Rehabilitation Equipment	Transmitters for Turbine and Auxiliary Equipment

Fig.5.1-14

The pressure transmitter for turbine bearing

Current status

(1) Turbine equipment is divided roughly into basic equipment (main turbine) and auxiliary equipment (condenser, HP/LP feed water heater, steam ejector).
(2) The sensor signal level of the surrounding basic equipment is updated to 4-20mA. The parameters are sent to the computer and supervision was made possible by CRT in CCR. (Metal, bearings, etc.)
(3) The turbine metal temperature signals are converted into the 4-20mA signal at the local area beside the turbine and converted at the relay room for computer supervision.

converter panel for turbine metal temp

Improvement plan

In connection with rehabilitation for the turbine control system, all of the signal levels of important sensors will be updated to 4-20mA, and the range possible for the operation and supervision from CCR is to be expanded. In parallel, the reliability of the whole turbine control system is to be raised.

Rehabilitation Equipment	Condenser Hotwell Level Control Equipment

Fig.5.1-15

Current status

(1) The condenser hotwell level control valve is manually set to full open, and condenser hotwell level control is performed with the local bypass valve.
(2) There is a difference in condenser hotwell level reading value between CCR and local.
(3) Condenser hotwell level is supervised with the temperature of condenser hotwell and the local water level gauge.

Improvement plan

(1) The condenser level control valve shall be replaced and condenser level control will be of automatic control.
(2) In connection with rehabilitation for the turbine control system, the condenser hotwell level indicator, operation devices and condenser hotwell level control valve position indicator etc., in CCR, are to be replaced with new ones.

Rehabilitation Equipment	Supervisory Instruments for No.1 - No.6 Turbine and Generator

Fig.5.1-16

Current status

Since the turbine vibration sensor is unreliable, it is now test-running by a Russian vibration sensor installed in the bearing cover.

Improvement plan

Since the turbine and generator bearing vibration supervisory instruments are very important to the security of the equipment, they are to be replaced at the same time as turbine overhaul.

Rehabilitation Equipment	No.1 - No.6 LP Feed Water Heater Level Transmitters and Controllers

Fig.5.1-17

Current status

(1) The left photograph shows HP feed water level controllers and control valves which were replaced by Japanese grant aid.
(2) LP feed water heater level controllers have much failure, and the local level gauges have also much failure.

Improvement plan

In parallel with the rehabilitation for LP feed water heater, the same level controller and same control valve as HP feed water heater will be replaced, and the supervision of feed water heater level and control valve position will be enabled in CCR.

Rehabilitation Equipment	Turbine Control and Instrumentation

Fig.5.1-18

Current status

(1) The major parameters of basic equipment are sent to the turbine computer, and supervision is possible with CRT which was installed additionally in CCR.
(2) Hard-wired relay circuits for alarms and interlocks are being updated in the relay logic functions (controller) of the computer.
(3) Electric motor valves and control valves associated with turbine equipment have many failed parts, and its maintenance and rehabilitation is not sufficient.
(4) The turbine portion has a low automation level and damage by misoperation of operators has occurred.
(5) As a whole, although the turbine supervisory instruments have been considerably updated by the power station, there are still many broken or unusable devices such as control switches, position indicators, and recorders.

Improvement plan

Corresponding to progress of turbine rehabilitation to be executed by the power station, turbine control and instrumentation is to be rehabilitated.