

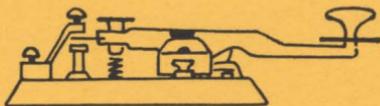
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nr 15

# Morsum Magnificat



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MORSUM MAGNIFICAT was first published in Holland, in 1983, by the late Rinus Hellemons, PAØBFN. Now published in Britain, it aims to provide international coverage of all aspects of Morse telegraphy, past present and future.

MORSUM MAGNIFICAT is for all Morse enthusiasts, amateur or professional, active or retired. It brings together material which would otherwise be lost to posterity, providing an invaluable source of interest, reference and record relating to the traditions and practice of Morse.

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COVER: British Army Key. Dummy. Signallers' MkII. 1917. Brass on mahogany. See page 28.

# THE SUTEL 40



by LOUIS MEULSTEE, PA6PCR.

At the beginning of WW2, almost 35 years after the introduction of the Fullerphone (see MM5, Autumn 1987), the German Signal Service ("Nachrichtentruppe") introduced a similar Morse-telegraph instrument: the "[S]ummer (Buzzer) [TEL]egraph 40", also known as the "Sutel". This instrument worked on the same principle devised in 1915 by Capt Fuller; also that of the WW1 German "Utel" ([U]nabhorbare [TEL]egraph [Non-interceptable Telegraph]).

The Fullerphone and Utel were developed by the British and Germans quite independently about the same time. But the Germans made an ingenious innovation with the later Sutel by replacing the awkward buzzer-interrupter with an electronic audio-frequency oscillator. Interception of Sutel 40 Morse signals was, as with the Fullerphone and Utel, practically impossible because of the very low line current and absence of clicks. A disadvantage was the relative high power drain from the batteries (50-60mA), compared with the Fullerphone and Utel (1-3mA).

During "stand-by", the Sutel 40 was replaced by an ordinary field-telephone (model 33); after a magneto call, the operator switched back to the Sutel 40. The handbook, dated 1942, indicates a range of 30-40 km when using ordinary field wire; signalling via fixed overhead lines exceeded 100 km.

## Working principle

The "Summer Telegraph 40" is basically a d.c. Morse telegraph with a very high sensitivity. Morse signals are sent and received by the same instrument. When pressing the Morse key a very small direct current flows through the line and the receiving instrument. This direct current Morse is changed into audible Morse by an a.f. valve oscillator.

The outstation is connected via a line to terminals "Ltg"; a field telephone (for calling) to terminals "Feldspr"; the Morse key to "Taste" and headphones to "Horer". Note the earth terminals in the connectors to the key and phones. These connect to a screen lead to reduce the danger of interception caused by induction via the leads.

The low-pass filter C1-D-C2 has, as with the Fullerphone and Utel, a twofold purpose: rejection of a.c. currents picked up by the line and prevention of Morse messages being read by key-clicks.



Fig.1 The "Sutel 40" is built into a strong fibre case, similar to the German field telephone Model 33. During transport the key is placed in a partition on the hinged lid of the case. (Collection A.O. Bauer, PA/OB.)

The a.f. oscillator valve is normally biased to prevent oscillation. By operating the Morse key, at either end of the line, a positive voltage exceeding the bias voltage is applied to the grid and the valve oscillates. This implies, however, that the line connections cannot be interchanged!

The operator will hear his own signals but is not aware of a broken line. The sensitivity of the circuit and valve characteristics require that the total line resistance must be between 20 and 50 kohm. With very short lines a series resistor (W1), must be inserted via switch "Ton I". Small d.c. currents, picked up by the line or earth caused considerable interference in working the Sutel 40.

In practice, the Morse signals tended to "blur" and the signalling speed was quite low. When the author recently tested a surviving instrument, he could work at only 5-7 words per minute. Connected to a capacitive line this was slightly reduced!

#### Space charge tetrode

Instead of using the inner grid of a tetrode as the control grid, it is possible to operate a valve by applying a small positive voltage to the inner grid and to use the second grid as the control electrode.

The positive voltage on the first grid overcomes the limiting effect of the space charge in the vicinity of the cathode, and thus increases the plate current and the transconductance. The effect is that the valve operates efficiently with a very low anode voltage. This feature was applied in the design of the Sutel 40.

The relative high current to the space-charge grid results in a less effective use of the cathode current. Space charge valves, invented during WWI by Schottky, were popular during the twenties and thirties, but declined in importance when a.c. valves came along.

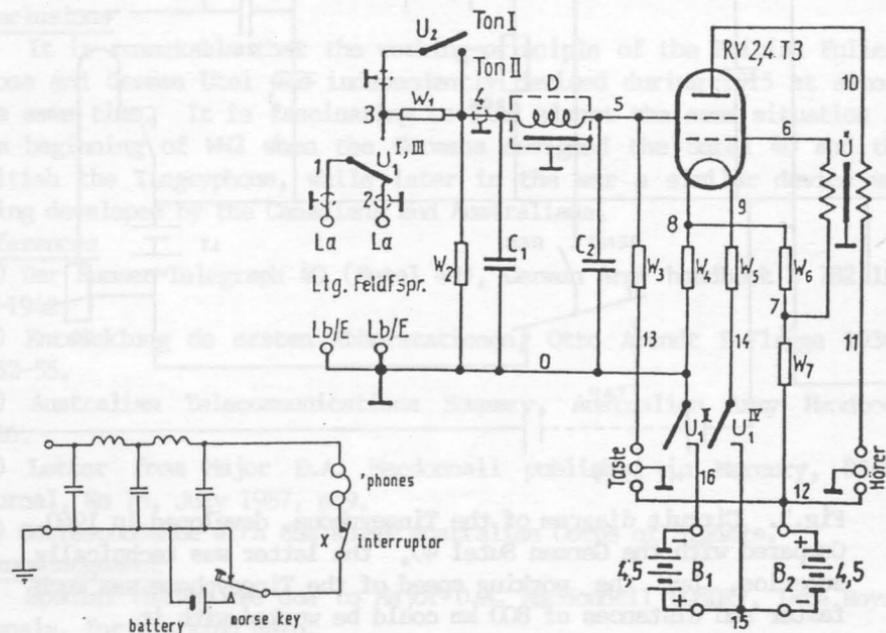


Fig.2 Circuit diagram of the WW2 German Buzzer Telegraph 40 which shows an ingenious application of the space-charge valve. The basic circuit, (left) was devised in WWI. Note: Taste = Morse key; Horer = headphones; Feldspr = field telephone; Ltg = line.

### Similar Developments in the Middle East, Canada and Australia

The "Tingeyphone" was developed by Robert Tingey, a Territorial Army officer posted to "Egypt Command Signals" in 1940. He was given an administrative job which was a waste of his undoubted talent. When he was posted Home he was more usefully employed. His instrument consisted of a standard Fullerphone circuit but with the interruptor circuit replaced by an a.f. valve oscillator normally biased negatively to prevent oscillation.

By pressing the Morse key, at either station, a positive voltage equal to or exceeding the bias voltage was applied to the grid and the valve oscillated. When the key was at rest, an applied negative voltage overcame the capacity of the line, stopping oscillation sharply (hence no "blurring" as with the Utel 40!).

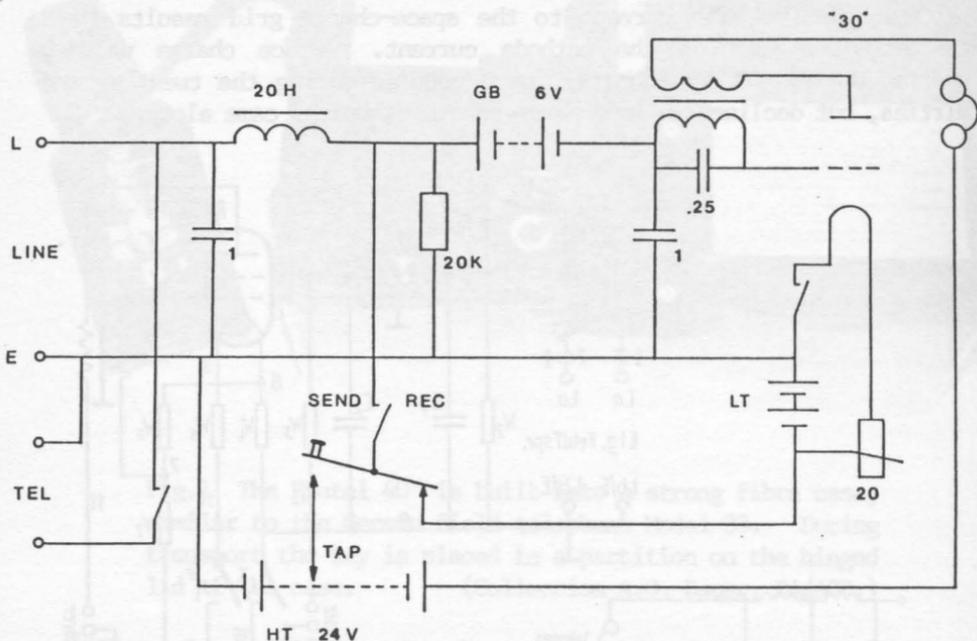


Fig.3. Circuit diagram of the Tingeyphone, developed in 1940. Compared with the German Sutel 40, the latter was technically superior, but the working speed of the Tingeyphone was much faster and distances of 800 km could be worked with it.

Major D.A. Macdonnell, who served with Tingey in Egypt and actually worked with Tingeyphones writes "... the instrument was a very fine piece of work and proved useful in the Desert. Using headphones it was a pleasure in use and a great change after listening to the "click click" of the sounder. It was a marvel how it functioned over bad lines and worked well over an earth return. The note could be varied to suit the listener ..."(4)

The "Australian Telecommunications Summary", a publication reviewing the developments of Australian signals during WW2, recorded in 1946: "... Late during the war years and in line with developments overseas, experimental work was carried out by the AMF to produce a design in which the mechanical chopper was replaced by an audio-frequency oscillator. As in the 1944 Canadian design (on which the Australian work was

based) one miniature valve was employed, together with a 12 volt "Mini-max" HT battery and the complete unit plugged-in to replace the standard buzzer. Final operational field tests of this rather protracted project were still in progress as at August 1945, and were eventually abandoned in view of the more promising nature of reports on new overseas instruments ..."

Little is recorded of the operational use during WW2 of the Sutel 40. The British Fullerphone, however, saw world-wide use throughout both WW1 and WW2 and was produced in far greater numbers than the Utel and Sutel 40.

### Conclusions

It is remarkable that the working-principle of the British Fullerphone and German Utel was independently devised during 1915 at almost the same time. It is fascinating to find almost the same situation at the beginning of WW2 when the Germans designed the Sutel 40 and the British the Tingeyphone, while later in the war a similar device was being developed by the Canadians and Australians.

### References

- (1) Der Summer-Telegraph 40 (Sutel 40), German Army handbook D 782 10-11-1942
- (2) Entwicklung de ersten Abhorstationen, Otto Arendt F-Flagge 1936, pp52-55.
- (3) Australian Telecommunications Summary, Australian Army Handbook 1946.
- (4) Letter from Major D.A. Macdonnell published in Mercury, RSARS Journal, No 78, July 1987, p19.
- (5) Correspondence with the Royal Australian Corps of Signals.

### Acknowledgement

Special thanks are due to Major D.A. Macdonnell (G8DK), late Royal Signals, for his kind help.

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### ANOTHER OPINION!

Q. What is the difference between the buzzer and the sounder methods of Morse signalling?

A. In the case of the buzzer the dots and dashes are represented by short and long notes of a more or less musical character. The sounder, on the other hand, produces two sharp clicks for each dot or dash, separated by short or long intervals. This instrument is used by the Post Office, and is considered to be less tiring to the operator than the buzzer.

("500 Wireless Questions Answered", 1924.)



# Old-fashioned way

by ARTHUR LEIGH, GOCHX

As a newcomer to amateur radio I am constantly amazed at the fear and trepidation with which people face the Morse test. I feel this is all down to inadequate preparation, so perhaps my own initiation into the art may be of interest, if only from a historical point of view!

I was taught Morse by an expert. So much of an expert, in fact, that I was able to pass the Amateur Morse test at my first attempt, after a break of 40 years, needing only a few hours practice beforehand.

In 1940, together with other future recruits for the Forces, I decided it would be useful to have a "service skill" before being called up. A local expert was available in the guise of an elderly retired post office telegraphist, who took pupils on a one-to-one basis for a fee of 2/6d (12½p) per hour!

Training started with three two-hour sessions a week, which took one up to about 15 wpm, reducing to two sessions up to about 20 wpm, and then one session a week to keep up the speed and to deal with any faults which might have developed.

## Translate immediately

It is interesting to compare the method of instruction with those of today. It went something like this:

After an explanation of its logic, ie that the most frequently used letters have the shortest symbols, the code was learned by opposites. It had to be learned thoroughly and you had to be able to translate immediately into code newspaper headlines and text, before ever listening to Morse on phones. The key was not touched until a receiving speed of about 10 wpm was achieved.

The initial introduction to the sound of code was dots, dots and more dots until the brain accepted one, two, three or four of them as complete letters and not simply a counted number of dots. Dashes then followed.

Letters were sent in groups of five, no plain language at first. Right from the beginning, letters were sent at about 12 wpm, but with a good space between each letter.

So it went on; gradually the space between the letters was reduced and "bingo", you were receiving good Morse at about 10 wpm.

### Wrist Movement

The sending procedure was now introduced. The key was held between the thumb and middle finger, with the forefinger resting on the top. The instructor steadied the forearm to ensure that a light wrist movement was achieved. Next came the sending of endless dots until they were sharp "dits" in groups of one, two, three and four. This needed quite a lot of practice.

At about 15 wpm (both sending and receiving), plain language was introduced, but with a difference - it was sent backwards. This was to avoid anticipation of words in sentences. By now speed was coming rapidly; occasionally there were "sticking points" which held one up, but the instructor measured his sending speed to keep you chasing all the time.

### Shorter Dots

When a pupil was sending he spotted every bad or sloppy letter and picked it up for comment at the end of the passage. Speed came with practice and within three months 20 wpm was the norm; the dots were sent even shorter and the dashes were slightly emphasised, while one's writing kept pace with the receiving.

To reward my efforts, Dr Sodde came with me to the Aircrew Selection Centre where, after passing the aircrew medical, I was selected for navigator training - with a Morse requirement of 6 wpm. Such is life!

Some time later I took the Wireless Operator (Air) course and had no difficulty in achieving the required 18 wpm, plus 10 wpm on the lamp. So my original training was not altogether wasted!

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### ITS A SMALL WORLD!

Within a couple of hours of receiving MM14 containing the article about his early days on the Great Western Railway, Ray Pascoe, G3IOI, had a phone call from Ken Hodge, GM3JIG, who recognised him as his ex-Royal Signals Morse instructor at Catterick in 1950. They are arranging a CW reunion on-the-air when Ken returns from his current tour of duty on an oil rig.

# Just rambling....

## MM CONTINUES!

I am very pleased to announce that publication of *Morsum Magnificat* will be continuing. As from the next issue, Nr 16, the editor and producer will be Geoff Arnold G3GSR, editor of "Radio Bygones", previously editor of "Practical Wireless", and one time sea-going radio officer. I am sure you will all be delighted at this news, and will join me in welcoming Geoff and wishing him every success with MM.

I shall continue to be associated with the magazine as consultant editor, and for the time being all articles, etc, for publication should continue to be sent to me. Despite the good news, however, our small circulation continues to give concern, so please take every opportunity to promote MM to your Morse friends. My thanks to you all for your help and support during my "term of office".

## SUBSCRIPTIONS.

There will be an increase of £1.00 in the annual subscription as a result of higher production costs, with MM continuing to be published on a non profit-making basis. All subscribers are paid-up to Nr 16, and a few have paid for the following year. The number shown in the code on your address label is the number of the issue you are paid-up to.

The renewal subscription for Nrs 17 to 20 will be UK, £8.00; EUROPE including EIRE, £8.50 sterling; OTHER COUNTRIES, Surface mail £8.50 sterling (or US \$14.00), Airmail £10.50 sterling (or US \$17.00).

Access/Eurocard/Mastercard or Visa are also welcome. Please quote your name as it is printed on the card, the card number, and expiry date. Renewal reminders will be included with the next issue, but if you wish to renew early please send your payment to *Morsum Magnificat*, 8A Corfe View Road, Corfe Mullen, Wimborne, Dorset BH21 3LZ. England. Cheques, etc, should be payable to "G.C. Arnold Partners".

## THE AMATEUR MORSE TEST

The news (p.9) of IARC's proposal to IARU Region 1 that the ITU be asked to abolish the amateur Morse test is not unexpected. The argument, that the abolition of a Morse proficiency requirement in the maritime mobile service takes away the original need for amateur proficiency in the code, is increasingly heard - usually with the idea of making entry to amateur radio easier. The IARC proposal may well founder when it is generally realised that they want to introduce a computer proficiency test instead of a Morse test. If it does, we can be sure there will other proposals to abolish the Morse test following on in due course.

73, Tony.

# END OF MORSE TEST?

Israel's national radio society (Israel Amateur Radio Club) is submitting the following formal proposal to the International Amateur Radio Union Region 1 Conference at Torremolinos, Spain, 1-6 April 1990:

"That IARU Region 1 agree in principle that in view of the abolition of Morse proficiency testing for Maritime Mobile operators the CW test for amateurs be replaced by some form of operating proficiency test more suitable to the present day data operating modes of amateur radio."

Should this proposal be carried then an additional proposal is submitted to the Conference suggesting that action be initiated with the ITU to modify Article 32 of the Radio Regulations to require any person seeking an amateur radio licence to prove that he has knowledge of the various data codes and operating procedures, and has demonstrated his competence in manual keyboard operation. An alternative proposal waives this requirement for those making exclusive use of frequencies above 30 MHz.

The Israeli paper recognises that even if the Conference agrees its proposals, the need to obtain ITU approval and subsequent adoption by individual administrations means that "nothing will happen overnight". It goes on, however, to make a further proposal, that a working group be set up to devise a practical and theoretical operating examination to "elaborate a common syllabus for Region 1" and "define the required keyboard skills, speed of data entry and acceptable number errors".

The paper is signed by Ron Roden, 4X4RR (G4GKO), IARU Liaison Officer, IARC, who comments "With great respect to the historical and traditional mode of amateur operation and the CW operators (amongst whom I am proud to count myself) I submit that we must not permit ourselves to indulge in nostalgia to the possible future detriment of the Amateur Service".

In its conclusion, the paper says, "It is felt that introduction of the measures proposed will not only prove attractive to the 'Computer Generation' but will also fully satisfy the concept of self-training'.

# The North Pole Key

by MURRAY WILLER, VE3FRX.



During the fall of 1987, Leonid Labutin, a Russian amateur radio operator, UA3CR, called Tommy Atkins, VE3CDM, president of the Canadian Radio Relay League, and asked if arrangements could be made for Canadian amateurs to provide communication facilities for a scientific expedition from Russia to Canada. The expedition, comprising both Canadian and Russian members, had already received the approval of both governments.

To facilitate amateur radio communications in support of the expedition, a third-party-traffic and reciprocal-operating agreement between Canada and the USSR was negotiated. It was an historic agreement jointly signed by senior officials of the Soviet Ministry of Communications, Communications Canada, the chief of the expedition Dr Dmitry Shparo, Chairman of Radio Sports Federation of the USSR Yuri Zubarev, and Tommy Atkins VE3CDM, and was effective from October 30, 1987 to August 1988.

The expedition became known as the USSR/Canada Polar Bridge Expedition or The Canadian-Soviet SkiTrek Expedition. The expedition started at Cape Arctic, at the northern tip of Severnaya Zemlya in Russia, with its final destination Cape Columbia, Ellesmere Island in Canada, with a stop at the North Pole, a total distance of almost 2000 kilometers.

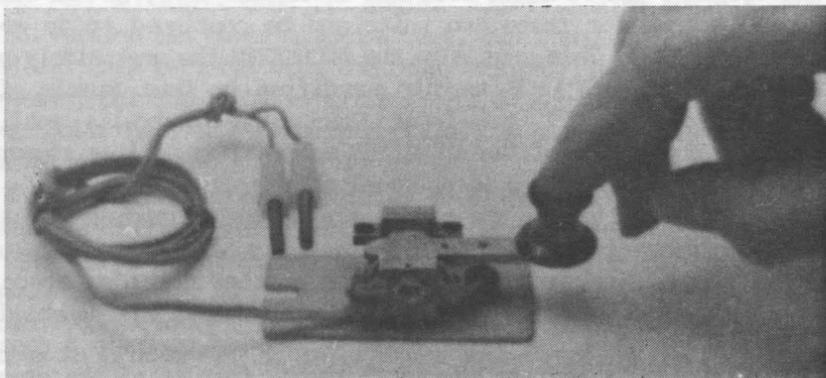
All communications were supplied by radio amateurs in the USSR and Canada. Prior to the expedition, Leonid Labutin UA3CR, and Alexander Tenyakshev, 4KOCOC, came from Russia to Canada to co-ordinate the communication requirements. During a meeting in Toronto I had the opportunity to meet Leonid and Alexander. I told them

that I was a key collector and had keys from many countries but none from the USSR. I asked them if they could find any Russian hams who had keys to trade or sell.

A few months later Tommy Atkins called me. He had just returned from Moscow to check on the Russian side of communications. He said that just before he took off from Moscow, Alexander had handed him a parcel to be given to me. The parcel turned out to contain three Russian keys, an army key, a practice key, and a miniature key.

The miniature key was made especially for a North Pole expedition in 1979, and carries the marking on the back of the base "UOGZ, North Pole, 31.05.79". While the key is very small it can be operated quite comfortably just using the tip of the middle finger.

I often display this key at flea markets, hook it up to an oscillator, and tell the visitors a little of its history. The really interesting thing about it is that it only sends Russian Morse code! How about that...!



The Russian 1979 North Pole miniature key.

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HE OUGHT TO KNOW!

"In my opinion it would be a mistaken policy to introduce legislation to prevent amateurs experimenting with wireless telegraphy.

Had it not been for amateurs, wireless telegraphy as a great world-fact might not have existed at all.

A great deal of the development and progress of wireless telegraphy is due to the efforts of amateurs." (Letter from Marconi to 'Wireless World', 1919.)

# KEYERS WITH AUTOMATIC SPACING



by Dr Gary Bold, ZL1AN

The digital keyer reached an important stage in its evolution with the development of Jim Garrett's ACCUKEYER, first described in QST, August 1973. This appeared for many years in ARRL Handbooks, together with the ACCUMEMORY, which Jim announced in 1975. By the time I purchased the original TTL PC board from Jim in October 1977, he had shipped over 15,000 boards for these two units and he continued to do so for some time after that. This must make the ACCUKEYER the most widely built keyer of all time. A CMOS version, modified by Gene Hinkle, first appeared in January 1977 and later Electronics Australia published another. The importance of the ACCUKEYER was that as well as supporting iambic operation, it included an optional auto-space feature.

It worked as follows: the paddle states were interrogated at the end of the dot-space following the last element sent. If neither paddle was closed, the clock remained on, and another dot plus space was formed, except that for this last element, the output was disabled, so that no dot appeared at the output. The effect was to force a space of three clock cycles (a correct character space) instead of the standard inter-element space of one clock cycle. Hence it was impossible to send less than the correct character spacing and, if one anticipated each new character slightly on the paddles and "waited for the keyer to catch up", one was able, for the first time, to send absolutely perfectly ratioed code.

A good ACCUKEYER operator using the autospace feature sends code that is a joy to read. If I had my way in this wicked world, I would hardwire the autospace on in every ACCUKEYER built. I guess Jim made it optional because many experienced operators found it unsettling to use. These were mainly those who had fallen into the habit of leaving too small a space between characters - in which case the keyer "takes over" and appears to be attempting to set the rhythm of the sending. Several Hams have complained to me about this over the years. I invariably

counsel them to persevere and master autospace sending, because if it throws you, you are simply sending bad code. Some have later admitted that I was right.

Many times, before I built my first keyboard sender, I was asked "which keyboard are you using?" because my code appeared to be perfect. (This is not a boast: any ACCUKEYER user can send perfect code after some practice.)

Autospace logic marked the last major step in digital keyer evolution. Some designers experimented with automatic word spacing: this also interrogates the paddles states at the end of each enforced character space. If neither paddle is set, a further four clock cycle delay is initiated, giving a seven character wordspace. I added logic for this to one of the later ZEEKEYS I built, but found it difficult to drive above about 20 wpm. The problem was that if I waited slightly too long between characters in a word, the keyer enforced a wordspace which I didn't want. I couldn't reliably send words without the keyer chopping them up into smaller words. I'd be interested to know whether anybody else shares my feelings about this feature.

My 1977 ACCUKEYER used TTL logic. Later, I also built a CMOS one. The TTL version has never missed a beat, but I and others did experience occasional chip failures with the CMOS version. The ACCUKEYER design is impressive, but the logic is difficult to follow and confusing to debug. If you build one, use sockets for the ICs and try chip substitutions first if it goes wrong.

The autospace feature was included in other published designs. Some had further frills. Paul Horowitz's excellent "VERSAKEYER" published in QST, May 1979, was meant to be the ultimate keyer for everyman. Paul designed this after designing and publishing a very successful Morse keyboard (Compucoder, QST, 1975) and incorporated a lot of its advanced features in this keyer. It had a linear speed control (speed is proportional to speed knob rotation, not bunched up at one end), analogue speed readout, optional iambic and character autospace selection modes, cold switching (with diodes) for RF immunity, sidetone with everything adjustable, a variety of keying outputs, and a receiver muting output with adjustable dropout time. It used 17 CMOS IC's on a board about three times as large as the ACCUKEYER's. Did anybody ever build one?

In the last column (see MM11, p.12) I lauded the positive/negative weighting capability of the Curtis 8044ABM and said that I knew of no other keyer implementing weighting control in this way. The VERSAKEYER (and several other commercial designs for that matter) did have adjustable weighting, but it was not truly digital. All these keyers vary the weighting by changing the mark/space ratio of the clock waveform. Hence varying the weighting is an ANALOGUE ADJUSTMENT (and hence needs initial setting up and may be subject to drift) even though the clock is produc-

ed by a digital oscillator. The Curtis chip, on the other hand, adds or subtracts weighting from correctly ratioed elements and hence must produce perfectly ratioed code when the weighting control is wound to minimum.

I don't think there have been any more fundamental advances in keyer design since the ACCUKEYER, unless I count John Curtis' weighting control - maybe I will. Do you think otherwise?

(This article originally appeared as part of Gary Bold's "The MORSEMAN" column in Break-In, journal of NZART, April 1988.)

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### GIBRALTAR MEMORIES

For almost 30 years, 1930-1958, I was a wireless operator and communication officer in the R.N. and in the mid 1930s was based at Gibraltar W/T, the naval station which also operated the commercial service for Cable & Wireless.

In this respect I became also a GPO wireless operator, operating on the 500 kcs band with a very large area of shipping to cover. During this time I was able to switch from the normal CW transmitter to an old spark transmitter when an SOS or other emergency incident occurred. It certainly silenced all ships and many nearby coast stations when our transmitter was in use and this, of course, was the reason it was employed!

The last time I used this was sometime between 1936 and 1938. Based at the transmitting end at North Front, the instrument was still there when I left for England. The W/T station itself was at Europa Point at the other end of the Rock and there was a land-line lag when the set was in use. You had to listen to what you had sent about a couple of seconds before, as well as concentrating on what you were then sending!

Some of my most interesting contacts while on 500 kcs were the frequent QTCs and TRs with the two German airships. These had a regular schedule between Germany and South America and made contact with us on every occasion. They would frequently pass overhead together, one on the outward journey and the other coming home.

The latter could be seen working its way across the Straits from Africa before reaching us. Frequently each would drop bundles of newspapers and magazines for us. It was a nice gesture but none of us spoke German and only a few could manage a smattering of Spanish. I have been trying to remember the airships' five letter callsigns. I think they were DEKKE and DENNE and to call them both was good fun.

Leslie Herbert-Gustar.

# Post Office Telegraphist

by May Sowter (nee Wilkin)



My introduction to the world of Morse and telegraphy happened, in a way, by chance. It was in 1916, during the first World War, when I was due to leave school at the age of 14 after spending the previous six months teaching a class of infants. Because of the acute shortage of teachers during the war, my headmistress wished me to continue this work, but, quite unexpectedly, I was offered a post as a girl probationer in the Post Office, which I accepted.

I began my duties at the Head Post Office at Camden Town in N.W. London in October 1916. The work was of a minor clerical nature and included distribution of official papers, manning the telephone switchboard and answering the Head Postmaster's bell. I had settled down to this routine when, in spite of the times (the war being then at its height), the Civil Service Commissioners announced an examination for "Female Learners" with no indication of what successful candidates would be required to learn. I sat for this exam and passed, and then found that I had qualified for training as a Post Office telegraphist.

While I was waiting for my appointment a senior official at the Camden Town Office - himself a former telegraphist - took me under his wing and coached me in the use of the Morse code. When he was satisfied that I had mastered the code, he borrowed a spare telegraph set from the instrument room and spent several sessions making me listen to the sounder. As a result, I was not all at sea when I eventually took up my appointment as a female telegraphist. I suspect that I was a wonderful excuse for him to rattle once again the key of which he was a master!

## The Devil's Daughter

I began training at the Central Telegraph Office (CTO) as a learner telegraphist in January 1918. The school was situated on the top floor of the building which was located in Roman Bath Street, London EC1. The first things to catch my eye there were bold posters urging "Accuracy before Speed" and humbler ones bearing the plea "Don't Guess"! I was one of a party of eight new entrants. We were told at the outset that we would spend one hour each morning and another in the afternoon working in the Galleries (as the various Divisions of the CTO were called) collecting telegrams as they came off the circuits and taking them to the circulation table for onward transmission. Always there was an air of desperate urgency, maintained by two supervisors - one of whom was known to us as the "Devil's Daughter"!

The rest of the day was spent in the school where we were taken in hand by two capable instructors, who first of all stressed the importance of poise and looseness of wrist, which they explained were essential for correct manipulation of the Morse key.

Later, we were carefully taught to 'send', very slowly, and in due course went on to 'receive', also very slowly. This was done by separating us into pairs, who sent and received between each other, the make-up of the pairs being changed frequently to give variety of style.

For practice, we used simple printed matter, newspaper cuttings, etc., and for figures Stock Exchange quotations and financial reports. From this we progressed, still in pairs, to signalling and receiving specimen telegrams. The acute shortage of paper towards the end of the war made economy in its use essential and we never, ever, wasted any, writing on both sides of the paper and even across the pages on which we had already written.

Being all very young, we were quick to learn and after a few weeks were required to pass a test. In the event, there were four such tests, failure in any one of which would have meant a serious set-back. I had passed my third test and was looking forward to the final when a very serious outbreak of influenza - known at the time as "Spanish Flu" - sent many operators away on sick leave. As a result, busy circuits were unmanned and the school received an unprecedented request for trainees nearing qualification to help man the circuits. I was one of them.

#### Be merciful!

I was taken to one of the circuits, when the overseer explained (by Morse) to the distant office - which I remember was Woking - that I was a learner and asked if they would "please be merciful"!

At first, I was trusted only to send messages rather than risk receiving any, the overseer deciding that we would work "Duplex", with one operator sending and the other receiving - on the same instrument. This method proved to be time saving in busy periods.

Eventually, so serious did the staffing position become, that I was asked if I thought that I could manage both to send and receive on my own. I said that I would try and fortunately managed the two-way operation successfully. This I did for a number of weeks, gaining thereby in both experience and confidence, until the staffing position eased.

I was then required to return to the training school to pass my final test. I remember the overseer, when I departed, looking down at me with a twinkle in his eye and saying "I will mention you in my report to the Postmaster General on Sunday".

I passed the final test and so became a fully qualified telegraphist. As such, I should have remained at the CTO but I opted to transfer to the London Postal Region where I became a Counter Clerk & Telegraphist at Holloway branch post office.

I began work at Holloway as the war ended with the declaration of the Armistice, a day of great relief and joy to everyone. At Holloway I was introduced to the simpler side of Post Office counter duties, continuing my work as a telegraphist for some part of each working day, since branch post offices in those days were telegraph offices also.

I received my appointment as a counter clerk and telegraphist on 17 December 1918. I was later transferred to Kings Cross branch post office. In close proximity to two main line railway stations - Kings Cross and St Pancras - it was a very busy telegraph office. There were then in the area several budding trade unions - one of which is now a mighty giant - a popular daily newspaper and many commercial organisations which gave us a lot of work, both counter and telegraph.

In the telegraph instrument room there were two direct circuits to the CTO over which all telegrams for destinations outside London were sent for onward transmission. At times of heavy pressure we resorted to the duplex method of working referred to previously. Telegrams for London addresses were transmitted over one of two switch circuits direct to the telegraph delivery offices concerned by using an extra piece of equipment consisting of a six inch brass cylinder with a glass top and a plunger on the side which when pressed showed a black and white star through the glass. When the star cleared, the appropriate number of the delivery office was signalled until a reply was received, when the telegram could then be sent.

#### Phased out

I remained at the Kings Cross office on both counter and telegraph work for about twelve years. During this period Morse telegraphy was phased out as the teleprinter replaced it. In addition, a training school for counter work was at last established and I became a member of the teaching staff. This involved instructing the trainees in all types of work carried out at a post office counter and, to supplement this, taking parties out to sorting offices, the Post Office Savings Bank headquarters, telephone exchanges, the Post Office London underground railway and Croydon Airport, then the principal airport of the country from which all air mails were despatched via Imperial Airways.

The counter training school, as it so happened, was located in the CTO building and remained there until, during the second World War, the building was almost destroyed by incendiary bombs in a heavy enemy air raid on the City. This occurred during the night and the CTO staff were employed, at great risk, in the task of disconnecting the telegraphic equipment and conveying it from the blazing building by an underground passage to a main sorting office across the road, which amazingly escaped damage. The counter training school was then removed to another building in Long Lane, London EC1. I remained at the school until I was promoted to a supervising post at a branch post office in East London.

Looking back, I have no regrets at having chosen the Post Office as a career. The learning of Morse was, in itself, a challenge and the transmission and reception of telegrams between offices was always full of interest. It was not always fun, of course, but there were many interesting diversions. For example, on race days at Alexandra Park racecourse I was regularly sent to help cope with the non-stop flow of press telegrams which continued all day until the end of the last race.

I had, too, to attend a Magistrates' Court in the City as a witness in the case of a fraudulent transaction at the Post Office counter - quite an experience but not exactly enjoyable!

Then, on another occasion, during the first World War, I came unexpectedly face-to-face with the then Prince of Wales (afterwards King Edward VIII) and his sister Princess Mary who were visiting the CTO - maybe as a morale booster following damage to the building caused by a bomb during an enemy air raid. The Royal couple, who were in deep mourning for the Russian royal family who had recently been murdered following the Bolshevik revolution, however, passed me before I realised who they were!

On the whole, I look back on my service in the Post Office with satisfaction and pleasure, particularly when I remember the many friends I made in the course of it.

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#### READERS' ADS

##### WANTED

Lionel Bug, Mac Key, or similar. Also any info on L.S. Brach Mfg Co J-5-A flameproof key. All expenses repaid. Jon Hanson, 104 Allington Close, Taunton, Somerset TA1 2NF, England. Tel: (0823) 321187.

Standard socket for Carpenter relay. Tony Smith G4FAI, 1 Tash Place, London N11 1PA. Tel: 01-368 4588.

Eddystone bug and German Novaplex bug. Smiley White WB4EDB, POB 5150, Fredericksburg, Va 22403, U.S.A.

##### EXCHANGE

Book: "Sir William Preece", by E.C. Baker, 1976, as new; also Cigarette cards, Will's "Signalling" series, about 1910, full set. Exchange for other books, Morse relics, ephemera, etc. What offers? Tony Smith, G4FAI, as above.

(Readers' free ads are accepted subject to space being available.)

# REFLECTIONS

## from Uncle Bas-10



### My first ship

Certain events in one's life can never be forgotten. One such event was when I joined the first ship on which I served as radio officer. It happened many years ago but I can remember the details as if it were yesterday. I imagine that when you go to work for a company for the first time, ie, a normal job in a city, you get some sort of introduction, you meet the various people employed there, and are briefed in detail on the new tasks ahead. On my first ship, however, things were completely different.

The vessel, a Norwegian freighter of approx. 6000 BRT, which I discovered after a long and tedious search in a shipyard at Hoboken, Antwerp, was safely and steadily tied up in dry dock. It looked deserted. Obviously no one expected me. Not even a watchman was to be seen. The "welcome committee" I had dreamed about was non-existent.

### Confrontation

It was a Saturday afternoon. Personnel of the shipyard had gone home, naturally, and most crew members, apart from a few individuals, were enjoying the "wild life" of Antwerp. Later, I was informed that the few bewildered gentlemen I encountered when stepping on board for the first time had been "stony-broke" after having spent several nights in town. I confronted them in my new uniform, in the middle of summer, wearing my shining new blue hat and carrying a heavy suitcase containing dozens of white shirts and socks.

The ship appeared a derelict, a rusty wreck. The decks looked like an iron junk yard, and among the rusty cables and dirty ropes stood the new Dutch radio officer in his shining new outfit.

No-one took any notice of me. In fact there was nobody to take notice. It must have been a pathetic sight; a very young and shy boy not daring to take the first step.

### Voices

After some time I saw a dirty individual, walking very carefully to avoid the piles of junk, disappear into some dark alley. Nobody said anything to me. I heard human voices somewhere but it was as if I did not exist.

After a while I decided I had to do something. Very carefully, I climbed a pile of dirt in order to get to one of the entrances which presumably led to the innards of the ship. I found a corridor where it was dark, despite the clear blue sky and sunshine outside. I almost toppled over a small blackish person.

Afterwards I learned he was a fireman coming off duty. When I asked him about the captain's quarters he appeared to be struck dumb. Then after a while he said in very elementary English "You seek capitán?" This was followed by a stream of sound from which I concluded he was a Spaniard and that the captain lived a few decks higher.

### The captain's cabin

To make a long story short, after a difficult search, and still carrying my suitcase I arrived at the captain's cabin. Fortunately, the Norwegian owner from Oslo was on board for a quick visit. If that had not been the case the captain would undoubtedly not have been there.

The old man looked at me in a very strange way. I don't think he was very pleased to see me. After all I was very young and innocent with no experience whatsoever, and "the Norwegian and the English" were still quite unfamiliar to me.

Before he decided to get rid of me and throw me overboard I quickly gave him a letter from the Norwegian Consul in Rotterdam which explained the situation in the man's own lingo.



After reading the letter, his attitude did not change drastically but a small improvement was noticeable. I was asked to come into the cabin, offered a chair, and shook hands, more or less in that order so far as I can remember.

No regrets

After a few glasses of gin (I was not used to that kind of thing at all) the captain decided to put me on the crew list. Probably because there was no-one else to take the job; it must be said that in those days radio officers were hard to come by!

I don't think he ever regretted it, however, because when I signed off several years and many thousands of sea-miles later he gave me a very nice reference/letter of conduct.

Bastian van Es, PAØRTW.

#####

# EDDYSTONE date-code



Since my article on the Eddystone Bug appeared in MML3, a number of readers have been in touch with me passing on impressions, histories and serial numbers of their own S689's. What has emerged is that there are more keys without a number on the underside connecting strip than was first realised. It is possible these keys form part of the remainder of the second production run which was eventually assembled for the deal with Chas H. Young.

Recent correspondence with Cliff Hartles, who was employed by Stratton & Co. at the time, suggests the total number of S689's specifically assembled under this deal, together with the 100 or so distributed normally, may have finally completed the second batch of 250 keys.

Cliff Hartles also confirms that the number stamped on the underside connecting strip was, in fact, a month/year code and production number of the type used on all major Eddystone products of that period. After further correspondence with Bill Cooke the sequence of this date code has finally been resolved.

Space does not permit a description of the date code used but I will be pleased to provide the date for other readers' S689's if they send me the numbers on their keys. (Send s.a.e. Ed.)

Colin Waters G3TSS,  
1 Chantry Estate, Corbridge, Northumberland, NE45 5JH, England.

# HINTS



## on learning the code

1932 STYLE

COLIN WATERS, G3TSS.

While searching through some early amateur radio periodicals, I came upon a short article designed to offer assistance to the raw beginner learning the code. At the time I paid little attention to this and continued with my original search.

As time progressed, the more I thought about the advice given the more I wondered if it would be of interest 57 years after its original publication?

The article was accompanied by a diagram similar to the one shown and was aimed at listeners or those who may not have had any personal contact with an operator who could teach them the International Morse Code.

The diagram is used as follows. Starting at the top line of the chart and continuing down towards and finishing in the square of the character required, one passes through shaded and unshaded areas. The shaded areas are sounded as dahs and the unshaded areas as dits.

E				T											
A		I		M		N									
W	R	U	S	O	G	K	D								
J	P	Ä	L	Ü	F	V	H	CH	Ö	Q	Z	Y	C	X	B

Taking 'K' as an example and starting on the top line, and moving down, we pass through shaded, unshaded and finally back to a shaded area, hence dah-di-dah.

Remembering it is the sound of the character we are required to learn, the student was advised to translate common everyday words into code sounds using the chart as a reference until fluency of the alphabet was obtained.

All characters of up to and including four "parts" are contained in this chart, which could of course be extended to include characters of five or even six "parts", ie, numbers, punctuation and procedure signals, but it then becomes over-complex and its simplicity is lost. The British student would not normally be required to learn the accented letters or the rarely used CH, but these are included here for completeness.

While it is difficult for the modern accomplished code operator to realise how useful this chart may have been to a lone student in the early 1930's, it would be interesting to hear from any MM readers engaged in the tuition of the code today as to the usefulness or otherwise of the chart as a "between lessons" reference for students in the early stages of code recognition.

### Reference

RSGB T & R Bulletin, August 1932.

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### "CATS WHISKER" MORSE PROFICIENCY RUNS

North Cheshire Radio Club puts out Morse Proficiency transmissions at 19.15 hrs (UK) local time on the second Sunday of each month, on 3.600 and 145.250 MHz, and issues the "Cats Whisker Award" to successful participants. Other, planned, frequencies are 1.975 and 144.250 MHz.

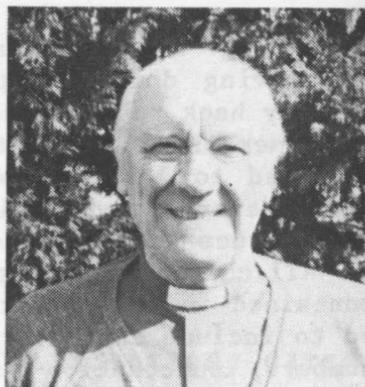
Transmissions last five minutes each at 30, 26, 22, 18 and 15 wpm, in plain language plus figures occurring in the text, and with four types of punctuation ( . , / -). Callsigns at present are GØLEQ or GØBAA.

Practice sessions at the same speeds are transmitted every Sunday. On the second Sunday of the month there is a five minute practice run at the appropriate speed before each proficiency test.

Applicants should send in the script as copied, with a fee of £1.00 (or 3 x IRCs) to cover costs, plus a signed statement confirming that no electronic or other aid has been used to decipher the transmission.

Applications, or enquiries, should be sent to: NCRC Catswhisker, PO Box 3600, Altrincham, Cheshire WA15 9LJ, England.

# The key to identification



Ray Hunting, G30C (SK)

The most unusual Signals unit I knew during WW2 was a group of top-class CW operators who never put their hands to a Morse key.

It was an established fact that the manner in which a wireless operator handled his key was as distinctive as his finger print. In other words, an expert Morseman with sensitive ears could readily identify other telegraphists by the way they used a Morse key.

This specialised skill was put to practical use at certain listening stations in the south of England, where the task was to identify and provide the exact location of German divisions serving in Occupied France. The method employed was actually quite simple. A group of listening operators would be given the call-signs and frequencies being used by the German "X" division. By using Direction Finding equipment in several parts of England, cross bearings would pinpoint the exact location of the divisional headquarters, somewhere in France.

## Careful record

The listening operators had no interest in the coded traffic being passed within the division, but concentrated entirely on the German sending operators who were soon identified by codenames, such as Fritz, Adolf and Herman. A careful record was made of their duty periods, and a roster was formed for the whole 24 hours.

This routine might continue for days or even weeks, then suddenly, a new and unidentified operator came on the key instead of Fritz. This raised the question, "Has Fritz gone on leave, or is he off duty because he is sick?" The listeners concentrated on the next operator to come on duty. If Adolf came on duty as expected, followed by Herman, it meant that only Fritz was missing, and the German signals unit was functioning as normal.

## Constant bandsearch

If on the other hand, Fritz, Adolf and Herman were replaced by unknown operators, it suggested that "X" division had been replaced by another. The wireless band would then be searched constantly until, a day or two later, the old firm of Fritz and company was back in business

on the air. The Direction Finders went into action again and, within the hour, the new location of "X" division was accurately marked on the map.

These listening operators were a rare breed of Morsemen who had no use for a key or a message form, yet achieved great distinction in Military Intelligence.

#####

## Q-CODES

Jack Pemberton, G3DOZ

I have enjoyed browsing through my copy of the MM Q-Z code book - but we used a lot of Q-codes in the RAF in 1942-46 which are not in the MM booklet.

For example: QOZ meaning 'no; negative'. This was very useful in front of another; e.g. 'QOZ QSY' and there was QNW : 'close down'. There were useful Q-codes for 'Yes', 'Use', 'From', 'At', 'Check', etc.

We had Q-codes for general traffic like the Z-codes, ZFA to ZFX. The most common one was QIC 'I have a message for you'. There were Q-codes for:

ZOE 'Give me your message, I will dispose of it'.

ZUH 'I am unable to comply'.

ZIM 'I am unable to use ...'

ZKA 'I am controlling station on this frequency'.

The RAF Q-code book had a blue stiff cover, and I can remember hurriedly trying to pick it up from the floor where I had knocked it while a slick naval telegraphist at the control station in Malta (KT1) was pounding a 30 wpm string of Q-codes into my headphones asking: 'I have not received a reply to my message; what is the reason for the delay; are you flying between two layers of cloud; shall I QRS? Place a competent operator on watch on this frequency.'

I remember that if we sent QAU in the middle of a long watch on a quiet traffic point-to-point channel the code would be understood.

I shall be most interested if there are ex-RAF wireless operators among our readers with a better memory than mine who can fill-in some more of the blanks in the reminiscent MM Q-Z code book.

#####

PSE QRS

Heard on 2 metres. "I am going to send some slow Morse at between 6 and 16 words per minute."

(From Groundwave, newsletter of the Wimbledon & District Amateur Radio Society, March 1988.)

# SHOWCASE



## COLLECTORS' ITEMS AND "HOMEBREW" SPECIALS

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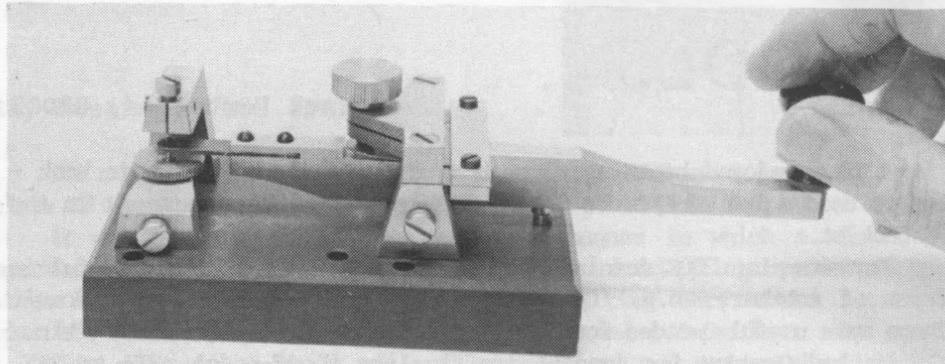


Fig. 1. Swedish army key. This was made for the Swedish army by a number of different contractors, and its contact configuration shows the Ericsson design influence. However, in this model the lever is suspended on a thin, very flexible steel spring, which gives the key a soft, positive feel; a beautifully-made key and a nice one to operate. (VE3FRX)\*

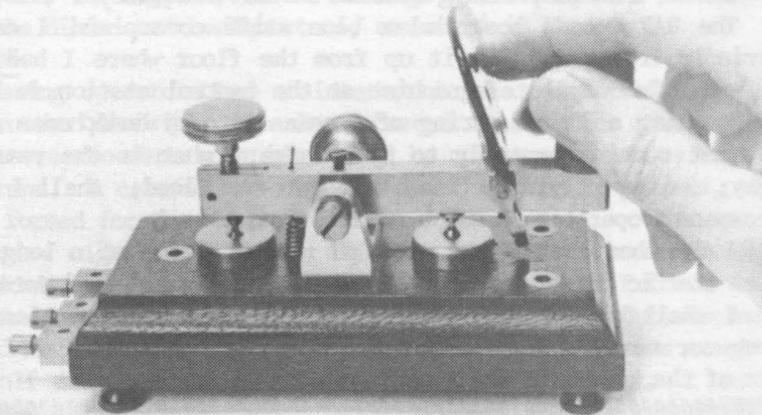


Fig. 2. Early Italian key. There is an extra lever to the rear of the fingerpiece which is pushed out of the way with the index finger when operating; then, when the operator is finished the extra lever makes contact with the anvil, thus acting as a circuit closer or shorting switch. Hence the key could be used for open-circuit or closed-circuit work, with the extra lever removed for open-circuit operation. (VE3FRX)\*

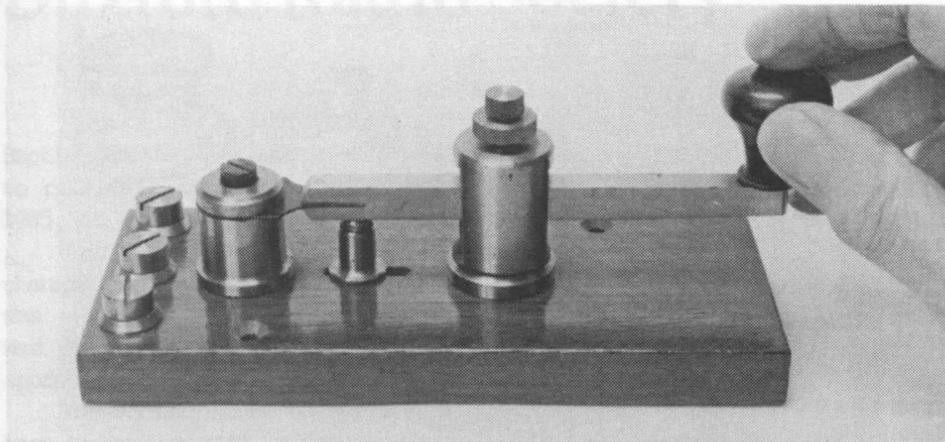


Fig. 3. Key made by the Walters company in England in the early 1900s. The front pedestal contains the upper and lower contacts. The lever is fastened to the rear pedestal by means of a flat spring, and the fulcrum, which is immediately in front of the rear pedestal, can be moved backward or forward to adjust the tension of the lever; this is one of the very few keys with an adjustable fulcrum. (VE3FRX)\*.

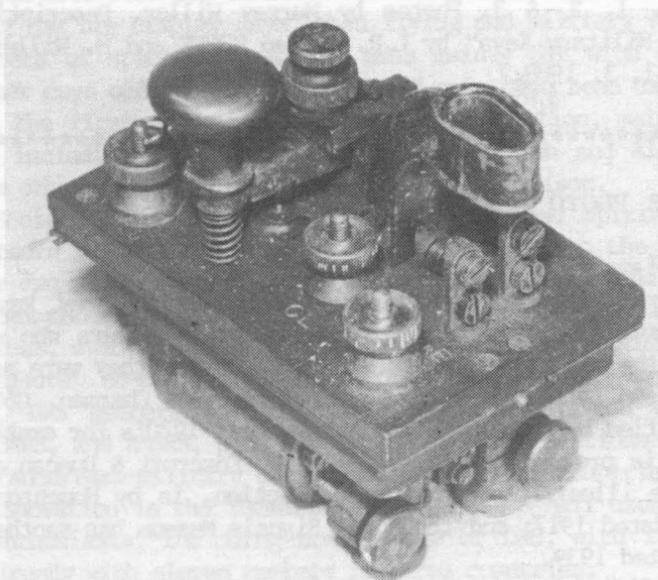


Fig. 4. "Vibrator" key. Small single contact key, mounted on a heavy double metal base with two electrically independent buzzers underneath. Not shown is the 1914 army type telephone handset normally connected to the "R" terminals. Information on this unit welcomed. Collection GØHR.

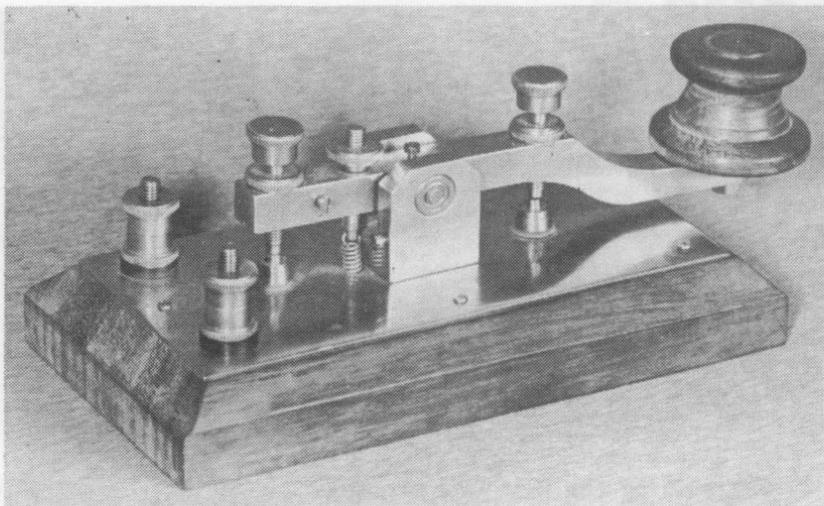


Fig. 5. Hand built in 1987 by Bob Freeman, GØJCW, the lever of this brass and teak 'replica' (based on a photograph of a wartime key) was cast in molten metal. Collection of Larry Robinson, GØHIR.

\*(NOTE: Figs. 1, 2, & 3. Photos by Murray Willer. Descriptions from "Foreign and Military Keys" by L.R. Moreau W3WRE and M. Willer VE3FRX, AWA Review Vol. 3. 1988.)

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#### FRONT COVER PHOTO

#### Key. Dummy. Signallers' MkII (Photo: G4FAI)

This lovely little brass on mahogany British Army key has no electrical contacts and was used for training signallers who relied on the click of the key as the only indication of what they were sending.

It was used by the army over many years. Dud Charman, G6CJ/RAOTA, has one (modified by the late G2UV in the early 1920's for amateur radio work), which is presumably the MkI, made by Foxcroft & Duncan and dated 1902; the one illustrated, from my collection, is by Houghton Butcher Mfg Co Ltd, dated 1917; and the Royal Signals Museum has another (maker not known) dated 1939.

G2UV's modified key can be clearly seen in a photograph of his 1922 experimental station in chapter 7 of "World at Their Fingertips", the history of the RSGB. He used the key until his death in 1981.

If any reader recalls using this type of key in the army or can provide further information about it, please contact me. Tony Smith.

# Duxford Radio Society

AND THE MODERN MUSEUM

The Society originated when members of the Special Forces Signals Section and friends operated a Special Event station at Duxford airfield to celebrate the 40th Anniversaries of D-Day and VE Day, in 1984 and 1985, at the same time putting on exhibitions of war-time radio sets.

Formed as the Duxford Airfield Radio Society in 1986, the name was changed to Duxford Radio Society in July 1989. From 1986, when GB2IWM was issued as the permanent call-sign, co-operation with the Imperial War Museum Dept. of Exhibits and Fire-arms has produced displays appropriate to the Special events for which Duxford is well known.

The Society aims to serve the Museum and the interests of its members by active work in documentation, collation, restoration, occasional operation of historic radio gear on the IWM inventory, putting on exhibitions of IWM and members' artifacts, publishing a Newsletter of activities, articles on specific equipment or techniques, as well as increasing the usage of GB2IWM (by a larger roster of operators).

So far GB2IWM has operated from the Operations Block, behind Hangar 5, used for Fighter aircraft control in WW2, but a more permanent "shack" with more room for exhibits and the Public will be used in 1990.

During the big Display days, when flying and military vehicles draw large numbers of spectators, GB2IWM uses mainly SSB with modern rigs, but on other days old CW only "rock-bound" sets have been used.

While the first priorities are the IWM collection, mainly Army and RAF gear, including American items used by British and Allied Forces, items from other countries are desirable for comparison.

The Society is now seeking to recruit kindred spirits, not only radio amateurs but men and women who can contribute to the aims, either from their own past experience or by cataloguing, research in literature or technical manuals, by translation from the several languages used by Allied Forces, even from Japanese, since IWM has some captured radios.

To ensure co-operation with the established Services radio societies, DRS members have been appointed as Liaison officers for RAFARS, RSARS, and RNARS, plus one for the Signals Sections of SOE, OSS, and Resistance/Para-military organisations in other countries.

One innovation is the formation of a Type B 3 MkII user group (B-2-UG) for enthusiasts, including non-members of DRS, with its own Newsletter, already with eleven members in three countries.

DRS subscriptions are £8 p.a. (UK); £10 for other countries, and include four issues of the Newsletter postpaid. Applications should be sent to Duxford Radio Society, J.I. Brown G3EUR, 74 Humber Avenue, South Ockendon, Essex RM15 5JN, England.

# ALL IN A DAY'S WORK!



"X21 man 35, 5ft 1 comp ruddy slim build. Dress dk suit, blk cloth cap blk boots. Had with him a spade and fork. Carrying sack under arm. Was temporarily employed at 27 Fanholt Rd and broke into house in owner's absence."

"Mrs Dyer, detective at Dickens and Jones is following two X496 and may require assistance."

"X21 2 men both middle age respectable appearance medium height. 1st grey suit 2nd blue suit. Disturbed in bedroom at 26 Lyndhurst Gdns and decamped on foot."

"X580 Hatfield X601 for interrogation by Hatfield Police re death of woman X503 X304 at St Albans Rd Watford this day = (name). Age 30/32 5ft 9 or 10. Slim bld dk hr full face, chin shaven, high cheek bones talks quietly. Walks with slight limp dress darkish grey suit grey trilby hat. Appearance of clerk. Was seen in Watford at 1030 today."

"X442 Walkers Jewellers High St Putney. Burglar alarm ringing."

"X227 Mrs ..... .. Meadow Road X801 1665 that at 1740/25 saw man whose description appeared similar to that described in the mornings papers X306. He appeared to be very agitated."

"X227 that man stating he is an employee of Carter Paterson in the Woodford District offering goods from a van at reduced prices."

"X227 that woman screaming in ... Hurseley Close."

## Illegal

"Enquiries show that index AXV8 is allotted to Rolls Royce = index is apparently illegally in use."

"X89 driver of Royal Enfield m/c combination. At 1450 man was seen to take some vegetable marrows from a field near KY, place them in sidecar and X124 Croydon."

"X21 Man 30 wearing brown suit riding pedal cycle indecently exposed himself to a female at Epping Forest near bathing pool at 0745."

"X21 black 2 ton lorry, tarpaulin on top, Webb on sides which knocked down a boy at North Side Clapham Common failed to stop X577 Wandsworth."

"Persons wanted. 2 women 1st ... (name) age 27 5ft 2, comp sallow, hair and eyes brown, squint in right eye, thick set. Blue dress black shoes. 2nd (name) age 28 5 ft, comp fresh, hair fair, eyes blue, slight bld, lge nose. White dress blue pattern, wearing plimsolls. Mental defectives absconded from Manor Certified Institution."

"X21 single horse trolley X803 men X503 case of tea stolen Brisbon St Bermondsey, last seen X577 over Tower Bridge towards east end = case believed to be covered with a sack."

"X227 that some youths from Essex St Shoreditch intend to break the windows of premises Rose Bros 135 Hoxton St this evening and steal X444."

"X445 from a field at Waltham Rd North Chingford a dark bay pony 12 hands."

"X442 Bute Passage Petersham near Richmond X503 with cycle stopped a little girl and asked her for money."

"In connection with the murder of ..... which occurred during the early hours of Tuesday last at the Palace Cinema Bow Rd, London = X21 of all ranks is drawn to (name given) age 19 5 ft 7, comp pale, hair light brown fairly long with parting at side, eyes brown, long face. When last seen he was dressed in brown suit cream colour shirt with soft collar to match, brown shoes. Seldom wears a hat or cap. Had with him a small new camera = absconded from the East End of London early on the 8th of this month = If this young man is seen he should be detained and a message sent to this office."

#### All in Morse

All the above are obviously Police messages. The interesting thing about them for readers of *Morsum Magnificat* is that they were all sent by Morse code.

They are from the 1934 log of Mr A.J. Nunn who was a police telegraphist. The examples shown were interspersed with innumerable messages about stolen vehicles, rendezvous arrangements and other coded communications.

Mr Nunn joined the Metropolitan Police in 1930 after several years in the RAF as a wireless operator, and eventually found himself using his Morse skills in the service of law and order.



the CID for observation, and were also used for control of demonstrations, or to report the progress of processions or public walk-about by the Royal Family.

There would be one control vehicle receiving reports from other vehicles, whose operators would be instructed by a superior officer responsible for reporting the progress of a procession, etc, through a particular area.

During my service I worked in the Information Room, the Flying Squad, Q-cars, Area cars, and in the transmitter vans. When telegraphy was overtaken by telephony I was transferred to other duties."



" X441 X295 !! GET A REPEAT ON THIS, NUNN! "

The X-codes used in the messages were specially devised for police work. Mr Nunn recalls that X01 was "found abandoned"; X430, "recovered" and X480, "telephone .....". Looking at the messages above it is easy to surmise the meanings of some of the others.

Mr Nunn recollects that the beginning of the end of police Morse came with the first two-way telephony in 1947, and thinks the end finally came about in 1952. In the 1930s he was the licensed operator of a friend's amateur radio station, G3QR, but he has not worked on the key since he was transferred away from police telegraphy.

# P.O.

## OPERATOR'S GUIDE



by GRAEME WORMALD, G3GGL.

About nine years ago I purchased an early Post Office Telegraphs operators' "guide" for £2 in a Birmingham antique and bric-a-brac shop (see illustrations). It was labelled as being a World War 2 radio operators' card!

It is a stiff card (approx 15" x 8"), about the weight of cornflake-packet material. It has been folded in four, probably to put it in an envelope, which undoubtedly accounts for its survival in such good condition. It is obviously original and vintage. At the time I sent a copy to the Post Office Museum at Evesham but it was new to them and they couldn't put a date on it.

There are two facets which could help to date it (accepting that it is post-1870, the start of the Post Office involvement with the electric telegraph). The first is the symbols used for punctuation and procedure, some of which are still current while others differ from those published at the turn of the century. The second is the reference to types of equipment. When, for instance, did the ABC circuit go out of use?

(MM FOOTNOTE. Another interesting aspect of this guide is the definition of spacing in the Rules for Signalling - the equivalent of two dots between letters, and three dots between words and groups of figures - which if used must have been very difficult to read.

Most early references to spacing I have found have three dots between letters and 6 between words (apart from the 1865 Paris Conference which decided on three between letters and 4 between words), so the Post Office must have arbitrarily decided on their own spacing system, unless the card was wrongly printed!

If readers have old books/manuals, etc, containing references to any of these interesting matters, please contact me. T.S.)

# Post Office Telegraphs.

## THE MORSE ALPHABET.

A ■ ■ ■ ■	H ■ ■ ■ ■ ■	O ■ ■ ■ ■ ■	U ■ ■ ■ ■
B ■ ■ ■ ■ ■	I ■ ■ ■	P ■ ■ ■ ■ ■	V ■ ■ ■ ■ ■
C ■ ■ ■ ■ ■	J ■ ■ ■ ■ ■	Q ■ ■ ■ ■ ■	W ■ ■ ■ ■
D ■ ■ ■ ■	K ■ ■ ■ ■ ■	R ■ ■ ■ ■	X ■ ■ ■ ■ ■
E ■ ■ ■	L ■ ■ ■ ■ ■	S ■ ■ ■ ■	Y ■ ■ ■ ■ ■
F ■ ■ ■ ■ ■	M ■ ■ ■ ■	T ■ ■ ■	Z ■ ■ ■ ■ ■
G ■ ■ ■ ■ ■	N ■ ■ ■ ■		

NOTE.—On the needle instrument the dot of the above alphabet is represented by a beat to the left, and the dash by a beat to the right.

## NUMERALS.

1 ■ ■ ■ ■ ■ ■ ■ ■	4 ■ ■ ■ ■ ■ ■ ■ ■	7 ■ ■ ■ ■ ■ ■ ■ ■
2 ■ ■ ■ ■ ■ ■ ■ ■	5 ■ ■ ■ ■ ■ ■ ■ ■	8 ■ ■ ■ ■ ■ ■ ■ ■
3 ■ ■ ■ ■ ■ ■ ■ ■	6 ■ ■ ■ ■ ■ ■ ■ ■	9 ■ ■ ■ ■ ■ ■ ■ ■
0 ■ ■ ■ ■ ■ ■ ■ ■		

## ABBREVIATED NUMERALS

(For use only in the repetition of figures which immediately follows the signalling of the message.)

1 ■ ■ ■ ■	4 ■ ■ ■ ■ ■ ■ ■ ■	7 ■ ■ ■ ■ ■ ■ ■ ■	0 ■ ■ ■ ■
2 ■ ■ ■ ■ ■	5 ■ ■ ■ ■ ■	8 ■ ■ ■ ■ ■ ■ ■ ■	
3 ■ ■ ■ ■ ■ ■ ■ ■	6 ■ ■ ■ ■ ■ ■ ■ ■	9 ■ ■ ■ ■ ■ ■ ■ ■	

Bar of division ( )	■ ■ ■ ■ ■ ■ ■ ■
Fractional bar (—)	■ ■ ■ ■ ■ ■ ■ ■
Signal to be used between whole numbers and fractions	■ ■ ■ ■ ■ ■ ■ ■

Full stop ■ ■ ■ ■ ■ ■ ■ ■	*Underline ■ ■ ■ ■ ■ ■ ■ ■
Break signal (between the address and text, and between text and signature of sender, if any, and for fresh line) ■ ■ ■ ■ ■ ■ ■ ■	*Parenthesis ( ) ■ ■ ■ ■ ■ ■ ■ ■
Apostrophe (') ■ ■ ■ ■ ■ ■ ■ ■	*Inverted „ „ commas ■ ■ ■ ■ ■ ■ ■ ■
Hyphen (-) ■ ■ ■ ■ ■ ■ ■ ■	Understand or completion of telegram ■ ■ ■ ■ ■ ■ ■ ■
Interrogation (?) ■ ■ ■ ■ ■ ■ ■ ■	Rub out ■ ■ ■ ■ ■ ■ ■ ■
Exclamation (!) ■ ■ ■ ■ ■ ■ ■ ■	Go on ■ ■ ■ ■ ■ ■ ■ ■
	Wait ■ ■ ■ ■ ■ ■ ■ ■
	Acknowledgment ■ ■ ■ ■ ■ ■ ■ ■
	Clear of work ■ ■ ■ ■ ■ ■ ■ ■

NOTE.—The signals marked \* are sent before and after words so treated and are counted as one additional word. See back.





THINGS WERE A LOT QUIETER



# IN THOSE DAYS

Gus Taylor, G8PG

Did you know that in 1933 there were less than 300 amateur stations in the whole of the USSR? And that the 5th District, then U5 and now UB5, contained only 23 of them? Actually, post-war UB5, the Ukraine, was the only area to retain its original numerical prefix.

In the 1930's Siberia, now UA9/UA0 was the first District, U1. The Moscow area used U2, and the Leningrad area U3 (now UA3 and UA1 respectively). The 4th District covered the Volga Departments, the 6th North Caucasus and the 7th South Caucasus. The 8th District was Uzbekistan, and the 9th Bellorussia.

Each of these used the district number prefixed by "U" in its call-signs. This era was also pre-Box 88, the QSL bureau being via S.K.W. Ipatievsky per 14, Varvarka, Moscow. It was just as easy to QSL direct, however, many stations had full postal addresses listed, and others were listed as being via their local branch of S.K.W.

Some of the addresses were pretty romantic sounding. Typical examples are UIKAQ, "Expedition of Sabiakol Oloviannaia Geological Party, Okrug"; UK1KAZ, "Gold Union", Sretensk; UK1KAX, "Nauchno-

S. M. SOKOLOV, 3 Crasnoarmeiskaj 58/a, Smolensk

SKW

U.S.S.R.

SKW

TO G8PG <sup>CW</sup>UR FONE ON 12/1 1935 AT 2/50 GMT. f M.C.RST 068  
CARD

# U 2 N E

VY TNX FR QSO! HPE CUAGN! 73 ES DX OM! *Vy txs for QSO*

PSE QSL TNX! TX C.C. 250 W. INPUT. RX 1-V-2 KUB4

DX 100 COUTR. ALL CONT. 7-14/28 MC *1/5 cont.* OP. *Sokolov*

promysolovaia Expedition of Sibtorg". These were all club stations, the "K" being used as now, but there were many private stations in Siberia, ULBZ, operated by Gleb B. Pentegoff of 17 Maltsevski Street, Vladivostok, being an example.

Readers will note that there is no mention of UP2, UQ2 and UR2. At that time Latvia (prefix YL), Estonia (ES), and Lithuania (LY), were all independent republics. It was only after WW2, following Russian/German/Russian invasions and terrible sufferings for their people that they were incorporated into the USSR. ES stations were unlicensed in 1933 but there were about 5 active. A similar situation existed in YL, and LY, which did issue licences, had 5 licensed amateurs.

On a personal note, in the summer of 1941 I found myself most unusually combining the jobs of Radio Officer and gunnery officer on the Estonian ship "Kalev" which having been taken over by the British had retained her Estonian Master, Captain Lepviikmann, and her other Estonian officers.

As they had no belligerent status, and their families in Estonia were under German occupation at the time, the Estonians obviously could not risk reprisals on their families by actually firing at attacking German aircraft or E boats, much as they would have liked to do so!

Captain Lepviikmann offered me the job at 1000 hours one morning, and although I had until then never fired anything bigger than an air rifle, I accepted; one gets tired of being battered down in the radio room while things are going bang all around. At 1800 hours that evening I was actually firing a machine gun at a German bomber, being rather more scared of the former than the latter!

A few crash sessions with the DEMS training organisation soon put that right, however, and my gunners (3 R.N. and 2 Maritime R.A.) and myself soon settled down as a very united team. This paid off one gloomy winter evening off Flamborough Head, when our combined fire damaged and drove off a German bomber which would otherwise have sunk "Kalev". I still have fond memories of my Estonian fellow officers, and particularly of Captain Lepviikmann, the best seaman and one of the best men I have ever served under.

\*\*\*\*\*

PARDON?

Heard on 2 metres (FM). "This is a slow Morse broadcast on behalf of the RSGB. Could someone give me a signal report and tell me which day of the week it is?"

(From Groundwave, newsletter of the Wimbledon & District Amateur Radio Society, July 1987.)

# BUG KEYS

## on official circuits



In the mid-fifties I was employed at Germiston near Johannesburg, at the Civil Aviation Aeradio station (ZTG). There were mostly telex circuits to internal centres, and RTTY was starting up. However, there were several Morse circuits to Central Africa as well as air to ground. Radio was also used as a standby, the telex lines being somewhat unreliable over long distances.

There were also several receive only positions where weather broadcasts were copied. These were known as AFMET broadcasts and supplied information to compile synoptic charts and analyses. We sent long weather messages to Kinshasa, in standard 5-figure code, which were most boring not to say heavy on the wrist.

Unfortunately it was not possible to clip my bug across the official hand pump as the keying circuit to the remote transmitters was "double current". This system used three wires and both upper and lower contacts of the key. The Superintendent would not hear of us using anything other than the official key.

Night shift has always provided the chance for mischief and this was no exception. We constructed a little box containing a battery, double contact relay and the necessary crocodile clips. It worked a treat. The bug was set with extra long dots so that it sounded more like a straight key as we knew the old Supt. had a habit of listening in at home to check up on us youngsters.

What a difference it made to those endless nets. Eventually we did let the Supt. into the game and although he was dubious at first he came round and allowed us to use the box and bug. Barrie E. Brokensha, ZS6AJY.

+++++

### SUBSCRIPTIONS - a reminder!

With immediate effect all subscriptions should be sent to Morsum Magnificat, 8A Corfe View Road, Corfe Mullen, Wimborne, Dorset BH21 3LZ, England. See p.8 for more details. Cheques, etc, should be made payable to "G.C. Arnold Partners".

# Workshop-made straight key

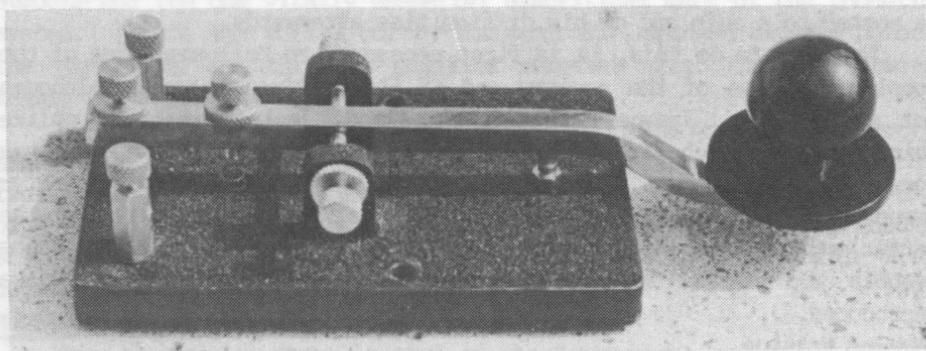


William P. Wilson, KØCDJ.

The photograph shows a straight key which I designed and which my father constructed on his metal lathe recently. Although he normally spends his time constructing live steam and gasoline models I was able to persuade him to fabricate this key for me.

The 3" x 5" base is made from  $\frac{1}{2}$ " steel plate and painted in black wrinkle. The bottom of the base has a milled slot to accommodate a wire connecting the contact with one of the binding posts (terminals). The pivot posts are also steel, mounted to the base by screws and loctite prior to the painting of the base.

The hardware is made, for the most part, of brass; the main lever being a piece of 5/16" stock. The binding posts are fashioned from hex stock, and all adjusting screws are made of steel with knurled brass heads.



The silver contacts were taken from an old relay and then soft-soldered onto the hex stock pillars. The knob assembly comprises a surplus ball knob, a spacer and a lower skirt of opaque plexiglass (cut on the lathe), all on a threaded shaft.

Because of the rather substantial knob and the weight of the key, as well as the fact that the key is about the size of the average bug, it has a very solid feel with the point bearings allowing an extremely smooth movement.

# THE JAPANESE OPERATORS' DIFFICULTIES



An Explanation of the Complex Japanese Telegraph Code.

(from "Modern Wireless", Dec. 1924)

Many an exasperated operator in the Pacific, cooped up in his stifling wireless cabin on a hot and sultry tropical night, has torn the 'phones from his aching and perspiring head almost with feelings of murder in his heart at being hopelessly jammed by a nearby Japanese ship sending what appears to be an inextricably muddled series of signals quite incomprehensible to any of the Western nations. Little does he realise the difficult lot of the Japanese operator who is making his life unbearable.

## The Japanese Alphabet

It is the object of this article to present in an interesting manner the tremendous obstacles which have had to be solved before telegraphic transmission of the language of Japan was possible, and to give some idea of the severe training undergone before the Japanese operator is posted to a ship and of his difficulties afterwards.

In order to do this, it is first necessary to tell something of the complex language of the country and of its writing systems. Although not strictly so, Japanese writing is almost letterless, and, unlike Chinese, from which modern Japanese has largely been derived, it has been developed into a phonetic system of syllables denoted by forty-seven symbols and twenty-six diacritical marks. Fortunately, of the latter only one is absolutely essential for telegraphing. Using these symbols and marks, all Japanese sounds, and hence words, can be reproduced.

## Complex Writing

This system is only one of the many methods of writing used in the country, and although despised by academicians, is used in many publications, since by its means it is possible to express foreign terms and scientific meanings which cannot be made clear by any of the other writing systems. Hence it follows that this is the only form of writing which can possibly be telegraphed.

The Japanese operator has also to understand and be able to translate into the phonetic system another form, largely derived from the Chinese, which has from three to six thousand roots and can only be written, being unintelligible when spoken.

イ	ee	ワ	wah	ヰ	wee	サ	sah
ロ	row	ク	kah	ヱ	no	キ	kee
ハ	ha	ヨ	yo	オ	oh	ユ	you
シ	nee	タ	tah	ク	too	ナ	zay
ホ	hoe	レ	ray	ヌ	yah	ニ	mee
ヘ	hay	ン	so	メ	mah	ツ	shoo
ト	toe	ツ	tsu	ケ	kay	エ	ays
チ	tchee	フ	neigh	フ	too	ヒ	shoo
リ	ree	フ	nah	コ	kwe	モ	mohe
メ	new	ラ	rach	イ	ach	セ	zet
ル	roo	ム	moo	テ	ray	ソ	soo
ヲ	wawk	ウ	vgh	ド	o.i	ソ	n

Morse Symbols for Japanese Alphabet and their Approximate Pronunciation.

From the complex methods of writing previously mentioned it will at once be seen what a difficult problem had to be mastered before the introduction of telegraphy was an accomplished fact. Combinations of dots and dashes had to be found adequately to express the forty-seven symbols and the one vitally essential diacritical mark of the phonetic system. A code was worked out by European and Japanese experts before the year 1900, but this was modified somewhat after the war between Russia and Japan.

The resultant code is consequently a difficult one, since forty-eight letters or symbols have to be expressed, as compared with the twenty-six of our own alphabet. This, of course, necessitates the use of a number of long groups of dots and dashes, as there are not enough short ones to go round; no less than eighteen groups each contain five dots and dashes.

#### Morse equivalents

The illustration shown is that of the forty-eight phonetic symbols, with their Morse equivalents and, as far as is possible, their approximate pronunciation. Of these symbols two sound exactly alike when spoken, but are written and used differently. As an example, the translation of a simple telegram into Japanese is given. The "love and kisses" has been seriously altered, making the translation very tame, as even mention of kissing is thought highly improper in Japan.

#### Japanese Operators' Hard Lot

From these remarks you will gather that the lot of the Japanese "Sparks" is not an easy one when compared to that of his British

counterpart. Again, the Japanese language is absorbing new words and ideas from the Western nations, making for an increase in the number of symbols and marks needed clearly to express these. Eventually this may compel an extension being made to the existing telegraphic code. The operator must, of course, be capable of translating and telegraphing the common, polite and Chinese-derived writing systems, of which the latter is in some cases capable of several interpretations determined merely by position.

*"Home Friday. Love and kisses. Mary*

<i>Home</i>	<i>Friday</i>
<i>tsu - koo</i>	<i>keenyo</i>
ツ    7	フ   ヨ   3   7
.....	.....

<i>Love and kisses</i>	<i>Mary</i>
<i>Yo - ro - shee - koo</i>	<i>Hannah - ko</i>
ヨ   12   ツ   7	ハ   フ   コ
.....	.....

This Message in Japanese reads "Friendly Compliments."

Good Education Necessary

An exceedingly good general as well as technical education is a necessity for an operator. There are many cases where the students, not being attached to military or naval schools, are forced to work long hours to pay for their tuition; and this, together with the strain of overstudy, is largely responsible for the high percentage of tragedies among the technical students in Japan. Faced with hunger and overwork, a number end their troubles in suicide.

The students who succeed in passing the strict examinations imposed are granted, in most cases, a second-class commercial licence by the Government. A first-class certificate is usually competed for after two years or so at sea, and to gain this the operator must be able to send and receive a hundred symbols a minute and at twenty words a minute in English in the Continental code, as well as have a sound knowledge of wireless law and theory.

Comparing conditions between Japanese and American operators as far as pay is concerned, there is not a great deal of difference, but in

status the Japanese is regarded much more favourably. He is one of the genuine officers in the ship, and dines with the captain and chief engineer in the first-class passengers' saloon, mixing with the latter freely. The American operator, on the other hand, even though he is a chief, is rated below the third mate. The position of the Japanese operator when on board is one of unusual authority. Under certain conditions his position is unassailable by even the captain or the owner of the vessel. He is a naval reservist, and responsible only to his Government with whom he keeps all his records and accounts.

### Equipment

A few words regarding the usual equipment to be found on Japanese ships may be of interest here. In the majority of vessels this is of an obsolete type similar to the Telefunken sets of fifteen years ago. The transmitters are seven-kilowatt type, direct-coupled and using the quenched-spark system. Although so old, they are usually in magnificent condition, as the operators regard it as a labour of love to look after them; whilst anyone who has listened to them in the Pacific can vouch for the great strength of their signals.

In Japan all wireless apparatus is built, installed and used under the strictest Government supervision, and transmitting by amateurs is not allowed except in the case of one or two powerful newspapers. Receiving is also illegal, but in the near future it is expected that receivers for broadcasting will be allowed to be used, subject to a number of restrictions.

We are indebted to the American journal "Radio" for much of the above information about the Japanese Morse Code.

British students learning the code should feel lucky that they were not born in the land of the Rising Sun!

### TIME MOVES ON!

Less than twenty years after the above article was written, Allied radio operators, in WW2, were faced with the task of intercepting Japanese radio traffic for the benefit of the Intelligence services.

Few, if any, of these ops actually knew Japanese or the Japanese code. Thanks to an ingenious double-conversion system, however, it proved possible for the Japanese signals to be taken down mainly as English letters and these were then translated into the phonetic language described in the 1924 article.

The original article described a system of forty-eight symbols, while forecasting future extensions to the code. The list used by the Allied ops contained seventy-four letters, plus seventeen procedural signals, so it appears that the anticipated expansion of the code did take place. Some examples from the Allied list are illustrated overleaf

<u>Signal received</u>	<u>International Morse</u>	<u>Written as</u>	<u>Translated as</u>
•	A	A	I
••	AA	AA	RO
•••	B	B	HA
••••	C	C	NI
•••••	F	F	TI
••••••	LT	L̄	WI
•••••••	UT	U <sup>l</sup>	NO
••••••••	AW	∧	TE
•••••••••	TL	TL	KI
••••••••••	XT	X <sup>l</sup>	YU
•••••••••••	AR	+	N

Examples from the WW2 Interceptors' List. See p.45.

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**FUN WITH DX PILE-UPS: AS SEEN FROM THE RECEIVING END!**

....Since there is not a great deal of CW operation from 5N, if you call CQ on CW you will be greeted by an over-exuberant response. I have counted as many as one hundred stations answering my CQ. This is quite an unmanageable number for the newcomer to CW pile-ups. There are some things that you can do to have quite a bit of fun on CW.

1. Rather than call CQ, tune higher in the band and look for a CQ from a station calling at a comfortable speed for you. Answer his CQ by sending his call two or three times and your call only once.
2. Try and engage the station in a real QSO, rather than 599, QSL via.... 73 AR. As you participate in more QSO's you will find that your effective CW receiving speed will increase as if by magic.
3. ....never, never, send faster than you can comfortably receive.
4. If you do get involved in a pile-up, do not answer the stations that use undisciplined procedure, ie, those who call you before you are finished with the QSO in progress. Do not let yourself be badgered into a QSO, maintain complete control of the group of stations on the frequency. If the situation begins to get out of control, just standby for a few minutes and then continue with the next station. The whole idea is to have fun and to improve your skills. K7UU/5N8.

(from QRZ-5N, Oct 1985, magazine of the Nigerian Amateur Radio Society).

# AERIALS FOR SUBS - I

by CHAS CLAYDON, GM4GNB (SK).



I read an article recently in a radio magazine. It warned hams not to put up kite antennas in thundery conditions. That struck a chord of memory. In 1932 I was serving in an 'O' Class submarine, based on Hong Kong. In company with another boat of the same flotilla we were detached under orders to proceed to the port of Swatow. Diving and other operational exercises were to be carried out en route and on the return journey. Swatow is roughly two hundred miles from Hong Kong and famous for the manufacture of all kinds of pewter articles.

Ours was a large modern boat with a comprehensive W/T installation which included a rotating loop D/F system. A hefty brass telescopic mast weighing three tons could hoist the main aerial yard forty feet above the waterline. The antenna was centre-fed, with twin legs each two hundred feet in length.

We sailed early one morning and proceeded to the diving area. Late that afternoon we surfaced and set course for Swatow. The weather suddenly worsened with a strong northerly wind and a rising sea. We were rolling so heavily that the captain ordered the mast lowered to the 'diving' position.

W/T contact with the parent ship was lost. A 'storm' kite, of considerably smaller dimensions than the 'fair weather' variety, was launched, in order to send a position report. Murphy's Law was in abeyance that day and the kite rose smoothly to the prescribed height of 400 feet and vanished into the low black clouds. Wearing the mandatory leather gloves, I kept the strain on the kite wire while the other telegraphist detached the bronze clip marking 400 feet, from the wire left on the drum of the winch.

Before I could mate it with the clip attached permanently to the central copper conductor of the deck insulator I experienced a severe shock and let out a scream that would have done credit to the Bride of Frankenstein. I don't know for the life of me, how I managed to hang on to that kite and draw the two clips together, but I did.



... CREDIT TO THE BRIDE ...

I was probably inspired by the fleeting thought of making an appearance at the Defaulter's table, charged with losing Admiralty property and trying to explain the phenomenon of static electricity to an unsympathetic submarine captain.

Still paying homage to St Vitus, I climbed down to the bridge decking where my unfeeling comrade was laughing his head off. After we reeled the kite in, he preceded me down the conning tower ... still laughing ... until I trod on his fingers ... quite accidentally, of course!

#### FINE SUPPORT FOR CW

Although having no dedicated CW operators in its own ranks, the Crowborough and District Amateur Radio Society is to be congratulated on sponsoring and funding an entry in the RSGB's 144 MHz CW contest on 4th-5th November 1989.

The club invited 8 top fists in the county to participate as guest operators, and every invitation was accepted. A caravan with all necessary radio equipment and remote control antennas was provided and located on a site in Ashdown Forest by special permission of the Conservators of the Forest.

(Information from Jim Harris, G4DRV, RSGB Liaison Officer, East Sussex.)

March 20, 1886.]

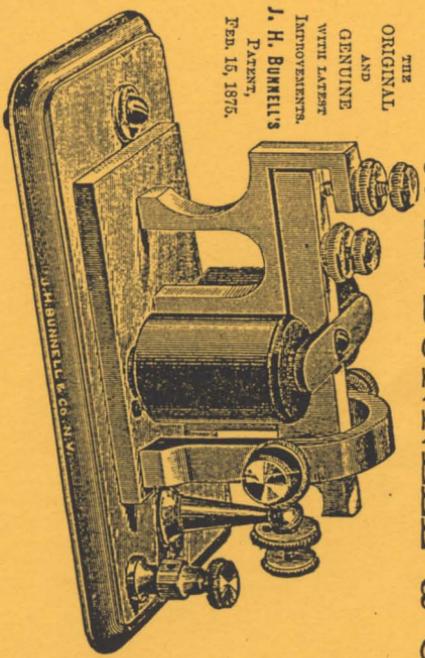
JOURNAL OF THE TELEGRAPH

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J. H. BUNNELL & CO., NEW YORK.

THE GIANT SOUNDER—UNEQUALLED! \$3.50.

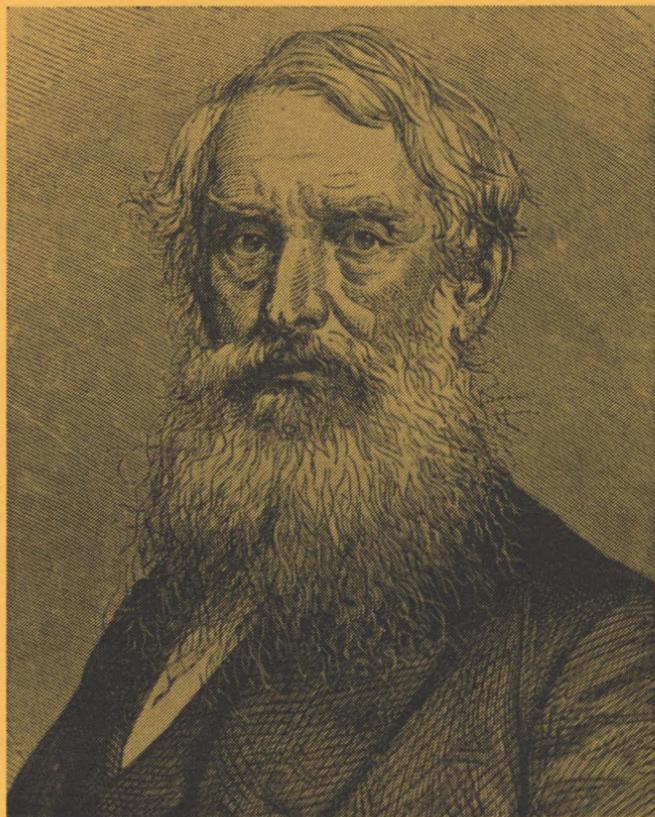
THE ORIGINAL AND GENUINE WITH LATEST IMPROVEMENTS. J. H. BUNNELL'S PATENT. Feb. 15, 1875.



We call attention to the fact that we are making these unrivalled Sounders, our own original invention, with our latest improvements added, at a lower price than has ever before been reached. Every Sounder warranted first-class in all respects, and with loud and clear tone. Price, \$3.50, carefully boxed and sent by mail, prepaid, to any part of the United States.

EXCHANGE OF SOUNDERS.

We will exchange our new, first-class, highly finished Giant Sounders, as here shown, for old, worn-out and otherwise inferior or worthless Sounders, for a cash difference of \$2.33. The old Sounders must be delivered to us, prepaid, by mail or express. If sent by mail, writing of any kind must not be put inside the package, and it must not be sealed, otherwise full letter postage will be charged, and we cannot receive it. Now is the time, while this offer holds good, to get new ones for old, worn out and poor Sounders, which consume every year far more battery material than they are worth, and give poor service at that.



Samuel  
Inley  
Greene  
Carse