

Class 1 Ham Radio Course Technician and General



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Welcome!



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Leslie Rohde

- Business Owner Since 1995
- Computer programmer since 1974
- Technologist my entire life
- Extra Class HAM
- EOC Volunteer



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Class Schedule

- Six Weeks Long
- 4 Teaching Sessions
- 1 Comprehensive Review Period
- The Exam
- The Classes are Wednesday 7p – 930p
- Exam Day Will be *Much* Shorter



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Class Format

- Presentation of New Material
- *Cumulative* Spot Check
- Bring Your Questions to Review!
- I'll focus on teaching the fun stuff, but *I'll quiz you on all of it!*



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Study Aids

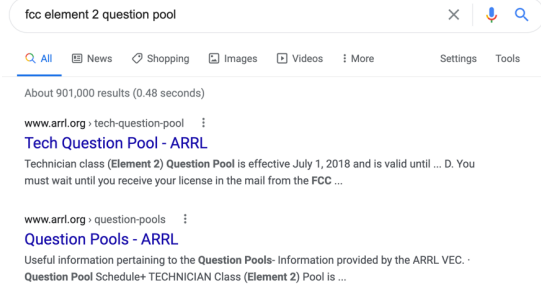
- Printed Slide Deck
- Slide Deck eMailed Each Thursday
- Link to Prior Class Videos Via eMail
- Online Practice Apps
- Mobile Practice Apps
- Review and Q&A at Each Class



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Two Ways to Pass the Test

1. Memorize the Entire Question Pool
2. Or **Understand** Why the Right Answer is Right



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The Right Answers are Always Right



Ref: Tautology

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**My Goal as a Teacher
is For You to Understand Why**



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**Passing the Exam is
a Useful Side Effect 😊**



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Trick Your Brain into Remembering

- Spaced Repetition
- Cumulative Review
- Take the Practice Examples
- Always Guess –
Even When You Have No Idea
- More References Beats Fewer References
- Understanding Sticks Far Longer Than Rote
- Memorize Where You Must,
But Look for Loopholes First



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The Four Parts to Being a Ham

- Regulation
 - RF is a Shared Resource
 - Regulations Segregate Use by Multiple Users
- Operation
 - Conventions (mostly) that Improve Utilization by HAMs
- Propagation
 - Regulated or Not, Physics is the Ultimate Rule of Law!
- Electronics
 - Some of This is a Holdover from Days Gone By
 - How Not to Break Stuff
 - How Not to Hurt People



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The 3+1 Kinds of Questions

- Concepts and Structure (T1F04)
- Keywords (T1F07)
- Memorization (T1B05)
- Poor Wording (T7A03)



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TANSTAAFL

- The Exam
 - VEs administered through ARRL
 - Cost is \$15 (cash or check only)
- Your License
 - FCC will send you an invoice as soon as they issue your license
 - The cost is \$35 for a 10 year term



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Plan Ahead for Test Day

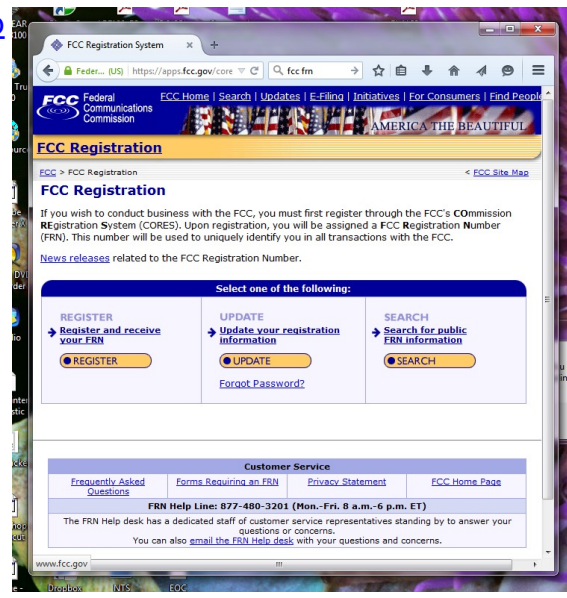
- Bring:
 - Photo ID
 - **Must have a CORES FRN ID**
 - \$15 in cash or check – no credit cards
 - Scrap paper (blank) and a calculator without memory
- The test is *untimed!*
- **There Will Be Cookies!**
- You will know in just minutes that you passed
- In ~10 days you'll have a call sign:
<https://wireless2.fcc.gov/UlsApp/UlsSearch/searchLicense.jsp>. (search "ham call sign lookup")



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Get Your FCC Registration Number (FRN) Now!

<https://apps.fcc.gov/coresWeb/publicHome.do>



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Unit 1

Regulation & Operation



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What Does 'Ham' Stand For?

Nobody Knows!



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A Bit of Amateur Radio History

- There are about 2,000,000 hams world-wide with about 750,000 in the US.
- Amateur Radio experimenters (Marconi) invented radio in the 1900s
- Started being used during WWI
- US Government started licensing amateur radio in 1912
 - Wanted to advance experimentation
 - Wanted trained radio operators for military
 - Morse code requirements dropped in 2003
- Many modern advancements in radio techniques have come from amateur radio experimenters



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Hams come in all flavors

- Hollywood Personalities
- Political figures like the King of Jordan
- Military personnel
- People interested in emergency operations – *What happens when the internet and phones go out?*
- Boy Scouts
- Sailors
- Astronauts
- Anyone interested in communications or electronics.



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What is Ham Radio?

Amateur Radio (ham radio) is a popular hobby and service that brings people, electronics and communication together. People use ham radio to talk across town, around the world, or even into space, all without the Internet or cell phones. It's fun, social, educational, and can be a lifeline during times of need.

You can set up a ham radio station anywhere! In a field...



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Usually it's Just for Fun

...at a club station...



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Sometimes it's the Zombie Apocalypse!

A collage of four images illustrating disaster scenarios. Top left: Aerial view of a destroyed town labeled 'Sandy hook NJ'. Top right: A large power line tower collapsed, labeled 'Houston, Texas'. Bottom left: A person riding a motorcycle through floodwaters, labeled 'Puerto Rico'. Bottom right: Aerial view of a flooded parking lot with cars partially submerged. In the center, red text reads: **NO POWER, NO GAS, NO TV, NO CELL PHONES and NO 911 Services!** In the bottom left corner, there are two logos: a diamond-shaped logo with 'ARES' and a circular logo for 'AMATEUR RADIO EMERGENCY SERVICE'.

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Don't Let the Name "Amateur" Fool You

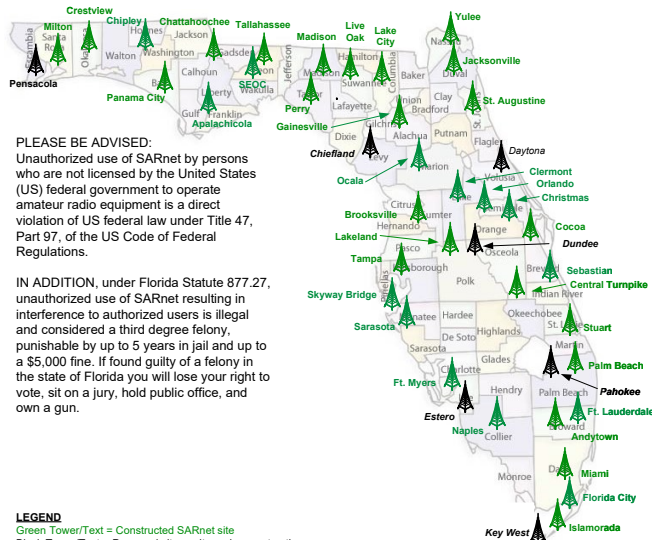
HAMs Are Often the Most
Professional Radio Operators You'll Find



* Individuals May Vary ☺

SARNet

Statewide Amateur Radio Network "SARNET" Constructed Sites as of April 10, 2022 YOU MUST BE A FEDERALLY LICENSED AMATEUR RADIO OPERATOR WITH A CALLSIGN TO USE SARNet



PLEASE BE ADVISED:
Unauthorized use of SARNet by persons who are not licensed by the United States (US) federal government to operate amateur radio equipment is a direct violation of US federal law under Title 47, Part 97, of the US Code of Federal Regulations.

IN ADDITION, under Florida Statute 877.27, unauthorized use of SARNet resulting in interference to authorized users is illegal and considered a third degree felony, punishable by up to 5 years in jail and up to a \$5,000 fine. If found guilty of a felony in the state of Florida you will lose your right to vote, sit on a jury, hold public office, and own a gun.

LEGEND
Green Tower/Text = Constructed SARNet site
Black Tower/Text = Proposed site or site under construction
TX frequency is repeater talk-out. All UHF repeaters have a +5MHz offset for the talk-in repeater receiver

SARNet SITE	TX (MHz)	Tone (Hz)
Andytown	442.825	110.9
Apalachicola	444.400	94.8
Brooksville	444.825	146.2
Central Turnpike	444.975	107.2
Chattahoochee	444.975	94.8
Chiefland	442.725	123.0
Chipley	444.750	100.0
Christmas	442.875	123.0
Clermont	444.975	103.5
Cocoa	444.650	107.2
Crestview	444.900	100.0
Daytona	444.850	123.0
Dundee	444.350	103.5
Estero	TBD	TBD
FL Lauderdale	442.850	110.9
Florida City	442.050	114.8
FL Myers	444.225	136.5
Gainesville	444.925	123.0
Islamorada	442.850	114.8
Jacksonville	444.700	127.3
Key West	444.400	114.8
Lake City	444.900	110.9
Lakeland	442.275	82.5
Live Oak	443.700	110.9
Madison	444.300	94.8
Miami	444.600	167.9
Milton	444.725	100.0
Naples	444.950	103.5
Ocala	444.025	123.0
Orlando	444.075	103.5
Pahokee	TBD	TBD
Palm Beach	444.325	110.9
Panama City	444.175	100.0
Pensacola	444.875	100.0
Perry	443.100	94.8
Sarasota	444.800	100.0
Sebastian	444.375	107.2
SEOC	443.500	94.8
Skyway Bridge	442.250	146.2
St. Augustine	442.800	127.3
Stuart	444.150	107.2
Tallahassee	442.100	94.8
Tampa	442.850	146.2
Yulee	442.900	127.3



Who Can Get a License?

- No age or nationality limits
- Can't be an AGENT of a foreign nation.
- Testing is administered by ARRL Volunteer Examiners
- Technician Test is 35 multiple choice
- Passing is 74%26 correct answers
- Entire question pool is online



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There are 3 License “Classes”

- Technician, General, and Extra
- Each License class offers more frequencies in HF bands
- General gives almost all privileges
- 80% of General is Repeated from Tech
- Extra is mostly just more technical (for “Elmers”) [and to show off!]



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Your License *Could* Last a Lifetime

- Issued for 10 Years
- Prove It?
 - Entirely Online at <https://wireless2.fcc.gov/UlsApp/UlsSearch/searchLicense.jsp>
 - Search for FCC Universal Licensing System
[and then bookmark it ☺]
- You Get a 2 Year Grace Period to Reclaim Your License
 - Can *NOT* Operate During the Grace Period
- Renew in Time With Just Another Payment
 - Or You Get to Start Over!



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Universal Licensing System

FCC > WTB > ULS > Online Systems > License Search

[FCC Site](#)

License Search

Search Results

[?](#) [H](#)

[New Search](#)
[Refine Search](#)
[Printable Page](#)
[Query Download](#)
[Map Licenses](#)

V

Specified Search						
Name like Rohde, Leslie						
Matches 1- 3 (of 3)						
PA = Pending Application(s) TP = Termination Pending L = Lease						
Page 1						
Call Sign/Lease ID	Name	FRN	Radio Service	Status	Expiration Date	
1 KC7ZBG	ROHDE, LESLIE E	0008749038	HA	Expired	08/25/2007	
2 KX4LV	Rohde, Leslie E	0015046709	HA	Canceled	06/26/2028	
3 N7LER	Rohde, Leslie E	0015046709	HV	Active	07/17/2028	
Call Sign/Lease ID	Name	FRN	Radio Service	Status	Expiration Date	
Page 1						



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https://wireless2.fcc.gov/UlsApp/UlsSearch/searchLicense.jsp

License Search

Search Results

[New Search](#) [Refine Search](#) [Printable Page](#) [Query Download](#) [Map Licenses](#)

Specified Search

Call Sign like **n7ler**

Matches **1- 2** (of **2**)

Pending Application(s)
 Termination Pending
 Lease

Page 1

Call Sign/Lease ID	Name	FRN	Radio Service	Status	Expiration Date
1 NZLER	WOODROW, KENNETH E		HA	Expired	02/25/2008
2 NZLER	Rohde, Leslie E	0015046709	HV	Active	07/17/2028

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Uls Help [Uls Glossary](#) - [FAQ - Online Help](#) - [Technical Support](#) - [Licensing Support](#)
Uls Online Systems [CORES - Uls Online Filing - License Search - Application Search - Archive License Search](#)
About ULS [Privacy Statement](#) - [About ULS](#) - [ULS Home](#)

Basic Search By Call Sign =



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https://wireless2.fcc.gov/UlsApp/UlsSearch/searchLicense.jsp

MAIN **ADMIN**

Call Sign	NZLER (Vanity)	Radio Service	HV - Vanity
Status	Active	Auth Type	Regular
Dates			
Grant	07/17/2018	Expiration	07/17/2028
Effective	07/17/2018	Cancellation	

Licensee Information

FRN	0015046709	Type	Individual
Licensee Name			
Rohde, Leslie E 645 King George Lane Fernandina Beach, FL 32034			

Amateur Data

Operator Class	Amateur Extra	Prev. Op. Class	
Group	C	Prev. Call Sign	KX4LV
Eligibility Code	Primary Station Preference List		

Trustee/Custodian (for Non-Individuals Only)

Name	Call Sign	
------	-----------	--

Basic Qualifications

Has the applicant or any party to this application, or any party directly or indirectly controlling the applicant, ever been convicted of a felony by any state or federal court? **No**



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The HAM Regulatory Hierarchy

- International Telegraph Union (ITU)
 - HAMs Talking Between Countries
 - Especially “Third Party Communications”
- Federal Communications Commission (FCC)
 - Controls Everything Radio Related in the US (except Military)
 - License class privileges are regulatory
- Self Policing of Amateur Radio by Amateurs
 - Band Plans
 - Volunteer Examiners
 - Repeater Frequency Coordination
- Local Building/Zoning Ordinances & Restrictions
 - Antenna Towers and HOAs



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Regulation is All About “Control”

- Stations are “Licensed” [sorta]
 - The (constructive) owner of a radio is a “question of fact” in court
 - No one cares until harm is done
- Any Radio Can be “Controlled” by Any Person
 - Operating Privilege Resides in the “Control Operator”
 - Permission to Control Vests in the Licensee (aka Owner)
 - Responsibility for Harm Adheres to BOTH Controller and Licensee
- There is Always a Control Operator
- The “Right Answer” is Always “Charge as Many People as Possible” 😊



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Operations



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Station Identification

- Call Sign
- Tactical
- ID every 10 minutes
- ID at end of conversation
- No Kerchunking!



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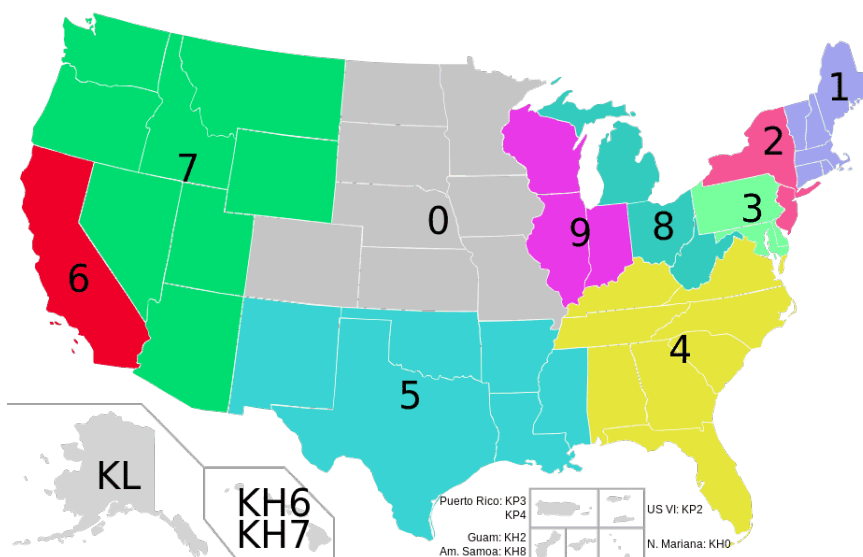
FCC Assigned Call Sign Format

- 1-2 Letters Assigned to U.S.
- A single number “call district” in U.S.
- 1-3 letter suffix
- Ex:
 - KQ4XYZ
 - KX4LV



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U.S. Call Districts



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Vanity Call Sign

- Same Format
- Applicants for each call sign are drawn randomly



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Technician Privileges

- Technician Frequencies and modes of operation
 - All VHF except 50 MHz (6 meters)
 - UHF and above: full privileges
 - 6 meters: full privileges but 200 watts max
 - 80 and 40 meter CW: most of the segment



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First Contact

- Set frequency inside an authorized band
- Set your mode to one consistent with the band-plan
- Listen to make sure someone is not talking
- On HF frequencies call “ CQ CQ CQ this is N7LER, over”
- On repeaters (144 and 440 MHz) just announce that you are Listening or mobile.... “W4NAS listening” or “ This is K6PK mobile”
- A station listening may call you back and start talking. “W4NAS this is N7LER, hey Bill how are you doing this morning, over”



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Tradecraft

- When are phonetics required?
- Q Codes
- Common Lingo



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Standard Phonetics



Phonetic Alphabet

A - alpha	N - november
B - bravo	O - oscar
C - charlie	P - papa
D - delta	Q - quebec
E - echo	R - romeo
F - foxtrot	S - sierra
G - golf	T - tango
H - hotel	U - uniform
I - india	V - victor
J - juliet	W - whiskey
K - kilo	X - x-ray
L - lima	Y - yankee
M - mike	Z - zulu

VIA 9646.COM

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Common Q Codes



Q CODES

QRL • Is the frequency busy? The frequency is busy. Please do not interfere.
QRM • Abbreviation for interference from other signals.
QRN • Abbreviation for interference from natural or man-made static.
QRO • Shall I increase power? Increase power.
QRP • Shall I decrease power? Decrease power.
QRQ • Shall I send faster? Send faster (WPM).
QRS • Shall I send more slowly? Send more slowly (___ WPM).
QRT • Shall I stop sending? Stop sending.
QRU • Have you anything more for me? I have nothing more for you.
QRV • Are you ready? I am ready.
QRX • Standby.
QRZ • Who is calling me?
QSB • Abbreviation for signal fading.
QSL • Received and understood.
QSO • Abbreviation for a contact.
QST • General call preceding a message addressed to all amateurs.
QSX • I am listening on ___ kHz.
QSY • Change to transmission on another frequency (or to ___ kHz).
QTH • What is your location? My location is _____.

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Lingo

- YL – Young Lady
- XYL – Your Wife
- 73 – Best Regards
- DX – Distance
- Copy – understood
- CQ – looking for a QSO
- Silent Key – a Ham on the other side



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Repeaters

- Transmit and receive on different frequencies
- You listen on one frequency and transmit on another
 - Called a split
 - Either up 600 or down 600 Kilohertz on 2 Meters
 - Up or down 5 MHz on 440
- High Antenna carries further and usually has more power
- Often use a sub-audible tone (CTCSS)
 - Usually 88 to 140 hertz which receivers filter out
 - Published in repeater directory or by the repeater's announcement



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Using Repeaters

- Don't use more power than you need
- Input power has nothing to do with Repeater output power
- Use simplex instead where possible
- Pro tip: Reverse Split tells you if you can go simplex



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Controlled Nets

- What does NCS mean?
- Joining a net
- Running a net
- Emergency procedures
- Highly recommended
 - Listen in Thursday at 1930 local on 147.000Mhz



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Space Stations

- A radio above 50 Km
- Many satellites
- The International Space Station
- Surprisingly easy to “work” space as a tech
- A few tricky bits
 - Doppler shift
 - When Can You See the Station? Orbital elements tell us this
 - U/V is not uncommon
- Beacons



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Emergencies

- When do FCC rules apply?
- Can you ever transmit outside your allowed frequencies?
- RACES
- ARES
- Net Etiquette



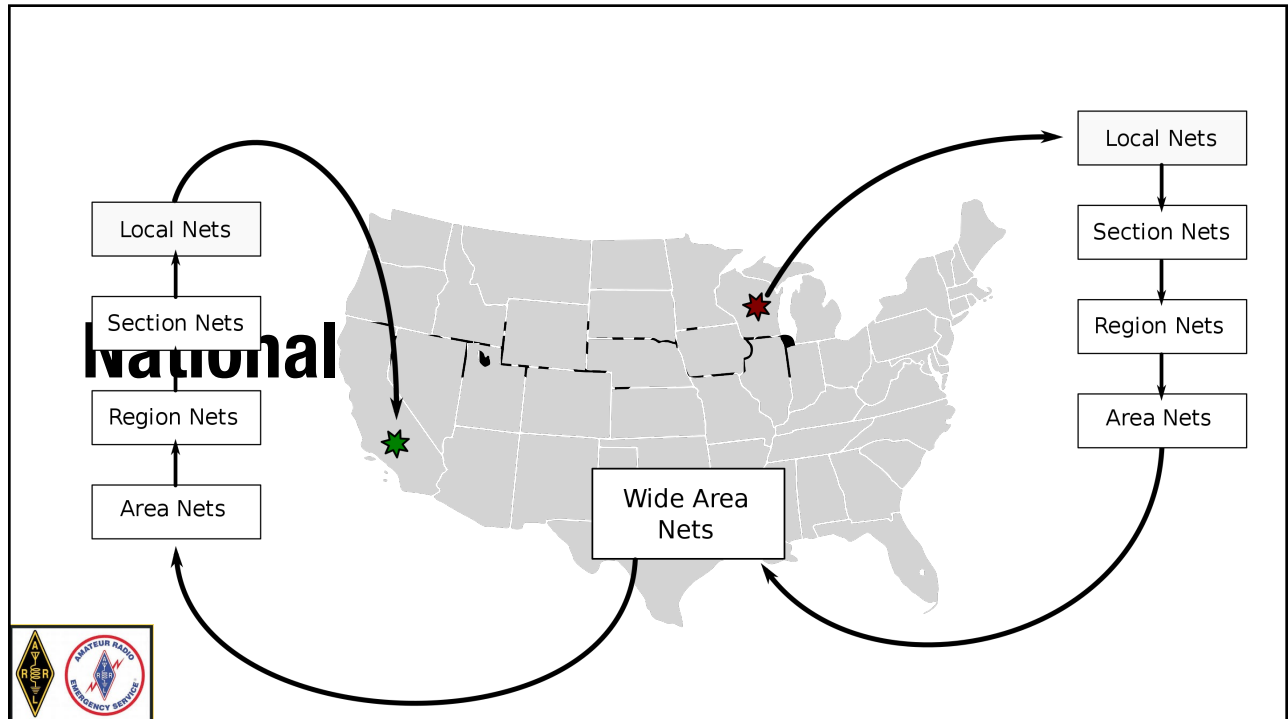
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What Does ARRL Stand For?

Amateur Radio RELAY League



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Formal Traffic

ARRL RADIOGRAM FORMAT:

PREAMBLE

NR	PREC	HX	STN ORIG	CK CHECK	PLACE OF ORIG	TIME FILED	MON DY
(2) TO						THIS RADIO MESSAGE WAS RECEIVED AT:(9)	
TEL						AMATEUR STATION _____ TEL _____	
OP NOTE (2.4)						NAME _____	
TXT						STREET ADDRESS _____	
						CITY, STATE, ZIP _____	
SIG (4)						OP NOTE (4.2)	
RCVD FROM			NET	DATE/TIME		SENT TO	NET
(5)						(6)	
(7) ORIG - FROM - DATE/TIME				(8) DLVD - TO - DATE/TIME			
Name				Name			
Addr				Addr			
City				City			
TEL				TEL			



W3YVQ.v1.04-5/02 PSCM APP.-B NTS MPG-MESSAGE FORMAT P 1-1
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1.0 THE ARRL MESSAGE FORMAT

The standard ARRL message format is used to send written amateur radio messages throughout the National Traffic System (ARRL NTS) and independent nets. The format is standardized in order to provide a uniform means of originating, handling, and tracking messages.

A message is considered a "formal" radiogram when it is completed with a correctly formatted preamble, address, text and signature. Stations in the system are not obligated to handle incomplete or improperly formatted messages.

This chapter presents the message format and how to fill out the message form. The ARRL standard message consists of four main parts:

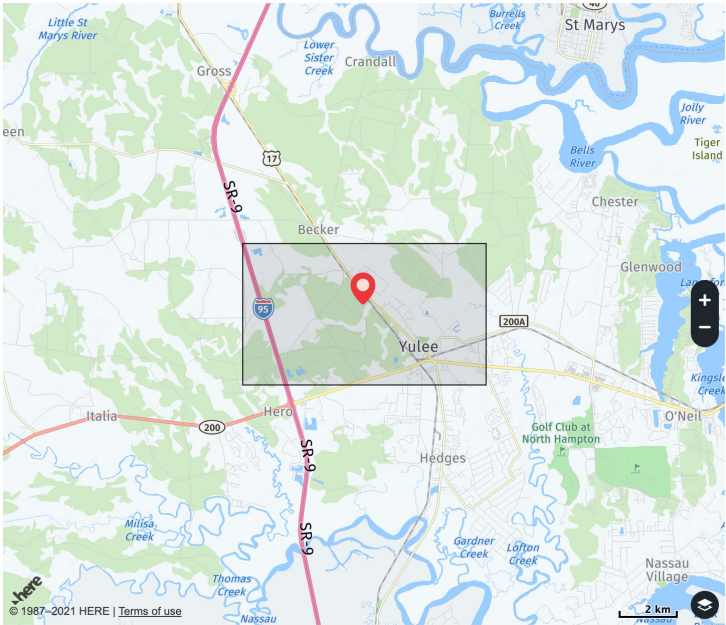

1. PREAMBLE: Information to track the message;
2. ADDRESS: Name and address of the intended recipient; (with optional delivery "Op Note");
3. TEXT: The message information; and
4. SIGNATURE: The party for whom the message was originated; (with optional reply "Op Note").

RECORDS: These four parts are recorded on the message form along with information records about how the message was originated, received, sent or delivered. The handling operator's duties include entering these records.

Latitude: 30.6487 / 30° 38' 55" N Longitude: -81.6254 / 81° 37' 31" W

Grid: **EM90ep**


Grid Locator

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Your First QSO

- Create Your Make-believe Call Sign
 - Use KQ for the prefix
 - Use the call district where you were born
 - Use 2 initials (first, last) as suffix
- I will announce that I'm "listening"
- I will pick on someone to respond
- We'll do this several times



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HAMs are Also Governed by Another Set of Laws



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EM Physics

- The only laws we can never violate
- Foundational properties of the universe
- By knowing just a little bit of physics, we know what we can do with radio, and what we can not



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