

FOREIGN AND MILITARY TELEGRAPH KEYS

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This paper deals in the main with foreign keys, i.e. non-American telegraph and wireless keys, and with military keys of all countries. However, it is important to compare the development of the key in foreign countries with its development in the United States, and such comparisons are included where they are considered of historical interest.

HISTORICAL

From the beginning of history, up to the 18th century, the speed of communications was virtually limited to that of the horse on land and the sailing ship on sea. There were, however, some simple signaling systems used in the early days. The Greeks, the Phoenicians and the Persians used fire beacons with a prearranged code, usually in time of war. In some parts of Africa the natives used drums to pass messages from village to village. The North American Indians used smoke signals. And the British navy used flags and pennants to signal between ships. While these "telegraph" systems were useful, they all had severe limitations.

The word "telegraph", coined in 1792 by a Frenchman, Claude Chappe, to describe his semaphore system, comes from the Greek "tele", meaning "far", and "graphein", meaning "to write". Chappe mounted his manually-operated semaphore arms on towers spaced 5 to 10 kilometers apart and equipped his operators with telescopes. He built these towers across France and into Bavaria; they were used with some success during the Napoleonic wars and up until the time the line (wire) telegraphy came into being.

During the 17th and 18th century a number of scientists contributed to the knowledge of electricity and magnetism. But it was an Italian scientist, Alessandro Volta, who initiated the field of electrotechnology in 1800 when he developed the first constant current battery, consisting of zinc and copper plates in an acid solution, and later called the Voltaic cell. Other scientists soon found that electric currents generated magnetic fields, and one of the first important developments arising from this early knowledge of electricity and magnetism was the electro-magnetic telegraph.

While a number of scientists contemplated the idea of communicating by electricity, the first practical telegraph was developed by two Englishmen, William Cooke and Charles Wheatstone, who patented their needle telegraph in 1837. The needle telegraph was based on the principle that a magnetized needle, when placed near a wire carrying current, would deflect to the right or to the left, depending on which way the current was flowing. Cooke and Wheatstone mounted five magnetized needles on a large panel, and by means

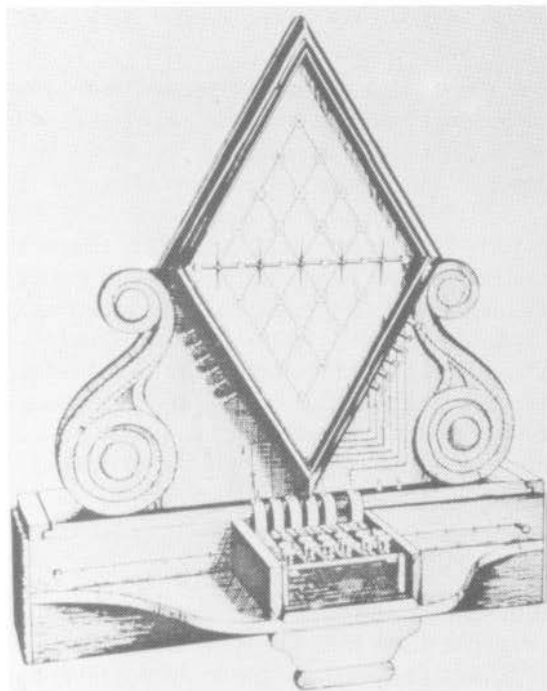


Fig. 1. Cooke and Wheatstone's five-needle telegraph of 1837.

of an electric current caused two of the needles to point to various letters mounted on the same panel, thus spelling out words.

However, it was an American, Samuel Finley Breese Morse, who deserves the credit for the telegraph. Morse worked on his ideas for a number of years, dating from about 1832, but he couldn't get adequate financing. He also was not very good at building the necessary instruments, and in 1837 he formed a partnership with Alfred Vail, whose father owned the Speedwell Ironworks in Morristown, New Jersey. Vail built the instruments, and it was Vail and Morse who developed the binary system of dots and dashes to represent the alphabet, and which later was called the Morse code. Morse finally convinced the U.S. government to put up the necessary funds to build a telegraph line between Washington and Baltimore to prove the feasibility of the system. That occurred in 1844, and within a relatively few years telegraph lines were connecting most of the major towns in the U.S.

In European countries, the development of the telegraph differed substantially from its development in the United States. In France, for example, the government was unwilling to abandon the Chappe semaphore system, since it was an important government department and employed a large number of people. A commission appointed to review the matter finally decreed that, if line telegraphy was to be installed, the telegraph indicators should have two needles, each needle having eight positions, thus simulating the Chappe semaphore system so that the Chappe operators would not require complete retraining. Within a few years, however, the government, realizing the disadvantages and greater complexity of the Chappe-type indicators, and also desirous of having a system compatible with other European countries who

were using Morse type equipment, changed over to the simpler and faster Morse system.

In England, also, the system developed in a different manner than in the United States and Canada. A letter could be mailed for a penny and was guaranteed to get there the next day. This was much cheaper than a telegram and had less chance of error. Also, this was at a time when the railways were rapidly expanding their routes. So, in England, the development of the telegraph coincided with the growth of the railways, and the needle telegraph was used to control railway operations. In the U.S., with a widely dispersed population, the telegraph was used mainly at first for railroad train orders and to get news to the newspaper offices. A press association was formed in New York, and the news from Europe and New York was wired to the inland cities. Also, Samuel Morse fought tenaciously and successfully to protect his patent rights. Thus the Morse key and sounder became the preferred and accepted practice in the United States, while in England the needle telegraph continued in use for many years.

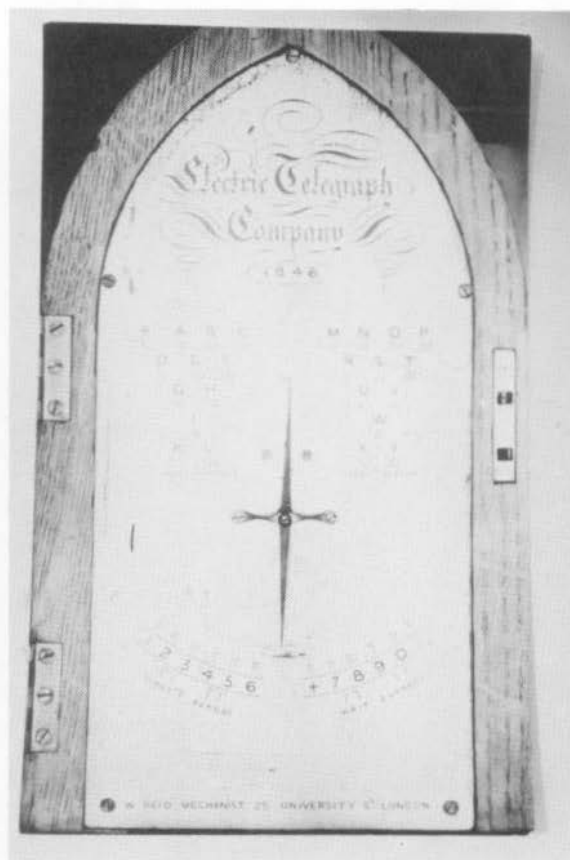
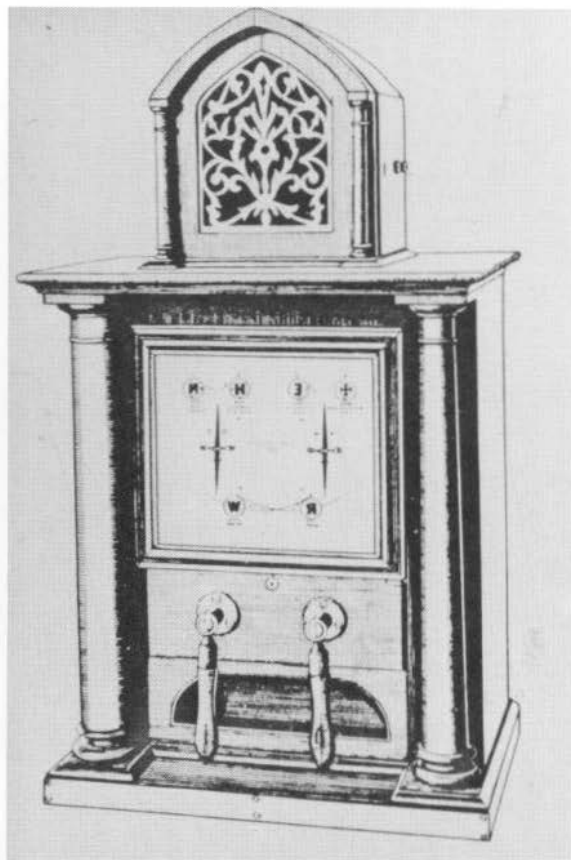
THE NEEDLE AND DIAL TELEGRAPHS

The five-needle telegraph, built by Cooke and Wheatstone, (Fig. 1) was the first British telegraph system. It was sold to the railways where it was installed with six wires. At first Cooke and Wheatstone were not too knowledgeable on how to properly insulate their wires, and after several of the wires had failed, the operators worked out a code using only two of the needles. As a result, Cooke and Wheatstone decided to develop a two-needle telegraph.

In the two-needle version (Fig. 2), each letter was represented by so many deflections of the left or right needles. Again, if one of the wires failed, the operators found they could communicate with one needle. So Cooke and Wheatstone then decided to bring out the single-needle telegraph.

The single-needle instrument (Fig. 3), with one wire and a ground return, was easy to maintain and easy to use. Each letter was represented by so many deflections to the right and so many to the left, similar to the military signal-flag system. Initially, the codes were arbitrary, but later the Morse code was adopted in which dots were to the left and dashes to the right, so that the letter B, dah-dit-dit-dit, for example, would be one deflection to the the right and three deflections to the left.

In the 1850s and 1860s a number of the European countries, including England, France, Belgium, and Germany, developed dial-type telegraphs or alphabetical telegraphs, as they were sometimes called. A dial telegraph built by the Siemens firm in Germany is shown in Fig. 4. Each instrument had an indicator dial and a control dial, with the letters and numerals marked around the circumference of each dial. In this system, after the alarm was actuated, each operator placed his control dial in the 12 o'clock position. Then, as the sending operator moved his control dial past each letter, the instrument would generate voltage pulses which caused the indicator dials to move to the corresponding letter; that is, the indicator dials tracked the control dial. The dial-type telegraphs were used fairly extensively at first, but because they were slow, 10 w.p.m. or less, and because they needed two operators, one to read



Figs. 2, 3. The two-needle and single-needle telegraphs, as devised by Cooke and Wheatstone.



Fig. 4. A dial telegraph built by the Siemens firm in 1857.

and one to copy, by the mid-1850s the majority of the European lines had adopted the more economical and simpler Morse system.

THE MORSE AND CONTINENTAL CODES

Since the Morse code lacked letters with diacritical marks, such as the German umlaut and French grave accent, it was not wholly satisfactory for use on the European continent. By agreement, a variant called Continental or International Morse was adopted by European countries in 1851, in which Morse's spaced letters such as C, O, R etc. were replaced with unspaced letters. In the United States, where the Morse code was well established, the telegraph companies considered that the move to the Continental code would cause too much confusion and they remained with the Morse code. Later, submarine cable and wireless telegraphy would adopt the Continental code.

THE U.S. CIVIL WAR

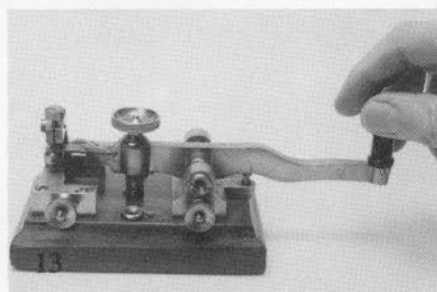
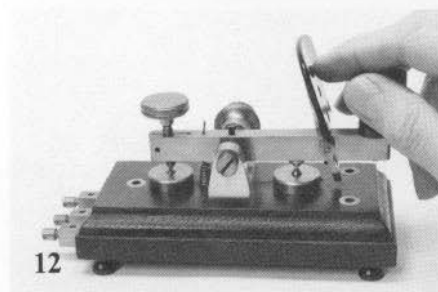
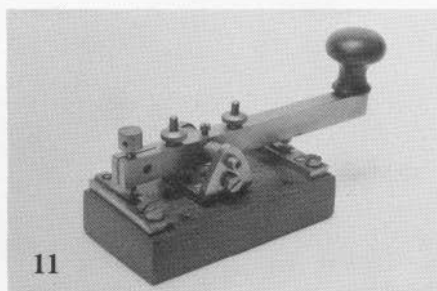
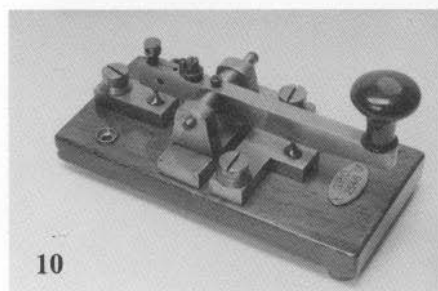
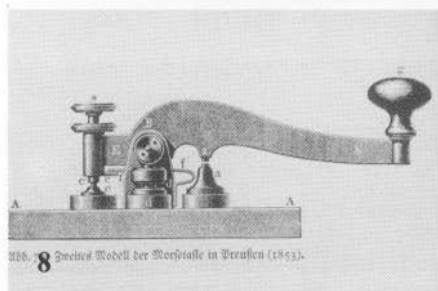
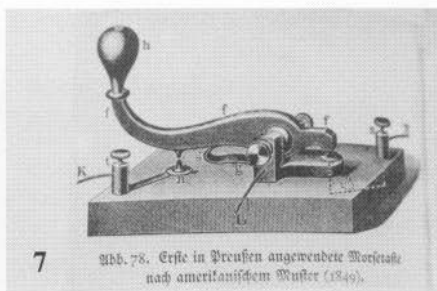
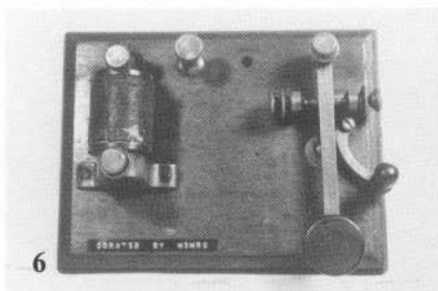
Military telegraph communications, established and used during the U.S. Civil War by both the Union and Confederate Armies, employed the straight lever and camelback keys from railroad and commercial telegraph services of that period. Most military signaling, especially during the first two years, was accomplished using signal flags from high locations. The Signal Corps of the U.S. Army was established, with Major Albert J. Myer as Chief Signal Officer. He recognized the potential and importance of the electric telegraph but trained telegraphers were in extremely short supply. He therefore introduced the Beardslee dial-type telegraph (Fig. 5), which did not require a trained operator. Unfortunately, this machine proved too slow when compared to the performance of skilled Morse telegraph operators, and less than two years later most of the Beardslee units were destroyed.



Fig. 5. The Beardslee A-B-C-type dial telegraph instrument of 1862-63. Most of these were destroyed.

Photo: Smithsonian Institution

The Military Telegraph Service, a civilian branch of the Quartermaster Corps, was equipped with "Battery Wagons" which served in the field as telegraph offices, together with a fleet of construction wagons carrying the necessary wire, insulators, tools, etc. As the war progressed these signal facilities became increasingly important. (Grant's message announcing Lee's surrender was sent by military telegraph to Washington.) The principal telegraph equipment used in the mobile offices was the KOB (Key on Base) set, consisting of a sounder and a key mounted together, as shown in Fig. 6.



Figs. 6-13. 6: The KOB, a complete sending and receiving station for Civil War military telegraphers; 7: Model 1, an early Prussian key; 8: A Model 2 Prussian key, 1853; 9: The Preece plunger key; 10: Standard British Post Office key; 11: Early German telegraph key by Siemens & Halske; 12: An early Italian key; 13: Swedish telegraph key by Ericsson.

Photos: 6, L.R. Moreau; 9-13, M. Willer.

THE EARLY EUROPEAN KEYS

The "camelback" key, so named because of its curved lever, was widely used in the U.S. and was manufactured by a number of instrument makers. While it never achieved wide popularity in Europe, the Prussians liked it, and Fig. 7 illustrates one built in 1849. This was called the Model 1 and its camelback lineage is apparent.

Fig. 8 shows another camelback-type key built in Prussia a few years later, called the Model 2. However, the curve on the lever of the Model 2 was no longer important, and the design was moving toward the straight lever.

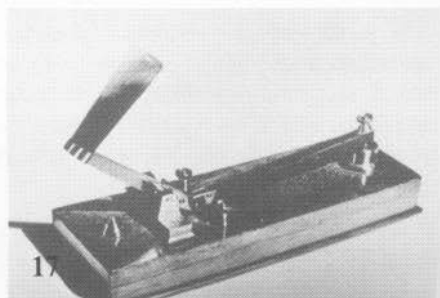
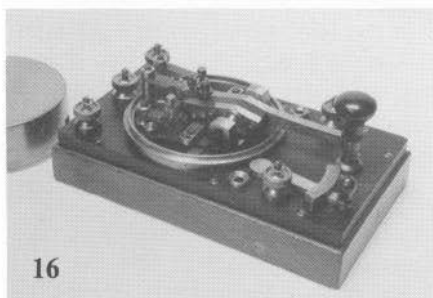
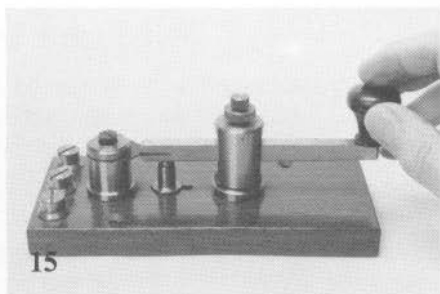
William Preece was the chief engineer of the British Post Office for many years and a very good engineer. He developed the Preece Plunger Key (Fig. 9) which was used in railway block operations. The railways developed the block system in which each railway line was divided into sections or blocks, and the telegraph was used to ensure that only one train was on one block at any one time.

Before the British Post Office took over the telegraph companies in 1870, there was a wide variety of equipment in use. While the needle telegraph was predominant, there was a mixture of other types including some dial telegraphs, some acoustical, some printing types and some Morse equipment. The Post Office, realizing the need to train large numbers of operators to take on the expanded systems, and also the need to standardize on equipment, made the decision to move to the Morse system, and the key shown in Fig. 10 is representative of the standard post office design.

In this version the spring is mounted to the rear of the fulcrum and is in tension, as opposed to the American key design, where the spring is in front of the fulcrum and is in compression. Also, the British and other European keys have an extra contact at the rear of the lever. This contact was connected to the next station through its relay. In the European system, the battery was not in the circuit until the operator started sending, i.e., the battery was open-circuit. This was termed the Open-Circuit system.

In the United States, however, the battery was always connected in the circuit, i.e., the battery was closed-circuit, so the American system was called the Closed-Circuit system. When the operator finished sending, he kept the circuit closed by means of his circuit closer, or shorting switch. Each system had its advantages, so the Europeans continued with their Open-Circuit system, while the Americans retained their Closed-Circuit system. That is why European keys have that extra contact at the rear, and American keys do not.

An early German telegraph key, made by Siemens & Halske, is shown in Fig. 11. The heavy lever and large knob are typically European. An interesting feature of this particular key is the use of two springs, one in front of and one behind the fulcrum, which allowed the operator to set the lever for very light balance. In the Siemens key the front and rear bottom contacts are mounted on springs cantilevered out from the side, giving the key a nice soft positive feel, a feature which the Germans carried right into some of their World War II designs. On these early models the contact on the lever was called the hammer, and the front bottom contact the anvil.



Figs. 14-17. 14: British key used in duplex telegraphy; 15: British Walters key with an adjustable fulcrum; 16: British double-current key; 17: The Marconi grasshopper key.

Photos: M. Willer

An early Italian key is shown in Fig. 12. There is an extra lever to the rear of the fingerpiece which is pushed out of the way with the index finger when operating; then, when the operator is finished, the extra lever makes contact with the anvil, thus acting as a circuit closer or shorting switch. Hence the key could be used for open-circuit or closed-circuit work, with the extra lever removed for open-circuit operation.

Sweden's first telegraph line was built in the 1850s by a Mr. A.H. Oller, using equipment from France and Germany. Oller then set up a plant in Sweden to build telegraph equipment. One of his trainees was a bright young fellow, Lars Magnus Ericsson, who was later sent to France and Germany on a scholarship to study the techniques used in the manufacture of telegraph equipment. Ericsson returned to Sweden and set up his own company, and Fig. 13 illustrates one of his keys. However, the Ericsson key was originally designed by Oller and then copied by Ericsson. The key is unique in that the hammer is a platinum-coated laminated-steel spring fastened to the lever with two screws, with the contacts located above and below the hammer. The upper contact is called the anvil and the lower contact the boss, and the dots and dashes are made when the hammer hits the anvil. The Ericsson or Oller style of key was also copied by the Great Northern Telegraph Company in Denmark and the Ihili Company in Norway, and early keys made by these companies reveal their Ericsson design origin.

Fig. 14 is a British key, which, with its six terminals and send-receive switch, was obviously used for duplex telegraphy. The key is beautifully made and mounted on a highly-polished piece of rosewood. In duplex telegraphy messages can be sent in both directions at the same time on the one wire.

A key made by the Walters company in England in the early 1900s is shown in Fig. 15. The front pedestal contains the upper and lower contacts. The lever is fastened to the rear pedestal by means of a flat spring, and the fulcrum, which is immediately in front of the rear pedestal, can be moved backward or forward to adjust the tension of the lever; this is one of the very few keys with an adjustable fulcrum.

The double-current key (Fig. 16) was used mostly in England and in India over long lines. An ordinary single-current key sends out square, positive pulses representing dots and dashes, but in a long telegraph line, due to the capacitance and impedance in the circuit, the square pulses tend to get distorted and pushed out of shape. In the double-current key the key sends out a weak negative current in the spaces between the dots and dashes, and this negative current tends to straighten and square up the positive pulses.

WIRELESS — 1900 TO WORLD WAR II

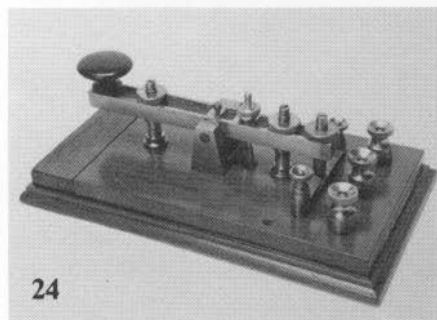
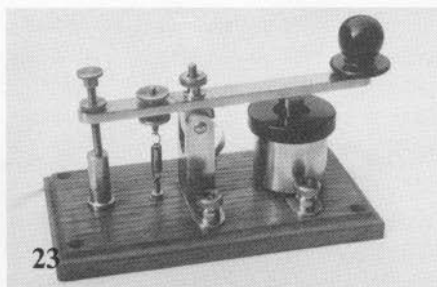
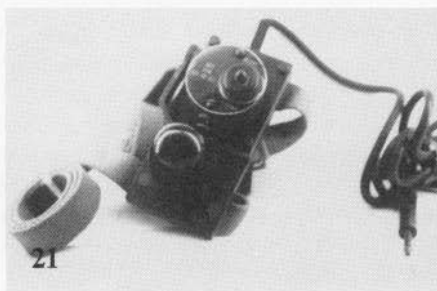
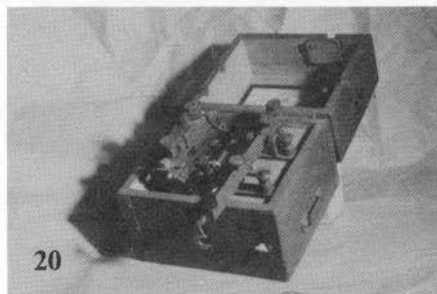
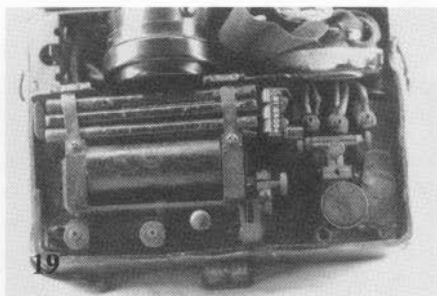
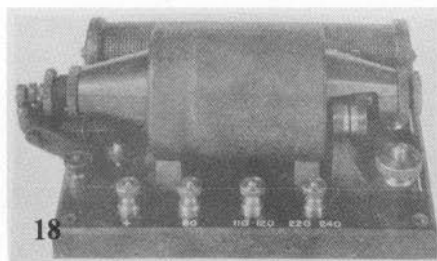
When wireless came along at the beginning of the twentieth century, all of the transmitters were spark transmitters. Because of the heavy current required, the telegraph keys with their small contacts were not suitable, and larger keys with heavier contacts were developed.

One of Marconi's first keys, known as the "grasshopper key", was a rather ponderous device and is shown in Fig. 17. The key was designed to handle high current during transmissions and at the same time short-circuit the coherer or detector to prevent its destruction.

The U.S. Navy was no longer limited to flag or light signals and adopted radio, using new styles of keys capable of controlling the high power required for spark transmitters. Some keys had contacts measuring an inch in diameter, and were equipped with cooling fins to dissipate the heat generated at the contacts. High-power coastal stations frequently used a heavy-duty keying relay (Fig. 18) between the key and the primary of the transmitter. Telegraphy was also the principal method of communication for armies using either wire or radio. During World War I the U.S. Signal Corps was equipped with a new and compact "Buzzerphone". The earliest of these were made by Stromberg-Carlson in 1914 (Fig. 19). Later units, by Western Electric, had a straight-lever key hinged in the center so that it could be locked for operation, or loosened and turned in at an angle when secured inside the case (Fig. 20).

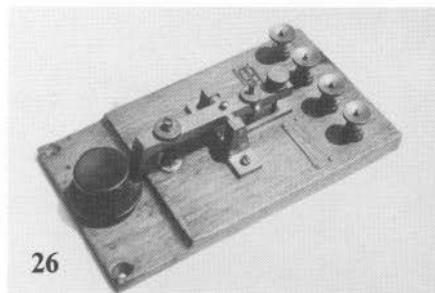
The U.S. Air Corps used the flame-proof J-5 key which could be strapped to the thigh so that the airman could transmit reconnaissance information in flight (Fig. 21). Both the Air Corps and the Navy used the type J-7 key, equipped with a light, for monitoring a remote light-signaling device (Fig. 22).

A very early spark key built in France is shown in Fig. 23. Its maker is unknown. In this key, the contacts were immersed in oil to suppress the spark and to provide better cooling. These were called oil keys; the French were



Figs. 18-25. 18: Heavy-duty keying relay from the spark era, 1914; 19: Stromberg-Carlson buzzerphone for use in trenches, WW I; 20: W.E. trench buzzerphone, 1917; 21: J-5 flameproof key with "mitten" knob for use in open-cockpit aircraft, 1917; 22: J-7 flameproof key, combined with a light-signaling device, 1917; 23: Early French oil key for spark use; 24: WW I Marconi key; 25: Yard-arm blinker key, 1911.

Photos: 18, 19, 21, 22, L.R. Moreau; 21, Henry Ford Museum; 23, 24, 25, M. Willer.



Figs. 26, 27. 26: Canadian Marconi key, 1920s-30s; 27: Marconi key used at Drummondville, Quebec.

Photos: M. Willer

apparently fond of this design, and a number of oil keys were built by them.

Fig. 24 illustrates a Marconi key used during WWI. There were a number of different methods of keying the transmitter and disconnecting the receiver, and there is an extra set of contacts at the rear of the lever, used to operate relays to do this.

The key shown in Fig. 25 was originally installed on a Great Lakes vessel built in 1911. On first examination its heavy construction with large internal contacts and two large cable connections would indicate it was built for spark use. However, this type of key was mounted on the bridge of the ship, and when the officer on the bridge wanted to communicate with some of the ships around him without using the wireless, he would use this key, which operated the lights on the yard arm of the ship. Hence its name, "yard-arm blinker". During WWII, some ships were equipped with an extra yard-arm blinker dubbed "Nancy". "Nancy" operated a set of infra-red lights on the yard arm and was used if there were enemy submarines around. Special optical equipment was needed to read "Nancy".

A Canadian Marconi key used on a Great Lakes vessel during the early 1920s and 30s is shown in Fig. 26. While the use of spark was discontinued in the 1920s, many of the ships on the Great Lakes retained their Marconi spark transmitters as back-up emergency equipment until 1940.

The key illustrated in Fig. 27 was used by a Canadian operator to control a Marconi transatlantic station in Drummondville, Quebec, from 1926 to 1963. The contact configuration in this key bears a strong resemblance to the Swedish Ericsson key, and it is possible that Marconi used Ericsson keys as replacements in some of their stations.

The Marconi Model 365, Fig. 28, was the universal key used on both land-based and sea stations before, during, and after WWII. In this model the large lever is supported on ball bearings. The British wireless operators were really brass pounders, and the heavy construction of the Marconi 365 reflects this fact.

American wireless operators usually mounted their keys at the rear of the desk and preferred operating with their arm on the desk. But the usual British

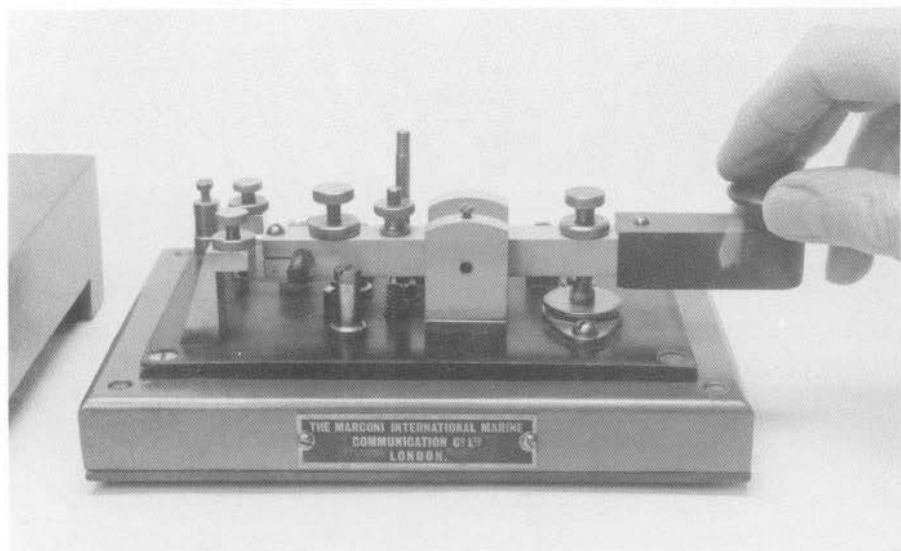


Fig. 28. The widely-used Marconi Model 365.

Photo: M. Willer

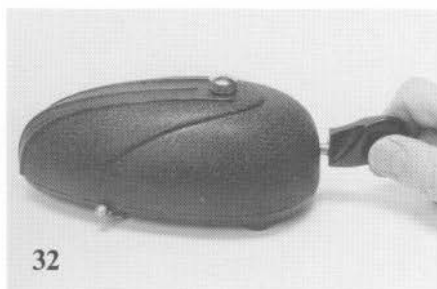
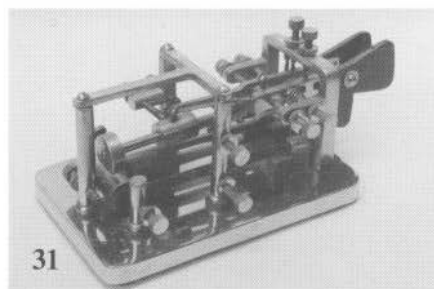
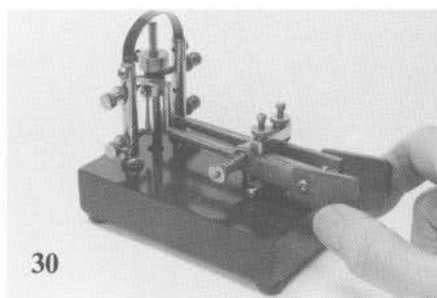
custom, which they felt provided greater operating freedom, was to mount the wireless key at the edge of the desk and pound away with the wrist and arm in mid-air. . . .and perhaps that's another reason their keys had to be heavier.

THE SEMI-AUTOMATIC KEY — 1900 TO 1950

Around the turn of the century a number of telegraph operators were trying to develop keys to speed up their sending. They were not too successful. Then, in 1904, an American by the name of Horace Martin received a patent for his "telegraphic transmitter", which just about locked up the design of the semi-automatic key or "bug". He called his key the Vibroplex. Martin and the Vibroplex company produced many different models of semi-automatic keys, and collecting one of each of the Martin and Vibroplex models would be a project in itself. However, by the early 1920s the Vibroplex patents were starting to run out, and a number of other companies entered the field and started to manufacture semi-automatic keys.

It was the policy of most U.S. telegraph companies to let the operator select the key he preferred, in the interest of speed and efficiency. Thus in the U.S. there was a large variety of keys and bugs developed and used. In other countries, where the government ran the telegraph systems, there was a tendency to remain with the standard straight-lever hand key; hence other countries simply did not develop the range of semi-automatics that were developed in the United States.

The Australians did produce several unusual semi-automatics, which in Australia were called "jiggers". One, built in Melbourne, Australia in the early 1930s (Fig. 29), is a sturdy right-angle jigger called the Simplex-Auto, in



Figs. 29-32. 29: The Australian Simplex-Auto, early 1930s; 30: The MacDonald Pendograph, Australia; 31: The Australian Automorse, Hitchcox Bros. triple lever; 32: British Eddystone beetle bug.

Photos: M. Willer

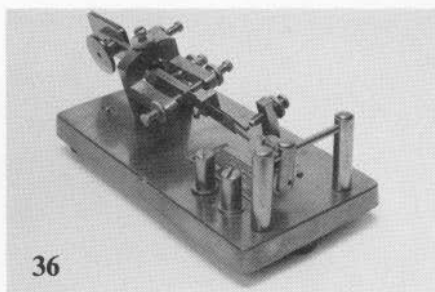
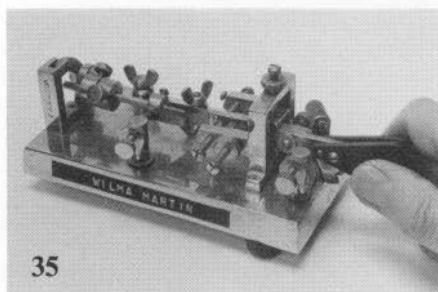
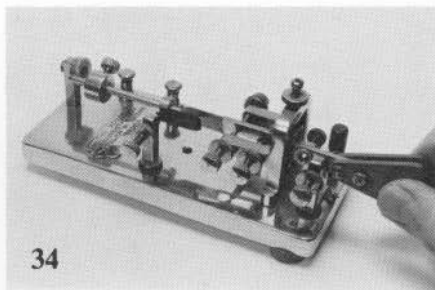
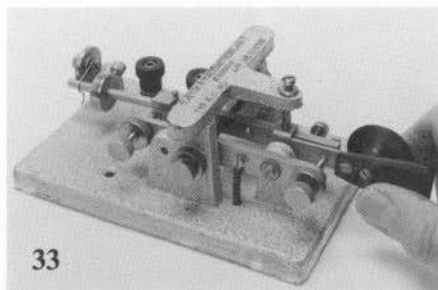
which the pendulum is at right angles to the finger knob. These were made for both right and left-hand operation.

Fig. 30 illustrates a double-lever jigger made in Adelaide, South Australia, called the MacDonald Pendograph. The left lever releases the pendulum to make automatic dots, while the right lever makes dashes manually. Because the pendulum is vertical this key could also be classed as a vertical jigger. The Post Master General in Australia allowed operators to use semi-automatic keys, and a number of these which were originally supplied to the post office carried the initials PMG (Post Master General).

An unusual key manufactured in South Australia by the Hitchcox Brothers (Fig. 31), is a triple-lever key called the Automorse. It has one lever for automatic dots, one lever for automatic dashes, and one lever for manual dashes. Its many adjustments makes it a difficult key to set up properly. While it is a most interesting design, it does appear to be a bit over-engineered.

So far as can be determined, there was only one bug produced in England on a production basis. This was known as the Eddystone beetle bug (Fig. 32). The British should be given special credit for this design, as it is the only "bug" that looks like a bug.

A semi-automatic key made by the Swedish Radio Company (Fig. 33) carries the designation "Bug 140". C.W. operators who are familiar with the famous American McElroy key will spot some of the rugged design features



Figs. 33-36. 33: Swedish Radio Co. "Bug 140."; 34: Canadian Xograph bug; 35: Fred Wilcox bug, Canada, early 1920s; 36: The "Bent Bug", Paul Dow, Canada.

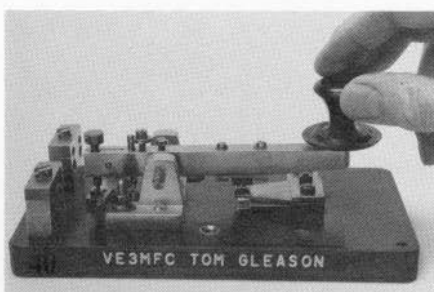
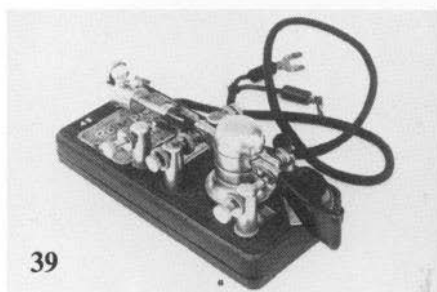
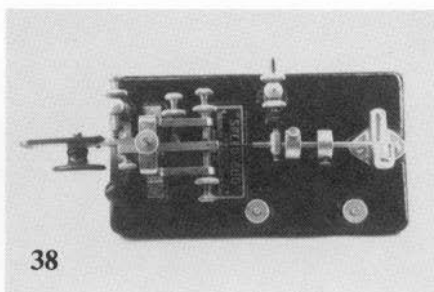
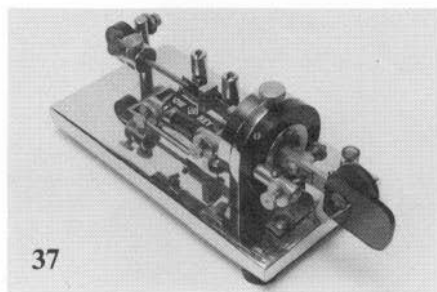
Photos: M. Willer

borrowed from the McElroy key. The heavy tee bar can be used for carrying, and also permits the key to be turned on its side; with the pendulum locked, it can be used as a straight hand key.

A key built by Rolph Brown of Toronto, Canada (Fig. 34) was called the Xograph. Rolph was an operator with the Canadian Pacific Telegraph Company and built bugs in his home basement back in the early 1920s. They were quite small, somewhat like the Vibroplex Blue Racer, and it is possible that Vibroplex borrowed one or two ideas from Rolph.

Fred Wilcox was an operator with the Canadian National Telegraph Company on Toronto. Fred was a pretty good machinist and had a machine shop at home where he manufactured bugs which he sold to his many friends who were telegraph operators. Fred didn't want his keys to move around the operating desk, so all his keys (Fig. 35) had heavy bases. They were made during the early 1920s, with serial numbers up to about 1500.

Paul Dow, of Winnipeg, Manitoba, built a number of bugs. Paul believed that, for ease of operation, the pendulum should be inclined at about 30 degrees, and in one of the bugs he built (Fig. 36), he actually inclined the pendulum and the bridge together with the dot and dash contacts at 30 degrees to the vertical. This was dubbed "The Bent Bug". In most bugs the base was of steel, with the upper brackets and lever of brass, but Paul made this model all of bronze.



Figs. 37-40. 37: Paul Dow bug with rotatable pendulum; 38: Brooklyn Metal Co. J-36 June, 1930. Earliest use of designation J-36 by Signal Corps for all their semi-automatics; 39: Martin Rotoplex semi-automatic, 1941; 40: Air Ministry Morse key, type D, 1930s.

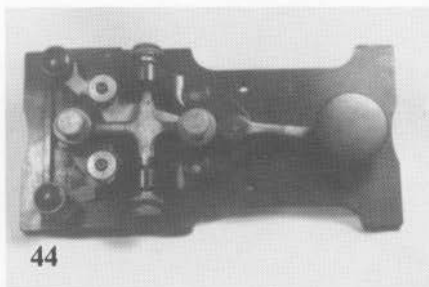
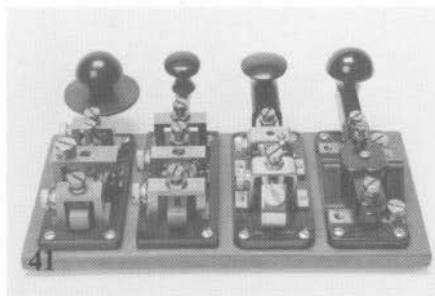
Photos: 37, 40, M. Willer; 38, 39, L.R. Moreau

In the 1950s Paul Dow went a little further and made the pendulum adjustable, so that the operator could set it at any angle for greater operating ease (Fig. 37). The set-screw at the top locks the rotating mechanism once it has been set at a convenient angle. The Canadian Dow Company was later taken over by an American Company, so the same key may be found with the label marked "Warren, Minnesota", instead of "Winnipeg, Canada".

A semi-automatic key adopted in the thirties by the U.S. Signal Corps was designated the J-36 (Fig. 38). It was manufactured originally by the Brooklyn Metal Stamping Company. Another noteworthy semi-automatic speed key made by Martin for the military during WWII was the "Rotoplex" (Fig. 39). This key was built with a quite substantial ball-bearing lever support.

WORLD WAR II — THE MILITARY HAND KEYS

When WWII came along there was a tremendous increase in communication requirements, and several keys which were developed during the 1930s immediately found use. Fig. 40 shows a key used before, during, and after WWII in Royal Air Force ground stations. It carries the designation "Key. Morse. type D Ref. No. 10F/7373 Air Ministry", and its heavy lever, large silver contacts, and large cable clamps indicates the builders may have designed it initially for spark use.

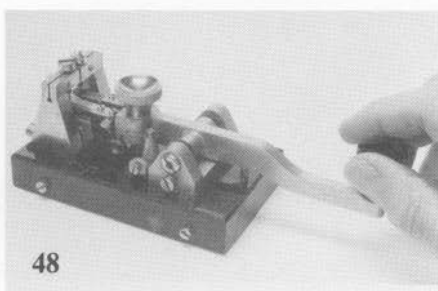
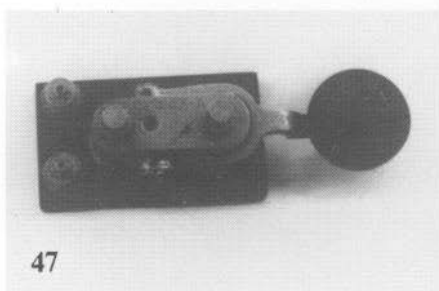
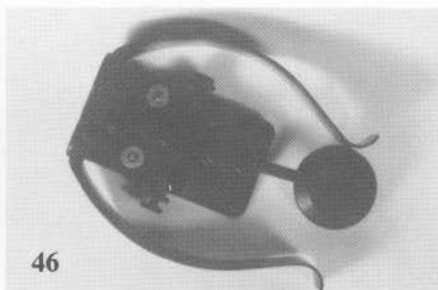
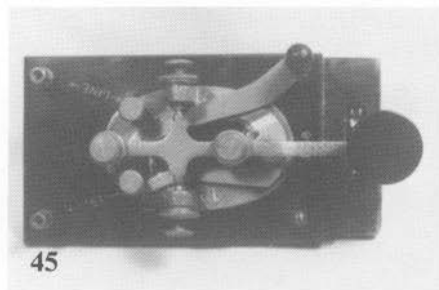


Figs. 41-44. 41: WW II keys, British Army and RAF; 42: RAF WW II "bathtub" key; 43: RAF light-signaling key, WW II; 44: 1941 J-37 U.S. military key...steel lever and leaf spring on a dielectric frame; could also be designated J-41A, J-43, J-44, J-45, J-46, J-47.

Photos: 41, 42, 43, M. Willer; 44, L.R. Moreau

A number of keys were built during the war for the British army and the RAF by various manufacturers, all to the same general specification, but differing in detail (Fig. 41). The one on the left, with the protective disc, was made by Western Electric for the British Air Ministry, and the body carries the Air Ministry markings with crown. The next one was made by Bunnell, with all the upper hardware of polished brass. The third one was by the Canadian Westclox Company, with the brackets all of pressed steel. The last one was by a British company, with the body made of plastic, except for the brass contacts and terminals. These keys all had the same standard base so they could be interchanged. The Westclox keys were also made with a steel enclosure fitted with web straps which fastened to the operator's thigh, for use in vehicles or tanks. All of these keys had an extra contact for possible use in land-line, open-circuit telegraphy, or for receiver-relay operation. The keys carried the designation "KEY W.T. 8 AMP NO. 2".

A key used on British bombers (Fig. 42) was dubbed "the bathtub key" because of its shape. The design was unusual in that all of the hardware was fastened to the top portion of the plastic enclosure. If the aircraft was going to ditch in the sea, the operator pushed the spring clip over the protective skirt of the knob to send out a carrier signal to assist in locating the downed aircraft.



Figs. 45-48. 45: 1941 J.H. Bunnell and Western Electric J-38 keys, the "workhorse of the Signal Corps." 46: 1941 J-45, actually a J-37 mounted on a thigh clamp; 47: U.S. Navy SE-1443A flameproof, 1920-1930 era, adopted after change from spark to CW; 48: WW II Swedish navy key with two hammers.

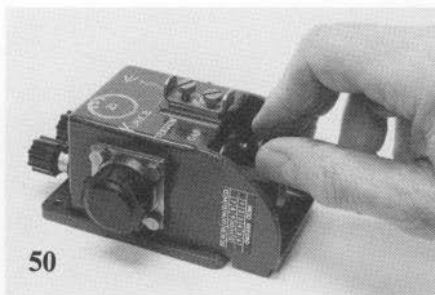
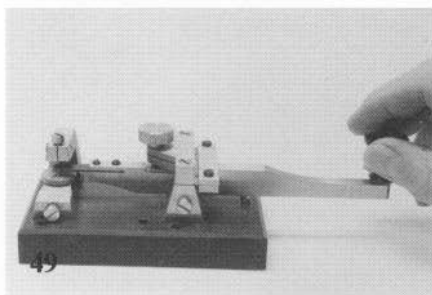
Photos: 45, 46, 47, L.R. Moreau; 48, M. Willer

The flame-proof key shown in Fig. 43 was used in a number of British aircraft, mounted at the side of the pilot's or navigator's position. The switch on the face of the key, marked "Upward Morse" and "Downward Morse", operated the lights on the top and bottom of the aircraft to signal aircraft in formation without using wireless. This was a type of "yard-arm blinker" for aircraft.

The U.S. Military, prior to and during World War II, used keys bearing type numbers J-37, J-38, and several others following J-41 (Figs. 44, 45). These were used in large numbers, and many manufacturers were involved in their production, including Bunnell, Western Electric, Lionel and E.F. Johnson. It is interesting to note that the J-38 was also produced in France by Vuilleminot Creteil with the designation "J-38FR" stamped on the underside of the frame. One model of the J-37 (Fig. 46) was arranged with a leg clamp for mobile use. It was used in trucks, jeeps and armored vehicles, but not in tanks; it was not safe in the enclosed environment, as it was not designed to be flame-proof.

Another key developed for use in U.S. Navy aircraft was the special SE-1443A flameproof key (Fig. 47). It was later used during the Byrd Expedition in 1934.

A key used by the Swedish Navy before and during WWII, (Fig. 48) reflects



Figs. 49-52. 49: Swedish army key; 50: KMK-2 South African military key; 51: WW II German Baumuster T-1 military key; 52: WW II British Admiralty key.

Photos: M. Willer

the design of the original Ericsson telegraph key. It has one lever with two hammers, but is operated like a conventional single-current key. The first hammer was connected to the oscillator circuit and made contact a few milliseconds before the second hammer, which was connected to the amplifier circuit. This gave the oscillator circuit time to stabilize before the amplifier was connected.,

Another Swedish key is shown in Fig. 49. This was made for the Swedish army by a number of different contractors, and its contact configuration shows the Ericsson design influence. However, in this model the lever is suspended on a thin, very flexible steel spring, which gives the key a soft, positive feel; a beautifully-made key and a nice one to operate.

There were very few keys made in South Africa. The KMK-2 key (Fig. 50) was made for the military by the S.M.D. company in Pretoria. The finger knob is in a well-protected location. There are two large connectors on the key, one on each side, with six sets of wires running through the key. However, only one set was connected to the key contacts. The five extra sets of wires were run through the key apparently to simplify the transmitter cabling.

A key known as the Baumuster T-1 (Fig. 51) was used extensively by the German forces. It is mounted on an aluminum sub-base which has a rubber

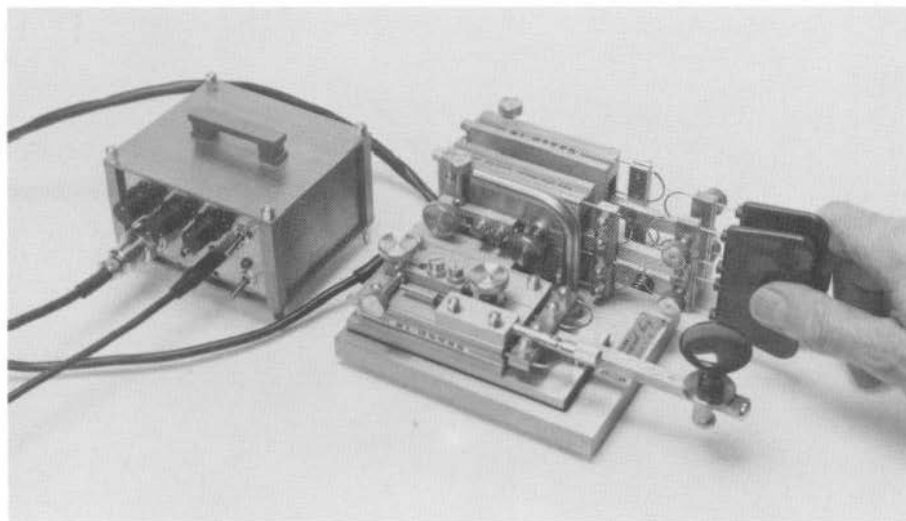


Fig. 53. Japanese Hi-Mound Compound key.

Photo: M. Willer

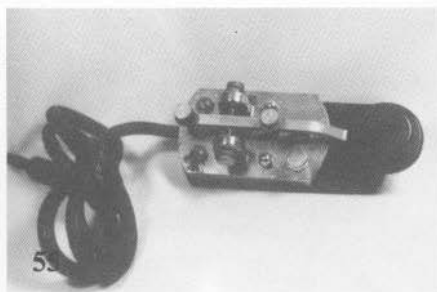
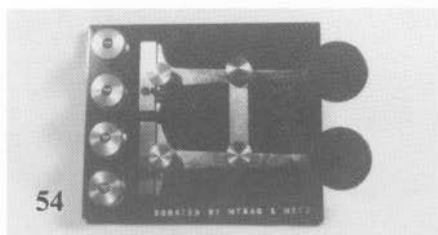
overshoe with large pimples on its bottom to prevent it from slipping on any surface. The finger knob is concave, which many operators considered an improvement over the flat-type knob. In this version the bottom contacts are mounted on springs cantilevered out from the side, a feature borrowed from the early Siemens telegraph key, providing a soft, quiet operation.

Fig. 52 shows a sealed, flame-proof type key built in Canada for the British Admiralty. It appears to have been designed for use with submarine detection equipment, although confirmation of its exact use is still lacking.

TODAY

Most of the companies that manufactured keys during the last 140-odd years have now faded into history. However, there are still a few firms building keys, mostly for amateur radio operators. The one shown in Fig. 53 is made in Japan, is still available, and combines a straight key with an automatic key on a common base. Called the Hi-Mound Compound key, it is certainly intriguing. The Japanese decided that if they were going to build a good automatic key they would incorporate every possible adjustment. This key has it; it is a bit over-engineered, but a unique key for the C.W. operator who has everything.

Alfred Vail's 1844 "Lever Correspondent" style was eventually adopted by all countries for telegraph and radio use. In English-speaking countries it is termed a "Key". In Germany we find "Der Morse Taste"; in France "Le Manipulateur" (frequently shortened to "Le Manip"). In Japan it is the "Den Ken", and in Israel the "Maft'ay'ach Telegraph'he". But whether the instrument is a bug or a hand key, everywhere it incorporates the original idea of "a lever acting upon a fulcrum;" the key, once referred to by Ed Raser, the dean of key collectors and historians, as "the fundamental symbol of the art itself."



Figs. 54-57. Miscellaneous keys not referred to in the text: 54: 1900 Double-lever Bunnell Cable Key, used by the military in Spanish-American War; 55: 1920s Logan SpeedX, adopted by U.S. Navy for CW operation; 56: 1941 J-41A, complete telegraph station for field operation; 57: 1941 J-51, for use with a light-signaling device.

Photos: L.R. Moreau

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Lou is a Fellow and a life member of the Radio Club of America and is affiliated with numerous other radio organizations. She is the recipient of many awards, including the Ralph Batcher Award of the Radio Club of America, the President's Award for History of Women in Communication, YLRL, and the A.W.A. Houck Historical Award. In 1976 she was nominated to the Telegraph Hall of Fame.

Murray D. Willer

A native of Toronto, Canada, Murray is a 1935 graduate of the University of Toronto in mechanical engineering. During the war and post-war years he worked in the aircraft industry, but in 1959 he established his own company, Willer Engineering Ltd., specializing in the industrial measurement and control field.

A licensed radio amateur since 1939, he has a dedicated interest in the history of wireless and telegraphy and in restoring old instruments. His collection of wireless and telegraph keys is considered one of the largest in Canada.

Among other affiliations, Murray is a Life Member of the Society of Wireless Pioneers, a member of the Canadian Aviation Historical Society, the A.W.A., the Morse Telegraph Club, and a Senior Member of both the Institute of Electronic and Electrical Engineers and the Instrument Society of America.

