

Number 81 – June 2002

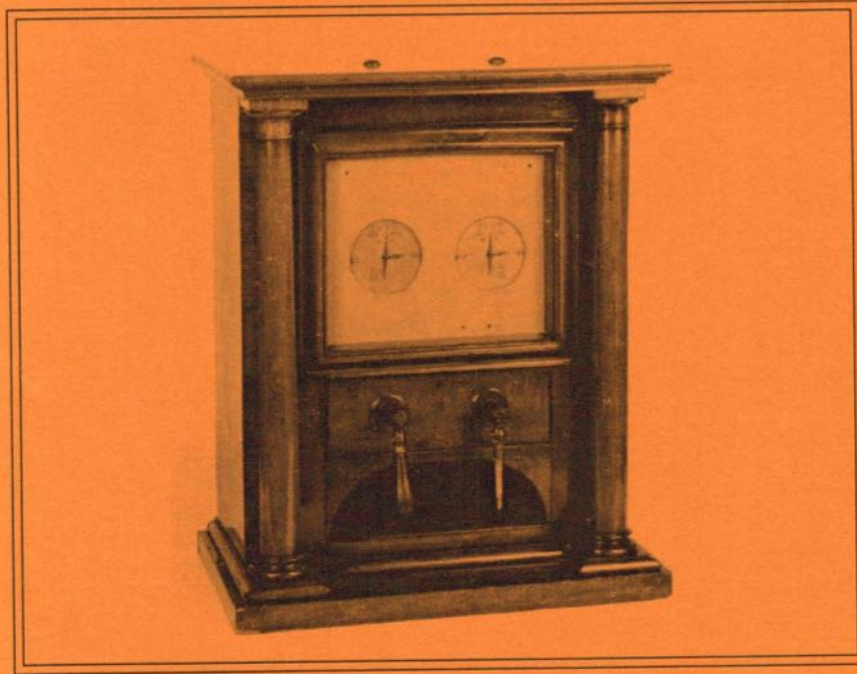
Flying  
the flag  
for  
Morse

# Morsum Magnificat

ISSN 0953-6426

£2.75

*The Morse Magazine*



*Cooke & Wheatstone 2-Needle Telegraph*



The International Journal of Morse Telegraphy

Flying  
the flag  
for  
Morse

# Morsum Magnificat

**EDITORIAL AND  
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*MORSUM MAGNIFICAT was first published as a quarterly magazine in Holland, in 1983, by the late Rinus Hellemons PA0BFN. It has been produced four, then six times a year in Britain since 1986, and up to January 1999 was published and edited by Tony Smith, G4FAI and Geoff Arnold, G3GSR. 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.*

**EDITOR:** Zyg Nilski, G3OKD

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MM home page – www.MorseMag.com

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Printed by Hertfordshire Display plc, Ware, Herts

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**ANNUAL SUBSCRIPTIONS (six issues):**

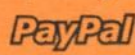
UK £15.00

Europe £17.00

Rest of the World £20.00 (US \$30 approx)

*All overseas copies are despatched by Airmail*

\* Prices in US dollars may vary slightly with currency exchange rates and commission charges



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This is printed on the top line of the address label.

Also, we shall jog your memory with a renewal reminder included with that final issue.

**MM Back Issues**

Issues Nos. 34,35 and 38-80 available from the

Editorial offices (see top of page). Price including postage £2.75 each to UK; £2.95 to Europe; £3.25 (US \$5) Rest of the World by airmail. Deduct 20% if ordering 3 or more.

**FRONT COVER**

This very exceptional and historic telegraph is the Double Needle Telegraph by Cooke & Wheatstone of circa 1840. It came soon after his very first telegraph in 1837/38, which was a 5-needle device. It was the very first electrical telegraph in several European countries (like Belgium) and preceded the Samuel Morse 1844 telegraph.

Photo/Collection: Fons Vanden Berghen, Halle, Belgium

## Comment

A number of readers who do not have access to the internet have commented on the increasing number of references to world-wide-web sites and e-mail addresses which they cannot take advantage of. MM is a complete publication in itself but inevitably news items in particular have to be edited to fit the space available and increasingly contributors provide references to web sites where additional information is available. The information content that is published remains the same whether or not web pages are given but I appreciate the frustration of wanting more without having the means of access and, whenever possible, am glad to help.

PLEASE NOTE THAT THE MM OFFICE WILL BE CLOSED BETWEEN 22<sup>RD</sup> JULY AND 7<sup>TH</sup> AUGUST.  
*Zyg Nilski, G3OKD*

## Contents

2	News	
7	Enigmas at the Dayton Hamfest	<i>by Tom Perera</i>
8	The Deal Telegraph	<i>by Fred Knight</i>
10	The Omnigraph Instruments – Part 2	<i>by David R. Pennes, M.D.</i>
18	Receiving SAQ with No Active Devices	<i>by Jim Moritz</i>
22	MM Bookshelf	
24	Showcase	
26	Women and Early Telegraphs	<i>by Tony Smith</i>
32	MM Binders	
33	A Mystery Key-on-Base	<i>by Peter Holtham</i>
36	Morse Software / Calibrating Keyers / The JPS NIR-12	<i>by Dr Gary Bold</i>
42	Info Please!	
44	Your Letters	
47	Readers Ads	

## Adverts

6	G-QRP Club
6	Morse Enthusiasts Group, Scotland
17	The Radio Officers Association
17	The Art & Skill of Radio Telegraphy – by William G. Pierpont, NØHFF
32	Radio Bygones
41	Fists CW Club – The International Morse Preservation Society

# News

## TASRT Now in Giant Print

A limited quantity of a new giant print version of *The Art and Skill of Radio-Telegraphy* by William G. Pierpont NØHFF is available from Radio Amateur Educational Society (RAES), Canada.

The GIANT PRINT book is 7 x 11 inches, printed in two columns with a coil binding so that the book will lie flat. The only down side is it doubles the production and mailing costs, however, it has been produced in response to genuine customer request.

RAES uses Canada Post air-mail with a typical delivery time of 7 working days after receipt of order. Please send your request to: Dave Clarke, 8607 - 34A Avenue, Edmonton, Alberta, Canada - T6K 0B9 and be sure to include your return mailing address. The prices are:

\$27.00 USD USA Delivery  
\$32.00 USD International Delivery  
\$40.00 CDN Canadian Delivery  
£22.00 GBP UK Delivery  
€34.00 EUR European Delivery  
\$56.00 AUD Australian Delivery  
\$65.00 NZD New Zealand Delivery

Payment is welcome by cheque, money order or IRC in the correct amount payable to Dave Clarke or via PayPal using account: raes@sas.ab.ca NOC.O.D

2

orders will be accepted.

The compact version (5.5 x 8.5 inch) of the book continues to be available. For information on this see the advertisement on page 17 in this issue.

*(Information Dave Clarke, VE6LX, RAES)*

## WRC-03: DARC Poll in Favour of Morse

In February the Deutscher Amateur Radio (DARC), Germany's national amateur radio society, asked its members to vote on the retention or abolition of the Morse Code requirement for HF licenses. The results show a majority in favour of a retention of the CW examination.

While the heads of DARC might have been taken by surprise (they favoured a no-code position), its membership voted differently. DARC's board of directors will therefore have to argue for a retention from now on, be it within IARU or in discussions with the German national telecommunications administration.

Martin Hengemuehle, DL5QE, Chairman of the Deutscher Telegrafief Club (DTC) said, "Personally I rather

*MM81 - June 2002*

would like to know what a similar polling would result if taken in the USA and other countries. It could be that the IARU recommendation is based on a few individuals who appear to be masterminding a no-code campaign."

The results of the DARC membership polling on this can be seen at DTC's web site: [www.muenster.org/dtc](http://www.muenster.org/dtc) then on "News".

(Information: *Martin Hengemuehle*)

## Swiss HTC - QRP Sprint

The HTC (Helvetia Telegraphy Club, Switzerland - HB9HC) is organising the Swiss HTC - QRP - Sprint Contest to be held on the second Saturday in September from 13:00 - 19:00 UTC.

The objective is to activate the short wave bands with QRP and work stations for the HTC and USKA diploma.

It is open to all properly licensed amateur radio operators, especially QRP stations. Operation is in CW (A1A) on the following amateur bands: 3,520 - 3,570; 7,020 - 7,040; 14,020 - 14,070 kHz. Stations can be worked only once per band:

**Entry Classes:** VLP Very low power with a maximum of 1 Watt output, QRP with max. 5 Watt output and QRO with over 5 watts output.

**Call:** "CQ HTC TEST"

**Exchange:** RST / Class / Kanton, Province, DOK, etc. / first name  
e.g. 579/QRP/ZH/Max or 569/VLP/C12/  
Gerd

*MM81 - June 2002*

**Scoring:** Each complete QSO is scored as follows:

QSO with "VLP" Station 3 points.

QSO with "QRP" Station 2 points.

QSO with "QRO" Station 1 point.

**Contest Total:** The sum of all QSO points times the class bonus

VLP x 3, QRP x 2, QRO x 1 will give the CONTEST TOTAL.

**Logs:** The log sheet and the cover sheet can be obtained from the contest manager or are available for download at [www.htc.ch](http://www.htc.ch). Please use only original log sheets.

**Score List:** There will be one result list which will be in the "Old Man" magazine from the USKA. It will be available at the HTC homepage, too. Participants who include a self addressed envelope (stamped or IRC) in their submission will get a score list direct.

**Log Submission:** Sending the log is what counts. All log entries must be received 30 days after the Sprint to be considered valid. Logs not send within time will be considered check logs. Please do not send E-Logs.

**Contest Manager:** Hans Tschärner, HB9XY, Grätzlistr. 1, CH-8152 Opfikon/ZH Switzerland.  
e-mail: [HB9XY@bluewin.ch](mailto:HB9XY@bluewin.ch)

## WRC-2003 Venue Moved

World Radiocommunication Conference 2003, at which the requirement for Morse code proficiency for access to amateur bands below 30 MHz is to be decided has moved venue. Due to economic considerations, the Venezuelan National Commission of Telecommunications has

3

advised the International Telecommunication Union (ITU) that it will be unable to host WRC-2003 as originally planned.

International conferences of this size normally takes a considerable time to plan and organise but the ITU staff have managed to re-arranged the Conference to take place in Geneva from June 9<sup>th</sup> until July 4<sup>th</sup>, 2003.

*(W5YI Report)*

## SAQ on the Air Again

The annual transmission from Grimeton Radio/SAQ in Sweden with the Alexanderson alternator on 17,2kHz took place on Sunday the 30th of June. The station building was open to the public during transmission. Those who heard the transmission can send a QSL report to:

SM6NM, via Swedish Amateur Bureau (SSA) or  
via mail to Alexander - Grimeton Veteranradios Vaenner, Radiostationen, Grimeton 72, SE-430 16 Rolfstorp, Sweden or  
e-mail [info@alexander.n.se](mailto:info@alexander.n.se) or  
fax +46-340-674195

QSL-cards to "SAQ" are not possible via Swedish Amateur Bureau (SSA) because SAQ is a commercial call sign and not a member of SSA. When sending a QSL to "SAQ" also please add a postal address, for the same reason. SAQ can only send QSL-cards direct and not via the bureau.

*(Information: Lars Kålland, SM6NM)*

4

## EUCW/FISTS QRS Party Results

Once again an interesting set of logs were received by Keith Farthing, MØCLO, Contest Manager for EUCW/FISTS 2002 QRS Party, although not as many as hoped for. What was apparent from the logs was that most people enjoyed the event again and included some new callsigns.

This year the eldest entrant, Dick/G8NT went one better than last year and won the event. The score Dick achieved was nearly 11,000 higher than last year's winner and more than double his last years score. It goes to prove that with some effort QSO's can be found and good scores assembled.

Congratulations to all the certificate winners and especially GØEML, Ray, for winning the "Most Readable Morse Heard" during the event. It was interesting to note that, like last year's winner of this title, this was Ray's first contest. The certificate winners were:

### Class A

Callsign	Total Score
G8NT (FISTS)	27,232
IK2RMZ (AGCW)	9706
G3HZL (FISTS)	9576
GØEML (FISTS)	9480

### Class B

G4FAI (FISTS)	3024
HB9OU (HTC)	732
OK2BMA (OKQRPC)	676

*(Keith Farthing, MØCLO, FISTS Contest Manager)*

*MM81 - June 2002*

## Armed Forces Day at Fort Verde, Arizona

The Armed Forces Day was held at Ft Verde, Arizona, Saturday, 18<sup>th</sup> May, 2002.

Re-enactors, Trooper Roger Fair and Sgt. Madison Walker, both of the 10th Cavalry E. Company, Indian War period were photographed with a heliograph. The 10th Cavalry were all black (except for the commissioned officers). These black soldiers were known by the Indians as "Buffalo Soldiers", so-called, it is believed, for their black, often curly hair.

The second picture is of Dennis and Mrs. Eaglestone, of Phoenix. Dennis is



enjoying a "hands on" practice, flashing a distant reflector with the Heliograph.

*(Information: James Riddle)*

## Historic Arizona Heliograph Stations Endangered

Three Arizona Heliograph Stations endangered: Fort Verde, Tubac, and Cochise Stronghold (Fourrs Ranch Station) according to information I received from Fort Verde.

Two Arizona Parks that were 1880's heliograph stations are still being considered for closure due to legislative budget constraints.

Tubac (north of Nogales, Arizona/Mexico) was the Western Terminus for the 1886 (Geronimo Campaign) heliograph system. Fort Verde (north of Phoenix) was "on-line" in 1890.

In addition, Cochise Stronghold in southeastern Arizona is endangered by the proposed construction of a monastery. The Fourrs Ranch station was located on a peak in the stronghold in 1886, and was sometimes referred to as the "Cochise Stronghold" station.

*(Information: James Riddle, Prescott, Arizona AZ USA 86305-5036, Heliography website:*

*http://www.cableone.net/kd7aoi/)*

## Revised AGCW Award 2000

AGCW-DL, CW Activity Group – Germany, has announced a revised version of its New Millennium Award: Applicants are required to reach a score of

2000 points for CW (A1A or F2A) QSOs worked with AGCW members since January 2000.

Scoring is as follows:

Each AGCW member worked counts 20 points

Each AGCW club station worked counts 50 points.

The club stations are: DFØACW, DFØAGC, DKØAG, DLØCWW, and DLØDA.

Each AGCW member number can be claimed only once.

To obtain the award, send a log excerpt to:

Andreas Herzig, DM5JBN (AGCW 1893), Bergring 5, D-08129 Oberrothenbach, Germany.

E-mail: [agcw2000@agcw.de](mailto:agcw2000@agcw.de)

Fee: Euro 5 or USD 7

Please note: The previous version of this award was limited to QSOs in the year 2000 only.

The new version does not have a date limit

*(Information and translation from Martin Zurn, IK2RMZ.)*



### G-QRP Club

The G-QRP Club promotes and encourages low-power operating on the amateur bands with activity periods, awards and trophies. Facilities include a quarterly magazine, Morse training tapes, kits, traders' discounts and a QSL bureau. Novices and SWLs welcome.

Enquiries to **Rev. George Dobbs G3RJV, St Aidan's Vicarage, 498 Manchester Road, Rochdale, Lancs OL11 3HE.** Send a large s.a.e. or two IRCs

### THE MORSE ENTHUSIASTS GROUP SCOTLAND



MEGS was formed in 1991 to encourage the use of Morse, especially by newcomers. Regular skeds are held using our callsign 'GMORSE' each Monday and Thursday from 7 until 9 p.m. (local time) around 3.530MHz. Among other services, we offer Morse practice tapes free of charge, other than postage. This offer is now also available to *MM* readers. Membership is open worldwide, the 'Scotland' in our title simply shows place of origin. Lifetime membership £1.00.

Details from Secretary: **G.M. Allan GM4HYF, 22 Tynwald Avenue, Rutherglen, Glasgow G73 4RN, Scotland.**



## Enigmas At The Dayton Hamfest

by Tom Perera W1TP\*

In addition to his display of hundreds of unusual telegraph keys, Tom Perera, W1TP brought a selection of Enigma machines to the 2002 Dayton hamfest. As he has done in the last three years, he

displayed them and offered talks and demonstrations of their operation every few hours throughout the hamfest.

\*Tom Perera, W1TP, Email: [tom@w1tp.com](mailto:tom@w1tp.com)  
Telegraph Museums: <http://w1tp.com>



*The model "K" Enigma with remote light panel, a typical German Naval telegraph key made by Junker, and the Swiss NEMA with remote light panel.*



*The 3-rotor Army Enigma, the UHR box, and the Marine 4-rotor Enigma.*



*From left to right, Two small cipher machines, a German 3-rotor Army model "A" Enigma machine, an UHR box used to facilitate programming the plug board, a Marine 4-rotor model "M" Enigma machine, a 4-rotor (one is the rotatable reflector) model "K" Enigma with remote light panel, and a 1947 Swiss NEMA with remote light panel.*

## The Deal Telegraph

*by Fred Knight G4GAN*

The 'Telegraph' public house located on the corner of Telegraph Road and Hamilton Road in the town of Deal, Kent recently had a new sign erected. It depicts what appears to be a ship's radio operator using some strange Morse key with a peculiar finger action. Unfortunately, the artist of the sign did not check their history before starting work resulting in artistic licence. The railway line runs parallel with Telegraph Road, and was the route of a Post Office

electric telegraph line installed in 1865, between Deal and the Port of Dover, hence the name of the road and the pub.

This was not the first Deal telegraph, in 1796 the first Admiralty shutter telegraph linked Deal to the Admiralty in London, and was in use for about twenty years. In 1820 a coastal Semaphore telegraph system was set up during the rampart smuggling period with one station located at Deal. This system lasted until 1842, but might still be useful these days!



*The Telegraph public house*

The first relay station from Deal of the Shutter telegraph was sited at a farm, on high ground, just over four miles west of the town at Betteshanger. The farm to this day is still called Telegraph Farm on Ordnance Survey maps.

During the Napoleonic Wars Deal contained a major Naval Yard, although, not a port, to supply all the wooden ships of war anchored in The Downs with victuals and personnel. The Downs is a sheltered anchorage, providing there is not a North East wind blowing, between the coast and the dreaded Goodwin Sands, known as "The Shippe Shallower", some six miles off shore.

In addition to the telegraphs Deal housed a Lloyds signal station and a Time Ball Tower in its maritime history. The Time Ball Tower still stands and was linked to Greenwich Observatory by electric current to give accurate time to ships off shore, superseded by radio in 1927.

*MM81 – June 2002*



Hamilton Road, mentioned above, was named after Lady Hamilton and her reputed goings-on with Lord Nelson within the town.

**References and further reading:**

- The Museum of Retro Technology.* <http://www.dself.demon.co.uk/museum/museum.htm> - Optical Telegraphs - Admiralty shutter telegraph. [this website is worth a visit]
- Classics of Communication* - Fons Vanden Berghen - 1999 [available from MM]
- Deal, Sad Smuggling Town* - Gregory Holyoake - 2002 [just published ISBN 1 85770 246 8]
- The History of Deal* - John Laker - 1917 [O of P, local library ]
- The Goodwin Sands* - George Goldsmith Carter - 1955 [O of P, local library ]
- Discovering Deal* - Barbara Collins - 1969 [O of P, local library ]

## The Omnigraph Instruments - 2

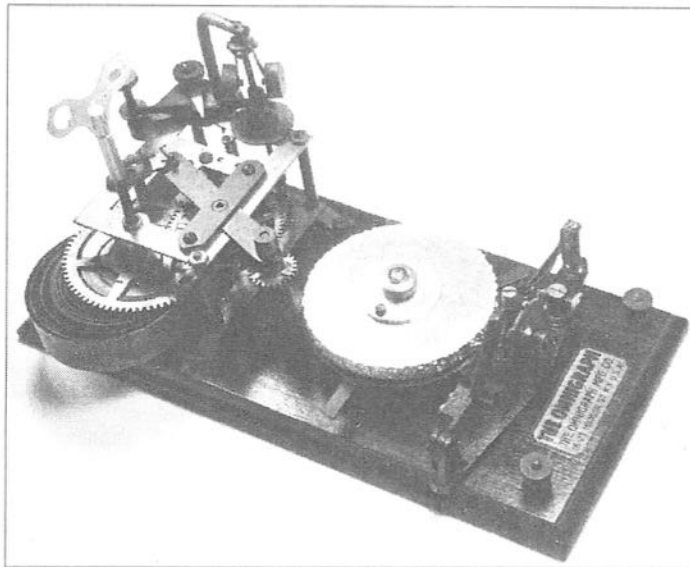
by David R. Pennes, M.D.  
WA3LKN

**T**HE 5 DISC MODEL was designated "Omnigraph No. 2 Junior" in the 1924 J.H. Bunnell catalogue. The five disc model (Figure 12) was probably the most popular model<sup>4</sup>, and incorporated the clock motor, a stack of 5 discs, and a cam mechanism to move the stylus from one disc to the next higher disc. When the stylus arrived at the highest disc, it would travel down the stack again from the highest disc to the lowest disc and then ascend again.

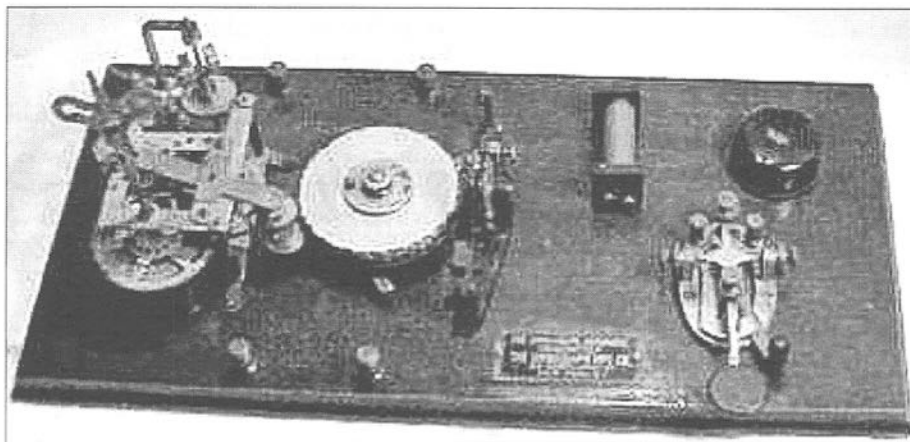
An adjustable mechanism allowed the user to decide whether to play the

entire disc before moving to the next disc in the stack, or to play a segment of the disc before moving to the adjacent disc. 1/5, 2/5, 3/5, 4/5 or the entire disc could be played before moving on to the next disc.

By allowing less than a full disc to play before moving to the next disc, the user could create non-repeating messages much longer than the sum of all of the characters on the 5 discs. For example, if the user wished to play only 2/5 of the disc before moving on to the



*Figure 12: "Omnigraph No. 2 Junior" is the company designation for this model, and is reported to be the most popular model sold<sup>4</sup>. A buzzer was included in the purchase price of \$12.50, or for \$14 the device came with a key and sounder, battery, wire, and a learner's manual*



**Figure 13:** Omnigraph No. 2 Junior with integral buzzer, key, and provision for use with earphones.

adjacent disc, then when the disc reached the highest level, it would begin to descend down the stack of discs again, and would play a *different* 2/5 segment of each disc on the way down.

At the lowest disc, the stylus would begin to ascend the stack of discs again, this time playing a 1/5 segment of the disc that had already been played with the last 1/5 segment of the disc that not been played. This ingenious pseudo-random character generator design would allow continued playing of different 2/5 disc segments for many, many hundreds of characters before repeating the message. By adjusting the device to change discs after 1/5 of a disc, then 2/5, 3/5, 4/5 or a complete disc, students could produce a nearly infinite number of non-repeating characters before repeating.

Of course shuffling the disc order, flipping the discs over, or rotating one or more of the discs 'out of phase' with each other would allow even more variety. Nevertheless, students may have relatively quickly memorized segments

of discs, diminishing the utility of the device as a learning tool.

### Other 5 Disc Models

The company also manufactured a 5-disc device with a key and buzzer (Figure 13). Advertisements for the 15 disc version of this device show earphones being used. The small cylindrical object next to the buzzer is a primitive coupling transformer for use with the earphones described in a c.1930 company catalogue as "induction coil #21".

The primary winding is in series with the buzzer, and the secondary is connected to the earphone terminals. The audio heard in the earphones would be the same frequency as the buzzer and would be expected to mimic the raspy audio quality of spark transmitter signals of the era. A similar coupling device is present on the Natrometer (Figure 2 in Part I of the article), and is also present on a similar device advertised in a c.1919 Gamage catalogue. The buzzers included on the Omnigraph devices so equipped

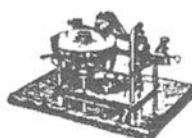
were almost certainly manufactured by Signal Electric Company of Menominee, Michigan.

Another version of the 5 disc model had the discs stacked on top of the motor (Figure 14) in a compact arrangement. As best as can be

manufactured for use by the New York Wireless Institute, and which bore their name (Figure 16). Although the New York Wireless Institute was a study-at-home correspondence school, advertisements mention an on-site 'post graduate' course. It is unknown how

many students actually studied at the 'campus'. Of note, the address of the New York Wireless Institute was 258 Broadway. Between about 1911-20 the Vibroplex Corp. factory was located directly across the street at 253

**Learn the Code at Home With the Omnigraph**



Morse and Wireless—taught at home in half usual time at trifling cost. Omnigraph Automatic Transmitter will send, on Sounder or Buzzer, unlimited messages, any speed, just as expert operator would. Adopted by U. S. Govt. and used by leading Universities, Colleges, Technical and Telegraph Schools throughout U. S. Send 6c for catalog. **OMNIGRAPH MFG. CO., 13M Hudson St., New York**

Figure 14: Compact 5-disc device. Advertisement from an issue of QST c.1920's

determined, there was no separate model designation for this device. A version of this model included a buzzer and key (Figure 15) similar to Figure 13, and was

Broadway. Students enrolled in the Wireless Institute 'post graduate' course of study wishing to purchase bugs could conveniently do so at the Vibroplex

factory. Of interest, a c. 1930 Omnigraph catalogue listed Vibroplex bugs for sale including the #4 model ("Blue Racer") for wire work and the #6 model ("Lightning Bug") for wireless work.

A typical 5-

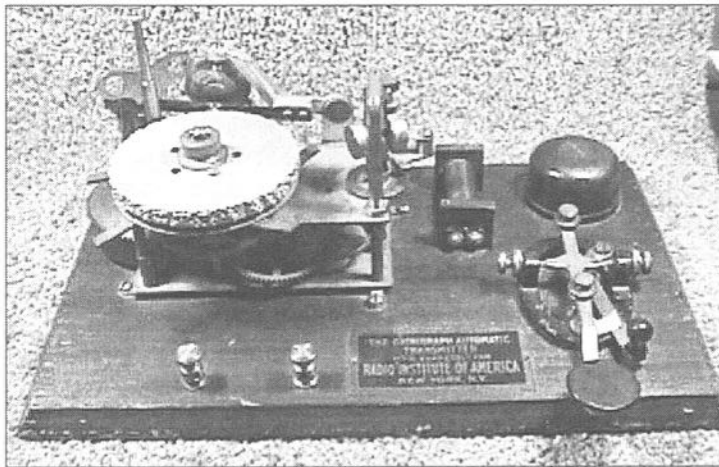


Figure 15: Compact 5-disc Omnigraph with integral key and buzzer made for the New York Wireless Institute. (Photo courtesy of Mr. Lynn Burlingame N7CFO).



Figure 16: Label on device shown in Figure 13. (Photo courtesy of Mr. Lynn Burlingame N7CFO).

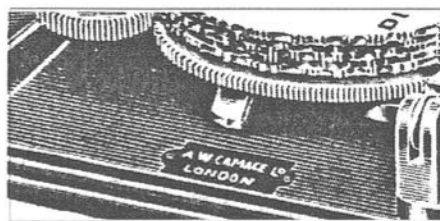


Figure 18: Detail from Figure 17 showing the Gamage label on the device. The label reads, "A. W. Gamage London"

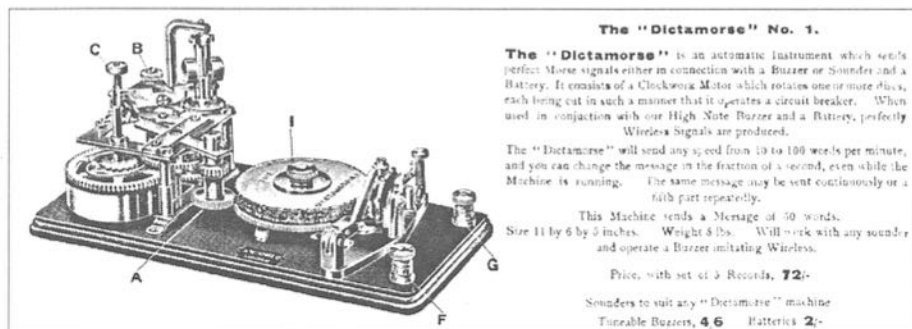


Figure 17: Typical No. 2 Omnigraph listed in a c. 1919 Gamage catalogue.

disc model Omnigraph was listed in a c. 1919 A. W. Gamages (London) catalogue (Figure 17) under the name "The Dictamorse No. 1" and bore a Gamages label (Figure 18).

### 15 Disc Model

The fifteen disc model was listed in company advertisements as "The No. 2 Omnigraph" incorporating the same driver motor as the other models, but with a more elaborate cam mechanism for changing the discs (Figure 19).

A version of this model advertised in 1909 as "The Omnigraph No. 2 Improved" used a battery powered motor and rheostat in lieu of the wind-up motor

(Figure 20). An elongated drive belt connected the drive shaft of the electric motor to the rotating platter. A total of 60 discs was included with this model.

At \$10 in 1909, this amounted to nearly a weeks' wages for a typical worker, making the purchase of this instrument a very serious decision. A slightly different version of this instrument with a different design cam mechanism also allowed for hand cranking (Figure 6a in Part I of the article).

A slightly different version of the 15 disc model advertised as "New Omnigraph No. 2" in 1910 employed the wind-up motor and also had the capability of hand cranking the device if desired

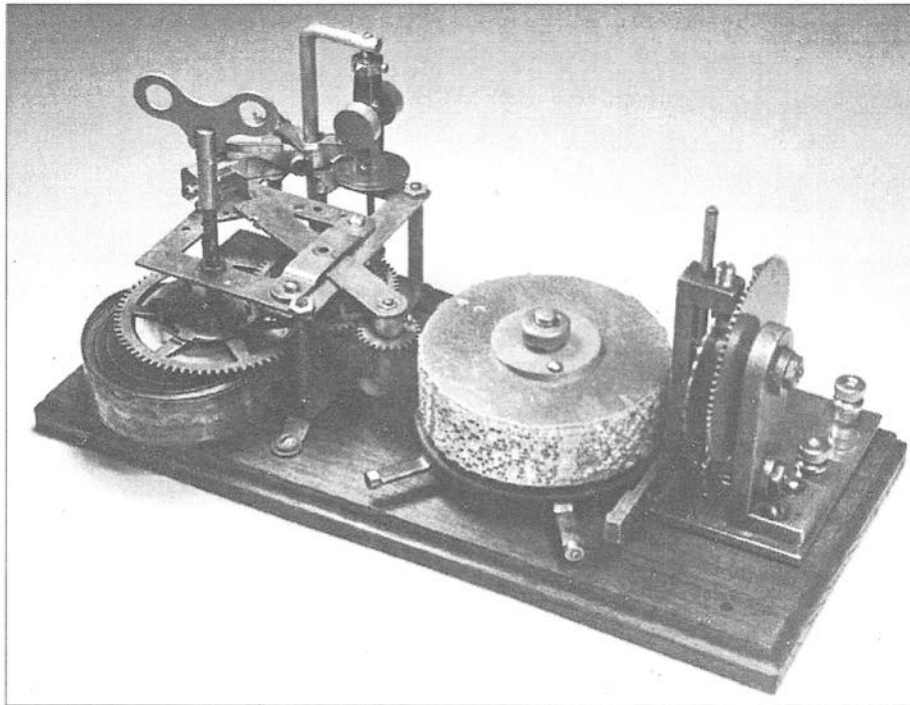


Figure 19: "Omnigraph No. 2" is the name the company gave to the fifteen disc model. This instrument is probably on a replaced wooden base.

<p><b>THE OMNIGRAPH NO. 2</b>  <b>IMPROVED</b>          Has 15 Dials and sends a message 300 words any speed you desire. 45 extra records.          You can make thousands of new messages by transposing the dials.          Will run by the day without touching the instrument.</p>		
<p>Price of Transmitter . . . . . \$10.00          Large Motor with resistance switch 4.00          No. 4 Key, Sounder, Transmitter and Motor with resistance switch 7.00          No. 5 Transmitter with Motor and resistance switch . . . . . 5.00</p>	<p>METAL DIALS PRACTICALLY EVERLASTING          TWO CELLS OF DRY BATTERY WILL RUN MOTOR OMNIGRAPH 80 HOURS WITHOUT RENEWING BATTERY          SEND FOR NEW CIRCULAR</p>	

Figure 20: "Omnigraph No. 2 Improved" is the company designation for the electric motor driven version of the No. 2. Omnigraph.



(Figure 21). As with the single disc device that has both motorized or manual drive (Figures 10 & 11 in Part I of the article), the author wonders why the hand crank mechanism is included with motorized capability. It is possible that the company knew that the clock motors wound down very rapidly and that students working in pairs probably represented a more efficient way to use the instrument. In addition, a human could probably crank the machine more forcefully, minimizing the slowing that occurred when the cam mechanism moved the stylus from one disc to the next higher

disc.

A version of the 15 disc model exists that has the hand-crank mechanism, and no motor drive, with extra stacked discs where the motor would be normally located (Figure 6b in Part I of the article).

The company also supplied a 15 disc device with a buzzer and straight key, to the New York Wireless Institute (Figure 22).

### Conclusion

The Omnigraph company advertised or produced at least 15 models of telegraph learning devices over an approximately 30 year span early in the

20<sup>th</sup> century (Table 1). There may be other devices or variations thereof not listed here that may come to light, and the author would appreciate hearing about the existence of any such devices from readers. It should be noted that a number of the devices described (above) are known only by their advertisements. Telegraph manufacturers in the early 20<sup>th</sup> century are known to have advertised items that are completely unknown today, and it is uncertain if they were ever produced<sup>7</sup>.

Devices similar to the Omnigraphs that appeared after the demise of company had an incised wheel which would send "SOS" repeatedly and were presumably of WW-II military origin.

Interestingly, in 1963, long after the demise of the company, a device was

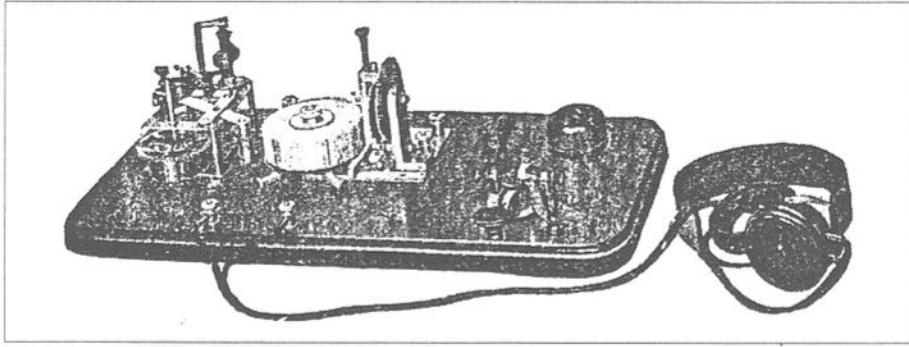
## LEARNING TELEGRAPHY



becomes simple when your instructor is the Omnigraph Automatic Transmitter. Combined with a standard key and sounder or Wireless Buzzer, it will send you telegraph messages at a slow speed, which can be increased at will to match the sending of an expert operator as you become more proficient. Adopted by U. S. Gov't. Made in 4 styles, from \$2.50 up, all accurate. Circular free.

**Omnigraph Mfg. Co., 39 L Cortlandt St., New York**

*Figure 21: "New Omnigraph No. 2" from a 1910 advertisement. The 15-disc instrument could be powered by either the clock motor or a manual hand crank. Notice the user wearing earphones. Auxilliary equipment such as a buzzer or oscillator must have been present and not illustrated.*



**Figure 22:** Omnigraph #2 with integral key, buzzer and provision for earphones. from a 1920 advertisement in *QST* for the New York Wireless Institute. Similar to Figure 13, except with 15 discs. Students enrolling at the institute received this instrument according to the widespread advertisements for the school.

advertised in *CQ* magazine identical in function to the Omnigraphs<sup>8</sup>. It consisted of a motorized circular wheel with the Morse code characters cut into the edge. Amateur radio operators could have a custom message (such as their radio call letters) cut into the disc as an operating convenience.

Inasmuch as the telegraph keys, sounders, buzzers, binding post hardware and the clock drives included with the Omnigraph instruments seem to be items supplied to the company by others, it is uncertain exactly what portions of the instrument were made at the Omnigraph factory itself. The wooden bases, the rotating platter, and the aluminum discs may be all that the company actually produced.

The unique design of the Omnigraphs represented a continuation of the 19<sup>th</sup> century American tradition of electromechanical innovation that also produced the universe of telegraph instrumentation, fire alarm systems, stock market tickers, nationwide time service systems, and innumerable other devices.

Given the explosion of the use of

telegraph following the successful demonstration by Samuel Morse in 1844, and the importance that instant communication played in the economic, social, and military fabric of the 19<sup>th</sup> and early 20<sup>th</sup> centuries, the Omnigraphs played a small but important role during the declining years of telegraph.

Morse code takes advantage of the simplest property of an electrical circuit: on or off. As such, this binary form of communication may be rightfully regarded as the earliest form of digital communication, and the necessary predecessor of digital communication as we know it today.

#### Notes and References

<sup>1</sup> An Omnigraph catalogue c. 1930 listed the company as 'Established 1900'. The first Omnigraph advertisement the author could locate was from a J.H. Bunnell catalogue from 1900.

<sup>2</sup> No advertisements for Omnigraphs were found after 1931 suggesting this year for the demise of the company.

<sup>3</sup> Numerous radio and electrical publications and equipment catalogues from 1900-1931 were

employed as reference materials and are too numerous to mention individually

- <sup>4</sup> Friedman, Neil D. *A Clockwork Omnigraph*: CQ Magazine Feb. 1981 p. 7-9.
- <sup>5</sup> Martin, Fredric W. Personal communication.
- <sup>6</sup> Friedman, Neil D. *Omnigraph Disc Codes*; Old Timer's Bulletin of the Antique Wireless Association. Vol. 35, issue one (Feb. 1994). p. 54
- <sup>7</sup> Reinke, Roger W. *I'll Never Forget That Old Whatchamacallit*; Old Timer's Bulletin of the Antique Wireless Association. Vol. 37, issue one (Feb. 1996). p. 39.
- <sup>8</sup> 'Parks Code Wheel'; Parks Electronics Laboratories Rt. 2 Box 35, Beaverton, OR. *QST* May 1963.
- <sup>9</sup> Elwood, John (WW7P). Personal communication.

#### Acknowledgements

The author wishes to acknowledge the kind assistance of Mr. Lynn Burlingame (N7CFO), Mr. Mike Feher (N4FS), Mr. Neil Friedman (N3DF), Mr. John Casale (W2NI), Mr. John Elwood (WW7P), Mr. Fredric W. Martin (KI6YN) and Mr. Roger Reinke for providing references, photographs and historical materials, and Mr. Edward Gable (K2MP) of the Antique Wireless Association for his assistance accessing the AWA database.

#### The Author

David R. Pennes, M.D. (WA3LKN) is an advanced class amateur radio operator and diagnostic radiologist living in Indianapolis. Dr. Pennes collects and restores bugs and landline keys.

*(There is also an article on The Omnigraph by Tony Smith in MM22 page 28 - Ed)*  
**MM**

### The Art & Skill of Radio Telegraphy

*by William G. Pierpont, NØHFF*

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### The Radio Officers Association

Membership is open primarily to former MN radio officers but is also open to anyone who has had an association with maritime communications or is interested in the subject. Members receive the quarterly newsletter QSO and its associated amateur component QRZ. There is an annual reunion and AGM. 2003 sees the meeting taking place in Newcastle-upon-Tyne. For further details and information please contact the Membership Secretary - John Russell, 21 Landcross Drive, Northampton, NN3 3LR.

**H**ISTORIC VLF STATION Grimeton Radio, SAQ, in Sweden is the only surviving Alexanderson alternator transmitter. It is now a national heritage site and is put back on the air on 17.2kHz, annually for a day of special transmissions. This inspired me to construct an appropriate receiver for the event.

I received broadcasts at 0830 and 1230 UTC from SAQ, using a tuned 3m loop and RA1792 receiver with 300Hz bandwidth. Both broadcasts were RST 599 QRN. The atmospheric noise level at 17.2kHz was rather high, but did not really affect copy.

I was also able to successfully receive SAQ with a homebrew electro-

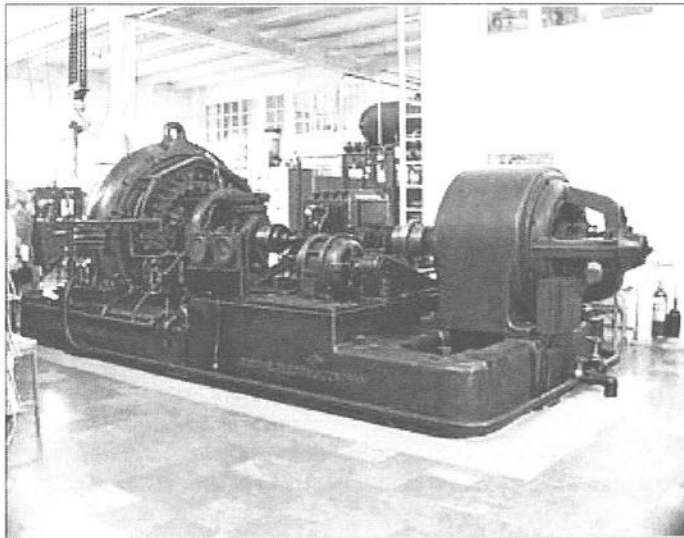
## Receiving SAQ with No Active Devices

An Electro-Mechanical  
Receiver for VLF CW

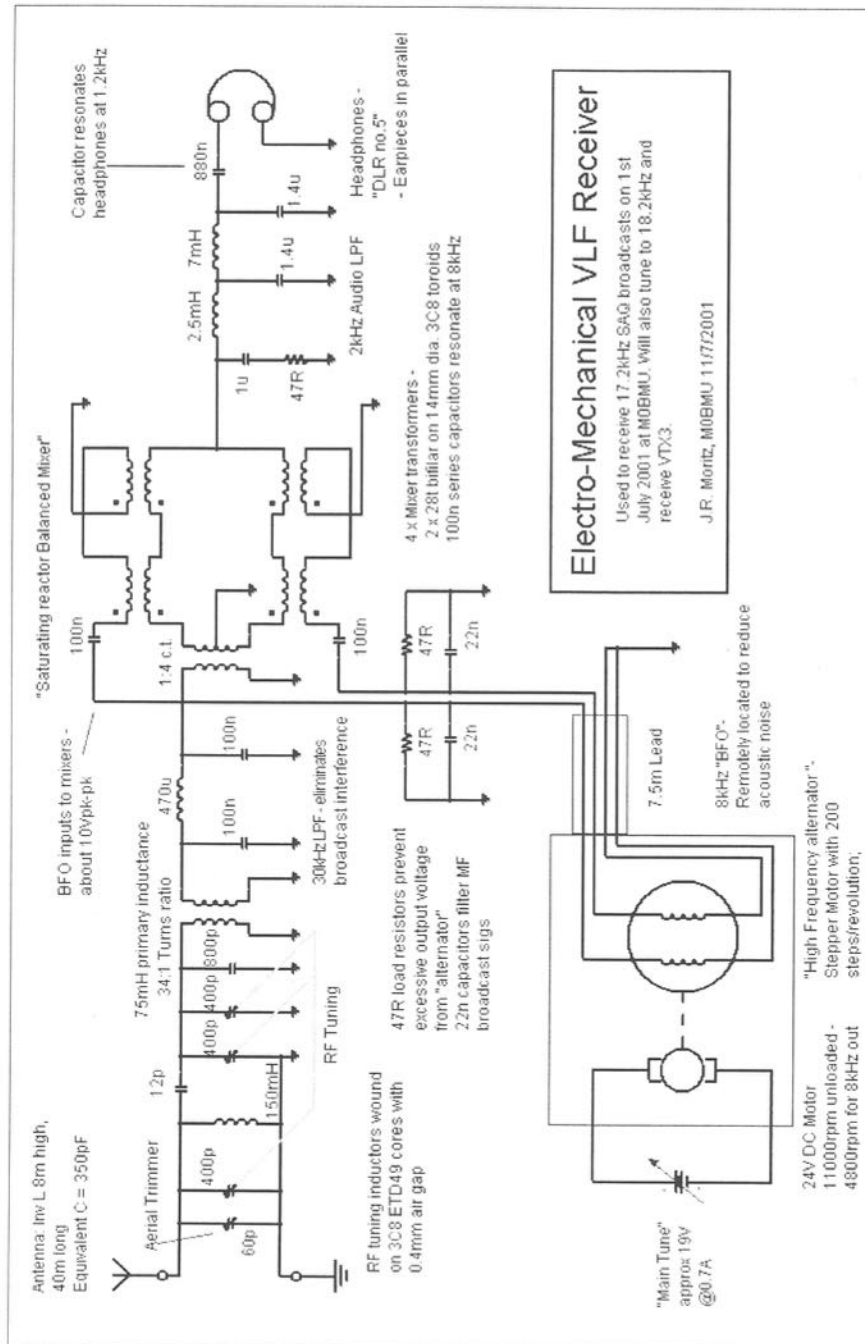
by *Jim Moritz MØBMU*

mechanical receiver. As far as I know, the Alexanderson alternator at SAQ is currently the only operating radio station with an electro-mechanical transmitter that does not rely on valves or semiconductors. For some time I have thought that it would be fun to make a VLF receiver based on similar principles, also without any valves or semiconductors, to receive the SAQ broadcasts.

At first, I thought this would involve some difficult mechanical engineering, but, somewhat surprisingly, I was eventually able to



*The Grimeton Alexanderson transmitter built by General Electric in 1924*



**Electro-Mechanical VLF Receiver**  
 Used to receive 17.2kHz SAO broadcasts on 1st July 2001 at M0BMMU. VMill also tune to 18.2kHz and receive VTx3.  
 J.R. Moritz, M0BMMU 11/7/2001

Circuit diagram



*The passive receiver and mechanical beat frequency generator*

make such a receiver using parts from the junk box.

It is basically a direct conversion receiver. It has a 2 pole passive pre-selector with RF bandwidth of about 800Hz, which also impedance matches the antenna to the mixer. The mixer uses saturating ferrite cores, in a way not unlike the SAQ keying circuit. The BFO signal saturates the cores at both the positive and negative peaks of its waveform, and so the core windings present an inductance that varies at twice the BFO frequency, in series with the signal path.

The BFO signal is produced by a small high frequency alternator. This is actually a 200 step/revolution stepper-motor salvaged from a scrap hard disk drive. When driven as a generator it produces a reasonable sine wave. Each winding produces a signal in phase quadrature with the other - with 100 cycles

for each revolution. Therefore as an HF alternator, it produces quite high frequencies when rotating at moderate speed. When driven at 4800 rpm by a DC servo-motor it generates a couple of watts at 8kHz, which, due to the frequency doubling action of the mixer, gives a 16kHz BFO signal. This "oscillator" is connected to the rest of the circuit with long cables, because of the mechanical noise it produces!

The resulting audio beat frequency at 1.2kHz is low pass filtered, and applied to a pair of 1944 vintage 'DLR no.5' headphones. With the two earpieces in parallel, and a series capacitor of 880nF, these are series resonant at 1.2kHz and close to 50 ohms impedance. They are surprisingly sensitive - an audio signal - 100dBm (2.2uV into 50 ohms) is just about audible in a quiet room. Therefore, although the receiver has no

amplification, in fact considerable loss, a 30uV signal at 17.2kHz from a signal generator can be detected at the mixer input.

The SAQ transmissions were received using this receiver with my 8m high, 40m long inverted 'L' antenna, which produced a comfortably audible signal in the headphones. In fact, the limit on sensitivity was the QRN, which was quite strong. Later, I re-tuned the receiver to 18.2kHz, and was able to copy Indian Navy station, VTX3, although this was considerably weaker than SAQ.

I also recorded the SAQ broadcasts on tape; listening to them, the main defect of the electro-mechanical receiver is poor

frequency stability as the motor currently has no feedback speed control. The "oscillator" frequency varies by about 1%, which is not a problem as far as copying goes, but does sound a bit wobbly!

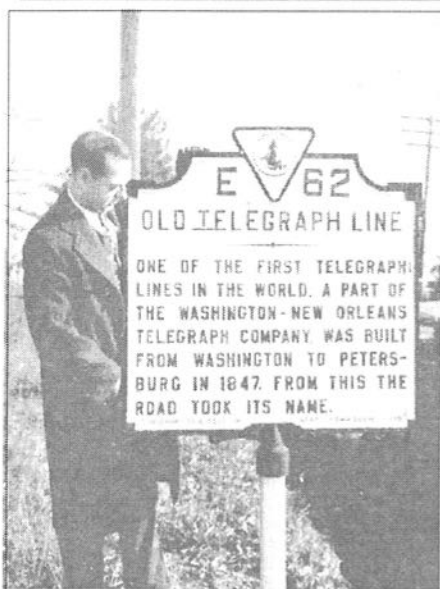
As far as I know, this is the only receiver of it's type in existence, and perhaps the only entirely electro-mechanical radio transmission and reception since the 1920s - but I would be very interested to hear if anyone knows of anything similar.

*(For more information on the Alexanderson alternator at Grimeton Radio, SAQ, see MM 67 page 6 - Ed.)* **MM**

## Monument to Telegraph Line Marks Highway

(Popular Mechanics, March 1933)

Submitted by Gunnar Eriksson



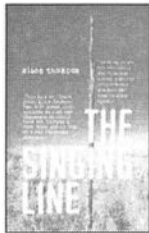
*MM81 - June 2002*

*Probably the only memorial to a telegraph line. Marking Telegraph Road about twenty miles south of Washington, D.C., a wrought-iron tablet stands as a monument to a telegraph line. An inscription on the tablet tells readers that the telegraph line was part of the Washington-New Orleans Telegraph Company's system back in 1847. The monument is near Mount Vernon, the home of George Washington.*

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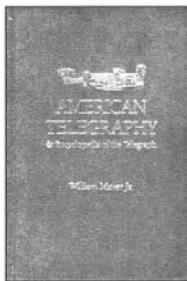
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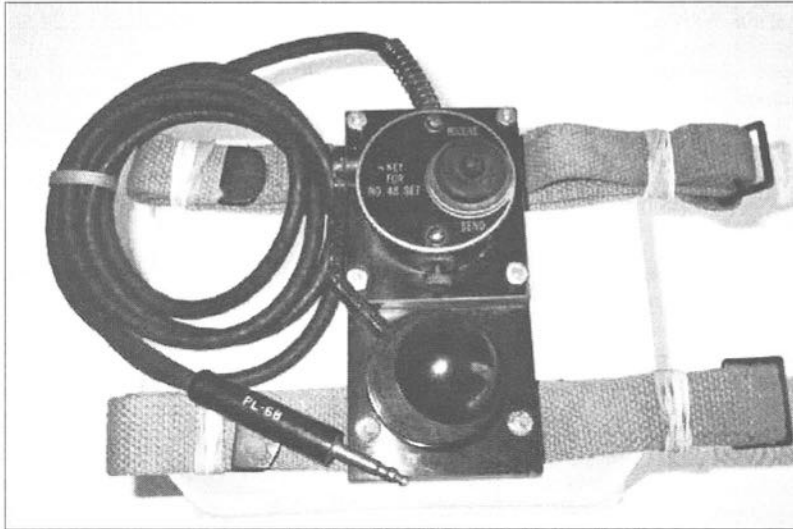
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# Showcase

Readers are invited to contribute any additional information and stories, no matter how minor, to the Editor, Morsum Magnificat. There have been thousands of designs of keys & telegraphy instruments. Information will be lost unless it is compiled in one place and shared with other readers.

Photo/Collection: Wyn Davies



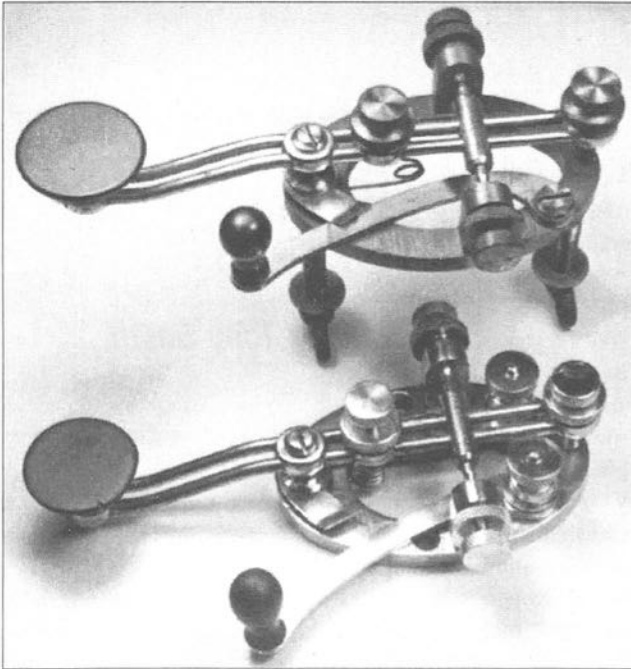
J5-A key with switch used with No. 48 set

Photo/Collection: Jack Barker



Jack Barker's Marconi Manipulating Key, circa 1912 – now fully restored except for the nameplate. A massive but beautifully balanced key.

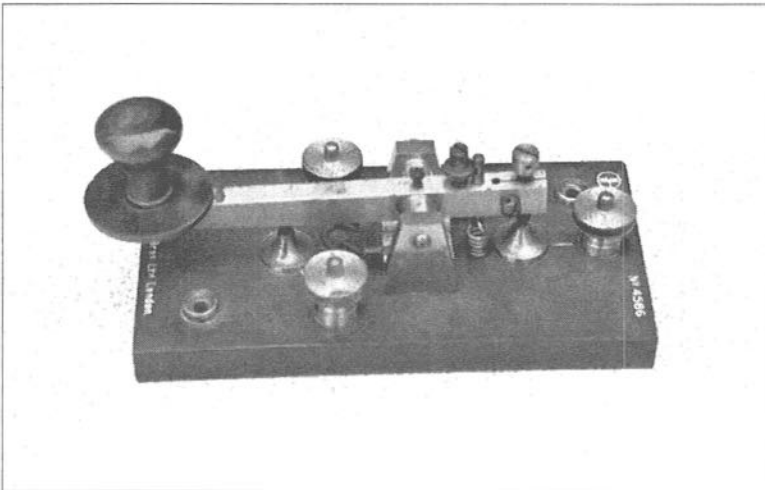
Photo/Collection: Dave Pennes



These are Western Electric "Double Bar" lever keys. They're very similar to the ubiquitous 'Triumph'-style keys made by Bunnell, MESCO and other manufacturers of the day, except for the double-bar style lever. It is unknown why Western Electric didn't use the cast single-piece steel lever but it may have had something to do with patent infringement on the 1881 Bunnell patent. The advantage of this design is that the contact point can be easily replaced if necessary. Double-bar lever Western Electric keys come in both many varieties with both leg and legless versions as shown. Some have red-brass bases with yellow brass hardware whereas others are

all yellow brass. Some have lacquered hardware whereas others are unlacquered. Some are entirely nickel-plated. Inscriptions on the crossbar include "PAT.APPL'D FOR" or the 1893 patent date.

Photo/Collection: Malcolm Brass, G4YMB



This key is by Gambrell Bros. Ltd, carries the no. 4586 and is obviously a single current telegraph key dating, I am reliably informed, from about 1915. It, unusually, shows the signal path in white on the top of the base.

## Women and the Early Telegraphs

by Tony Smith

**A**CCORDING TO A contemporary account, in 1863 the New York and Boston telegraph line was employing a number of women Morse operators, paying them from \$6 to \$25 a month for a 10-hour day, but they were unpaid while learning. "We employ about fifty women, and they only at small offices. There are no parts of our occupation suitable for women in which they are not engaged. They are generally more attentive and trustworthy than men."

In 1865, there was an acrimonious series of letters in *The Telegrapher* on the subject of "Lady Operators", with male operators suggesting that women were poor operators, with bad handwriting, and an overbearing and discourteous manner of transacting business who, because they could be hired for lower pay, would gradually replace the men. In the interest of upholding the standards of the profession, and as a protection against hard times to come, one writer called for the women to be kept out of the Union, and off the lines.

Women operators responded with a number of indignant letters, pointing out that plenty of men operators had faults too. One lady wrote "I will thank any gentleman operator to point out any

of my numerous faults pertaining to telegraphy, thus assisting me to overcome them."

An editorial in the same issue ruled an end to this discussion, because further correspondence "will do no good to either party, but tend to excite unpleasant feelings." The writer then defended the women, saying, "that the ladies will succeed in their endeavours to become telegraphers is beyond doubt... Women always succeed where men fail. There is no resisting them..."

The electric telegraph gave women the first opportunity to take up a "respectable" career outside the home. Employers were keen to have them, they cost less to employ than men, but the men themselves saw women as a threat, foreseeing that they could lose their jobs to them. Public reaction, too, was mixed, but eventually large numbers came to be employed as the service expanded and became part of everyday life

"We know nothing of moment about telegraphing to exclude women therefrom, and we consider it the duty of every operator to give them the same chance that is accorded anyone. If 'lady operators' are instructed and allowed to improve there will be no danger of their depressing salaries. The great fault has been in simply teaching a young



Emily Johnson, a telegrapher who worked for the Government Telegraph Service in the North West Territories, Canada, 1897 (From "Working Women: Past..." website <http://library.usask.ca/herstory/telegr.html>)

lady the rudiments of the business and then cooping her up in a room by herself or with others of her sex, away from all chance of gaining knowledge, or emulating those who are in the front rank.

"It is not that women are incapable of mastering our profession, but that they have not as yet had the advantages or instructions which they merit and should have. When a lady operator translates 'feels' for the commercial term 'fob', or 'seed' for 'C.O.D.' simply because she doesn't understand the meaning of either, we think it time she be permitted to take instructions from those who are experienced in 'all the arts men practice'".

### **An Increasing and Successful Quantity**

A New York writer, quoted in *The*

*MM81 – June 2002*

*Journal of the Telegraph* in 1886, observed that the lady operator was "an increasing and successful quantity", and suggested that telegraphy was one kind of business for which women seemed to be well fitted. "judging from the number engaged in it."

In almost any telegraph office from Harlem to the Battery, he said, there were female operators and, in general,

they seemed to be "young, pretty, and wide awake to their business." Sometimes they had subordinates, in the form of "callow youths and messenger boys, over whom they queened it with a right royal will and air of authority." Generally, he found them very pleasant and obliging, but occasionally, he came across a "terror", whose very look would freeze him to the marrow. However, he observed, "they all seem to give satisfaction to their employers...., and appear to be rapidly monopolizing the telegraphic business."

### **Out West**

The same writer commented that women were also to be found far out on the Western plains in the railroad telegraph offices. The traveller looking

from the train as it stopped, would be "nearly sure to see a bright, neatly dressed, white-aproned young woman come to the door to gaze at the train and its passengers, with a half-pleased, half-sorry, air."

This was the local telegraph operator who had "taken up her lonely life out here in the alkali desert amid the sage brush, whose only glimpse of the world she had left behind was this brief acquaintance with the trains which passed and re-passed two or three times a day." These are the true types, he said, "all of them, of our brave American girl, whose courage is equal to any emergency."

The same year, a reporter from the *New York Evening Sun* visited the Western Union central telegraph office in New York where there were 500 operators on duty, of whom a quarter were women. "Are they as efficient as men?", he asked.

"Not quite. Still, they are very expert. We have three married ladies. Most of the Wheatstone operators are women... Among the Morse operators, Misses F.L. Daily, M. Donovan, Fanny Martin and Masterson are among the most skilful. Among those that work the heaviest wires are Mrs. Randolph, Mrs. Herrington and Misses Frazee, Coxton, Reiners and K. McNally."

#### **Exclusively Employed by London Company**

In London, as early as 1846, the Electric Telegraph Co. had employed some women as telegraphists (in non-Morse telegraphy) on the grounds of economy. In 1859 the newly formed London District Telegraph Company decided to use women exclusively as

telegraphists, and the company was surprised at the number of applications received from highly respectable, well-educated young women, despite the poor pay offered.

Initially, 45 of the applicants were recruited, and arrangements made for them to be trained in single needle Morse telegraphy at the headquarters of the British & Irish Magnetic Telegraph Co. (known as the "Magnetic Co.") at 58 Threadneedle Street, where the male clerks were forbidden to speak to them under pain of instant dismissal.

Unpaid at first, the women received 5/- (25p) a week when they reached 5 wpm, 8/- for 8 wpm, and 10/- when they reached 10 wpm. By comparison, experienced male telegraphists employed by other companies, and working at speeds ranging from 10 to 35 wpm, earned between 10/- and 35/- per week in London and other large towns and cities.

The District Telegraph Co. did not do well at first. In 1860, its 52 stations averaged seven messages a day, with takings of 2/6d (12½p) which only covered the wage of the lady telegraphist in charge and part of the rent. From the beginning, it was a source of worry to the directors that they were unable to pay the ladies "in the manner they ought to be paid", adding "the wonder was that they were enabled to make both ends meet." The Company continued to make a loss until 1865, when a small profit, and a first dividend of 1%, was declared.

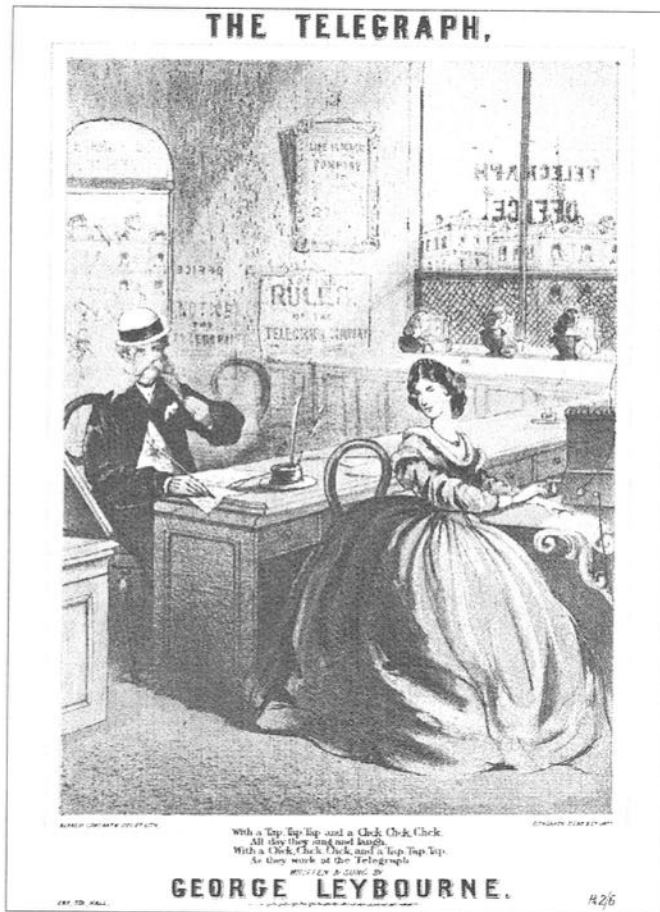
After completion of training, the lady telegraphists worked at the company's headquarters at 90 Cannon Street, or took control of small telegraph

offices located within four miles of Charing Cross, with messenger boys as their subordinates just like their sisters in New York. Those at Cannon Street worked under the supervision of a Matron, Miss Selina Oppenheim. Working hours were from 9 a.m. to 7 p.m., Monday to Saturday, with reading and needlework permitted between messages. Annual holidays were two weeks.

As in America, there was a mixed reaction to the lady telegraphists. One correspondent wrote that the employment of females tended to lower the tone of the service, "the whole tendency is to lightness and flippancy." Conversely, another commented that in the offices of some telegraph companies one met with the covert badinage and ill-concealed insolence of beardless boys, "whereas the young ladies of the District Co. were models of civility", and he particularly commended the young lady employed at the Sloane Square Office...

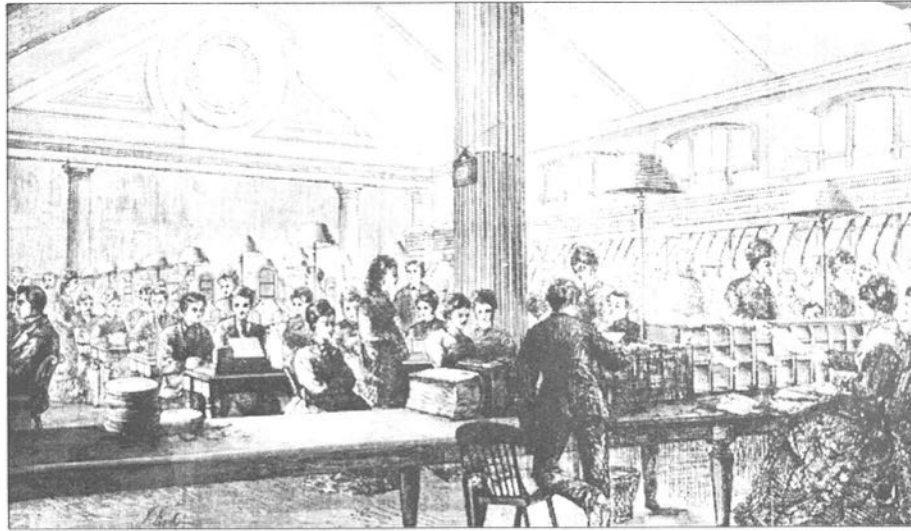
#### Telegraphists Become Civil Servants

*MM81 – June 2002*



*Drawing of a telegraph office on the cover of the music sheet for a song, The Telegraph.*

When the British General Post Office took over the telegraph companies in 1870, the Cannon Street offices of the District Telegraph Co. became the Post Office's London School of Telegraphy, and over two-thirds of all trainees were then female. In all, the Post Office took over 2,030 men and 470 women, from various telegraph companies, with most becoming established civil servants.



Central Telegraph Office, London, 1874 (Source unknown)



Annie Ellsworth with Samuel Morse as he sent the inaugural message along the first Morse line, Washington to Baltimore, 1844 (Source unknown)





*Sadie Cornwell, after sending Samuel F.B. Morse's last message to the telegraph fraternity, 1872 (Source unknown)*

Women were thought to be particularly suitable to be Post Office telegraph clerks, combining quickness of eye and ear with delicacy of touch. As previously, another perceived advantage was that they would work for lower wages than men and were less disposed to strike or combine to obtain higher pay.

By 1872, other training schools in the provinces had been set up and the Post Office telegraphs then employed around 5,500 staff of whom 1,500 were women. Basic salaries were now 12/- (60p) per week for men and 8/- (40p) for women, with efficiency payments leading to wages of 25/- and 15/- respectively. The normal

working period was 8 hours in the day and seven at night (men only). Paid annual leave was from 2 weeks to 1 month, depending on grade, and appointment was by competitive examination.

#### **Historical Role**

Women played their part in the historical moments of the telegraph too. In 1843, Miss Annie Ellsworth, daughter of a friend, brought Samuel F.B. Morse news of desperately needed financial help from Congress, enabling him to construct his first telegraph line from Washington to Baltimore a year later. He gratefully promised that she should choose the

inaugural message to be sent along that line and her choice, "*What hath God wrought!*", sent before an invited audience in Washington on 24<sup>th</sup> May, 1844, is now part of American history.

In 1871, when Morse was 80, the telegraphers of North America subscribed to erect a statue in Central Park, New York, to honour the "father of the telegraph." On 10<sup>th</sup> June that year, at a special ceremony, the lines were cleared to all telegraph offices in the US and Canada, and to many overseas. A young lady telegrapher, Miss Sadie E. Cornwell, was chosen to send Morse's farewell message to the telegraph fraternity, keying the original instrument used on the first line from Washington to Baltimore. To thunderous applause, Morse himself keyed his name at the end of the message, evoking an immediate response in the form of greetings and farewell messages telegraphed from

across the continent and as far away as Hong Kong, Bombay and Singapore.


By the 1880's thousands of messages were handled daily by the electric telegraph, intended for home and abroad. Telegraph offices were set up around the world, and in most of these women found an important place. Within a relatively short period of time telegraphy had become firmly established as a respectable occupation for women.

**Sources**

*Journal of the Telegraph*, April 20, 1886 / January 20, 1887 / April 20, 1887  
*Samuel F.B. Morse, Letters & Journals*, by Edward Lind Morse, pub. Houghton Mifflin, 1914  
*The Telegrapher*, February 27, 1865  
*Telegraphs in Victorian London*, by John Durham, pub. The Golden Head Press, 1959  
 Post Office Collection, Bruce Castle Museum, Tottenham, London  
*The Employment of Women; a cyclopedia of woman's work*, by Virginia Penny, pub. Walker, Wise & Co., 1863 **MM**

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## A Mystery Key-on-Base

by Peter Holtham\*

I FOUND THIS KEY-ON-BASE recently in a Brisbane antique (read junk) shop (Figure 1). It was dirty and tarnished and the paint was peeling off its wooden base. The tension spring had been badly stretched and the steel bearing pin was so rusted the key wouldn't even operate properly.

Somehow it looked vaguely familiar, I couldn't work out why. But it was cheap, just A\$15.50 (about £6), so I paid up and took it home for a closer look.

Comparing it with other keys in my collection I could see it was clearly patterned on the Australian Post Office landline key (Figure 2). That's why it looked familiar.

But it was missing the shorting lever, and when I looked at it closely the contacts were clearly not separate spark resistant tungsten, they were brass. So it was a one-off rather than a production

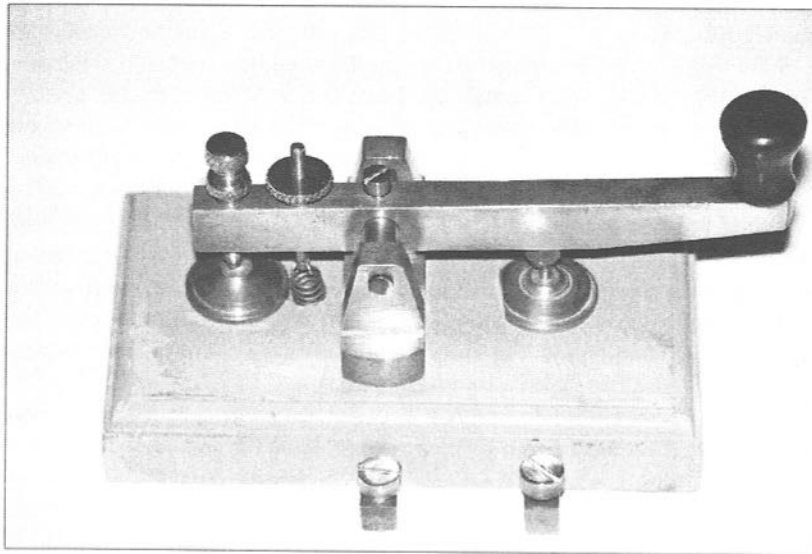


Figure 1. The restored key

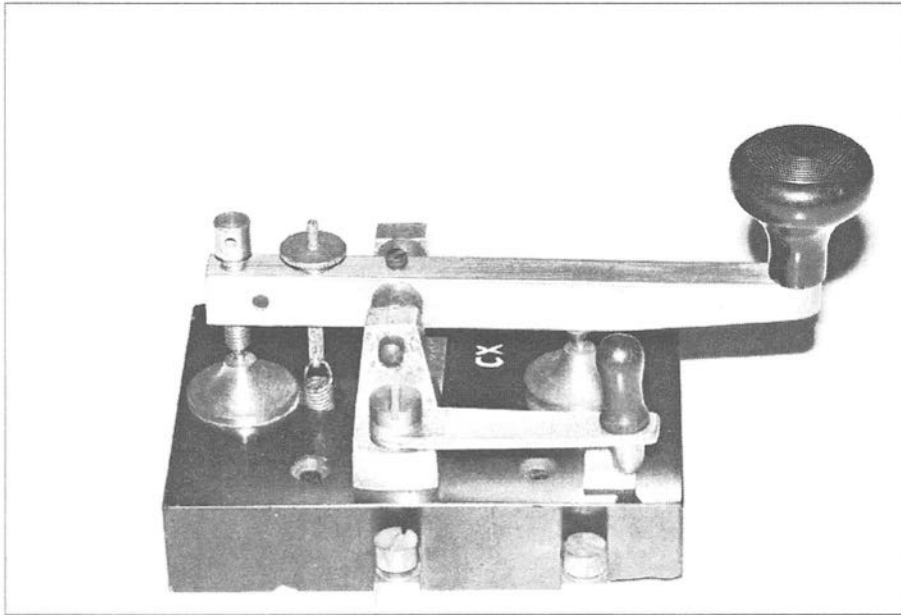


Figure 2. Australian Post Office landline key

transmitting key. It had obviously had some use as the front contacts were almost completely worn away.

I also noticed that it was not very well made. There were file scratches on most of the components and the contacts did not line up very well – the bar and bridge were not quite square.

When I turned it over, there was more evidence of poor workmanship. The screws holding the connectors to the base and the bridge were not properly countersunk, and stood proud of their surroundings.

The owners name and the number 66 were pencilled on the bottom of the wooden base.

My first job was to take it to pieces and clean it up. It was then that I noticed that 66 was also stamped underneath the

bar and the bridge.

I polished up all the brass pieces, cleaned and oiled the tapered bearing pin, cut out the stretched piece of spring and reassembled everything.

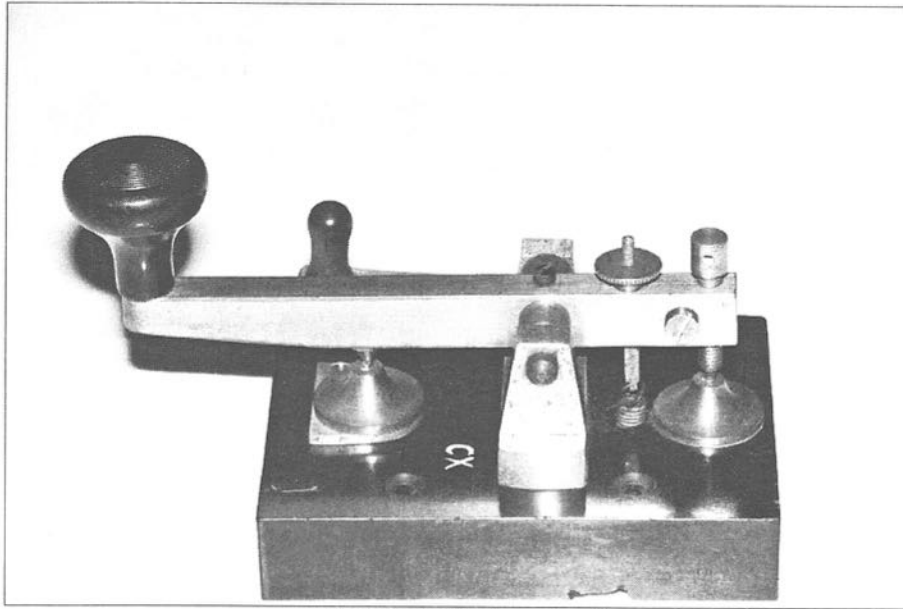
The worn front contacts meant I couldn't adjust the gap properly, but swapping the front and back fixed contacts soon solved that problem.

A few minutes of adjustment and I had an operating key with quite a nice feel to it. Not only did it feel nice, but with all the brass gleaming it also looked rather nice.

Now the question was, what had it been made for and when?

The only thing to do was to see if fellow members of the Brisbane Amateur Radio Club could shed any light on its origins.

And they could; a few of the old-



*Australian landline key - other side*

timers recognised it straight away as an 'apprentice key'. An apprentice electrician had made it in the early days of his trade training. That explained the standard of workmanship, as well as the mysterious number 66.

He had been given the rough brass castings to file clean and stamp with his class number. Then the contacts, the gap adjustment screw, the spring tension adjuster and the knob had to be turned on a lathe. He had to cut threads, internal and external, as well as drill and countersink fixing holes. Finally the completed components had to be assembled on a wooden base.

Quite a good little practical exercise for a new apprentice.

The base should have given me some clue as to the key's origin. It was nothing more than the wooden block that old time light switches were always

mounted on.

So now I knew who had made it and why, but not when it was made. But if it was in a Brisbane antique shop then it might have been bought as part of a house clearance when an estate was wound up.

It had probably been kept by a seventy to eighty year old man as a memento of his apprentice days. Perhaps he had been a radio amateur and used it on the air until the contacts wore away and he bought a proper key. When he died and his things were sold off, it was tossed in with all the other bric-a-brac accumulated over a lifetime.

So I guess he made it sometime in the 1940s or early 50s. I'll probably never know, and it doesn't really matter. At least it's found a good home now, and like all the keys in my collection, one of these days it'll get some use on the air. *MM*

---

**B**Y THE TIME YOU READ this, version 2.0 of my Morse teaching software will be on the NZART website. I've added several new features, some in response to feedback from users, and fixed a few bugs.

The main operating screen is shown in Figure 1. If you have one of the older versions, you'll note that a menu bar containing two items has appeared on the top, and a "Pause" button has been added. Clicking on "Notepad", brings up an editor window in which you can write notes about progress, problems, things you want to complain to me about. What you've written can be saved and reloaded later.

Clicking on "Advanced" brings up 8 further items, labelled

- "SaveEnv:" saves the "current environment". The code and Farnsworth speeds, audio frequency, and the number of "characters in use" in the initial character-recognition teacher are saved. This places a "bookmark" at where you were, and lets you resume from the same place later.
- "LoadEnv:" re-loads the parameters above.
- "Fast Mode" doubles the speed range, giving a variation of 6 - 40 wpm. Useful for faster practice.

## New Morse Teaching Software Calibrating Keyers

### The JPS NIR-12

*by Dr Gary Bold ZL1AN*

- "Slow Mode:" returns to the 3 - 20 wpm speed range.
- "Toggle Progress:" brings up, or hides, a smaller window underneath the main text window, in which the last 64 characters sent slide past. Useful for on-the-air practice sessions in conjunction with the "Pause" button, as you can see exactly whereabouts in the text you are.
- "RandChars:" allows you to enter a string of those characters which are giving you trouble. Random groups containing only these characters are generated and sent. Useful for practicing the difficult ones we all had. "Dits:" allows you to generate a stream of 200 dits, for calibrating keyers - see later.

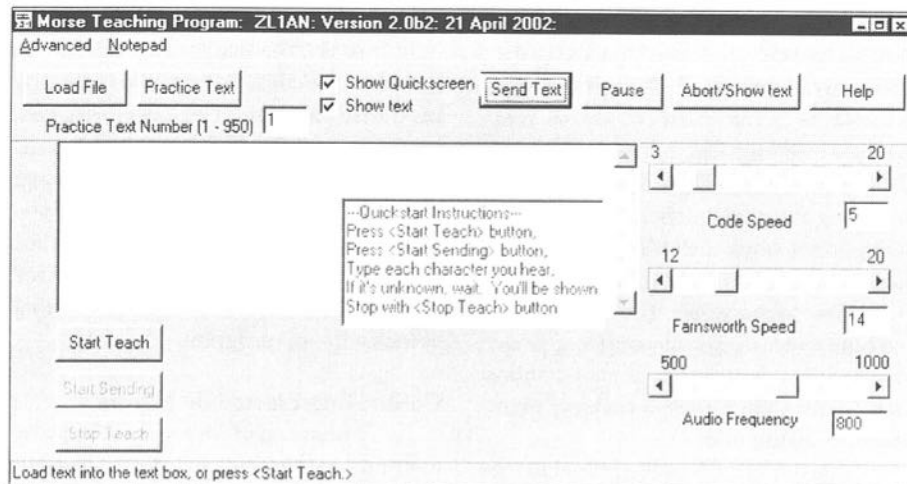


Figure 1. Main operating screen.

- “Fcompression:” allows you to change the Farnsworth spacing parameters. Experimental, and added in a response to a dialogue I’m having with a Canadian Teacher - see later also.

The help file has been expanded, and a new section on “learning to send” has been added.

### Farnsworth Morse Revisited

“Farnsworth Morse” has characters sent at a faster speed (the Farnsworth speed) than for “correct” Morse, with longer character and word spaces inserted to bring the “overall speed” (the code speed) down to that required. Russ Farnsworth popularised this in his code-teaching course, but he was not the first to use it. All good teaching programs implement it.

You’ll find a detailed explanation of the reasons in the help file with my teaching software, but basically the idea

is to let the ears hear characters as complete entities, and not as a concatenated string of dits and dahs. It’s generally agreed that the Farnsworth speed should be no lower than 12 wpm. My program uses a default of 14 wpm, which is also a comfortable speed for learners to model their sending on. If you have a program that even lets you listen to characters sent slower than 12 wpm, delete it immediately.

Some teaching programs just allocate “extra space” arbitrarily, adding some extra dit-times between characters, and more between words. Clearly there are many ways of doing this, so some time back the ARRL decided on a standard. The extra space is allocated such that the ratio of the resulting character-space/word-space ratio remains at 3:7, as for perfect Morse. This is what you’ll hear in my program.

### Varying the Farnsworth Parameters

But some people subjectively feel that

“ARRL standard” Farnsworth spacing makes character and word spaces hard to distinguish between. Although the ratio is the same as for “correct” Morse, they “seem more similar” because they are both much longer, and longer time durations are more difficult to compare than shorter ones. I don’t find this, but then, I’ve listened to a lot of Morse.

In particular, the Canadian teaching and testing system allocates less time to the character space, and more time to the word space, making them easier to distinguish.

Dave, VE6LX, a big wheel in the Canadian teaching system, suggested that I modify my code to allow the Farnsworth spacing ratio to be varied. This can now be done with the “Fcompression” option in the “Advanced” menu mentioned above.

Clicking this item brings up a spin-box, showing a “Farnsworth compression factor” which can be varied between 1 and 10. The default is 1, which gives “ARRL standard” spacing. A factor of 10 sends characters with the correct, “3-dit” spacing between characters, placing all of the extra space in the word space. Thus, you hear words sent as “correct” Morse, with very long spaces between them. These spaces are adjusted so that the overall code speed remains constant.

Compression factors in between 1 and 10 progressively vary the space-ratio between these two extremes. You might like to experiment to see “what seems best” to you. I’m awaiting comment from Canada.

The ratio for the ZL test will remain at the “ARRL standard”. The reason is

that this gives the maximum “thinking” time between characters. Test candidates here don’t seem to have much difficulty in distinguishing the word-spaces, particularly since the modern regulations give 30 seconds to correct copy, allowing run-together words to be corrected. If you haven’t yet read the new regulations, check them out. They’re on the NZART website, and also in the help file that comes with my program.

### **Calibrating Electronic Keyers**

The speed of Morse is defined, by international agreement, to be the number of times you can send the word “PARIS”, with perfect timing, in one minute. This turns out to require a dot frequency of exactly  $S=2:4$  seconds, where  $S$  is the speed in “words per minute”, or “wpm”.

Since the “average word” in English is shorter than this, you’ll find that you send about 10 to 20% more words in “conversational” Morse than the “wpm speed” implies.

All modern microprocessor-controlled keyers (like K1EL’s K9 and K10) have their speeds directly derived from the clock waveform, and are usually pretty accurate. Older units such as James Garrett’s ACCUKEYER use analogue oscillators, and have to be individually calibrated.

An approximate estimate can be made with your ears and your watch. Listen to the audio monitor and count the number of automatic dashes sent in 5 seconds. This is accurate to about  $\pm 10\%$ . (5 seconds should really be 4.8, but nobody can time that accurately).

A better method is to time the duration of a dit and the following dit-



space on an oscilloscope. The speed in wpm is  $2400/T$ , where T is the dit-space duration in milliseconds.

Even better is to use a hardware calibrator. Years ago I built and published a CMOS keyer-calibrator clocked from the 50 Hz mains, which digitally displayed speeds accurate to plus or minus 1 wpm.<sup>1</sup> This calibrated many, many keyers, but it's obsolete now. I, my graduate students, or Murray, ZLIBPU, will program a modern version using a cheap AVR microprocessor when one of us gets around to it. Stay tuned.

The most accurate method requires a Windows PC. Fire up Chris Craig's magnificent program Goldwave<sup>2</sup>, (everybody should have this) and digitize the audio monitor waveform of the keyer sending a continuous dot-stream. Goldwave has a zoom facility and cursors which allow timing to  $\pm 1$  ms. Average the time taken for a dit and the following space over a string of 5 to 10 of them. As before, the speed in wpm is 2400 divided by this time in milliseconds. You can easily obtain an accuracy of about 1%. You'll also be able to see whether the elements vary in length - some analogue keyers send a slightly longer or shorter first element - and be able to check the dit/dah ratio and weighting. You can even record another operator's signal from the receiver audio and calibrate his keyer for him remotely - I have done this several times!

### **Keyer Calibration by "Dit-stream Beating"**

There's another simple way for those with good ears. Use the "Dits" facility in the Teach "Advanced" menu

to send a stream of audio dits at a known speed, set with the "Code Speed" slider. At the same time, send an audio dit-stream from the keyer to be calibrated. The idea is to adjust the keyer's speed until the repetition rates of the two waveforms are the same. The keyer's speed will then be the same as that of the dit-stream produced by the program.

You'll find it difficult to get them exactly the same. As the two waveforms' rates become closer, you'll hear them drift in and out of synchronism - producing audible "beats". Adjust until the beats are as slow as possible. You can then estimate the error by timing the beat frequency. If each beat period takes  $n$  seconds, the speed error is  $2:4=n$  wpm. Hence, if the beat period is 10 seconds, your error is about a quarter of a wpm. This is good enough for all practical purposes.

### **The JPS NIR-12 DSP Unit**

Colin, ZLIBTT has one of these, and he ordered it for me to review. Unfortunately, JPS no longer make or service Ham-related units, and the NIR-12 is out of production. However, there are a few used units around (I found some on the web between (US) \$175 - \$200) and if one appears in a local junk-sale, you might want to buy it

The NIR-12 has a solid, black metal case 200mm (wide) x 150mm (deep) x 50 mm (high), and is inserted between the audio output of your receiver and headphones or speaker. It needs a 1 amp, nominally 12V DC power supply. It uses two TMS320C26 DSP microprocessor chips, running at 40 MHz, and digitizes

with 14-bits, which means that the background quantizing noise is absent - this was noticeable with some earlier units, like the W9GR kitset, which I reviewed in my column in December 1993.

There are options for processing SSB and data waveforms, and noise-reduction features, but I'll only comment on the band-pass mode. This is implemented as usual in DSP units, as a digital, finite impulse response (FIR, "tapped and weighted delay-line") filter.

The signal is sampled with an ADC, processed digitally, then turned back into an analogue waveform with a DAC. If there's enough interest, I'll talk about the principles. The earlier W9GR unit supplied several fixed passband filters.

The NIR-12 allows you to vary the passband width from 50 Hz to 3400 Hz, and vary its centre frequency between 200 Hz and 3400 Hz, with two front-panel knobs. This makes it very versatile and simple to operate. Figures 2 and 3 show two sample passband shapes, obtained with my standard "HF noise" method, described in detail in earlier columns. The "6 dB-down" bandwidth is shown in both Figures, and for display purposes I've set the centre frequency higher than you'd use in practice.

Figure 2 shows a 750 Hz passband, suitable for cutting the high and low frequency noise when copying a good CW signal. As with all filters, reducing the bandwidth reduces the noise, but also makes the

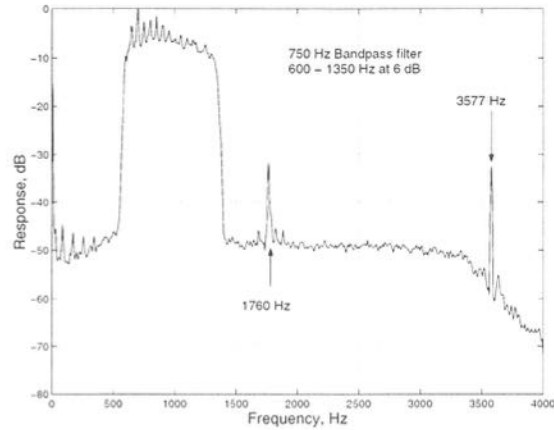


Figure 2. Passband at 750 Hz

noise "sound like" the signal - narrowing the passband too far makes the signal sound as if it's coming through a hollow pipe. As with all modern DSP filters, the passband edges are very sharp, much sharper than you can achieve with conventional analogue filters, and they do not ring. As you tune across a signal, it vanishes at the passband edges within 100 Hz or so.

The spikes at 1760 Hz and 3577 Hz are always there, and are artefacts of the

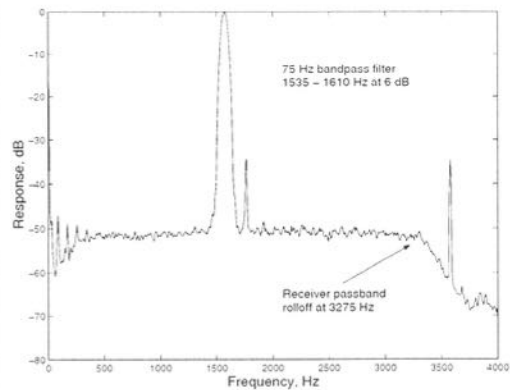


Figure 3. Passband at 75 Hz

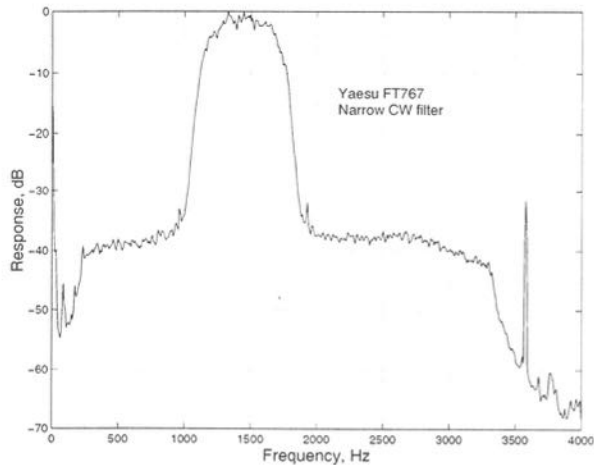


Figure 4 - Yaesu FT767GX passband

digital processing. But they are well down, and you're not really aware of them. The smaller passband spikes are harmonics of 50 Hz, which must be coming through the receiver, the NIR-12 was running from a Gel-cell.

The overall downward slope reflects the frequency response of my receiver passband. Figure 3 shows the narrowest passband you can select - 75 Hz wide at the 6 dB-down points. This is very sharp, suitable for pulling the really faint ones out of the noise. For comparison, Figure 4 shows the narrow CW IF filter passband of my Yaesu FT767GX. This is

550 Hz wide at the at the 6 dB-down points, and its shape is above average as such filters go - I've found that passbands can vary appreciably between different units of the same model (see November 1997 for ZL1UI's 767 passband).

If your rig has no CW filter, and you come across an NIR-12 at a junk sale at the right price, buy it. There are other noise-reduction features in the NIR-12 I don't have space to comment on here. Of

course, the very latest rigs have DSP filters of comparable performance built in. For the dollar-challenged, there are several freeware or shareware software DSP filters available on the web, and I'll review one soon.

#### References

<sup>1</sup> An Absolutely Calibrated Digital Speed Readout for electronic keys, Gary Bold, ZL1AN.

Break-In, July 1979, pages 260 - 264.

<sup>2</sup> Obtain Goldwave from the Website: <http://www.goldwave.com>

(Adapted and edited for MM from Gary Bold's *The Morseman* column in *Break-In*, journal of NZART.) **MM**

### FISTS CW Club – The International Morse Preservation Society



FISTS exists to promote amateur CW activity. It welcomes members with all levels of Morse proficiency, and especially newcomers to the key.

The club has awards, nets (including a beginners' net), dial-a-sked for beginners, straight key activities, QSL bureau, newsletter, and discounts from traders.

Further information can be obtained from **Geo. Longden G3ZQS, 119 Cemetery Road, Darwen, Lancs BB3 2LZ**. Send an s.a.e. or two IRCs.

# Info Please!

Readers are invited to contribute any additional information and stories, no matter how minor, to the Editor, Morsum Magnificat. There have been thousands of designs of keys & telegraphy instruments. Information will be lost unless it is compiled in one place and shared with other readers.

Photo/Collection: Doug Palmer, K4KEY



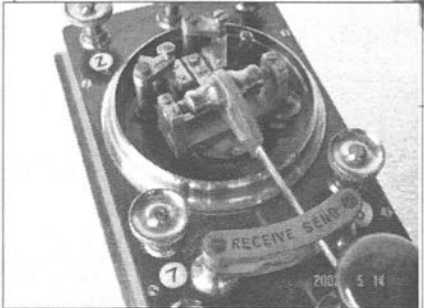
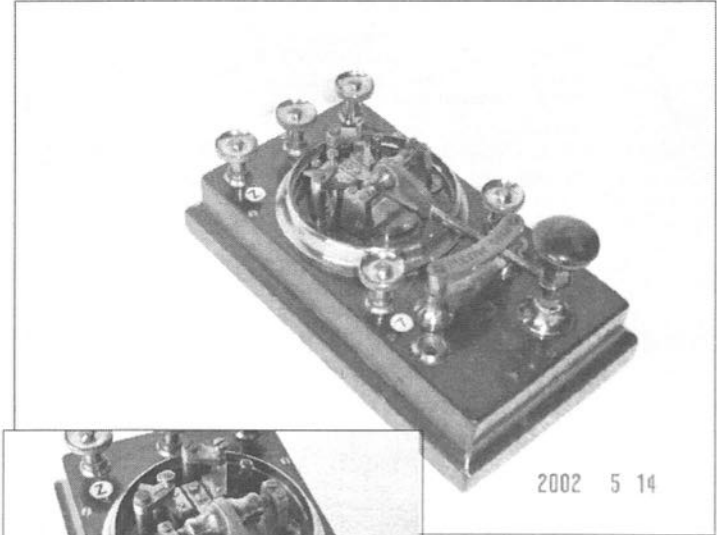
**Who was Louis Schaefer?** Doug Palmer, specialises in collecting Japanese telegraph items and has recently acquired this unique KOB instrument. It carries a paper label 'MORSE SET comprising KEY, GALVANOMETER, RELAY and SOUNDER. Made by LOUIS SCHAEFER (previously Chief Mechanician of "Great Eastern") whilst in Japan, circa 1872. Presented by Mrs Maud Schaefer, daughter-in-law. March 1946.' There is also a small brass plate inscribed, "L. Schaefer Tokyo Japan".

The "Great Eastern", built by Isambard Kingdom Brunel, was the ship that laid the first successful trans-atlantic telegraph cable from in 1866. It was the only ship large enough to carry 2500 miles of continuous cable.

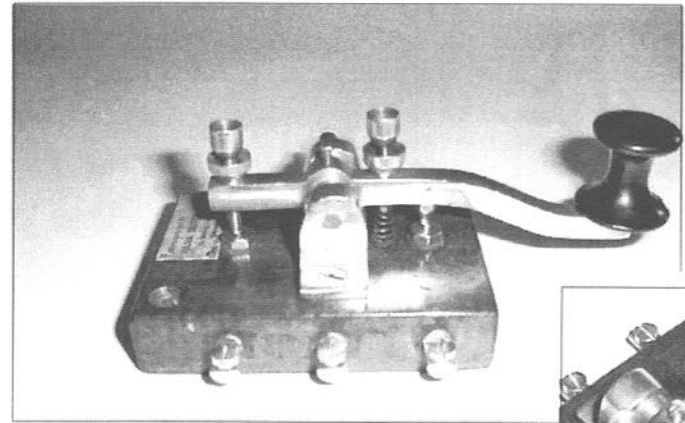
About 1872, Louis Schaefer was in Japan, when he built this instrument. This date could be significant because it marks the laying of the first submarine cables between Japan and the Asia mainland, from Nagasaki to Vladivostok and Nagasaki to Shanghai. The cables were laid by GNT, The Great Northern Telegraph Company of Copenhagen and the cable ships used were "The Great Northern" and "Africa". The circuits from Nagasaki to Tokyo were constructed and operated by the Japanese Post Office.

GNT (now called 'GN Nordic') operated the overland circuits from Shanghai and Vladivostok across Russia into Europe.

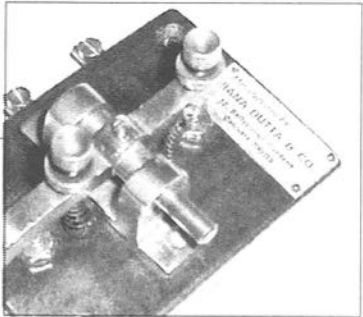
Can any reader offer any additional information on Louis Schaefer, his work in Japan or anything on this instrument.



Has anyone more information on this 1880 model British GPO double current key shown with glass cover removed? Fons Vanden Berghen calls it "1880 model" because on the bottom is a little label that states: GPO No. 62 Date 12.5.8? The label is not complete so the last digit is missing. The label is printed, the figures are handwritten. The connection strips underneath the base are made of plain brass.



An Indian telegraph key with the name plate "MANUFACTURED BY RANA DUTTA & CO. 12 BALLYGUNGE GARDENS, CALCUTTA-700019" Has anyone more information?



# Your Letters

Readers' letters on any Morse subject are always welcome, but may be edited when space is limited. When more than one subject is covered, letters may be divided into single subjects in order to bring comments on various matters together for easy reference. Please note that the views in readers letters are not necessarily those of MM.

## The Omnigraph

I liked Dave Pennes article on the Omnigraph very much and am looking forward to part 2 !

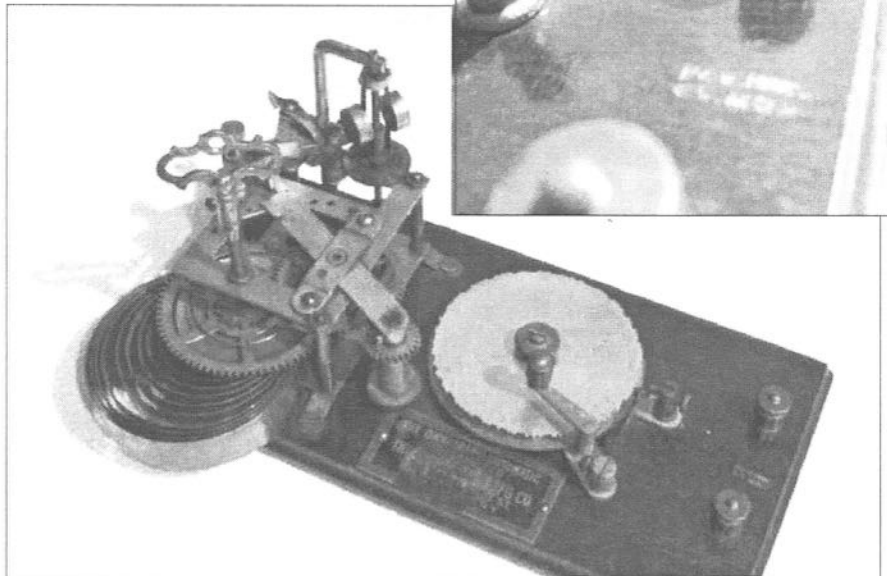
I only have one Omnigraph in my collection and after reading your article, what I thought to be scratches in the wood, might be the patent number but I cannot decipher clearly the letters/numbers with the naked eye.

The Disc shows clearly the digits

2 and 1, the 2 above the 1, embossed. Is this disc number 21?

The Morse code (international code) reads: "LONDON 9 TOE JONES 2 MAINEST, YORK."

*Fons Vanden Berghen  
Halle, Belgium  
[www.faradic.net/~gsraven/  
fons\\_images/fons\\_museum.html](http://www.faradic.net/~gsraven/fons_images/fons_museum.html)*



## Radio Room Carpathia

In 'More on 'Maggie' and the Titanic (MM79, page 31), I included a photograph which purported to be the radio room of the Carpathia (callsign MPA), which went to the rescue of the Titanic. However, it was intended to illustrate the standard Marconi (MIMC Co.) radio room on a ship of that size, compared with the special and more powerful installations on the Titanic and the Olympic.

It transpires now that I fell into the writer's trap of accepting relatively recently published information from other sources without being certain of its authenticity. Some Titanic writings are, I have found, of questionable reliability, especially where a subject like ships radio is concerned. I have found errors and misinterpretations on the internet. I should have known better.

At the National Vintage Communications Fair held recently at the NEC, I purchased, to add to my collection of early publications on radio, a book entitled Wireless Telegraphy by W.H Marchant, published originally in 1914 by Sir Isaac Pitman & Sons. On page 144 is a better version of the same photograph entitled operating cabin of the SS Franconia (callsign MEA). Who the operator was is anybody's guess. Perhaps Harold Cottam sailed also on the Franconia! However, I feel that this ascription is more likely to be accurate than my original source.

The Carpathia and the Franconia were both Cunarders and very likely had very similar, if not identical, radio rooms, with a separate silent room or compartment for the noisy spark transmitter. As a  
*MM81 – June 2002*

description of an example of a standard Marconi installation (and most if not all British ships at that time had Marconi equipment) the caption is accurate otherwise.

I suppose the moral is, carefully check your sources of information before going into print. All that glitters is not gold and writers very often copy others mistakes into their writings, the information becoming established fact on the way.

*Ken Jones, G3RRN  
Lincoln, UK*

## Info Please MM80 P.42

The key of SVIEDY was issued as standard equipment with the Polish designed BP5 60 watt suitcase transceiver from World War II.

*John Gillham, G3ING  
Southall, UK*

## Info Please MM80 P.43

With reference to the key of Don Breen in MM80, page 43, this is a simple Swiss army Morse key. Many different models exist. On models that I know of, the adjustment screw, shown in the photo on the left from the leverside, is on the opposite side to normal. This one could have been fitted the wrong way. Some keys have additionally, up to 8 "banana-sockets" located on the left and right of the base. These were used for interconnection between trainees and instructor during code practice in the classroom.

*Erich Walter, HB9CHE  
Happerswil, Switzerland*

## California National Guard Heliograph 'Experiment'- 1896

Last year I received this letter from Ken Brown, N6KB of Hilo, Hawaii:

"My grandfather once told me that he and a friend once held a distance record for heliographing between Santa



Catalina Island and somewhere such as Signal Hill or Telegraph Hill in or around Los Angeles. If anybody has any documentation of this I would love to see it. It would have occurred in the '20s, '30s or '40s (sorry I can't be more specific) His name was Claude P. Brown"

Well, thanks to Warren Miller of the Sharlot Hall Museum in Prescott, Arizona, we now have at least a partial answer to Ken's letter, although this experiment is quite a bit older.

Warren wrote that he "recently acquired a copy of the October, 1896, issue of Land of Sunshine. It contains an

article on the Heliograph, 'As Told by Heliograph,' by J. Torrey Connor, which relates an army experiment attempting heliograph transmission between Catalina Island and the mainland on August 23, 1896."

The photo shows the men using an "American" heliograph. It is equipped with a sight rather than a second (station or duplex) mirror indicating they were

facing the sun while sending (or, at least for posing).

I checked out the coordinates for Mount Wilson northeast of Pasadena, California and Black Jack Mountain on Santa Catalina Is-

land. I found the island's mountain, at an elevation of 2,020', is southerly from Wilson's 5,700' peak, 61 miles. Mount Wilson is home for an observatory completed in 1917 with a 100" telescope. A trail still exists up the mountain's south side, which may well be the same trail used by the heliograph team.

The website on "heliography" contains a copy of Ken's letter under "Guests' Comments":

<http://www.cableone.net/kd7aoi/>

**James Riddle, KD7AOI**

**Prescott, Arizona**

**E-mail: kd7aoi@cableone.net**

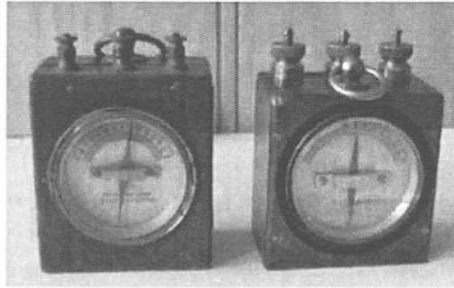
*MM81 - June 2002*



## Readers Ads

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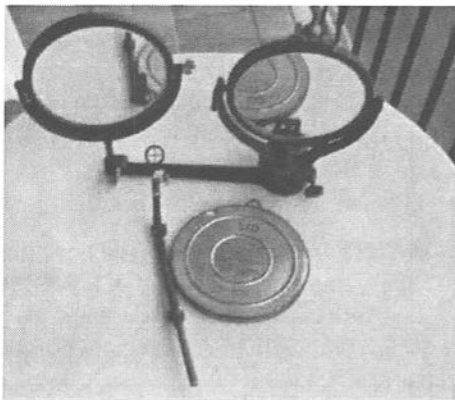
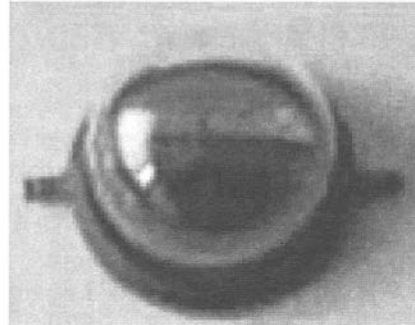


## FOR SALE

**FOR SALE:** Heliograph £40. Only have parts shown on picture, the steel box for spare mirrors is empty and there is some rust on the back. No tripod.

Also telegraph galvanometers. The one on the right in the picture is a W.G.PYE & C<sup>o</sup> N<sup>o</sup> 15416, dated 1917. The one on the left is a Telegraph Works, Silvertown, London.

Also a STUTZ galvanometer with its glass top cover. It was used on French telegraph lines. I suppose J.STUTZ is the maker and HLE above possibly stands for Holland. All these are in good condition, £25 for each. Jean Le Galudec, 26 Rue de L'Oratoire, 54000 Nancy, France. e-mail: jeanlegaludec@wanadoo.fr



MM81 – June 2002

**HUGE 11 YEAR** Telegraph Surplus to be whittled away. Wireless, landline, code books, & other books/paper, learning machines, U.S., foreign, military, parts, etc. - Specific enquiries invited - can send e-mail, pics etc.. Dr. Joe Jacobs, 5 Yorktown Place, Northport NY 11768, U.S.A. Fone: +1-631-261-1576. Fax: +1-631-754-4616. E-mail: joekey@aol.com

**THE MM Q & Z CODEBOOK**, a comprehensive 82-page list of the Q-codes and Z-codes, including a one-page list of the original Q-codes of 1912. Available from Dick Kraayveld PA3ALM, Merellaan 209, 3145 EH Maassluis, Holland. Price £5 UK, or US\$10.00 outside UK, including postage in both cases. Payment accepted in cash only.

47

**FOR SALE continued**

**MINT COPY** of MM19 Spring 1991 Morse Bicentennial Issue, £5 inc p&p (UK only, overseas extra). Contact Bruce Morris, GW4XXF +44 (0) 1654 710741 email: [bruce@gw4xxf.free-online.co.uk](mailto:bruce@gw4xxf.free-online.co.uk)

**EXCHANGE & WANTED**

**EXCHANGE:** I have MM magazines, issues 36-80 inc(45mags)to exchange for a Vibroplex double-paddle. Can collect/deliver in UK. Phone Keith +44 (0)7946-663109.

**WANTED:** Marconi 365A or B key with roller bearings. Will pay going price and it will end up as property of Radio Officers Association as an addition to the equipment held. Contact David Barlow, G3PLE, Pine, Churchtown, Cury, Nr Helston, Cornwall, TR12 7BW, UK. Tel: +44 (0) 1326 240738, e-mail: [dbarlow@lizardwireless.org](mailto:dbarlow@lizardwireless.org)

**I AM A KEY COLLECTOR** with over 300 different keys from 20 countries and have 50 keys available for swapping. Write to Henri Heraud, F6AUO, 9 Avenue de Bellevue, 91130 RIS ORANGIS, FRANCE.

**WANTED TO BUY:** Telegraphic Code Books, as used to reduce the costs of telegrams by replacing common phrases with codewords. Would be interested in both originals of photocopies. I am a hobbyist in Cryptography and am

fascinated in different ways data is and has been represented for different purposes (e.g. speed, economy, confidentiality etc.) Also interested in related items. Letters to Mark Darling, 132 Knowlands, Highworth, SN6 7NE, United Kingdom or e-mail: [darling@patrol.i-way.co.uk](mailto:darling@patrol.i-way.co.uk)

**WANTED: TELEGRAPHY ITEMS** (esp. land-line). I am looking for somewhat special telegraphy apparatus: Single and Double Needle, Wheatstone etc. Buy or swap. I can swap for early electricity (e.g. tubes from Crookes, Röntgen and Geissler; Ruhmkorff; Wimshurst;...), very old radiovalves, some telephony and of course telegraphy. Who else collects telegraphy ?? All letters answered. Fons Vanden Berghen; Lenniksesteenweg 462/22; B-1500 Halle, Belgium.

Tel. +32.2.356 05 56 ( home: after 8 pm my local time) or office: +32.16.38 27 21 or e-mail: [fovabe@telindus.be](mailto:fovabe@telindus.be)

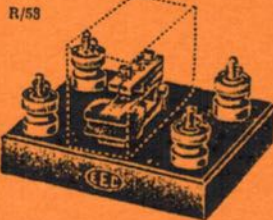
**WANTED TO BUY:** Back issues of MM nos. 6, 9 to 22 inclusive. Also 1960s NATO Navy key (5805-99-580-8558). Please contact Stephen Parry, G4LJZ, E-mail: [stephen@keying.co.uk](mailto:stephen@keying.co.uk)

**WANTED TO BUY:** GPO Type 56 key and Marconi side-lever Morse key with brass hardware on a wooden base. Letters to: D. Johnson, W5FZ, 15514 Ensenada Drive, Houston, TX 77083-5008, USA. Or Email: [fullerphone@yahoo.com](mailto:fullerphone@yahoo.com)

**WANTED:** Early paddles such as the Nikey, Autronic, Ham-key HK1 & HK2. Ray Bullock, 40 Little Harlescott Lane, Shrewsbury SY1 3PY, England. Tel: +44 (0) 1743 245896.

**BUZZERS**

**KEYS**



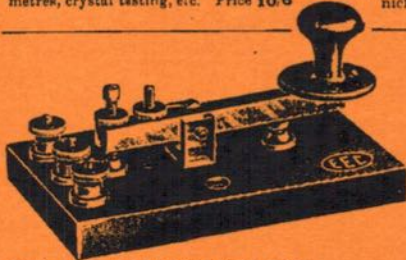
**R/53**  
**THE "MOSQUITO" BUZZER.**  
 A single pole buzzer giving an exceedingly high note, particularly suitable for wave-metres, crystal tasting, etc. Price 10/6



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 Double pole type with brass cover. A good serviceable instrument that will maintain its note. Price 5/6  
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 Substantially made, fitted with copper-faced poles to prevent sticking. Price 4/8



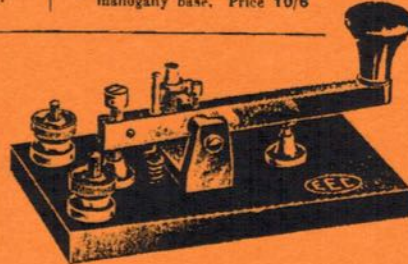
**R/55**  
**TRANSMITTING KEY.**  
 A fine example of exceptional value, all metal parts of finished and lacquered brass. Key bar of solid drawn brass rod  $\frac{3}{8}$  in. by  $\frac{1}{2}$  in. Ebonite knob and protector. Polished mahogany base  $5\frac{1}{4}$  in. by 3 in. by  $\frac{3}{4}$  in. Price 7/6



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**THE "P.O." BUZZER.**  
 This is an instrument of particularly robust construction giving a good high note. Enclosed in metal case with glass top and mounted on mahogany base. Price 10/6

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**TRANSMITTING KEY**  
 This key is precisely the same as we manufactured for the Government during the war and is an excellently balanced and splendid working instrument. Shaped key bar of cast gunmetal, finished and lacquered with gunmetal bracket. Turned and polished ebonite knob, silver contacts. Polished mahogany base,  $2\frac{1}{2}$  in. by  $5\frac{1}{4}$  in. by  $\frac{3}{4}$  in. Price, 10/6

N.B.—This key is fitted with a hardened steel tapered axle, ensuring a perfect action and allowing for adjustment to take up wear.



*Keys and buzzers as offered in the 25th Anniversary Catalogue of Economic Electric Limited, of 10 Fitzroy Square, London W1, published in August 1922*

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*From a book for writing Western Union trans-atlantic cablegrams from the UK and Paris, 1907.*