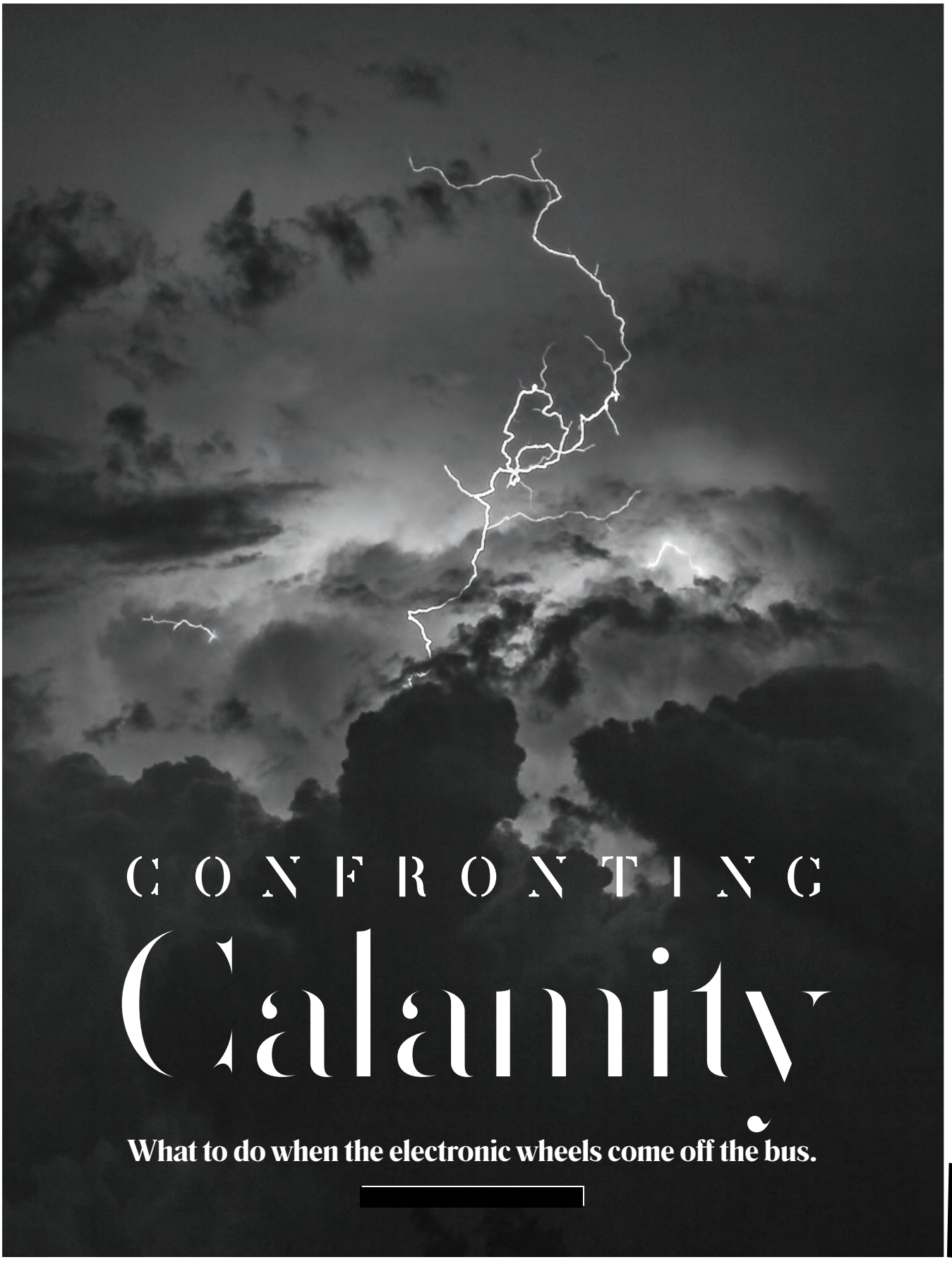


CONFRONTING Calamity

What to do when the electronic wheels come off the bus.

"OUR RADAR LIT UP, showing the storm cells," [redacted] recalled about weaving through storm bands during a fishing tournament off Cape May, New Jersey, aboard the Viking 43 Open *Blinky III*. Rain came first. Torrents of thunder and lightning followed. [redacted] and friends were on the bridge deck when a bolt appeared to hit the water just forward of *Blinky III*'s bow, creating a giant orange glow and physically shaking the water. *Blinky III*'s engine and electronics trumpeted their alarms. ¶ The crew silenced the sirens until — hours later — the storm abated into bluebird skies, allowing them to inspect the hull and bilges, individually restart the engines and reboot the electronics. All seemed fine, so they began fishing. ¶ Back ashore that evening, a friend stopped by their slip to hear the story. Only afterward, with the tale neatly unfurled, did he point to the charred portside outrigger: concrete proof that *Blinky III* had sustained a direct hit. ¶ According to the National Oceanic and Atmospheric Administration's most recent data, the odds of getting struck by lightning in a given year are 1 in 1,042,000, while the odds of getting hit in one's lifetime are 1 in 13,000 — not exactly nightmarish stuff, but the probabilities do fluctuate based on location, climate and personal lifestyle. Likewise, while the odds are skinny of sustaining a serious onboard electronics problem, the dangers are real. ¶ Lightning strikes are flashy (pun intended), but they account for a far smaller percentage of electronics-related calamities than power-supply problems, wear and tear, shorts, shoddy installation work and outdated software. ¶ "In my experiences, and anecdotally, the biggest cause of problems with your electronics and electrical system is that you've allowed the boat's voltage to get too low," says Michael Moradzadeh, owner of the Santa Cruz 50 *Oaxaca* and a longtime US Sailing Safety at Sea instructor. "It can usually be recharged, but not always." ¶ Likewise, pounding into rough seas can jostle tiny electrical fittings loose, while corrosion and resistive shorts can cause power loss. NMEA 0183 and 2000 (N2K) data networks can also lead to black screens.

"Technically, it's not Christmas lights, but one short circuit can take down the bus," says Eric Kunz, Furuno's senior product manager. "If an N2K network goes down, you won't have power to the sensors until the situation is fixed." ¶ Good installation work is also key, says Jim McGowan, Americas marketing manager at FLIR/Raymarine. When in doubt, the smart move is to hire American Boat and Yacht Council-certified technicians with solid dockside credibility. ¶ "Eighty percent of problems are installation related," McGowan says of issues brought to his company's attention. "Most professional installations are done well, but DIY owner installations cover the spectrum... I've seen Scotch tape used." ¶ In addition to ensuring proper hookups, habitually downloading and installing the latest software updates is also wise. ¶ "With software problems, generally the electronics will run within itself just fine, but if the owner adds [new equipment], it could cause a problem if the software isn't updated to support it," McGowan says. ¶ Electrical storms are one of the scariest meteorological realities for yachtsmen, and while prudence dictates avoidance, escape — as *Blinky III* experienced — isn't always possible. While there's not much that can be done in the moment, some important pre-emptive steps can be taken, starting with the vessel's build and continuing through every piece of installed equipment.

"There are differing philosophies about bonding materials, but we bond everything with heavy green bonding wire that's tied to zincs to prevent corrosion and electrolysis," says Larry Polster, vice president of Kadey-Krogen Yachts. "And if our bonding system is connected to a lighting-protection system, it may help protect equipment. Of course, that's dependent upon whether an electronics installer connected the equipment to our system."

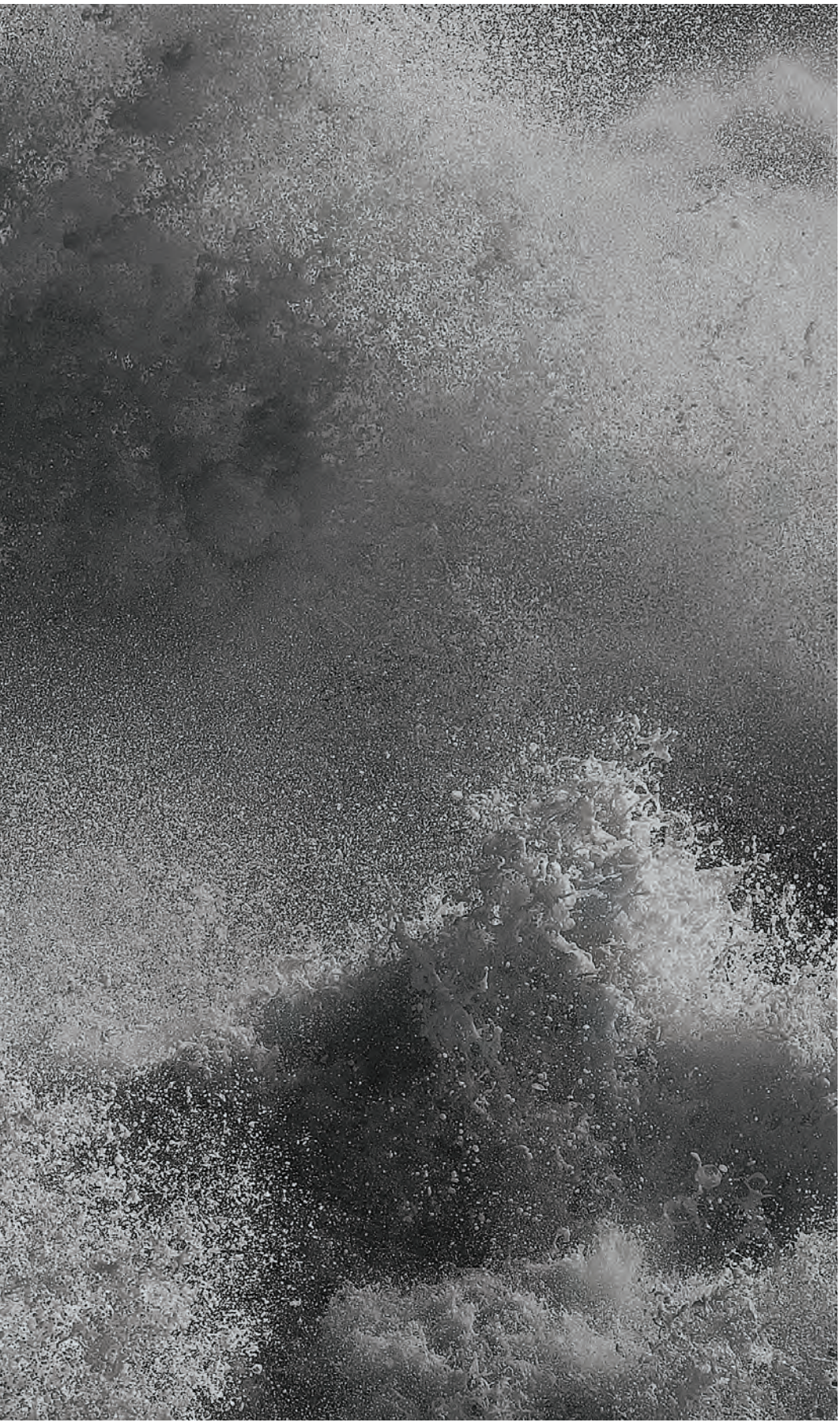
As for manufacturer-embraced preventive technologies such as mast-mounted lightning wands, Polster says, "Ask three people, get four opinions. They direct energy to the bottom of the boat, but there's a school of thought that says that these wands attract lightning." ¶ Likewise, there are differing approaches to grounding electronics; however, these likely fall into the questionable-installation category. ¶ "All of our equipment is built with proper grounds, but 85 to 90 percent of all people don't take the time to ground equipment — both the professionals and the DIYers," says Dave Dunn, Garmin's director of sales and marketing for marine. ¶ As with hiring ABYC-certified technicians, owners can require their electronics to be properly grounded, but nothing is bulletproof. ¶ "If there's a lightning strike to the mast, it's safe to say that some things won't work," Dunn says. ¶ While much of the sustained damage depends on where a charge physically enters and exits a boat, certain equipment is particularly exposed. ¶ "Anything that has

THE FARADAY PLAN

When it comes to protecting mission-critical electronics from lightning strikes and electromagnetic fields, the Faraday cage is a mariner's best friend. Faraday cages are enclosures covered with conductive material that, when exposed to juice, cause the charge to stay on the cage's outer surface, protecting its contents. Examples range from elevator cars to a yacht's oven to bags that protect handheld electronics. If you cruise on lightning-prone waters, it's wise to stow a GPS and satellite phone in a Faraday cage or bag, just in case.

"Lightning can blow out a through-hull fitting, and you could be sinking."

MICHAEL MORADZADEH, owner of *Oaxaca*

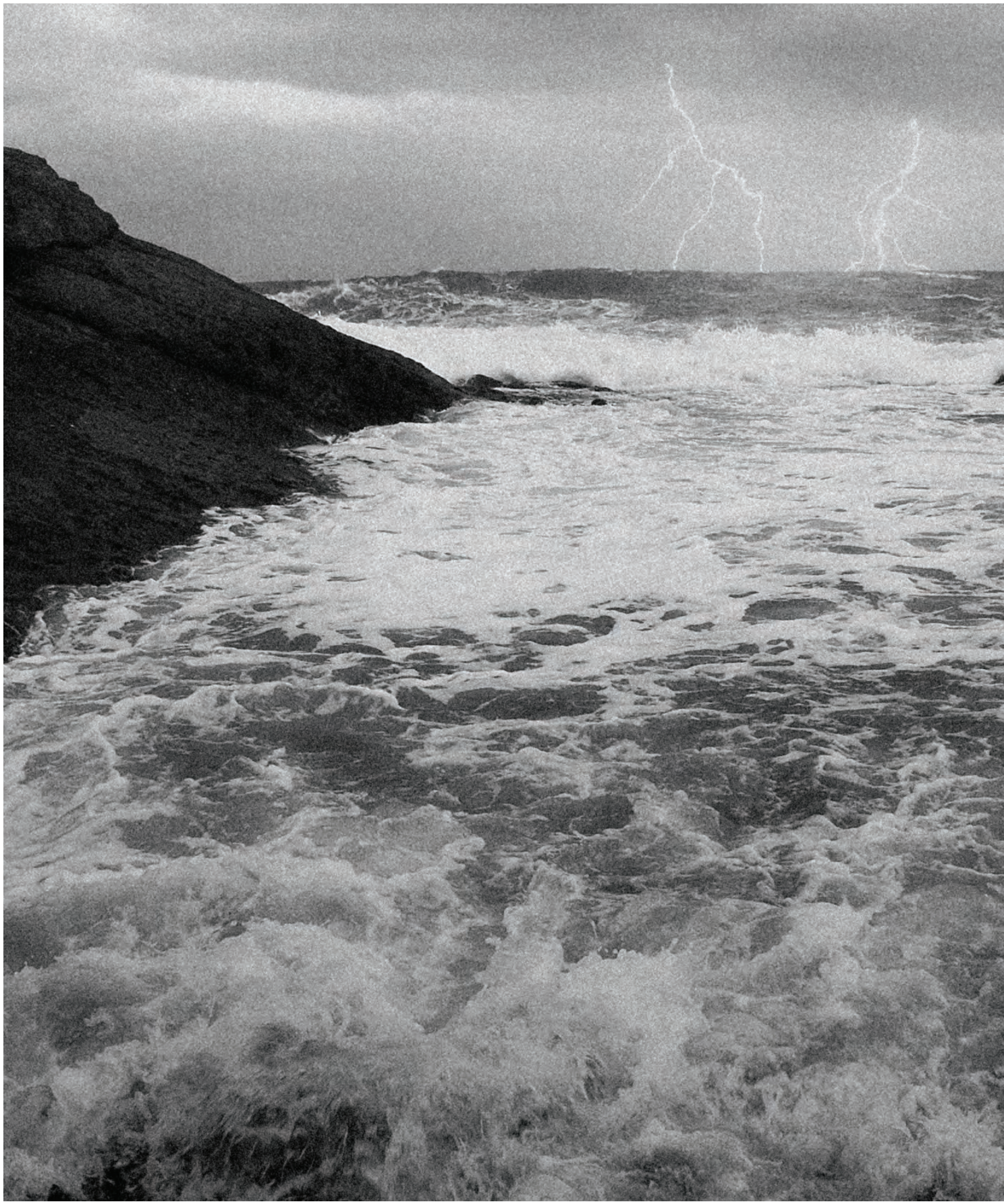


GLOBAL VOICE
Satellite phones allow you to make voice calls with rescuing authorities when your gear goes down during emergency situations.

TWO-WAY COMMS
Satellite communicators such as Garmin's inReach let you get lat/lon information while exchanging SMS communications with rescuers.

DROPPING THE PIN
A handheld GPS unit like the one above allows you to get your exact lat/lon from on board while performing basic chart-plotting functions.

It's impossible to anticipate the exact nature of an at-sea tech emergency, but mariners can help themselves with a selection of handheld electronics.



While rare, a lightning strike can be devastating and render a yacht's electronics useless. Thankfully, there are ways to mitigate a strike's impact.

a receiver is sensitive," says Kunz, adding that items such as GPS receivers, which listen for weak satellite signals, are especially vulnerable. ¶ Ideally, a correctly grounded vessel will properly dissipate an unexpected charge, but electricity isn't predictable. ¶ "You could have a strike that gets into one product but not another," says Kunz, adding that two-wire N2K backbones can be a lightning-strike liability. "If a boat with N2K gets hit, it can take out the entire electronics system because everything is connected with copper." Because of this, Moradzadeh says, "Whatever your data network is, it's important to understand where the connectors are. ... A spare cable might allow you to restore some functionality, but you need to know the system." ¶ Should your vessel get hit, check the boat's integrity and look specifically for hull damage. "Lightning can blow out a through-hull fitting, and you could be sinking," Moradzadeh says. ¶ Assuming that the crew and hull are intact, Moradzadeh suggests checking your VHF radios and satellite phones, and advising the U.S. Coast Guard about the incident before evaluating engines and navigation systems. ¶ "If it fires back up, it will be trustworthy," Dunn says of post-strike marine electronics. "There are resisters that will fry first." Kunz agrees, adding that users can cross-reference instruments to check their accuracy; for example, use AIS, which uses external signals, to verify that a radar's echo-generated data is correct. Trust, according to Stephen Thomas, Simrad's product line director, should be based on the information the system is presenting: "If my GPS says that I'm at 45 degrees north but I'm in Florida, I'm getting some feedback. It's not quite binary, but when things go bad, they go bad, and you need to develop a sense about if you can trust the equipment." ¶ Contingencies should include a properly maintained logbook with position, speed and direction information; a handheld GPS, VHF radio and satellite phone; an EPIRB; and, possibly, a two-way satellite communicator such as Garmin's inReach. ¶ Once ashore, all experts agree, it's imperative to get your yacht professionally inspected. ¶ "Go to a certified installer and have them look at the system and see if they can assess the damage," says Thomas, who suggests running diagnostic tests on, and examining, each piece of equipment. "Is there any electrical scarring on the equipment? Has the electrical grid been compromised? Is everything the correct voltage?" ¶ Also, Dunn says, lightning-strike casualties can be frustratingly elusive: "Lightning is one of those things where you thought it only hit one system, then six months later you find something else that got fried." ¶ While everyone hopes for fair winds and following seas, wise mariners give themselves plenty of defenses, plus fallback navigation, communication options and spare parts, just in case things go south. For every bullet-dodging story like *Blinky III*'s, history and harbors are sadly littered with less fortunate fates. *Semper Paratus.*

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