

Fathom Gemini Review

I'd like to be able to give a fully independent review of this unit, but I found myself unable to begin doing so without including a comparison with the KISS Sidewinder as well as my personal justifications for switching.

Disclosures: I have no affiliation with KISS (though I am certified to service the units). I have no business affiliation with Fathom, but am sometimes involved with KUR, whom has as a member of the BOD Charlie Roberson, the proprietor of Fathom. I *really* don't think any sidemount unit should be the first rebreather for people. Mike Young (and Edd Sorensen, and probably Matt Vinzant for the initial inspiration) built a unit that I'd speculate has also allowed for more line laid in the past five years than almost anything else. I do firmly believe in dual monitoring. All opinions are my own and should be taken with your own grains of salt.

My history with the Sidewinder:

- Initial training April 2019, first with Mike Young's unit and then finishing on my own after it was delivered
- Approximately ~350 hours on the unit between April 2019 and Jan 2023
- Max depth 96M, longest dive somewhere north of 6 hours
- Lowest temperature 1°C

Modifications on purchase vs the state when I sold it:

- From KISS DSV to Golem Gear BOV to Golem Gear DSV (I dislike the KISS one. It was improved in the most recent update and is now easier to service, but I have a strong distaste for the circ-clips that hold it to the loop hoses, as well as the vertical DSV open close vs a horizontal twist).
- Added Loop covers (homemade from SuperFabric or whatever the armored milspec dotted stuff is)
- Added syntactic foam coating
- From Omni-Swivel QDs for the ADV inlet to either QC6 or BC Inflator depending on the team I'm diving with
- Removed ADV (either needs an in-line shutoff, or to be removed, or run on a lower dilout IP, or a stiffer ADV membrane, or two membranes)
- Removed OPV (it's in a great place to wet your unit if you happen to bump it into a restriction or unintentionally hit it with your elbow)
- From Fischer driven single monitor with Molex cells to dual monitor FathomHUD hardwired + Petrel2/3 four-pin off an SMB splitter board (Fischer is silly, the argument for single monitor has improved with the advent of vibration in the Petrel 3, but I still am philosophically opposed).
- From stock towers to Light Monkey towers (not only have there been various shades of manufacturing tolerances over the twenty years of KISS using these, but a few friends have popped theirs off grinding through restrictions)
- From stock blanked WellsMarine first stage and KISS single button oxygen add (GAV) to a Poseidon XStream MK3 on a KISS dual button orificed needle valve (remove depth limit, add needle flexibility, better access to first stage parts, integral OPV. The stock oxygen add is also prone to breaking when torqued by the wrong people)
- Switched from the plastic loop hose retaining clamps to metal hose clamps

After all these changes, what remains an issue with the Sidewinder unit itself, whether outright or compared to other units? Some of the things that make the split-backmount-not-really-a-sidemount-unit-units great are the issues with them.

- Water removal. No water dump is available on the small lung. Brett Hemphill remains the only person I know that has used the DSMB style dump available on the larger lung, though I imagine Mike Young and a couple others have as well. Edd Sorensen speaks of intentionally flooding the unit and then proceeding to do a long cave dive on the unit "about 8 times" without ever having had a caustic, and he's not the only one. The shape of the lung on the back makes it less likely for the caustic water to move from the exhale scrubber, through the counterlung, up the inhale scrubber, and into the cells (and eventually the inhale loop). I would not advise trying this yourself.
- Wet sorb. Lung butter and any moisture dumps from the exhale and onto the top of the exhale scrubber. In 22°C water, you can make a sandcastle out of the right-side scrubber after four-ish hours and a partial sandcastle out of the inhale scrubber after five. Some of this is my drool, some is the byproduct of the scrubber reaction and lack of water trap on the unit.
- No gas inlet across cell faces. Some units (Fathom, for example, or a modified KISS Sidekick) have the diluent-in blowing across the face of the cells, allowing for instant cell verification. Others have cells oriented in a place that is less likely to get wet under normal diving conditions. In cold water, there is enough condensation on the inhale side of the hose that water drips down onto the back of the cells in the Sidewinder and into the Molex connectors. If the cell faces do end up wet, a few dil flushes may help stabilize, partially dry, and hopefully return the cells to function, but it's often a roll of the dice if they all come back.
- Thread on scrubber canister heads. Some scrubbers do and some scrubbers do not have a line indicating max fill. Some scrubbers seem to have more and some fewer rotations of the head nut to lock down the heads on the scrubbers. There have been at least two instances of the user managing to grind through a restriction or otherwise and rotating the nut loose and knocking the head off. User error? Definitely possible. When the first reports of the tower to loop thread popping loose surfaced, the immediate reaction was to state user error and poor assembly. Having held a pair of the failed ones in my hand, I humbly disagree.
- Scrubber to counterlung connection. These use another pair of the circ clips.

—Internal mesh screen on the scrubber. The bottom of the first few years of scrubbers had a glued in circular disc with a mesh screen to support the sorb and keep it separate from the counterlung. I've managed to break two of them. Mike replaced them for me, though I still find the plastic crossbars thin.

—Water from the OPV can drip down into the back of the cells / into the cell head. Short people (and people that have been taught poorly) trigger the OPV each time they reach for their butt d ring or XDeep OPV with their right hand and it's one of the few ways to get a quick caustic on a sidewinder.

—Various iterations of the SW MAVs and needles have had issues at extreme depths. Switching to higher durometer o-rings helped, but anybody that has taken their unit past 90m knows of these issues. Hint, they fail open and it's a nice way to get yourself into a boom drill. It's not a great trimix unit unless you need to squeeze through something at or on the way to these depths.

The above largely ignores any issues with parts that I've already replaced. An important thing to remember is that much of the Spirit series were simply built by parts on hand from the KISS Classic (and even the Sport). Have I been using this unit differently than intended? Certainly, or at very least differently than what Mike set out to make when he produced the units. With so many instructors screaming about how the SW is "the most versatile and simple rebreather made," I did put it through its paces. My unit was, at the time I retired it, at most, half stock components.

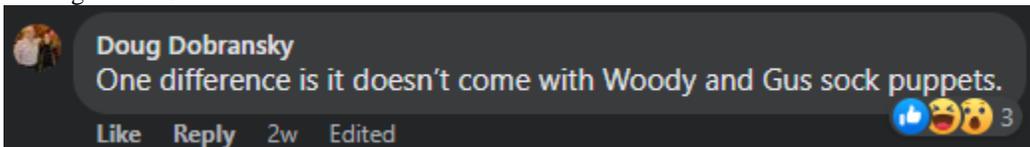
The Gemini

I began hearing rumors of Fathom working on a prototype sidemount unit in early 2022. Charlie and the team he dives with are pretty experienced at homebuilds and have used various designs over the years, from modified Fathoms to Billy Gambrell-esque Lowriders, to Sidekicks and SF2s and Choptimas and others, so I was eager to see what would pop out. Rumors beget rumors and poof, we get to DEMA in Nov 2022 and the Gemini is on display to the public.

Spec sheet: <https://www.fathomdive.com/support/downloads/>

Headlines:

- \$7695
- dual scrubber (hence the name)
- Axial
- potted head using SMB connectors (JJ/Fathom cells)
- No ADV
- OPV / water dump on the lung itself
- Easy integration with GG BOV, GG DSV as stock
- Fathom dual button needle valve with blocked, stiff spring Apeks DS4
- Swappable scrubber baskets
- Integrated HUD



I disagree with one of the Gemini instructor candidates calling the Sidewinder a Civic, to the Gemini a Bugatti. The Gemini and the Sidewinder are obviously units of a similar skeleton (not unlike an X vs a JJ vs a BMCL Liberty etc) and a few other comparisons can be drawn. That said, the stock and early manufactured Sidewinders (2018, 2019) are probably a Honda Fit to the 2023 Gemini being something like a new Toyota Corolla (or even the old Lexus LS 400)? The 2022 ish Sidewinders, properly configured with a bunch of aftermarket work, (imo) bring them closer to a Gemini. Some gaps are inevitable though.

Information that's not in the spec sheet:

- Prelim EN14143 testing with 812 sorb has given a 2.5 hour duration at a breathing rate of 40LPM with 1.6LPM CO2 injection on air at 4°C. My personal breathing rate is a quarter of that, and my CO2 production rate (extrapolated from my oxygen consumption) is ~0.375 that. Under normal conditions, that brings the expected duration to something more useful for me.
- Stock 44" LP hose from the DS4 to the Needle.

Price comparison for a 2022 Sidewinder with dual monitors as of 31 Dec 2022 to be "ready to dive" and excluding harness, regs, cylinder, and assuming one needs a MAV, and assuming that Delrin is a less good insulator than Amalgon+scrubberbasketmaterial matters for diving and thus you need syntactic foam:

KISS Sidewinder	\$ 4,290
Petrel, 4-Pin and head side cable	\$ 1,814
HUD + splitter board	\$ 1,209

2 button MAV	\$ 90
Cells	\$ 327
Syntactic foam coating	\$ 350
Sum	\$ 8,080

Note, a purchaser could do some other things to cheapen this, but I wished to use the KISS configurator to attempt to bring them together to something many view as more safe. Blah blah always know your PPO2. If two monitors saves one life, the quant in me says the math of everyone needing two monitors is positive expected value. Even better, an instructor can monitor student PPO2 on a Fathom HUD farther away than a petrel (or even scarier, instructors that permit use of only a Nerd to new students).

What is still lacking on this hypothetical sidewinder compared to a Gemini? The N@90 HUD is much worse than the Fathom version. You'd still be working with Molex cells and a head that isn't potted. And you have a depth limit in the 70m range. (*Mike has made and sent a few SMB style splitter boards, but they're Molex in and SMB out, so you're still drowning in six molex). If we were attempting to make this phantom sidewinder match the Gemini as closely as possible in function (higher depth limit, cap ADV, etc), we'd be out the needle (\$499 for the SubGravity, which is cheapest publicly available on market, but only allows for oxygen in, as opposed to the Fathom or KISS needle valves with two inlets and thus eliminating the MAV) as well as appropriate first stage, stiffer spring, blanking cap, and OPV+ADV caps. The price discrepancy would then increase further. Can someone argue that the Sidewinder is designed to be simple and shouldn't need splitters and dual monitoring and a needle, and that sump heads would solve some of these? Sure. It's not how I use it, and it's not how I think it should be taught. An uncertified user also isn't "allowed" to order sump heads with a new unit. You could order the Sidewinder without dual monitoring, but you can't order a Gemini without a HUD. I can't see a NERD2 in a true whiteout, but I can see the HUD or I can feel a Petrel3. I'd rather be able to stay on the loop and count via the HUD than stay on the unit and trust my, or most diver's ability, to dick around counting breaths in SCR mode.

The above information is all pre-purchase for me. I think I was the second consumer level class along with Lanny Vogel in mid January. Current instructor trainers as of this writing are Kelvin Davidson at Third Dimension in Tulum, MX, and Jon Bernot at Cave Country Dive Shop in High Springs, FL. Other instructors or future instructors include Jon Kieren, Giovanni Gastaldo, and Joey McNamara. After a hiccup with my work coverage interfering with a class w Bernot, I was able to find a mutual timeframe to sneak to Mexico for some time with Kelvin.

Pre-class and first impressions upon unit arrival:

My unit arrived at my office 4 January in a blue crate weighing right about 12kg. Initial thoughts:

- Loop hoses much shorter, but much more flexible
- Removable scrubber baskets mean I won't be able to use that dead space for packing (I formerly put two computers and my oxygen first stage inside of scrubber cans)
- Very tight tolerances on all connections. Almost "break an oring if you don't lube them" tight.
- Weedwacker cable seals the bottoms and tops of the cans to the lid. Coincidentally, this is also how the one atmosphere exo suits work.
- Not sure how I'm going to feel about the water dump placement. I debated for a long time drilling holes in the bottom of my sidewinder cans and installing Light Monkey tinkle valves. This way, I could dump water before it hits the lung. I elected not to proceed as I worried it would harm resale value and at the end of the day, rebreathers are a means to an end and I don't have emotional attachment to units.
- I'm pretty compact, the two button Fathom needle valve is not (I've had one in the past, this wasn't really a shock)
- No loop hose weights (I had them on the sidewinder and never experimented with removing them).
- Holes on the scrubber screens a little larger than expected. Fractions of a millimeter but would wait to put sorb in them to find out whether this concern was warranted.
- The choice to flow gas from right to left means that for the oxygen valve to remain on the right side, the hose into the needle must pass along the bottom of the harness and up the left side of the back (as opposed to straight up the right side like the SW).
- Cell placement is an improvement. In a horizontal swimming orientation, cell faces are down towards the ground rather than backwards towards your fins. Unlike Molex cells, backs of JJ and Fathom cells are covered with the wire lead.

Contents:

Lung (4.5L)

Scrubbers

Scrubber baskets

Gas addition head

Electronics head with HUD + 6" female 4-pin (Charlie will make it longer if you ask/need)

40" Inflator Hose DS4 w button gauge and beefy Apeks OPV

Needle + hose to head

QC6 male + hose to first stage

Flow meter

DSV + nipples

Three boltsnaps (can tops, bungee across front)

Bungee

Paracord

Fathom hat and sticker

Class and onwards:

I built the Gemini to copy over the rigging from my Sidewinder but did not get it wet before class. Made it to Tulum and took care of my crossover. Kelvin was using a Razor 4, Lanny an XDeep Rec, and myself a Katana2. Takeaways are listed below in positive, neutral, and negative order.

Positives:

+SMB cells. Larger surface area, fewer small connections. Molex are trash and I'm happy to fight anyone that says they prefer them.

+Proper threading on the head to loop connection. The LM ones aren't super well machined and most people have a chip on their first thread because of it. The KISS ones are...well KISS ones. Caveat, I and Dobbykins had the first retail set of LM towers so I don't know if this has been improved in the past two years.

+Connection from the cans to the CL do not have a circ clip that could break or be lost.

+Dewatering ability. I have not tested it. There's enough alkalinity in the freshwater in the cenotes in Mexico that I was worried about frying the cells. Next time I have a bit of sorb time left and the ability to pull my cells out, I'll hop back in the water and totally flood the thing a couple times to see what happens. Between Edd and one or two others' experiences having flooded one side, I'm not super concerned with some moisture assuming the inhale side remains unflooded.

+Easy BOV integration. I've danced both sides of the BOV DSV debate. On a Sidewinder, the integration with a BOV was either very messy, or needed Fathom parts, or would add an additional hose somewhere. I did the Jason Richards thing for a while but grew to hate the ADV and all the additional hardware necessary. On a Gemini, going from DSV to BOV requires a single 30" LP hose and an elbow (plus the BOV). One could ditch the necklaced backup and thusly ease gearing up. On all CCRs, I firmly believe you need either a BOV or a necklaced backup that is always breathable.

+The two button needle (and the other Fathom needle and other fathom MAV) are upstream. I'll use a quote from Charlie here to avoid confusion: "The manual addition button flows gas opposite of normal buoyancy compensator inflators. We did it to prevent the leaks that the SW mav is plagued with. Increased IP pushed it open in the normal downstream direction but assists in keeping it shut with upstream flow. Eliminates leaks and free flowing MAV. Also means that a HP seat failure on the oxygen 1st stage won't result in a boom scenario." I actually didn't know this and I don't currently know why it isn't advertised more heavily.

+Swappable canisters. I think Paul Raymakers is a better writer than a statistician. That said, the ability to swap scrubbers does present some interesting possibilities. Say I fly down to FL or Mexico for a week. Arrive by midday Saturday and want to get a shakedown dive in before doing much larger dives the next days. Now, I can get a 2hr dive in, swap the old inhale into the new exhale, repack the new inhale side, and be happy putting in a very long dive (caveat, you'll all need to figure this out by yourself and I'm not going to tell you my rules for sorb use. If you're pushing max scrubber durations, you should be in a big boy or big girl state of mind and be able to evaluate these risks.

+You're more likely to hurt yourself trying to disassemble the unit topside than you are to hurt it under water.

+No battery box on the loop hoses

+WOB. I saved this one for last, as I don't think humans can measure these things that objectively or with much precision and I don't want to lead readers astray. I feel that the Gemini breathes slightly better than the Sidewinder. 10%? 15%? And then I had to ask myself why (as well question whether I was still in the honeymoon phase with the unit). I think, very simply, it has fewer bends for the gas path and slightly less turbulent flow through the hoses. The towers run straight out of the lid, there is less dead space in the heads, the entry at the bottom of the scrubber is smoother. Hopefully Patrick and Piotr publish the results of the testing they've been having done, Fathom does the same, and we have some "data." The important thing to remember is the manner the cans and lung are rigged onto a will have a higher impact than any of this.

Neutral:

0 SW users are split running their MAV and GAV across their chest vs over the shoulder. I will need to get used to this being on my left shoulder.

0 Packing sorb is going to take longer. I'll trade this for the ability to pull scrubbers out to let cells dry without needing third party caps or to be able to toss the scrubber baskets into a drybag.

0 Haven't squeezed into anything that makes me prefer the straight routing vs the angled in routing of the KISS and LM towers. If the straight piping did improve build quality and WOB, I'm all for it and I do believe the straight plumbing puts the incompressible parts lower on the body

0 Flow right to left

0 Fathom advertises Black Amalgon as 400x better insulation than aluminum. Aluminum 6061 is in the ~167 W/m-K range, Acetal (Delrin) is 0.23 W/m-K range, and epoxy coated fibrous synthetic materials seem to be in the ~0.04 W/m-K range. I don't have the equipment to test whether the dual design of Amalgon + inner scrubber basket material is superior to the newer Sidewinder Delrin cans + syntactic foam coating.

0 Small instructor pool. Huge blessing, potential curse. The caliber of the KISS instructor pool on average is, uh, lacking. There's some high points. There's also at least one KISS IT that I wouldn't trust to teach a safe Mod1 class on the unit. Most instructor pools

decay as they grow and I'd speculate that the "Superwinder," should it come to existence, will not be eligible to be taught by the current pool of Sidewinder instructors to try and trim that problem.

Negatives:

- HUD uses a 2032 battery. Time will tell how long this lasts me and it's another thing to keep in the kit. Takes about three minutes to carefully change.
- My finger fits and has the dexterity to remove the heads via fingering. If one doesn't, you'll need a guitar pick or a spudger or a relatively high amount of grip strength to remove the heads when you need to disassemble the unit. I think Charlie should include a plastic bike tire lever, as I promise you someone is going to use a non-coated tool and either mar the cans or the head or chip the head loop connection. There is a trick to it, but GFL if you didn't lube the o-rings sufficiently.
- The fishing crimp on the end of the weedwacker line could mar the canister. The Gemini is a tool I'm going to scrape through rock and the crimp is not in a place to cut my suit. That said, I wrapped it in heat shrink so I could grab it better with wet hands.
- I'd like to see a notch machined into the head and canister to ensure future users always line the heads up properly. Minor, and matters less than on the Sidewinder because of the straight piping. The argument against doing this is that the bottom of the cans can also be removed (but seems to be more for maintenance and manufacturing ease than a need). Fathom would need to mark tops and bottoms or one could use a sharpie and be done with it. There's an unfortunately high amount of variation among SW instructors on correct counterlung bung to head tower angle.
- The mesh screen size is ever so slightly too big. I'm going to use some JJ scrim material (filter paper) on the cans to ensure less dust and no granules poking out. I popped through 5? 10? granules per time I packed the sorb. At very least, there needs to be a scrim on the side of the basket nearest the cells and one nearest the water dump on the lung.
- I don't think the spring on the scrubber basket adds much value. As more classes come through, I think a standard will end up developing. I'm kind of worried a muppet will bend the screen via the bolt and the bottom screen (top as packed) isn't of the same machining tolerance as every other piece of the unit.
- No water trap. I've experimented with different ideas on the Sidewinder (including a very small t piece in the middle of a loop hose) to absorb the sickening amount of spit I drool into the cans), but as of now, drool path is the same. Sorb works decently whilst wet, but eh. Still a complaint people will have.
- I have to suck it up and return to using an Apeks product.
- I dislike the stock GG mouthpieces. I've switched to a Divex (JJ) which I like better than the soft Scubapro one, which I prefer over the Comforbite for CCR use. On OC, my needs are slightly different. I'll inevitably end up with a gag strap should I move back to BOV use.

Conclusion:

The Gemini works about as I expected it to. It's not wildly different than the Sidewinder, but it is better and I trust it more. Any issues that I have with the Gemini are minor or are inherent in the design of split-backmount-not-really-a-sidemount-unit-units. If you believe (as I do) that dual monitoring is a need, then I do not believe there is a reason to buy a new Sidewinder as of Jan 2023. If you do not believe in dual monitoring but do believe in reducing the number of things that can go wrong on your unit via plugs, or sump heads, or LM towers, or a new first stage, or not using Omni-Swivel QDs, or dislike circ-clips, etc, then the question is a little more difficult. If demand outweighs availability of the small instructor pool for the Gemini, there's an inevitable bottleneck. There is currently a 3-to-12-month lead time for a new Sidewinder depending on who you ask. We're basically a wine store!

Matt Key and Charlie Roberson are both starting to be active on this forum. On an ending note, my motivation for putting such effort into this review comes from two things. One is a partial political motivation, and one (hopefully more important to future users) because I have one of the first couple non-prototype units.

—Independent of my opinion for or against the candidate, the current KISS Training Director shut off an instructor candidate's evaluation with an IT *in the middle of their evaluation*.

—I am opposed to oxygen shutoffs and they're commonly taught

—The owner of the Darkwater Group behaved in a petulant manner in the Facebook posts announcing the Gemini at DEMA. Petty, but hey, I'm the target for their product and I think these "fights" force forward evolution and consumer education. I don't know Piotr, but he has stood behind failures of some of his product (Regs, less so their POS computer).

—KISS employee and ambassador behavior surrounding Tom Ellis' death at Ginnie, Gustavo Gonzales' near death incident at Roaring River, and Eric Lee Hahn's death at Roaring River make me feel truly sick inside in a way that I cannot articulate. I do hope this doesn't appear to have clouded the above review too severely.

I'll include some more images in my next posts and happy to answer whatever questions to the extent I can.