

PC-63
reed relay
output card

User manual

THE PC-63 REED RELAY OUTPUT CARD FOR IBM-PC/XT & COMPATIBLES

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Introduction

The PC-63 reed relay output card is an industrial control interface card designed for the control of external devices from an IBM-PC/XT or compatible machine. The sixteen reed relays provided for switching control sixteen different contact points. The PC-63 fits directly into a system unit expansion slot, and high or low level language software can be used with it.

Specifications

16 sets of reed relay switches in two sets of eight

Switch set I/O address from 0280H-72F7H (total 512 bytes)

Status of each reed relay indicated by its corresponding LED

Multiple cards can be used in parallel

Output connector: 37-pin D-type

Each relay has its own or common ground

8-bit word size (one bit per relay)

2 ports with 16 reed relays (8 per port)

All address, data & control signals are TTL compatible

Relay coil rating: nominal 5V DC
 operates at 3.8V DC
 releases at 0.5V DC
 coil resistance 500 ohm +/-10%

Relay contact rating: power 10W (max)
 voltage 150V DC (max)
 current 1A (max)
 contact resistance 0.2 ohm

Breakdown voltage: between open contacts 250V DC (min)
 between contact & coil 500V DC (min)

Power requirements: +5V DC +/-5% at 700mA (max)

Operating time: 0.5mSec (max)

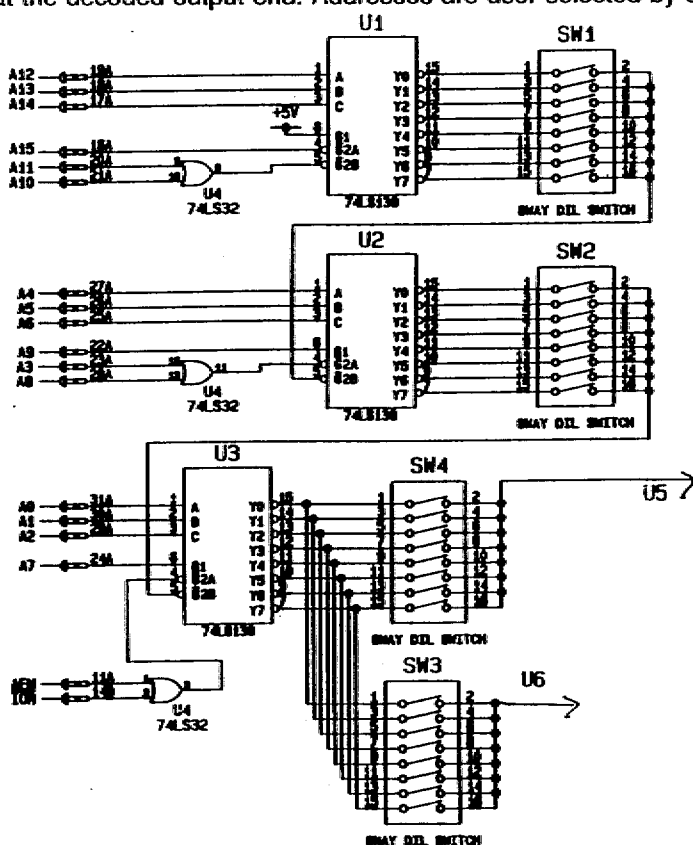
Operating temperature: 0 deg. C to 55 deg. C

Relative humidity: 0% to 90%

PCB size: 187.5 x 98.5 x 15.2mm

Circuit principles

Three 74LS138 decoders are used in address selecting. Decoded signals are latched at the decoded output end. Addresses are user-selected by switch.



The output signals from the decoding, PE1 and PE2, are used to latch the data for Port A and Port B respectively. The data is latched using two 74LS273s. The outputs of these latches drive the coils of 16 reed relays via 7406s (open collector inverters).

If a logical "1" exists on the data bus, and is latched by either PE1 or PE2, then the output of the corresponding latch will go high. As the 7406 is an inverter, this will cause its output to go low. This activates the coil of the reed relay, and will close its contacts.

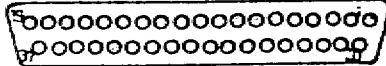
i.e.: "0" = Contacts open

"1" = Contacts closed

Note: On system start-up, all the contacts will be open.

37-pin D-type connector pin assignment

Pins 1 and 7 of each relay connect to the 37-pin connector. Relays RL1-RL8 belong to port 1 (A), and RL9-RL16 to port 2 (B). PA0 and PA1 are the contacts of the first relay in port 1; PB6 and PB7 those of the last relay in port 2.



PIN NO.	DESC	O/P PIN OF REED RELAY	PIN NO.	DESC	O/P PIN OF REED RELAY
1	NC		20	PB0	RL9
2	PA0	RL1	21	PB1	RL9
3	PA1	RL1	22	PB2	RL10
4	PA2	RL2	23	PB3	RL10
5	PA3	RL2	24	PB4	RL11
6	PA4	RL3	25	PB5	RL11
7	PA5	RL3	26	PB6	RL12
8	PA6	RL4	27	PB7	RL12
9	PA7	RL4	28	PB8	RL13
10	PA8	RL5	29	PB9	RL13
11	PA9	RL5	30	PB10	RL14
12	PA10	RL6	31	PB11	RL14
13	PA11	RL6	32	PB12	RL15
14	PA12	RL7	33	PB13	RL15
15	PA13	RL7	34	PB14	RL16
16	RL14	RL8	35	PB15	RL16
17	PA15	RL8	36	+5V	
18	NC		37	GND	
19	NC				

Address selection

The first digit is selected by switch S1:

1	2	3	4	5	6	7	8
0XXX	1XXX	2XXX	3XXX	4XXX	5XXX	6XXX	7XXX

The second digit is non-selectable, being always 2. Switch S2 selects the third digit:

1	2	3	4	5	6	7	8
XX8X	XX9X	XXAX	XXBX	XXCX	XXDX	XXEX	XXFX

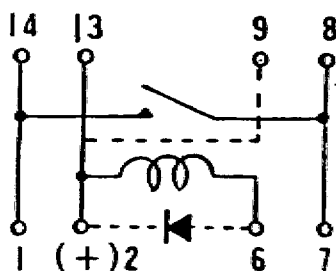
The fourth digit is set by S4 (for port 1) and S3 (for port 2). These two settings must not be the same.

1	2	3	4	5	6	7	8
XXX0	XXX1	XXX2	XXX3	XXX4	XXX5	XXX6	XXX7

E.G.: To set port 1 at address 2280H, and port 2 at 2287H, use switches S1/3, S2/1, S3/8 and S4/1.

To set (port 1) at 0280H, and (port 2) at 0281H, use switches S1/1, S2/1, S4/1 and S3/2.

Reed relay circuit diagram



The relationship between data bits, reed relays and LEDs is shown in the following table:

DATABIT		LED	REED RELAY
PORT1	D0	LED1	RL1
	D1	LED2	RL2
	D2	LED3	RL3
	D3	LED4	RL4
	D4	LED5	RL5
	D5	LED6	RL6
	D6	LED7	RL7
	D7	LED8	RL8
PORT2	D0	LED9	RL9
	D1	LED10	RL10
	D2	LED11	RL11
	D3	LED12	RL12
	D4	LED13	RL13
	D5	LED14	RL14
	D6	LED15	RL15
	D7	LED16	RL16

Application examples

The PC-63 comes with a floppy disc, and can be tested using the software on this disc.

Test by demo program

1. With the card installed as above, and Port A = 280H, Port B = 281H, run the program WALKBIT.COM.
2. This program will cause a single bit to "walk" along the 16 bits. It will be displayed by the LEDs as follows:

```
0000 0000 0000 0001
0000 0000 0000 0010
      :
```

```
0100 0000 0000 0000
1000 0000 0000 0000
0000 0000 0000 0001
      :
```

3. Type Control-C to exit the program. etc.
4. The program SLOWWALK.COM performs the same operation, but the bit "walks" one bit when a key is pressed.

```

Program Walk bit:
var Pattern : integer;

Procedure writebinary(pat:integer);
Var Mask, I : integer;
Begin
  Mask := $8000;
  For i := 1 to 16 do
    begin
      if (mask and pat) = 0 then write('0') else write('1');
      Mask := Mask shr 1;
    end;
  End;

begin
  ClrScr;
  gotoxy(15,9);
  Write('Test program for the relay output card (Board PC-63)');
  gotoxy(26,15);
  write('Pattern: ');
  Pattern := 1;
  repeat
    delay(100);
    port[2*256+8*16+0] := ((pattern and $FF00) shr 8);
    port[2*256+8*16+1] := ( pattern and $00FF);
    gotoxy(35,15);
    writebinary(pattern);
    Pattern := pattern shl 1;
    if pattern = 0 then pattern := 1;
  until 1=0
end.

```

```

program count;
var i : byte;
begin
  i := 1;
  repeat
    delay(100);
    i := i + 1;
    port[2*256+8*16+0] := i;
    port[2*256+8*16+1] := i;
    write(i:4);
  until 1=0
end.

```

```
program Slow Bit Walk;
var Pattern : integer;
    Ch : Char;
```

```
Procedure writebinary(pat:integer);
```

```
Var Mask, I : integer;
```

```
Begin
```

```
Mask := $8000;
```

```
For i := 1 to 16 do
```

```
begin
```

```
if (mask and pat) = 0 then write('0') else write('1');
```

```
Mask := Mask shr 1;
```

```
end;
```

```
End;
```

```
begin
```

```
ClrScr;
```

```
gotoxy(15,9);
```

```
Write('Test program for the relay output card (Board PC-63)');
```

```
gotoxy(26,15);
```

```
write('Pattern: ');
```

```
Pattern := 1;
```

```
repeat
```

```
delay(100);
```

```
port[2*256+8*16+0] := ((pattern and $FF00) shr 8);
```

```
port[2*256+8*16+1] := ( pattern and $00FF);
```

```
gotoxy(35,15);
```

```
writebinary(pattern);
```

```
Gotoxy(22,20);
```

```
Write('Press any key to move the bit');
```

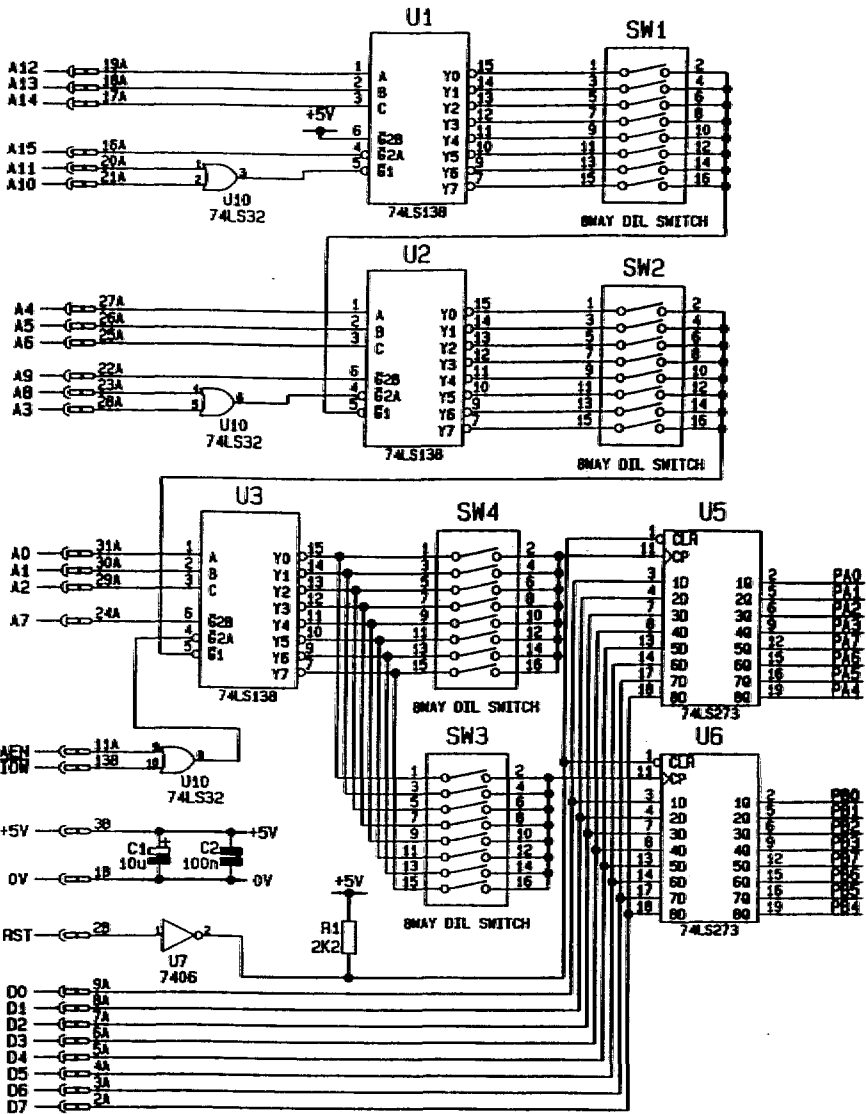
```
Read(KBD, ch);
```

```
Pattern := pattern shl 1;
```

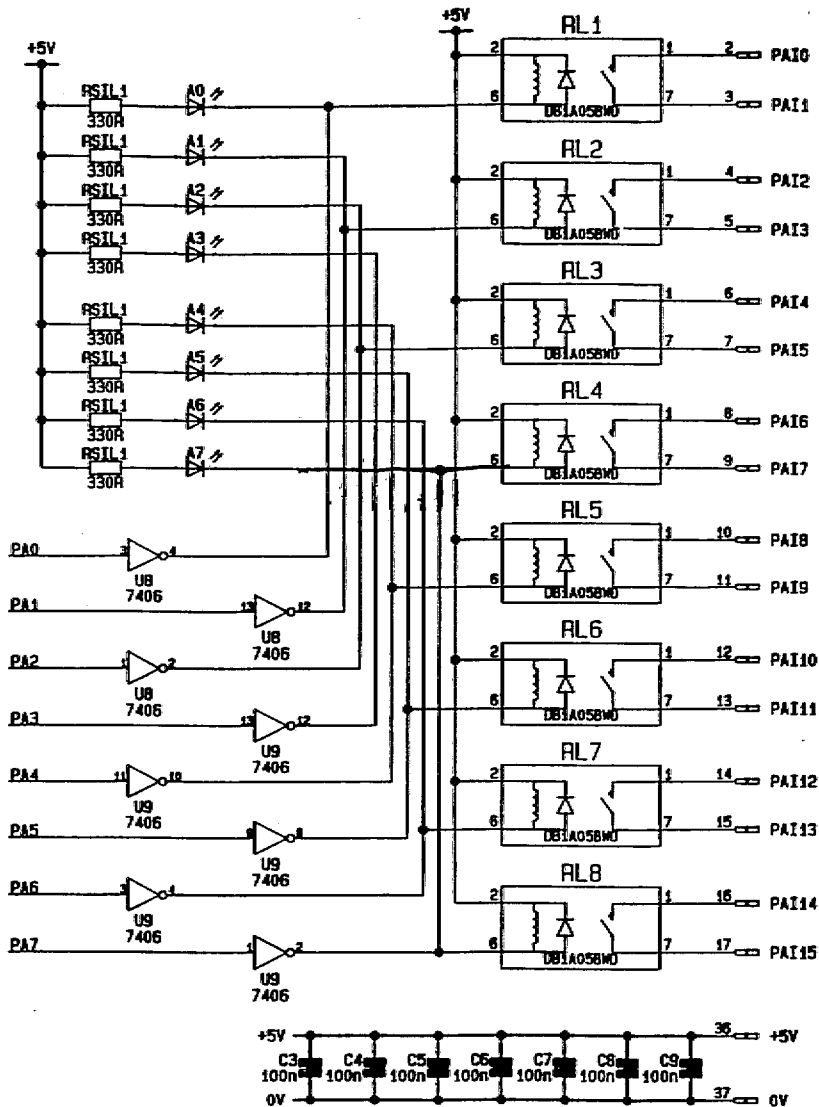
```
if pattern = 0 then pattern := 1;
```

```
until ch=0
```

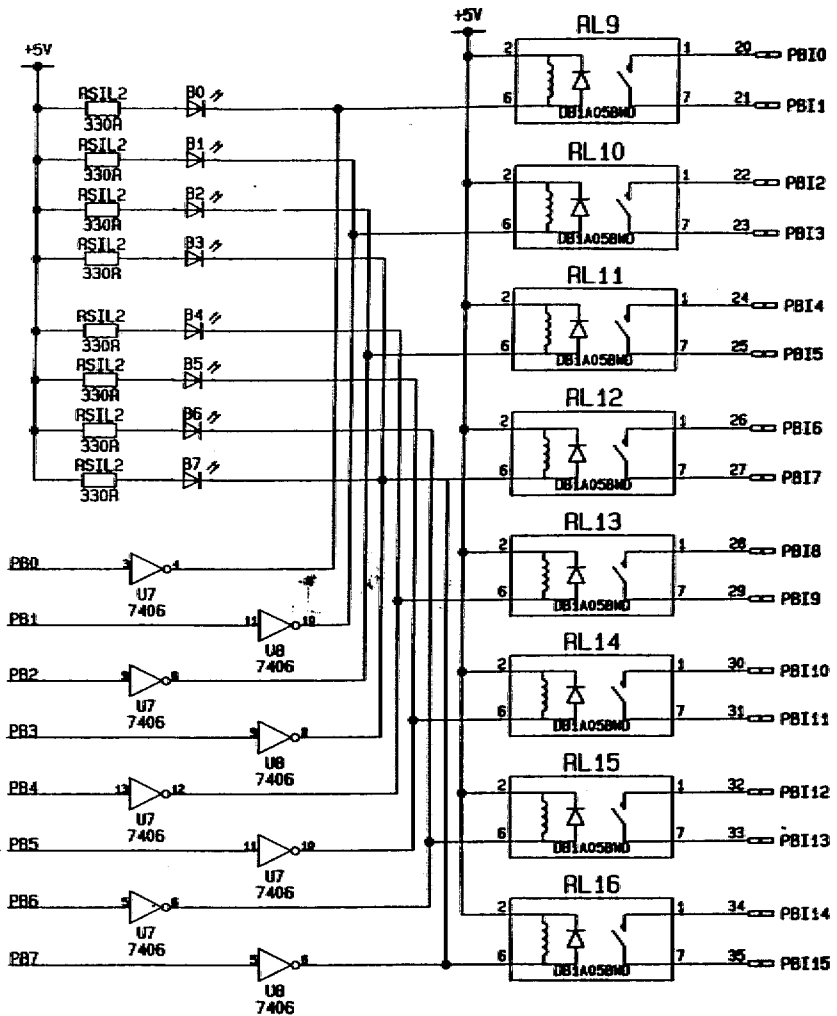
```
end.
```



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				PROJECT: - IBM PC	
				TITLE: - RELAY OUTPUT CARD	
AMENDMENTS				DATE	APPD
ENG	DSN	APPD	USED IN	FILE NAME: PC63-1.SCH	DSN NO. PC-63 SHT 1 OF 3



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				PROJECT: - IBM PC	
				TITLE: -	
				RELAY OUTPUT CARD	
				3 17-12-87	
AMENDMENTS				FILE NAME: PC63-2.SCH	
DES	DWN	APPD	DESG	DESG No. PC63 SHT2 OF 3	
CB					



IC No	PART No	VCC	VDD
RL1-16	DB1A058MD		
U7-U9	7406	14	7
U4-U6	74LS273	20	10
U10	74LS32	14	7
U1-U3	74LS139	16	6

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AMENDMENTS 1 17-12-97		FILE NAME: PC63-3.SCH	
DRG No. PC63 SHT3 OF 3			