THE SAILORS IN THE UPPER ILLUSTRATION ARE SIGNALLING WITH THEIR FLAGS THE WORD "STRAND," AND THE SOLDIERS IN THE LOWER ONE THE WORD "MAGAZINE."

Signalling in the Navy and Army.

By Herbert C. Fyfe.

Photographs specially taken for "The Strand Magazine" by S. Cribb.

I.—HOW SAILORS SIGNAL.

"IT is not easy," says a naval expert, "to overrate the importance of the part which is played by the signal staff on board a man-of-war. It constitutes the ears and the voice of each vessel, and is the means of conveying commands or reports of the most momentous as well as of the most trivial import, from an invitation to dinner with the admiral, to an order to engage the enemy."

Thanks to the progress of invention and discovery, the means of communication in cities and towns are to-day exceptionally well organized. The business man with the telephone on his office table, the telegraph office round the corner, and the messenger boy service in the next street, can send messages with the greatest ease, and dispatch and receive answers in a very short space of time. On the high seas, however, the telegraph, the telephone, and the boy messenger are of no use, and moving ships have to seek other methods of communication with one another.

For the instruction of seamen in the art of naval signalling there are three "Schools of Signalling": one is at Portsmouth, one at Chatham, and one at Devonport. Every signal-boy before going to sea, and every signalman on returning from a commission abroad, passes through a course of forty days' instruction in all its branches. Elaborate fittings and illustrations of the work are used, including a box of models invented by Commander Tuffnell, a former inspecting officer. Miniature ships are moved about by signal, through all sorts of fleet formations,

so as to give a perfect grasp of the important and difficult art of manœuvring. Great care is taken in the training of signalmen, for the importance of their duties cannot be over-estimated. A mis-read signal may send a ship to the bottom, and those whose business it is to watch for the messages and to report them correctly need clear eyes, steady nerves, and constant attention.

Mr. G. Stewart Bowles, lately a sub-lieutenant in Her Majesty's Fleet, has given us a very vivid picture of naval signalling in the entertaining collection of sketches and verses which he has published under the title, "A Gun-Room Ditty Box." Mr. Bowles, like Mr. Kipling, succeeds in re-counting incidents in a sailor's life in such a way that they remain clearly fixed in the memory of the reader. The sketch to which we wish to allude is entitled "Slate," and we trust its author will pardon us for quoting the following passage, which brings home to the landsman the unceasing watchfulness of the "ears and eyes" of the Navy:—

"It is Thursday afternoon, and the fleet is very still. The men are making and mending clothes; the liberty men have long since landed; the decks are deserted. Each ship cuts her reflection deep and clear into the water. The fleet is resting: apparently sleeping. Not so. The fleet never sleeps. Take your glass and look. High on the upper bridges, where the big semaphores stand, two or three white figures move silently to and fro, crossing, pausing, and re-crossing. The fleet, indeed, is resting; but it never sleeps. Night closes in—the figures are still there. Morning breaks—they are still there. Days become months, and months years; a King rises, a kingdom falls—it affects them not a whit. Consols may jump to 110, or a penny may be added to the income-tax—still they keep their solemn watch, high on the upper bridges. Who are these men, and what is their business? They are the ears and the eyes and the ultimate tongue of the Empire. They are signalmen of the watch."

Mr. Bowles then gives us some instances of ship-to-ship signalling. In the first the officer of the watch is sending a message to a friend on another man-of-war.

"A glance at the signalman of the watch, a short order, five seconds, and a hoist of bunting flies at the lower yardarm. There is no wind, and it is impossible to see the flags; they are curling gently round their halliards. But they made a little wind going up, and already, a mile away, a little red splotch climbs to its place in answer across two lines of ships. Then the big semaphore begins to talk, waving its arms for thirty seconds. It closes with a smack; the red splotch across the lines disappears; our hoist of bunting drops softly to the deck. The officer of the watch walks to the ward-room skylight, looks at the clock, yawns, and resumes his pace. He has asked a friend to dinner. The invitation has just gone."

A signalman is chatting with a friend up the line. "Keeping his elbows still, he begins to throw his hands about in front of him with quick movements of the wrist. He is recounting his last shore experience to a chum in the next ship. It doesn't take long, and as he nears the end he quickens pace, the movements become like lightning. He waves his hand past his face; there is an answering wave from the other bridge—and the story is told."

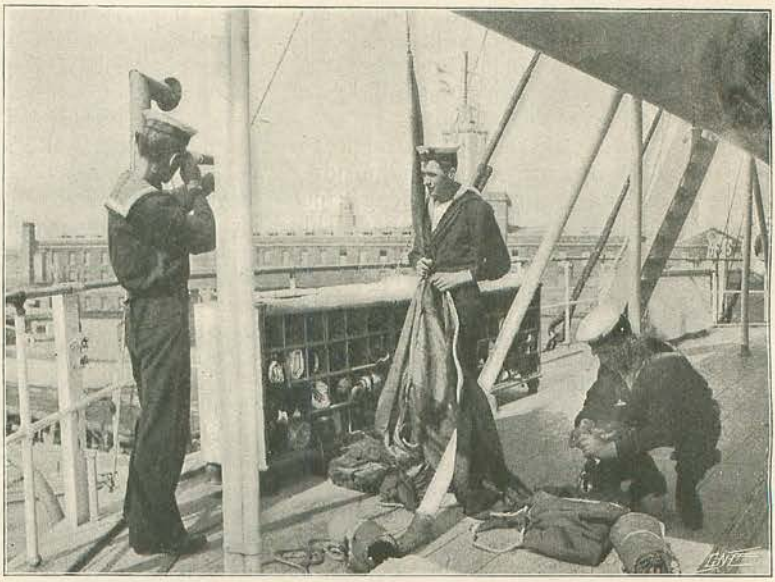
Next is a signal from the flag-ship, "The fleet is to sail to-morrow morning," and this is how Mr. Bowles hoists it for us: "The flag-lieutenant's white slate is in the signal-house with the message; the signal boatswain is on the admiral's bridge, ready to send it; the staff are bending on flags leisurely, seeing all clear. The signal boatswain walks to the centre, leans over the bridge rail, and says, 'Hoist.' Five hoists of a 'general signal' fly at the flag-ship's mast, and lo! at each masthead flies large a flag in answer. The signal boatswain glances up and down the fleet and orders 'Down.' In forty seconds the thing is done. The masts and yards are bare as winter trees. The fleet will sail to-morrow."

Mr. Bowles's last example is a specimen of night signalling: "The moon has not yet risen, and the night is very dark. Over the middle of the fleet a big white light hangs and winks in a great hurry. It wants to know whether anyone has seen its captain's over-coat, left carelessly at a dance. The signal midshipmen of the lee line smile darkly when the signal is brought to them; otherwise no one seems to know much about it. The lamps answer all round us, one in each great ship, clicking quickly. Nothing is known.

"When the morning dawns the time has come for the ships to leave. In the early twilight two dark shapes flutter at the flag-ship's main, two more, and another two. The six-ton anchors leave the mud together and dangle at the cat-heads. Then the engines move—stretching after their long rest. The speed is set, the flag-ship leads the way, and with enormous, certain strength the fleet files

out, quite silently, ship by ship, two cables apart, in perfect, splendid order. All done by the signalmen. In truth they earn their pay. Every ship must be watched as a cat watches a mouse; nothing escapes, every signal to be logged, reported, and attended to; a mistake may lose the ship."

Let us now examine the system of naval signalling in a more detailed fashion. In former days the ships sailed so close together that orders could be generally communicated by word of mouth; where this method was impossible, flags, banners, lanterns, and shields served as sailing directions, and for the sending of messages. Before the middle of the seventeenth century only a few stated orders and reports could be made known by signalling. Flags were used by day, and lights, occasionally with guns, at night, and the signals were interpreted according to the positions of the lights or the flags, which were hung in different parts of the vessel. Nelson's famous signal, "England expects that every man will do his duty," streamed in thirty flags from all his upper yards. At the time only two different flags were in use, and this necessitated the employment of a large number. From the year 1780, when Admiral Kempenfeldt devised a plan of flag signalling by combining distinct flags in pairs, till quite recent times, the systems of naval signalling have been vastly improved and simplified.

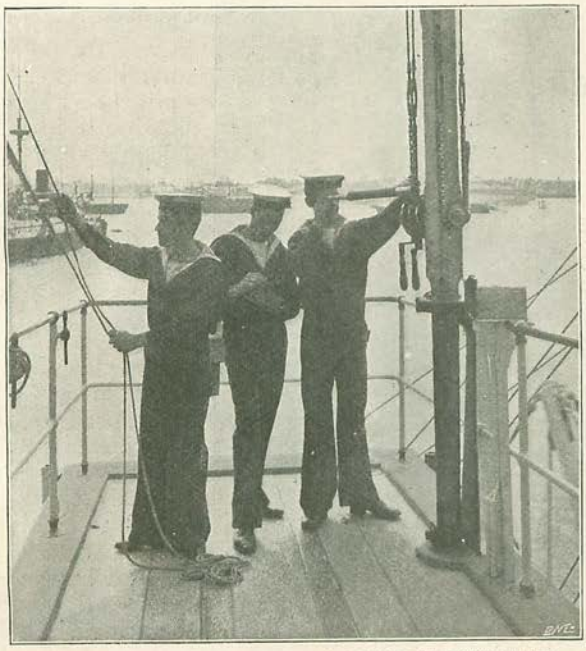


1.—THE SIGNAL-BRIDGE OF A BATTLESHIP.

Taking, first of all, signalling by means of flags, we find that there are about seventy different flags now in use in the Royal Navy. By arranging these in different ways any required signal can be sent. An International code of signals has now been arranged, and this has been adopted by all the great nations of the world, so that two ships, totally ignorant of each other's language, can converse by means of the code. The Royal Navy for its own purposes has, of course, a private system of signals. When a message has to be sent the flags are hung one under the other, each symbol or combination having an arbitrary conventional meaning attached to it.

The key to the meaning of the flag signals is contained in the signal code-book, in which the meanings of the flags and the combinations of flags are printed. The signal code-book of the Royal Navy is naturally very carefully guarded, and when it was discovered, some little time since, that a signalman had stolen the book, with the idea of selling it to a foreign Power, very severe punishment was meted out to the offender. Our illustration shows the signal-bridge of a battleship: there are the pigeon-holes where the flags are kept, and a signalman is taking in a flag signal from the station at Portsmouth Dockyard.

No. 2 shows sailors taking in a general signal—copying it on the ship's slate to lay before the captain. The man on the left is replying by flag to show the signal is received. As the signal flags can only be used within distances across which their colours are distinct, what are known as "distant signals" are sometimes employed. They are made by taking any two square flags, any two pennants, and two balls, and making the signals for letters on the flag-plate by certain combinations. The interpretations are made in the usual way by the aid of the signal-book.



2.—TAKING IN A GENERAL SIGNAL AND COPYING IT ON THE SHIP'S SLATE.

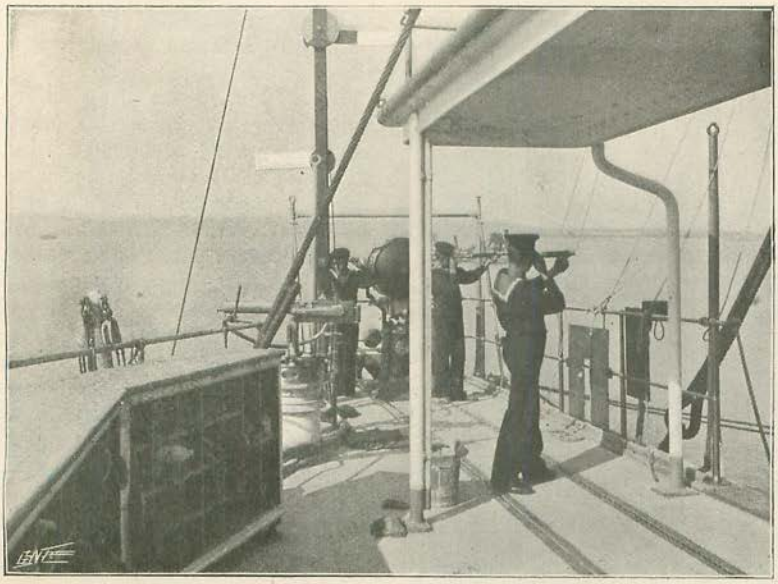
For more extended signals still the semaphore is used. This consists of a pole with three movable arms, the varying positions of which indicate the different letters of the alphabet. The semaphore alphabet seems terribly complicated to the beginner, but in this, as in everything else, "practice makes perfect."

Semaphores were in general use before the electric telegraph came into vogue. They consisted of towers built at intervals of from five to ten miles on commanding sites. The arms were worked from within the tower by winches, and messages were thus sent by visual signals from tower to tower. By means of semaphores, communication between London and Deal, Portsmouth, Plymouth, and other towns was, provided the weather was clear, surprisingly rapid. On the 31st of December, 1847, the last semaphore message was sent, the electric telegraph having shown its superiority. But though land semaphores became obsolete, this system of transmitting intelligence found favour in the Royal Navy, and most of the larger vessels carry this apparatus.

Semaphore signalling is taught at the naval barracks. "The pupils," says a writer, "are arranged in pairs after having mastered the signification of the various positions of the wooden arms, and one man reads off the signal made by the instructor, while the other writes it on the slate. It is easy enough to learn the semaphore—every letter, etc., is indicated by one or both arms in positions which follow a regular sequence, and are readily recollected: but to 'take in' a signal rapidly requires considerable practice, and, no doubt, some of the pupils will be nonplussed if the signal is made quickly, more especially if some of the signs are employed which have more than one signification. S and Z, for instance, are represented by one combination; U, V, and W by another; I and J by a third; and A and X by a fourth. It is easy to concoct a system which includes some of these letters and reduces the beginner to a despairing condition, though to a practised hand it presents no difficulty."

Signalling by semaphores is naturally a rather slow process owing to the cumbersome nature of the apparatus: the average rate is about three words a minute. Often for "conversational signalling" the sailor uses (as we have seen in Mr. Bowles's sketch) his own arms, and landsmen would be astonished to see the ease and rapidity with which a signalman relates an incident to a comrade. No. 3 shows the officer on the watch receiving a signal, and a signalman below replying. In No. 4 a signal has been hoisted at a distance, and the men are replying with their own semaphore. When a ship which has no semaphore wishes to send a message to some

3.—THE OFFICER OF THE WATCH RECEIVING A SIGNAL.



4.—THE EYES OF THE SHIP—SIGNAL BEING HOISTED AT A DISTANCE.

distance, a flag or ball at the masthead is dipped and hoisted with long and short intervals, corresponding to the dots and dashes of the Morse code.

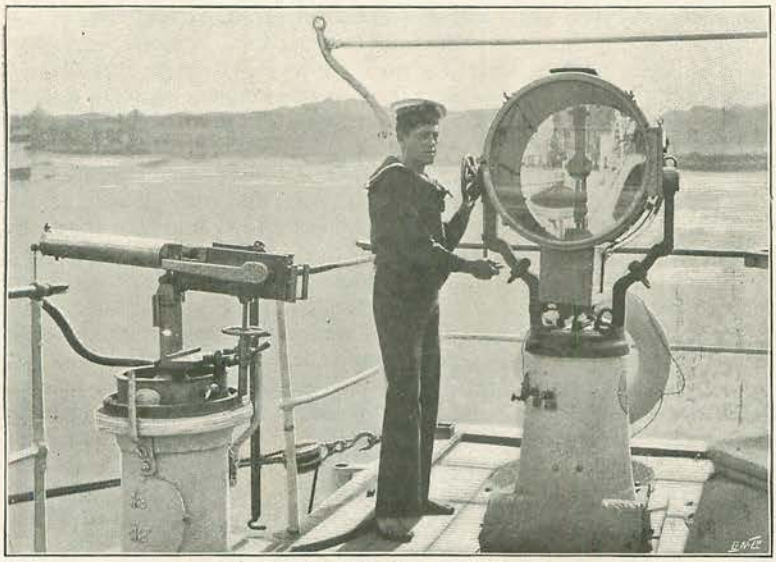
For long-distance signalling the heliograph is sometimes employed in the Royal Navy, but its use is not so extensive as in the Army. The heliograph is a small circular mirror which flashes the sun's rays on another mirror at a distance. The Morse code (*i.e.*, a system of long and short flashes) is used. The signals can be read at great distances, given a sunny day of course, sometimes over a distance of ninety miles and more. In No. 5, which represents a signal group on board H.M.S. *Mars*, a heliograph is seen on the left.

Before the year 1867 signalling by night was sometimes accomplished by means of lights and guns, but the whole system was in great disorder until in this year Captain—afterwards Vice-Admiral—Philip Colomb introduced his flashing system, on which he had been at work since 1858. Like so many other innovations, it was received with distrust, but it is now in general use in all fleets. A writer on naval matters remarks: "It is not too much to say that the Colomb system has made it possible to handle, with confidence and safety, in darkness and fog, squadrons composed of the gigantic ironclads of the day. Its adoption has not only contributed very materially to the increased efficiency of the British fleets, but also immensely reduced the risk of accidents, and the saving to the taxpayer since its introduction may probably be estimated in hundreds of thousands of pounds."

In the present system of night signalling a special lamp is used, either at the masthead

5.—A SIGNAL GROUP ON BOARD H.M.S. "MARS."

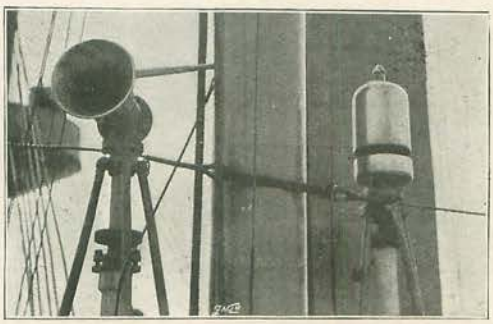
or elsewhere, fitted with a sliding shield, which is raised and lowered in front of the light. By this means messages can be transmitted at the rate of seven or eight words a minute. In No. 5 the lamp can be seen. Another way of sending "flashing signals" is by means of an electric light, the flashes being made by the "make" and "break" of the current. The rate with this system is two or three words a minute.



6.—SEARCH-LIGHT SIGNALLING.

An attempt has been made to fit the arms of the masthead semaphore with rows of electric lights, so as to make semaphore-signalling possible by night. The idea did not turn out a success, and it was eventually abandoned. Night signals over distances greater than the lamps will carry are made by the search-light. The dots and dashes are made by raising and lowering the beam of light against the sky, or by flashing it on and off a convenient cloud. No. 6 shows the search-light used for this kind of signalling.

In very thick, foggy weather all sight signals are, of course, useless, and sound signals have to be requisitioned. Here, again, the invaluable Morse code (long and short sounds) is used. The siren and the fog-horn emit the sounds, which can be heard and translated at great distances. No. 7 shows the siren of a battleship. To be in a fog at sea is depressing enough in itself, but when to this is added the scream of a siren or the groaning of a fog-horn for hours at a stretch, it gets on the nerves. It is on record that an exasperated seaman forfeited his liberty for six weeks for removing the vitals of a fog-bellows and stuffing them into the siren's gullet.



7.—THE SIREN OF A BATTLESHIP.

The latest method of communicating intelligence to the navies of the world is by carrier pigeons. Foreign countries seem to have done more in this direction than we have; still, at each of the three great naval ports, several hundred pigeons are kept. The birds are under the charge of the signalmen, and their chief usefulness will probably consist in carrying messages from ship to shore and *vice-versâ*.

Signalmen are instructed in the use of the electric telegraph, although there is a somewhat limited sphere of usefulness for this method on board ship. Wires are sometimes laid from vessels in harbour to the shore, and also from one stationary man-of-war to another.

During the manœuvres of 1899 some experiments in wireless telegraphy at sea were made, under the personal supervision of Mr. Marconi. Transmitting and receiving instruments were placed on H.M.S. *Juno* and on H.M.S. *Alexandra*, and messages were sent backwards and forwards with great ease over distances up to ninety miles. There seems to be a great future for wireless telegraphy in the Royal Navy.

II.—HOW SOLDIERS SIGNAL.

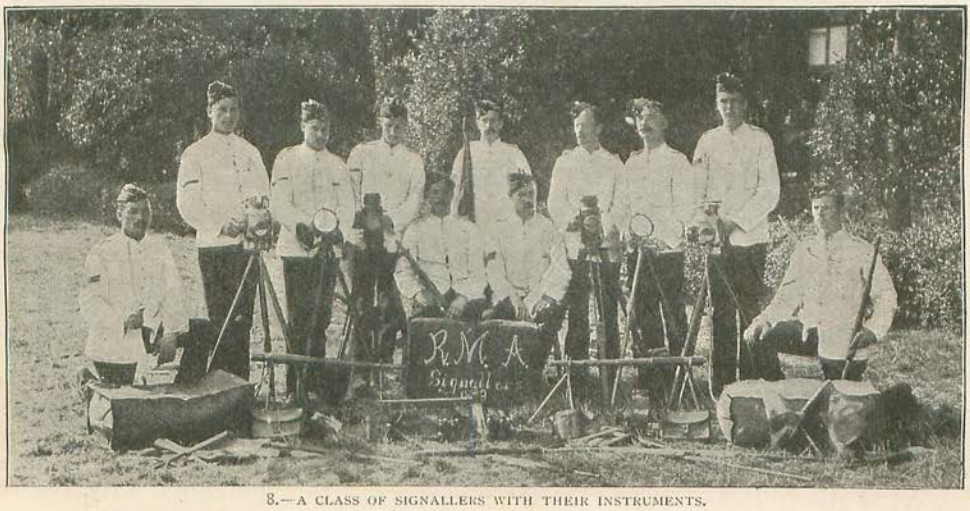
ARMY signalling differs from naval signalling in many respects. In the latter case, when the fleet is at sea, each ship is completely isolated from its fellow, and all messages from one vessel to the other must be sent across a certain distance. We saw that when the weather was fine the signals were sent in the daytime by flag, semaphore, and heliograph, and at night by lamps. In foggy weather, sight signals being of no use, sound signals such as the siren and the fog-horn are requisitioned. In the Army the flag, the heliograph, and the lamp are all used very much as in the Navy, but the soldier has this great advantage, that he can send messages by means of the electric telegraph.

At the present moment experiments in wireless telegraphy are being carried out in the Army and the Navy, with a view to the adoption of this system, but up to the present nothing very definite in the way of information can be obtained, for the greatest secrecy is observed in order that what we are doing in this country may not be known abroad. About the field telegraph, however, no such secrecy is observed.

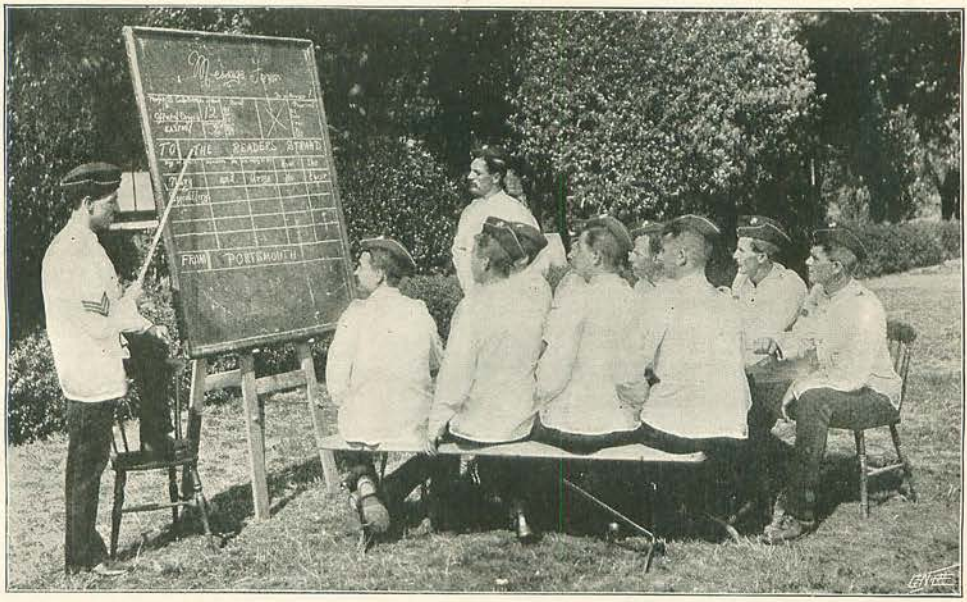
The means now in use for conveying intelligence and orders in the field are three in number: 1. The electric telegraph. 2. Visual signalling. 3. Mounted orderlies. Of these the first is the quickest and the most accurate. The working of the telegraph is in the hands of the Telegraph Battalion of the Royal Engineers, and the operators are so well trained that mistakes hardly ever occur in the messages received. It is possible, over short distances, to substitute the telephone for the telegraph, and thus the sender and the receiver of the message can converse at will.

There are, however, many difficulties in the way of successful telegraphy in the field. These have been well summed up by Colonel F. G. Keyser, C.B., Inspector of Signalling. "Its transport," he says, "is bulky; it requires carriages, horses, and drivers, with their necessary supplies; it requires time to lay down and more time to take up. Moreover, it is liable to constant interruption, and in a hostile country requires guarding more or less along its whole length, as one cut can entirely destroy communication. In Afghanistan these cuts were very frequent, and were made by the enemy, not so much for interrupting communication, as for twisting bits of wire into slugs for use in their matchlocks. A telegraph line is liable not only to be cut, but tapped by an enemy, and important messages may be read by a hostile force, or false messages transmitted. Then again it requires a specially trained corps for its use, men who do no other kind of duty; the numbers employed are comparatively small, so that an army in the field which depended on the telegraph, and the telegraph only, for its intelligence and communication, would be very imperfectly supplied."

If the line be only required for a short time the wires would be laid upon the ground instead of being fixed on poles, as would be the case if the line were to be used for a longer period. The wire is paid off from a large drum, and simply rests on the ground. Signalling by the telegraph has this advantage



8.—A CLASS OF SIGNALLERS WITH THEIR INSTRUMENTS.



9.—INSTRUCTOR GIVING LESSON IN ARMY SIGNALLING.

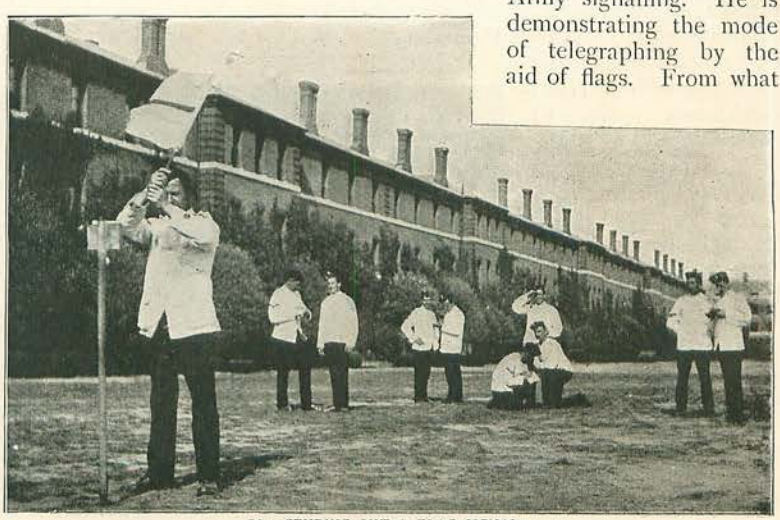
over visual signalling, that it can be worked at all times and in all weathers, whereas a fog or a mist puts a stop to the latter method.

With regard now to visual signalling, the first item the novice has to master is the "Morse Code or Alphabet," the basis of all systems of military and naval signalling. In this the letters are made up of "dots and dashes." The dash is three times the length of the dot; the pause between each sign or letter equals a dash or three units, and between words is double or six units. The alphabet can be readily picked up in three days.

The maximum rate with the small flag and the heliograph is twenty words a minute. But this is too great a speed for any length of time; the ordinary rate is about twelve words a minute. Visual signalling by day is carried out with flags, heliograph, and semaphore. No. 8 shows a group of soldier-signallers with their various instruments. By night, oil, gas, limelight and electric lamps are used. The flags are of two sizes: the smaller, and one most commonly used, is 2ft. square, with a pole of 3ft. 6in. in length; the larger is 3ft. square.

Dots and dashes are made by short and long waves of the flag, which is held up as high as possible. Messages sent with the large flag can be read with a Service telescope in the British Isles at from five to seven miles. With the small flag the distance is four to five miles.

In foreign countries, where the atmosphere is clearer, these figures are almost doubled. No. 9 shows an instructor giving a lesson in Army signalling. He is demonstrating the mode of telegraphing by the aid of flags. From what



10.—SENDING OUT A FLAG SIGNAL.

11.—SIGNALLING BY SEMAPHORE FLAGS.

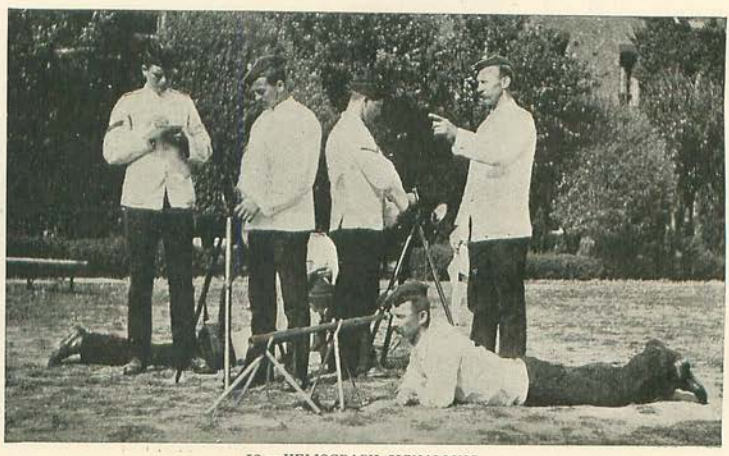
is written on the board, it will be seen that this photo. was specially taken for STRAND readers. No. 10 shows a signal being sent by flag and the mode of reply; No. 11 shows the semaphore system of signalling with flags.

The heliograph has been described as the trump card of visual signalling, because it possesses the four cardinal military virtues—portability, rapidity, range, and secrecy. The instrument consists simply of a mirror mounted on a tripod. The operator sights the mirror in such a way that the rays of the sun will be reflected on to a similar mirror at a distant station: he can then send dots and dashes by depressing a key at the back of the mirror in such a way that the light is flashed for short and long periods on and off the second mirror. The messages are invisible to persons standing a short distance from the mirror, and thus the heliograph can be worked across hostile country with perfect confidence. No. 12 shows a group of heliograph signallers.

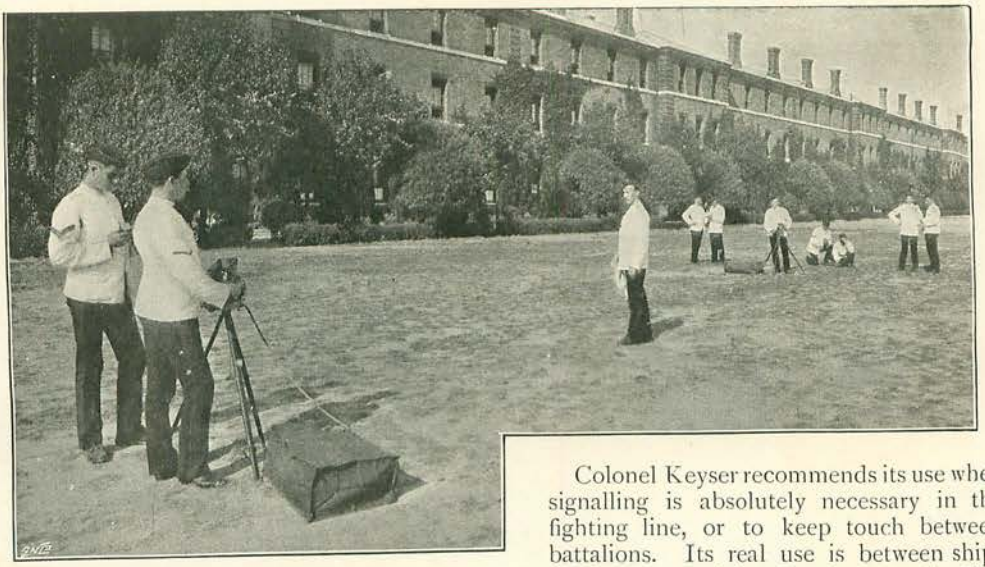
A few signalling incidents, borrowed from Colonel Keyser, may be mentioned. After the Battle of Ahmed Khel, General Chapman was particularly anxious that the news should be sent to Cabul and so home. Lieutenant Dickie, the signalling officer, was sent to the top of the Sheradham Pass, north of Ghuznee, with a squadron of cavalry to try and find General Ross's brigade, which had been sent out from Cabul to meet Sir Donald Stewart. His supposed line of march was ascertained from the map, and within four minutes after the first flash they found him, and a full report, 207 words in length, was flashed forty-eight miles, and so passed on to Cabul, Simla, and London; it may be mentioned that the forces did not actually meet for four or five days after. In 1880 the besieged garrison of Kandahar opened communication with the advanced guard of the relieving force under Sir F. Roberts, at Robat, a distance of forty-eight miles, and communication was kept up for several hours over the heads of the enemy, who did all they could to stop us, but were powerless to interfere.

The Colonel remarks that signalling in Egypt by heliograph is carried out under difficulties; the country is so flat, and messages have often to be read up in the clouds. "During our first occupation of Alexandria," he writes, "two drunken signallers in a distant fort roused Sir E. Hamley and his whole garrison by sending round a bogus message for a lark, a signalling feat which cost them dear.

"The ease and silence of this method and the correctness of the alignment are of great advantage. To limited distances the flash from a heliograph is capable of penetrating any ordinary haze, smoke, translucent clouds, or dust. An impromptu heliograph can be made by aligning two sighting points or a



12.—HELIOGRAPH SIGNALLING.



13.—GAS SIGNALLING BY NIGHT.

distant station and directing the flash from an ordinary shaving-glass on them. Signalling can be carried on by exposing and obscuring the flashes with a book or anything else at hand."

Such a rough and ready method of communicating intelligence is of great value on occasions. On March 15th, 1879, messages were sent in this way from Etchowe to Ginghilovo with a sixpenny shaving glass and two sticks to take the alignment, the flash being shut off by means of a board.

The longest range of the heliograph is probably not more than eighty or ninety miles. During the Waziristan expedition of 1881 messages were sent with the helio over a space of seventy miles, the climatic and atmospheric conditions being very favourable.

Signalling by semaphore is not often employed in the Army. The alphabet is very easily learnt, and words can be sent much quicker than with the ordinary flag-system. The semaphore to be seen on battleships, and described in our last article, is not employed. Instead of this instrument two flags are used, one in each hand as seen in No. 10. These are shown either singly or in combination at different angles with the body. This system can, however, only be used for short distances. It can be read with the Service telescope up to a distance of three miles.

Colonel Keyser recommends its use when signalling is absolutely necessary in the fighting line, or to keep touch between battalions. Its real use is between ships and shore, especially for forts or landing parties.

The Colonel says that the heliograph can be used at night either with the light of the moon or of lamps. In addition, signalling is carried out in the dark hours by gas-lamp, oil-lamp, and limelight-lamp. The two first are used when the distance between stations is under four miles. The Morse alphabet is, as usual, the one in use, the shutter of the lamp being alternately opened and closed. In No. 13 we have an instance of gas signalling by night.

With the limelight-lamp signals can be sent which may be read with a telescope twenty miles away. Signallers have to learn how to manufacture the hydrogen and the oxygen necessary for the system.

During manœuvres and in active service "lines of communication" are often made. This means that a chain of stations is laid down, each station being situated on high ground and at the requisite distance from the next, according to the system used. In India the stations are often twenty to thirty miles apart; but in this country six or seven miles would be the limit. By this means despatches of information, Press news, etc., can be forwarded from the scene of action to the nearest telegraph line, and thence to all quarters of the globe. A signalling station usually consists of six men: three to receive the message from the other station, and three to send it on to the next in line.