
SIGNALS

Rockwell
Collins Amateur Radio Club

Monthly Newsletter of the

Volume 28 Issue 05

Web Site <http://www.collinsclubs.com/rcarc/>

February 2007

RCARC

Membership Meeting

Due to the unavailability of the Verizon meeting room, there will be no meeting in February

Subject: Watch for the March 2007 meeting announcement

Local Club News

W5ROK Membership Renewals!

If you have not renewed your membership and need an application form, please contact Joe Wolf, N5UIC, at 972.705.1388.

KWM-1 Article from QST For those of you who may not be members of ARRL and haven't seen the KWM-1 article in the January issue of QST, it is reprinted in this issue of the newsletter.

3-4 March 2007: ARRL International DX Contest (Phone)

The object of this event is for W/VE amateurs to work as many amateur stations in as many DXCC countries of the world as possible on 160, 80, 40, 20, 15, and 10 meter bands. Foreign amateurs (also including KH6, KL7, CY9, and CY0) are to work as many W/VE stations in as many of the 48 contiguous states and provinces as possible. The event is on the third full weekend in March (**March 3-4, 2007**). The contest period is 48 hours and starts at 0000 UTC Saturday; ends 2400 UTC Sunday. More info at

<http://www.arrl.org/contests/rules/2007/intldx.html>

8-9 June 2007: Ham-Comm 2007

Make plans now to attend Ham-Com 2007, June 8-9, at the Plano Centre in Plano, TX. Online admission sales began January 1 on the redesigned web site, www.hamcom.org. The web site features a new format that enables users to quickly find what they need.

Here Is What's New For Ham-Com 2007:

- ALL parking is on-site and FREE! Up-to-date event information will be broadcast on 87.9 FM (via your car radio at the site).
- Registration is online (\$7.00) or at event door (\$10.00). No mail or FAX registrations, please!
- The tailgate market will be closer to the Plano Centre west entrance.
- There is a three (3) table limit for the indoor flea market. This will allow more people to offer items for sale.

Here Are Some Important Dates To Remember:

- January 1: Admission sales begin
- February 1: Flea Market registration begins
- February 15: Commercial exhibitor packets due!
- February 28: Registration and grand prize announcement
- March 1: Lone Star DX Association program announcement
- April 1: Program listing available online
- May 1: Ham-Com Flyer Event Edition online

Ham-Com 2007 will feature a full schedule of speakers, workshops and special-

interest group meetings. We will continue to place more emphasis on youth education and club activities.

Please visit our web site at www.hamcom.org and get all of the details!

73

Lisa McClellan, K5LRM
Chairman, Ham-Com 2007

Tesla's Theories Remain Current

(I have been trying to fit this article into a newsletter for several months...Ed.)

10 July 2006 was the 150th anniversary of the birth of the genius behind AC power. He died alone, poor and a little nutty — the Croatian-born ethnic Serb genius whose innovations had a profound impact on development of the modern-day electrical grid. Today marks the 150th anniversary of the birth of Nikola Tesla, who grew famous in the late 1800s for his public battles with inventor Thomas Edison during the "War of Currents."

Tesla, at 28, emigrated to the United States in 1884, a time when Edison was aggressively promoting the concept of direct-current power generation. But Edison's invention had major limitations. The "DC" power stations he was building had to be located in the centre of industry, since the direct current Edison was producing could only travel a kilometre in any direction.

Only 18 central power stations based on DC existed in the United States at that time, and about 370 smaller stations were located within factories. Tesla's vision was to liberate this electricity through the use of alternating current, or AC, systems, which make it possible to efficiently transmit power over (Cont. on page 3)

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VE SESSIONS

Dallas tests are held 4th Sat of each month at 10:00. 13350 Floyd Rd. (Old Credit Union) Contact Bob West, WA8YCD (972) 917-6362

Irving tests are held 3rd Sat. of each month at 09:00. 5th and Main St. Contact Bill Revis, KF5BL 252-8015

McKinney VE test sessions are held at the Heard Museum the first Sunday of the month. The address is 1 Nature Place, McKinney TX. The time of the testing is 14:30, ending no later than 16:45. *Note: no tests given on holiday weekends.*

Garland testing is held on the fourth Thursday of each month, excluding November, and begins at 1930 sharp. Location is Freeman Heights Baptist Church, 1120 N Garland Ave, Garland (between W Walnut and Buckingham Rd). Enter via the north driveway. A HUGE parking lot is located behind the church. Both the parking lot and the Fellowship Hall are located on the east side of the church building, with big signs by the entrance door. Contact Bill Reynolds, K8DNE, 972-475-3854.

Plano testing is on the third Saturday of each month, 1300 hrs at Williams High School, 1717 17th St. East Plano. Check Repeater 147.180+ for announcements.

Greenville testing is on the Saturday after 3rd Thursday, 1000 hrs at site TBA, contact N5KA, 903.364.5306. Sponsor is Sabine Valley ARA. Repeater 146.780(-) with 118.8 tone.

Wills Point Call Don W5QXK at 972-932-3595

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President's Message

You may remember that in my January President's Message that I mentioned that of the 37 members of RCARC only 10 of them are active Rockwell Collins employees. We celebrate the support of those retirees that are so faithful in coming to the meetings and providing input to the continued success of the RCARC. It is important to match that commitment from our retired members with an equal commitment from our active employees. I would like to challenge our eBoard and all of the RCARC membership to build the number of active employee membership in RCARC to a minimum of 15 by the end of the administrative year versus the current level of 10. Help us spread the word about the RCARC and take the initiative to invite someone to our next meeting. Any suggestions that you have in that regard are certainly welcome and requested.

At the 25 January meeting the members present affirmed the decision of the eBoard to sell the 30S-1 amplifier. Jim Skinner, WB0UNI, and Jim Gaston, KD5GYD were appointed to investigate the condition of the amplifier and determine a fair selling price. If you have any input regarding the establishment of a fair selling price, contact either Jim Skinner or Jim Gaston with that information.

The elimination of CW as a test element for an Amateur Radio License is going to result in a sudden jump of new amateurs especially in the next few months. While certainly broader than an RCARC issue, I believe it is important that all of us take the time to welcome those new operators and to demonstrate the very best operating practices that are so fundamental to good operation and having an enjoyable time on the air regardless of the activity that they choose to get involved with.

ARRL membership up for renewal or new application? See information elsewhere in this edition to get more information on how your membership application can be made through the club. Your club receives a commission for all renewals or new memberships that we process.

Well it is time to say 73s.

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 Bill Swan,
 K5MWC, President

Secretary's Report

Bill Swan, K5MWC, opened the meeting at 1735 (2007-01-25), in the RCI Cafeteria. Present at the meeting were:

Charles Beis	K5UWD
Dennis Cobb	WA8ZBT
Bill Fell	KK5PB
Jim Gaston	KD5GYD
Bob Kirby	K3NT
Steve Phillips	K6JT
Jim Skinner	WB0UNI
Bill Swan	K5MWC
Joe Wolf	N5UIC

The following business was conducted:

1. Officer Reports

- a. Treasurer's report was circulated and approved. Bill Swan, K5MWC, informed the club of a \$1000.00 (annual sponsorship) check received from RCI.
- b. Steve Phillips, K6JT, the Repeater Trustee, reported that our FCC FRN ID is registered to the company (Rockwell Collins) when it should be register to the club (Rockwell Collins Amateur Radio Club). Steve thinks it's likely that this happened several years ago due to an administrative error made within the ARRL. This can be fixed but there is a \$60.00 fee. Steve will keep us updated. We can continue to use the license at this time.
- c. Dennis Cobb, WA8ZBT, the Activities Chairman, reported that W5ROK competed in a contest over the weekend.

2. Old Business / E-Board Summary

- a. Replacement for the TS950 Transceiver
Bill Swan, K5MWC, recapped the club's decision to replace the TS-950 with a new transceiver (to cost no more than \$3500). The Radio selection committee has not made a recommendation yet but the prime candidates are:
 - Yaesu FT-2000 price—approximately \$2,650.00
 - ICOM IC-756ProIII price—approximately \$2,850.00

The Radio selection committee will generate a trade off matrix to help determine the best choice. Several

club members expressed a desire that the new unit support remote control and customized user interface settings. Someone mentioned that the FT-2000 has a 200W version coming out soon and probably warrants consideration.

b. 30S-1 kW Linear Amplifier

Bill Swan, K5MWC, reviewed the E-Board's decision to sell the 30S-1 amplifier. Jim Skinner, WB0UNI, and Jim Gaston, KD5GYD, will investigate the operating condition and fair selling price in order to make a recommendation. The floor was opened for feedback and discussion.

No members voiced opposition to the sale of the 30S-1.

c. Computers for the Club Shack

Bill Swan, K5MWC, talked with Bill Ransom about receiving several old RCI PCs for use by the club. This is still being pursued. Bob Kirby, K3NT, has been investigating the desired feature set that the club would ideally want. Among the features: Multiple USB interfaces, Quality Sound Card (to support digital modes), and processing power / memory capable of running modern antenna characterization software. Several members expressed interest in our ability to support "Log Book of the World".

d. ARRL Section Manager Elections

The ARRL section manager elections are coming up and everyone should read up on the candidates to make an informed decision. This is our first level of representation in an organization that has a great deal of influence in HAM privileges.

Bill Swan, K5MWC, closed the meeting at 1818. Dennis Cobb, WA8ZBT, introduced the program which consisted of a 40 minute video and accompanying handouts describing the capabilities of the Micro908 kit. The Micro908 is a reusable control and computing platform which provides antenna measurement, PSK31 digital modems, audio filtering, and VFO.

Tesla's Theories Remain Current (*Cont from page 1*) hundreds of kilometres at high voltages.

"He knew down the road, when industry develops, that there would be large amounts of power required to be trans-

ferred from one place to another," says Mike Radan, a Serbian-born Canadian and electrical engineer who worked 35 years at the former Ontario Hydro. "Edison felt threatened."

But Tesla, on his own an inept businessman, was no match for Edison. It took the support and foresight of American entrepreneur George Westinghouse and his Westinghouse Electric Corp. to push the "AC" concept forward — and to ultimately defeat Edison's active fight against the AC movement and his aggressive public relations campaign promoting the deadly nature of alternating current.

In the end, Tesla and his AC inventions won the currents war after the Niagara Falls Power Co. and the Canadian Niagara Power Co. embraced the technology for an unprecedented power project at Niagara Falls, which was dependent on Tesla's "polyphase" AC systems and patents. Westinghouse was chosen to lead construction of the massive hydro stations.

It was a dream come true for Tesla who, having seen a picture of the great falls as an 11-year-old boy, had vowed to harness its power. "I told my uncle that I would go to America and carry out this scheme," Tesla recalled in one of his biographies.

When the project commenced operation in 1895, the electricity was used locally and — perhaps most important — transmitted and distributed to the neighbouring city of Buffalo. It was a major feat, ultimately convincing a battle-worn Edison to abandon the electricity business altogether. Yesterday, the Niagara Parks Commission unveiled a Tesla monument in recognition of his contributions to the region and the world of electricity. The Professional Engineers of Ontario have also declared 2006 to be the year of Tesla.

"In 1906, Sir Adam Beck founded Ontario Hydro to ensure that every Ontarian would have equal access to affordable electricity, while helping build a foundation for the province's economic future," according to a statement from the engineers' association. "That would not have been possible without Tesla's polyphase generators, which became a standard by that time."

Tesla didn't make much money from his inventions. Westinghouse, which had run

into financial difficulties fighting Edison and a number of patent pirates, told Tesla that he had to give up his royalties or his AC systems would never make it to market.

"Tesla said 'Please don't cancel this program' and ripped up the contract," says Radan, whose own decision to become an electrical engineer was inspired by his boyhood fascination with the famous Serb.

"His purpose was to make sure this technology made it to the people and the world. It wasn't about money."

Still, Tesla needed money to continue his path of innovation. After the Niagara project, he became fixated on his "world system" of power transmission—a grand vision of wirelessly transmitting electricity through a layer of the Earth's atmosphere from one continent to the other, not unlike modern-day wireless telecommunications.

New York financier J.P. Morgan provided Tesla with research money for a while, but eventually pulled funding after Italian inventor Guglielmo Marconi demonstrated the first cross-Atlantic wireless telegraph transmission.

It wasn't wireless power transmission, and Marconi's invention was later found by the U.S. Supreme Court to violate Tesla's own patents, but investors such as Morgan didn't know the difference. Convinced that Marconi had outwitted Tesla, Morgan pulled funding.

The final decades of Tesla's life were not good ones. By 1916 he had filed for bankruptcy. Already an odd fellow, he had fallen victim to obsessive-compulsive disorder. He'd count every step he made, calculate the volume of food and drink before consuming it, developed a germ phobia and became obsessed with the number three.

His sanity was further questioned after claiming that Martians had tried to contact him through radio signals. Near the end of his life, he became strangely attached to pigeons and grew particularly fond of one white pigeon. After that pigeon died, he told one of his few friends, "I knew my life's work was over."

Tesla, who never married, died alone in 1943 of heart failure at 86. But his name lives on. This fall rock idol David Bowie will play Tesla in a movie called The

Prestige, which will also star Michael Caine and Hugh Jackman.

Tesla's ideas also live on, including his quest for the wireless transmission of electricity. It wasn't until after his death that scientists began realizing the full potential of microwaves.

"What Tesla was proposing was an inductive field (in the Earth's ionosphere). You send out a pulse from a central tower then try to tap whatever energy comes to you from a great distance," says David Criswell, an expert in space physics and director of the Institute for Space Systems Operation at the University of Houston.

"At the time he was doing that there was only beginning to be an understanding that microwaves could be manipulated in the same way that a light could through a lens."

Only since the 1970s has it been shown that power can be transmitted through microwave frequencies, with experiments demonstrating up to 30 kilowatts sent over more than a kilometre. In the 1980s, Canada powered its Stationary High Altitude Relay Platform, or SHARP aircraft using microwaves beamed from the ground.

Criswell believes Tesla's idea of a "world system" of power could be achieved, but with a dramatic twist and using different principles. He envisions covering the sunlit surface of the moon with solar panels that collect energy from the sun and beam it back 24 hours a day through microwaves to receiving stations on Earth, where the baseload power is redistributed accordingly.

The solar panels would be built on the moon using silicon and metals from its surface. Massive fields would be set up strategically around the globe to collect the energy-carrying microwaves and convert them into power. Criswell believes his \$500 billion moon-based solar project could provide enough emission-free electricity for the entire planet—about 20 terrawatts—by 2050, when it would be possible to replace all fossil fuel and nuclear plants.

He laments that the United States abandoned its space activities on the moon. "If we had stayed on the moon, the U.S. would be powered by this by now," he asserts. "We just did not look at the moon as

something we could use. We looked at it as an adventure.

"There hasn't been a day in the last 30 years I haven't worked on this. I think the day is going to come."

Radan, who's not so sure Tesla's grand vision can be realized, understands the drive to pursue it.

"For someone to come along and pick up on Tesla's ideas so we can do away with all these transmission lines and transmit power wirelessly, it's the remaining dream for humanity."

(By Tyler Hamilton, Energy Reporter for the Toronto Star, 10 July 2006)

ARRL Membership Benefits

There are "fringe" benefits for RCARC when our members join or renew through the following process.

Renewing By Check—After filling out the form, return it to RCARC with your check. Note the definition of New or Renewing Member at the top of the form. If you have previously been a member of ARRL but have let that membership lapse for 2 or more years then you are considered a new member and the club would get a \$15 commission. If you are renewing a current membership or one lapsed for less than 2 years, you are considered a renewing membership and would get a \$2 commission. Do not deduct the \$15 or \$2 commission—make the check out to RCARC for the full renewal amount.

Renewing By Credit Card—If you wish to CHARGE the renewal to a credit card note the special instructions (Box on right side of form) which indicate that you would then pay the \$15 or \$2 directly to RCARC. Your credit card would be charged for the full amount minus the appropriate commission. In this instance the check should be made out to the RCARC for the appropriate commission amount.

In both cases, return the application to RCARC regardless of payment method in order for RCARC to get credit. **The application is now available on the RCARC website!** Mail to the following address:

RC Amateur Radio Club
Attn: Treasurer
MS 461-290
PO Box 833807
Richardson TX 75083-3807

The Golden Anniversary of the Collins KWM-1

2007 marks the 50th anniversary of the introduction of the amateur rig that became the model for modern radio communication gear—the Collins KWM-1 transceiver.

Mike O'Brien, K0MYW

Not much larger than a shoe box, the KWM-1 was in stark contrast to the typical amateur station setup of hefty separate receiver and transmitter, the latter sometimes as bulky as a refrigerator. The *QST* review (Apr 1958, pp 23-27) of the new transceiver prophetically observed that "... the KWM-1 may well mark the end of one era and the beginning of another."

Although the KWM-1 was developed by the renowned Collins Radio Co, one of its most remarkable aspects is that it originated not in a sophisticated factory laboratory but rather in a home basement workshop. In 1956 Gene Senti, W0ROW (SK), then 38 years old and in his 14th year as an engineer with Collins in Cedar Rapids, Iowa, began tinkering with his personal 75A-4, the top-of-the-line receiver he had designed for Collins a couple of years earlier. He described his home experimenting as "...taking the receiver's block diagram and running it backward."

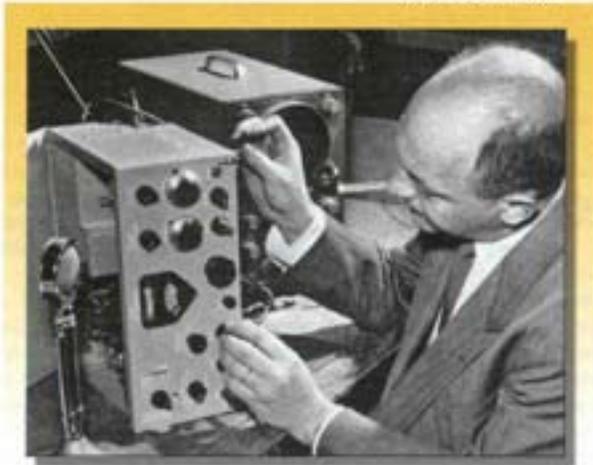
"I was trying to figure out a way to use the 75A-4's high-stability PTO (permeability-tuned variable oscillator), with its good linearity, along with the crystal oscillator for injection purposes in a transmitter," Senti told me in a 1991 interview.

"I took the signals from the oscillators out of the 75A-4 with some pieces of coax and re-combined them in a separate chassis. I also took out the BFO (beat frequency oscillator). So I was using all three of the receiver's oscillators. All I had to do was come up with new mixers."

While he toyed with the circuitry, Senti also began dreaming of the convenience such a setup could bring to his amateur station.

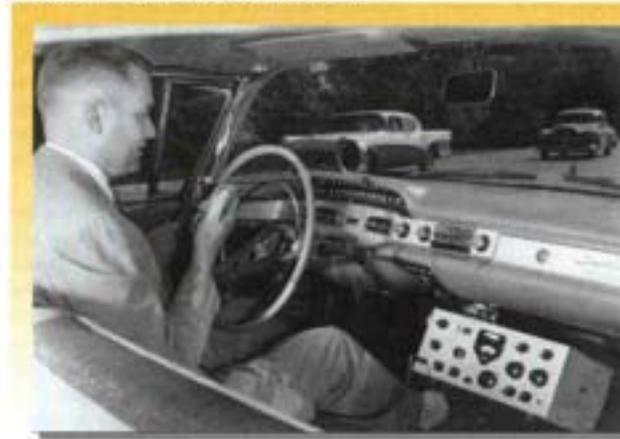
"After I saw where I was heading, I thought to myself, 'Gee, this could be neat! All I'll have to do is tune in a signal and my transmitter will be zero-beat with it.' So I went ahead and hooked it up — and, by golly, it worked!"

When Gene Senti was reflecting in 1991 about his homebrew experiments that pointed the direction that radio manufacturers have followed over the half-century since, he modestly conceded that his brainchild, the KWM-1, "turned out to be a pretty good little rig."



COURTESY JAY MILLER, K4MM

COURTESY BOB BLOKSTONE, K2KX/COLLINS RADIO CO ARCHIVES



The Collins KWM-1 in a 1958 Chevy Impala. This picture, from a Collins ad in the July 1958 issue of *QST*, featured John Hunt, K7XE (ex-W0YBE), the amateur product manager for Collins. The car belonged to Arlo Meyer, W0LBK, who designed the KWM-1's mobile mount.

Refinement of Old Idea

The concept of a station-in-a-box can be traced back to the very beginnings of Amateur Radio. It might be said that early regenerative receivers were accidental transceivers because their oscillations sometimes could be copied a mile or more away.

Compact transmitter/receiver combos were popular as far back as the 1920s for portable and emergency use. In the 1930s, the ARRL's *Radio Amateur's Handbook* promoted such rigs for the 5 meter (56 MHz) band because short antenna length require-

ments encouraged mobile operation.

The 1935 *Handbook* used the term "transceiver," noting, "In such a unit the same tubes, power supply and other components are used for both transmission and reception, with the obvious result of reduction in the cost, size and weight of the apparatus."

Over the next 20 years, many homebrewers and a few commercial manufacturers produced rigs that were called transceivers, though they were mostly separate transmitters and receivers packaged together in one cabinet. They did not have the KWM-1's ability to electrically vary receiving and transmitting

The KWM-1 and Military Spies

Although the KWM-1 was marketed as a ham rig, the US military and government agencies were among the first to put the transceiver to use.

For instance, when Richard Nixon visited South America in 1958, the Secret Service detail accompanying the Vice President carried a KWM-1 in a special suitcase. When the trip was disrupted by violent mob scenes in Venezuela, agents used the transceiver to communicate with Washington and coordinate a hasty exit for Nixon, according to Jay Miller, KK5IM, in his book *A Pictorial History of Collins Amateur Radio Equipment* (Trinity Graphic Systems, 1999).

Art Collins' personal friendship with Strategic Air Command chief General Curtis LeMay, K0GRL (later K4FRA and W6EZY) (SK), and SAC's vice commander, General Francis "Butch" Griswold, K0DWC (SK), led to widely publicized airborne demonstrations of Collins SSB equipment that helped promote acceptance of the mode in the mid-1950s.

But SAC's most exotic application of the KWM-1 went unpublicized — because the transceivers were installed aboard U-2 aircraft that were secret until one piloted by Francis Gary Powers was shot down over the USSR in 1960.

KWM-1s in the U-2

Powers' plane was operated by the Central Intelligence Agency and, contrary to ham lore, was not equipped with a KWM-1. The CIA fleet of U-2s carried no long-range radios "for fear that any HF transmission from an overflying U-2 would give away its position to the unfriendlies on the ground below," says Chris Pocock, author of *50 Years of the U-2* (Schiffer Publishing Ltd, 2005), the comprehensive history of the spy plane.

After Powers' shutdown, the CIA did install an HF rig, the Collins 618T avionic transceiver, in the agency's U-2s, but only to transmit automatic bursts of data that indicated



frequency synchronously with a single knob.

By the 1950s, Collins engineers were very familiar with the advantages of easy-to-tune rigs, thanks to extensive experience with designing avionics for military, commercial and private aircraft. So it was natural for employees such as Phineas Icenbice, W6BF (then W0NKZ), to explore to transceiver schemes — in his case, experimenting with a 75A-2 receiver and a simple exciter that he still displays in his California shack.

Warren Amfahr, W0WL (then W0WLR), was working for Boeing in Wichita, Kansas in 1954 when he put his own homebuilt SSB rig on the air and found himself talking with Art Collins, W0CXX (SK), who was using one of the first Central Electronics 10A SSB exciters to drive the final stage of a Collins KW-1 AM transmitter as a linear amplifier. Collins invited Amfahr to Cedar Rapids for an interview. When Amfahr accepted Collins' job offer, he found other engineers,

aircraft performance during flights over hostile territory.

Meanwhile, the mission of U-2s procured by SAC was not to invade enemy airspace, but rather to sniff for high-altitude traces of nuclear testing while staying in friendly or international skies. So, says Pocock, in late 1957 SAC began installing KWM-1s in its U-2s to allow pilots "...communication during their long, lonely sampling flights across remote wastelands."

The choice of the KWM-1 for that role probably came from Ray Meyers, W6MLZ (SK), who at the time was manager of radio operations for Lockheed Aircraft Co, which created the U-2 in its clandestine "Skunkworks." Generals LeMay and Griswold, avid Collins buffs, no doubt readily concurred.

The only spot in the cramped U-2 that initially could be found for the KWM-1 was a pressurized compartment called the Q-bay, located behind the pilot, says Joe Donoghue, who served with an overseas CIA U-2 detachment in the 1960s and more recently has researched declassified U-2 documents in the National Archives. Later, space was found to mount the KWM-1 in the U-2's "cheek" behind the rightside engine intake, although that installation required addition of a pressurized box to house the transceiver to ensure proper operation at the U-2's extreme operating altitudes (70,000 plus feet).

Because the KWM-1 was out of the pilot's reach in either configuration, there has been speculation in ham circles that mechanical extensions must have been fashioned to allow the pilot to operate at least some of the transceiver's panel controls; however, Lockheed documentation specifies only an electrical wiring harness.

Both Pocock and Donoghue describe the KWM-1's setup aboard the SAC U-2s as "fixed channel." With the KWM-1 pre-tuned to a locked frequency, all the pilot would need was a push-to-talk microphone — and not even that if VOX were used — and receiver audio plumbed to his helmet.

In that light, it seems likely that a couple of rare KWM-1 accessories made available to amateurs by Collins may have been rooted in the transceiver's mission aboard the SAC U-2s. The 399B-1 was billed as a "DX Adapter," allowing split-frequency operation of the KWM-1 (an "export model" was labeled the 399B-2). The 399B-3, described as a "Novice Adapter," provided crystal control of the KWM-1 transmitter section to comply with restrictions imposed upon Novice class licensees for 15 meter CW operation in the 1950s.

The KWM-1s in the U-2s operated by SAC apparently remained in operation until the mid-1960s, when they were replaced by the more cockpit-friendly 618T.

such as Leon Griswold, W0DXN, toying with the idea of using common oscillators to control the frequency of a receiver and transmitter simultaneously.

Amfahr says he may have influenced Art Collins' leaning toward a mobile transceiver. "I went in to work on a Saturday morning and parked my car on the first row, which was something you didn't dare do during the week because it was Arthur's row. Just as I was getting out of my car, Arthur pulled in next to me.

I thought I was going to be in big trouble. But he wanted to look over my homebrew mobile rig. I was using a pair of 6146s as the power amplifiers. That was unusual for a mobile setup in those days, and Arthur expressed quite a bit of interest. Of course, the KWM-1 wound up using a pair of 6146s."

Top Boss Gets Involved

Of all the Collins engineers experimenting on their own with transceiver schemes, Gene Senti was having the most success. He shared his growing excitement with fellow engineers at the factory. Scuttlebutt eventually reached the top boss, and there came a knock on the door of the Senti home one evening in the spring of 1956.

"Mr Collins came to my basement for a demonstration in my junky workshop," Senti recounted. "I was kind of embarrassed, but he seemed to enjoy it."

Art Collins promptly set a factory team to work on Senti's concept. Before the year was out, 25 pre-production KWM-1s were up and running.

The KWM-1 employed two dozen vacuum tubes, putting out about 175 W of SSB or CW. In keeping with the company philosophy of promoting SSB, there was no provision for AM in the KWM-1, although at the time, AM still was the dominant mode of voice transmission on the amateur bands.

The 15 pound KWM-1's dimensions — 14 inches wide, 10 inches deep and just a bit over 6 inches tall — would make it an impossible fit in most of today's tightly packed automobile interiors. But there was sufficient free space beneath the dashboard in most 1950s sedans to mount the KWM-1, with the separate mobile power supply going into the trunk. A Collins mechanical engineer, Arlo Meyer, W0LBK, who later helped Senti design the 30L-1 amplifier, was called in to create a mounting kit.

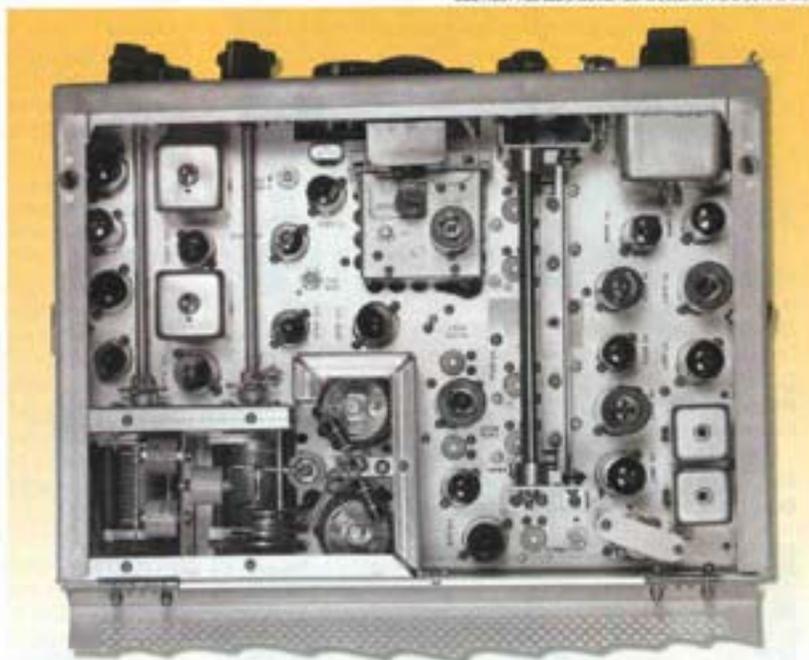
"Ernie Pappenfus, K6EZ (then W0SYF) (SK), director of SSB development for Collins, told me, 'I'll give you one of the (KWM-1) prototypes, if on your own time, you'll go figure out how to mobile-mount the thing,'" Meyer recalls. "I took a wooden mockup to all the local car dealers and made measurements to see what length of brackets and screws would be needed to mount the rig under the dash or on the floorboard of all the popular models."

Introduction of the KWM-1

When introduced in the spring of 1957, the KWM-1 carried a list price of \$770. A 12 V transistorized dc mobile power supply (516E-1) was priced at \$248, while a 115 V ac power supply (516F-1) for fixed use sold for \$103. Other available accessories included the MM-1 handheld dynamic



The front of the KWM-1.



An inside look at the KWM-1.

microphone for \$25; the 351D-1 mobile mounting tray for \$22; the 312B-1 speaker in cabinet for \$25, and the 312B-2 speaker console with a directional wattmeter and phone patch for \$146.

The KWM-1 featured a plug-in module that held 10 crystals, each allowing the transceiver to cover a 100 kHz span. The operating crystal was selected by a rotary switch. The standard crystal complement covered much of the 20, 15 and 10 meter amateur bands. (The 11 meter band was closed to amateurs in September of 1957, just as the first production KWM-1s were hitting the airwaves.)

A rare accessory was the 399B-1/2, the "DX Adapter," which replaced the standard crystal module and allowed the KWM-1 to

transmit and receive on split frequencies. An even scarcer item was the 399B-3 "Novice Adapter" that provided fixed crystal control for the transmitter.

The KWM-1's standard ability, however, to precisely vary the transmit and receive frequency with one dial led Art Collins to conclude that "the simple frequency control would appeal to the mobile operator because he wouldn't have to take his eyes off the road so much to tune," said Senti.

Just making SSB intelligible was a challenge to many AM-oriented operators in the 1950s. In his *QST* review of the KWM-1, Byron Goodman, W1DX (SK), observed, "There are still some hams who claim that tuning in a side-band signal is something that

TO XYL'S ONLY

Does your OM's hamshack resemble a surplus store? Are you afraid to clean 'that corner' for fear the vacuum cleaner will inhale cables, spare tubes or crystals? For your own future peace of mind, why not describe Collins' compact KWM-1 to him: small enough to fit neatly into the bookshelves in the living room. 173 watts of liquid power (SSB-PEP), a super-sensitive receiver, outstanding frequency stability and calibration, 14-30 mc frequency range — and, when he is mobiling in the family car, it makes a neat installation, easily removable, not a "shin humper." Cost? Through the years it will cost him less than anything else he can build or buy. Tell him to call his Collins distributor for the facts about the revolutionary KWM-1 mobile transceiver. Available on easy terms.

Collins CREATIVE LEADER IN COMMUNICATION **COLLINS**

The April 1958 QST ad targeting XYLs.

requires the patience of Job, the fine touch of a cross between a surgeon and Michelangelo, the luck of a Croesus and a lot of natural talent. They have never tuned the KWM-1. Combining a slow tuning rate (22 kc per knob revolution) with a good AVC system makes it no trick at all to tune in a side-band signal."

Practical mobile antennas also played a role in the decision to limit the KWM-1's coverage to 14-30 MHz, according to Senti. "Mr Collins said to us, 'The lower in frequency you go, the more loading coil and less antenna you have.' He told us to concentrate on 10 through 20 meters, and to worry about the rest later. Also, there were bad spurious emissions in the 80 meter band in our early models that weren't the type of

thing you'd want to sell to the public."

Clever and Successful Marketing

Despite the early emphasis on mobile operation, Collins eventually began touting its advantages for home stations, as well. Recalled Chuck Carney, WØDGJ (SK), Collins amateur product manager in the late 1950s, "Our field salesmen were mentioning little incidents at the ham shows and symposiums. A couple would come up to the KWM-1 table, and she would say something like 'Now why can't your radio look like that?' with maybe a little elbow jab. And I decided to try something that I don't believe had ever been done before — direct some of our magazine ads to the XYL."

For instance, in the usual page 2 full-page Collins advertisement in QST for April 1958, the headline addressed the message "To XYL's Only" and asked:

"Does your OM's hamshack resemble a surplus store? Are you afraid to clean 'that corner' for fear the vacuum cleaner will inhale cables, spare tubes or crystals? For your own future peace of mind, why not describe Collins' compact KWM-1 to him: small enough to fit neatly into the bookshelves in the living room..."

Present day company engineer Rod Blocksome, KØDAS, has determined approximate production totals for several pieces of vintage Collins amateur gear, combining surviving company records with survey results conducted among members of the Collins Collectors Association. When KWM-1 production ceased in the autumn of 1959, about 1150 transceivers had been built, Blocksome's research indicates.

By that time, the Collins 32S-1 transmitter and 75S-1 receiver were on the market, with the capability of being cabled together for common frequency control. November 1959 saw introduction of the KWM-1's successor, the KWM-2 transceiver, which added 40 and 80 meters and other refinements to the original KWM-1 package. The KWM-2 continued in production until 1982, with nearly 30,000 built, according to Blocksome.

The Collins legacy continues under the Rockwell Collins banner. The company is a major producer of electronic hardware and software for the military and the aviation industry.

The last Collins rig marketed to amateurs was the KWM-2's successor, the Rockwell Collins KWM-380. That solid-state transceiver was introduced in 1980, and about 3000 (including a general coverage version, the HF-380) were built during its six year production run.

When Gene Senti was reflecting in 1991 about his homebrew experiments that pointed the direction that radio manufacturers have followed over the half-century since, he modestly conceded that his brainchild, the KWM-1, "turned out to be a pretty good little rig."

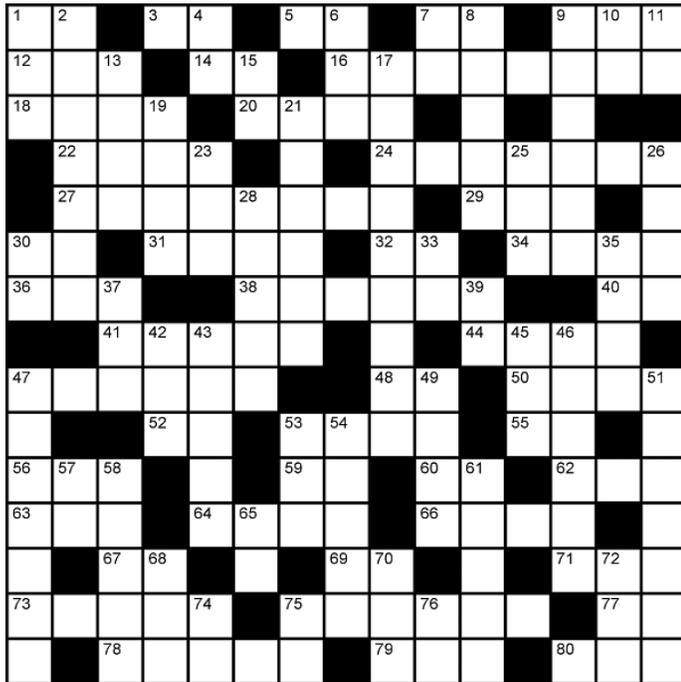
For more information on the KWM-1 and its competition, visit www.arrrl.org/files/qst-binaries/obrien0107.pdf.

Mike O'Brien, KØMYW, an Amateur Extra class licensee, was first licensed in 1957 when he was 12. After 20 years as a newspaper journalist, he came back to ham radio and began acquiring the rigs he listed after in his youth. Currently a college journalism instructor, he continues to write for newspapers and other publications. He has been published before in QST, writing articles on early Hallicrafters transmitters and the 1947 Gann-Hallicrafters DXpedition to Africa. Mike lives in Springfield, Missouri and can be reached at k0myw@shcglobal.net. QST

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(Reprinted from January 2007 QST courtesy of ARRL)

The Amateur Radio Crossword Puzzler



Across

- 1. Sixth district (postal code)
- 3. RTTY tuning signal
- 5. Negative reply
- 7. Too much (slang abbr)
- 9. Software (abbr)
- 12. What planes travel through
- 14. Measure of battery energy
- 16. Air travel checkpoint
- 18. Bladed device that propels
- 20. Proper form of ain't
- 22. Divulge a secret
- 24. Leave the ground
- 27. Height above ground
- 29. Conduit material
- 30. Semiconductor junction
- 31. Worn to simulate darkness in a simulator
- 32. Doesn't work (abbr)
- 34. Documents the passing of an element
- 36. Find bearing to a transmitter (abbr)
- 38. Seat at the side of the plane
- 40. Female ham
- 41. Western contest
- 44. Round tin that held a famous QRP transmitter
- 47. The worst seat of three in a row
- 48. Canadian postal code for VE9
- 50. Natural form of silicon dioxide
- 52. The equator runs through it (SA prefix)

code)

- 71. Broadband technology
- 73. Radio mentor
- 75. Walk through this between the plane and terminal
- 77. Iron's chemical symbol
- 78. Light wood
- 79. Alternate form of transport to planes
- 80. Navigation station

Down

- 1. Limit or maximum
- 2. Frequency range used by pilots
- 4. Afghanistan prefix
- 6. Possess
- 7. Cartesian coordinates
- 8. Connections to a hub
- 9. Airplane drivers
- 10. After-dinner CW farewell
- 11. Has no contents (abbr)
- 13. Tip to the right or left
- 15. CW laugh
- 17. Service person in the air
- 19. Airplane trajectory
- 21. Production facility for audio-video
- 23. Personal history (abbr)
- 25. General term for EMI, RFI, TVI (abbr)
- 26. Put gas in the plane
- 28. Field control
- 30. Two of something (abbr)
- 33. Proceed

- 53. Where you embark or disembark
- 55. Battery-powered auto
- 56. Keeps volume constant
- 59. Radians in half a circle
- 60. Opposite of UD on a joystick
- 62. Improves strong-signal capability on Kenwood rigs
- 63. Formal notice of fine from FCC
- 64. Admit (slang)
- 66. Move to a runway
- 67. Opposite of 20 Across
- 69. Mississippi delta state (postal

- 35. The blue-ish color in a three-color system
- 37. Your FCC ID
- 39. Weight (abbr)
- 42. Radars that look over the curve of the earth
- 43. Non-stimulating coffee
- 45. Put to work
- 46. General name of navigation station
- 47. Selected for communications
- 49. Must be fastened securely before takeoff
- 51. Shift in frequency due to velocity
- 53. Satellite navigation system
- 54. Seat easiest to get in and out of
- 57. Wire size (abbr)
- 58. Increase 27 Across
- 61. Determines range and bearing by using radio pulses
- 65. Electromagnetic (abbr)
- 68. What a plane might ditch into
- 70. The system that controls air travel
- 72. Third Silicon Valley airport along with OAK and SJC
- 74. Circuits that delay changes in current
- 75. Ham prefix in Tokyo
- 76. Original home of Boeing Aircraft Company (postal code)

Solution to this month's Puzzler



Classified Ads

Radio Repair, Kit Building, Antenna and Computer Help. Free Estimates; Contact Bob Kirby K3NT at k3nt@arrl.net

Rockwell-Collins

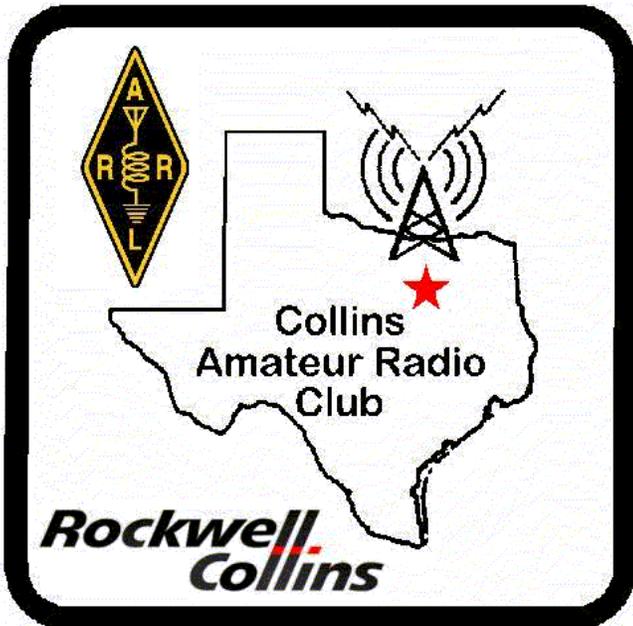
Amateur Radio Club

Mail Station 461-290

P.O. Box 833807

Richardson, TX 75083-3807

TO:



CLUB STATIONS

(972) 705-1349

W5ROK REPEATER

441.875 MHz +5 MHz Input

131.8 Hz PL - RX and TX

W5ROK-1 PACKET BBS ROK Node

145.01 MHz

MEETING

Due to the unavailability of the Verizon meeting room, there will be no meeting in February

**NEXT SIGNALS DEADLINE:
12 March 2007**