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pickering

USER MANUAL

Model No. **10-510, 10-520 & 10-530**

Matrix Modules

Designed & Manufactured by:-

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HELP!!!

If you need assistance with your Pickering Interfaces Switching System: *Switching problems, Programming or Integration within your Test System. – Please ring Pickering Interfaces and ask for "Technical Support".*

Alternatively you may fax, email or connect to our Internet Web Site.

A full set of operating manuals, application notes and software drivers is available on CD ROM.

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Section 1
Matrix Modules

1.1 Features

- 8 x 4 (32 cross-points), 16 x 4 (64 cross-points), or 8 x 8 (64 cross-points) Switching Matrix.
- Matrix Modules may be Cascaded to Build Larger Systems.
- 1 or 2 Pole Switching.
- Choice of Two Reed Switch Types: Ruthenium or Mercury Wetted.
- Switch up to 100Vd.c., 50W or 0.5A.

Range Overview

10-510 8 x 4 Matrix.

10-520 16 x 4 Matrix.

10-530 8 x 8 Matrix.

See table 1.1 for a summary of switching capabilities.

Series 10-500 switching matrices are cross-point switches, where one or more cross-points can be operated. System 10 matrix modules have applications mainly in the fields of test and measurement.

Status Display

The “Active” status indicator on the front panel shows if any switches on that module are closed. For a list of all active switches on the matrix the VIEW? command would have to be used.

Characteristics	Switch Type	
	Ruthenium	Mercury Wet
Max Power	10W	50W
Max Volts	100V	100V
Max Switch Current	0.5A	2A
Max Carry Current	1.0A	2A
Contact Resistance	100mΩ	85mΩ

Table 1.1 Switch Characteristics



Fig 1.1 10-500 Matrix Module

1.2 Matrix Module Model Numbers

The following tables list the standard options available with the 10-500 series matrices:-

Model 10-510: 8 x 4 Matrix

Number of Poles	Mercury Wet	Ruthenium Switch
1	10-510-011	10-510-021
2	10-510-012	10-510-022

Model 10-520: 16 x 4 Matrix

Number of Poles	Mercury Wet	Ruthenium Switch
1	10-520-011	10-520-021
2	10-520-012	10-520-022

Model 10-530: 8 x 8 Matrix

Number of Poles	Mercury Wet	Ruthenium Switch
1	10-530-011	10-530-021
2	10-530-012	10-530-022

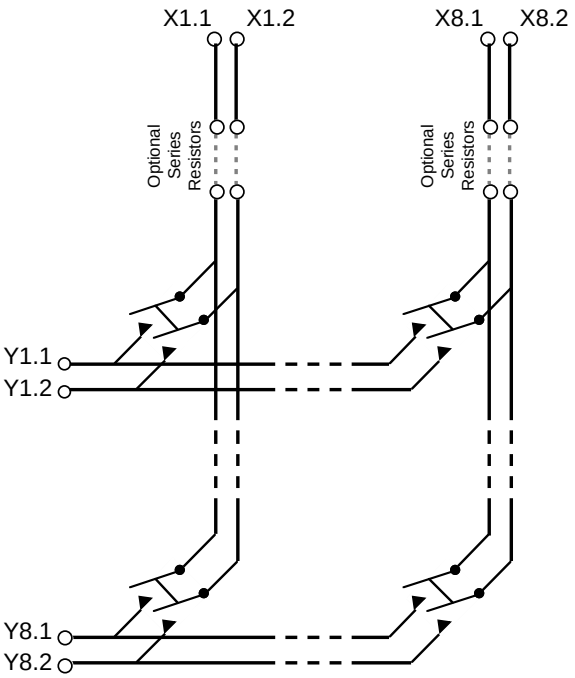


Fig 1.2 Schematic of 8 x 8 Double Pole Matrix Module
(64 Cross-Points)

1.3 Options

A summary of these modules capability is in table 1.1 .
Additional data is included below:-

1.3.1 Mercury Wetted Reed Switch

Reed Relay Type	107-1-A-12/6D (1 pole)
	107-2-A-12/6D (2 pole)
Maximum Standoff Voltage	100V
Path Resistance	On: 85mΩ.
	Off: $>10^9$ Ω.
Expected Life	$>10^9$ operations at low current/voltage load.
	$>10^8$ operations at 50W maximum load.
Operate Time	9ms (Switch operate time = 3.0mS max.).
Release Time	8mS (Switch release time= 1.5mS max.).

1.3.2 Low Level Ruthenium Reed Switch - *for low level signal use only*

Reed Relay Type	106-1-A-12/2D (1 pole)
	107-2-A-12/2D (2 pole)
Maximum Standoff Voltage	100V
Path Resistance	On: 100mΩ.
	Off: $>10^9$ Ω.
Expected Life	$>10^8$ operations at low current/voltage load.
	NB This switch is **not suitable** for switching high current loads.
Operate Time	7ms (Switch operate time = 1.5mS max.).
Release Time	6mS (Switch release time= 0.75mS max.).

1.3.3 AC Performance

Input capacitance:	
	Open channel < 6pF.
	Adjacent closed poles < 10 pF
	Channel to channel < 20pF.
Bandwidth (50Ω System):	10MHz
Differential Thermal Offset	< 5µV (switch options 1 & 3)
	< 10µV (switch option 2, Mercury Wet)

1.3.4 Connectors

All models have two front panel mounted 37 way D-type connectors (plug), see Fig 3.1. Module width 12 HP (2.4 inches, 60.9mm).

1.4 Cascading Modules to Build Larger Matrices

Matrix modules may as mentioned be cascaded together to construct larger matrices, up to 31 modules per matrix. The user will have to prepare the “daisy-chained” cable assemblies to interconnect the matrix modules, alternatively Pickering can construct and test these assemblies. See diagrams fig 1.2 and 1.3.

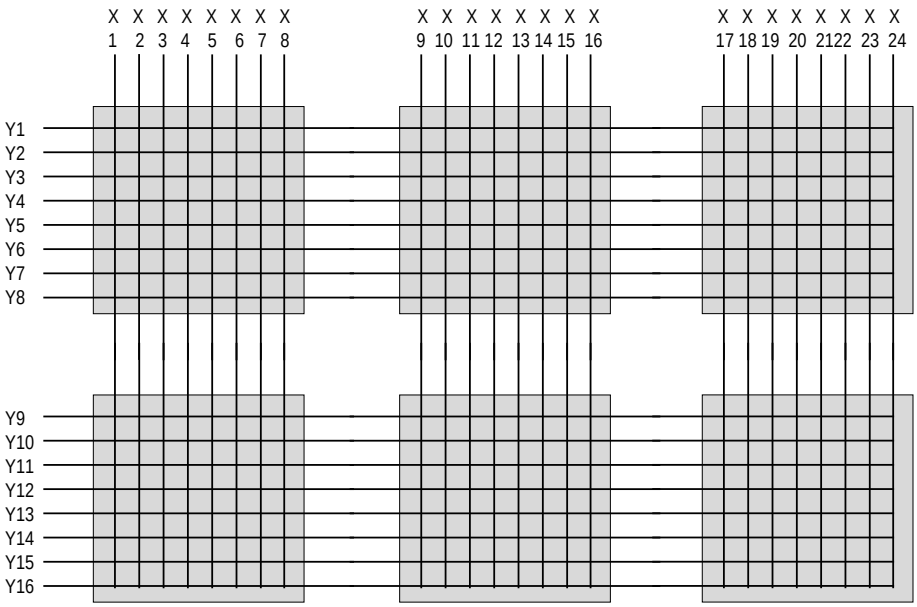


Fig 1.3 Typical 24 x 16 Matrix Switch

(constructed using 6 x 10-530 matrix modules)

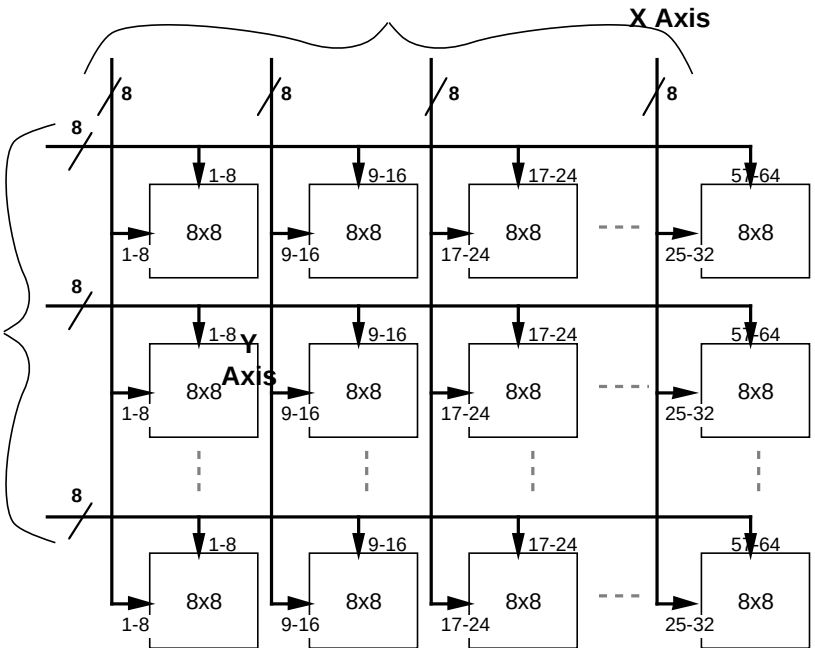


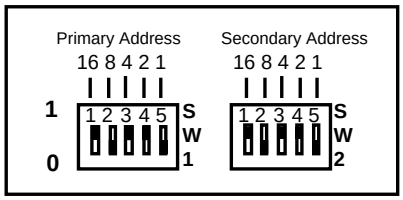
Fig 1.4 Constructing Large Matrices

Section 2
Programming

2.1 Select Module Address

Choose device address (from 0 - 30) using the address select switch (SW1) on the driver card.

The address selected in the illustration is 22 (16 + 4 + 2 = 22).



2.2 Select Module Bank (Secondary) Address

When more than one module is used to make up a large matrix (see Fig 1.3), where six modules are used to make up a 24x16 matrix), then all matrix units **must** have the same primary address, the location of each module within the matrix is given by its bank address. The matrix bank address is composed of two x and y components, see fig 1.4, these determine the individual matrix modules position within the larger matrix.

X_2	X_1	X_0	Y_1	Y_0

The bank address is constructed using 5 bits, see diagram, 3 bits for x and 2 bits for y. For example bit settings 0 0 1 0 0 represent bank address x = 1, y = 0.

There **must** always be a module present at the base address x = 0, y = 0, otherwise the matrix will not be recognised by the intelligent interface.

If there is a problem with any of the modules used to make up a large matrix then an error will be detected (use the REPORT? query to discover the cause).

2.3 Using the Intelligent IEEE-488.2 Interface

Switching matrices are controlled using the MCLOSE and MOPEN commands:-

To close switch at position X = 7, Y = 3 on matrix with address 11.

MCLOSE 11,7,3

Now to look at status of matrix 11.

VIEW? 8 will return “7,3”

To open last switch and close switches at positions X = 1, Y = 1 and X = 2, Y = 1 on matrix 11.

MOPEN 11,7,3;MCLOSE 11,1,1;MCLOSE 11,2,1

Now to look at status of matrix 11.

VIEW? 8 will return “1,1;2,1”

To reset all switches on matrix 11.

ARESET 11

Now to look at status of matrix 11.

VIEW? 8 will return “0,0" - 0,0 indicates no coordinates set.

Note: If you are using a large matrix switch (made up of several matrix modules) please bear in mind that if a very large number of cross-points are operated (several hundred) the power supply may overload and go into temporary shutdown. A future software update for the intelligent IEEE-488.2 interface will give a warning of this condition.

The IEEE-488.2 Interface enforces a firmware limit of no more than 100 closed cross-points at any one matrix address (this ceiling may be increased).

Section 3
Connector Pin-Out Diagrams

Three pin out diagrams are contained in this appendix:

- 10-510: 8 x 4 Matrix (1 and 2 Pole), Fig 3.1
- 10-520: 16 x 4 Matrix (1 and 2 Pole), Fig 3.2
- 10-530: 8 x 8 Matrix (1 and 2 Pole), Fig 3.3

All modules use the same pin outs on two 37 way D-type connectors. Therefore upgrading from a smaller matrix to a larger one simply means adding pins for the extra connections.

These diagrams may be photocopied for your wiring documentation.

Note: Connector shield are tied to System 10/20 ground potential.

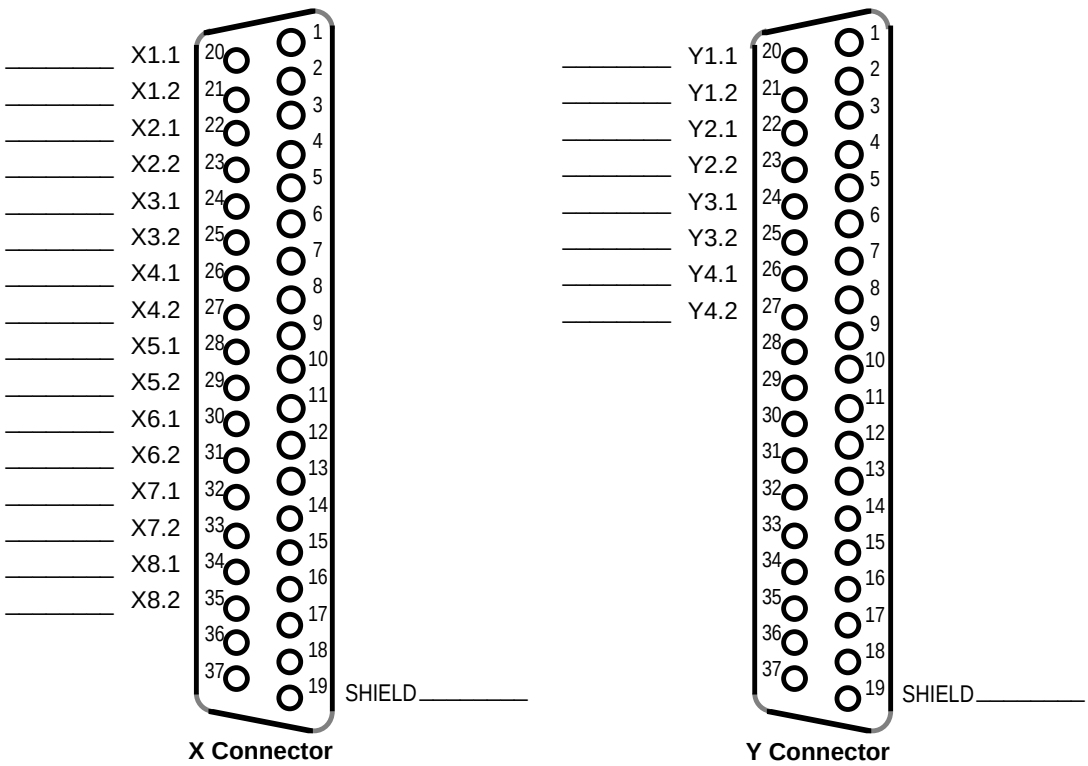


Fig 3.1 Model 10-510 8 x 4 Matrix Connections

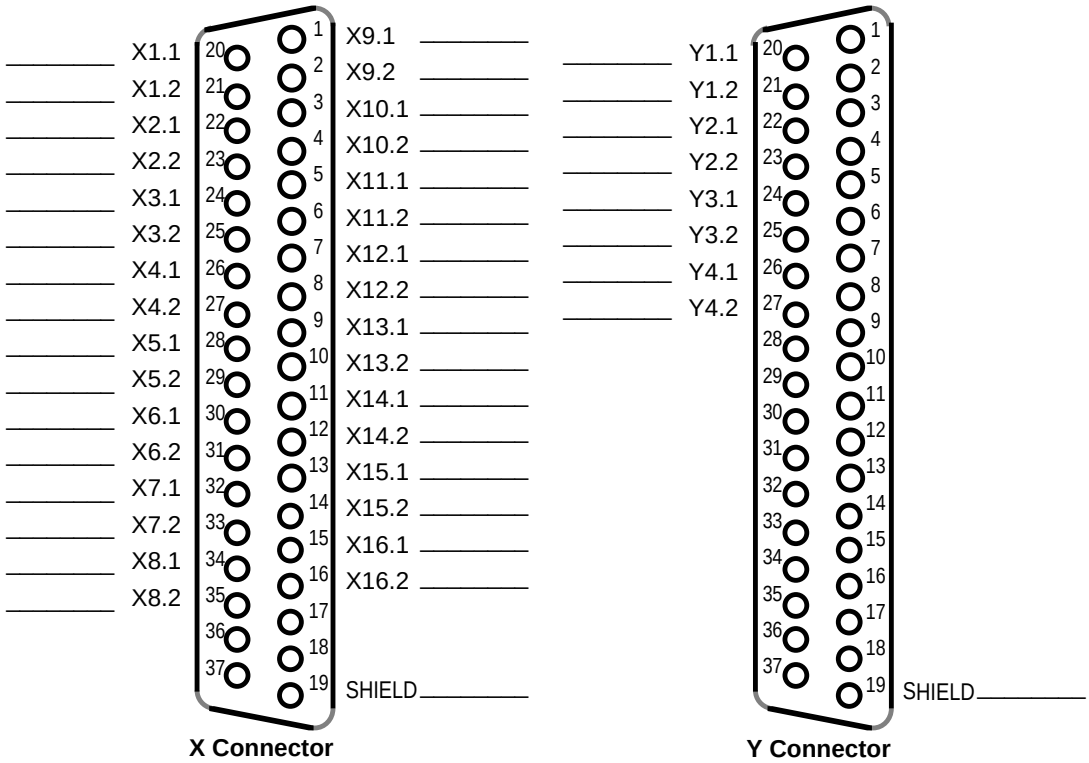


Fig 3.2 Model 10-520 16 x 4 Matrix Connections

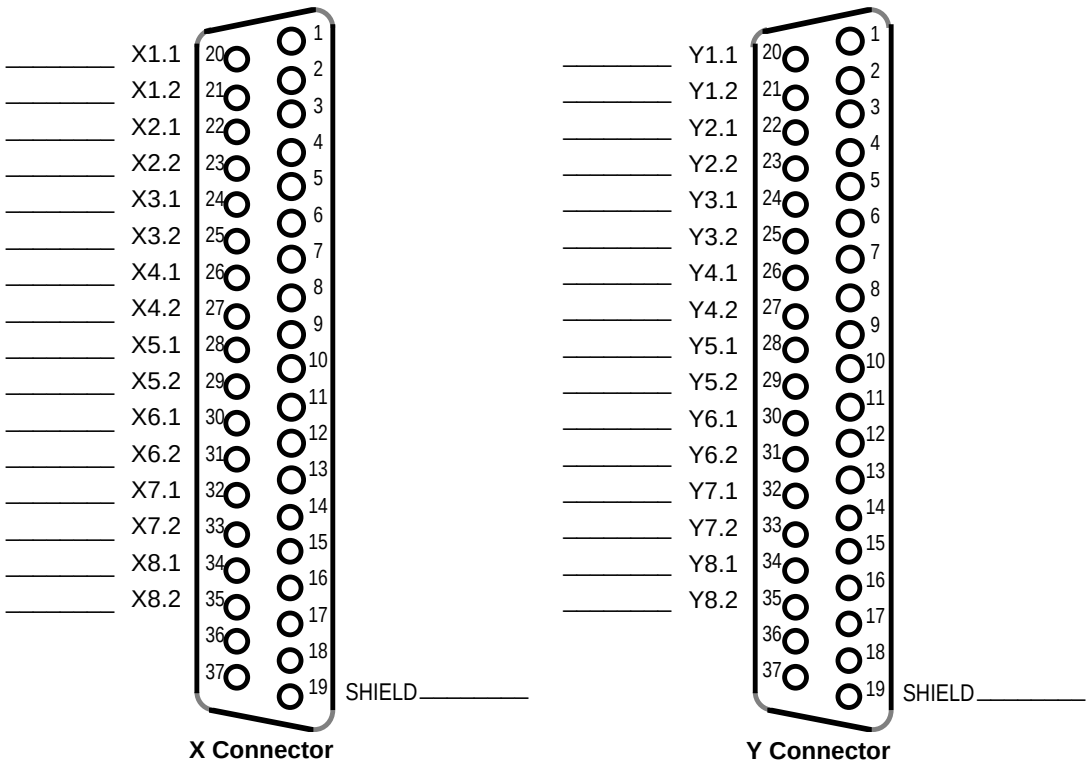


Fig 3.3 Model 10-530 8 x 8 Matrix Connections

Section 4
Reconfiguring Driver Card to Your Application

Your multiplexer driver card will leave the factory preconfigured, so take **great care** if you wish to change any of the settings. If in doubt contact Pickering for further details.

Universal Driver Card: Configuration Links

There are four choices of relay settling time, this is to allow for different applications and relay types (e.g. Dry or Mercury Wet).

LK4	LK5	Relay Settling Time †
0	0	4.0ms
0	1	1.0ms
1	0	0.5ms
1	1	0.0ms

† The “Settled” line is triggered after this delay

The Break-before-Make time delay is equal to half the settling time

LK6	LK7	Size of Y-Axis
0	0	4
0	1	8
1	0	16
1	1	32

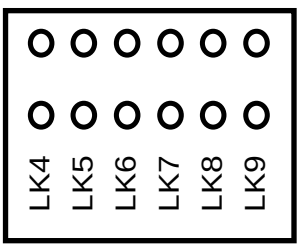


Fig 4.1 Driver Card Links

Section 5
Circuit Diagrams

Three sets of documentation (pcb layouts, circuit diagrams and parts lists) are contained, please note that this documentation is not exhaustive, if you require any further details please factory:-

5.1 Model 10-520 (16 x 4) Relay Matrix PCB Assembly

- PCB Layout
- Circuit Diagrams
- Parts List

5.2 Model 10-530 (8 x 8) Relay Matrix PCB Assembly

- PCB Layout
- Circuit Diagrams
- Parts List (same as 10-520 above)

5.3 Driver PCB Assembly

- PCB Layout
- Circuit Diagrams
- Parts List

5.1 Model 10-520 (16 x 4) Relay Matrix PCB Assembly

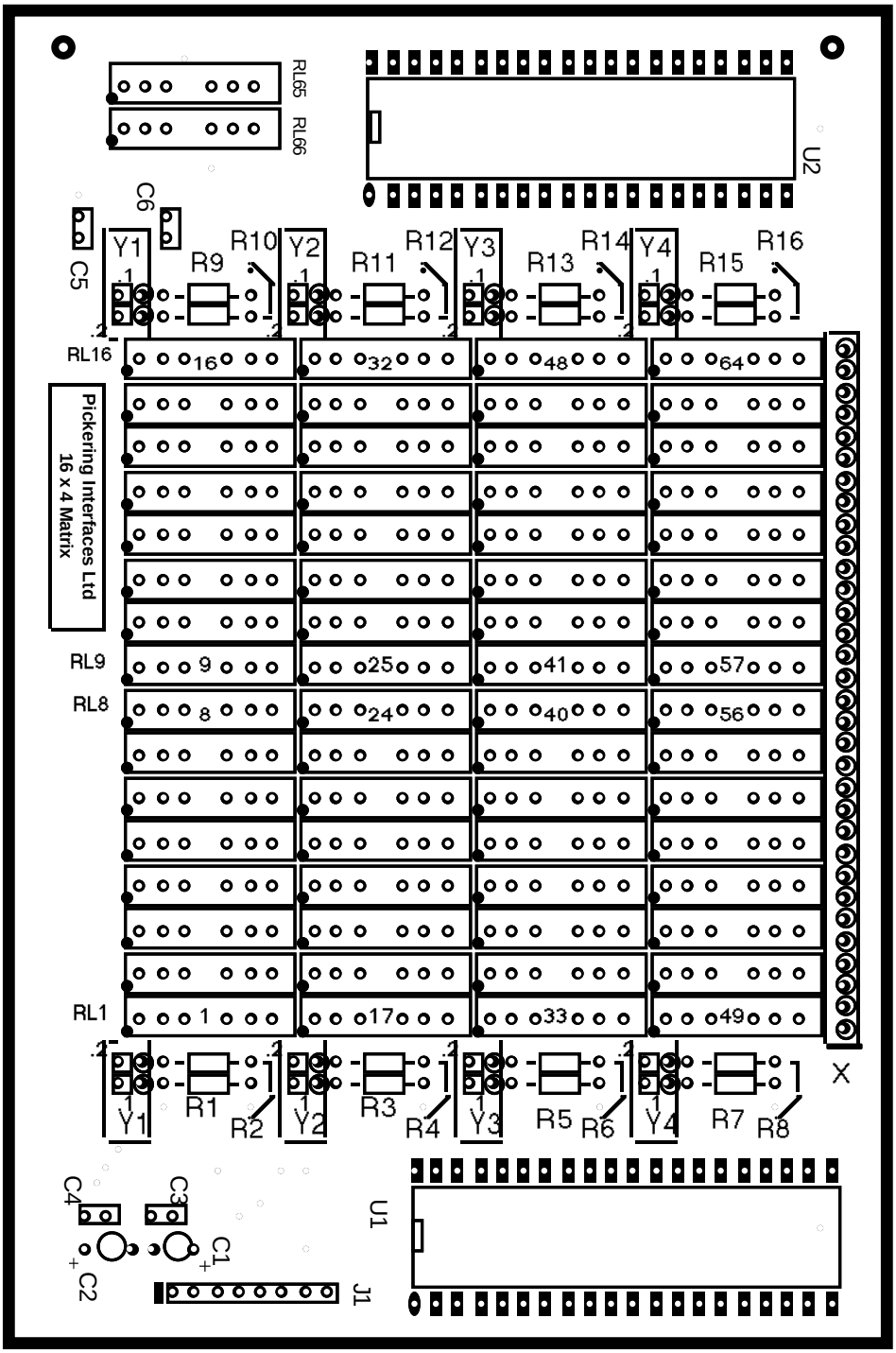


Fig 5.1 10-520 Relay PCB Layout

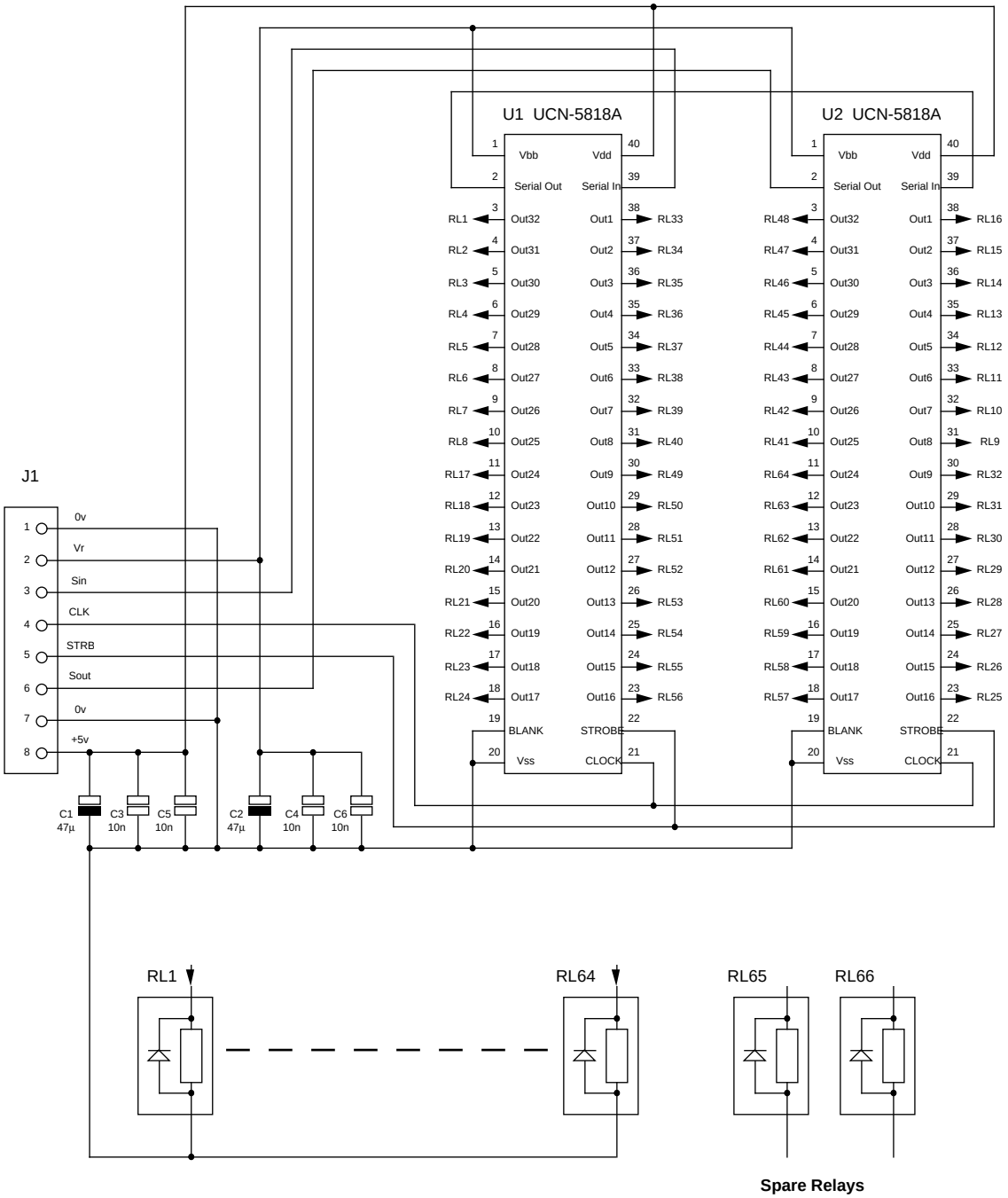


Fig 5.2 10-520 Circuit Diagram 1 of 3

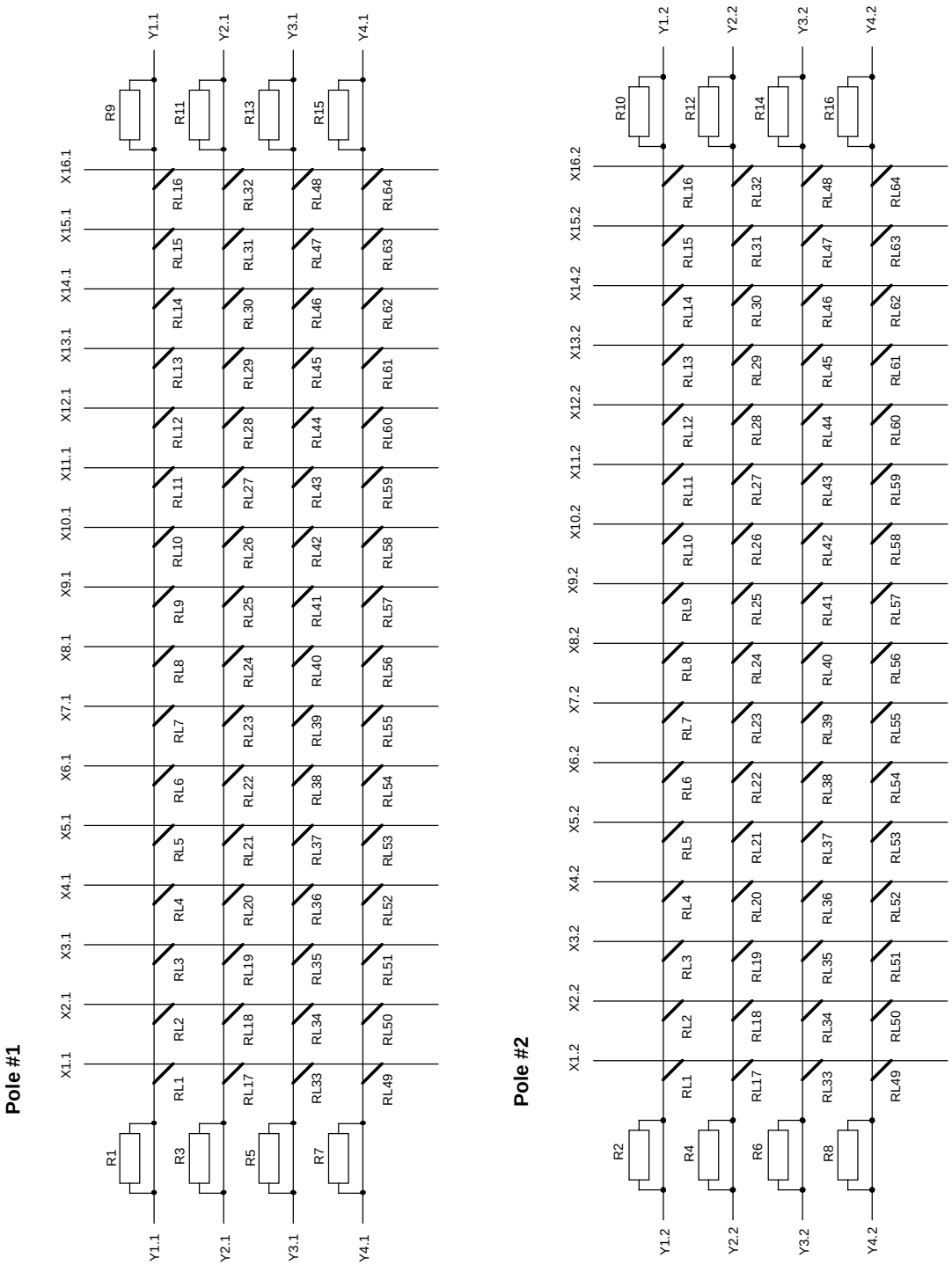


Fig 5.3 10-520 Circuit Diagram 2 of 3

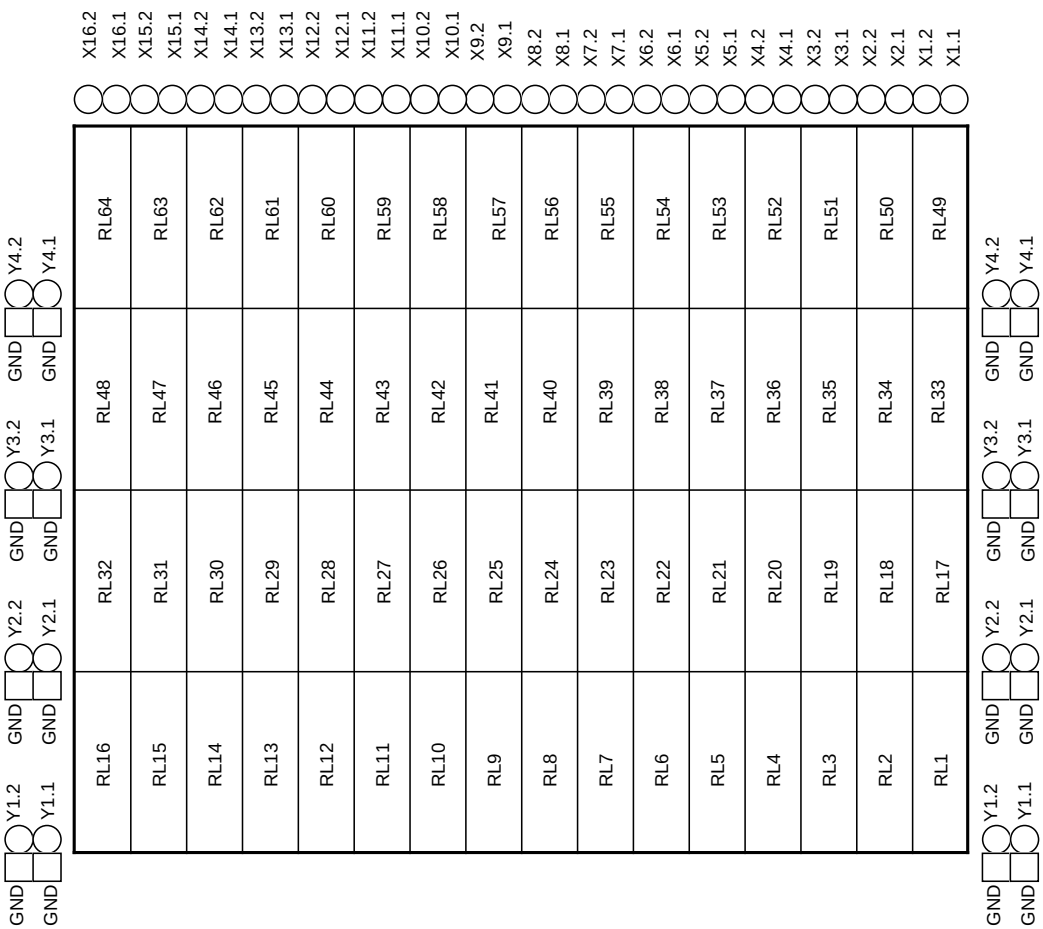


Fig 5.4 10-520 Circuit Diagram 3 of 3

Parts List for GPIB73 Rev 0 PCB assembly

PCB Location	PIL Part Number	Part Description
U1	C/IC/026	IC DIG UCN 5818A 32 Bit Relay Driver
C1..2	C/CP/003	Cap 22uF tant
C3..6	C/CP/001	Cap 10nF
J1	C/CN/033	2 x 4 Way Inter PCB Socket
R1..64		Matrix Reed Relays, See Sec 1.2 for type
R65..66		Spare Reed Relays, See Sec 1.2 for type
	C/PC/073	PCB 3U PTH

5.2 Model 10-530 (8 x 8) Relay Matrix PCB Assembly

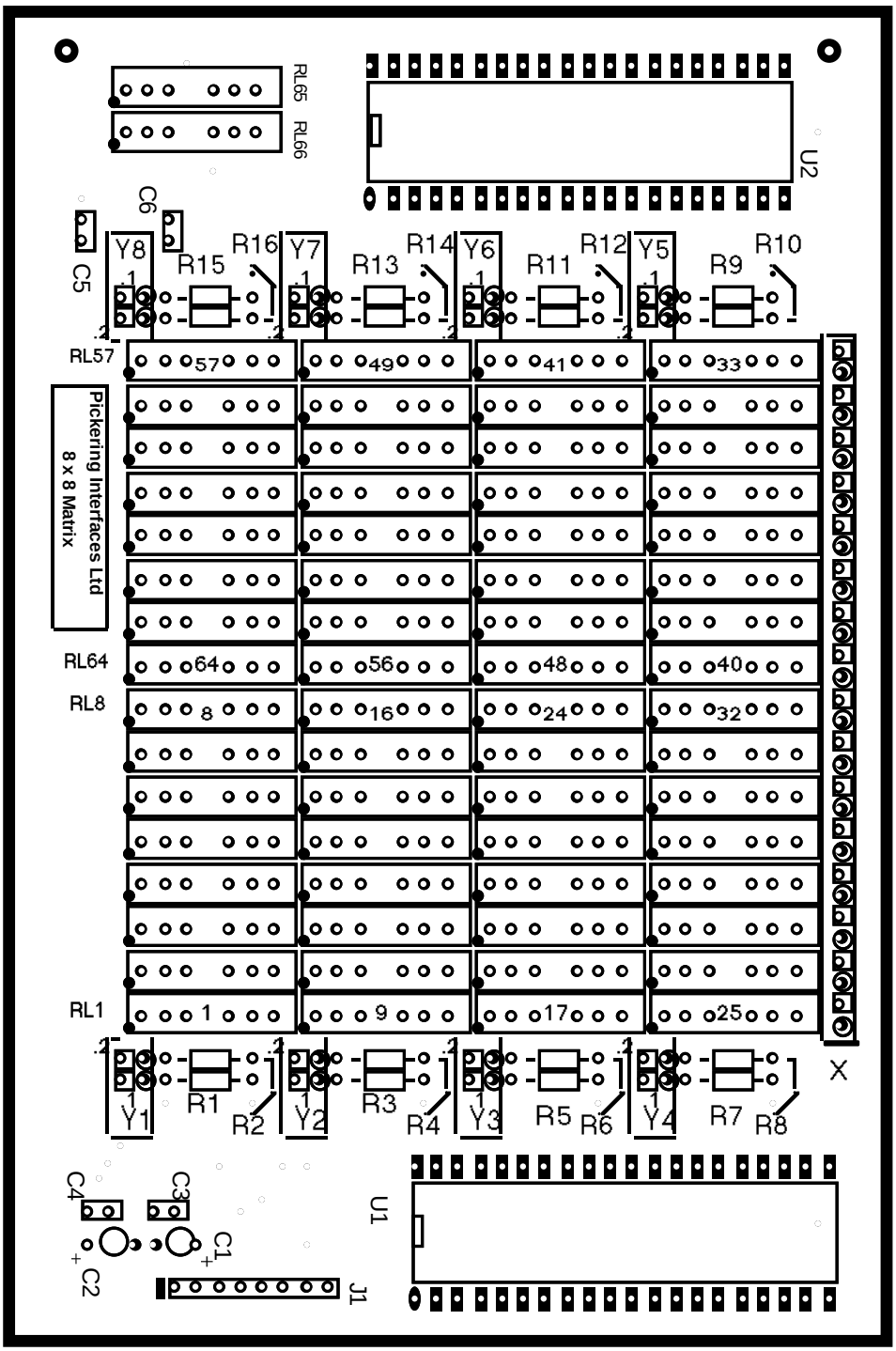
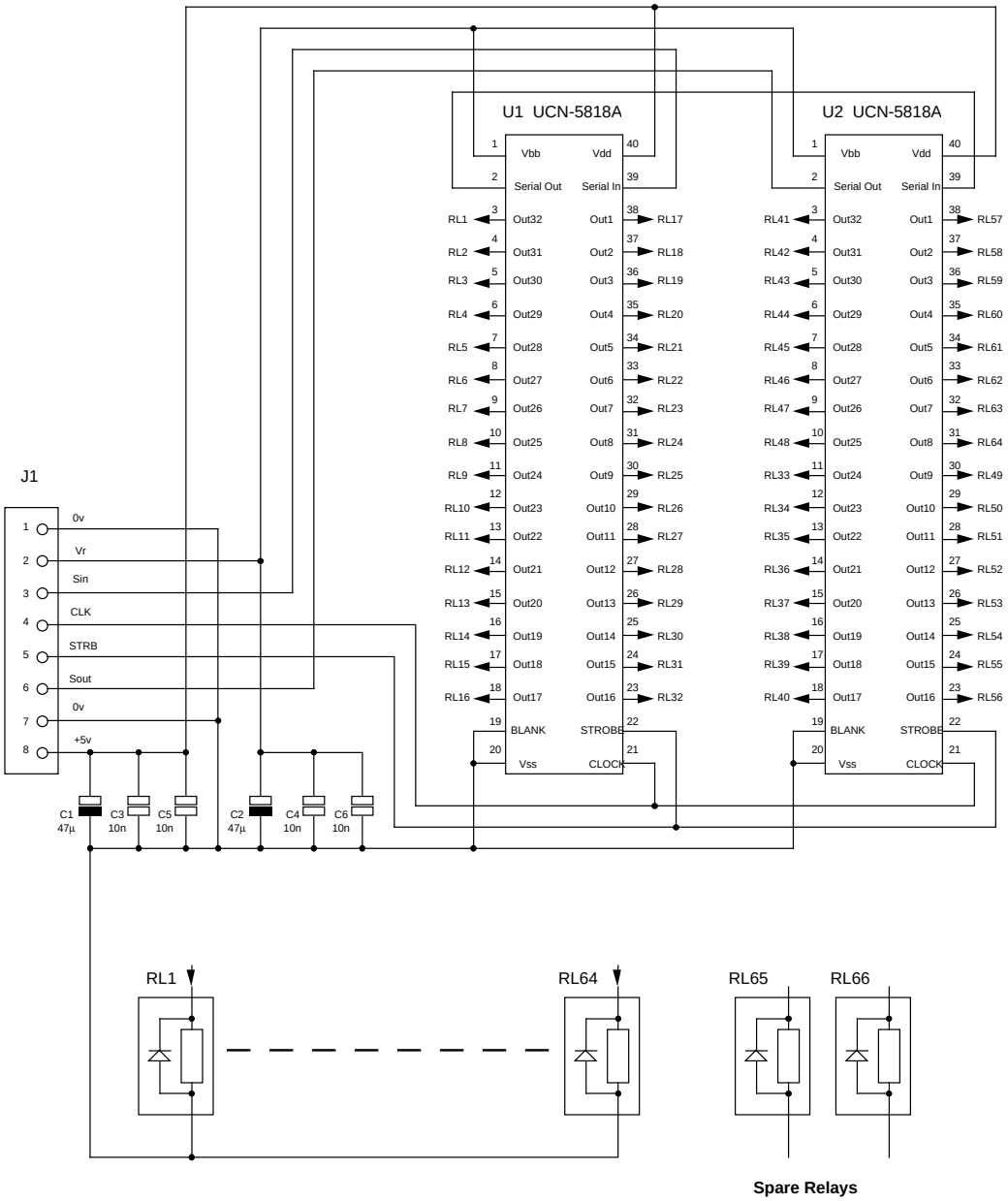


Fig 5.5 10-530 Relay PCB Layout



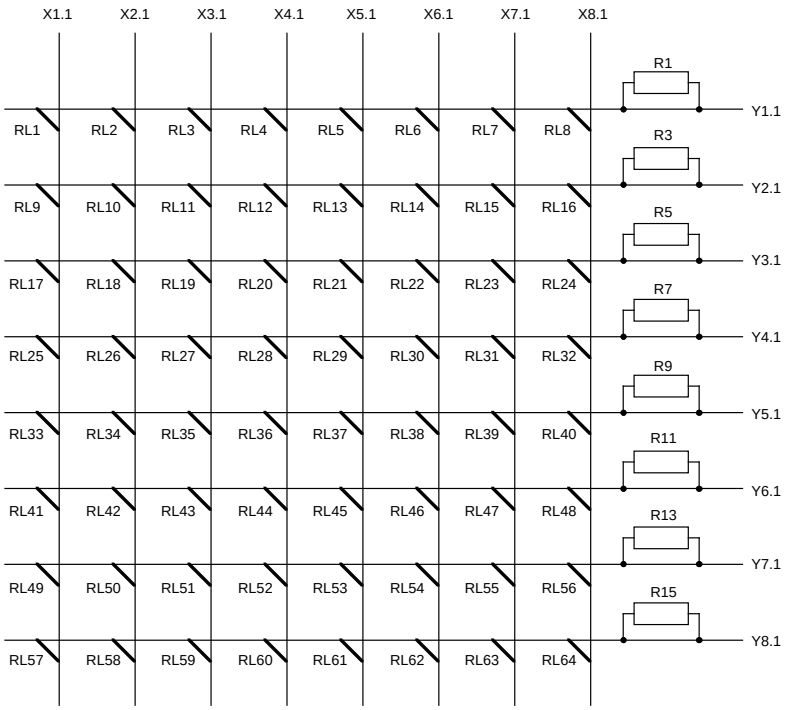
Note :-

For 8 x 8 matrix : fit all components
For 8 x 4 matrix : omit RL33 thru RL64

Single-pole version : fit single form-A relays in lieu of 2 form-A

Fig 5.6 10-530 Circuit Diagram 1 of 3

Pole #1



Pole #2

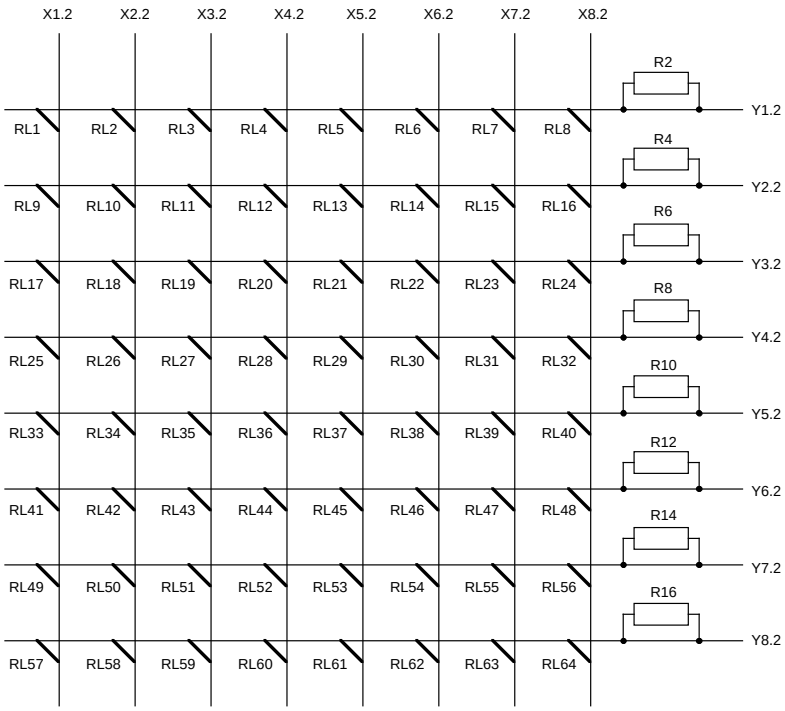


Fig 5.7 10-530 Circuit Diagram 2 of 3

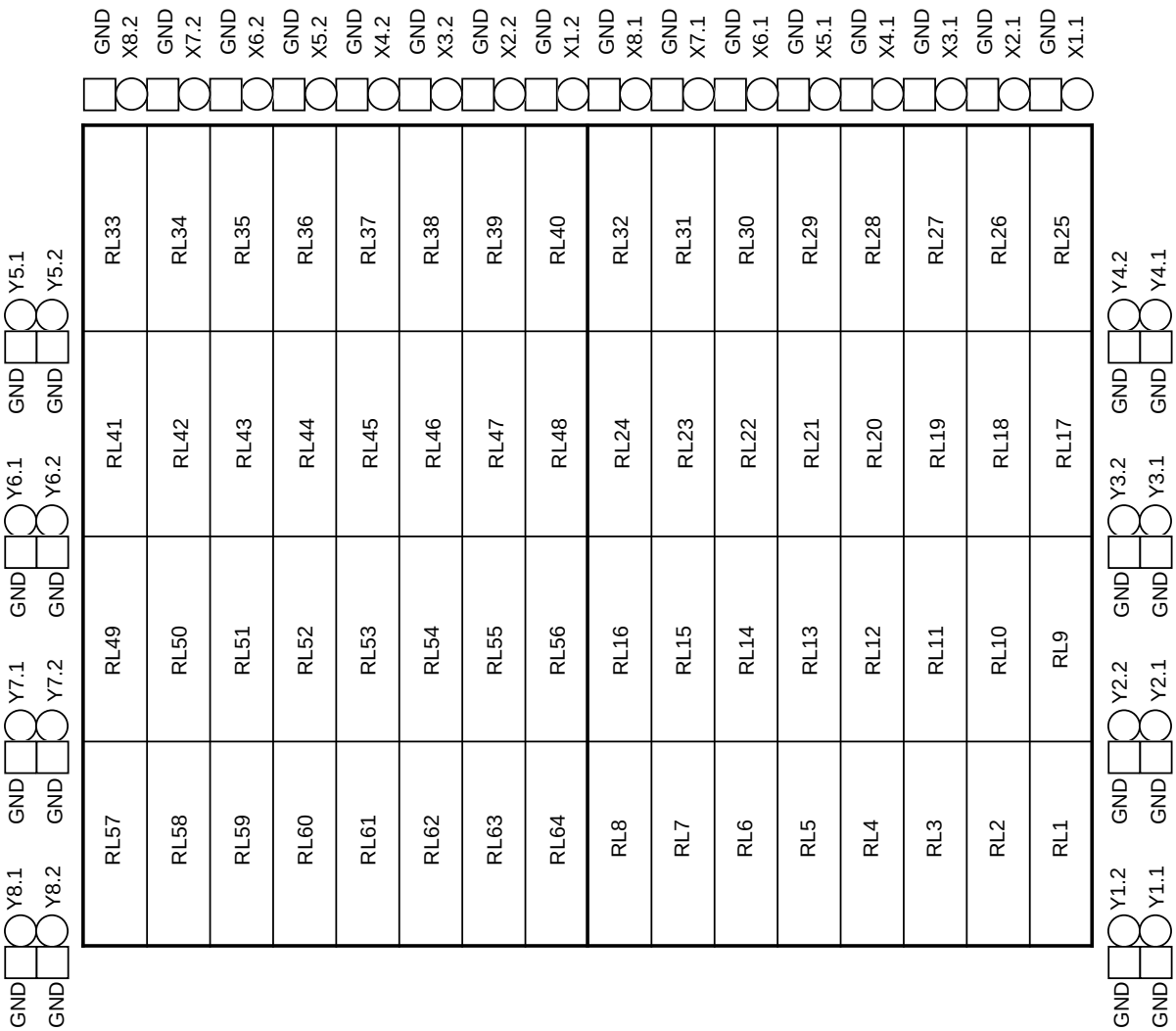


Fig 5.8 10-530 Circuit Diagram 3 of 3

5.3 Driver PCB Assembly

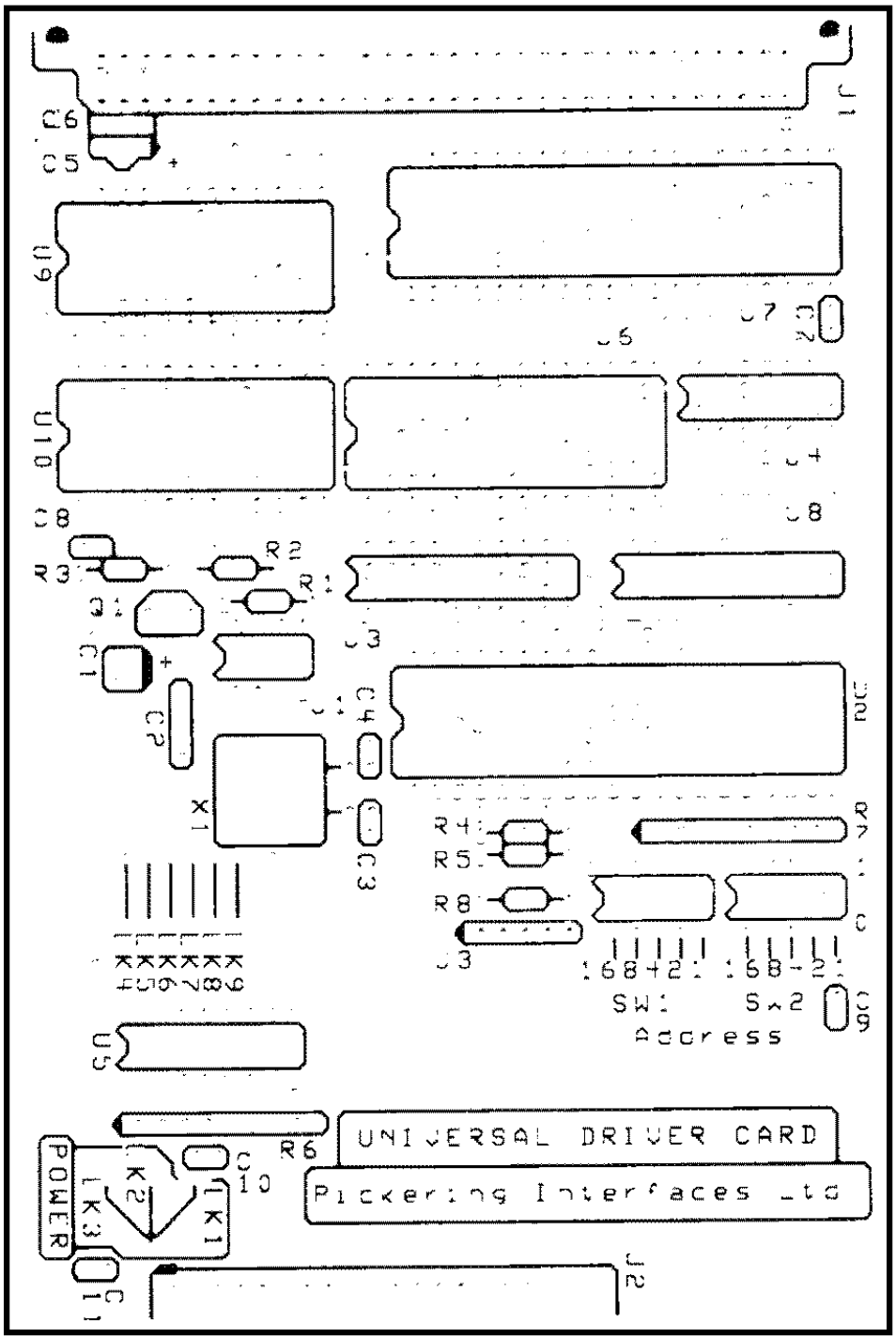


Fig 5.9 Driver PCB

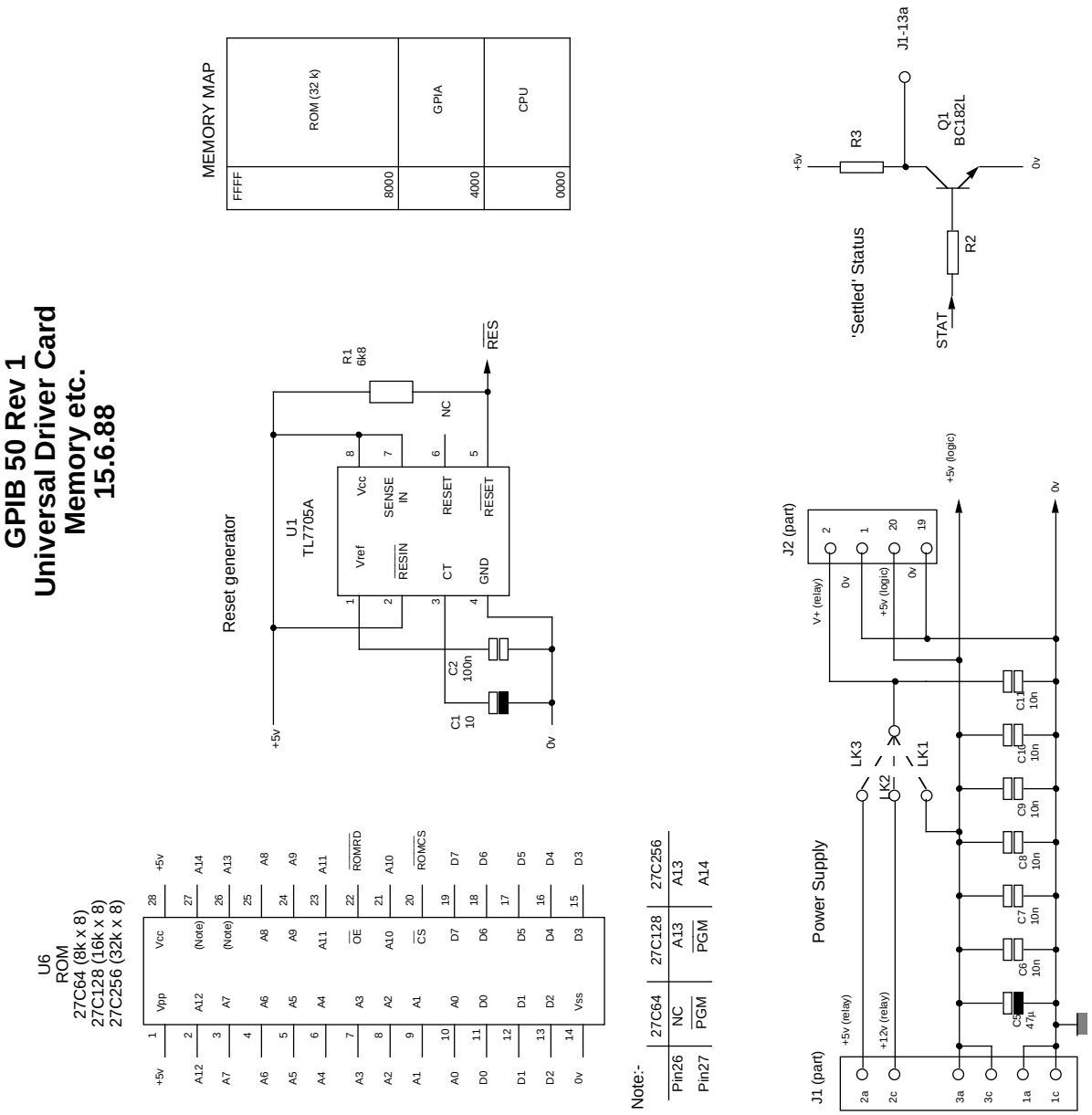


Fig 5.10 Driver Circuit Diagram 1 of 3

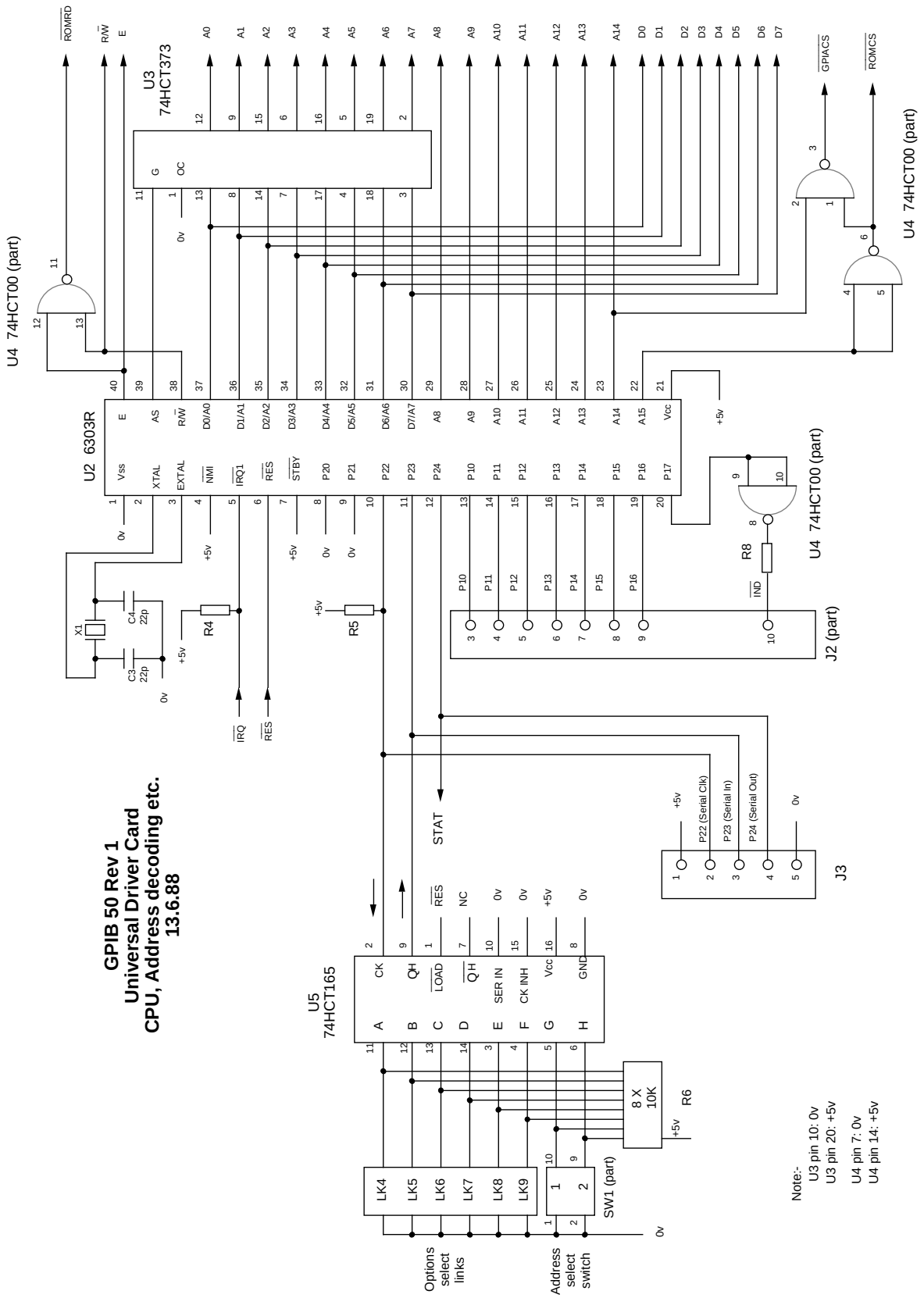


Fig 5.11 Driver Circuit Diagram 2 of 3

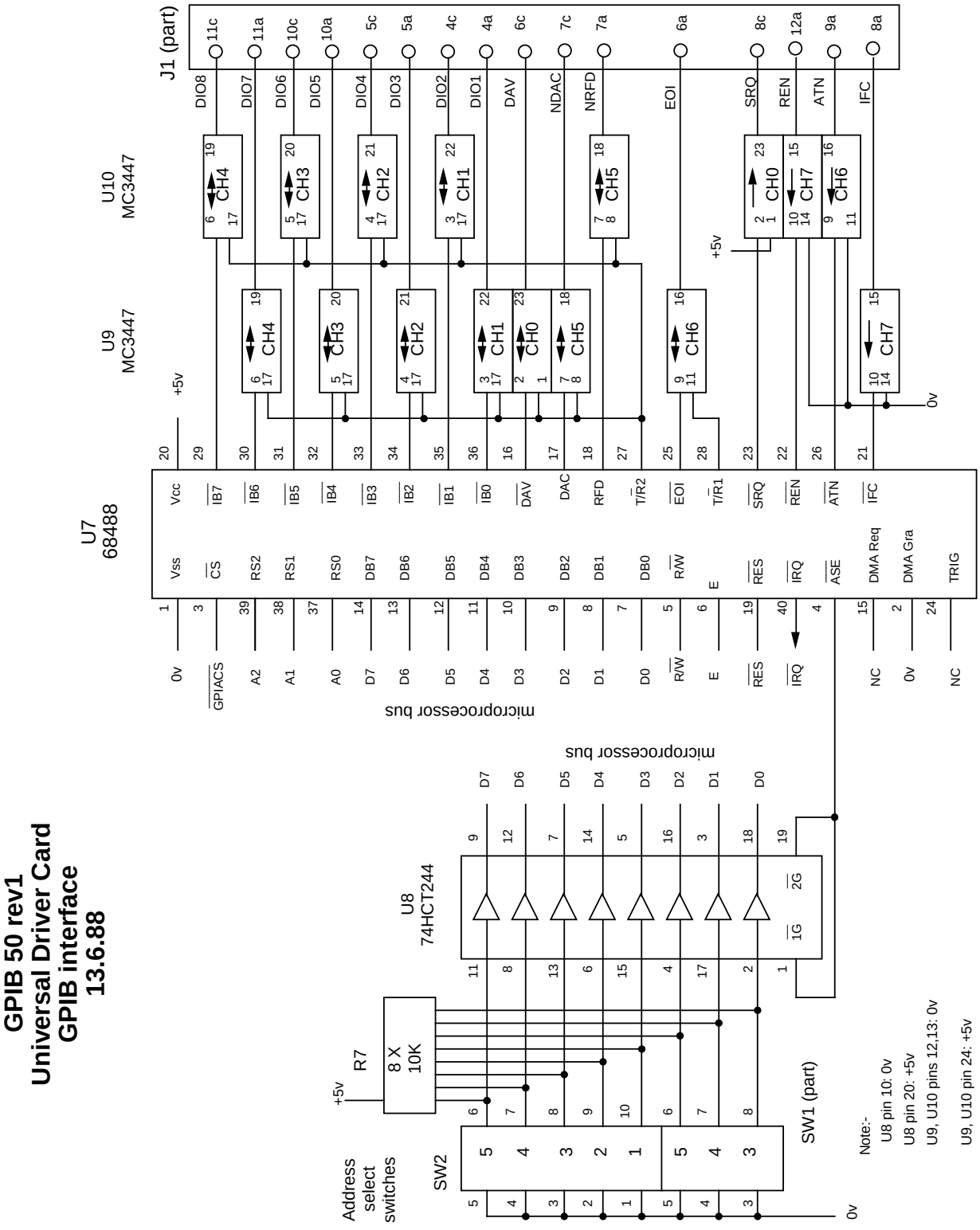


Fig 5.12 Driver Circuit Diagram 3 of 3

Parts List for GPIB50 Rev 1 PCB assembly

PCB Location	PIL Part Number	Part Description
R1..5	C/RS/012	Res 6k8Ω 5% 1/4W
R6..7	C/RS/013	Res 9-pin SIP, 8 x 10k commoned
R8	C/RS/???	Res 330Ω 5% 1/4W
Q1	C/SC/001	Transistor BC182L
U1	C/IC/019	IC DIG 7705ACP PS Monitor
U2	C/IC/022	IC DIG 63B03R Microprocesspr
U3	C/IC/031	IC DIG 74HCT373 Latch
U4	C/IC/030	IC DIG 74HCT00
U5	C/IC/029	IC DIG 74HCT165
U6	C/IC/024	IC DIG 27256 EPROM
U7	C/IC/020	IC DIG 68488P GPIA
U8	C/IC/033	IC DIG 74HCT244
U9..10	C/IC/021	IC DIG 3447 GPIB Transceiver
C1	C/CP/009	Cap 10uF elect
C2	C/CP/005	Cap 100nF
C3..4	C/CP/010	Cap 22pF
C5	C/CP/003	Cap 22uF tant
C6..11	C/CP/001	Cap 10nF
SW1..2	C/SW/001	DIP Switch 5-pole dip slide
X1	C/MS/002	Xtal 4.00 MHz
J1	C/CN/001	DIN 41612 Plug, R/A pcb mouting, 64 Way A/C
J2	C/CN/033	2 x 4 way inter pcb
J3	———	
	C/PC/050	PCB 3U PTH
Front Panel PCB Assembly		
	C/CN/002	2 x PCB Header, 10 Way
	C/CN/002	2 x PCB Header, 4 Way
	C/SC/004	LED (red)
	C/PC/063	PCB, PTH

Environmental

Operating Temperature 0°C to 50°C.

Storage Temperature -20°C to 75°C.

Humidity 95% non condensing.

Weight Dimensions and Power Requirements

Approx Weight/g		600
Dimensions/mm		
Front Panel Width		60.9
Height		128.5
Overall Length †		189
Power /Current Consumption		
Maximum	5V	250/mA
	12V‡	800/2000/mA
Minimum	5V	150/mA
	12V‡	0/mA

† Approx dimensions. Standard 160mm 3U Eurocard (as specified in DIN 41494.)

‡ First figure is for dry reed relays the second for mercury wetted versions (dry/mercury). For more precise figures please contact factory.

Voltage Supplies

Logic Supply 5Vdc ±5%.

Relay Supply 5Vdc ±10%

Relay Supply 12Vdc ±10%

Current Firmware Release: MTX 2.0

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