H & L Associates' UPG1600 and UPG2600

Upgrade Kit
for GCA/D.W. Mann 1600A and 2600 Pattern Generators

Installation, Operation and Technical Manual

UPG1626-D0197
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Document Conventions

<keys> or K
Angle brackets <> enclose single key descriptions. The key will be shown in bold type.
Keys may also be shown in a keyboard character font.

e.g.

'Press **<Enter>**' indicates the user should press the large key marked Enter or Return
'Press e 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
'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>pgen1600 {/i=5} {/p=$320}

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Section A - Introduction and Installation

A.1 Product Description

The GCA/D.W.Mann 1600A and 2600 pattern generators produce master patterns for integrated circuit fabrication and consist of a system controller, a rack of electronics and a micro-reduction camera. The resolution capabilities of the two machines are identical. The Mann 2600 generates patterns more quickly due to its faster Y-axis motor and its ability to produce flashes in both directions of X-axis motion.

H&L Associates' UPG1600 and UPG2600 packages are 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 operation of the software and the installation of the hardware is the same for both Mann 1600A and 2600 pattern generators so this manual is used for both machines.

The hardware in the UPG1600/UPG2600 package comprises three (3) custom printed circuit boards (ACOUT, BMBIN, BACIN) to upgrade the PG electronics, a digital I/O board (DIO12) for installation inside the PC and the necessary cabling to connect these items together.

The companion UPG1600/UPG2600 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

G Three (3) H&L designed printed circuit boards
- ACOUT-J5-RevB
- BMBIN-J9-RevB
- BACIN-J12-RevB

G One (1) Metrabyte PIO-12 Parallel I/O board (or equivalent)

G Six (6) feet of shielded ribbon cable with connectors

G Software (English or Metric version, free upgrades for one year)
- PGEN1600.EXE/PGEN2600.EXE operational software
- TEST1600.EXE/TEST2600.EXE test and calibration software
- VRFY1600.EXE data file error checking
- SORT1600.EXE data sorting within data files
- DATA FILES to be used in place of the original system calibration files

G Installation, Operation and Technical manual (2 copies)

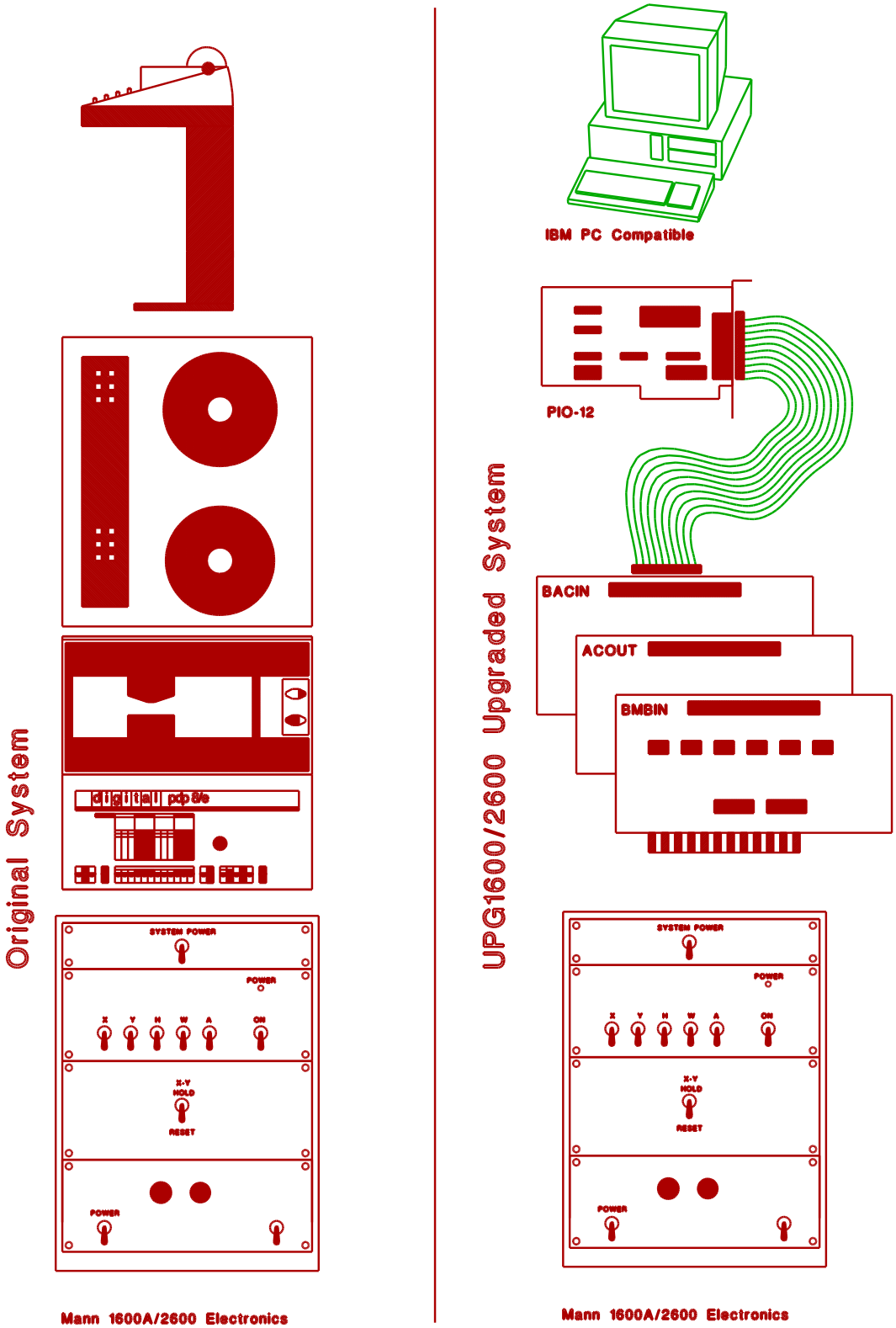

Figure A.1 : UPG1600/UPG2600 Overview

A.3 System Requirements

A.3.1 Hardware

In order to install the UPG1600/UPG2600 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 8 Mhz or greater
- PC/MS DOS Version 3.0 or higher
- CGA,EGA/VGA or Monochrome video display
- one (1) 360K floppy disk drive or network connection

The UPG1600/UPG2600 upgrade kit supplies the additional printed circuit boards and cabling required to complete the installation.

The H&L supplied digital I/O board (DIO12) is shipped with the following jumper settings:

- Interrupt Request Level of 3 (IRQ3)
- I/O base address of hexadecimal 300 ($300)
- wait state ON

If these values conflict with those of other devices attached to your computer, the DIO12 board must be reconfigured.

Information on reconfiguring the DIO12 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

UPG1600 and UPG2600 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 UPG1600/UPG2600 Installation

Before beginning the UPG1600 or UPG2600 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 DIO12 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 DIO12 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 start the TEST1600.EXE or TEST2600.EXE programme as described in Section B.1. The first check made by this software is for correct addressing of the DIO12 board. If the software terminates with a message that the DIO12 board could not be found, then return to Step 2 above and re-check the configuration process. Make sure that the correct command line options, if any, are included when invoking TEST1600.EXE or TEST2600.EXE.

[5] When the software indicates that it is ready to perform the **Interface Communications Test**, then the cover of the computer may be replaced. Attach the 37-pin D-type connector on one end of the supplied ribbon cable to the DIO12 board. Tighten the connector hold down screws. Continue to the next section for installation of the pattern generator boards.

A.4.2 Pattern Generator Connections

With reference to Figure A.2, 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

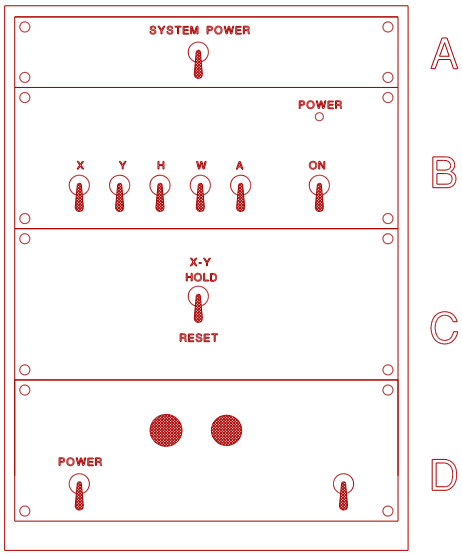

Figure A.2 : Mann 1600A/2600 Switch Locations

[4] Turn off the flash unit power

[5] Remove the four screws in the front corners of panel C 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.3

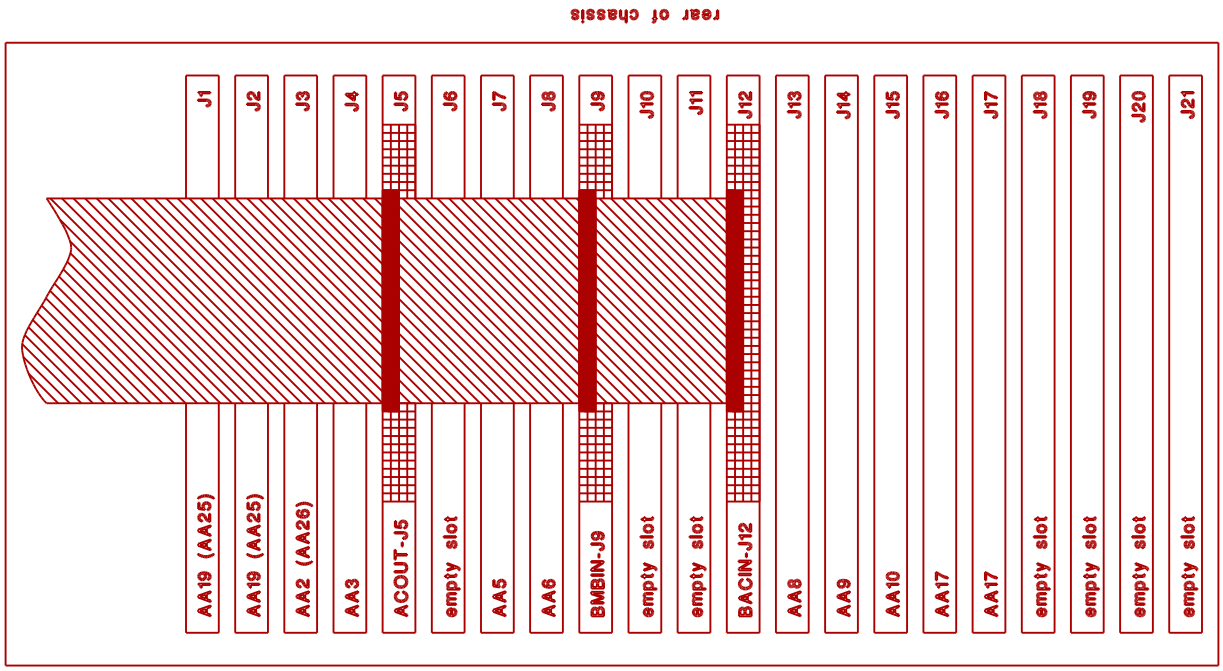

Figure A.3 : Mann 1600A/2600 Electronics Chassis (interior, top view)

The drawer behind panel C should contain 17 printed circuit boards. Starting at the left, these locations are designated J1 through J17. The four right-hand slots should be empty.

[6] The boards in locations J6, J10 and J11 are each attached to ribbon cables leading to the PDP-8. Remove these boards and cables. Slots J6, J10, and J11 will remain empty.

[7] Remove the board in slot J5 and replace it with H&L board ACOUT-J5-RevB

[8] Remove the board in slot J9 and replace it with H&L board BMBIN-J9-RevB.

Mann 2600 owners an external connection must be made by the user from BMBIN-(pin K) to AA26-(pin U) (see Appendix III **Mann 2600 Pattern Generator Logic Diagram**). This connection is best made from the bottom of the electronics rack.

[9] Remove the board in slot J12 and replace it with H&L board BACIN-J12-RevB

[10] The three connectors on the end of the H&L supplied ribbon cable attach to the newly installed boards. The end connector of the ribbon cable plugs into BACIN-J12-RevB, the second connector into BMBIN-J9-RevB and the third into ACOUT-J5-RevB. The cable may be routed through the back of the PG rack to allow panel C to be pushed back into place.

[11] Refer to Figure A.2 to check your installation. Leave the rack open for the upcoming testing and move to the PC. When the testing is complete, the rack of PG electronics may be pushed back into place.