on the Danube with (1880) 4154 inhabitants. The divi­sion of Sigmaringen is composed of the two formerly sovereign principalities of Hohenzollern-Sigmaringen and Hohenzollern-Hechingen (see Hohenzollern, vol. xii. p. 52) and has an area of 440 square miles, with a popula­tion in 1880 of 67,624. The Sigmaringen part of the Hohenzollern lands was the larger of the two (297 square miles) and lay mainly to the south of Hechingen, though the district of Haigerloch on the Neckar also belonged to it. The name of Hohenzollern is used much more fre­quently than the official Sigmaringen to designate the combined principalities.

SIGNALS, Naval. A system of naval signals com­prises different methods of conveying orders or information to or from a ship in sight and within hearing, but at a distance too great to permit of hailing,—in other words, beyond the reach of the voice, even when aided by the speaking-trumpet. Signals are divided into classes accord­ing to the instruments with which and the circumstances under which they are made. There are sight and sound signals; flag, semaphore, fixed lantern, flashing, firework, horn or steam-whistle, and gun signals; day, night, fog, and distant signals. Besides these, there are other divi­sions, such as general, vocabulary, evolutionary, &c., which depend upon technical considerations and are matters of arrangement.

The necessity of some plan of rapidly conveying orders or intelligence to a distance was early recognized. Polybius de­scribes two methods, one proposed by Æneas Tacitus more than three centuries before Christ, and one perfected by himself, which, as any word could be spelled by it, antici­pated the underlying principle of recent systems. The signal codes of the ancients are believed to have been elabo­rate. Generally some kind of flag was used. Shields were also displayed in a preconcerted manner, and some have imagined that the reflected rays of the sun were flashed from them as with the modern heliograph (see Helio- graphy). In the Middle Ages flags, banners, and lanterns were used to distinguish particular squadrons, and as marks of rank, as they are at present, also to call officers to the admiral, and to report sighting the enemy and getting into danger. The invention of cannon made an important addition to the means of signalling. In the instructions issued by Don Martin de Padilla in 1597 the use of guns, lights, and fires is mentioned. The introduction of the square rig permitted a further addition, that of letting fall a sail a certain number of times. Before the middle of the 17th 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. The significa­tion then, and for a long time after, depended upon the position in which the light or flag was displayed. Orders, indeed, were as often as possible communicated by hailing or even by means of boats. As the size of ships increased the inconvenience of both plans became intolerable. Some attribute the first attempt at a regular code to Admiral Penn, but the credit of it is usually given to James II. when duke of York. Notwithstanding the attention paid to the subject by Paul Hoste and others, signals continued strangely imperfect till late in the 18th century. Towards 1780 Admiral Kempenfelt devised a plan of flag-signalling which was the parent of that now in use. Instead of in­dicating differences of meaning by varying the position of a solitary flag, he combined distinct flags in pairs. About the beginning of the 19th century Sir Home Popham im­proved a method of conveying messages by flags proposed by Mr Hall Gower, and greatly increased a ship’s power of communicating with others. The number of night and fog signals that could be shown was still very restricted. In 1867 an innovation of prodigious importance was made

by the adoption in the British navy of Captain Philip Colomb’s flashing system, on which he had been at work since 1858. This is in general use in all fleets, though, oddly enough, on its first trial at sea it was condemned. 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 armour-clads 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 tax-payer since its introduc­tion may probably be estimated in hundreds of thousands of pounds.

In the British navy, which is copied by most others, sight- signals are made with flags, the semaphore, “flashes,” fixed lanterns, and occasionally with fireworks, and for “dis­tant” signals with flags, balls, and pendants displayed on account of shape but not of colour. Sound-signals are made with horns, steam-whistles, and guns. There are two sets of flags,—one of ten numbered from 1 to 10, and another of twenty-one called after letters of the alphabet. There are also pendants and a few special flags. The numbered flags are used with the general signal book, a kind of dictionary in which figures stand opposite sentences conveying orders or announcements. Opposite 123 might stand “hoist in all boats,” which would mean that, when the flag called 1 was hoisted with 2 beneath it and 3 beneath 2, the ship or ships addressed—indicated by a special flag or by pendants—were ordered to hoist all boats in. The lettered flags are used with the voca­bulary signal book, in which opposite collections of letters are put single words or small groups of words. Thus, if ABC were opposite the word “admiral” and STO opposite “will sail at noon,” when the first three flags were hoisted the signalman on board each ship addressed would note them down with their signification. When all addressed had acknowledged the first “hoist” the flags would be hauled down and STO would be hoisted, to be acknow­ledged and noted in like manner. The admiral would thus have made known his intention of sailing at a given hour. From this it will appear that the general code is used for words of command and the vocabulary for long communications. The night signal book contains a limited number of definite orders and announcements made known by exhibiting lanterns, never more than four, arranged vertically, horizontally, or in a square. For a few signals some kind of firework is displayed. Fog- signals are made by firing different numbers of guns at fixed intervals. Owing to the slowness of flag-signalling, it is now, especially for the vocabulary and at moderate distances, largely superseded by the semaphore, an upright post with two arms moving in a vertical plane. The changed positions of the arms indicate letters and each word is spelled. Before the adoption of Captain Colomb’s system, at night and in fogs only a few announcements could be made by signal, and sending messages was un­known. By a series of symbols formed of dots and short lines, like those of the Morse alphabet, he represents figures, letters, and special words. Thus ... means 3, and .\_\_\_ 7. The system can be employed in daylight, at night, and in fogs. In daylight long and short waves of a flag on a staff reproduce the flashes; in fogs long and short blasts on a fog-horn or steam-whistle; and at night the alternate exposure and concealment of the light of a lamp. Every order in the general signal book and every word in the vocabulary—by spelling, indeed, every word in the language—may be communicated by this system. Distant signals, now rarely used, are made by hoisting flags of different shapes at distances at which colours become invisible. The *Army and Navy Signal Book* contains the