



TODAY

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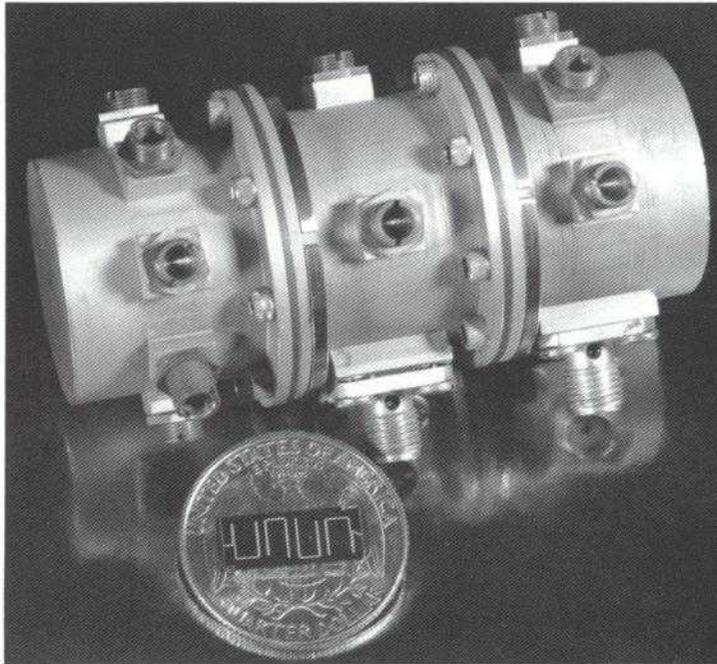
Joins MIT and Bell Labs

COMSAT Labs Teams Up For Microwave Filter Breakthrough

Scientists from COMSAT Laboratories have joined researchers from the MIT Lincoln Laboratory and AT&T Bell Laboratories in a collaborative effort to introduce the first fully engineered microwave filter to use superconductive thin films. Using the films of a high-temperature superconductor, the team produced a filter that has negligible loss of energy at -196° celsius, the temperature of liquid nitrogen.

Lincoln Laboratory reviewed the breakthrough at the Naval Research Laboratory during a recent discussion of its research efforts for the Navy's High Temperature Superconductivity Space Experiment (HTSSE), sponsored by the Naval Center for Space Technology. The HTSSE hopes to place a variety of high-temperature superconducting devices in space by mid-1992.

Although the filters delivered to the Navy represent only the initial step in highly advanced filter development, they could substantially improve the performance of communications satellites. In fact, the filter is already being considered as a replacement for the bulky, heavy cavity filter presently used in satellites.



One of the new microwave filters rests on a quarter. Above it is an older style, conventional six-pole filter.

Teamwork

"This really was a team effort between the three labs," said Dr. Albert Williams, manager of the microwave networks department at Clarksburg. "The high quality, superconducting films were provided by AT&T, the filter design was conceived by COMSAT, and the fabrication of the filters with the films was contributed by Lincoln Labs."

Williams added that future development of the new superconducting filters will permit significant performance improvements compared to today's filters because of their excessive loss, dispersion and size.

"We believe that this work will allow many more users to obtain high-quality telephone channels," he continued.

Dr. John Evans, Director of COMSAT Laboratories said, "The results of this work demonstrate a significant advancement in filter technology. What is truly amazing is the speed at which this team reduced to practice a technology that was discovered only about four years ago." ■

*What is
superconductivity ?*

See page 7.

What's New in Satellite Technology?

Stephen Day, vice president, ventures at COMSAT Systems Division, recently spoke at an Information Technologies Network meeting sponsored by the Montgomery County High Technology Council at Johns Hopkins University.

"When one thinks of satellite telecommunications technology, one should be reminded of the bumper sticker: 'Think Global, Act Local,'" Day told the group, citing area companies like COMSAT, Hughes Network Systems, American Satellite Corporation, Fairchild, Contel and Martin Marietta, among others.

Day addressed the question of "what's new?" in the industry by dividing it into space and ground segments.

Space Segment Technology

"The pressure points in the space segment include capacity, power, flexibility and cost — all of which have changed dramatically in the last few years," he said.

Capacity. Today's satellites have much more technology on board than older satellites. Intelsat VI and VII will carry far more information than their predecessors, Day explained.

"And circuit multiplication is further dramatically increasing capacity," he added. "With modest circuit multiplication assumptions, the amount of capacity available from satellites is enormous — and rapidly exceeds current estimates of demand."

Power. Higher power, particularly from direct broadcast satellites (DBS), means smaller antennas. "One to three foot antennas that can receive DBS transmissions are less unsightly and easier to install than large dish antennas," Day said.

"These smaller antennas also make such systems more widely affordable to the public," he added.

Flexibility. Day touted development of "LightSats" as one way to provide more satellite flexibility.

"LightSats are potentially cheaper than conventional satellites," said Day. "They can also be put into a lower,

"Developing countries are potential buyers of satellite technology. This is especially true because fiber optics do not reach, or are not available within, the undeveloped countries of the world."

nongeosynchronous orbit, resulting in less expensive lift off, cheaper insurance and easier replacements."

Besides saving money, these satellites would have less of a transmission/receive delay, making them largely "delay free."

"This is an important factor in the growing competition with fiber optic cables," Day added.

Remote sensing is another example of satellite flexibility. Satellites could be used to monitor world-wide carbon dioxide levels (global warming) pollution, oceanic shifts and mineral deposits.

"With the current global interest in the environment, remote sensing will be a lucrative satellite business for the 21st century," Day said.

Life/Cost. Several new developments have increased the lifetime cost of satellites, said Day.

"Common Pressure Vessel Nickel-Hydrogen batteries currently under development are 50 percent lighter than older batteries," he added. "This will give satellites another year to eighteen months of life."

Monolithic Microwave Integrated Circuits (MMIC) developments are also saving weight on satellites through miniaturization. Superconductors are expected to have one of their first applications in filters used on satellites.

"These developments will reduce

weight, increase performance and lower total cost," Day added.

He also cited the patented "COMSAT Maneuver" as a way of increasing the life of a satellite by conserving fuel.

Ground Segment Technology

In his discussion, Day divided the ground segment of the satellite business into products and services.

Products. Day told the group that flat antennas (developed by COMSAT), VSATs, network management and control and the new C-band mobile terminal were four exciting new technologies in this arena.

"This mobile terminal technology is now being used by trucking companies," Day said. "Satellite-linked trucks carry a small antenna on their roofs, which is connected to a processor-driven terminal located in the cab."

The system allows a central facility to monitor the location and status of all en-route trucks, as well as send and receive messages via the truck's terminal.

Services. The Montgomery County audience heard about new services as well, including HDTV, signal scrambling, and videomultiplexing.

"COMSAT has developed a videomultiplexing technology that can increase the number of TV channels through a transponder by 50 to 100 percent," Day told the group. "This development should reduce costs for broadcasters, as well as increasing their flexibility."

Day also described advances in mobile communications and Intelsat's International Business Service (IBS).

"This digital service is still in its infancy," he said.

Think Global, Act Local

Day concluded by pointing out the potential for satellite industry growth in the future.

"Developing countries are potential buyers of satellite technology," he said. "This is especially true because fiber optics do not reach, or are not available within, the undeveloped countries of the world."

"Remember," Day added. "Think global, act local." ■

Second Front Page

Aeronautical Services Expand

Recent media stories have highlighted the plans of a new company, IDB Aeronautical Communications, to construct an Inmarsat ground earth station (GES) in the San Francisco area. The company is a 50-50 joint venture between Teleglobe International (the Canadian Signatory) and IDB Communications, an outfit already in the business of providing IBS and other Intelsat services.

But the press reports have left out one important fact, according to Elizabeth Young, vice president of COMSAT Aeronautical Services.

"This is not really a 'new' Inmarsat ground earth station," Young said. "Teleglobe had announced more than a year ago that they planned to construct aeronautical ground earth stations on the east and west coasts of Canada."

"What they are doing now is cancelling their plans for a Canadian west coast station and 'moving' the station to San Francisco," Young added. Equipment Teleglobe had ordered for their station from EB Nera will be transferred to the San Francisco location. IDB will retrofit a former Intelsat antenna (180-B), then put it into service.

Also left unclear by media accounts is the fact that since the IDB GES will operate in the U.S., they must acquire the Inmarsat space segment from COMSAT. "Within 24 hours of learning about the new venture, we were on the telephone with the President of IDB, making preliminary arrangements to discuss service and prices," Young said.

"While this facility will be the first non-COMSAT owned GES in the U.S. operating with Inmarsat, we have always known that as the mobile business grew, there would be others interested in providing ground services," she added. "In fact, Arinc has filed for two ground stations but has not yet begun



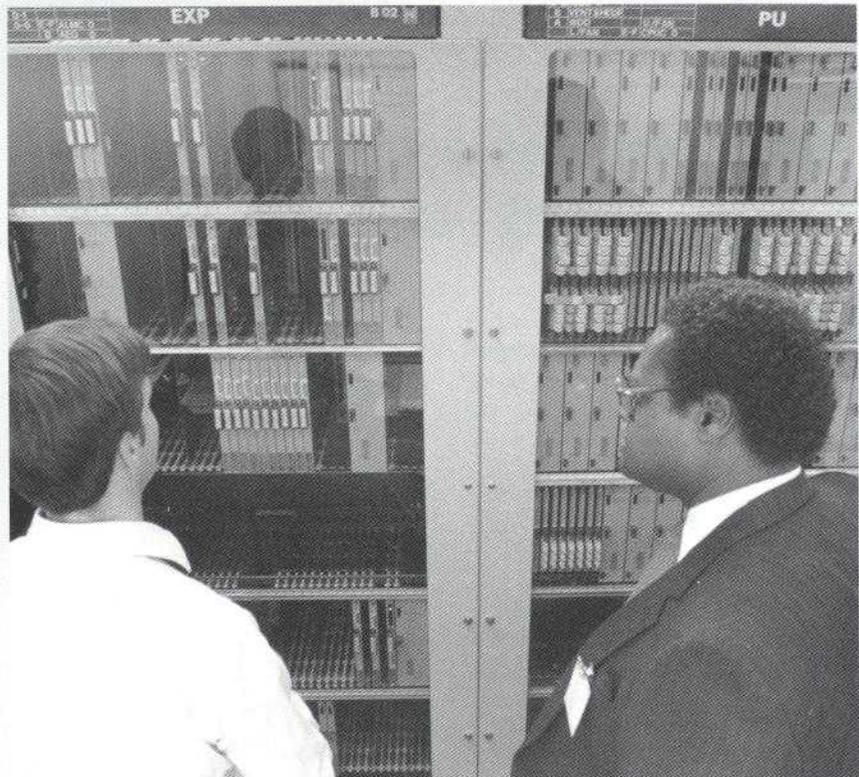
The first issue of Aerofacts, the new Aeronautical Services publication.

construction, and our service agreement with them is for both space and ground."

A Quick Update

Aeronautical services expects to be operational for its interim data service at Santa Paula within a month, and at Southbury about one month after that. The first planes equipped for the service are expected to fly around Memorial Day. There will also be added voice capacity by the end of the year.

"Since Teleglobe has the same contractor as we to upgrade the stations (EB Nera), but with a contract signed later than ours, we can reasonably expect to be on the air first at both stations," Young said. ■



Scott Hower describes COMSAT's ISDN Test Bed for a Plaza guest.

COMSAT Issues 1989 Earnings Report

Last month, COMSAT announced a net income of \$62.5 million for 1989, or \$3.35 per primary share, on revenues of \$411.5 million. Revenues for 1989 increased \$52.6 million, or 15 percent over 1988. Net income grew slightly over the 1988 figure of \$61.9 million.

Intelsat Satellite Services (ISS) and Mobile Communications combined (reported under the International segment) recorded 13% revenue growth, with the largest part attributable to Mobile, which registered traffic and revenue growth in excess of 40%. International operating income for 1989 grew 9% to \$105 million.

COMSAT Systems Division enjoyed its best year ever as revenues increased 21% largely due to work performed on contracts won during the year. Operating income improved 10% as CSD increased its bid and proposal activity along with its marketing team expertise. These actions paid off in 1989 as the division recorded bookings of \$70 million in new projects.

COMSAT Video Enterprises revenues grew 9%, largely due to a net addition of 20,000 hotel rooms. Approximately 307,000 rooms were receiving satellite delivered in-room entertainment and other services at year-end. CVE suffered a net operating loss in 1989 of \$17.6 million.

In the fourth quarter of 1989, COMSAT's net income was \$7.6 million, or 39 cents per share, on revenues of \$100.4 million.

Analysts Keep "Buy" Recommendation

New York's Nomura Research Institute, which analyzes the financial health of a company's stock, had a generally favorable view of COMSAT's results. It maintained its "Buy" recommendation on COMSAT stock. They did, however, reduce their fully diluted earnings per share estimate for 1990 from \$3.30 to \$3.20. This was done to "reflect continued operating losses from video entertainment," which

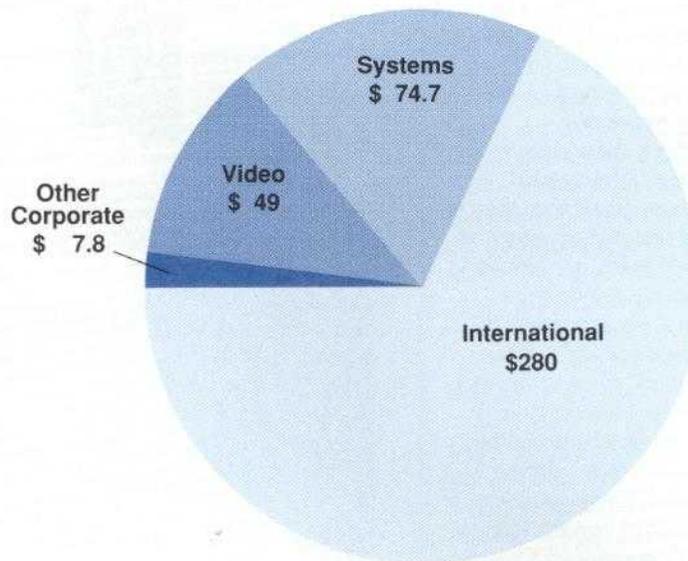
Nomura believes will equal last year's level of nearly \$18 million.

"Previously, we had expected reduced losses from that division in 1990," the report continued, but "now the company anticipates that (CVE) will not be profitable until 1992." Nomura attributed last year's losses as partly due to increased expenses from

employee relocation, as well as higher operating expenses.

Nomura did look favorably on two developments at COMSAT; a new price cap regulation filing with the FCC in the near future, and the company's accelerated digitalization of satellite services. ■

COMSAT's 1989 Results



| REVENUES (\$ millions) | 1988 | 1989 |
|--|-------------|-------------|
| International | \$247.5 | \$280 |
| Systems | \$ 60 | \$ 74.7 |
| Video | \$ 44.9 | \$ 49 |
| Other Corporate | \$ 6.5 | \$ 7.8 |
| COMSAT | \$358.9 | \$411.5 |
| OPERATING INCOME (LOSS) (\$ millions) | 1988 | 1989 |
| International | \$96.0 | \$104.6 |
| Systems | \$ 4.0 | \$ 4.4 |
| Video | (\$ 8.8) | (\$17.6) |
| Other Corporate | (\$10.5) | (\$5.3) |
| COMSAT | \$80.7 | \$86.1 |

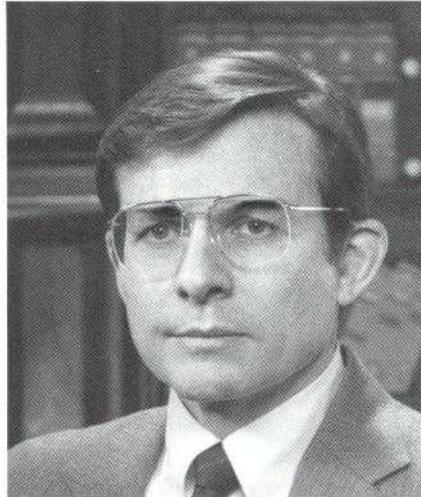
President Bush Appoints COMSAT Board Member to Science Panel

President George Bush appointed Dr. Peter Likins of COMSAT's Board of Directors to the President's Council of Advisers on Science and Technology last month. Dr. Likins, an engineer and president of Lehigh University in Pennsylvania, will join 12 other prominent scientists and engineers on the panel.

The council, which Bush pledged to create in a campaign speech two years ago, will report directly to him. It is expected to advise the President on how best to meet the challenge posed by foreign technological competition, in addition to its more traditional function of evaluating issues of basic science policy. The panel is intended to function on the same high level as the Council of Economic Advisers.

"We've got to keep our competitive edge," said the President. "It all boils down to that."

"The United States is the defending world champion," he added. "But we have to defend our title day by day, week by week, year in and year out."



Dr. Peter Likins

A Fundamental Link

Dr. Likins said the creation of the council indicates an awareness on the part of the Bush Administration of a "fundamental link" between America's economy and education in science and technology.

"This group will address America's future industrial competitiveness in the global economy," he added. "There is a growing awareness that education in science and technology is so fundamental to the future of our national economy that we must do a better job, from pre-school through post-graduate education."

According to Dr. Likins, the task ahead of the council is an unending one.

"I don't ever see a point in time where we will sit back and celebrate our achievements," he said. "For some years there had been a gap between the executive office of the White House and the leaders in the education and business communities concerned with issues of science and technology. We will try hard to rebuild these relationships."

"The President and the people at the White House seem very aware of the situation," Likins continued. "I'm optimistic that we can get things done." ■

Air & Space Museum Gets Ready For International Space Year

The National Air & Space Museum has put futurists, scientists and artists to work imagining the next 500 years in space for a special exhibition in recognition of the 1992 International Space Year.

Visitors to the exhibit, called "Where Next, Columbus?", will be invited to design their own voyages into space by using interactive computer/video programs. They will analyze the costs and risks of space travel given such variables as different missions, destinations, spacecraft and payloads. Each visitor may be able to spend as long as 15 minutes with the computers as opposed to the traditional limited museum computer play.

"We want to put people in the cock-

pit of a spacecraft and stimulate them to think about the motives and methods of space exploration," says the exhibit's curator, space historian Dr. Valerie Neal.

While other Smithsonian Museums will celebrate the 500th Anniversary of Columbus' discovery of America with historical exhibits in 1992, the Air & Space Museum will give their Columbus commemorative celebration a futuristic dimension.

"This is a thoughtful examination of the future of space travel in the next few centuries and the hurdles that will have to be overcome, such as engine development and power sources, medical consequences, sociological considerations and psychological factors."

says Martin Harwit, the museum's director. "We want to help make these issues clear to youngsters who will be the next generation of statesmen, explorers, scientists, engineers and pioneers of all kinds."

"Where Next, Columbus?" will help kick-off the International Space Year, a year that will be celebrated through cooperative space-based science research by 25 nations, and by numerous public activities and educational programs.

The million-dollar exhibit will open in February, 1992. It takes the Air & Space Museum about three years to mount a major new exhibition. The last exhibit, "Beyond the Limits" (which featured a model of the Intelsat V) opened in 1989. ■

Joint COMSAT, Intelsat, Ford Aerospace Effort

'Satellite Factor' a Big Hit With Teachers

Dozens of teachers have responded enthusiastically to the "Satellite Factor", a teaching kit created through the efforts of COMSAT, Intelsat and Ford Aerospace.

"This is the kind of response we were hoping for when we created 'The Satellite Factor'," said COMSAT's Director of Corporate Communications Robert W. Hunter, the driving force behind the teaching resource. "It's gratifying to know that the teachers, and by extension their students, will benefit from this."

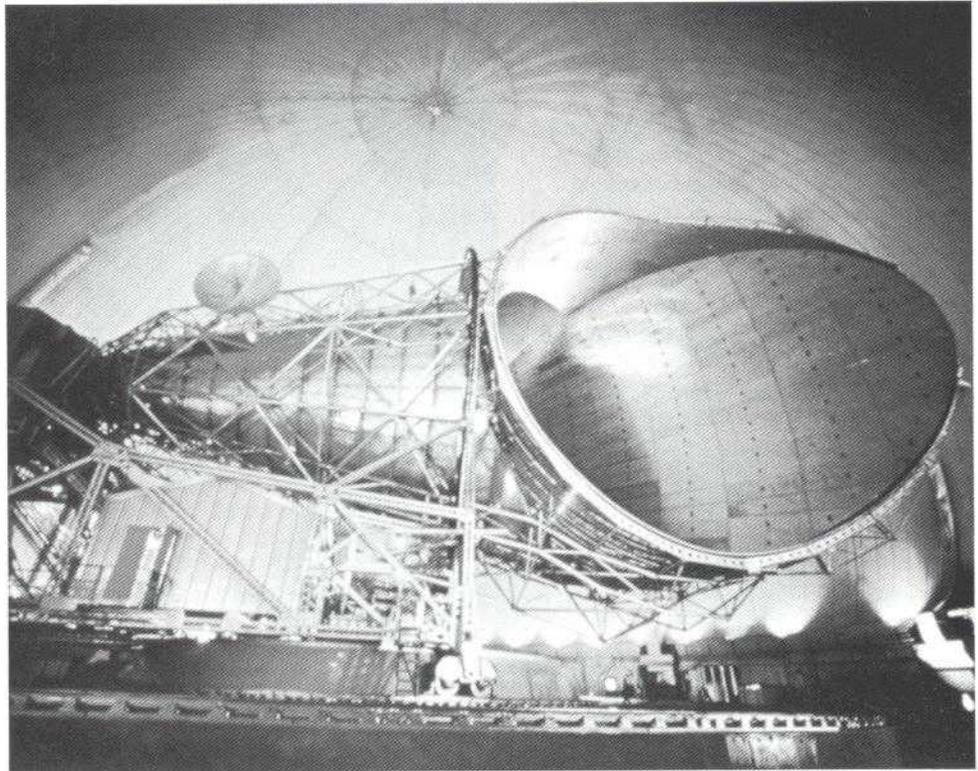
Teachers attending "in-service" training sessions for use of the kit last month in the San Jose, Calif. area (home of Ford Aerospace) were eager to put the kit to work in their classrooms. The kit has also been made available to teachers in the Washington, D.C. area, but it has yet to be evaluated. "The in-service training accompanying the kit was pretty much considered an unqualified success by the teachers who attended," said Ford's Polly Rash.

The kit was created last year in honor of Intelsat's 25th anniversary. Divided into segments on "Society", "Communications" and "Technology", it is designed for use by junior high and middle school teachers of science, mathematics, social studies and language arts.

Many teachers who filled out a post-event questionnaire indicated they plan to use the kit extensively.

"I intend to put the kit to good use in my earth sciences class," wrote one teacher. "In addition, I will use it in world geography and in pointing out the importance of global communications."

Another teacher wrote that the kit held "unlimited possibilities!" ■



Two of the visual aids that make up The Satellite Factor teaching kit.

Changes In Store For Employee Publications

The recent readership survey of COMSAT employees found four main areas where the company's publications *COMSAT Today* and *News Update* could be improved. These findings have led to some changes in the content of the two newsletters. What follows are some of the steps we've taken to serve our readers better.

Finding #1. Almost three out of four COMSAT employees said they received "too little" information about "Industry trends/information on competitors."

To meet this need, last December we introduced the feature Industry Bulletin Board Notes to the weekly *News Update*. This feature regularly deals with industry news and trends in a timely manner.

Finding #2. More than half of those surveyed said they did not receive enough information about "COMSAT top management" and "COMSAT goals."

In response, *COMSAT Today* has begun a series on leaders in the company, outlining what they see in COMSAT's (and the industry's) future. Last month's commentary by Chairman and CEO Irving Goldstein concerning Europe 1992 was the first of these articles. Next month, we will highlight a recently published piece by Aeronautical Services' Vice President Dr. Elizabeth Young.

In addition, we plan to publish more stories from COMSAT publications designed for our customers. Articles from *Marifacts*, *Aerofacts*, *Connections* and material from COMSAT Video Enterprises have already been published in internal newsletters. We will continue to do so in the future.

Finding #3. A majority of Clarksburg employees (57%) say they "rarely" or "never" read or see something about someone they know.

To reverse this trend, we have begun a process of regular communication with contacts at Clarksburg. Front

"Since we are in the communications business, it only makes sense that we should communicate clearly and often with our employees."

page stories about the Labs in the February and March issues of *Today* are the initial fruits of these efforts to get more of this coverage in our publications. In addition, stories from the

Clarksburg publication *Sideband* have recently appeared in *COMSAT Today* for the first time.

Finding #4. More than half of the respondents said they received "too little" information on "Company financial status/market share."

To provide this information, both *Today* and *News Update* will begin publishing more of the periodic memos circulated by the Investor Relations department concerning Wall Street analysts' reports and company stockholders. In this month's *Today*, we are publishing our third story in four issues about COMSAT's stock performance. This piece deals with the company's recent announcement of its 1989 results, and one analyst's reaction to it.

Taking these steps should make COMSAT's employee publications more valuable to their readers, said Vice President for Corporate Affairs Richard L. McGraw.

"Since we are in the communications business, it only makes sense that we should communicate clearly and often with our employees," he added. ■

Questions and Answers About Superconductivity

What is superconductivity?

Superconductivity is a phenomenon in which some materials lose electrical resistance below a point referred to by scientists as critical temperature (tc).

Why is this called "high temperature" superconductivity?

Scientists thought the tc was around -269° celsius until a Nobel Prize winning discovery in 1986 uncovered a new class of ceramic oxide materials that allowed superconducting at a comparatively higher temperature of -148° celsius. The tc of the materials in the new microwave filter (-196° celsius) is similar to the newly discovered materials, and also considered "high temperature".

What do microwave filters do in satellites?

While on board satellites, microwave filters break down the bandwidth of a transmission into a number of channels suitable for retransmission to various positions on earth. This allows for a greater quality of transmission.

New COMSAT Ad Campaign Gets Underway

COMSAT's first advertising campaign of the 1990's has already started. Here's where to look for the latest ads in the nation's top newspapers.

NEWSPAPERS

Washington Post

Wed., March 21 Federal page
 Wed., March 28 Business section
 Tue., April 3 Main news

Wall Street Journal

Mon., March 19 Section A or B
 Mon., April 16 Section A or B

New York Times

Mon., April 2 Main news

Don't Forget the Blood Drive!

WHO
 The American Red Cross, The COMSAT Fitness Center and YOU

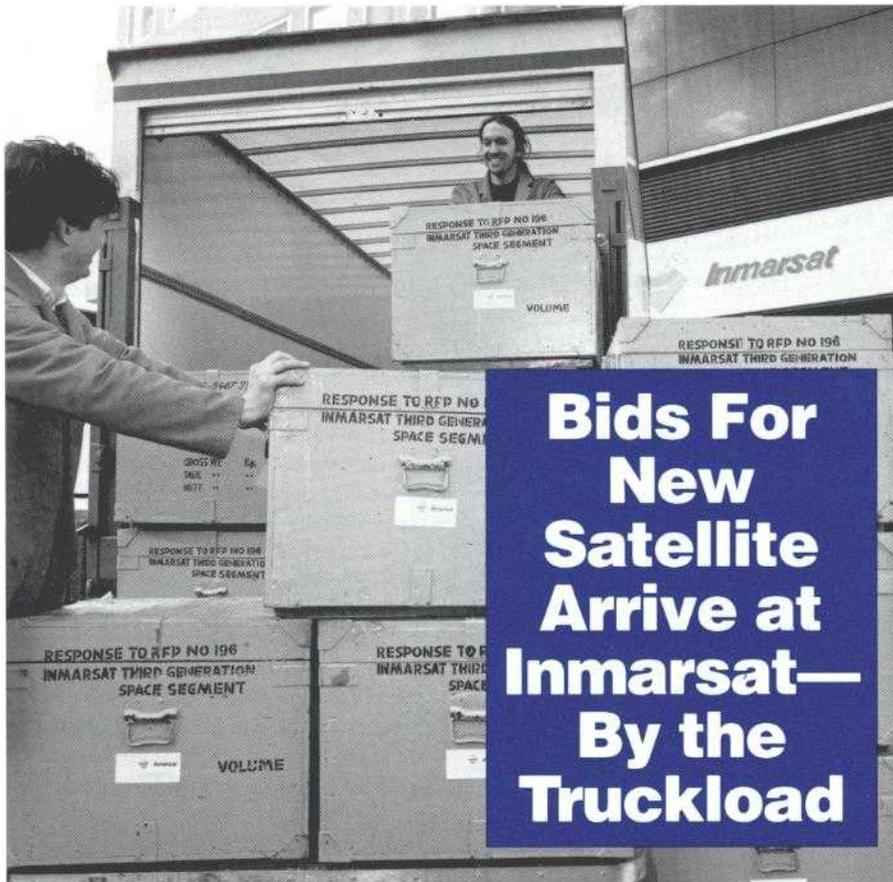
WHAT
 Blood Drive

WHEN
 Wednesday, March 28, 9 a.m. to 2 p.m.

WHERE
 COMSAT Theater

WHY
 To Save Lives

For more information, call the COMSAT Fitness Center, X6700



Bids For New Satellite Arrive at Inmarsat—By the Truckload

Bids for a new series of Inmarsat mobile communications satellites arrived at Inmarsat's London headquarters last month by the truckload.

The size and weight of the proposals reflect the degree of technical and financial detail needed to assess a new satellite series, an Inmarsat spokesman said. The bids, received from satellite manufacturers around the world, and each taking up to one year to prepare, required more than 11 tons of paper.

It will now take an Inmarsat review team of 80 staff and consultants, under high security, four months to evaluate all the bids. During this time, no further information will be released to the public.

The contract for the new satellites, to be awarded this December, will cover an initial purchase of three or four dedicated spacecraft. With additional options for up to nine satellites, the contract could be worth more than \$1 billion to the winner.

Companies submitting bids were Alcatel Espace-Aerospatiale, British Aero-

space, General Electric Astro Space, Hughes Aircraft Company, and the Indian Space Research Organization.

The new satellites, which are expected to be placed in orbit in 1994, will have enough power and capacity to give customers all over the world the capability to communicate with each other via telephone, facsimile, personal computers or pagers, using terminals small enough to be hand carried.

"We are extremely pleased with the number of bids we received," said Dr. Ahmad Ghais, director of Inmarsat's Engineering and Operations Division, as well as chairman of the evaluation committee. "We are confident of a very competitive bidding process."

The total EIRP (effective isotropically radiated power) of the satellites, as specified in the Request for Proposals, will be 48 dBw. This is nearly ten times the effective capacity of the Inmarsat 2 satellites, due to be launched later this year and in 1991 and thirty times the capacity of satellites currently in operation. ■