

A R E S
Amateur Radio Emergency Service

Amateur Radio and Emergencies
in Santa Cruz County

Santa Cruz ARES
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**AMATEUR RADIO
and
EMERGENCIES IN SANTA CRUZ COUNTY**

WHAT IS HAM RADIO?

Hams are hobbyists who communicate using short-wave radio. Amateur (ham) Radio has existed as a hobby since the early part of this century. The hobby is multi-faceted. Some hams communicate via morse code, while others use voice, television, or computer linkups. Some communicate on just a local basis, while others routinely talk with hams throughout the world. Amateur Radio has been an integral part of several United States space shuttle missions and with the Soviet MIRV flights. Hams have been operating communication satellites since 1961.

From the beginning, hams have provided auxiliary communications following disasters--the first record of organized disaster relief operations dates from 1913. Often they have been the only link with stricken areas. Following both the 1985 Mexico City earthquake and the 1989 Loma Prieta 'quake, Amateur Radio provided the only wide area communications for many hours. During the storms of 1982-83, and the disastrous fires of 1985, hams contributed many thousands of hours, providing communication services.

The Federal Communications Commission (FCC) established the Amateur Radio Service as a "voluntary non-commercial communications service, particularly with respect to providing emergency communications." Amateur operators are licensed by the FCC, after passing written examinations covering technical knowledge and familiarity with the Rules and Regulations. The ham is assigned unique station call letters, just like a broadcast station. Amateur Radio in some form exists in virtually every country. The allocation of radio frequency bands to the Amateur Radio Service is based upon international treaties.

**HOW IS HAM RADIO
DIFFERENT?**

Amateur Radio is sometimes confused with other forms of personal radio, principally CB and Mobile Telephone. There are some significant differences.

Essentially CB, or Citizens Band, radio is unregulated---there is no licensing. Where organization exists it is strictly at a local level. The limited range of CB equipment means two stations are usually unable to talk more than a few miles. CB operators can't communicate directly via the telephone system. Their reports must be relayed by someone with a telephone.

Mobile Telephones, including Cellular Radio units, provide regular telephone service to subscribers---generally only in urban areas.. The user is assigned a number and may be dialed from any telephone. There is a charge for every call. The system does not work when local telephone service is disrupted---as occurred following the 1989 earthquake.

Radio Amateurs have available a wide range of frequencies for operation. They can communicate around the world or locally, depending upon the frequency chosen. The amateur communicates with other local area fixed or mobile stations via repeater stations. Such "local" communication may occur over distances of a hundred miles or more.

**PUBLIC SERVICE AND
EMERGENCY PREPAREDNESS**

A trait common among many hams is a willingness to serve their communities. Besides providing disaster communications, they participate in such events as the March of Dimes, Special Olympics and other charitable fund raising activities.

Voluntary efforts are promoted and coordinated on a national basis by the ARRL. The American Radio Relay League is the ham operator's association. On a regional and local basis ARRL sponsors the ARES (Amateur Radio Emergency Service). In this area ARES provides emergency support to the Santa Cruz County OES, American Red Cross, the Salvation Army, Dominican Hospital and Watsonville Community Hospital as well as the California Division of Forestry (CDF). When called to service by County OES,

hams become part of RACES, (the Radio Amateur Civil Emergency Service). RACES is a unit established and managed through the California Office of Emergency Services and local governments. ARES represents a vast mutual aid resource, which may be found throughout the United States.

AMATEUR REPEATERS

Most emergency communication is handled on VHF or UHF frequencies, like police and fire radios. The relatively limited range of mobile and portable radio equipment requires repeater stations to extend coverage, by re-broadcasting signals. These stations are usually located on hills, mountains or tall structures. There are several hundred of these stations in our state. Thousands more are located around the US. Equipment is usually owned and operated by local radio clubs. Some is individually owned.

OTHER EMERGENCIES

Hams frequently report fires, medical emergencies, crimes, accidents and other situations. Most of the ham radios feature a telephone style Touch Tone (R) dial. At repeater stations there is often special equipment tied into the public telephone system. Hams may originate calls, but they cannot be called from a telephone. Only strictly personal or emergency calls may be made. Ham radio can never be used for conducting business.

LOCAL AMATEUR RESOURCES

The County Office of Emergency Services (OES) has equipped an Amateur Radio communication room in the Government Center. OES has also acquired a van and equipped it as a mobile amateur communications center. Amateur stations have been installed by the Red Cross, Watsonville Community and Dominican Santa Cruz hospitals and the California Division of Forestry.

In addition to county wide communication, direct contact is available with surrounding counties and with the State OES. When needed long-range communications can even be established with other parts of the country.

The Santa Cruz County amateur network could not function without county wide repeater coverage. Repeaters located in Santa Cruz and Watsonville are owned and maintained by the Santa Cruz County Amateur Radio Club. The San Lorenzo Valley is covered by a Felton area station operated by the SLV Radio Club. During disaster operations, these stations can be linked together.

The principal resources which make these networks feasible are provided by the individual ham volunteers. For example, following the Loma Prieta temblor nearly 400 ham volunteers worked in Santa Cruz County. Most came from other counties. They brought with them an estimated \$1.5 million of their own radio gear. Equipment which was uniquely valuable since it was useable in any area--amateur radio units are capable of operating on any assigned frequency within a given band.

SANTA CRUZ COUNTY

AMATEUR RADIO EMERGENCY SERVICE

The Santa Cruz Amateur Radio Emergency Services (SCARES), an all volunteer organization, is comprised of Amateur Radio operators who have registered their qualifications, and made themselves, and their equipment, available for disaster communication duty. Every licensed amateur is eligible for membership in the SCARES. The only qualification, other than holding a valid license of technician or higher class, is a demonstrated desire to serve.

ARES does not declare emergencies, but rather responds to the call for assistance from those public agencies which have that responsibility. Through the ARES and the RACES (Radio Amateur Civil Emergency Service) disaster preparation is coordinated with local governmental agencies. The planning and training conducted by ARES has that primary goal---as does on-going liaison with the agencies to be served.

ARES may be called upon to supply communication services where no established links exist, or to supplement existing systems when they become disabled or overloaded. The communications systems of Public Safety organizations are designed to routinely handle emergency situations. It is not feasible for them to also maintain resources which can meet the demands of all major disasters. In those instances, the Radio Amateurs serve to complement existing governmental and disaster agency communications resources. Services provided by amateurs may include:

1. Communication between Santa Cruz County and other governmental agencies.
2. Communication between county officials and other officials of local government or state agencies.
3. Inter-communication between county, municipal and state public service organizations.
4. Supplemental communication services to disaster relief organizations, including the American Red Cross and Salvation Army.
5. Supplemental communication services to hospitals and other medical resources.
- 6 Health and Welfare communications for the general public.
7. Additional public service communications as required.

**Emergency Contacts
and
Served Agencies**

The following organizations may be served by ARES in disaster situations involving their jurisdictions. Locations and telephone numbers are given.

Agency	Eqpt Location City	Telephone
American Red Cross*	2960 Soquel Avenue Santa Cruz	462-2881
American Red Cross	351 E. Lake Ave. Watsonville	722-3801
Ben Lomand Fire Department	Ben Lomand	336-5495
Bonny Doon Fire Department	Bonny Doon	426-1561
Boulder Creek Fire Department**	Boulder Creek	338-7222/338-2542
Brookdale Fire Dept.	Brookdale	Call Boulder Creek
California Highway Patrol	10395 Soquel Drive Aptos	662-0511
Capitola Police Department	422 Capitola Ave. Capitola	475-4242
Civic Auditorium	307 Church St. Santa Cruz	
Community Hospital Santa Cruz *	610 Frederick Santa Cruz	426-3282
Community Hospital/Watsonville*	Green Valley & Holohan Roads	724-4741
County Communications (OES)*	701 Ocean Street Santa Cruz	425-2355
Department of Forestry	Corralitas Road, Corralitas	
Department of Forestry*	6059 Highway 9 Felton	335-5355
Dominican Hospital*	1555 Soquel Drive Santa Cruz	462-7700
Emergicare Medical Clinic	6800 Soquel Drive Aptos	662-3611
Felton Fire Department	Felton	335-4422
National Weather Service	Redwood City	415/364-4610
Office of Emerg.Serv., SC Co.	701 Ocean Street Santa Cruz	425-2045
Pacific Gas & Electric	Santa Cruz	426-8300
Pacific Telephone	Santa Cruz	649-2189
Salvation Army**	721 Laurel Street Santa Cruz	426-8365
Santa Cruz County Sheriff	701 Ocean St. Santa Cruz	425-2121
Santa Cruz Fire Dept.	711 Center St. Santa Cruz	429-3600
Santa Cruz Med Clinic	2025 Soquel Ave Santa Cruz	423-4111
Santa Cruz Med Clinic	4615 Scotts Valley Dr. Scotts Valley	438-1711
Santa Cruz Police Department	809 Center Santa Cruz	429-3714
Scotts Valley Fire Department	7 Erba Lane Scotts Valley	438-0211
Scotts Valley Med Clinic	2980 El Rancho Dr. Scotts Valley	438-1430
Scotts Valley Police Dept.	370 Kings Village Rd Scotts Valley	438-2326
Toxic Info Center		800/233-3360
Watsonville Fire Department	Station 2 - 370 Airport Blvd Freedom	728-6066
Watsonville Fire Department	Station 1 115 2nd St. Watsonville	728-6060
Watsonville Police Department	215 Union Watsonville	728-8104
Zayante Fire Department Zayante		335-5100

* Amateur Radio Equipped

** 2 Meter Antenna Installed

ARES Communications Resources

The following frequencies will normally be utilized during mobilization of the Santa Cruz Amateur Radio Emergency Service.

REPEATERS

LOCATION	OUTPUT FREQUENCY	INPUT FREQUENCY	CALL	ARES FUNCTION
Santa Cruz	146.790	146.190	K6BJ	Primary Net Operations* 1 2
Watsonville	147.945	147.345	KI6EH	Primary Net Operations* 1 2
San Lorenzo Valley	147.120	147.720	N6RZ	Primary Net Operations 2
Santa Cruz Co.	440.850	445.850	N6IYA	Situation Coordination 2 3
Castle Rock	145.450	144.850	K6FB	Inter-County Net
Monterey Co.	146.970	146.370	K6LY	Primary Net
Fremont Peak	145.470	144.870	K6JE	San Benito/Monterey Counties

Notes: * If the repeater fails, go to Simplex operation on the Repeater Output frequency.

1 K6BJ & KI6EH are normally linked. May be separated for localized operations.

2 These repeaters may be linked during any emergency operation.

3 PL 100 hZ

SIMPLEX FREQUENCIES

146.520#	146.565	147.420	147.465	147.510
146.535	146.580	147.535	147.480	147.540
146.550	146.595	147.450	147.495	147.570

National Simplex Frequency

MUTUAL AID FREQUENCIES

147.735 mHz	WA6WVH	State EOC Region II, Pleasant Hill
7,240 kHz	Daytime	State EOC Region II, Pleasant Hill
3,997 kHz	Nighttime	State EOC Region II, Pleasant Hill
3,952 kHz		Western Public Service Net
7,255 kHz		WESTCARS
147.695 mHz	Simplex	National Alerting Frequency
146.520 mHz	Simplex	National Calling Frequency

PACKET OPERATIONS (Data Communications Network)

Bulletin Board Systems

144.990 mHz	KB6DUI	Boulder Creek
144.990 mHz	N6MPW-7	Ben Lomand
145.070 mHz	KI6EH	Santa Cruz - County Comm/ARES
145.090 mHz	KB6IRS	Soquel (WestNet Gateway)
145.090 mHz	N6IYA-2	Felton (WestNet Gateway)

NATIONAL DISASTER INFORMATION

When emergency conditions exist in another part of the country, or the world, you will be able to receive current information by listening to regularly scheduled broadcasts from W1AW, the ARRL Headquarters station in Newington, Connecticut.

MODE	TIME	FREQUENCY
Voice/SSB	On the hour	3990, 7290, 14290, 21390, 28590 kHz +
Teleprinter	15 mins past hour	3625, 7095, 14095, 21095, 28095 kHz +
	45.45 bps Baudot	
	110 cps ASCII	
	100 bps AMTOR	
CW (18 wpm)	On the half hour	3580, 7080, 14070, 21080, 28080 kHz +

GLOSSARY OF TERMS

AEC Assistant Emergency Coordinator. Working under the Emergency Coordinator, AEC's are responsible for specific areas of emergency communication preparedness and operations.

Amateur Radio Operator A person holding a license issued by the Federal Communications Commission. Dependent upon class of license issued, may use specific Amateur Radio frequency bands for non-commercial purposes.

APCO Associated Public Safety Communication Officers, Inc. A professional association.

ARC American Red Cross

ARES Amateur Radio Emergency Service. The emergency communications organization sponsored by the ARRL. Dedicated to providing public service communications on a voluntary basis, in times of disaster.

ARRL American Radio Relay League. The national organization for Hams.

ATV Amateur Television. FCC rules permit television operation in particular frequency bands. Lightweight portable equipment is popular.

Autopatch Equipment which allows an Amateur Radio station to communicate via the telephone system. Connects transmitter and receiver of a fixed station to a telephone line and provides the necessary controls for both the telephone system and the radio equipment. Often used for reporting emergency situations to 9-1-1.

Base Station An Amateur Radio station installed at a fixed location.

Breaker Anyone who interrupts a conversation between two other stations. Normally involves priority or emergency communication.

CDF California Department of Forestry and Fire Protection

Channel The transmit and receive frequencies which are used together.

CHP California Highway Patrol

Coverage The area over which a radio station can conduct two-way communication.

DEC District Emergency Coordinator. Coordinates and supervises the emergency communication groups within an ARRL District (for example Santa Cruz County).

Desense or desensitization. An interfering signal causes a radio receiver to become less capable of receiving weaker signals.

Distress Calls Normally applies to requests for emergency assistance from ships or aircraft.

DTMF Dual Tone Multiple Frequency. The tone signalling system commonly known as Touch Tone. Each button on the pad will cause two tone frequencies to be simultaneously generated. A 16 button pad utilizes 8 tones.

EC Emergency Coordinator. Appointed to administer and coordinate local emergency communication preparedness and operations.

FEMA Federal Emergency Management Agency

Ham Commonly used term meaning Amateur Radio operator.

Handheld Small portable transceiver capable of being hand held. Is often the only VHF or UHF radio owned by Hams.

Health and Welfare Traffic Messages relating to the Health and Welfare of private citizens.

Input In a Repeater station refers to the receiver frequency.

Intermod or intermodulation. The combining of two or more radio signals to produce other frequencies. Commonly the sum or difference of those frequencies, or multiples of them.

Machine Slang. Refers to the equipment of an amateur repeater station.

NCS Net Control Station. Directs and coordinates all stations participating in any net operation, emergency or routine.

NTS National Traffic System. The ARRL sponsored network which is organized to handle Health and Welfare communications during emergency situations. Normally handles message movement over large distances.

NiCad or Nickel Cadmium The type of rechargeable battery most often used with portable radio equipment.

OES Office of Emergency Services That organization at the state, county, or local government level charged with responsibility for planning, preparation, and disaster operations.

Offset The difference between the transmit and receive frequencies of a repeater station. Most commonly +/- 600 Hz.

Omnidirectional Refers to a non-directional antenna radiation pattern.

Output The transmit frequency of a repeater station.

Packet Radio A digital communications system using computer terminals transmitting via Amateur Radio stations. Provides fast reliable record communications.

Picket Fencing A condition produced in an FM receiver under poor signal conditions. Particularly noticeable with moving vehicles. Signal strength drops and noise level increases at regular intervals. Like dragging a stick along a picket fence. May cause squelch to rapidly turn on and off.

Point-to-Point Communications Communication between fixed locations.

Polarization Refers to the orientation of radiation from an antenna. Vertical polarization is normally used in base (repeater) to mobile communications. Horizontally polarized antennas would be undesirable for repeaters, since only vertical antennas are practical on a vehicle.

Public Safety Agency Governmental agencies charged with protecting lives and property. For example Police, Fire and Highway Patrol.

Public Service Non-profit. For the benefit of the general population.

Quieting The effect of a signal upon an FM receiver. The strength of the signal is defined by how much the audible noise level is reduced.

RACES Radio Amateur Civil Emergency Service. An FCC established service, managed by state and local governments to provide disaster management or civil defense communications. In Santa Cruz County ARES members are also enrolled in the RACES.

Relay Station A station which serves as an intermediate receiving and transmitting location. Passes messages between stations which can not communicate directly.

Repeater A station which receives transmissions from a mobile, portable, or fixed station and re-broadcasts them, for extended range. Usually located in a relatively high location.

Resource Net The network operations involving the coordination of personnel and equipment for an Amateur Radio Emergency Service activity.

SEC Section Emergency Coordinator. Coordinates emergency activities within an ARRL Section. Works with local ARES groups through the DEC.

Served Agency Any governmental agency or relief organization with which local ARES groups have a working relationship.

SET Simulated Emergency Test. A drill.

Simplex Operation Refers to radio operations where both transmitter and receiver operate on a common frequency.

SKYWARN A system which becomes operational during specific emergency weather conditions such as hurricanes, tornados, floods and blizzards. Provides weather information to the National Weather Service and disseminates NWS advisories to local authorities.

Squelch Tail The noise heard in a receiver as the received signal disappears.

Tactical Net A radio net organized for the purpose of handling the operational communications associated with an emergency situation.

Third Party Traffic Messages originated by, or addressed to, someone other than the originating amateur station.

2 Meters An FCC assigned Amateur Radio band covering 144-148 MHz. Most popular band for mobile and portable operation. Repeaters are operated nationwide.

911 Emergency Service A system which provides fast easy access, via telephone, for citizens in need of emergency help such as police, fire, or medical emergencies.