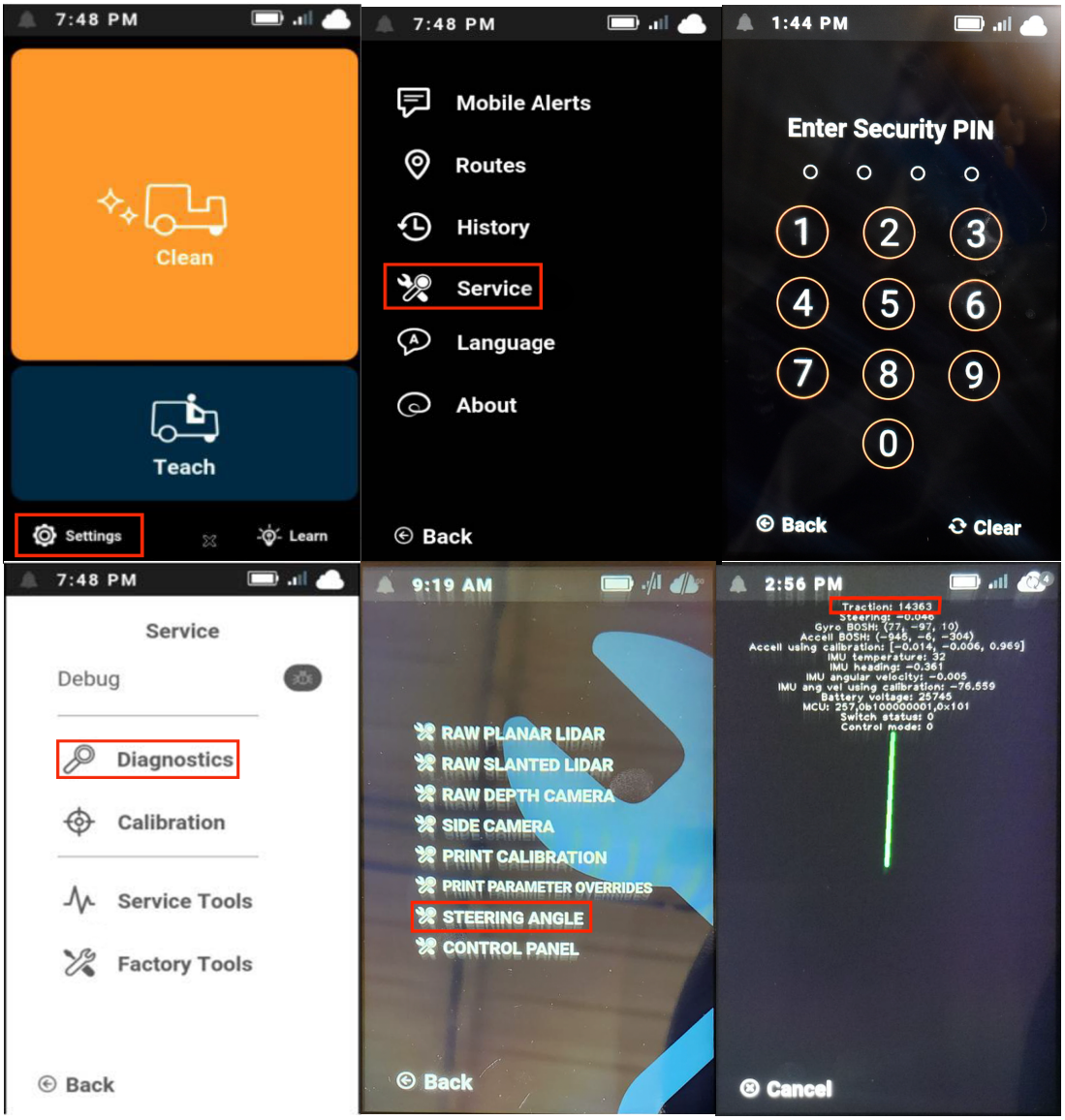
# Troubleshooting/Replacing the Traction Encoder

The Traction Encoder is responsible for tracking the movement (distance) traveled by the scrubber. As the traction wheel spins, the encoder counts ticks and relays that information to the robot, thereby quantifying and monitoring how much distance the scrubber has moved.

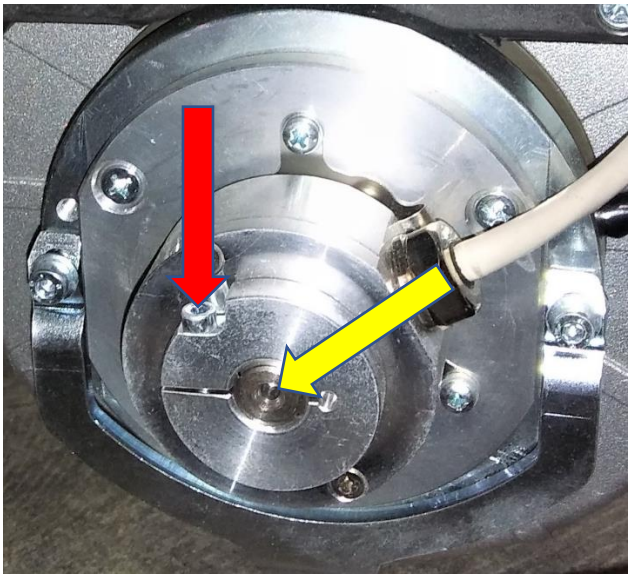
First, confirm the robot is not receiving information from the encoder. This value may be observed in the Steering angle section of the UI. As the unit is manually driven forward and backward, the Traction value should increase or decrease.

Select **Settings**->**Service**->**Enter PIN**->**Diagnostics**->**Steering Angle**
As the unit is manually driven forward and backwards, the Traction value should increase or decrease.



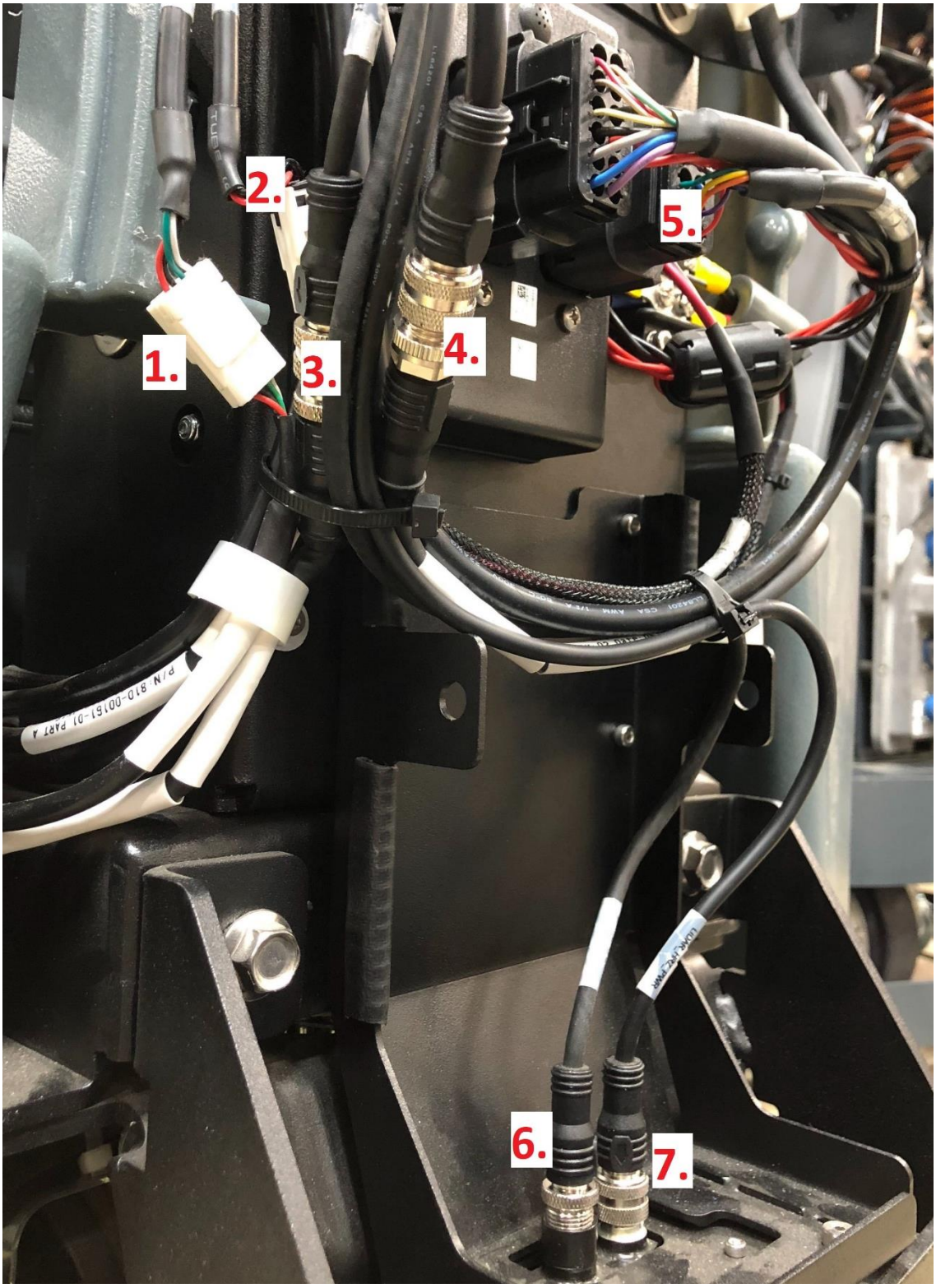

If it does not the following troubleshooting steps are recommended:

1. The indicated hex screw should be tight, which should enable the encoder to bite the center axel. As the unit is driven, both the encoder and axel should spin. When it spins, ticks are sent and counted by the robot.



2. The Downtrunk is a cable bundle that connects various sensors, encoders and indicators to a common plug which couples to the Brain Control Module (BCM). The cable from the BCM isn't long enough to connect to the encoder, so an extension is utilized. Here we will bypass the extension and connect the replacement encoder directly to the Downtrunk cable.

    1. START_PAUSE
    2. ESTOP
    3. SP_ETH (SSH Port)
    4. **ENC_TRACT1**
    5. STEERING
    6. LIDAR_HRZ_ETH
    7. LIDAR_HRZ_PWR
    8. ENC_ABS (Steering Encoder)


1.
2.
3.
4.
5.
6.
7.

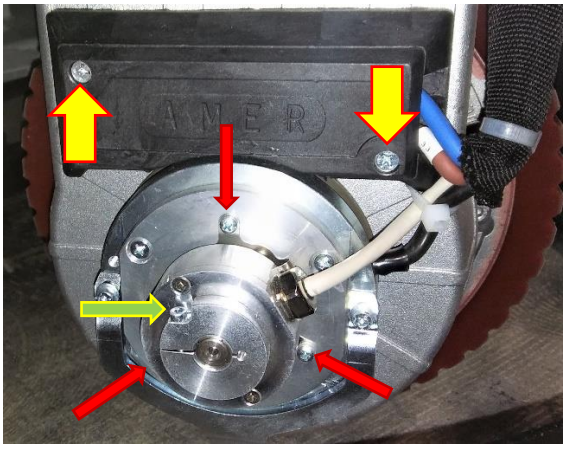
Once plugged in, spin the inner part of the encoder by hand and look for a traction response on the Steering Angle diagnostic screen. If a response is not seen with the new encoder, then the issue may be in the Downtrunk, the BCM or the software. Replacing the Downtrunk is the next step, which is outlined in a separate procedure.

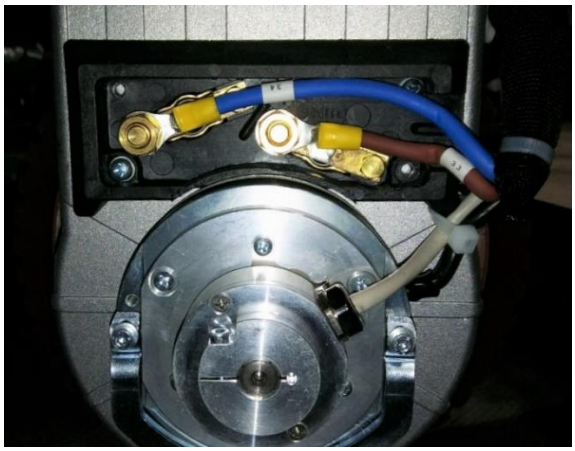
If a response is seen, then the Downtrunk is good and the issue is likely with the original encoder itself or with the extension cable.

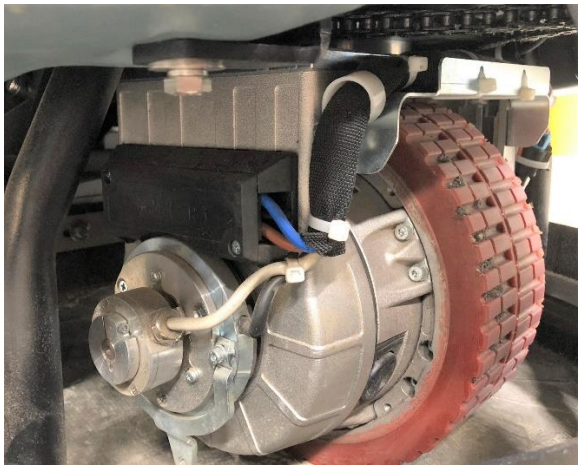
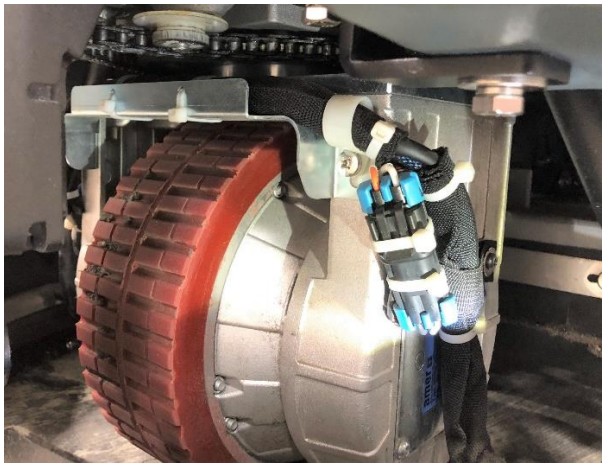
3. The encoder and extension cable come together inside of a woven sheath and are routed underneath the unit. Getting to the junction is difficult as it resides almost in the middle of the sheath. The "easiest" way to do this is as follows:

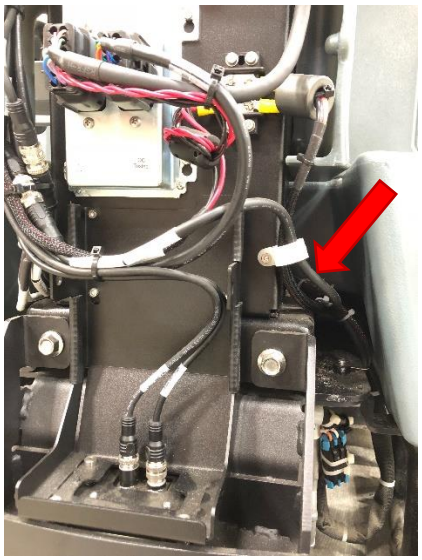
   Remove the black shield which covers the drive power connection. Loosen the nuts and free the cables. **Note: The unit will be powered on at this time, so it is important, with the cables exposed, not to trigger the seat sensor and push the accelerator pedal.**

   Loosen the hex screw which locks to the center axel, then remove the three Phillips screws that secure the encoder.

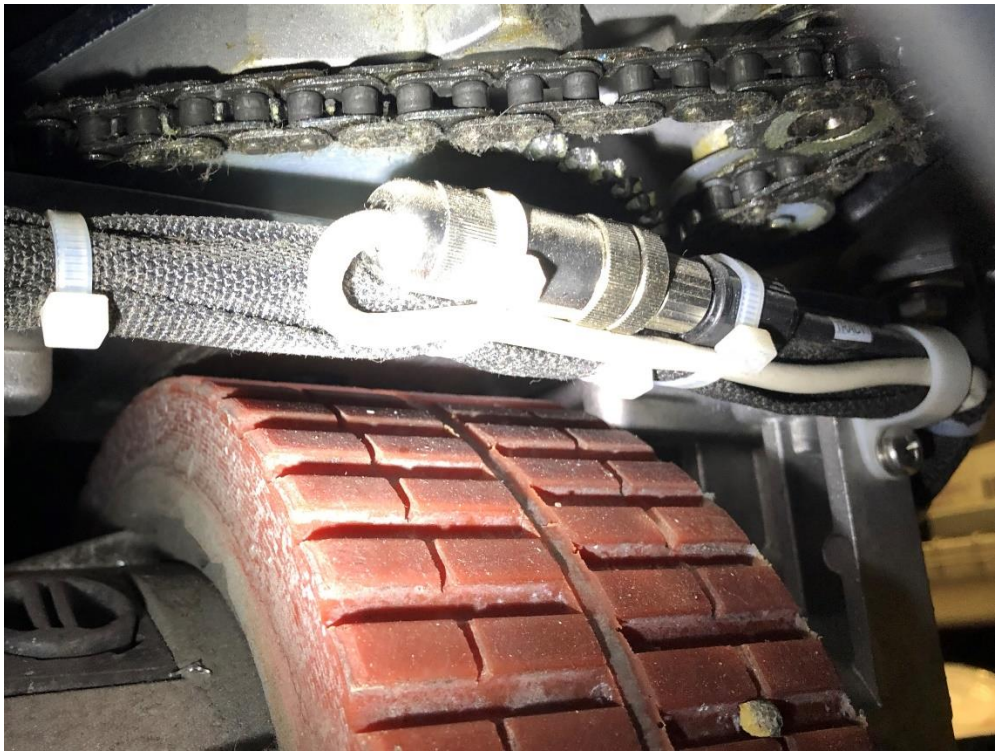




It will be necessary now to cut zip ties and remove the screws that hold the plastic routing loops. The goal is to pull the bundle away from the unit to allow access and pull back the weaved mesh to expose the coupling beneath. It is tedious and can be difficult, but it can be done. The coupling looks very similar to this within the sheath.



Decouple the encoder from the extension cable. Plug the new encoder into the extension cable, spin the inner part of the encoder by hand and look for a traction response on the Steering Angle diagnostic screen.

If the traction value increase/decrease, then the faulty part was likely the encoder. If the traction value still doesn't increase, the issue may be in the extension cable.

Plug the original encoder directly into the Downtrunk, spin the inner part of the encoder by hand and look for a traction response on the Steering Angle diagnostic screen. If the traction value increases, the faulty part is likely the cable. If the value STILL doesn't increase, both encoders may be bad. It is also possible that the BCM or the software may be the cause.

To replace the extension cable, it will be necessary to trace its path from the Downtrunk cable to the connection beneath the woven sheath. It may be easier to route it by connecting the new cable to the old cable and pulling it through.

Be sure to properly reassemble the unit paying attention to the locations of required zip ties.