Main Control Board

RPi_Output

Out — RPi_Out

Output pin to Raspberry Pi

RPi_Input

In1 — RPi_In1
In2 — RPi_In2

Input signal from RPi

T_Sensor

Temp1 — Temp_Sense1
Temp2 — Temp_Sense2

Temperature Sensors

P6 Button L — B — PJ0
P7 Button R — B — PJ1
PH1

GND-Connection for buttons

PK0 RPi_In1
PK1 RPi_In2
PK2 RPi_Out

Here, a Microcontroller, like the Arduino Mega should be

PWM_Solenoid3	PH3
PWM_Solenoid2	PH4
PWM_Solenoid1	PH5
LDR_COL1	PB7
LDR_COL2	PB6
LDR_COL3	PB5
LDR_COL4	PB4
Temp_Sense1	PK3
Temp_Sense2	PK4
Current_Sig3	PK5
Current_Sig2	PK6
Current_Sig1	PK7
LDR_ROW1	PF0
LDR_ROW2	PF1
LDR_ROW3	PF2

P5

Power Supply

P1

PWM_Solenoid1 — PWM_In
Shunt_Sig1 — Shunt_Out

Solenoid Driver

P2

PWM_Solenoid2 — PWM_In
Shunt_Sig2 — Shunt_Out

Solenoid Driver

P3

PWM_Solenoid3 — PWM_In
Shunt_Sig3 — Shunt_Out

Solenoid Driver

P4

Shunt_Sig1	A_In1	V_Out1	Current_Sig1
Shunt_Sig2	A_In2	V_Out2	Current_Sig2
Shunt_Sig3	A_In3	V_Out3	Current_Sig3
	A_In4	V_Out4	

R1
10k

Current_Sensing

0

Pull down resistor to set input to a defined level, as 4th channel is unused

LDR_COL1 LDR_COL2 LDR_COL3 LDR_COL4

J14

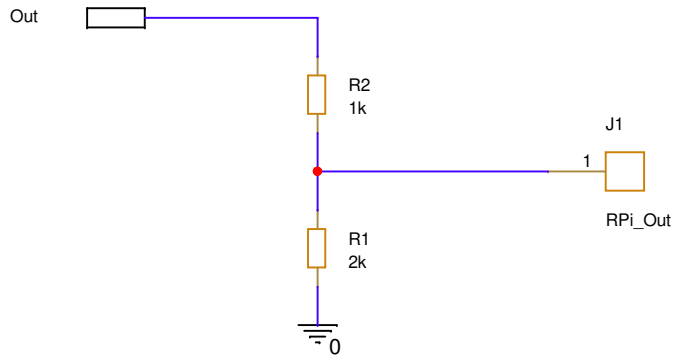
COL1 COL2 COL3 COL4

ROW1 — LDR_ROW1
ROW2 — LDR_ROW2
ROW3 — LDR_ROW3

LDR Matrix

University of South-Eastern Norway
Juergen Markl
Postboks 235
3603 Kongsberg
Norway

Title: Main Control Board		
Size: A4	Document Number: 1	Rev: JM
Date: Monday, November 29, 2021	Sheet 1 of 15	



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Postboks 235
3603 Kongsberg
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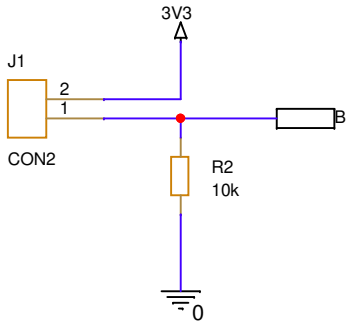

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Postboks 235
3603 Kongsberg
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Title
Main Control Board - Button Inputs

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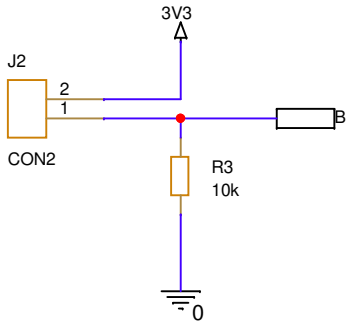

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Juergen Markl
Postboks 235
3603 Kongsberg
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Title
Main Control Board - Button Inputs

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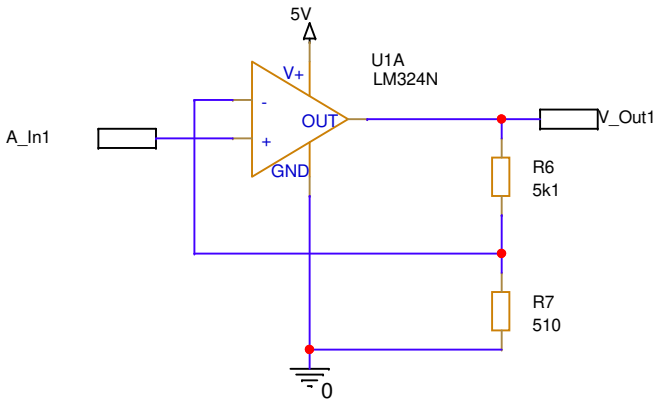
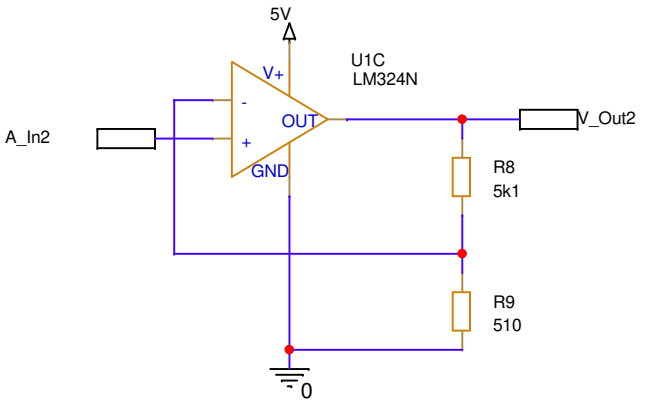
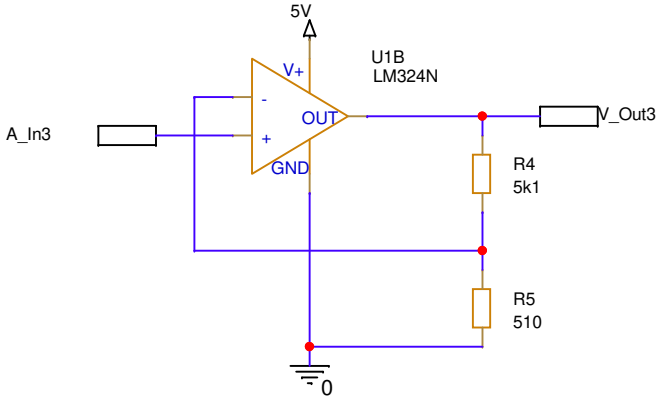
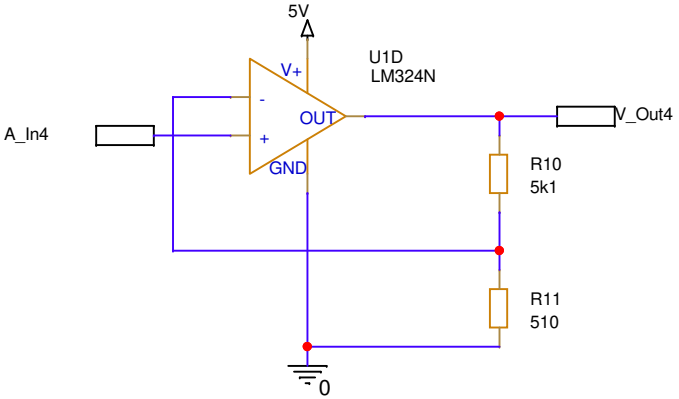
Date:	Sheet	of
Monday, November 29, 2021	3	15









gain calculation:

at 2.5A, 0.1Ohm Resisotr == 0.25 V @ 2.5A

gain of 11 is desirable:
a = 1 + R2/R1
picking R2 = 10k
R1 = R2 / (a - 1) = 1k

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Juergen Markl
Postboks 235
3603 Kongsberg
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Title
Main Control Board - Current Sensing

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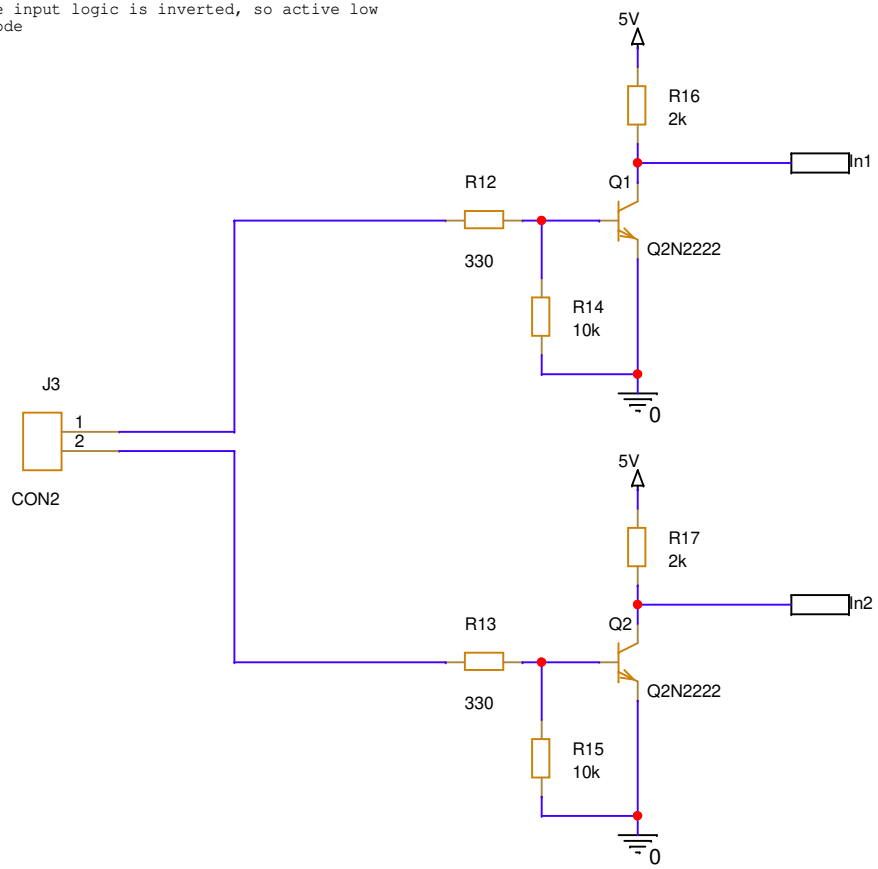
This Transistor circuit is required, as the 3.3V from the
RPi are not enough to set the input pin to a high level.

Threshold is 0.7 * VCC = 3.5V

With this circuit, the input logic is inverted, so active low
Is taken care of in code



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Juergen Markl
Postboks 235
3603 Kongsberg
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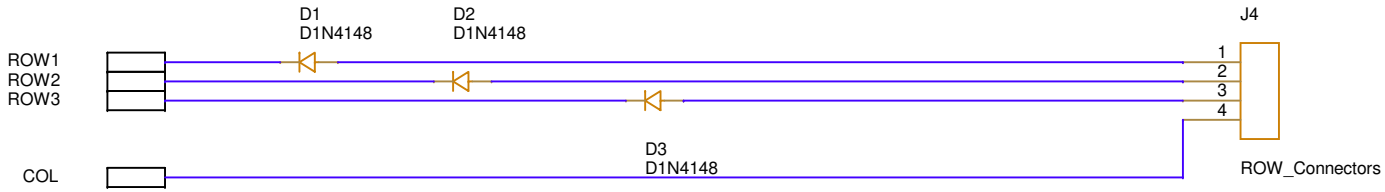

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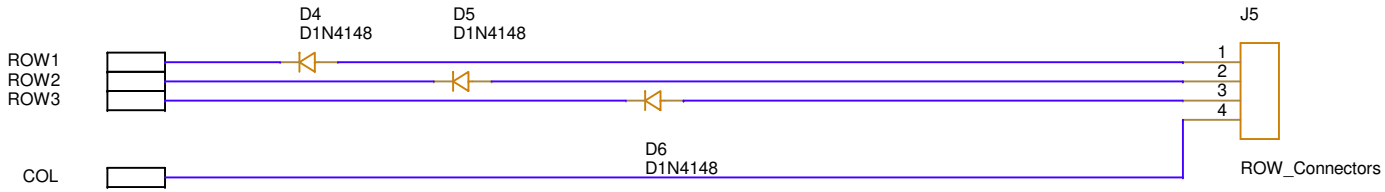

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Juergen Markl
Postboks 235
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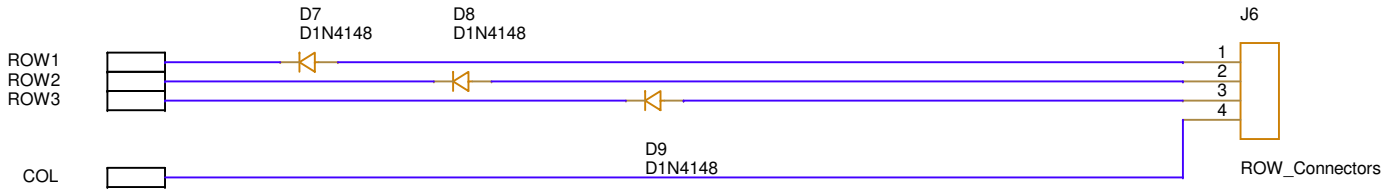

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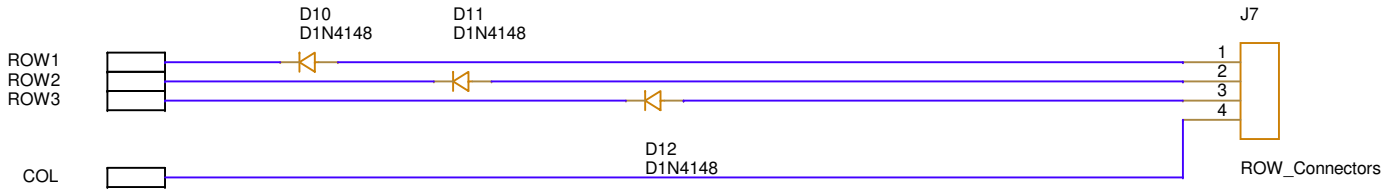

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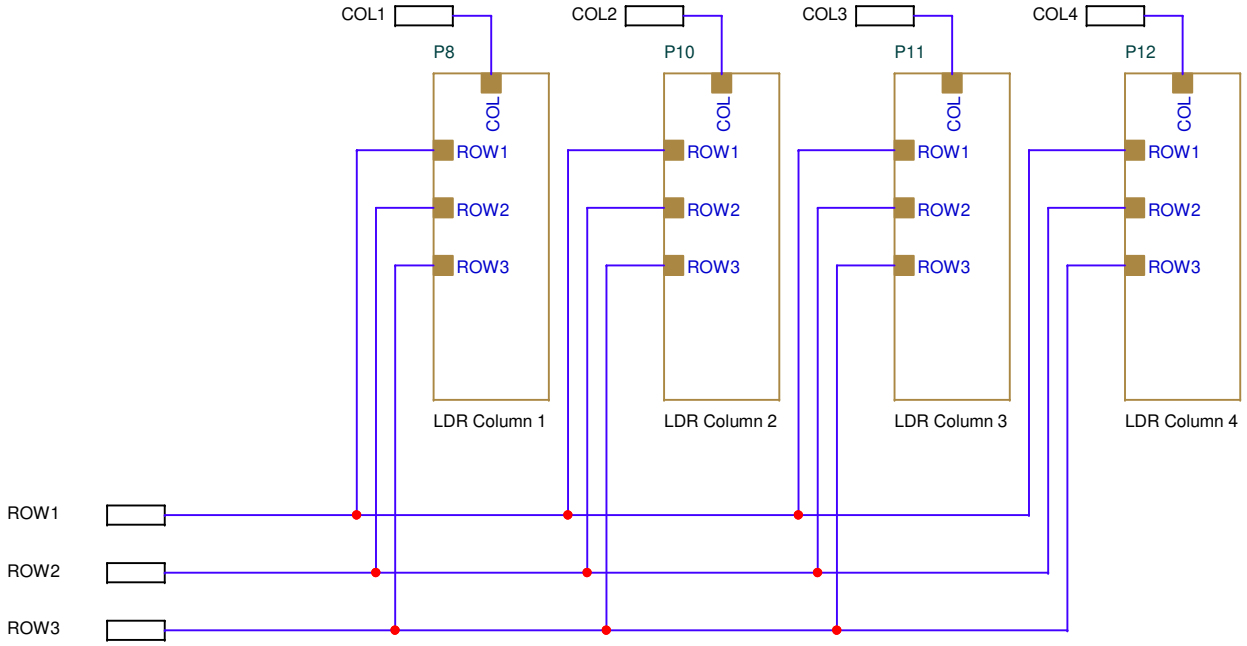

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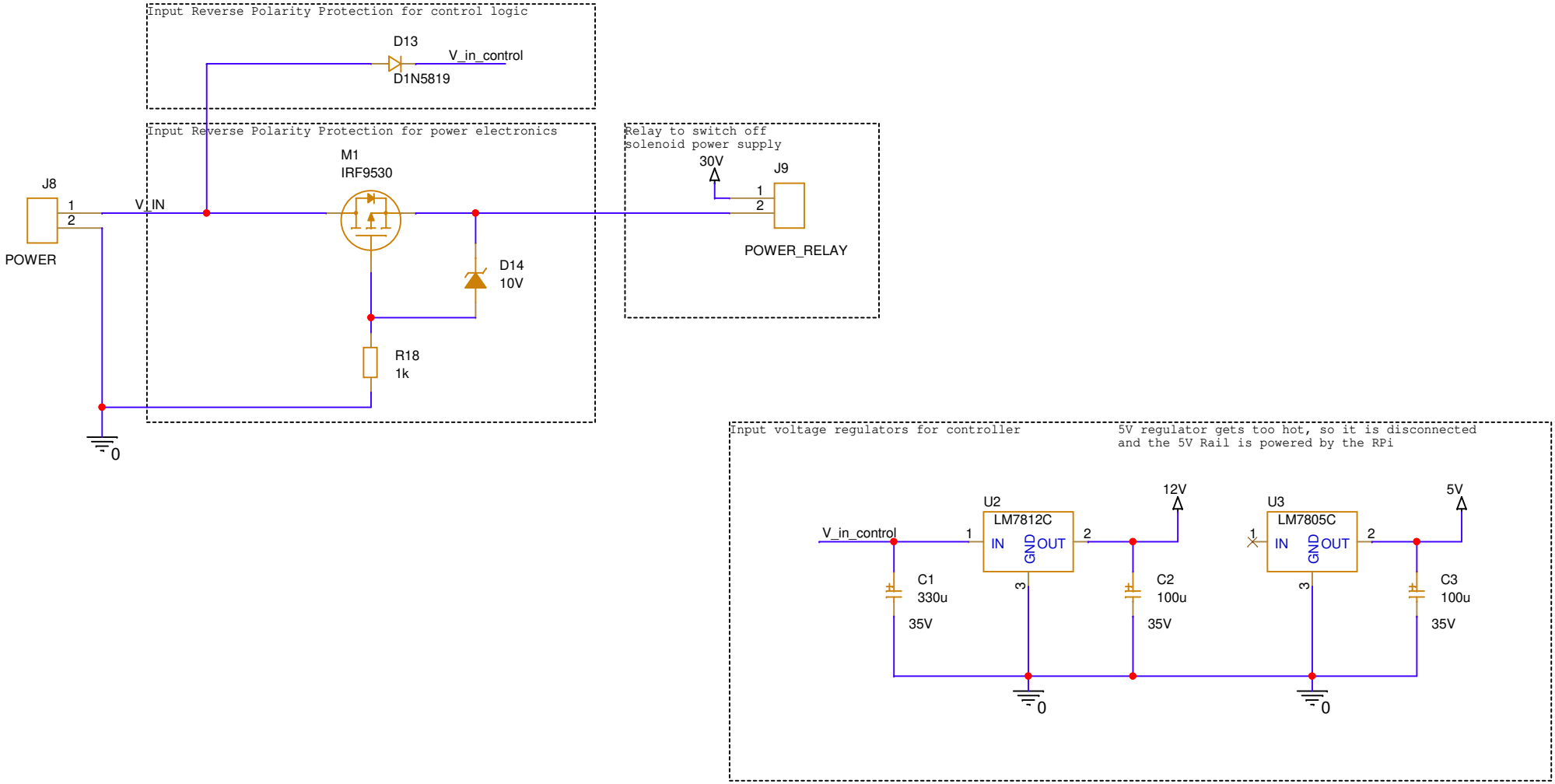

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Title: Main Control Board - Power Supply		
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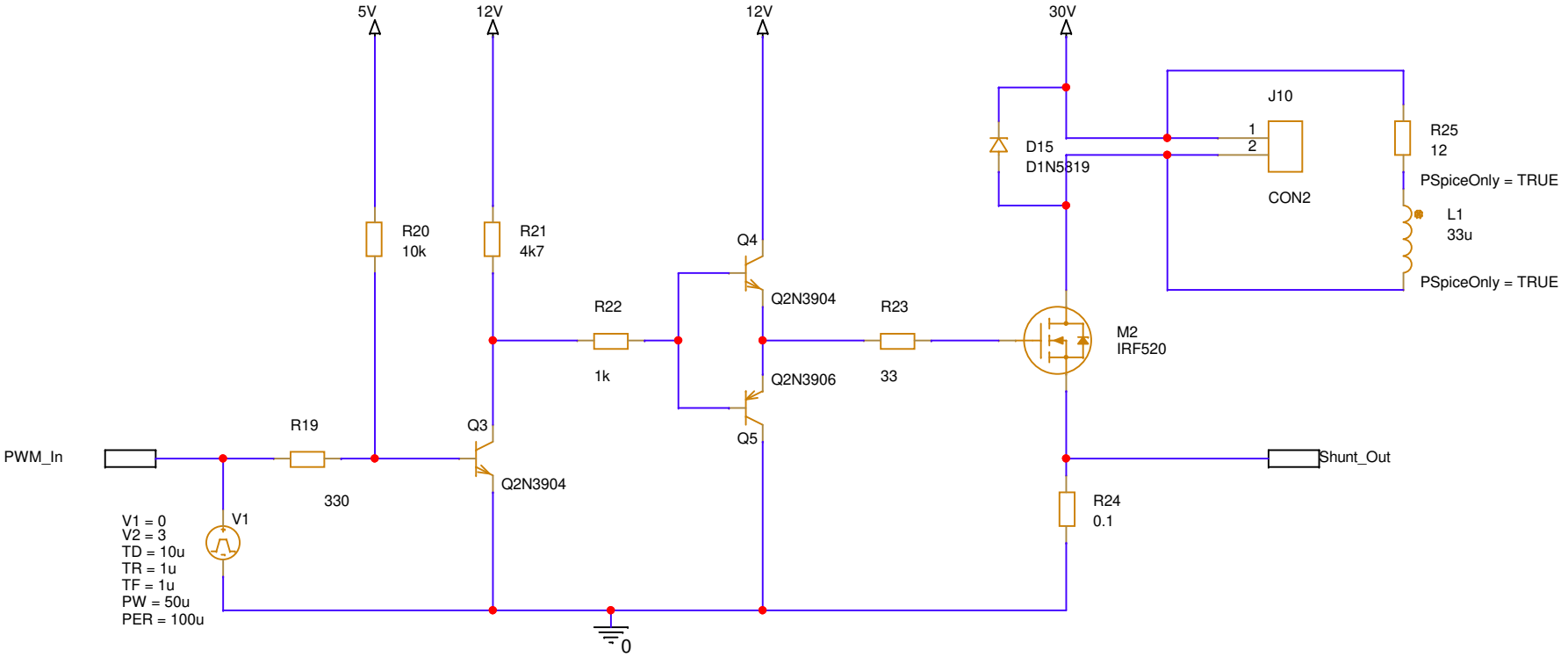
2N3904
hFE = 100 --> I_B = 2 mA

R_Bmax = 12 V / 2 mA = 6k



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Juergen Markl
Postboks 235
3603 Kongsberg
Norway

Title: Main Control Board - Solenoid Stage		
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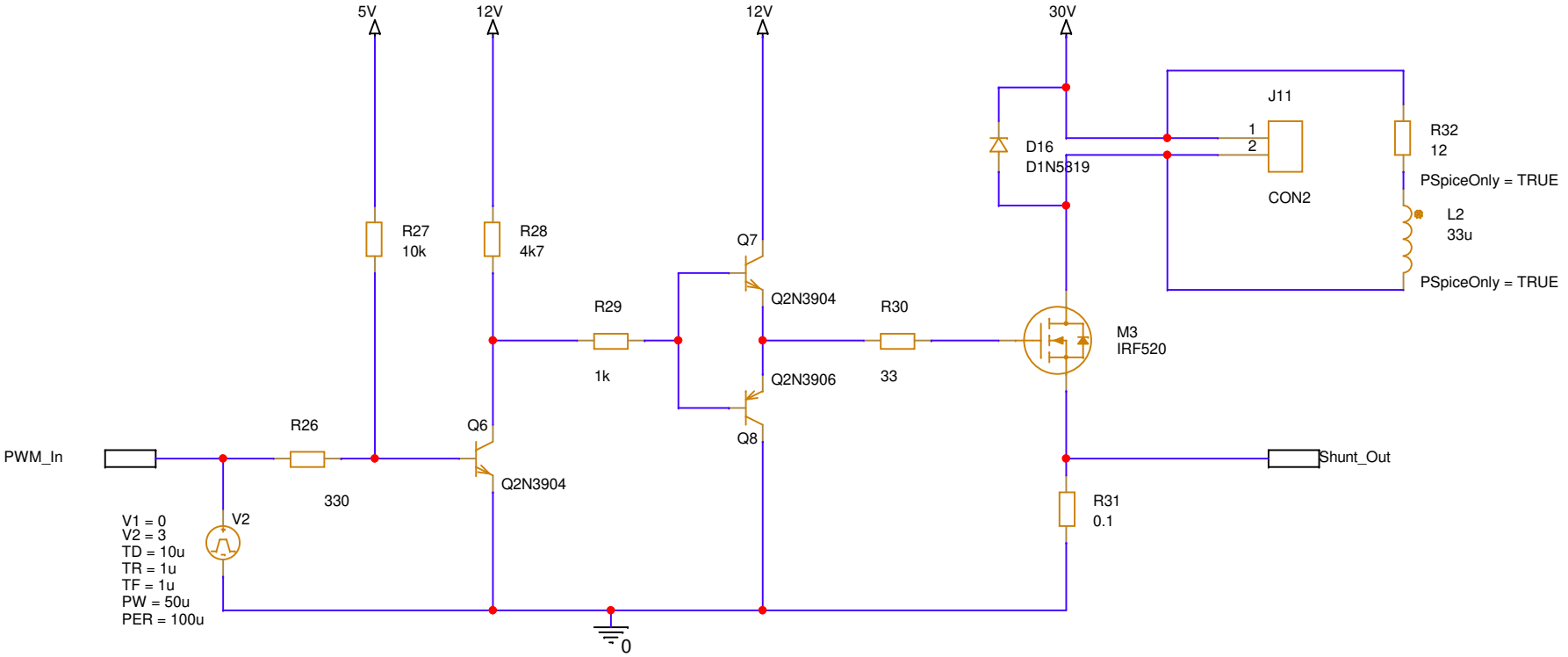
Date: Monday, November 29, 2021	Sheet 12 of 15	

2N3904
hFE = 100 --> I_B = 2 mA

R_Bmax = 12 V / 2 mA = 6k



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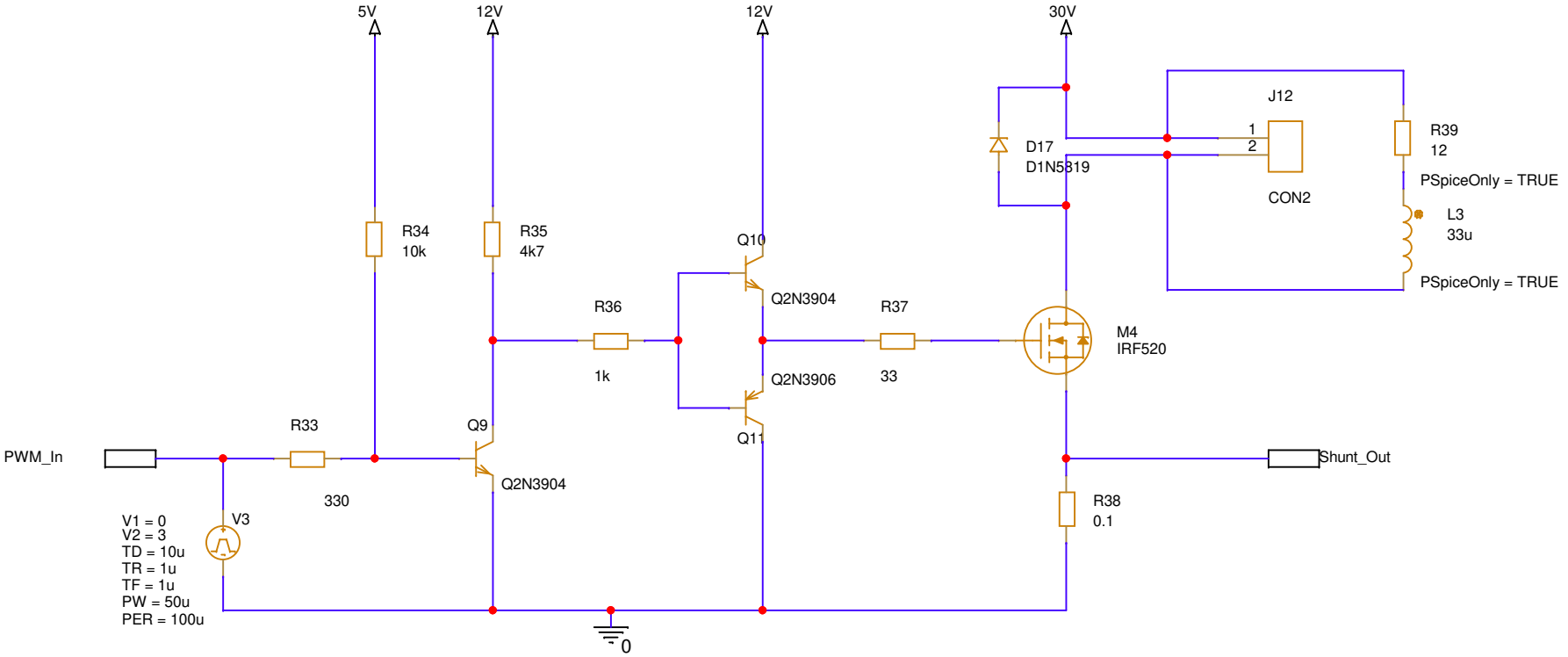
Title: Main Control Board - Solenoid Stage		
Size: A4	Document Number: 1	Rev: JM
Date: Monday, November 29, 2021	Sheet 13 of 15	

2N3904
hFE = 100 --> I_B = 2 mA

R_Bmax = 12 V / 2 mA = 6k



University of South-Eastern Norway

Juergen Markl
Postboks 235
3603 Kongsberg
Norway

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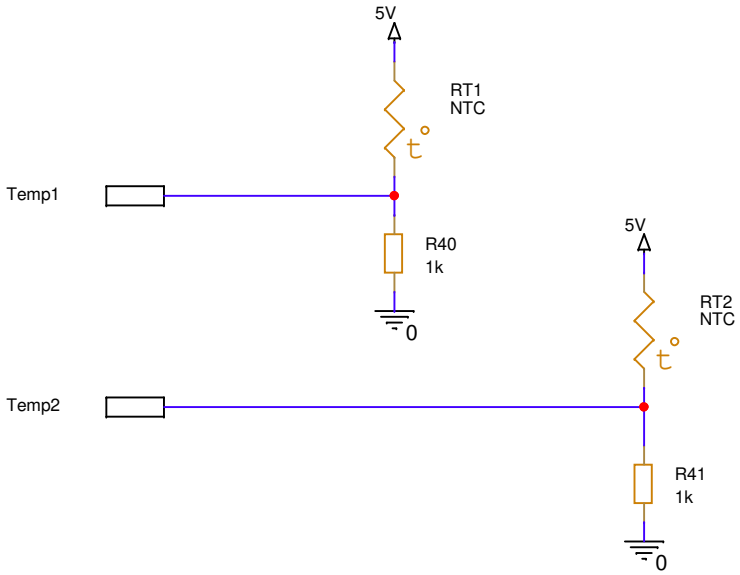

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Juergen Markl
Postboks 235
3603 Kongsberg
Norway

Title: Main Control Board - Temperature Sensors		
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