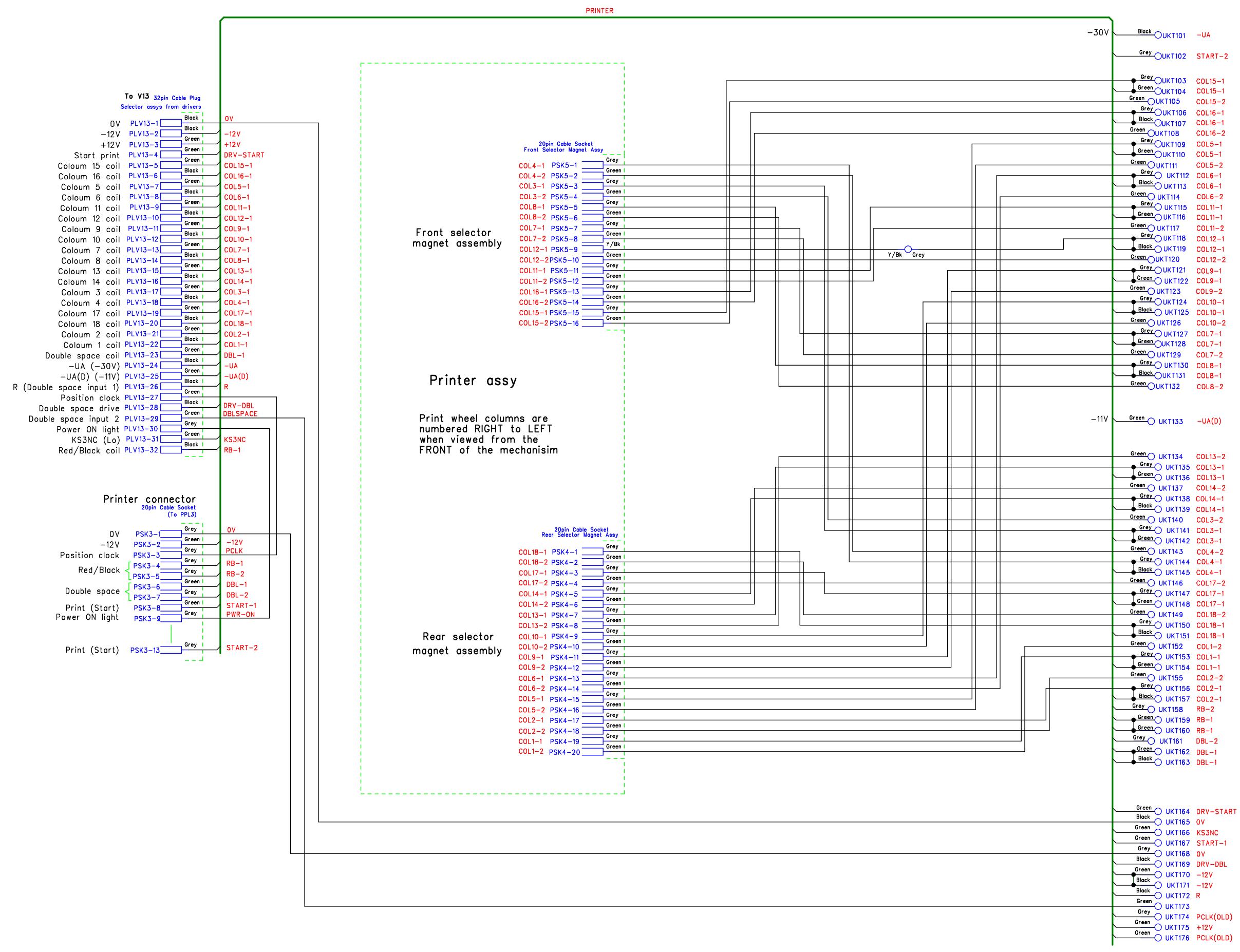
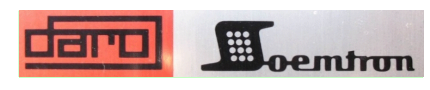


RevNo	Revision note	Date	By	Checked
-	-	-	-	-



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

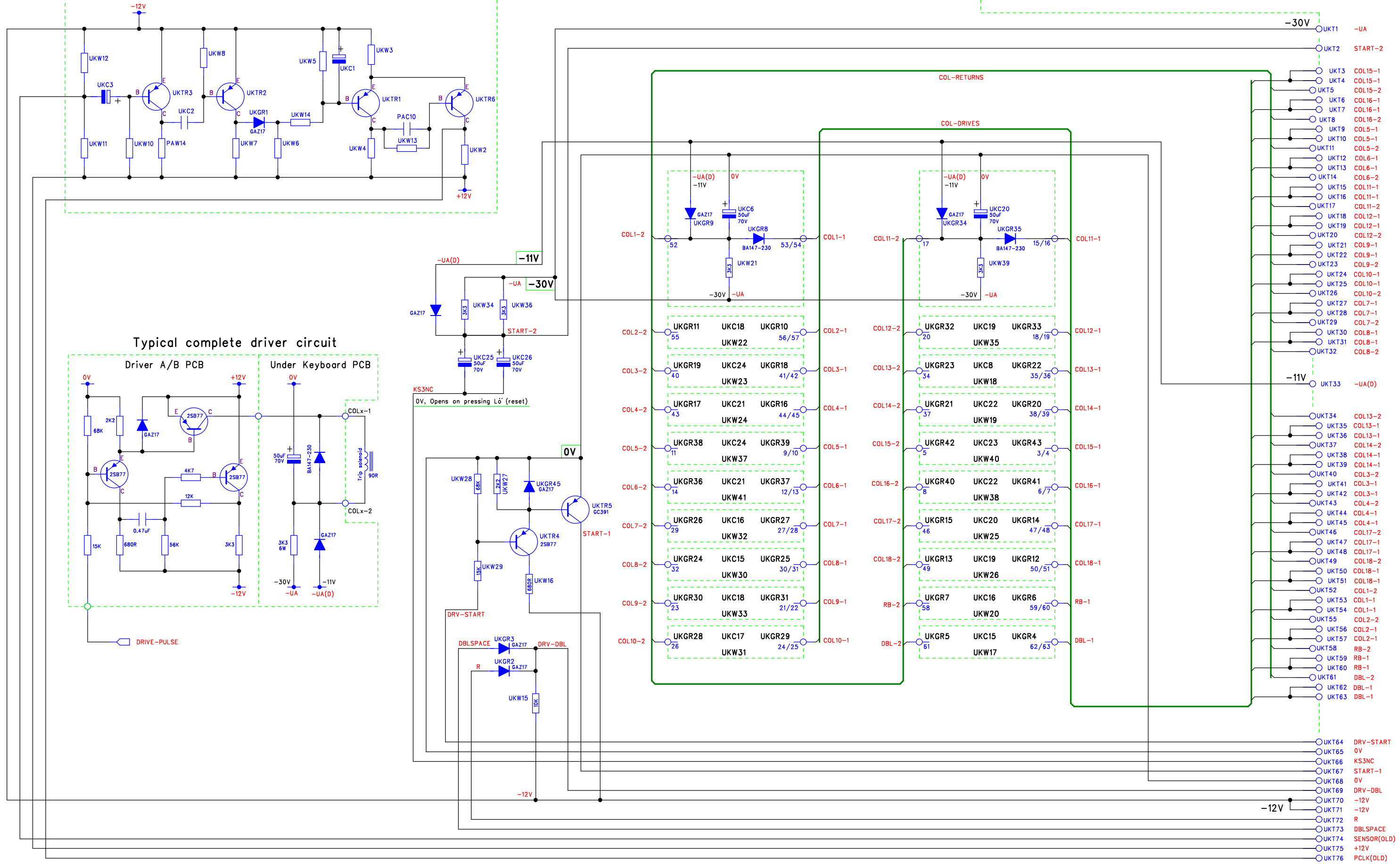


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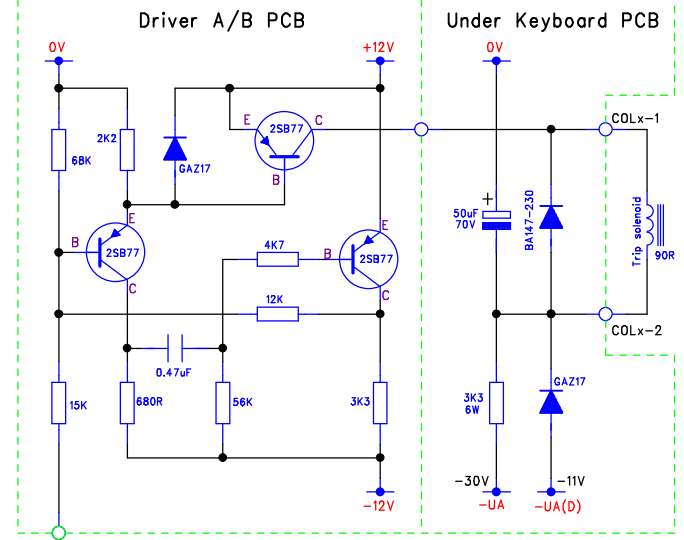
Pcb Dwg # =		Scale	Nts	Title	
Drawn	Name	Sheet	2	Soemtron ETR 224 Calculator	
Checked	Date	Next Sheet	3	Under keyboard - Wiring	
		Drawing Number		Cable Loom Wiring Diagram	
				Soemtron 224	A2 Issue A

RevNo	Revision note	Date	By	Checked
-	-	-	-	-

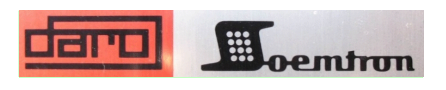
Original photosensor amplifier layout
 These components are not fitted - see sheet 4, Printer Assembly Wiring



Typical complete driver circuit



PCB = 224-309-017



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Pcb Dwg # =

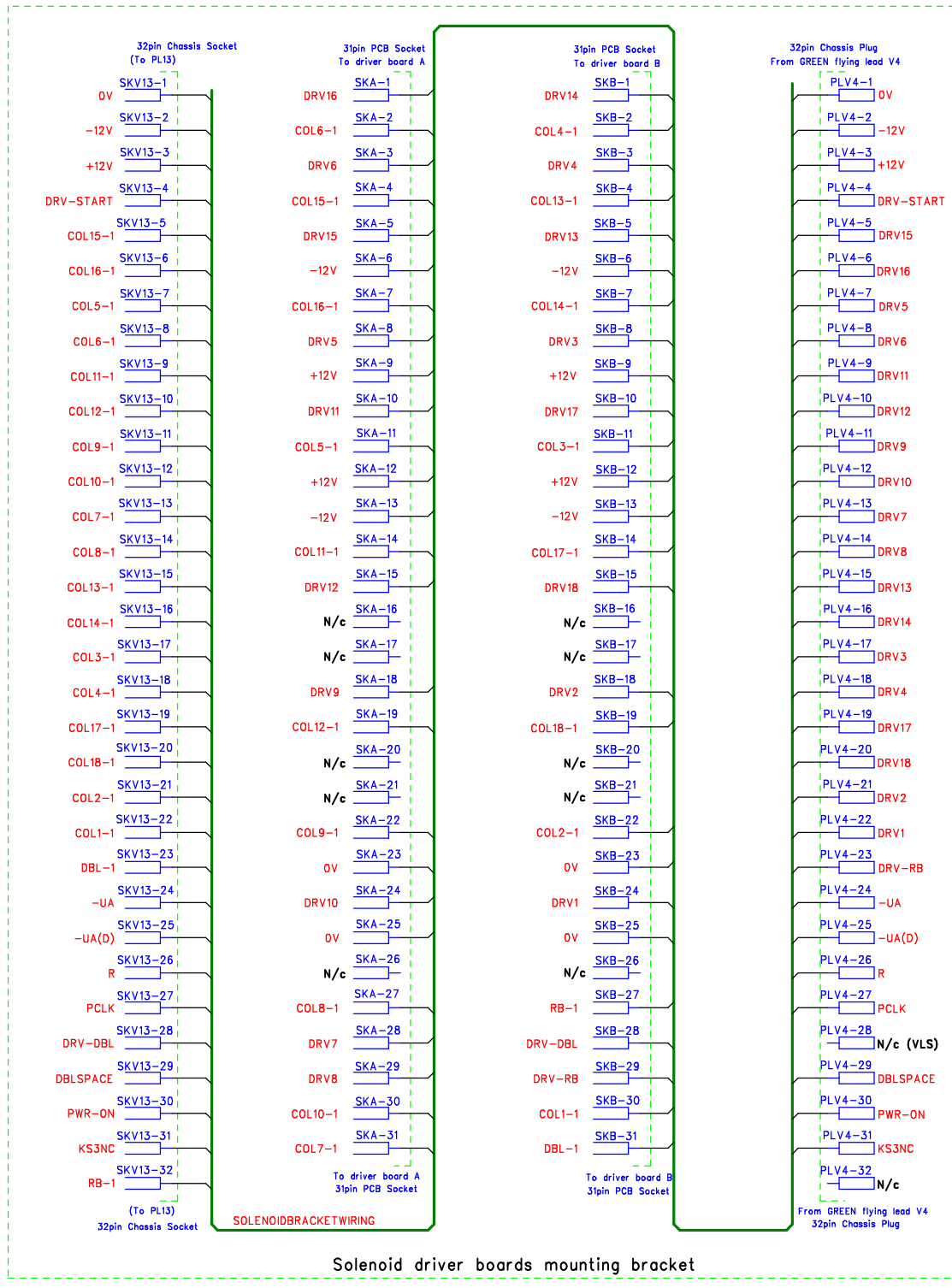
Name	Date
MD Hatch	11/4/2011

Scale	Nts
Sheet 3	4
Next Sheet	Drawing Number

Title	Issue
Soemtron ETR 224 Calculator Under Keyboard PCB 224-309-017 - Circuit Diagram	A2

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

RevNo	Revision note	Date	By	Checked
-	-	-	-	-



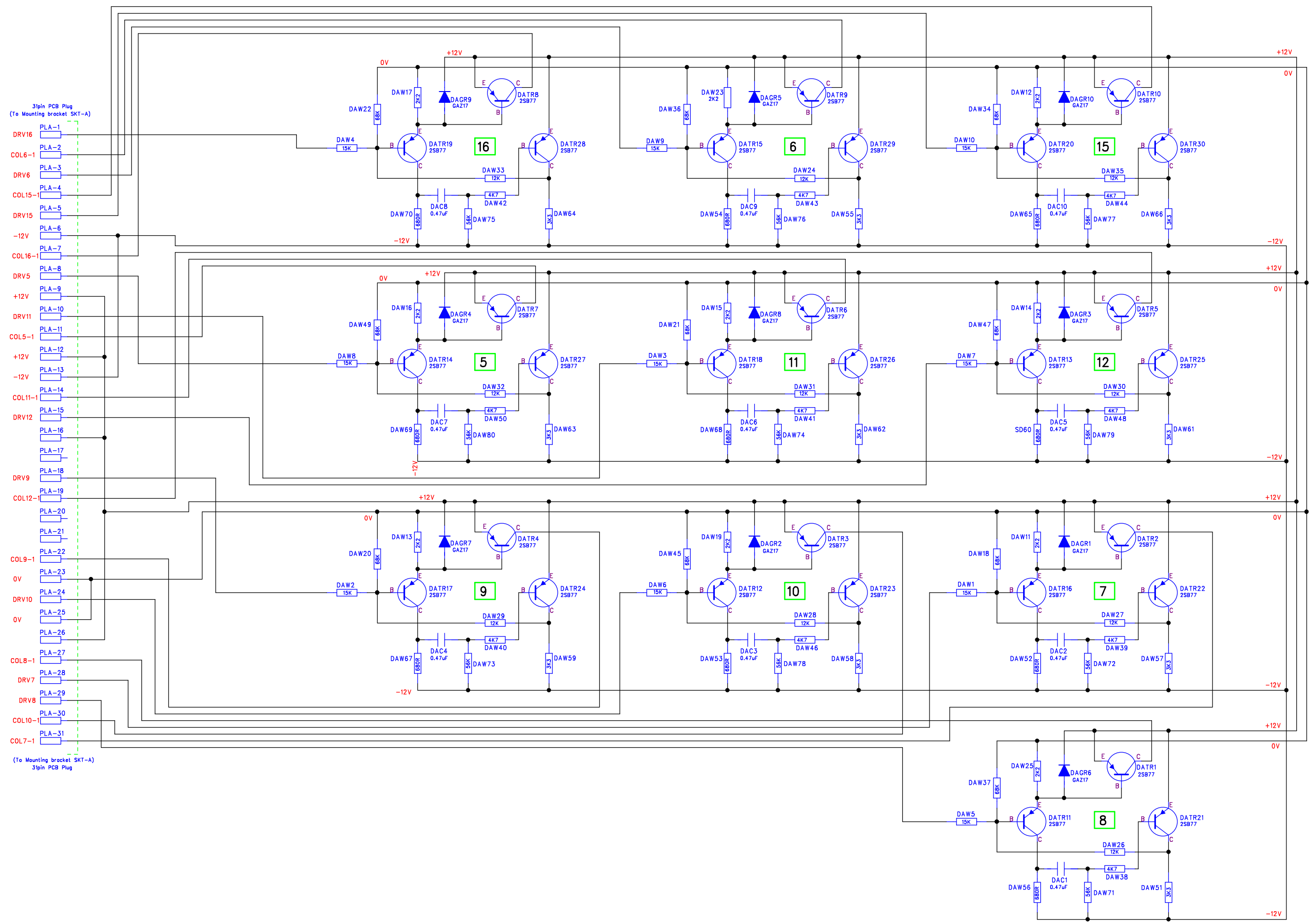
These diagrams are referenced to 0V - Logical 1 = -12V, logical 0 = 0V



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Pcb Dwg # =		Scale	Nts	Title Søemtron ETR 224 Calculator Solenoid Driver Bracket Wiring Circuit Diagram
Drawn	Name MD Hatch	Date 22/1/2010	Sheet 4	
Checked	-	-	Next Sheet 5	Drawing Number Soemtron 224
			A2 Issue	

RevNo	Revision note	Date	By	Checked
-	-	-	-	-



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

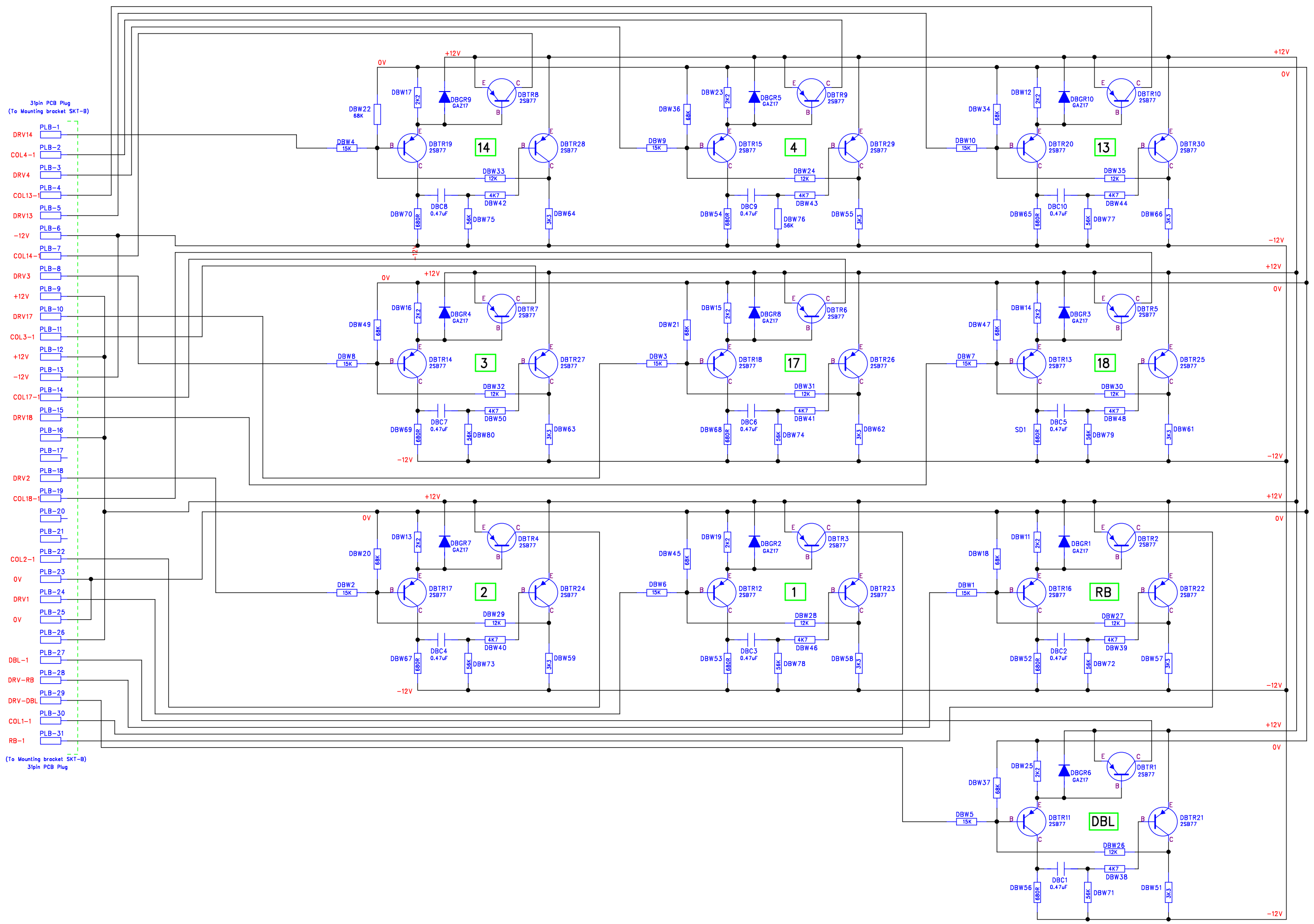


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Pcb Dwg # =		Scale	Nts	Title	
Drawn	Name	Date	Sheet	Soemtron ETR 224 Calculator	
Checked	MD Hatch	22/1/2010	Next Sheet	Solenoid Driver Boards	
			Drawing Number	Circuit Diagram Board A	
				Soemtron 224	A2 Issue A

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RevNo	Revision note	Date	By	Checked
-	-	-	-	-



- 31pin PCB Plug
(To Mounting bracket SKT-B)
- DRV14 PLB-1
 - COL4-1 PLB-2
 - DRV4 PLB-3
 - COL13-1 PLB-4
 - DRV13 PLB-5
 - PLB-6
 - COL14-1 PLB-7
 - DRV3 PLB-8
 - PLB-9
 - DRV17 PLB-10
 - COL3-1 PLB-11
 - PLB-12
 - COL17-1 PLB-14
 - DRV18 PLB-15
 - PLB-16
 - PLB-17
 - DRV2 PLB-18
 - COL18-1 PLB-19
 - PLB-20
 - PLB-21
 - COL2-1 PLB-22
 - PLB-23
 - DRV1 PLB-24
 - PLB-25
 - PLB-26
 - DBL-1 PLB-27
 - DRV-RB PLB-28
 - DRV-DBL PLB-29
 - COL1-1 PLB-30
 - RB-1 PLB-31
- (To Mounting bracket SKT-B)
31pin PCB Plug

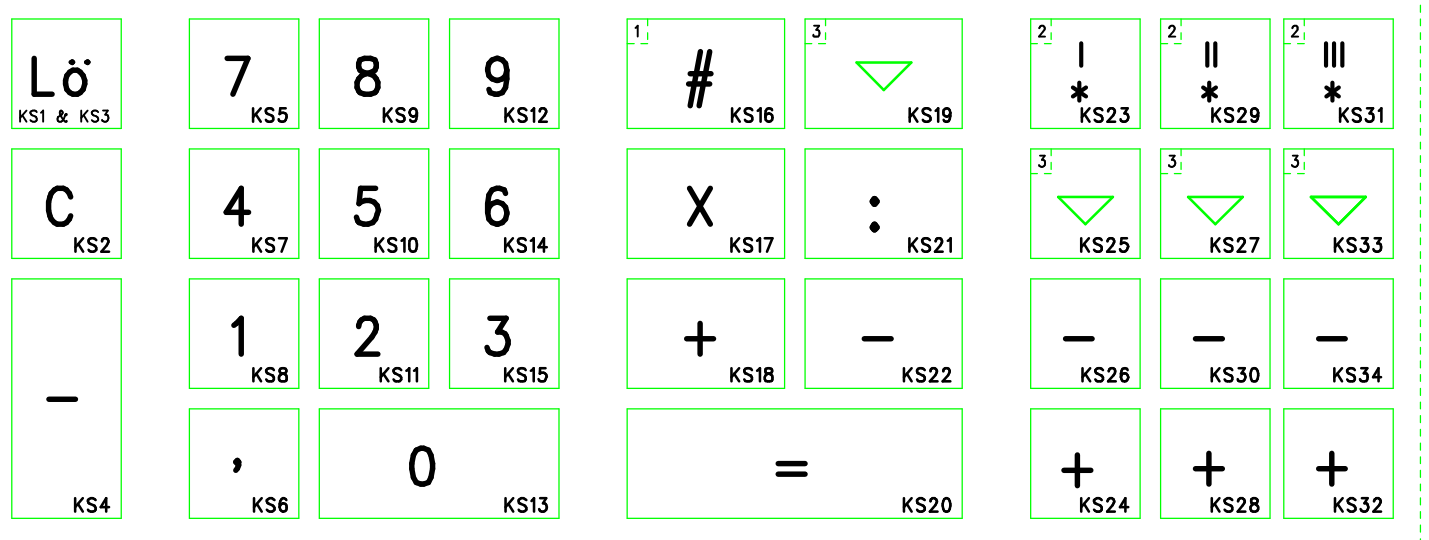


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Pcb Dwg # =		Scale	Nts	Title Soemtron ETR 224 Calculator Solenoid Driver Boards Circuit Diagram Board B
Drawn	Name MD Hatch	Date 22/1/2010	Sheet 6	
Checked	-	-	Next Sheet 7	Drawing Number Soemtron 220
			A2 Issue	

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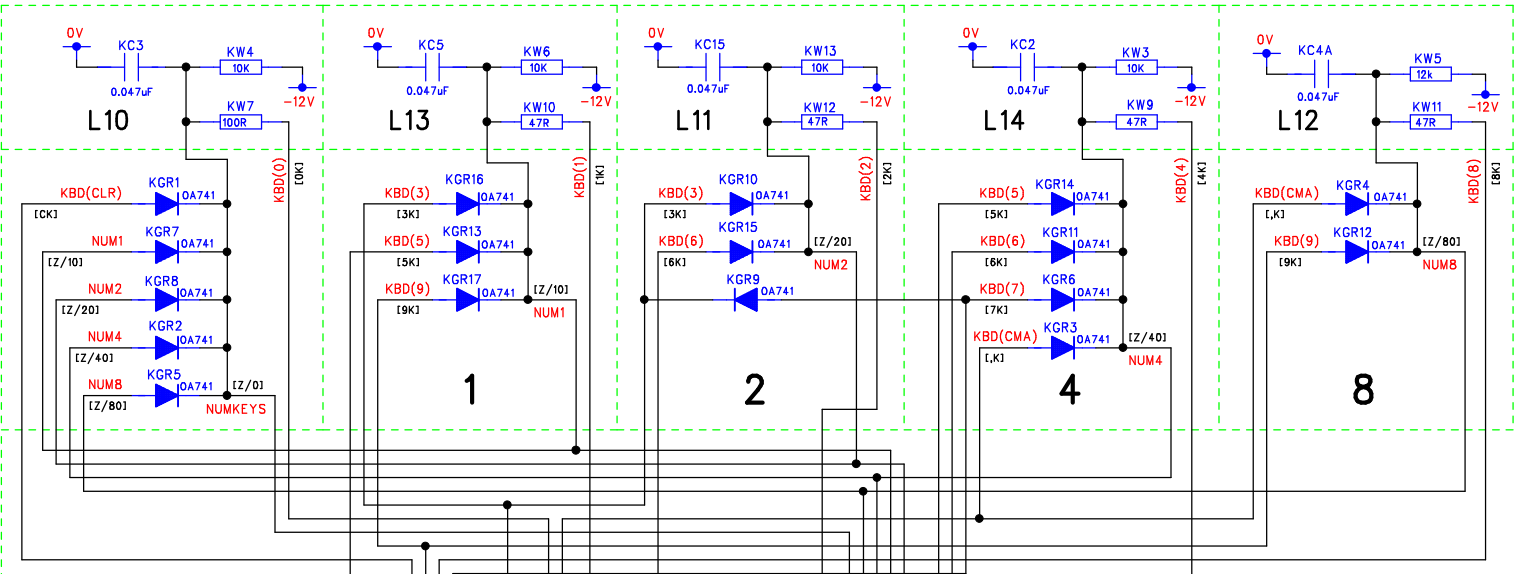
Keyboard Physical Layout

Notes -

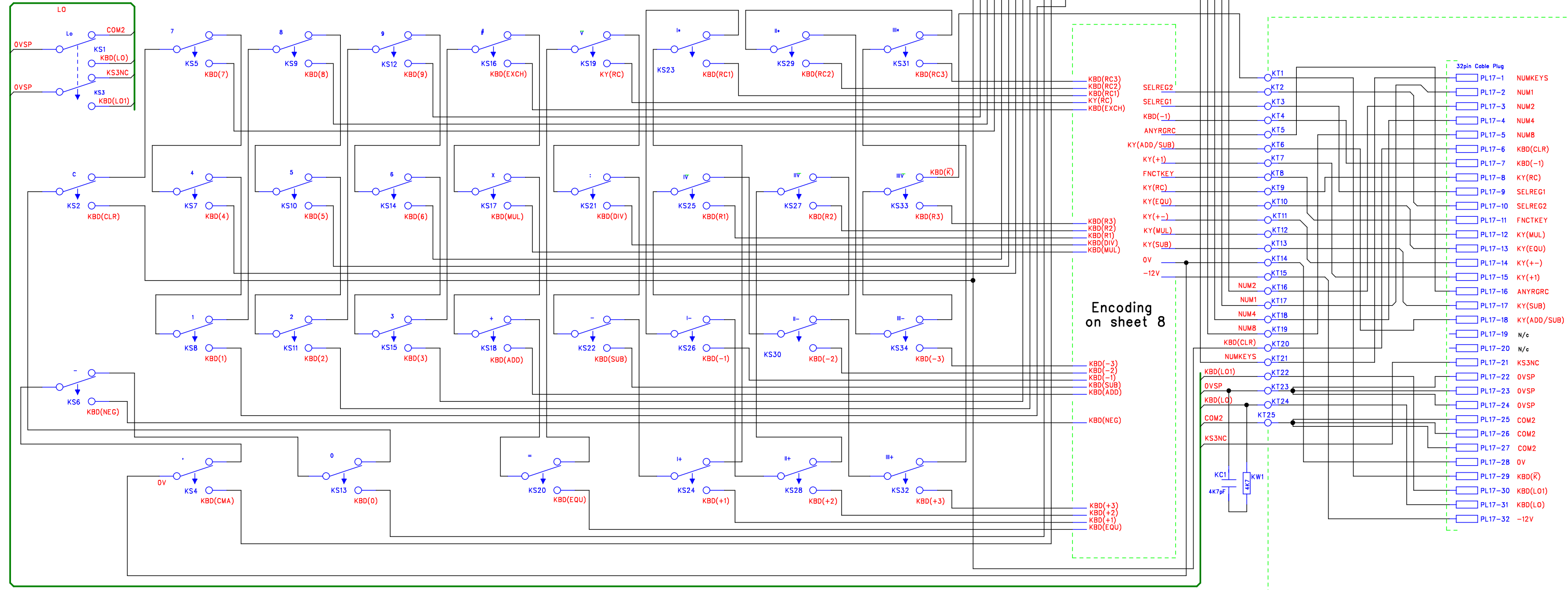
1	#	Exchange operands	4	-	Negate entry
2	I II III	Recall (clears memory)			
3	▽	Recall only			

RevNo	Revision note	Date	By	Checked
-	-	-	-	-

Numeric (BCD 0-9), Clear & DP (BCD 12) Encode Matrix



Keyboard PCB 224-301-014a



Encoding sheet 8

Keyboard & Digit Key Encoder

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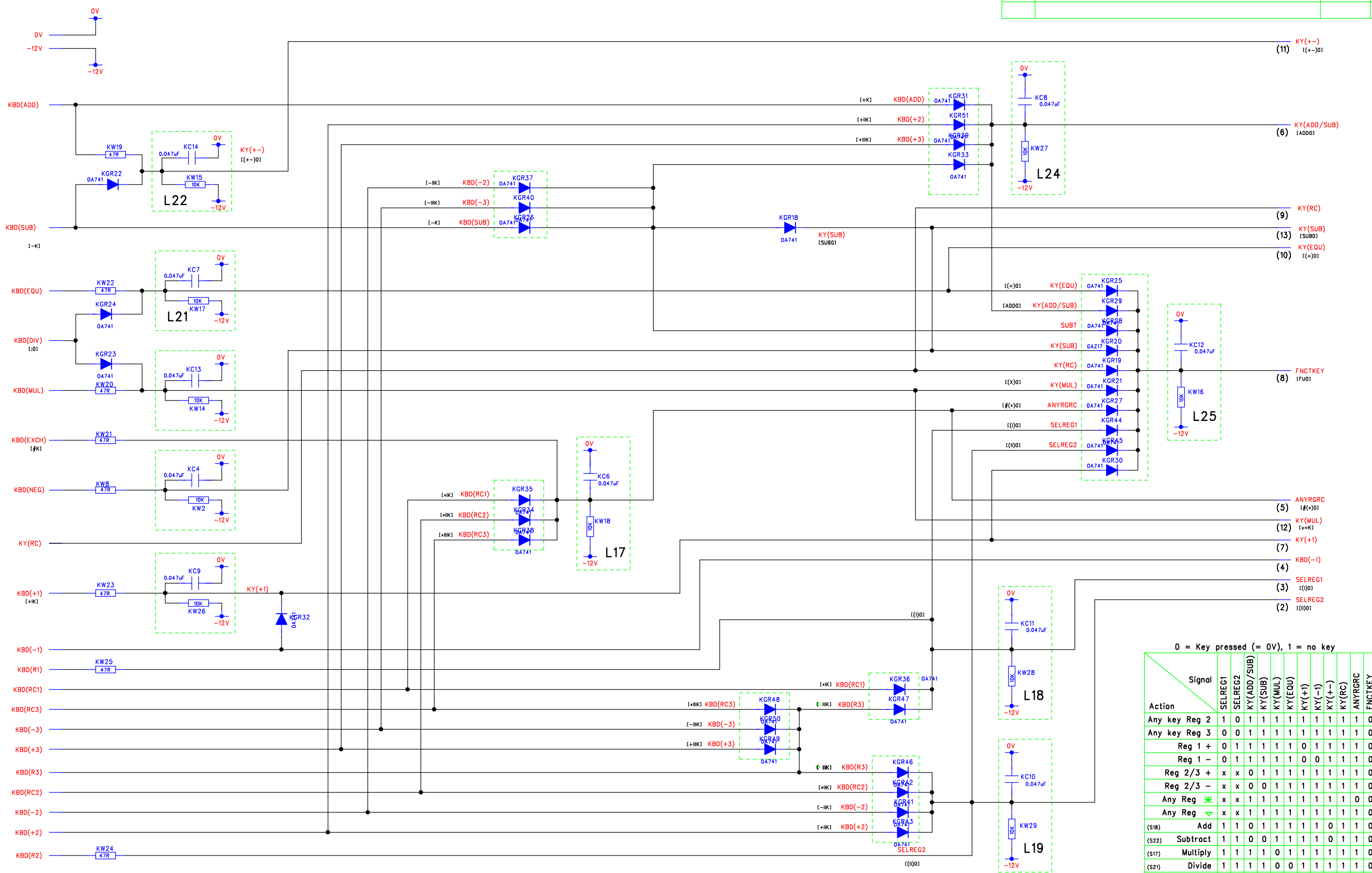
Pcb Dwg # =

Name	Date
MD Hatch	23/5/2011

Scale	Nts
Sheet 7	7
Next Sheet 8	8
Drawing Number	Soemtron 224

Title	Issue
Soemtron ETR 224 Calculator Keyboard Circuit & Layout PCB = 224-301-014a	A

RevNo	Revision note	Date	By	Checked
-	-	-	-	-



0 = Key pressed (= 0V), 1 = no key

Signal	SELREG1	SELREG2	KY(ADD/SUB)	KY(SUB)	KY(MUL)	KY(EQU)	KY(+)	KY(-)	KY(+/-)	KY(RC)	ANYRGC	FNCTKEY
Any key Reg 2	1	0	1	1	1	1	1	1	1	1	1	0
Any key Reg 3	0	0	1	1	1	1	1	1	1	1	1	0
Reg 1 +	0	1	1	1	1	1	0	1	1	1	1	0
Reg 1 -	0	1	1	1	1	1	0	0	1	1	1	0
Reg 2/3 +	x	x	0	1	1	1	1	1	1	1	1	0
Reg 2/3 -	x	x	0	0	1	1	1	1	1	1	1	0
Any Reg *	x	x	1	1	1	1	1	1	1	1	1	0
Any Reg v	x	x	1	1	1	1	1	1	1	1	1	0
(S18) Add	1	1	0	1	1	1	1	1	1	0	1	0
(S22) Subtract	1	1	0	0	1	1	1	1	1	0	1	0
(S17) Multiply	1	1	1	0	1	1	1	1	1	1	1	0
(S21) Divide	1	1	1	0	0	1	1	1	1	1	1	0
(S4) Negate	1	1	1	0	1	1	1	1	1	1	1	0
(S19) Recall	1	1	1	1	1	1	1	1	1	0	1	0
(S16) Exchange	1	1	1	1	1	1	1	1	1	1	0	0
(S20) Equal	1	1	1	1	0	1	1	1	1	1	1	0

Function & Register Key Encoder

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Pcb Dwg # =

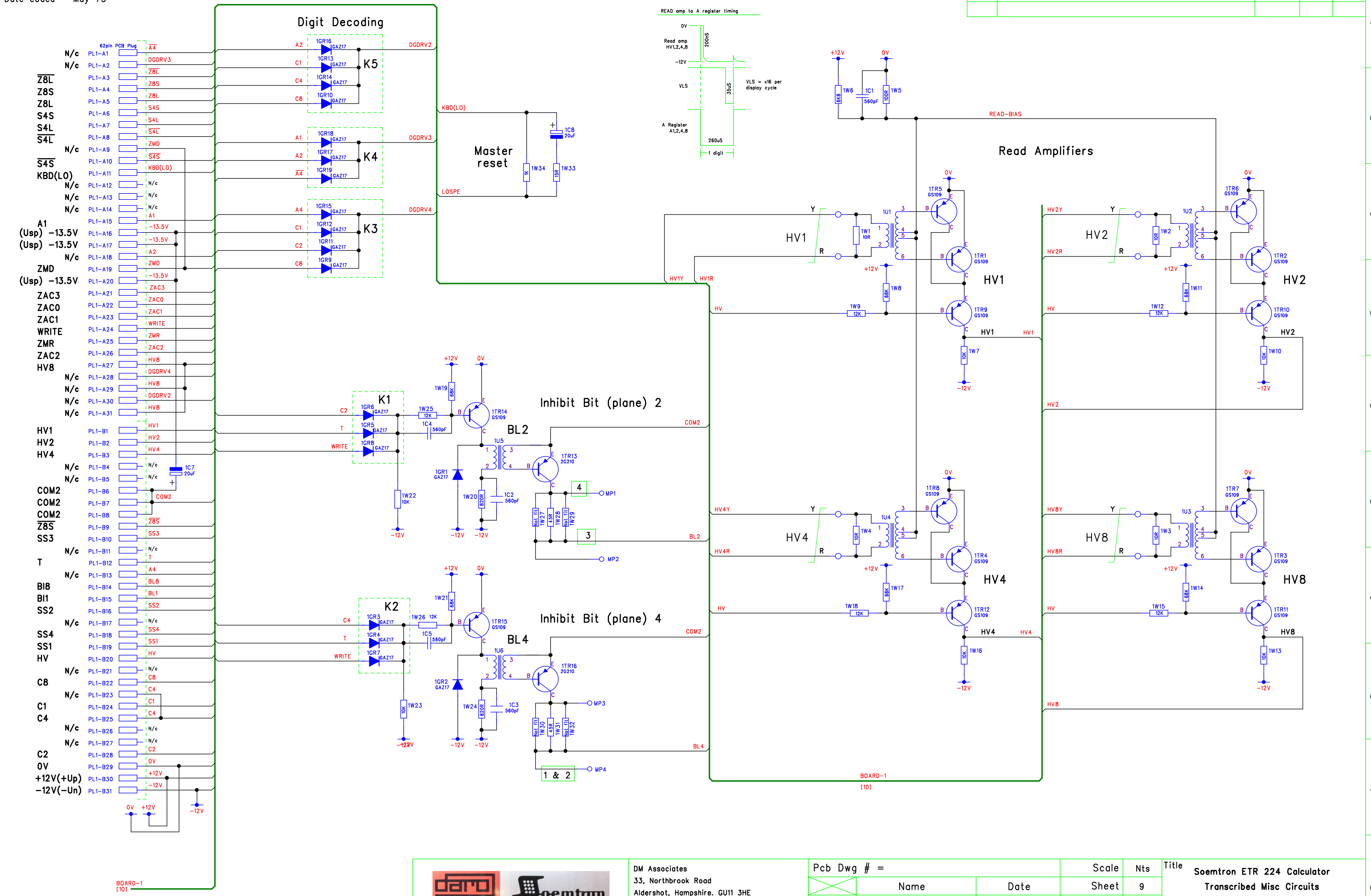
Name	Date
MD Hatch	23/5/2011
Checked	-

Scale	Nts
Sheet 8	9
Next Sheet	Drawing Number
	Soemtron 224

Title	Soemtron ETR 224 Calculator Keyboard Function Encoding Circuit Diagram
Issue	A2
By	A

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

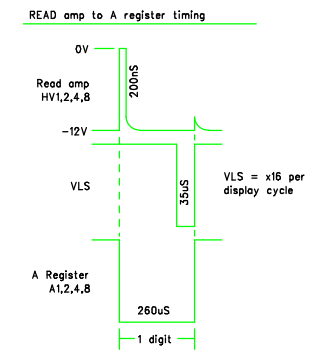
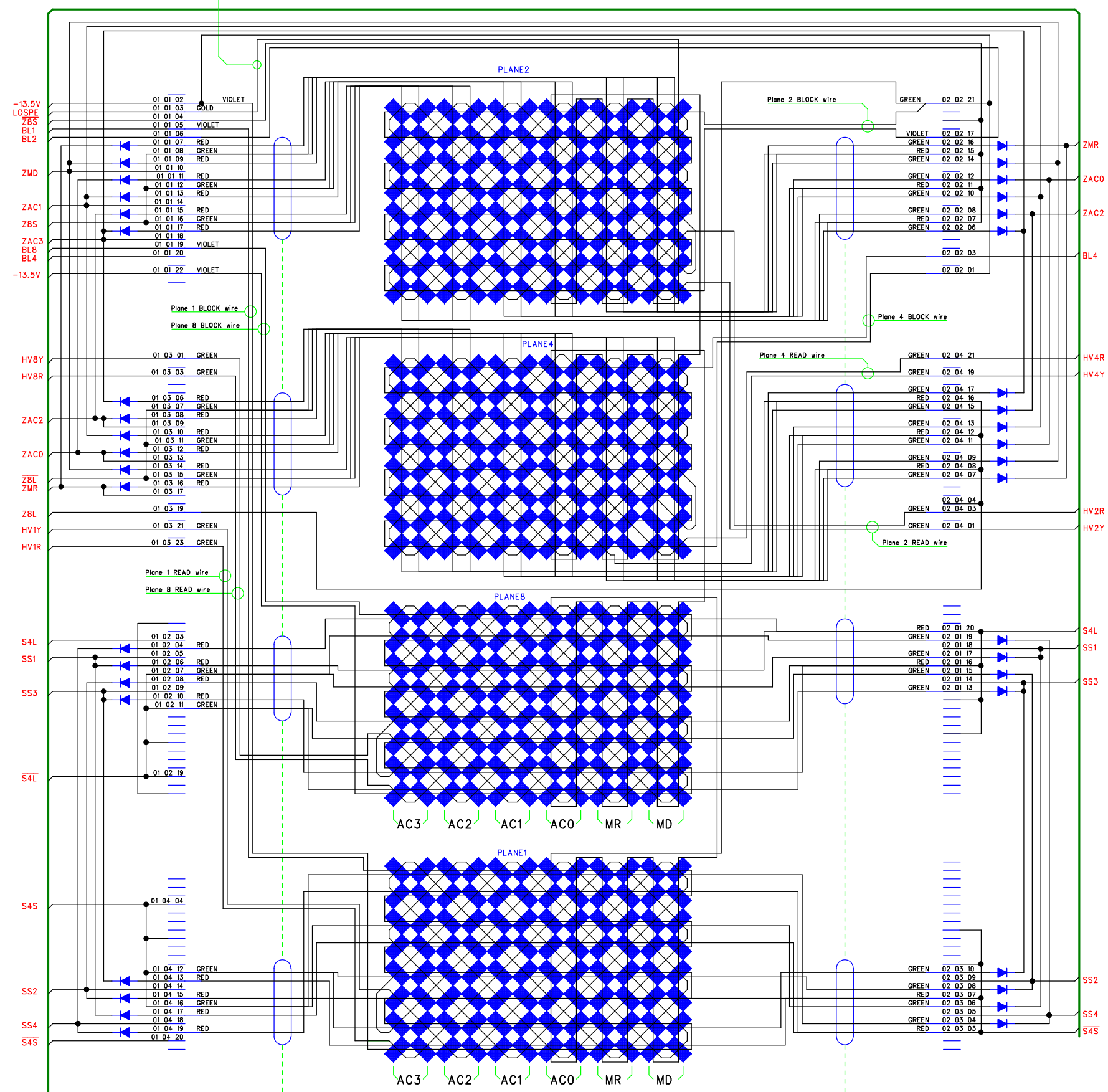


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Pcb Dwg # =		Scale	Nts	Title	
Drawn	Name	Sheet	9	Soemtron ETR 224 Calculator	
Checked	Date	Next Sheet	10	Transcribed Misc Circuits	
		Drawing Number		Board 1/1 - Digit Decode and Read Amps	
				Soemtron 224	
				A2 Issue A	

RevNo	Revision note	Date	By	Checked
-	-	-	-	-

Lö SPE only clears the MD, MR and ACO registers



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

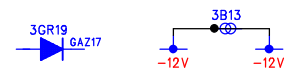
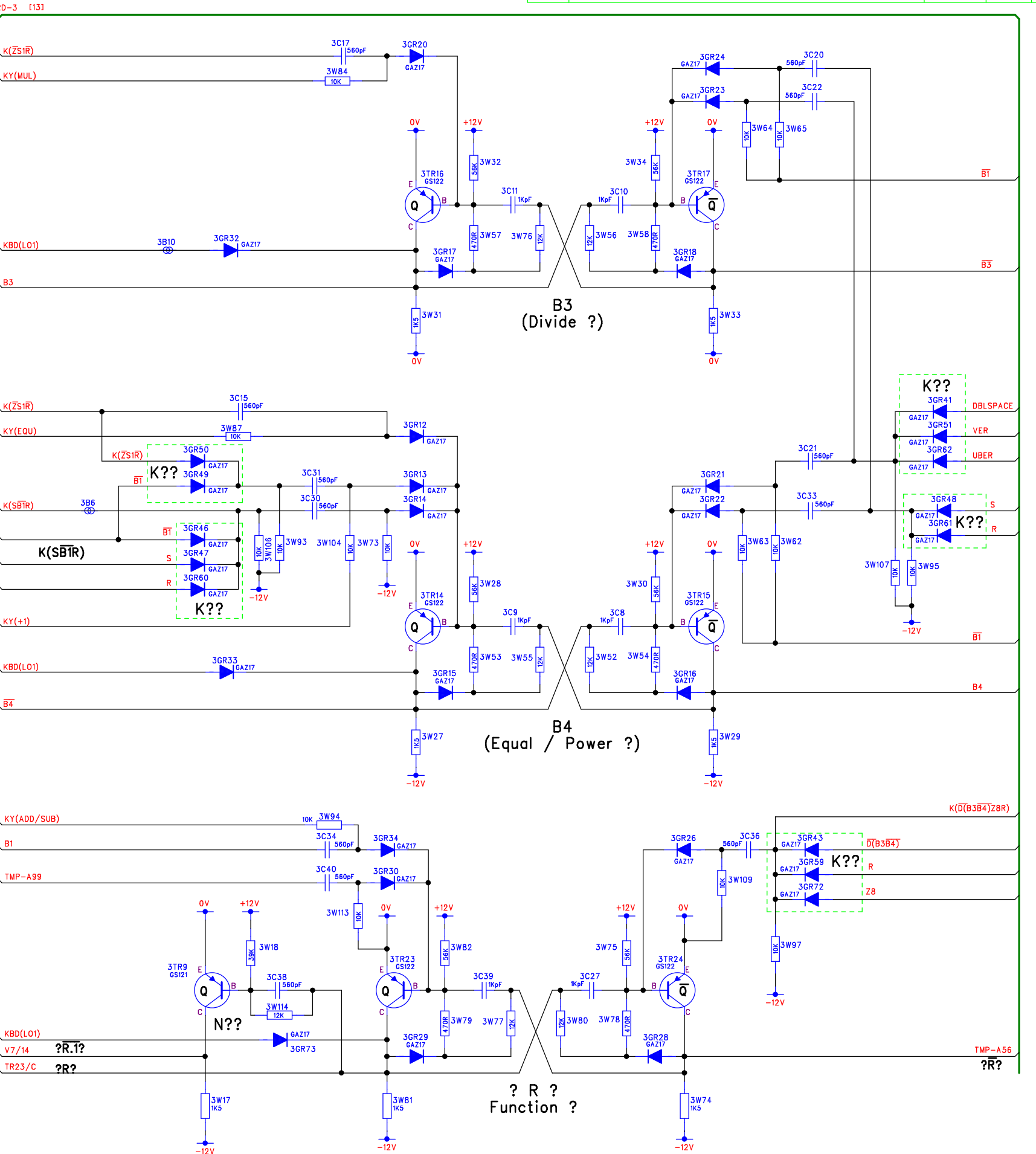
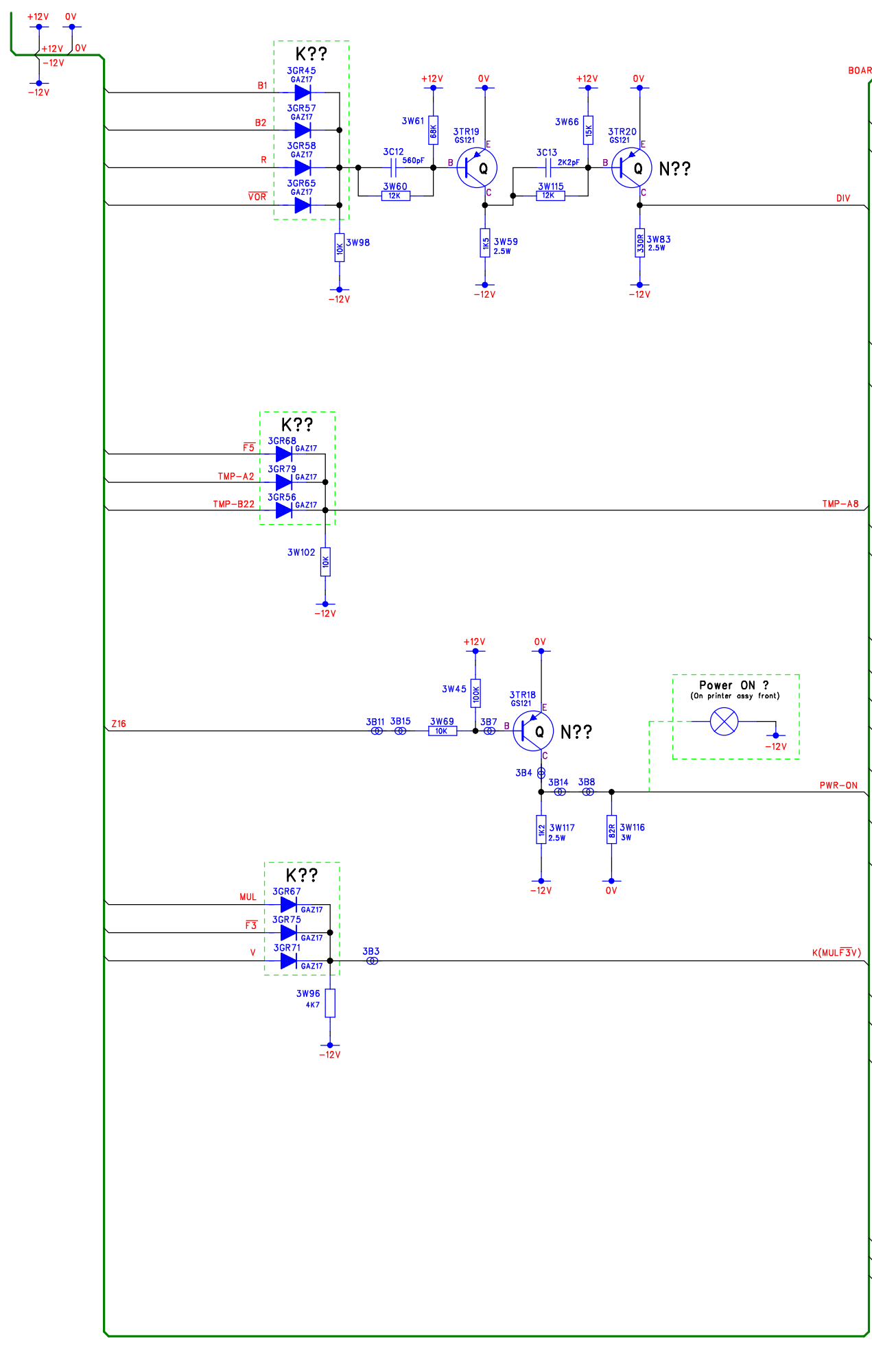
These diagrams are referenced to 0V - Logical 1 = -12V, logical 0 = 0V



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Pcb Dwg # =		Scale	Nts	Title	
Drawn	Name	Sheet	10	Soemtron ETR 224 Calculator	
Checked	Date	Next Sheet	11	Transcribed Misc Circuits	
		Drawing Number		Board 1/2 - Core Store Planes	
				Soemtron 224	A2 Issue A

RevNo	Revision note	Date	By	Checked
-	-	-	-	-



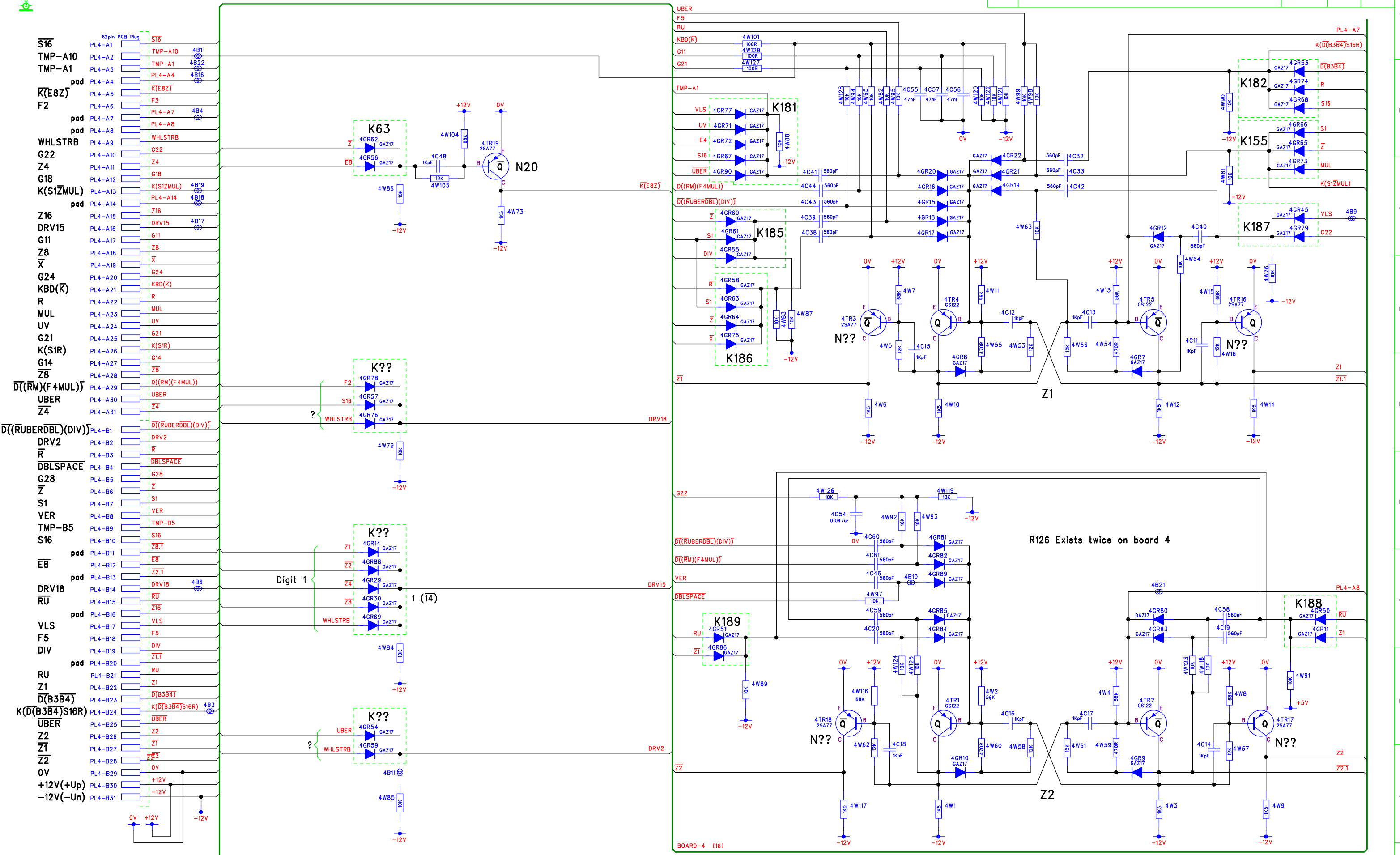
These diagrams are referenced to 0V - Logical 1 = -12V logical 0 = 0V



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Pcb Dwg # =		Scale	Nts	Title	
Drawn	Name	Date	Sheet	Soemtron ETR 224 Calculator	
Checked	MD Hatch	31/3/2014	Next Sheet	Transcribed Misc Circuits	
			Drawing Number	Board 3/2 - B3, B4, ?	
				Soemtron 224	A2 Issue A

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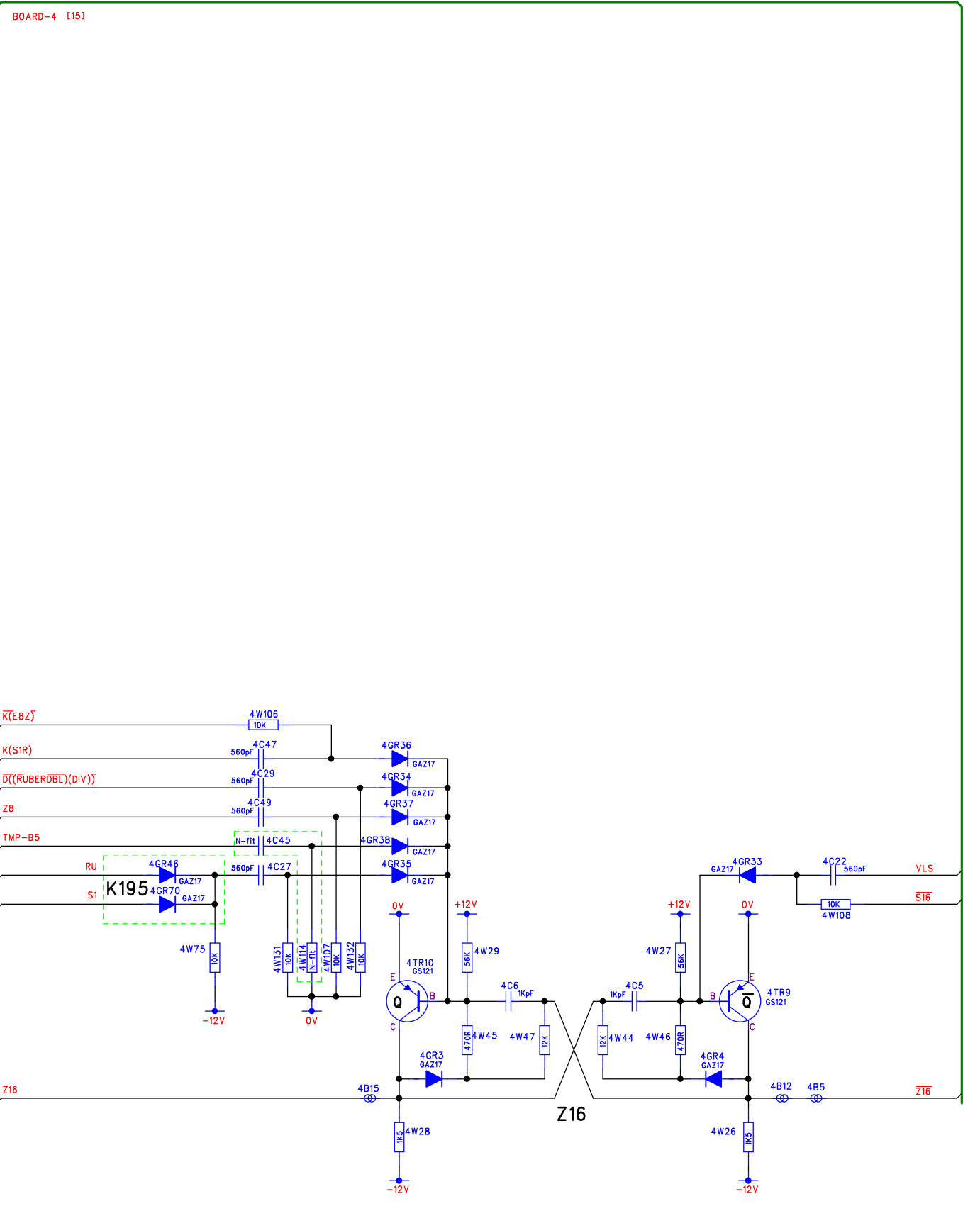
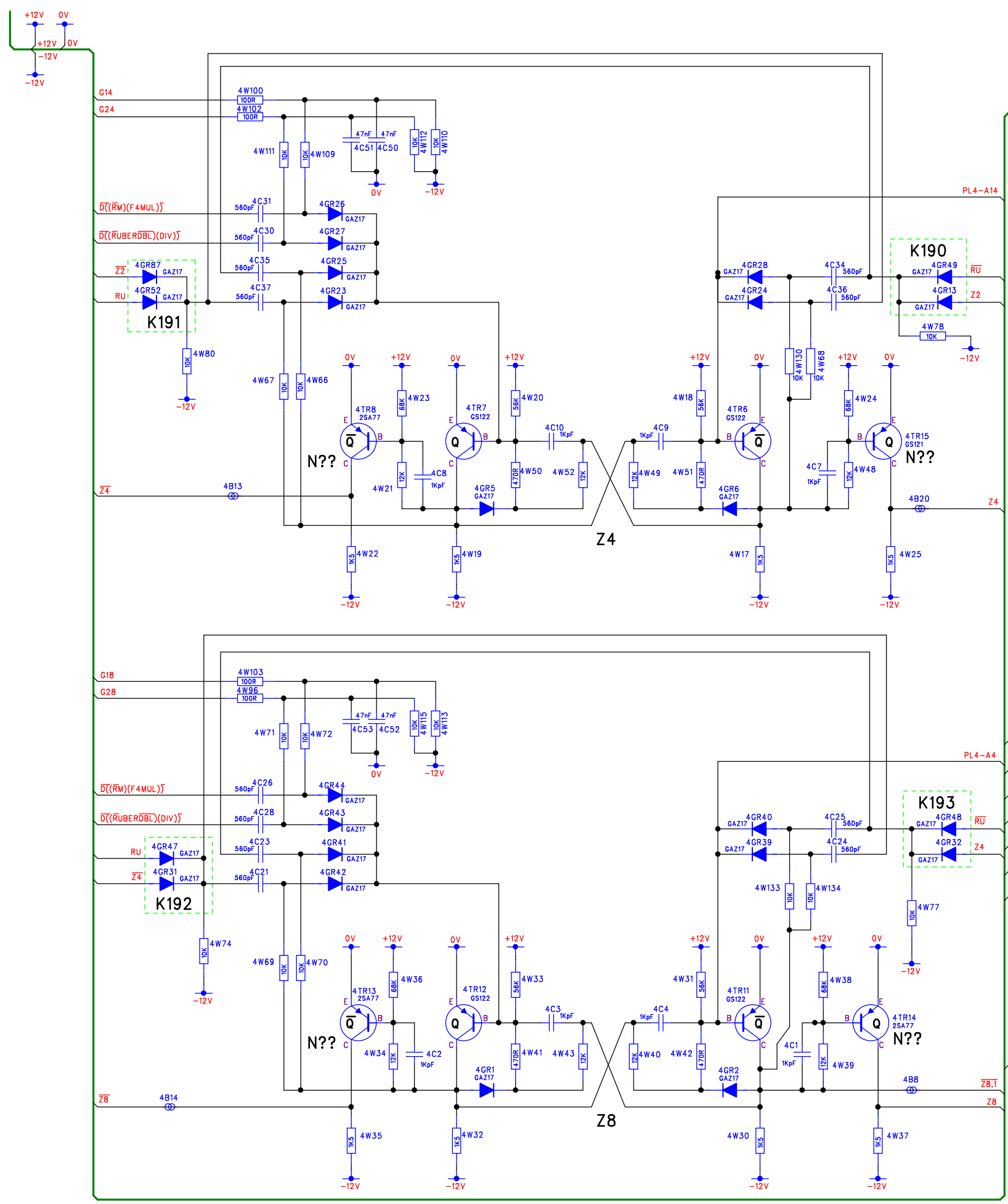
These diagrams are referenced to 0V - Logical 1 = -12V, logical 0 = 0V

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Pcb Dwg # =		Scale	Nts	Title
Drawn	Name	Sheet	15	Soemtron ETR 224 Calculator
Checked	Date	Next Sheet	16	Transcribed Misc Circuits
		Drawing Number		Board 4/1 - Z Counter, Drive 1,4,17
				Soemtron 224 A2 Issue A

RevNo	Revision note	Date	By	Checked
-	-	-	-	-



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Pcb Dwg # =

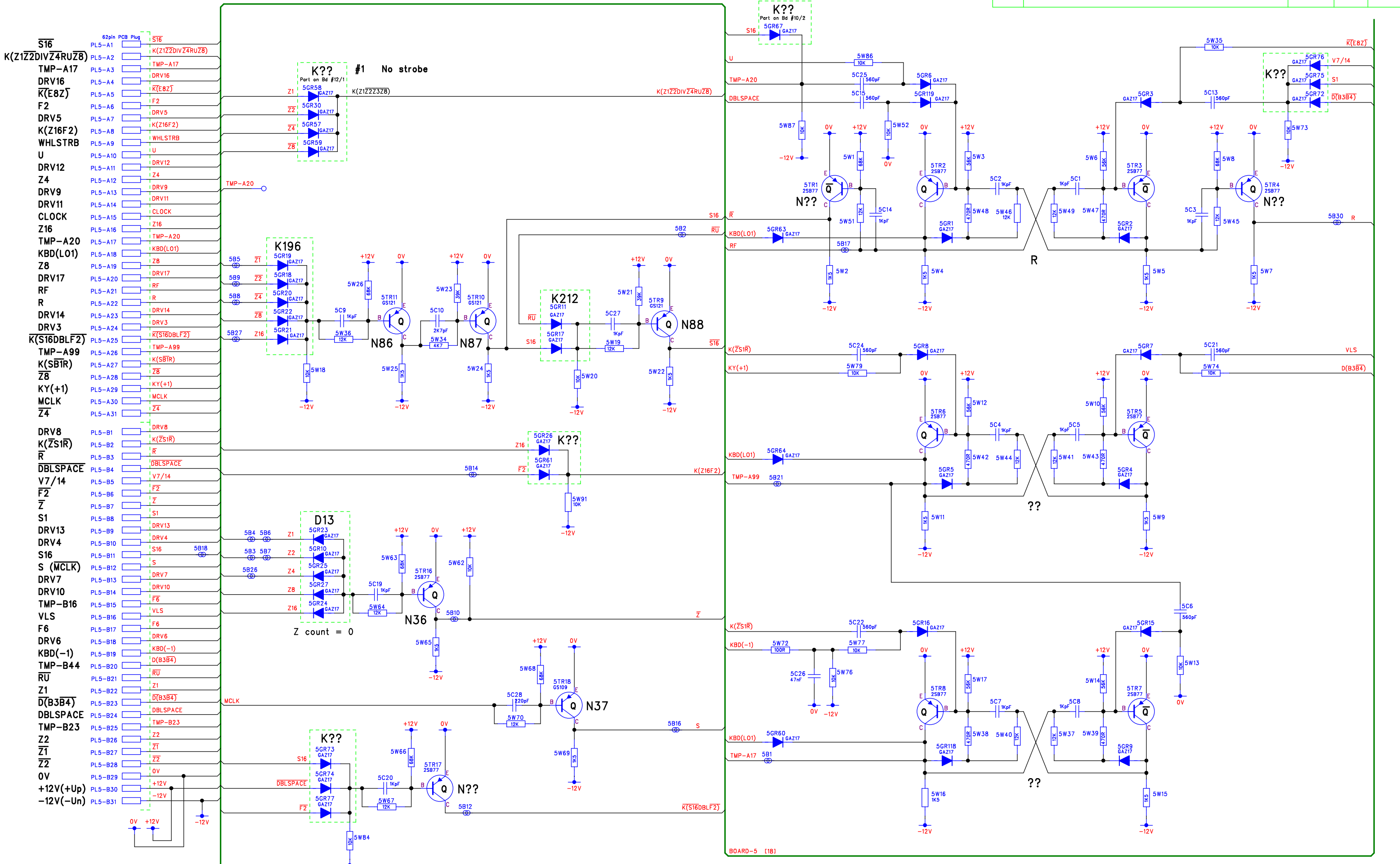
Name	Date
MD Hatch	11/4/2014
Checked	-

Scale	Nts
Sheet	16
Next Sheet	17
Drawing Number	Soemtron 224

Title	Soemtron ETR 224 Calculator
	Transcribed Misc Circuits
	Board 4/2 - Z Counter, Drive 1,4,17
A2 Issue	A

Comp side -
 Solder side - 224-307-003d 3966
 Date coded -

RevNo	Revision note	Date	By	Checked
-	-	-	-	-



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

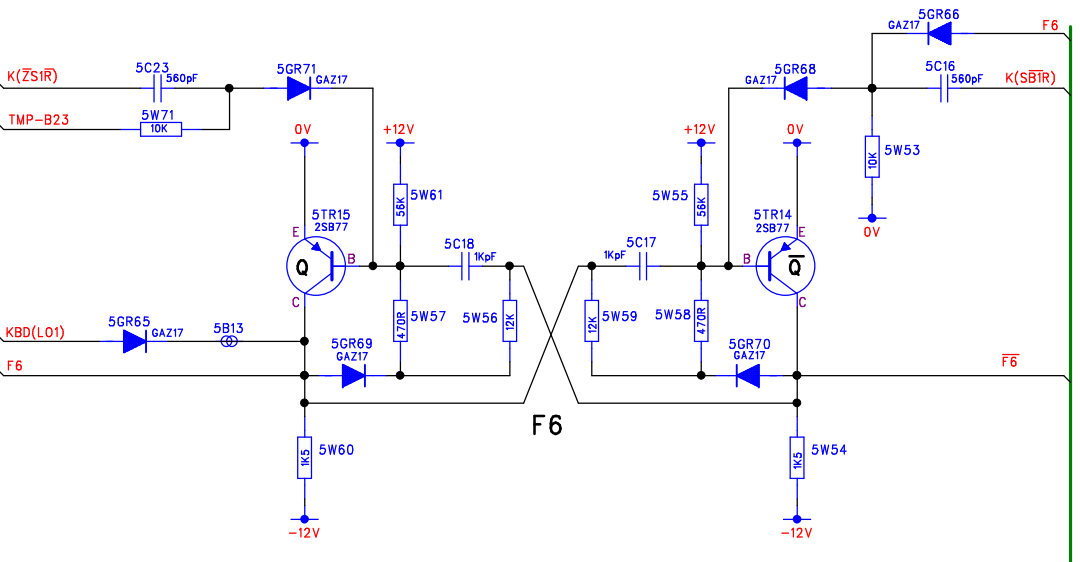
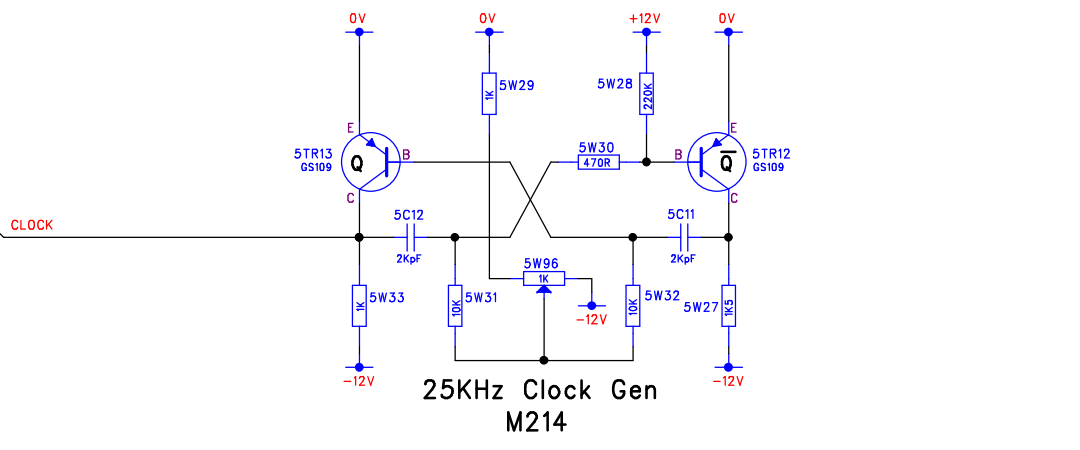
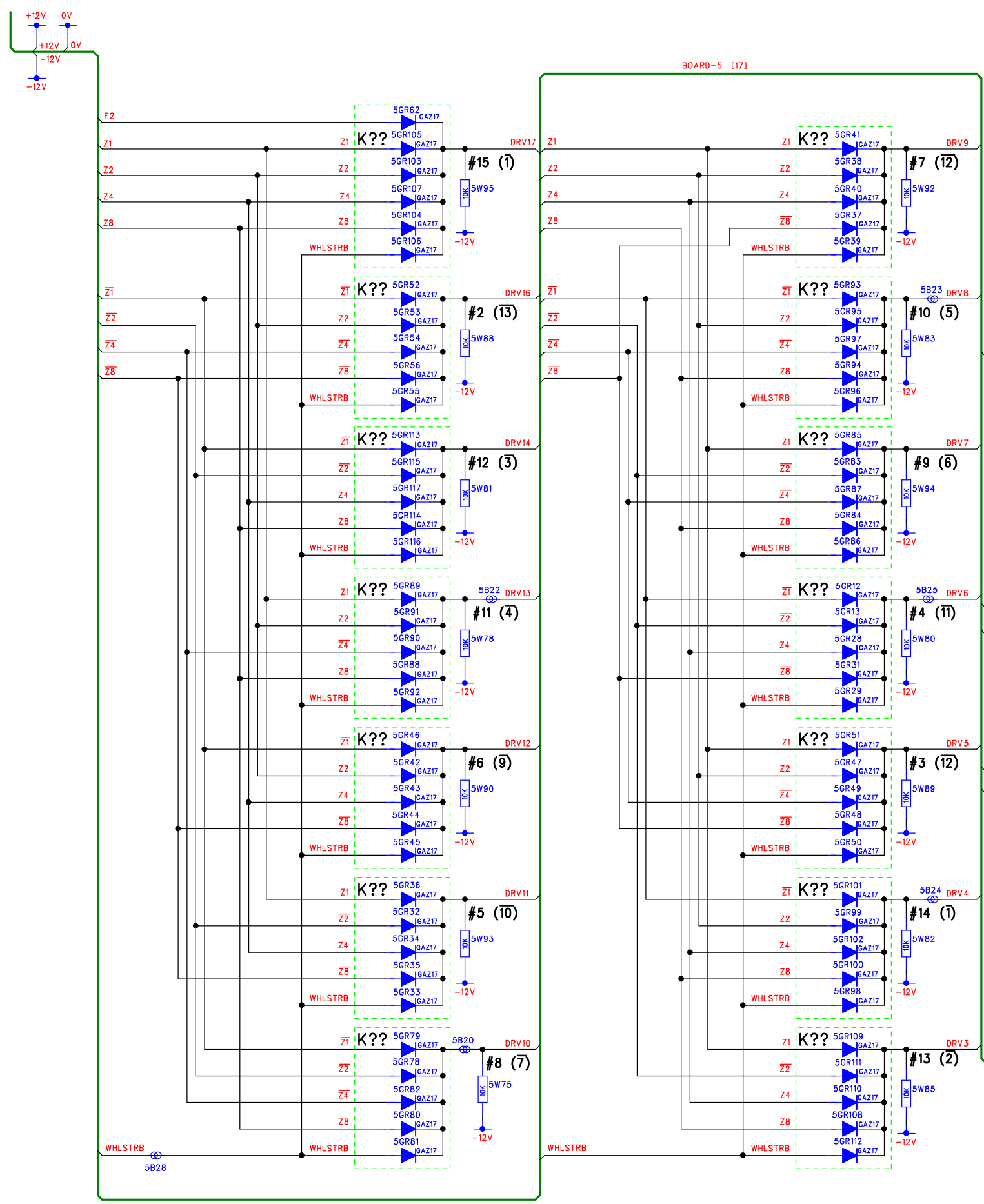


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Pcb Dwg # =		Scale	Nts	Title	
Drawn	Name	Date	Sheet	Soemtron ETR 224 Calculator	
Checked	MD Hatch	25/4/2014	17	Transcribed Misc Circuits	
			Next Sheet	Board 5/1 - Clock, DRV2-16	
			18	Drawing Number	Soemtron 224
				A2 Issue	A

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RevNo	Revision note	Date	By	Checked
-	-	-	-	-



Drive 2 is on board 4/1
 Drive 15 is on board 4/1
 Drive 18 is on board 4/1
 Drive 1 is on board 6/2

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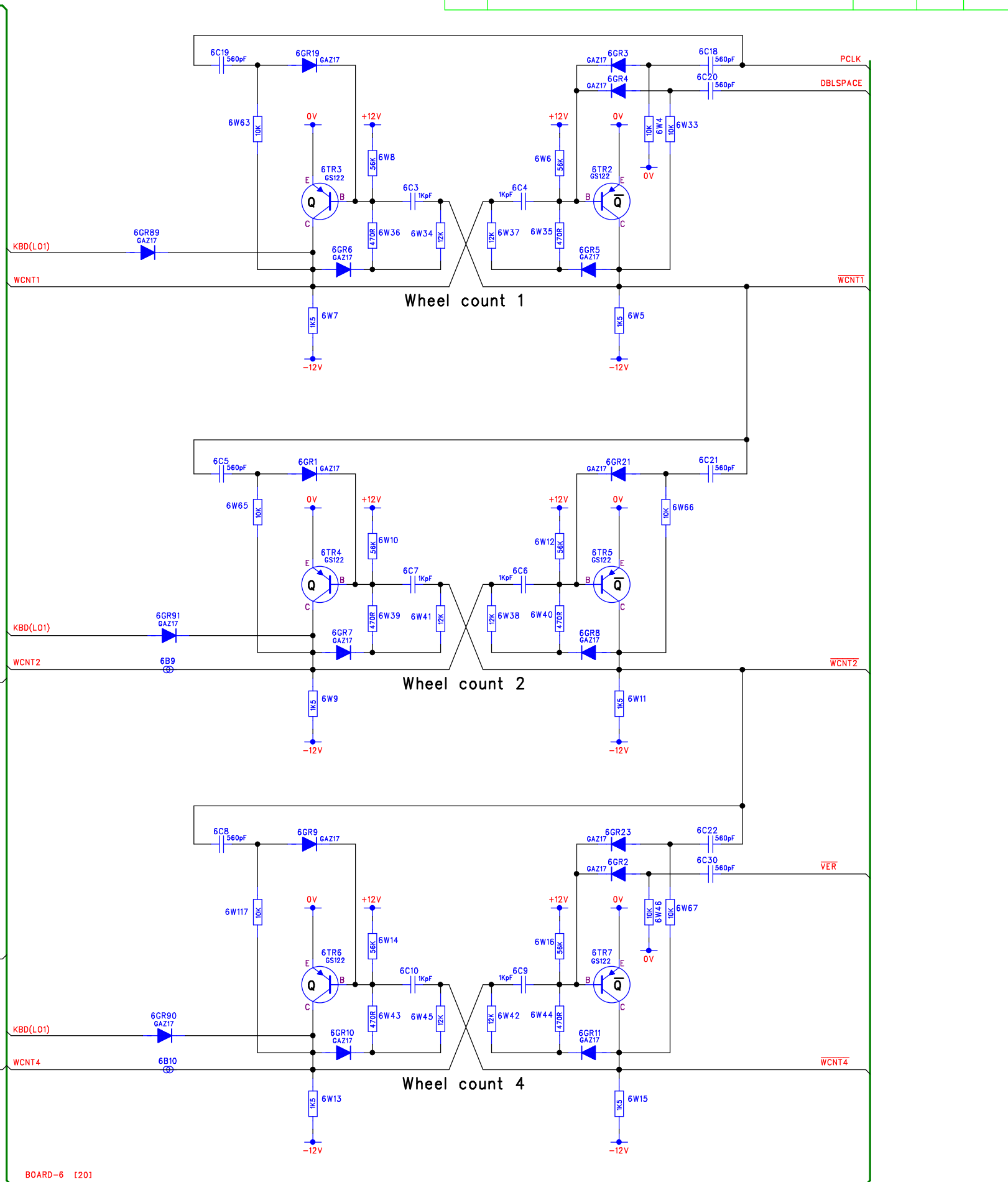
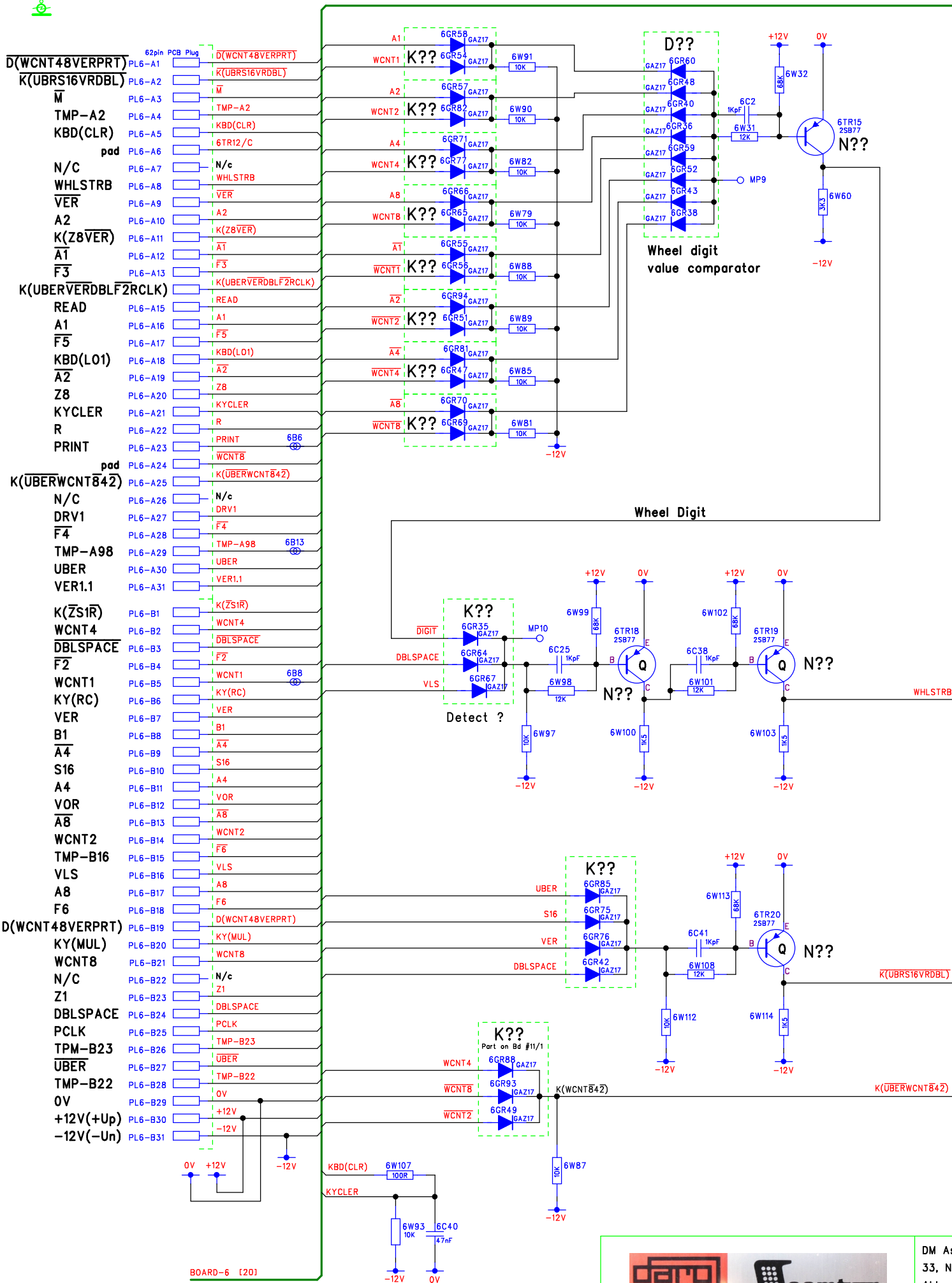
Pcb Dwg # =

Name	Date	Scale	Nts
Drawn MD Hatch	25/4/2014	Sheet 18	
Checked -	-	Next Sheet 19	
		Drawing Number	Soemtron 224

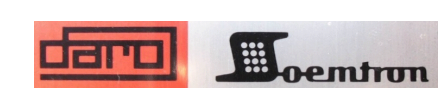
Title
 Soemtron ETR 224 Calculator
 Transcribed Misc Circuits
 Board 5/2 - Clock, DRV2-16
 A2 Issue A

Comp side -
 Solder side - 224-307-003d 3966
 Date coded -

RevNo	Revision note	Date	By	Checked
-	-	-	-	-



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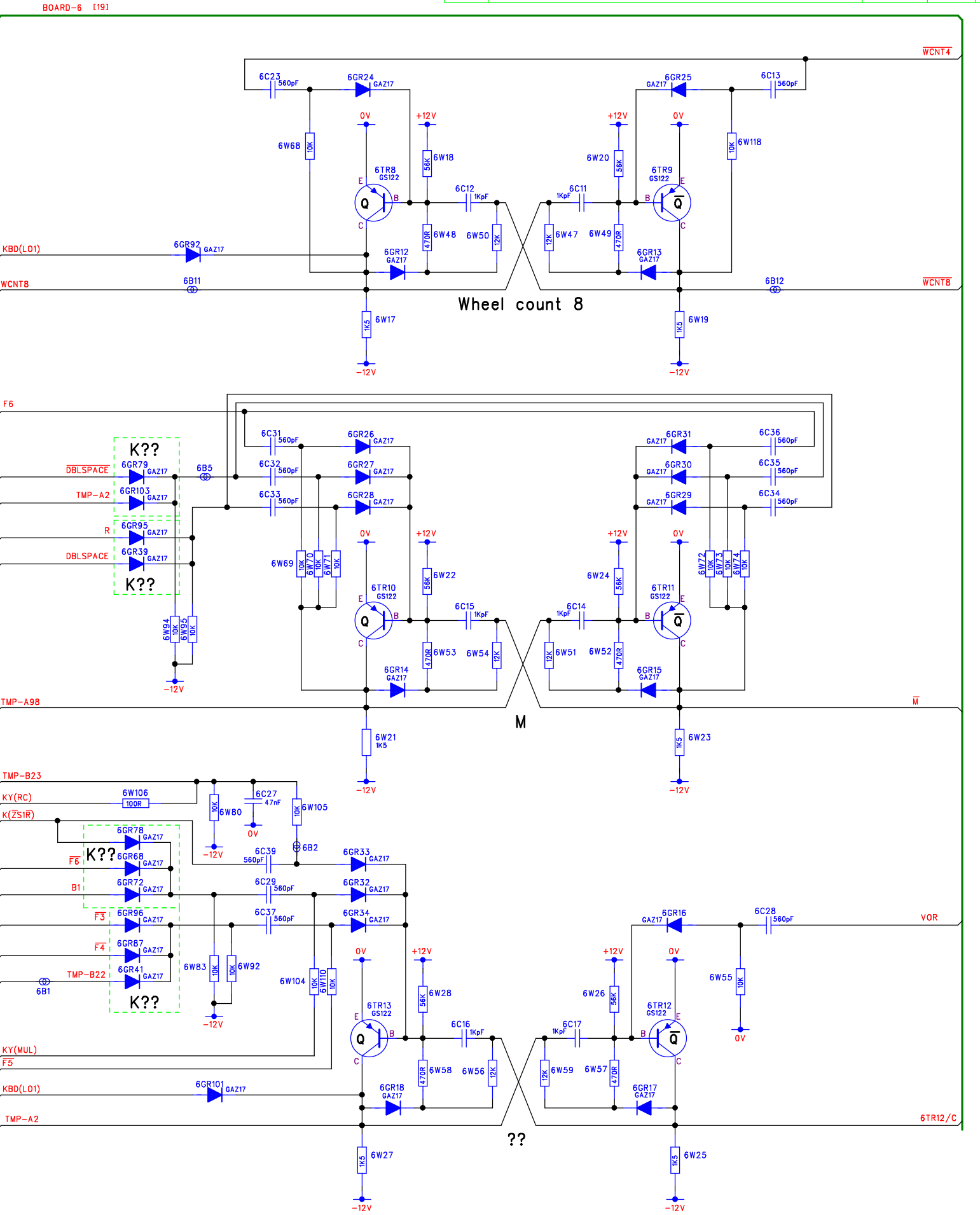
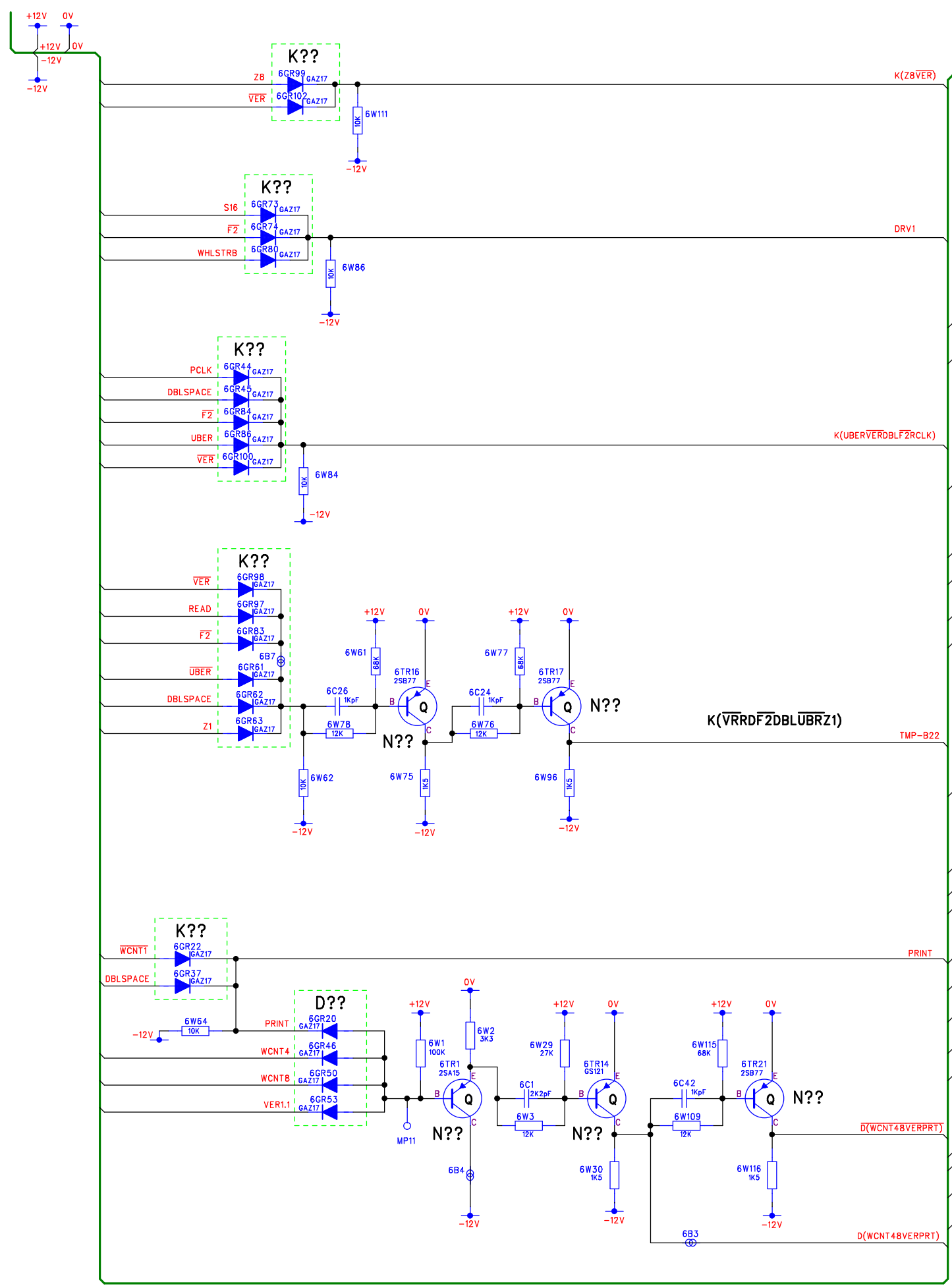
Pcb Dwg # =

Name	Date
MD Hatch	7/5/2014
Checked	-

Scale	Nts
Sheet	19
Next Sheet	20
Drawing Number	Soemtron 224

Title	Soemtron ETR 224 Calculator
	Transcribed Misc Circuits
	Board 6/1 - Wheel Position Count
Issue	A2

RevNo	Revision note	Date	By	Checked
-	-	-	-	-



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

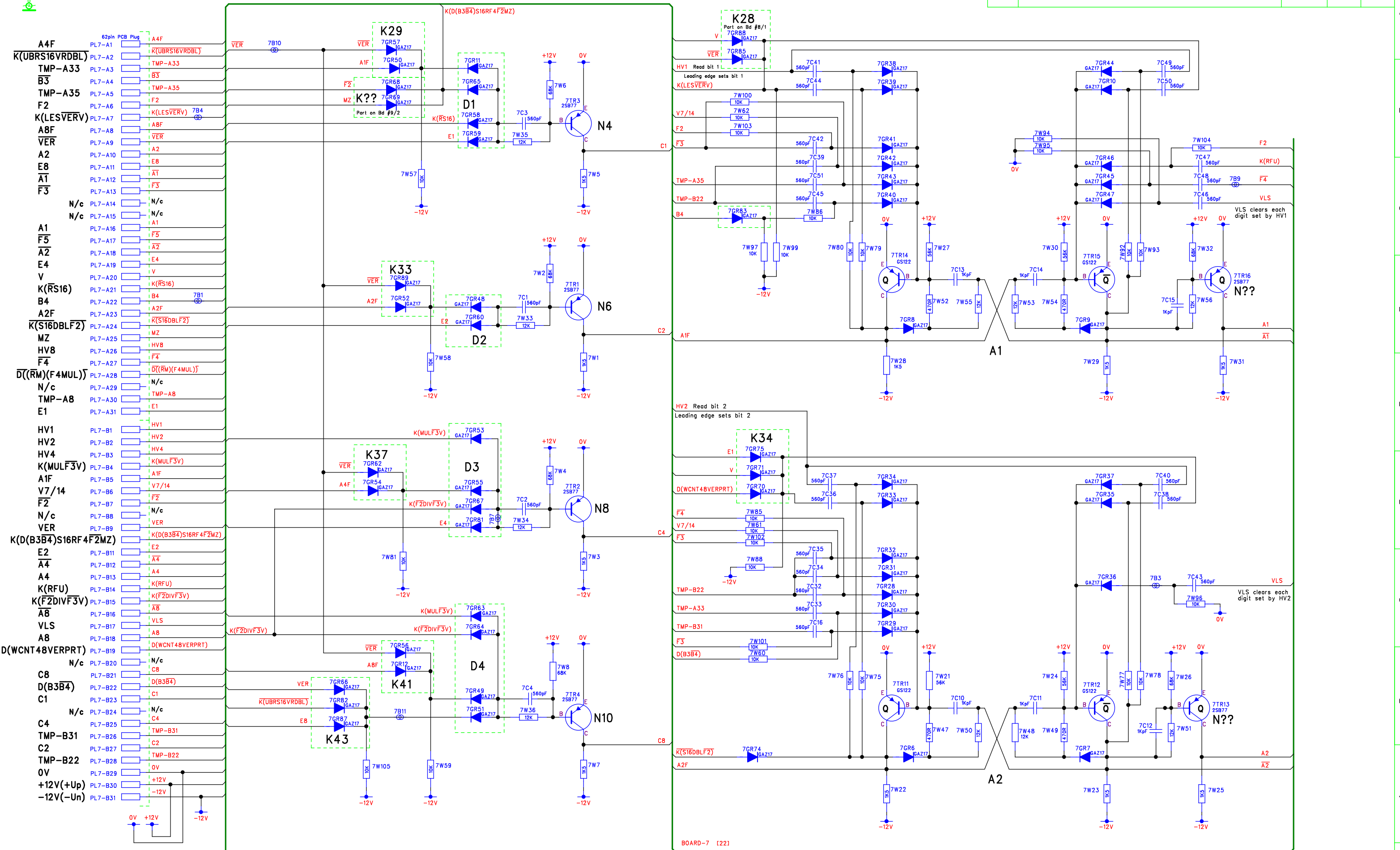


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Pcb Dwg # =		Scale	Nts	Title	
Drawn	Name	Date	Sheet	Soemtron ETR 224 Calculator	
Checked	MD Hatch	7/5/2014	Next Sheet	Transcribed Misc Circuits	
			Drawing Number	Board 6/2 - Wheel Position Count	
				Soemtron 224	A2 Issue A

Comp side -
 Solder side - 224-307-007c 3959
 Date coded -

RevNo	Revision note	Date	By	Checked
-	-	-	-	-



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

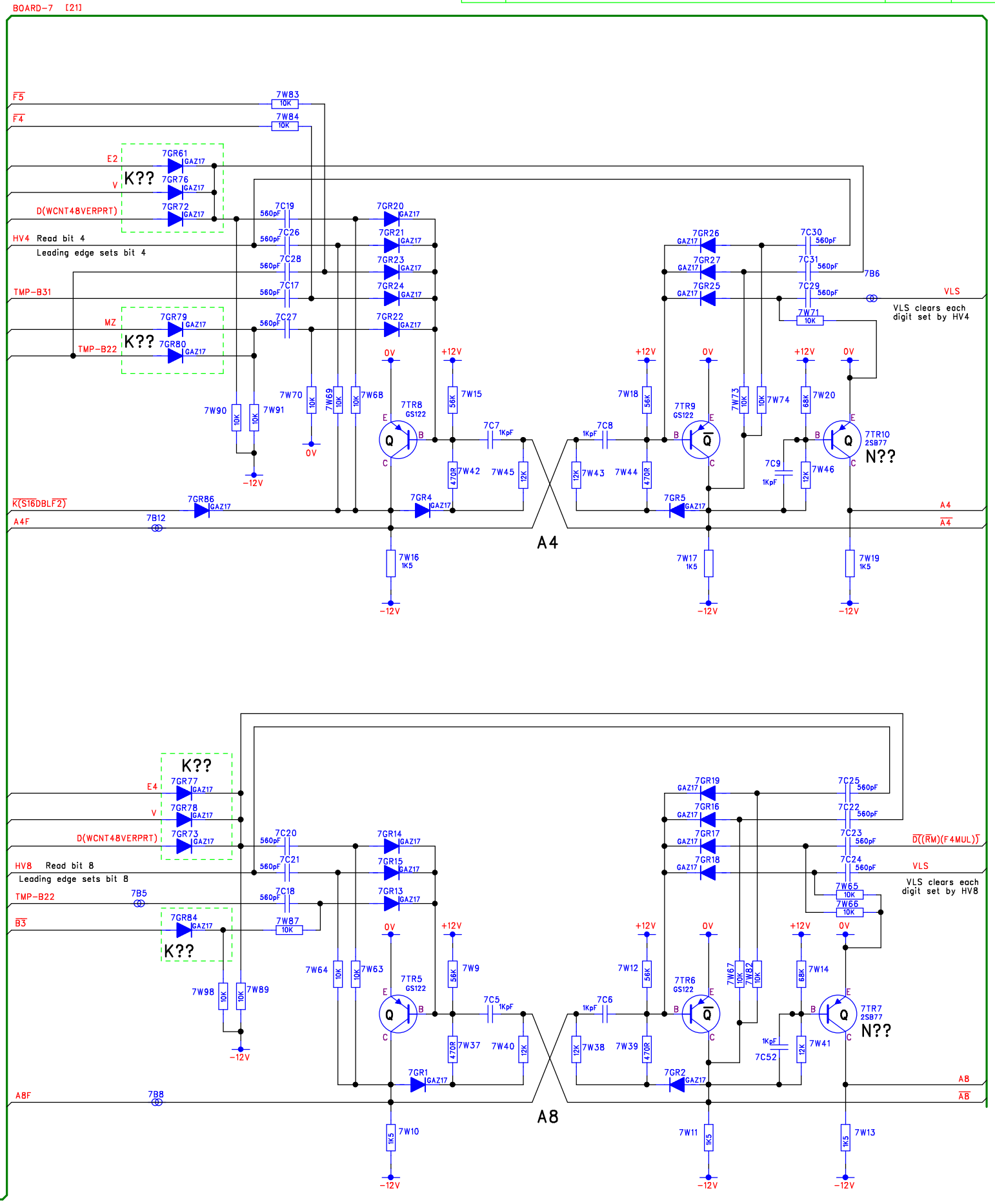
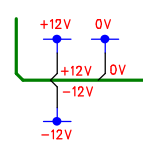


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Pcb Dwg # =		Scale	Nts	Title	
Drawn	Name MD Hatch	Sheet	21	Soemtron ETR 224 Calculator	
Checked	Date 9/5/2014	Next Sheet	22	Transcribed Misc Circuits	
Drawing Number				Soemtron 224	
				Issue	A

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RevNo	Revision note	Date	By	Checked
-	-	-	-	-



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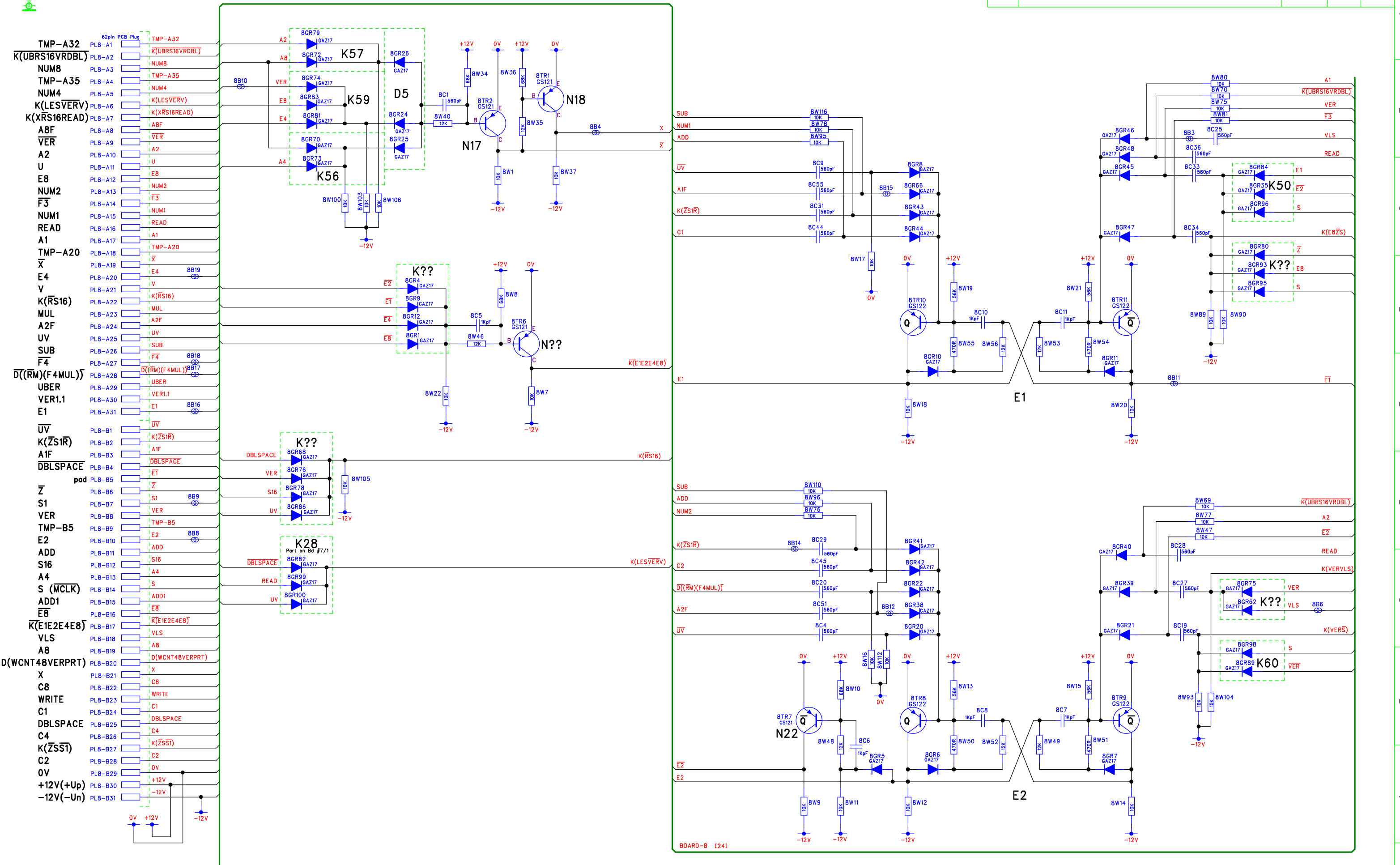
Name	Date
Drawn MD Hatch	9/5/2014
Checked -	-

Scale	Nts
Sheet 22	
Next Sheet 23	
Drawing Number	

Title	Issue
Soemtron ETR 224 Calculator Transcribed Misc Circuits Board 7/2 - A Register - A4, A8	A

Comp side -
 Solder side - 224-307-008c 3952
 Date coded -

RevNo	Revision note	Date	By	Checked
-	-	-	-	-



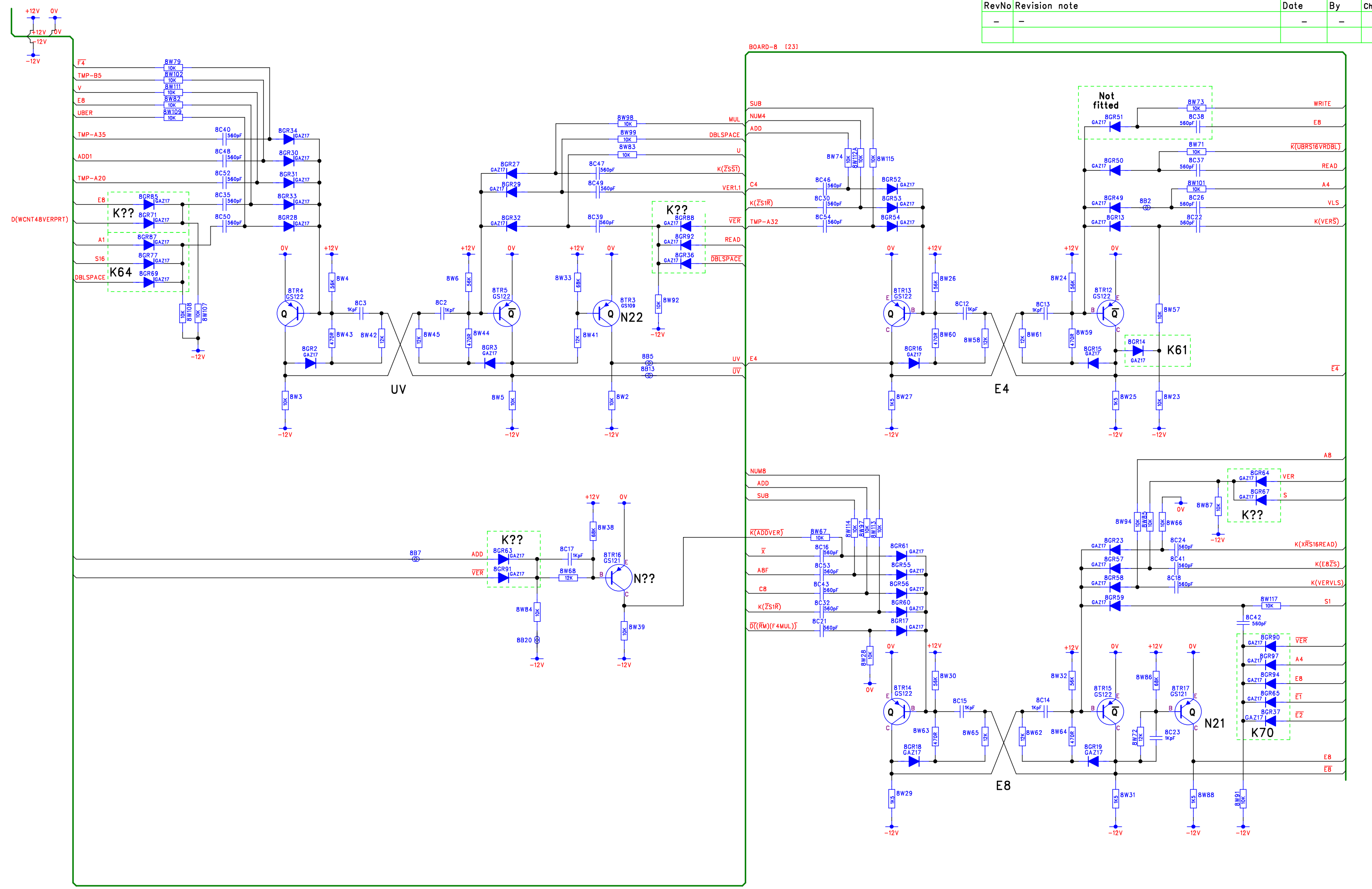
These diagrams are referenced to 0V - Logical 1 = -12V, logical 0 = 0V



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Pcb Dwg # =		Scale	Nts	Title	
Drawn	Name	Date	Sheet	Soemtron ETR 224 Calculator	
Checked	MD Hatch	15/5/2014	Next Sheet	Transcribed Misc Circuits	
			Drawing Number	Board 8/1 - E Register	
				Soemtron 224	A2 Issue A

RevNo	Revision note	Date	By	Checked
-	-	-	-	-



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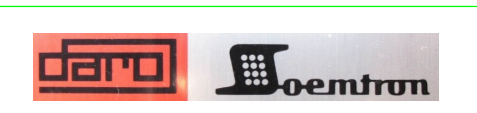
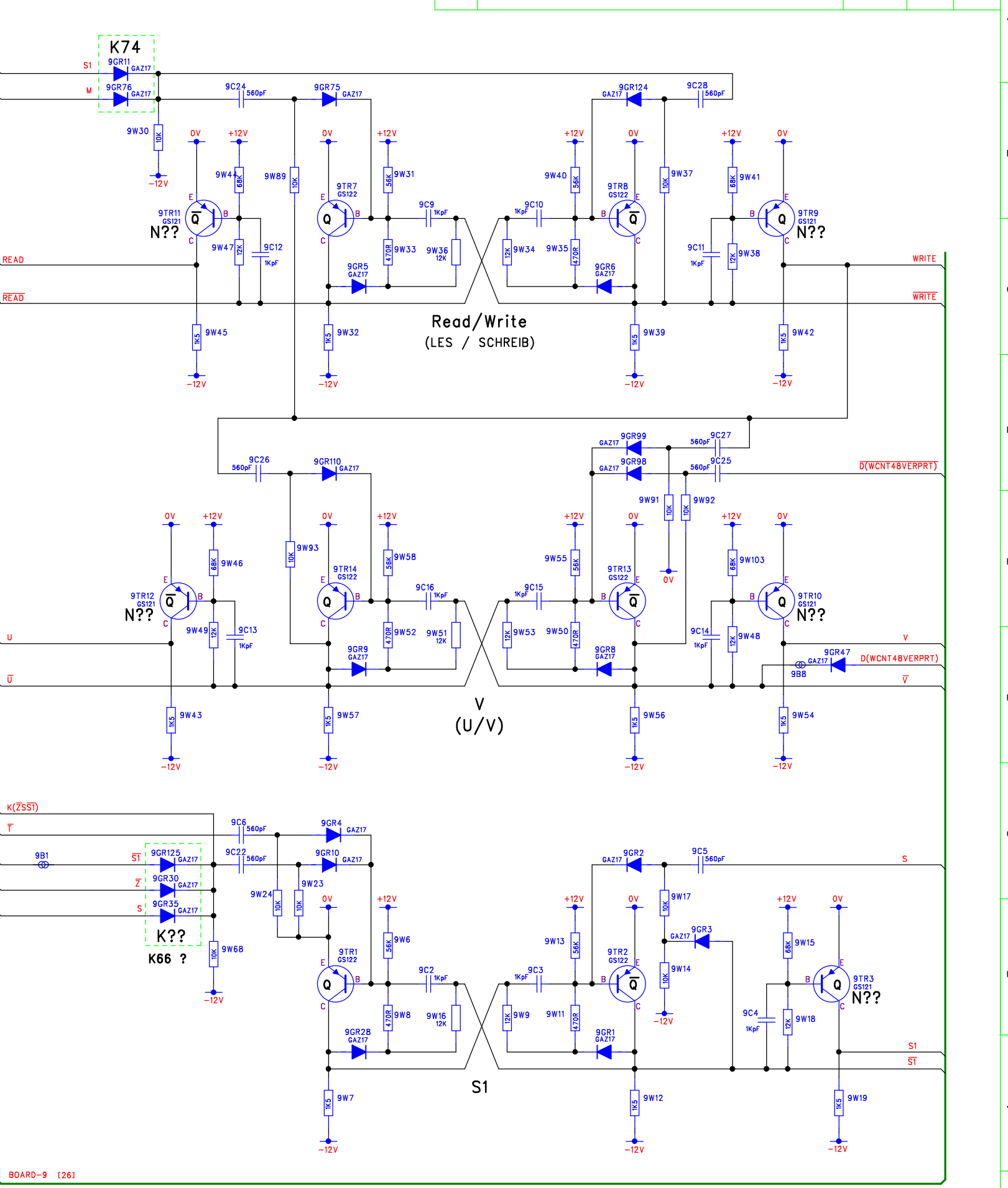
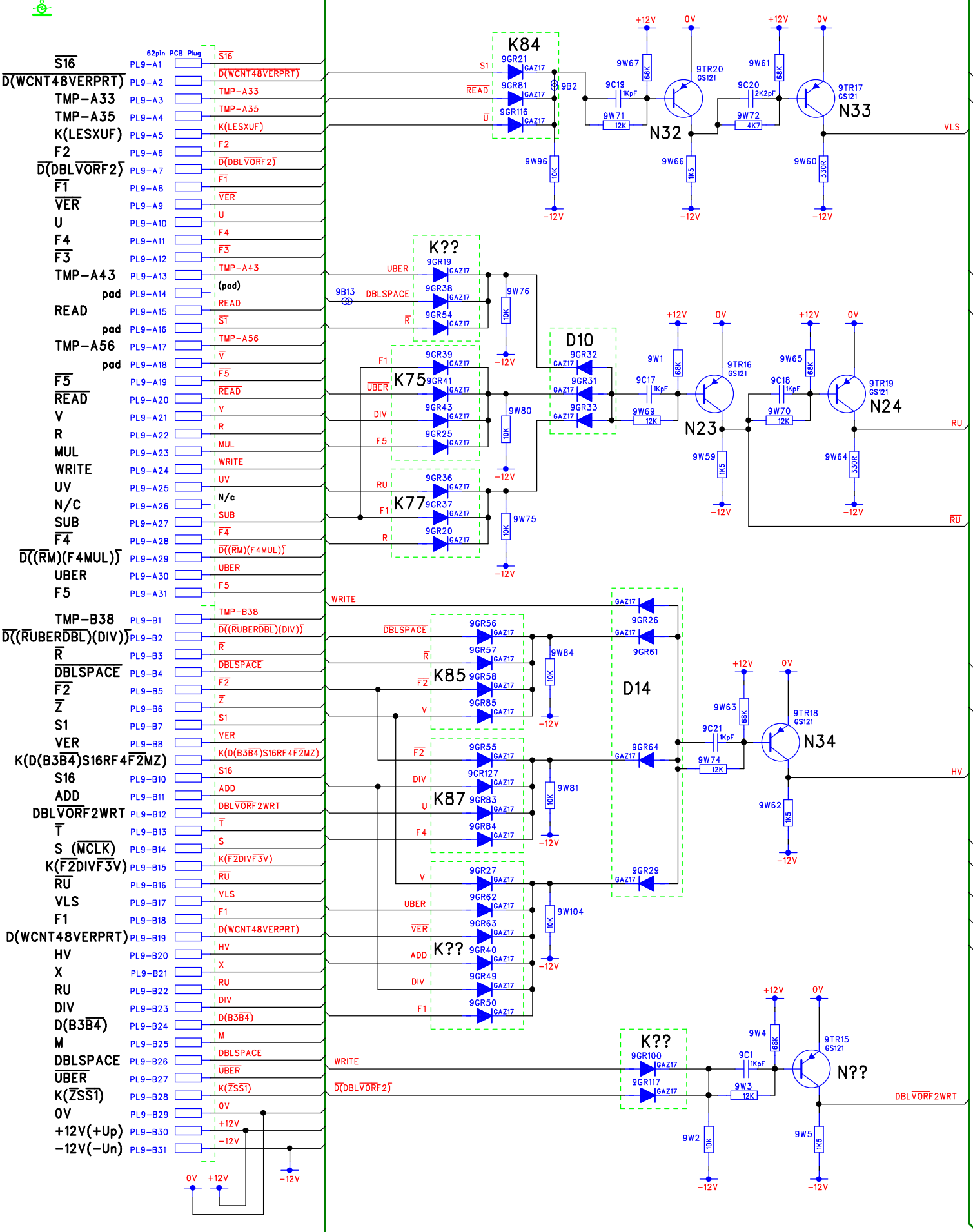
Name	Date
MD Hatch	15/5/2014
Checked	-

Scale	Nts
Sheet	24
Next Sheet	25
Drawing Number	Soemtron 224

Title
Soemtron ETR 224 Calculator
 Transcribed Misc Circuits
 Board 8/2 - E Register
 A2 Issue A

Comp side -
 Solder side - 224-307-009d 3958
 Date coded -

RevNo	Revision note	Date	By	Checked
-	-	-	-	-



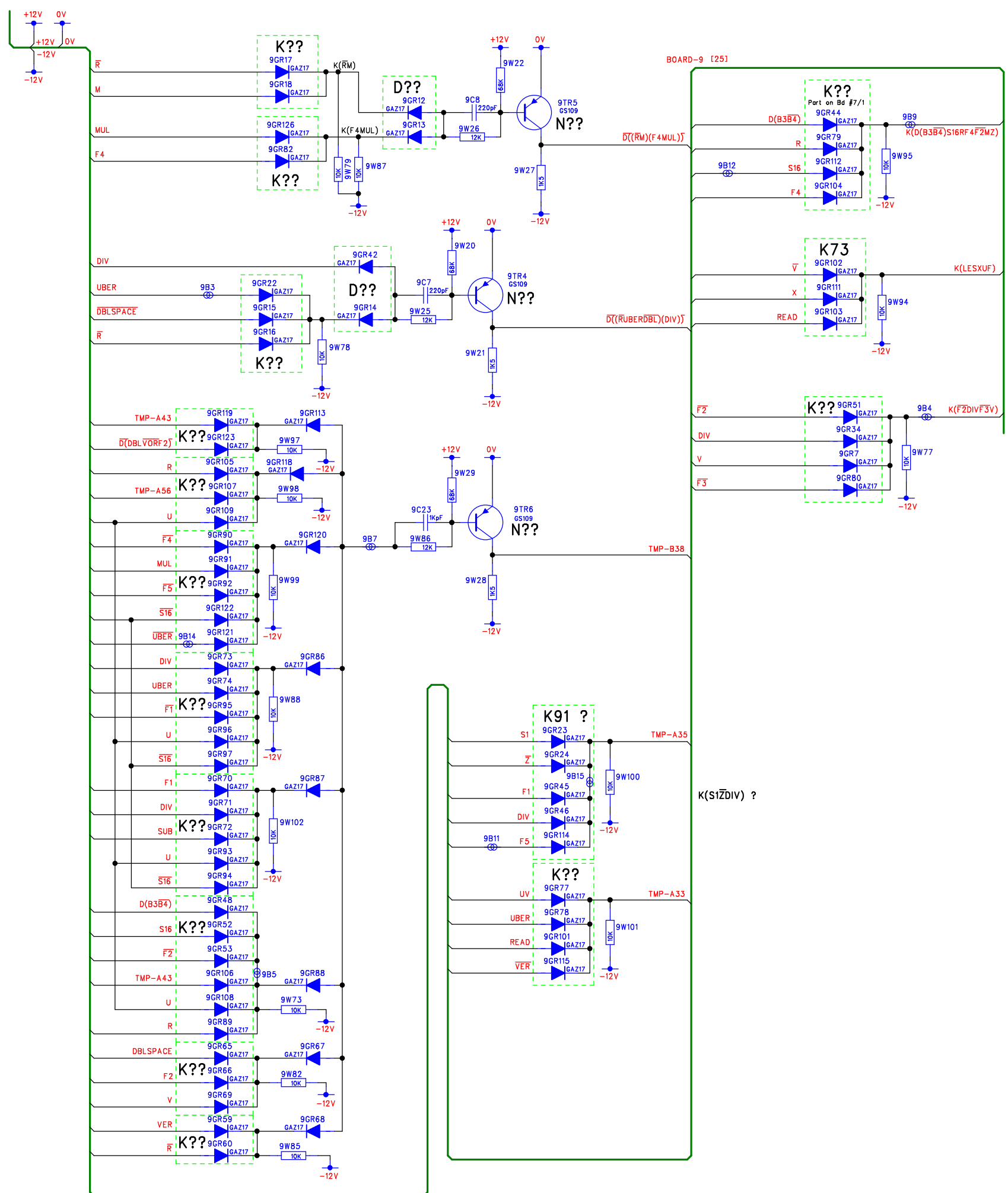
DM Associates
 33, Northbrook Road
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 Email: mike@soemtron.org
 www.soemtron.org

Pcb Dwg # =		Scale	Nts	Title
Drawn	Name	Sheet	25	Soemtron ETR 224 Calculator
Checked	Date	Next Sheet	26	Transcribed Misc Circuits
		Drawing Number		Board 9/1 - Read/Write, S1, V
				Soemtron 224

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

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RevNo	Revision note	Date	By	Checked
-	-	-	-	-



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

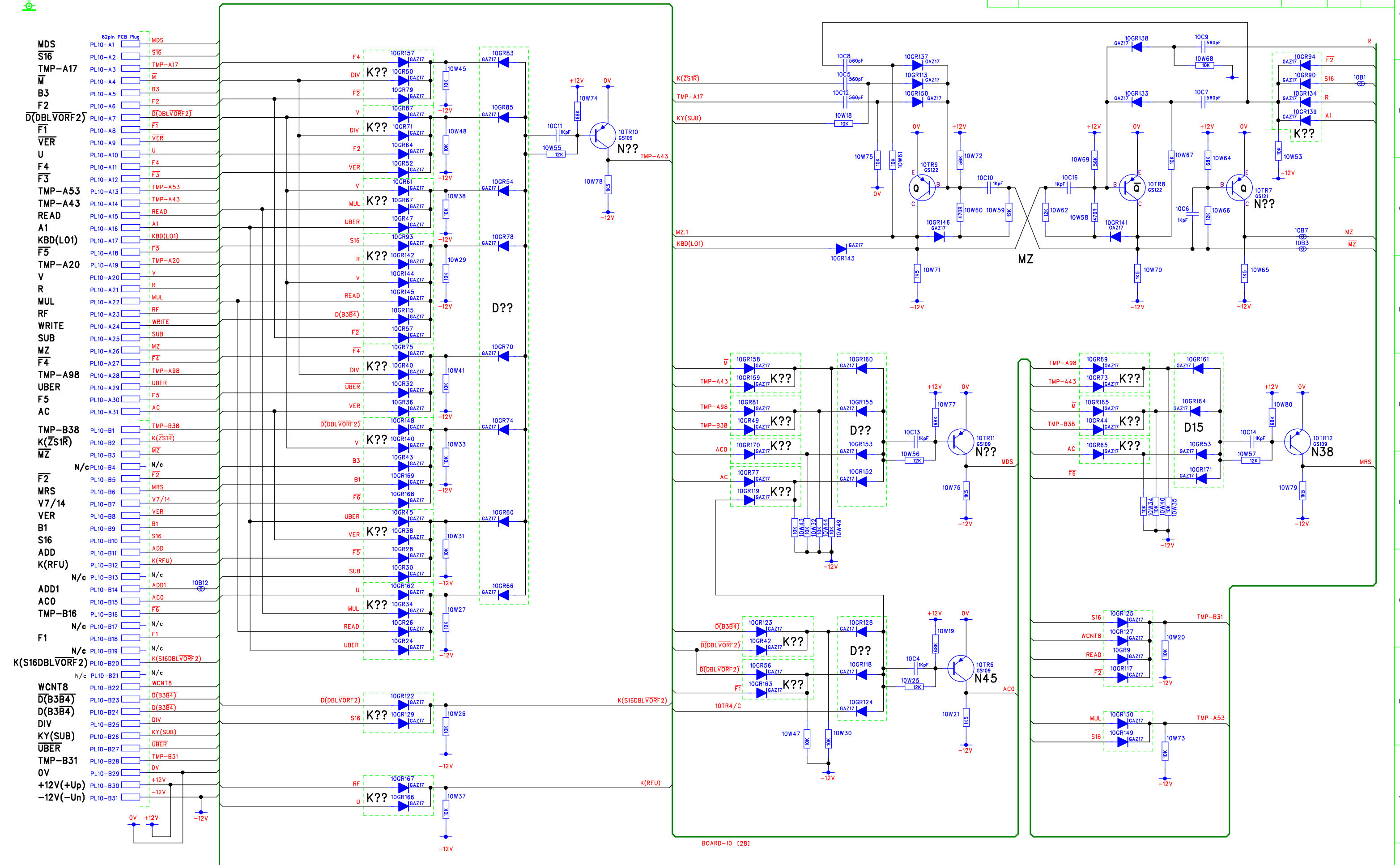


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Pcb Dwg # =		Scale	Nts	Title Soemtron ETR 224 Calculator Transcribed Misc Circuits Board 9/2 - ??
Drawn	Name	Sheet	26	
Checked	Date	Next Sheet	27	
		Drawing Number	Soemtron 224	
			A2 Issue	A

Comp side -
 Solder side - 224-307-010a 3970
 Date coded -

RevNo	Revision note	Date	By	Checked
-	-	-	-	-



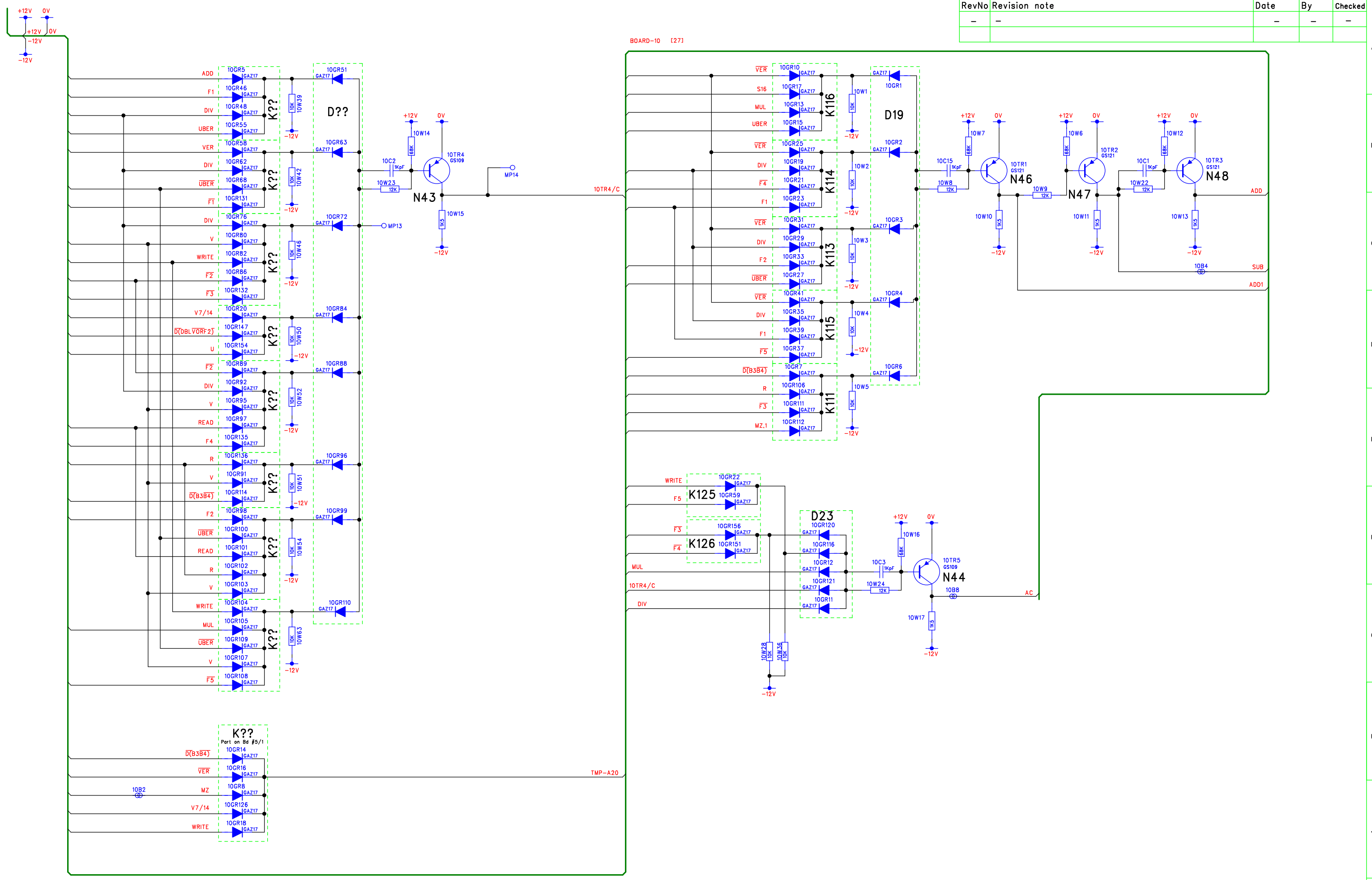
These diagrams are referenced to 0V - Logical 1 = -12V, logical 0 = 0V



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Pcb Dwg # =		Scale	Nts	Title	
Drawn	Name	Date	Sheet	Soemtron ETR 224 Calculator	
Checked	MD Hatch	16/6/2014	Next Sheet	Transcribed Misc Circuits	
			Drawing Number	Board 10/1 - MZ + Gating	
				Soemtron 224	A2 Issue A

RevNo	Revision note	Date	By	Checked
-	-	-	-	-



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



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Pcb Dwg # =	
Name	Date
Drawn MD Hatch	16/6/2014
Checked -	-

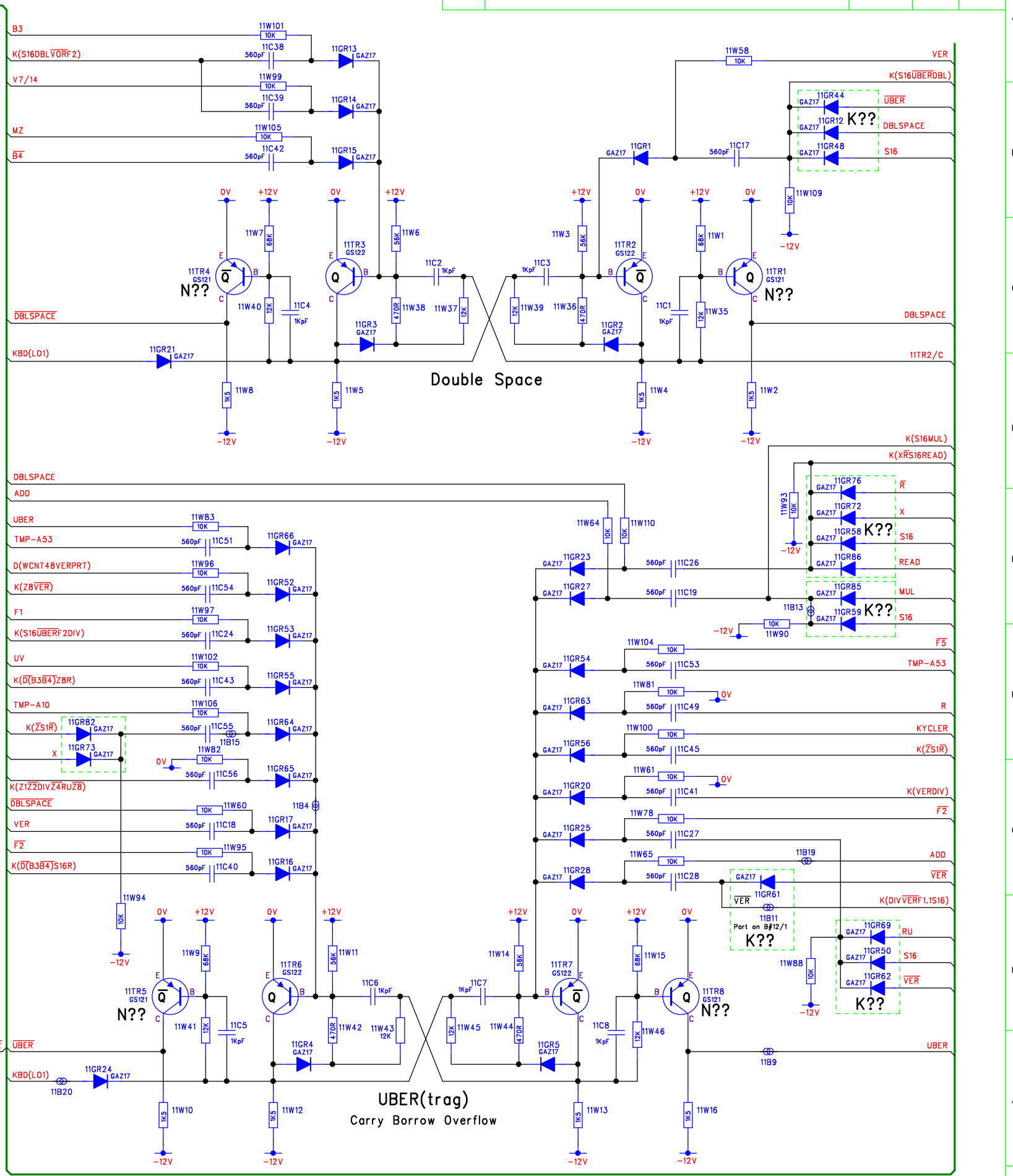
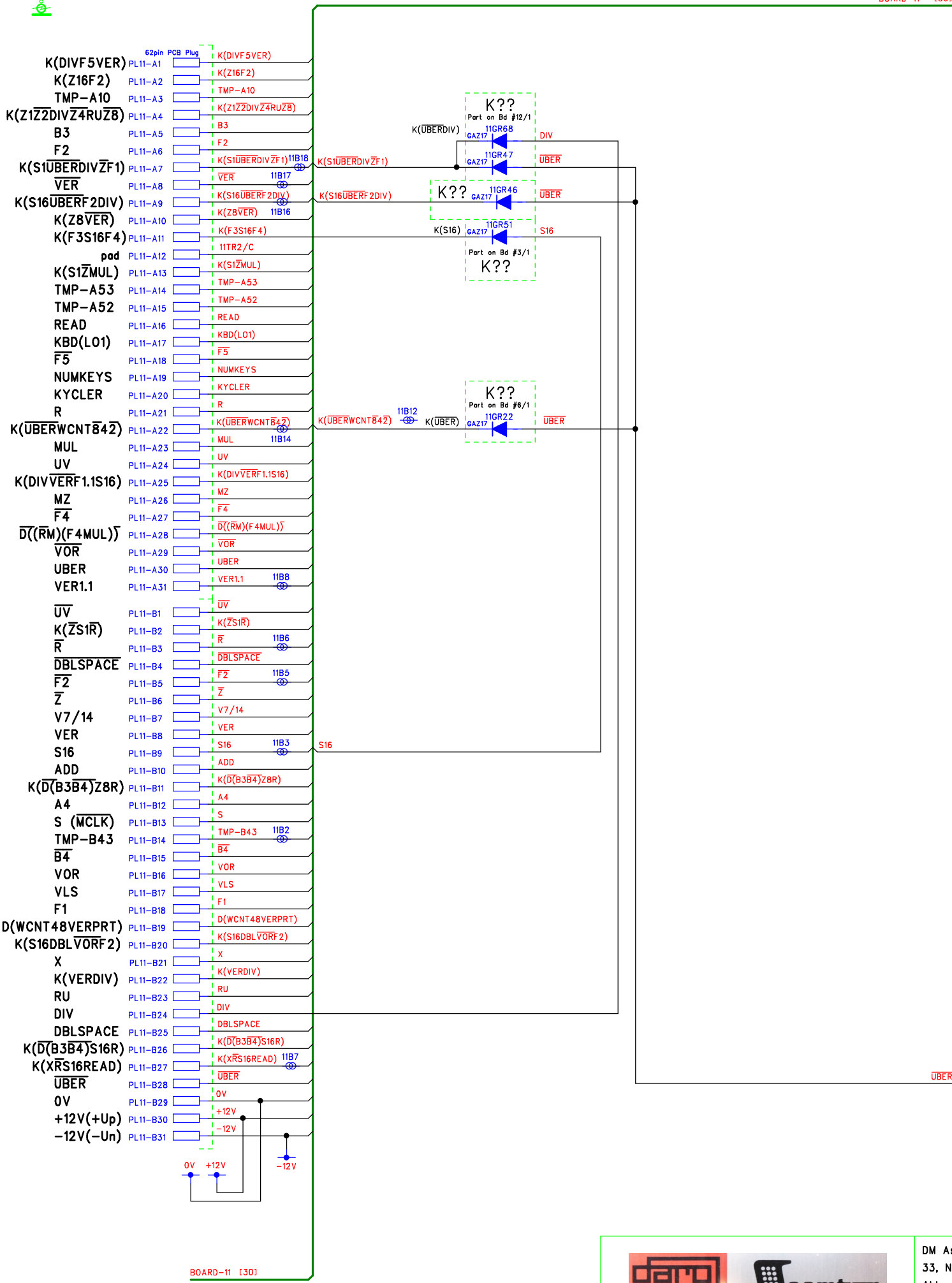
Scale	Nts
Sheet 28	28
Next Sheet	29
Drawing Number	

Title	Soemtron 224 Calculator
	Transcribed Misc Circuits
	Board 10/2 - Misc Gating
Soemtron 224	A2 Issue A

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Comp side -
 Solder side - 224-307-011a 3970
 Date coded -

RevNo	Revision note	Date	By	Checked
-	-	-	-	-



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

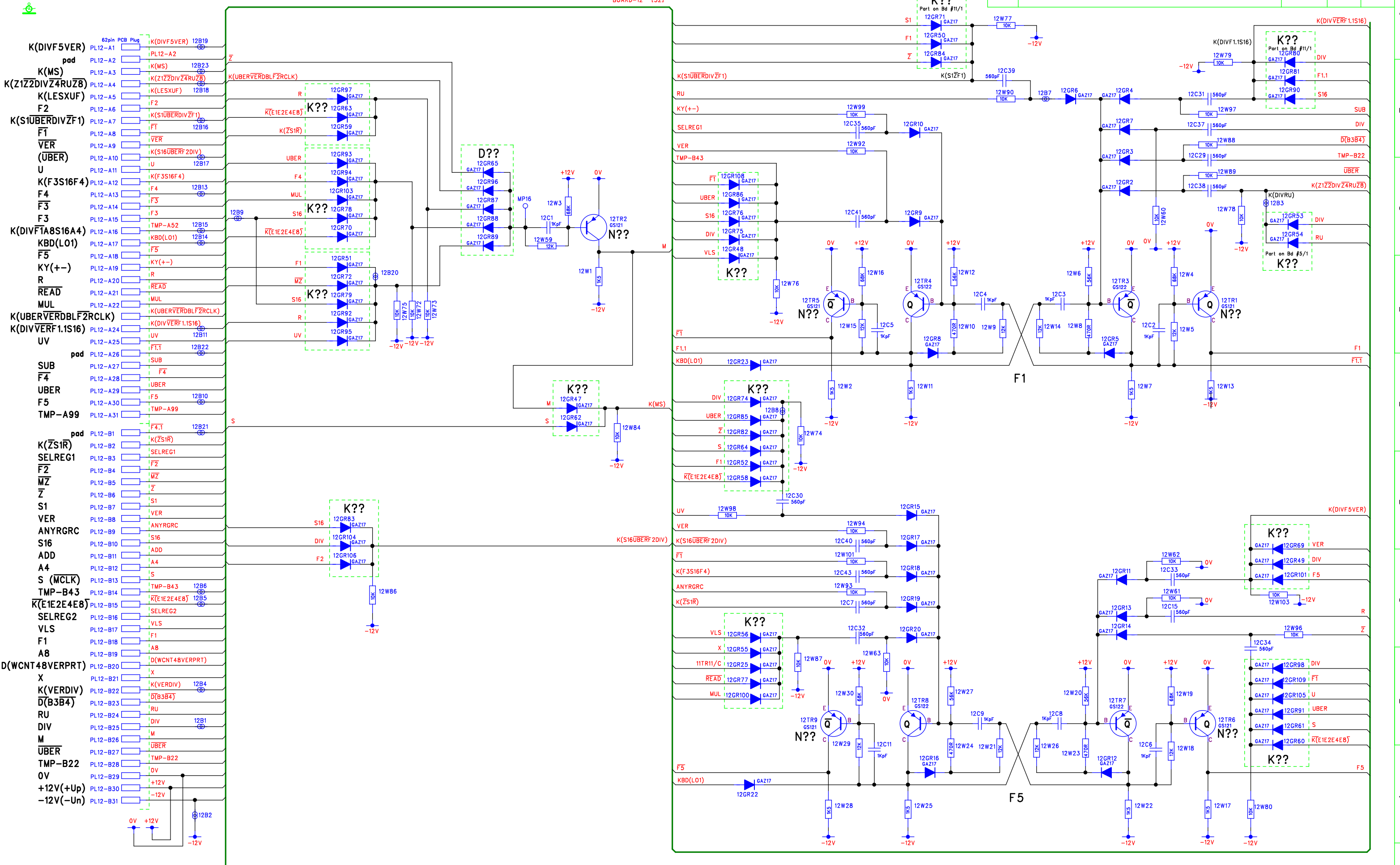


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Pcb Dwg # =		Scale	Nts	Title	
Drawn	Name	Date	Sheet	Soemtron ETR 224 Calculator	
Checked	MD Hatch	4/7/2014	29	Transcribed Misc Circuits	
			Next Sheet	Board 11/1 - Uber & Double Space	
			Drawing Number	Soemtron 224	A2 Issue A

Comp side -
 Solder side - 224-307-012d 3971-
 Date coded -

RevNo	Revision note	Date	By	Checked
-	-	-	-	-



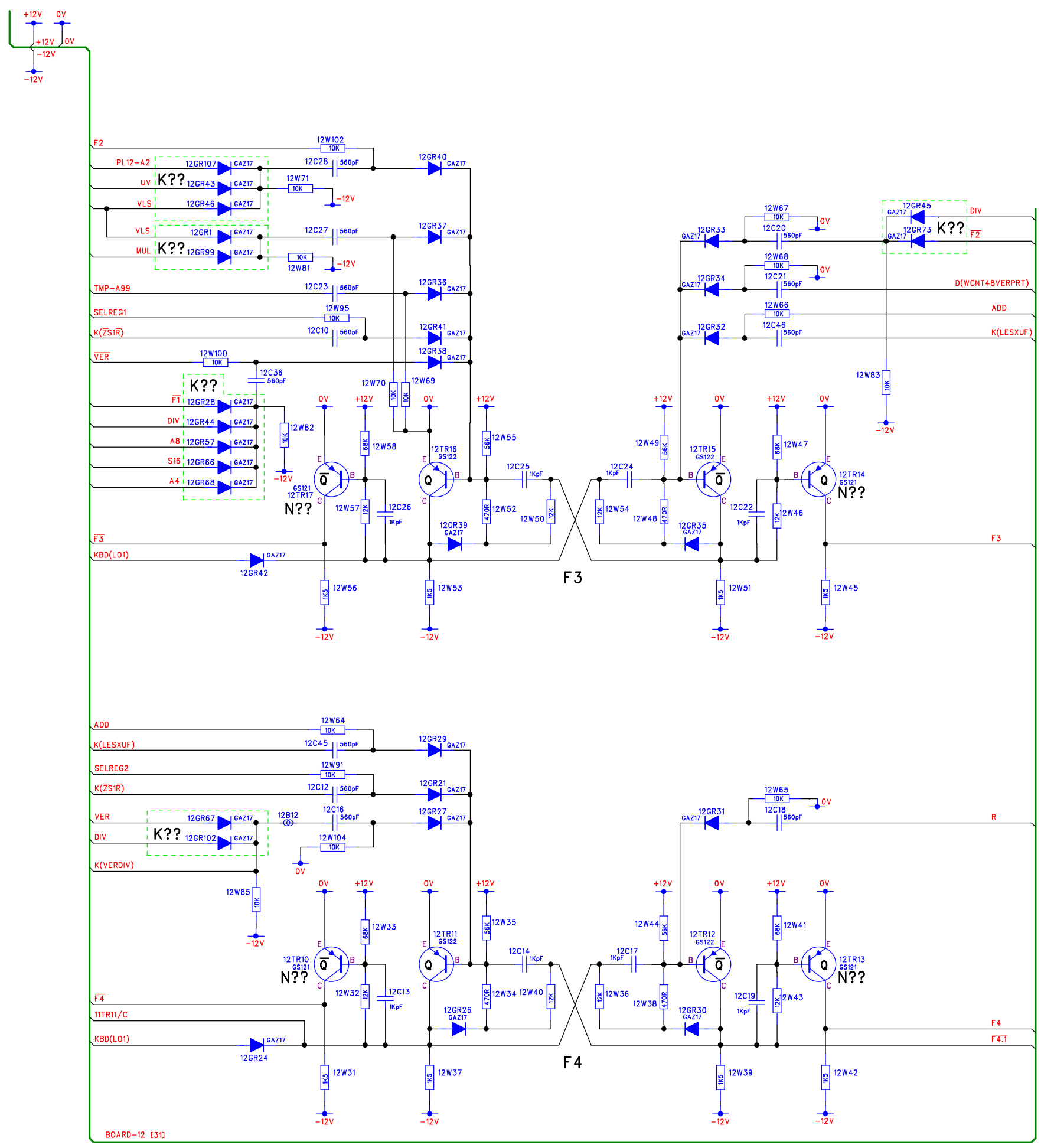
These diagrams are referenced to 0V - Logical 1 = -12V, logical 0 = 0V

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Pcb Dwg # =		Scale	Nts	Title	
Drawn	Name	Sheet	31	Soemtron ETR 224 Calculator	
Checked	Date	Next Sheet	32	Transcribed Misc Circuits	
	22/7/2014	Drawing Number		Board 12/1 - F1 & F5	
				Soemtron 224	A2 Issue A

RevNo	Revision note	Date	By	Checked
-	-	-	-	-



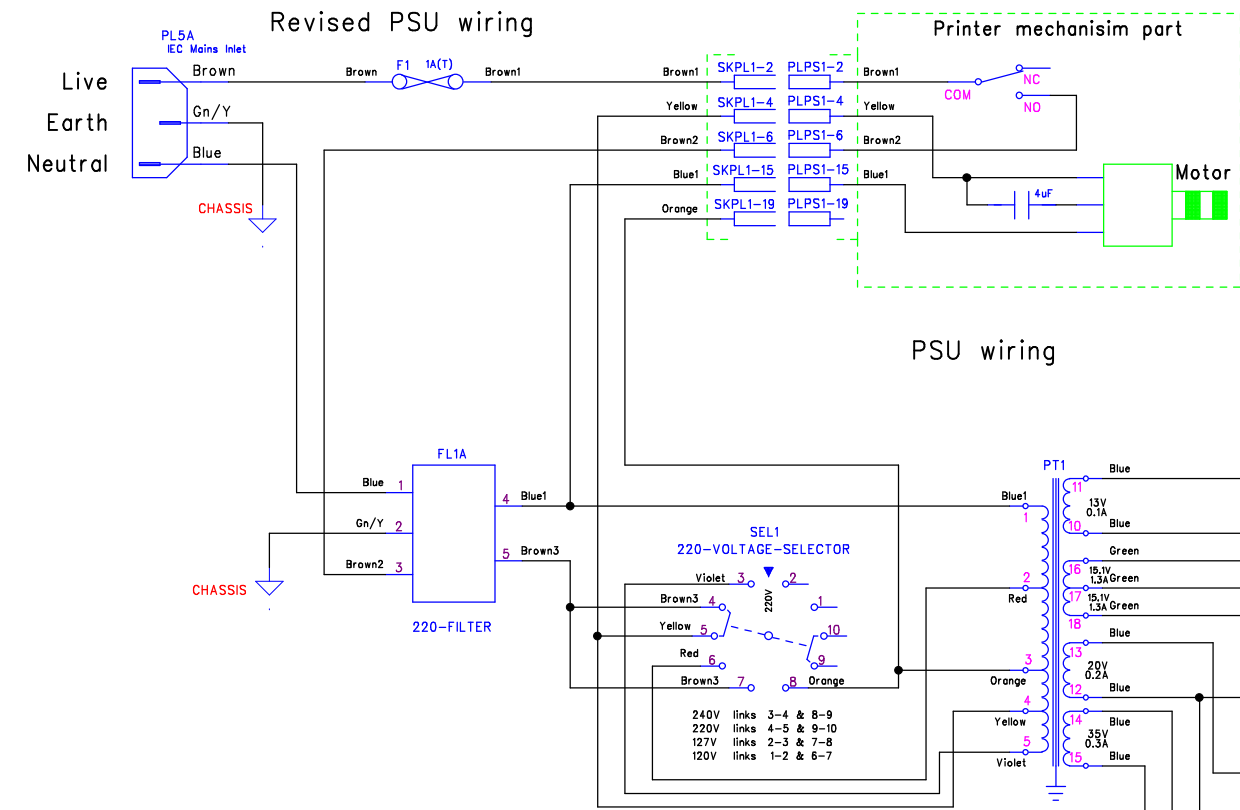
These diagrams are referenced to 0V - Logical 1 = -12V, logical 0 = 0V

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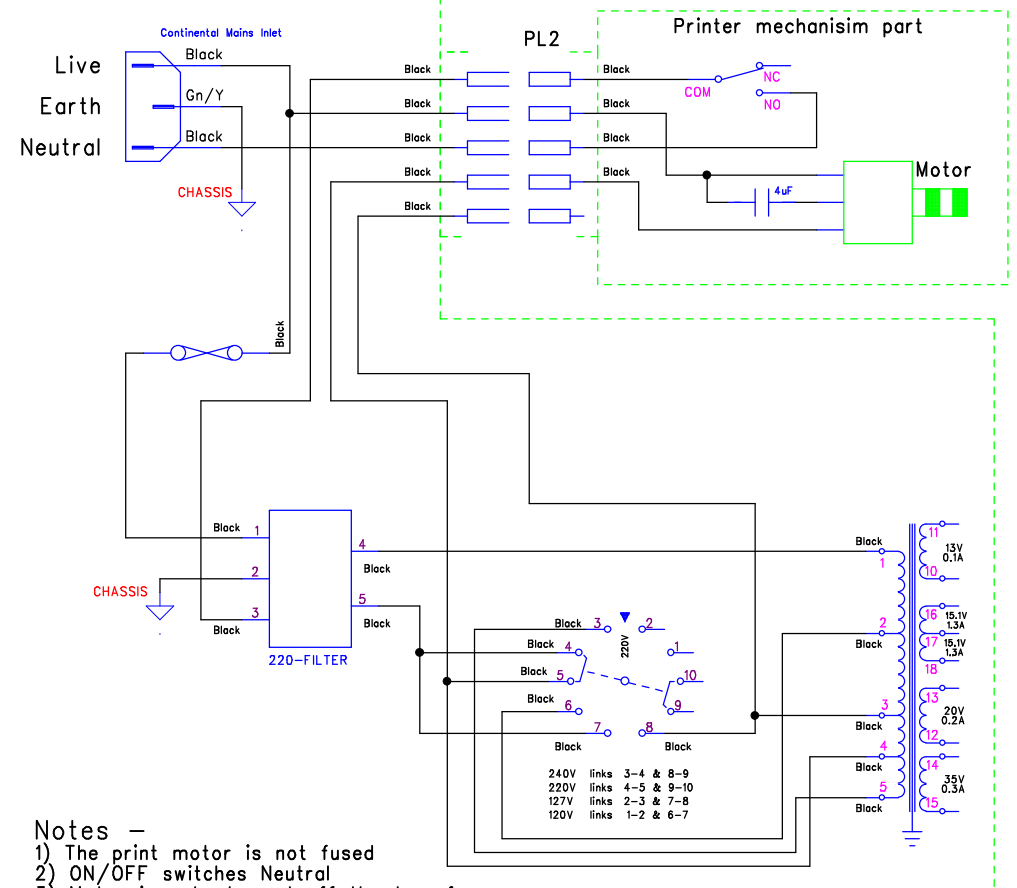
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Pcb Dwg # =		Scale	Nts	Title SOemtron ETR 224 Calculator Transcribed Misc Circuits Board 12/2 - F3 & F4
Drawn	Name	Date	Sheet	
Checked	MD Hatch	22/7/2014	Next Sheet	
			Drawing Number	
			Soemtron 224	A2 Issue

RevNo	Revision note	Date	By	Checked
-	-	-	-	-



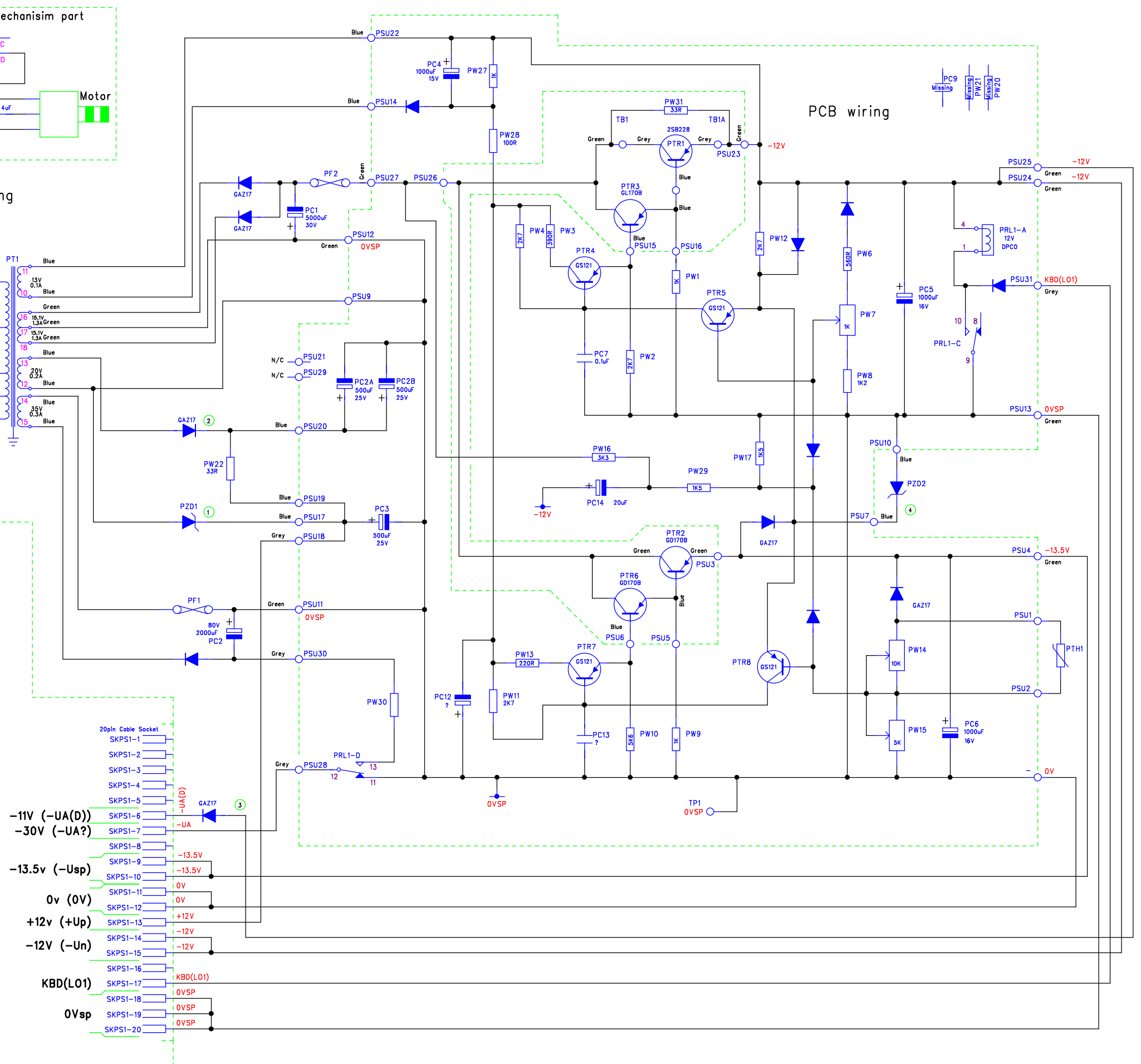
- Notes -
- 1) Everything fused
 - 2) ON/OFF switches Live
 - 3) Wiring colour coded
 - 4) Motor is auto tapped off the transformer



- Notes -
- 1) The print motor is not fused
 - 2) ON/OFF switches Neutral
 - 3) Motor is auto tapped off the transformer

Original PSU wiring

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



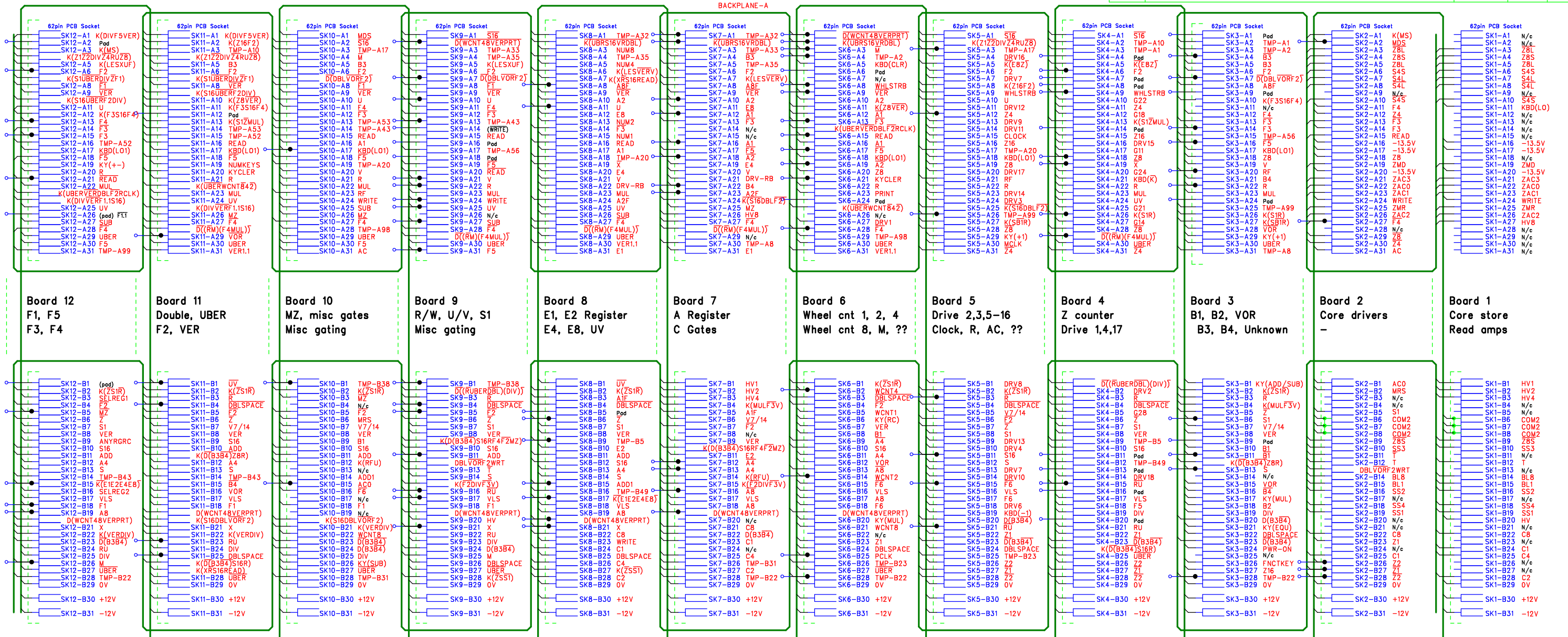
Output	SKPS1 Pin	Output	SKPS1 Pin
-11V (-UA(D))	SKPS1-6	-13.5V	SKPS1-9
-30V (-UA?)	SKPS1-7	-13.5V	SKPS1-10
-13.5v (-Usp)	SKPS1-8	0V	SKPS1-11
0v (0V)	SKPS1-11	0V	SKPS1-12
+12v (+Up)	SKPS1-13	+12V	SKPS1-13
-12V (-Un)	SKPS1-14	-12V	SKPS1-14
KBD(L01)	SKPS1-17	KBD(L01)	SKPS1-17
0Vsp	SKPS1-18	0VSP	SKPS1-18
	SKPS1-19	0VSP	SKPS1-19
	SKPS1-20	0VSP	SKPS1-20

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Pcb Dwg # =		Scale	Nts	Title	
Drawn	Name	Date	Sheet	Soemtron ETR 224 Calculator	
Checked	MD Hatch	9/9/2010	Next Sheet	Power Supply Wiring	
			Drawing Number	Circuit Diagram	
				Soemtron 224	A2 Issue A

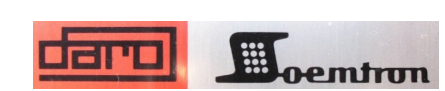
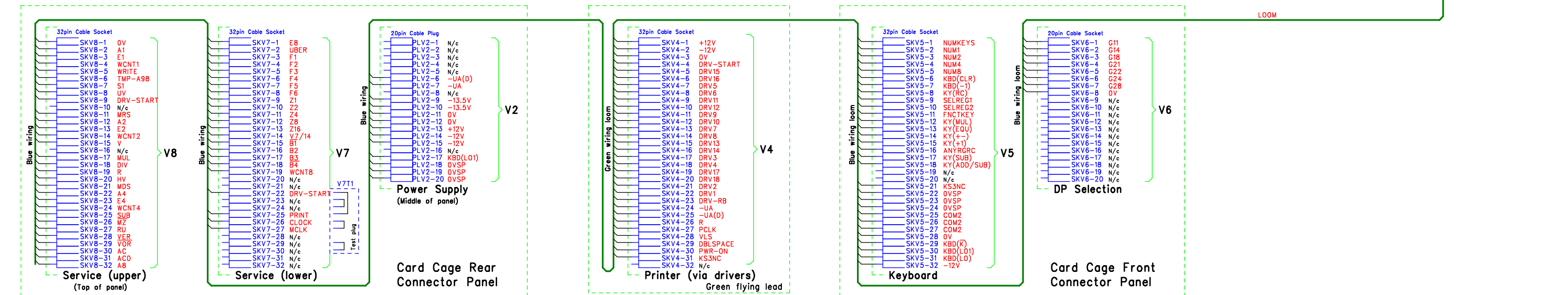
Backplane PCB



SK12 is behind the keyboard

SK1 is closest to the PSU

3956 224-307-013c



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Pcb Dwg # =	
Name	Date
MD Hatch	9/1/2013
Checked	-

Scale	Nts	Title
Sheet	35	Soemtron ETR 224 Calculator
Next Sheet	-	Card Rack Backplane
Drawing Number	Soemtron 224	Circuit Diagram - Preliminary
A2 Issue	A	

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