Mann 3600F Pattern Generator
Operations Manual

Please do not change the order of the icons on the desktop.
[Instructions, L-Edit, ASM2600, PGSORT, Users, PGPROXY, Coral]

NOTE – please keep file names simple and less than 8 characters. No special characters – letters and numbers only.

1. Open file in L-Edit (see appendix 1 for additional layout comments)
  Ensure the desired layer (setup layer) has:
    1- GDSII number (number between 2 – 256)
    2- GDSII Data type (1 or 2)
    3- CIF Name (3 alphabetical characters)
  You may need to "flatten" your layer to ensure all features export.
Flatten command is NOT reversible – so save a copy of your mask as backup prior to Flattening.

2. Export desired layer to GDS
  File--> Export Mask Data --> GDSII

3. Close or minimize L-Edit

4. Open ASM2600
  1- If no control dialog box
    - File --> Preference --> Enable "Control Dialog"

5. Select GDS File
  1 - Browse to folder that the GDS file is residing.
    - Make sure to Click "Working Directory" before opening file
  2 - When Select/Create CFG dialog opens click Open and Yes to create

6. Structure
  1 - Select correct cell and click OK

7. View GDS File
  1 - Ensure all features have exported, if not go back to L-Edit and "Flatten" your mask
  2 - Ensure that the ORGIN (0, 0) coordinate is in the correct location in your design.
  3 - Close GDS View

8. Configuration
    1 - Options tab
    Verify Manhattan data for all orthogonal, Complex for angles
            a. Karl Suss
                    a. Scale = 1
                    b. Feature Size = 2
            b. AutoStep 200
                    a. Scale = 5
                    b. Feature Size = 0.4
            c. 3696 Pattern Generator
                    a. Scale = 10
                    b. Feature Size = 0.2
            d. Complex for angles

    2 - Mask Options tab
            a - Minimum Flash Dimension = 2um
    (Must be less than or equal to Feature Size * Scale)
            b - Maximum Flash Dimensions = 750um
(It can print up to 1500um but the exposure field uniformity is not 100%)
            c - Sag Value =2.54um
            d - Percent Overlap = 0%
    3 - Output Tab
            a - Mann 3600 selected
            b - Use disk for PG buffer selected
    4 - Click OK

9. Layers
    1 - Select layer to convert
    2 - **CHANGE FILE NAME** (8 char or less) and **CHANGE to .dwm** extension
    3 - Click OK

10. Translate
    1 - Screens flash by
    2 - Warnings or errors must be addressed.
            Errors will need to be fixed in L-Edit and redo steps.

11. View PG File
    1 - Click Fill to show individual flash composition

12. Quit to close ASM2600

13. Open PGSORT
    1 - Icon on desktop
    2 - If no control dialog box
            - File --> Preference --> Enable "Control Dialog"

14. Select EM/Mann Files
    1 - Browse to folder that the GDS file is residing.
            - Select "Working Directory" before opening file, 'OK'
    2 - Open file

15. View Input File
    1 - This should be the same data as shown in View PG File Step
    2 - Fill on/off

16. Configuration
    a - Set sort precedence
            - Local vs. Global sort (Typically have Local)
            Local will sort over a set region
    2 – 'OK'

17. Output Settings
    1 - **CHANGE FILE NAME** under Output File Name column
    2 - **CHANGE File extension to .dwm**
    3 – 'H And L' selected at bottom
    4 – 'OK'

18. Sort
    1 - Note Flash Count
            - Flash count must be <50e3 flashes
            ~100 Flashes per minute (6000/hour)
            - **Remember total number of flashes** for Step 38

19. View Output Files
    1 - Fill on/off

20. Quit to close PGSORT

21. In USERS directory on desktop
    1 -Open ACSFIX directory and copy acsfix.exe to your directory

22. Drag and drop the sorted pg file (.dwm from step on top of acsfix.exe
    1 -This will automatically run the program
    2 -Outputs two files – use the file with the extra .txt extension.

23. **RENAME THE FILE** with the extra .txt extension
    1 –**REMOVE THE .txt** extension – leave it as a .dwm extension
    2 -This is the file that we will use on the PG

24. On the desktop
    1 -Click on the PGPROXY2 short-cut
    2 -Click on USERS directory
            a -Create a user directory if you do not have one
    3 - Copy the fixed .dwm file into this directory
    This places the file on the "M:" drive that is networked to the PG
    4 -If the PGPROXY1 program fails to open – See Appendix 2 the network
connection, likely the M: drive computer to the left of the Mann 3600F
controller / computer system is off. Turn it on and wait ~5 minutes, then
try again.

25. Close all programs and Enable system in Coral
    - Setup Spacer plates for correct mask size
            4" x 4" – uses 0.057 to 0.072 spacer plate
            5" x 5" – uses 0.080 to 0.097 spacer plate
    - Ensure Orings are in place and Vacuum is correct

IF you are not sure how to change this, please contact Lab Staff for
assistance/training on changing the spacer plate.

26. If the PG is in the Black screen press Alt-F1 to go to the Blue Screen
        1 -If in the BLUE screen, you can click OK if the box is on the screen
        2 -At the Top Click 'DATA FILES'
        3 -DISMOUNT TAPE FILE to clear the system out.
                At the lower right it should read DATA FILE CLOSED

27. At the Top, Select 'DATA FILES'
        1 -Dialog opens

28. Select CREATE TAPE

        1 -Click Add FILE
                a -If other users file is listed, select it and click REMOVE
FILE before adding your TAP file.

        2 -Type "M:" and press 'enter'

        3 -Click on your user directory

        4 -Click on the file that you just translated.
                a -Click 'OK'

        5 -Click on MAKE TAPE
                1 - Defaults to file name C:|UPG_3600\UPG3600.TAP

****
        MAKE SURE AND DO NOT SAVE ON THIS FILE
        IT IS AN IMPORTANT CALIBRATION FILE
****

Save file in Temp folder in - C:\UPG_3600\TEMP\YOURTAP.tap

        2 -Click 'OK'
                - System reads "Data File created"
                - Click 'OK'
        3 -Click 'DONE'

29. At the Top - select DATA FILES

30. Select MOUNT TAPE FILE
        1- Dialog opens
        2- Then go to the C:\UPG_3600\TEMP folder and select your TAP file
then press 'enter'
        3- If this doesn't work, reboot maybe needed – see Appendix 2
        4- Click on the TAPE (.TAP) file that you just translated.
        5- Click MOUNT TAPE
        6- 'OK'
        7- Your TAPE file will show on the lower right of the main blue screen

31. At the top, select 'OPERATE PG'
        1 -Select 'Start with Defaults'
        2 -Goes to the Black screen

32. IN the BLACK SCREEN

33. Type CLEARQ * and then 'Enter'
      1 -this makes sure you don't have a stray file in the system

34. Press CNTL-N to turn on logging.
      1 -should say "logging enabled" at bottom of screen

35. Type MODE
      1 -Arrow down to move
              Tape Format: 1
              Metric/English: M
              Flash/Shutter: S   (Note - System reboot defaults to F)
            APC/Manual Plate change: M
      2 -Arrow to bottom and press 1 to Save and then 'Enter'

36. Type LISTF and hit 'Enter'
      1 -Note the File Number of your file
            a -Typically your file will be file number .T02

37. Type SETUP and hit 'Enter'
      -Page 1 – arrow down to move
            a -file name enter #02
            b –exposure time enter: 80   (time in milliseconds)

The system puts a (') behind the number.
If you enter something invalid – the system will say 'invalid input'

            c -At bottom type 3, down arrow, to "go to page" 2

      -Page 2
            a -Enter in any offsets (0, 0) is default
            b –Mirror – N for normal, Y for Tamarack Reversal masks
            c -Arrow to bottom and go to PAGE 3

      -Page 3
            a -Type N for change plate
            b -Plate size:
                - 96, 96 for 4 inch Chrome
                - 125, 125 for 5 in Chrome
            c -Fiducial: 3696 ONLY – type 'A'
            d –Arrow to bottom and go to page 4

      - Page 4
            a -Barcode: Enter up to 10 characters (nothing fancy) if you
are making a Reticle for the Autostep-200, and you have not included your own
barcode and fiducial marks.
** This will automatically enter fiducial marks along with a barcode**

            b –Title: Enter up to 30 characters (nothing fancy)
Please put your LAB ID on your plate.
            c - Type "Y" for Date/Time
            d – Position Title:
                4" masks – set to 45
                5" masks – set to 55
            e - Arrow down and press 1 and 'enter' when setup complete
            -Will ask if you want to do another job Y/N to batch jobs
            -typically type 'N'

38. Type TESTQ and enter
        1 -Runs through the data file and verify syntax
        2 – **Verify Number of Flashes** equals number from Step 18
        3 – If Flash count is different – something happened in conversions
        4 -Returns to '>>' if no problems are found.

            All errors must be corrected - If the system indicates "Data
out of Range" and you are making a 4" plate, you probably did not change the
title location to 45 on page 4. You must CLEARQ * and redo SETUP.

39. Open the box of plates and retrieve the needed mask plate

40. Load the plate on the stage
        1 –Photoresist side UP
        2 -Enable Stage Vacuum

41. Close Doors of Environmental Chamber

42. Type RUNQ and press enter
        1 - The system asks to "Load plate and hit <CR>" (ENTER)
        2 - The PG will "think" for about a minute before moving
        3 - The system checks leveling and then starts to write the plate.

If Leveling fails, you probably didn't set the correct plate size in setup
        -CNTL-Q to quit the command executing, redo steps 33 - 42

43. There is NO indication of progress, you should estimate the exposure time
based on your exposure count.

(Control-P) will show progress and the number of completed exposures.
Barcode/Fiducials/Closure tests do not count towards the progress count.

        - When finished the system will return to the command prompt '>>'

44. Remove Vacuum

45. Develop, Etch Chrome --> Remove remaining PR.
        Develop: Positive PR = 25-30 sec develop, AZ-917
        Rinse in DI – Inspect development
        Chrome Etch: ~65 sec etch CR-4
        Rinse in DI: Inspect etch – use transmitted light
        PR Removal: Rinse remaining PR with ACE/IPA, then Drytek for 5 min.

46. Press Alt-F1 to return the system to the Blue Screen

47. Disable in CORAL.
        a - Indicate the number of plates and the type of plates used.

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Appendix 1 – Barcode and Fiducial Comments:

If you are making a reticle for use on the AutoStep. For now; you DO NOT
need to include fiducial marks and a barcode in your layout. The automatic
barcode generator is able to be used now.

You may still include your own barcode and fiducial marks in your layout. If
you choose to do this, then DO NOT add any offsets on Page2 and DO NOT add a
barcode on Page 4

As a result you DO NOT need to put an offset, on Page 2, as described in the
procedures (X = 0.0, Y = 0.0). You can go to the layout in the following
directory to find a set of fiducial marks and a template for the barcode:
C:\Users\Student\Documents\Users\AS200_Fiducials_and_Barcode

You can instance the cell named: Barcode_Fiducial Marks_and_DFAS Marks
This includes fiducial marks (the three squares, on the outer edge of the
reticle) and a barcode and a set of DFAS marks. When the cell is instanced,
into your drawing, make sure it came in correctly:

The fiducial marks should be 400*400 microns. There are three of them.
They should be centered, in Y, at 11500.000.   The two right ones should be
centered at 0 in X.

The barcode should have a large white space on either side of it.
The left edge of the left white space should be at -10000.000 in X and should
be in-line with the fiducial marks.

I have a Mac application that Dr. Snider wrote, in the same directory which
can be used to generate barcodes. This only runs in Mac right now.

The command line accepts TCL commands in the form of:
::box -ll "0 0" -ur "1000 1000" -layer Metal1
YES the :: at the front is needed to do a TCL command.
This works the same as typing box -!0 0 10 10 -l Metal1

You may need to scale the barcode to match the vertical size of the one in
the template layout. You can scale grouped items by selecting the cell and
pressing CNTL-E. In the lower right there is a SCALE Ratio. This is a RATIO
and must be entered as integers. It comes up a 1 over 1 which is a scale of
1:1   If you want to do a reduction to 70%: 'enter' 7 over 10

<<<<< IMPORTANT >>>>

If you need to make a Auto Step Reticle:
You MAY still include your own Fiducial marks and barcode in your layout
        - if you choose to do this, then do not add a barcode on page 4.
        - if you are not aware how to do this, then see lab staff

Appendix 2 – Rebooting the PGPROXY (M:) Computer:

The M: drive computer is to the left of the Mann 3600F controller. It is the stand alone computer with no monitor.

If after 40 seconds, the dialog box opens up and shows the "M" drive but, you see no files or no folders (i.e., you cannot see the M:\USERS directory) then it is possible that the Pattern generator computer lost communications with the M Drive.

- You will need to go out to the computer, outside the mask making room and verify that the PGPROXY2 computer is still able to be accessed by clicking on the icon on the desktop.

- If you are unable to access the PGPROXY2 computer from the Computer Outside the mask making room, then the PPROXY2 Computer (The M drive) may need rebooted.

- Even if you can access the PGPROXY2 USERS directory, the communications between the Pattern Generator Computer and the M-Drive may need to be re-established.

- Press CNTL-ALT-DEL on the pattern generator computer to reboot the Patter Generator Computer and re-establish communications with the M drive.

- When the computer is rebooting, it will ask you several questions, press 'enter' until you get to the BLUE screen.

_ Try to go to DATA FILES and CREATE TAPE and then the dialog should open within a couple seconds.

- Now the Directory should read:
          C:\UPG_3600*.*

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Appendix 3 – Stage Coordinates and Mask Orientation: