The Utility Terrain Vehicle (UTV)

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Off-road Utility is:

- The ability to cross terrain quickly while carrying all the possible gear required to get a job done.
- A proper UTV will always have a bed, a relatively comfy cabin, and 4 wheels

Applicable Standards

- 4 wheels or more (ANSI/OPEI B71.-2016)
- Intended to transport people & cargo (ANSI/OPEI B71.9-2016)
- Non-straddle seat (not ATV/Motorcycle) (ANSI/OPEI B71.9-2016)
- Pedals and steering wheel controlled (ANSI/OPEI B71.9-2016)
- Top speed of at least 25 mph (ANSI/OPEI B71.9-2016)
- 80” Width maximum (ANSI/OPEI B71.9-2016)
- 4,000 lb weight load maximum (ANSI/OPEI B71.9-2016)
- Minimum cargo load capacity of 350 lbs (ANSI/OPEI B71.9-2016)

End User

- Workers in difficult terrain need a way to transport themselves and their various equipment across vast amount of land. The UTV solves this issue

State of the Art

- 2013 John Deere Gator 855d
  - 850cc I3 Diesel
    - 37 ft-lbs, 23 bhp
  - CVT Transmission
  - All-Terrain Tires
  - 9’8” long, 62” wide, 75” tall
  - 11” Ground Clearance
  - 1697 lbs dry
  - 1400lbs Carrying Capacity

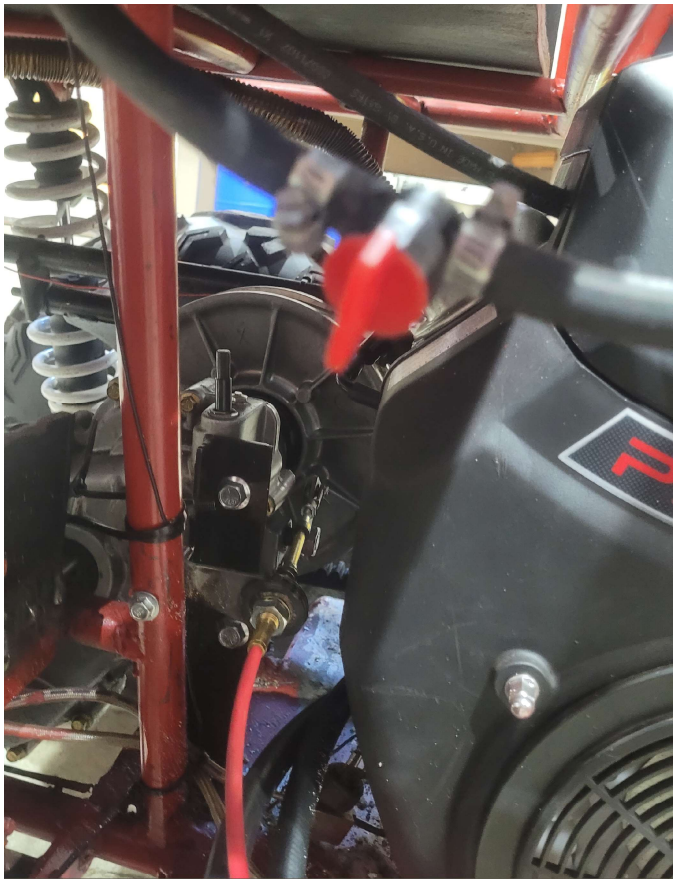
Summary of Work Done:

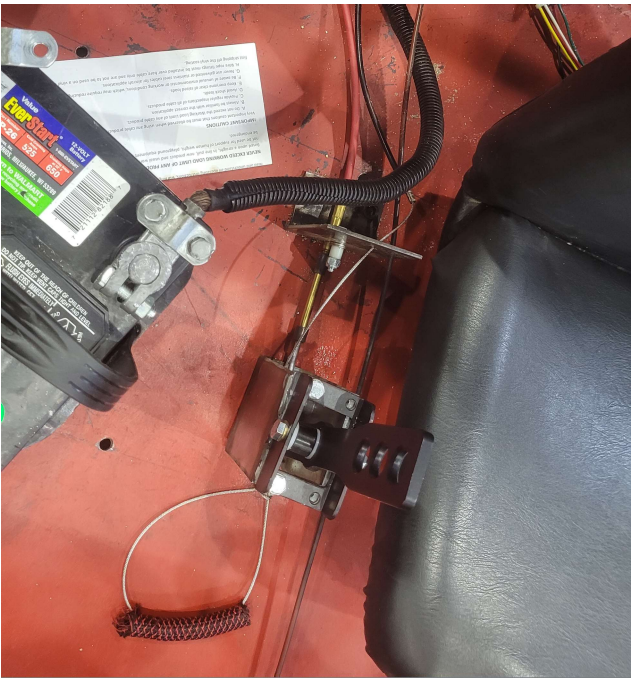
- Adjusted Ignition Wiring & Key Location
- Installed Fuel Cut-off Valve & Reinstalled Radiator
- Installed Shift Lever & Moved Choke
- Fabricated and Installed Steering Rack Extension
- Brake Lever Fulcrum Adjustment
- Installed New Fuel Pump & Cleaned Carburetor

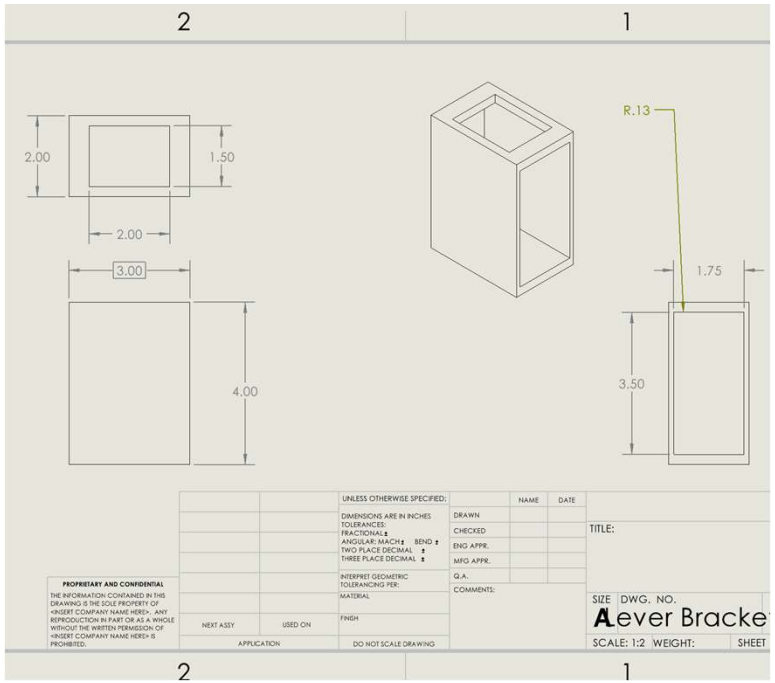
Ignition Wiring Relocation

- The ignition was moved from the engine (out of reach of the driver) to the cockpit for easy access.

Radiator Relocation & Fuel Valve Install



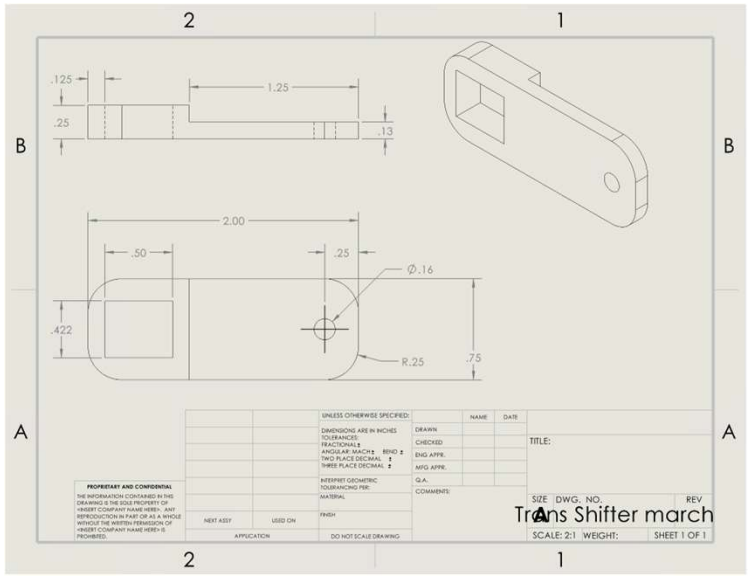




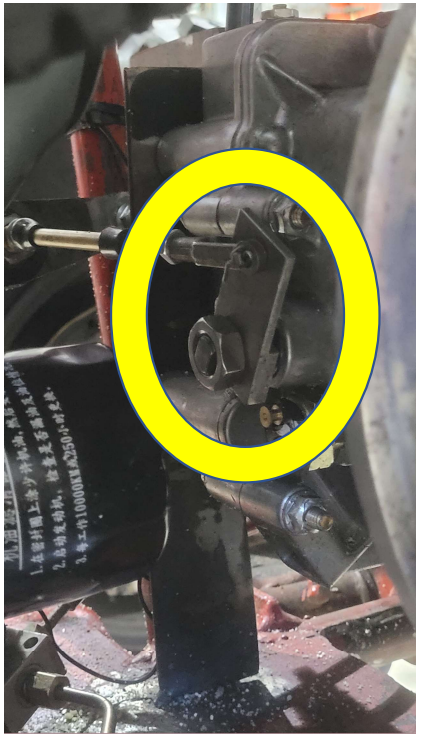
Shift Lever Installation &Choke Location Changed

- Shift Lever & cable were purchased, mounting brackets were fabricated

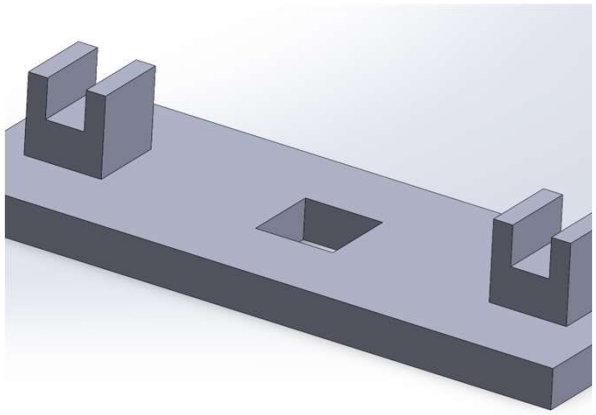
Drawings for New Shift Bracket (Cable to Transmission)

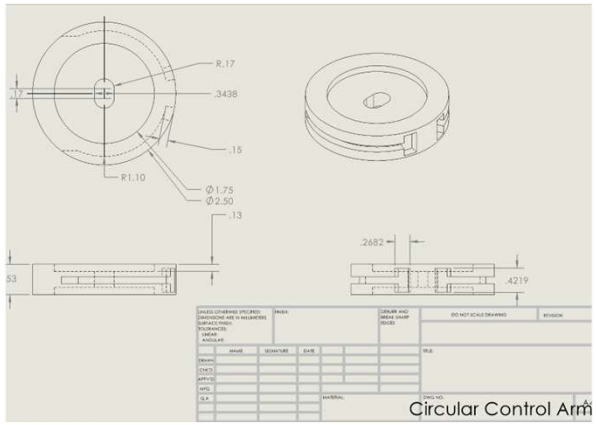


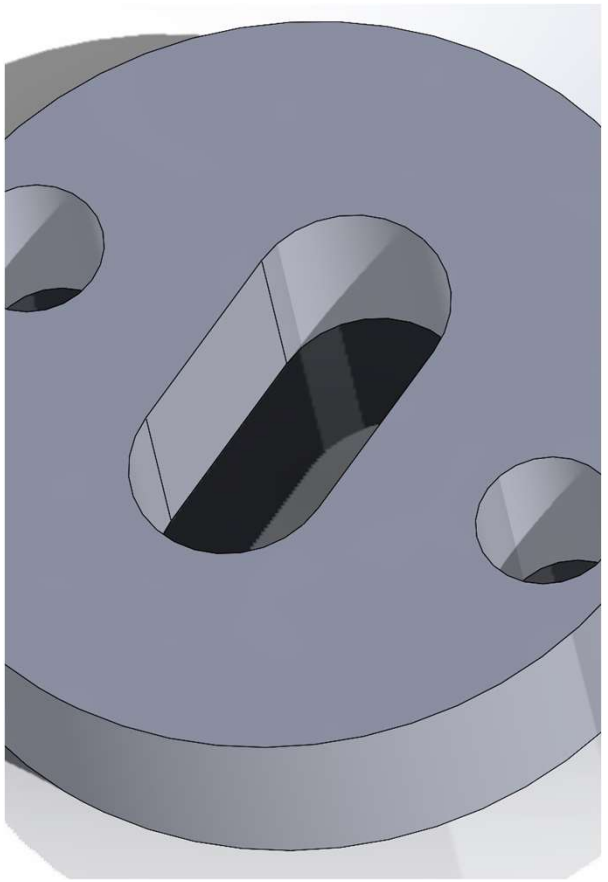
- The shift linkage needed to be attached to the transmission, so a custom shift-bracket was designed and fabricated

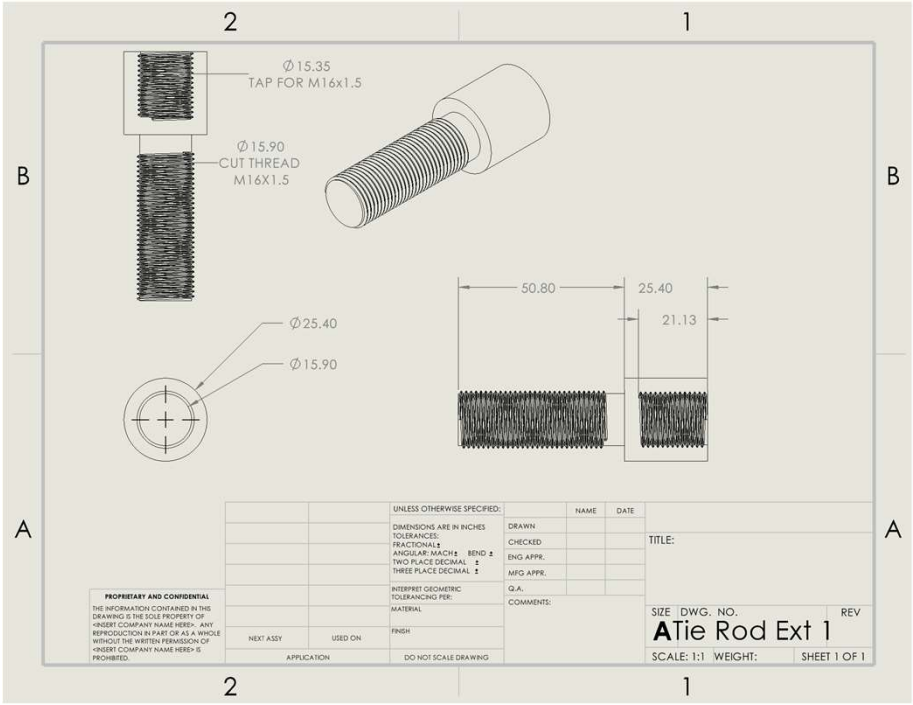


Previous Shifter Control Arm Drawings:







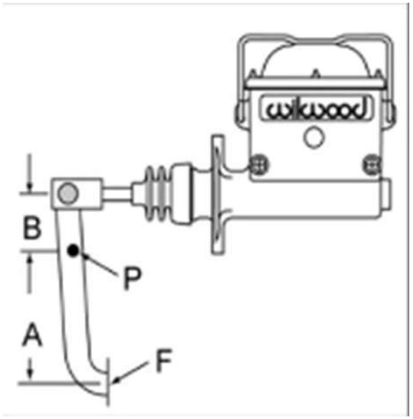


Steering Rack Extension

- Designed, Fabricated, and Installed to help mitigate bump-steer,

Brake Fulcrum Changed

- Stopping Power used to be minimal in the UTV. To elimate this problem, the pivot point (fulcrum) for the brake lever was changed.



Brake System

$$F = \frac{\frac{1}{2} \cdot m \cdot v^2}{x_{dist}}$$

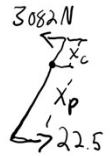
$$F = \frac{0.5 \cdot 515 \cdot \left(\frac{50}{36}\right)^2}{15} = 3082N$$

Pedal force should be ¼ weight of driver, assume 200lbs, 90kg, 22.5 kg desired

Currently, the fulcrum sits 5in away from the end of the pedal and 4 in away from the cylinder

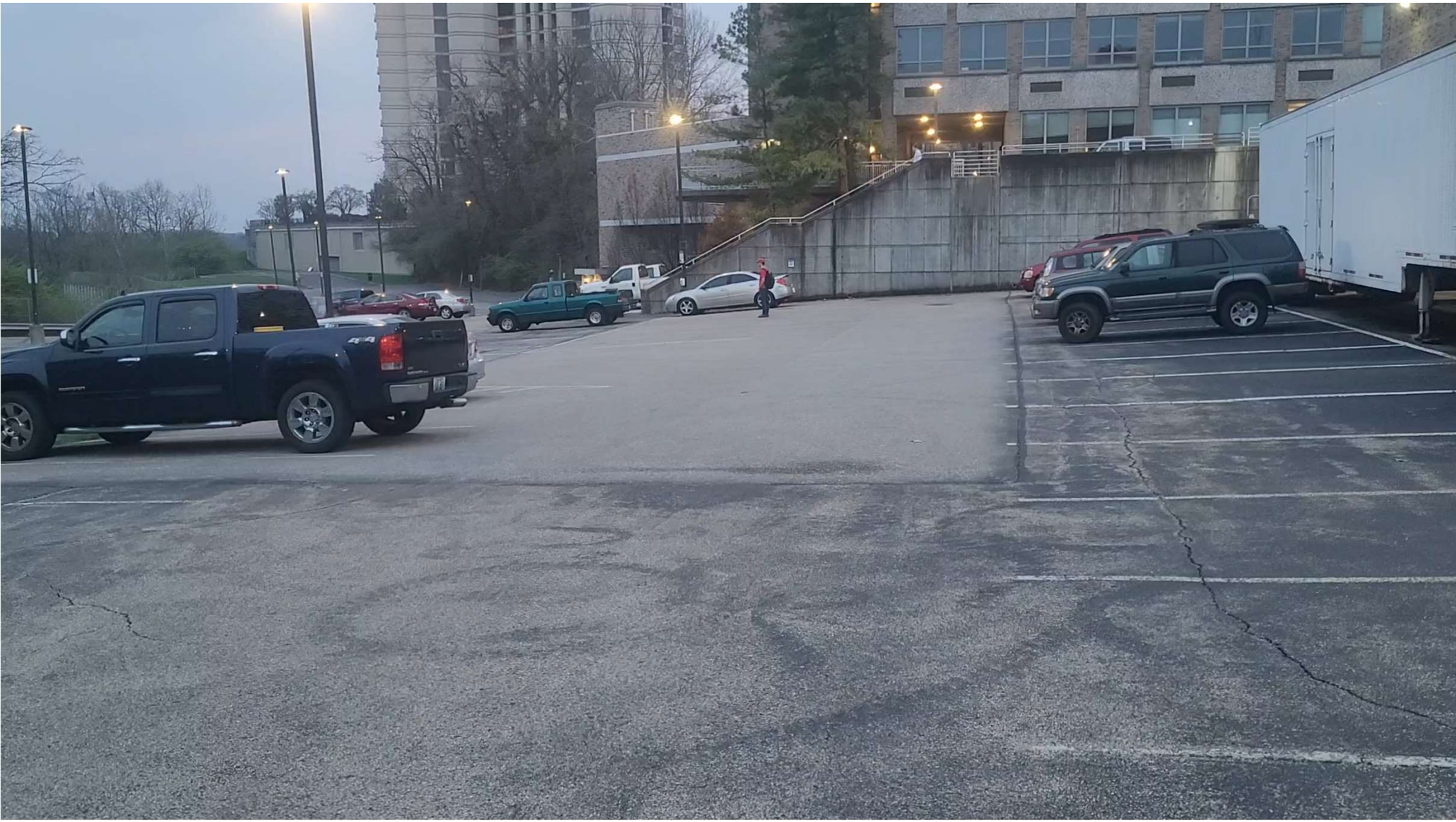
$\frac{F}{3082N} = \frac{4}{5} = 2465N$ is the current braking force required from the driver to completely stop the vehicle, which is far too high

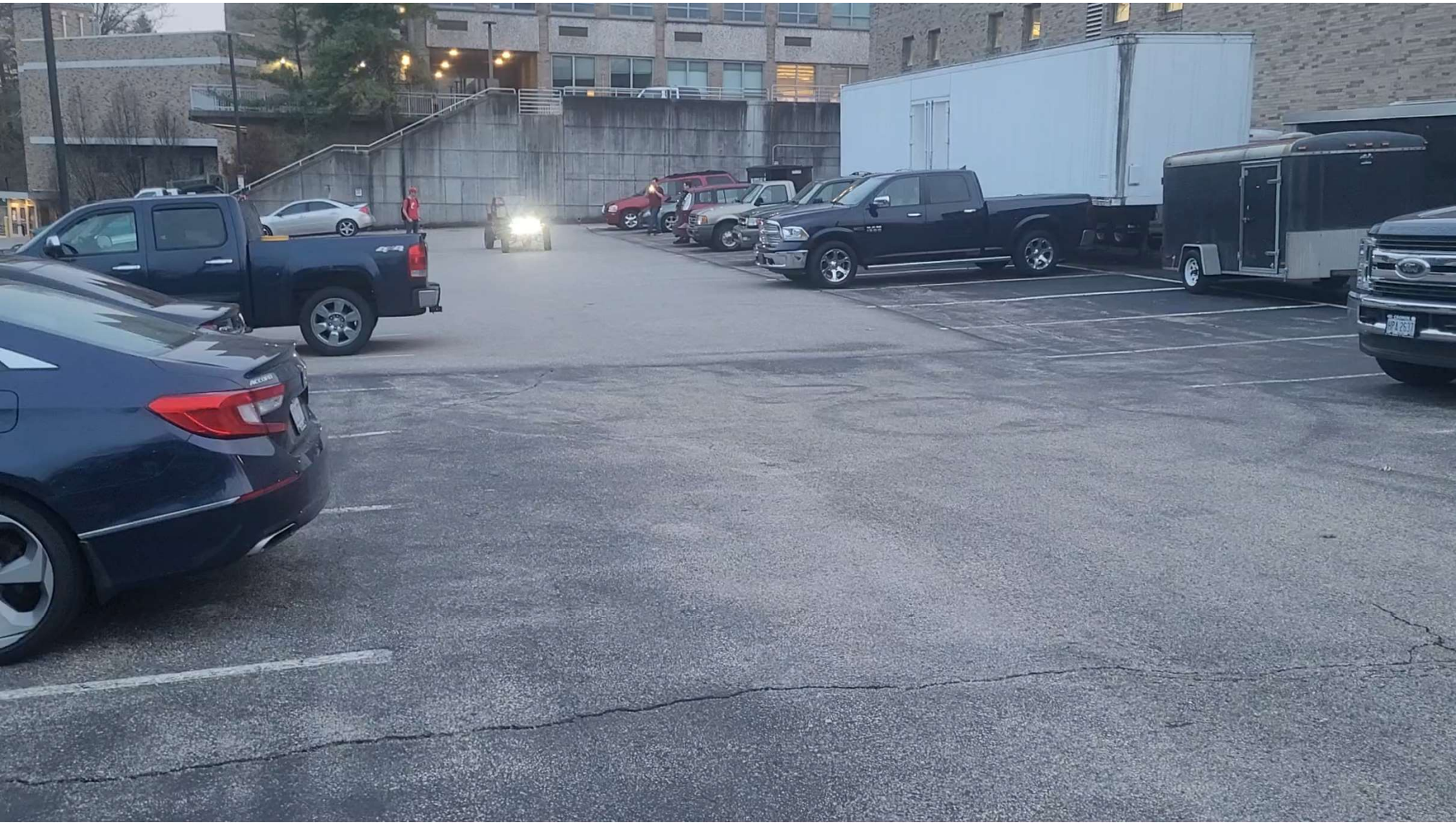
$$\frac{3082}{220} = \frac{14}{1}\frac{xp}{xc} \; length\ ratio$$



Starting the Engine for the first time:

- List of problems:
  - Wires coming lose
  - Old gas in tank
  - Bad fuel pump
  - Gas in crank case
- Solutions
  - Rewire ignition & check all connections
  - Drain old gas, clean carburetor thoroughly
  - Replace fuel pump
  - Change oil



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Thank you for your time!