

# ***TractionAir***

## ***Installation and Operating Manual***

***July 2018 G5***

Electronic Control Units EC9 .....	2
Pressure Cell .....	3
ECU Installation .....	4
GPS Reciever Mounting .....	5
Wiring for the Short Lead on the Loom .....	5
Fuse .....	6
Pressure Cell Installation .....	6
Wheel End Mounting .....	7-10
Plumbing .....	11-12
Tee Mounting Between Wheels .....	12-14
Loom Connection at Pressure Cell .....	15
Test System .....	16
TractionAir ECU Operation & Functionality .....	17
Air Leaks .....	17
Operating Instructions for versions with GPS Speed Up .....	18
General Operation .....	19-20
Functions .....	20
Pressure Sensor Fail .....	21-22
Pressure Transducer Test .....	22
Park Up .....	22
Operating Tips .....	23
TractionAir Hose Identification .....	24
Tyre Plumbing & Puncture Repair .....	25
ECU Version Identification .....	26
Contacts .....	28

## **TractionAir 5<sup>th</sup> Generation**

Designed and manufactured by TRT in Hamilton New Zealand, TractionAir is an electronically controlled proportional pressure system, for central tyre inflation (CTI). TractionAir is the user-friendly CTI System and is comprised of two main components, the electronic control unit (ECU) and the pressure cell. TractionAir is a modular system designed for quick fit, connect and run.

## **Electronic Control Unit EC9**

TRT's latest EC9 has an enhanced mini USB interface and functionality for the fleet technician, while retaining all of the functionality of the earlier versions.

Our 5th generation EC9 is a giant leap forward in pneumatic pressure control. The EC9 incorporates “dual pressure transducer technology”, delivering unsurpassed safety and performance.

The dual transducers work in tandem, continuously measuring pressure with each other, they effectively self diagnose. Should either transducer output differ from the other by more than 5 psi the ECU will alert the driver of the transducer fault.



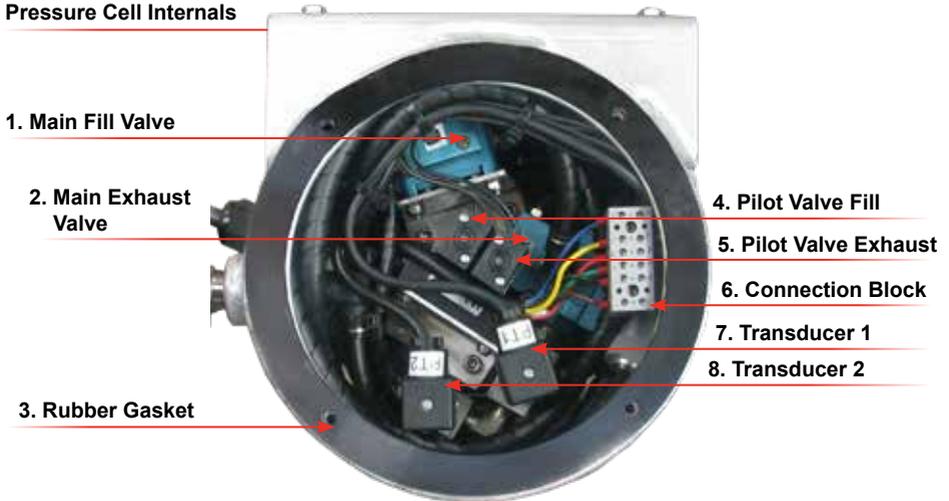
*Note: If you have chosen a manual system without speed-up the GPS and speed settings will not show on the display and the GPS on-off function will not operate.*

# Pressure Cell

The G5 Pressure Cell is a one piece alloy vessel which includes an integral air reservoir and the TractionAir pneumatics system. Mounted appropriately on the vehicle chassis, the TractionAir G5 Pressure Cell requires only two air line and one electrical loom connection.



## Pressure Cell Internals



## **ECU Installation**

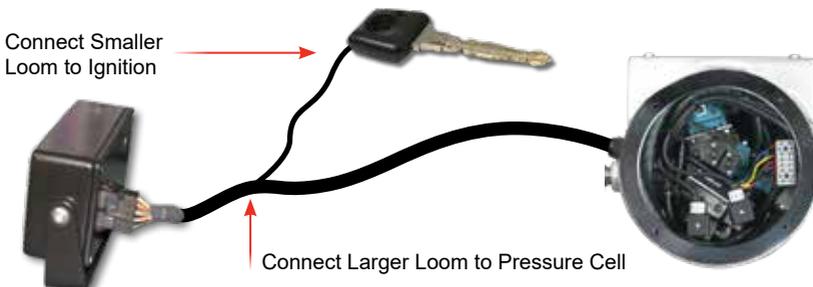
1. Mount the ECU in a position in the cab of the vehicle, where it will be easily accessible for making pressure adjustments whilst driving the vehicle.
2. The rear of the ECU has a male electrical connector which connects to the MOLEX Mini-Fit plug on the dual loom assembly. The two-core power loom is to be wired into an auxiliary circuit which is isolated when the ignition key is switched off. The other multicore loom is wired into the pressure cell. (Power on with ignition, power off with ignition). The system is suitable for both 12V and 24V vehicles and will operate between 11V to 30V DC.
  - a. The short loom is the power supply comprising of two wires (refer to ECU wiring diagram on pages 5). The ECU must be protected with either a 2 amp blade fuse located in the fuse board in the vehicle or by using the in-line 2 or 3 amp fuse provided in the kitset.
  - b. Run the long loom from the ECU to the alloy pressure cell. It is important that sufficient length of cable is allowed for with cab-over vehicles, to allow for tilting the cab. Use the convolute steering to protect the cable.
  - c. Attach the lead for the externally connected GPS unit to the Female DIN plug on the rear of the ECU and site to suit within the cab (as close to windscreen as possible).

## **10 Pin Female Plug**

(To Rear of TIDD - TPC Controller)

2 Core Power (3m) to Ignition

7 Core to Pressure



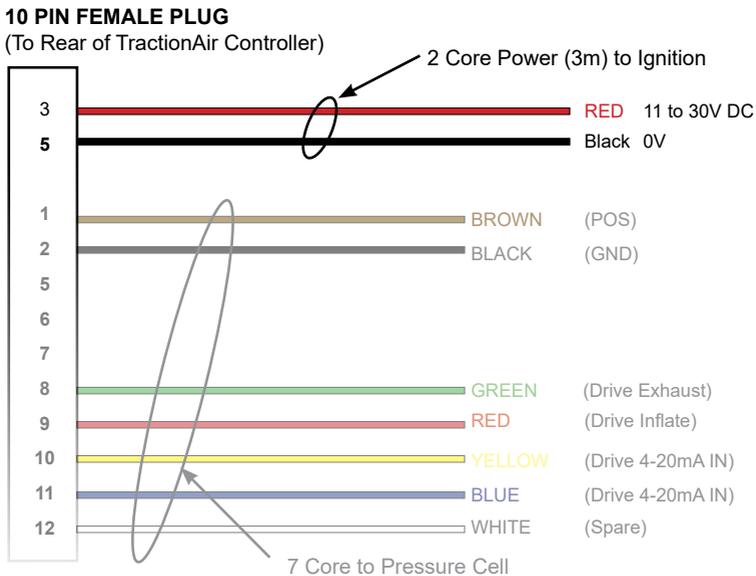
## ECU's with GPS Speed Control

Ensure the GPS receiver is mounted as close to the windscreen as possible with a clear view of the sky. This will allow the strongest signal.



## Wiring for the Short Lead on the Loom (Power and Earth to ECU)

Note: Power to be ignition fed.



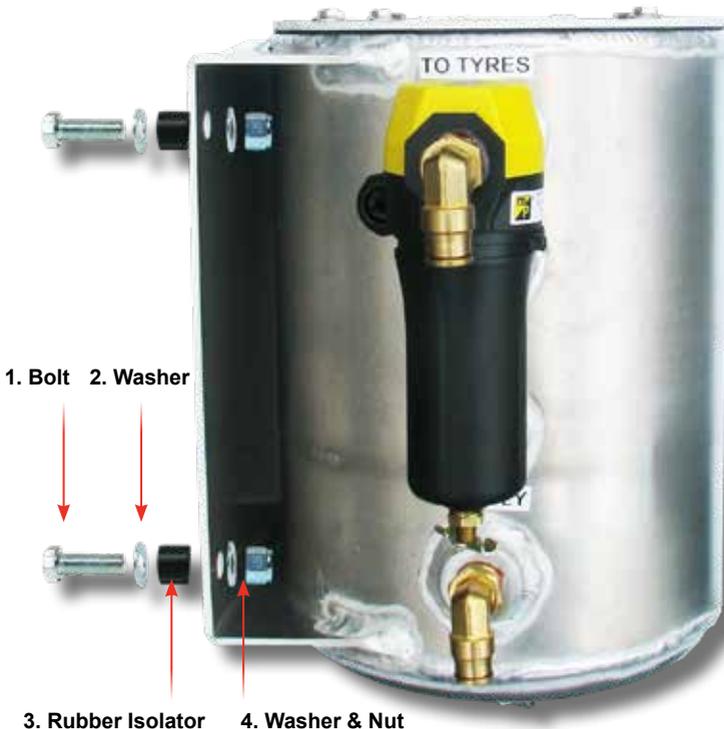
## **Fuse**

The TractionAir control mechanism only draws 0.75 Amp (single channel). Where possible power the unit from a spare 2 Amp fuse in the truck's fuse board. If this is not practical use the 2 or 3 Amp inline fuse supplied with the kit.



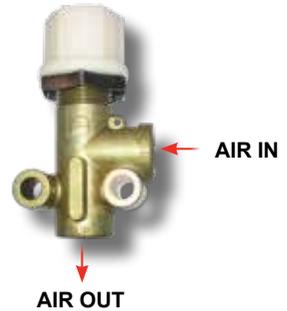
## **Pressure Cell Installation**

1. Mount the pressure cell in a position within the chassis to avoid damage.
  - a. Do not mount the enclosure close to any heat source. e.g. exhaust
  - b. Provided in each kitset are four ½" rubber washers approx. 15mm long. These are to reduce vibration. Fit them between the truck frame (mounting plate) and the Alloy Enclosure bracket. Tighten the ½" retaining bolts and lock nuts until the rubber washers are compressed to around half their starting length.



2. Fit the pressure protection valve TAPR2-90 hard-piped to the auxiliary air tank. The PR2 Valve protects the integrity of the vehicle's Air Brake System (ABS) and must be installed vertically. Mount with the white Plastic Knob facing up

**Plumb**    **INLET**    =    **Side Port (DEL)**  
                 **OUTLET**    =    **End Port (SUP)**



## ***Wheel End Mounting***

Depending on the make of the vehicle, position both inner and outer wheels so that the valve stems are opposite each other (180 degrees apart).

This may require rotating both inner and outer wheels. The easiest way of achieving this, is to position the Wheel Bridge so that the hose nipple points straight at the inner valve stem.

Remove any studs that will allow for this alignment. The inner hose will now point straight at the valve stem. This method means that only the outside wheel will need rotating to line up with the corresponding hose nipple. The two wheels should now have their valve stems opposite each other, which is critical to a successful job.

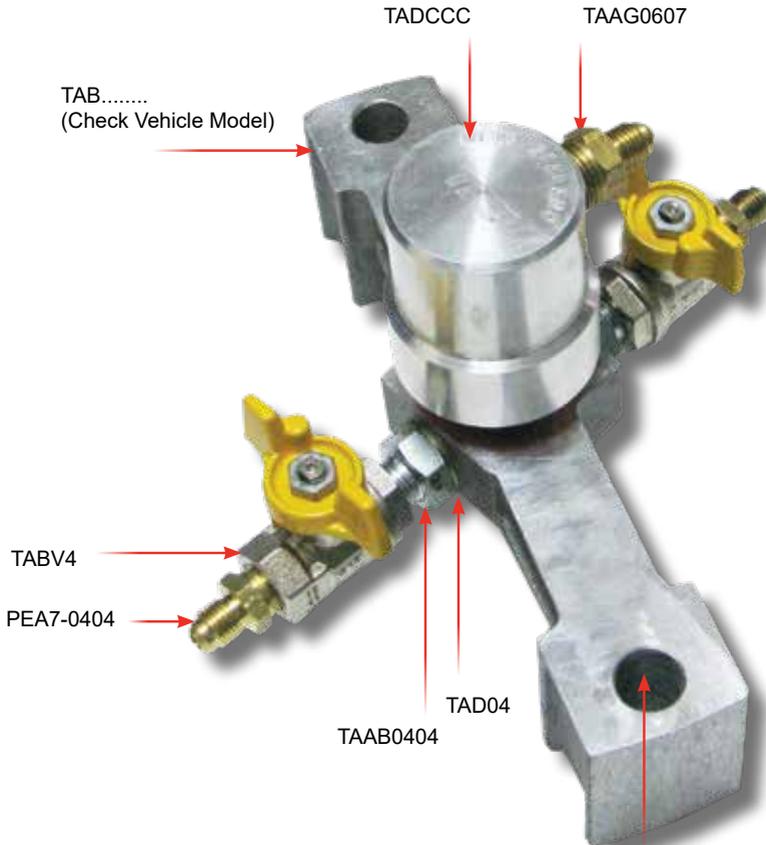


# Wheel End Mounting

Shown assembled (note integral low profile right angle adaptor for feed hose)

## Standard Conventional Rotor

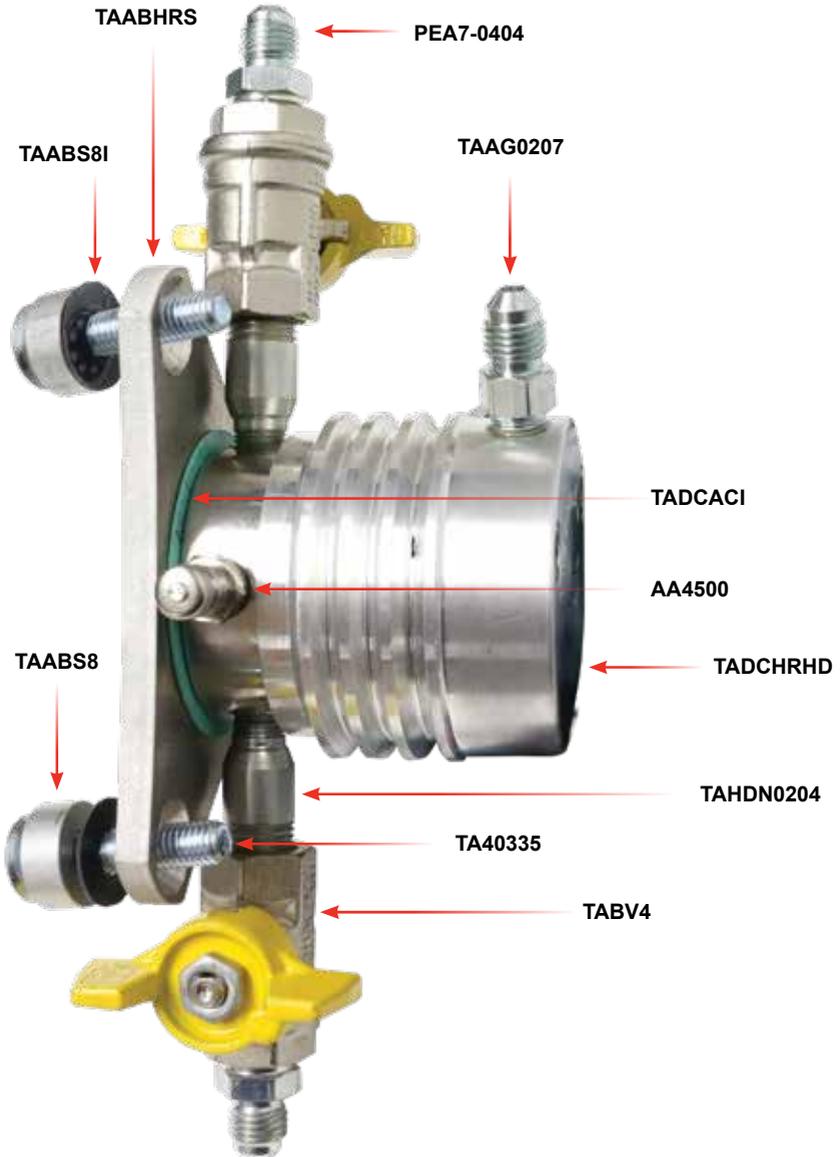
**Note\*:** Bridge, Spacers & Bolt will change to suit different vehicles.



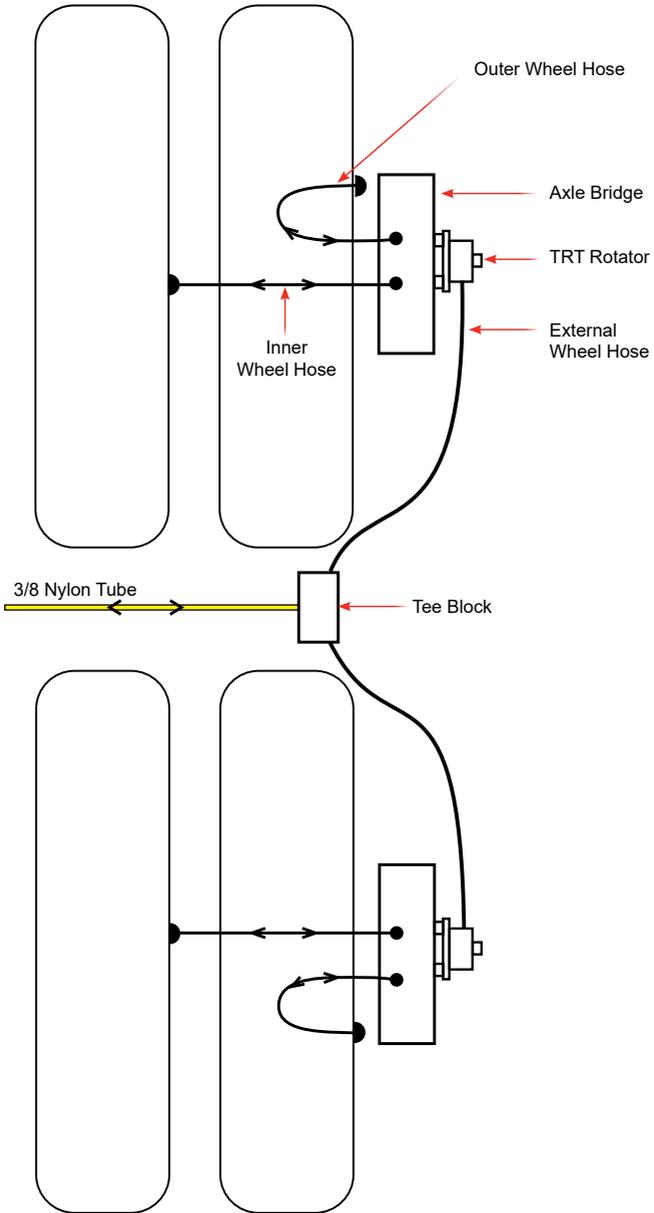
Bolt diameter length and thread may vary between various vehicle make's and model's.

# Heavy Duty High Temperature Hub Reduction Model Wheel End

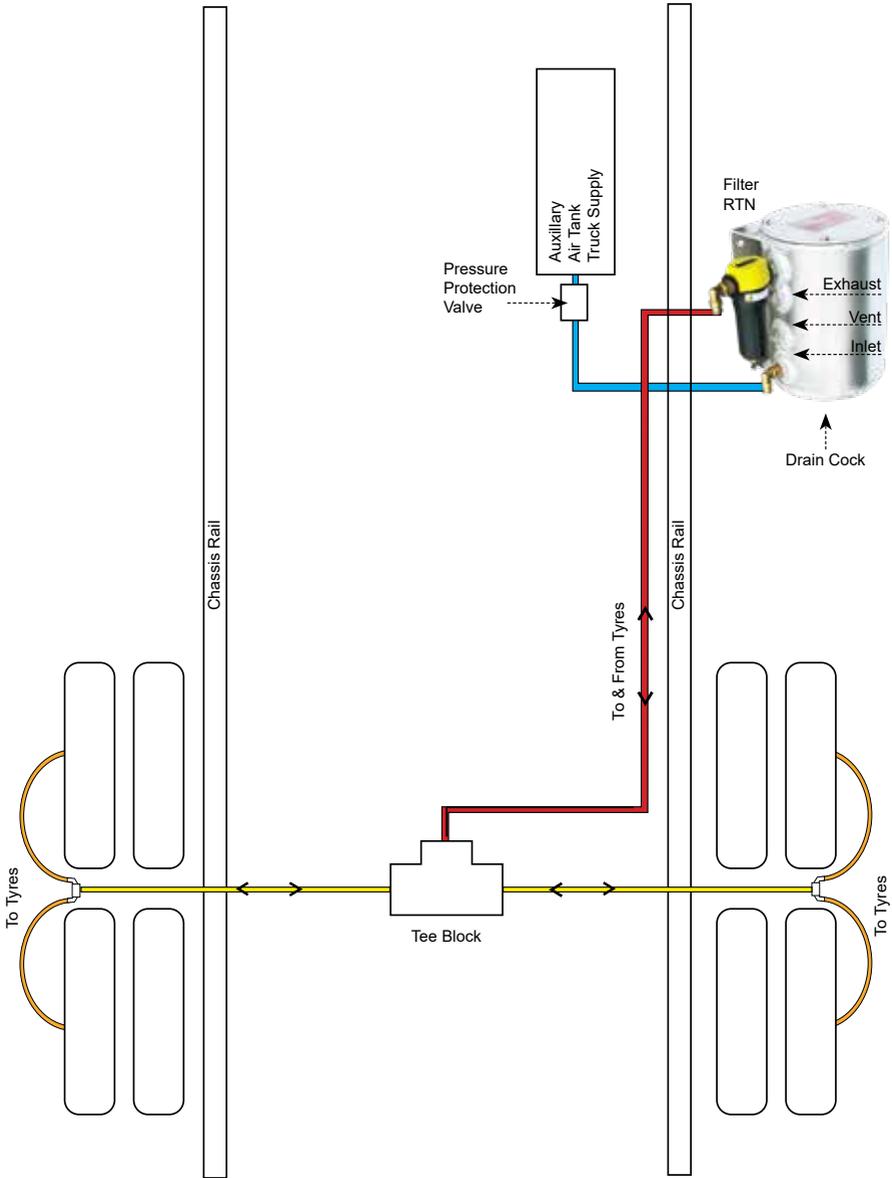
Note\*: Bridge, Spacers & Bolt will change to suit different vehicles.



# Wheel End Plumbing Layout



# Plumbing System





Chassis line Tee out to tyres  
note rubber hose sheathe



Feed hose Tee Block between wheels TA37004



## ***Nylon Tube***

The nylon tube is for plumbing from the truck's air system to the inlet side of the pressure cell, and then from the pressure cell to the tee between the tyres (TA37006). This tee needs to be fitted inside the chassis between the centre of the Drive Axles. The tube then runs from the Tee piece (TA37006) out to the outer bracket mount, where the special Tee block Part No TA37004 is fitted to take the external wheel hoses. Air brake hose has been supplied to protect the Nylon tube where it leaves the inner chassis and goes to the centre tee block (noted above) between the Drive Tyres. Cut the tube to length and insert into the Brake hose by using the natural lay of both to assist.



## ***Tee Mounting Between Wheels***

### **TA37004**

Tee shown assembled - Note can be 45° elbows (TAAG450407)

#### **Option 1**

Use with round chassis pole



#### **Option 2**

90° elbow



#### **Option 3**

45° elbow





**Mount the tee (part no. TA37004) as shown below.**

NOTE: The dimension of 250mm is a legal requirement for NZ fitment and it is recommended this standard is used in other countries where CTI systems are not legislated. Do not fit this tee until the guards are fitted on the drive tyres.



- a. Relocation of the hose support hangers towards the horizontal centreline position of the axles. The maximum vertical height difference between the centre of the rotating union and the height of the centre support is to be no more than 250mm. Leave a slight loop in the hose to allow for independent axle movement. The hose length is not to exceed the distance measured between the fixed point where the hose is attached to the truck (usually a tee) and the centre of the rotating union plus 20%.
- b. Hose support hangers may require custom modification for various suspension types.
- c. Ensure that hose hangers are reinforced adequately to prevent cracks from vibration.
- d. Hangers and hardware, including shut off valves must remain within the overall vehicle width of 2.5 metres (Note: Hardware excludes flexible air hoses and protection).
- e. The supply hose that extends to the outside edge of the hanger must have adequate protection from road debris coming from the tyres. (This protection may be by fenders over tyres, or guards over the supply hose).

## ***Wheel Hose Fitment***

Each wheel hose has had a tyre valve hose tail fitted. A straight fitting for the inner wheel and a 180 degree 'U' Bend fitting for the outer wheel. The wheel hose assemblies are made to length to suit the wheel size of the vehicle.

- a. All TractionAir hoses are measured overall outside end of one hosetail straight to the outside end of the other hosetail.
- b. When fitting TractionAir to alloy rims, ensure the hose does not ride against the alloy wall of the rim as the hose will wear the rim wall away.

Only hand tighten the tyre valve hose tails on to the tyre valve stems. Over-tightening will damage the rubber washer designed to seal on the "sharp" face of the valve stem.

To fit the wheel feed hose; attach the 45 degree hose tail to the nipple (TAAG0207) fitted to the side of the Rotator. Run the hose up to the elbow adaptor (45 deg TAAG450407 or 90 deg TAAG900407) as mounted to the tee between the wheels. This hose is made of sufficient length to allow for axle travel (up and down). A standard 22.5" truck wheel requires a hose length of 810mm. The hose should sit approx. 60mm from the outer side wall of the tyre to inside of hose. **WARNING** - excessive length here and the hose is likely to get caught on obstacles. However, remember to allow for "walk out" in the suspension for those trucks fitted with Hendrickson walking beam and other mechanical suspensions. For these suspension set-ups, the tee may need to be fitted further out from the chassis than on trucks fitted with air suspension.



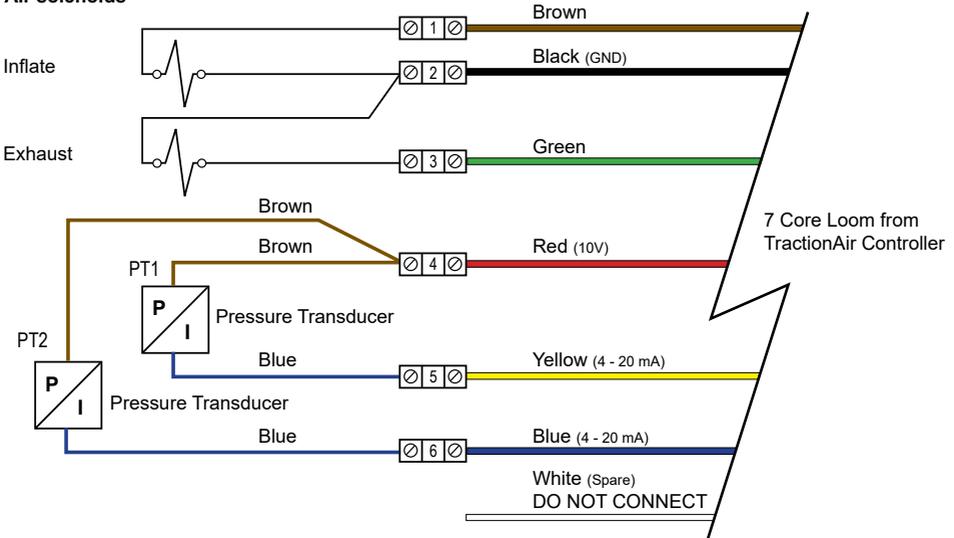
## Loom Connection at Pressure Cell

Insert the “tail” of the long 16m loom into the alloy pressure cell through the plastic gland connection. It is recommended that the excess loom be coiled and cable tied rather than cut, in case extra loom is required at a later date due to loom damage. Connect the coloured wires in accordance with the wiring diagram included at the bottom of these instructions. A copy of the wiring diagram is fixed to the inside face of the alloy enclosure lid. Only hook up the coloured wires required for your kit i.e. truck drive only.



Insert Loom into Plug

### Air solenoids



## **Test System**

Use a volt meter to check that the system has between 11 to 30 volts.

With the ignition on, switch the TractionAir ECU to on. Actual tyre pressure will show on readout, unless there is no air pressure in the system.

With all tyre valves shut, open only two ball valves on one hub assembly. This means we are only supplying and exhausting air from two tyres which will speed up the pressure setting time. You are now ready to check each of the four pre-set factory pressure settings. Start with the lowest setting. Push the lowest setting (maximum traction) button.

*NB Pressure can vary  $\pm$  2 PSI. Below is a common example of the pressure settings, yours may vary depending on your requirement and specification at the point of sale.*

<b>Tyre Pressure*</b>	<b>Based on 11R 22.5 tubless tyres.</b>
90psi	Gross Weight on Drivers 17000kg
70psi	Gross Weight on Drivers 17000kg at speeds less than 60kph
55psi	Empty Tare on Drivers 6300kg
32psi	Maximum Traction less than 15kmph

*\* Standard Settings Only*

Test each joint for air leaks using a squirt bottle with a mixture of dishwashing liquid and water.

Check all air lines and electrical cables are securely cable tied and wrapped where necessary to avoid chafing from vibration.

# **TractionAir ECU Operation and Functionality**

The ECU has four variable pressure adjustments, factory pre-set to your fleet's requirements. Below is a common example that explains the functionality. The LEDs indicate the setting selected by the operator.

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	90psi
	70psi
	55psi
	32psi

---

Whenever a pressure setting is changed, the LED button light will flash, then go to a solid state once pressure is achieved. The system checks itself every 10 seconds. If after 10 seconds the pressure is constant, the LED will light up as a solid light, indicating the pressure setting is achieved.

## **Small Leaks**

Should the driver find that the system is achieving pressure but the Air LED for the selected pressure is not changing to a solid state, there is a small air leak. The system will keep up with the majority of small air leaks, however the driver will need to monitor the situation and have the leak attended to when practical.

*Note: Pressure changes in the field. The changing of pressures pre-selected by the installer should not be made until recommendations have been obtained from your tyre supplier. The wrong pressure setting at speed may damage the tyres.*

## **Major Loss of Air Pressure**

If there is an unselected pressure drop from a previously selected setting, the control system will try to restore the pressure. If the pressure keeps dropping, the system will continue to feed the leak, an audible alarm will sound which will alert the driver to the pressure readings on the ECU: "The ECU reads the tyre pressure in real time". After 20 seconds of continually dropping air pressure, the following message is displayed-

***"Leaks or NO AIR"***

At this point the driver needs to assess the severity of the leak. If it is a small leak the system will keep up but may not achieve the pre-set pressures. i.e. you may be trying to get to 90psi and it may only get to 85psi. In this case it may allow the driver to finish the run and have the leak fixed at a convenient opportunity. Again they will need to visually monitor the pressure on the ECU.

Should the pressure on the ECU continue to drop, the driver needs to isolate the leak by turning the taps off at the affected wheels. This will prevent the other tyres from pressure loss. Once the leak has been isolated, the system will bring the remaining tyres to the selected pressure that was originally selected on the ECU. After 20 seconds the ECU will return to normal function and the “Leaks or No Air” message will no longer be displayed.

*NOTE: Pressure settings are pre-set in house at TRT’s factory. Adjustment is made though the USB connection on the ECU. This can be done through your TRT sales consultant, or with the software package issued with the EC8 model onwards.*

## ***Operating instructions for versions with GPS speed control***

In simple terms, TRT use the GPS receiver to measure the ground speed. This is more accurate than the speedo on the vehicle and allows our system to maintain its autonomy from the vehicle. The system can be set for one, two or three stage speed up. This function ensures that the tyres inflate relative to speed, if the driver forgets to push the button on the ECU.

- One Stage speed up: ‘MAX Traction’ ‘to NOT Loaded’.
- Two stage speed up: ‘MAX Traction’ ‘to NOT Loaded’ to ‘Loaded Off Road’.
- Three stage speed up: ‘MAX Traction’ ‘to NOT Loaded’ to ‘LoadedOff Road’ to ‘Loaded On Road’.

## ***GPS Function***

Selected via the TRT code number and the Windows SetUp program. If selected, speed in kph will be displayed in the upper LH corner of the display. In the lower LH corner the number of satellites used to obtain a fix is displayed. A black square under this number indicates a valid fix and that the displayed speed is correct.



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The GPS receiver needs to read a minimum of three satellites to function correctly. In the event that a valid satellite fix is not obtained within two minutes the following message will be displayed:

***“GPS SPEED FAIL  
NO AUTO  
PRESSURE CHANGE”***

Also all four keypad LEDs will flash twice, and the ECU will revert to manual operation only.

Should this situation occur, you will need to check the GPS receiver connection to the ECU, ensure that there is a clear view of the sky (as much as practical) and that the vehicle is not parked in a building. If this does not rectify the issue, contact your supplier.

## ***Dual Transducer***

TractionAir G5 now incorporates “dual transducer technology”. The dual transducers work in tandem continuously measuring pressure with each other, they effectively self diagnose. Should either transducer become out of phase with its partner, the driver is alerted with the ECU displaying the transducer fault.

# **General Operation**

## **MAX TRACTION: (One stage)**

If speed increases above set kph then the **NOT LOADED** led will start to flash at a fast rate and a message '**SPEEDUP ACTIVATED**' displayed. If in five seconds time the speed is still greater than the set kph, the **NOT LOADED** pressure setting will be selected. The **NOT LOADED** led will flash at a slower rate until the new pressure is reached.

## **UNLOADED: (Two stage)**

If speed increases above the set kph then the **LOADED OFF ROAD** led will start to flash at a fast rate and a message '**SPEEDUP ACTIVATED**' displayed. If in 5 seconds time the speed is still greater than the set kph then the **LOADED OFF ROAD** pressure setting will be selected. The **LOADED OFF ROAD** led will flash at a slower rate until the new pressure is reached.

## **LOADED OFF ROAD: (Three stage)**

If speed increases above the set kph then the **LOADED ON ROAD** led will start to flash at a fast rate and a message '**SPEEDUP ACTIVATED**' displayed. If in five seconds time the speed is still greater than the set kph then the **LOADED ON ROAD** pressure setting will be selected. The **LOADED ON ROAD** led will flash at a slower rate until the new pressure is reached.

*Note: should the driver try to select a lower pressure setting than what the speed threshold has been set at, a sequence of beeps will sound and the following message will be displayed.*

### ***“Reduce Speed”***

*Once you are below the set speed threshold for the setting, the system will allow the change.*

# **Functions**

## **LCD Back Light Level:**

Press the currently selected pressure button for at least four seconds and the light level will change from minimum to maximum in five steps. This will take about five seconds. Releasing the button will select the required light level.

## **Error Checking:**

At power ON the system automatically runs a self-diagnosis of memory integrity. If there are errors then 'MEMORY ERRORS' is displayed and service is required.

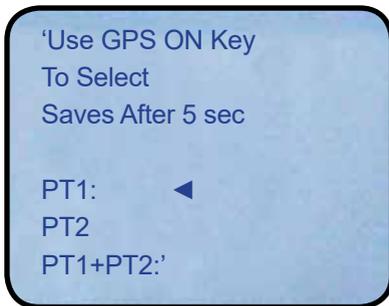
## **PRESSURE SENSOR FAIL**

Should either pressure transducer get 5psi out of specification with it's partner, the ECU will enter the pressure transducer failure mode. At this point the exhaust valves are turned off and the vehicle tyre pressure will return to vehicle pressure. The affected pressure transducer will need to be replaced. This can be done relatively simply however, prior to starting this you will need to identify the affected transducer and override it to allow the vehicle to carry on working until the faulty transducer can be replaced. This can done through placing an inline gauge on the external hose at the tyres, the pressure transducer that reads the same pressure as the gauge is the one that is reading correctly The main screen display is PT1 and the small read-out is PT2. These transducers are both clearly labeled in the pressure cell.

### **Pressure Sensor Failure & Manual Override Selection Instructions (EC9 only)**

Press '**MAX TRACTION**' and then '**POWER**' (press and release) to turn the controller **ON** and enter the **PRESSURE** Sensor Selection mode.

The '**MAX TRACTION**' button must be pressed for 4 seconds before the **PRESSURE** Sensor Selection mode is enabled and the following displayed.



Use the **GPS 'ON'** button to move the pointer (◀) to select the required option.

PT1 selects Pressure Sensor 1 as the main and only pressure sensor.

PT2 selects Pressure Sensor 2 as the main and only pressure sensor.

PT1 or PT2 can only be selected if a sensor has failed in the below PT1+PT2 mode.

PT1+PT2 selects PT1 as the main pressure sensor with PT2 being used to check PT1 for accuracy.

After five seconds the selection is saved and the controller starts normal operation. If '**Memory Errors**' is displayed repeat the selection as described above in a).

In the PT1+PT2 mode if either PT1 or PT2 differ by more than 5 PSI then an alarm will be triggered and the fill output will stay on continuously.

Reselecting the PT1+PT2 mode will cancel the alarm flag and the message

**'Pressure Sensor Fail – Contact Service Agent'** will not display until the next compare failure.

After an alarm, both PT1 and PT2 pressures will be displayed and updated every second. This will enable the operator to determine which sensor best matches a manual pressure gauge reading of the tyre pressure. a) above is then used to select this sensor to control the tyre pressure until the faulty sensor is replaced and PT1+PT2 selected.

## ***Pressure Transducer Test***

1. Ensure the ECU is turned on
2. Go to the Pressure Cell and open the lid.
3. Using a DC Volt meter measure the Transducer supply voltage between Terminal 4 (+ve) and Terminal 2. It should be between 8 and 10V. If not check that the RED wire is tight in Terminal 4 and that all the pins are correctly inserted in the 10 way ECU connector. Then check the wiring loom for damage.
4. If the voltage is OK go to the next step.
5. Remove the yellow wire from terminal 5 and connect a DC Amp meter in series with this wire and terminal 2.
6. If the reading is not between 4 and 20mA. (milliamps), you will have to replace the pressure transducer.

## ***Park up***

When parking up the vehicle overnight or any other extended time period, it is very important that **all wheel end axle bridge ball valves are turned off**. TractionAir can mask small leaks and punctures that may be present in a single tyre that left overnight, could result in all tyres losing pressure and breaking their beads. The ball valves located on the two brass TA37004 tees are there primarily to allow quick isolation of a wheel group in the event of a blown hose etc.

**Leave these taps on overnight.**



**Taps On (handles in line)**



**Taps Off (handles at 90 °)**

# **Operating Tips**

## **Compressor**

The truck compressor has a major influence over the successful operation of the TractionAir system; even a small amount of oil passing through the air system will have an adverse effect on the performance of not only the TractionAir pneumatics, but also the truck's air brake system.

## **Electronics**

TractionAir ECUs are non user-serviceable items and should only be repaired at the factory. Care must be taken when welding near the ECU or Pressure Cell. If possible, remove the 10 pin plug from the rear of the ECU first.

***Do not tin wires with solder before inserting into screw terminals as the wire will then loosen in the terminals over time.***

## **Filter Assembly - TAAF8**

### **Filter Element - TAAFE**

The pneumatic system component of TractionAir G4 is designed to cope better with the ingress of oil and other contaminants from the compressor and the truck's air system, but is still susceptible to blockage from chunks of rubber and dirt coming back from the tyres. We recommend that the filter is opened and emptied at each service interval (six months).



## **Rotary Union - TADCCC & TADCHRHD**

The TRT Extended Life rotator is a long service robust unit running carbon ceramic mechanical seal facings. This rotator minimises stand out of the wheel hub arrangement and is ideal for most applications. 80mm long by 57mm diam.



TADCCC

***Important: Take care when pressure washing not to damage the rotators by forcing water into the bearings through the seal.***



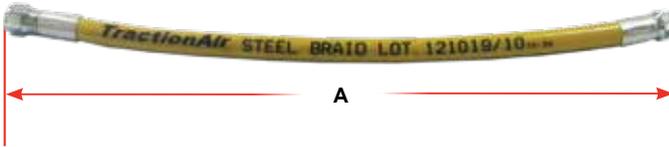
TADCHRHD

## ***TractionAir Hose Identification***

All TractionAir Hose assemblies are measured on overall length of a straight hose assembly from the outside of one end's hose tail to the outside of the hose tail at the other end.

### ***Inner Wheel Hose***

From inner wheel valve stem to rotator - TractionAir hose with straight valve stem hose tail. Overall length = A



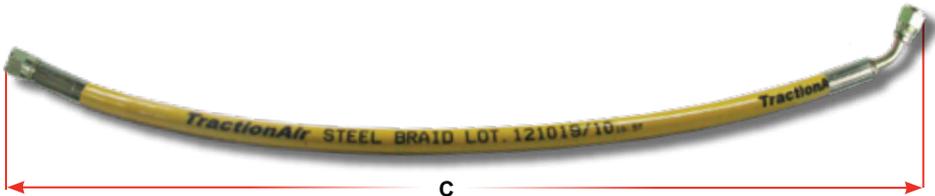
### ***Outer Wheel Hose***

From outer wheel valve stem to rotator - TractionAir hose with 180° U Bend valve stem hose tail. Overall length = B



### ***Truck External Feed Hose***

From tee between the wheels to wheel rotators - TractionAir with a straight and a 45° hose tail. Overall length = C



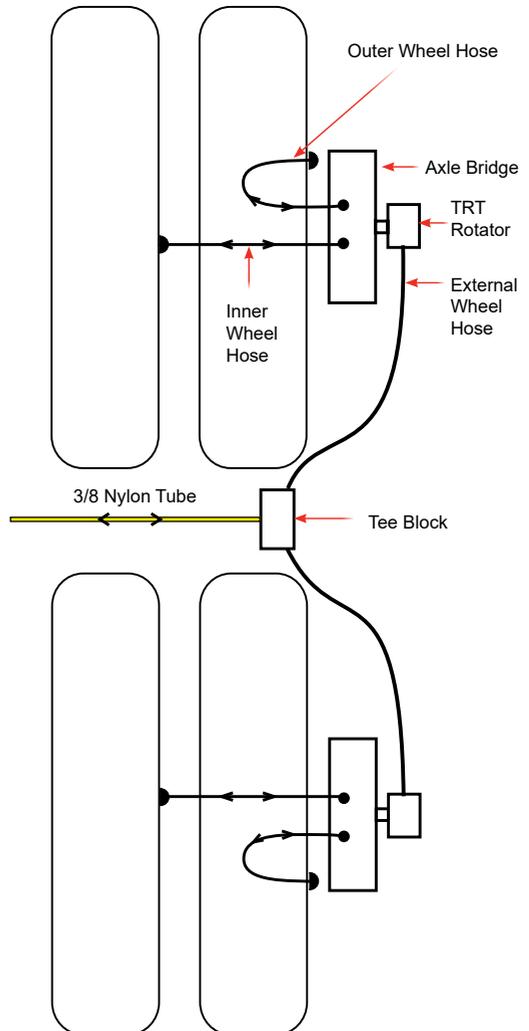
# Tyre Plumbing and Puncture Repair

Isolate the TractionAir CTI system before changing tyres or removing wheels.

1. Turn off the isolating tap at the external feed hose supply tee block.  
(one each side)
2. Turn off both wheel end ball valves as shown above.
3. Undo with a spanner the hex head wheel feed hose tail and remove from the rotary coupling. *NB All fittings at the CTI axle bridge are SAE ball seat type hex head.*
4. Undo the tyre valve end of the black wheel hose, to allow removal of the wheel.
5. The wheel can now be removed in the normal manner. *(Taking care not to damage the CTI axle bridge)*

## Reassembly

1. Make sure all the hoses are reconnected before turning the taps on.
2. The tyre valve hose tail is hand tightened only. Take care not to lose the internal rubber washer (convex side to tyre valve stem)
3. Once everything is reconnected and taps are turned on, check for leaks.



# ECU Version Identification



## ECU1

Up to July 2003



## ECU2

July 2003 to July 2006

Early VI Square Pressure Cell with PQE.



## ECU3

July 2006 to March 2009

Early VI Square Pressure Cell with PQE.



## ECU4

March 2009 to March 2010

G4 Round Pressure Cell No GPS single plug only on back.



## ECU5

March 2010 to June 2011

External GPS 2 x round plugs on back.



## ECU6

Integral GPS, only one built "PROTOTYPE ONLY"



## ECU7

June 2011 to October 2012

Size 120 x 64 x 36mm  
Large Face  
Rear USB Port



## ECU8

October 2012 - January 2014  
120 x 65 x 36mm  
Front USB Port

**Note:** EC4 - EC8 all compatible with G4 Pressure Cell.



## ECU9

January 2014 -

As per EC8 with 7 core loom to G5 pressure cell and second pressure transducer readout in bottom RH corner of ECU.



# **Contacts**



## **TRT - Tidd Ross Todd Ltd**

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## ***Local Dealer Contact***