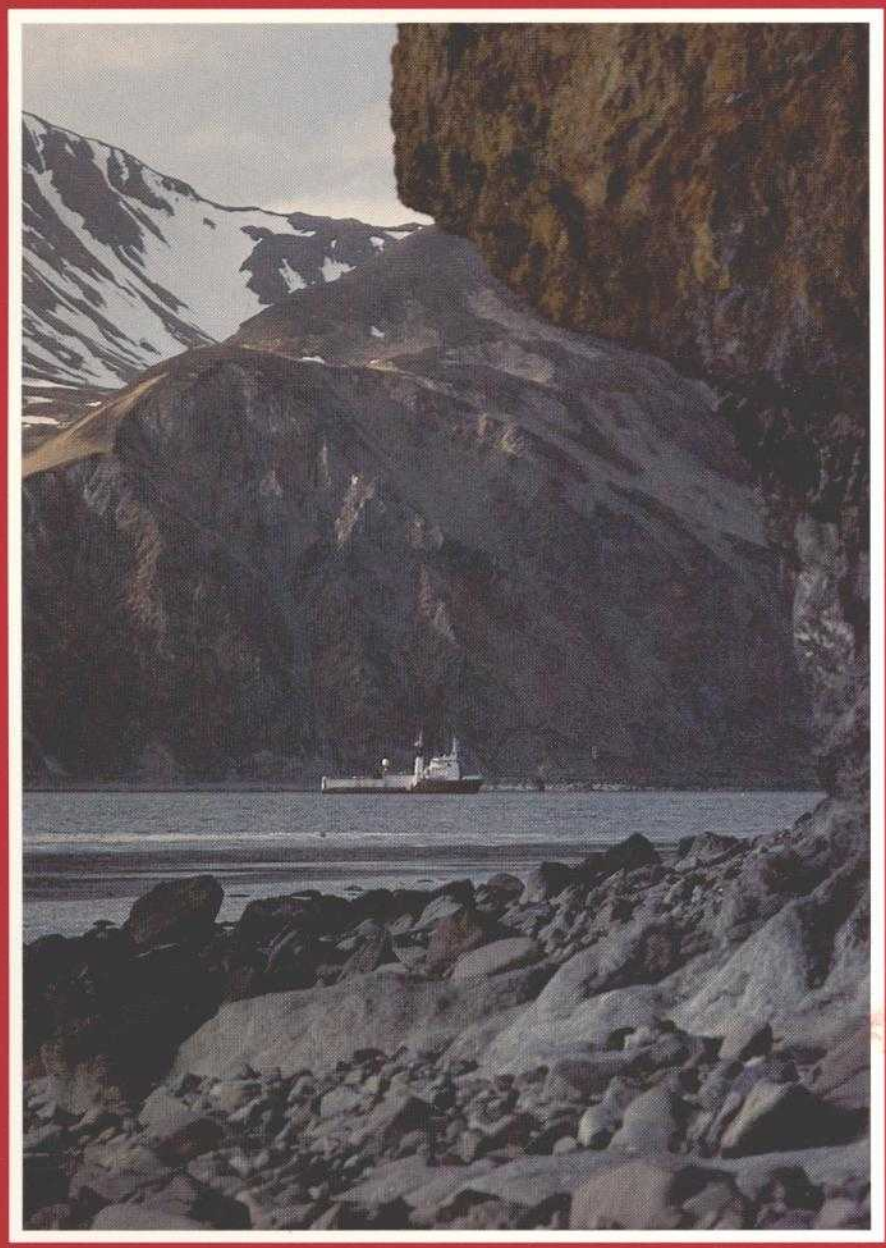
COMSAT®

COMMUNICATIONS SATELLITE CORPORATION MAGAZINE

1982



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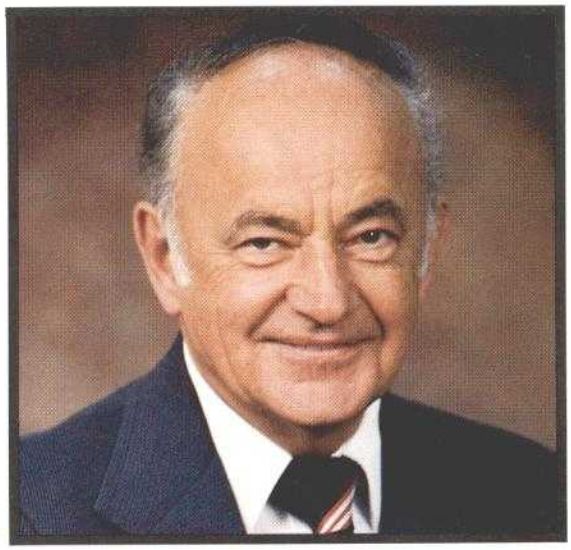
VIEWPOINT



by Dr. Joseph V. Charyk
President and Chief Executive Officer
Communications Satellite Corporation

It is no longer accurate to say that we in the United States stand on the threshold of significant growth in domestic satellite communications applications. The threshold has been crossed, and we are embarked on a number of developments that will have a dramatic impact on information processing and distribution in this country and throughout the world. Let us examine for a moment the case of Satellite Business Systems, whose progress is covered in a series of reports in this issue of Comsat Magazine.

Since launch of its first satellite in 1980, Satellite Business Systems, which we jointly own with Aetna Life & Casualty and IBM, has made impressive strides and today has operating networks in place for 11 of its 24 private network customers. These customers are taking advantage of the ability of the pioneering all-digital system to offer high quality, high quantity voice, data, electronic mail and video teleconferencing services to widely scattered facilities.

In addition, SBS has just recently started a long distance public-switched voice service for medium to high volume users of the telephone. The public-switched voice service will broaden significantly SBS's communications coverage, which already numbers over 65 customer-premise and SBS-premise earth stations. This is but a beginning. The potential impact of the capabilities being developed by SBS is enormous.

Our enthusiasm over where we are and where we are going in the realm of domestic satellite communications services was recently given still further spur with the announcement by the Federal Communications Commission of rules for offering direct broadcast satellite service. With adoption of the rules, the FCC left no doubt that it believes the concept of direct satellite-to-home television broadcasting is in the public interest. Our subsidiary, Satellite Television Corporation, the first company to file a U.S. direct broadcast satellite application, now anticipates the imminent granting of construction permits by the FCC so that it can begin the major undertaking of initiating satellite construction. Beginning in 1986, STC plans to offer in the eastern part of the country an entire service of three channels of premium television programming through a system that in due course will serve the entire country.

Any observer of the satellite communications business knows that ours is an endeavor that proved itself for international service long before it was able to have an impact on the domestic communications arena. The progress of SBS, and now progress towards broadcasting from satellites directly to the home, reaffirm our basic belief in and dedication to the potential of communication satellites to bring great benefits to people everywhere.

COMSAT

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Articles

Cover: The seismic ship, The Edward O. Vetter, in Iliukiuk Bay on its way to Dutch Harbor in the Aleutian Islands Chain. Vetter is the first ship to use new 56 kilobit data service authorized in December. Article—"Inmarsat & The Search for Oil"—begins on page 22. Photo by William J. Megna.

From the Editor

Our publication of a chart showing the orbital locations of commercial satellites in geosynchronous orbit in Comsat Magazine No. 2 was very well received, and we are pleased to present an updated version of it in the centerspread of our current issue under the heading "Commercial Satellites In Geosynchronous Orbit, Present and Planned." Our thanks go to Leslie S. Persinger of Comsat General Corporation for serving as our technical consultant for the revised chart.

Many other people who might not otherwise receive credit deserve recognition for help in making the current issue possible. Coverage of Satellite Business Systems figures prominently in the current issue, and two at SBS who deserve special mention for extensive assistance rendered are Larry Weekley, SBS Director of Public Affairs, and Candace S. Mayo, SBS News Service Administrator.

As the reader will note, much of our photography for the SBS series of articles was taken at the facilities of SBS customers. Unfortunately, we do not have the space to cite by name each of the people at each of the companies who assisted us in our photographic activities, but we can at least mention the companies and in that way offer our appreciation. And so to the appropriate staff of Allstate Insurance Company, Hercules, Inc., The Travelers Insurance Companies, and IBM, our heartiest thank you.

For help with the Intelsat V, FM-4, series of articles, of which No. 2 appears in this issue, our thanks go to Bud Porter-Roth of Ford Aerospace & Communications Corporation in Palo Alto, California, and finally our thanks to many people at Geophysical Service, Inc., including the crew of its seismic vessel, The Edward O. Vetter, for making possible our photographic rendezvous with the ship in Dutch Harbor, Alaska, and for much cooperation once we were there.

Stephen A. Saft

N O T E S

First Quarter 1982 results are made known

For the first quarter ending March 31, 1982, **Comsat** had Consolidated Net Income of $10,330,000, or $1.29 per share. This Net Income figure represents an increase of $1,990,000, or $.25 per share, over Income Before Cumulative Effect of Change in Accounting Policy for the same period of last year. Net Income for the first quarter of 1981 reflected a nonrecurring item in the amount of $11,769,000 or $1.47 per share, resulting from a change in accounting policy for investment tax credits related to non-public-utility property. First quarter 1982 Net Income was $2,927,000, or $.37 per share, greater than for the fourth quarter of 1981.

The Comsat Board of Directors declared a quarterly dividend of $.575 per share, payable June 14, 1982, to shareholders of record on May 14, 1982.

Operating revenues for the first quarter of 1982 totaled $94,102,000, an increase of $16,168,000 over the amount reported in the first quarter of 1981. This increase in operating revenues resulted primarily from growth in revenues associated with Intelsat services, and Marisat Satellite Systems Services and from sales by **Amplica**, which was acquired by Comsat General Corporation in January, 1982. Operating expenses for the quarter ended March 31, 1982 totaled $80,426,000, an increase of $13,086,000 from the same quarter of 1981. This increase in operating expenses resulted primarily from an anticipated increase in Operations and Maintenance expenses in 1982 and higher operating taxes resulting from higher pretax income. These anticipated operating expense increases result from expansion in costs related to **Inmarsat**, Satellite Television Corporation (**STC**), **CGIS**, and **TeleSystems**, in addition to the inclusion of operating expenses of **Amplica**.

Comsat's share of losses related to its partnership interest in Satellite Business Systems (**SBS**), after recognizing Federal income tax credits, rose from $4,183,000 in the first quarter of 1981 to $4,729,000 in the same quarter of 1982. **Comsat**'s share of **SBS** losses, coupled with lower income resulting from a smaller cash investment portfolio in 1982 than in 1981, are the major causes of the expense increase of $1,092,000 in Other Income (Expense)—Net over the first quarter of 1981.

Compared with the amounts reported for the last quarter of 1981, Operating Revenues and Operating Expenses rose by $4,563,000 and $1,401,000, respectively. These increases are primarily attributable to the inclusion of **Amplica**'s operating results for the first quarter of 1982. Other Income (Expense)—Net, which reflected an expense of $3,111,000 in the fourth quarter of 1981, increased to an expense of $3,346,000 in the first quarter of 1982.

Board Members reelected at 1982 Annual Meeting

At the 1982 Annual Meeting of shareholders, twelve members of **Comsat**'s Board of Directors were reelected for terms that expire at the 1983 Annual Meeting. At an organizational meeting of the Board of Directors following the Annual Meeting, John D. Harper was reelected Chairman of the Board and Joseph V. Charyk was reelected President and Chief Executive Officer.

The twelve Directors who were reelected are: Joseph V. Charyk, Frederick B. Dent, Elliott M. Estes, Lewis W. Foy, William W. Hagerty, John D. Harper, Melvin R. Laird, Howard J. Morgens, Ellmore C. Patterson, Charles J. Pilliod, Jr., Bruce G. Sundlun and William L. Zimmer III.

In other actions taken at the Meeting, independent public accountants were appointed for 1982, **Comsat**'s Articles of Incorporation were amended to increase the Corporation's authorized Common Stock from 10,000,100 shares to 25,000,000 shares, a stock option plan was approved, and a shareholder's proposal was rejected. The remarks of Mr. Harper and Dr. Charyk made at the Annual Meeting to the Shareholders appear in excerpt form beginning on Page 38.

News of Comsat officers

Appointments: Stephen M. Day, has been named Vice President, Marketing and Planning, of **Comsat General**. Mr. Day is

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responsible for coordinating **Comsat General**'s marketing and strategic planning activities.

Harold J. Detlefs has been elected to the position of Vice President of Marketing of Comsat General TeleSystems, Inc. Mr. Detlefs is responsible for the entire spectrum of **TeleSystems**' marketing activities, including sales, product planning, business planning, advertising, and public relations.

Honors: Dr. Joseph V. Charyk, President and Chief Executive Officer of **Comsat**, was honored recently by the Washington chapter of American Women in Radio and Television. Dr. Charyk was presented the award by Mal Johnson, President of the AWRT chapter and Director of Community Affairs for Cox Communications. Dr. Charyk was cited for his "outstanding leadership in satellite communications in America and worldwide."

Approval received from FCC for Roaring Creek station

Comsat World Systems Division has obtained approval from the Federal Communications Commission to construct a $50 million satellite earth station near Bloomsburg, Pennsylvania. The earth station, which will join other similar stations operated by Comsat World Systems for international satellite communications services, has been officially designated the Roaring Creek Earth Station. It will be the most advanced and powerful earth station complex ever to be constructed for operation in the Intelsat global communications satellite system.

Commenting on the FCC's approval, Comsat World Systems President, Dr. John McLucas, explained, "The very rapid growth of transatlantic and western hemispheric international communications traffic via satellite has made it necessary for us to add a third major earth station to the two that we already operate on the East Coast. This new station will considerably strengthen our ability to manage this growth." Joel R. Alper, World Systems Vice President, Communications Services, added that "we have worked closely with the people of Columbia County and of Cleveland Township to ensure that the construction of this new facility serves both their economic and environmental needs. In that spirit, we decided that Roaring Creek Valley, the beautiful area of Columbia County where the Station will be located, provides an ideal name for the facility."

Local approval for the construction of the Roaring Creek Earth Station, including approval from the Cleveland Township Zoning Board and support from the Township Supervisors, was obtained in September of last year. On-site construction is scheduled to begin in August of this year. The station, with the other U.S. earth stations that are part of the Intelsat system, will be owned by the Earth Station Ownership Consortium (ESOC), in which **Comsat** holds a fifty percent interest.

Clean Water Act award goes to ERT, from Roundtable

Environmental Research & Technology, Inc. (**ERT**),has been awarded a $130,000 contract to gather and review data relating to requirements and possible update of the Clean Water Act. **ERT** is performing the study for The Business Roundtable, an association of chief executive officers of 200 major companies for which **ERT** has acted as environmental consultant on other occasions. Based on data made available by the United States Environmental Protection Agency and other sources, **ERT** is studying water quality, sewage treatment, and wastewater treatment. Specifically, **ERT** is analyzing data to determine the major sources of "priority pollutants," their frequency of occurrence in water bodies, and the effectiveness of their removal from waste streams by industries and municipalities.

The Clean Water Act is under Congressional review and both the government and industry need timely technical information to help determine what revision might be prudent. Of particular concern under the rules of the Act is the control of certain pollutants in water: these 129 substances on the priority pollutant list include such metals as zinc, lead, cadmium, and copper and such organic pollutants as chloroform, trichlorethylene, and methylene chloride.

The Clean Water Act prescribes a level of control technology for priority

continued next page

pollutants. The ERT study examines both the priority pollutant list and the control methods to see if changes might be considered. How effective are present controls? Might the Act be requiring too much or too little control? Might it be prudent to reexamine the list of priority pollutants? Such questions as these are of interest.

New EC-4500 Echo Canceller introduced by TeleSystems

Comsat General TeleSystems has introduced its newest and most advanced echo canceller, the EC-4500. In announcing the new product, **TeleSystems** also disclosed that sales of the 4500 have reached 8,000 units.

TeleSystems' EC-4500, the fourth model of echo canceller manufactured and marketed by the Fairfax, Virginia-based company, features the most advanced digital circuitry available today. It incorporates a powerful VLSI chip that replaces over 30 integrated circuits and substantially reduces power consumption. **TeleSystems**' initial sales of its 4500 echo canceller have been made to MCI Communications Corporation and to Satellite Business Systems, with deliveries to begin in mid-April.

TeleSystems also introduced a new-generation maritime satellite communication terminal, the MCS-9000, following a recent Federal Communications Commission decision allowing **TeleSystems** to market the terminal, and the successful completion of sea trials on the MARECS-A satellite.

New satellite receiver, RC-40, system developed by Amplica

Amplica has introduced a major new satellite receiver system called RC-10, designed specifically for the rapidly growing 4 gigahertz small earth terminal market. The RC-10 consists of Model R-10 satellite video receiver and Model C-10 low-noise amplifier/downconverter.

The key to superior performance in the new **Amplica** satellite receiver system is the high-technology microwave component, Model C-10, low-noise amplifier/downconverter.

STC invites engineering bids for planned broadcast complex

Satellite Television Corporation (**STC**) has issued a request for proposal for architectural and engineering services relating to the design and construction of its broadcast complex for **STC**'s planned satellite-to-home pay television service to eight American companies experienced in the development of terrestrial broadcast facilities.

STC's broadcast complex will be located in the Las Vegas, Nevada, area. It will contain the equipment needed to control **STC**'s direct-broadcast satellites (DBS) and to transmit programming to them. The heart of the complex will be its video processing facilities.

STC's application for authority to construct DBS satellites was submitted to the Federal Communications Commission (FCC) in December 1980. **STC** is hopeful that the FCC will act on the application in the near future so that satellite construction can proceed expeditiously. The construction program is expected to take more than three years, resulting in start of service in late 1985 or early 1986.

STC, a wholly owned subsidiary of Comsat (Communications Satellite Corporation), will offer three channels of premium pay television, without advertising. Individual subscribers would receive STC's satellite pay-TV service using small, inexpensive home receiving antennas.

World Systems to construct six Pacific Region earth stations

The Federal Communications Commission has approved construction of six international communications satellite earth stations by Comsat World Systems Division in the Federated States of Micronesia and the Marshall Islands. The stations will be built on the islands of Yap, Truk, Ponape, and Kosrae in the Federated States of Micronesia and on Majuro and Ebeye in the Marshall Islands. This system of satellite earth stations will bring high-quality, reliable television, international telephone and worldwide telex services to the people of these islands for the first time. The FCC

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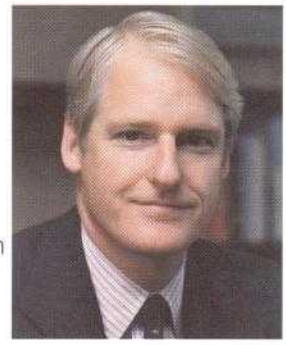
SBS OFF & RUNNING

Advanced integrated networks offering voice, data, electronic mail and video teleconferencing services are now operating, thanks to Satellite Business Systems.

*by **Richard S. Bodman**, President and Chief Executive Officer Comsat General Corporation*



As a member of the Satellite Business Systems Partners' Committee, I have had an opportunity to watch **SBS** grow from an exciting but unproven communications proposal into an operating company leading the telecommunications explosion we have all heard so much about. After many frustrating years during which the merits of the proposal were at first subject to debate before the Federal Communications Commission, then subject to debate before the courts, **SBS** is today alive and well and living up to the promise that we within the Comsat family have long believed in.

In brief, this is the SBS progress report: Two satellites are in orbit and in use, and a third is about to be the first commercial payload to be launched by the Space Shuttle. Communications systems are in place and functioning for many of its 24 private network customers. These customers are taking advantage of the advanced integrated voice, data, electronic mail and video teleconferencing services available to them and are realizing substantial cost savings on their intraorganizational long-distance voice services. In addition, a new public-switched long-distance voice service for business customers with moderate to large long-distance volumes called Message Service-I has been started.

That, I believe, is a portrait of a dynamic company aggressively moving forward and, thus, for whom the future is bright. True, there have been some difficulties associated with the start-up of the system. In no respect, however, have we of the Comsat family of companies and our colleagues on the Partners' Committee from Aetna Life & Casualty and IBM seen any evidence to dampen our enthusiasm over the inherent strengths of the SBS organization and the scope of its market potential.

As for future relations between the Comsat companies and **SBS**, I see us playing a major role in helping **SBS** capitalize on its already auspicious start. Specifically, I see Comsat General Corporation playing an active role in helping to bring together prospective SBS customers with similar specialized communications needs. By aggregating users with specialized needs, we may be introducing SBS services to people who otherwise might not be in a position to take advantage of them.

One concern that I believe demands vigilant attention is international integrated communication system compatibility. All of us on the SBS Partners' Committee must do what we can to make certain that foreign entities establishing SBS-like network services opt for system specifications and standards that are compatible. Only in this way can such systems efficiently and economically be linked together in the future.

In the following articles, the reader will find comprehensive reports on the extremely encouraging progress **SBS** has made to date and its exciting plans for the short- to medium-term future. It is my hope that the reader will capture from those reports a sense of where, in the longer term, I believe **SBS** is heading—toward the creation of a nationwide aggregation of communication networks available to everyone and toward its own establishment as one of the major companies of this nation.

AN INTERVIEW

In April, we had an opportunity to conduct an extensive tape-recorded interview with Robert C. Hall, President of Satellite Business Systems (**SBS**), an interview that ranged over many subjects including the milestones in the history of the young enterprise as it has moved from the pre-operational phase to its functioning as an exciting new telecommunications company with satellites in space and customers on earth. We are pleased to be able to publish an abridged version of the transcript of the interview.

Hall joined **SBS** on July 16, 1979. From 1977 to 1979, he was Executive Vice President of the New York Stock Exchange, Inc., in charge of all exchange operations and support organizations. From 1972 through 1977, he served first as President then as Chairman and Chief Executive Officer of Security Industry Automation Corporation (SIAC), an organization responsible for all data processing, communications, the consolidated tape and the combined clearance and settlement activities for the New York and American Stock Exchanges.

From 1961 through 1972, Hall was with Control Data Corporation, rising to Vice President and Group Executive, Computer Systems. We think the reader will find the following interview helpful in understanding a company that is leading the way to making advanced communications available to an ever enlarging commercial audience.

Editor's Note

Q: What do you consider the highlights of your first three years as President of SBS?

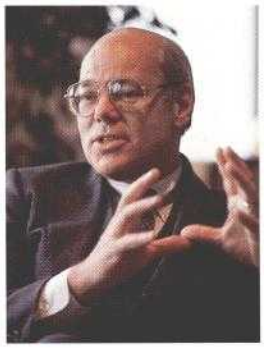
HALL: When I came to **SBS** we had fewer than 500 employees. We didn't have ground equipment in place. We didn't have a satellite flying. We didn't have a single order. We were still being challenged in court. And we certainly didn't have the financing structure to get us all the way into business. At the time, I felt that the most significant accomplishments would be getting rid of the regulatory uncertainties, achieving a successful satellite launch, getting the system integrated so that we were sure the total system met planned performance objectives, and getting customer orders. Each of those events was momentous, as it came to pass.

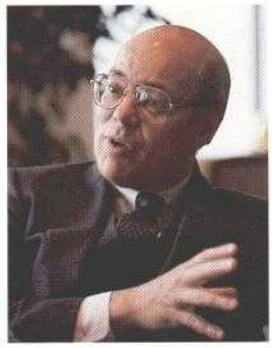
Successfully launching the satellites certainly has been among the more dramatic events, but the first orders were also very important. The system is meeting or exceeding design goals in almost every area. And, certainly, one can't forget the recent establishment of a banking relationship to facilitate our need for working capital. But those are all yesterday's events. The challenges we face today are getting networks installed, getting major voice networks cut over, getting further and further into the operational environment.

Q: Would you say that you are basically satisfied with the progress of SBS? An important part two of that question is do you sense that the Partners are satisfied?

HALL: We have accomplished some unique and very challenging objectives. We now have all three of our existing products, CNS-A, CNS-B, and Message Services, in operation and producing revenue. All are working well, and the voice and data quality are excellent when properly installed.

But we haven't achieved start-up as fast as we had expected and planned. It's costing us some more money because of that. We've had to get much deeper into the telephone interconnect world than we originally anticipated because of the voice component of our system. We have not been able to migrate our customers as fast as we would have liked. And this has caused a slower than planned revenue growth.





From my vantage point, however, the Partners have been understanding of the process. I think they see that the opportunity in the marketplace and the profit potential is as strong as it ever was.

Q: You used an interesting word, "migrate." What do you at SBS mean when you use the words "migrate" or "migration"?
HALL: Migration is bringing about the implementation of SBS services on a line by line, PBX by PBX basis for an entire customer network across the country. It involves a lot of detailed planning and a very careful coordination with the local phone company, and it takes time. We use the word to describe the phased process through which we implement SBS service for a customer and then gradually expand that service, displacing other carrier services along the way.

Q: As you've lived with SBS over the last three years, have there been any surprises? Have the risks, financial and technical, been what you expected?
HALL: There have been surprises. One is the complexity and the difficulty in making the interconnection to the Bell world. Providing high speed data service has been a reasonably straightforward process, and it works very cleanly. But most of the communication transmission business out there today is voice traffic. Our voice traffic has worked quite well when we go from earth station location to earth station location, but we run into problems when we have to interconnect with the Bell world.

The Bell lines must be of generally good quality if our system is to work properly, and we have found a broader variance of quality outside of specification than we had anticipated. Much more testing and line redesign is required because of that.

As a result, we have not migrated customers as fast as planned. The overall financial risk and the return on assets have not changed dramatically, but the upfront investment to get there has gotten larger.

Q: When you talk about the problem with voice interconnection, are you speaking of both the private network service that you've been offering since March 1981 and the new Message Service?
HALL: Yes, the interconnection difficulties are actually greater with a private network because we are changing something that is in operation today. The network customer's voice lines go out into the Bell world through a variety of different kinds of switches. With our Message Service business, we are going only from our earth station to the nearest big Bell center with a relatively short line that is not now in service. So, the interconnect requirements there are simpler, compared to what we have to do for our network customers.

Q: And so this is the case even though, as I understood it, the CNS private network service is basically an intra-organization or intracompany service?
HALL: That's right. For example, take the case of IBM, which has a large CNS-A network. The IBM building in Chicago is the hub of a regional private communications network that includes a number of buildings in several cities. The network is served by a large number of leased lines. In some cases, the leased lines go through multiple switches, and they sometimes are connected via dramatically different routes. We have to ferret out the problems in those lines to make sure that the customer has quality voice communications.

Q: What has the response been from your private network customers as to the benefits they are experiencing?
HALL: The response is favorable, as expected, except the volumes are not quite as high. We have sold our big CNS networks primarily as voice network

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Antenna for SBS's new Message Service-I for service to the Atlanta, Georgia, area is located on top of the Bank of the South building. A total of 18 earth stations in key locations around the country currently are used to provide this bulk voice or telephone service.

replacements on a cost-saving basis. That benefit is certainly proving to be true. Although we are effecting a price increase this fall, the price increases in the last year and a half by AT&T have been significant. So we continue to represent a very significant cost saving for most of our customers.

Our customers are also adding advanced applications at a steady pace. Most of them have in place, or are planning, data applications. They are moving data at speeds they couldn't achieve before. Some customers are also doing teleconferencing, both full-motion video and freeze-frame video, and some are experimenting with electronic mail. All the things we've said we hoped could be done are being done in integrated networks today.

Q: *You have recently begun your Message Service-I telephone service. Does this mean that the advanced applications via the private networks will play less of a role at* ***SBS*** *in the future?*

HALL: No, Message Service-I will not eclipse advanced applications. We are dedicated to providing integrated services. We think our future is in integration of data and video teleconferencing and voice, and we see this growing very fast. But we also recognize that today most of the money spent on telecommunications services is for voice. To justify all our capacity in space and get the necessary revenue growth, we have to tap that voice market. In Message Services we saw an opportunity, again trading on the experiences of our customers, to get some early revenue flow to bridge the gap until the advanced applications become a much larger percentage of the communications bill.

When we install a network for General Electric or General Motors or IBM, or whomever it might be, what they in effect do is run it as a corporate service. Some of them even sell the services to their divisions on a call-by-call

basis through a chargeback method. We simply said, "Hey, if that's what all our customers are doing, why don't we buy one of our own systems, install it around the country, and then sell service to the smaller organizations who aren't big enough to have a private network."

We have 18 Message Service earth stations installed in key locations around the country. We sell a voice service on a line-by-line basis. The eventual profitability will be very good, and the revenue comes up very fast. Rather than wait for the CNS customers to migrate, we're taking immediate advantage of our capacity. But it's not a shift away from integrated service. About 50 earth stations out there are being used to provide integrated service. One of our hopes is that very quickly we can add integrated services to the voice services through Message Service earth stations. We are looking at offering electronic mail, video teleconferencing, and data via this approach.

Q: You have developed some international plans. What were the factors that led you to develop a business relationship with British Telecom and to seek international carrier status from the FCC?
HALL: Because many of our customers are multinational organizations, they have been after us for some time to indicate how we would connect them to their foreign locations, particularly with high-speed services not offered by the conventional international carriers. We are not a common carrier in any other country except the United States and are not likely to be. We wish to offer international interconnection to our domestic customers. Our only option at present is to make interconnections through existing U.S. international carriers and let them broker the service through Comsat/Intelsat or to use submarine cables.

We say, "We have the customers. We have the traffic. Why go through a middleman? Why shouldn't we be able to deal directly with Comsat?" We have therefore negotiated an agreement with British Telecom, and we are seeking FCC authorization to interconnect with them via Comsat/Intelsat. That way our customers will have high-speed linkages to the United Kingdom for video teleconferencing, document transfer, and high-speed bulk data transfer. We hope to make similar arrangements with other foreign telecommunications administrations so that in a few years our customers have high-speed links to many points in the world.

Q: In the next three to five years, how do you anticipate the mix of services will look?
HALL: The mix will depend on economics and on how fast advanced applications are exploited within individual companies. As the big customers implement and demonstrate the viability of video teleconferencing, smaller organizations will want to implement it also. But they will probably need a public network vehicle as opposed to a private one.

It's hard to say whether the public or the private market is going to be dominant for us. I don't know, and I really don't care. What I want to do is make sure we have provided the foundation for integrated services. Data will be a much larger percentage of total service than it is today. Data volume will not be larger than voice volume, however. Voice will still be the dominant service because of its current size.

Q: You mentioned a public video teleconferencing network. Would you care to comment on the possibility of other new services that might be coming from SBS *in this three-to five-year period?*
HALL: We have under study a variation of our network service—potentially called Data Network Service (or DNS)—for locations that have high-speed data requirement, but don't have a large voice communications complement. A remote data center is an example. Our CNS earth stations are presently designed for fully integrated service. They need a reasonably large voice volume to be cost effective. DNS would use earth stations that are much simpler than CNS earth stations. It would provide a solution for the company that has a data center out in, say, North Dakota, and wants to link that center at high speeds with its communications hub in San Francisco, but has little need for a large voice linkage.

Q: I've seen the term "digital termination service." Is what you describe another term for this service?
HALL: No, that's a different service entirely. Digital termination service refers to the 10.5 gigahertz frequency band that the FCC has opened up. Xerox was going to use the frequency for its now-sus-

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Private network CNS service to and from the headquarters of Allstate Insurance Company in Northbrook, Illinois, depends on this antenna.

pended Xten service. Digital termination service is a wideband distribution system within a local area—a local distribution vehicle that bypasses existing telco lines. SBS conducted an experiment with LDD Company and Tymnet in New York and San Francisco, and we have filed for a license to provide a nationwide service. Seven national licenses will be granted for that frequency, and we hope we will be awarded one. That's really a new business.

Q: Do you feel you've covered the subject of new services then?
HALL: On the subject of public switched networks, there are a variety of new services that we could offer through shared facilities. One of the things we could do in time is provide a special electronic mail service. Also, we could equip video teleconferencing rooms at each of our locations, and then we could rent them out by the hour. In fact, we could add all the advanced applications on to our public switched voice network. We would love to do that.

In the realm of public switched voice communications, the second thing we will do is move into the residential market. We will fully compete with MCI, Sprint, and, of course, with AT&T.

Q: When will you start offering public switched voice services for the residential market?
HALL: Early next year.

Q: Why don't we say a little more about public voice service. I understand that you do feel that you have some very strong advantages when it comes to competing head to head against MCI, Sprint and AT&T. What are your competitive advantages?
HALL: In addition to price, we have total interconnectivity. You can dial any place in the country now, today, and the quality of the communications is generally excellent. We also have spent a great deal of time on good customer service. Our advantages will therefore be customer service, technical quality, interconnectivity, and the fact that we are competitive on cost with the other common carriers and very cost competitive against the Bell system.

Q: What do you anticipate in terms of personnel growth for SBS?
HALL: We have 1,450 people on board at the present time. We don't expect large short-term growth, maybe another 150 people this year. Those people will work primarily in field service and network operations. We don't anticipate any significant growth in any of the support activities. Our concentration now is on profit—holding our expenses at the lowest possible level and getting the revenue up. After that, we can start talking about more expansion.

Q: How has the fact that SBS now has bank creditors, not just three partners, changed life for you?
HALL: We have been dealing for the last several years with the Partners in a very detailed fashion. Now we have to keep another set of parties aware of what's going on. We give them a quarterly update, but little in the way of additional activity has been required. SBS has a viable business plan, and that's what has brought us the outside financing. Of course, we do keep the banks current on all plan changes.

Q: I wonder if you'd comment on the role that the Partners play on behalf of SBS. Are the three Partners bringing direct benefits to SBS?
HALL: Yes. Certainly they are much more helpful to us than the average shareholder board member because each Partner organization in its own right has a significant technical expertise applicable to our business. In the interaction of the Partners at our Partners meetings and through their individual counsel on strategy, approaches, and options, they are very helpful. There's no question about it. And in addition to their ownership roles, they have vendor and customer roles.

Q: How do you think AT&T divestiture might affect SBS?
HALL: The divestiture agreement is a favorable attempt to provide a basis for long distance competitors to eventually obtain equal access—equal to AT&T access—to the facilities and services of the local operating companies. But the proposed settlement does not adequately address how this equal access is to be provided in detail. That is a matter of concern. So is the specific manner in which AT&T's assets are to be divested and valued. If the Bell operating companies are loaded up with a lot of old assets at inflated values, then the operat-

Message Service I voice communications in Chicago is provided through this antenna in the city's downtown loop. Building in rear is Sears Tower, world's tallest building. **Below,** *Voice communications is an important use of the private CNS network at Allstate.*

ing companies are going to have to charge very significant access charges to all the long-haul carriers. In effect, we would then pay a subsidy for local access to justify all the assets that were passed off by AT&T. We are concerned also about the potential for cross-subsidies by the surviving AT&T. These are examples of areas where continued regulation of AT&T will be necessary.

Q: If you could have the ideal divestiture settlement, what would it be?
HALL: The basic direction of the settlement agreement is a pretty good foundation. However, some corrections and clarifications are needed to better insure that equal exchange access can and will be achieved, with fair access charges. We also want assurance that reasonable interconnection to AT&T's innercity facilities and services is available to other carriers and end users. Also, the Court and the FCC must carefully supervise the implementation of the settlement, including the divestiture of assets, to ensure that the goals of the settlement are met, since "new AT&T" will have an incentive to tilt the playing field their way, which could be seriously adverse to a fair competitive environment in the future.

CNS: COMMUNICATIONS - ADVANCED, PRIVATE, INTEGRATED

by **Scott Chase**, Specialist, Public Relations
Office of Corporate Affairs
Photography by **William J. Megna**

Later this year, the launch of the fifth space shuttle mission will open new chapters in the history of Man's utilization of space. Nestled tightly within Columbia's payload bay will be SBS-3, Satellite Business Systems' third communications satellite, and the first commercial payload to be delivered into earth orbit by the NASA ship.

The successful deployment of SBS-3 will augment **SBS**'s in-orbit space segment and provide additional capacity to meet growing demand. A fourth and fifth in-orbit satellite also are planned. The SBS-3 launch will occur seven years after **SBS** was established and over a year and a half after its first private network began customer service. Today 11 customer networks are in service, and 13 more are being installed.

SBS offers advanced, private-network services for organizations with large volumes of communications traffic among geographically dispersed locations. Designated by **SBS** as Communications Network Service (CNS), the networks are noteworthy for their very high capacity, allowing a full spectrum of internal communications applications—voice, data, video teleconferencing, and electronic mail—to be integrated into wideband communications transmission bursts. Separate CNS services—CNS-A and CNS-B—are offered to address the different needs of SBS business and government customers.

CNS-A customers have **SBS** earth stations for their exclusive use situated on their premises. For customers without communications volumes large enough to enable them to achieve significant savings using CNS-A, **SBS** introduced CNS-B early in 1982.

CNS-B earth stations are shared by several customers, permitting lower costs in exchange for some limits on usage and maximum network size.

CNS users transmit very large volumes of corporate data and other

communications at speeds of up to 1.544 million bits per second (Mbps) per single channel or port.

At today's conventional speed of 9.6 kilobits per second, a typical computer tape reel of 800 megabits would take about 26 hours to transmit. Using an SBS 1.544 Mbps channel, that same tape can be transmitted in about ten minutes.

In addition to CNS-A and CNS-B, **SBS** has introduced or announced other services to meet the needs of a market more diverse than **SBS** orginally anticipated.

As SBS President and Chief Executive Officer Robert C. Hall puts it, "In this respect **SBS** has already demonstrated a sound capacity for evolutionary growth in addressing more of the diverse needs of business and government organizations. Initially, the company focused on the private-network integrated-services requirements of large organizations—those whose complex, high-volume communications could justify dedicated, customer-premises earth stations."

Last year the number of SBS-installed earth stations within the United States rose from five to 60 and will increase to about 100 this year.

SBS, a partnership among Comsat General Corporation, IBM Corporation, and Aetna Life & Casualty, has as one of its first customers Allstate Insurance Company. Allstate's headquarters in suburban Chicago currently is one of **SBS**'s leading CNS installations.

"Allstate is using the SBS satellite link for several different functions," explains Debbie Smith, Allstate's Communications Manager. "We now use the satellite link to transfer large amounts of bulk data information that we used to send over terrestrial or land lines to our Menlo Park Regional Office near San Francisco. Using the satellite speeds the process up; it's a lot more in our control;

Telephone and antenna as photographed on the roof of The Travelers Companies facility in Norcross, Georgia, one way of symbolizing the presence of SBS private network CNS service at the facility. **Above**, *Video teleconferencing room in use at Allstate Insurance, Northbrook, Illinois.*

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it's better as far as errors and detection of errors are concerned than we were experiencing with land lines.

"All the SBS applications have been available for our use since November 1981," says Smith. "We send all of our telephone calls to the San Francisco area via satellite, and it's working very well. Most users don't even realize that they're speaking via satellite, and we've substantially cut our costs for intracorporate communications.

"We expect that as our network of earth stations grows, use of the satellite will cut the long distance charges even further. Even AT&T uses satellites today for its long-haul traffic."

The evolution of **SBS** from a developing company offering new and enhanced telecommunications services to an operational company actually providing those services was a milestone in the application and marketing of satellite communications technology. And the first several CNS customers have proven themselves to be leaders and innovators in the use of this exciting, almost futuristic, communications service.

"The fact that you can do video teleconferencing in a natural setting—with motion, color, and actual environment—using the SBS network is a very exciting development," Smith says. "It's not only more efficient, but it also helps us cut our travel expenses. It's cheaper for us to use video teleconferencing than to fly five executives to California or New York. I think that's the biggest single attribute of our CNS service. But the fact that you can also use it for electronic mail and other advanced applications is another plus. The satellite connection opens up new doors," Smith notes.

Field engineer for SBS testing voice circuits in the Port Adapter System at facility of Hercules, Inc. in Oxford, Georgia

Harold Johnson, Allstate's Director of Satellite Communications, comments. "With the SBS System, we've had no problems whatsoever in the transmission of any of our voice or data. We've found the video teleconferencing to be very reliable so far." One of Johnson's responsibilities is to encourage Allstate's managers and other corporate affiliates to experiment with the state-of-the-art technology which is now available at Allstate headquarters.

"If anyone within the corporation has a reason for traveling, we're asking them to use our video teleconferencing room as an alternative," Johnson says. "We want them to try it, see if they like it, and use it as a replacement for some of the meetings that take place face-to-face."

Another CNS-A customer, Hercules Inc., is the kind of multinational manufacturer that **SBS** had in mind when Communications Network Service was first planned. Hercules operates approximately 70 manufacturing plants in the United States and has similar facilities in about 26 countries. The company markets over 1,000 products, most of which are intermediate items used in the manufacture of finished goods.

"We are already using SBS services to communicate with other facilities within the U.S.," explains Bill Phile, an official at the company's headquarters in Wilmington, Delaware. "We use the telephone system for high volume calling every day. This is one of the reasons we went to the SBS System."

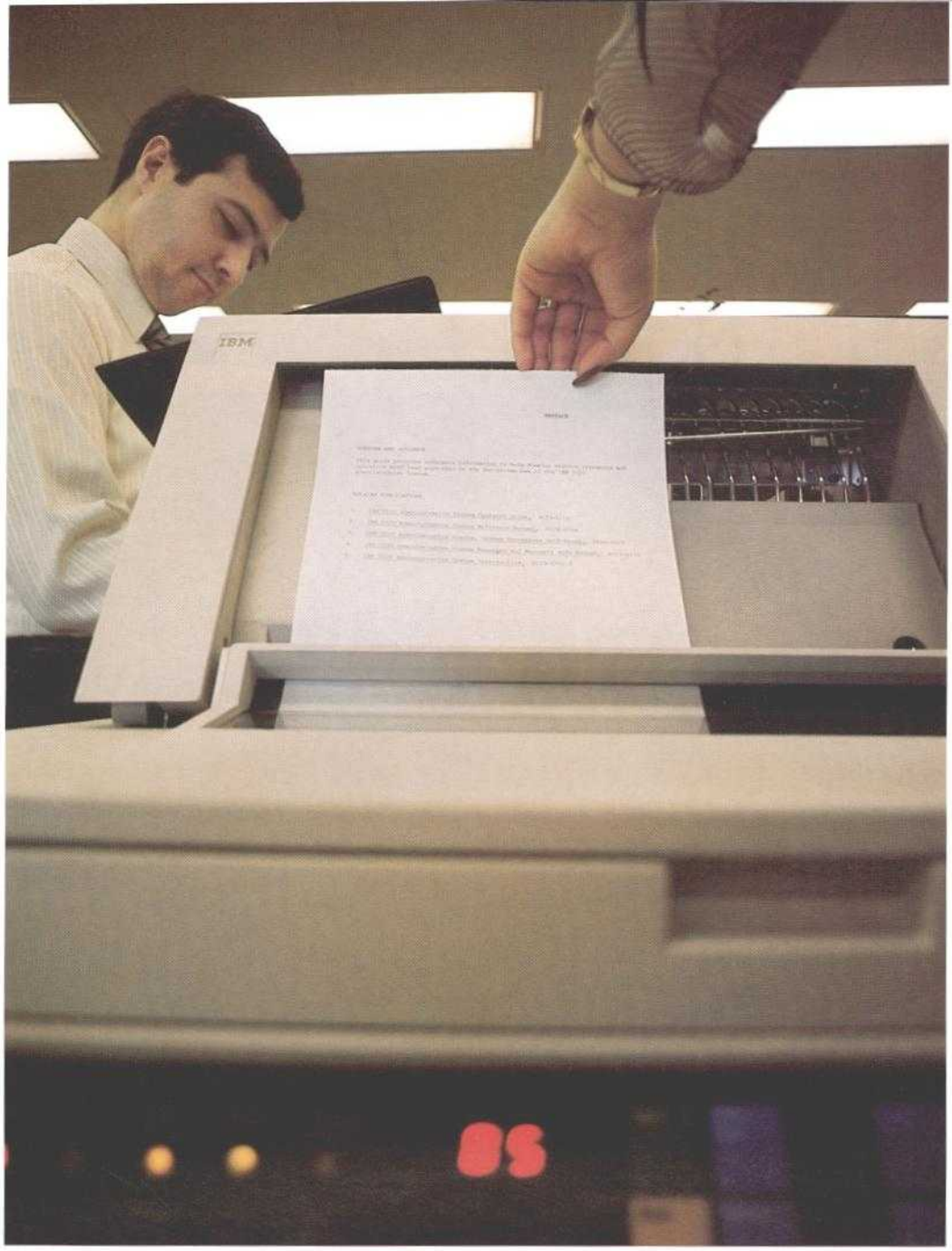
According to Phile, Hercules plans to start using the electronic mail capabilities soon and is preparing to expand video teleconferencing. Hercules was one of the first chemical companies to exploit advanced telecommunications applications. Phile says Hercules expects to save substantial sums in the next ten years using CNS-A.

At the offices of another **SBS** customer, The Travelers Insurance Companies', excitement over CNS service is evident even in a corporate film, which describes the **SBS** satellites as "the first designed for all-business use." The film gives an idea of the dimensions of the Travelers telecommunications needs. "By 1985 we expect our network to include over 50,000 terminals in 350 field office locations and over 9,000 agencies country-wide," says the commentator in the film.

The Travelers, a CNS-B customer, maintains two major data centers, one at corporate headquarters in Hartford, Connecticut, and the other at Norcross, Georgia, near Atlanta. Robert Pothier is the Director of Operations at the Norcross facility, and since the **SBS** service began there last December, he has become an **SBS** believer.

"Our interaction with **SBS** personnel and satisfaction with the CNS-B service has been very good," he says. "We had no problems in the start-up, and the system's stability has been excellent."

Glendell K. Davis, Travelers Assistant Director of Data Processing, is responsible for satellite communications planning and implementation. She served as project leader for the design and implementation of the initial CNS-B configuration. Mrs. Davis anticipates growth in the area of advanced applications. She concludes: "The future of communications is exciting. Implementation of the SBS satellite network is a significant step toward



Left, One use of the CNS network at Allstate is the experimental transmission and receipt of electronic mail. ***Below,*** *From this center, the Norcross link is controlled in the computer to computer communications of The Travelers Companies between Norcross and Hartford.*

a single integrated network capable of transmitting voice, data, and image at higher speeds and lower cost than transmission via traditional facilities. The SBS satellite network places The Travelers in a preeminent position to use technological advances to enhance the way we market and manage our products and services."

IBM, one of the SBS partners, has an extensive CNS-A private network including 15 earth stations, with more planned for the future. So far, IBM's network has been used primarily for voice communications and for low-speed data transmission. Teleconferencing and high speed data applications are expected to be added in the near future.

"SBS services will meet a growing customer demand for voice and wideband data communications of very high quality and low cost," says SBS President Robert C. Hall.

"Very high quality and low cost are key components of the SBS commitment to providing the finest telecommunications services available in the world today," Hall notes.

Strategic planning and aggressive marketing have put SBS at the frontier of productive and effective telecommunications.

As SBS President Hall has said, ". . . competition is clearly right for the communications industry." He plans to keep Satellite Business Systems at the top of the rapidly evolving business communications sector.

Voice Service for the Nation

by ***James W. Patty, Jr.****, Product Director*
Commerical Message Service
Satellite Business Systems
Photography by ***William J. Megna***

The marketplace was ripe for alternative long-distance voice services, and revenue prospects were favorable. Satellite Businesss Systems (**SBS**) certainly had the technology to offer such a service. So, two years ago, **SBS** decided to build a backbone network of earth stations and move into the promising voice market.

Based on the fundamental technology we developed for our large private network services, **SBS** developed a satellite-based long distance voice service, Message Service-I (MS-I). MS-I began revenue service in March this year.

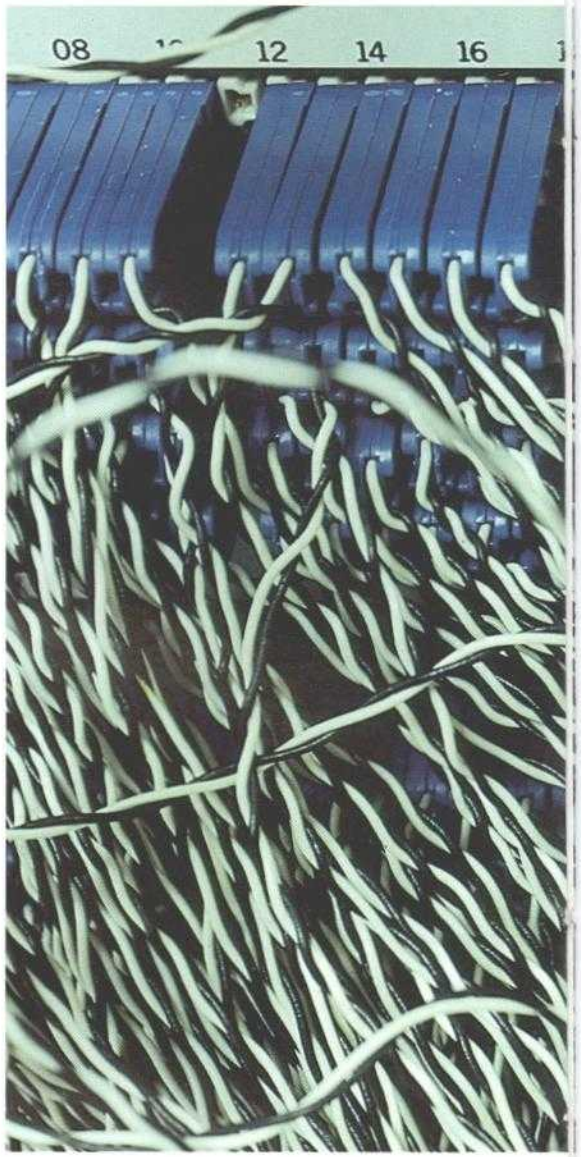
Administered by **SBS**'s Exchange Services Division, Message Service-I is an alternative to the Bell System's out-WATS and DDD services because it offers full national coverage. This is a fundamental selling point. Any user can reach any telephone in the continental United States, Puerto Rico, and the U.S. Virgin Islands.

SBS's Message Service Network consists initially of 18 Message Service earth stations and switching centers, located around the country in major cities. Eighteen are now operational. Two more, for a total of 20, are planned in mid-83.

The locations for these combination earth stations-switches are in Atlanta, Boston, Chicago, Cincinnati, Dallas, Denver, Detroit, Houston, Los Angeles, Miami, Minneapolis, New Orleans, New York, Philadelphia, Phoenix, Pittsburgh, St. Louis, San Francisco, Seattle, and Washington, D.C. Others will be added as customer demand warrants.

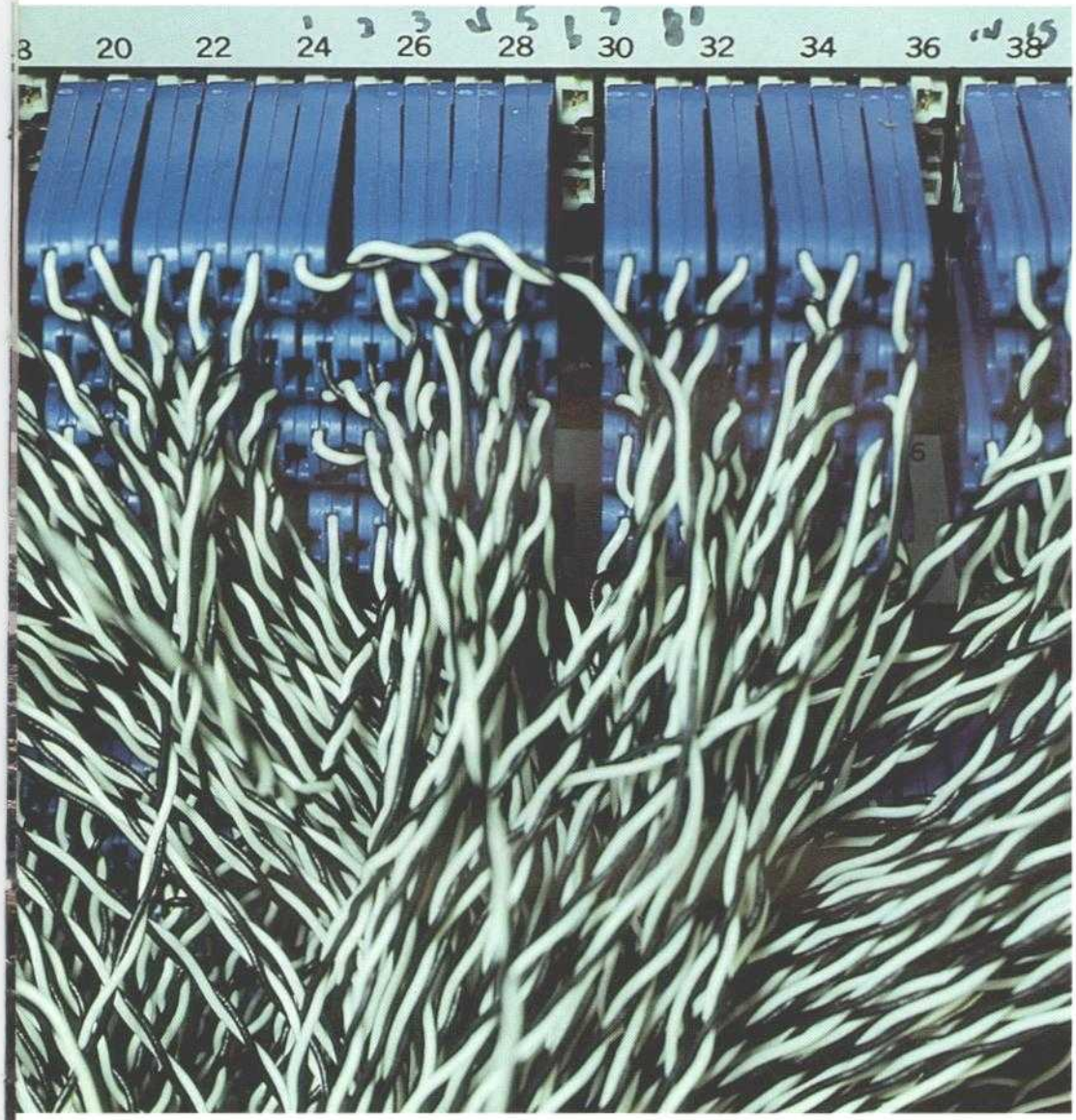
MS-I is being marketed to business customers who have moderate to large long distance calling volumes. It features direct access lines to the MS earth station nearest the customer's location. Using these dedicated access lines, the customer need dial only the area code and the number (a total of 10 digits) to complete a long distance call.

Because of the necessity to interconnect with local telephone company access and egress facilities, significant effort



during initial start-up is focused on fine tuning and adjusting our network. Considerable coordination with the local phone companies was and is necessary to ensure that their facilities are performing properly. The access and egress lines also must be of good quality if the user is to experience good quality.

SBS is the first U.S. satellite carrier to use radio frequencies in the 12 and 14 gigahertz bands. These higher frequencies avert congestion commonly found in urban areas at lower, C-band frequen-



Above. Another view of Message Service I antenna in Chicago. SBS antenna in rear is used by Aetna Life & Casualty for private network CNS service. Left. Complex wire configuration in the switching section of an MS-I Network Access Center. Below MS-I is a long distance telephone service.

cies. They also permit SBS to use smaller antennas. These characteristics allow earth stations to be installed in downtown neighborhoods where the greatest number of MS-I customers are located.

Marketplace response to MS-I has exceeded expectations. SBS now has a sizeable backlog of customers nationwide. We are especially proud of the fact that we've done all this with a relatively small marketing staff.

Prospects for additional customers and growth from existing customers are excellent. Over the next few months, the main focus will continue to be on fine tuning the network, installing, cutting over additional access lines, and establishing first-rate customer service capability.

MS-I customers typically realize a 10 to 20 percent saving on their monthly

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bills over WATS service; some save even more. The pricing structure of MS-I includes a monthly usage charge and a monthly charge per access line. The usage charge varies according to the number of hours a line is used per month, the time of day calls are placed, and the cities being called. MS-I has three rate tiers, each priced according to SBS's costs for providing call-completion service in the localities of that tier.

Tier 1, the least expensive, covers calls to metropolitan areas where Message Service earth stations are located.

Tier 2, the next most economical, covers the next 130 most-frequently-called cities.

Tier 3, includes the remainder of the continental United States, Puerto Rico, and the U.S. Virgin Islands. It is not quite as inexpensive because call completion requires use of WATS lines, which cost SBS more than the call completion facilities in Tier 1 and Tier 2.

MS-I provides further economies through non-business day rates. Calling after 5 p.m. and before 8 a.m. saves customers as much as 38 percent over MS-I day rates on Tier III calls. These rates obviously are structured to encourage customers to use the network after normal business hours when practical.

Most large business customers investigate alternative long distance services because they want to save money. We knew that already, but before deciding to embark on the MS-I offering, we retained an independent marketing research firm to survey over 40 large companies with heavy out-WATS usage. The findings were very interesting.

Besides saving money, the respondents said that they wanted a voice service supplier who would provide a knowledgeable, professional, and concerned marketing staff that could handle their concerns and answer questions—on an ongoing basis, not just at the time of sale.

The respondents said they wanted and needed assistance in regularly evaluating their usage so they could optimize their savings. They wanted prompt and efficient handling of their accounts—on all service questions including order status, billings, account changes, and trouble reporting.

That study revealed above all, that SBS had to provide top-notch customer service. This became a high priority for MS-I. As a result, SBS offers extensive up-front traffic and financial analyses so that the customer may compare MS-I to alternatives and make a decision based on a well-thought-out marketing proposal.

SBS also assists customers in understanding the related issues about their service such as interconnection, installation, and user training.

A complex process is entailed in taking a customer from the order stage through the procuring, installation, and testing of access lines up to the time SBS "brings-up" or "cuts over" the service. Some organizational languages refer to this process as the "delivery system." SBS has a system in place that tracks the order from the time it's taken all the way through cutover.

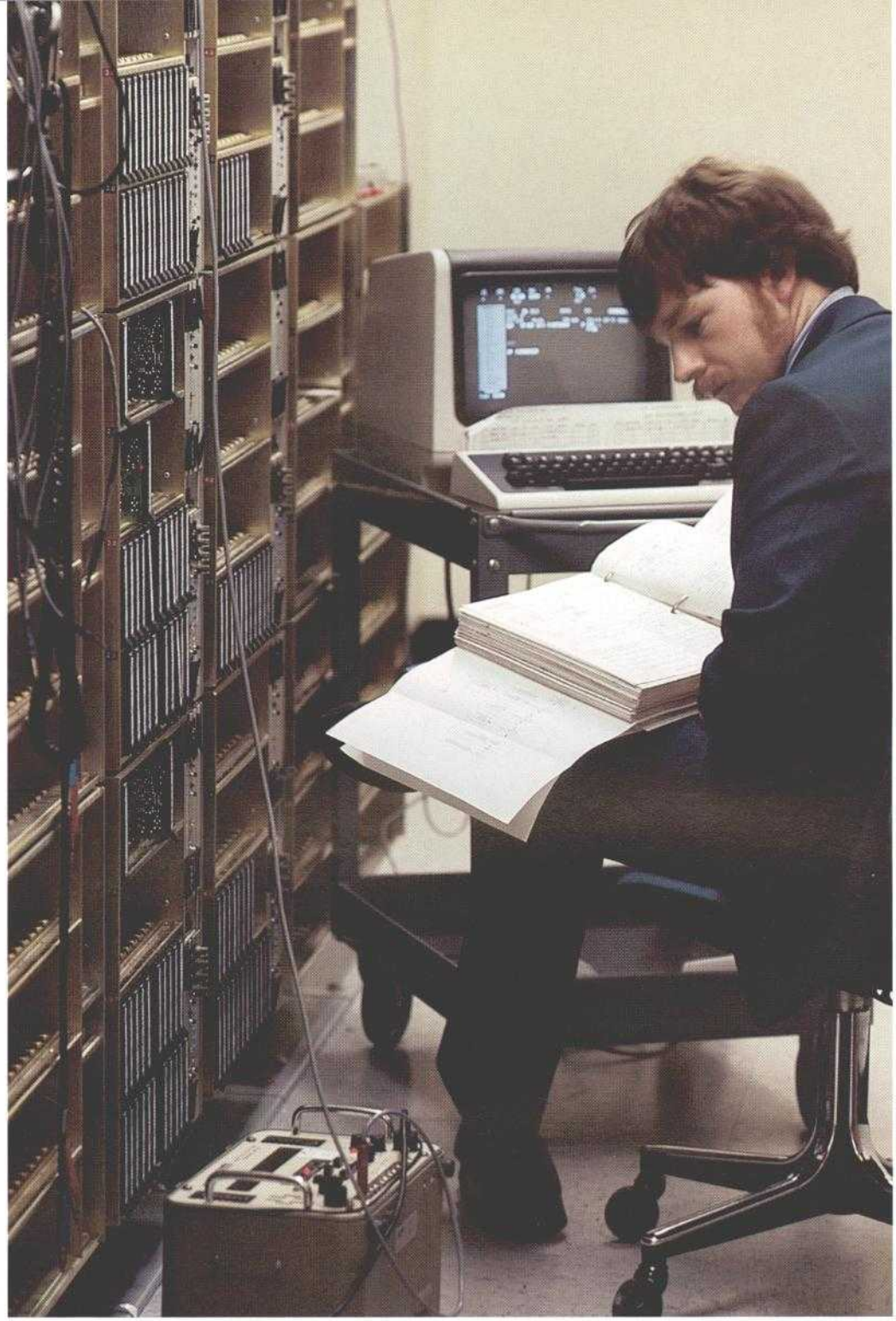
To reach cutover, we must coordinate with many different people and follow numerous procedural steps. It involves the customers (and their staffs). It involves one or more local telephone companies and often vendors of interconnection equipment. Within SBS, it involves staffs of several different departments.

The coordination of all these people, and putting the system into revenue service, are critical, difficult jobs.

Once the service is operational, we must manage it effectively. Ongoing information tells us how the customer is utilizing the service. For instance, it's important to know how the customer loads his access lines. It's important to him—and to SBS—that he keep those lines loaded as heavily as he can. He saves more money. We make more money. We also must be able to keep those lines in working order. If the customer can't use the lines, he's upset, and we're losing revenue.

Account administration is also an area on which SBS puts much emphasis. A central customer service department in McLean provides customers with one—and, to their advantage, only one—place to call with all their questions and concerns. When there is a problem, SBS seeks to take care of it right away. All customer billing records are on-line and immediately available to the customer service representative. A customer's questions are answered immediately. Equally important, prompt responses inform the customer what we've done to solve the problem.

It's taken us a little longer to begin revenue service than we had hoped. We have had some start-up problems and



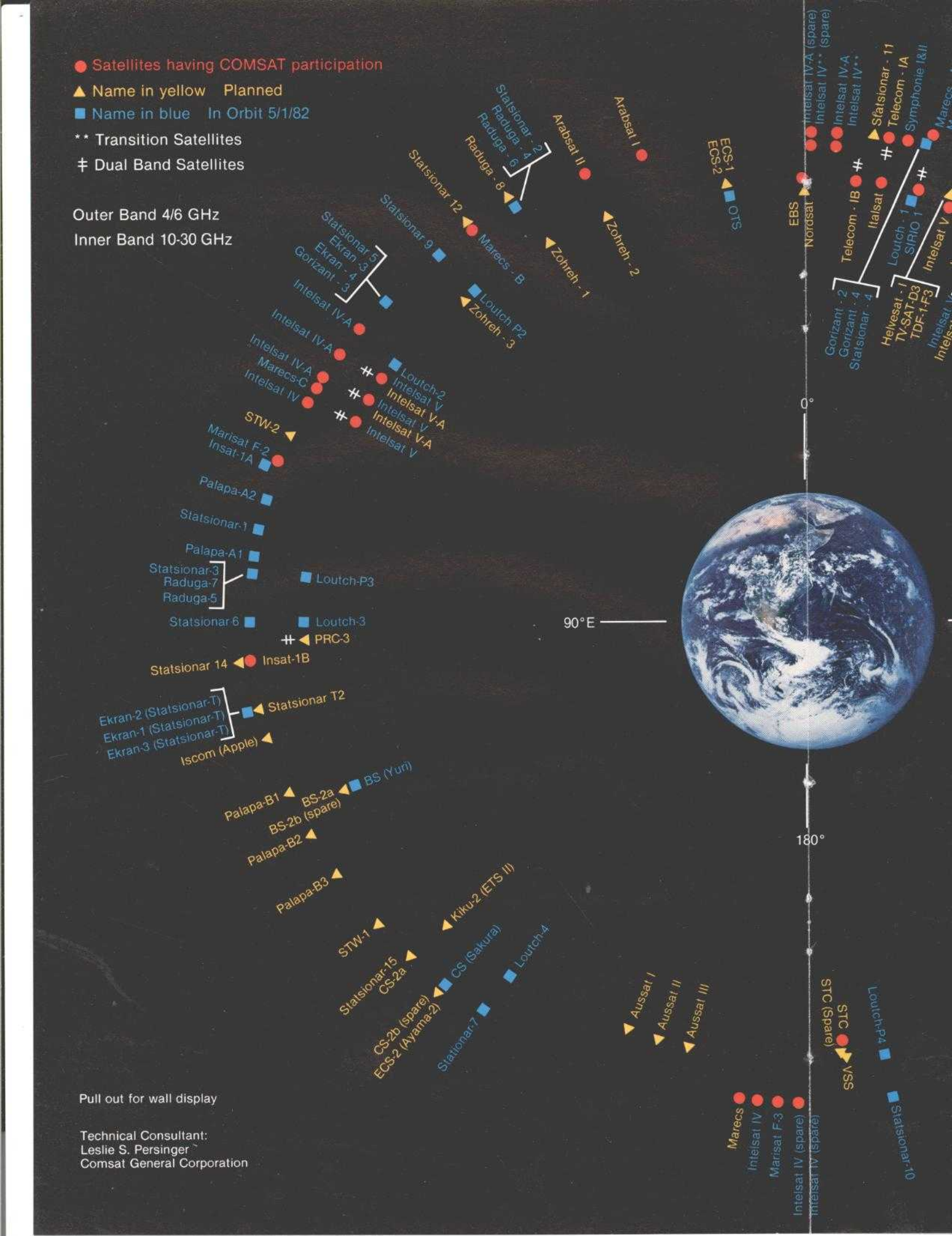
Left, SBS field engineer working on channel banks terminating equipment at the MS-I Network Access Center in downtown Atlanta. Below, MS-I is for those telephone users with a medium to high volume long distance requirement.

several delays. But, when you consider that we just started marketing Message Services a little over a year ago, and that we have brought the network into operation in just over a year, we've done pretty well.

Marketplace acceptance of MS-I has been exciting. Some prospective customers, of course, are cautious. They're interested in what SBS has to offer, but they're waiting to see if we can deliver what we've promised.

But we do know that our customers out there want an alternative to Bell. They want SBS to succeed. That adds even more encouragement.

Alternative voice service is a very competitive market. MS-I will, no doubt, always have competition. But success will flow from professional, marketing support, technical quality, and superior responsiveness to customer concerns and needs.



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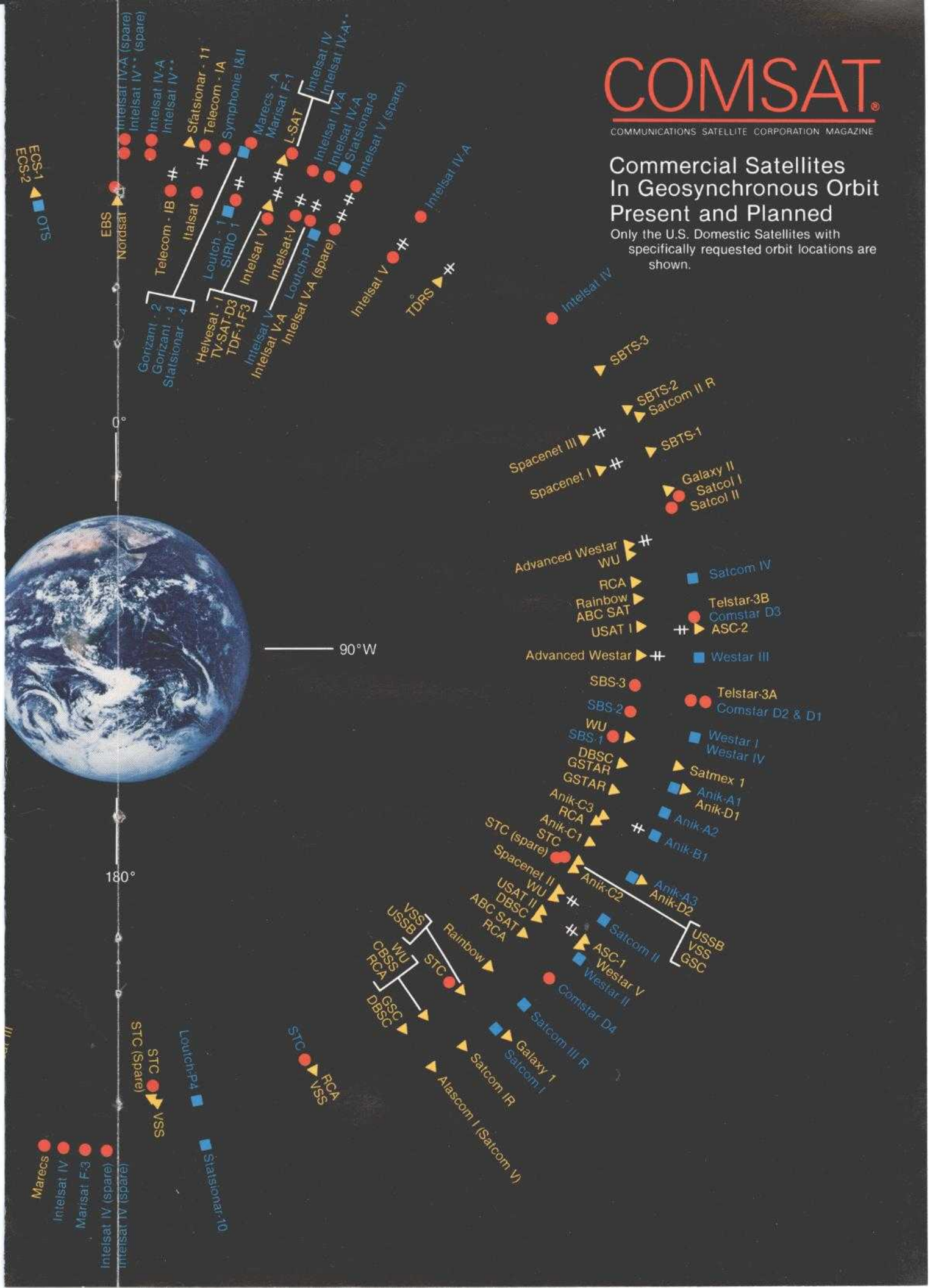
Technical Consultant:
Leslie S. Persinger
Comsat General Corporation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INMARSAT & THE SEARCH FOR OIL

M/V Edward O. Vetter of Geophysical Service, Inc., using new 56 kilobit data service off Aleutian Islands Chain.

Beautiful in their barrenness when the sun happens to be shining, the Aleutian Islands lie like a sickle blade between the Pacific Ocean and Bering Sea. Over 200 islands extending over a 1,200-mile range of ocean off the southwestern tip of the Alaskan mainland, the Aleutians are an oft forgotten part of the earth that nonetheless have occasionally figured prominently in world history. They were, for example, the scene of fierce fighting during World War II, and their principal port, Dutch Harbor, formed by the islands of Amaknak and the much larger Unalaska, was, like Pearl Harbor in Hawaii, the target of attacks by Japanese bombers.

Today Dutch Harbor is the center of the U.S. king crab and tanner crab industries and an important way station for shipping activities involving the northeastern Pacific and the Bering Sea. It is also an important way station for oil exploration ships, known as seismic vessels, as they use sophisticated technology to seek corroborating evidence for suspected

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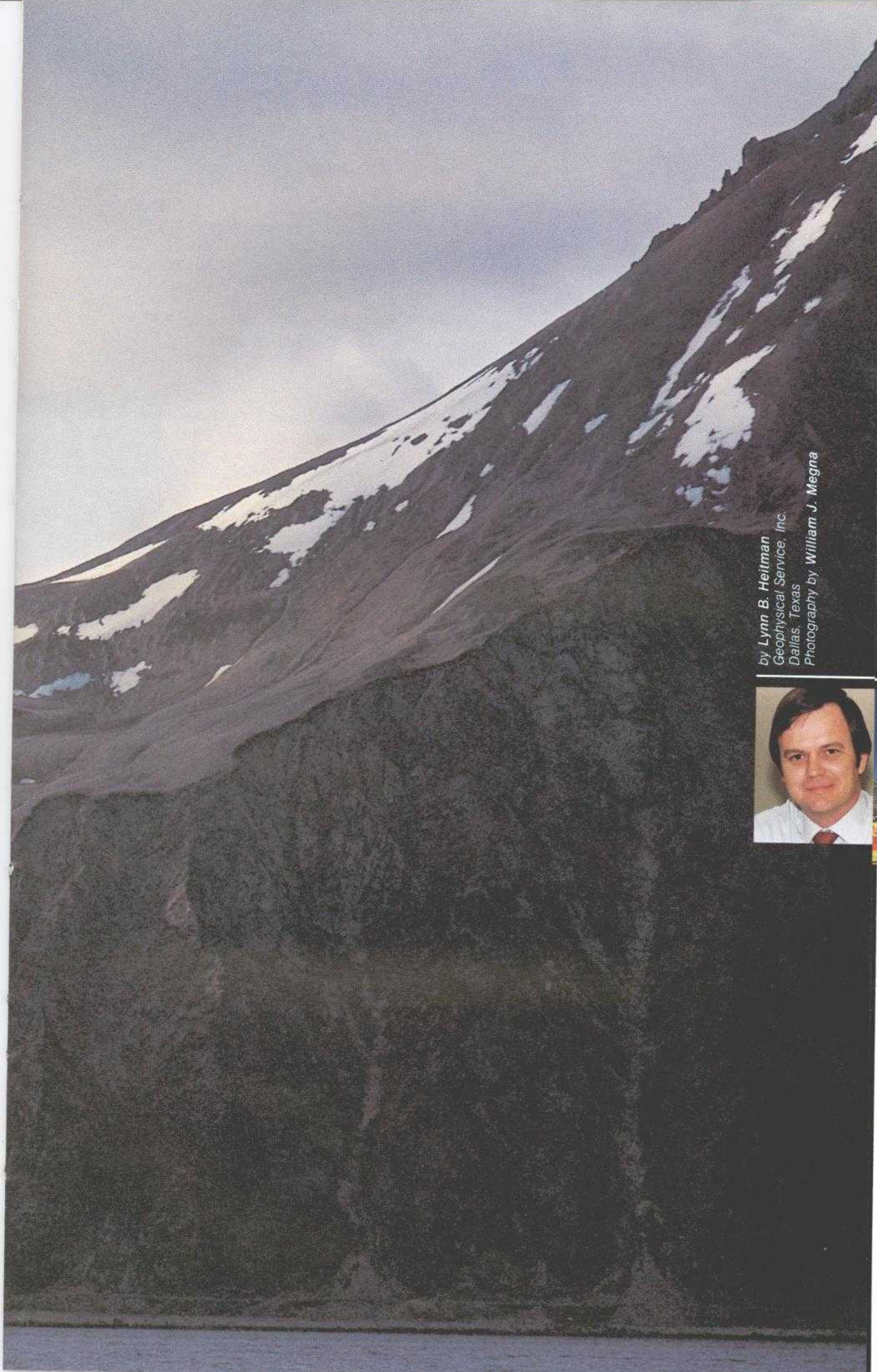
Heading into Iliuk Bay from the Bering Sea, the seismic ship Edward O. Vetter will soon find safe haven in the important Aleutian Islands port of Dutch Harbor.



by **Lynn B. Heitman**
Geophysical Service, Inc.
Dallas, Texas
Photography by **William J. Megna**

treasuries of oil in the undersea mantle of the region's waters.

Comsat Magazine's William J. Megna recently journeyed to this stark part of the world to photograph and spend time aboard the M/V Edward O. Vetter, an 185-foot seismic ship operated by Geophysical Service, Inc. (GSI) of Dallas, Texas. Geophysical Service, Inc., is a wholly owned subsidiary of Texas Instruments, Inc.

We were eager to see the Vetter and to bring her to the attention of our readers for one very important reason. Although one of the smaller vessels in the world equipped with maritime satellite communications, the Vetter is a true pioneer, for she is the first vessel to use maritime satellite communications not just for voice and telex communications but to communicate—ship to shore—data at the 56 kilobit rate authorized in December of last year.

From the waters off Dutch Harbor, 900 air miles southwest of Anchorage —indeed from anywhere the ship travels—the Vetter can transmit directly and instantaneously to GSI's Dallas communications center some of the vast amount of seismic information she collects in her searches, thus enabling the identification of possible oil hot spots much more quickly than has ever been possible before. It matters not at all that Dutch Harbor, Alaska, and Dallas, Texas, are many thousands of miles apart and as different as two places could possibly be. Thanks to the medium of maritime satellite communications, they can enjoy instant voice, telex and now data communications.

View of the port of Dutch Harbor as seen from a high point called Bunker Hill, site of a still surviving World War II bunker. Big ships are permanently moored crab processing vessels.

As a result of the pioneering work of the Vetter, maritime satellite communications, which is now made possible by the Inmarsat organization, has become even more valuable to the seismic industry than it has been in the past. In the article that follows, Lynn Heitman of Geophysical Service, Inc., explains the science of seismology, the work of seismic ships, how the seismic industry uses maritime satellite communications, and the work in data communications that the Vetter has carried out so far. We are pleased to have Mr.Heitman as our guest author this issue.

Editor's Note

Early attempts at scientific exploration for oil and gas consisted of the observation of surface formations by geologists who prepared geologic maps that revealed indications of petroleum bearing structures.

Dr. J.C. Karcher theorized that it would be possible to map the earth's subsurface by introducing sound (seismic) waves at the surface and recording the reflected energy from discontinuities in the subsurface. Dr. Karcher prepared a patent application on his invention and assembled the necessary apparatus to test the idea in 1920. The first field tests of the reflection seismograph occurred in June of 1921 in Oklahoma. The results of the tests were encouraging and Dr. Karcher and others went on to form early seismic exploration companies. These companies flourished and by the late 1930s, the seismic technique was widely used as an improved scientific method in the worldwide search for oil and gas.

Reflection seismic techniques played a significant role in the discovery of many major oil and gas fields over the past 20 to 30 years. Seismic crews have been active in Saudi Arabia for more than 40 years, and they have been instrumental in the development of these fields. Seismic methods have been the key in both the location and the development of North Sea fields. Recent discoveries in eastern Canada were aided by precision three-dimensional seismic surveys.

Marine techniques first emerged in the mid-thirties. Operations were limited to shallow water and daylight operations only. Seismometers (receivers) were planted on the water bottom and dynamite was used as an acoustic source. A recording boat was cabled to the seismometers and a shooting boat detonated the dynamite. Radio was used to synchronize the recording with the shot and to communicate with the base camp on shore.

Communication with central offices from the base camp usually was not possible. Operations were often in remote areas where communication facilities were not available. These early crews were very self-reliant and gener-

continued next page

View of the island of Unalaska across Iliukiuk Bay as seen from Amaknak Island. **Inset**, Maritime satellite communications radome on board the Vetter. Object in foreground is the tail buoy, which is used to pull two-mile-long streamer off the ship and which marks its terminus.

The Vetter in Dutch Harbor with area's ubiquitous crab traps piled up on land and mountains of the island of Unalaska in the background.

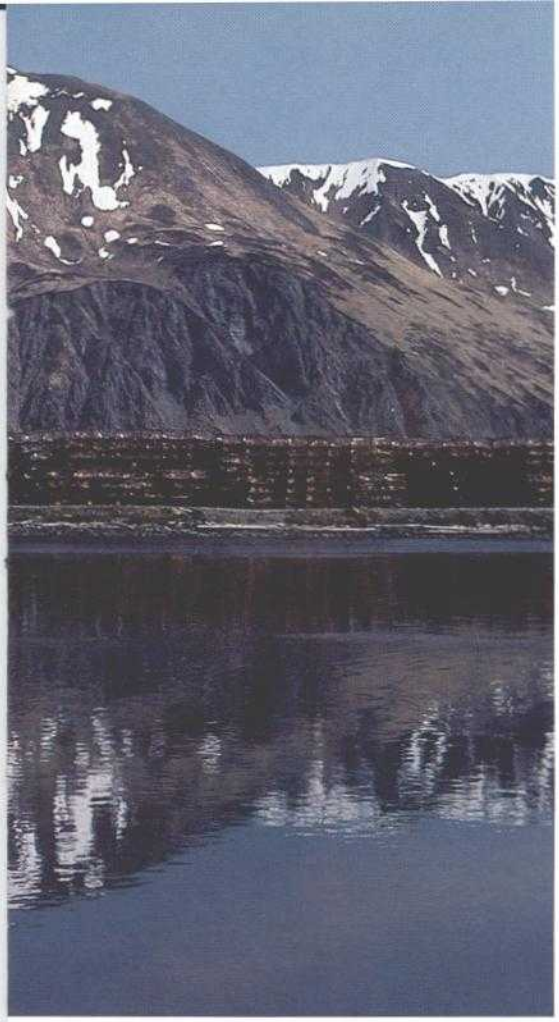
ally operated in an autonomous fashion. Seismic data was recorded on photographic film and the survey data was recorded by hand. The data was sent to central offices for analysis and interpretation.

Today's modern marine crews operate in both shallow and deep water areas worldwide. These crews generally work 24 hours per day and seven days a week in a variety of weather extremes. Deep water crews tow a marine streamer typically two to three kilometers in length. The streamer provides data signals to the ship from each 25-meter section. The most widely used marine acoustic source is an air gun array which releases compressed air at a pressure of 2,000 pounds per square inch. The source is fired every eight to 10 seconds.

The ship traverses along predetermined prospect lines under computer control, fires the air gun array and collects data typically every 25 meters. Data collection includes recording the seismic data from the sensors (hydrophones) in the towed streamer and from a wide variety of other sensors including precision navigation, gravity/magnetics, and water depth gauges.

There are two basic types of marine seismic surveys. Reconnaissance (two-dimensional) surveys generally involve shooting seismic lines on coarse grid spacings of several kilometers or more. In some cases the reconnaissance consists of long continuous lines. This data is useful in getting a rough idea of potential areas that might deserve a more detailed examination.

Three-dimensional surveys involve shooting seismic lines on tight grid line spacing of 50 meters or so and processing the resulting collection of lines as one continuous volume of three-dimensional data. The closely spaced 3-D seismic lines give a considerable amount of redundant data about the earth's subsurface. Advanced 3-D processing techniques make it possible to migrate (fit) the redundant data into a detailed and accurate representation of the subsurface. The resulting 3-D data volume can then be studied at various depths and angular orientations to aid in the interpretation. This technique is valuable in helping evaluate the potential of a new field and in determining the most produc-



tive method of drilling additional development wells.

Productive seismic crews can collect thousands of kilometers of seismic data between port calls. This amounts to thousands of reels of magnetic tape which are offloaded and transported to central computing facilities for processing and analysis.

In contrast with yesteryear's marine crews, modern crews are heavily dependent on marine communications. The Marisat system has been quickly adapted for use by seismic crews since its introduction in 1976. As **Marisat** has grown to a worldwide system, seismic contractors have learned how to use the system as a tool to enhance their operations. Maritime satellite telex and telephone services have made it possible to communicate with every crew worldwide on a daily basis. Daily production reporting and program coordination as well as online troubleshooting of failed equipment and systems even in foul weather conditions are now possible.

At the close of 1981, 70 of the estimated 137 seismic vessels worldwide were equipped with satellite communications terminals. Such terminals involved in the oil and gas industry accounted for about 70 percent of the total traffic handled by the system during 1981.

The future for maritime satellite communications looks bright. The International Maritime Satellite Organization (**Inmarsat**) is now operating and includes in its global satellite network the commercial capacity of the Marisat satellites. The organization consists of 37 member countries. Six coast earth stations are currently in use and four more are planned for completion during 1982. A new higher capacity satellite has been launched over the Atlantic Ocean and additional higher capacity satellites are scheduled to be launched over the Pacific and Indian Oceans during 1982.

Among the new services being offered through **Inmarsat** is 56-kilobit-per-second data transmission. This new service was first offered on the Marisat system during 1981, and the M/V Edward O. Vetter, which is operated by my company, Geophysical Service, Inc., became the first ship to transmit data via maritime communications satellite on December 18, 1981. The data transmitted included multiplexed fiber optic streamer as well as navigation, streamer tracking and automatic data logging information. This was the culmination of five months of extensive testing conducted on the West Coast to achieve a high-throughput, operational transmission terminal.

The new service makes it possible to relay data from ship to shore at data rates more than 10 times faster than previously possible. Seismic vessels using this service will be able to transmit all of the navigation, gravity/magnetics, and other non-seismic data to shore on a daily basis. This will allow data processing to be accomplished on the data in

__Bottom Left__. Vetter crewman with one of the air pressure guns used to generate underwater shock wave, a vital part of seismic work. __Below Right__. Small section of seismic vessel streamer cut open to reveal hydrophone.

Right. *The Vetter trailing tail buoy.* ***Below Left.*** *Systems engineer in Vetter's Communications Room, transmission point for data at 56-kilobit-per-second rate. All Inmarsat transmissions are handled here.* ***Below Right.*** *Data Processing Center at GSI facility in Dallas where 56-kilobit transmissions are received and from which seismic displays, foreground, are produced.*

parallel with subsequent data collection. Processed results can be available on shore before a vessel leaves the prospect area.

The data rate of the new service is not sufficient to allow all of the seismic data to be transmitted to shore, but it will allow test lines to be transmitted to central computers for processing tests and quality-control purposes. Next generation satellites are currently being studied and planned by **Inmarsat**. Consideration is being given to the provision of higher data rates on future satellites. In parallel with this activity are similar studies on ship terminals.

Seismic vessels could use peak data rates of up to 5 megabits per second to transmit all the raw seismic data that is collected to shore. There are some difficult economic, technical, and regulatory problems to be solved before this becomes possible.

OBJECTIVE: a larger share of a burgeoning marketplace

Comsat's Bruce Smith on strategic planning

by Stephen A. Saft, Editor
Photography by William J. Megna

Comsat is entering the new era of explosive communications growth with a strategic planning process at work that aims at substantially increasing its market share. That planning process is already proving a boon to **Comsat** senior management because it shapes a strategy of growth that takes into account the four critical realities of the worldwide telecommunications market and the U.S. economy—namely, the dynamic restructuring of the industry as a result of technological changes and deregulation, a technology characterized by tremendous increases in the operational speed of hardware, major changes in the domestic regulatory environment and extremely high interest rates.

Working within the constraints fashioned by these four realities, **Comsat** senior management is evolving new strategies for the Corporation that, though in some cases novel in form, nonetheless build on the company's proven strengths as represented by a record of success dating back to the launch of Early Bird in 1965.

These facts were drawn and sharply defined by Bruce D. Smith in a recent interview with **Comsat Magazine**. As Vice President of Corporate Development, Smith heads the team charged with developing and putting into effect the Corporation's strategic planning process. That process is the centerpiece of an effort aimed at moving **Comsat** aggressively forward as a leading international growth company. In the words of Smith himself, **Comsat**'s strategic planning gives evidence

- "one, that **Comsat** understands the commercial market in which our future lies,
- "two, that we have developed a strategy that is internally consistent, from part to part, to effectively attack the most rewarding parts of the market,
- "three, that we realize that different techniques of management are necessary in today's demanding financial environment,
- "four, that we will manage our investments and our earnings more aggressively than in the past,
- "five, that we plan to take advantage of opportunities, both on a worldwide basis and in terms of our knowledge of the communications marketplace, to gain an increasing share of selected markets relative to our competitors,
- "and, six, that we are selecting the markets in which we choose to compete very carefully, based on the principle that what we offer must not merely be a superior technological product but must satisfy specific customer needs better than our competitors are able to do."

The **Comsat** strategic planning process is market-driven. Fundamental to the process is a method of segmentation involving use of what are called "strategic business units or SBUs." Smith explains, "The strategic business unit approach is a way to divide a company into market-oriented units that enhances one's ability to think about how the units interface with the outside world. The approach does not necessarily imply an internal structure, although it frequently makes sense to structure the company along SBU lines. An SBU's purpose in life is to allow management to focus attention on changing demand in the marketplace rather than on internal problems. After all, in the long run, business succeeds only insofar as it satisfies the needs of its customers. The more long-term thinking and short-term operations are geared to the satisfaction of customers' needs, both today and tomorrow, the more successful the business will be."

The six strategic business units at **Comsat** are:

- World Systems Division, the Corporation's international carriers'

continued next page

carrier or rate-regulated business
- Satellite Systems and Technology, which performs the non-rate regulated kinds of communication service activities including systems engineering and space segment provision
- Communications and Information Products, a business unit designed to provide subsystem elements, components and high technology devices for both **Comsat**'s systems and others
- Environmental Research and Technology, otherwise known as **ERT**, whose primary focus is the environment and which, among other things, handles the acquisition and sale of environmental information via satellite
- Satellite Business Systems or **SBS**, the Corporation's partnership with Aetna Life & Casualty and IBM, offering a mix of private network communications services including voice, data, electronic mail and video teleconferencing
- Satellite Television Corporation (**STC**), which is geared to provide, initially, entertainment and, possibly later, information and other communication services to the home.

Previous Page, Bruce D. Smith, Comsat Vice President of Corporate Development, being interviewed. To his right is three-dimensional model created by Corporate Development team to explain telecommunications market.

For Smith, a meaningful way to look at communications is as "information transportation," and using that metaphor he expounds on the way that the SBU approach aids in serving the total interests of **Comsat**. "The SBUs succeed in advancing the interests of the Corporation in a total sense through their interactions. For example, Communications and Information Products—**Amplica**, **CGIS** and **TeleSystems**—play a significant role in providing the tires upon which travel the trucks filled with the information of an **SBS** or an **STC** or a World Systems Division."

Smith, however, is quick to correct any inference that what **Comsat** is about is the creation of a company based on a strategy of full vertical integration. "We seek to control the critical resources," he states, "those aspects of the system that determine its overall quality, the technically-advanced and performance-superior parts when the cost effectiveness of our providing them is clear. We see no benefits in providing commodity items—such basic components as wire and cable and connectors, for example."

To aid in grasping the dynamic nature of the telecommunications market and in locating the **Comsat** SBUs within that market, Smith and his strategic planning team have created a three-dimensional model that within its molded form embodies three variables. The variables—the model's axes—are geographic density of communications infrastructure approximated by the numbers of telephones per square mile, the electromagnetic spectrum, that is, direct current all the way through the optical wavelengths, and—in the words of Smith—"the chunks of revenue that are available in the market." Smith's "electronic information transportation business" is represented from its beginning by Samuel Morse and his telegraph key through the industry structure as it will look in 1990.

The lessons taught by the model are extremely important in terms of **Comsat**'s future. Says Smith, "What we learn from this way of looking at the overall market is that revenue volume is growing most rapidly outside those areas of the urban environment heavily dependent on low-speed communications electronics—that is, heavily dependent on cable. Growth is taking place in those parts of the urban environment where high-speed communications via higher frequencies make sense and in the less urban or industrializing areas where geographical dispersion presents special challenges.

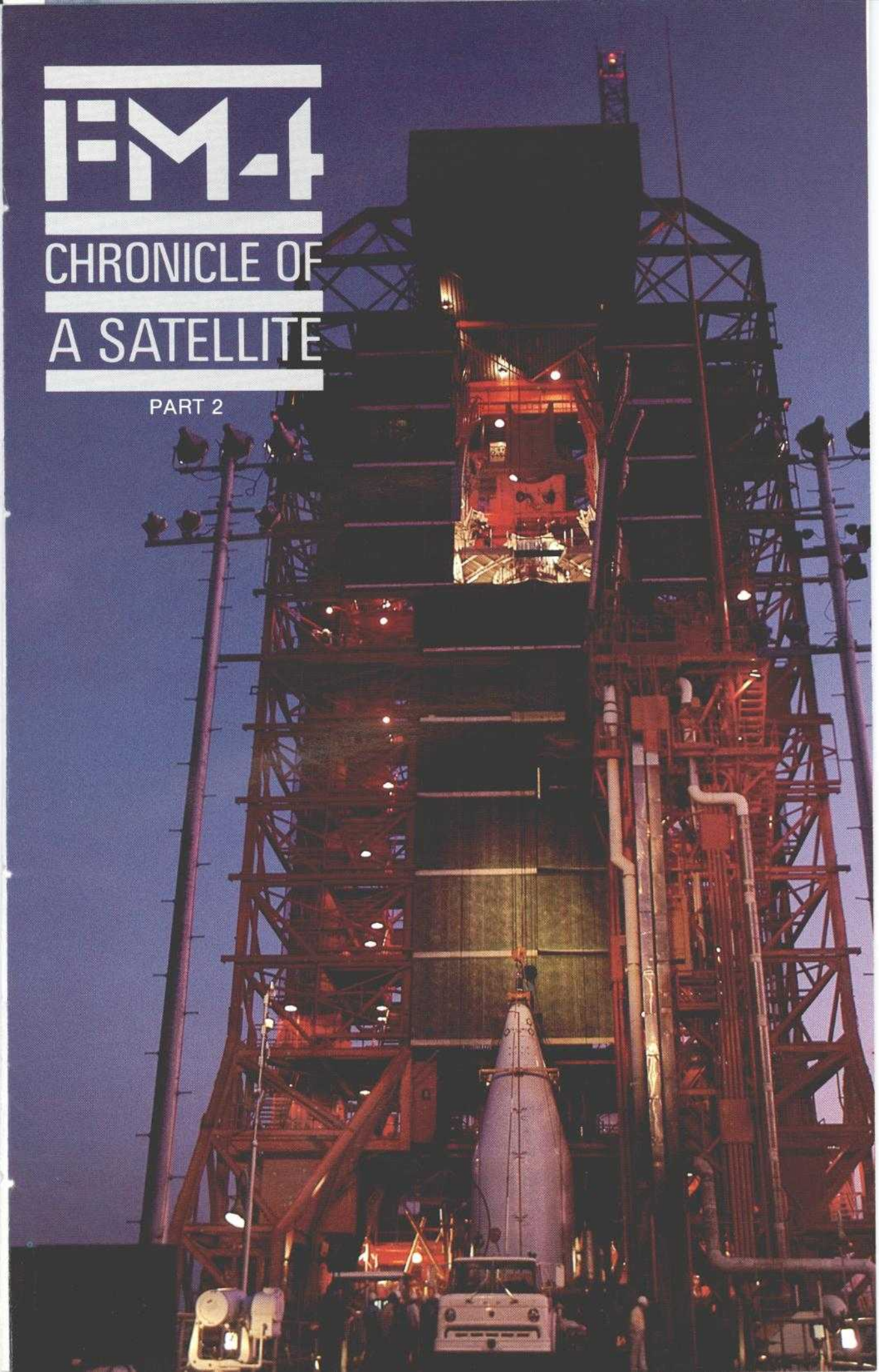
"**Comsat** with its great strengths in satellite communications is a world leader in the high-speed, high-frequency applications and at providing service in the rural areas where geographical dispersion is the rule. And so what we learn from the model is how to focus the Corporation's efforts in areas that show the highest growth and in which our technological strengths and experience can be brought to bear."

Smith continues, "By applying the knowledge gained from developing the market model through the focused strategic business unit approach, we are mapping a direction for the Corporation within which our internal development and diversification steps form a logical and coherent pattern. At the same time, we make clear that we are not trying to be all things to all people in the communications business. **Comsat** is a focused corporation which will realize an ever greater share of worldwide communications service and equipment revenues in those applications related to satellite communications. That is our mission, and we are well on our way towards its completion."

FM-4

CHRONICLE OF A SATELLITE

PART 2



FM-4
CHRONICLE OF A SATELLITE

FM-4 Chronicle of a Satellite

by ***Lou Bruno****, Deputy Intelsat V Program Director*
Ford Aerospace & Communications Corporation
Photography by ***William J. Megna***

This second article about Intelsat V Flight Model 4 (FM-4) describes the sequence of events from its shipment to the launch site through launch.

The Intelsat V series of spacecraft is scheduled for launch on both the Atlas-Centaur from the Cape Canaveral Air Force Station in Florida, and the Ariane from the Guiana Space Center in French Guiana. Like the prior three Intelsat Vs, FM-4 was launched by the Atlas-Centaur.

After completing its spacecraft acceptance testing at the Ford Aerospace facility in Palo Alto, California, FM-4 was placed in its climatically controlled shipping container. The spacecraft, its support equipment and the cadre of spacecraft specialists from the acceptance test phase at Palo Alto proceeded to Cape Canaveral, Florida, to complete the job begun many months before.

The spacecraft made its journey to Florida via a C-130 aircraft, whose flight departure from the San Jose Airport was timed for arrival at the Cape Canaveral "Skid Strip" at dawn the next day. Once safely down on the ground, specialists from the range unloaded the spacecraft and its support gear for the short trip by truck to the Payload Processing Facility. **Intelsat** uses the Building AO facility at Cape Canaveral for this purpose. Once inside the high bay of AO, the launch base processing of FM-4 commenced.

This phase of the operation takes over six weeks and is designed to:

1) verify the integrity of the spacecraft after transport to the launch site, and
2) to perform final preparations for launch.

The launch site activities of the spacecraft are timed to coincide with the preparation of the Atlas-Centaur launch vehicle. Intelsat and Ford Aerospace launch operations specialists support the spacecraft engineers and technicians from Palo Alto as the spacecraft undergoes preparations for launch. Facility availability, range-support personnel and specialized services for fueling the spacecraft with propellant and providing the myriad of other supporting activities must be scheduled and coordinated between various agencies at the range.

On the site, working days are referred to as "launch minus days" until the final hour before launch, when the

continued next page

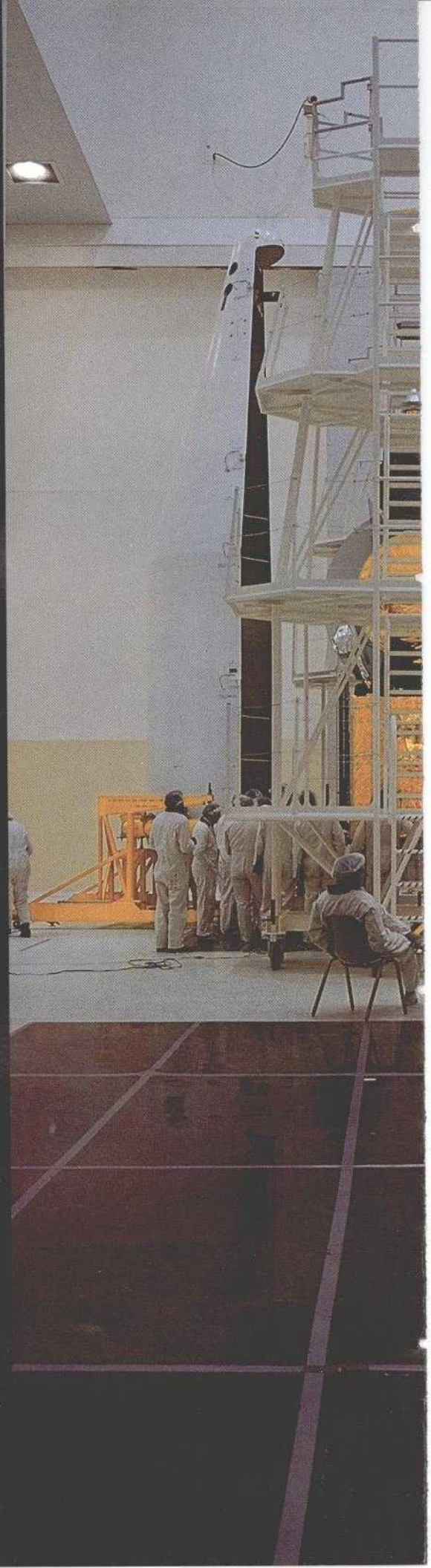
Opening Page. *Having reached Launch Complex 36A early in the morning, the encapsulated FM-4 is about to be hoisted from truck bed onto the Atlas Centaur that will take her into space.* **This Page.** *Moving FM-4 into position in the Satellite Assembly and Encapsulation Facility Number 2 (SAEF-2) so that pre-encapsulation activities can proceed.*

nomenclature drops to "T minus hours, minutes, and seconds." For FM-4, the process began on L −44 day.

Inside the high bay of Building AO, checkout of the spacecraft began immediately. Tests were rerun at Cape Canaveral which had previously been run at Palo Alto to judge the spacecraft's health. Results of these tests were compared with previous results by the Ford Aerospace, Intelsat, and Comsat specialists and the health of the spacecraft was pronounced excellent by L −35. Mechanical installation of the solar arrays on the spacecraft started on L −25. The spacecraft was moved into its vertical transporter in Building AO on L −19 for the second leg of its journey to the Satellite Assembly and Encapsulation Facility Number 2 (SAEF-2) across the Banana River at the Kennedy Space Center, where the hazardous phases of the preparations take place. L −18 day found the spacecraft safely inside SAEF-2 being prepared for the operations which could culminate in its being encapsulated within the Centaur nose fairing and then moved to the Atlas-Centaur Launch Pad.

In SAEF-2, the spacecraft hydrazine tanks were loaded and pressurized. This operation was followed by installation and hookup of the ordnance devices used to deploy the antenna reflectors and solar arrays. The large solid propellant apogee kick motor which provides the thrust to place the satellite into its final geosynchronous orbit was then installed. Following special tests of the ordnance electrical circuits, the remainder of the spacecraft's exterior thermal control surfaces were attached. The spacecraft was then mated to its flight adapter, the separation ordnance devices were installed, and adapter interface checks were accomplished. On L −9 day, the spacecraft was encapsulated in the nose fairing of the launch vehicle and was then ready for the third leg of its journey

The morning of L −8 day began early as the encapsulated FM-4 Intelsat V spacecraft was slowly wheeled out of SAEF-2 to begin its slow journey to the launch pad. Nestled between the Security Police cars, with warning lights flashing, the small convoy proceeded back across the Banana River and the seven miles to Launch Complex 36. From ground level at the launch pad the Atlas-Centaur stands 135 feet tall. The encap-



Below. *Ford Aerospace technician completing final spacecraft assembly.* ***Facing Page.*** *Fairing shrouds about to be joined, thus encapsulating FM-4.*

sulated spacecraft was slowly raised to the top of the launch vehicle and mated to the Centaur. The spacecraft was then turned on by a command from the Blockhouse and post-mate health of the spacecraft verified by technicians receiving the telemetry back at Building AO. L −8 day was complete.

The last several days of FM-4 on earth were a series of active tests with the launch vehicle and long hours of battery charging while the spacecraft remained high atop the launch vehicle.

Finally, L −0 day, the 4th of March 1982, arrives. The terminal count is picked up by hundreds of people around the range and as far away as Africa and the Indian Ocean. The Intelsat Mission Director confers with NASA Launch Director on hold and constraint criteria before he moves to the Mission Directors Center. The spacecraft undergoes final health checks from Building AO before final turn-on of heaters and selection of high-gain telemetry channels is completed. In the Blockhouse, Ford, **Intelsat** and **Comsat** technicians monitor hardline signals connecting the spacecraft with the Blockhouse Test Set.

At T −220 minutes, the apogee kick motor safe and arm device pin is removed. Centaur nose fairing access doors are secured and the large service tower moved away from the launch vehicle on railroad tracks. As the tower recedes, the Atlas-Centaur vehicle stands alone supported only by the umbilical connections from the tower and the large clamps at the base of the vehicle which will release at lift-off. By T −100 minutes, the tower is in its retracted position and the countdown pace picks up as the General Dynamics Test Conductor in the Blockhouse continues to monitor the green pages of the procedure he has run so many times before.

The countdown continues with numerous launch vehicle and range tests being ticked off, one by one. The FM-4 spacecraft continues to send out its telemetry while it receives and executes the commands necessary to place it into the correct configuration for launch. After launch, it will be acquired by the downrange facilities of the Intelsat Tracking Network.

T −55 minutes, the apogee kick motor safe and arm device within the Intelsat V spacecraft is armed by hard-

Closeup of Intelsat V thruster cluster.

line command from the Blockhouse. At T −5 minutes, the countdown goes into a preplanned hold. This is normally a ten-minute hold, but because of a problem earlier in the count in which extra time is used, the hold lasts only five minutes for this launch and allows the scheduled 7:23 p.m. lift-off time to be maintained. Just before resuming the count at T −5, the spacecraft is pronounced in a "go" condition by the NASA Spacecraft Coordinator. At 7:23 p.m. on the count of "3, 2, 1," the Atlas engines ignite and the Atlas-Centaur roars off from Launch Complex 36A bearing the Intelsat V, FM-4 spacecraft in its nose cone.

FM-4 is now in orbit and doing very nicely, thanks to the participation of the many dedicated Ford Aerospace, Intelsat, and Comsat people; not to mention the hundreds of others associated with the manufacture, checkout, and launch of the satellite from around the world.

Blastoff—Atlas-Centaur carrying FM-4 roars into the night sky at the start of a successful mission. ***Below,*** *FM-4 as she looked up close prior to encapsulation.*

N O T E S

continued from page 4

had previously authorized construction of an earth station in the Republic of Palau, which is scheduled for completion in November.

CGIS acquires Graphix, new London office established

Comsat General Integrated Systems (CGIS) has acquired Graphix Software, Incorporated—a Boca Raton, Florida-based company that specializes in the development of computer-aided software products.

Dr. Stephen A. Szygenda, CGIS President, noted, "This acquisition is another step in CGIS's software/hardware integration thrust—joining the logic and schematic capture capability with our own circuit design verification and test generation package, TEGAS. It also brings us closer to our corporate goal: To provide integrated sets of computer-aided design, manufacturing and test tools for full concept-to-finished-product services."

Dr. Walter Katz, Vice President of Graphix Software, Inc., said, "This action facilitates the integration of our products with the computer-aided design products of CGIS. For example—the LOGIX program—a product developed by Graphix Software, Inc., is designed to operate as an integral part of TEGAS, thereby providing enhanced CGIS CAD/CAT capabilities. Together, LOGIX and TEGAS both gain strength and value for the design and verification of LSI and VLSI circuits and circuit boards."

CGIS also announced the opening of a sales and support office in London, England. Initially the office will be staffed by sales representatives and technical support specialists, and it will include a computer system for CGIS software product demonstrations and customer support. Currently, CGIS software products are already being used by over 35 customers in more than 12 European countries.

International teleconferencing services to be offered

Comsat General Corporation has reached agreement with Intercontinental Hotels Corporation to establish a partnership that will offer international teleconferencing services. The partnership agreement provides that **Comsat General** and Inter-Continental Hotels subsidiaries will be equal partners and will equally contribute to the initial capitalization of the venture. The Comsat General partner will provide technical services and equipment and the Intercontinental partner will provide facilities and marketing services for the new partnership.

The partnership will operate from **Comsat General**'s headquarters in Washington, D.C., with the inauguration of service scheduled for the fall of 1982, between Inter-Continental Hotels in New York and London.

Comsat General aiding Italy, Cameroon in system plans

Comsat General Corporation has been selected by the Ministry of Posts and Telecommunications of Cameroon to assist the African nation in planning and procuring earth stations for a domestic communications satellite system. The Cameroonian system will use the satellite capacity of a communications satellite owned by the International Telecommunications Satellite Organization, **Intelsat**. The contract provides that **Comsat General** will assist the Cameroonian Ministry through pre-project studies, project specifications, and tender documents for the Cameroon Domestic Satellite Communications Systems.

In addition, **Comsat General**'s Systems Technology Services will provide assistance to Selenia, an Italian firm which is a part of the Societa Finanziaria Telefonica (STET) based in Rome, Italy. Under its contract with STET, **Comsat General** has been tasked to assist Selenia in its implementation of the L-SAT communications satellite systems and will provide technical assistance to Selenia in definition, integration and implementation of the L-SAT communications systems, which include a direct-broadcast television transponder, a communications repeater, and a propagation beacon. The assistance also includes review and assessment of specifications, analyses, and test programs. L-SAT, sponsored by the European Space Agency, is an advanced experimental communications satellite.

FOR THE RECORD

Excerpts of Mr. Harper's and Dr. Charyk's Remarks at the 1982 Annual Meeting of Shareholders Washington, D.C., May 21, 1982

Remarks of John D. Harper, Chairman of the Board of Directors, Communications Satellite Corporation.

We are pleased that in 1981 our keystone international satellite communications business continued to exhibit mature, healthy growth. Despite an 11.8 percent reduction in rates that took effect in early 1981, our Intelsat revenues increased 15 percent for the year. We will continue to do everything we can to foster sustained growth in our Intelsat system operations to ensure that you, our shareholders, receive a fair return from these rate-base-regulated operations.

The Corporation also passed an important milestone this year in its maritime satellite communications business. On February 1, the new multination Inmarsat organization started

Mr. Harper addressing shareholders at the 1982 Annual Meeting, Washington, D.C., May 21, 1982.

operations, taking over responsibility for the commercial maritime communications services that had been provided by Marisat. As the U.S. participant in **Inmarsat**, we look forward to the opportunities opened up by expanded international participation in maritime satellite communications. There are now more than 1,180 ships and offshore rigs relying on the Inmarsat system for instantaneous, high-quality communications—a tribute to our pioneering efforts in establishing and building this market.

Among our other projects, we were pleased to see that in 1981 Satellite Business Systems began providing advanced communications services to established customers through its own satellites. **Comsat**, IBM and Aetna Life & Casualty each have a one-third equity investment in the partnership. SBS is proceeding well, adding new customers and expanding its service offerings.

Another growth area in which we intend to concentrate substantial corporate resources is the provision by satellite of home entertainment and information services. Through our subsidiary, Satellite Television Corporation, we are preparing to offer the American consumer three channels of premium pay-TV, without advertising, beamed by satellite to individual homes. These high-powered satellites also will have the capability for exploring the potential of high-definition television.

The FCC is considering STC's application for such a direct broadcasting satellite system, along with the applications filed by other companies that followed our lead. With an FCC go-ahead in the next few months, we would be in a position to undertake satellite construction and initiate our satellite-to-home service in the eastern United States by 1986. We are eager to move ahead . . .

As new services come into being, there is a need for certain specialized equipment to be used in the provision of these new services. Therefore, through our subsidiary, Comsat General Corporation, we are strengthening our manufacturing operations. Also through **Comsat General**, we are addressing the need for improved productivity in segments of the electronics industry by offering computer-aided design, manufacturing and testing services.

Through our subsidiary, Environmental Research & Technology Inc. (**ERT**), we have also been exploring the potential for developing our environmental management and information services business, although at present the economic climate for this activity is difficult.

Our Comstar and Marisat satellite services will continue to contribute a positive cash flow during the next few years. We expect to draw upon substantial external financing as we progress further in our strategic diversification program.

The Corporation is positioned well for continued growth and improved profita-

bility. I am fully confident that the Corporation has the skills and resources needed to meet its strategic goals. Clearly, we have ample reason to be optimistic about the future.

Remarks of Joseph V. Charyk, President and Chief Executive Officer, Communications Satellite Corporation.

In our rate-base-regulated activities, our mission is clear. We are dedicated to promoting continued growth and reliability of service. For 1981, our jurisdictional services produced substantial earnings. And the number of full-time communications links we provided our customers through the Intelsat system was up 22 percent.

At the same time, the charge to our carrier customers for a typical full-time communications circuit is about one-quarter of the cost that it was almost 17 years ago when **Comsat** inaugurated its international satellite service. By the early 1990s, **Comsat** projects that the volume of its Intelsat system services will quadruple, ensuring a steadily expanding revenue stream from these jurisditional services.

The fourth satellite in the Intelsat V series was launched in March of this year. **Intelsat** has procured nine Intelsat V satellites. Each has the capacity to handle the equivalent of 12,000 telephone calls simultaneously plus two color television channels, which is double the capacity of a satellite in the previous generation. The next launch in the Intelsat V series is scheduled to take place in the fall.

In 1984, **Intelsat** also plans to begin deployment of six Intelsat V-A satellites that were procured in 1981, each with a capacity of approximately 15,000 telephone calls. Total cost of the 15-satellite Intelsat V and V-A program, including launch vehicles and services, is estimated to be approximately $1.3 billion.

Intelsat also has contracted with Hughes Aircraft Company for the construction of a succeeding generation of satellites—the Intelsat VI series. Each of these new satellites will be able to carry the equivalent of more than 30,000 simultaneous telephone calls plus four color television channels. The Intelsat VI satellites are scheduled to be introduced into service beginning in 1986.

The Corporation funds its share of Intelsat system expenditures for new satellites, and this share is added to the Corporation's rate base, which consists of the net investment in property used for this regulated business. Also included in the rate base is our share of expenditures for the U.S. earth stations in the Intelsat network.

We plan to begin construction this summer of our new Roaring Creek international earth station near Bloomsburg, Pennsylvania, which will operate with the Altantic region satellites starting in 1983. We will have 50-percent ownership of this facility, whose cost is estimated to be in the $50 million range. **Comsat** also has received FCC approval to build and operate several new U.S. international earth stations in the western Pacific. We will have complete ownership of these stations.

With the advent of **Inmarsat**, our jurisdictional operations have been significantly augmented. Until the start of Inmarsat operations, these commerical maritime services had been provided throught the **Marisat** satellite system.

The pioneering success of **Marisat** laid the foundation for **Inmarsat**. The maritime community was introduced for the first time to the advantages of satellite communications, and an initial market for these services was established, giving **Inmarsat** a solid customer base on which to build. **Comsat**, on behalf of the United States, holds an Inmarsat investment share of approximately 23 percent, the largest among the organization's member nations.

In addition to the jurisdictional services we are furnishing through the Intelsat and Inmarsat systems, we are providing non-jurisdictional satellite communications capacity directly to users to meet their special-purpose requirements. Our expertise is strong in fashioning

continued next page

satellite systems tailored for focused customer needs.

As an example, our Comstar program serves the requirements of AT&T for leased domestic satellite communications capacity. The Corporation's revenues from this program amounted to $49.5 million for 1981. These revenues are expected to remain at approximately their present level up to September next year, when the leases for two of the satellites expire. Although AT&T plans to put up its own domestic communications satellite system as a successor to the Comstar program, AT&T does have options to take extended service from the Comstar satellites in the 1983-1987 period.

Through the Marisat satellite system, we also provide high-quality communications services to meet the specialized needs of our customers, both military and civilian. The revenues contributed by these operations reached $28.4 million for the year.

On the commerical side, the capacity of the Marisat satellites is being leased by **Inmarsat** for a two-year period during the initial phase of its operations. Payments from **Inmarsat** are expected to total approximately $10.8 million through February 1984.

Another strategic focus for us is manufacturing and marketing specialized communications equipment. Our overall goal in these manufacturing operations is to exploit our strong technological capabilities and to ensure that the desired equipment necessary to support new services is available.

Early this year, we bolstered our manufacturing capabilities by purchasing Amplica, Inc. This California-based company is a rapidly growing manufacturer of a wide range of microwave amplifiers and related subsystems for defense electronics systems and commercial satellite communications equipment. **Amplica** provides us with an attractive entree into the microwave equipment business . . .

Among our other manufacturing operations, Comsat General TeleSystems continues to produce special products important to the application of communications satellite technology.

Another of our companies, Comsat General Integrated Systems—**CGIS**—is focusing on the computer-aided design, manufacturing and testing marketplace. Through **CGIS**, we are responding to the need for increased productivity in the production of advanced, highly complex digital and microwave circuitry . . .

The advanced business communications marketplace is the province of our Satellite Business Systems partnership. For more than a year now, **SBS** has been offering an integrated, all-digital, high-capacity private-network service. Recently, however, the company has taken steps to enlarge the scope of its offerings and move in new directions. **SBS**'s objective is to appeal to a wider range of customers with a greater variety of services.

In April of this year, **SBS** started its long-distance telephone service. The new service uses dedicated access lines linking customers offices to SBS switching centers. It is aimed primarily at large-volume users of interstate voice services . . .

As the Chairman noted, we are awaiting FCC action on our direct broadcasting satellite (DBS) application. We see DBS becoming a major force in the home entertainment and information industry. We are prepared to move quickly once we receive FCC approval.

We released provisional specifications for home equipment in March of this year, looking to stimulate activity by prospective manufacturers. We also are evaluating the responses we received recently to our request for bids on the manufacture of the satellites. And we continue to explore possible partnership arrangements that would bring additional resources and skills to this venture to complement our own.

Our diversification program is well under way. Our strategic goals are aimed at attaining market shares in high-growth areas. These targeted market segments have been chosen with care. They are areas in which our technological and business expertise equip us to compete effectively.

We are in the midst of an exciting period for the Corporation. We are pushing ahead on various selective fronts. The outlook is very promising. We expect to see many years of continued growth and profitability.

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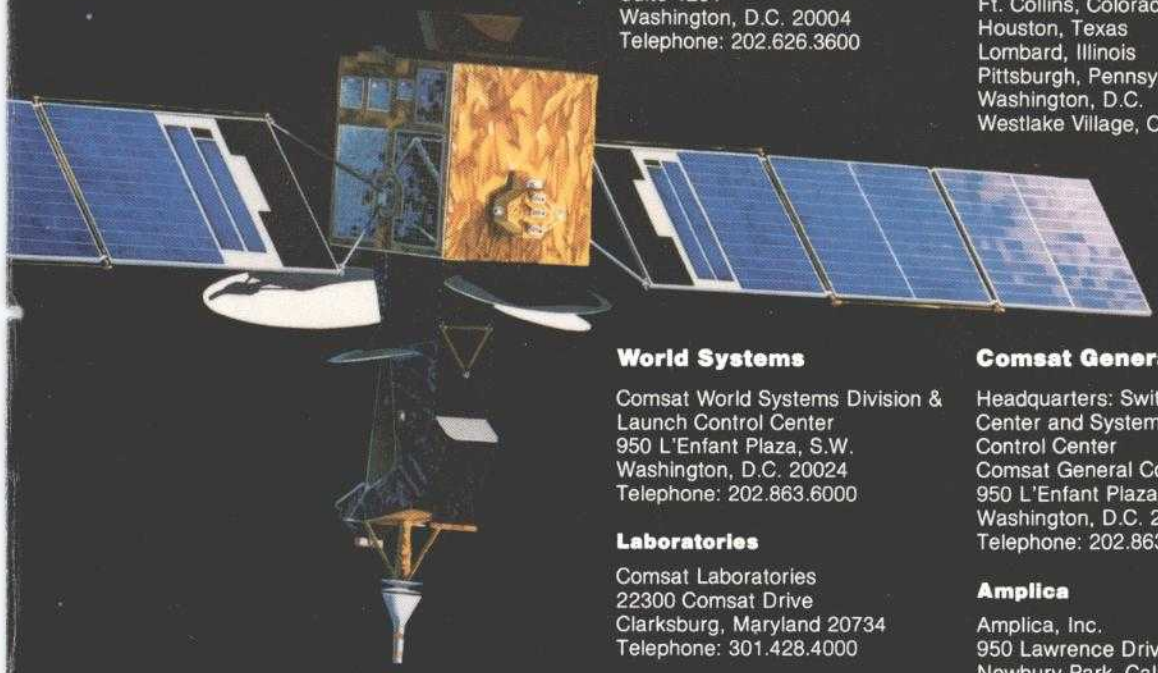

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