



**REAX INITIAL TROUBLESHOOTING**

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# ReAX Column

Initial Troubleshooting Guide

Version 2.0



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## REAX INITIAL TROUBLESHOOTING

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### History

Version	Date	Description
1.0	2021-09-21	Initial release created by Applications Engineering
2.0	2022-03-07	Revised step 4 of mechanical calibration procedure to include engine start and eBus/hybrid procedures.



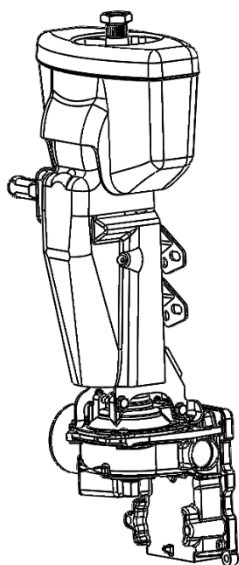
## Purpose

The purpose of this document is to provide a general overview of initial diagnostics and troubleshooting for vehicles equipped with the ZF ReAX C steering column.

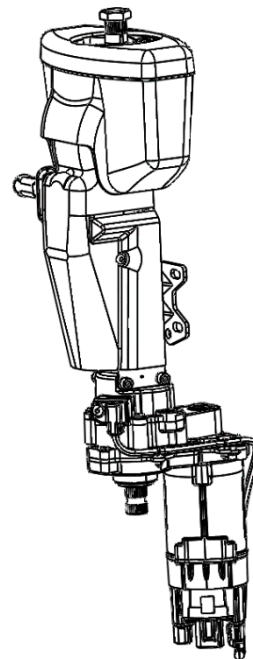
## ReAX Basics

This vehicle is equipped ZF ReAX adaptive steering technology. The ReAX Column (ReAX-C) product features an electric motor programed to provide dynamic assist and enhanced steering performance in conjunction with the hydraulic steering system. ReAX C replaces the formerly produced TRW "ColumnDrive". Similar to the outgoing ColumnDrive, ReAX C provides the following benefits:

- easier steering efforts while the vehicle is both in motion and while stationary
- smooth handling and adaptive steering feel from low to high speeds
- consistent steering experience independent of road conditions
- excellent reversibility from any turn angle at any vehicle speed while driving forward and while backing.
- cross wind and road crown compensation



*Figure 2: ColumnDrive*



*Figure 1: ReAX Column*



## Normal ReAX Function

The ReAX C column will exhibit normal behavior after wake-up. ReAX C should automatically wake up after receiving the ignition signal through the CAN connector. During normal operation, the column should provide smooth, easy steering to the driver. If at any point, ReAX is not exhibiting expected behavior, follow the below troubleshooting guide.

## Troubleshooting Guide

1. Is ReAX wired correctly?
2. Is ReAX operating correctly?
3. Is ReAX installed correctly?
4. Is ReAX calibrated correctly?
5. Are the right messages being sent to and from the vehicle?

### 1. Is ReAX installed correctly?

- Column should rotate without any interference to vehicle or shrouding
- If audible clicking, rubbing, or steering stiffness exists, remove steering wheel and check for interference between steering wheel and upper shroud. Follow OE guidelines for removing and installing steering wheel. If interference exists, contact OE Field Service
- Column should be mounted to column bracket with adequate torque to prevent unwanted movement or vibration

### 2. Is ReAX wired correctly?

- Ensure that the ReAX column is wired correctly, using the pin-out information shown in Appendix 2 of this document.
- If the column is turning on, an audible "click" will be heard at start up. (Once the vehicle ignition signal is received on internal combustion vehicles, or when put into drive or reverse on electric vehicles.)
- Check the column power fuse and ignition fuse on the vehicle and ensure the column is receiving 12V from the vehicle at the power connector.
- Ignition signal in the CAN connector should also read 12V after ignition is turned on



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- The steering column should be wired to vehicle CAN channel 1 (pins C & D on diagnostic port)
- Check continuity between the vehicle CAN harness for ReAX column and diagnostic port on vehicle
- Check voltage between pins C&D. Should be 5V
  - Check continuity between ReAX CAN harness and vehicle diagnostic port for all CAN channels (refer to Appendix 2)

### 3. Is ReAX calibrated correctly?

The steering column should not pull in either direction while driving straight down the road. If column is pulling in one direction, it may not be calibrated correctly or may be off center. Recentering can be completed via ZF Testman recalibration or by mechanically recentering the column.

#### Mechanical Recentering Procedure

1. Park vehicle on flat surface with road wheels pointed straight ahead.
2. Knife vehicle or disconnect vehicle battery
3. Disconnect the upper intermediate shaft from the miter box
4. **Ensure all personnel are clear of rotating shafts and steering linkages and any pinch points.** Turn the vehicle electronics back on or reconnected the battery, then turn ignition on and start the engine to wake the steering column up.

*For electric and hybrid applications, **be sure to have the vehicle parking brakes applied.** Apply firm pressure to the foot brake and switch the vehicle into high voltage mode and then into forward or reverse drive mode.*

5. The steering column should attempt to re-center itself. Once it has recentered and stopped moving, turn the vehicle back off and disconnect the battery or knife the vehicle off. Be sure to hold the steering wheel in position.
6. Reconnect the upper intermediate shaft to the miter box, be sure to follow OE installation procedure.
7. If needed, remove the steering wheel from the column and reinstall centered to vehicle and steering column, using OE specified torque and procedure. The



steering column should now be mechanically centered to the vehicle and should no longer be pulling in either direction.

#### 4. Is ReAX operating correctly?

- A small audible “click” should be heard every time when column wakes up. On internal combustion engines, this happens once ignition is turned on. For electric vehicles, the click occurs once the vehicle is put into drive or reverse.
- The column should attempt to center itself once it is awake. The column may not always completely return to center depending on internal system friction or friction at the road wheels, but it should move towards center (unless it is already perfectly centered)
- The column should provide smooth torque assist without unexpected noise or stiffness
- Perform an ignition key cycle to determine if column is waking up correctly
- If the column is still not operating as expected, contact OE field service, or connect ZF Testman diagnostic tool

#### Possible complaints from the field

**Hard Steering** - won't turn, locks-up, shuts-down, hangs-up, no assist, won't turn unless moving. ReAX would most likely not be a causal factor for this type of complaint. Look for symptoms in the regular hydraulic part of the system:

- Check hydraulic system to ensure flows and pressures are to specification
- Check front tire pressures
- Check the weight on the front axle
- Check for binding in the front suspension

**ReAX does not appear to be working** – static steer efforts high, reversibility poor, pull compensation non-existent (if one feature is not working all the others will not be working either). The easiest test to determine if the ReAX is functioning normally is to drive at a very low speed (about 5 mph) and turn the steering wheel to full lock with one finger in the



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steering wheel spoke (about 10 in-lbs torque required). If you cannot steer with one finger (and about 60 in-lbs torque is required) the unit is not functioning:

- Check voltage at the column power and vehicle ignition pins to ensure that it is no less than 9V and no more than 16V. See Appendix 2 for pin locations.
- If you have proper voltage to the back of the connectors and the system will not wake-up, disconnect the wiring harness and check the integrity of the pin connections in the terminal
- If you do not have proper voltage:
  - Check for a loose or broken ignition wire
  - Check for a blown ignition fuse
  - Check for a dead or dying battery.
- Removal and improper re-installation of the ReAX unit, or, removal and improper re-installation of the steering components between the ReAX output shaft and the steering gear input shaft. If joints are reconnected with the ReAX off center such that it is rotated beyond 3.5 handwheel turns from center before being powered up, the column may lose center position. If this occurs, Testman tool is required to recalibrate the unit.
- Check the column part of the ReAX for excessive friction causing binding of the input to the unit.
- Check the torque and angle sensor (TAS) connector at the bottom of the ReAX motor (refer to Appendix 1). The TAS resides in the belt housing portion of the ReAX Assembly and important signals are transmitted via a 5-wire harness that plugs into a connector near the CAN and power connectors (location shown in Appendix 2).

**Steering does not correctly re-center to straight ahead position** - This may be due to excessive friction on the steering column rotating group. Friction is the only known problem to cause the re-center feature to not work while other features do.

- Check for shroud rubbing on the steering wheel.

**Steering wheel pulls to one direction** - when the driver lets go of the steering wheel the steering wheel pulls to the right or left

- Check the alignment of the electrical/mechanical center of the ReAX column with the straight-ahead position of the road wheels. In order for this to occur, there had to





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be a disconnection and improper reinstallation of a joint between the output shaft of the column and the input shaft of the steering gear. Follow mechanical recentering procedure above

**Steering Wheel Spokes Off-Center** – while driving straight down the highway the steering wheel spokes are offset in the left turn or right turn direction. Note: Due to the “pull compensation” feature the wheel will be off-center when driving in a steady cross wind or on a road that is crowned. A good diagnosis of the problem is necessary here to decipher the difference.

- Check steering wheel alignment with the electrical/mechanical center of the column. Align the vehicle up on a straight line on a fairly flat surface. Turn the ignition switch off, wait 30 seconds and restart the engine with hands off the steering wheel. Drive about 20 ft with hands off and note the steering wheel position. If the coach continues to follow the line and the steering wheel is off straight ahead by more than 5 degrees in either direction, pull the steering wheel and index it to straight ahead



Appendix 1 – ReAX C overview

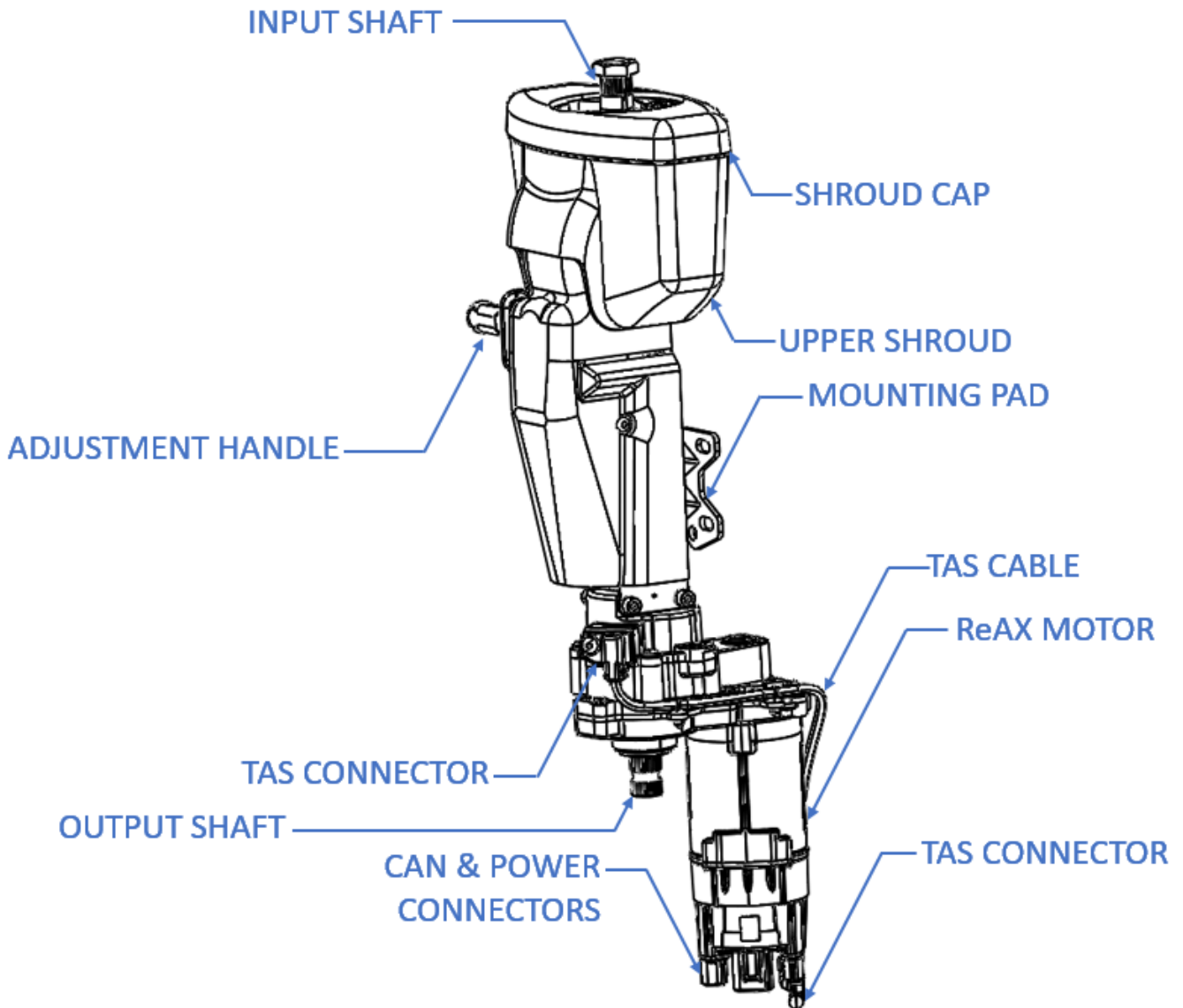


Figure 3: ReAX Column Details



## Appendix 2 – ReAX Connections and Pin Out

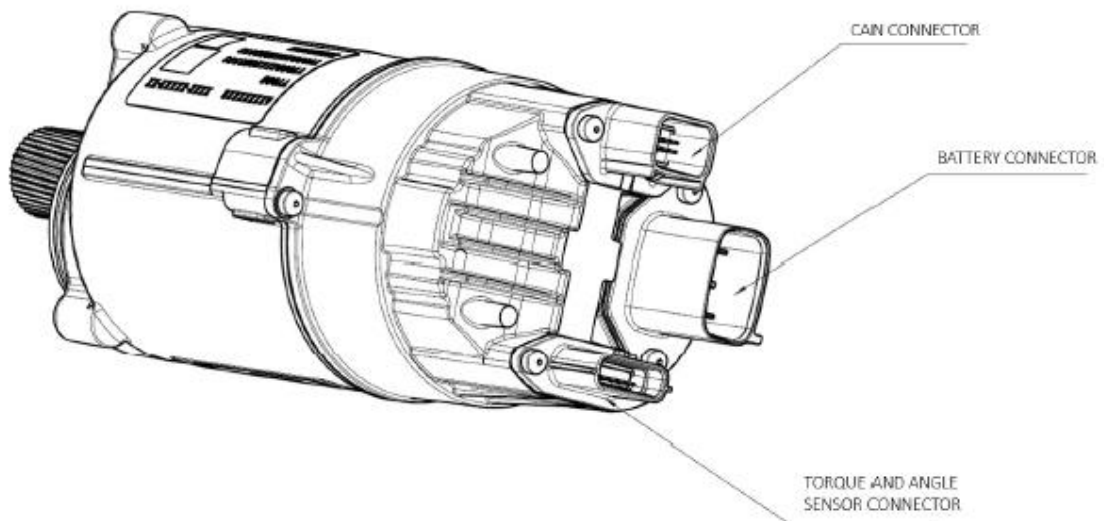


Figure 4: ReAX Connectors

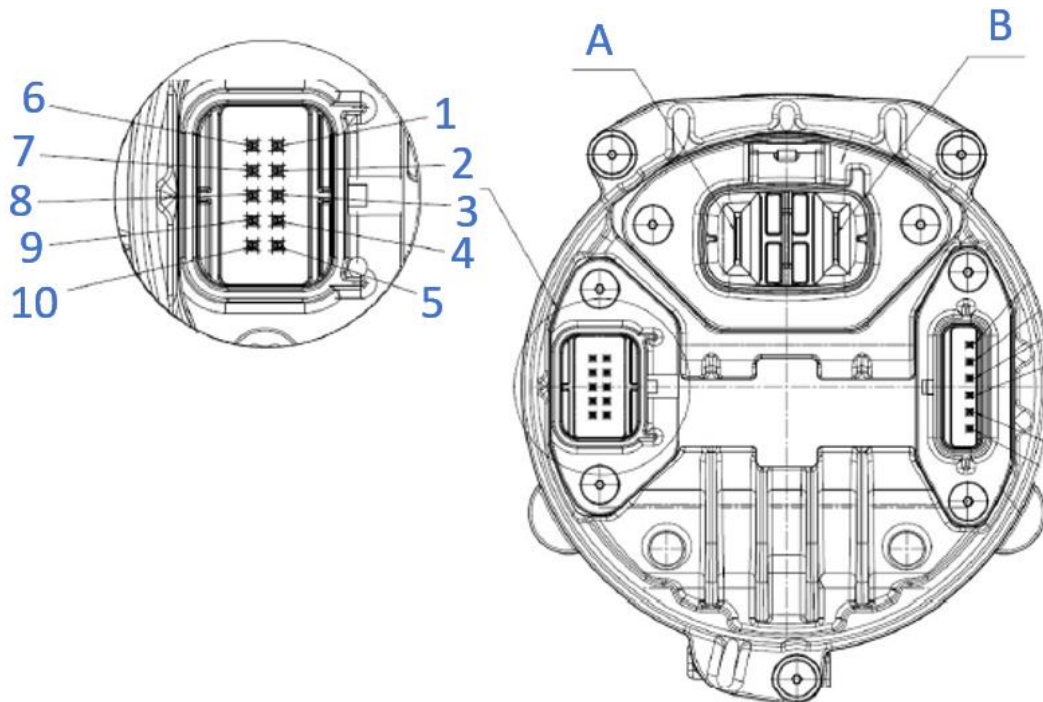
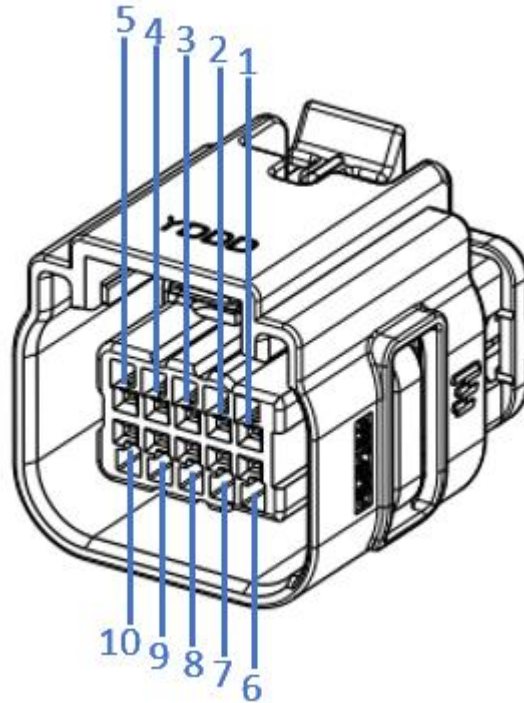


Figure 5: ReAX pin out

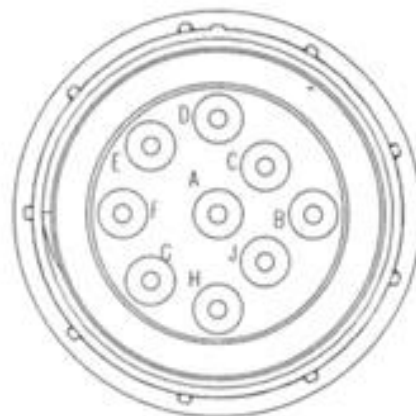


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*Figure 6: Vehicle CAN Connector*



*Figure 7: Vehicle Diagnostic Port*



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Table 1: Pin out info

PIN	SIGNAL	DESCRIPTION
A	GND	Negative battery return to ReAX
B	VBATT	Positive battery supply to ReAX
1	CAN2_H_BUS	CAN High line associated with private CAN
2	CAN2_L_BUS	CAN Low line associated with private CAN
3	CAN1_H_BUS	CAN High line associated with vehicle CAN
4	CAN1_L_BUS	CAN Low line associated with vehicle CAN
5	COMM_ENABLE_HS	Ignition switch status input
6	CAN2_H_BUS	Not used
7	CAN2_L_BUS	Not used
8	CAN1_H_BUS	Not used
9	CAN1_L_BUS	Not used
10	COMM_ENABLE_CE	Not used

Table 2: CAN Connector Continuity Test

Vehicle CAN Connector Pin (From Fig 6)	Diagnostic Port Pin to Check for Continuity Check (from Fig 7)	Description
3	C	CAN high
4	D	CAN low



## Appendix 3 – Contact info and Additional Resources

### ZF Commercial Vehicle Steering Field Service

Phone: 1-800-879-0899

Email: [css.trucksteering@trw.com](mailto:css.trucksteering@trw.com)

Web: [www.trucksteering.com](http://www.trucksteering.com)

### ZF Testman Diagnostic Tool

ZF offers a comprehensive software diagnostic tool called “Testman” for full ReAX Column diagnostic procedures. The tool can be sourced through ZF Aftermarket sales at <https://aftermarket.zf.com/us/en/aftermarket-portal/trucks-and-buses/spare-parts-and-products/zf-testman/>.

When using ZF Testman, refer to document “ReAX User Manual” for further instruction.