

# INTELFADS



## INTEL ISRAEL



**WHERE MERELY  
EXCELLENT IS NOT  
GOOD ENOUGH**

Up Front .....	page 2
Bulletin Board .....	page 2
Write To Know .....	page 3
Where Merely Excellent Is Not Good Enough... page 4	
Knowing What You Want And How To Get It..... page 7	
A Day In The Life Of Intel Israel..... page 8	
Moving To The Next Generation Of Leadership .....	page 10
Record Revenue for 1989 .....	page 14
Views .....	page 15
In The News .....	page 16

## INTELEADS

Vol. 14, No. 2, February 1990

Mary Burt Baldwin (765-1427)  
Editor  
Katie Woodruff (765-1423)  
Assistant Editor  
Stacy Yoshida (765-1431)  
Distribution  
Eden Design  
Graphic Design and  
Production  
Swan Graphics, Palo Alto  
Typography

*Inteleads* is published monthly by and for Intel Corporation. Cover and contents may not be reproduced in part, or whole, without prior written permission from Intel Corporation. Letters and comments should be directed to:

**Inteleads**  
Corporate Publications Department  
3535 Garnett Drive, GRI-63  
Santa Clara, California 95052-8119

Intel386, 386, 486 and i860 are trademarks of Intel Corp.

© Copyright 1990 Intel Corporation. All rights reserved.



When you live under a perceived threat of losing the land you love, you take very little for granted. It is understandable then that our Intel Israeli colleagues seem very intense in their attitudes towards not only the place where they live, but the work that supports their lives there. It's a good fit.

In an industry as intensely competitive as ours, Intel has a chance to hire a group of engineers bred to life on the edge.

No visitor to Israel can be unaffected by the sense of history embedded in this small country. So many cultures have made their imprint here. As we read of barriers break-

ing down in many other parts of the world, it cannot help but raise the hopes for peace here too. Shalom.

Mary Burt Baldwin

Mary Burt Baldwin, *Editor*

**With this issue**, we begin distributing *Inteleads* by internal mail to individual employees at our domestic sites. This is part of an ongoing effort to increase the efficiency with which Intel news is disseminated to our readership.

**Intel is cosponsoring an earthquake preparedness program** led by San Jose television station KICU TV Channel 36. The program, which is a follow-up to the Intel-sponsored earthquake preparedness campaign KICU televised in April 1989, is scheduled to air in February. It will feature a series of public awareness messages aimed at educating viewers on a variety of crisis-related concerns.

Although the new program was originally meant to run in April this year, the October 17, 1989 earthquake jolted many concerns about the need to broadcast a preparedness campaign earlier. Other organizations planning to provide sponsorship include the City of San Jose, Hewlett-Packard, PG&E (Pacific Gas & Electric), Wells Fargo and IBM.

**More good vendor of choice news:** Intel was recently named top supplier by IBM's Yasu and Fujisawa

facilities in Japan. Intel's Japan operation has now received vendor of choice ratings from 93 percent of its customers, boosting Intel's worldwide preferred vendor status to 92 percent.

**Intel employees made generous donations** to help make the 1989 holiday season brighter for the less privileged. Intel's Santa Clara site sponsored a toy drive to benefit the children of low-income families who receive subsidized child care services from ESO (Economic and Social Opportunities), a non-profit agency in San Jose. As a result of the successful drive, Santa Claus was able to hand out almost 200 toys at the agency's Christmas party. Employees at Intel's Oregon site also got into the holiday spirit by participating in the Employee Programs Holiday Giving Program. More than 200 people contributed toys, food and time to help Washington County families in need.

**Plans for Santa Clara 10**, a six-story building to be built on Intel's Mission Campus, are now underway. When the new facility is completed, all Santa Clara employees will consolidate into the Mission Campus. The SC 1, 2, 3, 4 and 5 buildings will be sold. In addition to improved productivity, Santa Clara GSS manager

Frank Giordano reports that the move could save Intel \$12 million a year. Santa Clara 10 may be occupied as early as December 1991.

**Intel's Folsom site is preparing to expand** with a third facility. In December, Intel founder Gordon Moore participated in the groundbreaking of this latest addition to the Folsom site, which is the largest Intel owns domestically. The new two-story facility will provide office space for as many as 1,000 employees; its construction is expected to be completed by October of this year. ■

INTEL  
BULLETIN  
BOARD

# WRITE TO KNOW

**Q** I am very concerned over some of the implications of Intel's new pre-employment drug screening program. My manager said that the firm Intel uses for test analysis is 99.9 percent accurate, but this still means that one significant in a thousand will get a false positive result. Is this accuracy rate acceptable?

**A** We initially shared many of your concerns when we began to pursue this program, which is why we chose our screening laboratory carefully. Intel has contracted with American BioTest Laboratories (ABTL) to perform all the pre-employment drug screening analyses and to certify all of the collection facilities throughout the country. ABTL is licensed by the U.S. Department of Health and Human Services and by the U.S. Drug Enforcement Agency.

All samples taken by ABTL first undergo an enzyme-multiplied immunoassay test (EMIT) for the illegal substance. All positive EMIT tests are then confirmed by gas chromatography/mass spectrometry (GC/MS) tests. The testing cutoff levels ABTL uses for the GC/MS confirmations are well above those which would be present in the case of "passive ingestion" — exposure through others' use of, say, marijuana — or from legal medications that the individual may be taking. In addition, all positive tests are confirmed by ABTL's scientific director prior to being reported to Intel as positive.

The 99.9 percent accuracy figure often cited in relation to drug screening tests is often misunderstood. The .1 percent of possible inaccuracy does not refer to "false posi-

tives," but rather to "false negatives" — meaning that approximately .1 percent of all tests which may actually be positive will show as negative.

We are confident that the procedures and regulations being followed by ABTL ensure accuracy of the results.

Sandy Price, manager  
Labor Relations/EEO

**Q** I would like to know why answering machines are supposedly "against Intel policy," yet the big push is for everyone to get on the Audix Voice Mail bandwagon? If a group's manager refuses to get Audix for his or her group, what is the secretary supposed to do when there is no one to cover her phone?

**A** Intel does not have a policy concerning the use of telephone answering machines. Such decisions have always been up to the discretion of each department manager.

Telephone coverage has always been a sensitive issue. Neither answering machines nor Voice Mail are intended to be used as a means to "cover" a phone. They are best used as tools to keep the information flow moving.

Voice Mail, if used correctly, can be much more powerful than an answering machine. The system not only answers telephones, it also allows you to create, reply to, send and store voice messages. Perhaps most importantly, it can give callers the option of being transferred to a "real person."

If you or your department would like more information on how Voice Mail can help you, please contact your local CSS Telecommunications department.

Michael Powell, manager  
Voice Mail Program

**Q** Word is going around Intel that capital purchases, especially the high-tech, high-price items, should follow a "Buy American" policy — even when such purchases reduce the net profit by increasing costs. The justification given is that Intel will improve costs over the long term by supporting American companies — despite the fact that we can now purchase better equipment cheaper from overseas companies. Is Intel management allowing parochialism to affect important economic decisions?

**A** Our current strategy for equipment does not involve pursuing a blind "buy American" position, nor does it ignore the long- and short-term value of multiple and/or domestic suppliers. Each specific sourcing decision will be made on its own merit.

There are several "real world" concerns about sole-source foreign suppliers. These range from instances of preferential treatment of local customers to the U.S. government's threat to institute a 100 percent tariff on certain critical equipment (Nikon steppers). In addition to these issues, we face the fact that almost 100 percent of assembly raw material and over 80 percent of our fab materials are no longer available from U.S. sources. As a result, we are actively participating in actions to maintain or develop an effective U.S. vendor base. Such actions include support of Sematech, SIA source development activities and a continuing series of direct investments to strengthen competition and develop supplier capabilities on a worldwide basis.

Tom Hogue, vice president,  
Administration Group  
director, Materials

The Write to Know program allows employees to ask any business-related question about Intel and receive an answer in a timely manner (usually within 15 working days). The program pro-

jects the identity of the questioner. Questions are forwarded for answer to the appropriate specialist within Intel, many times a person from the highest level of management. Questioners always receive

personal answers to their questions, but only questions of corporate-wide interest are published in *Intelleads*. Send written questions, your name and mailstop to Write to Know program, Intel Mailstop

GRI-50, 3535 Garrett Drive, Santa Clara, CA 95052, or send your question by eMAIL to Write to Know. For more information about the program, call Santa Clara extension 5-1883.

# WHERE MERELY EXCELLENT IS NOT GOOD ENOUGH



The van winds over the hilly terrain covered with low brush and thorny vegetation that is characteristic of this Mediterranean climate. A companion points to a tank abandoned on a hillside—a memorial to the war of 1948, she explains. Then as the van leaves the main road and curves around towards a valley, a forest comes into view. Pine trees are being planted here in an international reforestation effort. The van dips down through a new neighborhood of homes and apartments, where pale, stone buildings outline the curve of the hills in a manner that dates back to biblical times. From this historic setting, the van emerges and suddenly comes to a stop in front of the stark and modern frame of an industrial complex. The country is Israel and this is Jerusalem. We have arrived at Intel's Fab 8.



Intel's operation in Israel could seem on the surface to be a risky business. The small country remains a center of political controversy, with some military action part of the daily routine. Nonetheless, since 1974, Intel has had a presence there, which has continued to expand until today there is the Design Center in Haifa (1974), a thriving sales office in Tel Aviv (1978) and Intel's only fab outside of the U.S. (1985). Immediately, the question arises, why did Intel choose to expand to Israel?

The simplest answer is a name: Dov Frohman. In the 60s when today's general manager of Intel Israel studied in the U.S., and later came to work with Intel, Dov made up his mind to bring back a major economic contribution to his country. Beyond this, however, are some very convincing business arguments. In the early 70s, it was difficult to find talented engineers interested in microcomputer design in the U.S. As president and CEO Andy Grove explained recently, "There were many highly talented engineers coming from Israel's institutions and not a lot of local industrial opportunity to make the best use of their abilities. We were able to take advantage of these 'under-employed' engineers and put them to work." The Design Center at Haifa was the result.

As for building Fab 8, Andy credits Dov with many decades of determination, plus his role as a broker between the Israeli government and Intel to make such an installation economically inviting. "Again the quality of the employee base was excellent," Andy added. "Plus there was not much local competition and we had Dov to run it."

### Driven to demonstrate success

The result has been the building of smoothly driven manufacturing, design and sales organizations, where merely excellent performance is not good enough. At all three Intel Israel locations, staff members exude this message.

Some comments from staff at Fab 8, for example:

- "We have not missed a manufacturing commitment during the last two years and our first priority is to maintain a level of excellence," Dov declared. "We can never take anything for granted. We keep raising our expectation level with the emphasis on continuous improvement."

- "We work hard to get the most 'outs' (wafers out)," explained technician Sigal Vazana. "We almost have wars between shifts to get the most 'outs.'" Technician jobs are constantly upgraded where interest is shown. "I think I'm the first technician to know all the work areas in thin films and diffusion," Sigal added.

- "One of the keys to our success is very selective recruiting," Dov added. New college graduates (NCGs) are given at least two personal interviews, as well as one with a committee complete with whiteboard for demonstrating problem-solving abilities. Only one out of ten applicants may be accepted, which has made an Intel job a much sought-after prize. This practice applies to everyone, from operating technicians to experienced engineers.

"I could not believe how many times they wanted to see me before I was hired," the very experienced executive secretary Ety Salomon exclaimed, after going through a round of these inter-

views. Such careful hiring procedures, Dov believes, keep management problems to a minimum.

- "We drive a policy of building a center of excellence," assistant general manager Ilan Meshoulam declared. "We have a remote location, which makes us unique, but we use this uniqueness to build a spirit of survival—we must prove to the world that we can compete in the world market."

- "From the beginning Fab 8 has been isolated," said Ehud Kaplan, Thin Film/Diffusion engineering manager. "So we have made the case for being totally self-sufficient in fixing our equipment as well as handling our processes."

"Because we are remote, we feel the necessity to be better than our competitors—we have to be the best," Ehud concluded. "Doing business with us is only justified if we excel at what we are doing."

- The drive to keep up with the new buy-and-chase concept in fabs has led to modernizing Fab 8 working in the attic above the equipment, while production continues. "We will have at most a two-week shutdown," Ehud said.

- Fab 8 is working hard to achieve "cassette-to-cassette" (plastic carriers) handling, which removes individual wafer handling. At the same time, Ehud is trying to sell the idea of "box-to-box" handling—a step beyond cassettes.

- In 1988 Fab 8 got its first chance to ramp to full capacity and in 1990, we're tripling the number of products we handle—transferring 25 from Fab 3," Fab manager Marek Sternheim added.

Fab 8, known as Jer-1, -2 and -3 depending on your location, has become the second fab (in addition to Fab 9) handling 6-inch wafers on the one-micron process.

### A visit to sales in Tel Aviv

Tel Aviv has all the problems of contemporary city life with traffic at a stand-still before the start of an eight a.m. workday. Once inside Intel's offices here, however, it is business as usual with cubicles and PCs creating the familiar Intel atmosphere.

Avram Gelber leads a highly energetic sales and support team responsible for Israel, Greece, Turkey and—as a result of a recent sales triumph—Egypt. One of the unusual aspects about Intel's market in Israel is that it does not involve microprocessors or components for PCs. At least 60 percent of Intel business in Israel is in systems, such as pre-press systems for newspapers and magazines, and Intel is the leader in this market.

Intel's success in the Middle Eastern region is largely due to an organization that employs highly qualified engineers for its sales force, a leadership which supports its sales personnel and the maintenance of a highly specialized customer support operation.

"A lot of being good at sales comes from listening," Avram explained. "It's very easy to leave your salesmen on their own—it is, after all, independent work. But we have bi-weekly meetings to go over their achievements and we arrange for customer support where needed. We have very close cooperation among the 43 members of our staff."

Key also is the concept of supporting the customer after the pur-



A view from the heights of Mt. Carmel in Haifa shows the Bahai Shrine and the port opening into the Mediterranean Sea.

chase. Enter Israel's new position: the technical support specialist. In Israel, this is the field applications engineer (FAE) who works with the customer to provide the right technical solution, and this is also the engineer who returns to provide post-sales service—two roles under one hat.

"It gives the engineer exposure to all aspects of the business; the customer always deals with the same person and brings about better utilization of scarce resources," Avram concluded.

### At the foot of Mt. Carmel

Haifa is Israel's largest port. The city rises nearly 1,000 feet up the steep slopes of Mt. Carmel from the shores of the Mediterranean. It is a sister city to San Francisco, Calif., sharing both its climate and its hilly terrain. One of Israel's most distinguished technical universities is located in Haifa, so it was here that Andy Grove and Les Vadasz came in 1974, and with Dov Frohman, chose a group of four engineers to start an engineering design center in Israel. One young man applied for this work before he had even graduated, Andy recalled recently. The engineer with such "chutzpah" was Rafi Nave. Rafi went on to become manager of the Design Center and just returned from a stint at Intel Santa Clara, with a new assignment as corporate program manager of Design For Manufacturability (DFM).

Today, 250 engineers fill the building overlooking the sea at the

foot of Mt. Carmel, under the direction of Moshe Carmeli and Alex Kornhauser.

With the expansion of the center has also come the drive to take on more complete product responsibility. "As the 'parents' of our brainchild, we want to see it emerge as a successful adult," Moshe explained. "We want to see the whole process, from concept to delivery."

As a result, besides the original area for chip design, new groups include Quality and Reliability Engineering, Test Engineering, a Computer-Aided Design (CAD) group and a software development unit. Some of the important products to come from Haifa are cache controllers and numerics processors as well as projects involving data communication.

Together with innovative design have come new organizational concepts. A major one in use at Haifa is the role of the "development engineer."

This position, created during Moshe Stark's tenure as manager of the Design Center, combines the roles of design and product engineer, so that one engineer can carry a device from its original design to the final point where it is transferred to production. According to Engineering Technologies test engineering and production (ET-1) manager Arik Shemer, the barriers between these groups are thus removed. "No longer will the designer be unaware of problems in production—nor will an engineer design a device which is incapable of being produced," Arik explained.

More innovation: A new process for mask designers to "bootstrap" up to positions as graphic design technicians, who perform many of the tasks formerly performed only by design engineers; also the Israel Software Projects Operation (ISWP), which sells its services to groups within Intel and to Intel customers. Led by ISWP operation manager Yossi Levy, the group has worked extensively on software for the i860<sup>™</sup> microprocessor as well as for Intel customers throughout Europe—with profitable results. "Intel can provide custom software tailored to customer needs," Yossi explained. Areas of expertise include: compilers, debuggers, simulators, operating systems and Intel architectures.

### A triple threat

Design, manufacturing, sales—Intel's Israeli force is a stand-out. Savoring the uniqueness of their geographic location, the Israelis use it as a justification to build stronger organizations. Where outsiders might wonder at the atmosphere for doing business in Israel, using a bomb shelter as a training and meeting room makes a convenience of a presence they take in their stride. (There has never been a need to use it for its original purpose.) The intensity of their feelings for their jobs as well as for the land in which they live can be understood in this comment from fab manager Marek Sternheim: "Producing silicon in Jerusalem is a real achievement; we capitalize on our love of living here matched by our love of technology. We work in a survival mode."

"The survival instinct makes us proactive," Dov concluded. "We're already looking at what it takes to be around after 2,000 A.D.—we must stay a step ahead." ■

# KNOWING WHAT YOU WANT AND HOW TO GET IT

Early one morning back in 1966, Andy Grove (now Intel's president and CEO) first met Dov Frohman (now vice president and general manager of Intel Israel); the result may have been the first "constructive confrontation." Andy was teaching a seven a.m. class in device physics at Fairchild and giving ten-minute quizzes at the opening bell. "He told me that seven a.m. was too early for anyone to hold a class, much less give a quiz," Andy exclaimed.

It was not the last time that the slight, dark-haired man with the flowing beard and piercing eyes would confront Andy. In fact, Andy described Dov's dogged persistence as one of his many strengths. "He always comes back," Andy said. "Throw him out the front door, he comes in the back; throw him out the back and he comes in the window; throw him out the window and he comes in the crawl space. That's his major strength."

Andy has felt the power of this persistence too—in Dov's determination to build a fab in Israel. Every chance he got, he brought up "the fab."

"He never gives up," Andy added. "He keeps coming back—he pursues what he believes in and he makes things happen."

Building an Intel fab in Israel was Dov Frohman's realization of a promise he had made to himself as far back as 1963. Israel is an adopted homeland and Dov arrived there as a small boy of ten from his native Holland. When at the age of twenty-four he chose the U.S. for his graduate work, it was with a firm purpose in mind. "From the time I left, I knew I wanted to get my feet wet in some endeavor and bring it

back to Israel," Dov related. In 1979, Dov confronted Andy again; he got an OK for a feasibility plan for the fab; it was produced; finally, he won a "yes" for the project in 1980. In 1985 Fab 8 opened for production.

In the interim, however, Dov chose a career path few could follow.

After working at Fairchild, he followed that harsh professor, Andy Grove, to a new start-up called Intel. Initially, he worked part time until he finished his Ph.D. in 1969. It was in 1970, while working under Les Vadass (now president of the Systems Group) that Dov recognized the potential for a new memory device. It was in a reliability problem he was working on with the MOS (metal-oxide semiconductor) process. Dov saw that the floating gate phenomenon—a possible cause of failure in some devices—might be the basis for a memory that could be both programmable and erasable.

"The origin of the whole thing was an attempt to explain a process problem, and Dov deserves all the credit for recognizing what we had and utilizing it to create a new memory concept," Les commented.

Dov's invention, the erasable programmable read-only memory, or EPROM, was introduced in February 1971 at the International Solid State Circuits Conference in Philadelphia in a stunning display. At the time, however, the significance of the EPROM was not understood. With the advent of the microprocessor there came also a need for memory. Thus, a synergistic relationship between the two inventions was a natural development and the importance of the EPROM began to

be fully realized.

## Doing his own thing

Nonetheless, it was at this point, when the EPROM was only beginning to be produced, that Dov chose to leave Intel. "I had grown up during the decade when we were all 'doing our own thing,'" Dov explained, "and I had resolved to travel after two years of work. I came back to Andy and told him I was leaving to go to Ghana and teach. I had made a contribution and I felt that if I didn't move then, I might become too involved to ever take a year off."

"I had lived in the U.S. for almost ten years," Dov continued; "Somehow I felt that my ultimate home was in Israel. It had been my home for 14 years, I was in the youth movement and the army—that had a major impact. I really did not feel that the U.S. was my natural habitat."

## Back to Intel

"Then in 1973," Dov added, "I wrote to Andy to see if I might come back for six months, and I returned to work on a variety of things related to the EPROM." It was then that Dov set up the idea for a design center in Israel. Although the Yom Kippur War intervened, the opening was simply rescheduled and the center opened in 1974.

"With a war suddenly interrupting plans, many people would have simply said 'forget it,'" Dov commented, "but that's not the way decisions are made at Intel. It was only postponed."

Once again, however, Dov went his own way and returned to Israel as director of the Department of Applied Science at the University there. He was



Vice president and general manager of Intel Israel Dov Frohman sits in front of a poem written for him by corporate program manager of Design For Manufacturability Rafi Nave on the tenth anniversary of the Intel Israel site. It expresses the gratitude of Intel's Israeli employees to the one who "conceived and shaped" the "dream that led us here..."

naturally on hand as an advisor to the Design Center. (Tom Innes, now assistant general manager of the Chandler Microcomputer/ASIC Division, was the design center's first general manager.) Then in 1980, when the fab project became a reality, Dov returned as general manager for the Israel site.

In the end, Dov brought more than a large Intel investment back to Israel from the U.S. With him came his wife, Eilat, whom he met in the States. The Frohmans live today in a village outside of Jerusalem with their two children, Eran, 16 and Lora, 10, and Intel continues to depend on the "dogged persistence" of the new vice president (see the announcement on page 13) at the helm of its Israel site. ■

# A DAY IN THE LIFE OF INTEL ISRAEL...



**CAD (Computer-Aided Design)**  
Group project leader Eleonora  
Yoeli works on the language  
for VLSI description at the  
design center.



**Cache Control secretary Vivian**  
from the U.S., stands with her  
in the Israeli army as all young



**Fab 8 Thin Films/Diffusion secretary Leora Zafrani** was born in  
Jerusalem and prefers the atmosphere of the Old City to the more  
modern pace of Tel Aviv.



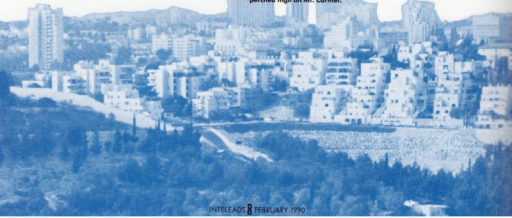
**Engineering Technologies test engineering  
and production manager Arik Shemer**  
stands in front of the hills of his native Haifa.  
From this point Arik can point out his home  
perched high on Mt. Carmel.



**Lithography/Etch engineering  
and Thin Films/Diffusion manager**  
some daily plans for production



**Design Center co-manager Moshe Carmell** and **vice president and  
general manager of Intel Israel Dav Frahman** share a joke after  
a meeting in Haifa.







benstein, who emigrated  
daughter, Zaki, who is serving  
men and women do.



Ety Saloman (at right), executive secretary to vice president and general manager Dav Frohman, and her assistant Elio Jacobi handle a myriad of activities at the Israel headquarters.



Fab 8 manager Marek Sternheim explains that during 1991 Fab 8 will be remodeled to a boy-and-chase configured Class One clean room.



anager Shlomo Caine at left  
Ehud Kaplan go over  
at Fab 8.



Quality and Reliability manager Nathan Zeldes stops a moment in his lab at Fab 8.



Lunch in Intel's cafeteria at Haifa is shared by Intel Software Project Operation manager Yossi Levy and Area Sales manager Avram Gelber.



Plant Maintenance manager Meir Lesham explains some of the computerized maintenance procedures at Fab 8.

