

***EXHIBIT E***

***Block Diagram***

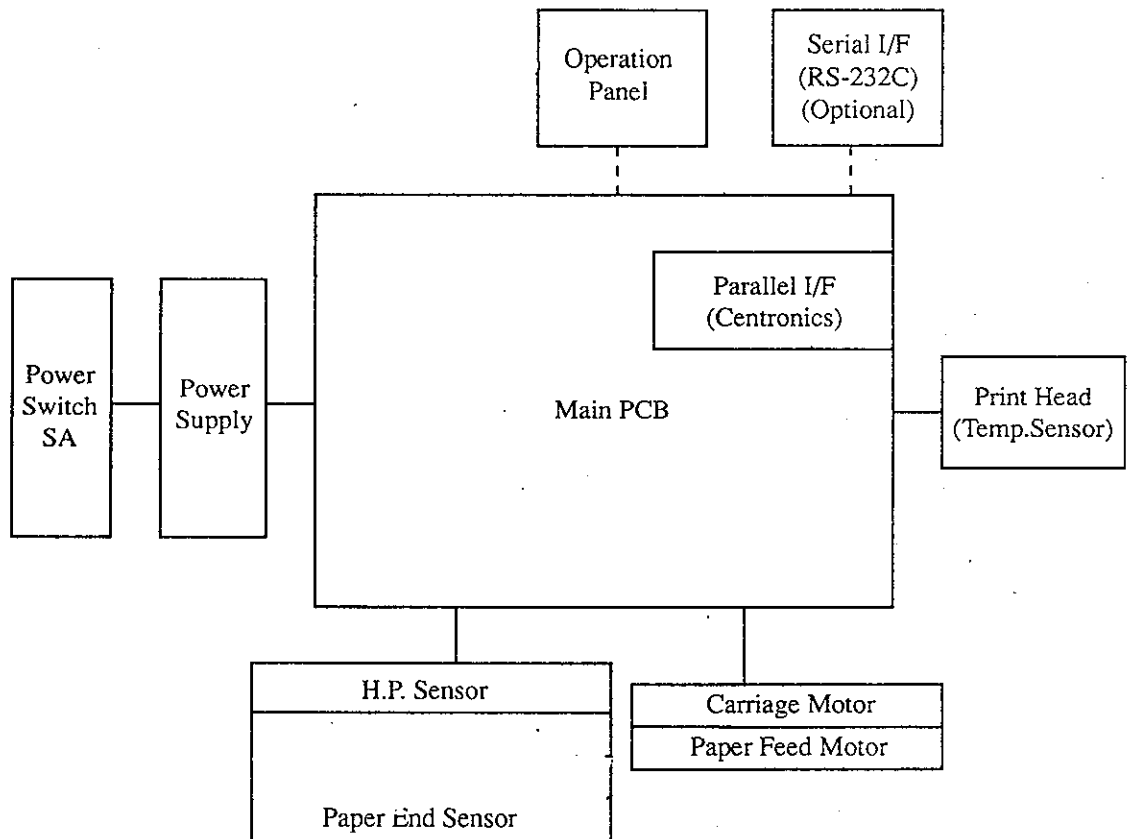
# BLOCK DIAGRAM OF MSP 345 CLASSIC

## 2. Operation of Control Parts

PRINTER

### 2-1. Configuration of Printer

The following shows major configuration blocks.



Major functions of individual components are described below:

#### (1) Power switch SA

Consists of a main switch and a filter circuit to eliminate external noise.

#### (2) Power supply

Transforms AC input to +5V or DC output required to drive the printer. The power supply is controlled with a switching type regulator.

#### (3) Main PCB

Controls entire operations of the printer. It consists of CPU, ROM, RAM, Custom IC and driver circuit, etc.

#### (4) Operation panel

A panel used to display the operating status of the printer and to set specifications.

**(5) Print Head**

The print head consists of two rows of 12 print wires with a diameter of 0.2mm each (staggered arrangement of a total of 24 wires). Each print wire has its own corresponding solenoid and armature. When a solenoid is turned on, it will attract its armature toward it, projecting the print wire forward to strike the ribbon against the platen, producing a dot.

**(6) Motors**

The motors in this printer include the carriage motor, the paper feed motor and they are all stepping –type motors.

**(7) Sensors.**

There are two sensors; the HP sensor, and the paper end sensor.

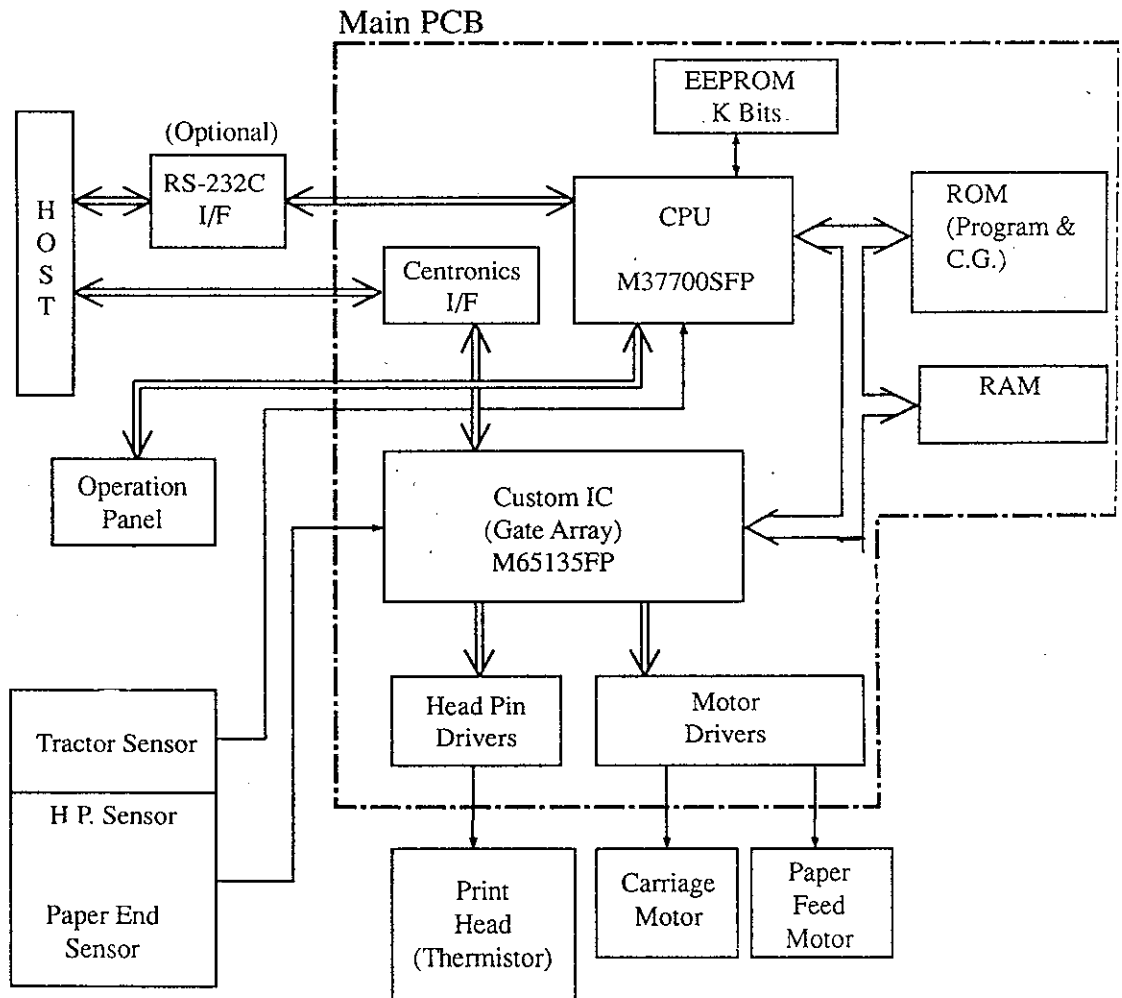
**(8) Interfaces.**

This is a circuit to transmit and receive data between host and the printer.

Two types, Centronics parallel I/F and RS-232C serial I/F (optional), can be used.

## 2-2. Operation of Control Unit

### (1) Block diagram



The following descriptions are for major functions of the components.

#### (a) CPU

The CPU is M37700SFP (Mitubishi) and it is a CMOS microprocessor with 16-bit architectures. The basic clock is 8MHz.

#### (b) ROM

K bytes ROM for the control program and the C.G. (Character Generator).

#### (c) RAM

It is used as working area, input buffer and download buffer

**(d) EEPROM**

It is 2K bits EEPROM.

It is used for storage of various settings

The stored data is retained even if the power is off.

**(e) Custom IC**

It is a CMOS custom IC incorporating a control circuit for the interface I/O port, current flow time of each motor and head pins, address decoder, etc.

**(f) Head pin driver**

It is a driving circuit for flowing current to the head pins.

It consists of the transistor array for driving, etc

**(g) Motor drivers**

It is a circuit to drive the carriage motor, and the paper feed motor.

The carriage motor is driven by the constant current driving system .

The paper feed motor is driven by the constant voltage driving system.