Adding Electric Power Steering to an Avanti

In 2012 when I bought my R2 Avanti, R4399, it had the original size tires that would have come on it when it was new. It had the "Quick Steering" option and was hard to turn at low speeds, and it was nearly impossible to turn when it was stopped.

Then I decided to change the wheels to real knock off wheels, retained with a spinner and not lug nuts.

This not only meant that the wheels were wider, but the tires would be wider. This would increased the amount of rubber on the pavement and therefore the steering effort to turn the wheels. I drove the car like this for several years and then replaced the steering box, rebuilt the front suspension, and even changed the steering arm pivot from one with a bushing to the type with needle bearings to decrease friction. But nothing helped, so I decided to do something about this...
before the muscles in my arms got bigger than my thighs.

I saw a video on You Tube about someone who had put electric steering on a Cobra. It seemed that he had the same trouble I had turning at low speed, so I decided to make my own.

I added Vintage Air to my car, and since it was an R2 there was nowhere left to put a power steering pump so bought a used Avanti steering column on E Bay and started the head scratching.

I bought a steering unit from a 2005 Saturn Vue.
I wanted the result to look like the original steering column, so I started to measure everything. After I took off the tilt adjuster from the Saturn unit, I found out that the Saturn column would fit exactly into the Avanti column.
I cut the tube just past the bracket that holds the steering column to the brace under the dash. All the torque from the motor would be transferred to this brace.
Inside of the Saturn column is a sliding shaft, it slides on the shaft from the motor. This would have to be welded to the Avanti shaft.
As you can see in the picture, there is a snap ring that keeps the shaft from pulling out of the Saturn housing. The Avanti shaft has 2 grooves for snap rings to retain the bearing in the upper housing.
This keeps the shaft from moving down and the snap ring on the Saturn keeps the shaft from pulling up.

After careful measuring I cut the Avanti shaft an inch long and turned the end down ½” and threaded it. The Saturn shaft was then tapped to ½”-13 and then they were screwed together before being welded.
The weld was then turned down. This wasn`t necessary but I did it anyway since it was already in the lathe.
The hole you see in the picture is the roll pin that I installed before the welding. The next four pictures are how the upper part of the complete steering shaft looks.
The 1/4" bolts were installed to position the motor after it was installed in the car. That way I could rotate the motor if there was any interference with anything under the dash. This also enabled me to lock it in position before I welded the two parts together.

Now that I has that worked out, I was able to start on the bottom shaft.
After careful measuring I cut the lower part of the Avanti shaft, leaving it 1" long. The 1" section was then turned down to 1/2" and the Saturn shaft was drilled out to 1/2". Both parts were tapped and threaded to ½"-13 and screwed before being welded.
The lower steering column bushing needed to be replaced on the old column, so I bought a new one from Studebaker International. The problem was how to install it after the two parts were welded. I finally decided to put the bushing on before the parts were welded. I soaked a shop rag with water and moved the bushing to the narrow part of the Saturn shaft. This worked just fine and there was no damage.
After welding it was back to the lathe to clean up the weld.

I checked the diameter of the flange on the lower part of the motor and it fit exactly into the steering column jacket so I cut it to length and drilled and tapped
three holes for 10-32 screws.

The holes were cut into the motor housing and tapped also. On the other side I made a bracket.
I made a bracket for the bottom and drilled and tapped a hole for a 1/4" bolt.
The lower Saturn shaft has a U-joint in it and a bolt to lock it to the motor shaft, so I drilled an access hole.
Now that I had the mechanical part worked out so the next step was the electrical part.

The Saturn motor came with an 80-amp fuse. I’m sure the motor would only draw a few amps in normal driving but to be safe I used two 40-amp relays and #8 wire. The relays would be energized when the ignition switch was in the "run" position. I also made a wiring harness.
To make this unit work without the Saturn computer, you need to buy this controller, it`s sold on E-Bay and comes from Portugal and cost about $50.00. It has a rheostat that controls the amount of assist that the motor supplies.
The turn signal switch wires had to be moved to the bottom of the column, so I cut a hole with a Dremel tool on the bottom of the tube. It was cut just below the lower bell to route the wires for the turn signal switch.
The turn signal wires were routed to the bottom of the column from their original location inside of the tube.
The piece you see in the next picture is the guide for the turn signal wires. It is inside of the Avanti tube and must be removed. It is held in place with 4 spot welds. In this picture I have already cut the guide to the length I needed.

I attached it with four button head screws so it could be removed to insert the turn signal wires.
This is how the completed steering column looks.
I used some old parts to build this column in case I made a mistake. Now that I have everything worked out, I’ll make another one.

Here is a picture of the relays and wiring mounted in the car.
Adding power steering was one of the best things I have done to improve the drivability to my car.

Below are some notes I made as I was working on this project. They contain the dimensions and electrical diagrams.
OVERALL LENGTH OF STEERING COLUMN JACKET BEFORE CUTTING 30 7/8"

INNER SHAFT BEFORE CUTTING 35"

13 7/8" FROM END OF JACKET TO END OF FEMALE

UPPER END OF SHAFT IS CUT TO 8" O.C.

THEN THE BOTTOM 1" IS TURNED TO 1/2"

LOWER END OF SHAFT IS CUT TO 5" THEN BOTTOM 1" IS CUT TO 1/2"