Alpha Lyracom: The Global MCI?

For two decades, international satellite communications links were the monopoly of Intelsat, a quasi-governmental consortium of countries established by treaty in 1970. Then in 1988, Alpha Lyracom became the first company in the private sector to launch a competitive satellite.

At first the going was difficult. Just as the telephone companies in the U.S. sought to prevent MCI's growth in its early days, so the national telephone companies of almost every country (who are the owners of Intelsat) along with Comsat in the U.S. tried to block Alpha Lyracom's market access. But having a needed product or service to sell can overcome even the most determined monopoly opposition.

Today, Alpha Lyracom's single satellite provides telecommunications links among almost every country in Europe and North and South America and company has been profitable for the last two years. Now the company is expanding to be a global service provider with three new satellites being built by Hughes Aircraft Company that will allow the company to sell its services everywhere in the world.

Why the success, and why the expansion to global operation? Technology is part of the answer. There has been a shift in the U.S. domestic market toward higher-power satellites and smaller, more capable and less expensive ground stations. Alpha Lyracom uses this new technology to carry digital communications and TV to very small, and very inexpensive, dishes. This enable Alpha Lyracom to provide service where no one else can.

Rene Anselmo, the Chairman and sole owner of the company believes there are two factors driving demand for their services. The first is the desire of corporate communications managers for competitive sources and for multiple routes between locations. The second is the fact that modern telecommunications has become a prerequisite for economic development. American and Japanese companies and financial institutions trading or making investments around the world need modern and reliable communications to connect their widespread activities. And countries like Argentina and Chile that cannot support their own satellites use Alpha Lyracom for their domestic satellite networks.

About half of the present satellite is filled with television programming. Companies like ESPN and CNN have global aspirations and need satellites to distribute their signals to cable systems and small dishes around the world; and there is a high volume of "backhaul" TV traffic from studio to studio. The present satellite has enabled new TV networks be formed in some countries. Alpha Lyracom expects to be the dominant supplier of TV distribution services in Asia and Africa, as it is now in South America.

Another important factor is the trend toward deregulation and competition in telecommunications services around the world, following the path the U.S. took in the 1970's and 1980's. In planning its expansion, Alpha Lyracom does not see the same regulatory barriers it experienced when its first satellite was launched. The U.S. government recently announce the removal of restrictions on private satellites' carriage of communications from public networks, opening up a major source of new business, including a number of value-added services for business that the company is planning.

Economics also plays a major role in defining Alpha Lyracom's place in the global telecommunications market. Cable &

Wireless has built a round-the-world fiber network, but it reaches only a few key cities where there is sufficient traffic to make the huge capacity of the fiber economic.

National telecommunications networks such as those in Japan, Europe and the U.S. require enormous amounts of capital for switches, fiber optic cables and the like. Yet those facilities are economic only if heavily used, and most developing countries won't have the volume of traffic for a decade or more to make those investments profitable.

Enter Alpha Lyracom's satellites and small dish antennas. These make it possible to provide economic digital and voice communications anywhere a company has a point of business activity. Perhaps even more than third-world countries, the former communist states like Russia, Poland and Czechoslovakia need to jump-start their obsolete and often non-functional telecommunications networks. Alpha Lyracom's satellites seem poised to provide a major part of this network need.

Along with the dramatic opportunities, of course, the more competitive telecommunications environment provides Alpha with competition. Regional private satellites are beginning to emerge, like AsiaSat in southern Asia and Orion, which will provide satellite links between the U.S. and Europe. Fiber optic cables provide superior service on telecommunications routes connecting major cities. And Intelsat already has a global satellite system.

But Alpha Lyracom is not worried. President Fred Landman points out that Intelsat designs its satellites for carrying high volumes of telephone calls between large and expensive earth stations located in major cities in competition with fiber cables. He believes Alpha Lyracom will follow the same path as MCI when it overcame its monopoly competition and rapidly gained a large market as the major competitive alternative.

Anselmo concedes that the major carriers will continue to get most of the high volume international telephone and digital traffic between major cities using Intelsat and undersea fiber optic cables. But everywhere else, often just miles outside those cities, Alpha Lyracom will for some time be be the only company that can provide business with affordable high-quality digital communications to any point on the globe and can give TV programmers access to the whole world.

No wonder Alpha Lyracom's sights are as high as its satellites.

2 DOCUMENTS WITHHELD FROM PRODUCTION
ATTORNEY CLIENT PRIVILEGE

113
114

Telesat

Engineering Excellence

Through Experience and Innovation

TELESAT'S CORPORATE VALUES

Commitment to these corporate values is essential to the long-term success of Telesat Canada

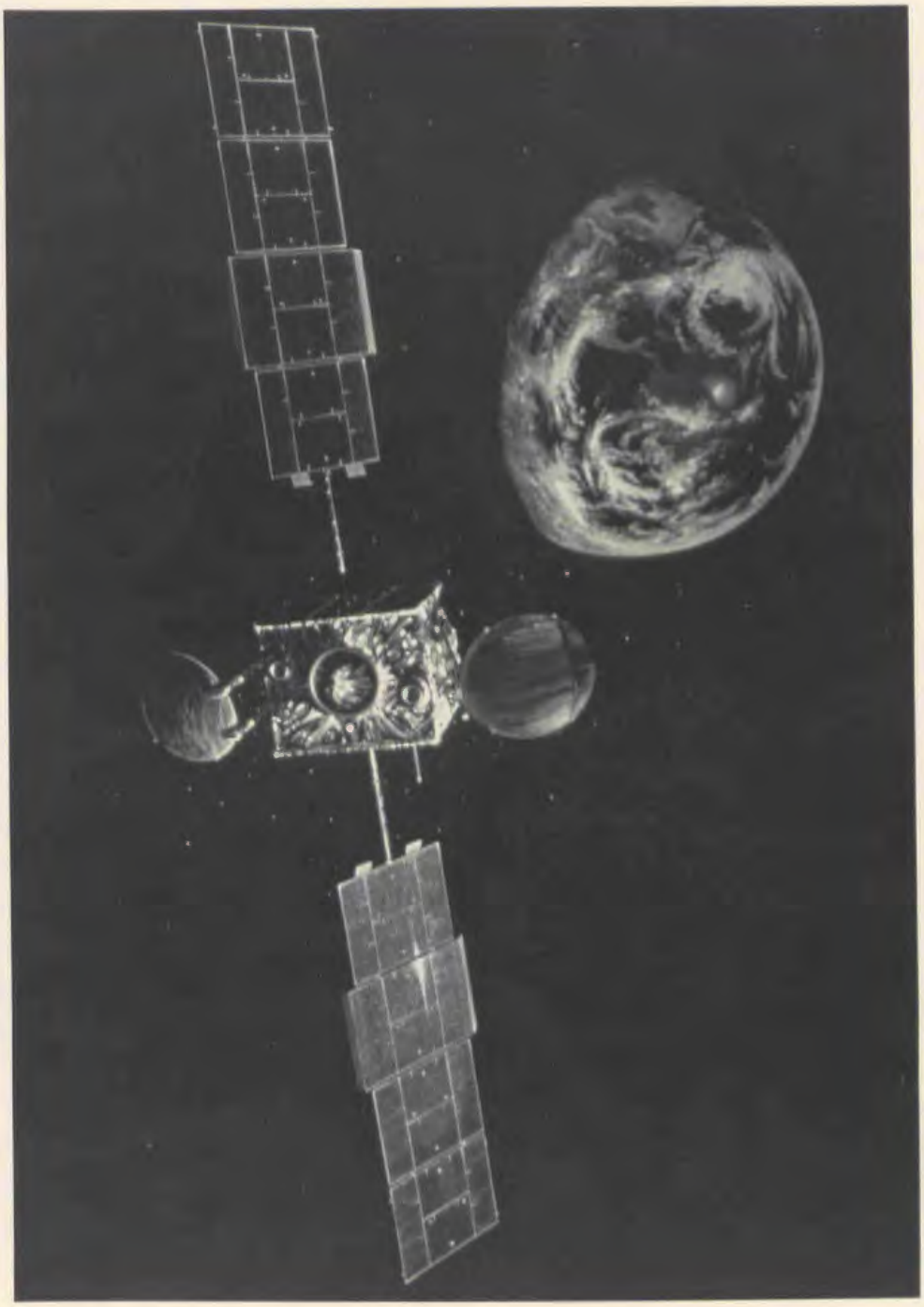
1. A commitment to high quality services to the customer.

2. People, their ideas and teamwork are the keys to success.

3. Innovation, initiation and action are qualities which are cultivated.

ANIK E

Artist's concept of the Anik E satellite in orbit. Anik E1 & E2, Telesat's newest generation of satellites, will provide Canadians with nationwide satellite communications into the 21st century.



CONTENTS

INTRODUCTION TO TELESAT

Telesat Canada

Telesat Canada was established as a private Canadian company by an Act of Parliament on 1 September 1969.

Telesat's corporate mandate is to design, implement, maintain, operate and market a satellite telecommunications system to serve Canadian needs, and to provide consulting expertise both domestically and internationally.

Only three years after the company was established, Telesat launched Anik A1 – the world's first domestic communications satellite in geostationary orbit. Since that launch, Telesat has remained a world leader in the development and application of telecommunications services via satellite. Today, Telesat Canada has over 800 employees, owns and operates five operational satellites and operates a sixth satellite for an American customer.

As a provider of telecommunications via satellite, Telesat markets services – broadcasting, voice, data and image – to the Canadian broadcasting industry, Canadian telephone companies, business, industry and government customers. Through a network of thousands of earth stations, some 1100 of which are owned or operated by Telesat, the Company provides affordable and reliable telecommunications service across Canada and into the United States.

The Company also operates internationally, providing consulting and services to both developed and developing countries interested in establishing, operating or upgrading their satellite systems.

Anik, an Inuit word meaning brother, is the family name for Telesat's satellites which have included spin-stabilized and three-axis stabilized satellites, operating in both the C (6/4 GHz) and the Ku (14/12 GHz) frequency bands. All 11 of Telesat's satellites were launched successfully.

TELESAT'S HEADQUARTERS

The autumn of 1988 marked the start-up of operations from the newly designed, "state-of-the-art" Satellite Control Centre located at Telesat's new headquarters building at 1601 Telesat Court in the City of Gloucester, just east of Ottawa, Ontario.

INTRODUCTION TO TELESAT cont'd

Telesat's satellites include:

- Three Anik A satellites, one Anik B, and Anik D1, which are now retired;
- Anik D2 – sold to GE American Communications, Inc. (also known as GE Americom) of Princeton, New Jersey. GE Americom took delivery of Anik D2 (currently designated F4R) on December 1, 1991. Telesat continues to operate the satellite for GE Americom.
- Anik C1, C2 and C3 providing 32, 27 MHz bandwidth channels each at Ku-Band; and
- Anik E1 and E2, each providing 32, 27 MHz bandwidth channels at Ku-Band and 24, 36 MHz bandwidth channels at C-Band.

Telesat has never had a major satellite failure or a significant traffic outage. Furthermore, as a result of precise engineering, all five of Telesat's retired satellites have exceeded their original design life – a track record of which Telesat is proud. If the operating times of all 11 Anik satellites were totalled, Telesat would have more than 80 satellite-years of operations experience.

Each successive satellite generation brings with it many improvements in satellite technology. Telesat's technical staff are continuously improving the command, data acquisition, orbit and attitude determination software and hardware to ensure that Telesat's satellite control system remains at the forefront of this sophisticated technology.

INTRODUCTION TO TELESAT cont'd

Telesat Enterprises Inc.

Telesat has recognized that future domestic business growth depends partly upon expanding and developing new applications for satellite technology. To do this, Telesat created Telesat Enterprises Inc. (TE) in 1986, previously known as Telesat Canada Communications Inc. (TCCI), as a wholly-owned subsidiary. Its mandate is to establish business ventures complementary to Telesat's core business activities, often by entering into joint ventures with other companies that bring their unique expertise to the venture.

TE's business units include:

- a 35 percent interest in Canadian Satellite Learning Services Inc. (CSLS), a company which markets satellite-delivered educational, health and business programming to institutional and business audiences;
- MediaSat, a joint partnership project with Toronto-based Telemedia-Procom Inc. to provide satellite-delivered, point-of-purchase audio services to retail chains across Canada;
- Satellite Information Services (SIS), a business group providing supplier-independent seminars and information on satellite applications and technology; and
- the Teleport Development business unit, which manages property development projects associated with Telesat's Canada-wide network of teleports. The Teleport Development unit manages Téléport de Montréal, one of the most successful teleport development projects in the world. TE is currently pursuing efforts to develop similar projects at the Company's teleports in Toronto and Vancouver.

INTRODUCTION TO TELESAT cont'd

Telesat Mobile Inc.

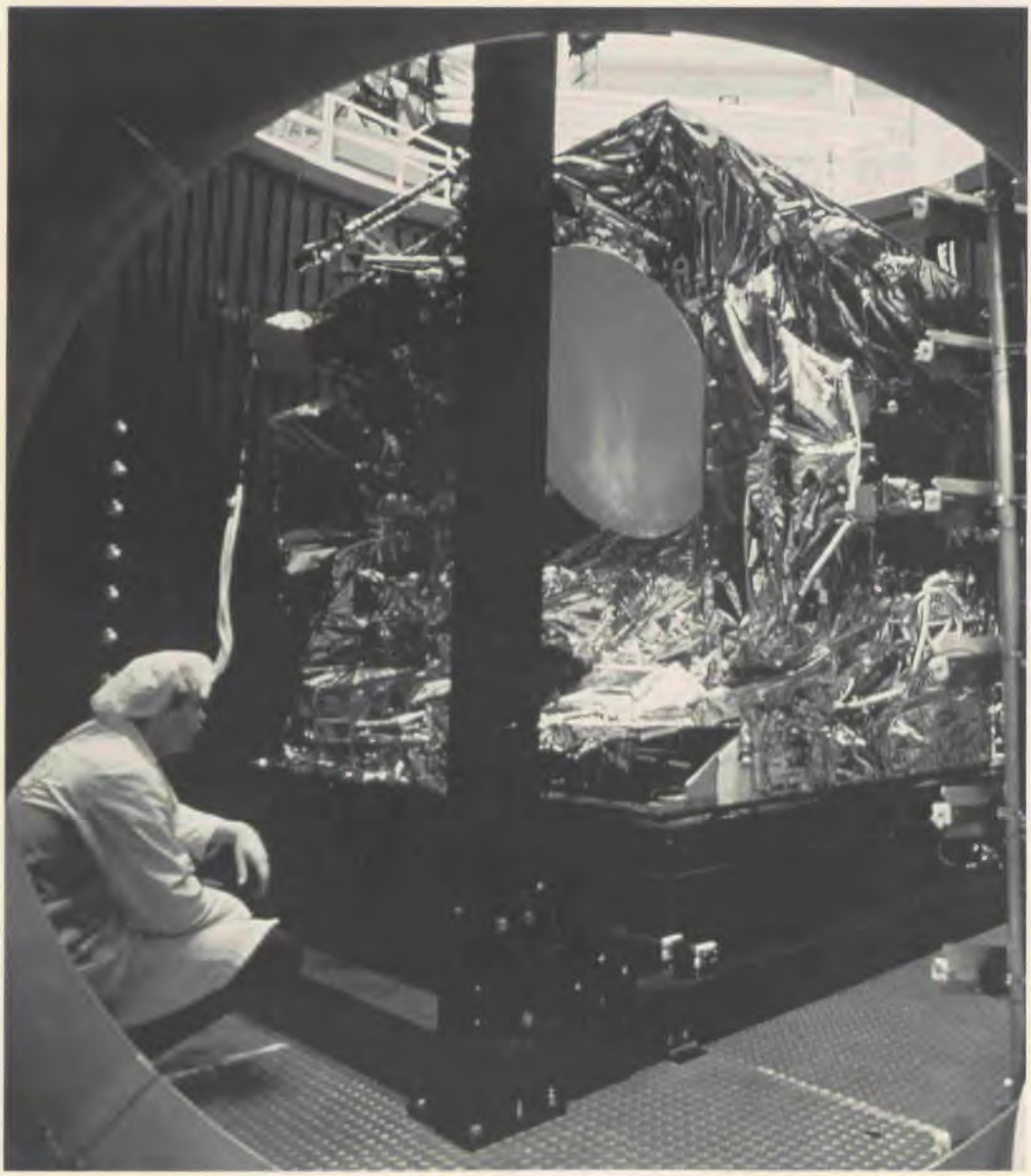
In 1987, Telesat Canada incorporated Telesat Mobile Inc. (TMI) with the mandate to construct and operate Canada's first commercial mobile satellite communications system. TMI is 50% owned by Telesat, with 30% ownership by Unitel Holdings Inc., and 20% by Japan-based C. Itoh and Co. Ltd. BCC Mobile Inc. also has financial interest in TMI.

TMI and its counterpart in the United States, American Mobile Satellite Corporation (AMSC), are jointly developing the world's most technologically-advanced and powerful mobile satellite communications system. In 1994, TMI and AMSC will each launch a mobile communications satellite known as MSAT. Telesat Canada is acting as a consultant in the procurement and launch of the two satellites, and will operate the TMI satellite. Both satellites will provide mobile communications throughout Canada and the U.S., including Alaska, Hawaii, Puerto Rico, the Virgin Islands, and the Canadian and U.S. coastal waters, providing voice and data services for marine, aeronautical and land-based fleet operators, as well as remote fixed applications.

MSAT users will have access to a wide variety of voice, fax, position location and data services, including complete fleet management systems using compact terminals similar to cellular phones. MSAT services will reach the 85 percent of the North American continent not served by terrestrial radio systems.

SATELLITE ASSEMBLY AND TEST

The Anik E satellite being assembled and tested prior to shipment to the French National Space Agency's Launch Site at Kourou, French Guiana for launch on an Ariane 44P Rocket.



SERVICES

Meeting Customers' Needs.

Telesat is a leader in providing domestic telecommunications services via satellite. These services bring simplicity and flexibility to broadcasting and to voice, data and image communications.

Since January 1973, Telesat has been providing Canadians in urban, rural and remote areas with secure, reliable and efficient satellite service. In fact, Telesat networks carry the most sophisticated range of telecommunications traffic of any domestic satellite operator.

Broadcasting Industry

Most national and regional television broadcasters choose Telesat to distribute their programming across Canada. Telesat's customers include the CBC, CTV and Global Television Networks and Canadian Satellite Communications Inc. (CANCOM), as well as specialty and educational broadcasters such as First Choice/Super Channel and Super Ecran, The Family Channel, The Sports Network (TSN), MuchMusic, TVOntario (TVO) and the BC Knowledge Network. More than 45 TV channels are distributed by Telesat's satellites on a full-time basis.

Telesat also provides North American broadcasters with access to channels for occasional use broadcasting. Applications include on-the-spot news reporting and coverage of special events.

Satellites are increasingly being used for radio program distribution and for non-traditional broadcast applications such as shop-at-home networks.

HIGH DEFINITION TELEVISION

Telesat's new High Definition TV Production Mobile, the only one of its kind in North America, has all the equipment needed for both live-to-air and live-to-tape productions, as well as some post-production capability.

SERVICES cont'd

Meeting Customers ' Needs.

Future Television Technologies

Since the broadcasting industry is a major component of Telesat's domestic service base, the Company has taken a leading role in the development and advancement of new broadcast technologies, including High Definition Television (HDTV), video compression and Direct-To-Home (DTH) satellite services.

In 1990, Telesat embarked on a two-year advanced television demonstration program, with particular emphasis on HDTV. For this program, Telesat purchased the equipment necessary to establish closed circuit HDTV networks, including a transportable uplink truck capable of transmitting HDTV signals using various signal encoding methods, encoding and transmission systems, transportable receive and display units, and a fully equipped mobile production vehicle able to support multi-camera productions.

This two-year program successfully contributed to the advancement of advanced television expertise in Canada through technology field trials, the transmission of several live HDTV events, the provision of the mobile for commercial production work in HDTV, and increased cooperation between Telesat, Canadian programming producers, and early HDTV adopters such as Japan's television network, NHK.

Telesat has also conducted extensive laboratory and field research into video compression technology to determine the suitability of various technical systems for commercial Canadian broadcast use. Information gained by Telesat is proving helpful to the broadcasting industry in setting technical standards for compression of video signals to increase the program carrying capacity of satellite transponders.

The Company is also actively exploring the use of its new and more powerful generation of Anik E satellites to provide a programming package of DTH television channels to home subscribers using video compression technology and addressable, one-meter or less, Ku-Band receive antennas.

These programs reflect the active ongoing research and development role Telesat has played over the years in providing Canadian broadcasters with the most advanced satellite system possible for broadcast signal distribution.

EARTH STATIONS

An overview of Telesat's network of earth stations across Canada.

SERVICES cont'd

Meeting Customers ' Needs.

Private Business Networks

Telesat serves a growing number of business customers who use satellites to transmit voice, data and image information. With private satellite networks, businesses can interconnect their offices for fast and inexpensive communications. Private telephone lines and rapid data transfers between computers are common. Locations in a business network not served by conventional telephone systems can still have communications via satellite. A satellite link to a mining site or an offshore oil rig, for example, keeps the head office informed of remote operations.

Satellite communications is also used for electronic banking and credit card verification, airline and travel reservations, retail inventory management, videoconferencing and business television.

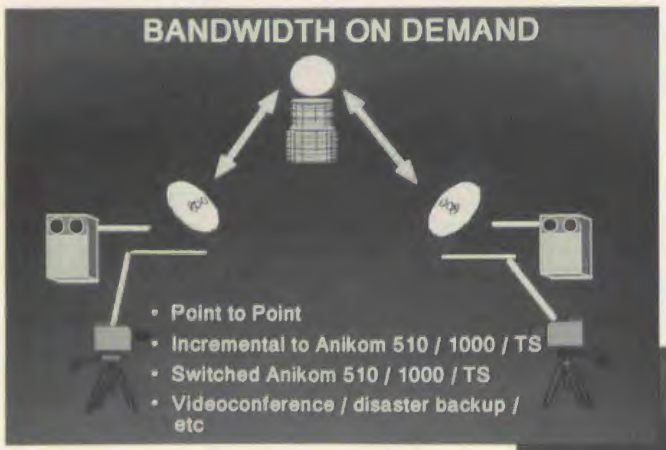
A variety of companies use satellites to convey business communications. The Hudson's Bay Company, Atomic Energy of Canada, National Bank of Canada, Hydro Quebec, Ontario Hydro, Atmospheric Environment Services, Canadian Pacific, Energy Mines and Resources, Transport Canada, Chevron, the Canadian Imperial Bank of Commerce and Home Hardware all use Telesat's services to transmit information across Canada quickly and at low cost.

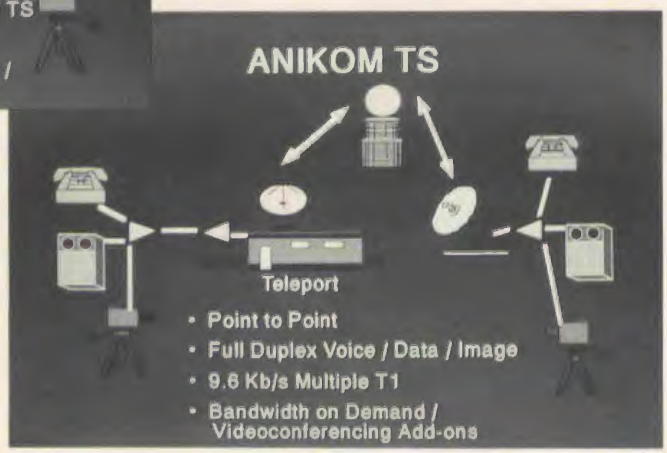
A new generation of earth stations (satellite dishes) called VSATs, or Very Small Aperture Terminals, make satellite technology practical for all types of two-way data communications. These small and inexpensive earth stations can be installed at any business location – on a rooftop, an outside wall, or in a parking lot – and can be directly connected to office computer networks.

Telesat also provides satellite voice and data services to provincial telephone companies which include Bell Canada, Alberta Government Telephones, BC Telephone, Northwest Telephone, Maritime Telephone and Telegraph, and the Manitoba Telephone System. Telesat has furnished networks which back up the major fibre optics network across Canada for rapid restoration of east-west telephone services, augment existing terrestrial links for alternate routing and traffic management, and provide essential telephone service to remote and northern communities in Canada beyond the reach of land circuits.

SATELLITE SERVICES

Anikom Bandwidth on Demand (BOD) – a pay-per-use, highspeed, data transmission service, and Anikom TS - a voice, data, and image network service.





SERVICES cont'd

Meeting Customers ' Needs.

Satellite Services

Some of the services offered by Telesat to corporations, broadcasters, and governments include:

- Anikom BOD (Bandwidth on Demand) – designed for applications such as videoconferencing, bulk data transfer and disaster recovery. BOD provides access to a pay-per-use, high-speed, data transmission service;
- Anikom TS – A voice, data and image network service available in either a Teleport-to-Teleport configuration or a Teleport-to-Customer configuration;
- Anikom 100, one-way data transmission up to 192 kb/s;
- Anikom 200, two-way data transmission for real-time interactive applications using Very Small Aperture Terminals (VSATs);
- Anikom 500, integrated voice, data, and image communications at speeds of 56 or 64 kb/s up to 768 kb/s in 64 kb/s increments;
- Anikom 1000, integrated voice, data and image communications at speeds up to 1,544 Mb/s (T1) or 772 Kb/s (1/2 T1) links;
- Anikast 1400, 14/12 GHz television transportables;
- Networks for radio and television distribution;
- Custom-designed voice, data and image networks for major Canadian corporations; and
- Communications to remote areas.

NETWORK OPERATIONS

Telesat technologists provide continuous monitoring of customer services from the Network Operations Centre at Allan Park, near Toronto.

EARTH STATIONS

Coast-to-Coast Communications.

Canada's vast distances and unique environment places extreme demands on a communications system. In meeting these demands, Telesat has developed a wide range of earth stations designed to operate under any of the climatic conditions found in Canada.

Fixed Earth Stations

Telesat's operational satellites transmit to thousands of earth stations across Canada and the United States. The Company owns, operates or maintains more than 1100 of these earth stations; the rest belong to private companies, broadcasters, telephone companies, federal and provincial governments and private citizens.

Telesat's earth stations are designed for unattended operation. Nearly 100 of the major earth station locations are monitored and controlled from Telesat's Network Operations Centre at Allan Park near Toronto. Some earth stations also have built-in redundancy which ensures a high level of availability. Telesat's network availability records exceed 99.9 percent.

TELEPORTS

Telesat's Téléport de Montréal, an earth station complex and broadcast center, is one of the most successful teleport development projects in the world.

EARTH STATIONS cont'd

Coast-to-Coast Communications.

Mobile Earth Stations

Telesat also has a small fleet of mobile earth stations that can be driven or airlifted anywhere in Canada for newsgathering, sports events, emergency communications and much more. These mobile earth stations, some of which are mounted on small trucks, can transmit and receive a television signal via satellite within minutes of arriving on site.

Teleports

A Teleport is an earth station complex where customers share the equipment needed to transmit data to and receive data from communications satellites. Some Teleports also offer adjoining office and broadcasting facility space.

Information is transmitted to a Teleport via telephone and cable lines, microwave systems or fibre optic networks. Voice, video, data or image information can be relayed from the Teleport to communications satellites and on to local, national or even international destinations.

Most major cities in the world have an existing or planned Teleport. Telesat has built and currently operates Teleports in Toronto, Montreal, Edmonton, Calgary and Vancouver, linking these major cities via easily-accessible satellite transmission centres. Telesat also operates smaller, common-user facilities in some Canadian cities not served by a Teleport.

ANIK E LAUNCH

Anik E2, launched on April 4, 1991, using a dedicated Ariane 4 launch vehicle from the Arianespace launch site in Kourou, French Guiana.

SPACE PROGRAMS

Current and future space programs in which Telesat is involved.

Anik E Satellites

Plans for Telesat's most recent generation of satellites were finalized in late 1985 with the decision to procure two dual-band satellites. Production of the satellites cost in excess of $600 million (Canadian), including launch costs, insurance, internal capitalized engineering and in-orbit performance incentives. Spar Aerospace Ltd. was prime contractor and GE Astrospace Division provided the bus.

Anik E1 and Anik E2 each provide the equivalent capacity of a combined Anik C and D satellite.

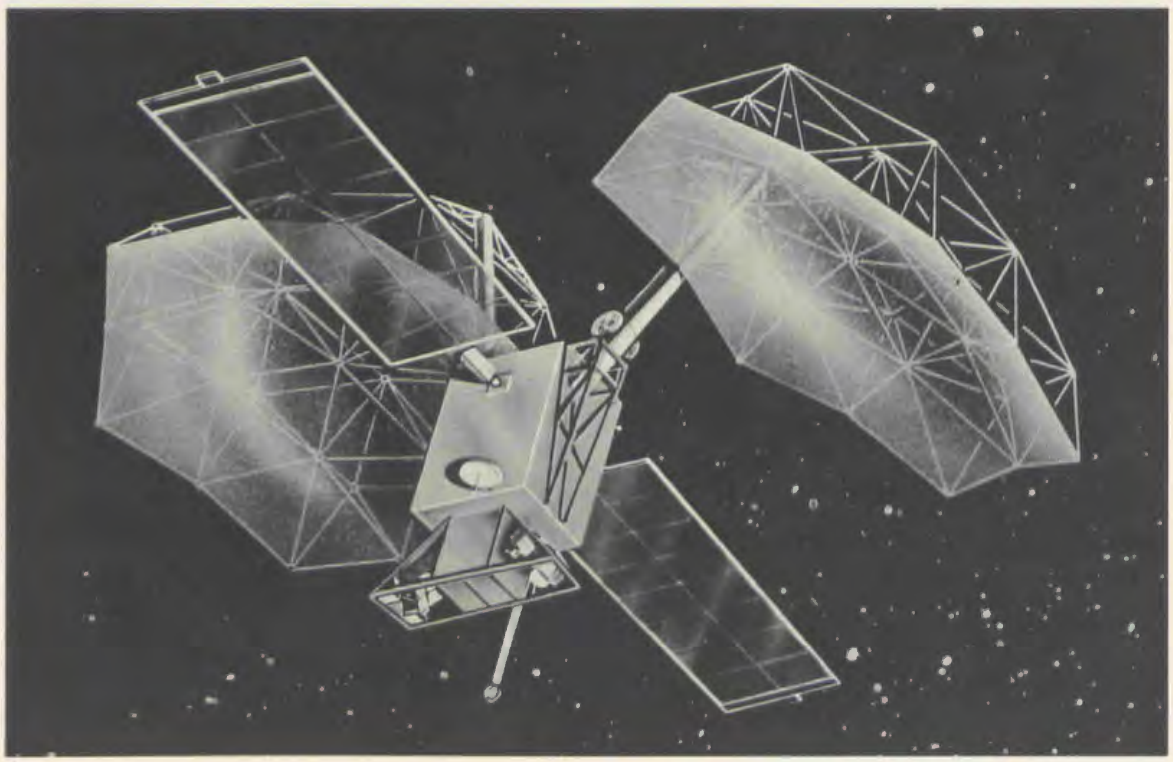
Specific improvements over the last generation of satellites include the lowest capital cost per unit capacity, use of solid state power amplifiers at C-Band for increased reliability, and expansion of Ku-Band coverage to include an all-Canada beam plus expanded USA coverage for cross-border traffic. Each Anik E is dual-band with a 56 TV channel capacity; twenty-four at C-Band and thirty-two at Ku-Band.

Anik E2 was launched on April 4, 1991 on a dedicated Ariane 4 launch vehicle from the Arianespace launch site in Kourou, French Guiana. After a successful launch and transfer orbit operations, the C-Band reflector failed to deploy. A Mission Recovery Team was immediately formed to analyze the possible failure scenarios and develop recovery procedures. The primary recovery attempts were based around unique maneuvers required to re-orient and spin the spacecraft. These maneuvers required the real-time development of customized software and hardware which culminated with the successful deployment of the reflector on July 3, ninety days following the launch.

Anik E1 was successfully launched on September 26, 1991 on board another dedicated Ariane 4 launch vehicle.

MSAT SATELLITE

Artist's concept of TMI's mobile satellite, to be launched on an Ariane launch vehicle in 1994. MSAT mobile customers will be able to communicate directly via satellite to any point in North America, Hawaii, and parts of the Caribbean.



SPACE PROGRAMS cont'd

Current and future space programs in which Telesat is involved.

MSAT

MSAT, a Canadian mobile satellite communications system, will revolutionize mobile communications. The MSAT satellites are based on the Hughes Aircraft HS601 spacecraft bus and SPAR Aerospace is responsible for the communications payload. The first MSAT satellite for TMI will be launched on the Ariane launch vehicle in 1994. Telesat will participate in MSAT through its subsidiary, Telesat Mobile Inc. (TMI).

By using small, inexpensive radio terminals, MSAT mobile users will communicate directly via satellite to any point in North America, Hawaii, and parts of the Caribbean. The terminals may be operated onboard trains, trucks, cars, ships or aircraft. A wide range of services will be available including two-way voice communications, air-to-air, ground-to-ground, radio dispatch, vehicle location, messaging and facsimile.

MSAT will be particularly useful for operations such as trucking and shipping, law enforcement, emergency medical services, resource exploration and weather monitoring in rural, remote or northern areas.

TMI and its counterpart in the United States, the American Mobile Satellite Corporation (AMSC) have signed a cooperative agreement for the joint design and procurement of two satellites. This arrangement ensures that MSAT services will always be available throughout North America, and will lead to substantial economic benefits through joint backup and sharing of development costs.

ALLAN PARK

Telesat's Tracking, Telemetry and Command Earth Station located north of Toronto, Ontario.

SPACE PROGRAMS cont'd

Current and future space programs in which Telesat is involved.

RADARSAT

Telesat has participated in the early phases of the Canadian RADARSAT project. In particular, Telesat performed the Phase B study for the Mission Control System. Extensive analysis was carried out to ensure the system could meet the orbit determination and propagation accuracies specified by the customer.

Currently, Telesat is providing consulting services to the Canadian Space Agency on this program, particularly in the area of the satellite bus and payload development.

Storage Orbit

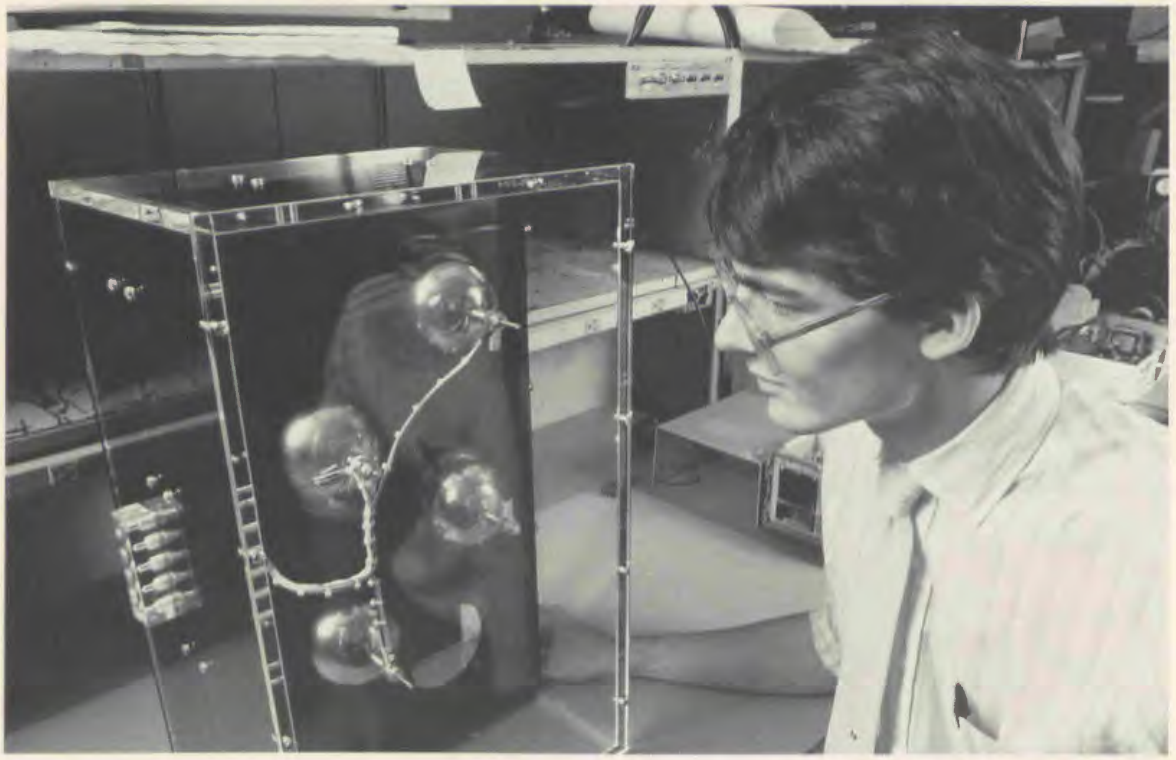
Telesat was the first Company to use natural gravitational forces to store satellites in space.

In the late 1970s, Telesat contracted to have five satellites built, two at C-band and three at Ku-band. One of the C-band and one of the Ku-band satellites were not required immediately for service and were launched into a "storage orbit" to take advantage of favourable launch (STS) and insurance rates.

In the fall of 1986, Telesat brought Anik D2 out of a two-year storage orbit and into commercial service. Anik C1, launched in April 1985, was brought into service in the Spring of 1988. Other satellite companies are now emulating this revolutionary idea to assist with long-term planning.

RESEARCH AND DEVELOPMENT

Prototype nickel hydrogen battery cells being tested at Telesat's Research and Development laboratory.



RESEARCH AND DEVELOPMENT

A highly technical, specialized organization supporting Telesat's R&D requirements.

Telesat's R&D Laboratory is a highly technical, specialized organization supporting a wide spectrum of scientific disciplines. It serves as a focal point and a centralized resource centre for Corporate research, development, testing, and pre-production endeavours.

Laboratory activities are as varied as the many facets of Telesat. Investigations and studies into current and future space and earth segment systems, including operational aspects, are carried out on a regular basis. New applications, service offerings, and technologies are also studied in depth. The scope and breadth of coverage ranges from solid state RF design and digital compression techniques to aerospace electrochemical power storage device testing.

The facility occupies a prime area in the Telesat Headquarters complex. Resources include a multi-million dollar inventory of state-of-the-art test equipment, including several C-band and Ku-band satellite transponder simulators. Additionally, the Laboratory employs a full-time technical support staff and plays host to over 60 engineers, scientists and technologists on a regular basis.

Laboratory personnel are capable of developing and implementing sophisticated hardware designs including computer controlled test/simulation systems and operational support hardware. The feasibilities of various designs, service offerings and operational modes are also routinely established through extensive testing and analysis.

Significant areas of recent activity include development and evaluation of digital audio, High Definition Television (HDTV), video compression, Satellite Wide Area Networks (SWAN), Limited Motion Antennas (LMA) for auto-tracking systems and Integrated Services Digital Network (ISDN). Additionally, Ni-Cd and Ni-H2 satellite battery characterization studies and real-time mission simulation life testing continue to be given high priority.

CONSULTING

What Telesat can offer.

As the first Company to establish and operate a domestic satellite telecommunications network, Telesat has evolved from being a pioneer in this industry to a full-service satellite operator.

The procurement and successful launch of 11 satellites, numerous consulting contracts, and the many years of successful satellite operations have made Telesat's engineers and technologists leaders in the satellite field. Telesat has vast experience in the areas of strategic planning, marketing, and business development. Telesat has developed these skills and the associated tools over the years as the world's leading domestic satellite company. This expertise is available to assist Telesat's clients in developing a viable business, and includes the following:

Satellite Systems

- Spacecraft conceptual designs, feasibility studies and performance/cost trade-offs,
- Spacecraft procurement specifications, bid documents and bid evaluation,
- Spacecraft procurement and program management, including contract administration, design reviews, construction, test monitoring, and final performance acceptance,
- Planning and procurement of launch services, and
- Planning and management of launch missions.

Satellite Control Systems

- Satellite control systems analysis and evaluation,
- Design, procurement and implementation of satellite control and earth station facilities,
- Mission planning, analysis and support,
- Satellite control systems training,

CONSULTING cont'd

What Telesat can offer.

- Transfer and drift orbit operations,
- Advanced software for stationkeeping, satellite commanding, data handling and data distribution,
- Launch mission operations in C and Ku frequency bands, and
- Satellite stationkeeping.

Space Segment Operations

- Operation of multiple satellites in geostationary orbit,
- Operation and maintenance of TT&C systems,
- Engineering analysis of satellite performance,
- Satellite operations documentation and training,
- Participation in launch missions and conducting in-orbit beginning of life (BOL) and on-going bus and payload RF testing,
- Design and operation of automatic RF test stations, and
- R&D laboratory operations including satellite battery testing.

Communication Systems

- Communication systems conceptual designs, modulation/access studies, and performance/cost trade-offs,
- Overall system performance calculations including quality and service availability,
- Satellite and earth station frequency coordination,
- Licensing, RF interference studies and new product development, and
- ITU frequency/orbit coordination.

CONSULTING cont'd

What Telesat can offer.

Earth Station Engineering

- Program management for large implementation projects,
- Earth station design and procurement specifications,
- Bid document preparation and bid evaluation,
- Earth station contract administration, design reviews and acceptance testing,
- Communications control centre design and procurement,
- Engineering economic comparison studies, program estimates and budgeting,
- Integration with terrestrial facilities, and
- 3D Auto CAD satellite visibility studies.

Software Engineering

- Structured software development,
- Multivendor platforms – HP, DEC, IBM, Macintosh,
- LAN, WAN, SWAN – network software,
- Distributed processing,
- Hierarchical and client/server computing models,
- Relational databases,
- Real-time systems,
- Office automation and electronic mail systems,
- Integrated real-time computer and networking systems, and
- Software quality assurance program.

CONSULTING cont'd

What Telesat can offer.

Business Services

- Corporate strategic planning,
- Joint venture/partnership analysis,
- Market research and analysis,
- Competitive assessment and positioning strategy,
- New service development process,
- Demand forecasting,
- Marketing strategy,
- Structured opportunity assessments,
- New business opportunity assessments,
- Business plan development,
- Business valuation tools, and
- Organizational development expertise.

PERTH TT&C

Telesat's Eastern Hemisphere Tracking, Telemetry and Command Earth Station located at Perth, Australia, can provide transfer orbit support in either the C or Ku frequency bands.

CONSULTING EXPERIENCE

Programs in which Telesat was or is currently involved.

Telesat's international business includes consulting services for satellite procurement programs, satellite control centre implementation, and TT&C earth stations. Telesat provides documentation, software, training and support services for flight dynamics systems, launch and early operations, and mission analysis and planning. Telesat has been operating a domestic satellite communications network since 1972 and, as a result, has developed considerable expertise in the area of satellite operations which has enabled Telesat to provide numerous extensive training courses to customers around the world.

Transfer Orbit Services

In 1984, Telesat installed a Telemetry, Tracking and Command (TT&C) facility in Perth, Australia. The Perth earth station is similar to Telesat's TT&C facility at Allan Park (near Toronto).

The two tracking stations and the Satellite Control Centre (SCC) at Telesat's headquarters in Gloucester, Ontario (near Ottawa) provide the means to conduct an entire satellite mission from initial acquisition following lift-off and separation, through transfer and drift orbits, deployments, and in-orbit testing to continuous on-station operations.

Telesat, with its eastern hemisphere tracking station in Perth, Australia and its western hemisphere tracking station at Allan Park, Ontario, supplemented by a staff of specialists in all fields of satellite mission support, can provide near continuous transfer orbit tracking services in either the C or Ku frequency bands. Telesat has participated in 22 successful satellite missions for its own programs and for customers worldwide.

CONSULTING EXPERIENCE cont'd

Programs in which Telesat was or is currently involved.

During the seven-year period 1985-1992, Telesat has either successfully supplied or is under contract to supply support for the following transfer orbit service programs:

- HAC/AUSSAT – Satellite K1 on Space Shuttle in 1985
- HAC/AUSSAT – Satellite K2 on Space Shuttle in 1985
- HAC/AUSSAT – Satellite K3 on Ariane in 1987
- HAC/AUSSAT – Satellite B1 on Long March in 1992
- HAC/AUSSAT – Satellite B2 on Long March in 1992
- SBS – Satellite F5 on Ariane in 1987
- SBS – Satellite F6 on Ariane in 1990
- HAC/JCSAT – Satellite F1 on Ariane in 1989
- HAC/JCSAT – Satellite F2 on Titan in 1989
- HAC/BSB – Satellite R1 on Delta in 1989
- HAC/BSB – Satellite R2 on Delta in 1990
- FACC/SUPERBIRD – Satellite 1A on Ariane in 1989
- FACC/SUPERBIRD – Satellite 1B on Ariane in 1990
- FACC/SUPERBIRD – Satellite 1E on Ariane in 1992
- FACC/SUPERBIRD – Satellite 1F on Ariane in 1992

CONSULTING EXPERIENCE cont'd

Programs in which Telesat was or is currently involved.

Launch Services

Telesat employs a staff of Launch Systems Engineering Specialists who have many years of experience in the three prime launch support areas, namely:

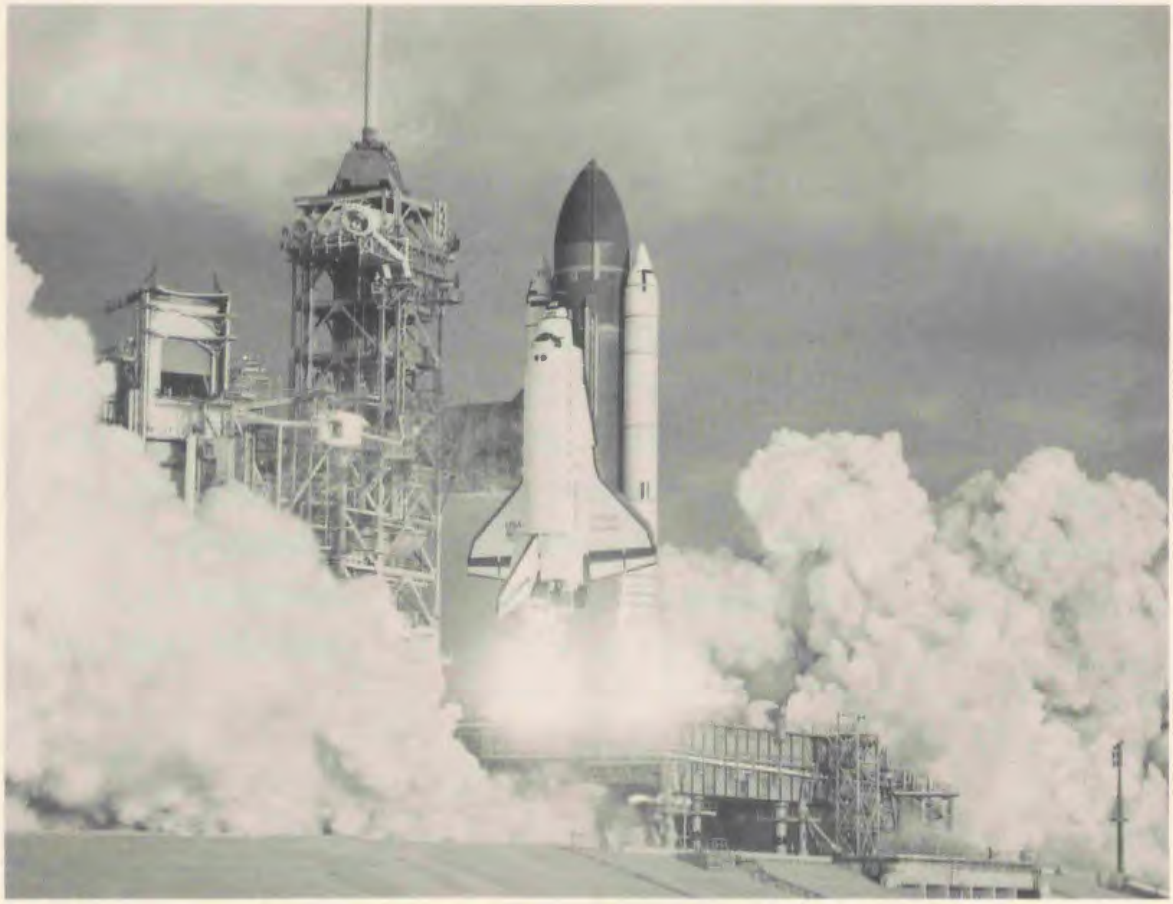
- launch services procurement,
- payload integration and test, and
- launch campaign management.

Telesat managed all 11 of its own launch campaigns, including five using the Delta launcher, four using the Space Shuttle and two using Ariane. In addition, Telesat has provided launch service support for the following programs:

- ASC – Space Shuttle
- AUSSAT – Space Shuttle
- GTE/SPACENET – Ariane
- EMBRATEL – Ariane
- BSB – Delta
- SES – Ariane
- ASIASAT – Long March
- SBS – Ariane

SPACE SHUTTLE EXPERIENCE

Anik C3 launched on the first commercial flight of the Nasa Space Shuttle Columbia, April 12, 1985.



CONSULTING EXPERIENCE cont'd

Programs in which Telesat was or is currently involved.

Flight Dynamics

Telesat's Mission Analysts have been directly involved in all of Telesat's missions, including mission planning, transfer orbit operations, and stationkeeping. In addition, the Mission Analysts have supported numerous other missions via transfer orbit service contracts and flight dynamics system sales. A comprehensive team of Mission Analysts is available to support all of Telesat's domestic and external consulting programs.

Telesat Canada is experienced in the design of flight dynamics systems suitable for all phases of geostationary satellite missions. Telesat's design is well-known for its flexibility, precision, and innovation. Telesat has sold flight dynamics systems internationally to:

- MCI/SBS – Telesat delivered a complete system to Satellite Business Systems (SBS) in mid-1986. The system was used in the successful launch of SBS-F5 in 1988 and has since been used to stationkeep up to five SBS satellites.

- MOD (UK) – Telesat delivered a transfer orbit flight dynamics system to the MOD (UK) in 1988 as a subcontractor to British Aerospace (BAe) for the Skynet IV series of satellites. The system was used successfully for the Skynet IVB mission in 1988 and for the Skynet IVA mission in 1989.

CONSULTING - INTERNATIONAL

Some of the countries in which Telesat has been involved as a consultant.

CONSULTING - NATIONAL AND INTERNATIONAL

Telesat has provided consulting services in Canada and around the world since the mid 1970s. Following is a list of some of the countries where Telesat was or is currently involved as a consultant:

EUROPE

European Space Agency

- Satellite stationkeeping strategy, transfer and geostationary management (1976).

Federal Republic of Germany

- **Deutsche Bundespost** – Interference/ coordination studies (1985/86); satellite operations training and organizational assistance (1986); satellite communications studies (1988).

Switzerland

- **Swiss PTT** – Earth station design and implementation (1985).

Luxembourg

- **Radio TeleLuxembourg** – Feasibility studies and RFP preparation for space and earth segments (1979-1984).
- **Coronet Research Inc.** – Systems studies and spectrum coordination (1983).
- **Société Européenne des Satellites** – Engineering/implementation support, negotiation support, coordination support, space segment implementation consulting, and transportable TT&C earth station (1976-1987).

CONSULTING - NATIONAL AND INTERNATIONAL cont'd

United Kingdom

- **Granada** – System definition, trade-offs and budgets (1985).
- **Unisat** – Spacecraft specifications and system studies (1982); trade-offs and budgets (1985).
- **Granada and Virgin Consortium** – British Direct Broadcasting Systems (DBS) planning support, RFP preparation and proposal evaluation (1986).
- **British Sky Broadcasting (BSkyB)** – Engineering/implementation support. Space segment, launch services implementation consulting, and on-station emergency backup support (1983 - ongoing).
- **British Aerospace (BAe)** – Sale of transfer orbit flight dynamics system including documentation and training (1987/88).
- **M.J. Marchant Underwriting** – Technical assistance on space insurance related matters (1991-ongoing).
- **Hughes Aircraft Co.** – BSB R1 and R2 transfer orbit services using the TT&C stations at Allan Park and Perth (1985/90).

CONSULTING - NATIONAL AND INTERNATIONAL cont'd

ASIA

Hong Kong

- **AsiaSat** – Engineering/implementation support, space segment and launch services implementation consulting (1988 and 1990).

Peoples' Republic of China

- **Ministry of Post and Telecommunications** – Technical assistance program to help the MPT operate, maintain and upgrade their domestic satellite communication system.

Korea

- **ETRI** – Systems definition study (1983 and 1990).

Japan

- **Japan Communications Satellite Company** – Spacecraft proposal review (1991).
- **Satellite Japan Corporation** – Support in preparation of RFP, spacecraft and launch vehicle proposal evaluation (1991).
- **Hughes Aircraft Co.** – JCSAT F1 and F2 transfer orbit services using the TT&C stations at Allan Park and Perth (1989).

CONSULTING - NATIONAL AND INTERNATIONAL cont'd

AUSTRALIA

- **Aussat** – Proposal evaluation, contract negotiations, engineering support, launch mission and launch campaign support (1981), RF design, supply of antenna building including installation and test (1985).
- **Hughes Aircraft Co.** – Aussat K1, K2 and K3 transfer orbit tracking services using Allan Park TT&C station (1985, 1987- ongoing).
- **Kalori** – Support of the bid preparation for the second telecommunication carrier licence.

PACIFIC REGION

Indonesia

- **PT Telecom** – Strategic in-orbit satellite study and technical and management training (1991-ongoing).

SOUTH AMERICA

Brazil

- **Embratel** – Satellite control hardware, software, and product effectiveness training (1984); satellite operations training (1984-1986).
- **SPAR Aerospace** – Mission analysis, payload support and launch management for Brazilsat - Ariane (1984-1986).

CONSULTING - NATIONAL AND INTERNATIONAL cont'd

NORTH AMERICA

United States of America

- **General Telephone & Equipment Co.** – Spacenet proposal evaluation, negotiation and implementation support. GSTAR proposal evaluation and implementation support (1981).
- **American Satellite Co.** – Implementation support (1983).
- **U.S. Satellite Broadcasting Co.** – System definition studies, spacecraft segment RFP, contract negotiations and design support (1983).
- **Hughes Aircraft Co.** – Multiple transfer orbit support programs (1985-ongoing).
- **American Mobile Satellite Corporation** – Space segment performance requirements definition, spacecraft RFP and proposal evaluation (1989).
- **Federal Express** – System studies and RFP preparation (1985); proposal evaluation (1986).
- **National Exchange** – Engineering support for spectrum coordination/FCC filing and system studies (1985).
- **Satellite Business Systems** – Sale of complete flight dynamics system including documentation and training (1985/86).
- **Orion Satellite Corp.** – System configuration and space segment performance evaluation and definition, spacecraft proposal evaluation, and specification contract negotiations support (1989 - ongoing).

CONSULTING - NATIONAL AND INTERNATIONAL cont'd

Canada

- **Department of Communications**
  - Mobile Satellite (MSAT) technical/conceptual studies (1982-84); commercial viability study (1983).
  - Radarsat documentation review and proposal evaluation (1985); implementation support (1990 - ongoing).
- **SPAR Aerospace**
  - Radarsat mission control facility design (1984).
  - Design and list of a Spar-sponsored "Get-Away-Special" flown on the Space Shuttle in 1985.
- **National Research Council of Canada**
  - Space station cost model study for Canadian facility (1985).
  - Support of operation and maintenance planning activities on the Space Station (1988).
- **Environment Canada** – Earth stations data broadcast (1985).
- **Telesat Mobile Inc.** – Technical feasibility studies, system configuration and space segment performance requirements definition, spacecraft RFP and proposal evaluation, and contract negotiation support (1988 - ongoing).

Mexico

- **Telecomm Mexico**
  - Assistance with generation of the Solidaridad RFP (1990).
  - Performance of Solidaridad proposal evaluations (1991).
  - Assistance with contract negotiations (1991).
  - Contract monitoring (1991- ongoing).

TELESAT MILESTONES

Some of Telesat's accomplishments.

The following is a list of the major developmental events in the history of Telesat:

September 1969	Telesat Canada incorporated by an act of Parliament.
November 1972	Anik A1, the world's first domestic communications satellite in geostationary orbit, is launched by Delta rocket.
January 1973	Start of commercial services on Anik A1. The Canadian Broadcasting Corporation (CBC) was the first customer, and provided live television to the remote Canadian North for the first time, giving Canada the world's first national television system via satellite.
April 1973	Anik A2 is launched by Delta Rocket.
May 1975	Anik A3 is launched by Delta Rocket.
May 1976	The first commercial Time Division Multiple Access (TDMA) system is switched into operation.
December 1978	Anik B, a three-axis stabilized satellite, is launched by Delta Rocket. It is the world's first, domestic communications dual-band satellite, operating in both the C- and Ku-Band.
August 1980	The first transportable message terminal begins service on an oil rig off Canada's east coast.
September 1980	The first commercial Ku-Band service via satellite is provided by Anik B.
February 1981	Anik A2 and A3 are collocated (within 0.1°) at 114° West Longitude to increase satellite capacity from that location.

TELESAT MILESTONES cont'd

Some of Telesat's accomplishments.

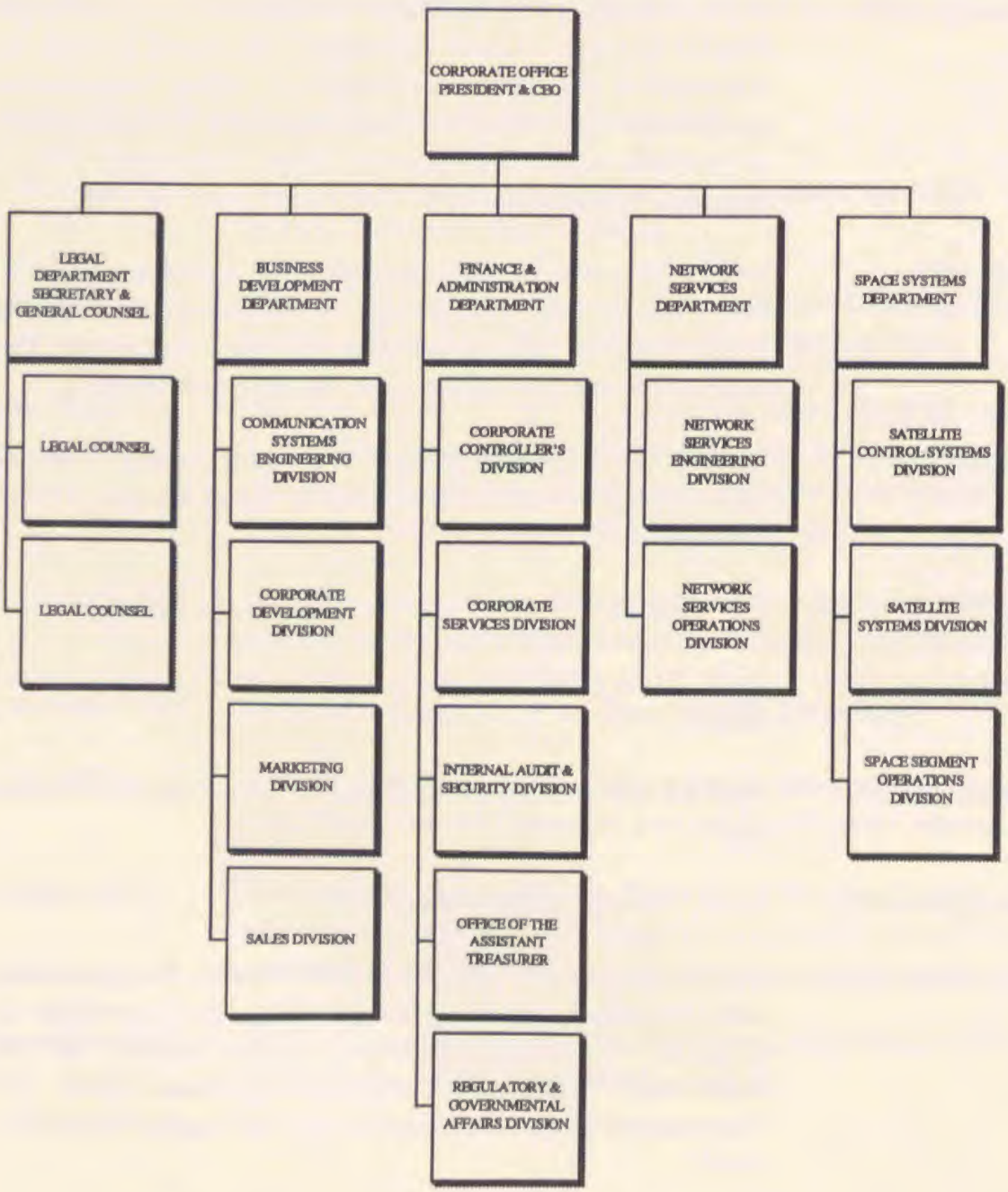
July 1982	Anik A1 is retired after exceeding its seven-year design life by 2.8 years.
August 1982	Anik D1 is launched by Delta Rocket.
November 1982	Anik C3 is launched on the first commercial flight of NASA's Space Shuttle Columbia.
June 1983	Anik C2 is deployed from the Space Shuttle Challenger by astronaut Sally Ride, the first American woman in space.
June 1984	Telesat Canada Communications Inc. (TCCI) was incorporated to allow Telesat to participate in new domestic business ventures through joint enterprises or other activities. TCCI has since been renamed Telesat Enterprises.
September 1984	Imperial Oil becomes the first Canadian business with a private network for interbranch communications via satellite.
November 1984	Anik D2 is launched by the Space Shuttle Discovery.
April 1985	Anik C1 is launched by the Space Shuttle Discovery marking the second time the Discovery was used by Telesat Canada.
October 1986	The contract to construct Telesat's fifth generation of satellites (Anik E), the largest, dual-band, three-axis commercial satellite built to date, is let to Spar Aerospace.
November 1986	Anik D2 is removed from storage orbit and configured to accept traffic originally carried by Anik B.

TELESAT MILESTONES cont'd

Some of Telesat's accomplishments.

October 1987	Telesat Mobile Inc. (TMI) was incorporated to develop the Mobile Satellite (MSAT) system. TMI, together with its counterpart the American Mobile Satellite Corporation (AMSC), plan to launch two satellites in the 1994 time frame to provide mobile communications throughout North America. Telesat owns 50 percent of the shares in TMI.
July 1989	Telesat switches satellite monitor and control to the SCS-1000, the world's most advanced satellite control facility which was five years in development and construction. This facility is located in Telesat's new headquarters building.
April 1991	Anik E2 is launched using a dedicated Ariane 4 launch vehicle from the Arianespace launch site in Kourou, French Guiana.
July 1991	The Anik E2 C-Band reflector is successfully deployed.
September 1991	Anik E1 is launched using a dedicated Ariane 4 launch vehicle.
December 1991	Anik D1 is retired after exceeding its design life by over one year.
December 1991	Anik D2 is sold to GE Americom.
December 1991	On December 13, 1991, the Telesat Canada Reorganization and Divestiture Act was proclaimed by the Government of Canada. This Act provides the mechanism for the Government to sell its 54% interest in Telesat Canada. The Government expects to complete the sale in the first half of 1992.

ORGANIZATION



TELESAT'S VISION STATEMENT

Building on our expertise in satellite communications, we are committed to being a world leader in communications, information services and space systems services.

We stand for value for money, excellence in service, business integrity and long term commitment to our customers.

Space Systems Department
January 1992 (Issue 4)

Telesat

1601 Telesat Court, Gloucester,
Ontario, Canada
K1B 5P4

Produced by Telesat Canada

NTT International Corporation

NTT International Corporation (NTTI) can help your business realize its full potential. We are your link to the impressive resources of NTT, our parent company and a world leader in telecommunications. Let us put our consulting, engineering and marketing expertise to work for you.

The Systems Integration Professional

NTTI provides clients with basic and advanced telecommunications engineering and consulting services. NTTI was founded in October 1985 by Japan's leading telecommunications company, Nippon Telegraph and Telephone Corporation (NTT), following the privatization of NTT and the deregulation of Japan's telecommunications industry. NTTI is a direct link to NTT. We primarily provide clients worldwide with access to NTT's vast managerial resources and superior capabilities in developing telecommunications infrastructures and advanced communications systems.

Whether your firm is a telecommunications carrier, a private company or a multinational enterprise, NTTI has the comprehensive expertise to provide services tailored to your specific telecommunications and data communications needs. Here's how.

NTTI provides consulting and engineering services related to the construction, operation and maintenance of telecommunications and data communications systems. In developing nations, the Corporation provides advice on the development of telecommunications networks, mainly through official development assistance programs. NTTI assists these countries in preparing master plans, conducting feasibility studies, and in designing, constructing, operating and maintaining the network.

Drawing on NTT's experience in developing the world's first commercial integrated services digital network (ISDN) system in 1988, NTTI designs, constructs, operates and maintains cost-effective, advanced telecommunications networks. Our highly skilled technical staff integrate a variety of carefully selected equipment and software to meet all your telecommunications objectives. We can link your corporation's branch offices, production facilities and international and regional headquarters using state-of-the-art telecommunications systems.

NTTI also designs intelligent building systems. Intelligent building systems integrate telecommunications, office automation and building automation systems.

As a recognized force in the development of data processing systems, the NTT Group serves a range of clients, including governments, financial institutions and manufacturers. We are backed by NTT's expertise in providing services for about 5,000 data processing and communications networks throughout Japan. Our familiarity with the full spectrum of equipment and customer needs enables us to provide your company with every kind of data processing system from simple intra-office information sharing to complex worldwide integrated information systems. We integrate hardware and software to revolutionize the way you process, transmit and store information. Our products include on-line data processing systems and local area videotex information systems.

NTTI's services are not completed when it installs a new telecommunications or data processing system. To guarantee that a system is used to its full potential, we provide your staff with in-depth operational and maintenance training. You can trust our experienced engineers to make your staff into competent telecommunications and data processing system operators and managers.

Drawing on our accumulated technical expertise, we also select and market high-quality telecommunications equipment produced by original equipment manufacturers. Our quality control standards ensure that all lines sold under our name satisfy the strictest reliability and performance standards.

The Infrastructure Architect

When planning a telecommunications infrastructure, your first requirement is a reliable business partner with the ability to understand and meet your specific objectives. Ask NTTI. Our track record, backed by NTT's expertise as the architect of Japan's telecommunications network, has made us the telecommunications expert of choice for many governments, utilities and private organizations.

Thoroughly familiar with a wide range of equipment and systems, our engineering consultants are able to advise clients on the most suitable equipment and systems configuration to meet their needs. Whether a customer wishes to set up telecommunications links in remote areas or create a private network, NTTI can do the job.

NTTI plays a vital role in the establishment of basic telecommunications infrastructures in developing countries with consulting and engineering services.

Our professionals closely oversee every stage of a project, from planning and design to the supervising of construction and the training of operation and maintenance personnel. Of course, we remain easily accessible for further consulting when you wish to expand or update your system.

NTTI is proud to be playing a key role in bringing people closer through development of telecommunications networks. A recent project is the National Telephone Program in the Philippines. NTTI coordinated field surveys and plans for the national telecommunications network and is currently supervising construction. This program will provide 59,000 telephone lines in 65 municipalities.

In the Pacific Ocean, we have been involved in the installation of a part of a submarine fiber-optic cable that directly links Japan and the United States by employing a dedicated cable ship fully owned and operated by NTT.

In the People's Republic of China, we are conducting feasibility studies for the automation of the local telephone network in Jilin Province.

NTTI is serving clients by installing network systems with advanced technologies, such as optical-fiber cables, digital switching and transmission, digital radio and satellite communications systems. Many of these utilize the most sophisticated technologies to be developed by NTT Laboratories.

For example, the Corporation recently configured a facsimile store and forward network for Australia Telecommunications Corporation, using local and imported hardware and software. Dubbed F-Net in Japan, this system allows subscribers to send facsimiles to up to 1,000 recipients simultaneously and to send confidential messages that require the recipient to punch in a personal password to retrieve the transmission.

We believe that our resources allow us to provide an unparalleled range of services and products to meet your telecommunications requirements around the world.

The Info-Communications Expert

For corporations to function efficiently in today's emerging global village, emphasis is being placed on the creation of information systems and networks that enhance decision-making processes and boost international competitiveness. Large and small enterprises are faced with an overwhelming array of data communications products and services. NTTI has the expertise to select the systems most appropriate to clients' present and future needs and to construct tools that help these companies toward higher productivity and profitability in an ever-changing business climate.


DK 198

NTTI is the info-communications expert. We are highly experienced in the design, integration and construction of systems for public and private organizations. We are a multivendor systems integrator, which means we know the strengths, weaknesses and quirks of a range of manufacturers' products and can choose the best combination of equipment to fulfill your needs.

NTTI has worked closely with clients in every business field, gaining an in-depth understanding of their needs and providing them with a wide range of advanced systems and networks.

NTTI integrates computer, telecommunications and building automation systems for intelligent buildings. For example, we played a critical role in the completion of Southeast Asia's first intelligent building, the Bank Negara Indonesia's headquarters in Jakarta.

On a larger scale, we linked the headquarters and branch offices of a company with its production bases worldwide through an integrated telecommunications and data processing network. The system was tailored to accommodate the various technical and regulatory differences among countries.

Electronic banking systems greatly enhance customer services. NTTI promotes the use of such systems worldwide through its involvement in a range of banking-related projects. We are currently developing the Electronic Interbank Transfer System for a client in Turkey. Past achievements include the creation of CCMS, a compact yet powerful system for financial information reporting. ANSER, a computer-generated, multilingual system for information and advice service using telephone networks, has proven popular with overseas banks.

NTTI also develops on-line data processing systems, key elements in improving administrative efficiency and productivity. For a client in Finland, we provided a handy point-of-sale terminal system used to collect and process credit card data from sales outlets.

In China, NTTI staff provide consulting services for the establishment of the State Economic Information System. This on-line system will aid the government in determining economic policy by collecting and analyzing macroeconomic data and making forecasts.

Our know-how gained from overseas projects is reinforced by NTT's experience and expertise in telecommunications and data processing technologies.

The Marketing Specialist

NTTI stands at the crossroads where technologies, products and markets meet. In addition to selling Japanese equipment overseas, we introduce foreign products to the Japanese market. Our strong ties with NTT and leading original equipment manufacturers worldwide, combined with technical expertise and comprehensive product knowledge, enable us to sell only top-quality products. And users recognize NTTI's quality control standards, which ensure that all lines marketed under our name satisfy the most stringent reliability and performance requirements.

NTTI can supply you with telecommunications terminals, data communications equipment, office automation equipment, computer systems, telecommunications networks and other advanced technologies. We are able to tap NTT Laboratories for the most current innovations and developments in telecommunications technologies.

We offer a range of direct technology transfers and top-quality communications equipment and devices that play a vital role in the smooth operation of telecommunications networks.

NTTI is also devoted to the development and transfer of optical-fiber technologies and products, ranging from connector devices to processing equipment, which incorporate advanced precision measuring and manufacturing methods.

NTTI's optical-fiber technologies have achieved an internationally recognized level of superior performance

and reliability. Examples include NTT's high-quality optical-fiber SC and MT connectors.

Products marketed by NTTI to help you manage your enterprise more cost-effectively and efficiently include our Personal International Communication System (PICS). This software can link your headquarters, branches and production bases by using personal computers connected with public telephone lines to send information at very high speeds.

NTTI also markets a variety of modems that feature cutting-edge technology, allowing for the fast, accurate and cheap transmission of large volumes of data over long distances.

With the model Fax 100i facsimile, you no longer have to cut apart or shrink oversized documents and drawings before sending them. The Fax 100i reads originals up to A1 size (594mm x 841mm). When the Fax 100i transmits to a standard-width facsimile, the copy at the receiving end is divided into standard-width documents that can be easily matched to reconstruct the original.

NTTI's Multimedia Filing System allows you to store and retrieve information in a variety of forms from a read- and write-type optical disk. In addition to written information, color photographs and sound can be recorded on the disk. This system can be incorporated into a local area network (LAN) to allow access from a variety of locations. Applications include the management of information related to the real estate and retail industries where detailed information on specific items must be readily accessible.

The Corporation also develops high-performance integrated circuit cards in cooperation with Citizen Watch Co., Ltd. NTTI is the exclusive international marketer of these products.

NTTI carries hundreds of products to meet every conceivable telecommunications and data processing need. Talk with us and see for yourself.

NTTI is dynamic, flexible and, above all, accessible. We

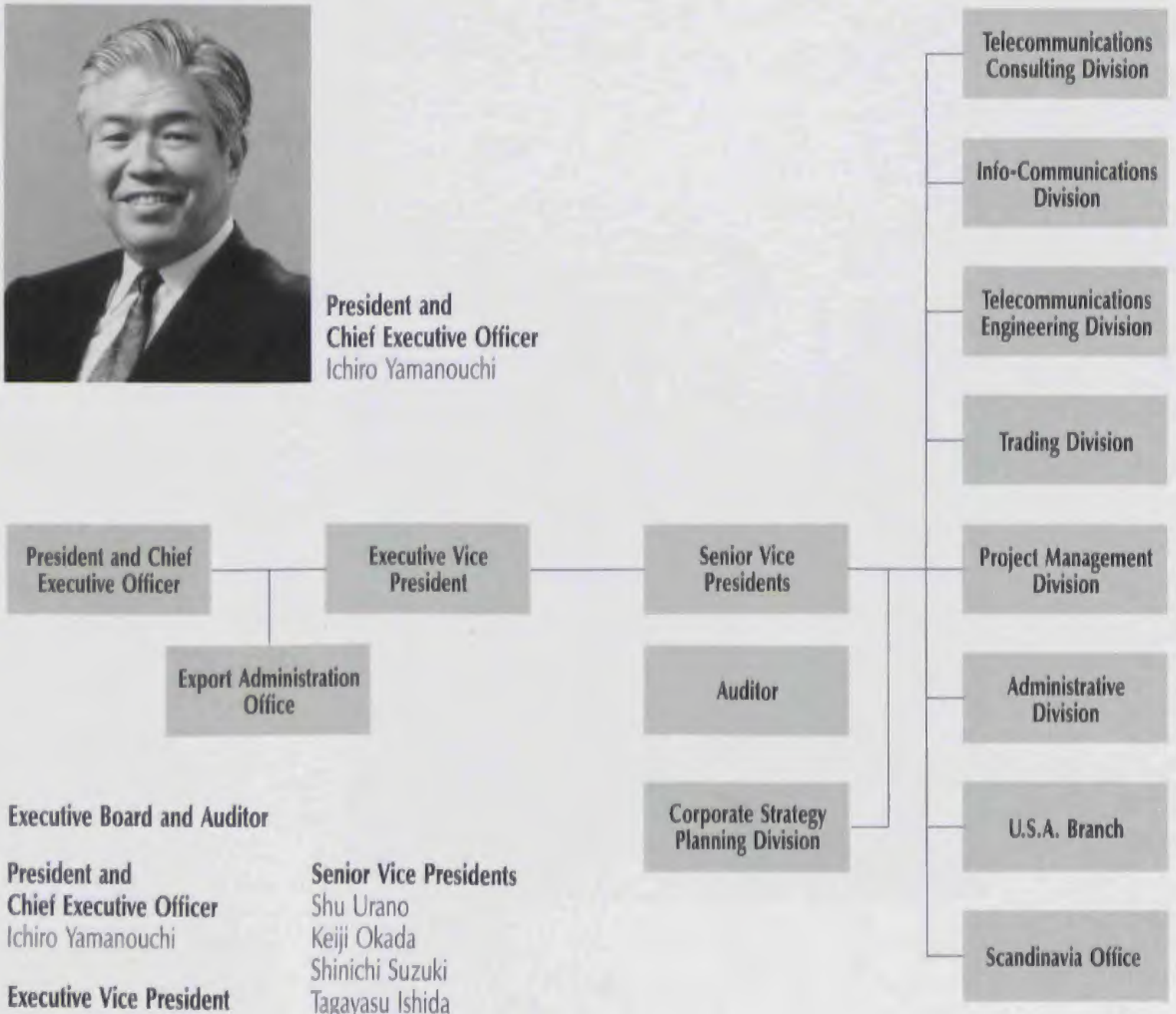
can anticipate and meet all your communications needs.

NTTI transcends the barriers of time and distance, bringing

people together through telecommunications technology.

Organization and Executive Staff

President and
Chief Executive Officer
Ichiro Yamanouchi



Executive Board and Auditor

President and
Chief Executive Officer
Ichiro Yamanouchi

Executive Vice President
Kikuo Mito

Auditor
Iichiro Ban

Senior Vice Presidents
Shu Urano
Keiji Okada
Shinichi Suzuki
Tagayasu Ishida
Seiji Takashima

(As of June 24, 1992)

Corporate Data

Company Name	**NTT International Corporation (NTTI)**
Head Office	21st Mori Building 4-33, Roppongi 1-chome Minato-ku, Tokyo 106, Japan Telephone: (03) 5562-7700 Domestic +81 3 5562 7700 International Telex: 2222701 NTTI J Facsimile: 81-3-5562-7706
Capital	Authorized ¥6 billion; total paid-in ¥4.8 billion
Sales (as of March 31, 1992)	¥13,070,000 thousand
Establishment	October 1985
Number of Employees	394

As of March 31, 1992

Accomplishments

Country	Project Name	Project Period	Scope of Work
Republic of Indonesia/ Kingdom of Thailand/ Malaysia/etc.	Compact Cash Management Service System	December 1986–Present	Design and installation of the Compact Cash Management Service System (financial information reporting system)
Republic of Indonesia	BNI 1946 Building Automation System	June 1989–September 1989	Design of the building and facilities for the building automation system of Bank Negara Indonesia (BNI 1946)
Federative Republic of Brazil	Corporate Telecommunications and Information Network System Project	July 1987–August 1988	Preparation of master plan for the Corporate Telecommunications and Information Network System of Companhia Vale do Rio Doce (CVRD)
Republic of Indonesia	Intracity Digital Microwave Subscriber System	March 1988–February 1989	Feasibility study for the Intracity Digital Microwave Subscriber System in Jakarta
Japan	International Digital Switching	April 1988–Present	Establishment of international communications facilities
U.S.A./U.K./Switzerland/ Germany/etc.	Global Network System Project	April 1988–Present	Construction of the Private Worldwide Information Network for private companies
Kingdom of Thailand	Thailand Telecommunications Master Plan	October 1988 –December 1989	Technical consulting for the development of telecommunications in Thailand (Master Plan to 2002)
Republic of the Philippines	National Telephone Program Phase I	January 1989–March 1990	Design of overall trunk and local digital network in the Philippines
Australia	Facsimile Mail System	February 1989–March 1991	Installation of Facsimile Mail System
People's Republic of China	Establishment of the State Economic Information System	April 1989–March 1992	Technical consulting service to establish the Price Information System in China
Republic of Turkey	Interbank Clearing System	October 1989–March 1992	Design and installation of the Interbank Clearing System in Turkey
U.S.A.	Sheraton Chicago Hotel IBS Project	January 1990–March 1992	Technical consulting and construction management of telecommunications, building automation, office automation and audiovisual systems
Republic of Korea	POSCO HQ IBS Project	February 1990–May 1992	Basic design of telecommunications, building automation, office automation
U.S.A./Japan	North Pacific Cable (NPC) System Project	March 1990–August 1990	Marine Survey and Installation of Submarine Cable System
People's Republic of China	Modernization of Telephone Network in Jilin	July 1990–September 1991	Feasibility study for the Modernization of Telephone Network in Jilin Province
Republic of Indonesia	Program Management Consulting Service (PMC-V)	November 1990–May 1994	Project management and consulting service for the entire fifth five-year Telecommunications Development Plan of Indonesia
Japan	Citibank Relocation Project	July 1991–October 1992	Consulting service to establish a dealing room and infrastructure for Citicorp Center
Republic of Indonesia	Outside Plant Maintenance Center Project (OPMC)	August 1991–July 1993	Technical consulting service for the construction of the Outside Plant Maintenance Center
Republic of Korea	Ssangyong Investment Securities HQ IBS Project	August 1991–July 1992	Basic design of telecommunications, building automation, office automation and dealing systems
Japan	TELEAD (Telephone Call Administrator) Project	September 1991–Present	Design and development of the PBX Call Accounting System (enhancement of an existing NTT system)
Republic of Honduras	Master Plan Study on Rural Telecommunications Network Project	December 1991– November 1992	Master plan study for the Rural Telecommunications Network Project

Printed in Japan

Printed in Japan

Mitsubishi Corporation

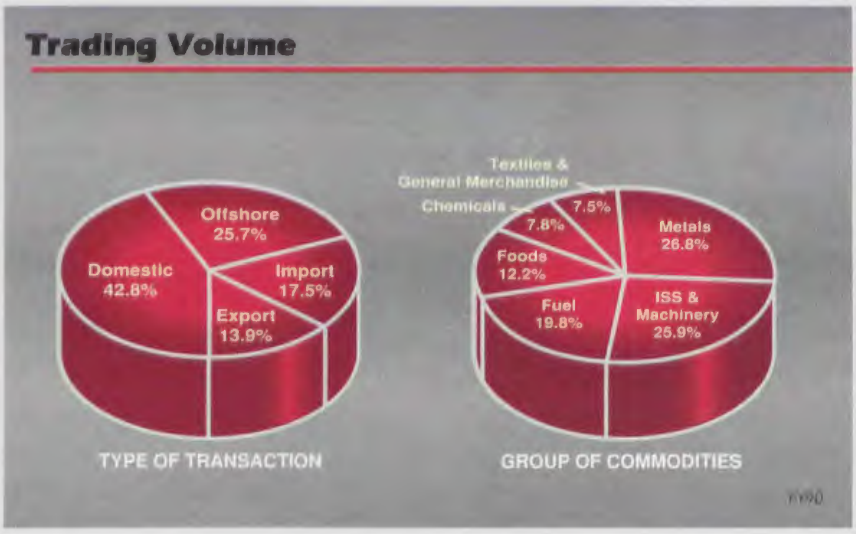
Creating New Space Markets

Mitsubishi Corporation

Tokyo Headquarters

Mitsubishi Corporation (MC) is Japan's leading integrated trading company, or ***Sogo Shosha.*** Headquartered in Tokyo and working through a network of offices worldwide, MC is able to utilize its vast resources and global presence to create and maximize business opportunities for its partners.

- $117 billion in trading transactions (FY90)
- A core Mitsubishi Group company
- International trade, marketing, finance, new business development, technology transfer, information services, joint ventures



Though the scale of MC's activities is immense, the source of its success is thousands of individual employees at offices around the globe. These experienced specialists are supported by the world's most extensive corporate communications network. Unmatched resources, communications and people combine to keep Mitsubishi Corporation at the crossroads of international business.

- Over 230 offices worldwide
- Over 13,000 people handling more than 25,000 different products
- Over 40,000 messages a day carried by a private communications network with enough cable to reach from the earth to the moon

Mitsubishi Corporation has been at the center of Japan's space programs since the late 1960s, when the Japanese government decided to undertake the development of large-scale, liquid-fueled launch vehicles. MC worked with U.S. Delta launch vehicle team members to successfully introduce their rocket technologies to Japan. Government-level agreements and export licenses supported a network of commercial agreements which included technology transfer, licensed production and hardware sales; all arranged and administered by MC. Throughout the years and through Japan's N-I, N-II and H-I programs, MC has been the primary trading interface between U.S. and Japanese producers of major launch vehicle systems.■

Mitsubishi Corporation is at the center of Japan's space programs ...

MC's vital role is further demonstrated by its direct support of NASDA's development, operation and maintenance of infrastructure necessary for launch vehicle and satellite programs. MC has served continuously as NASDA's prime contractor for downrange station operation and maintenance since 1974 and has provided vital support in areas such as launch site development, range safety assessment and engine test stand development. In all cases, involvement by MC created important roles for MC's international partners.■

MC has held a position of prominence in Japanese satellite activities since the early 1970s when Japan initiated development of application satellites. MC has participated in various Japanese national satellite programs, working with domestic satellite manufacturers and a wide range of overseas partners. Building upon these relationships, MC has been well positioned to participate in cooperative, international teaming arrangements on global satellite programs such as Intelsat.■


N-I


N-II


H-I


Christmas Island Downrange Station


Engine Test Stand


MOS-1


CS-3


ETS-3

Above photos courtesy of NASDA

Your Partner For Success

Positioning was a key factor in Mitsubishi Corporation's immediate response to the Japanese government's deregulation of satellite services in 1985. At that time, MC established Space Communications Corporation (SCC), a common carrier providing satellite communications services throughout Japan over powerful, U.S. built, "SUPERBIRD" satellites. SCC is capitalized at 20 billion yen and has over 200 employees. SCC has expanded satellite business opportunities for MC and its partners to include commercially procured satellite systems, ground control centers, network management, SNG, VSAT, television programming and more.■

SCC is one example of MC's commitment to create new space business. MC's ability to anticipate opportunities and its willingness to commit corporate resources to their development are based on a solid foundation of knowledge, experience and information. MC works with domestic and international partners to formulate and implement strategies appropriate to space business conditions.■

MC's commitment extends beyond current market opportunities to include the creation and development of completely new markets. In 1984, for example, MC founded a major industrial association in Japan, with over 80 corporate members, for study and promotion of the commercial utilization of space. MC led the study of remote sensing, telecommunications, broadcasting, small satellites, transportation, microgravity research, manned space activities and exploration, as well as space law, financing, insurance and international cooperation. Expertise in these areas has proven to be of great value to MC in its support of Japanese participation in the international space station program. MC has also sought to promote microgravity research in preparation for space station utilization. In 1990, MC arranged and participated in a multi-million dollar investment in Spacehab, Inc., a U.S. company which will build and operate commercial space shuttle augmentation modules. MC has also recently participated in the formation of three new Japanese companies which will undertake drop tower, launch vehicle and manned space system activities.■

As the world enters the space station era, space activities are certain to become increasingly international and commercial. MC's long term commitment, unmatched resources, unique global perspective and commercial approach will ensure its continued preeminence in future space business activities making Mitsubishi Corporation your partner for success.■

SCC Spaceport East

SUPERBIRD

SPACEHAB MODULE

SFU Free Flyer

Space Activities

Mitsubishi Corporation's deep, historic involvement in aerospace activities has made it Japan's leading trading company in this field, with over 300 people working on aerospace business at offices and subsidiaries throughout North America, Europe and Asia. MC enjoys business relationships with virtually every major aerospace company in Japan and with market leaders in aerospace worldwide. Aerospace is an important part of MC's business, with two complete departments at MC headquarters sharing responsibility for the coordination of all civil, defense and space activities. MC's aerospace experts have unequaled experience and success in expanding established aerospace business areas, as well as in developing new areas.■

NASDA photo

> Mitsubishi Corporation's aerospace experts have unequaled experience and success...

MC's dominant position in international business related to Japanese space programs predates the establishment of the National Space Development Agency of Japan (NASDA) in 1969. Since that time MC's space business has grown to encompass a wide range of activities. MC holds a position of leadership and respect in Japan's space business community, enjoying close relationships with important industry participants and key government officials in Japan and throughout the world.■

NASDA photo

In fulfilling its role as a creator of new markets, MC has worked to expand space sector demand beyond the scope of Japan's national space programs through commercialization of space infrastructure and services. Having played a vital role in the introduction of large launch vehicles and communication satellite technology to Japan, MC is now involved in providing transportation and satellite services on a commercial basis.■

Mitsubishi Corporation

Your Partner For Success

Mitsubishi Corporation
Tokyo, Japan
Tel: (3) 3210-4581
Fax: (3) 3210-4607

Mitsubishi Corporation
Nagoya, Japan
Tel: (052) 585-2617
Fax: (052) 565-2609

Mitsubishi International Corp.
Huntsville, Alabama U.S.A.
Tel: (205) 837-2190
Fax: (205) 837-2625

Mitsubishi International Corp.
Los Angeles, California U.S.A.
Tel: (213) 687-2914
Fax: (213) 687-2992

Mitsubishi International Corp.
Palo Alto, California U.S.A.
Tel: (415) 496-5415
Fax: (415) 496-0318

Mitsubishi Canada, Ltd.
Toronto, Canada
Tel: (416) 382-6731
Fax: (416) 385-1384

Mitsubishi Germany G.m.b.H.
Dusseldorf, Germany
Tel: (211) 4397-203
Fax: (211) 4397-397

Mitsubishi Corporation (UK) Limited
London, England
Tel: (71) 822-0185
Fax: (71) 822-1713

Mitsubishi France S.A.
Paris, France
Tel: (1) 40, 54, 49, 42
Fax: (1) 47, 83, 05, 35

Cover photo courtesy of NASDA

MITSUBISHI GROUP

THREE-DIAMONDS: 

SYMBOL OF MITSUBISHI COMPANIES
TO CUSTOMERS AROUND THE WORLD, WHICH IS A GUARANTEE
OF ATTENTION, QUALITY AND SERVICE.

- MITSUBISHI COMPANIES ARE LEADERS IN EVERY JAPANESE BUSINESS SECTOR,
  MANUFACTURING, TRADE AND FINANCE
- HISTORY GOES BACK OVER A CENTURY
- VARIOUS BUSINESS OPERATIONS ALL OVER THE WORLD

9 % TURNOVER OF JAPANESE GNP (1989)

MITSUBISHI GROUP

MAJOR BUSINESS AREA	COMPANY INVOLVED
SPACE DEVELOPMENT	MITSUBISHI ELECTRIC, MITSUBISHI HEAVY, MITSUBISHI SOFTWARE
SPACE COMMUNICATION	SPACE COMMNICATIONS CORP.
ELECTRONICS	MITSUBISHI ELECTRIC, NIPPON KOGAKU
CHEMICAL & BIOTECHNOLOGY	MITSUBISHI CHEMICAL
MACHINERY	MITSUBISHI HEAVY, MITSUBISHI KAKOKI
TRASPORTATION EQUIPMENT	MITSUBISHI ELECTRIC, MITSUBISHI HEAVY
METAL	MITSUBISHI METAL, MITSUBISHI CABLE, MITSUBISHI STEEL, MITSUBISHI ALMINUM
AUTOMOBILE	MITSUBISHI MOTORS
GLASS, CEMENT & CERAMICS	ASAHI GLASS, MITSUBISHI MINING & CEMENT
FIBER, PAPER & PULP	MITSUBISHI RAYON, MITSUBISHI ACETATE, MITSUBISHI PAPER MILLS
REAL ESTATE	MITSUBISHI ESTATE
TRANSPORTATION	NIPPON YUSEN
INSURANCE	TOKYO MARINE, MEIJI MUTUAL LIFE INSURANCE
FINANCIAL INSTITUTIONS	MITSUBISHI BANK, MITSUBISHI TRUST & BANKING
TRADE	MITSUBISHI CORPORATION
OTHERS	MITSUBISHI ATOMIC POWER, MITSUBISHI RESEARCH SPACE

MITSUBISHI

JJX-003

MITSUBISHI CORPORATION

MITSUBISHI CORPORATION
AEROSPACE DEPARTMENT A

MitsubishiCorporation

MITSUBISHI CORPORATION (MC)

- LEADING JAPANESE TRADING COMPANY OR *SOGO-SHOSHA*

- WIDE RANGE OF BUSINESS ACTIVITIES
  - PLANNING, MARKETING, CONSULTING, FINANCING, INVESTING AND TRADING
  - OVER 25,000 PRODUCTS AND COMMODITIES
  - OVER 18,000 CUSTOMERS

- DOMESTIC, IMPORT, EXPORT AND OFFSHORE TRANSACTIONS

- THE CORE OF MITSUBISHI GROUP COMPANIES

SCALE OF MITSUBISHI CORPORATION

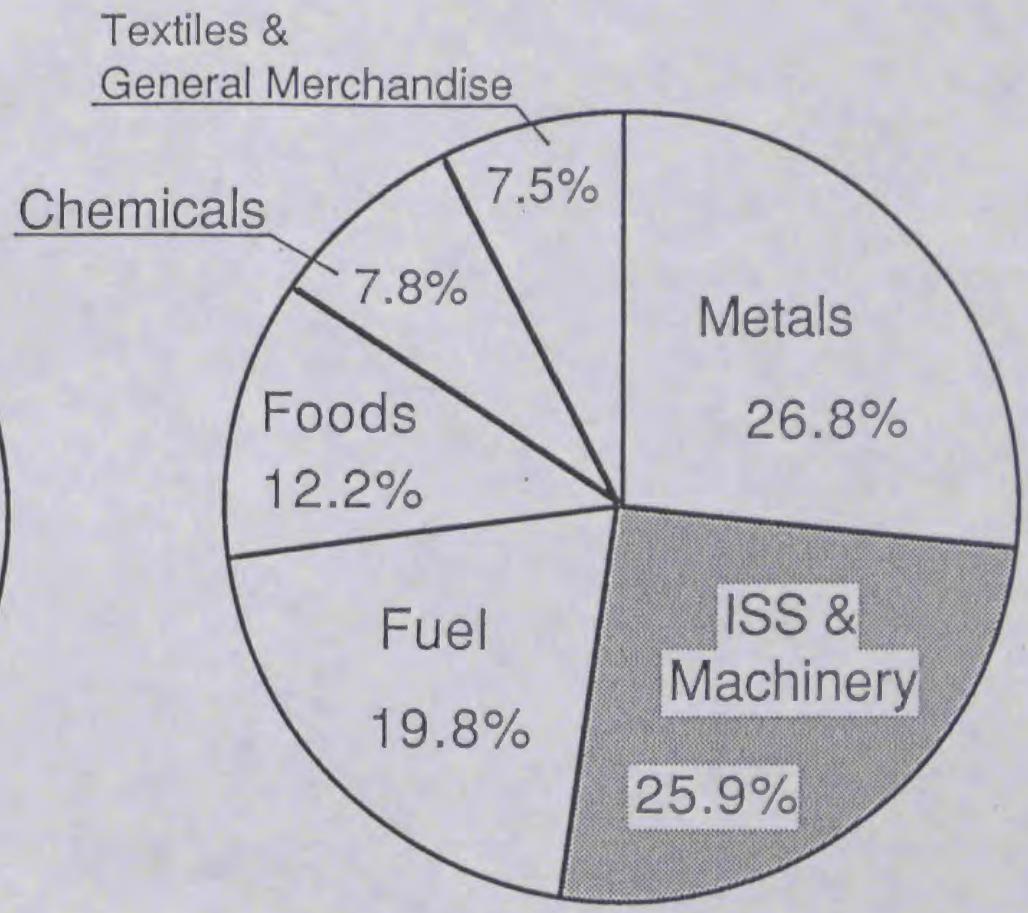
APRIL 1989 - MARCH 1990; 158 YEN/US$

ASSETS	:	$73.9 BILLION
TRADING TRANSACTIONS	:	$117.2 BILLION
NET INCOME	:	$382.0 MILLION
EMPLOYEES	:	13,237 (INCLUDING 5,417 AT SUBSIDIARIES)
OFFICES	:	JAPAN 45
		OVERSEAS 104

TRADING VOLUME OF MC

(APRIL 1989 - MARCH 1990)

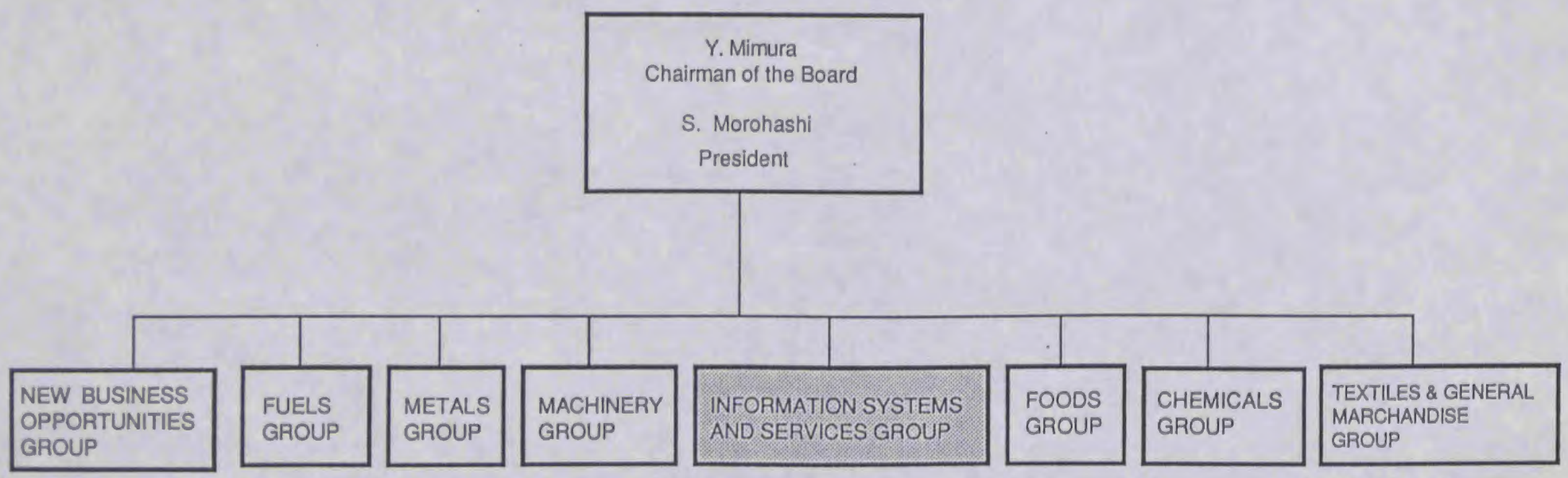
TYPE OF TRANSACTION



GROUP OF COMMODITIES

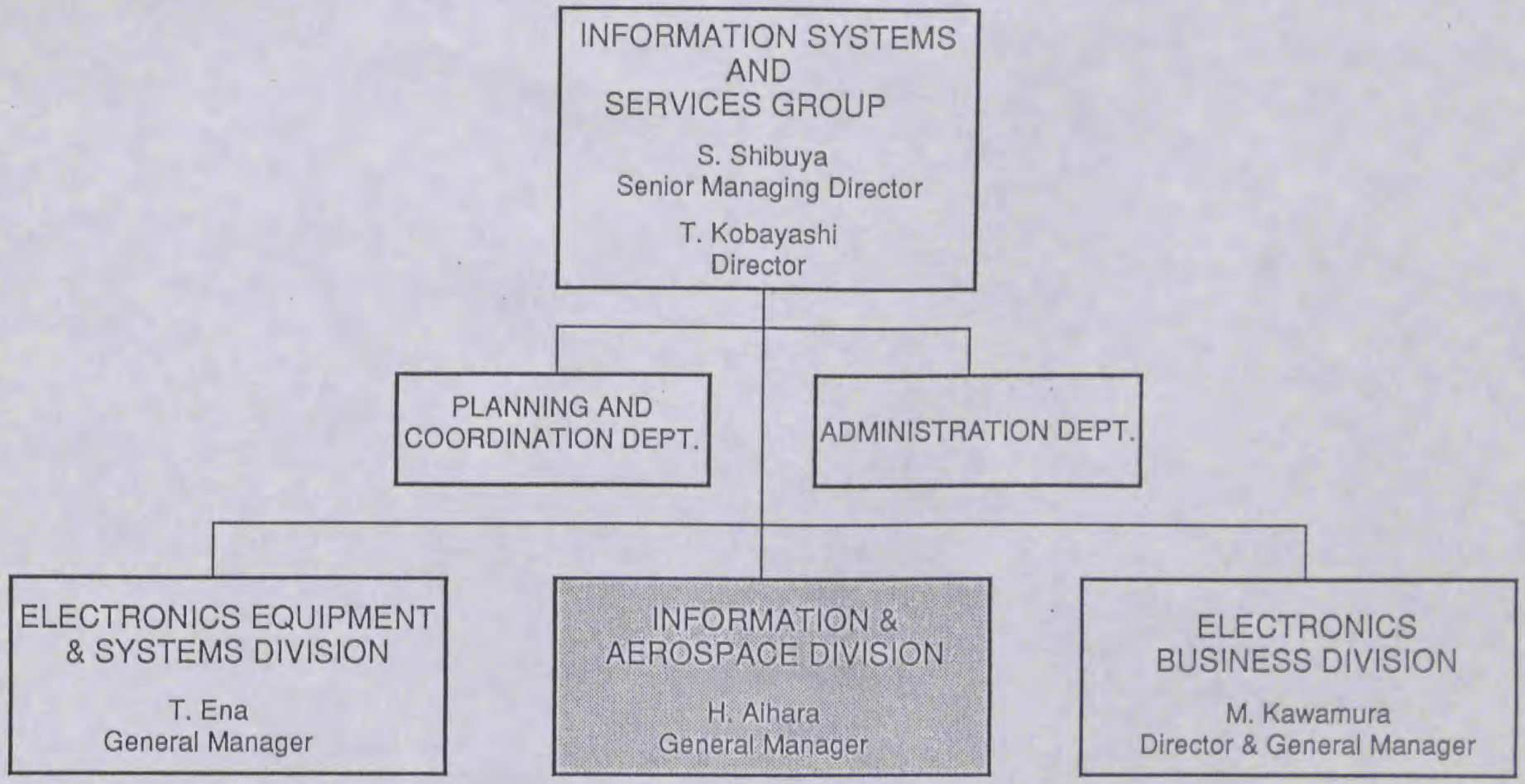
MC ORGANIZATION

CORPORATE



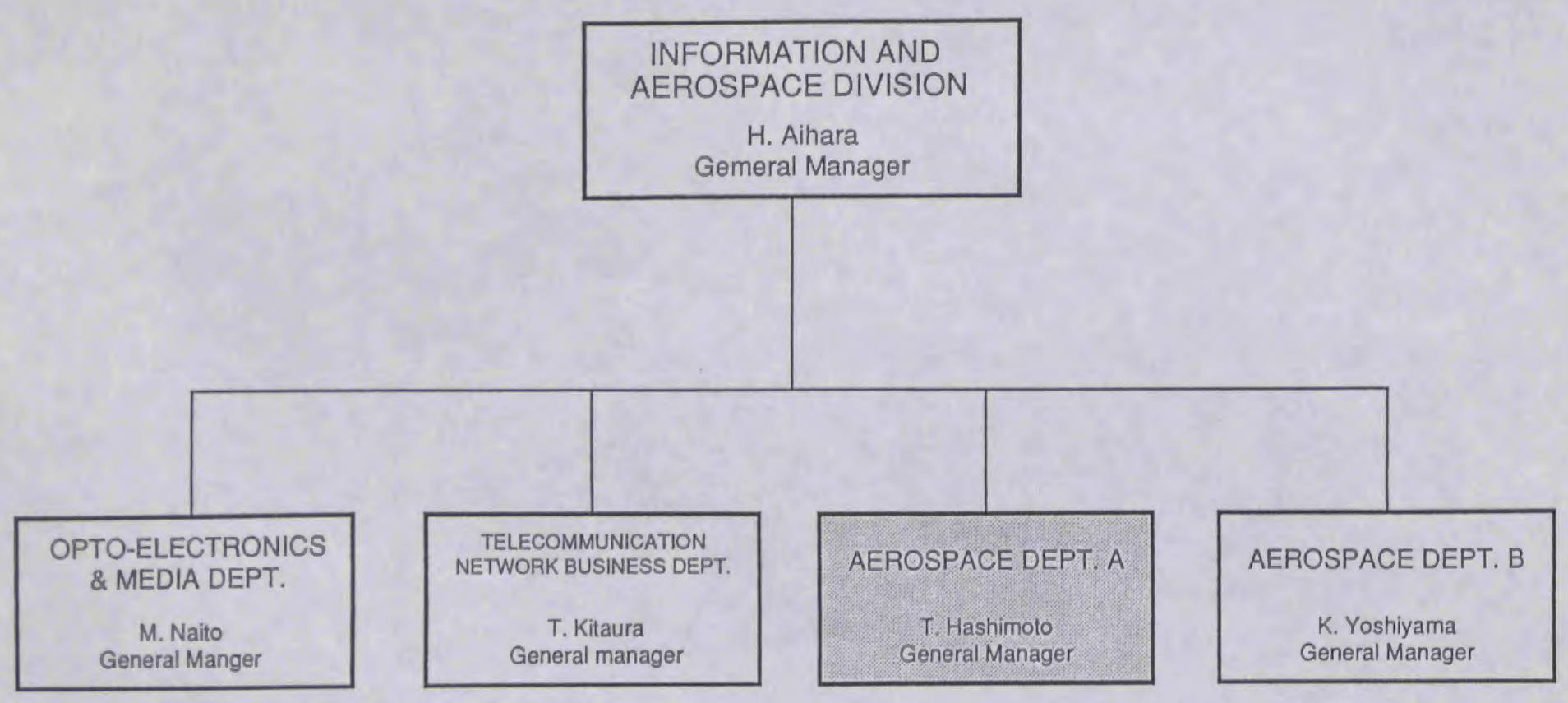
MC ORGANIZATION

INFORMATION SYSTEMS AND SERVICES GROUP



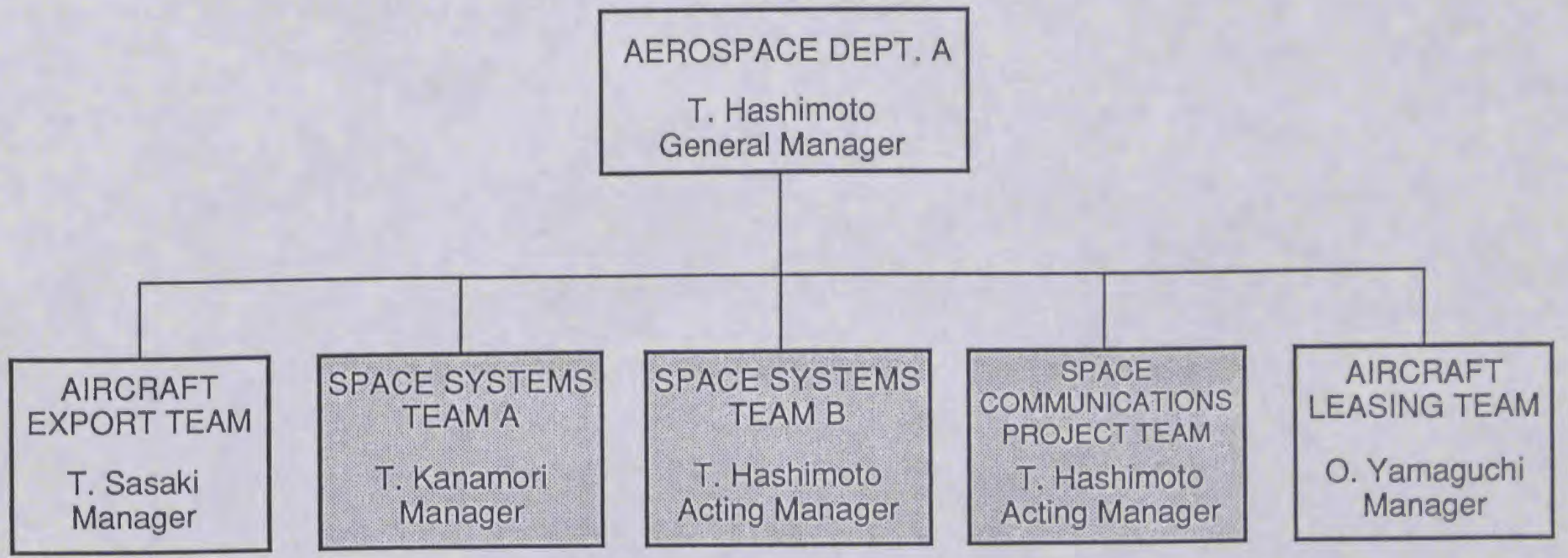
MC ORGANIZATION

INFORMATION AND AEROSPACE DIVISION



MC ORGANIZATION

AEROSPACE DEPARTMENT A



. DC-10/B767 Subcontracts
. Passenger Seat
. Galley/Lavatory
. Overseas Investment

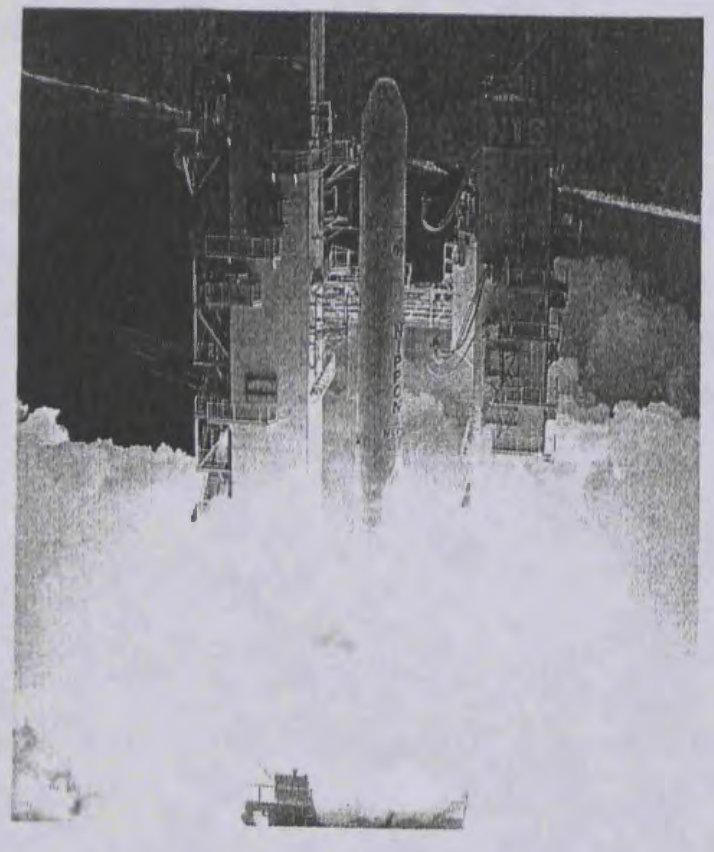
. Satellite procurement, export and marketing

. Launch vehicle
. Space Station
. Space Commercialization

. Satellite Telecommunication Service
. Management of five subsidiary companies involved in satellite telecommunication business

. Finance Arrangement for New Commercial Aircraft

MITSUBISHI CORPORATION
SPACE ACTIVITIES



MC: THE LEADER IN JAPANESE SPACE PROGRAMS

- **PIONEER IN MAKING MARKETS** FOR AND INTRODUCING OVERSEAS SPACE TECHNOLOGIES AND PRODUCTS FOR JAPANESE SPACE PROGRAMS.

- **UNMATCHED POSITION** AMONG TRADING COMPANIES IN THE BUSINESS OF JAPANESE SPACE PROGRAMS FOR OVER 20 YEARS.

- **DEEP INVOLVEMENT** IN MAJOR PROGRAMS

  - MORE THAN **70 %** SHARE OF LAUNCH VEHICLE BUSINESS

  - MORE THAN **50 %** SHARE OF SATELLITE BUSINESS

- **LONG-ESTABLISHED RELATIONSHIPS** WITH GOVERNMENT AGENCIES AS WELL AS THE JAPANESE SPACE INDUSTRIAL COMMUNITY.

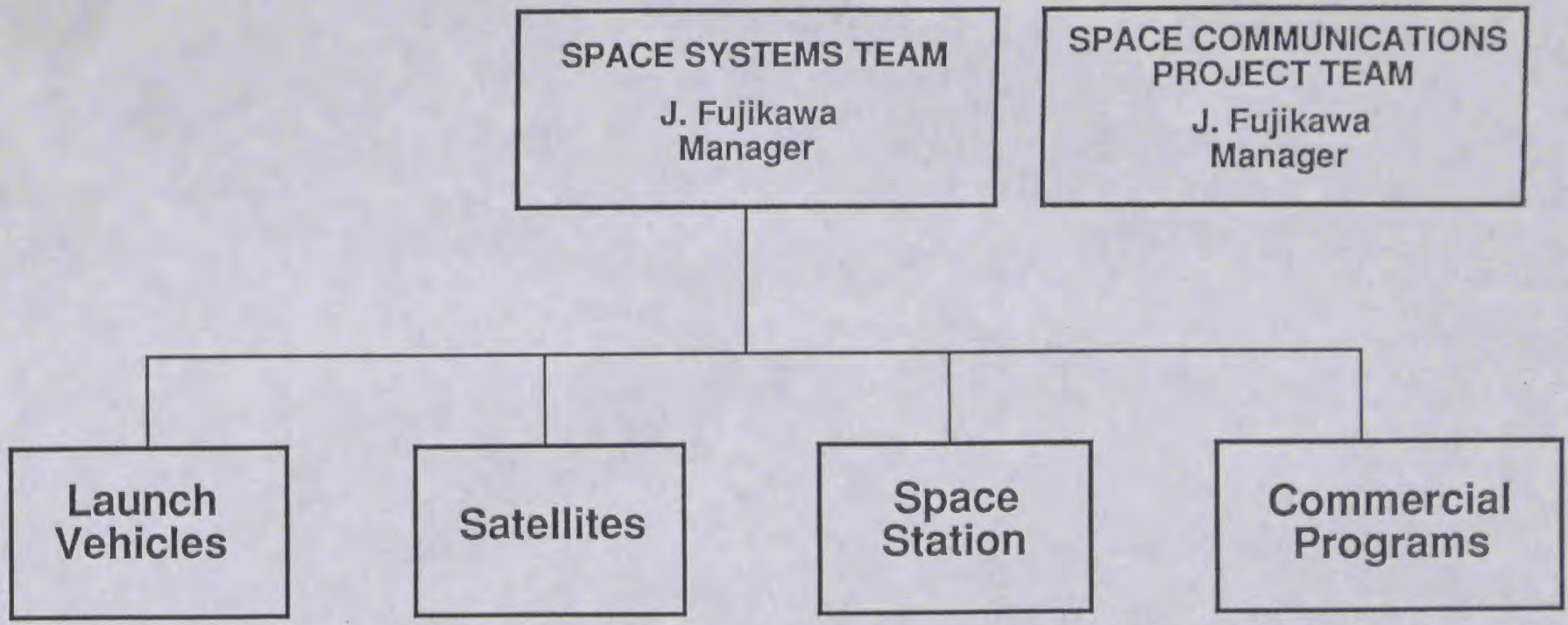
MC: MAKING MARKETS IN JAPAN

FOR SPACE PRODUCTS AND SERVICES FROM ABROAD

- ☆ SIGNIFICANT OPPORTUNITIES EXIST IN JAPAN FOR LEADING FOREIGN FIRMS WITH PRODUCTS, TECHNOLOGIES AND SERVICES TO MEET JAPANESE NEEDS.

- ☆ BUT LIMITED JAPANESE SPACE BUDGETS AND NATIONAL DEVELOPMENT POLICIES COMBINE TO COMPLICATE MARKET ACCESS. THE MARKET FOR FOREIGN PRODUCTS IS NOT READY MADE, BUT MUST BE CAREFULLY DEVELOPED.

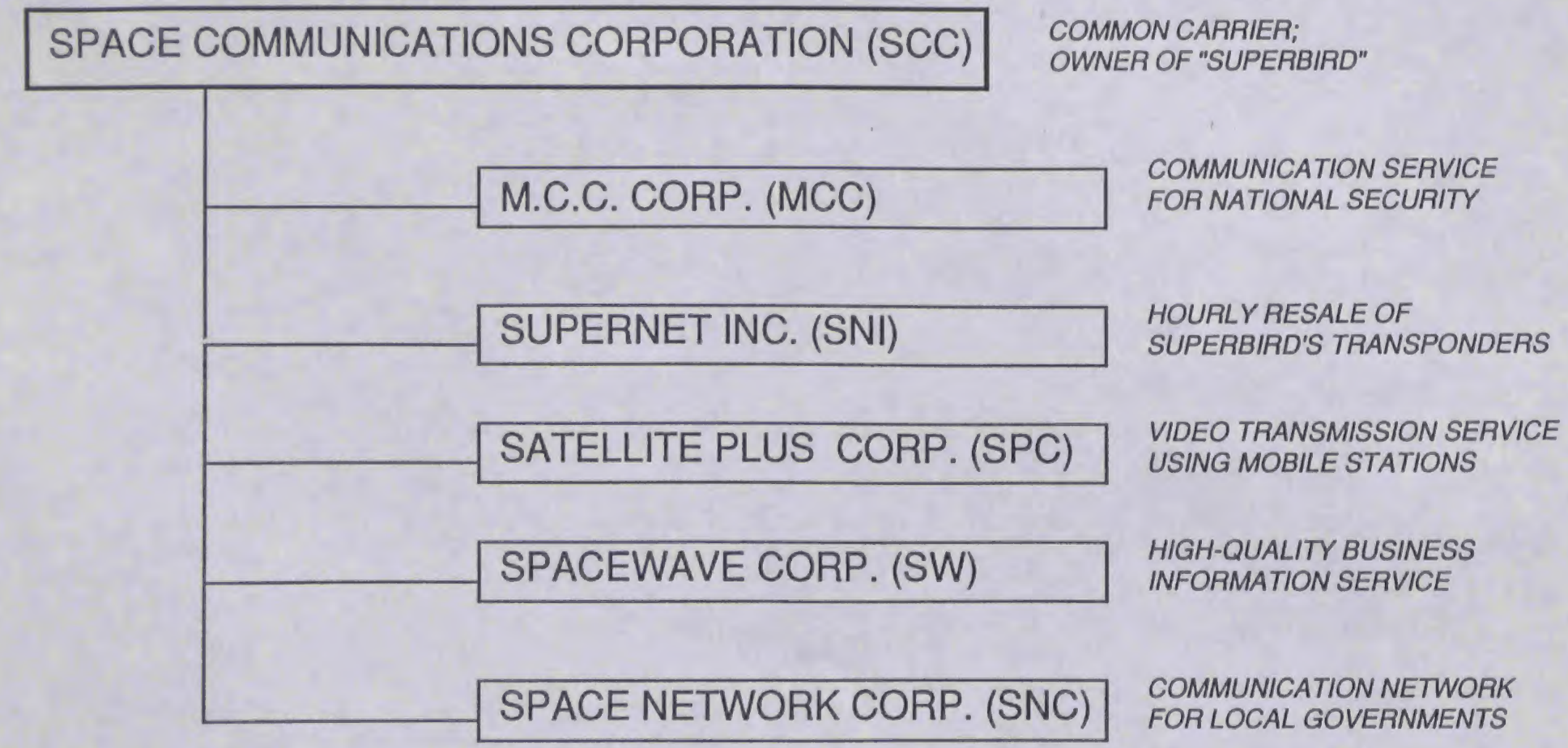
- ☆ MC HAS BEEN THE UNQUESTIONED LEADER IN THE DEVELOPMENT OF OPPORTUNITIES FOR FOREIGN FIRMS IN EVERY SIGNIFICANT SECTOR OF THE JAPANESE SPACE MARKET, INCLUDING JAPANESE LAUNCH VEHICLE, SATELLITE, SPACE STATION AND OTHER PROGRAMS.



UNMATCHED

ABOUT 50 PEOPLE WORK FULL TIME ON SPACE AT MITSUBISHI CORPORATION AND ITS SUBSIDIARIES. THE SPACE SYSTEMS TEAM, PART OF MC's PRESTIGIOUS AEROSPACE DEPARTMENT, IS A MAJOR MC PROFIT CENTER. SPACE SYSTEMS TEAM MEMBERS PROVIDE HUNDREDS OF YEARS OF COMBINED EXPERIENCE AND EXPERTISE IN EVERY AREA OF PAST, PRESENT AND FUTURE JAPANESE SPACE ACTIVITIES.

MITSUBISHI'S SATELLITE BUSINESS



SPACE COMMUNICATIONS CORPORATION (SCC)

DATE OF ESTABLISHMENT :	22 MARCH 1985
CAPITAL :	20 BILLION YENS (160 MILLION $)
MAIN STOCK HOLDERS	MITSUBISHI CORPORATION MITSUBISHI ELECTRIC CORPORATION AND 27 COMPANIES OF MITSUBISHI GROUP
ACTIVITY	TELECOMMUNICATIONS SERVICE
LICENSE	TYPE 1 COMMON CARRIER LICENSE TO COVER JAPAN GRANTED ON 22 JUNE 1986
EMPLOYEES	218
LAUNCH	6 JUNE 1989
START OF OPERATION	8 JULY 1989

SPACE COMMUNICATIONS CORPORATION (SCC)

- PIONNEER IN THE AGE OF ADVANCED COMMUNICATION SERVICES

- LEADER IN DOMESTIC SATELLITE COMMUNICATIONS

- SUPPLIER OF RELIABLE HYBRID COMMUNICATIONS SERVICE (Ka/Ku BAND)

SPACE COMMUNICATIONS CORPORATION (SCC)

- MULTIPLE BUSINESS SERVICE
  - HI-SPEED FACSIMILE TRANSMISSION
  - HI-SPEED DATA TRANSMISSION
  - TELEPHONE CIRCUITS
- TELECONFERENCE SERVICE
- CATV PROGRAMS DISTRIBUTION SERVICE
- TV PROGRAMS/COMMERCIAL MESSAGE DISTRIBUTION SERVICE FOR LOCAL TV STATION
- COMMUNICATIONS SERVICE FOR A NATURAL DISASTER
- COMMUNICATIONS SERVICE FOR REMOTE ISLANDS

FEATURES OF "SUPERBIRD"

-	**CONTRACTOR**	:	FORD AEROSPACE CORP.
-	**MASS**	:	2,500 Kg (Launch)
-	**PROPULSION**	:	BIPROPELLANT
-	**ATTITUDE CONTROL**	:	3 AXIS
-	**POWER**	:	3,800W (EOL)
-	**TRANSPONDERS**	:	10 Ka Band (29W: 32/20 GHz Band) 19 Ku Band (35W: 14/12 GHz Band) 2 X Band (40W: 8/7 GHz Band) TOTAL BANDWIDTH: 1,794 MHZ
-	**OPERATION LIFE**	:	10 YEARS
-	**LAUNCH**	:	SUPERBIRD-A JUN 1989 SUPERBIRD-E (TBD)
-	**LAUNCH VEHICLE**	:	ARIANE-4 (44L)
-	**SERVICE AREA**	:	Ka (30/20 GHz) Band NATIONWIDE Ku (14/12 GHz) Band Ka (30/20 GHz) Band TOKYO/OSAKA (SPOT BEAM) X (8/7 GHz) Band (MSS/FSS)

M.C.C. CORPORATION (MCC)

PRESIDENT: *S. TAKAGI*
HEADQUARTER: *TOKYO, JAPAN*
CAPITAL: *100 MILLION YEN*

MCC WAS ESTABLISHED JOINTLY BY MITSUBISHI CORPORATION AND MITSUBISHI ELECTRIC CORPORATION (MELCO). MCC IS THE ONLY PRIVATE COMPANY PROVIDING SATELLITE COMMUNICATION SERVICE FOR THE DEFENSE AGENCY OF JAPAN (JDA).

MCC IS CURRENTLY PROVIDING TELECOMMUNICATIONS SERVICE VIA **"SUPERBIRD"** AT X BAND AND AT Ka BAND FOR JDA; ITS SERVICES INCLUDES IDDN (INTEGRATED DEFENSE DIGITAL NETWORK) AND NAVAL SATELLITE COMMUNICATION SYSTEM, WITH GROWTH CAPABILITY TO MEET JDA'S FUTURE C3I (COMMUNICATION, COMMAND, CONTROL AND INTELLIGENCE) SYSTEM. MCC PLANS TO FURTHER EXTEND ITS SERVICE COVERAGE TO MEET THE GROWING DEMAND OF SATELLITE COMMUNICATION SERVICE FOR ALL SERVICES (NAVY, ARMY AND AIR FORCE).

SUPERNET, INC. (SNI)

PRESIDENT:	*T. OGAWA*
HEADQUARTER:	*TOKYO, JAPAN*
CAPITAL:	*4.9 BILLION YEN*

WITH ITS 7-METER DIAMETER ANTENNA LOCATED AT MITSUBISHI CORP. HQ., SNI SELLS THE TRANSPONDERS ON HOURLY BASIS FOR USERS WHO DO NOT NEED ONE FULL TRANSPONDER. SNI ASSISTS MITSUBISHI CORP.'S IN-COMPANY TV NETWORK AND OTHER VARIOUS EVENT BROADCASTING SERVICES.

SATELLITE PLUS CORP. (SPC)

PRESIDENT: *T. HASHIMOTO*
HEADQUARTER: *TOKYO, JAPAN*
CAPITAL: *2.2 BILLION YEN*

SPC HAS MOBILE UPLINK STATIONS FOR "ACTIVE" SERVICES SUCH AS SATELLITE NEWS GATHERING (SNG). SPC'S SERVICE TERRITORY ALSO INCLUDES PLANNING, OPERATION, PRODUCTION AND TRANSMISSION OF VARIOUS EVENTS LIKE TV CONFERENCE AND LIVE BROADCAST/TRANSMISSION OF SPORTS, CONCERT AND OTHER EVENTS.

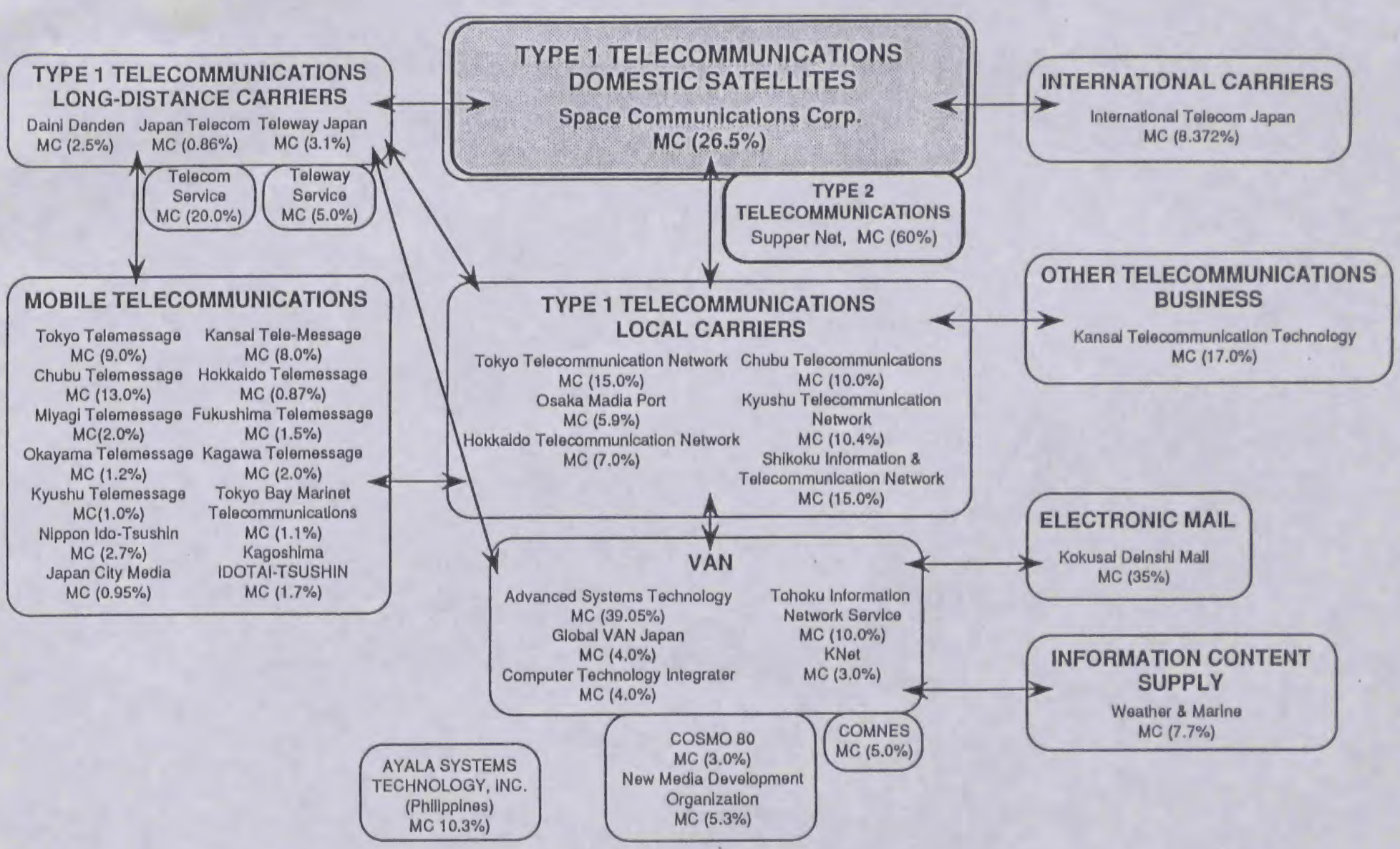
SPACEWAVE CORP. (SW)

PRESIDENT:	*Y. SHOGASE*
HEADQUARTER:	*TOKYO, JAPAN*
CAPITAL:	*30 BILLION YEN*

USING THE UNIQUE MEDIA OF SATELLITE COMMUNICATION, SW OFFERS ADVANCED, HIGH-QUALITY BUSINESS INFORMATION/NETWORK SERVICES ("NARROW-CASTING"), TARGETED TO COMPANY EXECUTIVES.

IN ADDITION TO VOICE/VIDEO TRANSMISSION, THE COMPANY PROVIDES SATELLITE INFORMATION TRANSMISSION SERVICE BY ONE-WAY (RECEIVE ONLY) FACSIMILE.

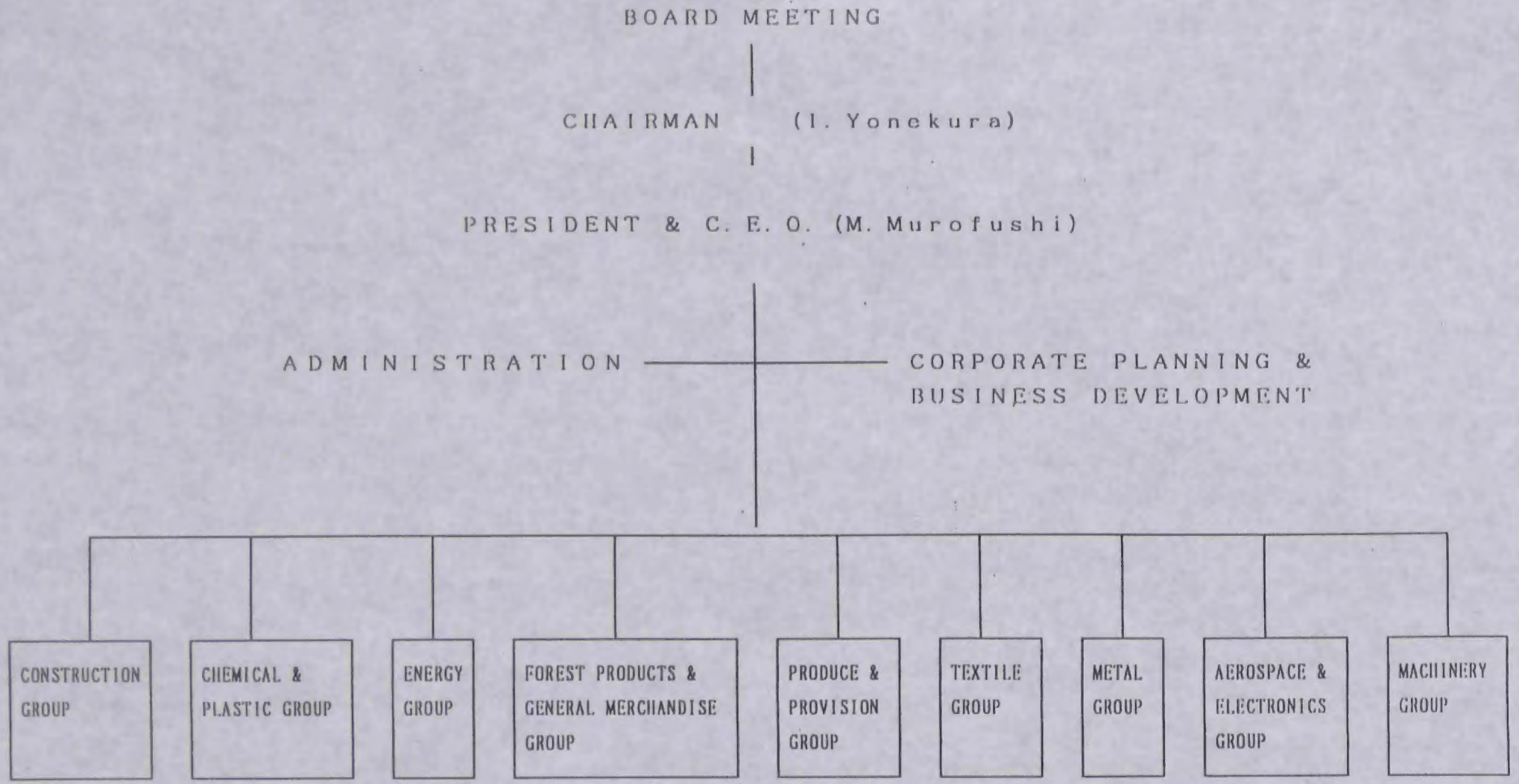
MC'S INVOLVEMENT IN TELECOMMUNICATION BUSINESS -- AN OVERVIEW



INTRODUCTION
OF
BUSINESS ACTIVITIES
OF
C. ITOH
IN
COMMUNICATIONS & ELECTRONICS FIELD

C. ITOH

FOUNDED	:	1858
TURNOVER	:	US$ 160 Billion (1989)
EMPLOYEE	:	7,000
WORLDWIDE NETWORK	:	OVERSEAS (85 COUNTRIES) 149 OFFICES & 119 AFFILIATED COMPANIES DOMESTIC 41 OFFICES & 198 AFFILIATED COMPANIES
DIVERSIFIED OPERATION	:	9 OPERATING GROUP COVERING ALMOST ALL INDUSTRIAL FIELDS


BOARD MEETING
CHAIRMAN (I. Yonekura)
PRESIDENT & C. E. O. (M. Murofushi)
ADMINISTRATION
CORPORATE PLANNING & BUSINESS DEVELOPMENT
CONSTRUCTION GROUP
CHEMICAL & PLASTIC GROUP
ENERGY GROUP
FOREST PRODUCTS & GENERAL MERCHANDISE GROUP
PRODUCE & PROVISION GROUP
TEXTILE GROUP
METAL GROUP
AEROSPACE & ELECTRONICS GROUP
MACHINERY GROUP

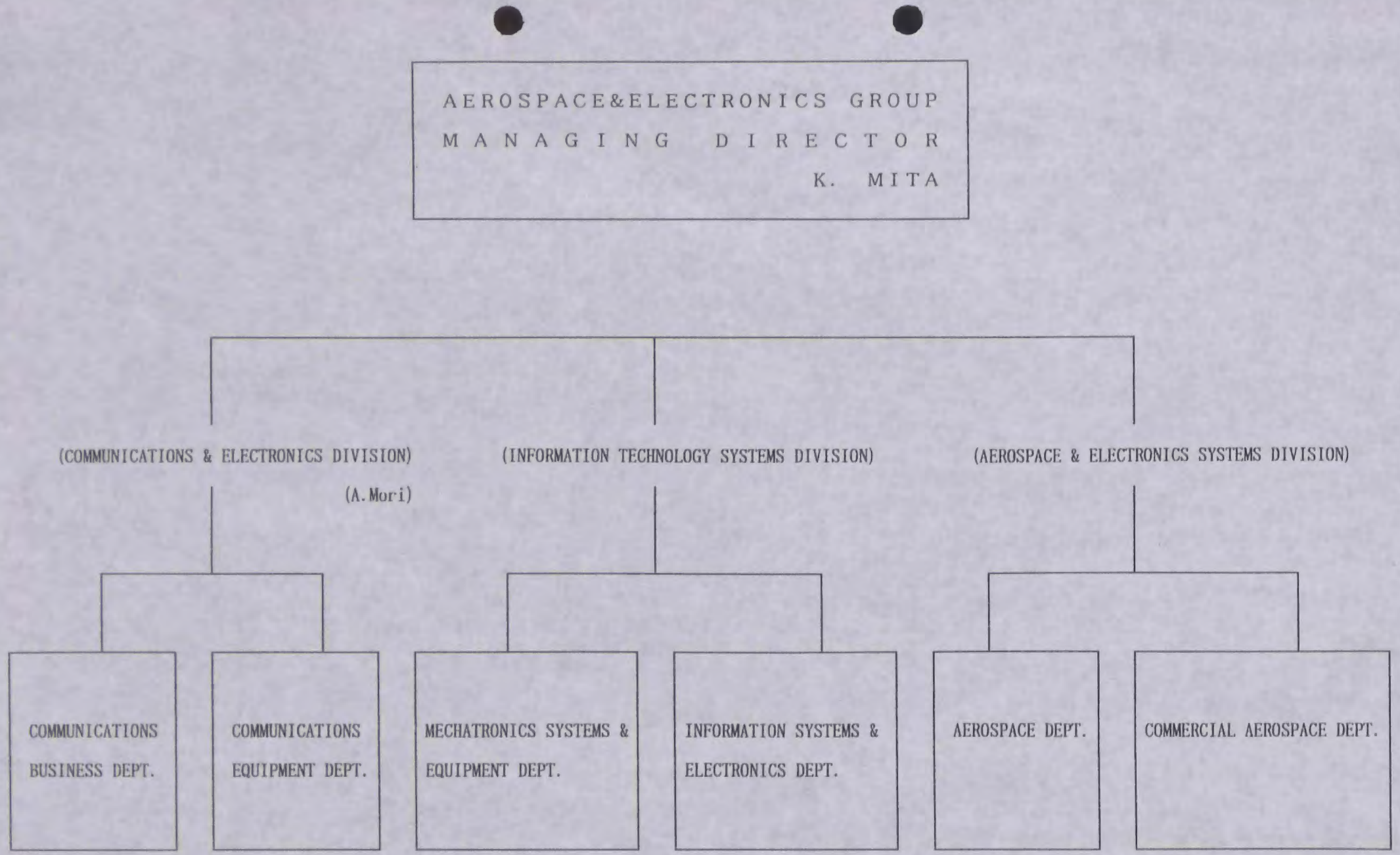
AEROSPACE & ELECTRONICS GROUP

45 SUBSIDIARY COMPANIES
US$ 7BILLION (F. Y. 1989)

COMMINICATIONS & ELECTRONICS DIVISION
* COMMUNICATIONS BUSINESS DEPT.
COMMUNICATIONS EQUIPMENT DEPT.

INFORMATION TECHNOLOGY SYSTEMS DIVISION
MECHATRONICS SYSTEMS & EQUIPMENT DEPT.
INFORMATION SYSTEMS ELECTRONICS DEPT.

AEROSPACE & ELECTRONICS SYSTEMS DIVISION
AEROSPACE DEPT.
COMMERCIAL AEROSPACE DEPT.


AEROSPACE&ELECTRONICS GROUP
MANAGING DIRECTOR
K. MITA
(COMMUNICATIONS & ELECTRONICS DIVISION)
(A.Mori)
(INFORMATION TECHNOLOGY SYSTEMS DIVISION)
(AEROSPACE & ELECTRONICS SYSTEMS DIVISION)
COMMUNICATIONS BUSINESS DEPT.
COMMUNICATIONS EQUIPMENT DEPT.
MECHATRONICS SYSTEMS & EQUIPMENT DEPT.
INFORMATION SYSTEMS & ELECTRONICS DEPT.
AEROSPACE DEPT.
COMMERCIAL AEROSPACE DEPT.

C. ITOH HAS
INVESTED AND WILL INVEST
IN VARIOUS COMMUNICATION
CARRIER PROJECTS

DEREGULATION OF COMMUNICATION INDUSTRY WORLDWIDE IS OPENING NEW OPPOTUNITIES FOR NEW COMERS

NEW TECHNOLOGIES WILL MAKE MANY NEW BUSINESS FEASIBILE

PEOPLE WILL PAY MORE FOR TIMELY NAD WELL-ORGANIZED INFORMATION

BETTER COMMUNICATION INFRASTRUCTURE WILL REDUCE THE PROBLEMS OF GEOGRAPHICAL SEPARATION OF THE BUSINESS, AND THUS MAKE WORLDWIDE DIVISION FO WORK MUCH EASIER

SATELLITE COMMUNICATIONS BUSINESS

CITOH'S OBJECTIVE IN JCSAT PROJECT

- DIRECT INVOLVEMENT IN COMMON CARRIER BUSINESS

- CREATE A CHANCE TO PARTICIPATE IN THE SATELLITE RELATED PROJECTS

  (EXAMPLE)
  - JSNET
  - VIDEOSAT
  - JAPAN VIDEOCIPHER
  - NIKKEN SATELLITE
  - SPACE SHOWER
  - SAT-ED
  - SPORTS CHANNEL

- CREATE OTHER BUSINESS CHANCES SUCH AS SUPPLY OF PRODUCTS/EQUIPMENT

J C S A T

- BUSINESS : TYPE I TELECOMMUNICATIONS CARRIER
  SATELLITE OWNER (HUGHES HS-393 2UNITS)
- ESTABLISHED : FEB. 1985
- TOTAL INVESTMENT : ¥87.2 BILLION
- PAID-UP CAPITAL : ¥24 BILLION (AS OF JAN. 1990)
- SHAREHOLDERS : C. ITOH 40%
  MITSUI 30%
  HUGHES 30%
- SERVICE START : APRIL, 1989
- TYPE I TELECOMMUNICATIONS SERVICE:
- TOTAL SATELLITE TELECOMMUNICATIONS SERVICES

CURRENT STATUS OF JCSAT TRANSPONDER SALES

APPLICATION:

VIDEO	–	25	
AUDIO	–	1	(CANDIDATE)
DATA	–	4	
(JSNET	–	1)	
NTT	–	13	
TOTAL	–	43	

TRANSPONDER SALES (CONTINUED)

USER TYPE:

UPLINKER	–	6
CORPORATE VIDEO	–	8
PROGRAM SUPPLY	–	6
VSAT	–	1
NTT (ISDN/VIDEO BACKHAUL)	–	13
OTHERS	–	9
TOTAL		43

OTHER: JOINT USE, AUCTION, SCHOOL etc.

J S N E T

- BUSINESS : TYPE II TELECOMMUNICATIONS CARRIER
  VSAT NETWORK OPERATOR
- ESTABLISHED : JULY 1987
- TOTAL INVESTMENT : ¥20 BILLION
- CAPITAL : ¥2.5 BILLION (AS OF JAN. 1990)
- SHAREHOLDERS :

C. ITOH	25.4%
MITSUI	25.4%
NEC	20.0%
HUGHES	10%
OTHERS	19.2%

- SERVICE START : 3rd QUARTER OF 1989
- ANTICIPATED NUMBERS OF ANTENNAS: 30,000 FOR 10 YEARS
- APPLICATIONS: FACSIMILE, TV TELEPHONE,
  COMPUTER (DATA) COMMUNICATIONS,
  COMPRESSED VIDEO TRANSMISSION,
  TV CONFERENCE, ETC.

- TARGET: 30,000 IN TEN YEARS' TIME

- AS OF July. 1990:
  ABOUT 30 COMPANIES/
  400 TERMINALS

- FACILITIES:

  1) HUB CENTER IN GUNMA PREFECTURE (11m DISH)

  2) TOKYO HUB CENTER (HQ BLDG) 3.3m DISH

OUTLINE OF JSNET LONG-TERM PLAN

	VSAT TERMINALS (ACCUMULATIVE)	REVENUE (MIL $)
1990	1,700	25
1992	6,000	70
1994	12,000	120
1996	18,000	200
1998	26,000	250

VSAT NOW

1) JSNET

2) VSAT CORPORATE NETWORK

- NEC
- FUJITSU
- HITACHI

3) JOINT USE
(VSAT DEVELOPMENT?)

- STAR COMMUNICATIONS
NTT/MATSUSHITA/NISSAN
etc.

V I D E O S A T

- BUSINESS : TYPE II TELECOMMUNICATIONS CARRIER
  UPLINKING AND VIDEO TRANSMISSION SERVICES
- ESTABLISHED : AUG. 1987
- ANTICIPATED TOTAL INVESTMENT : ¥2 BILLION
- CAPITAL : ¥1.0 BILLION (AS OF END JAN. 1990)
- SHAREHOLDERS :

C. ITOH	39%
NTT	18%
CLS	15%
HAKUHODO	12%
OTHERS 9 PARTIES	16%

- APPLICATIONS:
  - CRAM SCHOOLS NETWORK
  - IN-HOUSE TRAINING
  - EVENT/CONVENTION
  - BGV (BACK GROUND VIDEO)
  - OTB (OFF TRACK BETTING)
  - PROPAGATION, ETC.

JAPAN VIDEOCIPHER (JVCC)

- BUSINESS : SCRAMBLING BUSINESS
  - HARDWARE (SCRAMBLER, DESCRAMBLER) OF "VIDEOCIPHER PLUS" DISTRIBUTION
  - AUTHORIZATIONS (ADDRESSING) CENTER OPERATIONS
- ESTABLISHED : MAY. 1989
- CAPITAL : ¥700 MILLION (AS OF JAN. 1990)
- SHAREHOLDERS :

C. ITOH	: 69. 2%
GENERAL INSTRUMENT	: 12. 5%
CENTURY RESEARCH CENTER	: 12. 5%
TOSHIBA	: 4. 8%
ALL JAPAN RADIO & TELEVISION ENGINEERING SERVICES CO., LTD	: 1. 0%

- USERS : CATV PROGRAM SUPPLIERS & VIEWERS
  REMOTE ACTION CO.
  TV BROADCASTER ETC.

NIKKEN SATELLITE

- BUSINESS : TYPE II TELECOMMUNICATIONS CARRIER
  ARCHITECT'S SATELLITE NETWORK
- ESTABLISHED : JUNE, 1987
- CAPITAL : ¥50 MILLION (AS OF JAN. 1990)
- SHAREHOLDERS :

KENCHIKU SIRYOO	: 70%
C. ITOH	: 15%
CLS	: 5%
SUMITOMO BANK	: 5%
THE OTHER	: 5%

- CUSTOMERS : ARCHITECTS, CARPENTERS
- SERVICE MENU : LIFE TIME EDUCATION PROGRAM FOR ARCHITECTS AND CARPENTERS, SUPPLY OF INFORMATION ON CONSTRUCTION AND ARCHITECTURAL BUSINESS
- SIZE OF NETWORK : 3,000 AS OF JAN. 1990

SATELLITE ARCHITECTURAL OFFICE NETWORK

1) CONTENTS:
   - ARCHITECTURE TRAINING
   - ARCHITECTURE REGULATION/LAW
   - CONSTRUCTION MATERIAL INFORMATION
   - MODERN CONSTRUCTION METHOD

2) SITE:
   3,000 ARCHITECT OFFICES ALL AROUND JAPAN

3) PRODUCTION:
   ALL PROGRAM PRODUCTION/DISTRIBUTION DONE BY "NIKKEN"
   (30 MIN PROGRAM EVERY DAY, REPEAT TWO TIMES)

4) RECEIVING EQUIPMENT:
   1.8 m STEARING TYPE DISH

SPACE SHOWER INC.

- BUSINESS : PRODUCTION/SUPPLY OF MUSIC PROGRAMS FOR CATV OPERATORS AND SMATV'S
- ESTABLISHED : JAN. 1989/SERVICE-IN DEC. 1989
- CAPITAL : ¥1, 215 MILLION (AS OF JAN. 1990)
- MAJOR SHAREHOLDERS :

EXPRESS GROUP	49. 4%
C. ITOH	19. 8%
SHOUWA LEASE	6. 6%
RECORD PRODUCTIONS (34 PARTIES)	20. 9%
MITSUI	3. 3%

- REMARKS : AS OF JAN., 1990 ABOUT 30 CATV OPERATORS RECEIVE THIS PROGRAM

JAPAN SPORTS CHANNEL

- BUSINESS : 24-HOUR SUPPLY OF SPORTS PROGRAMMING FOR CATV OPERATORS AND SMATV'S
- ESTABLISHED : JULY, 1987
- CAPITAL : ¥100 MILLION (AS OF JAN. 1990)
- MAJOR SHAREHOLDERS :

C. ITOH	33.5%
CC/ABC VIDEO ENTERPRISES	16.5%
NHK ENTERPRISES	10.0%
KORAKUEN	10.0%
SUNTORY	10.0%
DENTSU	10.0%
TOKYU AGENCY	10.0%

SÁT. EDUCATION

·BUSINESS	:TYPE II TELECOMMUNICATIONS CARRIER CRAM SCHOOLS NETWORK	
·ESTABLISHED	:JUNE, 1986	
·CAPITAL	:¥100 MILLION(AS OF JAN. 1990)	
·SHAREHOLDERS	:GAKKYU-SHA	55%
	C. ITOH	5%
	OTHER 8 PARTIES	5% each
·SERVICE MENU	:REAL-TIME LECTURING IN REMOTE AREA	

TYPICAL APPLICATION SAMPLES

OF

JCSAT'S CUSTOMERS

JAPAN BUSINESS TV

(JOINT USE BY AUCNET AND MAZDA
BY WAY OF FREQUENCY DIVISION)

1) MAZDA:

DEALER NETWORK OF 300

- TRAINING
- PR
- INTRODUCTION OF NEW CARS

2) AUCNET:

SATELLITE CAR AUCTION BY 2,200 USED CAR DEALERS

YOYOGI SEMINAR

- LARGEST PREPARATION SCHOOL IN JAPAN
- SATELLITE SEMINAR LINKING 30 SCHOOLS ALL AROUND JAPAN
- CONTENTS:
  - LECTURES BY WELL-KNOWN TEACHERS FOR STUDENTS PREPARING FOR ENTRANCE EXAMS
  - TO BRING EDUCATION GAPS BY AREAS TO MINIMAL
- ONE WAY VIDEO (SATELLITE) / RETURN AUDIO (TERRESTRIAL)

NTT DATA NETWORK

- JOINT USE BY NISSAN AND MATSUSHITA

- NISSAN:

  DEALER NETWORK ALL AROUND JAPAN BY 1,000~2,000

- MATSUSHITA:

  PANASONIC SHOPS ALL AROUND JAPAN BY 25,000

- CONTENTS:

  - PR
  - TRAINING
  - INTRODUCTION OF NEW PRODUCTS

SATELLITE RELIGION (AGONSHU)

- EMERGING RELIGION GROUP "AGON"
- 300,000 BELIEVERS
- LINKING 20 AGON CHURCHES ALL AROUND JAPAN, EXPANDING ITS NETWORK
- CONTENTS:
  - -SERMONS BY AGON PRIESTS
  - -AGON CEREMONIES
  - -AGON FESTIVALS
  - -SUBLEASING TRANSPONDER CAPACITY

CATV INDUSTRY IN JAPAN

1) LICENSED OPERATORS: 826
(MORE THAN 500 SUBSCRIBERS)

SUBSCRIBING HOUSEHOLDS :1.7 MIL

TOTAL SUBSCRIVING HOUSE HOLDS
INCLUDING SMALL CATVS :5.8 MIL

2) URBAN TYPE OPERATORS :ABOUT 50
--- 〃- -- APPLICANTS : 〃 250
SUBSCRIBING HOUSEHOLDS : 〃 400K

INTERNATIONAL
TELECOMMUNICATIONS
BUSINESS

INTERNATIONAL DIGITAL COMMUNICATIONS INC. (IDC)

LICENSED : NOV. 1987 AS OF TYPE I
INTERNATIONAL COMMON CARRIER

SHAREHOLDERS :

C. ITOH	IBJ
CABLE & WIRELESS	DKB
TOYOTA	LTCB
PACIFIC TELESIS	NEC
	FUJITSU
	MERRILL LYNCH
	OTHERS (TOTAL 144 COMPANIES)

SERVICE START : MAY 1989 LEASED CIRCUIT SERVICE
OCT. 1989 PUBLIC TELEPHONE SERVICE

TOTAL INVESMENT : 41 BIL YEN AT 1ST STAGE
9 BIL YEN AT 2ND STAGE

N P C

- OWNERSHIP : 50% PTC (PACIFIC TELECOM CABLE)
  30% IDC
  20% C&W
- CAPACITY : 1260 Mbps (420 Mbps 3 pairs)
- COST : ABOUT 50 BIL YEN
- SUPPLIER : STC (UK/US), NEC (JAPAN)
- ROUTING : DIRECT CONNECTION BETWEEN USA AND JAPAN, WITH SPUR FROM OREGON TO ALASKA
- TRAFFIC FROM ASIA TO USA COULD GO THROUGH NPC

TELESAT M-SAT PROJECT PART I

·Description : Mobile Communications services
via satellite

·Satellite : 1 Satellites with L-Band transponders

·Satellite Launching : 1993

·Service Start : End of 1993

·Service Menu : Mobile telephone, Positioning etc.

·M-Sat covers following market:
Car, Truck, Airplane, Vessel,
rural area communications, etc.

Market Demand : 600k (1987)
1,000k (2000)

Projected subscribers: 40k(Voice)
80k(Data)
120k total

TELESAT M-SAT PROJECT PART II

- Total Budget : C$360 million

- Projected Shareholders of M-Sat : 50% Telesat
  (Capital: C$100 million) 30% Canadian Pacific
  20% Japanese investors Group

BUSINESS WITH QUALCOMM

1. 20,000 UNITS RF HEADS CONTRACTED WITH QUALCOMM FOR USA USE

2. CITOH IS ABOUT 1% SHAREHOLDER ($1 MIL) OF QUALCOMM

3. PLANNING MOBILE COMMUNICATION SERVICE COMPANY IN JAPAN USING QUALCOMM TECHNOLOGY (KU-BAND ON JCSAT)

C I C E

(C. ITOH COMMUNICATIONS GmbH)

FOUNDED : 1986

TURNOVER : DM50 MILLION
(FY1989 ESTIMATE)

OPERATION · DISTRIBUTION OF
TVRO EQUIPMENTS
FOR ALL EUROPE

· DEVELOPMENT OF NEW
TELECOMMUNICATION
BUSINESS

ORGANIZATION:

HEAD QUARTER--DUSSELDORF
BRANCH --LONDON

POSSIBLE FUTURE PROJECT

- GLOBAL FACSIMILE/E-MAIL NETWORK
- INTERNATIONAL PAGING/VOICE MAIL
- INTERNATIONAL TV CONFERENCE NETWORK
- PCN PROJECT IN UK
- CELLULAR MOBILE PHONE OPERATION IN INDONESIA
- OFF-TALK PROJECT IN JAPAN AND OTHER COUNTRIES
- TV BROADCASTING/NEWS PAPER PUBLISHING FOR JAPANESE RESIDENTS IN OVERSEAS COUNTRIES
- HDTV TRANSMISSION TO AND FROM JAPAN

C. ITOH IS ONE OF THE MAJOR TURN-KEY SUPPLYERS FOR PTT'S WORLDWIDE

- 25 YEARS HISTORY
- US$ 300-400 MILLION/YEAR (ABOUT 6-7% OF JAPANESE EXPORT OF TELECOMMUNICATION EQUIPMENTS)
- PRESENCE IN 42 COUNTRIES
- C. ITOH TAKES CARE OF COMMERCIAL/FINANCIAL ISSUES WHILE MANUFACTURERS TAKE CARE OF ENGINEERING/PRODUCTION/INSTALLATION/SERVICE

THE COUNTRIES WHERE C. ITOH HAS SUPPLY RECORDS OF TELECOMMUNICATION PRODUCTS

Algeria
Argentina
Bahrain
Brunei
Colombia
China
Costa Rica
Chile
Cuba
Denmark
East Germany
Egypt
Ethiopia
Ghana
Hong Kong
India
Indonesia
Ireland
Jordan
Kenya
Malaysia
Norway
Netherland
Panama
Pakistan
Qatar
Singapore
Sri Lanka
Sweden
Swaziland
Somalia
Tanzania
Taiwan
Tunisia
Thailand
Turkey
U. A. E.
Uganda
Uruguay
U. S. A.
Venezuela
Zimbabwe

TELECOM EQUIPMENT
CITOH HANDLES

- TELECOM SWITCHING EQUIPMENT (NEC/FUJITSU)
- TRANSMISSION EQUIPMENT (-- 〃 --)
  -MICRO/OPTICAL FIBER
- CELLULAR PHONE SYSTEM (MATSUSHITA/NEC)
- SUBMARINE CABLE SYSTEM (FUJITSU)
- SATELLITE EARTH STATION (NEC)
- ANTENNA/RECEIVER (DX/MASPRO)
- KEY TELEPHONE (MATSUSHITA)
- CATV SYSTEM (SCIENTIFIC ATLANTA)
- SATELLITE SCRAMBLING SYSTEM (GENERAL INSTRUMENT)
- FACSIMILE (HITACHI/MATSUHITA)
- RADIO PAGING SYSTEM (NEC)

C. ITOH IS AN ALLY OF NTT IN MANY AREAS

- NTT IS THE BIGGEST SINGLE CUSTOMER OF JCSAT
- IDC'S ENGINEERING DIVISION IS ALMOST ENTIRELY SUPPORTED BY NTT
- NIPPON TELEMATIQUE INC. - J/V OF NTT & C. ITOH
  TARGETS TO PROVIDE VAN SERVICES IN FUTURE
- C. ITOH PROVIDED PLANNING MANAGER FOR NTT'S PC-NET
- MANY PROJECTS ARE JOINTLY DEVELOPED BY NTT AND C. ITOH

JOINT VENTURE WITH NTT

V A N

INTERNET
NTT TOUR MEDIA
VIDEO-SAT
NTT CHUOO TELECONNET

DATA-BASE

NTT-BIS
ELECTRONIC LIBRARY
CAMPAS LINE

VIDEOTEX

CAPTAIN SERVICE
NIPPON TELEMATIQUE
KOBE PORT CAPTAIN

SYSTEM INTEGRATION

NTT INTERNATIONAL

OPERATOR SERVICE

NTT TELEMARKETING