AMERICAN RADIO RELAY LEAGUE

CLUB GRANT APPLICATION

MOBILE HAM RADIO STATION

SEPTEMBER 22, 2022

THE TRIDENT AMATEUR RADIO CLUB, INC.

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1. EXECUTIVE SUMMARY

The Trident Amateur Radio Club, Inc. (TARC), a non-profit 501(c)7 South Carolina Corporation in good standing located in North Charleston, SC, is pleased to present this application to the American Radio Relay League's Club Grant Program, funded by Amateur Radio Digital Communications. TARC currently has an active vibrant group of 93 licensed ham operators, which since the pandemic, has grown about 10% per month. We conduct monthly meetings with educational programs, and conduct many portable field operations under the club call sign of N4EE, N4HLH (H.L. Hunley), and W4ANK (Little David). TARC has been an ARRL affiliated club since its inception in 1973 (Figure 1).

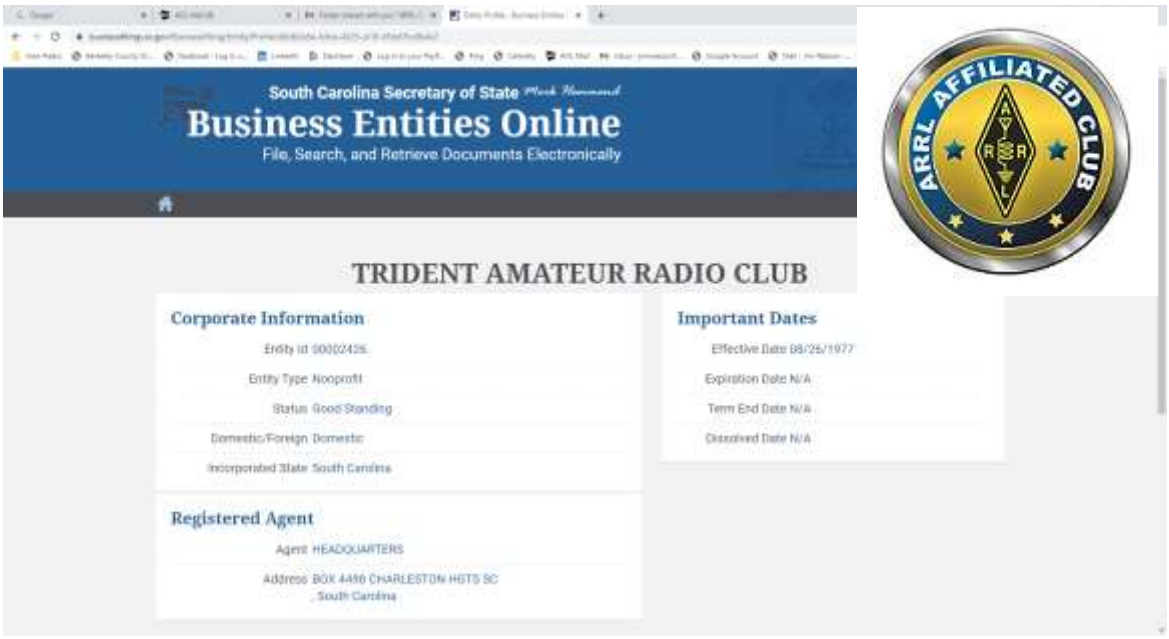

Figure 1. Screen shot taken from https://businessfilings.sc.gov/BusinessFiling/Entity/Search

TARC currently owns a small trailer (Figure 2) that is used for only for storage. It is not large enough to accommodate the installation of one or more operating stations. We propose to use this grant funding to construct and operate a Mobile Ham Radio Station (MHRS) to provide emergency communication services in cooperation with Amateur Radio Emergency Services (ARES) for the tri-counties of Berkeley, Charleston and Dorchester, which comprise over 820,000 people or 1/5 of the population of South Carolina. Letters of commitment are provided in the Appendix from all three counties.

In particular, Berkeley County ARES does not have a base of operations. As such, this grant would greatly benefit their emergency operations which serves areas further inland from the city of Charleston which is located on the east coast. This proposal will explain the importance of having adequate coverage in "the Low Country" that is prone to hurricanes and flooding. Several TARC members, including the core Project Team, are also members of these local ARES groups, and shall deploy and operate the MHRS and provide training for Emergency Communications Operations.

In addition, this grant will allow TARC to provide significant educational and training impact in our local schools and communities, and create greater public awareness and support for Amateur Radio. TARC has initiated STEM/STEAM learning programs through Amateur Radio at several local schools, and currently

sponsors an Amateur Radio Club (K4PSA) at Palmetto Scholars Academy. However, we do not have a mobile station to demonstrate to the students how to operate a ham radio station. The physical presence of an operating station will draw much attention in the community to promote growth in active Amateur Radio Operators and provide station resources for use by the Ham community at field days and other events, such as ARRL Field Days and quarterly portable operation events that TARC currently sponsors.

Figure 2. This is our current trailer that is only large enough to be used for storage.

The proposed TARC Mobile Ham Radio Station (Figure 3) shall be housed in an insulated, air-conditioned and heated cargo trailer (7' x 14' with a 7' height) with a V-nose (not shown) for storage. It shall have a rear ramp door and a screened side door allowing for the installation of two desks for two stations with the capability for HF/VHF/UHF with digital message traffic capability to support emergency operations (Figure 4). There shall be hooks on the wall opposing the operating stations for storing existing antennas, transmission feed lines, and extension cords. In addition, the trailer shall allow for storage of a canopies, Li-ion batteries, generator, and additional tables and chairs. TARC volunteers shall build the cabinets and desks and install the HVAC, flooring, electrical and the donated solar panels and antennas.

Figure 3. Proposed 7' x 14' trailer would have same lettering scheme as small storage trailer.

A canopy shall be used to provide shade for the trailer and to conduct information and training sessions, while the trailer itself shall be used to conduct radio operations and provide demonstrations. The trailer shall be stored in a secured car port on property owned by the TARC Club President, Glenn Stephens (shown on cover), and shall have installed anti-theft devices, such as a hitch and wheel locks and a GPS Tracking Unit and/or an APRS beacon. Electronic equipment shall not be stored inside the trailer when not in use, but shall be kept in a secure and controlled temperature environment in padded cases.

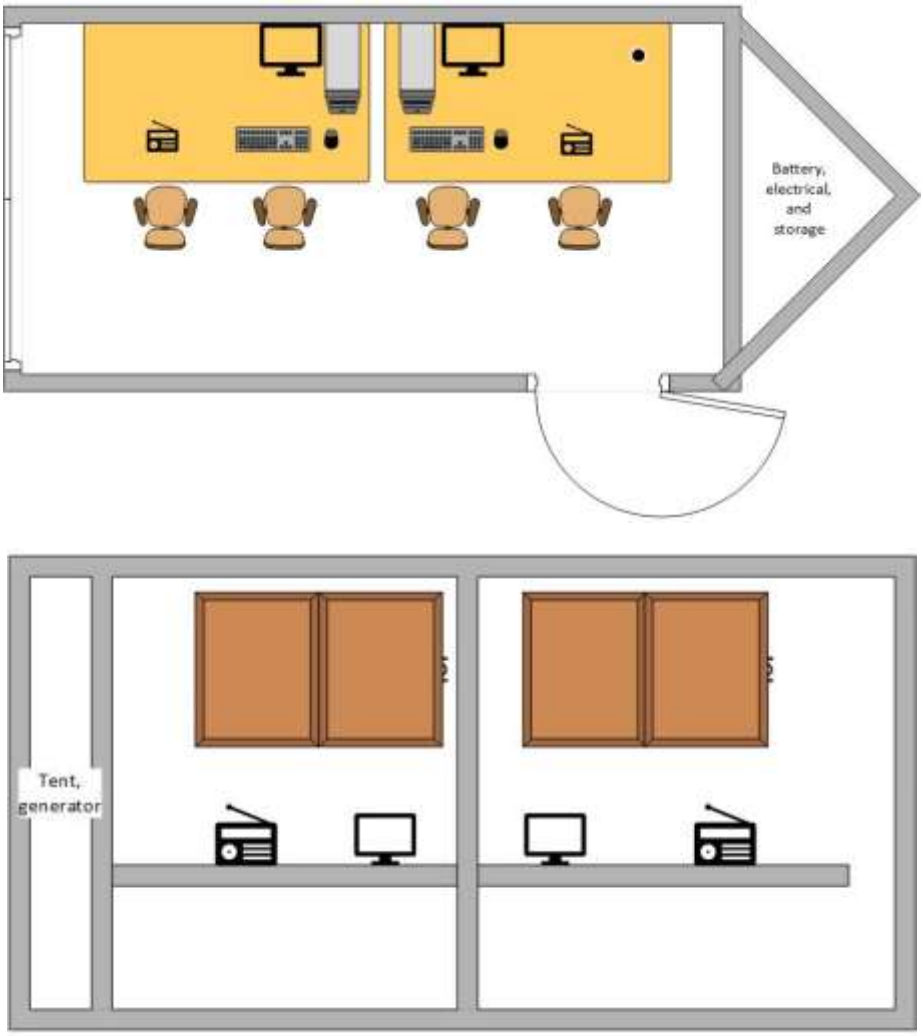

Figure 4. Two station layout of the proposed Mobile Ham Radio Station.

Annual dues collected from our 93 members, in addition, to monthly fundraising raffles, shall be sufficient to cover the insurance and maintenance costs. A regular maintenance and preventive maintenance schedule shall be developed in order to keep the trailer and equipment ready for deployment at a moment's notice. This shall include, but is not limited to: tire pressure, battery charge status, generator fuel levels and replacement, lubrication, and corrosion prevention.

ARRL Member and TARC President, Glenn Stephens, WA4NMW (Extra), is responsible for the overall managing of TARC. Glenn is retired executive from the electric utility industry and continues to consult in power systems and communications. He has BSEE from Clemson University and an MBA from the

University of South Carolina. He is a registered Professional Engineer in the state of South Carolina. He has managed over a $150M in communications projects. He has developed and delivered training courses for the introduction to amateur radio, Technician and General Class Licenses. He has been mentoring a First Robotics Team at Fort Dorchester High School for the past three years.

This grant project shall be managed by Jim Wasson, KO4MNB (General) and ARRL member. Jim holds PhD, MBA and BSET degrees, and is a certified Project Management Institute Project Management Professional (PMP). Jim has successfully managed over one thousand projects since 1981, mostly multi-million dollar U.S. Government contracts, while employed at major defense contractors, such as Northrop Grumman, Boeing, GE Aviation, and BAE Systems. In 2010, he founded Growth Strategies International LLC, a Project Management Consulting firm under contract to the U.S. Government (e.g., DoD and DoE), Industry and Academia. Jim is a Berkeley County ARES member, CERT trained, and active in Parks on the Air (POTA).

TARC Vice President, Steve Anderjack, KO4AFL (Extra) and ARRL member, is responsible for the design and construction of the trailer. Steve, who holds a degree in Computer Systems Technology, is an IT professional with over 10 years of experience in troubleshooting, security and infrastructure, He is a volunteer examiner for the ARRL, W4VEC, W5YI and GLAARG. He is also a session manager for GLAARG specializing in online ham radio testing, and volunteers as a POTA area manager.

TARC Public Information Officer, Ronnie Davis, K4TCP (Extra) and ARRL member, is assisting in the design and construction of the trailer and associated systems. Ron holds a degree in Information Systems Technology with over 30 years of working in the Healthcare IT space supporting Infrastructure and Platform as a service with a focus in system virtualization, network security, problem solving and critical thinking. Ron successfully works at deploying scalable systems to support a variety of System Development Lifecycle efforts in the cloud and legacy on premises solutions.

TARC Secretary, Stephen Behr, K4OPZ (Extra) and ARRL member, is responsible for education and training. Stephen is a retired U. S. Air Force pilot and retired American Airlines pilot ground school instructor. He has a BS in Banking and Finance, and a MA in Computer Resource Management. Steve is the trustee for K4PSA, the Palmetto Scholars Academy (PSA) Amateur Radio Club in North Charleston, which is currently being reactivated now that routine school functions have returned. He is also an accredited extra class volunteer examiner. Please see the Letter of Commitment from PSA contained in the Appendix.

We plan to use our Technical and General Class training materials in the classroom of STEM schools in the tri-county area. In 2022, TARC held one Technician license training class that produced 9 licensed Ham Radio operators, and one General license training class that produced 3 General class operators with one advancing to Extra class. Another General and Technician training class will commence in January 2023. We estimate that there are over 1,000 STEM and STEAM students that we can reach and provide Ham radio exposure through our various programs. The MHRS shall enable us to take the amateur radio experience to our local schools, colleges and Universities.

Sections 2 and 3 of this grant application contains our response to ARRL's questions regarding the transformational impact of this project and our capability to successfully execute it. Thank you for allowing us the opportunity to present to you our proposal. This grant will be of great benefit to TARC and our community in promoting amateur radio as detailed in the following sections.

2. TRANSFORMATIVE IMPACT

The Charleston area is one of the top 10 fastest-growing city for software and Internet technology, an emerging hub for aerospace, and a hotbed for healthcare and biosciences. This ARRL club grant project shall create a transformative impact for the community, especially those who are underserved, to become active in Amateur Radio. This project shall raise awareness that ham radio is beneficial to the community, and not just a hobby, particularly in times of emergencies, such as we have seen throughout the country when phone, and even internet, are potentially affected.

2.1 PROJECT GOALS: ***Describe the goals that you hope to achieve as part of your grant program. Be sure to emphasize how the achievement of your goals will have a transformative impact on your group, Amateur Radio operators around you, and your community. Please indicate the Grant Category or Categories that you program will address and be sure to outline your goals in each Grant Category. Also please note, in the questions which follow, the number of people outside your club that you expect to serve for each Grant Category.***

The Trident Amateur Radio Club (TARC) shall accomplish the following goals with the execution of this ARRL Club Grant project. Below are listed the Grant Categories that align with these goals.

2.1.1 Club Station

TARC currently owns a small trailer used for storage only (see Figure 2 on page 4). It is not large enough to accommodate the installation of one or more operating stations. We shall use the grant funding to construct and operate a Mobile Ham Radio Station (MHRS). The MHRS (see Figure 3) shall be housed in an insulated, air-conditioned and heated 7' x 14' V-nose trailer with a 7' height, and a rear ramp door and a side door (with mesh screen) allowing for the installation of two desks for two operating stations (see Figure 4 on page 5). The MHRS shall be set up to demonstrate HF/VHF/UHF using FM, SSB, CW and digital messaging modes. Digital messaging shall demonstrate the use of computers in radio communications over long distances, which is a great interest to the younger generation who are very computer savvy.

There shall be hooks installed on the wall opposing the operating stations for storing existing antennas, transmission feed lines, and extension cords. In addition, the trailer shall allow for the storage of canopies, Li-ion batteries, generator, and additional tables and chairs. TARC volunteers shall build the cabinets and desks and install the HVAC, flooring, electrical and donated solar panels.

A canopy shall be used to provide shade for the trailer and to conduct information and training sessions, while the trailer itself shall be used to conduct radio operations and provide demonstrations. The trailer shall be stored in a secured carport on property owned by the TARC Club President, Glenn Stephens, and shall have installed anti-theft devices, such as a hitch and wheel locks and a GPS Tracking Unit and/or an APRS beacon. Electronic equipment shall not be stored inside the trailer when not in use, but shall be kept in a secure and controlled temperature environment in padded cases. The MHRS shall not only serve our 93 club members, but the community as well, as discussed in the following sections.

2.1.2 STEM Learning and Youth Outreach

The grant project shall allow TARC to provide significant educational and training impact in our local schools and communities, and create greater public awareness and support for Amateur Radio. It shall attract and retain students in STEM related disciplines through the introduction of Amateur Radio activities, principles, and operations. Finally, this project shall empower teachers with the necessary

knowledge to integrate Amateur Radio theory as it applies to the mathematical, scientific, and technical, concepts learned in the classroom.

TARC currently sponsors the Palmetto Scholars Academy Amateur Radio Club in North Charleston, which is currently being reactivated now that routine school functions have returned. We anticipate, based on previous experience, that as many as 100 school children would visit the MHRS when deployed on school grounds. We shall expand our presence at other area schools as well to provide awareness, education and training. We anticipate 1,000 STEM/STEAM students will be reached each year.

2.1.3 Emergency Communications and Public Service Training

The MHRS shall provide essential Emergency Communication (EmComm) capabilities for use by our local Amateur Radio Emergency Services (ARES) for the tri-counties of Berkeley, Charleston, and Dorchester serving approximately 820,000 residents (Figure 5). The Berkeley County ARES does not have a portable station. As such, this grant shall greatly benefit Berkeley County emergency operations, which serves areas further inland from the city of Charleston located on the east coast. TARC members, who are also members of these local ARES groups, shall operate the MHRS when called to duty during an emergency.

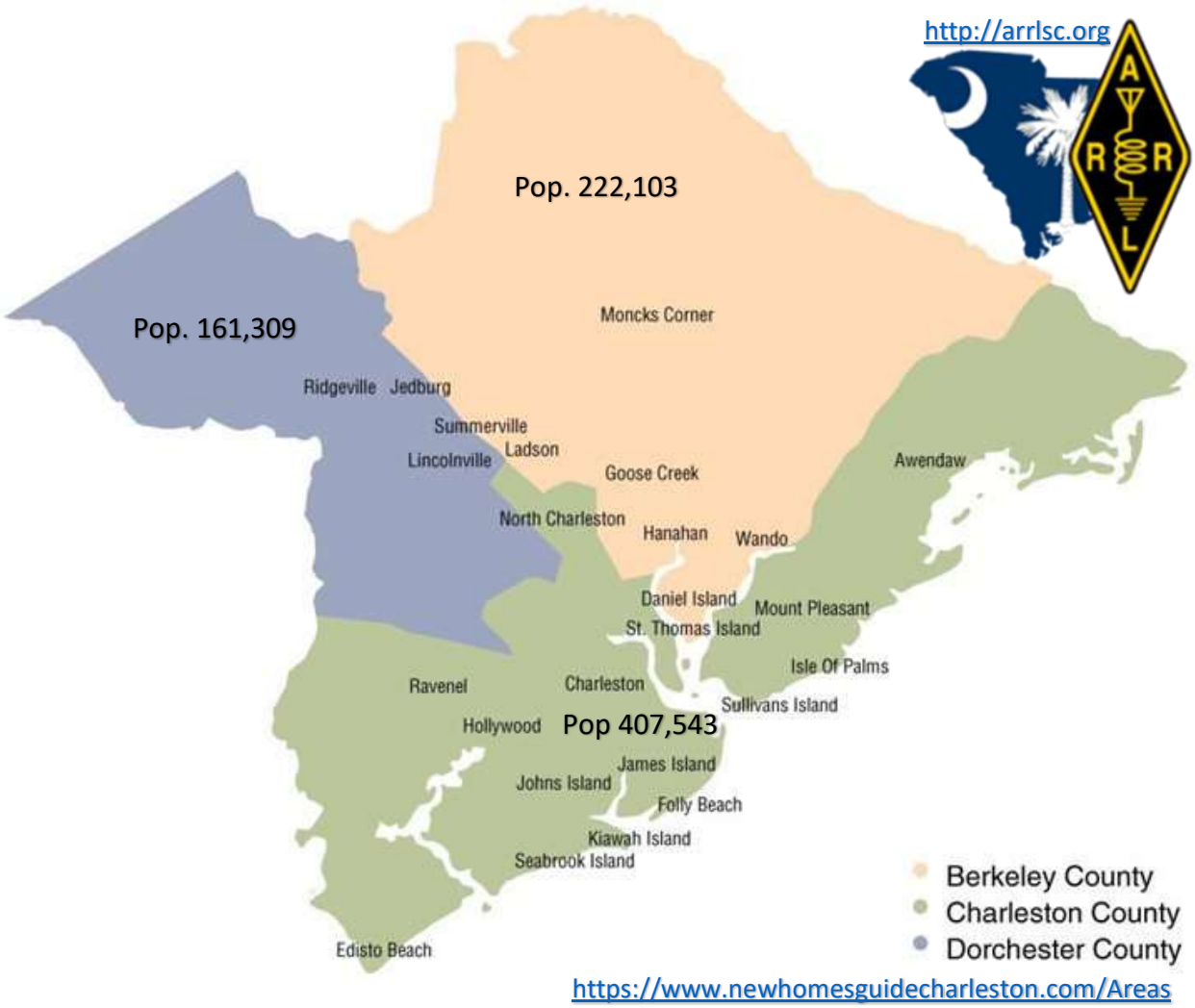

Figure 5. The Charleston SC tri-county area consists of 790,955 people (2020 U.S. Census)

2.1.4 GOTA Programs for Ham Skill Development

The MHRS will allow the ability to demonstrate real-world Ham Radio at the 10-day Coastal Carolina Fair, which has over 10,000 attendees annually, the Summerville Flowertown Festival, which has over 8,000 attendees annually, annual Boy Scouts Jamboree, and annual Air Show. In addition, we plan to use the MHRS as a Get-On-The-Air (GOTA) station at field days as a place for ham operators to practice the art of CW and to understand its importance in the history of ham radio; and to learn new skills, such as sending and receiving digital messaging formats. South Carolina has a population or approximately 5,250,000 people. According to Marc C. Tarplee, N4UFP, ARRL SC Section Manager, one out of every 509 people in SC has an Amateur Radio license. There are 10,309 hams in the state, so we have approximately 1,600 licensed ham operators residing in the tri-county area alone that shall benefit from this grant, and hopefully become members of TARC and ARRL, if not already.

2.1.5 Membership and Recruiting

This grant project shall increase community awareness of ARRL's advocacy, education and training programs, and licensing support. Our Mobile Ham Radio Station would draw attention to Amateur Radio by creating a visual connection, along with the potential for recruiting club membership, which brings about even more opportunities for greater interaction with the general public. It is our goal to increase our club membership to 300 ham operators, with 200 non-hams becoming licensed in the first two years after award of the grant.

2.2 TRAINING AND DEVELOPMENT: ***Describe your plans to provide training and skills development for hams and the public beyond the membership of your club. Explain how your project will enable and be coupled with your training and mentoring plans. Include an estimate of the number of people you plan to train within the first 2 years of your project.***

We shall demonstrate the MHRS at several large events and at Elementary, Middle, and High Schools, especially for STEM and STEAM students. At these events, we shall make it known that we have a group of experienced Ham Operators (Table 1) to assist new and prospective hams. We shall print brochures (see Figure 10) to hand out during the demonstrations encouraging prospective ham operators to attend our meetings, enroll in Technician and General license training classes, and take their license exams. Our experienced Elmers shall mentor them along the way, as we have always done in the past.

Table 1. TARC List of Elmers and Mentors

Call Sign	Name	Specialty Area
WW1TA	Tom Arno	HF, VHF, UHF, Digital
W4MEL	Mel Seyle	HF, CW, Antennas
KC8YTK	Chris Stinson	EMCOMM, RACES, ARES, Skywarn
KB1AWM	Greg Mitchell	DX, Contesting, Awards
KN4MJC	Philip Meyer	New HAMS, Event Planning
N4VGE	Van Herridge	New HAMS, Antennas, West Ashley
AE4ZR	David Merritts	HF Portable Operations
K4TCP	Ron Davis	Electronics, Homebrew, Microcontrollers, Arduino, Programming, Rig Interface.
KW4PW	Jim Self	End-Fed antennas.
KX4MI	Jan Kauser	HF Portable Operations.
KK4JS	John Satterfield	HF Portable Operations, HOA Antenna Installation/Ideas
AJ4UQ	Tom Glaab	Weak Signal, Digital Modes, QRP, and Lowcountry Repeaters
AA4TB	Tommy Billings	CW, QRP, or anything else except contesting.
W4ID	Tom Valenzia	POTA and portable operations.

We shall also include training and licensing of local community government employees, such as those working in fire and police departments. Such interest has already been shown by local law enforcement agencies for ham radio operator training programs. We provided a basic ham radio license training class for local Boeing employees that was supported by the company. Jim Wasson (KO4MNB), is a retired Boeing employee who has conducted several training classes at the local Boeing Charleston facility that produces the 787 Dreamliner. In addition, TARC provided ham radio training and testing to the NNPTC (Naval Nuclear Power Training Command) located near Charleston. A number of engineering students/physicists were trained and obtained their Technician class license with our six-week course.

2.3 STEM EDUCATION: ***Describe your plans to deliver Amateur Radio based STEM education in your community through your project. Please include an estimate of the number of groups you hope to serve with STEM education and the average size of the groups within the first 2 years of your project.***

We shall provide training and education to underserved students in K-12 science, technology, engineering, and mathematics (STEM) schools, along with colleges and universities with an emphasis on the physics and communications departments. The MHRS shall enable us to take the amateur radio experience to our local schools, colleges and Universities. The following paragraphs delineate the progress we have made thus far to deliver Amateur Radio based STEM education and our plans to expand our training and education program to other schools as well.

Stephen Behr, K4OPZ, is the trustee for K4PSA, the Palmetto Scholars Academy Amateur Radio Club (Figure 6) in North Charleston, which is currently being reactivated now that routine school functions have returned. At Palmetto Scholars Academy (PSA), Donna Heisler, our teacher sponsor and a licensed ham operator, is highly enthusiastic about bringing a radio station into the classroom, and several students are excited about getting on the air. Before school let for the summer, Stephen took his portable station to the school and supervised students make a SSB contact. Prior to the COVID lockdown, the school club was active with ten active members, including 4 students and a teacher with a Technician class license. We estimate approximately 10-15 new licensed amateur radio operators annually will come out of the school club. We anticipate that those students, that are already licensed hams, will encourage other students to become licensed Amateur Radio operators as well.

Figure 6. Palmetto Scholars Academy Amateur Radio Club Projects

The Amateur Radio on the International Space Station (ARISS) organization organizes and schedules interviews between ISS crew members and educational organizations. The ARISS program offers schools and educational organizations an opportunity to use NASA and amateur radio STEM education tied to the impact of a memorable event whereby students will learn about the challenges of space exploration,

space research, radio communications, and radio science and technology using amateur radio. TARC had assisted PSA in executing a very successful ARISS program in 2016-2017. Starting in the spring of 2016, we held two-hour classroom sessions on alternate Fridays, with after school meetings every Friday. Three more students earned their Technician licenses and several more were ready to test. The ISS contact was on 10 February 2017. A local TV station did live remotes from the parking lot and four TV networks sent camera crews. Over 600 students, parents, and community members crowded into the PSA gym. ISS Station Commander Shane Kimbrough, KE5HOD, returned our call and the entire gym broke out in applause. The QSO lasted for 7 minutes during a 38 degree pass. Now after the COVID lockdown, the school principal, teachers, and students are enthusiastic to reinstate the curriculum and once again make a QSO with ISS. Please see the article contained in the Appendix from ARRL Radio Waves, spring 2017.

On 20 August 2022, we met with Frank Bauer (KA3HDO), ARISS Executive Director concerning TARC's goal to reinvigorate the program at PSA and to also work with other schools to develop an educational plan to demonstrate our ability to integrate space and communication concepts into the curriculum. We truly believe that our association with ARISS will enhance the curriculum and experiences for the students.

Regarding encouraging other schools to become involved in Amateur Radio based STEM training, have contacted the ARRL Teachers Institute to request that they speak at a conference that we will arrange inviting Principals and STEM teachers from the Charleston Area STEM High Schools shown in Table 3.

Table 3. Charleston Area STEM High Schools shall be invited to ARRL Teachers Institute Conference.

1	Academic Magnet High School	North Charleston, SC
2	Palmetto Scholars Academy	North Charleston, SC
3	Charleston School of the Arts	North Charleston, SC
4	Wando High School	Mt. Pleasant, SC
5	Ashley Ridge High School	Summerville, SC
6	James Island Charter High School	Charleston, SC
7	Summerville High School	Summerville, SC
8	Fort Dorchester High School	North Charleston, SC
9	Charleston Charter School for Math and Science	Charleston, SC
10	Hanahan High School	Hanahan, SC
11	Cane Bay High School	Summerville, SC
12	Stratford High School	Goose Creek, SC
13	Woodland High School	Dorchester, SC
14	Goose Creek High School	Goose Creek, SC
15	Berkeley High School	Moncks Corner, SC
16	West Ashley High School	Charleston, SC
17	Baptist Hill High School	Hollywood, SC
18	Timberland High School	St. Stephen, SC
19	Cross High School	Cross, SC
20	R. B. Stall High School	North Charleston, SC
21	St. Johns High School	Johns Island, SC
22	Burke High School	Charleston, SC

The ARRL Teachers Institute recognizes that STEM instruction must focus on the connection among science, technology, engineering, and mathematics as it applies to Amateur Radio. Because it is the teacher's role to make these connections for students, teachers need to know the science and math content and understand, in sufficient detail, the technologies used in order to make the connections for their students. The Teachers Institute is only the beginning of a participant's exploration of wireless technology. The goal of the Teachers Institute program is to equip each school teacher with the necessary foundational knowledge and, through hands-on learning, generate the inspiration for teachers to continue to explore wireless technology and adapt relevant content into their classroom instruction. This training serves as an excellent foundation for school teachers interested in including classroom learning about radio communications and wireless technology as part of student preparation for participation in the Amateur Radio on the International Space Station program.

In addition to elementary, middle, and high schools, we shall demonstrate mobile ham radio operations at colleges and Universities as well to make the teachers and the students aware of the club's Amateur Radio training classes and testing sessions. For example, we have had discussions with the Trident Technical College (TTC) that has 12,000 students and vibrant Electronics Engineering Technology Program. Dr. Tim Fulford, Dean of Engineering and Construction, and Shakitha Barner, Dean of Science and Mathematics stated that they are extremely interested in having us bring the MHRS to the TTC campus to demonstrate Amateur Radio operations to the staff and students and to discuss a potential future collaboration. In addition, TARC member, Tradd Edwards, KN4IXC, will begin his college education at TTC this fall on an ARRL scholarship and is excited at the prospect of stating an Amateur Radio Club there. Tradd will be very instrumental in helping us to continue to engage with TTC faculty and students.

The College of Charleston has 11,000 students and offers BSEE degrees. As such, we have also contacted Dr. Kebin Xu, School of Engineering, and Dr. David Wyman, School of Business, about demonstrating our MHRS on campus. Dr. Wyman said that our proposed project fits nicely with the goals of their IMPACT-X program to make a difference for the community by keeping systems operational and serving those marginalized and disadvantaged. Finally, the Citadel, the military college of South Carolina in Charleston, once had an Amateur Radio Club prior to the COVID (Figure 7). Since then, Dr. Dennis Lloyd, KV4WM, along with several prominent Citadel Alumni, have expressed an interest in reinvigorating the club. We have contacted Dr. Mark McKinney, Department Head for Electrical Engineering, regarding deploying the MHRS to the Citadel for the purpose of revitalizing the club to gain new amateur radio operators.

Figure 7. TARC shall assist the Citadel Military College revitalize its Amateur Radio Club.

In conclusion, we plan to use our Technical and General Class training materials in the classroom of these schools, and many more schools in the tri-county area, to integrate into their curriculum. In 2022, TARC held one Technician license training class that produced 9 licensed Ham Radio operators, and one General license training class that produced 3 General class operators with one advancing to Extra class. We estimate that there are over 1,000 STEM and STEAM students that we can reach and provide Ham radio exposure through various programs.

2.4 UNDERSERVED: ***Explain the steps that you are planning to involve minorities in your project and how your program will help to improve diversity in Amateur Radio within your group and your community?***

Charleston County schools are almost even with the white to black student ratio, Dorchester County is the inverse of Charleston County, and Berkeley County is the only one with a predominately white student body (53% vs 35%). We shall take the MHRS to urban and isolated rural schools, such as those shown previously in Table 2, to allow us to demonstrate Amateur Radio to young people that may not be aware of the impact that amateur radio has especially in times of disaster.

As an example, some areas in Berkeley County have poor to non-existent cellular phone signals, which is a perfect place to show how amateur radio can be used, not only in a disaster, but also for regular communication across wide areas. We estimate 1,000 underserved residents shall be exposed to our instructional classes and we will see immediate positive results.

Boys & Girls Clubs provide safe places where kids can be themselves and participate in fun programs that build their skills for school, the workforce and life. The Club is a support system providing mentors, meals and meaningful life experiences for youth ages 6-18 after school and during the summer. We have contacted the Boys & Girls Clubs in the tri-county area, and they have expressed an interest in having us deploy the MHRS at their facilities to educate underserved youth in the virtues of Amateur Radio.

We shall also reach out to minority-lead church groups, such as African Methodist Episcopal churches, to inform them about Amateur Radio's role in supporting the community with the goal to involve more minorities in becoming Ham Radio Operators.

2. 5 HOW MANY WILL BENEFIT: ***Estimate the potential number of people (hams and non-hams) that would benefit from the proposed grant program within the first 2 years of your project.***

We estimate 20,000 students and adults shall benefit from the efforts described in this grant application within the first two years of the project. The MHRS will allow us to set up a station within minutes while providing the ease and comfort for ham operators to be effective in communicating and allowing non-hams to make supervised contacts. The club has dozens of members who have expressed an interest to volunteer to take the MHRS to local events, mentioned previously, and even to some farmers markets in rural Berkeley and Dorchester Counties to provide exposure to our underserved communities.

2.6 CREATE GROWTH: ***Estimate the potential of your program to create growth in the number of licensed and active amateur radio operators within the first 2 years of your project.***

As previously stated, there is one licensed Amateur Radio Operator for every 509 people, which means that we have approximately 1,600 licensed ham operators in the tri-county area. TARC currently has 93 members, and we had only 74 members two months ago, so we are growing our membership by over 10% per month since the pandemic. The increase in the amount of licensed hams from the exposure generated by operating a mobile ham radio station would be much more substantial. As such, have set a goal of 200 non-hams becoming hams in the first two years of the project. TARC is also working with a

distinguished member on establishing a Scholarship program to benefit the growth of ham radio with the first Scholarship award to be made in the first quarter of 2023.

2.7 WHO WILL BENEFIT: ***How will your project benefit members of your community who are not hams? Estimate the scope (numerically if possible) of the benefit to the public.***

As previously stated, the MHRS shall provide essential emergency communication capabilities for use by Berkeley, Charleston and Dorchester ARES serving approximately 820,000 residents. The availability of Emergency Communications is essential during, and especially after, natural disasters to assist first responders and provide shelter for those impacted.

Hurricane Hugo is a perfect example of how planning failed and communications needed to be very mobile in order to react to the changing situation. Hurricane Hugo (Figure 8) was a powerful Cape Verde tropical cyclone that inflicted widespread damage across the northeastern Caribbean and the Southeastern United States in September 1989. Across its track, Hugo affected approximately 2 million people. Its direct effects killed 67 people and inflicted $11 billion in damage. As shown in Figure 9, the eye of Hugo moved ashore South Carolina at Sullivan's Island in Charleston County at 04:00 UTC on September 22 (12:00 a.m. EDT). The storm's maximum sustained winds were estimated by the National Hurricane Center to have reached 140 mph (220 km/h) during landfall, making Hugo a Category 4 hurricane. Charleston County was at the epicenter of Hugo's devastation. Hugo produced an 8-foot (2.4 m) storm surge at Charleston, indicating that water levels rose 12.9 feet (3.9 m) above mean lower low water as Hugo made landfall.

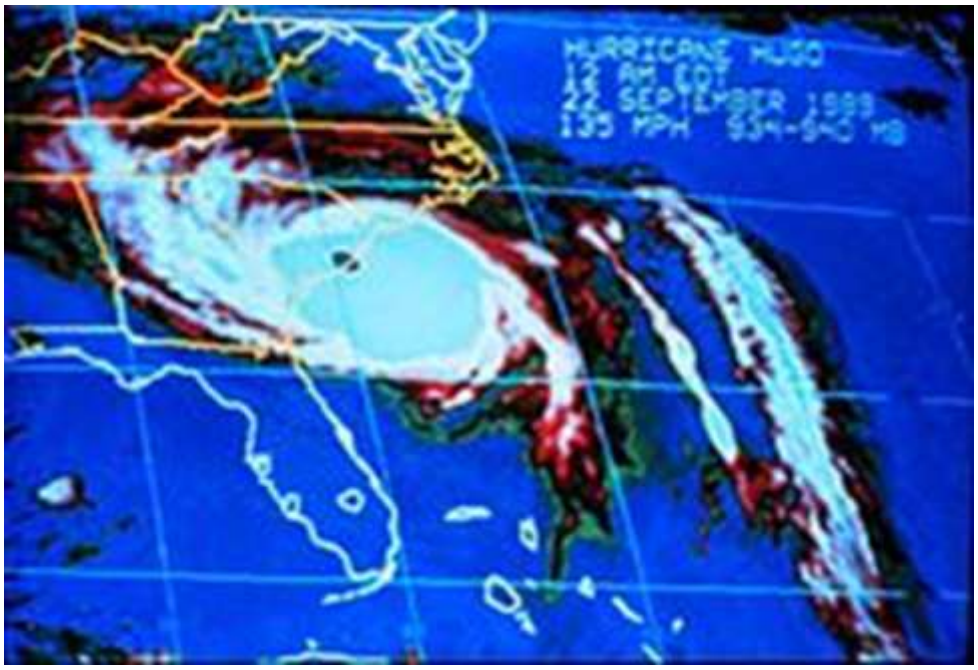

Figure 8. Hurricane Hugo's footprint was as large as the state of South Carolina.
https://en.wikipedia.org/wiki/Hurricane_Hugo

During the storm, several shelters had to be abandoned due to flooding and wind damage that threatened the lives of those inside the shelters, causing evacuation to already overcrowded centers further inland. In addition, there were civil communication outages causing chaos with an extremely high level of workload bleeding over to various Government agencies. Hugo had a devastating effect on infrastructure. Power outages were as long as several weeks, phone lines were down in areas for even longer, and several radio and TV towers were blown over. There were even boil water advisories in place for weeks. Figure

9depicts a small sample of the massive damage, including a bridge topped over going to Sullivan's Island in Charleston County where the Category 4 hurricane first came ashore. This was the only bridge from Charleston to Sullivan's Island at the time leaving those who did not evacuate in peril for weeks.

Figure 9. Hurricane Hugo emergency response could have benefitted if only we had a MHRS.

Further inland in North Charleston, we experienced over 3.5 weeks without electricity, 5 days without drinkable water, and 5 days without long distance phone service. Water was restored after 2 days, but was not drinkable for 3 days due to polluted pipes needing cleaned. Land lines worked for local calls, but the long distance system was simply over taxed. The infrastructure for cell phones was limited compared at the time. However, it is assumed that any cell towers today would be toppled.

The real need for ham radio came in the recovery phase. Public Service radio repeaters failed and communications with shelters was very intermittent. Shelters were needed because coastal areas had significant storm surge destroying many homes and businesses. In addition, the linked Low Country VHF/UHF repeater system did not exist for Hugo. Our first system, that today links 15 repeaters in the tri-county area, only became operational in 2005. However, today only 3 of our 15 linked repeaters have any backup emergency power, and "there is only one node located in heart of Berkeley County that almost no one can reach without being on top of it" per Linda Selleck, Berkeley County ARES EC.

The MHRS would be indispensable with the total loss of the electric grid in an emergency situation, such as we experienced during Hugo. The MHRS shall be equipped with a 100Ah battery, solar panels, and a generator that shall run on either gasoline or propane. Sufficient quantities of fuel shall be safely kept in a storage shed outside and away from the MHRS trailer.

Many of our club members are SKYWARN trained and tasked by the Charleston National Weather Service to be the eyes and ears on weather reporting during a storm and provide damage assessment reports after the passing of a major storm. TARC members Tom Arno (WW1TA), Chris Stinson (KC8YBK), and Jim Wasson are Net Controllers for the Low Country Storm Spotters Net. Several of our team members, including Steve Anderjack and Jim Wasson, have also completed Community Emergency Response Team (CERT) training and are badged into Berkeley County Emergency Operations Centers (EOCs).

Table 3 delineates the TARC members who are also ARES members. When called by the ARES EC's and/or County EOCs, they shall, not only deploy and operate the MHRS, but shall provide emergency training to other volunteers and conduct periodic drills with other members to encourage more ARES participation.

Table 3. TARC Members who are also Tri-County ARES Members shall provide EmComm training.

TARC Member	Call	QTH	ARES Affiliation
Steve Anderjack	KO4AFL	Goose Creek	Berkeley County
Ron Davis	K4TCP	Goose Creek	Berkeley County
Robert Davis	W4VRD	Mt Pleasant	Charleston County
Carl Dinge	WD4CXW	Ridgeville	Dorchester County
David Merritts	AE4ZR	Ladson	Berkeley County
Chris Stinson	KC8YTK	Charleston	Charleston County
Jim Wasson	KO4MNB	Daniel Island	Berkeley County

In conclusion. it is impossible to calculate the benefit to the public in terms of monetary savings from the potential impact of an event or emergency communications from a property and health/life-death perspective; however, having the ability to communicate and to provide information to help direct critical resources where needed in the event of a disaster could be argued as priceless.

2.8 SPECTRUM USE: ***Discuss the potential of your project to protect and utilize amateur radio spectrum.***

The MHRS shall initially be set up to operate HF/VHF/UHF using SSB, FM, CW, and various digital messaging formats (e.g., FT8). Digital messaging shall demonstrate the use of computers in radio communications over long distances, which is a great interest to the younger generation. Weekly nets shall be scheduled to confirm the radios are working properly. Local hams who reside in apartments and condos, and others who do not have access to an HF system, will enjoying operating the MHRS during field days and other events to get DX contacts.

Finally, the MHRS shall be an investment in the future for promoting of the use of equipment that supports bands/modes not commonly used (i.e., SHF, microwave, mesh) to bring awareness to these aspects of the hobby. The radio spectrum on all bands could eventually be utilized with the MHRS over time, but our initial intent is to construct two operating stations with HF/VHF/UHF digital messaging modes along with SSB, FM and CW.

2.9 PUBLIC AWARENESS: ***What are your plans to create positive public awareness and support for Amateur Radio in your community as part of your project?***

The MHRS shall be on display for various community events at the North Charleston Convention Center (Figure 10) and other venues, setup at public locations for field day, and taken to schools to demonstrate radio to STEM/STEAM classes. In addition, we shall deploy our MHRS at the annual Boy Scouts “On-the-Air” Jamboree held at Lake Moultrie in Berkeley County in October each year. We shall also coordinate with our local police departments during the National Police Night Out events to arrange for a setup space to show the emergency response capabilities and the support of local authorities during disasters. We have active TARC members who are retired policemen, fire fighters, EMS technicians, and even a Judge.

Besides those events mentioned in section 2.1.4., other events would be the “Open House” conducted by Joint Air Force and Navy Base Charleston, along with any specific public events, such as our annual air shows. We shall also meet with our local professional sports teams (i.e., River Dogs Baseball and Battery Soccer teams) to set up short term displays during some of their promotional events. As shown on our project schedule, we shall deploy the MHRS at a local event at least once a month, and professionally operate the station to create a positive public awareness. A minimum of two TARC members shall be stationed at the trailer at all times to promote support for Amateur Radio and ARRL.

In addition, during South Carolina Hurricane awareness week the beginning of May, in which the 'official' hurricane season begins, TV stations will have short segments each day about preparing for tropical storms. As such, we shall seek free publicity with local TV stations to set up and display the MHRS and demonstrate its operation. MHRS may even be used as a prop for local TV weather stations broadcasts.

In the fall, the Berkeley County School District has a 'back to school' festival that treats students to back packs of supplies and introduces them to the county bookmobile. We shall b ring the MHRS to this event. Having a mobile ham radio station would bring amateur radio to young students in the county. This would expose many minority and underprivileged children to the field of electronics and the science of radio. These any many other events are shown in the project schedule that appears in the Appendix.

Figure 10. North Charleston Convention Center is a great venue to display and demo the MHRS.

Finally, each November, the Berkeley Electrical Cooperative has many exhibitors from the community at its annual meeting in what amounts to a 'county fair' type of feel. Attendance is roughly 50,000 to 75,000 cooperative members from all parts of Berkeley, Dorchester and Charleston counties. We shall setup the MHRS, along with practice keys, buzzer and lights to have guests try 'sending' their name in Morse code. This is also a great time to demonstrate to the public how we provide communications when phones are not working during an emergency.

2.10 PROMOTION: ***Would you be willing to create content to help promote the ARRL club grant program? Please describe plans that you would be willing to commit to in this area. Please outline how you would utilize multiple channels including social media, Video, Print, Television, and other media.***

The MHRS shall have professional lettering (as shown on the old trailer in previous Figure 2) to promote Amateur Radio, TARC, and ARRL. We shall display an immaculately maintained station; properly adjusted radios and mic gain; and utilize standardized communication procedures. Operators shall wear TARC shirts and hats that will include the ARRL logo to present the image we know what we are doing and operate proficiently and legally within the amateur radio spectrum. We shall revise our existing color tri-fold brochure (Figure 11) to promote the ARRL Club Grant Program with a picture and description of the MHRS and tie it into the other activities, such as those shown here on the brochure.

We shall create a video of the MHRS in operation, and provide footage to our local TV stations to promote it when we are scheduled to be at a major event. We shall transport the MPRS to our local TV stations for an on-site demonstration. We shall provide news releases to our local TV and radio stations and newspapers promoting the ARRL Club Grant Program and the numerous benefits that it provides to the community. All this will be reported back to ARRL in our bi-annual status reports.

Figure 11. TARC Brochure shall be used to promote the ARRL Club Grant Program to the local media.

3. EXECUTION CAPABILITY

Benjamin Franklin once said "If You Fail to Plan, You Are Planning to Fail." Nothing could be further from the truth when planning to execute this grant project. As shown in Figure 12, we have defined the project goals, specifications, and tasks in Section 2. The Appendix contains our Project Plan schedule and budget. This section shall introduce the project team, assign responsibilities, and address resources, risks, and how we plan to manager the grant project and integrate it into our overall club operations. This section will demonstrate that we have the requisite experience and qualifications to execute this project as planned.

Figure 12. Every Project has a Life Cycle whereby a detailed Project Plan is key to successful execution.

3.1 RESOURCES: ***Explain the number of volunteers that are required to execute your grant program. Please explain the source of the needed volunteer help and the level of committed volunteers that you have in place currently. Also, please explain your plans to secure necessary volunteer help that is not currently in place.***

We have our core team in place, have established our team identity, and have a shared vision with the club members and the community (as shown in our letters of commitment). Our Core Project Team for executing this grant consists of the following volunteers:

TARC President, Glenn Stephens, WA4NMW (Extra), and ARRL member, is responsible for the overall managing of TARC. Glenn is retired executive from the electric utility industry and continues to consult in power systems and communications. He has BSEE from Clemson University and an MBA from the University of South Carolina. He is a registered Professional Engineer in the state of South Carolina. He has managed over a $150M in communications projects. He was the chairman of the NERC committee who wrote the current standards for balancing load and generation for all Electric Utilities in United States and Canada. He managed the planning and operating of a portion of the electric grid. He has developed and delivered training courses for the introduction to amateur radio, Technician and General Class Licenses. He has been mentoring a First

Robotics Team at Fort Dorchester High School for the past three years. Glenn can be reached at gestephe@sc.rr.com or 843-970-8835.

TARC Grant Project Manager, James "Jim" Wasson, KO4MNB (General), and ARRL member, shall manage this project to assure that all activities are kept on schedule and within budget, and that it meets the technical specifications contained within this proposal. Jim knows that building and retaining an effective team of volunteers requires that we conduct monthly project meetings, establish a team identity, create a shared vision, build a reward system, manage decision making, manage conflict, and have regular team-building sessions. Jim holds a PhD, MBA, and BSET, and is a certified Project Management Institute (PMI) Project Management Professional (PMP). Jim has successfully managed over one thousand projects since 1981, mostly multi-million dollar U.S. Government contracts, while employed at major defense contractors, such as Northrop Grumman, Boeing, GE Aviation and BAE Systems. Jim retired from BAE Systems as Chief Technology Officer (CTO) responsible directing over 600 engineers executing over $70 million of projects at 7 plants in the U.S. and U.K. He was also an MBA Professor for 15 years and Chair of the University of Phoenix Graduate Business and Management College for the West Michigan Campuses. In 2010, he founded Growth Strategies International LLC, a project management consulting business, and was under contract to the U.S. Department of Energy, U.S. Air Force, U.S. Navy, Boeing, Navitas Systems, University of South Carolina, Montana State University, and many others. As a certified PMP, he has taught many Project Management classes and lectured at many Universities. His consulting businesses has assisted numerous companies in winning and successfully executing hundreds of grants and contracts worth many millions of dollars. Jim is a Community Emergency Response Team (CERT) trained ARES member and active in POTA. Please direct any project management administrative questions to Jim at jimwasson58@aol.com or 607-727-4727.

TARC Vice President, Steve Anderjack, KO4AFL (Extra) and ARRL member, is responsible for the design and construction of the trailer. Steve, who holds a degree in Computer Systems Technology, is an IT professional with over 10 years of experience in troubleshooting, security and infrastructure. Steve excels in analytic, communications, and teamwork skills, combined with a proven ability to manage multiple large scale projects while meeting challenging deadlines. Steve enjoys portable operations and emergency communications planning – he is CERT trained. He is a volunteer examiner for the ARRL, W4VEC, W5YI and GLAARG. He is also a session manager for GLAARG specializing in online ham radio testing, and volunteers as a POTA area manager. Please direct any technical questions to Steve at ko4afl@gmail.com or 757-572-8365.

TARC Public Information Officer, Ronnie Davis, K4TCP (Extra) and ARRL member, is assisting in the design and construction of the trailer and associated systems. Ron holds a degree in Information Systems Technology with over 30 years of working in the Healthcare IT space supporting Infrastructure and Platform as a service with a focus in system virtualization, network security, problem solving and critical thinking. Ron's hobbies include Amateur Radio, Electronics design, and prototyping with Microcontroller and Single Board Controller systems.

Ron successfully works at deploying scalable systems to support a variety of System Development Lifecycle efforts in the cloud and legacy on premises solutions. Please direct any system related questions to Ron at K4TCP@arrl.net or call 843-572-2307.

TARC Secretary, Stephen Behr, K4OPZ (Extra) and ARRL Member, is responsible for education and training. Stephen is a retired U. S. Air Force pilot and retired American Airlines (AAL) pilot ground school instructor and has a BS in Banking and Finance, and a MA in Computer Resource Management. During his tenure at AAL, he developed computer-based training for Boeing 757 and 767 pilots using instructional systems design methodology. As a volunteer at the Arizona Science Center, in the Center for Amateur Radio Learning (the 'Harkin's Ham Shack') he demonstrated HF radio (including digital modes PSK and JT65), VHF radio, and taught visitors how to send their names using Morse code. As many as 100 school children would visit the ham shack on busy days. Stephen is the trustee for K4PSA, the Palmetto Scholars Academy Amateur Radio Club (Figure 5) in North Charleston, which is currently being reactivated now that routine school functions have returned. He is also an accredited extra class volunteer examiner. Please direct and education and training questions to Stephen at sbehr01@gmail.com or call 480-495-7324.

TARC Programs Chair, Van Herridge, N4VGE (Extra), and ARRL member, has volunteered to build the custom cabinets/desks, and install the electrical system and vinyl tile flooring for the trailer. Van is a retired contractor, licensed electrician, cabinet maker, entrepreneur, and a mentor to new hams.

We have over 40 of our 93 club members who regularly attend our monthly membership meetings at the CACI Conference Room in North Charleston. Approximately half of them have stated that they have the time and would welcome the opportunity to be able to deploy and operate the Mobile Ham Radio Station for the purposes stated in this proposal. At each deployment of the MHRS, a minimum of two licensed operators shall be required. Club members shall be the primary source for volunteers, along with students that have earned their technician class license.

3.2 ADMINISTRATION: ***Outline the role of and process used by key members of your club's leadership team in the following areas: 1) Securing volunteer participation in projects, 2) Administering and keeping records pertaining to the use of funds, 3) Developing plans and executing projects and schedules.***

Regarding securing volunteer participation, we have had no problem in the past securing the requisite number of volunteers for any of our events or projects, as evidenced by past field days and other events the club has held; and therefore, we do not anticipate any problems going forward as the club is very active, and is growing each month. The Club Board, consisting of the President, Vice President, Treasurer, and Secretary, and various committee chairs, meets the first Monday of every month to plan our projects and events to announce at the club membership meeting, held the third Monday of each month. At the membership meeting, the Club President announces those projects and events and asks for volunteers. We typically get 10-20 volunteers to support each project or event, which is sufficient.

Regarding administering and keeping records pertaining to the use of funds, the Club Treasurer, Jim Self KW4PW, shall establish a separate account for the grant funding to keep it separate from the club's normal operating expenses. The Grant Project Manager shall be responsible for requesting funds from the

Treasurer, as listed in the grant budget (see Appendix), and reporting expenditures monthly to the Treasurer using the club expense form. In accordance with our Articles of Incorporation, Charter, and Bylaws, any funding that is required for items not listed in the grant budget shall be determined by the Board that such an expense is justified before the treasurer will allow a disbursement of club funds. These decisions and actions shall be recorded by the Club Secretary in the meeting minutes and reported at the membership meeting. Clear and concise communication to the project team and the club members is key. It is important to note that the club just completed its annual audit with no issues being reported.

The Grant Project Manager, along with the project team, shall be responsible for developing the Project Plans (Figure 13) and executing the project within budget and in accordance with the project schedule. The Club Board, Governed by President Glenn Stephens, shall oversee the Project Team. The team shall give a written and oral report at each monthly board meeting for the Secretary to enter into the minutes to be shared with the club membership. Any issues that arise that are beyond the Project team's control shall be immediately brought up to the Board to seek resolution. The Grant Project Manager shall provide ARRL with a progress report every 6 months, including a final report upon completion of the project.

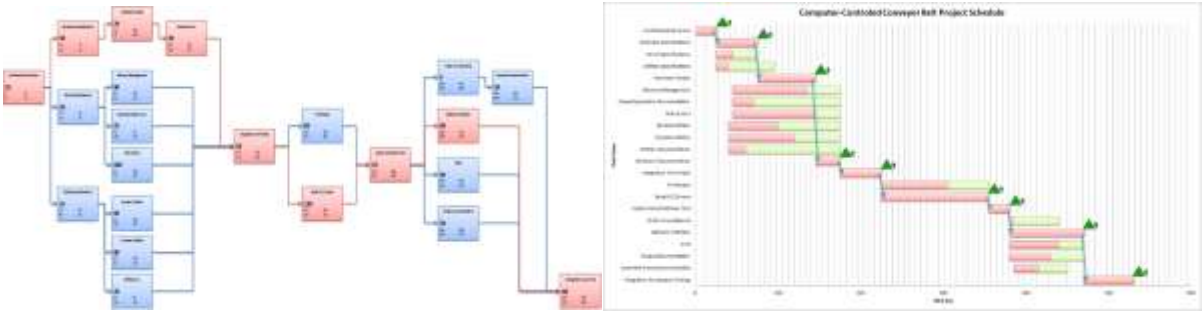

Figure 13. Example PERT dependency Network used to develop the Project Gantt Chart (Schedule).

3.3 PRIOR EXPERIENCE: ***Describe a project or program that you have successfully executed during the previous 5 years of similar scope, financial value, volunteer levels, and complexity. Describe the goals that you achieved, and the scope and makeup of the people served.***

The TARC Club President, Glenn Stephens has extensive experience in managing complex communications projects. One project he managed was the installation of 900 MHZ digital trunking system covering the state of South Carolina with a cost $25 million. The project included installation of fixed equipment at 65 sites, 4500 mobile and portables, antennas, 45 remote consoles, redundant master site controllers, and a backup site. As part of the project, he managed the extensive backhaul through the company's fiber and microwave network. The project provided communications for 17 different companies to allow for the operations and restoration of the electric grid. He managed a yearly budget of $50 million along with the 10 years planning budget of $500 million. His group decided what communications and transmission projects would be built and the associated schedules for those projects.

The Grant Project Manager, Dr. Jim Wasson, retired in 2010 from BAE Systems Inc., where he was Chief Technology Officer. As CTO, he oversaw R&D/technology strategy, business development, product development, and operations across 7 international sites for the Military and Commercial Aircraft, Land Vehicles, and Power and Energy Systems business units. Jim planned and executed over one hundred projects on schedule, managed over 600 people, and stayed within a 5% variance of his annual $70 million budget. He built and led up to 23 multiple international project teams, developed and executed project plans, and chaired quarterly program reviews at all 7 sites. He implemented complex Project Management

tools, such as earned value management, critical path analysis, and stage gates, and developed risk mitigation plans to meet or exceed customer expectations. Last year, working as a consultant to Navitas Systems Inc., he helped them secure a $1.25 billion U.S. Army contract to develop and manufacture conformal soldier-wearable lithium-ion battery packs. https://www.govconwire.com/2021/05/four-companies-land-spots-on-armys-1-25b-conformal-wearable-battery-contract

From a club perspective, we are currently overseeing the establishment of an Amateur Radio Club at Palmetto Scholars Academy that successfully executed an ARISS project in 2016-2017 (see Section 3.1). We organize quarterly events with 15-20 volunteers to set up, operate, take down, several ham radio stations operating across multiple bands. We have donated three radios to new hams and have monthly raffles for radios, antennas, and ham radio accessories. We are currently raffling off a brand new in-the-box ICOM IC-7300 radio to raise funding for sustaining ongoing club operations. As previously mentioned, we also have in place a scholarship program, funded by one of our members, with a scholarship award to be made in the first quarter of 2023.

3.4 PROJECT PLANNING: ***Provide a detailed plan including a schedule with key milestones identified, a budget breakdown for the use of grant funds, and the numbers of and roles for the volunteers required to execute your project. Please use the budget and schedule templates provided.***

Note that not all events for demonstrating the operation of the MHRS are shown on the project schedule that appears in the Appendix, but only those events that are known in advance. Besides Museum Ships, Summer Field Day, Winter Field Days, Field Operating Events, we anticipate that there will be at least one monthly public event where the MHRS shall be deployed, as previously discussed. When not participating in a public event, the MHRS shall be deployed at schools on a monthly basis while they are in session, for educational and training purposes. Emergency Communications operations, of course, shall always take precedent for the priority use of the MHRS.

The following is in regard to the proposed budget that is contained in the Appendix:

- **Personnel.** There is no budget allocated for salaries and benefits for individuals working on the project since everyone on the project team is a club volunteer. As stated in Section 3.1, the team consists of electrical engineers, technicians, and mechanics, in addition to an experienced cabinet maker and licensed electrician. It is estimated that each of the six volunteers shall spend 20 to 40 hours per month working on the project, especially during the first four months, as delineated in the project schedule. After the MHRS is operational, we expect 10-15 volunteers per month will be available to deploy the MHRS to the various events that were discussed earlier.

- **Supplies and equipment.** The major budgeted cost is for the 7’ x 14’ Blue Diamond cargo trailer, and the radio equipment. Once we have been notified of a grant award, we shall begin the process of selling the small storage trailer and any unneeded items stored in trailer to help defray the cost of purchasing a new trailer.

  Regarding radio equipment, we are in the process of selling our two of our three older Yaesu 897 radios to buy one new MF/HF/VHF/UHF transceiver providing operation on SSB, CW, AM, FM, and digital modes. In addition, a TARC Member, who prefers to remain anonymous, said that if we are awarded the grant, that he will donate a new in-the-box ICOM IC-9700 VHF/UHF/1.2GHz D-STAR transceiver. We will then use the grant funding to purchase an ICOM IC-7300 HF/50Mhz transceiver. These two new modern radios will outfit the MHRS operating stations (Figure 14).

Figure 14. The Grant will be used to purchase an IC-7300 and an IC-9700 will be donated.

Other items in the budget include the equipment needed to outfit the trailer, including a 100Ah Li-ion battery, inverter, HVAC, ladder rack, lettering, anti-theft devices, and materials needed for club volunteers (Glenn, Jim, Steve, Ron and Van) to build and install the custom-made desks and cabinets, insulation, vinyl flooring, HVAC and electrical power system. All items shown in the budget, except for miscellaneous, were taken from catalog prices or quotes and were rounded up to account for inflation. Firm pricing shall be provided upon notice of award upon request.

- **Travel.** There are no travel expenditures anticipated for this project.

- **Marketing** – We have elected to include the cost of printing flyers and purchasing social media ads to advertise a training class or event to be included in our operating costs, as that this has been our standard practice, rather than include this expense in the grant budget.

- **Indirect Costs** – None. TARC does not have an established indirect cost rate.

- **Other Funds Available** – As previously stated, a TARC member has offered to donate a new ICOM 9700, valued at $1750. In addition, several monitors, solar panels and mini-PCs have been donated to the club for installation on the trailer. Other equipment needed to outfit the trailer, such as chairs, tables, canopies, generator, bandpass filters, and antennas shall be taken from our existing storage trailer, which will be sold once emptied.

3.5 DEPENDENCIES: ***Please identify any dependencies that you have for support by third parties from outside your club for the successful execution of your project. Please secure and attach letters outlining each required third party's commitment to supporting your project.***

As previously stated, we shall use the grant funding to construct and operate a Mobile Ham Radio Station to provide emergency communication services in cooperation with Amateur Radio Emergency Services for the tri-counties of Berkeley, Charleston and Dorchester. In particular, Berkeley County ARES does not a base of operations. As such, this grant would greatly benefit their emergency operations, which serves areas further inland from the city of Charleston on the east coast. Letters of Commitment or Support from all three counties are contained in the Appendix.

Also, as previously stated, the MHRS shall support the education programs at the Palmetto Scholars Academy including other schools as well. Included in the Appendix is a Letter of Commitment from Palmetto Scholars Academy.

3.6 RISKS: ***Discuss the risks associated with achieving the goals stated in your proposal. Also discuss the top risks you face in executing your program on schedule and within the planned budget. For each risk, outline your plans to mitigate or limit negative impacts.***

The trailer will be stored in a shed out of sight at Glenn' Stephen's fenced private property. Theft shall be mitigated by installing hitch and wheel locks and a GPS tracker and/or an APRS. The radio equipment will not be stored in the trailer, but will be stored in padded Pelican boxes and secured in climate controlled environment at Glenn Stephen's house.

The equipped cargo trailer, owned by TARC, shall be covered up to $1,000,000 liability insurance under our current policy. There is also a "Disaster/Emergency" rider in our policy that covers things like floods, storms, fires, etc. The club has coverage for events where we obtain specific riders at no additional cost. At all times, at least one club member shall be assigned to monitor the trailer to address any potential liability issues while the trailer is unlocked and/or unoccupied in the field or on public display. Any additional coverage expense, if needed, will be a small percentage of our overall coverage costs, and well within the budgetary constraints of our current operating budget.

To mitigate the risk that ARES calls on TARC members to deploy the MHRS during an emergency and Glenn Stephens is not home, both Steve Anderjack and Jim Wasson shall have access to Glenn's lot and shall have keys to unlock the trailer and disable the anti-theft devices. In addition, both Steve and Jim, shall bring their own portable equipment with them to the trailer to be able to deploy on a moment's notice as a back-up contingency. Figure 15 is what Jim carries in his vehicle along with his battery and antenna.

Figure 15. IC-7300 Radio in a padded Gator Box ready for EmComm Ops.

To mitigate the risk of a mechanical breakdown, a regular maintenance and preventive maintenance schedule shall be developed in order to keep the trailer and equipment ready for deployment at a moment's notice. This shall include, but is not limited to: tire pressure, battery charge status, generator fuel levels and replacement, lubrication, and corrosion prevention. Jim Wasson, Grant Project Manager, is a FAA licensed aircraft mechanic. Steve Anderjack is also a skilled mechanic.

Finally, many schools require volunteers to obtain a background check before working with students. Stephen Behr shall assure that this will indeed be done as volunteer adults are trained. As stated in the letter from PSA, all volunteers shall go through a process of indoctrination and inculcation to gain endorsement in the goals and purpose of the grant project. In addition, all students participating in supervised operation of the MHRS shall undergo safety training, and the schools shall assure the club that our activities are covered under their school insurance policy to limit our liability.

3.7 ADDITIONAL FUNDING: ***Does you project require funding beyond what is outlined in your grant application? What other funding sources are you pursing and what is the probability you will receive the additional funds? Have you applied for funds that duplicate or overlap those requested in your grant application? If so, please list the sources and requested amounts.***

Our proposed project does not require any additional funding outside what is provided by this grant.

3.8 SUSTAINMENT: ***Discuss the funds that will be required to operate and sustain the project in your grant after the funds you are requesting have been exhausted. What level of on-going funding do you require and what is your plan for securing the necessary funding to sustain your project? If you are going to charge use fees to use the resources funded by your grant or existing resources directly enhanced by your grant, please explain these fees in detail and specifically relate the fees to ongoing costs directly associated with operating your project. Note that ARRL club grants may not be used for profit activities, commercial activities, or revenue generation beyond covering the direct costs for ongoing sustaining operations of the funded project.***

Annual dues collected from our 93 members, in addition, to monthly fundraising raffles, will be more than sufficient to sustain the project and cover our insurance and maintenance costs since this trailer will be replacing the smaller trailer that we have maintained for many years. The latest Treasurer's report, dated 19 September 2022, shows that we currently have $885 in the bank with annual expenses expected to be around $1000. Annual membership dues of $25 each are collected every fall. Therefore, we estimate that by the end of the year our bank balance will be approximately $2,200. The club is growing about 10% per month in membership mainly due to our robust training, education and license testing initiatives.

In conclusion, we believe that finding commonalities in our commitment to excellence in Amateur Radio communication through teamwork with ARRL and our community will be a catalyst for problem solving, sharing of ideas, and dedication to purpose. The greatest victories come in finding ways to make it work through common goals and inclusivity. Thank you for allowing us the opportunity to submit this proposal.

APPENDIX A: PROJECT SCHEDULE

ARRL Club Grant Milestones

Club Name:	Trident Amateur Radio Club
Template Revision:	Issue 1
Name of Author:	James W. Wasson, KO4MNB
Date Submitted:	9/5/2022

Date	Description	Why is this milestone important?	Who is responsible for completing the milestones	Milestone Dependencies
1/2/2023	Project Plan Kick-off Meeting	Discuss the Project Execution Plan and agree on task completions and reporting procedures	Jim Wasson with project team	Assumes grant award occurs mid-December 2022 and funds are in hand
1/16/2023	Purchase items shown in budget	Allows us to begin receiving the items needs to build our mobile club operationing station (MCOS)	Steve Anderjack and Ronnie Davis	All quotes have been obtained and source elections made and approved by board
2/13/2023	Receive trailer and install locks, electrical, HVAC, insulation, etc.	Allows the interior of the trailer to be readied for furniture and flooring installation	Glenn, Steve, Ron, Van and Jim	Assumes that trailer and other items ordered have been delivered on time.
2/13/2023	Build custom made desks and cabinets	The furniture shall be built in paraell with completing the interior modifications above	Van Herridge	Assumes that trailer and other items ordered have been delivered on time.
3/13/2023	Install custom made furniture and vinyl flooring	Need desks, cabinets and flooring installed before we can set up radio equipment	Van Herridge	Assumes Van has completed fabrication of furniture and that it all fits into place
3/27/2023	Deliver trailer to Fast Signs to apply lettering. Design and order brochures.	Need to have TARC and ARRL lettering on both sides of trailer to promote Amateur Radio	Steve and Van	Assumes artist can replicate design on existing storage trailer
4/10/2023	Install radio equipment, DC distribution, coax cables, filters, antennas and test	To have all equipment installed in trailer to demonstrate a fully operational MHRS	Glenn, Steve, Ron, Van and Jim	Assumes all previous tasks have been completed such that radios can now be installed and tested
4/24/2023	Begin conducting demos to ARES, EOCs, first responders, schools, and local events, such as the Flowertown Festival and JBC Open House and Air Show	Now that the MHRS is operational we shall demonstrate it to the public, begin training and educational programs. Pass out brochures and begin publicity campaign with local media.	Glenn, Stephen Behr, Steve A, Van, Ron and Jim	Assumes the MHRS is fully operational. Assumes that PARS has received ARISS grant. Assumes we are invited to bring MHRS to Joint Base Charleston (a TARC member works there)
5/6/2023	Field Operating Day and SC Hurricane Awareness Week	An opportunity to invite the community to learn about Ham Radio and to operate. TV coverage.	Glenn with 10-15 members	Assumes we can reserve a park to operate whuch has never been a problem in the past
6/3/2023	Museum Ships Field Day	Promotes awareness of Amateur Radio at the H L Hunley submarine exhibit (Call: N4HLH)	Van with 10 members	Assumes we are again permitted access to set up the MHRS at the exhibit
6/24/2023	ARRL Summer Field Day	Provides an opportunity for those new to the hobby to learn about field operations	Glenn with 10-15 members	Assumes we can set up in the large vacent lot owned by Glenn Stephens next to his house
July	Field Operating Day and River Dogs/Battery Sporting events	An opportunity to invite the community to learn about Amateur Radio and to operate	Glenn with 10-15 members	Assumes we can reserve a park to operate
Aug	National Police Night Out and Back to School Festival	Promote awareness of Amateur Radio	Mike Edwards with 5 members	Assumes we can reserve a park to operate
Sept	Field Operating Day	An opportunity to invite the community to learn about Amateur Radio and to operate	Glenn with 10-15 members	Assumes we can reserve a park to operate
Oct	Little David (W4ANK) Operating Day, Coastal Carolina Fair, and Boy Scouts Jamboree	An opportunity to invite the community to learn about Amateur Radio and to operate	Jan Kauser with 10-15 members	Need to make reservations so that space is made available to set up
Nov	Berkeley County Electrical Coop	Promote awareness of Amateur Radio	Glenn with 5 members	Assumes we can reserve a park to operate
Dec-Jan	ARRL Winter Field Day	An opportunity to invite the community to learn about Amateur Radio and to operate	Glenn with 10-15 members	Assumes we can set up in the large vacent lot owned by Glenn Stephens next to his house

APPENDIX B: PROJECT BUDGET

Trident Amateur Radio Club			
PO Box 60732, N Charleston, SC 29419			
	Steve Anderjack, KO4AFL		Timeline for Spending: Order all items at time of grant award
	8/26/2022		
No.	Expenditure Item	Budget	Expenditure Explanation
1	Cargo Trailer	$12,000.00	7' x 14' x 7' Blue Diamond Cargo Trailer Quote
2	Radio equipment	$1,500.00	ICOM 7300 HF/6M 100w Transceiver and Power Supply
3	Miscellaneous	$300.00	Wire and connectors, DC distribution block, etc.
4	Battery	$1,000.00	100Ah Battery for emergency power
5	Inverter	$600.00	Inverter/charge controller for solar cells
6	HVAC	$1,300.00	Air Conditioning and heating for trailer
7	Insulation	$600.00	Insulation of trailer to assist with sound/weather
8	Furnishings	$950.00	Materials for custom-built desks and cabinets and vinyl flooring
9	Roof rack	$180.00	Ladder rack for mounting solar and antennas on top of trailer
10	Anti-theft devices	$350.00	Hitch and wheel locks and GPS tracking unit or APRS
11	Trailer lettering	$1,938.00	Fast Signs Quote for custom vinyl lettering on trailer
	Total	**$20,718.00**	

APPENDIX C: LETTERS OF SUPPORT AND COMMITMENT

To the ARRL Club Grant Program:

Please accept this document as my formal recommendation that the ARRL approve the grant proposal submitted by the Trident Amateur Radio Club (TARC), of North Charleston, SC, for a mobile ham radio station (MHRS). I have read TARC's proposal and find that it addresses an important need in the South Carolina Low Country. The Greater Charleston, SC area is home to nearly 820,000 people, or about one-seventh of the state's total population, making it the largest population center in South Carolina. The city is located on the Atlantic coast in South Carolina's aptly named Low Country region, much of which is at elevations near sea level and prone to flooding when hurricanes strike. To get a sense of the Low Country's vulnerability to hurricanes, one need only look at what happened when Hurricane Hugo struck Charleston in September, 1989 as a category 4 hurricane. Telecommunications infrastructure in the area was overwhelmed by high winds, extensive flooding, and higher-than-normal service demands. Amateur radio operators provided some emergency communications, but were hampered by their lack of mobility. The MHRS directly addresses this issue.

More than three decades have passed since Hugo made landfall in 1989, during which time amateur radio operators in the Charleston area have made significant improvements to their emergency communications capabilities. However, the fruits of that progress are unequally distributed across this area's counties, another issue which this proposal addresses.

The project proposed by TARC does more than improve amateurs' emergency communications response during a disaster. It also provides an opportunity to showcase what amateur radio is and does, as well as a vehicle for STEM training. Outreach and training will make amateurs more visible to community leaders and will help these leaders understand how to leverage amateur radio as a resource. These activities will also contribute to the sustainability of the Amateur Radio Service in South Carolina by bringing new people into the hobby.

As I read through the proposal, I was also impressed by the team that TARC has assembled to undertake this project, as well as the metrics and methodologies they intend to utilize. It is my belief that resources and processes are by themselves inert and do nothing. Only people can make things happen and TARC appears to have the right team in place for that to happen.

In summary, I found TARC's proposal to be complete, clear, and compelling. I am sure that ARRL will agree and I recommend that this proposal be approved.

73,

Marc C. Tarplee, N4UFP
SC Section Manager
mtarplee@comporium.net
(803) 487-1115
ARRL – The National Association for Amateur Radio ™
http://arrlsc.org

Berkeley County ARES
P.O. Box 945
Goose Creek, SC, 29445

August 27, 2022

Trident Amateur Radio Club
P.O. Box 60732
N. Charleston, SC 29419

Re: ARRL Club Grant Program Application

Dear Trident Amateur Radio Club (TARC):

The Berkeley County Amateur Radio Emergency Services (ARES) supports your proposal to construct a Mobile Ham Radio Station (MHRS) to improve amateurs' emergency communications response during and after a disaster. The availability of Emergency Communications is essential to assist first responders and provide shelter for those impacted in the tri-county area consisting of over 800,000 residents.

Amateur Radio operators are often tasked by their local Emergency Operations Center (EOC)/Emergency Management Department (EMD) to serve as backup communications for our local medical facilities, shelters (as able and as needed), and other community resources as needed and able. Berkeley in particular is not entirely served by the hospital-based linked VHF/UHF network radio system, since our hospital was built after the linked system was established.

We also have recently lost many of our capabilities due to a change in the EOC location and relevant support structure (i.e. antennas towers supporting repeaters). At present, we do not have a base of operations and not all potentially supported locations have the ability to rapidly deploy safely. The MHRS directly addresses this issue and provides an additional EmComm resource.

We welcome the invitation from TARC to make their MHRS available to ARES on a priority basis, at no charge to us. to support our tri-county EmComm response. Several of the TARC members are also members of our ARES organization and have pledged to deliver and help operate the MHRS under our EM's supervision, based of course, on County Emergency Coordinator deployment instructions. As such, we recommend that this proposal for grant funding be approved to support our efforts across the community.

Sincerely,

Linda Selleck

Linda Selleck
Emergency Coordinator, Berkeley County ARES

Dorchester County ARES
212 Deming Way, Suite 3
Summerville, SC 29483

August 21, 2022

Trident Amateur Radio Club
P.O. Box 60732
N. Charleston, SC 29419

Re: ARRL Club Grant Program Application

Dear Trident Amateur Radio Club (TARC):

The Dorchester Amateur Radio Team (DART), which is the Dorchester County Amateur Radio Emergency Services (ARES) supports your proposal to construct a Mobile Ham Radio Station (MHRS) to improve amateurs' emergency communications response during and after a disaster. The availability of Emergency Communications is essential to assist first responders and provide shelter for those impacted in the tri-county area consisting of over 820,000 residents.

Amateur Radio operators are often tasked by the National Weather Service to be the eyes and ears on weather reporting during a storm, and provide damage assessment reports after the passing of a major storm. When Hurricane Hugo struck Charleston in September 1989 as a category 4 hurricane, the telecommunications infrastructure in the area was overwhelmed by high winds, extensive flooding, and higher-than-normal service demands. Amateur radio operators provided some limited emergency communications, but were hampered by their lack of mobility.

More than three decades have passed since Hugo made landfall in 1989, during which time amateur radio operators in the Charleston area have made significant improvements to our emergency communications capabilities, including a linked VHF/UHF network. However, the fruits of that progress are unequally distributed across the tri-county area, especially in HF and digital capability. The MHRS directly addresses this issue and provides an additional EmComm resource.

We welcome the invitation from TARC to make their MHRS available to ARES on a priority basis, at no charge to us, to support our tri-county EmComm response. Several of the TARC members are also members of our ARES organization and have pledged to deliver and help operate the MHRS under our EM's supervision, based of course, on County EOC/IC deployment instructions. As such, we recommend that this proposal for grant funding be approved to support our efforts across the community.

Sincerely,

Beverly R. Boyd W3BRB
DART EC

19 September 2022

To: James Wasson, KO4MNB

Subject: ARRL and TARC letter

From: Rick Valentine, N8BKN, Charleston County Emergency Coordinator

The Trident Amateur Radio Club is seeking a grant from ARRL to assemble a portable communications trailer. I fully support this endeavor. Charleston County is a long narrow coastal county comprising 1,358 sq. miles of metropolitan, agriculture, and rural areas. Neighboring Dorchester (576 sq. miles) and Berkeley counties (1,229 sq. miles) are also a mixture of different environments making communications critical in the event of a natural or man-made disaster.

The Low Country has several natural events of concern. Hurricanes, Earthquakes, and severe storms are always primary concerns. This is also a busy port facility with container ships, cruise ships, and other waterborne traffic. In the event of a major incident, many routine forms of communications can fail or just get overloaded, the need for reliable back communications is very important.

This area geographically is fairly flat so height of antennas limits the range of installed repeaters; this makes relay points and communications vehicles that can go to near the scene vital.

Amateur radio and ARES has always been important to this tri-county area and has the full support of the local Emergency Management Department. Any consideration to the TARC request and later grant would be put to good public service use and add to a redundant system already in use in the Low Country.

Thank you for your consideration.

Rick Valentine, N8BKN
Charleston County ARRL Emergency Coordinator

Palmetto Scholars Academy
7499 Dorchester Road
North Charleston, SC 29418

August 31, 2022

Trident Amateur Radio Club
P.O. Box 60732
N. Charleston, SC 29419

Re: American Radio Relay League Club Grant Program

Dear Trident Amateur Radio Club:

Palmetto Scholars Academy (PSA) is a public charter school designed to discover, nurture, and optimize the full potential of intellectually gifted 6th to 12th grade students. PSA students benefit from a challenging academic program, fine and performing arts, competitive athletics, and a wide selection of extracurricular activities, including Amateur Radio. We are delighted that our Amateur Radio Club is currently being reactivated now that routine school functions have returned.

PSA fully supports this grant proposal to construct and deploy a Mobile Ham Radio Station (MHRS) as it will provide significant educational and training impact for our students. It will attract and retain students in STEM related disciplines through the introduction of Amateur Radio activities, principles, and operations. It will empower teachers with the necessary knowledge to integrate Amateur Radio theory as it applies to the mathematical, scientific, and technical concepts learned in the classroom.

Our teachers are highly enthusiastic about bringing a radio station into the classroom and several students are excited about getting on the air. Prior to the COVID lockdown, the school club was active with about 10 active members; 4 Technicians and a teacher with Technician class license. We estimate that the deployment of MHRS will allow approximately 100 students to be exposed to Amateur Radio resulting in 10-15 newly licensed amateur radio operators every year.

We acknowledge that Stephen Behr, has been assigned by TARC to be the single point of contact to implement the school's policies and procedures, including making certain that all TARC adult volunteers obtain a background check before working with students, and that they are properly trained, through a process of indoctrination and inculcation, to gain endorsement in the goals and purpose of the grant project in supporting PSA's mission. In addition, all students participating in supervised operation of the MHRS will undergo the proper safety training, and club activities will be covered under our existing insurance policy. We appreciate your continued support of PSA's educational initiatives.

Sincerely,

Donna M Heisler
PLTW Engineering, Physics, Robotics, Mission Design teacher

Charter School's Young Scholars Reach Great Heights via ARISS

BY THOMAS GLAAB, AJ4UQ

Palmetto Scholars Academy (PSA), a public charter school providing a gifted curriculum to students in grades 6–12 in North Charleston, South Carolina, has a lot of experience with space science. But as we noted in our application for an ARISS contact, all of our mission design, micro-gravity experiments, and other work strictly focused on science. An Amateur Radio on the International Space Station (ARISS) contact would add the human element to our portfolio.

By the spring 2016 ARISS window, the school's Amateur Radio club, K4PSA, had licensed two teachers and two students, and had strong support from local organizations, particularly the Trident Amateur Radio Club (TARC). Local hams involved in the ARISS effort provided two stations, antennas, rotators, computers, feedline, and the experience to run a contact.

While the planning was being done, we were working hard to get more students licensed — our goal was for the students to be the operators for the contact, with the adults simply standing by. We held two-hour classroom sessions on alternate Fridays, with after-school club meetings every Friday. This work paid off, with three more students earning their Technician licenses and several more ready to test.

Students at Palmetto Scholars Academy ask their questions of astronaut Shane Kimbrough, KE5HOD, during the school's ARISS contact. [Joe Bullinger photo.]

ARISS Application Window

ARRL received 35 applications during the spring proposal window that closed April 15. The next proposal window will open September 1 – November 1 for contacts to be scheduled July – December 2018. For information on applying, visit www.arrl.org/hosting-an-ariss-contact.

On the day of the contact, we were ready. The questions had been selected and approved by ARISS. The student hams were familiar with satellite operation and comfortable on the air. They were also learning practical lessons, such as how to safely get heavy equipment onto the school's roof.

The contact was scheduled for Friday, February 10, 2017, after lunch. A local TV station was doing live remotes from the parking lot starting at 4:30 am, and four TV networks sent camera crews. Over 600 students, parents, and community members crowded into the PSA gym. Nineteen students with 21 questions were ready to go.

At 12:59 pm Todd, KN4ADY (now W4TFC), started calling "NA1SS this is K4PSA." After several calls and increasing tension, Station Commander Shane Kimbrough, KE5HOD, returned our call. The entire gym broke out in applause and immediately got quiet to listen to the Q&A. We were not expecting to ask all of our questions in the seven-minute, 38 degree pass, but the students were well-practiced and we made it through the whole pool with time to spare.

The support of the school principal, Dr Tim Gott, and the local amateur community was essential for our success. Teacher Kellye Voigt, KM4MSP, and TARC members Tom Lufkin, W4DAX, and myself led the effort. Shann Ladiser, KV4JJ, and Joel Thompson, KW4NO, contributed key equipment; Steve Behr, KE7OPZ, and Robert Wilhite, AJ5E, spent time in the classroom and after school preparing the students to get licensed and on the air.

Thomas Glaab, AJ4UQ, earned his Amateur Radio license in 2009 after 30 years of procrastination. He enjoys digital, weak signal, and QRP operating.