Connectors

J7
Conn_01x06
+12V
1
2
3
4
5
6
CT_SIG
BPS_SIG
SHUTDOWN_IN
SHUTDOWN_OUT
GND
Current Sensor
Brake Pressure Sensor
+12V
PWR_FLAG
C1
100u
PWR_FLAG
GND

IC Power and Unused Gates

+12V
U1E
LM339
3
V+
12
V-
C2
100n
GND
+12V
U2E
LM339
C5
100n
GND
+12V
R27
1k
D7
Green
Power LED
GND
+12V
U3G
40106
14
VDD
VSS
7
C6
100n
GND
+12V
U4C
4013
C7
100n
GND
+12V
U2C
LM339
U2D
LM339
GND
U4B
4013
GND
U3E
40106
GND

H1
MountingHole
H2
MountingHole
H3
MountingHole

Not part of the BSPD

The sensors will have resistors soldered directly onto their terminals as shown, and a pull-down resistor on the BSPD PCB. This will enable the detection of fault conditions.

Short to GND/open circuit:
0V measured

Short to +12V:
12V measured

Normal operation:
Minimum voltage ~= 0.1V due to resistors, max voltage 5V

+5V
PWR_FLAG
Current
(DHAB
S/137)
R1
1k
R3
47k
GND
+12V
Pressure
(Sensata
GP750
3-pin,
5V out)
R2
1k
R4
100k
GND

Filters

f_{cutoff} ~= 1500Hz
Should remove 12kHz PWM noise

CT_SIG
R7
1k
R5
100k
C3
100n
GND
GND
BPS_SIG
R8
1k
R6
100k
C4
100n
GND
GND

SCS Check
CURRENT_SENSE
PRESSURE_SENSE
SCS_ERROR_LATCHED
File: scs-check.kicad_sch

Brake Plausibility
CURRENT_SENSE
PRESSURE_SENSE
BRAKE_PLAUSIBLED
File: brake-plausibility.kicad_sch

Relay

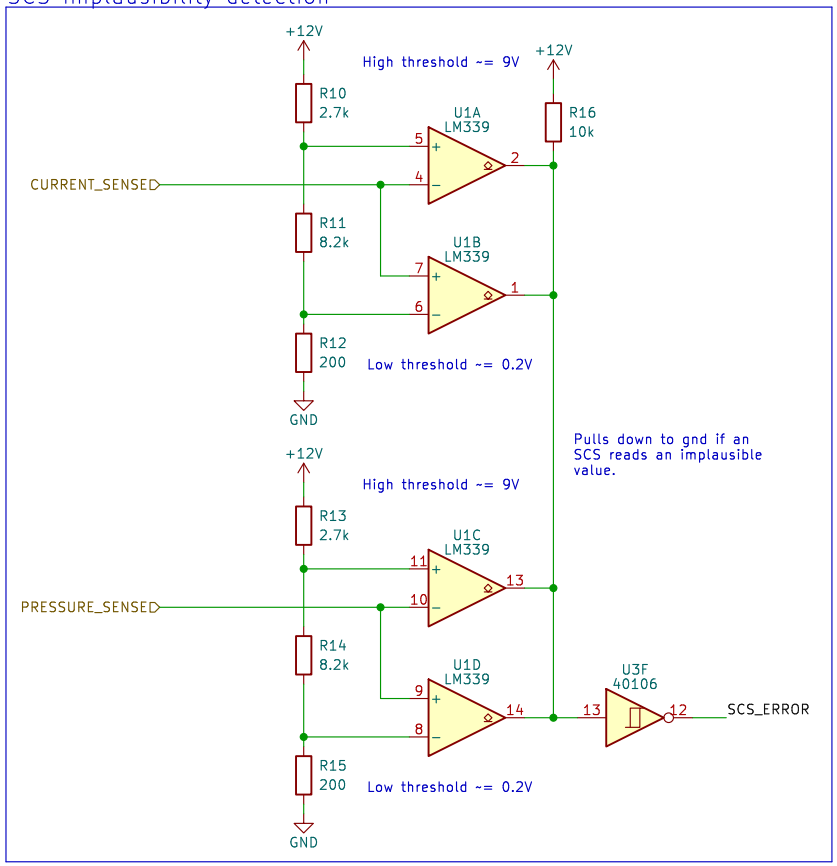
R26
1k
D6
Green
GND
+12V
SHUTDOWN_IN
D2
BAT54W
G5Q-1EU DC12
K2
SHUTDOWN_OUT
Diode allows gate to discharge if ~SCS_ERROR_LATCHED goes low
D1
BAT54W
Q1
XP262N7002TR-G
R25
1k
D5
Green
GND
R9
10k
GND
Turn on relay if BRAKE_PLAUSIBLE, but not if SCS_ERROR_LATCHED.

Vehicle: STAG X
Drawn By: Joe Pater
Checked By:
CAD Part:
SUFST – Southampton University Formula Student Team
Sheet:
File: BSPD.kicad_sch

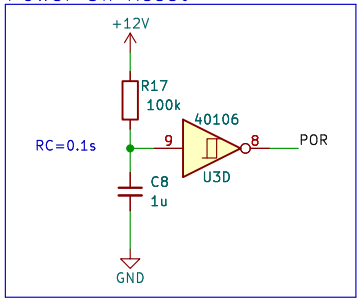
Title: BSPD

Size: A4	Date: 2024-01-11	**Rev: 1.2.0**
KiCad E.D.A. kicad 7.0.9-1.fc38		Id: 1/3

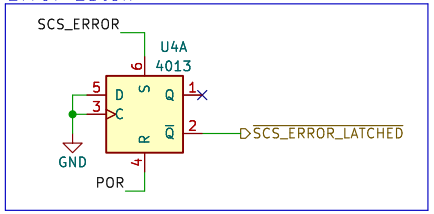
SCS implausibility detection



Power On Reset

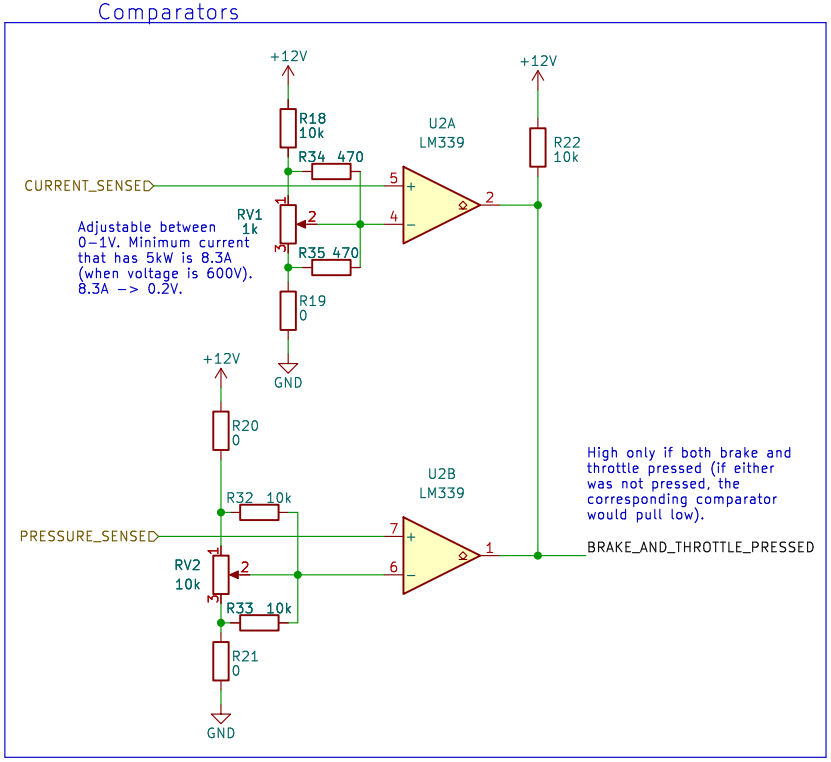


Error Latch

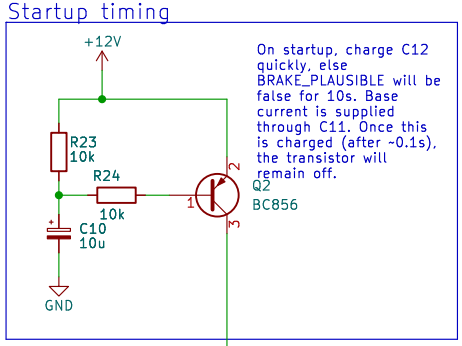


Vehicle: STAG 9	
Drawn By: Joe Pater	
Checked By: Marek Frodyma, Tim Brewis	
CAD Part:	
SUFST – Southampton University Formula Student Team	
Sheet: SCS Check	
File: scs-check.kicad_sch	
Title: BSPD	
Size: A4	Date: 2023-04-02
KiCad E.D.A. kicad 7.0.9-1.fc38	**Rev: 1.1.0**
	Id: 4/3

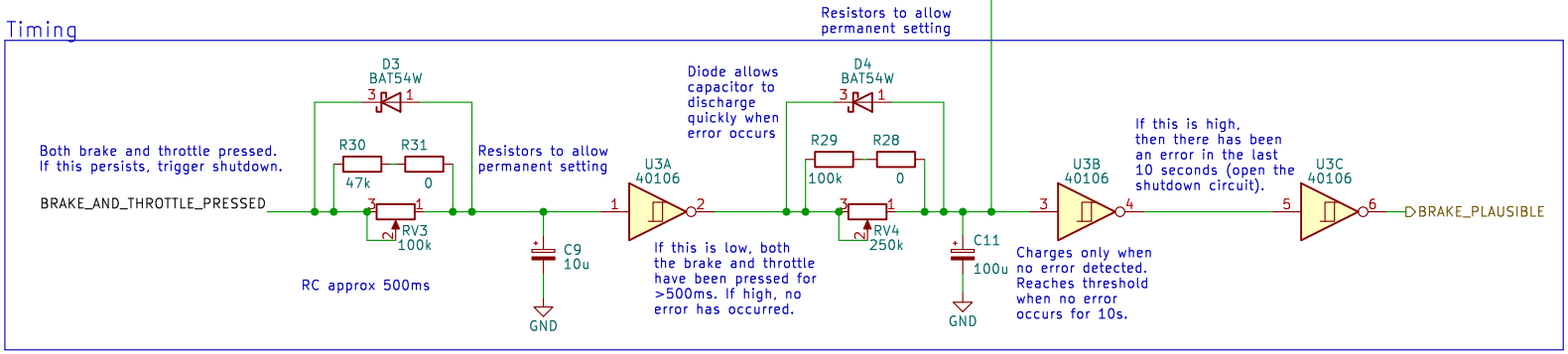
Comparators



Startup timing



Timing



Vehicle: STAG 9	
Drawn By: Joe Pater	
Checked By: Marek Frodyma, Tim Brewis	
CAD Part:	
SUFST – Southampton University Formula Student Team	
Sheet: Brake Plausibility	
File: brake–plausibility.kicad_sch	
Title: BSPD	
Size: A4	Date: 2023–04–02
KiCad E.D.A. kicad 7.0.9–1.fc38	**Rev: 1.1.0**
	Id: 5/3