

President: Bruce Small, M.D., KM2L  
Pres. Elect: Vacant  
Secretary: Jay Garlitz, D.M.D., AA4FL  
Historian: Michalline Przekop., KC9ARP  
Webmaster: Dave Lieberman, KT8E  
Treasurer: Chuck Lind, M.D., N8CL  
Radio-Internet: Chip Keister, M.D., N5RTF  
MediShare: Arnold Kalan, M.D., WB6OJB  
Aether Editor: Warren Brown, M.D., KD4GUA  
Online Edition Editor: Jay Garlitz, D.M.D., AA4FL

MARCO's "**AETHER**" Pronounced "Ether"  
Healthcare & Radio in One Medium  
The Medical Amateur Radio Council

133rd  
Edition  
2000-2022



A non-profit Corporation, founded in 1966, privately supported for the public good and dedicated to the advancement of Medicine through Amateur Radio.

Visit our [Public Facebook page—HealthCareHams](#)  
Join Our [Private Facebook group—MarcoMedical](#)  
Follow us on [Twitter—@HamsCare](#)  
MARCO callsign [WB5D](#), see us on [QRZ](#)

Web Site—<http://www.marco-ltd.org>  
Email—[secretary@marco-ltd.org](mailto:secretary@marco-ltd.org)  
Listserv—[marco-ltd@googlegroups.com](mailto:marco-ltd@googlegroups.com)

Vol. LVI (56th year)—February 2022—Online Edition #6—PO Box 1333, Hawthorne, FL 32640

## Education, Science and Technology in Dentistry

The October 2021 edition of the *Aether* focused on technological innovations in Medicine that have recently impacted patient care. With the assistance of contributing editor and MARCO member Dr. Jack Spitznagel, KD4IZ, this edition extends the discussion to Dentistry, as to the changes in dental education and technology that is transforming dentistry from an oral art to a dental physician. This edition initiates a dialogue on the subject where the reader can chose their level of engagement on each area discussed, **self-selecting links for additional information highlighted by underlined words in blue (hypertext)**. We hope members will continue with discussion about this subject on our Google Group through questions directed to AA4FL and KD4IZ. The Feb. 12th session of the MARCO Digital Voice Net and the Feb. 13th session of Grand Rounds on the Air will explore the this evolution of dental education and science in more detail, including the effect of COVID-19 on patient care and dental offices. See page 7 for DV net log-in information.

Dental school is most often a four year curriculum. Upon earning their dental degree most dentists (about 79%) practice as generalists. Historically dentists are solo practitioners (50% in 2019), or in small group practices. Demographics of the dental workforce can be [found at this link](#). [Approximately 21.1%](#) of dentists receive advanced training in a dental specialty. General dentists as primary care providers have baseline training in the treatment that dental specialists provide. When they chose to render care in a specialty area one must satisfy a standard of care that meets that of a specialist. The need for generalists to offer care within some of the following fields for less complicated cases is amplified by practicality due to demographics, insurance, and the cost of care.

There are [twelve recognized dental specialties](#), and [ten nationally recognized certifying boards](#). The amount of years of specialty training varies in each field, ranging from two to six years. Some programs result in multiple degrees such as M.D. and M.P.H., and are discussed in this edition in terms of training, evolving technology and science.

- [Dental Anesthesiology](#)
- [Dental Public Health](#) p. 6
- [Endodontics](#), pp. 3, 5
- [Oral and Maxillofacial Pathology](#) , p. 6
- [Oral and Maxillofacial Radiology](#), p. 6
- [Oral and Maxillofacial Surgery](#), p. 5
- [Oral Medicine](#), p. 6
- [Orfacial Pain](#), p. 6
- [Orthodontics and Dentofacial Orthopedics](#), p. 6
- [Pediatric Dentistry](#), p. 6
- [Periodontics](#), (AAP) pp. 5, 6
- [Prosthodontics](#), p. 6

February is a significant month for dentistry, [National Children's Dental Health Month](#). The month focuses on getting children off to a great start with their [oral health](#) and involves many [members of the dental team](#), an educational outreach to children and their parents. Dental team members volunteer for school visits to speak to students, usually 1st graders, a focus as permanent molars start to erupt around that age, [teeth with highest rate of being lost prematurely](#). Many dentists participate in February in the American Dental Association's pro-bono care effort, [Give Kids a Smile](#). Even veterinary offices get in the spirit with many offering February dental specials of the canine variety!

### Technology in Dentistry

The impact on the profession and dental education

- [History of Modern Dentistry](#)—p. 2
- [Bonding](#)—p. 3
- [Dental Implants](#)—p. 4, 6, 7
- Dental Materials and Biomaterials—pp. 3, 4
- [Diagnostic Salivary Tests](#)
- [Dental Lasers](#)
- [Optical Scanners](#)—p. 4, 6
- [Intra-oral Cameras](#)—p. 4
- [3D Printing](#)
- [CAD-CAM](#) (Computer Assisted Design and Computer Assisted Manufacturing)—pp. 3, 4, 5, 6
- [2D Digital Radiography](#)—p. 4, 5
- [3D Dental Imaging, CBCT—Dental Cone-beam Computed Tomography](#)—pp. 4, 5, 6
- [Dental Tissue Regeneration](#) and [Biologics](#)—pp.5, 6

## History of Modern Dentistry

Dentistry as a medical profession [dates back to 7000 B.C.](#), with origins in Indus Valley Civilization. The first U.S. dental college opened in 1840, the Baltimore College of Dental Surgery, the originator of the D.D.S. degree (Doctor of Dental Surgery). In 1867, [Harvard Dental School](#) was founded, the first dental school in the United States to be affiliated with a university and its medical school, and the first to confer the Dentariae Medicinae Doctoris (D.M.D.) degree. Both degrees are currently considered to be [equivalent within the dental profession](#).

### Dentistry or [Stomatology](#) ?

Is Dentistry an Oral Art or a branch of medical science dealing with the mouth and it's disorders?

As in medicine, the practice of dentistry has seen a serious evolution in the US and in much of the world. In the U.S. the previous paradigm of practice which dominated prior to the 1960's was education in the "Dental Arts", the development of hand skills, guided by the fundamentals espoused by a few clinical masters. This has been somewhat humorously referred to as "eminence-based" practice by some. This was accomplished in 2 to 3 years and led directly to a practical licensure exam. Training in dentistry was an apprenticeship for all intents and purposes.

In the past rigorous hands-on training was not strongly based in evidence derived by methodical clinical research. As a result there were divergent schools of thought and training was not uniform. This common thread produced the so called "DFB" (drill/fill/bill) dentists of the era, a product of their training. State board exam skill tests were performed on live patients and success in those exams was achieved by those who performed key skills according to the



local norms, not a set of national standards. A unified national board exam did not exist because the state boards of dentistry had an iron grip on standards for licensure in their own

jurisdictions.

To address the training discontinuities and elevate dental education to a high level of accordance with that of medical education, the American Dental Association formed a joint commission on National Board exams and the American Association of Dental Boards. The American Dental Education Association worked to unify school curricula to the national norms.

An ongoing issue is amount of supervision needed to train a dentist that makes per student dental education costs some of the highest within departments and colleges on University campuses, leading to high tuition and considerations for students due to debt load (post graduation decisions).

The purpose was, and still is, to create standardization of knowledge and skills required for basic licensure in dentistry, and to elevate the level of practice as a whole. Regional boards were formed to administer the licensure skills exams within groups of states. These actions all served to replace the apprenticeship aspect of dental education with an academically rigorous curriculum supported by evidence-based norms.

In the US, this trend was accelerated by several movements: a series of NIH/NIDCR initiatives (Clinician-Scientist Programs) which attracted a number of bright young clinicians to do research in oral medicine and oral surgery. A number of these dual degree practitioners became academicians. The clinician-scientists were trained in both basic and clinical research and began to develop rigorous research methods that changed our understanding of the biology, pathology, and therapeutics of, and within dentistry.

The profession is no longer defined by a largely hands-on skill set, it is defined by the application of a set of the oral-related basic and clinical sciences. As in Medicine, dental specialties are now defined by the organ system or categorical nature of the clinical problems addressed by that specialty as follows on upcoming pages.

### Ether in the Aether

According to [The College of Physicians of Philadelphia](#), T.G. Morton was a dentist who discovered the anesthetic use of ether in 1846. Previously, he had observed a fellow dentist use nitrous oxide, or "laughing gas," as anesthesia for a medical demonstration. Unfortunately, the patient awoke while under the anesthesia, and he was booed off the stage. After Morton observed this, he consulted with Charles A. Jackson, a chemist. He suggested using sulfuric ether as anesthesia for surgery.



He added odor-masking substances to mask the smell. In 1846 Morton used ether during a surgical demonstration at Harvard Medical School. The surgery was a success, and he was credited with "discovering" ether as an anesthetic, initiating its use as anesthesia throughout America and Europe. In 1849, ether was officially circulated by the U.S. Army. It was used both during the Mexican American War and the Civil War. In 1847 chloroform was discovered by James Young Simpson and the two substances became the most popular anesthetics of the day, making surgery a tolerable as a pain reduced or painless experience.

**General (Family) Dentists** have a voluminous amount of didactic material and clinical experience to gain in a short time during [dental school](#). If one ponders what the art of dentistry was like forty years ago and the treatment modalities required in dental education today that did not exist then, training needs must be accomplished in the same amount of time of a dental education. [Technological innovations](#) are an ongoing challenge for dental educators in making sure their students are prepared for the challenges of patient care and the marketplace.

The [Commission on Accreditation](#) monitors the curriculum of dental schools to make sure they meet the [standards](#) for a pre-doctoral program to remain an accredited dental school.

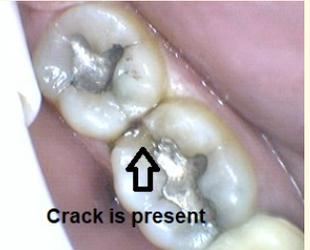
As mentioned on page 2 there is a [high cost to educate dentists and this is reflected in tuition and fees](#). With dental insurance not being as comprehensive in dentistry as in medicine, generating clinical income through a student's educational treatment output is problematic. Thus a great deal of the [financial burden](#) is placed on the student, and even more so at private institutions where state funding is not present. Some students/graduates are assisted by [loan payback positions after graduation](#).

The providers at solo practices need to keep up with continuing education. One must know when treatment they are capable of providing is in the best interest of the patient, thus know when to refer. While the [patient understands quality](#) as comfort and aesthetics is immediate acceptability quality? What about the length of treatment success? No one is looking over the provider's shoulder to gauge the result thus ethics are very important. Is the selection of technology when conventional options are available ethical and more [cost effective](#)?

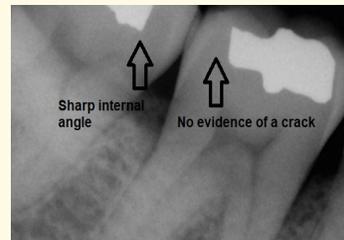
### Technology grounded in material science

General dentists and dentists in general have treatment [options not available to treating dentists a generation or two before](#). Early generations of chemical bonding to enamel initiated with [dental sealants that sealed the grooves on the surface of posterior teeth](#) (molars), which cut off the nutritional source that led to certain types or dental caries (cavities) to form.

Reliable bonds were developed to allow [bonding to enamel structure](#) (higher inorganic structure) but development of later generations of bonding were needed to [successfully bond to dentin](#) (more organic) for more extensive treatment. At one time it was taboo to expose [dentin](#) to the acid etches needed for dental



the science involved presented with a perceived affront to the health of the [pulp](#) (organic insides) of the tooth. [Filler particle science improvements](#) were also needed in treatment resins to provide durable restorations that are subjected to the [forces of mastication](#). This has allowed restoratives to shift from [dental amalgam](#), a mechanically retained material



with sharp interfaces that place internal stress on the tooth, toward bonded dental composite restorations, with smooth internal features aided by chemical created micro features in tooth structure for bonded retention. The images above show how a [crack](#) can be present and not detectable in a 2D radiograph. Here the crack extended down the root of the tooth and was not able to be restored with the aid of [root canal treatment](#). [Exodontia \(extraction\)](#) was provided and an [implant \(root platform\)](#) was inserted, with time allowed for [osseointegration](#). A prosthetic tooth form (abutment) was inserted into the implant to allow for a [crown to be cemented into place](#).

[Digital Dentistry: The Future is Now](#) — a video from the University of Michigan displaying what technologies their pre-doctoral dental students are engaging.



A screenshot of [one digital office software management](#) screen. The graphics display is active, clicking on each graphic opens up a digital module for [technologies](#) used in the dental operatory, as implemented by the office.

### Technology implementation, cost-benefit, and the effect on Practice Environment

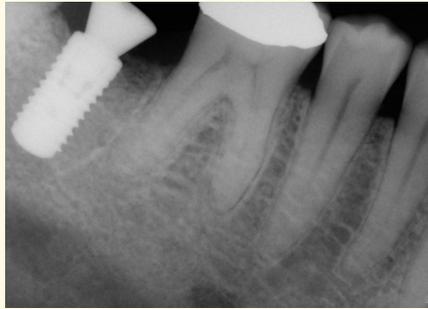
Setting up a practice of dentistry is a costly endeavor, even made challenging if a high student debt is present. The cost of education, setting up an office, and for the technology one would like to engage has an effect on the decision making process for recent graduates, [where they choose to practice and how](#). Similar decisions need to be made for solo practitioners [where equipment used does not have a benefit of economy of scale](#) as larger group and corporate practices.

The general practice of dentistry has greatly benefited and contributed to the developments outlined above. Over the most recent 20 years, it has become apparent that the traditional four-year curriculum in dentistry is sufficient for students to develop the technical skills needed to practice general dentistry, but not always a deeper understanding of the application of science to the skills. Many university-based dental programs and the [Veterans Administration](#) have added [residency programs \(GPR\) in Advanced General Dentistry](#) where students are trained in advanced and/or hospital-based dentistry, providing an opportunity to develop advanced skills while attending lectures in academic disciplines related to the skills they are developing. Similarly General Practice Residency programs provide recent graduates an extra year to explore the clinical skills needed for being an effective general dentist, or to consider which dental specialty they would like to consider for their clinical future.

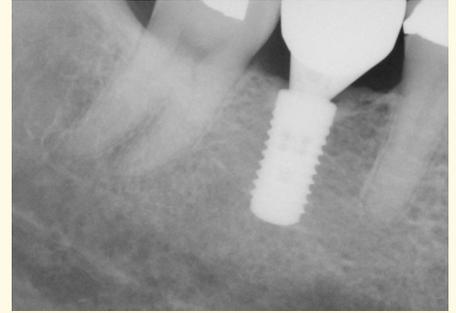
## Examples of Affordable Technology Commonly Found in General Dental Offices



2D radiography sensors are available in sizes for adults and children. Digitally capturing the x-rays allows the computer to process it as an image. [CMOS](#) or [CCD](#) technology is used.



This image is that of an implant body that replaced the tooth roots from the non restorable cracked tooth displayed on page 3.



This image displays the implant platform, abutment replacement to cement to, and the crown/cap placed to replaced the lost natural crown of the tooth.



2D Panoramic unit capable of digital capture a panoramic image.



2D Panoramic image used to assess the amount of bone and location of the mandibular canal for implant body placement. For this image [phosphor plate technology](#) was used. 3D imaging would be more ideal in determining implant location, to prevent potential paresthesia. (see page 8 for info on the clinical situation displayed).



Hybrid approach. [Scanner](#) used for CAD (design) of digital crown impressions with CAM (manufacture) in outside lab, vs in-office [milling](#) of prostheses.

Technology can offer an effective modality for improved doctor-patient communication. In this office five treatment rooms feature computer monitors in direct view of the patients for presentation of findings. The enclosures offer a safe placement for computers protected from aerosol contamination. Professional painted murals were commissioned to surround the technology in a relaxing manner, with each room having a different theme of nature in the locale. The software program is customizable to the needs of each office so staff can select the technology of their choice, and the manner that they display findings for patient communication and education. This digital dental office has twenty years of data in electronic charts, film free images, paper free periodontal measurements and progress notes. The patient's clinical history guides future choices for future diagnosis and treatment planning,

All images on this page are courtesy of Gator Dental Associates, Hawthorne Florida

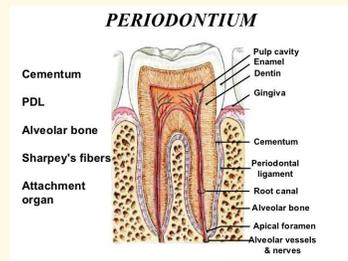
The mural is an artistic rendering of the [Paynes Prairie](#) Alachua County, in North Central Florida



[In what state was the toothbrush invented?](#)

## Periodontics

Periodontics has morphed from a focus on the surgical debridement of “pyorrhea” into a specialty that focuses on oral infectious disease, pathology, the surgical repair, and [regeneration](#) of the [diseased periodontium](#) all aimed at maintaining and supporting the dentition throughout a patient’s life.

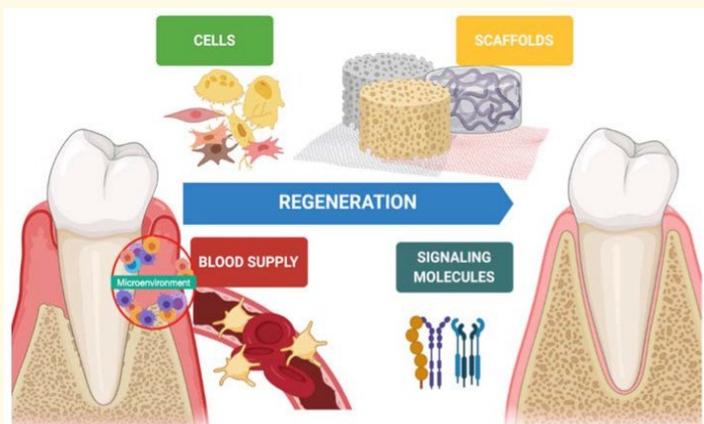


With the healthy status of the [periodontium](#) being an interaction of oral tissues that attach the tooth to the body, surgical correction of disease must focus on all connection components. [Oral medicine](#) is an important underpinning science in the field. Researchers studying [oral infectious disease](#) have demonstrated clear links between oral infection, [chronic inflammation](#), and [systemic disease](#).

To repair the damage done by acute and chronic periodontal infections, the specialty has developed [regenerative therapies](#) for both bone and oral mucosa. Periodontists have adopted the advanced surgical skills needed to provide [dental implants](#) to their partially edentulous patients.

[Periodontal and peri-implant regeneration](#) is a technique for restoring damaged tissue around teeth and implants. View the linked text for details of how “periodontal regeneration is one of several disciplines that has benefitted from [tissue engineering](#), [Biomaterials \(scaffolds\)](#), [molecules \(growth factors\)](#), and [stem cells](#) are keys in the regenerative process, and a synergy between them improves the quality and predictability of the technique”. Biomaterials available to clinicians and researchers for alveolar bone regeneration differ by the mechanism of action, and classified as barriers, bone fillers, and biologicals. [Click for additional resources](#).

[Biologics](#) in root coverage procedures include [enamel matrix derivative](#), [platelet-derived growth factor](#), [platelet concentrates](#), and [fibroblast-growth factor-2](#).



Images on page are open source — [Materials \(Basel\)](#), 2021 Jun; 14(12): 3319,

Published online 2021 Jun 15. doi: [10.3390/ma14123319](https://doi.org/10.3390/ma14123319)

## OMFS—Oral and Maxillofacial Surgery

The specialty of Oral and Maxillofacial Surgery morphed from a 2 to 3-year training in exodontia and oral trauma surgery into a 5 year or longer [advanced training program](#) that includes the option of completing a M.D. program. This is driven by the understanding that reconstruction of a diseased or severely damaged oral cavity requires advanced clinical skills in surgery with a serious focus on human biology and deep understanding of craniofacial medicine. Hospital experience is critical to addressing patient’s clinical needs.

[Oral and Maxillofacial Surgeons](#) are the trauma, cancer, and reconstructive orthopedic surgeons of the dental field. Subspecialties have developed which focus on maxillofacial cancer, cosmetic surgery, and major reconstructive implantology. Clinical researchers in the field develop an understanding of tissue repair and regeneration, including [nerve regeneration](#), and [scaffolds to aid that process](#), through biologic techniques that have been developed that have shown success in partial and complete restoration of function after damage due to trauma and surgery. These techniques have been applied where axonal transplantation is not feasible, after mandibular nerve damage post cancer surgery, and with complications after impacted mandibular third molar surgery. Researchers conduct clinical trials to bring these methods into common practice.

## CBCT—Cone-beam Computed Tomography

3D imaging can be clinically useful in dental surgery for implant placement, and diagnosis., an important enhancement to information obtained in 2D digital radiography, Equipment cost can be a factor for general dentists where 3D need vs. 2D is not as critical if opting not to provide procedures benefitting from 3D imaging. When in doubt refer!

[CBCT Use and Application in Dentistry](#)

[FDA CBCT Information Page](#)

[CBCT in Implant Dentistry](#)— BMC Oral Health Journal

[CBCT Use](#)—Implant Dentistry Journal

## Bone Graft Sources in Dentistry, by tissue

	Osteo-conduction	Osteo-induction	Osteo-genesis
Autografts <small>Host derived</small>	×	×	×
Allografts <small>Same species derived</small>	×	×	
Xenografts <small>Animal derived</small>	×		
Alloplasts <small>Synthetically derived</small>	×		

[Autografts](#)—same individual, [Allografts](#)—same species, [Xenografts](#)—other species, [Alloplasts](#)—synthetic derivative

**Prosthodontics**, or Maxillofacial Prosthetic Dentistry, has moved from the advanced restoration of multiple carious teeth. Their research has ranged from the discovery of advanced highly esthetic materials that can be colored to duplicate teeth and soft tissue, and the mechanisms to permanently attach them onto prosthetic supports embedded in bone through [osseointegration](#), or by [fabricating removable](#) and [fixed prosthetics](#) that anchor on natural teeth or [implant platforms](#).

A high level of prosthetic skill allow [maxillofacial prosthetics](#), a specialty branch, to treat severe facial defects and missing structures, periorbital tissues, ears as well as missing dental structures. They often work in multidisciplinary teams with Oral Surgeons, Periodontists, Orthodontists, and Endodontists to treat highly complex cases.

**Oral Medicine, Oral Pathology, and Maxillofacial Radiology** have become sciences enmeshed with their medical counterparts.

**Oral Medicine** focuses on the oral related health of medically complex patients. This includes understanding the oral inflammatory diseases, oral cancer, and [other diseases of the orofacial region](#). Using cellular and structural biologic principles, they have developed improved methods of detection and treatment of cellular dysfunction and autoimmunity.

**Oral Pathology**, and pathology in general is [exploring technology](#) and the tools it provides in aiding in diagnosis of specimens, [artificial intelligence applications](#) where analyses are aided by computerized automated processes. Think of the sheer volume of cells and cellular products that would need to be sampled in a specimen and the time that would be required as an unaided human task for effectiveness.

**Maxillofacial Radiology** In focusing on [imaging of the orofacial region](#), the specialty has adopted many of the [most advanced technologies](#) to oral imaging and have enable a great improvement in resolution and precision of measurement and at the same time greatly reducing the radiation exposure to the patient.

**Dental Public Health** [\(link\)](#) displays the transition using modern communication from an art of preventing and controlling dental disease and promoting dental health through organized community efforts, toward using an integration of dental, behavioral, public health, educational and political sciences as a dental specialty. In tandem with experiences from business, management, marketing, and advocacy, oral health care for individuals and populations can be available to patients at more levels of society.

**Orofacial Pain** is the [newest dental specialty \(2020\)](#). “the specialty of dentistry that encompasses the diagnosis, management and treatment of pain disorders of the jaw, mouth, face and associated regions. The specialty of OFP is dedicated to the evidenced-based understanding of the underlying pathophysiology, etiology, prevention, and treatment of these disorders and improving access to interdisciplinary patient care. OFP disorders include but are not limited to: temporomandibular muscle and joint (TMJ) disorders, jaw movement disorders, neuropathic and neurovascular pain disorders, headache, and sleep disorders. “ (<https://aaop.org/specialty/>)

**Endodontics**, and endodontist specialists, study to apply the basic and clinical sciences of normal [dental pulp](#), as affected by [etiology, diagnosis](#), prevention, and treatment of diseases and injuries of the dental pulp with the crown (above bone) and tooth roots, and with associated [periradicular conditions](#). This specialty is at the forefront in developing an understanding of [dental pulp biology](#), moving from [extirpating](#) and [obturating the canal system](#) of diseased pulpal tissue to intercepting and preserving the dental pulp where possible. Multi rooted teeth often have [complex root systems](#), [dilacerated roots](#)—those with non standard anatomy, and [tooth trauma](#) cases, are suited for specialist care. [Microscopes](#), CBCT, [rotary equipment](#) and [ultrasonics](#) in treatment are often integrated into specialty endodontic care to improve outcomes.

Researchers in the field are in the forefront of those developing methods for [regenerating oral tissue including the pulp vasculature and nerves](#). Specialist need to determine probability of treatment/retreatment or [periapical surgery](#) success with consideration of their referring dentists opt for referrals for [exodontia](#) and prosthetic replacement with/without implantology when a tooth is deemed to have a poor or hopeless prognosis.

[Use of Cone Beam Computed Tomography in Endodontics](#)—International Journal of Dentistry  
[Applications in Endodontics and Concerns](#)—American Association of Endodontics



**Pediatric Dentistry (Pedodontics)** has made many advancements using technology to focus on prevention of caries, and toward understanding facial growth and development to intercept problems as a child grows. They have a developed a strong background in the behavioral sciences as well that enables them to better serve the young patient and help those patients develop a good relationship to dentists.

From a real world application of technology an example is [a pediatric dental office that applies technologic innovation](#). This link is included not focus on the products displayed but the mechanisms and application of technologies available to pediatric dentists.

**Orthodontics** is a specialty of dentistry that focuses on the diagnosis, prevention, correction of malpositioned teeth and jaws, and misaligned bite patterns. When applied to guide facial growth that aspect is functionally dentofacial orthopedics.

**Digital Orthodontics**-The application of conventional orthodontics through digital mediums assisting orthodontists in taking digitally derived measurements, fabricating clear aligners, wires, and retainers using appliances built on digital ecosystems. CAD/CAM platforms produce digital scans toward fabricating custom wires and plastic aligners to treat patients.

Design, diagnosis, and treatment in Orthodontics is undergoing significant changes due to advances in technology. When movement through wires is displaced with [robotic production](#), clear sequentially designed aligners to move teeth becomes possible. The specialist and the generalist who desires to make it a component of their practice of dentistry is a choice not available to dentists in the past.

At home treatments are a byproduct of the technology and mass marketing to the public. [Are these treatment effective and safe?](#)

## MARCO Nets

### Weekly MARCO Medical Grand Rounds Net

The Medical Amateur Radio Council Organization (MARCO) conducts weekly Grand Rounds on Sundays at 1500 UTC (summer months) and 1600 UTC (winter months) on 14.342 MHz. Physicians from many specialties, including naval flight surgeons, biomedical physicists, infectious disease specialists, trauma surgeons, dentists, and many others discuss informative, and timely medical topics. The Net has worldwide listenership and contributes to dissemination of medical and public health awareness. MARCO live streams the Grand Rounds net audio on their website at [www.MARCOAudio.net](http://www.MARCOAudio.net).



Founded in 1966, MARCO's mission is to promote goodwill and fellowship among amateur radio operators who are professionals in the healing arts or who have an interest in medicine, dentistry, and allied fields. MARCO is open to all licensed amateur radio operators who are healthcare professionals or affiliated with the medical industry. MARCO participants may receive one hour of Category 2 CME credit per Grand Round presentation.

On-air network operation is an integral part of MARCO activities and is conducted for the purpose of discussing and exchanging medical and technical information and, whenever possible, to be a public service by passing emergency and priority traffic. All General class or higher (and their international equivalents) licensed amateurs are welcome to check in.

### Weekly Net Category II CME—on the HF Bands Medical Topic Discussions of Interest to all

Our Radio-Internet Coordinator Chip Keister, M.D., N5RTF, New Orleans, LA...[livestreams our net online](http://www.marcoaudio.net). Check into our nets and earn CME. For times when propagation is poor when you would benefit from audio from another receiver, if you are away from your radio, in a skip zone, or unplugged due to thunderstorms, join the MARCO CW net and Grand Rounds by live [internet streaming audio](http://www.marcoaudio.net). These are recorded to [listen in later to the online archive](http://www.marcoaudio.net).

#### To Listen:

1. Use a browser to go to the following web page which has a player app and **links to the audio stream and archive:** [www.marcoaudio.net](http://www.marcoaudio.net).
2. The second way is to manually enter <http://marcoaudio.ddns.net:8011/stream> into a standard music player on computer, phone, or portable device **while the net is in progress**.

Feel free to share these links with anyone, MARCO member or not. No login or password is required. There is room for 100 listeners at a time. Comments are appreciated.

*Chip* N5RTF

### MARCO DV NET

**MARCO DV (Digital Voice) net** that meets on Saturdays at 1500UTC. We have chosen to use the [QuadNet Array](http://www.openquad.net), an IRC or Internet Chat Facility that acts like a universal translator between difference digital modes and allows hams who identify by callsign to connect with other users of digital radios world-wide through interconnected reflectors and talk-groups. See their website for more details, including how to connect, within the <https://www.openquad.net/webpage>.

### MARCO CW NET

#### The Bob Morgan Memorial Net

Our CW net is held every Sunday one half hour before the *Grand Rounds on the Air* net, at 09:30 central time, currently 1530 UTC, on 14.140 MHz. Net control is Chip N5RTF. The net is named after the late MARCO member Dr. Bob Morgan, VE3OQM.

At times in the in the past the net was on the same frequency as the *Grand Rounds on the Air* in an effort to hold the frequency for the voice net to be in the clear at the top of the hour. The net today means so much more to MARCO...

You are invited to participate. With radio license issuance in the US dropping the morse code requirement there are many members who have not had experience with CW. Our net is a great way to gain CW proficiency.

There are many advantages to learning morse code, a yes-brainer. There is increasing evidence that not only GM plasticity but also changes in white matter are important in the context of learning processes, see <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5526915/>.

Use CW through the MARCO net to keep those neural connections intact and resist the aging process! Links to other sources follow. Add to the discussion by posting to the MARCO google group: [marco-ldt@googlegroups.com](mailto:marco-ldt@googlegroups.com)

[ARRL resources for Morse Code](#)

[Morse Code Instruction Learning, YouTube Options](#)

### Special COVID-19 Information Net



A medical information net on COVID-19—following NIMS protocols—will be held at 01:30 UTC Thursdays on 7.222 MHz, hosted by Biomedical Physicist and Infectious Disease Specialist, Professor Harry J. Przekop (WB9EDP), assisted by Dr. Jerry Ziperstein (N4TSC).

This special net has a worldwide listenership and will be live-streamed at [www.MARCOAudio.net](http://www.MARCOAudio.net) and archived on the website for anytime access. You do not have to be a medical professional to participate.

**WRITE TO US!**

We welcome your comments.  
Email to  
[aether@marco-ltd.org](mailto:aether@marco-ltd.org)

Letters and articles may be edited  
for brevity & clarity.

Unedited member article submissions made available through links, and linked online material are not the opinions of MARCO. Graphics selected are the choice of the editor and not of MARCO-ltd.

**MARCO NET SCHEDULE**

<u>DAY</u>	<u>TIME</u>	<u>FREQ.</u>	<u>NET CONTROLS</u>
Any Day	On the Hour	14.342	Hailing Frequency
Sunday	10:30 a.m. Eastern	14.140	CW Net, <a href="#">Chip, N5RTF</a>
Sunday	11 a.m. Eastern	14.342	<a href="#">Warren, KD4GUA</a>
Wednesday *	7:30 p.m Eastern	7.222	<a href="#">Harry WB9EDP</a>

**MARCO'S CW NET IS NOW CALLED THE "Bob Morgan Memorial Net"**  
Sundays, 14:30 UTC, 14.140 MHz

**Page 8**

MARCO Grand Rounds is held Sunday at 11 a.m. Eastern Time; 10 a.m. Central; 9 a.m. Mountain, and 8 a.m. Pacific Coast time on 14.342. You qualify for one hour Category II CME credit with your check-in. \* The Wednesday net is a member led discussion net held during the COVID-19 crisis. \*

**MediShare International News**  
Arnold Kalan, WB6OJB, Director



The charitable arm of MARCO is still alive despite the pandemic. We are looking for donations, big or small, to fund our next project. Exude some [HamsCare](#) and contact me at my qrz email address with leads for new potential MARCO MediShare projects.

Projects we have offered assistance with in the past have been to organizations that are in need of a means of communication for medical clinics in third world countries. Donations are fully tax deductible and you will receive a note of thanks together with some wonderful MARCO seals that look very nice on QSL cards.



Take this opportunity to send a donation in recognition of a member's exemplary service to MARCO or in memory of a member's loss, and assist MARCO's way of helping the less fortunate worldwide. For more details about MARCO's Project MediShare and the types of projects it [supports](#) [click here](#).

Thank you to MARCO members Dr. Jeff (K6KW) and Rowie Wolf with a donation to project MediShare in December. This a annual tradition, one we appreciate greatly. MARCO is a 501 (3)(c) organization and MediShare International is a project of MARCO.



[Click here to donate online](#) or mail written checks out to MARCO, noting MediShare in the check's "for" area. Send your donation to MARCO c/o Secretary Jay Garlitz, PO Box 1333, Hawthorne, FL 32640

Thank you , Stay Well & God Bless,

*Arnold*

**Arnold (Doc) Kalan, M.D.,** WB6OJB

**New Member Profile**

Dr. Jim York, KC3SOK



Jim is a specialist in sports medicine for all ages, with clinical focus on all aspects of care for shoulder, and knee. He specializes in cartilage transplant and joint repair/reconstruction. Dr. York is Board Certified in Orthopaedic Surgery and Subspecialty Board Certified in Orthopaedic Sports Medicine.

His interest in Amateur Radio goes back to his childhood fascination with science, particularly electronics and radio. Like many in our hobby, he built a crystal radio and added on staged amplifiers from kits and instructions found in library books. He made a small AM transmitter and also experimented with antennas to enhance reception on a portable shortwave radio.

Over the years, as a surgeon he considered that it could be very helpful to have an amateur radio license so that he could provide assistance during disasters and public emergencies. During the last couple of years during the COVID-19 epidemic, he started learning about ham radio and learning enough to achieve his technician license. For more information check out [this link](#).

**In case you wondered?**

The dental x-ray images on page 3 and 4 are of me. In spite of having small fillings I cracked and lost two permanent lower second molars one month apart in 2013. Treatment to replace them with implants occurred over almost a one year period. I appreciate the technology of modern dentistry!

## MEMORIES OF YEARS AGO IN MARCO

### Our History Book

#### Twenty Five years ago in MARCO—February 1997

[Click on for the full edition](#)

### MARCO'S MEDISHARE RECEIVES TWO PRESTIGIOUS HONORS

The MARCO MediShare International program has been honored twice in early 1997, with an excellent article in QST about the program, and then shortly after, it was awarded the Humanitarian Award from the ARRL.

The QST article, written by a friend of Smitty's, Tom McShane, NW6P, appeared in the February 1997 issue of the publication. As the article read to the general ham community, "In all likelihood, you're probably unaware of MediShare International - a MARCO program that provides medical equipment, instruments, supplies, technical information and trained professional who volunteer to work in hospitals and clinics in third world countries and disaster areas."

The article continues with the history of MediShare, including the involvement of Ken-Kirk Bailey, GJOKKB, and Dr Robert "Smitty" Smithwick, W6JZU in its formation, MediShare's ties with International Aid and other world known benevolent organizations, and a number of the countries that have gotten aid through its operations. It describes the help given in Chernobyl, Kenya, Rwanda, Northern India, Brazil, Liberia, Haiti, Mexico, and Honduras. Also featured were several excellent photos.

There's still time to sign up for the Annual Meeting, to be held May 1 thru 4 at the Sir Francis Drake Hotel. Every day we hear of others who will be attending. It may be the best attended meeting away from Dayton that MARCO has ever held. Ken Kirk Bayley, FSVD8, and Dr. Mike Marks, (not a ham)

- The editor of this edition was a dentist, Dr. Edward Briner, WA3TVG. Three other directors were dentists including the Chair of MediShare.
- The lead article was on MediShare receiving prestigious awards and recognition as the two founders of MediShare were recognized by the ARRL with the International Humanitarian Award for 1996.. Coverage about MediShare appeared in QST that month.
- An article describing the St. Luke's Hospital project in Kenya was appropriately a component in this edition, a project with MARCO fingerprints. A preliminary list of equipment needed for donation was included.
- An article covered an effort by a MARCO member during a flood disaster in California, and assistance he arranged for from a ham friend who was a pilot.
- Dayton Hamvention plans were discussed.
- The many HF MARCO nets were listed.

#### Ten years ago in MARCO—February 2012

[Click for the full edition](#)

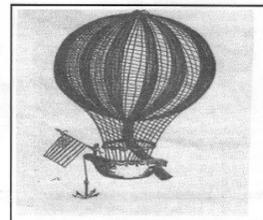
### THE SOURCE OF EMBARRASSING MOMENTS—GAS!

THE NUMBER ONE PROBLEM, ACCORDING TO FLIGHT ATTENDANTS ON AIRLINES (AMONG OTHER PLACES) IS INTESTINAL GAS—WHAT IS IT AND WHERE DOES IT COME FROM?

(An Update)

The average person eats three meals a day and drinks 6 eight oz. glasses of water. His food intake travels down the esophagus to the stomach where the first of four valves, the cardiac valve, opens and the distal pyloric valve closes. The contents are then smashed by the bolus over food blender—the stomach. Here the food is hit with hydrochloric acid which kills the bacteria on the food, activates the digestive enzymes and changes the swallowed basic foods into hydrogen gas and small particles which mixes with the swallowed nitrogen and oxygen from the atmosphere.

After the smashing is complete the pyloric valve opens and the contents enter the small intestine where the nutrients are extracted. Here there is an exchange of hydrogen, oxygen and carbon dioxide both in and out of the bowel lumen-blood vessel wall. The third valve, the ileo-cecal valve, then opens anywhere from 35 minutes to 5 hours after eating, allowing the now-watery portion of the food intake (about one liter daily) to pass through into the large bowel, or colon. Slow irregular contractions move the colocal material towards the right-sided sigmoid, then a mass peristalsis occurs 2-3 times daily initiated by the gastrocolic reflex (the same one that make you let the dog out after eating) propelling the colon contents toward the fourth valve, the rectum.



#### LATE BREAKING NEWS...

Dayton Hamvention Announcement... Make your reservations for the Dayton Hamvention May 18, 19, and 20, 2012. The MARCO annual meeting will be held during the Hamvention this year. MARCO will have a display booth. Our meeting is tentatively planned for 8:00 A.M. Friday the 18th and the banquet and program will begin at 6 p.m. Saturday night on the 19th.

- The *Aether* was already at edition 73 of the new millennium, and in the 35th year as a MARCO publication (previously called *The MARCO Newsletter*).
- The editor was KD4GUA—Warren Brown. His feature article was on flatulence and related anatomical and physiologic consideration of GI gas production.
- An article about who created the Internet was included, and it was not Al Gore.
- An article on current MARCO member (2022) Jim Patterson W8LJZ listing to Air Force One radio transmissions following the Kennedy assassination was included, including his log entry. He mentioned the scrambling mode that he overcame, SSB!



## MARCO Annual Meeting HamVention 2022

**Xenia, OH May 19-22**

Our Hotel is in Fairborn, Adjacent to Wright State University Near Wright-Patterson Air Force base and the National Museum of the United States Air Force and Aerospace Museum

**It is time for eyeball QSO's!**

**Hotel:** [Wingate by Wyndham](#)  
3055 Presidential Dr.  
Fairborn, OH 45324  
(937) 912-9350

Twelve 2-Queen bed and eight King rooms are available in our room block. Ask for the "Medical Amateur" group.

Cost \$129 per night plus tax,  
reserve by 4/27/2022

- TH night May 19 arrival, meet and greet
- FR morning breakfast business meeting at hotel
  - FR afternoon HamVention
  - SAT during the day HamVention
- SAT MARCO Banquet—6:30pm @ [El Ranco Grande](#) , [Mexican Grill /Catina](#) adjacent to our hotel
- SUN May 22—HamVention and depart

Questions? Email AA4FL at  
[secretary@marco-ltd.org](mailto:secretary@marco-ltd.org)

## COVID-19 Continues to affect in-person Participation in Amateur Radio

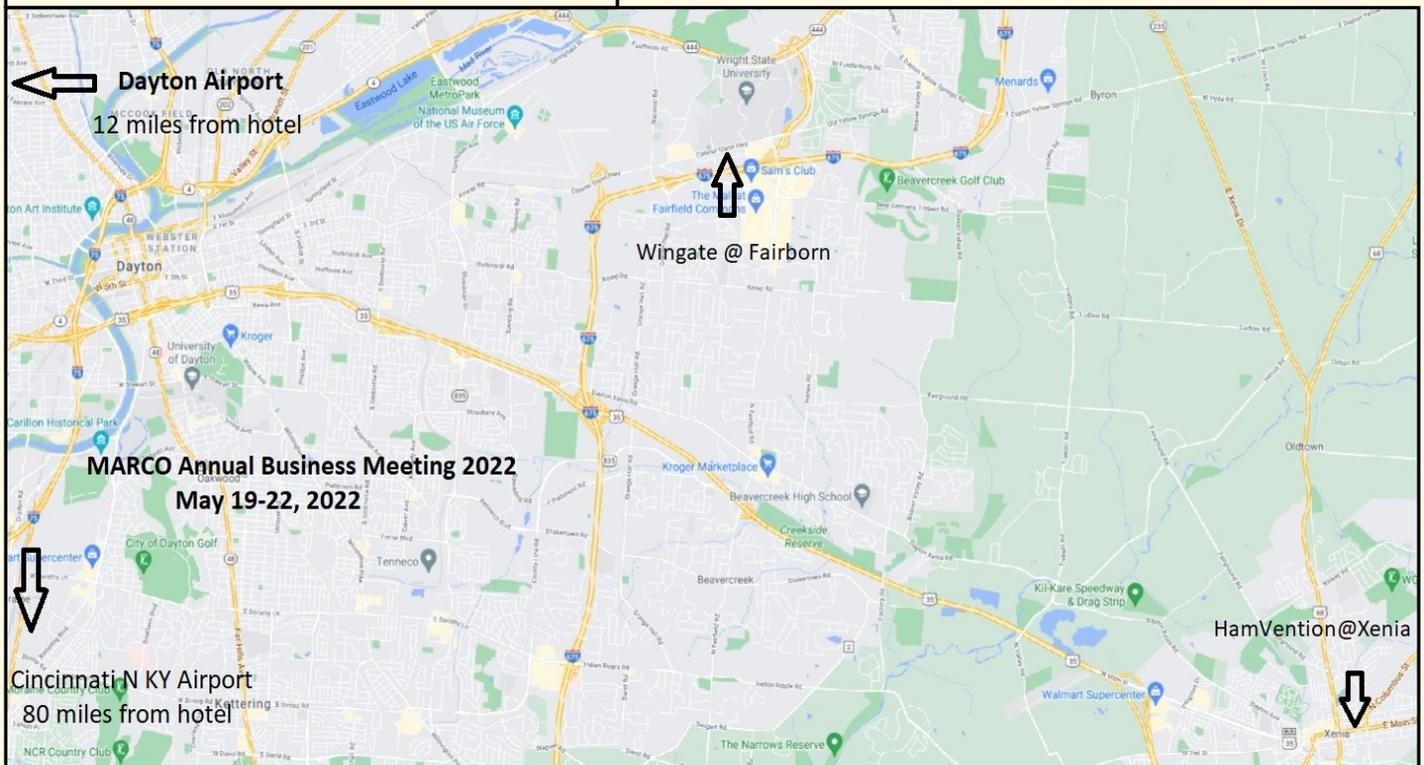
Many ham radio organizations are still opting for virtual meetings this winter. With spring and hopefully a waning Omicron variant on the horizon, in-person indoor meetings should be able to resume.

Reservations for our May 2022 MARCO annual meeting hotel block held in conjunction with Xenia/Dayton HamVention are open and we are looking forward to having you attend this year. Our contract allows for cancellation of your room in writing up to 5pm April 28, thus an unexpected new wave of COVID-19 leading to a HamVention cancellation will not be a financial risk in regard to your hotel room reservation.

MARCO will not be holding a get-together in Orlando this month at [HamCation/ARRL National Convention](#). At the time of writing this event is still being held for those who desire to attend.

Our Dxpedition to Sint Maarten, Saint Martin, St. Barts and Anguilla this May has been postponed due to the problematic logistics required for planning travel in the age of COVID-19. Thank you to MARCO members Bob Conder (K4RBC), Alanna Conder (K4AAC), Dave Rodman (KN2M), and Mike McGirr (K9AJ) for their extensive planning for this MARCO member Dxpedition. They had arranged for QTHs ideal for ham radio operation and had plans in place for equipment and antennas, with some gear already purchased.

Once SARS-CoV-2 becomes endemic we will resume planning MARCO Dxpeditons and in-USA group contest entries held at member's QTH. Email [secretary@marco-ltd.org](mailto:secretary@marco-ltd.org) if you would like to be keep informed of plans for these events (Zoom meetings)



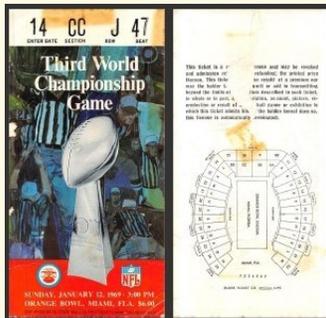
The Secretary's Keyboard Korner  
[secretary@marco-ltd.org](mailto:secretary@marco-ltd.org)



Our CW training MARCO Webpage was recently used by a student as resource for a school report about Morse Code. They submitted a link to be included on our page and by request is recognized for the effort, see <https://marco-ltd.org/?p=449> (bottom of the page).

A DMD MD confusion story...in 1982 after opening my dental practice in Hawthorne a patient surprised my staff with a request for an appointment, draining an anal abscess. The prior dentist in town was a DDS and they thought a DMD was akin to an MD.

I hope you enjoy the broadcast of the annual mega event, the [SuperBowl](#), and the accompanying commercials. In it's early years it was considered a game of light regard, before Joe Namath and the [3rd World Football Championship Game](#) and the 1970 merger of the NFL and AFL (Jets—Colts). Your secretary, a Miami resident, was in attendance at that game, as well as the prior year's 2nd championship game (Greenbay-Oakland game), and Colts-Cowboy SuperBowl V.



Check-ins on the MARCO DV net have increased and new members are joining after leaning about our organization from it's presence on the QuadNet array, a transcoding modality that allow hams who use radios from different manufacturers, and varying digital protocols, to communicate with each other. How about joining us on the net? To pique your interest check out recordings of the net on [YouTube](#) (by Hilton [PY2BBQ](#)) and on Chip's (N5RTF) overall [MARCO net recordings](#). You can also listen to the net live on the same venues, Saturdays @ 15:00 UTC.

Fuel for thought—famous [NHRA](#) driver [Don Garlits](#) called my dental office wanting to know if we are related. He lives about 45 miles from me, true family name was Garlitz, has a [drag racing and classic car museum](#), and received my [nitrous oxide](#) bill. We spoke and I expressed relief that I did not receive his more costly invoice. Both of us have been called "Big Daddy" but I am one of a few Garlitz's not related to him. Since we both have a [diastema](#) between our front teeth he might as well be related (by that logic to Madonna, David Letterman, and others).

To provide feedback on this issue of the *Aether* contact the editors of both the print and online editions at [aether@marco-ltd.org](mailto:aether@marco-ltd.org).

73, **Jay Garlits**, AA4FL

### MARCO Member Communication

There are many ways that MARCO's BOD and members keep in touch and stay informed:

- Our Website, [www.marco-ltd.org](http://www.marco-ltd.org)
- Our on-the-air nets as listed within this edition of the *Aether*.
- [Through printed and electronic versions of the \*Aether\* Newsletter](#)
- Radio QSO's
- [Our Google Group Listserv](#)
- Through emails
- [Facebook Posts](#)
- [Twitter](#)
- [Mailchimp](#) email campaigns
- Using distribution email addresses in the format @marco-ltd.org as seen within this edition (i.e. secretary)
- Zoom sessions of the board of directors that are open to members
- Annual live business Meetings with social events
- Hamfest presence
- Committee projects

Do not miss out - make sure to contact the secretary with changes of mailing and email address. To join our google group or update addresses send an email to [secretary@marco-ltd.org](mailto:secretary@marco-ltd.org)

**Online editions of the *Aether* can be printed by the reader for use at home but linked information available through clicks within the online document will not be available. Note in using the online edition you have control of the size of the text and images, being able to zoom in for more comfortable and informative reading.**

The next edition of *the Aether* in April 2022 will be in print and produced by long-term editor Warren Brown. My next online edition will be in June 2022.

## MARCO Membership News

December 2021—January 2022

### New Members

KA9PUP, Lanis Kuyzin, Long Grove, IL (5 year)  
 KC3SOK—Jim York, Millersville, MD (2 year)  
 KD2HZG—Joe Kalfa, Springfield, VA (5 year)  
 KN4ZHP—Michael Thorn, Chapel Hill, NC (2 year)  
 KO4SFZ—David Schnoor, Plantation, FL (UF Student)  
 N9OML—Howard Marcus, Huntley, IL  
 W1LV—Stephen Morley, North Haven, CT (2 year)

### Renewals

AA2VG—Peter Deluca, Huntington, NY (2 year)  
 AA5KV—John Stewart, Shreveport, LA (2 year)  
 AE4BX, Mary Favaro, Myrtle Beach, SC (2 year)  
 AK4LQ—Nancy Whittle, Mulga, AL (2 year)  
 JA0BXP—Etsuo Takada, Otawara, Tochigi, Japan (5 year)  
 K1DCA—Don Arthur, Brewster, MA (2 year)  
 K1WDR—Wayne Rosenfield, Parrish, FL (2 year)  
 K2DED—Steven Browne, Hyde Park, NY (2 year)  
 K4AAC—Alanna Conder, Raleigh, NC (2 year)  
 K4FTP—Forest Pavel, Kansas City, MO (2 year)  
 K4QY—Andy Magnet, Ponte Vedra Beach, FL (2 year)  
 K5EWS—James Lindley, Fredericksburg, TX (2 year)  
 K6JW—Jeff Wolf, Rolling Hills Estates, CA (2 year)  
 K8AFP—Gerald Hensley, Richburg, SC  
 K7NM—Lee Barrett, West Point, UT (2 year)  
 K8KRB—Ken Bertka, Coopersburg, PA (2 year)  
 K8MDS—Marvin Sparks, Dayton, OH (new call)  
 K9AJ—Michael McGirr, Crete, IL (2 year)  
 K9SGS—Steve Sligar, Urbana, IL (2 year)  
 K0IR—Ralph Fedor, Waite park, MN (2 year)  
 KC2PRZ—Bryan Quackenbush, Beacon, NY (2 year)  
 KC3POG—Jeffrey Thompson, Orefield, PA (2 year)  
 KD4IZ—Jack Spitznagel, Parkton, MD (2 year)  
 KD5QHV—Bernie Krasowski, El Paso, TX (2 year)  
 KD6ECP—Bob Smith, Clermont, FL (2 year)  
 KD9JTU, Stephen Channel, Linton, IN (2 year)  
 KE5BQK—Linda Krasowski, El Paso, Tx (2 year)  
 KE5VEB—Thomas Showers, Biloxi, MS (2 year)  
 KE5SZA—John O Connor, Marietta, OK  
 KE0RUZ—Chad Wagoner, Carthage, MO (5 year)  
 KE0WW—Mike Stapp, Minneapolis, MN (2 year)

Membership Invoices for 2022 dues have been emailed to members due for payment. Thank you to those who have paid. If you did not receive an invoice please check your inbox or junk mail folder.

A list of the callsigns of remaining members due for renewal as of January 28, 2022 can be [accessed here](#). If you are on the list and have mailed your payment, thank you.

The default billing renewal term is \$45 for two years. If you would rather opt for a \$25 one year or \$100 five year membership renewal contact secretary Jay Garlitz, AA4FL, by email at [secretary@marco-ltd.org](mailto:secretary@marco-ltd.org) and the invoice will be updated accordingly.

For those who prefer to pay MARCO by check use Jay's (AA4FL) snail mailing address on QRZ.com.

### Renewals (continued)

KF7ZN—Ron Wilcox, Clinton, UT (2 year)  
 KG4CSQ—Ralph Brigham, Huntsville, AL (2 year)  
 KG7ZWM—Scott Kline, Welches, OR  
 KG7RGX—Daniel Sprague, Corvallis, OR (2 year)  
 KJ7TKR—Thomas Resk, Reno, NV (2 year)  
 KK1Y—Arthur Larson, Seminole, FL (2 year)  
 KM2L—Bruce Small, Clarence, NY (2 year)  
 KM3S—Alan Adler, Bryn Mawr, PA (2 year)  
 KN2M—David Rodman, Buffalo, NY (2 year)  
 KN6HTD—Jose Melendres, Sacramento, CA (5 year)  
 KN0S—David Justis, Wicomico, VA (5 year)  
 KO4RCH—Ben Davis, Annandale, VA (2 year)  
 KO6MD—Malin Dollinger, Rancho Palos Verde, CA (2 year)  
 KX4CD—Gary Coates, Roxboro, NC  
 N2DNK—Edgar Bangsil, Silver Creek, NY (2years)  
 N2LND—John Barbato, Spencer, MA (2 year)  
 N2QM—Tim Sweeney, Pleasant Valley, NY  
 N3BHO—Peter Racciato, Stroudsburg, PA  
 N3FJ—Rob Olszewski, Newtown SQ, PA (2 year)  
 N3INY—Roy Kring, Bedford, MA (2 year)  
 N3MBC—Harlan Abbott Jr., Reedsville, PA (2 year)  
 N4FD—Larry Smith, Athens, GA (2 year)  
 N5EQ—Jeff Rossio, Frederick, MD (2 year)  
 N5HO—Allen Treadwell, Castle Rock, CO  
 N6DMV—Paul Lukas, Torrence, CA  
 N6HC—Arnold Shatz, Santa Ana, CA  
 N6LW—Walter Herbert, Billings, MT  
 N8CL—Charles Lind, The Villages, FL (2 year)  
 N8GMB—Charles Nohava, Chagrin Falls, OH (2 year)  
 N9GJ—Gregory Johnson, Florence, WI  
 NM2K—Diane Rodman, Buffalo, NY (2 year)  
 K8MDS—Marvin Sparks, Dayton, OH  
 ON4PG—Pieter Gerkens, Sint-Lievens-Houtem, Belgium (2 year)  
 PY2BBQ—Hilton Libanori, Sao Paulo, Brazil  
 VE7BSP—Richard Jones, Victoria, BC (2 year)  
 VU3WTJ—Sirsendu Ghosh, Nabadwip, Nadia, India (5 year)  
 W1ZAC—Dustin Zack, Fairfield, CT (2 year)  
 W2REF—Robert Ford, Teaneck, NJ  
 W2RFU—Thomas Lifland, Boca Raton, FL (2 years)  
 W3UEC—Stephen Dubin, Springfield, PA (2 year)  
 W4DAN—Danny Centers, Cleveland, TN  
 W4PFW—Peter Williams, Mount Crawford, VA (5 year)  
 W4UM—Michael Raskin, Stuart, FL (2 year)  
 W6NJY—Art Kahn, Beverly Hills, CA (2 year)  
 W8FIN—Todd Finnerty, Worthington, OH (2 year)  
 W8PJQ—Christopher Davis, Perrysburg, OH (2 year)  
 WA1EXA—Mark Petruzzi, West Yarmouth, MA  
 WA3QWA—Marc Fink, Chesapeake, VA (2 year)  
 WA3ZZU—Charles Wertz, Morgantown, WV (2 year)  
 WB1FFI—Barry Rabin, Syracuse, NY  
 WB5BHB—John McCann, Vancleave, MS  
 WB8UUB—Douglas Villa, Iron Mountain, MI (2 year)  
 WB9USA—C Kurt Alexander, Yorktown IN  
 WD8IMG—Robert Thompson, Hazard, KY  
 WD9GET—Keith Brandt, Alvin, TX (2 year)  
 WI9WI—Jim Fitzpatrick, Madison, WI  
 WJ8B—Andrew Smith, Gahanna, OH (2 year)  
 WM4R—William Rowlett, Hopkinsville, KY (2 year)  
 WW9F—Jeff Kraft, Glencoe, IL (2 year)

### Silent Key

N8APD--Carl Sosinski, Hudon, OH--Oct. 25 2021

**Payment Options for Renewing your Membership or Joining MARCO**

New Membership dues and renewals are processed by email. At the time of annual billing invoices are invoiced to each member. The default billing term is unified for all types of members, two years for \$45. New members apply by online form.

MARCO encourages members to consider a five year membership of \$100. This reduces your yearly cost of membership and simplifies your annual billing by our all volunteer staff. Existing members can chose to extend your membership at any time. Please use the online form at <https://marco-ltd.org/join-marco-amateur-radio/> and select the five year term from the pull down list. Completing the entire form just as you were a new member assists us with keeping your information current in our membership database.

For New members, and current members desiring to extend their membership term, the membership committee will receive your online application and process an invoice to be sent by email.

Online payment processing for dues has been limited to PayPal in the past. Due to processing fees higher than that of credit cards, as of February 2022, new invoices will include an additional option to pay online by credit card using [stripe](#). Buttons for paying online using credit card (stripe) or PayPal will located at the top left of the invoice you will receive by email.

**Thank you for your Membership!**



**This is the 133rd edition of The Aether (2000-2022) since Warren KD4GUA became editor, and the sixth online only edition by co-editor Jay AA4FL. In print (mailed) and online editions alternate every two months.**

**MEDICAL AMATEUR RADIO COUNCIL, LTD.**  
[New Membership Application & Renewals](#)

**Best method process application online**  
<https://marco-ltd.org/join-marco-amateur-radio/>

Once you fill out the online form it will be reviewed by the membership committee. Upon approval you will be invoiced by email with a link to pay online by credit card or PayPal.

If you need to pay by check use this application form. Send the written form to the mailing address below.

**Check your preference:**

- One year membership \$25 (USD)
- Two year membership \$45 (USD)  
(the default billing for renewal)
- 5 year membership \$100 (USD)

Name: \_\_\_\_\_

Address: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Health Related Career (if appropriate)  
 \_\_\_\_\_

Call Sign: \_\_\_\_\_ Type License: \_\_\_\_\_

Phone: \_\_\_\_\_

email: \_\_\_\_\_

Birthday \_\_\_\_\_ (year, full DOB optional) Member ARRL: Y / N

Written applications for membership should be sent to  
 Membership Committee  
 c/o Secretary Jay Garlitz, AA4FL  
 PO Box 1333  
 Hawthorne, FL 32640, USA