

Technical User Review








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9 December 2012 to 15 December 2012 (Geocaching)

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Report Note: I am in no way associated with Garmin. This review is an independent review that expresses my personal views and experiences. This review is not an endorsement and any statements made by me are to be viewed as my personal thoughts on the particular aspect. It is not intended to be advice.

Overall Rating			
			
Component	Star Rating	Version 2.90 (87%)	Version 3.00 (90%)
Software		80	100
Owner's Manual		60	60
Watch		100	100
Features		100	100
Aesthetics		100	100
Other		80	80

Review Background

It was with some expectation that I looked towards the launch of the fēnix™. Having entered the world of adventure racing, and in specific, multi-stage self-support races, I was in the market for a new GPS watch. But the order was a tall one, my new GPS watch would need to (1) record as much environmental and physiological data as possible, (2) be light weight, as every gram counts when you have to cart it around, and (3) have a battery life that allows for extended use.

My transition to the fēnix™ came with some sadness. My trusted *Forerunner 305* had given me much more than my monies worth. It was also much more than a mere GPS watch, it was my trusted training and race companion. The *Forerunner 305* is a reliable, albeit aging GPS watch, which gave me so many options during both training and racing. It was simple to use, had great screen real-estate, which allowed for extensive display customisation and could interface with both its desktop and later the internet based connect options. Its only real drawbacks are (1) its relatively short

battery life and (2) less than stylish looks. When I say 'relatively short battery life' I refer to it within the context of extended race times. With many endurance races lasting well beyond 40-hours the *Forerunner 305* fell short, however, the majority of runners out there won't even spend that length of time training and running in a month, so the *Forerunner 305* remains a very strong and powerful training and race aid. Its aesthetics is less suited to a new, trendier look that many runners pursue, personally I never had an aesthetic problem with the *Forerunner 305*. This latter part relates to individual taste and preferences.

After repeated delays in the launch of the *fēnix™*, which I must admit was most frustrating and to some extent worrisome, it eventually reached the South African shores. It was with great excitement that I collected my much awaited *fēnix™* from the *Cape Union Mart* in Sandton City. The very first *fēnix™* in South Africa was mine to review. The fear that nagged in the back of my mind was that the repeated delays must have meant that the company was trying to fix last minute software and hardware problems and that by the time it would hit the shelves that most, but not all of these would be resolved. I anticipated a number of return trips to Garmin South Africa to have these resolved. As many Garmin users would know, this is a daunting prospect as I still have an outstanding issue that remains unresolved on my GPSMAP® 62 that dates as far back as May 2012.

This fear, however, was unfounded. The *fēnix™* is the next best thing since ice-cream. I have now used the *fēnix™* for close on four months, have clocked around 1,500 running kilometres, including its real test, the Kalahari Augrabies Extreme Marathon (KAEM), a gruelling 250km self-sufficiency endurance race. My decision to use the KAEM as the *fēnix™* review environment was deliberate, as my aim is to specialise in multi-stage endurance desert racing, it was essential for me to test the marketing claims of an improved battery life as well as to see how the watch holds up in a high temperature environment. The heat, sand and rocks would surely put the *fēnix™* through its paces. But it didn't stop there, as my wife and I also participate in geocaching the *fēnix™* was more recently tested in the Eastern Cape (South Africa) where it had to withstand the sea, rain, rocks and the usual sand.

I am happy to report that the *fēnix™* came through with flying colours. It met my expectations, was able to address the short comings of the *Forerunner 305* and held its own in one of the most extreme environments on the planet. I can just say well done to the design team at Garmin. It is obvious that the feature, hardware and software design and construction of the *fēnix™* was not a lab exercise but rather a real collaboration between adventure user and the design team. For once, the technology seems to understand my needs.



Forerunner 305



fēnix™

What follows is a more detailed and critical review of the *fēnix™*.

1. Software

1.1 Device Software Version

I tested the fēnix™ with its version 2.9 software that was pre-loaded on the watch at the time. I decided not to upgrade the software prior to testing the watch for three reasons. Firstly I needed to assess whether the watch enters the market in a fully functional state, secondly, I wanted to test the watch with the same software that Garmin had tested extensively before the launch. This way the hardware is not assessed in terms of 'untested' software upgrades, and finally a friend and fellow KAEM runner, Clint Seager, was also running with the fēnix™ and had decided to upgrade its software.

1.2 Software Upgrading

Software upgrading is relatively simple, connecting to www.garmin.com/products/webupdater and the process is mostly automated. The watch needs to be connected to the USB port, the software will automatically detect the model and the upgrade will be completed. Once the update is completed and the watch disconnected from the USB port the update will be validated. This will take a few minutes and during that time the watch will be inactive.

1.3 Software Version Changes in the Version 3.00 Upgrade

The following software changes are included in the version 3 upgrade:

- Added ability to select Venezuela and UTC time zones,
- Added continuous altimeter auto calibration mode,
- Improved altimeter auto calibration. Settings are now: Off, At Start or Continuous. Use 'At Start' for an initial calibration from GPS when tracking has started. This will result in more consistent relative elevation change. Use 'Continuous' to continually calibrate the barometer towards the current GPS elevation. This will result in a more stable elevation during pressure changes due to weather,
- Improved ETE/ETA calculations so they are more responsive to speed changes,
- Fixed cadence units overlap in bottom data field,
- Fixed issue with proximity alerts when GPS was off,
- Fixed potential issue with alert notification settings,
- Fixed issue where Track and FIT History details did not match for the same activity,
- Fixed issue with Time -> Til Sunset alert

2. Owner's Manual

In my view this is the fēnix's weakness. The fēnix™ comes bundled with utterly meaningless 'manuals' (the fēnix™ 'Quick Start Manual' in six different booklets and a 56 page 'Important Safety and Product Information' booklet). To produce these must be having a meaningful impact on our rainforests and the environment in general. For the environmentally sensitive users this might be less than acceptable. It is true that to add such meaningless booklets has become standard practice for most products we consume, however, the fēnix™ is aimed at a very specific user, amongst these the adventurer who places a premium on the environment.

The real manual has to be downloaded in PDF format. This manual (product code 190-01507-00_0A) is comprehensive but is effectively outdated with each software upgrade. The manual has no software version control designation so it is somewhat problematic and could become more frustrating as each software upgrade is implemented.

The user manual itself lacks a table of term definitions. Adding such a table would provide new users with a point of reference and will greatly improve the user experience.

It may be argued that I am unfairly harsh in my review of this element; however, I have yet to find a person who have read, or indeed, needed to read the manuals that the watch came bundled with on the one hand, and on the other, the downloaded PDF version is a step back. The technology jump that the fēnix™ makes is huge and a PDF manual sort of feels pre-millennium. Garmin may consider creating an interactive electronic manual on the internet that aligns to the software version of the watch delivering the relevant information to its diverse global users. It would be really great if Garmin designs such an interactive solution around the end-user activity allowing the user to select an activity and be guided by the system through a step-by-step process that demonstrates how to utilise the watch to its fullness.

3. Watch

3.1 Setup

Setting-up the watch straight out of the box is simple and a user is up and running within minutes. The battery comes pre-charged and setup is a matter of following the on-screen prompts. The watch is extremely user friendly and its usage is for most parts instinctive. Much of the functionality is customisable (with additional customisability in version 3), the learning curve is relatively flat and migrating from other GPS sports watches to the fēnix™ is simple.

For users already using the Garmin Connect platform there is no need to transfer data as the fēnix™ simply replaces the previous watch used. For users migrating from a different brand the GPX files can simply be uploaded onto the Garmin Connect platform which provides training and racing data continuity.

For those runners who place a premium on light weight training and running aids the fēnix™ comes into its own, weighing in at 82g the USB dock adds another 34g's. The durability of the fēnix™ is found in the use of a combination of materials that range from aluminium to rubber (polyurethane). It has a sturdy construction, is well designed and presents a practical solution for the adventure racer. For the most part it is water and dust resistant, its LCD face is protected and the straps are fixed to the watch by two T10 Torx screws that give it a very modern and industrial type look.

The most impressive aspect of the watch, however, is its battery life. With the watch setup to take a GPS, temperature, altitude and other technical data reading once every minute the battery life is in the region of 50 hours, in continuous mode this comes down to 16 hours. Continuous mode battery depletion takes place at a rate of around 1-percent depletion every 9 minutes and 36 seconds. Using a PowerMonkey Extreme solar panel (without its battery) and connecting this to the fēnix™ via its USB docking station the depletion rate can be slowed down to a depletion rate of 1-percent every 33 minutes. I ran with the solar panel strapped to my back-pack and attached to my watch via the USB cable and dock. Running with the docking cable between my arm and the watch was not really uncomfortable and doing so would increase the continuous reading battery life to 55-hours. On the 1-minute reading setting this could extend the units battery life to around 172 hours. I know of few activities or races that will exceed these requirements.

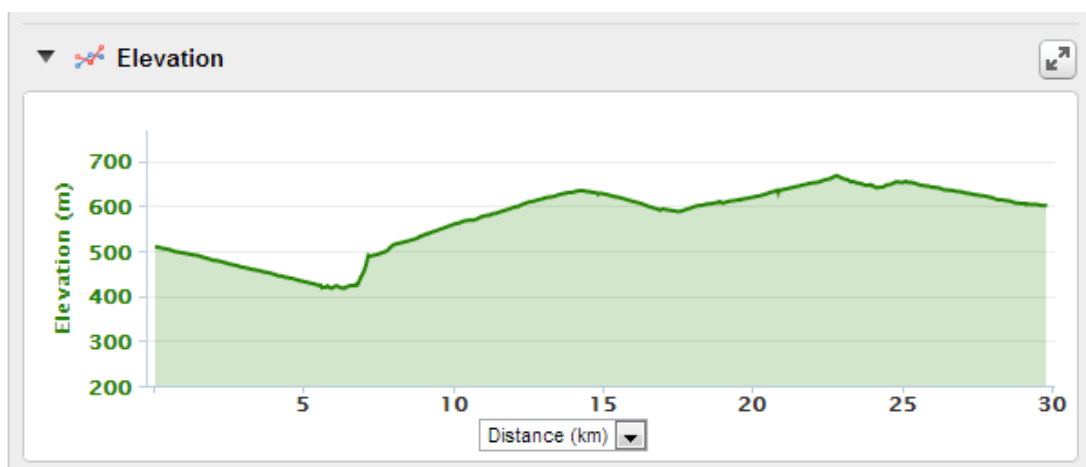
The unit charges, from the PowerMonkey Extreme solar panel at a rate of 1-percent every 4 minutes, which means that to recharge the unit from a totally depleted state could be achieved in little less than 7-hours. During the KAEM the battery, in continuous mode, would deplete at a rate of around 28-percent per day. To recharge from the PowerMonkey solar panel takes around 1 hour 52 minutes.

Carrying the PowerMonkey solar panel, weighing in at 202g, with me on my race pack provides a near indefinite power source for the fēnix™.

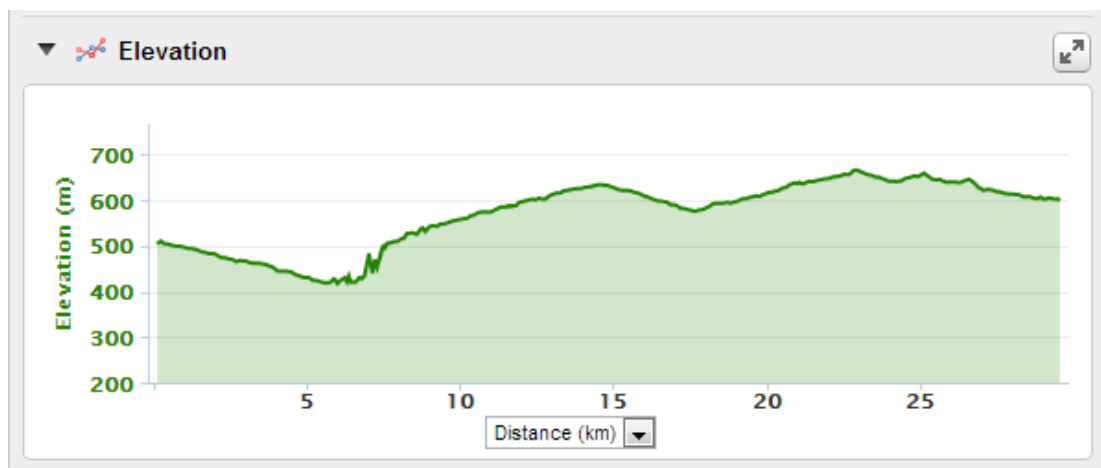
Using the UltraTrac feature allows the user to change the fēnix™ from continuous data recording mode to taking a data reference every minute (software version 2.90). During the software version 3.00 upgrade this was further refined to allow the user to define the data reference intervals from anywhere between continuous to something that is more appropriate to the user. As the interval times increase between data reference points so the battery life increases. There is, however, a balance that needs to be struck between increasing battery life and ending up with meaningful data that can be used in analysis or in real time while participating in the activity. I found that the average adventure racer is capable of sustaining a pace of around 6,5km/h (this range from 3km/h to nearly 13km/h) which means that at a 1-minute interval the adventure racer would have covered 108 meters between two reference points. Personally I feel that three to four readings per kilometre is more than sufficient, so the UltraTrac interval setting can be set to take a reading every 2 minutes 42 seconds before the data loses some value. Obviously faster activities will require a higher interval rate, and as with most things in sport much of this comes down to personal reference.

During the KAEM my fēnix™ was set on continuous mode, while Clint Seager's was set to take a reading once every minute.

The first graph is drawn using the continuous data from my fēnix™. I specifically chose the elevation data as it represents a constant across the data population. As both of us would have to cross the same terrain there should not be any real difference between my data graph and Clint's, for the day.



The next graph is drawn from the 1-minute interval data from Clint's fēnix™. As can be clearly seen his graph follows a very similar elevation trend than my continuous reading. The difference, however, comes in in the smoothness. His fēnix™ must calculate and attempt to fill the 108 meter gaps. It does this by calculating a number of progressive averages which means that his graph has some real data and some 'anticipated' data which presents a far less smooth rendering. The reality, however, is that from a purely elevation profile assessment perspective his data presents the same picture as mine.



My conclusion, therefore, is that using the UltraTrac interval setting in relation to your data requirements and activity specific performance is an efficient way to prolong your battery life without really exchanging data quality in the process.

There are exceptions; however, UltraTrac works best in an end-to-end 'straight line' activity. I will give an example; I have an urban out and back run with a number of turns in and around my neighbourhood. With a continuous interval setting my position throughout the route is tracked on a moment by moment basis and the watch accurately records the distance as 10km's. With an UltraTrac interval setting of 1-minute and my 10km pace of 10km/h it means that the fēnix™ records a reference point only every 167 meters. In a straight line this does not pose a problem, however, when a series of 90 degree turns are made, as is the case when one runs within neighbourhoods some of the real reference points are missing, so the watch compensates by drawing a straight line between the new and the previous reference point. The same things happen in an out and back run where as much as 167 meters can be 'lost' around the turn-point. In real terms this means that with a 1-minute UltraTrac interval my fēnix™ does not record this particular distance as a 10km run, but rather an 8,8km distance. This represents a 12% deviation, and would not be acceptable to many runners who carefully calculate their running distances.

Another area where the UltraTrac fails is in distance based interval running. Because the fēnix™ only updates once a minute a runners intervals lags somewhat which can be a source of great irritation. It does, however, make no difference to those runners who applies time based interval training.

In essence, the UltraTrac option allows the user to exercise control in that the runner can manage the relationship between data deficiencies and batter power, which becomes a really big issue during multi-stage ultra-endurance adventure activities.

4. Features

The fēnix™ is packed with amazing features, amongst these are the following:

- GPS,
- Altimeter,
- Barometer,
- Compass,
- Wireless Connectivity,
- Heart Rate Monitor,
- Speed / Cadence Sensor Connectivity, and
- Temperature.

The combination of features makes the watch suited to:

- Camping,
- Hunting,
- Hiking,
- Running,
- Geocaching,
- Off-Roading,
- Cycling, and
- Boating.

Of these diverse activities I assessed the watch performance in running and geocaching but tested all of the features.

4.1 GPS (Distance)

The GPS is easy to use, the receiver locates the GPS satellite signals amazingly fast and it has a high accuracy level. Comparing daily distances during the KAEM with other GPS watches and the organisers distance chart placed the fēnix™ accuracy at around 99,8%.

Transferring the GPS coordinate data to Google Maps / Earth produces a really great overlay that allows the user to clearly see where the activity took him/her. The training value this has is amazing; especially for those activities that takes the user into unfamiliar terrain. Combining the visual terrain data with environmental data (temperature, barometric pressure, and altimeter) and individual performance data (speed, pace, heart rate) allows the user to amend both the training program and activity strategy, thereby improving personal performance.

I personally used the data to redesign part of my training program and is using the information collected during the Kalahari Augrabies Extreme Marathon to reformulate a race strategy for the 2013 Marathon des Sables.

4.2 Altimeter

The altimeter function is extremely useful. Overlaying the altimeter, pace and heart rate data provides a clear picture of how the human body performs under altitude gain and loss conditions. I personally used it to determine just how much more I can increase my pace while running up a hill of a specific gradient. This allows a user to improve performance, develop an understanding of how his / her body responds to pace and stress.

4.3 Barometer

The barometer has a somewhat limited application. Using barometric pressure to determine altitude is only reliable if the weather is stable. The best usage for the fēnix™ barometer is to

identify possible weather changes when the user is out into the wild for prolonged periods. This applies mostly to hikers, adventure racers, hunters and fishers. For instance, a drop in barometric pressure indicates that a low pressure system is developing which is often a sign of rain or generally bad weather.

Although not directly associated with event performance, the use of the barometer has a safety application.

4.4 Compass

The compass is a great navigational aid. I used it primarily to guide me towards a geocache location, but it has a far greater application.

4.5 Heart Rate Monitor

The heart rate monitor is an essential training and racing aid for any serious athlete. The fēnix™ allows the user the usual heart rate zone alarm settings etc. The fēnix™ heart rate monitor was not compatible with my *Forerunner 305* heart rate sensor, so a new heart rate sensor had to be acquired.

In general I use the heart rate function of the fēnix™ to manage my weight, improve my fitness, endurance and speed as well as calculate my nutritional needs for multi-stage endurance races. For me this function forms part of the core around which I base my entire training and racing activities.

4.6 Speed and Cadence

I did not evaluate the cadence function which requires an additional sensor. The speed and pace functions of the fēnix™ is similar to that of most other products. It provides speed, pace and average pace readings in various formats.

4.7 Temperature

The temperature function of the fēnix™ is an excellent feature. If combined with heart rate, altitude, speed and GPS data it allows for a range of important performance issues to be addressed. I used the temperature feature during the KAEM to adjust my pace to ensure that my average heart rate remained within an acceptable level. The benefit of this is that I was able to avert dehydration, excessive energy consumption and a host of other performance issues even when ambient temperatures reached as high as 50 degree Celsius.

It is worthwhile noting that the built in temperature sensor of the fēnix™ is adequate and accurate for temperatures that exceed the normal temperature of the human body. Therefore, no external or additional sensor is required to measure temperatures that exceed 37 degree Celsius. For colder temperatures the normal body temperature contaminates the reading and the external sensor is essential.

4.8 Customisation

This is the fēnix's strong point, the user is able to customise the components to be displayed, set-up multiple pre-defined user specific screens, and order these in a sequence that is required by the user. This allows the user to utilise the limited screen real-estate of the fēnix™ to the full.

5. Other Aspects of the fēnix™

5.1 Aesthetics

I found the fēnix™ to be an aesthetically pleasing instrument that can easily be worn as a day-to-day digital time piece.

5.2 Price

The price is not cheap but compared to other similar products it represents great value for money.

My final conclusion is that the fēnix™ is an excellent GPS instrument that is well suited for adventure racing and multi-stage events. It is great value for money, has a host of well-designed features but that to get real value from all of these takes some time. It is worthwhile running the software upgrades, working through the user manual and finding out as much as possible about the benefits that can be derived from the various sensor data offered by the fēnix™.

This means that to gain the most value from the fēnix™ requires a strong scientific approach and that without such interest and knowledge the data is to a large extent somewhat redundant.

Technical Specifications

Physical & Performance:	
Unit dimensions, WxHxD:	1.9" x 1.9" x .7" (4.9 x 4.9 x 1.7 cm)
Display size, WxH:	1.2" (3.1 cm) diameter
Display resolution, WxH:	70 x 70 pixels
Display type:	Transflective, Monochrome LCD
Weight:	2.9 oz (82 g)
Battery:	Rechargeable Lithium-ion
Battery life:	Up to 50 hours (GPS mode); 2 weeks (sensor mode); 6 weeks (watch mode)
Waterproof:	Yes (50m)
Floats:	No
High-sensitivity receiver:	Yes
Interface:	USB
Ability to add maps:	No
Built-in memory:	20 MB
Accepts data cards:	No
Waypoints/Favourites/Locations:	1000
Routes:	50
Track log:	10,000 points, 100 saved tracks
Electronic compass:	Yes (Tilt-compensated, 3-axis)
Touchscreen:	No
Barometric altimeter:	Yes
Sun and moon information:	Yes
Tide tables:	No
Unit-to-unit transfer (shares data wirelessly with similar units):	Yes
Garmin Connect™ compatible (online community where you analyze, categorize and share data):	Yes
Additional:	Watch functions: time, date, alarm, timer, chronograph, chimes and vibration Fitness functions include: user profiles for running and cycling, Auto Pause®, Auto Lap®, alerts, customizable data fields such as heart rate, distance, pace, calories, laps, cadence and more