

East Cape Signal Towers in the context of the history of long- distance communication

by Professor Pat Irwin, based on his talk to the LAHS on 18/7/2024

INTRODUCTION

Sending messages and signals over long distances has been a human endeavour since earliest times. Signalling has most often involved the use of some form of technology, although at times this can be as simple as the raising of an eyebrow or a wink at a meeting. Up until the time of electrical and electronic impulses and their interpretation, nearly all signalling was dependent on the use of light (optical signalling) and occasionally sound. This article is confined to a brief historical overview of long-distance communication and some of the more significant technologies associated with these endeavours. It concludes with the construction and use of the East Cape Signal Towers in the 1840s.

EARLY HISTORY

Most of us would consider the emergence of large-scale communication networks to be a twentieth-century phenomenon, yet the oldest attempts to transmit information over long distances date back millennia and include ingenious uses of homing pigeons, mirrors, flags and beacons of fire. Among the oldest documented examples in the Western canon are from Homer, describing the use of bonfires as signals during the Siege of Troy and Odysseus' return journey home in about 1300 BC. Similar examples can be found in some of the early middle eastern and Asian cultures. Genghis Khan, for example, at one time had signalling relay stations right across Asia.

SMOKE SIGNALS

Smoke signals are possibly the oldest form of long-distance communication. Even though such messages are generally limited in content and duration, such as signalling danger or for gathering people together, they are still, in various forms, used widely across the world as a medium of communication. In South Africa they were used during the 1879 Anglo-Zulu War. Many 19th century writings relating to the Eastern Cape Frontier Wars refer to smoke signals made by the amaXhosa, although no serious study of the topic appears to have been made.

Today, smoke signals, for example of a bright orange colour, may be used to signal danger or to effectively mark a position or indicate wind direction during rescue operations at sea or in forest fires. Smoke signals are also traditionally used by the Vatican to signal the election of a new Pope.

PIGEONS

Pigeons as carriers of messages have been used from at least 3000BC onwards. They have often been used as a form of rapid communication for military and other urgent messages and are linked to the early use of codes and coding. 'Carrier' pigeons were still used extensively during the First World War.

DRUMS, BUGLES AND HORNS

People around the world have probably used drums of one sort or another as a means of communication from very early times. They could, in most cases, be effective for up to seven or eight kilometres – much faster than a person could run or ride a horse.

Drums, in accompaniment with bugles have also been used for communication by armies. In European armies they were, right up until the early 20th century, used primarily to communicate orders and instructions when an army was on the move or during battles. They were used across battlefields or within battles to signal messages such as advance, charge, withdraw or retreat. Sometimes a horn could be used as an appeal for help, as is claimed when the French knight Roland was ambushed by the Saracens at Roncesvalles in the 8th Century.

RUNNERS AND RIDERS

Using human **runners** and later riders on horseback to carry messages were a more advanced form of communication with distinct pros and cons. They could not only carry messages verbally but, as societies advanced to the written word, could carry increasingly complex information and lead to responses relatively quickly.

One of the most celebrated runners of ancient times was, according to Herodotus (c490-425BC), Pheidippides, an Athenian soldier and runner during the Persian invasion of Greece in 492-490 BC.

Part history, part legend, the story tells us that in 490 BC when the Athenians and their allies were about to confront a much larger Persian army on the plains of Marathon, about 42km north of Athens, they sent an urgent request for support to the formidable Spartan army some 160 km away in the Peloponnese.

Pheidippides, a soldier in the Athenian army and a runner of note, volunteered to run to Sparta with the message. The Spartans, famed for their rigid adherence to their religion and well as having the finest army in Greece, declined to participate until the end of their current religious festival some weeks away. As the story has it, by the time Pheidippides returned, the Greeks had by good fortune defeated the Persians at Marathon, but the remainder of the Persian army realizing that there were few soldiers left in Athens to defend it, sailed to attack it without warning.

Pheidippides, despite his exhaustion, then ran back to Athens to inform the citizens that while their army had been victorious, they would have to defend the city as best they could until their own army returned. The event is today commemorated in the Olympic and other athletic 'marathons', a standard race of 42.195km believed to be the historical distance run by Pheidippides, and by a bronze memorial alongside the modern Athens-Marathon highway. By comparison, a century and a half later, Alexander the Great used regular relays of horsemen for communications within his army, and to continue to govern his kingdom of Macedonia while he was away on his Asian conquests.

The ancient Romans, and later the Roman Empire, used all the above methods of long-distance communication but added two significant new dimensions:

- They built good roads right across Europe thus facilitating rapid movement of men, horses and wagons. They *inter alia* set up a system of relay stations for men and horses.
- They developed a regular and reliable postal service which was unsurpassed until the mid-19th century when the Britain's Royal Mail guaranteed 24-hour letter delivery within London and a three day period for the rest of the country. Thus, a letter posted in Vindolanda on the Scottish border could reach Dacia – modern Romania on the eastern edge of the Empire, within seven days – a distance of about 800 km.

In addition, some sources have claimed that the late Romans were the first to use mirrors to systematically flash messages.

As the centuries passed many of these technologies became more refined and sophisticated, a key one of these being the invention and development of the telescope which greatly enhanced line of sight communication. These devices reached their technical apogee with the combination of mirrors and lenses. Developing alongside this, by the end of 17th century, well before the electromagnetic telegraph was invented, many countries in Europe already had fully operational data communications systems, with altogether close to one thousand network stations. An interesting parallel development was that the use of flags came into their own as signalling devices, also becoming more diverse and sophisticated over time.

NAUTICAL FLAGS

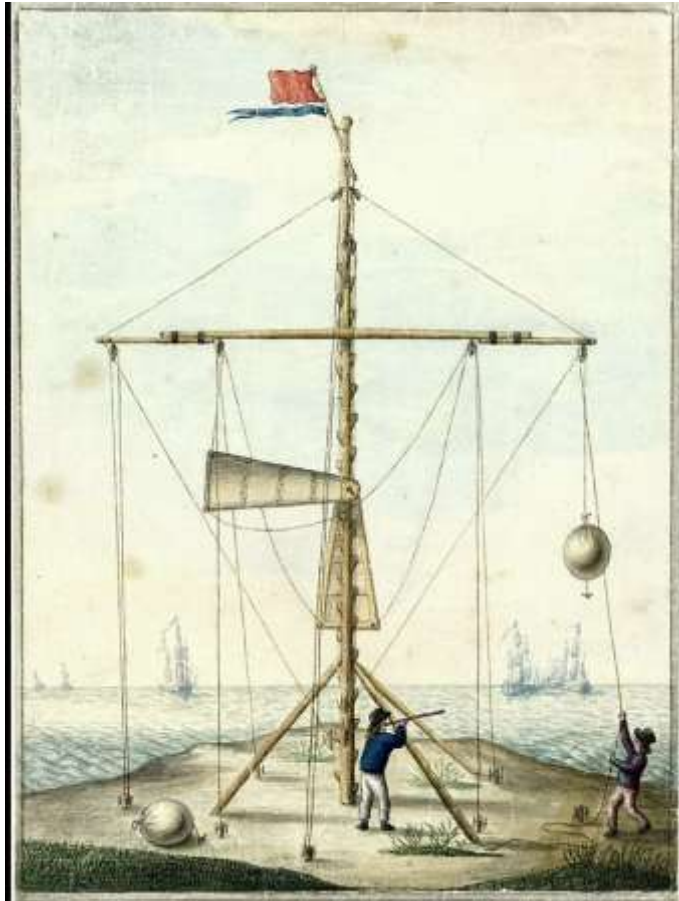
One experiment in this line of thinking was the development of what are known as Nautical Flags which are still in use today for both naval and civil ships. Despite the advancement of electronics and electric pulses, even in the middle of the ocean, and even with satellite communication, mariners of every stripe still consider the hoisting of nautical flags to be the most effective way to convey brief and easily identifiable messages. This is achieved by using internationally agreed upon coloured or multi-coloured flags, each representing a specific letter of the alphabet and/or having a specific meaning such “person overboard”.

Individual flags can also be used in combination with each other to create further meanings. For example, the combination of the **D** (referred to as **Delta**), a blue and yellow horizontally striped flag, and **V (Victor)**, a white flag with a red saltire cross meanwhile, means “I’m manoeuvring with difficulty and require assistance.” Historically **Q (Quebec)**, a plain yellow flag on its own, signalled an or infectious or dangerous disease on board and a vessel flying it was usually quarantined. With modern medicine this is generally no longer the case. If one sees the **W (Whiskey)** flag, (a blue rectangle with smaller white and red rectangles embedded within it) however, the vessel has a medical emergency and needs help. **BZ (Bravo Zulu)**, which may also be expressed by voice or radio signals means “Well done” regarding actions, operations or performance. The term has also passed into our spoken and written vocabularies.

SEMAPHORE

Semaphore is an alphabet signalling system based on the waving of a pair of hand-held flags in a particular pattern to represent letters of the alphabet. The system, which was

motivated by military concerns, following the Battle of Vienna in 1683, was later adapted for use by a structure using mechanical arms. This technology is what was intended for use on the East Cape Signal towers. This fascinating technique has been used by the majority of the world's navies and by thousands of Boy Scouts and Girl Guides worldwide was over the last century.



Left: coastal semaphore, 1799
(Wikipedia)

MORSE CODE is a method of communicating with a series of sounds or lights that can be understood only by someone who knows the code. Best described as a *language* of communication rather than a method, it was developed by Samuel Morse in the 1830s. It is a language whereby people could communicate with each other either through visual means – such as *shutter telegraph, flags and lights*, or later, through sound and electronic impulses – *telegraph, radio and satellite*. The language consists of a series of short and long bursts of sound or light that can be either

heard or seen. The short bursts are referred to as 'dit', and the long bursts as 'dah' (also called dots and dashes). An 'S' for example is represented by three dots and an 'O' by three dashes. So, the SOS distress signal is: three dots, three dashes, three dots (. . . --- . . .) which proved to be a simple way to communicate in an emergency. Over the past century, this signal has been used by countless ships in distress. From the 1840s a relatively efficient device known as the *heliograph*, came into widespread use. It was able to reflect beams of sunlight in short and long flashes (again dits and dahs) using movable mirrors. Not surprisingly, it was especially favoured among the military and by ships at sea.

It is interesting that one of the first successful experiments of this kind of optical signalling was carried out by horse-racing gamblers and their accomplices some distance away, to signal which horse had won a race so that they could immediately place bets on it before the results became generally known.

THE EAST CAPE SIGNAL TOWERS

We now turn our attention to the Signal Towers of the Eastern Cape. The period following the 6th Frontier War (1834-1836) was one of relative peace, but still with extensive cattle

reiving and regular foraging across the border in both directions, usually in small guerilla groups. As the only method of rapid military communication available to the British Army in the eastern part of the Cape Colony at that time was by mounted messenger, the idea of building lines of signal towers to give warning of such events was mooted. Such structures, combined with signalling technology, had proved to be practical in western Europe in the late 18th and early 19th centuries. The purpose of building signal towers in the Cape was to give warning to other military posts stationed along the Fish River as well as the military headquarters in Graham's Town of any such incursions.

Nothing is said in the existing literature of the original *method of signalling* for which the towers were intended or designed. Nor has any related literature to this effect been traced in relation to southern Africa. At some point however, it had been decided to employ a semaphore system to be operated from the roof of the towers using a purpose-designed structure with mechanical arms in lieu of flags. The remnants of the last remaining one of

these devices can be seen at Fort Selwyn in Grahamstown.

As indicated on the map [Fig], two lines of towers were planned: the Fort Beaufort Line and the Peddie Line. They were to make use of existing fortifications at Fort Selwyn, Fort Peddie and Fort Beaufort. A third line from Fraser's Camp to Bathurst was envisaged but never started. By the time the 7th Frontier War broke out in March 1846, the semaphore structures, or masts, on the Fort Beaufort Line had been erected, but they had not yet been provided for the Peddie line.



Remains of the tower at Governor's Kop, 2024
(Photo: Nick Cowley)

The tower system appears to have been planned by a Lt. Williams in the office of the Commanding Royal Engineer at the Cape, Lt.Col. George Lewis. The decisions were executed by Lewis' civil assistant, Henry Hall (in the Cape Colony from 1842-1858) who also wrote an

account of some of the difficulties faced in the construction of the towers. The actual building was carried out by British soldiers. Each tower was to have a floor space of about 20 square metres and be about 7.6m high so that they could be easily defended. The towers had three levels, the entry being at the middle level where a ladder could be pulled up. At this level, two rooms could accommodate a sergeant and five soldiers. Limited supplies of food and ammunition could be kept on the bottom floor, but water was to be delivered every two days by private contractors, which of course ceased with the outbreak of the war in March 1846.

Each tower was to be surmounted by a 3m to 4m wooden structure with movable arms for semaphore signalling. Signals at night were to be given by firing a small rocket or detonating a small explosive device, but there is no evidence that any of these munitions were ever provided. One should note here that a system of warning guns had been operated with moderate success in the western Cape Colony during the 18th and 19th centuries. There were originally intended to be 10 towers which would cost £500 each. The annual cost of staffing them would be about £2000.

In carrying out the project, a number of significant errors of judgement were made which came to prominence too late to be remedied or rectified. Lewis had originally considered it necessary to place the towers on prominent points, but the necessity of, or requirement for this, seems to have been lost in the construction process.

PROBLEMS ARISING

Following the completion of some of the towers during 1845, several defects and problems soon became apparent.

1.The major one was of not always being able to see other stations and hence their signals, against a horizon. The uneven nature of the Eastern Cape terrain which the towers were to traverse had made the selection of suitable sites very difficult, with the result that most of the towers did not have mutually clear horizons against which to read their neighbour's semaphore. Only in a few instances, were the semaphore arms silhouetted clearly against the sky as they all ought to have been in order to read the semaphore messages. In reality, there were not many other options open for siting the towers once it had been decided to erect them. This was a very different proposition to the European environment in which signalling towers of one sort or another generally had line of sight visibility to each other across open level plains.



LAHS members in 2016 at the tower of Fraser's Camp.(Photo: Sue Gordon)

1.The effect of light refraction – as the air warmed up, images became hazy and difficult to read. There was frequently mist on the tops of hills, which made communication unreliable.

The amaXhosa warriors were canny enough to take this factor into account and use it to their advantage when on a raid.

2.The choice of Fort Selwyn as the terminal point was a particularly unfortunate choice of site as not only was it often covered in mist but for Governor's Kop, the very fulcrum of the system, it was below the horizon. The nearby Woest (aka Signal) Hill would have been a far better choice and it had been used to some extent in the 6th Frontier War.

3.To compound these problems the telescopes provided were apparently of relatively poor quality making it difficult to read clearly.



Fort Selwyn today
(Photo: John
McConnachie)



An artist's rendering
of early
Grahamstown from
Fort Selwyn

In evaluating the overall non-effectiveness of the signal towers, one might also consider the following points:

- The distances between towers ruled out human flag semaphore.
- Alternative technical options existing at the time were not available. Morse could not be used as there was no electricity. Torches or hand-held lamps as we know them were not commonly available in the Cape Colony which ruled out artificial light.
- Gunshots as a signalling method might have been a possibility. They had worked relatively well in the western Cape for two centuries. They were however limited to very brief and simple messages.

I have found no first-hand accounts by the operators of the system – what difficulties they faced and how they overcame them. What little we know is from third party reports or comments.

IN CONCLUSION

Henry Hall, in his paper about the towers published in 1859, tells us that within one month of the outbreak of the 7th Frontier War (aka the War of the Axe) in March 1846, all the towers were in ruins, abandoned by the British army or burnt by the amaXhosa. Both the wood and iron would probably have been put to good use by them.

More than one British officer pointed out that the amaXhosa system of signalling using fire and smoke on commanding heights, when skilfully organised, was quite as effectual as the signalling systems which the British had at the time.

Today, the Martello Tower in Fort Beaufort has, by private initiative been restored to its original condition. It is well worth a visit.

The ruins of two others (Governors Kop and Fraser's Camp) although gutted, are still standing are also worth visiting for their own sakes. In a sense, they remain monuments to a sincere but misguided attempt to transplant a technical innovation which had worked extremely well in the environment in which it had been developed but failed in an environment that was neither suitable nor properly prepared for them.

It is a classic example of not being able to transfer successful technology without taking local circumstances into account. One is reminded of the Soviet Union sending snow ploughs to Ghana in the 1960s.

A wag of the day described the enterprise as 'a signal failure'.

Pat Irwin has had a life-long interest in history in general and military history in particular. He started working life as an underground miner, later followed a teaching career, and by a long process joined Rhodes University in 1988. Has served on the boards and advisory panels of several environmental organisations and educational bodies such as the National Botanical Institute, the CSIR and UNESCO.

Retired as Professor Emeritus in 2009 and has since then largely pursued his personal research interests which, other than military history, include wildlife and wild places – from elephants to mountains.

REFERENCES

Hall H 1859 'On telegraphic communications' *The Cape Monthly Magazine* Vol VI No 35 258-266
November 1859

Other, more recent publications include:

Coetzee Colin G 1994 *Forts of the Eastern Cape: Securing a frontier 1799-1878* Published privately [There is a copy in the Cory Library at Rhodes University, Grahamstown.]

Holzmann Gerald & Pherson Bjorn 1995 <http://www.spinroot.com/gerard/hist.html>

Kirby Percival R 1960 'South Africa's first telegraph' *Africana Notes & News* 14 (4) 123-129
December 1960