

# Low-power HF Communication Systems

GOVERNMENT departments and commercial organizations in developing territories use low-power HF systems extensively for national and international communication. With the large increase in the number of HF channels in general use, economic use of the available frequency spectrum is imperative. This urges the use of systems employing a high order of frequency stability as well as narrower bandwidths and higher selectivity. Whilst the output power range of the transmitters used is from 60 watts to 1 kW, it is normal practice to use SSB or ISB together with FSK telegraphy. SSB is now used on many circuits, including minor ones, since this is the most efficient system and it also requires less power. Whilst the telegraph traffic requirements of many older minor circuits may be satisfied by CW or MCW, there is an increasing requirement for higher speed telegraphy over low-power HF systems. This necessitates frequency-shift keying and this is now a standard feature of these systems. Receivers of simple design and good performance are usually employed, although in some cases a high grade international-class diversity receiver is necessary for telegraphy.

## SYSTEMS

The aerial systems employed will vary with the distances involved between the transmitting and receiving station and the type of equipment used. For distances of the order of hundreds of miles it is usual to employ half-wave folded-type dipoles, the height depending on the range required. For longer routes, reflectors are added. 600-ohm open twin-wire feeders are normally used for transmitting and 72-ohm unbalanced coaxial cable for receiving. Receiving-aerial feeder connectors are made via a suitable matching transformer, of which a range is available. RF power-matching transformers can also be supplied to match a 50-ohm unbalanced to a 600-ohm balanced impedance or vice versa. Transmitter outputs may be either 600-ohm balanced or 50-ohm unbalanced.

Aerial multi-coupler units are available. These are for rack-mounting and allow up to ten receivers to be fed from one or two aerials. When duplex communication is required, even in small stations, separation between the transmitting and receiving aerial should be kept as great as practicable.

Experience shows that it is seldom that any two operating concerns have identical requirements for transmitters, receivers,

aerials and buildings. Only a general indication of the variety of possibilities, using this equipment can therefore be shown. The Company will assist any organization in the detailed planning of its own particular system.

## EQUIPMENT

For small systems, as illustrated in Fig.1, equipment such as the Type HSR 21 (page 249) can be used for simplex or duplex telephony and telegraphy. Such systems use a simple single-wire aerial or a dipole. A transmitter output of 60 watts is suitable and the whole equipment is operated as a transceiver. A separate SSB receiver, such as the Type HR 61 (page 253) facilitates duplex operation.

More elaborate systems such as shown in Figs. 2 and 3, necessitating higher-power transmissions and frequency-shift keying, use transmitter output powers ranging from 300 watts to 1 kW with similar and integrated drives systems. ISB is also employed in these systems and sometimes radio-telephone terminal equipment. Transmitters Types HS 22 and HS 92 (page 246) are exclusive designs for SSB/ISB telephony and frequency-shift telegraphy respectively. Type HS 113 1 kW Wideband Amplifier

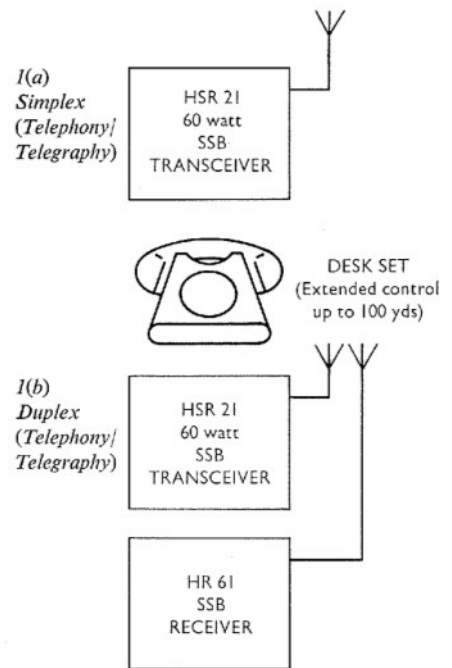


Fig.1 600-watt SSB Station

(page 245) is used in certain higher-grade international class systems and has now come into increasing use for aeronautical HF point-to-point services and other uses. Similar drive systems are used throughout and these are built into the equipments.

For reception on the less important systems, either Type HR 61 SSB or Type HR 22 General-purpose Receiver (page 252) may be employed. For more important systems using SSB telephony, Receiver Type HR 21, which features in the section on high-power systems, (page 231) may be desirable. Similarly it may be advantageous to use the Type HR 11 Telegraph Receiver (page 230) for FSK operation (see Fig.4). Combining units are used in conjunction with the simpler type of receiver for other telegraph services. The diagrams show the basis of some typical systems.

The important changes which have come into this class of system in recent years are the use of ISB and SSB for telephony, higher-speed telegraph operation and teleprinters. This development has resulted in the older type of general-purpose transmitters and similar equipment being superseded by lower-power types with a much higher order of performance, using improved circuit and system techniques.

Fig.2  
300/1000 watt  
SSB/ISB Station

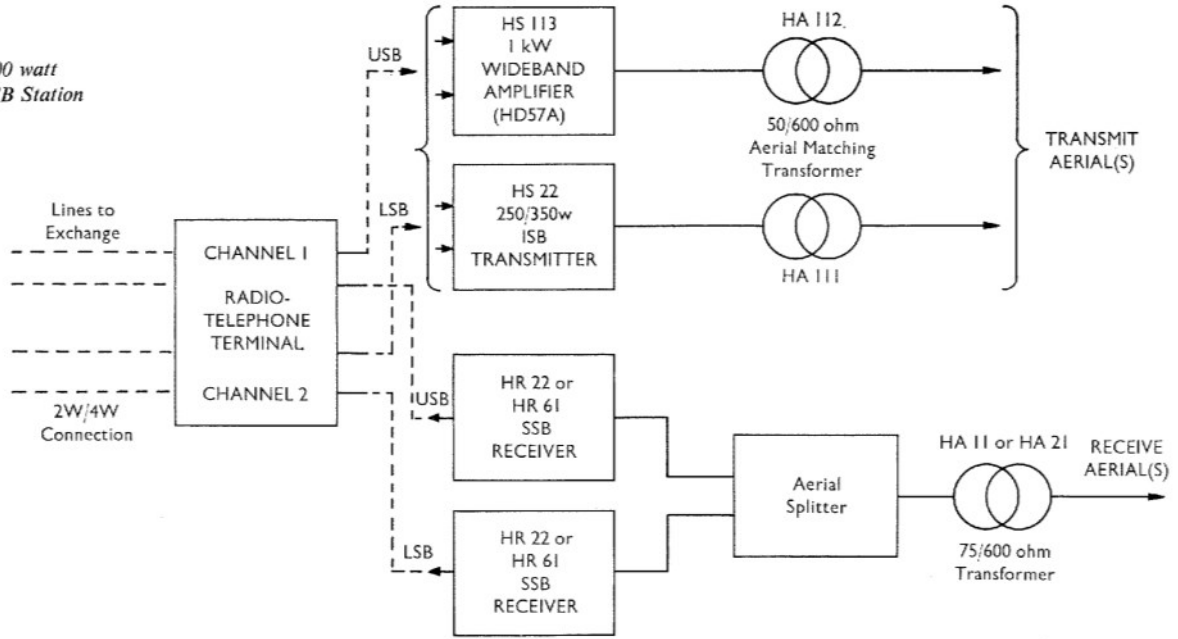


Fig.3  
400/1000 watt  
Transmitting Station  
FSK Telegraphy

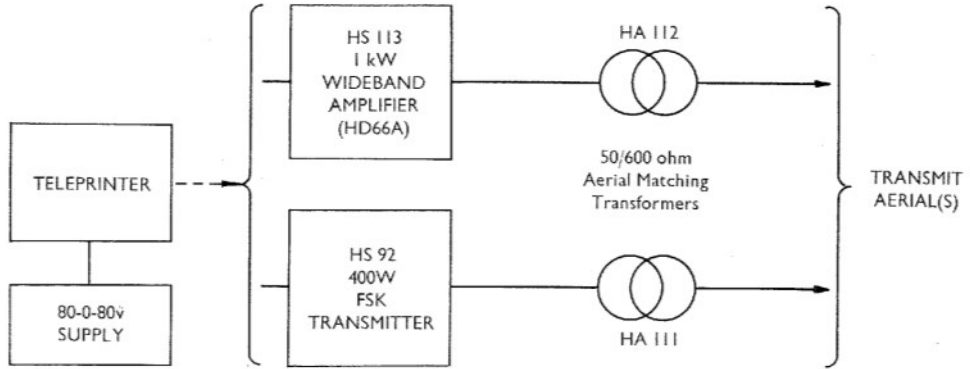


Fig.4 Receiving Station FSK Telegraphy

