RIEKER inc.

CARS

Curve Advisory Reporting System

Capabilities Brochure

Rieker Total Solutions

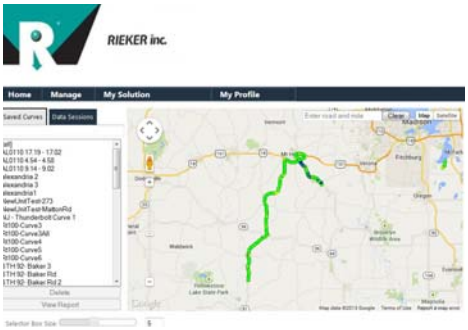
Total Solutions

Curve Advisory Reporting System (CARS)

Features

- Safe & Continuous Operation
  - 1 Pass each direction!
  - With Traffic!
- FHWA Compliant
- Meets Federal MUTCD Requirements
- Integrated GPS
- Key Data Collection
  - Curve Radius
  - Super Elevation
  - GPS coordinates
  - Date/Time
- USB Connectivity
- Secure Online Data Storage
- Automated Curve Speed Calculations
- Printable Reports
- Adjustable Trip Angle Setting
- Auto Leveling
- Dash Mount Quick Installation
- Portable Multi-vehicle Use

Rieker Total Solutions: Curve Advisory Reporting System



CARS is a fully integrated Road Survey system, with internal GPS, that will automatically record and determine recommended safe curve speed along with the curve radius and super elevation. This system will allow a driver to continuously survey miles of roads over hours of driving in a day without stopping. Road telemetry is recorded to the tablet as a permanent record for later analysis.

One pass each direction, with traffic at any speed - get the job done safer, faster and FHWA MUTCD compliant.

Accurate, Safe and Efficient

Based on the Federal Highway Administration (FHWA) guidelines on how to determine safe curve speed, our new system allows the operator to simply drive as many miles of road in a day as needed, even stop & go rush hour traffic! Review and analyze individual curve data after a road has been surveyed, or anytime on any computer. No need for multiple passes, constant speeds, or manual data input, making the job safer, faster, and under budget. Automatic calculation of the Safe Curve Advisory Speed to meet MUTCD requirements.

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The next generation digital ball bank system combines a sophisticated software package with Rieker's GPS integrated Accelerometer technology to deliver the first – and only - complete portable (patent-pending) Curve Advisory Reporting System.

CARS Total Solution unit will be supplied as a complete package containing:

1. RDS7-GPS-PRO (GPS ready Digital Ball Bank Indicator)
2. Compatible Windows Tablet, nominally the Dell Latitude 10
3. Rieker proprietary CARS Recording Software, pre-loaded, for operating the Device and recording road telemetry information.
4. All necessary cables including:
    a. GPS antenna extension cable with magnetic base for roof mount.
    b. 12VDC lighter power adaptor.
    c. USB Computer communication cable.
5. Vehicle tablet mount, nominally the Bracketron Gooseneck Vehicle Mount
6. Protective Carrying case for storage and transport

Photo 1: CARS Rugged Carrying Case

Photo 2: (top) RDS7-GPS-PRO
Photo 3: (bottom) CARS Tablet

Photo 4: Tablet Mounting Bracket

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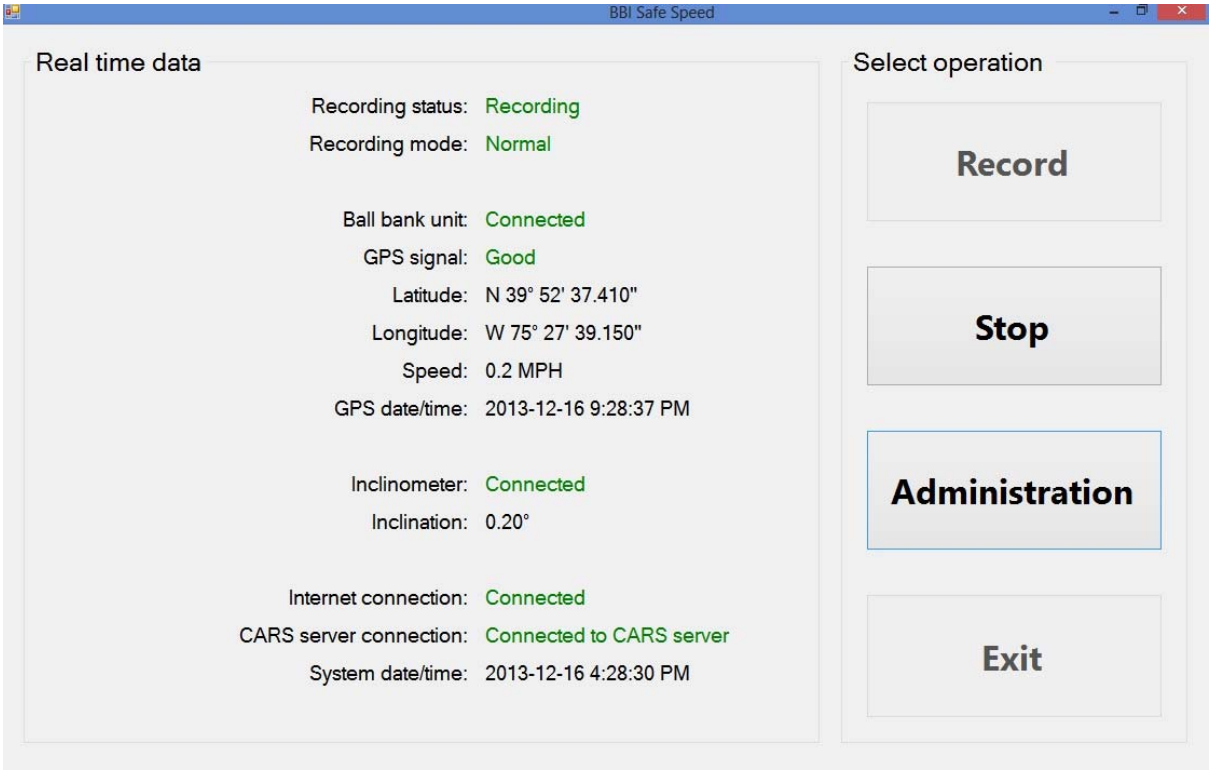
CARS Tablet Application (Curve Analysis Recording)

- What the driver sees when the RDS7-GPS-PRO and tablet are installed and powered on)
- GPS signal strength
- Recording status: recording or not, normal mode (automatically changes to reversionary with loss of GPS) Continues to record with loss of signal, and manually enter velocity (speed of vehicle) prior to driving no GPS signal area. Once GPS reinstated, operation continues automatically.
- Real time data: velocity, latitude longitude, inclination
- Device status: RDS7 connection, GPS connection
- Start program, continuously collects data, no need to turn on or off.
- **Legacy Mode**: allows operation as a standard RDS7-BB-09 ball Bank only unit
- **Reversionary Mode:** will automatically switch to allow operation even if GPS signal is lost. Switches back automatically on GPS signal return.

Figure 1: **Screen Shot (Tablet App)**



CARS Web Portal Application (Curve Analysis Reporting)

- Analyzing data from the tablet, printing reports
- Secure, hosted solution for Horizontal Curve Analysis
- Unlimited capacity to preload all the state-wide road inventory
- Automatically uploads survey data from the tablet to the customers secure account
- Allows review of detailed road survey data
- Generates reports for recommended curve speed based on federal guidelines
- Allows for customization of horizontal limits to meet individual State requirements

Figure 2: **Screen Shot (Curve Analysis App)**

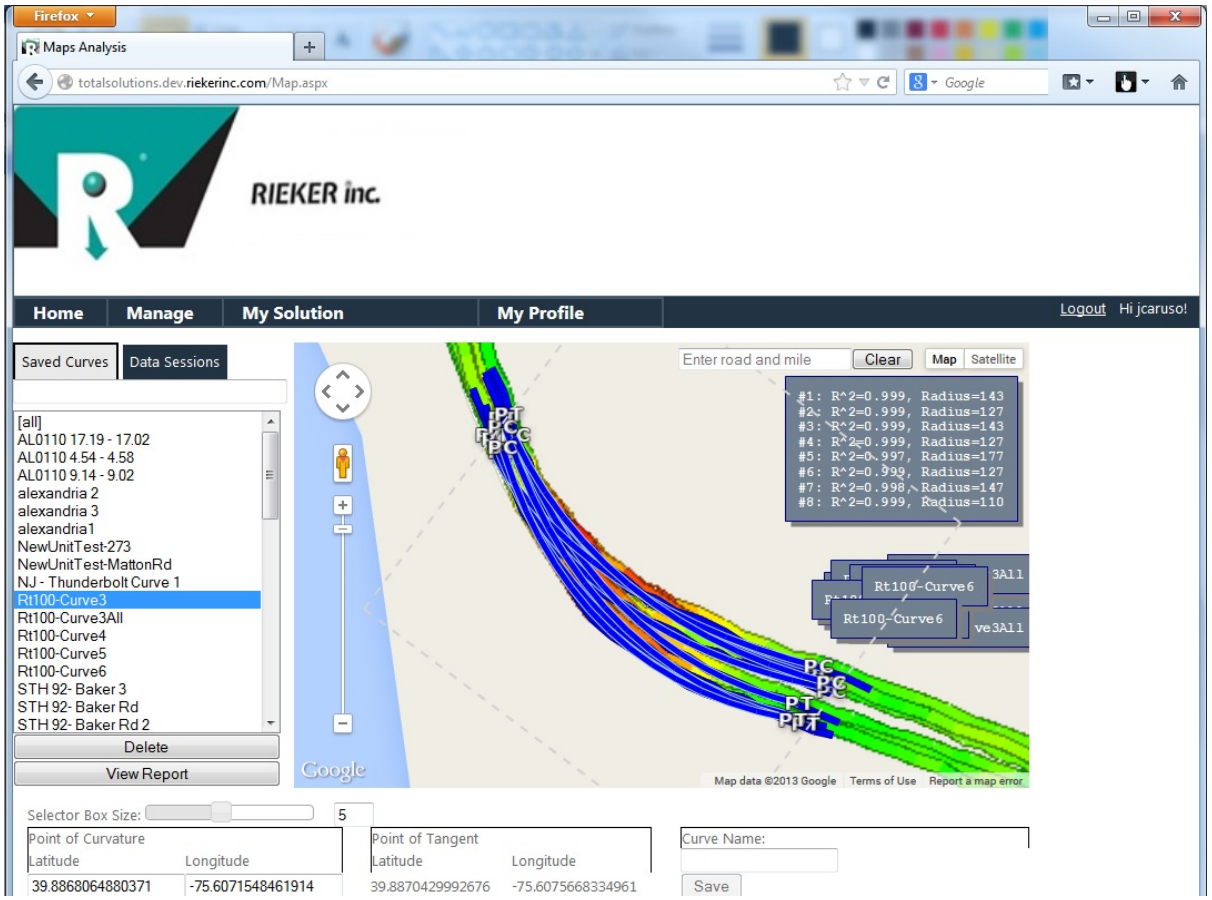
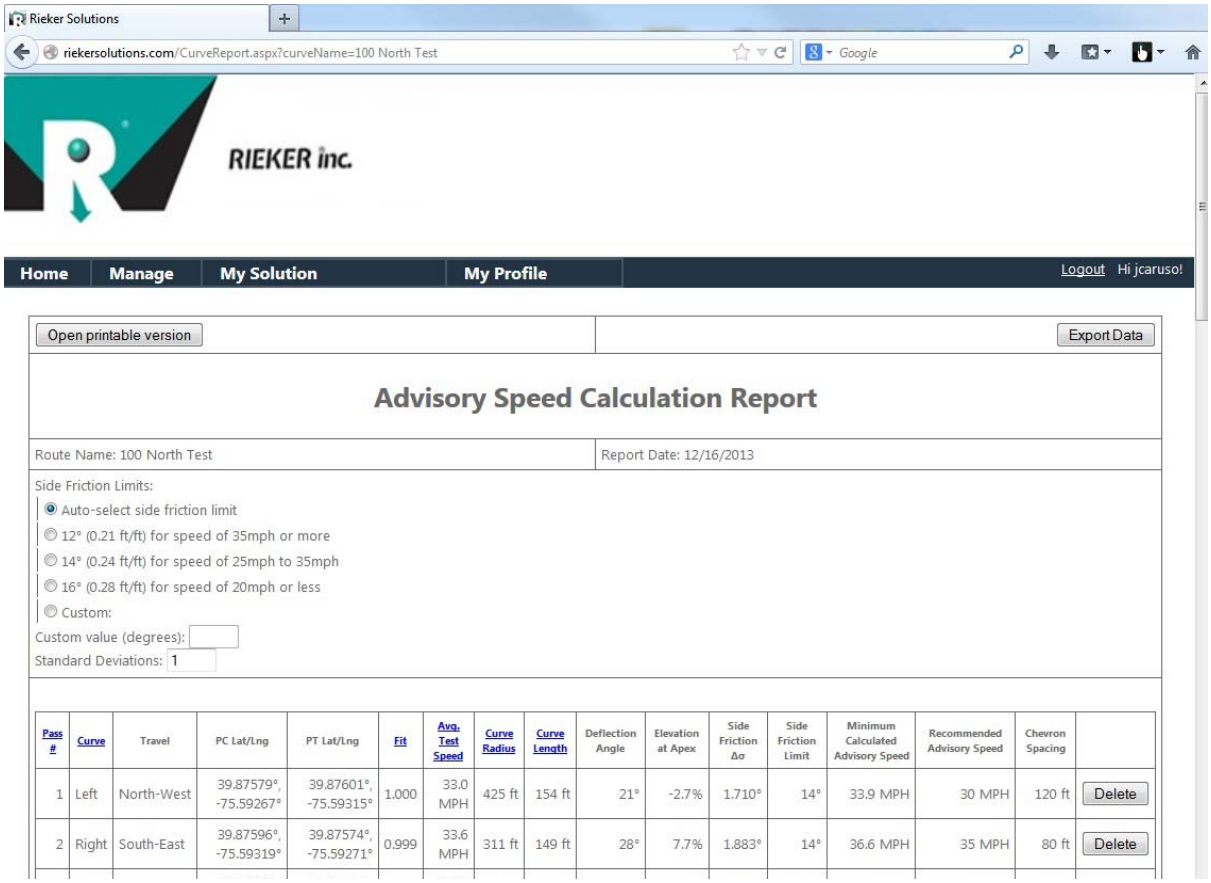


Figure 3: **Screen Shot (Generated Report)**



Pass #	Curve	Travel	PC Lat/Lng	PT Lat/Lng	Fit	Avg. Test Speed	Curve Radius	Curve Length	Deflection Angle	Elevation at Apex	Side Friction Δσ	Side Friction Limit	Minimum Calculated Advisory Speed	Recommended Advisory Speed	Chevron Spacing	
1	Left	North-West	39.87579°, -75.59267°	39.87601°, -75.59315°	1.000	33.0 MPH	425 ft	154 ft	21°	-2.7%	1.710°	14°	33.9 MPH	30 MPH	120 ft	Delete
2	Right	South-East	39.87596°, -75.59319°	39.87574°, -75.59271°	0.999	33.6 MPH	311 ft	149 ft	28°	7.7%	1.883°	14°	36.6 MPH	35 MPH	80 ft	Delete

Technical Specifications for RDS7-GPS-PRO

RDS7-GPS-PRO MECHANICAL CHARACTERISTICS	
Housing	Die-Cast Aluminum
Environmental Rating	Nema 4
Mounting Holes	Two M4 x 0.7 or Two #8-32
Outline Dimensions	4.54” x 3.54” x 2.27” (115 x 90 x 56mm) See Drawing
Electrical Connection	Cigarette Lighter Adaptor Plug (included)
Weight	16 ounces (not including cable)
Operating Temperature	-20°C to +70°C, (-4ºF to +158ºF)
INPUT PARAMETERS	
Measuring Angle Range	±45º (90 degrees full scale)
Measurement Axes	Single
Axis Mounting	Side to side (cross-slope) orientation
Power Supply	12V Cigarette Lighter (8-30 VDC Non-Regulated hardwire ready)

OUTPUT PARAMETERS	
Non-Linearity[1]	< 0.5% FR
Null Repeatability	< 0.05°
Transverse Sensitivity	<1.0% at 30° Tilt
Response Time	< 0.3 seconds (300mSec)
Output Units	Degrees default (Percent Grade secondary)
DISPLAY PARAMETERS	
LCD Display	Single Axis
Display Resolution	0.1°
Display LED (Green, Red)[2]	Field Adjustable Trip Angle Setting for Red LED, in 1º increments
Relative Zero	Temporary Zero Calibration Stored in Volatile Memory
CABLE TABLE (SUPPLIED WITH YOUR RDS7-GPS-PRO SYSTEM)	
POWER INPUT CABLE	6-FT, PIN PLUG, CIGARETTE LIGHTER ADAPTOR
GPS ANTENNA	17-FT EXTERNAL ANTENNA, MAGNETIC MOUNT, PIN PLUG
DATA OUTPUT CABLE	6-FT, USB 2.0 TYPE A / USB 2.0 TYPE B

Notes: 1. Non-linearity generated by best fit straight line using least squares regression. Output is linear with respect to the input angle directly. 2. LED trip angle can only be set within the measuring range of the device.

Auto Leveling (RELATIVE ZERO): When vehicle is on a level surface, press and release the REL button. The display will read "REL ON" for one second then revert to normal with the unit reading zero. When the unit is in REL mode you will see the (*) symbol displayed indicating that the relative zero (REL) function is active. Please remember that the unit should be auto leveled using the REL button while the vehicle is on a flat surface. Auto leveling with the REL button must be performed whenever the unit has been powered off.

Figure 4: **RDS7-GPS-PRO Dimensions and Mounting position (inches [mm])**