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3.1.5 OBSERVATION SUPPORT SYSTEM

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ABSTRACT

In the VLBI network of the Keystone project (KSP), every system is automatically controlled by computers located at the central station using the computer network, and the systems at the remote stations are usually unmanned. Operation manuals for routine operation, trouble shooting, and extraordinary operations were therefore developed and written in HTML format, making it possible for an operator with no special knowledge about the system to refer to the manuals using a browser installed on a notebook computer or a work-station at a remote station.
Keywords: VLBI, Internet, HTML

1. Introduction

In the KSP VLBI network, four stations distributed in an area with a radius of 70 km around Tokyo, Japan, are connected by communication lines and are operated remotely and automatically from the Koganei central station. Turning on/off the power of the system for maintenance and trouble shooting are still done manually, usually by people with no special knowledge about the system, such as a guard. Therefore, the operation of this system must be made simple. To do this and, an online manual was developed. This paper introduces an on-line manual, which can be accessed using a notebook computer or a work-station at a remote station.

2. Contents of the Manual

The contents of the manual are as follows:

VLBI operation
Routine operation
Hardware manual
Tape storage
Abort observation
Restart observation
Trouble shooting
Extraordinary operation
Correlation monitor
Report
Computer arrangement of central station
Equipment arrangement of observation station

The tutorial display for real-time correlation processing is shown in Fig. 1. By using this tutorial display, an operator can execute real-time correlation processing even if the operator has no experience doing so. The current condition of the processing is displayed in the main window, also shown in Fig. 1. The results of the correlation processing and the coarse delay search functions are displayed in another monitor display (see Fig. 2). An operator easily can refer to these displays to determine whether a given processing is working well or not.

An example of a display for the hardware manual is shown in Fig. 3. The display shows how to deal with scheduled power maintenance. Before power maintenance, the operator should turn off the power switch of each device to prevent the devices from being damaged by sudden power stoppage. After power is recovered, the operator should turn the power switches back on. The example display shows how to turn off the power switches of the devices installed in the antenna controller rack. This part of the manual also contains tutorials on the procedures for turning on/off the power for the real-time data transmitter rack, the meteorological sensors rack, the IF signal monitor rack, the back-end rack, the automatic data recorder rack, the temperature box, the earthquake sensor system, and the antenna power rack.

The KSP VLBI system now has a real-time data transfer system in which the data is transmitted from the observation site to the analysis center via a network cable[1] and tape-recording is not necessary. However, there is a tape-recording system that serves as a redundant system to recover failures in real-time data transfer.

In the usual tape-based VLBI, in which the data recording rate is 256 Mbps, about one tape is required for recording one hour of VLBI data for each station. Therefore, if a 24-hour session of a VLBI experiment is carried out, about 100 tapes are needed to record the data for the four KSP VLBI stations. The tapes should be stored on a database in order to prevent errors in handling the tapes.

Fig. 4 shows an example of a display for tape storage. The database contains the data of the tapes used in the KSP VLBI stations (Koganei, Kashima, Miura, and Tateyama) and the Kashima 34 m VLBI station. The database consists of data fields, including those for the tape ID by which the tape can be identified, how many times the tape was used, the name of the experiment for which the data was recorded, the date the experiment was carried out, the location of the tape, the owner of the data, and auxiliary data.

Trouble shooting is one of the most important purposes of this support system. Fig. 5 shows an example of a display for trouble shooting. This display has a tutorial on how to solve antenna trouble caused by an overload in the antenna-drive motor.

Fig. 6 shows an example of a display for extraordinary operation. This display shows how to deal with an international VLBI experiment. The configuration of the experiment, as well as the channel alignment and the

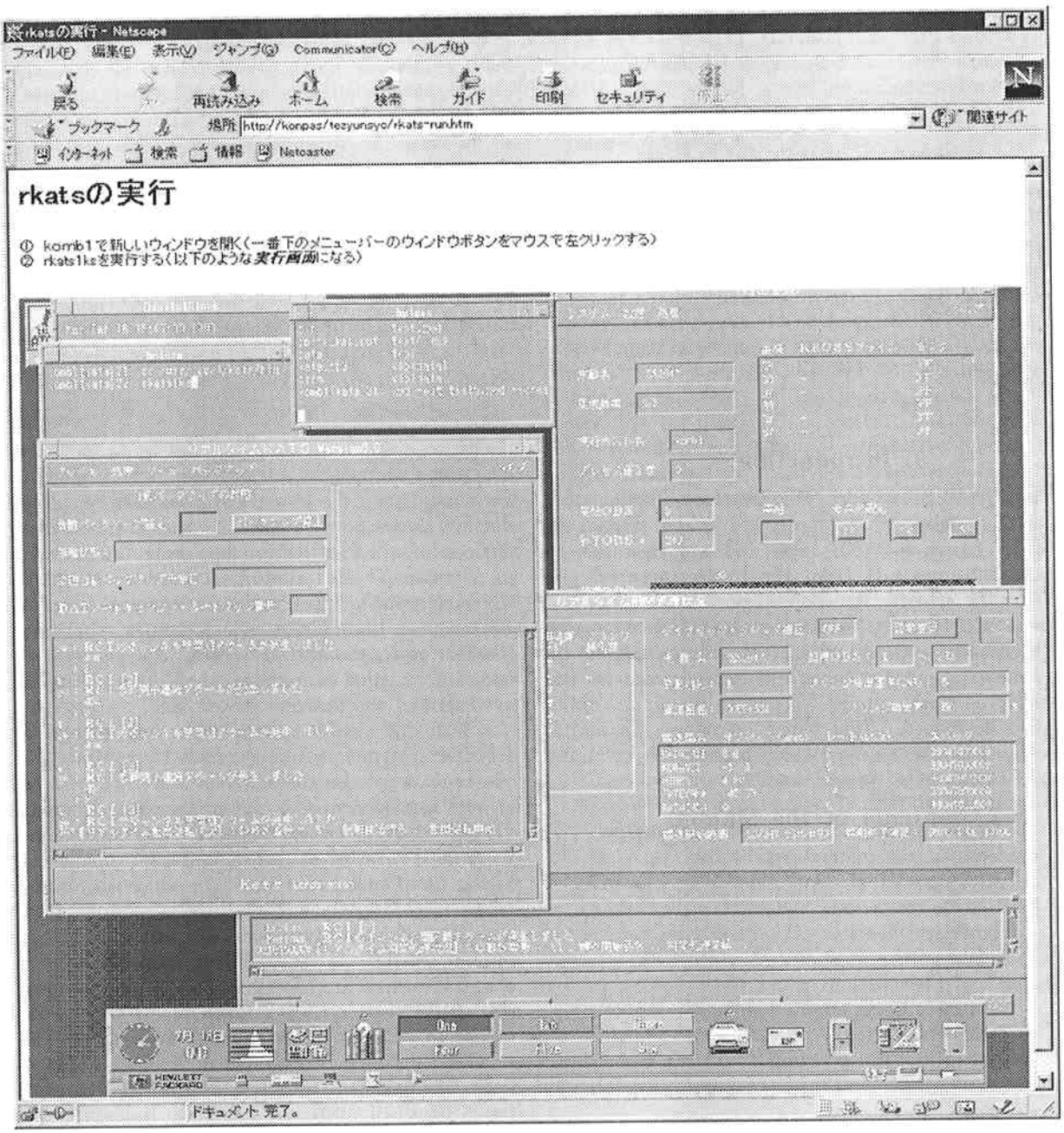

Fig. 1 Routine operation display.

number of channels used, for the KSP VLBI are different from those for the usual international VLBI. Therefore, when the KSP VLBI network is to be used for an international VLBI experiment, the cable connections must be changed manually. By referring to this tutorial display, an operator without technical knowledge can change the system configuration.

Operators of the KSP VLBI must report on the experiments monthly. Fig. 7 shows an example of a display for the report. This report contains the conditions of the routine observation, the status of tape-based correlation processing for extraordinary experiments, the status of system maintenance for each station, and auxiliary information.

3. Future Plans

The on-line manual introduced in this paper enables an operator with no special knowledge about the system to deal with system trouble or extraordinary operation. We plan to make the manual more friendly by introducing animation, and expanding the contents of trouble shooting.

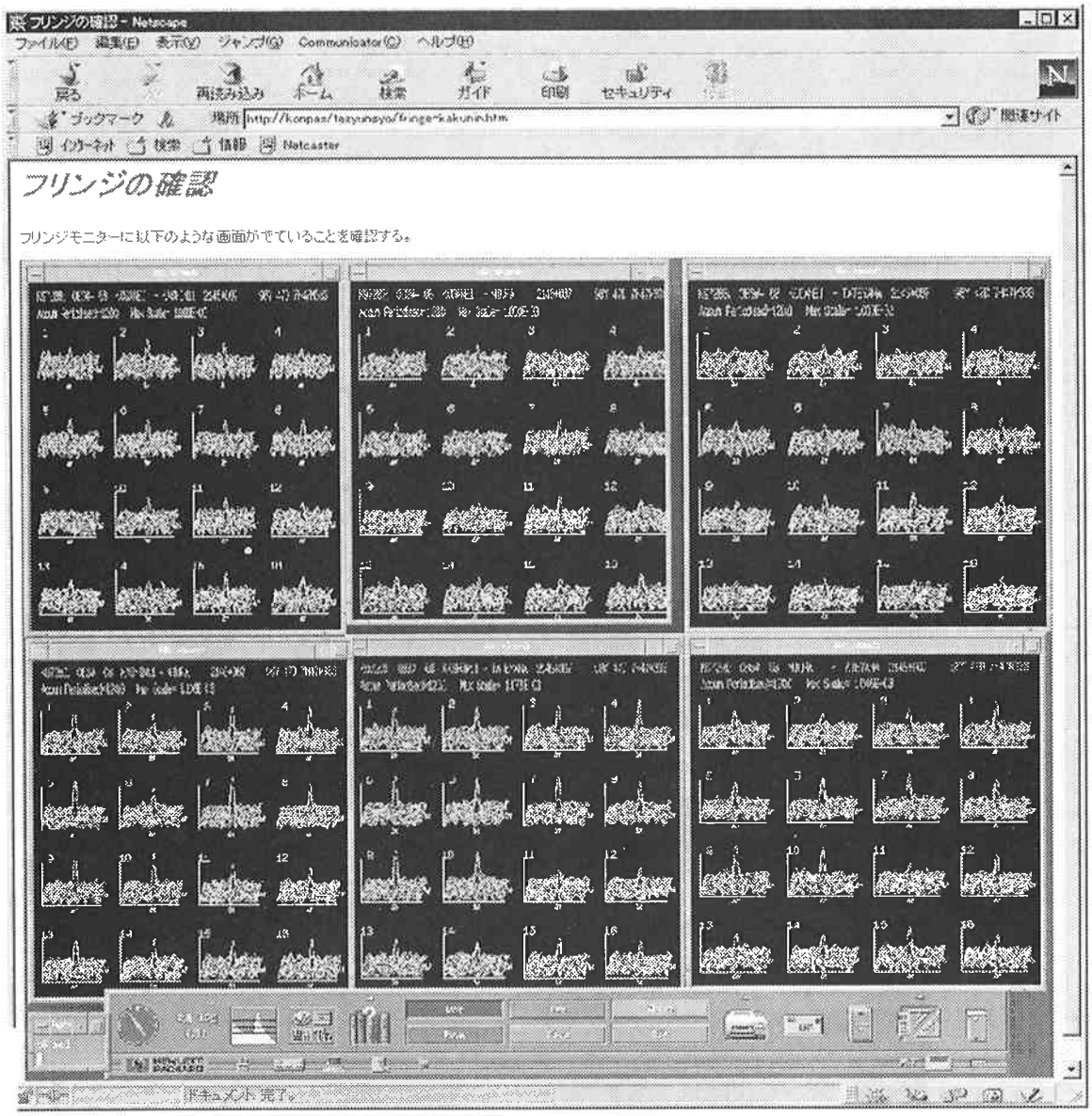

Fig. 2 Fringe monitor display.

Fig. 3 Hardware manual display.

Fig. 4 Tape registration display.

Fig. 5 Trouble shooting display.

Fig. 6 Extraordinary operation display.
Display says "Dealing with international experiments. Preparation (change connections); Go behind IF rack. Picture shows back of IF divider. Remove the cable connected to the connector (J206, indicated by red arrow), and connect it to the connector (J210, indicated by blue arrow). You can leave the cable which is originally connected to J210."

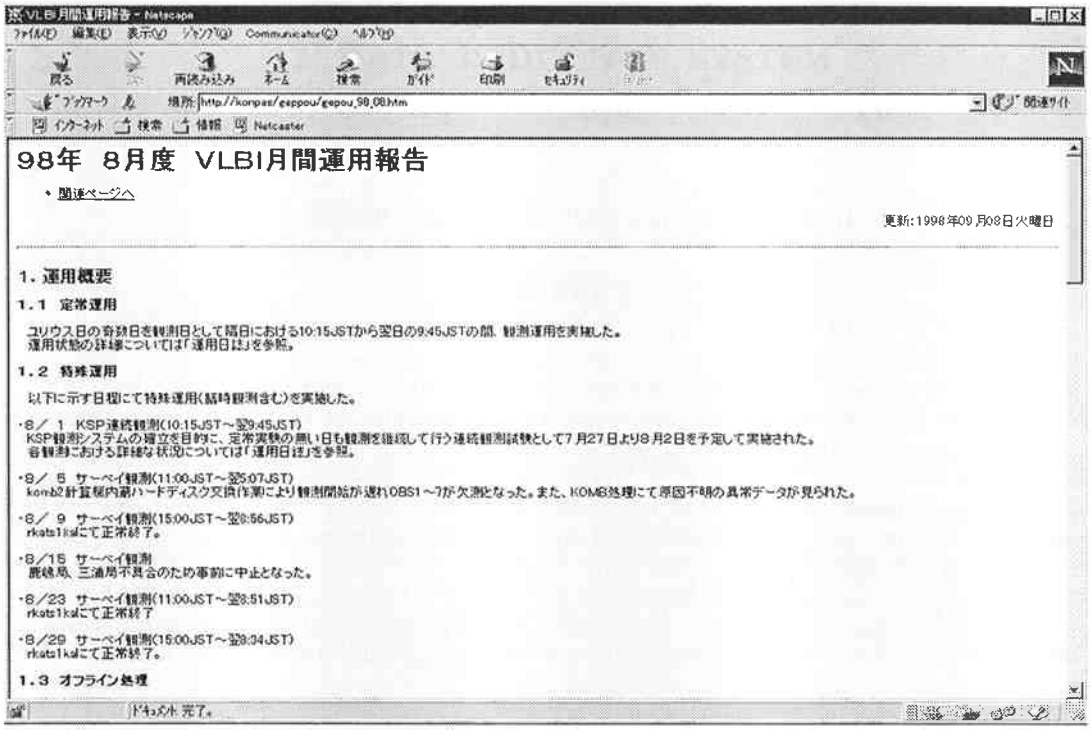

Fig. 7 Monthly report display.
Display says "VLBI Monthly report on August 1998. 1. Outline of the operation, 1.1 Routine operation, 1.2 Extraordinary operation, 1.3 Off-line processing".

References

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