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# **Semiannual Technical Summary**

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## 7.6 Development of two three-component stations in Poland

### *Background*

A network of four regional arrays currently contributes data to the NORSAR Data Processing Center in Norway. These arrays are the NORESS and ARCESS arrays in Norway, the FINESA array in Finland and the GERESS array in the Federal Republic of Germany (see Fig. 7.6.1). Data from ARCESS and NORESS are processed jointly in the Intelligent Monitoring System (IMS) that has been installed at NORSAR this year. A forthcoming upgrade of IMS will allow joint processing of data from N arrays and M single stations.

As a cooperative effort between Poland and the United States, two modern seismic stations, including workstations for on-site data recording and analysis, are now being installed in Poland. Each installation comprises a three-component broad band station and a three-component short period station. These stations represent a valuable extension of the existing network of regional arrays in northeastern Europe. In order for IMS, however, to take full advantage of these new stations, the data from Poland must be transmitted continuously and in real time to Norway. This contribution gives descriptions of the field systems installed in Poland, the communications arrangements between Poland and Norway, and the system configured at NORSAR for the purpose of acquiring the data from the two stations in Poland.

### *Installations in Poland*

The two stations in Poland are located at Ksiaz, in the vicinity of the town of Walbrzych in southwestern Poland, and at Stary Folwark, near the town of Augustow in northeastern Poland (see Fig. 7.6.1).

Teledyne Geotech installed in June this year a seismic system at Ksiaz, comprising a short period three-component station (GS-13 sensors), a broad band three-component station (BB-13 sensors), an RDAS-200 data acquisition unit, and a SUN-2 based NOMAD workstation for local data analysis and archiving. Ksiaz is an existing seismological observatory affiliated with the Department of Seismology of the Institute of Geophysics (in Warsaw) of the Polish Academy of Sciences. The local staff at the observatory at Ksiaz will operate the new station and use the workstation in their daily data analysis.

The new station in Stary Folwark will be installed by Teledyne in November. It will be identical to the station at Ksiaz, except there will be no workstation, since there will be no local seismological staff.

### *Communications links*

Reliable communications links between the NORSAR Data Processing Center in Norway and the two sites in Poland can only be accomplished via satellite. Discussions were conducted with the telecommunication authorities

in both Poland and Norway in order to determine how such links could be established, and the Polish PTT responded that they would allow the Norwegian Telecommunication Administration (NTA) to deliver and put into operation the ground station equipment needed in Poland.

NTA decided to use the EUTELSAT SMS system for the satellite links between Poland and Norway, and communications were installed in October/November as depicted in Fig. 7.6.2. The data transmission links each have a capacity of 64 kbits/s. The link between Stary Folwark and NORSAR is simplex, while the Ksiaz-NORSAR link is full duplex. The backlink from NORSAR to Ksiaz provides the staff at the Ksiaz observatory with access to data bases at NORSAR, including Stary Folwark data. The Ksiaz to NORSAR link uses a set of multiplexers to enable division of the capacity into several channels, as shown in Fig. 7.6.2. The seismic data from Ksiaz use a 19.2 kbits/s channel, the other 19.2 kbits/s channel will be running the SLIP protocol and used for general purposes, one of the 9.6 kbits/s channels will be used for general terminal access, and two remaining channels (9.6 and 2.4 kbits/s, not shown in Fig. 7.6.2) are spare ones.

#### *Data acquisition and analysis at NORSAR*

A data acquisition system to handle the data from the two stations in Poland has been configured at NORSAR, that is essentially identical to the data acquisition systems currently handling the data streams from the regional arrays. As seen in Fig. 7.6.2, the communications interface is NORSAR's BUSC system (see Paulsen *et al*, 1989). Otherwise, the data acquisition system comprises a SUN 3/260 computer with a Floating Point Accelerator, a 1.2 Gb disk drive with controller, an Exabyte tape drive with SCSI controller, and Ethernet. This system will make it possible to present the data from Poland to the IMS in the same way data from the arrays are made available.

The 24 October 1990 nuclear test at Novaya Zemlya was recorded by the new seismic station at Ksiaz, and the recordings for both the short period and the broad band stations are shown in Fig. 7.6.3.

S. Mykkeltveit  
R. Paulsen

#### *References*

- Paulsen, R., J. Fyen, P.W. Larsen and S. Mykkeltveit (1989): A new data acquisition system for FINESA. In: *Semiannual Technical Summary, 1 April - 30 September 1989*, NORSAR Sci. Rep. No. 1-89/90, Kjeller, Norway.

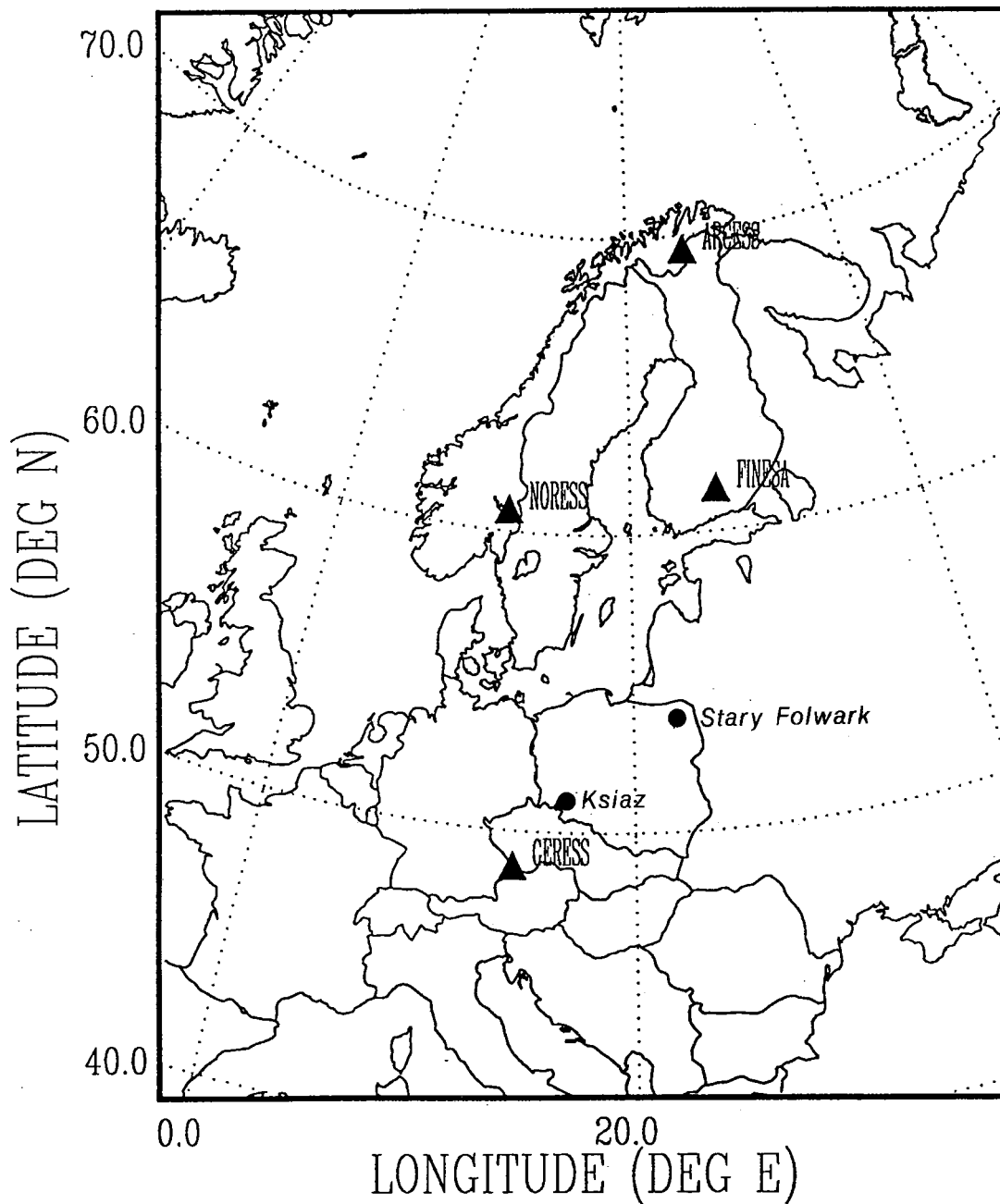


Fig. 7.6.1. The map shows the location of the regional arrays NORESS, ARCESS, FINESA and GERESS, as well as the two new stations in Poland.

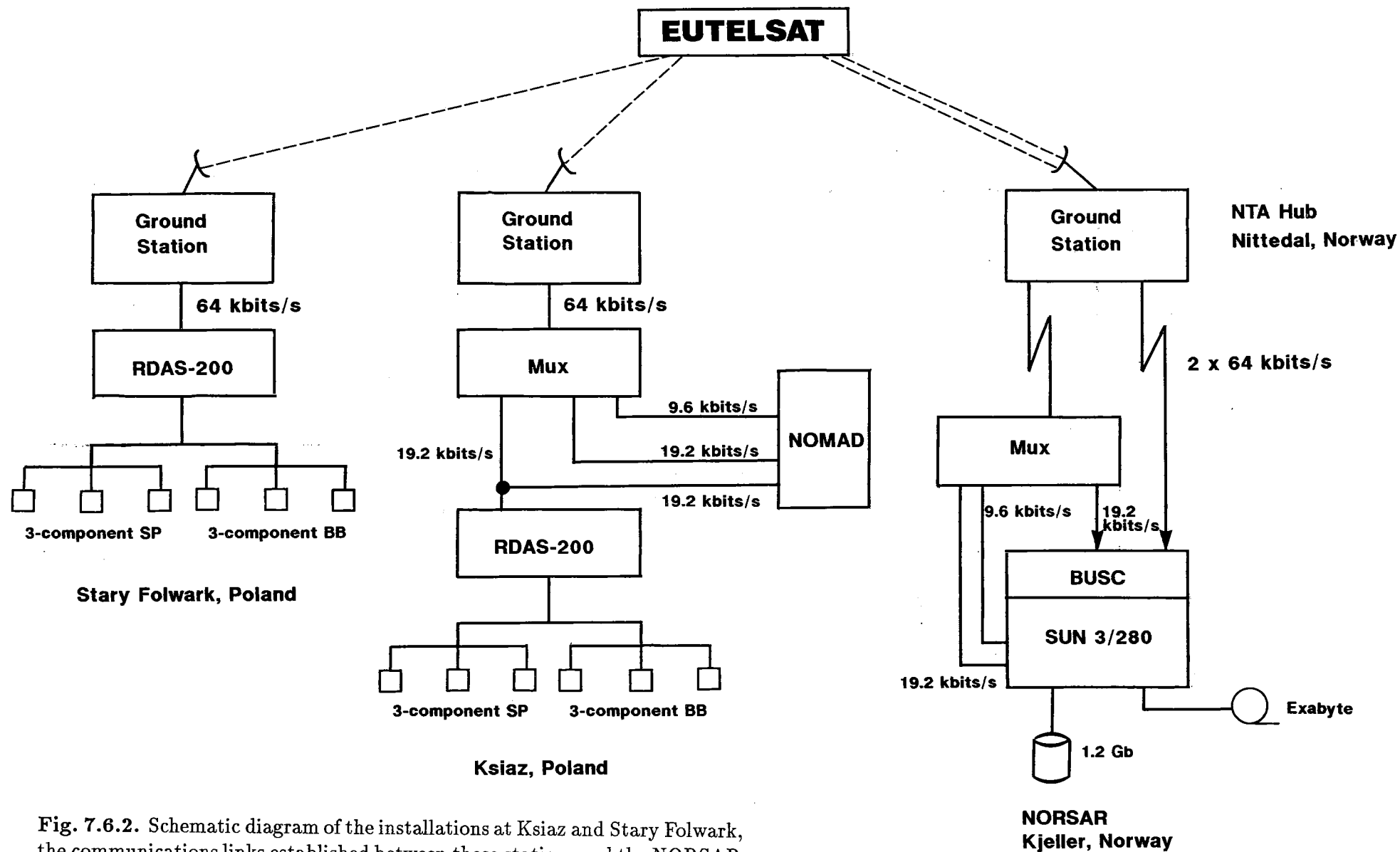
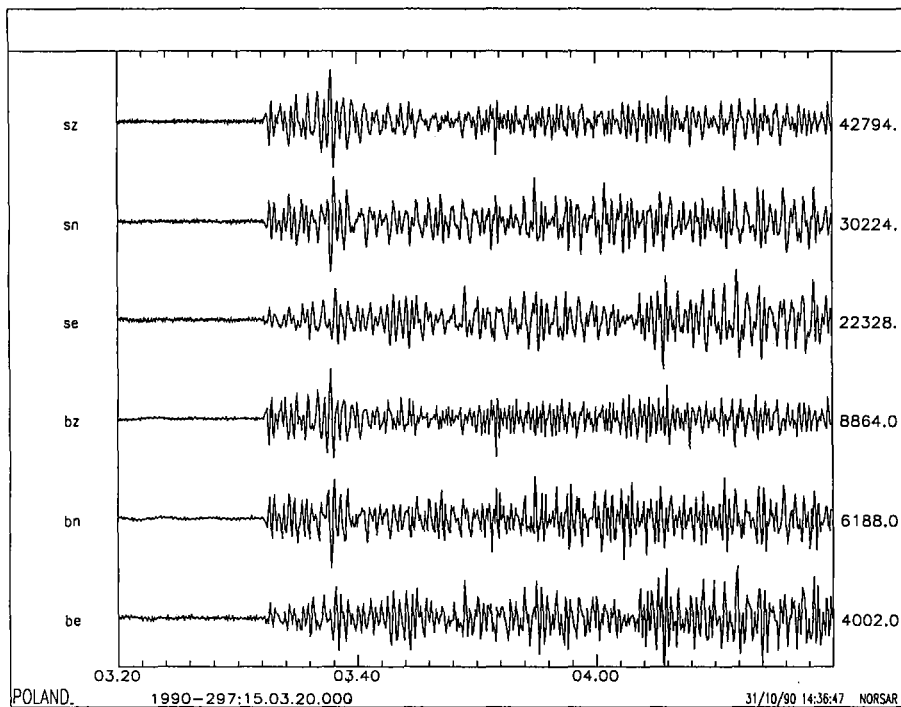
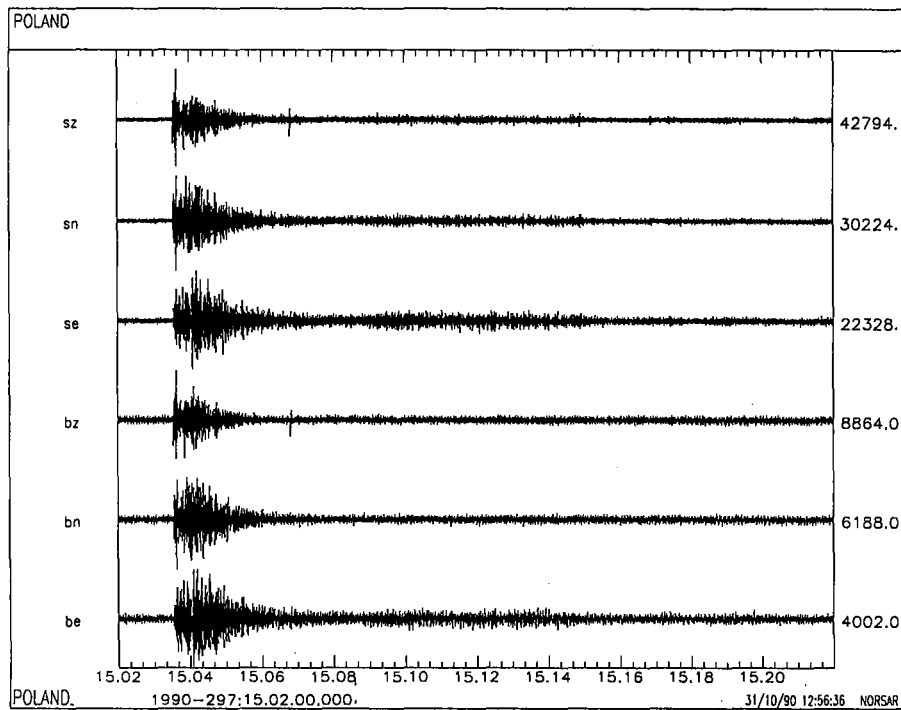


Fig. 7.6.2. Schematic diagram of the installations at Ksiaz and Stary Folwark, the communications links established between these stations and the NORSAR Data Processing Center in Norway, and the NORSAR data acquisition system for the two data streams from Poland.



**Fig. 7.6.3.** Short period (sz, sn, se) and broad band (bz, bn, be) 3-component recording at Ksiaz of the 24 October 1990 nuclear explosion at Novaya Zemlya. The upper frame shows 20 minutes of data, whereas the lower frame covers a one-minute interval around the P onset.