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NORWAY TO BUILD COMPLETE CENTER FOR VIETNAM OIL BASE

Oslo AFTENPOSTEN in Norwegian 15 Jun 78 p 12

[Unsigned article]

[Text] The electronics firm, United Marine Electronics, Inc., which is a subsidiary of Elektrisk Bureau, is, in the next few months, about to complete the delivery of a complete communications center for an oil base in Vietnam. The contract was signed in the beginning of this year, and the equipment will be shipped from Norway at the end of June. The base will be in operation by the middle of September. The whole contract is for 10 million crowns, of which about 20 percent goes to the subcontractor.

Elektrisk Bureau is negotiating further deliveries of communication equipment to Vietnam within a finance package of 23 million crowns which is being arranged by the Norwegian government.

Seven Vietnamese are now in Norway to be trained in maintenance. Also, operators will be taught at the location, and the Norwegian firm plans to have 6-7 men in Vietnam in the first period.

Actually there are two "packages" which will be delivered. The first is a station for communication out to the oil rigs. The other has to do with equipment in connection with an airfield which is to be built for helicopters which will fly back and forth to the oil fields. In addition to this, there will be spare parts and equipment for later repairs and instruction of workers. This is the first complete unit that United Marine Electronics has had an order for. The firm became a 100-percent-owned subsidiary of Elektrisk Bureau when the concern took over Nera, and from 1 July it will be a division of EB.

"Since we have had reversals in the marine area, we have had to find new markets, and Vietnam is one of the countries where we have worked hard to get in. We got the contract after extended negotiations, and we hope now to get further deliveries for Vietnam," said Edvard Flasen, sales director.

Seismic investigations are now being made in the ocean off the coast of Vietnam, and it is thought that the prospects for finding oil are promising. With the oil, the country hopes to be able to get much needed currency.

The base, which is now being built, is located near Ho Chi Minh City (formerly Saigon). The location will be the main base for southern Vietnam, and later there will be a concentration of refineries, petroleum activities and other activities which have to do with oil, in the area.

9124
CSO: 5500

SWEDISH L.M. ERICSSON CO SELLS TELEPHONE NETWORK TO BRAZIL CITY

Stockholm SVENSKA DAGBLADET in Swedish 2 Jun 78 p 17

[Article: "One More Contract for LM for a Billion Kroner. Brazil Buys the AXE System"]

[Text] On Thursday L.M. Ericsson took a new long stride out on the world market with their computerized AXE system. It was then clear that the national telephone company in Brazil had decided to choose AXE for developing the telephone network in the largest city in the country, Sao Paulo.

One condition for the transaction is that Brazilian interests must get the right to make decisions in LM's subsidiary Ericsson do Brasil Commercia e Industria S.A. (EDB). LM now owns 92 percent of the shares in that country.

"The Brazilian decision is of great stategic importance to us," says Director Nils Tengberg, LM Ericsson. "Sao Paulo is the most important city in Brazil, and Brazil is the largest country in Latin America..."

"It is especially encouraging that the Brazilians state clearly that our system is definitely technically superior to those of our competitors. The customers seldom say things like that."

Hard Battle

To start with, a series of telephone companies were fighting for the order from Brazil. In the last round there were only three left, the American ITT, the Japanese Nippon, and LM Ericsson.

"The Brazilians have taken their time to evaluate the system. We have been lying quite low when we have talked about the possibilities for getting the orders since we have been uncertain about our chances," says Nils Tengberg.

It is still impossible to say how much money the order involves, but it should be clear that over the long range it involves business for a billion kroner. LM Ericsson and the Brazilian TELEBRAS will now negotiate on the amount of the order, delivery times, and other details.

Negotiations are simultaneously going on about selling shares in the Brazilian subsidiary EDB. Brazilian private interests already own 8 percent of the shares, but the host country is now demanding a majority vote in the company.

It will not be the Brazilian state which gets into EDB. In accordance with the new strategy in Brazil, one will instead let a private company take over, in this case the insurance group Atlantic Boa Vista. It is not clear what percentage of the shares LM will release. Even though the Brazilian participant must have a voting majority, it does not have to own one-half of the shares.

Manufactured in Brazil

The Brazilian order will not have any great effect on employment in LM's installations in Sweden, which are operating with a troublesome overcapacity. One condition of the transaction is that the equipment must be manufactured in Brazil. However, there may be a positive effect on the Swedish employment during the transition stage before LM has managed to transfer the new technology to its subsidiary there.

In recent years LM's factories in Brazil have reduced their production since the ambitious Brazilian investment program has been reduced. Gradually LM expects that the new order should lead to a new increase in the production there.

Brazil is the latest in the series of LM Ericsson's export conquests with the new AXE system. So far a total of thirteen countries have chosen AXE to a larger or smaller extent. Four of them and an additional two have ordered the new telex system, which is based on the exact same principle.

All Over the World

The first large order came from France approximately 2 years ago. There LM and ITT got to share the development of the telephone system. In the same way as in Brazil now, LM was forced to sell the majority of the shares to French interests in order to get the order.

In the fall of 1977 a large order came from Australia after an intensive battle with the competitors, and in December of last year LM got their largest order ever from Saudi Arabia for a good two billion kroner. The Swedish Telecommunications Administration has ordered AXE for nearly a half-billion kroner up to 1983.

LM's technicians are very proud of AXE, which they have considered to be unbeatable for a long time. The advantage as compared to the competitors is that AXE is built entirely with modules, which facilitates the construction and the operation.

It has cost LM Ericsson approxiamtely 500 million kroner to develop AXE. As compared to the competitors, the development work started relatively

late, not until 1971. But LM believes this has been more of an advantage. The system has become more modern and more flexible since it has been possible to learn from the mistakes other people have made.

Progress in Thirteen Countries

The LM Ericsson Company has installed AXE in 13 [sic] countries--Australia, Brazil, Denmark, Finland, France, Holland, Yugoslavia, Kuwait, Norway, Panama, Saudi Arabia, USSR, Spain, Sweden, and Venezuela. Norway and the Soviets have chosen corresponding telex systems, the AXB-20. The first order came from France, but the big breakthrough for AXE was an order from Australia. There they carried out very detailed investigations before they decided on the purchase. LME got its largest order ever from Saudi Arabia --it was worth a good 2 billion kroner.

8958
CSO: 5500

TELECOM LINK VIA SPUTNIK SATELLITE: SOVIET PROPOSAL

Madras THE HINDU in English 27 Jun 78 p 10

[Text]

NEW DELHI, June 26.

The Soviet Union is understood to have put forward a proposal to the Union Government that India should join its inter-sputnik satellite system for establishing direct satellite telecommunication link between the two countries.

A tentative study carried out by the Union Communications Ministry has indicated that an investment of about Rs. 3 to Rs. 4 crores would have to be made by India if it were to join the inter-sputnik satellite system. In view of these and certain other problems, India has not made any commitment. It has to consider what advantages membership of the system would confer over and above those derived from its membership of the International Telecommunications Satellite Organisation (Intelsat) through which it is currently handling 90 per cent of its international telephone traffic.

The troposcatter link between India and the Soviet Union, estimated to cost about Rs. 3.90 crores with an exchange component of Rs. 92 lakhs is expected to be completed by 1980. It is estimated that the entire investment would be recovered in four years from the net revenue surplus that would be earned on the link. The link, which will have initially 12 channels, will be expanded to 24 channels later.

Each will meet the cost of setting up the facilities on its side. The terminal station on the Indian side will be located at Charar-i-Sharif, which is about 23 km from Srinagar while that on the Soviet side will be Dushanbe in Tashkent. The telecommunication channels from these places will be extended to New Delhi and Moscow by terrestrial coaxial cables or microwave system.

Most of the equipment consisting of antennae and multiplexing equipment, will be indigenously produced and the installation will be done by Indian engineers. Certain specialised sub-systems of equipment costing about Rs. 80 lakhs will be imported from the Soviet Union. Technical assistance for the installation, testing and commissioning of the equipment from the Soviet Union will be financed under the Indo-Soviet credit which is repayable in 12 years.

The Central Public Works Department (CPWD) has already prepared preliminary estimates and drawings for the civil works to be constructed at Charar-i-Sharif and Dushanbe. Action has also been taken for the purchase of necessary equipment from the Indian Telephone Industries, Bharat Electronics Ltd., Electronics Corporation of India and the Soviet Union.

At present, the telecommunication services for handling telephone, telegraph and telex traffic between India and the Soviet Union are operated by the Overseas Communications Service of the Communications Ministry, on the high frequency radio link between New Delhi and Moscow. Besides this, there is a satellite-cum-microwave circuit from Delhi. This circuit operates through the Intelsat satellite via Paris and is extended on mirowave system between Paris and Moscow.

The existing communication links with the Soviet Union are not adequate and reliable for long-term requirement due to the inherent technical limitations of the high frequency radio system. In order to improve the existing facilities between the two countries, an alternative communication medium was, therefore, considered necessary. As the terrain between India and the Soviet Union is mountainous, a troposcatter communication link was considered the most suitable.

CSO: 5500

FOREIGN COMPANIES ACTIVE IN MALAYSIAN TELECOMMUNICATIONS

Kuala Lumpur BUSINESS TIMES in English 17 May 78 p 8

[Text]

THE government's plan to increase its allocation to the Telecommunications Department under a massive effort to stimulate investment in the private sector will provide tremendous business opportunities to companies supplying such equipment.

It also serves to underscore the importance of telecommunications as a "superstar" in public sector development.

According to reports, the Telecoms Department which has originally been allocated $1.08 billion for projects under the Third Malaysia Plan, is likely to get another $.13 billion to fulfil its commitments.

With the department itself expected to foot another $1 billion from its own revenue, this would mean a total of $3.38 billion to be spent on development of telecommunications facilities.

There will be ample scope for various companies, especially those acting as agents of large international corporations or their local subsidiaries to get a piece of th e action each.

Major programmes under the TMP will include:

- Installation of new crossbar and electronic telephone exchanges, supplemented by mobile exchanges to overcome short-term delays.
- Installation of a submarine cable between Peninsular Malaysia, Sabah and Sarawak. Installation of microwave, VHF, UHF, coaxial and pulse code modulation (PCM) systems.
- Expansion of telex networks.
- Construction of a second satellite communication station in Malacca (originally sited in Kuantan) for operation with the Pacific Ocean Satellite.
- Expansion of telecoms network of the Asean countries.

So vast is the programme that it is not possible for any single company, no matter how large or extensive its world network, to hog all the tenders to supply telecommunications equipment.

At the same time, Malaysian telecoms specifications are said to be so exacting that international companies consider it a mark of prestige to be awarded a contract by the department, no matter how small the order.

Most of Malaysia's telecommunications equipment is imported, local assembly being confined mainly to cables (Federal Cables, Wires and Metal Manufacturing), telephones and private exchanges (Pernas Plessey) and switchgear (Ericsson).

About 70 per cent of Plessey's business is in telecommunications — supplying exclusively all receivers to the Telecoms Department — but they hope to take an increasing share in the market for radar, navigational and other aids for the Marine and Telecoms Departments and Armed Forces.

GEC already has a large stake in this field and its name can also be found on cables, multiplexing and channelling equipment and in the microwave and troposcatter links.

GEC — General Electric Company — is a British holding company with interests in GEC Telecommunications Ltd of UK, Marconi Communications System Ltd, Marconi Italiania and Allied Electrical Industires (AEI).

Their activities in Malaysia are coordinated by the GEC Malaysia Sdn Bhd which has a special Communications Projects Department.

The introduction of Pulse Code Modulation (PCM), which is the trend throughout the world in the field of telecommunications, made by Marconi Italiana through GEC Malaysia.

The company secured a contract to supply and

install PCM equipment to the Telecoms Department.

PCM is a digital technique for the tranmission of communication information resulting in a very efficient and reliable transfer of information from one end to another, said Mr A.P. Arumugam, manager of the GEC Communications Project Department.

He said the introduction of PCM by Malaysian Telecoms marked the beginning of the digital era for telecommunications in this country.

Originally, electromechanical exchanges were used in Malaysia followed by the cross-bar exchange and then the semi-electronic exchanges. The digital exchange is the latest stage in the development of telecommunications.

The contract to Marconi Italiana is for the supply of 30-channel PCM equipment from 1978 to 1980, at a cost initially estimated at $3 million.

Mr Arumugam said the contract, won in the face of stiff international competition, was viewed by Marconi Italiana as a very prestigious one, the first to be awarded to the company in Southeast Asia.

The contract will be executed jointly by Marconi Italiana and a 100 per cent bumiputra company, Juwira Sdn Bhd.

"GEC Malaysia's role in this is to provide liaison between our UK principals and local bumiputra companies," Mr Arumugam said.

A trial 30-channel PCM link is now in operation betweeen the Penang exchange and Balik Pulau, carrying 30 telephone channels over two cable pairs

One significant advantage in using PCM is that it can make maximum use of existing cables without having to lay new ones, thus avoiding the necessity to dig up public roads which often causes traffic jams.

Using PCM, the Telecoms is able to multiply by four to 15 the number of telephone lines using only existing cables.

In addition, transportable digital microwave links have been introduced by Marconi Italiana, thus avoiding the necessity to acquire land and construct buildings. This enables new housing estates or business centres to have a temporary telephone service until cables are laid for the installation of permanent telephone lines.

Marconi UK is also supplying communications equipment to Telecoms, Mindef, Civil Aviation Department and Radio and Television Malaysia.

Mr Arumugam said Marconi UK supplied and installed the first VHF radio links carrying 48 telephone channels in Peninsular Malaysia, stretching from North to South and to East. This main trunk communication network introduced in Malaya during the 1950s is still in operation as a standby link.

The Telecoms has introduced 1800/2700 micro-wave links since then to bear the heavier load.

Various other forms of civil communication equipment have also been supplied by Marconi UK, such as HF links Peninsular Malaysia and Sabah and Sarawak and of particular interest the troposcatter link between Gunong Pulai, Johore, and Kuching, Sarawak. This link, set up in 1965/66 was at that time the longest in the world.

Marconi Radar Systems Ltd. also supplied and installed various approach/airport radar systems to the Civil Aviation Department while Marconi UK supplied defence communication equipment like radar for the air force.

GEC Telecommunications Ltd, management the management company of the GEC group, specialises in civil telecommunications equipment ranging from telephone instruments to microwave links to highly compex electronic switching exchanges.

Together with other British telecommunications industries, it is now involved in the research and development of the revolutionary System X, the latest telephone exchange system introduced by the British Post Office in England.

This is expected to go into production by 1980 and, according to Mr Arumugam, the Malaysian Telecoms Department is keeping an eye on this system.

System X utilises stored programme control equipment thus entering the computerisation era.

Being a subsidiary of GEC UK, GEC Malaysia is now involved in promoting the sharing of technical knowledge with local bumiputra companies, some of whom are working closely with Marconi UK and Marconi Italiana in supplying and installing equipment to the Malaysian communication industry.

"GEC Malaysia is very impressed with the Telecoms Department's programme for development under the TMP," Mr Arumugam said.

"As a major equipment supplier, our role is not only to supply equipment meeting international standards but also to ensure that delivery dates are strictly followed so that TMP projects will not be delayed. This is one of our major responsibilities," he added.

"It is also our intention to train sufficient local manpower capable of installing, commissioning and maintaining the equipment without causing delays to the various departments."

Another objective of GEC Malaysia is the holding of seminars and conferences specifically catering for engineers from Telecoms and other departments.

At such seminars, experts from parent companies are called upon to lecture and discuss the various problems associated with telephone planning network.

Recently, GEC Malaysia held a seminar on secondary network planning to impart technical expertise to engineers from Telecoms. The topics discussed ranged from current development to solving of particular network problems such as provision of telephone services in urban areas where there is a long waiting list.

To commemorate World Telecommunications Day, GEC Malaysua will be holding an exhibition of its equipment at the Telecoms Training Centr

About 80 per cent all equipment whi goes into Malaysia's t ecommunications is i ported.

Nippon Electric Co: pany (NEC) has a v tual monopoly in T transmitters and a lar share in microwave a VHF/UHF systems a also in PCM cables.

Fujitsu, handled Nissho-Iwai (Japan GTE International a GEC are also evident.

NEC is part of the J panese giant Sumitor Shoji Kaisha, which s up office in Kuala Lu pur 16 years ago. It h installed, up to May la year, 77 of Malaysia TV transmitters wor about $35 million and h also taken a $10 millic lion's share of 38m, transmitters for 15 rad stations.

But the current cau: for joy in the Sumitor camp is the $10 millic contract for Malaysia second earth satelli station to be complete by 1979 in Malacca.

The present station Kuantan was put up b Mitsubishi and is use primarily for internatic nal telephone calls. Th new station will bear RTM programmes d rect to Kota Kinabalu i Sabah.

Siemens, the Wes German manufacture (handled by Guthrie Er gineering) last year s gned a contract to mee part of the Telecom Department's expansio programme over th next few years. Siemen will provide semi-elec tronic equipment for be tween 300,000 to 400,00 new lines.

Siemens has also hac the department's con tract for electronic tele switching equopmen and teleprinters for th past eight years.

In Malaysia, larg parts of the existing net work consist o Ericsson's Crossba exchanges that ar working well and relia bly. These electro-me chanical systems wil continue to be in use fo a long time to come unti Malaysia switches t Stored Programme Control (SPC) systems.

Ericsson Tele communications Manu facturing Sdn Bhd a Batu Tiga had since 197 been producing a ful range of public telephon exchanges which mak trunk subscriber dialling (STD) a standard facil ity throughout the coun try.

The company, whic employs more than 40 people at its factory, is member of the LM Ericsson Group, one o the largest internationa manufacturers of tele communications equip ment.

CSO: 5500

PRESENT STATUS OF TELECOMMUNICATIONS IN MALAYSIA

Kuala Lumpur BUSINESS TIMES in English 17 May 78 p 13

[Text]

THE overriding consideration in the development plans for telecommunications, as with all the other services in Malaysia at present, is how they fit in with the aims of the New Economic Policy and, more particularly, the Third Malaysia Plan (TMP). As is well known, the TMP forms the second phase in the implementation of the NEP which began in 1970 with the primary objectives of eradicating poverty and restructuring society in the interests of nation building and national unity and security. By coincidence, the first half of the TMP period will be completed at the end of this month and a brief review serves a timely purpose.

As part of the "physical infrastructure" of the country, the development of telecommunications — along with education and the other social services — figure as one of the major goals of the NEP, since these support services are vital to the success of all the other objectives. More specifically, telecommunications forms part of the broad category of economic activities known as transport and communications — a category which is recognised as having "a supporting but essential role to play in the overall development strategy under the TMP". As such, the main programme to be followed in the field of telecommunications can be summed up as the expansion of the available services "to serve the requirements of administration, commerce and industry".

Demands

As the TMP sees it, the main guiding principle for telecommunications programmes during the current period is that they should be geared to meet projected demands created by developments in industry, commerce and housing. Based on this guideline, the most important projects to be completed during the period of the TMP are as follows:

- Installation of new crossbar and electronic telephone exchanges, supplemented by mobile exchanges to overcome short-term delays;
- Installations of microwave, VHF, UHF, coaxial and pulse code modulation (PCM) systems;
- Laying of a submarine cable system between Peninsular Malaysia, Sabah and Sarawak;
- Expansion of the telex networks;
- Establishment of a public data switching network to cater for organisations using computers or modern electric business machines;
- Construction of a second satellite communications earth station at Kuantan for operation with the Pacific Ocean satellite; and
- Expansion of the telecommunications network of the countries of the Association of South-East Asian Nations (Asean).

In simple, ordinary terms, what do these projects mean, how far have they progressed and how will they affect our future as Malaysians? Before we can attempt to provide the answers, some preliminary facts must be known in order that the future developments may be looked at in their proper perspective.

It may surprise many that the telecommunications systems in Malaysia has a number of characteristics which make it unique in the world. To begin with, unlike the telecommunications systems of most other countries, Malaysia's is operated by the government as a public utility and not as a commercial enterprise. This basic fact partly explains why telephone subscribers in Malaysia enjoy by for the cheapest telephone ser-

vice in the world. The government subsidise every telephone that is installed to the amount of $8,000 and the installation fee of $25 in Malaysia has been found to be the lowest when compared to those of 26 other countries.

In Japan, where the fees are highest, the charge is $2,280 while in a "median" country like the United Kingdom, the rate is in the region of $250. No wonder the telephone is so popular in Malaysia, there being a national average of 28 telephones per thousand people in Malaysia, as compared to three per thousand in Indonesia and eight per thousand in Thailand.

High hopes

The public-service orientation of the telecommunications services also explain why Malaysia is remarkable in providing a high level of telephone services in the rural areas. This commitment is indicative of the lengths to which the government is prepared to go in putting the NEP into effect.

Another special characteristic of the Malaysian telecommunications system arises from the fact that Malaysia is virtually the only country in the world to be divided into the two main parts by a wide expense of sea. Because of this circumstances, Malaysia is one of the few countries in the world to operate what is called a "troposcatter" system — the high-quality radio-telephone link between Johore Bahru and Kuching — and also what is called a "domestic satellite system," (which involves the leasing of full transponder from the Intelast satellite over the Pacific Ocean) in order to enable TV programmes to be telecast simultanously in Peninsular and East Malaysia.

There is yet another feature which is peculiar to the telecommunications services in Malaysia. The explanation is somewhat technical and is best summed up by the following extract:

"The largest service provided by the Telecoms Department...is the telephone service. Its development involves a lot of planning which covers the provision of exchanges, the local cable distribution networks, and the trunk and junction network linking the various exchanges. The trunk and junction networks in Malaysia are normally by means of microwave and VHF systems spanning the whole country from hilltop to hilltop. What is unique in Malaysia is that these (hilltop) stations are engineered to co-site television transmitters, FM broadcasting transmitters, police communications systems and civil aviation systems. At certain stations, a troposcatter system is also co-sited and a radar station is installed nearby."

In other words, a special feature of Malaysia's system is the great extent to which the transmitting equipment tends to be closely grouped at the hilltop stations. This arrangement involves careful planning and is justified on the grounds of the economies to be gained.

Lastly, the Malaysian system is outstanding for the wide variety of services which is included in the telecoms network. These range from the basic services to such special provisions as the inclusion of the radio-call system by which timber operators in the jungle can communicate with the outside world through the national network.

Expansion

Another example is the incorporation within the system of the radio carphone system provided in the Kuala Lumpur areas. This carphone system is highly sophisticated and is normally avaialble only in the advanced countries.

It is in the light of such particulars that we can best appreciate the significance of the "blueprints" for the expansion and improvement of the telecommunications system in Malaysia to meet present day requirements. The programmes and achievements can be conveniently reviewed in terms of the increasingly sophisticated types of equipment used and services provided, beginning with the telephone.

The end-user equipment: This consists essentially of the telephone sets and the exchange lines connecting the sets to the nearest exchanges.

Under the TMP, the original target set was the provision of 396,000 new exchange lines in order to progressively reduce the backlog of applications which have accumulated over the years. According to the latest figures available, a total of 72,236 applications were received during 1977 and after the new telephones in response to earlier and current applications have been installed, there were still 76,438 applications which could not be attended to.

One of the reasons for the continued existence of a backlog was the shortage of funds and this has been recognised and met by the recent allocation of additional funds which will enable the Telecoms Department to fulfil the TMP target on schedule. According to the Department's director of development, Mr M. Tharmanason, there will be a total of half a million working lines in use throughout Malaysia by the end of 1980. The total line capacity and actual telephones in use will of course be greater.

It is expected that at the end of the TMP period, there will be an overall average of 56 telephones per thousand people in Malaysia; in Kuala Lumpur itself, the local average will in fact be around 260.

The telephone exchanges: To keep pace with the rate at which new telephone lines are applied for and installed, local distribution networks through the telephone exchanges have to be correspondingly increased and improved upon. According to the original estimates, this involves the installation of 452,600 cable pairs, to be used in connection with both telephone and telegraph services.

Wherever possible, the extension of the exchange network will be implemented in conjunction with similar extensions for the telex and data transmission networks. Apart from extensions in terms of quantity, the improve-

ments will involve qualitative changes aimed at full automation of the exchange systems at the end of the NEP period.

Latest returns show a total 386 telephone exchanges of which 370 are automatic.

The transmission networks: As may be expected, the "trunk and junction" networks will also be expanded in step with the increases and improvements in the provision of telephone lines and exchanges. It has been estimated that the total circuit requirements will increase at the rate of 15 to 20 per cent per year over the TMP period. In meeting these requirements, the Subscribers Trunk Dialling (STD) system will be extended to cover the whole country.

In more detailed technical terms, this development involves "the extension of pulse code modulation systems, coaxial cable systems, microwave radio systems, as well as aerial and underground cables and overhead carrier systems".

Telex

More transmitting stations will also be built in order to extend the basic telecommunications services to the rural areas, new townships and other growth centres.

The completion of the improved transmission networks will provide Malaysians with high-quality circuits throughout the country.

Telex and data networks: These will naturally be developed in line with the more basic improvements in order to provide a more varied and up-to-date range of services. It is expected that the demand for computerised telex services will increase at the rate of between 30 to 50 per cent. To meet the demand, additional telex and data facilities are being provided. The number of telex subscribers increased by 31 per cent from 1,316 in 1976 to 1,728 at the end of last year.

Overseas/international networks: For overseas and international communications, the use of both the cable and radio or "wireless" have existed side by side for along time. Under the TPM, they will continue to be developed. The advent of satellite communications has not affected the importance of the submarine cable. The unusual division of Malaysia into two geographical halves separated by a sea has given the submarine cable a special value, since it is more economical and more advantageous from the point of view of national security. For this reason, and in order to supplement and complement the more modern facilities provided by the satellite systems, a new submarine cable will be laid linking Kuantan in Peninsular Malaysia to Kuching in Sarawak.

The cable will be able to carry 1,200 speech circuits which is many times the capacity of only 80 circuits by the SEACOM cable which was put into commission in 1967 to link Malaysia and Singapore to Hong Kong and other countries by way of Kota Kinabalu. Described as the biggest project under the TMP, the Kuantan to Kuching cable, according to our information, is expected to be completed on schedule by the end of 1979.

In addition, to keep pace with the growing cultural, diplomatic and economic ties between Malaysia and the rest of the world, other means of overseas communications will be expanded. The existing earth satellite station at Kuantan will be enlarged and a second station will be built to operate in conjunction with the Intelsat satelliite over the Indian Ocean. It is most probable that the new station will be located on the West Coast of Peninsular Malaysia instead of at Kuantan as originally planned.

In the interest of promoting Asean developments, the Malaysian telecommunications system will be specially orientated towards greater participation in the region's integrated network.

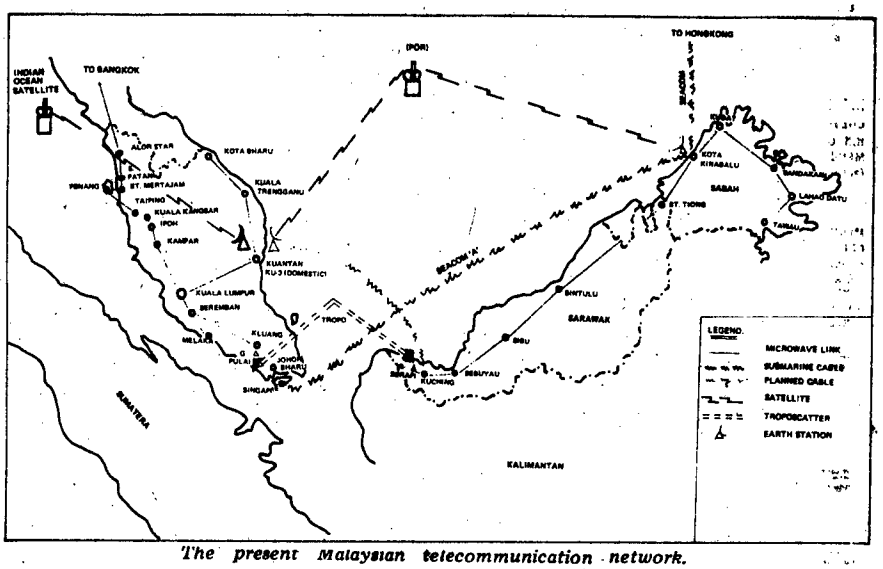
Broadcasting: The TMP provides for Radio and TV Malaysia (RTM) to extend the coverage of its services to the smaller towns. Emphasis will be laid on the provision of local and regional broadcasting stations and recording studios. Already, the introduction of colour television is scheduled to take place by the end of this year.

Aid

With the completion of new regional stations or studios at such centres as Kuala Lipis, Alor Star, Bintulu and Sandakan, RTM will be able to provide full coverage for the whole country by 1980.

A sum of over $1,000 million was originally set aside to meet the expenses of carrying out the programmes for developing the various telecommunications networks under the TMP. Because of the capital-intensive nature of the major projects, much of the financing for the developments in the telecommunications system is expected to be obtained from external sources such as the World Bank, the Asian Development Bank and the bilateral aid programmes.

On the whole, the Telecoms Department has been successful in carrying out the projects and improvements according to schedule in spite setbacks such as insufficient funds and manpower and operating difficulties. Given the will to succeed and the foresight and planning which have characterised much of the Telecoms Department's work so far, there is no reason why the objectives of the TMP and the New Economic Policy cannot be fulfilled and exceeded to provide Malaysia with a telecommunications system which is not only unique but one of the best in the world.



The present Malaysian telecommunication network.

OUTSTANDING TELECOMS STATISTICS, 1977

	P. M'sia	Fed of M'sia
No. of outstanding applications	67,763	76,438
No. of applications	64,076	72,236
No. of telephones lines (capacity)	315,740	376,140
No. of subscribers (working lines)	190,203	227,564
No. of Telephone Exchanges:		
Manual	8	16
Automatic	291	370
No. of telex subscribers	1,406	1,728

SOURCE: Telecoms Dept., Malaysia

CSO: 5500

DEVELOPMENT OF ASEAN SUBMARINE CABLE NETWORK

Kuala Lumpur BUSINESS TIMES in English 17 May 78 p 12

[Text] A NEW frontier in global telecommunications was created in that exciting year of 1866 when the world's first submarine cable was laid, stretching 2,600 miles on the bed of the Atlantic Ocean between New York and London.

In the 112 years since then, that act of laying submarine cables, then painstakingly carried out by the British iron ship Great Eastern, has been repeated many times over.

Submarine communication has expanded to more than 16,000 miles with multi-channels across the globe from Australia to the United States and such names as Seacom, Icecan, Canber, Oluho, Tasman, affixed to various cable projects, are imprinted in telecommunications history.

The latest addition to this communications collection is the Asean submarine cable metwork, one of the many Asean projects envisioned to link the five countries more closely together and perhaps one of the first to be so speedily implemented.

Asean cable

The concept of a uniquely regional telecommunications network structured on underwater cables dates back to March 1975 when the then Asean permanent committee on land transportation and telecommunications agreed to study the ramifications of such a bold project.

The groundwork was completed during subsequent meetings in Kuala Lumpur and Bangkok in 1976 and at the end of that year, the telecommunications agencies of the Philippines and Singapore — Eastern Telecommunications and the Telecommunication Authority of Singapore — signed a memorandum of understanding to construct a 1,450 nautical mile co-axial cable between Currimao, Illoces North in Northern Luzon and Singapore. This initialled the first stage of a four-phase project.

This $113 million link is to be commissioned in June, just over a year from the time the contract for the cable construction was awarded. The award was given to the British company Standard Telephones and Cables Ltd.

In the beginning of this month, the final stage of this multi-million cable was laid at the bottom of the turbulent South China Sea.

This final stage started with the arrival of the cableship CS Cable Venture which sailed out from Southanpton with 2,000 kms of cable and 157 ocean amplifiers.

The first phase was completed in February when cable was laid some 926 km off Singapore's shores towards the Philippines. The cable-laying along a precisely charted route is expected to be finished this week and will carry 1,380 telephone circuits.

The other segments of the cable network should be fully completed by 1982. The Indonesia-Singapore cable, carrying 480 circuits, is to be installed over 490 nautical miles at an estimated cost of $50 million by 1979.

The Singapore-Malaysia-Thailand link, to be laid at a total estimated cost of $77.5 mil-

lion, will carry a total of 960 links (480 circuits for each segment), stretching a total of 779 nautical miles.

The most expensive and longest connection is between the Philippines and Thailand. This is estimated to cost $148 million, carrying 480 circuits stretching 1570 nautical miles on completion. Altogether, the Asean submarine cable network will cost $396.5 million.

The most visible advantage of the network is the establishment of direct dialing services between the five capital cities at relatively low tariff. This service is very much an expansion of the subcriber trunk dialing service (STD) between Singapore and Malaysia. When fully implemented, the Asean direct dialing will be a convenience greatly appreciate appreciated, especially by the business community.

The cables, capable of carrying all types of telecommunications traffic — including telex, telegram and data broadcast — is also very useful for the transmission of television and high frequency data broadcasts, two services, increasingly useful in the fields of commerce and security.

The cost breakdown is to be based on the estimates of the usage of the system. For the Singapore-Philippines link, Singapore is picking up as much as one-third of installation cost.

Work on the Singapore-Malaysia-Thailand link has yet to be started. The three countries agreed in November last year on a provisional construction programme the connection by April 1980.

The landing sites for the cable are to be Katong, Kuantan and Phetchaburi. But the three countries have to go through the necessary procedures of signing a memorandum of understanding before tenders can be awarded.

However, a Japanese survey team from the Japan International Co-operation Agency, at the invitation of the three governments, was recently in Thailand to conduct a preliminary oceanic survey for the route and work may possibly begin before too long.

It appears that Singapore will act as the central exchange when the network is fully completed as the island republic lies at the centre of the region. It is believed that the Telecommunications Authority od Singapore is planning to spread the Asean network even further afield through the proposed IOCOM cable between Madras and the island. This will link the Asean cable to the Indian subcontinent and through that direct to Europe.

Another telecommunications project presently on the cards is the offer from Indonesia to use its orbital satellite system, Palapa, as the regional satellite communications system.

This offer was discussed in March by the Asean Committee on Transportation and Communications which also agreed to carry out a study on the Indonesian proposal.

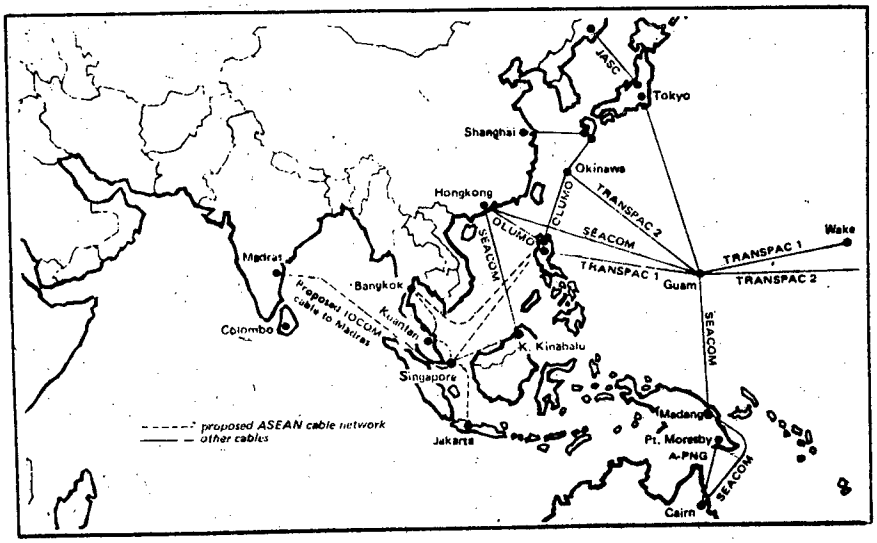
A working party of technical and economic experts are to convene in Indonesia and to come up with a report by September or October.

Pan-Asia

However, even if the five countries agree to accept the offer, there is still the legal problem of having to get clearance from the International Telecommunications Satellite Organisation (Intelsat) to which they belong. There is thus that possibility that this project, if it ever comes to pass, may take a longer time-span than did the submarine cable network.

Presently, Palapa will be used for the purpose of border communications, for circuits between Davao City in the Philippines and Medano in Indonesia. Malaysia and Indonesia will, on the other hand, use the line-of-sight microwave system between Kudat and Palawan.

The Asean countries are also part of a $75 million project jointly undertaken by the International Telecommunications Union and the Economic and Social Commission for Asia and the Pacific. This project, when completed by late 1979, will link 15 south and southeast Asian countries in a network comprising mainly of terrestial microwave links across Asia from Iran down to Indonesia and up to the Philippines.



CSO: 5500

COIN OPERATED TELEPHONES IN SOFIA VANDALIZED

Sofia IMPULS in Bulgarian 20 Jun 78 p 3

[Article by Chief Specialist Yordan Bezhev: "Coin Phones--An Unsolved Problem"]

[Text] The Sofia telephone and telegraph stations and the "Execution" Unit of the Ministry of Communications have shown unceasing concern for expanding and modernizing the network of automatic pay phones for local and long distance dialing and improving the organization of their maintenance and operation. In comparison with 1970, their number in the capital has risen by 35.14 percent. Nearly one-half of these were delivered from the USSR. At present for every 1,000 inhabitants of Sofia there are 2.6 automatic pay phones, concentrated chiefly in the central part of the city. There is a shortage of these phones in the busiest areas, in the new housing complexes and particularly in the settlements of the suburban region of the capital.

The development and modernization of the automatic pay phone network in Sofia (and in the entire nation) are also impeded by the fact that the MTA-4 [pay phone units] produced by our industry have a low technical level in terms of design and factory manufacture. The MTA-4 sets do not operate dependably. The absence of technical standards impedes their precise adjustment, and this tells on the quality of the call. There have been frequent instances of the jamming of the equipment with coins. There are prerequisites for easy intentional jamming by malfactors.

The long distance telephone communications between all the okrug towns and certain industrial, resort and key towns have been automated. But a standard coin phone has not yet been introduced. For this reason in Sofia in the suburban zone scarcely 50 automatic pay phones have been installed for long distance dialing, and this is a rationalization development which has a number of shortcomings.

The economic demand posed as a strategic task by the 11th BCP Congress for high quality and high efficiency in economic activities has been established as a daily concern and task in the work of each specialist and worker

involved in maintaining and operating the pay phones. This creates conditions for extending the operating time and on a daily basis to handle around 125,000 telephone calls. The 1977 plan for the volume of income was overfulfilled by 10.4 percent. Last year 90.86 leva of income were produced for each 100 leva of fixed productive capital. The level of social labor productivity is high and also the level of profitability measured as profit per 100 leva of fixed productive capital.

Along with these positive results in the work of the unit involved in the development, maintenance and collection of automatic pay phones, there are also a number of problems the solution to which will aid in a significant improvement in the serving of the citizens of Sofia.

In the first place, we must accelerate the delivery of Soviet pay phones for local and long distance dialing, and gradually replace the poor quality Bulgarian sets of the MTA-4 type. It is also essential to supply spare sets of dialing mechanisms, interchangeable units of internal parts, the microtelephone headsets and other spare parts.

For improving the management and control over the proper working order of the network of pay telephones it is essential also to expand and strengthen the dispatcher group, and particularly to organize the receiving of information from the citizens concerning nonworking pay phones. For this purpose it is essential to supply metal plates with a text which directs the citizens to where they can report a nonworking phone.

It is also essential to discuss the question of increasing the numerical size of this unit and to involve a broader group of inspector-coworkers mainly from among the retired postal workers and with whom a labor contract would be concluded for hourly pay. Each inspector would be responsible for a certain number of pay phones and each day by schedule in 2 or 4 hours would be visited and checked for proper working order.

Control of the proper working order of automatic pay phones can also be organized by the daily observation of the readings on the individual counter at the ATTs [automatic telephone exchange]. These functions must be entrusted to the technical personnel on duty at the ATTs. They should show the results in the log and should alert the dispatcher bodies under the unit in instances when there has been no increase in the metering.

A serious problem confronting the STTS [Sofia Telephone and Telegraph Station] is the protecting of the booths and telephones against intentional damage. In 1977, the enterprise suffered losses of around 40,000 leva. Some 31 sets were stolen, 84 coin boxes, 535 receivers, 1,380 microphone and telephone insets, 1,859 cords, 1,086 dials, a total of 1,430 m^2 of glass in the booths were broken and replaced, 270 m^2 of reinforced glass, 10 booths were unfit for use, and so forth.

Cooperation from the citizens must be enlisted to halt this barbarian attitude on the part of malfactors toward the booths and pay phones. For example, television, the movies and the press must be more frequently used.

The joint solution of these and a number of other problems by the STTS and the appropriate units of the ministry will help to improve the services for the citizens of Sofia. There are the forces and possibilities for this.

10272
CSO: 5500

COMMISSION TOLD TECHNICAL TRAINING NEEDED AT 'CTC'

Georgetown GUYANA CHRONICLE in English 27 Jun 78 pp 8, 9

[Text]

THE need for more technical training for employees attached to the Guyana Telecommunication Corporation was underlined yesterday as the Merriman Commission of Enquiry continued its probe into the operations and structure of the GTC.

This need was stressed by several employees who gave evidence before the commission yesterday. Those who gave evidence were drawn from the Radar, the Radio, Transmission External Plant Maintenance Control departments and the corporation's East-West Region which includes telephone exchanges between Mahaicony and Anna Regina.

Engineer in charge of the radio section who first raised the question of training for technical personnel told the commission that the situation in his department was "frightening". It was only last November, he said, that new and sophisticated radio equipment was installed in the city. However, there were only three persons -- including himself -- in that department capable of servicing and maintaining the equipment.

The general view was that while there was a lot of on-the-job training at the GTC there was need for more training to cope with the demands of the system and in some instances, there was also a need for more technicians to be recruited and trained.

Head of the Radio Department who explained that his department was responsible for the transmission of telephone messages via radio between distance points - Direct Distance Dialling -- also told the commission that there have been reports that the traffic between some exchanges has reached a stage of saturation.

These reports about congestion within the national network was further borne out in the evidence given by a representative from the West Demerara District. This representative explained that subscribers in the West Demerara area hardly ever make calls within their respective telephone exchange district. Instead most of the calls made in that district are terminated in Georgetown.

He contended that the number of junctions which facilitate the making of calls from the West Demerara area to the city were "drastically inadequate" and that this has resulted in bottlenecks and consumer dissatisfaction.

He said there were 164 subscribers at Vreed-en-Hoop but only 10 junctions to the city; there were 128 subscribers at Leonora, but only 15 junctions to the city; and while there were subscribers at Tuschen, there were only five junctions to the city.

The representative from the Essequibo Coast district where there are two telephone exchanges -- one at Suddie and the other at Anna Regina -- told the commission that while there was a lot of spare capacity at the two exchanges -- the Anna Regina Exchange could accommodate another 79 subscribers while the Suddie Exchange could accommodate another 93 subscribers -- the demand for

telephones by residents of the area was not being met because of the unavailability of line plant.

The district representatives also spoke about the need for improved transportation facilities to cope with the demands for their services and about problems in acquiring spare parts to carry out effective and important maintenance works.

However, Co-ordinator for the East-West Region explained to the commission that the transportation problem was due not only to the fact that the corporation has not sufficient vehicles at its disposal but also because of the indiscriminate use of corporation vehicles by employees, who often fail to carry out the required basic maintenance operations such as ensuring that there is oil in the engines of these vehicles.

The commission will meet again on Thursday at the Boardroom of the Ministry of Trade and Consumer Protection.

CSO: 5500

PROJECTS PLANNED FOR EXPANSION OF TELEPHONE SERVICE

New Exchanges in Arequipa

Lima EL COMERCIO in Spanish 7 Jul 78 p 18

[Text] Arequipa, 6 July--In the near future, the management of the National Telecommunications Enterprise will sign contracts with the Dutch company, Philips, covering the acquisition of two new, type PRX, semielectronic exchanges to expand the telephone capacity of Arequipa by 10,000 new lines.

This information was released by officials of ENTELPERU [National Telecommunications Enterprise of Peru] at the conclusion of activities in this city celebrating "Telephone Operator's Day."

The two semielectronic exchanges to be acquired from the Dutch company, Philips, will complement the PRX exchange now being installed at ENTELPERU facilities and will represent a combined increase in telephone service amounting to 22,000 lines which will permit the present demand for telephones in Arequipa to be met.

One of the new exchanges will be installed on Avenida del Ejercito, in the Cayma district, which will provide 5,000 lines for the region located on the right bank of the Chile River while the other exchange will be installed in Monterrey, in the Paucarpata district, to provide service for subscribers on the left bank of the Chile River.

Japan to Extend Credits

Lima EL COMERCIO in Spanish 8 Jul 78 p 1

[Text] Two telecommunications projects will be carried out in the country with a credit of 2.75 billion soles provided by the Government of Japan, through the Overseas Economic Cooperation Fund.

This information was released yesterday by ENTELPERU which emphasized that the loan will be used to build the microwave network of Cerro de Pasco-Huanuco-Tingo Maria-Pucallpa, an expansion of more than 300 kilometers, and the network via satellite of Lima-Iquitos-Tarapoto-Pucallpa.

The microwave networks will be integrated with the Microwave Trunk Network, will have a capacity of 960 telephone channels, plus one reserve channel, and will provide telephone, telex, telegraphy, television and teleprocessing services.

This work will be completed in a period of 18 months, beginning in the early months of 1979, with an estimated completion date of December 1980.

Experts have finished the survey studies; and it has been programmed that the equipment to be used in the projects will have long lifetime of use and high reliability, requiring little maintenance, because the repeaters are located in areas which are difficult to reach.

Also, for the first time in the country, solar cells will be used to obtain the energy needed to operate the repeaters, according to ENTELPERU.

The microwave project for Lima, Iquitos, Tarapoto and Pucallpa also involves the installation of mobile earth stations which utilize advanced technology in this sector.

The Iquitos earth station will begin operations in December 1978 and those of Tarapoto and Pucallpa in May 1979. The system to be used will be DOMSAT, employing the INTELSAT IV-A satellite.

The satellite system in the eastern forest region will have 92 channels distributed as follows: 48 for Iquitos, 23 for Tarapoto and 23 [figures as published] for Pucallpa. The quality of telecommunications will be improved.

8143
CSO: 5500

ARAB SATELLITE PLANS ANNOUNCED

Riyadh AL-RIYAD in Arabic 23 Apr 78 p 2

[Text] Concrete measures for implementation of the plan for an Arab space communications network have begun. A survey of communications traffic in the countries will be completed within a year for the purpose of designing the space network. In 4 years we will launch a pair of space vehicles carrying satellites to inaugurate operation of the Arab space communications network.

Plenary sessions of the Arab Organization for Space Communications, which will last for 3 days, began yesterday morning in al-Ta'if.

His Excellency Dr 'Alawi Darwish Kayyal, minister of telegraph, post and telephone, presented a report which alluded to the importance of these meetings and expressed his hope that the aspiration the Arabs have for this organization will be realized through rapid communications, exchange of news and information, and relaying of events through the air via our Arab satellites at the moment of their occurrence.

The minister stated that the creation of the Arab Organization for Space Communications shows that the Arab nation has resumed its cultural and technological position, and by God's favor has begun to show the unity and solidarity of a great nation.

Engineer Faysal Zaydan, deputy minister for telephone affairs in the ministry of telegraph, post and telephone and head of the board of directors of the organization, presented a report in which he stated that the participation of the various Arab parties in this meeting attests to its meaning and significance relative to the fervent wish and earnest desire for a strengthening and consolidation of the organization.

He indicated that this meeting represents the dividing line between two stages in the life of the organization, the stage of investigation, research and preparation and that of implementation through the attainment of concrete goals.

Engineer Faysal Zaydan stated that the organization has been able to carry out a number of its missions in spite of a scarcity of manpower resulting from the failure to create a continuing functional apparatus. He said that various schedules have been prepared and agreements made with advisers who will be responsible for various advisory services. He described an extensive series of stages in the implementation of the Arab space network project. He said that by a year from now the surveys and all the information from the member countries regarding communication traffic would be complete and that the designing of the network would follow. He added that the agreement with the contractor would be made by 1980 and that the first space vehicle carrying the first Arab satellite into outer space would be launched in 1982. Engineer Faysal Zaydan stated in conclusion that the second space vehicle carrying the second Arab satellite would be launched 4 months after the first, completing work on the space network.

This was followed by a telegram from Mr Muhammad Riyad, secretary general of the Arab League, addressed to the plenary session of the Arab Satellite Organization in its first session of meetings, in which he expressed his hope that the meeting would achieve the goal for which it strives, which will represent a major accomplishment, accelerated by the serious work to establish this organization, in the field of joint Arab work. He said, "Your coming together in the first plenary meeting of this organization will, God willing, advance the project of the Arab space communications network."

Dr 'Alawi Darwish Kayyal, minister of telegraph, post and telephone, announced that the satellites to be launched by the organization will serve to transmit telephone, telegraph, Telex and television communications between all Arab nations.

He added that the Kingdom of Saudi Arabia has provided more than a quarter of the organization's capital.

Dr Kayyal said that Saudi Arabia has been chosen as the headquarters of the organization and of its secondary control stations because it is located at the strategic heart of these stations and also because it is a center of international communications, since it is in the process of setting up a microwave project as well as being located in the center of the Arab east as a whole.

His Excellency concluded his statement by saying that this organization is considered a member of the Arab League and that it is an economic organization whose total profit after completion of its programs will amount to 40 percent of its capital.

The minister indicated that there are agreements between Saudi Arabia and other Arab countries, some of which are in force and some of which are in the study phase. He said that an international communications project involving Saudi Arabia and Sudan was agreed upon a few days ago and that there are international lines between Saudi Arabia and Qatar.

His Excellency stated that agreements have been concluded between Saudi Arabia and Jordan, Syria, Iraq, Oman and Yemen to open up international communications between Saudi Arabia and these other countries, which, God willing, will make Saudi Arabia a center of international communications.

8480
CSO: 5500

BRIEFS

SAUDI-SUDANESE MICROWAVE LINK--His Excellency 'Alawi Darwish Kayyal, minister of telegraph, post and telephone, yesterday signed an agreement to supply, construct, maintain and operate a microwave communications system between Saudi Arabia and Sudan. The implementation of this plan, which will cost 8,234,000 dollars, is intended to strengthen communications between Saudi Arabia and Sudan and to assure the movement of telephone, telegraph, Telex and television communications, thereby strengthening the fraternal bonds between the two countries. Saudi Arabia and Sudan have agreed to install this system across the Red Sea to connect the two countries at al-Ta'if and Port Sudan. Implementation of the project, for which Saudi Arabia will bear all the expenses, will take 19 months from the conclusion of the agreement. [Text] [Riyadh AL-RIYAD in Arabic 19 Apr 78 p 2] 8480

CSO: 5500

CONSTRUCTION OF SATELLITE STATION BEGINNING ON 26 JULY

Nairobi DAILY NATION in English 18 Jul 78 p 3

[Text]

EARTH BREAKING for the second satellite station connecting Kenya and West Africa will take place at the Longonot site on July 26.

Power and Communications Minister Mr. Daniel Mutinda will be guest of honour.

The Minister yesterday toured the external telecommunications services in Kenya.

He was first taken around the headquarters in Nairobi after which he had a brief stop-over at the Ngong station on the way to Longonot satellite station.

Mr. Mutinda had an exciting moment when he talked to someone in Australia through the Kenya satellite station. "It is so clear and quick to get through," he said.

The Permanent Secretary in the Ministry, Mr. D. Mwiraria and the Assistant Minister for Labour, Mr. S. Kairo accompanied Mr. Mutinda.

The officials were taken round by the chairman of Extelcoms, Mr. E. Hambwe, and the managing director, Mr. B. Okudo.

Mr. Okudo told Mr. Mutinda that kenya's external telecommunications services has been described as one of the best in Africa.

He said in future, the public will be able to dial international calls directly without going through the operators.

Mr. Okudo said the aim is to keep a abreast technology," adding "that Kenya was the first to have a satellite station, south of the Equator.

He said Extelcoms has a total of 400 engineers plus other trained staff.

The firm's present revenue was Sh. 150 million and was expected to rise to Sh. 280 million.

Mr. Okudo said much would depend on what the Kenya Post Office Corporation was doing, adding that there was a co-ordinating committee which looked in to the affairs of both the Corporation and the company.

Mr. J. Wachira, Longonot station manager, said when taking the Minister around that there were over 150 satellite stations in the world today with more 50 still under construction.

CSO: 5500

FUTURE POWER NEEDS DISCUSSED

Salisbury THE RHODESIA HERALD in English 5 Jul 78 p 3

[Text]

IF THE economy of Rhodesia grew as expected, new generating stations equivalent to about four or five Kariba's would be required by 1990, Mr P. G. H. Lamport-Stokes, Secretary for Transport and Power, said yesterday.

Opening the ninth annual congress of the association, Mr Lamport-Stokes said two factors which would interest farmers in the future would be the availability of adequate electric power and the ability of the railways to carry all traffic on offer.

Demands for power remained fairly buoyant even in periods of low overall economic growth and it was not unreasonable in Rhodesia to plan for a rate of growth of about 7 to 10 percent a year.

As it was important that demands for power could be met, the industry had to have an additional 15 percent on hand to cater for unforeseen changes, in particular for maintenance or for faults that occur in generating stations.

At the moment demand in Rhodesia was about 1 000 megawatts.

"On the basis of a return to sustained healthy economic growth and taking into account the 15 percent margin, it is forecast that in the early 1990s we will require about 3 500 megawatts.

"This means that by 1990, if the economy grows as we expect it to, we will require new generating stations equivalent in size to about four or five Karibas," he said.

If the new stations could be built in Rhodesia, and did not have to be shared with neighbouring countries, the requirement was reduced to about 2½ Karibas.

There were the available power resources to develop. There were tremendous coal resources and a number of potential hydro-electric schemes on the Zambezi.

The coal reserves at Wankie could sustain a thermal power station equivalent in size to Kariba for about 40 years.

"This project is our first priority and plans are in hand to implement it directly sanctions are removed," he said.

The five natural sites on the Zambezi for hydro-electric schemes are Victoria Falls, Batoka Gorge, Devils Gorge, further development at Kariba, and Mpata Gorge.

Speaking on transport, Mr Lamport-Stokes said that apart from a railways route to the north, there were the two routes to the south—one through Botswana and the other through Beitbridge.

Dealing with the post-sanctions situation, he said a problem would arise directly traffic began to pick up.

"If the Mozambique lines are not made available to us, there will be an immediate problem resulting from the line limitations south of Beitbridge," he said.

If the Mozambique border were opened the outlet was far more satisfactory and Rhodesia would be better off than before with one additional external link—the one through Beitbridge.

CSO: 5500

COMPUTER INDUSTRY COMPANIES TRAINS BLACKS

Business Equipment Association

Johannesburg THE STAR in English 7 Jul 78 p 10

[Article by Sieg Hannig: "Computer 'Brain Surgery' at Their Fingertips"]

[Text]

Yet another skill barrier has been toppled with the graduation this week of the first black "customer engineers" in the computer industry.

The five men will join a select band of white troubleshooters in pinpointing faults in computer brains and repairing them with delicate "surgery."

Their achievement has been made possible by the two-year-old technical training scheme of the Business Equipment Association at the Chamdor in-service training centre, near Krugersdorp.

Most of the five had post-matric qualifications before undergoing specialised training in electronics and computer logics at the R1-million training centre.

Now they are well versed in the intricacies of terminology such as bipolar and MOS integrated circuits, asynchronous counters demultiplexers, random access memories and logic families.

Big firms

As customer engineers they will serve large companies which often depend on computers for their efficiency, for example banks or building societies.

For their final period of training in computer logics, their lecturer was the first black lecturer in that subject, Mr Mike Nguyuza, a cyber data specialist who worked on the Airways computer at the Johannesburg Rotunda.

Mr Nguyuza, formerly a science student at Turfloop and now completing a Unisa course in data metrics, took over the course when the white lecturer left the training centre for Pelindaba.

"I have nothing but praise for the way these students worked to achieve their goal," said Mr Joos Lemmer, the principal of the training centre.

"We are delighted, because this will enable them to gain acceptance solely on their merits."

Technicians

Of the 1 500 trainees who have passed through this Government-sponsored centre for black training, more than 160 were from the Business Equipment Association.

Most of these are now working as technicians qualified to repair typewriters, calculators, adding machines and other of-

fice equipment. Others underwent speed-typing courses on electric typewriters.

The new customer engineers are Mr Dennis Magana (29), a former telephone technician from Soweto; Mr Simon Hadebe (25), a former high school teacher in Dobsonville; Mr Andries Lebelo (24), a former matriculant from the Setotoloane High School, near Pietersburg; Mr Vincent Mokoena (22) who matriculated in Natal and now lives in Soweto; and Mr Patrick Ndlovu who attended the Edendale Technical College on the East Rand.

International Computer

Johannesburg THE STAR in English 10 Jul 78 p 13

[Text] International Computers (SA), has made a breakthrough in the training of black South Africans in the field of computers.

The group has earmarked R300 000 this year for the education of blacks for computing careers, and the first 30 graduates have been awarded diplomas and certificates under the Manpower Development Programme.

The 30 successful students were chosen from more than 1 200 who had applied for a four-month course.

Presenting the awards, Dr C Wilson, managing director of ICL in Britian, said: "ICL, which operates in 86 countries around the world with its headquarters in London, is an Equal Opportunities organisation. It has to be, to succeed in a multinational scenario.

"It is my group's intention to become a leader in programmes and activities which enhance these opportunities for all citizens within the various countries in which it operates."

The group's South African training venture has been observed with great interest abroad, particularly in Britian. "These observers," said Dr Wilson, "have been impressed."

CSO: 5500

BRIEFS

EARTH SATELLITE PROJECT--Tanzania is to have its own earth satellite next year at a cost of 23 million shillings. Contracts for the provision of the satellite were signed yesterday by the director general of the Tanzania Posts and Telecommunication, Ndugu (Maida), for the corporation [as heard] and a representative of Japan's Nippon Electric Company. The project will end Tanzania's dependence on Kenya for external telecommunication services. [Excerpt] [Dar es Salaam in English to Central and Southern Africa 0400 GMT 13 Jul 78 LD/EA]

SATELLITE CONTRACT--Dar es Salaam, 13 Jul, (AFP)--The Tanzania Posts and Telecommunications Corporation has signed a contract with the Nippon Electric Company of Japan to deliver and install an earth satellite worth 2,900,000 dollars. J. Maeda, director general of the corporation, said that the satellite station would be in service in the second quarter of next year. He added that the corporation would sign another contract for the manufacture, delivery and installation of 1,150,000-dollar international telex exchange expected to be operational by the end of next year. [Paris AFP in English 0443 GMT 14 Jul 78 PA]

CSO: 5500

'TASS' ANNOUNCED LAUNCHING OF 'RADUGA' TELECOMMUNICATIONS SATELLITE

Moscow TASS International Service in Russian 1515 GMT 19 Jul 78

[Text] Moscow--In accordance with the program for the further development of communications and television broadcasting systems with the use of artificial earth satellites, another "Raduga" communications satellite was launched in the Soviet Union today. On-board is relay apparatus designed to insure in the centimeter waveband uninterrupted round-the-clock telephone and telegraph radio communications and simultaneous transmission of color and black-and-white central television programs to the "Orbita" station network.

The "Raduga" satellite has been put into a near-stationary circular orbit with the following initial parameters: distance from the earth's surface--36,590 km; period of revolution--24 hours 38 minutes; orbital inclination--0.5 degrees.

Apart from improved multichannel communications and television relay apparatus, the satellite has a triaxial system for precise earth orientation, a power supply system with solar batteries which independently aim at and track the sun, an orbital correction system, a thermoregulation system, a radiotelemetry system for transmitting to earth data on the function of the onboard systems, and a radio system for accurately measuring the orbital parameters and control of the satellite.

The apparatus installed on the "Raduga" satellite is functioning normally. The command and measuring complex is controlling the satellite. The communications and television apparatus of the satellite will be used in accordance with the proposed program.

The "Raduga" satellite has the international registration index "Statsionar-2."

CSO: 1866

RESEARCH ON RADIO COMMUNICATIONS DESCRIBED

Moscow VESTNIK SVYAZI in Russian No 4, Apr 78 p 25

[Article by V. S. Yampol'skiy, Head of the Department of Theoretical Physics, Candidate of Physical and Mathematical Sciences; L. B. Shtrapenin, Head of the Department of General Physics, Candidate of Physical and Mathematical Sciences of the Omsk State Pedagogical Institute imeni A. M. Gor'kiy]

[Text] Less than 100 years have passed since A. S. Popov, our famous countryman, had created the world's first artificial radio communication channel but today the air is filled to capacity with them. The total number of radio transmitters in developed countries is measured in hundreds of thousands, and their number doubles every 6-8 years. As a result of this, there has developed an acute problem of expedient effective utilization of radio waves of the entire radio spectrum.

The frequency band from 150 to 1600 kHz, which is the radio broadcasting band of long and medium waves, occupies a special position in the radio spectrum. Radio waves of this band propagate well both along the earth, and reflecting from the ionosphere (the upper part of the earth's atmosphere). The stability of the conditions of their propagation is considerably higher than that of shortwaves, the communication range is considerably greater than on untrashort waves, and the parameters of transmitting antennas (particularly economic) are substantially better than in the band of superlong waves. All this predetermined such a wide utilization of long and medium waves in radio broadcasting and navigation that less than one percent of the requests of all countries for the frequency of this band can be satisfied today.

In order to prevent chaos in the air and for the radio facilities of individual countries not to interfere with one another, international conferences are held regularly for the planning and distribution of the radio spectrum. These conferences make their decisions on the basis of recommendations of radio physicists studying the conditions of the propagation of radio waves. These recommendations are concentrated in the so-called "propagation curves" which show the dependence of the characteristics of the signal (its strength, fading) on the frequency, length of the route, the time of the day and year, etc. Since the problems of the allocation of the radio spectrum affect political, technical, and economic interests of many countries, very strict

requirements are imposed on the curves of radio wave propagation and they are created by scientists of various countries on the basis of long and numerous studies.

Such studies have also been conducted for 10 years in the radio physics laboratory of the Omsk Pedagogical Institute. We studied the structure of the radio wave field along routes of 300-700 km, i.e., under such conditions when it is necessary to take into consideration the effect of both ground and ionospheric waves. Amplitude distribution laws and their dependence on technical and geophysical conditions have been studied. Spectral characteristics of slow fading were obtained for the first time in the world practice for this waveband. Physicists of many schools of the Omskaya and neighboring oblasts helped greatly in our experiments. According to our program, they conducted simultaneous observations on the propagation of radio waves over the large territory of Western Siberia, Southern Urals, and Northern Kazakhstan.

By 1970, the institute accumulated and processed more than 16,000 hours of field intensity registration. Let us mention for comparison that the European Broadcasting Union (which includes almost all capitalistic countries of Europe) have conducted and processed 22,000 hours of experiments in six years. This is why the Council for the Propagation of Radio Waves of the USSR Academy of Sciences recommended our institute as a leading institute for developing propagation curves of radio waves at distances of up to 500 km.

We were faced with great difficulties, and the main difficulty was in the fact that there were no developed methods for measuring the intensity of the ionospheric field in the zone where the effect of the ground waves was great. The degree of these difficulties is indicated by the fact that the member countries of the International Radio Consultative Committee which approved the distribution curves for long distances at their Geneva Conference not long before that could not agree even on the method of creating such curves for short distances (to 500 km).

Our laboratory analyzed not only its experimental materials, but also the results obtained by the institutes of the USSR Ministry of Communications, Novosibirsk University, Institute of Geology and Geophysics of the Siberian Branch of the USSR Academy of Sciences, and other organizations (they constituted about one third of our studies).

Theoretical analysis of the mechanism of radio wave propagation, mathematical simulation on electronic computers, as well as the analysis of vast experimental data made it possible for us to develop new methods for measuring the field intensity of the ionospheric wave and to propose our method for creating propagation curves for short distances. An automatic multichannel receiving and registering complex was constructed in the laboratory for checking this method.

Experimental verification of the developed method was done chiefly during field measurements. The members of the laboratory and students of the

physics department participating in this work traveled by car in many regions of Western Siberia, Kazakhstan, Central Asia, and the Ukraine.

As a result of painstaking studies over many years, we have created wave propagation curves which are fundamentally different from all curves proposed earlier by various international organizations or individual countries. The results of this work have been published in journals and reported at all-union and international conferences. At the present time, on the basis of the results of these studies, proposals have been made to the MKKR [International Radio Consultative Committee] by the Soviet Union (on methods of measurement, methods of processing, and propagation curves).

Thus, the group of problems which was necessary for the development of radio broadcasting networks of this band has been solved. However, there are other radio engineering systems operating in this band for which it is necessary to have more detailed information on the structure of the signal, phase and polarization distortions, etc. Members of the scientific research laboratory of our institute are now engaged in this research.

10,233
CSO: 5500

NEW TELEVISION EQUIPMENT DESCRIBED

Moscow, VESTNIK SVYAZI in Russian No 4, April 78 p 24

[Article by N. V. Samsonov, engineer of the State Scientific Research Institute of Radio, USSR Ministry of Communications]

[Text] State Scientific Research Institute of Radio has recently developed devices which have made it possible to solve the problem of bringing the quality indexes of the operating television stations and main channels of program transmission to the requirements of colored television very effectively. These devices include a television signal regenerator (RTS), a device for input stabilization and correction of transmitting television stations (UVSK), a television signal level meter (IUTS), and others. The article gives a brief description of the technical characteristics of television equipment produced in series by the industrial enterprises of the USSR Ministry of Communications.

The RTS regenerator (Figure 1) is intended for stabilizing the levels of the components of the color television signal and improving the quality of synchronization during the transmission of television signals along long-distance communication lines and ensures the following: restoration of the amplitude and the form of the synchronous mixture of quenching pulses in accordance with GOST 7854-72 with a decrease in the synchronous mixture in the input signal to 0.1 V, the level of the background interference in the input signal to 50 percent, and the value of the noise interference to 40 dB; automatic stabilization of the level of image signals in the signals of black-and-white and color television with an accuracy of $\pm$5 percent when it changes at the input by $\pm$50 percent and of the color signal with an accuracy of $\pm$5 percent when it changes in the input signal by $\pm$6 dB; formation of a signal for external synchronization of the oscillograph which makes it possible to examine conveniently any region within the range of a frame quenching pulse, including test lines.

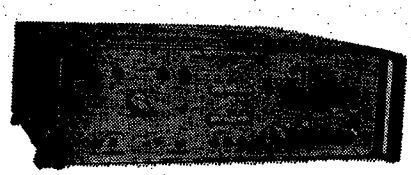


Figure 1. Television Signal Regenerator

RTS can be installed in intercity instrument rooms, at the outputs of long communication lines, at the input of television transmitters, and in the program instrument rooms of television centers.

Structurally, the device is housed in a standard casing. Its dimensions are 480X480X160 mm.

The IUTS meter (Figure 2) is intended for automatic digital measurement and monitoring of the video signal at any points of a television channel.

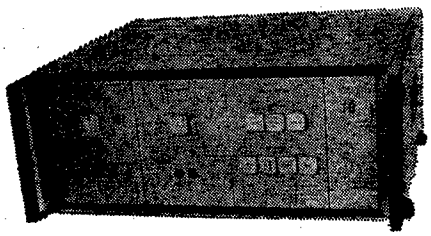


Figure 2. Television Signal Level Meter

The device monitors and measures the following components of the video signal: the amplitude of the video signal (signal of brightness in transmitting color television), synchronous pulses, signals of color synchronization (STsS) in the lines D_b and D_b and unmodulated color subcarrier (TsP) ituated on the rear sites of the quenching line pulses.

The technical characteristics of the IUTS are as follows. The measurement limits of video signal amplitudes are from 0.1 to 1.3 V; synchronous pulses from 0.1 to 0.5 V; STsS from 0.1 to 1.1 V; NTsP from 0.05 to 0.5 V. The basic measurement error is $\pm$ (0.03 U_x + 0.01) V.

The device ensures the cyclic measurement of the parameters according to a prescribed program, as well as continuous measurement of any one parameter selected by the operator.

The IUTS can be used in studio equipment complexes of television centers, intercity television equipment, space communication stations, and at television transmitting stations. The economic effect from the introduction of

the device will be 156,000 rubles. The housing of the device is the same as that of the RTS.

By equipping the television network with the IUTS devices, it will be possible to improve the monitoring of the state of the program transmission network, to determine the suitability of television signals for transmitting the television broadcasting programs, to determine timely the faults in television channels, and to take measures for their elimination.

The UVSK device (Figure 3) is intended for equipping of all operating transmitting television stations of any power in order to increase their stability and to bring their quality indexes to the requirements of color television.

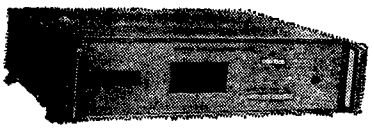


Figure 3. Device for Input Stabilization and Correction of Transmitting Television Stations

The UVSK device ensures the correction of the following: differential phase to 15 degrees; group time of the propagation of the transmitter-receiver channel in the band of up to 5.5 MHz with the possibility of continuous control; distortions of differential amplification to 60 percent; AChKh [amplitude-frequency characteristic] within the limits of up to $\pm$1 dB; amplitude of the synchronous signal in the case of deflections of up to 100 percent from the nominal deflection. The UVSK makes it possible to limit the depth of modulation during an increase of the amplitude of the input signal by 3 dB; to eliminate the additive frequency background of 50 Hz with an amplitude of 50 percent and the background to 500 Hz with an amplitude of 10 percent, in which case the background at the output is one percent; to reduce to 3 percent the skewness of the flat top of the rectangular pulse of the frequency of the fields from 70 percent at the input. UVSK ensures the operation of the systems of the restoration of constant component (VPS) in the modulators of the transmitters.

The device is constructed from transistors and integrated circuits and is housed in a standard casing. Its power intake is not over 40 W.

By equipping the operating TV stations with UVSK, it will be possible to improve the quality of the transmission of the color television signal by all TV stations, including stations not intended for transmitting television programs in color. The economic effect from their introduction will be 612,000 rubles.

All these devices have been transferred to industrial enterprises of the Ministry of Communications for their series production in order to equip operating enterprises with them.

10,233
CSO: 5500

BRIEFS

JAMMER NEARING COMPLETION--The installation of an ultramodern radio jamming station is nearing completion by the Soviets in Bulgaria. The principal targets: Radio Vatican, which is going to increase its power, and Radio Free Europe, broadcasting from West Germany. [Text] [Paris LE POINT in French 10 Jul 78 p 24]

CSO: 5500

FUNDING OF MEDIUM-TERM SPACE PROGRAM DISCUSSED

Rome L'UNITA in Italian 22 Jun 78 p 2

[Text] Rome. For over 1 year this government (and the preceding one as well) debated and then formulated a medium-term space program which, up to the present time, has remained locked away in ministerial and technical equipment offices. And yet this is a project of obvious significance. The program anticipates a public funding totaling about 500 billions for a period of 5 years beginning in 1979, in correlation with national and international commitments. Its main objectives are the development of a scientific satellite and an additional satellite for telecommunications, which would use the positive part of the "SIRIO" experiment, and could serve either for direct television transmission or as an advanced technological satellite for telecommunications at highest frequencies.

Does this concern a plan which can be divided in its entirety? Substantially no, for several specific reasons. This was almost the unanimous opinion of the representatives of the political forces (excepting, naturally, the DC [Christian Democratic Party]), which is the real proponent of this plan, as expressed yesterday morning in Rome at a round-table organized at the headquarters of the CNR [National Research Council] by the research unions. It has been said that this project, more than being a space program, is a "satellite program." At the present time it is recognized that space research can be performed without using these very costly devices. On this point comrade Mario Bolognani, in charge of the scientific research office of the PCI, intervened specifically and stated that the communist party is well-disposed toward selective and critical development of space activities and therefore not prejudicially opposed to the launching of a national satellite, on condition, however, that these activities be directly and strictly correlated with Italy's commitments in its relations with ESA (European Space Agency) and in accord with the perspectives of the industrial policies of our country.

As regards the entity of the expenditures contemplated, it is necessary to point out immediately that obviously they represent a substantial figure (which will be reviewed), especially if it is compared with the amounts

set aside for other research objectives in keeping with the immediate interests of the country (agriculture and human health). In addition it must be observed that in this program the quotas being assigned to research activities are not identified as compared with those which are a part of a "package" of initiatives for industrial promotion. Beyond the value of individual proposals which are being discussed at the present time in political headquarters and research laboratories it should be noted that the most important evaluation of the initiative taken by the unions rests on the fact that the discussion on this subject has finally been brought out of the restricted and specialized orbits in which, unfortunately, it had been held up to this moment.

Other than Bolognini [sic], the following were present at the parties' round-table: the honorable Gerardo Bianco and Dr Elia of the DC, Dejak (PLI) [Italian Liberal Party], Giunio Luzzatto (PSI) [Italian Socialist Party], Polcaro (PDUP) [Proletarian Unity Party]. The meeting was brought to an end by Angelo di Gioia of the industrial office of CGIL [Italian General Confederation of Labor]. Among others, the president of CNR [National Research Council] was present.

7993
CSO: 5500

SILICA-PLASTIC FIBERS FOR SHORT-MEDIUM DISTANCES

Milan ALTA FREQUENZA in English May 78 pp 236-238

[Article by M. Brenci, P. F. Checcacci, R. Falcial, A. M. Scheggi

[Text]

Abstract. The transmissive properties (relatively low losses and dispersion) of « silica-plastic » fibers are pointed out in view of their short-medium distance application. The technology for their fabrication developed at Istituto di Ricerca sulle Onde Elettromagnetiche of C.N.R. is briefly described and the measured propagation characteristic are reported along with a short discussion on the possible causes of the low dispersion presented by these fibers.

« Silica-plastic » fibres employing silicone resin as cladding and fused silica as core [1,2] are of interest for short-medium distance communications. The first merit of such fibers is the large core diameter which can reduce the coupling loss between fiber and light source; the second merit is the relative simplicity of manifacturing. In addition these fibers present reasonably low losses and small pulse spread which make them particularly suitable for other uses such as remote monitoring systems or data transmission in the premises or data links in airplanes and ships. A technology for manifacturing this type of fibers has been developed at the Istituto di Ricerca sulle Onde Elettromagnetiche » of C.N.R. in the framework of an activity aimed to the aquisition of a *know how* in this field. The technique used is the standard one for the fiber fabrication by preform method, however some noticeable modifications have been introduced, in particular the use of a R.F. induction heated furnace having an inert gas laminar flow for protecting the preform surface thus avoiding the contamination of the fiber core surface due to the furnace graphite susceptor [3, 4] which is a very important factor in determining the loss in the silica plastic fiber.

At the exit from the furnace the fiber is subject to two successive coatings: the first one constituting the

cladding and the second one the protection. These two operations are performed on line and consist in first dipping the fiber into the silicone resin, curing it in an oven placed in cascade with the resin vessel and then appying the plastic protection by using an analogous system.

Particular cautions have been taken for preform cleaning and resin mixture preparation [5]. Detailed descriptions of the drawing machine and of the used procedure have been already published [6, 7].

A view of the used drawing and coating machine is shown in Fig. 1.

The used material are either fused silica and synthetic silica rods (Synsil-Italglass; Suprasil 1, W1 Heraeus) with a 4 mm diameter as preforms, Sylgard 182 of Dow Corning as cladding and Kynar 7201 Pennwalt for external protection. Fibers having an overall diameter of about 300 μm with core diameter of about 140 μm and silicone cladding thickness of 70 μm have been obtained in typical lengths of 400 m. In spite of the very high attenuation presented by the resin constituting the cladding these fibers present rather low losses; this can be observed in Fig. 2 where typical spectral attenuation curves measured between 500 and 1 000 nm are plotted for two fibers having core in Suprasil 1 and Suprasil W1, respectively, silicon

resin cladding and external plastic protection. The upper curve represents the attenuation of the bulk cladding material measured on a 30 cm long and 3 cm diameter rod. The fiber attenuation curves exhibit a minimum value of about 10 db/km at $\lambda \simeq 820$ nm, for Suprasil 1 and a minimum of about 15 db/km at $\lambda \simeq 740$ nm for Suprasil W1.

The absorption peaks between 900 and 1 000 nm are probably also caused by the maxima in the absorption loss of the cladding material; however the Suprasil W1 fiber presents a much lower peak due to its low OH^- content. As for dispersion characteristics, measurements performed on the pulse emitted by a commercial type 900 nm GaAs laser diode give a half-width spread of about 2 ns for Suprasil 1 and of about 3 ns for Suprasil W1 after 350 m propagation in the fiber and hence a dispersion < 10 ns/km. This pulse spread is much lower than the theoretical value of about 80 ns/km which can be predicted on the basis of refractive index difference. These results are in good agreement with the data reported in

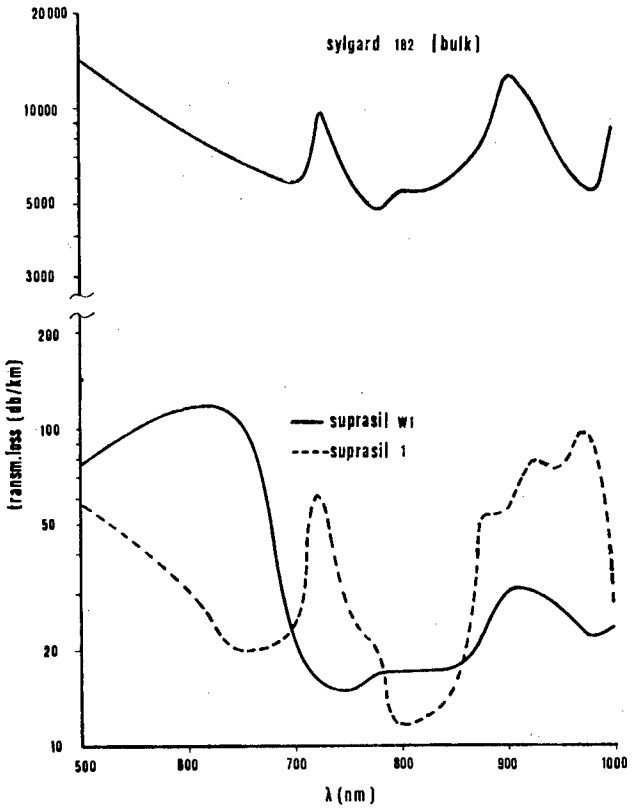


Fig. 2. - Spectral loss curves for Suprasil 1 and Suprasil W1 core fibers and for the cladding bulk material (Sylgard 182).

the literature [2, 8] which give a pulse spreading of $10 \div 20$ ns/km against a theoretical value of about 200 ns/km.

On the other hand it is well known that two are the main mechanisms which can reduce the mode dispersion predicted on an index difference basis: mode coupling and higher order mode losses. The second one is particularly relevant in silica-plastic fibres due to the very high losses of the cladding.

We recall that the power flow in the cladding is given by [9]

$$P_{clad}/P = \frac{1-b}{\sqrt{v^2 b + v^2 + 1}} \tag{1}$$

where P is the total power, b and v denote the normalized propagation constant and frequency respectively, and ν the azimuthal mode order.

By utilizing some numerical results obtained in previsious theoretical studies on dispersion characteristics in multimode fibers with nearly step index profile [10], we evaluated at the working wavelength (λ = 900 nm) the differential attenuation for the various modes.

Further, recalling that due to the large mode volume in this type of fiber the mode spectrum can be considered as a continuum and assuming an uniform modal illumination, it was possible to evaluate the impulse response of the fiber after a certain length, taking for the losses of the bulk cladding material the measured value of about 10 000 db/km and

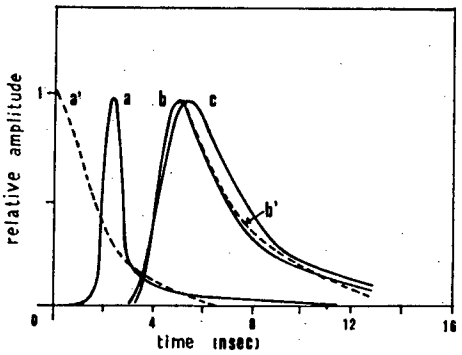


Fig. 3. - Measured pulse shapes after 350 m long fibers. Curve a) corresponds to the input pulse, curves b) and c) correspond to Suprasil 1 and Suprasil W1 core fibers respectively. The dashed curves a') and b') represent the evaluated impulse response and output pulse after the same fiber length. The time origins are indipendent for the different pulses which have been overlapped for convenience.

neglecting the differential losses in the core with respect to those in the cladding.

Fig. 3 shows the evaluated impulse response for a 350 m long fiber (dashed line a') and the measured pulse shapes for the same fiber length. Precisely curve a) corresponds to the input pulse, curve b) and c) corresponds to Suprasil 1 and Suprasil W1 fibers respectively. The output signal of the fiber, computed by convolution of the impulse response with the input pulse, is also shown (dashed curve b') which is very close to the experimental curves, thus confirming the relevance of the role played by the higher order mode losses in lowering the dispersion in this type of fibers.

Manuscript received march 20, 1978.

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CSO: 5500

NUMBER OF CUSTOMERS AWAITING PHONE SERVICE INCREASES

Oslo AFTENPOSTEN in Norwegian 16 Jun 78 p 12

[Unsigned article]

[Text] Before the end of the year about 70,000 people will be on the waiting list to get a telephone in this country. This is an increase of about 20,000 in the course of 1 year, and the waiting list will increase until 1981. It is predicted that 85,000 will then be on the waiting list, according to General Director Per Ovregard in the Telephone Directorate at a press conference in Oslo on Thursday when he announced the telephone company's yearly report. "If the predictions are accurate, the telephone waiting list will diminish to almost nothing in 1985," the general director said.

"If we are to reduce the waiting list, the level of investment must be raised and the appropriation must be increased. Several stations do not have sufficient capacity to handle the expected increase in traffic. They must be expanded, together with the cable network.

"There is also an undersupply of fitters. About 18,000 of the 70,000 who are now on the telephone waiting list are there because of lack of fitters. We think that this lack is only temporary and will be made up in the course of the coming years," Ovregard said.

One Million Subscribers

In the course of the year, the telephone company will get 1 million main subscribers with a total of 1.5 million telephones. An increase of 140,000 units a year is necessary to cover the waiting list and new subscribers, who, last year, reached 80,386. Telephone earnings make up 90 percent of the telephone company's income and yearly investments.

Ovregard pointed out that Norway is one of the most backward countries in Europe in automation, in spite of the fact that automation in Norway has now reached 92 percent. Only Ireland and Hungary in Europe are behind Norway in development.

Last year 66 manual stations were put out of service, and it is estimated that another 86 will be automated this year.

Eighty percent of the telephone traffic is now direct distance dialing, while 20 percent is manual.

At the end of 1977, the telephone company had 19,889 regular employees, an increase of 701 from the year before.

Most Expensive for Private Subscribers

Ovregard pointed out that in this country we have had a rather special tax system. As a result of the 20-percent added value tax on telephone rates, the private subscribers have had higher rates than business subscribers who get the added value taxes refunded.

Most countries in Europe do not have added value taxes on telephone rates. This includes, among others, Sweden and Finland. Denmark has 18-percent added value tax on telephone services, Belgium 16, Italy 14 percent on business telephones and 6 percent on residential phones, and Great Britain 8 percent.

The added value system is a great burden on the telephone company, according to Ovregard. Last year the telephone company paid 540.3 million kroner in added value taxes and 230.2 million kroner in investment taxes.

Fewer Telegrams

Mobile telephone traffic increased last year by 41.2 percent to 2,685,000 conversations. The number of mobile subscribers increased by 36.1 percent to 16,078 at the end of 1977.

There was a decrease in telegraph service at home last year to 985,700, while there was a decrease of telegrams abroad from 269,900 to 259,600. The number of radiograms to ships in distant waters increased last year by 9.3 percent to 81,152.

Mobile Stations Provide Telephone Service to 12,000

(Rolf L. Larsen) The telephone company will, in the course of the year and in the beginning of next year, set up 18 mobile telephone stations to help the most pressing telephone need. About 12,000 new telephone subscribers will be able to be connected to the mobile stations which will be placed in Oslo, Lorenskog, Drammen, Stavanger, Bergen, Steinkjer and Tromso, according to Section Chief Petter N. Pettersen in the Telephone Directorate, in a statement to AFTENPOSTEN.

The mobile telephone stations are built like large campers and can be transported by truck and placed where there is the greatest need for them. The

The stations come in two sizes. The largest has a capacity for 1,000 lines. The stations are purchased in Japan. The largest type costs about 2 million.

"Two of the stations are already set up in Oslo, one in Furuset and one in Slemdal. Bergen has also put a station into use, and one is about to be set up in Lorenskog. The stations can be connected to the net of fixed stations anywhere in the country, and the intention is that they are to remain until fixed stations have been built in these areas," Pettersen said.

He thinks that all the stations will be in Norway by the end of the year, and that all of them will probably be in use by the beginning of next year. The telephone company has bought 10 stations with 1,000 lines and 8 stations with 500 lines. It is expected that about 85-90 percent of the lines can be used by new subscribers.

Stavanger has great need and demand for new lines, and 3 of the stations with 500-line capacity will probably be placed there.

9124
CSO: 5500

TELEPHONE SERVICE TO SET UP MOBILE EXCHANGES

Oslo AFTENPOSTEN in Norwegian 16 Jun 78 p 12

[Unsigned article]

[Text] In the near future the telephone service will offer television conferences as one of its services. These types of television broadcasts make it possible to receive sound and picture from a speaker's area located several kilometers from the receiver.

The system was tested at the national meeting of Norway's Bus Owner's Union at Geilo last week. Eight hundred and fifty participants in 4 different hotels could follow what was said from the broadcasting station.

The equipment which is used in such transmissions is a new, mobile, radio line system which mainly has been obtained to cover the need of the permanent radio lines or cable system in the country to handle damage or make improvements.

Telephone Inspector Kjell Kaltenborn says that the telephone service will offer this system as a service. Among other things, it can be used for sports events, conferences, education and supervision. It can transmit up to 1,800 telephone lines, television and music channels.

The distance between sender and receiver cannot exceed 80 km, and there must be line of sight. This latter problem can be solved by setting up intermediary stations. The signals are reinforced over bowl-shaped antenna reflectors which also can provide two-way communication.

"The telephone service is expecting a great deal of this equipment, which, compared to conventional equipment, is light in weight, small in volume, and stable in the face of climate variations," Kaltenborn said. He added that it is quite easy to set up.

9124
CSO: 5500

BASIS OF INTEGRATED TELECOMMUNICATIONS NETWORK DESCRIBED

Bern BULLETIN TECHNIQUE in French No 9, 1977 pp 398-410

[Article by Walter Suter: "Fundamental Principles of the Integrated Telecommunications System (IFS)"]

[Text] Abstract. As one of the telecommunications systems of the future, IFS is called upon to provide a broad range of the most diversified services. It will eventually have to allow the economical and suitably adapted introduction of data services in parallel with telephone services. Primarily of digital design, switching and transmission in this system are based on the use of a PCM (pulse code modulation) channel capable of carrying 64 kbit/s. In the case of larger telecommunications sectors, the the control functions are grouped in centralized control devices with programmed memories. The overall structure is such that the fabrication of various functional blocks can be readily adapted to modern technology. In addition to the goals proposed for the system's design, the author describes the general structure of the network, security protection measures, as well as the principles which govern the exchange of control information and the communication traffic.

1. Introduction

Modern electronics has created a totally new situation in telecommunications technology. Until now, our efforts have been devoted to the development of new and more economical solutions for existing partial applications; current technology now makes it possible to convert a complete telecommunications network to digital design. The first digital transmission systems were built in the early 1960's using PCM. Once the technological conditions were specified, the PCM technique was also extended to switching. Following a number of projects and studies, an integrated telecommunications system (IFS) was developed in Switzerland [1,2]. Given the ambitious goals that were established for the project and the complexity of the development work, it was decided in 1970 to form a PCM work group composed of Hasler SA in Bern, Siemens-Albis SA in Zurich, Standard Telephone et Radio SA in Zurich, and the Research and Development Division of the PTT (Mail, Telegraph, and Telephone) General Directorate.

2. Goals

In structuring the system we had to satisfy a whole range of requirements typical of a telecommunications system and specific for IFS, while also taking into account the advantages offered by the all-electronic design and the reduced weight and volume of the installations.

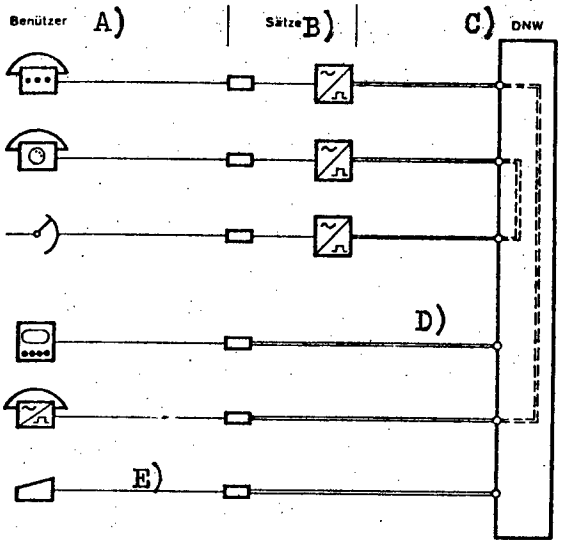

Figure 1. PCM channel as operational connection.

Key: (A) Users
(B) Line equipment
(C) Time multiplex switching network (DNW)
(D) ═══ 64 kbit/s PCM channel
(E) ——— Analog or digital channels

In order to take full advantage of the PCM technique in a telecommunications network, the transmission equipment as well as the switching equipment must be capable of directly handling PCM signals. Time multiplexed switching based on the principle of full frame memorization makes it possible to eliminate electromechanical contacts. This is the case of technical integration. And in a selection network of this type, a communication that crosses many switching points is of a quality equally as good as that of a point-to-point connection of the same length. The advantages of a digital network are also obvious from the standpoint of functional integration. A digital network makes it possible to integrate telecommunications services whose parts of very different natures (figure 1), such as telephone or other analog services, and telex, data transmission at medium or fast rates, or other similar digital traffic. We therefore do not have to establish and define at this time, the long range requirements for new services. Using a

broad base, we can assure the slow and progressive introduction of the system, which will meet the needs for future services. Service quality improvement is therefore manifested not only in the quality of the various services, but also in the number of facilities that are offered.

The switching systems existing in Switzerland differ greatly, not only from a technical standpoint, but also in terms of utilization. By introducing the IFS system, we are attempting to install throughout the country a uniform system with a very flexible structure. Given its technical capabilities, we are therefore laying the foundations of a system with a very high quality of operation.

A very important point in the design of the system, is the fact that the telecommunications technology is slow in adapting itself to the rapid development and modernization taking place in electronics. We can indeed remember that while electronic equipment has a lifetime of some 10 years, the life of telecommunications equipment is normally 30 to 40 years. This situation will change only very slowly. The development of a telecommunication system of the scope discussed here implies a high development risk, which should be reduced to a minimum through proper design.

Certain principles of introduction should be considered as early as the planning stage. An existing telecommunications system cannot be simply replaced; the new system must be installed progressively, over a long period of time, and must operate in parallel with existing networks without requiring that the latter be modified or adapted. The economic profitability of the integrated system must be maintained despite its long period of introduction and the additional costs involved.

These specifications and other requirements are so to speak the support piers of the IFS system, to wit:

The basis of the information transmission consists of a switchable and universal channel operating in a PCM mode at 64 kbit/s, for the transmission of voice signals, data, and signal and control information (figures 1 and 2). The use of 4-wire transmission and digital switching leads to a uniform, homogeneous, and high quality network. In accordance with CEPT (European Conference of Mail and Telecommunications Administrations) standards, we have combined 32 time intervals or 8-bit channels at a sampling frequency of 8 kHz, into a PCM multiplex circuit with 2048 Mbit/s connectors.

IFS is a centralized control system. It includes a limited number of system units, remotely controlled through a standardized and uniform connector. The PCM channel is used as control circuit, providing a semi-permanent communication path between the centralized control unit and system units, along a network of connections (figure 2).

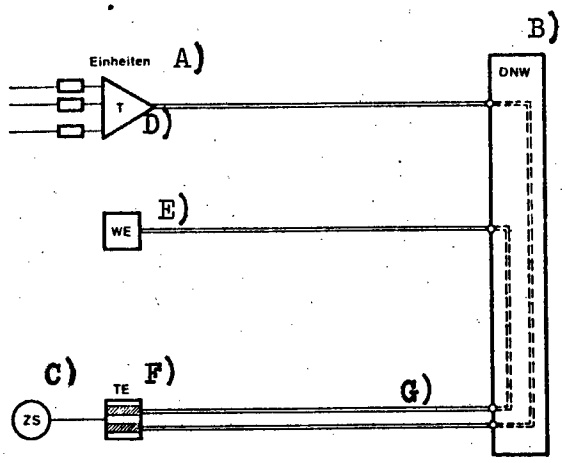

Figure 2. PCM channel as control connection.

Key: (A) Units
(B) Time multiplex switching network (DNW)
(C) Centralized control (ZS)
(D) Terminal (T)
(E) Dial unit (WE)
(F) Telegram unit (TE)
(G) ═══ 64 kbit/s PCM channel

The units can thus be located at separated points, such as any peripheral position of the network. No additional remote control network is needed.

By using standard connectors, the system units can be adapted to the most recent technologic advances without needing to modify the other parts of the system, a fact that unquestionably illustrates the flexible and modular concept behind the network's design.

Compatibility with existing systems, high control flexibility, and the modular nature of the network, require the installation of a programmed memory centralized control device, to be used for control, switching, and maintenance.

For the software, just as for the hardware, we had to create a structure with well defined interfaces, adapted to the needs of long range development.

Functional centralization demands very high reliability. In the IFS system, this reliability is assured by a multi-plane implementation, in which the traffic is distributed among four autonomous sub-planes. A total failure of all four planes is highly improbable. The four planes form a control group (essentially coinciding with a group of networks) that allows the connection of a maximum of 100,000 subscribers.

The introduction of new technologies is also reflected in a new concept of operation and maintenance. While maintenance and installation require less work, we must in return accept the inconvenience of having to make greater demands on the operating personnel. In order to rationally utilize the personnel, the system under consideration must facilitate the operators' work as much as possible. The operational functions are centralized in a district operations center (KBZ), which consists of a data processing installation serving several IFS networks.

3. Structure of the IFS Network

The operation of the IFS network can be subdivided into five fields (figure 3):

The connection field
The concentration field
The switching field
The processing field
The operational computer field

31. Connection Field

This field includes all the subscriber terminals for analog and digital services, their associated connection lines, as well as connections with conventional centrals. The analog subscriber network is identical with the present connection network; the information is transmitted along analog channels. Digital equipment subscribers are connected through the digital subscriber network, whose circuits use a totally transparent 10-bit code, with eight bits for the information and two bits for the signal.

32. Concentration Field

The concentration field is composed of analog and digital concentrators, and of terminals. It fulfills the following functions:

Concentrates traffic;
Supervises subscriber lines and circuits leading to conventional centrals;
Performs analog-to-digital conversions; and if necessary
Converts 2-wire to 4-wire connections;
Forms a PCM multiplex;
Adapts transmission modes to PCM channels; and
Converts signaling to a form standardized for IFS.

33. Switching Field

The switching network (DNW) switches all the types of communications -- whether control, signal, or information -- between any two inputs and outputs. Of modular structure, the DNW network is composed of standardized switching units. This is the only device of its kind that performs all the switching functions which depend on direction and bunching. However, the concentration field does not allow a direct connection between two subscribers.

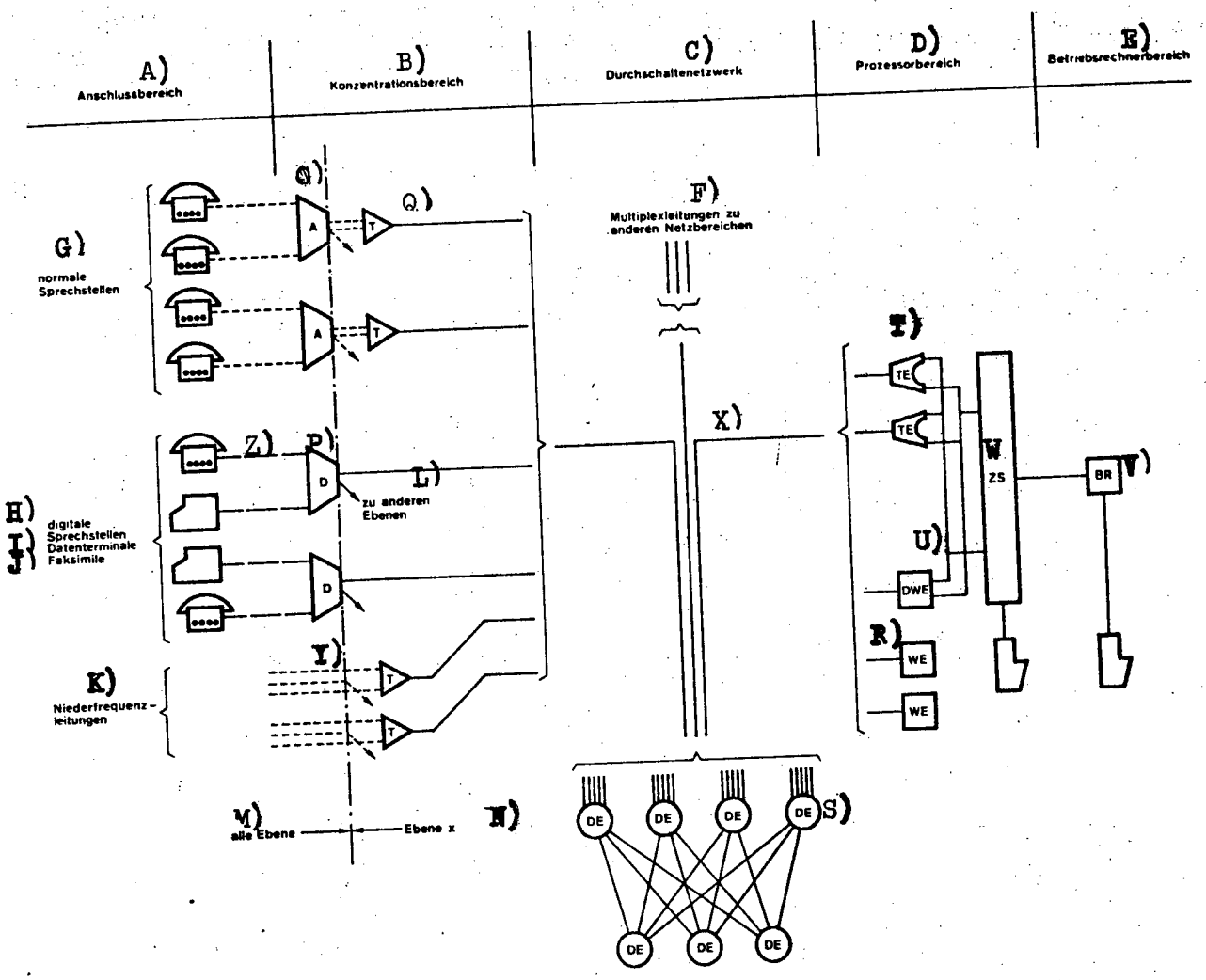

Figure 3. General structure of the IFS network.

Key:
(A) Connection field
(B) Concentration field
(C) Switching field
(D) Processing field
(E) Operational computer field
(F) Multiplex lines to other network areas
(G) Conventional telephone sets
(H) Digital telephone sets
(I) Data terminals
(J) Facsimile terminals
(K) Low frequency lines
(L) To other planes
(M) All planes
(N) Plane X

(O) Analog concentrator (A)
(P) Digital concentrator (D)
(Q) Terminal (T)
(R) Dial units (WE)
(S) Switching unit (DE)
(T) Telegram unit (TE)
(U) Digital dial unit (DWE)
(V) Operational computer (BR)
(W) Centralized control (ZS)
(X) ——— PCM multiplex line
(Y) ----- Low frequency line
(Z) — — — Digital subscriber line

34. Processing Field

The processing field includes devices that control and supervise the network, which in turn is composed of the central control and of an input system. In the case of telegram units, the latter adapts the control information from the central control to the IFS control channels or to the common channel (signal channels), and in the case of digital dial units, delivers the signal information from digital subscribers or from foreign systems to the common channel. The selection unit is used to transform the dialing signals from conventional systems. The centralized control (ZS) contains stored programs for unit control and traffic flow. Input and output paths connect the centralized control to the operations computer.

35. Operational Computer Field

This field contains all the devices that enable a rational and reliable operation of the IFS, namely:

A programmed memory processor connected to the centralized controls of several networks;
Operating stations connected to the processor; and
Various alarms and condition indicators.

4. System Units

41. Analog Concentrator (AKT)

Because the traffic generated by any one subscriber is low, it must be concentrated; the analog concentrator connects the network of conventional subscriber lines to the PCM multiplex circuits. The concentrator is divided into functional areas (figure 4), as follows:

A peripheral switching element that includes a two-stage modular network for electromechanical coupling, the subscriber equipment, and the line equipment;
Access devices with coupling network controls; and
Dual control devices for security purposes.

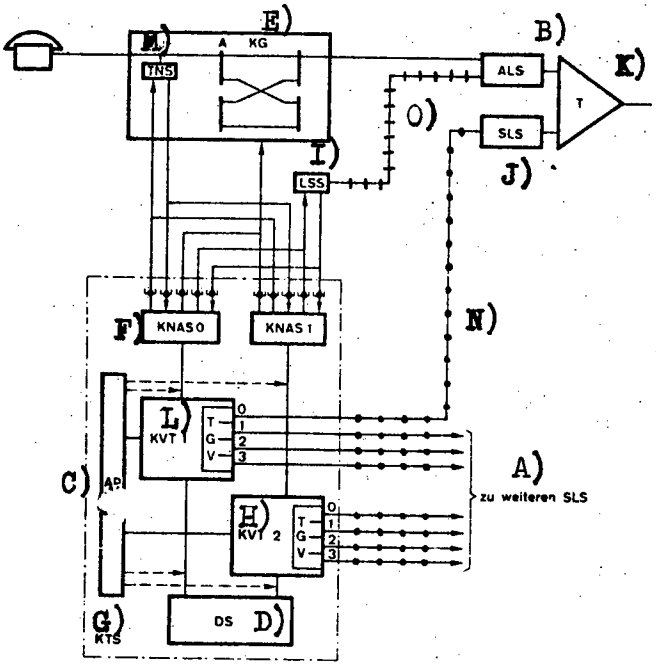

Figure 4. Analog concentrator (AKT) configuration.

Key:
(A) To other control equipment
(B) AKT line equipment (ALS)
(C) Discrimination circuit (AP)
(D) Data memory (DS)
(E) Coupling group (KG)
(F) Control circuit for coupling network (KNAS)
(G) Concentrator control (KTS)
(H) Concentrator processing assembly (KVT)
(I) Line equipment connector (LSS)
(J) Control line equipment (SLS)
(K) Terminal (T)
(L) Telegram processing (TGV)
(M) Subscriber equipment (TNS)
(N) -•-•-• Control channels to the central control
(O) -+-+-+ Signal line to ALS

Since the analog concentrator is a connection point between planes, it has control channels directed toward all the sub-planes attached to it. During the handling of traffic, it can perform some functions autonomously and independently of the planes, before relinquishing the communication to a sub-plane of its choice, for further processing.

From the standpoint of switching technique, it maintains control and signal connections with the centralized control, and works with the line equipment of the analog concentrator (ALS) through a link system. Up to 8000 subscribers can be connected to an analog concentrator.

42. Digital Concentrator (DKT)

Its function is similar to that of the analog concentrator, with this difference: digital equipment subscribers are connected to the primary PCM multiplex through a time multiplex coupling network. The DKT not only concentrates traffic, but also distributes it evenly among the four planes.

43. Terminal (T)

Its function is to perform the analog-to-digital conversion of at most 30 channels, and to group them into a 4-wire PCM multiplex. The lines are connected to the terminal through the line equipment (LS), which also groups the functions pertinent to telephone communications (line signalization, call insertion, and so on). Cost considerations make it reasonable to centralize the functions as much as possible; when the 30 lines operate on pulse signals, a terminal is used for pulse processing, whereas the analog concentrator terminal is used when the 30 lines lead to the analog concentrator. When a universal terminal is used, different types of line equipment can be intermixed depending on the type of signalization.

44. Dial Unit (WE)

It services 30 dial units or dial unit cells (WEZ) in time multiplex; the units must be capable of receiving and sending dial signals. Each WEZ can process all signal modes; it adapts the dial signals to a standardized internal format.

45. Switching Unit (DE)

A switching unit is a space-time switch to which one can connect 28 multiplex circuits (2048 Mbit/s). This unit thus makes it possible to simultaneously conduct 420 communications with four wires at most. Totally accessible, the unit is free of blockages. Switching units are grouped in symmetrical networks. Figure 5 shows an entirely symmetrical network with stages A and B, capable of handling a traffic of 3000 erlangs. All the units of the IFS system are attached to the stage A switching unit, while the switching unit of stage B is connected to the stage A switch through a system of junction lines.

Parts of the switching network can be located in a decentralized fashion (for instance in nodal centers).

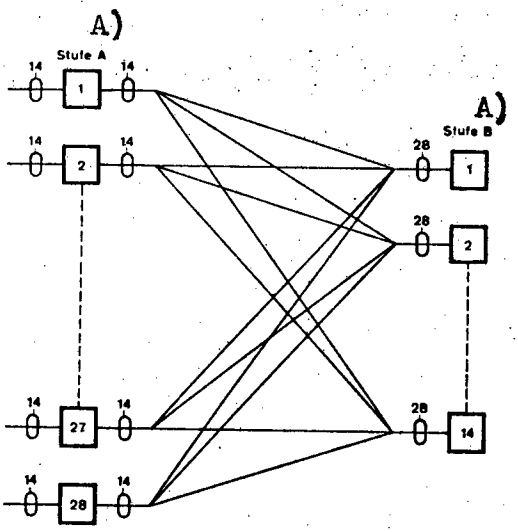

Figure 5. Symmetrical connection network.

Key: (A) Stage

46. Telegram Unit (TE)

The TE unit contains 31 control channel registers or telegram unit cells (TEZ). The control information between the centralized control and the units is exchanged through these TEZ (figure 2). This process transposes the exchange system of cyclic function data (telegram system) on the PCM control channel, and transfers non-cyclic data into the access system of the centralized control. The telegram units perform routine chores such as requests for state modification (line conditions, supervision points); these tasks are performed autonomously in the units, and only the state changes are signaled to the centralized control.

47. Digital Dial Unit (DWE)

This unit is used as signaling unit for rapid digital signalization, notably for signaling toward subscribers with digital equipment, or for common channel systems as well. It also includes 30 registers that require direct access from the centralized control, because of the high binary flow of the information.

48. Centralized control (ZS)

The centralized control functions are performed by a programmed memory processor [3] developed by Hasler (T 202 during the development stage, and T 203 for the higher performance later unit).

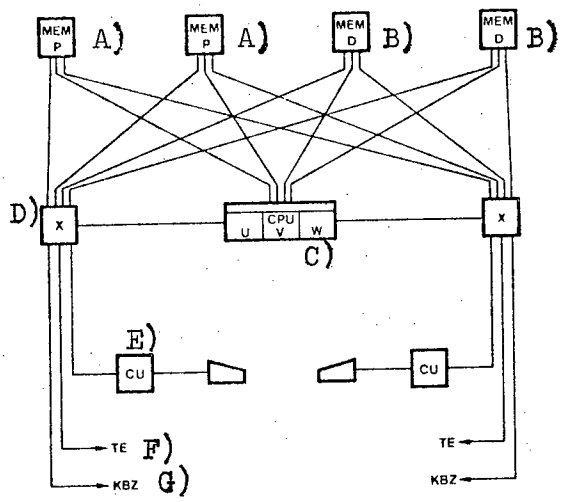

Figure 6. Configuration of the centralized control (T 202).

Key: (A) Read only, pre-programmed memory (MEM P)
(B) Data memory (MEM D)
(C) Central processor units U, V, W (CPU)
(D) Input and output unit (X)
(E) Control unit (CU)
(F) Telegram unit (TE)
(G) District operations center (KBZ)

A redundant configuration must be used because the system requires a very high reliability (figure 6), provided by a triplicate processor with ferrite loop memories and input and output units. This configuration protects against permanent and transient hardware errors, even though simple software errors could lead to total failure of the centralized control, and therefore of this sub-plane.

5. Multiplane System

The high redundancy at the processor level cannot by itself satisfy the extensive reliability requirements created by the strongly centralized control and switching functions. By using the multiplane system [4] (figure 7), service can be maintained either in the case of sporadic hardware and software faults, or when a sub-plane fails completely, even if this implies a somewhat poorer service quality. Each sub-plane operates autonomously, so that the extent of errors is limited to a single sub-plane.

The only interfaces are the concentrator, the district operational center, and the overflow traffic system with common signalization channel. The multiplane system also simplifies maintenance (disconnection of specific sub-planes, and so on).

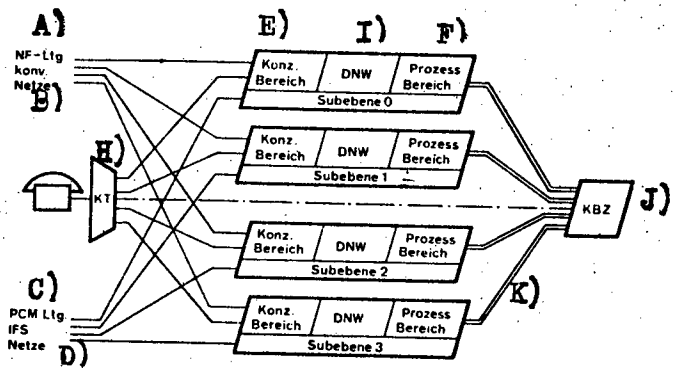

Figure 7. The multiplane system.

Key: (A) BF lines
(B) Conventional networks
(C) PCM lines
(D) IFS networks
(E) Concentration field
(F) Processing field
(G) Sub-plane
(H) Concentrator (KT)
(I) Connection network (DNW)
(J) District operations center (KBZ)
(K) Centralized control data-to-KBZ connection

6. District Operations Center (KBZ)

The operations center includes a data processing system capable of assuming the tasks involved in the operation of at most six control sectors (figure 8). This center is connected to the centralized control of each sub-plane and also has direct interfaces with the services. The operational concept [5] includes:

The tasks performed on one hand by the services, and on the other hand at the man-machine interfaces themselves, that is, at operator stations;
Maintenance, notably preventive maintenance, including on one hand test and maintenance, and on the other hand corrective maintenance such as the location, removal, and repair of faults.

The concept of maintenance implies an effective error detection, as well as the possibility of connecting avoidance channels for defective circuits in the centralized control and its sub-plane.

The KBZ is also equiped redundantly; but service of a somewhat lower quality is still possible without having recourse to the operations center.

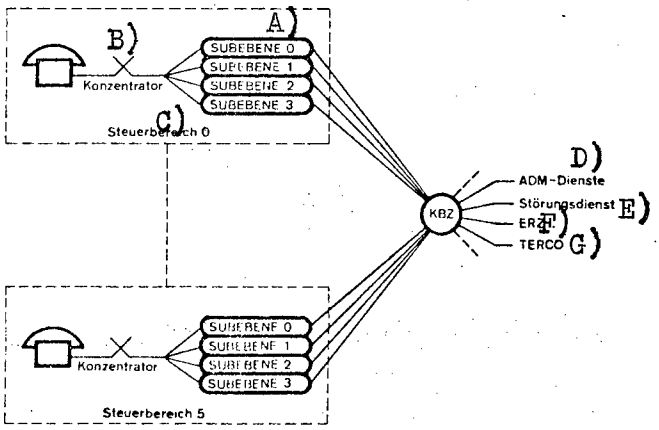

Figure 8. Position of the district operations center.

Key: (A) Sub-plane
(B) Concentrator
(C) Control sector
(D) Administrative services
(E) Repair services
(F) Computer center (ERZ)
(G) Computer management of telephone service (TERCO)

7. Remote Control Principles

Control paths lead from the processing sector to remotely controlled units, by way of a connection network, using the common PCM channels. Rapid and secure data transfer is provided by a data exchange system that is largely independent of the operation of the units. This system is operated by means of addressed telegrams (TG); at the heart of the processor sector we use the system of centralized telegrams, and outside the processor we use the system of peripheral telegrams (figure 9).

The telegram format is redundant, and in addition, the system rests on the following principles:

Receipt principle: The issue of each telegram (order or interrogation) must be receipted by the addressed unit.

Interrogation principle: A unit never issues a telegram on its own initiative, but only following an order or interrogation.

One-at-a-time principle: The centralized control or the TEZ issues no other telegram to a unit as long as it has not received an answer to the previous one. In case of transmission error in the peripheral telegram system, the telegram unit automatically repeats the last message.

Error surveillance principle: To the extent of its abilities, the unit supervises the correctness of the telegrams' content. The centralized control (software) compares the answer to the still-memorized order.

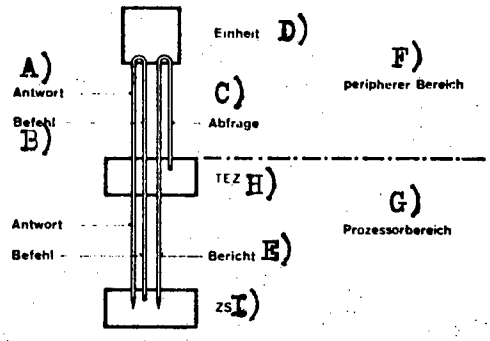

Figure 9. Telegram exchange between a unit and the centralized control.

Key: (A) Answer
(B) Order
(C) Question
(D) Unit
(E) Report
(F) Peripheral sector
(G) Processing sector
(H) Telegram unit cell (TEZ)
(I) Centralized control (ZS)

The data flowing along the control channels is continually supervised by means of these principles and their control systems.

Before a unit can be controlled, a semi-permanent control channel must be established, either during the initial installation of the network or when a conventional system is being expanded. The control channels are formed by programs for reconfigurating control channels at the level of the centralized control (figure 10). The operations proceed in the following order:

Seeking and holding a telegram register in the telegram unit beam;
Seeking and forming a free path through the connection network; and
Testing the established path.

Since the establishment of the control path makes new use of remote control, certain priorities must be set when the network is initially installed.

Because the control path is switchable, a new path can be established in case of faults; the new path is forme by reconfiguring a control path which avoids devices in the old path, so that the unit can then perform its traffic functions without limitations. As a first priority the system therefore seeks a path which will avoid defective circuits, the latter being then located and removed in corrective maintenance [5].

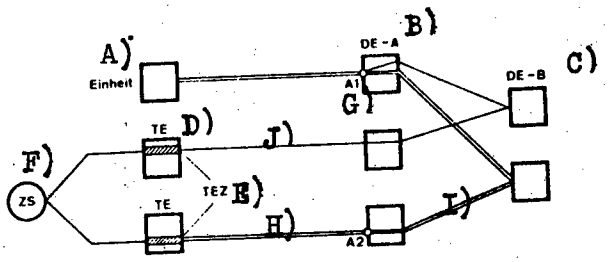

Figure 10. Constitution and reconfiguration of control path.

Key: (A) Unit
(B) A-stage connection unit (DE-A)
(C) B-stage connection unit (DE-B)
(D) Telegram unit (TE)
(E) Telegram unit cell (TEZ)
(F) Centralized control (ZS)
(G) Unit connection point (A1)
(H) Connection point for telegram unit cell (A2)
(I) ═══ Initial control path
(J) ——— Possible alternative control path

8. Principle of Communication Formation

In what follows, an example of a transit communication can explain the principle, function distribution, and internal signalization involved in the formation of a communication, given that the incoming and outgoing lines are both connected to a conventional system.

The incoming line equipment LS(K) receives the busy signal and changes its state. The periodic interrogations of the telegram system inform the centralized control of these changes of state by sending a report concerning the control channel of the terminal. The selection information is inserted through the connection of a register unit cell by way of the connection network. The call handling program

Seeks a free register unit cell among a group of register cells;
Seeks a free path;
Connects the itinerary that it finds.

The determined itinerary is then subjected to a continuity test (figure 11). The 4-wire digital channel is locked to the terminal so that a code train sent in the register unit cell is once more received and tested.

The test indicates that

The transmission paths function perfectly;
The units involved react properly to orders; and
The switching units switch properly.

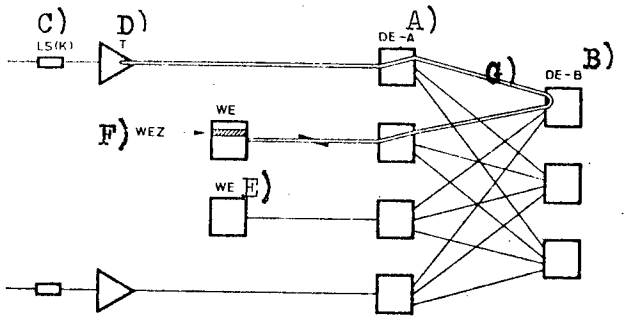

Figure 11. Input side continuity test.

Key: (A) A-stage connection unit (DE-A)
(B) B-stage connection unit (DE-B)
(C) Incoming line equipment (LS(K))
(D) Terminal (T)
(E) Register unit (WE)
(F) Register unit cell (WEZ)
(G) Locked PCM channel

If the test is negative, the result is communicated to the centralized control in a report, and all the devices are freed according to the principle of defect avoidance; another attempt is made with another register unit.

When the continuity test is positive (figure 12), the loop in the incoming line circuit LS(K) is eliminated, insofar as the latter receives the order to operate in a band status. The register unit cell which is still emitting a continuity signal recognizes this interruption and anounces it to the centralized control in a report; the centralized unit and the register unit are now ready to receive the selection information. Depending on the type of signal, the register unit automatically issues the ready signal. The band switching means that the signals are transmitted in the 7+1 bit format on the channel between the incoming line circuit and the register unit.

The register signals in the form of pulses arrive at the unit in the 8th bit, and the voice frequency signals in the seven other bits of the PCM channel in the circuit; at this stage, the register unit receives these signals and sends them in the form of one-at-a-time telegram message (report) to the centralized control, through the control channel of the register unit.

When the centralized control has received a sufficient number of figures, it can determine the destination of the call by using the following program:

Figure analysis program whose result determines a group of lines in the desired direction; and
Search for an outgoing line equipment LS(G) in this group (search for LS group).

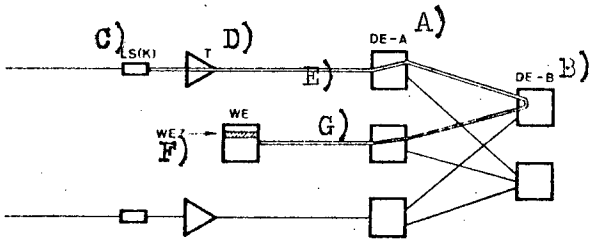

Figure 12. Selection phase.

Key: (A) A-stage connection units (DE-A)
(B) B-stage connection units (DE-B)
(C) Incoming line equipment (LS(K))
(D) Terminal (T)
(E) Register unit (WE)
(F) Register unit cell (WEZ)
(G) ——— PCM channel

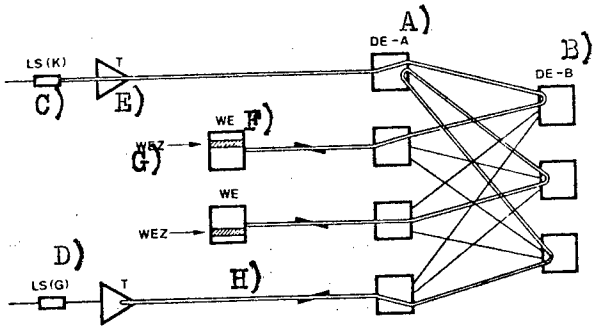

Figure 13. Outgoing continuity test.

Key: (A) A-stage connection units (DE-A)
(B) B-stage connection units (DE-B)
(C) Incoming line equipment (LS(K))
(D) Outgoing line equipment (LS(G))
(E) Terminal (T)
(F) Register unit (WE)
(G) Register unit cell (WEZ)
(H) - - - - PCM channel

On the outgoing side, a new register unit is connected to the outgoing line circuit LS(G) so that part of this signal path can then be used as a conversation channel (figure 13). This path is once more tested for continuity and then switched into a band condition. The register unit can now issue a busy signal on the outgoing line. By means of a report, the register unit announces to the centralized control that it has received a ready signal, and receives from the control the various selector figures in the form of a telegram.

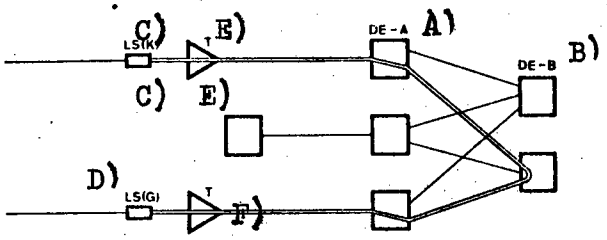

Figure 14. Established communication.

Key: (A) A-stage connection unit (DE-A)
(B) B-stage connection unti (DE-B)
(C) Incoming line equipment (LS(K))
(D) Outgoing line equipment (LS(G))
(E) Terminal (T)
(F) ═══ PCM channel

At the end of the selection:

The register units that are no longer needed, as well as their associated paths, are released;
The conversation channel is connected; and
The two line equipment units are switched (8 bit coding).

The communication is now in the call stage (figure 14); it is supervised by two line equipment units. The answer signal is recognized by the outgoing line circuit LS(G) and sent to the centralized control in the form of a report, so that the latter can begin its charges and send to LS(K) the order for sending the first charge pulse.

During the conversation phase, the release signal is received by the incoming line circuit LS(K) and communicated to the centralized control by means of a report. The call handling program

Orders the disconnection of the path in the connection network;
Standardizes the incoming line circuit LS(K) by means of an order; and
Causes the outgoing line circuit LS(G) to send the release signal.

Receipt of the release confirmation for the outgoing line circuit LS(G) is announced to the centralized control so that the communication handling program for the call will be returned to a stand-by condition.

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CSO: 5500

BRIEFS

NEW RADIO TRANSMITTERS--Two radio transmitters of 250 kilowatts output, established to insure that Turkish Radio and Television Administration [TRT] transmissions beamed abroad can be heard over a wider area, will go into service on Friday, 7 July. The transmitters are located at Cakirlar station near Ankara and will enable TRT transmissions to be heard better in Balkan and Middle East countries as well as in certain areas in Africa, Europe and Asia. The antenna and frequency change facilities of these transmitters are completely automatic and will enable TRT's transmissions beamed abroad to be received better and with greater intelligibility. According to the TRT technical authorities, these transmitters were ordered toward the end of 1973 and have cost nearly 63 million liras. [Text] [Ankara International Service in Turkish 1700 GMT 5 Jul 78 LD]

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END