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Worldwide Report

TELECOMMUNICATIONS POLICY, RESEARCH AND DEVELOPMENT

(FOUO 8/81)

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TELECOMMUNICATIONS POLICY, RESEARCH AND DEVELOPMENT

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CUBA

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CSO: 5500/2206

FRENCH COMMUNICATIONS NETWORK SAID TO STRENGTHEN OWN INTERESTS

Paris AFRIQUE-ASIE in French 2 Mar 81 pp 32-34

[Article by Pierre Clary]

[Text] The new transmitter in Moyabi, Gabon, will be able to broadcast the French-language programs produced in Libreville and relay the broadcasts of Radio-France Internationale "from the shores of the Mediterranean to the Cape of Good Hope." This is what Robert Galley pointed out during the opening of "Africa No. 1" on 7 February in the presence of Gabonese Prime Minister Leon Mibiame, Information and Telecommunications Minister Zacharie Myboto and the P-DG [president-general director] of Thomson-CSF [Thomson-General Radio Company], Philippe Giscard d'Estaing, who added that the transmitter could reach South America and all of Europe thanks to "its 22 antenna arrays which can receive shortwaves of 5.9 to 21 megahertz in 7 different directions." "Africa can profoundly influence Africa's development ...," Minister Galley noted. We could have guessed as much....

The operations of the Thomson-CSF group on the African continent are actually increasing in scope, but beyond that company's commercial results, there is reason to wonder about the significance of this industrial penetration, which concerns sectors as vital as telecommunications, radio and television broadcasting and civilian and military communications .... In Moyabi, Robert Galley provided partial answers which cannot fail to raise major concerns.

Complete control of information and communication infrastructures is essential for claiming true independence; but as it happens, everything is taking place as though the African continent were gradually being caught up in a huge net woven with the industrial and technical "assistance" of Thomson-CSF, among others--assistance that actually serves only to preserve and strengthen French interests in Africa.

How is this industrial establishment unique in comparison to the traditional operations of a multinational corporation? First of all, and this is the major difference, technical, industrial and military operations bearing the "Thomson-CSF" label are part of a vast amorphous organization of French origin, consisting of public, parapublic and private companies and establishments controlled by the French Government. Thus the sale or availability of Thomson-CSF equipment is rarely due to commercial success alone; it is above all the result of a political will dictated by French interests. In fact, it can only be noted that such a technological hold permits all sorts of meddling and constitutes a potential threat in a sector essential to all.

A few examples are enough to demonstrate the real risks of this situation. First of all, at the level of national networks, the installation of telephone exchanges, radio and television broadcasting stations, relay transmitters and ground stations for space telecommunications necessarily provide the manufacturer with complete information about equipment which every country considers strategic. In the event of foreign intervention, it is information of this nature that assures the success of an operation. It must be borne in mind that the French Government is in a particularly good position for obtaining this information; without analyzing in detail the type of relations between the industrial partner and the political authority, it may simply be noted that Thomson-CSF's volume of sales in France mainly depends on direct and indirect orders from the French Government and public agencies.

The technological development of the communications and broadcasting sector--through the use of electronics and data processing--will also make such intervention "smoother," more and more: knowledge of a network and technical communication processes are sufficient for intercepting, scrambling and interrupting messages and even for transmitting false information, i.e., replacing the legitimate transmitter. For example, it has been shown that the development of microwave and satellite communications--as in Zaire and soon in Niger--substantially increases these various risks.

It is in the military area, of course, that these risks are most important; Thomson-CSF is a specialist in military communications and detection and the group is proud of selling its equipment in many countries. Now the more that Thomson-CSF equips African armies, the more the French manufacturer holds strategic advantages; in the event of conflict, in particular, it has everything needed to figure out the communications of either side!

Trojan Horse

These remarks, which apply to both civilian and military areas, make it possible to understand the strategic stakes--not to mention the commercial benefits--which the broadest possible establishment of Thomson-CSF technology represents for French interests: having a Thomson-CSF "network" means having at all times the means necessary to monitor, and thus influence, events in Africa.

This technological infiltration is becoming more and more widespread; it is in this way that the training and assistance system favors this establishment, a perfect illustration of the Trojan Horse theory. The number of French cooperants [military draftees serving overseas in a civilian capacity] in the telecommunications sector--about 150 in Africa--makes the local spread of Thomson-CSF technology; moreover, procedures for training African nationals in France reinforce this spread of technology, since training is provided directly at manufacturers' plants; Thomson-CSF has even established a subsidiary specifically for handling this type of operation: Thomson-CSF Cooperation.

Thomson-CSF's strategic role in Africa becomes even clearer if we consider South Africa's position. In that country, Thomson-CSF's commitments are vital and date back several years: Thomson Berlow, Thomson Electronics and SODETEG Afrique du Sud [South African Company for Technical Studies and General Contracts]. It is a certainty, which is not the case in the other countries of black Africa, that Thomson-CSF has transferred its technology there and is continuing to do so, whether in civilian or military areas. Thomson-CSF is working with South African manufacturers, but the latter have acquired control of their equipment.

Reserve Satellite

Through manufacturing, the South African Government thus currently possesses a good knowledge of the operation of Thomson-CSF equipment installed throughout Africa, which obviously reinforces its intervention capabilities. And this observation in no way detracts from additional information which could be provided to Pretoria.

But for Africa, the principal risk in the area of telecommunications and transmissions lies in the development of satellites. Here again, Thomson-CSF is directly involved, since this company manufactures most of these satellites, i.e., the payload, which actually provides for transmissions.

The first French satellite, Telecom I, which will be operational in 1982-83, will of course be used for specific transmissions over French territory, but it is also intended to provide telecommunications between the West Indies and France on one hand and between Reunion and France on the other. It will also be possible to use it for African national telecommunications. In reality, it should be pointed out that even now the French government has designed a satellite which technically covers the entire African continent on the pretext of linking overseas departments with the mother country under good conditions.

For what purpose? For the time being, it is claimed that the satellite has only limited possibilities for Africa; the transmission opportunities are numerous and Thomson-CSF technology at all levels considerably favors technical compatibility. It should also be noted that, as in the case of any satellite transmission, a reserve satellite is put into orbit at the same time as the first one to assure continuity of service in the event of a breakdown. Under normal circumstances, what use is made of this second satellite, which has the same features as the first? Can't it be used to transmit information to certain receiving sites, information and receptions whose "confidentiality" would be considered essential?

To be sure, France is not unselfish when it encourages African nations to adopt a continental satellite transmission system. If the commercial interest is obvious, it is no less obvious that other considerations are very much involved: an infrastructure of modern links on the continent will make it possible to transmit to France a mass of information--under advantageous conditions of speed and cost--that is very difficult to collect and transmit using current methods. This concentration of information is particularly beneficial to French military, political and economic circles.

Thomson-CSF is also involved in the French ground observation satellite program, SPOT, which will be operational in 1984, as the group has been commissioned to build the electronic system to transmit data gathered by the satellite to earth. African nations are particularly interested in this program, which offers the possibility of making an exhaustive inventory of natural resources and thus appears to be of considerable value to Third World countries. In fact, few nations have the financial and technical means to directly make such observations. But in any case, France will have all these observations available and will use them for its own institutions. Judging from the agencies involved in this project--French Petroleum Institute, Bureau of Geological and Mining Research ...--the African continent will be particularly well observed.

Since such data of a scientific nature itself already constitutes strategic data when it is in the hands of a third country--such as France--it must not be forgotten that there is little difference between scientific observation and military observation; the Ministry of Defense, which has kept up with this program, is not wrong. It is true that in a few years it will use the results of SPOT studies to launch its own military observation satellite, whose technical construction will be assigned ... to Thomson-CSF.

Pretoria's Advantage

But the current problem is one of finding out to whom these observations will be transmitted. Couldn't they be transmitted to South Africa, for example? Although this possible operation implies the violation of international agreements, it must be admitted that this possibility cannot be ruled out. South Africa actually has in its hands an exceptional means of blackmail: it accommodates two monitoring stations of the National Center for Space Studies within its territory: at Pretoria and at Hartebeesthoek--stations which are absolutely essential for monitoring and maintaining the trajectory of all French satellites. What will happen if the South African Government threatens to seize those installations? In exchange, couldn't it actually obtain access to valuable strategic data?

Considering its close ties with Thomson-CSF, South Africa could quickly exploit such information and would thus be the first African country to possess the technological capabilities peculiar to that application. Pretoria would thus acquire a decisive advantage in Africa, in particular over the other countries of southern Africa, and would also have regional information about harvest estimates and the exploitation of mineral resources, as well as, of course, data which could be used in military operations.

Obviously, Thomson-CSF's operations on the African continent cannot be analyzed as just a commercial process. The context in which they are carried out and the technical means employed can leave no doubt about the goals being pursued; the various examples listed here tend to show that, in terms of both its civilian and military aspects, the establishment of Thomson-CSF in Africa takes on significant political implications.

11915
CSO: 5000/5003

MOZAMBIQUE

BRIEFS

PRESS AGENCY LISBON BRANCH--Mozambique, foremost of Portugal's former African colonies, is establishing a bureau in Lisbon for its press agency AIM [Mozambique Information Agency], and its national radio station. Its example should soon be followed by Angola, which has just completed plans for opening bureaus of its national agency ANGOP [Angolan Press Agency] in the other Portuguese-speaking countries. The Portuguese agency ANOP is itself already represented in Maputo (as well as in Cape Verde and Guinea-Bissau. [Text] [COPYRIGHT: Rene Moreux et Cie Paris 1981] [Paris MARCHES TROPICAUX ET MEDITERRANEENS in French 1 May 81 p 1264] 9516

CSO: 5500

USSR

UDC 621.396.43.088:621.397

THE TRANSMISSION SYSTEM FOR THE REFERENCE STANDARD FREQUENCY, TIME AND CENTRALIZED SYNCHRONIZATION SIGNALS OF MOSCOW TELEVISION CENTER

Moscow IZMERITEL'NAYA TEKHNIKA in Russian, No 2, Feb 81 pp 38-41

[Article by V.V. Borisochkin and Yu.A. Fedorov]

[Text] The principles of television (TV) broadcasting developed for the Olympics Television and Radio Center (OTRK) require central synchronization of all TV program sources with high stability of the sync pulse repetition rate [1], and, in particular, synchronization of the program sources for the Olympics Television and Radio Center and the technical television center (TTTs). In the case of centralized synchronization, mixing of signals from any source is provided (combining images, superimposing captions, etc.); the artistic perception of the images is improved, and breaks in the image at the points in time when program sources are switched are prevented. High stability of the sync signals makes it possible to assure high quality in transcoding color TV transmissions from the SECAM system to the TV broadcasting systems of other countries.

A set of equipment was designed in the VNIIFTRI [All-Union Scientific Research Institute for Applied Physics and Radio Engineering Measurements], which was located and placed in service at the technical television center and the Olympics Television and Radio Center, to provide for centeralized synchronization of TV program sources. It provides not only for centralized synchronization but also for the solution of a number of other problems: the generation and insertion in the TV signals of reference standard frequency and time signals; the generation and transmission of a 1 Hz signal for the electromechanical clocks in the central equipment room (ATs); the generation and transmission of a series code of current time values for transmission to secondary digital displays and printers in the central equipment room; remote correction of the time position of the time signal relative to the time scale of the state reference standard for time and frequency (GEVCh).

A block diagram of the equipment complex is shown in Figure 1. The generation of the final complete TV programs for the technical television center and the Olympic Television and Radio Complex is accomplished in the program equipment units (APB) using the sync signals fed from the appropriate sync generators, which are located in the central equipment rooms (ATs) of the technical

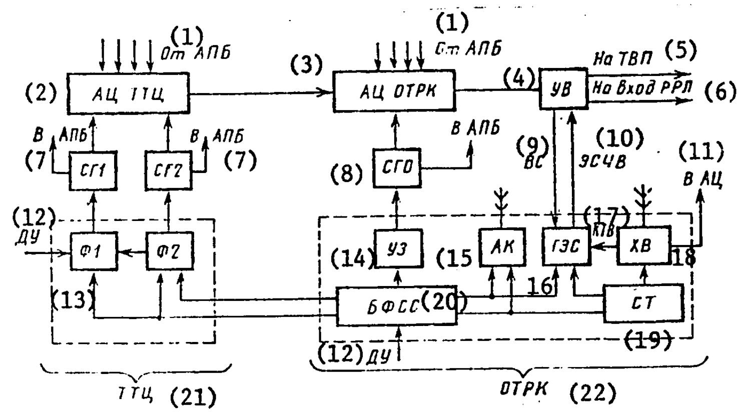

Figure 1.

Key:
1. From the APB [program equipment units];
2. ATs TTTs [central equipment room of the technical television center];
3. ATs OTRK [central equipment room of the Olympics Television and Radio Center];
4. UV [input units];
5. To the television transmitters;
6. To the radio relay link input;
7. To the program equipment units;
8. SGO [sync generator for the Olympics Television and Radio Center];
9. VS [time signals];
10. ESChV [reference standard time and frequency signals];
11. To the central equipment room;
12. DU [remote control];
13. F1 [sync signal driver 1];
14. UZ [delay lines];
15. AK [monitor equipment];
16. GES [reference standard time and frequency signal generator];
17. KTV [current time values];
18. KhV [time code storage and code generation equipment];
19. ST [not further defined];
20. BFSS [sync signal generator for the TV sync generator];
21. TTTs [technical television center];
22. OTRK [Olympics Television and Radio Center].

television center and the Olympics Television and Radio Center, and which operate in a slave mode fed by highly stable signals. There are two such sync generators in the central equipment room of the technical television center. Frequencies of 31,250 Hz and 12.5 Hz are used to synchronize one of them (SG1), and frequencies of 1 MHz and 12.5 Hz are used for the other (SG2). The sync generator in the central equipment room of the Olympic Television and Radio Center operates with synchronization using external 1 MHz and 12.5 Hz signals.

A highly stable rubidium standard, ST, is used as the source of the highly stable frequencies, for which the relative error in frequency reproduction is $2 \cdot 10^{-12}$. Signals at a frequency of 5 MHz are fed from this standard to a synchronization signal generator, BFSS, for the TV sync generators, which is equipped with an automatic remote control system, the DU. The output signals of the synchronization signal generator block, with a repetition rate of 1 MHz and 12.5 Mz, are fed through a delay line, UZ, to the sync generator of the Olympics Television and Radio Center (SGO) and via cable lines run between the technical center and the Olympics Television and Radio Center to the external sync drivers, F1 and F2, and then to sync generators SG1 and SG2. The delay line unit, UZ, in conjunction with similar delay devices in the TV sync generators, makes it possible to change the time position of the sync signals in a range of several microseconds and thereby assure that the TV signals of the technical television center and the Olympic Television and Radio Center are in phase and in sync.

All of the TV signals from the output of the equipment room of the Olympic Television and Radio Center are fed to the appropriate TV transmitters, the TVP's, and the inputs of the radio relay links, the RRL's, through special input devices UV, for the reference standard time and frequency signals (ESChV), generated by a special ESChV generator (GES). This generator produces the reference standard 1 MHz frequency signals, the reference standard 1 Hz time signal and the code signals for the current time values, KTV [2]. The time position of these signals correspond to definite portions of the working interval of the sixth horizontal line of the TV signal fed to the input of the GES generator. Such a system configuration for the centralized synchronization and generation of the reference standard time and frequency signals provides for the continuous input of reference standard signals into the sixth horizontal line TV signal during the frame blanking. In this case, the reference standard time and frequency signals are fed directly to the inputs of the transmitters, something which precludes random and systematic changes in the time position of the reference standard time and frequency signals related to switching inside the studios. The current time values are stored by means of special time storage and code generation equipment, KhV, which additionally serves for the automatic monitoring of the correctness of the time storage and the output of the series and parallel time codes.

Two Ch7-15 which operate from an external 5 MHz source and are synchronized by an external 1 Hz signal are used as the drivers and storage devices. The parallel codes from the Ch7-15 are compared, and in the case where they are identical, are transmitted to the GES generator for input into the corresponding sixth horizontal line interval [2]. The codes transmit cycle in the sixth line is one second. The time signals from the Ch7-15 should lead the actual time values by one second, so that at the end of each cycle, the actual time value is reproduced at the receive end. The initial setting of the time in the Ch7-15 is accomplished manually.

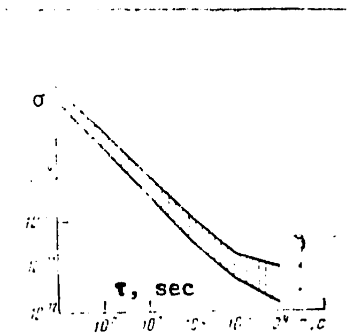

Figure 2.

Two "Avtokran" (automatic synchronizing radio clocks) are used to generate the current time value code, in addition to the Ch7-15; in these clocks, the time value is set automatically based on coded signals from the RBU radio station. The parallel codes of both radio clocks are compared in a code comparison unit, and when the codes are identical, they are transmitted to a time code transducer, where the parallel code is converted to a series 32 bit bipolar code. This code is transmitted to the central equipment room of the Olympics Television and Radio Center, is again converted to a parallel code and displayed on the "Standard Time" display in the central equipment room.

Monitor equipment, AK, is installed to monitor the transmission of the reference standard time and frequency signals through the ORPS [not further defined] to the Olympics Television and Radio Center, where this control equipment includes the following: a television receiver block, BTP; a USSR reference standard time and frequency signal selection unit [3]; a PKT television receiver-comparator; a Ch3-34 frequency meter and a printer. This equipment serves for the reception of the TV signals transmitted by the TV transmitters of the ORPS; the selection of the reference standard time and frequency signals transmitted in the sixth line of the TV signals; the comparison of the transmit times of the 1 Hz signals and the phase of the 1 MHz signals at the antenna of the corresponding transmitter with the 1 MHz signal phase and time scale of the reference generator, the SGO; automatic recording of the results of comparing the time and phase scales of the 1 MHz signals.

Such monitoring makes it possible to determine the travel time of the reference standard signals from the secondary TV standard via the channels to the Olympics Television and Radio Center up to the antenna of the ORPS transmitter, and in the case of a variation in the transit time (in the case of change in the switching circuitry, an equipment substitution, etc.), correct the point in time of the time signals and the phase of the 1 MHz signals at the TV transmitter antenna. Similar monitor equipment for the reference standard signal transmissions is incorporated in the state time and frequency reference standard and is used both to monitor the timewise position of the time signals and the phase of the reference standard signals transmitted by the TV transmitter and for remote control of the equipment of the technical television center and Olympics Television and Radio Center.

The centralized system for synchronization and transmission of reference standard time and frequency signals provided for high quality execution of all TV transmission during the 1980 Olympics in a centralized synchronization mode using a highly stable frequency standard as well as the transmission of the reference standard time and frequency signals with high metrological characteristics via the third TV channel. As the measurements show, the mean square values of the fluctuations in the phase of the reference standard time and frequency signals at a frequency of 1 MHz at a distance of 40 to 50 km from Moscow amount to 2 to 3 nanoseconds for a measurement time of up to 20 to 30 seconds and 4 to 5 nanoseconds in the case of large measurement time values. The relative value of this error, σ, is shown in Figure 2 as a function of the measurement time τ. It follows from Figure 2 that the transmission of the frequency values and the comparison or checking of model and working time and frequency measures against the reference standard signals is 10 to 20 times more accurate than when using the reference standard signals of specialized radio stations.

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8225
CSO: 5500/13

INTERNATIONAL AFFAIRS

KITS OFFER EXPANDED USE OF OPTICAL FIBERS

Paris AIR & COSMOS in French 11 Apr 81 p 43

[Article by Xavier Marchelidon: "Optical Connections Everywhere"]

[Text] Optical fibers are undergoing special development in the field of telecommunications.

At the electronics components exhibition the French Company Quartz et Silice [Quartz and Silica], showed the new QSF-AS series. These are "silica-silica" fibers of large core diameter (135 or 200 microns) and, also, very low attenuation (≈3 dB per km at 0.85μ). Future versions with variable OH^- ion content will offer high resistance to radiation. The Quartz et Silice fibers were employed in several experiments among which were those performed, on the Mirage 4000, for an optical bus and the study of lightning carried out on the Transall.

Eurofibroptic distributes, in France, the Eurotec fibers intended primarily for light and energy transmission and the Pilkington fibers for data transmission. These glass-glass fibers are being used in industrial and aircraft circles but not at all in telecommunications. Among contracts under study some are concerned with on-board systems for the Mirage 2000 and 4000 and Aerospatiale [National Aerospace Manufacturing Company] aircraft. The fibers have core diameters of from 100 to 400 microns for passbands of 100 to 10 MHz per km. Eurofibroptic also markets Pilkington cables, connectors, and transmitter-receiver units. The cables have Kevlar sheaths and Tefzel protective tubes.

Souriau at present is offering series S1005 fiber optic connectors, principally intended for short distance applications, with fibers of 200 or 400-micron core (fiber with index discontinuity). They are offered either in bulkhead feed-through or extender type. The connector's insertion loss is about 2 dB. Another series of passive connectors, S1006, is offered, for long distance applications, with index gradient fibers of 50-micron core. The connector's intrinsic loss measured at the equilibrium state of the modes at the connector level is less than 0.5 dB with stability of 0.1 dB under the various environments in telecommunications applications. For optical power exchanges between items of equipment or users of a bus line Souriau has adopted an active bidirectional T-shaped coupler, reducing the optical interfaces and hence the losses and length of the fibers, the predominant consideration for on-board applications.

An experimental bus line of two times four couplers has thus been constructed in collaboration with Marcel Dassault Aircraft and Marcel Dassault Electronics for the Mirage 4000. In such an environment it was possible to verify an average value of attenuation per coupler of less than 4dB and an error rate of less than 10^{-9}. These couplers utilize the following principle: the signal received by the detector, by means of rapid electronics, controls the emission of an optical signal compensating the reduction effected in the incident optical power so as to maintain the power level constant over the entire line.

Kits

However, penetration of optical transmission into the industrial field seems difficult. Two reasons may explain this phenomenon: for one, the technical capabilities of personnel are not yet adequate for effectively exploiting this kind of connection and, for the other, the constraints of utilization are basically different from those of the customary transmission lines.

Conscious of this problem, the manufacturers of components and complete systems for optical connections, such as Motorola, Hewlett Packard, Augat, and Spectronics, are offering short and medium distance connections in kit form to still hesitant industrial users. These generally consist of a diode transmitter, a receiver, and possibly a connecting cable provided with its connector ends.

Hewlett Package is even offering an HT system, TTL compatible, for 335 francs, Augat offers, for 3,000 francs, the 698-OK-008 kit which permits 100 meters of optical transmission with a transmission velocity of 40 megabands. The ensemble comprises a transmitter, a receiver, and an adjustable potentiometer. The cable is sold separately. This kit, among the most expensive, requires a source of +5 volts and operates with a minimal error ratio. Spectromics, represented by Europavia, for about 2,500 francs offers the "Missing Link" permitting connections up to 2 km with velocity of 30 megabands. In the case of short distances the fiber used is DuPont de Nemours Pifax PIR 140 and for greater distances the fiber used is Siecor 142 with 100-micron core and attenuation of 8 dB per km. The trend is therefore to kits with adequate performance over industrial distances and whose prices do not exceed 500 francs (cable included).

11706
CSO: 5500/2196

ITALY

PRESENT, FUTURE DEVELOPMENTS OF TELEPHONE COMMUNICATIONS

Milan IL MONDO in Italian 28 May 81 Special Insert

[Text] At the end of 1980, the number of Italian telephone subscribers amounted to 13 million. With the 845,000 new subscribers in 1980, telephone density increased to 33.7 telephones for every 100 inhabitants. While in 1965, one family out of five had a telephone, now one family out of two has a telephone installed.

In the 16 years of SIP [Italian Telephone Company] administration, the number of telephones in service has reached the sizable figure of 19,275,000. The number of subscribers has tripled and the 521 million conversation units, recorded in 1964, became 3,258,000,000 in 1980.

A special effort was made with regard to telephones available to the public, which increased to 389,000 of which about 41,000 are in street booths. The "business" classification also increased considerably. In 1980, there were 150,000 new users, bringing the number of subscribers in that sector to 2,443,000.

New technologies got the upper hand over old ones. Solid-state integrated circuits replaced vacuum tubes in amplifiers and radio relays are used instead of aerial lines and underground cables and artificial satellites are used for intercontinental communications.

Switching also underwent a radical change. Digital switching was introduced, replacing the old rotary switches with new electronic circuits without moving parts in exchanges. In Milan, at the end of 1980, the Bersaglio exchange was installed, the first Proteo (ITALTEL) digital switching transit equipment. The first AXE-10 (FATME) automatic switchboard was put in operation in Naples, almost at the same time.

These two events are the first step toward the goal of an integrated digital network, in accordance with the programs developed by the SIP technicians. The exchanges installed represent a potential of 15,000 connections and are capable of handling all required functions. Switching is accomplished by the time-division system and is based on the existence or nonexistence of a signal, corresponding to the digits "0" and "1," which identify the state. The most urgent objective of SIP is to activate dozens of these automatic switchboards in the next 4 years.

The installations to be put in operation within a year at the most will be in Bologna and Genoa.

Proteo-type exchanges that take up considerably less room than the electromechanical exchanges now in operation will make it possible to increase the capacity of a single component to 2,000 lines, five times the capacity attainable at present.

Both the services and operational characteristics of the new Proteo-type exchanges, to be used as urban switchboards by up to 14,000 users, were determined, in 1980, by agreement with ITALSIEL [expansion unknown]. With this kind of exchange it is possible to have a series of auxiliary services that could be obtained up to now by associating a computer with business telephone exchanges with many numbers. Repetition of the call for a busy number, a message prerecorded by an absent subscriber and the possibility of talking to three or four users on the same circuit are some of the possibilities that the new exchanges will be able to provide.

Experimentation with second-generation Proteo exchanges, already in an advanced stage, will continue all during this year. Digital switching in the urban sector will certainly put Italy in a prominent place with regard to other nations.

Within the framework of modernization of the telephone network, SIP has started to introduce public telephones that can take slugs or coins indiscriminately. The introduction of prepaid credit card telephones, to be used with special telephones, similar to what happens in some foreign countries, is noteworthy. These credit cards are usable even several times and the telephones that accept them indicate, from time to time, the number of conversation units still usable before the card, which used a magnetic code, expires.

SIP has also thought about developing the data transmission service. Activities in this field have been carried out in accordance with previously issued guidelines.

The peripheral equipment of the packet network, developed by ITALTEL [expansion unknown], facilitating data access and communication, was examined.

In the field of radio relays, which have gradually replaced cables almost everywhere, development of new equipment with a different frequency that can be used both on departmental and on district and urban networks has continued.

In spite of the persistence of uncertainties and conflicts in the general economic situation, of the delay and insufficiency of rate measures ordered and of delays in other measures specified by the CIPE [Interministerial Committee for Economic Planning] for ensuring development of telecommunications in Italy, SIP made investments amounting to 1,951,000,000,000 lire in 1980, compared with 1,586,000,000,000 lire in 1979.

On the basis of an objective examination of the soundness of the SIP structures and of the human potential available to it, it is to be hoped that, once the government commitments have been carried out, the company will also be able to implement the important facility modernization programs, for the purpose of rapidly attaining the goal of electronic switching.

This is the present. But the future of the telephone service is coming predominantly to the front of the technical stage, indicating right now what the fields of development will be.

Some achievements, regarded as feasible in the future, are ready to be used by a limited circle of users. Others will be ready shortly. The telephone service is changing its appearance with the new equipment. The telephone is no longer a means for communicating by voice from one point to another, but, rather, it is a complex, integrated telecommunications systems that makes it possible to send voice, sound, pictures, data and information at a distance by means of highly sophisticated techniques, providing essential services.

The foreseeable prospects should be examined.

It must be assumed that some of the services that will gain ground considerably in the future already exist. It suffices to think of facsimile transmission. Facsimile is a system of photocopying at a distance making it possible to send documents, drawings, written material from one user to another, even at a distance of hundreds of kilometers, by using the telephone network for transmission. The graphic signs that appear on the documents to be transmitted are picked up by scanning (a sensor scans them line by line) and they are transformed into electrical signals and inserted in the telephone line after having adjusted to its frequency. On arrival, a similar piece of equipment will perform the reverse operation, making it possible to have the "telephoned" document in a very few minutes. A standard format document or drawing is transmitted in less than 3 minutes, but new equipment is in process of development that makes it possible to reduce that transmission time to less than 1 minute.

Facsimile has found and is finding considerable application in a large number of sectors, ranging from the business sector to the industrial sector, from the journalistic sector to the legal sector.

Remote control is very interesting because of its practical possibilities. In general, these systems send and receive, by means of the telephone network, data pertaining to measurements at particular installation points. After the equipment has interpreted the data, it can send back corrective signals or memorize the data for management purposes.

These methods find application in all those installations in which it is not necessary to leave human operators, like control of traffic-signal networks, of aqueducts, gas pipelines, small stations for observing atmospheric pollution, and so on.

Other remote control systems make it possible to light off heating plants of remote apartments at a distance or to activate machinery and equipment at a distance. In this case, it suffices to transmit a code by voice or by means of the telephone dial, after dialling the number for the system desired to be activated.

Telemedicine, that is to say distance transmission, by the telephone network, of medical data like an electrocardiogram, clinical analyses, x-rays, supervision of dialysis, and so on, is very advantageous from the social and health point of view. This system, installed experimentally in some hospitals (primarily the application made in Udine with Hewlett Packard equipment) is about to become an important means for the qualitative and economic improvement of health services, oriented toward a decentralization of structures.

The telephone network can be used excellently for carrying all kinds of signals, even television. Noteworthy among this kind of application is "flexible video," consisting of a system of telecamera and monitor making it possible to transmit pictures through the switched network, rather than with a special television network on coaxial cable. Special areas, like accesses to establishments, street crossings, and so on can be subjected to supervision with this method.

But the revolution in the system of transmitting telephone signals will come from fiber optics that will enable two users to talk to each other by means of light pulses rather than electrical signals.

Light will be able to serve men for communicating. The basis for this revolutionary transmission system is fiber optics, hair-thin glass threads tens and hundreds of kilometers long. Each fiber, with a diameter of around a tenth of a millimeter, is covered with a very thin sheath, also made of glass. The light rays, inserted in the fiber by the effect of that phenomenon going under the name of total reflection, are reflected on the wall of the outer sheath and succeed in coming out of the fiber at a considerable distance regardless of how twisted the course is. The equipment is supplemented by diodes that transform the electrical signals generated by the voice into light at the input. When the optical signals arrive, another similar piece of equipment retransforms them into electrical signals and, therefore, into audible vibrations.

The advantages are considerable. Because the signals travel in special channels formed by light, they do not undergo any kind of interference. Electrical and magnetic fields do not act on them and, therefore, communications are be performed without disturbances.

Fiber optics links have already been operating experimentally between two urban exchanges in Turin and a cable approximately 16 kilometers long has been laid in Rome between some SIP exchanges and ASST [National Telephones State Board]. These achievements represent a European first. Experiments on this new kind of transmission are being continued at CSELT (Telecommunications Research and Study Center, with SIP participation).

The characteristics of the signal to be transmitted with fiber optics are maintained intact and restored with extreme fidelity by light on arrival.

Videotelephone, that is to say the possibility of seeing the speaker while talking, will undergo considerable development in the future.

Integration between telephone and television receiver may give rise to "teleaudioconference." The service will come about with telephone-type connections between several persons (made possible by the future digital switching exchanges) and will enable groups of individuals located in different, distant environments and places to hold conferences and debates without the need for facing expensive and often difficult trips.

All this finds expression in a considerable saving of time. The service can incorporate graphic aids, like electronic blackboards, transmission of documents in facsimile, and so on.

This kind of system, developed into a "televideoconference," may also be used for teaching at a distance, as is happening at present in Australia, where distances are enormous and do not make it possible to assemble a sufficient number of students. The home television receiver, connected by telephone with the teaching center, carries the pictures and the voice of the teacher to every plain and to every farm, in addition to the graphics and figures desired to be shown. The student can talk with the teacher by telephone, seeing him on the screen at the same time.

But the real revolution of integration of the television receiver with the telephone is represented by a series of new services that go along together with the preceding one under the name of "telematics."

In principle, telematics systems make it possible to transmit data by using an electronic computer and an ordinary television receiver specially adapted. If the transmission takes place by cable, using the telephone networks, the system becomes interactive, that is to say that it is possible to talk with it, requesting clarifications and details from time to time.

A new service of telephone-television data, called "Videotex," is being prepared now in Italy experimentally.

This system will enable everyone to have access to data banks regardless of where located and to receive data from them on the screen of a home television receiver.

The potential possibilities are enormous and the public's interest is just as vast.

It will suffice for Videotex subscribers to dial 165, in order to be connected to the Videotex transmission network. The list of obtainable data will appear on the television receiver properly adapted with a microprocessor (a small electronic computer made on a printed circuit one-fourth the size of a postage stamp). There can be a great variety of these data and possibly incorporated with advertising texts.

It will be possible to select data on foreign exchange, on stockmarket quotations, on show programs in city theaters and motion picture houses, on time schedules of aircraft and railroads and so much more of broad social interest.

Videotex can include a list of open drugstores in the various parts of the city, highway traffic conditions, weather data, the main news from newspapers, and also touring and all kinds of information.

In order to be able to talk with the system, it will be necessary to operate the keyboard or the telephone pushbuttons. In this case, the telephone has to be of the pushbutton type. Once connection with the Videotex has been established, a specific indication will correspond to each number, as obtained from instructions that will appear on the video from time to time.

Thus, once the subject that is desired to be known is selected and the corresponding pushbutton has been pressed, it will subsequently be possible to select the information until the one desired is found.

For example, for drugstores the various parts of the city will have to be sought, while for motion picture theaters it will be possible to select the place with various criteria, ranging from location to film title, to plot or to the actors playing in it, by way of example.

In the now near future, it will be possible, still by means of the telematics service, to leaf through, on the television screen, the pages of mailorder house catalogues and place orders by telephone with no need for speaking, conversing by means of appropriate coded signals with the computer of the store providing the service. In the same way it will be possible to shop by telephone, selecting merchandise from the pictures appearing on the television receiver and ordering kind and quality merely by operating the pushbuttons of the telephone or of the keyboards, which may be similar to the boxes in use at present to change channel remotely.

In the same way, it will be possible to read daily newspapers and books from the public library on the television screen. In order to turn the page of the newspaper or to change the page of the book already chosen and selected (which, naturally, must be placed in memory beforehand in the data bank of the central processor) it suffices to operate the appropriate pushbutton.

Obviously, all this will have its cost, at a certain rate that will be advantageous to the user. In order to prevent overloading the necessary interurban communications caused by the connection, SIP has already decided that Videotex subscribers are to dial a single number, 165, regardless of where they are in Italy, so that everyone will under the same conditions, without privileges for anyone.

The rate will depend on the cost of the information desired and on the kind of connection.

Videotex service will start experimentally at the end of this year for a limited number of subscribers. Subsequently, by adjusting services to the requirements shown by use, it will be extended to every subscriber desiring it.

But teledata does not cease amazing. The technologies of electronic mail, transmitted with coded signals along telephone wires, might greatly improve the exchange of messages between citizens and solve at the roots the trouble afflicting Italy's postal distribution service.

Automation of the office, foreseen in the next few years, will greatly benefit work organization. In this sector, the telephone will function as a linking factor between the various business sectors with regard to the transmission of voice, signals, orders, information and data.

The "special internal installations," produced owing to modern electronic methods, have not only expanded the range of services that the telephone networks can offer users, but they also make it possible to collect data for the greatest variety of applications.

Mention should be made, among the advantages of the new technologies in performing office work, of abbreviated numbering, making it possible to dial the most frequently called numbers merely with a code consisting of two or three numbers. Added to these advantages are automatic documentation of the charges for calls, call rerouting (for desired subscriber who is temporarily at another number different from the usual one) and multiple telephone conversation between several users.

Therefore, the future has already begun for the telephone. That operation of integration between telephones, television receivers and office functions that will lead to a true revolution in the conception of the telephone has started.

In particular, automation of the office provides, in the near future, for the various areas in which office work is performed (data collection, supervision of presence and access, data processing and text preparation, reproduction of pictures and documents, document filing, written and verbal communications inside and outside) to be handled by telephone from a single logic unit that will be the "brain" of the whole system.

The birth and very rapid growth of "telematics" have been possible owing to the evolution of telecommunications and to an increasing use of digital methods, in addition to the development of microelectronics.

If we add to this the fact that microelectronics has been followed by a complete transformation of office terminals, it can be assumed that very soon integrated systems will be functioning that will also include, in addition to the units for data processing and handling files, local terminals for oral communications, for handling documents and texts, for collecting data, all of this controlled by a single telematic system connected, on the one hand, to the public telecommunications network and, on the other hand, to more or less complex local terminals, like multifrequency pushbutton telephones, facsimile equipment, card and tape readers, optical document readers, video terminals, person paging, electrical contacts for security of accesses and word-processing terminals.

Distributed informatics, integrated with the telephone lines, will undoubtedly make it possible to carry out an operational decentralization on the communal, provincial, regional, national and international level.

The telephone is about to become, from the clever invention for transmitting words, the real protagonist of the world in the future. Its development and the evolution of services that it will be able to provide are a hinge on which tomorrow's civilization will be based.

PHOTO CAPTIONS

1. p 1, upper right. Interior of an electronic exchange.
2. p 1, lower left. A container exchange.
3. p 2. Public telephone station in the Villa Borghese underground parking garage, in Rome.
4. p 3. Radio relay in Puglia.
5. p 4, upper right. Telephone connection for watercraft.

6. p 4, lower left. Electronic card instrument.

7. p 5. Videotex system for telephonic transmission of visible data on a television receiver screen.

8. p 6. Personal remote pager.

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SWEDEN

LM ERICSSON TAKES COMPETITIVE LEAD WITH COMPUTERIZED PHONE NET

Stockholm VECKANS AFFÄRER in Swedish 26 Mar 81 pp 32-33

[Article by Annika Halldin]

[Text] The giants of the international telecommunications market are fighting for an annual pie of about 60-70 billion kronor. The Swedish firm of LM Ericsson--small in resources compared to its competitors--still has the lead with its new computerized telephone station system AXE, which has been sold since 1977 to 27 countries and accounts for 40 percent of the turnover. The strategy is first of all to grow on markets already won, and second to try to sell to the oil countries. "We have outgrown our swaddling clothes--the competitors still have problems ahead of them," says division head Ove Ericsson. But LM [Ericsson] has one handicap: not being able to offer as big and favorable credits as its rivals.

"We have 2 or 3 years to go, and then the competitors will be in the race technically. It is therefore up to us to sell to as many countries as possible as quickly as possible."

That was more or less the feeling in LM Ericsson's board room in 1977, when the firm's new computerized telephone station system AXE was ready to be put on the international market.

A great deal has happened since then:

- AXE has been sold to 27 countries besides Sweden--and LM is thus the firm that has succeeded in getting in on the most markets with computerized systems.

- There are already 54 AXE exchanges with 500,000 lines in operation around the world. And in the order books there are about another 240 stations with nearly 2.5 million lines. (Manufacture under license is included in the figures.)

- The value of the orders from the beginning to the present amounts to 6 to 7 billion kronor.

- AXE thus counts more and more heavily in LM's total business. In 1980 the system accounted for 40 percent of the turnover--and 50 percent of incoming orders--

in the telephone station division, the biggest unit of the parent firm. It is estimated that within a few years the figure will be close to 100 percent.

"Moreover, we still have a few years' lead on the competitors," says Ove Ericsson, head of the telephone station dividion at LM. "What we had achieved in December 1978--i.e., with our system in operation in Saudi Arabia--ITT [International Telephone and Telegraph] will not come up to until the second half of 1982. The programming, the software, is very important--and we have outgrown our swaddling clothes, while the competitors generally still have problems ahead of them."

Not Only Telephony

There are now about 450 million telephones in the world, and the growth in telephone stations is estimated at about 6 percent a year during the 1980's. That corresponds to an annual pie of about 60 to 70 billion kronor to fight over for the next few years. What counts here first and foremost, of course, is having the right product. The dividing line runs on the one hand between analog and digital and on the other between mechanical and electronic telephone exchanges. In analog systems the sound is transmitted "as it is," while the digital systems change it to computer language.

Such a technically advanced system as AXE is thus both digital and computerized--although the competitors sometimes slurringly refer to AXE as a "semidigital hybrid."

"Certainly we have analog parts in the system today. But beginning in 1982 we shall also be supplying completely digital systems," says Ove Ericsson.

AXE is best known for the part it plays in telephony, but in the future the AXE stations will have a broader application--for viewdata, teletex, data transmission, and mobile communications. (Within a few years it will be possible to ring up to and from automobiles anywhere in Scandinavia without having to take account of what area code area the automobile is in.) Thus far LM has only installed local and transit stations for national use, but both international stations and mobile systems are on order.

Saudi Arabia Biggest

The market strategy for AXE is first of all to grow on the markets where LM is already established. Beyond that the firm is looking toward countries with great potential and/or high national product per capita, such, for example, as the Far Eastern and OPEC countries. On markets where it is hard to get in with big systems because of a strong domestic industry, LM is trying to find niches--international exchanges, mobile telephone systems, etc.

Apart from France, where LM, through its licensee Thomson CSF [Compagnie Générale de TSF; General Radio Company], LM has a bit more than 700,000 lines in operation and on order, Saudi Arabia is the biggest customer country. About 250,000 lines have been installed there to date, and considerably over 200,000 are on order. The next biggest customer is Colombia, which has ordered 28 stations with nearly 270,000 lines. Otherwise the AXE system has been most successful on the traditional LM markets: Central and South America, Africa, Australia, and European countries such as Spain, Denmark, and the Netherlands.

But what is the biggest deal today?

In Europe right now LM is participating in only one competitive bidding. It involves Greece, which up to now has been a white spot on the firm's map. The order is for 150,000 lines plus a factory, and so is what is called a turn-key project. The strongest competitors are Siemens, which is already big in Greece today, and ITT. The decision will probably be made during 1981.

In the Far East, bidding is going on in two places--in Bangkok and Singapore, with 150,000 lines each. Indonesia has no direct bidding in progress, but LM is still working the markets there. And as reported in VECKANS AFFARER earlier, the firm has high hopes of picking up a small--but strategically important--order in China.

Tighter Market

On the South American market, LM expects smaller invitations for bids in Uruguay and Ecuador within a short time. Venezuela, where LM already has an AXE station in place, has not yet chosen a new large-scale telecommunications system, either, and that, of course, is an interesting market in view of the country's oil revenues.

How great chances the AXE system has on these current markets--and on the world market in general--is hard to say. Even though the LM management regards the AXE's technical lead as relatively short, there are other difficulties to contend with.

The market is tighter today than 10 years ago, partly because the Japanese have gotten into it. "Nippon Electric, especially, is very competitive, with prices 25 to 30 percent below ours," says Knut Albertsson, marketing chief for the telephone station division. "Since they are also strong on meeting delivery dates and the like, the Japanese are powerful competitors, especially on markets where the price counts most heavily."

On a number of markets--e.g., Japan, the United States, West Germany, and England --domestic industry has a monopoly position, which has largely shut LM out to date. After internal criticism of the dominance of Western Electric and its parent firm AT&T in the United States, the monopoly situation is loosening up and LM now sees an interesting market in the United States.

AXE often comes out as number one in the telecommunications authorities' technical evaluation. But when financing questions and political aspects get into the picture, it is often hard to hold that position. One example is the bidding in Egypt in 1979, where Siemens snatched an almost 8 billion kronor order right out from under LM's nose by means of extremely good credit conditions.

Since LM has considerably smaller financial resources than its big diversified competitors and cannot count on any help from the state, either (except for the loans that can be guaranteed via EKN [expansion unknown]), the firm cannot compete by such means. Instead, LM sells on its ability to tailor the system to the purchasers' needs--and on its reputation as a technically advanced supplier with no delays worth mentioning.

Main Threat Comes From Japan

Although the LM management considers that the AXE system still has a few years' start on the competitors, the fight for the international telephone market is now getting tougher.

The American firm ITT has in recent years acquired the right to compete on the home market, too, and has also gotten orders for its System 12 from Denmark and Mexico. (In both of these countries LM has also gotten orders for its AXE system.) Deliveries to Denmark are expected in the last half of 1982.

The big American home market firms Western Electric (a subsidiary of AT&T) and General Telephone & Electronics (GTE) have entered the international market. Western Electric has taken home an order from South Korea, and GTE has sold its digital telephone system to Belgium.

The Canadian firm Northern Telecom went digital early and has grown by expanding into the United States. (The parent firm Bell Canada is participating with LM and Philips in the big Saudi Arabian project.)

Siemens began to manufacture analog computer-controlled exchanges, EWS-A, in the mid 1970's. But that system was not approved by the West German Bundespost (Federal Postal Service), and so the firm made the system digital (EWS-D). A test installation is now being done in South Africa, but it will be several years before the system is launched on a broader scale. The Egyptian order that Siemens got in 1979 with the aid of very good credit conditions was for the analog system.

In France there are two telecommunications firms--Thomson CSF and Cit-Alcatel. Thomson took over LM's and ITT's French subsidiary several years ago, but has now brought out a system of its own: MT 20 and MT 25. With President Giscard d'Estaing as chief salesman and with state financing behind them, the French firms have gotten several orders beyond the borders of France during the last year. Thomson, which is responsible for the larger stations, has gotten orders from Chile and Iraq, among others. But the firm has had great delays, and this, besides penalties, can lead to the firm's reputation's getting badly frayed.

Philips, LM's partner in Saudi Arabia, has naturally also sold its PRX system to the Netherlands. LM, however, still has 20 percent of the Dutch market.

In England the domestic telecommunications industry has fallen behind. Plessey, which, together with General Electric and ITT's subsidiary STC, brought out a computerized telephone station called System X, is therefore expected to lower the price substantially to get in on the market.

The main threat comes from the Japanese manufacturers--Nippon Electric, Hitachi, and Fujitsu. These firms are far advanced technically, and can also be expected, of course, to get many orders because of their low prices. Nippon, for example, has gotten an order from Continental Telephones in the United States (but there have been certain delays).

Nippon Electric and Fujitsu also recently won the competitive biddings in Malaysia and Hongkong.

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