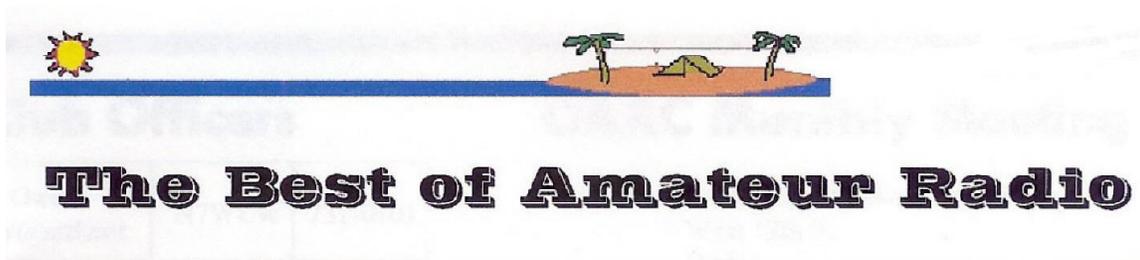




# WATTS NEWS



*Welcome to the OARC e-Magazine*

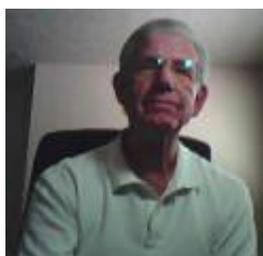
[www.OgdenArc.org](http://www.OgdenArc.org)

**MAY 2013**

Next Club Meeting/Activity

**3<sup>rd</sup> Saturday 18 May 2013**

**Topic: Field Day Past & Future &  
Golden Spike Remembered**



Larry Griffin AD7GL  
President



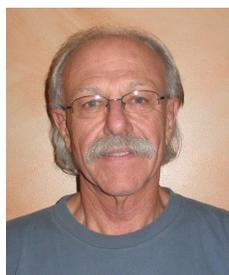
Gil Leonard NG7IL  
Vice President



Gary Hudman KB7FMS  
Secretary



John Shupe K7DJO  
Treasurer



Rich Kennedy KF7VAQ  
Program Director



Dave Woodcock WY7P  
Activity Director



Val Campbell K7HCP  
Webmaster/NL Editor

# PREVIOUS CLUB MEETINGS

3<sup>rd</sup> Saturday 20 April 2013

**Activity:** EmComm Hamfest  
**Time:** 8:00 AM to 3:00 PM  
**Location:** Ogden Weber ATC campus  
**Talk-In:** 146.92 (pl=123)

Ogden-Weber Applied Technology College - Student Union Building  
200 North Washington Boulevard Ogden, UT 84404

**NOTE:** Student Union Building (near UTA bus stop - west side of campus)  
Use North Entrance. Plenty of parking on the north side of campus.

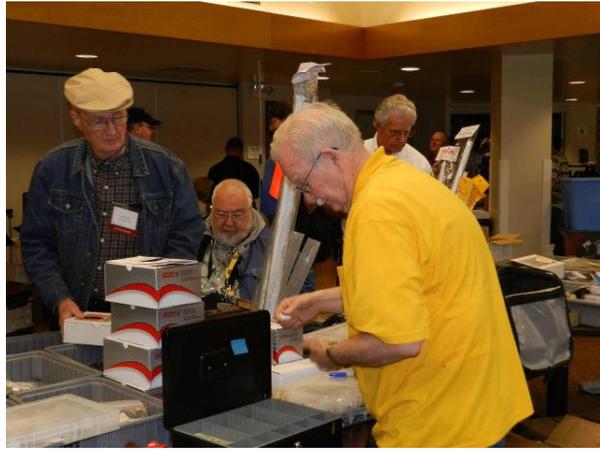
**NOTE:** Subway Boxed Lunch can be purchased/ordered at check-in

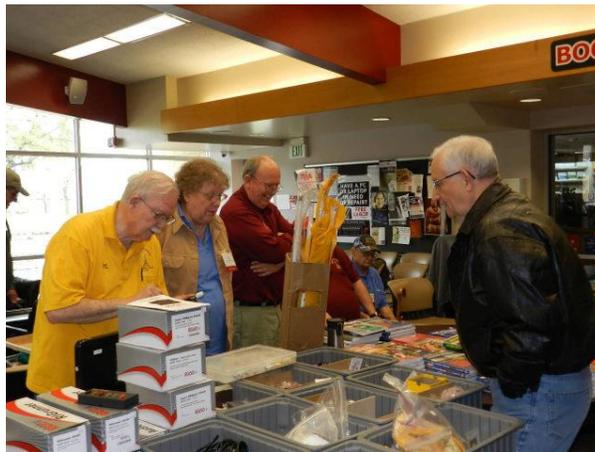
Photos by John Shupe K7DJO











## NEXT CLUB MEETING

3<sup>rd</sup> Saturday 18 May 2013

Activity: Field Day Past & Future  
& Golden Spike Remembered

Time: 9:00 AM

Location: Riverdale Fire Station

Talk-In: 146.92 (pl=123)

---

# Sara's CUSTOM EMBROIDERY

Call Sign Hats & Shirts

---

---

## Sara Morris Machine Embroidery

(Local ham)

- Hats \$8 (includes hat)
- Shirts \$5 (you supply shirt)
- Logo artwork available

801-394-5235 or 801-791-7789

[scse@webpipe.net](mailto:scse@webpipe.net)

# JOIN OARC

## Renew your membership now!

Membership in the Ogden Amateur Radio Club is open to anyone interested in Amateur Radio. You do not need an amateur license to join us. You do not need to join the club to participate with us. Dues are used to operate the club, field day activities, and repeater equipment maintenance.

Joining is easy. Come to a club meeting or fill out an application form from the club website (click "Join" from the left side main menu). Instructions for mailing on the form.

**DUES:** Dues are \$15.00 per person and runs September - August.  
Additional family members are \$8.00 each.

**NOTE: New Hams >>>** Membership in OARC is complimentary for remainder of 1st year licensed.

---

## Club Badges

OARC Club badges are still available for all club members and non-members. The cost is \$8.00 each. You can order the badge with either a "PIN" clip or a "MAGNETIC" clip. Badge includes your Call Sign in large letters and your First Name in a somewhat smaller font in white lettering on a pitch black background. See example below.



Place your order along with \$8.00 in advance for each badge ordered and specify Pin or Magnet style fastener, Call Sign and First Name.

Contact any club officer via email or see them at the next club meeting.  
See web site [www.ogdenarc.org](http://www.ogdenarc.org) "Club Officers" page.

---

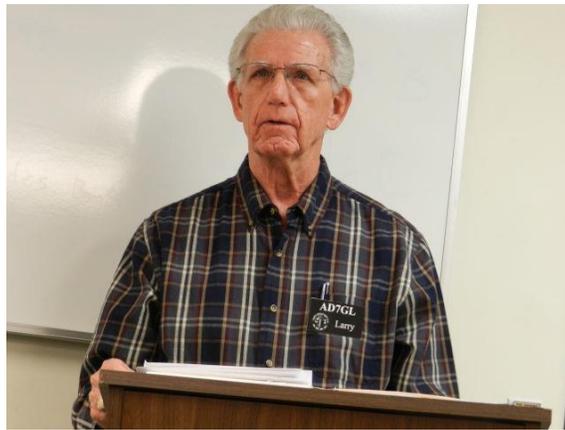
## Club Swapmeet

### "SALE" or "WANTED" ITEMS NEEDED

OARC's **O-bay (On-Line Swap-Meet) items needed** for the web site...

Visit <http://www.ogdenarc.org/> then click on **Obay-Swap**.

## QST's and QRM from LARRY'S SHACK



Larry Griffin AD7GL President

### QST'S and QRM from Larry's shack

Thanks to all who attended and supported our Em Com/OARC Hamfest in April. The folks attending this event were treated to a well planned and fun Amateur Radio event. If you haven't already looked, check the photos of all the fun on the main page of this web site. I would like to extend special thanks to the Club members and the Em Com team members who worked so hard to make the hamfest a special event.

As you read this, our annual Golden Spike Special Event Station, W7G will most likely be under way or will have become club history. The station will be operating on May 9, 10 and 11. If you read this in time, please come out to The Golden Spike National Monument and join the fun. Full information can be found on the main page of the Club web site. We look forward to making all those fun contacts around the world that a special event station attracts. The staff at the Monument are always very friendly and hospitable and are glad we are part of the annual Commemorative Celebration.

Saturday May 18th, our club meeting will consist of: 1. ratification of Club By Laws (which can be viewed via link on the main page of the Club web site) and 2. planning of our annual Field Day event. We will also be treated to photos of past OARC Field Days and photos of some recent Club events. Field Day this year is on June 22nd and 23rd. We will be at Marriott-Slaterville Park again this year. The Park proved to be a wonderful facility for Field Day last year. We all had a great time at the 2012 Field Day and look forward to Field Day again this year. Please make plans to join us again this year.

Amateur Radio Field Day has a wonderful and colorful history over many years. I found two photos that illustrate some of that history:



The first photo is from a 1939 Field Day, (the operation was strictly C.W.). The second Photo is from a 1950's Field Day which utilized both AM Phone and CW operation. My first Field Day was in 1957 with the Ogden Amateur Radio Club. I still have many fond memories of that Field Day. I look forward to seeing you on May 18th. Thanks for spending time with me.

73, Larry

# CLUB NEWS

## OARC Coming Events

- VE Test Session - 1st Wednesday 05 June 2013
  - ARRL Field Day Weekend - 22,23 June 2013
  - "T" Hunt - 3rd Saturday 20 July 2013
  - Steak Fry & Elections - 3rd Saturday 17 August 2013
  - Joint SwapMeet - 3rd Saturday 21 September 2013
  - VE Test Session - 1st Wednesday 02 October 2013
  - Family Dinner - 3rd Saturday 21 December 2013
- 

### NOTICE

**The family of Al Phillips, W7HS (sk) (who has passed away), has a tall telephone pole he used for his antennas, available to any body that would like to get it. The family is going to sell the home, so they will give the pole to any one that will take it.**

**Contact Rulon Passey W7QR 801-612-2000 for more information.**

## MORE CLUB NEWS

Submitted by Scott Willis KD7EKO



### Little Mountain Repeater Site

**Mike Fullmer KZ7O & Ray White K7RFW**

This is the 1<sup>st</sup> of several pictures in a series of Mike Fullmer KZ7O and Ray White K7RFW at the Little Mountain repeater site during their recent visit to the site to do necessary repairs.

Mike and Scott are the OARC repeater engineers that keeps our club repeaters at Mt Ogden and Little Mountain operational.

---

## MORE CLUB NEWS

**VE Test Session Weber County:**

**EmComm Hamfest 2013**

**Congratulations to the following Hams ...**

Mark Barello      General      KF7TZE

Ashly Smith      Tech      KG7DCJ

---

## HOBBY NEWS



### Get Ready for the 2013 ARRL EXPO at the Dayton Hamvention

The Dayton Hamvention® -- the largest gathering of radio amateurs in the US -- is just around the corner, May 17-19. Held annually at the Hara Arena Conference and Exhibition Center in the Dayton suburb of Trotwood, Ohio, Hamvention is sponsored by the Dayton Amateur Radio Association.

This year's "ARRL Dayton Team" includes more than 100 people -- volunteers, officials and Headquarters staff. The centerpiece of the ARRL's participation is ARRL EXPO 2013, a large exhibit area in Hara's Ballarena Hall. First introduced in 2005, ARRL EXPO has become a popular mainstay at the event. "ARRL EXPO is a show-within-a-show, and the area will be filled with membership program representatives and exhibits that cover a variety of Amateur Radio topics and interest areas," explained ARRL Marketing Manager Bob Inderbitzen, NQ1R, who also serves as the ARRL EXPO Coordinator. "The ARRL has put together dozens of exhibits, programs and activities to help represent the very best of our programs, services and information. There will be something for every ham at ARRL EXPO."



This year's ARRL EXPO will include a spotlight on W1AW, the Hiram Percy Maxim Memorial Station. The world's most famous Amateur Radio station turns 75 in September. Dayton attendees will enjoy a special W1AW exhibit, including photographs of the station from over the years.

---

## MORE HOBBY NEWS



### Announces Enforcement Actions for January - March 2013

In the first quarter of 2013 (January-March), the FCC issued 23 enforcement actions. These enforcement actions are in addition to the \$10,000 fine issued to Jared A. Bruegman, ex-KC0IQN, of Bolivar, Missouri, and the \$25,000 fine issued to Terry L. VanVolkenburg, KC5RF, of Cocoa, Florida, as previously reported.



This past quarter, the FCC sent *Warning Letters* to 10 individuals regarding unlicensed transmissions, interference and repeater-related infractions. In addition, the FCC sent *Warning Letters* to four commercial entities or individuals that had conducted commercial operation on the amateur bands. The FCC also sent one letter to a power company, as well as eight letters addressing RFI complaints regarding interference from various electronic devices, including plasma television sets, electric fence chargers and grow light ballasts.

---

### Radiating Well Pump Leads to FCC *Citation* for Interference to Amateur Radio

The FCC has issued a *Citation and Order* to Ruben D. Lopez Jr of Pomona Park, Florida. The *Citation*, issued April 23, was in response to several complaints concerning a well pump at Lopez's residence that was acting as an incidental radiator and causing harmful interference to local radio amateurs. In July 2010 and February 2011, the FCC received complaints from radio amateurs regarding interference on the MF and HF Amateur Radio bands. Upon investigation, the FCC found that a well pump at Lopez's residence was causing the interference, and advised Lopez of the complaints and of the rules regarding interference to licensed radio services. The FCC instructed Lopez to resolve any interference. In October 2012 -- in response to another interference complaint coming from Lopez's residence -- FCC agents used direction finding equipment to identify Mr Lopez's well pump as the source of transmissions on the frequency 1800 kHz.

## FEATURE ARTICLE

By Kent Gardner, WA7AHY

### Cleaning Up a Classic

What a thrill it was to look upon a Hammarlund HQ-180 ham radio receiver after so many years.

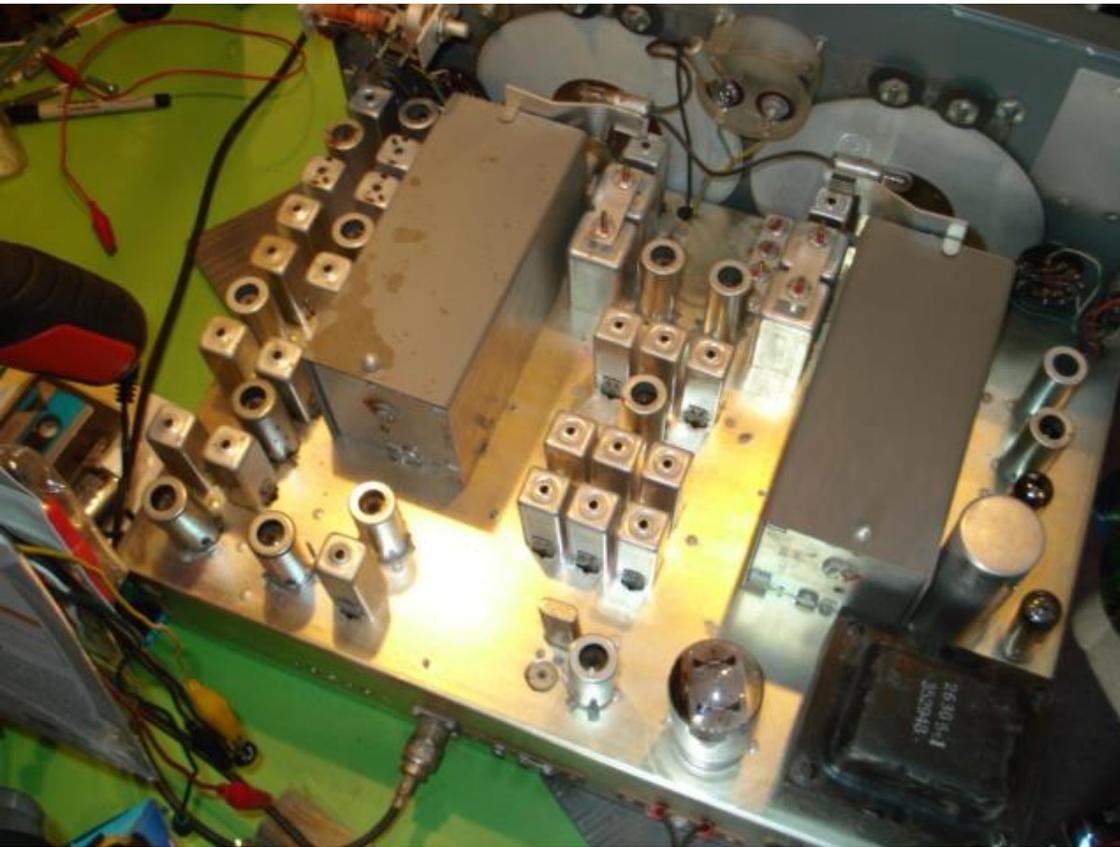


The HQ-180 was the top of the line for Hammarlund back in the 1960s and 1970s and even later. My personal second receiver as a ham operator was an HQ-100 which was a little brother to the 180.

The HQ-180 is a "triple-conversion" receiver, with three intermediate frequency (IF) stages at 3035, 455, and 60 KHz. It had 18 tubes. The G+version included a clock/timer in the upper left corner.

This radio has a complex power supply. In addition to the main supply, it has a second, smaller supply that is always on when the set is plugged in. The purpose of the secondary supply is to keep two critical tubes heated at all times to eliminate "drifting" problems as the set warms up and stabilizes. If you weren't going to use the radio for a long time, you would unplug it to prolong the life of the tubes.

Plus, there was an accessory socket in the back supplying B+ voltage and filament power for plug-in accessories. And, finally, there was a "system socket" in the back with eight connections (including power) for hooking up this set to a transmitter.

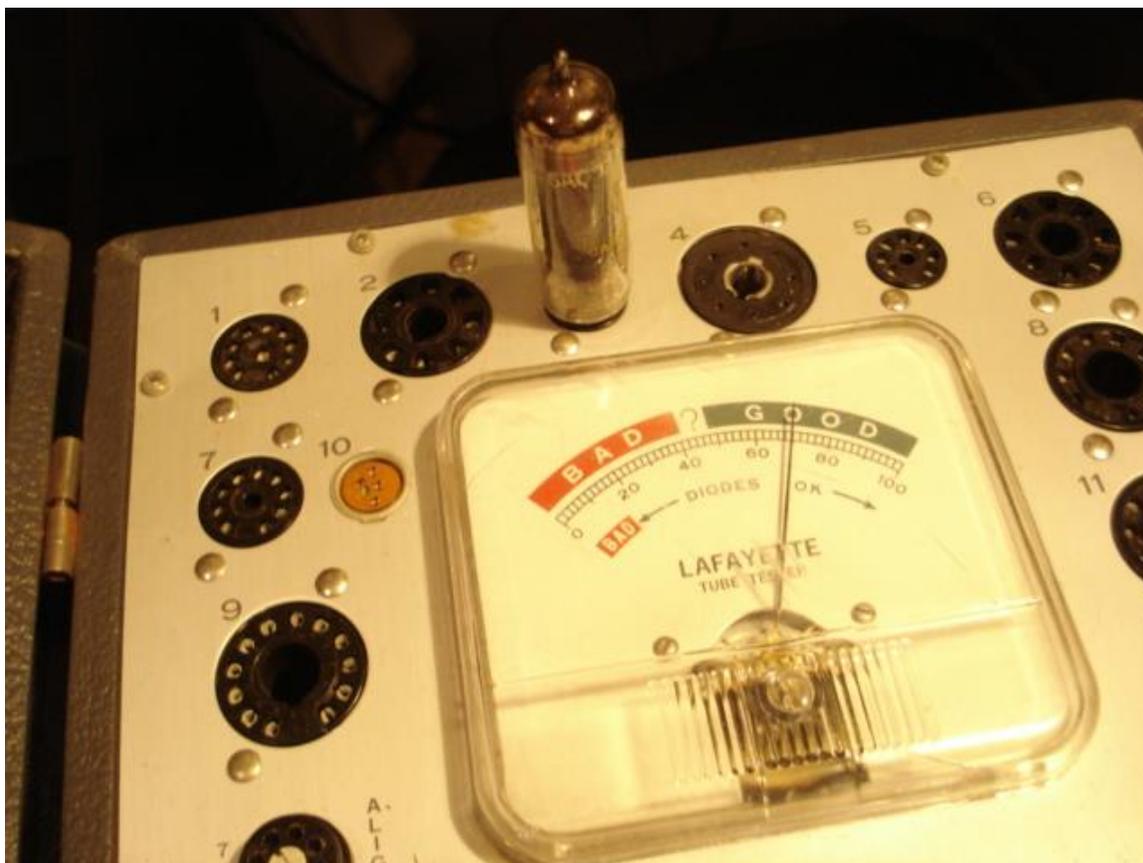


This receiver now belongs to fellow club member Jason Miles, KE7IET. It was donated to the last steak fry auction by another member Bill Daylong, KE7HPQ. Jason paid \$40.00 for this gem.

Initial results were disappointing in that all he could get out of the speaker were some cracks and pops when potentiometers and switches were actuated. Jason and I put the receiver on the workbench and took the cover off and set about looking for clues as to why he wasn't getting any output.

I had a transistorized code practice oscillator (CPO) and used it as a signal injector by touching the CPO speaker output to the tubes that had grids. I tried adding a couple of different value capacitors in series with the test probe as a safety measure, but didn't get any output through several of the tubes that I tried first. I then applied the CPO output directly and was able to show that the injected signal did make it through the tube lineup, without blowing my oscillator. I volunteered my tube tester, but it was slow going and several hours later we still didn't seem to be making any progress. We took a break for a week.

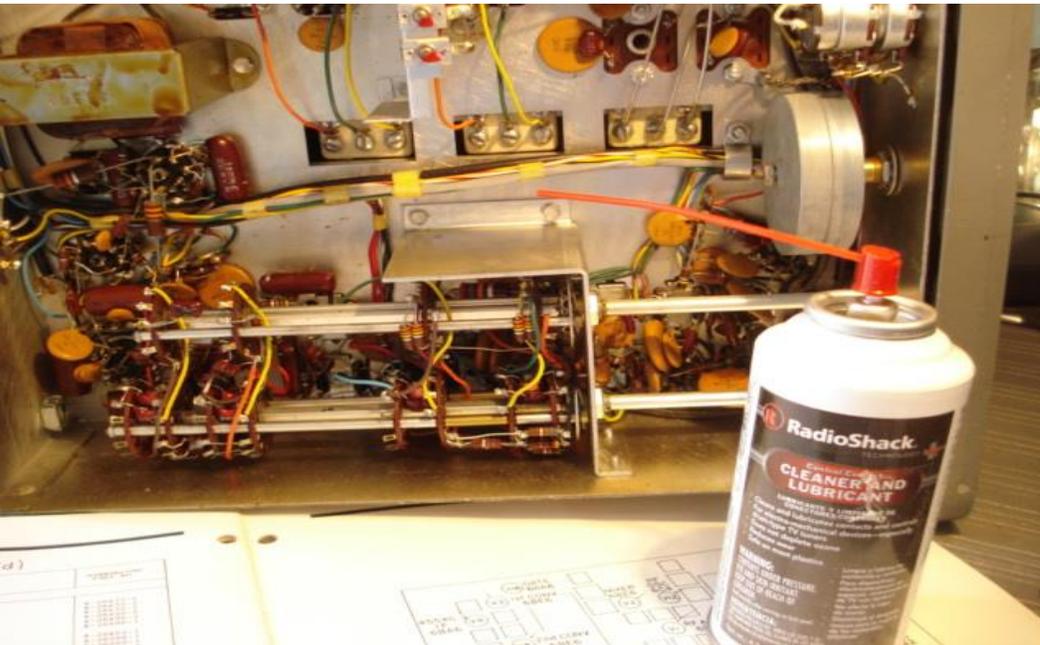
In anticipation of more tube testing, I made a spreadsheet showing all the tubes with room for test results. My Lafayette tube tester seemed to work okay and the 6AQ5 tested okay as shown by the picture below.



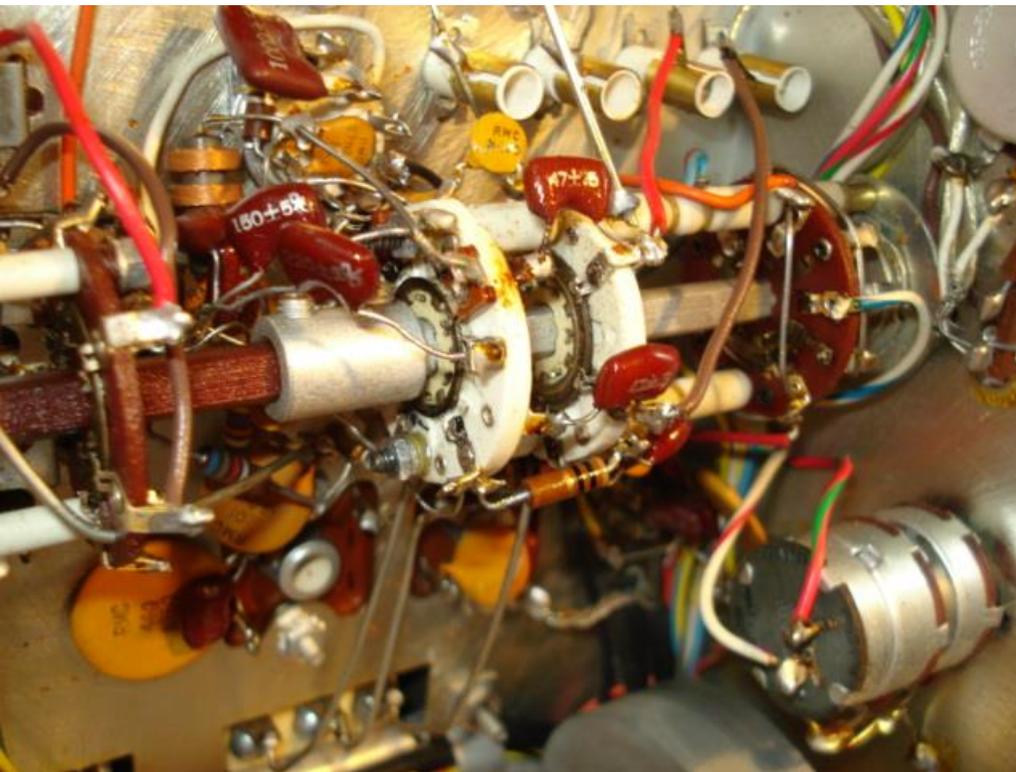
The next week before Jason came over to the shack I got things set up to begin the tube testing again. While I was doing this I had the receiver warming up. Luckily it was a nice day and I didn't have my noisy space heater running and things were very quiet. I heard some rushing noise faintly in the speaker. I excitedly began tweeking any and all controls and little by little was able to coax (not coaxial) some familiar signals out of the unit,

I got on the phone to a long-time member Stan Sjol, W0KP. He confirmed that all the switches and pots needed a good cleaning. He suggested Radio Shack. I immediately drove down to the Newgate Mall store and got a medium can of contact spray cleaner for \$10.00. It seemed expensive, but I couldn't wait to try it.

The can had a plastic tube that was similar to the ones used with WD-40 lubricant. The directions called for the power to not only be turned off, but unplugged as well. The spray cleaner is conductive by nature. When I sprayed it on the numerous wafer switches the liquid immediately turned to a white foam-like texture. For the volume and rf controls, I sprayed the cleaner into open holes in the backside covers. I waited another five minutes for things to dry before restoring power. Wow, what a difference that operation made. The receiver jumped to life immediately! All the controls and switches seemed to work fine. As I found out later, some contacts still needed more cleaning, but symptoms were very minor.



The picture following shows some wafer switches that, even though the entire receiver looked very well kept and clean, the contacts still needed cleaning after about 18-20 years of inactivity.



With everything cleaned, the receiver showed why it was so well liked in its day. We were soon receiving seldom heard aviation weather broadcasts on high frequency and JT-65 signals in the 10-meter band. It was a little hard to keep the frequency readout straight in my head using the main tuning dial (left) and the bandspread (right). It took a little practice, but tuning in WWV time signals on 5 and 10 MHz became a lot easier.



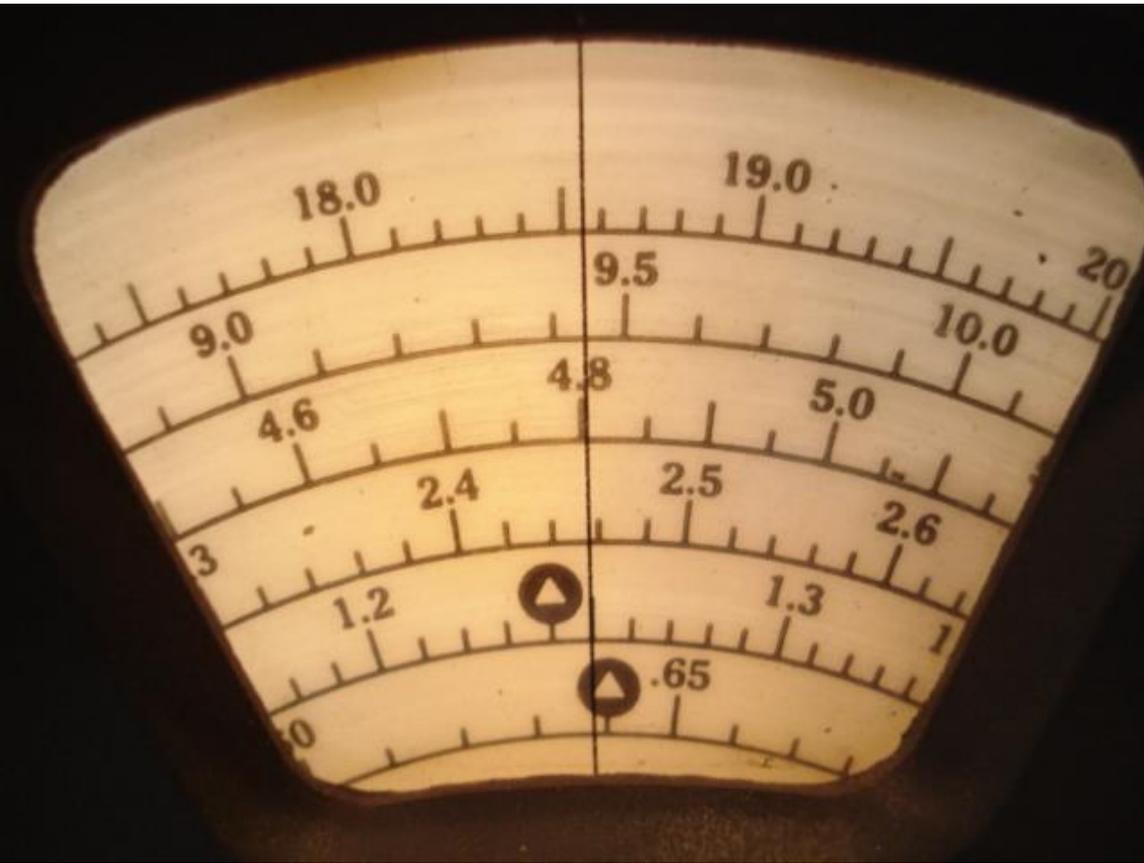
The picture, provided by Jason, above shows the beginning of a nice classic station in his ham shack. The AM-CW transmitter on the left is a Knight T-60. The variable frequency oscillator (VFO) is a V44. As an aside, the transmitter and VFO have a Knight logo on them, but in the manuals they are Knight Kits.

Then there is, of course, the HQ-180 with a Hammarlund speaker. At first, I thought that it was a generic speaker of some kind, but Jason confirmed that it had the Hammarlund symbol on it. The schematic in the manual shows the speaker to be 3.2 ohms which apparently made it better using their scheme of switching between transmit and receive.

Hammarlund expected users to plug in high impedance earphones which were predominant in that era. This resulted in a deliberate mismatch in order to reduce the level supplied to them. The lower the impedance of the phones, the more volume would usually be obtained. Users who were hard-of-hearing would use lower impedance headphones to hear better.

The photograph of the tuning dial window below brought back other memories. Notice the two white triangles in the black circles on the two bottom scales. One was at 1240 Kilocycles and the other at 640. These were CONELRAD markings.

In case of national emergencies all broadcast stations would stop transmitting. The American public would tune to one of these frequencies and listen for emergency instructions.



Cleaning up a classic was a fun and rewarding experience. It was good to be a part of Hammarlund history again and Jason now has a top-of-the-line receiver to build his shack around.

TNX

Kent Gardner, WA7AHY

---

# ANNOUNCEMENTS

## Next Club Meeting:

**3<sup>rd</sup> Saturday of each Month**

- The Ogden Amateur Radio Club meetings are usually held on the **3<sup>rd</sup> Saturday** of each month.

**Meeting/Activity: See notices above**

- **Talk-in: -146.90 (pl 123.0)**

Check OARC web site for details

[www.ogdenarc.org](http://www.ogdenarc.org)

- Please invite a friend to join you. You do not have to be a member of the club to participate in our club meetings or activities. We invite all to join us.
- If anyone is interested in doing a presentation on something or just have something unique to show at the meetings. - Please get a hold of any of the officers and let us know.

## Next Weber Co VE Test Session:

**1st Wednesday 05 June 2013**

- Exam sessions are held in Ogden every few months, *usually* the first Wednesday in February, June, and October.

**Time: 05:00 PM** *Walk-ins allowed*

**Location: New for 2013**

**Weber County Sheriff Office  
Training Room  
712 W 12<sup>th</sup> Street Ogden Utah**

**Contact: VE Liaison:**

**Rick Morrison W7RIK** [morrisonri@msn.com](mailto:morrisonri@msn.com)  
(801-791-9364)

**Jason Miles KE7IET**  
(IT)

**Mary Hazard W7UE** [w7ue@arrl.net](mailto:w7ue@arrl.net)  
(advisor) (801-430-0306)

**Cost: \$ 14.00**

Two forms of **ID**, one of which must be a **picture ID**.

For "Upgrades" bring current **license** and a **copy** of current license, and any **CSCE**'s

Most **calculators** allowed. Calculator memories must be cleared before use.

---

---

## Club Web Site

Be sure to visit our club web site.

- [www.OgdenARC.org](http://www.OgdenARC.org)

Club membership is open to anyone interested in Amateur Radio. You do not need an amateur license to join us. Dues are used to operate the club, field day activities, and repeater equipment maintenance.

You do not need to join the club to participate with us.

## Club Call Sign

Listen to the club repeaters for this very familiar CW ID. You do know Morse Code don't you?

- **W7SU**

ARRL Field Day is held on the last full weekend of June every year.

Location may vary each year so watch this notice for details as time draws near.

See you there.

OARC REPEATERS			
FREQ	CLUB	ZONE	LOCATION
146.820-	OARC	123.0	Mt Ogden
448.600-	OARC	123.0	Mt Ogden
146.900-	OARC "Talk-in"	123.0	Little Mtn (w/auto patch)
448.575-	OARC	100.0	Little Mtn (w/auto patch)

OTHER AREA REPEATERS			
FREQ	CLUB	ZONE	LOCATION
146.620-	UARC	none	Farnsworth Pk
147.120+	UARC	100.0	Farnsworth Pk
449.100-	UARC	146.2	Farnsworth Pk
449.500-	UARC	100.0	Farnsworth Pk
ATV	UARC	Ch-58	Farnsworth Pk
147.040+	DCARC	123.0	Antelope Isl
447.200-	DCARC	127.3	Antelope Isl
449.925-	DCARC	100.0	No Salt Lake
145.290-	GSARC	123.0	Brigham City
145.430-	GSARC	123.0	Brigham City
147.220+	GSARC	123.0	Brigham City
448.300-	GSARC	123.0	Brigham City
146.640-	BARC	none	Logan
146.720-	BARC	103.5	Mt Logan
147.260+	BARC	103.5	Promontory Pt
449.625-	BARC	103.5	Mt Logan
145.250-	WSU	123.0	* coming soon
449.250-	WSU	123.0	* coming soon
145.490-	K7HEN	123.0	Promontory Pt
146.920-	N7TOP	123.0	Promontory Pt
449.775-	N7TOP	123.0	Promontory Pt
448.825-	IRLP/Echo	123.0	Clearfield City
449.950-	IRLP	123.0	Clearfield City
449.425-	IRLP	100.0	Nelson Peak
147.360+	Summit County	100.0	Lewis Peak

**AREA CLUB MEETINGS & WEB SITES**

CLUB	WEB SITE	DATE/TIME	LOCATION
OgdenARC	<a href="http://ogdenarc.org">ogdenarc.org</a>	3 <sup>rd</sup> Saturday 09:00 am	Check OARC web site ...
WC ARES	<a href="http://ogdenarc.org/join.html#ares">ogdenarc.org/join.html#ares</a>	2 <sup>nd</sup> Thursday 06:30 pm	Weber Co. Library Ogden Utah
WC Sheriff Comm-O		1 <sup>st</sup> Saturday 10:00 am	Weber Co. Sheriff Complex West 12 <sup>th</sup> Street Ogden Utah
Barc	<a href="http://barconline.org">barconline.org</a>	2 <sup>nd</sup> Saturday 10:00 am	Cache Co. Sheriffs Complex 200 North 1400 West Logan Ut
CSERG	<a href="http://dcarc.net/ares.htm/">dcarc.net/ares.htm/</a>	Last Wednesday 8:30pm	Clearfield City Hall Clearfield Utah
DCarc	<a href="http://dcarc.net">dcarc.net</a>	2 <sup>nd</sup> Saturday 10:00 am	Davis Co. Sheriff Complex Farmington Utah
NU Ares	<a href="http://home.comcast.net/~noutares/">home.comcast.net/~noutares/</a>	3 <sup>rd</sup> Wednesday 7:00 pm	Cache Co. Sheriff Office Logan Utah
Uarc	<a href="http://xmission.com/~uarc/">xmission.com/~uarc/</a>	1 <sup>st</sup> Thursday 7:30 pm	UofU EMC Bldg Room 101 Salt Lake City Utah
GSarc	<a href="http://Ubetarc.org">Ubetarc.org</a>	Check Website	Check Website
Utah DX Association	<a href="http://udxa.org">udxa.org</a>	3 <sup>rd</sup> Wednesday check web page for details	check web page for details Salt Lake City area
UvhfS	<a href="http://ussc.com/~uvhfs/">ussc.com/~uvhfs/</a>	Each Tuesday 8:00 pm (refer to web site)	Weekly 2 meter net (no eye ball meetings)
WDArc	<a href="http://westdesertarc.org/">westdesertarc.org/</a>	1 <sup>st</sup> Tuesday 7:00 pm	Tooele County Courthouse Tooele Utah
WsuArc	<a href="http://arcweber.edu">arcweber.edu</a>	3 <sup>rd</sup> Thursday 5:30 pm	WSU Blding #4 Room ? Ogden Utah

## LOCAL AREA NETS

DATE	CLUB	FREQ
Daily @ 12:30 PM mt	Utah Beehive net HF	7.272 Mhz <b>HF LSB</b>
Daily @ 07:30 PM mt	Utah Code net HF	3.570 Mhz <b>HF CW</b>
Daily @ 02:00 UTC	Utah Farm net HF	3.937 Mhz <b>HF LSB</b>
Sunday @ 8:45 AM	Ogden Old Timers HF net	7.193 Mhz <b>HF LSB</b>
Sunday @ 7:30 PM	GS ARC	145.430 - 123.0 (training net)
Sunday @ 8:30 PM	SATERN Net	145.900 - 123.0
Sunday @ 9:00 PM	Morgan Co Net	147.060 = simplex
Sunday @ 9:00 PM	UARC Info net	146.620- no PL tone required
Monday @ 9:00 PM	2-meter SSB net	144.250 Mhz <b>2-meter USB</b>
<b>Tuesday @ 8:00 PM</b>	<b>Weber ARES</b>	<b>448.600 - 123.0</b>
Tuesday @ 8:00 PM	VHF Society Swap	147.120 + 100.0
Tuesday @ 9:00 PM	Bridgerland ARC	147.260 + 103.5
Wednesday @ 8:00 PM	GS ARC	145.290-, 145.430-, 448.300- (all 123.0)
Wednesday @ 8:30 PM	CSERG	145.770 simplex
Wednesday @ 9:00 PM	No. Utah 10m HF net	28.313 Mhz <b>HF USB</b>
Wednesday @ 9:00 PM	6-meter SSB net	50.125 Mhz <b>6-meter USB</b>
Thursday @ 6:30 PM	Davis Co Elmers Net	147.040 + 123.0 <b>New Hams</b>
Thursday @ 8:00 PM	Weber State ARC	146.820 - 123.0 (coming soon)
Thursday @ 8:00PM	State RACES VHF/IRLP	145.490 - 123.0, 146.680 - 123.0 3 <sup>rd</sup> Thursday - even months only
Thursday @ 8:30 PM	Davis ARES	147.420 = simplex
Thursday @ 9:00PM	Wasatch Back Net	147.360 + 100.0
Saturday @ 8:00AM mst	RACES State HF	3.920 Mhz <b>HF LSB</b> 3 <sup>rd</sup> Saturday – odd months only
Saturday @ 11:00AM mst	QCWA net HF	7.272 Mhz <b>HF LSB</b>

---

*OARC OFFICERS*

President: Larry Griffin AD7GL

Vice Pres: Gil Leonard NG7IL

Secretary: Gary Hudman WB7FMS

Treasurer: John Shupe K7DJO

Program Director:  
Rich Kennedy KF7VAQ

Activity Director:  
Dave Woodcock WY7P

*"WATTS NEWS" e-Magazine*

NL Editor: Val Campbell K7HCP

*OTHER CLUB APPOINTMENTS*

Webmaster: Val Campbell K7HCP

Historian/Librarian: Kent Gardner WA7AHY

Advisor: Kim Owen KO7U

Advisor: Kent Gardner WA7AHY

Advisor: Stan Sjol WOKP

Photographer: John Shupe K7DJO

QSL Manager: John Shupe K7DJO

Equipment Manager: Val Campbell K7HCP

Repeater Engineer: Mike Fullmer KZ7O

VE Liaison: Richard Morrison W7RIK  
Jason Miles KE7IET (IT)  
Mary Hazard W7UE (advisor)

Club Call Sign Trustee: Larry Griffin AD7GL

---

**73 es cul de W7SU**

[www.OgdenArc.org](http://www.OgdenArc.org)