

# ISRAEL HIGH-TECH & INVESTMENT REPORT

A MONTHLY REPORT COVERING NEWS AND INVESTMENT OPPORTUNITIES

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## From the Editor's Desk

### THE FUTURE IS HERE

Israel's gross domestic product has achieved relatively high growth in recent years -- up 5.4% in 1990 and 5.9% in 1991. A similar figure is expected for 1992. The Finance Minister, when tabling the Budget for 1993, used the Bank of Israel's forecast of 6.9% growth.

Political and economic considerations are increasingly positive. The mass immigration of 300,000 Soviet Jews in the past two years is having a favorable effect on the economy. The peace talks, now in their second year, may bring a greater level of stability to the region. Recent U.S. approval of \$10 billion loan guarantees represents backing from Washington and a basis for further economic growth. Negative factors persist -- the Israel Government maintains a high degree of control over the economy, unrest in the territories continues, an escalation of the arms race in the region is evident, and Israel's rate of unemployment is above 7% -- but on balance, perceptions of Israel's economic potential are brightening. More and more individuals and financial institutions are beginning to see the light.

Some developments have been recognized by Israelis. Over the past two years there has been an increase in overall confidence in the economy. As a result, the public financial institutions and foreigners have been consistently increasing their investments in securities. The Government has in recent years maintained a policy of gradual relaxation of regulations, and this trend can be expected to continue into the future. Accordingly, and as of July 1992, non-Israeli residents may invest in all securities, including mutual funds, and convert their original investment and profits into foreign currency.

A survey of the mutual fund industry appears in this issue. Foreign investors have been avid followers of Israel's advances in high technology, electronics, pharmaceuticals, software, graphics and telecommunications. Investments in Israeli

companies with shares trading at exchanges outside of Israel have increased significantly in 1992. The valuations of many of these companies no longer reflect what was once called the political discount. Moreover, these securities have been rising in price and initial public offerings and issues are well received.

Will investments in individual securities registered on the TASE follow?

Individuals wishing to invest in individual securities registered on the Tel Aviv Stock Exchange are likely to do so as investment information becomes more available, and as Israel's capital market, rightly so in terms of market activity, becomes known as an Emerging Market with substantial investment merit. In the meantime, though, price levels may be viewed as being high. The 1992 Tel Aviv Stock Exchange market averages continue to move ahead, and are now 54% up in dollar terms.

### MUTUAL FUNDS A \$ 10 BILLION MARKET

Among the many capital market opportunities from which to choose, Israelis are investing a growing percentage of their savings in mutual funds. One reason is that among the more than 200 funds there are six categories which satisfy key investor objectives... ranging from wealth building to preservation of capital. Foreigners may invest, as of July 1992, in all of the available mutual funds. But there is a catch. They may only do so if they maintain accounts with Israeli banks in Israel. From these

### In this Issue

- The Future Is Here: Editorial Comment
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- The Top Five Performers in Each Mutual Fund Category
- Israeli Companies on Wall Street: Comments on their Business Results: Teva Pharmaceuticals, 4th Dimension, ECI Telecom
- Elscont, Scitex
- Pharmos Completes \$65 Million Merger

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## Share Funds

**Category:** Diversified and Flexible Share Funds

**Investment Objective:** Growth

**Management Policy:** Manager invests in equities with mix of investments adjusted to market conditions.

**Funds in Category:** 40

### Top Five Performers

Fund	Manager	% gain
Emda	UMB	58.28
Hadas	UMB	53.30
General	General	50.12
Yesodot	Moritz	49.18
Siyon	Amban	45.40

*(percentages represent gain in value in U.S. dollar terms for ten months ending Oct. 31, 1992)*

**Category:** Market and Maof Index Funds

**Investment Objective:** Aggressive Growth

**Management Policy:** Manager invests in the 70 leading shares making up the TASE Share index or in the 25 leading shares which make up the Maof Index

**Funds in Category:** 55

### Top Five Performers

Fund	Manager	% gain
Mivneh	FIBI	63.27
Psagot Limit	Psagot	61.25
Mor	FIBI	61.09
Meitav	Meitav	60.33
Ankor	Lahak	59.64

accounts, foreign currency is used to buy shekel-denominated funds, and when they are sold the shekels may be freely reconverted to foreign currency.

However, the tide is turning, and more foreign investment may be attracted because of the high yields recorded on security investments in Israel over the past couple of years.

For the time being, foreigners may invest through

the first-ever country fund, registered and sold in the U.S. since October 1992. The \$75 million fund's policy is to invest up to 70% in the shares of Israeli public companies. The fund was underwritten by leading members of the American financial community, and was offered successfully to international investors anywhere in the world, with the exception of Israel. Two years ago, a major Israeli banking institution formed a mutual fund aimed at foreign residents. However, this fund can

## Bonds Linked to Cost-of-Living Index

**Category:** Government Bonds Linked to Cost-of-Living Index

**Investment Objective:** Conservative Growth

**Management Policy:** Manager invests in government bond issues.

**Funds in Category:** 38

### Top Five Performers

Fund	Manager	% gain
Epsilon	Epsilon	10.99
Meitav	Meitav	9.98
Orly	Nesuah	8.83
Analyst	Analyst	7.81
Leshem	UMB	7.47

*(percentages represent gain in value in U.S. dollar terms for ten months ending Oct. 31, 1992)*

**Category:** Non-Government Bonds Linked to Cost-of-Living Index

**Investment Objective:** Conservative Growth

**Management Policy:** Manager invests in Non-Government Bonds Linked to Cost-of-Living Index

**Funds in Category:** 45

### Top Five Performers

Fund	Manager	% gain
Gia	Amban	25.40
Hamara	UMB	19.57
General	General	16.95
Goren	Hapoalim	14.42
Psagot Yatziv	Psagot	14.30

only be bought from foreign currency deposits held with local banking institutions. The mutual fund issuers, if they wish to become part of the global investment market, will have to make the effort and undergo the expense of registering their mutual funds in the countries where there is a major potential for their sale. Successful investment in securities will be an additional step for encouraging and obtaining direct foreign investment in major areas of Israel's economy.

The beginning of 1992 was marked by a broad-based conviction on the part of Israel's business community that the capital market, especially the share market, would continue to be buoyant. The total market valuation for bonds and shares stood at \$41.3 billion. By June 30, the market valuation had risen to \$53.9 billion. The equity part of the market accounted for the major part of the advance. By June 30 it was valued at \$22.6 billion as compared with \$13.5 billion at the start of the year. Quantitatively and percentage wise, an eye-catching performance. Turnover figures, running sharply ahead of 1991, by mid 1992 were at \$12.6 billion, approximately 20% greater than in 1991.

#### **Mutual Funds**

Over 1,100 securities were listed for trading as of June 30. Of these, 676 were shares and convertible debentures. Except for avid market watchers and speculators, the mutual fund industry, which provides a spread of risk and professional management, opens up a more attractive way to participate in a rising securities market.

The number of mutual funds available have grown sharply in the past decade, and at the start of November, the market capitalization of the mutual funds totaled \$10 billion. According to a bank study, the activities of the mutual funds account for more than 25% of the total volume of the Tel Aviv Stock Exchange. The mutual funds are known to hold more than 30% of the total share float. In 1992, Israelis have been investing in mutual funds in ever-growing numbers.

The popularity of the mutual funds is also due to their excellent investment results.

Our study of 209 mutual funds focussed on pinpointing the five best performers in each major category for the the first ten months of 1992. It appears below. Though mutual funds are denominated in New Israeli Shekels, the performance expressed in percentage change since the beginning of 1992 is expressed in U.S. dollars, and takes into account an 11.4% currency exchange

rate differential since the start of the year.

Foreign residents residing outside of Israel cannot always buy these funds as easily as the law implies. In America, for example, Israeli mutual funds are not registered, and are therefore considered as being offshore, and not legal for investing purposes.

#### **Foreign Currency Bonds Funds**

**Category:** Bonds Linked to Foreign Currency Funds

**Investment Objective:** Conservative Growth

**Management Policy:** Manager invests in foreign currency linked bonds

**Funds in Category:** 22

#### **Top Five Performers**

Fund	Manager	% gain
Meitav	Meitav	12.18
Psagot	Psagot	11.63
Inbal	Hapoalim	10.37
Hohit	Lahak	9.30
Meged	FIBI	8.73

*(percentages represent gain in value in U.S. dollar terms for ten months ending Oct. 31, 1992)*

#### **Index Linked Bonds and Share Funds**

**Category:** Mixed funds

**Investment Objective:** Growth

**Management Policy:** Manager invests in a combination of index-linked bonds and shares.

**Funds in Category:** 9

#### **Top Five Performers**

Fund	Manager	% gain
Teena	Discount	36.59
Barak	Discount	29.04
Brosh	Discount	25.44
Moked	FIBI	23.49
Zofit	Lahak	21.10

*(percentages represent gain in value in U.S. dollar terms for ten months ending Oct. 31, 1992)*

#### ***Funds are no load or low load***

The load is the sales commission imposed by the institution selling the mutual fund to the investor. A no-load fund is one that sells its shares at net asset value, without adding a sales charge. A low-load fund is one that adds a sales charge of 3% or less. Some institutions charge from 0.5% up to 1.5% as

a sales charge. They qualify under the low-load category.

#### Management Fees

Management and Trustee fees are calculated as a percentage of a fund's annual value, and vary between 1-3%.

It was in 1992 that the Government of Israel made it legal for foreign residents to invest in all mutual funds in Israel. The law allows foreign investors to convert their original investment and profits into foreign currency. In less than a year, according to informed estimates, \$300 - \$500 million dollars has already been invested by foreign residents in mutual funds.

#### Performance of Equity Markets

	Nov 2, 1992	Dec 31, 1991	change
Dow Jones	3,262	3,169	+ 2.93 %
S&P 500	422.75	417.09	+ 1.36%
Nikkei	16,853	22,984	- 26.70%
FTSE 100	2,688	2,493	+ 7.82%
DAX	1,473	1,578	- 6.65%

#### NINE-MONTH RESULTS FOR PUBLIC COMPANIES

##### SCITEX

	1992	1991
Sales	\$ 396 mil	\$ 313.3 mil
Net income	\$ 87.1 mil	\$ 72.8 mil

Scitex Corporation has entered its 25th year since its founding at the Weizmann Institute, and could reach sales for 1992 in excess of \$525 million, earning as much as \$115 million for the same period. The prospects continue to be positive for the foreseeable future in terms of increased market share in America and Europe. Pacific-area sales, though small at \$20 million, could increase sharply.

##### LASER INDUSTRIES

Laser Industries' third-quarter and nine-month results indicate the effect of continuous cost-cutting measures, the need for which are reflected in the small profit figures. There are still no indications that new product sales are meaningful in terms of sales and profitability. Laser has called in its outstanding

debentures at 100% of value. Prior to the tender, they were priced at approximately 60% of par. The move was intended to reduce future interest costs.

	1992	1991
Sales	\$ 21.7 mil	\$ 23.2 mil
Net income	\$ 783,000	(\$ 270,000)

##### ELRON ELECTRONIC INDUSTRIES

On a quarter-to-quarter basis, the \$4.7 million earned by Elron Electronic Industries in the third quarter was a substantial improvement. However, \$12.2 million of those profits came about as a one-time gain resulting from the merger of an Elron subsidiary, Optrotech, with Orbot Systems. The new entity is Orbotech Ltd. - NASDAQ: ORBKF. The total from Optrotech and Fibronics operations, in the nine-month period, came to \$3.6 million. Elron's management is supporting Fibronics in a major restructuring program. Elron has announced that it anticipates fourth-quarter earnings to rise by \$6 million as a result of a private placement of \$22.7 million, to be concluded by year's end.

	1992	1991
Sales	---	---
Net income	\$ 10.7 mil	\$ 15.8 mil

##### ECI TELECOM

In the aftermath of the announcement of the company's merely good business results, the American investment banker Alex Brown downgraded its recommendation from "strong buy" to "buy". The market capitalization of ECI at its

	1992	1991
Sales	\$ 116.5 mil	\$ 79.5 mil
Net income	\$ 27.8 mil	\$ 19.1 mil

recent price of just over \$32 a share is now in excess of \$1.0 billion. ECI's past and future success is in its ability to capitalize on strong R&D programs. In the third quarter of 1992, R&D spending increased by more than 75%, to \$5.4 million. In view of its positive results, it is no wonder that ECI continues to be ranked in Israeli investment circles as a premier vehicle.

**TEVA PHARMACEUTICAL INDUSTRIES**

Most of the gain in Teva's net income came from its American subsidiary, The Lemmon Company. The company's main buyer in Israel, The General Health Fund, is in the process of being restructured. The GHF is Teva's biggest customer, but due to a stoppage of shipment from Teva to GHF, sales in Israel, which grew by 16%, have been shifted to the local pharmaceutical private market. Teva's marketing agreements and acquisitions in Europe will strengthen its presence there and, in due course, will contribute meaningfully to sales.

	1992	1991
Sales	\$ 281 mil	---
Net income	\$ 21.5 mil	---

**4TH DIMENSION SOFTWARE**

4th Dimension Software Ltd. completed its Initial Public Offering in the United States in October at \$12 a share. The company markets a family of integrated software products which automate many functions of data centers in large organizations. Its products are licensed to users in 39 countries. EDS, a General Motors subsidiary, has purchased an equity interest in the company, and the two companies have also signed a technical cooperation agreement. The company's shares are traded under the symbol DDDDF - NASDAQ/NMS. The company's shares recently traded above \$20.

	1992	1991
Sales	\$ 12.1 mil	\$ 4.85 mil
Net income	\$ 4.1 mil	\$ 882,000

One can only wonder whether investors are not over enthusiastic in bidding up the price of these shares. Having said that, 4th Dimension is viewed positively, and people in the industry agree with the company's management that, at least for the next year, the outlook is for increasing sales and profits.

**PHARMOS COMPLETES \$65m MERGER WITH PHARMATEC**

At its annual meeting, Pharmos Corp. announced that it has completed its \$65 million merger with Pharmatec Inc., a Florida-based biotechnology company developing a unique carrier technology for the delivery of drugs to the brain. Pharmatec's stock

(NASDAQ:PHTC) ceased trading in October 1992. Pharmos, the combined entity, began trading on 30 October 1992 on NASDAQ under the ticker symbol PARS.

The two companies have synergies in technology, management skills and products. "Pharmos' drug delivery system and Pharmatec's carrier system complement each other, and when combined will expedite the bringing of our drugs to the clinic," said Haim Aviv, Chairman. "Additionally, our rich and focused product pipeline, with one product commencing Phase III clinical trials, will enable us to establish a strong position, with novel treatments for the eye and central nervous system."

**BANK HAPOALIM REPRESENTS FIDELITY**

Bank Hapoalim has become an approved distributor for the American Fidelity Group. Of particular interest to Israeli investors will be Fidelity's many market functions.

**YITZHAK MODAI JOINS ELRON**

Yitzhak Modai, former minister of finance, has been appointed to Elron Electronic Industries' Board of Directors.

**MATHEMATICIANS IN THE MARKETPLACE**

Old-time biologists at the Weizmann Institute used to stifle a giggle whenever they passed a commercial knitwear machine clacking away in the basement of the Wolfson Building. It seemed curiously out of place in one of the campus' major centers of life-science research.

But no one is laughing now. That knitting machine, it turns out, was essential for the creation of one of the first products of the small company that was to develop into Scitex, the flagship of Israel's civilian high-tech industry. The \$400-million-a-year company is one of the world's leading producers of computer-graphics equipment for color printing, with its prepress systems operating in thousands of locations in the United States, Europe and Japan. Customers include such leading publishers as the New York Times, the National Geographic Society, and Time Inc.

The Weizmann Institute scientist who best remembers those early days is Prof. Amir Pnueli, then a young researcher in the Applied Mathematics Department, who used to spend his after-work hours programming for the fledgling company in the Wolfson Building.

The Weizmann-Scitex connection, recalls Pnueli, began in 1967, when Shalheveth Freier, Deputy



Director General of the institute -- with the support of Director General Prof. Amos de-Shalit and President Meyer Weisgal -- decided to promote high-tech industry in Israel by offering facilities on campus to recently formed companies. One of those ventures was Scientific Technology, a small firm created in 1968 by five Israelis who had returned to the country from positions in the United States.

Although mainly concerned at the time with the design of electro-optic devices for the Israel Defense Ministry, Scientific Technology won a short-term contract in a civilian area in which it had only limited experience. A North Carolina textile firm was seeking to develop a computer-operated device for loading hand-drawn knitwear patterns into its automated knitting machines. However, the vital technology for producing the electronic coding understood by the machine was the manufacturer's closely held secret. Scientific Technology decided to take up the challenge on the basis of its experience with the scanners required to read drawings. What the company lacked was the extensive programming skills required to enable a commercial minicomputer to handle the coding.

#### COMPUTER PIONEERS

Housed on the institute campus, Scientific Technology naturally turned to Weizmann mathematicians, who had already earned a reputation as the country's top computer experts. It was they who had built the hardware and designed the operating system for Israel's first computer, the WEIZAC, completed in 1955. In the 1960s, institute mathematicians followed up with GOLEM A and GOLEM B, which provided state-of-the-art, home-built computer power at a fraction of the market cost. In 1960, when the State of Israel purchased one of its first computers - the TRANSAC - the institute's Prof. Philip Rabinowitz was borrowed by the State for two years to set up and manage this installation, as well as to instruct the nation's first generation of computer programmers.

Providing programming for an automated pattern scanner was well within the capabilities of the institute's computer development team, and young institute mathematicians found the spare-time work challenging and economically rewarding. Every evening, a member of the mathematics staff and two staff programmers would make their way across the quadrangle from their facilities in the Zisking Building to the Wolfson Building. Within one year, the initial version of the scanning device for knitwear patterns was completed.

"Our work," notes Pnueli, "eventually led to a highly

automated device in which a pattern was fed into the scanner at one end, was reproduced by the knitting machine, and ready-made cloth was spewed out at the other end."

This new technology led to a reorganization and expansion of the company in the early 1970s under the combined ownership of Scientific Technology, the North Carolina textile company Texfi, and an Israeli household-appliance concern. It was renamed Scitex -- short for Scientific Technology, but ending with tex, as in textiles.

Pnueli and other institute computer experts -- particularly the brothers Hagi and Ido Lachover and Dr. Yigal Accad -- continued to work part-time for Scitex within the framework of Mini-Systems, an independent software consulting company. Subsequently, many outside programmers were hired to meet the expanding requirements of Scitex, which soon began using its scanners in units designed to automate silk-screen production for fabric printing, and ultimately in the first Response 300 computerized graphics system for the printing industry, introduced in 1979.

#### THE ORBOT STORY

MIT and its neighboring Route 128 high-tech industrial area were the spawning grounds for Orbot Systems Ltd., another highly successful Israeli company. This producer of automated quality-control inspection equipment for printed circuit boards was the brainchild of Weizmann Research Fellow Zvi Lapidot and Prof. Shimon Ullman. In 1981, Ullman was working at MIT and Lapidot was on sabbatical from the institute at a Route 128 company specializing in semiconductor inspection and quality-control equipment. They were soon joined by another Weizmann computer expert, Amiram Caspi.

#### "A Similar Company In Israel"

"Lapidot and I began thinking about setting up a similar high-tech company in Israel," recalls Ullman. "We were encouraged by the fact that such start-up firms have relatively few requirements -- a small group of people with good ideas for new technology and a minimal amount of working capital. With the experience we had acquired in automated semiconductor chip inspection and quality control, we decided to take on parallel challenges in the field of printed circuit boards. The printed circuit industry -- whose products, at the time, were beginning to be constructed from multiple-board sandwiches -- was running into quality-control problems. A small defect in a single board rendered the whole final device unworkable."

# ISRAELI COMPANIES WITH SHARES ON FOREIGN MARKETS

As of Nov 16, 1992

(IN MILLION \$)

	P/E	MARKET VALUE SHARE HOLDERS EQUITY	SHARE HOLDERS EQUITY	MARKET VALUE	EPS IN LAST REPORT	NET INCOME				REVENUES				LAST REPORT DATE	% CHANGE			LAST BID PRICE
						LAST YEAR	LAST QUARTER	PERIOD 1991	LAST REPORT	LAST YEAR	LAST QUARTER	PERIOD 1991	LAST REPORT		LAST YEAR	YEAR %	MONTH %	
EDUSOFT	37.8	5.96	4.95	29.50	0.17	0.42	0.15	0.12	0.59	2.09	1.01	1.20	2.66	30.09.92	NA	NA	-9.23	7.38
ORBOTECH	negative	3.04	29.7	90.18	(0.51)	1.46	(1.55)	0.36	(3.16)	71.77	17.72	35.91	36.18	30.06.92	112.0	9.43	8.41	14.50
IIS	21.5	3.68	36.4	133.95	1.12	5.74	1.70	4.13	4.67	43.94	10.86	31.56	32.37	30.09.92	80.0	77.78	-4.83	32.00
INTERPHARM	22.6	10.99	19.3	212.24	0.75	4.27	1.77	3.37	4.70	35.20	12.90	25.20	36.30	30.09.92	314.3	-21.84	-2.86	34.00
FCI TEL	27.5	7.44	137.1	1,019.28	0.88	27.42	9.94	19.08	27.82	113.98	41.73	79.46	116.55	30.09.92	274.0	37.97	3.20	32.25
ELBIT	24.1	3.56	202.2	720.73	1.30	35.55	7.37	18.59	22.41	409.58	109.33	300.02	331.98	30.09.92	85.0	68.69	1.83	41.75
ELSCINT	28.9	5.02	110.5	554.55	0.19	17.13	5.29	11.09	14.37	190.90	55.26	137.74	158.75	30.09.92	111.1	52.63	-3.33	7.25
ELRON	23.0	2.20	149.0	328.22	0.62	20.33	4.70	15.80	10.70	404.00	145.00	404.00	439.00	30.09.92	132.7	24.79	-7.93	18.88
ARYT	16.6	1.83	9.3	17.06	0.10	(0.71)	0.36	(0.20)	0.52	6.44	4.15	0.00	8.96	30.06.92	-5.9	237.50	17.39	3.38
ESHED ROBOT	19.4	3.26	10.1	32.96	0.09	2.10	0.67	1.18	0.85	9.28	2.60	4.97	4.36	30.06.92	1,150.0	6.00	-10.17	3.31
B.V.R	negative	6.43	5.9	37.99	(0.03)	(0.13)	0.23	0.32	(0.13)	2.76	3.25	1.44	3.91	30.06.92	NA	107.14	0.00	7.25
TAT TECH	16.9	53.85	0.4	19.76	0.06	(1.21)	0.27	0.08	0.59	6.04	1.50	0.76	3.33	30.06.92	181.8	100.00	19.23	1.94
HEALTH CARE	negative	2.66	5.0	13.34	(0.01)	(0.73)	(0.02)	(0.22)	(0.06)	2.69	0.92	1.22	1.73	30.06.92	200.0	23.81	-3.70	1.63
ILDCY	46.9	1.03	118.0	121.78	0.05	1.39	1.43	1.65	1.30	49.58	58.00	17.17	89.48	30.06.92	-7.0	37.50	-5.17	13.75
TEVA	31.9	3.96	231.4	917.43	0.78	23.30	6.86	16.57	21.54	321.00	95.05	241.50	281.02	30.09.92	67.8	75.50	0.76	33.13
TELEDATA	27.0	4.29	37.208	159.52	0.43	3.99	1.89	2.50	4.42	17.36	6.16	8.90	15.42	30.09.92	NA	NA	5.13	15.38
ISTEC	30.1	6.51	1.2	7.84	0.04	0.20	0.10	(0.51)	0.26	1.80	0.13		0.31	30.06.92	550.0	30.77	6.25	1.06
CARMEL	20.6	1.48	11.7	17.33	0.17	1.31	0.01	(0.09)	0.42	80.79	18.38	37.38	39.46	30.06.92	188.2	12.24	1.85	6.88
LASER	26.0	12.76	2.13	27.19	0.15	0.03	0.44	(0.27)	0.78	31.10	7.20	23.25	21.73	30.09.92	0.0	41.38	7.89	5.13
LANET	13.5	3.96	69.349	274.46	0.93	7.70	3.41	5.18	10.16	24.50	12.17	17.07	34.44	30.09.92	NA	45.32	-4.72	25.25
MAGIC	38.2	7.06	5.8	41.17	0.23	1.01	0.36	0.65	0.81	5.37	2.76	3.13	6.99	30.09.92	NA	48.39	-3.16	11.50
4TH DIMEN.	39.8	5.91	36.52	215.93	0.39	1.78	1.35	0.88	4.07	7.82	4.33	4.85	12.10	30.09.92	NA	NA	6.49	20.50
AIP	7.5	1.54	125.3	192.51	2.25	13.20	2.80	8.49	8.56	276.30	70.60	198.60	209.90	30.09.92	40.6	22.80	-6.48	50.50
S.P.I.	3.2	0.25	8.3	2.12	0.20	(1.00)		(1.00)	0.66	19.27		19.27	22.62	31.12.91	150.0	0.00	0.00	0.63
SCITEX	14.3	2.72	610.2	1,662.63	2.06	100.56	32.42	72.82	87.15	430.20	144.47	313.35	396.47	30.09.92	136.7	10.56	-5.99	39.25
OSHAP	negative	2.27	15.4	35.01	(0.06)	0.52	(0.46)	0.02	(0.40)	37.93	9.00	19.11	18.91	30.06.92	9.1	16.67	5.00	5.25
IDAN	negative	14.77	0.6	8.74	(0.02)	(0.65)		(0.14)	(0.12)	0.02		7.19	0.00	30.06.92	214.3	100.00	15.79	1.38
ELITE	29.7	1.44	77.53	111.87	0.09	11.84	(0.45)	10.54	2.83	251.0	49.71	189.94	158.5	30.09.91	-20.8	15.79	0.00	11.00
ETZ LAVUD	20.1	1.50	17.9	26.95	0.42	4.02	0.54	1.27	1.34	102.69	26.40	48.30	50.60	30.06.92	66.7	21.82	10.74	9.00
FRUTAROM	18.0	1.47	41.4	61.05	0.11	0.60	1.16	1.10	2.54	116.37	30.53	88.27	90.78	30.09.92	-17.2	83.33	-4.35	2.75
RADA	negative	2.76	9.4	25.82	(0.22)	0.21	(0.61)	0.78	(0.90)	28.70	9.11	19.71	24.51	30.09.92	82.4	-17.74	0.00	6.38
TADIRAN	6.5	4.83	105.0	507.52	1.99	30.17	8.40	15.50	39.10	726.29	171.90	371.70	392.80	30.06.92	NA	NA	6.15	25.88
TARO VIT	41.7	18.18	4.4	80.06	0.16	1.40	0.53	0.93	1.44	20.60	7.19	14.70	19.30	30.09.92	104.3	48.94	-5.41	8.75

Source: Bank Hapoalim

On their return to Israel, the founders succeeded in persuading the owner of a successful local firm, Ornat Turbines, to invest in their new project. Thus Orbot was born in 1982, and has operated ever since out of the Ornat complex in Yavne, eight miles east of Rehovot.

(IHTIR editor's note: Orbot is being merged with Optrotech Ltd. and will supply three-quarters of the American market for printed circuit board testing equipment)

#### **Tremendous Speed and Accuracy**

Orbot's first automatic optical inspection system for printed circuits was introduced in 1984. It contains an electronic camera that produces an image of the board, which is then digitized and analyzed by a proprietary computer system. This system has proved remarkably effective in detecting a gamut of physical defects -- such as shorts, holes or cracks -- with tremendous speed and accuracy.

Today, Orbot is the world's largest producer of this kind of technology, with a market share of over 55%. It employs about 500 people locally, and operates four foreign sales and service subsidiaries -- in the United States, Europe, Japan, and Hong Kong. Shimon Ullman still consults for the firm; Zvi Lapidot (on leave from the institute) serves as its Managing Director; and Amiram Caspi, who recently left the institute, is Director of Research and Development.

#### **Other Success Stories**

In Kiryat Weizmann, the science-based industrial park adjoining the Weizmann Institute, Elop Electro-Optics Industries is applying techniques first developed in the 1970s by institute Prof. Emeritus Isaac Horowitz. His innovations are used to simplify the design of various products that involve servo-control systems -- devices that have to keep operating even when external conditions fluctuate unpredictably. One of these is a novel tracking device with night-vision capability and a TV camera. Mounted on fast-moving police and coastguard ships, it can follow and help apprehend drug smugglers (or terrorists) foraging from small motorboats.

#### **Prospecting for Oil**

No discussion of how institute mathematicians have contributed to the local economy would be complete without mention of the first such activity in Rehovot: oil and geophysical prospecting for the newly created State of Israel. In fact, between 1951 and 1957, the activities of the Applied Mathematics Department

were almost exclusively devoted to this operation. The pioneering project was headed by Distinguished Weizmann Institute Prof. Chaim Pekeris, a world-renowned expert in theoretical seismology and founder of the Department. He was later joined by Prof. Joseph Gillis, who worked in the area of gravimetric surveying.

In the course of this massive undertaking, nearly 8,000 square kilometers were meticulously surveyed, probed and analyzed by both seismic and gravitational measurement. Thanks to the data gathered, foreign petroleum companies were induced to support drilling, and as a result, Israel's first oil field, Heletz, was developed in 1955. Eventually, the crews -- all of which had originally been trained, equipped and directed by institute personnel -- continued their work under an Israel government agency, the Geophysical Institute of Israel.

Even before the institute was built, Chaim Weizmann had set down as one of its missions the harnessing of modern science to serve the needs of local industry. The productive partnership that has developed between institute mathematicians and Israeli industry testifies to the wisdom and validity of his far-reaching goals.

*The above material, authored by Dr. Edward Tepper, appeared in a publication of the Weizman Institute of Science.*

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