RF

VOL. LX NO. 5 P.O. BOX 3454, TUSTIN, CA 92781-3454 MAY 2019

THE PREZ SEZ
by: Dan Violette

With the April meeting being a week later than usual and the May meeting seeming to be earlier in the month, there is a small window between our meetings. I appreciate our dedicated editors that rotate to put out the newsletter. This month Bob, AF6C, was under the gun with a short turn-around time.

We actually did almost reach room capacity for the April meeting (49 is the room limit with 42 in attendance) and it was great seeing so many come out on a "different" night and support our club and our speakers. Speaking of different nights. **the JUNE MEETING has been moved up to June 14th due to a conflict with Field Day weekend.**

Now Field Day is coming just as fast. We are into the full steam mode in the planning. Remember to volunteer to assist by talking to Tim, N6GP, who is working very hard to get everything in line. At least plan to stop by the FD site during the event and help. We do need to do some serious planning but there is also a need for those that show up to assist. We always have needs for someone to give breaks to operators. At least you will learn more about what is going on so that you may be able to commit more next year! Of course, we need many to assist with the set-up during the day Friday, on Saturday morning, and then teardown on Sunday morning.

I really enjoyed talking with a couple of the newer members last meeting. I hope every club member is willing to assist those that are learning. I also ask those that have a question to ask during our "Ask the Elmer" segment at our business meeting, which is after the break. We have many members with various knowledge that are willing to answer questions along with those that would be willing to go more in depth if needed after or outside the meeting.

Hope to see you all May 17th at the next OCARC meeting.

73,

Dan Viloette - KI6X

President

MAY 2019 MEETING

At the May 17th Meeting Ken Konechy - W6HHC will present a program on the **Baker-to-Vegas Race**. Each year almost 300 law enforcement groups meet to compete in a grueling 120-mile, 20-leg foot race from just north of Baker, Califor-

See: *Speaker* - page 24

**See you FRIDAY,
MAY 17th 2019 @ 7:00 PM
Meeting location on pg. 2**

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The Next OCARC Breakfast & Board Meeting is on Sat. JUNE 1st. 2019.

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Feedback & Corrections:
rf_feedback@w6ze.org

Submit Articles:
editors@w6ze.org

Monthly Events:

General Meeting:
Third Friday of the Month
(except Dec.) at 7:00 PM
The American Red Cross
600 N. Parkcenter Dr.
(west of Tustin Ave. & 4th St)
Santa Ana, CA

Club Breakfast (Board Mtg.):
First Saturday of the
month at 8:00 AM at the
Marie Callender's Restaurant
307 E. Katella Ave.
Orange, CA
(Just east of Glassell St.)

Club Nets (Listen for W6ZE):
28.375 MHz SSB ± QRM
Wed - 7:30 PM - 8:30 PM
Corey, KE6YHX, Net Control

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

VISIT OUR WEB SITE

http://www.w6ze.org

for up-to-the-minute club in-formation, the latest membership rosters, special activities, back issues of ***RF***, links to ham-related sites, vendors and manufacturers, pictures of club events and much, much more.

2019 DUES:

OCARC Membership period is: 1 January to 31 December

Individual New or Renewal:	$30
Family New or Renewal:	$45
Teen New or Renewal:	$15

***New Member Dues** are prorated quarterly and includes a badge:*

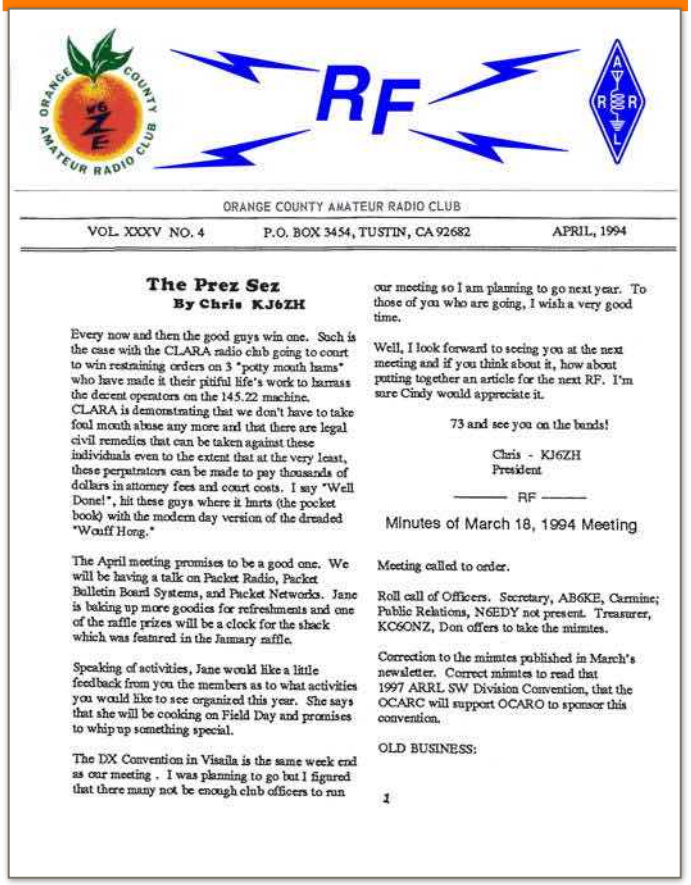
Additional Badges[1]	$3

Use one of our our interactive on-line forms to calculate current prices, join, renew, or order badges:

http://www.w6ze.org/FormsShortcut.html

[1] **$3 or less + mailing. See form.**

- 25 Years Ago in RF Newsletter - April 1994:



ORANGE COUNTY AMATEUR RADIO CLUB

VOL. XXXV NO. 4 P.O. BOX 3454, TUSTIN, CA 92682 APRIL, 1994

The Prez Sez
By Chris KJ6ZH

Every now and then the good guys win one. Such is the case with the CLARA radio club going to court to win restraining orders on 3 "potty mouth hams" who have made it their pitiful life's work to harrass the decent operators on the 145.22 machine. CLARA is demonstrating that we don't have to take foul mouth abuse any more and that there are legal civil remedies that can be taken against these individuals even to the extent that at the very least, these perpatrators can be made to pay thousands of dollars in attorney fees and court costs. I say "Well Done!", hit these guys where it hurts (the pocket book) with the modern day version of the dreaded "Wauff Hong."

The April meeting promises to be a good one. We will be having a talk on Packet Radio, Packet Bulletin Board Systems, and Packet Networks. Jane is baking up more goodies for refreshments and one of the raffle prizes will be a clock for the shack which was featured in the January raffle.

Speaking of activities, Jane would like a little feedback from you the members as to what activities you would like to see organized this year. She says that she will be cooking on Field Day and promises to whip up something special.

The DX Convention in Visalia is the same week end as our meeting . I was planning to go but I figured that there many not be enough club officers to run our meeting so I am planning to go next year. To those of you who are going, I wish a very good time.

Well, I look forward to seeing you at the next meeting and if you think about it, how about putting together an article for the next RF. I'm sure Cindy would appreciate it.

73 and see you on the bands!

Chris - KJ6ZH
President

RF

Minutes of March 18, 1994 Meeting

Meeting called to order.

Roll call of Officers. Secretary, AB6KE, Carmine; Public Relations, N6EDY not present. Treasurer, KC6ONZ, Don offers to take the minutes.

Correction to the minutes published in March's newsletter. Correct minutes to read that 1997 ARRL SW Division Convention, that the OCARC will support OCARO to sponsor this convention.

OLD BUSINESS:

1

May 1994 is one of the issues of RF that we are missing. Can anyone help? Cindy Hughes - KC6OPI was our editor for that year. Instead of the May issue LET'S cover April, since it wasn't covered last month:

In his Prez Sez article , Chris KJ6ZH announced that CLARA had won a restraining order on three "potty mouth hams" who were harassing the 146.22 MHz repeater. He also announced that the April meeting program would be on Packet Radio and the associated Packet bulletin boards and networks. Yes, hams were starting on digital radio back then. Chris also mentioned that his wife Jane was baking goodies for refreshments for the upcoming meeting.

Three upcoming events were covered in the newsletter. First the Visaila DX convention was being held the same weekend as the club meeting. Second, later in April, was the West Coast VHF/UHF Conference held at the Sheraton Cerritos Hotel in Cerritos, CA. the event featured technical talks, vendor exhibits, a swap meet, noise figure measurements, antenna measurements, banquet, breakfast, no-code technician class and free parking! The third event, coming up in late August, was the 1994 ARRL S.W. Division Convention at the Town & Country Convention Center in San Diego, CA.

In 1994 the club nets were very active and Bob Evans - WB6IXN had three and-three-quarter pages of net note activities. Bob's Net Notes was the Facebook of the nineties!

In 1994 the club was meeting at the Anaheim Emergency Operations Center on Vermont Ave. near the railroad tracks. The monthly breakfast and board meeting was being held at Denny's Restaurant on 17th St. just west of Tustin Ave. in Santa Ana.

Here is a list of the officers for 1994:

✳ President:	Chris Breller	KJ6ZH
✳ V. President:	Jim Roberts	N6XTJ
✳ Secretary:	Carmin Fiorello	AB6KE
✳ Activities:	*Jane Breller*	KC6TAM
✳ Membership:	*Bob Buss*	KD6BWH
✳ Public Relations:	Bill Hall	N6EDY
✳ Technical:	Larry Beilin	K6VDP
✳ Member at Large:	**Ken Konechy**	W6HHC
✳ Member at Large:	John Dawson	WA6RND

Current Member(s) in **bold**
Current Associates are underlined.
Silent Keys in *italics*

de AF6C

W6ZE Field Day

Walter Knott Ed Ctr. Buena Park (next to The new Fire Station)

We are planning an ambitious Field Day in the 6A Category, with the additional free VHF station. We need lots of help in the setup, operating and tear down. A sign-up sheet will be passed around at the May meeting.

Buena Park Boy Scout Troop 440 will be joining us this year, and will be providing food for us. The food was excellent last year, and heathy too! Menu and pricing will be announced at our meeting. We are looking forward to their Scouts operating for the Youth Bonus points.

We will have one more planning meeting in early June. .The band captains should be recruiting operators now, so don't be surprised if you receive an email or a call.

Band Captains:	
20m/75m SSB	**Tom - W6ETC & Bob - AF6C**
40m/15m SSB	**Tim - N6TMT**
20m/80m CW	**Dan - KI6X**
40m/15m CW	**Ron - W6WG & Jim - AF6N**
10m/440/satellite	**Tony - N2VAJ**
Digital	**Greg - W6ATB**
VHF	**Peter - NI6E**

Any questions? Email or call me.

Tim - N6GP, Field Day Captain
N6GP@w6ze.org **714-730-0395**

OCARC Officer Position of the Month
Treasurer

Note: *This will be a monthly Newsletter feature highlighting an officer position, his or her duties and where you can assist.*

Duties: The OCARC By-laws list the following as duties of the Treasurer (*edited and updated to account for actual duties not yet updated in the By-laws*).

- ✳ Keep a written record of all monies received or expended by the club. Initiate checks for normal monthly expenses and have them properly signed.
- ✳ Maintain the club's bank accounts at banks approved by the Board.
- ✳ Issue dues receipts as required.
- ✳ Maintain an accurate list of all physical assets of the club and their present location
- ✳ The IRS requires all 501(c)7 Non-profit Corporations to file an online FORM 990-N questionnaire yearly; after the close of the fiscal year and before the following May 15.
- ✳ The State of California requires all 501(c)7 Non-profit Corporations to file a Statement of Corporation, FORM SI-100 (or later form), every two years (during even years).
- ✳ Be issued the OCARC PO Box key, and service the PO Box as required.
- ✳ Perform other duties required by the president or the Board.

Current Officer:
Greg Bohning, W6ATB:

w6atb@w6ze.org

Areas that club members may assist the Officer: Volunteers are needed during times when there are large dealings with the Treasurer. This happens the first 3 meetings of the year for renewals and help is desperately needed at the Auction night when money is flowing freely. Please contact Greg or volunteer when you hear there is an opportunity to assist.

Heathkit of the Month #91:

by Bob Eckweiler, AF6C
AMATEUR RADIO - SWL

Heathkit SBA-300-3 and SBA-300-4 Six and Two Meter Converters

Introduction:

Late in 1963 Heathkit introduced the SB-300 ham band receiver and companion SB-400 transmitter. These are 5-band (pre-WARC) HF SSB/CW radios.

The SB-300 includes provisions for selecting a six-meter or two-meter converter on the front panel. Around late summer of 1964 Heath released the two converters designed to work with the SB-300 as well as other HF receivers with 10 meter coverage. These converters were given the model numbers of SBA-300-3 for six-meters (**Figure 1A**) and SBA-300-4 for two-meters (**Figure 1B**). The SBA-300-1 and -2 designations were already in use for the optional SB-300 AM and CW crystal filters. The converters also work with the later SB-301 receiver, released in 1966. The converters remained in production

Figure 1A: Heathkit SBA-300-3 Six-Meter Converter. Figures: 1A, 1B, 4 and 5 are courtesy of Chuck Penson, WA7ZZE

Figure 1B: Heathkit SBA-300-4 Two-Meter Converter

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

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

6 & 2 Meter Plug-In Converters For SB-300

EXTEND OPERATION OF SB-300 TO VHF! 6-meter model extends coverage of SB-300 from 48 to 54 mc (50 to 52 mc with crystal supplied); 2-meter extends coverage from 142 to 150 mc (144 to 146 mc using crystal supplied). Uses 6DJ8 cascode amplifier for low noise factor & high sensitivity. Applied AGC provision allows strong signal handling capability. Easy to build and install. Use with any receiver providing appropriate voltages and 10-meter coverage.

SBA-300-3 (6 meter), 2 lbs. **$19.95**
SBA-300-4 (2 meter), 2 lbs. **$19.95**

SBA-300-3 SPECIFICATIONS—Sensitivity (signal plus noise-to-noise in db): AM, less than 0.1 uv for 6 db @ 3750 cps bandwidth; SSB, less than 0.1 uv for 10 db @ 2100 cps bandwidth; CW, less than 0.1 uv for 15 db @ 400 cps bandwidth. **Noise figure:** 5 db or less. **Frequency:** Input, 48 to 54 mc (50 to 52 mc with crystal supplied). Output, 28 to 30 mc. **Bandpass:** Essentially flat over any 2 mc segment from 48 to 54 mc. **Image rejection:** 50 db or better @ 6 mc. **IF rejection:** 40 db or better @ 28 mc. **Crystal:** 22 mc ±0.005%, 3rd overtone. **Tube complement:** 6DJ8 cascode RF amplifier, 6EA8 oscillator-mixer. **Power requirements:** 120 v. @ 12.5 milliamperes, 6.3 v. AC @ 815 milliamperes. **Dimensions:** Overall, 2⅞" W x 5¾" L x 3¾" H.

SBA-300-4 SPECIFICATIONS—Sensitivity: (signal plus noise-to-noise in db) AM, less than 0.2 uv for 6 db @ 3750 cps bandwidth; SSB, less than 0.2 uv for 12 db @ 2100 cps bandwidth; CW, less than 0.2 uv for 20 db @ 400 cps bandwidth. **Noise figure:** 7 db or less. **Frequency:** Input, 142 to 150 mc (144 to 146 mc with crystal supplied); output, 28 to 30 mc. **Bandpass:** Essentially flat over any 2 mc segment from 142 to 150 mc. **Image rejection:** 80 db or better at 88 mc. **IF rejection:** 50 db or better at 29 mc. **Crystal:** 38.67 mc ±.003%, 3rd overtone. **Tube complement:** 6DJ8 casade RF amplifier, 6EA8 oscillator-tripler-mixer. **Power requirements:** 130 V. DC @ 12.5 milliamperes, 6.3 V. AC @ 815 milliamperes. **Dimensions:** Overall; 2⅞" W x 5¾" L x 3¾" H.

Figure 2: An early ad for the SB-300-3 and SB-300-4 converters (1966 Catalog 810/60A)

until shortly after the SB-301 receiver was replaced with the SB-303 solid-state receiver in 1970. The SBA-300-3 and SBA-300-4 each sold for $19.95 from the factory throughout their lifetime. The price at a retail Heathkit store was $4.00 higher. **Figure 2** is an ad from a 1966 Heathkit catalog.

Two screws mount each SBA-300 series converter to the outside rear cabinet of an SB-300 or SB-301 receiver in existing holes[1]. Each converter has an octal plug at one end and an octal socket at the other end. If two converters are used, they can be plugged directly together before mounting. A short jumper cable from the octal socket on the rear of the receiver to the exposed octal plug provides power and AGC voltage. The output connections are short RCA to RCA coax jumpers that go to the VHF-1 or VHF-2 inputs on the rear of the receiver. Parts for the power cable and antenna jumper cable are included in each kit along with a spare RCA plug for the VHF antenna input connection.

SBA-300-3 (-4) Converter Overview

The two SBA-300 converters each measure 2-5/8" W x 5-3/4" L x 3-3/4" H. They are an open frame design with two tubes in shields as well as alignment adjustments mounting outside the enclosed chassis. When mounted to the SB-300 or SB-301 the tubes are horizontal and the depth of the receiver increases by 3-3/4". Rubber feet are also included with each kit so it may sit on a table or shelf when used with a third party receiver. Two RCA connectors on each converter are for RF input and output. The input connects to the VHF antenna (through a user supplied antenna relay if the receiver is used with a VHF transmitter).

While designed for the SB-300/301 receivers, the SBA-300 converters work with any receiver that covers 28 - 30 MHz. It is convenient if the receiver can also supply 130 VDC at 12.5 ma and 6.3VAC at 815 ma. If not, a simple power supply can be built to supply the power externally. On the front of the SB-300 and SB-301 a **CONVERTER** switch selects either **VHF 1**, **VHF 2** or **HF**. It routes DC and filament power to the selected converter as well as connecting the correct converter to the receiver's antenna input.

The converters cover any two megahertz segment of their band, depending on the crystal installed in the converter. The factory supplied crystal covers the lowest two-megahertz of the six or two meter ham band. With the proper crystal, the converters can cover more than the ham band. SBA-300-3 covers 48 - 54 MHz[2] and the SBA-300-4 covers 142 - 150 MHz.

Let's take look at each converter separately. The common circuitry will be pointed out.

SBA-300-4 2-Meter Converter Overview

The two-meter converter will be covered first. **Table I** presents both converter's specs. Both converters use two dual-section vacuum tubes: a 6DJ8 dual triode provides RF amplification, and a 6EA8 pentode/triode provides mixing and the crystal controlled oscillator, and includes a frequency tripler for 2-meters.

Power for the both converters is provided through the octal plug. The pinout is shown in **Table II**. All the pins, except pin-5, which is not used, are directly connected to the octal socket on the other end of the chassis to allow daisy-chaining with either converter connected first. The 2-meter SBA-300-4 takes its B+ from pin-6 and its filament power from pin-8. If the converter is connected to the SB-300 or SB-301 receiver it will only receive power when the receiver's front panel CONVERTER switch is in the VHF-1 position. Note that when moving the switch to the VHF 1 or VHF 2 position that converter's filaments

PARAMETER	SBA-400-3	SBA-400-4
Sensitivity (S+N/N):		
AM @ 3.75 KHz BW	<0.1µV/6 db	<0.2µV/6 db
SSB @ 2.1 KHz BW	<0.1µV/10 db	<0.2µV/12db
CW @ 0.4 KHz BW	<0.1µV/15 db	<0.2µV/15 db
Noise Figure:	< 5 db	< 7 db
Input Frequency:	48 - 54 MHz	142 - 150 MHz
(With supplied Xtal):	50 - 52 MHz	144 - 146 MHz
Output Frequency:	28 - 30 MHz	28 - 30 MHz
Supplied Crystal:	22.000 MHz	38.66666 MHz
Xtal. Tolerance:	±0.005%	±0.003%
(Third Overtone type)		
Image Rejection (db):	>50 @ 6 MHz	>80 @ 88 MHz
IF Rejection (db):	>40 @ 28 MHz	>50 @ 29 MHz
PARAMETER	**FOR BOTH UNITS**	
Bandpass:	Essentially flat over any 2 MHz segment of input range.	
Tube Complement:	6DJ8 Cascode RF Amplifier 6EA8 OSC[A] - Mixer	
Power Requirements:	130 VDC 12.5 ma. 6.3 VAC 815 ma.	
Dimensions:	2-5/8" W x 5-3/4" L x 3-3/4" H	
Net Weight:	10-1/2 ounces	

Note A: Oscillator - Tripler for SBA-400-4

TABLE I :SBA-300-3 / -4 SPECIFICATIONS

need to come up to temperature before reception will begin. All power is disconnected from a converter unless it is selected.

Pin #	Function	Wire Color
1.	VHF-2 6.3 VAC Filament	YEL
2.	Power Common	BLK
3.	VHF-2 130 VDC B+	BRN
4.	AGC voltage	WHI
5.	Not Used	ORG
6.	VHF-1 130 VDC B+	RED
7.	Power Common	GRN
8.	VHF-1 6.3 VAC Filament	BLU

TABLE II :SBA-300-3 / -4 Power Connector

Figure 3 is a schematic of the SBA-300-4 two-meter converter, **Figure 4** is an internal photo and **Figure 5** is a block diagram. With the converter powered up and connected to an appropriate antenna, signals are amplified by V1 which is wired as a 'cascode'[3] amplifier. The cascode amplifier consists of V1A, a common cathode amplifier and V1B a common grid amplifier with their B+ chain in series. Between the two is a small inductor L_N (actually a small inductive 0.9Ω resistor) that is all that is needed for neutralization. The cascode amplifier offers high gain (without the noise of a pentode amplifier), a low noise factor, high bandwidth (due to a reduction in input capacitance caused by the Miller effect[3]), and simple neutralization (if needed). These traits make the cascode amplifier common for VHF/UHF front-end amplifiers.

The antenna input is coupled to the cascode amplifier by a broadly tuned circuit consisting of L2 and C2. The antenna signal is fed to a tap on L2 to match the 50Ω antenna impedance. L1 and C1 form a trap in the 88 MHz region. This trap is adjusted to reduce any interference that may occur from a nearby FM broadcast station, as discussed later.

On the SBA-400-4 the output of the cascode amplifier is fed to V2A, a triode mixer through a bandpass transformer consisting of L3, L4, C7 and C8. This transformer passes 143 - 149 MHz signals while rejecting other frequencies amplified by the cascode amplifier, effectively bypassing them to ground.

On the SBA-400-4 V2B, the pentode section of the 6EA8 is a crystal oscillator. It also acts as a frequency tripler. The screen grid acts as the plate for the crystal oscillator circuit and its associated tuned circuit (L6 and C14) is at the crystal frequency. However, the tuned circuit connected to the plate (L7 and C15) is tuned to the third harmonic of the crystal - 116 MHz with the supplied crystal

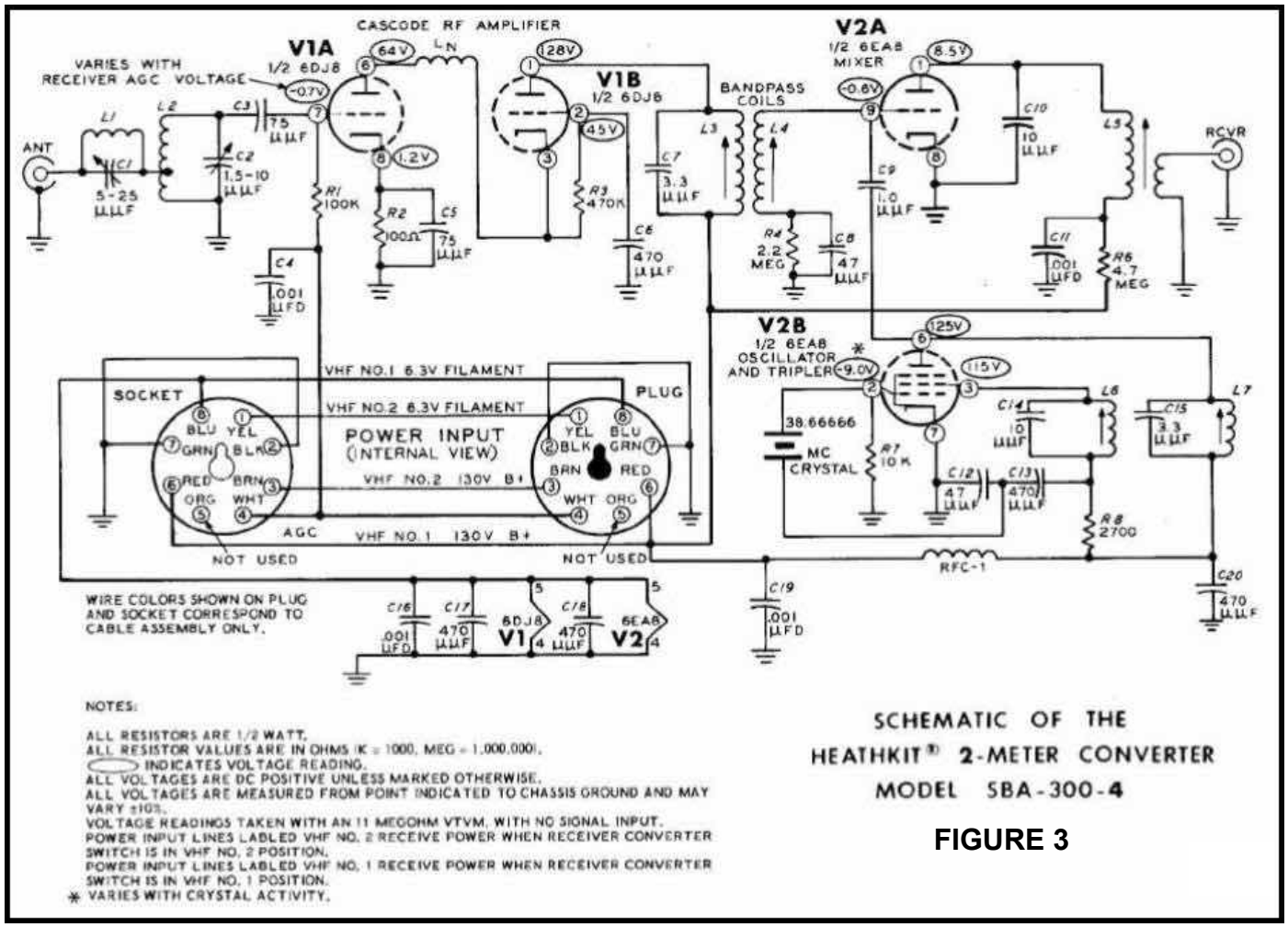
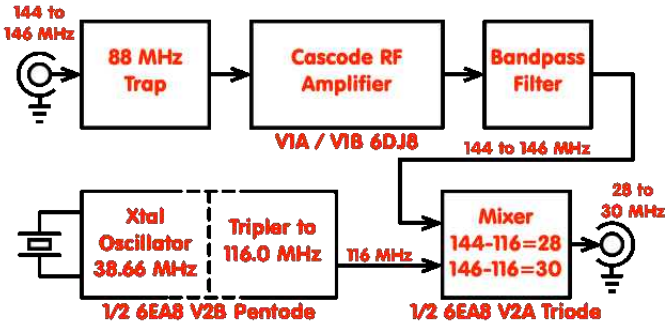


Figure 4: Inside view of the SBA-300-4 - 2-Meter Converter.
Photo courtesy of Chuck Penson, WA7ZZE

(38.66666 MHz.) The 116 MHz frequency is coupled through C9 to the grid of the mixer V2A alongside the signal from the bandpass transformer. In the mixer one of the products produced is the difference between the signals in the 144 to 146 range and 116 MHz. converting those signals into the range of 28 to 30 MHz. Other crystals may be used for different coverage as shown in **Table III**. Unwanted products from the mixer are rejected by the tuned circuit L5 and C10. The link coil of L5 provides the correct impedance for the receiver input.

An additional product of the mixer is the another difference frequency; thus frequencies in the 88 - 86 MHz range will also mix with 116 MHz and provide output in the 28 - 30 MHz range with the supplied crystal[4]. This "image" range borders the FM broadcast band (88 - 108 MHz). Worse yet, if you are using a custom 39.4 or 40.0 MHz crystal the image frequency range will be inside the FM broadcast band. A strong local FM station or two can create interference to a desired receive frequency. The trap of C1 and L1 can be tuned to the interfering signal to reduce it significantly, if not altogether. The trap is broad enough that it can be effective on two reasonably close signals by tuning it between them. For the provided crystal the manual recommends the trap be tuned to 88 MHz



Heathkit SBA-300-4 Block Diagram (2M)

Figure 5

unless warranted by a specific interfering signal. The manual discusses how to adjust the trap.

Alignment of the SBA-300-4 two-meter converter can be accomplished without equipment other than a compatible receiver. Heath claims these preliminary adjustments should provide performance equal to or better than the specifications. However, instructions are included for a full instrument alignment requiring an RF signal generator that covers 142 - 150 MHz and a VTVM. This alignment will assure optimum performance.

SBA-300-3 6-Meter Converter Overview

The six-meter converter is physically very similar to the two-meter converter both mechanically and physically. **Figure 5** is an inside photo of the 6-meter converter and **Figure 7** is the schematic and **Figure 8** is a block

Input Range	Crystal Freq.	Tripler Freq.	Output Range
142 - 144	38.00000	114	28 - 30
144 - 146	38.66666*	116	28 - 30
146 - 148	39.33333	118	28 - 30
148 - 150	40.00000	120	28 - 30

All frequencies are in MHz.
* Crystal supplied with kit

TABLE III :SBA-300-4 Crystal Options

Input Range	Crystal Freq.	Tripler Freq.	Output Range
48 - 50	20.0	114	28 - 30
49 - 51	21.0	116	28 - 30
50 - 52	22.0*	118	28 - 30
51 - 53	23.0	120	28 - 30
52 - 54	24.0	120	28 - 30

All frequencies are in MHz.
* Crystal supplied with kit

TABLE IV :SBA-300-3 Crystal Options

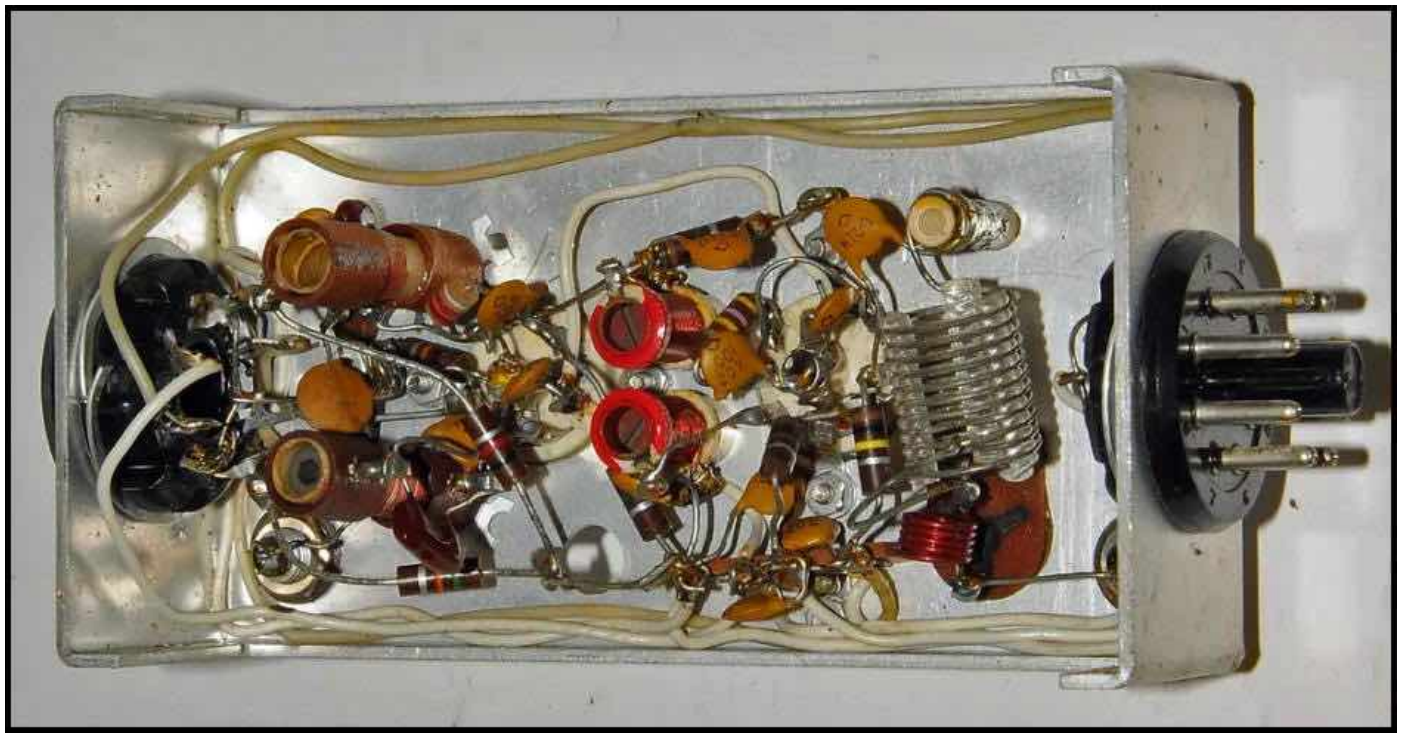


Figure 6: Inside view of the SBA-300-3 Six-Meter Converter (WA7ZZE - credit)

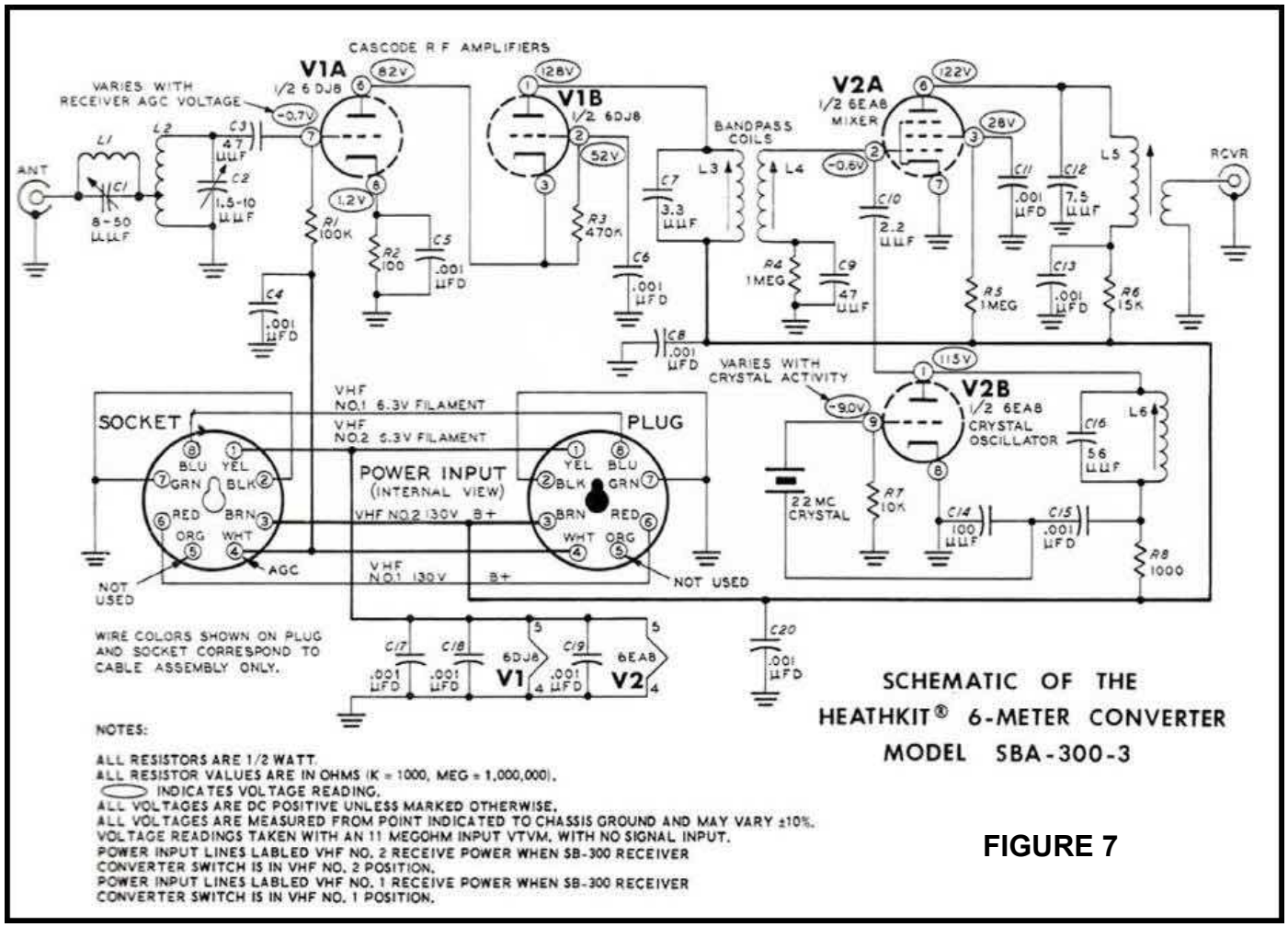


FIGURE 7

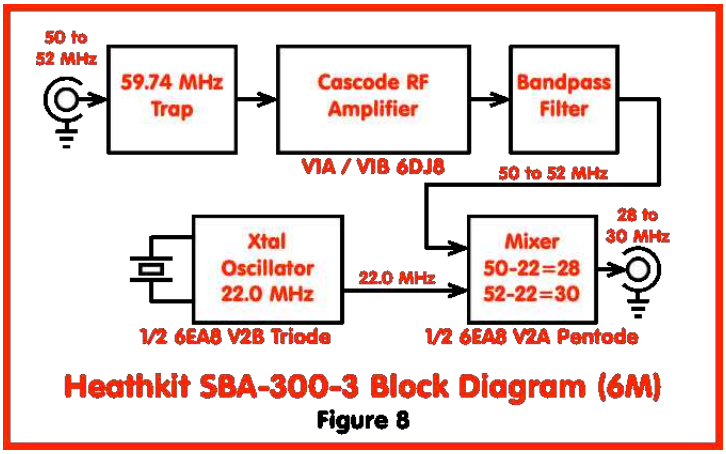


Figure 8

diagram. The major differences, besides those involving tuned circuits, are the input trap and the lack of a tripler as part of the crystal oscillator. This allowed the designer to swap sections of the 6EA8 tube (V2). In the six-meter converter the oscillator now uses the triode section and the mixer uses the pentode section. The trap is tuned to the 59.75 MHz (Old CH-2 sound carrier), which if strong will create a spurious signal at 28.025 MHz.

The SBA-300-3 cascode amplifier lacks L_N as neutralization isn't needed at the lower frequency. Otherwise the circuit is similar, with only the capacitors being larger due to the lower frequency.

The crystal oscillator circuit (V2B) operates at 22 MHz and its output is directly injected into the mixer. Thus the triode section is used, allowing the pentode section to be used for the mixer. Output of the crystal oscillator is tuned by L6 and C16 and coupled to the grid of V6A through C10 (2.2 pf).

The mixer uses the pentode section of V2A. The amplified 6-meter signal, after passing through the bandpass filter similar to that used in the 2-meter converter, is coupled to the grid of the mixer (V2A) along with the crystal oscillator signal. One output from the mixer is the difference between the desired signal range of 50 - 52 MHz and the 22 MHz oscillator, or 28 - 30 MHz. The broadband output tuned circuit allows 28 - 30 MHz to pass while attenuating others out side that range.

Power to the SBA-300-3 comes in on pins 1 (6.3 VAC filament power) and 3 (130 VDC B+ power) of the octal connector, allowing the six-meter converter to be powered separately from a daisy-chained two-meter converter.

Like the two-meter converter, the SBA-300-3 can use different crystals to cover other segments of the six-meter band as shown in **Table IV.**

Purchasing Crystals for the SBA-300-3/-4:

Vendors who manufacture custom crystals have become a rare commodity. The specifications for the crystals required for the two converters is given in **Table V**. Information on the three known vendors are given in the notes at the end of this article. Often a minimum purchase is required, and the price may be substantial. Two sources are Bomar Crystals[5] in Middlesex, New Jersey. and QuartSLab[6] in England. AF4K[7] also sells common crystals, though he doesn't manufacture them, he does stock many common

Crystal Specifications from the Heathkit Manuals

Specification	SBA300-3	SBA300-4
Manual P/N:	595-706	595-712
Manual Date:	7/18/1969	1/19/1968
Holder:	HC-6/U	HC-6/U*
Load Capacitance (C1)	12.8 pF	19.1 pF
Internal Capacity (Co)	6 pf max.	7 pf max.
Series Resistance (Rs)	30Ω max.	
Drive Level:	8 mW	10 mW*
Tolerance:	±0.005%	±0.003%
Mode of Operation:	3rd Overtone	

* Not stated, or incorrect in manual

Table V

frequencies and crystals for Collins, Drake and Heathkit,.

Operating the SBA-300-3/-4:

My history with the SBA-300-4 two meter converter began back on the 1st of February in 1969 when I purchased a kit from the local Heathkit store on Ball road in Anaheim. The kit cost $23.95, about 20% above the mail-order price. The kit assembled easily in an evening or two and was aligned using just the simple instructions in the manual.

For a short period I operated my SB-301, to which the SBA-300-4 was mounted on 2-meter CW and AM. The transmitter was an old Ameco TX-62. I didn't have a VFO, and so I was crystal bound with just two crystals, one for CW and one for AM phone. The receiver with the converter worked well and seemed very sensitive. I spent some time listening to hams ragchewing on two-meter SSB. My impression of the converter with the SB-301 is that signals were easy to tune in and seemed stable, though some of the stations, especially on CW and AM tended to drift (I attribute that to their transmitter); on my receiver most 2-meter SSB signals, with their more stable VFOs, seemed rock solid on frequency.

The converters only cover a two MHz portion of their band, and the factory supplied crystals result in coverage of the low end of each band. This typically works out fine, since it is in that band section that most CW, SSB and AM operations take place. Since the SB-300 / 301 receiver is not designed to receive FM there is little value receiving in the upper portion of the band since most of the activity there is FM.

I never made a measurement of the sensitivity, but it seemed to be very high. I did realign the converter using my old PACO G-30 signal generator (that covered the two-meter band) and my Heathkit V-7A VTVM. Little difference if any was noticed afterwards.

Credits:

The schematics were taken from the Heath manuals. Many photos were supplied by Chuck Penson - WA7ZZE, and a couple are from eBay or other unknown sources. The block diagrams were rendered in *Graphic* for the Mac by the author.

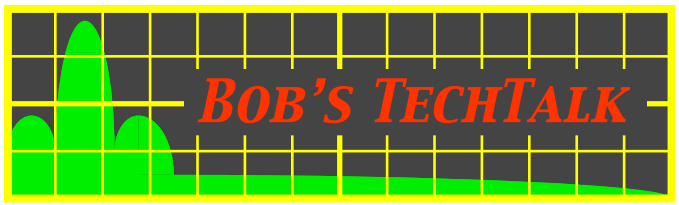
Final Comments:

I've been tied up with life and not able to spend too much time thinking about Heathkits for the past three-and-a-half months. Now I can get back to writing articles and completing the restoration of an S-40B and an SX-71 (Run-4 model with 15 meters). I hope to be back to nearly monthly articles soon.

73, from AF6C

Notes:

1. Some very early SB-300 cabinets lack mounting holes for the converters. HA detail in both of the manuals may be used for locating and drilling the four mounting 5/32" holes in the rear of the cabinet.
2. The pre-digital channel 2 covered 54 to 60 MHz no reception over 54 MHz would be practical.
3. A short discussion of the Cascode amplifier and the Miller Effect is included in this month's TechTalk column.
4. When the 116 MHz signal mixes with an 88 MHz FM station the result is 116 - 88 or 28 MHz; similarity: 116 - 86 = 30 MHz.
5. Bomar Crystals: :http://bomarcrystal.com/crystals.html
6. QuartSLab: http://www.quartslab.com
7. AF4K: http://af4k.com/crystals.htm



Number 52: The MILLER EFFECT and the CASCODE AMPLIFIER:
(TechTalk #126)
by: Bob Eckweiler - AF6C

Introduction:
The Miller Effect is an electronic principle where the capacitance at the input of a common cathode triode amplifier increases with the gain of the amplifier. If the impedance driving the amplifier is high, then the increased capacitance can reduce the bandwidth, especially at high frequencies. There are ways to reduce the Miller effect, one being the use of a cascode amplifier.

In the Heathkit of the Month #91 article both the Miller Effect and the Cascode amplifier are mentioned. Here are explanations of what the Miller Effect is and what the Cascode Amplifier can do to reduce its effect.

The Miller Effect:
The Miller Effect was documented by John Milton Miller (1888 - 1968). while he was experimenting with triode vacuum tubes. His distinguished career is well documented on Wikipedia. Miller published a paper in 1920 on the effect later named for him. While early on, the Miller Effect was not a problem in most circuits, as frequencies increased the added capacitance detracted from the gain and bandwidth. Today, the Miller Effect also occurs with bipolar and field effect transistor amplifiers.

Figure 1 shows a simple triode vacuum tube amplifier. An AC signal from the generator (*GEN*) is coupled to the grid of the triode with capacitor C_{IN} and the cathode is bypassed with capacitor C_K. Assume both of these capacitors are large enough to have little, if any, effect on the circuit. R_1, R_2 and R_K set the bias for the triode amplifier. C_{gp} and C_{gk} represent the internal capacitance between the grid and plate,

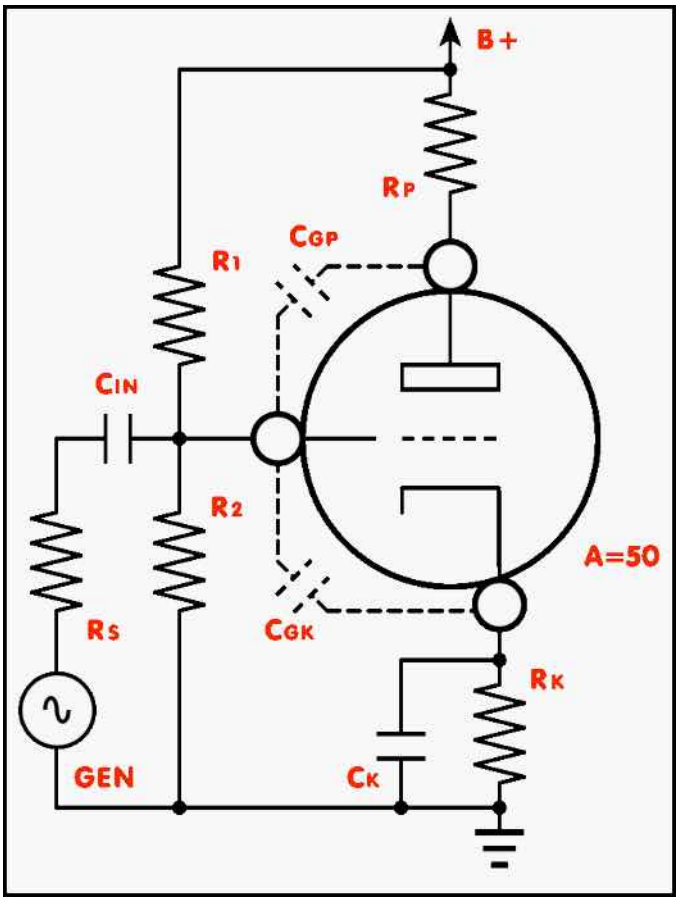


Figure 1: Typical small signal triode amplifier.

and the grid and cathode, respectively. Let's assume the circuit has a gain of 50. *GEN* and R_s represent the signal source and source resistance; this usually represents the previous stage or the antenna (or other) driving circuit.

Figure 2 is an AC equivalent of Figure 1. C_K and C_{IN} of Fig. 1, being large at the input frequency, are treated as shorts. Assuming the input is a signal of 10 mV peak-to-peak (P-P), and the amplifier gain is 50, a 500 mV P-P signal appears at the plate of the tube. A common cathode amplifier creates a signal at the plate that is 180° out of phase with the signal at the grid (When the grid is at the negative peak of its cycle, the signal at the plate is at its positive peak.)

If you look at C_{gp} you'll notice that when the voltage on the grid side changes, the voltage on the plate side changes 50 times more, and in the opposite direction. At the grid terminal this

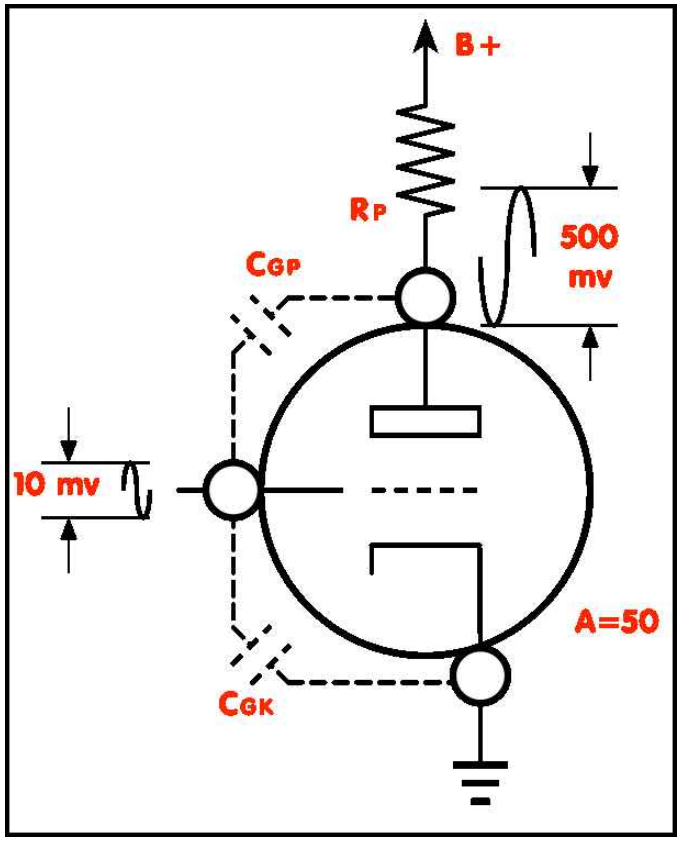


Figure 2: Typical small signal triode amplifier.

makes the effective grid capacitance (C_{eff}) much larger than the C_{gp} value. The equation is:

$$C_{eff} = C_{gk} + (1 + |A|)C_{gp} \qquad \text{eq. 1}$$

Where A is the actual amplifier gain. If the cathode resistor is reasonably well bypassed C_{GK} doesn't change. The vertical bars on either side of A in equations signify "the absolute value" (i.e. treat A as always a positive value).

Typical values for triodes for C_{gp} and C_{GK} are between 1.4 and 2 pF and 1.6 and 4 pf respectively. These seem like pretty small values , but with the Miller Effect C_{eff} will increase that value 10 to possibly 100 fold. If the source impedance is 5 KΩ and the Miller capacitance is 15 pF, the amplifier gain will be down 3 dB at a mere 2.1 MHz.

Solutions for the Miller Effect:

By placing another grid that has a low AC impedance (Capacitively bypassed to ground at the operating frequencies) between the control grid and plate the Miller Effect can be reduced substantially. Yet, the two-grid tetrode introduces a problem of its own, secondary emission; the solution is to add a third grid which results in the common pentode tube. At audio and HF radio frequencies the pentode performs very well and was used heavily throughout the electronic industry in the vacuum tube era. It does have some drawbacks though, - at VHF and UHF frequencies it becomes noisy. This noise is not so noticeable at HF frequencies because it is masked by the prevalent external noise. Triodes are a lot quieter, but not good at those higher frequencies due to the Miller Effect. A solution is the cascode amplifier.

If you are not into math, feel free to skip to the section titled "The Cascode Ampifier"

Some Basic Vacuum Tube Information:

On data sheets the maximum gain of a triode tube is usually expressed by its amplification factor (mu or μ). The gain of a common cathode triode amplifier is given as:

$$A_{CK} = \mu \frac{R_L}{r_P + R_L} \qquad \text{eq. 2}$$

Where A_{CK} is the actual gain, R_L is the load resistance, which is R_P in parallel with the load of the next stage, and r_P is the tube plate resistance (μ and r_P are given on the tube data sheet). Note that A can never be larger than μ, thus μ, the amplification factor, is the largest possible gain of a specific triode. Variables are listed and defined in **Table I**.

Amplification factor μ is determined by measuring the plate current change with a small change in grid voltage, then holding the grid voltage constant at its initial value and increasing the plate voltage until the same increase in plate current is reached. The amplification factor is the second voltage change divided by the first voltage change:

$$\mu = \frac{\Delta V_P}{\Delta V_G} \quad \text{for the same } I_P \qquad \text{eq. 3}$$

As an example, a triode is biased for nominal operation. The grid voltage is then increased 250 mV and the grid current increases by 4

mA. Next, the grid voltage is restored to its initial value and the plate voltage is raised until the plate current increases by 4 mA. The plate voltage increase is then noted, and say it's 4.5 volts. The amplification factor (μ) is then 4.5 V divided by 0.25 V or 18. μ has no units; it is a pure number or ratio. Since a vacuum tube isn't linear over its operating range, μ can vary somewhat depending on the initial bias point.

Plate resistance r_P is determined by the amount the plate current changes with a change in plate voltage with the grid voltage held constant:

$$r_P = \frac{\Delta V_p}{\Delta I_p} \quad \text{for the same } V_G \qquad \text{eq. 4}$$

Transconductance (g_m) is another parameter of a vacuum tube that is used in calculating gain. It is more commonly associated with tetrodes and pentodes since their plate current changes much less with changes in plate voltage due the action of the other grids. Thus they have extremely high values of μ, but also high values of r_P making gain calculations using μ problematic. Transconductance is a measure of the change in plate current with a change in grid voltage, with the plate voltage held constant:

$$g_m = \frac{\Delta I_P}{\Delta V_G} \quad \text{for the same } V_P \qquad \text{eq. 5}$$

Since g_m is current divided by voltage it is conductance, the reciprocal of resistance and is measured in mhos. Since g_m is a small number it is commonly specified in μmhos.

The gain of a common cathode tube amplifier, expressed by its transconductance is:

$$A_{CK} = g_m \frac{r_P R_L}{r_P + R_L} \qquad \text{eq. 6}$$

Comparing eq. 6 with eq. 2 you get:

$$g_m \approx \frac{\mu}{r_P} \qquad \text{eq. 7}$$

Note the approximate equal (≈) notation. Since μ and g_m are determined by different means, the equation is a first order approximation, but still reasonably close. If r_P is much greater than R_L then eq. 6 becomes:

$$A_{CK} \approx g_m R_L \qquad \text{eq. 8}$$

A common grid amplifier is also part of the cascode amplifier. This amplifier offers low input resistance and gain similar to the common cathode amplifier:

$$R_{IN} \approx \frac{1}{g_m} \qquad \text{eq. 9}$$

$$A_{CG} \approx g_m R_L \qquad \text{eq. 10}$$

The Cascode Ampifier:

Figure 3 shows a basic cascode amplifier. The word cascode comes from the fact the circuit uses two ***casc***ading triodes to act as a pent***ode.*** V1 is a common cathode amplifier, but instead of a load resistor, the plate is connected to the input of a common grid amplifier, V2, whose input resistance is given in eq. 9. The gain of the V1 circuit is given in eq. 8, with R_L being R_{IN} . This math is simple, assuming the two tubes are similar so the g_m of the two tubes are the same:

$$A_{V1} \approx g_m \left(\frac{1}{g_m} \right) = 1 \qquad \text{eq. 11}$$

The common grid amplifier V2 has a gain as given in eq. 10 where R_L is the V2 plate resistor in parallel with whatever the load resistance of the next stage is. The total gain of the cascode amplifier is approximately identical to the common cathode amplifier. What has changed is the input capacitance of the amplifier.

Since the gain of the first stage is now one, the capacitance due to the Miller Effect (eq. 1) is just:

$$C_{eff} = C_{gk} + 2C_{gp}$$

This results in a lot lower input capacitance and results in much higher frequency response. Since the common grid amplifier V2 has no signal on its grid, only DC bias with any AC components shunted to ground by the grid bypass capacitor, there is no Miller Effect associated with V2.

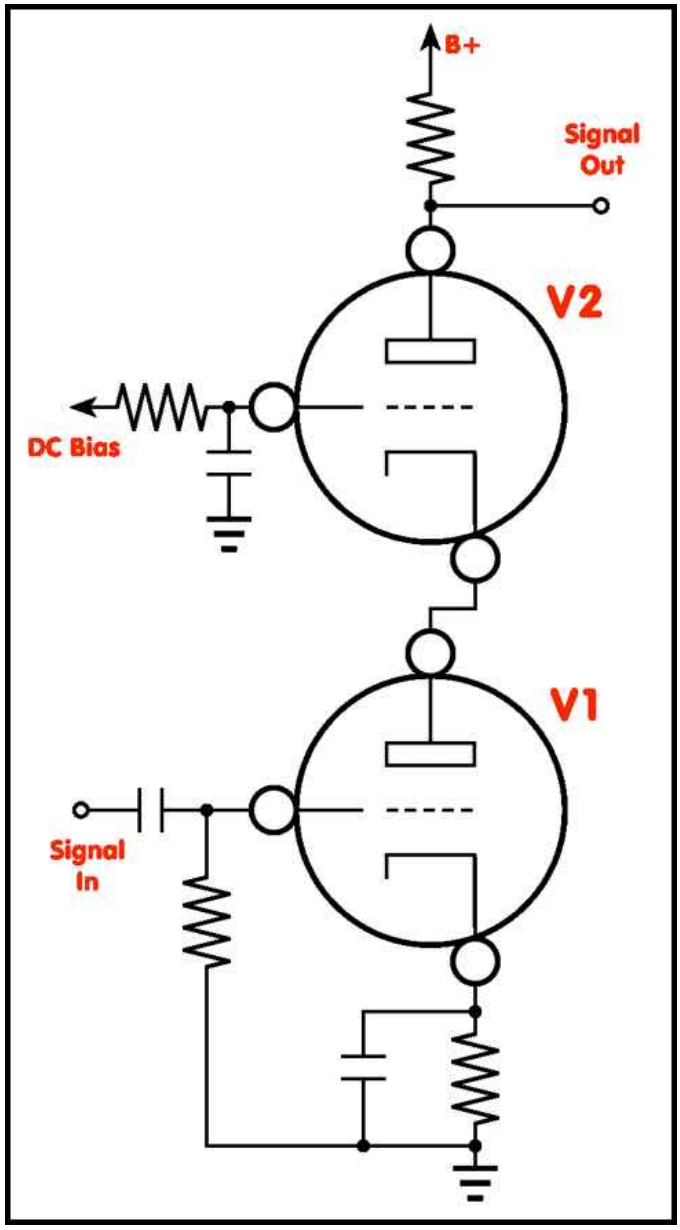


Figure 3: Basic cascode amplifier circuit.

Comments:

While a pentode, with its much lower grid to plate capacitance would also provide low input impedance and possibly even more gain, it will also tend to generate more noise. While at HF frequencies this noise would be indistinguishable from atmospheric noise, at VHF and UHF frequencies this would not be the case without using a more expensive vacuum tube and additional circuitry.

The cascode amplifier is made even more practical due to the availability of dual triodes in a single envelope eliminating the need for a second tube socket, and assuring the two triodes are similar. The added bias for V2 is no more complex than supplying screen voltage to a pentode, and can be tapped off the connection between the the plate of V1 and the cathode of V2, with a suitable resistor and bypass capacitor.

73, from AF6C

Mathematical Variable & Figure Description Table

A_{CG}	Common grid amplifier gain. See eq 10.
A_{CK}	Common cathode amplifier gain. See eqs. 2, 6 and 8 and associated text.
A_{V1}	Gain of the first cascode triode.
C_{eff}	Effective grid capacitance as defined by eq. 1
C_{gk}	Vacuum tube interelectrode capacitance between the grid and the cathode.
C_{gp}	Vacuum tube interelectrode capacitance between the grid and the plate.
C_K	Cathode bypass capacitor to ground.
C_{IN}	Grid input coupling capacitor.
g_m	Transconductance as defined by eq. 5.
I_P	Plate current.
R_1, R_2	Typical biasing resistors.
R_K	Cathode biasing resistor.
R_L	Plate load resistance. Usually R_P in parallel with the load imposed by the next stage.
r_P	Tube plate resistance defined by eq.4.
R_P	Plate resistor (usually to B+).
R_S	Input source resistance. In Fig. 1 the output resistance of GEN.
μ	Amplification factor as defined by eq. 3.
V_G	Grid voltage.
V_P	Plate voltage.

Table I

OCARC
GENERAL MEETING MINUTES
APRIL 26th, 2019 (Special Date)

The OCARC General meeting was held at the Red Cross Complex in Santa Ana on April 26, at 7:00 PM. A total of 42 members and visitors attended. A quorum of club officers for this meeting was achieved with all directors present.

Program:

The main April program was presented by Arnie N6HC & assisted by Chip K7JA on

"Using FT8 Mode in Contesting..."

Arnie N6HC explained that the new DXpedition mode for FT8 (sometimes called "foxes and hounds") allows DX stations to process as many as 5 contacts simultaneously. Arnie declared that FT8 DXpedition mode is a "game changer" allowing many more contacts/hour… especially compared to RTTY mode QSOs.

Both Arnie and Chip agreed that FT8 software for hams is free and easy to use. Just download the software and documentation from

https://www.wsjtx.net/home/ft8-mode.html

Arnie noted that FT8 seems to be drawing 20M station activities away from normal modes (like CW and phone) over to FT8 "watering holes".

Business Meeting:

- **Date for General Meeting in June**

Because the June normal third-Friday meeting date conflicts with Field Day weekend, the board is discussing moving the June General Meeting to Friday, June 14, the **second** Friday of the month.

- **Summer FD 2019 Plans**

FD co-chair Tim N6GP announced that the first Field Day planning meeting was held on April 23rd and was a great success. The current plan is to operate as CLASS 6A. Troop 440 is again planning to join OCARC during Field Day and will cook meals during FD at reasonable prices.

OCARC FD will be again held at the Walter Knott Education Center on LaPalma Ave in Buena Park, just one block west of Knott's Berry Farm Amusement park.

- **WFD 2019 updates**

Tim N6GP and Dan KI6X announced that the Winter Field Day organization had officially corrected the OCARC score during WFD 2019 to be the top outdoor score during the January event.

Chip K7JA, in appreciation of the tremendous OCARC team effort for WFD, presented club Prez Dan KI6X with a "blue ribbon" certificate/ flag of the club's achievement.

Chip K7JA presented Dan KI6X with an award for first-place "outdoors" Winter Field Day effort.

Submitted by *Ken Konechy - W6HHC*

OCARC Secretary

OCARC
BOARD MEETING MINUTES
MAY 4th. 2019

The OCARC Board meeting was held at the Marie Callender's Restaurant at 307 E Katella Ave. in Orange on Saturday, May 04. NOTE; this a NEW location for a club board meetings, the previous Marie Callender's Restaurant located on Grand Ave in Santa Ana has permanently closed down. There were a total of 8 club members present. A quorum of club officers was achieved with only Bob AF6C, Nicholas AF6CF, and Vijay KM6IZO absent.

Director Reports:

- **Treasurer**

Greg W6ATB reported that the club was in a "net profit positive" mode with a YTD net profit of $949 [see cash flow report on page 22]. The board confirmed that the monthly "cash flow reports" should be published in the RF Newsletters. Greg also confirmed that the issue of a $966 check had finally been resolved by Bank of America and Wells Fargo. The $966 is now back in the club's WF account where it belongs.

Old Business:

- **Newspaper Editors**

May – Bob - AF6C

Jun – Jim - AF6N

Jul – Like to Volunteer? Contact: w6hhc@w6ze.org

Aug – Tim - N6GP

- **General Mtg Programs**

May – "Baker-2-Vegas race support" by Ken - W6HHC

Jun – "Field Day Prep Talk / Video"

Jul – "APRS plus Satellites" by Robert - KE6BLR

Aug – To Be Determined. There was discussion to conduct an antenna project?

Sept – "Ducie Island DX-pedition" by Arnie - N6HC

Oct – "OCARC Radio Auction"

- **Bylaws Update Committee**

Tim - N6GP and Corey - KE6YHX reported that more progress had been made on updating the OCARC Bylaws. Ken has submitted two small proposed changes for the Treasurers section. The first set of proposed changes will be sent out to board members within one week.

- **Date for General Meeting in June**

Because the June normal third-Friday meeting date falls on Field Day weekend, FD co-chair Tim N6GP moved and it was voted for that the June General Meeting will be held one week early on June 14, the **second** Friday.

- **Field Day Plans**

1. At the board meeting, Tim - N6TMT agreed to be the 40M PHN band captain and Dan KI6X agreed to be the 20M CW band captain. These were the last two unfilled band-captain positions.
2. Ken W6HHC reminded board members that the May RF Newsletter is an excellent time to publish a map and list of all the team-captains and set-up/tear-down schedules. Also a field day budget should be presented at the May General Meeting. Ken explained that the 2018 Audit Report provides a good estimate of FD expenses to be budgeted for 2019 FD.

- **ARRL Affiliation info update for OCARC**

OCARC Secretary Ken - W6HHC reported that he has updated the club's info for the ARRL web page on Affiliated Ham Clubs

New Business:

- **Antennas in the Park (Oct)**

Traditionally, the club has organized an 'Antennas in the Park" fun event to coincide with the California QSO Party in October. While the park off Jeffrey Road in Irvine is NOT an exciting propagation location, Ron - W6WG proposed that the new remote site in Boron, CA (along Hwy. 395) may be ready to be used remotely by the OCARC fun event?

Submitted by *Ken Konechy - W6HHC*

OCARC Secretary

May

- **7TH Call Area QSO Party:** 1300 UTC Saturday May4 through 0700 UTC Sunday May 5
- ***CQ World Wide WPX Contest/CW:** 0000 UTC Saturday May 25 through 2400 UTC Sunday May 26
- **June**
- ***ARRL June VHF QSO Party:** 1800 UTC Saturday June 8 through 0300 UTC Monday June 10.
- **Kids Day:** Saturday in June 15, 1800 UTC through 2359 UTC
- **Field Day:** 1800 UTC Saturday 22 through 1800 UTC Sunday 23.

* 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:

- **Indiana QSO Party:** 1600 UTC Saturday May 4 to 0400 UTC Sunday May 5
- **Delaware QSO Party:** 1700 UTC Saturday May 4 to 2359 UTC Sunday May 5
- **New England QSO Party:** 2000 UTC May 4 Saturday to 2400 UTC Sunday May 5
- **Kentucky QSO Party:** 1400 UTC June 1 to 0200 UTC June 2

Repeating Activities:

- **Phone Fry** Every Tuesday night at 0230Z to 300Z
- **SKCC** Weekend Sprintathon (Straight Key CW) on the first weekend of the month after the 6TH of the month. 1200 Saturday to 2359Z Sunday.
- **SKCC** Sprint (Straight Key CW) 0000Z to 0200Z on the 4th Tuesday night (USA) of the month.
- **CWops** Every Wednesday 1300 UTC to 1400 UTC 1900 UTC to 2000 UTC and Thursday 0300 UTC to 0400 UTC

Send an email to *Ron W6WG, w6wg@w6ze.org to have your favorite activity or your recent RadioActivity listed in next month's column.*

Submitted by *Ron Mudry - W6FPS*

OCARC Activities Chairman

UP COMING EVENTS

MAY 17th 2019

General Meeting:

Baker-2-Vegas Race by Ken - W6HHC

Ken will present a recap of this year's B2V Challenge Cup Relay Race and the amature radio support that tracks the runners. Also in attendance will be many of our club members that took part in this year's event and can add their voices to the experience.

JUNE 14th 2019 (Special Date)

General Meeting:

Field Day Pep-Talk by Chip - K7JA

Chip will get us all fired up for our Club efforts in the 2019 ARRL Field Day event. Also a special video visit to Bioenno Power's new facilities will round out the evening. NOTE: Meeting is one week early because Field Day is following weekend June 22nd-23rd and we will be on site Friday June 21st for setup.

JUNE 21st – 23rd 2019

Club Event:

A.R.R.L. Field Day

The OCARC once again will participate in the annual ARRL Field Day. Details are on our Field Day web-page.

JULY 19th 2019

General Meeting:

"APRS and Satellites / Space Station" Talk by Robert MacHale - KE6BLR

Robert will present some of his deep knowledge of APRS and Satellite communication. Robert maintains a website called www.spacecommunicator.club He also hosts regular meetings of the Space Communicator Club where he helps students and Scout groups learn about and make ARISS contacts with the ISS.

AUGUST 16th 2019

General Meeting:

Program TBD

More Info next month.

SEPTEMBER 20th 2019

General Meeting:

"Ducie Island DX-pedition" by Arnie - N6HC

Once again Arnie is going to take us on a DX-pedition to another paradise Isle. This time we'll travel to the mid-Pacific near Pitcairn Island with Arnie as our DX guide. Learn about the trials of operating VP6D in the comfort of our air-conditioned meeting room.

OCTOBER 5th 2019

Club Event:

California QSO Party & Club Picnic

Details for this annual event are in the planning stage.

OCTOBER 18th 2019

General Meeting:

OCARC Annual Electronics and Radio Auction

Now is the time to start cleaning out your garage and shack for the annual club auction. Please, radio and electronic items only !

NOVEMBER 15th 2019

General Meeting:

Board Election & Program TBD

DECEMBER 6th 2019 (Friday)

Club Event

Christmas / Holiday Dinner Party:

Mark Friday December 6th down on your calendar for this extravaganza.

May 2019 Treasurer's Report

Cash Flow - Year To Date

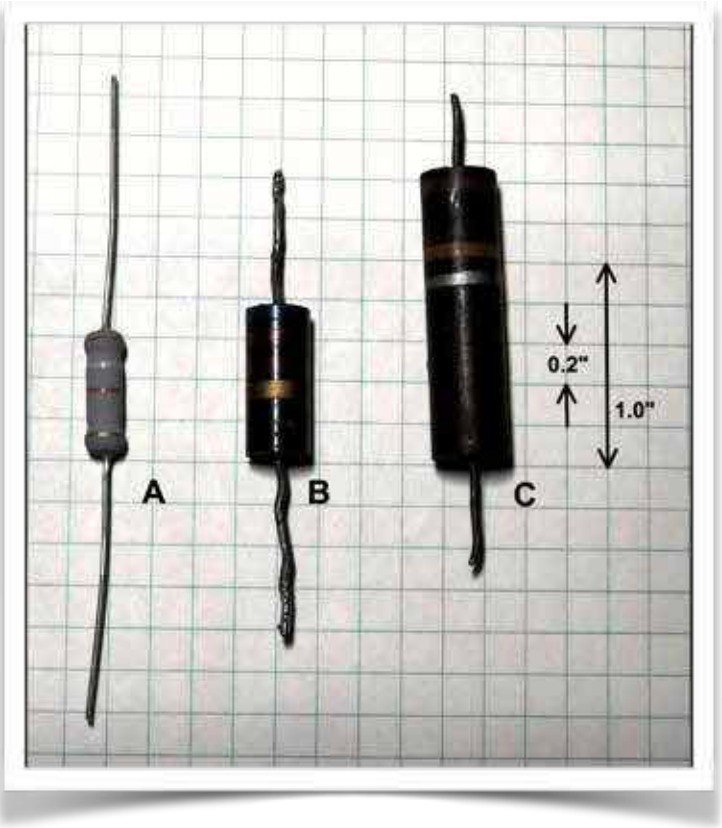
1/1/2019 through 5/5/2019

Category	1/1/2019-5/5/2019
INFLOWS	
ARRL FD 2019 T-shirts	$79.40
ARRL Membership Dues	49.00
Badge Income	8.00
Dues, Family 2019	120.00
Dues, Membership (PayPal) 2019	922.56
Dues, Membership 2019	765.00
Food Snacks Donations	51.00
RAFFLE PROCEEDS	69.00
TOTAL INFLOWS	**$2,063.96**
OUTFLOWS	
ARRL Membership Expense	$34.00
Field Day Equipment	49.79
Field Day Rental - Tent	140.00
New Bank Checks (Refill)	47.16
OCARC Historian	48.97
Raffle - Monthly Expense	98.12
Refreshments Expense	66.66
Storage Locker	528.00
Web Site Hosting	101.94
TOTAL OUTFLOWS	**$1,114.64**
OVERALL TOTAL	**$949.32**

Submitted by *Greg Bohning - W6ATB*

OCARC Treasurer

?? PUZZLER ??



It's been awhile since someone submitted a Puzzler to RF. Here is one for the old-timers. It is simple yet also tricky.

The photo above shows three resistors that the editor found in his junk box. Their color codes are a bit hard to read, 'A' is a 39KΩ 5% resistor (orange-white-orange-gold), 'B' is a 620Ω 5% resistor (blue-red-brown-gold) and 'C' is a 10KΩ 10% resistor (brown-black-orange-silver). The question is:

Which resistor is a two watt resistor?

They are all carbon or carbon film resistors and are standard sizes. The squares on the graph paper are 0.2" x 0.2" (five squares per linear inch).

Send your answer to rf_feedback@w6ze.org

As usual people with correct answers will have their names published in an upcoming issue of RF Newsletter. Give it a try!

?? PUZZLER ??

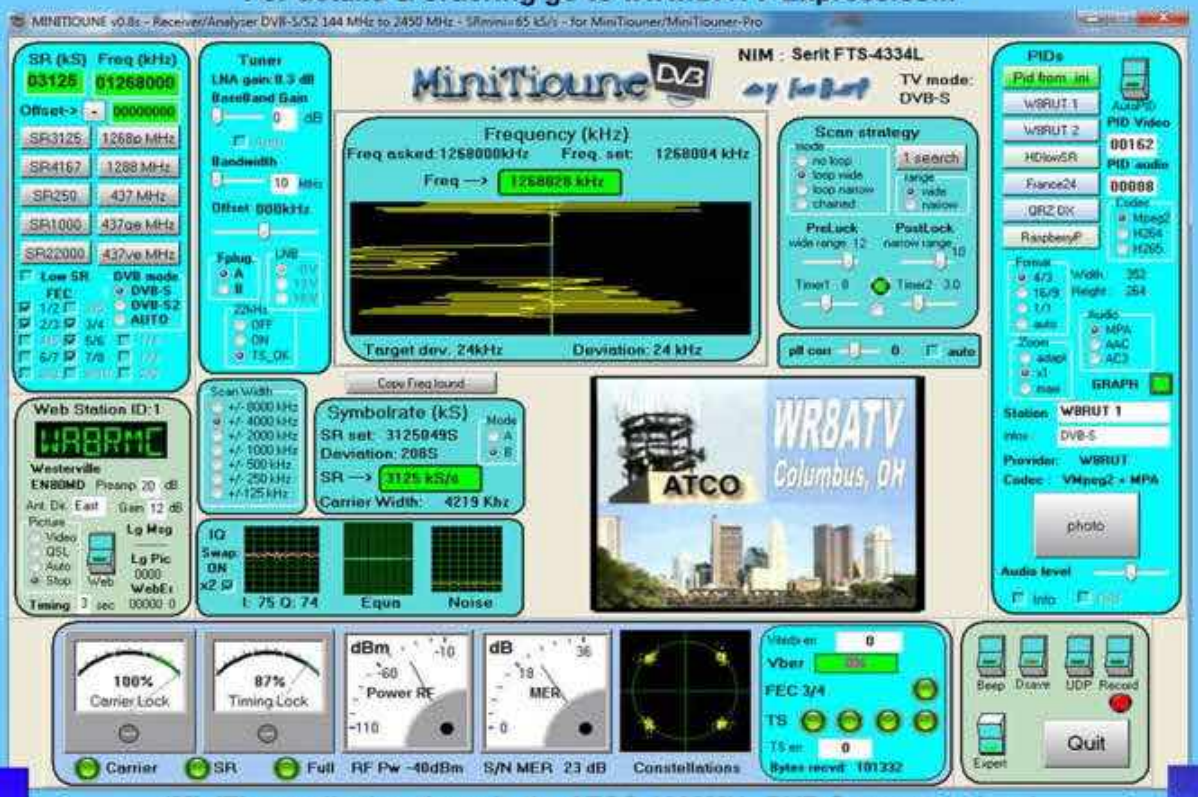
MiniTiouner-Express

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).

JUNE GENERAL MEETING
to be held
ONE WEEK EARLY
JUNE 14th, 2019

Officially, Field Day is always held on the FOURTH FULL WEEKEND in June. Usually that results in Field Day weekend falling on the weekend after our third Friday meeting date. Should June 1st Fall on a Saturday however, the fourth full weekend starts the day after our third Friday meeting. Since we usually start setting up on that Friday there is a conflict with the meeting. This last happened in 2013, and before that in 2002. On both of those occasions the June club meeting was moved to the second Friday. That will be the case again this year.

Continued from page 1

nia to Las Vegas, Nevada, through Shoshone, CA and Pahrump, NV. Amateur Radio is one path to handle the logistics of a race team. For the past twenty plus years a group of hams, many from the OCARC, have supported the Orange Police Department team during their participation in the B2V race. See EmComm training/practice at it best.

The ORANGE COUNTY AMATEUR RADIO CLUB, INC.
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