802.4L/87-012

NEC

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Date : July 9, 1987

To : David J. Greenstein, Chairman IEEE 802.4L

From : TOSHIO SAITO *Toshio Saito*

Subject : About my investigation for your request at New Orleans.

C/C : Chandos A. Rypinski

Attached is the short document that shows the optical atmospheric transmission equipment.

There is no more information about the experimental data of the transmission characteristic.

I regret that I found no information about the data terminal equipment where the optical atmospheric transmission technique were applied.

Atmospheric Laser Communications Equipment

NEC has developed a portable laser transmitter/receiver, LE-9102 T/R, with the technical advice of NHK (Japan Broadcasting Corporation).

It transmits one video and one audio signal via a laser beam. Using a laser diode as the optical source, it is compact and light on account of its good coupling efficiency even to a transmission optics of small diameter.

The new transmitter/receiver adopts a novel modulation technique PIM (Pulse Interval Modulation) to drive the laser diode. PIM permits smaller circuit size and lower power consumption than PCM, to achieve good quality for wide band analog signal transmission. This PIM technique is used in signal conversion of both video and audio signals to pulse stream. Other features of a laser atmospheric transmission system are: capability of parallel transmissions in a limited area, resistance to interference from other radio waves, and ease of installation.

LE-9102 T/R laser transmitter/receiver has a wide range of applications such as ENG (Electronic News Gathering), ITV system for security, CATV system, and so on.

Millimeter Wave and Video Communications Development Laboratory

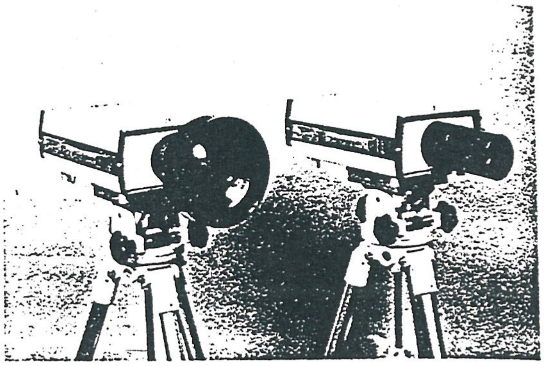

Photo 1 LE-9102 T/R laser transmitter (right) and receiver.

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Super Minicomputer MS190

The super minicomputer MS190 was announced in January, 1982 as the high end machine of the minicomputer MS series. The MS190 was developed to provide a three to four times improved performance over the former high end unit, the MS70. Some of the MS190's remarkable features are as follows:

The MS190 has 32 bit general registers and instruction set, which makes possible 32 bit processing, keeping upward compatibility with the current minicomputers, MS30, MS50, and MS70.

The capacity of the main memory can be increased up to 16 Mbytes. Thirty-seven addressing methods are supported for the addressing mode. Many advanced new technologies and devices are adopted. such as connection of up to three high-speed standard 32 bits buses, a 4-way interleaved main memory, a cache memory with 32 Kbytes capacity, pipeline-processing, Current Mode Logic (CML) with 0.5 nsec delay per gate, CML·LSI with 1200 gates per chip, 64K RAM chips and others.

Scientific Instruction Processor (SIP), for high-speed processing of floating point arithmetic, and Vector Instruction Controller (VIC), for high-speed processing of vector arithmetic, are provided optionally.

Computer Engineering Division

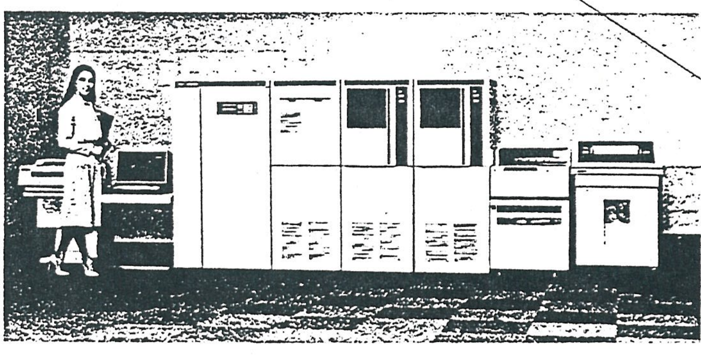

Photo 1 Super minicomputer MS 190.

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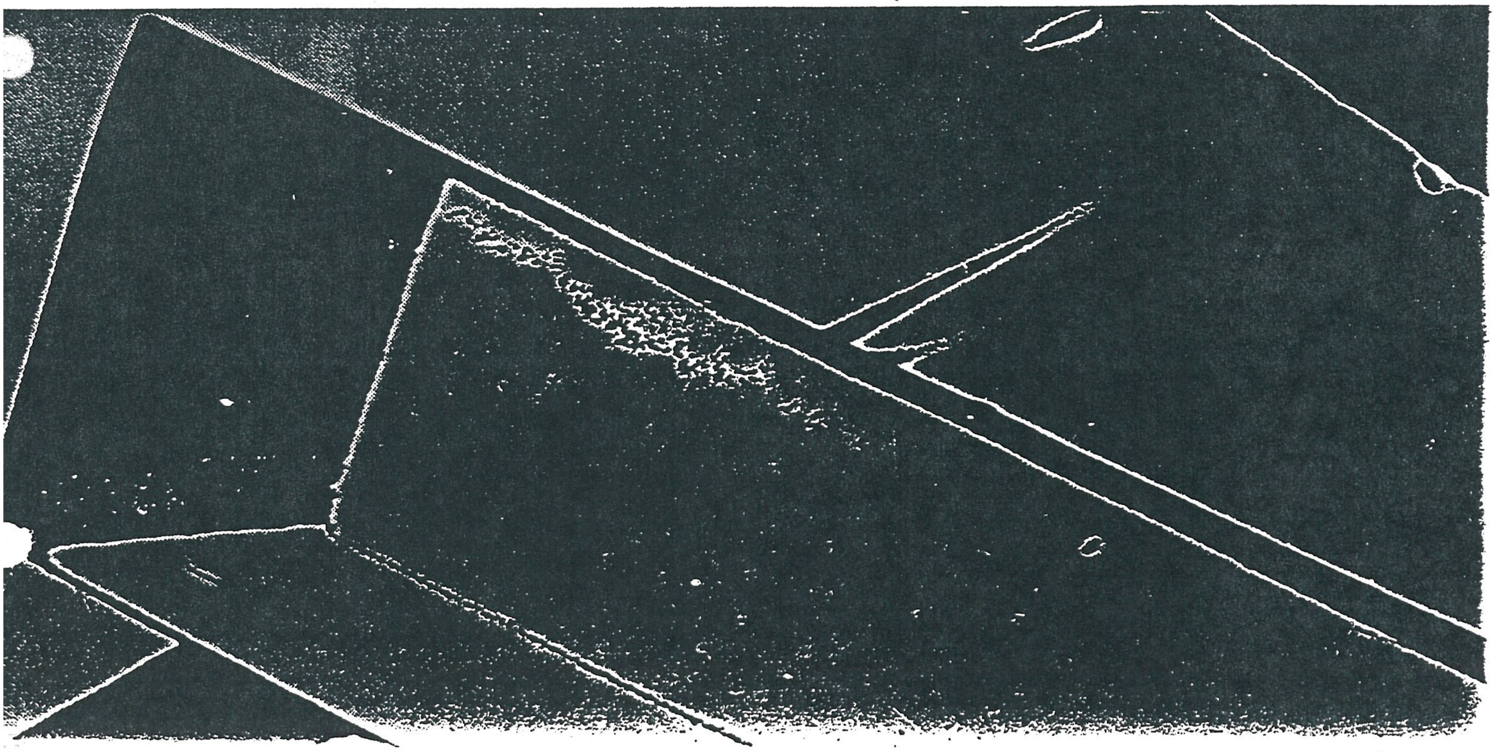
Stamping Technology — Drawing and Forming IV —
Reactor Dismantlement Has Begun
Plan for Teleterminal System



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CONTENTS

Running Control of a Self-Controlled Vehicle

National Mechanical Engineering Laboratory is developing an automobile communication system which employs weak waves and controls the movement of the vehicles which are connected without physical contact by means of digital communication respectively.

Non-contact connection of mobile communication is defined as vehicles which mutally exchange information necessary for running to produce an effect on each other. Separation is also carried out automatically. The vehicles equipped with this system have the ability to locate their position and to measure their direction, as well as the capacity to navigate with the help of a map stored in the system. A typical example of such a vehicle is the automatic guided vehicle (AUG).

The vehicle used in the study of the system is an AVG having a dead recognizing function and navigation function used in intelligent vehicles (unmanned control passenger car).

The aim of the non-contact connected vehicle system is to improve the efficiency of transport systems through the increase in traffic density. This system is not only applicable to in factory conveyance systems. It is also applied in highway automation as an elemental technology such as follow-up driving, route guidance, crush prevention, etc.

Communication between the non-contact connected vehicles is divided into two categories: macroscopic and microscopic information. Macroscopic information includes route, destination, and work to be ished on the way. Micro-information comprises the location and the speed of the vehicles. In this system, each vehicle communicates with the control center at various key points of the route. Therefore, the road-vehicle communication equipment is mounted on the vehicle.

The vehicle is controlled by a steering control and speed control. The speed control algorithm is formulated as an LQ problem (regulator question). The aim of the speed control is to maintain a predetermined distance between the car and the following car. The information necessary for the control is derived from a predetermined distance (0.9m) and its differential time.

Fig.1 and Fig.2 show the results of simulation. Fig.4 shows the optical communication system fabricated on trial by MEL. Fig.5 shows its modulation unit.

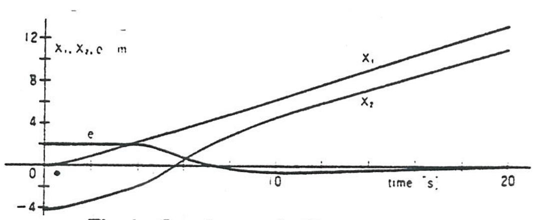

Fig. 1. Speed control of two cars by bidirectional communication

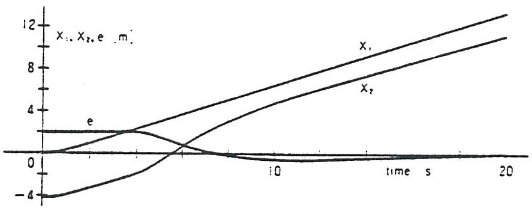

Fig. 2. Speed control of unidirectional communication

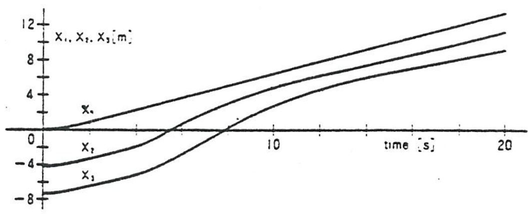

Fig. 3. Speed control of three cars by unidirectional communication

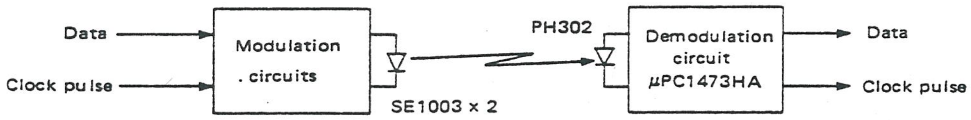

Fig. 4. Optical communication system

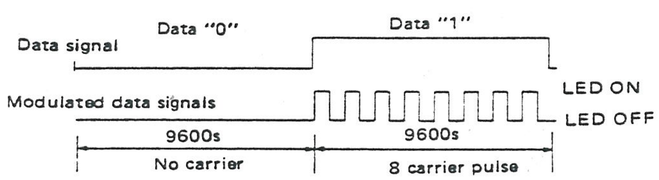

Fig. 5. Modulation system

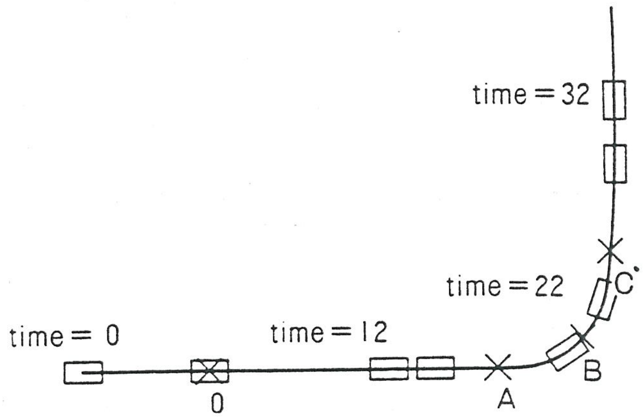

Fig. 6. Steering control for 90° turning to left of two cars