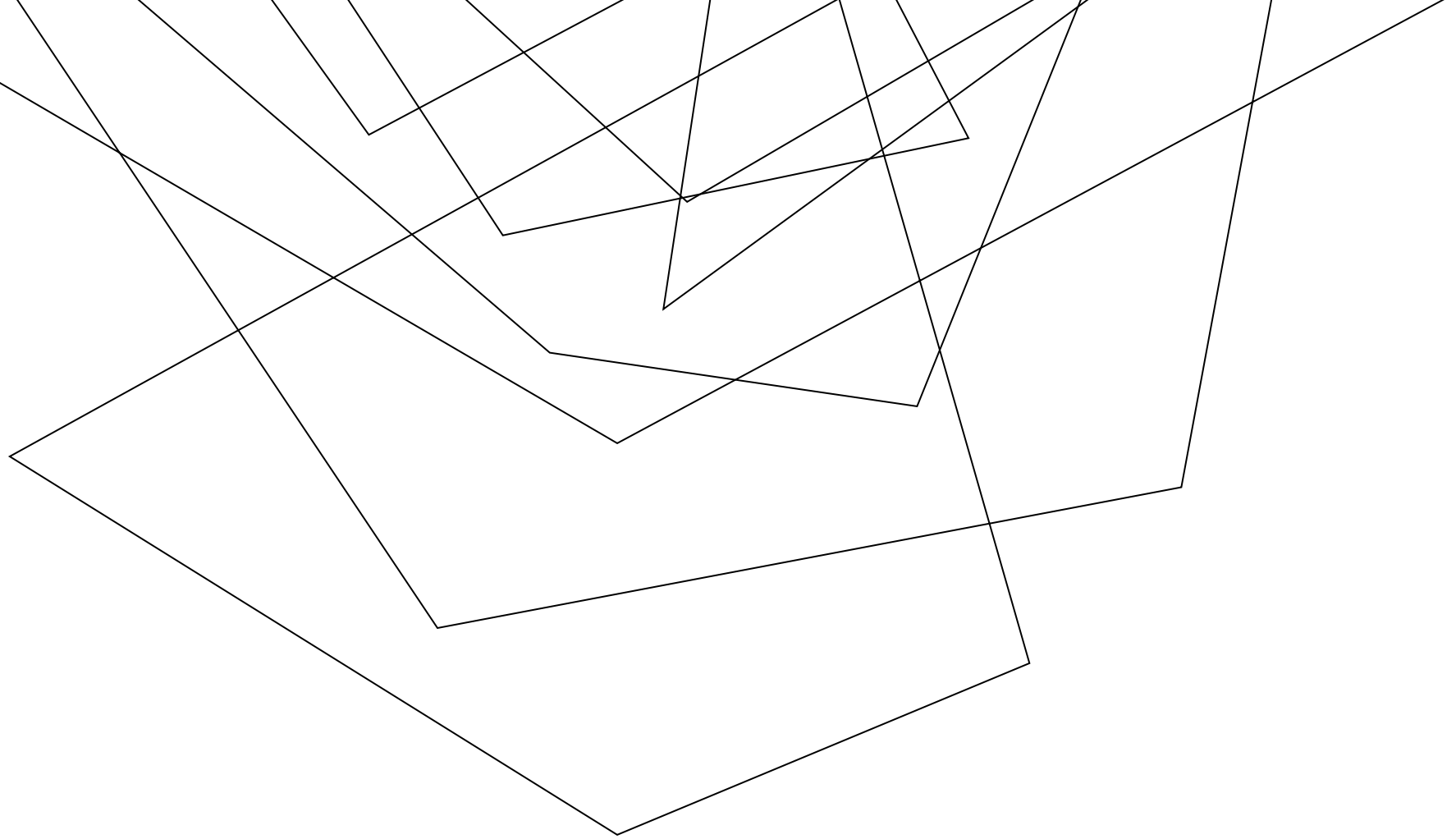


12V LV CAV SYSTEM

- Muhammad Haseeb Aslam
- Jethro Lin

INTRODUCTION

Task: Design a 12V LV power distribution system.

Deliverable 1: Gather accurate ratings for the components from their respective datasheets.

Deliverable 2: Use converters if component's voltage range doesn't include 12V.

Deliverable 3: Determine fuse ratings to protect each component.

Deliverable 4: Prepare a Bill of Materials used in fuse box.

Deliverable 5: Design a schematic showing power flow of the circuit and inside the fuse box.

COMPONENT RATINGS

Part # / Name	Operating Voltage	Nominal Current	In-rush Current	Peak Power (watts)	Operating Temperature	Typical Power
OAK-D-Pro-W-PoE-97	5-5.25V	1.43-1.5A	2A	7.5W	-33° C - 55° C	6W
OS1-64 Lidar	9 – 34 V 12/24 V nominal	1.42A	1.83A	20W	-40°C to +60°C Reduced performance >53°C	14-20W
MK6 OBU	7 – 36 VDC	1.5A	1.8A	64.8W	-40°C to +74°C	18W
MR-CANHUBK344	5-40V (12V nominal)	100mA	120mA	4.8W	-40°C to +125°C	1.2W
dSpace Autera	10-30V (12V operating Voltage)	7.42A	10A	300W	-20°C - 55°C	89W
Surface Go 3 8VA-00001(PSU 1735)	15V	1.6A	1.92A	28.8W	0°C to 35 °C	24W

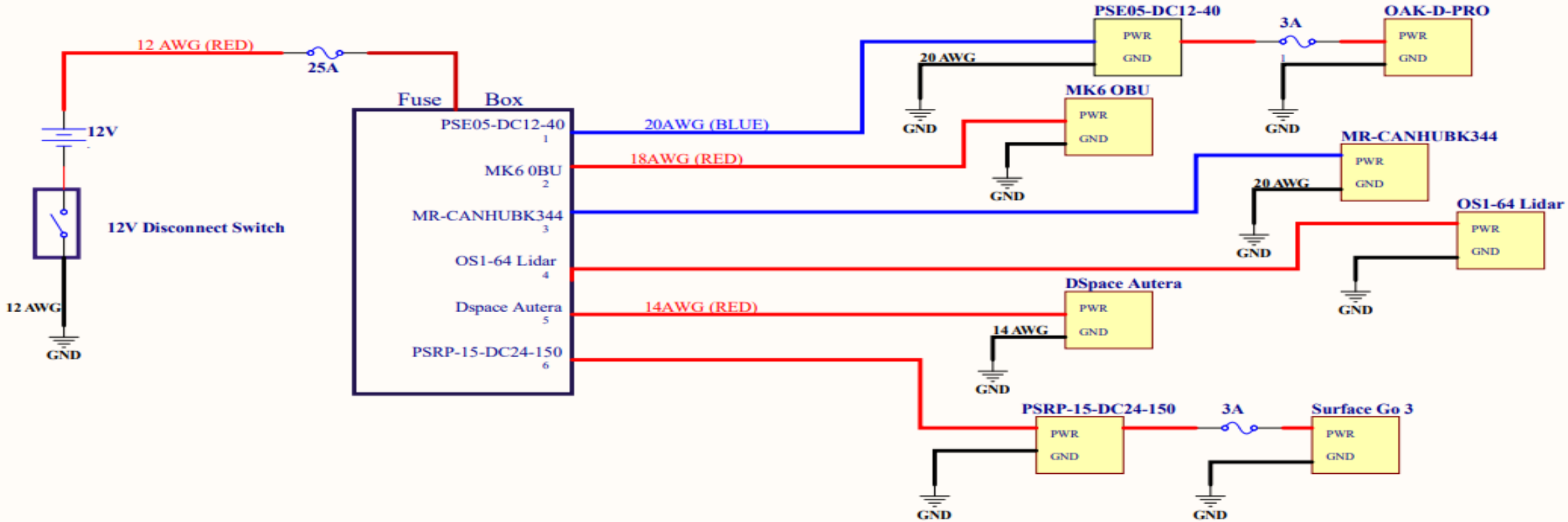
CONVERTERS

Part # / Name	Input Voltage	Output Voltage	Input Current	Power Draw	Power Output	Operating Temperature	IPx Rating
RHINO PRO DC to DC Converter PSRP-15-DC24-150	12V	15VDC	2.33A	27.9	24	-40°C to +75°C	55
RHINO PSE Series DC to DC Converter PSE05-DC12-40	12V	5.1VDC	0.7A	8.33	7.5W	-40°C to +85°C (65°C max. IEC/EN/UL60950-1)	N/A

RATINGS OF FUSES USED

Part # / Name	Nominal Current	In-rush Current (Specs)	Fuse Size
OAK-D-Pro-W-PoE-97	1.5A	2A	3A
OS1-64 Lidar	1.42A	1.83A	3A
MK6 OBU	1.5A	1.8A	3A
MR-CANHUBK344	100mA	120mA	150mA (1A)
DSpace Autera	7.42A	10A	12A (15A)
Surface Go 3 8VA-00001 (PSU 1735)	1.6A	1.92A	3A
RHINO PRO DC to DC Converter PSRP-15-DC24-150	2.33 A	2.8A	3A
RHINO PSE Series DC to DC Converter PSE05-DC12-40	0.7 A	0.84A	1A

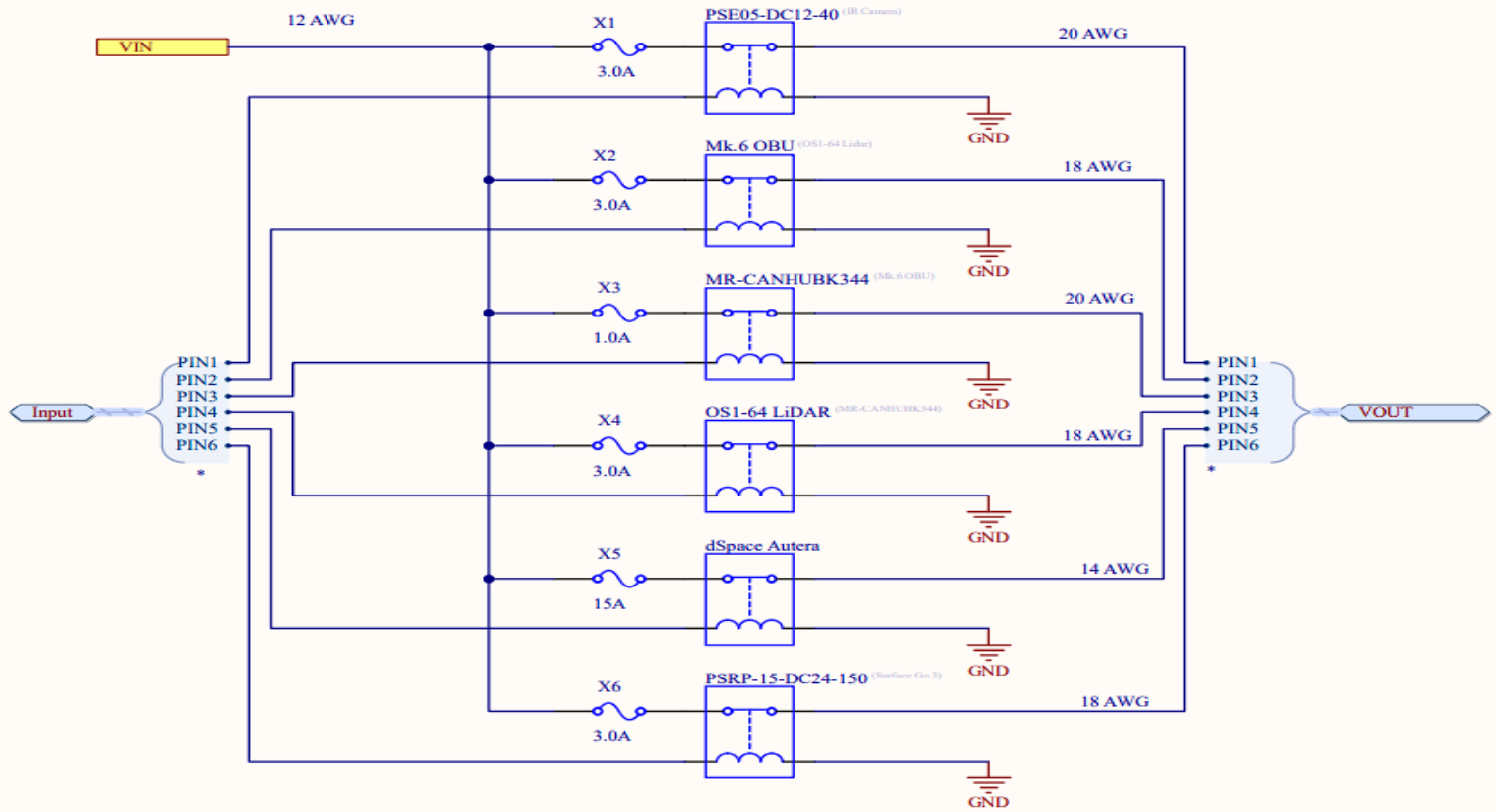
12V POWER FLOW SCHEMATIC



All red wires are 18 AWG, and blue wires are 20 AWG, while GND wires are Black and 18AWG, "UNLESS OTHERWISE STATED".

Title: 12V Schematic (CAV Components)		
Size: A4	Number: 1	Revision:
Date: 9-24-2023		Sheet of
File: C:\Users\My PC\Desktop\Sheet1.SchDoc		Drawn By: Jethro Lin/ Haseeb Aslam

FUSE BOX SCHEMATIC



Title: 2023 EcoCAR Electrical Challenge - Fuse Box		
Size: A4	Number: 1	Revision: 1
Date: 9-24-2023		Sheet1 of 1
File: C:\Users\..\Fuse Box.SchDoc		Drawn By: Jethro Lin / Haseeb Aslam

BILL OF MATERIALS

Description/Part #	Quantity	Unit Cost (per 1 item)	Total
1A ATO FUSE 0ATO001.V	1	$1.64	$1.64
3A ATO FUSE 0ATO003.V	6	$1.64	$9.84
15A ATO FUSE 0ATO015.V	1	$1.64	$1.64
25A ATO FUSE 0ATO025.V	1	$1.64	$1.64
5A RATED FUSE HOLDER 81AH9433	2	$5.45	$10.90
20A RATED FUSE HOLDER FHAC0001ZXJ	1	$5.60	$5.60
25A FUSE HOLDER (FHAC0003ZXJB)	1	$9.29	$9.29
FUSE BLOCK 03500418Z	1	$22.23	$22.23
IP68 ENCLOSURE	1	$24.99	$24.99
12V Disconnect Switch (40A)	1	$13	$13
TOTAL	14		$100.77

THANK YOU!

Now it's time for Q/A!

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