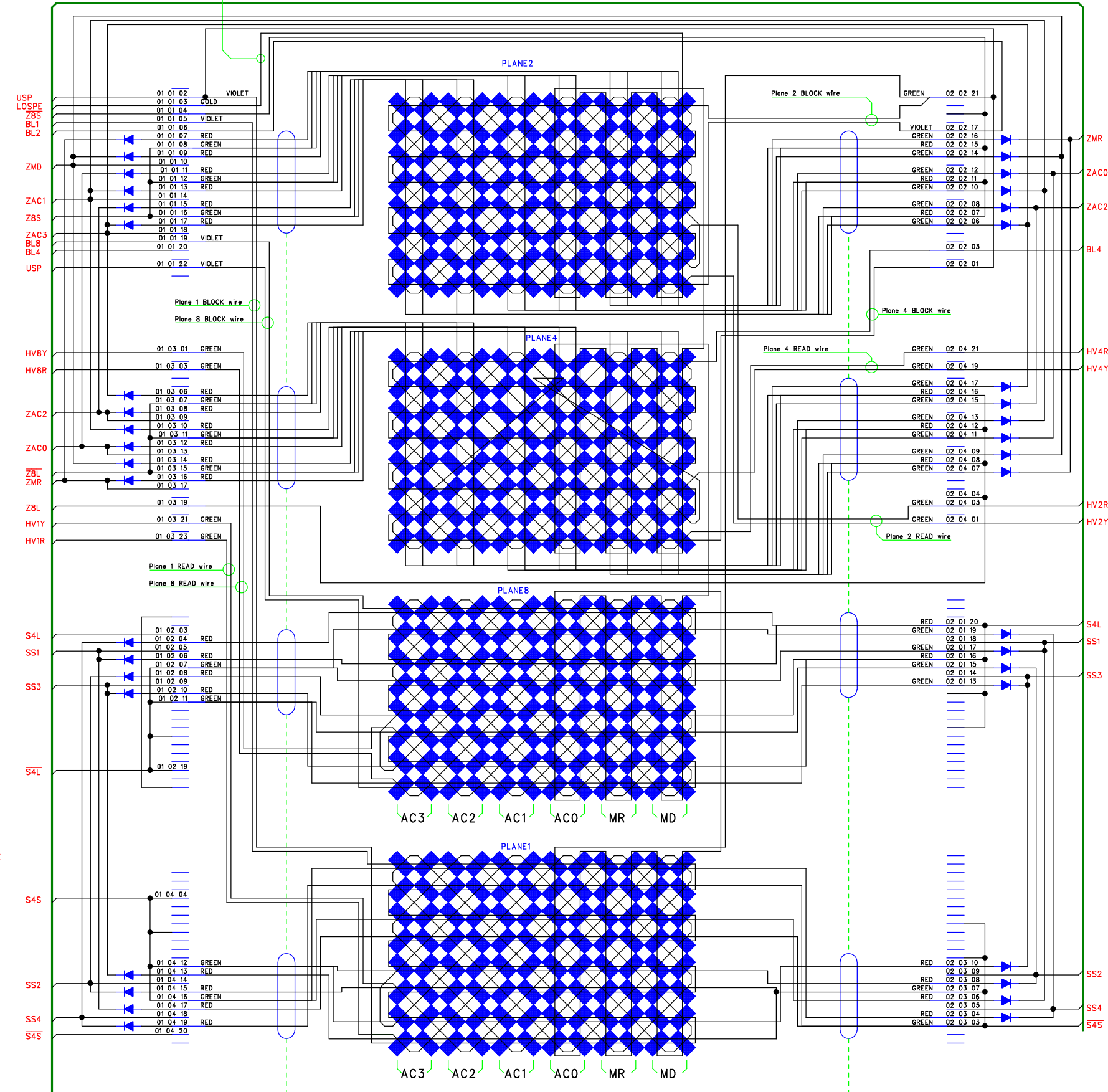
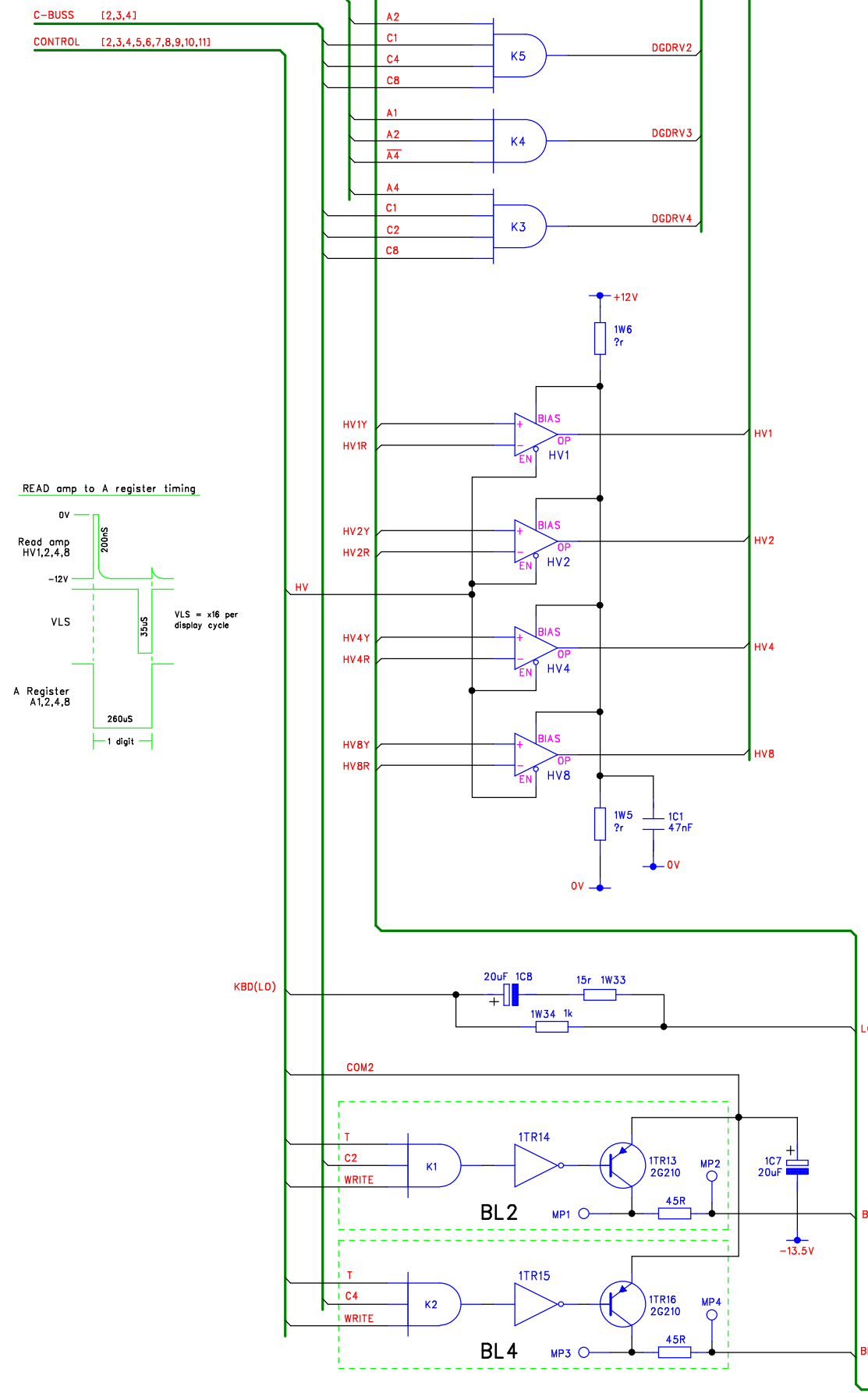


RevNo	Revision note	Date	By	Checked
-	-	-	-	-

Lö SPE only clears the MD, MR and ACO registers

- READ-BUSS [3]
- DIGIT-BUSS [3,4,9,12]
- CORE-BUSS [2]
- A-BUSS [3,4,6,7,8,9]
- C-BUSS [2,3,4]
- CONTROL [2,3,4,5,6,7,8,9,10,11]



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



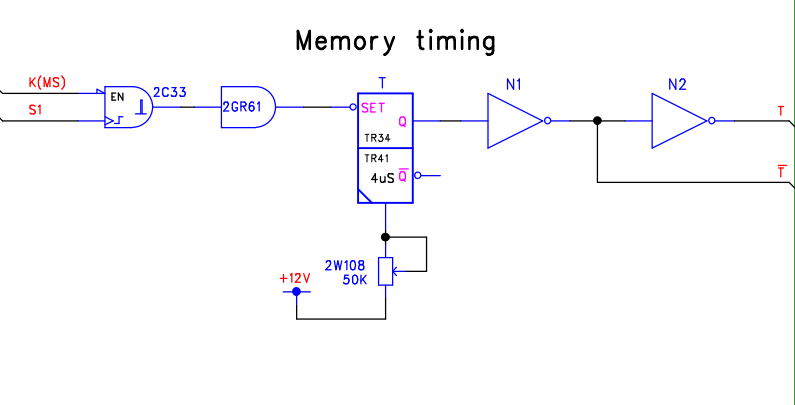
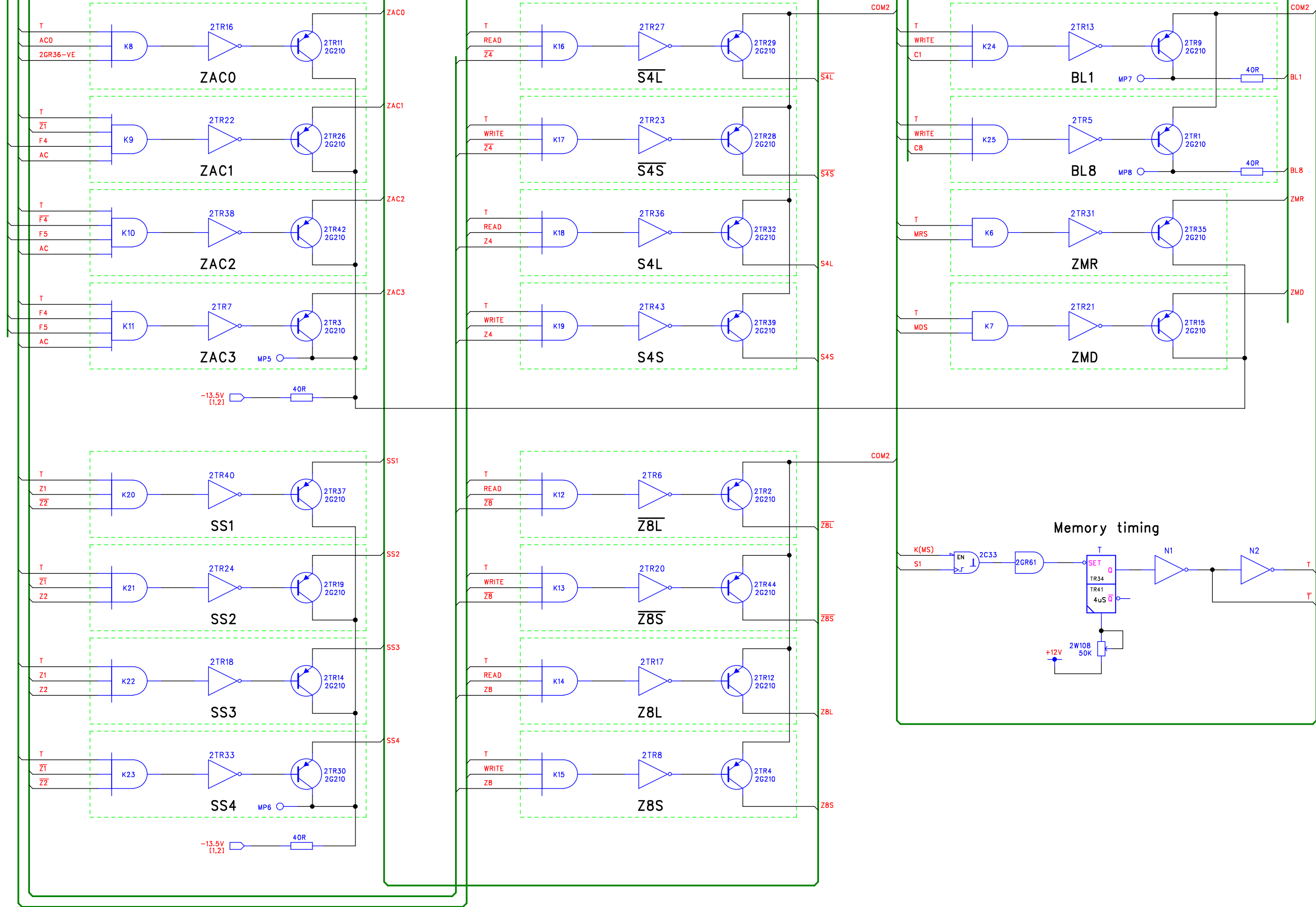
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Pcb Dwg # =		Scale	Nts	Title	
Drawn	Name	Date	Sheet	Soemtron ETR 220 Calculator	
Checked	MD Hatch	21/10/2009	Next Sheet	#1 - Core Memory	
Drawing Number			Logic Diagram		
Soemtron 220 Logic			A2 Issue A		

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CORE-BUSS [1]
 C-BUSS [1,3,4]
 Z-BUSS
 CONTROL [1,3,4,5,6,7,8,9,10,11]
 FUNCTIONS [3,4,5,6,7,8,9,10]

RevNo	Revision note	Date	By	Checked
-	-	-	-	-



Negative logic referenced to 0V - Logical 1 = -12v, logical 0 = 0v

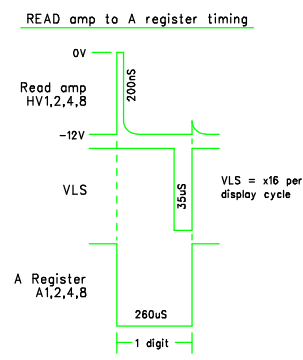
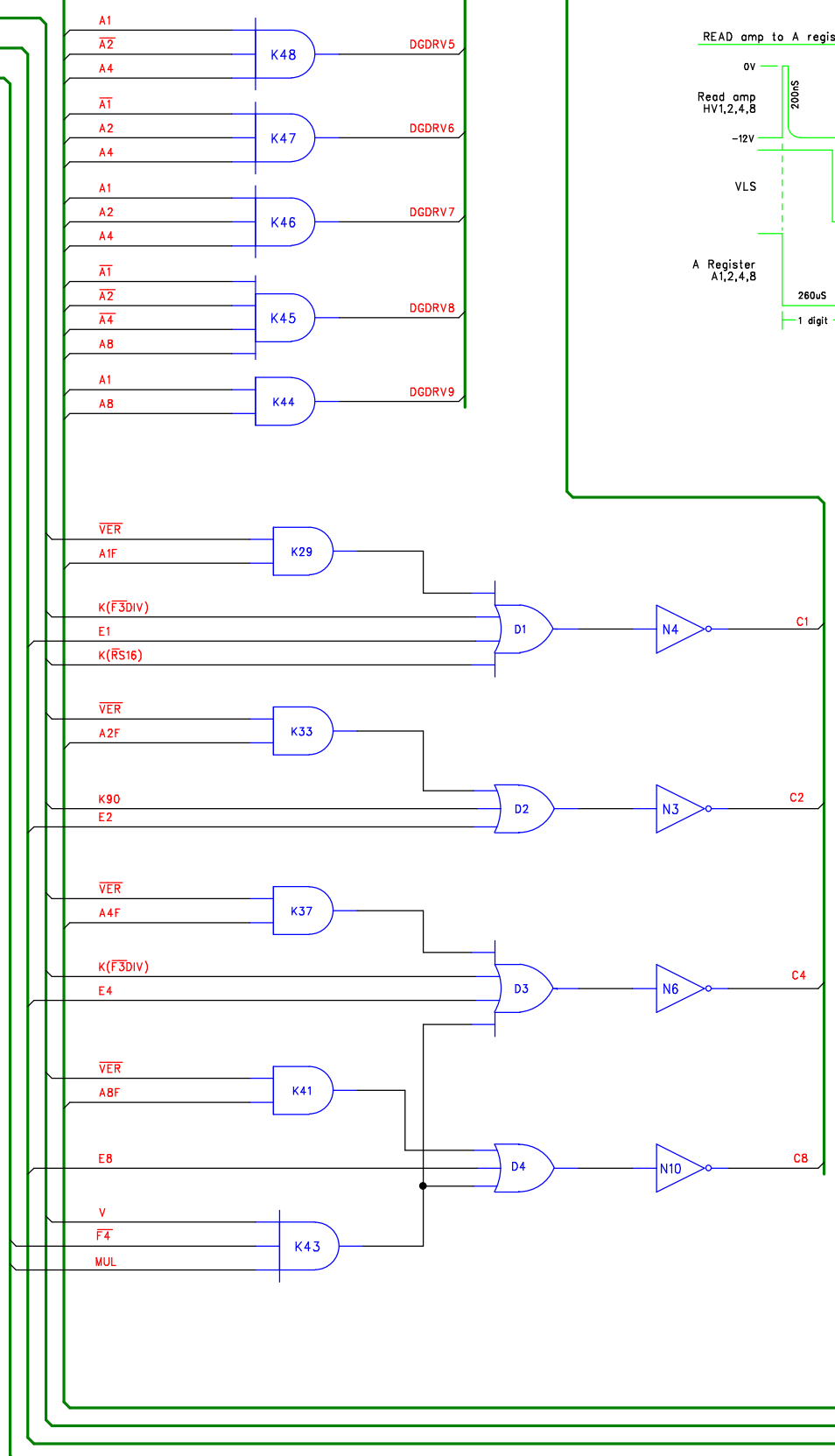


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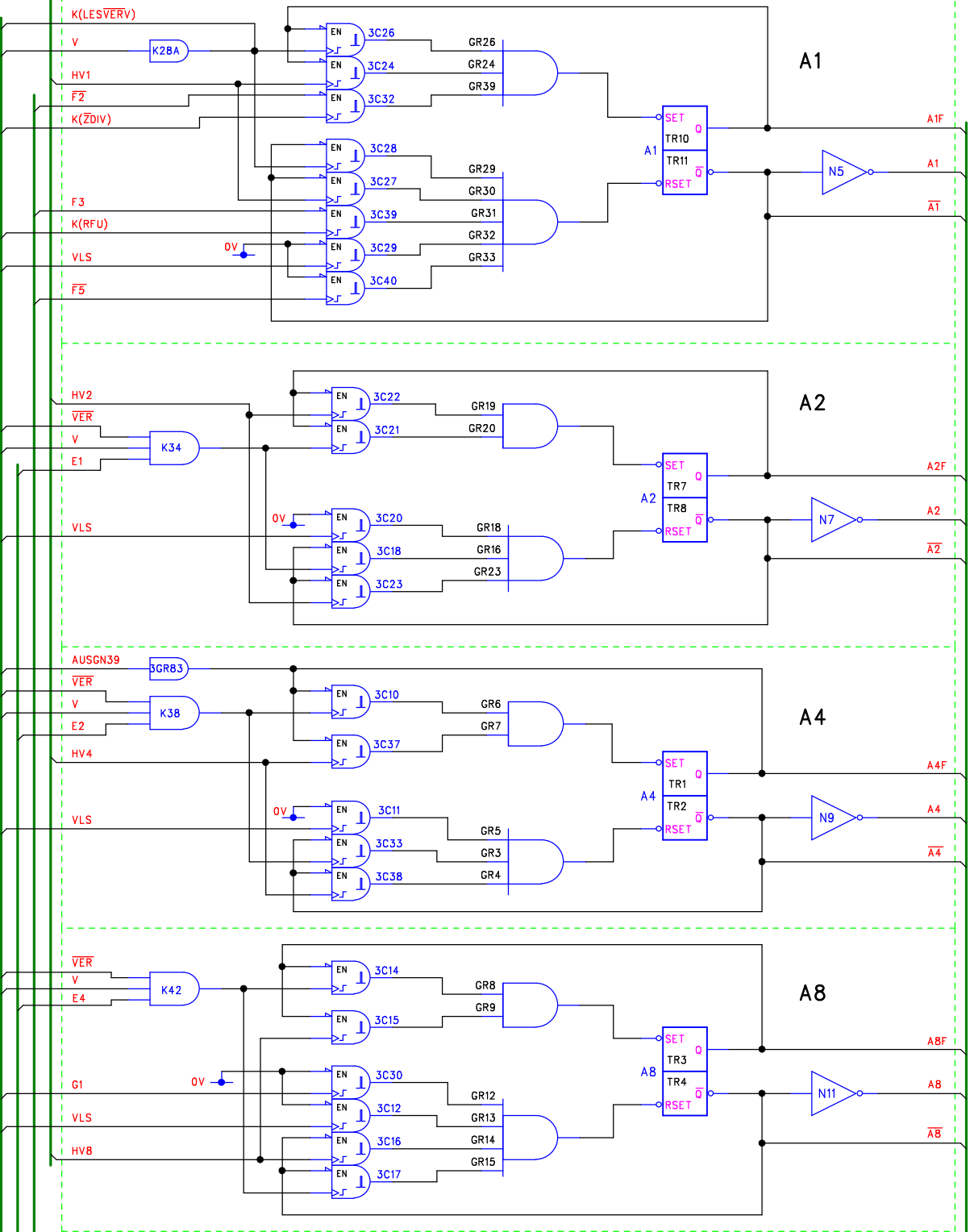
Pcb Dwg # =		Scale	Nts	Title	
Drawn	Name	Sheet	2	Soemtron ETR 220 Calculator	
Checked	Date	Next Sheet	3	#2 - Core Memory Drivers	
		Drawing Number		Logic Diagram	
				Soemtron 220 Logic	A2 Issue A

RevNo	Revision note	Date	By	Checked
-	-	-	-	-

- READ-BUSS [1]
- C-BUSS [1,2,4]
- DIGIT-BUSS [1,4,9,12]
- A-BUSS [1,4,6,7,8,9]
- CONTROL [1,2,4,5,6,7,8,9,10,11]
- E-BUSS [4]
- FUNCTIONS [2,4,5,6,7,8,9,10]



K28/A is split over boards 3/4



Negative logic referenced to 0V - Logical 1 = -12v, logical 0 = 0v



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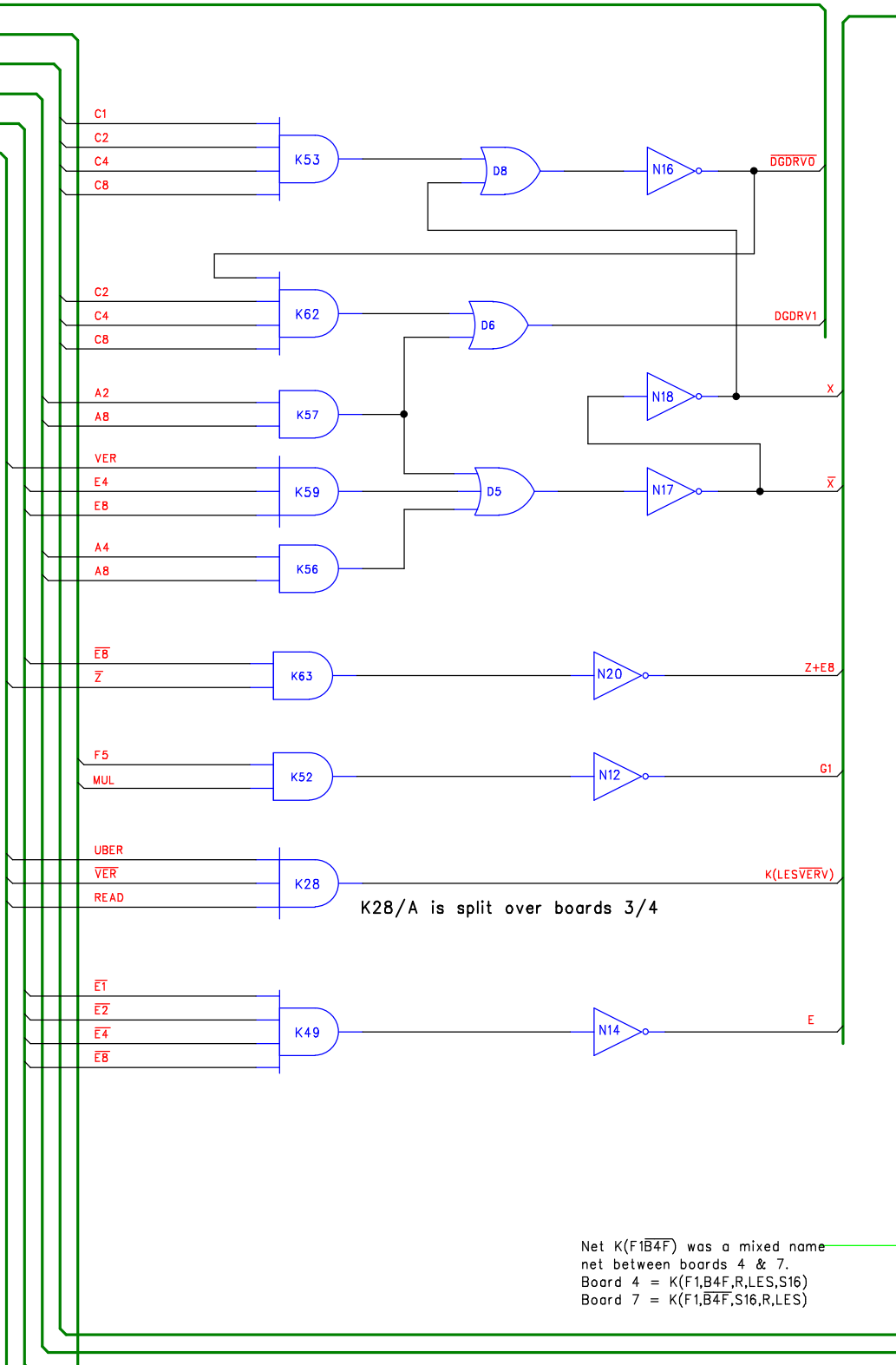
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Name	Date
MD Hatch	12/10/2009
Checked	-

Scale	Nts
Sheet	3
Next Sheet	4
Drawing Number	

Title	Soemtron ETR 220 Calculator
	#3 - A Register & Digit Drives
	Logic Diagram
Soemtron 220 Logic	A2 Issue A

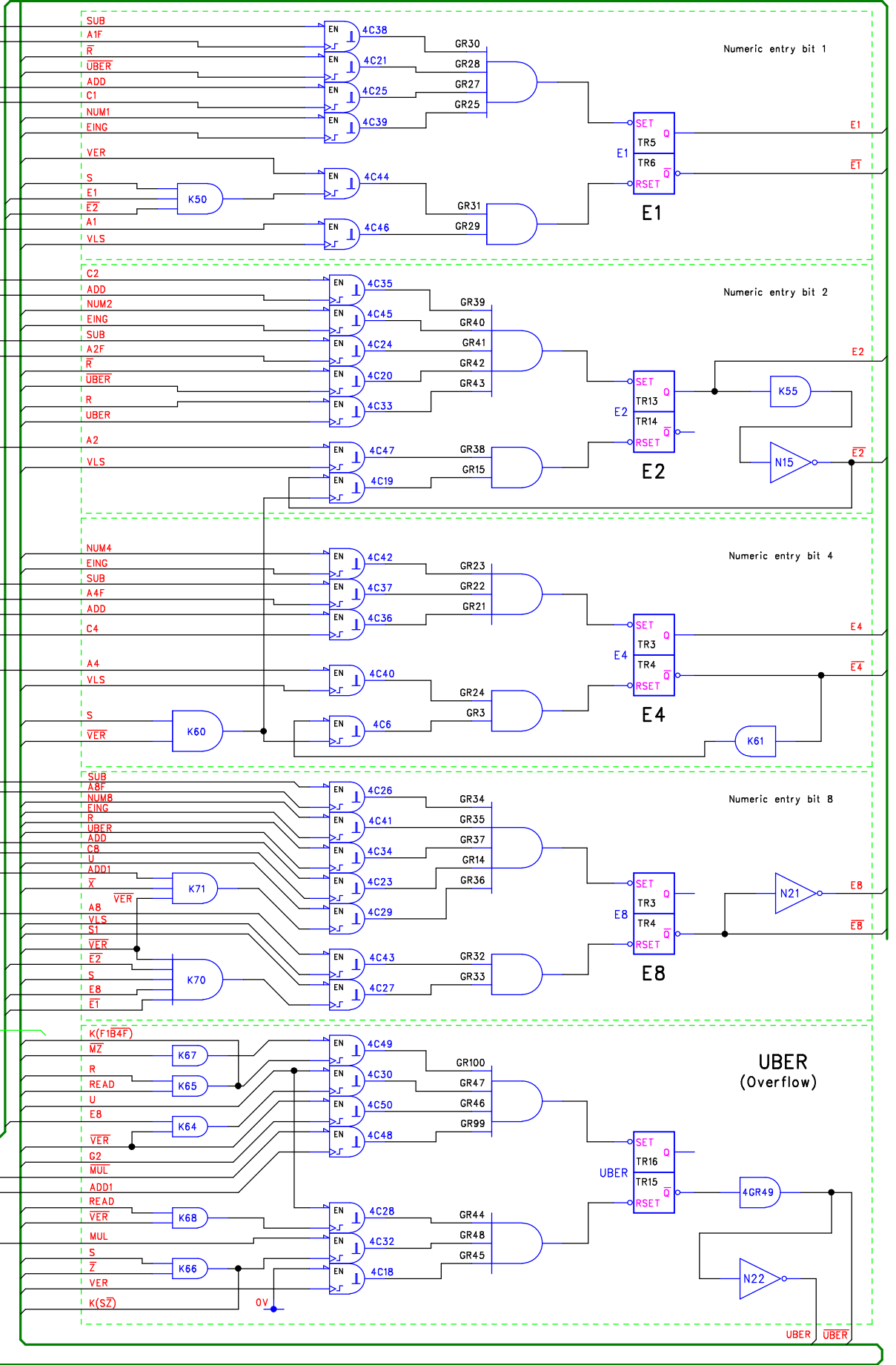
RevNo	Revision note	Date	By	Checked
-	-	-	-	-

DIGIT-BUSS [1,3,9,12]
 FUNCTIONS [2,3,5,6,7,8,9,10]
 C-BUSS [1,2,3]
 A-BUSS [1,3,6,7,8,9]
 E-BUSS [3]
 CONTROL [1,2,3,5,6,7,8,9,10,11]



K28/A is split over boards 3/4

Net K(F1B4F) 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)



Numeric entry bit 1

Numeric entry bit 2

Numeric entry bit 4

Numeric entry bit 8

UBER (Overflow)

Negative logic referenced to 0V - Logical 1 = -12v, logical 0 = 0v



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Pcb Dwg # =

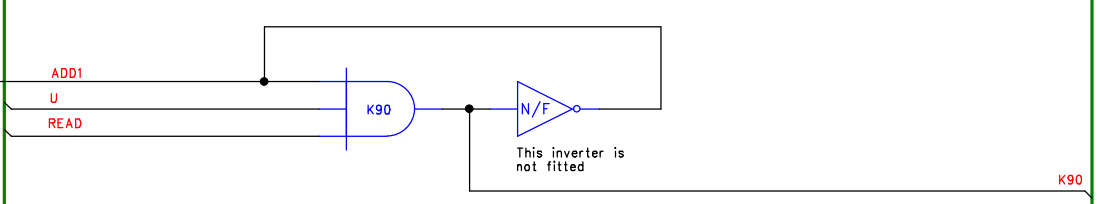
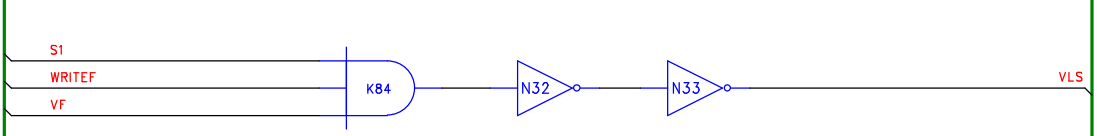
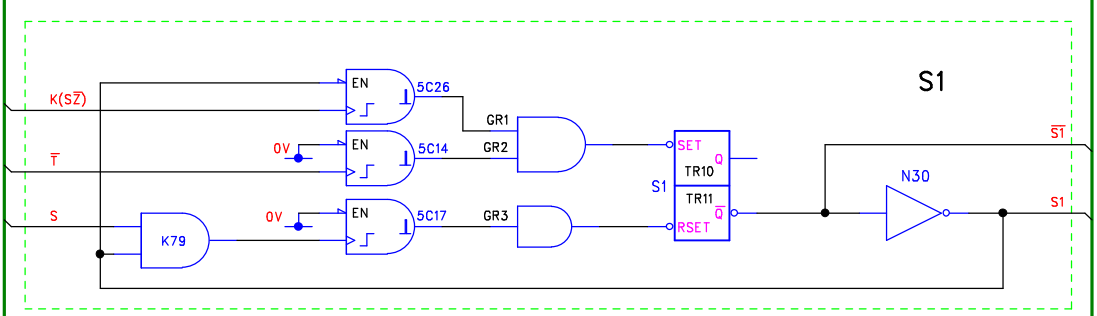
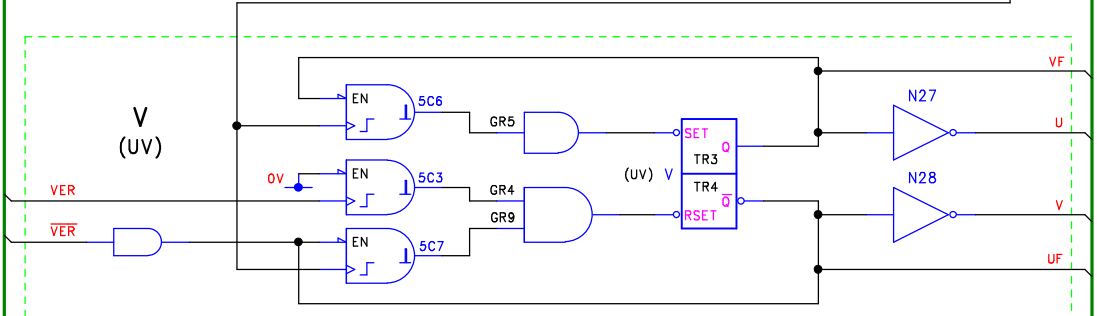
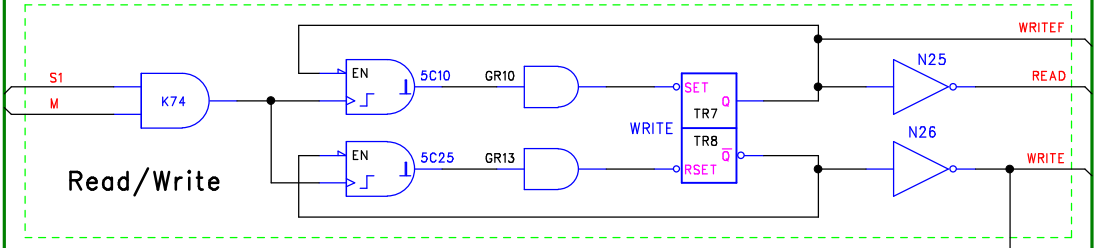
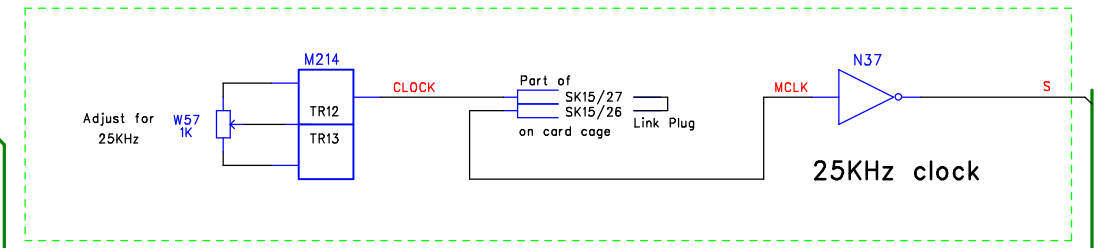
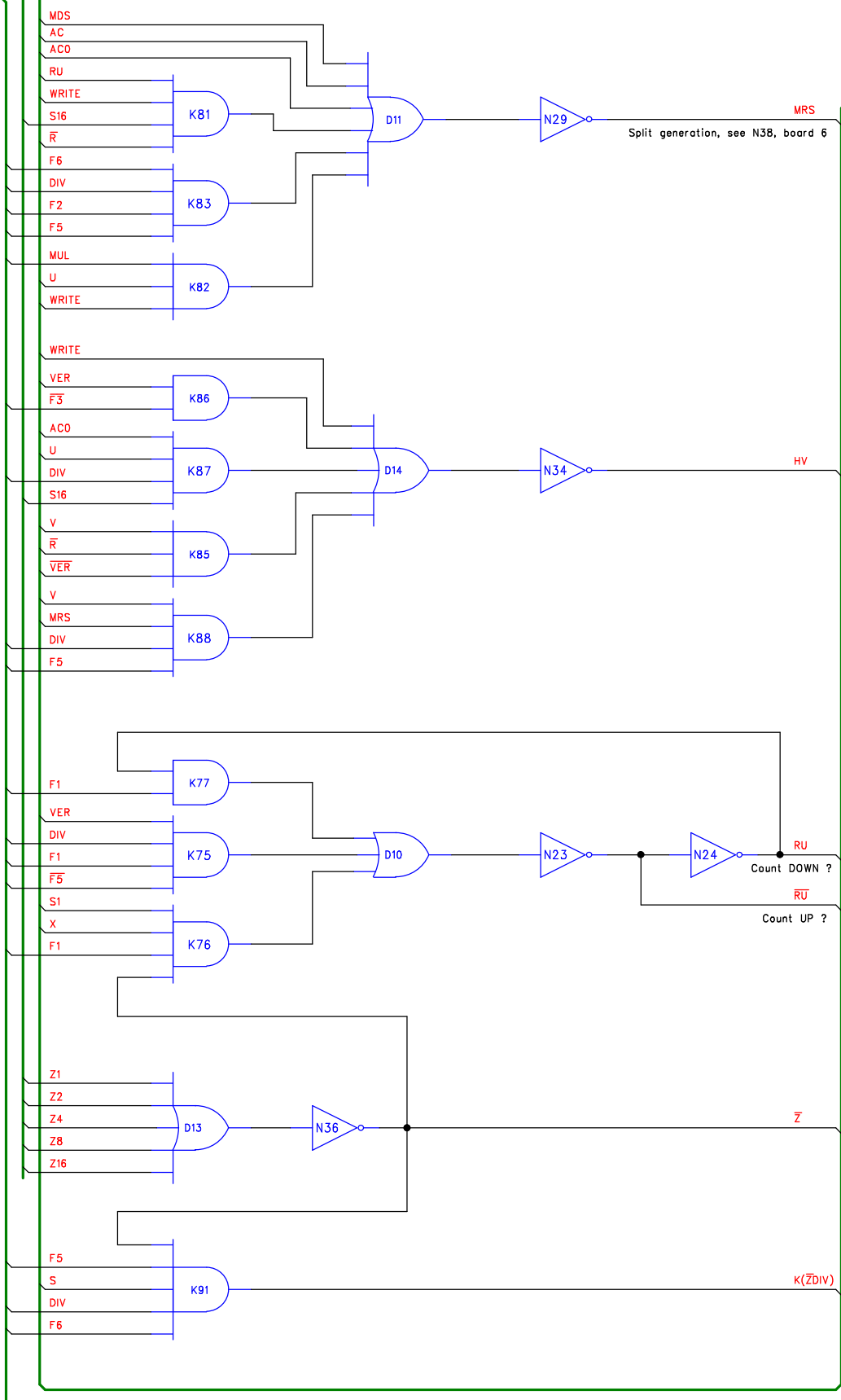
	Name	Date
Drawn	MD Hatch	5/10/2009
Checked	-	-

Scale	Nts
Sheet	4
Next Sheet	5
Drawing Number	

Title	Issue
Soemtron ETR 220 Calculator #4 - E Register and Overflow Logic Diagram	A
Soemtron 220 Logic	A2

RevNo	Revision note	Date	By	Checked
-	-	-	-	-

CONTROL [1,2,3,4,6,7,8,9,10,11]
 Z-COUNTER [6,7,8,9,10,11]
 FUNCTIONS [2,3,4,6,7,8,9,10]



Negative logic referenced to 0V - Logical 1 = -12v, logical 0 = 0v



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Pcb Dwg # =

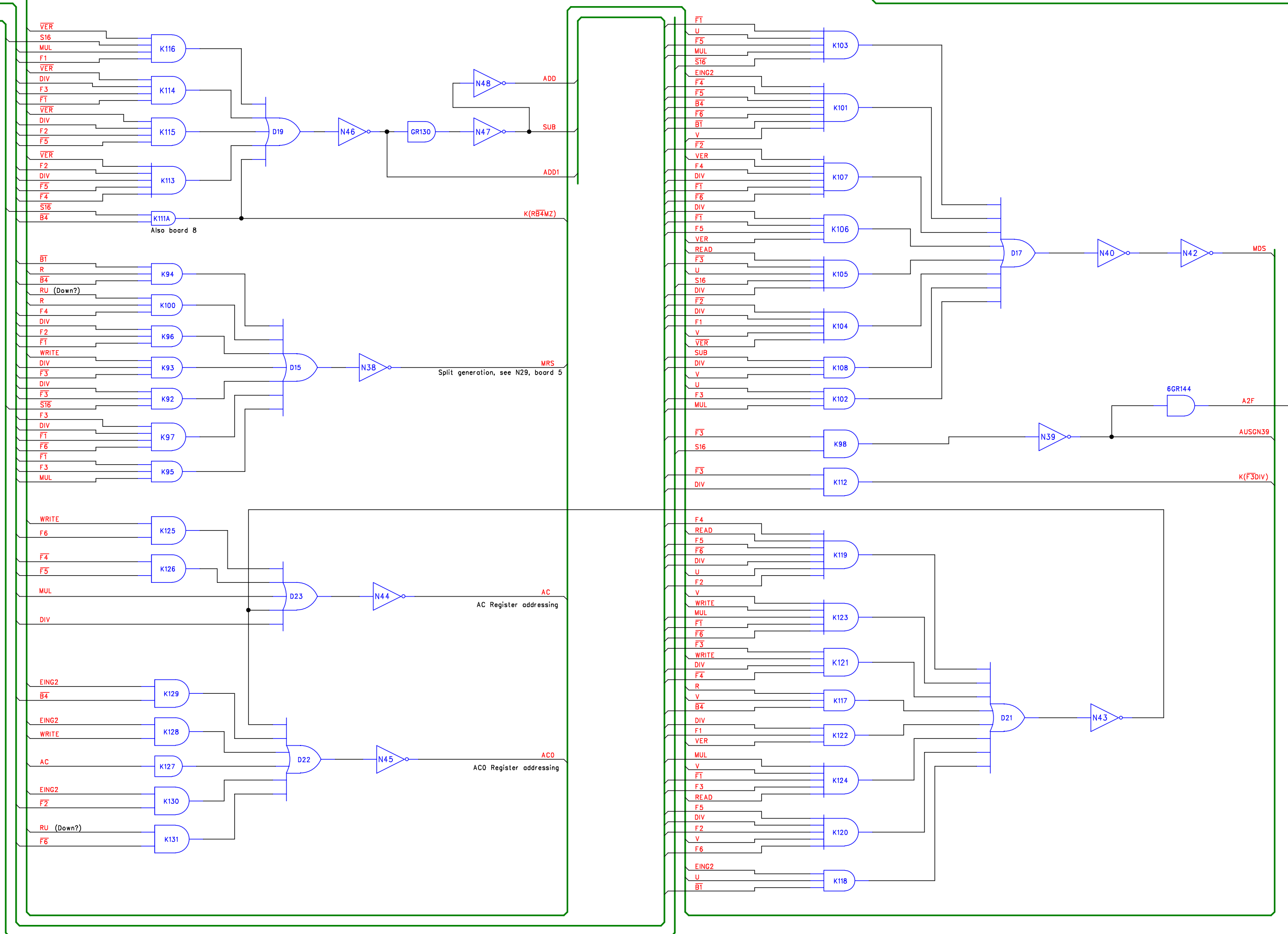
	Name	Date
Drawn	MD Hatch	19/9/2009
Checked	-	-

Scale	Nts
Sheet	5
Next Sheet	6
Drawing Number	

Title	
Soemtron ETR 220 Calculator	
#5 - Control, Clock Gen, Misc	
Logic Diagram	
Soemtron 220 Logic	A2 Issue A

A-BUSS [1,3,4,7,8,9]
 CONTROL [1,2,3,4,5,7,8,9,10,11]
 FUNCTIONS [2,3,4,5,7,8,9,10]
 Z-COUNTER [5,7,8,9,10,11]

RevNo	Revision note	Date	By	Checked
-	-	-	-	-



Negative logic referenced to 0V - Logical 1 = -12v, logical 0 = 0v



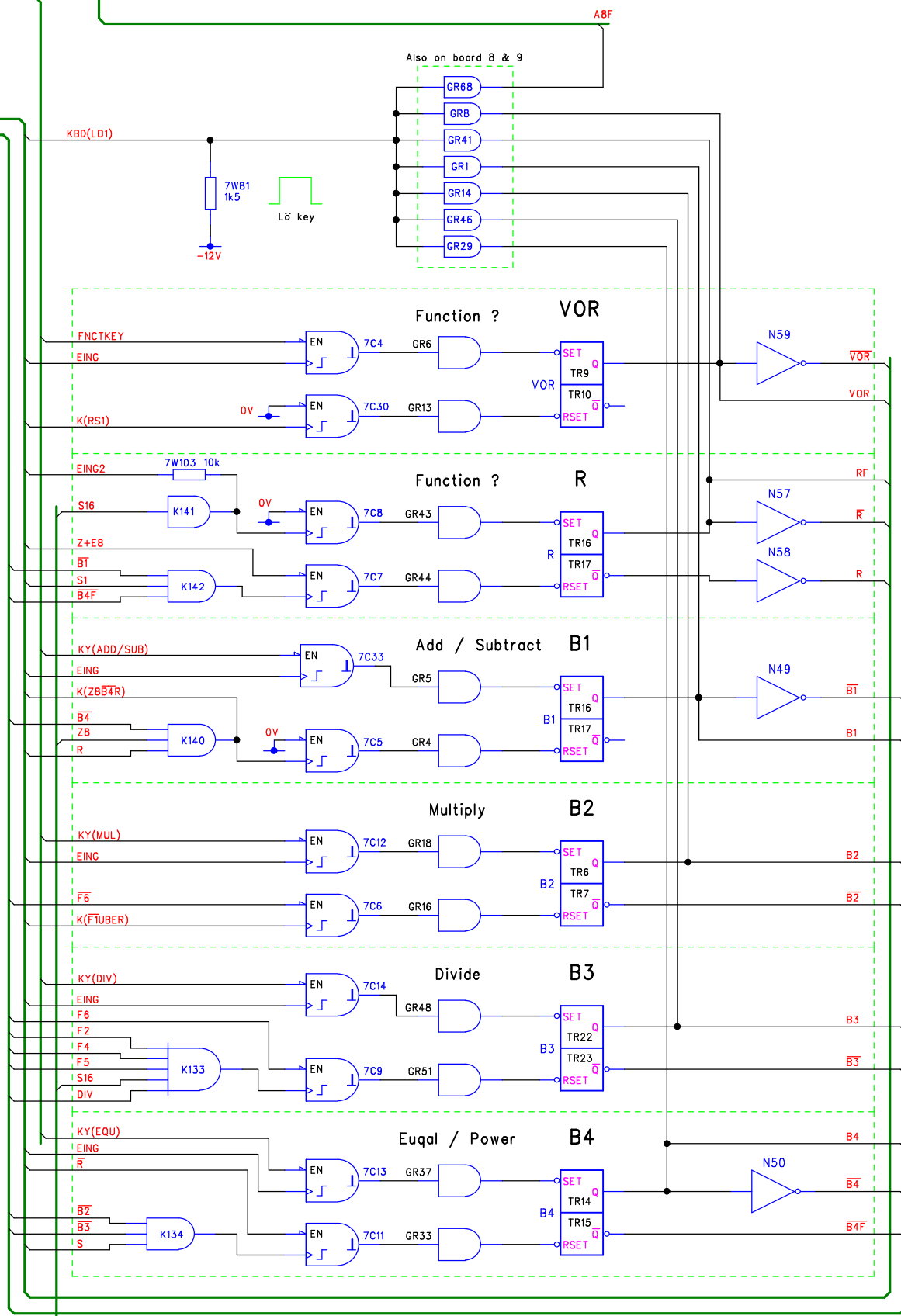
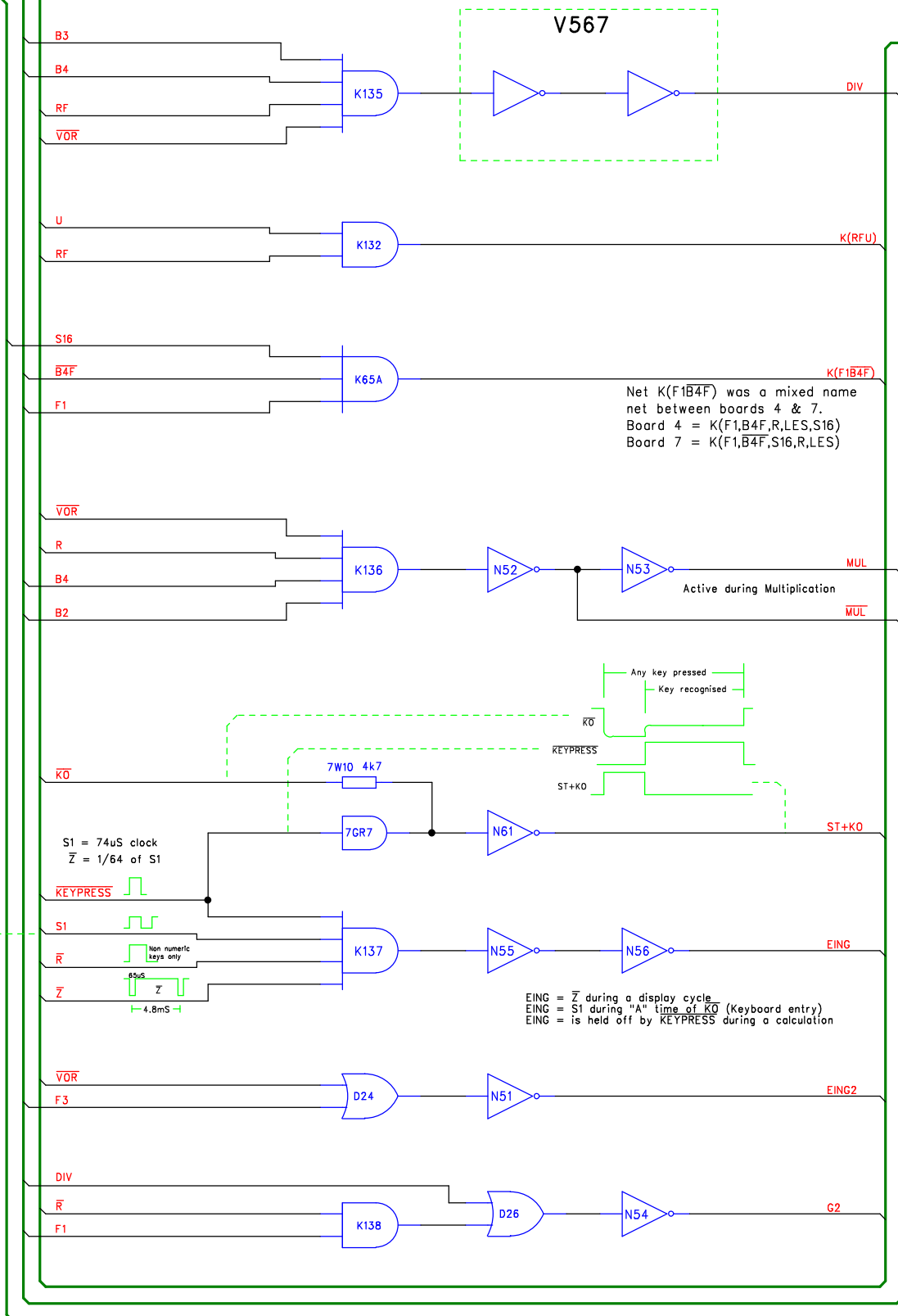
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Pcb Dwg # =		Scale	Nts	Title	
Drawn	Name	Date	Sheet	Soemtron ETR 220 Calculator #6 - Control Gating Logic Diagram	
Checked	MD Hatch	17/9/2009	Next Sheet	6	
			Drawing Number	7	
			Soemtron 220 Logic	A2 Issue	A

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RevNo	Revision note	Date	By	Checked
-	-	-	-	-

A-BUSS [1,3,4,6,8,9]
 ENCODED-FUNCTION [8,9,11]
 CONTROL [1,2,3,4,5,6,8,9,10,11]
 FUNCTIONS [2,3,4,5,6,8,9,10]
 Z-COUNTER [5,6,8,9,10,11]



Function key entry ?

Negative logic referenced to 0V - Logical 1 = -12v, logical 0 = 0v



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Pcb Dwg # =

Name	Date
MD Hatch	15/9/2009

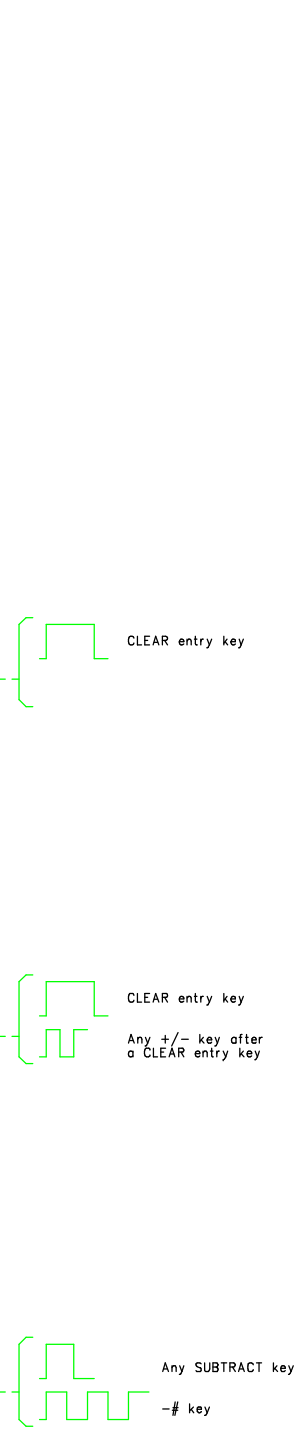
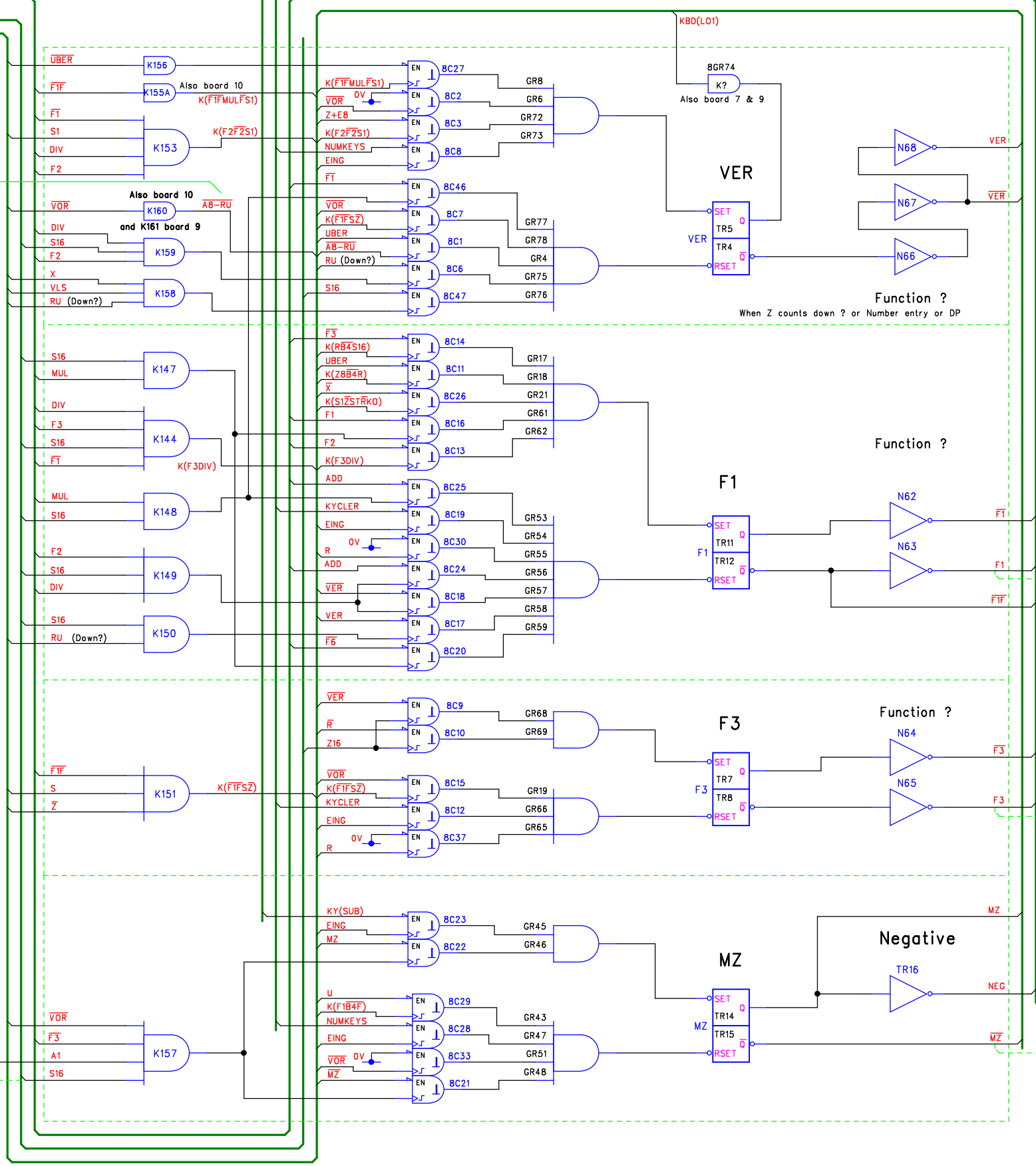
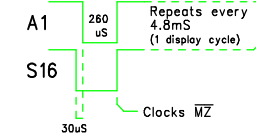
Scale	Nts
Sheet 7	8
Next Sheet	Drawing Number

Title **Soemtron ETR 220 Calculator**
#7 - FUNCTION-LATCH-B1/2/3/4,VOR,R
 Logic Diagram
 Soemtron 220 Logic A2 Issue A

ENCODED-NUMBER [9,12]
 ENCODED-FUNCTION [7,9,11]
 FUNCTIONS [2,3,4,5,6,7,9,10]
 Z-COUNTER [5,6,7,9,10,11]
 CONTROL [1,2,3,4,5,6,7,9,10,11]
 A-BUSS [1,3,4,6,7,9]

RevNo	Revision note	Date	By	Checked
-	-	-	-	-

Net $\overline{A8-RU}$ is a mixed name net between boards 8, 9 & 10
 Board 8 = $K(\overline{VOR}, \overline{VLS}, \overline{A8}, \overline{R}, \overline{RU}, S16)$
 Board 9 = $K(\overline{VOR}, \overline{VLS}, \overline{A8}, \overline{R}, \overline{RU}, S16, AUSG)$
 Board 10 = $K(\overline{VOR}, \overline{VLS}, \overline{A8}, \overline{R}, \overline{RU}, AUSG)$



Negative logic referenced to 0V - Logical 1 = -12v, logical 0 = 0v

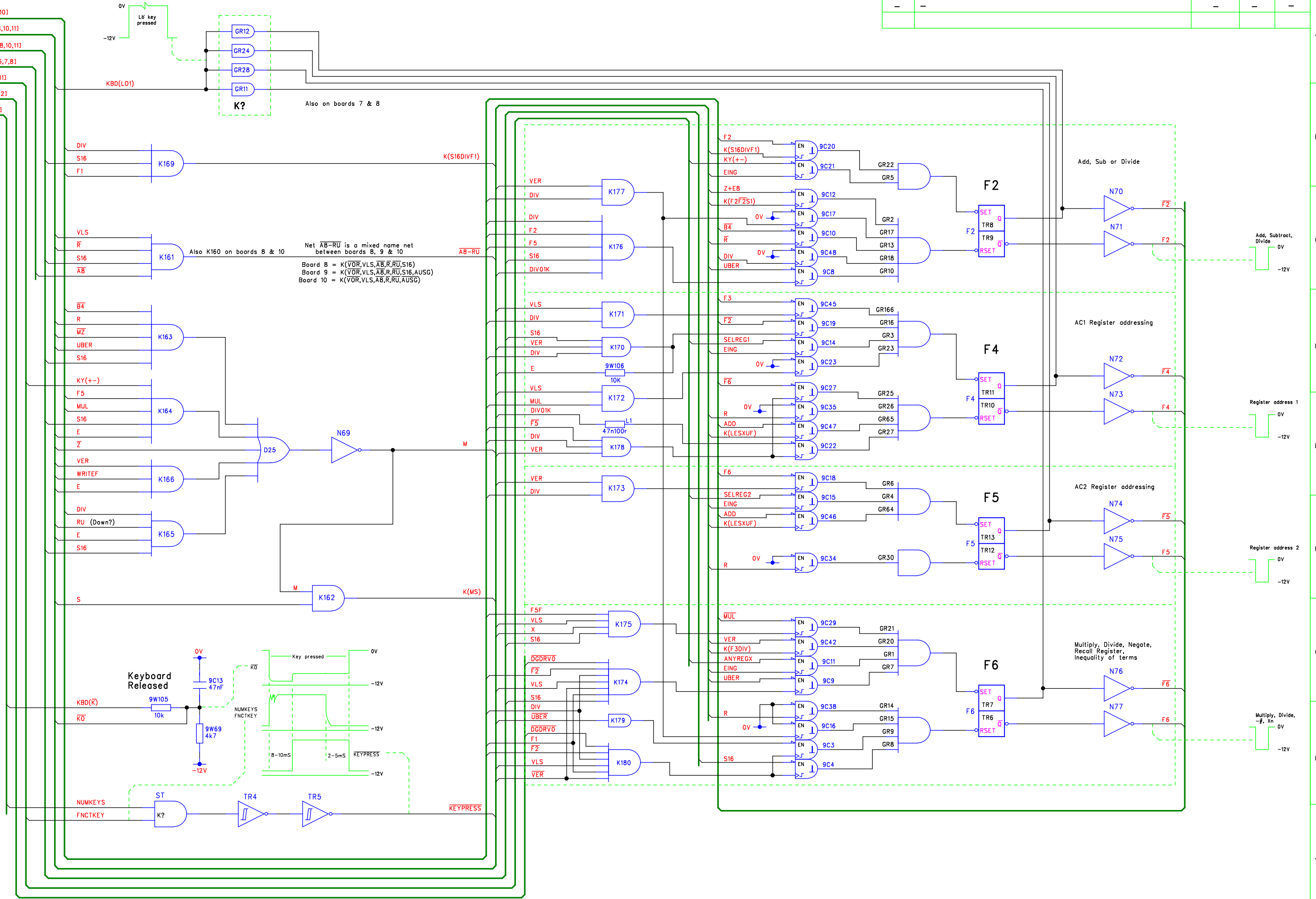


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Pcb Dwg # =		Scale	Nts	Title	
Name	Date	Sheet	8	Soemtron ETR 220 Calculator	
Drawn	10/9/2009	Next Sheet	9	#8 - Function Latches F2, F3 + others	
Checked	-	Drawing Number		Logic Diagram	
				Soemtron 220 Logic	A2 Issue A

RevNo	Revision note	Date	By	Checked
-	-	-	-	-

- FUNCTIONS [2,3,4,5,6,7,8,10]
- CONTROL [1,2,3,4,5,6,7,8,10,11]
- Z-COUNTER [5,6,7,8,10,11]
- A-BUSS [1,3,4,6,7,8]
- ENCODED-FUNCTION [7,8,11]
- DIGIT-BUSS [1,3,4,12]
- ENCODED-NUMBER [8,12]



Negative logic referenced to 0V - Logical 1 = -12v, logical 0 = 0v

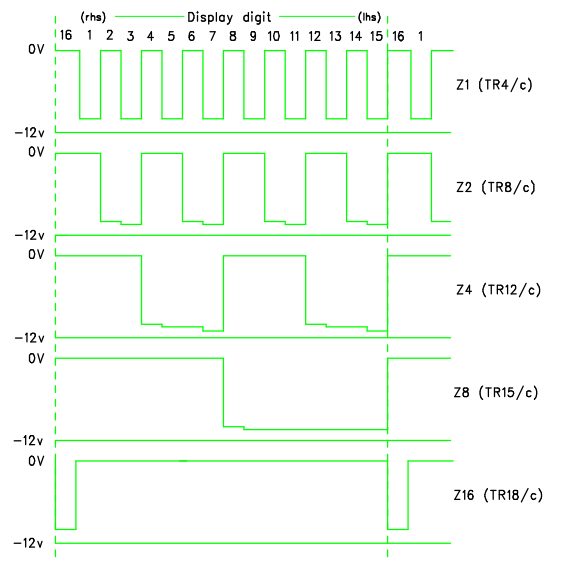
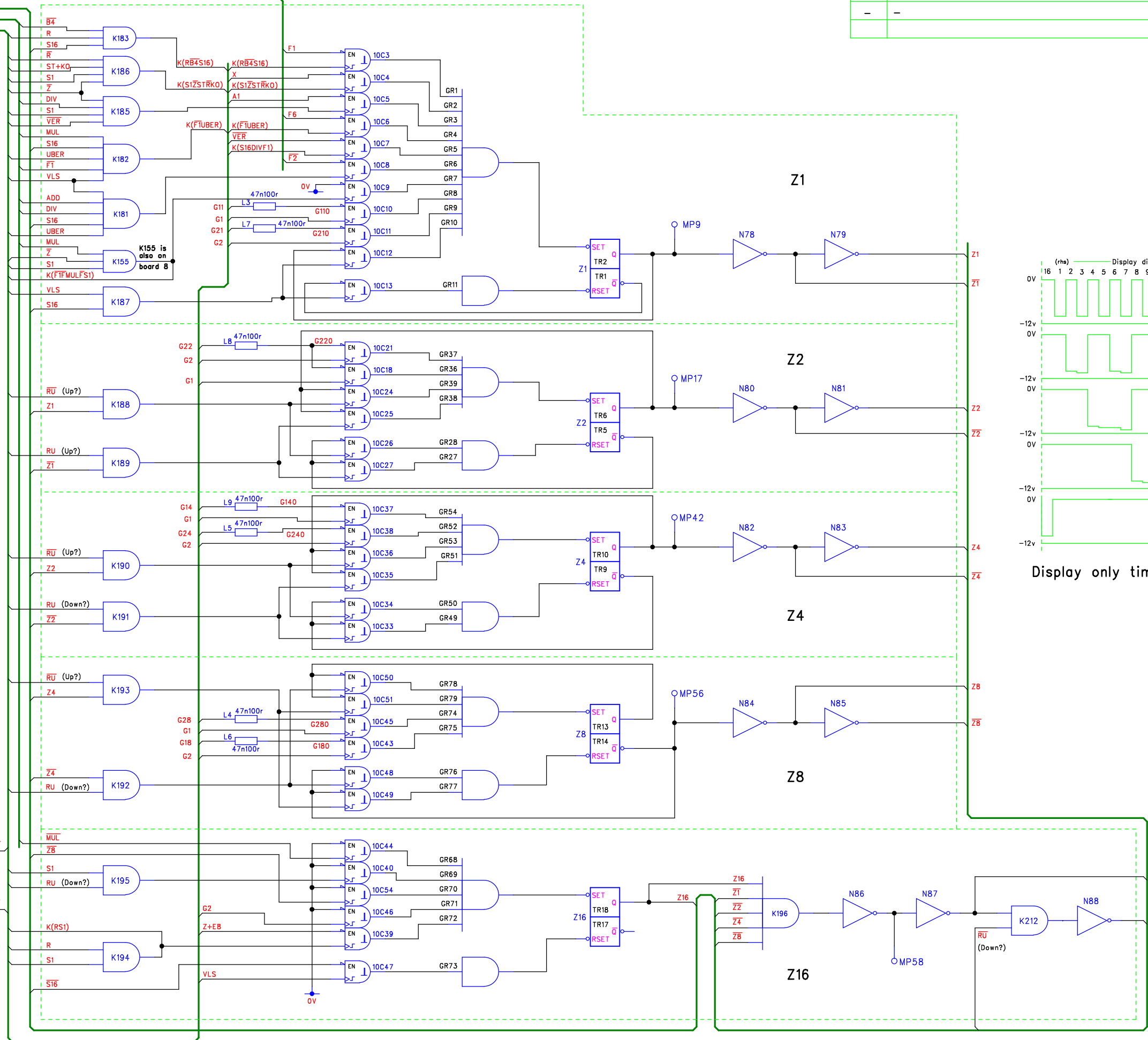


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Pcb Dwg # =		Scale	Nts	Title	
Drawn	Name	Sheet	9	Soemtron ETR 220 Calculator	
Checked	Date	Next Sheet	10	#9 - Function Latches F2, F4, F5, F6	
		Drawing Number		Logic Diagram	
				Soemtron 220 Logic	A2 Issue A

FUNCTIONS [2,3,4,5,6,7,8,9,10]
 Z-COUNTER [5,6,7,8,9,11]
 FUNCTIONS [2,3,4,5,6,7,8,9,10]
 CONTROL [1,2,3,4,5,6,7,8,9,11]

RevNo	Revision note	Date	By	Checked
-	-	-	-	-



Display only timing diagram

Net A8-RU is a mixed name net between boards 8, 9 & 10
 Board 8 = K(VOR,VLS,A8,R,RU,S16)
 Board 9 = K(VOR,VLS,A8,R,RU,S16,AUSG)
 Board 10 = K(VOR,VLS,A8,R,RU,AUSG)

K160 (Up?)
 Also on board 8 and K161 board 9

Negative logic referenced to 0V - Logical 1 = -12v, logical 0 = 0v



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Pcb Dwg # =

Name	Date
Drawn MD Hatch	8/12/2008
Checked -	-

Scale	Nts
Sheet 10	10
Next Sheet 11	11
Drawing Number	

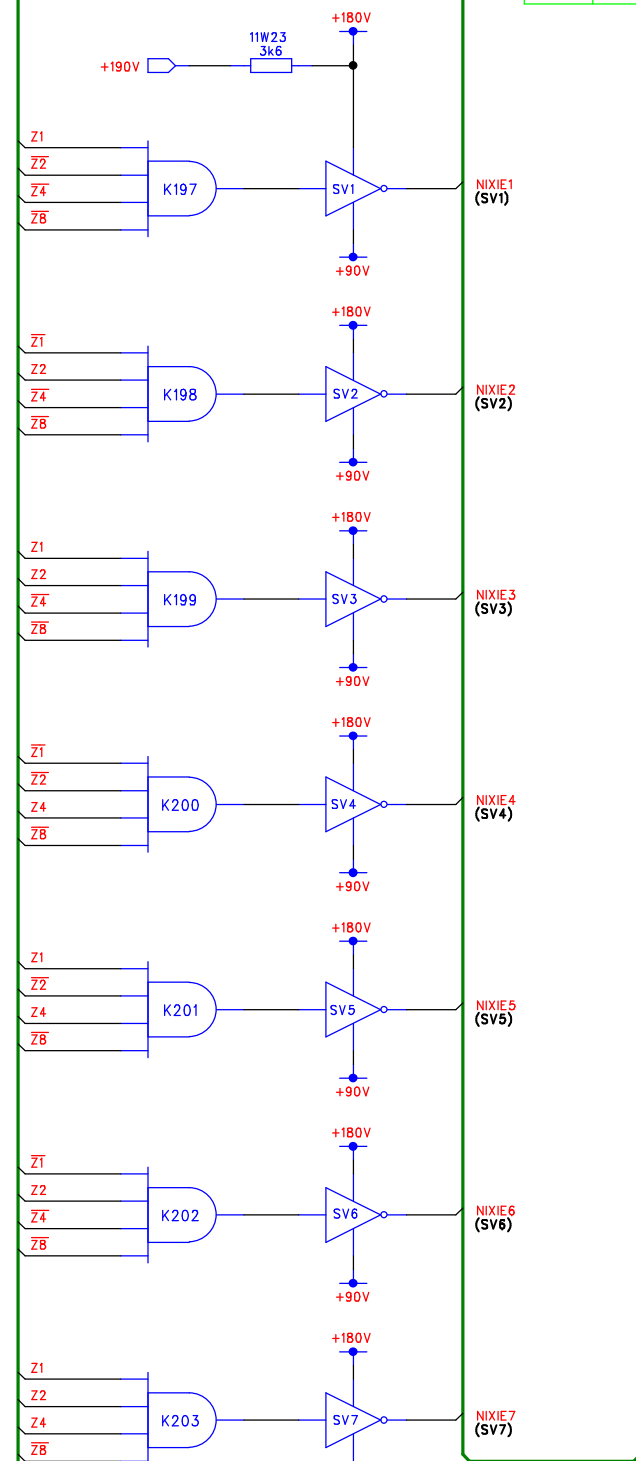
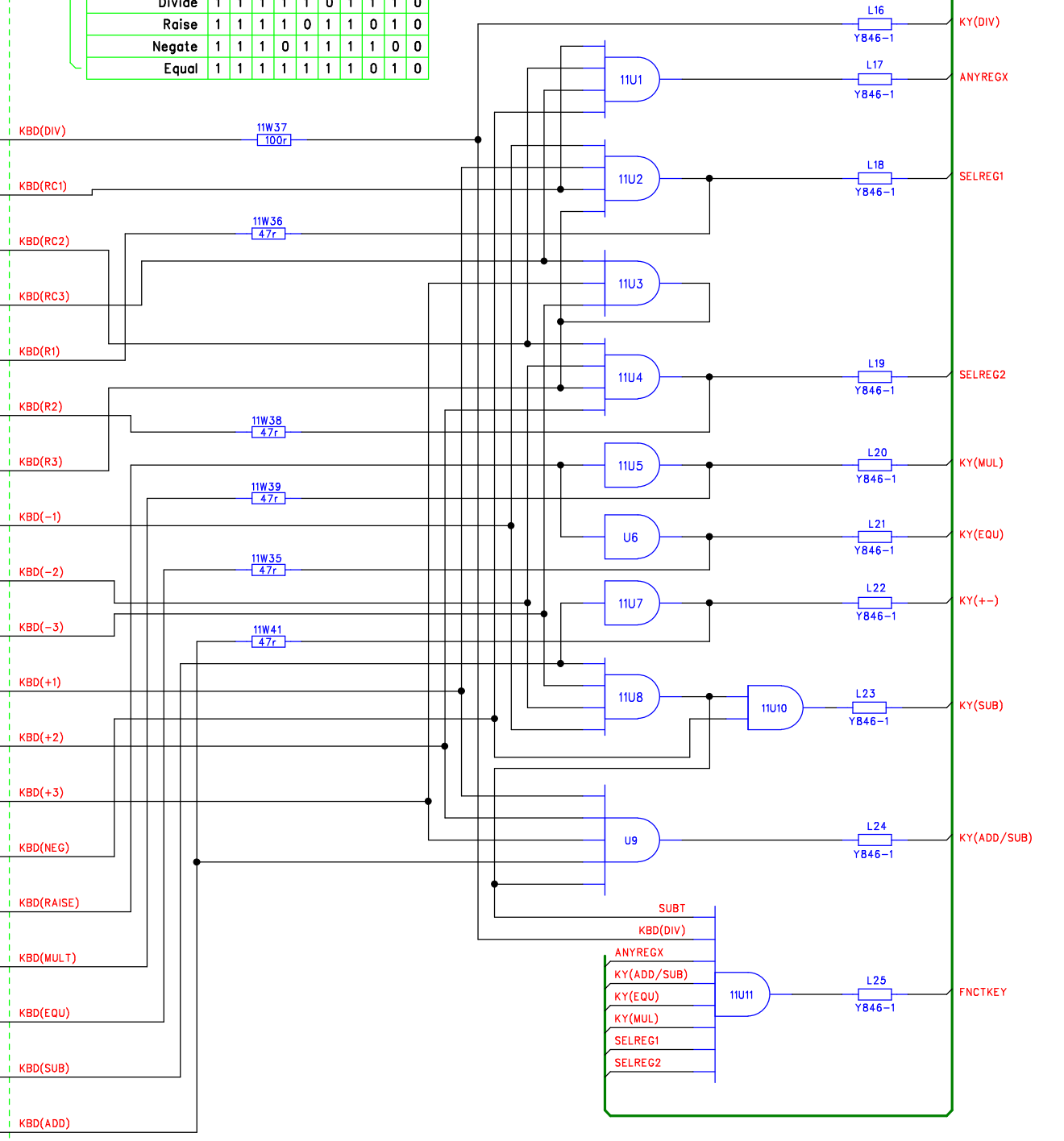
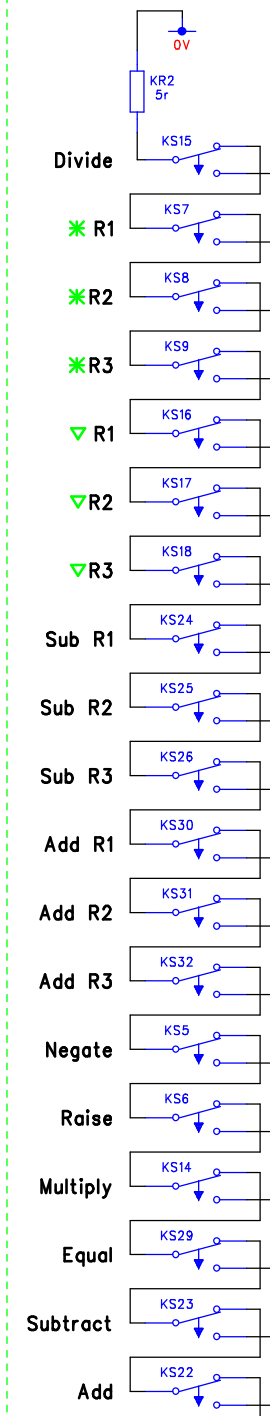
Title	Issue
Soemtron ETR 220 Calculator #10 - Z Counter (Digit Counter) Logic Diagram	A2
Soemtron 220 Logic	Issue A

NIXIE[1:15] [12]
 Z-COUNTER [5,6,7,8,9,10]
 CONTROL [1,2,3,4,5,6,7,8,9,10]
 ENCODED-FUNCTION [7,8,9]

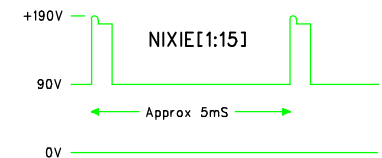
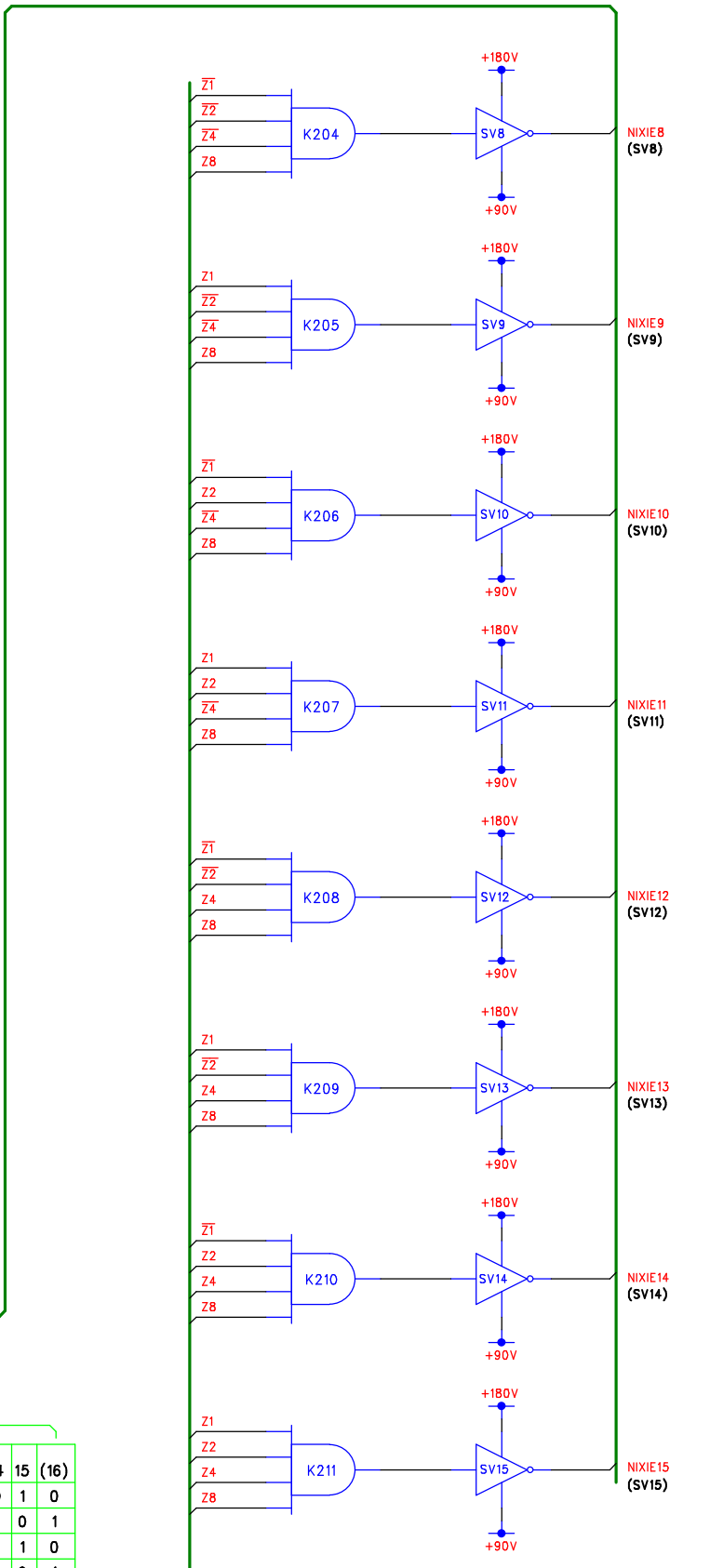
Signal	SELREG1	SELREG2	KY(ADD/SUB)	KY(SUB)	KY(MUL)	KY(DIV)	KY(+/-)	KY(EQU)	ANYREGX	FNCTKEY
Any key Reg 1	0	1	1	1	1	1	1	1	1	0
Any key Reg 2	1	0	1	1	1	1	1	1	1	0
Any key Reg 3	0	0	1	1	1	1	1	1	1	0
Any Reg + Key	x	x	0	1	1	1	1	1	1	0
Any Reg - Key	x	x	1	0	1	1	1	1	1	0
Any Reg *Key	x	x	1	1	1	1	1	1	0	0
Any Reg ▽Key	x	x	1	1	1	1	1	1	1	0
Add	1	1	0	1	1	1	0	1	1	0
Subtract	1	1	0	0	1	1	0	1	1	0
Multiply	1	1	1	0	1	1	1	1	1	0
Divide	1	1	1	1	0	1	1	1	1	0
Raise	1	1	1	0	1	1	0	1	1	0
Negate	1	1	1	0	1	1	1	1	0	0
Equal	1	1	1	1	1	1	1	0	1	0

0 = Key pressed (= 0V)
 1 / x = No key (-12V)

Keyboard

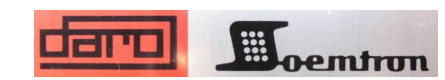


Signal	Digit	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	(16)
Z1	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1
Z1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0
Z2	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0	0
Z2	1	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	0
Z4	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1	0	0
Z4	1	1	1	0	0	0	0	1	1	1	1	0	0	0	0	1	0
Z8	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0
Z8	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	0



Keys are ordered for this diagram, not as they are wired, see circuit.

Negative logic referenced to 0V - Logical 1 = -12v, logical 0 = 0v



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Pcb Dwg # =		Scale	Nts	Title	
Drawn	Name	Date	Sheet	Soemtron ETR 220 Calculator	
Checked	MD Hatch	4/7/2008	Next Sheet	#11 - Digit Decode & Anode Drive	
Drawing Number			Soemtron 220 Logic		A2 Issue A

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RevNo	Revision note	Date	By	Checked
-	-	-	-	-

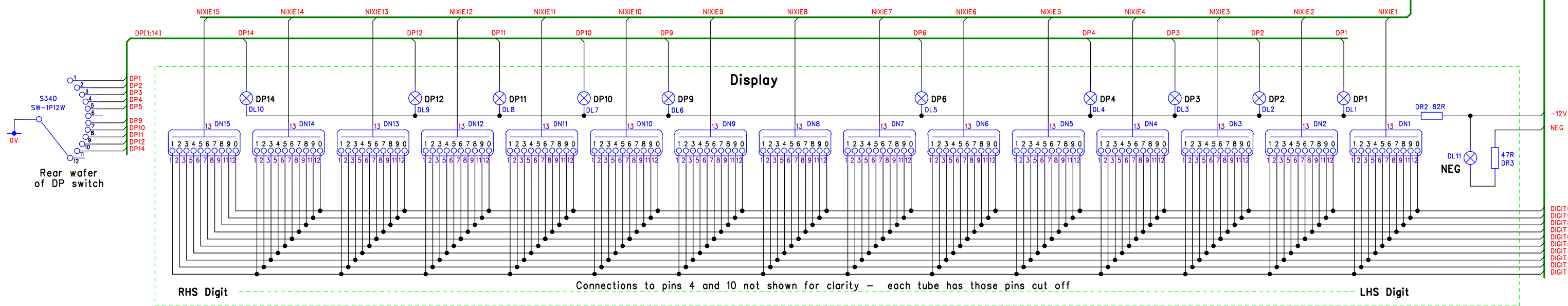
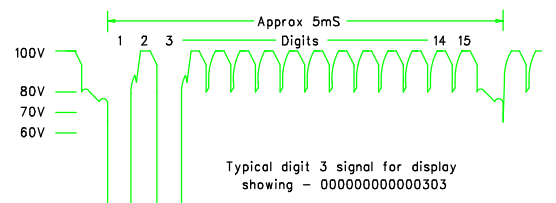
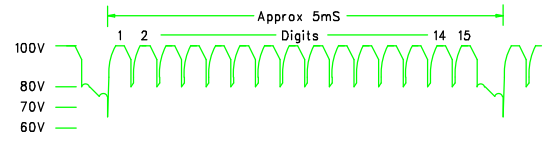
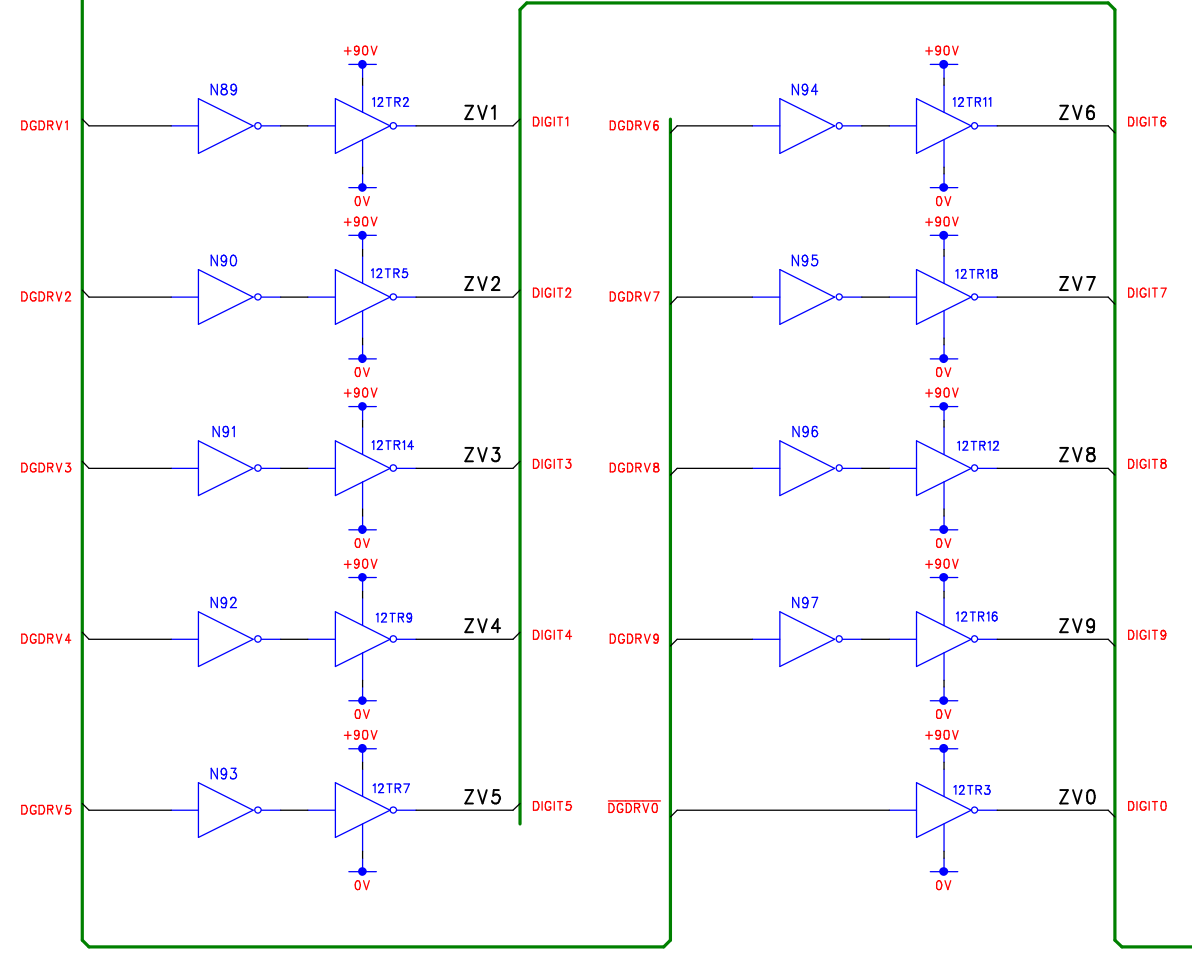
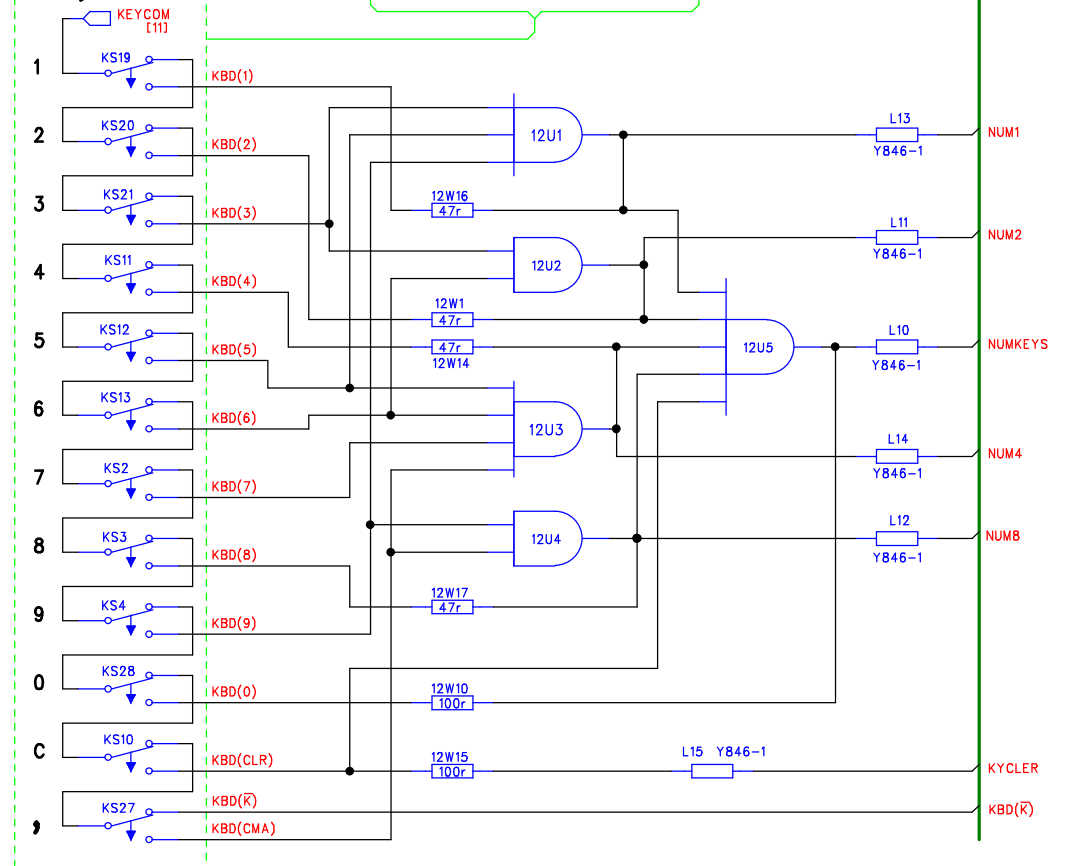
DIGIT-BUSS [1,3,4,9]
 NIXIE[1:15] [11]
 ENCODED-NUMBER [8,9]

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

0 = Key pressed (= 0V)
 1 = no key (-12V)

Keys are ordered for this diagram, not as they are wired, see circuit.

Keyboard



Negative logic referenced to 0V - Logical 1 = -12v, logical 0 = 0v



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Pcb Dwg # =

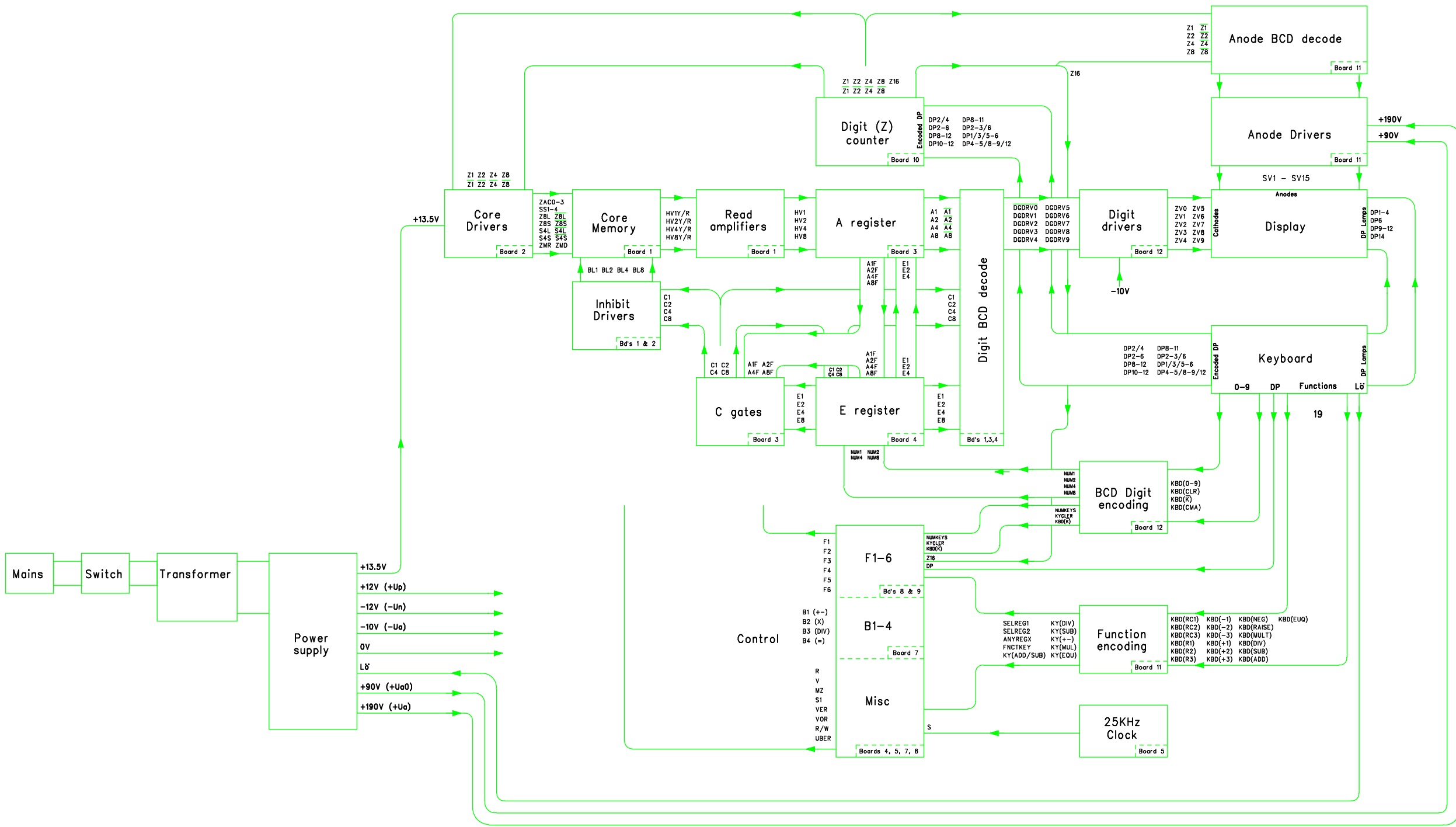
Name	Date
MD Hatch	10/7/2008

Scale	Nts
Sheet 12	12
Next Sheet	13
Drawing Number	

Title	Issue
Soemtron ETR 220 Calculator #12 - Cathode Drive & Kbd # Encode Logic Diagram	A

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RevNo	Revision note	Date	By	Checked
-	-	-	-	-



Notes:



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Pcb Dwg # =		Scale	Nts	Title	
Drawn	Name	Sheet	13	Soemtron ETR 220 Calculator	
Checked	Date	Next Sheet	-	#13 - Overall Block Diagram	
		Drawing Number		Block Diagram	
				Soemtron 220	A2 Issue A