POINT TO POINT RADIO SERVICE

RADIO DEPARTMENT

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NETHERLANDS POSTAL AND TELECOMMUNICATIONS SERVICE

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A. GENERAL

1. The terminal point for the fixed radiocircuits is Amsterdam, viz the Telegraph Office for radiotelegraphy and the Telephone Office for radiotelephony.
   The receiving station for both offices mentioned above, known as Nera (52° 14' 31" N, 5° 4' 38" E),. is situated at Nederhorst den Berg about 25 km south-east of Amsterdam.
   The transmitting station Kootwijk (52° 10' 24" N, 5° 49' 30" E) is situated near Apeldoorn, about 90 km east of Amsterdam.

2. Amsterdam is connected by cables with Nera and by multichannel carrier circuits with Kootwijk.

3. A special automatic telephone network interconnects the vital points of the offices at Amsterdam and of Nera and Kootwijk.

B. TELEGRAPH OFFICE - PUBLIC TRAFFIC DEPT.

1. Amsterdam has 13 radiotelegraph circuits, viz with Tokyo, Shanghai, Djakarta, Karachi, New York RCA, Willemstad Curaçao, Parabaribo Surinam, Rio de Janeiro, Buenos Aires, Cairo, Beyrouth, Rome and Lisbon.

2. The circuits with New York RCA, Willemstad Curaçao, Paramaribo Surinam, Buenos Aires, Rio de Janeiro, Karachi, Rome, Tokyo, Djakarta, Beyrouth and Lisbon are protected printercircuits with application of the automatic error correcting system (see item C). The circuits with Cairo and Shanghai are unprotected printercircuits.

3. The average public radiotelegraph traffic per working-day amounts to about 3800 telegrams with 82000 words these figures including the radio-gentex traffic. Gentex is telegraph traffic between telegraph offices vi'a fully automatic telegraph exchanges.

C. TELEGRAPH OFFICE-MUXROOM

1. Protected printer-, telex- and "leased circuit"-service have become possible due to the introduction of the automatic error correcting system of Dr. Ir. H.C.A. van Duuren, Director of the Dr. Neher Laboratories of PTT.

2. The system has been realized as a complete device called TOR (<u>T</u>eleprinter <u>O</u>ver <u>R</u>adio) furnishing two or four protected duplex channels by means of time division.

3. The muxroom locates the valve type - and transistorized TOR equipment and the auxiliary equipment used to connect the TOR with leased circuits, the telex/gentex exchange and the public traffic positions of the telegraph office.
   Particularly the telex channels require special adaption in order to operate those circuits according to the CCITT recommendations. The tape relay unit, used in combination with the auxiliary equipment for telex channels is also situated at the muxroom.

4. TOR systems are used on New York RCA (2 channels), Karachi (4 channels), Willemstad Curaçao (4 channels), Tokyo (6 channels), Lisbon (6 channels), Paramaribo Surinam (4 channels), Rome (8 channels), Buenos Aires (6 channels), Rio de Janeiro (4 channels), Djakarta (2 channels) and Beyrouth (2 channels).

Besides the normal use on radio, three 2 channel TOR sets are used with New York RCA on the transatlantic cable.
Some of the TOR sets are used in combination with twinplex systems and VF-radiotelegraphy systems (narrow frequency shift).
On TOR channels normal five unit page printers are used.

5. Special radiotelegraph services are:

   a. Unilateral emissions and receptions for Press Agencies.

   b. Leased circuit service.
   8 leased channels are now in use with:
   New York, Karachi, Willemstad Curaçao, Buenos Aires, Beyrouth, Paramaribo Surinam and Djakarta.
   The rate for all channels is based on 24 hours service.
   Division of a full channel into at most 4 parts is obtained by means of a time division device.

D. TEX (OR TELEX) SERVICE for telex subscribers with Argentina, Curaçao, Japan, Pakistan, Portugal, Surinam, Brazil and Indonesia.

1. As most of the traffic has to be completed during the coinciding office hours on either side, the channel capacity must be in accordance with the load of traffic during these hours. For this reason the number of channels must be rather high.

2. The average total traffic amounts to 225 calls with 1200 minutes per day.

3. The following table indicates the rates for the various destinations:

country	for the first 3 minutes	for each following minute
Argentina	33. - Dutch guilders	11. - Dutch guilders
Brazil	33. - " "	11. - " "
Indonesia	33. - " "	11. - " "
Japan	33. - " "	11. - " "
Neth. Antilles	21.60 " "	7.20 " "
Pakistan	30. - " "	10. - " "
Portugal	4.35 " "	1.45 " "
Surinam	21.60 " "	7.20 " "

E. RADIOTELEPHONE OFFICE

1. There are 3 radiotelephone circuits, viz with Bandung, Willemstad Curaçao (2 channels) and Paramaribo Surinam.

2. All circuits are on single side band both ways.
   Terminals, privacy equipment and send vogads (voice operated gain adjunstment device) are installed at the Amsterdam Telephone Office.

3. Since June 1965 two additional channels via the satellite HS303, the Early Bird, are in operation for telephone traffic between the United States of America and the Netherlands.

4. The average radiotelephone traffic per day amounts to about 110 calls with 470 minutes.

F. TRANSMITTING STATION KOOTWIJK

1. The transmitting station Kootwijk is situated in wood and heather country, about ten kilometers west of Apeldoorn and covers an area of about 450 hectares (1100 acres).
   At present the total number of operational HF transmitters is forty-eight, thirty-three of which are used for point-to-point service, twelve of which are used for maritime mobile service and three of which for press service.
   One VHF transmitter is used for the radiotelegraph circuit with Rome on scatter propagation.

2. The station consists of three transmitter buildings and a control building, located centrally with respect to the transmitter buildings. Apart from these operational buildings there are buildings containing workshops, stores, administrative rooms and a department for developing and manufacturing transmitting equipment.
   A total number of 210 men is employed, including operators, antenna workers, craftsmen, workshop people, administrative staff etc. Houses for staff and a part of the other personnel are also provided.

3. In the control building the lines from Amsterdam are terminated on a low frequency distribution, switching and monitoring table. On this low frequency distribution panel the lines can be connected to premodulators, either for telephony or telegraphy, installed in the same room.
   The premodulators for telephony arrange the single sideband speech channels (maximum four) around a frequency of 1 Mc/s as reference frequency.
   The telegraphy premodulators also deliver their signals on a 1 Mc/s frequency level.
   The 1 Mc/s outputs of the premodulators are terminated on a high frequency switching panel, from which connections can be made to high frequency cables that carry the 1 Mc/s signals to the transmitters on distances between one and two kilometers.

4. In the transmitters the 1 Mc/s signal is stepped up to the nominal transmitter frequency by a final modulation procedure, in all transmitters followd by a linear amplifier.
   Every transmitter can be connected to any premodulator and in this way every transmitter is capable to handle all kinds of traffic.

5. The transmitters are equipped with a demodulator coupled to the final circuit which demodulates the transmitted signal to the 1 Mc/s frequency level. This regenerated signal is carried back to the control building and can be used for maintenance measurements and monitoring.

6. Each transmitter building is equipped with a central table for remote control and monitoring, with the possibility to switch over from short-distance control to distant control by cable in the control building.
   Here each transmitter has a small panel on the switching and monitoring table with which the transmitter can be switched on and off with the possibility to change over to each of the three preset frequencies.

7. Many transmitters are of Netherlands PTT design and are built at the Kootwijk transmitter manufactory department. Others are built by Philips Telecommunication Industry and the Standard Electric Cy of the Netherlands. A number of the transmitters are equipped with three preset frequencies.

There are transmitters with an aerial power of 30 kW, 20 kW, 10 kW, 3 kW and $2\frac{1}{2}$ kW. They are used corresponding the required power to each circuit. The 10 kW-transmitters are all in use for maritime mobile service.

8. Each transmitter building is surrounded by groups of aerials.
Several types of aerials are used in accordance to the circumstances of the circuit.
For point-to-point service directional aerials, mostly rhombics but also small and large curtain arrays, which consist of a structure of dipoles, are used.
For maritime mobile service omnidirectional aerials are used, viz a square-loop aerial and special vertical dipoles with ground plane.

9. The power required for the transmitter station is supplied by a sub-station of the Provinciale Gelderse Electriciteits Maatschappij (PGEM), which is fed from two sides by overhead 50 kV-lines. From this sub-station the radio station is supplied via cables with a voltage of 10 kV to the main building. These cables are terminated in a distribution system from which 10 kV-cables carry the power to the other buildings.

G. RECEIVING STATION NERA

1. The station, put into service on December 4, 1950, is situated on flat, humid polderland.
The antenna area is about 160 hectares.

2. The antennas used for short waves are nearly all rhombics, in most cases two per direction (space diversity). Most of them are 3-wire rhombics. The antennas are constructed with steel poles.
For special purposes a log-periodic antenna and a beam antenna are used together with 2 omnidirectional monopoles and some vhf/uhf aerials for the monitoring section.

3. The antennas are connected with a central distribution panel in the receiving room by means of underground coaxial cables.
The maximum cable length used is 300 metres. For longer distances the coaxial cable is extended with overhead open wire feeders.

4. In the receiving room (dimensions 25 x 25 metres) the receivers are placed in 4 groups. At the top of each group a maximum of 9 antenna broad band branching amplifiers are installed each branching amplifier having 20 outputs: 10 for the frequency range of 3-12 Mc/s and 10 for the range of 12-30 Mc/s. On the central distribution panel a connection is made between the antennas wanted and the amplifier inputs of a group.
The amplifier outputs may be connected with the receivers of a group and can, if necessary, also be connected with receivers of other groups.

5. Two desks placed between the two rows of receiver groups contain the equipment for monitoring 2 groups of receivers. The control desks have a monitoring receiver, a cathode ray oscillograph, meters, a teleprinter, a line panel and a telephone connection. Moreover there is a facility for listening in the two wire telephone circuits behind the terminals at Amsterdam.
In this way 2 operators control all the receivers.

6. Nearly all receivers are designed by PTT, most of them being also constructed in the PTT workshops at the Hague.
Some ssb telephony receivers have been built by Philips Telecommunication Industry. The ssb receivers have been equipped for 4 channels. Also some Racal receivers are used.

Western Electric Vogads or similar equipment designed and built by PTT have been joined to the receivers.
The PTT telegraphy short wave receiver is a double diversity set, suitable for on/off and frequency shift working, and has been equipped with automatic frequency control, just like the ssb telephony receivers. Another version of this receiver is crystal-controlled without automatic frequency control, while the latest version is variable-tunable or crystal-controlled with automatic frequency control on the second oscillator. In this receiver it is possible to use a two-tone detector yielding frequency-diversity with mark and space.

7. A special monitor TOR receiver is available for monitoring 7-units protected printer signals.

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