

# MASK AND PLOT GENERATION ON THE CALMA

By

Glenn A. Marshall  
5th Year Microelectronic Student  
Rochester Institute of Technology

## ABSTRACT

The procedures to create hardcopies of designs created on General Electric's CALMA, Computer Aided Design system is discussed. Also addressed is the interfacing of the CALMA to a Mann 3000 Pattern Generator.

## INTRODUCTION

Computer Aided Design (CAD) is a key technological advance for the electronics industry, encompassing everything from circuit conception to mask generation. The system presently being implemented for the Microelectronics Department at RIT is manufactured by CALMA, a subsidiary of General Electric. Though this system features a variety of engineering tools our present interests are in its I.C. layout capabilities. The reasoning behind this move is the ease with which designs may be created or edited. Our present layout tool, Integrated Circuit Editor (ICE), employs only keyboard commands making the process of creating circuitry very tedious and time consuming.

As with any computer system it is advantageous to establish a uniform set of parameters, such as layers colors, so that a designer may devote all his time to circuit design. This program sets up color codes, layer designations as well as grid and view area for beginning designers. Once the circuit has been designed the designer may want hard copies and/or down load to mask making. This project was concerned with producing VERSATEC plots and Mask production using a MANN 3000 Pattern Generator. For the Plot to be generated the designer simply inputs various parameters and a plot is returned via the plotter. The job of mask making on the other hand involves a few more steps. First, the designer dumps the information to a magnetic tape using keyboard commands much like that for a Versatec, then this tape must be loaded onto the VAX/VMS system here at RIT so that the file may generate a paper tape which is then fed into the photo repeater for mask creation.

## EXPERIMENT

This project was concerned with production of hard copies of designs created on the CALMA system. Both VERSATEC plots and photothermal prints via SCREEN DUMP were obtained. Also researched was the downloading of database files for mask generation on a MANN 3000 pattern generator.

In order to produce hardcopies of what is designed on the CALMA system the two following procedures are employed.



## 1. SCREEN DUMP

To get a hard copy of information currently displayed on the Workstation Display, use the screen dump. This can only be done from work station 1. In order to use this command turn on the switch and allow to warm up for 10 to 15 minutes, so that the developer heater reaches operating temperature. (SCREEN dump uses a photographic based paper that is thermally developed). Press the print lever located next to the ON - OFF switch and in approximately 1 minute a copy of what was displayed on the screen will appear.

## 2. VERSATEC PLOTTER

In order to get a hard copy using this plotter it is necessary to enter the following commands from the Keyboard at the work station.

Jobcreate <cr>

This will be followed by the following prompts:

Job Type (XCLI):            enter OVERSA8242 <cr>

Priority (B):              enter <cr>

Job Name (OVERSA8242)    enter <cr>

Library Name:             enter your library name <cr>

Structure Name:          enter desired structure from  
opened library <cr>

Plot Options (PLTR):     enter <cr>

Plot Window  
CE1(0,0)                  enter lowermost X,Y coordinates  
of structure

CE2(0,0)                  enter uppermost X,Y corodimates  
of structure

Scale Factor (n):        n - default value for 48 x 41  
inch plot. If you wish it to  
be smaller enter a lower (n)

Layer Groups:            enter layers to be plotted  
(singly spaced)

Assign fill codes:        enter desired fill code numbers

Run, Save, Abort (RUN): enter <cr>

Job OVERSA8242-GM has been entered

### 3. DOWNLOADING

In order to create a tape for mask generation the following commands must be entered via keyboard at the work station.

Mount magnetic tape: located in back hallway of  
Microelectronics building

OUTFORM: enter <cr>

This will be followed by the following prompts:

GDSII Library: enter your library name <cr>

Library name in stream  
file (your library): enter <cr>

OUTPUTFILE (MTO:0): enter <cr>

Options (VX) enter <cr>

Structure Names or  
Patterns (-): enter <cr> for all files  
in library else enter names  
of desired structures

#### STRUCTURES OUTFORMED

Returns list of structures specified

#### OUTFORM HAS FINISHED

#### RESULTS

The following are the results and recommendations for future work, which were achieved with the CALMA systems Mask & Plot generation functions. The procedure for creating a 'SCREEN DUMP' or 'VERSATEC PLOT' hard copy produced successful results (see attached examples of each). Downloading a CALMA database file for mask making purposes, however was unsuccessful. The inaccuracies of the proposed procedure are not known and should be cleared up by contacting a General Electric CALMA representative, familiar with our system, directly prior to any further attempts at producing a magnetic tape suitable for mask production on our MANN 3000 pattern generator.

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#### REFERENCES

CALMA (version 3.0) Reference Manuals