

CRACKLIN' STATIC



SIERRA NEVADA Amateur Radio Society

Serving the Amateur Radio Community since April 16, 1968

<http://www.snars.org>

RENO, NEVADA

APRIL 2016

----PRESIDENT'S VOICE----

Anthony Marcin, W7XM

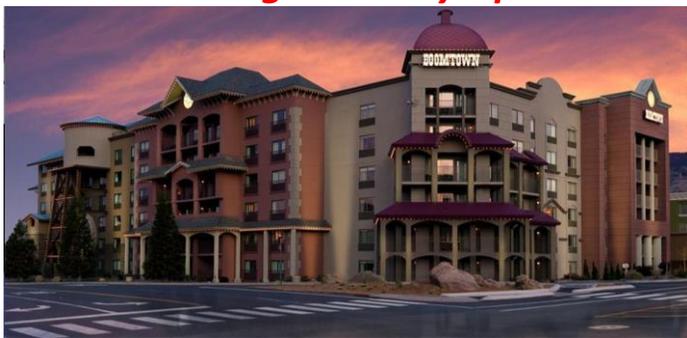
Our winter months tend to be slow with limited activities due to weather and holidays. So with this downtime we are planning on new things for the membership and our system infrastructure. One notable area is the work the technical committee is working on. At the last meeting we saw a consensus for a plan for rebuilding our high level systems. It was decided to replace out Mt Rose and Peavine with GE Master III Repeaters which are far newer than what is currently at the two sites. The plan also is making us look at surplus GE Master III repeaters so we can build them on the group and then do a full replacement of sites. This will of course make it easier for us to install systems rather than spending time at sites working on the repeaters. Thank you to the technical team for their efforts and looking forward to the work this summer to replace out the systems.

We are also in the works planning for this year's field day at Washoe Lake State Park and our May Ham Swap that will be the first weekend in May at Boomtown. In addition looking for new presentations for our monthly breakfast meetings and new educational classes/workshops focusing on items not related to repeaters but HF, Satellite and other modes and projects. Please keep sending your ideas and thoughts on activities and classes you would like to see developed.

I hope everyone had a great March and looking forward to April and of course seeing everyone at the Monthly Breakfast meet at Boomtown, Saturday April 2nd at 8:00am where this month's presentation will be about Satellite operating. Greg Roush, WA7IRW will be presenting and providing an overview of operating amateur radio satellites.

Tony, W7XM

SNARS meeting Saturday April 2



8:00 AM Boomtown Casino Hotel, I-80 exit 4, Verdi NV, in the Banquet/Conference Center.

Greg Roush WA7IRW will present a talk on operating Amateur Radio satellites.



SNARS, P.O. Box 7727, Reno, NV 89510

Membership: \$40 Individual, \$50 Family

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CRACKLIN' STATIC PUBLICATION

E-mail..... holden7471@msn.com

Cracklin' Static is the Newsletter of, and sponsored by the Sierra Nevada Amateur Radio Society. Opinions expressed herein are those of the editors and contributors and should not be considered as official expressions of the Club Officers, Staff or Club Members, or as endorsements by same.

Material for publication may be edited to enhance readability or to save space. We reserve the right to use whatever font size or line spacing may be required in order to publish this Newsletter.

Deadline for input to the newsletter is 1500 hours on the Sunday prior to the 1st Saturday of each month.

Cracklin' Static is e-published in Adobe PDF Format. It may be enjoyed at the SNARS web site.

Amateur Radio License Testing 2016

SNARS, Third Saturday of February, April, June, August, October and December. Testing will be at the REOC located at 5195 Spectrum Blvd., be there at 9 AM sharp! Bill Nichols... NN7K
SIERA CLUB: Silver State Charter High School, 788 Fairview Dr, Carson City..... 3rd Saturday of January, March, May, July, September, and November

.....Dale Anderson, kv7s@charter.net

Elko Area: Third Saturday of January, April, July, October.

11:00AM, Northeast Nevada Regional Hospital, 2001 Errecart Boulevard, Elko, NV w7gk_1@yahoo.com

SNARS Repeater System Frequencies

I-80-Mt Rose Linked System (W7TA)

Reno, Sparks, Carson City (Ophir Peak) 443.075 + 123.0 Normal Operation
 Lovelock, Black Rock Desert (Toulon Peak) 146.925 - 123.0 Normal Operation
 Winnemucca 146.670 - 123.0 Normal Operation
 Reno, Sparks (Virginia Peak) 147.030 + 123.0 Normal Operation
 Carson City, Tahoe, Truckee (Mt Rose Knob) 147.150 + 123.0 Normal Op
 Reno, Sparks, North Valleys (Peavine Peak) 147.210 + 100.0 Normal Operation
 Yerington, Wellington (Lobdelle Peak) 444.875 + 100.0 Normal Operation

IRLP/EchoLink System (W7TA)

Reno, Sparks (GSR) 147.300 + 123.0 Connected to/Status:

Standalone Systems, Ragchew Repeaters (W7TA)

Reno, Sparks 52.580 - 114.8 Normal Operation
 Reno, Sparks, Carson City, Dayton (Ophir Peak) 147.390 + 100.0 Normal Op
 Reno, Sparks 927.1125 - 114.8 Normal Operation
 Reno, Sparks, Carson City (Ophir Peak) 146.610 - 123.0 Not Linked, off air

Digital/APRS Systems (W7TA)

Reno, Sparks, Carson City (Ophir Peak) 145.050 - RNO Normal Operation
 Carson City, Tahoe, Truckee (Mt Rose Knob) 145.050 - ROSE Normal Op
 Lovelock, Black Rock Desert (Lobdelle peak) 144.390 - TOULON Normal Op

Portable Repeaters (KR7ENO)

Portable System 147.000 - 123.0 Special events only

DMR Digital Mobile Radio

Reno-Sparks 444.925 + CC1 DMR System
 Reno, Carson, Dayton 444.825 + CC1
 Lake Tahoe, Truckee 443.925 + CC1

C4FM Digital Repeater – YAESU OFF THE AIR

D-Star (N7NDS) NARRI

Reno-Sparks-Carson (Mt Davidson) 444.625 + (Module B)
 Reno-Sparks-Carson (Mt Davidson) 145.175 - (Module C)

THE NAME OF THE GAME

By Jim Shepherd W6US nvjims@gmail.com

IWCE

Just got back from a couple of days down in Las Vegas at the International Wireless Communications Expo (IWCE). While there were a few ham radios being shown, this is the major show for commercial land mobile radio and public safety. There were about 375 exhibitors on the 91,000 square foot show floor with about 7000 attendees from about 60 countries.

Major vendors like Kenwood and Icom had their top of the line HF ham transceivers on display, but most of their booth space was taken up with the commercial lines. One of the big things this year was the addition of PTT Cell and LTE capabilities to the traditional and digital LMR radios. With the mandate to move off of the 800 MHz frequencies and on to the 700 MHz for Public Safety, the reduction in numbers of channels is causing the agencies to scramble for other connectivity avenues to carry their traffic.

There were an amazing amount of radio accessories on display. Speaker-mics and headsets, both conventional and stealthy were on display with adaptors to fit most any radio or wireless device. I was interested in the site equipment supplies such as IM panels, duplexers, antennas and connectors. Times Microwave, the coax company, has a new line of lightning protection equipment including a new entrance panel that provides grounding, mounting of surge protectors and is totally sealed to the elements and bugs... Lots of antennas ranging from rubber duckies to large dishes were on display.

There were tower companies with both the standard permanent types and tower trailers for portable use. For the big ones, a number of vendors had tower lighting with LED lights for reduced maintenance. Several outfits had the necessary climbing safety equipment and approved training programs. If you have a tower on a mountaintop, you will need an equipment building, and there were a number of very nice models on the floor.

Test gear is important, and the companies are making smaller and more powerful equipment. Service monitors that will do analog and most of the different flavors of digital signals are now the size of a shoebox and weigh

under 20 pounds with batteries. There are even smaller ones that use your laptop for the primary control and display that are less than \$1000, though most of the standalone units are \$20,000+.

FEMA and other groups had exhibits. FEMA in cooperation with NIST is working to improve the technical part of interoperation communications in the field. In talking with one of the FEMA representatives, he expressed great appreciation for the contributions of ham radio to our national emergency communications.

A complete list of the exhibitors can be seen at <http://www.iwceexpo.com/iwce16/Public/Exhibitors.aspx?ID=1061760&aeid=573,613&sortMenu=104001&MainMenuID=1061759>

Besides the exhibits, there were technical sessions and panel discussions. Most of the more technical presentations were available with paid attendance, there were a number of sessions that were available to all pass holders. (most vendors had free passes available for the exhibit hall and the 'town hall' sessions) I attended several including a very interesting one on transitioning from conventional LMR systems to the new 700 MHz and LTE networks.

What does all this have to do with ham radio? A lot of these technologies were developed by hams, then enhanced in the commercial realm, developed into new equipment, and finally 'surplused' equipment comes back to the hams. Most of our digital radio equipment is available to us now because of the commercial development. P-25 digital really started a lot of this by requiring all of their "high band VHF" equipment to operate from 136 to 174 MHz which made it instantly useful on our 2 meter band without having to be modified. A lot of the accessories like antennas were developed to have wide bandwidth to cover most of this spectrum which has made it easier to get quality mountaintop antennas.

Next year's show will be March 27-31 down in Las Vegas, mark your calendar now!

MIKE'S MISSIVES CHAPTER FIFTEEN

Part 97 - Message forwarding system

97.219 Message forwarding system

- (a) Any amateur station may participate in a message forwarding system, subject to the privileges of the class of operator license held.
- (b) for stations participating in a message forwarding system, the control operator of the station originating a message is primarily accountable for any violation of the rules in this Part contained in the message.
- (c) Except as noted in paragraph (d) of this section, for stations participating in a message forwarding system, the control operators of forwarding stations that retransmit inadvertently communications that violate the rules in this Part are not accountable for the violative communications. They are, however, responsible for discontinuing such communications once they become aware of their presence.
- (d) For stations participating in a message forwarding system, the control operator of the first forwarding station must:
- (1) Authenticate the identity of the station from which it accepts the communication on behalf of the system;
 - (2) Accept accountability for any violation of the rules of this Part contained in messages it retransmits to the system

Weekly nets on the SNARS repeater systems

Western Nevada Noon net (daily, 12:00 PM) 147.150 + 123.0, 147.210 + 100.0, 147.030 + 123.0, 444.875 + 100.0	147.300 + 123.0
The Morning Net (Monday – Friday at 10:00 AM) 147.300 + 123.0	State SKYWARN Net (Wednesday nights at 7:00 PM) 147.150 + 123.0, 147.210 + 100.0, 147.030 + 123.0, 444.875 + 100.0
Bishops Storehouse Net (Monday nights at 9:15 PM) 147.150 + 123.0, 147.210 + 100.0, 147.030 + 123.0, 444.875 + 100.0	Northern Nevada Preppers Group Net (Wednesday nights at 8:00 PM) 147.150 + 123.0, 147.210 + 100.0, 147.030 + 123.0, 444.875 + 100.0
North Western Nevada ARES Net (Tuesday nights at 7:00 PM) 147.150 + 123.0, 147.210 + 100.0, 147.030 + 123.0, 444.875 + 100.0	State ARES Net (Thursday nights at 7:00 PM) 147.300 + 123.0
State SATERN Net (Tuesday nights at 8:00 PM)	SNARS New Ham Net (Sunday afternoons at 12:00 PM) 147.030 + and 147.150+, PL 123.0, and 147.210 + and 444.875+, PL 100.0

Welcome To The World Wide Repeater Directory! By Mike Katz N7MSK

The RFinder (RepeaterFinder) Worldwide Repeater Directory is a steadily growing worldwide repeater directory including IRLP, Echolink, AllStar, DStar, MotoTRBO, and even Winlink information. We currently have over 175 countries in the directory!

Access to the World Wide Repeater Directory is provided by any version of the RFinder smartphone apps on Android, iPhone and iPad/iPod Touch, by subscription for \$9.99/year. The same userid enables access from any version of the RFinder app, our browser interface (web.rfinder.net), or through a growing list of third-party memory programming applications such as [RTSystems radio programmers](#) and [CHIRP open source software](#).

One subscription, access to world wide repeater data from any computing device! We will be releasing Windows Phone and Symbian later this year as well as POI data for TomTom and Garmin GPS units. Again, one subscription, access from anywhere! All info can be found at www.RFinder.net

Editor's note: In February, the ARRL announced it had reached an agreement with RFinder, to be its preferred online resource of repeater frequencies. Details can be seen at:

<http://www.arrrl.org/news/rfinder-now-includes-coverage-maps>

THE SNARS NOON NET

The Noon Net, formerly the New Hams Q&A Net on 147.030 + and 147.150+, PL 123.0, and 147.210 + and 444.875+, PL 100.0 . The net is held weekly at 1200, every Sunday afternoon. The purpose of this net is a Q&A and information net for newly licensed hams and all hams wishing to ask question about different aspects of Ham Radio. It will give new hams in particular a venue for getting on the air in a controlled net moderated by a ham with more experience. The net will be open to any interested ham. Questions will be answered and discussed by the more experienced hams listening on the Net.

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NAME THAT RIG



(Answer on page 6)

FUN STUFF FOR APRIL

Looking for some excitement on the bands during the winter blahs? There's something for everyone on the air! Some of the more popular or interesting ones:

4/17 1800 to 4/17 2359 3.5-50 Mhz ARRL Rookie Roundup, SSB www.arrl.org/rookie-roundup

4/23 0001 to 4/24 2359 28 Mhz 10-10 International Spring Contest, Digital www.ten-ten.org

There aren't a lot of major events in April, but if you're into the various states' QSO parties, April has no less than 9 of them!

For a full list of contests, visit: <http://www.arrl.org/files/file/Contest%20Calendar/2016-04.pdf>

SNARS CALENDAR

SNARS monthly meeting (breakfast!)
Saturday, April 2nd, 8:00 AM
Boomtown Casino Hotel, I-80 exit 4, Verdi NV

Technical Committee Meeting - SNARS
Wednesday, April 13th, 2016 6:00 PM - 7:00 PM PDT
Washoe County Regional Emergency Operations Center,
5195 Spectrum Blvd Reno, Nevada 89512

If you're not into contests, there's always DX to chase, lots in April! Some of the better DX coming up in April:

Spratly Island 4/5 to 4/9 call TBA
East Timor 4/5 to 4/11 call prefix 4W

Market Reef 4/9 to 4/10 call 0JOW

Cambodia 4/12 to 4/19 call XU7AKC

Palau 4/13 to 4/18 call T88SM

Lord Howe Island 4/15 to 4/20 call VK9L

Iran 4/15 to 4/25 call EP2A

Maldives 4/17 to 4/30 call prefix 8Q7

Norfolk Island (Australia) 4/23 to 5/2 VK9NU

Ogasawara (Japan) 4/26 to 5/6 calls JD1BOI and JD1BMH

Bahrain 4/28 to 5/1 call A91HI

Visit <http://www.ng3k.com/Misc/adxo.html> for current info and full lists!

VE Exams – SNARS
Saturday, April 16th, 2016 must be there 9:00 AM sharp
Washoe County Regional Emergency Operations Center,
5195 Spectrum Blvd Reno, Nevada 89512

Board of Director's Meeting - SNARS
Wednesday, April 20th, 2016 6:00 PM - 7:00 PM
Washoe County Regional Emergency Operations Center,
5195 Spectrum Blvd Reno, Nevada 89512

SNARS MEMBERS' QSL CARDS



Paul Tueller K7PTT's QSL card featuring the Roberts Range in Eureka County. To quote Paul, "As a student of the Great Basin I always try to create interest in our Beautiful Nevada landscapes." Awesome!

If you have a colorful QSL you'd like to share with us, send me a copy..... holden7471@msn.com

WELCOME NEW SNARS MEMBERS!

Daniel	Delaplain	WB7QBO
Krystal	Rhoades	KI6KQI
David	Gmur	KA7VLL
Levi	Hoople	KI7CLX
Eric	Simmons	KI7CIM

GENERAL MEMBERSHIP BY LICENSE CLASS - 316 Active Members

Technicians	105	33%
Generals	87	28%
Advanced	10	3%
Extra	94	30%

LOOKING FOR A FEW GOOD WRITERS

Do you have an interesting radio-related article you'd like to see published in Cracklin Static? Proud of your shack, and have some photos of it? Built a nice piece of gear or accessory for your station? A colorful QSL card? We'd love to include your work in Cracklin Static! See an error in Cracklin Static? You can contact me (WB2AWQ) at holden7471@msn.com, or call me at 846-6820 (cell) to discuss! This is YOUR newsletter!.....73, Howie

NEVADA STATE CONVENTION

Set for April 29, 30, May 1, 2016 - Las Vegas, NV.
Info: <http://nvcon.org>

NAME THAT RIG (from pg 5)

Introduced in 1959 and aimed at the burgeoning Novice crowd, the Eico 720 transmitter was one of the better quality beginner transmitters in a very big field. It was available as kit at \$79.95 or wired at \$119.95, used four tubes to generate up to 60 watts out on 80 through 10 meters, and featured a very heavy copper chassis and clean well designed layout. It could be driven by an external VFO or directly with crystals, and there was an available mating high level plate modulator model 730 shown below once the Novice had gotten his (or her) General ticket. These Eico units are still highly sought by collectors and the AM crowd, especially the modulator.



* * * * *

ARES NEWS

Expanded full calendar of ARES events requiring communications, including contact info

EVENT 2016	DATE	DATE END	SPONSOR/ORGANIZER	COORDINATOR	CONTACT
Reno 5000 -1	5/1/16		Dolan Auto Group	Bob Miller WA6MTY	wa6mty@gbis.com
Silver State 50/50 race	5/20/16		SNARS	Ray W7TAP	w7tap@w7tap.com
America's Most Beautiful Bike Ride	6/5/16		Tahoe Amateur Radio Assn	Paul McCaffee	paul.mcafee@att.net
Pony Express Re-Ride	6/15/16	6/25/16	SIERA		http://www.cvhams.com/contact.php
FIELD DAY	6/25/16	6/26/16	SNARS		holden7471@msn.com
Reno 5000-2	6/26/16		Dolan Auto Group	Bob Miller WA6MTY	wa6mty@gbis.com
Death Ride	7/9/16		Tahoe Amateur Radio Assn	Paul McCaffee	paul.mcafee@att.net
Tahoe Rim Trail	7/16/16	7/17/16	WC-ARES	Bob Miller WA6MTY	wa6mty@gbis.com
Round Valley Walk/Run	8/6/16		Plumas ARC	Larry Trotter K16YUK	dltrrotter@sbcglobal.net
Running With the Bears	8/20/16		Plumas ARC	Larry Trotter K16YUK	dltrrotter@sbcglobal.net
Reno 5000-3	8/28/16		Dolan Auto Group	Bob Miller WA6MTY	wa6mty@gbis.com
Tahoe 200	9/9/2016	9/13/16	WC-ARES	Bob Miller WA6MTY	wa6mty@gbis.com
Tour De Tahoe	9/11/16		Tahoe Amateur Radio Assn	Paul McCaffee	paul.mcafee@att.net
Reno Air-Races	9/14/16	9/18/16	WC-ARES	Rick Russell KF7KEM	wa6mty@gbis.com
Edible Pedal 100	9/18/16		Sunrise Rotary Club	Bob Miller WA6MTY	wa6mty@gbis.com

73

Bob Miller WA6MTY

Washoe County Emergency Coordinator

Amateur Radio Emergency Service

775 843-5952

www.wcares.us

The February Board of Directors minutes will be presented in the next issue of Cracklin Static

US NAVAL COMMUNICATIONS IN THE COLD WAR ERA (PART ONE of THREE)

I wrote the following article in 2011 for Electric Radio Magazine, and thought it might be of interest to SNARS members. It relates to Naval and Amateur communications in the Cold War years. There have been very minor revisions to the article to customize for CS, but all pertinent facts and photos remain. Enjoy. WB2AWQ

A view of how the Navy communicated in the Mediterranean Sea, through the eyes and ears of a Navy CW operator stationed at NavCommSta Greece/NGR in the late 1960s, with much able assistance from Joel Roberson KG5KD and Nick England K4NYW.



(KG5KD)

Banks of R-390A receivers. A choice of several long-wires, some Vee beams, a rhombic or two, some conical monopoles, or, if you really needed it, rotatable 13-30 MHz log periodic arrays up about 40 ft. Add to that 5 KW of RF (and more up to 40KW if conditions warranted) so you can be heard anywhere the frequency is open to. Sounds like a ham's dream, right? No, this was the CW ship-to-shore operating position at Navcommsta Greece – call sign NGR – in the 1960s. Yours truly spent two years there from 1968 to 1970, mostly as a CW operator, with some time as a message center supervisor and traffic checker.



Ship-Shore CW operating positions modeled by Joel Roberson KG5KD

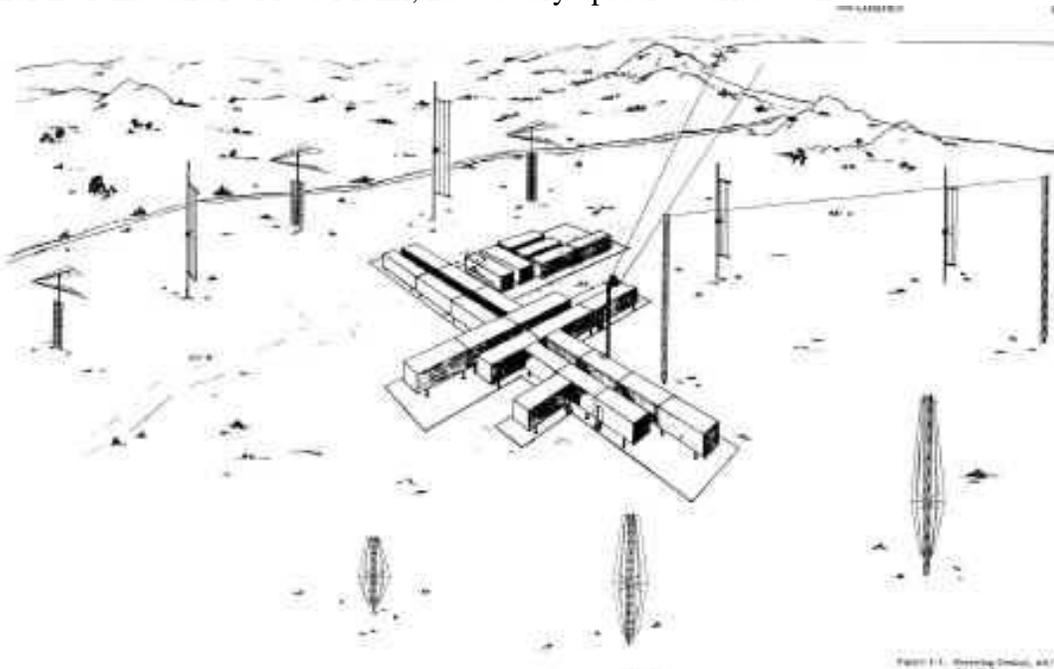
Naval Communication Station Greece (NGR), situated on the western coast of Greece at Marathon Bay, about 30 miles East-northeast of Athens, was part of the U.S. Navy's massive HF communications system in the Cold War years. There were actually two sites, the transmitter site at Kato Souli near Marathon, Greece, and the receiver/relay/message center site at Nea Makri, about 8 miles south of the transmitter site. NGR was a major relay center, serving not only ships at sea, but many smaller U.S. facilities scattered throughout southeastern Europe and the Middle East. NGR was a stand-alone command, the only U.S. Navy presence on mainland Greece at the time, and communications was its only function. It was activated in 1963, and closed in 1990.

While NGR functioned much the same as most other Navy major relay stations, it was unique, in that it was "transportable", meaning that the bulk of the facility could be moved out on short notice if political or other situations demanded it. Housed in 57 forty-foot long inter-connected trailers, some 27 at the receiver site, and 30 at the transmitter site, NGR was built mainly by the Technical Material Corporation, and was the model AN/TSC-35 Transportable Communication System, as per the manual on Nick England's Navy-radio site, <http://www.navy-radio.com/commsta-trans.htm>. NGR differed from the manual's setup plan only slightly, so the manual is a fairly accurate technical description of NGR. The author has seen no other examples of this particular TMC system having been used in the military.



View of the receiver site vans circa 1972. The antennas in view are part of the Wullenweber array. (KG5KD)

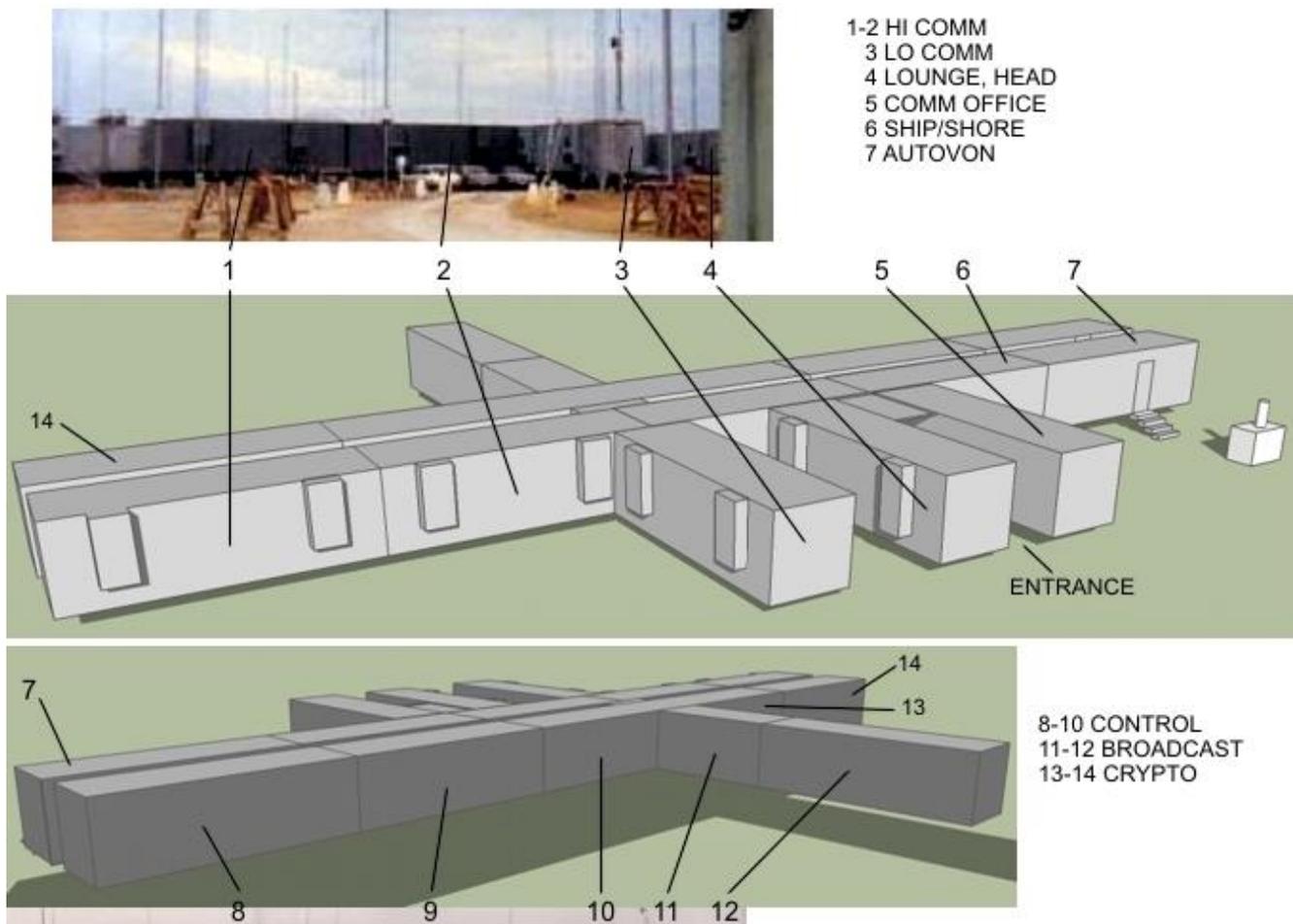
The receiver site, which also included a number of locally-built structures for administration, storage, repair and maintenance facilities, barracks, food service, recreation and small stores, was located right on the coast, just north of the center of Nea Makri, now a very upscale tourist town.



Receiver site layout as depicted in the TMC AN/TSC-35 manual (K4NYW)

The trailers (which we called “the vans”) were located a few hundred yards off the shore, and the antenna farm, which occupied several hundred acres, was adjacent on the southern side of the vans. The support buildings were between the vans and the main road, aptly named Marathon Road, as it went from Marathon to Athens. Each year a reenactment of the original Marathon is run along this road. In 1969 the vans were encased in a Wullenweber electronically steered directional antenna system, commonly called an elephant cage. The Wullenweber was not part of the AN/TSC-35. (more Wullenweber info here: <http://navy-radio.com/frd10.htm>)

The receiver site vans were divided into a number of areas, interconnected and fully weatherproofed.



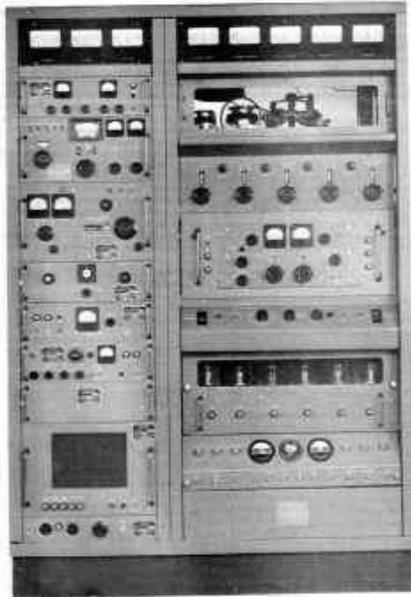
Identification of parts of the receiver site (KG5KD) The message center, not indicated above, was to the left of Ship-Shore in the middle diagram.

Message Center: This is where all messages bound to or from NGR itself, or received from ship-to-shore or other military and government customers were processed. The processing included adding Julian dates and routing indicators (RTTY call signs) for various addressees, correcting any procedural errors – text could not be changed - and generating any service messages which might be required in the normal handling of traffic. Traffic processed by the message center then went to one of several relay delivery areas: ships broadcast, Hi-comm (for special priority circuits), lo-comm (for normal priority circuits), Autodin (for entry into the Defense Communications System automated message delivery system), or to ship-shore for direct delivery to ships.

Ship-to-shore: 6 CW circuits covering world-wide HF, on the shared frequencies of 4289, 6453, 8578, 12867, 17156 (on-call), and 22443 KHz (on call), and two MF frequencies of 500 KHz where a distress listening watch was maintained, and 470 KHz working frequency. CW traffic came from ships the world over, and was about 70% from USNS (civilian manned Navy) ships or government-contracted merchant ships. The balance was from regular Navy or NATO ships. The HF transmitters used were TMC FRT-39s (10KW max) and FRT-40s (40KW max), while the 500/470 frequencies used old TAB-7s. There were four locally assigned HF full duplex secure RTTY circuits, known as Orestes on 4, 6, 8, and 12 MHz frequencies, utilizing the KW-7 encryption system. This was for itinerant ship traffic strictly from regular Navy ships. There were as many as four dedicated RTTY circuits, utilized for 24/7 direct communication with individual ships on special assignments. All HF receivers in ship-to-shore were R-390's, 5 for CW and 4 for Orestes, and one R-389 for MF. Ship-to-shore operators could select from an assortment of about 8 different antennas for receive, independent of Technical control.



Major components of RTTY and CW ship-shore equipment: KW-7 crypto transceiver, 28ASR teletype machine, R-390A HF receiver (K4NYW and other sources)



FRT-39 transmitter (10KW max)



FRT-40 transmitter (40KW max) (K4NYW)

Hi-Comm: Very high security cleared RTTY circuits with high priority customers, DoD links, and some ships with special requirements. Hi-comm also provided encoding and decoding of off-line encrypted CW traffic, commonly known as coded groups, using World-War Two vintage crypto machines.

Lo-comm: Regular RTTY traffic circuits, mostly bound for stateside DoD destinations.

Technical control: Maintained receivers for all point-to-point circuits and Hi-comm ship circuits, microwave tropo-scatter link, routed all outgoing RTTY signals to the transmitter site, and incoming RTTY signals to various areas of the receiver site as appropriate. Some of the signals from stateside links were in the form of time-division-multiplex signals, which sounded much like a buzz-saw, but were in fact a conglomerate of up to 16 different RTTY signals on one sideband of a transmitted signal. These signals required extremely accurate tuning and processing into the individual signals. Technical control also worked a tactical HF voice circuit. NGR's voice call sign was "Cactus Pete".

Ships broadcast: This was an area used to put traffic on HF broadcast, both CW and RTTY, bound for various ships at sea. Most of the time, the broadcast was controlled through the Control Area Master Station (CAMS) in Sidi Yaha Morocco, remotely keying transmitters at various stations, but once every three months, for a week, NGR took over CAMS duties, training and functioning as CAMS in readiness in the event of the Morocco station going down.

Electronic and Teletype Repair: Maintained all station electronics and teletype machinery.

(To be continued next month)