

## 2010 CLUB OFFICERS

Swearing in of the 2010 Club Officers took place at the December meeting. Congratulations!

President:	Wayne Carpus W2ZDP
Vice President:	Jim Starr N2TFA
Treasurer:	Jack Cullum KB2ESM
Secretary:	Keith Patterson KC2DGC
Financial Secretary:	Judy Levan N2TEZ
Director:	Ken Pokigo KC2AYK
Director:	John Crawford KB2VWC




Front row: (from left) N2TEZ, KB2VWC, KB2ESM, W2ZDP  
Back row: (from left) KB2VWC, N2TFA, KC2AYK

## JANUARY MEETING

This month's club meeting will begin at 7:00 PM on Thursday January 7th at the NIKE Base Clubhouse. All interested in amateur radio are invited to attend. Neither club membership nor an amateur radio license is required.

We look forward to seeing you there!



## HAVE YOUR RENEWED YOUR MEMBERSHIP?

Don't forget to renew your membership.

A renewal application was included in the November and December Telstar.

Send the completed application along with your dues check made payable to STARS to:

Judy Levan N2TEZ  
120 University Blvd.  
Depew, NY 14043-2874

## HAPPY JANUARY BIRTHDAY!



2nd:	Mark Barnack N2LAB
7th:	Ken Pokigo KC2AYK
12th:	Patrick Groom KC2VWG
17th:	Alex Clark W2SPY
17th:	Mike Harrington W4QY
25th:	Jim Sojka WB2TJO
30th:	Anne Fanelli WI2G
30th:	Fred Velott KA2TTP

## A MESSAGE FROM YOUR NEW PRESIDENT

First and foremost, let me say that it is a privilege and an honor to have been chosen to lead our club for the coming year. Having been the Secretary for the past three years, I gotten to know many of you and I look forward to meeting many more during the coming year.

I was bitten by the Ham Radio bug at a very early age, 6 or 7 years old, but I didn't get my Novice license, WN2LGT until 1963. In 1966 I achieved the Technician Class with WB2ZDP, and there I stayed until 1978 when I upgraded to Advanced Class. In the late '90's I dropped the "B" out of my call sign but my license class stayed the same until November 21st of 2009 when I made the final upgrade to Extra class.

Now the whole purpose of this message is to introduce myself to those who have known me only previously as the "Secretary", but to also challenge you to upgrade your Amateur Radio skills, and this can done in many different ways. Obtaining the next higher license class is one way, but how about trying a new mode of operation. RTTY, PSK-31, SSTV can easily be done with just your computer and sound card, OR like I'm going to do, work on my CW skills. Our hobby offers many different ways for enjoyment and I realize that not all of us can operate every mode available, but my challenge to all is to try something different and then share that with others.

We are a diverse group, with many different interests beyond Amateur Radio, but that is our common bond, so let's challenge ourselves to do something extra with our hobby or be an Elmer to someone, young or old and advance our knowledge or someone else's.

By the time most of you read this, the Holiday's will be just another memory; I hope that there were many good ones. I extend an invitation to all to attend the January meeting and let's get started challenging ourselves to enjoy our hobby in some new way.

Best of 73's, Good Luck and Good DX  
Wayne, W2ZDP

## AMATEUR RADIO EXAMINATIONS

STARS will be sponsoring a VE session on Saturday January 16th at 9AM at the Hamburg Youth Center (corner of Hawkins and Prospect). For information or to pre-register for STARS tests, contact John Crawford KB2VWC at 649-5933.

LARC Holds it's VE tests on the last Tuesday of selected months (usually every other month). Test sessions are held at 7:00 PM . pre-registration is requested for all sessions, but not required. Contact John Maxwell W2JM at maxwell@buffalo.edu / OR - Joseph Gearhart WV2NY at : 894-2407 / wv2ny@roadrunner.com .

ARATS will be hold test sessions on the first Saturday of the month (except when falling on a holiday weekend, when they will be on the second Saturday) starting promptly at 10AM at the North Tonawanda Fire Headquarters at 495 Zimmerman Street. Walk-ins accepted, pre-registration is highly recommended. For information on or to pre-register for ARATS exams, call Bill Klepser WB2AIV at 839-3525 or email wb2aiv@arrl.net.

PROS holds test sessions as needed at 585 North Star Road, East Aurora. For information, contact Pat Murray NW2I at 652-8178.

## CLUB MEETINGS

Club meetings are held on the first Thursday of the month at 7:00PM at either the Hamburg Youth Center (Prospect and Hawkins Avenues) or the NIKE Base Clubhouse. Everyone is welcome. Board meetings are held on the fourth Thursday of the month at the Nike Base Club Station at 7:30PM and are open to all club members.

## CLUB NETS

STARS WB2EZU Memorial HF net meets at 10AM local time on Saturdays on 3.925 MHz +/- QRM. Bob Lehning WA2YSJ is usually the net controller.  
STARS Sunday morning RagChew Net at 9:30AM on 28.380 Mhz.

## THE MISSING Q SIGNALS

Original List by John Queen, KA0SEY & Mike Colyar, K7ITL  
Additions by Thom LaCosta K3HRN and members of QRP-L

Some Q signals have never made it to the ARRL's official list. Here are some that may agree would be useful in appropriate situations. As with regular Q signals, each can be a statement or a question, depending on whether a question mark follows it.

- QBA - My antenna is BIG!
- QBO - Don't sit next to that guy in the meeting.
- QBS - It's getting deep in here.
- QCP - I am using Cat Power (From Rotary Cat Power Wheel)
- QCW - I am going to whistle Morse Code on FM (or SSB)
- QDR - Damn Right the frequency is busy!} In response to QRL
- QET - Phone home.
- QEW - Copy is difficult due to Ear Wax.
- QFH - This frequency is MINE! - go elsewhere.
- QHI - I am jumping in quick to say hi, then going QRT.
- QLF - I am sending with my left foot.
- QLK - I am sending with my left foot and keyboard.
- QOF Yes, I am an Old Fart.
- QOK - Your last transmission was Okie Dokie.
- QPM - Your signal is purr modulated.
- QRC - Warning, rag chewer on frequency.
- QRG - You are transmitting in or near the ... (wave length or frequency) amateur band.
- QRW - Means Qrp - Really Weak
- QWC - I have to go to the bathroom }
- QZZ - I fell asleep at the mike.



## A RESOLUTION FOR THE NEW YEAR

By Duncan P MacLachlan, KUODM  
ARRL Youth Editor

It's that time of the year again! Instead of making your New Year's resolution something hard to stick to, such as cleaning the garage, why not make your resolution one that you'll look forward to carrying out? Why not make your New Year's resolution one you can have fun with -- and benefit Amateur Radio?

I have two propositions for a New Year's resolution. The first is that you try something new. Regardless of how long you've been licensed, there is something in ham Radio you have yet to try. Whether it is Morse code or meteor scatter, take a leap of faith and try something that you know absolutely nothing about.

The second proposition is an easy, but important one: Make one contact a day, using any mode you wish. Whether it's on a repeater or 20 meters, make one contact each day for the entire year. The most important part of Amateur Radio is using what we have. If you can make one contact a day, it not only preserves our spectrum, it is a display of our passion for Amateur Radio.



## TOKELAU ISLANDS

Look for operators Bill N7OU and Bob W7YAQ to operate from the Tokelau Islands (OC-048) between February 17th and March 10th, 2010. Activities will include an entry in the ARRL International DX CW Contest (February 20-21). Operations will be on 160-10 meters, mainly on CW, with some SSB and RTTY, using 100 watts and vertical antennas. Also, look for them to operate from Apia, Samoa (5W), before they sail to Tokelau and after between February 10-16th and March 11-15th. QSL via their home callsigns.

## MARS GETS NEW NAME / FINE TUNES MISSION

On Wednesday, December 23, the Department of Defense (DoD) issued an Instruction concerning MARS, effective immediately. This Instruction gives the three MARS services -- Army, Air Force and Navy/Marine Corps -- a new focus on homeland security and a new name: Military Auxiliary Radio System. The Instruction is the first major revision to MARS since January 26, 1988 -- as such, the first revision since the 9/11 attacks and Hurricane Katrina, two major events that changed the way Amateur Radio dealt with emergency communications.



The DoD defines a "military auxiliary" as "an organized body of volunteers prepared to supplement the uniformed services or any designated civilian authorities by provision of specialized autonomous services when called upon or when situations warrant," and gives the Civil Air Patrol and Coast Guard Auxiliary as examples of auxiliaries.

In the past, MARS had focused primarily on emergency communications and health and welfare support. The DoD's Instruction now directs the three MARS services to provide "contingency radio communications" to support US government operations, DoD components and "civil authorities at all levels," providing for national security and emergency preparedness events. MARS units will still continue to provide health and welfare communications support "to military members, civilian employees and contractors of DoD Components, and civil agency employees and contractors, when in remote or isolated areas, in contingencies or whenever appropriate." MARS must also be capable of operation in "radio only" modes -- without landlines or the Internet -- and sustainable on emergency power (when public utility power has failed); some MARS stations must be transportable for timely deployment.

The Secretaries of the Army, Air Force and Navy are to encourage participation in MARS.

The Instruction calls on them to establish programs "to promote civilian interest, recruit qualified volunteers, sponsor them for basic background checks and furnish them suitable training in contingency support communications."

The Instruction also gives some new perks to MARS members. Active duty military personnel who are affiliated with MARS may be able to earn Reserve points based on service in MARS and, in cases of permanent change of station, qualify for weight exemption for transportation of MARS communications equipment. All members may be considered for benefits associated with DoD civilian service, such as access to DoD morale, welfare and recreation Category C recreational facilities and access to DoD credit unions.

Membership in any of the three MARS services is open to qualified active duty, Guard and Reserve personnel, as well as those in civilian agencies who report to civil authorities or their supporting organizations (including nongovernmental organizations) and private US citizens who meet age, education and other criteria -- such as an FCC-issued Amateur Radio license -- imposed by a DoD Component MARS office.

## CANADIAN WEB SITE PROMOTES ARISS

The Amateur Radio on the International Space Station (ARISS) Canadian delegate has been working to promote the ARISS program. In doing so, a new Web page has been developed by the Ottawa Valley Mobile Radio Club which provides information on amateur radio and the ARISS program. To view the site, go to: <http://www.ovmrc.on.ca> and select "ARISS" at the bottom of the left hand side menu.



## LAST SURVIVOR FROM KON-TIKI PASSES AWAY

Knut Magne Haugland, LA3KY, of Norway, passed away on December 25. He was 92. Haugland was one of six men, who with Thor Heyerdahl in 1947, successfully crossed the Pacific Ocean in a 45 foot raft made of balsa wood and bamboo -- named Kon-Tiki -- to prove that people from South America could have settled Polynesia in pre-Columbian times.

Called the "most unusual expedition ever to place reliance on Amateur Radio for communication" in the December 1947 issue of QST, Kon-Tiki departed Peru for Polynesia on April 28, 1947. "It was the theory of Thor Heyerdahl, Norwegian ethnologist and leader of the venture, that the settlement of the Pacific Islands resulted from a migration of American peoples who had sailed there many of years ago, rather than a trek from Asia as claimed by other scientists," the article explained. "To prove that such a migration was possible, Mr Heyerdahl decided to attempt the trip in a raft of the type preserved in Incan legends and early Spanish historical accounts. He named the expedition on honor of the pre-Incan Sun god. The Kon-Tiki raft was fashioned out of logs of the lightest wood in existence and lashed together with native-made hemp rope. Its only sources of locomotion would be the Pacific trade winds and the Humboldt Current which sweeps northward along the west coast of

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## ANTARCTIC OPERATION

Alex, UA1PAW, now operating as R1ANR from Novo Runway in Antarctica, is expected to be there until the end of February 2010. Gianni, I1HYW, who spoke with Alex states, "He (Alex) said propagation is only open around 2000z on 40m. While 10/15/20/30m are closed. He is running a Stepp-IR all band vertical antenna using a Yaesu MARK V RTX and PA ACOM 2000A. His QSL Manager is ZS1ANF: Oleg S. Sakharov, P.O. Box 15968, Vlaeberg RSA, Cape Town, Western Cape 8018, SOUTH AFRICA.

South America and thence in the direction of the Tuamotu Archipelago."

Heyerdahl and his five companions sailed the raft for 101 days more than 4300 miles across the Pacific Ocean before smashing into a reef in the Tuamotu Islands on August 7, 1947. The Kon-Tiki carried 250 liters of water in bamboo tubes. For food, they took 200 coconuts, sweet potatoes, bottle gourds and other assorted fruit and roots. The US Army Quartermaster Corps provided field rations, tinned food and survival equipment. In return, the Kon-Tiki explorers reported on the quality and utility of the provisions. They also caught plentiful numbers of fish, particularly flying fish, mahi-mahi, yellow fin tuna, bonito and shark.

The expedition used call sign LI2B and carried three watertight radio transmitters. The first operated on the 40 and 20 meters, the second on 10 meters and the third on 6 meters. Each unit was made up entirely of 2E30 vacuum tubes providing 10 W of RF input. As an emergency backup, they also carried a German Mark V transceiver originally re-created by Britain's Special Operations Executive in 1942. Other equipment included a hand-cranked emergency set of the Gibson Girl type for use on the maritime bands, a special VHF set for contacting aircraft and two British Mark II transmitters. The Kon-Tiki also carried a National Radio Company NC-173 receiver. Dry batteries and a hand-cranked generator supplied the power.

For the first 22 days following their departure from Peru, the only radio contact Kon-Tiki had was with OBE, the station of the Peruvian Naval School. LI2B kept to its schedule, trying to contact key amateur stations on specified frequencies without success.

Finally, on May 20 at 9:44 PST, Harold Kempel, W6EVM, heard and worked LI2B on 14.142 kHz, providing the raft with its first North American contact. By mid-June, LI2B had worked numerous amateur stations.

As the trip progressed, a long-haul network of amateur stations developed. Stations in North America, the Canal Zone and Norway cooperated in handling the

*(Continued on page 6)*

Kon-Tiki's traffic. [Gene Melton] W3FNG, in Washington, DC, relayed messages to and from the Norwegian Embassy. "On at least two occasions, urgent traffic was exchanged between the Embassy and the raft via this circuit," the QST article explained. "In one instance, a message was relayed from the raft to W3FNG, delivered by telephone to the Embassy, an answer procured and relayed in the reverse direction to Kon-Tiki -- all in a matter of 35 minutes elapsed time!"

Kon-Tiki's mission ended on August 7, 1947 -- just 101 days after departure from Peru -- when waves deposited the raft on a reef off Raiora Island. "But the safety of the courageous crew which had made the venture a success was still at stake," the QST article said. "Half an hour after being stranded, LI2B was fortunate in making contact with [G. W. Hitch] ZK1AB on Raratonga, who was asked to stand a listening watch and communicate with the Norwegian Embassy in Washington if LI2B was not heard at the end of a 36 hour period. Just before the specified period ended, contact was established with [P. Fuller], WOMNU, and word of the landing passed along, thus avoiding the necessity of sending out any rescue parties."

In his book *Kon-Tiki*, Heyerdahl described the rush to make contact after landing on the reef, including the crew's despair as the NC-173 slowly dried after getting soaked in a shipwreck, gradually receiving at higher and higher frequencies until eventually settling on the 13.990 MHz frequency needed to make contact:

"Coils and radio parts lay drying in the tropical sun on slabs of coral. The whole day passed, and the atmosphere grew more and more hectic. The rest of us abandoned all other jobs and crowded round the radio in the hope of being able to give assistance. We must be on the air before 10 PM. Then the thirty-six hours' time limit would be up, and the radio amateur on Rarotonga would send out appeals for airplane and relief expeditions.

"The thirty-six hours would soon be up. Suddenly it crackled on the Rarotonga man's frequency, and we gathered that he was in full contact with the telegraph station in Tahiti. Soon afterward we picked up the following fragment of a message sent out from Rarotonga: '...no plane this side of Samoa. I am quite sure...'"

"We turned the handle madly while Torstein called Rarotonga. No one heard us. We called Hal and Frank at Los Angeles and the Naval School at Lima, but no

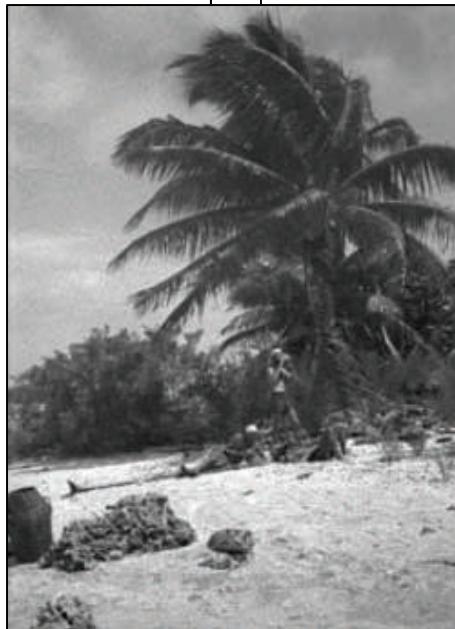
one heard us. Then Torstein sent out a CQ message, that is to say, he called all the stations in the world which could hear us on our special amateur wavelength. That was of some use. Now a faint voice out in the ether began to call us slowly. We called again and said that we heard him. Then the slow voice out in the ether said 'My name is Paul. I live in Colorado. What is your name and where do you live?'

"This was a radio amateur. Torstein seized the key, while we turned the handle, and replied, 'This is the Kon-Tiki. We are stranded on a desert island in the Pacific.' Paul did not believe the message. He thought it was a radio amateur in the next street pulling his leg, and he did not

come on the air again. We tore our hair in desperation. Here were we, sitting under the palm tops on a starry night on a desert island, and no one even believed what we said. "Torstein did not give up; he was at the key again sending 'All well, all well, all well' unceasingly. We must at all costs stop all this rescue machinery from starting out across the Pacific. Then we heard, rather faintly, in the receiver, 'If all's well, why worry?'

After Kon-Tiki

In 1951, Haugland married librarian Ingeborg Prestholdt. 1963, Haugland left the Air Force to become acting director of the Norway's Resistance Museum; he was later made its permanent director and retired from this position in 1983. He was also the director of the Kon-Tiki Museum from its start in 1947, continuing until 1990.



**The Kon-Tiki makes landfall on Raiora.**

<b>JANUARY CONTESTS</b>	
NCCC Sprint Ladder	0230Z-0300Z, Jan 8
PODXS 070 Club PSKFest	0000Z-2400Z, Jan 9
Hunting Lions in the Air Contest	0000Z, Jan 9 to 2400Z, Jan 10
Mongolian RTTY DX Contest	0000Z-2400Z, Jan 9
MI QRP January CW Contest	1200Z, Jan 9 to 2359Z, Jan 10
WW PMC Contest	1200Z, Jan 9 to 1200Z, Jan 10
Midwinter Contest, CW	1400Z-2000Z, Jan 9
North American QSO Party, CW	1800Z, Jan 9 to 0600Z, Jan 10
SKCC Weekend Sprint	0000Z-2400Z, Jan 10
NRAU-Baltic Contest, CW	0630Z-0830Z, Jan 10
Midwinter Contest, Phone	0800Z-1400Z, Jan 10
NRAU-Baltic Contest, SSB	0900Z-1100Z, Jan 10
DARC 10-Meter Contest	0900Z-1059Z, Jan 10
RSGB 80m Club Championship, SSB	2000Z-2130Z, Jan 13
NCCC Sprint Ladder	0230Z-0300Z, Jan 15
LZ Open Contest	0000Z-0600Z, Jan 16
Hungarian DX Contest	1200Z, Jan 16 to 1159Z, Jan 17
North American QSO Party, SSB	1800Z, Jan 16 to 0600Z, Jan 17
Feld Hell Sprint	1600Z-1800Z, Jan 17
Run for the Bacon QRP Contest	0200Z-0400Z, Jan 18
NAQCC Straight Key/Bug Sprint	0130Z-0330Z, Jan 21
RSGB 80m Club Championship, Data	2000Z-2130Z, Jan 21
NCCC Sprint Ladder	0230Z-0300Z, Jan 22
YL-ISSB QSO Party, SSB	0000Z, Jan 23 to 2359Z, Jan 24
MIE 33 Contest	1100Z-1500Z, Jan 23
MIE 33 Contest	2300Z, Jan 23 to 0300Z, Jan 24
BARTG RTTY Sprint	1200Z, Jan 23 to 1200Z, Jan 24
ARRL January VHF Sweepstakes	1900Z, Jan 23 to 0400Z, Jan 25
SKCC Sprint	0000Z-0200Z, Jan 27
NCCC Sprint Ladder	0230Z-0300Z, Jan 29
CQ 160-Meter Contest, CW	2200Z, Jan 29 to 2159Z, Jan 31
REF Contest, CW	0600Z, Jan 30 to 1800Z, Jan 31
UBA DX Contest, SSB	1300Z, Jan 30 to 1300Z, Jan 31
SPAR Winter Field Day	1700Z, Jan 30 to 1700Z, Jan 31
Classic Exchange, CW	1400Z, Jan 31 to 0800Z, Feb 1

# JANUARY SPECIAL EVENTS

**Jan 1, 1300Z-2000Z**, Northfield, MA. 72 Rag Chew Group, K1R. Celebrate and welcome in the new year - 2010. 7.272. Certificate. Robert Lobenstein, WA2AXZ, 1958 E 36 St, Brooklyn, NY 11234. [www.ragchewers.net](http://www.ragchewers.net)

**Jan 1-Jan 31, 0000Z-2359Z**, All US Call Areas. Straight Key Century Club (SKCC), K3Y. Celebrating 4 years of steady growth to nearly 6,000 members. 14.050 10.120 7.055 3.550. QSL. Dan Rhodes, KA3CTQ, 618 Seminole Dr, Erie, PA 16505. [www.skccgroup.com](http://www.skccgroup.com)

**Jan 2, 1600Z-2000Z**, Clinton, IA. Clinton Amateur Radio Club, WØCS. Eagle Watch on the Mississippi River Dam 13. 14.250 7.250. QSL. CARC, PO Box 1501, Clinton, IA 52733-1501. [w0cs@arrl.net](mailto:w0cs@arrl.net)

**Jan 2-Jan 10, 1400Z-0559Z**, Newburgh, IN. Indiana Patriot Guard Riders, N9P. 5<sup>th</sup> Anniversary of Indiana Patriot Guard Riders. 21.300 14.265 7.210 3.825 SSB CW RTTY PSK. QSL. Rick Williams, 515 E Jennings St, Newburgh, IN 47630. *Indiana Patriot Guard Riders first mission honoring Pvt Jonathan Pfender, killed in Iraq December 30, 2005.* [www.qrz.com/db/n9p](http://www.qrz.com/db/n9p) or [www.themmd.com/N9P](http://www.themmd.com/N9P)

**Jan 9, 1700Z-2359Z**, San Diego, CA. USS Midway (CV-41) Museum Raido Room, NI6IW. USS *Nautilus* (SSN-571) Underway on Nuclear Power 1955. 14.320 7.250 7.070 D-STAR. QSL. USS Midway Museum Radio Room, 910 North Harbor Dr, San Diego, CA 92101-5811. [kk6fz@arrl.net](mailto:kk6fz@arrl.net)

**Jan 23-Jan 24, 1400Z-2000Z**, Wilsona Gardens, CA. BioRem RAC, AL7LS. Release date for movie *Hot Rods to Hell* 27 Jan 1967. 14.105 7.243 7.105 3.952. Certificate. Bruce Rossi, 2127 Sierra Stone Ln, Las Vegas, NV 89119. [bioremrac-northbase.club.officelive.com/Documents/hrth2010post.mht](http://bioremrac-northbase.club.officelive.com/Documents/hrth2010post.mht)

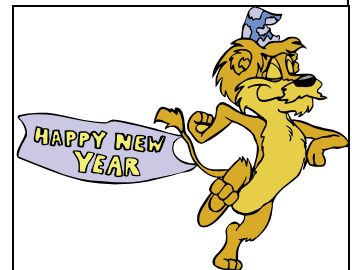
**Jan 29-Jan 31, 0001Z-2359Z**, Fort Monmouth, NJ. Garden State Amateur Radio Association, K2USA. Farewell to Fort Monmouth from the Fort Monmouth

MARS Station (AA2USA). 14.260 7.260 3.860 CW +50 PSK31 +70 W2NJR/R repeater. QSL. Garden State ARA, 8 Donner St, Holmdel, NJ 07733-2004. [www.gardenstateara.org](http://www.gardenstateara.org)

**Jan 30, 1400Z-2100Z**, Punxsutawney, PA. Punxsutawney Area Amateur Radio Club, K3HWJ. Commemorating Groundhog Day 2010. 14.240 7.240 146.715 147.390. Certificate. Mike Miller, N3HBH, 1097 Wishaw Rd, Reynoldsville, PA 15851. [www.qsl.net/k3hwj](http://www.qsl.net/k3hwj)

**Jan 30-Jan 31, 1700Z-1700Z**, Saint Marys, GA. Camden County Amateur Radio Society, KB4CC. Activation of Cumberland Island USI# GA-002S IOTA# NA-058. 14.260 14.040 7.055 7.030. QSL. CCARS - USI#GA-002S, PO Box 2203, Kingsland, GA 31548. [www.ccars.org](http://www.ccars.org)

**Jan 30-Feb 4, 1500Z-0400Z**, Lubbock, TX. Buddy Holly Memorial, W5B. 51<sup>st</sup> anniversary of the death of Buddy Holly. 18.150 14.260 7.260 3.860. QSL. Bryan Edwards, 3801 68th St, Lubbock, TX 79413. [www.amcrc.com/w5b](http://www.amcrc.com/w5b)



Solution to Last Month's Crossword

V	S	W	R		M	O	X	O	N		R	S	I	X
T	H	I	S		I	N	E	P	T		I	C	O	M
V	O	L	T		N	I	N	E	X		C	O	N	T
M	O	D	U	L	A	T	O	R		P	O	W	E	R
			V	O	M		N	A	S	A				
A	D	C		G	I	G		P	R	E	A	M	P	
M	U	L	T	I		Y	A	G	I		A	R	I	A
S	P	E	E	C	H	P	R	O	C	E	S	S	O	R
A	L	A	R		I	S	M	S		C	T	O	N	E
T	E	R	M	A	N		H	R	O		N	E	D	
				P	T	W	O		E	L	E			
K	E	Y	E	R		A	M	P	L	I	F	I	E	R
I	C	E	D		A	D	O	R	E		G	R	A	Y
T	H	A	I		T	E	N	O	N		H	A	R	A
S	O	R	T		E	R	E	C	T		I	N	N	S