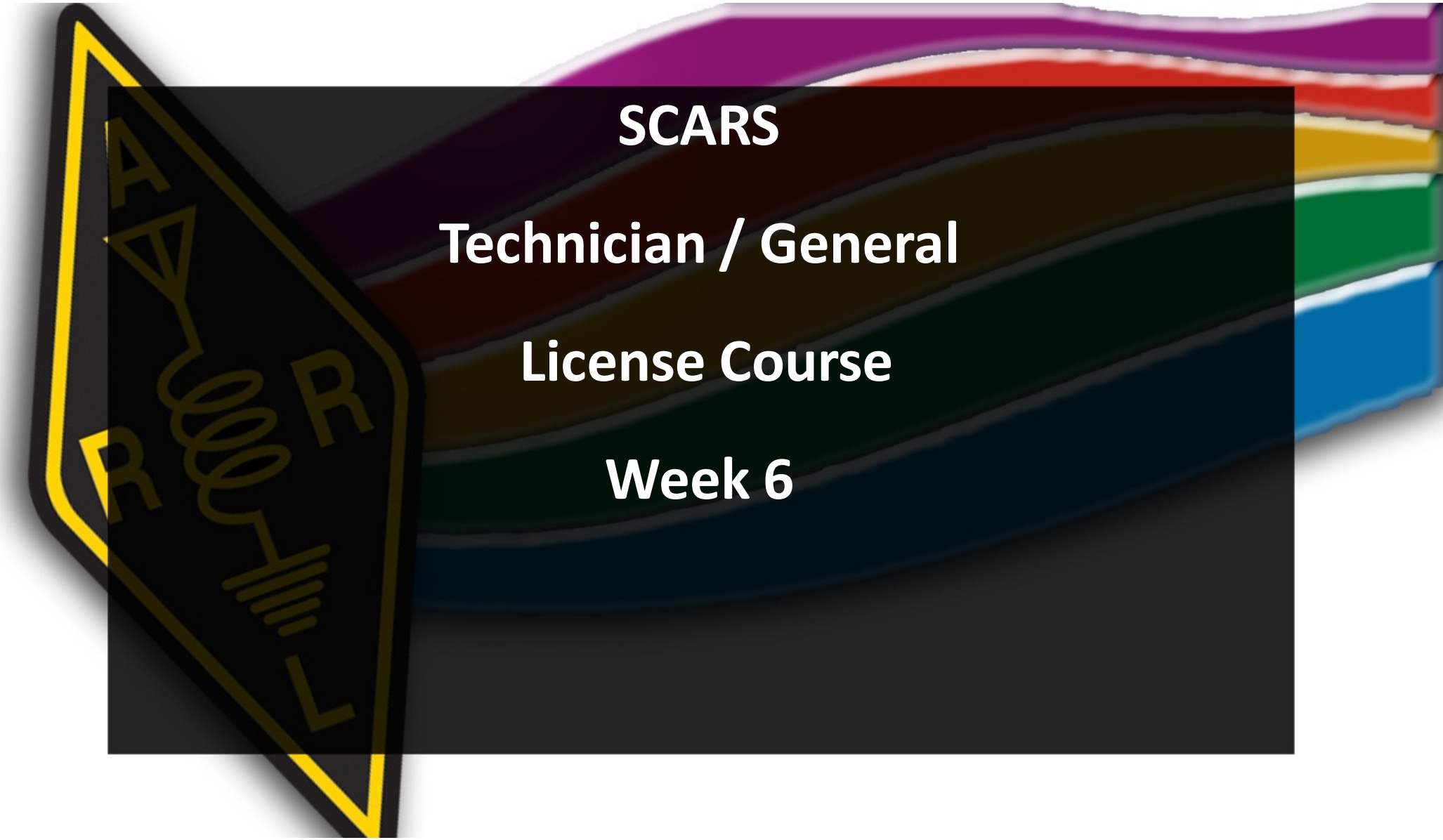

SCARS
Technician / General
License Course
Week 6

The Typical Telephone Conversation

- Greeting
- Identify who is participating
- Exchange information, generally taking turns
- Salutations
- End the conversation

The Typical Ham Contact (QSO)

- Greeting
- Identify who is participating
- Exchange information, generally taking turns
- Salutations
- End the conversation

Radio Manners

- Speak clearly and distinctly
  - Remember – you can't see the other person talking!
  - Use phonetics when needed
- Assume all communications are public –choose topics accordingly

Radio Manners

- Before transmitting, be sure the frequency is clear and you are authorized to use it!
- Station identification (10-minute rule)
- Frequencies are shared
  - No one has a prior claim to a frequency
  - Schedules, nets, pre-planned events
  - Be flexible, always have a “Plan B”

Radio Manners

- Signal reports
- Power level
  - Avoid excess power
- Location (QTH)
  - Grid locators
- RST
  - **R**eadability (1–5)
  - **S**trength (1–9)
  - **T**one (CW only 1–9)
  - "Your signal is 58"

Radio Manners

- Advice and assistance
  - Radio and antenna tests or checks
- Ham radio is self-regulated
  - ARRL Official Observers
- Logging contacts – on paper or computer
- QSLs and award programs

Band Plans

- A band plan is a formal plan for organizing types of operation on a band
  - Informal agreement – not a regulation
  - Intended for normal circumstances
  - Be flexible in times of heavy band use (contests, special events, DXpeditions)
  - Always have a “Plan B”

Making Contacts

- Repeater operation
  - Listen to see how the regulars operate
  - To announce your presence, just say your call
  - Respond to a call with the station's call followed by your own call
  - Often used by a club or group as a regional intercom

Making Contacts

- Repeater signal reports (examples)
  - Full-quieting: signal is strong enough that no noise is heard
  - Scratchy: occasional noise with your signal
  - Flutter: multi-path from a mobile station
  - In and out: occasionally copyable but mostly inaudible

Making Contacts

- HF on CW or SSB
  - “CQ” means “I am calling anyone”
  - To answer give the station’s call followed by your call once or twice
  - Use of phonetics is common

Making Contacts

- Taking turns
  - Nets
  - Roundtables
  - Shared contacts
- Breaking in
  - Wait for a pause
  - Give your call

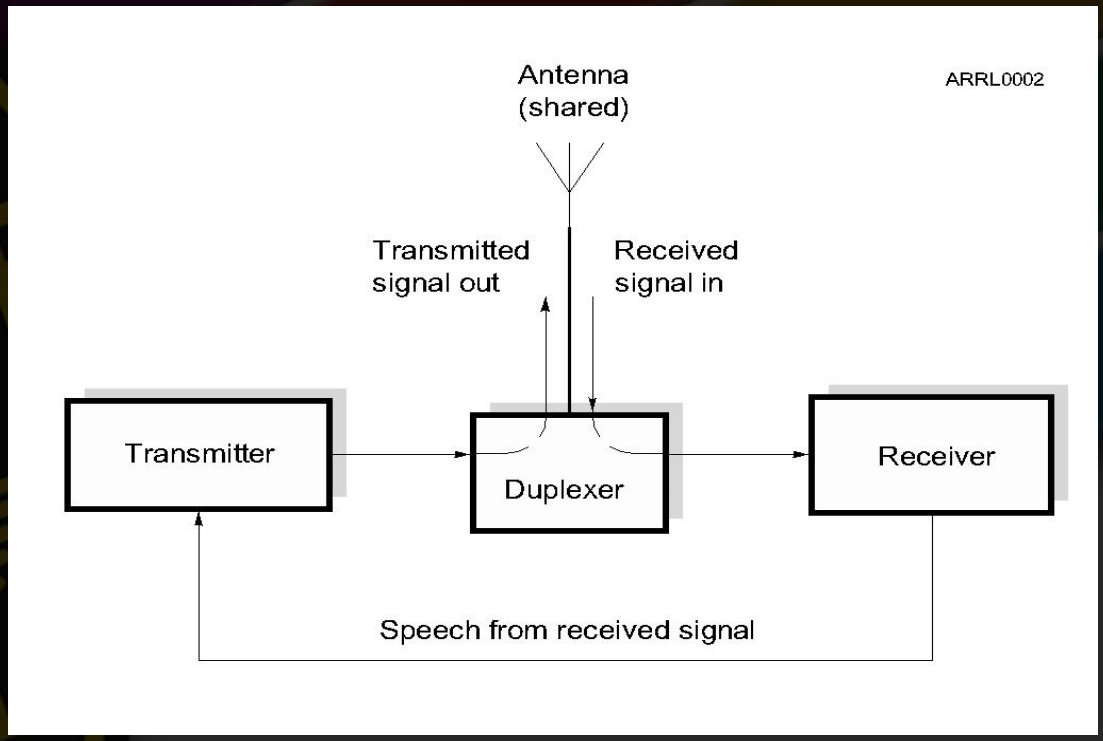
Making Contacts

- Simplex FM
  - Each user takes turns to transmit
  - Works for stations close to each other
  - If you can hear the other station on the repeater input frequency, try simplex
  - 2 meters: 146.52 MHz
  - 70 cm: 446.00 MHz

Repeater Review

- Specialized transmitter/receiver interconnected by a controller.
- Generally located at a high place.
- Receives and simultaneously retransmits your signal on a different frequency.
- Dramatically extends line-of-sight range.

Repeater Review – How They Work



Duplex Communication

- Transmitting on one frequency while simultaneously listening on a different frequency.
- Repeaters use duplex communications.
- **Output frequency** – the frequency the repeater transmits on and you listen to.
- **Input frequency** – the frequency the repeater listens to and you transmit on.

Things to Know to Use a Repeater

- Output frequency
- Frequency offset
  - –And therefore the input frequency
- Repeater access tones (if any)

Repeater Output Frequency

- Repeaters are frequently identified by their output frequency.
  - "Meet you on the 443.50 machine."
    - Here the specific frequency is used.
  - "Let's go to 94."
    - Here an abbreviation for a standard repeater channel is used, meaning 146.94 MHz.

Repeater Output Frequency

- "How about the SCARS repeater?"
  - Here the repeater is referenced by the sponsoring club name.

Repeater Frequency Offset

- The offset frequencies (shifts or splits) are standardized to help facilitate repeater use.
- There are + and – offsets depending on the plan.
- Different bands have different standardized amounts of offset.

Standard Repeater Offsets by Band

Band	*Offset*
10 Meters	–100 kHz
6 Meters	Varies by region: –500 kHz, –1 MHz, –1.7 MHz
2 Meters	+ or -600 kHz
1.25 Meters	–1.6 MHz
70 cm	+ or -5 MHz
902 MHz	12 MHz
1296 MHz	12 MHz

Repeater Access Tones

- Prevents accessing multiple repeaters at once.
- Subaudible low-frequency tone must be present before the repeater transmitter will turn on.
- Tones have various names (depending on equipment manufacturer).
  - CTCSS (continuous tone coded squelch system)
  - PL (a Motorola trade name for CTCSS)
  - Privacy codes or tones
  - DCS (digital coded squelch)

Repeater Access Tones

- Access tones are usually published along with repeater frequencies.
- Could also be announced when the repeater identifies.
  - "PL is 123.0" meaning 123.0 Hz
- Tones are generally programmed into the radio along with frequency and offset.

Repeater Control

- Repeater identification (Morse code or synthesized voice)
  - Same ID requirements as you have
- Time-out protection
  - Protects against continuous transmission in the event of a stuck PTT or long-winded speaker
  - Usually three minutes

Repeater Control

- Courtesy beep or tone signals time-out timer reset
- May have an autopatch system for phone calls

Common Problems

- Off frequency: causes audio distortion
- Low batteries: weak signal, audio distortion
- Poor location: hear repeater OK, can’t make or maintain contact
- Access tone off or wrong: repeater is strong but can’t access it
- Repeater drops in and out of your receiver: squelch setting too high

Digital Repeater Systems

- Repeaters linked by the Internet
- Use digital audio – Voice Over Internet Protocol (VOIP)
  - Similar to Skype
- Allows communication world-wide
- Internet Linking Relay Project (IRLP)
- Echolink
- Access codes on system websites

D-STAR

- Both a repeater linking system and a digital voice protocol
- DV: Digital Voice mode (voice + 1200 baud data)
- DD: Digital Data mode (128 kbps data)
- Repeaters linked together worldwide
- Call user-to-user based on call sign
- Currently an ICOM system
- Yaesu and Kenwood also building digital systems

Nets

- Net is short for “Network”
  - Evolved over the years to share and exchange information in an organized and efficient way
- Social nets
- Traffic nets
- Emergency and public service nets

Traffic Nets

- *Traffic* refers to formal messages that are relayed via Amateur Radio
  - Radiogram structured to ensure accuracy
- National Traffic System (NTS)
  - Procedures
  - Accountability

Emergency and Public Service Nets

- Public service nets – training for emergency nets
  - Training for ham operators as well as emergency groups and managers supported by Amateur Radio
- Emergency nets

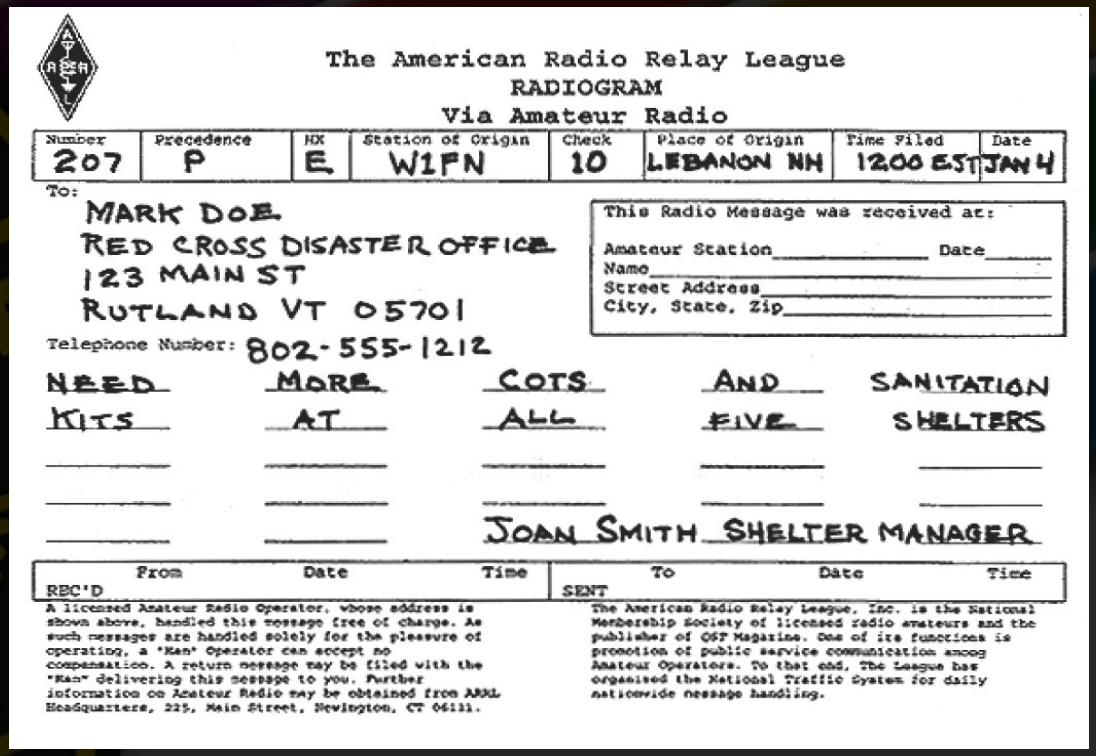
Net Structure

- Net Control Station (NCS)
  - Traffic cop who controls the flow of information
- Check-in and check-out procedures
  - Priority/Emergency access to Net Control
- Communications discipline vital
  - Learn and follow procedures

Net Structure

- Speak only when directed, and only to whom directed
- Follow through with your commitments

The Radiogram



The American Radio Relay League
RADIOGRAM
Via Amateur Radio

Number	Precedence	HX	Station of Origin	Check	Place of Origin	Time Filed	Date
207	P	E	W1FN	10	LEBANON NH	1200 EST	JAN 4

To:
MARK DOE
RED CROSS DISASTER OFFICE
123 MAIN ST
RUTLAND VT 05701

Telephone Number: 802-555-1212

This Radio Message was received at:
Amateur Station _____ Date _____
Name _____
Street Address _____
City, State, Zip _____

NEED MORE COTS AND SANITATION
KITS AT ALL FIVE SHELTERS

JOAN SMITH SHELTER MANAGER

From	Date	Time	To	Date	Time
REC'D			SENT		

A licensed Amateur Radio Operator, whose address is shown above, handled this message free of charge. As such messages are handled solely for the pleasure of operating, a "Ham" Operator can accept no compensation. A return message may be filed with the "Ham" delivering this message to you. Further information on Amateur Radio may be obtained from ARRL Headquarters, 225, Main Street, Newington, CT 06111.

The American Radio Relay League, Inc. is the National Membership Society of licensed radio amateurs and the publisher of QST Magazine. One of its functions is promotion of public service communication among Amateur Operators. To that end, The League has organized the National Traffic System for daily nationwide message handling.

Supporting Emergency Operations

- One of the most important reasons for the existence of Amateur Radio.
- Get involved and use what you have learned.
- Know where you fit in the overall emergency management team.

Emergency Communications Organizations

- Radio Amateur Civil Emergency Service (RACES).
  - Supports civil emergencies
  - National in scope
- Amateur Radio Emergency Service ® (ARES®).
  - Local and regional in scope
  - Supports non-governmental agencies

Emergency Communication Tips

- Don’t become part of the problem.
- You are a communicator, not a decision or policy maker.
- Don’t give out unauthorized information.
- Know your abilities and limitations — keep yourself safe.
- Follow radio discipline and net procedures.
- Protect personal information — Amateur Radio communications is public.

Emergency Declarations

- FCC may declare a Temporary State of Communications Emergency.
  - Includes details of conditions and rules to be followed.
  - Specifics communicated through web sites and ARRL bulletins, the NTS, and on-the-air.
  - Avoid operating on restricted frequencies unless engaged in relief efforts.

Making and Answering Distress Calls

- Rule number one – speak in plain language!
- Mayday (voice); SOS (Morse code)
- Identify
- Give location
- State the situation
- Describe assistance required
- Provide other important information

Tactical Communications

- Tactical Identifiers
  - Facilitate communications
  - Location- or function-specific
  - Transcends operator changes
- FCC ID rules still apply
  - Give your FCC call sign every 10 minutes and when changing operators

Emergency Equipment

- "Go-kits"
  - Portable Amateur Radio equipment
  - Emergency power sources
  - Personal survival supplies and equipment

Emergency Communications Training

- If you are going to participate, get training.
- Actively participate in training and drill activities.
  - Nets
  - Public service activities
  - Attend community meetings and get involved in your community.

Emergency Communications Training

- Take emergency communication courses.
  - ARRL courses
  - FEMA courses on NIMS and other topics
    - May be required for your participation

Awards, DXing, Contests

- On-the-air activities provide incentive to get on the radio.
- Learn about propagation as you search for specific stations on various bands.
- Improve operating skills.
- Fun!

Awards

- WAC
  - Contacting all six inhabited continents
- WAS
  - Contacting 50 states
- VUCC
  - Contacting 100 grid squares on VHF/UHF

DXing

- Contacting stations far away – a tradition since the first days of radio.
- On HF, usually means contacting stations in other countries.
- On VHF/UHF, means contacting stations outside your normal coverage area.

Contests

- ARRL Rookie Roundup
- North American QSO Parties (ncjweb.com)
- State QSO Parties
- VHF/UHF Contests
- CQ World Wide DX Contest (a big one!)
- Contest Calendars

Field Day

- Emergency communications training with a competitive spirit.
- Set up portable station and antenna (in the field, mobile, anywhere!) and make as many contacts as possible.
- Get started with your local club or group – great way to get involved.

Special Events

- Special Event stations are set up to commemorate some significant local event.
- Usually stations are demonstration stations set up for public display.
- Commemorative certificates are awarded for contacting the stations.

Radio Direction Finding

- Useful for locating interference or noise sources.
- Works best with a directional antenna.
- “Fox hunting” competitions offer a fun opportunity to learn and practice.
- Good training for search and rescue.

Amateur Satellites

- OSCAR
  - **O**rbiting **S**atellites **C**arrying **A**mateur **R**adio
- Modes
  - FM
  - Analog (SSB and CW)
  - Digital
- International Space Station

Satellite Terms

- Uplink – Earth stations transmit to satellite
- Downlink – Satellite transmits to stations on Earth
- Beacon – Signal from satellite with information about satellite operating conditions
- Doppler Shift – Shift in frequency due to relative motion between satellite and Earth station
- LEO – Low Earth Orbit

Satellite Terms

- Spin fading – caused by rotation of satellite
- Pacsat – packet radio satellite
- Tracking software – gives beam heading and times when satellite is in view
- Mode – bands satellite is using for uplink and downlink (eg Mode U/V = 70 cm uplink, 2 meters downlink)

Other Special Modes

- Slow Scan TV (SSTV)
  - Sending snap-shot pictures
  - One frame every few seconds
- Amateur TV (ATV)
  - Similar to commercial TV imagery
  - Uses analog TV format (NTSC)

Other Special Modes

- Radio Control (RC)
  - Telecommand
  - 50 MHz band

Section 1 – License Rules

- Licensing authority for Amateur Radio
  - Federal Communications Commission
  - FCC rules published in Part 97 of Title 47 – Code of Federal Regulations.
  - Usually referred to as “Part 97”

Why Is There Ham Radio? (Part 97.1)

- Providing emergency communication capability.
- Advancement of the art and science of radio.
- Advance communication and technical skills of radio.
- Provide a trained reservoir of operators, technicians and electronics experts.
- Promote and enhance international goodwill.

Some Definitions

- Amateur Service – no pecuniary interest (private and personal, non commercial).
- Amateur Operator – the person holding authorization (license) to operate an Amateur Radio station.
- Amateur Station – equipment capable of transmitting on frequencies authorized for Amateur Service.

The Amateur License

- No age limit or citizenship restrictions.
  - One exception – foreign representatives
- License actually contains two parts.
  - Operator license
  - Station license (the call sign)
- Three levels of operator privileges: Technician, General, Amateur Extra.

Licensing Examinations

- Volunteer Examiners (VEs)
- Volunteer Examiner Coordinators (VECs)
- Preparation
  - Study the content
  - Question Pool

Licensing Examinations

- Taking the exam
  - Proctored exam
  - Multiple choice
  - What the fee pays for

License Term and Renewal

- The license is free and good for 10 years.
  - Renewable within 90 days of the expiration date.
- Some personal identification information is required.
  - Tax ID (Social Security Number).
  - Current Mailing Address.
  - Federal Registration Number (FRN).

Responsibilities of Licensure

- Prevent unauthorized operation of your station.
- Provide personal information as required – keep a current mailing address on file.
- Make your station available for FCC inspection upon request.

FCC ULS Web Site

www.wireless.fcc.gov/uls

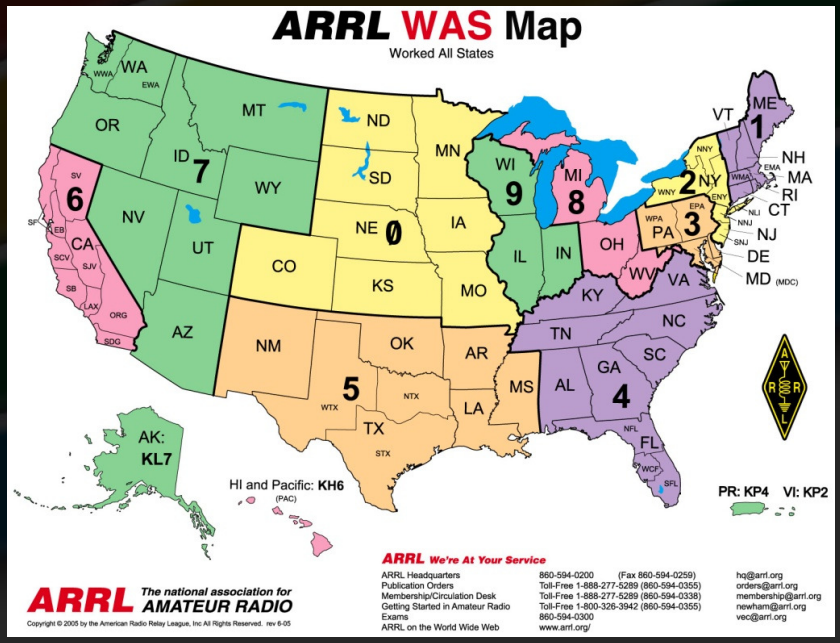
- Register for on-line access to your license information.
- Make changes to your address and other information.
- Renew your license.
- Search for other station information.

Call Signs – Your "Radio Name"

- All amateur call signs have a prefix and a suffix
  - Prefix – indicates country of license
  - Suffix – indicates a specific licensee
- Prefix – generally two or three letters and numbers assigned by the ITU
- Suffix – one or more letters

Call Signs

- US call signs begin with: K, N, W, and AA–AL
- Ten US call sign districts indicated by 0–9 in prefix
- Pacific and Caribbean possessions have special prefixes



Call Signs

- U.S. call sign types for amateurs
  - 1x1 (W1W); 1x2 (W1WW); 2x1 (WW1W); 2x2 (WW1WW); 1x3 (W1WWW); or 2x3 (WW1WWW)
- 1x1 (“one by one”) is for special events
- Remaining types are Group A through D
  - Assigned by license class

Call Signs

- Indicators – added to the call sign following a slash (/) or a word such as “portable”
- Portable – operating away from primary station location
- Mobile, aeronautical mobile, maritime mobile
- Upgrade indicators “AG” or “AE” or “KT”

Choosing Your Call Sign

- Vanity call signs – similar to vanity license plates
- Pick any call sign authorized for your license class
  - Technicians can have 2x3 (Group D) or 1x3 (Group C) calls
- www.arrl.org/vanity-call-signs

Special Event and Club Calls

- Special event call signs: 1x1
- Reserved via administrators (www.arrl.org/special-event-call-signs)
- Club calls
  - Must have a valid club
  - Application by club's trustee
  - www.arrl.org/club-call-signs

International Telecommunications Union

ITU – is the organization responsible for all international radio regulations

- Each nation agrees by treaty to abide by those regulations
- Each country decides how to administer and implement those regulations (U.S. is the FCC)

ARRL The national association for AMATEUR RADIO

International Telecommunications Union

- The world is divided into 3 regions

RC1

ARRL The national association for AMATEUR RADIO

(GCLM fig 3-1, pg 3-1)

Slide 2

RC1 Image tags are being used inconsistently. For instance, do we want one on slide 2, mod !

I made this 14 pt., rt justified
What do you mean about "Tags" on this slide? This figure comes from the Figure Fil
Richard Crockett, 3/10/2015

FCC Structure and Authority

- The FCC was established by the Communications Act of 1934
  - Regulates interstate and international communications by radio, television, wire, satellite and cable
- FCC jurisdiction covers the 50 states, District of Columbia, U.S. possessions and territories, and U.S.-flagged vessels

ARRL The national association for AMATEUR RADIO

Amateur Auxiliary

- The Amateur Auxiliary is composed of ARRL volunteer-appointees, known as *Official Observers* (*OOs),* and was created to assist the FCC
  - Monitoring the bands
  - Notifying amateurs of technical and operating discrepancies
  - The mission of the Amateur Auxiliary is to encourage self-regulation and compliance with the FCC rules

ARRL The national association for AMATEUR RADIO

Amateur Auxiliary (OO)

In cases involving serious rule violations, such as malicious interference, the Amateur Auxiliary is trained and certified to gather and forward evidence that can be used by the FCC in enforcement actions

- Transmitters stuck on
- Defective equipment (amateur or not)
- Noise sources
- Jamming or deceptive signals

ARRL The national association for AMATEUR RADIO

Fox Hunting

- Transmitter Hunting (*Fox Hunting*)
  - Very popular Amateur Radio club activity
  - Competitive radiosport events
  - Hand-held directional antennas used to DF hidden transmitters
- Direction finding skills are used by the Amateur Auxiliary to locate stations violating FCC rules or stations in distress

ARRL The national association for AMATEUR RADIO

FAA Rules

- Amateurs who want to construct an antenna structure more than 200 feet in height must notify the FAA and register the tower with the FCC
- Additional restrictions may apply if the antenna is within 4 miles of a public use airport or heliport

License Elements

- There are three license exams, which are called elements:
  - Element 2 – Technician class (35 multiple-choice questions)
  - Element 3 – General class (35 multiple-choice questions plus Element 2)
  - Element 4 – Amateur Extra class (50 multiple-choice questions plus Elements 2 and 3)
  - There is no longer an Element 1. Morse code was dropped as a licensing requirement.

ARRL The national association for AMATEUR RADIO

Examiner Rules

- Volunteer Examiner (VE) requirements:
  - Must be accredited by a Volunteer Examiner Coordinator
  - Must be at least 18 years of age
  - Must hold a General class or higher license and be in the FCC data base
  - Must have never had your amateur license suspended or revoked
  - Non-U.S. citizen must hold an FCC-granted General class license or higher
  - General class VEs may administer ONLY the Element 2 Technician class exam

ARRL The national association for AMATEUR RADIO

Examination Rules

- Rules are the same for all exam elements
  - Exam session must be coordinated by a VEC with each VE accredited by that VEC
  - Exam session must be conducted by at least three VEs who grade all exams and are responsible for determining the correct answers
  - Each successful applicant is given a Certificate of Successful Completion of Examination (CSCE) — good for 365 days — indicating which element(s) the examinee passed

ARRL The national association for AMATEUR RADIO

Examination Rules

Allowed License Exams by VE License Class	
VE License Class	**Allowed License Exams**
General	Element 2 (Technician)
Advanced	Element 2 (Technician) Element 3 (General)
Amateur Extra	Element 2 (Technician) Element 3 (General) Element 4 (Amateur Extra)

ARRL The national association for AMATEUR RADIO

Beyond Grace Period

- Grace period is 2 years for renewing a license without re-testing
  - A person with an expired General class or higher license can get a new license issued once they pass the Technician class license exam to insure they still understand the rules and regulations
  - No new Advanced class licenses will be issued
  - A new General class license will be issued to expired Generals or Advanced license holders
  - A new Extra class license will be issued to expired Extra license holders

ARRL The national association for AMATEUR RADIO

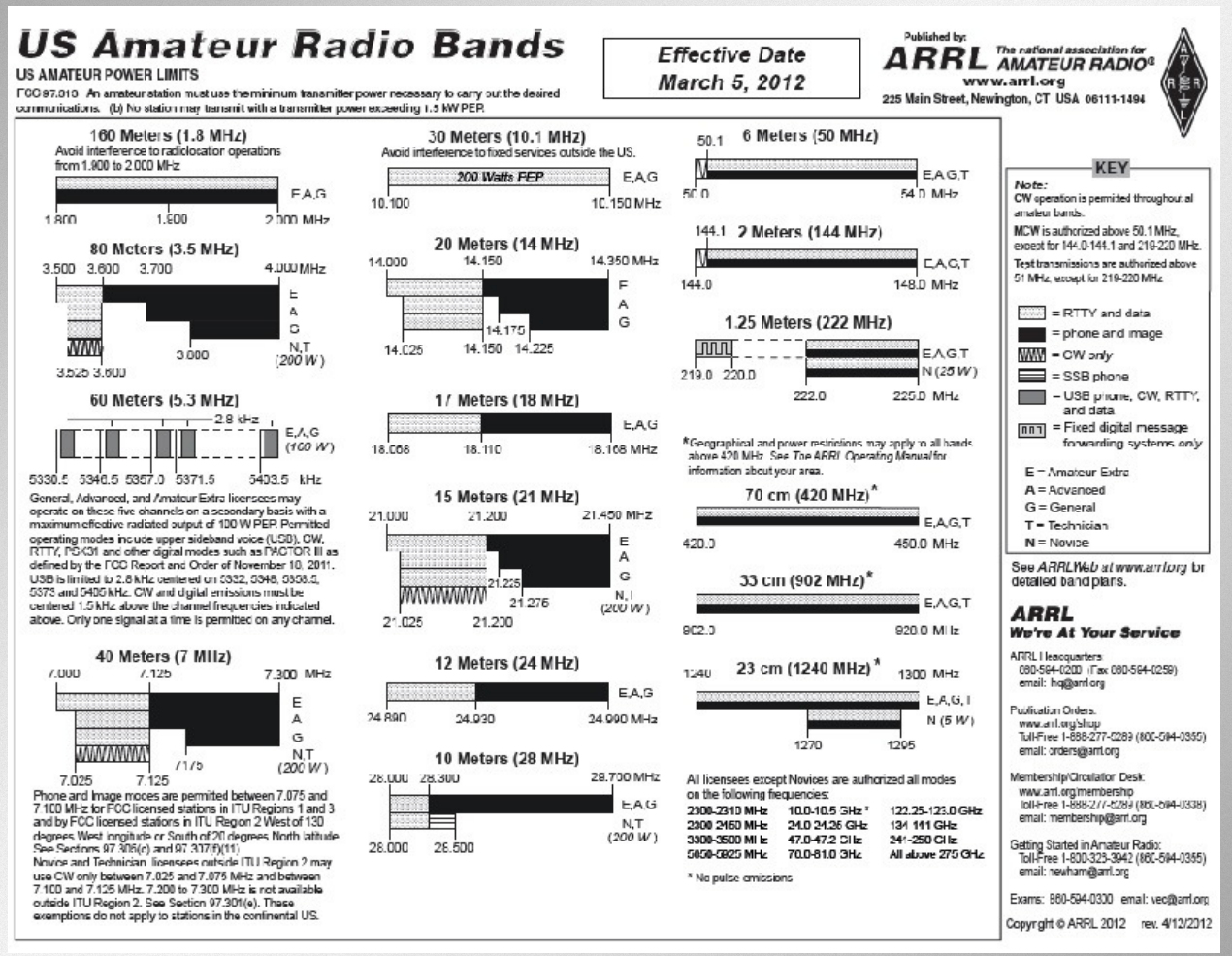
Identification Requirements

- As soon as you upgrade and receive your CSCE you can start using all of your new privileges
- Remember to append your call with the identifier (interim AG or slash AG)
- Communicate in any language but identify in English or standard English language alphabet

ARRL The national association for AMATEUR RADIO

Frequency Privileges

www.arrl.org/graphical-frequency-allocations



US Amateur Radio Bands

US AMATEUR POWER LIMITS

FCC 97.313 An amateur station must use the minimum transmitter power necessary to carry out the desired communications. (b) No station may transmit with a transmitter power exceeding 1.5 kW PEP.

Effective Date March 5, 2012

Published by: ARRL The national association for AMATEUR RADIO® www.arrl.org 225 Main Street, Newington, CT USA 06111-1494

160 Meters (1.8 MHz)
Avoid interference to radiolocator operations from 1.900 to 2.000 MHz
E,A,G
1.800 1.900 2.000 MHz

80 Meters (3.5 MHz)
3.500 3.600 3.700 4.000 MHz
E
A
G
N,T (200 W)
3.525 3.600

60 Meters (5.3 MHz)
2.8 kHz
E,A,G (100 W)
5330.5 5346.5 5357.0 5371.5 5403.5 kHz
General, Advanced, and Amateur Extra licensees may operate on these five channels on a secondary basis with a maximum effective radiated output of 100 W PEP. Permitted operating modes include upper sideband voice (USB), CW, RTTY, PSK31 and other digital modes such as PACTOR III as defined by the FCC Report and Order of November 10, 2011. USB is limited to 2.8 kHz centered on 5332, 5348, 5358.5, 5373 and 5405 kHz. CW and digital emissions must be centered 1.5 kHz above the channel frequencies indicated above. Only one signal at a time is permitted on any channel.

40 Meters (7 MHz)
7.000 7.125 7.300 MHz
E
A
G
N,T (200 W)
7.025 7.125
Phone and image modes are permitted between 7.075 and 7.100 MHz for FCC licensed stations in ITU Regions 1 and 3 and by FCC licensed stations in ITU Region 2 West of 130 degrees West longitude or South of 20 degrees North latitude. See Sections 97.305(c) and 97.307(f)(11).
Novice and Technician licensees outside ITU Region 2 may use CW only between 7.025 and 7.075 MHz and between 7.100 and 7.125 MHz. 7.200 to 7.300 MHz is not available outside ITU Region 2. See Section 97.301(e). These exemptions do not apply to stations in the continental US.

30 Meters (10.1 MHz)
Avoid interference to fixed services outside the US.
200 Watts PEP
E,A,G
10.100 10.150 MHz

20 Meters (14 MHz)
14.000 14.150 14.350 MHz
E
A
G
14.025 14.150 14.175 14.225

17 Meters (18 MHz)
E,A,G
18.068 18.110 18.168 MHz

15 Meters (21 MHz)
21.000 21.200 21.450 MHz
E
A
G
N,T (200 W)
21.025 21.225 21.275 21.200

12 Meters (24 MHz)
E,A,G
24.890 24.930 24.990 MHz

10 Meters (28 MHz)
28.000 28.300 28.700 MHz
E,A,G
N,T (200 W)
28.000 28.500

6 Meters (50 MHz)
50.1
E,A,G,T
50.0 54.0 MHz

2 Meters (144 MHz)
144.1
E,A,G,T
144.0 148.0 MHz

1.25 Meters (222 MHz)
E,A,G,T
N (25 W)
219.0 220.0 222.0 225.0 MHz

*Geographical and power restrictions may apply in all bands above 420 MHz. See The ARRL Operating Manual for information about your area.

70 cm (420 MHz)*
E,A,G,T
420.0 450.0 MHz

33 cm (902 MHz)*
E,A,G,T
902.0 928.0 MHz

23 cm (1240 MHz)*
1240 1300 MHz
E,A,G,T
N (5 W)
1270 1295

All licensees except Novices are authorized all modes on the following frequencies:

2300-2310 MHz	10.0-10.5 GHz *	122.25-123.0 GHz
2390-2450 MHz	24.0-24.25 GHz	134-141 GHz
3300-3500 MHz	47.0-47.2 GHz	241-250 GHz
5650-5925 MHz	76.0-81.0 GHz	All above 275 GHz

* No pulse emissions

KEY

Note:
CW operation is permitted throughout all amateur bands.
MCW is authorized above 50.1 MHz, except for 144.0-144.1 and 219-220 MHz.
Test transmissions are authorized above 51 MHz, except for 219-220 MHz.

= RTTY and data
= phone and image
= CW only
= SSB phone
= USB phone, CW, RTTY, and data
= Fixed digital message forwarding systems only

E = Amateur Extra
A = Advanced
G = General
T = Technician
N = Novice

See ARRLWeb at www.arrl.org for detailed band plans.

ARRL
We're At Your Service

ARRL Headquarters
860-594-0200 (Fax 860-594-0259)
email: hq@arrl.org

Publication Orders:
www.arrl.org/shop
Toll-Free 1-888-277-5289 (860-594-0355)
email: orders@arrl.org

Membership/Circulation Desk:
www.arrl.org/membership
Toll-Free 1-888-277-5289 (860-594-0338)
email: membership@arrl.org

Getting Started in Amateur Radio:
Toll-Free 1-800-32?-3942 (860-594-0355)
email: newham@arrl.org

Exams: 860-594-0300 email: vec@arrl.org

ARRL The national association for AMATEUR RADIO

Frequency Privileges

- Traditional amateur band frequency sequence: 1.8, 3.5, 7, 14, 21, 28 MHz
- Convert to wavelength: 300/f (f = frequency in MHz)
- Traditional band wavelengths are: 160, 80, 40, 20, 15, and 10 meters
- Other amateur bands: 60, 30, 17, 12 meters
- General class license operators have privileges on all bands

ARRL The national association for AMATEUR RADIO

Beacons

- Beacons are used for observation of propagation and reception to various parts of the world
- No more than one beacon signal in the same band from a single location is permitted
- Beacons are limited to 100 W PEP
- 14.100 MHz is reserved for beacons

ARRL The national association for AMATEUR RADIO

Beacons

- Beacons help determine when band openings occur
  - Northern California DX Foundation operates and maintains CW beacons on 14.100, 18.110, 21.150, 24.930 and 28.200 MHz (www.ncdxf.org/beacons)
  - There are many beacons on 10 meter CW

World Wide Beacon Network

Picture from the NCDXF: www.ncdxf.org/beacons

ARRL The national association for AMATEUR RADIO

Repeater Coordination

- Repeater or Frequency Coordinators are established to minimize repeater-to-repeater interference
- Regional Coordinators work with local amateurs to assign input and output frequencies to minimize interference
- The FCC expects amateurs to respect and use local frequency coordination process as a matter of “Good Amateur Practice”

ARRL The national association for AMATEUR RADIO

Primary vs. Secondary

- Amateurs have the primary status on most bands
  - Exceptions: On 60 meters, 30 meters, and 70 cm amateurs have secondary status
  - When operating on a secondary allocated band, listen carefully to prevent interference to the primary service
  - If necessary, change frequency to avoid interference

ARRL The national association for AMATEUR RADIO

Third Party Traffic

- ***Third-party communication*** **- sending messages on behalf of someone who is not an amateur.**

- **Third-party communications may be exchanged between any two amateur stations operating under FCC rules with the constraint that the *communications must be noncommercial and of a personal, unimportant nature or must be related to emergencies or disaster relief.***

- **U.S. amateurs may conduct amateur and third party communication outside the U.S. *unless the country has notified the ITU that it objects to such communications.***

ARRL The national association for AMATEUR RADIO

Third Party Traffic Agreements List

Table 3.3

Third-Party Traffic Agreements List

Occasionally, DX stations may ask you to pass a third-party message to a friend or relative in the States. This is all right as long as the US has signed an official third-party traffic agreement with that particular country, or the third party is a licensed amateur. The traffic must be noncommercial and of a personal, unimportant nature. During an emergency, the US State Department will often work out a special temporary agreement with the country involved. But in normal times, never handle traffic without first making sure it is legally permitted.

US amateurs may handle third-party traffic with:

V2	Antigua/Barbuda	C5	Gambia, The	OA-OC	Peru
LO-LW	Argentina	9G	Ghana	DU-DZ	Philippines
VK	Australia	J3	Grenada	VR6	Pitcairn Island*
V3	Belize	TG	Guatemala	V4	St. Kitts/Nevis
CP	Bolivia	8R	Guyana	J6	St. Lucia
E7	Bosnia-Herzegovina	HH	Haiti	J8	St. Vincent and the Grenadines
PP-PY	Brazil	HQ-HR	Honduras	9L	Sierra Leone
VE, VO, VY	Canada	4X, 4Z	Israel	ZR-ZU	South Africa
CA-CE	Chile	6Y	Jamaica	3DA	Swaziland
HJ-HK	Colombia	JY	Jordan	9Y-9Z	Trinidad/Tobago
D6	Comoros (Federal Islamic Republic of)	EL	Liberia	TA-TC	Turkey
		V7	Marshall Islands	GB	United Kingdom
TI, TE	Costa Rica	XA-XI	Mexico	CV-CX	Uruguay
CM, CO	Cuba	V6	Micronesia, Federated States of	YV-YY	Venezuela
HI	Dominican Republic			4U1ITU	ITU - Geneva
J7	Dominica	YN	Nicaragua	4U1VIC	VIC - Vienna
HC-HD	Ecuador	HO-HP	Panama		
YS	El Salvador	ZP	Paraguay		

Notes:

Since 1970, there has been an informal agreement between the United Kingdom and the US, permitting Pitcairn and US amateurs to exchange messages concerning medical emergencies, urgent need for equipment or supplies, and private or personal matters of island residents.

Please note that Region 2 of the International Amateur Radio Union (IARU) has recommended that international traffic on the 20 and 15 meter bands be conducted on 14.100 – 14.150, 14.250 – 14.350, 21.150 – 21.200 and 21.300 – 21.450 MHz. The IARU is the alliance of Amateur Radio societies from around the world; Region 2 comprises member-societies in North, South and Central America and the Caribbean.

At the end of an exchange of third-party traffic with a station located in a foreign country, an FCC-licensed amateur must transmit the call sign of the foreign station as well as his own call sign.

Current as of January 2015; see **www.arrl.org/third-party-operating-agreements** for the latest information.

ARRL The national association for AMATEUR RADIO

Prohibited & Restricted Communications

- Music except as part of manned space craft retransmissions
- Transmissions of codes designed to obscure/hide the meaning of the message
  - Exceptions: controlling a space satellite or radio-controlled model craft
- Transmitting false distress signals
- Business-related or pecuniary (monetary) interests in communications activity

ARRL The national association for AMATEUR RADIO

Written Records

- Keep an activity log (logbook):
  - Date/time of contacts, frequency or band used, call sign of station(s) contacted, signal reports, mode and power used
- Guest operators:
  - Date/time, call signs of guest operator(s), especially if you transferred control operator status of your station to another amateur

Keeping a Log

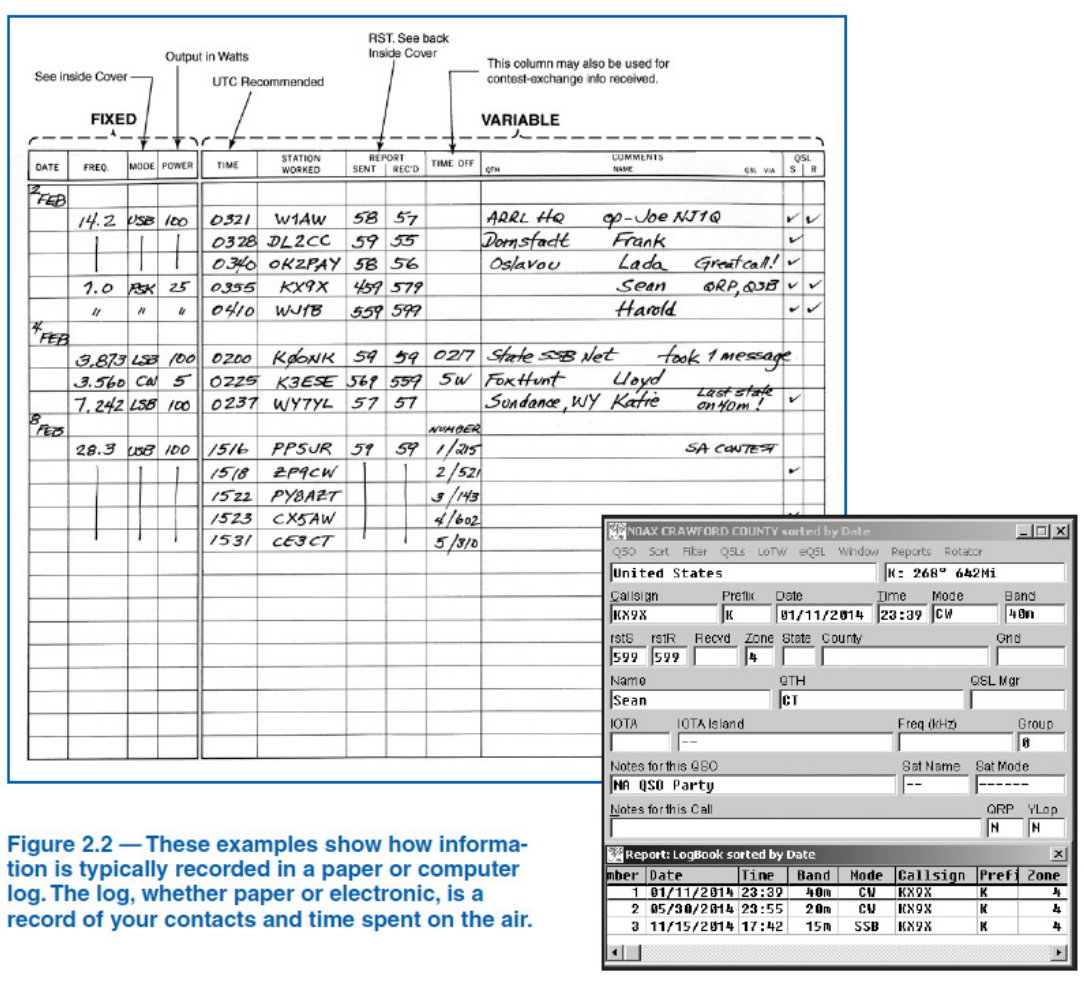


Figure 2.2 — These examples show how information is typically recorded in a paper or computer log. The log, whether paper or electronic, is a record of your contacts and time spent on the air.

ARRL The national association for AMATEUR RADIO

Good Amateur Practices

- The general requirement by the FCC, in the *absence of a specific rule*, is that Amateur stations be operated in *conformance with good engineering and good amateur practices*
- The FCC determines what is or isn't good engineering or amateur practices

ARRL The national association for AMATEUR RADIO

Transmitters & Power

- General, Advanced and Amateur Extra operators are limited to a maximum transmitter output of 1500 W PEP
- Amateurs are restricted to 200 W PEP on the 30 meter band
- Amateurs are restricted to 100 W PEP on 60 meters with a maximum bandwidth of 2.8 kHz
- Amateurs are required to use the minimum power necessary to carry out the desired communication

ARRL The national association for AMATEUR RADIO

Transmitters & Power

- *QRP* – low-power. 10 W output power or less; 5 W is common.
  - Some hams use even less power
  - Popular for portable operating
- General, Advanced, and Amateur Extra licensees are no longer restricted to 200 W in the former Novice segments on 80, 40 and 15 meters.

ARRL The national association for AMATEUR RADIO

Digital Transmissions

Table 3.4

Maximum Symbol Rates and Bandwidth

Band	*Symbol Rate (baud)*	*Bandwidth (kHz)*
160 through 10 m	300	1
10 m	1200	1
6 m, 2 m	19.6k	20
1.25 m, 70 cm	56k	100
33 cm and above	no limit	no limit

ARRL The national association for AMATEUR RADIO