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## Summaries and Notices

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### Radio Astronomy

H. H. Klinger, Bern

An introduction to radio astronomy is given. Its techniques and various installations, such as radio telescopes, dish antennas, radio interferometers and receiving systems, are described. The various sources and types of radiation are dealt with and flare stars, pulsars, quasars as well as emission from planets are discussed.

p. 52...60

### Functional Analysis of Microwave Combiners

R. Zeender, Berne

The author analyzes the functions of several types of microwave combiner for in-phase addition of two signals of the same instantaneous frequency. An ideal combiner is used to examine the transformations of two linearly polarized input signals of arbitrary amplitude ratio and phase difference. The control voltage of the servo system for automatic addition of the transformed vectors is then derived for different amplitudes and phase positions and discussed. The analysis shows that despite differences in their design there is a functional similarity between the various combiner systems.

p. 61...68

### Training of Swiss PTT Telecommunication Staff

E. Kurz, Berne

Swiss PTT Telecommunications attaches great importance to basic, specialized and follow-up training at all levels. High standards and effective deployment of the work force have contributed to the present produc-

tivity figure of 1000 telephones per 4.25 personnel. Staff grades, distribution, duties and training are outlined. Details are given of the training facilities and material available to technicians.

### News Items

#### Telephone

In the last quarter of 1975, **international subscriber dialling** was made available in 32 Swiss exchanges serving 37,529 lines.

The **Leuk satellite earth station**, which proved 99.9999 pc reliable in the first six months of 1975, accommodated **129 permanent circuits** to 5 extra-European countries by the end of December.

The PTT Board has approved plans for a **national car radiophone system NATEL**, which is to be brought into service in three stages between late 1977 and the end of 1979.

#### Telegraph, Telex

Swiss PTT plans to open an **experimental public facsimile service** from and to 6 national call offices and possibly the United Kingdom and France early this year.

**Telex service between Switzerland and Yugoslavia** has been improved by opening a direct Zurich-Belgrade voice-frequency telegraph system and increasing the number of lines from 13 to 40.

#### Radio, Television

In December the **Swiss television network** was extended by 28 translators. By the end of 1975 it comprised 336 stations with 663

transmitters and translators (345, 173 and 145 respectively on chains 1-3). Programme 1 was supplied to 98.9 pc of the population and programmes 2 and 3 to some 90 pc.

A 3-camera **colour TV outside broadcast unit**, which is already available at Lugano and Geneva, has been supplied to the **Zurich** studio to complete its colour equipment.

In December two **microwave supply circuits to CATV systems** came into operation in cantons Schwyz (1 Austrian and 2 German programmes) and Valais (3 French programmes).

To improve **efficiency in the use of postal motor vehicles**, a car radiophone system enabling direct communication between drivers and their district office has been put into operation at Lucerne.

Swiss PTT's 23rd **VHF simplex relay for radiophone service** between fixed and mobile stations has been erected on the Stockhorn to serve large parts of the midland and the Bernese Oberland.

### Miscellaneous

**Automation of Swiss PTT's city-wide pneumatic tube systems** was completed by the end of December, almost exactly 50 years after the opening of the first tube network at Lausanne on 11 January 1926.

Last year a further 24 companies began using **Swiss PTT's shortwave radiophone service with aircraft**. Revenue from call charges increased by 35 pc on 1974.

The PTT organized its **largest-ever road transport** last December, when 7 drums of **special coaxial cable for the Schwarzenburg shortwave transmitting station**, each weighing 13 tons and measuring 4.5 m in diameter as well as 3.6 m in width, were collected from the works at Hanover.