



INTERNATIONAL ATOMIC ENERGY AGENCY
UNITED NATIONS EDUCATIONAL, SCIENTIFIC AND CULTURAL ORGANIZATION



INTERNATIONAL CENTRE FOR THEORETICAL PHYSICS
34100 TRIESTE (ITALY) - P.O. B. 586 - MIRAMARE - STRADA COSTIERA 11 - TELEPHONES: 224281/2/3/4/5/6
CABLE: CENTRATOM - TELEX 460392-1



SMR/101 - 20

SECOND COLLEGE ON MICROPROCESSORS: TECHNOLOGY AND APPLICATIONS IN PHYSICS

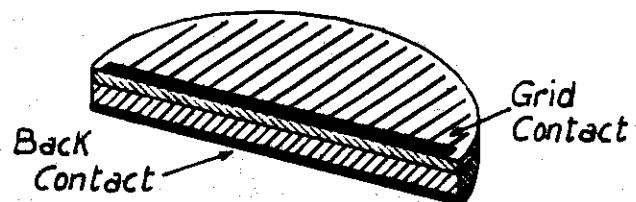
(18 April - 13 May 1983)

A Microprocessor-controlled Instrument to Measure
Characteristics of Photo-voltaic Cells.

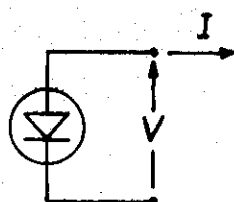
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These are preliminary lecture notes, intended only for distribution to participants.
Missing or extra copies are available from Room 230.

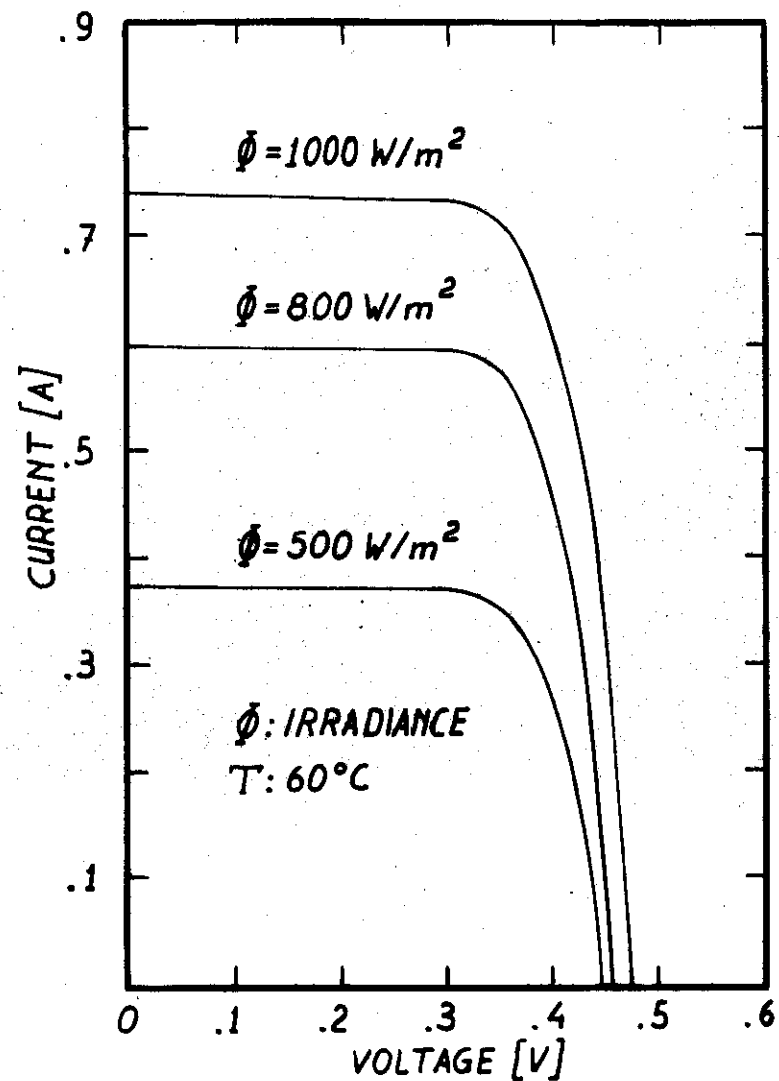
CROSS-SECTION OF A PHOTOVOLTAIC CELL



-  n type Semiconductor
-  p type Semiconductor
-  contacts



Photovoltaic Cell
Symbol



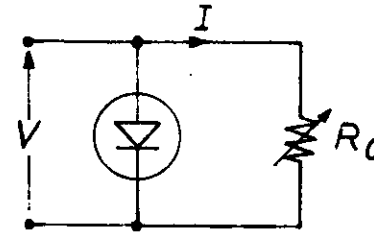
I_{sc} : SHORT CIRCUIT CURRENT

V_{oc} : OPEN CIRCUIT VOLTAGE

P_m : MAXIMUM POWER

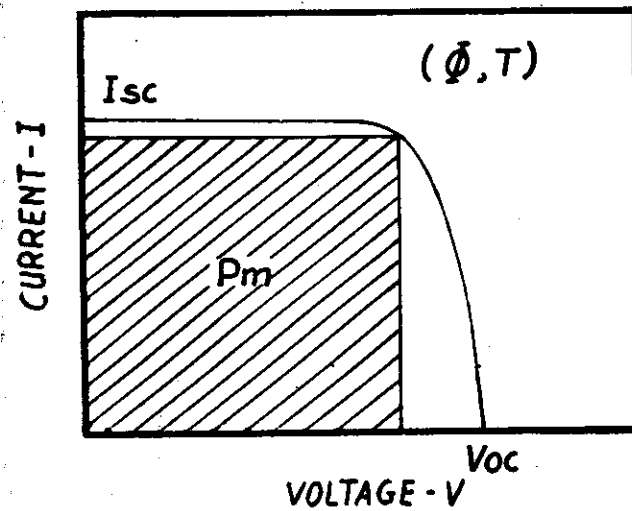
FF : FILL FACTOR = $P_m / (I_{sc} * V_{oc})$

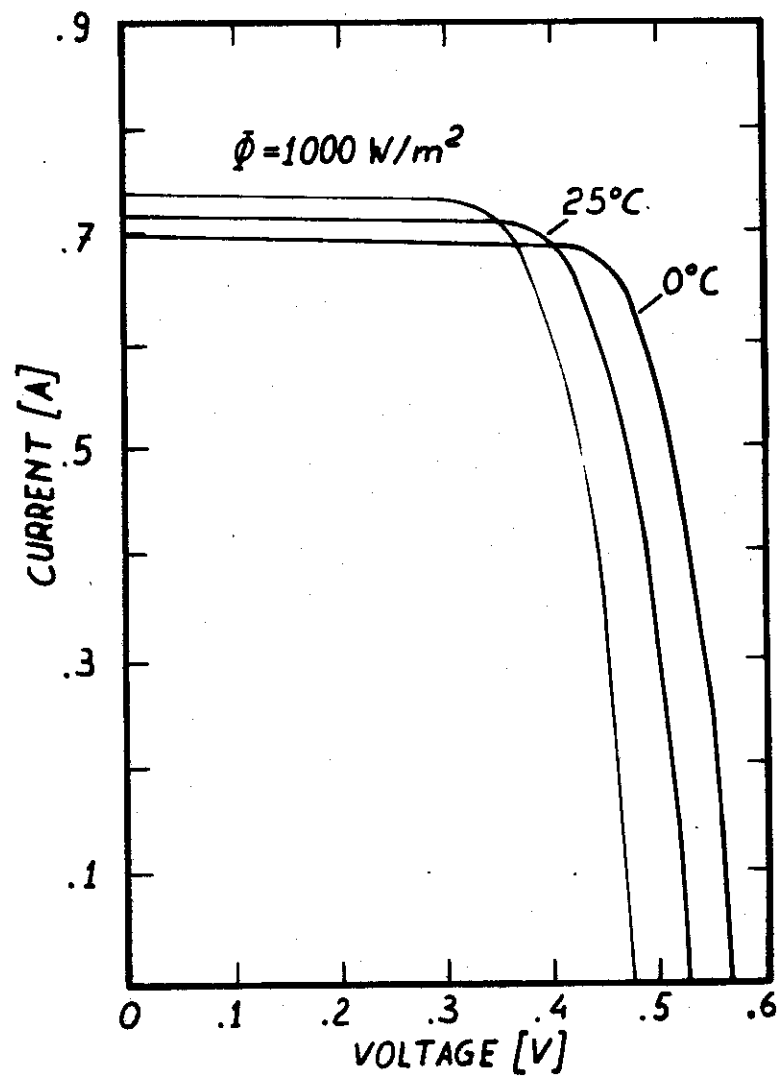
Eff : EFFICIENCY = $P_m / (\Phi * A)$



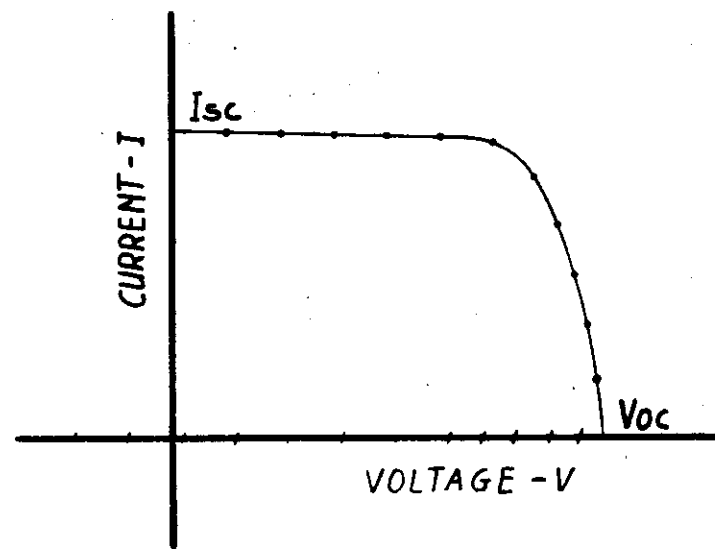
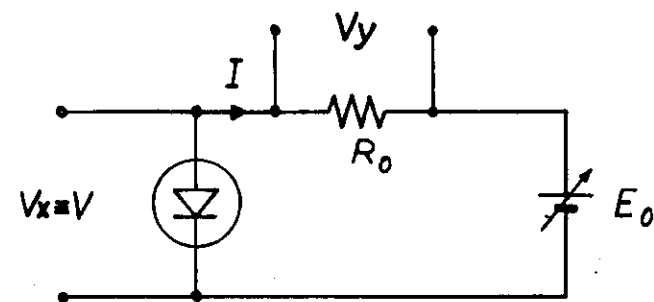
Φ : IRRADIANCE

A : CELL AREA

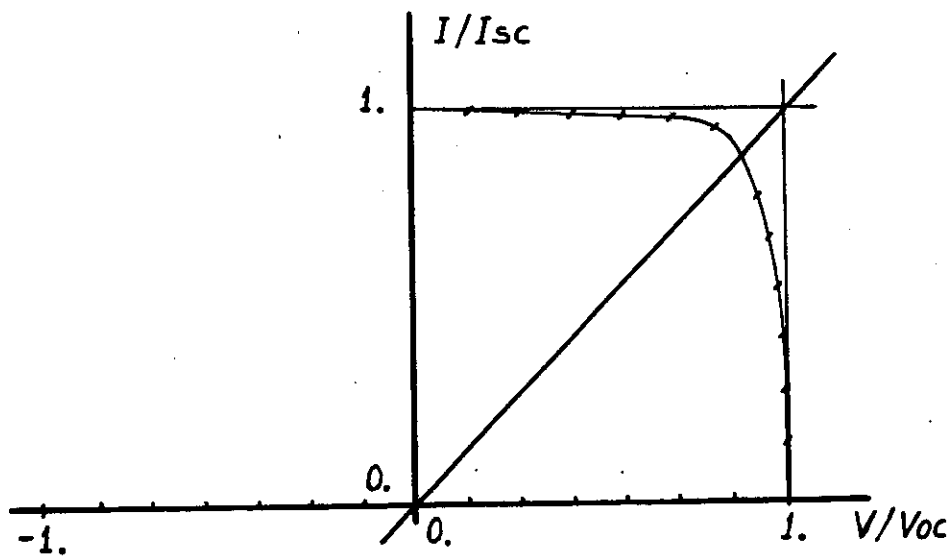
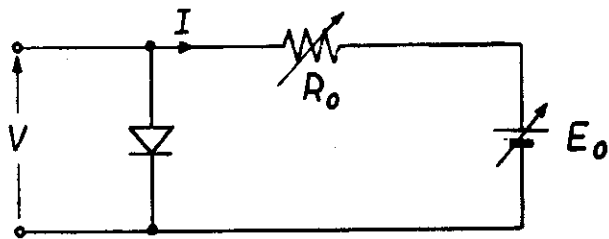




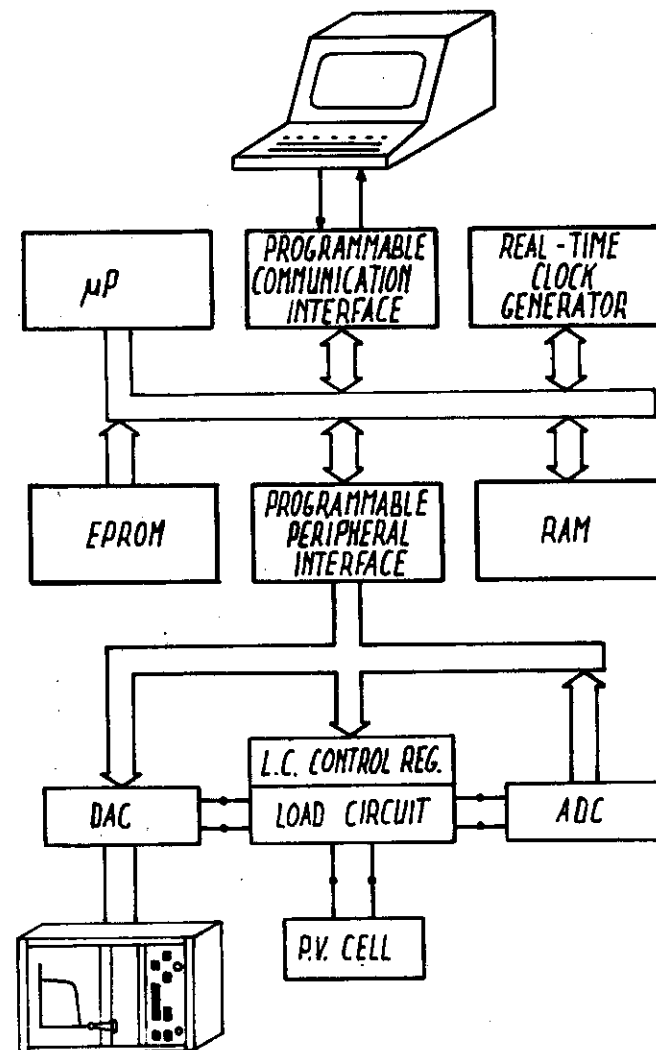
- 5 -



- 6 -



- 7 -



- 8 -

CPU BOARD

8085-A CENTRAL PROCESSING UNIT (6.144 MHz)

8251-A PROGRAMMABLE COMMUNICATION INTERFACE

8253-5 PROGRAMMABLE INTERVAL TIMER

MEMORY BOARD

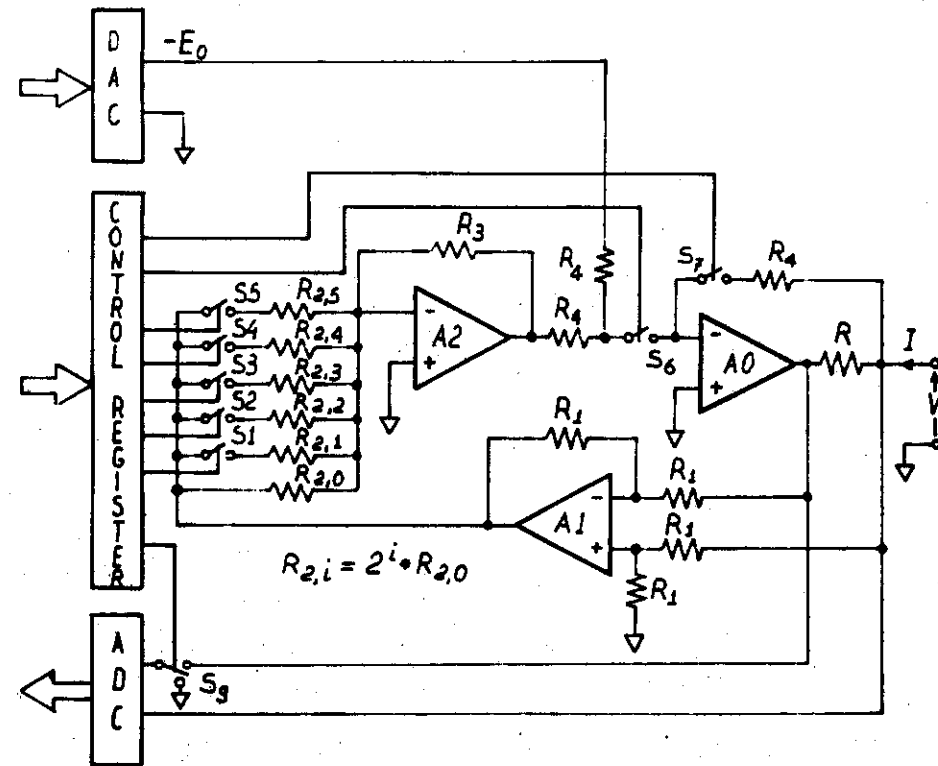
4 x 2716 8 KBYTES EPROM

8 x 8185 8 KBYTES RAM

I/O BOARD

4 x 8255-A5 PROGRAMMABLE PERIPHERAL INTERFACE

96 programmable Input/Output Lines



$$V = R \cdot (R_3/R_2) \cdot I + E_0$$

$$R_0 = R \cdot (R_3/R_2)$$

SOLAR CELL MEASUREMENT SYSTEM

*** COMMAND LIST ***

A SOLAR CELL AREA DEFINITION
C COMMAND LIST REQUEST
H HEADING MESSAGE DEFINITION
I INSTRUMENT OPERATING MODE DEF.
L LIST REQUEST
M MEASUREMENT PARAMETER DEFINITION
P PLOT REQUEST
S START MEASURE

EXAMPLE OF MEASUREMENT OUTPUT

SOLAR CELL : LAMEL SOLE 40-7

SPECTRUM = AM1.5

IRRADIANCE = 100 mW/cm**2

TEMPERATURE = 25 C

CELL AREA = 4 cm**2

NUMBER OF POINTS = 15

AVERAGED MEASUREMENTS NUMBER = 20

Isc = 1206 * 10**-4 Amp.

Voc = 585 * 10**-3 Volt

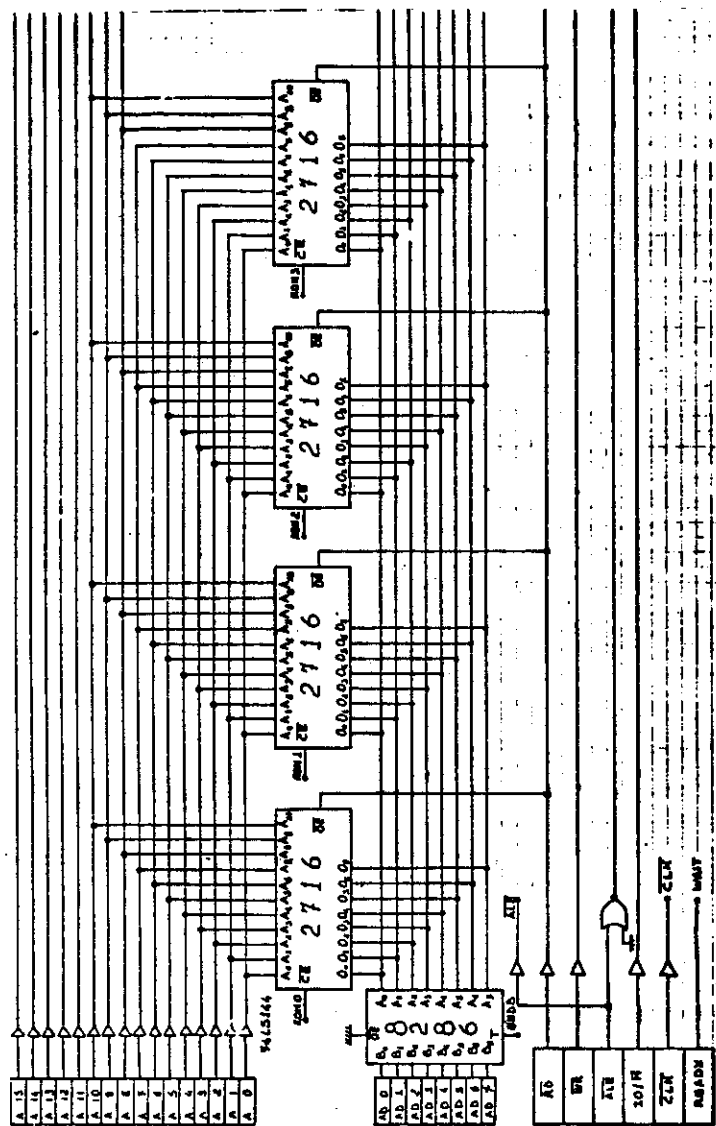
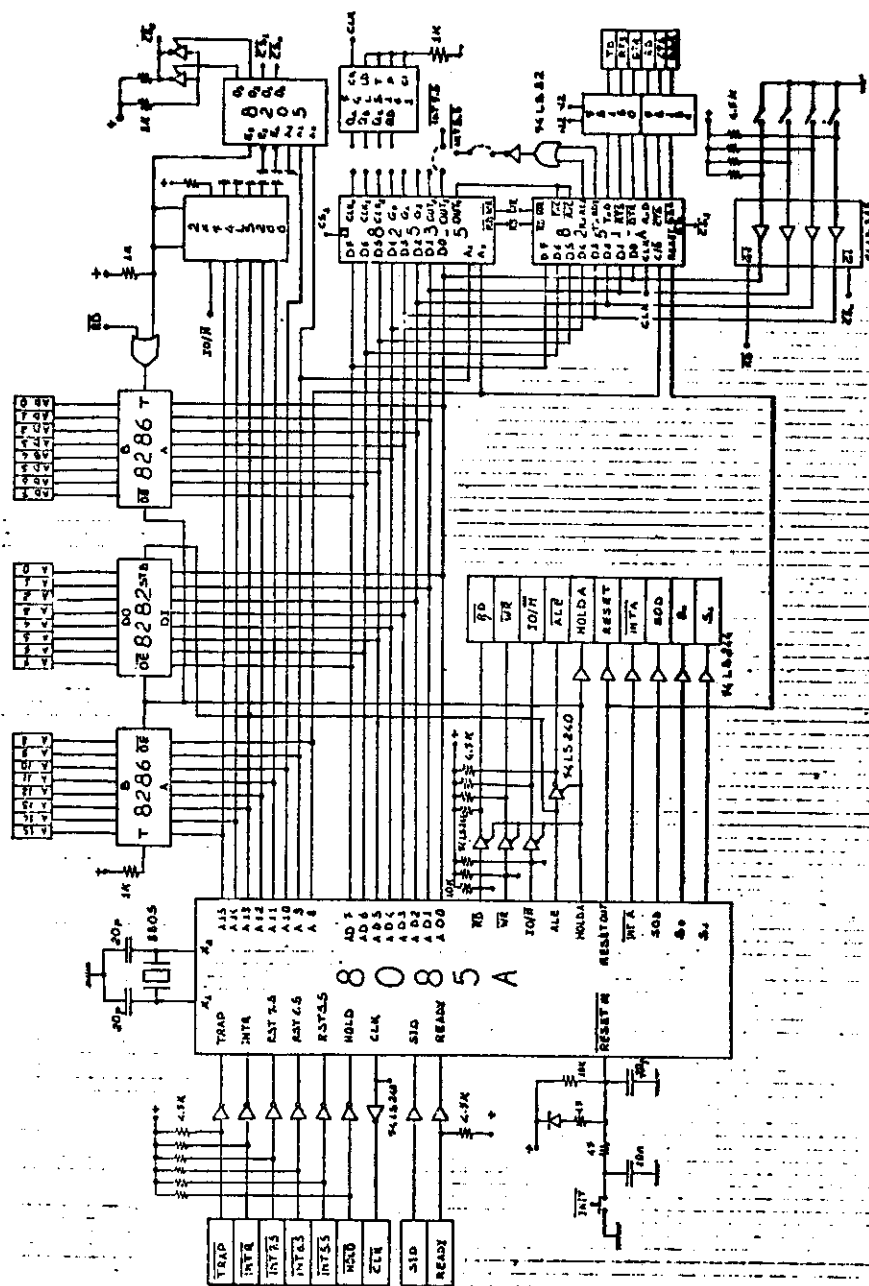
Pm = 528 * 10**-4 Watt

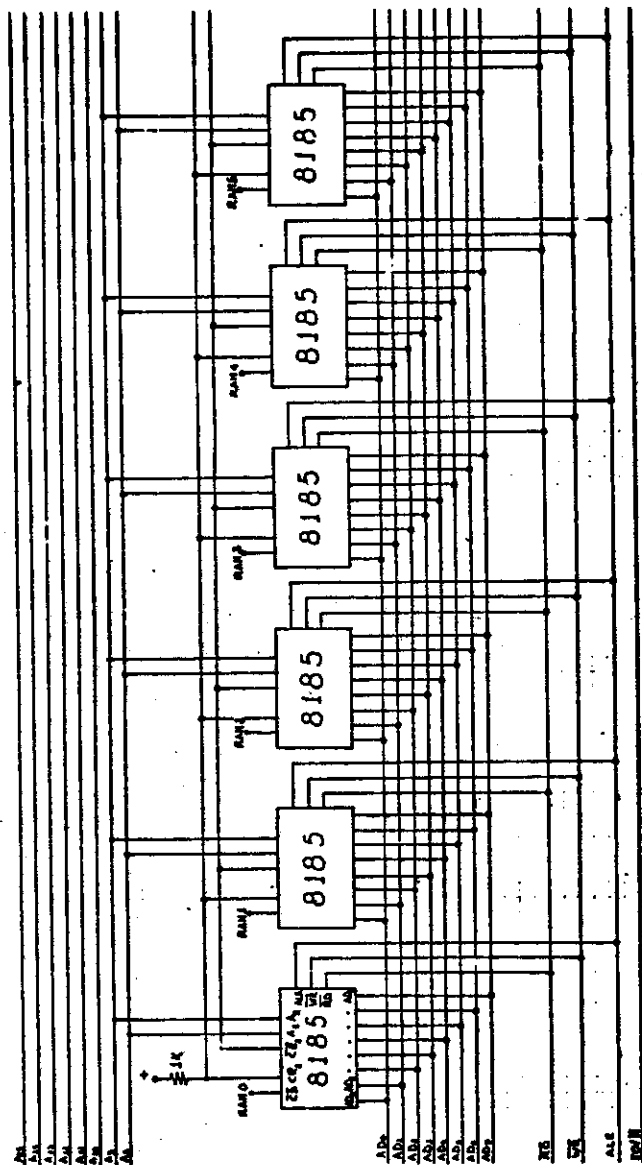
Vmp = 505 * 10**-3 Volt

Imp = 1044 * 10**-4 Amp.

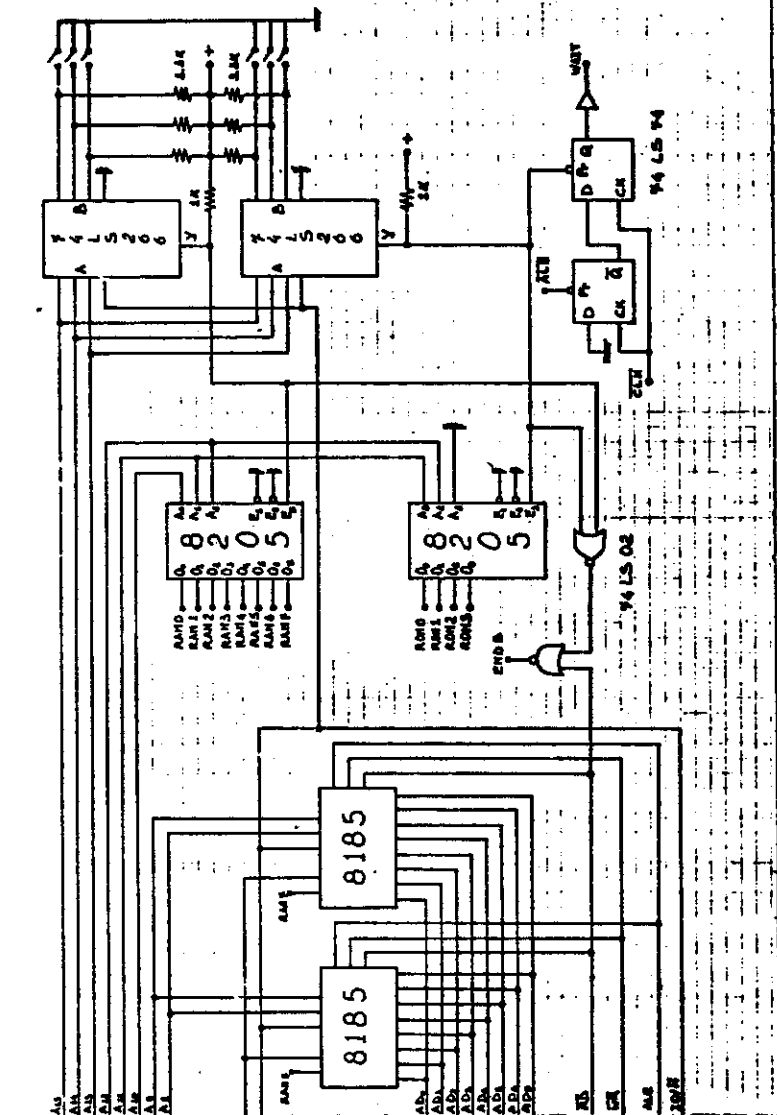
FF = 748 * 10**-3

Eff = 1320 * 10**-4





-15-



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