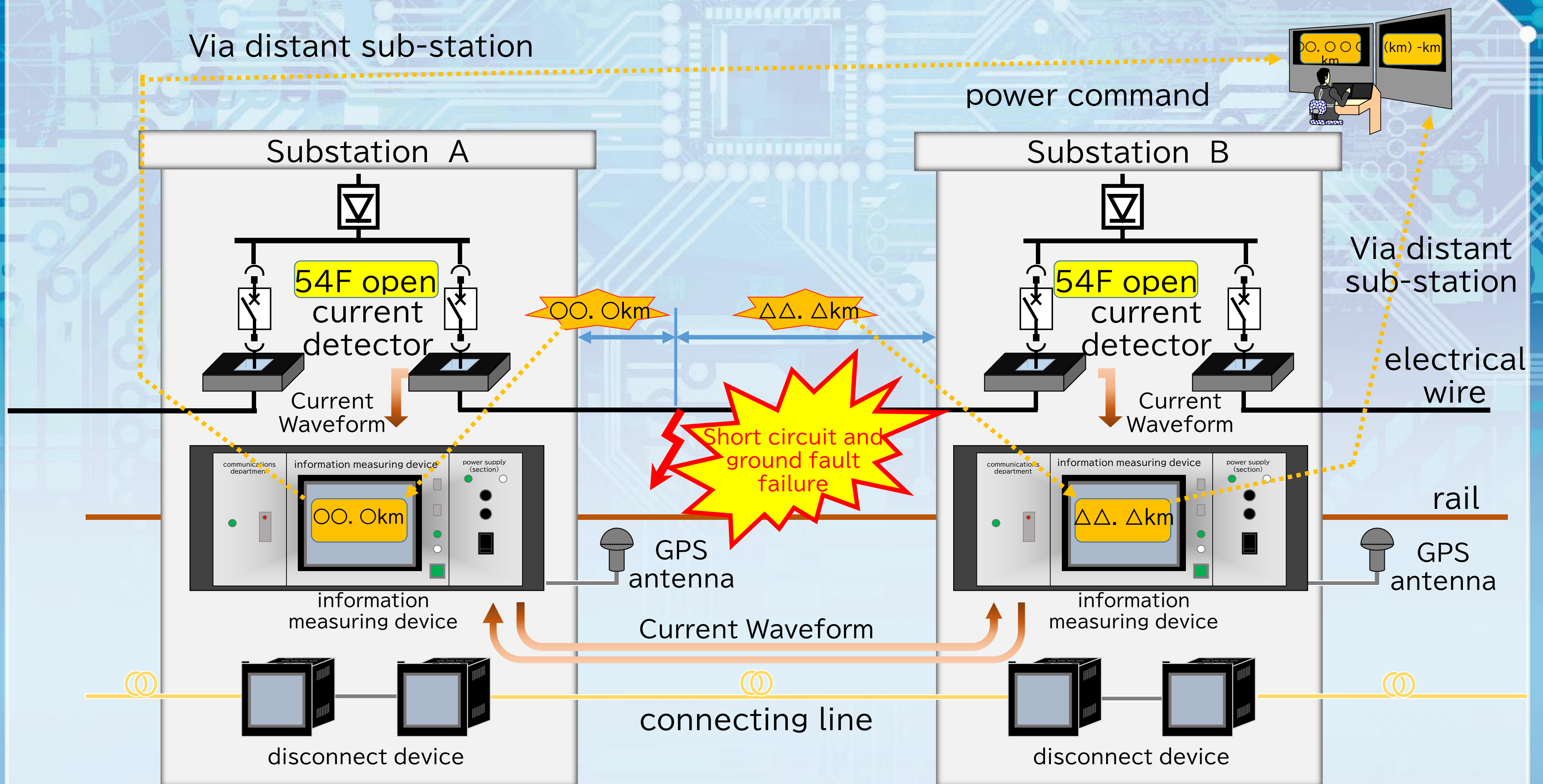


information measuring device Fault Point Locating Function

This device locates the distance from the substation to the fault point when the occurrence of a breaking current 50F,85F, or 64P on the line is detected under the basic condition of receiving 54F open signal when a short circuit or ground fault occurs between substations for DC electric railway.



Purpose and role of the device

Finding the point of failure soonest when a power line failure occurs is an important factor in reducing downtime. Therefore, it is desirable to shorten the time required to search for failure points from the viewpoint of stable transportation.

In response to this, a new fault locating function has been developed that locates the fault point based on the ratio of the fault currents in the substations on both sides of the fault point.

Transmission of location results

Fault location results can be transmitted to the power command (via a remote control station) along with the fault occurrence time and fault waveform.

Saving and viewing of the results

The results of identification by the information measurement device are stored in the device together with the time of occurrence and waveform of the failure, and can be viewed on the touch panel screen of the device.

Information Management

Information stored in the information measurement device, such as labeling results, time of occurrence, and fault waveform, can be transferred to a USB memory.

By using the playback software (PC software), it is easy to check and edit the recorded information.



Device configuration

The current waveform at the time of the fault is communicated between the information measurement devices of each substation, and the fault point is marked from the current ratio.

Fault point determination is possible only with the following devices

- Information measurement device ···· for calculating failure points
- Current detector ······ for measurement of current waveform
- Contact circuit breaker ···· for current waveform transmission between substations
- GPS antenna ······ for time synchronization between information measurement devices

Selection principle

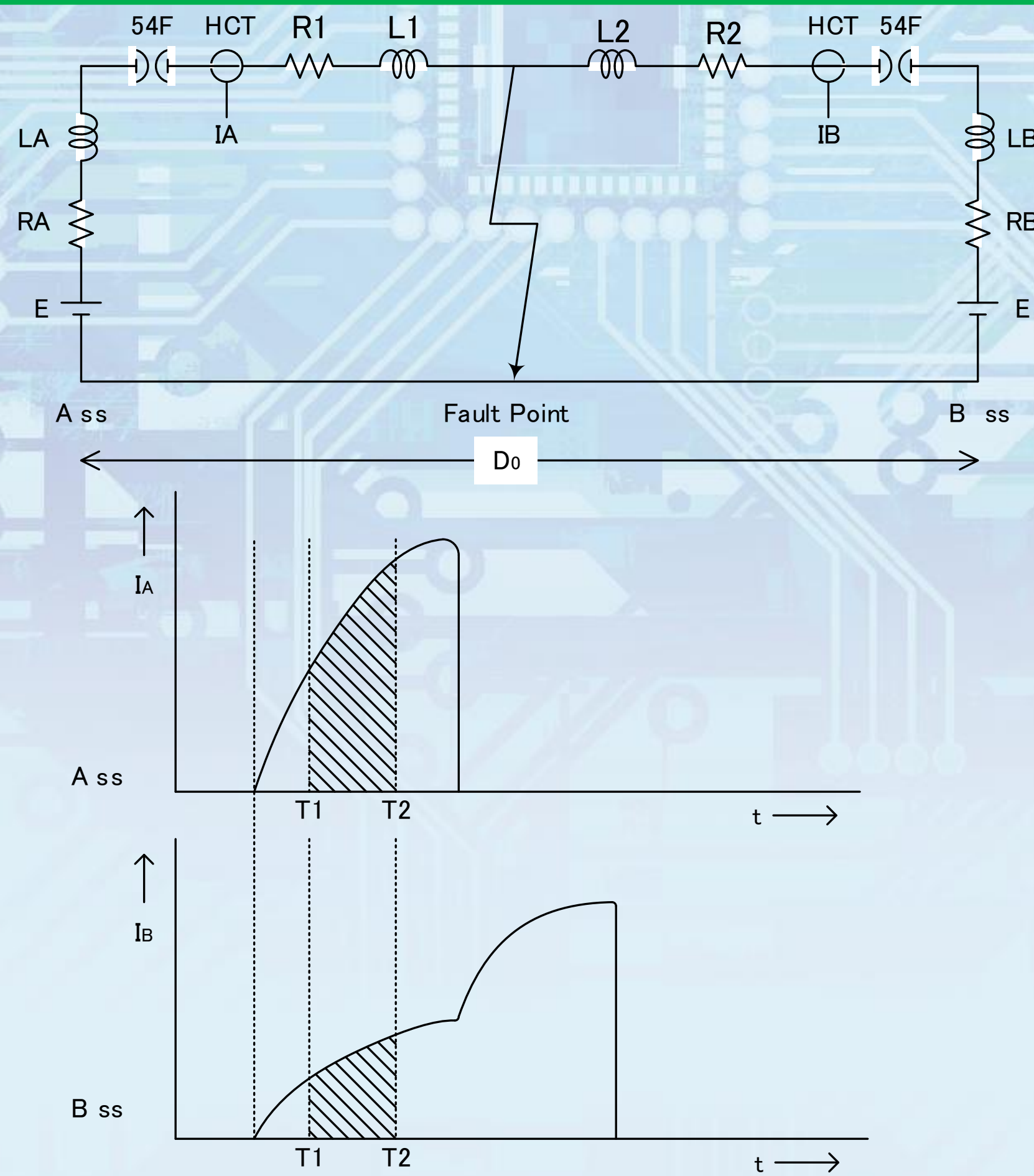


Fig. 1 Principle diagram

The formula for calculating the fault point distance from Substation A is shown in Equation (1).

$$\text{Fault Point Distance} = \frac{\Delta I_B}{\Delta I_A + \Delta I_B} (D_0 + D_A + D_B) - D_A \quad \dots \dots (1) \text{ Equation}$$

- D_0 = Distance between substations
- D_A = A substation internal inductance equivalent distance
- D_B = B substation internal inductance equivalent distance

ΔI_A and ΔI_B are time-synchronized averages around the rise of the fault current in both substations
 If we assume that ΔI_A and ΔI_B are the values near the rising edge

$$\Delta I_A = \left(\frac{di_A}{dt} \right)_{t=0} = \frac{E}{L_A + L_1}$$

$$\Delta I_B = \left(\frac{di_B}{dt} \right)_{t=0} = \frac{E}{L_B + L_2}$$

