



“Alternatives to Pyrotechnic Distress Signals”

**Standing Committee on Recreational Boating
Canadian Marine Advisory Council
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Weems & Plath®

**Shipwrite
Consulting**

Who are we?

Anthony Covelli, CEO. Designer and engineer of distress signals.
Co-inventor of the C-1001 SOS Distress Light

www.siriussignal.com

anthony@siriussignal.com

Peter Trogon, President. Manufacturer of nautical products.
Licensed manufacturer and distributor of the SOS Distress Light

www.weems-plath.com

trogdon@weems-plath.com

Kevin Monahan

Consultant providing assistance in Canada

www.shipwrite.bc.ca

monahan@shipwrite.bc.ca

For copies of this presentation visit: www.siriussignal.com
www.shipwrite.bc.ca

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Current Initiative

Congratulations to Transport Canada

- Many rescues are initiated by radio or other remote RF technology
- Expired pyrotechnic distress signals are hazardous waste and environmental contaminant requiring special disposal
- Large proportion of expired flares are illegally dumped in landfills or the environment
- Each flare illegally dumped can contaminate 900,000 litres of water
- 2014 Transport Canada proposal reduces requirement for pyrotechnics by 50% if vessel is equipped with EPIRB or VHF radio or if operator is wearing a 406 MHz PLB
- However, the TC proposal does not include non-pyrotechnic alternative types of visual signal — **“Electronic Flares”**





What is an “Electronic Flare”?

United States CFR Title 46 Part 161.013 (Night-time Distress Signal for Boats)

- 161.013-5 (a)
 - white light with peak intensity (horizontal) of at least 75 cd
 - maintains equivalent fixed intensity for at least 6 hours
 - flashes S—O—S
 - automatic signalling when switched on (non-participatory)
 - independent power supply using alkaline batteries
 - floats upright and is submersible
 - 360-degrees signal
- 161.013-5 (b)
 - hand-held such as the ACR S-O-S light from 1990's
 - automatic, but light is directional
 - requires manual participation to aim the device

Not considered in this presentation





Advantages / Disadvantages

Electronic Flares Pyrotechnics

Duration = min 6 hours at specified intensity C-1001 = 60 + hours total illumination	Rocket = 40 sec Multi-star = 5.5 sec Hand = 1 min
Brilliance = 75 cd	Brilliance = 10,000 to 30,000 cd depending on type
Safe to operate; no toxic or burning by-products	Risk of fire and injury from burning by-products, toxic smoke
No disposal problem, fully recyclable Can be tested by owner	Hazardous waste, proper disposal “a drop in the bucket” Cannot be tested
No Training required	Requires training to operate safely
Submersible, designed for marine environment	Protection from moisture depends on integrity of plastic bag
Lasts indefinitely, one-time expense	Recurring expense every 4 years
Floats upright, may be used by person in water	Pyrotechnics virtually impossible to use in water
Non-participatory Runs automatically until switched off	Participatory (user-operated) Takes attention away from other rescue/survival tasks



C-1001 Light Output vs Time (Common Alkaline Battery)





History of “Electronic Flares” (Electric Distress Light)

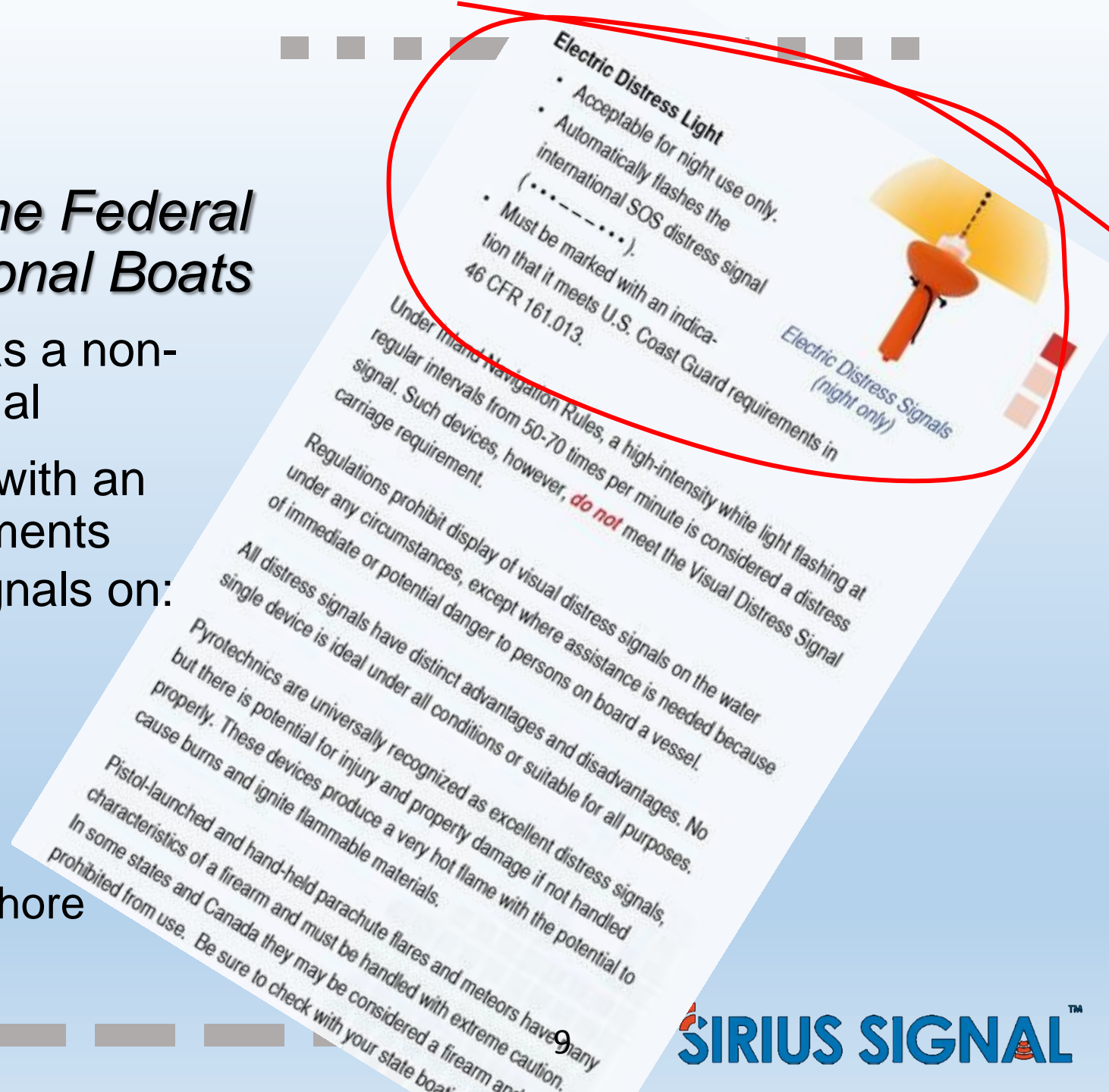
- 46 CFR 161.013 written in 1979
 - To address safety (not disposal) issues
 - At the time, technology did not exist to meet the standard
- 1990's - ACR – SOS Distress Signal – subsection 5(b)
 - Not a success in the market. Now discontinued
- 2015 - Sirius Signal – C1001 Distress Light – subsection 5(a)
 - Until recently the technology to manufacture 5(a) type lights did not exist
 - Required high efficiency LED lights and optics
 - Uses common alkaline batteries (3 “C” cells)
 - Highly successful introduction to the market at boat shows, etc.



USCG Booklet

A Boater's Guide to the Federal Requirements for Recreational Boats

- Accepted by the US Coast Guard as a non-pyrotechnic night-time distress signal
- An electric distress light combined with an orange distress flag meets requirements for day and night visual distress signals on:
 - pleasure craft 16 ft. to 65 ft.
(pleasure craft <16 ft. are exempt unless they operate at night)
 - commercial fishing vessels operating within 3 nautical miles from shore











Minor differences exist in the standards for certain flare types between the US and Canada.

Canada is moving away from the categorization of flares as Type A, B, C or D and is using the specific names for the flare types.

There are still products being sold under old approvals that use the Type A, B, C or D designations.

Visual Distress Signals for Power-Driven Vessels and Sailing Vessels

		United States		Canada	
Pyrotechnic Devices	Day and Night	Parachute Flare		Rocket Parachute Flare	Type A
		Red Meteor		Multi-Star Flare	Type B
		Red Flare		Hand Flare	Type C
	Day only	Floating Orange Smoke Signal		Buoyant Smoke Signal	Type D
		Orange Smoke Signal		Hand Smoke Signal	Type D
	Non-Pyrotechnic Devices		Orange Distress Flag	 10	N/A
Night only		Electric Distress Signal	N/A		



Visual Distress Signals for Power-Driven Vessels and Sailing Vessels

Note: Vessel type exceptions are similar in the US and Canada

United States		Canada (Current Requirements)	
Length		Length	
< 16' (4.88 m)	Only night signals required: 3 day/night flares or 1 Electric Distress Light	< 6m (19' 8")	1 watertight flashlight or 3 flares (A, B, or C)
16'-65'	Day and night signals required: 3 day/night flares or 3 day flares (smoke) + 1 Electric Distress Light or 1 Distress Flag + 1 Electric Distress Light	6 – 9m (19'8" to 29'6")	1 watertight flashlight and 6 flares (A,B or C)
		9 - 24m (29'6" to 78'9")	1 watertight flashlight and 12 flares (no more than 6 are smoke)

Note: Unlike the “watertight flashlight”, which may be used for multiple purposes, the Electric Distress Light is a dedicated light. *It is only used in emergencies.*



Proposed Changes for Visual Distress Signals (Spring 2014 CMAC)

Note: Vessel type exceptions are similar in the US and Canada

United States		Canada (Proposed changes in red)	
Length		Length	
< 16' (4.88 m)	Only night signals required: 3 day/night flares or 1 Electric Distress Light	< 6m (19' 8")	1 watertight flashlight or 3 flares (no more than one is smoke)
16'-65'	Day and night signals required: 3 day/night flares or 3 day flares (smoke) + 1 Electric Distress Light or 1 Distress Flag + 1 Electric Distress Light	6 – 9m (19'8" to 29'6")	1 watertight flashlight and 6 flares (no smoke) or 3 flares (no smoke) if within 3 [5] miles of shore, and equipped with VHF, EPIRB or PLB
		9 - 24m (29'6" to 78'9")	1 watertight flashlight and 12 flares (no more than 6 are smoke) or 6 flares (no more than 3 are smoke) if within 3 [5] miles of shore, and equipped with VHF, EPIRB or PLB

Note: Unlike the “watertight flashlight”, which may be used for multiple purposes, the Electric Distress Light is a dedicated light. *It is only used in emergencies.*



US Recreational Boats in Canada

- Due to highly successful 2015 /16 marketing of the Sirius Signal C-1001 at boat shows and in the media US boaters carrying electronic flares in Canada this summer may be in the thousands.
- This number will increase over the next several years as existing pyrotechnics are retired
- US vessels are not subject to Canadian carriage requirements if the equipment they carry meets the US carriage requirements (*includes carriage of “electronic flares” **instead of** pyrotechnics*)
- Canadian enforcement agencies will need to be informed that “electronic flares” are permitted in the US and are acceptable on US vessels in Canada



Electronic Flares as “Optional Equipment” in Canada

- *Collision Regulations* specify S-O-S transmitted by any means is a distress signal (***normally as Morse code***)
- *Small Vessel Regulations* apply to pleasure craft and small non-pleasure vessels of 15 gross tonnage or less
- *Small Vessel Regulations* set minimum requirements for safety equipment, but do not prohibit additional equipment
- If “electronic flares” are offered for sale in Canada, retailers should be encouraged to inform Canadian boaters that they do not satisfy the requirements of the *Small Vessel Regulations* on Canadian vessels but may be carried as additional equipment




Safe Boating Guide, 2009

Distress Signals

2009 Edition of the Safe Boating Guide recognizes S-O-S as a distress signal

MARINE RADIO

DISTRESS CALL
Use: 2182 kHz (MF) or channel 16, 156.8 MHz (VHF)
DSC alert, channel 70 (only for DSC type radios and where the service is offered)




CALLING PROCEDURES

Mayday	Immediate danger for persons or ship
Mayday	
Mayday	

Pan-Pan	Urgent message about the safety of a person or ship
Pan-Pan	
Pan-Pan	

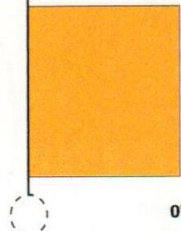
- Give vessel name and call sign
- State position of vessel
- Describe the emergency

EMERGENCY POSITION INDICATING RADIOBEACONS (EPIRBs)







Use alarm signal

CODE FLAGS




N
over
C




BALL
over or under
SQUARE

DISTRESS CLOTH



To attract attention: spread on cabin or deck top, or fly from mast.


ARM SIGNAL



Keep raising and lowering outstretched arms.


SOUND SIGNALS

Make continuous sound with any fog-signalling apparatus. Fire a signal gun or other explosive signal at one-minute intervals.




FLARES


Type A: Rocket Parachute Flares
Type B: Multi-Star Flares
Type C: Hand-Held Flares
Type D: Smoke Signals (Buoyant or Hand-Held)



DYE MARKER












FLASHLIGHT



or other light source



2016 Edition of the Safe Boating Guide does not recognize S-O-S as a distress signal

<div>MARINE RADIO</div> <div></div> <div><div>Distress call</div><ul style="list-style-type: none">• Use 2 182 kHz (MF) or channel 16, 156.8 MHz (VHF)• DSC alert, channel 70 (only for DSC type radios and where the service is offered)<div>Calling procedures</div><ul style="list-style-type: none">• Immediate danger for persons or ship "Mayday" — "Mayday" — "Mayday"<ul style="list-style-type: none">• Give vessel name and call sign• State position of vessel• Describe nature of emergency• Urgent message concerning safety of a person or ship "Pan-Pan" — "Pan-Pan" — "Pan-Pan"<ul style="list-style-type: none">• Give vessel name and call sign• State position of vessel• Describe nature of emergency</div>	<div>EMERGENCY POSITION INDICATING RADIOBEACON (EPIRBs)</div> <div>Use alarm signal</div> <div></div>	<div>CODE FLAGS</div> <div><ul style="list-style-type: none">• N over C• BALL over or under SQUARE</div> <div><div>N</div><div>C</div><div></div></div>
	<div>DISTRESS CLOTH</div> <div>To attract attention: spread on cabin or deck top, or fly from mast.</div> <div></div>	<div>DYE MARKER</div> <div></div>
	<div>ARM SIGNAL</div> <div>Keep raising and lowering outstretched arms.</div> <div></div>	<div><div>SOUND SIGNALS</div><div>Make continuous sound with any fog-signalling device. Fire a signal gun or other explosive signal at one-minute intervals.</div><div>FLARES</div><div>Type A: Parachute Rocket Flares Type B: Multi-Star Flares Type C: Hand-Held Flares Type D: Smoke Signals (Buoyant or Hand-Held)</div><div>FLASHLIGHT</div><div>Other light source may be used.</div></div>



S-O-S

S-O-S is deeply embedded in popular culture

**S-O-S is specifically identified as a distress signal in the
*Collision Regulations***

**S-O-S (and its Morse Code version) should be re-instated
into safety messaging in both:**

- **Safe Boating Guide**
- **Pleasure Craft Operator Card Syllabus**





Recommendations to the Standing Committee on Recreational Boating

- Consider permitting pleasure craft to carry “electronic flares” that meet 46 CFR 161.13-5(a) in lieu of pyrotechnic flares
- Considerations
 - Area of operation (distance from shore, remoteness)
 - Vessel length
 - Requirement for daytime signals (orange signal flag or smoke)
- Mechanism for change
 - *Small Vessel Regulations* amendment (3 years or more)
 - SVR s.4 Ministerial authorization — if equipment provides an equal or greater degree of safety