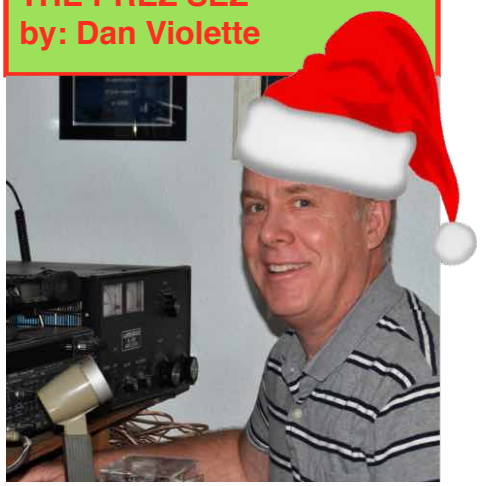
ORANGE COUNTY AMATEUR RADIO CLUB 2020 W6NZE

RF

VOL. LXI NO. 12 P.O. BOX 3454, TUSTIN, CA 92781 DECEMBER 2020

THE PREZ SEZ
by: Dan Violette



Well, another year is finishing up in the books. I am also termed out so an end to my Presidency and we will welcome Nicholas, AF6CF, as the 2021 President in January. These two terms have gone fast and have been quite enjoyable. I think the Board and I were able to keep OCARC progressing through the tough times. I know we have had very good membership numbers, good enthusiasm, and good participation in events when we were still able to be together and then in Covid on-line events or "group" events where we participated individually. I really appreciate the work the 2020 Board members have done which made it much easier on me. Please continue to support the new Board and get your ideas in for consideration.

You have seen my mug (face picture) at the top of this section for two years now! I am including the full picture in this RF with a simple description of my home set-up. [Page 25] Nothing fancy but gets me on the air. I also spend time at the Boeing HB club which I have spent many, many hours setting up and maintaining along with a helper or two (and also had a move from Anaheim over the last 30+ years). Gives me an outlet when not at home.

Assuming this article gets to you in time, please plan on attending the Dec 18 non-business Zoom meeting. This is replacing the normal dinner and the other ideas we had for in-person get togethers in December. Emails will follow (or if this is late, hopefully they got to you in time).

Again, I thank you the membership and the 2019 and 2020 Boards for helping me perform my duties these last two years.

73,

Dan Violette - KI6X

President

EXCLUSIVE (Page 14):

SWLing on the AVIATION BANDS

DEC 18, 2020 MEETING

OCARC Holiday Meeting "Stories and Eggnog" Via Zoom©

The meeting is set to start at 7:00 PM. There will be a social half-hour starting at 6:30 PM prior to the meeting where you can test your Zoom connection and socialize with other members.

See: *Program* - page 32

Join us on FRIDAY, Dec 18th 2020 @ 7:00 PM on Zoom©

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The Next OCARC Board Meeting is on Zoom© on Sat. January 2nd. 2021.

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Submit Articles:
editors@w6ze.org

Monthly Events During Covid:

General Meeting:
Currently meetings are being held on Zoom© on the third Friday of the month at 7 PM. The meeting room opens a little after 6 PM for practice & random discussions.

Club Breakfast (Board Mtg.):
Currently the breakfasts are canceled, and the board meetings are being held via Zoom© on the first Saturday at 8:30 AM.

Club Nets (Listen for W6ZE):
10M: 28.375 MHz USB ± QRM
Wed - 7:30 PM - 8:30 PM
Corey, KE6YHX, Net Control

2M: 146.55 MHz Simplex FM
Mon. Wed. Fri. 8:30 - 9:00 PM
Corey, KE6YHX, Net Control

75M: 3.883 MHz LSB
Wed - 9:15 PM
Corey, KE6YHX, Net Control

Outside Nets: ***CARA Repeater 147.090 MHz (+600 kHz) No PL***
("Net-At-9") Monday - Friday
9:00 AM and 9:00 PM
NC & Prg. Director: Tom W6ETC
NC: Jeff KK6RTC / Don W6ZZW

2021 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

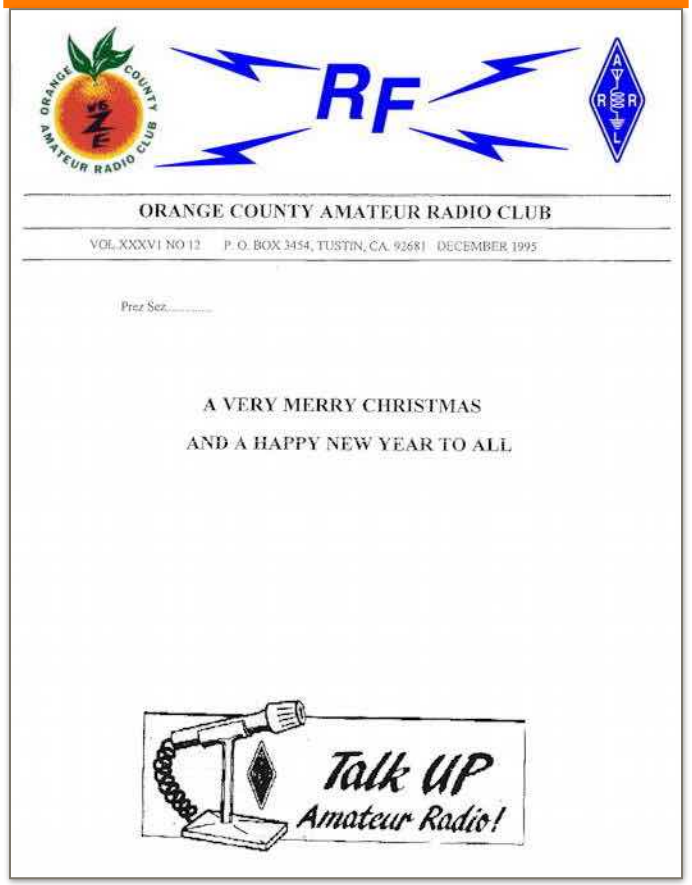
New Member Dues *are prorated quarterly and includes a badge:*

Additional Badges[1]	$3

Use one of our our interactive online 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 - December 1995:



ORANGE COUNTY AMATEUR RADIO CLUB

VOL. XXXVI NO 12 P. O. BOX 3454, TUSTIN, CA. 92681 DECEMBER 1995

Prez Sez.....

A VERY MERRY CHRISTMAS

AND A HAPPY NEW YEAR TO ALL

December of 1995 was a slow month for 'RF' with the Christmas party replacing the general meeting. The dinner party was held on December 10th at 6 PM at Marie Callander's at 721 1st St. in Tustin. RF editor Cindy Hughes did a good job of filling 10 pages with material interesting to hams when she got no input or write-ups from club members, other than Bob - WB6IXN's 'Net Notes'. There was no 'Prez Sez', nor reports from the Secretary, Treasurer or Activities manager. The Holiday party was not mentioned, though it was announced in the preceding 'RF'.

At the Christmas dinner party President Jim Roberts turned the President's gavel over to Bob Eckweiler AF6C with Ken Konechy filling in the VP slot. Bob introduced the rest of the 1996 board.

In 1995 the club nets were very active and Bob Evans - WB6IXN published three and-one-third pages of 'Net Notes' covering November in 'RF'.

Nineteen ninety-five was the first year the club held meetings at the American Red Cross complex in Santa Ana. For the first four months we met at the building on Golden Circle Dr. moving in April to the building on Parkcenter Dr. The monthly breakfast and board meeting was being held at the Wild Flower Restaurant on Grand Ave. just south of 22 freeway in Santa Ana.

Here is a list of the officers for 1995:

✳ President:	Jim Roberts	N6XTJ
✳ V. President:	Cindy Hughes	KC6OPI
✳ Secretary:	Don Hughes	KC6ONZ
✳ Treasurer:	*Frank Smith*	WA6VKZ
✳ Activities:	*Steve Rasmussen*	KE6NAH
✳ Membership:	*Bud Barkhurst*	WA6VPP
✳ Public Relations:	*Jane Breller*	KC6TAM
✳ Technical:	*Elmer Thomas*	WA6PFA
✳ Member at Large:	*Bob Buss*	KD6BWH
✳ Member at Large:	Chris Breller	KJ6ZH

Current Associates are underlined.
Silent Keys are in *italics*

It's sad to see that so many of the 1995 board members have become silent keys. I could find no record of the winner for the Good of the Club Award for 1995 (nor for 1991, 1993 and 1994) with the year end holiday rush this piece of history rarely is included in the club minutes for the following January. Can anyone help supply the missing information?

de AF6C

DECEMBER

- ***ARRL 10 Meter Contest:** 0000Z Saturday Dec. 12 through 2359Z Sunday Dec. 13.
- **ARRL Rookie Roundup, CW:** 1800Z to 2359Z Sunday Dec. 20.

JANUARY

- **Straight Key Night:** 0000Z – 2359Z January 1
- **ARRL RTTY Roundup:** 1800Z Saturday January 2 to 2400Z Sunday January 3.
- **ARRL Kids Day:** 1800Z – 2359Z Sat. January 2
- ****North American QSO Party / CW:** 1800Z Saturday January 9 to 0600Z Sun. January 10.
- ***ARRL January VHF Contest:** 1900 UTC Saturday Jan 16 to 0359 UTC Mon. January 18.
- ****North American QSO Party / SSB:** 1800Z Saturday January 16 to 0600Z Sun. January 17.
- ***CQ 160 Meter Contest/ CW:** 2200Z Friday January 29 to 2159Z Sunday January 31.
- *** Winter Field Day:** 1900Z Sat. January 30 to 1900Z Sun. January 31.
  - *** 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"**

Repeating Activities:

- **Phone Fry:** Every Tuesday night at 0230Z to 0300Z.
- **SKCC:** Weekend Sprintathon (Straight Key CW) on the first weekend of the month after the 6TH of the month. 1200Z Sat. to 2359Z Sunday.
- **SKCC:** Sprint (Straight Key CW) 0000Z to 0200Z on the 4th Tuesday night (USA) of the month.
- **CWops:** Every Wednesday 1300Z to 1400Z, 1900Z to 2000Z and Thursday 0300Z to 0400Z.
- **K1USN Slow Speed Test:** (CW, 20 WPM Max.) Every Sunday night at 0000Z to 0100Z Monday

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

de Ron - W6WG

BREAKING NEWS: KJ6LHA SK

The Club is sad to learn of the death of one of its past members. Steve Bachmann - KJ6LHA. Steve was member for a few years starting around 2012. He was often accompanied by his lady friend Ping Lee - KJ6UJA.

Heathkit of the Month #103:
by Bob Eckweiler, AF6C

AMATEUR RADIO - SWL

Heathkit GR-88 & GR-98 Portable VHF Monitor Receivers.

Introduction:

In 1969 Heathkit released two solid-state portable monitor receivers. One, the GR-88 covers police, fire, marine and weather bands from 152 to 174 MHz [1]. It can receive narrow and wide-band FM. The other, the GR-98 covers the aircraft NAV and COMM bands, 108 - 118 and 118 - 136 MHz respectively The GR-98 receives AM. Both units operate portable on six 'C' cell batteries, or can run on 120 VAC power using the optional GRA-88-1 AC power supply. This accessory mounts internally to the monitor receiver.

The two radios each sold for $49.95 in the Summer 1969 catalog. The optional AC power supply was initially an additional $7.95, but was raised to $8.50 in 1972. The price for these radios remained at $49.95 through most of their life but did raise to $56.95 in 1975. In fall 1976 catalog they dropped back down to $49.95 as they were evidently being closed out. The GR-98 was last seen in 1976, but the GR-88 remained for sale into 1977. This may have just been because the stock of GR-98s sold out first?

[1] Notes appear on page 9.

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

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

Figure 1: The GR-98 Air-Band AM VHF Monitor

The GR-88 FM VHF Monitor Receiver and The GR-98 AM Air-band Monitor Receiver:

There are many similarities between these two models that may be discussed in unison. Their specifications are shown in **Table I**. The receivers feature a handle that may be used for carrying and as a foot to hold the receiver at an angle while in use. Either the built-in collapsable whip antenna, or an external antenna (RCA jack) may be used.

Both use a pre-built and pre-aligned modular tuner, simplifying construction and alignment. The tuners each have 3 transistors, two 2SC784 (RF amplifier, and mixer) and an SE5006 local oscillator. The tuner has a three section variable capacitor, tuning the input and output of the RF amplifier as well as setting the oscillator frequency. From the part numbers of the tuner transistors, the tuners were probably manufactured for Heathkit in Japan.

Each radio has a provision for a single crystal controlled channel. When using the crystal channel the main tuning knob should be set near the channel frequency to peak the RF gain at that frequency. Both use the same crystal specifications (**See Table II**).

Specifications

	GR-88:	GR-98
Tuning Range:	152 - 174 MHz	108 - 136 MHz
Sensitivity:	<2.0µV for 20 dB quieting	1.5 µV for 10 dB (S+N)/N @ 1 KHz 30% modulation
IF Selectivity		
@ 6 dB down:	±40 KHz	40 KHz
@ 30 dB down:	(not given)	100KHz
Transistor & Diode Complement:	See Table III	

Common to both the GR-88 and GR-98

Antenna Input:	50 - 75 Ω
IF Frequency:	10.7 MHz
Image Rejection:	40 dB or greater
IF Rejection:	80 dB or greater
Audio Output:	250 mW @ < 10% distortion
Speaker:	3" round, 24Ω
Batteries:	1.5V 'C' cells (Six required)
Dimensions:	8 ¾" W x 7 ½" H x 3 ½" D.
Net Weight:	3 lbs, less batteries

Table I

However, the two crystal formulas are different (Note the change in sign):

$$\text{GR-88:} \quad X_f = \frac{(R_f - 10.7)}{3}$$

$$\text{GR-98:} \quad X_f = \frac{(R_f + 10.7)}{3}$$

where:
X_f is the crystal frequency, and
R_f is the desired receive frequency.

Both receivers use an IF frequency of 10.7 MHz. However, the IF and detector circuit are different, as are their AGC circuits; these differences can be attributed to AM vs. FM detection. The two stages of audio pre-amplification, the audio driver and audio output stages are identical with a few minor exceptions.

Both receivers have the same controls. From left to right the front panel contains, in the upper left a pull-out whip antenna, the **VOLUME** control with power **OFF** switch at the full CCW position., the **SQUELCH** control, the main tuning dial, which has a 6:1 vernier action, and the **OSC.** slide switch that selects either **VAR.**iable tuning (down) or **XTAL** channel (up). An RCA external antenna connector is located on the left side of the case. If the optional AC power supply is installed an AC power cord connector and a **BATT** - **AC** slide switch are present on the right side of the case. If the optional supply is not installed the openings for these components are covered with 'knock out' plates. The radios are packaged in a leatherette case (See **Figure 3**).

Both radios use a single conversion superheterodyne circuit [2]. This circuit has been discussed before and won't be covered here. Over the production run changes were made to the radios, a lower cost TO-92 plastic-case 2N5770 transistor replaced the 2N2369 TO-18 metal-case transistors in the IF circuits. The 2N5770 also replaced the TO-17 metal cased RCA 40481 transistor (Q13) in the crystal oscillator circuit. The 2N5770 probably had a positive effect on perfor-

Crystal Information

Frequency (MHz):	See Text for Formulas
Holder Type:	HC-18/U
Load Capacitance:	32 pF.
Mode:	Parallel mode, 3rd Overtone
Frequency Tolerance:	0.0025% at 25° C (77° F)
Maximum Drive Level:	1.2 mW.
Effective Resistance:	25 ohms
Xtal Range GR-88:	47.1000 to 54.4333 MHz
Xtal Range GR-98:	39.5666 to 48.9000 MHz

Note: Provide these specifications to the crystal manufacturer.

Caution: The formula to determine the crystal frequency for a given receive frequency is different between the two radios.

TABLE II

mance as the 2N5770 transistor is designed for RF while the 2N2369 is a high-speed switching transistor.

The GR-88:

Being an FM receiver, the GR-88 has a Ratio Detector composed of T4, D1 and D2. This detector circuit was discussed in HoTM #63. The interior of the GR-88[3] is shown in **Figure 2**.

The GR-88 has no AGC (automatic gain control) circuit. The gain of the RF Amplifier in the tuner is set by fixed resistors R102 and R103. The IF selectivity is determined by L1, a high 'Q' tuned circuit at the input of the IF chain. The IF gain is high and on all but the weakest signals the last IF stage limits the peaks of the IF signal eliminating any AM signals. On the strongest of signals all the IF stages act as limiters. In between strengths, are limited in one or more of the IF stages.

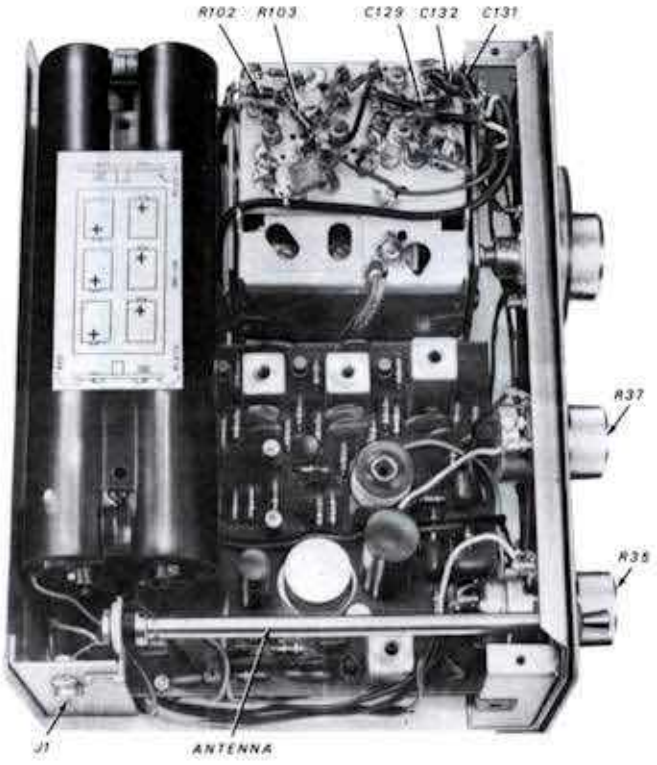


Figure 2: Inside the GR-88 FM VHF Monitor. Note the pre-built and aligned tuner at the top right. the single circuit board in the bottom half and battery pack to the left. The optional AC power supply mounts under the batteries at the upper left.

Semiconductor Complement and Function

Stage	GR-88	GR-89	Part #
RF Amplifier (Tuner)	Q101	Q101	2SC784
Mixer (Tuner)	Q102	Q102	2SC784
Local Oscillator (Tuner)	Q103	Q103	SE5006
1st IF Amplifier	Q1	Q1	2N2369*
2nd IF Amplifier	Q2	Q2	2N2369*
3rd IF Amplifier	Q3	Q3	2N2369*
4th IF Amplifier	Q4	Q4	2N2369*
IF Limiter	Q5		2N2369*
IF AGC Amplifier		Q5	MPF105
1st Audio/Squelch Amp.	Q6		2N3393
Squelch Amplifier	Q7	Q6	2N3393
Squelch Gate	Q8	Q7	X29A829
1st Audio Preamplifier		Q8	MPF105
2st Audio Preamplifier	Q9	Q9	2N3393
Audio Driver	Q10	Q10	X29A829
½ Audio Output Amp.	Q11	Q11	2N2430
½ Audio Output Amp.	Q12	Q12	2N2431
Crystal Oscillator	Q13	Q13	40481*
AGC Gate	Q14		2N3393**
Ratio Detector:	D1		1N191
AM Detector:		D1	S160
Ratio Detector:	D2		1N191
Squelch Rectifier:		D2	1N191
Squelch Rectifier:	D3		1N4646
Squelch Rectifier:		D3	1N191
Squelch Rectifier:	D4		1N4646
Squelch Switch		D4	1N4149
AGC voltage drop		D5**	1N4149

* **Replaced by the 2N5770 transistor in later units.**

** **Diode D5 was added and Q14 changed to a PNP 2N2431 in later units for better AGC action.**

TABLE III

A squelch circuit quiets the receiver audio when there is no signal present, removing the tedium of constant white noise between transmissions. After the audio is recovered it is amplified by Q6 and fed to the volume control and audio circuits. The output of Q6 is also fed to a notch filter composed of derived around L2. The resulting sampling of noise voltage is sent through the squelch control to the Squelch Amplifier Q7, a voltage doubling detector circuit composed of D3, D4, C29 and C32 and on to Q8, the Squelch Gate. When Q8 is conducting it

puts a large positive voltage on the emitter of Q9, the Second Audio Preamplifier driving it into cutoff along with the remaining audio stages.

The GR-98:

Since the GR-98 is an AM receiver [4] it uses an AM detector composed of D1 and C17. Audio from the junction of D1 and R25 is fed through C23 to the audio stages. GR-98 has an AGC circuit that underwent significant modifications during the production run. Voltage from the detected audio is divided by resistors R23, R24 and R25.

In the early AGC circuit, voltage at the junction of R23 and R24, which becomes less positive with stronger audio, is fed back to the tuner and through R101 to the base of the tuner's RF amplifier Q101 reducing its gain. A bit of the IF signal is rectified by D2 and D3, a voltage doubler, and fed to the gate of a FET amplifier Q5. In the early units this FET was called the AGC Amplifier. The output from the FET source is fed to an NPN transistor Q14, the AGC Gate. It is also fed to the squelch circuit. Q14 is in series with R11, the emitter resistor for Q2, the Second IF Amplifier. As the base of Q14 goes more positive, the gain of the second IF stage is reduced. The intended effect is to keep the volume nearly constant for signals of different strengths.

Evidently Heath was not satisfied and during production the circuit was changed. The voltage at the junction of R23 and R24 is still connected to the tuner RF Amplifier, but first the voltage is dropped about 0.6 volts by D5, controlling the RF Amplifier but at an overall higher gain. Q14 was replaced with a PNP transistor (2N2431) and its base connects to the same R23, R24 junction of the voltage divider. The collector is grounded. As the base voltage to Q14 goes less positive, Q14 draws more current. This current is supplied by R2 and R8, the base resistors for the First IF Am-

Special Purpose & Exploration Gear

Hear Police, Fire, Marine & Weather Broadcasts With This Heathkit VHF-FM Monitor Receiver . . . Covers 152 to 174 MHz

GR-88 $49.95

• Receives both narrow and wide band FM signals • 152-174 MHz coverage • High sensitivity and selectivity • Six-to-one vernier tuning control plus single channel crystal control • Adjustable squelch control quiets background noise • All solid-state construction for long, trouble-free life • Portable battery operated • Convenient carrying handle doubles as a stand • Built-in whip antenna • Jack for external antenna • Accessory AC power supply available • Rugged brown leatherette case • One circuit board & preassembled & aligned tuner save builder time

The Heathkit GR-88 is easy to build, smooth to operate and easy to take along . . . anywhere. To make constant monitoring of a particular frequency easier, just plug in a crystal, tune to the approximate frequency, then flip the panel switch to "Xtal" and you're on frequency. The accessory AC power supply, Kit GRA-88-1, fits inside the GR-88 case. Handle turns 90 degrees from vertical to prop up unit on a table.

Kit GR-88, 5 lbs. $49.95
Kit GRA-88-1, Accessory AC Power Supply, 1 lb. $7.95

GR-88 SPECIFICATIONS—Tuning range: 152-174 MHz. **Antenna input:** 50-75 ohms. **Sensitivity:** 2.0 uV or less for 20 dB quieting. **IF Frequency:** 10.7 MHz. **IF Selectivity:** ±40 kHz @ 6 dB down. **Image rejection:** 40 dB or greater. **IF Rejection:** 80 dB or greater. **Audio output:** 250 mW at less than 10% distortion. **Speaker:** 3" round, 24 ohms, permanent magnet. **Transistor complement-tuner:** (2) 2SC784 and (1) SE-5006. **Transistor complement-IF & Audio:** (5) 2N2369, (4) 2N3393, (1) X29A829, (1) 2N2430, (1) 2N2431, (1) 40481. **Diode complement:** (2) 1N191 and (2) 1N4646. **Batteries:** Six 1.5 volt "C" cells, not supplied. **Dimensions:** 8¾" W x 7½" H x 3½" D. **Net weight:** 3 lbs. without batteries.

Monitor The Aircraft Band With This Heathkit GR-98

• Tunes the complete Aircraft Band—108 to 136 MHz • All solid-state circuitry • Completely portable • Built-in whip antenna • Handsomely styled, rugged brown leatherette case with tilt-stand/carrying handle combination • Excellent sensitivity and selectivity • Vernier tuning • Adjustable squelch control • Single channel crystal-control feature • Built-in external antenna jack • Accessory AC power supply available • Fast, enjoyable assembly with circuit board construction and factory assembled and aligned tuner

Kit GR-98, 5 lbs. $49.95
Kit GRA-88-1, Accessory AC Power Supply, 1 lb. $7.95

GR-98 SPECIFICATIONS—Tuning range: 108-136 MHz. **Antenna input:** 50 to 75 ohms. **Sensitivity:** 1.5 uV or less for 10 dB signal-to-noise plus noise ratio @ 1000 Hz 30% modulation. **IF Frequency:** 10.7 MHz. **IF Selectivity:** 40 kHz @ 6 dB down; 100 kHz @ 30 dB down. **Image rejection:** 40 dB or greater. **IF rejection:** 80 dB or greater. **Audio output:** 250 milliwatts at less than 10% distortion. **Speaker:** 3" round, 24 ohm, permanent magnet. **Transistor complement-tuner:** (2) 2SC784 and (1) SE-5006. **Transistor complement-IF & Audio:** (4) 2N2369, (3) 2N3393, (2) X29A829, (1) MPF-105, (1) 2N2430, (1) 2N2431 and (1) 40481. **Diode complement:** (2) 1N191, (1) 1N4646 and (1) S-160. **Batteries:** Six 1.5 volt size "C" cells (not included). **Dimensions:** 8¾" W x 7½" H x 3½" D. **Net weight:** 3 lbs. without batteries.

GR-98 $49.95

Figure 3: Ad from Winter 1970Heathkit Catalog showing the GR-88 and GR-98.

plifier (Q1) and the second IF Amplifier (Q2) respectively. This reduces the gain of those stages when more current is drawn by Q14. L2 provides RF isolation between the two controlled stages. Controlling two IF stages give the AGC a lot larger dynamic range.

The GR-98 squelch circuit also went under some minor changes, mostly the addition of a trimpot to set the squelch level and give the front panel control better sensitivity. In the later units the signal from the source of the FET Q5 is fed through the squelch control to the base of Q6, the Squelch Amplifier. Q5 is now called the Amplifier as it no longer plays a part in the AGC circuit. With the SQUELCH control properly adjusted and no signal present Q6 is cutoff, cutting off PNP transistor Q7 causing its emitter voltage to rise and D4 to conduct. This raises the voltage on the emitter of Q9, the Second Audio Preamplifier, causing it to cutoff, muting the audio stages. When a signal is received Q6 conducts turning on Q7 which biases D4 off allowing Q9 to operate normally, passing the audio.

Summary:

GR-88 and GR-98 Receivers may still be found at swap meets and currently there is one of each for sale on eBay. The eBay price is around the $70 mark.

While the GR-98 selectivity was good back in the 70's, channel spacing has decreased so in more populated areas you may have some co-channel interference on the aircraft bands. the GR-98 was probably quite popular with the aviation crowd. It was light and portable and its sensitivity compares favorably with current day scanners that cover the aircraft band.

The GR-88 probably had a lot more competition with a lot of scanners being sold by both Heathkit and other manufacturers. The continuous tuning, instead of channelized tuning, could be both a drawback and an advantage.

Let me take this time to wish you all a happy holiday season. It has been a tough year in many ways. Don't despair though, there is light at the end of the tunnel.

Schematics are available at:
http://www.w6ze.org/Heathkit/GR88_98.html

73, from AF6C

BEFORE HEATHKIT others were introducing kits into amateur radio. Here is an ad from a small startup company. Many are probably familiar with the later non-kit products from this company:

Crystal Transmitters

Radically new design suitable for Class B modulation or high output C.W. on 14, 7 and 3.5 M.C.

Consists of crystal-oscillator, buffer amplifier, and Class C output amplifier mounted on polished aluminum and hard rubber chassis with plug-in coils and plug-in crystal holder for quick change of frequency. Complete Kits, less tubes, crystal and power supply:

210 Output.....$37.25 203A Output....$47.50
852 Output.....$47.25

The smoothest, neatest little rig you ever saw—and what a Kick she has!

Immediate Delivery *Write for data sheets*

ARTHUR A. COLLINS

Cedar Rapids, Iowa Radio Laboratories, Inc., W9CXX

Ad from January 1932 QST Page 77
(Thanks Steve -

Notes:

1. Much of the police and fire communications have since been moved to UHF and to trunking channels.
2. Schematics are available at: http://www.w6ze.org/Heathkit/GR88_98.html
3. Photo taken from Heath GR-88 manual 595-1080-05.
4. Aircraft VHF communications use AM. FM has a capture effect that may cause controller to not hear pertinent calls.

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

Thanks - AF6C

OCARC
General Meeting Minutes via ZOOM
2020 - 11 - 20

The November OCARC General Meeting was held on ZOOM via the Internet on Nov 20, 2020. The meeting was called to order about 7:06 PM by "El Presidente" Dan KI6X.

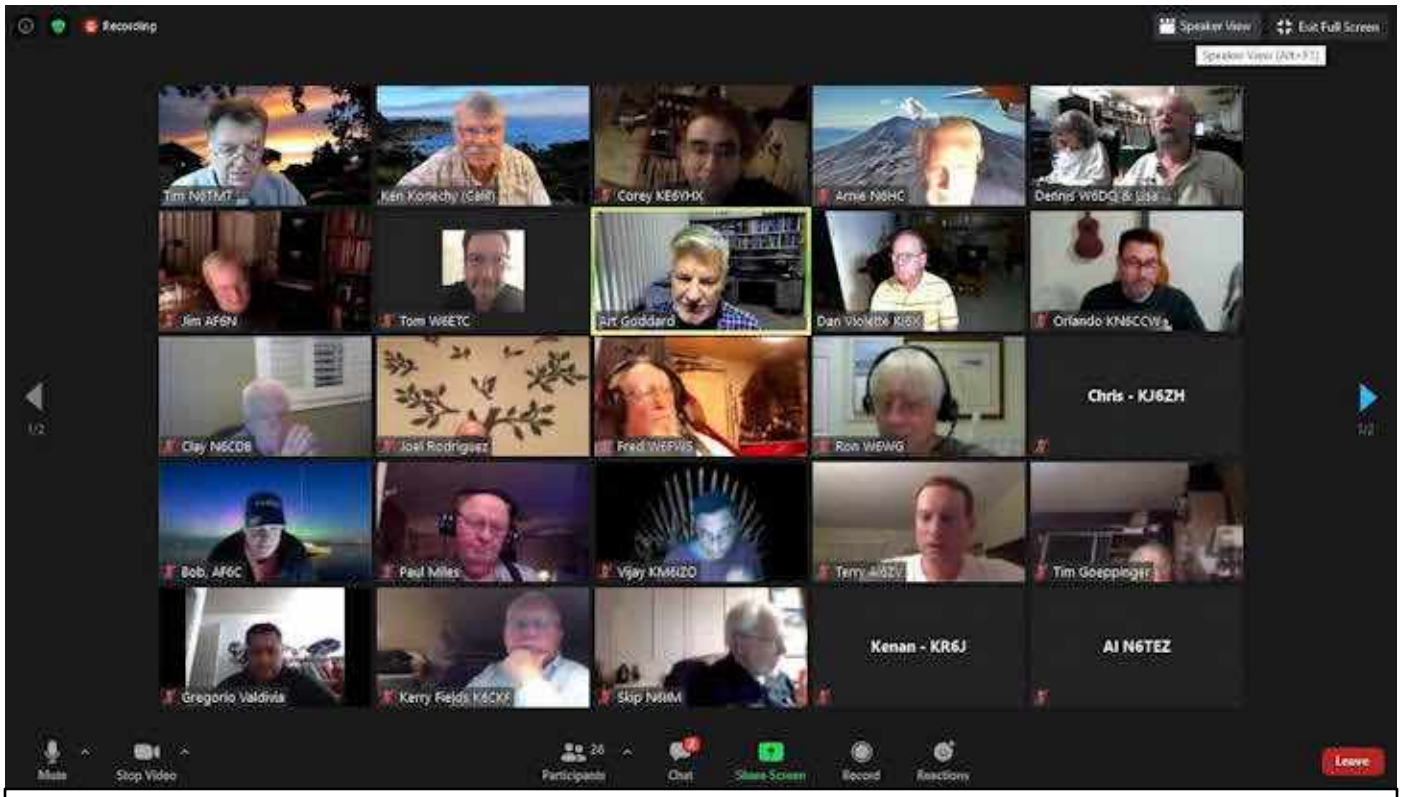


Figure 1 - A typical Screen-Capture of members in attendance during the November meeting. The majority of attendees could provide video from their home QTH. But, while some sent no video, everyone could watch video on ZOOM and could hear the audio during the meeting. NOTE – our guest speaker for the meeting, Dennis W6DQ, and his wife Lisa KF6QNG can be seen in the upper-right corner of attendees.

There were a total of 32 members and visitors in attendance. There was a quorum of officers, with all directors present, except Greg W6ATB. This was the eighth OCARC General Meeting that was completely conducted using ZOOM (due to meeting restrictions imposed by the Coronavirus).

November Program:
Tim N6TMT introduced Dennis Kidder – W6DQ, the Secretary of the Collins Collectors Association, on ZOOM as the club program speaker for the evening, who talked on:

"Voice of America and Very Large Collins Transmitters"

Dennis W6DQ gave a talk on the VOA station at Delano, CA and the very large 250 KW Collins transmitters…see **Figures 2 - 7**.

The first "Voices from America" broadcast from London to Germany started in February of 1942. Today there are still 19 different VOA transmitter sites around the world.

One of the Collins 8251A-1 transmitters was completely disassembled by a team of Collins enthusiasts (including Dennis W6DQ) at Delano and shipped for reassembly and display at the Antique Wireless Association (AWA) Museum in Bloomfield, New York.

Figure 2 – The VOA Delano Relay station first began to broadcast in November 1944. It relayed broadcasts from Washington DC (by Bell landline) and then on to the Pacific.

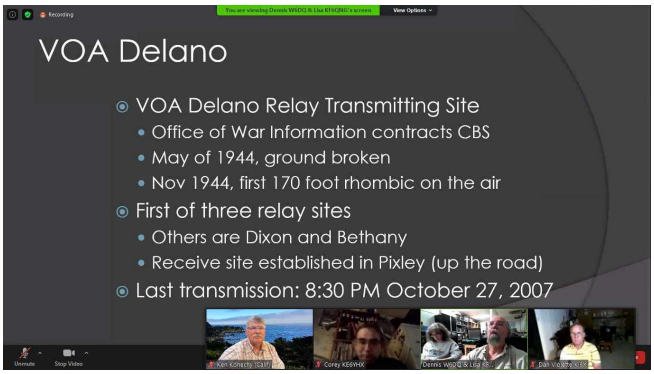


Figure 3– The VOA Delano Relay station was originally an operation by CBS. The first of many operational antennas was a 170-foot rhombic antenna.

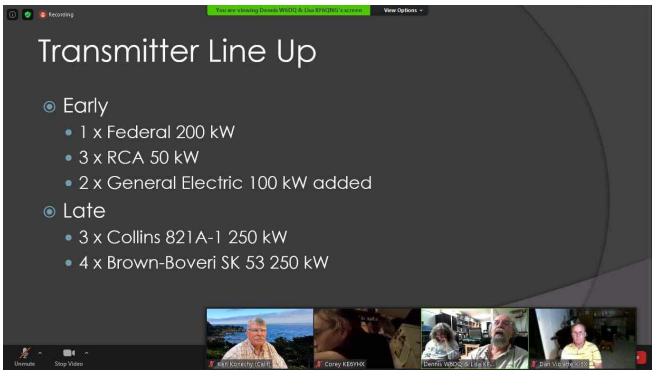


Figure 4 – The VOA Delano site included a long list of transmitters. None of the AM transmitters were more powerful than the Collins 821A-1 AM transmitter.

Figure 5 – The Collins model 821A-1 AM Transmitter produced 250 KW of AM. Each unit weighed 50,000 lbs, much from power supply transformers

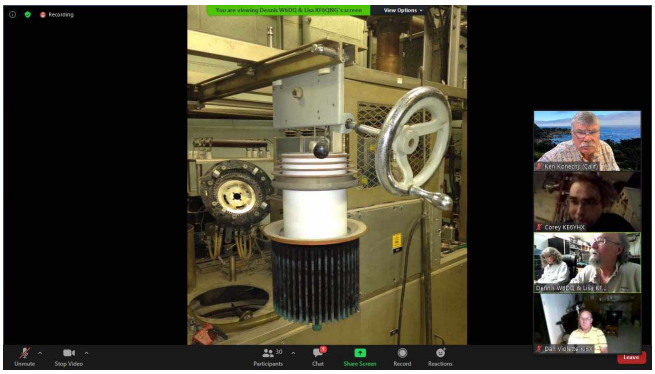


Figure 6 – There were four 4CV100,000C Eimac ceramic tubes - two in parallel in the RF PA and the modulator had two in push-pull. Each filament used 3,000 Watts.

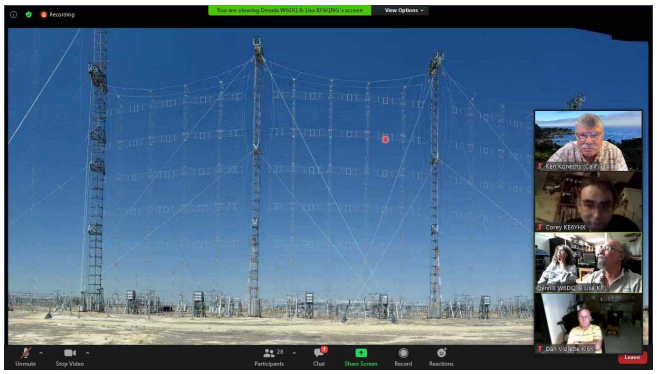


Figure 7 – The 200 foot high phased-dipole-curtain antenna, one of the many antennas at the site. It can be azimuth-aimed by adjusting the phase of the horizontally-oriented antenna dipoles array.

Business:

- **Treasurer** – no report was provided. It should appear in the January RF. Our Treasurer is in the middle of moving.
- **Membership** – Corey KE6YHX reported that the club currently has a total of 110 members.
- **Winter Field Day –** Ron W6WQ reported that Winter Field Day (WFD) will be conducted on January 30 and 31, 2021. It will be conducted at home QTH's and portable locations much like Summer Field Day was…and is open to all club members. Club members are asked to contribute their individual scores with their own call letters to Orange County ARC – CA for aggregation of those scores.

Election of OCARC 2021 Officers:

After a short break the meeting reconvened to cover club business. The most important item of business was the 2021 Board Officer elections. Secretary Ken W6HHC and President Dan KI6X conducted the elections. None of the presented nominations were contested. Each of the following officers and directors were duly and individually elected by acclamation by a show-of-hands vote (on Zoom) to serve during the 2021 term.

The elected 2021 OCARC Board of Directors will consist of:

President	**– Nicholas Haban,**	**AF6CF**
Vice-President	**– Tim Goeppinger,**	**N6GP**
Secretary	**– Corey Miller,**	**KE6YHX**
Treasurer	**– Ken Konechy,**	**W6HHC**
Activities	**– Ron Mudry,**	**W6WG**
Membership	**– Bob Eckweiler,**	**AF6C**
Public Relations	**– Tom Cowart,**	**W6ETC**
Technical	**– Steve Belasco,**	**N1BKD**
Director at Large	**– Dan Violette,**	**KI6X**
Director at Large	**– Tim Millard,**	**N6TMT**

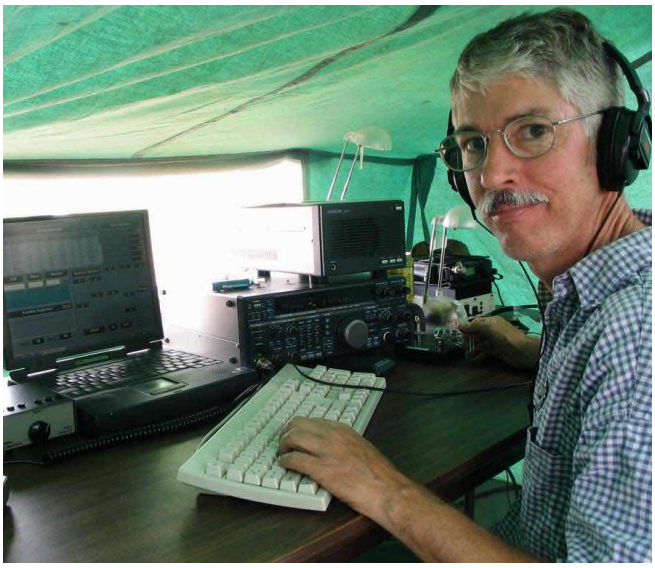
Other Business:

- **Auction Plans –** An OCARC Radio Auction is currently planned for February.
- **Christmas Dinner –** Dan KI6X reported that the Christmas Dinner is **CANCELLED** this year because of COVID-19. A ZOOM get-together may be planned for the third-Friday, December 18.
- **December Newsletter Editor** – Bob AF6C asked that details of Winter FD should be e-mailed to him by Ron W6WG.

GOOD of Club:

- **SK – Mike Gaude YN4MG/WK6O –** Kenan KR6J announced that his long time friend from high school, Mike Gaude YN4MG/WK6O died from COVID-19 in Nicaragua on October 31. Mike YN4MG had been working as a missionary in Nicaragua for many years. Kenan also showed the photo below of Mike as WK6O operating CW at an OCARC Field Day held at JFTB in Los Alamitos in 2006.

  Kenan KR6J went to explain that Mike WK6O was the ham who dragged him to his first OCARC meeting. Kenan went on and explained "If it weren't for Mike, I likely would not have become a ham radio operator".



Mike Gaude WK6O (SK) is shown operating CW on Field Day with OCARC in 2006. In 2004, Mike first earned the reputation as "the-traveling-CW-man" who went from band-to-band to really increase the club points.

- **ARRL CUP** – Tim N6TMT showed a picture of an ARRL coffee cup he received using his birthday credit perk. The nifty cup displays the level of your coffee through transparent morse code letters.

Meeting adjourned 8:58 PM

Submitted by Ken W6HHC - Secretary

[Editor's note: The data sheet for the Eimac 4CV100,000C (AKA 8351) may be found at: http://www.tubecollectors.org/eimac/archives/4cv100,000c(68).pdf]

Tim - N6TMT's W1AW Coffee Mug

Whaler's Eggnog- Christmas Cheer! Here's an old family recipe for a potent Egg Nog. It's great for sipping while trimming the tree or listening to holiday music. It keeps well in the refrigerator for days. (Don't believe all you read on the Internet, Confectioners' and powdered sugar ARE different. Confectioners' sugar is 10X powdered sugar with about 3% corn starch added).

Title:	**Whaler's Eggnog**	**Serves 10 to 12**
Category:	**Drink (Alcoholic)**	
Ingredients:	1/2 cup **4X or 6X powdered sugar**	1/4 cup **confectioner's sugar**
	6 **large eggs** - *separated*	1/4 tsp **salt**
	1 pint **milk** *and*	1 pint **bourbon**
	1 pint **heavy cream**	1/4 cup **brandy**
	or	*or*
	1 quart **half-and-half**	1/4 cup **dark rum**
	ground nutmeg to taste	

Separate eggs while cold. Let whites warm to room temperature. Beat six egg yolks until light and lemon colored. While beating add powdered sugar.

Beat six egg whites with confectioner's sugar and salt. Combine. Add heavy cream, milk, bourbon and rum or brandy. Blend and let stand for 30 minutes.

Mix again. Serve in 6 oz. glasses. Top with nutmeg to taste.

de AF6C

SWLing on the Aviation Bands:

Bob Eckweiler, AF6C

Listening to the aircraft bands can be an interesting pastime. This is especially true if one lives near an airport with a control tower. In the northern part of Orange County many people will find themselves within reception distance from one of the local airports. A list of such Orange County and LA airports is shown in **Table I**.

There are numerous aircraft bands, some used specifically for navigation and others are used for voice communication (See **Table II**). Most non-military communications occurs in the VHF 118.0 to 136.975 MHz band. There are also 106 HF upper sideband (USB) discrete channels that are used for long range communications when aircraft are out of VHF range. These are the MWARA (Major World Air Route Area) frequencies[1, 2]. They are composed of 11 HF channel groups at approximately 3.0, 3.4, 4.6, 5.5, 6.6, 8.6, 10.0, 11.3, 13.3, 17.9 and 21.9 MHz.

This article will deal mostly with the voice communications occurring in the VHF band starting at 118.0 MHz and will touch on other frequencies of interest to the SWLer. As aviation communication grew over the decades the upper end of the VHF band expanded[3] and the channel separation decreased. Before 1947 the band end was 132 MHz with 200 kHz spacing (70 channels). In 1947 the channel spacing was reduced to 100 kHz allowing 140 channels. Then in 1954 the upper band frequency was extended to 136 MHz and the channel separation was reduced to 50 kHz allowing 360 channels. 720 channels followed in 1972 when the channel separation was further reduced to 25 kHz [4].

[1] NOTES appear on page 23).

Figure 1: ICOM IC-2820H monitoring Coast Approach Control (121.3 MHz) and John Wayne Tower (126.8 MHz).

In 1990 an additional 1 MHz was added to the top of the band extending it to 137 MHz and allowing 760 channels. However, to guard the 121.5 MHz emergency channel, the three channels below and above that frequency are not utilized, giving the 121.5 MHz a spacing of 100 kHz on either side.

Equipment needed to listen in on the VHF aircraft band has been simplified considerably in recent years now that many 2-meter transceivers, including handhelds, have extended receive capability in the 108 or 118 to 137 MHz band (See **Figure 1**). Since all VHF aircraft communications uses AM modulation, most radios, automatically switch to the AM mode when receiving in that band. So, chances are you already have an air-band receiver.

In earlier years you had to buy a special receiver such as the tube-based Regency AR-132 or AR-136. Also, Heathkit sold the solid-state GR-98 between 1969 and 1977. See this month's Heathkit of the Month. These radios were all manually tuned. The

KLAX	LosAngeles Int. (LA County)
KLGB	Long Beach (LA County)
KSNA	(John Wayne (Orange County)
KFUL	Fullerton Municipal (Orange County)
KSLI	Los Alamitos JFTB - Military (OC)
KTOA	Torrance (LA County)

Table I - Nearby Airports w/Tower

190 - 435 kHz	NAV	NDB (Non Directional Beacon)
510 - 530 kHz	NAV	NDB (Non Directional Beacon)
2854 - 21985 kHz	COM	106 Discrete USB Channels MWARA (Aircraft outside VHF range)
75.0 MHz	NAV	ILS Marker Beacons - Outer, Middle Inner and Back-course Beacons
108 - 112 MHz	NAV	ILS/LOC (Localizer - 40 channels - paired with ILS/GS), VOR
112 - 118 MHz	NAV	VOR (VHF Omnidirectional Range)
118 - 137 MHz	COM	Tower, En route, Departure, Approach, Ground, FSS, etc. AM
225 - 400 MHz	COM	Military
329.15 - 335 MHz	NAV	ILS/GS (Glide Slope - 40 channels - paired with ILS/LOC)
1025 - 1150 MHz	NAV	252 channels DME/TACAN Air to Ground
962 - 1213 MHz	NAV	252 channels DME/TACAN Ground to Air
Emergency / Guard Channels:		
121.5 MHz	COM/ELT	Emergency COM channel (and Older ELT Beacons)
243.0 MHz	COM	Emergency COM Military
406.0 MHz	ELT	Later ELT Beacons
Transponder:		
1030 MHz	SUR	Surveillance RADAR Transponder Ground to Air
1090 MHz	SUR	Surveillance RADAR Transponder Ground to Air

Table II Major Aircraft Frequencies (USA)

Regency and Heath radios also covered the VHF NAV frequencies (108 - 117.975 MHz).

Many of the synthesized scanning monitors sold by companies such as Regency, Bearcat and Radio Shack (Realistic), cover the VHF aircraft frequencies. Some also include the NAV frequencies between 108. and 117.975 MHz.

Nearby aircraft in flight generally have strong signals due to their altitude, so the SWLer's biggest concern is being able to receive the ground transmissions from airports and en route ground stations whose antennas are most likely lower. The John Wayne Airport (KSNA) is located 7.5 miles from the author's QTH at a heading of 213° magnetic, and the reception using just a Comet 2-meter GP-6 antenna results in a reasonable (S6) signal from the tower. Copying aircraft on the ground varies depending on the antenna location on the plane. Most airliners have VHF antennas flush mounted in their vertical tail.

A two-meter antenna, while not really tuned for the aircraft band, should be sufficient if you are close enough to the airport. Otherwise you may need a better antenna. Ground to air antennas are usually vertically polarized. There are antennas sold that combine a vertical with a small Yagi (or a log-periodic antenna). They are expensive, but you can build your own. If the airport is close by, an inexpensive unity-gain omnidirectional VHF/UHF discone antenna such as the MFJ 1866 will give reasonable performance across the air-band and will also be useable for transmitting on the 2, 1¼ and ¾ meter amateur bands.

Let's focus on one local airport, John Wayne (KSNA). **Figure 2** is the FAA Airport Diagram for KSNA[5]. The diagram shows runway and taxiway layout; information a pilot needs while the plane is on the ground. In the upper left of the diagram are a list of radio frequencies associated with that airport. Here they are (all frequencies are in MHz):

D-ATIS: (Digital-Automatic Terminal Information System.) *126.0* [6]. This is a digitally synthesized voice transmission giving important airfield (terminal) information including WX, altimeter setting [7], runways in use, im-

portant notifications, etc. The information is updated frequently and each update is identified using a letter of the phonetic alphabet in sequence. When a pilot first contacts the tower he/she will say "…with information Quebec" confirming he has heard the current ATIS information (at the time Quebec).

John Wayne Tower *: The main frequencies used for communication when the aircraft is within the terminal control area. *119.9* for runway 2R - 20L and *126.8* for runway 2L - 20R. The third frequency *343.625* is for military use. The tower controls landing and takeoff and aircraft in the pattern. Most airports just have a single tower frequency, but busy airports have two or more frequencies; one for each runway or group of runways, At airports with multiple frequencies, you may find one controller transmitting on both frequencies simultaneously during light traffic times, overseeing operations on both runways. The asterisk (*) after '**Tower**' signifies that the tower has specific hours of operation. John Wayne tower hours of operation are 0615 - 2300 local time.

GND CNL: (Ground Control) *120.8* east and *132.25* west. Controlling traffic on the ground is as important for safe operations as in the air. Runway incursions by taxiing aircraft was becoming a serious problem and new rules were put in effect to increase safety. Like the tower, ground control may also operate with a single controller during light traffic times. This can extend to the point, usually late in the evening, where the tower operator will tell a landing pilot, "taxi to the gate on this (the tower) frequency", acting as ground control as well. Don't pass up listening to ground control, it can be entertaining.

CLNC DEL: (Clearance Delivery) *118.0* IFR (Instrument Flight Rules) departures and 121.85 VFR (Visual Flight Rules) departures. Clearance delivery is where aircraft receive their clearance instructions - Route to their destination or a waypoint, altitude, departure control frequency, transponder squawk code, and other pertinent information. Pilots flying VFR receive a clearance if they're leaving the landing pattern, for travel through the controlled airspace around the airport. After receiving a clearance the pilot must "read back" the clearance to confirm it is correctly received.

While KSNA is used in this example, Information on frequencies for other airports can be found in a similar manner. Unfortunately the links to the FAA website changes each time a new chart is issued. So to find the current Airport Diagram or one of the approach or departure plates for a given airport go to:

https://www.airnav.com/airports/

Enter the three letter airport code with or without the preceding 'K' (in the USA). Or, if you're not sure, just enter the city and the a list will appear to guide you. When you get to the correct airport page, if the airport has a control tower then it will have an "**Airport diagram**" link in the righthand column. Click on it and it will take you to the current FAA Airport diagram. Scroll down on the left side of the screen to "**Instrument Procedures**" where you will find the various approach and departure plates (discussed later).

The frequencies discussed so far only relate to air traffic within the boundary of the airport's control zone. Aircraft approaching and departing the airports around Southern California are controlled by Southern California TRACON or SCT. (TRACON - Terminal Radar Approach Control). The SCT (**Figure 3**) is located in San Diego, just outside MCAS Miramar. The SCT is divided into six areas: Burbank, Del Rey, Los Angeles, Coast, San Diego and Empire.

The Coast area covers the three Orange County airports as well as Long Beach. Thus you will hear the terms "SoCal" or "Coast" Departure and "SoCal" or "Coast" Approach. "SoCal" refers to the SCT while "Coast" refers to the Coast area of the SCT.

The initial departure frequency is given as part of the clearance. Other frequencies are passed from the current controller to the pilot before each handoff. Larger airports have special departure and approach charts called "plates". The plates also list the frequencies associated with the particular departure or approach. KSNA has twelve departures and eight approaches, each with their own plate. **Figure 4**

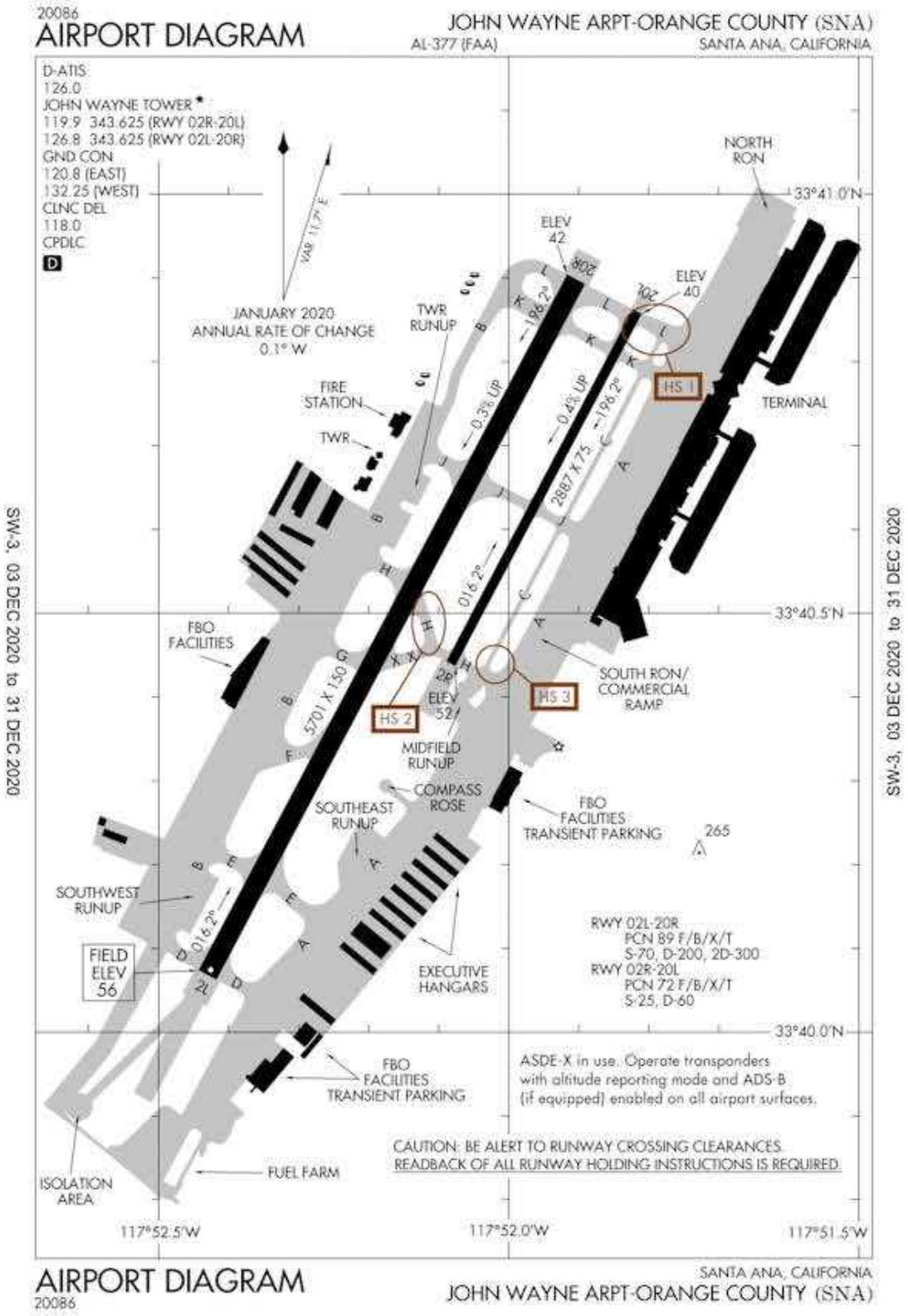


Figure 2

Figure 3: Southern California TRACON facility provides radar control of the airspace from the US/Mexican border to 20 mi north of Burbank and from Santa Catalina Island to San Bernardino.

shows the ILS (Instrument Landing System) approach plate for runway 20R. (See sidebar for more on runway numbering). The current departure and approach frequencies for KSNA are shown in **Table III**.

You can find approach and departure frequencies for any area in the USA using the link given for other airports on page 16. These frequencies are shown on the navigation plates linked to under "**Instrument Procedures**" on that site, in PDF form.

While short flights, say Burbank to John Wayne, can be handled by TRACON, longer flights, while en route, are handled by ARTCC (Air Route Traffic Control Centers). Often referred to just as "Centers". The Los Angeles Center

John Wayne (Orange County) Airport
Approach and Departure Frequencies

Departure Frequencies (KSNA):
128.100 125.350 132.700 133.850 281.400

Approach Frequencies (KSNA):
121.300 124.100 124.605 128.100 263.100

Other Coast Area Frequencies:
VHF: 127.200
UHF: 269.600 279.575 316.125 346.350 350.325

Table III

(designation ZLA) is located in Palmdale, and its jurisdiction encompasses about 177,000 square miles. There are a total of 21 centers covering the continental US and one each for Alaska (ZAN) and Hawaii (ZHN). **Table IV** gives some of the LA Center frequencies, and the location of nearby remote transmitter sites. Pleasants Peak is above Silverado and gives good coverage for SWLers in the Orange County area.

Listening to the ARTCC frequencies can be a bit frustrating as you often can only hear one side of the conversation. One reason is that

LA Center (ARTCC - ZLA)
En Route Frequencies

VHF	UHF	Transmitter Location(s)
119.950	277.400	Pleasants Peak
125.275	351.700	Pleasants Peak and Whittier
125.275	351.675	Palmdale
125.650	346.400	Ontario
126.350	290.200	Riverside
132.500	284.700	Palmdale
132.850	322.400	Pleasants Peak
134.575	354.100	Santa Catalina

TABLE IV

often a controller will be transmitting simultaneously on more than one frequency and the aircraft is responding on one of those other frequencies. This is also often true for TRACON frequencies. Not hearing the controller is usually the result of not having a favorable receive path to the transmitter.

SWLing on the NAV frequencies can also be interesting. In the VLF bands there used to be numerous NDB (non-directional beacons) used for navigation. Most of these have been decommissioned due to the density of air traffic and the heavy radar coverage in the SoCal area. At least one remains in San Bernardino at 397 kHz, Petis (formerly Colton) with a tone CW ID of "SB". Marker beacons used at airports as part of an ILS are also being phased out. Markers oper-

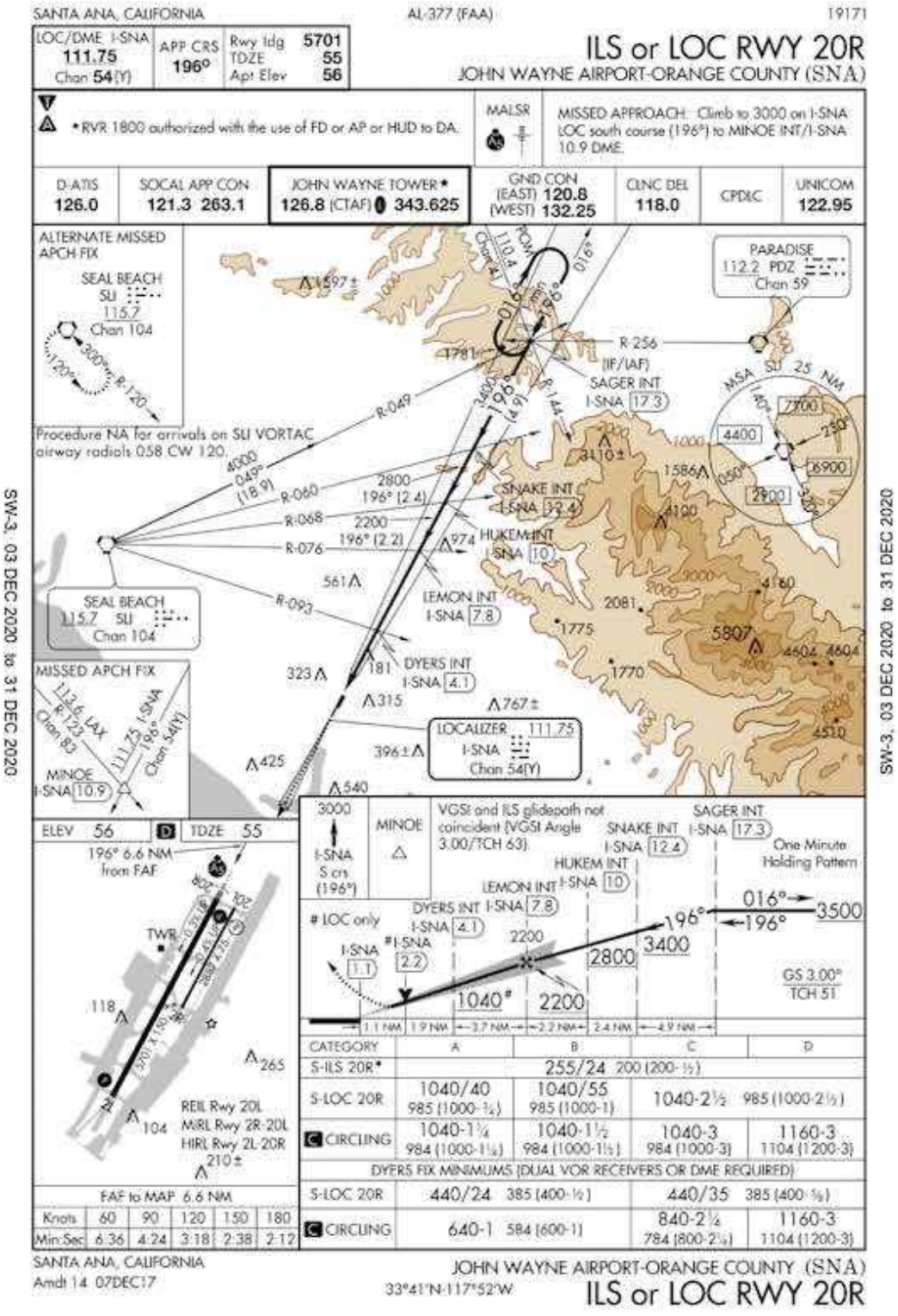


Figure 4: The approach 'plate' for John Wayne Airport ILS approach. Note that the Comm frequencies are given in the horizontal strip just above the map. NAV frequencies for the Seal Beach and Paradise VORs (see text) and the ILS are given in boxes on the map. The ILS frequency is also given in the upper left of the 'plate'. 'Chan' refers to the paired DME channel for each NAV aid.

ate at 75.00 MHz. There are four types, Outer Marker (OM) **(Figure 5)**, Middle Marker (MM), Inner Marker (IM) **(Figure 6)** and Back Course Marker (BC). The OM identifies an FAF (final approach fix). The OM is located about five to seven miles from the runway and transmits a series of 400 Hz tone dashes. The outer marker for John Wayne airport was recently deactivated. It was located on the SE corner of Hewes Ave. and Fowler Ave. south of El Modena Park[8]. Few, if any, MMs still exist. They were located about ¾ mile from the end of the runway and mark the decision point during a CAT I[9] approach. The MM transmits alternating dots and dashes at a tone of 1.3 kHz. The IM still exists at many airports that have CAT II and III ILS approaches. It is situated near the runway threshold and transmits a series of dots with a tone of 3 KHz. The rare BC marker is used in conjunction with a back course ILS approach. This is where the pilot lands from the opposite direction flying the ILS localizer beam backwards. The BC marker indicates the FAF for the back course approach. The markers have been made obsolete with GPS NAV and DME (distance measuring equipment).

Figure 5: The ILS Outer Marker Beacon for Yuma Runway 3L located in the middle of a farm field. This ILS was privately owned by Douglas Aircraft Co. as part of their flight test facility at the airport.

The ILS consists of four components; the Localizer, Glide Slope, Distance information and Approach Lights.

The localizer **(Figures 7A & 7B)** provides horizontal guidance during approach. telling the pilot whether he is to the left or right of the approach path. The localizer transmits a composite signal on the specified VHF NAV frequency. The left component is modulated at 90 Hz and the right component is modulated at 150 Hz. The two signals are equal in strength along the centerline of the approach. The pilot indicator is an analog meter. Full width of the meter is 700 feet at the runway threshold. This is approximately 10° on either

Figure 6: The ILS Inner Marker Beacon for Yuma Runway 3L located just beyond the runway threshold (Note the anti-collision lights).

side of centerline. On newer aircraft this meter is built into an integrated cockpit display.

Of interest to Air-band SWLers, the VHF ILS also transmits a morse code identifier. Usually it is the airport code preceded by the letter 'I'. For John Wayne it is "ISNA". LAX has eight ILS systems, each with its own identifier.

The second component of the ILS is the glide scope (**Figures 7C)**. It transmits on a UHF channel paired with the localizer VHF frequency. It works similarly to the localizer but turned on its side. It is of little interest to an SWLer since it doesn't ID.

The third component is distance information. This includes the markers already discussed and DME. The UHF DME transmitter is normally located with the localizer at the far end of the runway so the pilot reads the slope distance to the far end of the runway.

The last ILS component is the approach lights, which are of little interest to SWLing but very important to the pilot. (Figure: **7D)**

The VOR (VHF Omnidirectional Radio Range) provides pilots with a bearing to or from the VOR location. TACAN (Tactical Air Navigation) is a UHF military system that provides precision bearing and distance information. The VORTAC is a combination VOR and TACAN at one location. Civilian planes use the VOR for bearing and the TACAN for distance. A VOR/DME is a VOR that includes the distance measuring part of a TACAN, and for civilian pilots it acts just like a VORTAC. The UHF DME channels are paired to the VOR frequencies automatically.

Of interest to SWLers, the VOR and VORTAC identify with a three letter morse code tone and many also by voice. Some provide en route weather and flight information. Orange County has one VORTAC located on the Los Alamitos JFTB airfield and one VOR/DME located on the former MCAS El Toro property. Both are operational. **Table V** gives information on these NAV aids and others

Monitoring VHF NAV Aids requires the receiver either be at altitude or reasonably near the source; obviously, most of the energy is directed upward along narrow paths. Mobile listening as you drive around can provide some interesting catches.

This article just scratches the surface of aviation SWLing. It is of value to keep a log handy to write down and

Nearby VOR/VORTAC NAV Aids

Name	City	Type	ID	Freq.	Lat/Lon
Pomona	Pomona, CA	VORTAC	POM	110.40	34° 04' 42.199"N / 117° 47' 13.473"W
Santa Monica	Santa Monica, CA	VOR/DME	SMO	110.60	34° 00' 36.882"N / 118° 27' 24.176"W
Santa Catalina	Santa Catalina, CA	VORTAC	SXC *	111.40	33° 22' 30.201"N / 118° 25' 11.675"W
Los Angeles	Los Angeles, CA	VORTAC	LAX	113.60	33° 55' 59.337"N / 118° 25' 55.246"W
Oceanside	Oceanside, CA	VORTAC	OCN *	115.30	33° 14' 26.282"N / 117° 25' 03.795"W
Seal Beach	Los Alamitos, CA	VORTAC	SLI	115.70	33° 46' 59.884"N / 118° 03' 17.130"W
El Toro	Santa Ana, CA	VOR/DME	ELB *	117.20	33° 40' 33.707"N / 117° 43' 51.901"W

* No Voice ID

TABLE V

Figure 7A: After routine maintenance Mark - KD6NOT restarts the localizer system in the localizer shed.

Figure 7B: The author standing by multi phased localizer VHF Yagi array. Electronics are in shed at lower left.

Figure 7D: Approach lights to Yuma Runway 21R. Post to right holds one of the 3R ILS localizer Yagi antennas

Figure 7C: Mark - KD6NOT standing by multi-phased UHF Glide Slope antenna and equipment shed.

Figure 7: Some Photos of the former Douglas Aircraft Company ILS System at Yuma, AZ

accumulate frequencies; when a handoff between controllers occurs, the new frequency is normally given along with the name of the next controlling area. In a future article, if interest is shown, Other frequencies such as UNICOM will be discussed.

Have fun!

73, from AF6C

A Few Aviation Abbreviations and Acronyms:

ARTCC	Air Route Traffic Control Center
ATIS	Automatic Terminal Information Service
CATn	ILS approach CATegory (I, II, IIIA, IIIB, IIIC)
CLNC DEL	Clearance Delivery
COM	COMmunications (voice)
CPDLC	Controller Pilot Data Link Communication
CTAF	Common Traffic Advisory Frequency
D-ATIS	Digital Automatic Terminal InformationService
DME	Distance Measuring Equipment
ELT	Emergency Locater Transponder
FAF	Final Approach Fix
FAR	Federal Aviation Regulation
FBO	Fixed Base Operator
GND CON	Ground Control
GS	Glide Slope (ILS)
HS	Hot Spot, extra caution required on airfield
IFR	Instrument Flight Rules
ILS	Instrument Landing System
IM, BC	Inner Marker, Back-Course marker
LOC	LOCalizer (ILS)
MWARA	Major World Air Route Area
NAV	NAVigation
NDB	Non-Directional Beacon
OM, MM	Outer Marker, Middle Marker
PCN	Pavement Classification Number
RON	Remain Overnight
RWY	Runway
TACAN	Tactical Air Navigation
TDZE	TouchDown Zone Elevation
TRACON	Terminal Radar Approach CONtrol
TWR	(Control) Tower
UNICOM	Universal Communications
VFR	Visual Flight Rules
VOR	VHF Omnidirectional Radio Range
VORTAC	VHF Omnidirectional Radio Range / Tactical Air Navigation

Table VI

RUNWAY NUMBERS

Runways are numbered 1 through 36. If the airport has parallel runways, a suffix letter: L (left), C (center) or R (right) is added to the number. Each runway has two numbers depending upon the current departure direction. The number is determined by the magnetic runway heading from the departure end rounded to the nearest 10 degrees. The reciprocal runway number is always different by 18 (representing 180° difference). At KSNA the large runway is numbered 20R at the north end and 2L at the south end.

The true runway heading can be calculated from the magnetic heading (currently given as 196.2° on the Airport Diagram) and since the magnetic variation, currently 11.7° E, the true runway heading is 207.9°. Since the magnetic variation is slowly changing over time, runway numbers are occasionally updated. In September 2014 the KSNA runway numbers were changed from 1L - 19R and 1R - 19L to 2L - 20R and 2R - 20L.

Notes:

1. Abbreviations and Acronyms are given in **Table VI**.
2. See.https://wiki.radioreference.com/index.php/MWARA.
3. The FM broadcast band (88 - 108) prevented downward expansion of the Air navigation band (108 - 118).
4. In Europe the 25 kHz channels have been further split, adding an additional 2 channels between existing channels with a 8.333 kHz split.
5. A legend for the Airport Diagram is located on page 24.
6. Italicized frequencies are shown on the Airport Diagram.
7. The altimeter setting is the current barometric pressure at the airport adjusted to mean sea-level.
8. On the John Wayne ILS approach 'plate' this location is marked as LEMON.
9. CAT (short for category) determines the distance and altitude where the pilot must be in visual sight of the runway or fly the missed approach. There are five CATs: I, II, IIIA, IIIB and IIIC. The CAT is determined by the airport terrain and the ILS capability as well as the the plane's equipment and pilot.

19339

LEGEND

INSTRUMENT APPROACH PROCEDURES (CHARTS)

AIRPORT DIAGRAM/AIRPORT SKETCH

Runways

Hard Surface | Other Than Hard Surface | Stopways, Taxiways, Parking Areas | Metal Surface

Closed Runway | Closed Surface | Under Construction | Water Runway

ARRESTING GEAR: Specific arresting gear systems; e.g., BAK12, MA-1A etc., shown on airport diagrams, not applicable to Civil Pilots. Military Pilots refer to appropriate DOD publications.

uni-directional | bi-directional | Jet Barrier

ARRESTING SYSTEM [ ] (EMAS)

REFERENCE FEATURES

Displaced Threshold
Hot Spot
Runway Holding Position Markings
Buildings
24-Hour Self-Serve Fuel ##
Tanks
Obstructions
Airport Beacon #
Runway
Radar Reflectors
Control Tower # TWR

When Control Tower and Rotating Beacon are co-located, Beacon symbol will be used and further identified as TWR.

A fuel symbol is shown to indicate 24-hour self-serve fuel available, see appropriate Chart Supplement for information.

NOTE:
All new and revised airport diagrams are shown referenced to the World Geodetic System (WGS) (noted on appropriate diagram), and may not be compatible with local coordinates published in FLIP. (Foreign Only)

Runway Weight Bearing Capacity/or PCN Pavement Classification Number is shown as a codified expression. Refer to the appropriate Supplement/Directory for applicable codes e.g., RWY 14-32 PCN 80 F/D/X/U S-75, D-185, 25-175, 2D-325

Helicopter Alighting Areas

Negative Symbols used to identify Copter Procedures

landing point

NOTE:
Landmark features depicted on Copter Approach insets and sketches are provided for visual reference only.

Runway TDZ elevation TDZE 123

Runway Slope 0.8% UP — 0.3% DOWN
(shown when runway slope is greater than or equal to 0.3%)

NOTE:
Runway Slope measured to midpoint on runways 8000 feet or longer.

U.S. Navy Optical Landing System (OLS) "OLS" location is shown because of its height of approximately 7 feet and proximity to edge of runway may create an obstruction for some types of aircraft.

Approach light symbols are shown in the Flight Information Handbook.

Airport diagram scales are variable.

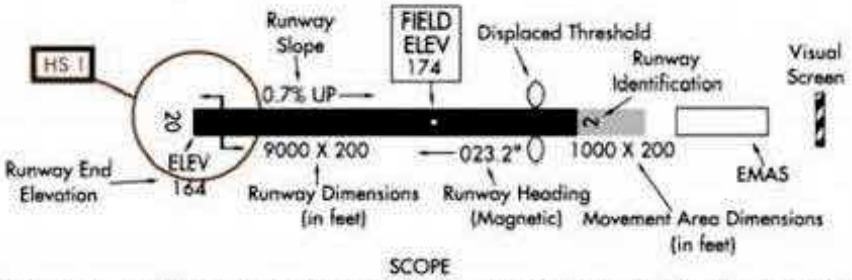
True/magnetic North orientation may vary from diagram to diagram.

Coordinate values are shown in 1 or ½ minute increments. They are further broken down into 6 second ticks, within each 1 minute increments.

Positional accuracy within ±600 feet unless otherwise noted on the chart.

Runway length depicted is the physical length of the runway (end-to-end, including displaced thresholds if any) but excluding areas designated as stopways.

A D symbol is shown to indicate runway declared distance information available, see appropriate Chart Supplement for distance information.



SCOPE

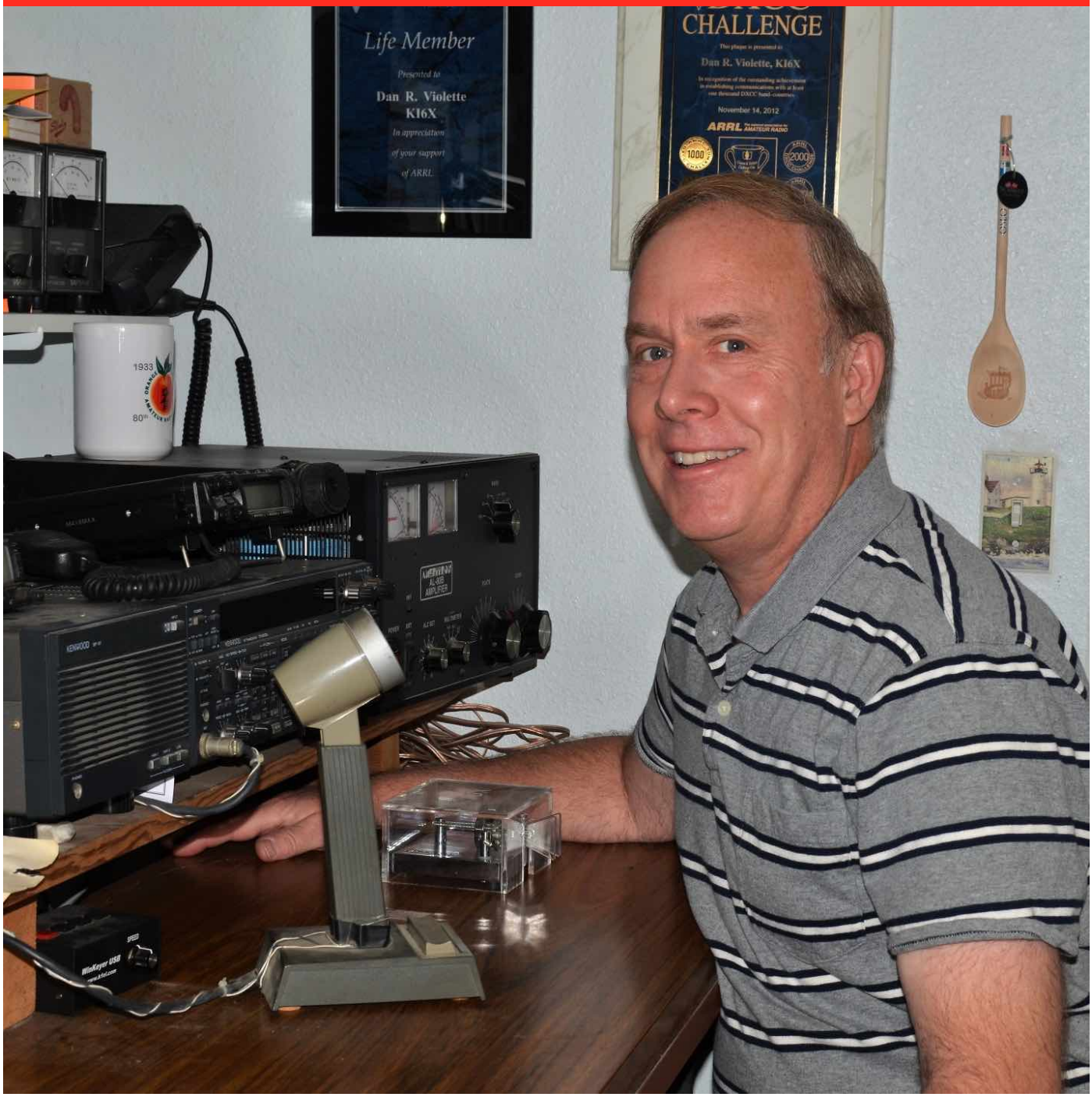
Airport diagrams are specifically designed to assist in the movement of ground traffic at locations with complex runway/taxiway configurations. Airport diagrams are not intended to be used for approach and landing or departure operations. For revisions to Airport Diagrams: Consult FAA Order 7910.4.

26 MAR 2020 to 23 APR 2020

26 MAR 2020 to 23 APR 2020

LEGEND

Station Highlight – Dan Violette, KI6X



This is the full picture that my head shot came from for my "Prez Says" articles these last two years. I got my Novice in 1978 and then in the summer of 1978 my General and Advanced at the FCC office in Long Beach while in High School. The Extra came 1980 also at the FCC office. Hard to believe it has been this long until I put this in writing. Had to teach myself some math that I had not had in school yet for these tests (nothing to memorize like now).

Indoors: You can see my Kenwood TS-850S with SP-31 speaker/filter. I have a second

one that I can swap in if something fails. I started as a Novice with a Henry Tempo-One, then KW TS-440S, then used the TS-850S the last 20+ years. After retirement I hope to start enhancing the station with more modern equipment. On the right is an Ameritron AL-80B which I can kick in 5-600 W as needed. On top is a Yaesu FT-857D for 6M and 2M/70cm SSB/CW. I was never on SSB/CW on 6M and above until the last few years and have enjoyed 6M. A KW TM-G707 gets me on 2M/70cm FM from home along with an Icom HT and various "cheap" HTs when out. That is my 40+ year old Shure 444 mic I have had since I started on voice. Still get good audio reports, great mic. Bencher paddles and WinKeyer for CW are relatively young. Used an old Autek MK-1 memory keyer for many years.

Outdoors: Butternut HF6V vertical on a 10' pole with elevated radials, dipoles at 30' for 80/160, 4 element yagi at 20' for 6M (recently replaced my home built Moxon), multiband VHF/UHF discone at 25'.

Award highlights: DXCC Honor Roll, DXCC Challenge 1500+, 5B DXCC with 12M & 17M add-on, VUCC 6M (250+ grids), various contest certificates, and other chases I enjoyed working towards. Some of these I still have room to add to which keeps the spark.

Memberships: ARRL Life-Member, QCWA Life-Member, OCARC, BEARS-HB (Boeing), still technically OCCARO Treasurer even though they went into hiatus a few years ago.

Dan Violette - KI6X

? ? PUZZLER ? ?

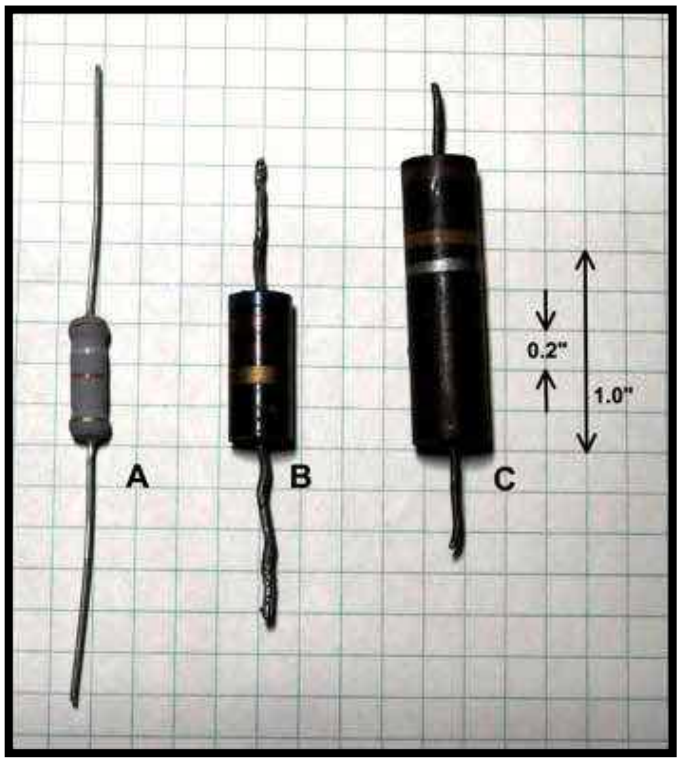
In the May 2019 *'RF'* the following Puzzler was proposed: *The photo below shows three resistors that the editor found in his junk box. Their color codes are a bit hard to read, 'A' is a 39KΩ 5% resistor (orange-white-orange-gold), 'B' is a 620Ω 5% resistor (blue-red-brown-gold) and 'C' is a 10KΩ 10% 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).

The response was **underwhelming**, only Fried - WA6WZO offered an answer: "*Both A and B (C looks too big for this age).*"

He was two-thirds correct; they are all 2-watt resistors. 'A' is a modern carbon film resistor, 'B' is a circa 1960 - present carbon composition resistor and 'C' is 1940's style carbon resistor. 'C' came out of an Hallicrafters S-40B receiver (circa 1946 - 1956).



? ? PUZZLER ? ?

"2021 Winter Field Day"

January 30th and 31th 2021
(Contest period Saturday 1900 UTC to Sunday 1900 UTC)

Come join the OCARC team for 2021 WINTER FIELD DAY. We need everyone to turnout to continue our winning streak and be the highest scoring club for 3 years running. Be sure to enter "Orange County ARC-CA" as your club in your Cabrillo Log submittal. If needed, help will be provided for your log submittal.

The event will be held at your QTH due to Covid 19 so review the revised rules for 2021. The new rules can be downloaded from: https://www.winterfieldday.com

Bands: 160m, 80m, 40m, 20m, 15m, 10m, 6m, 2m plus UHF and VHF

Points: 1 for phone QSOs and 2 for CW & digital QSOs.
Multipliers: one for each mode operated per band.
Modes: SSB, CW, and Digital. A single Satellite contact is worth 1500 bonus points. See the rules for additional Bonus Points.

If you are interested and need more information or his power point summary contact Ron W6WG by email at,: W6WG@W6ZE.ORG

de W6WG

OCARC BOARD MEETING MINUTES 2020-12-05

Due to the COVID-19 restrictions on physical gatherings, the latest OCARC Board meeting was held ON-LINE via ZOOM© on Saturday December 05, 2020 at 8:30 AM. In attendance were ten Board Members and three other club members. All board directors (were present for a Board quorum. The ZOOM technology was hosted by Tim N6TMT with screen shares by President Dan KI6X

Directors Reports:

- **Treasurer** – no report was provided
- **Membership** – Corey reported that the club currently has a total of 113 members.

OLD Business:

- **Newsletter Editors**
  Dec. Bob AF6C (this newsletter).
  Jan. Tim N6GP
  Feb. Tom W6ETC
  Mar. Tim N6TMT
- **General Meeting Programs (Zoom meetings until further notice)**
  - December Dinner – **CANCELLED** (COVID restrictions)
  - December Meeting – informal OCARC Holiday Zoom Mtg - "Stories and Eggnog"
    See details below
  - January – ICOM via Zoom
  - February - possible Zoom Radio Auction ???
- **2021 Winter Field Day –** Information on the contest (Jan 30 and Jan 31) for OCARC members can be found elsewhere in this newsletter.
- **OCARC Audit Committee** – The following people will conduct the 2020 Financial Audit in January: Greg W6ATB, Tim N6TMT, and Ken W6HHC.
- **December Zoom Fun Gathering** – Friday Dec 18, 7:00 PM (gather 6:30 if you would like). Dan KI6X welcome all, introduce visitors/new members
  - Tim N6GP to Emcee "Ham Radio Storytelling" Think of some story to tell regarding Ham Radio
  - Introduce new Board (KI6X outgoing President or W6HHC Secretary?)
  - Present a plaque to the outgoing President (N6TMT, KI6X has plaque to open)
  - Present Good of the Club award (KI6X, N6TMT will have package to open and show the winner via Zoom)
  - All member raffle (no cost) for two (2) $25 HRO cert, one (1) $50 HRO cert, and a "Mystery Prize" courtesy of AF6CF. Will draw alternate winner if winner not present in case winner turns down award. Club keeps for another time next resort. Draw from roster (108 or 109) which excludes Honorary Members. Jim AF6N will pick the winner(s) using numbered balls from the club roster,

NEW Business:

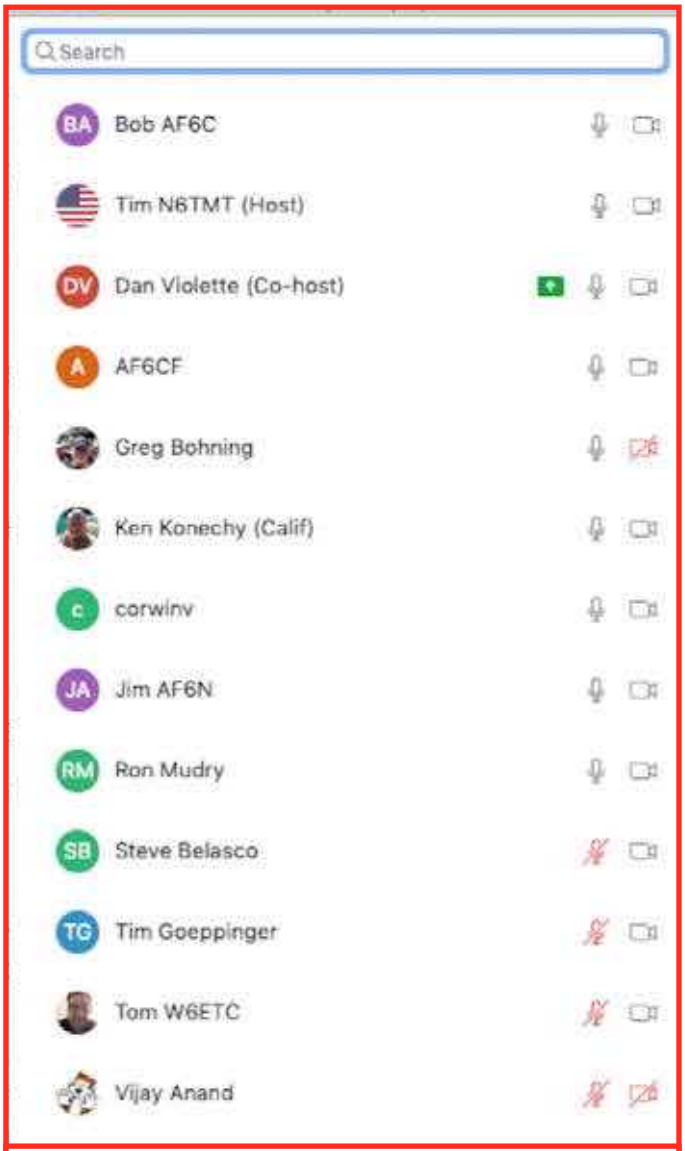
- **OCARC to Pay for Zoom Paid Membership** – Since COVID is not going away soon…discussion was held about the club paying for the cost of possibly two ZOOM paid subscriptions (each around $15/mo). Also a club YouTube subscription would be helpful for posting club Videos on our web site. The team of club web-masters will do further research and finalize with the Board.
- **Possible New OCARC Website Technologies"** – Bob AF6C reported on some testing he has done to add photos to the club's "front page". Also changing to HTML5 technology offers some benefits for displaying videos. Further reports to follow.

Good of the Club:

- **Possible 5 element 2M Beam Donation** – In the process of moving QTH. Greg W6ATB reported he has a surplus 5-element 2M Beam that he is willing to donate to the team of the remote ham station in Boron California.

Meeting adjourned 10:00 AM

Submitted by Ken W6HHC - Secretary



Screen Shot of attendees at the December Board Meeting.

Disaster at the Arecibo Radio Telescope

On June 19th 2015 the club was treated to a program by Chip Margelli titled: ***"A Tour of the World's Largest Antenna: The Arecibo Radio Telescope in Puerto Rico."***

Sadly, in mid August of this year a 3-inch cable failed; it didn't actually break, it popped out of its socket and fell onto the 1,000-foot reflector dish below severely damaging the reflector. In early November a second cable failed before repairs could begin on the first failure. Shortly after that a decision was made not to fix the telescope but to tear it down as it was now too dangerous to repair.

On Tuesday December 1st at about 7:55 AM (Atlantic Standard Time) a third cable failed and the 900 ton platform fell onto the dish below, resulting in irreparable damage. Luckily, no one was injured.

For a video of the collapse see:

https://apod.nasa.gov/apod/ap201209.html

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.

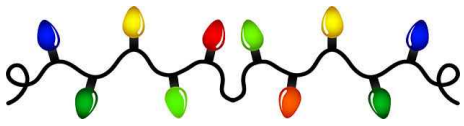
Solar Cycle #25 - Bust or Boom:

The science behind sunspots has yet to be mastered. Using current knowledge the prediction for cycle 25 is mediocre at best with a peak of 114 . However, there is some who believe it will result in sunspots reaching well over 200 at the peak.

Every 11 years, on average, the sun's magnetic field reverses. This occurs at the sunspot minimum. Eleven years is just an average, and when the cycle exceeds that length the following cycle is weak. Cycle 24 was short, under 10 years, and cycle 25 began in December of 2019. Solar physicist Scott McIntosh of the US National Center for Atmospheric Research, looking back over the past 270 years of solar data discovered that solar activity picks in the cycle following a sorter than normal cycle. Cycle 23 was almost 13 years.

Hams and scientists alike are going to wait and see what develops in the current cycle. To quote Dr. McIntosh: ***"A weak Sunspot Cycle 25, as the community is predicting, would be a complete departure from everything that the data has shown us up to this point."***

73, de Bob AF6C



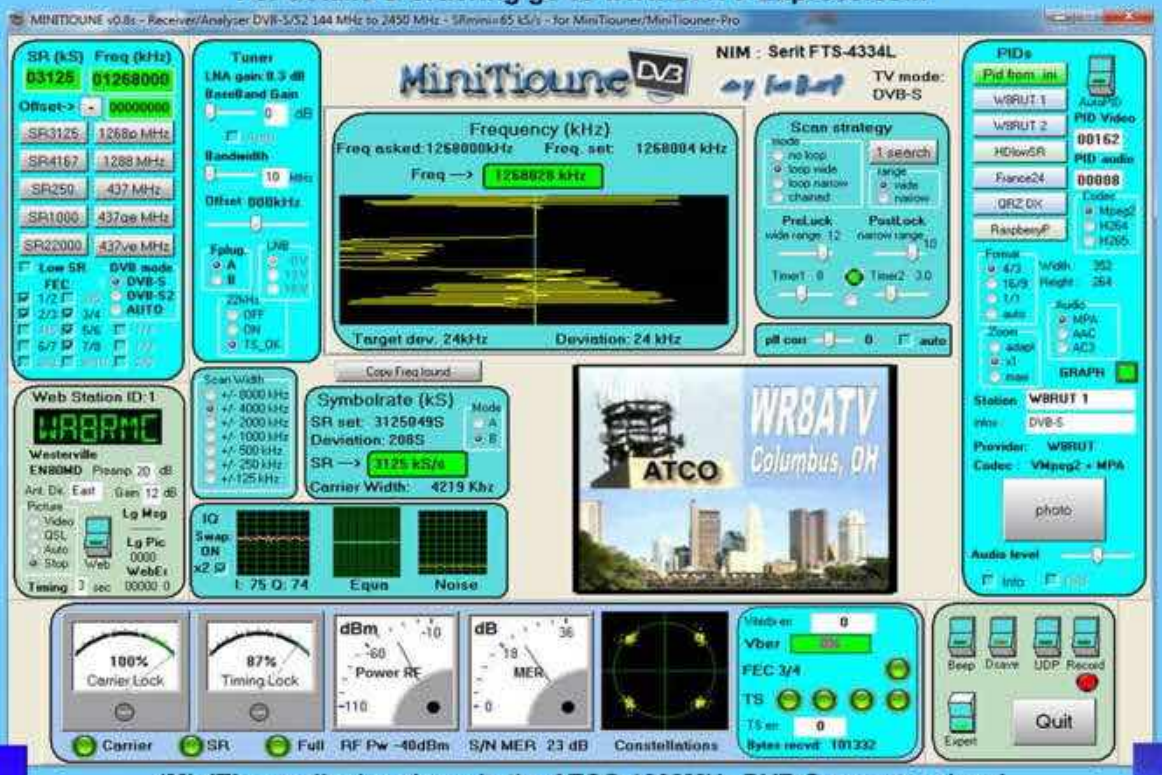
MiniTiouner-Express

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

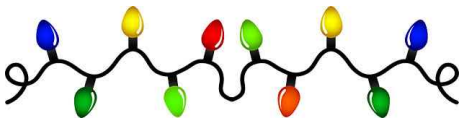


(MiniTioune display above is the ATCO 1268MHz DVB-S repeater signal at WA8RMC QTH 15 miles away).

Program ***- Continued from page 1***

Here's a rough agenda for the meeting:

- Dan - KI6X will welcome all and introduce visitors and new members.
- Tim - N6GP will Emcee "Ham Radio Storytelling".
  - If you have any stories you'd like to share contact Tim
- Introduction of the New Board.
- Presentation of Presidential plaque to outgoing president Dan - KI6X, by outgoing VP Tim - N6TMT.
- Presentation of the ***Good of the Club*** award by Dan - KI6X and Tim - N6TMT.
- There will be two raffles.
  - An "All Member" raffle - prizes include two $25 and one $50 **Ham Radio Outlet** gift certificates. You need not be present at the virtual meeting to win.
  - A "Mystery Prize" raffle that you need to be present at the virtual meeting to win. The prize is being donated by Old St. Nicholas himself - AF6CF
- Ask the Elmer session.
- Good of the Club session.
- Meeting Adjournment



Graphic Credits:

The W6ZE Christmas Ornament Logo and the Radio Activity are the work of Tom - W6ETC. Both were edited slightly for fit.

The ORANGE COUNTY AMATEUR RADIO CLUB, INC.
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P.O. BOX 3454
TUSTIN, CA 92781

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