

```
*****
*                                     *
*          DCR MFB                    *
*                                     *
*          multifunction board        *
*                                     *
*          Technical manual           *
*                                     *
*****
```

Version 1.1



1	GENERAL DESCRIPTION	1
1.1	Introduction	1
1.2	Purpose	1
1.3	Specifications	2
1.3.1	physical dimensions	2
1.3.2	operating environment	2
1.3.3	shipping environment	2
1.3.4	power requirements	2
1.3.5	addressing, vector and speed range serial interface	3
1.3.6	reliability	3
2	INSTALLATION	4
2.1	Jumpers on DCR MFB	4
2.2	Serial interface	7
2.2.1	data format selection serial interface	7
2.2.2	framing error halt serial interface	7
2.2.3	baud rate selection serial interface	7
2.2.4	break enable/disable serial interface	8
2.3	Programmable clock	9
2.4	Printer control interface	10
2.5	Run LED indicator	10
2.6	Bootstrap option	11
2.7	Proms	12
2.7.1	address selection prom	12
2.7.2	vector selection prom	12
2.7.3	boot prom	12
2.7.4	baud rate prom	13
2.8	Bus terminators	14
2.8.1	rules for configuring single backplane systems	14
2.8.2	rules for configuring multiple backplane systems	14
2.9	Required tools and materials	15
2.10	Adjustments	15
3	MAINTENANCE	16
3.1	Regular inspection	16
3.2	Hardware testing	16
3.3	Software testing	16
4	PROGRAMMING	17
4.1	Register definition serial line interface	17
4.2	Register definition of the parallel printer	18
4.3	Register definition clock	19
4.4	Interrupt priority	20
4.5	Bootprom address range	20
4.6	Printer interface signals	21
5	PIN LAYOUT J1 (26p flatcable conn.)	22
6	ENGINEERING CHANGE ORDERS	23

7	DRAWINGS	24
7.1	Electric diagram	24
	sheet 1	24
	sheet 2	25
	sheet 3	26
	sheet 4	27
	sheet 5	28
	sheet 6	29
	sheet 7	30
	sheet 8	31
	sheet 9	32
	sheet 10	33
	sheet 11	34
	sheet 12	35
	sheet 13	36
7.2	Component lay-out	37
7.2	Partslist	38
	sheet 1	38
	sheet 2	39
	sheet 3	40
	APPENDIX 1 standard pattern list	41
	APPENDIX 2 set up of address prom	42
	APPENDIX 3 set up of vector prom	45
	APPENDIX 4 set up of baud rate prom	48
	APPENDIX 5 set up of boot strap proms	49

1 GENERAL DESCRIPTION

1.1 Introduction

Chapter 1 gives general information and specifications.

Chapter 2 contains all necessary information for installing.

Chapter 3 informs about the necessary maintenance.

Chapter 4 informs about programming.

Chapter 5 shows pin layout J1 (34 pin flatcable conn.).

Chapter 6 deals with "engineering change orders" (ECO's).

Chapter 7 contains the necessary drawings.

Appendix 1 standard prom list.

Appendix 2 set up of address prom.

Appendix 3 set up of vector prom.

Appendix 4 set up of baud rate prom.

Appendix 5 set up of boot strap proms.

1.2 Purpose

DCR MFB is a dual width card, that plugs directly into the LSI-11 Q-bus. It is used in combination with the DCR MCB distribution panel located at the rear of the computerbox.

The card contains an asynchronous serial line interface (DLV11 compatible), a programmable line time clock, a parallel printerinterface (LPV11 compatible), a 512 word bootstrap prom (REV11 compatible) and busterminators as an option.

The serial channel has an EIA RS232 interface, with selection of data rate and data format. In general this channel is used to communicate with the console. Therefore the standard address and vector are fixed, namely 177560 and 60/64. The parallel channel supports Centronics type printers. The address and vector correspond to those of the LPV11 interface of DEC. To facilitate the use of the RSTS and RSX11M operating systems the line time clock drives the BEVENTL line on the Q-bus at a rate of 50 or 60 Hz and can be enabled or disabled via software or by a switch located on the DCR MCB. The address is 177546 and the vector 100. (This clock can be used as a normal LTC. For use with LSI 11/73 processor boards it can be disabled.) The bootstrap has two sections. A standard console bootstrap routine and an automatic bootstrap sequence. The standard console bootstrap routine is entered

by the CPU at address 773000, Dec's conventional starting address. The autoboot sequence is entered at address 765000. Each section has 256 words.

The DCR MFB connects to external devices through a 26 pin flatcable connector. The DCR MFB is normally used in combination with the DCR MCB distribution panel which provides two 25 pin D-connectors. One for the serial channel, the second for the printer interface. The pin definition is according to the IBM-pc printer connector. Furthermore the connector board has a baudrate rotary switch for the serial channel, a line time clock on/off switch, a halt/run switch and a LED RUN-indicator.

The DCR MFB fits into any Q-bus backplane card slot. If the DCR MFB is to be used as the Q-bus terminator, it must be installed in the last slot on the Q-bus. To prepare the DCR MFB for system termination, install the termination-resistor packs in sockets PR1, RP2 and RP3. In these packs, 180 Ohm is connected to + 5 V and 390 Ohm is connected to ground on each Q-bus line. These three resistors networks may be ordered from Datelcare.

1.3 Specifications

1.3.1 physical dimensions

PCB thickness	:	1.6 mm (typical)
width	:	130.8 mm
length	:	229.0 mm (including plastic handles)
max comp. height:		10.0 mm
total thickness	:	12.5 mm

1.3.2 operating environment

Temperature	:	ambient air 0 to +55 degrees C
Thermal shock	:	30 degrees C per hour
Humidity	:	10 to 90% relative humidity (non condensing)
Cooling	:	Suggested air flow of 25 cfm

1.3.3 shipping environment

Temperature	:	-40 to +85 degrees C
Humidity	:	0 to 95% non condensing

1.3.4 power requirements

+ 5 V +/- 5% @ 0.9 A.

1.3.5 addressing, vector and speed range serial interface

Addressing range: 174000-177770 (prom selectable)
Vector range : 0-774 (prom selectable)
Speed range : 75 to 19200 baud.

(For baudrate selection see 2.1.3)

1.3.6 reliability

The DCR MFB modules are designed to meet the best commercial standards of workmanship. Extensive testing is conducted to ensure a reliable service over the products lifetime.

2 INSTALLATION

This section contains information on procedures to install DCR MFB modules in Q-bus computer systems.

Installation should be performed by qualified personnel only. Incorrect installation cannot only damage the multifunction board, but also all other system components.

After carefully unpacking the multifunction board, it should be inspected for any physical damage. If any damage is found or expected, contact your distributor and do not install the board.

2.1 Jumpers on DCR MFB

Fig. 2.1 shows the location of the jumpers used on the DCR MFB. Table 2.1 gives a summary of the function of all these jumpers. In the next chapters the function of the various jumpers is explained more detailed.

Jumpers for serial interface:

jumperfield	Installed	Removed	Factory	Chapter
EPS	odd parity	even parity	R	2.2.1
NB1	2 bits code for word length		R	2.2.1
NB2			R	
TSB	one stop bit	two stop bits	R	2.2.1
PAR	parity enable	parity diable	R	2.2.1
DR - A			R	
DR - B	4 bits code for baudrate		R	2.2.3
DR - C			R	
DR - D			R	
BREAK - EN	break bit en.	---	I	2.2.4
BREAK - DIS	break bit dis.	---	R	

Jumpers for line time clock:

jumperfield	Installed	Removed	Factory	Chapter
LTC - RPLY	prog.clock	beventl.only	R	2.3
LTC - PROG	prog.clock	beventl.only	R	2.3
K5	freq = 50 Hz	freq = 60 Hz	R	2.3

Jumpers for paralel interface:

jumperfield	Installed	Removed	Factory	Chapter
BITS - 7	7 bits word	---	I	2.4
BITS - 8	8 bits word	---	R	2.4

Jumpers for run LED indicator:

jumperfield	Installed	Removed	Factory	Chapter
R - Active	Active mode	---	R	2.5
R - Passive	Passive mode	---	I	2.5

Jumpers for bootstrap option:

jumperfield	Installed	Removed	Factory	Chapter
BOOTSTRAP - ON	option on	---	I	2.6
BOOTSTRAP - OFF	option off	---	R	2.6
K2	BDOUT adr.sel	no BDOUT sel.	I	2.6

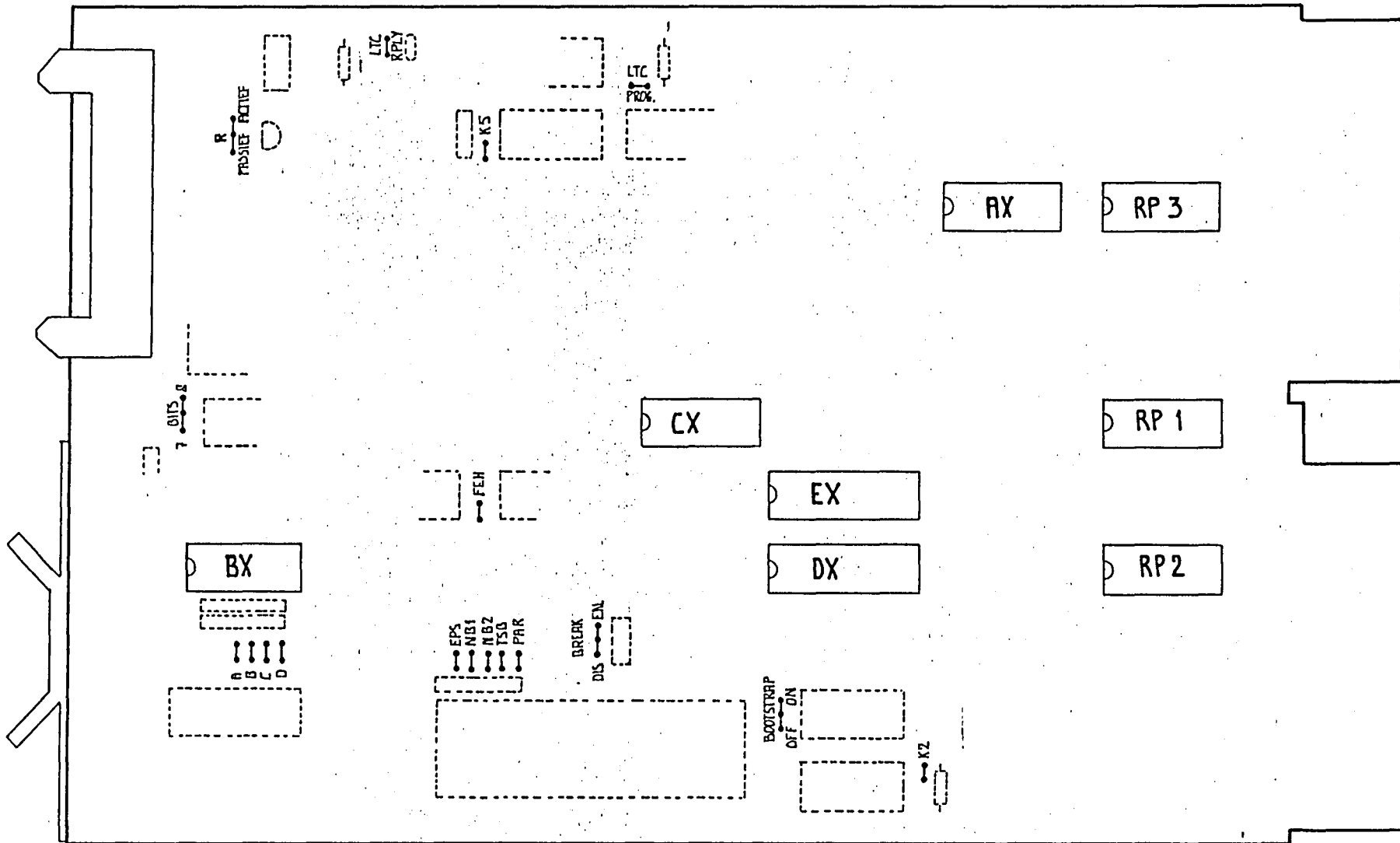


FIG. 2.1
JUMPER FIELD LOCATIONS

gewijzigd	datum	JUMPER LOCATIES	get. : H.2.	gec. :
		DCR MFB 125. A	datum : 06-27-86	schaal :
		REV. 0	aant.bl. : 1	tek.nr. : 15860616
			bladnr. : 1	doc.nr. :

2.2 Serial interface

2.2.1 data format selection serial interface

The next jumperfields can be used to select the data format for the serial interface. (For jumperfield locations, see Fig 2.1.)

o o	EPS	parity
o o	NB1	number of bits
o o	NB2	number of bits
o o	TSB	stop bits
o o	PAR	parity inhibit

Fig. 2.2

EPS	NB1,NB2	TSB	PAR
I:odd	I,I: 5 bits	I:one	I:enable
R:even	R,I: 6 bits	R:two	R:disable
	I,R: 7 bits		
	R,R: 8 bits		

Table 2.2

R = jumper removed
I = jumper installed

Factory settings: parity disabled, 8 bits, 2 stop bits.

2.2.2 framing error halt serial interface

Jumper-field FEH can be used to select halt on framing error. For jumperfield locations see Fig. 2.1

When this jumper is installed the halt-on framing error feature is implemented, causing system halt on a detected framing error.

Factory setting: no halt on framing error.

2.2.3 baud rate selection serial interface

There are two ways to select the baud rate;

- internal on the DCR MFB using 4 jumpers,
- external using the DCR MCB distribution panel.

When using remote baud rate selection, all baud rate jumpers on the DCR MFB board should be removed, and a special PROM should be inserted into the prom position marked as Bx. This PROM translates the info from the DCR MCB rotary switch to the right baudrate. (Only 10 different baud rates can be selected with the DCR MCB, see chapter 2.5.4) Appendix 2 shows the standard baudrate selection prom.

The baud rate can be set on the MFB board itself. For this reason the jumperfield DR is made. If the baudrate is set on the board the baudrate selection prom (position Bx) should be removed !
 For jumper setting see Table 2.3., the jumperfield locations are shown in fig 2.1.

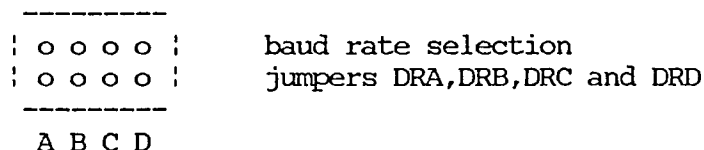


Fig 2.3

jumper/line				baudrate	
A	B	C	D		
R	R	R	R	19200	
I	R	R	R	9600	I = jumper installed
R	I	R	R	7200	R = jumper removed
I	I	R	R	4800	
R	R	I	R	3600	
I	R	I	R	2400	
R	I	I	R	2000	
I	I	I	R	1800	
R	R	R	I	1200	
I	R	R	I	600	
R	I	R	I	300	
I	I	R	I	150	
R	R	I	I	134.5	
I	R	I	I	110	
R	I	I	I	75	
I	I	I	I	50	

Table 2.3

2.2.4 break enable/disable serial interface

Jumperfield break enable/disable selects if it is possible to set the break bit. For jumperfield locations see Fig. 2.1

mode	BREAK		
	EN	DIS	
break enable	I	R	I = Installed
break disable	R	I	R = Removed

Table 2.4

Factory setting: break enabled

2.3 Programmable clock

The clockinterface is designed to emulate a linetime clock which drives the BEVENTL only or to emulate a programmable clock with build-in vector and control register. The mode can be selected by means of two jumpers named LTC-RPLY and LTC-PROG. For jumper field location see Fig 2.1 and table 2.5. The clockfrequency can be chosen between 50 and 60Hz, by installing or removing jumper K5.

mode	LTC RPLY	LTC PROG	
progr. clock	I	I	I = installed
BEVENTL. only	R	R	R = removed

Table 2.5

The "BEVENTL. only" mode is used in turnkey systems and in case a 11/73 processor is used. The progr. clock mode is used in other cases (e.g. a 11/23 processor board).

The clock-frequency can be selected by jumper K5.

mode	K5
50 Hz	Installed
60 Hz	Removed

Table 2.6

Factory settings: BEVENTL. only, 60 Hz.

2.4 Printer control interface

The principal function of the printer interface logic is to control "handshaking" across the interface. Handshaking is performed by the interface signals: character request ACKNOWLEDGE (or DEMAND), BUSY, ON LINE, PAPER-OUT (printer status), and DATA STROBE (character available).

Jumper field BITS can be used to choose between 7 and 8 bits data format. For ordinary printers only 7 bits ASCII-code is used, but the 8th bit may be strapped for use as a control bit for certain printers.

=====			
mode	:	BITS	
	:	7	8
=====			
7 bits format	:	I	R
8 bits format	:	R	I
=====			

I = Installed
R = Removed

Table 2.7

Factory setting: 7 bits.

2.5 Run LED indicator

The run LED indicator on the DCR MCB indicates if the processor is in RUN state or in HALT state. The best way to detect this state is sensing the SRUNL line on the Q-bus. This bus line (AF1 or AH1) is not used in DIGITAL cable or backplane assemblies. So the user should wire this pin from the processor slot to the DCR MFB slot to use this facility. This method is called a 'Active indicator'.

Another method is a 'Passive indicator'. In this case the run LED indicator senses the RUN/HALT switch on the DCR MCB and no special wiring is necessary.

Jumper field R is used to choose between active and passive indication.

=====			
mode	:	R	
	:	ACTIVE	PASSIVE
=====			
Active indicator	:	I	R
Passive indicator	:	R	I
=====			

I = Installed
R = Removed

Table 2.8

Factory setting: Passive indicator.

2.6 Bootstrap option

The bootstrap option can be used to boot-load an operating system. The function and options for the DCR-BOOT program are explained in the next chapter. There are two jumpers controlling this option. The first jumper field 'BOOTSTRAP' should be used to switch the bootstrap function on and off. The second jumper field 'K2' determines if the BDOUT signal is used for the address selection of the bootstrap proms.

=====				
mode	BOOTSTRAP		K2	
	ON	OFF		
=====				
Bootstrap on	I	R	I	
Bootstrap off	R	I	I	
=====				

I = Installed
R = Removed

Table 2.9

Factory settings: Bootstrap on, use BDOUT.

2.7 Proms

The DCR MFB board is standard produced with a set of empty proms. The programming is normally performed by DATELCARE on delivery.

2.7.1 address selection prom

The address selection is performed by inserting the correct prom, with programmed pattern, into the prom position marked as Ax. The addresses of all channels should be within the range of 174000-177770. Appendix 1 shows the standard address selection. Other selections can be made by DATELCARE on customers request. Appendix 2 explains the pattern set up.

2.7.2 vector selection prom

The vector selection is performed by inserting the correct prom, with programmed pattern, into the prom position marked as Cx. The vector of all channels should be within the range of 000-774. Appendix 1 shows the standard vector selection. Other selections can be made by DATELCARE on customers request. Appendix 3 explains the pattern set up.

2.7.3 boot prom

The DCR-BOOT program is used to boot-load an operating system.

The following commands are supported:

- DY[n] Boot RX-02 floppy-disks, n = 0 or 1
- DU[n] Boot MSCP devices, n = 0 - 3
- MS[n] Boot TS-11 tape devices. n = 0

The DU bootstrap is ment for Emulex controllers only (QD01/02 - QD32 etc.) Other devices can be programmed by DATELCARE BV on request.

The following utility command is supported:

- OD Go into ODT mode, press P to restart the boot.

The following messages can appear:

- >>> The normal boot-prompt, when this prompt occurs it means that the system passed the 0-28K memory test. You can now type the name of the drive you want to boot.

MEM ERR Memory error during 0-28K memory test.

INV DEV Invalid device, you tried to bootstrap a device that is not supported in this boot-program or that is not in your configuration (See list of supported devices above).

HRD ERR Hard error, the device you tried to boot returned a hard error. This generally means trouble but it could also be off-line, or a drive-door not properly closed.

If no message appears, verify the baudrate setting, the word length and the parity strapping for your console terminal.

The boot strap proms should be installed in position Dx and Ex. See appendix 1 for standard pattern list.

2.7.4 baud rate prom

The baudrate prom should be used together with the DCR MCB. When this panel is used, the prom should be inserted into position Bx. This prom translates the info from the DCR MCB rotary switch to the right baudrate. With the standard baud rate selection prom the following 10 baudrates can be selected on the DCR MCB: 75, 110, 150, 300, 600, 1200, 2400, 4800, 9600 and 19200. Appendix 4 shows the standard baudrate selection prom.

2.8 Bus terminators

On the DCR MFB a position is reserved to install the DCR MFB BUSTERM.KIT. This kit contains 3 special resistor arrays and a description how to install them. The next paragraphs explain when you should use the bus terminators.

2.8.1 rules for configuring single backplane systems

An AC bus load is the amount of capacitance a module presents to a bus signal line. One ac load equals 9.35 pF. A DC load is the amount of DC leakage current a module presents to a bus signal. One DC load equals 105 microamperes (nominal).

- 1 - The bus can accommodate modules that have up to 20 ac loads (total) before an additional termination is required. The processor has on-board termination for one end of the bus. If more than 20 ac loads are included, the other end of the bus must be terminated with 120 ohm. (e.g. The DCR MFB BUSTERM.KIT.)
- 2 - A single backplane terminated bus can accommodate modules comprising up to 35 ac loads (total).
- 3 - The bus can accommodate modules up to 20 dc loads (total).

2.8.2 rules for configuring multiple backplane systems

- 1 - Up to three backplanes may compose the system.
The signal lines on each backplane can be up to 25.4 cm long.
- 2 - Each backplane can accommodate modules that have up to 20 ac loads (total). Unused ac loads from one backplane may not be added to another backplane. It is desirable to load backplanes equally, or with the highest ac loads in the first and second backplanes.
- 3 - DC loading of all modules in all backplanes cannot exceed 20 loads (total).
- 4 - Both ends of the bus must be terminated with 120 ohms. This means that the first backplane must have an impedance of 120 ohms (obtained via processor 220 ohm terminations and a separate 220 ohm terminator), and the last backplane must have a termination of 120 ohms (e.g. the DCR MFB BUSTERM.KIT).

2.9 Required tools and materials

No special tools or materials are necessary to install the DCR MFB board, though you need solder equipment to change the strappings. You can use a sharp instrument to remove the factory installed strappings.

2.10 Adjustments

No adjustments are necessary.

3 MAINTENANCE

3.1 Regular inspection

The DCR MFB does not need any special maintenance, other than normally performed with computer systems. Twice a year the board should be removed from the system. The Q-bus edge connector should be inspected for dust, corrosion or other contaminants and if necessary, cleaned with alcohol (Ethanol 99%) and a soft cloth.

3.2 Hardware testing

The hardware testing is done by installing the interface in the computer system and running the appropriate diagnostic software (see chapter 3.3).

3.3 Software testing

With the DCR MFB no software is delivered.
DEC test VKAE can be used to test the module.

4 PROGRAMMING

4.1 Register definition serial line interface

The serial channel has four registers, each requires four addresses. The "BASE" address corresponds to the Receive/Status Register (RCSR). The addresses of the other registers of the channel then default as follows:

Base	RCSR	(Receive Command/Status Register)
Base+2	RDBR	(Receive Data Buffer Register)
Base+4	XCSR	(Transmitter Command/Status Register)
Base+6	XDBR	(Transmitter Data Buffer Register)

```
=====
RCSR - Receiver Command/Status Register
=====
```

Bit(s)	Function
15-08	Not used. Read as 0.
07	Receiver Done. Set when an entire character has been received and is ready for input to the processor. This bit is automatically cleared when RDBR is addressed or when the BDCOK H signal goes low. A receiver interrupt is requested by the channel when this bit is set and receiver interrupt is enabled (bit 6 is also set). Read only bit.
06	Interrupt Enable. Set under program control when it's desired to generate a receiver interrupt request when a character is ready for input to the processor (bit 7 is set). Cleared under program control or by the BINIT signal. Read/Write bit.
05-00	Not used. Read as 0.

Table 4.1

```
=====
RDBR - Receiver Data Buffer Register
=====
```

15-08	Not used. Read as 0.
07-00	Contains five to eight data bits in a right-justified format. The most significant bit (MSB) is the optional parity bit. The parity bit is not available if 8 bit/char data is selected. Read-only bit.

Table 4.2

```
=====
XCSR - Transmitter Command/Status Register
=====
```

15-08	Not used. Read as 0.
07	Transmit Ready. Set when XDBR is empty and can accept another character for transmission. It is also set during the power-up sequence by the BDCOK H signal. This bit is automatically cleared when XDBR is loaded. A receiver interrupt is requested by the channel when this bit is set and receiver interrupt is enabled (bit 6 is also set). Read only bit.
06	Interrupt Enable. Set under program control when it is desired to generate a transmitter interrupt request when the channel is ready to accept a character for transmission (bit 7 is set). Cleared under program control or by the BINIT signal. Read/Write bit.
05-01	Not used. Read as 0.
00	Break. Set or reset under program control. When set, a continuous space level is transmitted. BINIT resets this bit. Read/Write bit.

```
=====
Table 4.3
```

```
=====
XDBR - Transmitter Data Buffer Register
=====
```

15-08	Not used. Read as 0.
07-00	Contains five to eight data bits in a right-justified format. Loaded under program control for serial transmission to a device. Parity, if enabled, is automatically generated and suffixed to the data as it is transmitted. Write only, always read as 0.

```
=====
Table 4.4
```

4.2 Register definition of the parallel printer

The parallel interface, just as the serial, has the Q-bus address and interrupt vector address preset in the Prom. The standard lineprinter addresses are 177514 for the Command Status Register (CSR) and 177516 for the Data Buffer Register (DBR). The interrupt vector address is 200.

```

=====
CSR - Command Status Register
=====

```

15	Error - Set when either a fault occurs in the printer or the printer is placed off-line. Read-only bit.
14-08	Not used. Read as 0.
07	Done - Set when printer signals it is not busy and is ready for another character. When this bit is set and the interrupt is enabled (bit 6 also set), an interrupt request is asserted by the channel. Read-only bit.
05-02	Not used. Read as 0.
01	On-Line - Set when the printer is in the select condition. Read only bit.
00	Busy - Set when the printer is busy. Read only bit.

```

=====
Table 4.5

```

```

=====
DBR - Data Buffer Register
=====

```

15-08	Not used. Read as 0.
07-00	Contains eight data bits that are loaded under program control for transmission to the printer. Write-only. Read as 0.

```

=====
Table 4.6

```

The eighth data bit (bit 07) is generally used for special printer control such as double width characters on the CT701 printer. This bit, if not used, can be disabled by a jumper on the DCR MFB.

4.3 Register definition clock

The control and status register (LTCCSR) of the clock is fixed at the default address 777546. By reading this register the status of the clock can be obtained, by writing it the clock will be enabled or disabled, according to the register definition below.

```

=====
WRITING the LTCCSR.
=====
15-07      | not used, contents ignored.

06         | Interrupt enable, set under program control when it
           | is desired to generate an interrupt at the BEVENTL
           | busline every 1/60 sec, Cleared under program
           | control or by a BINIT signal. This bit can be read
           | back.

05-00      | not used, contents ignored.
=====

```

Table 4.7

```

=====
READING the LTCCSR.
=====
15-08      | not used, read as 0.

07         | LTC interrupt request. Set when the line time clock
           | generates an interrupt at BEVENTL. Cleared when the
           | the LTCCSR is read or by a BINIT signal.

06         | Interrupt enable, Set under program control for
           | enabling clock interrupts. Cleared under program
           | control or by a BINIT signal.

05-00      | not used, read as 0.
=====

```

Table 4.8

4.4 Interrupt priority

Standard (on board) priority is as follows:

3 (highest)	Serial interface receive
2	Serial interface transmit
1 (lowest)	Printer interface transmit

4.5 Bootprom address range

The bootprom address range is from 773000 to 773777 and from 765000 to 765777.

4.6 Printer interface signals

Signal name	Signal pin (on J1)		
Data 1/8	6,7,8,9,10, 11,12,13	output	Seven or eight-bit character or control code DATA1-DATA7.
DATA STROBE	5	output	Negative-going pulse (approx.2 usec) sent to printer when data character has settled in the Output Buffer Register. STROBE causes printer to sample the data lines.
ACKNOWLEDGE	4	input	Four-microsecond pulse synchronizes transfer from the Controller to printer. Printer sends ACKNLG to request a character from the Controller after last-received character has been stored or functional operation has been completed.
ON LINE	2	input	Indicates to Controller that printer is ready and has been selected by operator. SELECT is an error condition shown in the status returned to the program.
BUSY	3	input	A high level indicates that the printer cannot receive data. Typical conditions that cause a high BUSY level are buffer full, or an error condition.
PAPER OUT	1	input	A high level indicates the printer is out of paper

Table 4.9

5 PIN LAYOUT J1 (26p flatcable conn.)

Connector J1 carries all external signals and power supply, needed on the MFB MCB

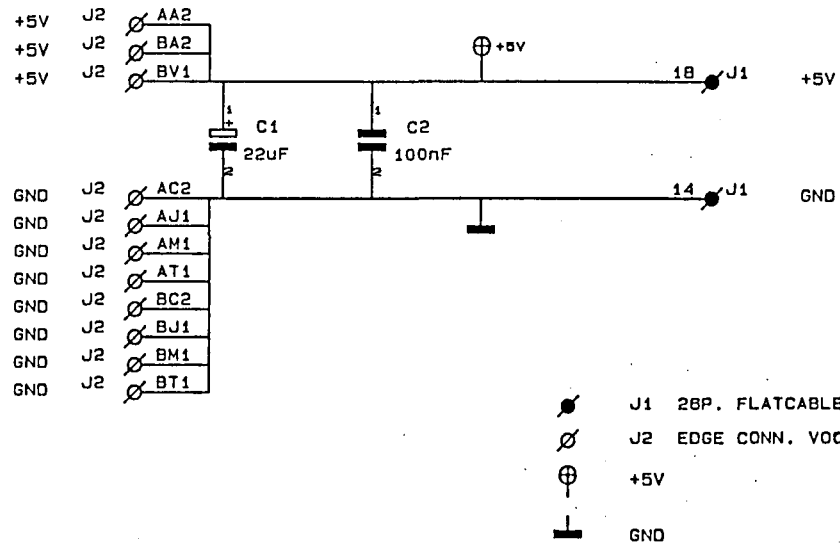
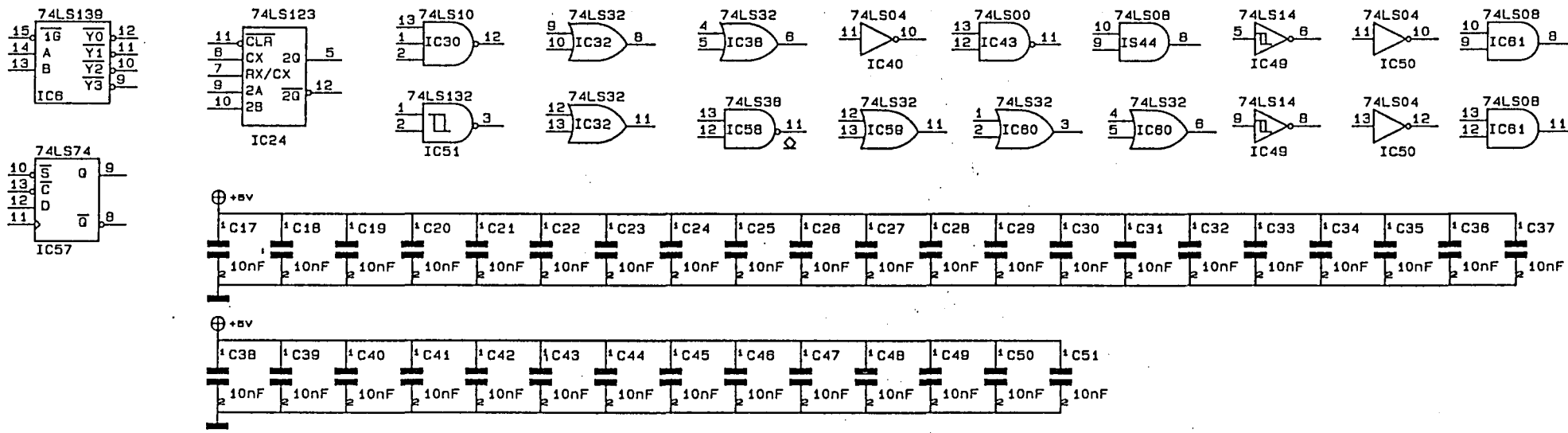
For special applications the signals and power supplies are available as shown in Table. 5.1.

pin number	label	function
1	PAPER OUT	printer: paper out signal
2	ON LINE	printer: on line signal
3	BUSY	printer: busy signal
4	/ACK	printer: acknowledge
5	/STROBE	printer: data strobe
6	D1	
7	D2	
8	D3	
9	D4	printer: data bits
10	D5	
11	D6	
12	D7	
13	D8	
14	GROUND	signal ground
15	BHALT 1	halt/run: GND = RUN
16	BHALT 2	halt/run: GND = HALT
17	RUN L	run LED indicator
18	+ 5 VOLT	
19	LTC ENABLE	GND: disable LTC
20		not connected
21	TX RS232	RS232C transmit signal
22	RX RS232	RS232C receive signal
23	A	For baudrate select switch
24	B	
25	C	
26	D	

Table 5.1

6 ENGINEERING CHANGE ORDERS

No engineering change orders are to be made on A-level boards.



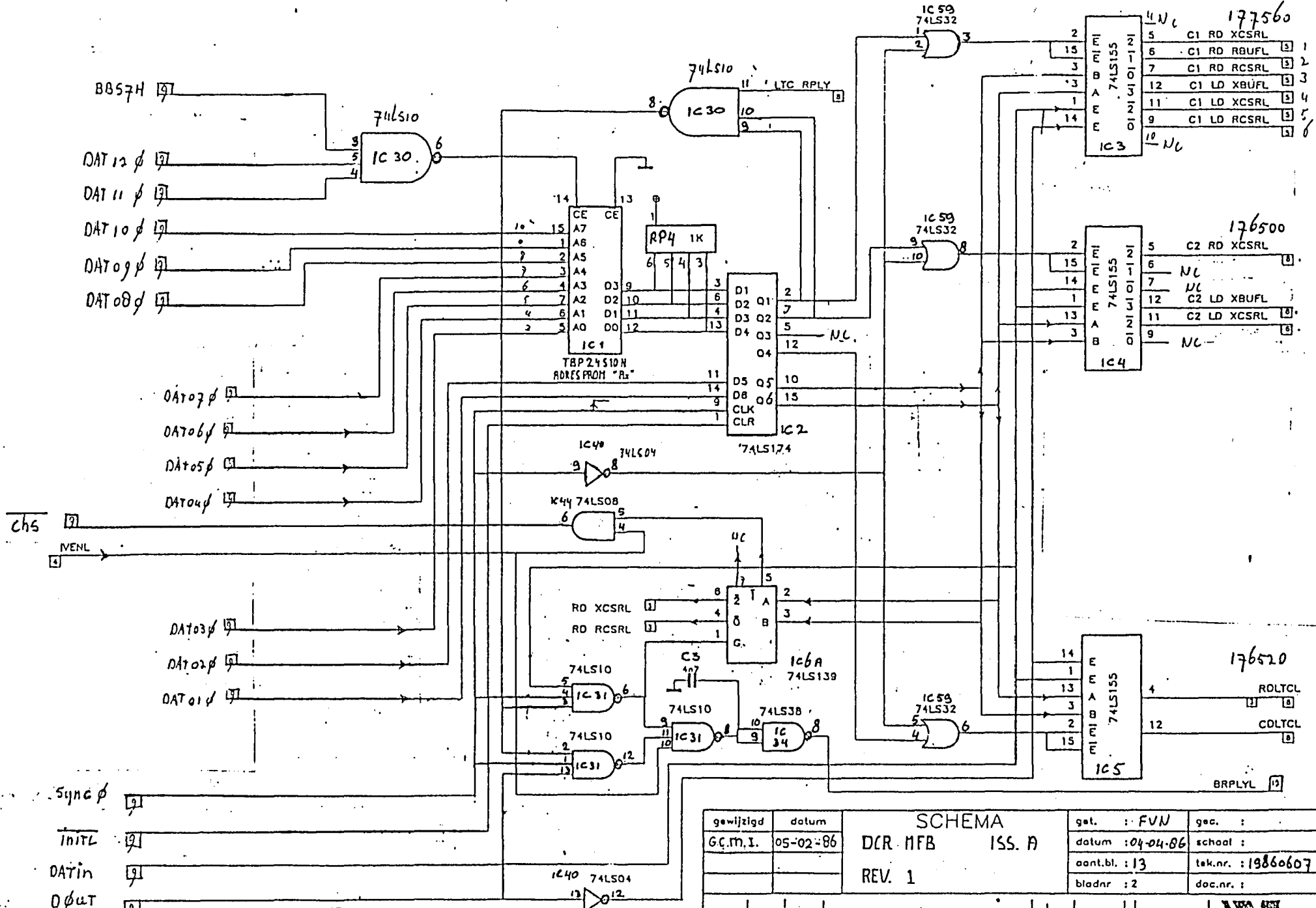
- J1 28P. FLATCABLE CONN. T.B.V. DCR MCB
- J2 EDGE CONN. VOOR Q-BUS
- +5V
- GND

PRINTNUMMER 19860806 REV.1

OVERZICHT
VOEDINGS PUNTEN VAN DE VERSCHILLENDE IC 'S

IC NR.	+5V	GND	IC NR.	+5V	GND
IC1	16	8	IC31	14	7
IC2	18	8	IC32	14	7
IC3	18	8	IC33	14	7
IC4	18	8	IC34	14	7
IC5	18	8	IC35	14	7
IC6	18	8	IC36	14	7
IC7	20	10	IC37	18	8
IC8	18	8	IC38	14	7
IC9	18	8	IC39	14	7
IC10	18	8	IC40	14	7
IC11	18	8	IC41	14	7
IC12	20	10	IC42	14	7
IC13	18	8	IC43	14	7
IC14	18	8	IC44	14	7
IC15	18	8	IC45	14	7
IC16	18	8	IC46	14	7
IC17	18	8	IC47	18	8
IC18	20	10	IC48	18	8
IC19	20	10	IC49	14	7
IC20	20	10	IC50	14	7
IC21	18	8	IC51	14	7
IC22	14	7			
IC23	18	8			
IC24	18	8			
IC25	4	3			
IC26	14	7			
IC27	14	7			
IC28	2	11			
IC29	18	8			
IC30	14	7			

GEW.	DATUM	SCHEMA	GET.:	HJ	GEC.:
G.C.M.I.	05-27-86	DCR MFB iss. A	DAT.:	04-03-86	SCHAAL:
		REV. 1	AANT.BL.:	13	TEKNR.: 19860807
			BLADNR.:	1	DOCNR.:



177560

5	C1 RD XCSRL	1
6	C1 RD RBUFL	2
7	C1 RD RCSRL	3
12	C1 LD XBUFL	4
11	C1 LD XCSRL	5
9	C1 LD RCSRL	6
10	NC	

176500

5	C2 RD XCSRL	
6	NC	
7	NC	
12	C2 LD XBUFL	
11	C2 LD XCSRL	
9	NC	

176520

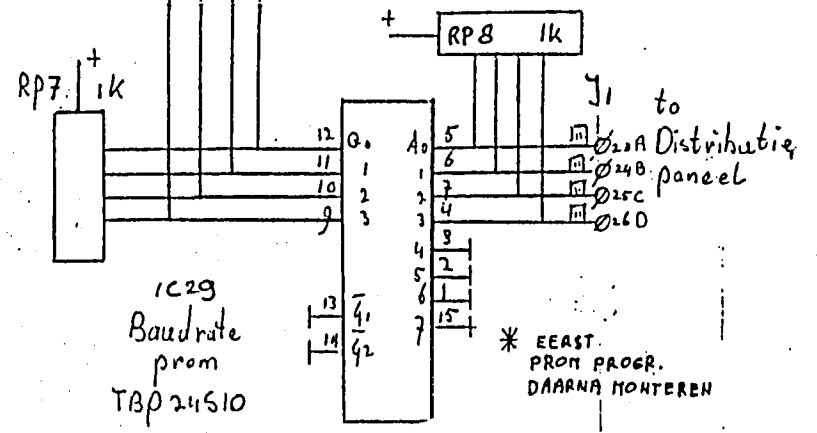
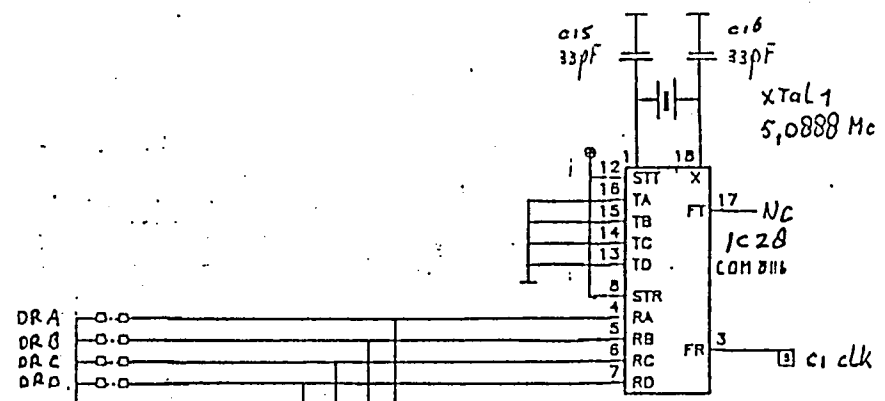
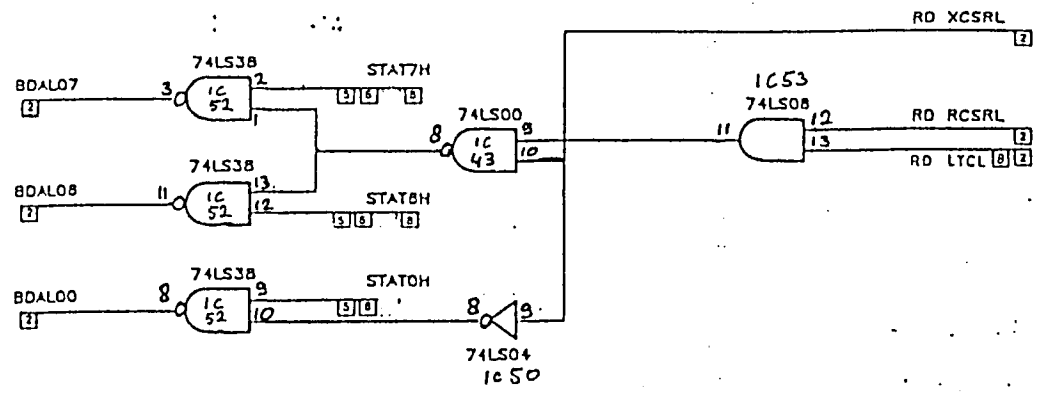
14	E	
1	E	
13	A	ROLTCL
3	B	
2	E	CDLTCL
15	E	

gewijzigd	datum	SCHEMA		get.	: FVN	gec.	:
G.C.M.I.	05-02-86	DCR MFB	ISS. A	datum	: 04-04-86	school	:
		REV. 1		aant.bl.	: 13	tek.nr.	: 19860607
				bladnr	: 2	doc.nr.	:

RS232

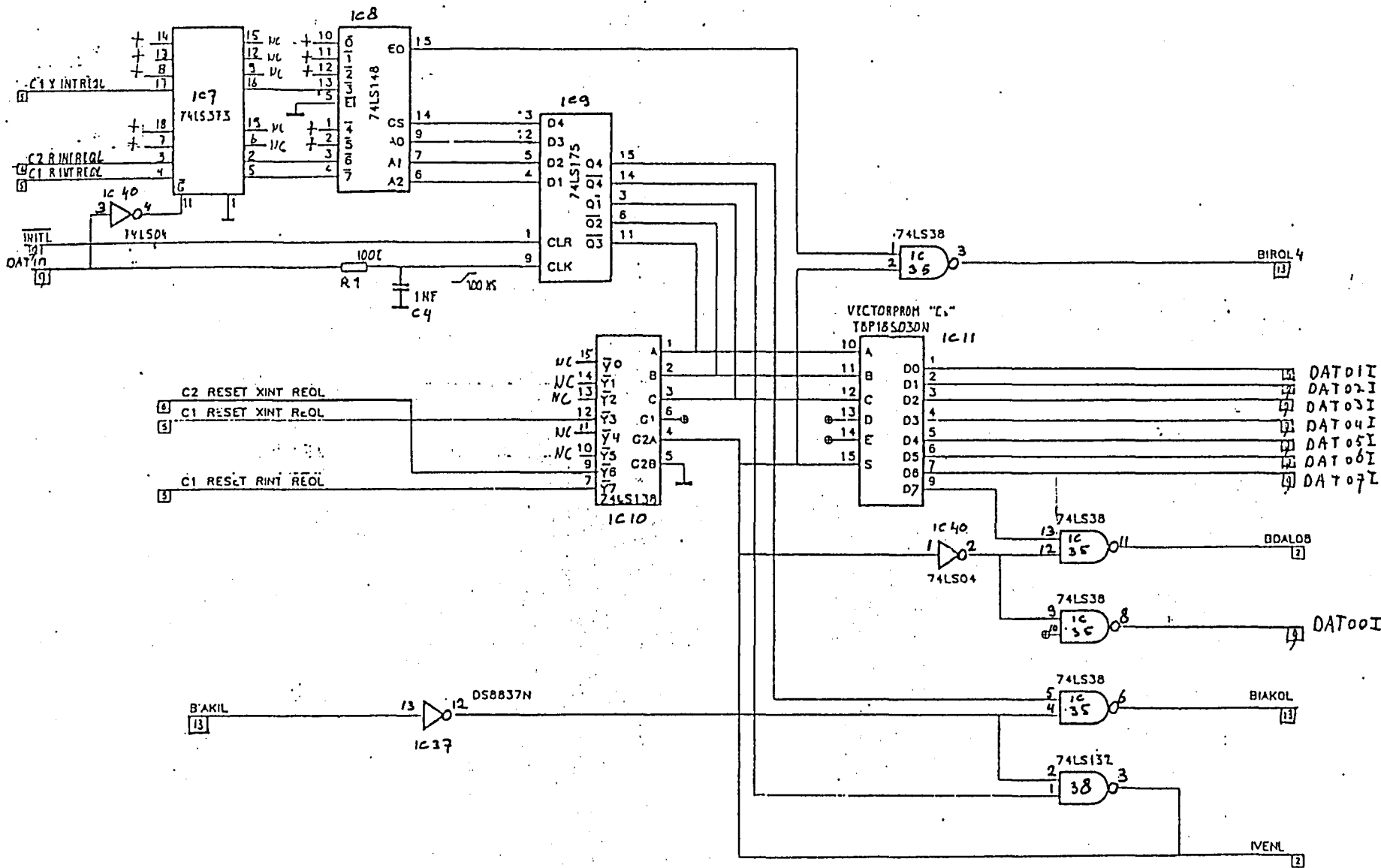
Centrom

clock

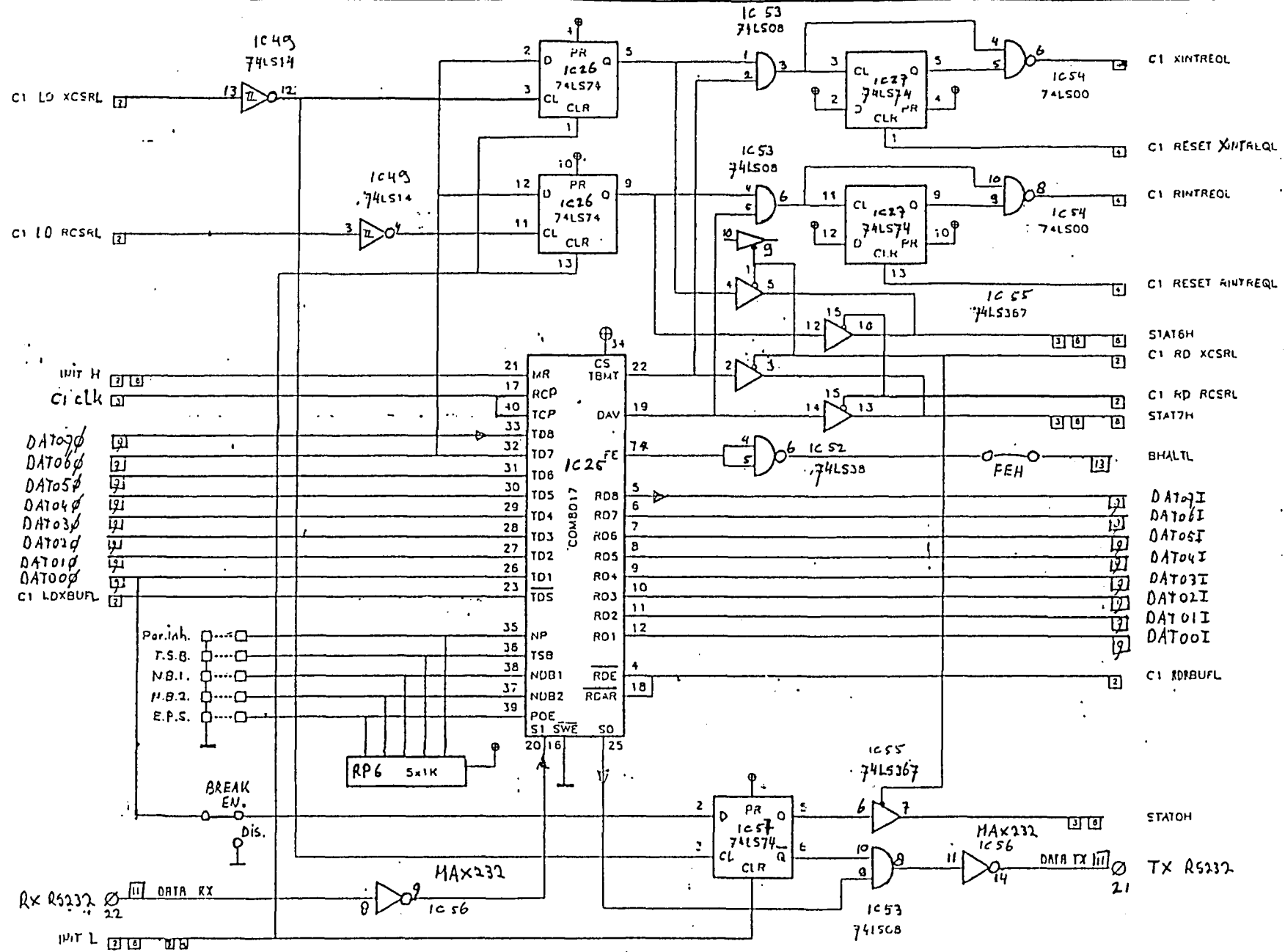


Ø CONN. PWT. 21 FLATCABLE CONN.

gewijzigd	datum	SCHEMA DCR MFB ISS. A REV. 1	get. :	FvN	goc. :
GEMI	05-02-86		datum :	4/4/86	schaal :
			aant.bl. :	13	tek.nr. :
			bladnr. :	3	doc.nr. :



gewijzigd	datum	SCHEMA		get. :	FvN	gec. :
G.C.M.I	05-02-86	DCR MFB	ISS. A	datum :	4-4-86	school :
G.C.M.I	05-26-86	REV. 1		aant.bl. :	13	tek.nr. :
				bladnr. :	14	doc.nr. :

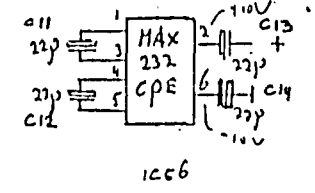


INIT L 2 3 4 5

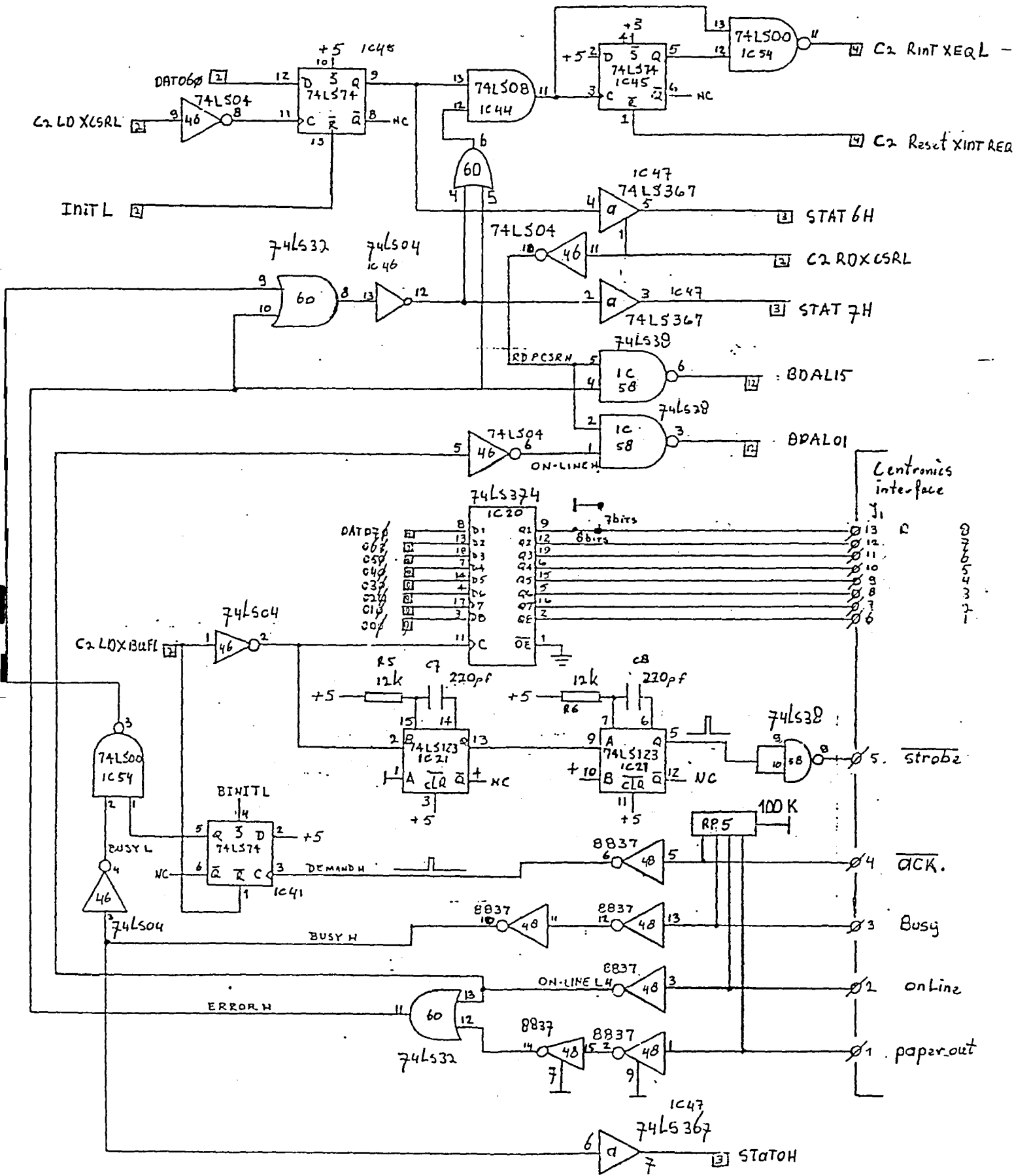
DATA RX 22

DATA TX 21

21 FLATCABLE CONN.



gewijzigd		datum		SCHEMA		get. :	goc. :
GCM	I	05-02-86		DCR	MTB	ISS. A	
				REV. 1			
						datum :	4-4-86
						aant.bl. :	13
						bladnr :	5
						tek.nr. :	19860607
						doc.nr. :	



SCHEMA
 DCR MFB ISS. A
 REV. 1
 TEKNR. 19860607
 BLANR. 6
 4-4-86

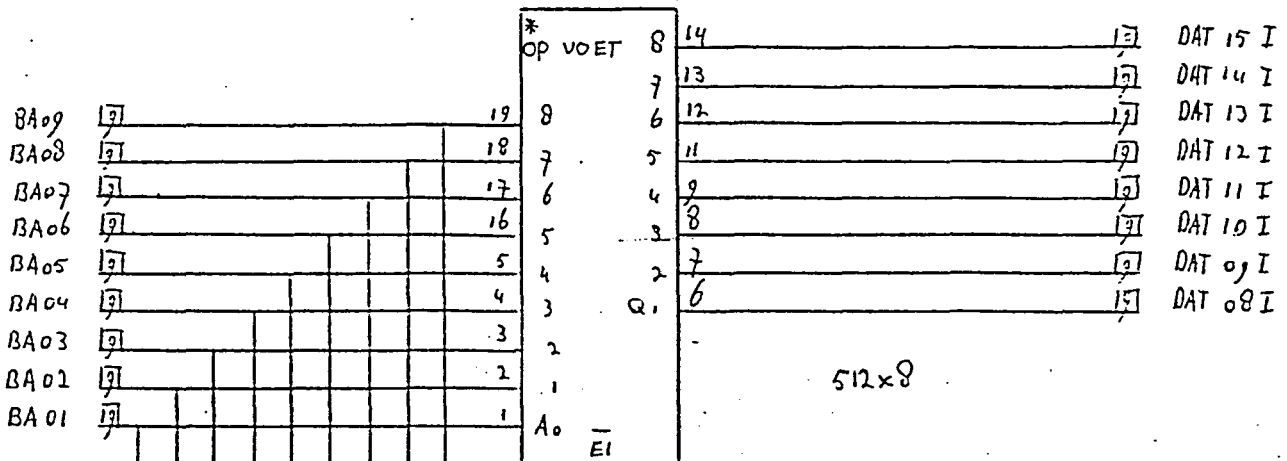
Ø to distributie paneel

Gew: G.C.M.I. 05-26-86
 H.2. 06-26-86

printer port
 Channel 2

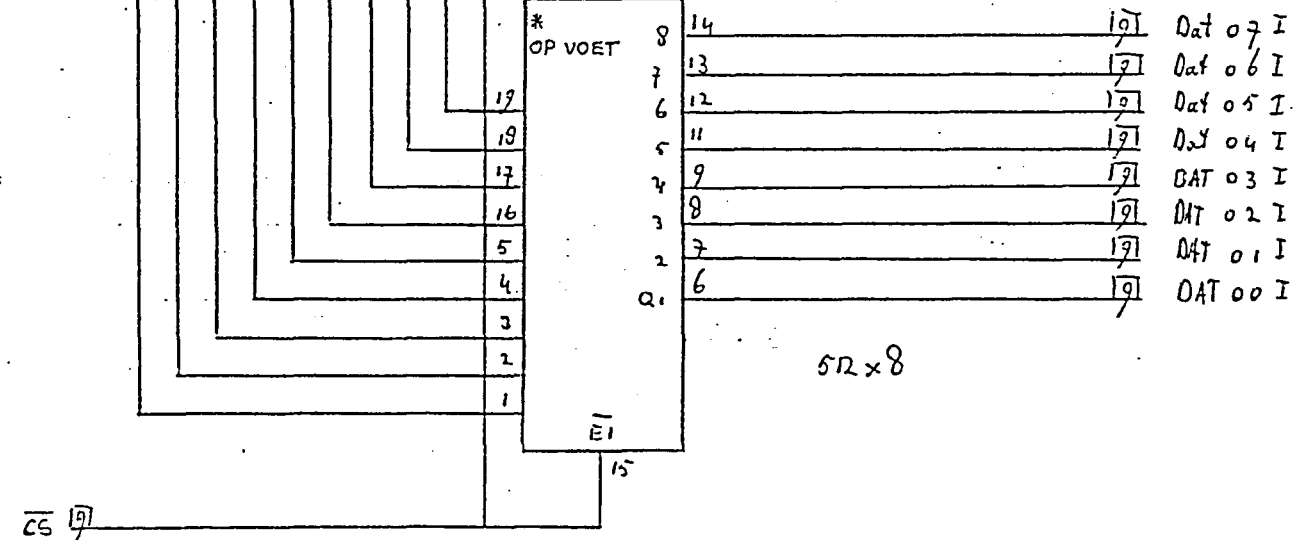
gewijzigd	datum	SCHEMA DCR MFB 1ss. A REV. 1	get. : H.J.	gec. :
GCMS	05-02-86		datum : D4/04/86	schaal :
			aant.bl.: 13	tek.nr. : 19860607
			bladnr.: 7	doc.nr.:

IC18
SN 745 472



512x8

SN 745 472
IC19



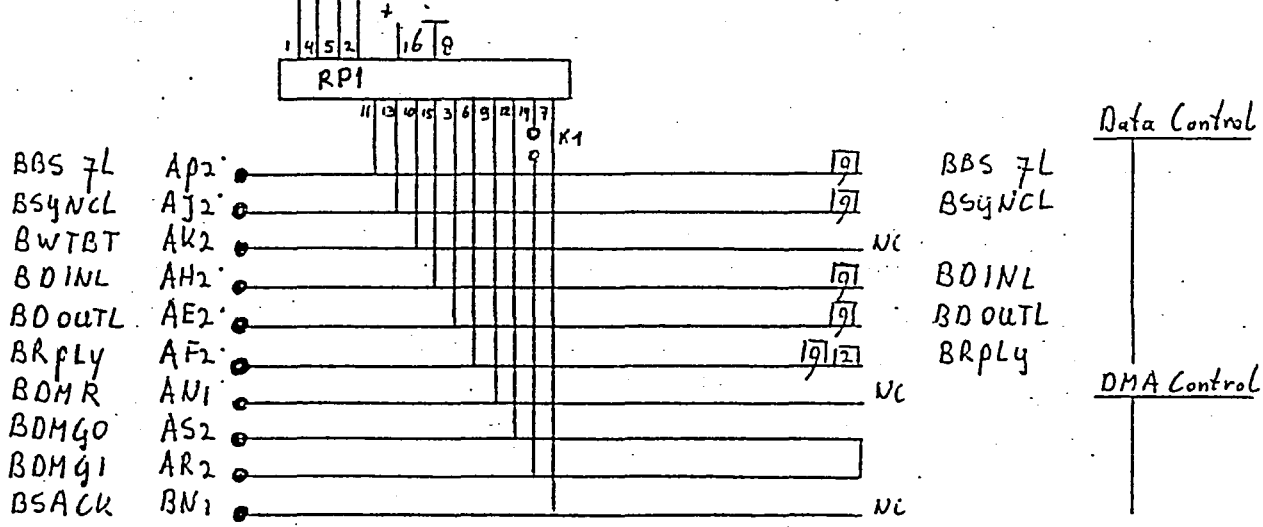
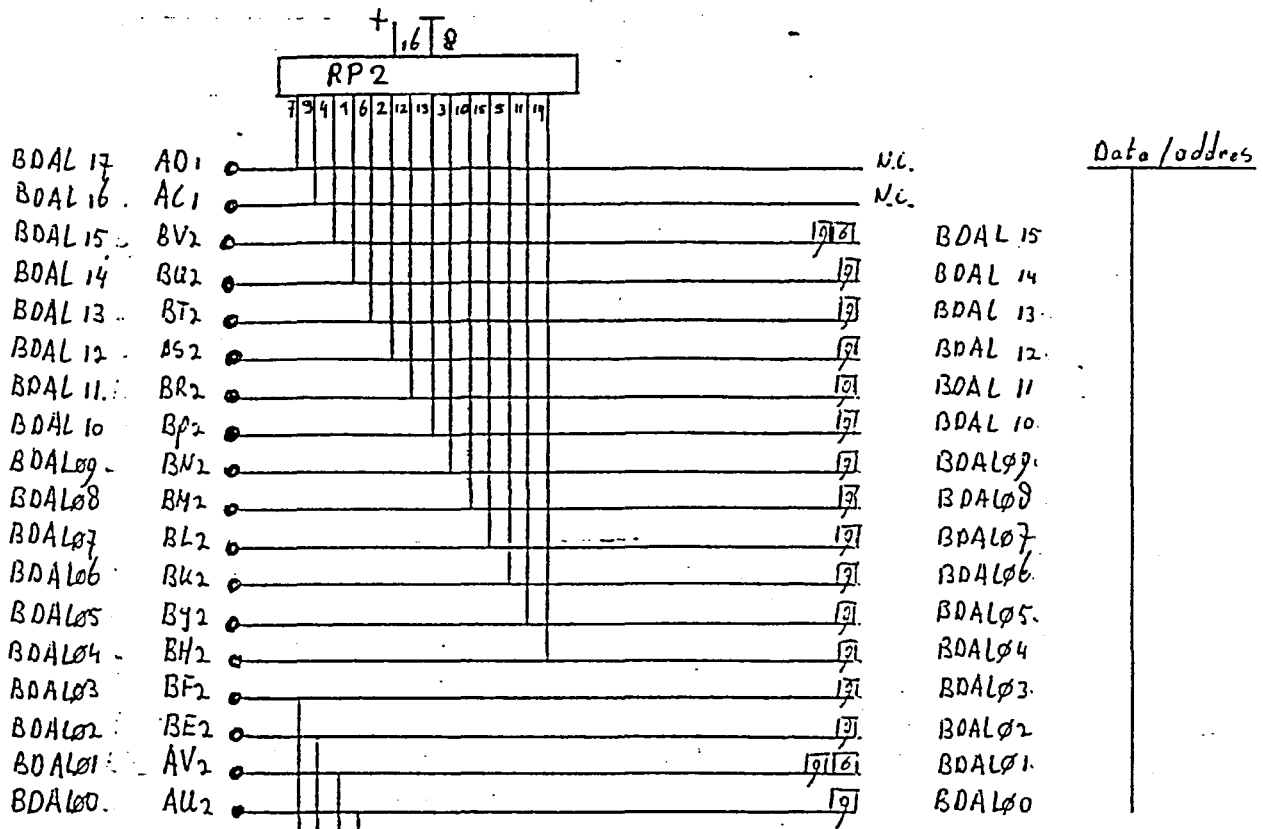
512x8

CS 19

prom AMD 27529
Harris 7649
HMI 6349-1
National 745472
Signetics 825147
TI TBP 28542

gewijzigd	datum	SHEMA	get. : F.M	gec. :
G.C.M.I.	05-02-86	DLR MFB	datum : 27-1-86	schaal:
		ISS. A	aant.bl.: 13	tek.nr.: 19860607
		REV. 1	bladnr.: 10	doc.nr.:

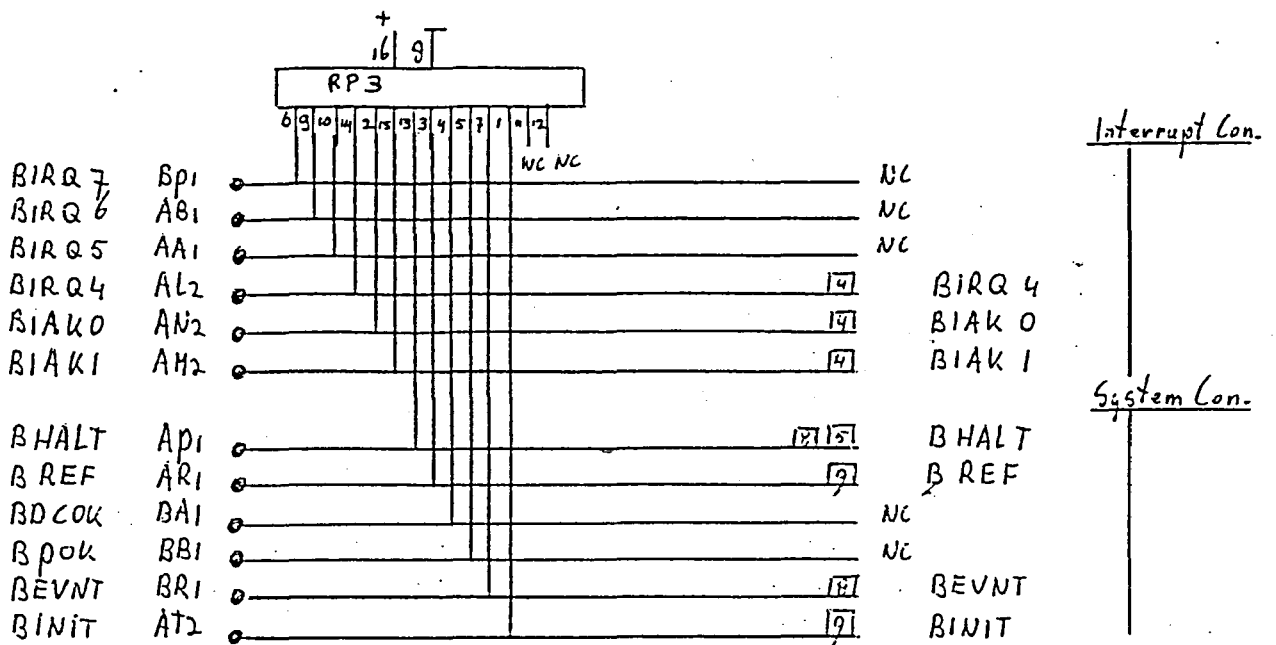
gewijzigd	datum	SCHEMA DCR MFB iss. A REV. 1	get. : H.J.	gec. :
G.C.M.I	05-02-86		datum : 04-04-86	schaal :
			aant.bl.: 13	tek.nr. : 19860607
			bladnr.: 11	doc.nr.:



VOOR RP1, RP2 EN RP3 GELDT DAT DEZE STANDAARD NIET GEMONTEERD ZIJN.
 DE KONTAKT BUSSES VOOR DEZE BUSTERMINATORS ZIJN WEL GEPLAATST.
 DE BUSTERMINATORS ZIJN TE VERKRUIGEN DOOR DE "DCR MFB BUSTERM. KIT" TE BESTELLEN

o = Q Bus

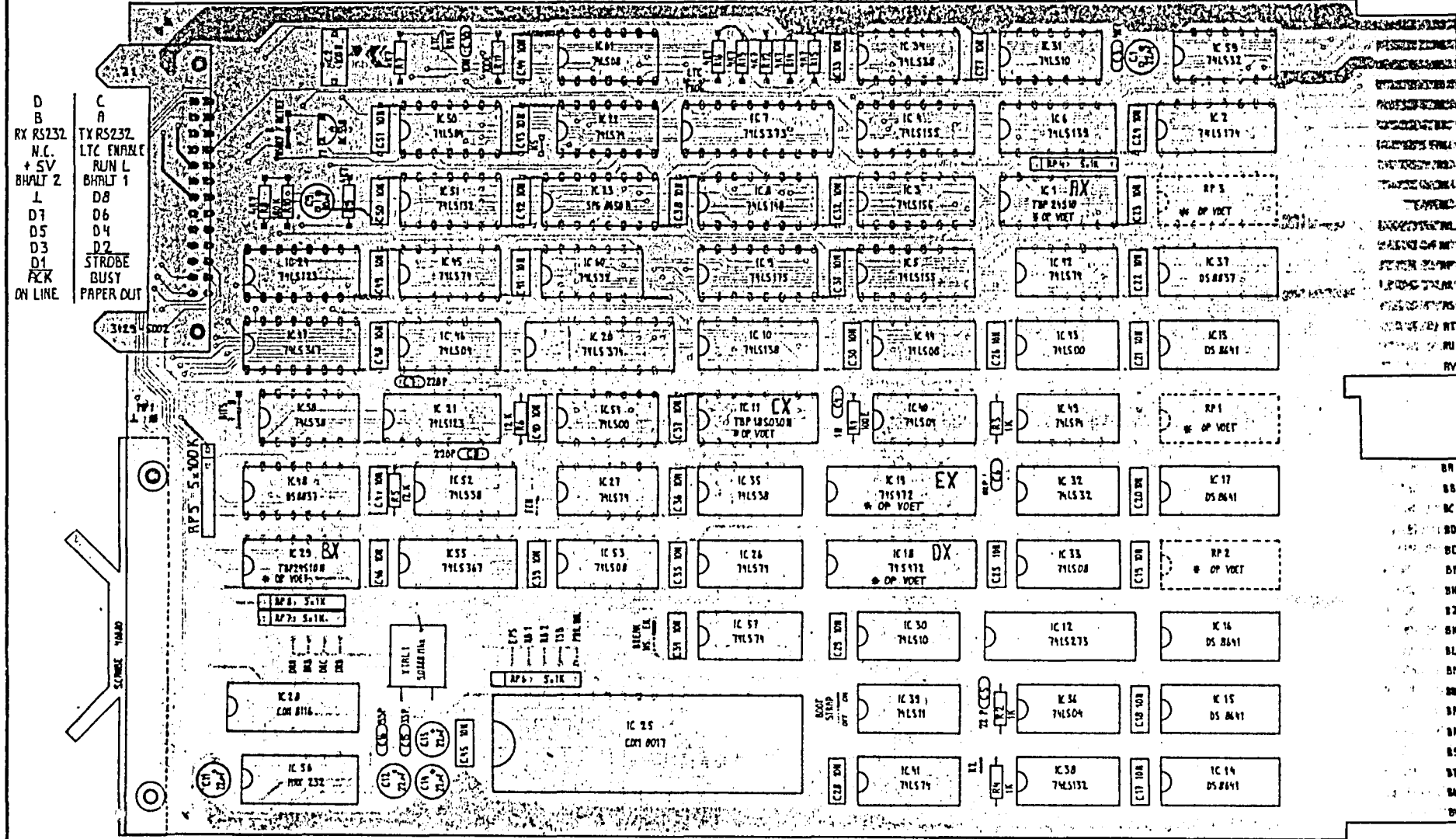
gewijzigd	datum	SCHEMA DCR MFB ISS. A REV. 1	get. : F.v.N	gec. :
G.C.M.I	05-02-86		datum : 14-2-86	schaal :
H.2.	06-26-86		aant.bl. : 13	tek.nr. : 19860607
			bladnr. : 12	doc.nr. :



VDDR RP3 ZIE OPMERKING OP BLAD 12

o = Q Bus

gewijzigd	datum	SCHEMA DCR MFB ISS. A REV. 1	get. :	FvN	gec. :	
G.C.M.I	05-02-86		datum :	14-2-86	schaal :	
H.2.	06-26-86		aant.bl.:	13	tek.nr. :	19860607
			bladnr.:	13	doc.nr.:	



PRINT NUMMER 19860606-1

* VAN RP1, RP2 EN RP3 WORDEN ALLEEN DE KONTAKTBUSSES GEPLAATST. ALS DE BUSJTERMINATORS GEMONTEERD MOETEN WORDEN, BESTEL DAN DE "DCR MFB BUSJTERN. KIT"

DE VOLGENDE JUMPERS MOETEN GEINSTALEERD ZIJN
 BREAK EN.
 BITS
 R PASSIEF
 BOOTSTRAP ON
 KZ

gewijzigd	datum	MONTAGEPLAN	get. : H.A.	gec. :
GCM	04-14-86	DCR MFB 1 155.A	datum : 04-01-86	schaal:
		REV. 1	aant.bl.: 1	tek.nr.: 19860608
			bladnr.: 1	doc.nr.:

Pos.	omschrijving	Fabriikaat	Opmerking	aant.
R1, 11	METAALWEERST. 100E-0.5W	PHILIPS	SFR 16T	2
R2, 3, 4	.. 1K-0.5W	..	SFR 16T	3
R5, 6	.. 12K-0.5W	..	SFR 16T	2
R7, 8	.. 4K7-0.5W	..	SFR 16T	8
9, 12	13, 14, 15, 16			
R10	.. 100K-0,5W	..	SFR 16T	1
RP4	WEERST.NETW. 5x1K	BOURNS	4306R-101-102	4
6, 7, 8				
RP5	WEERST.NETW. 5x100K	..	4306R-101-104	1
C1	ELCO 22uF-25V	MATSUSH.	K - SERIE RADIAAL	5
C11, 12, 13, 14				
C2	MMKO 100nF-100V	EVOX		1
C3	KER. 4,7nF-63V	PHILIPS	2222 629 08472	1
C4	.. 1nF-63V	..	2222 629 08102	1
C5	.. 22pF-100V	..	2222 680 10229	1
C6	.. 82pF-100V	..	2222 680 10829	1
C7, 8	.. 220pF-100V	..	2222 630 08221	2
C9	ELCO 10uF-35V	MATSUSH.	K - SERIE RADIAAL	1
C10	KER. 10nF-63V	PHILIPS	2222 629 08103	1
C15, 16	.. 33pF-100V	..	2222 680 10339	2
C17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51	.. 10nF-50V	AVX	MD 015C 103 MAA	35
T1	TRANSISTOR BC 338	PHILIPS	T0-92	1
XTAL3	KRISTAL 5.0688 MHZ	FRISCHER	NC-18 U BEHUIZING	1
IC1	PROM TBP24S10N	T.I.	ADRES	1
IC2	74LS174	..		1
IC3, 4, 5	74LS155	..		3
IC6	74LS139	..		1

GEW.	DATUM	STUKLIJST	GET.: HJ	GEC.:
HJ	05-27-86	DCR MFB	DAT.: 03-07-86	SCHAAL:
HJ	06-26-86		AANT.BL.: 3	TEKNR.: 19860609
		REV. 1	BLADNR.: 1	DOCNR.:
DATELCARE ZEIST HOLLAND				

tot. af	afg.	tot. af	JTC nr.	calc. prijs	stuks prijs	totaal prijs	bestel datum	te da	verdere opmerkingen
			15111076						
			15111293						
			15170094						
			15285450						
			15210317						
			15210309						
			15210308						
			15210323						
			15210311						
			15210303						

paraaf inkoop	magazijn	Order nummer :
		Te produceren aantal :
		Serienummer (s) : t/m
datum	datum in	
		inkoop <input type="checkbox"/> montage <input type="checkbox"/>
TEKNR.: 19860609		

APPENDIX 1 standard pattern list

D C R M F B SERIE

=====

Pattern #	RSCR	Base address	Interrupt Vector		Next pattern
			REC	XMT	
MFB 6	CH1	177560	60	64	-
	CH2	177510	200	200	
	CLOCK	177546	100	100	
	=====		=====		
	Ax prom		Cx prom		

Dx prom

MFB D1 Boot devices: DY, DU and MS (high bytes)

Ex prom

MFB E1 Boot devices: DY, DU and MS (low bytes)

Bx promMFB B1 Baud rate prom for DCR MCB: 75, 110, 150, 300, 600,
1200, 2400, 4800, 9600 and 19200 baud

APPENDIX 2 set up of address prom

If you want to program a prom for address selection you must use a TBP24S10N prom and a DA-24 unit with switch setting 5-14.

If you know the Q-bus address (octal), the matching prom location (hex) is found in the ADDRESS ---> LOCATION list (next page).

For CH#1 the prom should read the data "7" (hex),
For CH#2 the prom should read the data "B" (hex),
For CLOCK the prom should read the data "E" (hex),

Not used locations should read "F" (hex).

For example: for channel 1 you want address 177560 (octal)
for channel 2 you want address 177510 (octal)
for the clock you want address 177546 (octal)

This means you should program: data "7"(CH#1) in location "EE"(addr. 177560)
data "B"(CH#1) in location "E9"(addr. 177510)
data "E"(CH#1) in location "EC"(addr. 177546)

When you manufacture a new pattern for a prom set, please contact the drawing-office. This new pattern should be added to the standard prom list.

ADDRESS (octal)	----> LOCATION (hex)	LIST
174000	00	174600 30
174010	01	174610 31
174020	02	174620 32
174030	03	174630 33
174040	04	174640 34
174050	05	174650 35
174060	06	174660 36
174070	07	174670 37
174100	08	174700 38
174110	09	174710 39
174120	0A	174720 3A
174130	0B	174730 3B
174140	0C	174740 3C
174150	0D	174750 3D
174160	0E	174760 3E
174170	0F	174770 3F
174200	10	175000 40
174210	11	175010 41
174220	12	175020 42
174230	13	175030 43
174240	14	175040 44
174250	15	175050 45
174260	16	175060 46
174270	17	175070 47
174300	18	175100 48
174310	19	175110 49
174320	1A	175120 4A
174330	1B	175130 4B
174340	1C	175140 4C
174350	1D	175150 4D
174360	1E	175160 4E
174370	1F	175170 4F
174400	20	175200 50
174410	21	175210 51
174420	22	175220 52
174430	23	175230 53
174440	24	175240 54
174450	25	175250 55
174460	26	175260 56
174470	27	175270 57
174500	28	175300 58
174510	29	175310 59
174520	2A	175320 5A
174530	2B	175330 5B
174540	2C	175340 5C
174550	2D	175350 5D
174560	2E	175360 5E
174570	2F	175370 5F
		175400 60
		175410 61
		175420 62
		175430 63
		175440 64
		175450 65
		175460 66
		175470 67
		175500 68
		175510 69
		175520 6A
		175530 6B
		175540 6C
		175550 6D
		175560 6E
		175570 6F
		175600 70
		175610 71
		175620 72
		175630 73
		175640 74
		175650 75
		175660 76
		175670 77
		175700 78
		175710 79
		175720 7A
		175730 7B
		175740 7C
		175750 7D
		175760 7E
		175770 7F
		176000 80
		176010 81
		176020 82
		176030 83
		176040 84
		176050 85
		176060 86
		176070 87
		176100 88
		176110 89
		176120 8A
		176130 8B
		176140 8C
		176150 8D
		176160 8E
		176170 8F

176200	90	177000	C0	177600	F0
176210	91	177010	C1	177610	F1
176220	92	177020	C2	177620	F2
176230	93	177030	C3	177630	F3
176240	94	177040	C4	177640	F4
176250	95	177050	C5	177650	F5
176260	96	177060	C6	177660	F6
176270	97	177070	C7	177670	F7
176300	98	177100	C8	177700	F8
176310	99	177110	C9	177710	F9
176320	9A	177120	CA	177720	FA
176330	9B	177130	CB	177730	FB
176340	9C	177140	CC	177740	FC
176350	9D	177150	CD	177750	FD
176360	9E	177160	CE	177760	FE
176370	9F	177170	CF	177770	FF
176400	A0	177200	D0		
176410	A1	177210	D1		
176420	A2	177220	D2		
176430	A3	177230	D3		
176440	A4	177240	D4		
176450	A5	177250	D5		
176460	A6	177260	D6		
176470	A7	177270	D7		
176500	A8	177300	D8		
176510	A9	177310	D9		
176520	AA	177320	DA		
176530	AB	177330	DB		
176540	AC	177340	DC		
176550	AD	177350	DD		
176560	AE	177360	DE		
176570	AF	177370	DF		
176600	B0	177400	E0		
176610	B1	177410	E1		
176620	B2	177420	E2		
176630	B3	177430	E3		
176640	B4	177440	E4		
176650	B5	177450	E5		
176660	B6	177460	E6		
176670	B7	177470	E7		
176700	B8	177500	E8		
176710	B9	177510	E9		
176720	BA	177520	EA		
176730	BB	177530	EB		
176740	BC	177540	EC		
176750	BD	177550	ED		
176760	BE	177560	EE		
176770	BF	177570	EF		

APPENDIX 3 set up of vector prom

If you want to program a prom for vector selection you must use a TBP18S030N prom and a DA-2 unit with switch setting 3-12

If you know the vector (octal), the matching prom data (hex) is found in the VECTOR ---> DATA list (next page).

For CH#1 R the vector should be programmed into location "1F"(hex) highprio.
For CH#2 R the vector should be programmed into location "1E"(hex)
For Clock the vector should be programmed into location "1C"(hex)
For CH#1 T the vector should be programmed into location "1B"(hex)
For CH#2 T the vector should be programmed into location "1A"(hex)
For Clock the vector should be programmed into location "18"(hex) lowprio.

For the clock you must always program vector 100.
Not used locations should read "0" (hex).

For example: for channel 1 R you want vector 60 (octal)
for channel 2 R you want vector 200 (octal)
for the clock you need vector 100 (octal)
for channel 1 T you want vector 64 (octal)
for channel 2 T you want vector 200 (octal)
for the clock you need vector 100 (octal)

This means you should program:

data "18"(60) in location "1F"(CH#1R)
data "40"(200) in location "1E"(CH#2R)
data "20"(100) in location "1C"(Clock)
data "1A"(64) in location "1B"(CH#1T)
data "40"(200) in location "1A"(CH#2T)
data "20"(100) in location "18"(Clock)

When you manufacture a new pattern for a prom set, please contact the drawing-office. This new pattern should be added to the standard prom list.

VECTOR ---> DATA list
(octal) (hex)

000	00	140	30	300	60
002	01	142	31	302	61
004	02	144	32	304	62
006	03	146	33	306	63
010	04	150	34	310	64
012	05	152	35	312	65
014	06	154	36	314	66
016	07	156	37	316	67
020	08	160	38	320	68
022	09	162	39	322	69
024	0A	164	3A	324	6A
026	0B	166	3B	326	6B
030	0C	170	3C	330	6C
032	0D	172	3D	332	6D
034	0E	174	3E	334	6E
036	0F	176	3F	336	6F
040	10	200	40	340	70
042	11	202	41	342	71
044	12	204	42	344	72
046	13	206	43	346	73
050	14	210	44	350	74
052	15	212	45	352	75
054	16	214	46	354	76
056	17	216	47	356	77
060	18	220	48	360	78
062	19	222	49	362	79
064	1A	224	4A	364	7A
066	1B	226	4B	366	7B
070	1C	230	4C	370	7C
072	1D	232	4D	372	7D
074	1E	234	4E	374	7E
076	1F	236	4F	376	7F
100	20	240	50	400	80
102	21	242	51	402	81
104	22	244	52	404	82
106	23	246	53	406	83
110	24	250	54	410	84
112	25	252	55	412	85
114	26	254	56	414	86
116	27	256	57	416	87
120	28	260	58	420	88
122	29	262	59	422	89
124	2A	264	5A	424	8A
126	2B	266	5B	426	8B
130	2C	270	5C	430	8C
132	2D	272	5D	432	8D
134	2E	274	5E	434	8E
136	2F	276	5F	436	8F

440	90	600	C0	740	F0
442	91	602	C1	742	F1
444	92	604	C2	744	F2
446	93	606	C3	746	F3
450	94	610	C4	750	F4
452	95	612	C5	752	F5
454	96	614	C6	754	F6
456	97	616	C7	756	F7
460	98	620	C8	760	F8
462	99	622	C9	762	F9
464	9A	624	CA	764	FA
466	9B	626	CB	766	FB
470	9C	630	CC	770	FC
472	9D	632	CD	772	FD
474	9E	634	CE	774	FE
476	9F	636	CF	776	FF
500	A0	640	D0		
502	A1	642	D1		
504	A2	644	D2		
506	A3	646	D3		
510	A4	650	D4		
512	A5	652	D5		
514	A6	654	D6		
516	A7	656	D7		
520	A8	660	D8		
522	A9	662	D9		
524	AA	664	DA		
526	AB	666	DB		
530	AC	670	DC		
532	AD	672	DD		
534	AE	674	DE		
536	AF	676	DF		
540	B0	700	E0		
542	B1	702	E1		
544	B2	704	E2		
546	B3	706	E3		
550	B4	710	E4		
552	B5	712	E5		
554	B6	714	E6		
556	B7	716	E7		
560	B8	720	E8		
562	B9	722	E9		
564	BA	724	EA		
566	BB	726	EB		
570	BC	730	EC		
572	BD	732	ED		
574	BE	734	EE		
576	BF	736	EF		

APPENDIX 4 set up of baud rate prom

If you want to program a prom for the baud rate selection via the DCR MCB, you must use a TBP24S10 or equivalent prom. For the Digelec UP-803, use a DA-24 unit with switch settings 5-14.

From the rotary switch on the DCR MCB there comes a 4 bits data word. This generates the address in the prom. The data on this address is the setting for the baudrate generator, confirm table 2.2. The next table show the contents of the baudrate prom Bx.

=====				
ADDRESS	:	DATA	:	GENERATED BAUDATE
=====				
0F	:	01	:	75
0E	:	02	:	110
0D	:	04	:	150
0C	:	05	:	300
0B	:	06	:	600
0A	:	07	:	1200
09	:	0A	:	2400
08	:	0C	:	4800
07	:	0E	:	9600
06	:	0F	:	19200
=====				

APPENDIX 5 set up of boot strap proms

If you want to copy the bootstrap proms, you must use two 74S472 or equivalent proms. For the Digilec UP-803 programmer, use a DA-4 module with switch settings 3-6. If you use AM27S29 type proms, use a DA-34 module with switch settings 5-14.

The source code for the bootstraps proms is not free available.