

Run Safe™

Electronic Tire Pressure
Warning System

Safety and Performance
Where the Rubber Meets the Road



USER MANUAL

Sensor Technology International, LLC

5336 West 79th Street

Indianapolis, Indiana 46268

Phone: (317) 334-1545

Fax: (317) 334-1546

Email: info@stisensors.com

Web Site: www.stisensors.com

The *Run Safe*™ System

This User Manual is designed to assist you in the installation and operation of the *Run Safe*™ Electronic Tire Pressure Warning System.

You must read and agree to the Software License Agreement on page 11 prior to installing the system.

Please read the Limited Warranty on Page 12



CONTENTS

Introduction	2
Installing the <i>Run Safe</i> ™ Receiver Display	3
Receiver Display Set-up	4
FCC Statement	6
Sensor Transmitter Installation	7
Using the <i>Run Safe</i> ™ System	8
System specifications	9
Accessories	10
Limited Software License Agreement	11
Limited Warranty	12

Receiver Display Installation

Included with the *Run Safe™* Receiver Display (RD) Unit is a power cord, antenna and coaxial cable. Your Kit also includes the Sensors. See page 6 for instructions.

STEP 1: Select a location for your Receiver Display unit that is accessible or in view of the operator.

STEP 2: The Receiver Display (RD) Unit should be wired into the vehicles' on-board power system (12 - 24 VDC operating range available) using the **power cord** provided with the unit. The RD unit can also be powered using an optional cigarette lighter adapter. The power outlet is located on the rear panel of the RD unit (see picture). The RD is currently set to work with 12 and 24 volt systems.

RD Rear Panel View



Alarm Contact | Data Port | Power | Antenna

STEP 3: Antenna Installation—We have found that the antenna works best when located near the middle of the vehicle. The antenna should be attached to the frame, pointing down from the frame.

Run the cable from the antenna to the Receiver Display unit and attach to back of unit (see picture).

If you have excess cable, DO NOT PUT IN A COIL, this will create RF choke. Wrap the excess cable into a yarn-like skein of about 12 to 16 inches, put a wire tie in the center.

STEP 4: Power up the Receiver Display unit. The system will perform a self-diagnostic check and display a greeting (hello) if all is OK. You are now ready to start set-up of the system, *see page four for set-up procedures*. (Not required if factory pre-programmed.)

Other Operational Notes: The RD will monitor the power source and automatically shut down when the power supply goes below 10 volts. This capability avoids the possibility of draining the battery when a vehicle is parked for an extended period of time.

Receiver Display Set-up

RD Face Plate - Front view of RD



To set-up the Receiver Display to receive signals from the Sensors, you enter the four digit ID code (see label on sensor) of each Sensor and a Location ID code. This allows the system to only recognize those Sensors entered during set-up and accumulation of history information for those Sensors.

STEP 1: To start the program, press the "MODE" and "UP" buttons at the same time. "PRG" will appear on the display screen and you are now ready to enter information.

STEP 2: Press the "YES" button to start.

- A. **Set the date** - "set date" will appear on the display screen. The "UP" and "DOWN" buttons will change the value in the field. Use the Mode button to move from field to field entering the date.
- B. **Set the time** - "set clo" will appear on display screen. The time is based on the military method of time. The "UP" and "DOWN" buttons will change the value in the field. Use the Mode button to move from field to field entering the time.
- C. **Enter Sensor ID's and Location ID's**- "Set ids" will appear on display screen.
 - a.) Press "YES" to see first channel "CXX" (channel numbers 00-99) and "XXXX" for entry of four digit SENSOR ID code. The "UP" and "DOWN" buttons will change the value in the field. Use the Mode button to move from field to field.
 - b.) Press "MODE" to go to "XXXXX" the five digit alphanumeric field for LOCATION ID/code of your choice. This location code will be displayed when

Receiver Display Set-up (continued)

the Sensor transmits a message. Suggested codes: L1 = Left Front, R1 = Right Front, etc. Note the location code on the Sensor tag and/or template.

c.) You should press the "UP" or "DOWN" button to increment through channels. Continue entering sensor ID and Location ID codes until all sensors are entered.

D. After entering all of the Sensor information, press "MODE" to enter the "Operate" mode. **Note:** The system will automatically enter operate mode after two minutes.

In "Operate" mode the Receiver Display unit will listen for and decode transmissions from the Sensors. The system will verify the transmission is from a Sensor listed in the ID table. The Receiver Display will update the History file and display the message on the display screen. e.g. LO, HI, A-OK, Battery, Learned Pressure.

NOTE: The Receiver Display Unit will report a fault 5 times on the display screen. In the event you do not see the fault report, the display panel will blink with a row of dots until the fault is corrected.

This function provides you with two levels of reporting faults to increase your awareness to a fault and the need to correct the problem.

See page 6 for other RD Operations

Troubleshooting

"DEAD" report— If the Receiver Display reports a DEAD for a Sensor, this can be a result of not hearing the 12 hour check-in by the Sensor.

1. Remove the Sensor and keep removed for 2 minutes. Re-mount the Sensor on the Valve Stem. It should report the "Zero Pressure" first and then a "Learned Pressure". This should solve the problem.

2. If you continue to receive DEAD reports, you may need to change the location of your antenna to assure reception of signals from all Sensors.

Other Operations of RD

Last Scan Mode

Press the "MODE" button and then the "UP" or "DOWN" button until "Last Scan" appears on the display.

Using the "UP" button the operator can toggle through each channel and view the history of reports by location code.

The Last Scan Mode will display all channels and confirm that you have received a report from all Sensors during the last twelve hour period.

Alarm Poll Mode

Press the "MODE" button and then the "UP" or "DOWN" button until "Alarm" appears on the display.

Using the "UP" button the operator can toggle through the locations reporting faults only.

Receiver Display Unit - Extra Items:

Data Port (RS 232)

The Data Port (see picture) is used to connect to a PC. This connection allows for programming of the Receiver Display as well as downloads of the history file. See Page 10 for Software information.

Alarm Contact (Normal Output)

The alarm contact (see picture) is used to connect the Receiver Display to an alarm or light system. The alarm is activated by the Receiver Display receiving a fault message from a Sensor.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Sensor Installation

Note: You should verify that the tire pressure is set at the appropriate PSI prior to mounting the Sensor.



Once you have entered the Sensor ID code and Location ID code in the Receiver Display unit, you are ready to start mounting the sensors on the valve stems.

Step 1: Simply remove the valve stem cap and replace it with the Sensor unit. **Note:** Valve stem may require cleaning prior to mounting Sensor.

Step 2: The Sensor will sense when pressure is applied, determine if the pressure is stable, and then store the pressure in the memory chip in the Sensor. The Sensor will also send a message to the Receiver Display unit that it has learned a pressure.

Step 3: The Sensor will read the tire pressure once every 30 seconds and determine if the tire pressure is +/- 15% from the stored pressure. If the pressure varies by more than +/- 15%, the Sensor will transmit a fault message to the Receiver Display unit.

Step 4: If the Sensor has not transmitted a fault within the last twelve hours, it will transmit an A-OK message to advise the Receiver Display unit that it is still monitoring the pressure and is operating properly.

Operating Notes: If you remove the Sensor for any reason, the Sensor should remain off of the valve stem for at least 60 seconds. This will allow the Sensor to register a zero (0) pressure reading and properly read the new pressure when remounted on the valve stem. This procedure clears the memory of the old pressure and records a new pressure for monitoring.

Using the template provided with the system, you can note the Sensor ID and corresponding Location ID for each Sensor. This will be a good reference in the future and allows you to remove all identifying labels if your desire.

Using the *Run Safe*™ System

The tire pressure in each pneumatic tire should be set at the cold operating pressure recommended by the tire manufacturer.

After you have entered the Sensor codes and returned the Receiver Display to operate mode, the system will work independently, reporting the status of the various Sensors.

Adjusting Pressure in Tires

If you need to adjust tire pressure, remove the Sensor from the valve stem for at least 60 seconds, this allows the Sensor to record a zero pressure, report the fault to the Receiver Display and will re-initialize (record the new pressure) once you placed the Sensor back on the valve stem. The new tire pressure is stored in memory for future operation.

Rotating Tires

If you rotate your tires, each Sensor should remain at its location and not accompany the tire on rotation. This procedure maintains the integrity of the tire location codes you entered during setup.

Sensor Battery

The Sensor includes a lithium battery with an expected useful life of 3 to 4 years. The battery is enclosed in the case and is not available for replacement. If you receive a LO Battery message, you will need to replace the Sensor for continued operation. Safe for disposal in the municipal waste system. Do not incinerate.

Contact your Distributor or Sensor Technology International for core credit and replacement Sensors.

WARNING

This *Run Safe*™ System was manufactured according to commercial and industrial specifications. The Limited Warranty shall be void if the product or parts have been subjected to misuse, abuse, accident, improper installation, improper maintenance, or non-conforming use under STI's instructions. Please read the Limited Warranty included with the system.

System Specifications

Receiver Display Unit

Power	12 - 24 VDC on-board vehicle power .95 mA average power consumption.
Package	Black Anodized Aluminum, 5.625 X 4.625 X 1.25
Connections	Alert Out, RS-232 Port, Antenna in and Power
Display	8 character, 7-segment LED display
Controls	3 pushbuttons
External Communications	Using the <i>Run Safe</i> ™ Software, the receiver is able to communicate via the RS-232 port.
Radio	Operating frequency: 433.92 MHz
Operating Temperature	-40F to 140F
Weight	14 oz

Transmitter / Sensor Unit

Power	Permanent Rayovac 1632 Extended Temperature Range battery. Operating voltage from 3.2 VDC to 6.5 VDC
Package	Hexagonal, ultrasonically sealed housing. Glass reinforced nylon material.
Transducer	Piezo Resistive transducer.
Ranges	28 - 85 psia and 75 - 200 psia
Operating Temperature	-40F to 140F
Serialization	Internal serial number on the PIC processor, with 65k alternatives.
Radio	Operating frequency: 433.92 MHz
Weight	0.6 oz

Run Safe™ Software Program

Sensor Technology International offers the *Run Safe™* Software package for easy programming of the *Run Safe™* Electronic Tire Pressure Warning System. The software also allows the operator to download the history file to a PC, where the report can be printed.

Fleet managers with several units to install and monitor will appreciate this easy to use program. Installation will go faster! The program also makes it easy to maintain a history file on each unit, allowing for monitoring of the operator and vehicle.

The software requires a system using Windows 95/98, a Pentium 100 MHz or higher, 16mb memory and 2 mb of hard disk space.

Optional Accessories

Cigarette Lighter Adaptor - Alternative power supply.

Special Antenna with T Bracket - This antenna assembly includes the antenna whip, NMO, 17' coaxial cable, T bracket and clamps.

Repeater Unit - Receives and Sends the communications with Sensors. Ideal for long applications such as Monorails and People Movers.

Run Safe™ Software - Makes set up of the Receiver Display very easy. Software also allows for downloading information from Receiver Display Unit for viewing, printing or saving to file.

Power Splitter - Used to attach two antennas to the vehicle to improve reception on longer applications not requiring a Repeater Unit.

Future Product

Trailer Receiver Display— This unit will be designed to monitor Trailer tires. Operates on separate power supply and communicates with the main Receiver Display unit when on vehicle power system. Ideal for fleet operations that spot trailers on a regular basis. Should be available early 2001.

SENSOR TECHNOLOGY INTERNATIONAL (STI)
LIMITED SOFTWARE LICENSE AGREEMENT
Run Safe™ System

Read this Agreement carefully before using programs on STI, *Run Safe™* - Electronic Tire Pressure Warning System (*Run Safe™*). By opening packaging of *Run Safe™* Sensor, Receiver Display, Trailer Receiver Display or Repeater Unit (Programs), you agree to abide by these terms and applicable U.S. and International copyright and patent laws. If you do not agree, promptly notify the provider of the programs and products and request a refund of the amount you paid.

Programs are owned by STI and are licensed and not sold to you as the end user of the programs. STI grants you a nonexclusive and strictly NON-TRANSFERABLE license to use the Programs.

LICENSE: Under this license you may use the Programs on only one *Run Safe™* - Electronic Tire Pressure Warning System. You acknowledge and agree that the product and all copyrights, patents and trade secrets related thereto are and shall remain the sole and exclusive property of STI and are protected by U.S. and certain International copyright and patent laws. Unauthorized reproduction and or sale can result in fines of up to \$10,000.00 and up to one (1) year in prison, and you understand that STI WILL also prosecute infringers for civil liability. The Programs and *Run Safe™* may not be reproduced, modified, or enhanced (except as essential to your application of *Run Safe™*, and which are approved in writing by STI); reverse engineered, reverse compiled or decompiled, nor, other purpose than for its intended use, may the product be applied or used without the express agreement in writing of STI. You covenant that you will not directly or indirectly disclose, demonstrate, exhibit, display, apply or in any way use the Programs or any component, part or software or information therefrom or about the Programs, in developing any product competitive with, or similar to, the Programs.

LIMITATION OF LIABILITY: Sensor Technology International will not be liable for any lost profits, lost savings, incidental, special or indirect damages or other consequential damages during the use of the *Run Safe™* System and its programs.

**SENSOR TECHNOLOGY INTERNATIONAL
LIMITED WARRANTY
RUN SAFE™ SYSTEM**

Sensor Technology International ("STI") makes the following limited warranties with regard to the Run Safe™ System ("Product"). These limited warranties extend only to the Original End-User ("You[r]").

One (1) Year Limited Warranty - Parts STI warrants that this Product will perform in accordance with specifications for a period of one (1) year from the date of purchase by the original end-user. During this one (1) year period, STI will repair or replace the Product, if it does not perform as warranted, subject to (a) prompt delivery of the Product to STI; (b) pre-payment by you of transportation and insurance charges for shipment of the Product to STI; and, (c) you shall pay all charges for labor and parts. If the Product failure occurs after more than One (1) year from the date of your purchase, STI reserves the right to substitute factory refurbished parts in place of those in need of repair. **LABOR SERVICE CHARGES FOR PRODUCT INSTALLATION, SET UP AND ADJUSTMENT OF CONTROLS ARE NOT COVERED BY THIS LIMITED WARRANTY.**

Instruction Manual (Owner's Manual): You must read the Owner's Manual thoroughly before operating this Product. Before seeking warranty service, you must check the troubleshooting guide in Owner's Manual and strictly follow the instructions and make a diligent attempt to correct the problem.

Your Responsibilities: This Limited Warranty is subject to the following conditions:

1. You must provide the bill of sale or other proof of purchase at the time that warranty service is requested.
2. You must notify STI within the Limited Warranty period and within thirty (30) days after You discover that the Product does not perform in accordance with specifications.
3. You must pack the Product in its original carton using the original packing material, then insert the original carton containing the Product into another carton with additional packing material before shipping the Product to STI.

DISCLAIMERS:

ALL OTHER EXPRESS OR IMPLIED WARRANTIES ON THIS PRODUCT, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE HEREBY EXPRESSLY DISCLAIMED.

IF THIS PRODUCT IS NOT IN GOOD WORKING ORDER AS WARRANTED ABOVE, YOUR SOLE AND EXCLUSIVE REMEDY SHALL BE THE REPAIR OR REPLACEMENT OF THE PRODUCT. IN NO EVENT WILL STI BE LIABLE TO YOU OR ANY THIRD PARTY FOR ANY DAMAGES IN EXCESS OF THE PURCHASE PRICE OF THE PRODUCT. THIS LIMITATION APPLIES TO DAMAGES OF ANY KIND, INCLUDING ANY DIRECT OR INDIRECT DAMAGES, LOST PROFITS, LOST SAVINGS OR OTHER SPECIAL, INCIDENTAL, EXEMPLARY OR CONSEQUENTIAL DAMAGES, WHETHER FOR BREACH OF CONTRACT, TORT OR OTHERWISE, AND WHETHER ARISING OUT OF THE USE OF, OR INABILITY TO USE, SUCH PRODUCT, EVEN IF STI HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES OR OF ANY CLAIM BY ANY OTHER PARTY.

THIS LIMITED WARRANTY SHALL BE VOID IF THE PRODUCT OR PARTS HAVE BEEN SUBJECTED TO MISUSE, ABUSE, ACCIDENT, IMPROPER INSTALLATION, IMPROPER MAINTENANCE, OR NON-CONFORMING USE UNDER STI's INSTRUCTIONS, OR WHERE THE PRODUCT HAS BEEN ALTERED OR MODIFIED WITHOUT STI's PRIOR AUTHORIZATION OR INSTRUCTION, OR UPON THE REMOVAL OR ALTERATION OF STI's FACTORY SERIAL NUMBER.

UNITS USED IN ANY COMPETITION PUBLIC OR PRIVATE, ARE EXPRESSLY EXCLUDED FROM ANY AND ALL WARRANTY COVERAGE.