G.E.C.O.

Grassroots Emergency Communications Operations

FOCUS

A GECO-WARC Presentation

Grassroots Emergency Communications Operations

GECO-AEO

The Accidental EmComm Operator:

When a hobby becomes a life-saver

A Grassroots Emergency Communications Operations (GECO) presentation

GECO-AEO

This Grassroots Emergency Communications Operations Community-based Education presentation is a collaboration of

A community-based education volunteer group dedicated to emergency preparation and emergency communications

A community-based education volunteer group dedicated to providing education of, for, and by the people for a better world for all.

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Nature can disrupt your life…

but your hobby can help save lives. EmComm may not be a priority for you, but you may become an accidental EmComm operator.

Are you ready?

WHO?

I am Greg KI6GIG

- Geographer
- Educator
- Environmentalist
- Licensed Amateur Radio Operator
- An Accidental EmComm Operator

Acknowledgements & Disclaimers

- Thanks to my Elmers Mark N7YLA, Joe N6WZK, Phat HS1WFK, and Sam A41KL for their mentoring and encouragement.
- I use amateur radio for international friendship, understanding, and EmComm.
- Please forgive me, in advance, for only speaking English.
    - If some of my ideas do not work in your country, please help me adapt the good ones for your use. I may be a teacher, but I am willing to be your student.

Advisory Note

This presentation is formatted for viewing on a single computer screen by a few people.

A group presentation may need a narrator to read the slides with text not readily legible to the audience.

Special Thanks

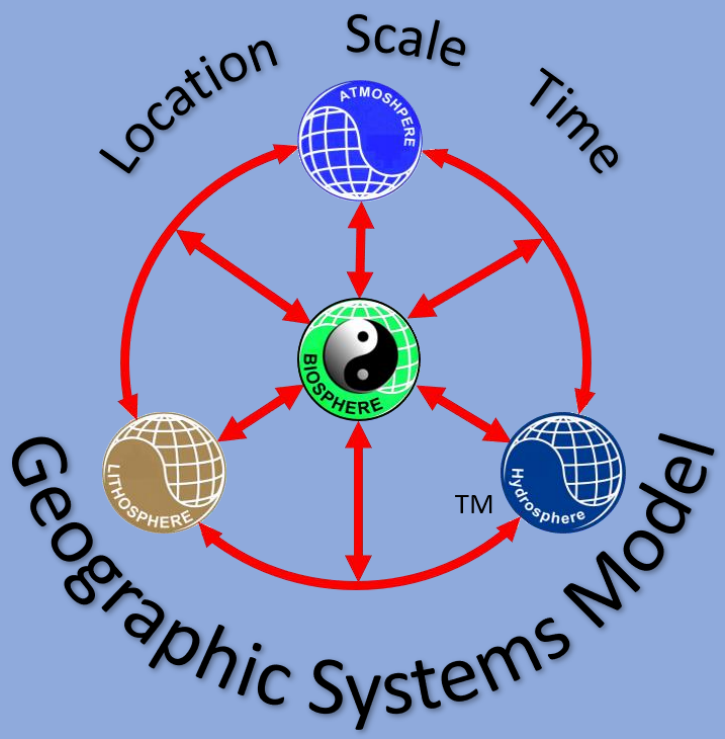
Three people who made my life possible.

My mother (Irene, 1921-2019) & father (Mack, 1916-2017) who gave me life, an education, and good life examples to follow.

Cary, my friend since 3rd grade, who saved me from drowning over 55 years ago.

WHAT?

I am a Geographer



"Geography may not make the world, but it will change the way you see it." ---G.K. Lee

I created the Geographic Systems Model (GSM). It is a holistic, systematic conceptual model to integrate all life, physical, and social sciences. It shows how the inter-connectedness of Nature. This helps guide curiosity and seeing and finding connections.

WHAT?

I am an Educator

I developed my own kind of Community-based Education (C-bE). The individual and the family are the basic education units, not a class or a school. Curiosity drives the learning. Nature is the library and source of wonder and stimulates curiosity.

WHAT?

I am an Educator

I adapted STEM and STEAM curricular methods to become STEAMING by ***I**ntegrating **N**ature and **G**eography* to reconnect people with Nature. Whenever possible, lessons and activities are held outdoors.

WHAT?

I am an Environmentalist

I create and teach lessons for sustainable agriculture and soil management using my community-based education methods. I want to make the world a better place by teaching and empowering people to create sustainable and resilient communities.

WHAT? **I am a Licensed amateur radio operator.**

KI6GIG Gregory Lee

US FCC Technician License:
2006 Nov 07 (upgraded)
US FCC General License:
2007 May 21 (current)

Call Sign / Number	Grant Date	Expiration Date
KI6GIG	08-11-2016	11-07-2026
Operator Privileges		**Station Privileges**
General		PRIMARY

ATTN: GREGORY K LEE

AMATEUR RADIO LICENSE

FCC Registration Number (FRN): 0015699507

FCC 660 - May 2007

KI6GIG Node #384040
KI6GIG-L Node #584695

WHEN?

I am an Accidental Amateur EmComm Radio Operator

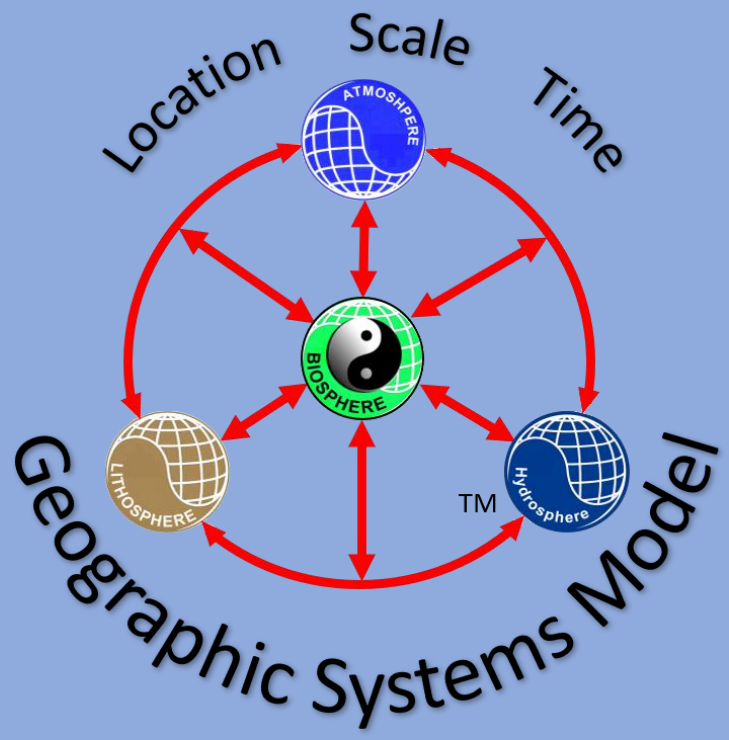
I created GECO, Grassroots Emergency Communications Operations. YOYO (You're On Your Own) and PYOR (Plan Your Own Rescue) are the core ideas. It uses compact, light weight equipment for a single operator to carry and set up. It is simple, low cost, portable, robust and reliable.

The operator should be up and running in 60 minutes of a disaster and be able to hold out for at least 72-hours before needing to be re-supplied.

Geography of EmComm

Use the **Geographic Systems Model** to

- Map local geo-hazards.
- Identify safe zones (areas with little to no geo-hazard risk) as Net Control operating sites and test the RF coverage.



Geo-sphere	Natural Hazard
Atmosphere	Severe storms, Lightning
Lithosphere	Earthquakes, Landslides
Hydrosphere	Floods, Flashfloods
Biosphere	Wildfires, Epidemics, Human activity

Geography of EmComm

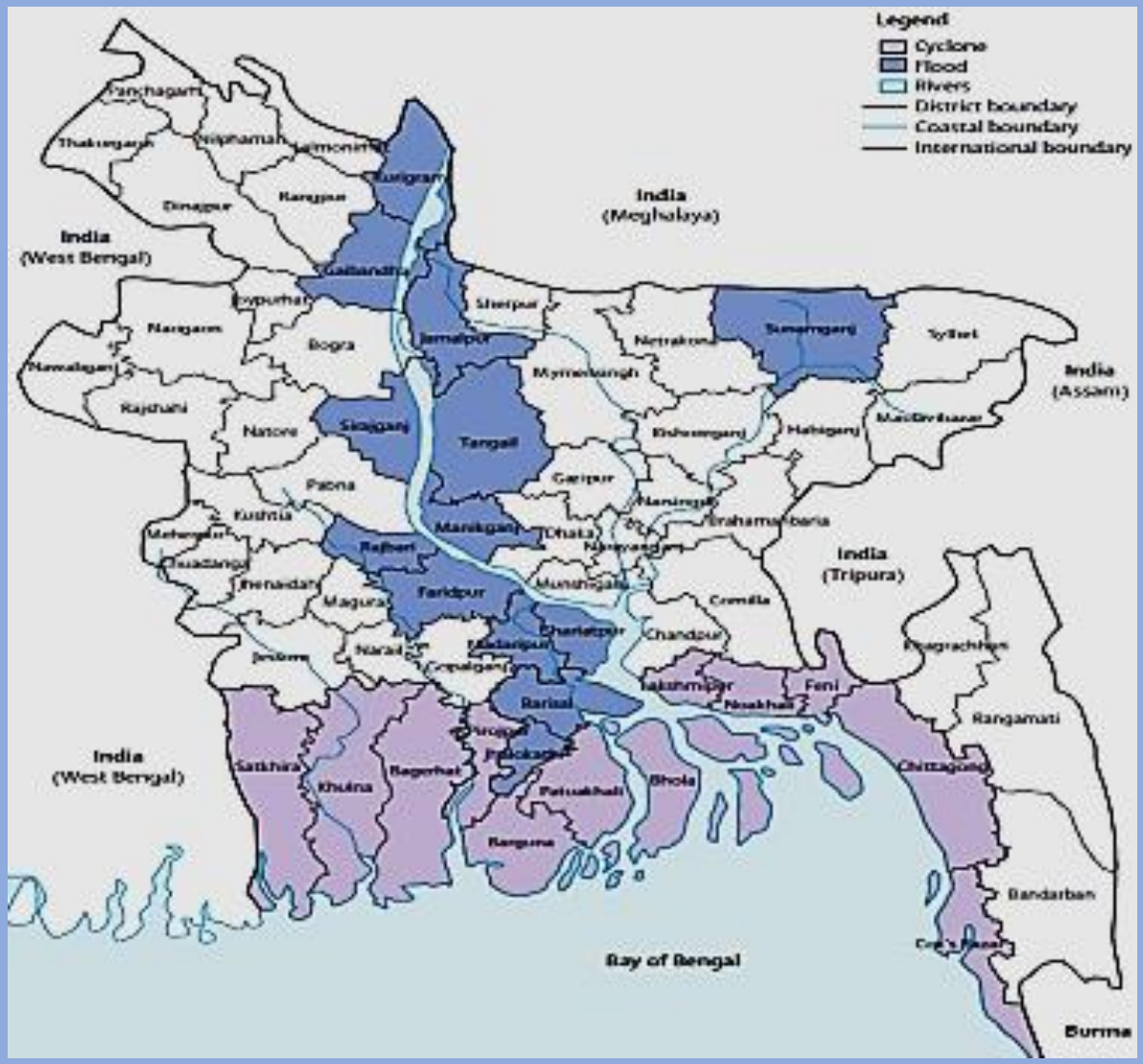
Use the Geographic Systems Model to know and map local geo-hazards.

- **Net Control site** must have primary and secondary access routes with minimal geo-hazard vulnerability. This makes it easier to get to and to re-supply.
- **Recruit EmComm** Team Leaders and members based on geography. They should live or work near each other. They must be flexible; it may make sense to be on one team when at home and a different team when at work when the disaster hits. They must practice with both teams.

Note: Past failures in EmComm operations were because the unexpected happened. GECO EmComm training is based on YOYO (You're On Your Own) and uses a no cost/low cost, no tech/low tech approach. The reality can be an EmComm amateur radio operator crawling out of the wreckage after the disaster and having to start operating in 1 hr. and continue for 72-hrs.

Geography of EmComm

Get maps of the EmComm operating area. For example, Bangladesh has recurring annual disasters from flooding and cyclones. This map shows the commonly affected areas. EmComm operators need more detailed maps of these areas to identify sites for RF and EmComm operations.



Geography of EmComm

Start with a topographic map.

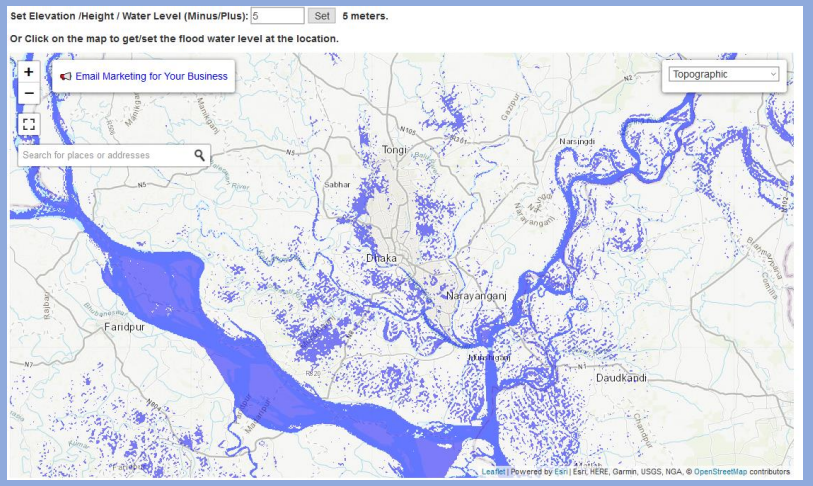
https://en-us.topographic-map.com/maps/tlv9/Dhaka/

You can change scale by “zooming in” for a closer look for high ground with a clear Line-of-Sight conditions for the areas of concern.

Look at a Flood map.

https://www.floodmap.net/?gi=1185241

You can set the flood level height to estimate the extent of the flooding. Look for “safe zones” and access to and from them when planning EmComm operations.



Geography of EmComm

For EmComm coverage and resilience:

- **Map Primary and Secondary EmComm Net Control locations** outside major local geo-hazard zones. Be sure primary and secondary access routes are clearly identified and assessed for vulnerability.
- **Map Net Control simplex RF coverage and dead zones.** All Team Leaders must get this map. Do not rely on repeaters; if available in a disaster, use them.
- **Make a list of primary and secondary EmComm operating frequencies.** Everyone must have this.
- **Map of cell phone coverage and dead/weak zones** must be given to Net Control and Team Leaders.

Geography of EmComm

For rapid response, EmComm Teams live and/or work close to each other. Flexibility is the key to success.

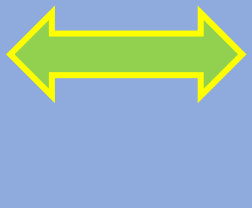
- **Know home & work locations and schedules** (24/7) of all members and prospective members. You never know when or where disasters will strike.
- **Map the locations of Team Leaders** (Licensed amateur operators with radios) relative to members, prospective members, and Net Control.
- **Map local geo-hazards.** It is best if EmComm Team members are not cut off from each other in a disaster.

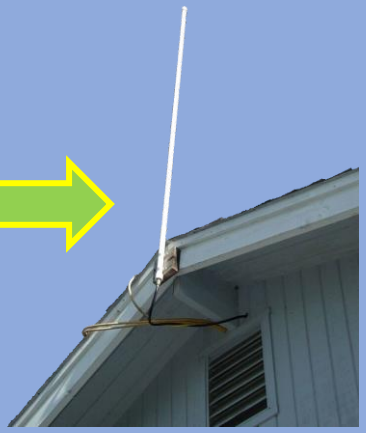
Use geography to identify areas needing improved EmComm team coverage. This tells you where you need to recruit more volunteers.

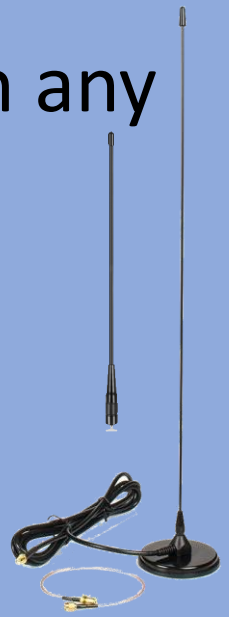
EmComm Operational Considerations

Safety: Personal & Team

Interoperability: Any radio can work with any battery/antenna.







Flexibility: Everyone can do what needs to be done regardless of assigned team duties.

Trust: Everyone works with mutual respect and mutual trust for mutual benefit.

EmComm Team Safety

- **Work in pairs.** Maximum field team size is 10 people.

- **Avoid confrontation and conflict.** You are an observer NOT a police officer. Your duty is to observe and report.

- **Keep safe.** Putting yourself at risk puts your teammates in danger.
  - **Learn First Aid and CPR.** Practice and keep your skills current.

  - **Keep all your equipment in good working condition.**

EmComm Interoperability

Equipment:

- Standardize all radio/battery/charger connectors.
- Have necessary radio/coax/antenna connectors and adapters for all radio and antenna combinations.

People:

- Keep procedures simple and standardized for training ease and use.
- Team members must learn to use each other's equipment and do all duties.

Licensed Amateurs and VOIP

People wanting to become licensed amateurs face many challenges: lack of funds, no access to equipment, and no access to training and exams. Many new amateurs do not have a radio. But many of them have a smartphone.

Licensed amateurs ONLY

Free

By Subscription

No amateur radio license needed

Free smartphone Applications

These are two of several free Voice Over Internet Protocol applications.

Teams of Amateurs & Non-amateurs

In most countries, there are many more cell phone users than licensed amateurs.

It makes good sense to get volunteers with smartphones using selected free VOIP applications to join EmComm teams.

Licensed amateurs ONLY

Smartphone owners using free apps
No amateur License Needed

These VOIP systems require Internet access or cell phone service. Radios require favorable atmospheric conditions. No method is perfect.

A Way to Get More EmComm Volunteers

Here is an example of what could happen by recruiting smartphone users for EmComm.

In Bangladesh, there are 161,506,000 cell phone users. It is estimated 110,000,000 have smartphones. In contrast, there are 500 licensed amateurs and only 85 (17%) are active.

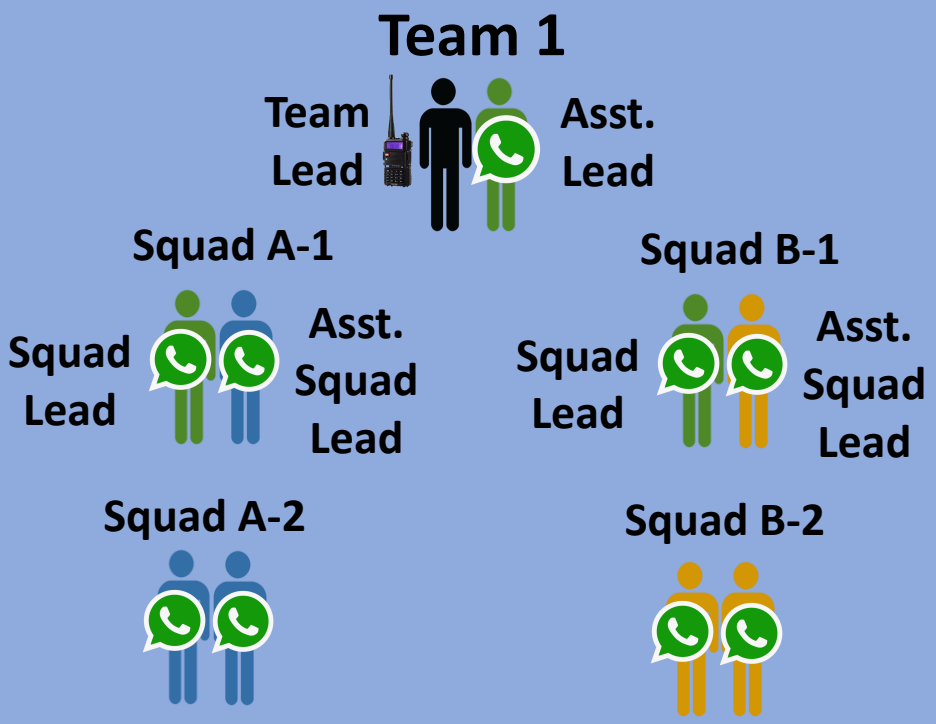
If only 0.01% of smartphone users volunteered to join EmComm teams, this adds 11,000 people available for EmComm duty.

If 1% of these volunteers got licenses, you now have 110 new amateurs for EmComm. That is a 22% increase in total amateurs and a 129% increase in active amateurs.

For these to work, cell phone service must be available.

Teams of Amateurs & Non-amateurs

This arrangement optimizes management and team safety with rapid reporting using only 1 radio.
It gives non-amateurs exposure to amateur radio and could lead to them becoming amateurs.



All non-amateur volunteers are encouraged to get licensed and to advance in the EmComm organization.

Teams of Amateurs & Non-amateurs

Amateur/Non-amateur EmComm Teams are a maximum of 10 people (the optimum number a person can supervise). For safety, work in pairs.

Team Leader *in radio contact to Net Control*

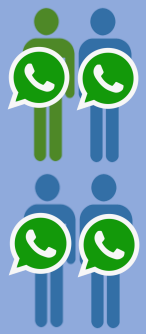
Team 1

Team Lead **Asst. Lead**

Asst. Team Leader *monitors a private team channel for* ***Squad Leader*** *reports.*

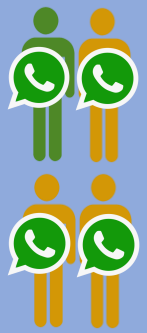
Squad A

Squad Lead **Asst. Squad Lead**



Squad B

Squad Lead **Asst. Squad Lead**

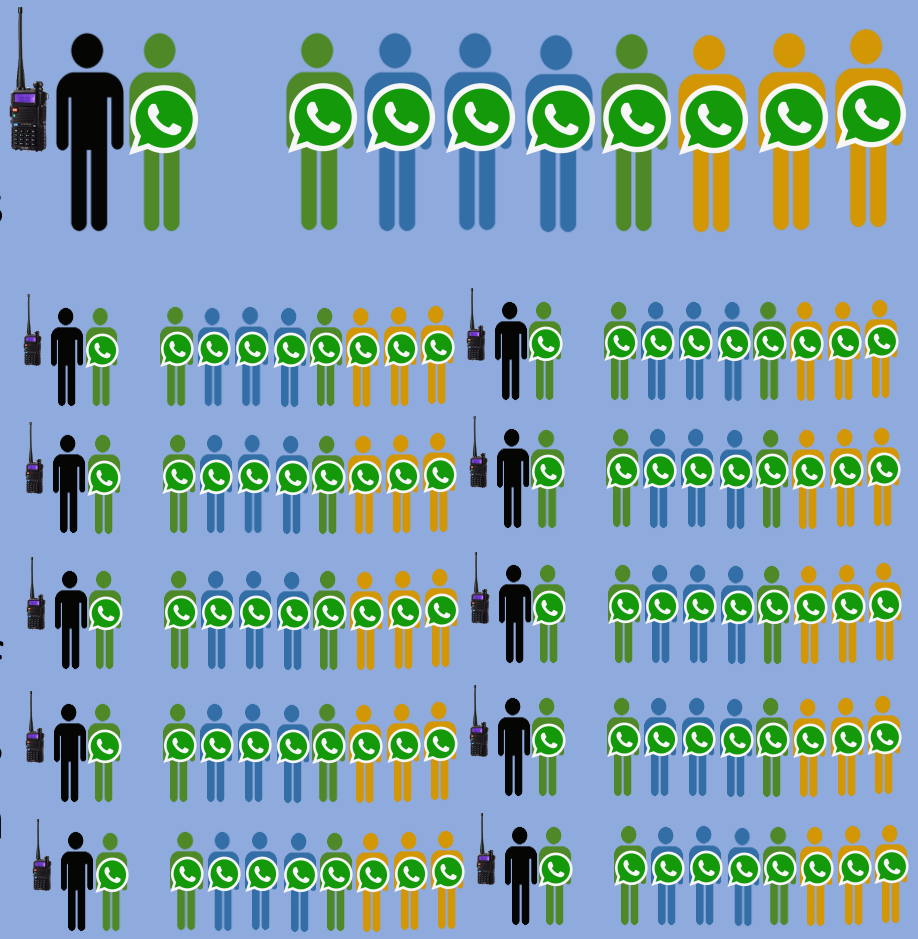


Each Squad has its own private Squad channel monitored by its ***Asst. Squad Leader****. Squad members are in VOIP contact with their Asst. Squad Leader.*

VOIP is an EmComm Force Multiplier

The numbers tell the story.
An amateur with a radio starts an EmComm Team with 9 non-amateurs with smartphones and VOIP for an EmComm Team of 10 operators.

A group of 10 amateurs with radios can now grow to an EmComm group of 100 operators at 1/10th the cost of licenses and radios. This is a 10 times force multiplier to improve EmComm capacity at a minimal cost.

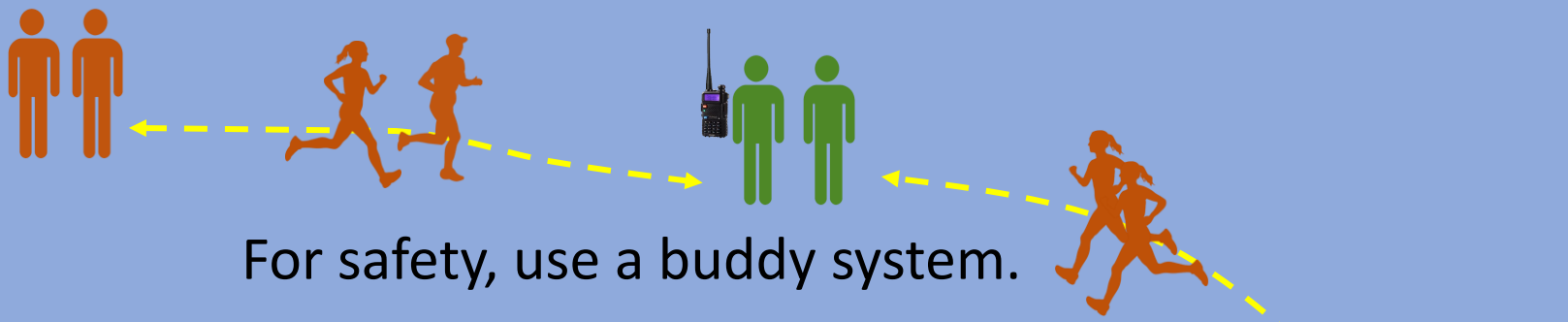


An EmComm Group is a maximum of 10 Teams. A Team can be 2-10 people.

More amateurs than Radios

A group of amateurs has only one radio. In a worst-case scenario, the other amateurs can go around the community and either report in person or send runners with messages to the radio operator.

It works but it is slow and **risky**.



For safety, use a buddy system.

Ten-person EmComm team, one radio, using runners to gather field data. If radios fail, runners carry data back to Net Control.

Bottom Line EmComm

The guiding principles for GECO EmComm:

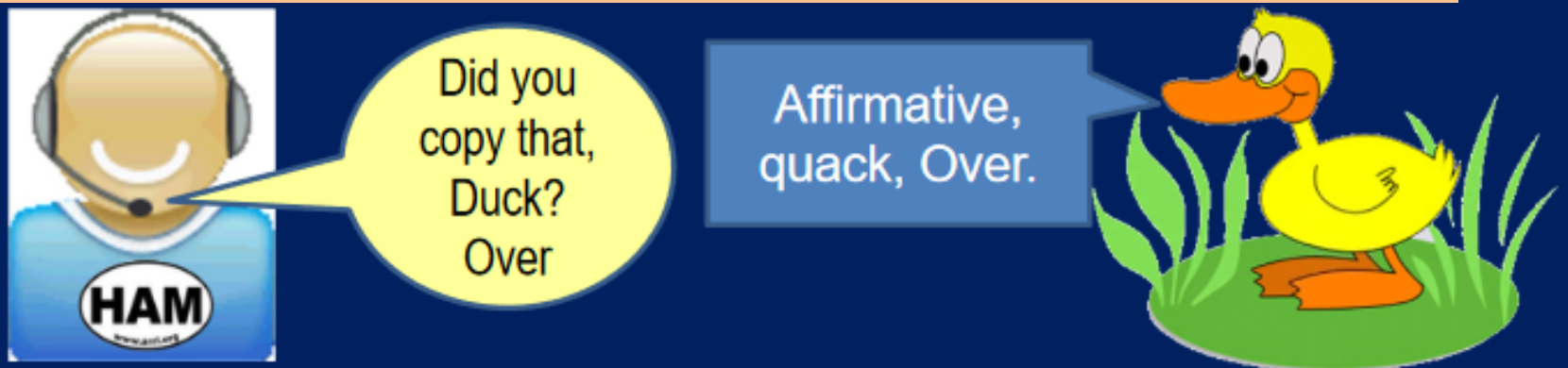
1. Prepare based on YOYO (You're On Your Own) and PYOR (Plan Your Own Rescue).

2. It is better to Network than to Not Work.

3. Care and share to build community resilience and sustainability.

Be a Responsible Amateur

If you want to be an amateur radio operator, you can't duck your responsibilities to prepare for EmComm service.



- Be a good, decent human being. Be honest, transparent, ethical, caring, sharing, humble, and helpful.
- Use amateur radio for international friendship and understanding (and prepare for EmComm).
- Know and live the EmComm Creed.

EmComm Creed

1. My own house is in order. I have all the resources to get my family through an emergency.
2. I am well-informed on what to do and how to respond in an emergency. I keep up my skills in First Aid, CPR, and Disaster Communications training-up-to date.
3. I maintain well-equipped personal and EmComm response bags and keep contents current.
4. I practice my communication and survival skills by actively participating in outdoor camping and communications events.

From N7YLA of the Glendora Emergency Response Communications group.

EmComm Quick Quiz

1 2 3 4

1. Can you get on the Air within 60 minutes (or less) of being activated?
2. Can you operate 72 hrs. before being re-supplied?
3. Are you ready to deploy if you wanted to?
4. Are you ready to shelter in place or evacuate (or both) to an alternate operating location?

To Deploy or Not

Before Deploying to the Field	
Every operator is an individual with unique circumstances. Use this checklist to guide your decision to "GO / NO GO" point. Binary scoring. Yes = 1; No=0	
#	Question
1	Is your family / property safe and secure?
2	Is all of your equipment in good operating condition to go?
3	Do you have all necessary current radio / ID documents?
4	Do you know the operating bands / frequencies?
5	Will you be going on the deployment with others?
6	Do you know the Deployment Area (DA)?
7	Do you have maps of the DA?
8	Has the DA been scouted and mapped?
9	Do you know the present DA conditions?
10	Do you know who is in charge in the DA?
11	Are you familiar with the route to the (DA)?
12	Is there an alternate route to/from the DA?
13	Do you have transport and fuel for a round trip to the DA?
14	Do you know how long you will be gone?
15	Can you afford to pay your own way for the duration of the deployment?
16	Do you have \sufficient emergency power to operate for the term of the deployment?
17	Do you have sufficient supplies to be self-sufficient for the term of the deployment?
18	Do you have a Plan B if it will be longer?

0-10	11-13	14-16	16-18
No Go; to close to 50-50	Maybe No; looks iffy	Maybe Go; think carefully	Go; know your limits

A volunteer, cannot be "ordered" to deploy. Safety is always a top priority. The GECO Deployment Check List (see p. 4) helps you decide to deploy or not. Just answer "Yes" or "No" (a "not sure" counts as a "No"). Then count the number of "Yes" items and use the scoring scale at the bottom of the chart.

The Accidental EmComm Amateur

For operator safety, it is best to work in pairs. However, the worst-case scenario is you're on your own (YOYO). GECO Accidental EmComm Operator training emphasizes learning single-handed operating methods.

EmComm Team

GECO YOYO EmComm is still best done in pairs. Although your companion may not be a licensed amateur, train them to use the radio. In an emergency (e.g., life-or-death situation), they can talk on the radio.

You're on your own (YOYO) EmComm

Basic HT EmComm Kit

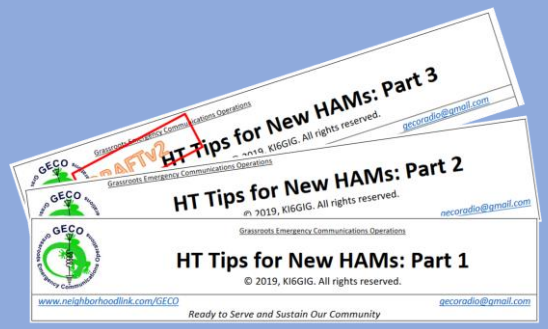
Minimal Kit

- HT with high gain whip and Tiger Tail
- Spare batteries
- Spare high gain antenna
- Notepad and pen with list of primary and alternate operating frequencies
- Flashlight and spare batteries

FFI: GECO HT/Antenna systems.
To learn more about HT radio / antenna connectors.

Basic HT Suggested Enhancements

- Replace the OEM rubber duck with a high-gain whip.
- Inventory all your antennas and get the necessary adapters to connect the HT.
- See other information in links below.



Part 1 Part 2 Part 3

First Buy Care & Feeding

FFI: To learn more about HT radio / antenna connectors.

HT EmComm Kit Accessories

A

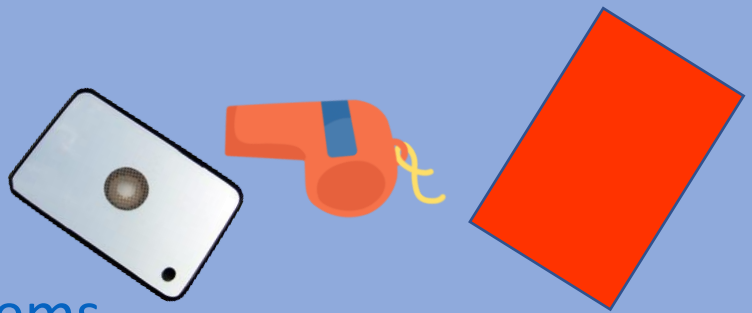
B

C

D

E

F



Handy Extras

A. 12 VDC battery eliminator for HT

B. AA Battery Pack for HT

C. Roll-up antenna

D. Paracord to hoist roll-up antenna (~7 m)

E. Adapters for HT radios/antennas

F. Non-Radio EmComm Kit

FFI: GECO HT Radio/Antenna Systems.

HT Field Battery Charging Options

We have an external USB battery pack and the USB charging cable for the GECO HT charging cradle.

Our backpacking solar panel can be pressed into GECO EmComm service as needed. The plan is to use an HT battery while the second HT battery is being charged.

You may use other battery charging methods, but the items shown above can all fit into the GECO EmComm Ready Pack (see the next slide).

GECO EmComm Ready Pack

I made the GECO EmComm HT Ready Pack. It is simple, low cost, portable, and robust. It is for a single operator, with room for one day's supplies.

The GECO HT EmComm Ready Pack is 56x36x20 cm, weighs 4.3kg with masts and radio gear.

It has multiple antenna/mast configurations, 2 HT radios, spare batteries, all necessary cables and adapters.

Plastic Bag “Radio Raincoat”

Rain and radios are not good partners. During monsoon season in Thailand, I kept a plastic bag as a raincoat for my HT. I used tape to seal the hole in the bag around the antenna.

HT Battery Charging Readiness

GECO batteries are kept on the charging rack and are routinely charged at least monthly.

GECO HTs and their batteries are kept as close to full charge as possible so they are ready to go at a moment's notice

GECO Low-Battery Operating Protocol

When the transceiver battery power reaches 80% of full charge, GECO policy is to declare a low-battery condition to other stations.

1) Inform all stations of your intention to limit contact to three times a day (if no plan, the default is 0700, 1200, and 1700 hours local times), and frequency (give a primary and secondary).
2) Request they guard those frequencies for a ten-minute period to call or listen for you.

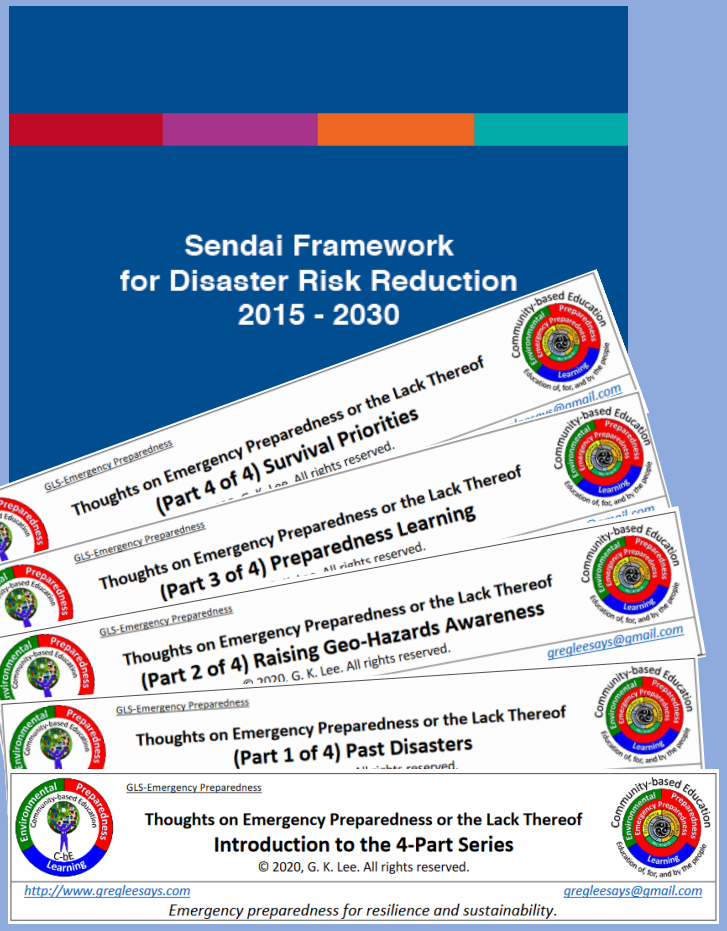
Know Your Neighborhood

Know the RF and cellphone dead spots in your neighborhood. Map these out BEFORE there is an emergency.

1) Walk your neighborhood and map the RF dead spots (both simplex and for repeaters).
2) Walk your neighborhood and map the cellphone dead spots. Use the phone's built-in cell signal strength function (not the bar icons shown on the display; click here for Apple ; for others check your phone manual or for smartphone apps.

Note: In an emergency, you won't know if the Internet, cell service, or what the RF band conditions will be until you try them.

Know Your Local Hazards



[Intro](#) [Part 1](#) [Part 2](#)
[Part 3](#) [Part 4](#)

This series of papers directly supports the UN Sendai Framework for Disaster Risk Reduction.

Help me find teachers willing to teach these lessons to elementary and high school students. Students would use their math and science lessons to learn about local geo-hazards and help improve community emergency preparedness.

Know Your Neighbors

If you are in a Net (and especially if you are the Net Control Operator), get to know your neighbors.

- Name, callsign, and location relative to you (e.g., distance, azimuth, elevation) for simplex (and repeaters common to both of you).
- Their equipment, antennas, power (type and durability).
- The stations they can simplex relay traffic to/from.
- The repeaters they can reach.
- Their alternate operating sites (e.g., distance, azimuth, elevation) if not at their QTH.

Note: GECO suggests every station have a portable vertical and directional antenna 1) as a spare if station antennas are damaged; 2) for portable use if evacuating your station.

Know Nets in Simplex Range

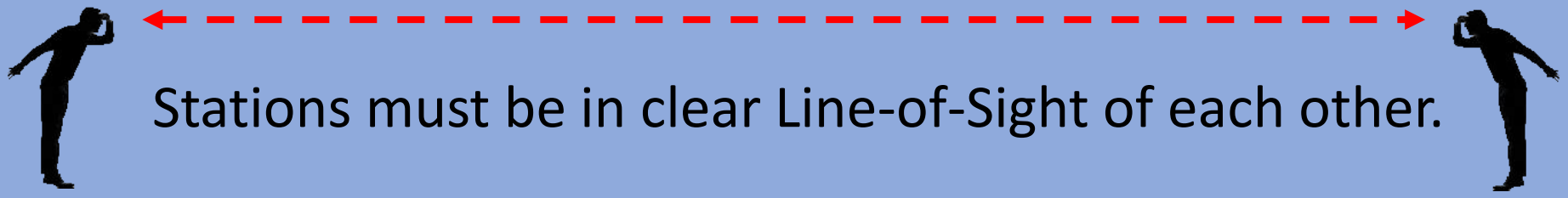
You should keep a list of Nets (frequencies and schedules) within the simplex range of you.

- You don't have to join or participate in them, but you should know their frequencies and schedules. These would be prime places to transmit your call for help.
- As a good Samaritan, these would be frequencies to monitor for possible emergency traffic.

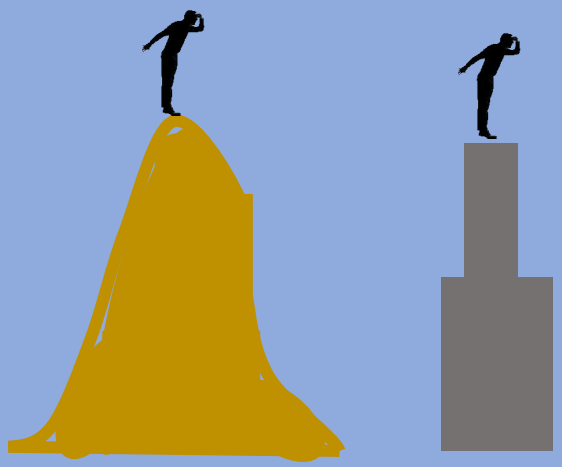
Note: If you notice, the preamble to most Nets includes a statement at the start of the Net "Is there any emergency traffic? Please call now."

Optimum Operating

Plan to operate simplex.
In a disaster, repeaters may not be available.

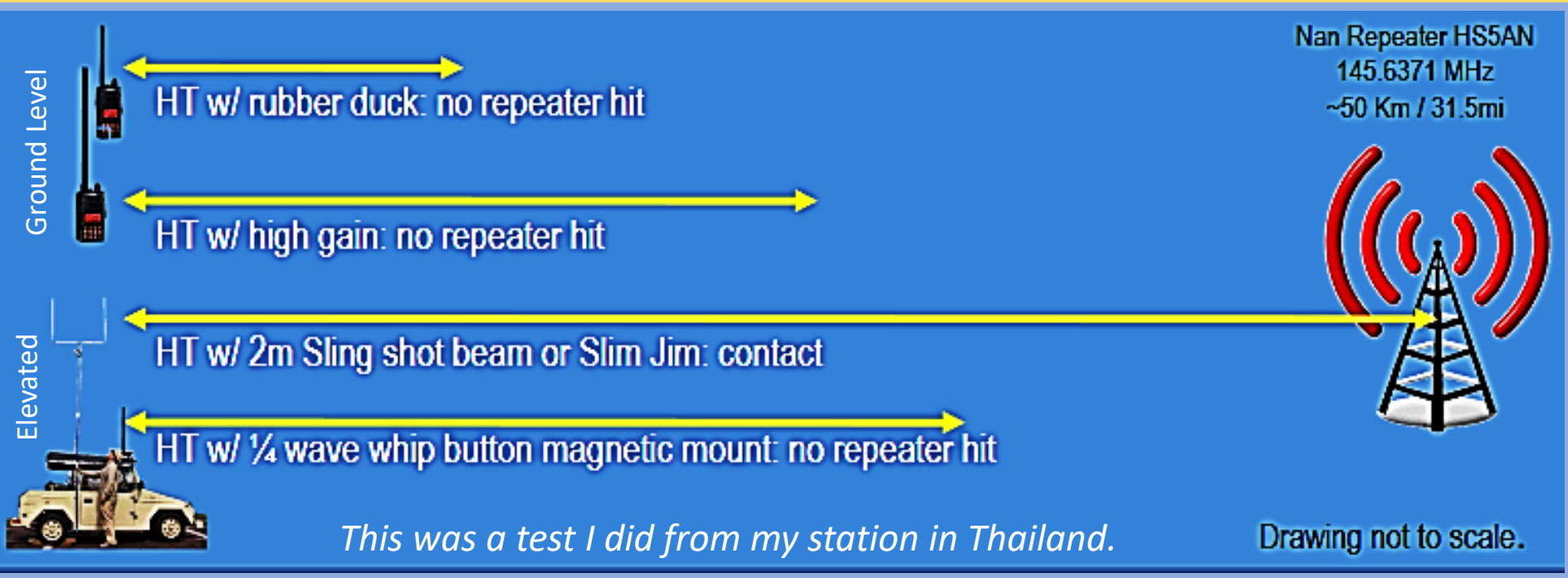


Stations must be in clear Line-of-Sight of each other.



It is best to operate from a tall mountain or hill; a tall structure; or have a high antenna mast.

Optimum Operating



Here are examples of how antenna height can affect radio range.

Note: There are many other factors affecting your transmission range: TX power, antenna height, terrain, vegetation, proximity to metal objects, weather and atmospheric conditions, etc.

Field Mast/Antenna Matrix

Your Portable Field Masts should have the necessary equipment and materials to meet these common situations.

Environment	
Barren: no structures, no trees	Mast must be self-supporting
Fence, signpost	Tie mast to post
Park bench	Tie mast to bench
Picnic Table	Tie mast to table
Trees	Hoist antenna on a tree branch.

Wind Can Kill Masts & Antennas

Do you know how strong the wind is blowing? Use a flag and the GECO Modified Beaufort Wind Scale to estimate wind speed. It is no-cost/low-cost, no-tech/low-tech.

The GECO Modified Beaufort Wind Scale

Radio operators are advised to estimate antenna systems wind loads for areas of operation BEOFRE deployment. Be sure to stand-off from helicopter landing zones by a distance equal to 3 X the helicopter rotor diameter.

Description	Flag	WMO term	MPH	Km/h	Knots	Force	Psu lbs/sq ft (Kg/sq m)
		Report wind speed in knots to all flight crews					
Calm: smoke rises vertically	---	Calm	<1.0	<1.5	<0.9	0	0.006266 (0.003059)
Smoke indicates wind; flag hangs limp, wind vanes do not move		Light air	1-3	1.5-6	1-3	1	0.02924 (0.01428)
Wind felt on face, leaves rustle, flag stirs, wind vanes move		Light breeze	4-7	6-12	4-6	2	0.142 (0.6934)
		5 Knts max tailwind for helicopter take off					
Leaves and twigs in constant motion; flag occasionally extends		Gentle breeze	8-12	12-20	7-10	3	0.3759 (1.835)
		10 Knts ideal for helicopter flight operations					
Dust and paper fly; small branches move; Flag flaps		Mild breeze	13-18	21-29	11-16	4	0.8145 (3.977)
		20 Knts maximum gusts for helicopter flight operations					
small leafy trees begin to sway; white crested wavelets appear on lakes/ponds; Flag ripples,		Fresh breeze	19-24	30-39	17-21	5	1.504 (7.342)
Large branches move; wires whistle; umbrellas hard to use; Flag snaps		Strong breeze	25-31	40-50	22-27	6	2.485 (12.13)
Whole trees sway; hard to walk; Flag extended		Near gale	32-38	51-61	28-33	7	3.822 (18.66)
Twigs and small branches broken; cars veer on roads; Flag tatters		Gale	39-46	62-74	34-40	8	5.597 (27.33)
Slight structural damage occurs (roof shingles blow off)		Strong gale	47-54	75-87	41-47	9	7.769 (37.93)
		45 Knts maximum winds for helicopter flight operations					
Trees broken or uprooted, considerable damage to buildings		Storm	55-63	88-101	48-55	10	10.53 (51.39)
Widespread damage caused	---	Violent storm	64-72	102-114	56-63	11	13.78 (67.3)
	---	Hurricane	>73	>115	>63	12	>13.78 (>67.3)

Disclaimer: Wind pressure values are the upper limits for a wind category. Use of the wind pressure data to calculate tower/antenna wind loads are at your own risk. GECO and KI6GIG assume no liability for the use of this data.

Mast/Antenna Wind Loads

To use the GECO Modified Beaufort Wind Scale:

Step 1. Use basic math to calculate the minimum and maximum surface of your mast and antenna.

Step 2. Look at a flag and find the matching flag image on the chart.

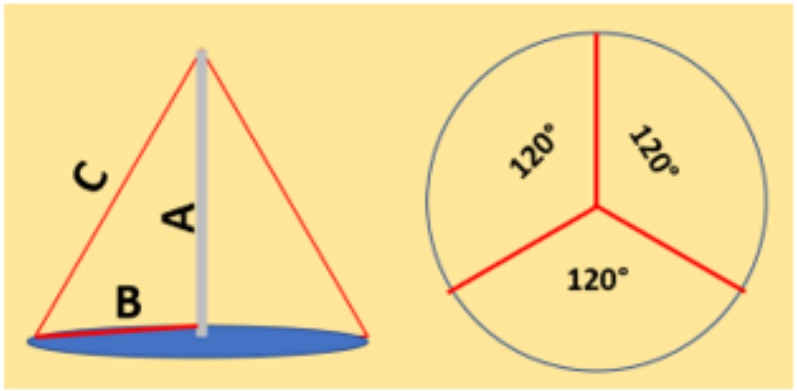
Step 3. Follow the row to the right-hand column to get the wind pressure.

Step 4. Multiply the mast/antenna surface area by the wind pressure. [**Note**: To be safe, use the next higher wind pressure values.]

You can protect your mast/antenna system in two ways:

1. Lower the mast/antenna and stop operating and take shelter.
2. Use guy lines for added support, keep operating and put equipment and personnel at risk.

Mast Guying Notes



- Guy for every 10 ft of height (A)
- Minimum distance (B) from mast is ½ of mast height.
- *Guy length (C) includes 0.6m (1 ft) extra for tying off.

A		B		C	
Mast Ht.		Dist.		Guy Line*	
m	Ft	m	Ft	m	Ft
9.14	30	4.57	15	10.82	33.54
7.62	25	3.81	12.5	9.12	27.95
6.10	20	3.05	10	7.42	22.36
4.57	15	2.29	7.5	5.71	16.77
3.05	10	1.52	5	4.01	11.18

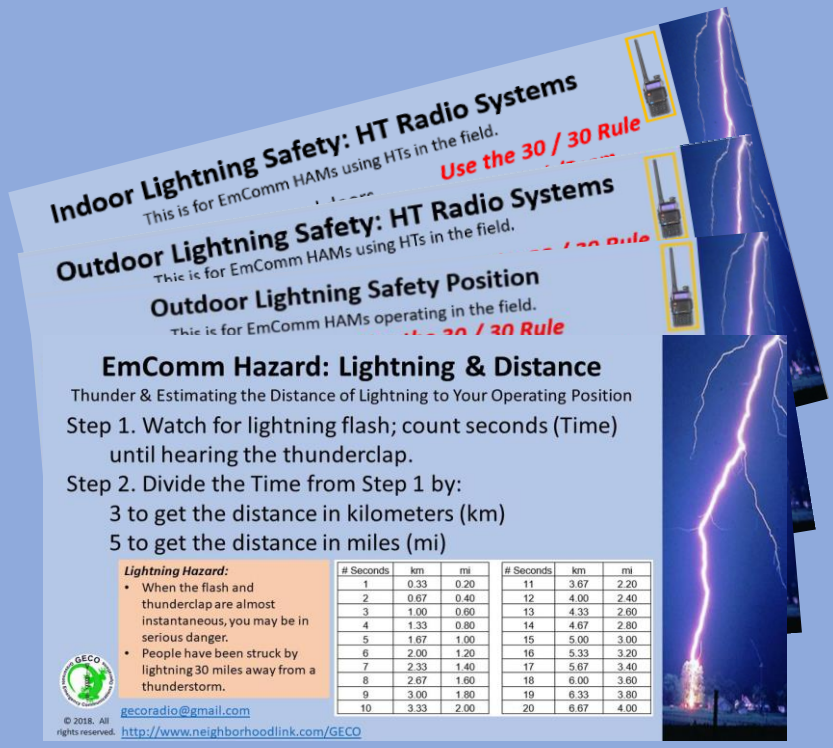
GECO portable field masts use PVC pipe and are limited to 3 m tall. This makes for a compact, light weight system to fit in a backpack for portability.

Guying may be necessary to support masts in high winds.

Beware of Lightning

You may still be at risk from lighting even when the sky above you is clear and blue. Learn more about lightning and safety with the materials below.

[EP-9 Lightning]

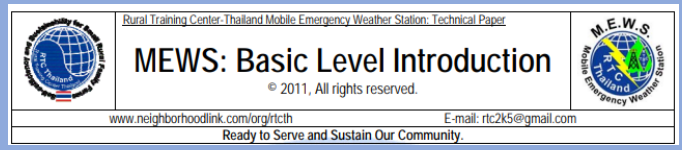


[EPC-L1 EmComm Lightning Awareness and Safety]

Value Added EmComm Skills

Disasters may destroy local weather stations (the source of valuable disaster relief planning and flight safety data. GECO MEWS (Mobile Emergency Weather Station) enables EmComm operators in the disaster area to add value to their efforts by making ***systematic weather observations***.

[OA Brief Intro]
[OB Observer Orientation]
[OC Handbook Orientation]
[Observer Handbook]



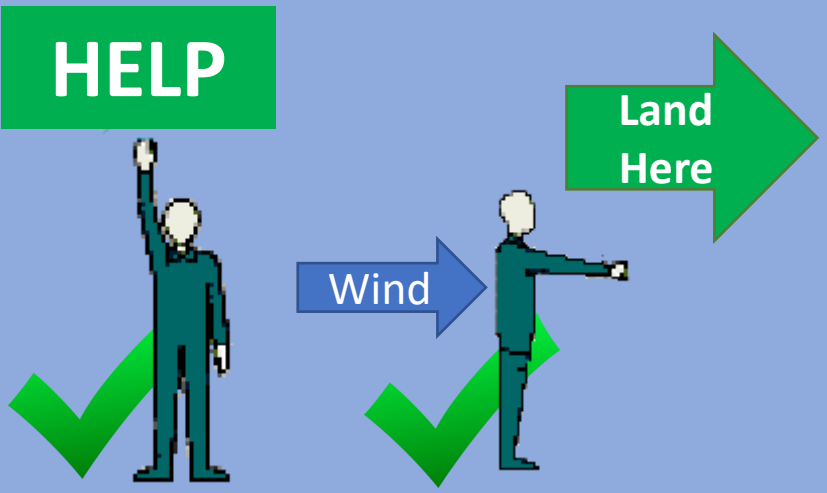
[Intro to Basic MEWS Lessons]
[B1] [B2] [B3] [B4] [B5] [B6] [B7] [B8]

Learn About Helicopters

Helicopters may be the first outside help to arrive. Getting weather reports from the disaster area improves flight safety.

Teach everyone, young and old alike, these basic hand signals to helicopters.

To get help, DO THESE…



….NOT THIS!

Learn About Helicopters

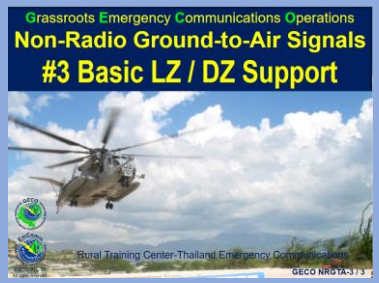
GLS-Emergency Preparedness

Non-Radio Ground-to-Air (GTA) Signals

http://www.gregleesays.com gregleesays@gmail.com

Emergency preparedness for resilience and sustainability.

NRGTA



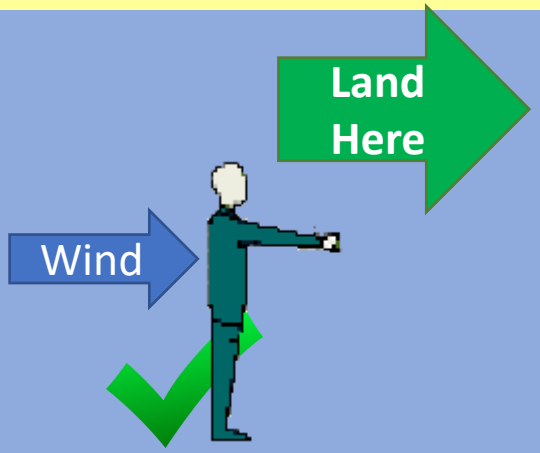
Amateur radio operators cannot talk with helicopters. But these no-cost/low-cost, no-tech/low-tech ***non-radio ground-to-air signal methods*** can be taught to elementary school students (as practical math and science lessons) to build local village EmComm capacity for disaster resilience.

NRGTA-1 NRGTA-2 NRGTA-3

Scout Helicopter LZs/DZs

Helicopters need a large, open, level area about the size of a football field. It must be clear of vertical obstacles (e.g., trees and especially overhead wires). Helicopters land flying into the wind. Plan to ***scout possible LZ/DZ sites*** BEFORE a disaster.

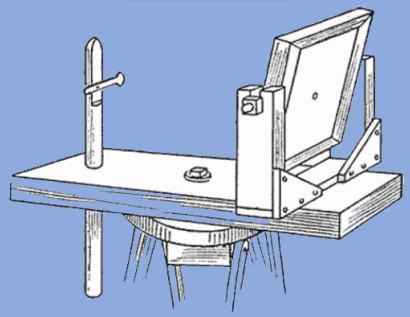
Lessons are in development. Watch for a newsletter announcement when they are available.

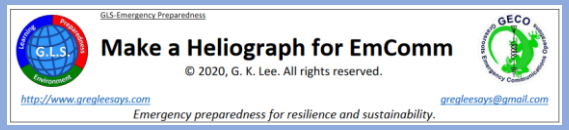


Non-Radio EmComm Methods

GECO advocates the study and use of ***non-radio EmComm methods*** as the ultimate Plan B (when all else fails). Most of these are no-cost/low-cost, no-tech/low-tech and can be taught as practical math/science lessons in schools and scouts, as community service projects, and to community members to build disaster resilience.

NRGSM





Heliograph

General Review

- Speak plainly, slowly, and clearly.
- Know your call sign.
- Know the ITU Alphabet.
- Know how to report time.
- Know how to report location.
- Know the standard procedure words & phrases.

Plain English, Slowly & Clearly

- **Speak <u>slowly</u> and <u>clearly</u>**. Not everyone on the air is fluent in English.
- **Use plain simple English. Avoid** jargon, abbreviations, and Q-codes. Be courteous and friendly.
- **Protect privacy.** Do not give out personal information. There are NO private conversations on the air. You don't know who is listening.
- **Avoid clipping** (cutting off words)**:** Hold the mic about 2.5 cm from your mouth. Press and hold the PTT button for 1-2 seconds before and after speaking.

Review: Your Call Sign

Write out your call sign: For example, **KI6GIG**.

Spell your call sign using the ITU alphabet.

Kilo India Six Golf India Golf

Avoid “clipping” your transmission by doing the following.

- Before speaking, key the mic, and pause 1-2 seconds before talking.
- After speaking, hold the key down for 1-2 seconds.

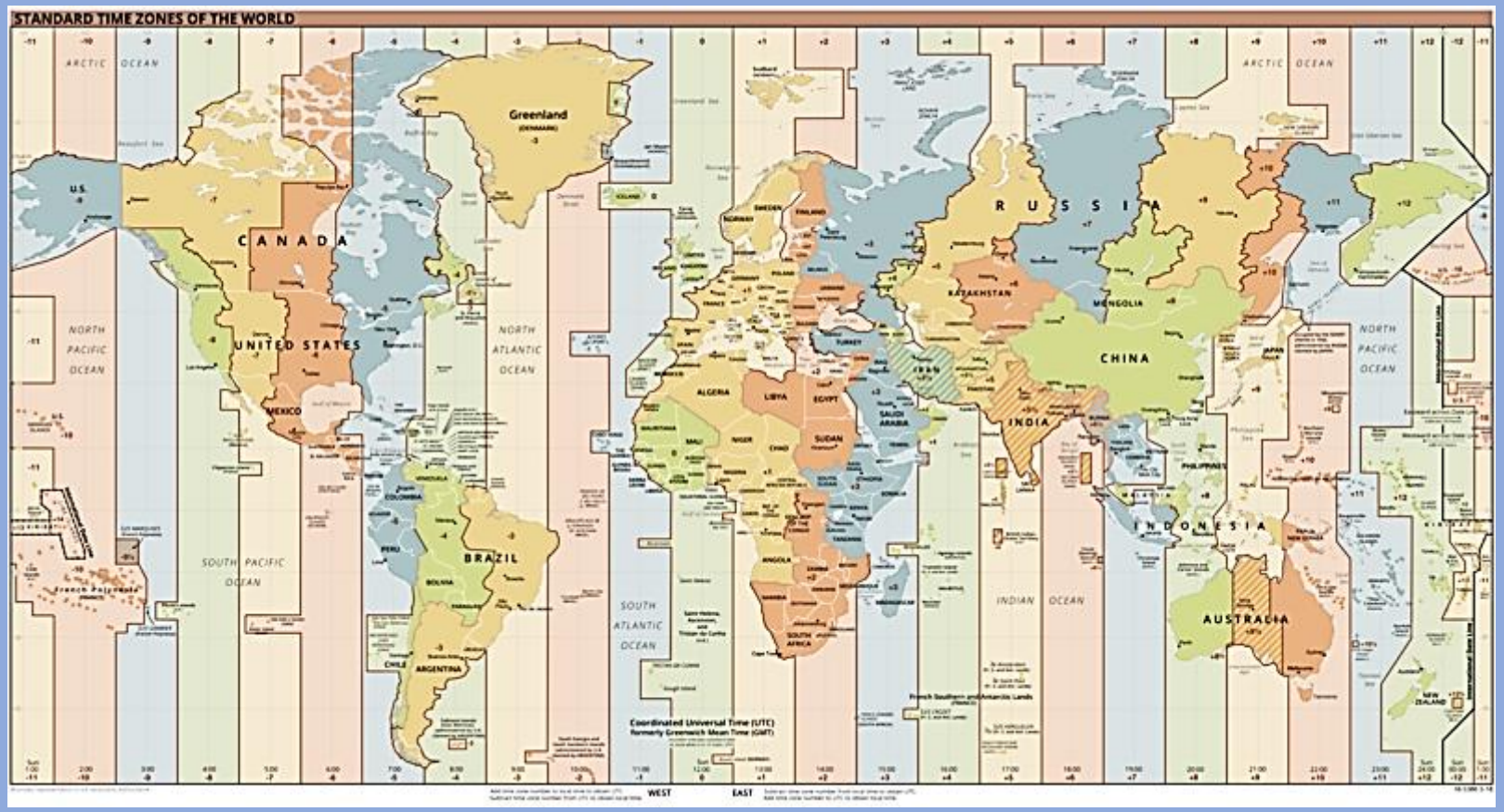
Basic Operating: ITU Alphabet

Not everyone speaks English. Keep things clear by learning and using the standard ITU alphabet on the air.

Do not make up your own words. It is confusing and can slow communications (especially if the other person doesn't understand you).

ITU Alphabet			
A	AL - FAH	N	NO-VEM-BER
B	BRAH-VOH	O	OSS-CAH
C	CHAR-LEE	P	PAH-PAH
D	DELL-TAH	Q	KEH-BECK
E	ECK-OH	R	ROW-ME-OH
F	FOKS-TROT	S	SEE-AIR-RAH
G	GOLF	T	TANG-GO
H	HEH-TELL	U	YOU-NEE-FORM
I	IN-DEE-AH	V	VIK-TER
J	JEW-LEE-ETT	W	WISS-KEY
K	KEY-LOH	X	ECKS-RAY
L	LEE-MAH	Y	YANG-KEY
M	MIKE	Z	ZOO-LOO
0	ZEE-ROW	5	FI-VER
1	WUN	6	SIX
2	TOO	7	SEV-EN
3	TH-UH-REE	8	ATE
4	FOWER	9	NIN-ER
	DECIMAL		DEH-SEE-MAL

Reporting Time



Emergencies tend to be local/regional. But EmComm traffic can be global. Standardize time reporting by using UTC (Universal Time Coordinated). EmComm traffic may have a global reach. Using UTC will make it clear for all stations when relaying time-sensitive traffic.

Know Your Time Zone

Georgia (USA) is UTC -5 Standard Time (or -4 Daylight Savings Time, DST). Bangladesh is UTC +6 and doesn't use DST. If your country uses DST, know the start and end dates for DST. [**Note**: London is UTC 0, but is UTC +1 with Daylight Savings Time (called British Summer Time; starts last Sun of Mar and ends last Sun of Oct; clocks change at 0100 UTC 0 and UTC +1 respectively).

DIY Time Conversion

Automated time conversion tools are common online and on many smartphones. But the power is gone, GECO advocates the use of a manual Do-It-Yourself time wheel.

Use Date / Time Format

12-Hr. AM/PM		24-Hr
1:00 AM		0100
2:00 AM		0200
3:00 AM		0300
4:00 AM		0400
5:00 AM		0500
6:00 AM		0600
7:00 AM		0700
8:00 AM		0800
9:00 AM		0900
10:00 AM		1000
11:00 AM		1100
12:00 PM	noon	1200
1:00 PM		1300
2:00 PM		1400
3:00 PM		1500
4:00 PM		1600
5:00 PM		1700
6:00 PM		1800
7:00 PM		1900
8:00 PM		2000
9:00 PM		2100
10:00 PM		2200
11:00 PM		2300
12:00 AM	midnight	2400/0000

Use the date format: YYYY-MMM-DD (e.g. 2020 JUN 07) which starts with the largest time unit going to the smaller. This makes it faster to retrieve records.

Use 24-hour format to avoid the confusion over 12 AM and 12 PM. Mid-night is either 2400 or 0000

Location, Location, Location

- Give your location as precisely as possible. Local place names may not be understood by emergency teams from outside the area (especially international relief workers).
- Air navigation systems use latitude/longitude in decimal degrees. You can get this from a GPS unit or some cell phone applications.
- What3Words is a new way to specify locations with 3 m accuracies. It is useful in places where there are no street names and house numbers.

Standard Procedure Words & Phrases

It helps to use standard words and phrases for clear communication. These notes are compiled from various radio sources and classes.

Word / Phrase	Meaning / Reply
Acknowledge	"Let me know that you have received and understood this message."
Affirmative	"Yes" or "permission granted."
Break	"I hereby indicate the separation between portions of the message." (To be used when there is no clear distinction between the text and other portions of the message.)
Correction	"An error has been made in the transmission (or message indicated). The correct version is..."

Standard Procedure Words & Phrases

Word / Phrase	Meaning / Reply
Go Ahead	"Proceed with your message."
How Do You Read	Unreadable, readable now and then, readable but with difficulty, readable, perfectly readable.
I Say Again	Self-explanatory.
Negative	"No" or "permission not granted" or "That is not correct."
Over	"My transmission ended, and I expect a response from you."
Out	"This conversation is ended and no response is expected."
Read Back	"Repeat all, or the specified part, of this message back to me exactly as received."
Roger	"I have received all of your last transmission." (Under no circumstances to be used as an affirmative.)"

Standard Procedure Words & Phrases

Word / Phrase	Meaning / Reply
Say Again	"Repeat all, or the following part, of your last transmission."
Speak Slower	Self-explanatory
Standby	Self-explanatory
That Is Correct	Self-explanatory
Verify	"Check coding, check text with the originator and send correct version."
Wilco	"Your last message (or message indicated), received, understood, and will be complied with."
Words twice	(1) As a request: "Communication is difficult. Please send every word twice." (2) As information: "Since communication is difficult, every word in this message will be sent twice."

Standard Emergency Words

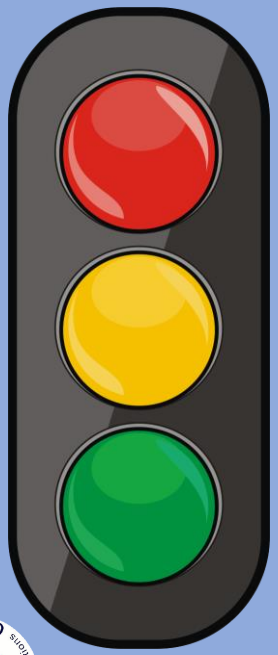
Advisory Note: GECO has chosen to use these internationally recognized emergency words borrowed from maritime communications. Other emergency communicators may or may not use all of these.

	Pan Pan	Mayday
Purpose	Urgent; need help; **not life-threatening**	Emergency; ***Life-threatening***
Format	Pan Pan, Pan Pan, Pan Pan. All Stations, All Stations, All Stations. [callsign, callsign, callsign]	Mayday, Mayday, Mayday. All Stations, All Stations, All Stations. [callsign, callsign, callsign]
	1) Give a specific location, 2) Nature of emergency, 3) Number of people involved, 4) Specific help needed.	

Make an emergency call on the National Calling Frequency or on a local radio net frequency. After making the call, pause to listen for a response. Repeat this until you get a response.

GECO EmComm Message Ranking

Advisory Note: GECO uses a simple color-coded method to simplify ranking the importance of EmComm messages. Other emergency communicators may or may not use all of these.

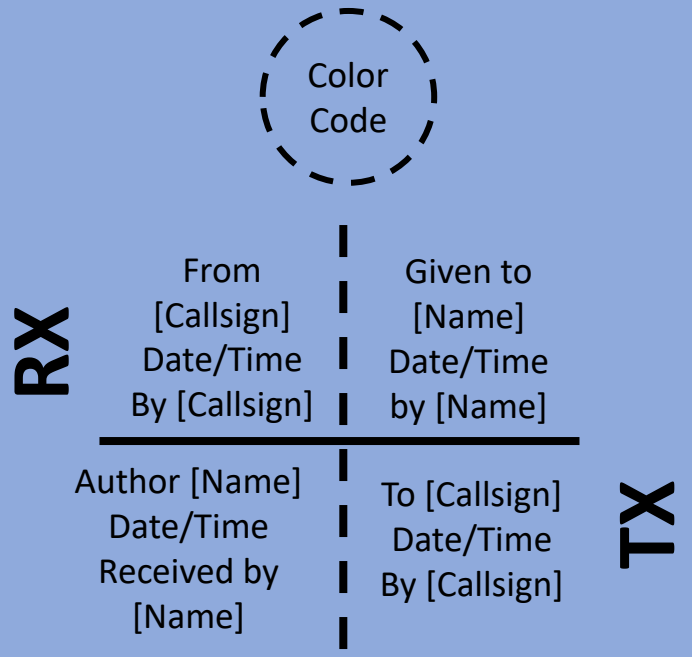


Top Priority: Use for **Mayday**; Immediate handling.

Medium Priority: Use for **Pan Pan**; secondary handling.

Low Priority: All other messages.

Message Cross Notation



Other Equipment Ideas

Have a basic field test Kit

VOM Meter

- Test batteries
- Monitor radio battery use
- Test coax

SWR Meter

Dummy Load

Jumper cables

Test SWR of field antennas or other antennas salvaged in the field.

Check all the connectors on your equipment to be sure they fit.

Other Equipment Ideas

12 VDC External Power Connectors

In a disaster, you need power to operate. These accessories let you make use of salvaged or scavenged 12 VDC batteries you may find.

Don’t forget any necessary tools to remove, carry, and install the batteries.

1. Car accessory plug with Anderson PowerPoles.
2. Car accessory socket with battery clips.
3. Car accessory plug with double sockets
4. Car accessory plug with double sockets & LED status indicators.

Other Equipment Ideas

Terminal & Connector Cleaning Kit

- Soft cloth
- Electrical tape
- Erasers (pencil & typing)
- Toothbrush
- Fine sandpaper

***Note**: Dirty contacts can mean poor signals, low or no power.*

Recharging Batteries in the Field

An option if available along with the fuel (which could be in short supply in a disaster).

Beware of exhaust gases and fuel handling for team safety.

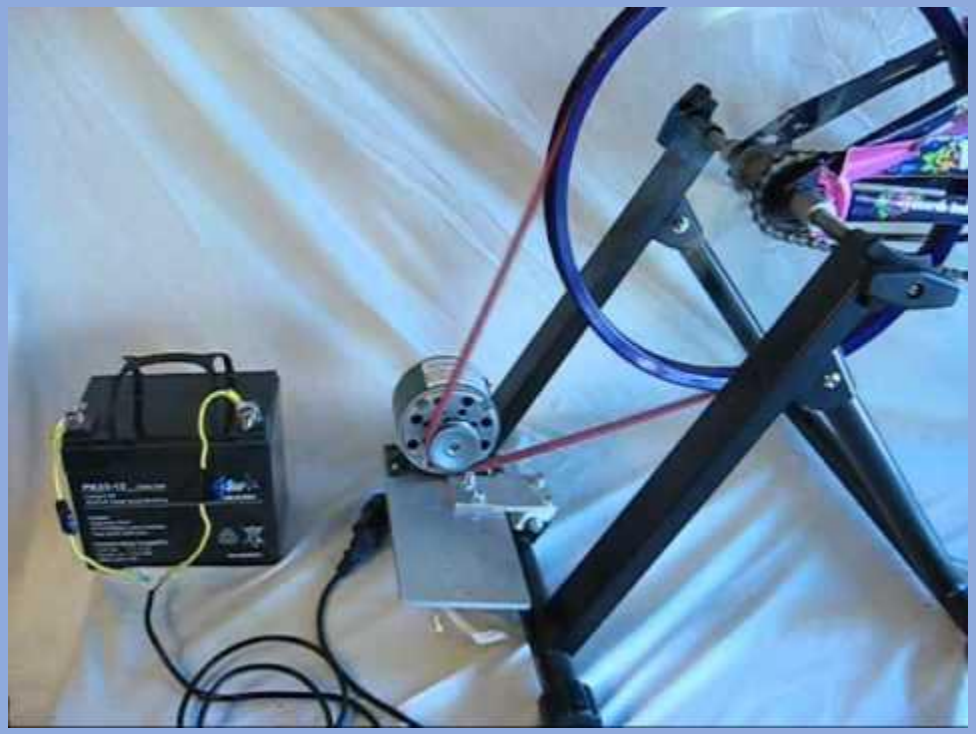
Note: Never connect radios directly to the generator. Power surges can damage the radio. Always connect radios to batteries (which are connected to the generator). Let the battery take the surge rather than the radio.

Recharging Batteries in the Field

Solar panels are good IF you can afford them and have enough sunlight.

You will need to consider your battery use vs. the solar panel output to charge your batteries to keep up with your usage.

Recharging Batteries in the Field



A bicycle-powered battery charger is a great math/science school project or an amateur club project for emergency battery charging.

This video gives you a good overview of the project.

DC to AC Inverters

If you must run AC powered devices (e.g. a computer or power supply) from your batteries, use a pure sine wave DC/AC inverter.

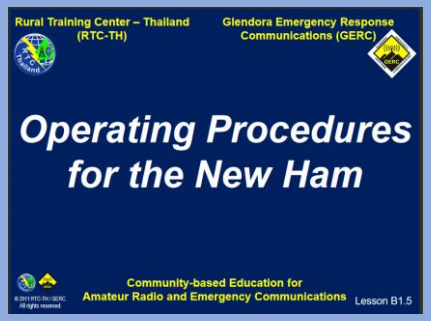
Two big issues:

1) You need a pure sine wave inverter, or you may damage your equipment.
2) You may lose up to 60% of the battery power in the conversion process.

Resources for New Amateurs

If you are a new amateur, welcome. Amateur radio has many facets from the very technical to fun activities for the not-very-technical.

These links go to helpful plain English materials.



[New HAMs]

[Buying First HT]

[First HT Care]

[Repeater Use]

A 3-part series about HT radios for new amateurs.

[Part 1] [Part 2] [Part 3]

Teaching EmPrep & EmComm in Schools

EmPrep and EmComm should be taught to elementary to high school students.

This can be easily done by supplementing existing lessons based on the concepts of the Geographic Systems Model,

Community-based education, and STEAMING (Science, Technology, Engineering, Arts Integrating Nature and Geography.

Note: No curriculum changes are needed.

Some Examples

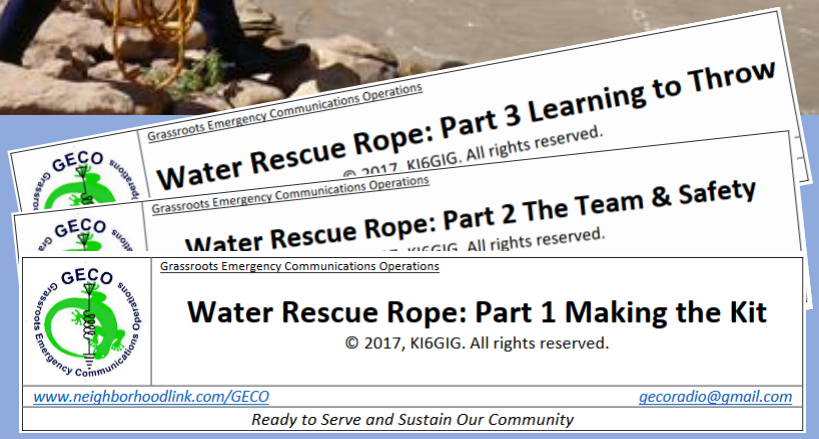
Here are some examples based on local conditions and situations in Bangladesh.

1. Drowning accounts for 43 percent of all deaths among children between one and four years of age, making drowning the leading cause of death among children.
2. Lightning kills up to 300 people a year in Bangladesh due to thunderstorms.
3. Diarrhea is one of the major diseases in Bangladesh (even though recent government programs effectively reduced cases during floods).

Water Rescue Rope

Teach school children how to make and use a water rescue rope.

Students can practice by having contests organizing teams to throw and retrieve water rescue ropes on the playground.



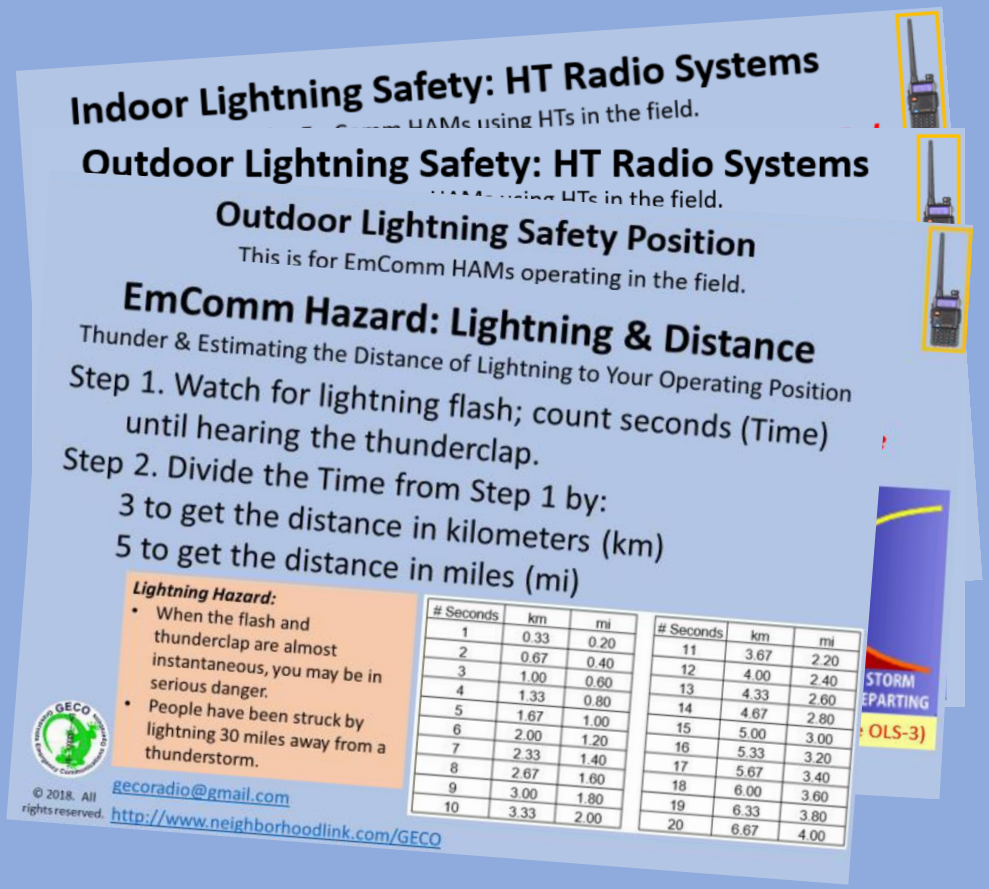
[Part 1](#) [Part 2](#) [Part 3](#)

Water Rescue Rope Lesson

This lesson uses common classroom lessons in:

Science	Water, Weather, Gravity
Technology	Rope, using tools
Engineering	Design and construction
Arts	Language, communication, drawing plans
Mathematics	Measuring
Integrating	Using STEAMING in the context of the local environment.
Nature	Weather, seasons, soil, rivers & riverbanks,and flowing water
Geography	Location, Scale, Time

Lightning Safety



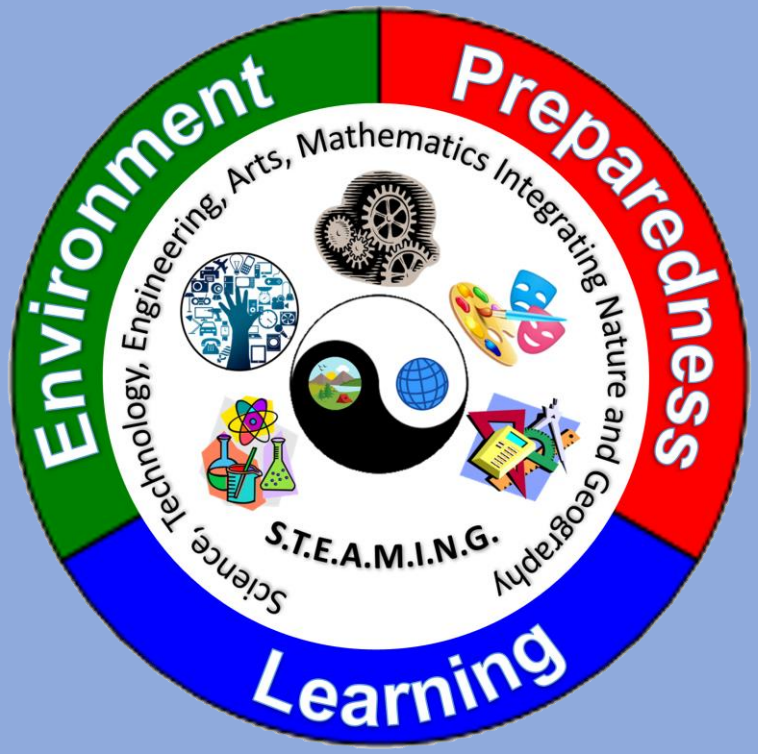
[Distance](#) [Safety Position](#)

[HT Outdoor](#) [HT Indoor](#)

Another example of a practical lesson using traditional classroom math and science applied to Nature. This is more interesting than the math problems in textbooks.

Lightning Safety Lesson

This lesson uses common classroom lessons in:



Science	Weather
Technology	Materials science
Engineering	Design and construction
Arts	Language, communication,
Mathematics	Measuring, counting
Integrating	Using STEAMING in the context of the local environment.
Nature	Weather, seasons, soil, electricity
Geography	Location, Scale, Time

Say Sari for EmPrep, not Sorry.

A set of 4 cards showing how useful a sari can be in emergencies. These can be used to teach children practical emergency skills. They have a way to make use of their classroom math and science lessons.

Set of 4 Cards

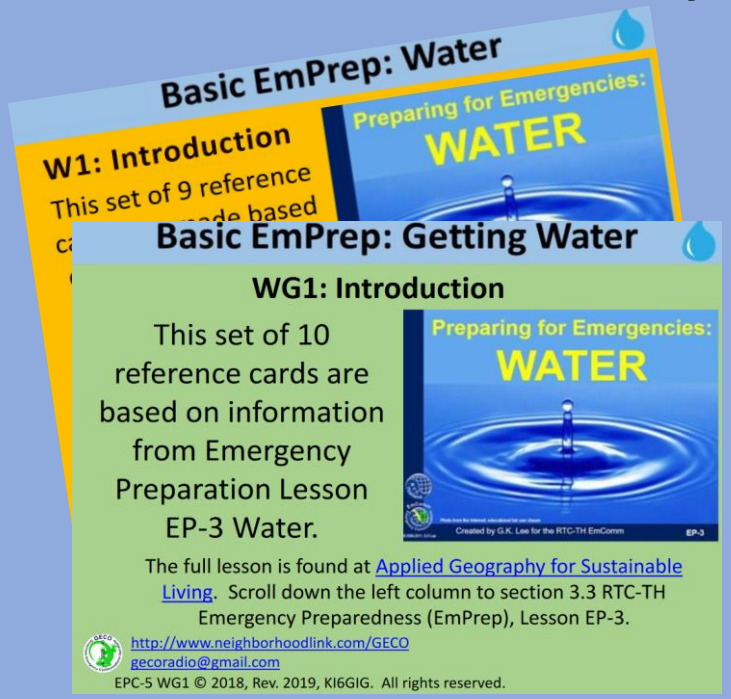
Uses for a Sari in Emergencies

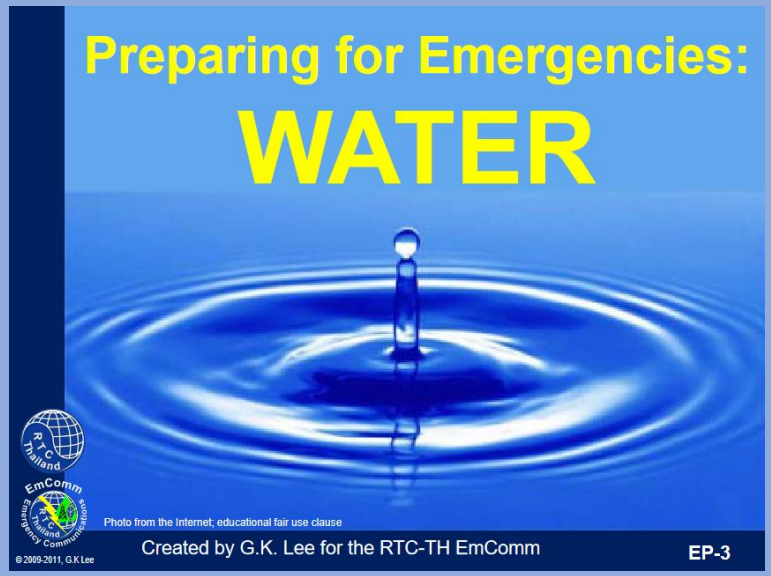
This lesson uses common classroom lessons in:

Science	Weather, Biology
Technology	Materials science
Engineering	Design and construction
Arts	Language, communication,
Mathematics	Measuring, counting
Integrating	Using STEAMING in the context of the local environment
Nature	Weather, seasons,
Geography	Location, Scale, Time

Emergency Water

More practical uses for classroom math and science applied to emergency preparedness to build community disaster resilience.





[Water](#) [Getting Water](#) [EP-3 Water](#)

Emergency Water Lessons

This lesson uses common classroom lessons in:

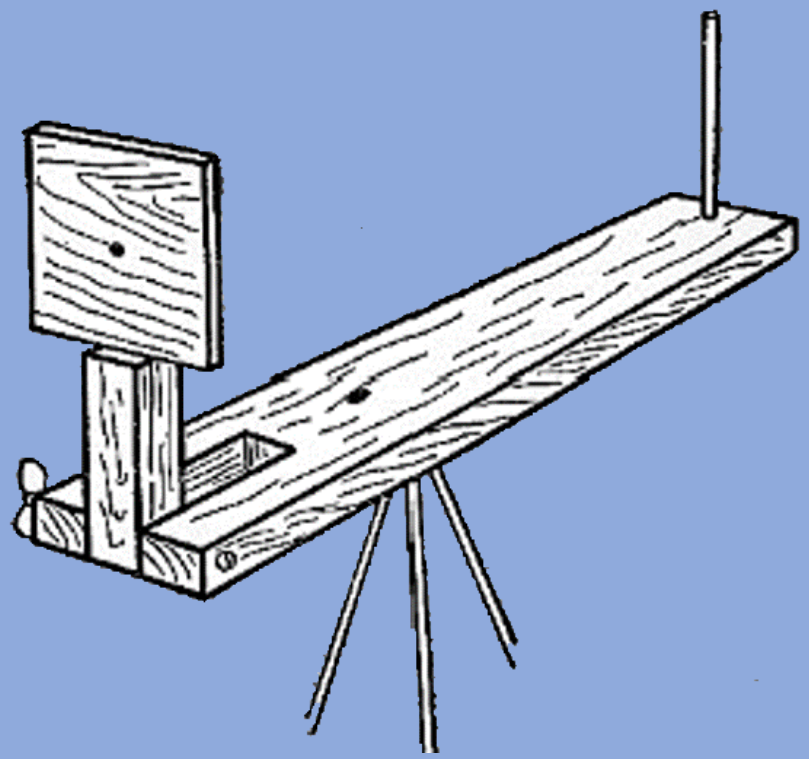
Science	Water, Biology, Sunlight
Technology	Materials science
Engineering	Design and construction
Arts	Language, communication,
Mathematics	Measuring, counting
Integrating	Using STEAMING in the context of local conditions
Nature	Weather, seasons,
Geography	Location, Scale, Time

Non-Radio EmComm Methods

Have a backup plan if no radio is available or you need to signal aircraft without a radio.

[GECO Non-Radio Ground Signals]
[GECO Non-Radio GTA Signals Part 1: What a Spotter Looks For]
[GECO Non-Radio GTA Signals Part 2.2: Selected GTA Signals]
[GECO Non-Radio GTA Signals Part 3.2: Basic LZ / DZ Support]
[GLS-GECO Non-Radio GTA Signals]
[GLS-GECO Make a Heliograph for EmComm]

Make a Heliograph



Making a simple heliograph is a good way to integrate classroom math / science lessons to build local capacity EmPrep and EmComm for disaster resilience.

Morse code could be taught as a “foreign language” and pave the way for the next generation of EmComm amateurs.

Make a Heliograph

This lesson uses common classroom lessons in:

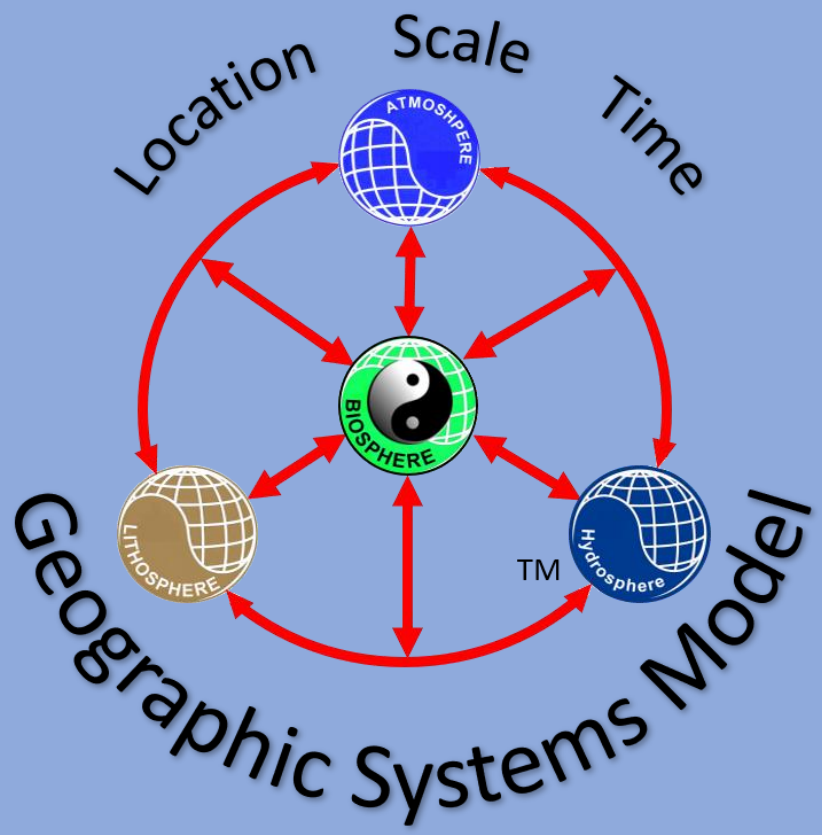
Science	Sunlight, Reflection
Technology	Materials science
Engineering	Design and construction
Arts	Language, communication,
Mathematics	Measuring, counting
Integrating	Using STEAMING in the context of the local environment
Nature	Sunlight
Geography	Location, Scale, Time

Help with Finding Schools and Teachers

Contact me if you know local education leaders or teachers who want to get students to use their classroom lessons at home and in the community.

I am available to consult on curriculum, training programs for Community-based Education, Learning, Sustainability, Emergency Preparedness, and Emergency Communications. These programs would help your country show it is taking action to support the UN Sendai Framework for Disaster Risk Reduction.

For More Information



Geography may not change the world, but it will change the way you see it.

Greg KI6GIG
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Please Help

- Please report broken links to us so we can fix them.
- If you have suggestions for accidental EmComm operators, please feel free to share them with us.
- If you can volunteer to help translate lessons and materials to help make the world a better place, please contact us.

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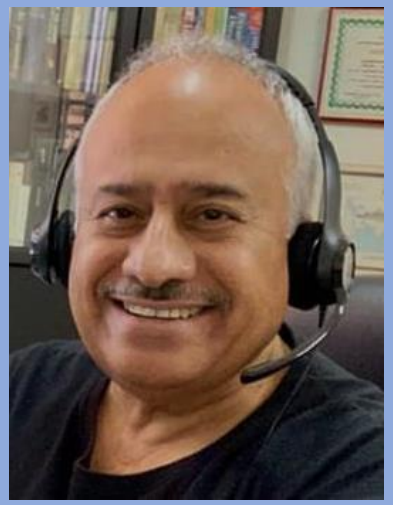
Thanks to My Elmers…

who made my amateur radio life possible, and to all the amateurs I have met over the years.

Mark N7YLA who got me started in amateur radio and keeps me going.

Joe N6WZK for his technical support and help in many ways.

Phat HS1WFK motivated me to continuously learn about EmComm.



Sam A41KL for stimulating conversations and encouragement.

A Grassroots Emergency Communications Operations
Community-based Education presentation

The End

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