, Israel's air force could launch counter strikes in retaliation, and the missiles would probably inflict only minimal damage if targeted against Israeli military installations.

The arrival of the SS-21 has made it impossible to ignore the threat of surface-to-surface missiles. As the Arab inventory of SS-21 missiles grows, Israel may find that it can no longer tolerate the damage that could be inflicted by a strike from tactical ballistic missiles. Missile strikes at the outset of a war could inflict sufficient damage to vital Israeli installations to seriously weaken Israel's military capabilities during the critical first hours of a war, even if Israel knew in advance that an attack was about to take place.

For example, a successful missile attack against airfields would significantly reduce the number of aircraft that the Israeli air force could put into the air. After such a strike, Israel's ability to defend its borders during the critical opening hours of a conflict would be significantly weakened, since ground units deployed on the borders in peacetime may well depend on support from the air force until reserves are mobilized. Under such conditions, Israel

also would have fewer aircraft available to send on strike missions against surface-to-surface missile launchers, and could not count on preventing follow-on missile attacks. Accordingly, it appears that Israel can do little to stop Arab missiles from hitting and damaging air bases and other vital installations.

As a result, the Israeli military will be increasingly forced to identify and attack launchers before missiles are fired. If there is a danger of an Arab attack, Israel will be forced to strike first, because it will not be able to take the risks of waiting and absorbing an Arab attack. Although such a strategy will make the Middle East a more dangerous place, the absence of a viable defense against tactical ballistic missiles will leave Israel with no alternative.

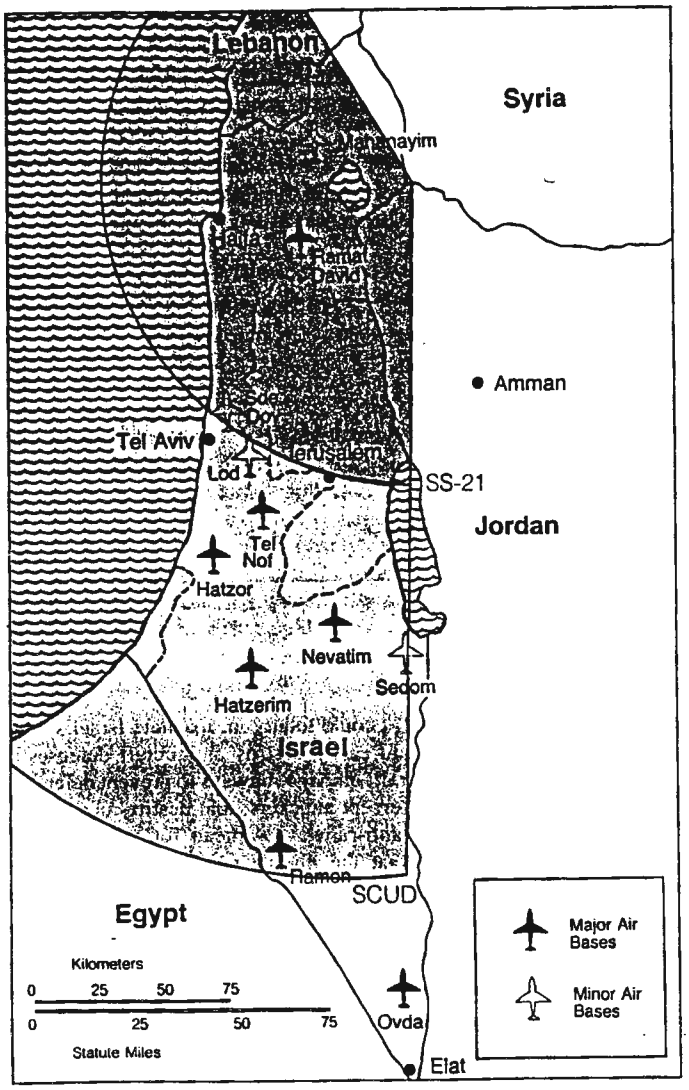
There appears to be a growing awareness in Israel that the enormous inventory of short range ballistic missiles available to Arab armies will make it difficult or impossible for Israel to locate and destroy all the launchers. Hence, even under ideal circumstances, a large number of missiles will strike military and civilian targets throughout Israel. As the Arabs acquire larger quantities of accurate missiles like the SS-21, and as Israel's ability to deter missile attacks diminishes, Arab armies will be able to employ their older and less accurate FROGs and SCUDs against urban centers. As a result, tactical ballistic missiles directed against cities potentially could easily result in 5,000 dead and wounded Israeli civilians in a future Arab-Israeli War.

Defending Against the Tactical Ballistic Missile

The lack of an effective defense against tactical ballistic missiles poses serious problems for Israel. For the moment, Israel might be able to tolerate such a weakness without jeopardizing its security. As additional new generation tactical ballistic missiles are deployed in the region the inability to defend against surface-to-surface missiles will become a serious one.

A defense against tactical ballistic missiles would significantly enhance Israel's security. Although the Israeli military could take steps to develop defenses on its own, the development of such systems is too great a challenge to be handled by one small country. Clearly, any progress made in the United States to develop answers to the dangers posed by tactical ballistic missiles could have a fundamental affect on Israel's future security. And, it should be stressed, the benefits resulting from the development of such a system would be shared by other American allies who also find that they must deal with the growing threat of tactical ballistic missiles.

The Missile Threat from Syria



SDI: PRESERVING ISRAEL'S FUTURE

By Charles D. Brooks

In March of 1983, President Reagan formally announced a pioneering defensive strategy predicated on the notion that it is better to save lives than avenge them. The President's plan, called the 'Strategic Defensive Initiative' (SDI), was designed to replace the doctrine of 'Mutually Assured Destruction' (MAD), a dangerously obsolete and immoral doctrine of holding civilian population centers hostage to nuclear attack.

In Israel, a nation faced with the ultimate challenge of ensuring self-survival, the President's vision and the invitation to U.S. allies to participate were met with great interest. After preliminary discussions, Israeli Defense Minister Yitzhak Rabin formally responded to the American invitation agreeing "in principle" to participate in the initial research and development phases of the SDI program.

The strategic, economic and political implications of Israeli involvement in SDI are significant. The most immediate benefit to Israel will be the development of missile interception technologies. The invitation sent to the allies specifically states that the program will "examine technologies with potential against shorter-range ballistic missiles," and anti-tactical missile technologies are likely to be among the first to be developed.

The use of surface-to-surface missiles against major cities in the Iran-Iraq war has alerted the Israeli defense

establishment to the urgent need for such technologies. Syria, Israel's foremost adversary, has already deployed highly accurate and lethal SS-21 missiles capable of reaching Israeli population centers, air bases, storage depots and other vital facilities. General Dan Graham, founder and director of High Frontier, the organization from which many of the concepts for SDI arose, has noted these implications for Israeli defense planning. Obtaining defenses against the SS-21s, he said, "would enable Israel actually to defend itself...rather than simply deter attack by threat of retaliation."

While the threat of retaliation has served Israel well in the past, this option may no longer be effective in light of the changing realities of modern warfare and the increasingly fanatical character of Israel's enemies. Such threats are unlikely to deter enemies whose scant regard for human life is reflected in suicide bombings in Lebanon and the use of poison gas in the Gulf War. To guard against the growing ballistic missile threat, Israel must move beyond deterrence to develop a defense against missile attacks if she is to survive.

In a recent paper presented in testimony before the Senate Armed Services Committe, W. Seth Carus, a military analyst for the American-Israel Public Affairs Committee (AIPAC), called attention to Israel's growing vulnerability to missile attack. Carus pointed out that by 1990 Arab armies will possess large numbers of surface-to-surface missiles armed with sophisticated warheads. As the Arab inventory of SS-21 missiles grows, he noted, a missile attack on vital Israeli installations would

leave the country dangerously vulnerable. In addition, he wrote, existing technologies alone would be insufficient to defend against such attacks, even if Israel knew of them in advance.

Dr. Robert O'Neil, director of the London-based International Institute for Strategic Studies, has also pointed out the inherent benefits of Israeli particpation in SDI. O'Neil believes that Israel's involvement will allow Israel to remain abreast of the technologies central to a tactical missile defense.

Avram Schweitzer, a journalist with Israel's respected Ha'Aretz newspaper, perhaps best describes the benefits of SDI interception technologies: "To be in on this kind of technology...could mean the purchase of peace for Israel, or more realistically, the imposition, by non-aggressive means, of a permanent state of non-belligerence along its borders."

Besides the utilization of missile interception technologies, Israel will also benefit in other ways from participation in SDI. Israel's industrial future will be greatly enhanced by being at the forefront of the SDI technological revolution while spinoffs could include new computer systems, energy sources, communication devices, medicines and consumer products. Research funds from SDI will help revitalize the universities and the Israeli scientific community.

SDI cooperation will be of critical importance to the Israel defense industrial base that will otherwise be subject to foreign aid cutbacks generated by the Gramm-Rudman deficit reduction bill. In particular, SDI will provide jobs and revenues to

defense related industries who have already been forced to cut back on research and development activities because of lack of funds.

America will also benefit from Israeli involvement in SDI.- Israel's high state of technological and scientific capability can be utilized in SDI research. The Israeli Defense Forces demonstrated an unforseen mastery over command, control, and communications (C3) by downing over 80 Syrian Jet fighters with no losses during the recent Lebanon conflict. Their expertise in battle-tested technologies would immensely enhance development of weapon systems. In addition, the Israelis are known for their rapid turn around times from research and development to making weaponry operational. Israeli involvement can serve to catalyze the entire SDI program by accelerating the pace of the effort.

Israel's acceptance of President Reagan's invitation to participate in SDI should yield invaluable dividends particularly in the critical area of development of ballistic missile interception technologies. Unable to match the quantitative advantage in weaponry accumulated by her numerous adversaries, Israel's involvement in SDI should enable her to maintain a qualitative edge necessary for survival.

Israel can only be part of this strategic, technological, economic and political revoultion if SDI is funded and promoted by Congress. With the help of Israel's friends in America, SDI may prove to be the most important project ever undertaken by the two allies.

Charles D. Brooks is a Liason to the Jewish Community for High Frontier. He also serves as Outreach Director for the National Jewish Coalition. He was educated at DePauw University in Indiana, the Hague Academy of International Law and holds an M.A. in international relations from the University of Chicago.

Charles D. Brooks is the Outreach Director for the National Jewish Coalition in Washington, D.C. and also serves as a liaison for High Frontier to the Jewish community. He was educated at DePauw University in Indiana, the Hague Academy of International Law and holds an M.A. in international relations from the University of Chicago.

N.E.R. INTERVIEW

Zakheim on Qualitative Edge

"I don't think we are on the threshhold of a Middle East arms race in which Israel cannot keep up. . . . I don't see why it should lose its qualitative edge," U.S. Deputy Undersecretary of Defense Dov Zakheim told *NER* recently.

Zakheim, in charge of Planning and Resources at the Pentagon, is known for his view that Israel has underestimated the costs of its Lavi fighter-bomber project. But he said he was "not out to kill the Lavi." Israel's Defense Minister, Yitzhak Rabin, has imposed a "cap" on the amount of U.S. aid to be used for the project—no more than $550 million out of the $1.8 billion in annual military assistance. That "has changed the nature of the discussion," Zakheim noted.

Although he questioned whether Israel can build the "next generation" fighter-bomber on schedule and in the numbers it wants while staying within the spending cap, Zakheim stressed that "we are trying to be helpful. We're not telling them what to do."

The Pentagon planner visited Israel last fall. He pointed out that in addition to the Lavi, Jerusalem is focusing on three other "lesser but still important" military spending programs. These are upgrading the Merkava tank, naval modernization and the continued upgrading of American-built F-16 fighter-bombers with Israeli-designed additions. [Other sources said that Israel also wants to expand and modernize its helicopter fleet, a fourth "big ticket" item.]

Twin goals of the $1-billion naval modernization are the replacement of six older surface ships with four new missile boats and construction of three new diesel-powered submarines to replace the present three-sub force early in the next decade. Zakheim called the new class of missile boats "very, very capable" and said they would be able to "strike at some of Israel's most distant potential Arab adversaries."

He noted that the Merkava had earned a "good reputation" but added that "any major military which relies as heavily on tanks as Israel . . . essentially is always looking to modernize—not necessarily the vehicle but what goes into it." Upgrading the Merkava could include improving its guns and fire control systems, Zakheim explained.

He believes that Israel can structure these major programs and stay within its own domestic military budget—now reportedly about $2.5 billion annually—and the $1.8 billion supplied by the United States. "But that means that some projects will be stretched out or [otherwise] altered." He added that Israel must maintain "a high level of readiness and training" for the complex defense systems it needs, and that too is expensive.

Based on his most recent visit, he said Israeli officials recognize that in the atmosphere of the Gramm-Rudman-Hollings deficit reduction legislation any increase in direct U.S. aid is unlikely. "In future years, keeping constant at $1.8 billion—without an adjustment for inflation—will be hard enough."

One way Israel can keep its qualitative edge, according to Zakheim, is by "considering whether its management structure in the defense area has kept up with its 'phenomenal success' " in developing new arms. He said that the Israeli Defense Ministry has "a very capable economics office, but it is very small."

He added that "a lot of Israeli economists are discussing whether the defense sector is as efficient as it could be." However, given the talents of the people, "I'm optimistic about Israel retaining its qualitative edge." □

HEARD ON CAPITOL HILL

Relief on Military Debt

A plan to restructure military loan repayment schedules affecting Egypt, Israel and other countries has been approved by the Reagan Administration. The plan, which would apply to all Foreign Military Sales (FMS) loan recipients, was prepared by Secretary of State George Shultz and Treasury Secretary James Baker at the urging of Sens. ROBERT KASTEN (R-Wis.) and DANIEL INOUYE (D-Hawaii).

Kasten and Inouye had been advocating such a form of debt relief for more than a year. The loan repayment terms now in effect and which the plan will replace include interest rates set in the 1970's which were much higher than rates currently available. The high annual repayment requirements have diluted the effectiveness of other U.S. assistance programs and imposed a heavy burden on Israel, Egypt and other FMS loan recipients.

President Reagan has approved the two-tier plan. Under the first option, borrowers could repay all outstanding principal and accumulated interest on their loans without penalty. The second option would reduce the rates on high-interest FMS loans to current market levels and capitalize the difference, to be repaid with interest after the original loan matures.

Israel probably would choose the second option since it does not have the cash to repay its high-interest debt of $5.5 billion. If Israel decides to participate in the second option, it will mean a savings of over $200 million for the remainder of fiscal 1987, and some $300 million over each of the next three years if forecasts prove accurate. The savings will diminish as loans are paid off over the next two decades.

FMS borrowers like Israel will benefit from a temporary reduction in debt service cost and from the chance to restructure and improve their economies. The result will be a large "balloon" payment at the loans' maturity. For Israel, that will come due about the year 2009.

State Department officials were quick to point out that the United States will recover the full value of each loan within the term of the contract. Neither option will require any new legislation or budget authority, nor does the plan violate any Gramm-Rudman-Hollings requirements.

Administration officials stressed that the debt refinancing program would lose its effectiveness if foreign aid to participating states were cut. They argue that it would not be in America's national security interest to offset the short-term financial benefit to FMS recipient states by reducing their foreign aid.

Egypt, which owes $4.5 billion, and Israel have the largest FMS debt burdens, although the Administration proposals also are of interest to Turkey, South Korea, Spain, Pakistan, Morocco and Tunisia. President Hosni Mubarak reportedly has sent several high-level representatives to Washington to discuss debt relief for the troubled Egyptian economy. □

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ILLUSTRATION BY RHONA BOSIN

Stormy Seas for Nazi Hunting Unit

BY LARRY COHLER

Representatives of East European ethnic organizations last week called on the United States to emulate Canada's recent decision to initiate Nazi war crimes trials in its own courts.

Jewish groups rejected this proposal as a ploy to gain time while the "biological solution" to the presence of Nazi war criminals here does its work. They charged that East European groups are waging an ill-concealed campaign to stall and, ultimately, shut down war-crimes-related prosecutions here by attacking the procedures under which they are conducted.

Canada's announcement last week that it would initiate its own war crimes trials seems certain to intensify the debate here. Under current practice, the Justice Department simply seeks to denaturalize and then deport those it believes concealed wartime atrocities when they gained admission and, later, citizenship here. A special Nazi-hunting unit, the Office of Special Investigations (OSI), is charged with this task.

The East European groups voice concern for what they argue are weak legal protections for persons charged under OSI procedures. In particular, they score the involvement of the Soviet Union in key aspects of the cases. And they unconditionally oppose deporting those found guilty of atrocities to the Soviet Union, which forcibly annexed the formerly independent countries from which they, and many of those accused, hail.

These activists are currently lobbying vigorously to prevent the deportation to the Soviet Union of Karl Linnas, a retired Long Island land surveyor found by U.S. courts to have participated in numerous atrocities as a concentration camp guard supervisor in Tartu, Estonia. Linnas, whose deportation awaits only Attorney General Edwin Meese's order, was sentenced to death *in absentia* in a 1962 Soviet trial.

"Even if he is guilty, let's have a public hanging, if that would satisfy people," said Mari-Ann Rikken, vice president of the Coalition for Constitutional Justice, an umbrella group of organizations opposed to OSI. "Why hand the moral high ground to the Soviets on this? Why not have war crimes trials here?"

In a recent meeting with Rikken's coalition and other East European groups, Meese promised not to oppose legislation that would permit war crimes trials here and reduce the Soviet role. No such legislation has been introduced, but Rikken said that in an effort to do so, her group was consulting with sympathetic members of Congress.

Rikken declined to name them. But recently, her group persuaded three senators—Paul Simon (D-Ill.), Alan Dixon (D-Ill.) and Don Riegle (D-Mich.)—to send appeals to Meese to at least delay deporting Linnas to the Soviet Union in order to review his case and possibly allow time for his attorney to find another country willing to take him. Because of their antipathy to the Soviet role, former White House aide Pat Buchanan and conservative columnist William Buckley have backed Rikken's cause even more vigorously.

On the other hand, a number of senators and representatives are circulating a letter among colleagues calling on Meese to deport Linnas to the Soviet Union immediately.

Eli Rosenbaum, who oversees the World Jewish Congress's work on war crimes cases, dismissed the East European ethnic organizations' claims that they are merely seeking reform of OSI procedures out of due process concerns. He pointed to earlier appeals by some leaders of these groups for a statute of limitations on wartime atrocities, though they now disavow this as a goal. He also scored much of their campaign against OSI and its alleged violations of due process as "outright lies and disinformation."

Nevertheless, he feared they may succeed.

"Jews can't believe that these groups have any real clout," he warned. "They believe Arabs may have clout. But Baltics, Ukrainians?"

"On the surface, it sounds so

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Nazi-Hunting Unit

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liberal," said Rabbi Marvin Hier, dean of the Simon Wiesenthal Center in Los Angeles, in reference to the call for war crimes trials here. "But I'm afraid it's one big ruse."

Hier said it could take "years" to formulate such legislation, gain support for it in Congress and, after passage, implement it and face up to any constitutional challenges. In addition, Hier cited the difficulties of negotiating permission for Soviet citizens who have crucial information on the suspects to come here to testify.

"The emigre groups know the difficulties. But their purpose is to delay ongoing court proceedings," he charged.

East European ethnic organizations contend they are motivated only by alarm over what they see as appallingly weak due process protections for those charged under current procedures. They are especially incensed over the Soviet Union's role.

In 1980, soon after the Soviet invasion of Afghanistan turned U.S.-Soviet relations ice cold, Soviet officials and attorneys

from OSI concluded a surprising informal agreement. Under it, the Soviet Union provides OSI lawyers with Nazi documents it holds that may have bearing on the wartime activities of OSI suspects. It also arranges for Soviet citizens who may have relevant information to give videotaped depositions in the Soviet Union to American lawyers under Soviet supervision.

To the East European Americans, this constitutes consorting with an enemy that they believe has every reason to manufacture documents and testimony against members of their fervidly anti-Soviet communities.

Danute Mazeika, secretary of the Coalition for Constitutional Justice, said that the KGB is only too happy to help prove "that those who left 'paradise' did so not because they were anti-Communist but because they were Nazis."

Rikken, who is the coalition's Washington representative, said that due to OSI's dependence on the Soviet Union for much of its evidence, East European Americans now see the Justice Department unit as "an arm of the KGB."

The cases against Linnas and John Demjanjuk, a Ukrainian deported to Israel where he is now on trial for war crimes, are but two in which the decision rests in part on Soviet-supplied evidence. With their fates now hanging in the balance, the campaign against OSI has reached a fever pitch.

Critics note that when OSI suspects a person, it asks Soviet authorities what documents or eyewitnesses it may have that bear upon his wartime activities, entrusting the task of evidence gathering entirely to them. Like other Allied powers at the end of World War II, the Soviet Union inherited reams of Nazi records, particularly from Eastern Europe, from which the Nazis were routed by the Red Army. In addition, in areas now controlled by the Soviets, there are witnesses, often themselves admitted Nazi collaborators, with personal knowledge of the events and people in question.

Said one recent law review article critical of this practice, "Because [the witnesses] are invariably chosen by Soviet authorities, suspected collaborators are effectively denied the benefit of the right to obtain and present witnesses on their own behalf," the article asserts.

INS PHOTO/WIDE WORLD

Prosecutors claim this pass, issued to Ivan Demjanjuk, bears the photo of sadistic Treblinka guard 'Ivan the Terrible.' The pass was issued to Ukrainians training to be concentration camp guards.

OSI attorneys deny this. They reply that critics vastly overstate their reliance on Soviet witnesses. Nazi records from the Soviet Union and other countries, whose authenticity can be tested, also play an important role, they say. And non-Soviet witnesses also testify.

Nevertheless, since 1980, OSI has taken testimony from more than 100 witnesses in the Soviet Union, making them a clearly crucial tool. Often, Nazi documents indicate a suspect's role as a camp guard or member of a Nazi-controlled security force while eyewitness testimony ties him to specific acts or atrocities.

Allan Ryan Jr., a former director of OSI, explained that defense attorneys, too, can ask Soviet authorities to produce witnesses to testify on their client's behalf.

"The reason they don't do it more often is that for all their alibis, many defendants don't really have anyone that can support their contentions," Ryan said.

Ryan conceded, however, that the witness search and selection process remains in the hands of Soviet authorities, whose good faith both sides depend on. Neither side is permitted to send investigators to the scene of the wartime crimes, where many who witnessed them still live.

OSI attorneys assert that this is a disability suffered equally by both sides. But this does not allay the concerns of East European Americans, who believe the Soviet Union skews its selection towards those with incriminating testimony.

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The East Europeans also sharply score the deposition-taking process itself. It is, they say, tightly controlled by the Soviet procurator, who both conducts much of the pre-deposition investigation and presides over the videotaped hearing. The procurator, they charge, often limits the defense counsel's line of questioning, an accusation borne out in some of the U.S. court opinions.

Critics also claim that Soviet authorities intensively coach many of the witnesses before they appear and that the procurator's presence serves to intimidate those tempted to say something other than what is expected of them.

OSI officials respond by referring to "numerous" instances in which Soviet eyewitnesses gave testimony favorable to the witness. In other cases, they note, different witnesses have given contradictory testimony or individual witnesses have contradicted themselves. Often, said Rosenbaum, himself a former OSI attorney, the answer is, "I don't know. I can't remember," which rings sincerely with regard to events of 40 years ago.

OSI director Neal Sher has stressed the value of cross-examination in winnowing out both honest mistakes and perjured testimony. He rejected the charge that Soviet procurators exerted excessive control over this process or excessively limited defense counsels' questioning.

Former OSI director Ryan, pressed as to whether he had concern at any point about possible Soviet manipulation, replied, "Sure. I had that qualm from my first day at OSI. We never assumed everything from the Soviet Union was unimpeachable. We compared it to other sources. We treated all evidence very rigorously. I never found any evidence from the Soviet Union that was tampered in any way."

But David Roth, director of inter-ethnic relations for the American Jewish Committee, spoke of indications to the contrary from OSI itself, even as he supported its claims of rigor.

"Of course there are problems," said Roth, who is involved in the issue as part of his work with East Europeans. "Mike Wolf, who is [OSI's] director of investigations], will tell you of cases where it was so obvious the witnesses were being coached. But if they [OSI attorneys] don't have enough credible eyewitnesses, they will drop the case."

Wolf could not be reached for comment.

The great majority of judges in OSI cases have found the testimony of the Soviet eyewitnesses to be reasonably credible and have admitted it as evidence, though at times with qualifications. But a handful, echoing many of the concerns voiced by OSI critics, have decided otherwise in at least four cases. These judges ruled all or much of this evidence inadmissible, in some cases criticizing OSI sharply.

Critics of OSI have also attacked its use of Soviet-held Nazi records. As with witnesses, neither side is permitted free access to search the Soviet Union's archives. But Rosenbaum, the former OSI attorney, explained that here, too, defense attorneys have requested exculpating documents, and Soviet authorities have produced them "in quite a number of cases."

"It's the same agreement we have with West Germany and Australia," Rosenbaum said. Other countries, such as Greece and Great Britain, also bar access to their wartime archives, he noted, while Communist Poland allows OSI and defense attorneys to search through its archives themselves and freedom to find their own witnesses.

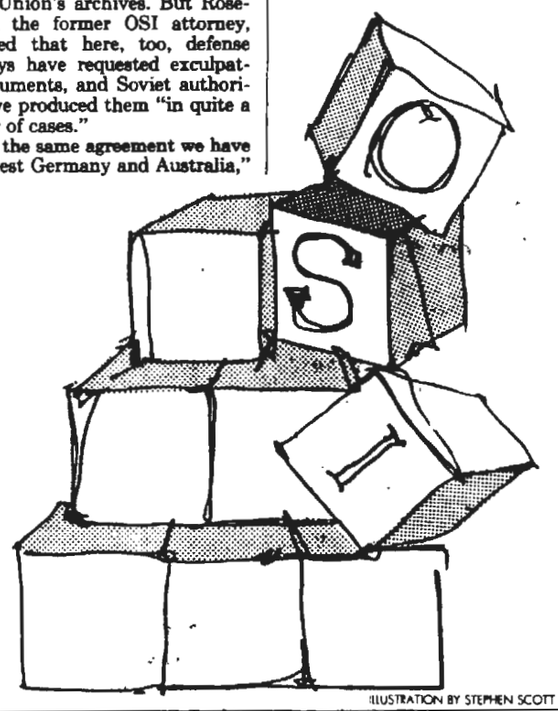

ILLUSTRATION BY STEPHEN SCOTT YOUNG

In any event, from the Nuremberg Trials to war crimes trials in West Germany, Holland and, more recently, the U.S. hearings, no Nazi document provided by the Soviet Union has ever been successfully challenged as to its authenticity.

From a strictly legal point of view, suspects are on trial for concealing Nazi affiliations or lying about them in answer to questions asked when they entered this country and later when they applied for citizenship. They are not tried for the war crimes *per se*—the route Canada proposes to take. This has led some critics to claim that many of those OSI prosecutes may have committed no atrocities but may merely have served with a Nazi unit. Or they may have had no Nazi links at all but, as many did, misrepresented their date or place of birth, their residence, occupation or other data to conform with forged IDs they obtained in the course of fleeing the Communists.

But according to Ryan, "We never filed against someone unless we were prepared to prove he himself took part in the persecution of innocent people."

Still, while OSI may not initiate a case against someone for lesser misrepresentations, it has, on occasion, continued to pursue a case on the basis of lesser sins after its evidence on the larger crimes was thrown out.

Juozas Kungys, for example, was initially charged with participating in the murder of more than 2,000 Jews in Kedainiai, Lithuania and then concealing that crime from U.S. officials. But a federal judge in New Jersey ruled Soviet eyewitness testimony to this effect inadmissible for lack of credibility.

OSI attorneys have continued to pursue the case against him on the basis of other misrepresentations the judge found he committed: his place and date of birth, his wartime occupation and where he was during the war (which also happened to be the site of the massacre he was initially accused of having participated in).

Various proposals short of instituting actual war crimes trial have been suggested for reforming or altering OSI procedures. So far none have come close to enactment.

An article in the *Columbia [University] Journal of Transnational Law* suggested that if Soviet witnesses are not allowed to come to the United States to testify, their depositions be taken in the U.S. embassy in Moscow or a nearby consulate rather than a site chosen by Soviet authorities. The article also urged that:

* The Soviet procurator not be allowed to preside over the deposition hearing when he is also assisting in the investigation.
* Interpreters be U.S. citizens, rather than employees of the Soviet national tourist organization, Intourist, as has sometimes been the case.
* All previous testimony by Soviet citizens be made available to lawyers from both sides. (This has, on occasion, not been done.)
* Permission be arranged for the defense counsel to visit sites of the alleged criminal acts in order to investigate and seek witnesses.

Roth, of the American Jewish Committee, attempted to work out a set of guidelines that would be acceptable to Jewish groups, OSI and the East European organizations. Among them was a firm declaration that OSI's investigations "must not be seen as a reflection on any ethnic or religious groups." The media, in particular, would be urged to avoid identifying defendants by their ethnic or religious identity.

The working group of Jewish, Polish, Baltic and Ukrainian organizations also discussed including a guideline that would prohibit deportations to the Soviet Union, a point Roth seemed willing to grant.

But after a year, said Roth, these efforts came to nothing.

Polish American groups strongly support OSI, he noted. But with the others, "It always came down to the issue of deportation and what we felt were thinly disguised attempts to do in OSI," he explained. "Just when we'd come close, one of the Baltic or Ukrainian groups always came up with another issue."

Latvians Respond

I wanted to commend Larry Cohler and the *Washington Jewish Week* for your fair and evenhanded coverage of the highly controversial Karl Linnas deportation case. As a participant in the March 6 meeting with Attorney General Edwin Meese, I would however like to amplify and perhaps clarify the purpose and content of that meeting.

Contrary to Justice Department spokesman Pat Korten (*WJW*, March 12), we did not attend the meeting solely to "press" the attorney general on his intentions in the case. We approached Mr. Meese with two requests that impact all present and future war crimes cases:

1. First and foremost, we expressed our categorical and unequivocal objection to all and any deportations of Americans to the Soviet Union against their will. While we are in no position to determine the guilt or innocence of Mr. Linnas, the world community, including Jewish, Baltic, Ukrainian and other Western ethnic organizations, do agree on the repressive, manipulative and brutal nature of the Soviet system of "justice." The Soviet Union itself has committed massive atrocities in the Baltic States (500,000 deported or killed) and in the Ukraine (eight million killed in the 1933 famine), and continues to decimate the population of Afghanistan. Today, the Soviet "justice" system routinely violates the human rights of Jews, Balts, Ukrainians and other minorities. For these reasons we do not believe the Soviet Union has either the moral or legal right to try anyone for crimes against humanity. Their hands are not clean. Were the U.S. to forcibly place Karl Linnas in the hands of the Soviets, it would, in effect, be establishing the moral equivilancy of the Soviet system of justice and the U.S. system of justice. We cannot bleieve that the U.S. would want to grant this kind of legitimacy to the same system that framed Natan Shcharansky and has placed thousands of religious and human rights activists in the Soviet Gulag. Even former associate justice of the Supreme Court, Arthur J. Goldberg, has stated that "Soviet judges are not independent, but are instruments of the party and government. Judgment and sentence in political cases are predetermined." We agree, and asked that Mr. Meese do all in his power to find another country—a Western one with a respected system of justice such as Israel or West Germany—to which Karl Linnas could be sent.

2. We asked Mr. Meese for his support in changing present war crimes legislation so that Americans accused of war crimes could be tried in criminal trials here in the United States. This would eliminate the problem of deportations to the Soviet Union, and provide the accused with the rights of due process (trial by jury, public defenders, etc.). We support the objectives of the Office of Special Investigations and wish to see former war criminals brought to justice. If the United States has undertaken the moral and legal responsibility to seek out accused war criminals, it shouldn't stop halfway and export its problems to other countries, but instead should finish the job, right here, in U.S. courts of law. It is the only right and proper thing to do.

There is also another reason for supporting war crimes trials in the United States. Like the Jewish community, Baltic and Ukrainian Americans too have lost family members at the hands of both the Nazis and Soviets. We can empathize with the Jewish community's committment to keeping the memory of the Holocaust alive. We too want our children to learn the lessons of history, so that they can work to prevent the reoccurance of such massive tragedies. The John Demjanjuk trial in Israel has become a living history lesson for many there who are too young to have experienced the horrors of World War II. War crimes trials in the United States would serve that same purpose.

While the disposition of the Karl Linnas case is still undetermined, Mr. Meese indicated that he would not object to new legislation which would allow for war crimes trials in the United States. The responsibility for initiating such legislation lies with the U.S. Congress. The responsibility for initiating such legislation lies with the U.S. Congress. It is our hope that the American Jewish community will join us in rejecting deportations to the Soviet Union, and supporting war crimes trials in the U.S.

OJARS KALNINS
American Latvian Association in the United States, Inc.

Is Demjanjuk Guilty?

The stigma of being accused of Nazi war crimes is such that anyone accused becomes automatically guilty of the crime.

The American system of justice has usually been one in which those accused are innocent until proven guilty, but in the case of John Demjanjuk, the opposite has been true. Many, probably thousands of East Europeans, lied on their immigration applications to the U.S. because they did not want to be regarded as Soviet citizens. Many Ukrainians did this in regard to their place of birth—they cited Poland rather than the USSR.

And why did these Ukrainians lie about their place of birth? Did you ever hear of the "Forgotten Holocaust?" In 1932-33, Stalin artificially engineered a famine to starve the population into submission so that they would collectivize their farms according to the Soviet plan.

I sincerely hope Demjanjuk is guilty, although I seriously wonder if he is, given the Soviet-supplied evidence being used against him. If he is innocent, his life is ruined anyway.

ANN MASON
Silver Spring, Md.

Likes Gun Control Editorial

As an ardent supporter of handgun control through the Board of Directors of Handgun Control, Inc., I applaud and thank you for your editorial of February 12. It is a beautiful piece.

JOHN HECHINGER
Washington, D.C.

EDITORIAL

PROSECUTE WAR CRIMINALS

The work of the Justice Department's Nazi-hunting unit, the Office of Special Investigations (OSI), has come under increasing attack. Various East European groups have called for suspension of its prosecutions pending a congressional review of its work, and Pat Buchanan, President Ronald Reagan's former communications director, has called for its dismantling.

Meanwhile, the biological clock is ticking away for many Nazi war criminals who have found refuge in North America, and last week Canada resolved to do something about them. We welcome its decision—some 45 years after the crimes—to prosecute Nazi war crimes in its courts. But we firmly oppose East European ethnic organizations in this country who urge the United States to do the same.

OSI's ongoing program—to denaturalize and deport those who came here and settled after World War II but concealed the atrocities they committed in Europe—is sound. It is an approach that leaves few wholly satisfied, since jail or execution seems more fitting for those found guilty after fair trials. But it has some virtues that the proposal for war crimes trials lacks: It is in place, it is working and those who committed these heinous crimes know, right now, that they are at risk.

Canada, under its parliamentary system, can promptly legislate proposals once its government decides on them. But here, the path from a lobby group's proposal to congressional sponsorship to actually getting a bill passed and implemented can take years. Additionally, even Canada will have to negotiate with the Soviet Union over the ticklish subject of allowing Soviet citizens with eyewitness information to come to Canada and testify—a process that could bog down interminably.

In this case, justice deferred is truly justice denied.

Baltic and Ukrainian American groups have objected angrily to the current U.S.-Soviet arrangement under which Soviet eyewitnesses give videotaped depositions in the Soviet Union to American lawyers from both sides under Soviet supervision. But most American judges, carefully scrutinizing the evidence, have seen it otherwise. They have ruled this testimony admissible, though in some cases with qualifications.

The concerns raised by a small minority of judges about videotaped Soviet depositions says more about the particular cases heard than about the depositions *per se*. Nevertheless, it would be worthwhile to approach Soviet authorities about adjusting the ground rules under which depositions are taken in order to put all of them beyond reproach.

If Soviet authorities refuse these requests, there is no reason to throw the baby out with the bathwater. In those cases where the Soviet procurator's behavior interferes with American justice, American judges can be trusted to assess the situation and rule accordingly. But it would be the height of folly, in the absence of any other indications of irregularity to disallow evidence provided by the Soviet Union, merely because it is from the Soviet Union.

Bilateral Agreements with External Powers

The Soviet Union signed a twenty-year Treaty of Friendship and Co-operation with Iraq in April 1972 and a further agreement in December 1978. A similar treaty was signed with Syria on 8 October 1980. A Treaty of Friendship and Co-operation with South Yemen was ratified in February 1980, and an agreement for Joint Co-operation was signed in January 1983. Soviet units continue to use some of Aden's naval and air facilities but there is uncertainty over the status of Khormaksar air base. All three countries have received significant Soviet arms deliveries. Despite this, Iraq has tried to broaden its contacts with the West, particularly with France and Italy. In November 1979 Iran unilaterally abrogated two paragraphs of a 1921 treaty under which the USSR reserves the right to intervene in Iran's internal affairs if a third country threatens to attack it from Iranian territory; the USSR has refused to accept this abrogation. A 20-year Treaty of Friendship between the USSR and North Yemen was signed in October 1984; details are not known.

Bulgaria and the People's Democratic Republic of Yemen (PDRY; South Yemen) signed a Protocol for Co-operation in April 1980 and a Treaty of Friendship and Co-operation on 14 November 1981. Similar agreements with Hungary were reported in April and November 1981. Libya signed treaties of Friendship and Co-operation with Bulgaria and Romania in January 1983. Sudan and Romania signed an agreement providing technical co-operation and training in November 1982.

The United States concluded a mutual defence agreement with Israel in July 1952. A subsequent strategic co-operation understanding, reported in early 1982, led in March 1984 to a series of agreements covering aid and support, details of which have still not been published. A 1981 agreement enables the US to use Egyptian bases, but only under strict conditions. A similar agreement was reached with Morocco in May 1982. An agreement has been concluded with Oman to provide economic and military aid in exchange for permission conditionally to use Salalah and Masirah as staging bases. An agreement with Bahrain permits the US Navy to use port facilities. In November 1981, a strategic co-operation agreement was signed with Tunisia.

Britain concluded Treaties of Friendship with Bahrain, Qatar and the United Arab Emirates (UAE) in August 1971 and a Defence Co-operation Agreement with Oman in June 1985. It has supplied arms to Bahrain, Egypt, Jordan, Kuwait, Oman, Qatar, Saudi Arabia, Sudan and the UAE. France has continuing arms-supply arrangements with Egypt, Iraq, Lebanon, Libya, Morocco, Sudan and Tunisia. West Germany provided technical training assistance to Sudan under a 1982 agreement. Spain has reached a defence agreement with Morocco enabling its navy to use Moroccan ports; the benefits to Morocco have not been identified.

China signed a Treaty of Friendship with North Yemen in 1964, under which minor arms were provided. Arms and spare parts have been sent to Egypt under agreements signed in 1978/9 and 1983. A military co-operation agreement was signed with Sudan in January 1982 and arms supplied. North Korea and Libya signed a Treaty of Alliance or Friendship and Co-operation in November 1982 which permits exchanges of military data, specialists and supplies.

Peace-Keeping Forces

The United Nations (UN) withdrew the 4,000-man Emergency Force (UNEF) from the Sinai on 24 July 1979; its duties were temporarily assumed by the Truce Supervisory Organization (UNTSO), 298 officers (including Observer Group Beirut of some 50 officers). It has monitored the cease-fire on Israel's northern border since 1949. The Egyptian-Israeli border is now patrolled by the 2,642-man Multinational Force and Observers (MFO) under the Israeli-Egyptian Peace Treaty; contingents come from the US (1,186), Australia (which

is being replaced by Canada in 1986) (109), Britain (37), Colombia (500), Fiji (500), France (43), Italy (90), the Netherlands (102) and Uruguay (75).

The UN also deploys in the Golan Heights the 1,317-man Disengagement Observer Force (UNDOF), made up of contingents from Austria (532), Canada (226), Finland (402) and Poland (157).

The UN Interim Force in Lebanon (UNIFIL) consists of some 5,827 men from France (1,391), Fiji (627), Finland (514), Ghana (690), Ireland (746), Italy (51), Nepal (800), Norway (864) and Sweden (144).

Arrangements Within the Region

Algeria, Bahrain, Djibouti, Iraq, Jordan, Kuwait, Lebanon, Libya, Mauritania, Morocco, Oman, the Palestine Liberation Organization (PLO), Qatar, Saudi Arabia, Somalia, Sudan, Syria, Tunisia and North and South Yemen are members of the League of Arab States (Egypt's membership was suspended in March 1979). Among its subsidiary bodies are the Arab Supreme Defence Council, comprising Foreign and Defence Ministers (set up in 1950), the Permanent Military Committee of Army General Staffs (1950), which is an advisory body, and the Unified Arab Command (1964).

Syrian and Palestine Liberation Army forces, initially deployed as the Arab Deterrent Force, remain in parts of northern Lebanon. Syria has reinforced its component and maintains a measure of control over the Arab guerrilla group elements in the Beqa'a Valley and northern Lebanon. Israeli forces, supported by a Lebanese Christian militia and a Home Guard, exercise a measure of control over a strip of territory in the south of Lebanon.

Algeria and Libya signed a defence agreement in 1975. Egypt and Sudan signed a joint defence agreement in 1977. The Egyptian-Sudanese Joint Defence Council's minutes of December 1981 were tantamount to another agreement, and in October 1982 an 'Integration Charter' was signed covering, *inter alia*, military policy; these are probably no longer in effect. Saudi Arabia has long supported Morocco against *Polisario* guerrillas; the two countries signed a security pact in February 1982. A Mutual Defence Agreement between Libya and Morocco was ratified in September 1984; no change in Saudi policy is reported. Libya signed a 'Strategic Agreement' with Iran in June 1985; no details have been released. An understanding between Saudi Arabia and Iraq is believed to have been signed in 1979. Jordan and Iraq ratified a defence agreement in March 1981. The Gulf Co-operation Council (GCC), created in May 1981 by Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the UAE, is developing a mutual defence structure to include a joint 'rapid deployment' force, air defence, transport and procurement. It is being reinforced by internal security pacts between Saudi Arabia and Bahrain, Qatar, Oman (1982) and the UAE. A draft Gulf security agreement is being considered.

Morocco has loaned forces to the UAE. Libya, South Yemen and Ethiopia formed the Aden Treaty Tripartite Alliance in 1981; it included a joint defence commitment but nothing has since been reported, and the commitment has probably lapsed. North and South Yemen have agreed in principle to a merger (1981, 1986); the details remain obscure. Egypt, Jordan, Morocco and North Yemen have announced the departure of unspecified numbers of 'volunteers' to assist Iraq in the war against Iran, but no formed units have been despatched. Iraq has stated that multinational composite units have been formed; their roles are obscure. Sudan and Ethiopia agreed a regime of security, stability and non-interference in each other's internal affairs in July 1982. Actions since the coup in Sudan in April 1985 suggest the possibility that this agreement is being implemented.

Arms movements in the region are peculiarly complex. Egypt has supplied arms to Morocco, Sudan and Iraq. Algeria and Libya have supplied arms to *Polisario*, and most Arab countries have supplied Palestinian guerrillas with arms. In some cases a third nation funds the recipient's foreign arms purchases. Iran has reportedly received arms, supplies and spares from, *inter alia*, Israel, North Korea and Eastern Europe and is also buying material on the open market in Western Europe. Some Chinese weapons have been identified in Iranian ser-

vice, and more are reported as being delivered. Iraq has apparently recently received arms from Egypt, the USSR, China, North Korea, France, Portugal and Brazil.

In 1975 an Arab Organization for Industrialization (AOI) was set up in Egypt, under the aegis of Saudi Arabia, Qatar, the UAE and Sudan, to encourage indigenous Arab arms production. Arab involvement ended in 1979 following Egypt's *rapprochement* with Israel. Egypt replaced the AOI with an existing Egyptian Arab Military Industries Organization and with foreign aid. Some of this aid is from Saudi Arabia for limited specific projects. Egypt also has been entering into co-production agreements with Britain, France, the US and Yugoslavia. For their part, Saudi Arabia, Iraq, Kuwait, Qatar and the UAE agreed in 1979 to replace the AOI with an $8-billion arms industry in the UAE. This proposal is still before the GCC and may now be moribund.

Military Developments

North Africa has been a main area of conflict over the past year, with combat in Libya, Western Sahara, Chad and the Sudan. Libya received Soviet SA-5 SAM late in 1985. These were being installed at the time of the US air strikes against Libya but were inadequate to protect Libyan airspace. It is not known whether they are fully operational, nor whether these systems have been modified to bring them to the latest specifications. Libyan actions in Chad were intermittent and not very successful. *Polisario* continues to operate in Western Sahara; the Moroccan defensive wall limits those operations to hit-and-run raids which are being contained. Losses occur on both sides and there are indications that budgetary constraints have delayed some of the purchases of replacements by the Moroccan Forces. The civil war in the Sudan continues to frustrate national development and any improvement of military capability. The transfer from interim military rule to a civil administration has not brought with it the hoped-for reconciliation between the North and South. No major arms purchases have been noted.

The Gulf War continues, with no apparent change in the balance between Iranian numerical superiority on the one hand and Iraqi material superiority on the other. Reports of losses and confusing indications of resupply make evaluations of strength difficult and of limited reliability. The 'Tanker War' also goes on but without any major impact on exports. The Iraq-based Kurds have taken advantage of the War to strengthen their position. The apparent increase in total Iranian personnel strength stems largely from our inclusion this year of the Revolutionary Guards as Regulars, reflecting their actual position.

Israeli financial constraints appear to have caused delays in naval equipment programmes and may interfere with the export sales plans for the indigenously-designed *Lavi* fighter. Despite financial constraints, Saudi Arabia has gone ahead with its order for *Tornado* FGA and air defence aircraft and *Hawk* and Pilatus trainers. Oman, on the other hand, has postponed the delivery of *Tornado* — presumably for financial reasons. Decisions by the United States Congress and Senate to oppose further orders for equipment has Saudi Arabia seeking alternative sources. The political conflict in Southern Yemen resulted in bitter fighting and the destruction of a considerable proportion of its military equipment; reports on replacement continue to be inconclusive and conflicting.

Economic Factors

The Middle East is experiencing the worst economic recession in recent history. After dramatic economic growth on the part of the oil-exporting countries, and substantial economic improvements in many non-oil-producing states (e.g Jordan) during the 1970s, all states of the region are now having to come to terms with economic difficulties until recently confined to the western hemisphere and Africa: large external debts, a drastic reduction in income; and massive trade deficits and deficit financing, which is being partially offset by drawing down reserves. Moreover, the Middle East and North Africa are experiencing significant population

growth and urbanization which may have unforeseeable economic consequences and serious implications for regional security, especially in the Gulf.

The drastic decline of oil prices (in many cases by over 50%), an equally drastic fall in petroleum output, due to conservation measures by the consumer countries and the worldwide recession, are only some of the reasons for this economic malaise. The Iraq—Iran War (and its concomitant economic effects on the GCC), the continuing crisis in the Lebanon and Syria's expensive involvement there, the instability of Sudan, Egypt's expensive modernization of the military, and Libyan and Moroccan military involvement in the Saharan belt are also contributing factors. Moreover, massive infrastructure development projects over the past decade, especially in the major oil-producing countries, have committed these states to their upkeep, forcing them to abandon, or at least to curtail, further development projects. Finally, due to the severe manpower shortage in the Gulf states, Iraq and Libya, many regional states with surplus manpower (e.g. Egypt and Pakistan) have become dependent on hard-currency remittances, and during the past two years these have been drastically reduced.

Regional debt, excluding Iran, Iraq and Israel, is estimated to amount to about $110 bn. Iran's debt is negligible in comparison to those of other Middle Eastern states, amounting to well under $1 bn. Iraq's debt, on the other hand, is somewhere between $65 bn and $85 bn (three times its GDP), $50—60 bn of which is owed to the GCC states and probably will have been written off; the rest consists of debts to western and Asian creditors and especially to its arms suppliers: the USSR, France and Brazil. Israel's debt — one of the highest in percentage terms of GDP and servicing ratios — amounts to over $30 bn. Of the other states, Sudan, Egypt and Morocco continue to have the highest total national debts, but Jordan, Tunisia, and the Yemen Arab Republic are also dangerously over-exposed (with debts representing about 70% of GDP).

Regional GDP growth for 1984 was expected to be about 2.5%; in reality, however, it fell to under 1%, while in 1985 GDP actually declined by at least 1.6%, or probably more. With the oil price collapse in 1986, the region will have entered a steep decline (probably around −10%) in terms of GDP output. While the rich oil producers (especially members of the GCC) have sufficient capital reserves to deal with the fall in income in the short run, the poorer states (Jordan, Egypt, Sudan, etc.) will have to find other means to finance their budget deficits.

With some of the world's highest population increases (between 3 and 5%), economic progress is constantly being eroded; there has been a constant annual rate of decline, ranging from 3% to 5%, in real per capita GDP in the 1980s. The seriousness of the economic situation is further indicated by the decline in trade. Regional exports declined from $253 bn in 1980 to $131 bn in 1985, while imports remained more or less unchanged (falling from $129 bn in 1980 to $116 bn in 1985), and this has caused serious balance-of-payments difficulties in some countries (e.g. Libya, Egypt and Sudan). Some countries, such as Sudan, are near financial collapse, while Israel, with the highest inflation rate and debt exposure, has to be supported financially by Western powers, especially the United States. Their burdens are accentuated by involvement in external conflicts (Morocco, Syria, Iraq, Iran, Israel and Libya) or by serious internal problems (Sudan). Political and military insecurity, and high population growth, therefore remain the greatest obstacles to economic advancement in the Middle East.

ALGERIA

GDP	1984:	D 230.3 bn ($46.213 bn)		
	1985ε:	D 250.0 bn ($49.723 bn)		
growth	1984:	3.7%	1985:	5%
Inflation	1984:	4.6%	1985:	6.6%
Debt	1984:	$15.8 bn	1985:	$17.2 bn
Def bdgt*	1985:	D 4.793 bn ($953.300 m)		
	1986:	D 5.459 bn ($1.114 bn)		
$1 = D	(1983):	4.7888	(1984):	4.9834
	(1985):	5.0278	(1986):	4.9000

D =dinar

MRL: 200: incl 122mm: BM-21; 127mm: 60 *ASTROS* II; 132mm: BM-13/-16.
SSM: 30 *FROG*-7, 20 *Scud* B.
mor: 120mm, 160mm.
ATK: RCL: 73mm: SPG-9; 82mm: B-10; 107mm.
guns: 85mm; 100mm towed; 105mm: 100 JPz SK-105 SP.
ATGW: AT-3 *Sagger*, SS-11, *Milan*, *HOT*.
Avn (Army Air Corps): (?150) armd hel.
attack (?40) Mil Mi-24 *Hind*; 50 SA-342 *Gazelle* (some with *HOT*); 10 SA-321 *Super Frelon*, some with *Exocet* AM-38 ASM; some 30 SA-316B *Alouette* III with AS-12 ASM; some 44 MBB BO-105 with SS-11 ATGW.
tpt (hy): 10 Mi-6 *Hook*. **(med:)** 100 Mi-8, 20 Mi-4, 10 SA-330 *Puma*.
ATGW: 360 *HOT*, AS-11/-12, AT-2 *Swatter*.
AD: guns: 4,000: 23mm, ZSU-23-4 SP, M-1939 and twin 37mm, 57mm incl ZSU-57-2 SP, 85mm, 100mm, 130mm.
SAM: 120 SA-2, 150 SA-3, SA-6, SA-7, SA-9, 60 *Roland*.
(Captured Iranian eqpt in service.)
(On order: no confirmed information.)

NAVY: 5,000.*
Bases: Basra, Umm Qasr.
Frigates: 2:
1 *Lupo* with 8 *Otomat*-2 SSM, 1 octuple *Albatros/Aspide* SAM, 1 hel;
1 Yug (trg).
Corvettes: 6 (?5) *Assad* with 1 quad *Albatros/Aspide* SAM;
2 with 2 *Otomat*-2 SSM, 1 hel;
4 with 6 *Otomat*-2.
FAC(G): 10 *Osa* with 4 *Styx* SSM.
FAC(T): 5 P-6⟨.
Patrol craft: large: 3 SO-1;
coastal: 8: *Poluchat*, *Nyryat* II, PO-2, *Zhuk*⟨.
Minesweepers: ocean: 2 Sov T-43 3 *Yevgenya*⟨; **inshore:** 3 *Nestin*⟨.
Amph: LSM: 4 *Polnocny*; **LST:** 3.
Spt ship: 1.
(On order: 3 *Lupo* FFG, 1 *Stromboli* (reported commissioned but undelivered); 1 *Agnadeen* tanker, 1 tpt.)

AIR FORCE: 40,000 incl 10,000 AD personnel; some 500 combat ac.*
Bbrs: 2 sqns:
1 with perhaps 7 Tupolev Tu-22, 1 with 8 Tu-16.
FGA: 11 sqns:
4 with some 40 Mikoyan-Guryevich MiG-23BM;
4 with 20 Dassault *Mirage* F-1EQ5 (*Exocet*-equipped), 23 *Mirage* F-1EQ-200;
3 with Sukhoi Su-7 and Su-20.
Interceptors: 5 sqns:
Some 25 MiG-25, some 40 MiG-19, some 200 MiG-21, 30 *Mirage* F-1EQ.
Recce: 1 sqn with 5 MiG-25.
Tpt: ac: 2 sqns:
10 Antonov An-2 *Colt*; 10 An-12 *Cub*, 6 An-24 *Coke* (retiring); 2 An-26 *Curl*, 13 Ilyushin Il-76 *Candid*, 2 Tu-134 *Crusty*, 13 Il-14 *Crate*, 1 DH *Heron*.
Trg: incl MiG-15/-21/-23U, Su-7U, BAe *Hunter* T-69; 16 *Mirage* F-1BQ; 50 L-29 *Delfin*, 40 L-39 *Albatros*, 50 PC-7 *Turbo Trainer*, 11 EMB-312 *Tucano*.
AAM: R-530, R-550 *Magic*, AA-2/-6/-7/-8.
ASM: AS-30 *Laser*, *Armat*, *Exocet* AM-39, AS-4 *Kitchen*, AS-5 *Kelt*.
(On order: no confirmed information.)

PARA-MILITARY:
Frontier Guards.
Security troops 4,800.
People's Army 650,000.

OPPOSITION: Kurds.
Kurdish Democratic Party (KDP): 10,000 (20,000 more in militia); small arms, some Iranian lt arty reported.
Patriotic Union of Kurdistan (PUK) 10,000.

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* Incl military debt to USSR and other Warsaw Pact members.
† Losses and incomplete reporting of resupply makes eqpt estimates very tentative.

ISRAEL

GDP	1984: NS 7.069 bn ($24.110 bn)			
	1985: NS 25.966 bn ($22.027 bn)			
growth	1984: 0.9%		1985: 1.7%	
Inflation	1984: 373.0%		1985: 304.0%	
Debt	1984: $30.0 bn		1985: $30.2 bn	
Def bdgt	1985/6: NS 4.980 bn ($4.225 bn)			
	1986/7: NS 8.030 bn ($5.378 bn)			
FMA*	1985: $1.4 bn		1986: $1.723 bn	
$1 = NS	(1983):	0.0562	(1984):	0.2932
	(1985):	1.1788	(1986):	1.4930

NS = new shekel

Population: 4,400,000

	18—30	*31—45*
Men:	472,800	410,000
Women:	450,000	405,000

TOTAL ARMED FORCES:
Regular: 149,000 (93,300 male and female conscripts).
Terms of Service: officers 48 months, men 36 months, women 24 months (Jews, Druze only; Christians and Arabs may volunteer). Annual training as reservists thereafter to age 54 for men, 34 (or marriage) for women.

Reserves: 554,000 (all services) Army 494,000; Navy 10,000, 1,000 immediate recall; Air Force 50,000, 9,000 immediate recall.

ARMY: 112,000 (88,000 conscripts, male and female); some 606,000 on mobilization.
11 armd divs (many cadre; on mobilization comprise 33 armd bdes (each 3 tk, 1 mech inf bns).
9 mech inf bdes.
3 inf bdes.
7 para bdes.
12 territorial/border inf bdes with *Nahal* militia.
15 arty bdes (each 5 bns of 3 btys).
AD: 2 *Vulcan/Chaparral* btys.
Equipment:†
Tks: 3,660: incl 1,100 *Centurion*, 600 M-48A5, 1,210 M-60/A1/A3, 250 T-54/-55, 150 T-62, 350 *Merkava* I/II.
AFV: recce: about 400 incl *Ramta* RBY, M-2/-3, BRDM-2. **APC:** 5,900 M-113, BTR-50P.
Arty: guns: 130mm: 85 M-46; 175mm: 140 M-107 SP.
how: 105mm: 70 M-101; 122mm: 100 D-30; 155mm: 300 Soltam M-68/-71, M-839P/-845P, L-33 SP; M-50, 450 M-109A1/A2; 203mm: 48 M-110 SP.
MRL: 122mm: BM-21; 160mm: LAR-160; 240mm: BM-24; 290mm: MAR-290.
SSM: MGM-52C *Lance*, *Ze'ev (Wolf)*.
mor: 1,100 81mm, 120mm, 160mm (some SP).
ATK: RL: 82mm: B-300; **RCL:** 106mm: 250.
ATGW: BGM-71 *TOW*, *Cobra*, M-47 *Dragon*, *Picket* 81mm, *Togger* (*TOW/Sagger* derivative).
AD: guns: 30 M-163 *Vulcan* 20mm gun and M-48 *Chaparral* msl systems, 900 20mm, 50 ZSU-23-4 23mm SP, 30mm, 37mm and L-70 40mm.
SAM: MIM-42A *Redeye*.
(On order: *Merkava* MBT, *Re'em* AFV; M-107 175mm SP guns; *Lance* SSM, *TOW*, *Dragon* ATGW.)

NAVY: 9,000 (3,300 conscripts), 19,000 on mobilization.
Bases: Haifa, Ashdod, Eilat.
Subs: 3 Type 206.
Corvettes: 6 *Aliya* (*Sa'ar* 4.5) with 4 *Gabriel* II and 4 *Harpoon* SSM, 2 with 1 Bell 206 *Kiowa* ASW hel.
FAC(G): 23:
8 *Reshef* (*Sa'ar* 4) with 5 *Gabriel* III, 4 *Harpoon* SSM;
6 *Sa'ar* 3 with 3 *Gabriel* III, 1 twin *Harpoon*;
6 *Sa'ar* 2 with up to 5 *Gabriel* II;
1 *Dvora* with 2 *Gabriel* III;
hydrofoil: 3 *Shimrit* (*Flagstaff* 2) with 2 *Gabriel* III, 4 *Harpoon* SSM.
Patrol craft: 41 coastal(:
32 PCBR Mk 1 *Dabur*, 9 *Yatush*.
Amph: LSM: 3; **LCT:** 6; **LCM:** 3.
MR: ac: 7 *Seascan* 1124N.
Spt: 1 tender, 2 armed tpts, 2 trg ships (1(), 4 coastal patrol auxiliaries(.
Naval cdo: (300), 1 *Firefish* III attack craft.

AIR FORCE: 28,000 (2,000 conscripts, in AD), 78,000 on mobilization; some 629 combat ac (perhaps 90 stored), 58 armed hel.
FGA/interceptor: 15 sqns:
2 with some 50 McDonnell-Douglas F/TF-15;
5 with 131 McDonnell Douglas F-4E;
5 with 150 IAI *Kfir* C1/C2/C7;
3 with 67 General Dynamics F-16A, 8 -B.
FGA: 4 sqns with 130 A-4N/J *Skyhawk*.
Recce: 13 RF-4E.
AEW: 4 Grumman E-2C.
ECM: 4 Boeing 707 (some comd), 2 C-130 *Hercules*.
Tpt: 1 wing: incl 7 Boeing 707 (2 tanker mods), 20 C-130E/H, 18 C-47 (Douglas DC-3), 2 KC-130H.
Liaison: 1 BN-2 *Islander*, 19 Dornier (5 Do-27, 14 Do-28D); 22 Cessna (18 U-206C, 2 T-41D, 2 180); 12 Beech *Queen Air* 80; 2 IAI *Westwind*; 20 Piper *Super Cub*.
Trg: incl 20 TA-4E/H *Skyhawk*, 50 *Kfir* (incl TC-2), 85 CM-170 *Magister/Tzugit*.
Hel: attack: 1 sqn with 30 Bell AH-1G/S, 1 with 28 Hughes 500MD;
ECM/SAR: 1 sqn with 70 Bell 206, 212;
tpt: (hy): 17 Sikorsky CH-53A/D; **(med):** 8 SA-321 *Super Frelon*, 17 Bell UH-1D; **(lt):** 2 sqns with 50 Bell 206A, 212.
Drones: *Mastiff* 3, *Scout*, Teledyne Ryan 124R, MQM-74C *Chukar* II.
SAM: 15 bns with MIM-23B *HAWK/Improved HAWK*.
AAM: AIM-9/-9L *Sidewinder*, AIM-7E/F *Sparrow*, *Shafrir*, *Python* III.
ASM: *Luz*, AGM-65 *Maverick*, AGM-45 *Shrike*, AGM-62A *Walleye*, AGM-12 *Bullpup*, *Gabriel* III (mod).
(On order: 75 F-16 ftrs; 60 *Kfir*-C7/-TC-2 trg ac; 12 AS-365 *Dauphin* hel; 200 *Improved HAWK* SAM; 200 *Sidewinder* AAM.)

Forces Abroad: Lebanon (ε 500).

PARA-MILITARY:
Border Guards 4,500; BTR-152 APC.
Arab Militia; small arms.
Coastguard; 3 US PBR, 3 other patrol craft.
Gadna (youth bns), volunteers 15—18, pre-military service trg by Defence Force.

* US military aid has so far reached a total of $21.4 bn, of which $11.2 bn is to be repaid.

† Does not include captured PLO equipment: T-34, T-54 MBT, APC, 130mm guns, BM-21 MRL, ZSU-23-4 AA guns, SA-9 SAM.

JORDAN

GDP	1984:	D 1.523 bn ($3.965 bn)		
	1985ε:	D 1.675 bn ($4.252 bn)		
growth	1984:	2.3%	1985:	4.8%
Inflation	1984:	3.8%	1985:	5.5%
Debt	1984:	$2.9 bn	1985:	$4.2 bn
Def bdgt	1985:	D 206.0 m ($522.807 m)		
	1986:	D 243.7 m ($735.365 m)		
FMA	1984:	$400.0 m		
$1 = D	(1983):	0.3630	(1984):	0.3841
	(1985):	0.3940	(1986):	0.3314

D = dinar

Population: 2,720,000 (excl West Bank)

	18—30	*31—45*
Men:	407,000	218,000
Women:	370,000	210,000

TOTAL ARMED FORCES:
Regular: 70,200.
Terms of service: voluntary conscription, 2 years authorized.
Reserves (all services): 35,000. Army 30,000 (obligation to age 40).

ARMY: 62,750.
2 armd divs (?each 2 tk, 1 mech inf bdes).
2 mech inf divs (?each 2 mech inf, 1 tk bdes).
1 indep Royal Guards bde.
1 Special Forces bde (3 AB bns).
16 arty bns.
4 AA bdes.
Equipment:
Tks: some 790: 140 M-47/-48A5 (in reserve), 186 M-60A1/A3, 270 *Khalid*, 191 *Centurion*.
APC: 1,200 M-113, 32 *Saracen*.
Arty: some 247:
guns: 155mm: 17 M-59.
gun/how: 180 GH N45.
how: 105mm: 36 M-101A1; 155mm: 38 M-114 towed, 20 M-44, 108 M-109A2 SP; 203mm: 4 M-115 towed, 24 M-110 SP.
mor: 400 81mm, 107mm and 120mm.
ATK: RCL: 300 106mm.
ATGW: 300 BGM-71A *TOW*, 310 M-47 *Dragon*.
AD: guns: 20mm: 100 M-163 *Vulcan*; 40mm: 16 ZSU-23-4, 250 M-42 SP. **SAM:** SA-7B2 *Redeye*, 34 SAM-8, *Improved HAWK*.
(On order: *Javelin*, *Rapier* SAM.)

NAVY (Coast Guard): 250.
Base: Aqaba.
Patrol craft: 6 (2 armed()).
(On order: patrol craft.)

AIR FORCE: 7,200; 119 combat ac, 24 armed hel.
FGA: 3 sqns with 67 Northrop F-5E/F.
Interceptor: 2 sqns with 34 Dassault *Mirage* F-1CJ/EJ.
OCU: 1 sqn with 15 F-5A, 3 F-5B.
Tpt: 1 sqn with 6 C-130B/H *Hercules*, 2 North American *Sabreliner* 75A, 2 CASA C-212A.
VIP: 1 sqn with 2 Boeing 727, 3 Dassault *Mystère-Falcon* 20, 1 T-39 *Sabreliner* ac, 4 Sikorsky S-76 hel.
Hel: 4 sqns:
2 with 24 Bell AH-1S (with *TOW* ASM; for eventual transfer to Army);
2 with 16 SA-316B *Alouette* III, 14 S-76, 8 Hughes 500D hel.
Trg ac: 13 Cessna T-37C, 19 BAe *Bulldog*, 1 C-212, 12 Piper *Warrior*-II, 6 Piper *Seneca*-II.
AAM: AIM-9 *Sidewinder*.
ASM: *TOW*.
AD: 2 bdes:
14 btys with 112 *Improved HAWK* SAM.
(On order: 14 CASA C-101/5 *Aviojet* trg/COIN, 2 CASA-Nurtanio CN-235 tpt, 1 C-212 lt tpt ac; 6 *Maverick* ASM.)

PARA-MILITARY: 6,000:
Public Security Force 3,500.
Civil Militia 'People's Army' 2,500: Men 16—65; Women 16—45.
Palestine Liberation Army: 1,500; bde.

KUWAIT

GDP	1983/4:	D 6.415 bn ($21.969 bn)		
	1984/5:	D 6.425 bn ($21.474 bn)		
growth	1983/4:	−1.5%	1984/5:	−4.0%
Inflation	1984:	1.2%	1985:	1.0%
Debt	1984:	$5.0 bn	1985:	$3.7 bn
Def bdgt*	1984/5ε:	D 490.0 m ($1.638 bn)		
	1985/6ε:	D 540.0 m ($1.827 bn)		
$1 = D	(1982/3):	0.2908	(1983/4):	0.2920
	(1984/5):	0.2992	(1985/6):	0.2956

D = dinar

Population: 1,710,000 (incl 1.1 m expatriates)

	18—30	*31—45*
Men:	224,000	252,000
Women:	159,000	125,000

TOTAL ARMED FORCES:
Regular: 12,000.
Terms of service: 2 years (university students, 1 year).
Reserves: planned conscript force.

ARMY: 10,000.
2 armd bdes.
1 mech inf bde.
1 SSM bn.
Equipment:
Tks: 70 Vickers Mk 1, 10 *Centurion*, 160 *Chieftain*.
AFV: recce: 100 *Saladin*, 60 *Ferret*. **APC:** 175 M-113, 100 *Saracen*.
Arty: guns: 155mm: 20 AMX Mk F-3 SP. **how:** 18 M-109A2 SP. **SSM:** 4 *FROG*-7.
mor: 81mm.
ATGW: *HOT*, BGM-71A *TOW*, *Vigilant*.
SAM: SA-6, SA-7, SA-8 *Gecko*.
(On order: *Scorpion* lt tks, 188 M-113 APC, 56 M-113 SP *TOW*, 4,800 *Improved TOW*, SA-7, SA-8 SAM.)

NAVY (administered by Ministry of the Interior): 1,100.
Base: Kuwait City.
FAC(G): 6 Lürssen TNC-45 with 4 *Exocet* MM-40 SSM.
FAC: 2 Lürssen FPB-57.
Patrol craft: 50 coastal⟨ (15 armed).
Amph: LCU: 6 *Loadmaster*, 7 landing craft, 3 spt ships (320-ton).
(On order: 20 *Sedan* patrol craft; 6 SRN-6 hovercraft; SA-365N *Dauphin* II hel; *Exocet* MM-40 SSM.)

AIR FORCE: 2,000 (excl foreign personnel); 80 combat ac, 23 armed hel.
FGA: 2 sqns with 30 A-4KU, 4 TA-4KU *Skyhawk*.
Interceptor: 1 sqn with 32 Dassault *Mirage* F-1CK, 2 F-1BK.
COIN/trg: 1 sqn with 12 BAe *Hawk*.
Tpt: 2 McDonnell-Douglas DC-9; 4 Lockheed L-100-30; used also in civil role.
Hel: 3 sqns:
attack: 23 SA-342K *Gazelle*;
tpt: 12 SA-330 *Puma*, 5 AS-332 *Super Puma*.
Trg: incl 9 BAe/BAC-167 *Strikemaster*.
AD: 1 bn (4 btys) with 8 twin Improved *HAWK* SAM.
AAM: R-550 *Magic*, Super R-530, AIM-9 *Sidewinder*.
ASM: AS-11/-12.
(Store: 12 BAe *Lightning*, 9 BAe *Hunter*.)
(On order: 6 AS-332F *Super Puma* hel; 12 *Exocet* AM-39 ASM; AD radar and command system.)

PARA-MILITARY:
National Guard: Palace, Border Guard.
20 V-150, 62 V-300 *Commando* APC.

* Excl capital expenditure.

LEBANON

Given the continuing conflict in the Lebanon, the development of at least two economies, the political impotence of the President and the National Assembly, and the existence of several armed forces, it is no longer possible to provide macro-economic, population or meaningful defence economic data.

There are no longer any truly 'national' forces. Even the respective sectarian militia forces vary in their degrees of cohesion. They all have small regular cadres, rapidly expanded by mobilizing reserves. Much of the equipment of the former national forces is held by these groups; some is stored unserviceable. The militias have their own ources of supply, and it has not been possible to determine types and quantities accurately.

CHRISTIAN:

ARMY: some 15,000.
5 nominal brigades.
Equipment:
Tks: some 90 M-48 A1/A5. **lt:** 50 AMX-13 (35 with 75mm, 15 with 105mm guns).
AFV: recce: 80 *Saladin*, 20 *Ferret*. **APC:** 300 M-113, *Saracen*, 20 VAB-VTT.
Arty: guns: 130mm: M-46. **how:** 122mm: 18 M-102, M-1938/D-30; 155mm: 36 M-50, M-114, M-198. **mor:** 200 81mm; 120mm.
ATK: RL: 85mm: RPG-7; 89mm: M-65.
RCL: 106mm.
ATGW: *ENTAC*, *Milan*, BGM-71A *TOW*.
AD: guns: 20mm; 23mm: ZU-23; 30mm: towed; 40mm: M-42 SP.

NAVY: some 300.
Base: Juniye.
Patrol craft: 4: 1 38-m, 3 30-m coastal⟨.
Landing craft: 2 Fr EDIC 670 ton.

AIR FORCE:
1 operational base.
Equipment (?operational):
Ftrs: 7 BAe *Hunter* F-70.
Hel: 1 sqn:
attack: 4 SA-342 *Gazelle* with SS-11/-12 ASM;
tpt: (med): 7 Agusta-Bell AB-212; 12 SA-330 *Puma*; **(lt):** 9-SA 315/316 *Alouette* II/III.
Trg: 5 BAe *Bulldog*, 3 CM-170 *Magister*.
Tpt: 1 DH *Dove*, 1 Rockwell *Turbo-Commander* 690B.

PARA-MILITARY:
Ministry of the Interior:
Internal Security Force 8,000 (largely ineffective: law courts closed); 30 *Chaimite* APC.
Customs: 1 *Tracker*, 5 *Aztec* patrol craft.

MILITIAS:
Lebanese Forces Militia (*Kata'eb* = Phalange): 4,500 regulars, 30,000 reservists.
Equipment:
Tks: 110 T-34, 50 M-48; 5 M-4, 55 T-54.
lt: some 20 AMX-13 tks.
APC: M-113.
Arty: some 100: 122mm, 130mm, 155mm.
mor: 60mm, 81mm, 120mm.
ATK: RPG-7.
AD: 12.7mm, 14.5mm, 23mm guns.
Patrol boats: 1 *Tracker*, 2 *Yatush*.

Guardians of the Cedars: (Right-wing): ?300.

Marada Brigades (Zehorta Liberation Army) (pro-Syrian): ?200.

South Lebanon Army (SLA; Israeli-backed): Maronite and some Shi'ite: perhaps 1,000.
Equipment:
TKS: 40 M-4, 15 T-54.
Arty: M-1938 122mm, M-46 130mm, M-198 155mm.

Al-Tanzim: (extremist): ?600.

DRUZE:

1 nominal army bde.

MILITIA:

Progressive Socialist Party (Jumblatt): (5,000 regular; perhaps 12,000 reservists);
Equipment:
Tks: 50 T-34/-54.
APC: BTR-60/-152.
Arty: 122mm, 130mm. **MRL. mor:** 82mm.
Patrol craft: 18 small.

SUNNI:

1 nominal army bde.

MILITIAS:

Islamic Unity Movement (*Taweed*): Tripoli, (1,000), small arms incl ATK.

Al-Mourabitoun (independent Nasserites, underground: (400).

October 24 Movement (secular).

Junudullah ('soldiers of God', PLO-financed): (?few hundred).

SHI'A:

3 nominal army bdes.

MILITIAS:

Amal (orthodox pro-Syria; Berri): (6,000 regulars; some 10,000 reservists).

Equipment:
Tks: M-48, 50 T-54/5.
AFV: recce: *Saladin*. **APC:** VAB, BTR, M-113.
Arty: guns: 130mm. **how:** 105mm, 122mm, 155mm. **MRL:** 107mm, 122mm.
ATK: guns: 85mm, 100mm. **ATGW:** AT-3 *Sagger*.
AD: guns: 23mm ZU-23. **SAM:** SA-7.

Al Amal al Islam (Islamic Amal; break-away faction, links with Iranian Revolutionary Guard Corps): (600).
Equipment incl
Arty: 130mm. **mor.**
ATK: RL: RPG-7.
AD: guns: 20mm ZPU-2.

Hizbollah ('The Party of God'; fundamentalist, pro-Iranian): (1,000).
Equipment incl:
AFV, arty, RL, RCL, ATGW, AA guns.

Islamic Resistance Movement (*Hizbollah*-linked): (400).
Equipment:
ATK: RL: 'Grad' (BM-21 122mm). **ATGW:** AT-3 *Sagger*.

OTHER:

Lebanese Arab Army: Lebanese Army deserters; pro-Syrian (numbers decreasing).

Lebanese National Resistance Front: umbrella for anti-Israeli forces in South Lebanon.

LIBYA

GDP	1984ε: D 6,700 bn ($22.627 bn)	
	1985ε: D 5.900 bn ($19.926 bn)	
growth	1983: –21.0%	1984: –4%
Inflation	1983: 9.0%	1984: 11.0%
Debt	1984ε: $2.0 bn	1985ε: $4.0 bn
Def exp	1982ε: D 210.0 m ($709.338 m)	
$1 = D	(1982/3/4/5): 0.2961	

D = dinar

Population: 3,800,000

	18–30	*31–45*
Men:	455,000	390,000
Women:	375,000	264,000

TOTAL ARMED FORCES:
Regular: 71,500.
Terms of service: selective conscription, term varies — 3 to 4 years.
Reserves: People's Militia, some 40,000.

ARMY: 55,000.
1 tk, 2 mech inf div HQ.

NYTimes 4/30/86

Church-State

Room for Darwin And the Bible

By Irving Kristol

The argument over whether (or how) the scientific theory of evolution should be taught in our public schools, as against the religious doctrine of "creationism," generates high passions. The consequence, alas, is that the debate has become a dogmatic crusade on both sides, and our educators, school administrators and textbook publishers find themselves trapped in the middle.

It should not be this way. It is largely a pointless conflict, because its terms have been erroneously formulated. There is no single theory of evolution as taught in our elementary or high-school biology textbooks. And the religious doctrine of creation is a more complicated affair than many of our believing Christians think it is.

Practically all biologists, when they engage in scientific discourse, assume that the earth's species were not created by divine command. As scientists, they could not make any other assumption. But they agree on little else — a fact which our textbooks are careful to ignore, lest it give encouragement to the religious. There is no doubt that most of our textbooks are still written as participants in the "warfare" between science and religion that is our heritage from the 19th century. And there is also little doubt that it is this pseudo-scientific dogmatism that has provoked the current religious reaction.

If evolution were taught more cautiously, it would be far less controversial

The majority of our biologists still accept, and our textbooks still teach, the "neo-Darwinian synthesis" — Darwin's original teaching as modified by modern genetics. We all know this theory: Living creatures emerged by evolution from inert matter, and the original species evolved over time into the species we are familiar with — including, of course, our own species, homo sapiens. The mechanism of this evolution is "survival of the fittest," speeded up by the occasional genetic mutation.

Though this theory is usually taught as an established scientific truth, it is nothing of the sort. It has too many lacunae. Theological evidence does not provide us with the spectrum of intermediate species we would expect. Moreover, laboratory experiments reveal how close to impossible it is for one species to evolve into another, even allowing for selective breeding and some genetic mutation. There is unquestionably evolution *within* species: every animal breeder is engaged in exemplifying this enterprise. But the gradual transformation of the population of one species into another is a biological hypothesis, not a biological fact.

Moreover, today a significant minority of distinguished biologists and geneticists find this hypothesis incredible and insist that evolution must have proceeded by "quantum jumps," caused by radical genetic mutation. This copes with some of the problems generated by neo-Darwinist orthodoxy, but only to create others. We just don't know of any such "quantum jumps" that create new species, since most genetic mutations work against the survival of the individual. So this is another hypothesis — no less plausible than the orthodox view, but still speculative.

And there are other speculations about evolution, some by Nobel prize-winning geneticists, that border on the bizarre — for example, that life on earth was produced by spermatozoa from outer space. In addition, many younger biologists (the so-called "cladists") are persuaded that the differences among species — including those that seem to be closely related — are such as to make the very concept of evolution questionable.

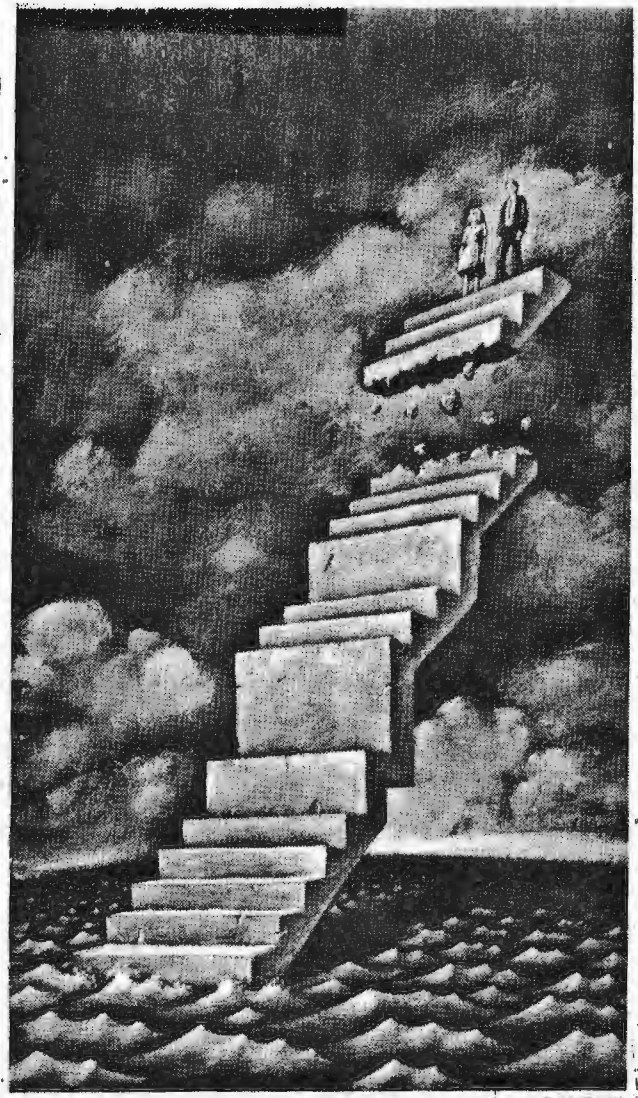
So "evolution" is no simple established scientific orthodoxy, and to teach it as such is an exercise in dogmatism. It is reasonable to suppose that if evolution were taught more cautiously, as a conglomerate idea consisting of conflicting hypotheses rather than as an unchallengeable certainty, it would be far less controversial. As things now stand, the religious fundamentalists are not far off the mark when they assert that evolution, as generally taught, has an unwarranted anti-religious edge to it.

"Creation" is a matter of faith, not science. Such faith is perfectly defensible, theologically. Indeed, many learned and sophisticated religious thinkers — Soren Kierkegaard and Karl Barth, most notably — have argued that "a leap of faith" is in some sense a "natural" and preordained fulfillment of the human condition. Such writings may well be read with profit in college courses on religion, but are inappropriate to the lower school grades. And in any case such theological analysis, establishing the grounds of faith, has nothing to do with the study of biology.

Moreover, even if one wished to teach "creationism" in a high-school course in religion, one would quickly find oneself in a booby-trap. Exposing the doctrine to literate, inquiring minds results in all sorts of intellectual complications. For such minds, theologians have offered all kinds of subtle and sophisticated interpretations — analogical, symbolic, esoteric and mystical. Such theological discussions, expressed in the rhetoric and imagery associated with a particular creed, are best left to parochial schools or to the churches.

The current teaching of evolution in our public schools does indeed have an ideological bias against religious belief — teaching as "fact" what is only hypothesis. But religious instruction in our public schools is something we have carefully avoided for most of American history, for the good and obvious reasons that in a pluralist society, theological issues can so easily become a focus of conflict. If believing Christians are persuaded that their children are not exposed to anti-religious instruction, one may reasonably hope that they will feel comfortable once again with this American tradition. □

Irving Kristol is professor of social thought at New York University's graduate school of business and co-editor of The Public Interest.



Rafal Olbinski

FOREIGN AFFAIRS

Uncharted Adventures

China's urban-reform experiment

CHONGQING, China

This World War II capital of China during the Japanese occupation once again has a special role to play. It is the largest of the "experimental cities," indeed the largest city in China, with 14 million compared with Shanghai's 12 million. And it is expected to demonstrate that urban reform can transform the industrial cities the way agricultural reform has changed the countryside.

Nobody doubts that success. China can now feed its billion people, an extraordinary achievement compared not only with its own need for huge grain imports a few years ago but with the Soviet Union's continuing obligation to buy food.

The principles for urban reform are not different: provide incentives for work, reduce administrative interference with economic decisions, open a role for market forces and proceed with enough caution so mistakes can be corrected before they are made on a vast scale.

But changing how industry works is much more complicated than freeing peasants to resume their traditional patterns of family farming and marketing. And the new measures cut much closer against the grain of orthodox Communist practice.

The official label for the current policy is "socialist [read "planned"] commodity economy." And read "commodity" as a euphemism for the market. But don't expect anything akin to the Western idea of a mixed economy, because the opening for private enterprise remains at the small end of industry and basic controls are not to be abolished.

Here and there, practices familiar to capitalist economies are being introduced. These include bankruptcy, but only in limited and dire cases; contract labor instead of lifetime tenure at a job; very limited issue of stocks and bonds, though they cannot be traded; and above all an enlargement of the role of competing market forces and of the right of factory managers to respond to them.

China is not going capitalist, and simplistic souls who choose to discern any such decision in its ventures into uncharted social economics are only creating deceptions. But it may be redefining what a Communist society is supposed to mean, a standard so far derived primarily from Stalin. That is exciting in itself, and could have world-shaking consequences.

For now, all the focus is on efforts to modernize, with just enough marginal attention to theoretical canons so as to avoid tiresome debate about fidelity to the Marxist creed. Traveling about a bit, it is easy to find all kinds of people eager to explain what has changed, but not what it means.

It's hard to believe these are the same people who sustained the Cultural Revolution. As one editor said to prove it couldn't happen again, "Failure can be the best guarantee of success." Or is that just another kind of mass-think system? Officials show superb confidence in their ability to "learn from facts," in Deng Xiaoping's phrase, because what is "correct" will be obvious to all. Eyes newly opened, or again the leader's authority?

Downriver at the Yangtze port town of Wuhan, three million population and another flourishing "experimental" city, the 39-year-old ebullient Deputy Mayor, Wang Ming Quan, explains with bursting local pride that the agricultural reform meant some peasants "could get rich first," and now the urban reform means some cities can "get rich first."

Wuhan is doing it Chicago-style, reviving its old commercial customs by becoming a merchandise mart between thriving east coast cities and lagging inland areas. There is a hustle about the place that smells prosperity.

That comes particularly from reanimation of commerce, which is recognized as a spur to production, and production is what the reforms are all about. A major change is the "division of labor" between the Communist Party secretary of each enterprise and its manager. Mr. Deng has told the party to get out of the way of management.

At the Machine Tool Construction Factory in Chongqing, the 46-year-old manager, Chen Zisheng, said he had definite responsibility for decisions now. The party secretary, 40-year-old Zhang Xiaochuan, listened with a taut smile and granted that, "As a party member, I must obey the party's decision" about the manager's role. But, he added, the manager has to take a personal risk along with his personal responsibility.

These snippets give a bare notion of what economic reform is coming to mean here. It will certainly continue, but not necessarily smoothly. China is almost totally absorbed by it, and while foreign help is sought, that won't be decisive. This is an internal drama of global implications. □

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HIGH DIVIDENDS FROM A U.S.—ISRAELI PARTNERSHIP ON STRATEGIC DEFENSE

INTRODUCTION

The Israeli decision to participate in research on the Strategic Defense Initiative (SDI) promises to be the most important project ever formally undertaken between the two nations. Never before has a joint U.S.-Israeli military project offered so many strategic, technological, economic, and political benefits for both countries. The U.S. stands to gain not only a stronger ally in the Middle East, but a much improved technology base for the SDI program. Israel stands to gain a stronger defense capability and access to the technical and economic benefits of participating in the world's most advanced technology research program.

Specifically, building an Israeli defense against Soviet-supplied SCUD-B, SS-12, SS-21, and SS-22 surface-to-surface missiles deployed in Syria would serve U.S. interests by strengthening Israel's defenses, which should help stabilize the Middle East's military balance. It would benefit SDI by calling on Israeli expertise in laser technology, aero-mechanics, computer software, microelectronics, and propulsion systems. It would accelerate the SDI program by taking advantage of the rapid weapons acquisition process in Israel. It would create technological spinoffs for conventional armaments that would improve Israel's ability to coordinate its military forces and stop attacks by enemy tanks and heavy armored vehicles. And it would stimulate the Israeli economy by imparting to Israel some of the estimated $5 trillion to $15 trillion commercial value of SDI high technology spinoffs.

To reap these benefits, it is vital that the U.S.-Israeli cooperation on SDI be allowed to develop fully. Thus the Reagan Administration should:

1) vigorously oppose congressional efforts to reduce allied participation in the SDI research program;

2) establish a U.S.-Israeli working group as soon as possible to accelerate research and development on an anti-tactical ballistic missile (ATBM) system for Israel; and

3) begin working with Israel to upgrade the Israeli air defense system around air bases, mobilization centers, and cities as a first step toward a more comprehensive defense system against tactical ballistic missiles.

THE TACTICAL BALLISTIC MISSILE THREAT TO ISRAEL

When Ronald Reagan unveiled his Strategic Defense Initiative in March 1983, he offered U.S. allies the opportunity to participate in the project. Three years later, in May 1986, with the unanimous support of the Israeli Cabinet, Israeli Defense Minister Yitzhak Rabin signed a Memorandum of Understanding with U.S. Secretary of Defense Caspar Weinberger signaling a go ahead for Israeli involvement in the program. This prompt Israeli response derives in large part from the growing threat to Israel from ballistic missiles armed with conventional, chemical, and nuclear warheads.

Arab states confronting Israel have accumulated weaponry that totals well over $100 billion. Israel's chief adversary is Syria, which boasts Soviet-supplied SCUD-B, SS-12, SS-21, and SS-22 surface-to-surface missiles. These missiles--even when carrying non-nuclear warheads--can destroy Israeli military control centers, storage depots, and airfields almost without warning. Virtually all of Israel's airbases north of Jerusalem would be vulnerable to attack and could be neutralized for up to 24 hours. This would allow Syria to overrun Israeli forces on the Golan Heights.

Israel currently has ten airbases potentially vulnerable to Syrian short-range missiles.[1] Ten direct hits by either a chemically armed or conventionally armed SS-21 could completely incapacitate a base. The Syrians now possess about two dozen SS-21s. In the near future, the Soviets could supply Syria with enough missiles to knock out all of Israel's bases with a first strike.

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1. For a detailed analysis of the Syrian missile threat to Israel airbases and major cities, see Seth W. Carus, "The Threat to Israel From Tactical Ballistic Missiles," testimony before the Senate Subcommittee on Strategic Nuclear Forces, January 30, 1986.

The Syrian SS-21 short-range ballistic missiles have a range of 75 miles and an accuracy reported to be within 100 yards. They can strike major Israeli population centers. A surprise attack by these missiles would seriously disrupt the call-up of reserves, the lifeline of the Israel Defense Forces. Israel believes, moreover, that Syria will soon receive the SS-23 with greater accuracy and more than four times the range of the SS-21. It could hit almost any point within Israel.

The use of surface-to-surface missiles in the Iran-Iraq war has revealed to Israeli officials the vulnerability of population centers. One of Israel's most pressing needs thus has become to develop technologies to counter this threat. That SDI offers a promise to remedy this vulnerability is understood by the Israelis.

THE ADVANTAGES OF ISRAELI PARTICIPATION IN SDI

The U.S. invitation to its allies to participate in SDI stated that the program will "examine technologies with potential against shorter-range ballistic missiles." One of the first technologies likely to emerge from SDI research will be for anti-tactical ballistic missiles. SDI technologies thus could enable Israel to defend itself rather than rely upon the risky strategies of deterrence by threat of retaliation or preemptive attack. The development of an Anti-Tactical Ballistic Missile System (ATBM) or a theater defense system offers a near-term deployment option for Israel. Interceptor weapons such as kinetic energy kill systems, ground-launched hypervelocity interceptor missiles, Rail guns, laser beams, particle beams and various other intercept technologies are already being tested.[2] Defense against SS-21, SS-22, and SS-23 missiles could employ a wide range of current technologies since the trajectories of the missiles are lower, and the speeds are slower than those for ICBMs.

What Kind of System

Upgrading existing air defense systems to meet the short-term ballistic missile threat would be the first step in creating a theater defense system. Newer technologies, however, offer great promise. An ideal candidate for an Israeli defense against the Syrians' SS-21 is the U.S. Navy's "Aegis" acquisition radar deployed with a two-stage

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2. Israel is reported to be able to deploy a ground-based free electron laser weapon system capable of intercepting ballistic missiles as part of an ATBM system during the 1990s. The system could use a single system to defend the entire country and would rely upon ground-based relay/fighting mirrors instead of space-based systems. Aviation Week and Space Technology, October 20, 1986, p. 27.

hypervelocity missile being developed by Rafael Corporation in Israel. Many of the major components for the missile have already been flight tested. Also promising are a modified version of the U.S. Army's "Patriot" air defense missile and the French "Aster" anti-ballistic missile, which could engage warheads inside the atmosphere.

A point defense at a lower altitude could be composed of proved "off the shelf" anti-ballistic missile technologies, which might also include Patriot surface-to-air missiles. Newly devised "Swarm Jets," hypervelocity Rail guns, lasers, and various other ground-based interceptors could serve as a second layer to catch missiles in the terminal phase of their trajectories that permeate the higher altitude defense.

Each layer when utilized alone would have an 80 percent reliability rate, and when combined, could produce a 96 percent reliability rate. Syria, therefore, would need to target 500 missiles per base, instead of ten missiles, to guarantee destruction of each base. To wipe out all Israeli bases then would require 5,000 SS-21s. Logistics, costs, and political and strategic constraints make this an almost impossible number for Syria to deploy. Without SDI, the Syrians now require only 200 SS-21s to achieve the same results.

Enhancing Israeli Conventional Warfare Capability

SDI technologies should spill over considerably on Israel's conventional capabilities. Weapon designs and battlefield management systems, for instance, could be upgraded via cooperation with the U.S. in developing and sharing such state-of-the-art technologies as electronics, optics, computers, and energy. Domestic defense production enhanced by SDI contracts and shared expertise will contribute to Israeli self-sufficiency and the development of advanced weapons systems necessary for Israel's survival. Writes Avram Schweitzer, an Israeli journalist for the widely respected Ha'Aretz newspaper: "A system that can make out, identify, hone-in-on, and destroy an object less than 100 feet long, moving at near Mach 1 speed at a distance of 10,000 miles, is essentially a [ballistic missiles defense] system, the application of which could do to the foot soldier, the artillery piece, the tank, or the helicopter, what its space-progenitor is supposed to do to strategic missiles. To be in on this kind of technology...could mean the purchase of peace for Israel, or more realistically, the imposition, by non-aggressive means, of a permanent state of non-belligerence along its borders."[3]

The Israelis are already researching the possibilities of converting offshoots of SDI hypervelocity Rail guns into weapons capable of being mounted on tanks and armored vehicles. Because of

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3. Midstream, June/July 1985, pp. 6, 7.

SDI, Israel will be in a better position to update aviation electronics and keep combat command and control systems close to state-of-the-art. The 1982 Lebanese conflict demonstrated the importance of these components for military success during Israel's confrontation with Syria.

Reducing the Likelihood of a Future Arab/Israeli Conflict

Unable to match the numbers of men and weapons fielded by its adversaries, Israel has had to rely on its qualitative advantage. But because of economic restraints, and the influx of Soviet, British, French, and even American weaponry to its adversaries, Israel's qualitative deterrent has eroded seriously. Syrian short-range missiles, for example, soon may be able to destroy Israel's fighter aircraft on the tarmac in a surprise attack. Israel's only way to counter such an imminent attack from surface-to-surface missiles would be by a preemptive strike against the missiles before they can be fired. Such a preemptive strike, of course, could ignite a new war in the Middle East. SDI, however, could enable Israel to regain its qualitative edge and thus be able to counter an impending missile strike without having to take preemptive action. Such a capability to deter Syrian aggression would not only enhance Israeli security immeasurably, but stabilize the entire region as well.

Insurance for Israel's Reserve System

The bulk of the Israeli Defense Forces consists of reserves. Israel's standing armed forces number 174,000. The reserves bring IDF to around 500,000--and most of this can be done within 72 hours. Israel's strained economy, however, cannot bear the cost of a constant reserves mobilization.

An ATBM system for Israel would help protect such Israeli mobilization capabilities as storage depots, roads, and supply lines which could seriously disrupt the call of the reserves. Moreover, by providing Israel defensive cover for calling up the reserves, an ATBM system would give the Israelis more time to decide and prepare for mobilization.

Strengthening the U.S.-Israeli Relationship

The U.S.-Israeli relationship will grow as the SDI program expands. Shared research and development between industries and applications of weaponry in the conventional arena will build a new array of relationships. This could lead to heightened strategic cooperation beyond anything envisioned at present.

Israel also will benefit from SDI relationships with those other U.S. allies that have accepted the President's offer. Great Britain and West Germany already have begun discussions on hybrid technological ventures for theater defenses. With an SDI role, Israel

could assume a de facto allied membership by helping to guard the southern flank of NATO.

Economic Benefits

U.S. federal budget constraints could restrict future U.S. aid to Israel. Possible aid drops, however, could be offset by SDI contracts awarded to Israeli defense industries. The Pentagon already has signed three contracts with Israel. Israeli research facilities and firms already have submitted some 150 science and technology proposals (including a project for the study of the basic features of regional anti-tactical ballistic missiles systems) to the U.S. Strategic Defense Initiative Organization. Since high-tech products now account for 40 percent of Israel's industrial exports, the rapid development of SDI-related industries will boost economic growth.

Technological spinoffs could include new computer systems, energy sources, communication devices, medicines, and thousands of consumer products. SDI also will channel research funds to Israeli universities and will help revitalize the Israeli scientific community.

Israeli defense-related industries will receive contracts, strengthening strategic and economic cooperation between Israel and the United States. Major General David Ivry (Ret.), former Chairman of Israel Aircraft Industries, confirmed that Israeli industry is committed to playing a significant role in the SDI program. Such high-tech firms and organizations as Ivry's, Technion, Tadiran, Rafael, Elbit, El Op, Elisra, and the Sofek Nuclear Research Centre will be the likely recipients of the initial SDI subcontracts.

New opportunities in high-tech jobs surely could prevent Israeli scientists from leaving the country to seek opportunities in the West. In fact, an expanded high-tech industrial base in Israel may serve to be an attractive incentive for Jewish scientists abroad to move to Israel. In a sense, the economic importance of SDI to Israel is equally as important as the strategic benefits toward ensuring Israel's survival.

ISRAELI CONTRIBUTIONS TO SDI

Israel can contribute substantially to the SDI effort.

Technological Innovations and Battlefield Experience

Israel leads the world in the share of its population employed in research and development. There are approximately 300 engineers and scientists per every 10,000 people in Israel. Israel excels in the development of lasers, aero-mechanics, computer software, and

propulsion systems. Israel's vast battlefield experience, meanwhile, can be of great value to SDI. Example: the development of such U.S. weaponry as the F-16 Fighting Falcon interceptor aircraft was enhanced by lessons Israel learned during the Lebanon war.

The Israeli Defense Forces' battle experience ranges from remotely piloted vehicles (drones) to command, control, and communications (C^3). This could enhance development of SDI.

A Catalyst for the SDI Program

Because of the precarious nature of the Middle East, the Israelis cannot afford long research and development time spans to move weaponry from the drawing board to the field. The Israelis team the military with scientists to conceive new technologies quickly. The Israeli Weapons Acquisition Cycle, therefore, provides a quick reaction capability and an emergency "surge" production capability. This could catalyze the entire SDI program by accelerating its pace.

The Israeli military/industrial partnership has advantages over the American. Since the Israeli military is small, it has a more fluid organizational structure, and there is more room for individual initiative in weapons proposals. Israel, moreover, need not contend with a strong anti-national security political network. Israel's historical experience dictates that military strength is the best insurance for survival.

CONCLUSION

Deployment of a ballistic missile defense system in Israel is feasible and necessary. An SDI system in Israel should prevent its adversaries from contemplating attack. Such a system also could guard against a conflict arising from an accidental launch or conventionally armed shorter-range missiles. A joint U.S.-Israeli project, moreover, will not only improve the SDI program with Israeli technical expertise but produce important technical spinoffs for conventional armaments, and it could stimulate economic growth in Israel by encouraging the development of marketable high-technology spinoffs. Finally, U.S.-Israeli cooperation on SDI will set a good example in participation for Western Europe.

For both Israel and the United States, the Strategic Defense Initiative is an opportunity and insurance policy for survival. Recent congressional efforts to restrict SDI contracts to allies was vigorously and successfully opposed by SDI supporters in Congress and by the Reagan Administration. The Administration must continue to

oppose amendments designed at reducing allied support for SDI by undermining competitive bidding on projects.

To facilitate research on a tactical ballistic missile defense system for Israel, the U.S. should form a working group with Israel and NATO allies to accelerate research and expedite cooperative development not only of an ATBM system but improved air defense systems as well. Establishing ATBM defenses in Israel and in Western Europe would greatly reduce the chances of a successful preemptive attack against Israeli and NATO forces. This would, in turn, deter aggression and thereby help preserve the peace in two regions of vital interest to the U.S.

SDI cooperation serves the interests of both the U.S. and Israel. It strengthens U.S. and Israeli ties as well as the SDI program itself. But clearly cooperation is most important for Israel. For the ability to defend itself against a growing Syrian short-range ballistic missile threat may some day be necessary for Israel's very survival.

Prepared for The Heritage Foundation
by Charles Brooks, an official of
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THE REVOLUTION IN U.S.-ISRAEL RELATIONS

by

Thomas A. Dine
Executive Director
American Israel Public Affairs Committee

Washington, D.C.
April 6, 1986

My congratulations to Bob Asher on his re-election as AIPAC's president. I have been looking forward to saying something about Bob to all of you. Over the last two years, I have worked extremely closely with him. He is farsighted, he is demanding, he is a leader of whom the pro-Israel community should be proud. AIPAC is a stronger organization because of him. And I look forward to working with him, together, side-by-side, for the next two years, solidifying and energizing the U.S.-Israel relationship as it ascends to ever greater heights.

Let me join Bob in praise and enthusiasm for AIPAC's new slate of elected officers, our Executive Committee, and National Council members. Homegrown from the grassroots, you set the agenda. Of the entire pro-Israel community, you are the pre-eminent political activists in this country. By your community and national efforts, you are the ones who make such a decided difference in the very positive position Jerusalem has in America's foreign policy and among the American public.

This is -- again -- a tremendous turn-out for AIPAC's annual Policy Conference. What a thrill it is to see so many in attendance -- of all generations. From around the country have come our top chieftains: state chairpersons, congressional caucus leaders, key contacts, leaders on so many local fronts, on so many issues of concern to us as American citizens.

And if you want to get a glimpse into the 21st century, look around you. The more than 500 students are high schoolers and collegiates.

They have come from a variety of places like Utah and Iowa, Kansas and Alabama, Vermont and Arizona -- and New York. This is the largest number of students ever assembled at an AIPAC policy conference!

As we march into the 1990s and beyond, these young people will be marching with us! They are the vanguard, the vanguard of a new generation that appreciates the imperative for political involvement, and for political activism. AIPAC students match their passion with their political acumen. They are literally transforming their campus environments. And, in time, they will transform the political landscape of this nation. On the college campuses of America, AIPAC has seen the future -- and it works!

Jews and Christians, young and old, white and black, liberals and conservatives, Democrats and Republicans, energetic and enthusiastic and responsible citizens, we are here on behalf of our common cause -- to expand, to deepen, to enhance the partnership between Washington and Jerusalem.

The theme of this conference is "People made the difference in policy and politics."

Each of you gives our cause strength. You are the heart of AIPAC. Together we are strong. Each one of us needs each other.

And nowhere is this more clearly expressed than in the Congress of the United States.

Congress functions both as a forum through which public opinion is brought to bear upon the whole federal government and as a medium for gathering and disseminating information for the enlightenment of the people. Capitol Hill is the repository of our democratic principles. It is in Congress that laws are made and national policy codified. No one appreciates these facts more than those of us in this room tonight -- AIPAC's members and staff.

The barometer by which one measures Israel's standing among the people of America is by what takes place on Capitol Hill. Here U.S. support for Israel is built, maintained, and advanced. Congress is the bedrock of the U.S.-Israel relationship.

Just a year ago I stood before you and laid out a legislative agenda that some said was too ambitious. I am here tonight to report that we have met or exceeded every one of our goals.

Congress in 1985 passed -- and the President signed into law -- the first foreign aid bill since 1981. Despite the budget-cutting mood here in Washington, the legislation contained the most generous Israel aid package ever: $3 billion in regular aid plus an additional $1.5 billion in emergency economic aid. All the funds are grants. The $3 billion in aid represents an increase of $400 million above the previous fiscal year and a doubling of grant assistance since 1983.

When Senator Richard Lugar (R-IN) took the aid authorization bill to the Senate floor as the new chairman of the Committee on Foreign Relations -- and he is there thanks to the defeat of Charles Percy -- he wanted to plant the bill firmly into the most solid political foundation possible. He began with something easy for his colleagues to vote on -- one and a half billion dollars in emergency economic aid money for Israel. The amendment passed unanimously! There could be no better indicator of support for Israel than that.

Senator Lugar's tactic of starting with Israel acknowledges that aid to Israel is the locomotive that powers the whole foreign aid train through the legislative process. It was a signal also to the Administration that foreign aid passes largely because of support for aid to Israel, and that Israel is a Congressional priority.

But there was more, much more, in that landmark legislation by the time it reached the President's desk.

-- Funding was assured for Israel's Lavi aircraft project, Israel's fighter for the 1990s.

-- The United States will no longer pay the bills for United Nations programs which benefit the PLO.

-- And funding was increased for a unique cooperative program that combines American aid with Israeli know-how to help developing nations.

-- Four strong messages for the peace process were contained in that legislation as well.

* First, the Egyptians were put on notice that America's generous aid to that country is linked to its performance in sustaining its peace treaty with Israel.

* To Jordan, Congress said it wanted to see a tangible commitment to a peace process, not just more rhetoric, before a major arms transfer would even be considered.

* For the Saudis, Congress has now legislated that they must contribute substantially to the peace process before the AWACS sold in 1981 can be delivered later this year. We will be taking a much closer look at that issue in the weeks ahead as the Congress begins probing it in depth.

* And to those in the State Department who were anxious to bring Yassir Arafat to the peace table (instead of the docket where he belongs), Congress barred all US officials from direct contact with the PLO unless it publicly accepts UN Resolutions 242 and 338, recognizes Israel's right to exist, and renounces terrorism.

This year we will be lobbying for another grant of $3 billion in aid for Israel, as recommended by the Reagan Administration in the Gramm-Rudman environment.

The generous scope and consistently supportive provisions of U.S. aid for Israel, especially during this period of deficit reduction, reflect the widely-held belief, both in Congress and in the Administration, that a strong, economically stable Israel is in the highest interest of the United States.

That is also why the Congress approved the final Free Trade Area agreement and implementing legislation by an overwhelming 422 to 0 vote in the House and by unanimous voice vote in the Senate.

And just a few weeks ago, after 37 years of delay, the Senate finally gave its advice and consent to the Genocide Convention, a treaty the Government of Israel ratified in 1950.

But the real story of last year was one that each of you was personally involved in. I want to pay special tribute tonight to you, to Congress, and to our guest speakers tomorrow night and Tuesday morning, Senators Ted Kennedy (D-MA) and John Heinz (R-PA) and Congressman Larry Smith (D-FL). Together, you blocked the Jordan arms sale! Together, you set the pursuit of peace above the sale of arms as this nation's priority.

The message was loud and clear: First send in the peace makers, not the arms merchants. As Senator Heinz put it, "selling advanced weapons prior to direct negotiations between Israel and Jordan is premature and unwarranted."

Our strategy, frankly, was to convince the Administration not to push for the arms sale until King Hussein had taken an irrevocable step toward peace. Our goal was to see him seated across the negotiating table from the Prime Minister of Israel. If we have learned anything it is that arms sales to Israel's enemies are no incentive for peace. On the contrary, when we have withheld weapons, as we did with Egypt in the mid-1970s, we witnessed progress toward reconciliation. This was clearly the view of overwhelming majorities in both parties and both houses of the Congress.

Nonetheless, despite all the warnings, the Administration sent its $2 billion jets-and-missiles package for Jordan to Capitol Hill on October 21. Twenty-four hours later nearly three-quarters of the U.S. Senate introduced a resolution to disapprove that arms sale. This was followed a few days afterward by a 97-to-1 vote in the Senate (and later unanimously in the House) shelving the sale for another 100 days or until "direct and meaningful peace negotiations between Israel and Jordan are underway." As the March 1, 1986, deadline for action approached, as Congressional opposition continued to grow and was strong enough to override the President's veto, with still no sign of progress in getting King Hussein to the table, the Administration reluctantly

announced it was indefinitely postponing its arms proposal.

This did not happen by accident. It came about because you and thousands more like you all around this country worked very hard. You spoke, and wrote, and phoned, and visited your Representatives and Senators. You let them know clearly how you felt about selling advanced fighter jets and missiles to a country still at war with Israel which shares her longest hostile border. Your message, in the words of one Congressman, was "no peace, no planes"!

By withdrawing the arms package, even the Administration conceded that there had been no progress on the peace front. Even King Hussein acknowledged this when he finally blamed the breakdown of his peace initiative on Yassir Arafat.

You shaped the debate by demanding that major arms sales be predicated on a viable peace process. You articulated your views in an effective manner to your elected officials. That is the essence of the democratic process, and it is the essence of AIPAC. It is the essence of America. That is what we are all about. You made the decided difference. I salute you.

In reviewing this record, it is clear that we have grounds for great satisfaction. We have succeeded in building extraordinary support for Israel in Congress.

But I want to use this annual occasion to do more than just list our achievements. As Executive Director, I want to take the opportunity to delve more deeply into the issues before us as an organization.

This year, we meet at a time when the community is seized with a controversial issue concerning the Executive branch. The question is, when Israel is increasingly dependent upon the United States, how do we strike the right balance in our policy toward the Executive branch? Our goals depend very much on the decisions that the President and his top officials make toward Israel specifically and the Middle East generally. In these areas, a close and consultative relationship between our community and the Administration is a mainstay of U.S.-Israel relations.

Yet there are, inevitably, other policy issues on which we are destined to disagree with this or any other administration. In some cases, once in a while, administrations are just plain wrong! Or, to be a little more charitable about it, in some cases they are trying to solve a different problem with another country, but their actions, while not <u>intended</u> to harm Israel, have the effect of eroding Israel's narrow margin of security.

We are the watchdogs of one key issue, the U.S.-Israel partnership. In some cases, we oppose Administration policy, particularly if it threatens Israel, even if this opposition strains our relations with the President.

But we know there is a tension between these two aspects

of our work, and there is a dilemma of when to work with and when to work against this or any administration. We also know that every choice has a price. If we are working with an administration to achieve vital goals, we pay a price in not facing down some policies which are adverse but are in areas of lesser importance.

In the past, when we have been forced to mobilize opposition because an administration has embarked on a course that threatens damage to the Jewish state and to the higher interests of the United States, we have done so with the realization that, inevitably, we are also thereby damaging our other goals.

There is no painless, cost-free way to make the policy choices we at AIPAC must make. What we have to do is weigh carefully the costs and benefits of the alternatives before us. We try to make choices on the basis of a clear vision of our immediate and ultimate goals, and a clear strategy for achieving them.

When we make these decisions we must always be aware of the responsibilities we bear for the future of the bilateral relationship, and the future of the Jewish people. Israel may be strong today. But its enemies are also stronger than they have ever been. The enormous investment in arms that the Arabs undertook in the 1970s is now reaching maturity. Arab radicalism and Islamic fundamentalism are on the loose. Those few in the Arab world who advocated peace are either cowering in fear or dead.

We sense, deep in our hearts, that a very dark hour may visit us again, that an extreme threat may rush, perhaps with little warning, to Israel's door. When this storm does come, what we in this room have done and not done will be judged, not by the passing standards of the moment, but by the unforgiving measure of how choices made today affect the ability of the Jewish state to survive that future danger.

With this ultimate criterion in mind, let me review where we are, and explain to you the choices we have made and are making.

To put it simply, the relationship today between the United States and Israel is excellent. This relationship has entered a revolutionary era. We are no longer talking about a transformation in the relationship, we are talking about a revolution. The old order in which Israel was regarded as a liability, a hindrance to America's relationship with the Arab world, a loud and naughty child -- that order has crumbled. In its place, a new relationship is being built, one in which Israel is treated as -- and acts as -- an ally, not just a friend, an asset rather than a liability, a mature and capable partner, not some vassal state.

This Administration, this Congress, and this community -- together with Israel -- are engaged in changing the entire basis of U.S.-Israel relations. And I submit to you, these

changes in the strategic, economic and diplomatic spheres will be felt for decades to come.

Many of these changes are occurring slowly and undramatically, in ways that hardly appear in the press, so let me give you a few signposts.

Let us begin with strategic cooperation. It is hard to believe that barely two years have passed since the American President and the Israeli Prime Minister announced that the two countries would embark on joint military planning, joint exercises, and prepositioning of military equipment in Israel. But, at President Reagan's initiative and in pursuit of his vision, Israel is now being treated as an ally. What were mere words at the outset of Ronald Reagan's presidency, have now been translated into tangible actions undertaken by both countries in pursuit of their common interests as fighting democracies. Meetings of the U.S.-Israel Joint Political Military Group are now a matter of routine; joint military maneuvers and medical training exercises occur on a regular basis; U.S. Navy fighter pilots of our Sixth Fleet now train at Israeli bombing ranges in the Negev desert; visits by the Sixth Fleet to Haifa have quietly taken on the dimensions of a minor invasion, including the visit to Israel last year of some 30,000 American sailors.

This relationship is vital to the future of Israel, for several reasons. First, to have the United States standing beside Israel in this way sends a strong deterrent signal to radical forces in the Arab world, and to the Soviet Union. It tells them that any thought they might have had about driving a wedge between the U.S. and Israel, about isolating the Jewish state in order to destroy it, is foreclosed.

Second, strategic cooperation is improving Israel's access to the most advanced American technologies, and these will contribute significantly to Israel's defense. When "the few" fight against "the many", the small band must rely on qualitative advantages to offset the enemy's enormous quantitative superiority. Advanced technologies therefore are the very heart of Israel's security requirements. Here, as elsewhere, Israel is afforded the same treatment as America's other allies in Europe, Japan, Canada, and Australia. And this is being done not merely as some favor to Israel, but because Israel's brain-power has much to contribute to the development of technological breakthroughs in the area of defense.

Third, the President has declared that the U.S. will consider the use of Israeli facilities to stockpile U.S. defense items for joint use in preparation for a possible emergency in the region. Prepositioning will strengthen the ability of U.S. forces to maintain security there, while also providing Israel with an additional stockpile to draw upon in a crisis.

Fourth, the U.S. is stepping up dramatically its own purchases of defense goods and services from Israeli firms. This, too, helps to reduce the burden of Israel's defense, by

increasing production runs and reducing unit costs of defense items. And, of course, it strengthens America's defense by providing it with effective weapons at lower cost.

The whole story of this revolution in strategic cooperation cannot yet be told, because many of the most important steps are in an embryonic stage and both countries feel that greater progress can be achieved without an undue burden of publicity. Let me, however, share with you what Secretary of State George Shultz recently explained. He said the point of strategic cooperation is, and I quote, "To build institutional arrangements so that eight years from now, if there is a Secretary of State who is not positive about Israel, he will not be able to overcome the bureaucratic relationship between Israel and the U.S. that we have established." Think about that. For a Secretary of State to feel that way -- think about how far we have come.

And on the question of defending Israel, the Secretary of State forecasted, "Eight years from now, discussions about Israel's security will be different. They will be about the highest, state-of-the-art weapons technology and how Israel is taking advantage of that technology. That is how we are going to secure Israel."

So I can only re-emphasize: we are in the middle of a revolution in the area of strategic cooperation, and this President and this Secretary of State are going to leave a legacy that will be important to Israel's security for decades to come.

A similar process is taking place in the economic arena. With the Free Trade Area as a permanent basis for future trade relations between the two countries, Israel is the only country in the world to have across-the-board, two-way duty-free trade relations with the United States of America, the world's largest market. Since Israel is also an Associate in the European Common Market, it is in the unique position of being the one place on the entire globe where you can locate a factory to export freely to both the United States and Europe without tariffs. The benefits of this revolutionary change will take some years to materialize fully. This treaty will have an enormous effect on Israel's export opportunities for the rest of our lives.

But this is only one of the revolutionary changes in the economic sphere that the Reagan Administration has wrought. In 1983, as you know, the President ended the practice of giving Israel a mixture of grants and loans, and shifted instead to an all-grant basis for aid. If you were following the alarming rate at which Israel's debt burden was increasing, you can understand that this decision to cap the debt burden and end its growth is vital to the process of Israeli economic recovery.

This President, and especially this Secretary of State, have also played an important role in helping Israel to stop the galloping inflation that was raging at 800% per year, an achievement that no other democracy has ever scored in so short a period. At the same time, they helped Israel survive a foreign exchange crisis, by recommending to the Congress a multi-billion dollar special appropriation over the past few years. And, beyond this, Secretary of State George Shultz is playing a unique role in providing excellent economic advice and personal support for renewed economic development in Israel. Israel was, very frankly, hemorrhaging economically the last time we met. Today, the painful cuts are being felt, but she is getting back on her feet. Credit goes to the Government and people of Israel. But it also must go to the U.S. Congress and the Administration, and particularly Secretary of State George Shultz, for helping the recovery, and for helping create a strong economic future for the Jewish state.

We also see the revolution in the diplomatic sphere. The State Department used to define success in the peace process in terms of how much pressure the U.S. was bringing to bear on Israel to make concessions. Now, Israel is treated as a partner in the peace process. Cooperation on the strategic level is complemented by coordination on the diplomatic level. The United States now only moves on the peace process after the closest consultation with the Government of Israel. Trust, the most crucial ingredient in any negotiation, has been established in the diplomatic discourse between the United States and Israel.

Moreover, in its public diplomacy, this Administration has demonstrated unprecedented support for the sometimes controversial actions Israel is forced to take. The understanding expressed by the White House of Israel's retaliation against PLO headquarters in Tunis is but the most recent example of this phenomenon. At the United Nations, the United States has now gone beyond defending Israel to actively opposing and undermining the anti-Israel efforts of the Arabs. On the other hand, only Israel supported President Reagan's actions in the Gulf of Sidra, while our Arab "friends" condemned American actions.

In the interest of time I will close this review here. We are in the midst of a revolution that is raising U.S.-Israel relations to new heights. In the process, a whole new constituency of support for Israel is being built in precisely the area where we are weakest -- among government officials in the State, Defense, and Treasury Departments, in the CIA, in science, trade, agriculture, and other agencies. These are the people responsible for proposing policy and for implementing it. In a crisis these anonymous officials will play a vital role. And they are now learning, through personal experience, the value of Israel to the United States. In other words, we are talking not only about a revolution in the relationship between two states, but also in the attitudes of key people responsible for that

relationship. That is what we mean when we talk about sinking down roots that will secure the tree of U.S.-Israel relations from future storms.

But we cannot afford to be complacent about these matters. The revolution has only just begun. The gains are not yet secure. We are still dependent on the continued commitment of the Reagan Administration to press ahead -- at the urging of Congress and the public. But, despite our enormous respect for the Administration and its friendship toward Israel, that has not stopped us from opposing and challenging certain arms sales and, of course, so-called peace policies.

The Jordan arms sale of 1985 and 1986 is a case in point.

There was another case last spring. We were advised then by American and Israeli defense experts that a proposed package of F-15s and other highly sophisticated weapons to Saudi Arabia would materially erode Israel's security and add to its burden of defense. Even though there was a risk of tension with the Administration, we concluded that the danger to Israel from not challenging that sale was greater than the cost of actively opposing it, and therefore, we mobilized opposition and succeeded in having the package stopped.

Now over the past few weeks, there has been a third arms sale case in which we have made an opposite decision. We decided not to fight an arms sale because in our best judgment, the cost of a confrontation with the Administration would have been greater than the marginal benefit of stopping the arms sale. This package to Saudia Arabia involves a variety of missiles about which we are of course not particularly happy, and our very strong instinct was to fight it, especially because of Saudi Arabia's abominable record.

But it is also our function to examine and evaluate the facts of the case. And there we found that there was a consensus among defense experts associated with all factions and all schools of thought, that this particular package would have questionable impact on the security of Israel. The most authoritative study conducted found that this package would add little of consequence to the existing overall threat to Israel. We also found a remarkable consensus among the major Jewish organizations in our community, such as the Conference of Presidents, Council of Jewish Federations, the defense agencies, NJCRAC, and CRCs. They felt that we would not be justified in mounting a major campaign to confront the Administration's policy in this particular case.

We are an activist organization, and deciding not to fight does not come easily to us. But I believe we are obliged to act not out of impulse, but out of a careful assessment of all the factors in the situation. Indeed, making decisions in this way is a mark of our maturity and is

in fact essential to our continued effectiveness. No army should allow itself to be drawn into battles that are outside its vital interests, and no army should fight when the costs of war are greater than any possible gains from victory.

When we were weak, we did not have the luxury of these problems. Being weak means being unable to fight successfully even when our vital interests are threatened. But when we are strong, we have the dilemma that comes with that situation, the responsibilities of when to unleash and when to restrain our use of power. We have had to learn that a wise, potent policy is not necessarily one based on endless contests of strength.

And we have always had to bear in mind that ultimate criterion that I stated earlier. If the enemies of Israel and America mass at the gate, will the young men and women who must defend the Jewish nation with their lives have at their disposal every means of defense and every advantage that we with all of our ingenuity and all our efforts could arrange? Will America be there as a true ally when Israel needs it?

I am confident that we made the right decision. In looking back, we can find things that we did in implementing the decision that could have been done better.

We are learning as we go. We are all discovering that the revolution in U.S.-Israel relations touches us at AIPAC as well. It affects our attitudes and our actions. And as the issues today are much wider than they were, so the scope of our responsibilities is much greater, and the stakes much higher.

In a word, we are, all of us in this room, giving birth to a new AIPAC, one which has all the character of the original but also one which has the qualities we need to prepare for the future. The times have changed, and we must change with them.

We know the Congress contains our most reliable and essential friends. But it is essential to work closely with Executive branch officials as well. Many of the foreign policy issues of greatest importance to us are decided and managed primarily by the Executive branch of government. For example, how the United States conducts itself in the peace process is decided primarily by the President and his advisers. Whether Israel is excluded or asked to be included in scientific arrangements such as Strategic Defense Initiative research and development programs is, on the whole, decided by the Executive branch. How the United States will relate to moderate and radical Arab countries, and to Israel itself, is controlled by those who sit on the National Security Council. We must do in the Executive branch what we have done in the Congress -- make new friends, and spread the message of how close relations with our one reliable, democratic ally in the Middle East serve the interests of the United States of America.

In this context, there are new requirements to our political action. We must expand our lobbying efforts beyond Washington to every Congressional District, and this is where you come in.

Accordingly, we have undertaken to establish a system of congressional caucuses throughout America. Pro-Israel citizens, Jews and Christians, are now meeting by several times a year with their Congressmen and Senators to sensitize them to the issues we care about. We have established these caucuses in towns you have probably never heard of - McAllen, Texas; Monroe, Louisiana; Jonesboro, Arkansas; Seminole, Oklahoma; Roswell, New Mexico; Bellingham, Washington; Medford, Oregon.

The results of these organizing efforts are amazing. In the Southwest region alone -- from Louisiana over to Arizona, Congressional voting patterns have changed dramatically. A few short years ago, we were fortunate to garner 35% of the votes for foreign aid by the 53 Congressmen there. By the summer of 1985, 70% voted in favor of foreign aid. In 1981, only four of the Southwest's 12 Senators voted with us on the AWACS. In 1985 nine of the 12 signed the Heinz-Kennedy Resolution of Disapproval for Jordan arms - and another Senator probably would have supported our position if it had come to a vote. A Congressman in Texas who had never opened the door to our Washington lobbyists, after meeting with his caucus back home, is today an ardent supporter. An Arkansas Congressman, whom our community did not even know early in his campaign and actually feared, began meeting with pro-Israel activists and has become a reliable pro-Israel friend, including visiting Israel to see for himself. The examples go on and on.

We have also begun creating coalitions state-by-state. In Texas, three state officials have begun one of the most exciting efforts at coalition building I have seen in my career. Tomorrow morning you will hear from Commissioners Mack Wallace, Gary Mauro, and Jim Hightower. The Agricultural Commissioner has begun the Texas Israel Exchange (TIE) which has involved hundreds of farmers in a program of agricultural technology exchange during a period that has witnessed anti-semitism in the farm belt. Imagine bringing farmers into our caucus system and other efforts at influencing Congress. Imagine the power of a letter from the Agricultural Commissioner of Texas stating to each member of his Congressional delegation that the Free Trade Area legislation was in the best interests of his state. Imagine coalitions in every state from farmers to blacks to oilmen to Hispanics. Imagine hundreds of caucuses meeting with their Congressmen. That is where we are going. That is where the strength and future of the U.S - Israel relationship lies.

This sophisticated political action requires more reliance than ever on individual acts and individual discipline. Individual resilience in the face of an arbitrary universe, indeed in the face of heartbreak, is the test of the human spirit. This is what makes the difference

in people. This is what makes the difference for us here at AIPAC.

We know the U.S.-Israel relationship is strong, but that Israel is not yet safe. But we also know that what we do today will help secure the Jewish state and the Jewish people tomorrow. And now, in this new era in which the United States and Israel are allies in the defense of freedom, we also know that we can pursue our mission, ourselves secure in the knowledge that what is good for America is good for Israel, and that what strengthens Israel equally strengthens America. These are the values which bring us together -- love for America and love for Israel. I feel privileged to share in this work with you. Our task is far from over, but with each day we must and we will build on this truly grand beginning.

TESTIMONY OF
THOMAS DINE, EXECUTIVE DIRECTOR
DOUGLAS BLOOMFIELD, LEGISLATIVE DIRECTOR
AMERICAN ISRAEL PUBLIC AFFAIRS COMMITTEE (AIPAC)
BEFORE THE
SUBCOMMITTEE ON STRATEGIC AND THEATER NUCLEAR FORCES
SENATE ARMED SERVICES COMMITTEE
JANUARY 30, 1986

Mr. Chairman, the American Israel Public Affairs Committee appreciates the opportunity to submit testimony to the Armed Services Subcommittee on Strategic and Theater Nuclear Forces. The subject of this hearing, the threat of tactical ballistic missiles and the need to examine possible defenses against them, is of particular interest to those concerned about the supply of tactical missiles by the Soviet Union to its client-states in the Middle East. These missiles threaten American security interests and the security of our only reliable, consistent and democratic ally in that part of the world, Israel.

Israel's enemies are now being armed by the Soviet Union with a new generation of highly lethal surface-to-surface missiles, more accurate and more deadly than any previously available weapons. Unfortunately, there are no comparable defensive systems available today that Israel could obtain to protect its vulnerable cities from bombardment.

To further examine the increasing problems that these missiles pose for the security of Israel, we have prepared a detailed paper for submission to the committee on "The Threat to Israel from Tactical Ballistic Missiles." I request that it be included in the record of the Committee's proceedings on this subject.

The Threat to Israel from Tactical Ballistic Missiles

W. Seth Carus*

Circumstances have made Israel particularly sensitive to the dangers posed by tactical ballistic missiles. For more than two decades, Israel's leaders have recognized that their country could be attacked by hostile states using short range surface-to-surface missiles. In the early 1960s, Egypt launched a massive effort to design and build its own force of short and medium range ballistic missiles. Although this program failed, the Soviet Union stepped into the breach and supplied Arab armies with FROG and SCUD missiles. At least thirty of these missiles were fired at Israeli targets during the 1973 Arab-Israeli War. The Syrians fired about twenty-five FROG-7 missiles at sites in Israel, mainly against Ramat David and other Israeli air bases. The Egyptians reportedly fired a small number of FROGs and at least three SCUD-B missiles at Israeli targets.

Arab armies currently possess more than 200 Soviet-supplied SCUD-B, FROG-7, and SS-21 launchers, probably supported by an inventory of at least 1,000 surface-to-surface missiles. These missiles are now treated as conventional weapons and are routinely used in conflicts with other countries. Iraq has fired a substantial number of FROG and SCUD missiles against Iran, and Iran has recently reciprocated using missiles provided by Libya.

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* The author is the senior military analyst for the American Israel Public Affairs Committee.

The Threat of Surface-to-Surface Missiles

Based on their experience in 1973, Israeli military planners came to believe that the FROG and SCUD missiles did not endanger the security of their country. Although it was recognized that cities were vulnerable to attacks by such weapons, it was believed that the threat of retaliatory strikes would deter attacks on civilian targets and that the missile launchers could be destroyed before serious damage was inflicted. Also, with the warheads then available to the Arabs, damage to civilian targets would be limited. At the same time, it was recognized that the FROG and SCUD missiles could not destroy hardened military targets. Thus, the missiles could temporarily prevent Israeli aircraft from landing at an air strip, but could not destroy an air base.

The threat from tactical ballistic missiles is far greater today. The decision of the Soviet Union in 1983 to supply Syria with the new SS-21 surface-to-surface missile is largely responsible for the heightened awareness in Israel of the potential threat posed by such weapons. Unlike the FROG and the SCUD, the SS-21 has the range, accuracy, and lethality to destroy hardened targets deep inside Israel.

The SS-21 is part of a new generation of Soviet-built surface-to-surface missiles have appeared in the past few years that correct the weaknesses of the weapons they replaced. These new weapons, the Soviet SS-21, SS-22, and SS-23 family of missiles, are extremely accurate and can be armed with cluster munitions. Thus, unlike the SCUD-B and FROG-7 systems, they pose a considerable threat to all but the most mobile or best protected military targets.

Normally, the SS-21 is considered a tactical weapon, because of its relatively short range, but because of Israel's small size, strategically important targets are within close proximity to enemy ground forces. This

lack of strategic depth transforms short-range surface-to-surface missiles, like the SS-21, into strategic weapons able to strike targets throughout Israel, including air bases, command posts, equipment storage depots, surface-to-air missile batteries, radars, and other vital facilities.

Syria now has as many as 24 SS-21 missiles, and additional numbers are reported to have gone to Iraq. The 120 kilometer range of the SS-21 allows it to be used against targets that the FROG-7 cannot reach. When fired from Syria, the SS-21 can reach targets throughout northern Israel, including one of Israel's main air bases, Ramat David. If deployed in Jordan, however, all of Israel would be brought within range.

Currently, there are only a few SS-21 missiles in the Middle East, but even this small quantity is of concern to Israeli military planners. Past experience indicates that the Soviet Union will provide more of these weapons as time passes and Arab armies want to replace their existing FROG-7s. Similarly, it is highly probable that SS-23 missiles will begin to appear in the region before the end of the decade. Thus, by 1990 Israel will be faced by Arab arsenals containing large numbers of highly accurate surface-to-surface missiles armed with sophisticated warheads.

It is likely that in the 1990s Arab armies will acquire tactical ballistic missiles from other sources. Brazil is looking into building a medium range ballistic missile, with the development funded by foreign countries. Past experience indicates that Arab countries, Iraq or Libya, would be the likely sponsors and beneficiaries of such a project. Similarly, European countries are developing sophisticated weapons payloads that could be added to a tactical ballistic missile, providing further improvements in accuracy and lethality.

The increasing emphasis given to chemical weapons by Arab countries

makes even older missiles more of a problem for Israel. Iraq has used chemical weapons in battle, and Syria is known to have an extensive and sophisticated chemical warfare capability. Ballistic missiles armed with chemical warheads pose an obvious threat to Israeli population centers, but they also could effectively suppress Israeli air bases and other military installations and significantly reduce Israel's retaliatory capabilities.

The Lack of an Effective Response to the SS-21

Israel can defend against surface-to-surface missiles only by destroying their launchers before surface-to-surface missiles are fired. This was not a serious weakness when the missiles were inaccurate. If inaccurate missiles were used against civilian targets, Israel's air force could launch counter strikes in retaliation, and the missiles would probably inflict only minimal damage if targeted against Israeli military installations.

The arrival of the SS-21 has made it impossible to ignore the threat of surface-to-surface missiles. As the Arab inventory of SS-21 missiles grows, Israel may find that it can no longer tolerate the damage that could be inflicted by a strike from tactical ballistic missiles. Missile strikes at the outset of a war could inflict sufficient damage to vital Israeli installations to seriously weaken Israel's military capabilities during the critical first hours of a war, even if Israel knew in advance that an attack was about to take place.

For example, a successful missile attack against airfields would significantly reduce the number of aircraft that the Israeli air force could put into the air. After such a strike, Israel's ability to defend its borders during the critical opening hours of a conflict would be significantly weakened, since ground units deployed on the borders in peacetime may well depend on support from the air force until reserves are mobilized. Under such conditions, Israel

also would have fewer aircraft available to send on strike missions against surface-to-surface missile launchers, and could not count on preventing follow-on missile attacks. Accordingly, it appears that Israel can do little to stop Arab missiles from hitting and damaging air bases and other vital installations.

As a result, the Israeli military will be increasingly forced to identify and attack launchers before missiles are fired. If there is a danger of an Arab attack, Israel will be forced to strike first, because it will not be able to take the risks of waiting and absorbing an Arab attack. Although such a strategy will make the Middle East a more dangerous place, the absence of a viable defense against tactical ballistic missiles will leave Israel with no alternative.

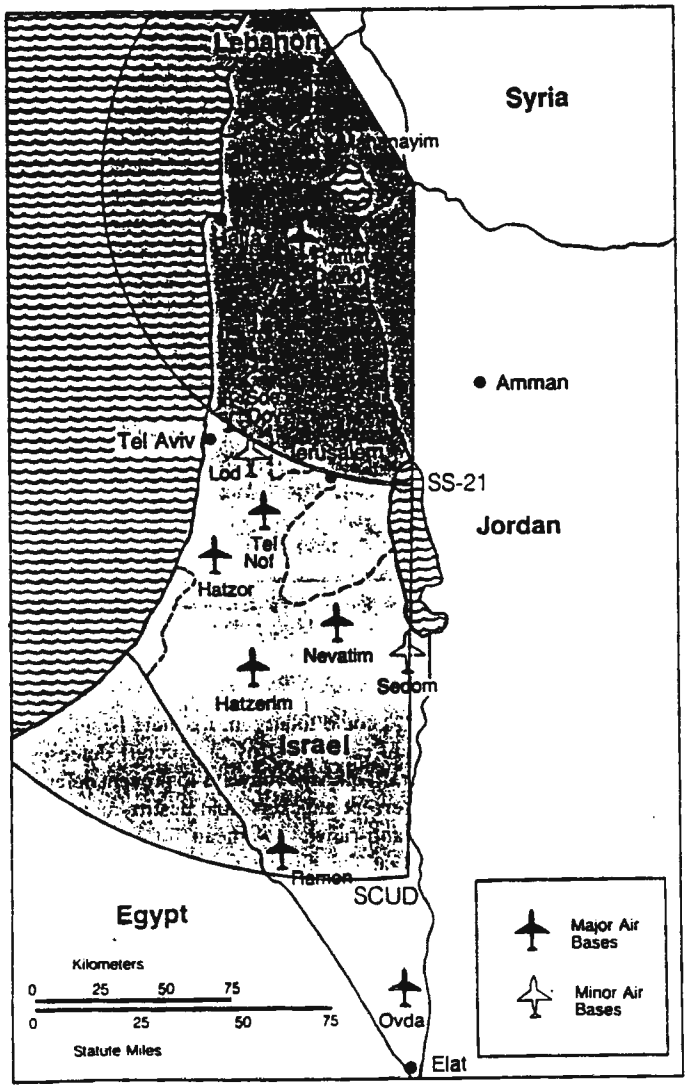
There appears to be a growing awareness in Israel that the enormous inventory of short range ballistic missiles available to Arab armies will make it difficult or impossible for Israel to locate and destroy all the launchers. Hence, even under ideal circumstances, a large number of missiles will strike military and civilian targets throughout Israel. As the Arabs acquire larger quantities of accurate missiles like the SS-21, and as Israel's ability to deter missile attacks diminishes, Arab armies will be able to employ their older and less accurate FROGs and SCUDs against urban centers. As a result, tactical ballistic missiles directed against cities potentially could easily result in 5,000 dead and wounded Israeli civilians in a future Arab-Israeli War.

Defending Against the Tactical Ballistic Missile

The lack of an effective defense against tactical ballistic missiles poses serious problems for Israel. For the moment, Israel might be able to tolerate such a weakness without jeopardizing its security. As additional new generation tactical ballistic missiles are deployed in the region the inability to defend against surface-to-surface missiles will become a serious one.

A defense against tactical ballistic missiles would significantly enhance Israel's security. Although the Israeli military could take steps to develop defenses on its own, the development of such systems is too great a challenge to be handled by one small country. Clearly, any progress made in the United States to develop answers to the dangers posed by tactical ballistic missiles could have a fundamental affect on Israel's future security. And, it should be stressed, the benefits resulting from the development of such a system would be shared by other American allies who also find that they must deal with the growing threat of tactical ballistic missiles.

The Missile Threat from Syria



STATEMENT BY
THOMAS A. DINE, EXECUTIVE DIRECTOR
AMERICAN ISRAEL PUBLIC AFFAIRS COMMITTEE (AIPAC)
BEFORE THE
HOUSE FOREIGN AFFAIRS COMMITTEE
MARCH 11, 1987

Thank you, Mr. Chairman, for the opportunity to testify before this distinguished committee on behalf of aid to Israel. Appearing with me is Mr. Douglas Bloomfield, AIPAC's Legislative Director. The American Israel Public Affairs Committee (AIPAC) appreciates the opportunity to express its views on the proposed Foreign Assistance Act for FY 1988 and the importance of U.S.-Israel relations.

AIPAC is a domestic organization of American citizens who value a close and consistently strong partnership between our country and Israel. On our Executive Committee sit the presidents of the 40 major American Jewish organizations representing more than four and one-half million members throughout the United States.

The FY 1988 foreign assistance authorization request of the Administration reflects true needs for U.S. foreign policy. It addresses current circumstances in key global spots; it is fiscally responsible; it tries to redress some of the severe cuts in the 150 budget function over recent years. Economic and military aid serves our national interest--both at home and abroad.

The U.S. has a particular moral and strategic interest in Israel, the one democracy and our only reliable ally in the Middle East. It is the only country in the region with meaningful free elections, a robust free press, checks and balances to prevent and correct abuses of authority, extensive protections for the rights of individuals and minorities, basic equality for women, and other safeguards and rights that are typical of a free society. It stands in sharp contrast to other countries of the region, which include feudal monarchies like Saudi Arabia, where all power is permanently concentrated in the hands of a few wealthy princes and where average citizens are under constant surveillance by the religious police and internal security forces; dictatorships like Syria, where the government slaughtered 10,000 of its own citizens five years ago; or radical fundamentalist regimes like Iran, which terrorizes its minorities, suppresses its middle class, and ships off its youth to be slaughtered in a meaningless war.

In poll after poll for nearly 40 years, the American people have resoundingly reaffirmed their sympathy for the Jewish state and their conviction that Israel is a democratic ally whose security and well-being are vitally important to the United States. The absolute amount of our aid to Israel is substantial, but it is comparatively one of the most cost-effective investments that the United States makes in support of its common interests.

U.S. expenditures in support of our European allies in NATO, for example, are more than 40 times the size of our aid to Israel.

Mr. Chairman, we are meeting at a time when the relationship between the United States and Israel is strong and close: there is a deep, broad-based partnership; a full-fledged political and military alliance is emerging.

Significantly, Mr. Chairman, we are partners for peace. In the search for peace with its neighbors, Israel's National Unity Government continues to build upon the bold initiatives taken last year in close coordination with the United States. This holds true following the smooth transfer of power in October from the Labor Party's Shimon Peres to the Likud's Yitzhak Shamir.

1986 witnessed several encouraging developments in this respect. July saw the historic public meeting between an Israeli Prime Minister and an Arab head of state for only the second time in the nearly four decade-old Arab-Israeli conflict. Prime Minister Peres' summit in Ifrane with Morocco's King Hassan II, then chairman of the Arab League summit conference and the Islamic Conference Organization, demonstrated the willingness of Israel's leaders to go anywhere and discuss any proposal to resolve the conflict.

Soon thereafter, following Vice President Bush's mission to the region, Israel and Egypt announced the completion of a draft arbitral compromise to resolve the Taba border dispute. Israel's significant concessions to the Arab side on this matter facilitated the first summit ever between President Mubarak and an Israeli Prime Minister and led to the return of Egypt's ambassador to Israel following a four year absence.

It is Israel's policy--and hope--that these advances would create the necessary conditions for King Hussein to come to the negotiating table with Israel's leaders. Both Premier Peres and his successor, Yitzhak Shamir, have extended the hand of friendship to Hussein, repeatedly calling on him to enter direct negotiations without preconditions on the basis of United Nations Resolutions 242 and 338. In an effort to help meet the King's preconditions, the Government of Israel continues to seek a formula for international accompaniment to direct negotiations with Jordan and has declared its readiness to sit down with Palestinian participants who are not associated with terror. Peace has not, however, been pursued. The King has directly participated in repairing relations with his northern neighbor, Syria, the foremost rejectionist in the region. The King has cooled his contacts with the PLO's leadership, but has allowed the PLO to exercise a veto over his entering into direct negotiations with his western neighbor, Israel.

The Government of Israel in 1986 has continued to work closely with Secretary of State Shultz in adopting tangible measures to improve the quality of life for the inhabitants of the West Bank and Gaza--permitting the opening of an Arab bank in Nablus; granting increased numbers of family reunification permits; expanding the territories of 15 West Bank towns, and, most important, completing the return of the reins of municipal government to the local Arab inhabitants. The Israeli Government, in cooperation with the United States, is now pursuing a $500 million economic development plan for the territories.

And, despite the rejection of direct negotiations by each of Israel's Arab neighbors except Egypt, Foreign Minister Peres continues to seek ways to promote a peaceful environment through economic development under a multi-year, large-scale "Marshall Plan" for the Middle East. This plan's farsighted purpose is to help those Arab neighbors of Israel (Egypt, Jordan, Lebanon and Syria) who are now suffering seriously from the recession in the Arab world brought on by the collapse of oil prices, and thereby to create a regional environment more conducive to peaceful coexistence.

King Hussein, for his part, has sought to implement an ambitious, $1.4 billion development plan to upgrade the skills, abilities, and incomes of Palestinians in the territories in an effort to promote a moderate influence and leadership there more likely to engage in a peace process. This plan dovetails with the goals of the "Marshall Plan," and, coupled with the Israeli measures already in place, could serve as an essential building block for peace by nurturing a stable Palestinian leadership in the territories with a stake in coexistence with Israel.

Yet this fledgling process is in jeopardy: First, Saudi Arabia and Kuwait have actively moved to undercut King Hussein and bolster Arafat's PLO by donating $9.5 million and $5 million, respectively, to revive a committee dedicated to promoting PLO influence in the territories. Second, the plan itself suffers for lack of funds. Even though it is the brainchild of Secretary of State Shultz, the Administration has only requested $7 million in FY 1988; allocations over the last two years came to $19.5 million, largely as a result of Congressional initiatives. Taking their cue from Washington, the Europeans have been particularly reluctant to contribute serious money to the effort. Because this plan is critical to creating an environment conducive to peace in the territories, AIPAC strongly supports increased U.S. funding for the West Bank development plan and calls upon our European allies and Japan to contribute substantially as well.

But to achieve peace and maintain it requires strength, particularly in the Middle East where the forces of radicalism must be deterred. In this area, too, the United States and Israel are strategic allies.

This was best symbolized during last month's visit by Prime Minister Shamir to Washington with its special emphasis on Israel's status as a major non-NATO ally, along with Japan, South Korea, Australia, and Egypt. This Congressional provision, signed into law by President Reagan in the FY 1987 Defense Authorization bill late last year and recently reiterated in a letter to Chairman Fascell by Secretary Shultz and another one from Secretary Weinberger to Chairman Aspin, will better enable the two nations to expand the scope of strategic cooperation. This is not an area of special benefits, grants or loans. Rather, it is a logical extension of the alliance which has blossomed since November 1983 when the United States and Israel enunciated the policy of expanding cooperation, particularly joint military planning and exercises, to meet threats to mutual interests in the Middle East and the eastern Mediterranean. Without the strong support of this Committee, this new area of law would not have been possible. I hope this year will see an expansion of this effort.

Israel has participated in joint naval exercises with the Sixth Fleet designed to strengthen U.S. antisubmarine warfare capabilities in the eastern part of the Mediterranean Sea. It has provided access to its ports for regular ship visits by the Sixth Fleet. Indeed, when the President ordered a naval task force to the region earlier this month, elements of that fleet, led by the carrier USS John F. Kennedy, called on the port at Haifa. During his recent visit, Prime Minister Shamir renewed Israel's offer for continued use of Haifa port by all U.S. Naval forces in the region.

It has made facilities available for the storage and maintenance of U.S. materiel for American use in a conflict. It has provided Kfir aircraft to the U.S. Navy's Aggressor Squadron and to the U.S. Marine Corps to help train American fighter pilots. It has provided access to bombing ranges in the Negev desert for training exercises for U.S. Navy fighter pilots. It has engaged in military training exchanges with the U.S. Marines. It has staged joint military exercises with American special anti-terrorist forces.

It has entered into formal arrangements to provide access to its sophisticated hospital facilities for U.S. military casualties in a conflict. These facilities have already been used to treat U.S. personnel injured in the bombing of the U.S. Embassy Annex in east Beirut and on several other occasions.

It has shared with the United States the lessons of its combat experience in Lebanon, where Israel successfully used American equipment against Soviet weapons. It has undertaken joint research and development projects with the Pentagon to build on the technological expertise acquired from decades of conflict.

It has signed a formal agreement with the United States to participate in the Strategic Defense Initiative and has already been awarded several small SDI contracts. Israel will be key to the successful development and deployment of an Anti Tactical Ballistic Missile (ATBM) system.

But Israel's role as an ally of the United States goes well beyond the confines of military cooperation in the Middle East.

Israel stood foursquare behind the United States in support of U.S. military actions against Libya in the spring of 1986, unlike Jordan and Saudi Arabia, who condemned "the American aggression against Libya," or Egypt, who termed it "unacceptable."

At the United Nations, Israel voted with the United States on more than 91 percent of the General Assembly resolutions introduced in the 40th session, the highest rate of cooperation of any country in the world. And on the 10 annual "key" votes determined by the Administration, Israel voted with the United States all 10 times in 1985. This contrasts with 38 percent for Turkey, and 33 percent for Greece--America's NATO allies in the eastern Mediterranean. It also contrasts with 15 percent for Egypt, 14 percent for Jordan, and under 14 percent for Saudi Arabia--and the Soviet Union's 12.2 percent record.

In the information war, Israel has initialed an agreement with the United States to install a Voice of America transmitter in the Negev desert to enhance American broadcasts to Soviet Central Asia, Afghanistan, and Eastern Europe, this despite the inherent risk of worsening the plight of Soviet Jews. By contrast, two of America's NATO allies, Greece and Turkey, refused to host the VOA transmitter because of their unwillingness to endanger their relations with Moscow. Reportedly, Oman also turned down an American request.

Moreover, at a time when American exports are meeting protectionist trade barriers erected by our closest allies and trading partners, Israel signed the historic Free Trade Area agreement, making it the only country in the world to abolish virtually all trade barriers with the United States.

And so, Mr. Chairman, in the peace process, in strategic cooperation, in the diplomatic arena, and on the trade front, Israel is today one of our foremost partners in the world, working with the United States toward regional and global security.

Israel and the United States have also cooperated over the past two years in another bold initiative. Working together, they have successfully undertaken to rescue Israel's economy from the severe distress it was suffering just 18 months ago.

Israel has demonstrated how U.S. foreign assistance, in combination with strong and well-conceived corrective measures in the economy, can turn economic distress into an opportunity for recovery. Those who questioned the large injection of economic aid warned it could prevent Israel from instituting tough austerity measures which inevitably could not be avoided. Israel's experience clearly challenged this notion. U.S. assistance to Israel has made a concrete difference in Israel's struggle to regain economic stability, and has been accompanied by some of the toughest austerity measures ever imposed by a democracy in a compressed period of time. The battle is far from over, but a good beginning has been made.

Less than two years ago, Israel was hemorrhaging economically. Years of shouldering the enormous defense burden imposed by Arab hostility, and the accumulated result of the dependence on imported raw materials and fuel for Israel's industry--to say nothing of the continuing cost of absorbing waves of destitute immigrants and providing them with the full range of social welfare services--had led to extensive borrowing and a huge foreign debt. Foreign reserves plummeted below $3 billion to the perilous "red line" of $2 billion. At the same time, inflation was raging at 450 percent per year, and in one month reached an annual rate of 800 percent. The government was running a deficit equivalent to 17 percent of the Gross National Product.

Then something unusual happened. Within Israel, the many parties and different schools of thought pulled together, and decided that the higher national interest required them to put aside their differences and work in a united fashion for national economic recovery. Equally important, the Government of the United States, and particularly Secretary of State George Shultz and the U.S. Congress, stepped forward and in the spirit of a true ally, offered the hand of assistance in a time of trouble.

At this time last year, we reported to you on the economic plan implemented by Israel aimed at curbing runaway inflation, reducing the budget deficit, bringing the foreign exchange crisis under control, and starting the nation back on the path to economic growth. The major elements of the austerity program were severe and painful, but necessary, and included a wage and price freeze, a suspension of monthly cost-of-living adjustments, a reduction in government subsidies to basic commodities that especially strained those in the lower income brackets, major cuts in the government budget, a 19 percent devaluation of the shekel, and a freeze on government hiring.

These measures led to one of the most rapid reductions in standards of living ever imposed on a free people by their democratic government. The government imposed wage freezes that cut the purchasing power of workers by 15 percent, and reduced government spending by 2 percent. But while earnings declined, the cost of living rose, according to the plan.

Israelis were forced to pay user fees for health services and for educating their children. Each family had to pay $60 per child enrolled in kindergarten through high school. Subsidies on basic commodities like bread, milk, chicken and electricity were cut. The tax rates paid by Israelis were still among the highest in the world. And, the Government of Israel instituted a tax on the elderly's pensions.

This terrible "scissor" of incomes rapidly going down while the cost of living went up, cut deeply into the living standards and quality of life of the people of Israel. But they joined their government in recognizing the necessity to "bite the bullet" to rescue the economy and get back on the path to economic growth.

But the Congress, the people, and the President of the United States were partners in this process also, because another critical ingredient of the recovery program is U.S. economic assistance. U.S. aid provided the critical "safety net" to stop the decline of foreign reserves and restore confidence in Israel's economy. This in turn prevented a crisis in which Israel would have become more dependent on high-interest rate, short-term borrowing in the international financial market. Aid made it possible to bring Israel's international financial position back under control.

U.S. aid was also essential to prevent massive unemployment from overwhelming the economic recovery program, which might have destroyed public support for the steps required for recovery. Israel's unemployment has, unfortunately, increased to very high levels--at one point even reaching 8.3 percent, but the trend would have been worse still without U.S. assistance.

U.S. assistance bought Israel the time to implement the necessary structural changes in its economy. It has been a critical and indispensable ingredient--perhaps the most significant factor--in the progress made by the Government of Israel in restoring economic health. Happily, I can report today the impressive results of the stabilization plan. Israel's foreign reserves have risen above $4 billion, from the dangerously low $2 billion mark. The inflation rate has also improved dramatically from 450 percent in 1985 to 19.7

percent in 1986, actually reaching zero or a negative rate during several months. While that rate is high, it is a long way from the triple-digit numbers of two years ago.

The government's budget deficit was running at about 17 percent of the Gross National Product before the plan was implemented; it has now fallen to about 3 percent of GNP. Israel's current account was in deficit by $1.4 billion; the year ended with a current account surplus of $500 million. Due to reductions in the budget deficit, the Bank of Israel printing press did not need to issue a single additional shekel during the first year and a half of the economic program.

But much remains to be done. As Prime Minister Shamir declared, "Restoring economic health is the raison d'etre of this government." At the urging of the Secretary of State and the economic advisory panel he assembled, Israel has turned its focus to economic growth. Toward this end, the government announced the second phase of the economic program aimed at creating the necessary conditions for growth and expansion.

Following the leadership and advice of the United States, phase two consists of a wide range of measures directed at reducing government involvement in, and regulation of, the economy. Just as there has been tax reform in the United States, Israel has cut its marginal tax rates, lowering the top income tax bracket from 60 percent to 48 percent (with some exceptions), raising the zero income bracket, and reducing the overall number of brackets. Israel has begun to implement capital market reform measures intended to limit government control of, and involvement in, the capital market and to free up capital for much needed private investment. To relieve the burden on exporters, the shekel was devalued by 10 percent. Out of a continued commitment to budget restraint, and despite the difficulties inherent to any effort to cut the budget in a democracy familiar to budget-watchers in Washington, the Government of Israel trimmed an additional $244 million from its budget. The government also negotiated a reduction in the cost of living adjustment for wage earners and cut subsidies.

Israel is not out of the woods yet. In 1986, real wages, consumption expenditure and imports increased. But Secretary Shultz expressed the shared sentiments of Israel and the United States during Prime Minister Shamir's talks here when he said:

> We agreed a strong economy is no less important than a strong defense, and that Israel needs to redouble its efforts in this area to prosper and to ultimately reduce dependence on foreign aid.

The United States has a vital interest in Israel's economic recovery for several reasons. First, the economic health of our major allies and fellow democracies is inherently a vital interest for the United States, because in a very profound sense, the free nations stand or fall together. Second, the economy of Israel is the bedrock of the nation's ability to sustain its own defense, and for this reason Israel's economic health is essential to the stability of the region. And third, it is a vital interest of the United States to

ensure that Israel continue on the path of economic growth and self reliance. This is something we can do, and for our own interest, must do.

The challenge for the United States, and for this Committee, as we look to the year ahead, is to continue a program that is working, and to take the steps that are necessary to reinforce and indeed accelerate the recovery to which the United States has already contributed so much. The foreign assistance program before you is truly an investment in Israel's future.

Beyond the challenge of economic recovery, the program before you is essential for a second reason. This is the fact that our assistance to Israel over the coming year will have a critical impact on the security of the Jewish state.

Last year we painted a bleak picture describing the erosion in Israel's margin of security, that resulted to a great degree from the very financial and budgetary austerity measures that were necessary to rescue Israel's economy. Regrettably, that picture still captures the essence of the situation. Indeed, current economic plans call for the continuance of defense budget cuts into the 1990s.

The austerity measures cut Israel's defense spending by about 20 percent in a two year period--one of the largest reductions ever imposed by a democracy in so brief a timespan. While Israeli military planners have attempted to make the cuts without eroding Israel's narrow margin of safety, reductions of this magnitude have, inevitably, added to the element of risk in many areas. As Defense Minister Rabin put it,

> The large cuts that have been made in the last few years have exposed us to serious risks. If this should continue, it will damage the defense of the state in the near and distant future.

(1) Active combat units have been disbanded, reduced in size or converted into reserve formations. This has decreased the number and size of army brigades and air force squadrons available to meet a surprise attack. This has weakened the basis on which Israel's security has rested since the conclusion of the 1973 Yom Kippur War.

(2) At least one of Israel's mechanized/armored divisions has been dissolved. This means a serious decline in Israel's visible deterrent capability as well as a decline in its war-fighting ability.

(3) Training has been significantly reduced. There have been serious cuts in the number of flying hours allowed aircraft pilots, ground forces training has been limited, and the expenditure of ammunition in training has been curtailed. For example, Israeli pilots now are able to fly fewer training hours than their American or Jordanian counterparts.

(4) Reserve readiness has been cut. The number of reserve days served by Israeli soldiers remains at last year's low levels. Reserve units will continue to be less prepared for war than they were two years ago.

(5) Thousands of active duty military personnel have been released. This has meant the loss of a great many highly-skilled individuals who will be sorely missed by the Israeli armed forces.

(6) Morale has been lowered. Pay cuts and personnel releases have produced an exodus of highly trained and motivated professionals and have lowered morale generally. It threatens to undermine a key aspect of Israel's military superiority--its large qualitative advantage in personnel.

(7) Ammunition and equipment stockpiles have suffered deep cuts. This has reduced Israel's ability to sustain its forces in combat. Stocks expended during the Lebanon war have not been replaced, and in order to further reduce expenses, the armed forces have continued to draw down their stockpiles without full replacement.

(8) Many programs, such as continued acquisition of new Merkava tanks, have been slowed or postponed.

(9) Naval building programs have continued to be delayed.

(10) Expenditures on research and development have been significantly curtailed. This has diminished Israel's ability to develop and produce the unique new weapons and countermeasures needed to counter increasingly sophisticated weapons entering Arab arsenals. This further diminishes Israel's qualitative advantage over its opponents. The Israeli defense industries have reduced their staffs and plant facilities and thus are less able to support Israel's military needs.

These cuts in Israel's defense budget have made American FMS aid to Israel all the more important. This money has helped in the upgrading of Israel's Air Force, whose margin of superiority over its adversaries remains the cornerstone of Israel's security doctrine. In particular, these funds support the acquisition of Lavi ground attack aircraft and F-16 fighters. We specifically wish to thank the Committee and the Congress for earmarking funds for procurement of defense items in Israel.

Another key program that will be funded through the FMS account is the upgrading of Israel's Navy, which must confront the colossal growth of hostile Arab navies like that of Syria, which has nearly doubled its number of combat vessels since 1982; Saudi Arabia, which has added 17 new guided missile warships since the beginning of the decade; and Iraq, which has added five guided missile warships since 1980, with six more on order.

Despite reductions in oil revenues, Israel's enemies continue to purchase more and newer weapons to add to their already bulging arsenals. They have placed orders for billions of dollars worth of new weapons each year, and have tens of billions of dollars more still in the pipeline from past years. Since 1973, the leading Arab nations still at war with Israel have spent nearly $400 billion on their armed forces, and are continuing to spend at an annual rate of $30 billion. According to the last set of figures released by the United States Arms Control and Disarmament Agency, five of the seven largest arms importing nations in the world are Arab nations at war with Israel: Iraq,

Saudi Arabia, Libya, Syria, and Jordan. And, it may be significant that despite its economic problems, Egypt was the fourth largest importer, ordering in 1987 some $1.3 billion worth of American weapons alone.

Syria has made major efforts to expand and improve its armed forces since its defeats in the 1982 fighting. All branches of Syria's military have grown as a result. Syria's president, Hafiz Assad, has made very clear that he is preparing for war. Indeed, according to one estimate, the Syrians devote half their national budget to the armed forces, spending $1 billion more than Israel each year. As part of that buildup Syria has increased by 50% the number of divisions in its army. These troops have been reequipped with the latest model tanks, artillery, and other equipment available to the Syrians. The Syrians studied carefully the fighting in Lebanon in 1982 and have incorporated lessons from that campaign into their doctrine and training.

Syria's navy has also been a major beneficiary of this buildup, seeing its number of combat vessels nearly double in the years since the Lebanon war as well as the addition of previously unavailable capabilities. These new capabilities include Syria's first two submarines and a new coastal defense missile, the Sepal, with a range of about 180 miles.

Syrian air defense and air forces have also benefitted in this expansion. The losses of 1982 have been made good and then some; and more advanced types of anti-aircraft missiles and aircraft have entered service. New anti-aircraft systems have included the SA-5, SA-11, SA-13, and SA-14 missiles. Syrian pilots have spent the last year being trained in the Soviet Union on one of its most advanced fighters, the MiG-29, which is expected to begin arriving in Syria soon.

The Syrians have also acquired Soviet-built SS-21 tactical ballistic missiles, another piece of first-line equipment for Soviet forces facing NATO. These missiles are much more accurate and dangerous than the earlier Soviet-built Frog and Scud tactical missiles in the Syrian armory. The accuracy of these new missiles increase Syria's 'first-strike' attack abilities against key Israeli installations including air bases and mobilization points.

Jordan too has continued its defense buildup. The Jordanians have placed orders to increase inventories of tanks, artillery, anti-aircraft systems, vehicles, air-to-air missiles, and other munitions. According to the United States Arms Control and Disarmament Agency, Jordan, a country with a gross national product of $4.3 billion (1983) took delivery of over $3 billion in arms in the two-year period between 1981 and 1983.

A key part of Jordan's military buildup plan appears to focus around increasing its air defense capability through the acquisition of advanced fighter aircraft and mobilization of its batteries of Improved Hawk anti-aircraft missiles. If Jordan succeeds in its search for this capability, then it will be in a position to directly threaten Israel's margin of air superiority.

Since 1980, Iraq, which has sent forces to fight Israel in three wars, has more than tripled the size of its armed forces. Indeed, since the beginning of this decade, Iraq has become the world's leading arms importer, taking delivery

of weapons worth an average of over $3 billion every year. Regardless of the outcome of the Gulf War, as both opponents have sworn Israel as an enemy, it can be expected that the enormous arsenal accumulated in Iraq will be at least in part available for use against Israel, as it has been in the past.

Despite steep reductions in oil revenues, Saudi Arabia continues to order weapons on a grand scale. It leads the Arab states in military expenditures, this year spending over $18 billion on its military, a sum equal to more than 75% of Israel's entire GNP. In each of the years 1981-1983, it was the world's second largest importer of arms. Current Saudi military expenditures per regular soldier are almost twice American expenditures (approximately $262,000 to $136,000). And, as Saudi Defense Minister Prince Sultan made clear in a recent Washington Post report, the focus of this military buildup is Israel, not Iran or the Soviet Army in Afghanistan. Therefore, not only does it seek to acquire military capabilities far beyond its own legitimate defense needs, it continues to fund Syrian and Jordanian arms purchases and PLO terrorist activities against Israel.

As part of this huge ongoing military buildup, Saudi Arabia has been seeking steadily to increase the size and combat capabilities of its air force. An important aspect of this particular effort has been the Saudi attempt to enhance the fighting qualities of the combat aircraft it has acquired from the United States. In this it has been partially successful, to the detriment of Israel's security. The sale of further American aircraft enhancements to Saudi Arabia cannot but lessen the opportunity for Israel to expend its resources on projects more productive for its society than on countering an ever-extending range of Arab military power.

Mr. Chairman, the Arabs purchase these arms from dozens of different nations around the globe. Our country has been a major supplier to these nations, selling scores of billions of dollars of military goods and services to avowed enemies of Israel. American sales of new weapons systems to hostile Arab nations have had a particularly profound impact on the military balance between Israel and those states because American technology is often superior to that of competing weapons. These sales have significantly raised the cost to Israel of maintaining its own defenses, exacerbating the strain on Israel's economy, and barring any changes in American policy, will continue to do so in the future.

The past year has also revealed a new dimension of the threat to Israel: chemical weapons. Both Syria and Iraq have developed their abilities to the point where they are manufacturing their own deadly chemical weapons, and in the case of Iraq, have used them on numerous occasions in its war against Iran. The realization of what was earlier an approaching threat has forced Israel to take in its turn precautionary steps to protect its population and soldiers, again at further cost to itself.

Overall, what we have is a pattern of accelerated Arab buildup while Israel substantially cuts its forces. The effort to maintain the qualitative edge adds to the burden on the Israeli economy, further worsening the quantitative gap in the Arab states' favor.

Mr. Chairman, we are all proud of Israel's achievements, but realistically it is impossible to have this combination of trends without a diminution of security. Israel's margin of safety is, inevitably, reduced by the austerity measures it is forced to take.

And so I come before you to ask that you take these very serious risks into account when you consider the level of aid to Israel for FY 1988. What this Committee does will have a very real and direct impact on Israel's security, in a situation where there is much less room for error. Moreover, any reduction in aid will send the wrong signal to Israel's enemies.

Let me sum up, Mr. Chairman, the conclusions of my testimony. Our aid to Israel has been a wise investment, because Israel is our one democratic friend and most reliable ally in a critical region of the world. But this year, aid to Israel is particularly important, for two reasons. First, to prevent any further erosion in Israel's narrow margin of security, in a situation where its forces have been cut while those of its adversaries are rapidly growing.

The second reason aid is particularly important this year is to stay the course on the economic recovery and growth program on which Israel has embarked. This is no time to reduce our effort.

AIPAC understands, however, the budget constraints operating in Washington. For this reason, I commend the Committee for seeking to authorize the full amounts contained in the President's request and for communicating this to the Budget Committee. Israel is also aware of America's budget constraints and thus has not increased its aid request and is seeking ways to promote economic independence. Indeed, last year the Government of Israel, acting as a responsible partner in the foreign aid process, returned a check for $51.6 million to the U.S. Treasury despite its economic pressures.

Mr. Chairman, I thank you for the strong friendship you and this Committee, and the House of Representatives, have demonstrated toward Israel, and for this opportunity to explain the importance of FY 1988 aid to Israel and to America.

STATEMENT BY
THOMAS A. DINE, EXECUTIVE DIRECTOR
AMERICAN ISRAEL PUBLIC AFFAIRS COMMITTEE (AIPAC)
BEFORE THE
SENATE FOREIGN RELATIONS COMMITTEE
FEBRUARY 26, 1987

Thank you, Mr. Chairman, for the opportunity to testify before this distinguished committee on behalf of aid to Israel. Appearing with me is Mr. Douglas Bloomfield, AIPAC's Legislative Director. The American Israel Public Affairs Committee (AIPAC) appreciates the opportunity to express its views on the proposed Foreign Assistance Act for FY 1988 and the importance of U.S.-Israel relations.

AIPAC is a domestic organization of American citizens who value a close and consistently strong partnership between our country and Israel. On our Executive Committee sit the presidents of the 40 major American Jewish organizations representing more than four and one-half million members throughout the United States.

The FY 1988 foreign assistance authorization request of the Administration reflects true needs for U.S. foreign policy. It addresses current circumstances in key global spots; it is fiscally responsible; it tries to redress some of the severe cuts in the 150 budget function over recent years. Economic and military aid serves our national interest--both at home and abroad.

The U.S. has a particular moral and strategic interest in Israel, the one democracy and our only reliable ally in the Middle East. It is the only country in the region with meaningful free elections, a robust free press, checks and balances to prevent and correct abuses of authority, extensive protections for the rights of individuals and minorities, basic equality for women, and other safeguards and rights that are typical of a free society. It stands in sharp contrast to other countries of the region, which include feudal monarchies like Saudi Arabia, where all power is permanently concentrated in the hands of a few wealthy princes and where average citizens are under constant surveillance by the religious police and internal security forces; dictatorships like Syria, where the government slaughtered 10,000 of its own citizens five years ago; or radical fundamentalist regimes like Iran, which terrorizes its minorities, suppresses its middle class, and ships off its youth to be slaughtered in a meaningless war.

In poll after poll for nearly 40 years, the American people have resoundingly reaffirmed their sympathy for the Jewish state and their conviction that Israel is a democratic ally whose security and well-being are vitally important to the United States. The absolute amount of our aid to Israel is substantial, but it is comparatively one of the most cost-effective investments that the United States makes in support of its common interests. U.S. expenditures in support of our European allies in NATO, for example, are

more than 30 times the size of our aid to Israel.

Mr. Chairman, we are meeting at a time when the relationship between the United States and Israel is strong and close: there is a deep, broad-based partnership; a full-fledged political and military alliance is emerging.

Significantly, Mr. Chairman, we are partners for peace. In the search for peace with its neighbors, Israel's National Unity Government continues to build upon the bold initiatives taken last year in close coordination with the United States. This holds true following the smooth transfer of power in October from the Labor Party's Shimon Peres to the Likud's Yitzhak Shamir.

1986 witnessed several encouraging developments in this respect. July saw the historic public meeting between an Israeli Prime Minister and an Arab head of state for only the second time in the nearly four decade-old Arab-Israeli conflict. Prime Minister Peres' summit in Ifrane with Morocco's King Hassan II, then chairman of the Arab League summit conference and the Islamic Conference Organization, demonstrated the willingness of Israel's leaders to go anywhere and discuss any proposal to resolve the conflict.

Soon thereafter, following Vice President Bush's mission to the region, Israel and Egypt announced the completion of a draft arbitral compromise to resolve the Taba border dispute. Israel's significant concessions to the Arab side on this matter facilitated the first summit ever between President Mubarak and an Israeli Prime Minister and led to the return of Egypt's ambassador to Israel following a four year absence.

It is Israel's policy--and hope--that these advances would create the necessary conditions for King Hussein to come to the negotiating table with Israel's leaders. Both Premier Peres and his successor, Yitzhak Shamir, have extended the hand of friendship to Hussein, repeatedly calling on him to enter direct negotiations without preconditions on the basis of United Nations Resolutions 242 and 338. In an effort to help meet the King's preconditions, the Government of Israel continues to seek a formula for international accompaniment to direct negotiations with Jordan and has declared its readiness to sit down with Palestinian participants who are not associated with terror. Peace has not, however, been pursued. The King has directly participated in repairing relations with his northern neighbor, Syria, the foremost rejectionist in the region. The King has cooled his contacts with the PLO's leadership, but has allowed the PLO to exercise a veto over his entering into direct negotiations with his western neighbor, Israel.

The Government of Israel in 1986 has continued to work closely with Secretary of State Shultz in adopting tangible measures to improve the quality of life for the inhabitants of the West Bank and Gaza--permitting the opening of an Arab bank in Nablus; granting increased numbers of family reunification permits; expanding the territories of 15 West Bank towns, and, most important, completing the return of the reins of municipal government to the local Arab inhabitants. The Israeli Government, in cooperation with the United States, is now pursuing a $500 million economic development plan for the territories.

And, despite the rejection of direct negotiations by each of Israel's Arab

neighbors except Egypt, Foreign Minister Peres continues to seek ways to promote a peaceful environment through economic development under a multi-year, large-scale "Marshall Plan" for the Middle East. This plan's farsighted purpose is to help those Arab neighbors of Israel (Egypt, Jordan, Lebanon and Syria) who are now suffering seriously from the recession in the Arab world brought on by the collapse of oil prices, and thereby to create a regional environment more conducive to peaceful coexistence.

King Hussein, for his part, has sought to implement an ambitious, $1.4 billion development plan to upgrade the skills, abilities, and incomes of Palestinians in the territories in an effort to promote a moderate influence and leadership there more likely to engage in a peace process. This plan dovetails with the goals of the "Marshall Plan," and, coupled with the Israeli measures already in place, could serve as an essential building block for peace by nurturing a stable Palestinian leadership in the territories with a stake in coexistence with Israel.

Yet this fledgling process is in jeopardy: First, Saudi Arabia and Kuwait have actively moved to undercut King Hussein and bolster Arafat's PLO by donating $9.5 million and $5 million, respectively, to revive a committee dedicated to promoting PLO influence in the territories. Second, the plan itself suffers for lack of funds. Even though it is the brainchild of Secretary of State Shultz, the Administration has only requested $7 million in FY 1988; allocations over the last two years came to $19.5 million, largely as a result of Congressional initiatives. Taking their cue from Washington, the Europeans have been particularly reluctant to contribute serious money to the effort. Because this plan is critical to creating an environment conducive to peace in the territories, AIPAC strongly supports increased U.S. funding for the West Bank development plan and calls upon our European allies and Japan to contribute substantially as well.

But to achieve peace and maintain it requires strength, particularly in the Middle East where the forces of radicalism must be deterred. In this area, too, the United States and Israel are strategic allies.

This was best symbolized during last week's visit by Prime Minister Shamir to Washington with its special emphasis on Israel's status as a major non-NATO ally, along with Japan, South Korea, Australia, and Egypt. This Congressional provision, signed into law by President Reagan in the FY 1987 Defense Authorization bill late last year and recently reiterated, Mr. Chairman, in a letter to you by Secretary Shultz and another one from Secretary Weinberger to Chairman Nunn, will better enable the two nations to expand the scope of strategic cooperation. This is not an area of special benefits, grants or loans. Rather, it is a logical extension of the alliance which has blossomed since November 1983 when the United States and Israel enunciated the policy of expanding cooperation, particularly joint military planning and exercises to meet threats to mutual interests in the Middle East and the eastern Mediterranean. Without the strong support of this Committee, this new area of law would not have been possible. I hope this year will see an expansion of this effort.

Israel has participated in joint naval exercises with the Sixth Fleet

designed to strengthen U.S. antisubmarine warfare capabilities in the eastern part of the Mediterranean Sea. It has provided access to its ports for regular ship visits by the Sixth Fleet. Indeed, when the President ordered a naval task force to the region earlier this month, elements of that fleet, led by the carrier USS John F. Kennedy, called on the port at Haifa. Just last week, Prime Minister Shamir renewed Israel's offer for continued use of Haifa port by all U.S. Naval forces in the region.

It has made facilities available for the storage and maintenance of U.S. materiel for American use in a conflict. It has provided Kfir aircraft to the U.S. Navy's Aggressor Squadron and to the U.S. Marine Corps to help train American fighter pilots. It has provided access to bombing ranges in the Negev desert for training exercises for U.S. Navy fighter pilots. It has engaged in military training exchanges with the U.S. Marines. It has staged joint military exercises with American special anti-terrorist forces.

It has entered into formal arrangements to provide access to its sophisticated hospital facilities for U.S. military casualties in a conflict. These facilities have already been used to treat U.S. personnel injured in the bombing of the U.S. Embassy Annex in east Beirut and on several other occasions.

It has shared with the United States the lessons of its combat experience in Lebanon, where Israel successfully used American equipment against Soviet weapons. It has undertaken joint research and development projects with the Pentagon to build on the technological expertise acquired from decades of conflict.

It has signed a formal agreement with the United States to participate in the Strategic Defense Initiative and has already been awarded several small SDI contracts. Israel will be key to the successful development and deployment of an Anti Tactical Ballistic Missile (ATBM) system.

But Israel's role as an ally of the United States goes well beyond the confines of military cooperation in the Middle East.

Israel stood foursquare behind the United States in support of U.S. military actions against Libya in the spring of 1986, unlike Jordan and Saudi Arabia, who condemned "the American aggression against Libya," or Egypt, who termed it "unacceptable."

At the United Nations, Israel voted with the United States on more than 91 percent of the General Assembly resolutions introduced in the 40th session, the highest rate of cooperation of any country in the world. And on the 10 annual "key" votes determined by the Administration, Israel has maintained a 100 percent record over the three years Congress has required our U.N. Mission to keep score. This contrasts with 38 percent for Turkey, and 33 percent for Greece--America's NATO allies in the eastern Mediterranean. It also contrasts with 15 percent for Egypt, 14 percent for Jordan, and under 14 percent for Saudi Arabia--and the Soviet Union's 12.2 percent record.

In the information war, Israel has initialed an agreement with the United

States to install a Voice of America transmitter in the Negev desert to enhance American broadcasts to Soviet Central Asia, Afghanistan, and Eastern Europe, this despite the inherent risk of worsening the plight of Soviet Jews. By contrast, two of America's NATO allies, Greece and Turkey, refused to host the VOA transmitter because of their unwillingness to endanger their relations with Moscow. Reportedly, Oman also turned down an American request.

Moreover, at a time when American exports are meeting protectionist trade barriers erected by our closest allies and trading partners, Israel signed the historic Free Trade Area agreement, making it the only country in the world to abolish virtually all trade barriers with the United States.

And so, Mr. Chairman, in the peace process, in strategic cooperation, in the diplomatic arena, and on the trade front, Israel is today one of our foremost partners in the world, working with the United States toward regional and global security.

Israel and the United States have also cooperated over the past two years in another bold initiative. Working together, they have successfully undertaken to rescue Israel's economy from the severe distress it was suffering just 18 months ago.

Israel has demonstrated how U.S. foreign assistance, in combination with strong and well-conceived corrective measures in the economy, can turn economic distress into an opportunity for recovery. Those who questioned the large injection of economic aid warned it could prevent Israel from instituting tough austerity measures which inevitably could not be avoided. Israel's experience clearly challenged this notion. U.S. assistance to Israel has made a concrete difference in Israel's struggle to regain economic stability, and has been accompanied by some of the toughest austerity measures ever imposed by a democracy in a compressed period of time. The battle is far from over, but a good beginning has been made.

Less than two years ago, Israel was hemorrhaging economically. Years of shouldering the enormous defense burden imposed by Arab hostility, and the accumulated result of the dependence on imported raw materials and fuel for Israel's industry--to say nothing of the continuing cost of absorbing waves of destitute immigrants and providing them with the full range of social welfare services--had led to extensive borrowing and a huge foreign debt. Foreign reserves plummeted below $3 billion to the perilous "red line" of $2 billion. At the same time, inflation was raging at 450 percent per year, and in one month reached an annual rate of 800 percent. The government was running a deficit equivalent to 17 percent of the Gross National Product.

Then something unusual happened. Within Israel, the many parties and different schools of thought pulled together, and decided that the higher national interest required them to put aside their differences and work in a united fashion for national economic recovery. Equally important, the Government of the United States, and particularly Secretary of State George Shultz and the U.S. Congress, stepped forward and in the spirit of a true ally, offered the hand of assistance in a time of trouble.

At this time last year, we reported to you on the economic plan implemented by Israel aimed at curbing runaway inflation, reducing the budget deficit, bringing the foreign exchange crisis under control, and starting the nation back on the path to economic growth. The major elements of the austerity program were severe and painful, but necessary, and included a wage and price freeze, a suspension of monthly cost-of-living adjustments, a reduction in government subsidies to basic commodities that especially strained those in the lower income brackets, major cuts in the government budget, a 19 percent devaluation of the shekel, and a freeze on government hiring.

These measures led to one of the most rapid reductions in standards of living ever imposed on a free people by their democratic government. The government imposed wage freezes that cut the purchasing power of workers by 15 percent, and reduced government spending by 2 percent. But while earnings declined, the cost of living rose, according to the plan.

Israelis were forced to pay user fees for health services and for educating their children. Each family had to pay $60 per child enrolled in kindergarten through high school. Subsidies on basic commodities like bread, milk, chicken and electricity were cut. The tax rates paid by Israelis were still among the highest in the world. And, the Government of Israel instituted a tax on the elderly's pensions.

This terrible "scissor" of incomes rapidly going down while the cost of living went up, cut deeply into the living standards and quality of life of the people of Israel. But they joined their government in recognizing the necessity to "bite the bullet" to rescue the economy and get back on the path to economic growth.

But the Congress, the people, and the President of the United States were partners in this process also, because another critical ingredient of the recovery program is U.S. economic assistance. U.S. aid provided the critical "safety net" to stop the decline of foreign reserves and restore confidence in Israel's economy. This in turn prevented a crisis in which Israel would have become more dependent on high-interest rate, short-term borrowing in the international financial market. Aid made it possible to bring Israel's international financial position back under control.

U.S. aid was also essential to prevent massive unemployment from overwhelming the economic recovery program, which might have destroyed public support for the steps required for recovery. Israel's unemployment has, unfortunately, increased to very high levels--at one point even reaching 8.3 percent, but the trend would have been worse still without U.S. assistance.

U.S. assistance has been a critical and indispensable ingredient in the progress made by the Government of Israel in restoring health to the economy. Happily, I can report today the impressive results of the stabilization plan. Israel's foreign reserves have risen to $4 billion, from the dangerously low $2 billion mark. The inflation rate has also improved dramatically from 450 percent in 1985 to 19.7 percent in 1986, an average of under 1.5 percent per month. While that rate is high, it is a long way from the triple-digit numbers of two years ago.

Due to cuts made in the budget, the Bank of Israel printing press did not issue a single additional shekel during the first year and a half of the economic program. The government's budget deficit was running at about 17 percent of the Gross National Product before the plan was implemented; it has now fallen to about 3 percent of GNP. Israel's current account was in deficit by $1.4 billion; the year ended with a current account surplus of $500 million.

But much remains to be done. As Prime Minister Shamir declared, "Restoring economic health is the raison d'etre of this government." At the urging of the Secretary of State and the economic advisory panel he assembled, Israel has turned its focus to economic growth. Toward this end, the government announced the second phase of the economic program aimed at creating the necessary conditions for growth and expansion.

Phase two consists of a wide range of measures, including $244 million in budget cuts; cuts in the marginal tax rates, which lower the top income tax bracket from 60 percent to 48 percent (with some exceptions), raise the zero income bracket, and reduce the overall number of brackets; capital market reform measures intended to limit government control of, and involvement in, the capital market; and, a 10 percent devaluation of the shekel to promote exports. In addition, the government negotiated a reduction in the cost of living adjustment for wage earners as well cuts in subsidies.

Israel is not out of the woods yet. In 1986, real wages, consumption expenditure and imports increased. But Secretary Shultz expressed the shared sentiments of Israel and the United States during Prime Minister Shamir's talks here when he said:

> We agreed a strong economy is no less important than a strong defense, and that Israel needs to redouble its efforts in this area to prosper and to ultimately reduce dependence on foreign aid.

The United States has a vital interest in Israel's economic recovery for several reasons. First, the economic health of our major allies and fellow democracies is inherently a vital interest for the United States, because in a very profound sense, the free nations stand or fall together. Second, the economy of Israel is the bedrock of the nation's ability to sustain its own defense, and for this reason Israel's economic health is essential to the stability of the region. And third, it is a vital interest of the United States to ensure that Israel continue on the path of economic growth and self reliance. This is something we can do, and for our own interest, must do.

The challenge for the United States, and for this Committee, as we look to the year ahead, is to continue a program that is working, and to take the steps that are necessary to reinforce and indeed accelerate the recovery to which the United States has already contributed so much. The foreign assistance program before you is truly an investment in Israel's future.

Beyond the challenge of economic recovery, the program before you is essential for a second reason. This is the fact that our assistance to Israel over the coming year will have a critical impact on the security of the Jewish state.

Last year we painted a bleak picture describing the erosion in Israel's margin of security, that resulted to a great degree from the very financial and budgetary austerity measures that were necessary to rescue Israel's economy. Regrettably, that picture still captures the essence of the situation. Indeed, current economic plans call for the continuance of defense budget cuts into the 1990s.

The austerity measures cut Israel's defense spending by about 20 percent in a two year period--one of the largest reductions ever imposed by a democracy in so brief a timespan. While Israeli military planners have attempted to make the cuts without eroding Israel's narrow margin of safety, reductions of this magnitude have, inevitably, added to the element of risk in many areas. As Defense Minister Rabin put it,

> The large cuts that have been made in the last few years have exposed us to serious risks. If this should continue, it will damage the defense of the state in the near and distant future.

(1) Active combat units have been disbanded, reduced in size or converted into reserve formations. This has decreased the number and size of army brigades and air force squadrons available to meet a surprise attack. This has weakened the basis on which Israel's security has rested since the conclusion of the 1973 Yom Kippur War.

(2) At least one of Israel's mechanized/armored divisions has been dissolved. This means a serious decline in Israel's visible deterrent capability as well as a decline in its war-fighting ability.

(3) Training has been significantly reduced. There have been serious cuts in the number of flying hours allowed aircraft pilots, ground forces training has been limited, and the expenditure of ammunition in training has been curtailed. For example, Israeli pilots now are able to fly fewer training hours than their American or Jordanian counterparts.

(4) Reserve readiness has been cut. The number of reserve days served by Israeli soldiers remains at last year's low levels. Reserve units will continue to be less prepared for war than they were two years ago.

(5) Thousands of active duty military personnel have been released. This has meant the loss of a great many highly-skilled individuals who will be sorely missed by the Israeli armed forces.

(6) Morale has been lowered. Pay cuts and personnel releases have produced an exodus of highly trained and motivated professionals and have lowered morale generally. It threatens to undermine a key aspect of Israel's military superiority--its large qualitative advantage in personnel.

(7) Ammunition and equipment stockpiles have suffered deep cuts. This has reduced Israel's ability to sustain its forces in combat. Stocks expended during the Lebanon war have not been replaced, and in order to further reduce expenses, the armed forces have continued to draw down their stockpiles

without full replacement.

(8) Many programs, such as continued acquisition of new Merkava tanks, have been slowed or postponed.

(9) Naval building programs have continued to be delayed.

(10) Expenditures on research and development have been significantly curtailed. This has diminished Israel's ability to develop and produce the unique new weapons and countermeasures needed to counter increasingly sophisticated weapons entering Arab arsenals. This further diminishes Israel's qualitative advantage over its opponents. The Israeli defense industries have reduced their staffs and plant facilities and thus are less able to support Israel's military needs.

These cuts in Israel's defense budget have made American FMS aid to Israel all the more important. This money has helped in the upgrading of Israel's Air Force, whose margin of superiority over its adversaries remains the cornerstone of Israel's security doctrine. In particular, these funds support the acquisition of Lavi ground attack aircraft and F-16 fighters. We specifically wish to thank the Committee and the Congress for earmarking $300 million each year for procurement of items in Israel.

Another key program that will be funded through the FMS account is the upgrading of Israel's Navy, which must confront the colossal growth of hostile Arab navies like that of Syria, which has nearly doubled its number of combat vessels since 1982; Saudi Arabia, which has added 17 new guided missile warships since the beginning of the decade; and Iraq, which has added five guided missile warships since 1980, with six more on order.

Despite reductions in oil revenues, Israel's enemies continue to purchase more and newer weapons to add to their already bulging arsenals. They have placed orders for billions of dollars worth of new weapons each year, and have tens of billions of dollars more still in the pipeline from past years. Since 1973, the leading Arab nations still at war with Israel have spent nearly $400 billion on their armed forces, and are continuing to spend at an annual rate of $30 billion. According to the last set of figures released by the United States Arms Control and Disarmament Agency, five of the seven largest arms importing nations in the world are Arab nations at war with Israel: Iraq, Saudi Arabia, Libya, Syria, and Jordan. And, it may be significant that despite its economic problems, Egypt was the fourth largest importer, ordering in 1987 some $1.3 billion worth of American weapons alone.

Syria has made major efforts to expand and improve its armed forces since its defeats in the 1982 fighting. All branches of Syria's military have grown as a result. Syria's president, Hafiz Assad, has made very clear that he is preparing for war. Indeed, according to one estimate, the Syrians devote half their national budget to the armed forces, spending $1 billion more than Israel each year. As part of that buildup Syria has increased by 50% the number of divisions in its army. These troops have been reequipped with the latest model tanks, artillery, and other equipment available to the Syrians. The Syrians studied carefully the fighting in Lebanon in 1982 and have incorporated lessons from that campaign into their doctrine and training.

Syria's navy has also been a major beneficiary of this buildup, seeing its number of combat vessels nearly double in the years since the Lebanon war as well as the addition of previously unavailable capabilities. These new capabilities include Syria's first two submarines and a new coastal defense missile, the Sepal, with a range of about 180 miles.

Syrian air defense and air forces have also benefitted in this expansion. The losses of 1982 have been made good and then some; and more advanced types of anti-aircraft missiles and aircraft have entered service. New anti-aircraft systems have included the SA-5, SA-11, SA-13, and SA-14 missiles. Syrian pilots have spent the last year being trained in the Soviet Union on one of its most advanced fighters, the MiG-29, which is expected to begin arriving in Syria soon.

The Syrians have also acquired Soviet-built SS-21 tactical ballistic missiles, another piece of first-line equipment for Soviet forces facing NATO. These missiles are much more accurate and dangerous than the earlier Soviet-built Frog and Scud tactical missiles in the Syrian armory. The accuracy of these new missiles increase Syria's 'first-strike' attack abilities against key Israeli installations including air bases and mobilization points.

Jordan too has continued its defense buildup. The Jordanians have placed orders to increase inventories of tanks, artillery, anti-aircraft systems, vehicles, air-to-air missiles, and other munitions. According to the United States Arms Control and Disarmament Agency, Jordan, a country with a gross national product of $4.3 billion (1983) took delivery of over $3 billion in arms in the two-year period between 1981 and 1983.

A key part of Jordan's military buildup plan appears to focus around increasing its air defense capability through the acquisition of advanced fighter aircraft and mobilization of its batteries of Improved Hawk anti-aircraft missiles. If Jordan succeeds in its search for this capability, then it will be in a position to directly threaten Israel's margin of air superiority.

Since 1980, Iraq, which has sent forces to fight Israel in three wars, has more than tripled the size of its armed forces. Indeed, since the beginning of this decade, Iraq has become the world's leading arms importer, taking delivery of weapons worth an average of over $3 billion every year. Regardless of the outcome of the Gulf War, as both opponents have sworn Israel as an enemy, it can be expected that the enormous arsenal accumulated in Iraq will be at least in part available for use against Israel, as it has been in the past.

Despite steep reductions in oil revenues, Saudi Arabia continues to order weapons on a grand scale. It leads the Arab states in military expenditures, this year spending over $18 billion on its military, a sum equal to more than 75% of Israel's entire GNP. In each of the years 1981-1983, it was the world's second largest importer of arms. Current Saudi military expenditures per regular soldier are almost twice American expenditures (approximately $262,000 to $136,000). And, as Saudi Defense Minister Prince Sultan made clear in a recent Washington Post report, the focus of this military buildup is Israel, not Iran or the Soviet Army in Afghanistan. Therefore, not only does it seek to

acquire military capabilities far beyond its own legitimate defense needs, it continues to fund Syrian and Jordanian arms purchases and PLO terrorist activities against Israel.

As part of this huge ongoing military buildup, Saudi Arabia has been seeking steadily to increase the size and combat capabilities of its air force. An important aspect of this particular effort has been the Saudi attempt to enhance the fighting qualities of the combat aircraft it has acquired from the United States. In this it has been partially successful, to the detriment of Israel's security. The sale of further American aircraft enhancements to Saudi Arabia cannot but lessen the opportunity for Israel to expend its resources on projects more productive for its society than on countering an ever-extending range of Arab military power.

Mr. Chairman, the Arabs purchase these arms from dozens of different nations around the globe. Our country has been a major supplier to these nations, selling scores of billions of dollars of military goods and services to avowed enemies of Israel. American sales of new weapons systems to hostile Arab nations have had a particularly profound impact on the military balance between Israel and those states because American technology is often superior to that of competing weapons. These sales have significantly raised the cost to Israel of maintaining its own defenses, exacerbating the strain on Israel's economy, and barring any changes in American policy, will continue to do so in the future.

The past year has also revealed a new dimension of the threat to Israel: chemical weapons. Both Syria and Iraq have developed their abilities to the point where they are manufacturing their own deadly chemical weapons, and in the case of Iraq, have used them on numerous occasions in its war against Iran. The realization of what was earlier an approaching threat has forced Israel to take in its turn precautionary steps to protect its population and soldiers, again at further cost to itself.

Overall, what we have is a pattern of accelerated Arab buildup while Israel substantially cuts its forces. The effort to maintain the qualitative edge adds to the burden on the Israeli economy, further worsening the quantitative gap in the Arab states' favor.

Mr. Chairman, we are all proud of Israel's achievements, but realistically it is impossible to have this combination of trends without a diminution of security. Israel's margin of safety is, inevitably, reduced by the austerity measures it is forced to take.

And so I come before you to ask that you take these very serious risks into account when you consider the level of aid to Israel for FY 1988. What this Committee does will have a very real and direct impact on Israel's security, in a situation where there is much less room for error. Moreover, any reduction in aid will send the wrong signal to Israel's enemies.

Let me sum up, Mr. Chairman, the conclusions of my testimony. Our aid to Israel has been a wise investment, because Israel is our one democratic friend and most reliable ally in a critical region of the world. But this year,

aid to Israel is particularly important, for two reasons. First, to prevent any further erosion in Israel's narrow margin of security, in a situation where its forces have been cut while those of its adversaries are rapidly growing.

The second reason aid is particularly important this year is to stay the course on the economic recovery and growth program on which Israel has embarked. This is no time to reduce our effort.

AIPAC understands, however, the budget constraints operating in Washington. For this reason, I commend the Committee for seeking to authorize the full amounts contained in the President's request and for communicating this to the Budget Committee. Israel is also aware of America's budget constraints and thus has not increased its aid request and is seeking ways to promote economic independence. Indeed, last year the Government of Israel, acting as a responsible partner in the foreign aid process, returned a check for $51.6 million to the U.S. Treasury despite its economic pressures.

Mr. Chairman, I thank you for the strong friendship you and this Committee, and the Senate, have demonstrated toward Israel, and for this opportunity to explain the importance of FY 1988 aid to Israel and to America.

THE WHITE HOUSE

Office of the Press Secretary

For Immediate Release June 18, 1987

REMARKS BY THE PRESIDENT
AT SIGNING CEREMONY FOR
ISRAELI RELAY STATION SITE AGREEMENT

Room 450
Old Executive Office Building

3:45 P.M. EDT

THE PRESIDENT: Well, I want to welcome Minister Yaacobi, and Director-General Gov, Professor Rubinstein, and all the other distinguished guests.

And I'm delighted that the exchange of letters between myself and then-Prime Minister Peres some two and a half years ago has now come to fruition in this agreement for a relay station in Israel, through which the reach and clarity of the Voice of America, Radio Liberty, and Radio Free Europe will be so significantly enhanced. Peoples throughout the Eastern blocs will be the beneficiaries.

My administration, with the kind of bipartisan Congressional backing that I would certainly welcome for all our programs, remains dedicated to the long overdue modernization of our international broadcasting capability. Israel's fine gesture has now made a major contribution to that worldwide effort.

With this signing, our special historical relationship will be given another dimension. We could not be happier in this partnership with Israel because it will result in the broader dissemination of those values which we have in common. We stand now together in promoting the exchange of information and ideas throughout the world -- as we have stood before and will continue to stand as partners in seeking the free movement of people and the promotion of democratic values and beliefs.

Our international broadcasts are dedicated to presenting, through news and features, an objective picture of American society and, through commentary, a clear statement of American policies and positions on major world issues. To those deprived of the right to express or experience a diversity of views in their own societies, we offer the chance to hear such. At the bottom of it all lies the conviction that the fewer the barriers to communication in the world, the better the chance for success in international relations. I have often expressed that as it's better to be talking to each other than -- instead of talking about each other.

We owe the government of Israel our gratitude for being host to the site, and I ask its distinguished representatives here today to convey that to Prime Minister Shamir and others in their government who played major roles in advancing the project. To the negotiators on both sides, my congratulations. And to all of you, my best wishes for the future of this new cooperative venture.

And now, I think we shall all witness the signing.

(The agreement is signed.) (Applause.)

THE PRESIDENT: Let me know if you need any old movies. (Laughter and applause.)

END 3:50 P.M. EDT

TAGAR / Union of Students for Israel
4439 Markley-Butler, 1503 Washington Heights, Ann Arbor, Mich. 48109

FOR IMMEDIATE RELEASE

Sunday, March 29, 1987

Contact:
Debbie Schlussel at (313) 764-1809
Keith Hope at (313) 763-1813

UNIVERSITY OF MICHIGAN STUDENTS BUILD SOVIET GULAG JAIL CELL

Several University of Michigan students will build a Soviet gulag jail cell on Monday, March 30, 1987, at 10 am. The jail cell will be built on the Diag, the center and major student hangout of The University of Michigan's Ann Arbor campus.

The Soviet jail cell will be up for a period of approximately two weeks, during which student activists will pass out literature detailing the oppression of Soviet Jewry and what can be done about it. The students will also dress up as Jewish prisoners of conscience and sleep in the jail cell at night. In addition, the names of Jewish refusniks will be read off. A homemade mannequin resembling an imprisoned Soviet Jew will remain in the jail cell for the two-week duration of the jail cell.

The students are members of two student organizations on The University of Michigan campus, Tagar and Union of Students for Israel (USI). Tagar is a national college-based youth group of Jewish nationalists, and it is affiliated with the Herut political party in Israel. USI is an organization of students allied in support of the State of Israel.

The jail cell was the idea of Keith Hope, founder/chairman of U of M Tagar, and a freshman at The University of Michigan. "The idea of the Soviet jail cell is to call attention to the plight of Soviet Jewry, one of the most severely persecuted ethnic groups in the Soviet Union," Hope said.

Debbie Schlussel, a U of M freshman active in Tagar and USI, and the National Jewish Coalition representative on campus, added, "With all of the recent media coverage of the supposed liberalization in the Soviet Union, our goal is to show the world that Soviet 'Glasnost' is really Glas-Nyet!" Facts about the persecution of Soviet Jewry are enclosed.

IN AMERICA, YOU HAVE TO KILL SOMEONE TO GET 12 YEARS IN PRISON.

On November 6, 1982, Dr. Joseph Begun of Moscow was arrested. Now, after 6 months of KGB interrogation, he faces trial and sentence. For the third time. For up to 12 years. In a forced labor camp.

Not for murder or manslaugther. Not for armed robbery or arson. But for privately teaching, in a country where more than 100 languages are spoken and dozens more are taught and studied, the one that is forbidden: Hebrew.

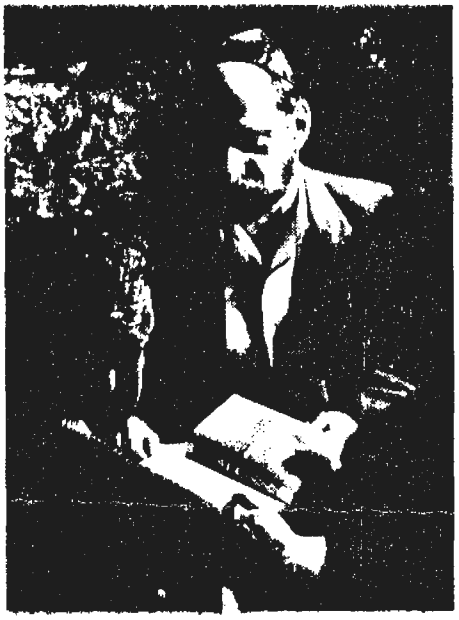
All across the Soviet Union, Jews who try to transmit their heritage face arrest, trial, and imprisonment as serious "threats" to Soviet law and order.

Yuri Tarnopolsky, for example, who taught in a Jewish Free University in Kharkov, is expected to be tried in May. Dr. Alexander Paritsky, its founder, is already undergoing savage treatment in a slave labor camp. So is Felix Kochubiyevsky of Novosibirsk, who tried to set up a Soviet-Israel Friendship Society. Simon Shnirman of Kerch has again been sentenced for wanting to join his elderly father in Israel.

Yaakov Mesh of Odessa is in danger of arrest for Jewish educational activities. Lev Elbert of Kiev has just been charged. Even a respected scholar like Ilya Essas of Moscow, known for his scrupulous compliance with Soviet law, cannot conduct a small private study group without constant fear of KGB interference.

We appeal to Congress to speed the passage of its Joint Resolution against oppression of Soviet Jews. We appeal to President Reagan to take special note of this Congressional call to use fully the leverage inherent in "negotiations in the area of trade, and science and technology exchange."

We ask Soviet Ambassador Dobrynin to inform his government of the importance of a Congressional Letter written by Senators Paul Laxalt and J. Bennett Johnston and signed by 98 of 100 U.S. Senators, calling for an end to this kind of cultural genocide and for Begun's release. And to tell the Soviet leadership that if they ignore this call from the American people, they risk further poisoning U.S.-Soviet relations and undermining that climate of trust without which arms agreements, large commercial credits, and scientific and technological exchanges cannot be possible.



We urge people of good will to write the President and their legislators to support Senate Concurrent Resolution 11 and House Concurrent Resolution 63.

This will show that the American people will not sit idly by while 3 million human beings are condemned to a spiritual gas chamber.

Because that would be the biggest crime of all.

IN RUSSIA, YOU MAY JUST HAVE TO TEACH HEBREW.

Tagar

For more info. call 763-1813

Analysis of
Decree on Emigration
Issued by The Supreme Soviet - November 6, 1986

1. The new decree, which updates a 1970 statute on entry into the USSR, for the first time recognizes that departure by ordinary citizens is acceptable rather than criminal.

2. Emigration is <u>not</u> a Soviet norm, in contradiction to Western practices.

3. The decree codifies an existing restrictive practice operational since 1980. This practice allows Jews to leave on the basis of family reunification only. It also restricts the conventional interpretation of family to that of the nuclear family, condemning hundreds of thousands of people from ever applying, much less receiving permission, to leave.

4. The new decree disregards many of the human rights provisions of three international documents, notably the Universal Declaration on Human Rights, the International Covenant on Civil and Political Rights, and the more recent Helsinki Accords, to which the Soviet Union is a signatory.

5. The codification of existing restrictive emigration procedures has been welcomed by some critics who maintained that practice has been arbitrary and secret.

6. The public release of the decree masks the reality of Soviet emigration practices at a time when it faces public criticism for human rights violations, at the current Review Conference of the Helsinki Final Act underway in Vienna.

7. The decree continues the Soviet practice of withholding permission from those who have "knowledge of State secrets". The decree does not define the term and has no ceiling on time. This vagueness is consonant with Soviet practice of arbitrarily denying the right to repatriate to Israel to hundreds of families, many of whom have been waiting <u>over</u> fifteen years. Forgotten was Communist Party General Secretary Mikhail Gorbachev's promise in Paris, over a year ago, that such cases would be resolved within five years or, at a maximum, ten years.

8. The new decree makes no mention of emigration as a right, and continues to leave Soviet authorities with absolute power to reject applications for emigration.

9. The new decree spells out nine reasons for denying requests for emigration, especially a catch-all provision that gives Soviet authorities the right to reject applications on grounds of "insuring the protection of social order, health or the morals of the population".

10. The new decree is a codification of restrictive Soviet practices gradually put into effect since 1979, and confirms the view of Secretary of State George Shultz who, in assessing the USSR's policy on Jewish emigration last month, stated: "The situation is bleak and deteriorating."

If the Soviet Union wants to demonstrate a new and human face to the world and demonstrate that it lives up to its solemn international commitments, it need only free the Prisoners of Conscience whom it has incarcerated for teaching Hebrew and insisting on the right to be repatriated to Israel; grant visas to the thousands of refuseniks, many of whom have been waiting ten years or more to emigrate; and start issuing visas to the hundreds of thousands of Soviet Jews who have initiated the emigration procedure by requesting and receiving invitations from their relatives in Israel.

November, 1986

Adapted from analysis by National Conference on Soviet Jewry.