H & L Associates' UPG3000

Upgrade Kit
for the GCA/D.W. Mann 3000 Pattern Generator

Installation, Operation and Technical Manual

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Document Conventions

<keys>
Angle brackets <> enclose single key descriptions. The key will be shown in bold type.

e.g.
'Press <**Enter**>' indicates the user should press the large key marked Enter or Return

e.g.
'Press <**A**>' indicates the user should press just the single character 'A' key

numbers
Numeric data may be entered as a normal decimal number or as a hexadecimal (base 16) number if preceded by a dollar sign ($) character

e.g.
I/O base address = 800

e.g.
I/O base address = $320

{options}
Command line entries which are optional are enclosed in curly brackets {}

e.g.
C>pgen3000 {/i=5} {/p=$320}

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Section A - Introduction and Installation

A.1 Product Description

The GCA/D.W.Mann 3000 pattern generators produce master patterns for integrated circuit fabrication and consist of a system controller, a rack of electronics and a micro-reduction camera.

H&L Associates' UPG3000 package is designed to increase the efficiency and reliability of the pattern generator (PG) by providing the hardware and software necessary to replace the original Digital Equipment Corporation (DEC) PDP-8 system controller with an IBM PC/AT or compatible desktop computer (IBM PC).

The IBM PC will completely replace the PDP-8, its Teletype, mag tape drives, paper tape reader and other peripherals. The maintenance problems associated with the PDP-8 are eliminated, and the features of an IBM PC are made available to the user e.g. hard disk storage, local area networks, PC-based IC design software.

The hardware in the UPG3000 package comprises one (1) custom printed circuit board (UPG3000-PIO) for installation inside the PC and the necessary cabling to connect this board to the pattern generator

The companion UPG3000 software package consists of programmes to test and calibrate the installation, produce photomasks, check data files for errors and sort the data within the files for increased speed when generating a pattern. The pattern generation component of the software uses the same algorithms as the original system to control the micro-reduction camera but differs from the original in that:

- The user display gives real-time updates of axes positions
- Operational error messages are more complete. Certain procedures are retried before the user is notified of an error condition.
- Data files are created using any text processor software or design application and stored on PC/MS-DOS diskettes or hard disks

A.2 Package Contents

- One (1) UPG3000-PIO (Revision C) H & L designed printed circuit board (ISA bus)
- Software (may be English or Metric version) on a PC/MS DOS compatible diskette containing :

PGEN3000.EXE	✓	pattern generation software
TEST3000.EXE	✓	test and calibration software
DIAG3000.EXE	✓	UPG3000-PIO interface card diagnostics
UPGUTILS	†	bi-directional DXF to Mann3000 format data file conversion with sorting
UPGVIEW	†	data file view option for UPGUTILS
Sample data files (*.TXT)	✓	system calibration data files
† - optional item		

- One (1) six foot shielded ribbon cable with connectors
- Installation, Operation and Technical manual

A.3 System Requirements

A.3.1 Hardware

In order to install the UPG3000 software and accompanying I/O board, the user must provide the following **minimum** computer hardware :

G IBM PC/AT (16-bit ISA bus) or compatible
- minimum 512K memory, clock speed 12 Mhz or greater
- PC/MS DOS Version 3.3 or higher
- CGA,EGA/VGA or Monochrome video display
- one (1) 360K floppy disk drive or network connection

The UPG3000 upgrade kit supplies the additional printed circuit board and cabling required to complete the installation.

The H&L supplied UPG3000-PIO board is shipped with the following jumper settings:

- Interrupt Request Level of 10 (IRQ10)
- Memory mapped I/O at address $CCC0:0000

If these values conflict with those of other devices attached to your computer, the UPG3000-PIO board must be reconfigured.

Information on reconfiguring the UPG3000-PIO board will be found in Appendix III of this document. Appendix III also details standard IRQ and I/O address assignments and provides examples of typical configurations.

A.3.2 Software

UPG3000 programmes are PC/MS-DOS compatible, and may be used directly from the diskette, or copied to a hard disk.

Since the control and test software operate in real time, **DO NOT** install memory resident programmes which intercept the system timer interrupt. As well, **DO NOT** operate the pattern generation software under a multitasking operating system. Either of these situations will slow system response and produce erroneous photomasks.

A.4 UPG3000 Installation

Before beginning the UPG3000 installation, the installer should have a basic knowledge of IBM PC hardware and PC/MS DOS software. The only tool normally required is a medium sized Phillips screwdriver. The original instruction manual for the pattern generator will be required in the future for regular system maintenance and calibration.

A.4.1 Desktop Computer Connections

[1] Power down the IBM PC and open the cover. It is recommended that the computer also be unplugged from the wall outlet.

[2] Review the configuration of the UPG3000-PIO board as shown in Appendix III of this document. Make any necessary changes to the board jumpers in order to avoid a conflict with existing computer I/O boards.

[3] Plug the UPG3000-PIO board into any empty backplane slot. Tighten the hold down screw of the board's rear bracket to ensure a solid connection.

[4] Turn the computer back on and run the DIAG3000.EXE programme as described in Section B.2.

[5a] If the UPG3000-PIO board fails any of the diagnostic tests then recheck the memory address setting of the board and return to step 1 above. If problems still occur, contact H & L Associates for assistance before continuing.

[5b] If the board successfully completes all diagnostic tests then plug one end of the supplied ribbon cable into the newly installed board. Ensure that the polarized ribbon cable connector is properly and firmly inserted.

A.4.2 Pattern Generator Connections

With reference to Figure A.1, perform the following steps :

[1] Turn off the main PG power

[2] Power down the PDP-8

[3] Turn off the main XYHWA motor power. Disable each of the X, Y, H, W and A motors

[4] Turn off the flash unit power

[5] Remove the four screws in the front corners of the electronics chassis and carefully pull out the drawer, taking care not to jam any internal cabling. This chassis should contain the interface electronics as shown in Figure A.2

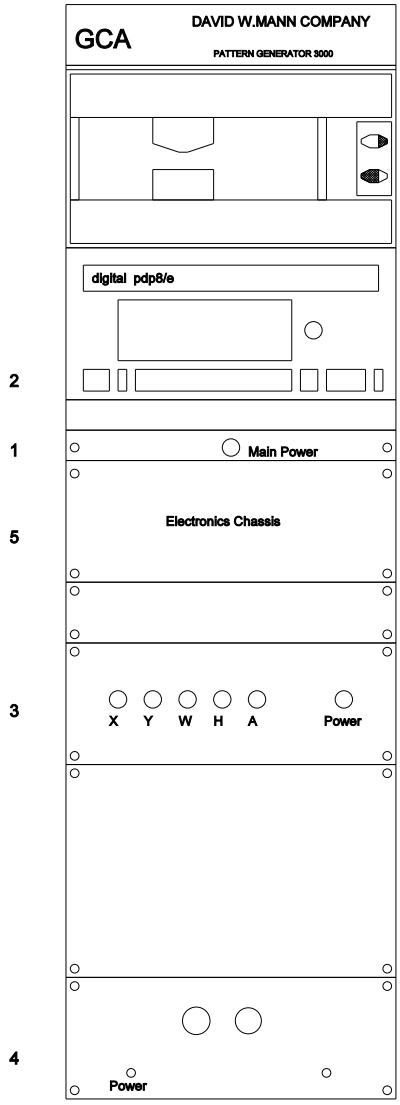

Figure A.1 : D. W. Mann 3000 Switch Locations

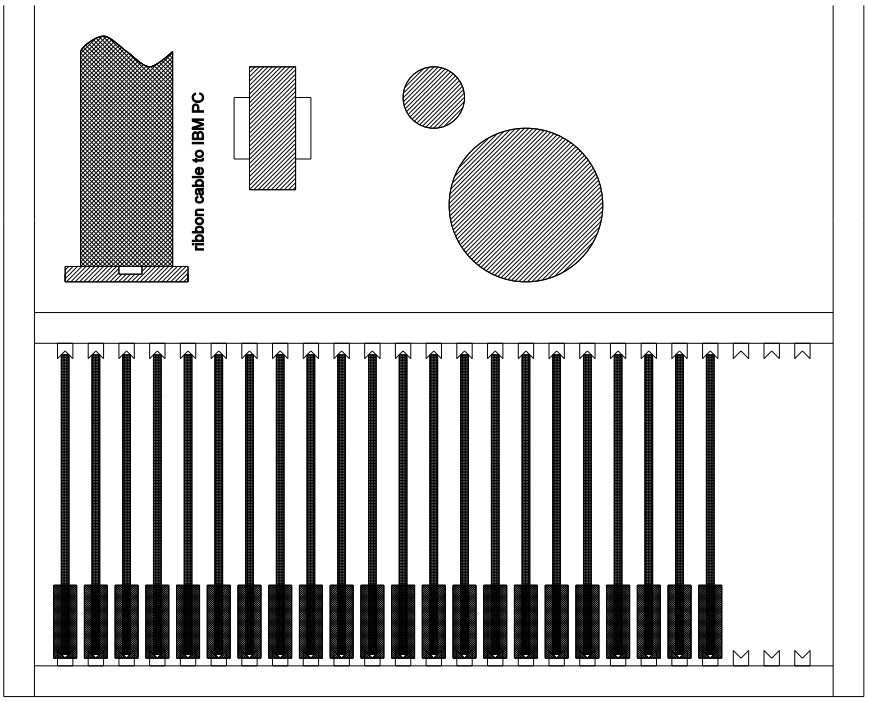

Figure A.2 : Mann 3000 Electronics Chassis (interior, top view)

[6] The electronics chassis contains a card cage of printed circuit boards. A ribbon cable leading to the DEC PDP-8 is located at the rear left corner of the chassis. Remove this cable. Attach one end of the H & L supplied ribbon cable to the chassis connector. A shielded ribbon cable now connects the Mann 3000 pattern generator to the UPG3000-PIO card installed in the PC.

[7] Return to the PC and rerun the DIAG3000.EXE software. If the programme now shows failures, where previously it showed proper UPG3000-PIO operation, then the ribbon cable has somehow been installed incorrectly. Check and correct the cable connections.

[8] Run the test and calibration software TEST3000.EXE as described in Section B.2.3. If this programme shows a properly functioning installation, then the user can proceed to Section C in order to produce photomasks. The entire installation and checkout procedure should not take more than 30 minutes. Contact H & L Associates before continuing if there are any problems which cannot be resolved in this time.