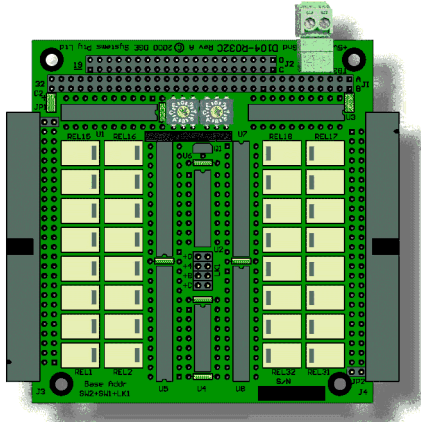


D104-RO32C
32 Relay Output Card
for
PC/104 Systems**Rev A**
15th October 2000

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Introduction

The D104-RO32C provides 32 relay outputs. The relay contacts are single pole, changeover (form C). Typical applications for the D104-RO32C include light power switching and signal multiplexing/demultiplexing.

Targeted for industrial applications, the D104-RO32C is constructed with CMOS logic devices which are rated for operation over an extended temperature range. CMOS components also reduce power requirements.

Features of the D104-RO32C include:

- **32 SPDT relay outputs**
- **Signal and power switching**
- **Off state on reset**
- **PC/104 compliant**
- **CMOS construction**
- **Low power consumption**
- **+5V power supply**

Bus Interface

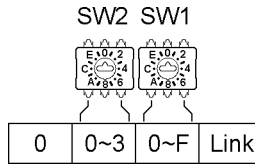
The D104-RO32C is an I/O mapped, polled, write-only, digital controller occupying 4 contiguous locations in the I/O address space. The module's address is set on a 16 byte boundary by two hex-encoded rotary switches (SW2, SW1). Jumper links are provided to economise on I/O space usage by allowing this address to be offset. Additional D104-RO32C (and other) modules can reside within the same 16-byte boundary.

Users should note that while the I/O address is decoded to 12-bits on the D104-RO32C, most PC processors output 10-bit I/O addresses on the system bus. This means addresses 400h and above will not be output by the PC processor limiting the maximum selectable address by SW2 and SW1 to 3F0h.

For the same reason aliasing will occur where the D104-RO32C will respond to a number of different addresses. For example if the base address is set to 330h the module will also be seen at 730h and B30h and FF0h.

While the D104-RO32C interfaces to the 8-bit bus through J1/P1, it is fitted with the J2/P2 stack-through bus connector to retain 16-bit integrity on the PC/104 stack.

Setting the Base Address



Base Address = Address set by SW2, SW1 + Offset at Link 1

Table 1 shows jumper links LK1 positions and the corresponding offset from the address set by SW2 and SW1. Only one position is selected. As an example, if the address set by SW2 and SW1 is 330h and link position 3 is selected, the module's base address is 338h.

Link1 Settings	
Jumper	Offset
1	+0
2	+4
3	+8
4	+C

Table 1: Link LK1 Settings

Control Registers

Four, write-only registers are provided, each controlling a bank of eight relays. A logic 1 in a register's bit causes the corresponding relay to be energised. A logic 0 turns the device off. Table 2 shows the I/O address map for the D104-RO32C

Address Map			
Base	Port	Relay	Access
+0	PA	1 to 8	Write only
+1	PB	9 to 16	
+2	PC	17 to 24	
+3	PD	25 to 32	

Table 2: Address Map

Power Up and Reset

On power-up and reset, the relays go to their un-energised state. Systems builders will appreciate the importance of having the D104-RO32C power up in a known "all outputs off" state.

Testing the D104-RO32C

If the D104-RO32C is installed on a PC system running MS-DOS, users can test the module by invoking Debug.exe which is an utility program able to execute input and output statements. Inexperienced users are cautioned in the use of debug.exe, erroneous and misguided commands can cause interference with the system, possibly with unwanted results.

The following sequence assumes a D104-RO32C module is set for a base address of 330h. <Cr> is the **Enter** key on main keyboard or on the numeric keypad. Note: the character after the dash is the alpha character 'O' (for Output), not the number zero

```
C:>debug      ; invoke debug.exe from the MS-DOS prompt
-O330,FF<Cr> ; activate relays 1 to 8 inclusive
-O331,FF<Cr> ; activate relays 9 to 16 inclusive
-O332,FF<Cr> ; activate relays 17 to 24 inclusive
-O333,FF<Cr> ; activate relays 25 to 32 inclusive
-O330,0<Cr>  ; relays 1 to 8 off
-O331,0<Cr>  ; relays 9 to 16 off
-O332,0<Cr>  ; relays 17 to 24 off
-O333,0<Cr>  ; relays 25 to 32 off
-O330,55<Cr> ; 55h = 01010101 = relays 1, 3, 5 and 7 on
-O330,AA<Cr> ; AAh = 10101010 = relays 2, 4, 6, 8 on, relays 1, 3, 5, 7 off
-O330,0<Cr>
-Q<Cr>       ; exit debug.exe
C:>          ; MS-DOS prompt
```

Component Layout

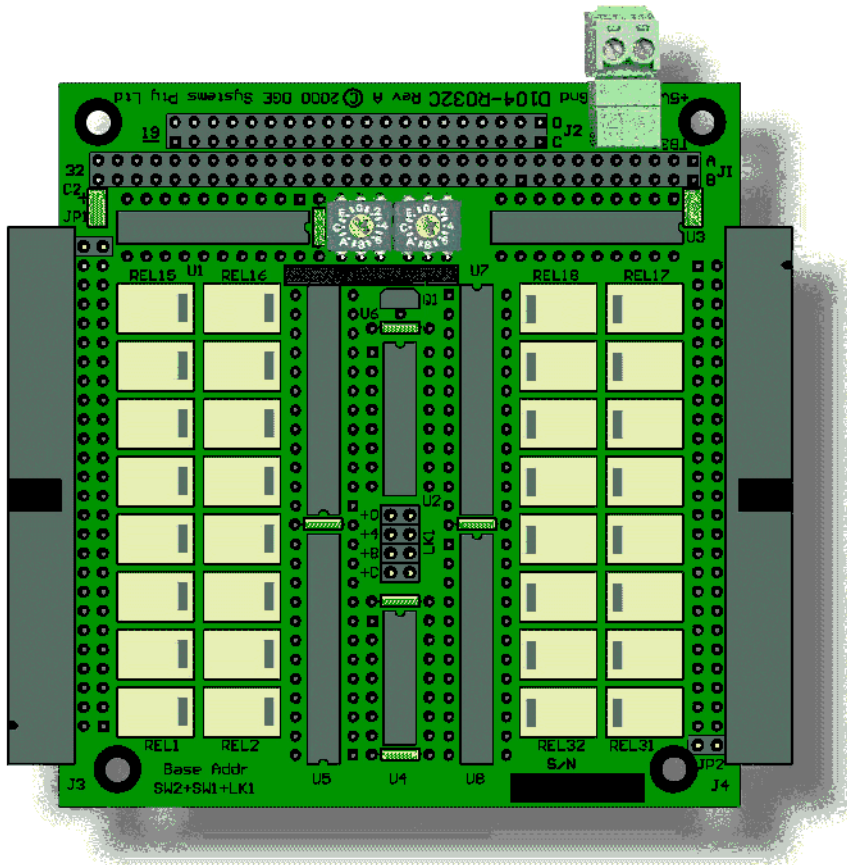


Figure 1: Component Layout

Connector Pin Assignments

Connector J1/P1 Pin Assignments			
Signal		Pin	Signal
/IOCHCHK		1a	1b □ 0V (Gnd)
SD7	□	2a	2b □ RESETDRV
SD6	□	3a	3b □ +5V (VCC)
SD5	□	4a	4b □ IRQ2/9
SD4	□	5a	5b □ -5V
SD3	□	6a	6b □ DRQ2
SD2	□	7a	7b □ -12V
SD1	□	8a	8b □ /ENDXFR
SD0	□	9a	9b □ +12V
IOCHRDY		10a	10b □ (KEY)
AEN	□	11a	11b □ /SMEMW
SA19		12a	12b □ /SMEMR
SA18		13a	13b □ /IOW
SA17		14a	14b □ /IOR
SA16		15a	15b □ /DACK3
SA15		16a	16b □ DRQ3
SA14		17a	17b □ /DACK1
SA13		18a	18b □ DRQ1
SA12		19a	19b □ /REFRESH
SA11	□	20a	20b □ CLK
SA10	□	21a	21b □ IRQ7
SA9	□	22a	22b □ IRQ6
SA8	□	23a	23b □ IRQ5
SA7	□	24a	24b □ IRQ4
SA6	□	25a	25b □ IRQ3
SA5	□	26a	26b □ /DACK2
SA4	□	27a	27b □ TC
SA3	□	28a	28b □ BALE
SA2	□	29a	29b □ +5V
SA1	□	30a	30b □ OSC
SA0	□	31a	31b □ 0V (Gnd)
0V (Gnd)	□	32a	32b □ 0V (Gnd)

□ Signals used on the D104-RO32C

Connector J2/P2 Pin Assignments			
Signal	Pin	Pin	Signal
0V (Gnd)		0c	0d □ 0V (Gnd)
/SBHE		1c	1d □ /MEMCS16
LA23		2c	2d □ /IOCS16
LA22		3c	3d □ IRQ10
LA21		4c	4d □ IRQ11
LA20		5c	5d □ IRQ12
LA19		6c	6d □ IRQ15
LA18		7c	7d □ IRQ14
LA17		8c	8d □ /DACK0
/MEMR		9c	9d □ DRQ0
/MEMW		10c	10d □ /DACK5
SD8		11c	11d □ DRQ5
SD9		12c	12d □ /DACK6
SD10		13c	13d □ DRQ6
SD11		14c	14d □ /DACK7
SD12		15c	15d □ DRQ7
SD13		16c	16d □ +5V (VCC)
SD14		17c	17d □ /MASTER
SD15		18c	18d □ 0V (Gnd)
(KEY)		19c	19d □ 0V (Gnd)

Table 3: Connector J1/P1 and J2/P2 Pin Assignments

Table 4 shows the port/bit and pin assignments for the 50 pin IDC headers. All of the relays' three terminals (NO, C and NC) are mapped to the header.

J3 Connector Pin Assignments									
Port	Bit	Term	Pin	Pin	Term	Bit	Port		
PA	0	NO	1	2	C	0	PA		
	0	NC	3	4	NO	1			
	1	C	5	6	NC	1			
	2	NO	7	8	C	2			
	2	NC	9	10	NO	3			
	3	C	11	12	NC	3			
	4	NO	13	14	C	4			
	4	NC	15	16	NO	5			
	5	C	17	18	NC	5			
	6	NO	19	20	C	6			
	6	NC	21	22	NO	7			
	7	C	23	24	NC	7			
	PB	0	NO	25	26	C		0	PB
		0	NC	27	28	NO		1	
1		C	29	30	NC	1			
2		NO	31	32	C	2			
2		NC	33	34	NO	3			
3		C	35	36	NC	3			
4		NO	37	38	C	4			
4		NC	39	40	NO	5			
5		C	41	42	NC	5			
6		NO	43	44	C	6			
6		NC	45	46	NO	7			
7		C	47	48	NC	7			
(+5V) *			49	50			Gnd		

* Set at JP1

J4 Connector Pin Assignments									
Port	Bit	Term	Pin	Pin	Term	Bit	Port		
PC	0	NO	1	2	C	0	PC		
	0	NC	3	4	NO	1			
	1	C	5	6	NC	1			
	2	NO	7	8	C	2			
	2	NC	9	10	NO	3			
	3	C	11	12	NC	3			
	4	NO	13	14	C	4			
	4	NC	15	16	NO	5			
	5	C	17	18	NC	5			
	6	NO	19	20	C	6			
	6	NC	21	22	NO	7			
	7	C	23	24	NC	7			
	PD	0	NO	25	26	C		0	PD
		0	NC	27	28	NO		1	
1		C	29	30	NC	1			
2		NO	31	32	C	2			
2		NC	33	34	NO	3			
3		C	35	36	NC	3			
4		NO	37	38	C	4			
4		NC	39	40	NO	5			
5		C	41	42	NC	5			
6		NO	43	44	C	6			
6		NC	45	46	NO	7			
7		C	47	48	NC	7			
(+5V) *			49	50					

* Set at JP2

Table 4: Connectors J3 and J4 Pin Assignments

Specifications

D104-RO32 Specifications	
Bus Interface:	8 bit, PC/104 compliant.
I/O Space:	Occupies 4 I/O locations within 16-byte boundary. Jumper offset by 0,4,8,C
Connectors	
Bus:	J1/P1, J2/P2 (stackthrough)
I/O:	2 x 50 pin IDC headers
Power Requirements:	+5Vdc, 3.4 watts, all relays on
Temperature:	
Operating:	-20 to +70°C.
Storage:	-55 to +100°C.
Humidity:	5% to 95% non condensing.
Dimensions:	90 x 96mm (3.55 x 3.775")
Weight:	

Relay Contact Specifications	
------------------------------	--

Configuration:	SPDT (form C).
Rated Load:	0.3A / 125Vac, 1A / 30Vdc.
Rated Carry Current:	1A
Max Switching Current:	1A
Max Switching Voltage:	125Vac, 60Vdc
Resistance:	100mOhm max.
Minimum Load:	10uA at 10mVdc
Operate Time	
Engage:	1.4mS typ, 3mS max.
Release:	1.3mS typ, 3mS max.
Withstand Voltage:	1,500Vac, coil to contact
Life	
Mechanical:	50,000,000 operations min.
Electrical:	100,000 operations min at 5A.
High Frequency	
Isolation:	65dB at 10MHz, 45dB at 100MHz
Insertion Loss:	0.05dB at 10MHz, 0.18 at 100MHz
Return Loss:	40db at 10MHz, 30 dB at 100MHz

Ordering Information

Part Number	Description
D104-RO32C	PC/104 32 Relay Output Module
D104-RO32C-TM	Technical Manual