RF

ORANGE COUNTY AMATEUR RADIO CLUB, INC.

VOL. LIX NO. 11 P.O. BOX 3454, TUSTIN, CA 92781-3454 November 2018

The Prez Sez.....

by Tim N6GP

Our auction last month went very well, thanks to our auctioneer Nicholas, AF6CF. He made it fun, entertaining, and profitable for our club. Thanks also to Ken, W6HHC, Ron, W6WG and Dan, KI6X who did the accounting, and kept the items moving. The family of former member Rich Heryford, WD6ESZ-SK was grateful for this venue to unload their very large collection of estate items. There was a good turnout of bidders this year that made the action lively. With the combination of this crowd, and the many estate items, I really think we had the best radio club auction in Southern California this year.

The Christmas Banquet is coming up on Friday December 7th at Mimi's Café in Tustin and tickets are on sale now. The outgoing President threatens to sing again this year, and there will be a raffle of a rich bounty of prizes.

Save the date for **Winter Field Day** on January 26th and 27. Ron, W6WG just received notice that we have received the permit for the Ocean View School District site in Huntington Beach. This site worked out well for us last year.

Many of our club members worked the VP6D DXpedition from Ducie Island. The team which included Arnie, N6HC logged over 120,000 QSOs before cutting the operation short 1 day due to bad weather. They have safely made it back to their home port in the Gambier Islands of French Polynesia. From there they take flights home.

We have a full slate of candidates to serve on the 2019 board, and if anyone else would like to run, nominations will be taken from the floor at our November meeting. In addition, I am looking forward to the electrifying program by John KF6I and Steve W6RHM complete with a spark gap and a Marx generator.

Tim Goeppinger N6GP
President

Next General Meeting

The November 16th 2018 OCARC General Meeting program will be presented by John Stanford, KF6I, and Steve Jensen W6RHM on...

"High Voltage Ham Apparatus"

and

OCARC Elections for 2019

See pages 7 & 20 for details

The next General Meeting will be on:

Friday, November 16, 2018

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

In This Issue..... Page

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www.W6ZE.org

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Feedback & Corrections:
rf_feedback@w6ze.org

Submit articles:
editors@w6ze.org

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

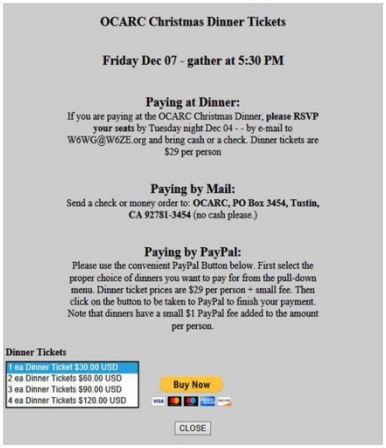
7.086 ± MHz CW **OCWN**
Sun- 9:00 AM – 10 AM
Ann K6OIO, Net Control

Club Dues for 2018:
Regular Members renewals*- - - $30
Family renewal/Join**- - - - - - - $45
New Member Join Nov-Dec*** $30
Replacement Badge**** - - - - - - $ 3

* Member renewals Jan-Dec.
** Two members or more, w/badge.
*** New members Nov thru2019 w/badge.
**** There is a $1.50 charge if you'd like to have your badge mailed to you.

OCARC Holiday Party!!!!
Friday, December 7th

Come and celebrate the Holiday season with OCARC on **Friday, December 7th, 2018** at Mimi's Cafe in Tustin. **Social hour begins at 5:30 PM.....Dinner at 6:30 PM,**



Easiest way to pay and reserve your spot is to go to our weblink below:

http://www.w6ze.org/XMAS/Christmas-Paypal.html

This will allow you to reserve a place for you and your party. Tickets are $29 per person with a $1 PayPal fee per ticket for a total $30 on online. $29 if paying cash or check.

You may also purchase your tickets at our next General Meeting or e-mail "Activities" at **W6WG@w6ze.org** to arrange purchasing your holiday party dinner tickets! Remember to bring your spouse and friends too! Amateur entertainment will be provided.

Dinner is priced at $29 per person and it includes the following meal choice:

- ***10oz Steak with Frites***
- **Grilled Atlantic Salmon**
- **French Pot Roast**

All dinners include a choice of coffee, tea, lemonade or soft drink and come with choice of house salad, Caesar salad or a cup of soup. (Tax and Tip is included)

You do not need to make your meal selection until the evening of the event **but you must reserve your place and let us know in advance by Tuesday night Dec04, since seating is limited.** Check the club website www.w6ze.org for info:

Drawing prizes include: $500 in gift certificates and radio items. Drawing tickets are available for $1 per ticket.

Grand Prize: $750 HRO Gift Certificate, 100 grand-prize tickets will be available at $5 per ticket.

Mark the date on your calendar!

Friday night, December 7th - gather at 5:30pm.

Location:

Mimi 's Cafe
17231 E. 17th St., Tustin, CA 92780

Located East of the 55 Freeway at the 17th St. Tustin exit.
Restaurant is on North side of street next to the freeway.

OCARC Christmas Dinner Tickets

Friday Dec 07 - gather at 5:30 PM

Paying at Dinner:

If you are paying at the OCARC Christmas Dinner, **please RSVP your seats** by Tuesday night Dec 04 - - by e-mail to W6WG@W6ZE.org and bring cash or a check. Dinner tickets are $29 per person

Paying by Mail:

Send a check or money order to: **OCARC, PO Box 3454, Tustin, CA 92781-3454** (no cash please.)

Paying by PayPal:

Please use the convenient PayPal Button below. First select the proper choice of dinners you want to pay for from the pull-down menu. Dinner ticket prices are $29 per person + small fee. Then click on the button to be taken to PayPal to finish your payment. Note that dinners have a small $1 PayPal fee added to the amount per person.

Dinner Tickets

1 ea Dinner Ticket $30.00 USD
2 ea Dinner Tickets $60.00 USD
3 ea Dinner Tickets $90.00 USD
4 ea Dinner Tickets $120.00 USD

Buy Now

CLOSE

PICTURES FROM THE OCTOBER BOARD MEETING AND CQP CONTEST…IN THE PARK

→→→

OCARC Board Meeting held at the Jeffery Open Space Park in Irvine with coffee and rolls before CQP contest started

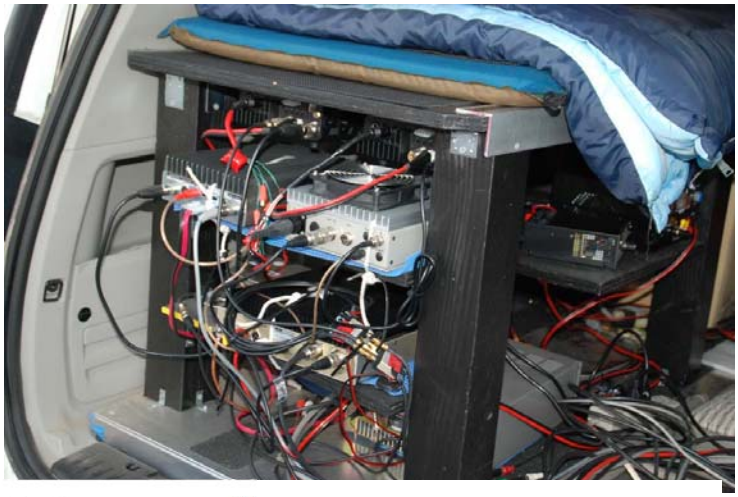
Doug K6PGH (L) started the club CQP operations on 20M with N6GP making sure everything is working OK →→→

←←← Newest OCARC member, Charles KM6VWQ (R), has Clem W0MEC (L) explains setting up hand-held to get onto OCARC 2M net, Rodger AI6WV (C) provides Charles with his first QSO as a ham (on 2M)…then shakes his hand.

←←← Tim N6GP (C) explains the concepts of the CA QSO Party to newest OCARC member Charles KM6VWQ (L) while Dan KI6X (R) rolls up the CPQ contacts.

PICTURES FROM THE MOBILE RADIO EXHIBITION AT THE 85TH ANIVERSARY MEETING IN SEPTEMBER

Radios and control heads mounted on the console of George, N6VNI's vehicle



An impressive rack-mounted setup for radios and amplifiers in Wayne, N6NB's vehicle.

Tom, W6ETC making final adjustments to his mobile installation

Check out this very clean installation inside Tom, W6ETC's truck. Notice the installation of the control heads for his Yaesu FTM-350AR (above) and ICOM IC-7000 (below).

UPCOMING EVENTS

November 16th, 2018...

"High Voltage Apparatus" John Stanford, KF6I, Steve Jensen W6RHM

Presentation will cover various spark-generating electrical apparatus. John and Steve will bring and demonstrate an actual rotary spark generator originally used at 9YD in Nebraska back in 1918. Two other surprise high voltages generators will be demonstrated as time permits.

December 7th, 2018...

OCARC Holiday Dinner (Mimi's – Tustin)

(see Page 3 and Page 4 for details)

January 18th, 2019

Arnie Shatz, N6HC "Baker Island DXPedition"

Photos and discussion of the recent Baker Island, KH1/KH7Z, DXPedition. Arnie was the medical representative along with all the other duties of preparation, set-up, operating, and tear-down. , Arnie always brings back interesting presentations from his trips.

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

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

Opportunity Drawing Request:

If you have something you would like to part with, donate it before the meeting for the Opportunity Drawing.

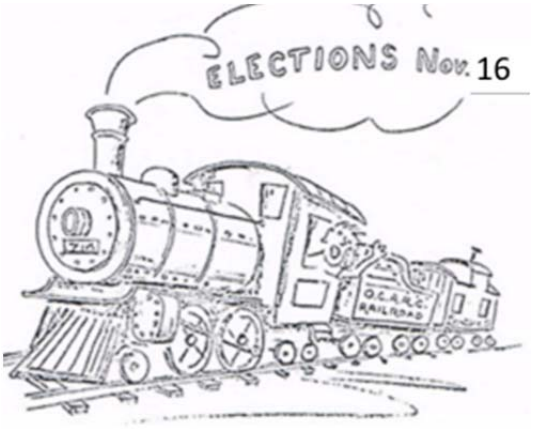
See Ron W6WG

Election Announcement

The OCARC 2019 Board election will be held at our General Meeting, Friday November 16. Other nominations will be taken from the floor

List of Nominations from the Nominating Committee
(revised 2018-11-12)
Nominating period is still open. OCARC members are encouraged to run for any of these offices.

Office	Nominations for 2019
President	Nicholas AF6CF --- or --- Dan Kl6X
Vice President	Tim N6TMT
Secretary	Ken W6HHC
Treasurer	Greg W6ATB
Activities	Ron W6WG
Membership	Corey KE6YHX
Publicity	Vijay KM6IZO
Technical	Bob AF6C
Director at Large 1	Tim N6GP **(automatic per Bylaws)**
Director at Large 2	Clem W0MEC



IT'S RAILROAD TIME!

Heathkit of the Month #88:
by Bob Eckweiler, AF6C

ELECTRONIC TEST EQUIPMENT

Heathkit AW-1
Audio Wattmeter.

Introduction:

In September of 1953 Heathkit introduced the AW-1 Audio Wattmeter. This meter measures the power output of audio amplifiers up to 50 watts. Over its lifetime it sold for $29.50. The AW-1 continued in production until around 1960. During that time it underwent one significant circuit change and at least three style and front panel changes, yet the model number continued to be AW-1. One style of the Heathkit AW-1 is shown in **Figure 1**.

Heathkit AW-1 Audio Wattmeter:

All U.S.[1] AW-1 wattmeter models include built in non-inductive load resistors for 4, 8 16 and 600Ω. These load resistors are rated for 25 watts continuous and 50 watts intermittent. Full-scale (f.s.) power ranges are from 5 mW to 50 W in five decade ranges. The AW-1 uses a single 12AU7 dual-triode, a selenium rectifier and four crystal diodes.

The various styles and front panel changes will be discussed later in the article. The single circuit change, which occurred just a few months into production, involved changing the four-position rotary **LOAD** switch to a nine-position rotary switch. An AW-1 with the four position **LOAD** switch is shown in Figure 2 (a drawing from a 1953 Heathkit flyer). The original four positions are **4Ω, 8Ω, 16Ω** and **600Ω.** Each position is connected to the selected internal load resistor. On the later nine position switch the first four positions are identical to the original four, the fifth position, marked **OFF**, disconnects the input from the meter and load, and the last four positions are identical to the first four except no connection is made to the internal load resistors. The user is supposed to provide an external load, such as the speaker or an external load resistor. The nine switch positions are marked **4Ω, 8Ω, 16Ω, 600Ω,**

Figure 1: A late 1954 or early 1955 AW-1 with red jewel pilot light. Photo By Keith Greenhalgh[2].

Here is a link to the index of Heathkit of the Month (HotM) articles:

http://www.w6ze.org/Heathkit/Heathkit_Index.html

1. Notes will be found at the end of the article.

Figure 2: The Winter 1953 flyer ad for the original AW-1. Notice four-position LOAD rotary switch on the left.

OFF 4Ω, 8Ω, 16Ω and **600Ω**. Above the first four positions is the marking **INT. LOAD** and above the last four positions is the marking **EXT. LOAD.** This change allows the meter to be left hooked up across a speaker during normal listening.

The AW-1U European Audio Wattmeter:

In Europe Heathkit sold an AW-1U version of the audio wattmeter. It is very similar to the US model except for a few details. The instrument is designed for 200 to 250 VAC 40-60 cps power and has a DPST AC power switch, that breaks both sides of the 230V AC line. Also the internal load ranges are **3Ω**, 8Ω **15Ω** and 600Ω, and the load divider resistor chain values are adjusted accordingly. It appears that the European version of the AW–1 only came with the nine-position load switch. It also underwent style changes during its production run.

Here's a bit of trivia: What we call *solder terminal strips*, the British call *tagstrips*!

The AW-1 Specifications:

Table I shows the published specifications for the AW-1.

Heathkit AW-1 Audio Wattmeter

Freq. Response:	±1 db 10 cycles to 250 kc.
Wattage Range:	0-5 milliwatts, 50 milliwatts, 500 milliwatts,5 watts, 50 watts.
DB Range:	Total range, -15 db to + 48 db, scale -5 to +18 db (1 mw @ 600Ω). Five switch selected ranges from -10 db to + 30 db.
Load Resistors:	4, 8, 16, 600 Ω non inductive 25 watt
Power Ratings:	up to 25 watts maximum continuous duty, 50 watts maximum intermittent. Duty cycle at 50 watts is 3 minutes. Cabinet is ventilated for efficient cooling.
Multipliers	Precision 1% resistors.
Meter:	4½" 200 microampere movement
Tube:	12AU7 dual triode - voltage amplifier, current amplifier.
Solid State devices:	Selenium power rectifier. Crystal diode (4 ea.) bridge meter rectifier.
Dimensions:	7-3/8 high, 4-11/16 wide, 4-1/8 deep
Power Rqmts.:	105-125 volts AC 50/60 cycle, 6 watts.
Net Weight:	3-3/4 lbs.
Shipping Weight:	6 lbs.

TABLE I: AW-1 Specifications

The AW-1 Controls and Front Panel:

The layout of the AW-1 is very basic with just a meter with **0 - 50 POWER** and **-5 to +18 DECIBELS scales**, two rotary switches, a SPST **ON-OFF** slide-switch for AC power, a pilot lamp assembly and two black binding posts.

The left rotary switch is the four or nine-position **LOAD** switch already discussed. The early four position switch is not marked as LOAD. The right rotary switch is the **RANGE** switch and has five positions: **-10 DB 5 MW, 0 DB[3] 50 MW, +10 DB 500 MW, +20 DB 5 W and +30 DB 50 W**. This switch is not marked RANGE on the early units that have the four-position LOAD switch. Two 5-way binding

posts provide input. Both are black and the left one is marked **HI** and the right one **LO**.

The AW-1 Operation:

Measuring amplifier audio power with an AW-1 involves connecting the audio output to the binding posts (be sure the non-grounded audio output goes to the HI terminal) and selecting the correct LOAD switch position. The load should be marked at the output terminals of the audio amplifier being measured. Most have multiple outputs, so choose the output that you are using with your speakers, unless you want to measure a different output. Often the amplifier's power output rating changes for different loads.

If you have an AW-1 with the nine-position LOAD switch you can use an external load such as the Heathkit ID-5252 Audio Load or your speaker. Just be sure to use the correct external load position. The meter can even be left inline during normal use.

The maximum input to the AW-1 meter is 50 watts. However, that is an intermittent rating with a 3-minute duty cycle. Continuous operation is allowed up to 25 watts.

To measure power output, a sine wave audio oscillator, such as the Heathkit AG-8, is used to supply a constant audio input while the AW-1 reads the output power. Power changes can be read on the meter in watts or dBm. To get an idea of the amplifier's frequency response the input frequency may be varied and the corresponding output power plotted. Keep the input level constant.

Heathkit warns about changing the LOAD switch when power is being applied. It is also important that an external load be applied if the internal load is not in use. Running many audio amplifiers without a load can damage the amplifier.

The AW-1 Circuit:

The AW-1 circuit may be broken into four parts: The power supply, the AV voltmeter section, the load circuit and the range selector. A schematic of the later AW-1 is shown in **Figure 9**.

The Power Supply Circuit:

This circuit is a simple half wave transformer operated power supply using a selenium rectifier. The B+ powers only the AC voltmeter circuit which draws just over 1 ma. A high resistance (100KΩ) in the filter circuit assures very low AC ripple in the power supply output at the cost of a high drop in B+ voltage. The AC voltmeter circuit operates with a nominal B+ of just 35 volts. The transformer low-voltage winding powers the pilot lamp and the 12AU7 tube filaments and requires less than half an ampere.

The AC voltmeter Circuit:

The two stages of the 12AU7 tube form an AC voltmeter that is designed to create full-scale deflection of the 200 μA meter with an AC input of 0.14 volts RMS. The first section of the dual-triode 12AU7 provides an open-loop voltage gain of somewhat under 50. The second stage converts this voltage into an AC current which is coupled through a large 2 μF capacitor to the meter. Four germanium diodes form a full wave bridge to rectify the AC and provide a DC current to the meter.

The low side of the meter bridge is an AC signal almost identical to that at the top of the meter bridge. This AC signal is fed to the cathode of the voltage amplifier stage across a potentiometer. This voltage provides degenerative feedback, reducing the overall gain of the circuit and providing added circuit stability. The overall gain of the circuit is controlled by the potentiometer which sets the feedback level. It is adjusted during calibration to give a full scale reading when the input signal is 0.14 volts RMS.

The Load Circuit:

The load circuit consists of a two-pole rotary switch. One pole selects the load resistor, and the other pole selects a voltage divider to correct for the different load resistors. (See **Figure 3**)

The load voltage divider acts as a PI attenuator circuit, changing the circuit impedance from 8Ω, 16Ω or 600Ω to 4Ω, and at the same time provides the proper voltage attenuation to correct for the impedance change.

From Ohm's power law, wattage is equal to the voltage squared divided by the current, or:

$$W = \frac{E^2}{R} \qquad (1)$$

But the power is being measured using a voltmeter. Rewriting equation (1):

$$E = \sqrt{WR} \qquad (2)$$

For a 4Ω load on the 5 mW range the voltage can be calculated by equation (2):

$$E = \sqrt{0.005 * 4} = \sqrt{0.02} = 0.14 \text{ volts}$$

This 0.14 volts is the voltage required to give full deflection on the AC voltmeter described previously. From equation (2) it is obvious that if the load resistor R is changed the voltage will also change. Yet the voltage needs to remain 0.14 volts when the load resistor is changed. This is what the load voltage PI attenuator does; it provides the required voltage correction for each of the load resistor settings. Note that 0.14 volts is only correct for 5 mW. The full scale voltages for all five ranges, calculated from equation (2), are:

Range:	f.s. Voltage:
5 mW	0.14 V rms
50 mW	0.45 V rms
500 mW	1.41 V rms
5 W	4.47 V rms
50 W	14.14 V rms

To calculate the required correction, which is designated K, for each value of load resistor, an equation may be derived:

$$E = \sqrt{WR} = K\sqrt{WnR}$$

or:

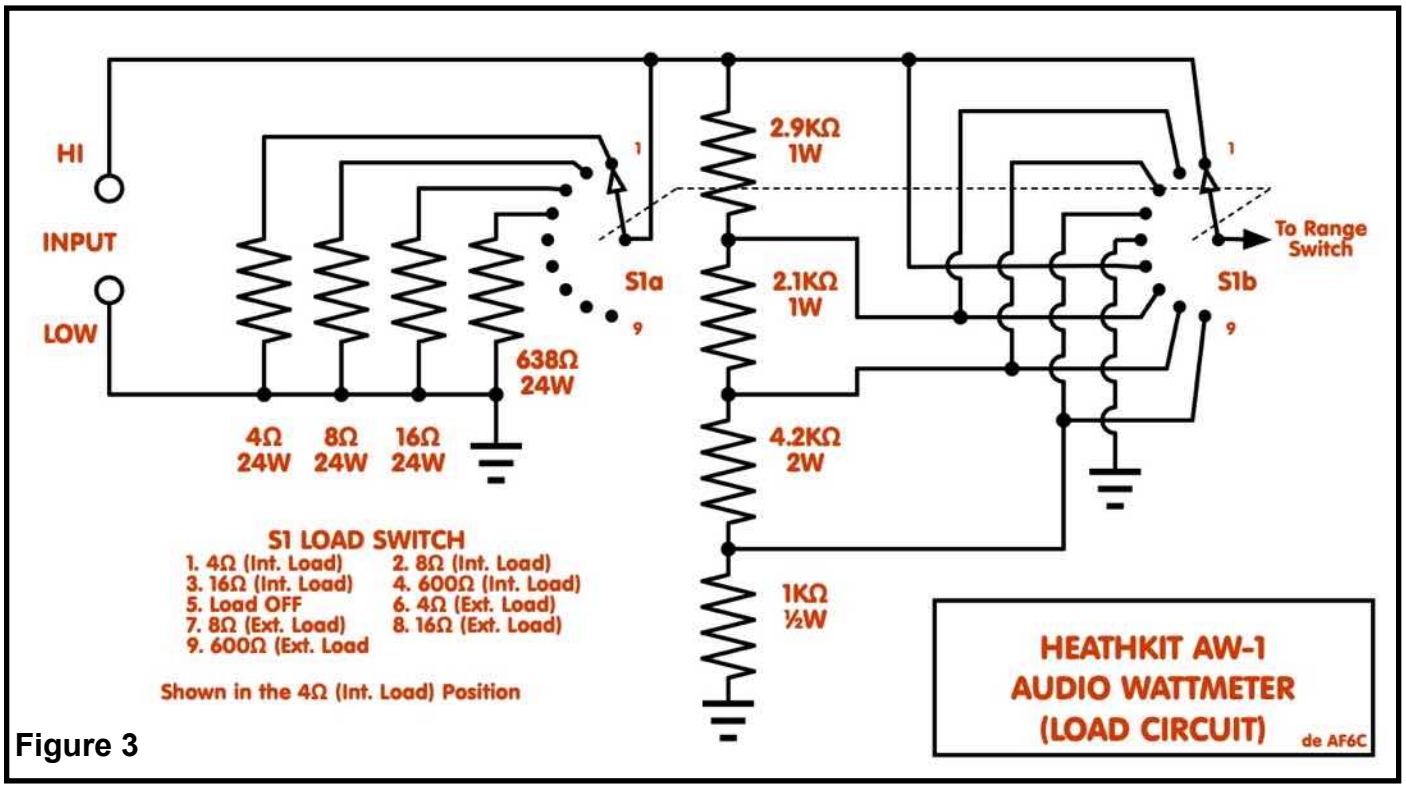


Figure 3

$$K = \frac{\sqrt{WR}}{\sqrt{nWR}} = \frac{1}{\sqrt{n}} \qquad (3)$$

Where R is 4Ω and n is the desired load resistance divided by R (4Ω). K may then be calculated:

Load Resistance	n	K
4Ω	1	1.00
8Ω	2	0.71
16Ω	4	0.50
600Ω	150	0.08

The corrections needed to keep the voltage at the correct voltage for the various load resistances is accomplished by the voltage divider. It consists of four resistors that total to 10 KΩ (R_T). The resistors, from top to bottom ,are: 2.9KΩ, 2.1KΩ, 4.2KΩ and 0.8KΩ. Solving the basic voltage divider equation[4]:

$$K = \frac{R_A}{R_T}$$

Load	R_A	R_T	K
4Ω	(1.9K + 2.1K + 4.2K+0.8K)Ω	10KΩ	1.00
8Ω	(2.1K + 4.2K + 0.8K)Ω	10KΩ	0.71
16Ω	(4.2K + 0.8K)Ω	10KΩ	0.50
600Ω	0.8KΩ	10KΩ	0.08

Notice that the two sets of K are the same.

A sharp eyed reader may notice that the 600Ω load resistor is actually marked as 638Ω while the others are the correct value. The added parallel resistance of the voltage divider is the reason for that. The 10 KΩ appears across the selected load resistor. While 10 KΩ across 16 ohms results in an error of less than 0.16%, (and this number is even smaller for the 4Ω and 8Ω loads), for the 600Ω load the error is over 5%. Thus a slightly larger 638Ω resistor is used, which, when in parallel with 10 KΩ, is very close to 600Ω.

The Range Circuit:

The range circuit (See **Figure 4**) sets the full scale wattage for each of the five range switch positions. On the 50 mW range the input voltage is 0.14 V. However, the voltage goes higher with each consecutive range position, which results from a ten-fold increase in power. From equation (2) one can see that if the power goes up by a factor of ten the voltage increases by a factor of $\sqrt{10}$ or 3.16. Thus the range divider provides attenuation in steps of 3.16. The divider resistors total to 100 KΩ. The resistor values are shown in Figure 4; feel free to calculate the range K values as a little exercise.

Here they are for the five range positions:

Sw. Pos.	Range (Watts)	Volts at Input:	K
1	5 mW	0.141	1.00
2	50 mW	0.447	0.316
3	500 mW	1.41	0.100
4	5 W	4.47	0.0316
5	50 W	14.1	0.010

These are full scale meter voltages. In each case the output voltage is 0.141 volts RMS.

AW-1 Calibration:

Heathkit has always found clever ways to calibrate their instrument kits without the need for a lot of test equipment. If test equipment is available Heathkit also often included instructions for more formal (read: more accurate) calibration.

The AW-1 is no exception. Simple calibration involves setting the AW-1 controls: LOAD to 16Ω and RANGE to 5 Watts. Then the HI input binding post is temporarily connected to the 6.3 volt filament voltage on the pilot light assembly. The resulting power being input is 6.3 volts across 16 ohms or 2.48 watts [From equation (1)]. The calibration control is then set to read 24.8 on the 0 - 50 POWER scale,

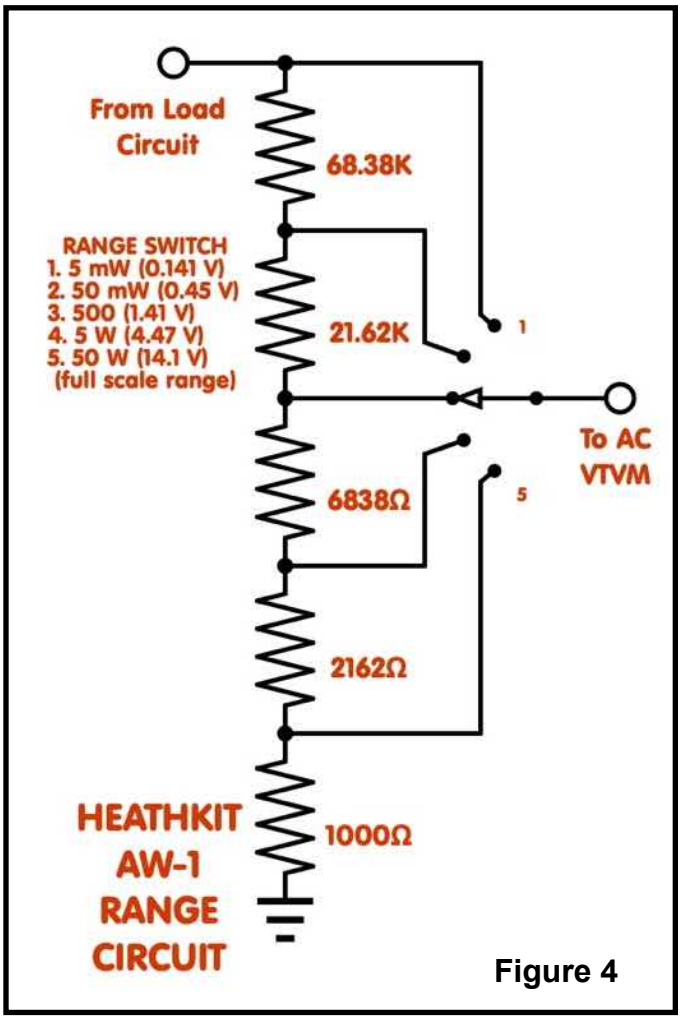


Figure 4

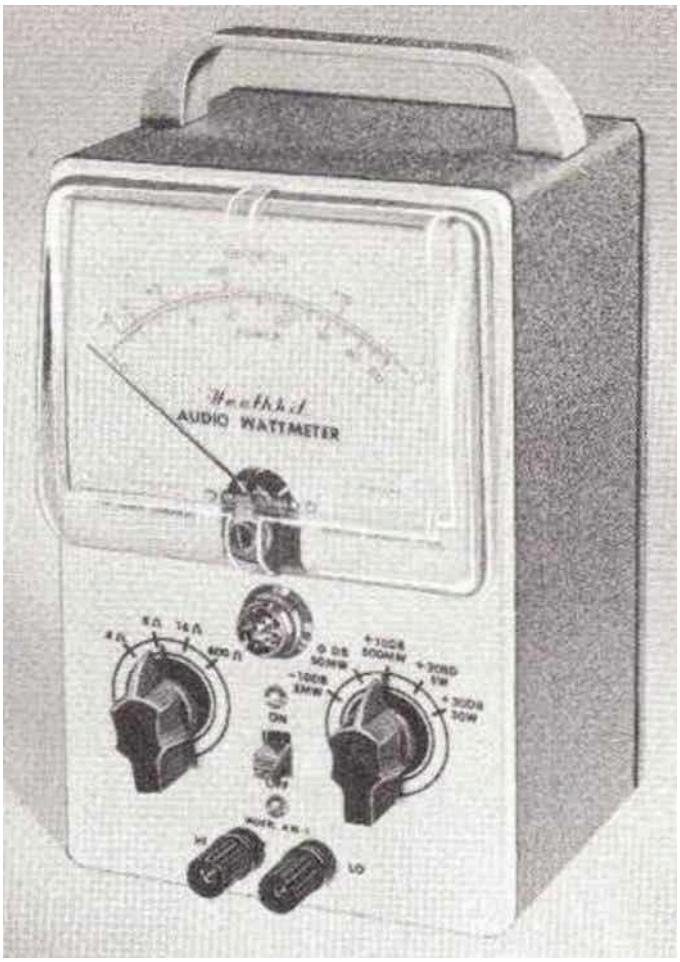


Figure 5: A drawing of the "Late Pre-Classic" style AW-1 with the four-position LOAD switch.

which is conveniently marked on the meter face as **CAL**.

Since the 6.3 volt filament voltage is only a nominal value, a more accurate calibration can be achieved by measuring the filament voltage with an accurate AC voltmeter, calculating the wattage for that voltage using equation (1) and using that as the CAL mark.

The European AW-1U is calibrated similarity, except, since it has a 15 Ω load instead of 16 Ω, the calibration wattage is 2.65.

AW-1 Styles:

When first introduced the AW-1 style was "Late Pre-Classic"[5, 6] with a beige front panel and maroon markings. See **Figure 2** and **Figure 5** for examples.

Sometime in early to mid-1954 the LOAD switch change was made. In Heathkit ads the "Late Pre-Classic" style AW-1 was only shown with the 4-position switch. However, **Figure 6** shows that style AW-1 with the nine-position switch from the collection of Jerry O'Reilly.

In September of 1954 Heathkit change the style of the AW-1 to the "Classic I" style with the dark gray front panel with white lettering and markings, and a lighter gray cabinet. Figure 1 is an example of this third iteration of the AW-1 Audio Wattmeter.

From September of 1954 until the end of the AW-1 production in early 1960, the unit is known to have at least one other change. That is the pilot lamp which went from a red

jeweled glass type to a simpler round plastic lens type. The reason for this is probably due to the surplus jeweled lamp sources drying up. The plastic lens socket assembly was an inexpensive replacement (See figure 7). By 1956 the AW-1 was taking a back seat in catalogs and ads to other, probably better selling, kits. In the 1956 and 1958 catalogs most kits were shown as large images and with their schematic. The AW-1 was not so prominently shown, just a small image and no schematic. In magazine ads it was often not shown at all. Heathkit continued using the same image for its ads so it is difficult to tell

Figure 6: A "Late Pre-Classic" style AW-1 with the nine-position LOAD switch. From the collection of Jerry O'Reilly. (Photo by Chuck Penson - WA7ZZE)

Figure 7: A "Classic I" style AW-1 with later green plastic pilot lamp lens (web photo).

when the pilot lamp change occurred. A guess would be in late 1956 as that was when the same pilot lamp began showing up on the oscilloscope line.

The plastic lens is green, as opposed to the red jeweled lamp. However a red plastic pilot lamp appeared in one image, which opened the possibility that Heathkit did use red plastic pilot lamps for a time; or perhaps someone just changed the lens cap? Recently another, different, AW-1 image has the same style red pilot lamp, increasing the possibility red was used, most likely early on.

AW-1 Summary:

If you work with Hi-Fi or stereo equipment, the AW-1 can be a handy instrument to have on your test bench. Even though it uses a tube, it will work with even the newest solid-state audio amplifiers.

73, from AF6C

Notes:

1. Heathkit released a European version, the AW-1U discussed later in this article.
2. Follow Keith Greenhalgh on Flickr for many detailed photos of Heathkits and other electronic equipment.
3. Zero dB is defined as 1 mW into 600Ω for the AW-1.
4. See sidebar for voltage divider discussion.
5. In Chuck Penson's ***Heathkit Test Equipment Products*** book he discusses six distinct design styles Heathkit used for their test equipment. See pages iv through vi.
6. ***Heathkit Test Equipment Products*** by Chuck Penson - WA7ZZE. ISBN 2014, 978-0-615-99133-7, available from amazon.com.

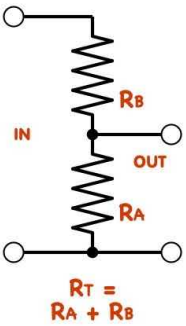
Remember, if you are getting rid of any old Heathkit Manuals or Catalogs, please pass them along to me for my research.

Thanks - AF6C

Figure 8: A "Classic I" style AW-1 with a red plastic pilot lamp lens. Possibly a user change? Maybe a Heathkit change to initially replace the red jeweled lamp. (web photo).

The Voltage Divider:

The voltage divider is a circuit that a ham should become knowledgeable in. It is a simple circuit and is shown in the attached schematic. The output voltage is related to the input voltage by the voltage divider equation:



$$V_{out} = \frac{R_A}{R_A + R_B} V_{in} \quad \text{or}$$

$$V_{out} = \frac{R_A}{R_T} V_{in} \quad \text{where}$$

$$R_T = R_A + R_B$$

When calculating R_A the external resistance across it must be considered unless it is significantly higher than R_A (>10 times at a minimum.)

A voltage divider has a Thévenin equivalent that can make circuit calculations much easier. It is beyond the scope of this sidebar, but can be found in basic circuit analysis text books and on the web, such as:

https://www.electronics-tutorials.ws/dccircuits/dcp_7.html

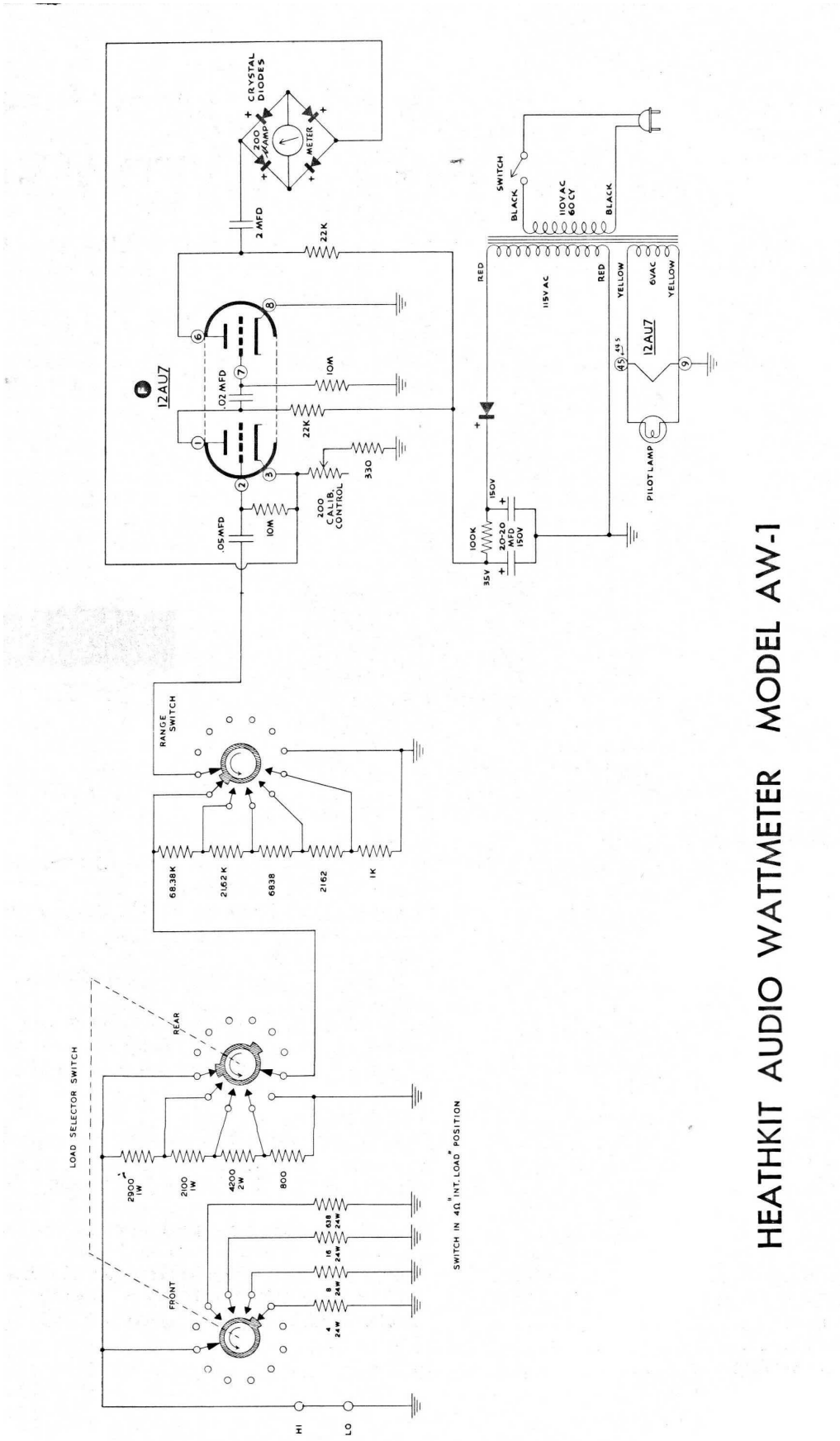

HEATHKIT AUDIO WATTMETER MODEL AW-1
CRYSTAL DIODES
200 MA METER
2 MFD
22K
12AU7
.02 MFD
10M
22K
330
200 CALIB. CONTROL
.05MFD
10M
SWITCH
BLACK
105 VAC 60 CY
BLACK
RED
115 V AC
RED
YELLOW
6VAC
YELLOW
12AU7
PILOT LAMP
100K
35V
20-20 MFD 150V
150V
RANGE SWITCH
68.38K
21.62 K
6838
2162
1K
LOAD SELECTOR SWITCH
REAR
FRONT
2900 1W
2100 1W
4200 2W
800
638 24W
15 24W
8 24W
4 24W
SWITCH IN 4Ω INT. LOAD POSITION
HI
LO

Figure 9

PUZZLER

Answer to the August Puzzler:

Sadly there was only one reply to the Puzzler Fried - WA6WZO challenged us with. It was from Dan, KI6X who answered Macy's. Congratulations to Dan; while incorrect, it was the closest answer received. If you noticed the hint SCP below the photo, it might remind you of South Coast Plaza. I'm surprised more of the members didn't ask for help from their spouse or children!

It was just a coincidence that I was at the Crystal Court section of SCP days prior to receiving this puzzler from Fried and happened to take the bridge over Bear St. and do some window shopping. There I found the display in the window of **Eileen Fisher.** However I wasn't clever enough to think what a good Puzzler this would make! The window display has since been changed.

A New Puzzler:

A colleague recently commented; "Halloween and Christmas must be the same holiday since their dates are the same!"

I replied wisely; "Huh???"

"It's true." he replied, while taking out a sheet of paper and writing on it:

OCT. 31 = DEC. 25

"Oh, you're right!" I replied, "What you wrote is correct."

CAN YOU EXPLAIN WHY THAT IS RIGHT?

Email your answer to puzzler@w6ze.org.

THANK YOU TO THE 2018 BOARD OF DIRECTORS

President
Tim Goeppinger N6GP
Vice President
Dan Violette KI6X
Secretary
Jim Schultz AF6N
Treasurer
Ken Konechy W6HHC
Activities
Ron Mudry W6WG
Membership
Bob Eckweiler AF6C
Public Relations
Tim Millard N6TMT
Technical
Kenan Riley KR6J
Director at Large
Clem Brzoznowski W0MEC
Director at Large
Corey Miller KE6YHX

by Tom W6ETC

RadioActivity
November 2018

NOVEMBER

- ***ARRL Sweepstakes CW:** 2100 UTC Saturday Nov. 2 through 0259 UTC Monday Nov. 4.
- **10-10 Fall Contest, Digital:** 0001 UTC Friday Nov. 9 through 2359 UTC Monday Nov. 10.
- ***ARRL Sweepstakes SSB:** 2100 UTC Saturday Nov. 16 through 0259 UTC Monday Nov. 18.
- ***CQ WW DX / CW**: 0000 UTC Saturday Nov. 24 through 2400 UTC Monday Nov. 25.

DECEMBER

- ***ARRL 160 Meter Contest:** 2200 UTC Friday Nov. 30 through 1600 UTC Sunday Dec. 2.
- ***ARRL 10 Meter Contest:** 0000 UTC Saturday Dec. 8 through 2359 UTC Sunday Dec. 9.
- **RAC Canada Winter Contest:** 0000 UTC Saturday Dec.29 through 2359 UTC Saturday Dec. 29.

*** Indicates club entries are accepted**
**** Indicates team entries are accepted**

Continuing Activity:

- **ARRL International Grid Chase**: January 1, 2018 through December 31, 2018

Reoccurring Activities:

- **Phone Fry** Every Tuesday night at 0230Z to 0300Z
- **CWops Mini-CWT:** Every Wednesday at 1300 to1400 UTC, 1900-2000 UTD and Thursday 0300-0400 UTC
- **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.

Send an email to *Ron W6WG, w6fps@w6ze.org to have your favorite activity or your recent RadioActivity listed in next month's column.*

OCARC
GENERAL MEETING MINUTES
October 19, 2018

The OCARC General meeting was held at the Santa Ana Red Cross Complex on October 19, 2018

Club Officers:
There was a quorum. All officers were present.

The meeting was called to order at 7:02 pm and was followed by the Pledge of Allegiance to the Flag.

The regular business meeting was deferred in favor of the Annual OCARC Auction. Introductions of members and guests were deferred as well.

Program: Annual OCARC Auction.
President Tim, N6GP thanked all for their attendance and welcomed visitors to our auction/meeting.

Tim turned the mike over to Dan, KI6X who read the rules for the upcoming auction.
Nicholas, AF6CF was introduced as Auctioneer for the evening. Nicholas, with the able assistance of Tom, W6ETC and supported by Dan, KI6X, Joel, KM6EMP and Tim, N6TMT, lead a spirited and entertaining auction.

Tim thanked the auction team and all attendees for a successful auction.

Anniversary Mugs:
Tim, N6GP announced that OCARC Anniversary Mugs have been delivered and are available for pick up from Jim, AF6N this evening.

Mugs not picked up at the October Meeting will be made available at the November General Meeting.

Meeting Adjourned at 9:07 pm.

Submitted by *Jim Schultz, AF6N*
OCARC Secretary

OCARC
BOARD MEETING MINUTES
November 3, 2018

The November OCARC Board meeting was held at the Marie Callender's Restaurant at 1821 N. Grand Ave in Santa Ana on November 3, 2018. Meeting called to order at 8:10 am with a quorum.

Roll Call:

President: Tim N6GP, Present
Vice President: Dan KI6X, Present
Secretary: Jim AF6N, Present
Membership: Bob AF6C, Present
Treasurer: Ken W6HHC, Present
Activities: Ron W6WG, Present
Publicity: Tim, N6TMT, Present
Technical: Kenan KR6J, Absent
Directors at Large:
Corey KE6YHX, Present
Clem W0MEC, Present

DIRECTOR REPORTS:

Vice President Report deferred to Programs.

Secretary: Jim AF6N delivered a final accounting of the Anniversary Mug Program. The final count was 22 personal mugs sold and 14 generic mugs purchased as a supply for future thank you gifts. Invoices for mug purchases and FedEx charges were submitted along with a final $75 of sale proceeds.

Membership: Bob, AF6C reported the October OCARC Roster has been completed. One new application has since been received since and will be included in the next roster. Current membership has reached 93 members.

Technical: No current report.

Treasurer: Ken, W6HHC presented the Year to Date Cash Flow report. As of November 1, the club has realized a positive cash flow of $770.73. See the attached Cash Flow Report for details.

Activities: Ron, W6WG deferred his report for New Business.

Publicity: Tim, N6TMT reported restocking OCARC flyers at HRO.

Director at Large: Clem, W0MEC reported that the 10M net conditions were again poor and with only 4 check-ins.

The 2M net conditions were good but attendance suffered from Halloween night activity and was limited to 4 check-ins as well.

Tim,N6GP reported Arnie, N6HC and the VP6D team were forced to leave Ducie Island a day early and are now at Pitcairn Island.

Director at Large: Corey, KE6YHX reported receiving permission to post the "Story of the OCARC" on our website. Corey and Ken W6HHC will make some revisions and post a completed pdf website "Items of Interest" section.

Corey also reports having completed research of the OCARC/OCRC meeting locations for possible use in the next History Presentation.

OLD BUSINESS:

Newsletter Editors: Upcoming RF Newsletter Editors: Kenan, KR6J for November.
Dan, KI6X for December
Tim, N6TMT for January

Programs:

November 16th, 2018
John Stanford, KF6I
"High Voltage Apparatus"

December 7th, 2018
OCARC Holiday Dinner to be held at Mimi's – Tustin

January 18th, 2019
Arnie Shatz, N6HC
"Baker Island DXpedition"

EMCOMM Update: Bob AF6C reports that update of the RF webpage continues but is not yet complete.

Field Day Tower Plate: The tower plate has not been delivered to Atlee.

Winter Field Day: Ron, W6WG reported that the request for site use has been placed with the school district for January 23 thru 27. We currently expect approximately 20 participants and about 3 transmitters for the event.

Ron also reported that he submitted a copy of our RF Newsletter articles to the school district for which they were very appreciative.

Holiday Banquet: Ron W6WG reported confirmation of the December 7 reservation with Mimi's Café for their large room. The dinner price will remain the same as last year, namely, $29 cash or check to Treasurer W6HHC at the November Meeting or $30 via Paypal. See the Banquet page below for details.

Ron will visit Ham Radio Outlet to obtain door prize gifts. He suggested possibly buying one boxed ARRL Handbook and offering single volumes from it as dinner gifts. Other gifts will be presented including Chuck Penson WA7ZZE Heathkit books donated by Bob, AF6C.

Tim, N6GP offered to contact and request Jim Day, W6DF to deliver a short talk recalling the midnight phone call he received from NASA asking for his help.

NEW BUSINESS:

Annual Club Audit: A committee was formed including Tim, N6TMT, Jim AF6N, and the incoming and outgoing Treasurers. The audit will take placed in January, 2019.

Nominating Committee: The nominating committee for the 2019 Board includes: Tim, N6GP, Tim, N6TMT, Ron, W6WG, and Bob, AF6C. A tentative 2019 slate has been drafted and will be published pending confirmation from nominees.

FOR THE GOOD OF THE CLUB:

Paul Nese, KB6OZZ was welcomed as our guest and invited to join OCARC. He comes to us from Whittier and we enjoyed his visit to the meeting.

Tim, N6GP requested that Board members submit nominations for the Good of the Club awards to him by secure email before November 15.

Honorary members were approved unanimously to include Lee Evans, Janet KL7MF, Chip K7JA, and Lifetime members Bob Evans, WB6IXN and Jerry VerDuft, AD0A.

A general discussion of the successful October auction took place and included suggestions for future improvements.

Ron, W6WG related a chance meeting by his daughter with Wayne, W6IRD while conducting a business oriented landscaping meeting.

A motion was passed to cancel the December Board meeting to avoid conflict with holiday activities.

We regret announcing the passing of Michael Abreu, K6KAA SK. Bob, AF6C offered to supply an obituary for the RF Newsletter.

President Tim, N6GP delivered a **State of the Club** address that included:

Concerns for the future such as: Advancing member age -- Lack of female involvement -- Lack of VEC activity -- Need for a By-Laws update -- replacing of roll calls and readings of minutes with Show and Tell activity -- Revise duties of Technical Director possibly to include estates and handling of technical questions.

Positive attributes of the Club such as: Membership has reached a very diverse 93 and includes some very high profile members of the ham community -- Awesome Field Day and Winter Field Day activity -- A good Board working together and committed to the betterment of the club -- A top notch monthly newsletter and website, delivered by rotating editors and contributors.

The meeting was adjourned at 9:20 am in the name of Rev Paul Bittner,W0AIH SK who's mantra, good for us all, was "THINK BIG".

Submitted by:

Jim Schultz AF6N
OCARC Secretary

OCARC YTD Cash Flow

1/1/2018 through 11/1/2018

Category	1/1/2018-11/1/2018
INFLOWS	
Auction In	2,073.75
Badge Income	2.00
Coffee Mug Sales	237.29
Donation	10.00
Dues, Family	50.00
Dues, Family (PayPal)	172.89
Dues, Membership	895.00
Dues, Membership (PayPal)	778.10
Field Day Food Income	422.00
Opportunity Drawing -Monthly	375.00
Opportunity Drawing IN - Christmas	100.00
Refreshments Income	67.83
Troop 440 donation from KM6EMP	65.00
TOTAL INFLOWS	**5,248.86**
OUTFLOWS	
Anniversary Party Food	122.47
Auction Payout	1,812.38
Awards and Plaques	52.55
CA Statement Of Info filing	20.00
Club History Archive	56.24
CU service Fee	20.00
Donation to Troop 440 - from Joel KM6EMP	65.00
Field Day - Flowers	53.88
Field Day - Gas	44.85
Field Day Equipment Repairs	49.48
Field Day Food Reinbursement	657.00
Meals - Board Mtg	12.48
OCARC Historian	122.45
Opportunity Drawing - Monthly	218.80
PO Box Rental	70.00
Postage	11.00
Publicity - OCARC Biz Cards	18.29
Refreshments Expense	73.03
Storage Locker	751.00
Supplies	24.33
Web Site Hosting	152.91
Web Site SSL Fee	69.99
TOTAL OUTFLOWS	**4,478.13**
OVERALL TOTAL	**770.73**

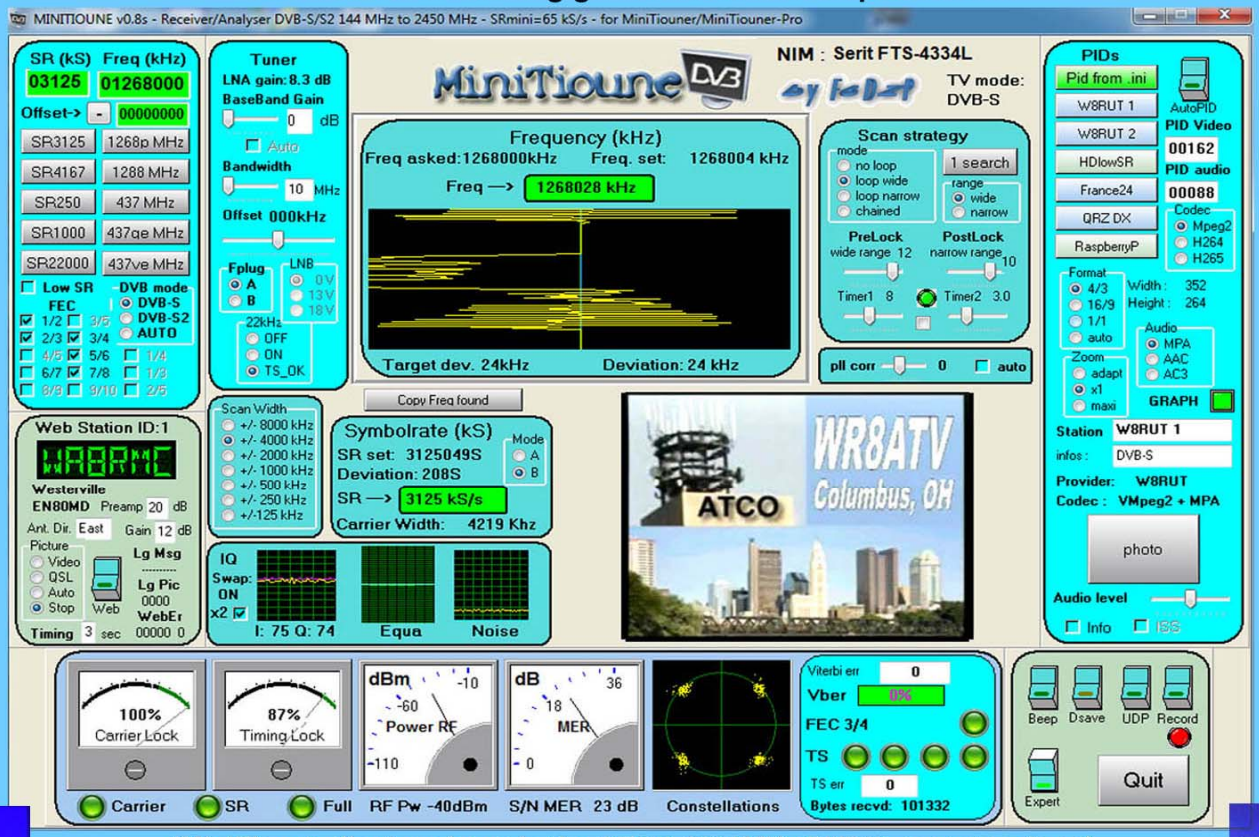
MiniTiouner-Express

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 KSymb/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).