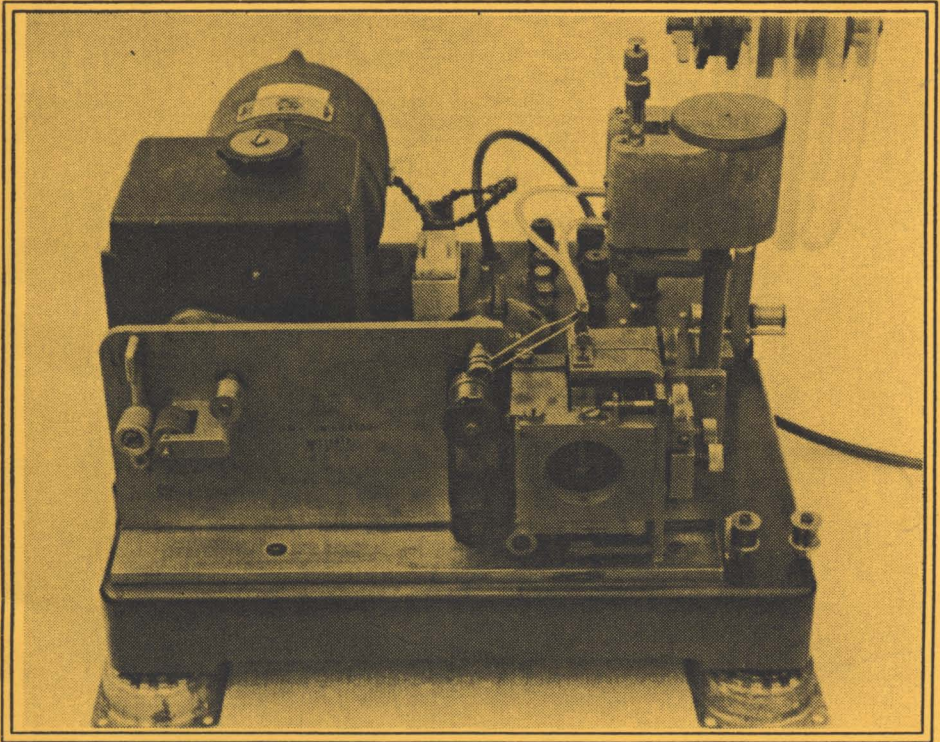


Number 23 – Easter 1992

# Morsum Magnificat



*The Morse Magazine*

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# Morsum Magnificat

*the Morse Magazine*

*MORSUM MAGNIFICAT* was first published in Holland, in 1983, by the late Rinus Hellemons PA0BFN. 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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**EDITORIAL AND SUBSCRIPTION OFFICES:**

Morsum Magnificat, 9 Wetherby Close, Broadstone, Dorset BH18 8JB, England.

Telephone: Broadstone (0202) 658474; International +44 202 658474

**EDITOR** Geoff Arnold G3GSR

**CONSULTANT EDITOR** Tony Smith G4FAI, 1 Tash Place,

London N11 1PA, England. Tel: 081-368 4588

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**ON OUR FRONT COVER**

A GNT Undulator in working condition.

Photo by Dennis Goacher G3LLZ

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# Comment

**F**IRST OF ALL, AN APOLOGY to all of you who were confused by the fact that they hadn't had a Christmas issue of *MM*. I don't quite know how it happened, but when I was laying out the front cover of *MM22*, I called it 'Spring 1992' instead of 'Christmas 1991'. To get things back in step again, I've called this one 'Easter 1992', and the next issue, due out at the end of July, will be called 'Summer'.

In response to many requests from readers over the past year or so, I am pleased to be able to tell you that binders for *Morsum Magnificat* will be available within the next couple of weeks. Each binder will hold two years-worth of *MM* – that's eight issues. For further details and prices, see the announcement on page 36 of this issue.

The new 'MM Bookshelf' service which was launched in the last issue has proved to be very popular with readers. As I feared might happen, we rapidly ran out of some titles, and I hope that those of you who had to wait for books as a result enjoyed them when they did arrive. We now have stocks of all the books, and can fill your orders by return.

In this issue, two new titles are added to the list – neither of them connected with telegraphy, I'm afraid, but for anyone whose interests extend into the wider field of wireless history they will be fascinating. We are expecting some new telegraphy titles from the pen of Tom French towards the end of 1992, and I'm sure that they will be of great interest. We shall also be keeping an eye open for books on telegraphy from any other sources.

*Geoff Arnold*

G3GSR

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# News

## New ISWL Publication

THE INTERNATIONAL SHORT WAVE LEAGUE has recently published a useful 25 x A4 page reference booklet, *Standard Frequency and Time Signal Stations of the World*.

Chapters cover (a) an explanation of the various time systems; (b) transmission systems used; (c) standard frequency and time signal stations in frequency order from 16kHz to 22.536MHz and from 95.00 to 171.13MHz; (d) callsigns in alphabetical order, including location and frequencies, and (e) countries in alphabetical order, with frequencies, transmission times, addresses, systems used and QSL card policies.

Priced at £1.75 or 3 x IRCs post-paid, this well set out and helpful publication is available from ISWL HQ, 10 Clyde Crescent, Wharton, Winsford, Cheshire CW7 3LA, England.

## Telegraph Grade Abolished

THE TELEGRAPH GRADE in British Telecom was finally abolished at the end of March 1991, 151 years after the provision of the first commercial telegraph circuit. Delving into the history of the Telegraph Service shows how important a role it played in the development of telecommunications.

The first commercial circuit in 1839 preceded the first telephone exchange by 40 years exactly. In fact the first transatlantic telegraph cable was laid 23 years before the opening of the first telephone

exchange, and telephone cables did not go transatlantic until 1956.

Until the 1970s telegraphists were trained to use Morse code and also to read the Murray code, the five unit system punched as holes in paper strips. These skills became obsolete in the 1980s as systems were replaced. All work is currently undertaken on VDUs but now the two remaining telegraph grades, Telegraphist and Telegraph Executive 'C' are to be abolished after agreement between British Telecom, the UCW and the CMA.

*From The CTO Veteran, official organ of the Central Telegraph Office Veterans Association.*

## World QRP Day

JUNE 17 IS DESIGNATED annually by the International Amateur Radio Union as World QRP Day. It is not a contest. The idea is simply to try working with low power.

Many QRP stations will be heard on the amateur bands using typical power levels from 5 watts output down to milliwatts. High power stations are asked to avoid interference to these QRP stations or, better still, to reduce power themselves and join in the fun!

## Europe for QRP Success

THE FIRST Europe for QRP Weekend, organised by the G and OK QRP Clubs (UK and Czechoslovakia), held last September was a great success. No fewer



than 50 logs were received from 14 European and 3 DX countries and all leading stations received certificates from the G-QRP Club.

Many useful comments were received from entrants and these, together with the massive political changes in eastern Europe, have led to the rules being re-drafted for the next event which will take place on 2-4 October 1992, when it is hoped there will be even greater participation from low power stations both within and outside Europe.

*Report from Gus Taylor, G8PG, on behalf of G-QRP Club and OK QRP Club. (For further information about the G-QRP Club, see Club Profile in this issue. - Ed.)*

### **RNARS QRQ Transmissions**

THE ROYAL NAVAL Amateur Radio Society's Morse proficiency transmissions were originally established in 1963 with Creed and GNT Morse auto heads keying a KW Viceroy transmitter into a trapped dipole, and monthly QRQ runs have continued almost without failure up to the present day.

Nowadays, the Morse autos have been replaced by a BBC Master computer with software specially developed for RNARS by GMOLEG, keying a Kenwood TS-830 plus Heatherlite linear into the trapped dipole.

Transmissions take place on the first Tuesday of each month on or near 3.520MHz at 2000 UK local time. A preamble transmitted at 15 wpm gives all information required to enable would-be readers to send in their entries and (hopefully) qualify for their certificates. The second part of the transmission consists of plain language text, including

spelt out punctuation, at speeds of 15, 20, 25, 30, 35 and 40 wpm, with each speed transmission lasting three minutes.

After a repetition, at 15 wpm, of the salient points of the preamble an RNARS news bulletin is transmitted, again at 15 wpm, which also provides useful practice at the lowest qualifying speed.

One hundred percent copy at 15 or 20 wpm qualifies for the RNARS Code Proficiency Certificate and stickers are awarded for higher speeds up to 40 wpm. The certificate must be gained at 20 wpm before stickers can be issued.

A charge of £1.00 sterling, or the equivalent in IRCs, is made to cover the cost of certificate, postage and packing. The speed stickers cost just the price of a self-addressed envelope.

Since 1963, nearly 1600 certificates and many speed stickers have been gained by readers throughout the United Kingdom and in nearby parts of Europe. The RNARS QRQ Manager, Mike Matthews G3JFF, looks forward to many more applicants taking part in this popular service which is available to all radio amateurs, whether members of RNARS or not.

*Information from G3JFF on behalf of RNARS.*

### **Morse Day at Locust Grove**

THIS YEAR'S MORSE DAY EVENT arranged by Poughkeepsie Amateur Radio Club will be held as usual at Samuel F.B. Morse's country home, Locust Grove, (Young-Morse Historic Site) in Poughkeepsie, NY, on May 23-24. Look out for station K2KN operating mainly CW over most bands on both days. In addition to the multi-dipoles normally used, the station this year will

have a three-element Yagi tri-bandier beaming east in the hope of attaining more DX QSOs than in the past.

There was great public interest in the station during last year's (bicentennial) celebrations with visitors crowding almost shoulder to shoulder between the operating positions.

Multiple ear-phone jacks were provided for visitor's use, club members versed in CW and 'Ham lingo' acted as tour guides and, as can be seen in the photo, Prof. Morse himself was present at the celebrations! Portrayed by Dick Whatham K2JXU, the Professor is always a big hit with the visitors, and Dick himself enjoys playing the part.

*Contributed by Don Stein W2PTF, Wappingers Falls, NY.*

### Duxford RS Re-inaugurated

At a re-inaugural meeting held at the Imperial War Museum's historic Duxford Airfield on 8 March 1992, the Duxford Radio Society adopted a new constitution with the declared aim of supporting an international interest in the history of military radio, including all armed forces, para-military and clandestine (Resistance) groups; assisting in the provision of an exhibition of radio equipment at Duxford; and operating an amateur radio station at the museum, using both modern and historic equipment.

Specially adapted accommodation (visitors will find this next to the Gibraltar Gun) has been provided by the museum which will feature an exhibition of equipment later this year with permanent public access. Additionally, it is aimed to have amateur station GB2IWM (or other call as appropriate for special events) operating every Sunday during the main season with public access whenever it is staffed. The Society's own call is G0PZJ.

The purpose of the exhibition and station is to increase public

awareness of the important role played by radio in war-time operations and, hopefully, to make contact with many people, whether radio amateurs or not, who can help in the achieving the aims of the Society either from personal experience and knowledge of historic equipment or from a special interest in the subject.

Active members of the Society are also members of the Duxford Aviation Society, with various privileges, including unrestricted access to the site, while distant or corresponding members, including overseas members, are also welcome.

There are a number of regular special events/flying days, etc., planned by the museum for 1992, and a special highlight in September will be the 50th anniversary of the American Air Force's use of Duxford airfield during WWII. Many American visitors are expected for this



*'Professor Morse' at Locust Grove, 27 April 1991*

*Photo by Dick Whatham K2JXU*



occasion, including many (ham or not) who will undoubtedly be interested in the Radio Society's activities.

President of the Duxford Radio Society is John I. Brown G3EUR and its Chairman is Dick Pope G4HXH. Further information about all aspects of the Society, including classes of membership, can be obtained from the Secretary, Mrs B.I. Pope, 95 Northolt Avenue, Bishop's Stortford, Herts CM23 5DS, England.

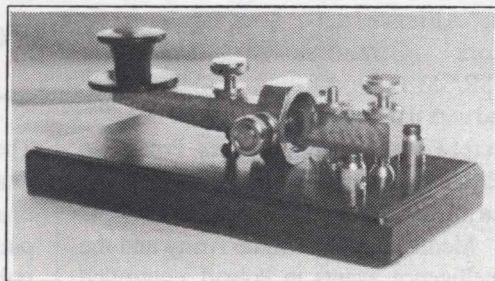
### New Hand Key

A new ready-assembled hand key has been introduced by L-E-M Moulds, a precision engineering company based near Blackpool. Featuring a massive brass beam and trunnion, with solid silver contact points 0.040 inches thick, it has adjustable single-ball gimbal bearings which are claimed by the makers to be immune from any 'lock-up' due to ingress of dirt or grit which might occur in a miniature ball race.

The price, from 1 April 1992, is £37.95 plus £1.55 p & p. Callsign engraving £5.00 extra. Enquiries or orders should be sent to L.E.M., 'Springfield', Staynall Lane, Hambleton, nr Blackpool, FY6 9DR, and cheques should be made payable to 'G.H. McQuire'. Allow 28 days for delivery.

If any readers have obtained one of these keys, *MM* would be pleased to receive their comments on its handling and performance.

*The new L.E.M. brass key. The base now has rubber feet, not shown in the photo*



### CW Activity Calendar

While care has been taken in preparing this information it is offered as a guide only and prospective participants should contact the activity organisers to obtain the rules and check that the dates are correct.

#### May

- 1 AGCW-DL QRP/QRP Party.
- 9-10 RSF CQ-M DX contest.
- 17 RSGB County Roundup.
- 30-31 CQ World-Wide WPX contest.

#### June

- 6-7 RSGB National Field Day.
- 7 RSGB 70MHz contest.
- 7 RSGB 50MHz contest.
- 17 International QRP Day.
- 21 RSGB 432MHz single/multi-op contest.
- 27 AGCW-DL VHF/UHF contest.
- 27-28 RSGB Summer 1.8 contest.

#### July

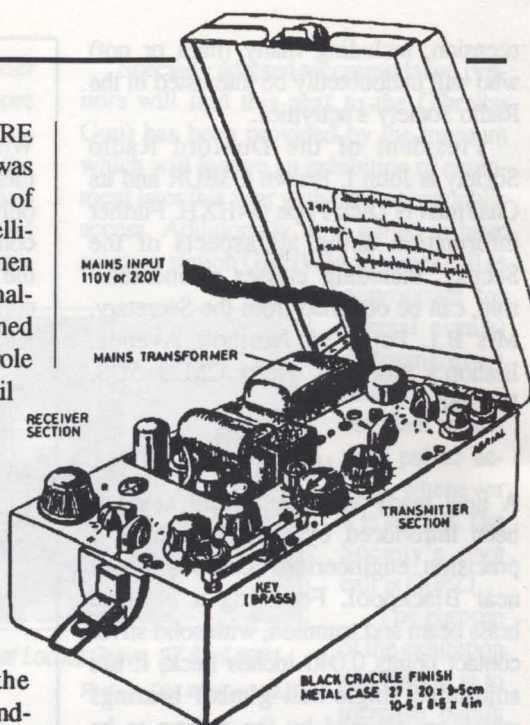
- 11-12 SARTS SEANET contest.
- 11-12 IARU HF Championships.
- 18-19 AGCW-DL Summer QRP contest.
- 19 RSGB Low power field day.
- 25-26 RCV YV DX contest.

**T**HE POLISH RADIO CENTRE at Stanmore, in Middlesex, was set up following the escape of members of the Polish Army and Intelligence staffs from France in 1940 when the Polish Government-in-Exile, originally in Paris and then Anvers, was re-formed in London. The extremely important role of Polish covert radio operations, until the withdrawal of British Government support in 1945, has seldom been acknowledged.

They not only provided the links with the Polish Home Army but also played a major role in the secret radio links with Occupied and Unoccupied France, with French North Africa (particularly important during the preparations for 'Torch', the Allied landings in North Africa), and with Belgium and the Balkans.

It was from Stanmore that the Poles provided the vital radio link in 1941-42 with 'Cadix', the covert French/Polish/Spanish cryptographic unit near Nîmes in the unoccupied zone of France; with the Inter-Allied (Polish/French) intelligence network in France; with some of the links for the Alliance network (Giraud's DSR/SM network); and with the 'Rygor' secret Polish centre in Algiers. Poles also played a key role in the secret air and sea movements in and out of France.

Members of the Home Army and the Intelligence agents in Poland, controlled



*Polish AP4 transmitter-receiver with single-stage 6L6 transmitter and superhet receiver.*

*Designed by T. Heftman at Stanmore*

*Drawing by David Edwards*

by the 'London Poles', rather than the Moscow organised 'Lublin Poles', were later harassed and often imprisoned in the immediate post-war period when representatives of the London Government-in-Exile were put on trial in the USSR.

The London Poles have never forgotten that at least 4000 (and probably more than 10 000) Polish Army officers were put to death in 1940 by Stalin's secret police in the Katyn Forest.

## Clandestine Radio

### Part 2

*by Pat Hawker G3VA*



### Polish Sets

Chief designer of a series of excellent agent sets produced at Stanmore (AP and BP series, etc.) was Tadeusz Heftman who later became one of the founders of British Communications Corporation (BCC). (Major) H.R. Adams G2NO, as Manager of Webb's Radio, off Oxford Street, London, supplied the Poles with radio components, etc., and later became Liaison Officer between Stanmore and the British organisations.

In the late 1920s several early Polish amateurs (then operating with four-letter calls beginning TP) including Antoni Palluth (TPVA), Ludomir Danilewicz (TPAV) and his brother Leonard, together

with Edward Fokczynski, formed the AVA Radio Manufacturing Company in Warsaw. It was this small specialist firm that built the copies of the German Enigma cipher machine and the original 'Bomba' machines that enabled the Polish cryptographers to make the first breaks into Enigma.

They also built the Polish Lacida cipher machine and their radio expertise contributed to the early use of HF radio for Polish diplomatic and intelligence traffic. By 1943 the sets designed by

*Early equipment for radio-agents, including Mk VII transmitter-receiver, separate power supply unit and early signal plan*

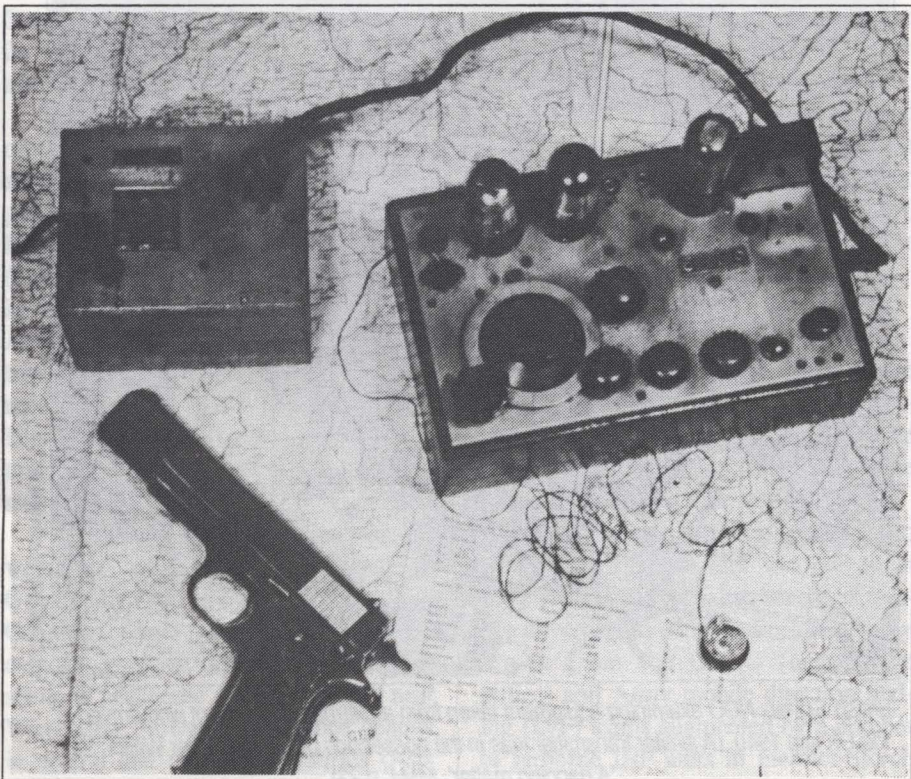


Photo: F2WL



Heftman had gained the reputation as the best available at that time. A number were supplied to MI6, to SOE and to DSR/SM, the French Special Services organisation which recognised Giraud rather than De Gaulle.

### ***Down-played Role***

The secrecy which has continued to surround British Intelligence activities has led to down-playing the value to the Allied war effort of not only the Polish links but also the activities of the French Special Services and those Resistance and Intelligence groups in France which, until 1944, did not accept allegiance to

De Gaulle. These included the MI6-controlled Jade network which worked in close co-operation with the French Kleber group based in Paris, through which Gustave Bertrand, the French cryptographic expert, continued to pass information after the Germans occupied the south of France in 1942.

It was the French Special Services (equivalent to MI5 and MI6) which established the first radio links with the UK, in some cases via Spain, in the summer and autumn of 1940. It was not until Spring 1941 that agents and equipment from the UK began to establish tenuous links. A Gaullist agent of BCRA, 'Remy', estab-



*British Signals NCO examining equipment taken from a German radio-agent who arrived in the UK late 1940. (A similar transmitter was in the possession of agent Werner Walthi. See 'A hanging matter', MM4, p.23)*

Photo courtesy Wireless World



lished an effective radio network during 1941–43 working to Weald, and later played a key role in 'Sussex', a joint British/American/French intelligence operation for the invasion of France in 1944.

### *The Abwehr*

It must also be recognised that the Germans were pioneers of the organised use of clandestine radio. In 1936 the Abwehr (German Military Intelligence) began establishing a Secret Radio Reporting Service (Geheimen Funkmeldedienst) to collect information from many countries. A professional engineer (he was also a radio amateur) Technical Superintendent Black became responsible for the development and production at Berlin-Stahnsdorf of portable HF radio equipment for this service, including sets for radio-agents; the site also housed a radio station.

The Abwehr set up an 'A' network of clandestine radio stations in Czechoslovakia, Poland, France, etc., although in peacetime these came on the air only for occasional tests. 'Stay-behind' agents (J-network) with radios were installed in the border regions of Germany. The Abwehr also pioneered the use of portable battery-operated transmitters for military reconnaissance teams (Abw-Frontauf-Klarungaverbaende), used for the first time in September 1939 during the invasion of Poland.

'A' agents and reconnaissance agents were very active during the May 1940 German invasion of France and the Low Countries. Large control stations specifically for working radio-agents had been set up in peacetime in Hamburg and near Wiesbaden. Abwehr intelligence centres in neutral and occupied countries (Asts

and KOs) were linked by radio to Berlin or Vienna and also themselves formed control centres for further networks.

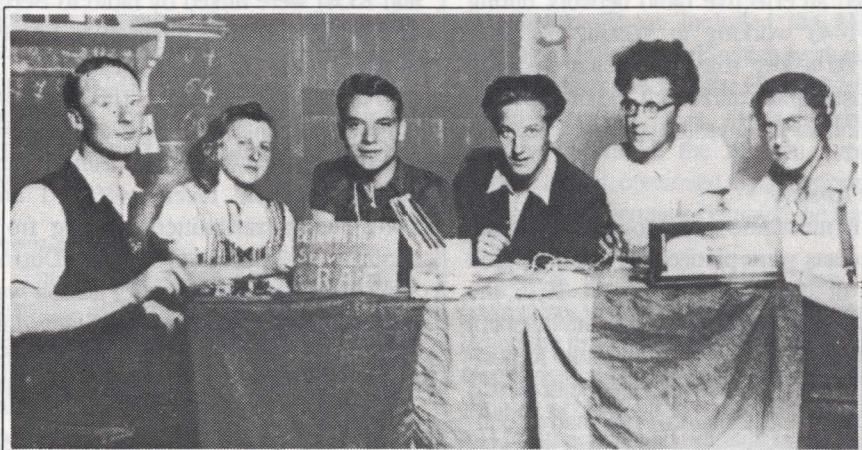
At Stahnsdorf about 100 different radio equipments were developed before and during the war, mostly using regenerative 'straight' receivers (1-v-1 and 1-v-2), with transmitters ranging from about 2 to 250 watts output. During 1942–43 a new main control station was built at Belzig/Mark to replace Stahnsdorf with more powerful transmitters and directional antennas designed by Ing. Gruenberg.

In 1944, the Abwehr was taken over by the frightful RSHA (which included Gestapo, SD, ORPO, etc.) and its head (Admiral Canaris) executed. (A number of senior Abwehr officers were active in the German resistance to Hitler). Even before seizing control of the Abwehr, RSHA Amt VI (foreign intelligence) had built its own radio network under Peter Siepen, with a large control station set up in 1942 (Havel Institute, Wannsee, Berlin) used mainly to communicate with the German 'Zeppelin' agents in the USSR.

### *Many Dangers*

Throughout Western Europe, the Germans directed increasing efforts at closing down or gaining control of the Allied radio-agent stations. The clandestine operators faced the following dangers:

**Funk Abwehr:** This German Radio Counter-Intelligence unit was set up in 1940–41 specifically to counter the increasing covert radio activity. Personnel were drawn from the ORPO (occupation police) and Army mobile direction finding (D/F) teams augmented by a number of airborne D/F units in Fieseler-Storch



Wartime photograph

*A group of young Belgians who provided daily weather reports for the RAF from the Brussels area by radio. Organised by Albert Toussaint ('Beagle'), left, it operated for several years until the liberation of Belgium. Not all the group survived*

army co-operation planes. Initially the mobile D/F vehicles could be spotted by the loop antennas above their roofs but later the loops were concealed within the vehicles. At very close ranges, portable 'sniffer' receivers were used and by 1943 these included models that could be 'worn' under outer clothing. Funk Abwehr also had medium and long-range static D/F and intercept stations and cryptographic sections.

**V-Men:** These were trusted German agents recruited from nationals of the occupied countries under Abwehr or RSHA control. They were given the task of penetrating the Resistance, Intelligence and Escape groups. The V-men were possibly more dangerous than the Funk Abwehr.

**Searches:** Random searches in the towns, on trains or at road-blocks presented a major hazard to anyone carrying a suitcase radio, the purpose of which could not be easily disguised. In a few cases agents were able to convince the police that it

was medical (diathermy) equipment or, particularly in France, to bribe French policemen. Because agents were advised not to operate for long from the same house, they often needed to carry their heavy suitcases around. A safer scheme (operated by Jade) was to have several transmitters planted in different safe houses, working to the same signal plan, so that at most the operator needed to carry his crystals while moving around.

**Informers:** The Germans offered large cash rewards for information leading to the capture of radio-agents and a number were betrayed by 'amateur' informers for money.

The French Special Services, nominally under Vichy control, were permitted to establish intercept stations supposedly to help the Germans track down clandestine radios. In practice, these stations through Bertrand and others provided much useful intelligence to the Allies on the current activities of the Funk Abwehr.



### **'Sussex' Teams**

In July 1944, in support of 'Sussex', and to provide liaison between the Underground, MI6 and 21st Army Group, a small group of us (including several pre-war and post-war amateurs, GM3AVA, G2ALM, G4NY and G3AVI) went to Normandy. By August 27 I was in newly-liberated Paris, a never-to-be-forgotten experience.

The French Sussex teams had performed well, although not without losses. One team provided the first report that Rommel's car had been shot-up by an RAF plane and he was believed dead (in fact he recovered from his injuries only to be forced to commit suicide for his promise to participate in the aftermath of the attempted assassination of Hitler on July 20).

One radio operator badly injured in landing by parachute had worked his battery-operated Mark XXI transmitter from a barn, only to be found by the Germans, dragged outside and shot. The French agents had been recruited by Remy in French N. Africa and trained at St Albans.

### ***Thin Dividing Line***

Soon one began to learn of the tortures that had been inflicted on the Resistance; many radio-agents had been taken at the last moment to Germany, usually to perish in the concentration camps. But one saw also some of the grim process of 'epuration' (cleansing) during which thousands of French men and women were denounced as collaborationists, sometimes on flimsy evidence, arrested and often put to death. One began to see how thin and flexible is the dividing line between Resistance and Terrorism, including State Terrorism.

### ***Freedom Fighters or Urban Guerillas?***

Many of the techniques and tactics we have seen in the 1970s and 1980s were born or grew up in the wartime Resistance. Some groups specialised in the liquidation of those who were, or were suspected of being, collaborationists or informers. Few of us questioned the morality or ethics of our friends in the Underground; it was enough that they were helping to defeat the common enemy.

### ***We Remain in their Debt***

Perhaps we should have examined our consciences more carefully. Air Chief Marshal Portal, as Chief of Staff of the RAF in 1940, wrote, apropos of SOE: 'The dropping of men dressed in civilian clothes for the purpose of attempting to kill members of the opposing forces is not an operation with which the RAF should be associated... there is a vast difference, in ethics, between the time-honoured operation of dropping a spy from the air and this entirely new scheme for what one can only call assassins.'

Yet as the war progressed the RAF was forced to stomach area bombing of cities in which aircrew in uniform randomly killed thousands of civilians. Were they in any position to react to the idea of vastly more selective killing of far fewer people even when done by people not in uniform?

For my part, I still admire without reservation the radio-agents who dared to tap out their messages from enemy-occupied territory. We remain in their debt!

*(This article first appeared in OT News, journal of the Radio Amateur Old Timers' Association, April 1990)*

**F**OUNDED IN 1973 by the Rev. George Dobbs G3RJV, with around 30 members, the G-QRP Club is today the largest QRP (low power) club in the world with over 4000 paid-up members.

Although not designated a CW club, most of the emphasis in club activities and publications is CW-related and the club is a founder-member of the European CW Association. It also has contacts with QRP clubs in other countries through the World QRP Federation. The club's definition of QRP power is not more than 5 watts output CW or 10W PEP SSB.

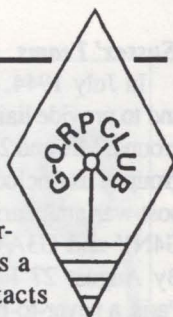
### *Magazine*

The club's excellent journal, *SPRAT* (standing for 'Small Powered Radio Amateur Transmission') is published quarterly. It contains many circuits, technical hints and ideas for QRP projects, together with club news, award and contest information, an annual QRP calendar and other items of interest to QRP operators.

### *Services*

There is a data sheet service providing photocopies of circuits, etc., for receivers, transmitters, transceivers, modifications for early commercial QRP equipment and other projects; the club can supply a number of books, kits, printed circuit boards, special components, and club insignia; it provides Morse training tapes at

modest cost, with two test preparation tapes, up to 14 wpm, and two code improvement tapes covering 14–20 wpm; and has a QSL bureau for contacts made between members.



## **Club Profile – 5**

### **The G-QRP Club**

An annual handbook lists all members and contains information on the services provided. Specialised advice is available for indi-

vidual members on antenna installation in particular locations; on circuit and construction problems, and for Radio Amateur's Examination students.

Club QSL cards are available by arrangement with specialist printers. A Circuit Handbook, originally published in 1982, has been so popular that it is now published by the Radio Society of Great Britain.

### *Activities*

On the amateur HF bands there are internationally known QRP calling frequencies where QRPers can find fellow enthusiasts. For CW operation, the frequencies are 1.843, 3.560, 7.030, 10.106, 14.060, 21.060, and 28.060MHz.

The club has weekly activity periods centred on these frequencies, also special activity weekends several times a year. These include an OK/G QRP weekend (in collaboration with the OK QRP Club) for contacts between the UK and Czechoslovakia, and a 'Europe for QRP' weekend, again with the OK QRP Club, which



tests QRP paths and conditions from one side of Europe to the other.

The climax of the QRP year is the week-long QRP Winter Sports in the week after Christmas which often results in excellent contacts over remarkable distances around the world.

### ***Rallies and Conventions***

The club mounts a stand at several major rallies or conventions throughout the UK where members can 'sign-in' and meet other members of the club. In co-operation with the QRP Amateur Radio Club International (QRP ARCI) the club also attends the annual Dayton Hamvention in the USA where contact is made with US members and new members are enrolled.

The G-QRP Club mounts its own Mini-Convention annually in October, in Rochdale, with a full lecture programme, bring/buy/swap facilities, component and kit sales, an equipment display and a large social area where members can meet for traditional 'eyeball QSOs'.

### ***Awards and Trophies***

A number of awards are available to club members only, while a CW Novice Award is open to all licensed amateurs as detailed below. This award has been instrumental in encouraging many new amateurs to take up CW as a regular mode. The awards programme culminates in the prestigious QRP Master's Award.

**Worked G-QRP Award.** The basic award is for working twenty other members, and endorsements are awarded for every further twenty members contacted. In all cases, both stations in a contact must be using QRP power.

**QRP Countries Award.** Basic award for working 25 DXCC countries, with endorsements for each further 25. The applicant must use QRP power for each contact but the other stations may be using any power.

**Two-Way QRP Award.** Basic award for 10 DXCC countries worked, endorsements for each further 10 countries. In all contacts both stations must be QRP.

**QRP WAC (Worked All Continents) Award.** Applicants must contact all six continents using QRP. The stations contacted may be using any power.

**QRP Master's Award.** Awarded to any member who holds awards for contacts with 60 members, 75 DXCC countries and 20 countries with two-way QRP.

**CW Novice Award.** This very popular award is available to any amateur who, during the first 12 months of holding a licence, contacts 50 different stations while using CW. The Class A award is for QRP operation only and Class B is for contacts made using any power.

**The G2NJ Trophy** is awarded annually for outstanding services to international QRP.

**The Partridge Trophy** is awarded annually for the best antenna article appearing in *SPRAT*.

**The Suffolk Trophy** is awarded annually for the best technical (non-antenna) article published in *SPRAT* during the year.

**The G4DQP Trophy** is awarded annually to the member submitting the best log of QRP contacts made during the Club Winter Sports.

**The Chelmsley Trophy** is awarded annually for the best QRP log submitted within certain criteria, including the use of single-element antennas not more than

35ft (10m) in height and 132ft (40m) in length, covering the period January 1 to December 31 each year.

A QRP Day plaque is awarded annually for the best QRP log submitted as for the Chelmsley Trophy, but for a maximum of 6 hours activity in contacting IARU Region 1 countries on June 17, International QRP Day.

### **Novice Licence**

The club supports the new UK Amateur Novice Licence and a number of new Novice licensees have already joined the club. A newly appointed Novice Licence Manager answers queries from members on Novice matters and writes a Novice column in *SPRAT*.

The club recommends the following calling frequencies for Novices using CW. 1.960MHz (also 'phone), 3.570, 21.130, 28.130, and 28.360 (also 'phone), and club members are asked to look round the bands at least once a day for Novice members.

### **Membership**

Membership is open to all licensed radio amateurs and short-wave listeners (SWLs), world-wide. Subscription rates are, UK £5.00, Overseas £6.00 (US \$12.00 cash or \$14.00 check). Subscriptions may be paid in local currency overseas via club representatives in Germany, France, the Netherlands, and USA.

Enquiries about membership should be sent to the Hon Secretary, G-QRP Club, Rev. George Dobbs G3RJV, St. Aidan's Vicarage, 498 Manchester Road, Rochdale OL11 3HE, England, enclosing a first class postage stamp or 2 x IRCs. **MM**

*(Our thanks to G3RJV for his assistance in preparing this profile)*

## **Readers' ADs**

### **A FREE SERVICE FOR YOUR TELEGRAPHIC SALES AND WANTS**

#### **FOR SALE**

**Amstrad PCW 9512** word processor with two disc drives. Includes LocoScript v2.29 and LocoFile database. Daisywheel printer. All handbooks, etc. £250. Ideal for writing articles for *MM*! Will deliver within reasonable distance from London. Tony Smith G4FAI. Tel: 081-368 4588.

**Free! Radio Communication** in binders, from 1972 to 1983. Offered as complete batch only (space needed!). Collect, or free delivery possible within reasonable distance from London. Tony Smith G4FAI. Tel: 081-368 4588.

**Back Issues of MM**, Spare copies of Nrs. 8-10, 12, 15, 17-20 for disposal. Keith Dickens G4OCH, 26 Knaves Castle Ave., Brownhills, West Midlands WS8 7PN. Tel: 0543 360372.

#### **HELP WANTED**

**Mac Key** - Does anyone within reasonable distance of Swindon have a Mac Key I could look at, to take measurements, etc., for reproduction purposes? Dennis Goacher G3LLZ, 27 Glevum Road, Swindon, Wilts SN3 4AA.

#### **WANTED**

**Back issues of MM**, Nrs. 3-5, 7, 12, 14-15. I.G. Mant G4WWX, 28 Welbourne Road, Childwall, Liverpool L16 6AJ.

**Back issues of MM**, Nrs. 3 and 4. Gaspard Lizée VE2ZK, 666 Lamarre, Laprairie, Quebec J5R 1M6, Canada.



# W

HEN the Second World War commenced, I had just taken the then equivalent of 'O' Levels. As a Boy Scout I knew the code and as a lad with an interest in the works had an oscillator and key. The Navy and RAF didn't want me; I was too young, and short-sighted as well.

Seeing an advertisement for Marconi, I made a few enquiries, read up the Official Handbook and went for my test for the Special Certificate.

I scraped through the Morse test, just. The examiner showed me how to set up the transmitter. I then did it for him and, probably because I could use a D/F set, passed out. I had learnt about the properties of frame aerials from my reading of 'anything about wireless'.

I went to sea, used my spare time, and some of my watchkeeping hours to study the *Admiralty Handbook*. I still think that is one of the best written books. On leave I sat for the First Class ticket and, surprise, surprise, learnt a trip later that I had passed.

## 'Neutral' Jamming

Just before the United States joined in the War, the ship I was on was inside US waters when we heard a distress call from a British ship being shelled by a German raider. The call was immediately jammed by a 'Neutral' ship sending a weather report on a spark transmitter. We managed to read the distress and passed

it on to a British Station on HF. That was all logged. Mistake number one.

Going back to 500kc/s I called the 'Neutral' and gave him some advice which doesn't appear in the Q-code. Mistake number two. But both of us in the Radio Room, and the Master, agreed and felt better for it.

Next day, tied up and starting to load, the Radio Room was sealed as was the practice for our vessels in neutral ports. A few

hours later, the Federal Communications Commission men arrived, complete with Sheriff and Star! They did not ask any questions, just studied the Log and told us that ships of countries at war must not use the radio within their waters. A few months later, having survived a somewhat unpleasant voyage, including a lifeboat spell, I returned home to receive two letters from the Post Office.

## First You See It...

One contained my 1st Class Ticket, the other a letter detailing my crimes, cancelling that ticket, and enclosing a 2nd Class one instead. My previously issued 1st was to be returned as it was now invalid.

Obviously, early in the war, tickets were easy to come by, because of the need for continuous watch in our vessels, however the International Rules had to be obeyed, even then. I have often wondered if my indiscretion had occurred a month later, after Pearl Harbour, whether any action would have been taken. **MM**

# Obey the Rules!

by 'Ex Sparks'

# American Telegraph Instrument Makers 1837-1900

©1986 By Roger W. Reinke. Reprinted by permission from files of The Morse Telegraph Club, Inc. This table first appeared 1987 in *DOTS & DASHES*, journal of The Morse Telegraph Club, Inc., Vol. XV Nos. 2-3-4. Dates shown are only approximate and are based on trade catalogs, patent dates, advertisements and other ephemera. Corrections or additions are welcome; please write Roger W. Reinke, 5301 Neville Court, Alexandria, VA 22310, or phone 703-971-4095.

MAKER	ADDRESS	CITY	DATES	PRODUCTS	NOTES
American Electrical Works	61 Stewart St.	Providence, R.I.	c. 1880	"Steiner" keys	
..Same..	461 Clark Ave.	Cleveland	1894		
Anders, George L.		Peekskill, N.Y.	c. 1875	Practice sets	
Anderson Bros.		New York	1848	Keys	
Avery, Thomas C.		Philadelphia	1865-67	General line	
Ayers, Tillotson & Co. (A)	333 Chestnut St.				See Welch & Anders
Bain, Alexander		Utica, N.Y.	1849-51	Chemical Printers	For O'Reilly's lines.
Barber, Palmer & Jones			c. 1875		(S) Utica Fire Alarm.
Barnes, Edmund F.			1847	"Columbian" Register	1 [See Gray & Barton] [See Speedwell Iron]
Barion, Enos M.					(S) Western Electric
Baxter, William					...Same...
Blattner (A)					As Electric Mds. Co.
Bliss, George H.	41 Third Ave.	St. Louis	1851	General line	(S) Geo. H. Bliss & Co.
Bliss, Tillotson & Co. (A)	220 Kintle St.	Chicago	1873-76	General line	
..Same..	76 Market St.	Chicago	1876-79	General line	Also made fire alarm.
..Same..	126, then 171 S. Clark	Chicago	1879	General line	(S) W.B. Cleveland.
Bradley, Dr. Leverett	247 S. Water St.	Chicago	1868-70	General line	"...and Sons" variant.
Buell, Nelson A.	54 S. Fourth St.	Philadelphia	1870-74	General line	
Buell, M.A.	7 Exchange Pl.	Jersey City	1874	General line	
..Same..	26-27 Waring Block	Cleveland	1867-73	General line	
..Same..	26 Waring Block	Cleveland	1872-84	General line	
..Same..	86 Bank St.	Cleveland	1870-76	"Eureka" sounders	
..Same..	76 Frankfort St.	Cleveland	1876	General line	
..Same..	144 Superior St.	Cleveland	1876-82	General line	
Bulkley, Charles S.			1882-84	General line	(S) by W.B. Cleveland.
			1848	Registers	2

(A) May have been an agent only, and probably not an instrument maker.

1 With Zook; a "copy" of Morse's patent?

2 "Copy" of Morse's patent.

(V) Verification sought that this firm actually made instruments.

(S) Succeeded by...



MAKER	ADDRESS	CITY	DATES	PRODUCTS	NOTES
Bunnell, Jesse H.	70 Courtlandt St.	New York	1878-80	General line	With Tillotson 1876-78.
Bunnell, J.H. & Co.	106-108, then	New York	1880-	General line	[See Partrick, Bunnell]
...Same...	112 Liberty St.	New York	-19??	General line	3
...Same...					[See Merchant's Mfg.]
Burrell, Samuel J.		Ithaca, N.Y.	1865	Registers	
Burritt, J. & Son					
Calahan, Edward A.		New York	1867	Printers	Improved Law's ticker
California Electrical Works	134 Sutter St.	San Francisco	1877-	General line	James Gamble on Board of Directors.
Cardwell, Dr. G.A.		New York	1896-	Keys and sounders	
Carter, Franklin S.		Ottawa, Ill.	1851-72	General line	[See Partrick & Carter]
Caton Instrument Shop					4 (S) Western Electric
Channing, Dr. W.F.					[See Farmer, Moses G.]
Chester, Charles T.	104 Centre St.	New York	1855-58	General line	John N. joined 1858
Chester, C.T. & J.N.	104 Centre St.	New York	1858-71	General line	John N. died 1871
Chester, Charles T.	104 Centre St.	New York	1872-80	General line	5
Chester, Partrick & Co.	38 S. Fourth St.	Philadelphia	1868-72	General line	6 (S) Partrick, Bunnell.
Chubbuck, A.S.	Hotel St.	Utica, N.Y.	1852-69	General line	Western Union supplier
Chubbuck, S.W.	Hotel St.	Utica, N.Y.	1852-69	General line	"...and Sons" variant.
Clark, James J.		Philadelphia	1845-61	General line	James' father.
Clark, William		Philadelphia	1846-47	"Harp" registers	Harrisburg in 1868
Clark, J.J. & Co.	19 E. 20th St.	New York	1861-68	General line	Manager at Hicks & Shawk
Cleveland, W.B.	144 Superior St. S.	Cleveland	1884-	Practice sets	
Cooperative Mfg Co. (V)	216 1/2 Walnut St.	Philadelphia	1871-76	General line	
...Same... (V)	218 Pear St.	Philadelphia	1876	General line	
Crain, George H. & Co. (V)	145 S. Clark St.	Chicago	c. 1871		

3 Acquired 19?? by INSO Electronic Prods. (Dr. Joe Jacobs, prop.) Inventory liquidated 1969-

4 The Caton shop, James Gamble, Supt. (see Calif. Elec. Wks.) was owned by the Illinois & Mississippi Telegraph Co.

5 Stephen Chester joined his brothers in 1867, but left in 1868 to join Partrick in Chester, Partrick & Co.

6 See (5)

**American Telegraph Instrument Makers**

Page 3

MAKER	ADDRESS	CITY	DATES	PRODUCTS	NOTES
Davis, Daniel Jr.		Boston	1842-48	Relays	
Davis, William E.	319 Newark Ave.	Jersey City	1869-74	General line	(S) Palmer & Hall
...Same...	341 Newark Ave.	" "	1874-	"Uncle Sam" sounder	Elegant machining.
Day, S.F. & Co.		Ballston Spa, N.Y.	c. 1865	General line	
Day, W.E. & Co. (A)		Pittsfield, Mass.	1876	General line	
Decker		New York	1881	Relays and sounders	[See Lannert & Decker]
Delaney Patent Relay Co.	61 Broadway	Coultersville, Ill.	1877	Relay "cut-out"	
De Mier, John R.		Washington	1842-48	Relays	(S) Palmer & Hall
Donaldson, Dr. R.B.	61 Ann St.	New York	1850-88	General line	Pope connection?
DuBois, Charles H. & Son	86 Nassau St.	New York	1869	"Nonpareil" Relay	
Durant, Charles		Newark, N.J.	1869-73	Registers, keys	7
Edison & Murray	10 Ward St.	Boston	c. 1873	"Magneto" telegraph	
Edison & Unger	40 Hanover St.	San Francisco	c. 1868	General line	(S) California Electrical Works
Edmonds & Hambilet		New York	1871-88	General line	Also made "prosch" key
Electrical Constr'n & Maintenance Co.	109 Liberty St.	Galesburg, Ill.	1875-85	General line	(S) Western Electric
Electrical Supply Co.		Chicago	c. 1872	General line	George H. Bliss, Mgr.
Electric Improvement Co.		Philadelphia	c. 1871	Snapper sounders	(S) Fleming, Potter
Electric Merchandising Co. (A)	76 Market St.	Brooklyn	c. 1887		[See Huttman, W.E.]
Electric Telegraph Works (V)	2nd & Chestnut Sts.				
Empire Electrical Mfg Co.	27-38 Walnut St.				
Erpelding, J.					
Farar, W.E.	48 S. 4th St.	Philadelphia	c. 1868	General line	
Farmer, Moses O.		Boston	1852-57	Repeaters	8
Farmer & Woodman		Boston	1857-62	Repeaters	

"General line" products include at least keys, sounders and relays.

<sup>7</sup> Edison also used Bradley's shop.

<sup>8</sup> Farmer invented duplex, developed Boston Fire Alarm system with Channing.

To be continued...



# **G4ZPY**

## **PADDLE KEYS INTERNATIONAL**

41 MILL DAM LANE, BURSCOUGH,  
ORMSKIRK, LANCS., ENGLAND L40 7TG  
TEL. (0704) 894299

Following International success with our Very High Speed Twin Paddle Key, we now proudly present another World Winner which will complement the VHS and all other Paddle Keys.

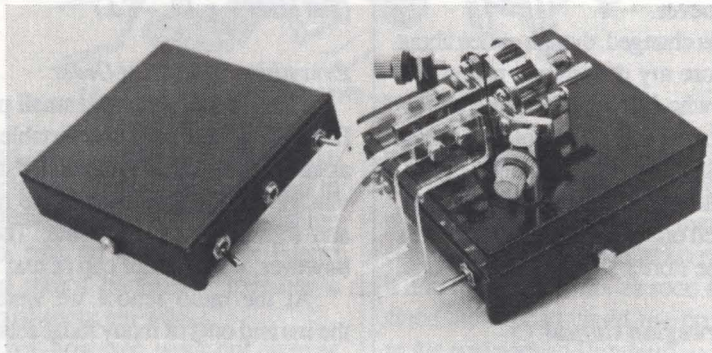
### **THE NEW G4ZPY MINIATURE IAMBIC ELECTRONIC KEYS**

This little beauty, measuring only 80 x 80 x 20mm, is probably the most versatile Iambic available; and at a practical price. No; we are not using anyone else's Micro-processor. This is a new one that has been programmed to our specifications.

We also fit this little Gem under our Twin Paddle Keys, making them into the very attractive

### **NEW G4ZPY COMBO**

Star features of this dynamic duo are too numerous to mention here



*For information on all our Products, just send a  
9" x 4" S.A.S.E. (GB), or 2 IRCs Overseas*

**M**Y TICKET for a voyage to the Far East on a well known passenger ship had been booked. I was going to join the radio operator group in Indonesia, at that time known as the Dutch East Indies. Various Dutch shipping companies were trading between the islands and their ships never left the region.

The crew for these ships signed on locally, while the officers were transferred from Holland to the Far East by normal passenger liners. My wages were to be 240 guilders a month, about £24. During the voyage, practical lessons were given by the experienced radio officers of the passenger ship for the benefit of the newcomers from radio school who, after all, had no experience whatsoever.

My plans changed, though, when about a week before my departure I met an acquaintance who had been working on foreign ships for some time. He told me stories about foreign wages and foreign experiences that amazed me. To a 19-year-old, who received one pound a month from his mother, these stories sounded like paradise.

### *Visit to Norwegian Consul*

My friend's knowledge of foreign companies was limited to Scandinavian vessels, and since a Norwegian consulate was very close to my home in Rotterdam I decided to pay them a visit. Extremely

nervous, I asked the Norwegian official if he could secure me a nice place as a radio operator on board a Norwegian ship.

He beamed as if I were a gift from heaven and exclaimed in English that he was in urgent need of a Sparks. I just had to sign a two-year contract, offering

a salary I had not dreamed possible. At the same time he handed me a train ticket to Antwerp where my future ship was located.

The Consul did not know the exact destination of the voyage, although

he mumbled something about the West Indies, a trip of a few weeks and then back to Europe. In Antwerp, the freighter appeared to be an old rusty steamer of about 6000 BRT, and she was in dry dock to be converted from coal to oil! (See MM15, p.19. – Ed.)

### *Everything in Perfect Order*

The radio cabin was a small paradise. Everything was very comfortable and reassuring. The entire radio installation was vintage WWII, exactly like the receivers and transmitters back home. The radar, however, was another cup of tea.

At the radio school we were taught the ins and outs of many radar sets, but the one on this Norwegian vessel was completely unknown to me. The manuals of both the radio and radar gear were probably lost during the war, since there was nothing of the kind on board.

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## **REFLECTIONS from Uncle Bas – 14**

**Straight Out of Radio School**

**by Bastian van Es PA0RTW**

---



According to the captain, everything was in perfect order and there was nothing I need worry about. Nevertheless, as I looked at the equipment and thought of the voyage ahead, there was a queer feeling in my stomach.

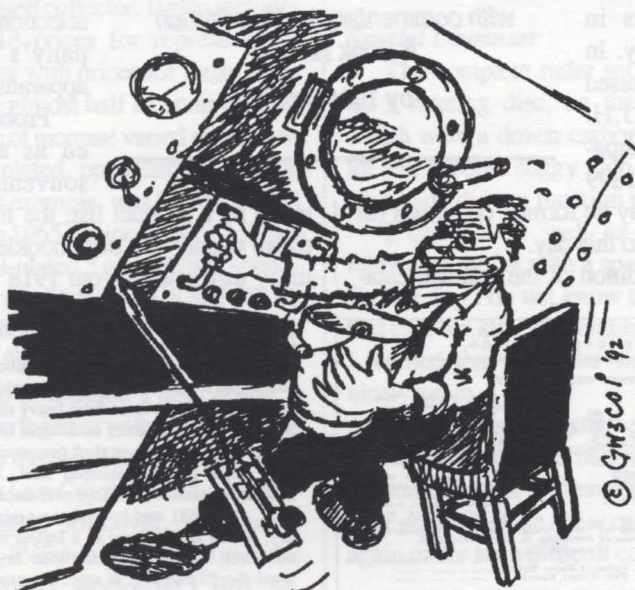
### *Destination West Indies*

The departure from Antwerp went off nicely. The old man told me we were go-

time, though, we were still in European waters and on our way to Hamburg.

Leaving Antwerp, we had excellent weather for the North Sea, but after a few days the situation changed completely. Stormy weather, cold and plenty of rain, and my stomach wasn't so strong after all. Misery in the extreme!

As I suffered quietly in the radio cabin, the chief mate barged in and told



*STOMACH NOT SO STRONG...*

ing to visit several north-European ports, after which we would cross the ocean to the West Indies. There we would discharge our cargo, pick up a new one in Puerto Rico, and return home. All together a round trip of about ten weeks.

It did not, however, work out quite as he had forecast. For me, it was the beginning of a three year's voyage, after which I signed off in New York since the vessel never returned to Europe! In the mean-

me the captain wanted me immediately on the bridge, on the double. The radar was on the blink. There were many strange echoes; I was supposed to know all about it and repair the s.o.b. as soon as possible since the captain could not do without it as we approached Hamburg.

Trembling, I climbed the ladder to the little deck on top of the wheelhouse, where the radar was located and where, to

*continued on page 23*

**J**ESSE BUNNELL was a Union telegrapher during the American Civil War. In 1878, following an association with L.G. Tillotson and Company, he began his own company manufacturing keys, sounders, and electrical buzzers in New York City. In 1880 he reorganised and formed J.H. Bunnell & Company. He died in 1899 but the company he formed continues (in name at least) to this day.

The 28th edition of the Bunnell cata-

log was published in 1918 as a hardbound book containing over 200 pages, the major part of which covered supplies from other manufacturers. Around 1965, Bun-

nell published an abridged paperback version of catalog No. 28 containing a selection of the company's telegraph apparatus.

Probably intended as a company souvenir piece as

much as a product list, the little (4¼ by 6½in) twenty-one page booklet illustrated many instruments from 1918 which were

## Bunnell's Last Catalog

with commentary by Tom French

A Book Review

by Tony Smith

J. H. BUNNELL & CO.

### THE "TRIUMPH KEY."



No. 9620.

Note the name "Bunnell" on the Lever. This new model legless form of Steel Lever Key has been adopted as the Standard of the Western Union, and Postal Telegraph Companies.

It is the finest steel lever key ever produced. In addition to the Tungsten contact points of our Standard Steel Lever Key, it has improvements and other valuable

improvements—The Arm of Protection in Steel Lever Keys. Schedule BB.

List No.	Price Each
9620 Triumph Key, Polished Brass Body.....	
9621 Triumph Key, Full Nickel Plated.....	



No. 9627.

### BUNNELL OPEN CIRCUIT KEY.

Front and Back  
Contact.

When it is preferable to use dry cells instead of closed circuit cells this type of key is highly recommended. Even though a closed circuit is maintained for communication in either direction no current is being used except when key is depressed. Each individual station supplies its own current. Popular with commercial companies and becoming more so with the individual.

Schedule BB.

List No.	Price Each
9625 O. C. Leg Key, Polished Brass Body.....	
9626 O. C. Leg Key, Full Nickel Plated.....	
9627 O. C. Legless Key, Polished Brass Body.....	
9628 O. C. Legless Key, Full Nickel Plated.....	

### THE FRY OPEN CIRCUIT KEY.



No. 6215.

Ideal for open circuit working with Dry Battery.

Has circuit-closer which must be worked like an ordinary key.

With circuit-closer in "closed" position, the battery cannot be put to line or short circuited by pressing down on key lever, hence leaving a book or other heavy object on key does not waste the battery, but the relay is always in circuit ready to receive signals.

Schedule BB.

List No.	Price Each
6215.....	

**6A** In the early days of telegraphy, keys used a brass lever through which a steel pivot shaft was fixed. This made for a heavy key on which the shaft was liable to work loose from heavy use. In 1881, Bunnell obtained a patent on a "steel lever key" on which the lever and pivot shaft (trunnion) were parts of a single piece of stamped steel. This design became the standard for keys ever since.

The 1881 steel lever key was originally a leg key; it was later offered in a legless model. Bunnell's best model legless steel lever key was christened the "Triumph." It used, for example, mica insulation as opposed to the fiber of the standard models.

**6B** The usual telegraph key has a circuit closer and is intended for use on gravity battery circuits. These batteries, typically of the bluestone or crow-foot variety, put out a small, constant current into a closed circuit as used on American railroads of the past century.

Dry cells require less maintenance and are not subject to spillage, but would rapidly wear down in a closed circuit. The circuit must be kept open except when keying a message. This kind of circuit (as used in European land-line telegraphy) required an "open circuit key."

**6C** Another form of open circuit key. Since dry cell batteries lose capacity quickly under closed circuit conditions, the "circuit closer" on this model actually worked as a cut-out for the battery.

Two pages from Tom French's book (reproduced approximately half original size)



no longer available in the 1960s, although surprisingly many were. No prices for the '60s were included in the abridged reprint, but were available on a separate mimeographed sheet.

Tom French's booklet reprints the pages of instruments from the abridged 1960's catalog and includes comments against each item which are of value to those with a general interest in the subject as well as to the specialised collector. It also includes a list of 1918 prices for representative items, together with prices for those items still available almost half a century later.

The range of increase varied enormously. A nickel-plated, open-circuit leg key, No. 9036, for example, was \$5.80 in 1918 and \$14.95 in 1965, an increase of 157 per cent. A nickel-plated 5 ohms Giant sounder, No. 9076, was \$4.50 in 1918 and \$58.95 in 1965, an increase of 1210 per cent! To demonstrate the usefulness of this publication, page 6 of Bunnell's last catalog is illustrated here together with Tom French's comments on the individual items.

*Bunnell's Last Catalog (with commentary)* (36 pages, softcover, saddlewire bound, 5½ x 8½in) is available from the publisher, Artifax Books, PO Box 88, Maynard, MA 01754, USA. Price \$6.95 plus postage as follows: Surface \$2.00 per order any quantity or destination; Air, Europe \$5.00, Canada and Western Hemisphere \$3.50, Asia/Africa/Pacific Rim \$6.50. All payments in US funds only.

Readers outside North America who prefer to pay in Sterling may find it more convenient to obtain this publication from the 'MM Bookshelf'. UK price £4.65 including post and packing. Europe airmail (elsewhere surface) £4.85. See page 36 of this issue for further details. **MM**

## UNCLE BAS - 14

*continued from page 21*

make the situation even trickier, the radar antenna was mounted on top of a small mast. The next problem was to open the radar box. Shaking hands, water dripping from my nose, and seasickness, did not make the job any easier, although fortunately there was a sailor on hand providing moral and mental support.

### *Special Dispenser*

The complete radar set was mounted on a rotating disc, on the underside of which were a dozen carbon brushes. The lot had become soggy with sea water and obviously did not function properly.

I dried it as well as I could, and lubricated the lot with a special dispenser. To this day I do not know the contents of that can, but after descending to the bridge I learned that the radar was performing nicely again.

The captain was extremely pleased and told me later that he had never expected me to repair that broken set. Since then, I have repaired quite a few radios, but never again under such difficult conditions. **MM**

## **RADIO BYGONES** In the Apr/May issue, out now!

Wireless on board RMS *Queen Mary*  
Inside the Eddystone 888A Receiver  
The 'Gee' VHF Radionavigation System  
Researching the Chakophone

Annual subscription (6 issues) £17 to UK  
addresses, £18 overseas by surface mail.

All payments must be in Sterling.

Airmail rates on request.

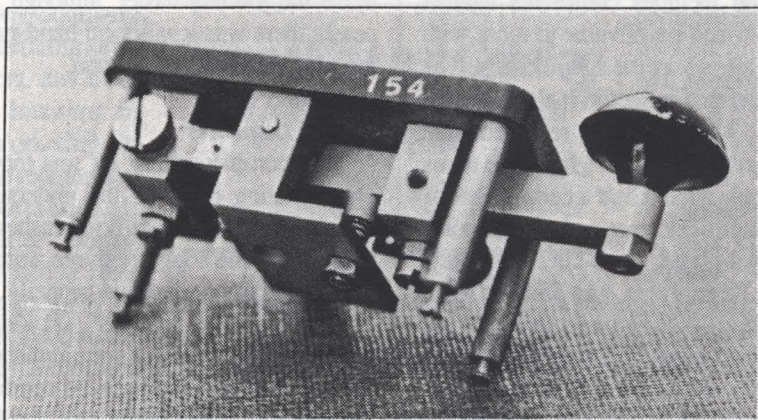
G C Arnold Partners, 9 Wetherby Close,  
Broadstone, Dorset BH18 8JB, England.  
Telephone 0202 658474

For a sample copy, send  
£3.00 or a US\$5 bill



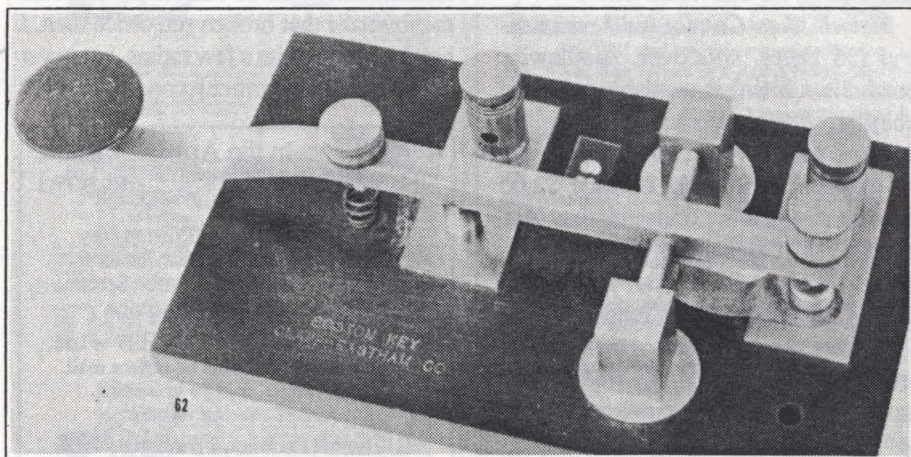
# Showcase

*Featuring keys and other collectors' items of telegraphic interest.  
If anyone can add to the information given please contact TS*



*Unknown key, obtained from Yugoslavia. No markings. Dimensions are identical to Key WT 8 Amp, but knob is aluminium painted black. Further information requested*

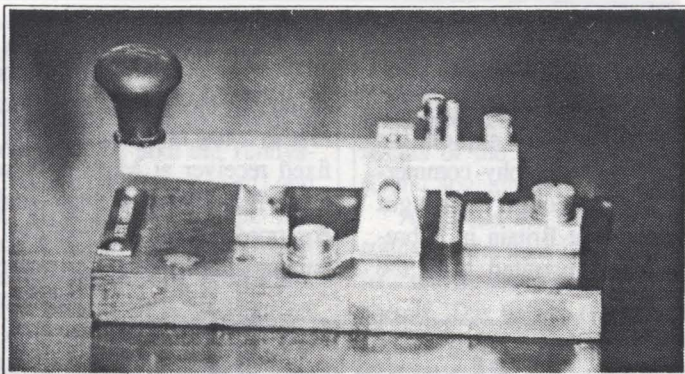
*Collection/photo: David Couch VK6WT*



*Clapp-Eastham Co. Boston key. Introduced 1915 with a marble base and German silver-plated working parts. Every amateur's dream key at that time. See 'The Story of the Key', MM11, p.31*

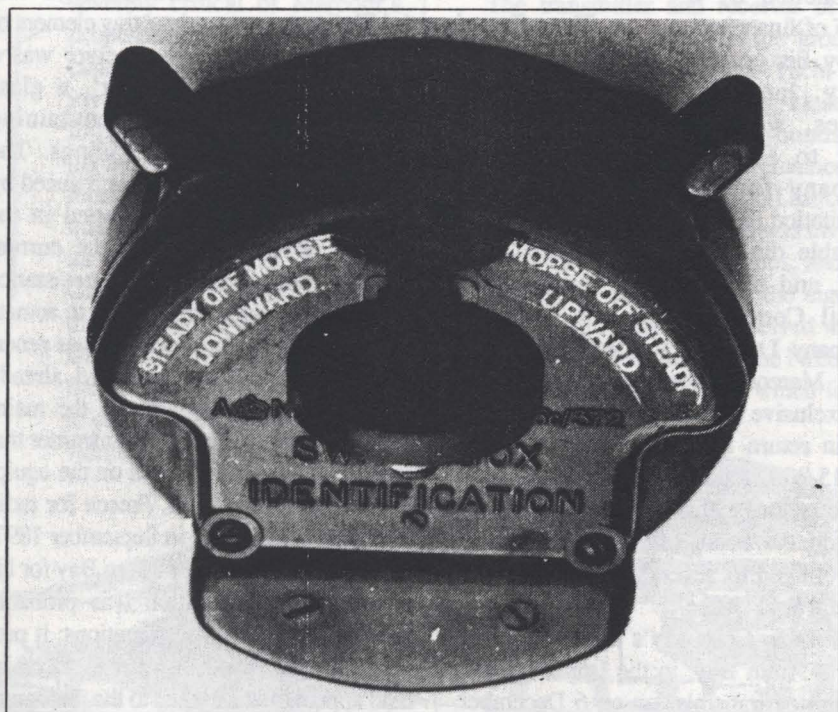
*Collection: John Elwood W7GAQ*





*Elliott Brothers Ltd, about 1890. Very similar to GPO standard key*

*Photo by Chuck Brydges W4WXZ*



*RAF Light-signalling key. Long-time devotees of MM may recall seeing Murray Willer's 'Switchbox Identification No 2, Mark III' on the cover of MM14.*

*Reader Alex Vilensky, in Israel, has sent this photo of his own key which he 'purchased long ago in the flea market'. In the absence of any Mark Number it is presumably the Mk I*

*Photo by Alex Vilensky 4X1MH*

**T**HE ITALIAN INVENTOR, Guglielmo Marconi (1874–1937), unable to exploit his system of wireless telegraphy commercially in his native country, brought his apparatus to Great Britain in February 1896 and demonstrated it to the engineer-in-chief of the Post Office, W.H. Preece, in July of that year. In April 1897 he was approached by a group of financiers, led by his cousin, Henry Jameson-Davies, with an offer to form a company for the development and exploitation of his inventions. After considerable discussion, he accepted their offer, and the Wireless Telegraph & Signal Company (now the Marconi Company Ltd) was formed on 22 July 1897. Marconi made over his patents to the exclusive use of the new company, and in return received a cash payment of £15 000, together with 60 per cent of the ordinary shares and a controlling vote on the board of directors; he was now obliged to sever his links with the General Post Office.

The new Company's first station was built at Alum Bay, in the Isle of Wight, and started transmission on 6 December 1897. From 1897 to 1901 Marconi's experiments were mainly carried out at various stations established on the island, which was thus the true birthplace of the commercial radio industry.

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## Marconi and the Isle of Wight

Three Experimental Stations

*by Roland F. Pocock*

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The Alum Bay station, in the grounds of the Needles Hotel, transmitted signals first to a tug in Alum Bay and later to a fixed receiver at Madeira House, South Cliff, Bournemouth. These stations were equipped with the conventional radio apparatus of the period. The transmitter was

a spark-gap in the secondary circuit of an induction coil, connected directly to a vertical aerial 120 feet high. The detecting element of the receiver was a 'coherer', a glass tube containing metal filings. The

resistance of this coherer was reduced by a radio wave; it was connected in the receiver aerial circuit and the current changes consequent on its resistance changes were used, via a relay, to actuate a Morse printer. The apparatus was generally similar to that which had already been used in experiments on the mainland, but with a simplified transmitter that appears to have been based on the equipment designed by W.H. Preece for radio experiments at Dover in September 1897.

Marconi's choice of Alum Bay for his first independent station was probably prompted by three considerations: it provided an open length of water to the mainland approximately equal to the maximum range of a transmitter of the period, it was reasonably remote from large centres of population, where interference from tramways and other electrical equipment had already been experienced, and there

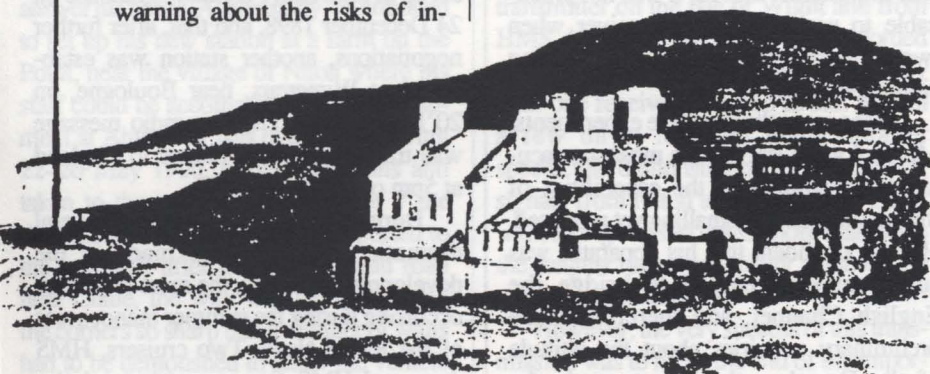


was a convenient hotel to accommodate himself and his staff. The site was not, however, so remote that visitors could not reach the station, and during the spring of 1898 Marconi received both the Tennyson family (from nearby Farringford) and the eminent physicist Lord Kelvin. The latter used the Marconi apparatus to send telegrams of greeting to W.H. Preece and to Sir George Stokes; as he insisted on paying for each message, these were the first commercial radio-telegrams to be transmitted. This was a gesture of confidence on Kelvin's part – for he had been severely critical of Marconi's proposals in 1896 and its significance was not lost on the Italian inventor. But it caused Marconi to break the law, for by accepting the fee he had defied the GPO monopoly of telegraph services inside the United Kingdom and its territorial waters. The Post Office took no action, regarding the payment as being a voluntary gift by Lord Kelvin to help finance a scientific experiment; it did, however, send a letter warning about the risks of in-

fringement of the monopoly when the Wireless Telegraph & Signal Company supplied radio apparatus to a Dublin newspaper office in order to report the results of the yacht races at Kingstown (Dun Laoghaire).

A second set of equipment was installed on the island in August 1898, constructed to the order of Queen Victoria herself. This was to enable the Queen to keep in contact with her son, the Prince of Wales, who was at that time spending a period of convalescence on the royal yacht *Osborne*.

The transmitter and receiver of the land station were set up in the grounds of Osborne House. The Royal Yacht was usually moored in Cowes Bay, close to, but out of sight of, the grounds of Osborne, but the apparatus remained in use during several sea cruises off the coast of the island. Marconi himself was invited on board for some of these trips, and on August 12 he observed that the signals from Osborne House were received when the yacht was three miles off the Needles, a range of eighteen miles of which four-



*Marconi's station at the Royal Needles Hotel, Alum Bay, Isle of Wight.*

*Sketch by Donna Woodward, based on an original photograph*

teen and a quarter miles were over land. This was one of the longest overland ranges which had been achieved at that date. On this same trip, the *Osborne*, while off Newtown Bay, established coast communication with both Osborne House and Alum Bay, linking the east and west coasts of the island by radio for the first time.

While the radio transmissions from the royal yacht were attracting public attention, Marconi was carrying out important experiments at Alum Bay with coupling transformers between the spark-gap and the aerial of his transmitter. These experiments, described in a patent specification filed on 1 July 1898, were seen by representatives of the fighting services – Admiral Lord Charles Beresford and Commander Evan-Thomas of the Royal Navy on 7 May 1898, and Major G.A. Carr of the Royal Engineers a month later.

The service departments were particularly interested in the trials with the coupling transformers, as these were actually the first steps toward the development of selectively tuned apparatus. The untuned spark transmitters radiated on all frequencies, so that secrecy of signalling was impossible. Indeed, it was not practicable to use an untuned receiver when two or more transmitters were operating simultaneously.

At the same time as these experiments, Marconi was planning the most spectacular demonstration of the capabilities of this new system of signalling yet proposed. He was confident that his apparatus was sufficiently developed to bridge the English Channel, and therefore made preliminary enquiries about the attitude of the French authorities towards the possible establishment of a station at

Cherbourg to communicate with Alum Bay. His first approach was made through Captain Henry Jackson, the British Naval Attaché in Paris, a personal friend of Marconi and himself a distinguished radio engineer. Jackson was not very encouraging. His official duties delayed the enquiries for several months, and the approval, when it was received from the French government, was for a station near Calais and not on the Cherbourg peninsula.

Jackson suggested that Marconi should, in the meantime, set up another station at Portland Bill, so that he would gain experience of using his apparatus across a water-gap as long as the English Channel. Marconi did not, in fact, construct a station at Portland Bill, but in September 1898 moved his mainland station from Bournemouth to the grounds of the Haven Hotel at Poole. By October 1898, he had proved that his system was capable of signalling over a distance equal to that from Dover to Calais.

Although it is not strictly relevant to this account of radio trials in the Isle of Wight, it may be recorded here that the Dover end of the cross-Channel link was set up at the South Foreland lighthouse on 24 December 1898, and that, after further negotiations, another station was established at Wimereux, near Boulogne, on 20 March 1899. The first radio message was transmitted from France to England at 5pm on 27 March 1899.

During the summer of 1899, several dramatic advances were made in the development of radio, the most important occurring during the summer manoeuvres of the Royal Navy. Two cruisers, HMS *Juno* and HMS *Europa*, exchanged signals when sixty miles apart in the Atlantic.



For the first time it had been demonstrated that radio telegraphy was capable of performing in situations and over ranges which could not be covered by any other signalling system. After these manoeuvres, Marconi sailed to New York, in order to demonstrate his equipment. He returned in the liner *St Paul*, and the signals exchanged between that ship and the Alum Bay station while still thirty-six miles distant on 15 November 1899 were used as a basis for the first ship's newspaper.

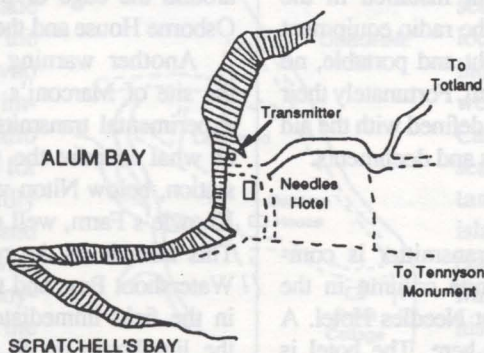
But by the end of 1899, the ranges of radio transmission had increased so much that the open sea space available from Alum Bay was insufficient for further experiments. Marconi surveyed the whole length of the coast of the island, and concluded that St Catherine's Point, the southernmost tip of the Isle of Wight, would best answer his needs. Accordingly, he arranged to set up his new station at a farm on the Point, near the village of Niton where his staff could be accommodated. The equipment at Alum Bay was dismantled during 22–26 May 1900, packed into vans and taken to the new station. On June 7 the mainmast for the aerial was transported to the new site: after leaving the main road near Chale, the way was so narrow and the corners so sharp that a number of walls had to be demolished to allow the vehicle to pass. A new topmast was delivered from George Marvin, a yacht builder at Cowes,

and within a week the new station was working.

The new station at Niton was the first to be fitted with Marconi's selectively tuned system. Early trials were made by exchanging signals with the Royal Navy's wireless operators undergoing training at HMS Vernon, Portsmouth. One of the officers on the staff of the training school was engaged to the daughter of the farmer from whom Marconi had leased

the site, and he made the first transmission to Niton when during one of these experimental sessions he invited his fiancée to meet him for lunch.

Early in the new year a major advance in radio telegraphy was



*The Alum Bay station*

made. On 25 January 1901, HMS *Jaseur*, fitted with a tuned receiver designed by Captain Henry Jackson, distinguished separate signals from the Marconi transmitter on the Isle of Wight and from HMS *Hector*. This is the first recorded working of two stations simultaneously with one receiver in a ship at sea. Within a few days, Marconi made another spectacular demonstration by transmitting signals from Niton to the Lizard in Cornwall, a range of 196 miles, more than twice the longest range previously achieved by any radio transmission.

However, the very success of this transmission was to mean the end of the importance of the Isle of Wight as a centre for radio experiments. Once the practicability

of working consistently at ranges far beyond the optical horizon had been demonstrated, Marconi began the construction of a new station, with a larger and more powerful transmitter than Niton's, at Poldhu in Cornwall. This was to form the British end of the first transatlantic radio link. The major part of Marconi's experimental work was thus transferred to Cornwall.

There were thus three experimental radio stations in the island – or four including the equipment installed in the royal yacht – but, as the radio equipment of those days was light and portable, no permanent traces are left. Fortunately their exact positions can be defined with the aid of contemporary maps and documents.

### *The Site Today*

The Alum Bay transmitter is commemorated by a granite column in the grounds of the present Needles Hotel. A warning is necessary here. The hotel is not the same building as existed on this site in Marconi's time, and the memorial, despite its inscription, is not on the exact site of the original transmitter. A photograph of the station shows the transmitter to have been situated on the edge of the cliff and on the high ground somewhat to the left of the present path from the Needles Hotel to the beach. There were no low loss feeders available in the 1890s, and even ordinary copper wire was expensive in comparison with present-day prices, so it may reasonably be assumed that Marconi followed the usual practice of the period and sited the transmitter as near the foot of the aerial mast as possible. The memorial, however, is now well away from the cliff edge in the forecourt of the hotel – a much safer place for the visitors

who stop to read the plates on the column, but unfortunately rather misleading in the absence of any explanation.

The temporary station set up in the grounds of Osborne House can be located exactly, as the equipment was installed at Ladywood Cottage, a small house marked on contemporary maps. The cottage was roughly half-way between Osborne House itself and Osborne Bay to the north of the Swiss Cottage, and at an angle in the path around the edge of the woods between Osborne House and the sea.

Another warning is needed, about the site of Marconi's Niton station. The experimental transmitter was not set up at what is now the GPO transmitting station, below Niton village itself, but at Knowle's Farm, well outside the village. This farm is on the road from Niton to Watershoot Bay, and the transmitter was in the field immediately to the west of the lighthouse on St Catherine's Point. The site of the station is marked by a memorial stone, erected by Miss Kirkpatrick, daughter of the owner of Knowle's Farm, at her own expense.

### *Surviving Apparatus and Documents*

A few relics of the stations themselves are still in existence. Most of the surviving documents relating to the Isle of Wight stations are in the company's archives at Marconi House, Chelmsford. Some, including photographs, charts and Morse tapes relating to the signals received in the tug during the earliest Alum Bay trials, were exhibited at the Carisbrooke Castle museum in the summer of 1964 in connection with the meeting of the British Association at Southampton. Transmitters and receivers of the period are on display



at the Science Museum in London. The private message sent from HMS Vernon to Niton was recorded on a Morse tape, which was also later sent to the Science Museum, though it is not at present traceable there.

Very few records remain on the island itself, and the staffs of the local libraries and museums, understandably, do not often appreciate the extent or the importance of the Marconi trials. The trials made little impression on the local inhabitants, who could not foresee the importance which radio would one day have for them. They are hardly mentioned in the island newspapers, and provided little trade or employment, as the staffs at the radio stations were small and composed of skilled technicians recruited on the mainland. Marconi did not encourage uninvited visitors, and by the time that his name was well known, he had moved his main experimental apparatus to Cornwall.

Fortunately, there is a considerable quantity of written material concerning the Marconi trials. The most interesting document on the island itself is perhaps an account of the establishment of the Niton station which was written by Miss Kirkpatrick and is now in the scrapbook of the Niton Women's Institute. (See *Pioneer Wireless*, MM9, p.27) Another series of eye witness accounts is preserved in the diary of G.S. Kemp, Marconi's assistant, which is now at Marconi House. Marconi himself published various papers

on the trials in the journals of the leading learned societies, and the reports of the Army and Royal Navy experts who visited his stations are in the relevant files at the Public Record Office. This paper is based largely on the above sources.

The casual visitor to the island, however, is unlikely to be aware of the radio trials unless he chances to read the Alum Bay memorial. It is unreasonable to expect

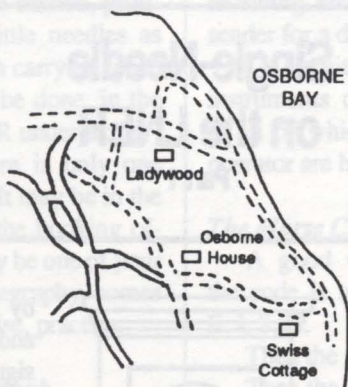
librarians and museum curators, excellent local historians, to be industrial historians as well. The staff of the Carisbrooke Castle museum, the most important museum on the island, do in fact appreciate the importance of Marconi in Isle of Wight history. But this organisation is run as a private trust and has neither the

finance nor the premises to establish an industrial collection on a permanent basis.

(Dr Pocock's original article, published in 1976, goes on to argue the need for a permanent exhibition on the Isle of Wight to record the island's important place in the early history of radio. Today, the Wireless Museum at Arreton Manor provides such a record. It is hoped to publish information about this museum in a future issue of *MM*.)

### Acknowledgment

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*The Osborne House station*

**I**N 1943 THE LONDON & NORTH EASTERN RAILWAY published a booklet entitled *Let's Send a Message by the Single Needle*. This was specially written for use at LNER Training Centres and for reference purposes after completion of general training.

Although it describes the practices of 1943, the single-needle goes back well into the previous century and the booklet gives a fascinating insight into a system of railway telegraphy in Britain which evolved from the earliest days.

The following extracts from the booklet relate to the use of the instrument itself. A further extract in a future issue of *MM* will cover message procedures.

## THE SINGLE-NEEDLE TELEGRAPH

Perhaps you have seen already a single-needle telegraph; if not, study the picture (Fig. 1.1).

A single-needle telegraph is a box-like affair with a little desk in front of it. Above the desk is a black needle. Below the desk is a wooden handle. Soon we shall learn that when the handle is moved to the left or right, the needle imitates it.

When the needle telegraph was intro-

duced in 1838, five dials with needles were utilised. A letter was signalled by pointing some of the needles one way and some the other. You can guess what a cumbersome system this was: there were not sufficient combinations of needle deflections to cover more than twenty letters of the alphabet.

Later Morse invented *his* alphabet, an arrangement of dots and dashes. When an RAF wireless operator signals back to base he uses the Morse code. The letter 'A'

by wireless is a short buzz and a long buzz. When we signal on the single-needle telegraph our letter A is one tap to the left with the needle and one tap to the right. So you see, one tap to the left equals a short buzz or dot in the Morse code, and a tap to the right equals a long buzz, or dash. The adoption of the Morse code for use in telegraphy, therefore, enabled the *multi-needled* instrument to be altered to one with a *single-needle*.

At first sight you may regard the telegraph as a complicated affair but actually it is a simple instrument; easy to operate, easy to 'learn'. It gives both visual and aural signals, that is to say, you can *see* the needle move to left or right or you can *hear* it, because there is

## Single-Needle on the LNER Part 1

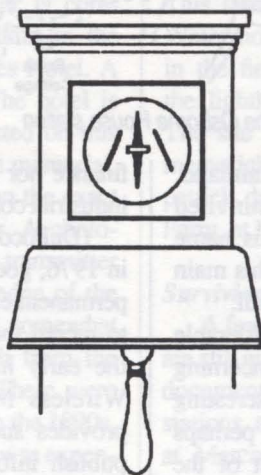


Fig. 1.1



a distinct difference between its metallic tap to the left or right. When you are proficient you will *hear* messages 'coming off' as ribbons of sound: you will be able to write words down as you listen to the spelling of others.

In a large telegraph office, where perhaps a score or more needles are ticking to and fro, the untrained listener hears only a continuous tinkling, like temple bells in the breezes of Burma. The trained, proficient listener hears the little needles as shouting messengers, each carrying word of something done, or to be done, in the working of the great LNER undertaking.

At many stations there is only one single-needle instrument. It may be in the signal box. It may be in the booking office. Telegraphy, then, may be one of your duties. Proficiency in telegraphy comes soon if you practise, practise, practise.

### *How to Operate the Telegraph*

The single-needle instrument is operated simply by the movement of the handle beneath the desk. The mechanism of the instrument is quite strong. Clasp the handle and move it smartly to the left or right – the needle will similarly respond. The illustration (Fig. 1.2) shows how the needle inclines always as the handle is inclined.

If you use a practice instrument and move the needle once to the left and once to the right, your fellow student will tell you that, on the receiving dial, the needle also moves once to the left and once to the right. Thus you both learn that the sending operator controls the needle of

both the sending and receiving instruments.

Now ask your fellow student to move over the needle on the opposite instrument to the right and hold it there for a second or so. You will find that, while that needle, and incidentally your own, are held to one side, it is impossible to send signals from your end. You can stop operation on a real circuit in this manner but it is permissible to do so only when you are receiving and you wish to interrupt the sender for a definite purpose.

(A circuit, by the way, is a string of instruments connecting several stations, at all of which signals sent by any one operator are heard at the same time.)

### *The Morse Code*

A good way to set about learning the code is to pick out the 'dot' letters: E, I, S, H.

Then the 'dash' letters: T, M, O.

Then the 'opposites': A & N; B & V; D & U; F & L; G & W; K & R; P & X.

The remaining letters are C, J, Q, Y, Z.

Practise individual letters at first. If another student is sending to you and you understand the letter telegraphed, give T (one to the right). If you do not understand, give E (one to the left). The sender will then repeat the signal.

Make up simple words. From the first two groups above, for example, you can produce the statement: I SEE

THE MOIST MOTH.

Remember that the Morse dot is one to the left on the needle; the Morse dash is one to the right on the needle.

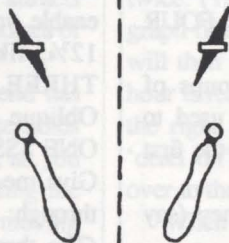


Fig. 1.2

## How to Practise Telegraphy Without a Telegraph

You do not need an actual single-needle instrument when you practise the Morse code. A good expedient is two spoons of different sizes held steady on the table with your left hand (Fig. 1.3).

By striking the spoons with a pencil or pen you can successfully imitate the sounds of a single needle tapping to left or right. Try it. You will soon know each letter's little tune 'by heart' – and by ear!

### How to Send Figures

Although the Morse code has ten further signs – one for the cipher (nought) and others for the nine figures – they are not used in needle telegraphy. For accuracy all figures are spelt. If you have to send the figures 1234 you first signal FI (think of 'figures intended') then spell ONE TWO THREE FOUR and lastly FF ('figures finished').

When signalling several groups of figures the full stop (.. ..) is used to separate them. FI is sent before the first group and FF after the last.

A number of pounds in money (say £20) is signalled thus:

FI L TWO NOUGHT FF

### The Affixes

The following signals, known as 'affixes' are used to save time. One or two letters are signalled to convey the meaning of a number of words.

G – Go on; T – I understand; E – I do

not understand, repeat; II – End of address; III – Full stop (signalled but not counted); FI – Commence figures; FF – Figures finished; GQ – Begin fresh line; SN – Message finished; MQ – Wait; KQ – Call me when you are ready; UQ – Go to other instrument (You use this signal only where there are two or more instruments in one office); LQ – Wait while I attend to a customer; HQ – How

are my signals? (If the needle moves feebly at your end you enquire of the clerk at the other end by the signal. The needle at that end may be moving perfectly); \*RR – Inverted comma; \*LL – Underline; \*KK – Parenthesis; RD – Message correctly received; SQ – End of this message, but I have another for you; MM –

fraction follows; MMM – Horizontal bar of division (The signals MM and MMM enable you to send a quantity, such as  $12\frac{3}{4}$ , like this: FI ONE TWO MM THREE MMM FOUR FF); SSS – Oblique stroke ( $1/9/4$  is signalled: FI ONE SSS NINE SSS FOUR FF); CQ – Give me switch for ...; TQ – You are through; IQ – Switch circuit occupied (The three signals CQ, TQ, and IQ are used only where there is an arrangement for switching one circuit into connection with another).

\*Regarding the three signals marked with an asterisk: although you must use a signal of this kind at each end of the word or words affected, the signal is counted only as one word, not two. Note these

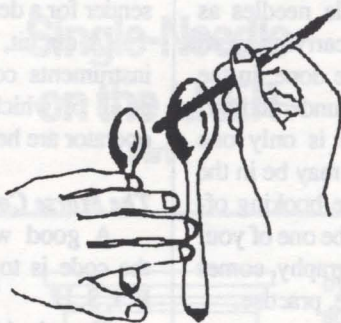


Fig. 1.3



examples: 'paid on' is telegraphed as RR PAID ON RR (3 words); very urgent as LL VERY URGENT LL (3 words); (private) as KK PRIVATE KK (2 words).

### *How to Call Another Station*

Before you send a message to another station you must be sure that the clerk there is ready, with his telegram forms and pencil, to read what you have to send. You must attract his attention. This is done by repeatedly sending his station callsign.

Near, or over, every telegraph instrument is a card showing the names of all the stations and offices on the circuit. Against each name are two, or at some stations three, letters. These letters are the station's callsign.

Suppose you are calling a station called Smithtown. The callsign is (shall we say?) ST. You send the signal ST repeatedly: ST ST ST ST ST. Each callsign has a 'tune' of its own. The 'music' is provided by the particular combination of letters making up the sign. Whatever one may be doing, the little exclusive tune attracts attention, even above the normal noises of a station or traffic office.

When the clerk at the other end has been attracted to his instrument he holds the needle over to one side. This, as you already know, prevents you sending the callsign any longer. So you stop moving the handle. The other clerk then signals ST. You, at Brownborough, send your callsign - BN - and follow it immediately with the prefix of your message. (You will learn a little later that the urgency of a message is denoted by its prefix.)

If the operator at the other end is ready he gives "T" and you go on with the rest of the message, word by word. After

each word the receiver gives 'T' or 'E' to indicate that he understands, or does not understand, what you have sent. If he gives 'E' you repeat the word.

If the receiving clerk is a good reader he will probably give 'G' when you 'offer' the prefix to him. Then you go straight on with your message, not waiting for his word-by-word acknowledgment. If he is too busy to take an ordinary message at the time you call, he sends 'MQ' (wait). You send 'KQ' (call me when you are ready). But do not wait too long before having another try to get your message to Smithtown.

### *The Daily Time Signal*

In order to ensure that all 'traffic' clocks on the LNER tell the same story, the telegraph is used to send out at 10 a.m. each day (except Sundays) a time signal by which the hands can be set.

At a minute before the signal is due your needle will tick from side to side, and then spell the word T-I-M-E once or twice. (This is done from the main telegraph office on each circuit). The needle will then stay over to the left. When the hour is reached the needle swings over to the right and spells T-E-N. The time is 'dead on' when the needle first swings over to the right.

When you receive the time signal you naturally watch your office clock and alter the hands as necessary as soon as you can. It may also be your duty to let other people know when the signal comes.

Where there is a bell-push in the office for operating a bell on the station platforms, it is the usual custom to keep it depressed during the whole of the time that the needle is over to the left. Immedi-

ately the time signal comes the bell-push is released, the platform bell stops ringing, and the station master or other person in charge, with an eye on the clock, notes what time it tells.

If you have to pass the signal along a telephone circuit or circuits, you send ten short rings, the first when the signal is given.

### ***When Things Go Wrong***

So high is the standard of maintenance that single-needle instruments rarely fail. If they do, it is sometimes a serious matter, especially if traffic communications are held up.

If your instrument 'goes wrong', it

does not help a bit to start tinkering with it. In fact, it may make things worse. So send at once for the Telegraph Lineman, whose name and station should be recorded for reference. You can do this by, perhaps, getting a message along the signal box telephone circuits or even by sending an Urgent Train Message on the next available train.

Repairs are part of the Lineman's everyday job, and he'll do them well when he comes.

*Extracts from the LNER booklet Let's send a message by the Single Needle are printed by kind permission of the British Railways Board.*

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376 pages, 9 x 6in  
Hardback £11.00 (UK): £11.50 (Eur/Sur)  
Paperback £8.00 (UK): £9.00 (Eur/Sur)

See opposite page for  
news of two new titles

**A**N ARTICLE IN A RECENT ISSUE of *MM* on Amateur Morse tests caused me to think of the time when I was Station Manager at Portpatrick Radio/GPK, and held the power of pass or fail.

Not long after moving to Portpatrick a test application form, duly affixed with the correct number of postage stamps, arrived through the post. At that time, for some reason best known to those in authority, this was the way the test was paid for.

Having recently been promoted, this was one of the moments I had dreaded, having had no training in how to conduct the test.

While rummaging through a filing cabinet one day I had found a dog-eared folder marked AMATEUR MORSE TEST containing several sheets of what turned out to be test papers together with the obligatory forms to fill in when it was all over. The examinee arrived on the said day at the appointed hour; I don't know who was the more nervous but between us we managed. He went away happy and I decided that I really needed to get a more accurate way of calculating 12 wpm than glancing at my watch. After that things didn't go too badly.

### *Scared Stiff*

I never ceased to be amazed at the age and range of people who came to take the test. Some I remember quite well, like the

cellist with a well-known orchestra who was off work with cellist's wrist (something like tennis elbow I think) and the old fellow who rang me up to see if he could come at short notice.

He was an Englishman living in Indonesia who was on holiday in the old coun-

try and wanted to get a British callsign. After the test he gave me his business card and told me to call in any time I was in Jakarta. Then there was the owner of a sweet factory, teachers, schoolboys, doctors, AA men

and the unemployed. Many came and went but they all had one thing in common; they were scared stiff. My wife could never get over this. 'It's only a hobby', she'd say.

The majority of people were of a standard to pass the test with no problems. They knew it and so did I, but put them at a desk with a blank piece of paper and a Morse key and they became gibbering wrecks. I tried many ways of making them relax. Some I showed around the station, some had to go outside for fresh air, some needed coffee or something stronger and one or two were physically sick, but somehow or other I managed to coax or cajole most of them to at least take the test, even if they failed.

Once they reached the stage of actually sitting down I tried to lull them into a false sense of security. On the pretext of giving myself some practice (as I did not

## **My Days as an Amateur Morse Examiner**

*by Brian Faulkner*



send Morse regularly), I suggested that the examinee might like to jot down what I sent. At the end of this I had sent all parts of the test and I'd say 'How was that?' Almost invariably they would have got it all and the look of relief when I suggested that we might as well call it quits, and take that effort as the exam, was a joy to see.

It did backfire at least once. I was busily sending away when, out of the corner of my eye, I could see that the fellow was not writing anything down. I stopped and asked how he was getting on, to which he replied 'OK, no trouble at all'. He was reading it in his head and it turned out that he was an ex-seagoing Radio Officer.

Some would never pass in a month of Sundays but you could tell these people the moment they started sending although it didn't stop them pleading for 'Just one more go!'

### No Spaces

One fellow turned up and had no problem receiving my Morse. The only trouble was he didn't leave any spaces between the words; it was one long line of letters. He made no mistakes and told me that he had taught himself using a tutor giving random letters and had never taken plain language.

The next bombshell came when he said that no-one had ever listened to his sending. This, I'm afraid, was blatantly obvious and unfortunately there was no

way he was going to pass that day. It turned out that he lived in a very remote area and had no contact with other amateurs. I was able to give him some addresses and a few months later he came back and passed.

Only once did a husband and wife take the test at the same time. Both were in good spirits but the wife passed and the husband failed. I was glad I wasn't in their car going home that night. A month later the husband was back for a second try but failed again.

One of the more interesting episodes occurred when an old man of 96 came with a young lad. After the lad had taken the test I chatted to the old boy and it turned out that he had been a Radio Officer before and during

the first world war, shipwrecked three times, who later worked for the Post Office. When I showed him some photographs of equipment from the 1921 period, his eyes lit up and he cheerfully told me he had actually used it, describing what each part did.

Unfortunately there was the odd occasion when you'd get a 'try-on' merchant. These were the ones who, for some reason, couldn't or wouldn't learn Morse but who thought if they pleaded illness or a disability they would get some sort of special treatment. One of these jokers even told me he was dying, although I know he was still with us several years later and I learnt that he had never been ill in his life.



... CELLIST'S WRIST...

## *Chindit Memories*

On the other hand there were those who were genuinely ill who had stuck at it for months and finally felt able to take the test. In exceptional circumstances we were allowed to go to the person's home and I remember making a round trip of some 160 miles to an elderly man who fascinated me with stories of his days in the Far East with the Chindits, who promptly burst into tears when I told him he had passed.

Another time I made a similar trip to a man who was obviously very ill. He was cheerful enough and passed the test with flying colours but died two weeks later. His wife told me that the only thing that kept him going was his determination to pass the test and once that had been achieved he went quickly downhill.

## *Only a Joke*

There were funny moments too, like the time a terrified driving test examiner arrived. He told me afterwards that he would feel a lot more sympathy for his own 'victims' from then on. A colleague of mine with a dry sense of humour was once asked by an examinee how much the fee was. 'Ten pounds for a fail, twenty for a pass' came the reply, at which point £5 notes came flying out of pockets and it took some time to convince him that it was a joke.

Coast stations used to get people trav-

elling quite long distances to take the test rather than go to a ship inspection office which might only take the tests on certain days, and where several people might be taken at the same time. They felt that we were perhaps more friendly and the whole experience a little less nerve-racking. That's not to say that occasionally we did not get parties.

## *All Doctors*

One such group came over from Northern Ireland on a day trip. There were nine of them, all hospital doctors, and my office, the only room in the building suitable for taking the test, was really only big enough to take one at a time. However, on this occasion I managed three at one go; one had the luxury of a spare desk, one leant on the window sill and the other perched paper on his knee. They all passed, leaving immediately to get the ferry back so that they would not be late for duty that afternoon.

Unfortunately testing was a time-consuming process and the fee received for each test came nowhere near covering outgoings. It was therefore no surprise when British Telecom eventually lost out to the RSGB who now administer the Amateur Morse test on behalf of the DTI.

*Brian Faulkner is Station Manager  
of Land's End Radio/GLD.*



**FISTS CW Club – The International Morse Preservation Society**  
*Aims to further the use of CW on the amateur bands, to encourage newcomers in the CW mode and to engender friendship within the membership. Open to all amateur CW operators and listeners, irrespective of speed and ability. Write to the Club Secretary, Geo. Longden G3ZQS, 119 Cemetery Road, Darwen, Lancs BB3 2LZ, for further information.*



# Your Letters

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## Mini MM Key-Meet

Last December I had the great pleasure of visiting two *MM* readers, Tom Luxmore G3AWL and Lee Grant G3XNG, both of whom have interesting key collections.

First I visited Tom in Easington, some thirty miles from my home, where he showed and demonstrated some of his keys, ranging from Speedex, Vibroplex, and the RAF Type D, to a little beauty marked PS5785A, with each key having its own story to tell. We then travelled north together to Morpeth where Lee and Margaret entertained us to a special lunch.

A detailed and leisurely look at Lee's collection opened up areas of speculation and debate. For me the *crème de la crème* was a sensitively restored Post Office Double Current key (sometimes referred to as a Silvertown key or a 9401) similar to the one displayed on the front cover of MM17.

One key, the Westclox 'No. 9 Key and Plug assembly', once again revealed the large variety in design derived from the humble WT 8 AMP key. Unlike other versions the arm and two bridges are formed from sheet metal and, perhaps most importantly, there are four symmetrical corner holes in the base for securing the key in the assembly. This contrasts with other keys fitted into the No. 9 Assembly which have the back right hole brought forward to clear the cord anchorage. Also unusual was the case, complete with knee straps, which was well rounded with no sharp corners.

The key which took my fancy was one made by Pye, described and pictured in 'Showcase', MM18, p.27. In addition to being absolutely beautiful, it was smaller than I had imagined it, being a little smaller than the P.O. 1056A (base size about 6 x 3 inches). Another interesting feature, not apparent from the picture, is its narrow arm, a little less than 1/4 inch wide.

Other keys looked at in detail included a Canadian key from the Wireless Set No. 48 (front cover MM18); a Marconi 365 (inside back cover MM17); two RAF Type D keys; several Swedish style keys (Naval, and one made by ITT); and a variety of Junkers and German WWII keys.

Unfortunately, time did not permit us to examine in detail Lee's substantial collection of semi-automatic and other keys but as I headed home I was able to reflect with great satisfaction on what had been a very special day.

*Jim Lycett G0MSZ, Darlington,  
County Durham*

## Cover Key Japanese

The key shown on the front cover of MM22 is a Japanese Navy key, c.1944. On mine, the translation of the label is:

'No. 2455.

Made in the 19th year after Shōwa.  
DAIKO DENKI COMPANY LIMITED  
FACTORIES'.

This one is the smaller of two similar patterns.

*David Couch, Wembley,  
Western Australia*

## Early German Wireless

German military equipment in WWI had quite a modern look and the transmitters used in their battle cruisers, etc., would, in appearance, be quite at home in any transmitting station today. Their U-boats carried spark and CW transmitters and were capable of sending back to Germany from off the US coast.

The Battle of Jutland was brought

about by Round, at his D/F station on the east coast, noting a slight difference of location of the German High Seas Fleet. A little known fact is that he intercepted the 'Z' senders. These transmitters were located up in the fighting top up the main mast. They used a spark frequency of 2000 against the usual German one of 1000, allowing them to be used at the same time as the main transmitters, locat-

## NATO Navy Key

The Morse key referred to by Colin Waters G3TSS in Readers' Ads (MM21, p.19), was manufactured by Fleming Instruments Ltd, of Caxton Way, Stevenage, Herts.

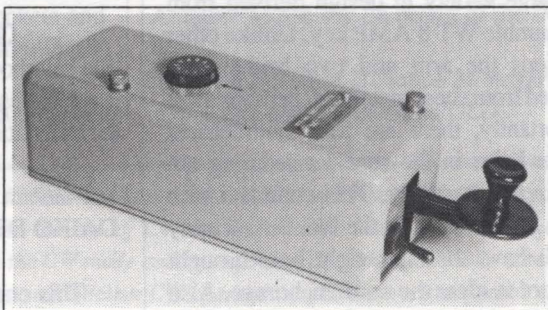
I first saw and handled this key on the Royal Navy stand at the last Radio and Television Exhibition held at Earls Court, London, in 1968. My understanding was that the key was made to a NATO specification, copied from an East German design, and was standard fit for NATO navies, mobile and shore stations, from the late sixties until the demise of W/T over recent years.

I have one of the original keys, produced in 1969, which comes out of mothballs on SKD occasions. The numbers on my key are the same as those mentioned by G3TSS (5805-99-580-8558) but the space for adding an individual serial number is blank.

**Brian Payne G4CJY,  
High Wycombe, Bucks**

*(Colin Waters has established from Lamerholm Fleming Ltd, successors to Fleming Instruments Ltd, that following takeover by the present company ten years ago, production of Morse telegraph keys was discontinued and all documentation relating to this product was destroyed.*

*Colin has also established that keys of this type marked I.M.R. were made by International Marine Radio. He is still trying to establish the meaning of P.E.S. on other keys. He believes that the contractor has either the initials P.E.H.L. or P.E.S. If anyone can help please contact Colin or MM. - Ed.)*



NATO key 5805-99-580-8558

Photo: Jim Lyett GOMSZ



ed well out of harm's way down below the armour belt.

These Z senders were used for inter-ship communication when in formation, etc. They were of quite low power and used frequencies around Top Band, which speaks well for Round's D/F receivers (2 triode RF stages, crystal detector, and audio).

The main German station, at Nauen, started life with a modest 12kW or so, developing by the end of the war into a 750kW sender – 750kW of quenched spark! It was intercepted here in Australia and also in New Zealand, and the famous German raider *Emden* copied it when well down the Indian Ocean. My guess is that they had on board one of the top-secret valved receivers which had RF stages, but I have never been able to verify this.

Very little is known in the UK about German wireless in WWI, or WWII for that matter. It's fascinating and puts things in their true perspective when you learn the facts. I'd love to have got hold of one receiver they used in WWII, for curiosity value if nothing else. This used an 11-gang tuning condenser!

I have a German friend here in Australia who was in signals in the war. Pre-war they went on 'schemes', as did our forces, and they used to send CW in the broadcast band. As he says, it was fun trying to copy through the BC QRM.

**Norman Burton,**

**Revesby, New South Wales**

*(MM would very much welcome memories, information or articles from our German readers about their experiences or the equipment they used in the past. If you think your English is 'not good enough' don't worry! We are expert in converting*

*'schoolboy English' into fluent English!*

*Incidentally, an article on the Nauen station is scheduled to be published in Radio Bygones in the near future. – Ed.)*

### Chinese Puzzle Solved

What was the Chinese telegraphist doing? (Letter from Olive J. Roeckner VE7ERA, MM22, p.47). He was operating a two-stick punch such as I myself operated when stationed for a brief period at Marconi House, London, some seventy years ago.

The device consisted of three parallel metal bars (keys) with a tape running through them; the operator held a rubber-tipped metal punch in each hand with which he struck the keys as appropriate. Striking the left hand key punched a dot, the right hand key a dash and the centre key a space.

In addition the struck key moved the tape the appropriate distance, i.e., one unit for a dot, three for a dash and (I think) two for a space. At Marconi House we ran the punched tape through a transmitter which on the busy London to Paris link operated at four hundred words per minute!

**Jack Sykes G3SRK, Slaithwaite,  
Yorkshire. (Age 90)**

### Readers Ads Work World-wide!

In response to my request for help with my 'MON-KEY', c.1950, in 'Readers Ads', MM21, I had one reply. This was from G6CJ who very kindly sent me 4 new valves as a gift.

**David Couch VK6WT,  
Wembley, Western Australia**

### Call the Novices Please

I am the Novice Manager for the G-QRP Club in which just about 90 per cent of

### Lorenz Style Key – British Ref!

Judging from the style of cover and cranked insulated arm with the typical German concave knob, the Lorenz key illustrated on the inside back cover of MM20 is similar to a key I obtained from a British surplus dealer. The key was accompanied by a Ministry of Defence release note dated 1974, from REME stores Donnington, and simply described as MORSE KEY, part No. ZA 54574. Could it be that they were having a WWII captured items clear-out?

The arm is of fairly thick pressed steel similar in shape to the American J38 or J41 keys but having a robust appearance like that of the Junker. It has micrometer screw thread adjusters and pin and cup type bearings. The fixed contacts (front and rear) are attached to pieces of flat spring material, cantilever mounted to give silent soft touch operation.

The unusual feature about the key is that it has appalling push-lock terminals similar to the type currently available in Tandy stores. The overall size of the cover (brown Bakelite moulding)

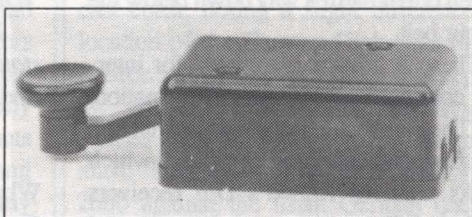


Photo: Jim Lycett

Photo: ZA 54574 key from REME stores (UK).  
Compare this with the photo in MM20

is  $3\frac{3}{4} \times 2\frac{1}{4} \times 1\frac{1}{2}$  inches high, with the arm/knob protruding from the cover a further 2 inches. My cover has two slots at the back for the wires while the Lorenz photo shows side exits. Nevertheless both mouldings, complete with small skirt, are very similar. Unlike the Lorenz key, however, neither the key nor its cover carry any identification marks.

**Jim Lycett G0MSZ,**  
**Darlington, County Durham**

*(Can any readers, in Germany or elsewhere, provide further information? Is this perhaps a standard design military key manufactured with slight variations by different makers? Can anyone explain how a German key was apparently held in, and released from, British Army stores? – Ed.)*

our operation is in Morse. For overseas readers who may not know about it, can I explain that the UK now has a Novice licence aimed mainly, but not exclusively, at the younger age group, which permits operation with low power on designated frequencies.

After undergoing a short period of

hands-on training by an RSGB registered instructor, the Novice acquires a callsign with the prefix 2 followed by E, W, M, J, U or I designating his or her regional location. For example 2W0AAI is located in Wales. The 0 signifies an HF and VHF licence (Morse test 5 wpm) and a 1 is for VHF only.



My role is to help or advise Novice members of the club on such matters as antennas, Morse, and choice and construction of projects, and I am privileged to have around 3500 active QRPers to call on if I get into difficulty myself!

All CW operators, whether low power or not, are asked to listen and call occasionally on 3.570, 21.130, 28.130 or 28.360MHz for the UK Novices. A good long slow call on 3.570MHz  $\pm$  usually does the trick!

*Dave Gosling G0NEZ,  
Hemel Hempstead, Herts.*

### **Trial Period**

I was interested in Roy Clayton's reference to a trial period for the QSO format of the new Novice Morse test, and the possibility that the same format could be used for the full 12 wpm test (MM21, p.31).

At the end of 1990 my club, the Hazelrigg ARC, in Newcastle-Upon-Tyne, in organising the new Novice 5 wpm course, decided to use the new format for the 12 wpm class as well. This was because a lot of time was taken after the 12 wpm test introducing CW procedures, abbreviations, simulated QSOs and punctuated plain language to those interested.

We use the (RSGB) Margaret Mills course as standard and I have extended each lesson to include mixed figures and letters in the form of random call signs, both UK and foreign, including the oblique stroke or slash '/' and all the figures 1 to 0; and each lesson ends with fully punctuated texts, including figures.

We tried this idea on our 1991 12 wpm Morse class and after one month at the club, and regular practice on 2 metres,

the members, given the choice, opted to continue with the experimental format.

Four weeks before the test date, we reverted to strict test format and a speed check showed that class members were receiving at 15 wpm with figures and 16 wpm with plain language. They also discovered how boring unpunctuated plain language and blocks of figures can be!

It would appear that change may be in the pipeline. It is so much more enjoyable for learners to send and receive in this format that we shall continue our courses for both the Novice and the full test 'in parallel' until further instructions are received regarding the format of the 12 wpm test.

*Ivan Sharkey G0CNZ,  
Gateshead, Tyne & Wear*

### **CW in Russia**

I would like to tell readers of *MM* something about CW operating in my country. For a long time, the USSR was a 'military' state and a lot of money was spent for military purposes. Many special schools were opened where you could be trained (absolutely free) for any technical speciality, including radio operating and Morse code, in preparation for army service.

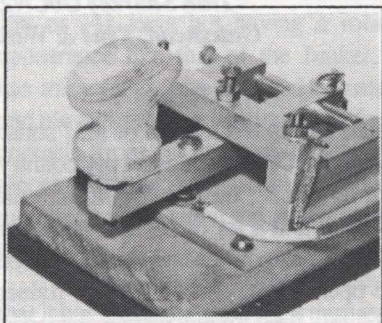
All young men reaching 18 years of age had to serve in the army for two years and most of the future soldiers wanted to be radio operators as they much preferred to sit in a warm shack rather than crawl in the snow with a gun! That's why there are so many high-speed CW signals from Russia with rude habits (such as not asking QRL? before using a frequency) picked up in the army! Nevertheless, many Russians are very skilful on the key.

There are four classes of licence over

## Specialised Knobs

Musing about key-knobs recently, I thought 'if my fingers are in the "right" position I must surely send perfect code – or at least, it should help! Why not have a knob adapted and designed to suit my fingers so that when keying they are in a normal, not stressed, position?'

My friend F6EQC did the development work and discovered that the fingers, mainly the forefinger and thumb, need some slight freedom of movement during long traffic. He designed and made a special knob (see photo 1) to meet these needs and I call this the V-knob. It is very comfortable in use!



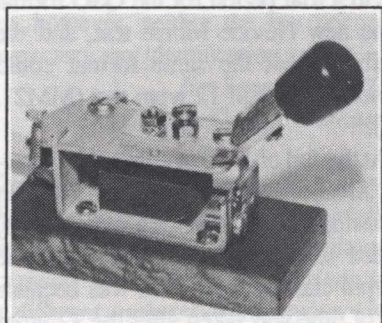
Photos: Dominique Bourcart

1. V-knob by F6EQC

Suffering from rheumatism, my friend also developed a horizontal bar knob and then a 'slope' knob (see photo 2). You hold this one like a pen and it seems to be tireless. The key is made from an old relay and in the absence of a key-lever the free movement is quite surprising at first. After a while, however, it works very well and it could be perfect for mobile operation.

I wonder if any other readers of *MM* have developed their own special-purpose key knobs?

*Dominique Bourcart FD1OEB,  
Poix-Terron, France*



2. Slope-knob by F6EQC

here. The 4th class is for novices on 160 and 10m, QRP, with no knowledge of CW required. For HF operation, like the UK, we have to pass a Morse test at about 12 wpm. Very few amateurs here can speak English but they do want to work foreign stations. This is easy on CW where all you have to know is just a few codes.

*Andy Troubachov UA3PIP,  
Tula, Russia*

## Bug User Group

In answer to the query from Jon Hanson (Readers' Ads, MM21, p.19) the Bug User Group was founded on 11 November 1987 by seven East German amateurs, all enthusiastic users of old semi-automatic keys. As at 16 April 1990 there were 12 members, including myself.

We had weekly skeds on Fridays at 1930 local time on 3.555MHz  $\pm$ , but events



in the former East Germany caused the skeds to cease. I talked to BUG member DL2HQB (previously Y62QH) recently and the skeds will probably start again soon although I am not sure if they will be on the same day and time as previously. The latest information can be obtained over the air from DL2HQB who is very active.

I agree with Jon Hanson's suggestion that more bugs are being used on the amateur bands. I can well understand this – the sound of a well-operated bug is the sound of a sweet melody!! It is much nicer, and has much more 'style' than any electronic keyer. Since 1989 I have worked some 40–50 bug-operators in 10 European countries.

Can I mention to all bug-operators that AGCW-DL holds a 'Semi-Automatic Key Party' on the 3rd Wednesday of each February from 1900–2030 UTC on 3.540–3.560MHz. This is a very nice contest and as it only lasts for 1 hour 30 minutes anyone interested can surely afford the time!

Incidentally, with reference to 'What Became of EY EN TOC BARRED' (MM18, p.14, and later issues), I learned INT barred as 'a question' in the Royal Danish Navy in 1957.

**Jens Henrik Nohns OZICAR,  
Bording, Denmark**

### **Learning to Send**

It is popularly believed in Australia (*and elsewhere – Ed.*) that the way to approach sending is to go out and learn to receive first and then, and only then, think about sending. This is against all common sense. I think I can reasonably claim to be something of an authority on the subject because I was a professional telegraphist and have spent many hours actually

pounding a key or a typewriter.

It is essential when learning Morse to learn both receiving and sending simultaneously. As any educator knows, the more ways a subject impinges on the pupil's senses the better the learning process.

When I started learning, my Morse instructor would send to me, and would announce the name of the signal he was sending. I was then required to vocalise it while he sent it again. Then he would send while I wrote down what I was receiving. I then took my place at the key to send to him, naming the letters, etc., as I sent them.

By this method the sounds and rhythms of the signals were imprinted on my brain by several different methods and so the learning process was most effective. The only way to learn Morse efficiently is on a one-to-one basis, i.e., one teacher to one pupil, although I realise this is an ideal situation which is not always possible.

The first thing an intending 'Morsiac' does is buy a key, and he is very soon tempted to start pounding it in imitation of what is not necessarily good Morse. He should start to key early, but only under supervision.

When teaching Morse classes here, I advised pupils on the first night, 'Now any of you who have your own keys (and most of them had) ... if I hear of any one of you even thinking of touching a key outside this classroom I will rip your bloody arms off... if you want to become good CW men (or ladies) you will not touch a key until I tell you that it is OK for you to do so.' I can happily report that I turned out some pretty good operators by this method.

**Gordon Brown VK1AD,  
Manuka, ACT, Australia**

# Just rambling. . .

DOES ANY READER know about 'Burmese Morse'? Ted Jones G3EUE has found a reference to its use on the Indian Railways when messages were sent in a mixture of 'English' and 'Burmese' Morse, with each change of code prefixed by a string of dots. I will be pleased to hear from anyone who can provide further information on this intriguing system.

## Translation Needed

Can anyone help with some translations from French to English please? I have some interesting material on file with English summaries but would like some help in expanding these before publication in *MM*.

## Key Survey

The survey of Keys WT 8 Amp is going well and so far I have identified nearly 60 versions made in six different countries. Many readers have already written to me, but if you have one (or a dozen!) of these keys and have not yet sent me details please contact me for a survey form.

As part of the survey, I am trying to ascertain the full name (and/or original address or location) of the following

makers, A.M.C., C.E.L., Clipsal, H & C, LMK, N.C. Co., Pye, and T.B. & S., if anyone can help?

Also, what is the meaning of the circled C usually shown above or below the ZA reference number?; the letter 'N' sometimes stamped on the arm of a key?; and 'PX'?; and what type of equipment was used with the Unit Operator No. 1; Key & Plug Assembly No. 19, Key & Plug Assembly No. 8, and Key & Plug Assembly No. 6?

Finally, does anyone have a copy (or copies) of the specification for the Key WT 8 Amp in any of its versions?

## CMOS Super Keyer II

Has anyone got one of these intriguing keyers as described in November 1990 *QST* and the 1992 *ARRL Handbook for Radio Amateurs*, either in its kit version or ready-made as the Logikey K-1 or Logikey K-1 version 2?

If so, please send me details and let me know how it performs. If more than one report is received this will help to build up a composite review to appear in *MM* at the earliest opportunity.

73, Tony G4FAI

## BACK ISSUES

Copies of Issues Nos. 19-22 are still available, price £2.20 each to UK addresses, £2.25 overseas.

ALL OTHER ISSUES ARE  
NOW OUT OF PRINT

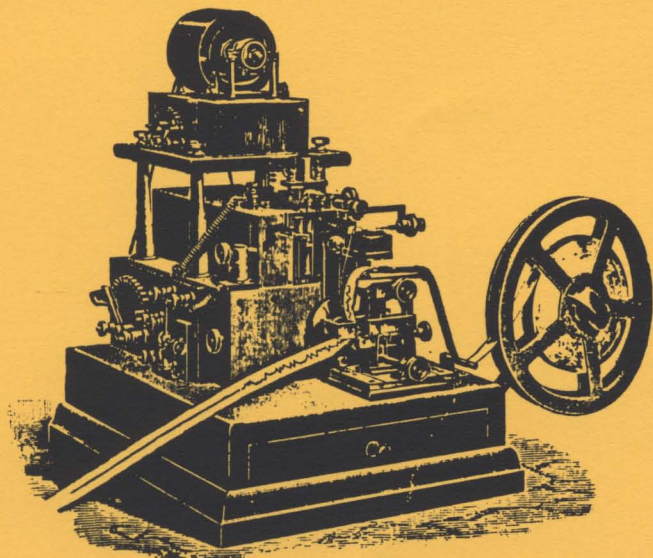
Morsum  
Magnificat

## IN THE NEXT ISSUE

'The Thin Red Line'  
'Why Farnsworth?'  
'Radio & Railway Morse in  
Canada'  
AND LOTS MORE!



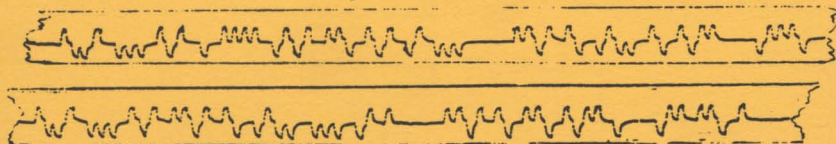
PORTHCUENO TELEGRAPH MUSEUM.



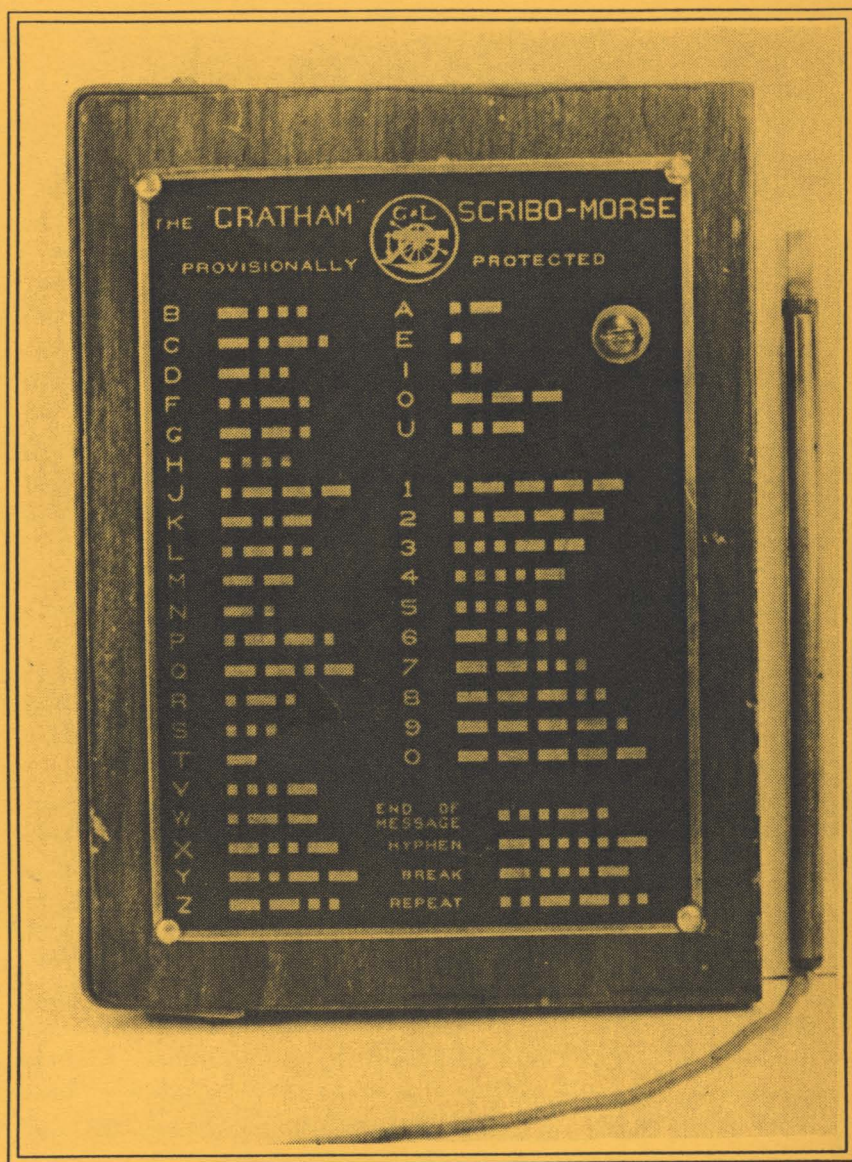
a b c d e f g h i j k l m

p q r s t u v w x y z

Siphon Recorder Alphabet.



KELVIN (MUIRHEAD) SIPHON RECORDER with SAMPLE SIGNALS



*'Scribo-Morse', c.1920, by Graham & Latham Ltd, London SW10, for 'rapid learning' of Morse. See MM19, p.18, for more details*

*Collection/Photo: Tony Smith G4FAI*