



CRUISING CLUB OF AMERICA  
SAFETY AT SEA HANDS-ON TRAINING

# Layered Emergency Signaling Strategy

*Optimizing use of emergency distress signaling*

The old days of single side band, VHF/HF, and flares as the only ways of sending distress signals are gone. Satellite communication systems really changed distress signaling. How do we decide which distress signals we send from which systems that will optimize the probability of getting assistance? We are introducing the layered emergency signaling strategy.



## Concept of a Layered Signaling Strategy

- Yachts have a large array of distress signaling systems
- Critical to understand each system and how to best use it
- Plan in advance how distress signals will be used
- Ensure the crew understands the strategy, locations, and how to use each system

In midst of casualty not the best time to develop strategy

Yes, we now have a larger array of distress signaling systems, but we must understand how each system works and how best to use them. It doesn't make sense to decide on a plan at 3AM when the water is up to your knees. Develop your basic strategy prior to getting underway to ensure the systems are ready when they are called on. Not only that, but make sure the crew understands this strategy, including where the systems are located and how to use each system — because the skipper may not be available to do it or the situation may demand immediate action and the skipper can't do everything.



## Signaling Systems That May Be Aboard

### Long Range and Regional Alert

EPIRB (with or without RLS & AIS)  
Personal Locator Beacon  
DSC Distress (VHF or HF)  
AIS-MOB  
VHF Voice  
HF Voice

### Satellite Messengers

Iridium GO!  
Garmin InReach  
SPOT  
YB Tracker  
Satellite Phone  
Starlink  
Limited Cell Phones

### Visual Distress Signals

Ocean Signal EDF-1  
Sirius LED  
Handheld Flares  
Rocket Parachute Flares  
Great Land Laser Flares  
UV or Fluorescent Dye  
Smoke  
Mirrors  
Boat Lights/Orange Sails

Which Signal When?

For this discussion, we'll divide the distress signaling systems into three groups:

1. First group is the long range and regional alert systems including EPIRB with the return link system (RLS) or AIS, personal locator beacon, VHF/HF DSC distress, AIS MOB, and both VHF and HF voice.
2. Second group is satellite messengers or satellite communications systems, which includes tracking devices, satphones, and Starlink. Because satphones and Starlink do not have an automatic connection to IERCC activities, they perform more of an adjunct distress signaling function and can be used to call the RCC directly. 12v Starlink, IridiumGo with a cell phone, and satphones can be used from a life raft to aid in your rescue. T-Mobile cell phones have limited capability for SMS and MMS messaging direct to satellite with an additional subscription.
3. Third group is visual signals such as the rocket parachute and handheld flares, LED and laser signals, mirrors, and smokes. Also included in this group are boat lights, flags, and orange storm sails that make your boat more visible in day or night.

The question is – which signal and what sequence?



## Long Range and Regional Alert

Device	Type	Network	Who Receives Alert	Typical Range	Subscrip. Required	Registration Required	GPS	Primary Purpose
EPIRB	Global Satellite	COSPAS-SARSAT	RCC	Global	No	Yes (NOAA)	Yes	Global SAR activation
PLB	Global Satellite	COSPAS-SARSAT	RCC	Global	No	Yes (NOAA)	Yes	Personal global distress
EPIRB-AIS	Global Satellite + Local	COSPAS-SARSAT, AIS	RCC, Ships, SAR	5-10+ nm	No	No	Yes	Local homing signal
DSC Distress (VHF)	Regional Digital	VHF Channel 70	Ships + USCG in range	20-40 nm (+ for air)	No	Yes (MMSI)	Yes	Regional digital mayday
DSC Distress (HF)	Global Direct	4, 8, 12, and 16 MHz	RCC	Global	No	Yes (MMSI)	No	Global Mayday; Icom 802/3 require GPS input
AIS-MOB	Local Digital	AIS	Ships nearby	5-10 nm	No	No	Yes	Man overboard tracking

When we look at the long range and regional alert systems the primary ones are EPIRB and EPIRB AIS which transmit directly to rescue coordination center (RCC) by satellite. The RCC must confirm a valid activation by calling the phone numbers listed on your registration. Make sure these numbers are up-to-date. If you have your boat's satphone number listed, it makes the process easier. The Coast Guard would prefer you advise them early rather than wait until the casualty overwhelms.

The personal locator beacon will also alert the RCC directly. The AIS MOB will alert other boats in the area with a flashing red symbol on their MFD. Commercial aircraft do not have AIS but rescue aircraft do. The AIS MOB will also alert the boat the person fell off of with an alarm if the boat's MMSI is properly entered into the device.

The final item is DSC, both VHF and HF, which transmit a digital DSC message automatically to the Coast Guard and adjacent ships. Commercial ships will forward the distress message to the RCC by other means. When you are on board a receiving boat and receive the alarm, you should wait 5 minutes to give the signal sufficient time to reach the Coast Guard and for them to acknowledge. Transmitting on channel 16 too early interferes with the process.

The HF DSC distress capability is rare but ICOMM M802 and M803 transceivers have the capability, but need a GPS input. The main advantage of HF is that it is not dependent on a satellite, but more dependent on atmospheric as MF/HF signals are.

The next category is satellite messengers.



## Satellite Messengers

Device	Network	Who Receives SOS	Two-Way Comms	Subscrip. Required	Admin Setup Required	Best Use
Iridium GO! / Exec	Iridium	IERCC or phone recipient	Yes	Yes	Yes	Offshore comms + SOS
Garmin InReach	Iridium	IERCC via Garmin Center	Yes	Yes	Yes	Text-based distress + tracking via Garmin
SPOT	Globalstar	GEOS emergency center	Limited	Yes	Yes	Coastal / limited offshore
YB Tracker	Iridium/Inmarsat	Monitoring center / contacts	No	Yes	Yes	Race tracking + emergency flag
Satellite Phone	Various	No SOS	Yes	Yes	No	Not automatic, must call RCC
Starlink	Starlink	No SOS	Yes	Yes	No	Not automatic, must call RCC

Satellite messengers are a group of transmitters that connect with various satellite systems to transmit an emergency signal to shore using the SOS button on the receiver. The IridiumGo, IridiumGo Exec and Garmin InReach will transmit SOS to the RCC. The SPOT will transmit to the GEOS emergency center and then the information will be passed to the RCC. The YB tracker will typically transmit to whoever happens to be monitoring the YB tracker and will show up as a flashing symbol on a display.

The next category is visual signals.



## Visual Distress Signals

Device	Type	Brightness	Duration	Typical Visibility	Primary Use
SOLAS Rocket	Pyrotechnic	~30,000+ candela	~40 sec	10–20+ nm (ideal)	Long-range night alert
SOLAS Handheld	Pyrotechnic	~15,000 candela	~60 sec	5–10 nm	Close-range night signal
Orange Smoke	Pyrotechnic	Daylight plume	~3 min	Daytime only	Day marking
USCG Handheld	Pyrotechnic	~700 candela	~60 sec	Night only	Near shore
LED Electronic Flare	Non-pyro LED	~500 candela	Hours	5–10 nm (ideal)	Persistent visibility
Laser Distress	Directed beam	Collimated beam	Minutes	10+ nm (night)	Directed signaling
Dye Marker	Chemical	UV/Fluorescent	Minutes	<5 nm (day)	Day marking
Boat/liferaft Lights	Electrical	Varies	Hours	<3 nm	Night marking
Orange Storm/Flags	Sail/flag	N/A	N/A	<3nm	Day marking

For visual signals the most important factors are brightness, duration and altitude.

- For the flares, as you can see the SOLAS rocket flare at 30,000 candela is the brightest, and the least bright is the LED electronic flare such as Sirius, which puts out about 500 candela.
- The orange smoke provides a daylight plume which is great for helping the aircraft home in on you. Even at night it will show up as an infrared arrow shape pointing toward the smoke pot due to the heat of the smoke.
- The advantage of the electronic LED by Sirius or Ocean Signal EDF-1 is that they can operate for a long period of time and could be hung in the rigging to make it easier for the rescuer to home in on you.
- The Great Land laser distress signal has a fan-shaped beam that does not blind the aircraft pilots like the regular point lasers do. Because of laser's small size, it is great to have in the life raft to use for scanning the horizon to alert rescuers.
- The dye markers, boat lights, orange storm sails and flags are good for giving your boat contrast and making it more visible. SOLAS life rafts have a strobe light slightly brighter than a life jacket light.

So how do we put all this together to develop a strategy? Let's look at one example.



## Nearshore vs. Offshore Strategy

### NEARSHORE

(within strong Rescue 21 coverage)

1. VHF DSC Distress first
2. Voice MAYDAY on Channel 16
3. Standby on Channel 16
3. EPIRB if situation is grave or deteriorating
4. Visual signals as needed:
  - If AIS contact in range, rocket or handheld
  - For aircraft rescue, consider smoke or dye
  - If night, LED flare, deck lights

### OFFSHORE

(beyond reliable VHF coverage)

1. EPIRB AIS activate immediately
2. HF/VHF DSC Distress transmission
3. Satellite SOS activated (Iridium, YB, InReach)
4. HF/VHF Voice Mayday
5. Follow up on Satellite Phone with RCC
6. LED flare on for continuous visibility
7. Sail illuminated or orange stormsail; lights
8. Rocket flare when rescue sighted or heard
9. Handheld flare, smoke, or dye for final approach

This example compares possible nearshore and offshore strategies.

With nearshore, the first action is to activate the DSC distress followed by the voice Mayday, only using the EPIRB if the situation is immediately grave and deteriorating. This gives you almost instantaneous connection with the Coast Guard. You use visual signals if you have an AIS or visual contact within range, using rocket or handheld flares. For aircraft rescue consider putting down the smoke or the dye. Aircraft will home on your AIS, so make sure it is transmitting. If not, then an EPIRB with AIS can serve this function. At night time, hoisting the LED flare into the rigging or turning on your deck lights provides visibility.

In contrast, when offshore beyond reliable VHF coverage, the first action is to activate the EPIRB with AIS and the VHF/HF DSC distress transmission, followed by an SOS activation from your satellite messengers, then transmitting the VHF Mayday if ships happen to be within antenna line of sight. Be ready with the satphone when the RCC tries to contact you after receiving your alert. Turn on the LED flare for continuous visibility, illuminate your sails or put up your orange storm sails to make your boat more visible. Hold off on the rocket flare until the rescue vessel or aircraft is in within range, and follow that up with handheld flare smoke or dye markers for the final approach.

These are just examples. Your boat may be equipped differently which requires you to develop your own strategy.



## Pre-Departure Checklist

### EPIRB

- NOAA registration current
- Battery in date
- Self-test completed

### PLB

- NOAA registration current
- Battery in date
- Self-test completed

### VHF DSC Radio

- MMSI programmed
- GPS connected and position displayed
- Distress test performed

### Satellite Messengers

- Subscription active
- Emergency contacts verified
- Firmware updated
- Test message sent
- Battery fully charged

### AIS-MOB

- Battery in date & MMSI updated
- Properly armed in PFD

### Crew

- All crew know device locations
- All crew understand "which button first"

All this is a waste of time if the systems were not properly set up in port and your crew is not trained on how to use them.

- The EPIRB registration must be up-to-date and if possible it gets your boat's phone number and ensure your POC (point of contact) has it. Complete the self test.
- The PLB is registered, battery up-to-date, the MMSI is inserted properly, and system tested.
- VHF or HF DSC radio MMSI is programmed, GPS working, and the distress test is performed.
- The satellite messengers require active subscriptions, and the systems need to be properly registered in order for you to use any SOS capability.
- Finally, the AIS-MOB battery checked, the MMSI entered especially if you're going on somebody else's boat. Problems occur with the arming of the AIS-MOB and PLB. Be especially careful with this. System test conducted. Don't forget the life jacket and life raft checks.
- In the safety brief it's important that all the crew know the device locations and understand how to use them.



## Core Principles

- Call far first; call near second
- Stay visible continuously
- Confirm with flares when help is in sight or within range
- If vessel may be lost, activate both EPIRB and DSC immediately
- Prepare in advance

Advance Planning Vital

In summary, remember to call far first and then call near second. Stay visible continuously in any way that you can and don't use your flares until there's a probability that they will be sighted. If your boat is going down, activate both the EPIRB and DSC immediately. It does not do any good if the systems are not set up properly or your crew doesn't know how to use them. Advance planning is vital.