

N F P A

Fluid Power

VEHICLE

Challenge



NFPA
Education and
Technology
Foundation

Final Presentation & Design Review
Milwaukee School of Engineering
Dr. Rodriguez
4/20/2026

MS
OE

UNIVERSITY

Team Intro

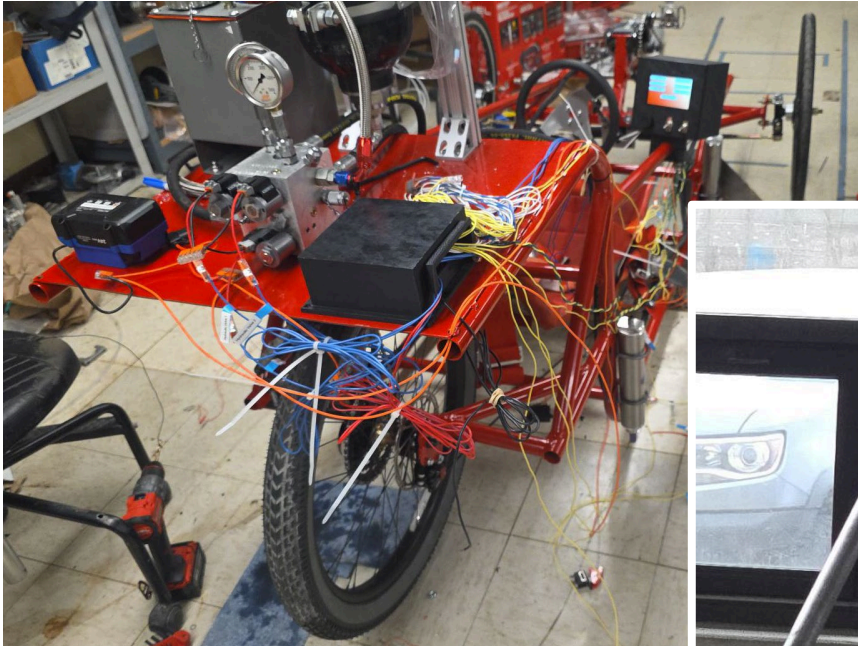


- Guadalupe Ernesto Sandoval – Team Lead, Controls Subsystem Technical Lead
- William Schewe – Hydraulics Subsystem Technical Lead
- Mike Rose – Frame Design Technical Lead
- Daniel Cantu – Pneumatics Subsystem Technical Lead
- Jeffrey Kaas, CFPHS – Hydraulic Advisory
- Michali Perez – Engineering Support (not pictured)
- Dr. Luis Rodriguez – MSOE Faculty Advisor (not pictured)
- Fluid System Components
 - Harley Quarnstrom – Engineering Manager (not pictured)

Vehicle Construction



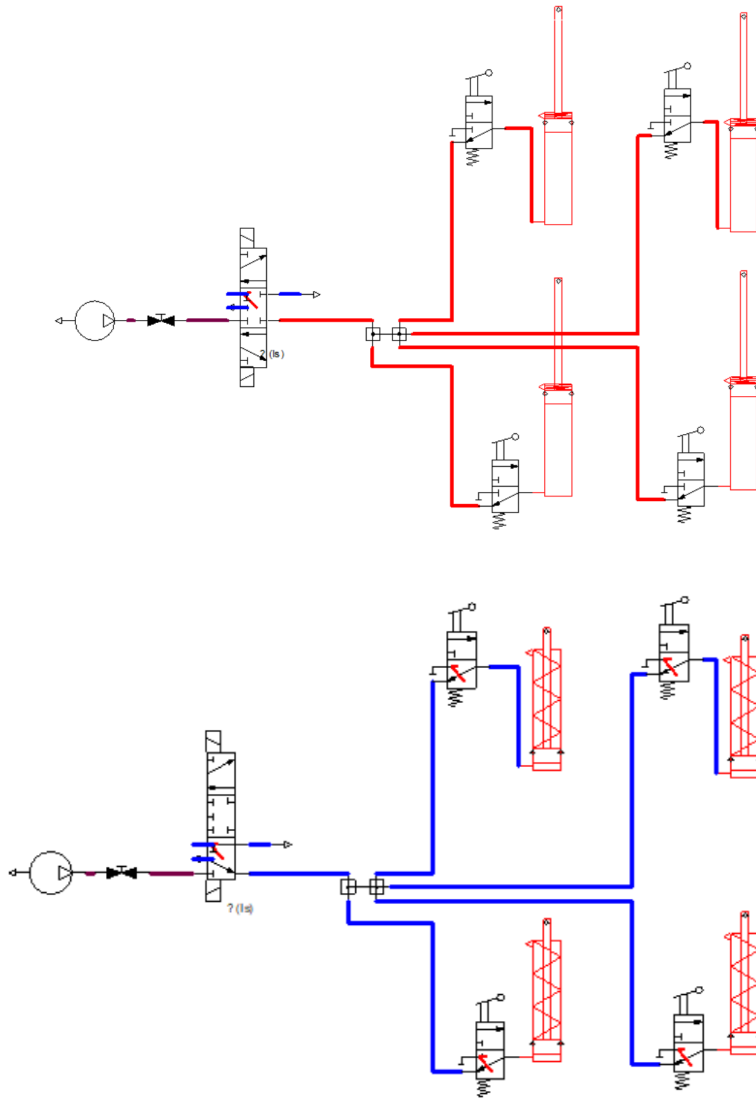
Vehicle Construction



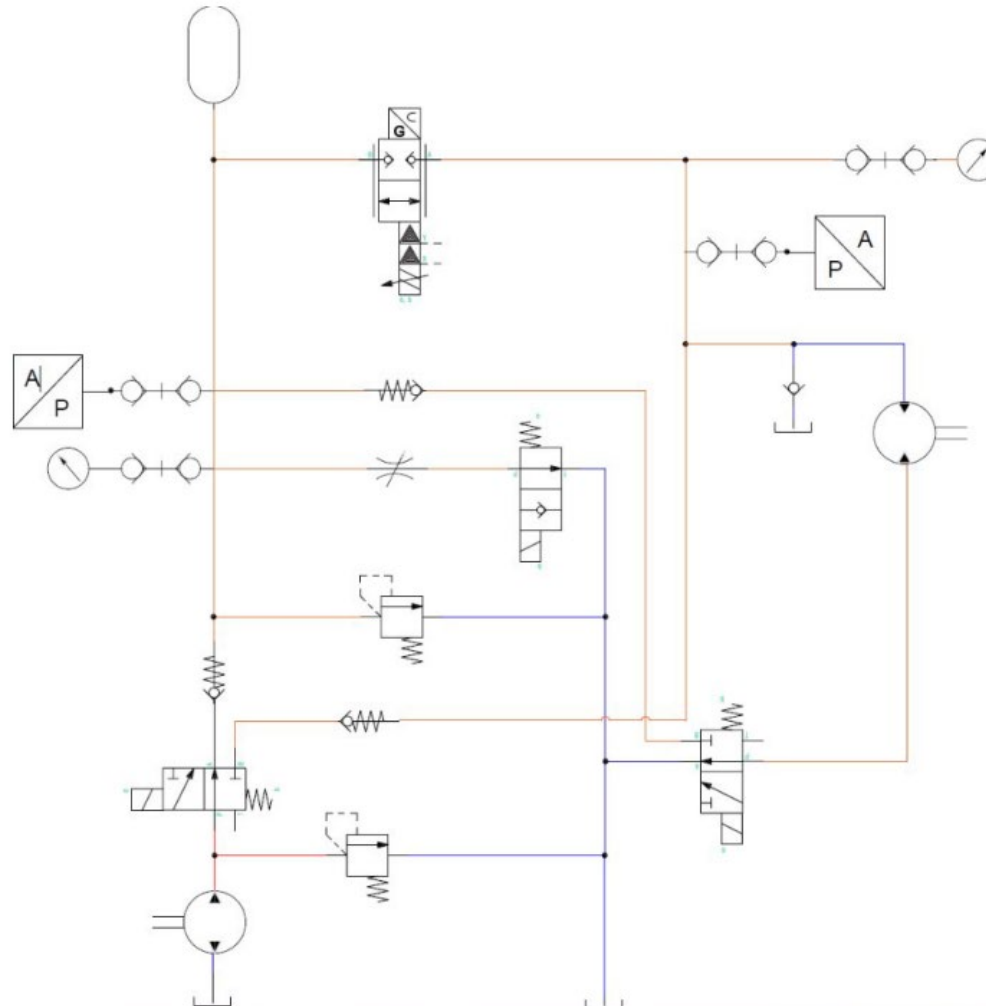
Final Vehicle



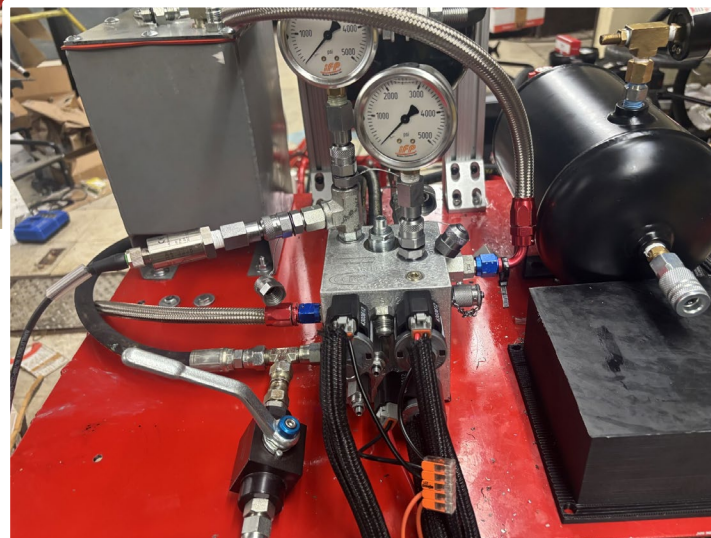
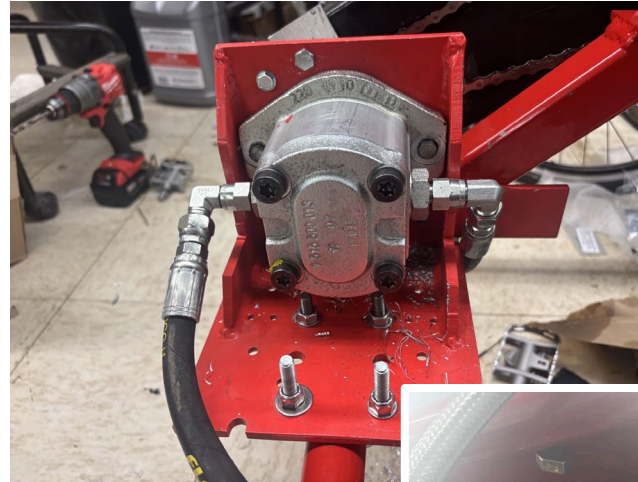
This Year's Pneumatic Circuit



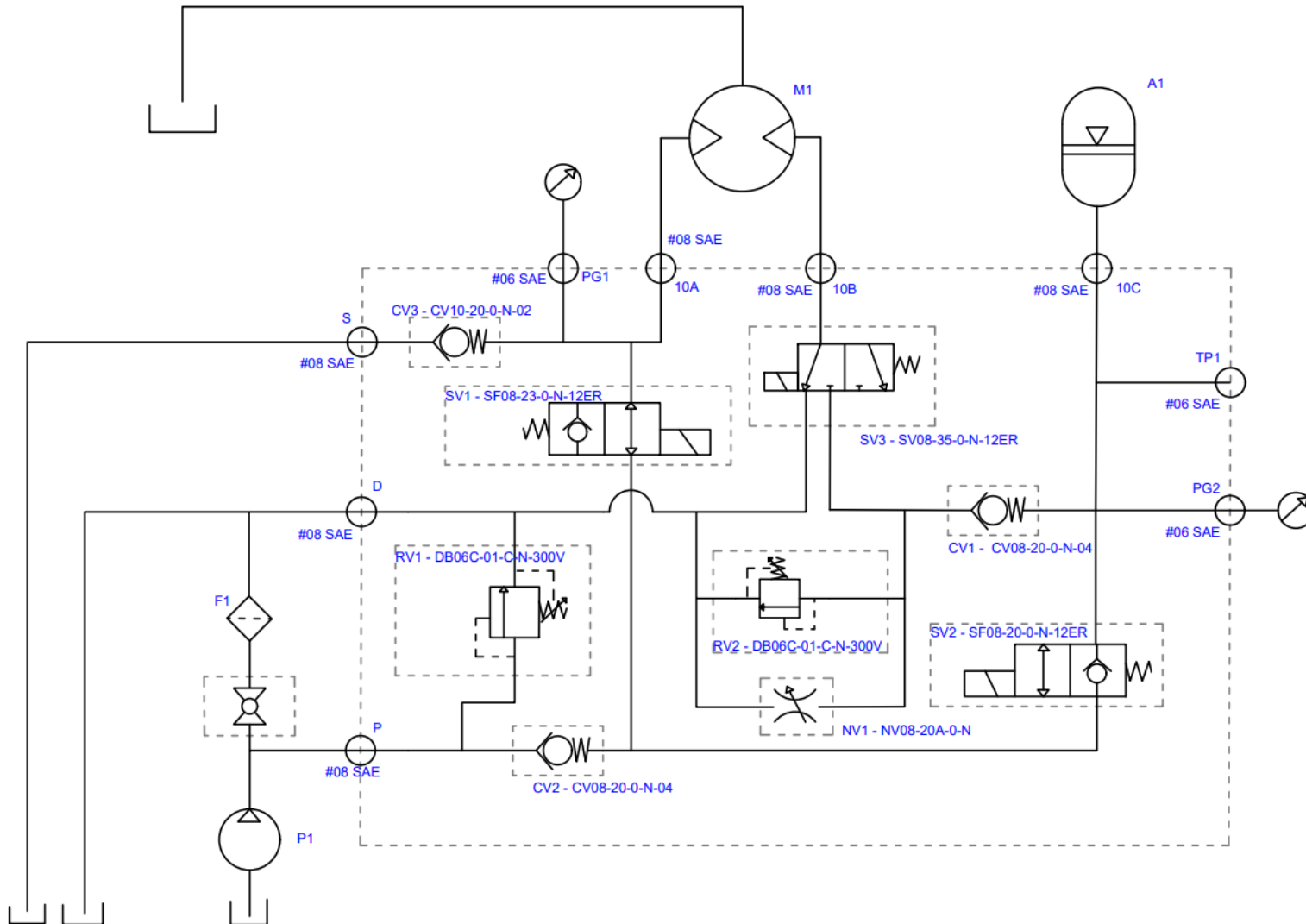
Previous Year's Hydraulic Circuit



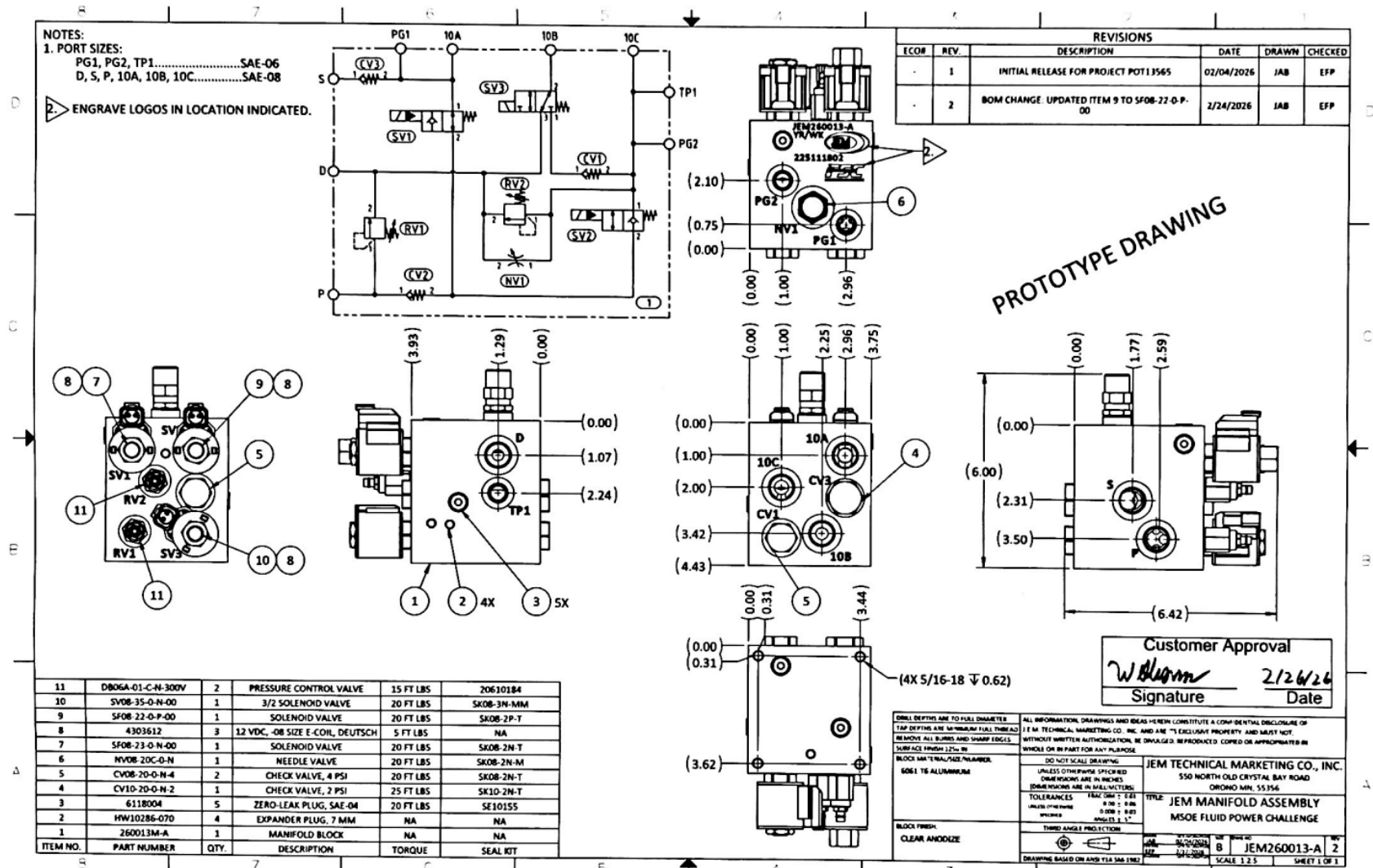
This Year's Hydraulic Circuit



This Year's Hydraulic Circuit



Manifold Design



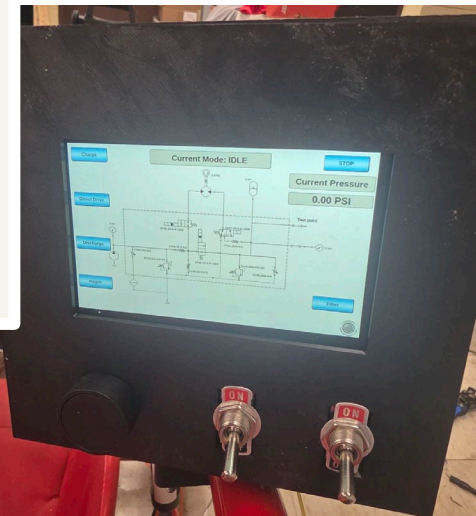
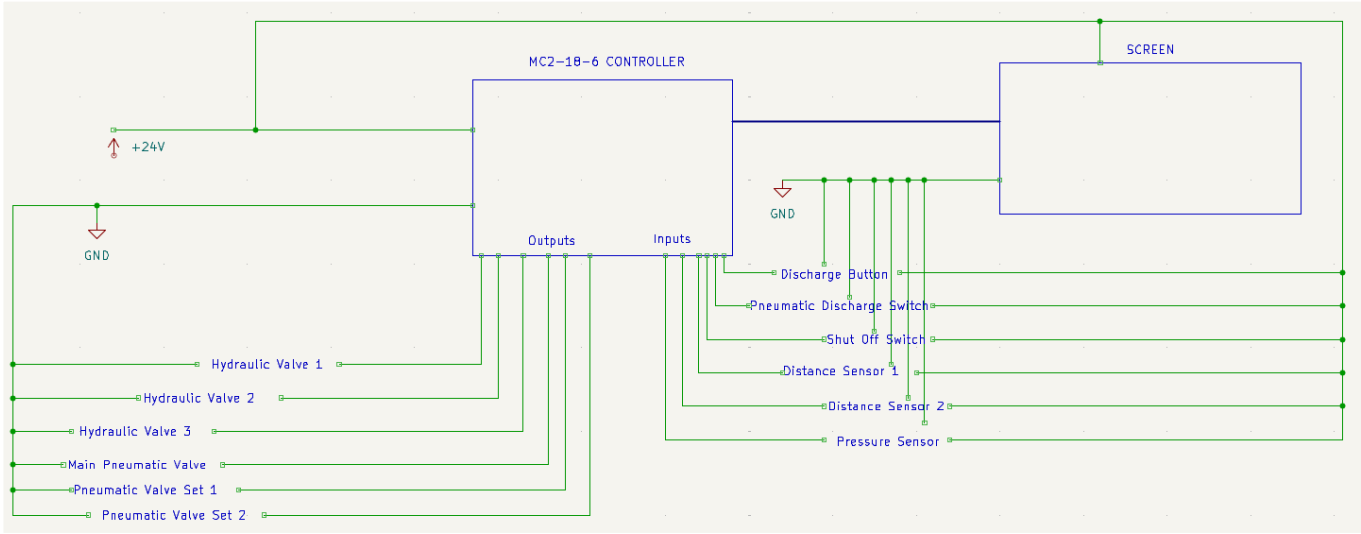
REVISIONS					
ECOM	REV.	DESCRIPTION	DATE	DRAWN	CHECKED
-	1	INITIAL RELEASE FOR PROJECT POT13565	02/04/2026	JAB	EPF
-	2	BOM CHANGE. UPDATED ITEM 9 TO SF08-22-0-P-00	2/24/2026	JAB	EPF

PROTOTYPE DRAWING

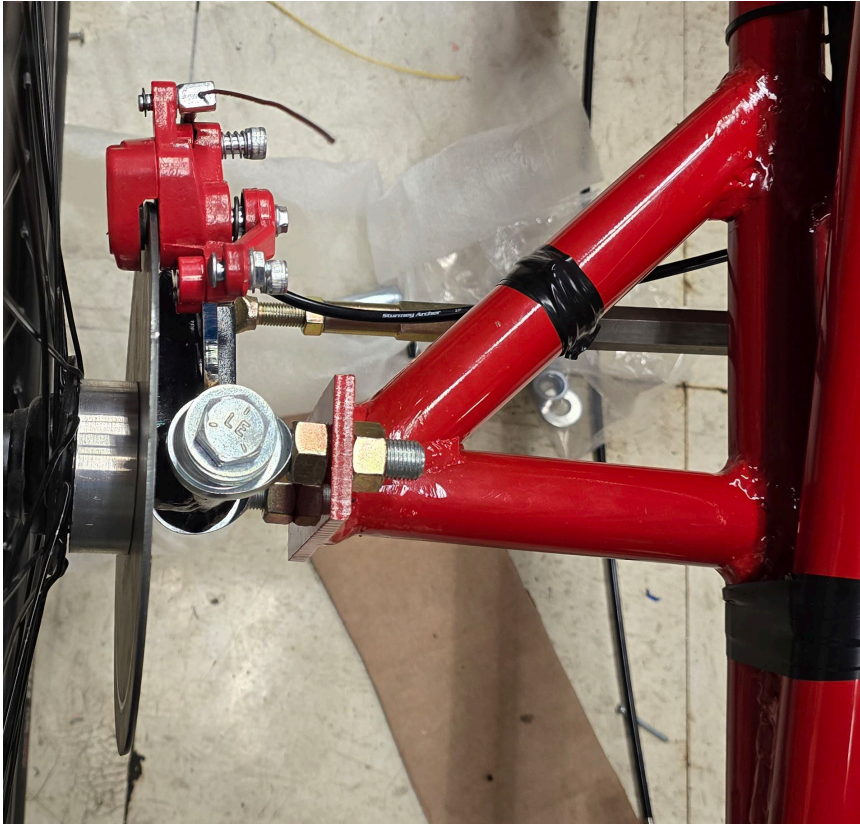
Customer Approval
W. Blum 2/26/26
 Signature Date

SMALL DEPTHS ARE TO FULL DIAMETER. TAP DEPTHS ARE MINIMUM FULL THREAD. REMOVE ALL BURRS AND SHARP EDGES. SURFACE FINISH: 12.5 μm BLOCK MATERIAL: ALUMINUM 6061 T6 ALUMINUM BLOCK FINISH: CLEAR ANODIZE	ALL INFORMATION, DRAWINGS AND IDEAS HEREIN CONSTITUTE A CONFIDENTIAL DISCLOSURE OF JEM TECHNICAL MARKETING CO., INC. AND ARE THE EXCLUSIVE PROPERTY AND MUST NOT BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, WITHOUT WRITTEN AUTHORIZATION. BE OMALED, REPRODUCED, COPIED OR APPROPRIATED IN WHOLE OR IN PART FOR ANY PURPOSE. DO NOT SCALE DRAWING. UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES DIMENSIONS ARE IN MILLIMETERS TOLERANCES: FRACTIONS: ±0.005 DECIMALS: ±0.005 ANGLES: ±0.01 UNLESS OTHERWISE SPECIFIED THIRD ANGLE PROJECTION	JEM TECHNICAL MARKETING CO., INC. 550 NORTH OLD CRYSTAL BAY ROAD ORONO, MN, 55356 TITLE: JEM MANIFOLD ASSEMBLY MSOE FLUID POWER CHALLENGE DATE: 2/24/2026 DRAWN: JAB CHECKED: EPF SCALE: 1:1.5 SHEET 1 OF 1
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Electrical System



Vehicle Testing

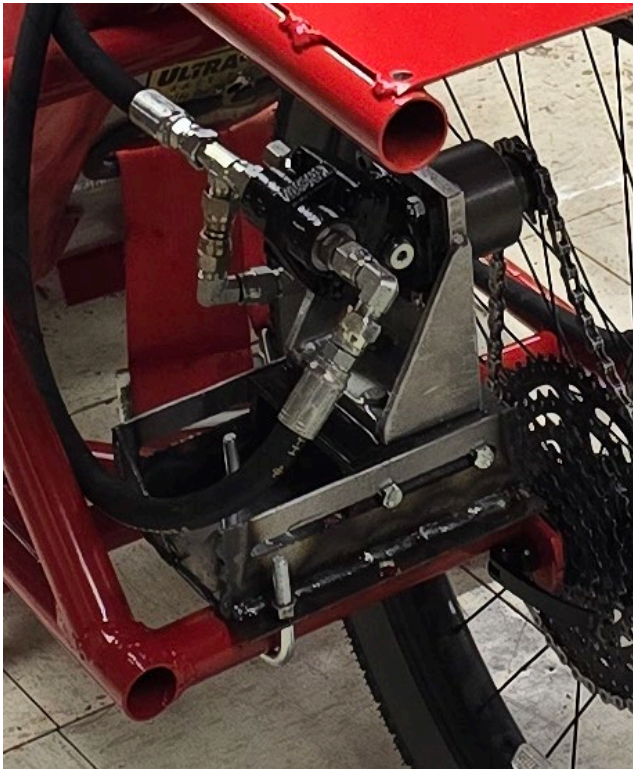


Front rotors warped due to excessive clamp force from caliper



Rear Wheel Had Tendency to Wobble

Vehicle Testing



Difficult alignment of motor position parallel to rear axle



New motor mount uses larger tapped holes instead of slots

Lessons Learned

- Start construction early
 - Things never go right the first time
 - Always have a contingency plan
- Chain alignment is crucial
 - Carryover from last year's concerns
 - Used laser tool this year
- Accumulator releases all pressure in any mode but charge/regen
- Pressure buildup creates lots of pedal resistance
- Make sure rigid fittings are aligned properly
- Have back up options
 - Some valves or ports might have different size than intended
 - Having alternative options is crucial

Questions?

