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GAGE APPLIED TECHNOLOGIES

CompuGen ISA Hardware Manual and Driver Installation Guide

Reorder #: MKT-HWM-ISA01
0506

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First Edition (June 2005)

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Owned by: _____
Serial Number(s): _____
_____
Purchase Date: _____
Purchased From: _____

You must also have the following information when you call:

- Software Driver & Application Version
- Software Development Kit, if applicable
- Brand name and type of computer
- Processor and bus speed
- Total memory size
- Information on all other hardware in the computer

How to reach Gage Applied Technologies for Product Support
Toll-free phone: (800) 567-GAGE Toll-free fax: (800) 780-8411

To reach Gage from outside North America
Tel: +1-514-633-7447 Fax: +1-514-633-0770

Email: prodinfo@gage-applied.com **Website**: www.gage-applied.com

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Preface

This manual provides detailed information on the hardware features of CompuGen Analog Output cards. This information includes specifications, block diagrams, connector descriptions, memory architecture descriptions, etc.

In addition, this guide takes you through the process of installing your CompuGen card(s) and describes available custom features.

It is assumed that the reader is familiar with using PCs, Windows and ISA bus cards. No description is included for these topics. If you are not comfortable with these areas, it is strongly recommended that you refer to the relevant product guides.

To maintain the accuracy of the information contained herein, we reserve the right to make changes to this manual from time to time.

Note: For brevity, in this manual,

"CompuGen 1100" is abbreviated as "CG1100"

"CompuGen 3250" is abbreviated as "CG3250"

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Preventing ESD

Before installing or servicing this product, read the ESD information below:



CAUTION. *Static discharge can damage any semiconductor component in this instrument.*

When handling this instrument in any way that requires access to the on-board circuitry, adhere to the following precautions to avoid damaging the circuit components due to electrostatic discharge (ESD).

1. Minimize handling of static-sensitive circuit boards and components.
2. Transport and store static sensitive modules in their static protected containers or on a metal rail. Label any package that contains static sensitive boards.
3. Discharge the static voltage from your body by wearing a grounded antistatic wrist strap while handling these modules and circuit boards. Do installation and service of static-sensitive modules only at a static-free work station.
4. Nothing capable of generating or holding a static charge should be allowed on the work station surface.
5. Handle circuit boards by the edges when possible.
6. Do not slide the circuit boards over any surface.
7. Avoid handling circuit boards in areas that have a floor or work-surface covering capable of generating a static charge.

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General safety summary

Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it. To avoid potential hazards, use this product only as specified.

Observe all terminal ratings.
To avoid fire or shock hazard, observe all ratings and markings on the product. Consult the product manual for further ratings information before making connections to the product.

Do not apply a potential to any terminal, including the common terminal, that exceeds the maximum rating of that terminal.

Do not operate with suspected failures.
If you suspect there is damage to this product, have it inspected by qualified service personnel.

Do not operate in wet/damp conditions.

Do not operate in an explosive atmosphere.

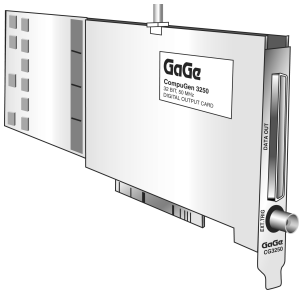
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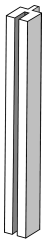
What you should receive with your CompuGen 3250

If you order an independent CompuGen 3250 card, you should receive the following articles:

- One CompuGen 3250 card (of memory model type purchased)

  256K, 512K, 1M, 2M, 4M or 8M model and one (1) plastic card guide





- Standard items included with each independent CompuGen 3250 card

  Gage CompuGen ISA CD (with GageBit Software and CompuGen Software Development Kits)



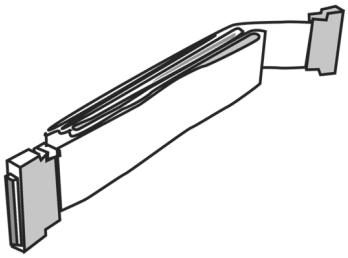
The Gage CompuGen ISA CD, shipped with all CompuGen ISA orders, contains all of the user manuals and software drivers that you need to operate your CompuGen ISA hardware. The CD also contains all of the installers for the CompuGen ISA SDKs and application packages provided by Gage, including GageBit.

  Warranty card

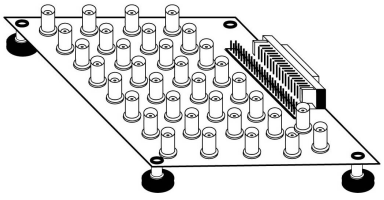


- Optional items, if purchased

  Pleated foil cable



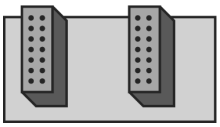
  CS32x0: BNC breakout board



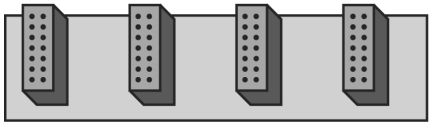
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- If you ordered Master or Slave upgrades, you will receive one of the following Master/Slave Timing Modules in addition to the number of CompuGen cards in your Master/Slave system.

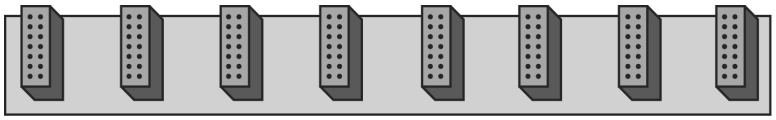
  2 Card Master/Slave Timing Module

  4 Card Master/Slave Timing Module

  8 Card Master/Slave Timing Module

Carefully inspect these articles before proceeding further. If you find any damage caused by transportation, please report it to the organization from which you purchased the CompuGen card.

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CompuGen 3250 product introduction

CompuGen 3250 is a family of 50 MHz, 32 bit ISA bus based digital pattern generator cards. Its key features are:

- 50 MHz digital pattern generation
- 32 bit-wide word
- Up to 8 Meg x 32 memory buffer

Characteristics of the CompuGen 3250:

- **50 MHz CLOCK RATE**
  The CompuGen 3250 uses high-speed digital memory components that operate at a maximum clock speed of 50 MHz. In other words, a new sample is output every 20 nanoseconds.

  An on-board crystal-controlled oscillator ensures timebase accuracy and long-term thermal stability.

- **OUTPUT**
  The CompuGen 3250 provides high current drive TTL/CMOS outputs using four (4) 74FCT162245 drivers in parallel. The outputs can drive a 0 to 5 Volt signal into a 50 Ω load.

- **MEMORY DEPTH**
  CompuGen 3250 is available with memory depths from 256K to 8M samples. Each "sample" consists of a 32 bit word.

- **MEMORY LOOPING**
  Memory looping allows the on-board memory to be optimized. For example, a 4096 point pattern can be repeated 1000 times using only 4096 words of memory, instead of 4,096,000 words. Infinite looping is also possible using CG3250.

- **TRIGGERING**
  The CompuGen 3250 supports both internal and external triggering.

  For internal triggering, software generates the trigger signal through an on-board register on a single or periodic basis.

  The CompuGen 3250 also provides a TTL External Trigger Input. External triggering can be software selected by setting the appropriate bits in an on-board register. Software can also control whether the trigger occurs on the rising or falling edge of this external trigger signal.

  The CompuGen 3250 also supports the retriggerable mode, where a pattern is produced every time a trigger occurs. In this mode the trigger is automatically re-armed in hardware at the end of signal generation.

- **EXTERNAL CLOCK**
  An External Clock option can be ordered from the factory where a special real-time clock frequency is required or when the output must be coherent with the rest of the system.

  A new 32 bit word is output on every rising edge of the clock.

  The user is responsible for ensuring that the maximum External Clock frequency remains lower than or equal to 50 MHz.

  There is no limit on how low this clock frequency can go, i.e. External Clock can be started and stopped at will.

  The input level required for External Clock signal is 0 to 5 Volt CMOS/TTL.

- **MULTI-CARD SYSTEMS**
  A multi-card system, comprising one Master and up to 7 Slave cards, can be ordered if more than one output channel is needed. All signals necessary for synchronization of multiple CompuGen 3250 cards are passed from the Master to the Slave cards using a Master/Slave Timing Module.

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CompuGen 3250 specifications

PLEASE CHECK THE GAGE WEBSITE FOR THE MOST UP-TO-DATE SPECIFICATIONS.

SYSTEM REQUIREMENTS

ISA bus compatible PC with at least one free ISA slot; 128 MB RAM, 50 MB hard disk and SVGA video.

SIZE

Single-slot full-length ISA Bus printed circuit board

POWER

20 Watts at +5 Volts

DIGITAL OUTPUT

No. of output bits:	32
No. of output clocks:	1
No. of output SYNC:	1
Voltage Levels:	TTL (For CMOS Availability, Call Factory)
Internal Clock Speed:	Max 50 MHz, Min 1 Hz
External Clock Speed:	Max 50 MHz, Min DC
Buffer Depth:	Max. 8 million double words (32 bits each) Min. 4 double words
Min. Record Length:	8 double words (32 bits wide)
Record Length Resolution:	2 double words (32 bits wide)
Output Impedance:	50 Ω

MATING PARTS

On-Board Connector:	68 pin MDR Type. 3M P/N 10268-55H3VC
Mating Connector:	Connector is 3M 10168-6000EC, Hood is 3M 10368-A230-00
Cable:	6 foot 68 Wire Pleated Foil Cable, available from Gage at an extra charge. The 68 wire cable provides 50 Ω characteristic impedance for all outputs. Pleated foil construction virtually eliminates EMI. For lengths other than 6 feet, contact your local 3M distributor.

MEMORY DEPTH

Memory Depth:	256K, 512K, 1M, 2M, 4M & 8M double words (1 sample = 32 bit word = 1 double word)

TRIGGERING

Source:	Internal or External
External Trigger:	0 to 5 Volt TTL
Trigger Slope:	Rising or Falling
Connector:	BNC

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EXTERNAL CLOCK INPUT (OPTIONAL)

Clock Frequency:	Min DC, Max 50 MHz
Voltage:	TTL (For CMOS Availability, Call Factory)
Connector:	On-board SMA connector

MULTI-CARD SYSTEMS

Maximum Number of Cards:

Master/Slave mode:	8 (1 Master and 7 Slaves)
Multiple/Independent:	Limited by the backplane

Operating Mode: Master/Slave or Multiple/Independent

APPLICATION SOFTWARE

GageBit Application for Win 95/98/ME, Win NT/2000/XP

SOFTWARE DEVELOPMENT KITS (SDK)

- CompuGen Digital SDK for C/C++ for Windows
  Includes Sample Programs in Visual C++
- CompuGen Digital SDK for MATLAB for Windows
- CompuGen Digital SDK for LabVIEW for Windows

OPTIONAL ACCESSORIES

6 foot Pleated Foil Cable

BNC Breakout Board

WARRANTY

One year parts and labor.

All specifications subject to change without notice

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CompuGen 3250 ordering information

Hardware, upgrades & options

Product	Order No.
CompuGen 3250 – 256K	325-101-001
CompuGen 3250 – 512K	325-101-002
CompuGen 3250 – 1M	325-101-003
CompuGen 3250 – 2M	325-101-004
CompuGen 3250 – 4M	325-101-005
CompuGen 3250 – 8M	325-101-006
CG32X0: BNC Breakout Board	325-181-020
CG3250: Cable	325-181-021
Refer to the Gage website for a list of available upgrades for your CompuGen: www.gage-applied.com	

Software Development Kits (SDKs)

Product	Order No.
Gage SDK Pack on CD (Manuals in PDF format provided on CD)	200-113-000
Gage SDK Pack on CD (Hardcopy of Manuals included)	200-113-002
CompuGen Digital SDK for C/C++ for Windows	333-200-201
CompuGen Digital SDK for MATLAB for Windows	333-200-202
CompuGen Digital SDK for LabVIEW for Windows	333-200-203

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CompuGen 3250 block diagram

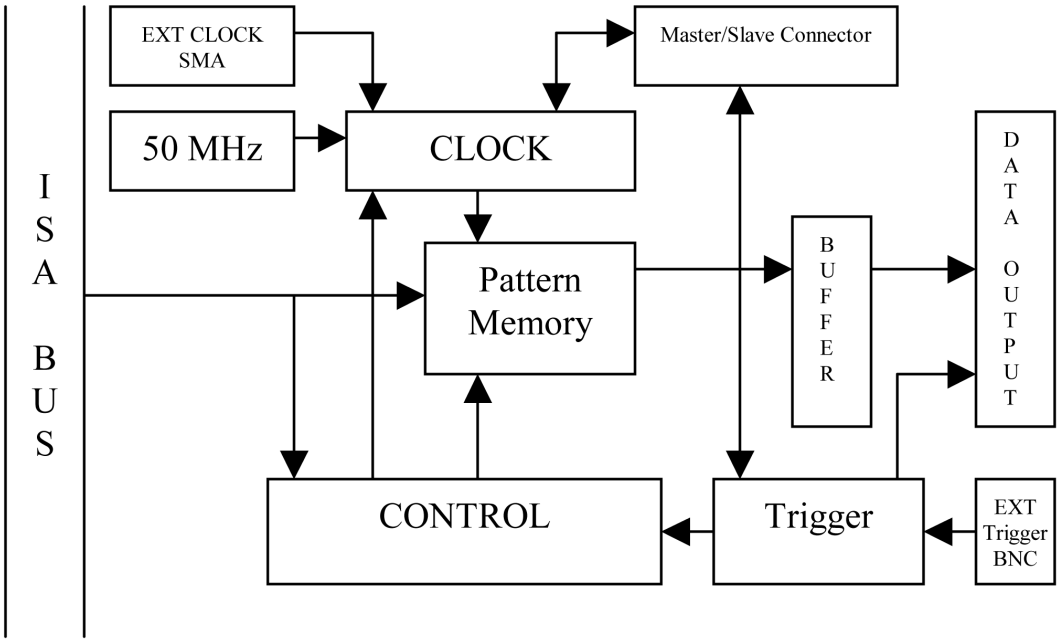


Figure 34: CompuGen 3250 block diagram

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CompuGen 3250: identifying your card

CompuGen model and version

The CompuGen 3250 product consists of two boards: an add-on board which contains output buffers and a base board which includes bus interface circuitry.

To determine the model and version of CompuGen you have, look at the top of the add-on board for the model name and version number.

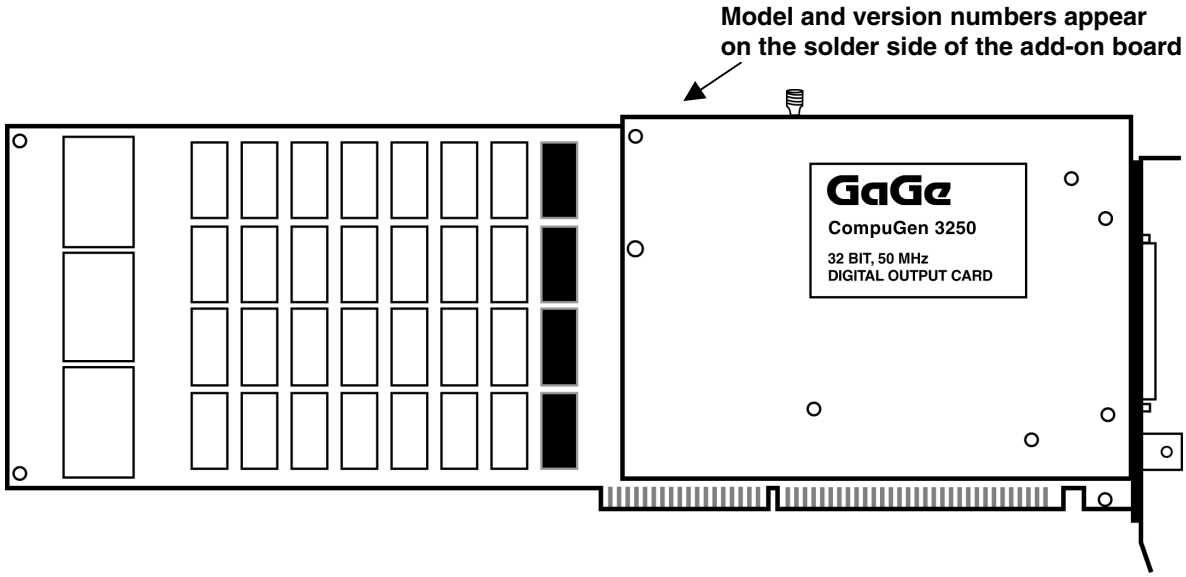


Figure 35: CompuGen 3250 model and version

Serial number, Calibration label, Options label

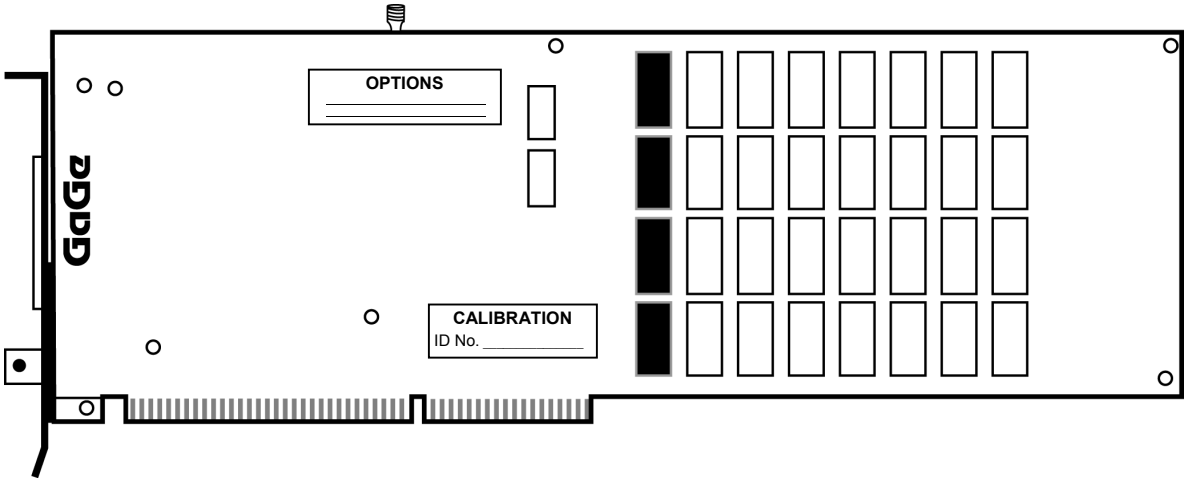


Figure 36: CompuGen 3250 base board labels

The Calibration label is located on the base board. The **serial number** is written next to "I.D." on the Calibration label. You may also see an "Options / Mod" label, which indicates any special modifications performed on your card.

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Master/Slave labels

If you have purchased a multi-card system, you will notice that one card has been designated as the MASTER card, and the remaining cards are SLAVE cards (SLAVE 1, SLAVE 2, etc.). The Master/Slave label is located on the bracket beneath the BNC connector, as shown in the diagram below:

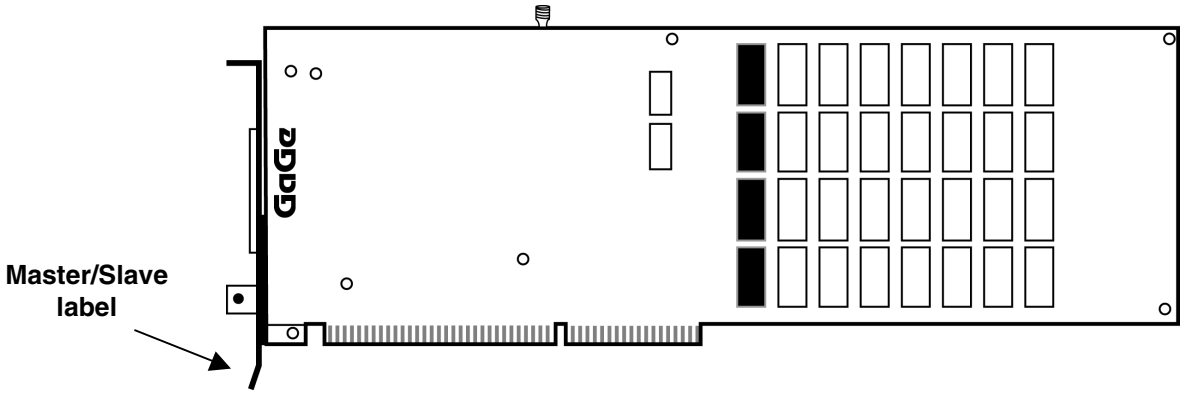


Figure 37: CompuGen 3250 Master/Slave card label

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CompuGen 3250 optional features

Labels specifying all options, upgrades or modifications are located on the solder side of each card.

The following options are currently available:

- Master/Slave
- External Clock

Master/Slave option

The CompuGen 3250 can be operated as an Independent card, as a Master card or as a Slave card. All cards are set as Independent cards unless specifically requested otherwise. This manual assumes your card is an Independent card.

When configured as a Master card, the CompuGen 3250 provides its master clock signal to other slave CompuGen 3250 cards. For Slave cards, the clock signal is supplied by the "Master" CompuGen 3250.

External Clock option

If your CompuGen card has been upgraded for External Clocking, you can change between internal and External Clock through software. There are no jumper settings for the External Clock on the CompuGen 3250.

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CompuGen 3250 connectors and headers

CompuGen 3250 cards connect to the outside world through specialized connectors. This section describes these connectors for the CompuGen 3250 card. The connectors and headers on the CompuGen 3250 are shown below:

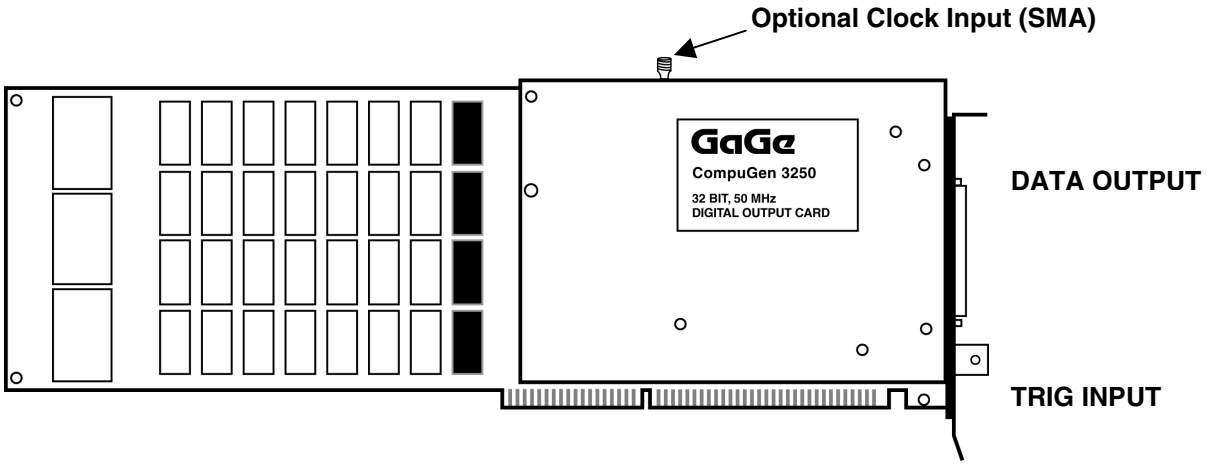


Figure 38: Connectors and headers for the CompuGen 3250

As illustrated above, the connectors that interface to the user on the CompuGen 3250 are as follows:

Function	Type
DATA OUTPUT	68 Pin MDR
Trig In	BNC
Clock In	SMA

Master/Slave connector

The Master/Slave connector near the top-left corner of the CompuGen 3250 add-on board (see Figure 39) is used to pass all the signals necessary to synchronize Slave cards with the Master.

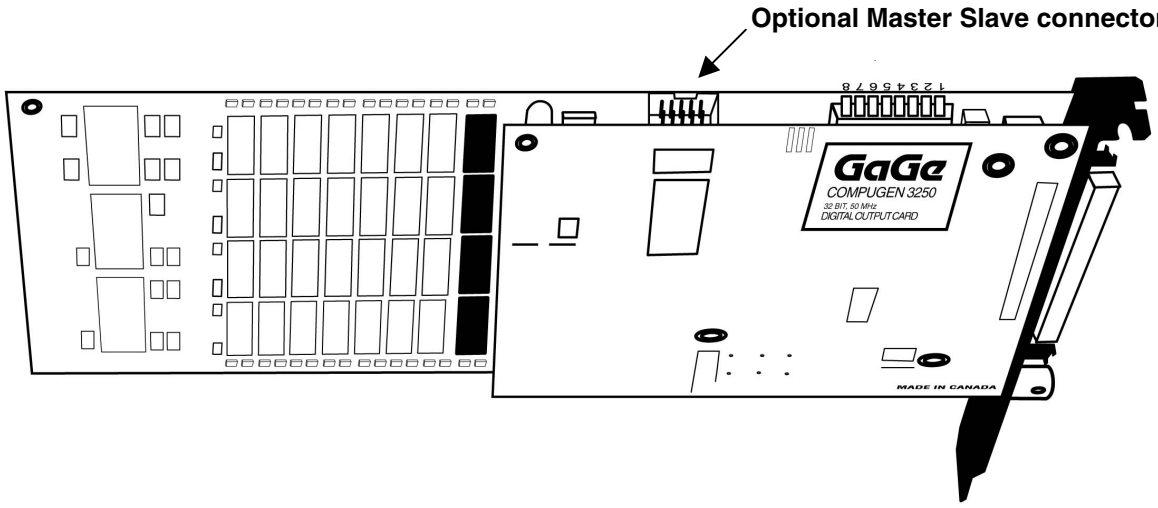


Figure 39: Location of Master/Slave connector

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The connector, JP1, is a 10-pin dual-in-line IDC header. The pinout of JP1 is shown below:

Pin	Function
1	GND
3	CLK_IN
5	GND
7	+5V
9	GATE

Pin	Function
2	GND
4	+5V
6	GND
8	CLK_OUT
10	TRIGGER

A Master/Slave Timing Module links the CompuGen 3250 Master/Slave cards (see page 67 for more information on installing Master/Slave cards).

Pin layout on CG3250 connector			
1	CLK	35	GND
2	D0	36	GND
3	D1	37	GND
4	D2	38	GND
5	D3	39	GND
6	D4	40	GND
7	D5	41	GND
8	D6	42	GND
9	D7	43	GND
10	D8	44	GND
11	D9	45	GND
12	D10	46	GND
13	D11	47	GND
14	D12	48	GND
15	D13	49	GND
16	D14	50	GND
17	D15	51	GND
18	D16	52	GND
19	D17	53	GND
20	D18	54	GND
21	D19	55	GND
22	D20	56	GND
23	D21	57	GND
24	D22	58	GND
25	D23	59	GND
26	D24	60	GND
27	D25	61	GND
28	D26	62	GND
29	D27	63	GND
30	D28	64	GND
31	D29	65	GND
32	D30	66	GND
33	D31	67	GND
34	TRIG IN	68	GND

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CompuGen 3250 I/O address

The base I/O address is determined by the eight position DIP Switch located near the top right of the card, partially hidden by the add-on board.

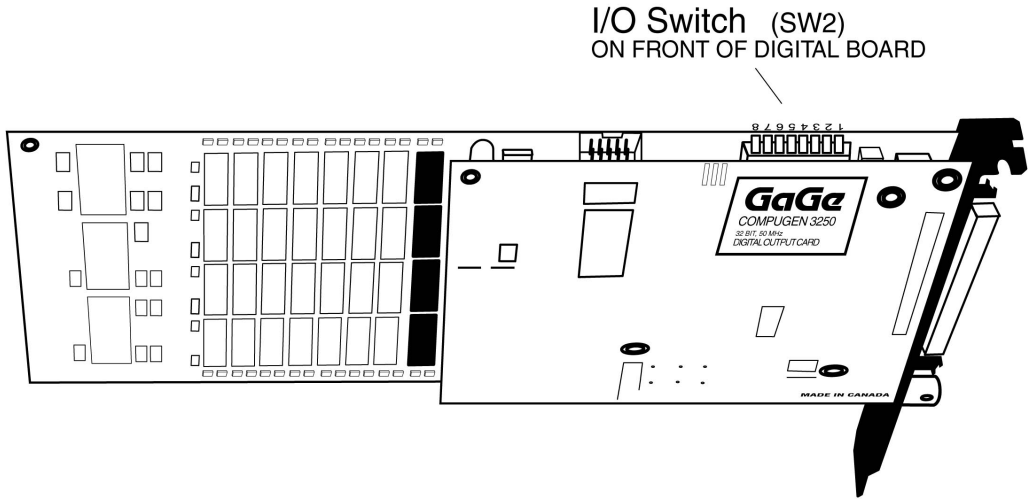
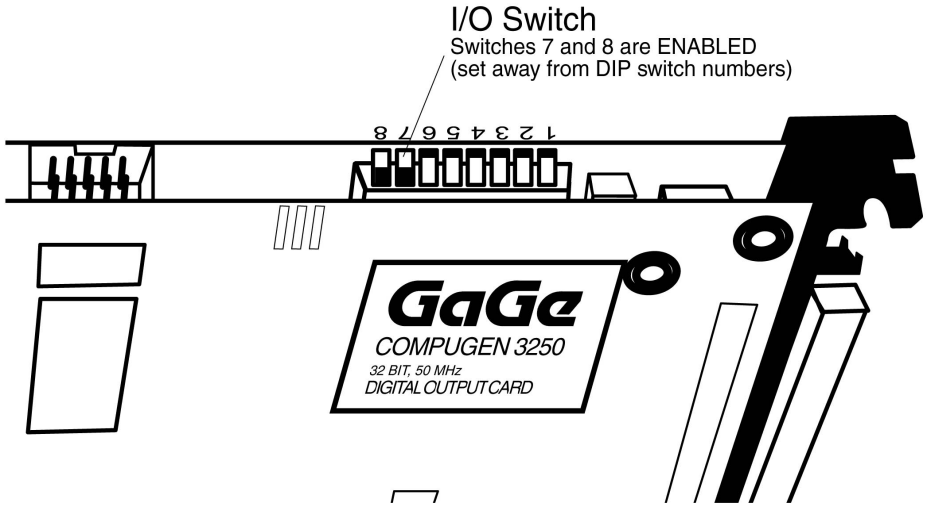


Figure 40: Location of I/O address DIP switch

The CompuGen 3250 has an I/O address space of four 16 bit words, which can be re-located anywhere between 0x200 and 0x3F8 on a four-word boundary. In other words, four consecutive I/O addresses are needed. For example, if the base address is 0300H, then 0300, 0301, 0302, and 0303 will be occupied by the CompuGen 3250 card.

The default I/O address

The default I/O Address setting is 0300, which corresponds to setting switch positions 7 and 8 AWAY from their switch numbers.



If you must change the I/O Address setting due to a conflict, the information on the following pages can help you calculate which switch positions you must set.

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I/O DIP switch and ISA bus address lines

Each of the switch positions 1 through 8 corresponds to an address line A2 through A9 from the ISA bus.

Switch Position	*Address Line*
1	A2
2	A3
3	A4
4	A5
5	A6
6	A7
7	A8
8	A9

As the CompuGen 3250 uses four I/O locations, there is no need to configure a switch for Address Lines A0 and A1.

Calculating the switch settings

Some of the more generally available I/O addresses are listed on the following page with their equivalent SW2 switch settings. If you need to calculate alternate settings, use the following procedure.

1. Choose a hexadecimal address you want to calculate.
2. Convert the hexadecimal address into its binary form. (You can use the Windows scientific calculator for this purpose.) Each digit in the binary form corresponds to an address line – the rightmost digit corresponds with A0, the second rightmost corresponds with A1, etc., as shown in the table below.

Example: the address 0300 converts to binary 1100000000.

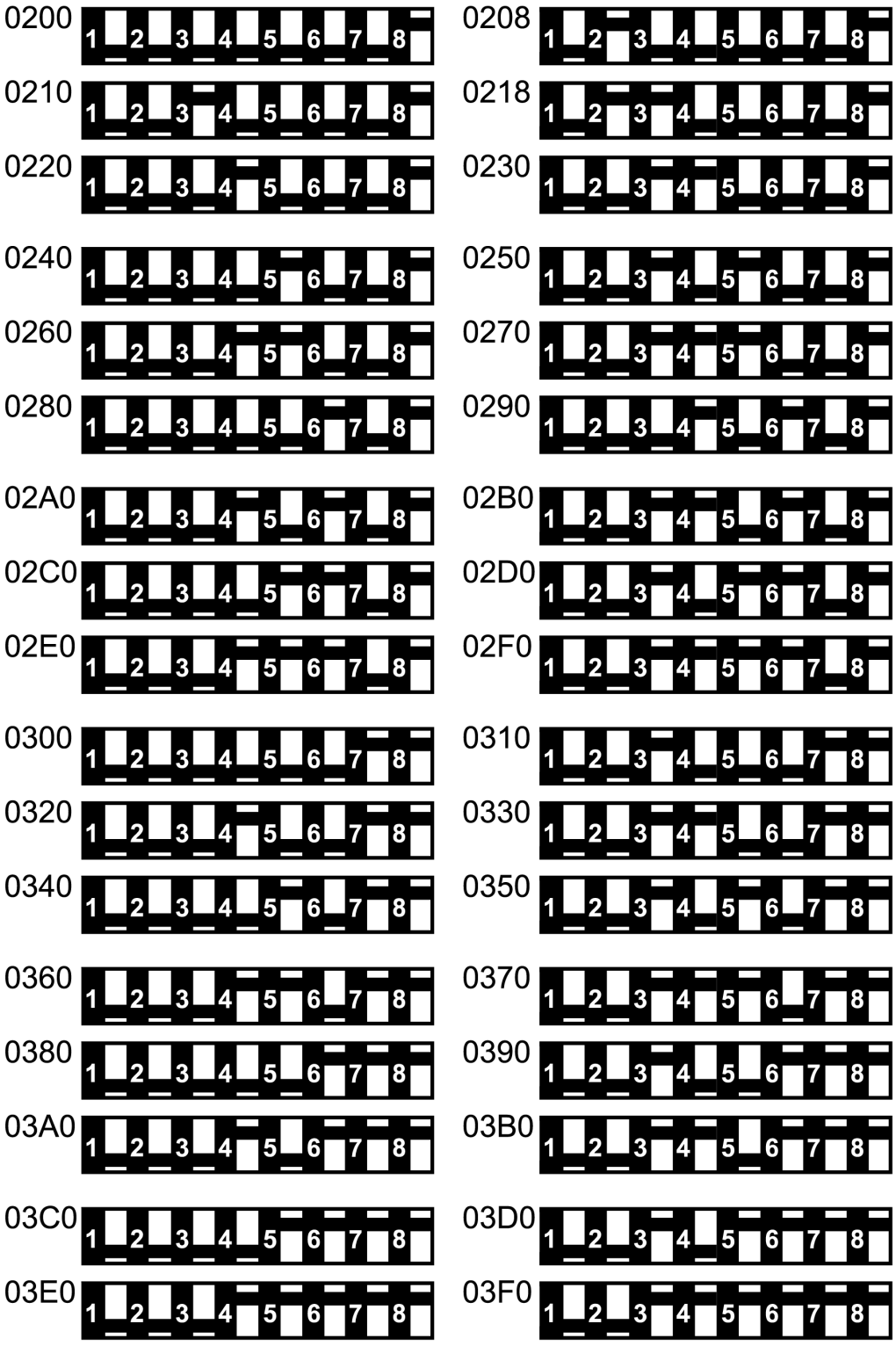
Binary form	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	0	0
Address Line	**A9**	**A8**	**A7**	**A6**	**A5**	**A4**	**A3**	**A2**	A1	A0
SW2 DIP Switch	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	-	-

3. A “1” means “enable” and a “0” means “disable”. In the above example, switches 1 to 6 are DISABLED, and switches 7 and 8 are ENABLED.

   Remember that to enable an SW2 switch means positioning the switch AWAY from the switch number.

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Generally available I/O addresses and corresponding SW2 settings



The numbers to the right of each address are the switches you must ENABLE to use that particular address. Remember that to ENABLE an SW2 switch position, set it AWAY from the switch number.

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CompuGen 3250: installing a single card

Below, you will find detailed instructions to guide you through the installation process.

1. Install the CompuGen ISA driver (refer to the *Driver installation guide* section on page 3 for details). Windows drivers are supplied with the product on the Gage CompuGen ISA CD.
2. Power off your PC and consult your computer's user manual on installing expansion cards.
3. To avoid contention with other host PC resources, check that the I/O address of your card is set correctly (see pages 35 & 36).
4. Choose an unused expansion slot. There are no restrictions on which ISA slot may be used.
5. Insert the card into the expansion slot and screw the backplate to the chassis.

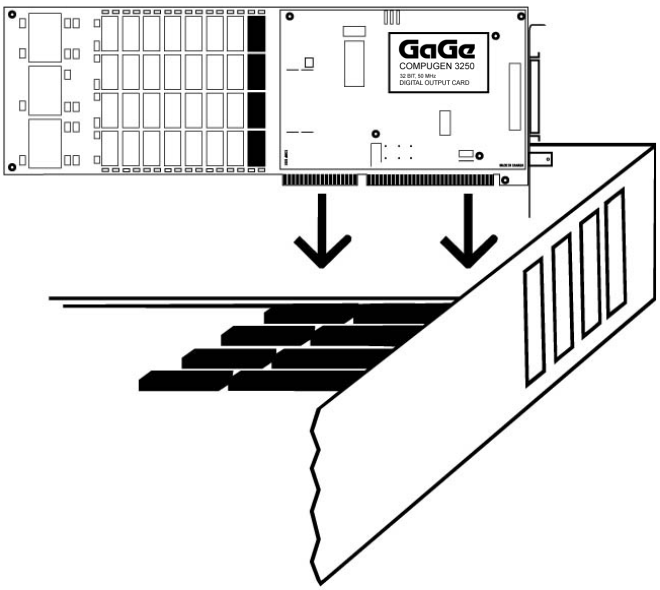


Figure 41: Installing a single card in your PC

6. Slide the plastic card guide extender onto the back-end of the CompuGen 3250 to secure it in place.
7. After making sure the card is properly seated in the PC, close the PC's cover and turn the main power switch back to ON. If the power supply and fan do not start, your computer's power supply may not have enough amperage available to run a CompuGen 3250. Please contact the manufacturer of your computer to rectify the situation.
8. If the computer starts properly, install GageBit software. This application software is also supplied on the Gage CompuGen ISA CD. Refer to section: *GageBit Application* on page 20 for more details on installing application software.
9. Run GageConfig to verify proper installation of Windows drivers (see page 69).
10. Run GageBit software to generate a pattern. You can do so by clicking on the **Generate** button on GageBit screen.

    If you have purchased a *Pleated Foil Cable* and a *BNC Breakout Board*, you will be able to see the output bits on an oscilloscope if you connect the appropriate bit from the *BNC Breakout Board* to the oscilloscope using a coaxial cable.

    With the default pattern loaded by **GageBit**, you should see a series of square waves with 50% duty cycle on each of the data outputs (bits 0 through 9). Note that if you load a pattern different than the default pattern, the outputs will be different. This shows that you have successfully installed your CompuGen 3250 without any conflicts with the rest of the PC system.

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CompuGen 3250: installing multiple cards

Below, you will find detailed instructions to guide you through the installation process.

1. Install the CompuGen ISA driver (refer to the *Driver installation guide* section on page 3 for details). Windows drivers are supplied with the product on the Gage CompuGen ISA CD.
2. Power off your PC and consult your computer's user manual on installing expansion cards.
3. To avoid contention with other host PC resources, check that the I/O address of each card is set correctly (see pages 35 & 36). Each card should have a label indicating the I/O address set at the factory.
4. Ensure that you have as many unused consecutive expansion slots as you have cards to install.
5. Position your computer so that the external connectors of your computer's expansion cards are facing toward you. (The MASTER card will be installed in the rightmost vacant expansion slot, with vacant slots to the left of the MASTER card.)
6. Insert the MASTER card into the rightmost vacant expansion slot as shown below.

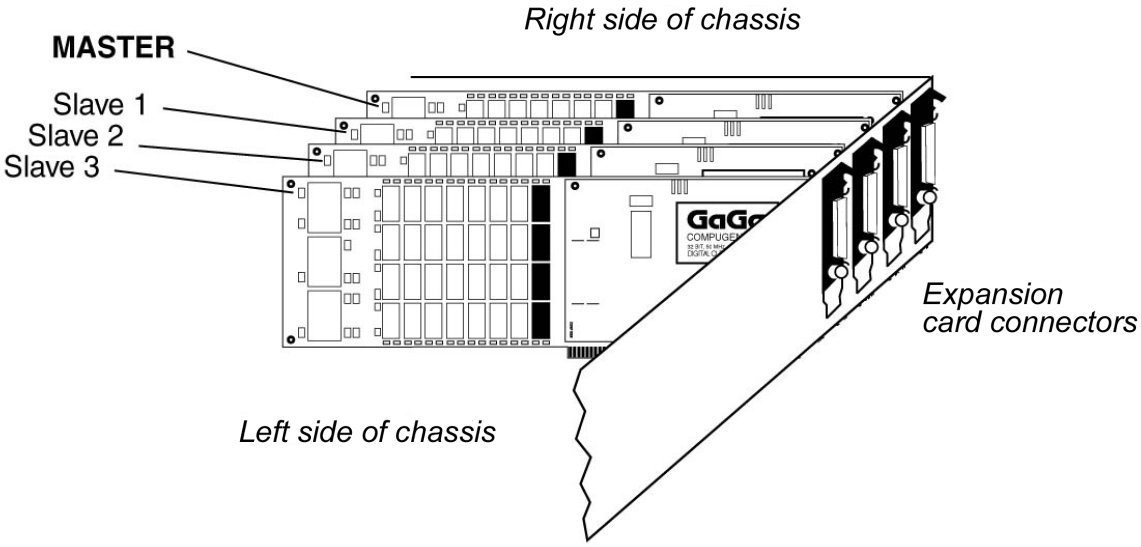


Figure 42: Installing multiple cards in your PC

7. Insert subsequent SLAVE card(s) into adjacent expansion slots, next to the MASTER card.
8. **Important:** Record the I/O and memory segment addresses of each of the cards in order, from the MASTER to the last SLAVE. (You will need this information when configuring the cards to work with the CompuGen software.)

	Master	Slave1	Slave2	Slave3	Slave4	Slave5	Slave6	Slave7
I/O								
Mem								

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9. Attach the Master/Slave Timing Module (MSTM) to all of the cards. (The MSTM is polarized to avoid incorrect insertion.)

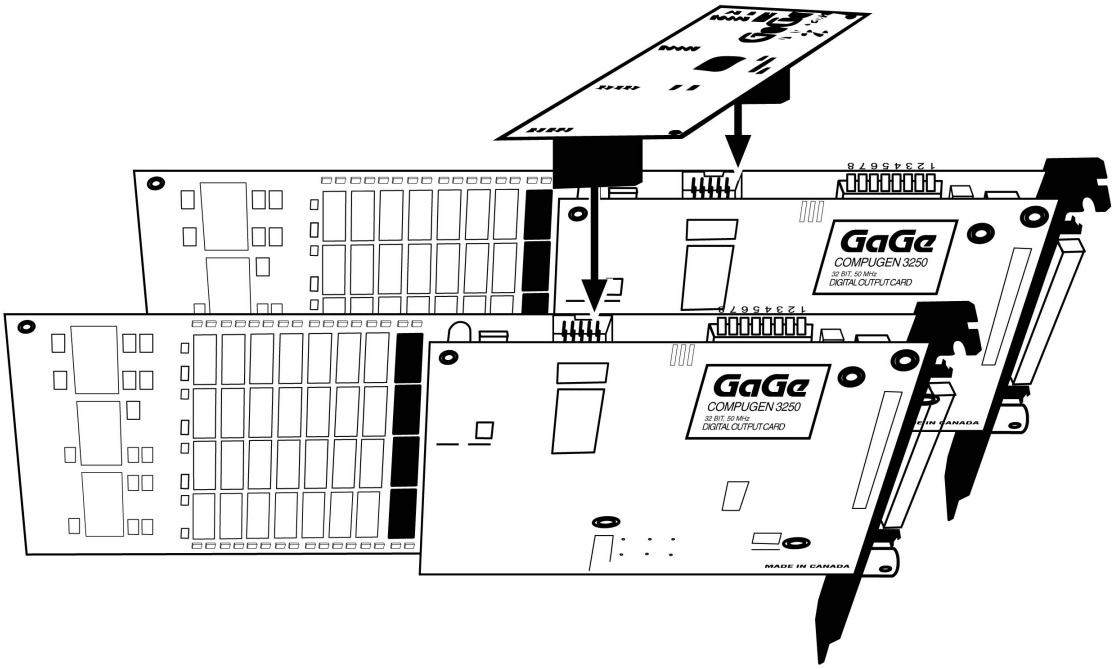


Figure 43: Attaching the MSTM

10. After making sure the cards are properly seated in the PC, screw the backplate of each card to the chassis.
11. Slide the plastic card guide extender onto the back-end of the cards to secure them in place.
12. Close the PC's cover and turn the main power switch back to ON.
    If the power supply and fan do not start, your computer's power supply may not have enough amperage available to run all CompuGen 3250s. Please contact the manufacturer of your computer to rectify the situation.
13. If the computer starts properly, install GageBit software. This application software is also supplied on the Gage CompuGen ISA CD. Refer to section: *GageBit Application* on page 20 for more details on installing application software.
14. Run GageConfig to verify proper installation of Windows drivers (see page 69).
15. Run GageBit software to generate a pattern. You can do so by clicking on the Generate button on GageBit screen.

    If you have purchased a Pleated Foil Cable and a BNC Breakout Board, you will be able to see the output bits on an oscilloscope if you connect the appropriate bit from the BNC Breakout Board to the oscilloscope using a coaxial cable.

    With the default pattern loaded by GageBit, you should see a series of square waves with 50% duty cycle on each of the data outputs (bits 0 through 9). Note that if you load a pattern different than the default pattern, the outputs will be different.

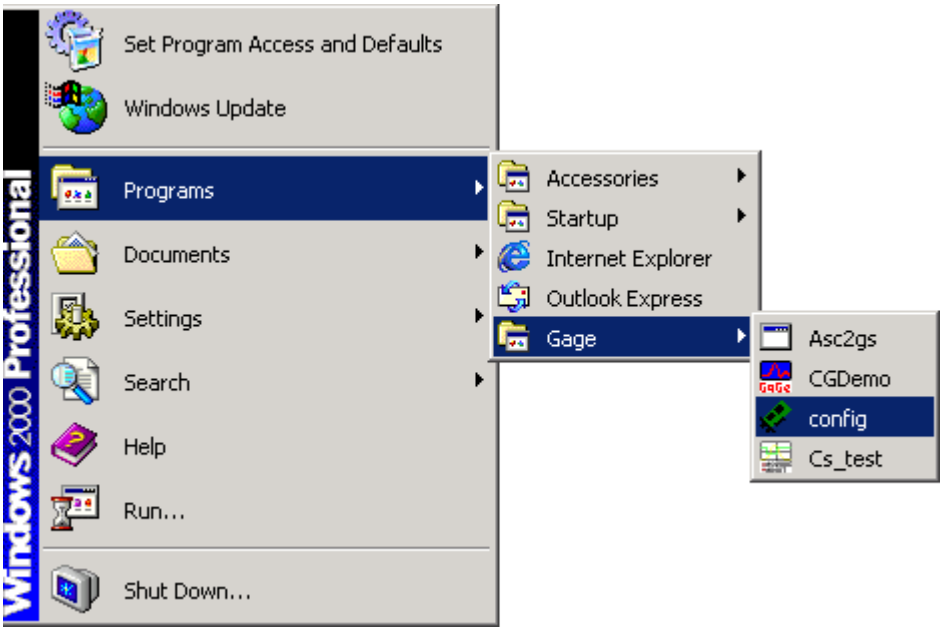
    This shows that you have successfully installed your CompuGen 3250 without any conflicts with the rest of the PC system.

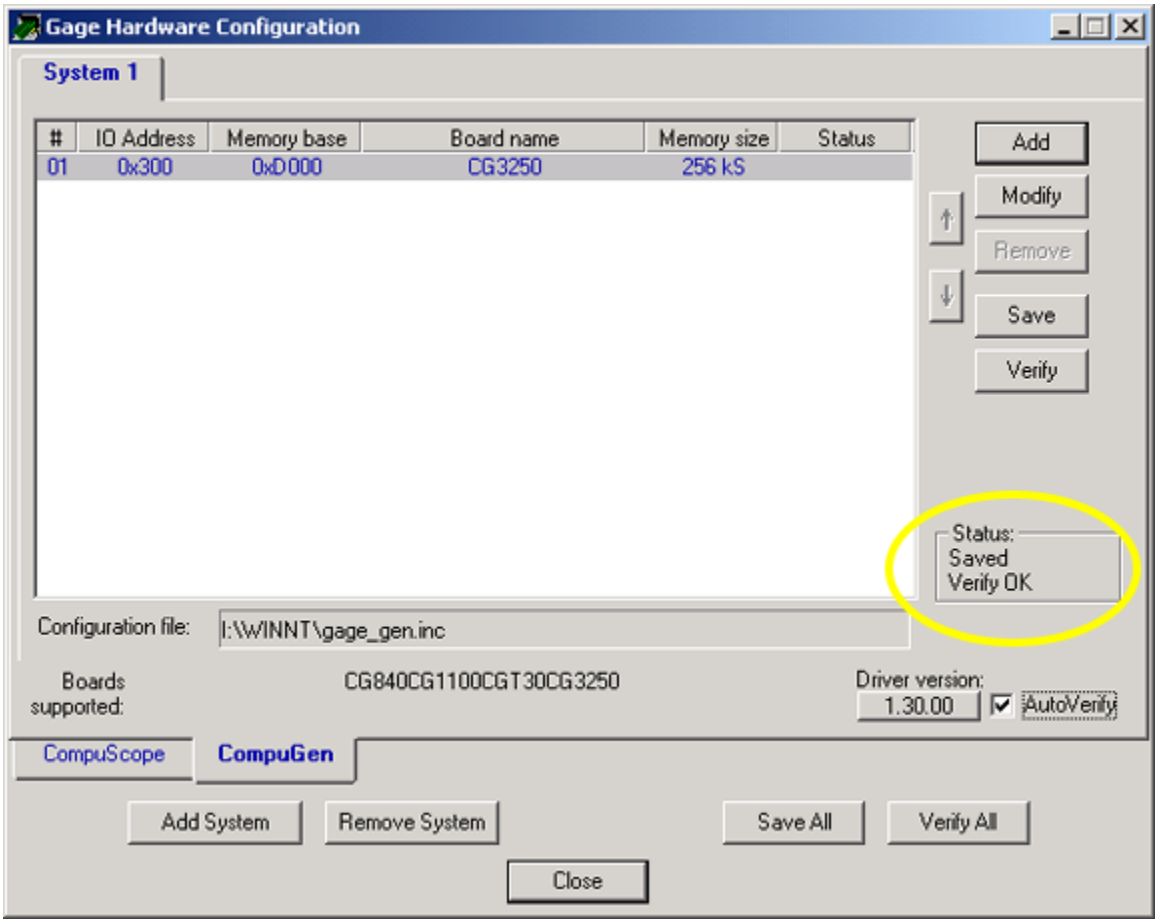
Note: Once upgraded to the Master/Slave option, the CompuGen 3250 Master or Slave card will not function without the Master/Slave Timing Module.

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CompuGen 3250 troubleshooting with GageConfig

In almost all cases, a CompuGen 3250 can be installed in a PC and made functional within 15 minutes of opening the box. However, there are times when there may be a conflict between a CompuGen 3250 and the rest of the PC system.





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If you run GageConfig and see the verification result to be "ABSENT", you may have either an I/O conflict or a memory conflict.

To solve the problem, try the following:

1. Check that I/O Address listed on the screen matches that of the card's I/O DIP Switch setting
2. If you have multiple CompuGen or CompuScope cards in the same system, compare the I/O address of your card to the I/O addresses of other cards in your system. Ensure that no two cards have the same I/O address. (Remember that the CompuGen 3250 requires four consecutive I/O addresses. For example, if the base address is 0300H, then 0300, 0301, 0302, and 0303 will be occupied by the CompuGen 3250 card.)
3. Check to see if each individual switch in the I/O DIP Switch is fully flipped to one side or another. There has been one case in which vibration during shipment caused one of the switches to be "in between" ON and OFF states.

   To solve this problem, simply flip the switch to one state and then back to the desired state, e.g. if the switch had to be ON, just flip it to the OFF state and then back to ON.
4. Enter different memory segment addresses into the "Memory Address" box and click on the **Verify** button to try again. Some common addresses are listed below:

   D000 D100 D200 D300 D400 D500 D600 D700
   D800 D900 DA00 DB00 DC00 DD00 DE00 DF00

   B000 B100 B200 B300 B400 B500 B600 B700
   B800 B900 BA00 BB00 BC00 BD00 BE00 BF00

   C000 C100 C200 C300 C400 C500 C600 C700
   C800 C900 CA00 CB00 CC00 CD00 CE00 CF00

   E000 E100 E200 E300 E400 E500 E600 E700
   E800 E900 EA00 EB00 EC00 ED00 EE00 EF00
5. If the reported error is a memory failure, check CONFIG.SYS to see if EMM386 is installed and if the following line exists in CONFIG.SYS:

   DEVICE = C:\WINDOWS\EMM386.EXE NOEMS

   If this line does exist, change it to the following using any text editor:

   DEVICE = C:\WINDOWS\EMM386.EXE NOEMS X=D200-D3FF
6. Some motherboards may use up the Upper Memory Blocks (UMBs) for their own use. You will have to find an appropriate entry in the CMOS BIOS (in a sub menu called Advanced Chipset Control or something similar) and change the relevant memory space from "Available" to "Reserved".

   When this setting says "Available", it really means to say "Available for the motherboard to use". When you set it to "Reserved", you are telling the BIOS to "Reserve it for me".

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CompuGen 3250: generating a pattern using GageBit

This section will show you how to generate a digital pattern using GageBit software.

IT IS HIGHLY RECOMMENDED THAT YOU PURCHASE A PLEATED FOIL CABLE AND A BNC BREAKOUT BOARD TO MAKE THIS PART OF THE VERIFICATION EASIER

Note: For more detailed information on using GageBit, refer to the *GageBit Manual* which is available on the Gage CompuGen ISA CD in Documentation → Manuals.

Running GageBit

Note that the system requirements for using GageBit are a Windows 95/98/NT/2000/XP, Pentium-based computer with 64 MB of RAM for Windows 95/98/ME, 128 MB of RAM for Windows 2000/XP, SVGA or better graphics card and monitor, and 25 MB minimum (64 MB recommended) of available hard disk space. A CompuGen 3250 card must be present in order to output data.

You can run GageBit by selecting the shortcut installed:

Start: Programs: Gage: GageBit: GageBit

The left-hand panel corresponds to Digital Output (as displayed on the screen). The default pattern loaded is a simple counter with a pattern length of 1024 words.

If you click on the **Generate** button and you have the outputs connected to an oscilloscope through the Pleated Foil Cable and a BNC Breakout Board, you should be able to verify that each of the outputs is behaving properly.

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CompuGen 3250 triggering

CompuGen 3250 features state-of-the-art triggering. A user can select the trigger source and trigger slope using software commands.

The user can software-select the trigger source from any one of the following:

- External Trigger
- Manual Trigger

Data output appears on the output connectors exactly 5 clock cycles after an external trigger is received from the outside world.

Trigger Bus for Master/Slave systems

CompuGen 3250 features a Trigger Bus on the Master/Slave Timing Module, which allows the Master to generate a trigger and cause the entire system to trigger.

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CompuGen 3250 output drivers and connector

Output drivers for the CompuGen 3250 are designed to be compatible with the high quality connector and cable assembly supplied optionally with the CG3250.

The drivers have +/- 100 mA drive capability for each output, thereby providing a 5 Volt swing into a 50 Ω load. This is in line with Ohm's Law that dictates that:

$$V = I * R$$

Hence, if the voltage (V) must be 5 Volts into a load (R) of 50 Ω, the drive current (I) must be 0.1 Amps or 100 mA.

If the output from CG3250 is not terminated with a 50 Ω load, the signal at the load may not be very clean. In some cases, the signal may be very noisy due to mismatched transmission lines.

The output connector, 3M 10268-55H3VC, was selected for its exceptional signal integrity specifications. For more information on this device, visit www.mmm.com.

A 50 Ω cable, when attached to this connector, can transmit these signals to your circuit board with high fidelity.

A pleated foil output cable can be purchased as an accessory.

The External Trigger connector is a BNC connector that allows the CompuGen 3250 to be triggered on the rising or falling edge of an external TTL signal.

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CompuGen 3250 accessories

There are two accessories that can be purchased with the CG3250:

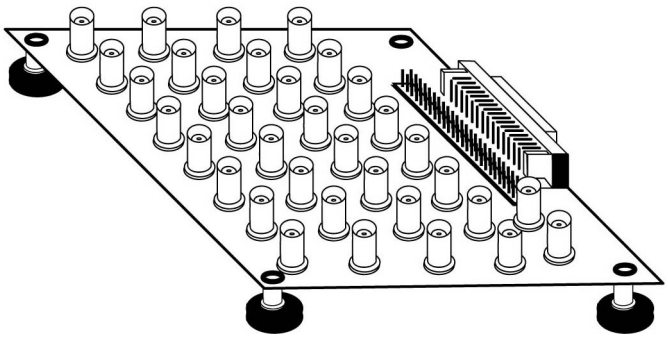
- 68 wire Pleated Foil Cable
- BNC Breakout Board

The Pleated foil cable uses copper conductors encapsulated in a specialized Teflon substrate to create just the right dielectric constant such that when wrapped in a “pleated copper foil”, each conductor becomes equivalent to a 50 Ω coaxial cable.

Thus, this cable is equivalent to 68 coaxial cables. CG3250 uses half of these conductors as GROUND wires, thereby providing even better noise immunity.



The BNC Breakout Board is invaluable in allowing the user to quickly verify the operation of the CompuGen 3250. This board breaks out all 32 data lines, one Trigger line and one Clock line into 34 BNC connectors which can easily be connected to other devices using standard 50 Ω coaxial cables.



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CompuGen 3250 memory organization

Note that this information is for your information only. Gage's drivers take care of all memory management issues. As a user, or even a programmer, you do not have to worry about the details of how memory is accessed on CompuGen 3250.

Memory architecture

The clock speeds at which the CompuGen 3250 card can generate data are too fast for the computer's ISA bus to handle. As such, the CompuGen 3250 has high-speed on-board memory to store the digital data from the computer to generate waveforms.

Interface for the ISA bus

In order to allow optimum data transfer rates from the PC memory to the CompuGen memory, the on-board memory is mapped within the memory map of the 80x86 processor, between 640K and 1M (factory default is D200-D3FF for the CompuGen 3250).

The CompuGen 3250 takes only 4 kilobytes of memory space between 640K and 1M. This memory address is configurable by writing to the on-board segment register, i.e. it is configured by software, not by DIP switches, etc.

This small memory window and software configuration means that there is very little chance of memory conflicts in any PC.

The CompuGen 3250 has memory depths much greater than just 4 KB. Therefore, the on-board memory is addressed in a segmented manner and is divided into 4 KB blocks.

On-Board Memory Address	Block Number
0 to 4095	0
4096 to 8191	1
8192 to 12287	2
12288 to 16383	3
...	...

Using the above method, any byte of on-board memory can be addressed using the BLOCK NUMBER and an OFFSET.

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Notes

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Technical Support

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By utilizing the internet to the fullest, we are able to provide you better than ever technical support without increasing our costs, thereby allowing us to provide you the ***best possible product at the lowest possible price.***

To obtain technical support, simply visit:

www.gage-applied.com/support/support_form.php

Please complete this form and submit it. Our form processing system will intelligently route your request to the Technical Support Specialist (TSS) most familiar with the intricacies of your product. This TSS will be in contact with you within 24 hours of form submittal.

In the odd case that you have problems submitting the form on our web site, please e-mail us at

tech-support@gage-applied.com

As opposed to automatic routing of technical support requests originating from the Gage web site, support requests received via e-mail or telephone calls are routed manually by our staff. Providing you with high-quality support may take an average of 2 to 3 days if you do not use the web-based technical support system.

Please note that Technical Support Requests received

via e-mail or by telephone will take an average of 2 to 3 days to process.

It is faster to use the web site!

When calling for support we ask that you have the following information available:

1. Version and type of your CompuGen SDK and drivers.
   (The version numbers are indicated in the About CD screen of the CompuGen ISA CD. Version numbers can also be obtained by looking in the appropriate README.TXT files)

2. Type, version and memory depth of your CompuGen card.

3. Type and version of your operating system.

4. Type and speed of your computer and bus.

5. Any extra hardware peripherals (i.e. CD-ROM, joystick, network card, etc.)

6. Were you able to reproduce the problem with standalone Gage Software (e.g. CGWIN, GageBit)?

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Gage products

For ordering information, see Gage's Product Catalog or visit our web site at www.gage-applied.com

CompactPCI/PXI Bus Products	CompuScope 1610C	16 bit, 10 MS/s A/D card
	CompuScope 14100C	14 bit, 100 MS/s A/D card
	CompuScope 82GC	8 bit, 2 GS/s A/D card
	CompuScope 3200C	32 bit, 100 MHz Digital Input Card
PCI Bus Products	CompuScope 1610	16 bit, 10 MS/s A/D card
	CompuScope 1602	16 bit, 2.5 MS/s A/D card
	CompuScope 14200	14 bit, 200 MS/s A/D card
	CompuScope 14105	14 bit, 105 MS/s A/D card
	CompuScope 14100	14 bit, 100 MS/s A/D card
	CompuScope 1450	14 bit, 50 MS/s A/D card
	CompuScope 12400	12 bit, 400 MS/s A/D card
	CompuScope 12100	12 bit, 100 MS/s A/D card
	CompuScope 1250	12 bit, 50 MS/s A/D card
	CompuScope 82G	8 bit, 2 GS/s A/D card
	CompuScope 8500	8 bit, 500 MS/s A/D card
	CompuScope 3200	32 bit, 100 MHz Digital Input Card
CompuGen PCI	CompuGen 4300	12 bit, 4-channel, 300 MHz Analog Output Card
	CompuGen 8150	12 bit, 8-channel, 150 MHz Analog Output Card
	CompuGen 11G	12 bit, 1 GHz Analog Output Card
CompuGen ISA	CompuGen 1100	12 bit, 80 MS/s D/A card
	CompuGen 3250	32 bit, 50 MHz Digital Output Card
Application Software	GageScope Software	World's Most Powerful Oscilloscope Software
	GageBit Software	Digital Input/Digital Output Software
	CompuGen for Windows (CGWIN)	Arbitrary Waveform Generator Software for Windows
Software Development Kits	CompuGen SDK for C/C++	CompuScope SDK for C/C#
	CompuGen SDK for LabVIEW	CompuScope SDK for MATLAB
	CompuGen SDK for MATLAB	CompuScope SDK for LabVIEW
		CompuScope SDK for LabWindows/CVI
Instrument Mainframes	Instrument Mainframe 7500	Instrument Mainframes for Housing CompuScope PCI bus and CompuGen ISA bus Products
	Instrument Mainframe 2000	
	Instrument Mainframe 8000C	Instrument Mainframes for Housing CompuScope CompactPCI/PXI bus products

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