Keeping up with the future

Telefónica is constantly striving to provide top quality telecommunications services to meet the fast-growing demands of modern day Spain, set to step into the Information Age. We are firmly convinced that economic and social developments are becoming increasingly reliant on the quick and efficient transmission of information.

We are currently second in Europe in terms of public packet switching data network connections and have the fifth highest number of telephones in service. However, there is still room for growth. We aim to offer our customers universal telecommunications services, founded on a highly sophisticated digital network which will provide the essential framework for the new Information Age.

At **Telefónica** we have a forward-looking, market-driven approach to growth. We are determined to keep one step ahead of public demand. This means both expanding the basic telephone service and at the same time offering brand-new Information Age services to satisfy the needs of our residential, business and large corporation customers.

The Buitrago earth Station. International satellite communications Centre.

1986: Quantity and quality upgrading

The telephone service is a top priority in Spain, not only because of its economic role but equally due to the social benefits it brings. In 1986, with almost 10 million access lines in service, we are nearing a ratio of 25 lines per 100 inhabitants and providing service to 54% of all homes. Our target for 1990 is 30 lines per 100 inhabitants with 65% of households connected.

1986 was an outstanding year, which witnessed record increases in the Company's performance. Telephone service strategy was modelled on the three criteria of **expansion, quality upgrading** and **new services provision.** This was matched by a terrific surge in demand, reflecting the progressive transformation of Spain into an **Information Society.** There were 963,037 telephone line applications, a record in the history of **Telefónica** and an increase of 27% over the previous year. The net increase in demand was 506,743 lines, 45.5% up on 1985.

By the end of the year, Spain had a total of 9,785,254 lines installed and 14,784,231 telephones in operation, i.e. 37.81 telephones for every 100 inhabitants. Telephone service enhancement was also reflected in trunk and international traffic, which grew by 7.6% and 14.6% respectively.

Spain is stepping ahead to the Information Age. Bolstering the huge surge in demand for telecommunications there is a new entrepreneurial fabric of information-based firms such as the brokerage house Eurocapital (centre). To meet the new challenges, **Telefónica** has set out to capture the market with our «Teletiendas» (Teleshops: top, right) and our fleet of Subscriber Service buses (above). At our Information Systems department, Luis Alvarez, Antonio Aceña y Pedro Gamero (bottom, left to right) have developed MIGA, a fully computerised Subscriber Service management system now in operation.

In the rural community

Telefónica is endeavouring to expand telephone services throughout the rural community. The telephone has a vital role to play in the daily lives of those folk living in sparsely populated areas. **Telefónica** hopes to gain the firm backing of the local and regional authorities, together with that of the European Community via the STAR program.

Last year we formed 168 new Local Zones and installed 604 Public Service Telephones in rural areas. We also signed cooperation agreements with seven of the Regional Autonomies and two of the Provincial Authorities under the Royal Decree 2248/84 governing the expansion of telephone services throughout the rural community. Under these agreements, **Telefónica** will form 109 new Local Zones and install 404 more Public Service Telephones.

The expansion of the telephone service has met with a warm welcome and **Telefónica** intends to negotiate further agreements with the different local and regional bodies in order to ensure a healthy growth in this field. What is more, one of our top technological priorities is to develop advanced systems of rural communication and thereby provide an extensive, reliable, cost-efficient service.

Our goal is to build up a network of analog and digital multi-access systems to serve those sparsely populated areas and so ensure that the demand for basic communication services is readily met.

We are committed to expanding the telephone service throughout the rural communities. The village of Urrizola and the farms in the Ulzama valley, on the slopes of the Navarre Pyrenees, is the working area covered by Outside Plant Technicians Manuel García (at the wheel, above), Juan Sarasate and Marino Gorria (bottom). The installation of modern digital multiaccess radio systems will significantly upgrade the quality and efficiency of communications in rural areas.

Supplementary services breakthrough

Along with basic telephone services, we are aiming to market a whole package of brand-new Supplementary Telephone Services (STS). The steady introduction of digital switching exchanges will enable us to offer our customers a range of highly practical new services along with the more traditional ones. Any user whose telephone is connected to a digital exchange will be able to take full advantage of these.

New features will include call waiting, conference calls, rerouting of calls and pre-programmed dialling. By 1990, following the major modernisation and digitization programs currently under way, we plan to be offering these new features to over 500,000 subscribers.

During 1986 we developed several advanced telephone facilities, which are now being piloted from the Madrid-Atocha digital exchange, in preparation for marketing.

The Madrid-Atocha digital
switching centre now
enables us to offer
customers a wide range
of Supplementary Telephone
Services. Technician Juan
Romera checks an LIC
subscriber's card.
Companies such
as the Catalan firm,
Takio, S. A., design
equipment which uses our
network to supply new
services such as a medical
check-up by phone.

New communication solutions

Telefónica's star product in **Data Communications** is the **Iberpac Network**. This has been steadily upgraded since 1971 and was the driving force behind one of our major technological achievements: the **Tesys** system. It stands at the technological forefront in network management and packet switching and its outstanding quality is reflected in the export rate, in keen competition with other major world suppliers.

There are currently over 32,000 Iberpac connections, making **Telefónica**'s packet switching network one of the largest in Europe. By 1990 there will be 66,000 Iberpac connections, offering a range of telecommunications services, such as the dataphone, teletext and videotex. In addition, we offer **Facsimile and Data Communication Services** over the telephone network, such as the **Dafo, Telefax** and **Coded Alarm Services.**

Particularly important were the steps taken to introduce the **X25 protocol** into the **Iberpac Network**, which has led to an eightfold increase in Node Switching capacity. Equally significant was the piloting of the **X28 protocol**. This service will be in action by early 1987 and will provide simple, low-cost communication between personal and mainframe computers.

Computers need to communicate with each other. When José Luis Ozcoidi (right), from Caja de Ahorros Municipal de Pamplona (Pamplona Savings Bank) decided to modernize their data processing system, our Marketing Area Manager Jesús-Mari Abarzuza (left) came up with the high-tech solution: Iberpac X25. Every day millions of Spaniards use their credit cards. Manuel de Andrés (top right), manager of the 4B Credit Card Authorization Centre, also uses the Iberpac network to connect their terminals. Research workers (bottom right) Juan Pedro Cerezo (seated), Communications Manager of the UAM High Energy Centre and Santiago Ayllón, Systems Programmer, communicate with remote data bases via Iberpac.

New communication solutions

Our **Electronic Funds Transfer at the Point of Sale (EFTPOS or Dataphone) Service,** transmitted over the Iberpac and telephone networks, finally took off at the end of 1986 with the connection of 7,857 terminals, providing excellent growth prospects.

In 1986 **Telefónica** also launched a videotex service called **Ibertex.** Through **Ibertex,** via the telephone and Iberpac networks, any user with a suitable terminal has access to the information and applications of private Data Bases and Information Service Centers.

Ibertex has a wide array of possible applications. These include telebanking, teleshopping, telereservations, educational purposes, weather forecasts, statistics, stock exchange information and entertainment. **Ibertex** provides the market with a new information source and unifies access paths, which all ensures that the customer is the first to benefit. **Ibertex** is currently in operation in Madrid and Barcelona.

For many years Toni Martin's Record Shop has been an essential meeting place for country music, pop, and jazz lovers. Juan Manuel Martínez and Luis María Puente (above) rely on the Electronic Funds Transfer at Point of Sale Service (Datáfono) to help cope with the numerous customer purchases. With more than 10,000 terminals installed throughout the whole country, Spain's EFTPOS network is one of the largest in Europe. Spain's videotex, which is known by the trade-mark Ibertex (bottom left), has begun to make an impact. Several major public service institutions, such as the railways, are about to introduce it in order to offer improved service to the public.

Communications on the move

For anyone on the go, mobile services are becoming a must. To keep up with demand we plan to build a network structure over the next two years to cover 25% of the country and 70% of all vehicles. This 450 MHz. cellular radio network will be enhanced by a digital network on 900 MHz. by 1992. We expect that the new network will be incorporated into the whole European system which is being jointly developed. This would enable a vehicle to travel throughout the continent maintaining telephone contact and full automatic tracking facilities.

Our aim is to expand the **Automatic Mobile Telephone** service from 1,800 subscribers at the end of 1986 to some 30,000 by 1990. We also have a further commitment to **Closed Group Radio Telephony,** and to one-way **Radiopaging.**

Our traditional **Paging** service, which transmitted verbal messages via the operator, will become a fully automatic service. From 1987 onwards it will include a non-verbal Simple Message service (audible and/or visual signal) together with Numeric and Alphanumeric Messages. By 1990, the national radiopaging service will have a 300,000 user capacity and cover 35% of the country and 60% of the population.

From the port of Santander, José Pérez Barandica fishes the anchovy season in May, the tuna season in July... Channel 16 of his 156.8 MHz UHF radio equipment, supplied by **Telefónica**, *keeps him in touch with our Praves Coastal Station. This guarantees his safety on the rough Cantabrian waters and at the same time, via a different channel, allows him to stay in permanent contact with his family or any corner of the world.*
A growing number of cars and leisure craft are taking advantage of our lighter and more compact mobile telephone equipment.

A seafaring country requires reliable, quality **Maritime Services. Telefónica**'s **Inmarsat Services** will soon be operating from a coastal station in Spain. We are also working on other new back-up services to guarantee greater **Safety at Sea** and **Aeronautical Communications with Public Network**. In 1986 our, **Maritime Service Coastal Stations** answered 73,892 navigation aid calls, 3,628 radio-medical calls and 148 SOS calls.

Integrated communications

Along with other countries, we are facing major challenges in the field of **Business Communications. Telefónica** is already responding with specialized solutions and the first ISDN (Integrated Services Digital Network) lines should be on the road in 1988. The drawback of traditional business communications is the lack of integration between equipment, networks and information. ISDN provides an integrated solution from a host of new services across **just one network and one line transmitting all communications types:** voice, data, video and facsimile. ISDN means an end to problems of special non-compatible networks, different protocols, and nonstandard terminal junction boxes. By 1992 we expect to have fulfilled most of the EEC 1993 objectives, in terms of the number of ISDN lines: 5% of all telephone lines in service in 1983.

1992 is a year of key significance for **Telefónica** and if we are to meet specialized services demands we do not have a minute to lose. In 1992 Spain will be celebrating the Fifth Centenary of the Discovery of America and hosting the World EXPO in Seville and the XXV Olympic Games in Barcelona. In 1986 we began providing similar services to those which ISDN will be offering over the **Ibercom** and **Ibermic** Networks.

Ibercom aims to offer major corporations and firms «Virtual Private Networks», **custom-built** but sharing resources to cut costs. **Ibercom** is a fully digital switching and transmission system offering a broad spectrum of voice and data communication services. In addition, the system provides 64 Kbit/s end-to-end digital switching continuity for the first time in Spain.

Telefónica began marketing **Ibercom** lines in 1986 with outstanding results, contracting some 15,000 lines. In addition, the Madrid Front-end Centre was launched as an access point to the **Ibercom** transit infrastructure; Front-end Centres are scheduled for 1987 in Barcelona, Oviedo, Valencia and Bilbao with others following on shortly. **Ibercom** has excellent prospects as an Integrated Business Communications Service and we will be offering this service to 365,000 customers by 1990. The **Ibercom Service** is a clear indication of our ongoing commitment to offer high-tech solutions to the growing needs of the business community, be they specific to one customer or multiuser **Centrex** facilities.

Even such historical institutions as the Pamplona City Council will soon be welcoming the most advanced telecommunications technologies. **Telefónica** has signed an agreement with the Council to install Ibercom, the integrated communications network, so that Information Age technology will soon be incorporated into local authority services. State-of-the-art fibre optics will be installed to connect the separate municipal buildings. Ibercom provides connections as if all the terminals were in one building, which ensures minimum interference and maximum transmission capacity. As a result, local people will receive better quality, lower cost service.

Integrated communications

Our venture in the field of high speed data transmission, has been the launching of **Ibermic** to provide 64 Kbit/s and 2 Mbit/s point-to-point digital transmission services. Our basic aim here is to meet the growing demand for medium and high speed data circuits with **state-of-the-art technology.** This should minimize the cost of medium speed point-to-point services, in addition to introducing new services at speeds greater than 2 Mbit/s. Nationwide, the **Ibermic** service comprises seven nodes, called Secondary Ibermic Exchanges, in Barcelona, Bilbao, Leon, Madrid, Seville, Valencia and Zaragoza.

Ibermic also gives access to international, high speed digital signal transmission, care of the **Teleport.** The Teleport is a satellite telecommunications complex comprising several stations. Its services include business connections with Europe via EUTELSAT, using the SMS service, and with the rest of the world via INTELSAT, by its IBS service. By 1989 two Teleports are scheduled for Madrid and Barcelona. These will allow simultaneous transmission of over ten circuits at a rate of 2 Mbit/s for videoconferencing and high speed data and over 50 circuits at 64 Kbit/s. By 1990 **Ibermic** will be handling some 340 high speed point-to-point circuits. We will be well on the way to achieving our goal of meeting the complex communication requirements of our major customers.

José Luis Guezuraga
and the other members
of **Telefónica**'s Corporate
Customers' Sales
and Marketing team,
frequently use our
videoconferencing services.
On this occasion, they are
speaking to the Barcelona
commercial department,
housed in the Estel building.
The videoconferencing service
is transmitted through
the new Ibermic network via
cables and earth stations.
Our Buitrago (Madrid)
and Armuña de Tajuña
(Guadalajara) satellite tracking
stations are connected
to the Intelsat and Eutelsat
services.

A telecommunications strategy for the year 2000

Telefónica intends to meet both the growing demand for the latest telecommunication resources and radically enhance our transmission capacity. We are building up an efficient digital network, using existing coaxial cables, digital radiolinks and particularly optical fibre cables. Some 11,000 km. will be installed over the next four years. At the same time, we plan to install digital loops in the main metropolitan areas to guarantee sufficient digital connections. We are also going to triple the number of earth stations in order to increase satellite transmission capacity and manage with maximum efficiency the increase in traffic brought about by the 1992 events. By 1990 all Spanish provincial capitals will have digital access and at least two digital transmission channels. By the year 2000, we aim to provide each capital with a minimum of two optical fibre routes.

In 1986 we looked at those commercial areas with the greatest potential demand for services requiring transmission capacities of 2 Mbit/s or more. In order to plan optical fibre access loops, we pinpointed buildings likely to require optical fibre cables.

Our network modernisation program is based on a speedy introduction of digital channels by superimposing. This will allow rapid deployment of a digital access and interconnection infrastructure which will be able to carry the necessary services to the points where demand is likely to arise. So a digital network with common channel signalling will be built and superimposed over the original analog network whose capabilities will thus be outdated. In this way **Telefónica** will meet the EEC objective of supplying ISDN services by the early nineties.

In line with **Telefónica**'s installation plans, network digitization will rise from 3.2% of subscriber lines and 10.6% of trunks in 1986, to 22% and 45% by 1990, respectively. Before 1991 we will have installed 2.5 million new digital lines, ensuring implementation of new telecommunications services. By 1992 the **Ibermic** and **Iberpac** systems will be fully integrated into the ISDN, providing customer access to the specific services of these networks.

ISDN means **Telefónica** will be providing better quality service at lower cost. Our switching exchanges will operate at higher speeds and switching equipment will be less sensitive to noise and distortion. Most important of all, ISDN will allow the efficient integration of communication services —voice, data, facsimile and video— and provide our customers with single line access to these services. By the early nineties Spain will have a telecommunications framework providing the building blocks for the communications services of the 21st century.

Telefónica is building up a highly sophisticated digital network, capable of sending information to any corner, at space-age speed with maximum reliability. In cities such as Barcelona (left) the first digital loops are being laid with fibre-optics cables. The cable vessel Atlantida (bottom right) will shortly be in service, playing a vital role in the optical cabling of the Mediterranean and North Atlantic seas. At the Buitrago earth station, satellite communications technicians like Antonio Gómez (bottom left) keep watch 24 hours a day to safeguard the quality of services.

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On the verge of the Intelligent Network

Enhancement of our switching exchange capacity will soon enable us to offer customers a new range of **Intelligent Network Services**.

Among these is the **Centrex Service** which will provide PABX functions marketed as subscriber services integrated into public exchanges, extending its scope to a whole metropolitan area.

We also plan a new service which we expect to be in popular demand: the **Automatic Reverse Charge 900 Service**. Similar to the British «Freephone», the **900 Service** is specially tailored for companies, to facilitate calls from potential clients. The service provides a specific tollfree number to each company who will then accept charges for all incoming calls from potenţial customers. **900 Service** offers companies an effective marketing tool for communication with their clients and consumers.

Other Intelligent Network services are in the pipeline. These include **personal telephony, multi-link calls** and **credit calls**. These services were defined in 1986 and are scheduled to enter into operation in 1989, in order to be ready and waiting for the 1992 events.

A flexible, market-focused organisation

At **Telefónica** we are fully aware that a flexible, efficient organisational structure is essential in order to meet the telecommunications needs of Spanish society. In 1986 we began a far-reaching business restructuring program, setting up Provincial Units as basic management bodies. This implies, not only functional decentralisation with work transferred to the Units, but also a significant increase in Provincial Unit decision-making capacity with their management taking on the corresponding business risks.

The Provincial Units' corporate structure has consequently been strengthened with a highly qualified executive staff and a small back-up team who see to liasing with Headquarters. The new organisation chart of the Operations Division has a General Manager, who is on the Management Committee. This ensures that top level decisions take the situation and needs of territorial management units into account.

Each Provincial Unit will operate as a true «**Profit Centre**», planning its own goals and drawing up and carrying out its own revenue and expenditure budget. It will also be responsible for sales and marketing and offering customers a quality-enhanced local service.

The birth of the new corporate structure has maximised use of **Telefónica**'s human and physical resources.

Without doubt, a more flexible internal structure means better service for customers and better performance in the marketplace. A new entrepreneurial approach prepares us for future legal regulations and for the fast-growing rate of technological change in Spanish telecommunications.
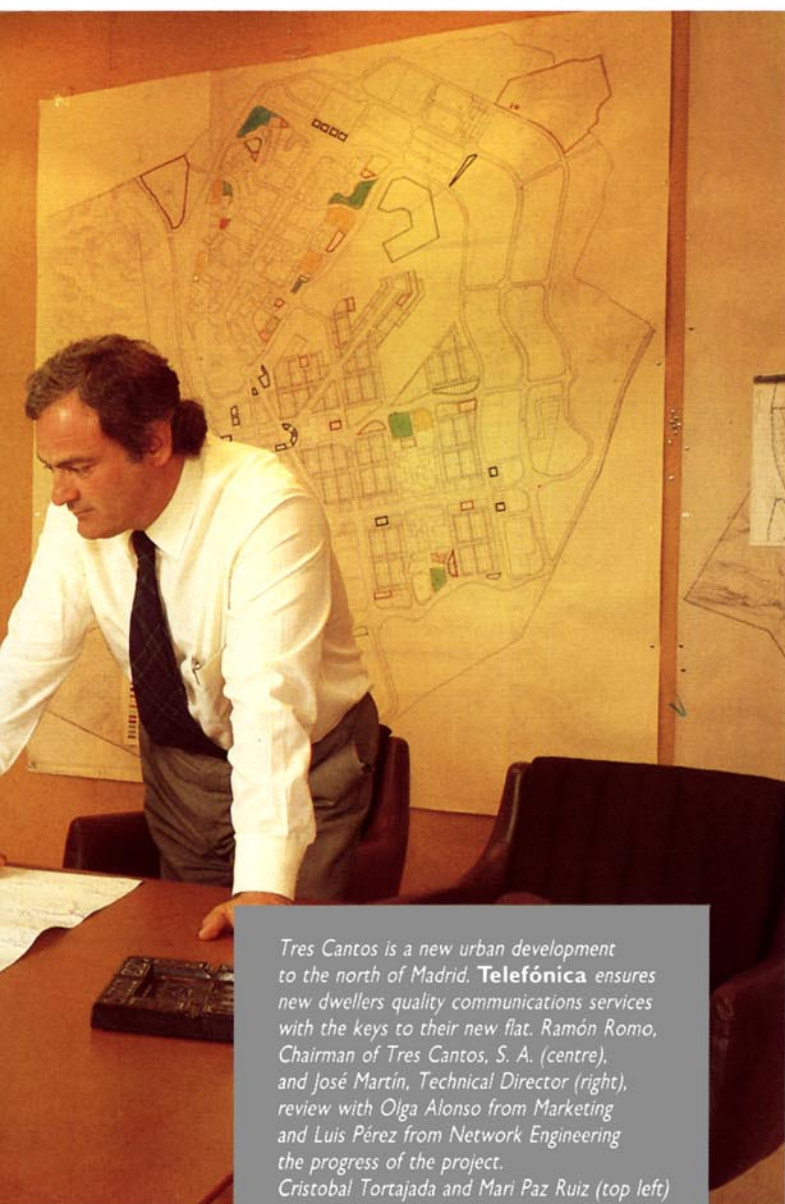
*Tres Cantos is a new urban development to the north of Madrid. **Telefónica** ensures new dwellers quality communications services with the keys to their new flat. Ramón Romo, Chairman of Tres Cantos, S. A. (centre), and José Martín, Technical Director (right), review with Olga Alonso from Marketing and Luis Pérez from Network Engineering the progress of the project.*
Cristobal Tortajada and Mari Paz Ruiz (top left) use interactive digital mapping to design new networks at our Ríos Rosas Centre.

Productivity and human resources

The continuing development of Spanish telecommunications depends on the mobilisation of huge amounts of human and technical resources. **Telefónica**'s **chief asset** is its extensive human resource base, whose dedicated efforts are essential to the successful accomplishment of our corporate goals. At the end of 1986 **Telefónica** had 63,021 current employees, with an average service of 17.5 years in the Company.

Non-stop technological advances in telecommunications means that labour requirements and levels of technical know-how are constantly changing. Last year the level of qualified employees increased significantly with university graduates and other technically qualified staff accounting for 9.1% of the workforce, as opposed to 8.3% in 1985.

We plan to cope with the changing needs for a specialized work force while maintaining the current number of employees. Our policy is a combination of new recruitment, promotion, the axing of outdated functions and increased training programs.

At the same time, **Telefónica** will take major steps to improve management performance of the network, sales and administration departments. In the next four years there will be major investments in **office automation and information technologies, mechanized monitoring facilities, dynamic network management, network maintenance and security measures.** These investments should lead to substantial productivity gains and a healthy enhancement of overall flexibility and efficiency.

Technological upgrading is already underway with the replacement of manual operator equipment by the latest Multipurpose Operator Workstations. Advanced services, such as credit cards, telemarketing and simultaneous translating will soon be on offer via the operator. To guarantee staff productivity gains, an ongoing professional training program is of vital importance. In 1986, 47,000 employees —almost 75% of the workforce— followed a variety of courses and training programs. These were primarily concerned with new equipment and services, new technologies and management methods.

One of the year's major events was the opening of the new Training Centre in Seville. The Centre offers up-to-date training facilities and equipment. Employing modern teaching techniques, we aim to extend training in the use of the latest tools and design and develop specific training programs in **marketing, data processing and advanced telecommunications technologies.**
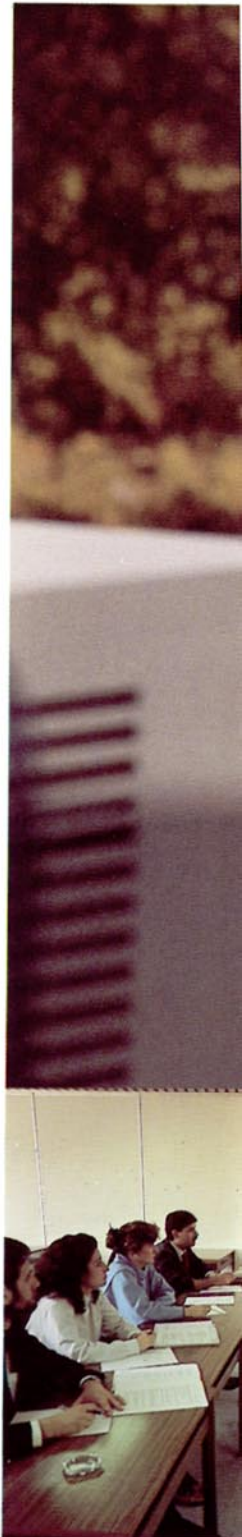
Though new technologies are vitally important, the human factor is much more so.

At **Telefónica** we are convinced that it is the quality and expertise of people, rather than the sophistication of machines, that determines success or failure in the Information Age. We have therefore opted for regular staff training programs —seen here taking place in the various rooms at the Madrid Training Centre—. As a result, operator Julia Sanz can today employ modern teleprocessing systems to upgrade the quality of Directory Enquiries.
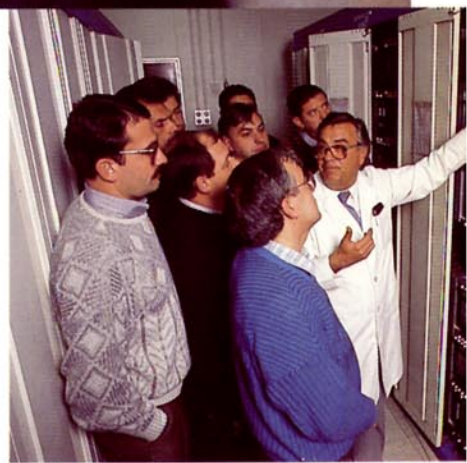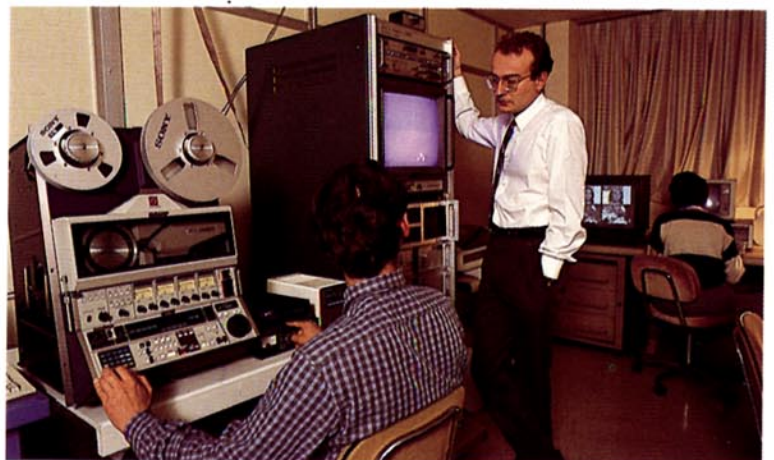
Research and Development

Research and development activities are essential if we are to keep abreast of the changes in telecommunications technology. **Telefónica** is keen to encourage activities in this field in order to safeguard the efficient up-dating of the network and services and to plan future technology. We have therefore stepped up funding of R & D operations. This policy is already bearing fruit in the form of our technical leadership in Packet Switching Data Transmission with the family of Tesys equipment. Now that Tesys A has met all performance requirements, work is underway on a new advanced version, to be unveiled in 1988 as the Tesys AX.

Development work began in 1986 on a new Packet Switching venture called Tesys B. Tesys B will be the equipment of the early nineties. Over the longer term, we are considering development of future Tesys generations within the EEC RACE program, possibly based on High-Speed Packet Switching systems.

We have completed development of a digital multiplexed system for the rural community, called Rural Digital Multiaccess. Our first multiplexed system, in use in our home network and abroad, is analog-based. The new system uses a Time Division Multiplexing Technique (TDM). We have also completed development of a millimetric waveband radiolink which is currently in production.

This year has also seen the development of a 2,400 bit/s full duplex modem. This will be followed by high speed digital signal modems.

In 1986 we became full participants in the European «Conformance Testing Service - Wide Area Network (CTS-WAN)» Consortium, set up to define and develop tools for Protocol Certification. This project is partly EEC funded and aims to develop standard tools for future European Certification Centres and to standardize existing ones.

Related to the Integrated Services Digital Network, significant progress was made on terminals and the ULISES project. Terminals which fully comply with the recently standardized S interface are operating in the laboratory. Development work on a range of equipment is well-advanced and will be tested as part of the 1983 ISDN pilot operation. The operational phase of the ULISES Project (Integrated Services Local Unit) has proved the feasibility and defined the architectures of the project, confirming its attraction for subscribers within local networks. The first product within the project, aimed at satisfying Ibercom network requirements, has been defined and development is underway.

Our achievements in the field of voice digitization have provoked wide interest among a great variety of users. **Telefónica** has used the designs to supply spoken information, while our algorithms have led to technology transfer contracts with telecommunications companies and other sectors.

Telefónica *is gradually up-dating the Tesys packet-switching technology. Systems Engineers Francisca Oliva and Juan Carlos González (above) at work on development of the new generation of Tesys equipment.*
In the digital image laboratory (left), researchers Alfonso V. Castillo and Miguel Roser carry out simulations of video signal coding techniques.
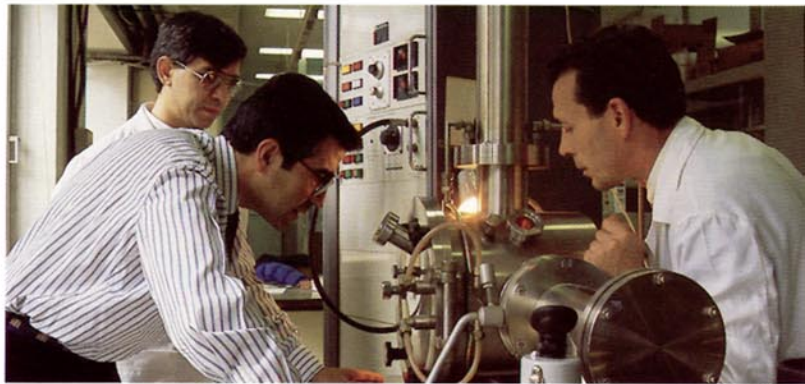
Research and Development

High level designs were completed in 1986 for the Sectorial Control System and the Operations and Maintenance System, intended to optimize network management and maintenance. Both systems, together with the Multipurpose Plant Terminal now at an advanced stage of development, will fulfill advanced network control and monitoring functions for the company.

High quality, low binary speed Voice Signal Coding and Acoustic Echo Cancelling in teleconferencing rooms are other areas where major progress has been made. We have also researched and developed voice signal processing architectures with special attention to the demands of voice recognition techniques.

Work on Video Signals has led to interesting results in high compression graphics coding, which is being successfully applied to videotex displays. In addition, the ESPRIT Project for an ISDN low speed video-conferencing system is coming along on schedule.

During 1986, the first Expert System prototype was completed, developed entirely by **Telefónica**. An application was found and an expert system prototype is now assisting telephone repair personnel.

Closer collaboration with EEC Research and Development Programs has led to two new contracts as part of the ESPRIT Program: one for the LION Project for a Local Optical Network and the other for the AMADEUS Project developing a method of Software Specification.

We have also won further contracts with the European Space Agency (ESA), to develop a tool for Digital Signal Processing and an Optical Receiver for the earth prototype of a future satellite link. **Telefónica** will also carry out research on Mobile Satellite Services and New Techniques of Modulation and Access via Satellite, on behalf of the European Space Agency.

New Research and Development Centre

Last year witnessed the start of construction work on **Telefónica**'s new R & D Centre, in which 6,400 million pesetas are to be invested. With a net area of 20,800 m², it will house some 600 scientists and research workers when it opens in 1988. Design and construction of the centre was contracted to Pacific Telesis International with technical consultancy from Bell Communications Research (BELLCORE).

A subsidiary company called Telefónica Investigación y Desarrollo, S. A. has been set up to promote and manage the new Centre. The Centre will coordinate research projects with Public Research Institutions, Universities, R & D Units and various international programs.

The annual budget will amount to 5,000 million pesetas and the Centre will be one of the first **intelligent buildings** in Madrid. It will expand horizons in the areas of information and telecommunications basic and applied technologies. These will include: design of integrated circuits for specific applications, voice and video signal digitization, automation, artificial intelligence and operating systems.

The goal of the new R & D Centre is to develop products with a clear market focus, by exploring the boundaries of modern science and engineering, so becoming a true «Centre of Excellence» of worldwide renown.

The development of advanced communications systems is one of our top priorities. In the current Madrid Research and Development Centre, engineers José Félix Hernández-Gil (left) and Andrés Gebauer design a millimetric wave transceiver for digital communications in urban areas.

Subsidiaries and Affiliated Companies

Telefónica is more than
a telecommunications company with
over 60 years experience and a world
leadership in packet switching networks
technology. It also comprises an extensive
family of companies involved in information
technologies, R & D, manufacturing, engineering
and installations, marketing and maintenance.
This group was initially set up to cover
the Company's own requirements but is now
expanding towards broader and more ambitious
goals with an international focus.

The family of companies was finally formed in 1985
and 1986 was devoted to organisation
and structuring, in order to encourage activities,
optimize resources and enhance investment
profitability.

With these aims in mind, the new group is being
structured along the following lines:

— **MANUFACTURING GROUP,** producing
    telecommunications equipment components
    and devices. This group is headed by Amper
    and companies such as Telefonia y Datos
    and Elasa will be joining Amper and current
    affiliates.

— **ENGINEERING AND INSTALLATIONS
    GROUP,** with Sintel as the core company
    and comprising, among others,
    of Telefónica Sistemas.

    INFORMATION TECHNOLOGY GROUP,
    with software as a priority, headed by Entel
    and also comprising Maptel, Ecotel
   and Ibermatica.
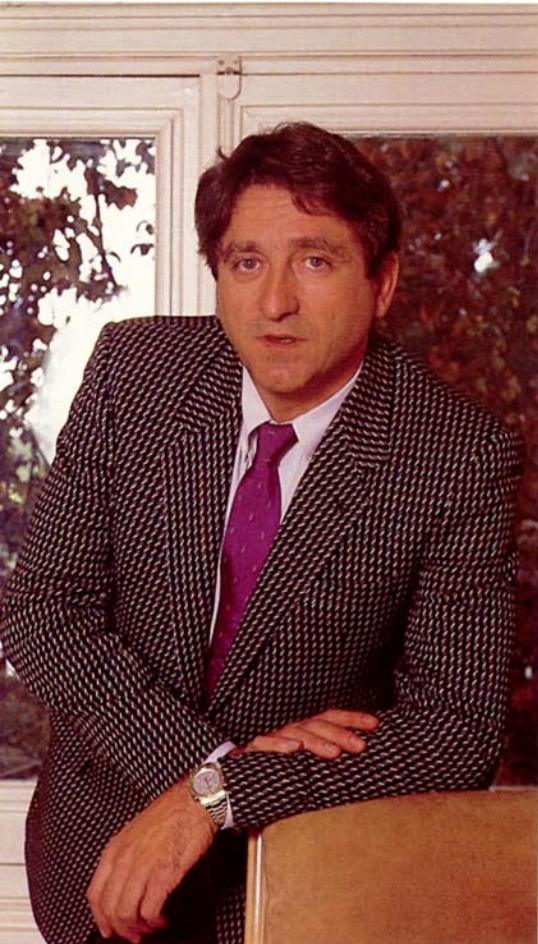
Our Subsidiaries are steadily sharpening their competitive edge with a clear market-focused strategy. Of major importance are (clockwise, from top right). Entel, headed by José Francisco Olascoaga; Sintel, by Baltasar Aymerich; Cetesa, by Julio Camuñas and Amper, by Antonio López.

— **SERVICES GROUP,** which will incorporate all firms exclusively owned by **Telefónica** and active in areas related closely to the marketing or financing of **Telefónica**'s services. This group will include commercial concerns such as Cetesa, Cosesa, Telyco and Cabitel, and other companies like Telfisa (finance) and Temasa (submarine cable).

— **INTERNATIONAL GROUP,** led by Telefónica Internacional which, via its Luxembourg subsidiary, will include the enterprises set up abroad to promote **Telefónica**'s interests in world markets.

— **RESEARCH AND DEVELOPMENT GROUP,** recently formed and primarily consisting of Telefónica Investigación y Desarrollo, set up in 1987. Bringing all the R & D activities under this one umbrella, will ensure maximum profitability, reaching the «critical mass» level necessary for forging ahead with ambitious new projects in Information Age technologies.

New business ventures

Telefónica is determined to remain a strong, competitive player in the constantly changing world marketplace. A flexible corporate policy has led to joint ventures and agreements with leading partners abroad. The following are some of **Telefónica**'s most important new business ventures:

— ATT Microelectrónica España: construction of the factory in Tres Cantos, Madrid, is well ahead of schedule. With a capital of 65 million dollars (20% **Telefónica**'s), ATT Microelectrónica España will manufacture high-tech custom integrated circuits aimed particularly at the export market.

— Maptel: this is a digital mapping company, in which our Norwegian partner, SysScan, provide the technology and have a 30% shareholding. The remaining shares belong to Entel and qualified users. The setting up of the company and staff recruitment are progressing according to plan and the firm already has a promising order book.

— European Silicon Structures (ES2): this is a joint venture between British Aerospace, Olivetti, Brown Boveri, Philips, Saab-Scania, Telfin and **Telefónica**. ES2 will specialise in short series of custom integrated circuits.

— Fujitsu España: the new company, resulting from the merger of Fujitsu España and Secoinsa in April 1986, has continued its operations. Fujitsu has a 60% stake in the new company and **Telefónica** 40%. The activities of Fujitsu España mainly involve the design, development, manufacture and marketing of data processing, office automation and telematic equipment, together with related software.
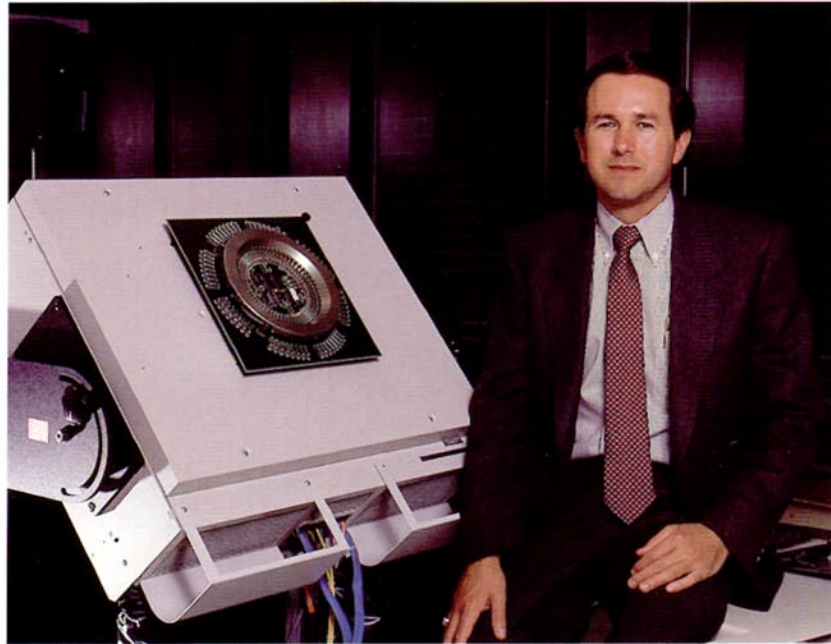
AT&T Microelectrónica España, headed by George Foyo (top, left) has recently handed over to **Telefónica** the first custom-made microchip to be used in our network. Managing Director of Fujitsu España, Chiaki Sugishima (left) and Director Kazuto Kojima, appear outside their Málaga Research and Manufacturing Centre. Julian Conthe (right) of Maptel is seen here attending the recent launching of this digital mapping venture.

PHOTO: LUIS DE LAS ALAS.
MERCADO MAGAZINE.

TELEFONICA 82-86: SELECTED OPERATING DATA

TELEPHONE SERVICE

Service parameters	31-12-86	31-12-85	31-12-84	31-12-83	31-12-82
Degree of automation (%)	99.7	99.5	99.2	98.9	98.6
Automatic trunk circuits (thousands)	244.3	228.8	217.1	205.8	192
International service automation (%)	86	84	80	79	76
Plant					
Telephones (thousands)	14,784.2	14,258.9	13,825.5	13,345.3	12,820.2
Local lines installed (thousands)	10,650.3	10,313.1	9,989.8	9,630.4	9,207.3
Automatic	10,621.5	10,262.8	9,911.9	9,525.6	9,080.2
(% of those installed)	(99.7)	(99.5)	(99.2)	(98.9)	(98.6)
Digital	350.4	184.3	127.0	78.0	43.0
(% of automatic)	(3.3)	(1.8)	(1.3)	(0.8)	(0.5)
Conventional and semi-electronic	10,271.1	10,078.5	9,784.9	9,447.6	9,037.2
(% of automatic)	(96.7)	(98.2)	(98.7)	(99.2)	(99.5)
Manual	28.8	50.3	77.9	104.8	127.1
(% of those installed)	(0.3)	(0.5)	(0.8)	(1.1)	(1.4)

BASIC INFRASTRUCTURE

	31-12-86	31-12-85	31-12-84	31-12-83	31-12-82
Coaxial cable (Km.)	10,379	10,112	9,933	9,514	9,425
Fibre-optics cable (Km.)	227	93	—	—	—
Trunk pair cable (Km.)	46,095	44,979	44,086	43,085	41,498
Subscriber networks (pair Km.)	35,464,943	33,625,843	32,067,254	30,449,616	28,733,982

TRENDS IN TELEPHONE TRAFFIC AND DEMAND FOR LINES

	31-12-86	31-12-85	31-12-84	31-12-83	31-12-82
TELEPHONE TRAFFIC (*) (Millions of billing units)	99,089	88,477	83,173	79,673	75,789
% Annual growth rate (**)	12.0	6.4	4.4	5.1	7.3
AVERAGE GROWTH IN CONSUMPTION PER LINE	5.0	3.4	1.8	2.5	1.6
DEMAND FOR NEW LINES	963,037	756,164	773,812	783,867	591,313
% Annual growth rate	27.4	(2.3)	(1.3)	32.6	15.5

TRENDS IN DATA TRANSMISSION SERVICES

	31-12-86	31-12-85	31-12-84	31-12-83	31-12-82
DATA TRANSMISSION CIRCUITS	31,152	28,950	26,651	24,001	21,573
Year-on-year growth (%)	7.6	8.6	11.0	11.2	6.0
TELEPHONE NETWORK CONNECTIONS FOR DATA TRANSMISSION	58,175	45,080	24,792	19,451	15,149
Year-on-year growth (%)	29.0	81.8	27.4	28.4	12.6
IBERPAC NETWORK CONNECTIONS	27,632	23,810	20,056	14,302	12,539
Year-on-year growth (%)	16.0	18.7	40.2	14.0	32.8

(*)   Includes domestic and international traffic.
(**)   The traffic increase is calculated in standard billing units (i.e. of equal length) for billable subscribers, and does not include telephone booths, for which standardised data are not available.