

RECOMMENDATION ITU-R M.584-2
CODES AND FORMATS FOR RADIO PAGING

(Question ITU-R 12/8)

(1982-1986-1997)

Summary

This Recommendation describes codes and formats which may be used to provide radio paging.

The ITU Radiocommunication Assembly,

considering

- a) this Recommendation which describes codes and formats presently used by some of administrations;
- b) Recommendation ITU-R M.539;
- c) that the studies necessary to define the requirements for new radio-paging systems are ongoing;
- d) that some administrations need to implement, or intend to implement, radio paging systems offering higher transmission speeds, to increase data throughput and subscriber handling capability;
- e) that, among other things, standard code(s) and format(s) are necessary to permit radio paging;
- f) that the codes and formats described in the annexes are presently used for radio paging,

recommends

- 1** that future work should allow for possible future changes in these codes and formats;
- 2** that studies should continue in order to meet the evolving requirements for paging systems.

ANNEX I

Radio-paging code No. 1

1 Code and format

This code is sometimes referred to as POCSAG. A transmission consists of a preamble followed by batches of complete codewords, each batch commencing with a synchronization codeword (SC). The format of the signals is illustrated in Fig. 1. Transmission may cease at the end of a batch when there are no further calls.

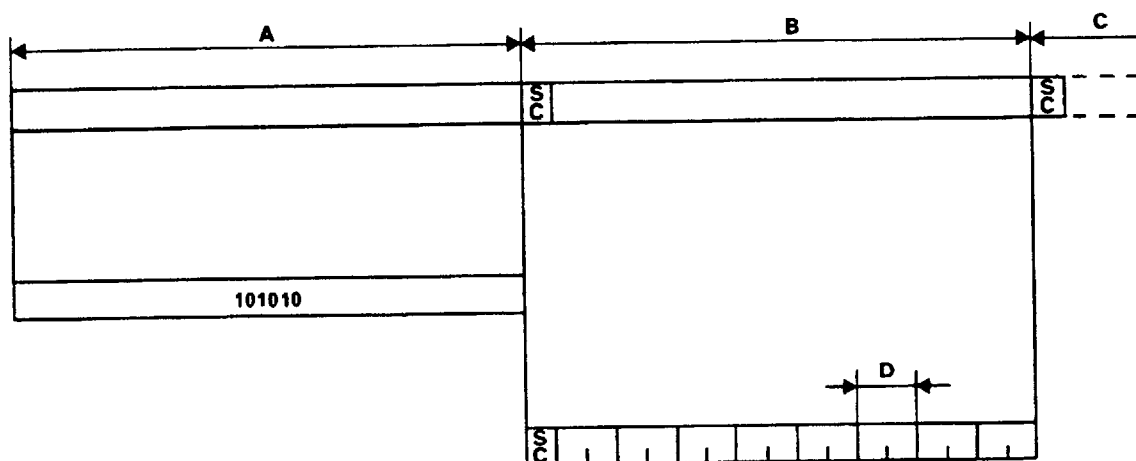


FIGURE 1 – Signal format

- A: preamble. Duration at least 576 bits = the duration 1 batch + 1 codeword
- B: first batch
- C: second and subsequent batches
- D: one frame = 2 codewords
- SC: synchronization codeword

Note – 1 batch = synchronization codeword + 8 frames = 17 codewords.

D01-sc

1.1 Preamble

Each transmission starts with a preamble to aid the pagers to attain bit synchronization and thus help in acquiring word and batch synchronization. The preamble is a pattern of reversals, 101010... repeated for a period of at least 576 bits, i.e. the duration of a batch plus a codeword.

1.2 Batch structure

Codewords are structured in batches which comprise a synchronization codeword followed by 8 frames, each containing 2 codewords. The frames are numbered 0 to 7 and the pager population is divided into 8 groups. Thus each pager is allocated to one of the 8 frames according to the 3 least significant bits (LSB) of its 21 bit identity (see § 1.3.2), i.e. 000 = frame 0, 111 = frame 7, and only examines address codewords in that frame. Therefore each pager's address codewords must be transmitted only in the allocated frame.

Message codewords for any receiver may be transmitted in any frame but follow, directly, the associated address codeword. A message may consist of any number of codewords transmitted consecutively and may embrace one or more batches but the synchronization codeword must not be displaced by message codewords. Message termination is indicated by the next address codeword or idle codeword. There is at least one address or idle codeword between the end of one message and the address codeword belonging to the next message.

In any batch, wherever there is no meaningful codeword to be transmitted, an idle codeword is transmitted.

The last codeword in any transmission should be an idle codeword.

1.3 Types of codewords

Codewords contain 32 bits which are transmitted with the most significant bit first.

The structure of a codeword is illustrated in Fig. 2.

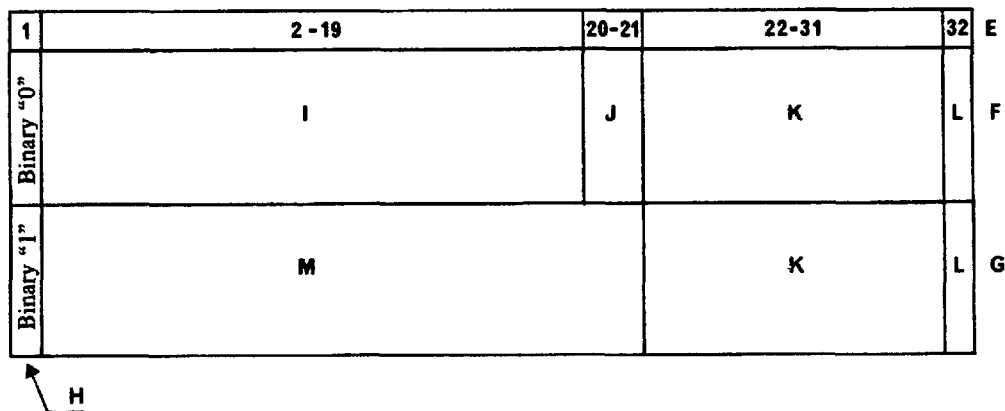


FIGURE 2 – Form of address and message codewords

E: bit number
F: address codeword
G: message codeword
H: flag bit
I: address bits (2-19)

J: function bits
K: check bits
L: even parity bit
M: message bits (2-21)

D02-98

1.3.1 Synchronization Codeword

The synchronization codeword is shown in Table 1:

TABLE 1

Bit No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Bit	0	1	1	1	1	1	0	0	1	1	0	1	0	0	1	0
Bit No.	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
Bit	0	0	0	1	0	1	0	1	1	1	0	1	1	0	0	0

1.3.2 Address Codewords

The structure of an address codeword is illustrated in Fig. 2.

Bit 1 (the flag bit) of an address codeword is always a zero. This distinguishes it from a message codeword.

Bits 2-19 are address bits corresponding to the 18 most significant bits of a 21 bit identity assigned to the pager.

For information regarding the least significant bits see § 1.2.

Bits 20 and 21 are the two function bits which are used to select the required address from the four assigned to the pager. Hence the total number of addresses is 2^{23} (over 8 million).

Bits 22 to 31 are the parity check bits (see § 1.4) and the final bit (bit 32) is chosen to give even parity.

1.3.3 Message Codewords

The structure of a message codeword is shown in Fig. 2. A message codeword always starts with a 1 (the flag bit) and the whole message always follows directly after the address codeword. The framing rules of the code format do not apply to a message and message codewords continue until terminated by the transmission of the next address codeword or idle codeword. Each message displaces at least one address codeword or idle codeword and the displaced address codewords are delayed and transmitted in the next available appropriate frame. Although message codewords may continue into the next batch, the normal batch structure is maintained, i.e., the batch will consist of 16 codewords, preceded by a synchronization codeword. At the conclusion of a message any waiting address codewords are transmitted, starting with the first appropriate to the first free frame or half frame.

Message codewords have 20 message bits, viz bit 2 to bit 21 inclusive and these are followed by the parity check bits obtained according to the procedure outlined in § 1.4 below.

1.3.4 Idle Codeword

In the absence of an address codeword or message codeword, an idle codeword is transmitted. The idle codeword is a valid address codeword, which must not be allocated to pagers and has the following structure as shown in Table 2:

TABLE 2

Bit No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Bit	0	1	1	1	1	0	1	0	1	1	0	0	1	0	0	1
Bit No.	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
Bit	1	1	0	0	0	0	0	1	1	0	0	1	0	1	1	1

1.4 Codeword Generation (31: 21 BCH + Parity)

Each codeword has 21 information bits, which correspond to the coefficients of a polynomial having terms from x^{30} down to x^{10} . This polynomial is divided, modulo-2, by the generating polynomial $x^{10} + x^9 + x^8 + x^6 + x^5 + x^3 + 1$. The check bits correspond to the coefficients of the