



A Member
of the
SARL



**Antique
Wireless Association
of Southern Africa**

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- * Technical Advisor—Rad ZS6RAD
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AWA Newsletter

#73

February 2012

Reflections:

Having now been a radio ham for 27 years, a mere triviality compared to some of the members of our fine organisation, I was thinking how much technology has changed in that time period.

I must admit when I first started, solid state technology was already well entrenched and the silicon chip was well on its way to metamorphosing to “micro” technology.

Some of the Icom, Yaesu and Kenwood rigs were already a quarter the size of the old valve finalised rigs and were working as good, if not better than they could be expected to.

I remember gazing in astonishment at the Icom 6m all mode rig so neatly installed in the shack of a fellow ham and thinking

that this was it. We had finally gotten there. Could radio's get any better or smaller than this ? Could technology improve any more than this ?

The Yaesu FT950 was an amazing piece of Technology as far as HF rigs went. My head spun at the thought of ever owning such a magnificent piece of equipment.

Of course, even then, the price was more than enough to bring heart palpitations on without batting an eyelid.

Who would ever have thought that 20 plus years down the road, we would still be feeling the same way about the new rigs appearing every year on the market place.

Yet, the valve has held a

place in the hearts of many radio operators, even today in this age of “super” micro-technology.

I can get just as excited at the thought of firing up an old 1952 valve rig that has just been restored to its former glory, as I can staring at the face of a brand new modern HF/VHF/UHF/satellite/battery/mains/solar powered/wind charged/LCD display/with graphic equaliser and stereo performance on all bands rig. In fact, I think I can get more excited when it all works and that gentle glow from the valves permeates the dull atmosphere in my shack and brightens it up.

This is operating at its best.

No plug and play here.

De Andy ZS6ADY

WIKIPEDIA

Capacitive reactance is an opposition to the change of voltage on a element. Capacitive reactance X_C is inversely proportional to the signal frequency f and the capacitance C .

$$X_C = \frac{-1}{\omega C} = \frac{-1}{2\pi f C}$$

A capacitor consists of two conductors separated by an insulator, also known as a dielectric. At low frequencies a capacitor is open circuit, as no current flows in the dielectric. A DC voltage applied across a capacitor causes positive charge to accumulate on one side and negative charge to accumulate on the other side; the electric field due to the accumulated charge is the source of the opposition to the current. When the potential associated with the charge exactly balances the applied voltage, the current goes to zero. Driven by an AC supply, a capacitor will only accumulate a limited amount of charge before the potential difference changes polarity and the charge dissipates. The higher the frequency, the less charge will accumulate and the smaller the opposition to the current.

CW Net:

CW still seems to be doing fairly well here in ZS land. I often hear discussion points about CW and read them on the SARL forums and admittedly, although people aren't falling over one another on the bands, there is still a fair amount of activity.

The AWA activity day has come and gone and Barrie ZS6AJY, operating ZS0AWA, had a fairly active day on the air.

16 contacts on the 40m band, with a thunderstorm in between and 2 on 80m.

Barrie was running a home brew 2 valve transmitter putting out 30w and using an AR88 receiver.

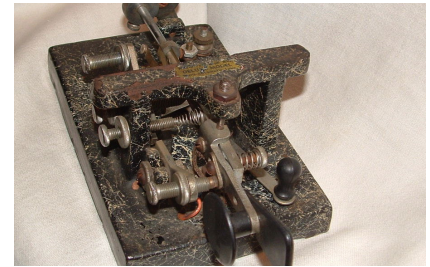
Unfortunately, up to this stage, he is the only one to have submitted a log for the activity day, but we are hopeful there will be a few more.

Dave ZS6AAW has been on at me a few times about running a straight key net, but, as I explained to him, all my keys are bent. Please remember that should anyone like to run a net of this kind, they would be more than welcome to do it and to use the AWA call sign if they so wished, in order to link it to the AWA.

Simply let us know when and for what purpose you would like to use the ZS0AWA call sign and permission will be arranged to do it.

The AWA call sign is registered as an educational call, so it can be used for many purposes. This applies to more than just CW of course.

Schools, Boy Scouts, Girl Guides, and many other institutions can benefit greatly from learning CW. So too, the AWA call



sign can be used in these places to encourage others to use CW as a means of communication.

SSB activity:

It is encouraging to hear the many stations calling in on the SSB net on a Saturday morning again. The numbers are up, new members are joining and the allotted time span for the SSB net is not enough.

Although we do not have a set time limit on the net, it never used to run more than about an hour. These days its stretching closer to an hour and a half in order to give all the stations a 2nd round.

This is really great and we do appreciate everyone taking the time to call in and tell us what rigs they are running and what new projects they are embarking on.

Unfortunately, the 20m relay has not been as successful as we had hoped it would be down to the Western Cape, but it has brought along Atholl Z21LV from Harare to join us. Conditions certainly seem to be favourable off the side of the beam to that neck of the woods.

We want to encourage the Div 1 and 2 stations to listen out on 20m and see if conditions are better than those on 40m. Early morning conditions seems to be fine on 40m, but as the sun rises, so the band goes down and conditions deteriorate.

If we are to keep the 20m relay running, it would be nice to know if there is anyone in Div 6 who is able to do an 80m relay. Winter

conditions will soon become very apparent and there is the possibility we may need 80m to bring in the Div 5 stations.



Yaesu FT200

AM:

The AM net continues on a Saturday morning and is still quite active. A few additions to the AM net have been Richard ZS6TF and Barrie ZS6AJY.

Unfortunately my Collins is still sick and is awaiting some replacement parts and the return of the Doctor from salt mine activities out of the country. Fortunately there have been more than enough people to keep the net running and some good conditions in and around Div 6.

The unfortunate part is that 80m starts to fade very early in the summer conditions and Div5 normally disappears into the noise before having a decent chance to play a few good MF's.

Don has thought of the Div 5 stations moving off to another frequency when the band goes out just to keep the interest going, but so far they have not had much success with it.

Thunderstorms have been quite active late afternoons here in Div 6 and as far as I am aware, there has been no Wednesday evening activity on AM. Hopefully with the winter conditions just around the corner, this will be able to change.

We would welcome any newcomers to the AM nets and you don't have to be using valve equipment. Some of the chaps on the net use solid state rigs, but one just has to be careful on AM so as not to cook the finals in

your precious rigs. If you decide to join us on AM using a SS rig, then do take it easy and do not drive the rig any more than what the instruction book says, but don't let that be a deterring factor.

Looking forward to hearing more of you on AM.



Hallicrafters SX28

The Golden Anniversary of the Collins KWM-1

2007 marked 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."

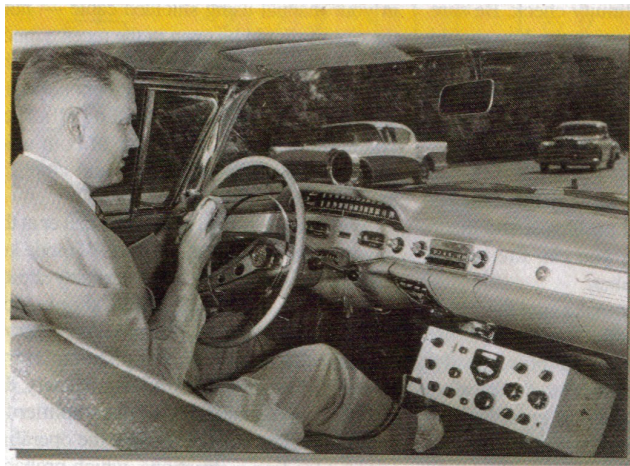
While he toyed with the circuitry, Senti also began dreaming of the convenience such a setup could bring to his amateur station.

"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!"

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.

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:"



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, W0ISK, who designed the KWM-1's mobile mount.

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 requirements 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 to-

gether in one cabinet. They did not have the KWM-1's ability to electrically vary receiving and transmitting frequency synchronously with a single knob. By the 1950s, Collins engineers were very familiar with the advantages of easytune 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 he still displays in his California shack.

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 4FRA and W6EZV) (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-1 s 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' shootdown, 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 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 highaltitude 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 "OX 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.

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, 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-I 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 mock-up 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 floor-board 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 de 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 microphone for \$25; the 351 D-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 100kHz 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, WI DX (SK), observed, "There are still some hams who claim that tuning in a side-band signal is something that 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 ave system makes it no trick at all to tune in a side-band signal."

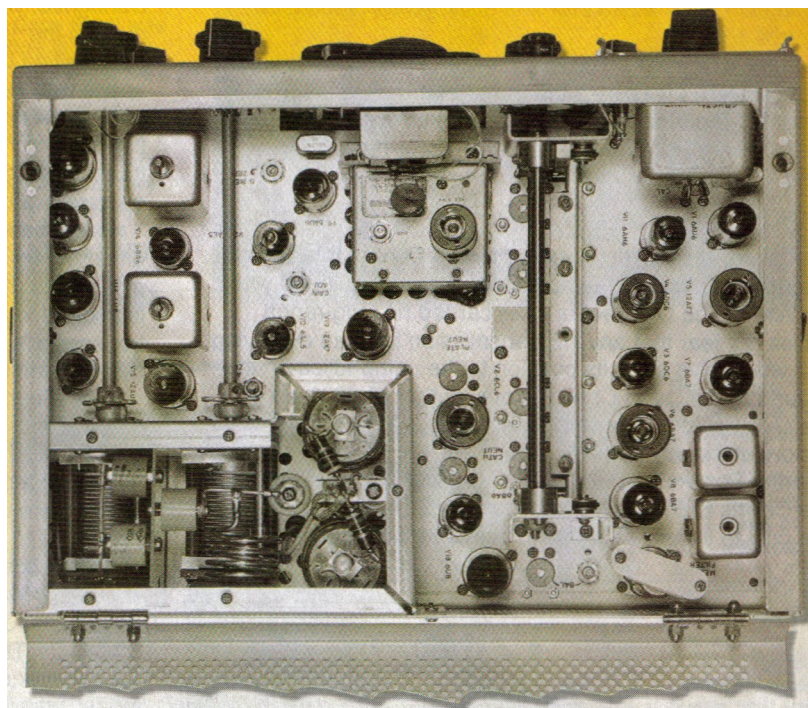
Practical mobile antennas also played a role in the decision to limit the KWM-1's coverage to 14-30 MHz, according to Senti. "Mr Collins said to us, 'The lower in frequency you go, the more loading coil and less antenna you have.' He told us to concentrate on 10 through 20 meters, and to worry about 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 ad-



The front of the KWM-1.



An inside look at the KWM-1.

vantages for home stations, as well. Recalled Chuck Carney, W0DGI (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 Blocksme, K0DAS, 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, Blocksme'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 Blocksme.

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.arrl.org/files/qstbinariesiobrienOI07.pdf.

Mike O'Brien, K@Myw, 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 lusted 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 Gatti-Hallicrafters DXpedition to Africa. Mike lives in Springfield, Missouri and can be reached at kOmyw@sbcglobal.net.

QST January 2007



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 ... " 175 watts of input power (SSB—PEP) Super sensitive receiver, outstanding frequency stability and calibration, 14—30

mc frequency range—and when he is mobilizing in the family car, it makes a neat installation, easily removable, not a "shin bumper". Cost? Through the years it will cost him less than anything 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

The April 1958 QST ad targeting XYLs.



President's Corner

Richard ZS6TF

One of my other passions is collectable old cars, not just because they are old but they have a multi-faceted appeal, style, rarity, engineering, performance (for their day), and the sheer challenge of driving them with competence and reliability.

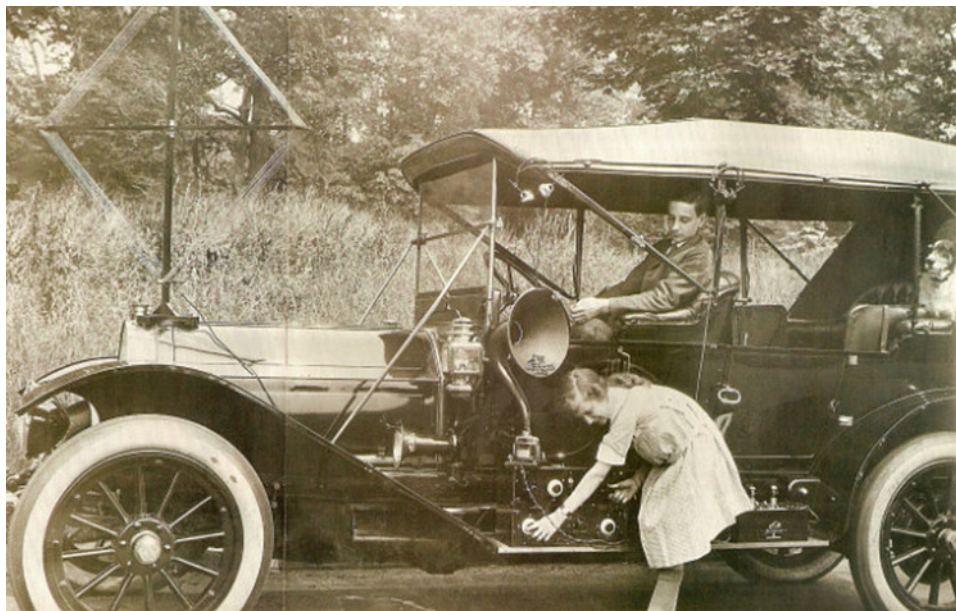
I have a preference for the vintage era because many of the parts can be made or renewed in the home workshop. It can be very fulfilling to turn the rusty contents of a pile of boxes and packing cases into a viable and valuable vintage car, for others the cheque book restoration results in the admiration of less fortunate onlookers.

Recent trends are turning away from cars which look as though they “came out of the box” to those with history, patina and signs of a lifetime of good honest use becoming the most sought after.

So it should be with older classic radios that one might have inherited from a SK or acquired at a flea market where the marks around the dials for example are signs of frequent use by the previous owners and operators.

As with the cars, the temptation to upgrade with modern components should be resisted if the motive is to make the unit produce more than it was designed for, however frequently needed replacement of leaky capacitors, resistors gone high from aging, and perished wiring, can be achieved in a sympathetic manner to retain authentic period appearance. However, the pursuit of authenticity should not keep an old radio off the air. If it is incomplete, make it work with the modern substitution and if you show it to enough people, someone will point out your “error”, and dip into their hoard of spares to give you the correct part.

Such is the essence of fellowship that AWA membership encourages.



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**Antique Wireless Association
of Southern Africa**

Mission Statement

Our aim is to facilitate, generate and maintain an interest in the location, acquisition, repair and use of yester-days radio transmitters and receivers. To encourage all like minded amateurs to do the same thus ensuring the maintenance and preservation of our amateur heritage.

Membership of this group is free and by association.

Notices:**NET TIMES AND FREQUENCIES:**

The following are times and frequencies for the AWA nets:

AM Net—Wednesday evenings from around 18:30; Saturday mornings from around 06:00 or when band conditions allow. Frequency—3615.

SSB Net—Saturday mornings from 08:30. Frequencies—7070 with a relay on 14125.

CW Net—Saturday afternoon from 14:00. Frequency—7020.
(Times given are CAT or SAST)
