




SMARTTIRE[®] RV

ACTIVE TIRE PRESSURE MONITORING
FOR RECREATIONAL VEHICLES



-  REDUCE ACCIDENT RISK CAUSED BY BLOWOUTS & TIRE FIRES
-  AVOID THE INCONVENIENCE OF BEING STRANDED WITH A FLAT
-  MAXIMIZE FUEL ECONOMY & TIRE LIFE

OWNER'S MANUAL

SMARTTIRE[®]



SMARTIRE RV SYSTEM GUIDE

Thank-you for purchasing SmarTire RV – *the next generation in active tire pressure monitoring.*

SmarTire RV is an advanced tire pressure monitoring system specifically designed to meet the unique needs of RVs. The system constantly monitors the tires of your RV and towed vehicle or trailer in order to warn you of a tire problem before it becomes dangerous.

SMARTIRE RV:

- Reduces accident risk caused by a tire blowout or tire fire.
- Avoids the inconvenience of being stranded with a flat tire.
- Maximizes fuel economy by ensuring tires are properly inflated.
- Extends tire life for both RV and towed vehicle/trailer.

FEATURES OF SMARTIRE RV

- Temperature compensated alert: know when your tires are at risk no matter how long you've been driving.
- Real-time tire information while you drive.
- Audible and visual alerts provide instant warning when a tire problem occurs.
- 3 types of alerts: Pressure Deviation Alert, Critical Low Pressure Alert, High Temperature Alert.
 - Monitor the tires of a towed vehicle or trailer.



IMPORTANT NOTICE: PLEASE READ

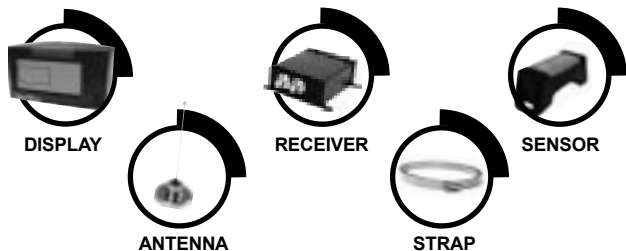
SMARTIRE RV SENSORS CAN BE BROKEN WHEN DISMOUNTING A TIRE UNLESS SPECIFIC INSTRUCTIONS ARE FOLLOWED. IF TIRE WORK IS DONE BY A NON-SMARTIRE AUTHORIZED FACILITY, PLEASE LET THEM KNOW THAT A TIRE PRESSURE MONITORING SYSTEM IS INSTALLED ON THE VEHICLE BEFORE THEY REMOVE A TIRE FROM A WHEEL.

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1.0 SYSTEM OVERVIEW

1.1 SYSTEM COMPONENTS



1.1 HOW SMARTIRE RV WORKS



1. Tire data is sent wirelessly to the receiver by in-wheel sensor/transmitters that constantly monitor tire pressure and temperature.

2. The receiver comes pre-configured with each sensor programmed to a specific wheel position. It can monitor up to 20 wheel positions and is able to handle the most complex RV and towed vehicle/trailer configurations.

3. The display is mounted in view of the driver providing real-time tire information. If a problem occurs, both an audible and visual warning will alert the driver to the condition.

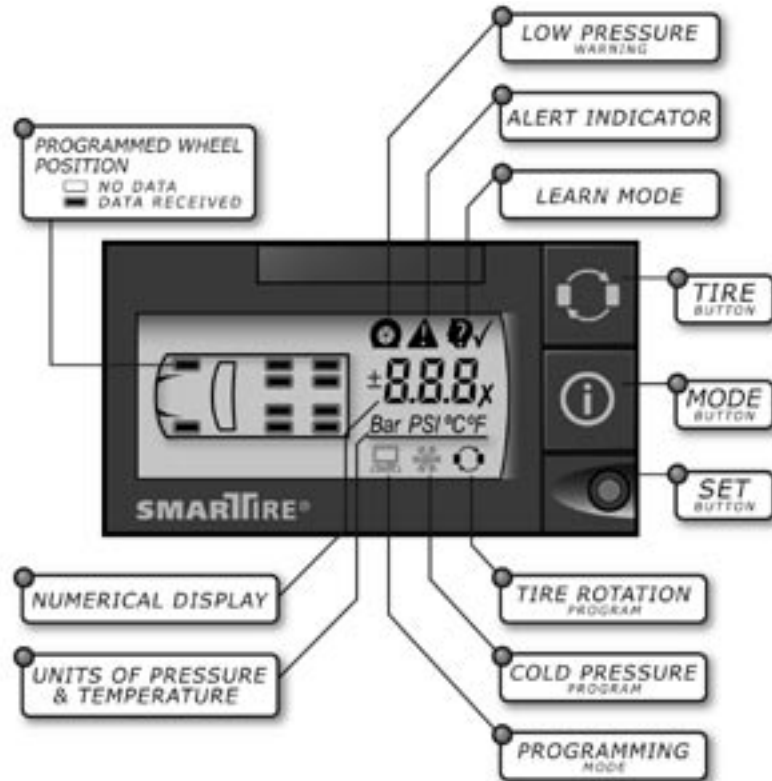
4. Towed vehicles or trailer tires can also be monitored. See your authorized SmarTire dealer for more information.

1.3 SENSOR OVERVIEW

SmartTire RV offers two kinds of tire pressure/temperature sensors. The Low Pressure Sensor (black) is for smaller RVs and towed vehicles. It is configured to measure tires with a cold inflation pressure up to 65 PSI. The high pressure sensor (orange) is configured for medium to large RVs with cold inflation pressures up to 160 PSI.



1.4 DISPLAY OVERVIEW



2.0 USING SMARTIRE RV

2.1 GETTING STARTED

When your vehicle is started, your SmarTire system will power up and the display will briefly flash all of its screen icons, and flash the alert light. The system will then go into stand-by mode, waiting for tire data from the sensors. When your vehicle is driven over 15 mph (24kph), the SmarTire will begin to receive tire data. When all of the tire icons are filled in, the SmarTire has captured data from all of the tires. While the vehicle is in motion, the sensors will measure pressure and temperature every 12 seconds and transmit data approximately every 3 - 5 minutes. If a sensor detects a pressure change of 3 PSI, it will transmit data immediately.



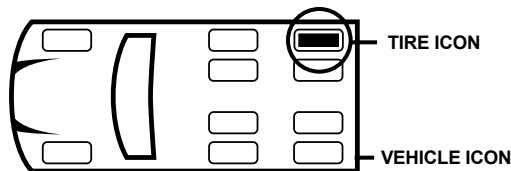
NOTE: HIGH PRESSURE SENSORS TRANSMIT DATA ONCE EVERY 15 MINUTES WHILE STATIONARY. THEY CONTAIN A MOTION SWITCH AND WILL SEND DATA REGULARLY ONCE THE VEHICLE REACHES A SPEED OF APPROXIMATELY 15 MPH (24 KPH).

2.2 CHECKING TIRE PRESSURE AND TEMPERATURE

At the push of a button, SmarTire RV will provide you with real time pressure and temperature status for all of your tires. Please check tires only when your vehicle is stopped and you are in a safe location. Never check tires when the vehicle is in motion and your attention is on the road.

When viewing tire data for an RV/tow vehicle, the programmed wheel positions are displayed in a vehicle icon (Figure 1). When viewing tire data for a trailer or towed vehicle, the windshield graphic disappears and the vehicle icon becomes a trailer icon. The system will alternate views between the towing and towed vehicle when operating with this configuration. Figure 2 illustrates the differences between the two viewing modes.

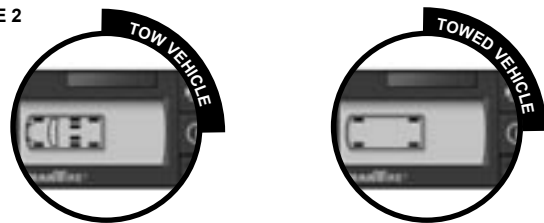
FIGURE 1



To check your tire pressure and temperature:

1. Press the 'Tire' button once and the display will highlight a wheel position. Each time the 'Tire' button is pressed, the display will scroll to the next wheel position on the vehicle. Scroll past the last wheel on the vehicle in order to view the wheel positions of a towed vehicle or trailer.
2. Press the 'Mode' button to check the pressure, temperature, and pressure deviation for the highlighted wheel position. Each time the 'Mode' button is pressed, the display will show the next set of information for the selected wheel position.
3. Press the 'Tire' button to scroll to the next wheel position on the vehicle and repeat the process to view tire pressure information.
4. To exit, press the 'Set' button.

FIGURE 2



2.3 ALERTS & WARNINGS

PRESSURE DEVIATION ALERT



The Pressure Deviation Alert is the first warning of an under-inflated tire. If a tire deviates 10 PSI from its “proper” inflation pressure, the driver is alerted to the condition by a warning light and an audible alarm. SmartTire RV calculates a tire’s “proper” inflation pressure by measuring the tire’s operating temperature and comparing it to its cold inflation pressure setting. This temperature compensation calculation enables SmartTire RV to provide accurate information and alerts regardless of a tire’s temperature. The numeric value displayed during the Pressure Deviation Alert is the number of PSI a tire is above or below its proper inflation pressure.

The default setting triggers the alert when a tire is 10 PSI under or over inflated. This setting can be customized by the user.

CRITICAL LOW PRESSURE ALERT



The Critical Low Pressure Alert is the second warning of tire under-inflation. It warns the driver when a tire’s pressure falls 10 PSI below the cold inflation pressure level. This audible and visual warning is intended to alert the driver to a critical tire condition in order for them to take immediate precautions.

Unlike the Pressure Deviation Alert, the Critical Low Pressure Alert does not use a temperature compensation calculation. As such, if a tire’s pressure falls below the default setting (10 PSI below the cold inflation pressure, e.g. cold inflation =105 PSI, default =95 PSI), the tire is critically under-inflated and should be addressed immediately.

Like the Pressure Deviation Alert, the default settings for the Critical Low Pressure Alert can be customized by the user.

HIGH TEMPERATURE ALERT



The High Temperature Alert warns the driver when a tire's temperature exceeds a preset threshold. The High Temperature Alert default settings are:

- 176°F (80°C) for all 4 wheel pre-configured kits.
- 195°F (90°C) for all 6 & 8 wheel kits.

High tire temperatures are typically caused by under-inflation and the SmartTire system will usually provide a Pressure Deviation Alert and a Critical Low Pressure Alert well in advance of a High Temperature Alert. If triggered on its own, the High Temperature Alert can be an indication of an alternative problem such as a dragging brake or a bearing failure. Like the other two alerts, the default High Temperature Alert setting can be customized by the user.

2.4 ERROR MESSAGE OVERVIEW

E1 Error – No signal
received from sensor for 20 minutes.

If the E1 code persists after the RV is driven, then a signal reception problem has been detected. This may be caused by a broken antenna, sensor or receiver. Contact your authorized SmartTire dealer for assistance.

E2 Error – Indicates
there is a problem with the data held in the receiver and/or display.

Power the system off and on (turn off vehicle and then turn back on). If the error clears, the system will operate normally. If the error does not clear, the receiver (or display) may need to be replaced. Contact your authorized SmartTire dealer for assistance.

E3 Error/E4 Error –
Indicates an internal power problem.

Power the system off and on (turn off vehicle and then turn back on). If the error continuously occurs, the receiver may need to be replaced. Contact your authorized SmartTire dealer for assistance.

IF AN ERROR MESSAGE IS RECEIVED, IT IS STRONGLY RECOMMENDED THAT YOU CONTACT YOUR AUTHORIZED SMARTTIRE RV DEALER FOR PROPER DIAGNOSIS AND REPAIR.

2.5 WHY IS TEMPERATURE MONITORING IMPORTANT?

THE PRESSURE TEMPERATURE RELATIONSHIP

We all know that vehicle and tire manufacturers specify that tire pressures should be checked and adjusted when a tire is “cold”, but most of us may not know why, or even what a “cold tire” is. The temperature of a tire actually has a significant impact on its inflation pressure.

A tire is considered to be “cold” when its temperature is 65°F (18°C). The inflation values provided by vehicle manufacturers (found in the vehicle’s owner’s manual and usually on the door jam or in the glove box) are called ‘Cold Inflation Pressures’ (CIP) because they represent the correct amount of pressure a tire should be inflated to when it is “cold”. The reason that tires have cold inflation pressures set at 65°F is because a tire’s pressure will change relative to its temperature.

Air naturally expands when heated and contracts when cooled. Inside a contained vessel such as a tire, this expansion and contraction causes a change in contained air pressure. As a tire heats up, its pressure will naturally increase and as it cools down, its pressure will naturally decrease.

A tire inflated to a CIP of 105 PSI at 65°F will increase in pressure to 125 PSI at 152°F and decrease in pressure to 97

PSI at 32°F. As such, on days when the ambient temperature is higher than 65°F, the proper starting pressure of a tire should be higher than the cold inflation value specified by the vehicle manufacturer.

On days when the ambient temperature is less than 65°F, it would be reasonable to assume that the pressure in a properly inflated tire should be less than the manufacturer’s recommended CIP. This is not actually the case.

Tire manufacturers never recommend inflating a tire to less than the specified cold inflation pressure. The beads of an RV/commercial tire can unseat if its pressure gets too low resulting in a catastrophic tire failure. The general rule of thumb is to inflate a tire to a proportionately higher starting value when the ambient/tire temperature is hotter than 65°F (18°C) and to the recommended CIP value at temperatures below 65°F.

The chart on the adjacent page shows equivalent inflation values for a series of cold inflation pressures at various temperatures.

RECOMMENDED CIP	OUTSIDE AMBIENT TEMPERATURE													
	°F	32	55	60	65	70	75	80	85	90	95	100	105	110
	°C	0	13	16	18	21	24	27	29	32	35	38	41	43
75		69	73	74	75	76	77	78	79	79	80	81	82	83
80		74	78	79	80	81	82	83	84	85	86	87	87	88
85		79	83	84	85	86	87	88	89	90	91	92	93	94
90		84	88	89	90	91	92	93	94	95	96	97	98	99
95		88	93	94	95	96	97	98	100	100	101	102	103	104
100		93	98	99	100	101	102	104	105	106	107	108	109	110
105		98	103	104	105	106	107	109	110	111	112	113	114	115
110		102	108	109	110	111	113	114	115	116	117	119	119	121
115		107	113	114	115	116	118	119	120	121	123	124	125	126
120		112	118	119	120	121	123	124	126	126	128	129	130	132
125		116	123	124	125	126	128	129	131	132	133	135	136	137
130		121	128	129	130	131	133	134	136	137	138	140	141	142
DO NOT EXCEED MAXIMUM PRESSURE CAPACITY OF THE WHEEL.														

THERMAL EQUILIBRIUM

As a vehicle moves, its tires naturally heat up due to friction from the road and the flexing of its side-walls. Weight, vehicle speed and the inflation pressure a tire starts at all have an impact on how much and how quickly heat is generated.

As the tire generates heat, its pressure increases causing a reduction in side-wall flexing. Less side-wall flexing and road resistance combined with air rushing past the tire as the vehicle moves effectively counteract the conditions that cause the tire to heat up. As a result, the temperature increase tapers until the tire reaches a point of balance called Thermal Equilibrium.

Tire “Thermal Equilibrium” is the point where the heat being generated is equal to the heat being dissipated. Tires are designed with the principles of temperature and pressure in mind in order for them to achieve Thermal Equilibrium. Once a properly inflated tire reaches Thermal Equilibrium, it will operate at its peak; providing the best performance, handling, tire life and fuel economy.

SMARTIRE RV TEMPERATURE COMPENSATION

Since a tire’s contained air pressure naturally increases as a vehicle moves, it can be difficult to tell if a hot tire is under-inflated. Without some form of temperature compensation, a hot tire that is under-inflated might appear to be fine because its contained air pressure is at or above its cold inflation pressure (CIP).

For example, a tire correctly inflated to a CIP of 105 PSI at 65°F will reach thermal equilibrium when its temperature increases to 152°F and its pressure increases to 125 PSI. A tire starting at 95 PSI at 65°F (10 PSI under inflated) would have to reach 202°F for it to reach thermal equilibrium (125 PSI). The tire will then be running 50°F hotter than it should be, causing more tire wear and the potential for a catastrophic failure or tire fire.

When checked using a handheld gauge or a tire monitoring system that does not measure operating temperature, this 10 PSI under-inflated tire can appear to be normal.

Smartire measures both tire pressure and temperature in order to provide “Temperature Compensated” pressure deviation values and alerts. By measuring the operating temperature of a tire

and comparing it to the cold inflation pressure (CIP) value programmed into the system, the SmarTire will know what a tire's pressure is supposed to be in relation to its operating temperature.

The system is able to warn the driver of an under-inflated tire even if that tire's actual contained air pressure is at or above its CIP.

The advantages of temperature compensation are even more dramatic when a tire has a slow leak. A tire that is constantly losing pressure will not be able to reach thermal equilibrium because the contained air simply cannot expand enough to generate the required pressure, regardless of how hot the tire becomes. Since the leak is slow, the tire may appear over an extended period of time to be properly inflated when it is actually dangerously under-inflated and operating well above its temperature capacity.

As air leaks from the tire, increased side-wall flexing and road resistance cause the tire's temperature and pressure to increase. The pressure increase will soon plateau and begin to slowly decrease while the tire's temperature continues to increase. Eventually, the tire will become so hot that its structure will degrade and then fail in the form of a blow-out and/or tire fire.

Consequently, for a tire pressure monitoring system to be of value, it must be able to measure the operating temperature of a tire and provide the driver with temperature compensated information.

3.0 TIRE MAINTENANCE

Proper tire maintenance is critically important for keeping tires rolling smoothly. When properly maintained and inflated, tires will provide shorter stopping distances and better vehicle handling in emergency situations. Tires should not only be replaced when their tread wears out, but when their casings are old and fatigued.

MAINTENANCE TIPS FOR LONG TIRE LIFE

- Keep tires properly inflated at all times.
- Ensure your tires are rotated as specified in your vehicle's owner's manual.
- When not in use, park the vehicle on level ground.
- When using blocks, make sure the full tire is supported.
- Block up axles at the end of the season to avoid load weight on the tires.
- Cover tires to protect them from sunlight as this leads to side-wall cracking.

3.1 TIRE ROTATION

Rotating tires is one of the easiest ways to extend tire life. Follow the steps below to reprogram the wheel positions in your SmartTire RV after a tire rotation. This procedure is valid for up to 20 tire locations.

1. Press and hold the 'Set' button for more than two seconds, but less than five seconds to enter the Level 1 Programming Mode.



2. Press the 'Mode' button to toggle between different programming screens until the tire rotation icon and the computer icon are displayed. The display is now showing the Tire Rotation programming screen.
3. The system assigns a number to each wheel position on the vehicle (see pg 29). Press the 'Tire' button to toggle to the desired tire and its wheel position number will be displayed.

4. Press the 'Mode' button to select the tire.
5. Increase the position number by pressing the 'Tire' button or decrease the number by pressing the 'Mode' button until the number displayed corresponds with the sensor's new wheel position on the vehicle.
6. Once the desired value is displayed, press the 'Set' button to save the value.
7. Two tires will now be assigned to the same wheel position number. Press the 'Tire' button to toggle to the other tire assigned to that wheel position number and repeat steps 4 - 6 to assign it a new number. Repeat the process until all tires are assigned the correct wheel position numbers.
8. Press the 'Set' button once to exit the Tire Rotation programming screen and again to exit the Level 1 Programming Mode.



NOTE: IF MORE THAN ONE TIRE LOCATION CONTAINS THE SAME SENSOR NUMBER, THE DISPLAY WILL PROMPT AN ERROR WITH THE CONFLICTING TIRES FILLED IN AND THE ASSOCIATED SENSOR NUMBER. PRESS ANY BUTTON TO RETURN TO THE TIRE SELECTION MENU AND MAKE THE NECESSARY CORRECTIONS.

3.2 NOTICE REGARDING TOWED VEHICLES OR TRAILERS

If you are using SmarTire RV in conjunction with a towed vehicle or trailer, the following information is important to note.

When you unhitch a tow-behind vehicle or trailer and begin driving the towing vehicle, the SmarTire system may pick up a stray transmission from the tow-behind. If this occurs, the display will show an "E1" alert within 20 minutes. To clear the error message, simply turn the system off (by turning the ignition off) and then back on. The next time you hook up the towed vehicle or trailer, SmarTire RV will automatically receive the towed vehicle or trailer's data transmissions and reset itself to monitor all tires.

It is possible to upgrade a SmarTire RV system to accommodate a tow-behind vehicle or trailer. It is also possible to have an independent SmarTire tire monitoring system for a tow-behind vehicle that integrates with a SmarTire RV system. Contact your authorized SmarTire dealer for more information.

4.0 CONFIGURING & CUSTOMIZING YOUR SMARTIRE RV

During the installation process, SmarTire RV's default settings should be customized to your specific vehicle by the installer. At any time, the alert thresholds can be made more or less sensitive and system settings can be adjusted to accommodate vehicle changes and use.

Replacing the tires on your vehicle or installing your system on a new vehicle may require you to adjust the settings of your SmarTire RV system. Fully loaded RVs should also be weighed in advance of a trip so that tire inflation pressures can be appropriately adjusted. The following section will describe how to adjust the pre-configured settings of your SmarTire RV system.

4.1 PRE-CONFIGURED SETTINGS

Default pressure settings can be customized for your particular vehicle. Check your vehicle's owner's manual to determine the manufacturer's recommended Cold Inflation Pressure settings. Check the owner's manual of the towed vehicle or trailer for the manufacturer's recommended Cold Inflation Pressure settings. SmarTire recommends setting the Critical Low Pressure Alert at 10 PSI below the recommended Cold Inflation Pressure for your vehicle. SmarTire also does not recommend changing the default Pressure Deviation Alert settings.



WHENEVER THE COLD INFLATION PRESSURE SETTING IS ADJUSTED, THE CRITICAL LOW PRESSURE ALERT SETTING AND THE SLOPE SETTING MUST ALSO BE APPROPRIATELY ADJUSTED.

SMARTIRE RV IS PRE-CONFIGURED WITH THE DEFAULT TIRE PRESSURE SETTINGS LISTED BELOW:

TYPE OF SYSTEM	4 WHEEL LOW PRESSURE	4 WHEEL HIGH PRESSURE	6 WHEEL HIGH PRESSURE	8 WHEEL HIGH PRESSURE	6 WHEEL HIGH PRESSURE + 4 WHEEL TOW-BEHIND		8 WHEEL HIGH PRESSURE + 4 WHEEL TOW-BEHIND	
	RV	RV	RV	RV	RV	TOW BEHIND	RV	TOW BEHIND
Cold Inflation Pressure	30 PSI	80 PSI	100 PSI	100 PSI	100 PSI	30 PSI	100 PSI	30 PSI
Pressure Deviation Alert	+/- 5 PSI	+/- 10 PSI	+/- 10 PSI	+/- 10 PSI	+/- 10 PSI	+/- 10 PSI	+/- 10 PSI	+/- 10 PSI
Low Pressure Warning	25 PSI	70 PSI	90 PSI	90 PSI	90 PSI	25 PSI	90 PSI	25 PSI
High Temperature Warning	176°F	176°F	195°F	195°F	195°F	195°F	195°F	195°F

Default pressure settings can be customized for your particular vehicle. Check your vehicle's owner's manual to determine the manufacturer's recommended Cold Inflation Pressure settings. Check the owner's manual of the towed vehicle or trailer for the manufacturer's recommended Cold Inflation Pressure settings. SmarTire recommends setting the Critical Low Pressure Alert at 10 PSI below the recommended Cold Inflation Pressure for your vehicle. SmarTire also does not recommend changing the default Pressure Deviation Alert settings.

4.2 PROGRAMMING MODES

LEVEL 1 PROGRAMMING MODE: Press and hold the ‘Set’ button for two seconds to enter this mode in order to perform tire rotation, program the cold inflation pressures, Critical Low Pressure Alert, Pressure Deviation Alert, and High Temperature Alert.

LEVEL 2 PROGRAMMING MODE: Press and hold the ‘Set’ button for five seconds to enter this mode in order to program Slope.

LEVEL 3 PROGRAMMING MODE: This programming mode is not required for the SmartTire RV system. Press the ‘Set’ button to exit this mode.

PROGRAMMING THE COLD INFLATION PRESSURE (CIP) SETTING

1. Press and hold the ‘Set’ button for more than two seconds, but less than five seconds to enter the Level 1 Programming Mode.
2. Press the ‘Mode’ button to toggle between the different programming screens until the snowflake icon, the computer icon and a designation of pressure units (PSI or Bar) are displayed. The display is now showing the “Cold Inflation Pressure” (CIP) programming screen.



3. Press the 'Tire' button to select the CIP programming screen.
4. Press the 'Tire' button to toggle to the desired axle.
5. Press the 'Mode' button to select the axle and the current setting for that axle will be displayed.
6. Increase the CIP value by pressing the 'Tire' button or decrease the value by pressing the 'Mode' button.
7. Once the desired value is displayed, press the 'Set' button to save the value.
8. Press the 'Tire' button to toggle to the next axle to be programmed (if required) and repeat steps 5 - 7 until all programmed axles are set to the desired CIP values.
9. Press the 'Set' button once to exit the CIP programming screen and again to exit the Level 1 Programming Mode.



WARNING: ANY TIME CIP VALUES ARE CHANGED, THE SLOPE VALUE MUST BE ADJUSTED ACCORDINGLY. THE SLOPE VALUE SHOULD ALWAYS BE SET TO 10 POINTS ABOVE THE RECOMMENDED CIP. FOR EXAMPLE, IF THE CIP IS SET TO 105 PSI, THE SLOPE VALUE SHOULD BE 115. ENSURE SLOPE IS SET CORRECTLY FOR ALL AXLES. SEE PAGE 21 FOR PROGRAMMING THE SLOPE SETTING.

PROGRAMMING THE PRESSURE DEVIATION ALERT

1. Press and hold the 'Set' button for more than two seconds, but less than five seconds to enter the Level 1 Programming Mode.
2. Press the 'Mode' button to toggle between the different programming screens until the computer icon, the plus and minus signs, and a designation of pressure units (PSI or Bar) are displayed. The display is now showing the Pressure Deviation Alert programming screen.
4. Increase the value by pressing the 'Tire' button or decrease the value by pressing the 'Mode' button. (This alert can be disabled by pressing the 'Mode' button until the display shows 'Off').
5. Once the desired value is displayed, press the 'Set' button to save the value.
6. Press the 'Set' button to exit the Pressure Deviation Alert programming screen and again to exit the Level 1 Programming Mode.



3. Press the 'Tire' button to select the Pressure Deviation Alert programming screen. The current setting for the entire vehicle will now be displayed. The standard setting is +/- 10 PSI from the temperature compensated CIP value.

PROGRAMMING THE CRITICAL LOW PRESSURE ALERT

1. Press and hold the 'Set' button for more than two seconds, but less than five seconds to enter the Level 1 Programming Mode.
2. Press the 'Mode' button to toggle between the different programming screens until the flat tire icon, the computer icon and a designation of pressure units (PSI or Bar) are displayed. The display is now showing the Critical Low Pressure Alert programming screen.



3. Press the 'Tire' button to select the Critical Low Pressure Alert programming screen.
4. Press the 'Tire' button to toggle to the desired axle.

5. Press the 'Mode' button to select the axle and the current setting for that axle will be displayed. The standard setting for this alert is 10 PSI below the CIP value.
6. Increase the value by pressing the 'Tire' button or decrease the value by pressing the 'Mode' button.
7. Once the desired value is displayed, press the 'Set' button to save the value.
8. Press the 'Tire' button to toggle to the next axle to be programmed (if required) and repeat steps 5 - 7 until all programmed axles are set to the desired values. Usually, all axles are programmed to the same alert value.
9. Press the 'Set' button once to exit the Critical Low Pressure Alert programming screen and again to exit the Level 1 Programming Mode.

PROGRAMMING THE HIGH TEMPERATURE ALERT

1. Press and hold the 'Set' button for more than two seconds but less than five seconds to enter the Level 1 Programming Mode.
2. Press the 'Mode' button to toggle between the different programming screens until the caution triangle icon, the computer icon and a designation of temperature units (°F or °C) are displayed. The display is now showing the High Temperature Alert programming screen.
3. Press the 'Tire' button to select the High Temperature Alert programming screen. The pre-programmed High Temperature Alert for the vehicle will now be displayed.
4. Increase the value by pressing the 'Tire' button or decrease the value by pressing the 'Mode' button.
5. Once the desired value is displayed, press the 'Set' button to save the value.
6. Press the 'Set' button once to exit the High Temperature Alert programming screen and again to exit the Level 1 Programming Mode.



NOTE: THE HIGH TEMPERATURE ALERT SETTING APPLIES TO ALL AXLE LOCATIONS. THE HIGH TEMPERATURE ALERT CAN BE TURNED OFF BY SETTING THIS PARAMETER BELOW 86°F/30°C.

PROGRAMMING THE SLOPE

SmartTire RV uses a “Slope” calculation in order to determine accurate inflation pressures based on measured tire temperature. The Slope calculation is the change in tire pressure divided by the change in tire temperature. The value of the Slope setting is constant for radial type tires and should be set to 10 points higher than the cold inflation pressure value. For example, if a tire has a cold inflation pressure of 105 PSI, its Slope should be set to 115.

1. Press and hold the ‘Set’ button for more than five seconds, but less than ten seconds to enter the Level 2 Programming Mode.



2. Press the ‘Mode’ button to toggle between the different programming screens until the computer icon and ‘SL’ are displayed. The display is now showing the Slope programming screen.
3. Press the ‘Tire’ button to select the Slope programming screen.
4. Press the ‘Tire’ button to toggle to the desired axle.
5. Press the ‘Mode’ button to select the axle and the current setting for that axle will be displayed.
6. Increase the value by pressing the ‘Tire’ button or decrease the value by pressing the ‘Mode’ button.
7. Once the desired value is displayed, press the ‘Set’ button to save the value.
8. Press the ‘Tire’ button to toggle to the next axle to be programmed (if required) and repeat steps 5 - 7 until all programmed axles are set to the desired values.
9. Press the ‘Set’ button to exit the Slope programming screen and again to exit the Level 2 Programming Mode.

5.0 REMOVING A TIRE THAT HAS A SMARTIRE SENSOR INSTALLED

This section outlines the correct methods for removing a tire from a wheel that is equipped with a SmarTire sensor. Instructions for using both tire irons and a tire mounting machine are provided.

Please read these instructions carefully and follow each step precisely to ensure that you do not damage a sensor when dismounting the tire. If steps are not taken to avoid the sensor located in the drop center well of the rim, it can be crushed by the beads as the tire is removed.



**NOTE: THIS INFORMATION SHOULD
BE PROVIDED TO TIRE FITTERS THAT
ARE NOT AUTHORIZED SMARTIRE
RV DEALERS**

5.1 USING TIRE IRONS

1. After removing the deflated tire/wheel assembly from the vehicle, lay the assembly on a floor mat and unseat both beads directly opposite the sensor. The sensor should be located at the valve stem (the rim mounted decal should also indicate the sensor's location). Do not unseat the bead at or near the valve stem.



2. Ensure that the mounting side of the wheel is facing upward and both the bead and wheel flange are properly lubricated.
3. Starting near the sensor, lift the top bead over the wheel flange with the tire irons and progressively work away from the sensor until the top bead is free. Be careful not to contact the sensor with the tire irons.
4. Again starting near the sensor, repeat the process for the bottom bead until the tire is free from the wheel.

5.2 USING A TIRE MOUNTING MACHINE

1. After removing the deflated tire/wheel assembly from the vehicle, unseat the beads directly opposite the sensor and valve stem. The sensor should be located at the valve stem (the rim mounted decal should also indicate the sensor's location). Do not break the bead at or near the valve stem.
2. Position the lubricated tire/wheel assembly on the machine so that the dismount head and the sensor are approximately aligned.
3. Lift the bead over the rim flange with the bead lifting bar and then advance the assembly/dismount head clockwise to remove the top bead.
4. Repeat steps 2 and 3 to remove the bottom bead.

6.0 SYSTEM INSTALLATION

6.1 TOOLS REQUIRED

INSTALLING THE RECEIVER

1. Wire cutter/stripper/crimping tool
2. Phillips screwdriver

INSTALLING THE DISPLAY

1. Cleaning supplies
2. Power drill & bits *

INSTALLING THE ANTENNAS

1. Power drill & bits *
2. Silicone sealant *
3. 1" open ended wrench or crescent wrench

INSTALLING THE SENSORS

1. 5/16" or 8mm hexagon driver
2. Metal cutter
3. Torque wrench *
4. Tire changing equipment
5. Tire balancing equipment

* Tool may not be required

6.2 GETTING STARTED

Like all integrated systems, the installation location of each component is dependant upon the location of the other components in the system. As such, it is best to select the overall location of each component before starting.

Use the following sequence when determining the best location for each component:

1. Determine the installation location for the display. Pick a location that is easily viewable by the driver, can be easily reached in order to check tire pressure and that can conceal the wire that connects the display to the receiver.
2. Starting at the rear of the vehicle, lay the antenna cables the length of the vehicle with one antenna at the rear axle(s) and another at the front axle. If a towed vehicle will be monitored, add a third antenna at the very rear of the vehicle. Determine a concealed location for the antenna cables to enter the cab of the vehicle.
3. Determine the installation location for the receiver. Select a concealed location that is in the cab of the vehicle and within reach of a fused, ignition keyed power supply and ground. The location must be within reach of the display cable and the antenna cables. It should also ideally be

within audible range of the driver so that the receiver's audible alert can be heard.

It is important to ensure that the display is mounted in the best location for the driver. The installation location of the receiver and the entry point for the antenna cables should always accommodate the installation location of the display.

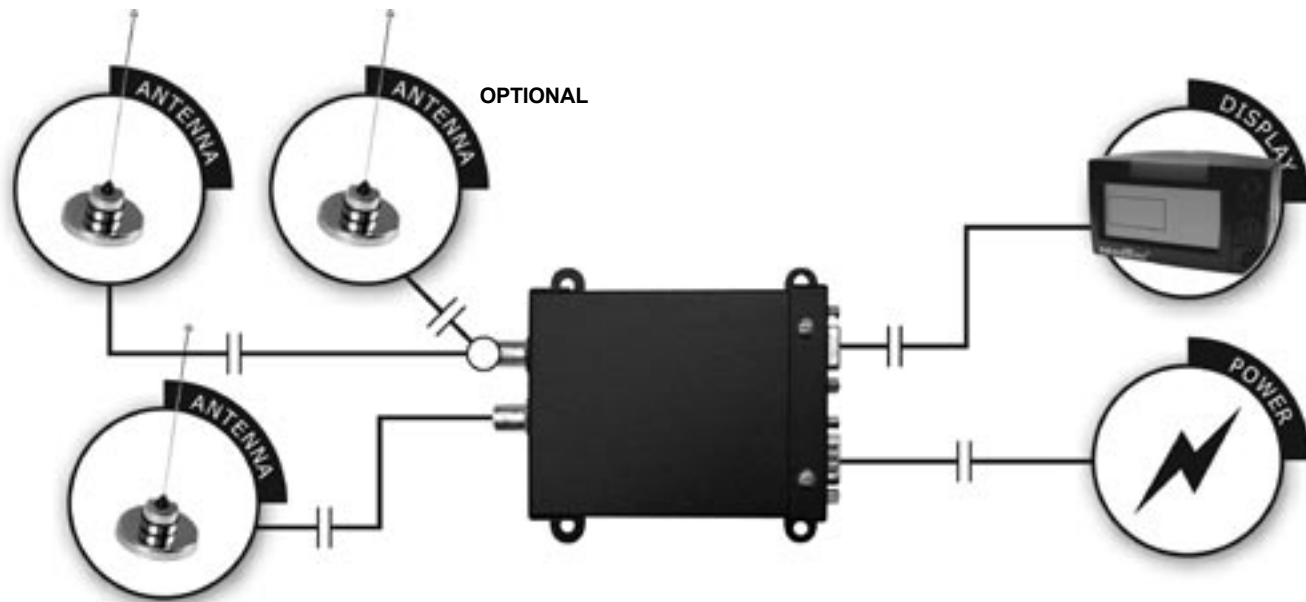
6.3 STEP 1: INSTALLING THE RECEIVER AND DISPLAY

1. Select a location to mount the display and a concealed location to mount the receiver. For the display, select a location that is easily viewable by the driver, can be easily reached in order to check tire pressure and that can conceal the cable that connects the display to the receiver. For the receiver, select a concealed location that is within easy reach of the display cable and the entry point of the antenna cables, and has access to a suitable power source and ground. It should also be within audible range of the driver (receiver emits audible alert during tire pressure/temperature warnings).
2. With the vehicle's power off, wire the receiver power cable to the vehicle connecting the positive (red) wire to a fused

(2 – 5 Amp), ignition keyed 12 or 24 volt power source and the negative (black) wire to ground.

3. Run the display cable from the desired location on the dash or console to the receiver (may require drilling a hole in the dash). Connect the display cable to the back of the display and, using the included Velcro, mount the display to the dash in a clean, easily viewable and reachable location.
4. Place the receiver in its intended mounting location and mark the mounting holes for drilling. Be sure to leave sufficient room to connect the antenna cables and the display cable. Using a 1/8" drill bit, drill the mounting holes.
5. Mount the receiver in place using the supplied self-tapping metal screws.
6. With the vehicle's power off, connect the display cable to the receiver and then connect the power cable.

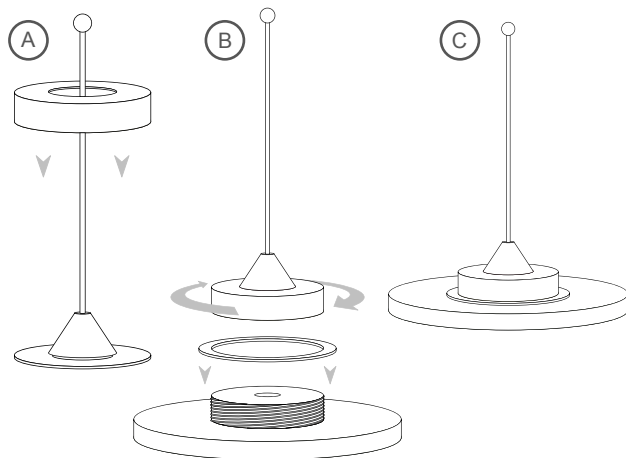
INSTALLING THE RECEIVER AND DISPLAY: CONNECTION DIAGRAM



6.4 STEP 2: INSTALLING THE ANTENNAS

1. Assemble the antennas.

- A. Slide the metal retainer over the antenna whip and pull it tight so that the rubber boot fits snugly in the retainer.



- B. Install the rubber washer and screw the antenna whip/metal retainer on to the antenna base. Tighten the assembly using a wrench. **CAUTION: DO NOT OVERTIGHTEN THE ASSEMBLY.**

2. Since wireless signals are reflected by metal surfaces, the antennas require a clear line-of-sight to the tires. Magnetically mount the antennas to the underside of the vehicle in locations that are open and unobstructed with as much ground clearance as possible and never pointed upward (see Sensor and Antenna Diagram on pg 29). They can be adhered to frame rails, bumpers, and/or the tow-hitch as required.
3. Run the cables the length of the vehicle and drill a hole to provide access into the cab. Existing holes can also be used. Feed the cables through the hole to the intended location of the receiver.



TOW BEHIND ANTENNA:

MOUNT IN THE REAR ENGINE COMPARTMENT POINTED TOWARD THE REAR OF THE VEHICLE.



**DRIVE AXLE
ANTENNA:**

MOUNT AS CLOSE
TO THE AXLE
AS POSSIBLE IN
AN OPEN AND
UNOBSTRUCTED
LOCATION.



**STEER AXLE
ANTENNA:**

MOUNT AS CLOSE
TO THE AXLE
AS POSSIBLE IN
AN OPEN AND
UNOBSTRUCTED
LOCATION.

NOTE: THESE ANTENNA LOCATIONS ARE ONLY SUGGESTIONS AS EVERY VEHICLE IS DIFFERENT.



ANTENNA CABLES

HOLE

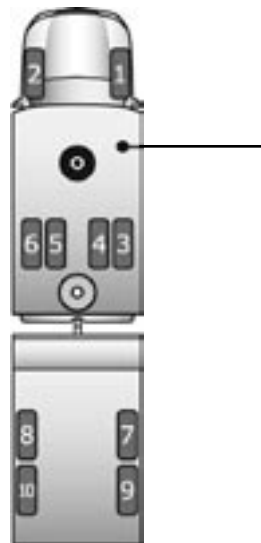
4. Starting at each antenna, attach the cables to the underside of the vehicle using the included cable ties. Be sure that the cables avoid moving parts and excessive heat.
5. Feed any slack through the hole and then seal it using silicone sealant. Be sure that the seal is weatherproof and will not allow moisture to enter the cab.
6. Connect the antenna cables to the receiver. If three antennas are used, connect the supplied metal T connector to one of the antenna ports on the receiver and then connect the tow-behind antenna and the steer axle antenna to it. Attach the drive axle antenna to the remaining port.

SENSOR AND ANTENNA DIAGRAM

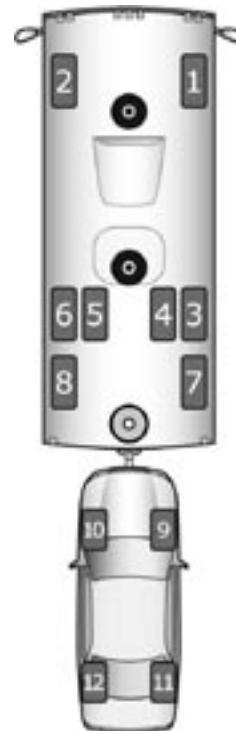
4 WHEEL LOW
4 WHEEL HIGH



6 WHEEL
6+4 WHEEL



8 WHEEL
8+4 WHEEL



NOTE:
If vehicle length exceeds 25 feet, use 2 antennas for the vehicle and 1 for the tow-behind as per the 8 + 4 diagram.

6.5 STEP 3: INSTALLING THE SENSORS

Please read this section carefully and follow each step precisely to ensure that you do not damage a sensor and the sensors are installed in the correct, pre-programmed locations.

1. Remove the wheel from the vehicle and then remove the tire.
2. Each sensor is pre-programmed in the receiver to a specific wheel location on the vehicle. The P number on the side and bottom of the sensor corresponds to a wheel position number on the supplied Sensor and Antenna Diagram (pg 29). Select the sensor that is pre-programmed to the wheel you are working on.

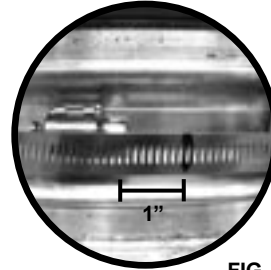


FIG. 1



FIG. 2

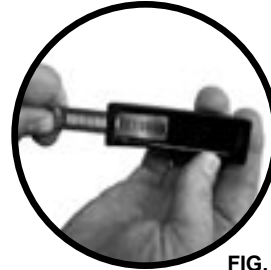


FIG. 3

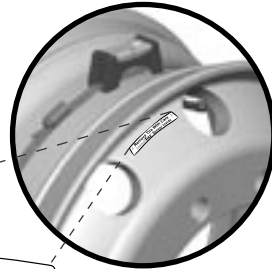
3. Wrap the strap around the rim and mark it 1" past the worm gear (Fig 1). Cut the strap at the mark and slide on the sensor (Fig 2/3). **Excess strap must be removed or it will potentially break-off and damage the tire.**
4. With the strap and sensor positioned in the lowest point of the drop center well, feed the end of the strap into the worm gear and pull it tight. Orient the sensor so that it is positioned at the valve with the worm gear 3" away from the edge of the sensor (Fig 4). The sensor must always be oriented at the valve in order to know its approximate location after the tire has been mounted.

5. Hand tighten the strap using a 5/16" (8 mm) hexagon driver until the sensor can not be moved. **CAUTION: Do not over tighten the strap.** Reference torque: 35 in-lbs (4 Nm)

6. Indicate the location of the sensor by applying the supplied rim label to a clean and dry location on the rim.



FIG. 4



Remove Tire With Care
SMARTIRE® Sensor Inside

6.6 STEP 4: RE-MOUNTING TIRES AFTER A SENSOR HAS BEEN INSTALLED

Please read this section carefully and follow each step precisely to ensure you do not damage the sensor when mounting the tire. If steps are not taken to avoid the sensor located in the drop center well of the rim, it can be crushed by the beads as the tire is mounted.

RE-MOUNTING RV TIRES USING TIRE IRONS

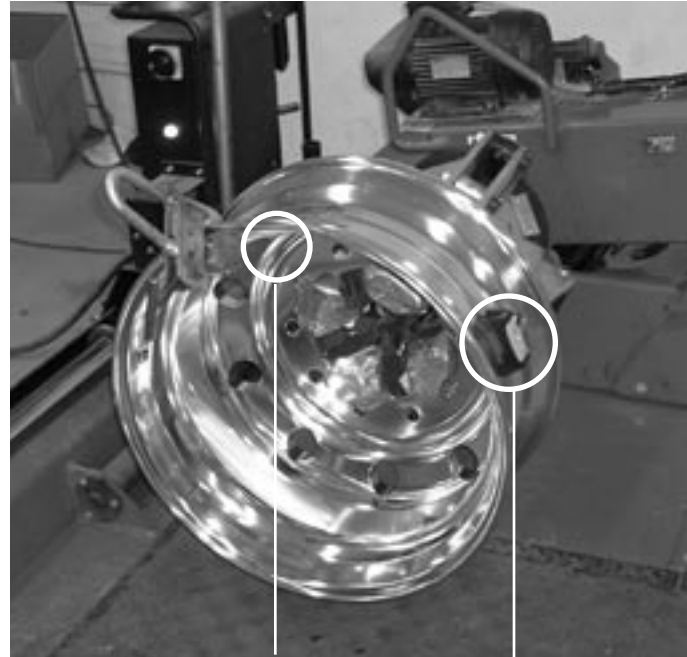
To avoid damaging the sensor, simply mount the tire so that the last part of the bead to slip over the flange happens directly at the sensor.

Start at one end of the tire and work towards the opposite end with the tire oriented so that the beads are first pushed under the rim flange directly opposite the sensor (1) and then worked over the flange toward the sensor (2). The bead will finally slip over the rim flange at the sensor without contacting it (3). Repeat for the remaining bead.



RE-MOUNTING RV TIRES USING A VERTICAL TIRE MACHINE

1. Place the rim on the machine so that the rim flange clamp is at a 12 o'clock position, the sensor is at a 2 o'clock position and the mounting hook is at an 8 o'clock position.
2. Advance the wheel clockwise to pass both beads over the rim flange simultaneously. The tire should mount onto the wheel without contacting the sensor.



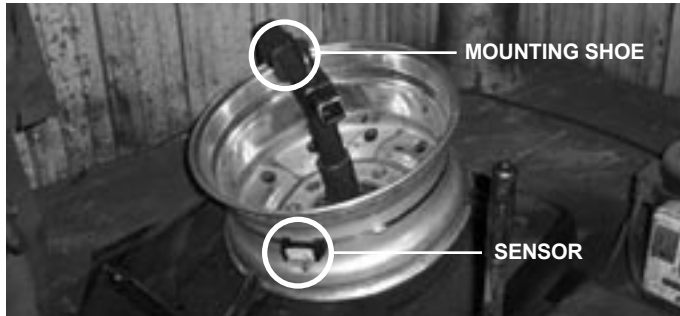
RIM FLANGE CLAMP

SENSOR



RE-MOUNTING RV TIRES USING A CENTER POST TIRE MACHINE

1. Place the rim on the machine with the mounting shoe at a 9 o'clock position and the sensor at a 5 o'clock position.

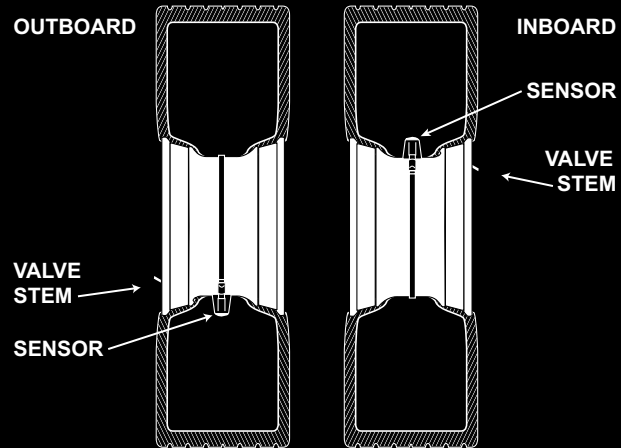


2. Place the tire on the rim with the bottom bead under the flange at a 6 o'clock position with the mounting shoe at a 9 o'clock position.
3. Advance the mounting shoe clockwise to pass the lower bead over the rim flange.
4. Return the mounting shoe to the 9 o'clock position, depress the upper bead under the rim flange at a 6 o'clock position and advance the mounting shoe clockwise until the second bead is completely mounted.



DUAL WHEEL ASSEMBLIES

WARNING: IN ORDER TO ACCOMMODATE SMARTIRE SYSTEM PROGRAMMING, DUAL WHEELS MUST ALWAYS BE MOUNTED ON THE VEHICLE WITH THE VALVE STEMS 180° FROM EACH OTHER.



RE-MOUNTING TOW-BEHIND & CAR TIRES USING A TIRE MACHINE

1. Place the rim on the turn-table of a tire mounting machine with the sensor at 7 o'clock and the mount head at 12 o'clock.



2. Starting from the mount head, manually depress the bottom bead of the lubricated tire on the rim and into the drop center well until its pinch point is approximately 3" (7.5 cm) before the sensor.

(Note: The pinch point, also known as a traction point, is the position on the rim where the tire bead encounters resistance when trying to slip over the rim flange.)

3. Advance the turn-table clockwise using the mount head to guide the rest of the bottom bead over the flange and onto the rim. When done properly, the bead will slip over the flange without contacting the sensor.



4. Repeat for the top bead. Do not allow the pinch point to slip as the rim rotates or the sensor could be broken.
5. Finish the tire installation as normal (seat the beads, install the valve core, inflate to the recommended cold inflation pressure, balance tires and mount wheels in specified locations).

7.0 REPLACEMENT PARTS

PART NUMBER	DESCRIPTION
101.9001	Receiver (no cable)
061.4001	Remote Full Function Display (FFD) (with FFD cable)
101.1112	High pressure axle kit (includes two high pressure sensor and two straps)
061.1002	Low pressure axle kit (includes two low pressure sensor and two straps)
062.4003	FFD cable
062.0005	Power cable
069.0009	Installation kit
101.1020	Antenna kit, 20'
101.1040	Antenna kit, 40'
101.1060	Antenna kit, 60'

CONTACT SMARTIRE DEALER FOR PARTS PRICING

8.0 SYSTEM SCOPE OF USE AND WARNINGS

This tire monitoring system does not in any way replace the need for regular maintenance of the tire pressures and tire conditions.

8.1 SYSTEM INSTALLATION AND USAGE

Warranty of the SmarTire system requires that it has been properly installed and programmed by qualified personnel according to SmarTire Systems Inc. documentation. This includes all manuals and any supplementary installation instructions included with system components.

8.2 USE OF CHEMICALS

Temporary resealing or re-inflation products containing internal sealers or propellants in any tire/wheel assembly may adversely affect the operation of the Sensor/Transmitters and void the warranty.

8.3 REACTING TO ALERTS

When an alert or warning condition is detected, reduce vehicle speed to an appropriate safe level and proceed to a safe stopping location or facility where the tire can be inspected and serviced.

9.0 SPECIFICATIONS

	RECEIVER	FULL FUNCTION DISPLAY	HIGH PRESSURE SENSOR (WITH CRADLE)	LOW PRESSURE SENSOR
Power	12 or 24 v DC		Internal Lithium Battery	Internal Lithium Battery
Power Consumption	Normal = 480 mW, Max = 1.60 W	Normal = 115 mW Max = 150 mW		
Weight	16.0 oz (454 g)	1.55 oz (44 g)	1.89 oz (58.7 g)	1.5 oz (43 g)
Dimensions	4.0 x 4.6 x 1.5 in. (102 x 117x 38mm)	2.8 x 1.7 x 0.75 in. (71 x 43 x 19 mm)	3.58 x 1.65 x 1.34 in. (91 x 42 x 34 mm)	2.68 x 1.08 x 0.91 in. (84 x 25 x 22 mm)
Operating Temperature	-40 °F to 185 °F (-40 °C to 85 °C)	-20 °F to 185 °F (-29 °C to 85 °C)	-40 °F to 257 °F (-40 °C to 125 °C)	-40 °F to 257 °F (-40 °C to 125 °C)
Pressure Accuracy			+/- 4.35 PSI (0.3 BAR)	+/- 1.5 PSI (0.1 BAR)
Maximum Cold Inflation Pressure			160 PSI (11.03 BAR)	65 PSI (4.5 BAR)
Maximum Operating Pressure			188 PSI (13.0 BAR)	78 PSI (5.4 BAR)
Battery Life	N/A	N/A	7 years at 50,000 miles/yr (80,500 km/yr) - approx.	5 years at 30,000 miles/yr (48,000 km/yr) - approx.

10.0 SMARTIRE PRODUCT & SERVICE PART WARRANTY: EFFECTIVE NOVEMBER 15, 2005

This warranty is effective as of November 15, 2005 and supersedes all past warranties expressed by SmarTire Systems Inc. Warranty subject to change by SmarTire Systems Inc. at any time without notice.

Warranty claims must be processed with the Authorized SmarTire Dealer of purchase and not SmarTire Systems Inc.

WARRANTY POLICY

Subject to the conditions stated herein, SmarTire Systems Inc. (“SmarTire”) warrants that its Products and service parts, when properly installed in approved applications, will conform to Product specifications and will be free from defects in material and workmanship under normal use and service. The term of SmarTire’s warranty for its Products is 24 months and unlimited mileage commencing on the date of retail sale. Dated proof of purchase and claimed parts for return are required. The term of SmarTire’s warranty for its service parts is 12 months and unlimited mileage commencing on the date of retail sale. Dated proof of purchase and claimed parts for return are required. The SmarTire warranty will be honored by the authorized SmarTire dealer from which the Product or service part was purchased.

Subject to warranty approval, SmarTire shall, at its discretion, cover the following:

- Products: replacement parts and cost of labor;
- Service Parts: replacement parts only.

SmarTire's obligation to satisfy a warranty claim is subject to, yet not limited to the following conditions:

- a. dated proof of purchase is provided;
- b. all Product involved must, unless otherwise indicated by SmarTire, be returned to the Authorized SmarTire Dealer of purchase; and
- c. SmarTire's examination of the Product must disclose to SmarTire's satisfaction that none of the Warranty Exclusions described herein apply. In all cases, SmarTire shall make the final determination as to the warrantability of the Product.

Products replaced under warranty are covered hereunder by whichever is greater; the remaining portion of the original warranty period or 12 months.

GENERAL LIMITS AND EXCLUSIONS

Coverage is not provided for the following failures or expenses:

- a. Towing;
- b. Downtime, lodging, meals, and travel time or transportation;
- c. Troubleshooting/Diagnostics - except where allowed as indicated in the SmarTire approved guidelines;
- d. Freight for expedited or rush parts shipments (Parts will be shipped by the most economical means possible);
- e. Non-genuine replacement parts void the component warranty when used to make a repair;
- f. Component damage due to failure of other chassis or vehicle components;
- g. Undefined or unidentifiable miscellaneous changes;
- h. Failures due to product misapplication or SmarTire unapproved application;
- i. Failures due to unapproved alterations or modifications to the vehicle or the SmarTire component;
- j. Failures caused by improper installation or improper prior repair including damage to Product by tire (tyre) removal or installation;
- k. Corrosion and rust;

- l. Tires (tyres);
- m. Failures due to dirt, snow, or ice build-up;
- n. Accident, damage, negligence, abuse or misuse.

All returned Products become the property of SmarTire and will not be returned. SmarTire's determination of warranty coverage shall be final in all cases.

SmarTire reserves the right to reject warranty claims for any or all of (but not limited to) the following reasons:

- a. Proof of purchase was not provided;
- b. Failure occurred beyond applicable warranty period;
- c. Claim information is insufficient;
- d. Product was not returned for inspection as requested;
- e. Product inspection does not substantiate claim or indicate a failure.

WARRANTY DISCLAIMER

SMARTIRE'S EXPRESS WARRANTY AND PURCHASER'S REMEDIES THEREUNDER ARE EXCLUSIVE AND GIVEN IN PLACE OF (a) ALL OTHER WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, WHETHER WRITTEN OR ORAL, INCLUDING, BUT NOT LIMITED TO, ANY WARRANTY OF MERCHANTABILITY, FITNESS FOR PARTICULAR PURPOSE, OR IMPLIED WARRANTY ARISING FROM PERFORMANCE, COURSE OF DEALING OR USAGE OF TRADE, AND (b) ALL OTHER OBLIGATIONS, LIABILITIES, RIGHTS, CLAIMS OR REMEDIES, INCLUDING ANY RIGHT IN CONTRACT, TORT, EXTRA-CONTRACTUALLY, STRICT LIABILITY OR ANY RIGHT ARISING FROM SMARTIRE'S NEGLIGENCE, ACTUAL OR IMPUTED. YOUR STATUTORY RIGHTS ARE NOT AFFECTED.

LIMITATION OF LIABILITY

SMARTIRE'S OBLIGATIONS AND PURCHASER'S REMEDIES UNDER SMARTIRE'S EXPRESS WARRANTY ARE LIMITED TO SMARTIRE'S CHOICE OF REPAIR, CREDIT OR REPLACEMENT AND EXCLUDE LIABILITY FOR INCIDENTAL, SPECIAL, CONSEQUENTIAL OR ANY OTHER DAMAGES, INCLUDING, WITHOUT LIMITATION, REPLACEMENT COSTS, ECONOMIC LOSS, LOST REVENUE, LOST PROFITS, OR LOSS OF USE OR DAMAGE TO OTHER PROPERTY.

PRODUCTS ARE CONSIDERED TO BE MONITORING DEVICES, AND ARE NOT TO BE CONSIDERED AS SAFETY DEVICES.



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