

ISRAEL HIGH-TECH REPORT

A MONTHLY REPORT COVERING NEWS AND INVESTMENT OPPORTUNITIES

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NEW FOREIGN PARTNERS FOR SCIENCE-BASED INDUSTRIES

Because of Israel's dynamics, assessing ongoing events is not always easy. For the same reason, forecasting future developments carries with it more than the usual plethora of conventional pitfalls related to fathoming the future. However, a number of signpost events are taking place that prompt us to take a long look at the current state of affairs and its implications for the future for Israel's high-technology sector.

A recent Bank of Israel economic survey covering developments in the first quarter of 1989 reveals that the economic slowdown of last year is continuing. That negative is considerably softened by other data which indicate that the slowdown is primarily reflected in reduced sales to the local market. Most constructive criticism of Israel's economy has in the past focused on the high level of personal consumption. A slowing of consumer spending therefore is a step to normalization. Businessmen were big foreign-currency spenders, prior to the anticipated turn-of-the-year devaluation. Prices of nearly all inputs which are related to foreign currency or government budgeting have by now reflected the devaluation. The end result is the public's decreasing spending. This in turn lessens inflationary pressures. Supporting this was the impressively low half of one percent rise in the cost-of-living index for March. Yet the outlook for the economy is far from rosy. Unemployment figures are a source of concern. The current rate of unemployment of 8.2 percent is at a peak not seen since the alpine levels recorded in the first half of 1986. Unfortunately, the

unemployment level has been trending higher in recent months. The continuing employment fallout resulting from the Koor Industries restructuring serves as a warning signal that unemployment levels are unlikely to improve dramatically in the coming months.

The economic statistics as reported by the Bank of Israel are a type of macro-economic view of events. They are broad and do not bring into focus specific areas. For that reason, we like to look at the science-based industries and the high-technology sector as an individual group, not as part of all manufacturing industries' statistics. It is a group that is not readily identifiable in the statistical information. Since the beginning of the last quarter of 1987, high-quality well-managed medium- to large-sized science-based industries, some of them truly high-tech, have been reporting solid and improving earnings. The managers of these companies have adopted restructuring strategies which have resulted in increased sales, profits, and a growing figure for the percentage of exports as part of total sales. These developments have come to the attention of foreign investors. Companies such as Scitex and Teva Pharmaceuticals have recently become the objects of major

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foreign investments. Britain's Robert Maxwell, by virtue of investments of nearly \$70 million in these two companies, has given expression to his expectations that these companies have the potential of becoming multinationals. These investments also serve as a practical expression of optimism in the future performance of these companies, their products, and management. Assuredly we believe that there will be more foreign investment flowing into the local economy. The government and businessmen are becoming more liberal in their view of allowing foreign investment. As investment capital flows, it takes the pressure off the government and serves as a compelling incentive to carry out the long-discussed but only initially surface-scratched privatization program. The Israeli economy, in spite of the worrisome burdens of the Intifada, defense expenditures, and a relatively high level of unemployment, appears ready for a turnaround. Science-based industries and the high-tech sectors are assuming a leadership position and are serving as a spearhead for an export-driven economy. We anticipate that the financial and business reports of the first quarter of 1989 will indicate that increasing sales will be matched by exports and relatively strong profitability.

IHTR CO-SPONSOR OF THE SECOND INTERNATIONAL HIGH-TECHNOLOGY CONFERENCE

Last year's Inaugural Conference of Israel's High-Technology Industries proved to be one of the most successful conferences to be held in Israel in 1988. IHTR who initiated the conference served as co-sponsor with the Israel Management Center. Now visualized as an annual event we are joining with MIL to co-sponsor this year's conference. The 1989 conference will be held in Tel Aviv on June 27, 1989. Israel's leading personalities in the high-technology and science based related fields as well as top government leaders and America's new Ambassador to Israel William Brown will be

present. A number of well known overseas participants are expected to be join the Israeli group. A one hour Worldnet Satellite hookup and dialogue between Washington and Tel Aviv, depending on satellite time availability should to add an international dimension to the High-Tech Conference.

HIGH TECHNOLOGY BUSINESS FEATURES ISRAELI RESEARCH & DEVELOPMENT

High Technology Business the premier American monthly high technology magazine in its April 1989 issue carried a four page story entitled R&D Bounty from Israel. Mel Mandell who researched and wrote story the story for HTB did a fine job. IHTR and its editor were used as resources in preparing the story. For reprints please contact Joannie Molloy, Production Director at High Technology Business, 270 Lafayette, Suite 705, New York, New York, 10012 tel (212) 431-5511.

SECURING DEUTSCHE BANK

Deutsche Bank, one of Europe's largest banks, with deposits reaching \$155.4 billion at the end of 1987, has purchased a computer system for safeguarding banking communications from Algorithms Research. The system is an application and improvement of a coding method originally developed at Massachusetts Institute of Technology in Cambridge, Mass. The Ministry of Trade and Industry's chief scientist provided R&D assistance for the project, which also produced PC-based protection systems, file coding, electronic mail, communications safeguarding and access control between different computers. The Government's Revenue Administration purchased a similar system over a year ago which allows over 200 accountants and tax consultants to call the Income Tax Authority's main computer daily.

IAI ACQUIRES TADIRAN'S MAZLAT HOLDINGS

Israel Aircraft Industries recently purchased Tadiran's shares in Mazlat,

a jointly-owned company that develops and manufactures RPV unmanned vehicle systems. The sale to IAI is intended to improve Tadiran's financial position while Tadiran intends on continuing its active participation in the company on a subcontractor basis. Originally both Tadiran and the IAI engaged in the development of unmanned aircraft and competed against one another for sales. Mazlat was established to do away with this duplication. A number of successes have been posted including development of the Pioneer drone, and the sale of a number of systems to the U.S. Navy and Marine Corps.

ASTRA JETS BACK ON COURSE

In a recent meeting between Israel Aircraft Industries (IAI) Board of Directors and Roy Bargstrom, IAI's North American marketing director, a decision was reached to continue manufacture and sale of the Astra executive jet. The board expressed confidence in the Astra project by agreeing to intensify marketing efforts.

AVIATION INDUSTRY AT LE BOURGET

Twenty-three Israeli exhibitors will participate this year in the Paris Air Show scheduled for June 1989 at Le Bourget. The exhibition is the most prestigious of its kind in the world in aviation. Among the traditional exhibitors are Israel Aircraft Industries, Rafael and Elbit

Exhibitors scheduled to participate but not necessarily active in the aviation sector include Rabintex and Eagle Military Gear, in the military textiles and Pelson-Sasa specializing in a parallel conference and exhibit on chemical warfare to be held in Sweden in June. Protection shields, vests, boots and mittens, medicines and vaccines, and decontamination equipment will be on display.

MULTIPLE SCLEROSIS THERAPY

Kop-1, a new drug developed at the Weizmann Institute for the treatment of multiple sclerosis will be manufactured and marketed by Teva Pharmaceuticals on condition that it be approved by the U.S. Food and

Drug Administration (FDA). Positive results from limited clinical testing have already been recorded and an application has now been submitted to the F.D.A. for more extensive and expanded clinical testing. The submission of such a request is regarded as a milestone in the protracted process of having the drug approved.

EGYPTIAN & ISRAELI SCIENTISTS IN UNIQUE AGRICULTURAL PROJECT

For seven years Egyptian and Israeli scientists have been working together in what is a unique agricultural research program. Dr. Dov Pasternak, director of Ben Gurion University's Institute for Agriculture and Applied Biology describes the American sponsored research project as one that "is creating scientific knowhow in desert development while proving that former enemies can work together in harmony".

The CALAR- Cooperative Arid Lands Agricultural Research Program began in 1982 with financing from the US Agency for International Development which makes available \$1.25 million yearly for research work being carried out in the three countries. The project deals with three major areas including saline water irrigation, fodder and small animal production and industrial crops. BGU is the research contractor with the Volcani Institute, the HU Agriculture Faculty of the Ramat Negev Experimental Station being key Israeli participants. In Egypt five universities and three research institutes are participating while the American group includes researchers from four universities. In Egypt 40 per cent of breadwinners are farmers and the Egyptian Government is favors the development of innovative agricultural techniques.

The Israeli and Egyptian research teams are concentrating on growing tomatoes and melons. Fellahin in the delta east of Alexandria have been growing winter melons and tomatoes for over 100 years and sell these to Cairo and Alexandria In keeping with Egyptian traditional growing methods the dunes were irrigated in furrows, causing

Israel High Tech Shares Traded in the United States

Selected earnings summaries for the quarter ended March 31, 1989 Price quotations are from the 15th of the month and the change relates to the corresponding quotation a month ago.

<u>Company</u> <u>Change</u>	<u>Revs</u> <u>(In mil.)</u>	<u>Net income</u> <u>(In thou.)</u>	<u>Share</u> <u>Price</u>	
BIO-TECH GENERAL Biological products for health care	6,745	(6,805)	2.13	-0.375
BTGC OTC ELBIT COMPUTERS * Defense electronics	158,385	10,663	7.38	n.c.
ELBTF OTC ECI TELECOM Telecommunications	12,880	1,069	7.36	+0.50
ECLF OTC ELRON ELECTRON. Invests in high-tech	158.9	(8,584)	5.00	+0.25
ELRAF OTC ELSCINT Medical imaging	118.1	(11.7)	1.25	n.c.
ELT NYSE FIBRONICS Fiberoptics	10,612	723	4.50	-0.375
FBRX OTC INTERPHARM LAB. Biological products for	----	----	3.00	-0.25
IPLF OTC LASER INDUSTRIES Medical surgical lasers	----	----	3.68	-0.25
LAS ASE OPTROTECH Electro-optical systems	61,836	3,090	6.00	+0.375
OPTKF OTC SCITEX Computer graphics	47,756	3,872	9.88	+0.375
SCIXF OTC IIS INTELL. Computer peripherals	4,710	955	6.00	-0.25
IISLF OTC				

problems when salts rose to the surface. The Egyptians have overcome this problem by adopting drip irrigation methods developed in Israel. Now they are working on improving a local salt-tolerant cultivar of tomato by increasing immunity to root diseases and on improving fruit quality. Israeli researchers are active in developing tomato varieties for processing and having selected the best cultivars are now introducing salt tolerance. As a result a hybrid melon has been developed which has the quality of being salt tolerant while being tasty. Egyptian and Israeli arid zones are suitable for exploiting for the growing of salt and drought resistant crops. These in turn will serve as sources for the extraction of oils, waxes and fibers and form the basis of new industries. Again basing themselves on two decades of experience with jojoba at Ben Gurion University the Egyptians have planted this crop in oases in south-western and north-western Egypt. The CALAR project can be viewed as a showcase for normalization between Egypt and Israel.

ISRAELI COMPANIES ON WALL

STREET

TEVA PHARMACEUTICALS OBJECT OF ROBERT MAXWELL INVESTMENT

Robert Maxwell in 1988 after acquiring for more than \$2 billion the US McMillan publishing company established himself among the world's leading figures in the international media arena. In the space of several months has become the single largest foreign investor in Israel in the 1980s. At the turn of the year he acquired a 28% stake in Scitex [IHTR-12/88] for just over \$38 million and at the outset of April he added to his Israeli investment portfolio a \$30 million holding in Teva Pharmaceuticals [IHTR-10/88]. Eli Hurwitz, Teva's CEO closed the "deal" with Robert Maxwell in a two hour meeting in London. Hurwitz succeeded in maintaining secrecy as the Charles Bronfman, Canadian Claridge group was strongly interested to increasing its existing 5 per cent share in Teva and

his representatives in Israel met with Hurwitz, few hours after he returned from his one day trip to London, to bid for the 18 per cent of Teva shares.

Both Teva and Scitex have their corporate plans set on becoming multi-nationals, a goal which has previously eluded Israeli companies. Both companies are well established in their respective fields and are sales and profitability are assured under present local and world market conditions. The economic stability in Israel in the aftermath of the turn of the year devaluation and a return to record low March monthly cost-of-living index of half of one per cent is a positive background for expectations of further business progress for both Scitex and Teva.

IIS INTELLIGENT INFORMATIONS SYSTEMS PAYS DIVIDENDS:

Shareholders of the rapidly growing Haifa and Carmiel based manufacturer of computer peripheral and communications equipment were paid a \$0.04 quarterly dividend at the end of March. Indications are that IIS in 1989 will pay dividends that will yield more than 3% to investors who paid \$ 5 a share. earlier this year.

AT&T COMMUNICATION INCREASES ORDERS WITH ECI TELECOM:

ECI Telecom is securing new orders at a rate exceeding our projections [IHTR-2/89] when we felt that the company's sales would reach \$50 million in 1989.

AT&T Communications has written a new \$4 million order specifying

ISRAEL HIGH-TECH REPORT INDEX*

55.26 UP 1.00%

*ISRAEL HIGH-TECH REPORT INDEX is a weighted index made up of the shares of 10 leading high-tech companies.
Base=100 as of 9/30/84

ECI's DTX-240 digital circuit multiplications systems. In the past thirteen months AT&T has placed orders totaling \$17.7 million. The South Korea Telecommunications company has placed a new order valued at \$ 1.7 million. ECI will be delivering both orders in 1989. DTX-240 systems multiply fivefold the capacity of digital satellite and fiberoptic links. ECI Telecom (NASDAQ:ECILF) shares have been inching upwards but are modestly priced in view of 1989/1990 fundamental projections. Sales are currently running at an annual pace of \$60 million. In 1988 ECI sales were at a record high of \$38.4 million.

BIOTECHNOLOGY GENERAL BRISTOL-MYERS RELATIONSHIP SOUND:

In February 1989 we wrote "unconfirmed is the rumor that BTGC is losing Bristol Myers as a partner for the development of SOD". BTG's Rehovot based operation is unique in many ways and is a prototype of an American style company operating in Israel. Graduate Israeli molecular biologists and biotechnology researchers consider it as the best place to develop their career goals. Yet corporate communications is a weak point of the local operation. Our telephone calls at the time to question local management went unheeded. It took a communique from Sim Fass, the US based BTG president BTG to assure us that that the Bristol Myers/BTG relation is in good order. We understand that our item "has done (BTG) much damage" and indeed we are sorry for that. However, our reportage is Israeli based. Had BTG local management at the time replied to our telephone messages the item would have never appeared.

ELBIT DELIVERS ANTENNA TO RAN THREE MONTHS AHEAD OF SCHEDULE:

The Royal Australian Navy (RAN) received from Elbit four high performance antennas valued at more than \$500,000. Elbit was awarded the contract by the RAN in November 1987. This antenna is a miniaturized version covering frequency ranges of 100 KHz to 2 GHz. The antenna

meets all the environmental requirements of MIL-E-16400G and has been tested to withstand high pressure.

YEDA AND UK'S STERILIN IN LICENSEEING AGREEMENT :

The scaling up of production of biological and pharmaceutical materials via biotechnology is one of the challenges of companies active in the field. The conventional methods in current use for the growth of mammalian cells employ petri dishes, roller bottles and multitrays. Sterilin Ltd., an English company and a member of the BIBBY Group has entered into a research and licensing agreement with Yeda Research and Development Co., to commercialize the work at WI which has resulted in the development of supporting carriers for growing mammalian cells in tissue culture. The carriers provide a highly speeded up technique that can benefit the production of growth factors and hormones in situations where it is now not possible to grow sufficient amount of cells for commercial exploitation. Sterilin will be using the WI findings to create a high-yield tissue culture system using these newly developed carriers.

Two kinds of carriers have been developed and they consist of twisted polystyrene ribbons or dishes of a nonwoven fabric. The twisted ribbons provide cells with flat surfaces on which to cling, while the nonwoven fabric offers an increased surface area enabling high-density growth. Within the disk's porous matrix, for example densities of 50 million cells per milliliter have been achieved. This is five to ten times higher than that possible with conventional systems. As the cells are well protected against physical forces and therefore once they grow, they can be maintained alive and fully productive on this carrier in a serum-free medium for several months. At WI biologically active molecules such as plasminogen activator and antileukemic factor are being produced with these carriers.

BEN GURION UNIVERSITY FINDINGS ARE A SLAP TO MOSQUITOES IN SRI-LANKA

BGU researchers have found an environmentally-safe solution to the problem of the mosquitoes plaguing Sri-Lanka. The findings resulted from a three-year joint research project funded by AID. The study concentrated to improve methods for controlling mosquitoes and to introduce genetic engineering techniques into Sri Lanka.

The various insecticides used to kill the mosquito larvae are not only poisonous to people and animals and very costly to use, but are no longer effective because the larvae have developed immunity to them.

The bacterium, bacillus thuringiensis, which releases a toxin that kills mosquito larvae, was discovered for the first time in the Negev. However, the life span of this bacterium is very short. Work is continuing to clone the gene in the chromosome of the bacterium which is responsible for the production of the toxin and to introduce it into other organisms with longer life spans.

The work in Israel will be carried on in parallel in Sri-Lanka. A genetic engineering laboratory to teach the recombinant DNA techniques used at BGU is being set up there.

HOLOGRAPHIC EYE IN THE SKY FOR PILOTS HELMET DISPLAY

Helmet displays based on holographic lenses can improve the displayed imagery without adding significantly to the weight and complexity of the overall system.

Holographic helmet displays are the optimal successors to the imaging systems found in aircraft today according to Yaakov Amitai, a former Israeli air-force officer and now a graduate student at the Weizmann Institute. Amitai together with Institute Professor Asher Friesem, have developed the new procedure. HUDs are optical systems mounted on the floor consisting of cathode-ray tubes which project, through lenses,

vital information on attacking missiles, fuel supply, and other data on a transparent screen between the pilot and the cockpit window. The screen serves as a firing sight as well.

Among today's existing system's shortcomings is its fixed position. Another is the need to face the target which can be changing course in midair.

Helicopter pilots presently employ helmet mounted displays composed of miniature cathode ray tubes and conventional lenses. These systems respond to a turn of the pilots head, that signals the target or direction from which he wants information. The weight of such systems limits their use to helicopters or ships.

Lack of resolution and brightness, particularly around the edges of the image is another mitigating factor.

The WI developed method builds compensatory corrections into a single lightweight holographic element that can be worn comfortably by pilots in advanced supersonic jets.

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NEWS AND INVESTMENT OPPORTUNITIES**

Written for venture capitalists, investment bankers and bankers active in international trade, industrial researchers, business men, security analysts and portfolio managers, underwriters, private and institutional investors and individuals who need to maintain insights into Israel's evolving and dynamic high-technology field.

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AUTOMATED GUIDED VEHICLE FOR INDUSTRY

An automated guided vehicle which does not require physical tracks and can operate anywhere on a factory floor, has been developed by researchers at the Jack W. Ullman Center for Manufacturing Systems and Robotics Research in the Faculty of Mechanical Engineering, at the Technion-Israel Institute of Technology.

Automated Guided Vehicles (AGV) are unmanned computer controlled vehicles used to transfer, large or small loads, from one location on the factory floor to another.

The AGVs, like mobile robots, must avoid obstacles in their way. In order to do it effectively, they must be capable of finding the limits of any detected obstacle. The Technion developed AGV, includes: sensors, a collision avoidance system, and computer control. The moving units of the AGV consist of two step motors controlled by a computer. The wheels are located in the right and left hand side of the vehicle. There are two supporting wheels which are located in the front and in back of the vehicle. The unit is comprised of two major sub-systems, a free running vehicle, and a computer which is located near the operator. In order to be able to travel on a factory floor, the AGV is equipped with an emergency collision avoidance system, which consists of two emergency stopping bumpers, located on the front and back sides of the vehicle. These bumpers stop the vehicle in case of collision with an obstacle, which, was undetected by the other systems. It also includes two ultrasonic sensor systems.

NEW IMAGING DEVELOPMENT

An innovative new image processing technology which emulates the eye's ability to adjust and adapt to variations within a single scene has been developed by researchers in the Faculties of Electrical Engineering and Computer Science of the Technion-

Israel Institute of Technology. Smartscan emulates the eye's ability to adjust sensitivity and resolution locally. By improving the input the Smartscan camera and processing techniques can improve performance and reduce the cost of imaging systems. The technology offers greater sensitivity, range, and speed in a wide variety of target identification, tracing, surveillance, image compression for transmission and storage of visual images, high-performance image sensors and cameras.

WORLD BANK BREAKTHROUGH ORDER FOR TOVNA'S MACHINE TRANSLATION SYSTEM:

One hundred man years of development work over a span of more than three years has resulted in the development of a machine translation system which allows automatic translation of text for French-English-Russian-English. The young startup company has entered the American market after a unit of the World Bank adopted the Tovna system.

COMPACT DISK A RECENT STARTUP:

C.D.I. (Compact Disk International) LTD, was founded in 1987. and earlier this year it commissioned its production facilities of compact disks with an annual capacity of two million disks.. Located in the Industrial Zone of Carmiel the company bases itself on know-how and equipment re acquired in Holland and West Germany. Production is fully automatic and is operated and controlled by computers and robots. C.D.I. maintains a delivery service by air to principal geographical areas throughout the world.

ORMAT COMPLETES FIRST ICELAND PROJECT

Ormat Turbines Ltd. designed and patented turbines left Israel for the Reykjanes Peninsula where they will utilize low temperature exhaust steam to increase the output of Sudurnes's geothermal power plant. Ormat's sales in 1988 totalled \$39 million.