Sole E95 Elliptical

Pete Matthews Jr – https://3nt.xyz – © December 31, 2020

When the COVID-19 pandemic struck, it became clear that going to the gym would be a poor idea for many months to come. After a trip to Dick's Sporting Goods, where I tested out Sole E25 and E35 elliptical machines, we decided to invest in a Sole E95.

This extensive review updates and replaces an earlier page of impressions. It will help with the buying decision and with getting the most out of the machine if you have one.

Summary: Sole E95 Elliptical Machine ★★★★

Pro:	**Con:**
Solid machine for $1,800	Software solid but deficient
Versatile	Mediocre manual
Crisp console display	Brown: draws up to 5 amps
No touch screen – real buttons	Grip heart rate sensors nearly useless
Chest strap & heart rate programs	Chest strap battery cover & screws
Adjustable pedal tilt	Rails prone to squeaking
Multi-grip arms, good stationary grips	Large footprint and headroom
Tablet/phone holder, USB charging, Bluetooth, console tilt, fan & speakers	Reputation of Sole app
Warranty	

The E95 has a lot going for it, with issues. My rating is very good (★★★★), the minimum rating at which I would buy a product again.

Sole Elliptical Product Line & Competition

Differences Between Sole Elliptical Models					
Model	**E25**	**E55**	**E35**	**E95**	**E95S**
Frame	Good	Good	Better	Better	Better
Price	$1000	$1,500	$1,500	$1,800	$2,200
CR Rating		61			76
Flywheel	20 lb	20 lb	25 lb	27 lb	30 lb
Dimensions	24" W x 71" H x 70" D	27"W x 71" H x 71" D	31" W x 71" H x 82" D	31" W x 67" H x 82" D	32" W x 71" H x 84" D
Product Weight	212 lb	214 lb	231 lb	236 lb	265 lb
Weight Limit	350 lb	375 lb	375 lb	400 lb	400 lb
Pedal Adjust	No	10 pos	3 pos	10 pos	No
Pedal Cushions	No	Yes	Yes	Yes	Yes
Power Adjust	Incline	Incline	Incline	Incline	Stride
Power Adj levels	20	20	20	20	11
Stride	20"	20"	20"	20"	18" - 24"
Display	6.5"	9.0"	7.5"	10.1"	10.1"
Electronics & parts	3 years	5 years	5 years	5 years	5 years
Labor warranty	1 year	2 years	2 years	2 years	2 years

Discussion of Selected Features

CR Rating. Consumer reports only rated two Sole models. They rated the "Exercise Range" of the E55 only "fair," resulting in the relatively low (but still "very good") overall rating. In other words, they found only a small difference in resistance between the minimum and maximum levels. I would not buy either the E25 or E55 model without testing this in person.

Flywheel. A heavier flywheel should provide a smoother ride in general, but may become noticeable when changing your riding speed.

Dimensions. The smaller, lighter frame of the E25 and E55 has a somewhat smaller footprint. If space is at a premium, consider other brands, two of which are discussed below.

Pedal Adjust. It seems possible for ankle or tendon pain to develop from an unsuitable pedal position. A personal trainer at the gym once corrected my riding, saying that my heels should stay down. Tilting the pedals forward supports that, but the tilt does not adjust on the E25 and E95S. Selecting a shorter stride length on the E95S would reduce the need for tilting the pedals.

The 10-position pedal adjustment is actually a continuous screw-drive with a 10-position label. The simpler-looking 3-position adjustment on the E35 may be just fine.

Power Adjust. The power *incline* adjustment on most models is mostly a marketing frill, as it inclines the rear rails up, tilting the rider forward. This is slightly redundant with pedal adjustment, but it does change what muscles are used slightly.

Adjusting the *stride* is a feature which appears to have real value, especially for particularly tall or short riders. Any rider might want to vary the stride length – just as when walking or running – and the E95S can do that as part of the workout. I am 5'11", and the fixed 20" stride is fine for me.

Display. Four different display sizes are provided, depending on the machine. The built-in software seems to be tailored to the specific display, organizing the information on each display differently. The buttons below the display, on the console, may also be in a different order. While the appearance of the display and console may differ, the effective content displayed appears to be the same, with one exception: Watts does not appear to be on the display of the E25.

Market Positioning and Overview

The Sole E35 is a solid workhorse for $1,500. If you have the funds, upgrading to the additional features of the E95 is worthwhile: 8% larger flywheel, continuous pedal adjustment (unfortunately hard-to-dial), and larger screen.

The E95S replaces the mostly cosmetic power incline feature with power stride adjustment. However, this feature, along with a larger flywheel, costs $400 more than the E95; and you lose the capability of adjusting the tilt of the pedals.

Sole positions the E25 as the best elliptical under $1,000 (by a penny). They position the E55 as a compact version of the E95, which is true to some extent, but you save less than a foot in length. By weight and measurements, the E25 and E55 share the same frame and flywheel, so the E55 is more accurately an upgrade to the E25. Either of these models should be adequate, but the larger, sturdier frame is definitely better.

The computers on all the Sole elliptical machines discussed above appear to be similar, with similar software. For $2,300, the E98 seems to be an E95 with a 32 lb. flywheel, no pedal adjustment, and software containing a

> *Fitness Test program, mainly used in settings that demand a certain level of fitness requirements to be met. This program focuses on maintaining a certain pedal speed that will automatically make adjustments to the work load depending on the user's heart rate response to the set work levels. It's a great way to gauge on whether or not your fitness level is improving from month to month.*

The Competition

Prominent competitors provide a smaller footprint and different features:

Comparison (1) of Prominent Competitors to Sole				
	Diamondback	**Vision**	**Sole**	
Model	**1060ef**	**S7100HRT**	**E95**	**E95S**
Price	$1,200 (sale)	~$2,600	$1,800	$2,200
CR Rating	76 (provisional)	77		76
Flywheel	N/A	23 lb	27 lb	30 lb
Dimensions	30” W x 65” H x 49” L	30” W x 65” H x 62” L	31" W x 67" H x 82" L	32" W x 70" H x 82" L
Product Weight	144 lb	240 lb	236 lb	265 lb
Weight Limit	300 lb	300 lb	400 lb	400 lb
Height Limit	5’2” – 6’6”	None	None	None
Pedal Adjust	No	No	10 pos	No
Pedal Cushions	Yes	Yes	Yes	Yes
Power Adjust	No	Incline (Front)	Incline(R)	Stride
Power Adj levels	No	18-37 %	20	11
Stride	18” / 20” / 23”	20-21.5” ellipse	20”	18” - 24”
Display	Smallish	With extras	10.1”	10.1”
Electronics & parts	3	5 years	5 years	5 years
Labor warranty	1	2 years	2 years	2 years

The Diamondback has manual stride adjustment: loosen the knob, change the setting, and tighten the knob to prevent vibration – repeat on other side. It appears that the Diamondback does have a small flywheel and magnetic resistance, similar to a Keiser exercise bike.

If you can get inside a Dick’s Sporting Goods Store, you may be able to try out an E35 or other Sole model. It appears that Diamondback is sold only online. The Vision web site says Precision Fitness stores sell the S7100HRT in New England, if you want to try one. There is lots of other competition.

How about the brands you find in commercial gyms, such as Precor and Life Fitness? In a commercial setting, those machines must be able to take far more abuse than you would give them at home. Precor prices for their home model EFX 200 are $2,600 to $3,699; with lots more models in between, the AMT 800 starts at $9,295. I have seen refurbished Precor elliptical machines advertised for $3,300 to $4,400. You can bet they were used at gyms.

Comparison (2) of Prominent Competitors to Sole			
	DB 1060ef	**Vision S7100HRT**	**All Sole Models**
Resistance levels	16	20	20
Rear wheels, rails	None	None	4, heavy duty
Pedal direction	Forward & back	?	Forward & back
Step up height	6.7”	8.5”	14”
Min clearance est.	Height + 10”	Height + 13”	Height + 18”
Console adjust	None	None	Tilt
Pedals tilt inward	No	No	2 degrees
Std programs	8	10	6
Custom programs	4	4	2
HR programs	4	3	2
Multi-grip arms	No	Yes	Yes
Grip heart-rate	Near vertical	Horizontal	Near vertical
Chest strap HR	Included	Included	Included
Drive System	Front	Front	Front
Built-in fan	No	No	Yes
Sound system	No	No	Yes
Tablet holder	Yes	No	Yes
Play BT audio	No	No	Yes
USB port	No	No	Yes (charging)
Bottle holder	Yes	Yes	Yes
Electronic lockout	No	Yes	Yes
Power	Wall wart	3-wire AC	3-wire AC 5amp
Frame warranty	5 years	Lifetime	Lifetime

The S7100HRT includes Vision’s Sprint 8 workout program, which appears intriguing, especially compared to Sole’s HIIT. However, I have used fixed horizontal grips in the past, and they are not as comfortable.

At the time of my purchase, I limited my consideration to Sole models, after trying the E25 and E35 in a store. Many customers will be well-served by choosing between the Sole E35 and E95 elliptical machines, as I did. Just be sure you have at least 18 inches of clearance over the head of each rider, where the machine will be. For example, I have 92 inches from floor to ceiling, and I am 71 inches tall. That leaves 21 inches, 3 to spare. Because it does not incline, the E95S may need 4” less headroom.

When I ordered my E95, I obtained several advantages by ordering directly from Sole. For $1,994, I obtained the E95, a mat to protect the floor under it, and delivery to my basement. They unboxed it and took away the packing. Had I decided to take advantage of the free return policy, they said they would take it whole. Unfortunately, that delivery option, and the same option with assembly, are not available now, due to COVID-19. The delivery choices are curbside ($0) or delivery to garage ($59) – ask if that includes unboxing. The flywheel section comes preassembled, and you should have help to move it.

Assembling the Sole E95 (or similar model)

It took me nine hours to assemble the E95 on my own, taking pictures along the way. Those pictures, with detailed captions, are available at https://3nt.xyz/fitness/photos/Sole_E95/index.htm. They should allow you to complete the assembly in about four hours – or less with help.

Look over the pictures before purchasing the machine. If you find the procedures daunting, consider the 1060ef; Diamondback says it requires "some light assembly." Look at their online manual, before you believe that: https://www.diamondbackfitness.com/products/1060ef-elliptical. (On this page, it's just before the reviews.)

Sole E95 Feature Rundown

Manual

The manual is distinctly mediocre. The installation instructions are insufficient. There is not even a picture of the fully-assembled unit! Be sure to use my photos, because some parts are difficult to distinguish from each other using only the manual.

Software features and displays are often inadequately described. Some sections were obviously written by a person whose native language was not English. Some sections are for the E95S, documenting Stride instead of Incline.

The manual is necessary and useful. Read on, for more details.

Power

The manual says to plug the E95 into "a 115-volt, 15-amp grounded outlet with only the elliptical plugged into the circuit." Such a circuit is good for 12 amps on a single receptacle or appliance. The power plate says the E95 draws 5 amps, so a separate circuit is clearly not necessary. This is likely boilerplate, to cover all their potential products. Not sharing the circuit is clearly CYA, in case the E95 catches some electromagnetic interference. However, if the computer in the E95 does show possible interference, try it then with nothing else on the circuit.

The manual also says, in bold caps, “Do not use an extension cord unless it is a 14AWG cord or better, with only one outlet on the end.” A lighter 16AWG cord should be fine for a 5-amp draw; however, the cord shipped with the E95 is 14AWG, and it makes sense to use the same for an extension cord. I extended a 20-amp circuit from my shop to the area of the E95. I won’t be using tools while I ride, so this is fine. I recently plugged a very good surge suppressor strip into the outlet, and I plugged both my speakers (see below) and the E95 into it. I power off the whole strip when not in use.

At the maximum draw of 5 amps, this equipment would use 690 watts at 115 volts. I don't know what the E95 draws at idle.

I did notice an up-tick in my electric bill.

Given all the power that the rider supplies, it clearly is possible to capture much of that energy. Without metering it, I assume that the harder I ride, the more electricity the machine uses, powering the electromagnetic resistance. As it is, *this is not a green machine*.

Console Display

The 10.1-inch display is beautiful and clear. No touch-screen here – real buttons – super! You don’t want to be tapping at a touch-screen during your workout. (Older Precor and Life Fitness machines at gyms, with buttons, have worked much better for me than "upgraded" models with touch screens.)

When the E95 is powered on, you see an initial Sole splash screen, and then this informatory screen appears:

The total distance is shown in miles, whether the units for the machine are set to English or metric. As you can see, the software is from December 2018 on the system I received at the end of March, 2020. Dividing 142.4 by 37.7 produces an average speed of about 3.8 mph or 6.1 kmph, which makes sense for me.

This is the console display from the HIIT (high intensity interval training) program, which I have been exploring lately. (I'll have more to say about HIIT later.) The histogram at the bottom center, above the program name, represents the 18 equal-length segments of the program. It shows that this program starts easy, gets a little harder, and then alternates high intensity with low, by pairs of segments, for the rest of the workout. The segment that you are on will flash on the histogram. The manual says you can press the Display button to switch the histogram back and forth between showing Level and Incline but I won't be bothering with that.

Incline shows the level (1-20) to which the motor has raised the incline of the rear rails. The effect of a higher incline is to tip the rider a little forward, thereby slightly changing the muscles the rider will use. In the process, this also tilts the pedals forward, augmenting the pedal adjustment. The ***Level*** (on the top right) is the resistance, with 20 being the most strenuous.

Distance is either kilometers (km) or miles, depending on whether the machine is set to metric or English units, English being the default. ***Time*** is, of course, in minutes and seconds; it counts down to zero. ***Pace*** shows how fast the rider is currently pedaling: if the rider holds the current speed, it would take the displayed number of minutes and seconds to go one unit of distance (km or mile). I would rather see ***Speed*** (kph or mph) than Pace; but the two are inversely equivalent. Now that I have been using Pace, it's fine.

Pulse is zero when neither the handgrips nor the chest strap are reporting a heart rate. The ***HR %*** histogram represents the percentage of the theoretical maximum heart rate that the pulse represents. That theoretical heart rate is 220 minus age, a reasonable estimate in general, but not accurate for some

people. The computer remembers the age of the rider from the previous ride, which it displays for the rider to change at the start of the new workout. The age should be used only for heart rate calculations, so you can lie about your age to modify the result of the standard formula.

Watts measures the work you are currently doing upon the machine, a function of the resistance and your speed. ***Calories*** estimates the energy you have burned so far in the workout, which should consider your weight as well as Watts. I ignore these, but Cross-Fit athletes are often most interested in these stats.

Console Buttons

Start the workout by pressing one of the ten program buttons in the top two rows. HILL, FAT BURN, CARDIO, STRENGTH and HIIT are programs built into the machine, specifying the Incline and relative resistance Level to be used for each of the 18 workout segments. Before the workout, for these five programs only, the rider is asked to specify both the Time (length) of the workout and the maximum Level to be used. The rider gets a stretched or compressed workout of the same nature by changing the length of the workout, and gets a more or less strenuous workout by changing the maximum Level.

This is the screen at the start of the HIIT program. I have the machine set to metric; 209 lb divided by 2.2 does put me at 95 kg. The minimum time setting for a programmed workout is 10 minutes, which limits the usefulness of the HIIT program for sprint sets, as we'll see later. For some reason, the MAX LEVEL is not remembered for HIIT from last time; it always starts as 5. I need to set it each time, using the

ENTER key to move over to the MAX LEVEL field, and then change the value using either set of Arrow buttons. Finally, I press Start to begin the workout. When the PROFILE is ON, the program will vary the incline from segment to segment. Turn it OFF, and the incline will stay at 1. I use the incline profile as-is when it is available. I don't know what happens if you change the incline during the workout.

The histograms for all five of the standard programs are shown on page 22 of the manual (along with the E95S Stride histogram instead of the Incline). I have made active use of the FAT BURN program, and looked at the others.

The MANUAL program disables programmed segments, and lets you control the Incline and Level yourself, with directional buttons on the console or the arms. Any changes you make persist until you change them. This is the simplest way to get on and go with constant settings.

The USER1 and USER2 buttons allow you to set up, store, retrieve, run and replace one specific program for each of the two buttons, which I describe below. In addition to the Incline and Level for each segment, the USER programs include the Age, Weight and Time of the workout, which cannot be changed later. This means the rider cannot change the time to stretch or compress the workout, a flaw we'll explore later.

The HR1 and HR2 programs require the use of the chest strap; the heart rate (pulse) information from the strap will be used to control the workout.

The red ***Stop*** button allows you to pause, stretch, go for a towel or whatever, and resume within five minutes – or to quit by pressing Stop again, or by exceeding five minutes.

During the workout, pressing the ***Display*** button, shows some additional data for three seconds. Although the manual is silent on this, a Lap is typically 400 meters (437.4 yards), or possibly 440 yards (quarter mile) in English mode. The SPEED will be in kmph in metric mode, or mph in English.

The manual also does not define a revolution. I suspect it is a full rotation of the flywheel, which is independent of the stride length. (While five of the Sole elliptical models have a fixed 20-inch stride, the E95S has an interactively variable 18- to 24-inch stride.) Some athletes may like to use RPM instead of Speed or Pace.

The Segment Time is the time within the current segment of the 18 in the workout. For MANUAL, USER1, USER2, HR1 or HR2, the Segment Time and Max Level are not shown.

This screen is presumably equivalent on all models, which would let you see Watts and Level on an E25 (which currently does not have Watts, and formerly may not have had Level, on the primary display).

The best way to use the Display button is to either ignore it, or to learn where the one piece of data you want lives. You won't have time to look at more.

Console Tilt and Fan

The whole console will tilt forward and back. This can improve your view of the screen or extend the built-in angling of the fan. It's a small fan, but it definitely helps when the sweat starts to run.

Pedals

The pedals pop. This started with the right pedal, but now each clicks a little when weight goes onto my heel, and pops when it comes off. Since I have been told to keep the heels down, I adjusted the pedals to tilt farther forward, and this helped a little with the pops as well.

If I move my foot backward on the pedal, the pops disappear. However, I don't want to do that, because keeping my foot at the front of the pedal shortens my reach for the grips (easing back strain) and keeps my foot position stable against the front lip. (There is no lip on the back of the pedal.) My position puts my heel at the middle of the pedal. This may be something I just have to live with – and I hardly notice it any more.

The pedal adjustment is by a screw, with a knob at the heel end. The knob is hard to turn, but I expect that means the setting is unlikely to self-adjust. A label on either side of the pedal notes degrees the heel is raised, from 1 to 10. On the right pedal, the scales agreed. On the left, they did not. I counted the turns of the wheel on the right pedal, and did the same on the left, setting both as best I can to 3. A reliable click-in with only three positions should be fine; perhaps that's what the E35 has.

Mat

The Sole mat is 76 inches long, just long enough to take the feet of the E95, with a total of about two inches to extend beyond the front and back feet. The shields and handle of the E95 overhang the edges of the mat, but that's fine. Do not get a shorter mat. The Sole mat is fine for me; I have it on concrete.

Leveling the E95

My machine tended to pull to the right. When I pulled with my right hand, it was solid; but when I pulled with the left, the left front foot tended to come off the mat & floor. [The lighter frame of the E25 or E55 might be more prone to this issue.]

I filled out the form on the Sole web site, describing the problem and asking how to level the machine. That afternoon, I got a reply: "Give our service department a call at 866-697-6531 x 3 and they will be happy to assist." I never got around to doing that.

Instead, I tested by trying wooden shims in various positions under the six feet of the machine. I discovered that the problem was completely at the left front of the machine. The feet at the middle and rear of the system are adjustable with a wrench. It appears that the legs at the front, merely a rubber foot with a fully tightened screw in the middle, are not adjustable.

Accordingly, I got out a package of 1-inch diameter felt pads. These have a 1-mm white layer with adhesive on both sides. One side comes adhered to about 3.5mm of beige felt. The exposed sticky side has a peel-off cover.

One pad on the bottom of the left front foot was better, but not enough. However, a second pad was too much, making the machine pull a little to the left. I removed the double stack, which you see in the adjacent photo. Next to that is a piece of felt that I removed from a third pad. I applied the used side of the white portion of that pad to the sticky white portion of a fourth pad; then I applied that *white-white-felt* pad to the left front leg. This provided accurate balance for the machine.

It's possible that the problem could have been resolved by adjusting the other four feet, but I would not count on it or on getting it done as efficiently.

Handlebars

The D shaped grips, unfortunately without the heart rate sensors that many commercial machines have, offer multiple gripping positions around the D.

My use of the grips depends on what I am doing. If I'm working hard with my full body, I'll usually grip the vertical insides of the D bars, just below the buttons. Otherwise, I'll switch around and use various positions. For people with smaller hands, the straight section at the bottom (slightly angled up & in) may prove comfortable. I push my XL hands to the outside, putting a fleshy area onto the curved part, keeping the knuckles of my forefingers away from the abrasive vertical bar. It works, but not for long. The outside of the D can be comfortable.

As with all the other elliptical machines I have tried, the height of the arms is not adjustable. This could make gripping the outside of the D difficult for a shorter person – smaller hands should gain the bottom of the D.

Stationary Grips and Heart Rate Sensors

The stationary grips are properly angled, close to a vertical position. This is far more comfortable for a legs-only workout than stationary horizontal grips. (Specific to me: prolonged, clenched use of the grips can cause my fingers to go numb from a pinch in my neck. I usually find changing my grip easier than remembering a loose grip.)

The grip sensors on commercial machines are usually decent. For me, the sensors on the E95 have been reduced to an unreliable novelty, with a twist of alarm. Early on, they would provide sensible Pulse readings for most of the workout, but then read zero once my hands got sweaty. Then I had a period where they seldom worked at all. Now, they are more like in the beginning.

However, when I first get on the machine and I am not working particularly hard, my Pulse may march right into the 150s and sometimes over 160 – without my feeling any stress, let alone a pluse. My theoretical maximum is 148. Later in the workout, my readings are typically 130s or less.

About 15 years ago (theoretical max of 163 for me), I could still send my pulse over 200 in a sprint swim workout, but my heart would be pounding. Are these early high readings off the wall, or what? I need to get a reliable heart rate.

This makes a further complaint almost irrelevant: you can take your hand off the sensor for a second or maybe two and it will interpolate and continue. Any longer, and the readout goes to zero. It won't always start again for me, but if it does, it starts over in the 70s, and slowly climbs to a stable reading, as at the start. High-end machines tend to be more forgiving.

Chest Strap and Heart Rate Programs

The chest strap is the reliable way to get your pulse. The Heart Rate programs (HR1 & HR2) require the use of the chest strap. These modify the workout on the fly, attempting achieve your target heart rate. Instead of specifying the maximum level, you specify the heart rate target; and the heart rate target is what gets changed by the level-arrow buttons. The resistance level starts at 1, and adjusts up slowly until the heart rate target is reached. Because I am unwilling to go hard at low resistance, this meant that the early part of the workout was largely wasted. The workout finally caught up at level 16, then plunged as my heart rate went high.

The chest strap comes with a CR2032 battery in a little plastic bag, taped to the sensor section. When I could not get the original strap to work, I assumed that either no battery was installed, or it was dead. To install a battery, four tiny screws must be removed from the back of the sensor section. Using the smaller Philips jeweler's driver from my computer repair kit, I got three screws out, but the head of the fourth stripped. I had to quit; when I tried to put the other three screws back, one of those heads stripped. Why should the buyer of an $1,800 machine have to put up with those little screws, anyhow? The chest strap is broken as designed.

Having found Sole's online form to be useless, I called Sole's number, 866-697-6531 on 7 Dec 2020. I reached Spirit Fitness, who were apparently servicing Sole products that day. After a little menu dance, I was put on hold to speak to a rep. My total call time was 59 minutes.

Although I had filled out my online registration on 6 Apr 2020, and I had ordered the machine directly from Sole, they had no record of me. They registered me again, which took quite a while. In addition to my personal info, three bits of information were key:

1. The serial number of the product. This is on the bottom front of the machine, *behind a shield*. Fortunately, I had recorded the number in the front of the manual during assembly. (A photo with the instruction to record this number is part of the page recommended in "Assembling the Sole E95 (or similar model)" above.)
2. The date of purchase (not of delivery). No big deal, because it's on …

3. A copy of the invoice. I had ordered directly from Sole; I forwarded their e-mail order confirmation to the rep – all set.

Once I was registered, we discussed the issue. The rep got some further info from me and ordered a new chest strap to be shipped to me. I should have been better prepared for the call, as I failed to ask some useful questions.

After that, nothing. On 21 Dec 2020, I investigated online and concluded that the Polar H9 for $60 is probably the best chest strap for this and most applications. I watched a video of changing the battery, and it's simple.

Before ordering one, I called Sole again the next day. After half an hour, I was connected to Ken, who said the strap was in the mail. He backed that up with a USPS tracking number.

> Before getting off the line, I asked how the strap should connect to the machine, and whether it was automatic (my first unasked question from before). Ken said, automatic and Bluetooth: download the app. I said, no app, just using the machine. He started in with the app again. While the strap and heart rate programs are described on pages 27-28 of the manual, as part of my product search, I had turned up a description of using Bluetooth (BLE 4.0) on page 18. (LE stands for low energy, but Ken only said Bluetooth.) Research online had suggested it might be using a 5 kHz connection often called gymlink.
>
> Next, I asked how long this chest strap would be covered by the warranty. He expected, five years.

USPS tracking shows the shipping label was printed Tue 8 Dec, and the package was clocked in by USPS on Fri 11 Dec. Further tracking inconsistencies suggest USPS may sometimes be lackadaisical about scanning packages. On 18 Dec USPS Springfield MA clocked it in. Next report, 21 Dec "In Transit, Arriving Late … to the next facility." After reportedly visiting Albany NY, the strap arrived in my mailbox south of Boston on 28 Dec. The padded envelope had three small tears and a USPS first class pkg label with tracking code. So Sole shipped it on the cheap – not a good advertisement for the USPS, even with Christmas….

The strap wants the pads to be moist. Once the connections to the body are made and the machine is running, the sensor connects automatically. The measurements displayed are sensible and consistent with how I feel I am exerting myself. For my test, I warmed up with Manual at level 11, not working hard, and my heart rate was consistent with that (not zooming over 150 as with the handles). After a few HIIT segments, I did three sprints. AFTER the first one, my HR went into the 130s; just over 140 after the second; and in the 130s thereafter. This all makes a great deal of sense.

Since the HR programs don't work for me, my plan for occasional use of the strap is to set up on Manual at level 11, pick a target heart rate, and adjust my speed (and perhaps level) to achieve that.

Speakers

My little Clip music player works fine with the Sole speakers and a little mini-to-mini cable. The speakers themselves are marginal, but better than nothing for a workout. I had an old set of computer speakers in a box in the basement. "Just in case" arrived! I hung the tweeters on the studs in front of the machine, connected them to the subwoofer on the floor, plugged the Clip into the sub – much better sound.

The Sole speakers are on whenever the E95 power is on, even when the computer is sleeping.

Tablet Holder, Bluetooth and USB Port

The tablet holder sits on top of the console, without blocking anything. When I'm not working hard, I usually read a book on my phone. [I have an electronic membership at the Boston Public Library; other libraries offer electronic books, too. Reading on my phone with the Libby app is so great that I seldom read books on paper any more.] Many other things that people do with phones and tablets are possible, including Bluetooth connection to the speakers.

The USB port supports charging, but I have not used it. If Sole built the thing properly, it is connected to the computer, and it could be used to update the software via a USB stick. Don't hold your breath, waiting for an update.

Rear Wheels and Rails

The concave polyurethane rear wheels sit on aluminum rails. This system is solid and effective, but can squeak. Periodically wipe the rails with a cloth. If they still squeak, clean the rails and wheels with isopropyl alcohol. It's now available at 91% strength at Target and other locations. Finally, the rails can be lubricated with a dab of silicone from the tube supplied with the E95.

After whatever cleaning, put the wheels down carefully onto the rails. They may still squeak for a few strides, as the wheels center onto the rails.

Computer Software Deficiencies

First, the software on the machine is robust: the computer has never crashed on me. The workout programs seem to work as designed. I can get substantial use out of the machine and the computer as delivered. The problems I see are:

- Calculations are rife with obvious discrepancies, discussed below.

- The Distance is displayed to only one decimal place. While the display looks nice this way, a ***second decimal place*** could provide the rider useful information. To partially address this deficiency, I switched the units on the system from English to metric. Because the kilometer is shorter than the mile, tenths of a kilometer tick over more rapidly than tenths of a mile. For the same number of decimal places, this change could make the distance up to 39% more accurate. (Conversely, entering weight by the larger whole kilogram is less accurate than by the pound, but this is inconsequential.)
- The software arbitrarily requires a workout to be at least 10 minutes long. This means that a segment, the smallest configurable part of a workout, cannot be less than 33.3 seconds long. ***6- and 9-minute workouts*** would permit 20- and 30-second segments. (Because of the lag in adjusting resistance, it would make sense to have a 6-minute limit.)
- ***More than two user-defined programs*** would be useful. The HILL program seems expendable: while its profile looks like a hill, it does not ride like a hill.

Here is one of many examples. The 30-minute (half-hour) workout covered a DISTANCE of 4.1 kilometers. The rate for a full hour appears to be 8.2 kmph, but the workout summary reports an AVG SPEED of 8.1 kmph.

This may be a simple rounding inconsistency. For example, if the actual distance covered were 4.06 km, it would be rounded up for display to 4.1 km. The actual speed would be 8.12 kmph, which rounds down to 8.1 kmph. Displaying an additional decimal place for distance and speed would improve the situation. Of course, there could be similar rounding errors in the next digit, but maybe nobody cares about that digit. Maybe nobody but me cares about this digit, either ☺

Now look at the AVG PACE. If a ride covers exactly 4.0 km in 30 minutes, then the average to cover one km is 7:30. There is no way that this ride was 30

minutes, covered 4.1 km (with rounding), and yet had an average pace of 7:31. Something is clearly wrong.

Technical Discussion

Let's take a basic example. The machine probably has a sensor to detect revolutions of the flywheel. The number of strides per revolution is known to the programmer; in the simplest case, one revolution is two strides (one per foot). The stride length on the E95 is fixed at 20 inches. Calculating the distance per revolution is therefore relatively simple.

There are two simple ways to report the distance traveled, given the running total of the revolutions in the workout:

1. Before displaying the distance, calculate it from the running total revolutions.
2. Get the number of revolutions since the last display, calculate the distance for these revolutions (which may be useful for some other purpose as well), and add it to the previous total to produce the new total distance.

In algebra, the second method would give the same result, but in computational terms, it's horrible. The result of each of those calculations will usually include a rounding error. Those errors add up, when you keep adding to the previous distance. With the first method, each calculation is independent of the previous one, without *accumulating* the errors.

In one or more places in the software, the programmers may have made this mistake. It seems too basic for them to have made this error on the distance, but it's possible: the E95S has a variable stride length. The second scheme is easily modified to insert the additional calculations for a variable stride. If the programmers did that, and then Sole ran the same software on the E95, the distance calculation would be inaccurate on both machines. Instead, a more complicated method is required, possibly:

3. Modify the second plan to accumulate distance traveled as integers (whole numbers). The stride must be measured in some unit, perhaps inches, that will always be an integer. Use only integer arithmetic, without division, to calculate the distance in "stride units." These calculations will have no rounding errors, so they can safely be accumulated. Then the final result is converted to miles or kilometers, with a single rounding error, as in the first method. This solves the problem for distance, but other data must also be displayed.

A worst case scenario would be to calculate the numbers for display, and then base further calculations on those aggressively rounded numbers. It appears the programmers did not do that. However, it does seem likely that the average pace includes accumulated errors.

A Lower Level Technical Problem

In the example that prompted this investigation, the relatively fast ride averaged 74 RPM. That means the number of revolutions of a ride is roughly one revolution per second. Other than the twice-a-second flash on the histogram, the display appears to be updated once a second. The accuracy of the data will depend on how often rotation data is sensed by the computer, but it appears necessary to get it far more often than once a second.

Let's look at Speed, which is simpler to understand than its inverse, Pace. If you plot the distance against time, the velocity is the slope of the curve, that is, the direction of the curve at a particular instant in time. The displayed Speed is the velocity at the end of the curve. The computer has to estimate where the curve is going, based on the recent past. Clearly, more data points will be better.

When riding, the values displayed for Pace jump around, but tend to land on specific values, such as 9:07. Lots of values, such as 9:05, 9:06, 9:08 and 9:09, and quite a few more contiguous values do not seem to be displayed at all. This indicates that the sensors and calculations are not precise for Pace down to the second.

It could well be that display of the distance to two decimal places, as I would like, would raise this somewhat unsightly issue in a more prominent location. Still, as we have seen, distance is much easier to calculate than Speed or Pace. This problem might not appear.

While I did not notice any of these defects on commercial products from Precor or Lifetime that I have used, that does not mean those products are free of them.

Dealing with Existing Software Deficiencies

- Change the units from English to metric, for 39% more apparent accuracy in the distance, as described below.
- The rider could plan to achieve the goal early. Calculating just what "early" means is probably not worthwhile.

- The rider could add a tenth of a unit (mile or km) to the goal. I have adopted this plan, but as the workout summary above shows, it is not completely clear that I will actually reach my goal. The Pace display is key in staying on target, but if Pace is unreliable…
- The rider should decide that only the displayed distance counts. Ignore the workout summary. Yuk.

Maintenance Menu (aka Engineering Mode)

To enter the Maintenance Menu, hold down the **Start**, **Stop** and **Enter** keys simultaneously. The manual describes all seven options, but the only one I changed is:

> B. UNIT MODE – Choose from English or Metric display readings.

Workout Programs on the E95

In this section, I'll talk mostly about ways to get value out of the machine.

The MANUAL Program

Sometimes, I get on the machine, hit the MANUAL button, set the time, and press Start. I then immediately set a level 11, for example, and I seldom change it after that. A Fat Burn workout has a similar flat profile, with lower resistance at the start and end.

For each setup, I have a high-end distance target in mind. However, I listen to my body, and sometimes I reduce my goal by 15% or so.

30 minutes, level 4, target 4.1 km, pace under 7:30. The last time I did this workout, I got to 4.2 km. However, after running like that at low resistance, my more-arthritic left hip started hurting all the time, including trying to sleep in most positions. It's better now, but I won't be doing high speed at low resistance again. *Macho is the enemy of fitness!*

20 minutes, level 11, target 2.1 km, pace under 10:00. About four days a week I now do either the weights or the bands portion of my gym workout. On some of those days, I do this as a cardio segment. This 6 kmph speed at higher resistance does not hurt my hip.

On cardio-only days, when either weather or weekend walkers keep me inside, I may do this for up to 60 minutes. In such a case, I would glance at the pace periodically, but probably not set a distance target. I'd just keep going while reading my book on my phone.

Lots of people don't really want to exercise hard – that's fine – and that's me some of the time. Getting onto the machine is the required first step to riding in

whatever way works for you. *Ninety percent of the game is half mental.* – Yogi Berra

This is important. I am in it for life. I need to get on the machine next time, and the time after that… I listen to my body and give myself a break. Bad days happen, and I don't need to push hard every time. I'm no longer training for races.

FAT BURN, CARDIO, HILL and STRENGTH Programs

When the hand grip sensors were working better, I tried the FAT BURN program for 60 minutes. At that time, it was not trivial for me to keep my heart rate at 105 (70%) or higher for that period. This type of workout has no "hook" to keep you going. You just try to maintain a decent pace, and grind it out. I cannot do this type of workout often.

The CARDIO program would be a variation on this theme, or it could be used as I use the MANUAL program. I tried it a couple of times.

The shape of the HILL profile looks like a hill, but it does not represent walking on a hill. Going up a hill would correspond to a relatively high level of resistance, with variations. The FAT BURN, CARDIO and, to a lesser extent, STRENGTH programs look more like going uphill. Going downhill can be a risk both to knees and for falling – other than when running at low resistance, the E95 does not present those risks. I have not used the HILL or STRENGTH profiles.

High Intensity Interval Training (HIIT)

In "Fitness for Life" I talk about interval training and HIIT in general. I'll assume you have read the applicable pages there.

The HIIT program on the E95 is set up with a 1:1 ratio of hard:easy. As with all other programs on the E95, HIIT is broken into 18 segments of equal length. As we saw above, those segments are paired, two easy, two hard, etc. This produces four hard double-segments sandwiched between five easy doubles. When I set my maximum level to 15 (the hard segments), the easy segments are run at level 4. (The first and last single easy segments actually run at 2.) Using the HIIT program, this table shows how many seconds will be in each single and double segment:

Total Minutes	3	6	9	10	12	18	24	30	36
Segment Seconds	10	20	30	33.3	40	60	80	100	120
Double Segment	20	40	60	66.7	80	120	160	200	240

There are two problems with this: (1) The E95 does not permit a program to be shorter than 10 minutes, an artificial limit that reduces the usefulness of interval

training for sprints. (2) The resistance level changes gradually, so there is a lag on both ends of the "hard" interval – we have to make our peace with that.

The lack of those shorter segment times (the gray area of the table) cripples the HIIT program by insisting that a "hard" double segment be significantly over a minute long. As a consequence, a 10- or 12-minute workout is likely, to keep those double segments to no more than 80 seconds (1:20) in length. It's fine to run HIIT again, either immediately, with a break between sets, or interleaved with other sets.

A Short HIIT User Program (SPRINT)

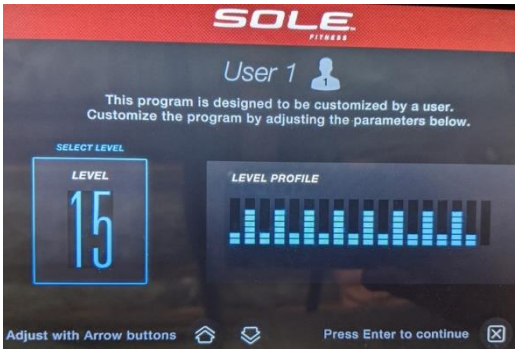
After pressing the USER1 button, I declined to run the existing program and deleted it.

I named my new user program SPRINT.

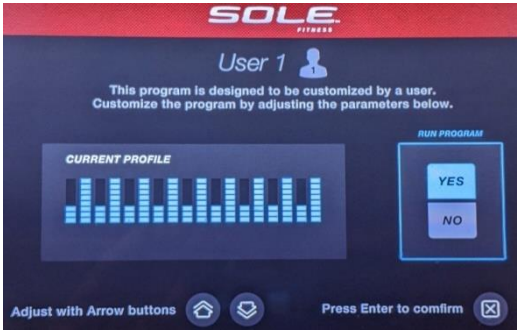
This program is tied to a specific user, so I accepted my current age and weight, when they appeared. (My system is set to metric: kilograms.)

This program will be 12 minutes in length. As the table shows, this means each segment will be 40 seconds.

The level profile is quite simple: easy alternating with hard, by segments. This provides nine hard intervals. It's fine to stop short or start again – and even better to plan that in advance.



The level for the hard parts is 15, which I just set for the flashing last segment. The level for the easy parts is 5. On the Incline page (not shown), I accepted the default incline of 1 for all segments by repeatedly pressing Enter. Once set up, the program can be run immediately.



To run the program later, press the USER1 button. A welcome page for SPRINT will be displayed briefly, and then the current profile is displayed. Press Enter or Start to run the program immediately. (NO to RUN PROGRAM only leads to the option to delete the program.)

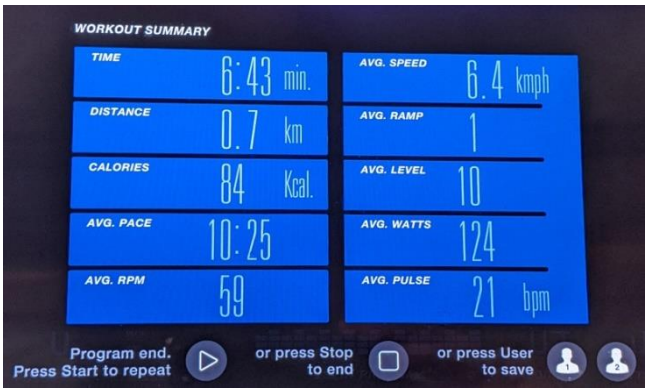
When the program is running, pressing the Level Up or Down arrow changes the resistance for the current segment and all remaining segments, until the next change.

Running SPRINT, I'm not using the segments just as a signal to go harder, but also to make the going harder. When the displayed Level value changes to 15, I ease into the sprint. The resistance increases slowly over about 10 seconds – I go all-out when I feel the change. If I miss the start of the level 15 sprint segment, no problem: when the going gets tough, the tough get going!

In theory, I should continue sprinting ten seconds into the next segment. In practice, no way – the finish line is when the level to ticks over to 5. So these are not 40- but 30-second sprints (and the hard:easy ratio is not 1:1 but 3:5).

Let me tell you, nine 30-second sprints is a big deal. I plan to decide in advance how many I will be doing. I also plan to do some warm-up on MANUAL, to do some cool-down, and to include some HIIT programs occasionally.

For example, one day I did a 30-minute manual program at Level 11, reading my book and not pushing hard. After a short break, I did five 30-second, full-body SPRINTs. I then stopped the SPRINT program, producing the summary you see below. Fast-slow is more work than an even pace – in this case, brutally more. I would normally have no trouble holding a 10:00 pace for seven minutes or so. With five sprints in that time, I was both pooped and slower overall.



After pedaling a little more, I pressed Stop again, because I was done. Some other day, I could press Start to repeat the program for another set.

Consider assigning a SPRINT program to one of your USER buttons. Also consider combining various capabilities of the machine and your home gym into a single workout.

Conclusions

Overall I get the sense that Sole may be coasting, making minor but useful updates to formerly great products. Other vendors have abandoned the wheel and rail system on their machines. Those machines require less space and may use less electricity. Their software may be better, but only experience would confirm that.

Sole has decent models down to $1,000, and Diamondback has a good one on sale for $1,200 (waitlisted). If your budget does not extend to this, see my article, "Exercise Bikes for Home Gym". However, beyond being usable when seated, a bike is not as versatile as an elliptical.

The E95 has a lot going for it, but has issues. My rating is very good (★★★★), the minimum rating at which I would buy a product again. The E95 is likely to be the best Sole offering for those willing to afford it.