Richta



User's Guide

Version 2.4
March 21, 2011
www.richtarally.com

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Introduction

The Richta Rally Calculator is a software program which is intended to perform the calculations necessary for time-speed-distance road rallies, such as those sanctioned by the Sports Car Club of America (SCCA – www.scca.org). It runs on a hand held hardware such as Palm, Apple (iPod, iPhone, iPad) and Android phones and tablet computers.

Richta History and Design Philosophy

Richta was designed and written by a TSD navigator with experience in competing in over 50 events. The author previously used a Curta mechanical calculator to perform the rally calculations, but the limitations of that device spawned the realization that the functions performed by the Curta could be duplicated and the navigator's job made easier through the use of current computer technology.

The operating principles and application of the Curta to TSD rally are well documented. A good description of these techniques is available from Rally Racing News (http://www.rallyracingnews.com/manuals/curtaman.html).

Throughout the 2004 and early 2005 rally season several short comings of the Curta became apparent to the author. First, speed changes on the Curta can not be executed rapidly. Changing average speed on the Curta requires setting 6 small lugs on the side of the device to the minutes per mile factor (the amount of time it takes to traverse one mile at the desired average speed. The factors are typically determined prior to the rally and copied to the route instruction before the event or during the odometer calibration run. Entry and verification of these factors (small numbers entered while bouncing down the road) is time consuming and error prone. It can be very difficult when several route instructions involving speed changes are to be executed in short order. The navigators can find themselves concentrating on the route instructions (as they should) and entering a checkpoint without a precise calculation as to whether they are early or late.

A second issue arises after a calculation is performed and it must be determined whether the rally team is early or late. Performing rally calculations with a Curta is very accurate. Accuracy to within .01 minute or better is possible when using an accurate odometer that reports mileage to the .01 mile. The Curta output, the calculated time of day at which the rally team should arrive at the indicated mileage, must be manually compared to the time of day clock. The navigator must concentrate to determine whether the team is .01 minute early or .01 minute late and this operation can be mentally exhausting when performed five to ten times per mile over the course of a 150 mile event.

The Richta Rally Calculator was designed and written to overcome these shortcomings of the Curta calculator.

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About the Name

The name Richta (pronounced rik'-ta) is a play on words, combining the designer/author's first name (Rich) with name of the mechanical device the software replaces (the Curta calculator). The original Curta calculators were designed by Curt Herzstark and manufactured from 1946 through about 1966.

Hardware Platforms

Richta was originally written in 2005 for the Palm OS platforms. Richta for Palm will run on most any Palm Pilot including the Palm III, though the author has used a Palm Tungsten for several years with good success. The Tungsten features sturdy construction, metal case, and a color, backlit screen and they are available used on eBay for a reasonable price.

Richta development for Palm has been stopped due to the availability of newer and more popular hardware platforms. Bug reports and requests for enhancements will be accepted. The latest version, 1.32, is available for free on the web site: www.richtarally.com.

The Apple version of Richta is available from the Apple App Store and runs in iPhone, iPod Touch and iPad. There is an inexpensive version, Richta-Lite, which is an restricted version of the full-function Richta calculator. The unrestricted (Richta) version supports using timing units of 0.01 minute for increased accuracy and will be enhanced with additional features (odometer correction factor support, leg-rebuild) in the future.

An Android version of Richta is under development. An early version of the Android version is available for download at www.richtarally.com.

Precautions

As with any piece of rally equipment, the rally team should be thoroughly familiar and comfortable with the Richta rally calculator prior to using it in an event. Using it to run through prior rallies on the dining room table (with the checkpoint slips) and practicing with the calculator on a mock rally are both practical methods for familiarizing a rally team with this software.

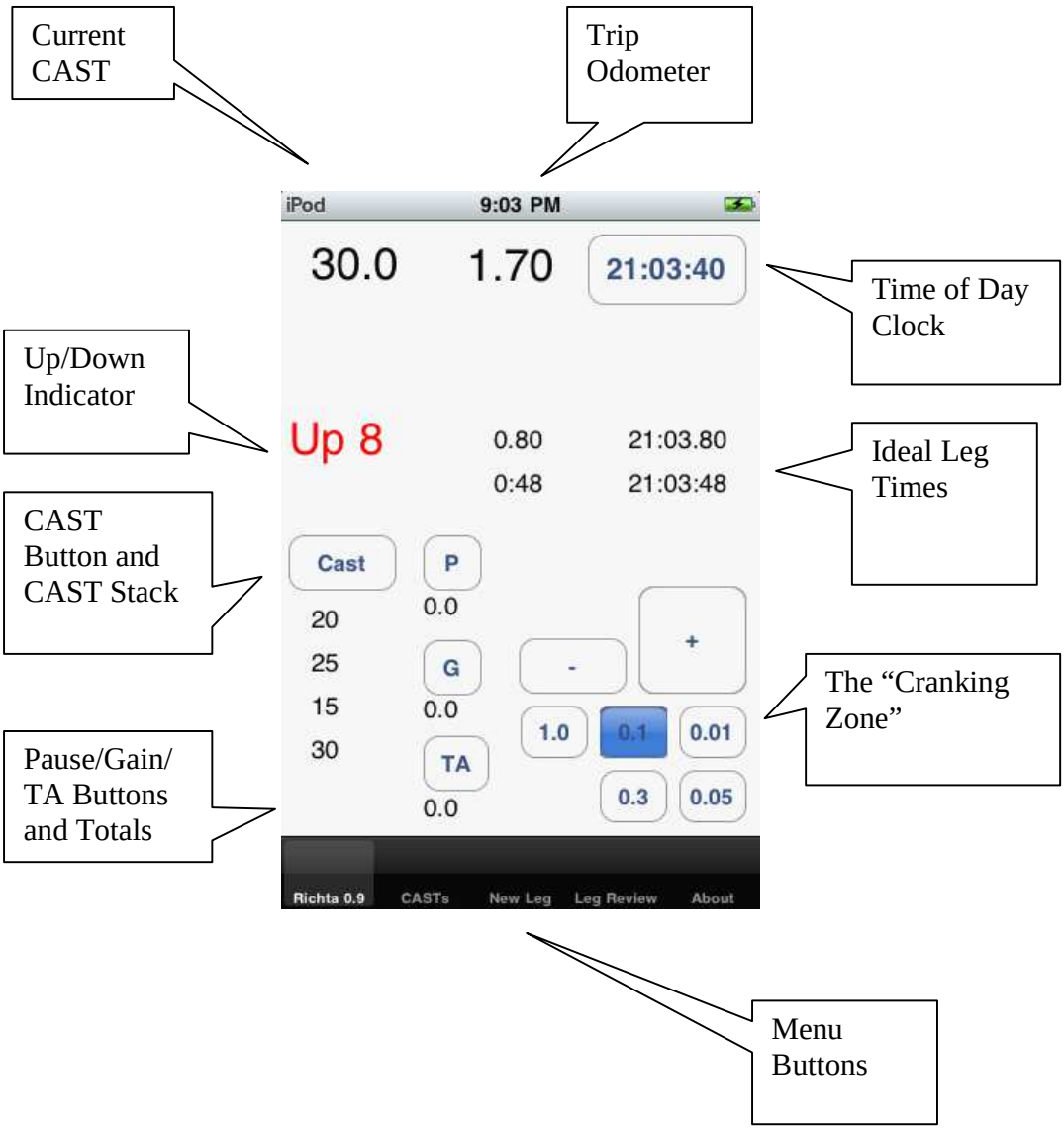
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Apple Screens and Richta Operations

There are four primary screens in Richta.

Apple Primary Richta Screen

The main screen is described below.



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This screen is the primary screen for the application and the TSD navigator will spend most of their time working with and reading this form. It has eight areas and they are described below:

Current Cast – This field displays the current average speed the rally team is required to average. An average speed of zero is taken to mean an infinite average speed. The trip odometer may be freely adjusted when the CAST is zero.

Trip Odometer – This field displays the current value of the trip odometer. It is adjusted by using the buttons in the cranking zone.

Time of Day Clock – This field displays the current value of the device's time of day clock. This is the time reference used to determine whether the rally team is early of late. Tapping on the TOD clock once activates a split-action function. When the split-action function is activated a copy of the TOD clock is frozen and displayed immediately beneath the TOD display. Tapping on the TOD display dismisses the TOD split display.

Up / Down Indicator – These fields report whether the rally team is Up (early arrival at the mileage indicated at the trip odometer) or Down (late arrival) and by how many seconds.

Ideal Leg Times – These four fields display the results of the time-speed-distance calculations in four different formats. The ideal elapsed time of the current leg is reported in minutes and hundredths of a minute (mm.th) and minutes and seconds (mm:ss). The time of day at which the rally team should arrive at the indicated mileage is reported in a similar format (hh:mm.th and hh:mm:ss).

Multiple display formats are used to accommodate different navigating styles. Rally teams who require accuracy to the nearest second will rely on the Up / Down indicator and use the displayed leg times at check points to verify the rallymaster's calculations. Rally teams who require accuracy to the nearest hundredth of a minute will use the Up / Down indicator to get close and then compare the display ideal time of day to their external clock and manually calculate the precise amount of being early or late.

CAST Button and CAST Stack – The CAST Stack holds future average speeds, allowing the navigator to pre-enter the next CASTs. The next 4 CASTs are shown on the main form. Pressing the CAST button makes the top entry in the stack the current average speed and shifts the remaining entries in the stack up one position. When the CAST button is pressed a confirmation dialog box is shown, allowing the navigator to either confirm the speed change or enter an alternative speed to which to CAST.

Pause / Gain / Time Allowance Buttons and Totals – These buttons are used to execute pauses, gains and time allowances. The fields display the total amount of pauses, gains and time allowances for the current rally leg. To execute a pause, enter the amount to pause in the input field of the pop up box and confirm the pause. Gains and time allowances are handled in a similar manner. The units of time used can vary. In Richta-

Lite, enter the time in seconds. In Richta, a preference may be set to indicate the entry units as either seconds or 0.01 minutes.

Cranking Zone – These buttons are where the navigator will spend most of their time tapping and the aspect in which the Richta software is most similar to an actual Curta mechanical calculator. The navigator taps the "+" button to increase the trip odometer. The amount of the increase is determined by which field is highlighted beneath the "+" button. Increments of 10, 1, 0.1, 0.3, 0.01, and 0.05 miles are available. The trip odometer is decremented in the same fashion by pressing the smaller "-" button.

Apple New Leg Screen

The screen used to start a new rally leg is described below.

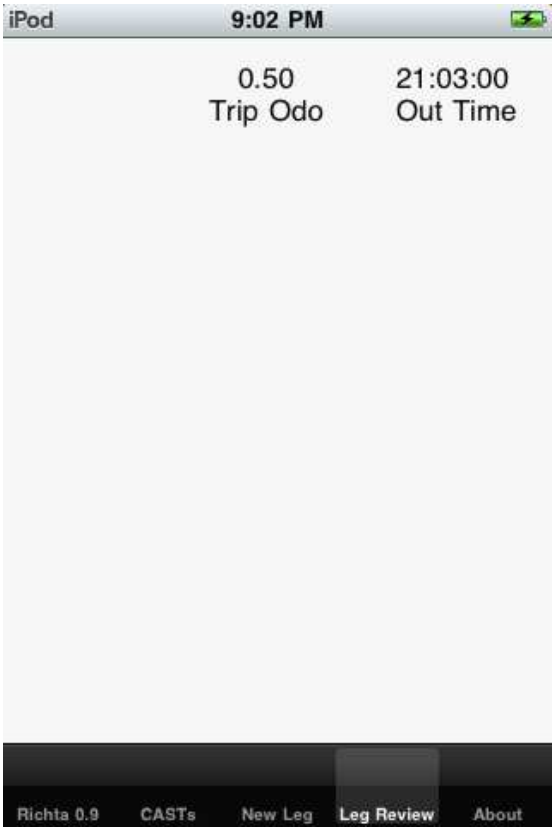


This screen is accessed from the main form by tapping on the New Leg menu button on the bottom of the screen.

This screen allows the navigator to set the value of the trip odometer and out time at the start of a new leg of the rally. The values are set using the same "cranking zone" input model that is used on the main form. To return to the main screen, press the Richta menu button on the bottom of the screen. The navigator will be prompted to save or cancel the changes made.

Apple Leg Review Screen

The leg review screen is described below.



This screen is accessed from the main screen by tapping on the Leg Review button on the bottom of the screen.

This screen displays the trip odometer setting and Out time for the current rally leg. It can be used by the navigator to verify the current settings without risk of changing any values.

In a future release this screen will allow the display and edit of all calculations used in the current leg.

Apple CAST Screen

The Cast screen is described below.



This screen is accessed from the main form by tapping on the CAST menu bottom on the bottom of the screen.

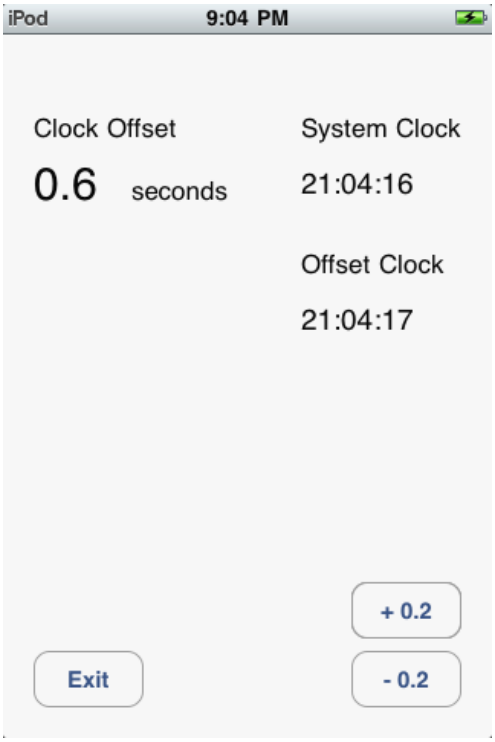
This form allows the navigator to enter future average speed changes. The first four of these CASTs are shown on the main Richta form.

Future CASTs are entered using the input field as follows: Press the CAST entry which will serve as the insertion point for the new CAST. Press the "+" button on the top left of the screen. A pop up window and keyboard will appear, allowing the CAST to be entered. Enter the desired average speed and confirm the entry.

The stack of future CASTs may be edited by pressing the "Edit" button on the top right of the screen. CAST entries may be moved relative to each other or deleted.

Apple TOD Adjustment Screen

Richta allows the navigator to apply an adjustment factor to the device's time of day clock. This screen is accessed by pressing the About menu button on the bottom of the screen.



The offset (corrected) clock is used in the main screen and for the Up/Down calculation. The offset TOD clock can be adjusted in increments of 0.2 seconds, allowing close synchronization with official rally time of day.

Apple Known Restrictions and Limits

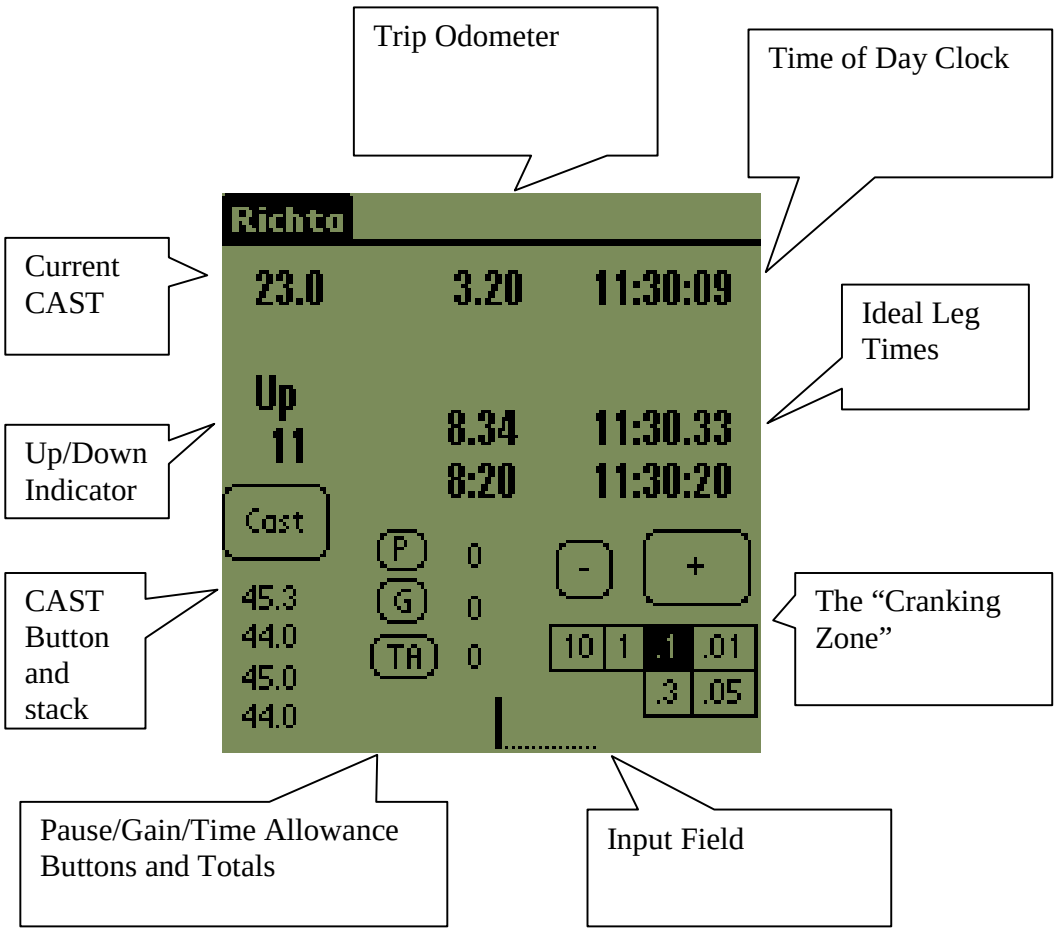
(None at this time)

Palm Forms and Richta Operations

There are four primary forms in Richta.

Palm Primary Richta Form

The main form is described below.



This form is the primary form for the application and the TSD navigator will spend most of their time working with and reading this form. It has eight areas and they are described below:

Current Cast – This field displays the current average speed the rally team is required to average. An average speed of zero is taken to mean an infinite average speed. The trip odometer may be freely adjusted when the CAST is zero.

Trip Odometer – This field displays the current value of the trip odometer.

Time of Day Clock – This field displays the current value of the Palm's time of day clock. This is the time reference used to determine whether the rally team is early of late. The internal Palm clock has a resolution of one second. Tapping on the TOD clock once activates a split-action function. When the split-action function is activated a copy of the TOD clock is frozen and displayed immediately beneath the TOD display. Tapping on the TOD display dismisses the TOD split display. When the split-action function is active the Up / Down indicator uses the split-action TOD value for comparison instead of the running TOD clock.

Up / Down Indicator – These fields report whether the rally team is Up (early arrival at the mileage indicated at the trip odometer) or Down (late arrival) and by how many seconds.

Ideal Leg Times – These four fields display the results of the time-speed-distance calculations in four different formats. The ideal elapsed time of the current leg is reported in minutes and hundredths of a minute (mm.th) and minutes and seconds (mm:ss). The time of day at which the rally team should arrive at the indicated mileage is reported in a similar format (hh:mm.th and hh:mm:ss).

Multiple display formats are used to accommodate different navigating styles. Rally teams who require accuracy to the nearest second will rely on the Up / Down indicator and use the displayed leg times at check points to verify the rallymaster's calculations. Rally teams who require accuracy to the nearest hundredth of a minute will use the Up / Down indicator to get close and then compare the display ideal time of day to their external clock and manually calculate the precise amount of being early or late. (The technical reason for this is that the internal clock in the Palm devices is only accurate to the nearest second. There is a second, higher resolution clock in the Palm devices, but it does not run while the device is asleep).

CAST Button and CAST Stack – The CAST Stack holds the next 32 average speeds, allowing the navigator to pre-enter the next 32 CASTs. The next 4 CASTs are shown on the main form. Pressing the CAST button makes the top entry in the stack the current average speed and shifts the remaining entries in the stack up one position. Future CASTs are entered using the input field as follows: Enter the desired average speed in the input field using the Graffitti language then use the stylus to tap one of the CAST Stack fields. If the CAST Stack field tapped is currently 0.0, the input field is copied to the tapped stack entry. If the CAST Stack field tapped contains a non-zero value, the input field is copied to the tapped stack entry and the lower stack entries are shifted down one position. This allows the navigator to insert a CAST in the middle of the pre-entered values. (Do not use the decimal point when entering CASTS. When entering two digits, the decimal point is presumed to be after the second digit (entering 23 results in a CAST of 23). When entering three digits, the decimal point is presumed to be after the second digit (entering 235 results in a CAST of 23.5). When entering 4 digits, the decimal point is presumed to be after the third digit (entering 1200 results in an average speed of 120.0).

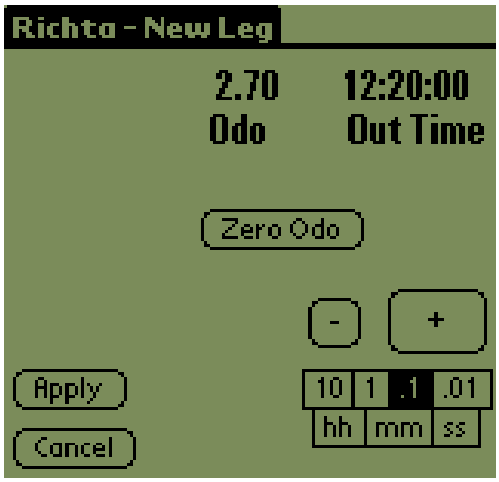
Pause / Gain / Time Allowance Buttons and Totals – These buttons are used to execute pauses, gains and time allowances. The fields display the total amount of pauses, gains and time allowances for the current rally leg. To execute a pause, enter the number of seconds to pause in the input field and press the pause button. Gains and time allowances are handled in a similar manner. Do not enter a decimal point in the input field as this terminates the reading of the input field.

Input Field – This input field is used to enter future CASTs and the amount of time for a pause, gain or time allowance.

Cranking Zone – These buttons are where the navigator will spend most of their time tapping and the aspect in which the Richta software is most similar to an actual Curta mechanical calculator. The navigator taps the "+" button to increase the trip odometer. The amount of the increase is determined by which field is highlighted beneath the "+" button. Increments of 10, 1, 0.1, 0.3, 0.01, and 0.05 miles are available. The trip odometer is decremented in the same fashion by pressing the smaller "-" button.

Palm New Leg Form

The form used to start a new rally leg is described below.



This form is accessed from the main form by tapping on the title ("Richta") and selecting the New Leg menu item.

This form allows the navigator to set the value of the trip odometer and out time at the start of a new leg of the rally. The values are set using the same "cranking zone" input model that is used on the main form. Pressing the "Apply" button sets the calculator to use the new out time and trip odometer, pressing the "Cancel" button returns to the main form with no changes made to the calculator settings.

Palm Leg Summary Form

The leg summary form is described below.

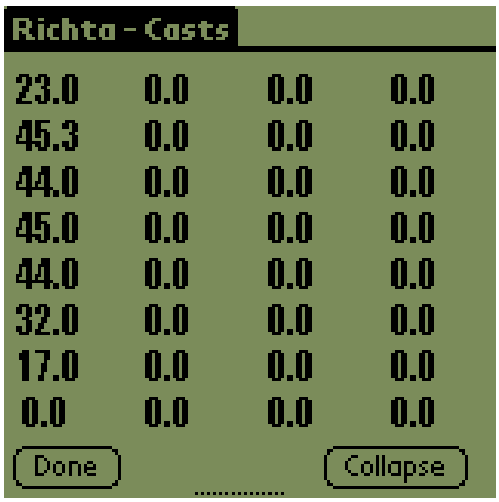


This form is accessed from the main form by tapping on the title ("Richta") and selecting the Leg Summary menu item.

This form displays the trip odometer setting and Out time for the current rally leg. It can be used by the navigator to verify the current settings without risk of changing any values.

Palm CAST Form

The Cast form is described below.



This form is accessed from the main form by tapping on the title ("Richta") and selecting the CASTS menu item.

This form allows the navigator to enter up to 32 future average speed changes. The first four of these CASTs are shown on the main Richta form.

Future CASTs are entered using the input field as follows: Enter the desired average speed in the input field using the Graffitti language then use the stylus to tap one of the CAST Stack fields. If the CAST Stack field tapped is currently 0.0, the input field is copied to the tapped stack entry. If the CAST Stack field tapped contains a non-zero value, the input field is copied to the tapped stack entry and the lower stack entries are shifted down one position. This allows the navigator to insert a CAST in the middle of the pre-entered values. (Do not use the decimal point when entering CASTS. When entering two digits, the decimal point is presumed to be after the second digit (entering 23 results in a CAST of 23). When entering three digits, the decimal point is presumed to be after the second digit (entering 235 results in a CAST of 23.5). When entering 4 digits, the decimal point is presumed to be after the third digit (entering 1200 results in an average speed of 120.0).

If the input field is blank or zero, then the current CAST value is overwritten with a zero value.

The Collapse button is used to collapse the CAST stack, removing any imbedded zero CASTs and shifting all non-zero values to the front.

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Palm Known Restrictions and Limits

Gains may not be entered that exceed the current leg elapsed time. The technical reason for this is that the calculator uses unsigned integers to store the elapsed time and negative values are not allowed.

Decimal points may not be entered in the input field. Doing so terminates the internal scanning/conversion parsing that is done. This may be the subject of a future enhancement.

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Running a Rally with Richta

Regardless of the hardware platform you use, the operation of the Richta rally calculator is similar. This section will review a typical Time-Speed-Distance event and see how to use Richta.

After running the odometer check, correct the CASTs by multiplying by your car's indicated mileage and dividing by the official mileage of the odometer check. Enter as many future CASTs as time allows.

Press the New Leg button and enter your out time and out mileage. If the odometer check has a given elapsed time, you can use the out time and out mileage at the end of the odometer check.

Press the CAST button to set the calculator's current CAST to the first CAST of the rally. The Up/Down indicator will now tell you how far you are ahead (Up) or behind (Down) from perfect time.

When you are up 10, leave the end of the odometer check and start the rally. Set the cranking zone to the desired mileage increment. 0.3 is a good place to start. "Crank up" 0.3 miles and watch for the car's odometer to match the calculator's trip odometer. When they match look at the Up/Down indicator and call this value out to the driver: "up 10", "down 2", as an example.

To change speeds, crank the trip odometer up to the mileage at which to change speeds. Press the CAST button and confirm the speed change.

At a checkpoint, you may wish to press the TOD clock to obtain a split of your time across the in line for comparison with the checkpoint clock. To start a new leg, clear the split value by pressing the TOD clock again, go to the New Leg screen and enter the out time and out mileage for the new leg. Confirm the calculator is set for the correct CAST and start the leg. (Remember to check the critique slip for a new CAST or special instructions).

Happy Rallying!

We'd be interested in your feedback. You can supply feedback from the Contact Us screen at our web site: www.richtarally.com

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A Note on Clock Drift

Richta (on all platforms) is dependant on the devices time of day clock to provide an accurate up/down indication. On the Palm Pilot, clock resolution is one second. On the Apple and Android platforms the clock is reported in milliseconds, but the actual achievable accuracy is less precise, on the order of 50 milliseconds.

Some users have noted that the devices TOD clock will drift an unacceptable amount over the course of an event. For this reason it is recommended that you have a second time of day reference clock in addition to your rally calculator. You should check your device against this clock at rest breaks or when time permits in order to achieve maximum accuracy.

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Acknowledgements

Richta for Palm Pilot was designed and coded by Rich Bireta.
Richta for Apple was designed by Rich Bireta, coded by David Bireta.
Valuable feedback and field testing were provided by Dave Horoshak, Clarence Westberg, Walt Kammer and Gary Patrick.

Software Change Log

Android 1.95

Early version available for download from the web site:
www.richtarally.com
Functionally equivalent to Apple release 2.4

Apple 2.4 (Build 26)

Fixed three minor software bugs:

- Thousandths of a mile not displayed after New Leg if trip odometer is not zeroed.
- CAST, trip odometer, timing units not protected against power loss or exit.
- Moving/editing CASTs leaves future CASTs in wrong location.

Apple 2.3

Fixes:

- TOD offset not reloaded on calculator restart (critical fix)
- Calculator exits if CAST with empty CAST stack.

Enhancements

- Allow timing units of seconds or hundredths of a minute (Richta only)

Apple 2.1 (Richta and Richta-Lite)

Fixes:

- Richta exits unexpectedly – corrected memory leaks.
- Labels in Gain and TA dialogs corrected.
- Rounding error in ideal leg times (hh:mm:ss and mm:ss) corrected.

Enhancements:

- Better CAST keyboard added (requires iOS Version 4).
- Allow multiple consecutive CAST entries.
- Add additional digit of resolution in ideal leg times (hh:mm.ttt and mm.ttt)
- Add support for iPad.

Software Versions

Palm

1.32 – current version

Apple

Richta
2.1 – See Software Change Log for details (January 2011)
2.0 – initial Apple version (November 2010)

Richta-Lite
2.1 – See Software Change Log for details (January 2011)
2.0 – initial Apple version (November 2010)

Documentation Change Log

Version 1.0.0 November 11, 2005

First release distributed to testers.

Version 2.0.0 November 18, 2010

Documentation revised to add Apple iPod, iPhone.

Version 2.1 January 3, 2011

Documentation revised to document changes to Apple 2.1 versions.

Version 2.3 March 3, 2011

See software change log

Version 2.4 March 21, 2011

Add note about device clock drift.
See software change log for details of three minor software bugs that were corrected.