AWA Newsletter

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A Member of the SARL

Antique Wireless Association of Southern Africa

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AWA Committee:

* President—Don ZS5DR
* Technical Advisor—Rad ZS6RAD
* Net Controller—Willem ZS6ALL
* Secretary/PRO—Andy ZS6ADY

Reflections:

When I first started with Amateur Radio, there were no such thing as "small" rigs. The majority of them were about the size of some of the mobile CB radio's that still proliferated many homes with little power supplies. The Home base units were too expensive.

With my introduction to Amateur Radio, my first impressions were "Big, is good". I mean if it took up more space on your table, that meant it could put out more power than these tiny things which some of the more prominent hams were using. Even my 2m rig, a Trio 700G, was bigger than most of the newer HF rigs. I used to use it with a 100w linear and 5 element yagi to access the Bloemfontein repeater from over 300km away. Cause a pile up on the repeater. This DX station from div 3.

So my love for boat anchors was formed at an early stage and I always used to tell people that being a radio ham, one did not have to be wealthy, as there was a lot of second hand equipment out there that did not cost an arm and a leg. (I used that same excuse on my wife—"nah, I bought it second hand").

I never had the opportunity to buy a brand new rig, but had plenty of second hand ones, and always ended up with something big, that had valves in it. I think the smallest HF rig I had purchased up until a few years ago when I got my first 706, was an FT200. This was too small, so I went back to an FT901. I sometimes think I must have been influenced by my brother and his love for V8 cars. "Bigger was Better".

It has been this love for the bigger radio's that has kept me attached to boatanchors for so long, and every time I see another one I have not seen before, the first thing I want to know is how big it is. Size is everything.

I recently purchased some Central Electronics equipment from the late 50's. Really big radio and linear, and I mean big. When one looks at a photo of the front of it, you don't realize how much of it still sticks out the back. I think, it may be heavier than my Collins 32V-3 too. I asked my back to testify on that one.

So it is as the FT 897's, the Icom 7000's and some of the nice shiny new rigs with all band, all mode, satellite tracking bell ringing plug and play digital software with built in everything take their place in shacks and mobiles these days, my shack continues to sink by a few 10'ths every rainy season because of the weight it carries. I still believe, bigger is better, besides, you do still get more for your money.

Best 73

De Andy ZS6ADY

Wikipedia—The Resistor

Resistance decade boxes

A resistance decade box is a box containing resistors of many values and two (or four) terminals, with a mechanical switch that allows a resistance of any value allowed by the box to be dialed. Usually the resistance is accurate to high precision, ranging from laboratory/calibration grade accurate to within 20 parts per million, to field grade at 1%. Inexpensive boxes with lesser accuracy are also available. All types offer a convenient way of selecting and quickly changing a resistance in laboratory, experimental and development work without having to stock and seek individual resistors of the required value. The range of resistance provided, the maximum resolution, and the accuracy characterize the box. For example, one box offers resistances from 0 to 24 megohms, maximum resolution 0.1 ohm, accuracy 0.1%.

CW Net:

Well another month of battling band conditions and hard to hear signals has passed, but these seem to be coming the norm these days. Just think how appreciative we will be the day the bands do suddenly come alive and we are able to communicate well again.

I must say, even with my hearing impairment, I am better able to copy CW in these trying times than I sometimes am to copy phone conversations.

I can very often still hear the CW tones quite audibly with an S2 signal, which becomes impossible to hear on phone. I need to put my head cans on to be able to hear a lot of the voices on phone clearly.

Be that as it may, CW is still not a popular mode of communication, especially in the good ole SA.

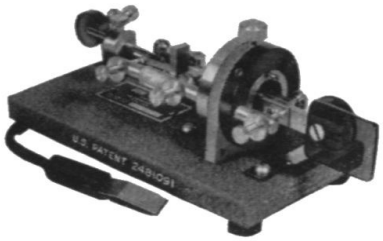
The old timers and die hards really come from those who have immigrated to SA and were actively involved in CW in their previous countries.

Now I know that is a bit of a general statement, and Pierre will probably want to roast me, but there really are not many SA hams on CW any more. Maybe I am wrong, and please, prove me so if you wish, but this is really my perception of CW on our bands here.

One can listen on 20 and 15m and hear plenty of DX stations running on CW. Even there, I don't hear many, if any, SA call signs.

Such a pity, as I know there must be quite a few stations who are quite able to run CW out there.

I wonder how many stations will be out



there showing off their CW prowess on the SARL CW contest. The problem is, these things come and go with so many saying, "I must jack up my CW and I'll see you there". But how many actually get around to it.

Best 73,
De ZS0AWA … -.-

SSB activity:

No change in the opening statement here, except there are still many who brave the conditions to come up on the SSB nets on a regular basis. We salute you. It is because of all of you, the AWA nets are still going.

We do realise it is extremely difficult at times to hear the control station, but do persevere and remember the relay on 80m.

I must say, and not because I run the 80m relay, but conditions as far as short skip are concerned, 80 is definitely my frequency of choice. The Local stations and even stations as far as Harrismith and Ladysmith, who often battle to hear anyone on 40, also work a good readability 5 on 80m.

Of course, there are always the exceptions, but I think in general it definitely works over shorter distances.

The call in's on the SSB net are pretty much the same as usual, not varying by one or two additions, but at least there are always people on the net. I believe this goes to show there is a genuine interest in the care and maintenance of the old valve rigs which does bring a lot of people together.

I am sure, when the bands do finally improve, there will be a surge of people calling in on the net and it will be quite difficult to get more than 2 turns. I have often wondered if we should not be doing something more formal on the SSB net or if it should stay as informal as it is. Right now, I think informal is good.

Collins 75A4 Rx with CE100es600L

AM:

Conditions for AM these last few weeks have been fantastic. The Saturday morning nets have been dragging on to quite late, because of the band opening so late and also I believe because conditions have been so good.

What Willem would call FM quality on AM.

I must say too that the Wednesday evening nets are not too far behind. We have had a good few evenings where the band has not gone out at all and we have enjoyed 2 to 3 hours of good AM transmissions.

With this in mind, we must remember that soon the summer storms will be upon us and the Wednesday evening nets will become an almost impossible task.

As the storms move in to the centre of the country band conditions will deteriorate quite badly and we will be at the mercy of the storms. Do remember though, when the skies are clear, the bands can be really good and AM conditions will shine.

There are still quite a few who enjoy coming up on AM and the playing of MF's (musical frequencies) really does take preference. Enjoyed by most of the guys as well as we are sure, a few listeners.

An update from Barry ZS2H who has been doing the refurb on the FR50B, is that it is in it's final stages now and we should have it back in our clutches by next month. We'll publish a few pic's of it just to whet your appetite and maybe encourage more of you to send in reports of the AM net to stand in line for the draw of this receiver. So far there are about 30 names on the list already.

Yaesu FR50B Rx

Points Of Interest
By Oscar Egenes (ZT5R)

QTC January 1934

Solar Constant

Having considered Sunspots as the general and apparent outcome of solar activity we now come to a most important phenomena, "solar constant". Its importance is found in the fact that it is, perhaps, that phenomena upon which most of our radio communications depend.

Solar constant can be measured directly upon the sun, the earth's outer atmosphere and it surface. It is, therefore, a factor to be carefully considered.

What actually is solar constant? This was at one time a very difficult question to answer but, briefly, it is computed to be " the energy received from the sun in calories per minute per square centimetre at the earth's surface assuming no atmosphere and that the earth is at it's mean distance from the sun."

Recent figures indicate the average to be 1·94 calories. The extreme variation about this mean over a period of years is only a matter of ± 2.5 per cent.

Higher solar radiation accompanies high solar activity although it does not follow that other phenomena. will vary in conformity. We have already seen that the changes in the intensity of the earth's magnetic field do not always follow variations in solar activity and radiation. Apart from the general fluctuations in solar constant it has been noted that there are also superimposed periodic variations of 25, 15 and 11 months of which the first is the strongest. Most of the variation has been observed in the ultra-violet region of the spectrum.

There was a time when it was very difficult to arrive at any mathematical conception of the amount of radiation which was received from the sun. Let us for a moment consider the problem.

Radiations from the sun are dissipations of heat and light in wave form, both being energy. Before reaching the earth these radiations have to pass through miles of atmosphere surrounding the earth and a great amount of absorption takes place. It will, therefore, readily be realised that only a very small percentage of the original radiation actually reach the earth's surface.

No doubt we have all observed the sun when it is on the horizon at dawn or at sunset, most probably at sunset as the dawn has no message for modern humanity. On such occasions it is quite possible to gaze at the sun's disc with the naked eye because its rays have many more miles of atmosphere to pass through than at noon when it is directly overhead and the light too strong for human sight.

It must be remembered that the amount of absorption in the earth's atmosphere is not proportional to the length of the path which, the radiations traverse. It depends upon the mass of the various strata of atmosphere. Here again it is found that two layers of different, thickness but having the same mass will absorb a similar proportionate amount of solar radiations.

Following layers will also absorb proportionate amounts. Provided the mass of the various layers surrounding the earth is equal, the first would absorb half and transmit half the amount, the second would absorb half the amount incident upon it and pass on the other half. This would continue until the energy reaching the earth's surface had been sadly depleted.

The percentage of the radiation absorbed by passing through a unit thickness of air is known as the " co-efficient of absorption." By ascertaining the relative amounts transmitted through any two strata of known yet widely different mass the co-efficient can be computed.

Here an important factor must be borne in mind. Different wavelengths are absorbed differently and the absorption grows less as the wavelength is increased. In view of this fact it became necessary to use an average coefficient. The" solar constant " or amount of heat received at the upper surface of the earth's atmosphere has been quoted as varying from 17·6 to 25·4 calories.

A calorie is a perfectly definite unit whose equivalent is well known in mechanical energy. It is the measure of quantity used in heat determination and is actually represented by the amount of heat required to raise one kilogram of water one degree centigrade. A small calorie is the amount of heat required to raise one gram of water one degree and is, therefore, one-thousandth that of a large calorie. Some investigators use the former whilst others prefer the latter.

With an imaginative mind it will readily be' realised that the regular reception of light and heat from the sun is very necessary for the maintenance of life upon this planet and the amount of solar constant received primarily determines the variations in the operation of the electro-magnetic waves as used in radio. Any great variation from its normal characteristics would change the earth into a blazing furnace or a frozen waste. Yet, as we have seen, there are diurnal and periodic variations, not large enough to be detrimental to the existence of life, but sufficient to cause large variations in the various phenomena effected by solar activity including radio.

In discussing solar constant care must be taken to distinguish between heat and temperature. A simple example will illustrate this point. It takes twice as much heat to raise a quart of water to the boiling point as it would a single pint. The temperature in both would be the same although the amount of heat in the quart proportionately larger.

Heat is, therefore, the quantity of motion whereas temperature is a measure of the intensity of that motion. To measure the wavelengths of solar radiations the micron, -equivalent to one-thousandth part of a millimetre and the angstrom, which is 10^{-8} centimetre, are used.

Radiations are, still steadily streaming away from the sun as they have done throughout the millions of years which have passed without any appreciable loss. Each square foot of the sun's surface radiates 110,000 calories per minute, which is sufficient to develop continuously 10,000 horse power.

'Taking the form of wave motion in the " ether " and originated by the molecular vibrations of the radiating source they do not become heat or produce the sensation of light until the radiations fall upon a surface which will absorb them. The temperature of the intervening space between the sun and its surface is stated to be unaffected by the transmission of wave form energy from the sun.

Approximately 40 per cent of the solar constant is intercepted by the earth's atmosphere and absorbed. Thus the earth receives only about 1/2,200,000,000 of the total radiation from the sun. This amount will, naturally, vary in proportion to the variation of the solar constant itself. The rest streams off into interstellar space, the balance of the planets comprising our universe having absorbed their respective share.

According to the theory of light, pressure must accompany the transfer of such energy in wave form and this pressure is known as Radiation Pressure. It will vary with the nature of the absorbing medium. Although very small, about $4{\cdot}1 \times 10^{-5}$ milligrams weight for sunlight, it is important because it has been detected that under certain circumstances it can be greater than gravitation .

It is not proposed to deal with the theories Governing the ability of the sun to maintain its radiations for such an indefinite ,period a very interesting subject but apparently without any bearing on radio as we know it.

Magnetic Field of the, Earth.

The earth acts like a magnetised sphere whose negative pole is approximately 71 degrees north latitude and 96 degrees west longitude and whose positive pole is somewhere near 73 degrees south latitude and 156 degrees east longitude. In equatorial regions the field is mainly horizontal and in polar regions it is chiefly vertical The magnetic and geographical poles do not coincide, the horizontal magnetic field is not parallel to the geographical meridian but differs by an angle called the declination which varies for various geographical locations.

There are diurnal variations in the various magnetic components depending upon the altitude of the sun although the field is usually quite constant during the night. The earth's field is subject to disturbances of, varying degrees and the amplitude of these fluctuations is greater in high latitudes than in equatorial regions. There is little or no difference in intensity as regards the day and night hemisphere although there seems to be some indication that the P.M. hemisphere is slightly more disturbed than the A.M. hemisphere.

Disturbances are characterised by rapid and excessive fluctuations in the earth's field with a net increase in the vertical field and a decrease in the horizontal field. Beginning within a minute over the whole of the earth's surface the disturbances are usually most intense during the first day.

No proved theory has been submitted to account for the existence and variations of the earth's magnetic field although there is a correlation between this phenomena and that of solar origin as explained above. There is a stream theory appertaining to magnetic currents but in this case recourse has to be made to the suggestion of electric currents flowing in a conducting layer. One such theory calls for a flow from west to east during the first phase of a storm when the horizontal field is slightly increasing and a current from east to west when the storm increases and the horizontal field decreases. The phase is fairly evident to those experimenters who have observed the change in radio conditions between the Union of South Africa and California in the United States of America during such variation in the horizontal field. It is also apparent in the change in current flow in the vertical field in respect of radio communication between New Zealand and Great Britain.

Irrespective of existing knowledge it must be admitted that many theories that have been submitted remain as yet unproved and although the variation in the field may depend upon a variation in solar activity it is also just possible that solar and terrestrial disturbances have a common origin in some invasion of power or matter from interstellar space – that solar activity is merely the brother and not the father of all the other phenomena which has been quoted above.

References :

“The Solar System” Charles Lane Poor
“Astronomy” Moulton
“Transatlantic Radio Communication” Anderson, P.I.R.E Vol 16. No3
“The Sun” Young

This article was taken from the January 1934 edition of QTC, of the South African Radio Relay League. I approached our well known Author and writor of many books and articles for Amateur Radio, John Fielding ZS5JF and asked for his opinion of this article and whether it was still very much applicable today. Here follows his answer:

Yes, it seems to be still correct today.

Incidentally, the bit about calories is interesting. Slimmers usually talk about "calories" when devising diets. But the calorie they use is the large one, today we call it a "kilo-calorie". The generally accepted definition of a calorie is that amount of heat energy to raise 1 gram of water by 1 degree Celsius. When they say chocolate is only so many calories they are deluding themselves as it is really one thousand times greater!

The atmosphere surrounding the earth forms a barrier to the more harmful radiation from the sun, such as ultra violet and x-rays, but allows the less harmful longer wavelengths like infrared to pass to earth. Without the atmosphere we would all be burnt to a crisp. It is astonishing how stable the sun's output is, scientists have calculated that a variation of more than 2% would either see an increase on temperature beyond humans tolerance or plunging us into an ice age where all living matter would perish. The sun is about 4.5 billion years old and in about another 4 billion years it will have used up all its resources and become a red dwarf star. It is too small to become a supernova.
John ZS5JF

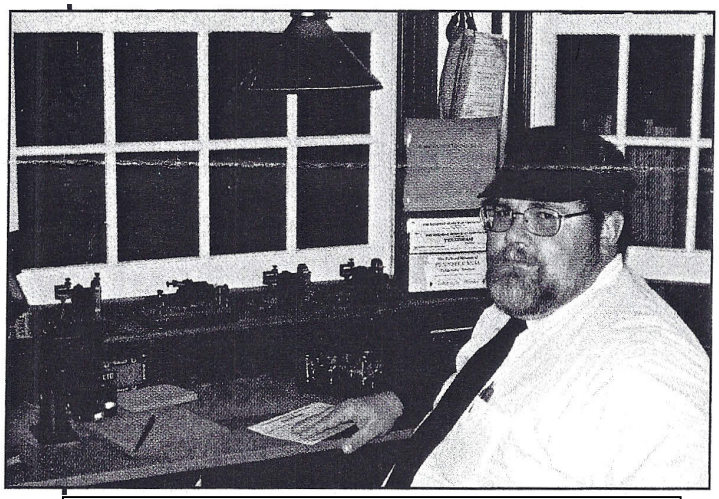
Old-School Digital Communications

Digital! It's everywhere! All of our cell phones are now "digital." There is no more NTSC analogue television; it's all digital now. Ditto for our old standby, "Ma-Bell." POTS (Plain Old Telephone System) will shortly be replaced. by VoIP (Voice over Internet Protocol), or digital voice. Even our cordless phones, once easily eavesdropped on by anyone with a scanner, are now frequency agile (read that "frequency hopping") and use a digitized transmission medium. For someone like me, an analogue guy In a digital world, this trend is very, very upsetting!

So where did all this "digital" stuff get its start?

Smoke signals aside, the early days of radio communications were dominated by dots and dashes:

Morse code, the original digital mode! Samuel F. B. Morse did indeed make a niche for himself in the world of communications. The idea of using an on/off keying system to transmit intelligence is elegantly simple. To be sure, there was more than one "code" system in use over the years. However, the International Morse code is the one that we hams have used for nearly a hundred years. The American Morse code was used by the railroads even into the 1960s! My good friend, Chip Morgan, N3IW, is a master of both the International and American Morse code systems and is a volunteer at the Railroad Museum of Pennsylvania, near Strasburg, where he mans the railroad depot office.



Chip Morgan, N3IW, operating American Morse code at the Railroad Museum of Pennsylvania. (Photo courtesy N3IW)

Why am I devoting an entire column to Morse code, or more intimately known in the ham radio world as CW (continuous-wave modulation)? For some incomprehensible reason, since the FCC dropped the CW test as a licensing requirement, it seems that thousands of hams now want to learn CW! Go figure. On the other hand, I personally think it is a great trend! CW is a fun mode and the word is out! Dits & Dahs

One of my favourite historical movies is Empire of the Air, The Men Who Made Radio, a Public Broadcasting System movie showcasing the development of radio from its earliest days. Empire of the Air is a must-see for any ham radio operator in order to receive insight into the history of our hobby and more importantly, because it sets the stage for why Morse code was first used to transmit information via "the ether." To watch the rotary spinning and the blue-white spark jumping as the key is closed, making dots and dashes, is worth the price of admission.

OK, I digressed ... sorry. Back to the present.

Beyond the technical change from spark gap to transmitters using a Continuous-amplitude Wave (that's where CW came from), little has changed as far as CW is concerned over the last 100 years. Now that is quite a record. In order to understand why CW is such a backbone of communications, you have to realize that although relatively slow, the dots and dashes of well-sent CW can cut through bad atmospherics and manmade interference when other modes of modulation fail. Restated, CW will work when other modes won't. Also, the only computer you need to decode it is the one between your ears!

In researching my book on QRP, I found an astounding bit of information: A single-sideband (SSB) signal needs to be seven times higher in receive signal level (RSL) than a similar CW signal . over the same path to be readable. Said a different way, CW is seven times more efficient as a communications mode than SSB! Oh, I guess I forgot to mention that many VHF/UHF weak-signal operators use CW simply because it will work when SSB and digital modes won't. Now you know the "why" as to the popularity of CW in this digital age.

To further drive home this point, I use QRP (ham radio done at or below the 5-watt RF output level) for about 90% of my operating time. I have worked all over the world with as little as 2.5 watts using CW and wire antennas!

Am I a good CW op? No, merely an average one. Try as I might, I top out at about 26-28 words per minute, but I manage to work my share of DX and get QSO's in contests merely by being persistent. I realize that to hams unfamiliar with CW, speeds such as 20 wpm (words per minute) sound tremendously fast, but believe me, they're not. Some of the folks I hang out with-Dick Bentley, K2UFT; Ralph Bates, K1ZZI; Fran Slavinski, K3BX; Paul Stroud, AA4XX; and Chuck Adams, K7QO-routinely whip along at 40+ wpm. Now that is fast!

CW Program Learning Links

(Some are free, others require registration and payment.)
http://wwW.K7qo.neV
http://www.qsl.net/n9bor/morse.htm
http://www.ac6v.com/morseaids.htm
http://www.stormy.ca/morse/index.html
http://www.dxzone.com/catalog/Software/Morse_Code_

Training!
http://www.mrx.com.au/
http://morse-code1.software.informer.com/

Getting Started in CW
Here's the scenario: You recently upgraded your Tech license to General Class and are now interested in learning CW so you can enjoy more of the ham radio hobby. Where do you start? Well, believe it or not, there is an insane number of CW programs and learning aids on the internet. Also, there is a plethora of CW learning programs available via mail-order in. ads within the pages of CO and CO VHF magazines.

I remember the "good old days" back in the early 1960s when I dutifully copied my AMECO 45-rpm code records until I had memorized every five-letter group. Needless to say, my CW speed suffered. Once I became acquainted with Master Chief Petty Officer Jake Ritzen, CT2AZ, while stationed in the Azores, I found a bounty of CW training aids courtesy of the US Navy. Jake nurtured my CW efforts, and before long I was copying a solid 15-17 wpm, more than enough for the General Class license requirement of 13 wpm at the time.

For now, pick a CW learning program for your computer, load the software, and start listening to the dits and dahs. I will guarantee that you will, at first, have a bit of a problem picking out the dots from the dashes. However, within a couple of sessions you'll be recognizing individual letters. The main point I want to make here is don't give up! Your initial speed will be very, very slow, but will advance quickly with daily practice. One thing to remember: Make your practice sessions no longer than 30 minutes at a time, and preferably at the same time each day. If you find that you can tolerate some extra CW study time, go for a second practice session. Too much CW is counter-productive when you are just trying to learn the alphabet and numbers. Speed will come, I promise. The big thing to remember is that learning CW is much the same as learning a foreign language. It takes time, patience, practice, and persistence.

Some Fun at Arland's Expense!
Back in the early 1970s, when I was stationed at Lajes Field, the Azores, using the callsign CT2BH, I decided to try my hand at some CW on 20 meters. Let me set this up for you:

First of all, there were only about nine hams in all of the Azores back then-ergo, fairly rare DX for the day. I had inherited an old Collins KWM-1 (boy, do I wish I had that rig today!) from one of the locals who was returning stateside. While primarily built for SSB, you could transmit CW with the KWM-1.

One evening while 20 meters was hopping, I decided to drop down to the lower end of 20 (quaintly called "Kilowatt Alley") and started calling "CO de CT2BH." I gave a really long CQ call. When I stopped, the S-meter on the KWM-l hit full scale and I had myself an honest-to-goodness pile-up! I was stunned. The cacophony of CW signals was horrendous-no, down right scary! I tried "CQ" once again and was met with the same huge wall of CW signals in my receiver. In desperation, I shut off the rig and walked out of the shack. The next day I related all this to Jake and my boss, CMSgt Bill Wood, CT2AA. They both stopped laughing after about 10 minutes. Yup, my big debut as a DX CW op was a total bust.

There is CW life after an Azorian pileup. Over the next couple of years I forced myself to get in front of the radio and keep working at my CW skills by making several CW contacts each day. It wasn't long before I found myself routinely copying and sending CW well in excess of 20 wpm. The key is practice, practice, practice, and not just practice in front of the tape or CD machine. Get on the air and have actual CW contacts. This is the proven way to not only increase your CW speed, but to hone your CW operating skills, which are different than the skill set you use on phone. In short, there is absolutely no substitute for time in front of the radio. We will develop this concept in a minute.

Ghost Writing
This may sound really strange, but it does work. I have used this technique myself and with practice, it is a great way to break away from using a pencil or pen to copy individual letters/numbers on paper. Why would you want to do away with copying a OSO on paper? Simply put, speed. That's right, your speed will increase dramatically if you get to the point where you can copy in your head and not on paper. Along with the increase in speed, you will become more comfortable using CW, and that leads to having fun with the CW mode.

I am sure that there are former military CW operators (affectionately called "ditty-bopps" by those of us in the USAF) who will read this and totally disagree. After all, they were taught to copy using a "mill," a special typewriter with only uppercase letters and numbers. However, ask proficient contesters and/or DXers and you will undoubtedly find that they all copy in their heads! Contesters especially don't have the time to write things down. It's Qs, Qs, and more Qs (as in QSOs, or contacts)-"up the rate"! If you're writing things down, you are not making Qs!

The method I have used is called "Ghost Writing," and it consists of doing away with the pencil and, using the end of your index finger, writing each letter as it is heard in your headset (you will find that using a headset, or "cans," as the Old-Timers called them, filters out local noise and greatly increases your ability to decipher CW signals). No pencil, just your index finger. Keep increasing the CW speed and eventually you will start to visualize each character in your mind. Cool, huh? Don't laugh, it does work. However, it takes practice, practice, practice.

If you want to be proficient in CW, it takes time. Period.

You need to start slowly with a beginning CW program and gradually increase your speed until you can feel comfortable at around 10 wpm. Then it is time to get on the air!

Getting on the Air
Your first on-the-air CW contact can be a bit like my first parachute jump! Unnerving, in a word. Thus, to preclude problems, stay in the upper portions of the CW segments of 80, 40, and 30 meters, and tune around looking for a station sending "CQ" at a slow speed you can readily copy, and when he signs his call, give him a call.
It would go something like this: "CQ CQ CQ de ND4V, ND4V, ND4V K". I would respond with: "ND4V, ND4V de

K7SZ, K7SZ KN". Now, if Mike Weathers, ND4V, heard me, he would come back with my callsign and we would begin a CW QSO, swapping signal reports, name and location, possibly rig, antenna, and weather information. Oh, by the way, Mike is a world-class contester and DXer and has one of the best CW "fists" I have ever had the pleasure of hearing.

Your first CW QSO will break the ice, and if you apply yourself and spend time in front of the radio, you will rapidly become a competent CW operator. The "time in front of the radio" thing is an absolute must. You need the experience with copying CW signals off the air when there is interference present. The CW you copy on CDs or tapes is ultraclean-no interference (QRM) and no fading (QSB), no natural noise such as lightning (QRN), and no close-by stations splattering their interfering signals intermixing with the signals you are trying to copy. On the air, you will encounter all of this and more. When you think you are ready, go to and snag a copy of RufxXP, a CW program that fires callsigns at you at various speeds while duplicating what it is actually like in a fierce CW contest. Its a free download and it is a very humbling experience the first few times you try it. However, as with all things CW, with practice you will be able to start snagging callsigns out of the mess of interference and bad atmospherics like a pro!

Time in front of the radio also has another advantage: It will force you to become intimately familiar with your radio equipment. You'll learn how to adjust your IF passband and apply the proper IF and DSP filtering to pull signals out of the noise/QRM. You'll learn that there are times when you don't run the RF gain on the receiver wide open but dial it back to improve the ability of your receiver to capture the desired signals. In short, time in front of the radio is priceless and will hone your skills to perfection.

Internet to the Rescue

There are several large organizations that can be found on the internet that specialize in the joys of using CW. Most notably: FISTS (http://www.fists.org/) "The International Morse Code Preservation Society, SKCC (http://www. skccgroup.com/) The Straight Key Century Club, and The Morse Telegraphy Club (http://www.morsetelegraphclub/ default.asp). To be sure, there is a multitude of other CW-oriented organizations out there, but these three are ones I belong to and they offer a wealth of information on the Morse code.

Of course, to enjoy CW you need a key or keyer and paddle set. This is a whole column in itself. However, I will provide one URL that I find extremely helpful, and that is Milestone Technologies (<http://www.morsex.com>. phone 800-238-8205), owned and operated by Marshall Emm, N1 FN, who offers a vast array of CW paraphernalia. Marshall is a great guy to deal with and I have used his resources over the years with outstanding results. Another excellent source of high-quality keys,
and a longtime CQ advertiser, is Vibroplex (<http://www.vibroplex.com>. phone 800-840-8873).
That all for this time. Don't forget that this is your column, so don't be afraid to send me comments via e-mail or snail mail and tell me what you would like me to cover in future columns. Feedback to column editors is essential to be sure we are serving our readership to the maximum extent possible. Also, June is Field Day month, so plan on getting together with a local radio club and get out into the field and have some ham radio fun! 73, Rich, K7SZ

(From Page 8)

SYLVANIA NEWS —15-T

MOON RADAR (Continued)

Lock-In Tubes Used

Practically all the tubes used in the receivers are Lock-Ins. The R.F. amplifier, and the first converter are Sylvania type 7AB7's but the next two converters are type 7Q7's. Types 7W7 and 7A7 are used as IF amplifiers, type 7H7's in the heterodyne amplifiers and type 7C5 in the audio IF with a type 7A6 as the final mixer. No oscillator is required in the receiver as the frequencies required are obtained by amplification of the desired multiplied frequency from the transmitter. This procedure permits the receiver to keep in synchronism with the transmitter which is absolutely necessary since an accuracy of 50 cycles in 111.6 mc is not obtainable even with the best crystals and thermostatic control. Success depended on having less than 50 cycles change in the time required for the signal to return.

The Transmitter

The transmitter also used a large number of Lock-In tubes. Type 7H7's were used as the crystal controlled oscillators, frequency doublers and triplers right up to the type 7C5 which drives a type 807 tripler. This in turn drives a pair of type 257B's which drive a pair of 450TH's which drive the final pair of type 6C21's. The last three types mentioned are not Sylvania types.

The total power input to the final stage was 800 watts, approximately half of which was radiated by the antenna. By using a larger radar antenna than usual, a concentrated beam was directed at the moon to give an effective power gain of about 200. The antenna itself was built on a 100 ft tower, but since the usual radar direction mechanism was used contact could only be made with the moon when it was close to the horizon.

According to the calculations made by the Mathematical Analysis Section of the Signal Corps the moon re-radiated only 3 watts and since this was scattered in all directions it can be seen that a very small transmitter with a directive antenna would be adequate for use on a rocket to communicate with its home station.

Future Uses

One large communication company is seriously considering the use of this system for long distance code transmission and it has been suggested for television broadcasting. There would seem to be a good possibility for use in the first but its big draw backs are, the large amount of power required, and the fact that it could be used only when the moon was visible to both stations. Its use in television broadcast relaying would not seem to be practicable with our present knowledge because of the above objections and the fact that television requires a very broad band.

SYLVANIA NEWS
TECHNICAL SECTION

MAY-JUNE, 1946 EMPORIUM, PENNA. VOL. 13, NO. 4

SYLVANIA TUBES USED IN THE MOON RADAR

Probably most servicemen saw the announcement made on January 25th of this year that on January 10th, success was finally achieved in the attempt to get a radar echo from the moon. As most of you know, previous radiation theories had required that an ionized layer in the stratosphere reflect or refract the radio waves striking it. It is now an established fact that enough energy can be sent through this layer to make interplanetary communication possible.

This may not seem to have much practical value at the present time, but rocket development is rapidly approaching the point where radio control of, or communication with, a rocket flying above the Heaviside layer may be necessary. Many of the fantastic ideas of Jules Verne and H. G. Wells have become possible and interplanetary rockets may be developed in the not-too-distant future. When they are, the first one should be radio operated and contain many recording meters to determine the conditions a future passenger may encounter.

Sylvania is proud of the part played by Sylvania research men and tubes in this development. The complete radar unit was built in the Sylvania Research Laboratory but required modification to adjust time intervals, etc. to suit it to the moon experiment.

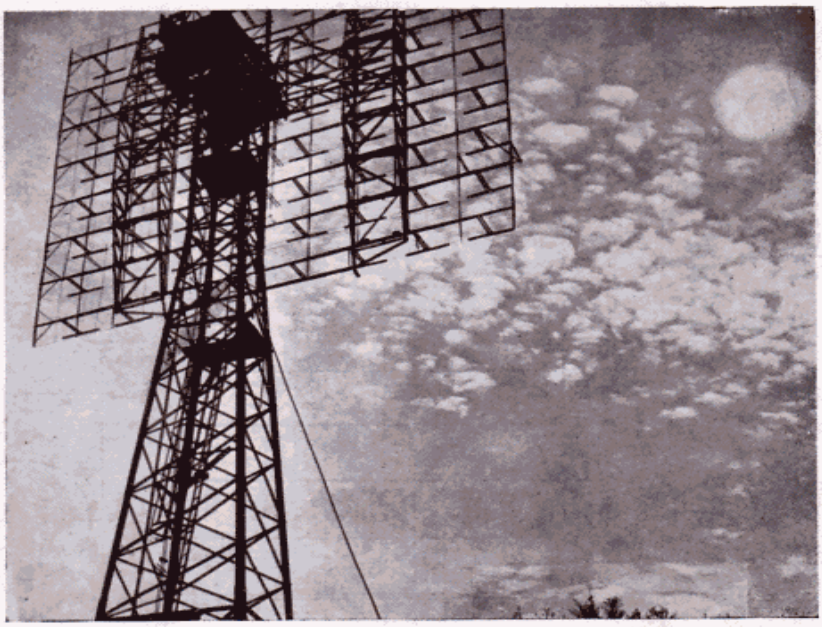
The Receiver

Experimenters and servicemen will be interested in some of the technical details of this equipment. Those in locations which give trouble with background noise at a sensitivity of 5 microvolts will be astonished to hear that the sensitivity of the receiver was 0.01 microvolts. To obtain this sensitivity special precautions were necessary particularly at the high frequency employed which was 111.6 megocycles. A quadruple superheterodyne was used having a tuned RF stage followed by I.F. amplifiers of 32.6, 6.7, 1.5 mc and 180 cycles. The effect of background noise was greatly reduced by the use of the tuned IF stage at 180 cycles. (The background noise depends on the band width received, and the band width obtained at an IF of 180 cycles is approximately 50 cycles.) Due to the Doppler effect and the fact that there is a relative motion of several hundred miles per hour between the transmitter and the moon the frequency of the received echo was not the same as the transmitted signal. The difference may be as great as 300 cycles at this transmitter frequency, and because of the narrow band received the heterodyne frequency has to be correctly adjusted for the relative velocity of the earth's surface and the moon at the time the experiment is made.

The Doppler effect is the name given to the noticable change in the pitch heard at the instant a whistling train passes. When a sounding body approaches, you receive more waves per second than are sent; and from a receding body you receive less per second. The change as the sounding body passes causes a sharp drop in the pitch of the sound. Radio waves behave in a similar way and this same effect was used in the design of the V.T. Fuse.

The time interval between the transmission of a signal and the reception of the echo was about 2.5 seconds which corresponds to a distance of 238,000 miles, the moon's distance from the earth. This DX record will probably stand for a few years. The transmitted pulses were ¼ second long and about 4 seconds apart.

(Continued on page 15)



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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 yesterdays 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:

For Disposal:

Drake 2B Receiver with Q Multiplier.
Contact Bill Hosie ZS6CCY on 0829029272
for further information:

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 3615.

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