



RF



ORANGE COUNTY AMATEUR RADIO CLUB, INC.

VOL. LIX NO. 05

P.O. BOX 3454, TUSTIN, CA 92781-3454

May 2018

The Prez Sez.....

by Tim N6GP



About a week ago, I was still riding the post Visalia DX convention wave of euphoria as I was getting back to the normal routine of a normal week. These emotions ended quickly as I received the sad news that Sandi Heyn WA6WZN had passed away. In addition to being a friend to many of us, she was an OCARC member for over 40 years, and served as Secretary for our club. See her obituary on page 3 of this issue of "RF". Sandi was actually my first contact with OCARC way back in the late 1970's, when I lived in the Pasadena area. I was hunting 10-10 certificates at that time, and OCARC was the "El Camino Real" chapter of 10-10, and offered a certificate. I made the required number of QSOs with OCARC members, and sent away for

the certificate, and I mailed off the log to Sandi. A week or so later I received the beautiful certificate with her signature on it. In addition to OCARC meetings, I would see Fried and Sandi at various ARRL conventions locally. She had a genuine sense of kindness about her, and when she asked "how are you doing?" she really wanted to know how your life was going. I will never forget the many Field Days when Fried and Sandi would visit on their tour of the various Southern California Field Day sites. As they snapped candid photos of us, I considered them the "Royal Couple of Amateur Radio in Southern California". We hope to support Fried WA6WZO and pray for him during this difficult time.

Our Field Day is gathering steam for quite a big event. Our second FD meeting date will be at my house on May 23rd at 6PM. My QTH is 18122 Estes Way, North Tustin. Additionally, I am teaching part 1 of the 2 part "Field Day Univ." class at 6PM right before our general meeting.

We wish Nicholas, AF6CF a safe journey to the Dayton Convention and back, and we will be interested to hear his report on it at our June meeting.

Tim Goeppinger N6GP,
President

Next General Meeting

The May 2018 OCARC General Meeting program will be presented by:
Marty Woll, N6VI
His topic will be

"Troubleshooting for the Non-Techie Ham"

The next General Meeting will be on:

Friday, May 18th, 2018
@ 7:00 PM

ENTER from the WEST SIDE entrance of the Red Cross Building, Room 208
Take elevator to the 2nd Floor.
See you there!

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Monthly Events:

General Meeting:

Third Friday of the month
at 7:00 PM held at:
American Red Cross
600 Parkcenter Drive
Santa Ana, CA
(Near Tustin Ave. & 4th St.)

Club Breakfast (Board Mtg):

Normally First Saturday of month at 8am
Marie Callender's Restaurant
1821 North Grand Ave
Santa Ana, CA
(Between 17th & Santa Clara)

Club Nets (Listen for W6ZE):

28.375 ± MHz SSB
Wed- 7:30 PM - 8:30 PM
Bob AF6C, Net Control
Alt: Corey, KE6YHX, Net Control

146.55 MHz Simplex FM
Wed- 8:30 PM - 9:30 PM
Corey, KE6YHX, Net Control

7.086 ± MHz CW **OCWN**
Sun- 9:00 AM – 10 AM
Ann K6OIO, Net Control



Club Dues for 2018:

Regular Members renewals* - - - \$30
Family renewal/Join** - - - - - \$45
New Member Join May-Jun*** - \$30
Replacement Badge**** - - - - - \$ 3

* Member renewals Jan-Dec.

** Two members or more, w/badge.

*** New members Apr-Jun, w/badge.

**** There is a \$1.50 charge if you'd like to have your badge mailed to you.

Sandi Heyn WA6WZN SK

Members of the amateur radio community were saddened to learn of the passing of well known amateur radio operator **Sandra Heyn WA6WZN** of Costa Mesa, California

Sandi Heyn succumbed at home on April 28th following a three year battle with cancer. She was 75.

A member and leader of many amateur radio groups, Sandi is remembered by Nevada hams for her long time participation with the ARRL booth and the Ham Radio Operators reception at the annual National Association of Broadcasters conventions in Las Vegas.



Sandra Heyn WA6WZN (sk) shown with husband Freid Heyn WA6WZO

Sandi was a member of the Orange County Amateur Radio Club, the Palomar Amateur Radio Club, the Quarter Century Wireless Association, the Southern California DX Club, the Young Ladies Radio Club of Los Angeles, she was a past officer of the Young Ladies Radio League, a life member of the American Radio Relay League, a member of the Western Country Cousins, the Bishop Amateur Radio Club, and many other amateur radio groups.

Sandi played a big role in the organization of the 1992 ARRL National Convention in Los Angeles. She was also a member of the ARRL Maxim Society, where by way of her generous financial contributions she has helped to ensure that amateur radio continues for future generations.

Sandra Heyn was the bride of Freid Heyn WA6WZO for the past 57 years. Both Sandi and Freid were active skiing enthusiasts throughout her life, and could often be found on the slopes of Mammoth Lakes and other ski areas.

Freid Heyn is the Vice President Emeritus of the ARRL and past Director of the ARRL Southwest Division. Together Freid and Sandi Heyn continued as ambassadors for the ARRL and for amateur radio as a whole.

In a final act of giving, it was Sandi's wish that her body be donated to science. No service has been planned at this time.

- Source: Nevada Amateur Radio Newswire www.nevadahamradio.com

Radio~Activity Opportunities

Dates and Activities well worth considering...

MAY

- ***CQ World Wide WPX Contest/CW:** 0000 UTC Saturday May 26 through 2359 UTC Sunday May 27

JUNE

- ***ARRL June VHF QSO Party:** 1800 UTC Saturday June 9 through 0259 UTC Monday June 11.
- **Kids Day:** Saturday in June 16, 1800 UTC through 2359 UTC
- **2018 Field Day:** Setup begins 9am Friday June 22nd - Operations from 1800 UTC Saturday June 23rd through 2059 UTC Sunday June 24th.



* Indicates club entries are accepted

** Indicates team entries are accepted

Note: When submitting logs for ARRL Contests indicate your club affiliation as "Orange County ARC"

State QSO Parties:

- **Arkansas:** 1400 UTC May 12 to 0200 UTC May 13
- **Kentucky:** 1400 June 2 to 0200 UTC June 3
- **West Virginia:** 1600 June 16 to 0200 UTC June 17

Continuing Activity:

- **ARRL International Grid Chase**
January 1, 2018 through December 2018

Repeating Activities:

- **Phone Fry** Every Tuesday night at 0230Z to 0300Z
- **SKCC** Weekend Sprintathon (Straight Key CW) on the first weekend of the month after the 6TH of the month. 1200 Sat. to 2359Z Sunday.
- **SKCC** Sprint (Straight Key CW) 0000Z to 0200Z on the 4th Tuesday night (USA) of the month.

To have your favorite activity included
in next months *Radio~Activity* column
send an email to Ron W6WG, w6wg@w6ze.org



UP COMING EVENTS

May 18th, 2018

Marty Woll, N6VI

“Troubleshooting for the Non-Techie Ham”

Marty, N6VI, is a prolific radio operator and is always willing to give presentations on many subjects at many events. In this talk he presents that with the ability to solve a radio problem on the fly is what distinguishes Hams from almost all other radio users and is an invaluable skill whether you're into Emcomm or DXpeditions. This talk gives non-engineers a practical, systematic approach.

June 15th, 2018

Chip Margelli, K7JA

“Getting Ready for Field Day” (aka: Field Day Pep Talk from the Guru)

This is the week before Field Day so a chance to build the excitement and get some last-minute tips. Rumor has it that Chip will be bringing film from his Field Day 1973 at W7FR.



July 20th, 2018

Panel

“ARES and RACES – A Discussion”

In the planning stage for Carl Gardenas (WU6D – Section Manager, ARES) and Ken Bourne (W6HK – OC RACES Chief) to support a half hour presentation from each on their organizations. Would include purpose, membership, when activated, etc. This will be followed up with a panel of the presenters available for some questions.

August 17th, 2018

“Not Your Grandpa's Ham Radio”

We've all participated in demonstrating ham radio to non-hams in events like Field Day or perhaps emergency communications drills. In every case, demonstration stations feature station equipment and antenna setups and operators in front of the radios. Often, the rigs and operators face away from the passers-by, and all they see are people's backs and wires and the rear panels of radios.

For the most current Upcoming event information go to the OCARC EVENTS website:

<http://www.w6ze.org/Events.htm>

Report from the 69th Annual International DX Convention in Visalia

by Tim Goeppinger, N6GP

The International DX Convention in Visalia is the biggest DX convention west of the Rockies. Why Visalia? Because it is the mid-point between the Bay Area and the Los Angeles metropolitan area. It is mainly attended by California hams, but also has attendees from all over the West Coast and all across the country. Additionally, DX countries represented were Germany, Spain, England, Japan, Hawaii, Alaska, Norway, Sweden, Denmark, Finland, New Zealand, Canada, Mexico, and the new one – Republic of Kosovo. 7 OCARC members were in attendance.

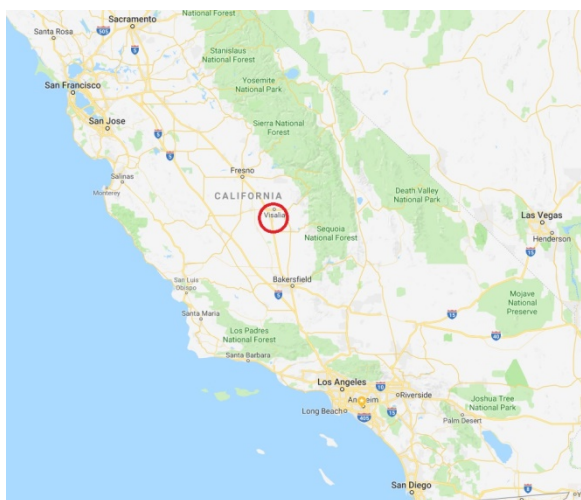


Figure 1 Visalia – the great compromise between north and south

I had decided to stay home for the OCARC meeting that Friday night., and my wife and I got up early Saturday morning, and left for Visalia just after 6AM. Along the Grapevine we saw a beautiful display of California Poppies.

We arrived about 10:30AM, and got our registration packets. I caught the end of the DXCC Forum and then stayed for the Contest Forum.

The BBQ Chicken Lunch was very good. The weather outside was warm, about 89 which is better than the 100 degrees it often is up there.



Figure 2 Convention Logo for 2018

Some of my friends arrived late to the lunch, because they had attended Bob Heil's organ concert across the street at the 100 year old Fox Theatre. He is an amazing, accomplished organist, and I am sorry I missed it. It was actually intended to be part of the Women's Tour. Those that saw it said it was the highlight of the convention! See this Youtube video of his amazing performance: <https://www.youtube.com/watch?v=5l885rU>

WI5A



After lunch was the ARRL Forum, which was lead by our Director, Dick Norton N6AA. He has been censured by his supposedly anti League remarks at this forum last year by the ARRL Board of Directors.

This is disputed by those that heard his talk last year. There were 100 "I support Dick Norton" buttons that were handed out, and you saw them everywhere. This year he did not say anything outlandish or news-making. He supports the ARRL proposal to allow Pactor-4 on the HF bands, because it is the same bandwidth of the other Pactors, and it is already used around the world with no problems. Opponents say Pactor-4 should not be allowed, because the protocol

is proprietary, and the company charges a lot of money for their modems.

I saw the legendary DXpeditioner Don Miller, W9WNV at his talk. He was a pioneer in DXpeditioning in the 1960s, and went all over the world. He was the first to use 5NN instead of 599 for the exchange for DXpedition QSOs. He had activated 40 DXCC countries, 15 of them all time new ones. With just a small sailboat, and 1 other ham along, he spent only about \$70 a day. He contrasted this to today's expeditions that are in the high 6 figure range. I also saw Ward Silver's talk about Grounding and Bonding, which was excellent. Maybe we can get this talk on Skype?

I saw Chip and Janet at the HRO booth, and they were doing a lot of business. Elecraft was showing off their new KPA1500 1500 watt amplifier. Yaesu, Icom, and Flex also were exhibitors. The special event station K6V was on the air with the new Icom 7610, Expert linear amp, and a SteppIR beam on a US Towers tower trailer.



Figure 3 OCARC First Lady Edna, Tim N6GP, and Peter NI6E

Late in the afternoon was the Happy Hour outside in the courtyard. The reason why this DX Convention exists is to be able to see your friends in person. I ran into fellow OCARC member Peter NI6E there, and talked a bit. It was a thrill to meet renowned ham, Martti Laine OH2BH, who has done many DXpeditions, and worked years to get Kosovo on the air.



Figure 4 L to R Wayne Mills N7NG, "Mr. MFJ" Martin F Jue, Chip K7JA & Janet KL7MF

Next was the banquet, which was emceed by Chip K7JA. He was very dapper in his tux and black sequined Chuck Taylor Converse All-star shoes, and had his usual wit and humor. Chip did a FUNK-y routine for Sandy DL1QQ and the World RadioSport Team Championship (WRTC) that will be held in Germany this July.



Figure 5 SCDXC President Mel K6SY giving award to Arnie, N6HC

Many awards were presented by the northern and southern California DX clubs. DXer of the year was Bill N6MXU of Anaheim Hills. Our friend Arnie N6HC was given a special "Meritorious Service Award" for the 9 DXpeditions he has been on, and for the medical expertise he has brought along on each trip. It is fresh in everyone's mind that he was 21 days at sea on the very dangerous Bouvet expedition this year. Arnie and the other Bouvet DXpeditioners were given a round of applause for their bravery.

The program for the evening was on the new DXCC Country of the Republic of Kosovo. Keynote speakers Vjolica Caka Z61VB, Martti Laine OH2BH and Jim Fenstermaker K9JF took us through the arduous 10 year journey from Kosovo's Independence in 2008 to achieving DXCC status this year. There had been around 100 hams there that were without a country in our ham radio world. A touching moment was when we rose to hear the Kosovo national anthem being played. Vjolca had tears of joy. The dinner concluded with the raffle drawing for some great prizes. No I did not win anything.



Figure 6 Keynote speakers Vjolica Caka Z61VB and Martti Laine OH2BH

The convention concluded with a great breakfast buffet on Sunday morning. The program was on the VK9MA Mellish Reef DXpedition by N7QT. Really beautiful photography of that tiny island. A myriad of raffle prizes were given away, but I came up empty.

OCARC members attending were: Bob AA6PW and Gloria KE6GLC, Arnie N6HC, Chip K7JA and Janet KL7MF, Peter NI6E, and Tim N6GP. Other local friends included Cass W6SQC and Wayne W6IRD and Sharon K6IRD.

My thanks go to the Southern California DX Club and their convention Chairs Cathy Gardenas K6VC and Kris Jacob KC6TOD for their hard work in putting on this wonderful convention.

Photos above are courtesy Bob Wilson N6TV. Used by permission.

Epilogue – the Long Way Home on the 101



Figure 7 Main gate of the Surf Ranch

After the convention we headed to Lemoore to see what we could of the Kelly Slater's Surf Ranch, which is a huge pool with a wave maker for surfing. Unfortunately, there is a big wood fence around the place with security guards, so there is nothing to see. They just had their first world class surfing competition there last weekend. See Kelly Slater himself ride a wave there: <https://youtu.be/k0F9zR2Z8q8?t=44>

We then went to Hanford to Superior Dairy for Ice Cream, and their portions are huge!



Figure 8 Gaviota Beach CM94 looking south to Channel Islands

Continued down the Hwy 101 and stopped by Gaviota State Beach to scout out a VHF roving site. Nice spot on the hill 100 feet above the water will put the grid square CM94 on the air with coverage from LA all the way down to San Diego.



Save the Date – Sept. 21, 2018

Early in 1933 the Moore brothers, Earl W6IGO and Harry W6FUU, opened a radio store in Santa Ana and supported the formation of a radio club that came to be named the Orange County Amateur Radio Club. Shortly thereafter, on March 15, 1934, that club, OCARC, was granted affiliation with the American Radio Relay League.

Today, in 2018, we're celebrating our 85th year of service to the ham community and plan to gather at the September General Meeting for an 85th Anniversary Celebration including all current and former OCARC members.

Please keep the date of Friday, September 21, 2018 open and plan to meet with your old friends at our 85th Anniversary Reunion Meeting.

Meeting time – 7 pm

Meeting location – Santa Ana Red Cross Office Building, Room 208

600 Park Center Drive

Santa Ana, CA 92705

Directions including a map are available at www.w6ze.org/meetings.

Next Planning Meeting 6:00 pm Wednesday May 23, 2018

Field Day 2018 (Updated May 9, 2018)

Band Captains

10m/40m SSB **CHIP K7JA** 10m/40m CW **KENAN KR6J** 15m/80m SSB & CW **TIM N6GP**
 20m SSB **RON W6WG** 20m CW **JIM AF6N** VHF **ROBBIE KB6CJZ** Satellite **GREG W6ATB**
 Digital **GREG W6ATB** GOTA **TIM N6TMT**

Coordinators

Power **Bob AF6C** Computers **TIM N6GP, VIJAY KM6IZO** Site **TIM N6GP**
 Food **TIM N6TMT** Transportation **STEVE KK6REB**

Bonus Points

Media Publicity TIM N6TMT	Public Information TIM N6TMT
Message to Section Manager TIM N6GP	Message Handling TIM N6GP
Satellite QSO GREG W6ATB	Alternate Power NICHOLAS AF6CF
W1AW Bulletin CHIP K7JA	Educational Activity Clem W0MEC
Site Visit by Government Official TIM N6GP	Site Visit by Agency N/A
Web Submission TIM N6GP	Youth Participation Jesse KB6MQY
Social Media Kristin K6PEQ	Safety Officer N/A

Operators

SSB Bob AF6C, Chip K7JA **10/40m**, Dan KI6X **10/40m**, Don K0VNI VHF, Doug K6PGH **20m**, Joel KM6EMP, Ken W6HHC, Ken WB9YCJ **20m nighttime**, Tim N6GP **15/80m**, Tim N6TMT **GOTA**, Robbie KB6CKZ VHF, Rodger AI6WV, Ron W6WG **20m**, Steve KK6REB, Steve N1BKB **20m**, Tim N6GP **15/80m**, Terry NS6D

CW Bill W1HIJ **15/20/40m**, Bob AA6PW **20/40/80m**, Chip K7JA, Jim AF6N **20m**, John KF6I, Kenan KR6J **10/40m**, Paul W6GMU **20m**, Tim N6GP **15/80m**, John KQ6ES

Digital Greg W6ATB, Corey KE6YHX, Steve KK6REB, Vijay KM6IZO

Support

Gene KJ6OML, Bryan K6AJY, Jesse KB6MQV, Clem W0MEC,



Field Day University Class #1 is 6PM May 18th

Our first Field Day University Class meets one hour before our general meeting at the Red Cross. This course is targeted at the beginning level operator, who will be using the microphone (phone) on Field Day.

We hope to train some new operators for either the GOTA station or the other Phone stations. This class was a secret weapon that helped propel us high ranking scores in previous years. Topics for this class include:

Introduction to Field Day – What is it?

How to call “CQ Field Day”

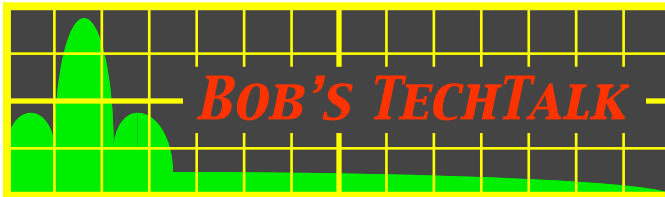
Search and Pounce- Knowing if and when to use it.

Use of Phonetics on the air

US and Canadian Callsigns – How to enter them correctly

This is the first class of a 2 part series taught by Tim Goeppinger N6GP. The class in June will be hands-on training of the N3FJP software. As the mattress salesman says “It’s FREEEE”





Number 51: The OSCILLOSCOPE CRT:

(TechTalk #125)

by: Bob Eckweiler - AF6C

INTRODUCTION:

This month the plan was to publish a Heathkit article on the first four Heathkit Oscilloscopes that were sold between July 1947 and August 1949, the O-1 through the O-4. The task was larger than anticipated and the article won't appear until next month (hopefully). However, part of the article diverged into the function of the CRT tube. Separating that information and putting it into a separate article seemed like a good idea, and so here it is.

The CRT used in the O-1 through O-4 o'scopes is the 5BP1 (See **figure 1**). The 5 refers to the screen diameter (5 inches); the B is the CRT model sequence; and P1 is the type of phosphor used on the screen. The 5BP1 is a World War II surplus tube, and Heath Company obtained a railcar full of them (according to folklore) which started Heath in the oscilloscope kit business.

The 5BP1 is a **mono-accelerator** CRT. Once the electron beam leaves the electron gun (to be discussed) it travels to the screen with no additional forces working along the CRT axis. Only deflection forces act upon the beam between the electron gun and the screen.

Later CRTs, used by Tektronix, HP and others, have become a lot more sophisticated in design and performance since the forties design, still the basic concepts remain. So here is a look at the 5BP1 and how it works.

Electron Accelerators and Lens:

If you've ever taken a Physics 101 class in college you probably learned that an electron inside a charged sphere has a net force of zero

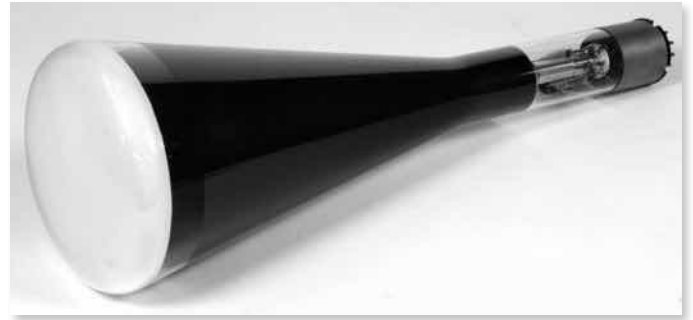


Figure 1: Sylvania 5BP1 Cathode Ray Tube

acting on it. All the attraction forces trying to pull it towards or away from the wall cancel, and the electron, if at rest, stays at rest, and if moving continues to move in the direction it was going unaltered by the internal field. The same can be said of a long cylinder except near the open ends where end effects prevail. Thus many CRT elements are cylindrical.

Figure 2 shows the electric field between two discs. Each disc has a hole in its center to allow an electron beam to pass (blue). If the discs are at different voltages, an electric field is created between the two discs. The dashed lines in figure 2 represent **equipotential lines** of force. Near the center of the disc the field is perpendicular to the axis of the discs and only influence the beam in the direction of the axis. Since the field is increasing in the direction of electron travel the electrons will be accelerated and the electrons coming out the right side will be traveling faster than the electrons entering at the left.

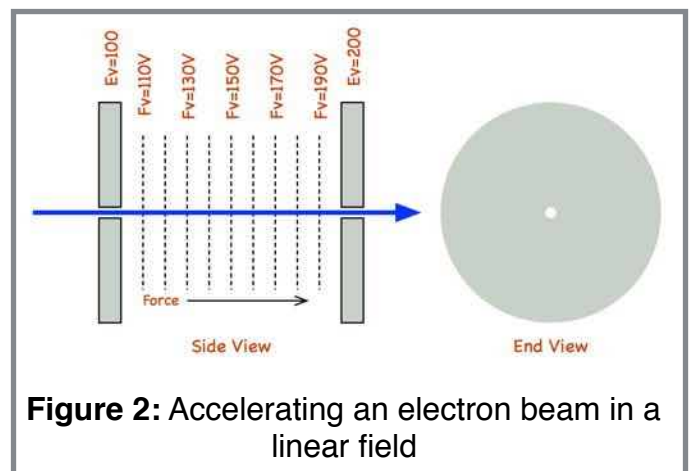
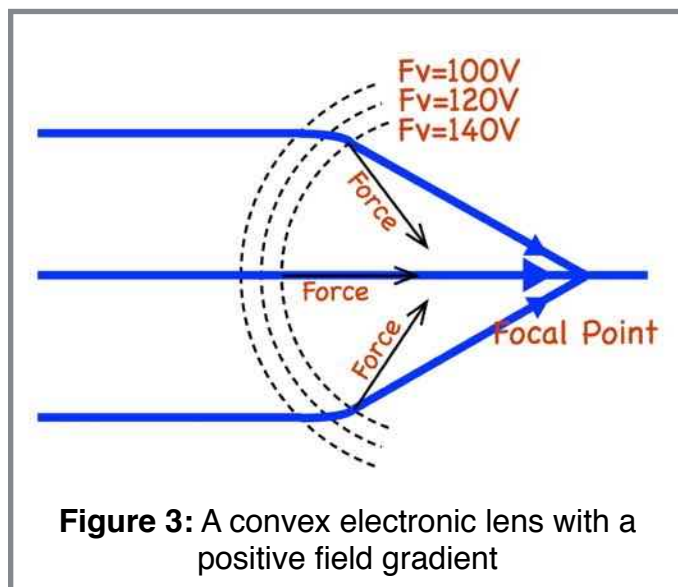


Figure 2: Accelerating an electron beam in a linear field



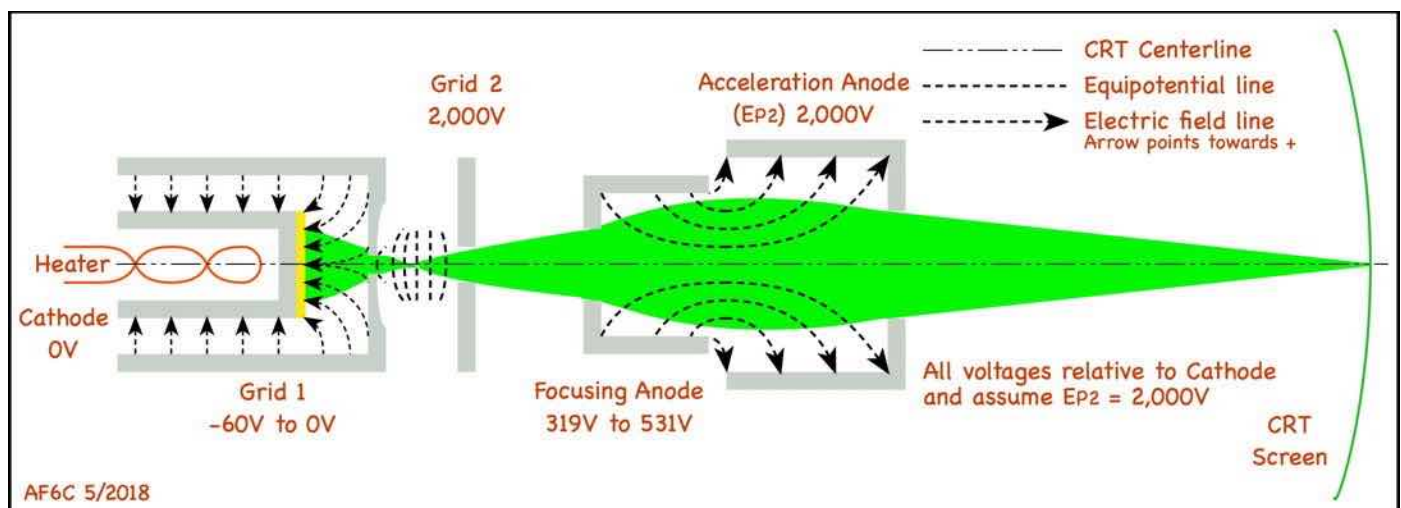
Electrons may be focused by using curved electric fields. These curved fields occur in apertures and bend the electron beam. The equipotential lines may be convex or concave and the voltage gradient may be increasing or decreasing in the direction of electron flow. **Figure 3** shows a convex electron lens with positive gradient that forces parallel or diverging electrons back towards the axis and to a focal point. Should the electron lens be concave and the gradient positive then the electrons not on the axis would be forced to diverge from the axis. By reversing the field gradient, the action of a convex or concave electron lens can be reversed.

The Electron Gun:

The electron gun emits a focused stream of electrons that, when properly adjusted, has a focal point at the phosphorescent screen. The electron gun in the 5BP1 is composed of a heater, cathode, control grid, acceleration grid, focus anode and acceleration anode. On data sheets these elements are sometimes referenced with a number, such as "grid 1" or "anode 2". **Figure 4** depicts the 5BP1 electron gun.

The **heater** is a spiral wound wire coil that fits into a cylinder that is closed at the far end. An oxide coating is on the outside of the end cap. This closed-end tube is the **cathode**. When heated, the oxide coating emits electrons which form a cloud around the cathode. The cathode and heater are closely spaced and since the cathode is commonly at a high negative potential, it is electrically tied to one side of the heater to prevent arcing. This mandates that the heater be supplied by a well insulated separate filament winding on the power transformer.

Surrounding the cathode is the **control grid** (grid 1). The control grid is nothing like the wire mesh grid of a typical vacuum tube; instead it is a cylinder, open at one end but closed at the other except for a small aperture at the center of the closed end. This grid surrounds the cathode and controls the number of electrons passing through the aperture. The grid should



never be positive with respect to the cathode and most intensity controls are wired to prevent this. If the grid becomes negative enough, none of the electrons in the cloud surrounding the hot cathode can pass through. This is the grid cutoff voltage; the screen is dark. As the grid becomes less negative electrons begin to escape through the aperture and are attracted to the accelerating grid. When the electrons first leave the grid aperture they are traveling very slowly. The equipotential lines near the aperture are convex and the slowly moving electrons are deflected towards the center axis. They reach a crossover point near the center of the gap between grid 1 and the acceleration grid (grid 2).

The **acceleration grid** (grid 2) is a disc with an aperture in its center. In most of the space between two grids the equipotential lines are straight and acceleration occurs in the direction of the axis. As they approach grid 2 the lines become convex and the beam begins to diverge. However by now they are moving fast and the amount of divergence is limited. The potential of the accelerating grid is the same as the accelerating anode; in the 5BP1 they are connected together internally.

In the space between the grid 2 and the **focusing anode** the beam passes through another linear equipotential field that slows the electrons down, since the focus anode is at a lower potential than grid 2. The voltage on the focusing anode is adjustable between about 17% and 28% of the accelerating anode volt-

age by the focus control. The focus anode is cup shaped with a large aperture at its entrance. The larger cup shaped **acceleration anode** immediately follows the focusing anode and the electric field between them bends the diverging electron beam to a focal point. The strength of this field determines where the focal point occurs and the focus control thus adjusts the dot size on the screen.

Since focus is also determined to some extent by the intensity control, the focus control is on the front panel so focus can readily be adjusted as needed. It is not a set and forget control.

The Cathode Ray Tube Screen:

The screen of the CRT contains a phosphorescent coating that emits light when excited by bombarding electrons. Different phosphors have been developed for different display purposes. Two important aspects of a phosphor are its color and its persistence. Persistence is how long the spot remains on the screen after electron bombardment has stopped at the location. Short persistence is usually used for photo oscillographs, medium persistence for television and oscilloscopes, and long persistence for radar. Table I lists the phosphors used in Heathkit products. Of special interest is the P7 phosphor used in the HO-13 and SB-620 spectrum analyzers. It has two colors and two persistences, a short-medium purple-blue fluorescence and a long yellow-green phosphorescence. By using a color filter after the screen either color can be selected.

Trace Deflection:

Without a way to move the spot around the screen, the CRT would be useless. Deflection may be introduced by two means, **electromagnetic** and **electrostatic**. Electromagnetic, commonly used with TV picture tubes, is accomplished by an external pair of coils called a yoke. Electrostatic deflection occurs internally by two sets of parallel deflection plates mounted 90° from each other. One set of plates is located closer to the screen than the other. This is usually the vertical deflection plates. Af-

COMMON* CRT PHOSPHORS

Type:	Persistence	Color	Use
P1	medium	green	gen'l o'scopes
P2	medium	blu/grn	o'scopes, radar
P4	33 ms for TV	white	BW TV display
P7	short to med.	blue	radar and spec-
	and long	yellow	trum analyzers
P11	short to med.	blue	o'scopes & photo
			oscillographs

* As used in the field of amateur radio

Table I

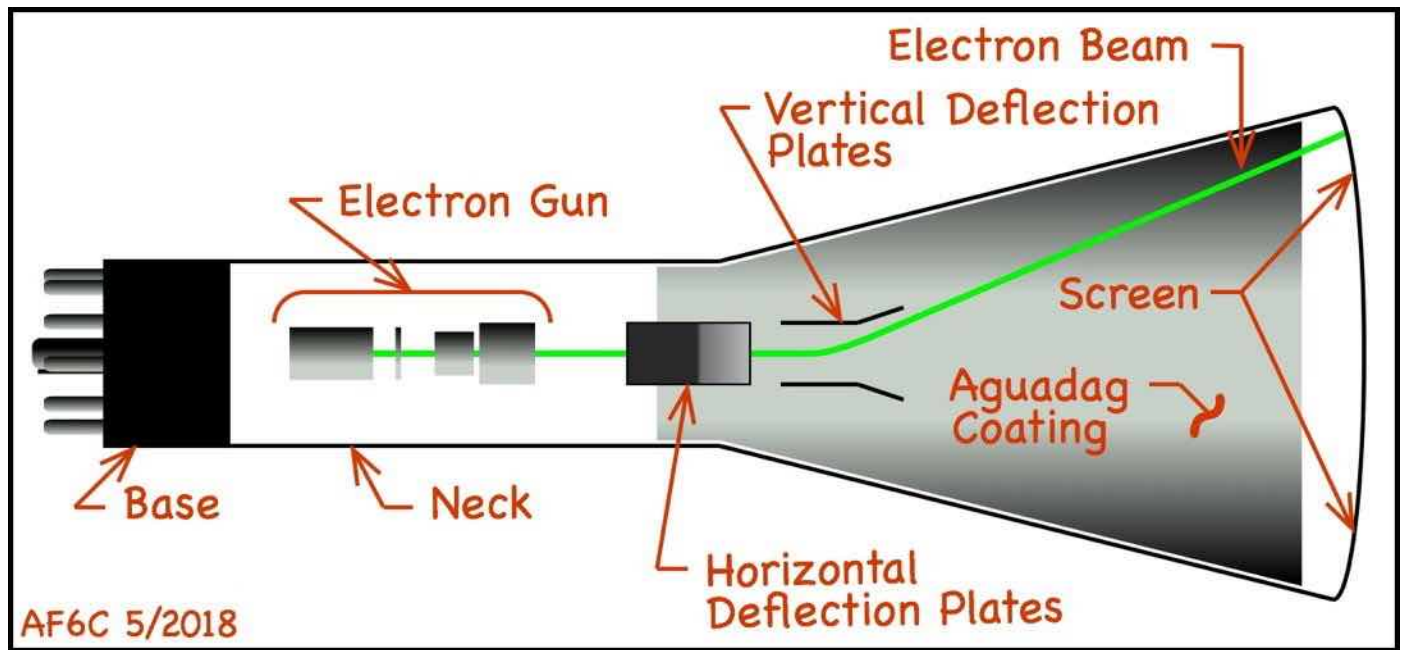


Figure 5: Inside View of the 5BP1 CRT

ter leaving the electron gun, the beam of electrons passes between these two sets of deflecting plates causing the beam to deflect away from the center of the screen. (**Figure 5**) The voltage on the deflecting plates consists of the sum of the desired signal or sweep voltage and a DC bias voltage that is set by the appropriate (vertical or horizontal) position control. The deflection voltage required to move the trace a given distance is specified in the data sheet as volts-per-inch of deflection per-kilovolt of accelerating potential. Since the distance from the vertical plates to the screen is less than the horizontal plates, its deflection voltage is typically higher. For the 5BP1 the vertical deflection voltage is specified at 35 to 49 volts per inch per KW, and the horizontal deflection voltage is specified at 31.5 to 44.5 volts per inch per KW (of the anode 2 voltage). The deflection plates usually have a single flare bend in them to widen the gap at the exit end and allow wider deflection with the plates closer together.

Aquadag Coating:

The inside of the CRT bulb, from near the end of the neck to just short of the screen, is painted with aquadag, a conducting colloidal graphite coating. When electrons collide with the screen they often knock electrons off the

screen, resulting in secondary emission similar to what happens in a tetrode vacuum tube. These electrons, if they are allowed to accumulate, can form a negatively charged cloud between the beam and the screen that inflicts forces on the beam causing distortion. The coating is at the anode 2 voltage and attracts these slow moving electrons, capturing them.

Post Deflection Acceleration (PDA):

The 5BP1 is a mono accelerator CRT. Heath used mono CRTs in most of their early scopes. The exception is the Heathkit O-8 o'scope that uses the 5CP1 CRT. This CRT has an additional accelerator element after the deflection plates. The advantage is that the electrons pass the plates at a lower velocity and thus deflection may be done with a lower voltage. The electrons are then accelerated further towards the screen. The 5CP1 maximum PDA (anode 3) voltage is 4 KV. TV picture tubes use a PDA voltage of 15 to 30+ KV.

PDA CRTs generally are brighter than mono accelerator CRTs, however that is only an advantage at high frequencies; much higher than the fastest 'O' series Heathkit scope can achieve. At lower frequencies mono acceleration CRTs are quite bright.

Astigmatism:

The dot on the face of a CRT can be in focus in one axis and somewhat out of focus in the other. Astigmatism may be corrected by adjusting the voltage on the anode 2. This changes the electron lens that forms between that anode and the first set of deflection plates, slightly varying the focus in one axis and not the other. In the Heathkit O-1 through O-5 no astigmatism control is incorporated. In the O-6 a fixed resistor is used to provide a fixed correction, and in the O-7 through O-12 an astigmatism control (called Spot Shape) is incorporated as an internal adjustment.

CRT Voltages:

Figure 4 shows the voltages with respect to the CRT Cathode. However, CRT voltages are high and electrode spacing is close, thus certain maximum voltages are specified between various electrodes. One is the peak voltage between the anode 2 (acceleration anode) and any deflection electrode. For the 5BP1 that voltage is 500 volts maximum. Since the 5BP1 can operate with 2KV on anode 2 this makes the DC potential required on the plates excessive.

The solution is simple. Start with the grid 1 at a high negative voltage and with the anode 2 at ground potential or a few hundred volts positive. The cathode and focus anode voltages may then be tapped off a resistor chain between the negative high voltage supply and ground. **Figure 6** shows a typical resistor chain and includes an optional astigmatism control.

Summary:

As LED and OLED screens continue to take over the display market, CRTs are quickly becoming an item of historic curiosity. Still, the idea of “seeing” what is happening in an electronic circuit makes the oscilloscope a most valuable test instrument. A good DC coupled o’scope can measure voltage, frequency and detect glitches that would never be visible with even the most modern digital voltmeter. Today’s o’scopes use digital display screens and get rid of the need for a fragile and expensive

CRT, and also the high voltage power supply needed to accelerate the electrons in the CRT.

If you want to learn more about Cathode Ray Tube technology a good source is “**Cathode Ray Tubes**”, by Chuck DeVere. The book is part of the *Tektronix Circuit Concepts* library (second edition, fourth printing 1969).

The WWII Surplus CRT:

It was the stockpile of CRTs that was available surplus after WWII that started a whole new industry in electronics. Just how inexpensive

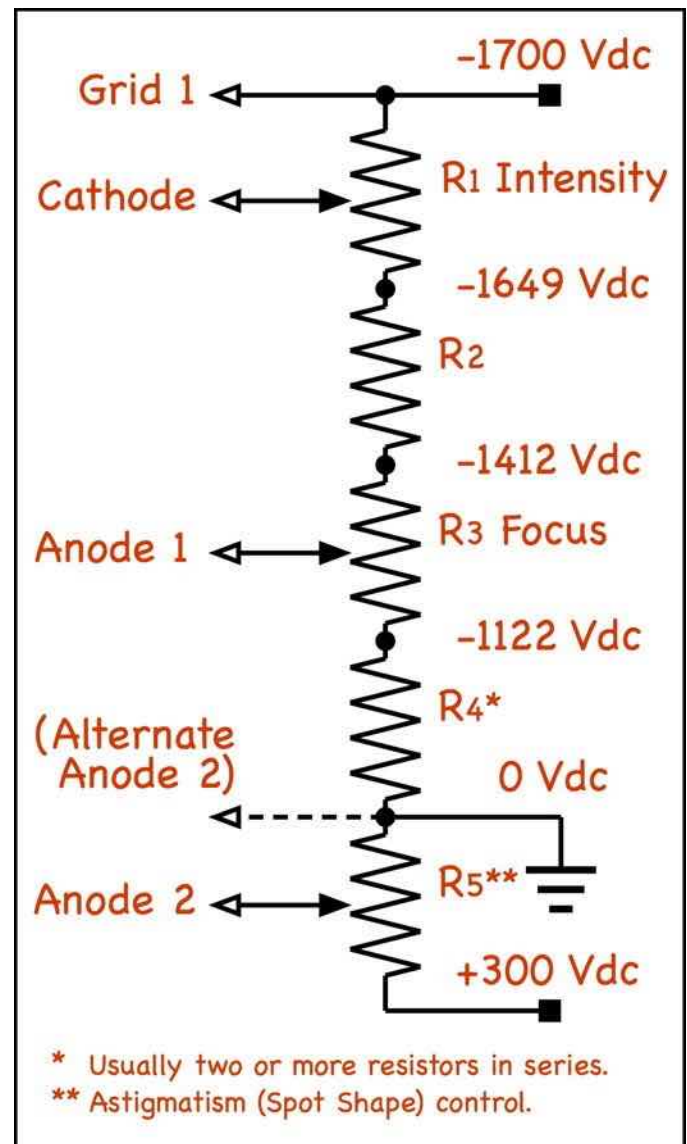


Figure 6: Typical CRT resistor divider chain designed to prevent high anode 2 voltages. Left pointing arrows go to CRT connections.

the 5BP1 CRT was to companies that bought them in bulk is unknown. To get some idea I pursued a few 1946 through 1948 issues of *Radio News* and found the two lowest-price ads for the 5BP1 CRT (See **Figures 7** and **8**).

Shortly after the end of the war an ad was selling the 5BP4 for \$18 each in the January 1946 issue. War surplus electronics were slowly appearing at the time. A year later (January 1947) TAB in New York City offered the 5BP1 for \$9.95 with the 11-pin (medium magnal) socket thrown in. Another year later (January 1948) the TAB ad had the 5BP1, 5BP4 or 5CP1 for \$2.25 each. The socket was 59¢ additional. By April of 1948 the TAB price had increased to \$3.75. In August of 1948 when the Lafayette and Photon ads appeared, the TAB ad did not advertise any CRTs. Also in the August issue G & G Radio Parts on Vesey St. was selling 5BP1 CRTs in lots of 4 for \$1.79 each as "new and in original cartons". Both TAB and G & G were located in New York City's "Radio Row". (See RF for May 2004 page 6 for more on Radio Row.)

The two ads shown on this page represent the lowest prices that could be found after moderate searching. The Photon ad ran for many month with the \$1.15 price, even though a typo in the early ads call it the 5PB1.

Looking at the low prices for a single CRT one has to believe Heath probably purchased the CRTs for significantly less than a dollar each, perhaps less than 50¢ each. How many 7" x 7" x 18" boxes can you get in a railroad box car?

TUBE SPECIALS			
5BP1	.....\$1.15	726	..... 4.95
3AP1	..... 2.25	75TL	..... 2.50
2X2	..... .75	5BP4	..... 2.50
9002	..... .75	717-A	..... .69
		6L6G	..... 1.10
		12A6	..... .29
		4 for	..... 1.00
		VR150	..... .90

PHOTOCON SALES
1062 North Allen Avenue Pasadena 7, Calif.

Figure 7: Ad from the August 1948 issue of *Radio News* showing the lowest 5BP1 price found. Photocon kept this price over many ads.

Spot-lite Values

XP5916-
5BP1 Tube While
They Last
Your Cost **\$1.39**

5BP1/5GP1 C-R Tubes
Brand new 5BP1/5GP1 cathode ray tubes, perfect for oscillograph use. Green fluorescence with medium persistence. Five inch screen, medium shell magnal 11 pin base, 6-3 volt heater, 2500 volts on anode No. 2. Each tube individually boxed. About one-tenth list price. Quantity extremely limited.

from Lafayette

MAIL NOW

New York
100 SIXTH AVE.
110 Federal St., Boston 10
24 Central Ave., Newark 2

Lafayette Radio
RADIO WIRE TELEVISION, INC.
Dept. RH-8, 100 Sixth Ave., N. Y. 12

Figure 8: Another ad from the August 1948 issue of *Radio News* showing another low 5BP1 price.

Next month I hope to have the first of the Heathkit scope articles completed. Once the O-1 is covered it will be easier to discuss just the differences and improvements of the later o'scopes.

73, from AF6C



OCARC BOARD MEETING MINUTES May 5, 2018

The May OCARC Board meeting was held at the Marie Callender's Restaurant at 1821 N. Grand Ave in Santa Ana on May 5, 2018. Meeting called to Order at 8:00 am.

Roll Call:

President: Tim N6GP, Present
Vice President: Dan KI6X, Present
Secretary: Jim AF6N, Present
Membership: Bob AF6C, Present

Technical: Kenan KR6J, Present
Treasurer: Ken W6HHC, Present
Activities: Ron W6WG, Present
Publicity: Tim, N6TMT, Present

Directors at Large:

Corey KE6YHX, Present
Clem W0MEC, Present

DIRECTOR REPORTS:

Vice President No current report.

Secretary: Jim AF6N delivered \$14 in mug sales receipts to the Treasurer.
"Save the Date" mailers are ready for distribution.
No new mail has been received.

Membership: Bob AF6C reported current roster at 77 paid members. He also reported updating the online sorted rosters to show Rodger Kerr's current Extra Call, AI6WV.

Technical: No current report.

Treasurer: Ken W6HHC passed out the current Cash Flow Summary and reported the \$100 ICOM rebate has been received and is entered as current month income.

Jim AF6N reported that USPS accepted our application for renewal of PO Box 3454 but would not accept payment at that date. He was told that the payment would be due later and that we would be so advised. Discussion of PO Box renewal followed and, the actual renewal date being unknown, the Board recommended rechecking with USPS as to the due date.

Ron W6WG asked who to pay for a mug purchase. The payment may be made to Jim AF6N or Ken W6HHC by mail or at a meeting. Ken asked that the purchasers be identified to him.

Activities: Ron W6WG reported \$52 received from the April Opportunities Drawing. Ron requested

that a request for prize donations such as the used books be included in the RF Newsletter.

Publicity: Tim N6TMT reported receiving the free Field Day pamphlets from ARRL but had to order a tee shirt to receive the free pamphlets without additional shipping charges. Tim modeled the tee shirt.

Director at Large: Clem W0MEC reported on an extremely rare CW bug that he owns. He contacted well known (65 years) collector, W1TP who was very helpful in trying to identify Clem's bug and it's history. The consensus was that Clem's bug is indeed rare and the only one multiple collectors have ever seen. The bug enables Clem to use it for either American or International Morse.

Director at Large: Corey KE6YHX reported his volunteering to assist in tracking a high altitude balloon scheduled for launching by Joann Michael's Meadows Elementary School science class. Unfortunately, wind conditions changed and the launch was aborted. Ms. Michael will contact us again for a possible future experiment attempt.

OLD BUSINESS:

NEWSLETTER EDITORS: Tim N6GP listed the Editors schedule: May - Tim N6GP, June - Dan KI6X. Kristen K6PEQ will be invited to edit the July newsletter.

PROGRAMS: Dan KI6X reported as follows:

May - Marty Woll N6VI will present on "Troubleshooting for the Non-engineer".

Dan invited Marty to dinner at Mimi's before the meeting.

June – Chip K7JA will offer his annual Field Day Prep and Pep Talk

July – A combination of half hour talks is planned including representatives from both ARES and RACES.

August – Wayne KH6WZ, a frequent CQ writer, is expected to present on "Maker Fairs".

September – OCARC Anniversary Meeting

October – Annual Club Auction

November – Possible EMI and/or SteppIR presentation by John Stanford, KF6L.

December – Christmas Dinner

HISTORIAN: Corey KE6YHX will begin entering a second M-disc when Bob AF6C can resume scanning RFs. Santa Ana Library reports are suspended pending resumption of RF scanning.

85th ANNIVERSARY:

Mug sales opened at the last meeting with the first sale. Ken W6HHC suggested that an email blast go out featuring the ordering form and photo.

Jim AF6N reported that "Save the Date" mailers are ready for distribution and will be mailed this weekend. Approximately 250 will be emailed to current and former members. Another 22 will be mailed USPS to former "Board Members and Affiliates". Jim also suggested placing a "Save the Date" in the upcoming RFs.

Tim N6GP reported that Peter N16E has agreed to bring his TV van to the reunion meeting. And, Wayne N6NB has agreed to bring one of his microwave units as well. Tim also volunteered to present a half hour on history of the club.

Ken W6HHC suggested time for members present at the reunion to talk about their affiliation with the club.

Dan, K16X reminded of Skype availability at the last reunion and suggested repeating.

Lifetime Achievement Award: Corey, KE6YHX explained that he is involved in extensive research on one

candidate for Lifetime Achievement but will hold the results and name for the selection committee.

Emergency Communications: Bob, AF6C reports receipt of an email from Jeff, KK6YUP who is volunteering to update the Emergency Communications Page.

Field Day Report: Ron W6WG reported addition of several good CW Ops to the list. Nicholas AF6CF will handle Alternate Power. Prior to the next meeting Ron will email each captain to confirm the individual captain's needs at this point. Planning seems to be going well.

Tim, N6GP mentioned that Neal N6VHF will again work to obtain a government official visit for the bonus.

Tim, N6GP suggested and volunteered to host the next Field Day meeting at 6pm on Wednesday May 23. All agreed.

General Field Day discussion followed. Two trucks have been volunteered to help with equipment delivery. Two sets of generators are committed. And Tim N6GP has delivered a router to Vijay KM6IZO for networking preparation.

E-MAIL BLAST:

Tim, N6GP reported that the e-mail blast system seems to be working well.

NEW BUSINESS:

None:

GOOD OF THE CLUB:

Tim, N6TMT volunteered historical information found in some family paperwork. The papers identified a cousin of his grandfather who was born in 1919, and an early ham in Ohio. His last call was WD8HV.

Interesting historical discussion followed including recollection of Bob AF6C's father who was originally 2CXF and whose QSL card is pictured on the wall of Art Collins shack, then 9CXX.

Tim N6GP noted receiving a misdirected offer of equipment meant for the Orange County Amateur Radio Club of North Carolina. The offer was redirected to North Carolina.

Bob AF6C reported again that Bob WB6IXN is in good health but very busy assisting his brother Lee with his health difficulties.

Ken, W6HHC reported offering a new Digital Amateur TV receiver at the very low price of \$75 plus shipping.

The meeting adjourned at 9:30 am.

Submitted by *Jim Schultz, AF6N*
OCARC Secretary



ARRL
The national association for
AMATEUR RADIO



85th
Anniversary

June 23rd - 24th

FieldDay 2018

Mark your Calendar NOW to JOIN with us!

Orange County Amateur Radio Club 85th Anniversary Coffee Mug



Celebrate 85 Years of OCARC with your Morning Cup O' Joe

Order Form			
Call Sign	<input type="text"/>	Quantity	<input type="text"/>
Name Desired	<input type="text"/>		
Call Sign	<input type="text"/>	Quantity	<input type="text"/>
Name Desired	<input type="text"/>		
	Price Each	<input type="text" value="\$14.00"/>	
Please make & mail check to:		Total	<input type="text"/>
OCARC			
PO Box 3454			
Tustin, CA 92781			
or			
Bring check to next meeting			

OCARC GENERAL MEETING MINUTES April 20, 2018

The OCARC General meeting was held at the Santa Ana Red Cross Complex on April 20, 2018.

Club Officers:

There was a quorum. All officers were present.

Attendance:

Present were 25 members, 3 guests, and our guest speaker Cliff, KG6MIG.

The meeting was called to order at 7:00 pm and was followed by the Pledge of Allegiance to the Flag and introductions of the members and guests.

February Program:

Dan, KI6X introduced the evening's presenter, Cliff Guice KG6MIG. Cliff is very active in County of Orange RACES, (OCRACES) activities and is expert in operation of Near Vertical Incidence Skywave (NVIS).

Cliff presented an interesting slide show describing NVIS. He explained the very high angle emissions, 60 to 90 degrees from horizontal, how they are generated using horizontal antennas mounted very low to the ground and how they are valuable for military and emergency communications. The history of military NVIS use includes use in the Vietnam jungles and during D-day over the English Channel.

The high angle transmission enables the military to effectively communicate over short distances (generally less than 300 miles) but reliably between valleys without degradation from physical obstacles such as mountains. Cliff explained that the propagation of NVIS signals penetrate the ionospheric D Layer while refracting quickly back down from the F Layer.

NVIS has advantages of low power requirements, reliable short range communication skipping over physical obstructions, conveniently low height requirements and low weight for portability, Cliff demonstrated his home brew multi-band half dipole that uses his vehicle as the counterpoise.

We thank Cliff for an interesting and educational evening.

Show and Tell:

Tom, W6ETC demonstrated a portable NVIS antenna that he bought on the internet and tried out during Baker to Vegas. Results were a contact to Louisiana.

Nicholas, AF6CF offered a stack of QST's to any members interested.

He also showed a spool of Flex Weave antenna wire from Davis RF. The wire is extremely flexible and strong, great for antenna use.

Intermission was taken from 7:46 to 8:10 pm.

Business Meeting:

Director Reports: Dan, KI6X thanked Cliff and presented a thank you OCARC coffee mug to him. Bob, AF6C discussed the assignment of Emergency Communications Director that has not been updated recently. He asked for interested volunteers but none came forth.

Field Day Reports:

Tim, N6GP explained the next Field Day meeting date will be decided at the upcoming Board meeting and will probably be early in May.

Ron, W6WG passed around a tentative Field Day map and Operator's List. He noted that all positions have been filled except for Alternate Power. Nicholas will not be available at Field Day but volunteered to fill the Alternate Power void anyway. Steve, KK6REB will coordinate transportation of equipment. Additional CW operators will include Chip, K6JA, Bob, AA6PW, and Bill, W6HIJ. And, OCRACES members will participate as W6ZE operators this year.

Tim, N6TMT reported that Jessie and the Boy Scout group have asked for food requests.

Kenan, KR6J requested clarification on Band Captain responsibilities.

Tom, W6ETC asked for extra care at Sunday teardown to prevent member's loss of equipment.

He noted missing military masts belonging to Nicholas, AF6CF. They probably ended up in the storage room.

Tom, W6ETC also suggested that members try Echo Link access to the Wednesday night nets. He has accessed the net from Idaho and Jeff, KK6TRC demonstrated Echo Link by contacting within the meeting room.

Nicholas, AF6CF explained that he will be attending the Dayton Hamvention and will miss the next OCARC meeting. He will attempt to document the Hamvention for a report.

Ask the Elmer:

Ron, W6WG asked for a recommendation as to the best type of solar panel to purchase. Answers offered were that mono crystal panels are heavy and affected by shade. Costco has a 100 watt panel offer on-line and Bioenno has a good folding panel that may be offered at a possible discount.

Wardy, N6SKE showed an aluminum folding panel acquired at a garage sale. He asked for suggestions how to use it as an antenna.

Good of the Club: Jim, AF6N spoke of the upcoming 85th Anniversary Reunion Meeting including polo shirt embroidery and the Anniversary coffee mug. He asked for suggestions for names of past members that should be added to a "Save the Date" mailing. Bob, AF6N and Nicholas, AF6CF offered possibilities and will try to find a list from the 2013 Reunion.

Tim, N6GP announced the Board's intent to organize a mobile radio equipped vehicle show before the Reunion. Several member's vehicles were suggested for show.

Bob, AF6C reported that Bob, WB6IXN is in good health but has been kept busy caring for his brother Lee. Lee's health has been poor recently.

Dan, KI6X announced that the May presentation will be "Troubleshooting by the non-technical Ham" by Marty Woll, N6VI.

Closing:

Ron, W6WG conducted the Opportunity Drawing including a variety of donated books and magazines.

The meeting was adjourned at 8:56pm.

Submitted by *Jim Schultz, AF6N*
OCARC Secretary

2018 is OCAR C's 85th Anniversary

Customized Embroidering of the OCAR C Logo,
Your Name and Callsign can placed on shirts, jackets, hats,
bags, and just about anything you want.



You can either purchase the item from I.Initial or bring in whatever you have and have it embroidered for \$10.00.

They have the OCAR C logo artwork on file. Delivery takes one to two weeks.

Location: 399 El Camino Real, Tustin, CA 92780

Phone # (714) 573-2552 Online at "iinitial.com"

MiniTiouner-Express

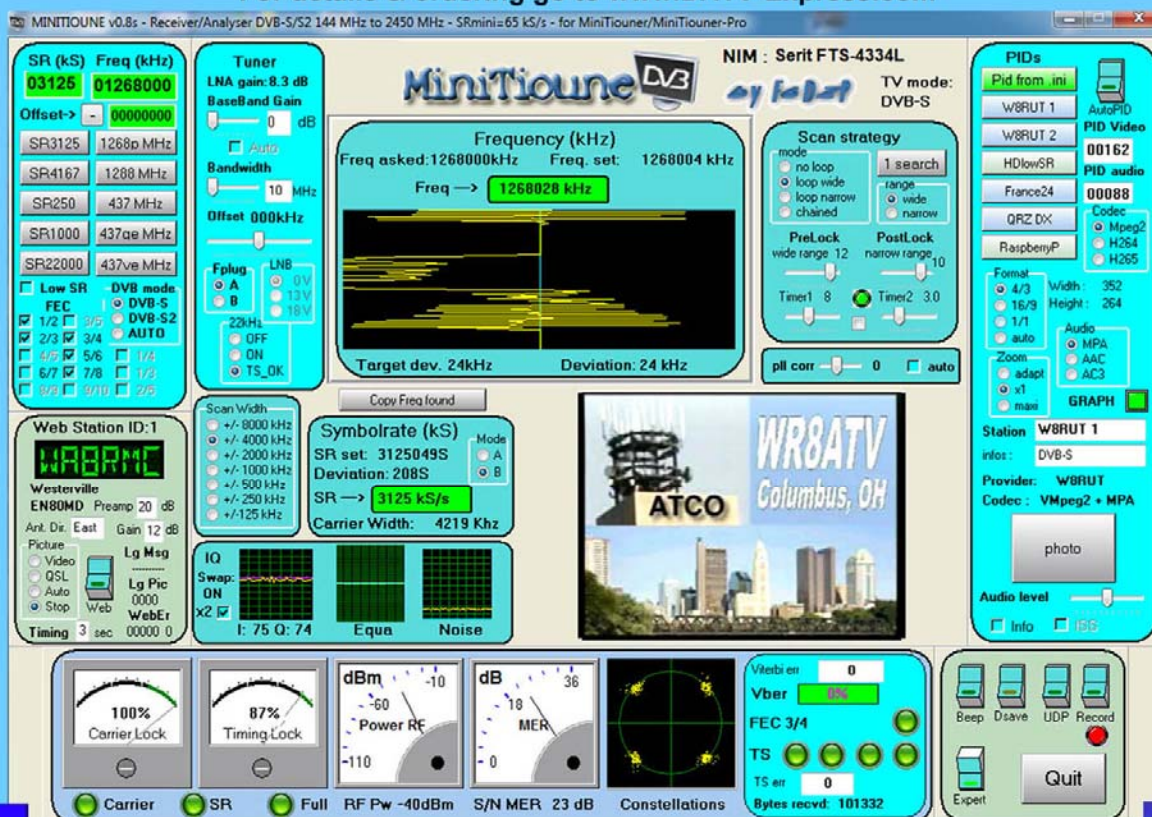
Digital Amateur Television DVB-S/S2 Receiver / Analyzer



Available at DATV-Express.com

- Operates with Windows PC using free MiniTioune software from Jean-Pierre F6DZP
- Smaller than a stack of 2 decks of cards (picture above is full size)
- Two independent simultaneous RF inputs with internal preamps
- High sensitivity -100dBm @1288MHz – at 1/2 FEC
- Fully assembled/tested in aluminum enclosure
- Covers 144-2420MHz (ideal for Space Station DATV reception)
- Symbol rates from 75 KSymbol/s to >20 MSymbols/sec
- Uses external 8-24VDC supply or +5V from USB-3 port (with small modification)
- Real time signal modulation constellation & dBm signal strength display
- Price: US \$75 + shipping – order with PayPal

For details & ordering go to www.DATV-Express.com



(MiniTioune display above is the ATCO 1268MHz DVB-S repeater signal at WA8RMC QTH 15 miles away).

OCARC Cash Flow - Year To Date

1/1/2018 through 5/5/2018

Category	1/1/2018- 5/5/2018
INFLOWS	
Badge Income	2.00
Donation	10.00
Dues, Family (PayPal)	172.89
Dues, Membership	742.50
Dues, Membership (PayPal)	634.26
Opportunity Drawing -Monthly	141.00
Opportunity Drawing IN - Christmas	100.00
Refreshments Income	23.83
TOTAL INFLOWS	1,826.48
OUTFLOWS	
CU service Fee	20.00
Opportunity Drawing - Monthly	114.57
Publicity - OCARC Biz Cards	18.29
Refreshments Expense	31.22
Storage Locker	410.00
Supplies	24.33
Web Site Hosting	50.97
TOTAL OUTFLOWS	669.38
OVERALL TOTAL	1,157.10