

The Gemini MultiBoard Microsystem

FDC

**80-BUS FLOPPY DISC
CONTROLLER CARD**

*INSTRUCTION MANUAL
AND
FUNCTIONAL SPECIFICATION*

G809
ISSUE 1
14-08-81

Introduction

G809 is an 80-BUS and Nasbus compatible Floppy Disk Controller card for use with Gemini Multiboard and Nascom systems. The card has been designed to allow it to be used with 5.25" or 8" drives. They may be single sided or double sided, ordinary or double track density drives, in single or double density formats. Switching between single and double density is under software control. The card also has variable write precompensation and phase locked loop data recovery circuitry. The controller I.C. used is the Western Digital 1797. The board occupies a group of 5 x Z80 I/O ports, and these ports may be located in one of two positions, allowing up to two cards to be used on a single system.

Contents

Commissioning	1-1
Links	1-2
Connectors	1-4
Potentiometers	1-4
8" Operation	1-5
Nascom 2 Mod.	1-5
Preferred Drives	1-5

Brief Specification 2-1

Commissioning

Carefully unpack your G809 and examine it for any mechanical damage. In the event of any damage please inform your dealer immediately.

Your G809 will have been shipped to you fully tested and working. Dependant on the type of disk drive being used all that may be required is for the board to be plugged in. However, please take time to read through this manual as it may prove useful.

When plugging the G809 into the bus, please take great care. Excessive force should not be required. Any difficulty which may be encountered will, in all probability, be due to the keyway of the edge connector not fitting accurately into the slot in the edge of the card. Please ensure that the card is plugged in with the edge connector going in first and the correct way round. It is not possible to plug the board in the incorrect way because of the keyway.

The drives are connected to 809 via the 34 way (5.25" drives) or optional 50 way (8" drives) connectors on the card edge. The pin 1 end of each connector on the card is identified by a '1' on the PCB and an arrow head or other marking on the connector itself. Please ensure that the cable is connected the correct way round, or damage may occur to the card and drives.

There are several linking options on the G809. These have been set during manufacture and full details are provided in the section on links, to allow the user to configure the card to his own requirements.

80-BUS & Multiboard are trademarks of Gemini Microcomputers Limited.
Nasbus is a trademark of Lucas Logic Ltd. (Nascom Microcomputers Division).

Links.

There are seven linking options on G809. All links should be made by soldering wire from one connector to the other. Please take great care as an incorrect link may cause damage and a poor connection will result in an unreliable system.

Link 1. (LK1). 1797 clock.

```

A      1-----1 C21
O      1-----1

DO  OB
CO
LK1

```

This link is used to provide the necessary clock to the 1797 FDC chip. For 5.25" drives this should be 1MHz and for 8", 2 MHz. At pins B, C and D divisions of the bus clock are available. At pin D is the bus clock itself, pin C the clock divided by 2, and at pin B the clock divided by 4. This link therefore should be set as follows:

A - B for 5.25" drives and 4MHZ CPU clock

A - C for 5.25" drives and 2MHZ CPU clock

A - C for 8" drives and 4MHZ CPU clock

A - D for 8" drives and 2MHZ CPU clock

For systems with different CPU clock speeds, see link 7 below.

Link 2. (LK2). 5.25" Drive type.

```

DO  OB
1  1
1 / 1
1  1
CO  OA
LK2

```

This link block is used to select between different 5.25" drive types. If pin 6 of the drive connector is the fourth drive select line (ISLT3), then B should be linked to C. If pin 34 of the drive connector is the fourth drive select line (DS4), then C should be connected to D. In the latter case pin 6 will be the drive ready line (RDY), and so B should be connected to A.

For example: Pertec FD 250 drives - link B to C

Micropolis 1015 drives - link A to B and C to D

Also see link 3.

Link 3. (LK3). Ready line connection.

```

LK3
  0
  1
  1
  1
  1
0   0
1
1
0 R7

```

n/c

This link should be inserted when pin 6 of the drive connector is the ready line (RDY), or if 8" drives are being used. This link should therefore be fitted for Micropolis 1015 type drives and 8" drives.

Link 4. (LK4). Write Precompensation selection.

```

      A      R9
      0      0
    /  \
CO   OB    1
LK4      1
          0

```

n/c

This link is used to enable/disable the write precompensation circuitry. Linking A to B disables the write precompensation circuitry, and this will only normally be done during testing of the card. Linking A to C provides write precompensation on all tracks beyond track 43 on the drive. This latter link should only be fitted when 8" drives are being used. With 5.25" drives the link is omitted. The write precompensation circuitry is only enabled when the system software selects the card for double density operation.

Link 5. (LK5). Z80 Port addresses.

```

LK5      1--
BO      OC  1
 \ /      1
  0      1
A      1 IC3

```

B-A

This link selects one of the two blocks of Z80 port addresses that this board can occupy. Linking A to C locates the board at Ports C0-C4, linking A to B locates the board at ports E0-E4. The latter is the normal configuration.

Link 6. (LK6). /NASIO.

		R1
	0	0
	1	1
LK6	1	1
NASIO	1	1
	0	0

Linked.

This link provides a /NASIO (IOEXT) signal to line 12 of the bus. The /NASIO signal is only required by Nascom 1 or 2. The external I/O link (or switch) on Nascom 1 (or 2 respectively) should be set to 'External'. Because of a decode fault on the Nascom 1 board, when external I/O is selected, the on-board PIO must be removed. The /NASIO signal need only be supplied by one expansion card. Inserting the link enables the /NASIO signal.

Link 7. (LK7). Clock selection.

		A	
		0	
		/	\
R1			
0			
1	CO		OB
1		LK7	
0			

A-B

This link determines the source of the clock on the G809. If A is linked to C, the clock will be taken from the bus AUXCLK line. If A is linked to B, the clock will be taken from the main system clock line, and this is the normal position. If the host system is running at 2 or 4 MHz, then the 1 or 2 MHz clock signal required by 1797 FDC can be provided by appropriate selection at link 1. However, if a different system clock is used, then a 4 MHz clock should be provided on the AUXCLK bus line, and A should be linked to C. For full details of implementing the AUXCLK line, please see the manual for the bus master.

Connectors.

=====

G809 is provided with a 34 way insulation displacement connector (PL2). This is the standard type of connector used with 5.25" drives. Provision has also been made for a 50 way insulation displacement connector to be fitted (PL3) and this is the standard type of connector used with 8" drives. Ensure that the cable connector is inserted with the correct orientation. See page 1-1, Commissioning.

Potentiometers.

=====

There are 3 multiturn potentiometers on G809. These have been set at manufacture for 5.25" drives and 250 nS write precompensation. If alternative adjustments are required, these should be made with reference to a 1797 data sheet and the G809 circuit diagrams.

VR2 is set (while no data is being transferred) for 1.45V +/- 0.05V at Pin 2 of the 74LS629 VCO (IC 9).

VR3 is adjusted to provide a 2MHz (+0% -5%) clock signal (4 MHz for 8" drives) at Pin 7 of the 74LS629 VCO (IC 9).

VR1 is used to set the required write precompensation timing (Nominally 250nS). It should be adjusted whilst formatting in double density for the desired effect at Pin 6 of the WD 1691 FSL (IC 7)(TP6). Trigger a 'scope from IC7 pin 1 (TP10) and adjust the delay between the start of the 'early' and 'late' pulses to twice the desired precompensation value.

DO NOT adjust the potentiometers unless the card is to be used with alternative drives as this may negate any warranty claim.

Component changes for 8" operation

=====

The following component values should be substituted when using G809 with 8" drives.

R12 - 33R C4 - 33uF C5 - 47 pF

Note that it is not possible to use 8" drives in double density mode if the Z80 CPU is only running at 2MHz.

Nascom 2 modification. ✓

=====

In the Nasbus specification the bus reset pulse (line 14) was specified as 10 uS. In the 80-BUS specification this has been extended to 50 uS, as chips in the 179X family require a reset pulse of this duration. In reality this has not been found to cause a problem. However, Nascom 2. owners who are concerned by this should substitute a 10 nF capacitor for C1 (previously 1nF) on their Nascom 2.

Preferred Drives.

=====

The G809 design has been tested for use with the following drives:

Pertec FD250 - 5.25", double sided, double density, 48 tracks/inch.
 Micropolis 1015 - 5.25", double sided, double density, 96/100 tracks/inch.
 Pertec FD650 - 8" , double sided, double density.

These are the recommended drives for use with the card, and software support will be based on these. Alternative drives may be used, but it must be pointed out that although other drives may be electrically compatible, there are often small differences in timing that would require modification to any software written specifically for the above drives.

CP/M 2.2 is available configured for use with G809 & Pertec FD250 drives for:

- (a) Nascom 1 or 2 with Nascom screen or Gemini G812 IVC card (80x25).
- (b) Gemini Multiboard System (G811 CPU & G812 IVC).