

Internal use only

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Title:

RC3941 external disk cabinet
Technical Manual

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1. General description.

RC3941 is a 300M byte winchester expansion to the RC39 high performance multiuser microcomputer system. It acts like an integrated part of the RC39 computer and is designed to match the RC39 design with the same physical dimensions.

Notice that your basic XENIX software must support RC3941.

It is possible to extend the RC3941 to double capacity by adding a second drive (RC3943). Further a second disk cabinet (RC3945) with 300MB and a fourth drive (RC3943) can be added.

This manual describes the hardware of the RC3941, RC3943 and RC3945.

WARNING:

Don't move the cabinet when it is running and don't subject it to vibrations or shock by transporting it on the wheels. See chapter " 9.4 Transport ".

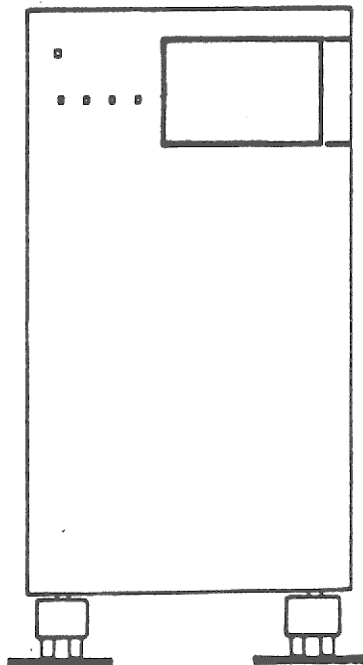


Fig.2.1 The RC3941/45 in front view.

2. Introduction

The disk cabinet of a RC3941 contains:

1. One NEC D2268H winchester drive WDD611.
2. One NEC power supply for the D2268H drive POW691.
3. A remote power up/down section.
4. One KBN606 cabinet.
5. LED indicator board LED605.
6. Two external cables.
7. Internal cables.

Parts to be installed in RC39:

1. One XYLOGICS 451 SMD controller board WDC601.
2. One connector plate.
3. Two internal cables.

This manual does not contain a full description of the elements, for further information see the reference list in appendix A .

RC3943 contains:

1. One NEC D2268H winchester disk drive WDD611.
2. One NEC power supply POW691.
3. One external cable.
4. 3 internal cables.

RC3945 is containing the same as RC3941 except the parts to be installed in RC39. It is equipt with a special internal cable and require only one internal cable in RC39.

The external connections between RC39, RC3941/43, RC3945/41 are shown in figur 2.1.

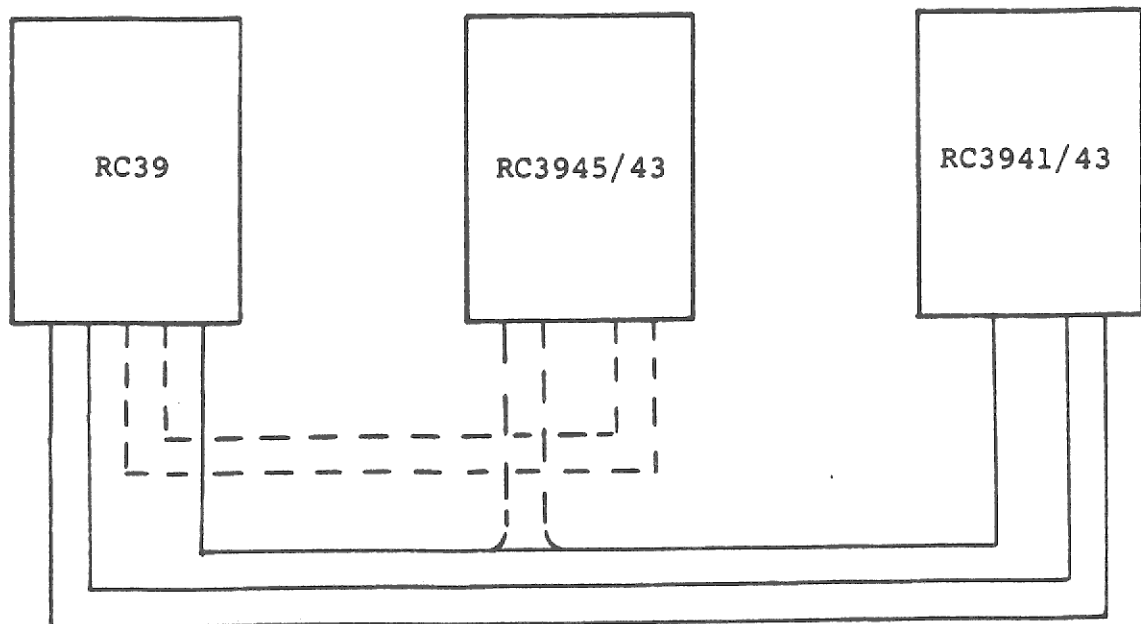
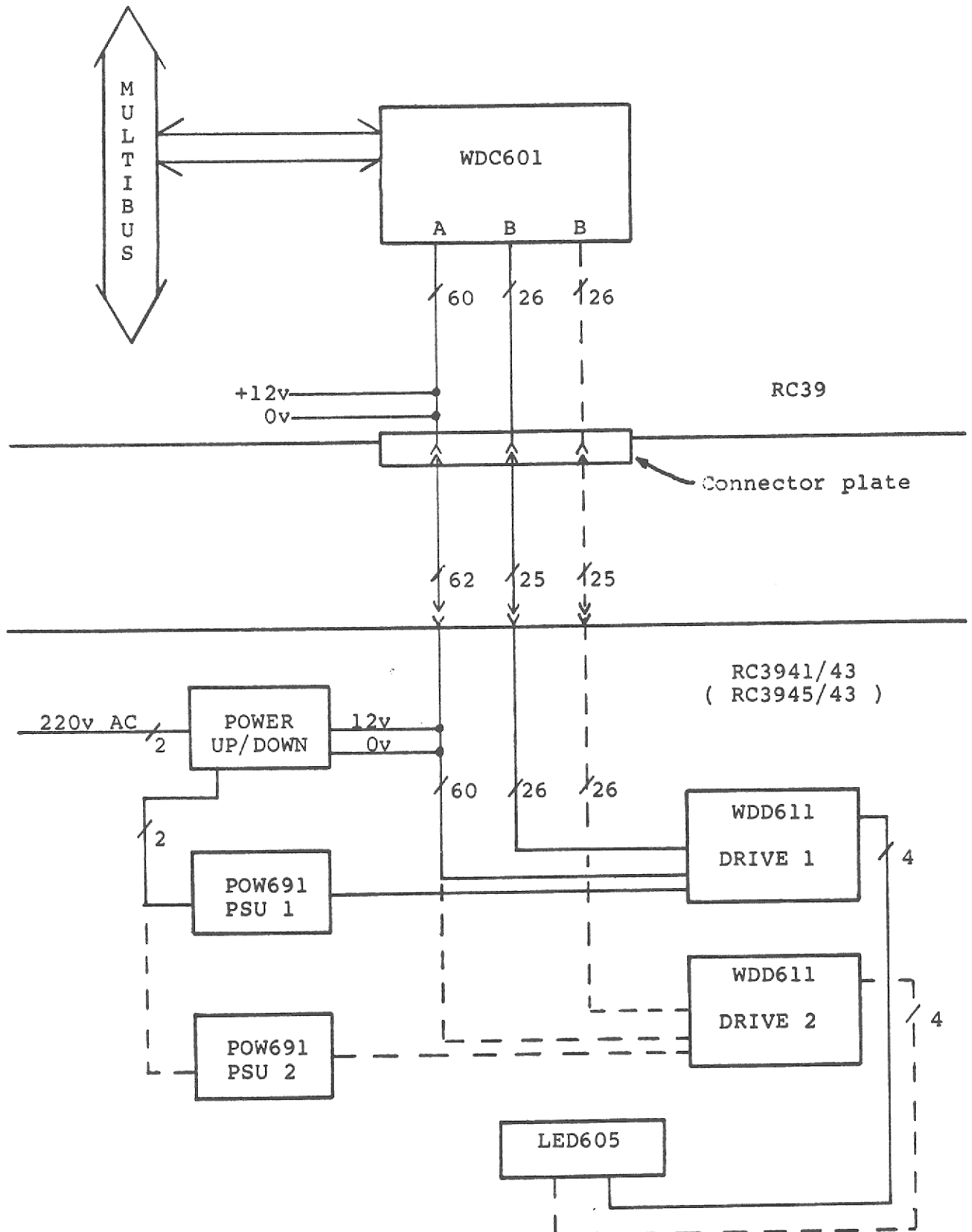


Fig. 2.1.

3. Block diagram.



3.1 Block diagram description

As shown on the top of the block diagram on page 4, the RC3941 interfere very little with the RC39. The WDC601 is a SMD controller which fits directly on the RC39 backplane. To make connections out of the RC39 two cables are used (the dashed lines is for the extention RC3943). These are the A and B cables of the SMD interface. The two 12 v lines are used in the power up/down. The connectors on RC39 are mounted on a metal connector plate.

For the RC3945/43 one/two more cables are connected to WDC601 and the A cable of the SMD bus is led through the RC3945 cabinet and ends in the RC3941 cabinet.

The bottom of the diagram shows the RC3941 (the dashed lines are the RC3943 extention). The WDD611 is a 8" winchester disk drive with a capacity of 300MB data, and POW691 is a power supply for the drive. LED605 is the LEDs on the front of the cabinet, which indicates if there is power on the drive and the status of the drive.

In the next chapter the parts of the block diagram are described in details. For further details see the references for this manual.

4. Module description

This section describes the parts of the RC3941, RC3943 and RC3945 in details. (See also references.)

4.1 WDC601 SMD controller board.

The WDC601 is a XYLOGICS 451 SMD controller board. It has some jumpers, and these are not configured right from the factory. Fig.4.1.1 shows the location of the jumpers on the 451 SMD board, and table 4.1.1. lists the actual jumper configuration for use with the RC3941. There is no change of the jumpers for use with RC3943 and RC3945.

The main data of the SMD controller:

More than 2.4MB/sec disk data transfer rate

8kB FIFO buffer

Fast DMA up to 3 MB/sec

Up to 4 drives per board

The drive is factory set to 1024 bytes data per sector, and this cannot be changed by the user.

JA 1-2 OUT	JA 3-4 OUT	
JA 5-6 OUT	JA 7-8 OUT	(JA will give the
JA 9-10 OUT	JA 11-12 OUT	controler the I/O
JA 13-14 OUT	JA 15-16 IN	address of 100H.)
JA 17-18 OUT	JA 19-20 OUT	
JA 21-22 OUT	JA 23-24 OUT	
JA 25-26 OUT		
JC 1-2 OUT	(16 bit register addresses)	
JD 1-2 IN	JD 3-4 IN	
JE 1-2 IN	JE 3-4 IN	
JG 1-2 OUT	JG 3-4 OUT	(-5v on board regulator)
JH 1-2 IN	(DC power fail detect)	
JK all IN	(24 bit address)	
JM 1-2 IN	(24 bit address)	
JN 1-2 OUT	(Remote activity indicator off)	
JW 2-3 IN		
JX 1-2 OUT	JX 3-4 OUT	
JX 5-6 IN	JX 7-8 OUT	(JX will give the
JX 9-10 OUT	JX 11-12 OUT	board interrupt
JX 13-14 OUT	JX 15-16 OUT	level 2)
JY 1-2 OUT	(Parallel abitration)	
JZ 1-2 IN	(CBRQ enable)	

Table 4.1.1

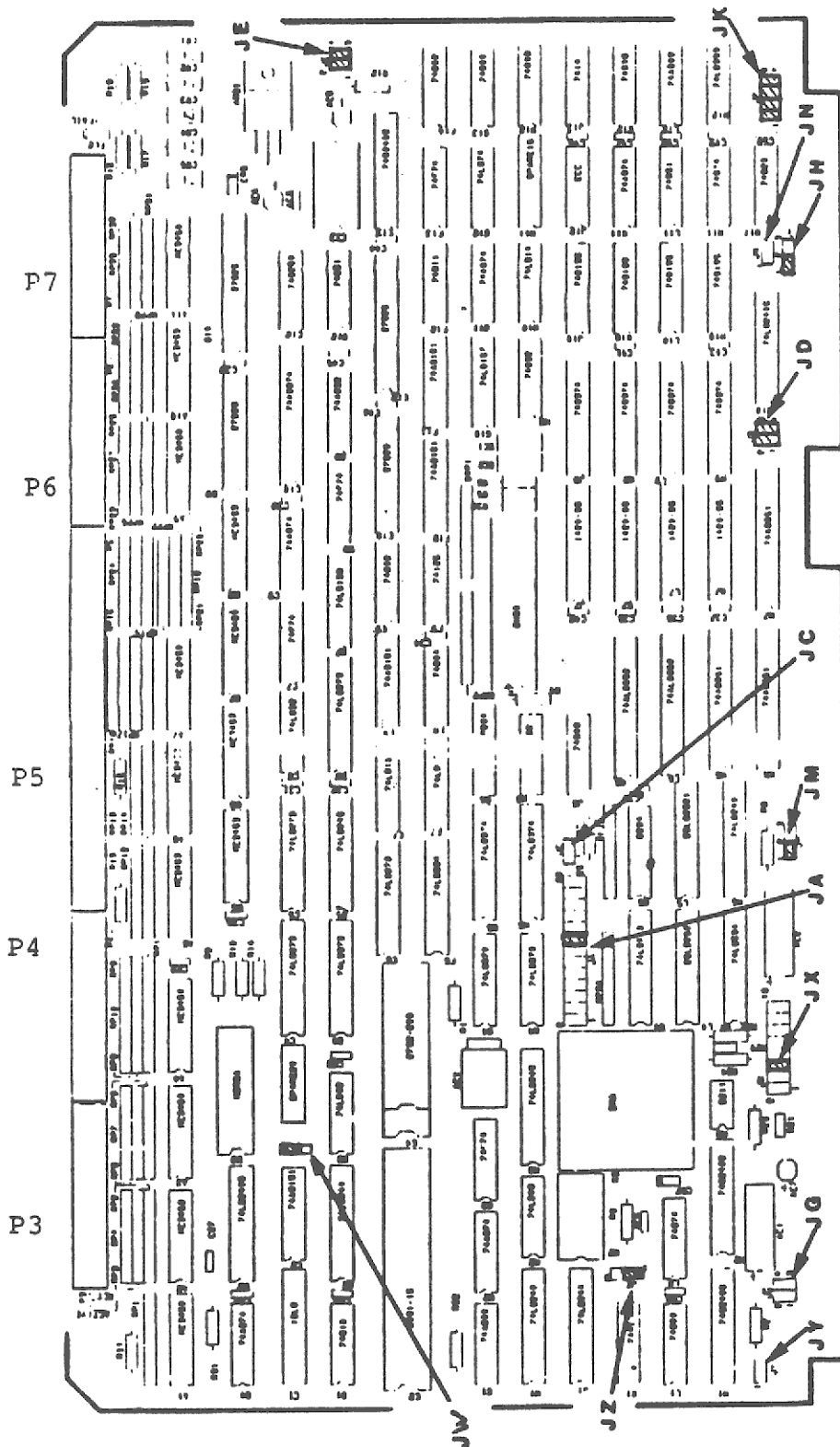


Fig. 4.1.1 jumper location.

Fig. 4.1.2 and 4.1.3 show the SMD interface connections on the WDC601 board.

Signal Name	Differential Pins Asserted State Pin Polarity		Signal Source
	Low	High	
Unit Select 2 ^a	23	53	Controller
Unit Select 2 ¹	24	54	Controller
Unit Select 2 ²	26	56	Controller
Unit Select 2 ³	27	57	Controller
Unit Select Tag	22	52	Controller
Tag 1 — Cylinder Address	1	31	Controller
Tag 2 — Head Select	2	32	Controller
Tag 3 — Control Select	3	33	Controller
Bus Out 0	4	34	Controller
Bus Out 1	5	35	Controller
Bus Out 2	6	36	Controller
Bus Out 3	7	37	Controller
Bus Out 4	8	38	Controller
Bus Out 5	9	39	Controller
Bus Out 6	10	40	Controller
Bus Out 7	11	41	Controller
Bus Out 8	12	42	Controller
Bus Out 9	13	43	Controller
Bus Out 10	30	60	Controller
Open Cable Detected	14	44	Controller
Index	18	48	Disk Drive
Sector Mark	25	55	Disk Drive
Fault	15	45	Disk Drive
Seek Error	16	46	Disk Drive
On Cylinder	17	47	Disk Drive
Unit Ready	19	49	Disk Drive
Address Mark Detected	20	50	Disk Drive
Busy*	21	51	Disk Drive
Write Protect	28	58	Disk Drive
Power Sequence Pick	—	29	Controller
Power Sequence Hold	—	59	Controller

*Dual port units only

Fig. 4.1.2 SMD interface A cable.

Signal Name	Differential Pins Asserted State Pin Polarity		Signal Source
	Low	High	
Write Data	8	20	Controller
Ground	7	—	
Write Clock	6	19	Controller
Ground	18	—	
Servo Clock	2	14	Disk Drive
Ground	1	—	
Read Data	3	16	Disk Drive
Ground	15	—	
Read Clock	5	17	Disk Drive
Ground	4	—	
Seek End	10	23	Disk Drive
Unit Selected	22	9	Disk Drive
Ground	21	—	
Index	12	24	Disk Drive
Ground	11	—	
Sector	13	26	Disk Drive
Ground	25	—	

Fig. 4.1.3 SMD interface B cable.

Fig. 4.1.4 shows the A and B connectors on the WDC601 board.

2	4	6	8	26
	o	o	o	o
	o	o	o	o
1	3	5	7	25

B connectore.

2	4	6	8	60
	o	o	o	o
	o	o	o	o
1	3	5	7	59

A conector.

Fig. 4.1.4

4.2 WDD611 winchester disk drive

The WDD611 is a 8" winchester drive from NEC (D2268H).It has enhanced SMD interface and specifications as listed below.

2.458 MB/sec transfer rate.

337.1 MB unformatted data.

20 ms average seek time.

11 ms average latency.

3600 RPM rotational speed.

20-80 % relative humidity.

5-40 C operating temperatur.

5 G ,10 ms shock non-operating.

The WDD611 has to be configured by setting the switches located on the end of the drive. (See fig. 4.2.1)

The switches should be set as described in table 4.2.1 , for the RC3941 only. RC3943 and RC3945 deviates from RC3941 with some of the switches and these are listed in the following tables. See table 4.2.2 for RC3943 installed in RC3941, table 4.2.3 for RC3945 and table 4.2.4 for RC3943 installed in RC3945.

The "PROTECT" switch next to SW4 must be selected "off".

NOTICE: Only RC3941 must have the terminators installed (see fig. 4.2.1). ON all the others these must be removed.

SW2:

8 = 0
7 = 0 (8-5 select the drive address 0)
6 = 0
5 = 0
4 = 1
3 = 0 (Local mode motor start)
2 = 0 (Motor start delay = 0 sec.)
1 = 0

SW3:

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

SW4:

(SW4 select databytes per sector
and are set to 1024)
10 = 0
9 = 0
8 = 1
7 = 0
6 = 1
5 = 0
4 = 0
3 = 1
2 = 0
1 = 0

Table 4.2.1 RC3941.

SW2 :

8 = 0
7 = 0 (8-5 select the drive address 1)
6 = 0
5 = 1
2 = 1 (Motor start delay = 30 sec.)

Table 4.2.2 RC3943 in RC3941.

SW2 :

8 = 0
7 = 0 (8-5 select the drive address 2)
6 = 1
5 = 0

Table 4.2.3 RC3945

SW2 :

8 = 0
7 = 0 (8-5 select the drive address 3)
6 = 1
5 = 1
2 = 1 (Motor start delay = 30 sec.)

Table 4.2.4 RC3943 in RC3945.

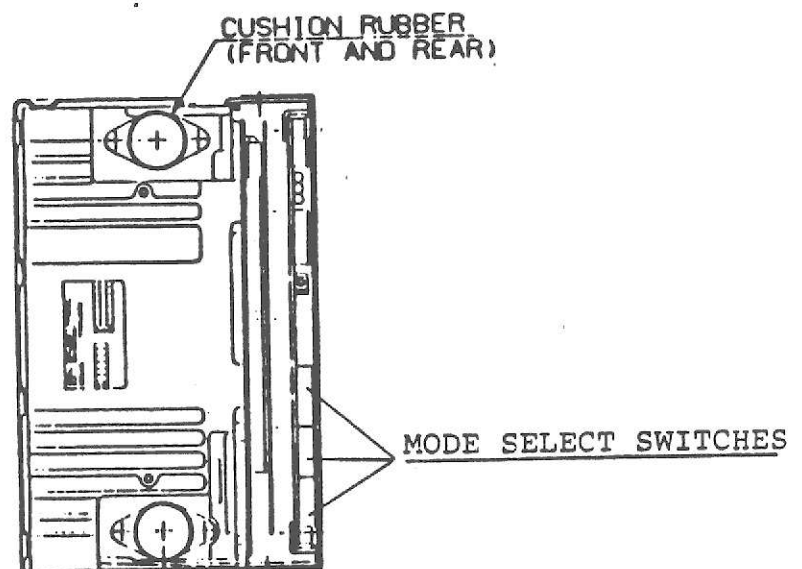
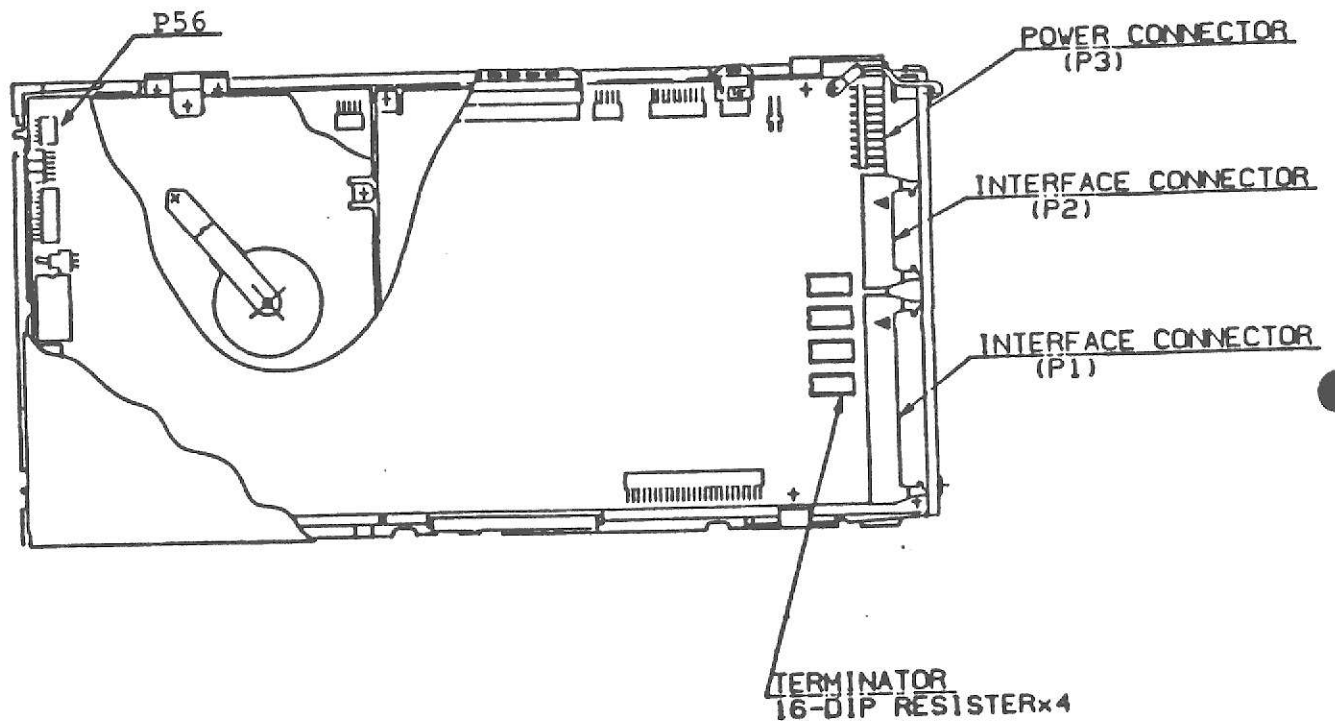


Fig. 4.2.1 mode select switches location.

4.3 LED605 LED indicator board.

The LED605 mainly consists of five LEDs. In fig. 4.3.1 the diagram is shown. LED605 is connected to the winchester drive by KBL776.

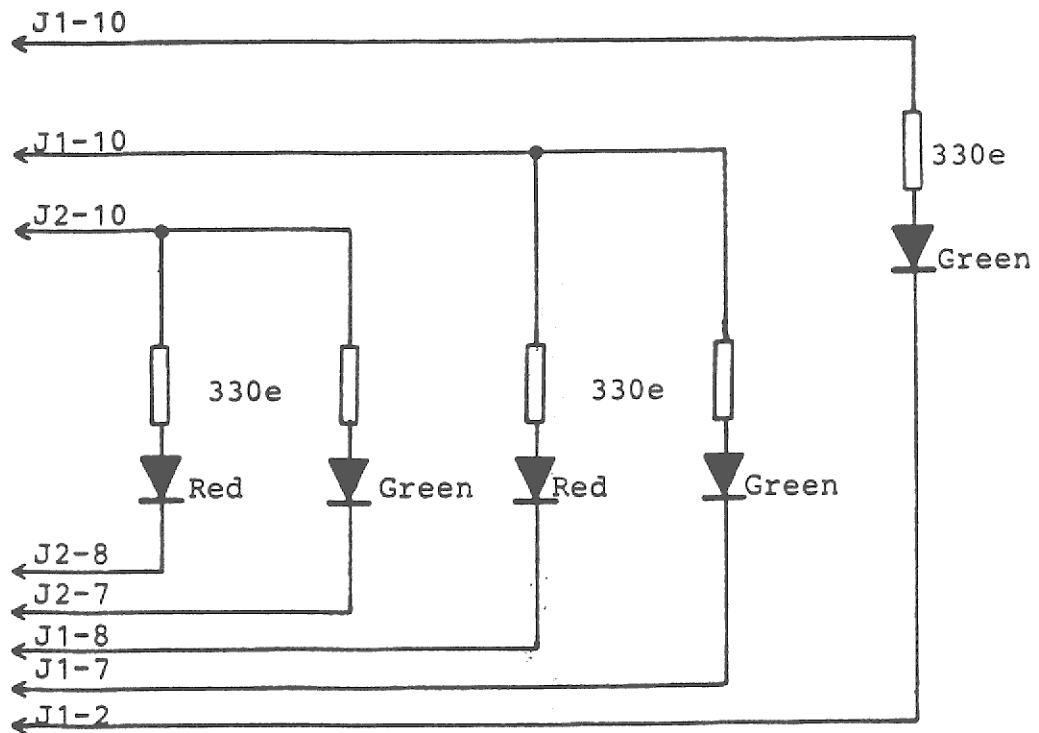


Fig. 4.3.1

J1 and J2 are indicated on the PCB. J1 is connected to drive no. 1 (RC3941/45) and J2 is connected to drive no. 2 (RC3943).

5. External connection

This section describes the external connection between RC3941 and RC39. Fig. 5.1 shows the connectors on the RC39 and fig.5.2 the connectors on RC3941/45. The J61 and J11 are 75 pin connectors for the SMD A cable, J62 and J21 is a 25 poled connector for the SMD B cable. J63 and J22 is also for a B cable, but is only used with the RC3943 extension of the RC3941/45. J12 is used to connect RC3945 to J11 on RC3941. J13 and J14 are for future use.

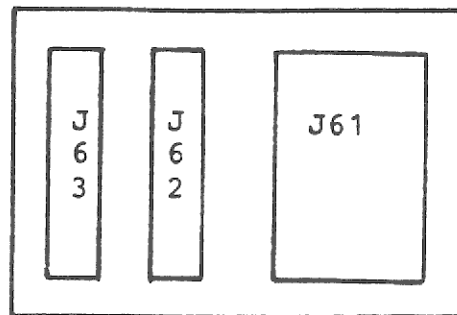


Fig. 5.1 cable connectors on RC39

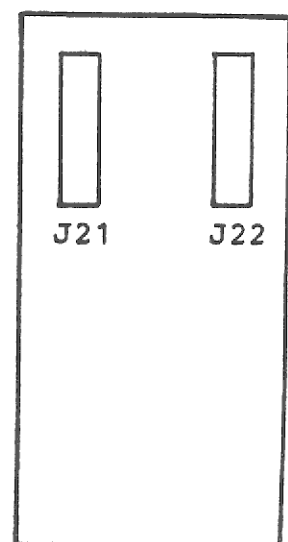
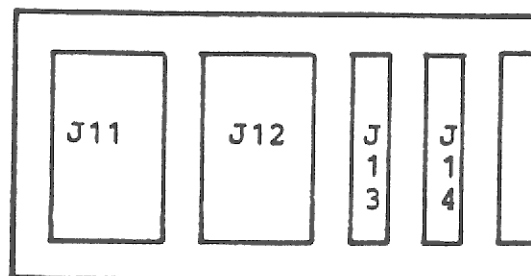


Fig. 5.2 cable connectors on RC3941/45.

The cables between RC39 and RC3941/45 are KLB835 (SMD A cable), which shall be connected to J61 on RC39 and J11 on RC3941/45, KBL836 (SMD B cable) shall be connected to J62 on RC39 and J21 on RC3941, and KBL836 between J63 on RC39 and J22 on RC3941. The SMD B cables to RC3945 are connected to J43 on RC39 to J21 on RC3945 and J44 on RC39 to J22 on RC3945/43 (See figur 5.3).

Appendix A contains a detailed description of the connectors.

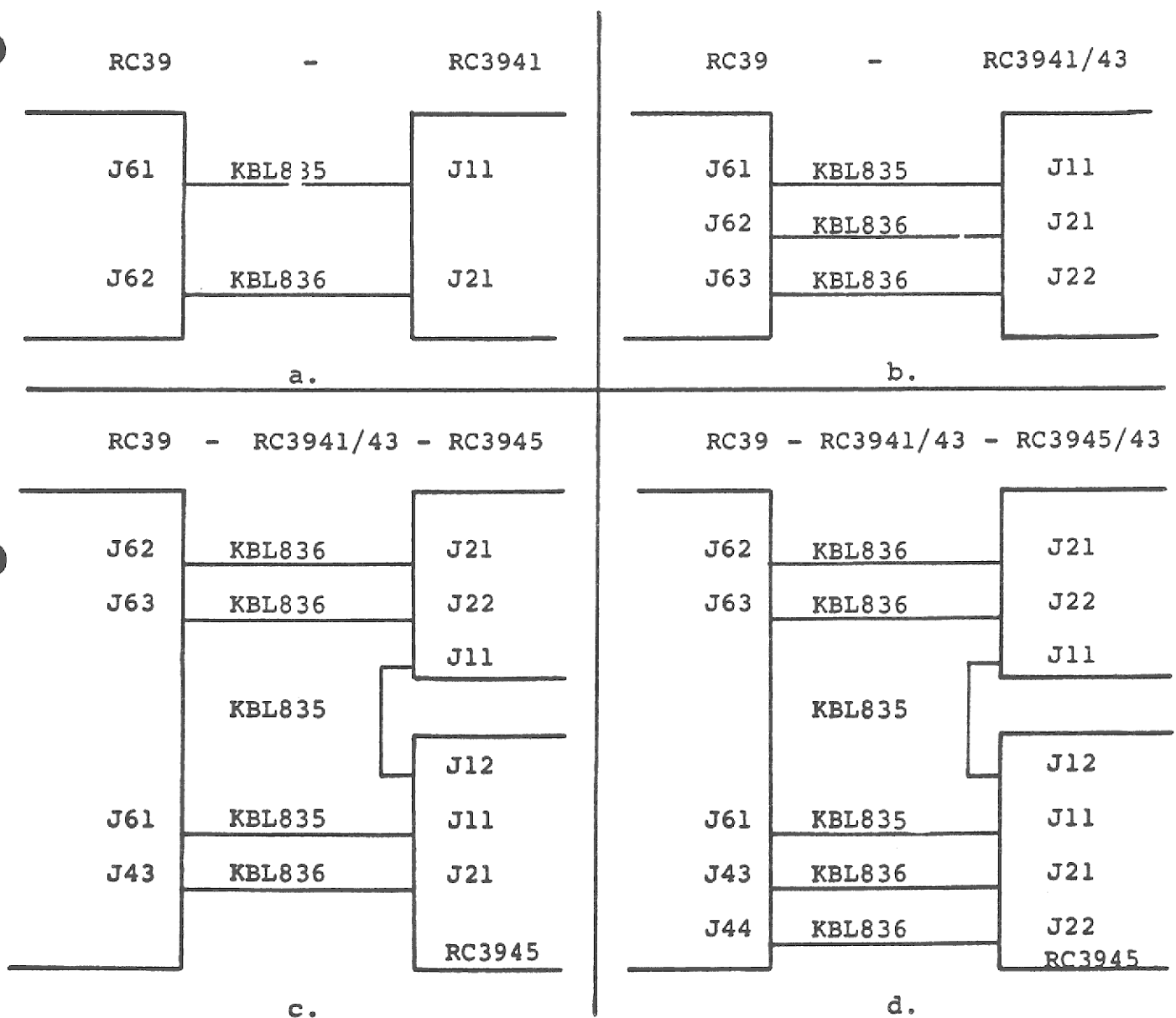


Fig. 5.3.

6. Internal connections

This section describes the internal connections in both RC39 and RC3941/45.

6.1 Internal connections in RC3941/45.

This section describes the internal connections in the RC3941/45. Fig. 6.1.1 shows the cables and respective numbers. See also section 8. Power connections.

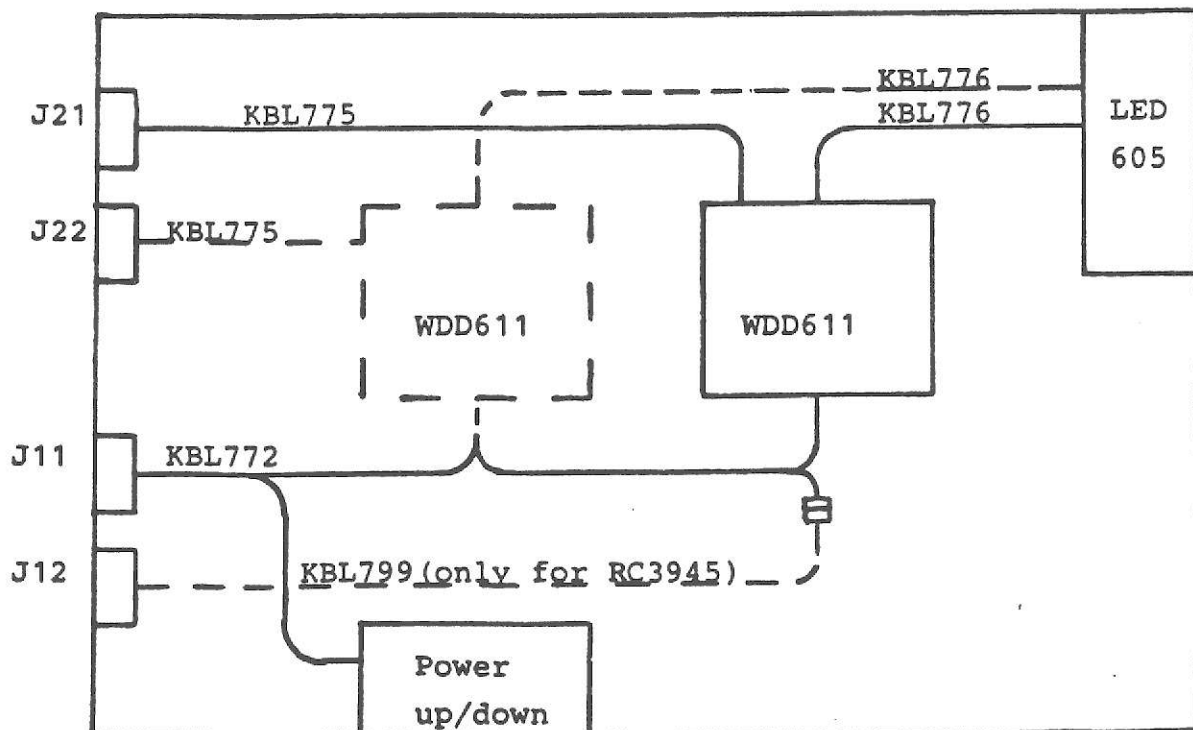


Fig. 6.1.1 internal cables in RC3941/45.

6.2 Internal connection in RC39

This section describes the internal connections in the RC39 concerning the installing of the RC3941/43/45. Fig. 6.2.1 shows the cables and their numbers.

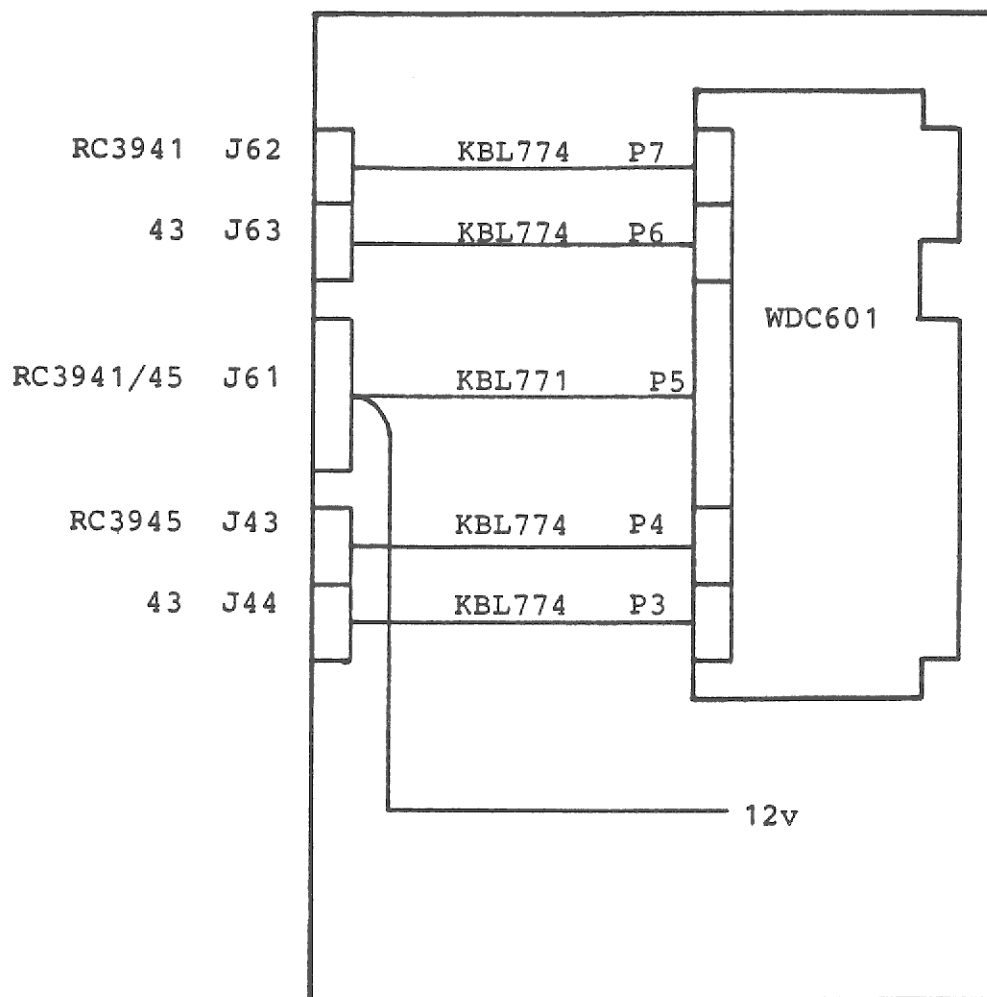


Fig. 6.2.1 internal cables in RC39

7. MULTIBUS usage

This section describes only the most important information about the WDC601 on the RC39 backplane (the MULTIBUS).

7.1 Position in the card cage

The WDC601 is to be installed in card cage position 5 on the RC39 backplane, fig. 7.1.1 shows the installation. The number refer to the numbers in the bottom of the RC39 cabinet in front of the card cage.

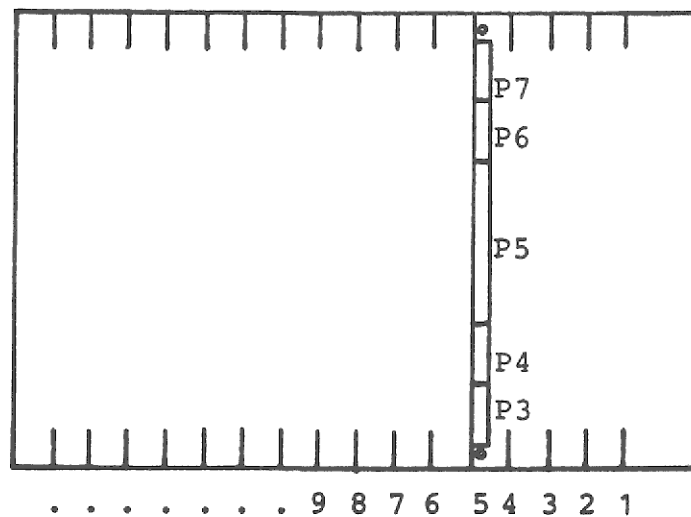


Fig. 7.1.1 card cage in RC39

7.2 Interrupt and I/O map

The WDC601 has some I/O registers as listed in table 7.2.1. For further informations about these see reference 1. page 9.

The interrupt request level is set to INT2/.

Use	16-bit
IOPB relocation register low byte.....	0100H
IOPB relocation register high byte.....	0101H
IOPB address register low byte.....	0102H
IOPB address register high byte.....	0103H
Control and status register (CSR).....	0104H
Controller reset/update register.....	0105H

Table 7.2.1

8. Power section

This section describes the power supply and cables in the RC3941/43/45.

8.1 POW691 power supply for WDD611

The POW691 power supply is made by NEC, and is dimensioned for the WDD611 (NEC D2268H winchester drive). It is only capable of driving one WDD611.

It is important to check, that the POW691 is set to the right voltage (must be 220 v AC). To control this look at the end of the POW691. It will clearly show, what is chosen.

8.2 Remote power up/down.

This section consist of one 12v relay, which is connected to a 12v power line directly from the RC39, and will switch on the power for the RC3941/45 at the moment, there is power from the RC39.

The 12v power line is coming from the cable A of the SMD interface which is extended by 2 more lines.

8.3 Power connections

Fig. 8.3.1 shows all the cables concerning the power supply in the RC3941/45.

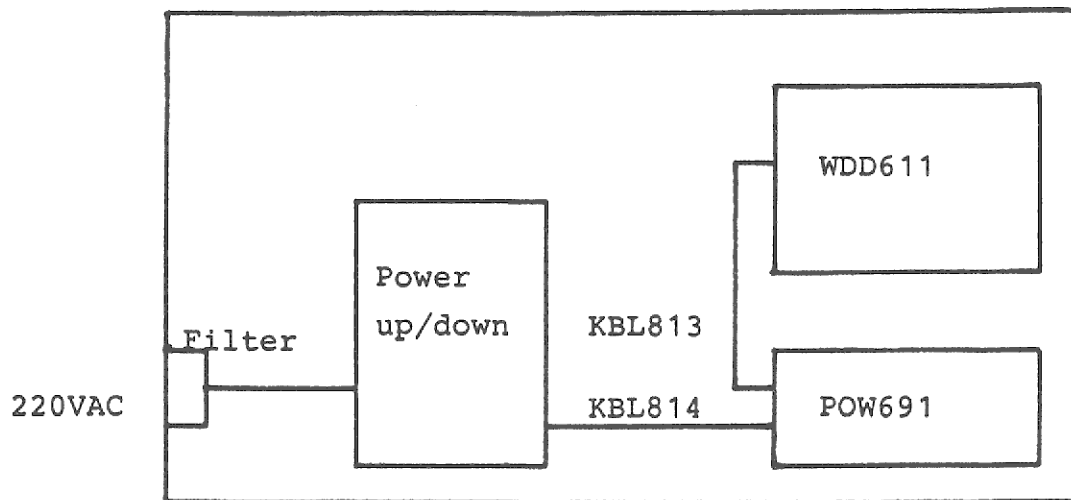


Fig. 8.3.1 power cables in RC3941/45.

9. Specifications

This section describes the environment in which the RC3941/43/45 can work correct and the physical specifications of the RC3941/43/45.

9.1 Power

Power consumption	RC3941/RC3945	max 200 W
	RC3943	max 170 W
Power voltage	220-240 VAC , earth required	
Fuses	One 1 A slow blow internal, in each POW691.	

9.2 Environmental specifications

Ambient temperature	5 - 40 C
Relative humidity	20 - 80 % (No condensation)

9.3 Physical specifications

Hight	630 mm
Width	310 mm
Depth	642 mm
Weight	38,5 kg (RC3941/45) (56,3 kg RC3941/45 and RC3943)

9.4 Transport

Environmental specifications for non operating.

Ambient temperatur	-10 - 60 C
Relativ humidity	10 - 90% (No condensation)
Shock	< 5 G , 10ms

WARNING:

Do not subject the RC3941/45 to vibrations or shock by transporting it on the wheels. The wheels are only to be used on a smooth floor. Be very careful on passing a door threshold.

A. Connectors.

Connectors:

On RC39: J62,J63,J43,J44

On RC3941/RC3945: J21,J22

Pin	Signal	
	I	
1	I	Servo clock
14	I	Servo clock
2	I	ground
15	I	Read data
3	I	Read data
16	I	ground
4	I	Read clock
17	I	Read clock
5	I	ground
18	I	Write clock
6	I	Write clock
19	I	ground
7	I	Write data
20	I	Write data
8	I	ground
21	I	Unit select
9	I	Unit select
22	I	Seek end
10	I	Seek end
23	I	ground
11	I	not used
24	I	not used
12	I	ground
25	I	not used
13	I	not used

Connectors:

On RC39: J61
 On RC3941: J11
 On RC3945: J11, J12

Pin	Signal
A1	Tag 1
A2	Tag 1
A3	Tag 2
A4	Tag 2
A5	Tag 3
A6	Tag 3
A7	Bus bit 0
B7	Bus bit 0
B6	Bus bit 1
B5	Bus bit 1
B4	Bus bit 2
B3	Bus bit 2
B2	Bus bit 3
B1	Bus bit 3
C1	Bus bit 4
C2	Bus bit 4
C3	Bus bit 5
C4	Bus bit 5
C5	Bus bit 6
C6	Bus bit 6
C7	Bus bit 7
D7	Bus bit 7
D6	Bus bit 8
D5	Bus bit 8
D4	Bus bit 9
D3	Bus bit 9
D2	Open cable det.
D1	n.c.
E3	Open cable det.

Pin	Signal
E2	Fault
E1	Fault
E4	n.c.
E5	Seek error
E6	Seek error
E7	On cylinder
F7	On cylinder
F6	n.c.
F5	n.c.
F4	n.c.
F3	n.c.
F2	Index
F1	Index
H7	n.c.
H6	n.c.
H5	n.c.
H4	n.c.
H3	n.c.
H2	n.c.
H1	Unit ready
J2	Unit ready
J7	n.c.
J6	n.c.
J5	n.c.
J4	n.c.
J3	n.c.
J1	Address mark
K1	Address mark

Pin	Signal
K2	Unit select tag
K3	Unit select tag
K4	n.c.
K5	Unit sel. bit 0
K6	Unit sel. bit 0
K7	Unit sel. bit 1
L7	Unit sel. bit 1
L6	Sector
L5	Sector
L4	Unit sel. bit 2
L3	Unit sel. bit 2
L2	Unit sel. bit 3
L1	n.c.
M1	Unit sel. bit 3
M2	Write protect
M3	Write protect
M4	Not used
M5	Not used
M6	Bus bit 10
M7	Bus bit 10
N1	12v or 0v
N2	0v or 12v

B. References

1. XYLOGICS 451 User Manual 166-451-001
PN: 99-1 10464
2. NEC D2268H 8" Winchester Disc Drive, Product Description.
PN: 99-1 10539
3. NEC D2268H 8" Winchester Disc Drive, Circuit Diagrams.
PN: 99-1 10540
4. RC3941 External Disc Test.
DLI 055
5. RC3941/43/45 External Disc Cabinet, HW Installation
Manual.
PN: 99-1 10534