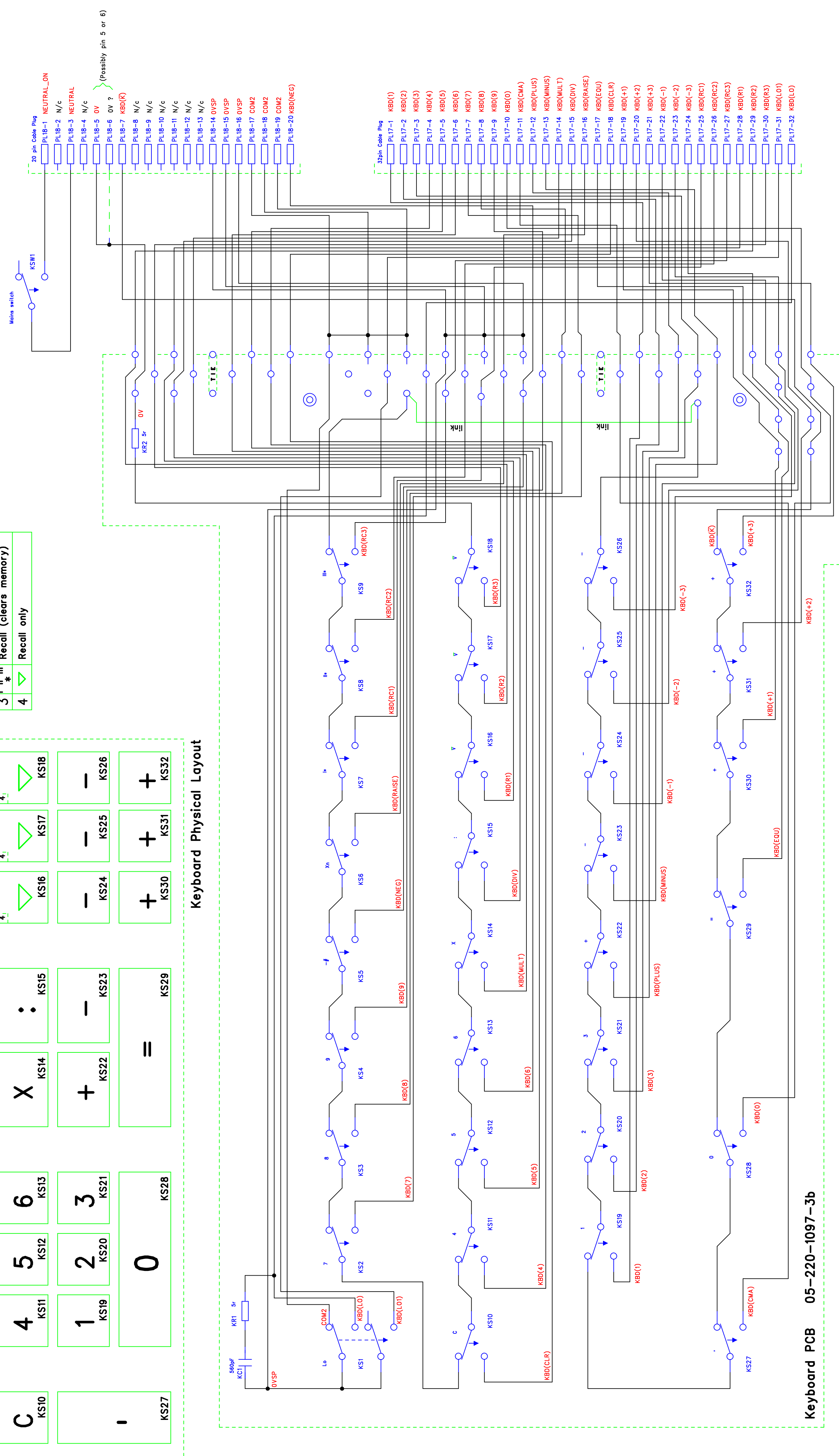
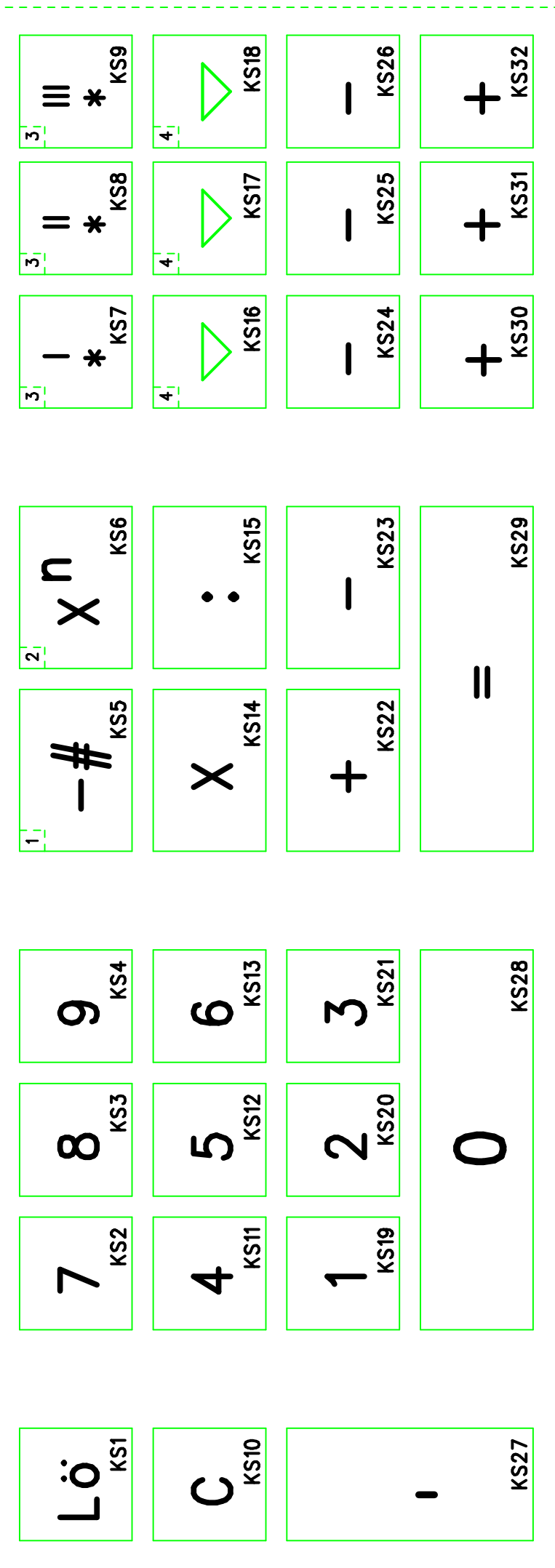


RevNo	Revision note	Date	By	Checked
-	-	-	-	-

Notes -

1	-#	Negative entry
2	X ⁿ	Raise to power N
3		Recall (clears memory)
4	*	Recall only



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Scale: 1:1
Sheet: 1 of 2
Drawing Number: Soemtron 220

Title: Soemtron ETR 220 Calculator Keyboard Circuit & Layout
PCB = 05-220-1097-3b

Date: 7/8/2007

Name: MD Hatch

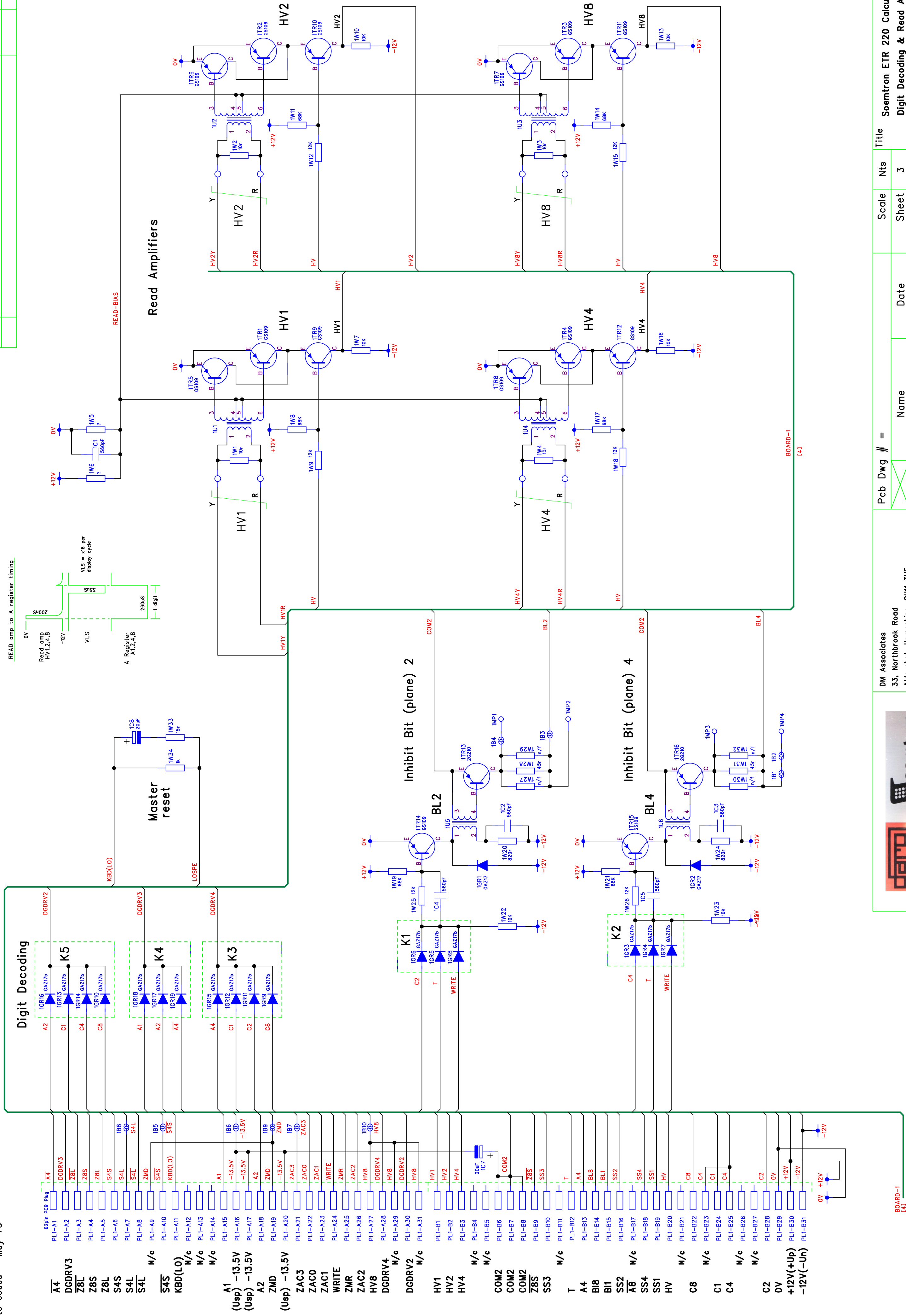
Drawn: [Signature]
Checked: [Signature]

RevNo: -
Revision note: -
Date: -
By: -
Checked: -

Comp side - ETR 220
 Solder side - 3033 05-220-7001-0 0e
 Date coded - May 73

RevNo Revision note

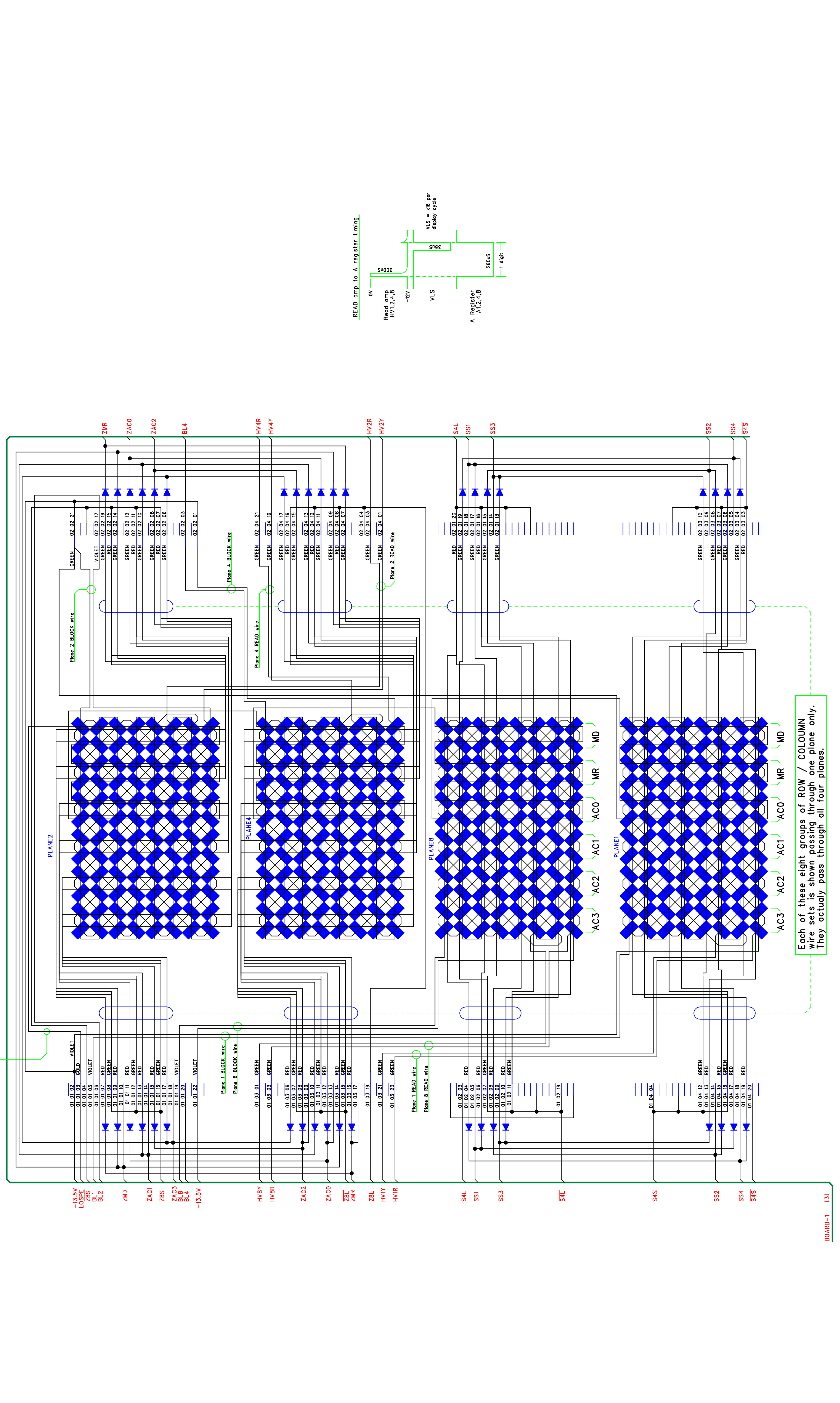
Date By Checked



These diagrams are referenced to 0V - Logical 1 = -12v, logical 0 = 0V

		DM Associates 33, Northbrook Road Aldershot, Hampshire, GU11 3HE Email: mike@soemtron.org www.soemtron.org	
Pcb Dwg # =	Name MD Hatch	Date 13/5/2008	Title Soemtron ETR 220 Calculator Digit Decoding & Read Amps BOARD 1
Drawn Checked	Next Sheet 4	Drawing Number Soemtron 220	Nts 3
Sheet 3	Scale 1:1	A2 Issue 10	A2 Issue 10

Lo SPE only clears the MD, MR and AC0 registers



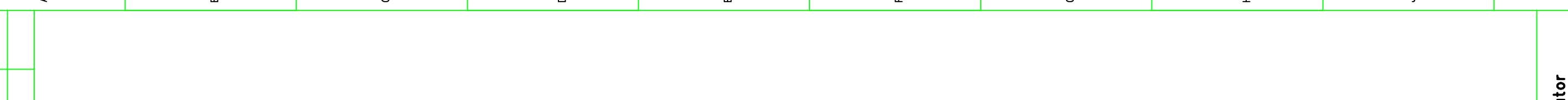
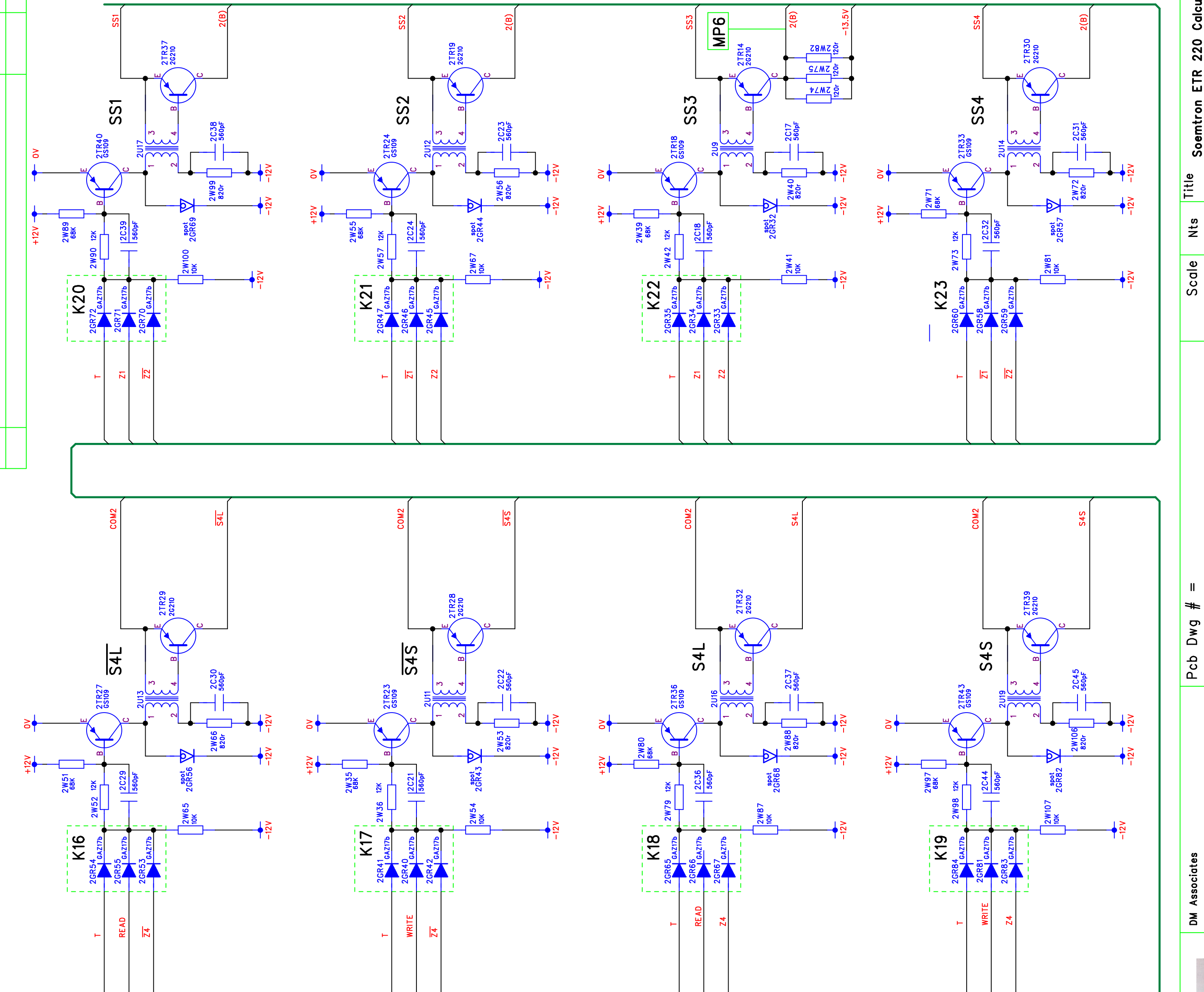
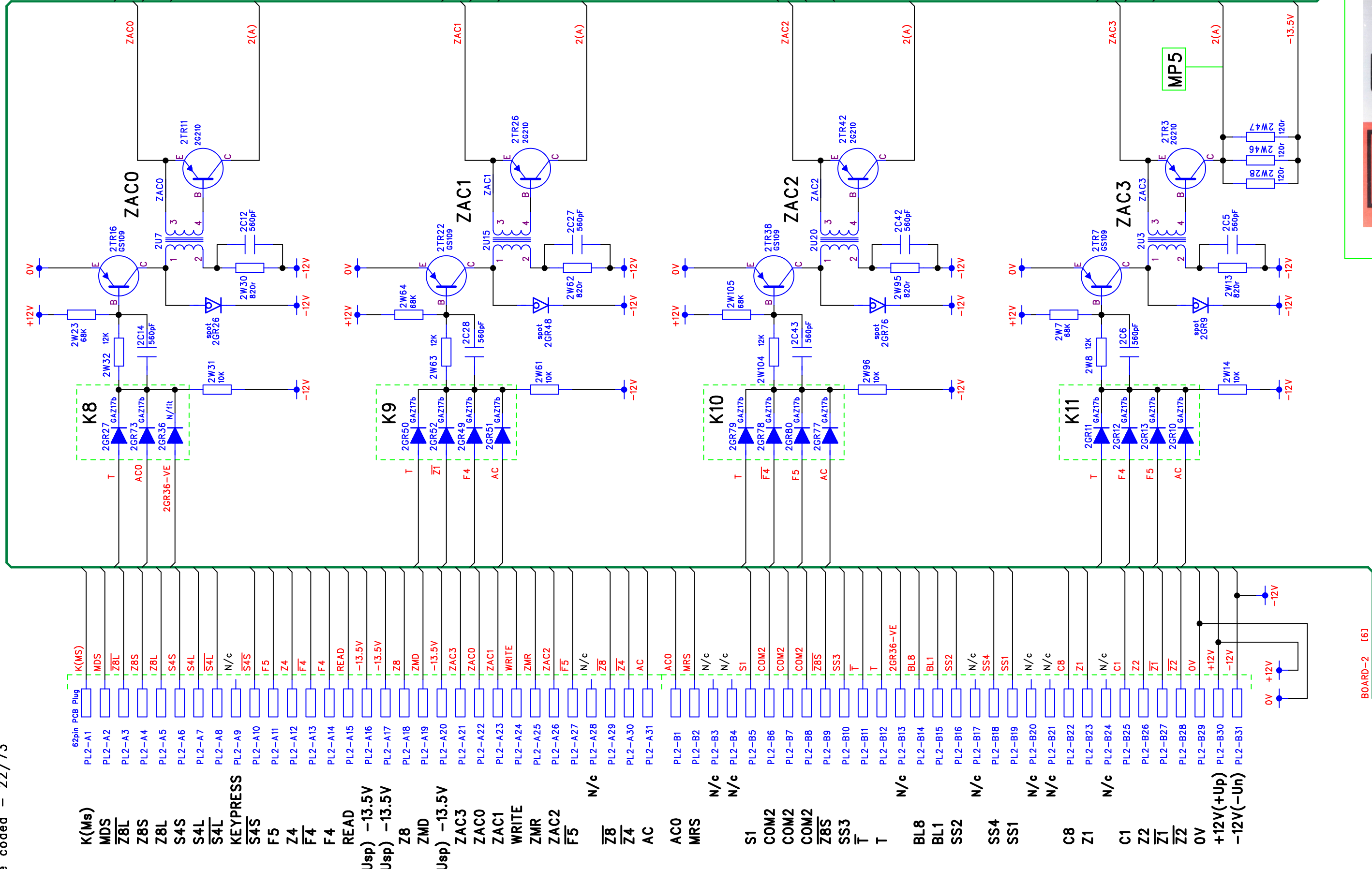
Each of these eight groups of ROW / COLUMN wire sets is shown passing through one plane only. They actually pass through all four planes.

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© 2008 Mike Hatch. (www.soemtron.org)		Pcb Dwg # =	
Drawn MD Hatch		Name	
Checked		Date 25/11/2008	
Title Soemtron ETR 220 Calculator Core Store - Planes BOARD1 Sheet 2		Nts 4 Sheet 5 Next Sheet Drawing Number Soemtron 220	
These diagrams are referenced to 0V - Logical 1 = -12V, logical 0 = 0V		A2 Issue A	

Comp side
 Solder side
 Date coded - 22/73

RevNo Revision note

Date By Checked

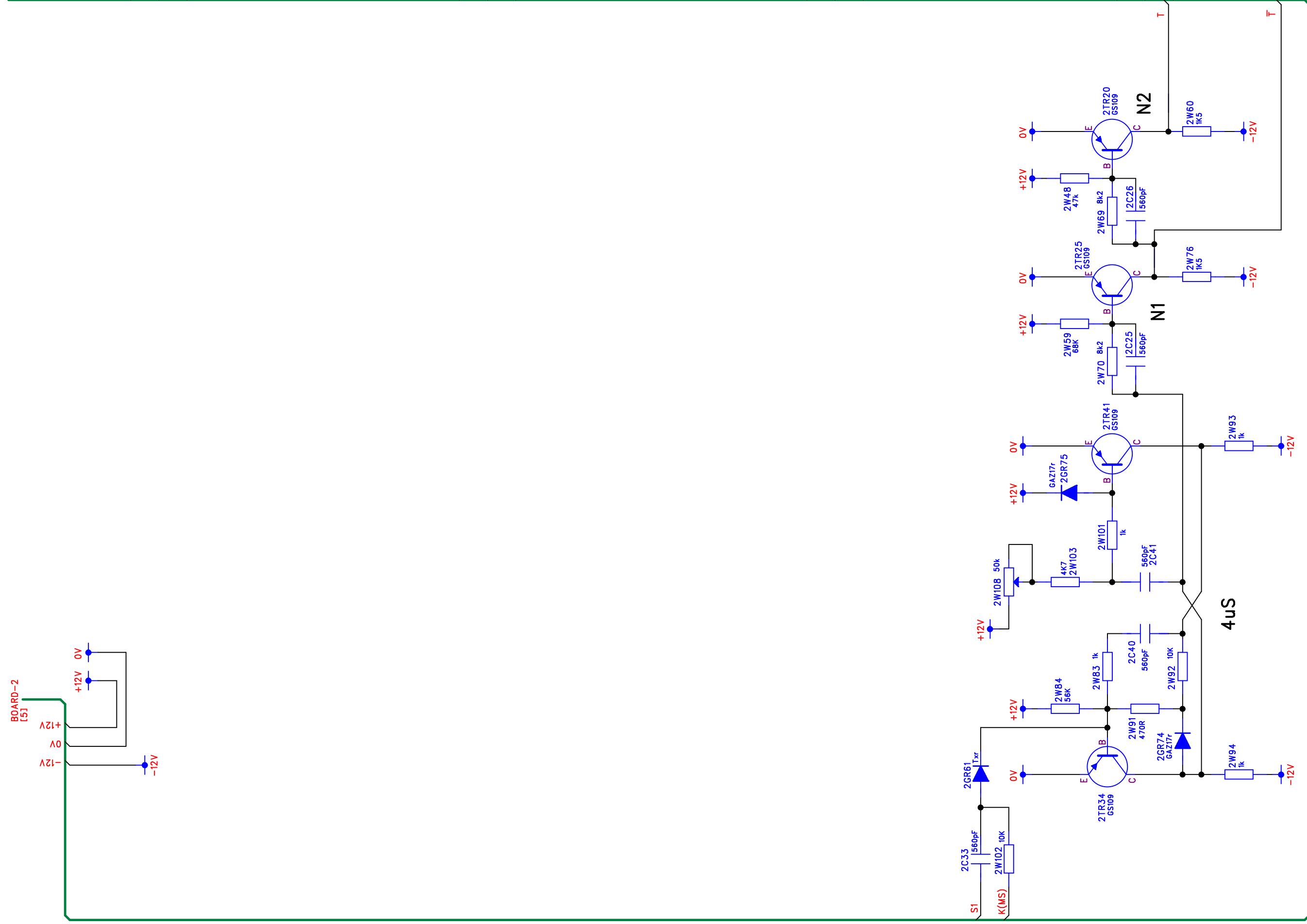


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Pcb Dwg # =	Name	Date	Title	Nts	Scale
Checked	MD Hatch	12/5/2008	Soemtron ETR 220 Calculator Core Drivers BOARD 2	5	Sheet
				6	Next Sheet
					Drawing Number
					Soemtron 220
					A2 Issue
					A

These diagrams are referenced to 0V - Logical 1 = +12V, logical 0 = 0V
 Signal names are from German logic diagrams which reference +12V - Logical 1 = 0V, 0 = +12V

BOARD-2 .161



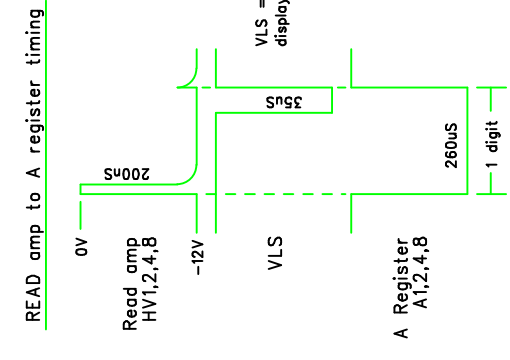
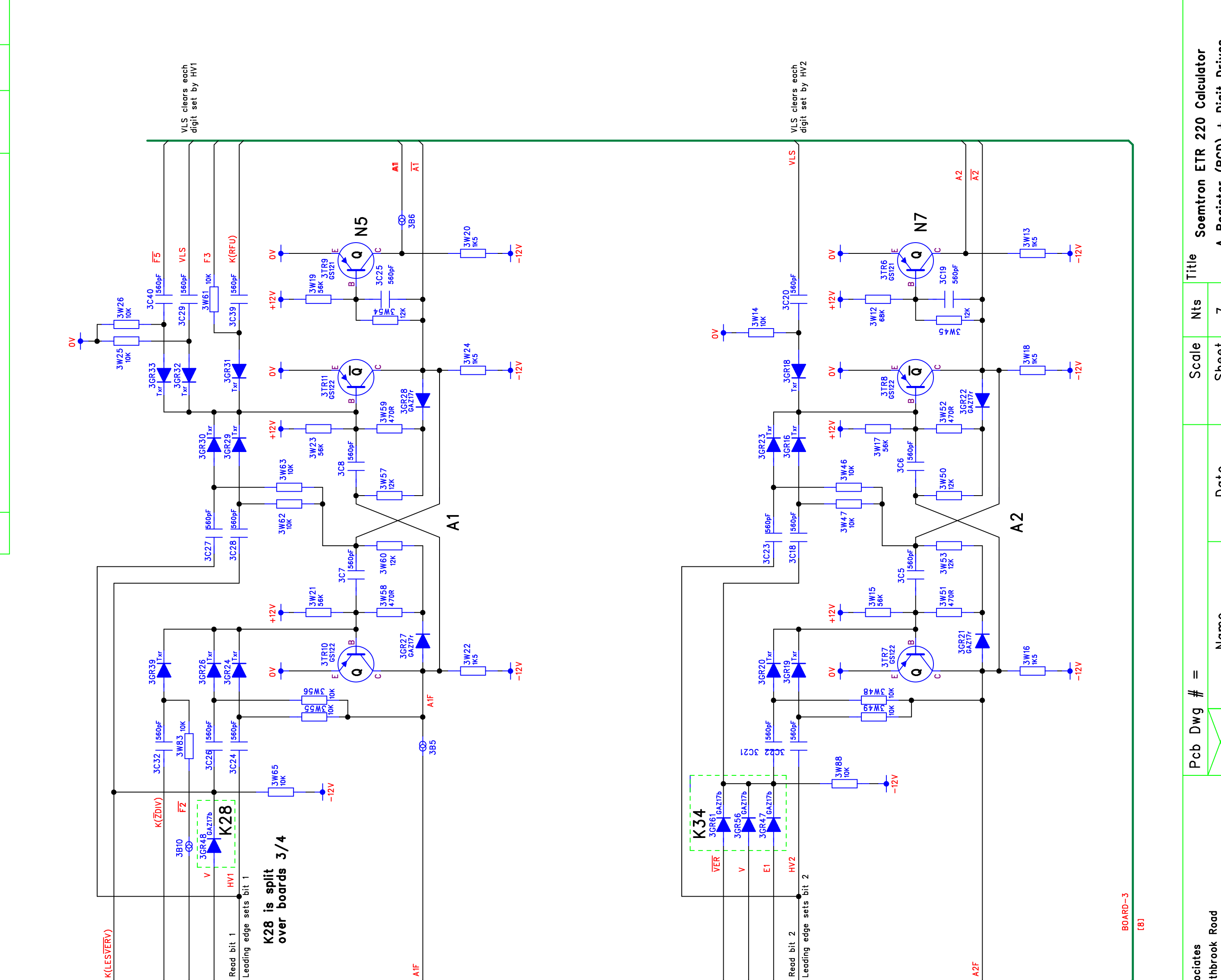
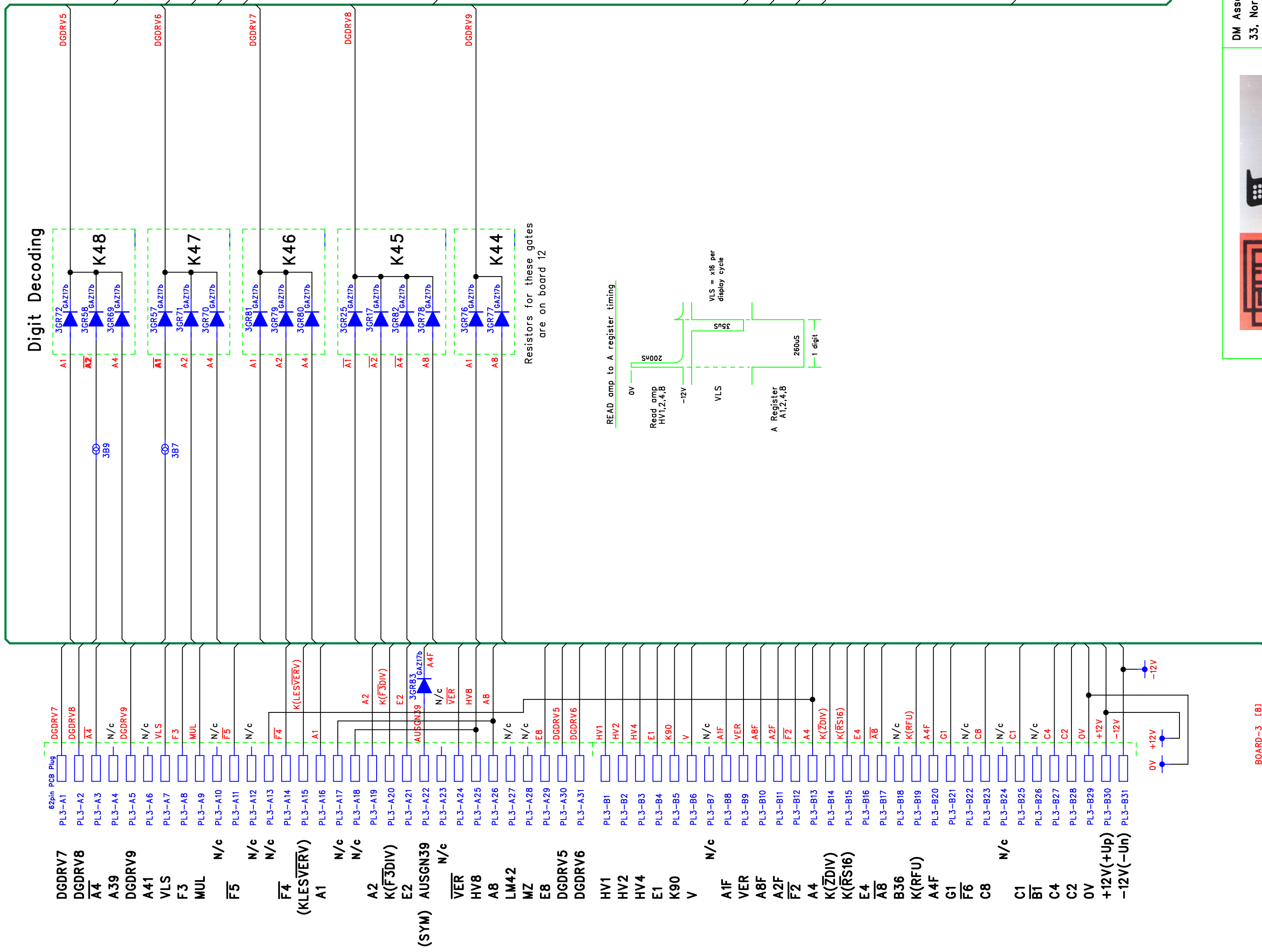
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www.soemtron.org

Pcb Dwg # =		Name	
Drawn	MD Hatch	Date	12/5/2008
Checked		Next Sheet	7
Title		Soemtron ETR 220 Calculator	
Scale		Sheet 6	
Nts		Core Drivers	
Drawing Number		BOARD 2 Sheet 2	
A2 Issue		10	

Comp side - 05-220-7003-5 0e
 Solder side - 3035 05-220-7003-5 e
 Date coded - 22/73

RevNo Revision note

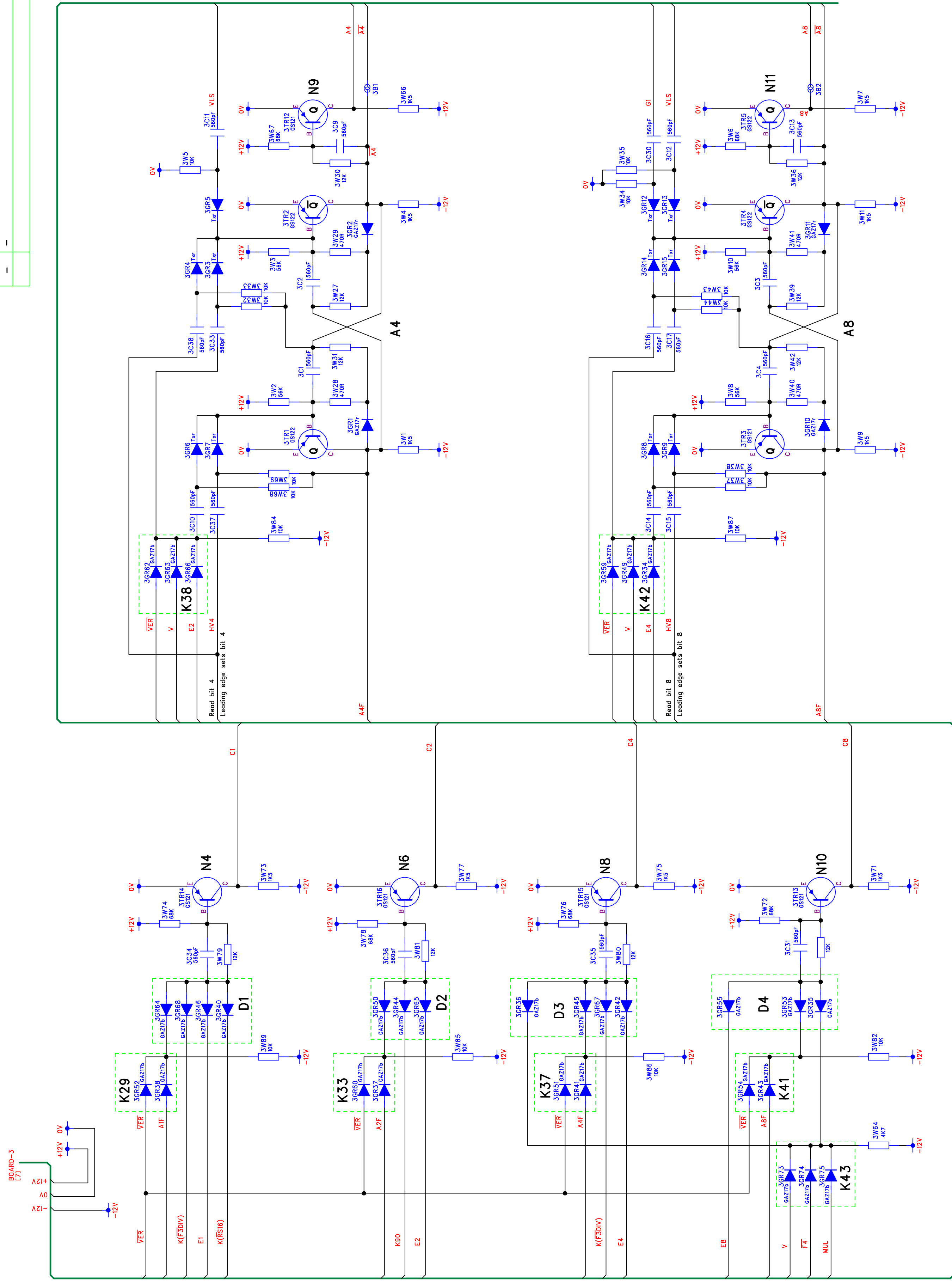
Date By Checked



DM Associates 33, Northbrook Road Aldershot, Hampshire, GU11 3HE Email: mike@soemtron.org www.soemtron.org		Soemtron ETR 220 Calculator A Register (BCD) + Digit Drives BOARD 3	
Pcb Dwg # =	Name	Date	
MD Hatch			
Drawn	Checked		
Scale	Sheet	Next Sheet	
7	8		
Title		Nts	
Soemtron ETR 220 Calculator		7	
A Register (BCD) + Digit Drives		8	
BOARD 3			
Drawing Number		Soemtron 220	
A2 Issue			
A			

These diagrams are referenced to 0V - Logical 1 = -12V, logical 0 = 0V

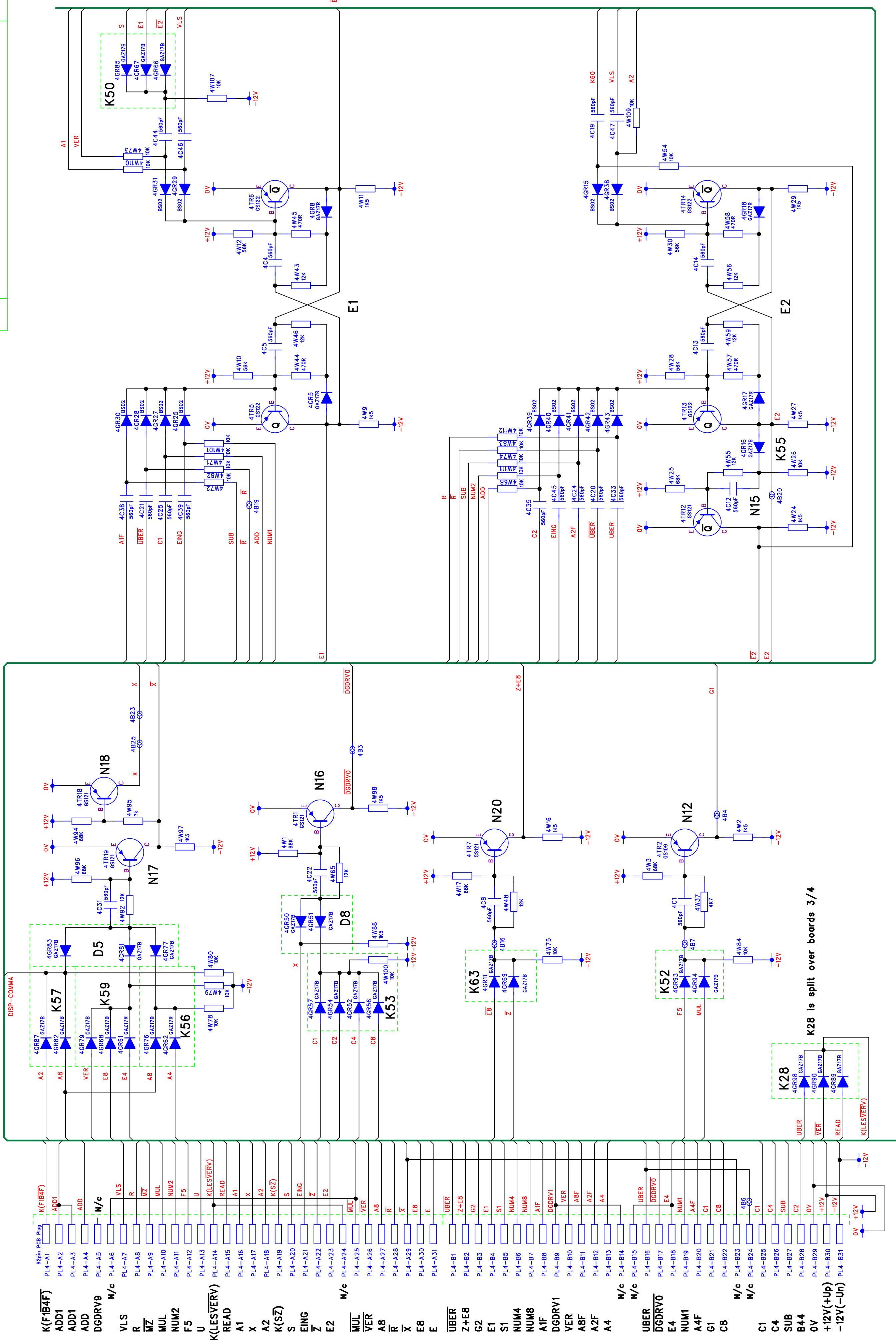
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		


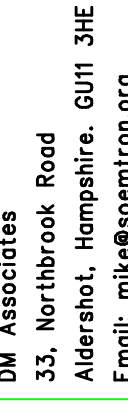


Comp side - 05-220-7004-3 0h
 Solder side - 3036 05-220-7004-3 0i
 Date coded - 17/73

RevNo Revision note

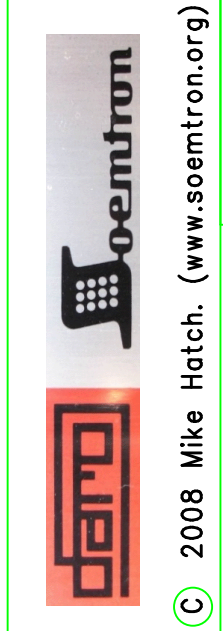
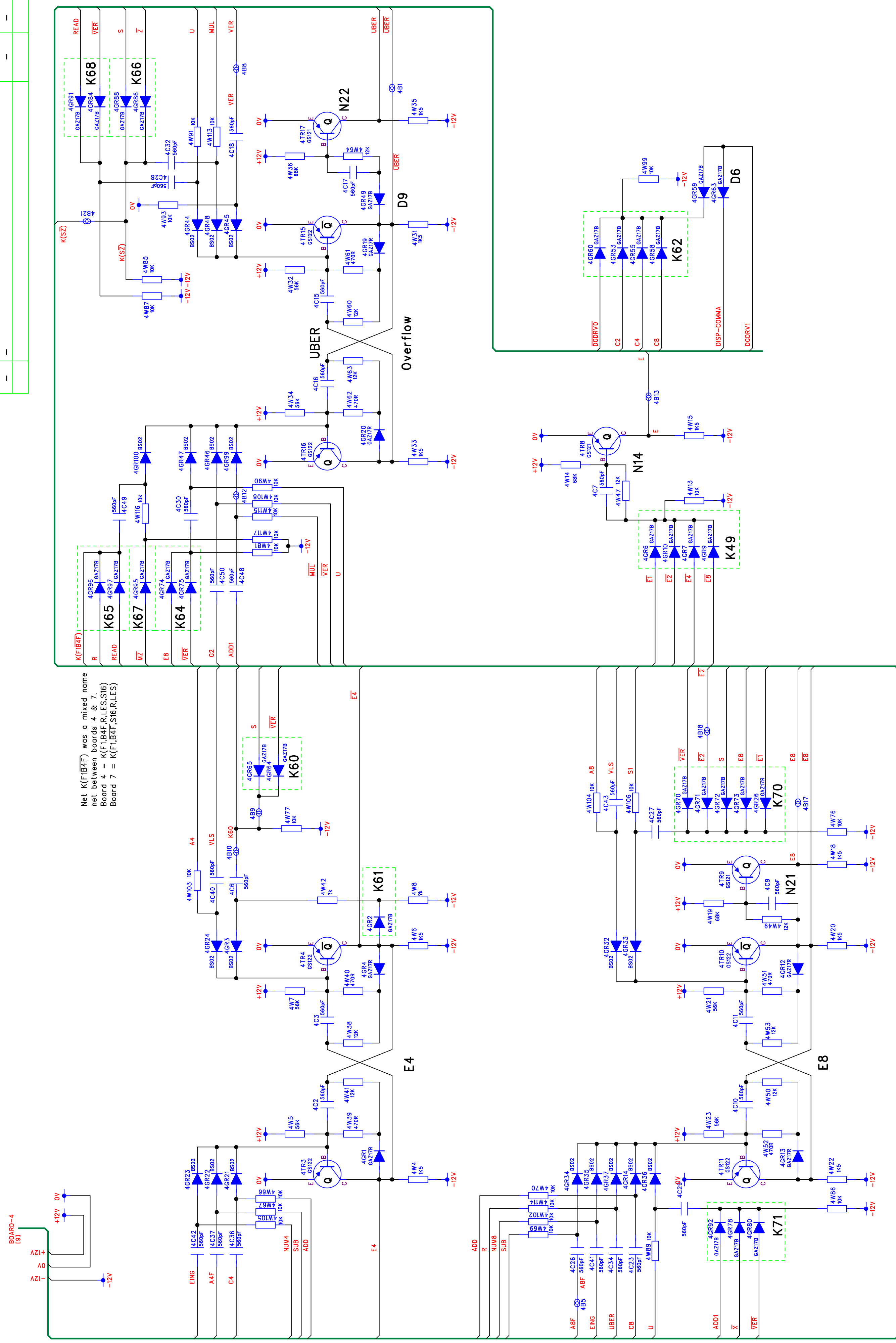
Date By Checked



			
© 2008 Mike Hatch. (www.soemtron.org)		DM Associates 33, Northbrook Road Aldershot, Hampshire. GU11 3HE Email: mike@soemtron.org www.soemtron.org	
Pcb Dwg # =	Name	Date	
MD Hatch			
Checked	Drawn	Next Sheet	Sheet
		10	9
Title		Scale	
Soemtron ETR 220 Calculator		Nts	
E Register (BCD) + UBER		9	
BOARD 4		Drawing Number	
		Soemtron 220	
		A2 Issue	
		A	

These diagrams are referenced to 0V - Logical 1 = +12V, logical 0 = 0V

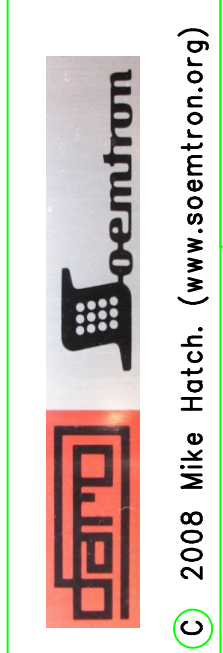
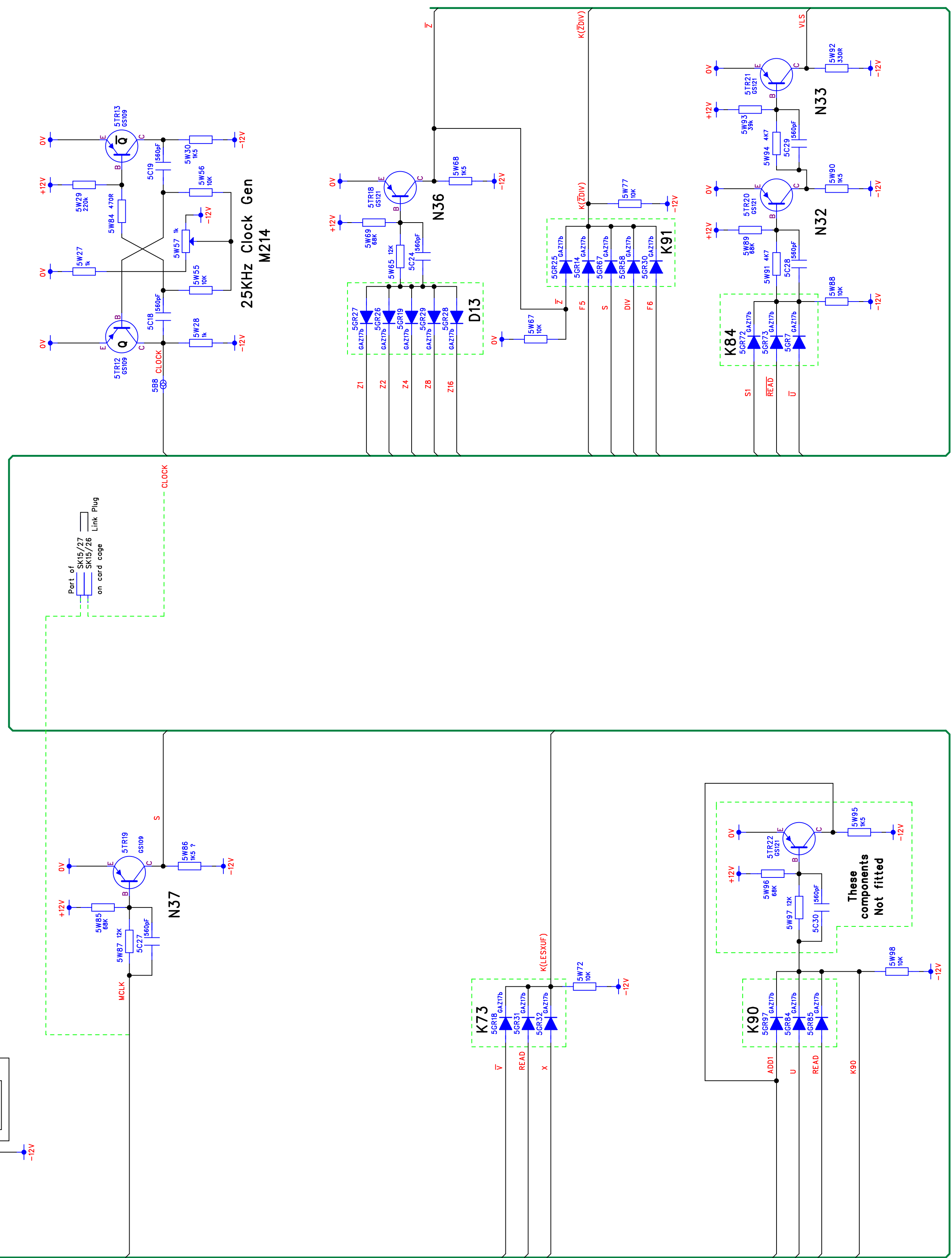
Net K(F1B4F) was a mixed name net between boards 4 & 7.
 Board 4 = K(F1B4F,R,LES,S16)
 Board 7 = K(F1B4F,S16,R,LES)



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Pcb Dwg # =	Name	Date	Title
MD Hatch	MD Hatch	-	Soemtron ETR 220 Calculator
Checked	Checked	-	E Register (BCD) + UBER
Scale	Sheet	Next Sheet	BOARD 4 Sheet 2
Nts	10	Drawing Number	Soemtron 220
			A2 Issue

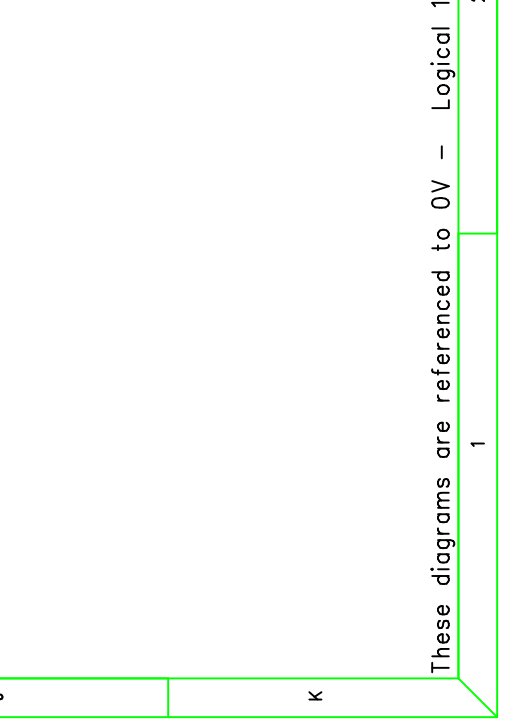
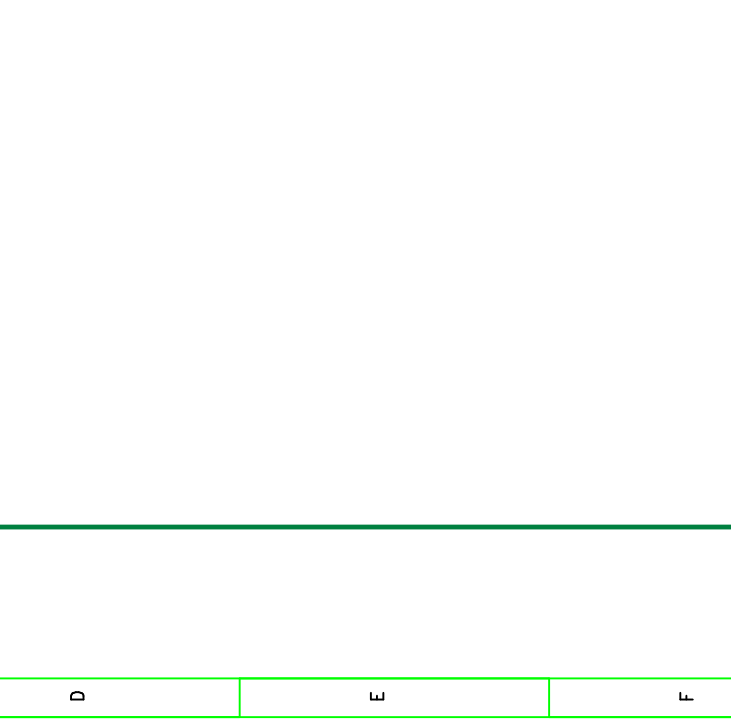
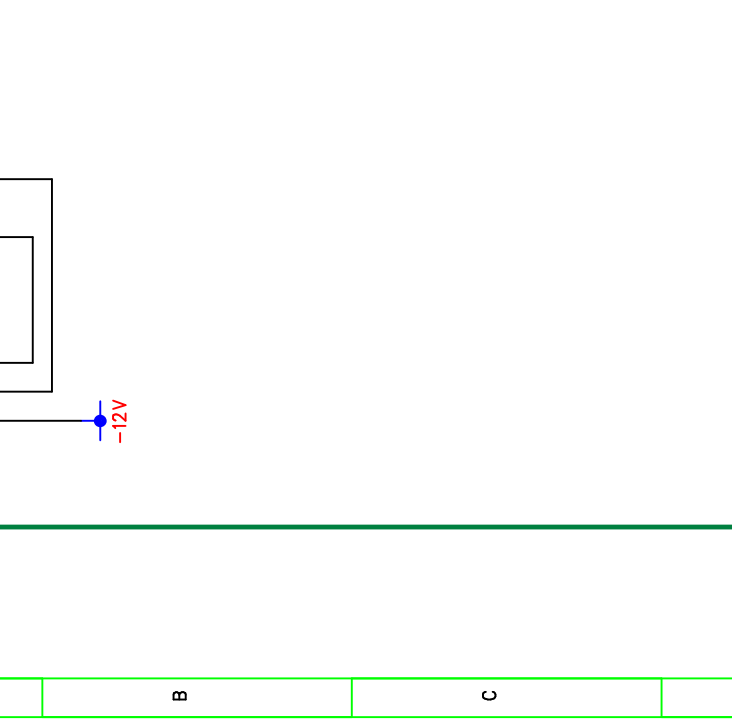
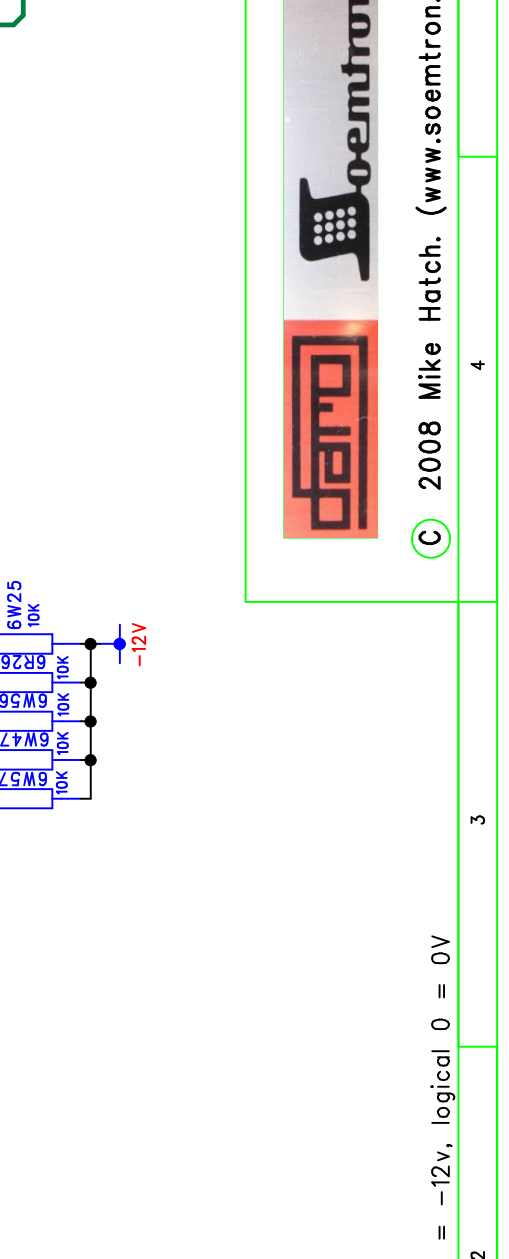
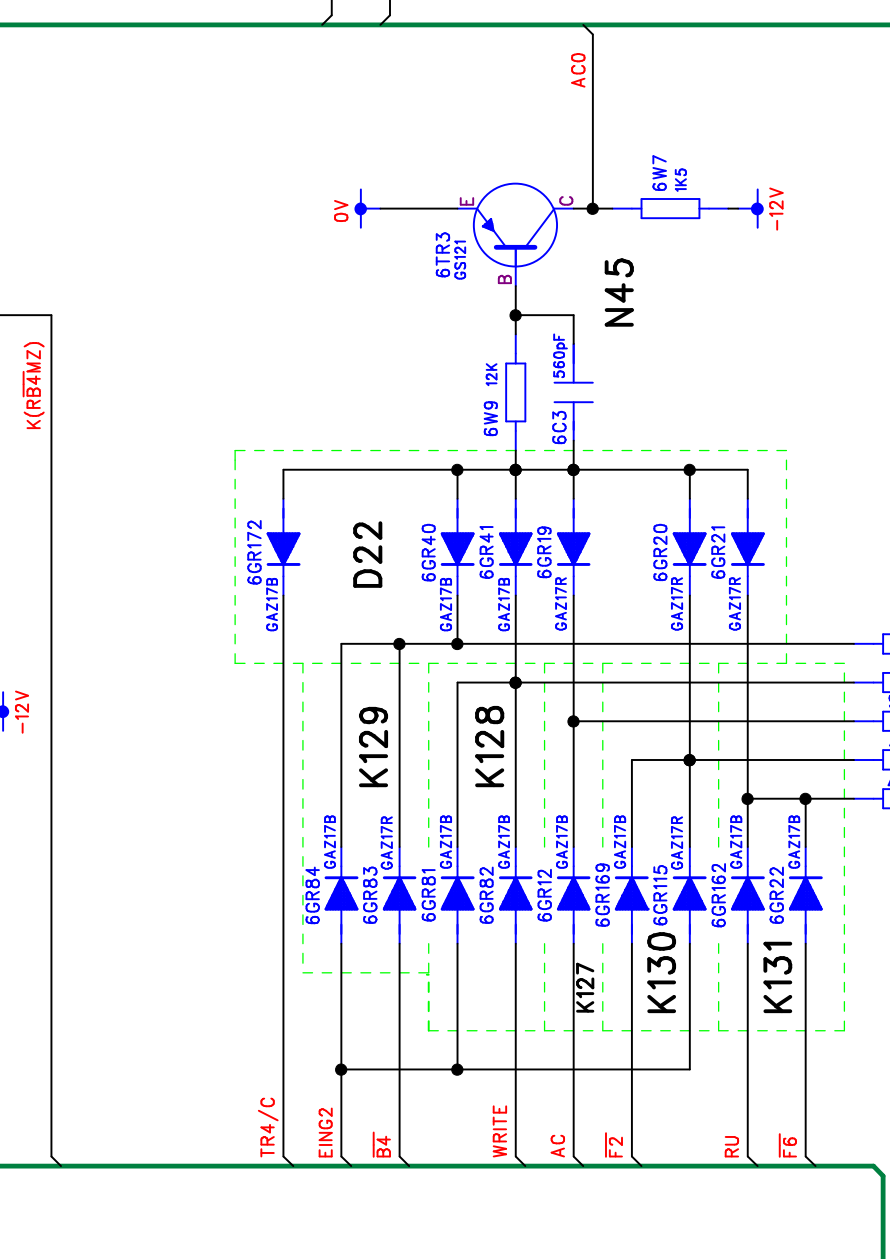
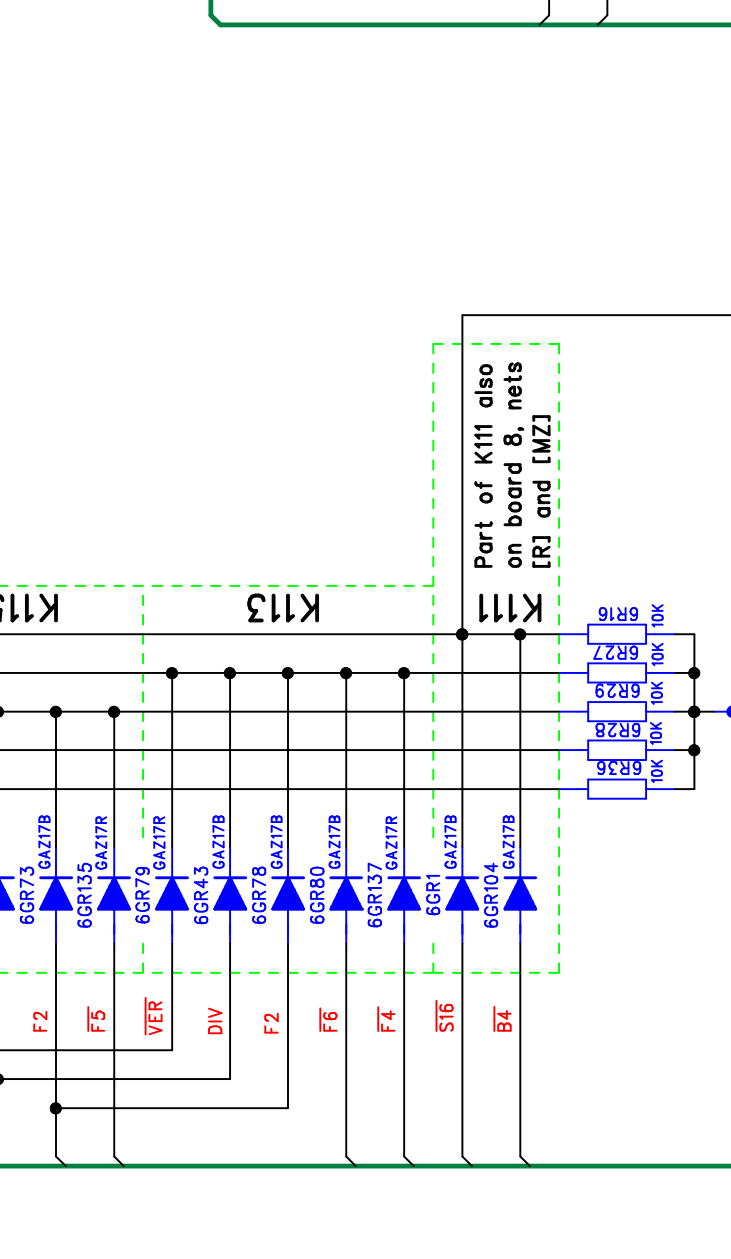
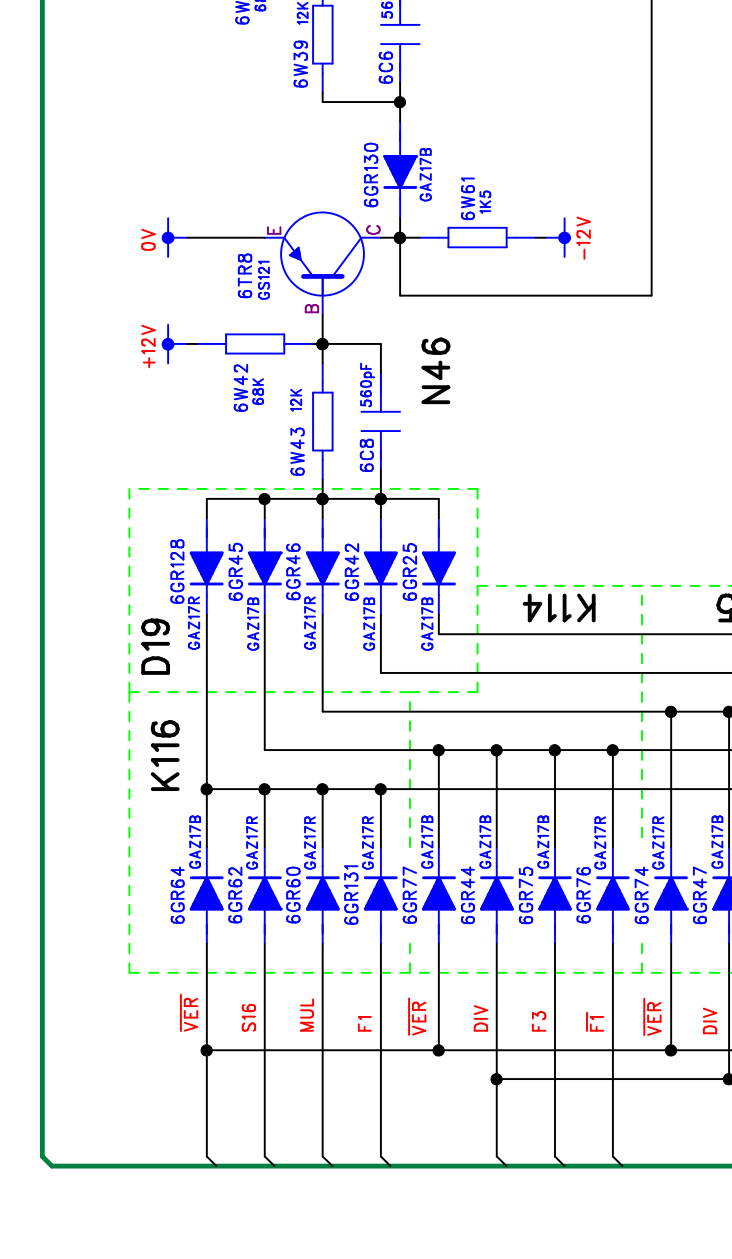
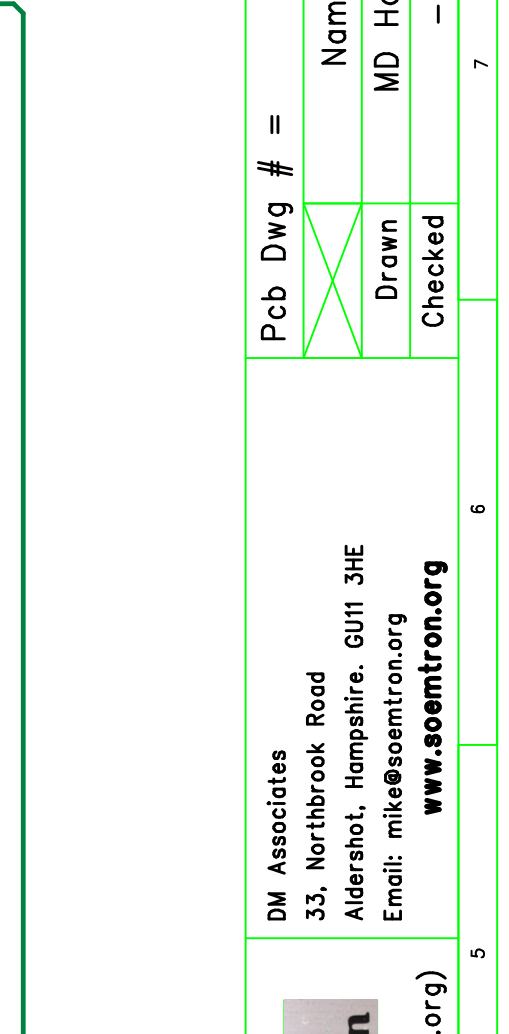
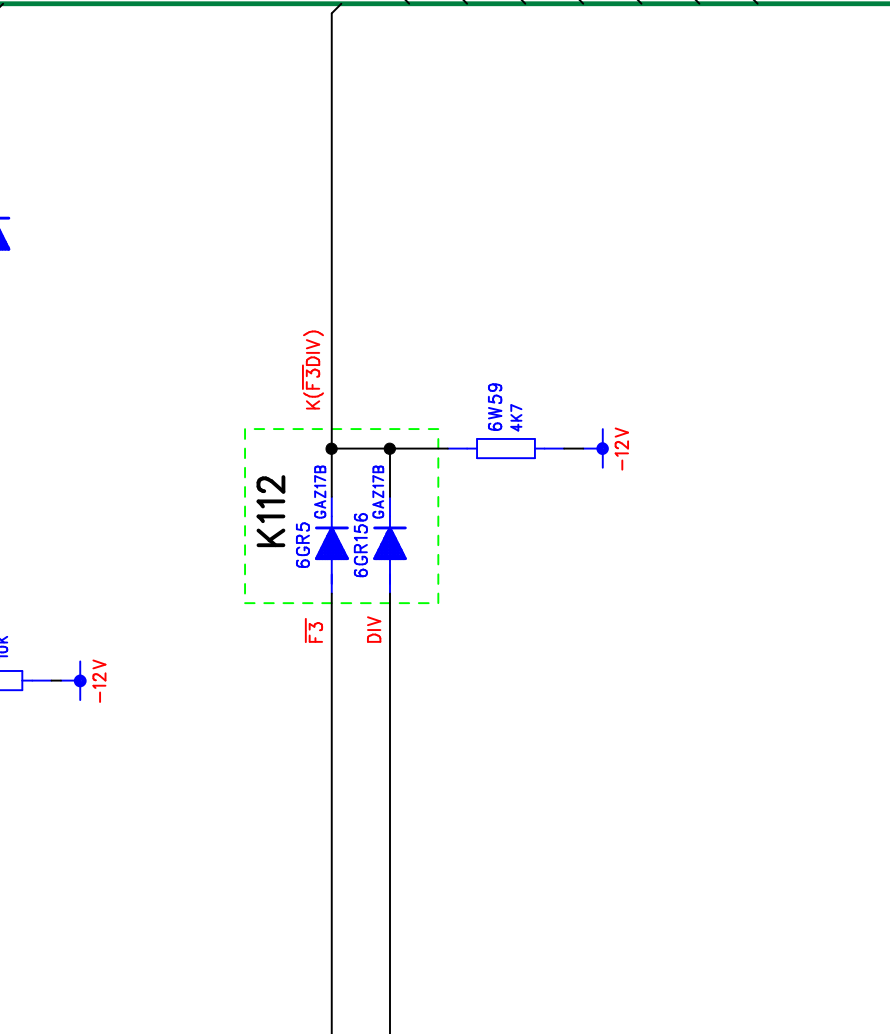
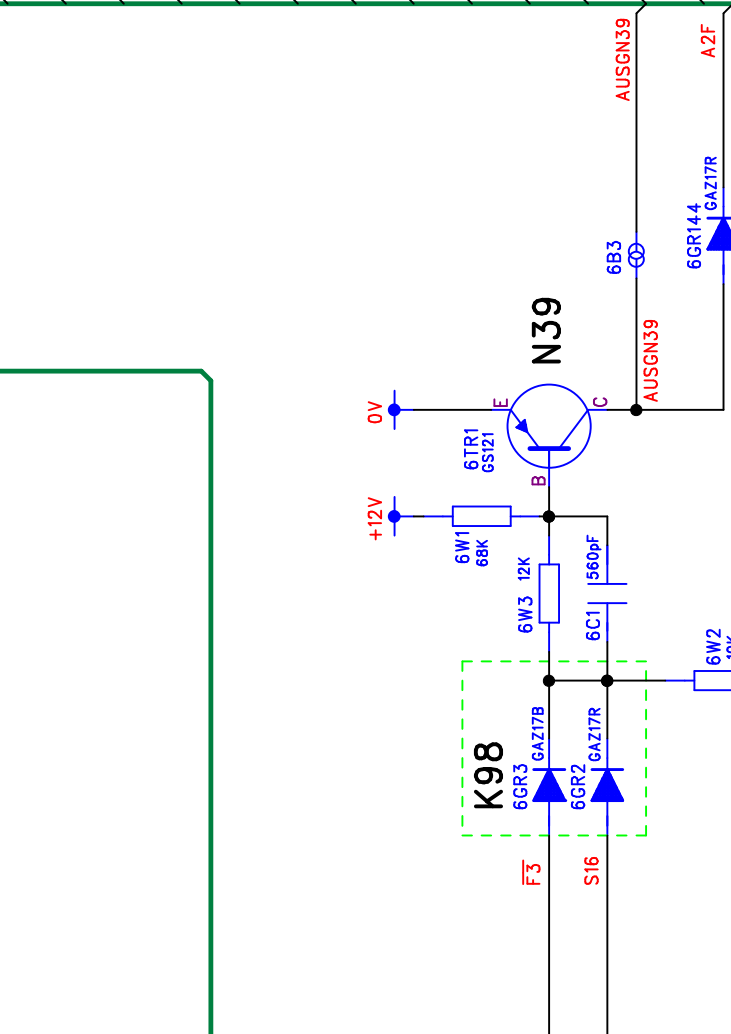
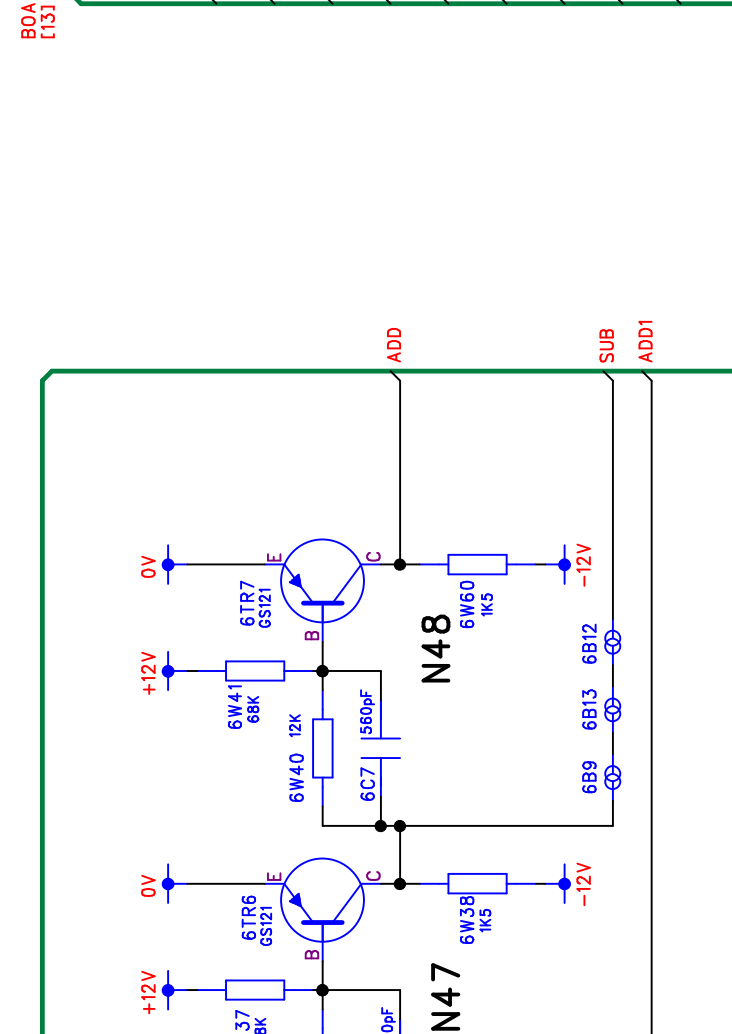
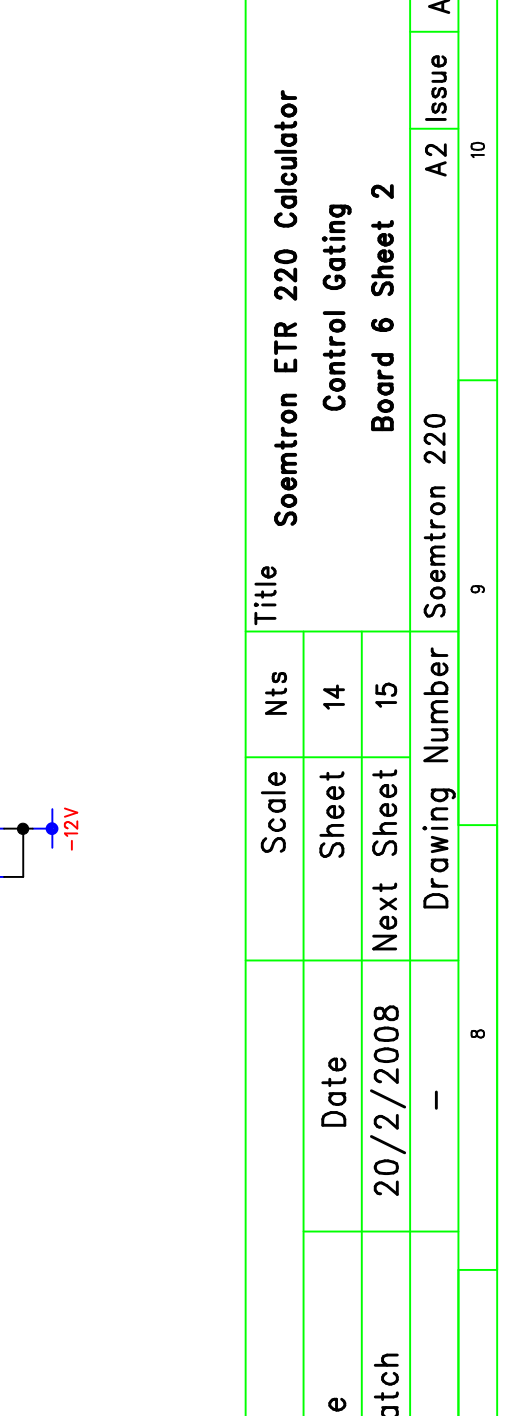
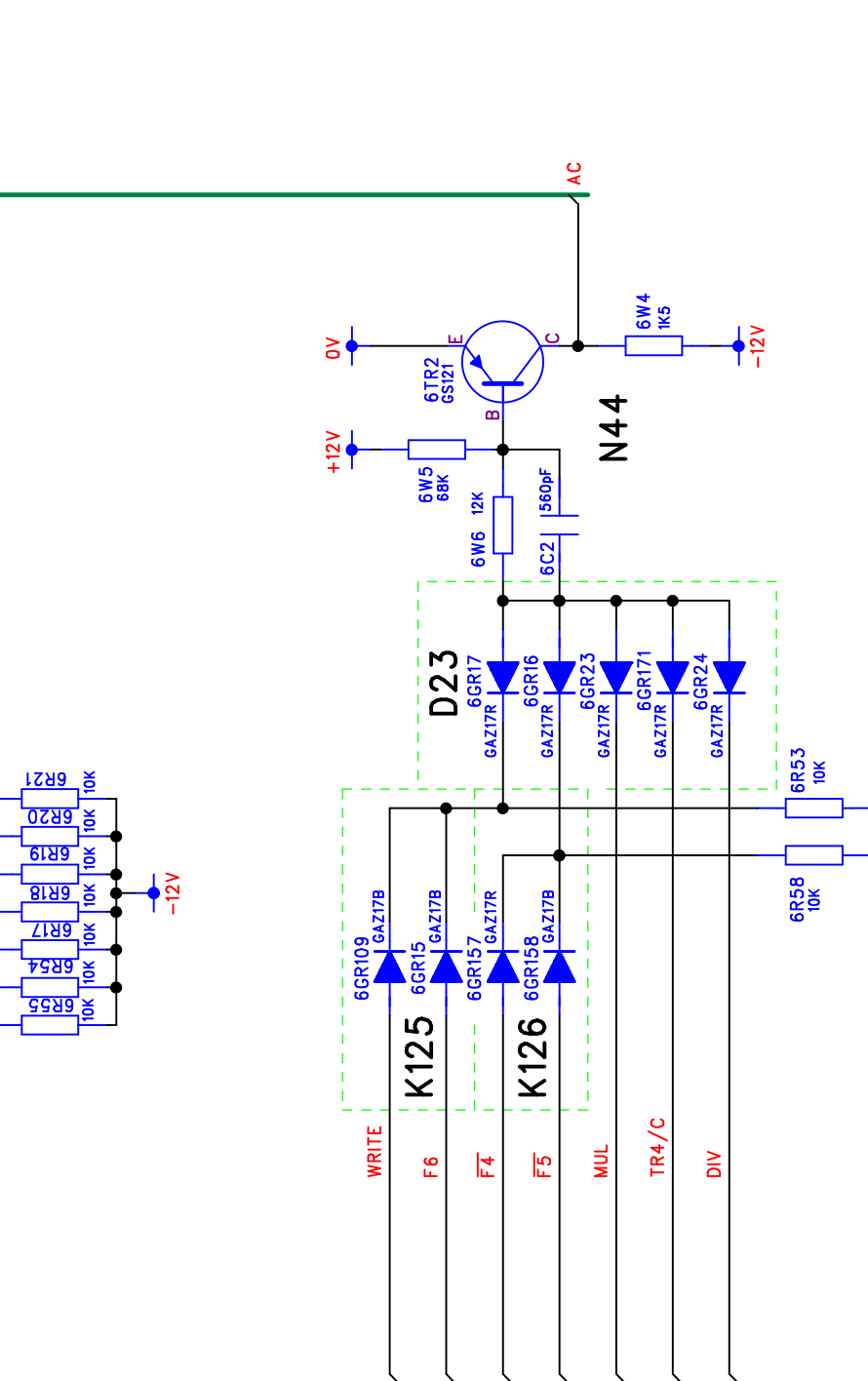
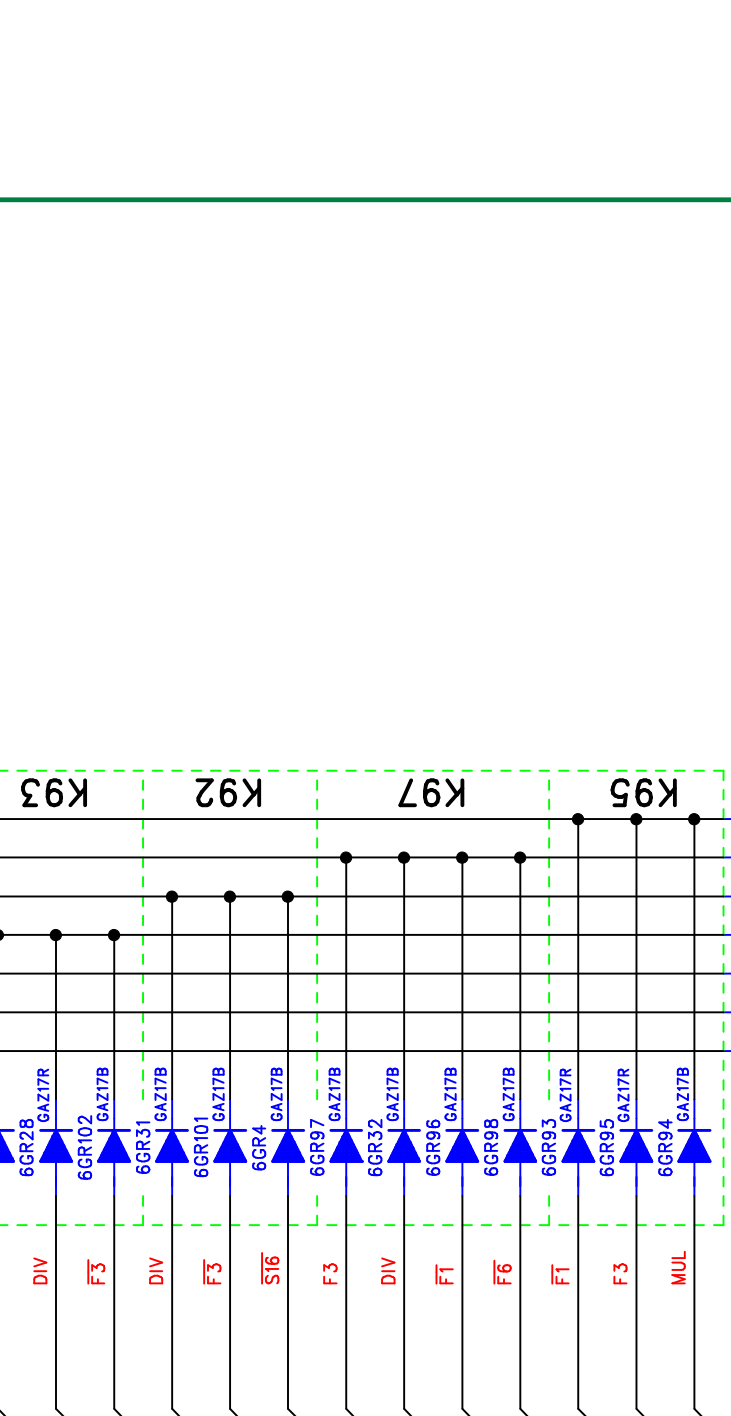
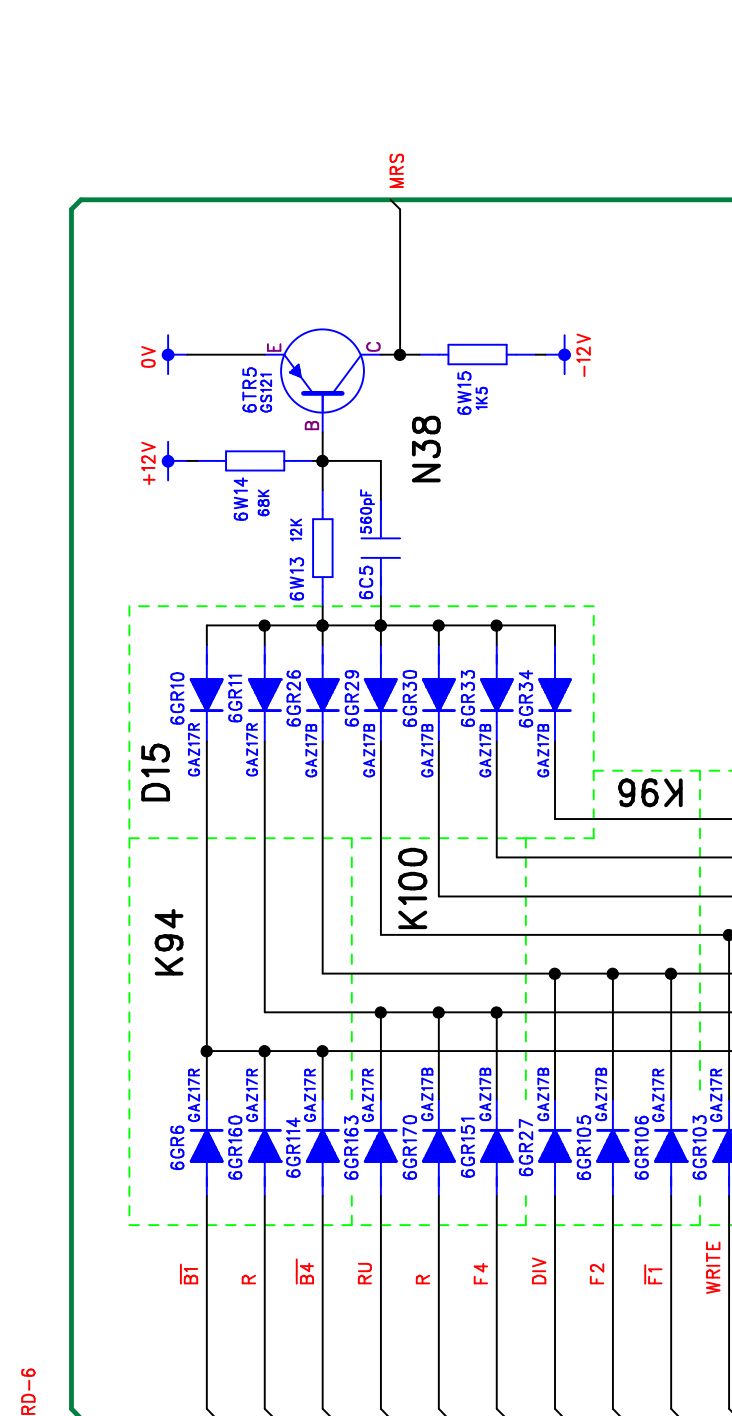
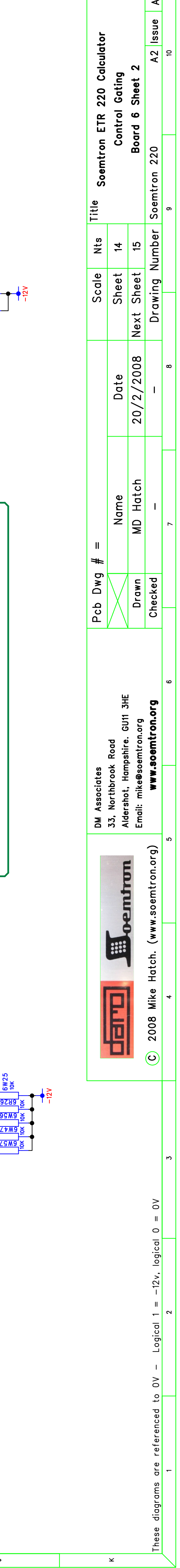
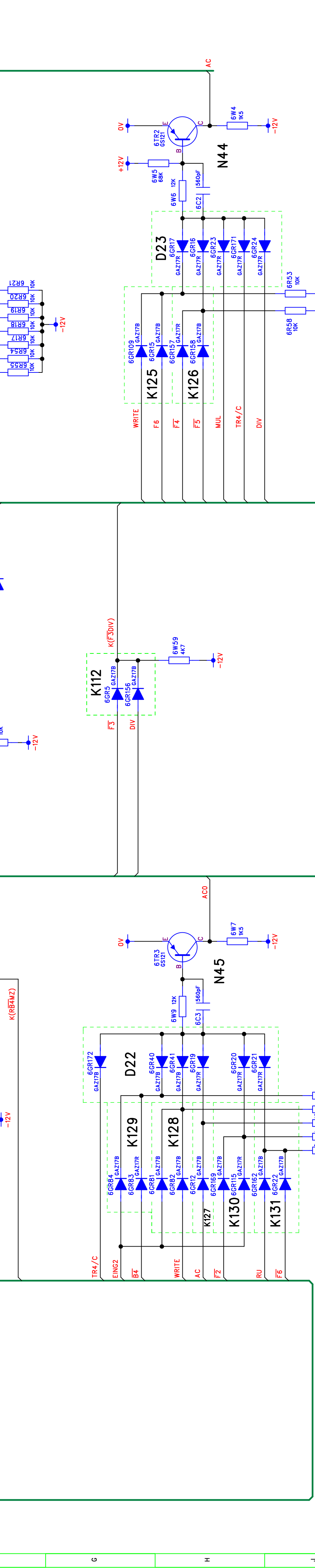
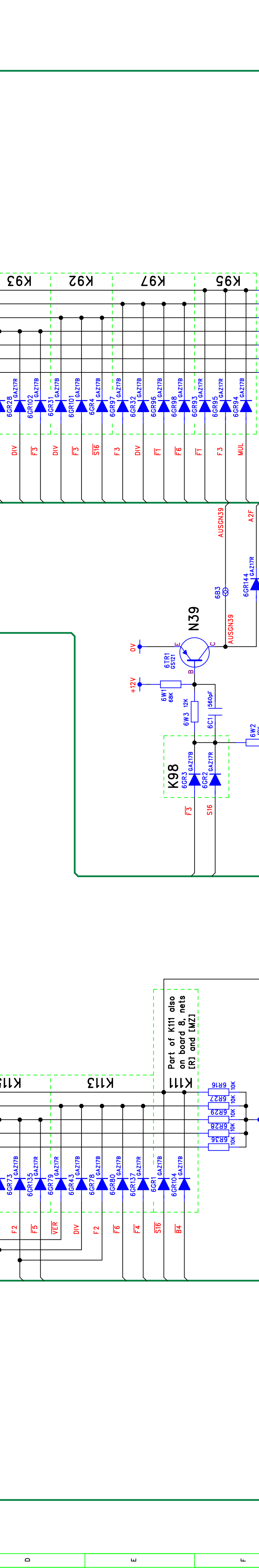
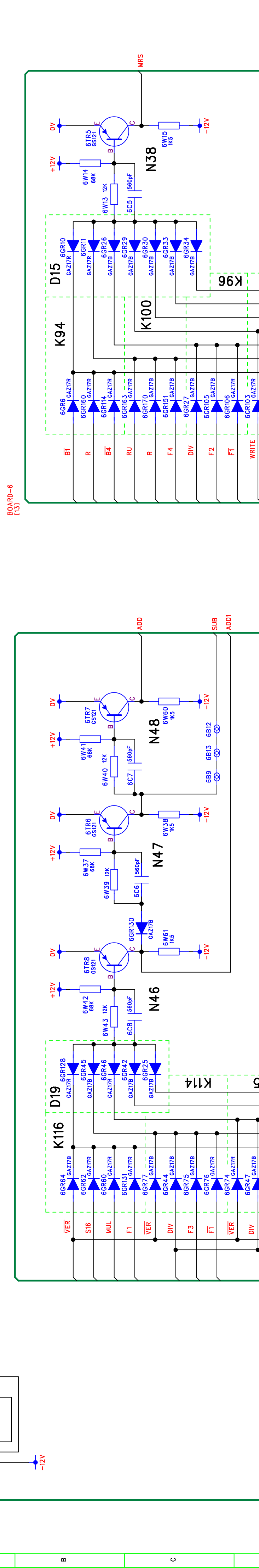
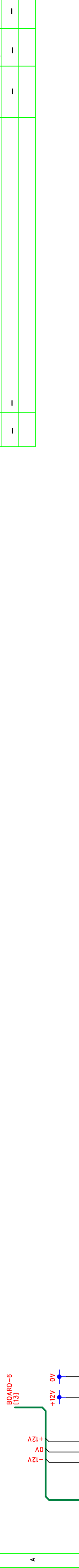
RevNo	Revision note	Date	By	Checked
-	-	-	-	-



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Pcb Dwg # =		Name	Date	Title	
Drawn	Checked	MD Hatch	25/2/2008	12	Soemtron ETR 220 Calculator
				13	Control Gating - Clock Generator
					BOARD 5 Sheet 2
				Drawing Number	Soemtron 220
				A2 Issue	A

These diagrams are referenced to 0V - Logical 1 = -12v, logical 0 = 0V

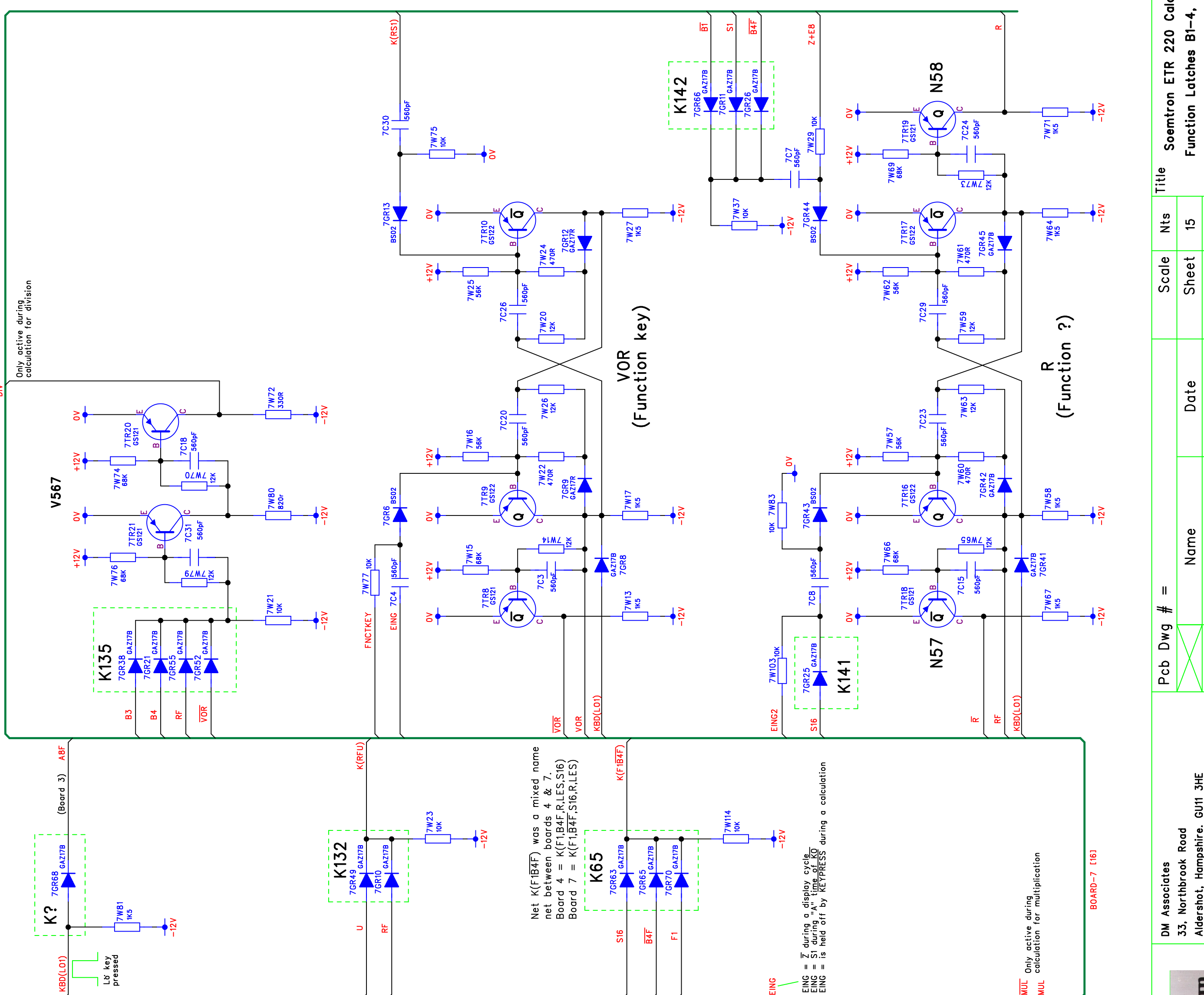
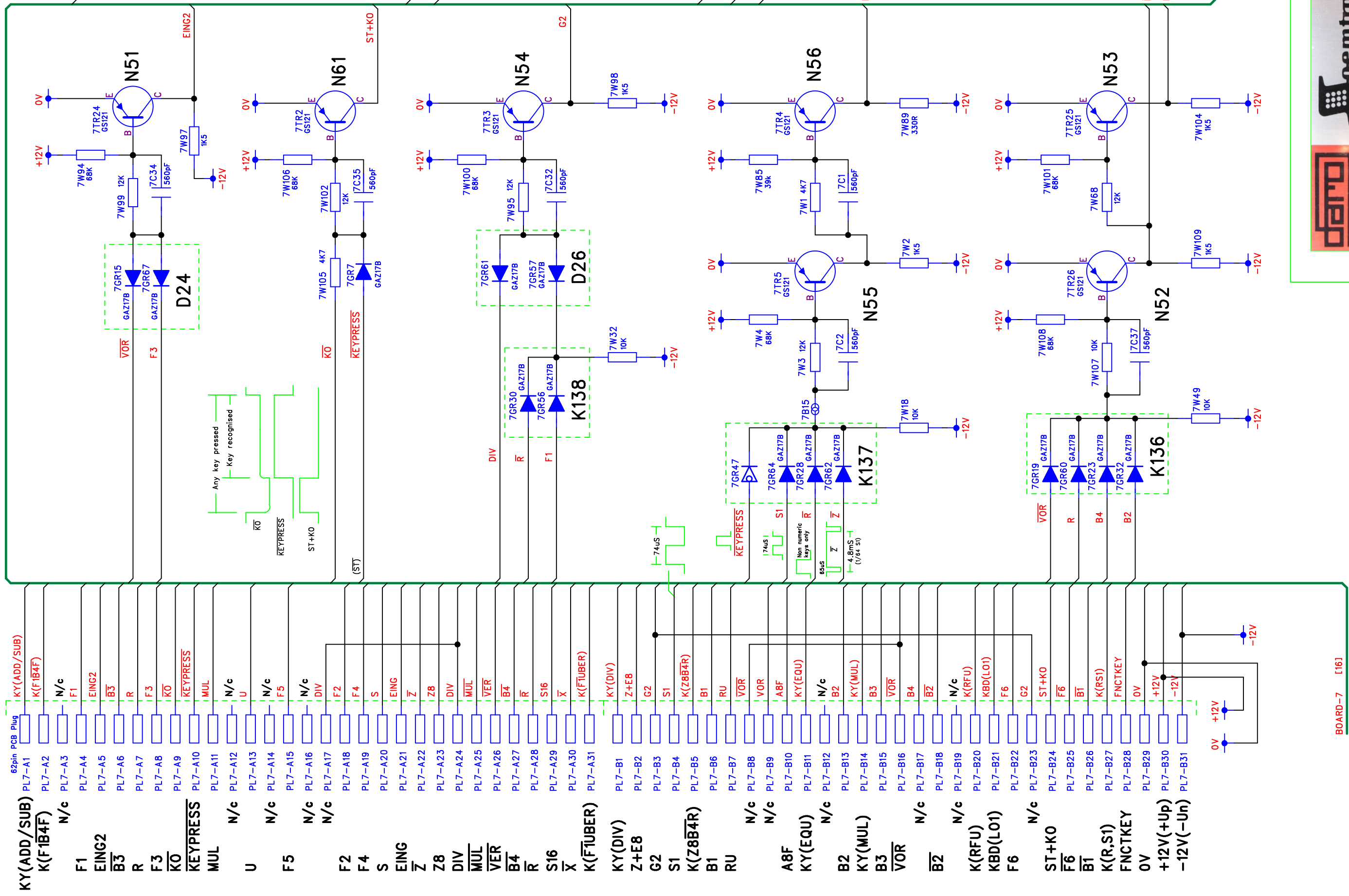


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Soemtron

Pcb Dwg # =	Name	Date	Nts	Scale	Title
	MD Hatch	20/2/2008	14	Sheet	Soemtron ETR 220 Calculator
Drawn	Checked		Next Sheet	Sheet	Control Gating
			15		Board 6 Sheet 2
			Drawing Number		Soemtron 220
					A2 Issue



Net K(FIB4F) was a mixed name net between boards 4 & 7.
 Board 4 = K(F1,B4F,R,LES,S16)
 Board 7 = K(F1,B4F,S16,R,LES)

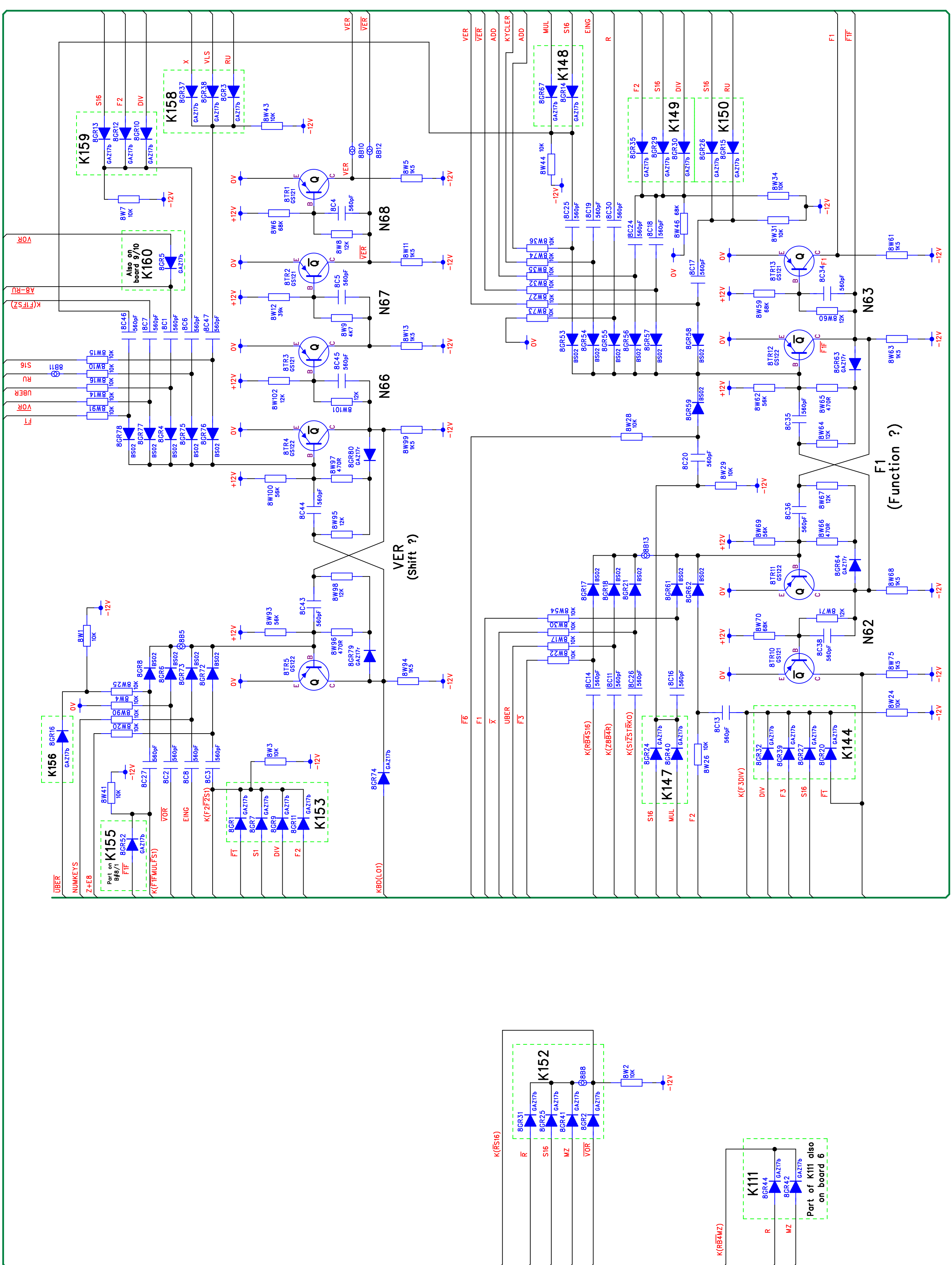
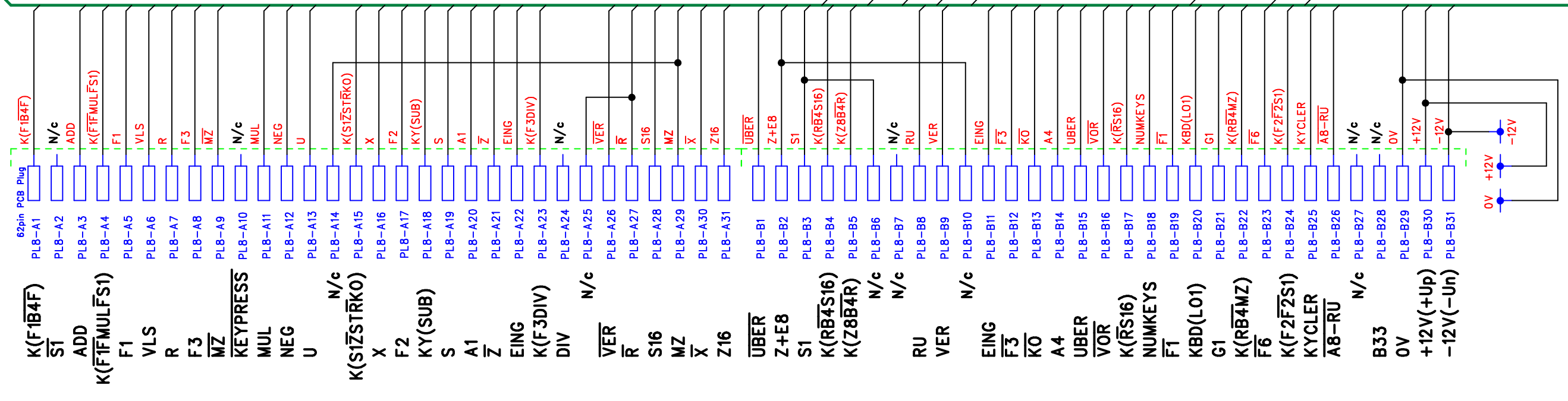
ENG = 7 during a display cycle
 ENG = S1 during "A" time of KO
 ENG = is held off by KEYPRESS during a calculation

MUL Only active during calculation for multiplication

Comp side - 05-220-7008-4 Of
 Solder side - 3040 05-220-7008-4 Of
 Date coded - 22/73

RevNo Revision note

Date By Checked

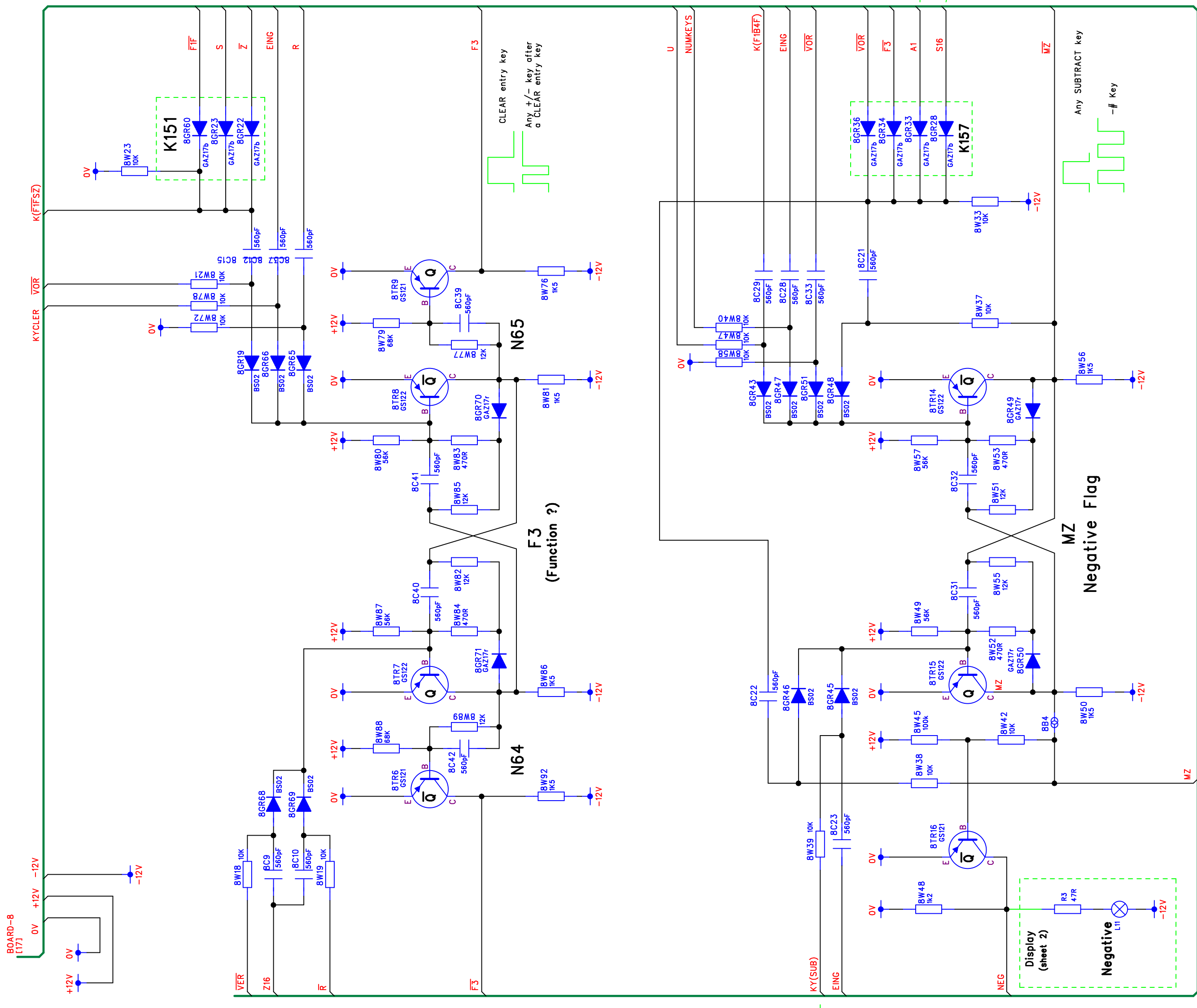


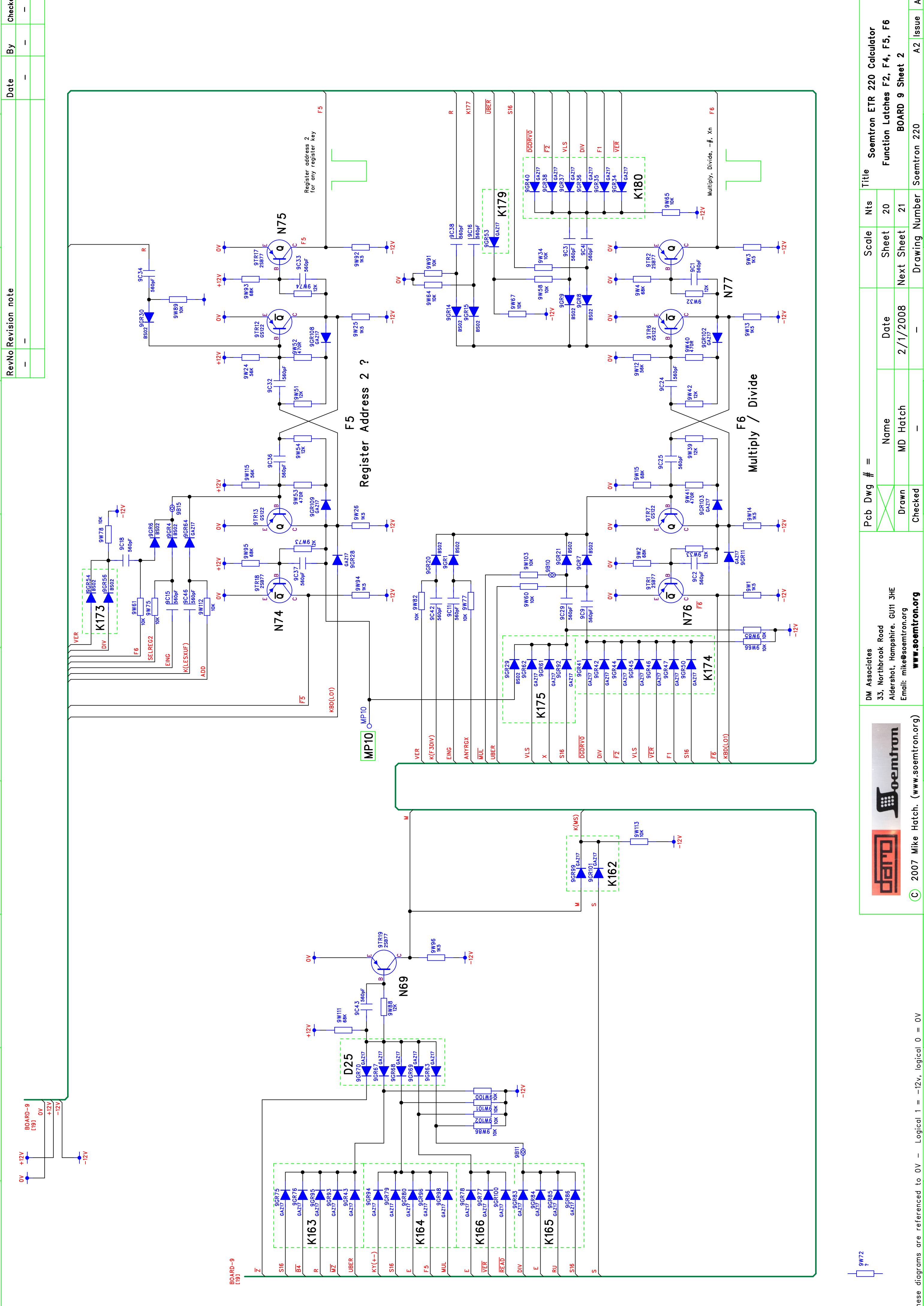
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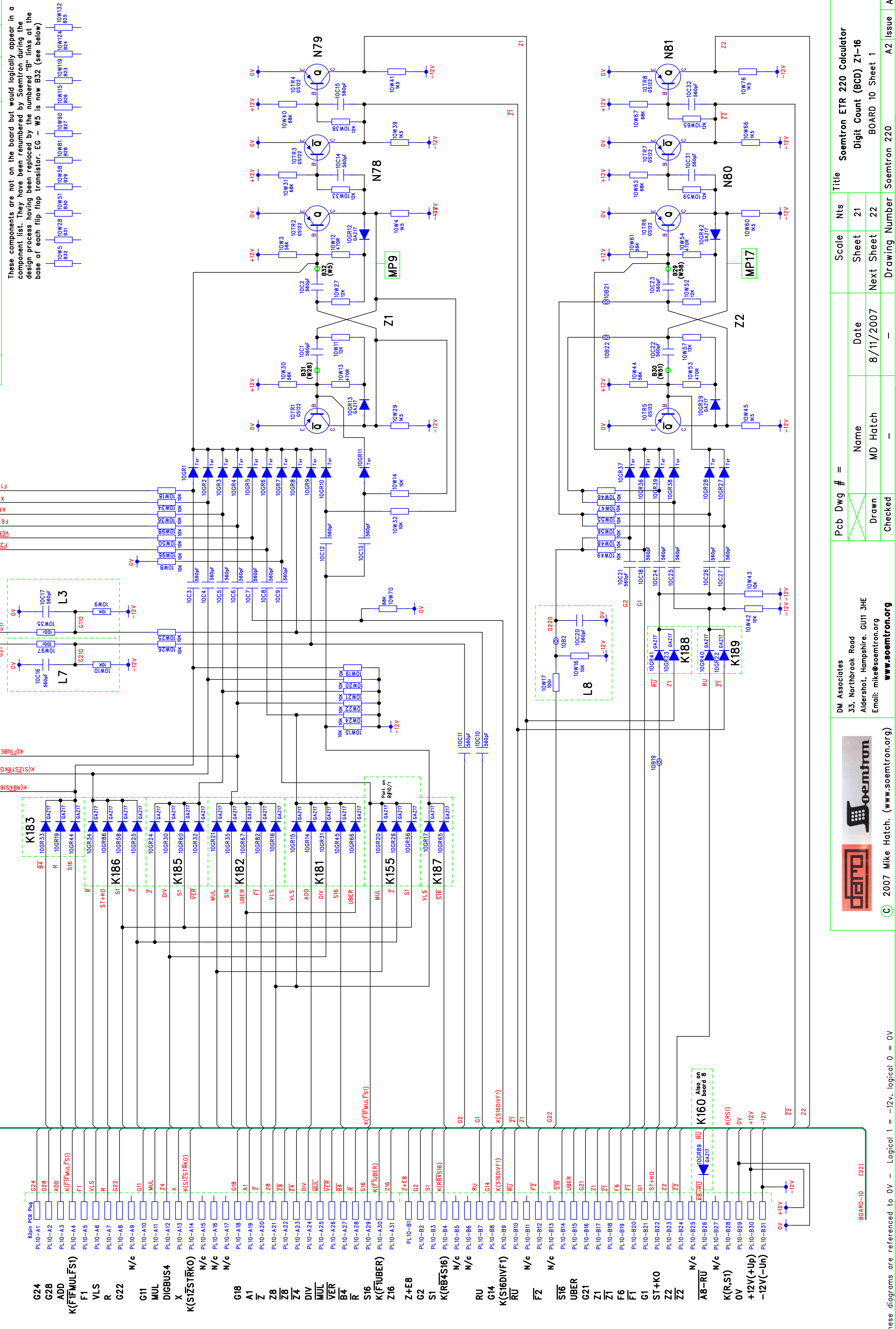
Pcb Dwg # =
 Name MD Hatch
 Date 31-1-2008
 Checked

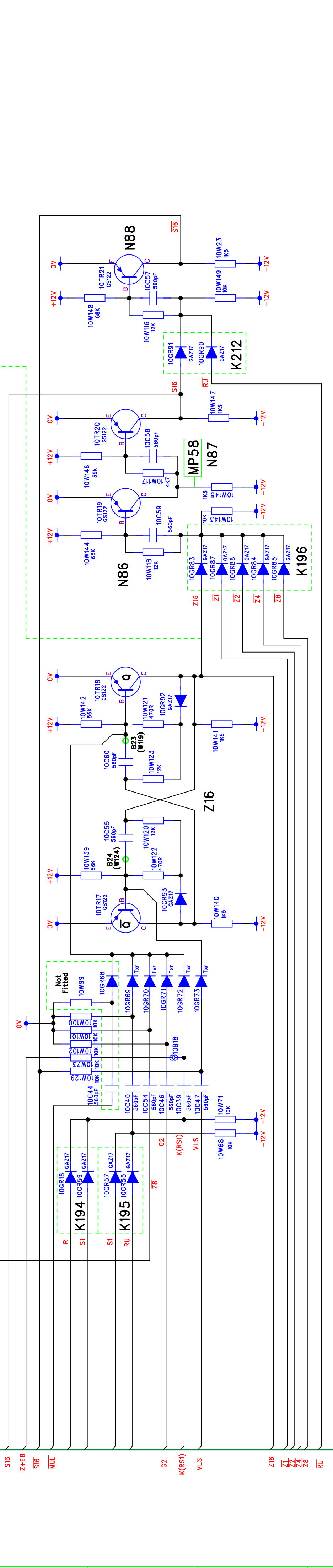
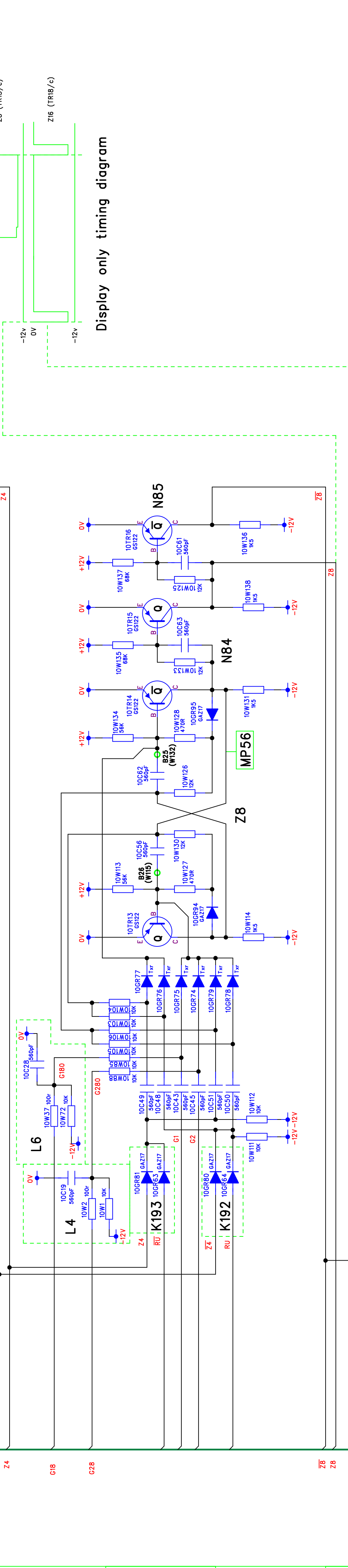
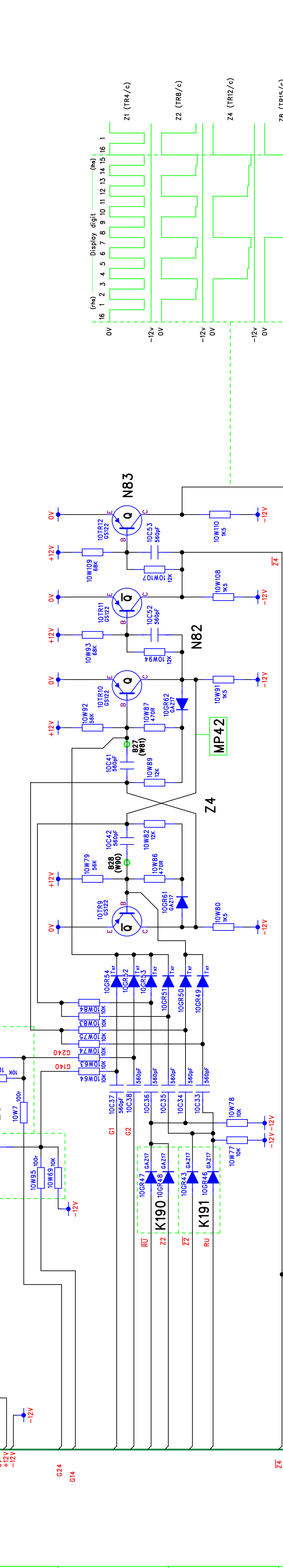
Scale	Nts	Title
Sheet 17	17	Soemtron ETR 220 Calculator
Next Sheet	18	Function Latches F1, F3, VER, M2
Drawing Number Soemtron 220		Board 8 Sheet 1
		A2 Issue A

These diagrams are referenced to 0V - Logical 1 = +12V, logical 0 = 0V





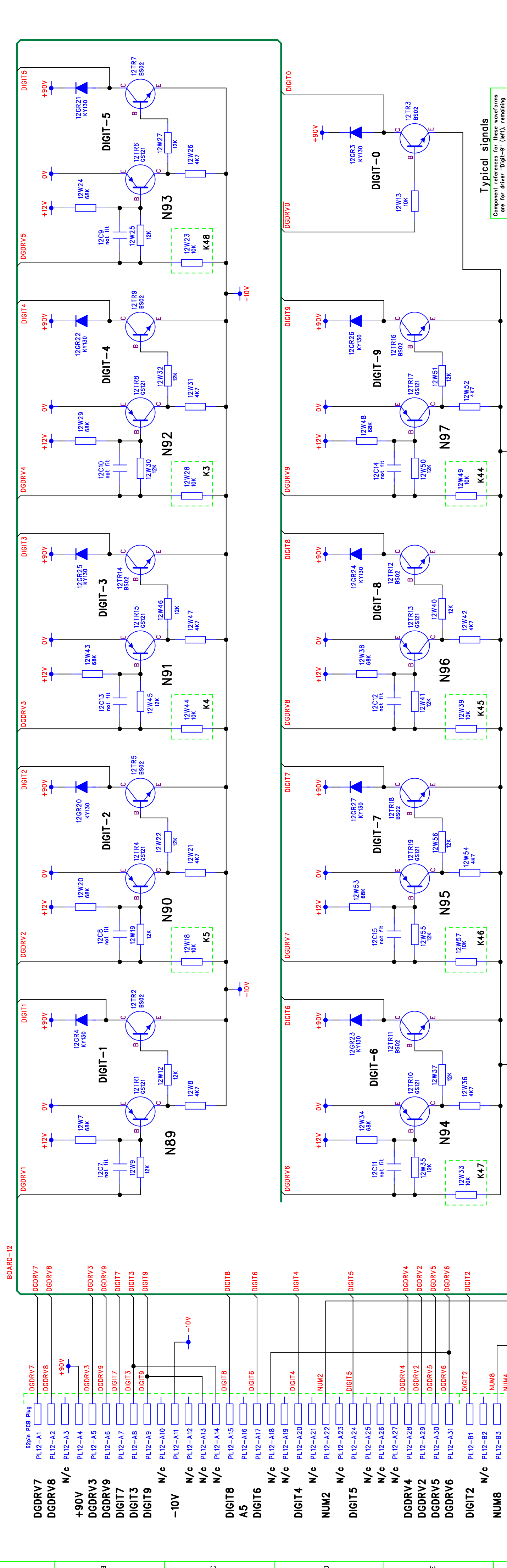




DM Associates 33, Northbrook Road Aldershot, Hampshire, GU11 3HE Email: mike@soemtron.org www.soemtron.org	Pcb Dwg # =	Name MD Hatch	Date 8/11/2007	Scale Sheet 22	Nts 22	Title Soemtron ETR 220 Calculator Digit Count (BCD) Z1-16 BOARD 10 Sheet 2
© 2007 Mike Hatch. (www.soemtron.org)	Drawn Checked	MD Hatch	8/11/2007	Next Sheet	23	Drawing Number Soemtron 220
10	7	8	9	10	10	A2 Issue A

Comp side - 05-220-7012-3 0h
 Solder side - 3044_05-220-7012-3 0f
 Date coded - 22/73

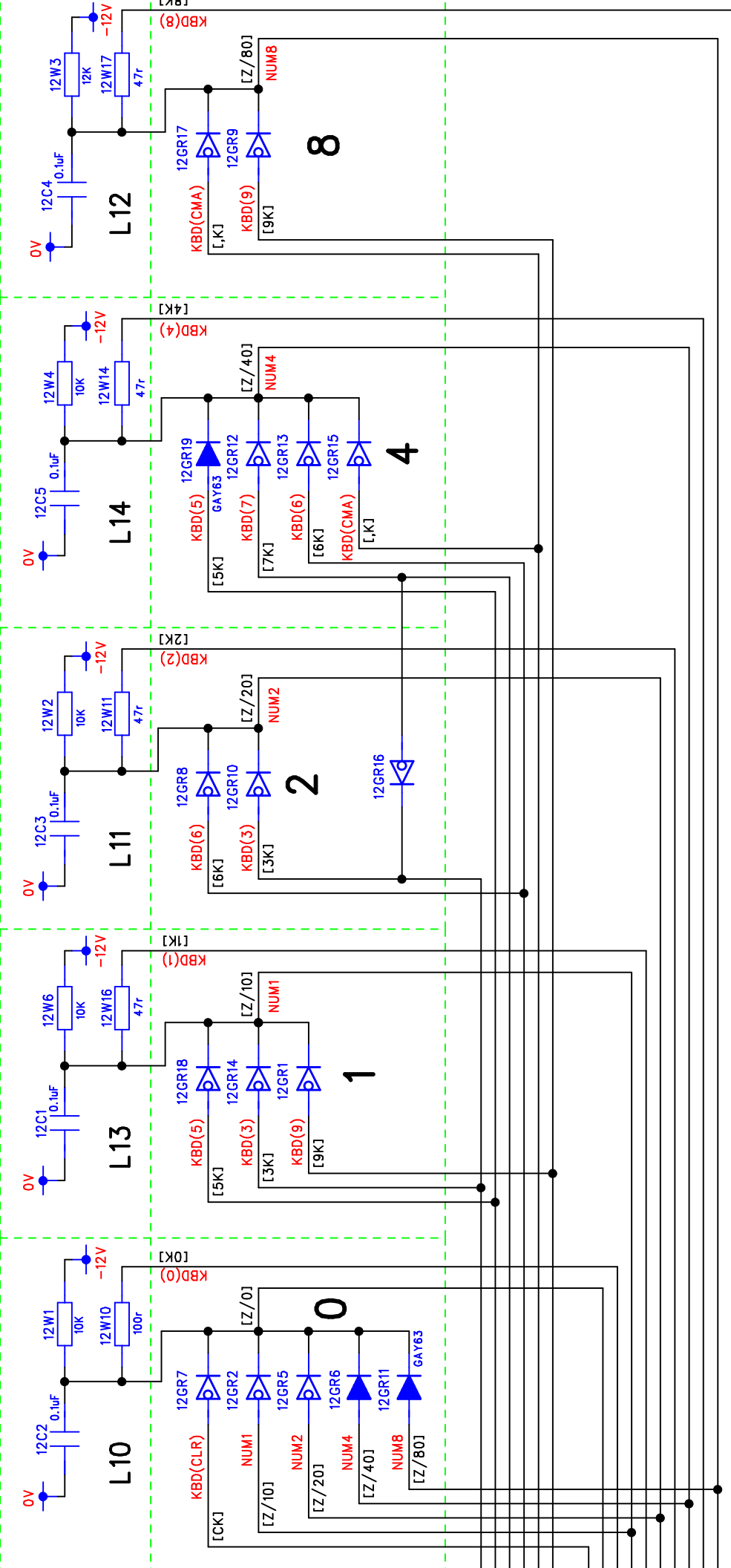
RevNo	Revision note	Date	By	Checked
-	-	-	-	-



0 = Key pressed (= 0V)
 1/x = no key

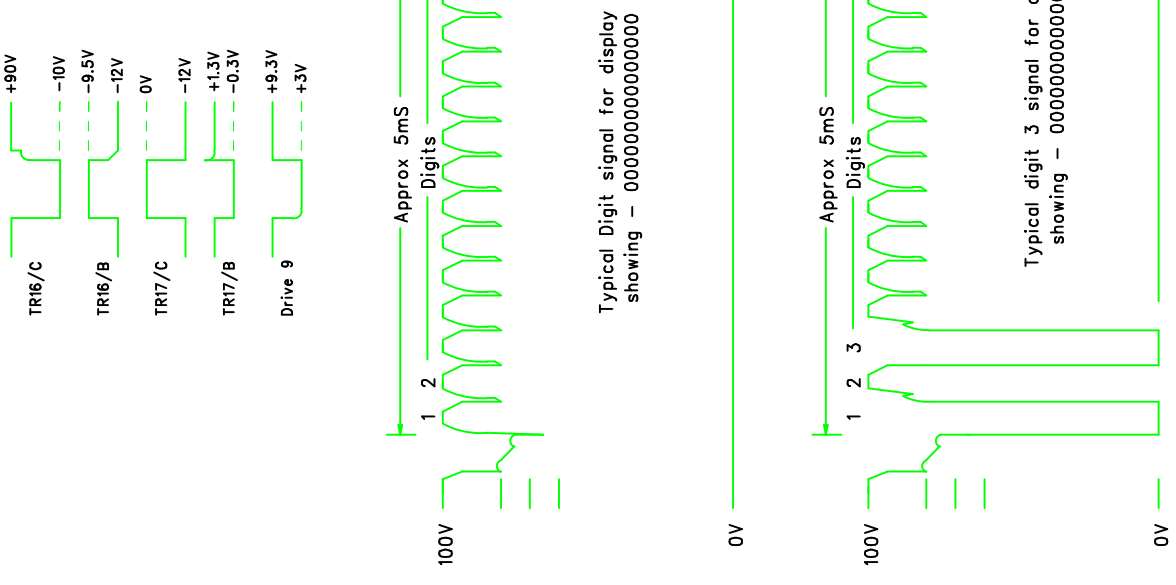
Code	NUM1	NUM2	NUM4	NUM8	NUMKEYS	KYCLER
Key	0	1	1	1	0	1
1	0	1	1	1	0	1
2	1	0	1	1	0	1
3	0	0	1	1	0	1
4	1	1	0	1	0	1
5	0	1	0	1	0	1
6	1	0	0	1	0	1
7	0	0	0	1	0	1
8	1	1	1	0	0	1
9	0	1	1	0	0	1
Comma	1	1	0	0	0	1
Clear	1	1	1	1	0	0
X	1	1	1	1	1	1

Numeric, Clear & DP (.) Encode Matrix



Typical signals

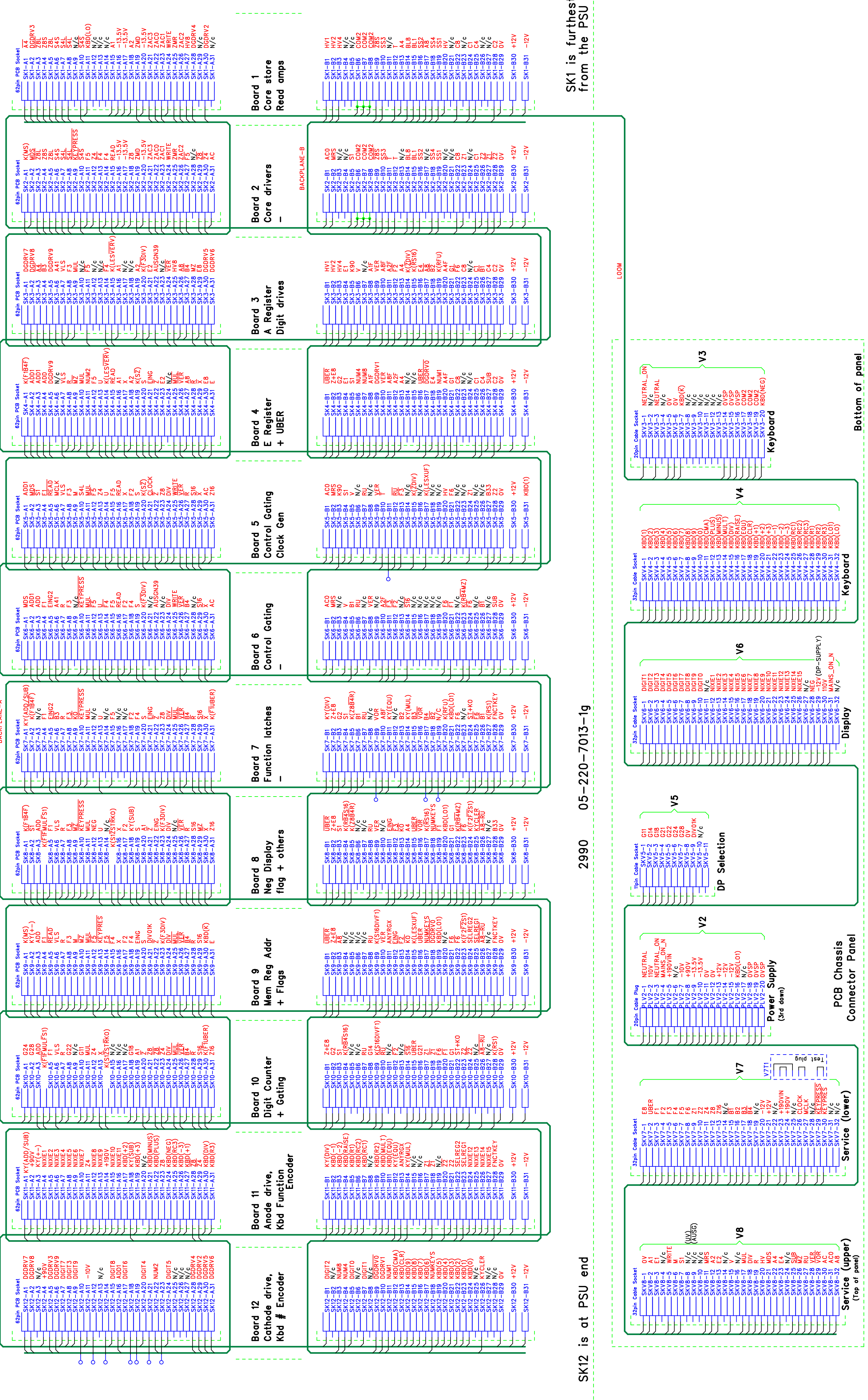
Component references for these waveforms are for driver "digit-9" (left), remaining driver circuits have the same signals but with different component designations.



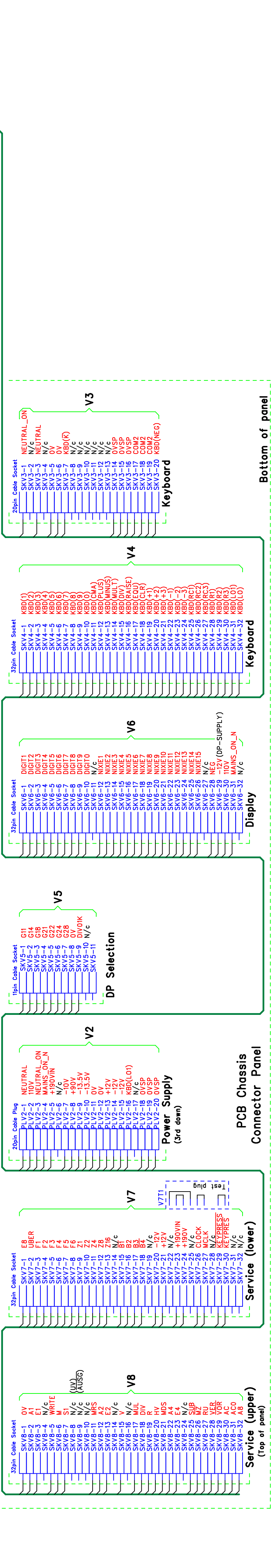
DM Associates 33, Northbrook Road Aldershot, Hampshire. GU11 3HE Email: mike@soemtron.org www.soemtron.org		Pcb Dwg # =	Scale	Nts	Title
		Drawn	Sheet	25	Soemtron ETR 220 Calculator
		Checked	Next Sheet	26	#12 - Cathode Drive & Kbd # Encoder
© 2007 Mike Hatch. (www.soemtron.org)		Date	Next Sheet	BOARD 12 Sheet 1	
		9/10/2007	Drawing Number	Soemtron 220	
				A2 Issue	A

These diagrams are referenced to 0V - Logical 1 = -12V, logical 0 = 0V

Backplane PCB



SK12 is at PSU end
 2990 05-220-7013-1g
 SK1 is furthest from the PSU



DM Associates 33, Northbrook Road Aldershot, Hampshire, GU11 3HE Email: mike@soemtron.org www.soemtron.org	Scale Sheet 27	Title Soemtron ETR 220 Calculator Backplane
Drawn MD Hatch	Date 15/8/2007	Nts 27
Checked	Next Sheet	Drawing Number Soemtron 220
		A2 Issue A