BURNHAM W/T STATION

The Ships' Bureau

Except for Senior Courses, few Communicators get the opportunity to look around Burnham Ship/Shore wireless station whose dual role, combining that of principal station in the World-Wide Merchant ship long distance organisation and as Admiralty Ship/Shore receiving terminal, is well known.

This article giving details not contained in official publications, may be of interest to the many operators who have worked the world-renowned callsigns GKV and GKL.

Burnham Radio, sited at Burnham-on-Sea, Somerset, was extended to its present size in 1948 when new wings were added in order to deal effectively with the increased post war traffic. The station carries out the duty of receiving station, whilst Portishead situated 19 miles northwards, houses the transmitters which are keyed by the operators at Burnham over land-lines connecting the two stations.

During the war, established overseas wireless stations were brought in to collaborate with Burnham in a unified organisation, thus bringing about the present Area scheme, which has been retained for post-war commercial purposes organising traffic to and from ships of the British Commonwealth.

The station, which is under GPO control, is staffed mainly by Post Office personnel; naval operators number 22 and constitute not more than 25% of operators borne.

A 4 Watch watchkeeping system is employed, naval telegraphists working alongside and carrying out the same wireless watch duties as their civilian counterparts. Naval personnel are not borne exclusively for working H.M. Ships but do in fact spehd the greater part of their time on duty working Commercial ships; whenever practicable however, H.M. Ship working is always carried out by naval telegraphists.

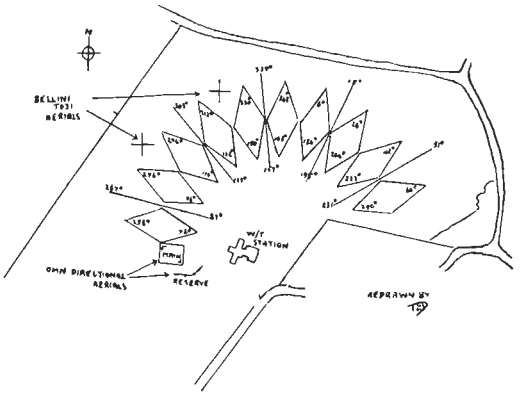
It follows that a pre-requisite required from telegraphists drafted to Burnham is a good standard of operating. Ships of all nationalities and denominations are worked and handling messages as part of the public service calls for a high degree of competence and operating ability.

A "draft" to Burnham is regarded as a "good number" under the New Centralised Drafting system; it should appeal particularly to natives of the area.

There are thirty-two operating positions at Burnham for dealing with ships' incoming wireless traffic; of these, twenty-eight are for working long distance on the higher frequencies, the remaining four for low frequency working. In addition a coastal station service is provided for short range shipping on 500 kcs., callsign GRL.

In the " Search-point" or "group working" system employed, which has proved very successful, operators work in groups, one or more groups being allocated to each frequency band, and the functions of finding ships and taking their traffic are separated. One operator in each group searches continuously for calling ships and the others deal with the traffic after the searching operator has contacted the ships. Variability of the number of traffic operators allocated to any group also contributes considerably to the success of the system.

Outgoing traffic for commercial ships in all parts of the world is transmitted on regular scheduled broadcasts to merchant ships through Area Wireless Stations each responsible for its own area. Each of these stations is provided with multiple transmitting and receiving facilities, and are linked with London (Whitehall) by Radio-teleprinter point to point fixed services. Burnham, the area station for Area 1 (sub-divided into Areas 1A, 1B and 1C) is linked to Whitehall W/T by direct land line teleprinters.



All ships operating under the system notify their movements to the appropriate area stations and this information from all stations is recorded in the "Ships' Bureau" at Burnham where a record of each ship's position, destination, expected time of crossing into a new area or of reaching port, and similar information is kept.

Shipping movement information (TR's) is also passed direct by land line teleprinter to Lloyds Shipping Information Bureau in London.

Outgoing traffic for ships is routed according to instructions given at the Bureau; traffic for Area 1 is broadcast at the scheduled times laid down, and that for other areas is forwarded to the appropriate area stations via Whitehall W/T for inclusion in their broadcasts.

Traffic from British Commonwealth ships within Area 1, and also world wide traffic to and from ships which do not work within this system, e.g. foreign ships, is dealt with in the original way, that is each ship calls or is called and after two-way communication is established, the messages are passed.

For group working in the high-frequency bands, the search-point operators use continuous omni-directional reception. Aerials used consist of six horizontal V-dipoles, and as a reserve in the event of storm damage, there are six separately supported vertical dipoles. The aerials are all of the multi-wire cylindrical cage construction type and sufficiently aperiodic to enable one aerial of each type to cover one frequency band.

Traffic operators need the best practicable reception from any direction they may select at any moment. All round coverage combined with the highest practicable directivity gain is achieved mainly by the use of a number of horizontal rhombic aerials. This type of aerial has a suitable directional response throughout most of the required frequency range and because of its relativity uniform impedance—frequency characteristic, it is ideally suited for the purpose.

By correctly matching a second receiver in lieu of the absorbing resistor which terminates the unidirectional rhombic aerial, simultaneous bi-directional reception on each aerial is made possible, resulting in a 50% saving in the number of aerials required.

Ten such aerials, each of side-length 246 ft., side-angle 140 degrees, 102 ft., above ground, serve two diametrically opposed zones 18 degrees wide, thus enabling all round coverage.

Interspersed with the horizontal rhombic aerials are five vertical bi-directional half-rhombic aerials, of the same side-length and side angle. These supplement the performance of the former, particularly at the lower frequencies where the response of the horizontal aerials to signals arriving at very low angles is poor. Since the horizontal and vertical aerials respond predominantly to waves polarised in their own plane, and in practice an electro-magnetic wave tends to become randomly polarised after ionospheric reflection, the two aerial systems are complementary.

The whole H.F. aerial system is arranged to receive signals in the frequency range 4 to 22 mcs. Aerials can be used simultaneously by any number of operators without interaction.

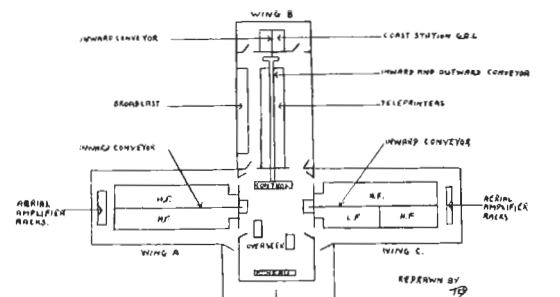
For L/F working high-gain receiving aerials are unwarranted, and the best reception is frequently obtained by using crossed-looped aerials omni-directionally by directional discrimination against unwanted signals. A distribution system enables all four L.F. operators to use the aerials simultaneously and independently.

Transmitter control and intercommunication facilities similar to those for H.F. operators are provided, although group working is not used.

To give an indication to the operators of the sensitivity of their receivers, and to serve as a frequency calibration, low-level test signals from crystal oscillators are available at each position. There is one such test signal exactly in the middle of each frequency band and it is keyed with continuous dots to differentiate it from any other signal.

The remote control from Burnham of the transmitters is normally restricted to keying only; control of the Portishead transmitters is effected over two 12 channel V.F. systems, supplemented by a telephone order wire. Access to and keying of transmitters is effected by the operation of lever-type and morse keys provided at each operator's position.

As most of the outgoing traffic is broadcast, and therefore controlled from Wing B, incoming traffic preponderates in Wings A and C where usually one group, headed by its search-point operator, operates on one marine frequency band sharing the same transmitter. In order to avoid more than one operator of a group using a shared transmitter at the same time, aural or visible engaged light signals are given off at the positions of all other operators who share the transmitters.



The success of the group system of operating depends largely on easy and rapid communication both between search-point operators and their working operators, and between the central control position and all operating and information points. This intercommunication telephone network is provided for operators wearing headphones, i.e. search and traffic operators, by switching in one earpiece to the intercomm whilst at other positions loud speakers are fitted. Speech is effected through microphones installed at all positions.

The diagrammatic layout of the station giving details is illustrated above.

The building illustrated consists of three wings, each 60 ft. x 24 ft., radiating at right angles from a 35 ft. square central control room. Wings A and C accommodate the 32 receiving positions for long-distance ship-to-shore traffic. The far end of Wing B accommodates the position equipped for medium-frequency Coast Station services, and the remainder of Wing B is occupied by line-teleprinter and broadcast positions. The central control room contains the traffic circulation control positions, the Ships' Bureau and the P.B.X.

For the reception and despatch of telegrams over the inland network twelve teleprinters are fitted, connected to what is known as the "Teleprinter Automatic Switching" system. By this means direct teleprinter two-way connection is made to main post offices in large provincial cities throughout the country.

Commercial traffic handled at Burnham in 1956 was 12 million words counting an average message as twenty words.