

South Carolina Amateur Radio Emergency Service and Radio Amateur Civil Emergency Service Tactical Communications Guide

September 5, 2011

This guide provides tactical information for members of the South Carolina Amateur Radio Emergency Service (ARES), Radio Amateur Civil Emergency Service (RACES) and the general amateur radio community. The information in this guide was developed over a two year period starting in 2008, and is the outcome of the Amateur Radio Emergency Services (ARES)/ Radio Amateur Civil Emergency Services (RACES) Strategic Communication Plan for South Carolina, dated 2009.

Comments or corrections to either plan should be sent the ARRL Section Emergency Coordinator of South Carolina. The ARRL Emergency Leadership for South Carolina may be found on <http://ares-sc.org/>.

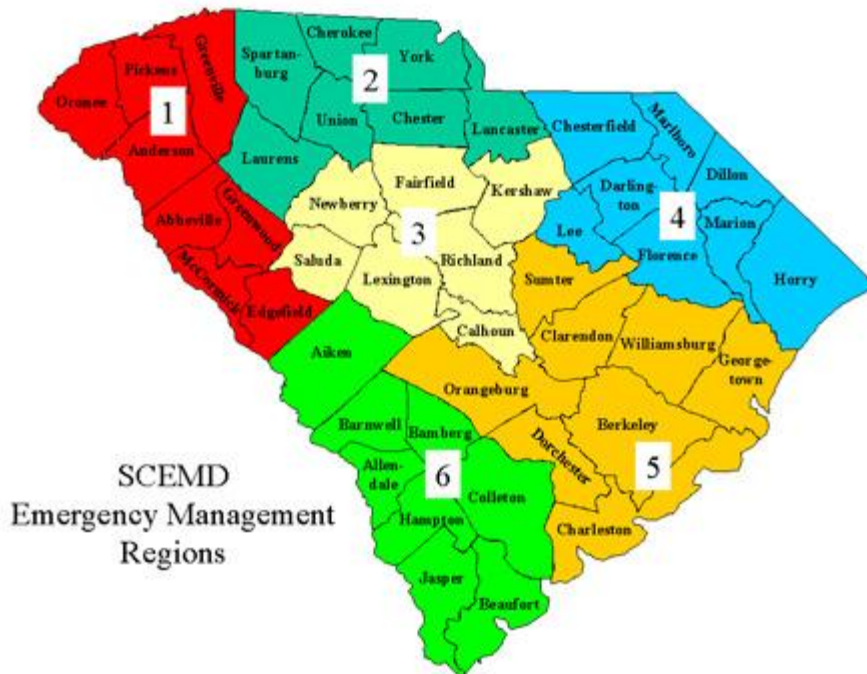
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1.0 South Carolina ARES/RACES Emergency Communications Structure

In South Carolina, the Amateur Radio Emergency Service (ARES) and the Radio Amateur Civil Emergency Service (RACES) are integrated under one leadership structure. The Section Manager is elected by the ARRL membership and represents amateur radio interests in the state. The Section Manager appoints a Section Emergency Coordinator (SEC) to manage the ARES and RACES programs. Integration of both programs under one individual improves efficiency and resource use for training and response functions. Information about and application to ARES/RACES programs can be found at <http://ares-sc.org/>.

The SEC recruits qualified ARRL members to serve as individual county Emergency Coordinators (EC) and District Emergency Coordinators (DEC). The ARES/RACES field organization is aligned to the South Carolina Emergency Management Division's Regional Emergency Areas, and uses the same district numbering plan.



The DEC in each area works with each County EC to help train ARES/RACES members, recruit new members, provides information on local nets, and work with local county agencies in preparing for communication emergencies. Any ARRL member can volunteer to be an EC. The EC, or in the case where a county does not have an EC, the DEC, will work with individual amateur radio operators to provide any necessary training. If you are interested in joining the emergency leadership team, please contact the Section Emergency Manager.

There is also a DEC for the State Emergency Operations Center (SEOC). The SEOC DEC and the 3 EC's there, provide support resources to the various agencies serving the State EOC and supports ARES members in the field. During activation, all responding agencies will be operating under the Incident Command System (ICS) as part of the National Incident Management System (NIMS). That means the field Incident Commander is in charge of the operation and EOC/SEOC act in supporting roles. It is very important that DEC and EC fully understand the ICS and must complete basic FEMA training courses, available online: IS-100b. Introduction to Incident Command System, IS-200b ICS for Single Resources and Initial Action Incidents, IS-700a National Incident Management System (NIMS), An Introduction and IS-800b National Response Framework, An Introduction.

All of these courses are free and can be found at FEMA Independent Study Program National Incident Management System web site: <http://training.fema.gov/IS/NIMS.asp>

These courses are highly recommended for all ARES members, and required for all RACES members. Individual counties may require additional training for people who work in the EOC area. It is up to the county EC to ensure volunteers have the necessary skills (training and knowledge) to successfully work in the demanding environment of an EOC. As volunteer communicators, we always need to present a professional image and remember we are there to support the operation, not direct it. We can not tell the agencies what to do, or how to conduct their missions. Interfering with the operation is a quick way to be escorted from the scene. Amateur Radio volunteers shine when other systems break down, and we can pass traffic effectively for others. It is important to remember our role.

The RACES program, while integrated with ARES, has additional requirements. First, a volunteer in RACES must have a county Emergency Manager's endorsement. The Volunteer may undergo a security background check, and they must complete additional FEMA training. In the end, RACES members become part of the South Carolina Volunteer Emergency Communicator Program and are issued an identification badge by the SC Emergency Management Division. The identification badge provides access to communication facilities for emergency response. While not a requirement, almost all RACES members are also members of ARES. If you would like to join RACES, complete the application at <http://ares-sc.org/>. It is a good practice to contact your EC or the SEC before sending the application to the County Emergency Manager for advice and to let them know you are starting the process. If you need help determining who is your County Emergency Manager, go to http://scemd.org/Who/county_orgs.html. South Carolina EMD maintains this listing on their web site <http://scemd.org/>

You do not have to be a member of ARRL to join ARES or RACES. However to be in a leadership role, you must be a member of the League.

2.0 Role of Amateur Radio in South Carolina Emergency Communications

The State of South Carolina includes Amateur Radio in its emergency communications planning documents. Amateur Radio has been integrated into emergency back-up plans for EOC to EOC communications, healthcare communications, and weather information communications. The planners did not include amateur radio because they believe that it is easy and cheap communication; it's actually hard to organize groups of amateur radio operators, to depend on them to show up for training exercises and to integrate their capabilities into a statewide plan. However, time and time again, individual amateur radio operators have risen to the challenge and provided the only communication channel when disaster strikes. We need to recognize that planners in our state have seen the benefits offered by the amateur community and have formally documented our support in state plans. It is now up to our amateur community to volunteer, train and support our fellow citizens. With staffing cuts that are occurring across the state and county agencies, volunteers will be key to success in an emergency. Joining ARES/RACE and participating in these programs will help you be ready to help those in need.

3.0 The Communications Plan for South Carolina ARES/RACES

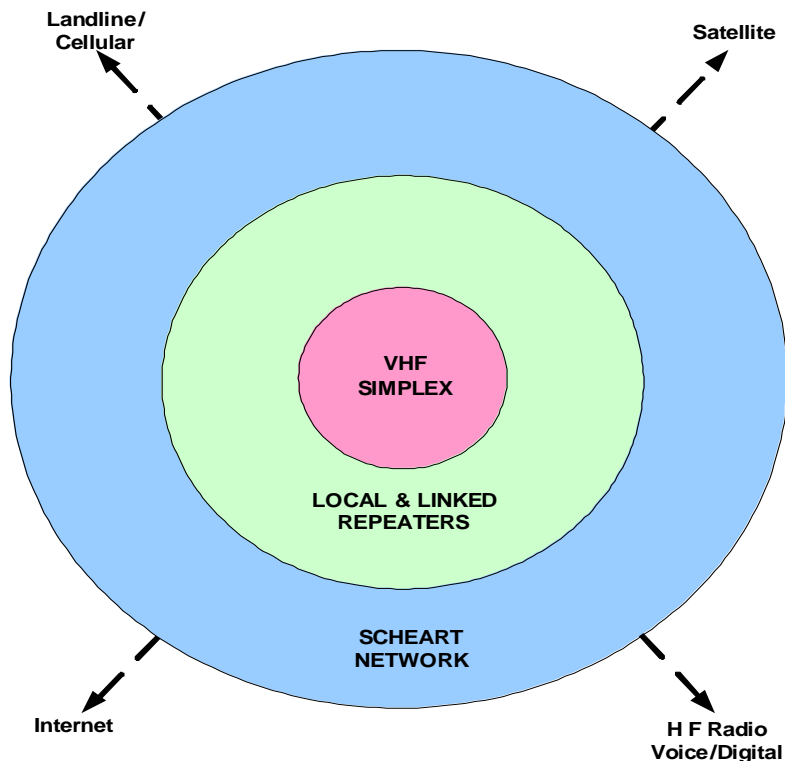
An effective emergency communications program must be developed around a structure that provides sufficient levels of redundancy to meet anticipated failure modes, offers multiple means of message transport, be adaptive to a changing environment, and have sufficient operators to manage the system. The South Carolina Plan is based on a redundancy of systems. The strategy of including commercial transport modes with amateur radio capability provides an adaptive and efficient communication concept. As systems fail or degrade, operators will rely on less infrastructure intensive systems with

simplex radio operation as the foundation. The figure below shows a graphical representation of a tiered communication system concept with layers of capability. Each layer is built on a simpler, more robust layer.

The core of the model is based on simplex operation, two radios talking to each other directly with minimal infrastructure. Each additional layer surrounding the core builds additional capability, and increases the dependency on infrastructure. Underling the VHF simplex layer is HF simplex (shown lower right). VHF and HF simplex represent the absolute minimum fall back mode for ARES/RACES. Using these two modes, traffic can be relayed Intrastate and Interstate. Exiting the model to the upper right and left are landlines/cell phones and satellite. In a communication emergency, a partial or total impairment of these commercial systems will very likely occur at some point somewhere within the state. However, at locations where cell phone, landline and satellite are still functional, they should be incorporated into ARES/RACES operations to ensure the most efficient method to pass traffic is being used. On the lower left is Internet connectivity for data transport. To the extent possible ,ARES/RACES integrates functioning Internet connections to move data. When local Internet connections fail, ARES/RACES activate the digital fall back plan.

The following paragraphs outline the three tiers of operational capability represented in the graphic. Later sections provide specific guidance and operational details for the layers and digital fall-back plan.

County ARES Communication Layers



System redundancy is achieved by using an encapsulated communication model with simplex being the absolute fallback mode. When all other infrastructure has failed, simplex VHF/UHF and HF are available to move messages. In the case of total infrastructure failure, ARES/RACES members must establish basic simplex operation quickly and relay traffic to the county EOC or State EOC. The center core of the figure is designated Tier 1 Operational Capability or T1OC.

The next communication layer adds infrastructure and establishes local repeaters or local linked repeaters. This layer provides additional capability by extending station range and allowing members with hand held transmitters to communicate over wide geographic areas. The enhanced geographic coverage provides for county to county contact. Local repeaters provide for Tier 2 Operational Capability or T2OC. Emergency Coordinators, in consultation with the District Emergency Coordinator, determine what repeater frequency is designated for the county, and perform the necessary coordination with the repeater Trustee or owner. The designated repeater will then provide coverage for periodic ARES/RACES nets, so members can train and verify equipment operation. The repeater output frequency is the **county tactical frequency** and will be published in a statewide Emergency Communications plan.

The top layer provides statewide coverage by allowing operators to establish point to point links or SCHEART control stations to linking numerous repeaters for statewide coverage. SCHEART repeater network consists of VHF/UHF repeaters located across the state. Each individual repeater provides wide area local coverage and has the ability to link to other SCHEART repeaters. Collectively the network provides adaptable geographic coverage and greatly increases the number of stations that can support an incident. The SCHEART network provides for flexible linking for point to point or statewide conference mode of all repeaters. Full Tier 3 Operational Capability- T3OC is achieved when SCHEART network is operating normally. Detailed information on the SCHEART repeater network can be located under the IRLP tab on <http://scheart.us/>. A quick guide for operating on SCHEART system is located in the Appendix.

Note that HF simplex communication remains an option for communication while operating in any of the three tiers. HF represents another transport mode for communication traffic, voice and digital.

Included in the model, is an Internet path. Failure of this path adversely impacts all agencies responding to the emergency. While amateur radio provides various means to transport digital data, ARES/RACES have been requested to support South Carolina's emergency back up interoperability mode for data. That mode operates under the SC Agency MARS License Program. South Carolina joined adjacent states and other governmental and non-governmental agencies as part of the Agency MARS Program. The state of South Carolina holds the station license and it is responsible for training operators. ARES/RACES members are encouraged to complete the training and obtain an operating permit. The operating permit is good for 10 years and allows the individual to operate any South Carolina MARS station. Reciprocal agreements with adjacent states provide access to their stations during an emergency response. Information on the South Carolina Agency MARS Program can be found at <http://ares-sc.org/>.

3.1 Tier 1 Operational Capability T1OC

Tier 1 represents simplex operational mode. The Appendix provides a county by county listing showing two simplex VHF frequencies: a Coordination Frequency and a Tactical Frequency (The Tactical Frequency is the local ARES/RACES designated repeater output frequency). The Tactical Frequency supports primary communication for ARES/RACES volunteers actively working the emergency. Establishment of a controlled net on the Tactical Frequency is a top priority for emergency activation. A controlled net allows ARES/RACES stations to check-in for tasking, accept remote station reports and provide a central communication channel to share current situational information. The controlled net is essential to ensuring coordinated action.

County to county coordination and command and control will occur on the assigned Coordination Frequency. The County Coordinating Frequencies provide inter-county contact from the incident command location and adjacent county EOC. The County Coordination Frequency handles supervisory level traffic or information that is not directed to all ARES/RACES responders. The County Tactical Frequency is the frequency for primary operations. A fallback to full Tier 1 Operational Capability occurs if higher tiers have been compromised.

The State EOC monitors 146.595 MHz when activated. This VHF frequency is defined as the statewide simplex coordination frequency. ARES/RACES members can use this frequency to relay information across the state during an emergency when SCHEARTS and/or HF are not available. If required, the DEC/EC can establish simplex relay points to move traffic across the emergency management area EMA to the SEOC. Activated ARES/RACES net control stations are encouraged to monitor this frequency for possible activity.

HF provides an additional statewide transport mode. The SEOC monitors 3.9935/3.990 MHz LSB or 7.232 MHz LSB depending on band conditions during activation.

During activation, DEC/EC's should monitor the County Coordinating Frequency and Tactical Frequency. If the event covers a wide area, they should also monitor the SCHEART network: VHF for EOC type traffic and UHF for Healthcare type traffic.

ARES/RACES volunteers are encouraged to monitor their assigned County Tactical Frequency. By routinely monitoring the County Tactical Frequency, members are able to learn of an emergency and start net activations quickly. Monitoring the County Tactical Frequency also serves to assist in the alert process should cell phone and landlines be disrupted without warning. The County Tactical Frequency should be the first place to start net control operations and local ARES/RACES response.

3.2 Tier 2 Operational Capability- Local Repeaters

Local Emergency Coordinators in consultation with the local District Emergency Coordinator are responsible for establishing local repeater frequency or frequencies where one repeater does not cover the county. The Appendix lists the repeater frequency assignment and the EC must notify the SEOC (if activated) when they are using any other frequency either for a temporary period or if they want to re-coordinate the county frequency. Notification helps ensure all responders know what frequency to use. The output of the primary ARES/RACES repeater for the county becomes the County Tactical Frequency. ARES/RACES volunteers use the designated County Tactical Frequency to conduct local nets and training exercises as scheduled by the EC/DEC. Members are encouraged to monitor the Tactical Frequency. In the event of an emergency, implementation of a controlled net on the frequency should begin immediately and timely information provided to ARES/RACES responders.

If the designated county repeater fails, a simplex control net is implemented on the County Tactical Frequency (repeater output). This serves two distinct purposes. First, members are trained to monitor the County Tactical Frequency and if there is no activity on the frequency, members may not be aware of an emergency situation. Second, it provides a graceful fall back mode to simplex operation that is easy to remember. If the repeater is put back in service while the emergency is in progress, all members are already listening to that frequency. By staying on the County Tactical Frequency, people coming into the area will hear the latest instructions. Local EC/DEC may establish alternate communication channels but should ensure the County Tactical Frequency is monitored with periodic announcements that a net is being conducted on another frequency.

If a jamming signal appears on the tactical frequency, members should switch to the County Coordinating Frequency until the interference can be resolved.

3.3 Tier 3 Operational Capability Linked Repeaters

Statewide VHF/UHF communication and coordination is available via the SCHEART system. In a typical emergency, SCHEART will be configured to provide two coordination paths and/or support two traffic nets: VHF net for EOC/SEOC traffic and UHF net for healthcare traffic. At periodic intervals, these two nets merge and coordinate information and status. Depending on the emergency situation, controlled nets may be established during certain time periods for statewide information coordination and situation reporting. At times when a controlled net is not operational, the SCHEART system will be

configured to allow point to point communication traffic with VHF being primarily for EOC type information flow and UHF being primary healthcare emergency traffic. HF remains a back up mode for statewide coordination traffic. Under ICS concepts, the SCHEART network is configured to support the ARES/RACES and radio response team stations. Since a statewide situation falls under an Area Command or Multi Agency Coordination System, the State EOC is responsible for SCHEART configuration.

During normal day to day operation, any amateur may link two repeaters in the SCHEART system. However, during training exercises and emergencies, point to point links should be established by ARES/RACES members or radio response team members. Amateurs not involved in the training or activation should not use linking functions. Establishment of multiple point links is restricted to official SCHEART control operators. The SEC is responsible for designating control operators for SCHEART, which includes, but is not limited to, ARES/RACES DEC's and ETV system engineers. County EOC operators requiring specialized linking configurations during an event must contact their area DEC or the SEOC. SCHEART Control stations must coordinate with any net control operators who may be using SCHEART before changing the configuration that would affect their net operations. For instance if the SEOC is having a statewide net every 3 hours that lasts 30 minutes, the control operator must ensure the configuration change will not impact the next scheduled net. This allows another configuration outside the scheduled nets but should be announced on the next scheduled net to ensure all stations understand there will be a change in SCHEART configuration.

4.0 Establishing Local or Regional Emergency Nets

During a communication emergency situation, it is critical to quickly re-establish communications for the following purposes: 1) protection of life, 2) stabilization of the incident that caused the emergency, 3) conservation of property and 4) protection of the environment. ARES/RACES members assist local authorities and responders by quickly establishing back up modes of communication and providing situational and tactical information between the agencies that have lost communication capability. ARES/RACES members must be able to mobilize quickly and implement pre-planned communication strategies. Planning and exercising is the key to success. So, the first stage of any response is the planning and training program.

The second stage is triggered by an event that creates a need to establish a controlled communication net. Other than personal safety of an ARES/RACES member, the establishment of a control net should be the top priority. The first station to initiate the net becomes the control operator.

The control operator has the following responsibilities. :

- 1) Alert all stations listening to the frequency that a control net is being implemented and the reason why a control net is being started,
- 2) Provide stations with information about checking into the net such as who should check in, how to check in to the net, i.e. call sign; name, location, and availability to help or if they are already supporting an agency or organization,
- 3) Document all stations checking into the net, where they are located and what organization they are supporting,
- 4) Assist stations in passing traffic essential to the communication objectives,
- 5) Develop an overview of the situation and provide relevant data to stations, as it becomes known,
- 6) Continue net control duties until relieved by another station or the emergency is over,
- 7) Remain calm and focused on the primary duty of passing accurate information in a timely manner.

For an unexpected event, a controlled net is started while many ARES/RACES responders are in route to the agencies they support. Once ARES/RACES establishes operation at the Incident Command Post, Area Command Location or the Emergency Operations Center, net control should be transferred to that location. Ideally, net control originates where command decisions and instructions are being issued.

For example, assume that a large fire is affecting part of the state and has adversely affected cellular and 800 MHz communications. Due to the complexity of the fire and agencies involved, a Unified Command is implemented. Net control would move to the Unified Command location because it improves efficiency and reduces resources. ARES/RACES can work with command staff and assist in moving traffic between responders and/or the County or City EOC. This may require mobile communication resources, but could be accomplished in a vehicle if a communication trailer isn't available. The role of ARES/RACES is to assist in providing back-up communications when normal channels fail. Volunteers need to listen closely to the radio traffic and not become too engaged in other support functions.

5.0 Establishing Statewide Emergency Net

Amateurs in South Carolina area have a unique capability with the SCHEART VHF/UHF link system. The system is configured each weekend to cover the state for ARES/RACES training. While the system is open for all amateurs to use, during an emergency, control responsibility falls under the ARES/RACES program with the SEC having lead responsibility. In addition to the SCHEART network management staff, the SEC and DEC stations are provided with control operator privileges for the system. They have the ability to link multiple repeaters to form a wide area net or to cover the entire state. A decision to implement a statewide net during an emergency is based on the incident complexity, the affected area, and the need to have a common communication channel. There are benefits to having a common communication channel, but there are also risks when running a statewide net during rapidly changing events.

Based on several years of testing, the following type of statewide net is planned for a large-scale emergency event:

1. The system is configured to provide statewide coverage for check in from all counties. The net control station logs active stations, provides situation information, alerts station to changing environment and maintains communication control. The net control station advises operators the time of the next net when closing the current net.
2. The net is closed and system opened for any station to station traffic.
3. At the appropriate time, the system is configured for statewide coverage. The net control station provides updates, new instructions, current situational information and takes station reports from the field. Emergency traffic should not wait until the next schedule net. Any emergency traffic should be passed as quickly as possible.

Activation of statewide nets occur when the South Carolina Emergency Operations Center, SEOC, requests communications support from county EOC's, or when a Healthcare emergency affects the state. Control stations at the SEOC and Department of Health and Environmental Control, DHEC, control the system and coordinate net times. A field DEC and EC may schedule the local repeater for wide area nets when not being used for statewide nets but must coordinate with the SEOC. It is preferred that announcements for local area nets be made during the statewide net to ensure that all operators are informed. When possible, DEC and EC should limit their local net time on the SCHEART system during a statewide emergency activation since activity on the local system inhibits the ability of any other station passing point to point traffic.

6.0 Changes to the Guide

You may submit changes or suggestion to this guide to the Section Emergency Coordinator via email.

ARES/RACES Coordination and Tactical Frequency Plan

Blank data fields indicate the county information has not been submitted to the Section Emergency Coordinator. All County ARES/RACES Emergency Coordinators are encourage to review and submit corrected information to the Section Emergency Coordinator: Charlie Miller ae4ux@bellsouth.net or the South Carolina State Emergency Operations Center DEC: Roger Mull KD4JQJ@arrl.net.

County	Simplex Coordinating Frequency (MHz)	Tactical Frequency (MHz)	Repeater Input Frequency (MHz)	Repeater CTCSS Tone (Hz)
Abbeville	147.555			
Aiken	147.555	145.350	144.750	156.7
Allendale	147.420			
Anderson	147.510	146.970	146.370	
Bamberg	147.525			
Barnwell	147.585	147.030	147.630	156.7
Beaufort	147.525	145.130	144.530	88.5
Hilton head		145.310	144.710	
Beaufort		146.655	146.155	
Hilton head		147.240	147.840	100.0
Berkeley	147.585	147.150	147.750	
Calhoun	147.420			
Charleston	147.570	146.790	146.190	123.0
Cherokee	147.420			
Chester	147.570			
Chesterfield	147.420			
Clarendon	147.510	145.230	144.630	123.0
Colleton	147.510	146.910	146.310	156.7
Darlington	147.585	146.850	146.250	
Dillon	147.555	146.745	146.145	
Dorchester	147.540	147.180	147.780	123.0
Edgefield	147.420	145.490	144.890	123.0
Fairfield	147.420	147.120	147.810	156.7
Florence	147.570	146.850	146.250	
Georgetown	147.420	147.375	147.975	123.0
		146.655	146.055	
Conway		145.110	144.510	85.4
Grand Strand		147.330	147.930	85.4
Greenville	147.585	146.610	146.010	
Greenwood	147.570	147.165	147.765	107.2
Hampton	147.540			

County	Simplex Coordinating Frequency (MHz)	Tactical Frequency (MHz)	Repeater Input Frequency (MHz)	Repeater CTCSS Tone (Hz)
Horry	147.540	147.330	147.930	85.4
		146.655	146.055	123.0
Jasper	147.570			
Kershaw	147.510	146.775	146.175	156.7
Lancaster	147.525			
Laurens	147.525			
Lee	147.540			
Lexington	147.525	147.390	147.990	156.7
Western		147.255	147.855	123.0
Marion	147.510	147.000	146.400	91.5
Marlboro	147.525			
McCormick	147.585			
Newberry	147.555			
Oconee	147.420	145.290	144.690	162.2
Orangeburg	147.570			
Pickens	147.540	442.400	447.400	127.3
Southeast		443.450	448.450	110.9
Southwest		441.800	446.800	110.9
Richland	147.570	147.330	147.930	156.7
Saluda	147.510	146.910	146.310	123.0
Spartanburg	147.510	147.315	147.915	
Sumter	147.555			
Union	147.585	145.470	144.870	123.0
Williamsburg	147.525			
York	147.540	147.030	146.430	88.5
Statewide	146.595	NA	NA	NA

Appendix: A quick guide to SCHEART operation

The SCHEART repeater system is open to all licensed amateur operators except for emergencies. During emergencies, only stations responding to the emergency or stations assisting those responding should use the system. Other stations are welcome to listen.

By having geographically installed VHF/UHF repeaters, the SCHEART network covers all of South Carolina. Most of these repeaters are located at South Carolina Educational Television broadcast sites. Along the coast other repeaters may link to the SCHEART network to provide expanded coverage.

There are three basic system operating modes: 1) stand-alone, 2) point-to-point link and 3) area or statewide link.

Stand Alone Mode

In a stand-alone mode, each SCHEART repeater operates independently. Only local operators within the coverage area of the repeater can use the repeater. Normal repeater protocol is used.

Point-to-Point Link Mode:

Any operator may link their local SCHEART repeater to any other SCHEART repeater in the state. Using the DTMF microphone controls linking. Each SCHEART repeater has an assigned two digit node number. Think of it as a short telephone number for that location. You must issue a "*" before the two digit number. This tells the repeater to execute the command to link to the node. The normal process:

1. Listen to the frequency to ensure it is not in use
2. Key your transmitter and identify yourself and indicate you are making a link
3. Key your transmitter and touch * and the two digit repeater address number you wish to link. Then unkey.
4. If the repeater understands the command, it will establish a link and give you verbal indication the link is operating.
5. Key your mike, and wait 2 seconds, then speak. It is very important to wait after keying the microphone. Since you are operating across a network and bring up remote repeaters, it takes a couple of seconds for the remote station to key. If you speak too soon, the first part of your transmission at the remote transmitter will be lost.
6. If the system indicates it is busy, wait 5 to 10 minutes and attempt your link again. If the repeater you are linking to is being used the link will not be established. If you are near to a computer with Internet access you can check repeater status at <http://SCHEART.US>. Use the IRLP tab.
7. After completing you traffic, good manners says you should release the link. Key your transmitter and enter on your DTMF 73. No * command is needed. The system will alert you the link has been cleared. Don't forget to give your call when you sign off the system.

Area or Statewide Link Mode:

Only SCHEART authorized control operators may access this mode. Authorized operators have the flexibility to configure the VHF/UHF repeaters to provide one or two simultaneous conference channels. The system will be configured for area or statewide operation to support exercise nets and emergencies. Each Sunday night the system is configured to support a statewide ARES/RACES net.

When SCHEART is operating in this mode it is critical for operators should listen to instructions from the net controller. Remember, listen for the frequency to be clear before keying your microphone. When you press the push-to-talk button, wait at least 2 or 3 seconds before speaking. If you do not wait, other stations on the net will not hear the first part of your transmission. Also, remember to give your call sign after finishing.

SCHEARTS ETV Repeaters
reference <http://sheart.us> for most current
information

Node #	Location	Repeater Output Frequency (MHz)	Repeater Input Frequency (MHz)	CTCSS
30	Conway	146.715	146.115	162.2
31	Charleston-Awendaw	146.760	146.160	123.0
32	Columbia	146.715	146.115	91.5
33	Charelston-Wallace	147.105	147.705	123.0
34	Whitehall	146.715	146.115	123.0
35	Florence	146.685	146.085	91.5
37	Greenville-Paris Mountain	145.370	144.770	91.5
39	Orangeburg	146.880	146.280	123.0
42	Beach Island	147.315	147.915	91.5
50	Conway	441.675	446.725	162.2
51	Charleston Awendaw	441.725	446.725	123.0
52	Columbia	441.725	446.725	91.5
53	Charleston -Wallace	441.575	446.575	123.0
54	Whitehall	441.675	446.675	123.0
55	Florence	441.575	446.575	91.5
56	Greenville-Ceasars Head	443.125	448.125	123.0
57	Greenville-Paris Mountain	441.675	446.675	91.5
58	Aiken RMC	441.525	446.525	91.5
59	Orangeburg	441.750	446.750	123.0
60	Rock Hill	441.525	446.525	162.2
62	Beach Island	443.125	448.125	91.5
63	Greenwood	441.625	446.625	91.5
64	Sumter	441.625	446.625	162.2
65	Barnwell	442.000	447.000	91.5
80	NC CARES	224.680	223.080	91.5
81	NC HEARS	444.175	449.175	110.9
70	Main Conference Node			
71	Back up Conference Node			

NOTE: * used before each node number to link
nodes;
73 used to de-link, no * required