AUTOMATIC MEASURING SYSTEM OF E-M FIELD PATTERN FOR THE ANALYSES OF E-M ENVIRONMENT

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INTRODUCTION

Recent electronics industry is requiring super miniaturization and high integration. It leads to the reduction of the signal level. In this case, devices will incline to be interfered easily by the external E-M field. Therefore, it is important to know the unwanted E-M emvironment. The other hand, oppotunities to be exposed by high intensity E-M energy are increasing. The safety for human bodies is going to the important problem.

These situations desire precise measurement methods strongly. The visualization of the E-M field will be more effective to find the method of protection for electronic equipments and human bodies.

To know the E-M field pattern, many measurement procedures will be needed, and it will be very laborious. Automatic measurement system will be helpful.

We developed self-running automatic measuring system. This paper presents this system and some results in test.

This measuring robot can search in the pre-set space range under the given instruction. The out-line will be given later.

SELF RUNNING PROBE

This probe can run itself driven by stepping motors. These motors move a E-M sensor up and down, also.

This probe is mainly made of wooden and plastic materials to avoid to disterb the E-M field. Metalic parts as motors are set on the bottom of the probe. The feature is shown in Fig.1. A sensor on this probe is connected to the Electric Field Strength Meter or Spectrum Analyzer and its output DC signal is digitized. The digitized data are stored on a flexible disk through a small scale computer. The all instructions as the positioning, measuring space range setting and so on, are also given by this computer.

DISPLAY OF E-M FIELD PATTERN

The measured data of E-M field pattern are proceeded by display software to show the 3-dimensional pattern or contour map. These figures give the intuitive recognition of the field.

EXAMPLES OF MEASUREMENT RESULTS

Test measuring results are shown in Fig.4. These results were measured in the corridor of the building. The E-M wave source was settled at the end of the corridor as shown in Fig.3, The sensor moved in the plane perpendicular to the longitudinal axis of the corridor. The sensor positioned itself at 19 X 26 points on the plane. Patterns of the figure corespond to the different distances L from the source.

CONCLUSION

We developed a self-running E-M probe to measure the E-M field pattern. The probe worked very well and gave the test measurement results. The data reliability are confirmed by the way that repeated measurment results give only small differences each other.

The application of this system will expand, for example, to measure the noise source distribution, to measure the reflection coefficient of various materials and to know the absorption characteristics of the human bodies.

Acknowledgements: Authors would like express great thanks to Mr. M.Hotta who constructed this probe.

This research was supported by the Grant-in-Aid for Cooperative Research of the Ministry of Education, Science and Culture.

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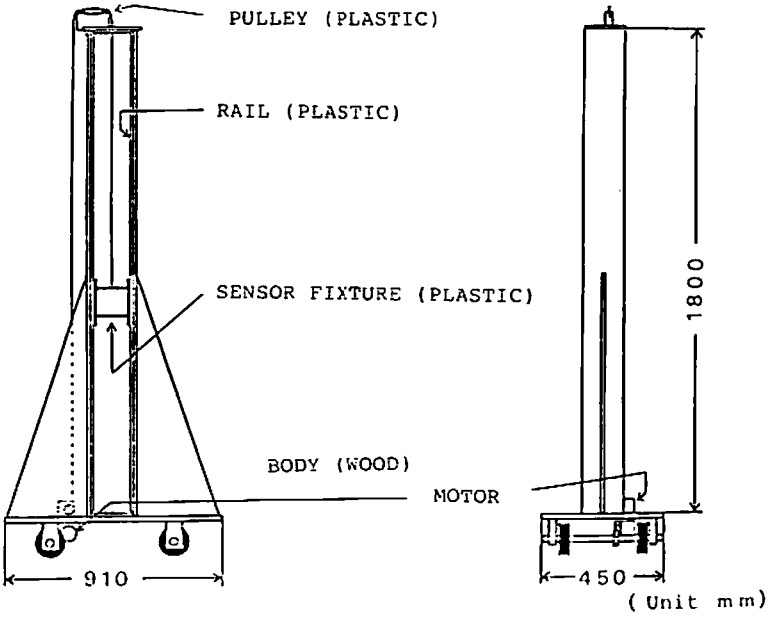

Fig.1 Newly developed E-M probe.

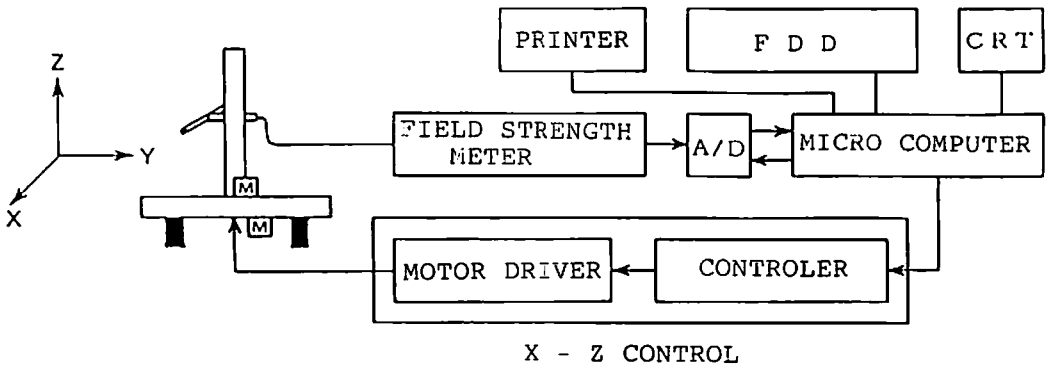

Fig. 2 Measurement System

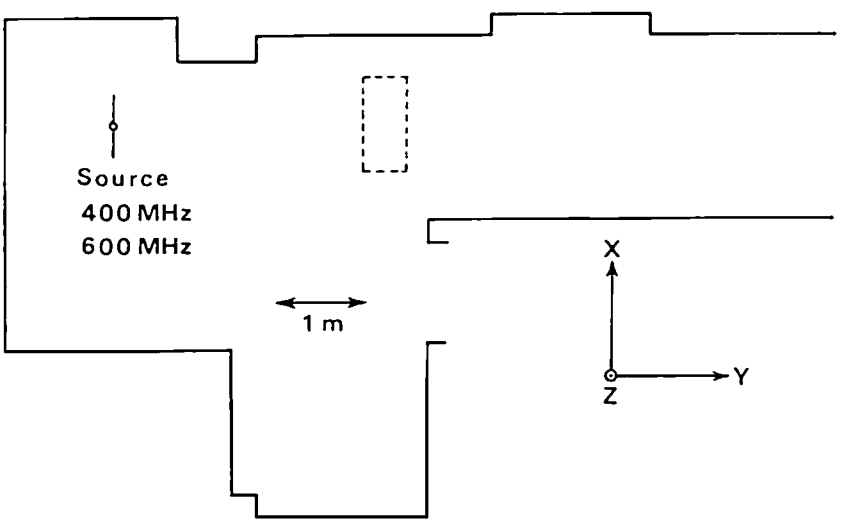

Fig.3 The plane figure of corridor where E - M pattern was measured.

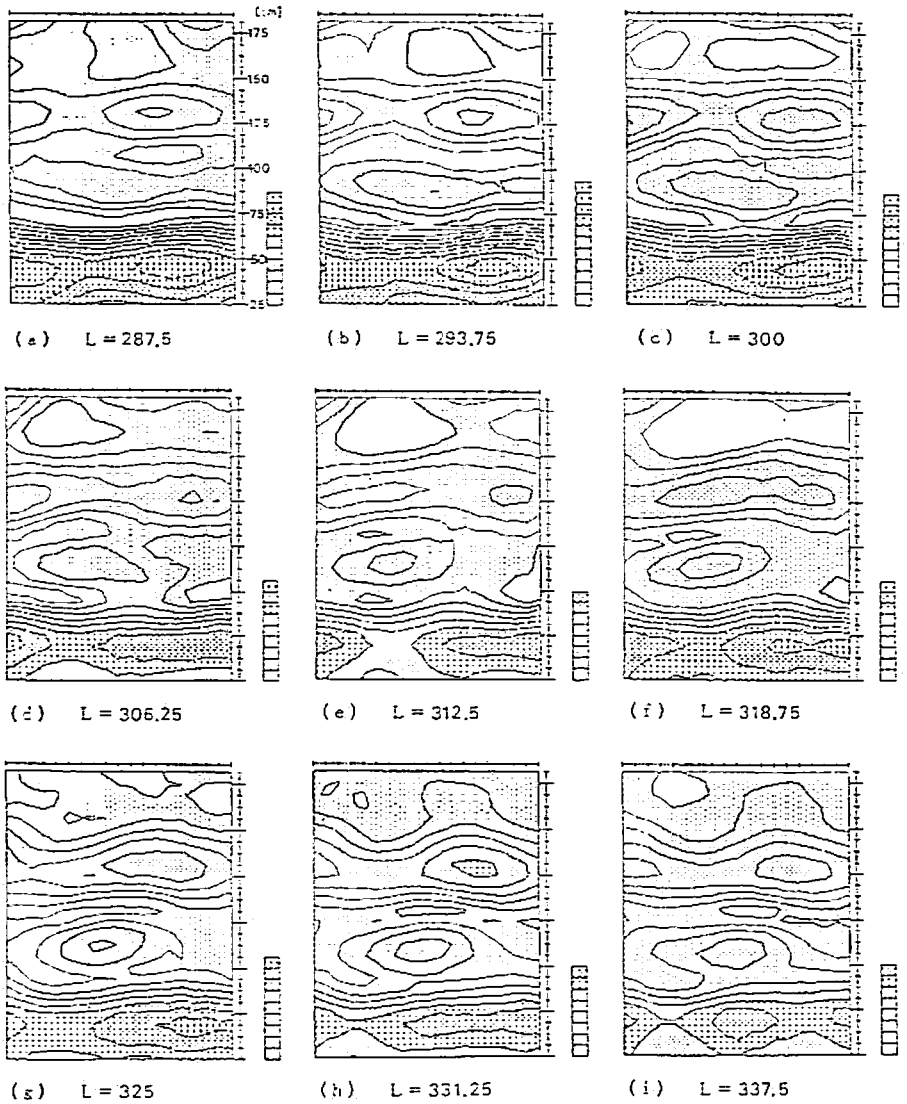

Fig.4 E field pattern in the corridor (600 MHz, Hor.)
L: distance from source