

REPORT 1024

PERSONAL RADIO SYSTEM

(Question 71/8)

(1986)

1. Introduction

This Report relates to the personal radio system used in Japan as an example of multi-channel access technique without a central controller. Intended as an initial technical response to Question 71/8, this Report introduces the basic characteristics, connecting procedure, and receiver input level versus connection reliability.

2. Basic characteristics

- 2.1 *Frequency:* 903.0125 to 904.9875 MHz
- 2.2 *Channel separation:* 25 kHz
- 2.3 *Number of channels:* 80 channels (one control channel and 79 traffic channels)
- 2.4 *Class of emission:* F2D: control channel
F3E: traffic channels
- 2.5 *Type of operation:* Simplex
- 2.6 *RF power output:* 5 W

3. Connecting procedure**3.1 Configuration of control signal**

An automatic transmitter identification system (ATIS) is included in a read-only memory (ROM) obtained from the licensing authority. The ROM is required for the operation of the personal radio system (PRS) transceivers.

Code configuration for ATIS and circuit linkage

Bit synchronization:	50 bits 101010 ...
Word synchronization:	15 bits 111011001010000
Selective calling number:	20 bits, 5 BCD bits
Channel number:	8 bits, binary
Reserved bits:	4 bits, 0000
ATIS code:	48 bits binary: identification codes (for more than ten million stations, licence issue date and scrambling)
Length of Hagelbarger code:	$2 \times \text{data bit length} + 12 = 172 \text{ bits}$
Total:	$172 + 65 + 237 \text{ bits (197.5 ms)}$
Code type:	NRZ
Bit rate:	1200 bit/s
Modulation method:	MSK 1200 Hz mark 1800 Hz space

3.2 Receiver (RX) input versus connection reliability

In Fig. 1, an example of receiver input level versus bit error ratio (BER) is shown. Line C of $\text{BER} = 10^{-2}$ corresponds to 90% connection reliability for the personal radio system.

3.3 Flow chart

Figure 2 is a simplified communication procedure flow chart for the personal radio system. The procedure of connection is as follows. All the radios in the system are in the stand-by state on the control channel. The calling station looks for and finds an idle traffic channel and stores the channel number in its memory. Then it emits the control signal on the control channel. Those radios whose selective call number coincides with the control signal transfer to the specified traffic channel and enter into conversation. The call sign consisting of the ATIS code is automatically transmitted before the start of conversation, every 60 s through conversation and at the end of the conversation. A selective call number is specified before transmission. On the other hand, up to two selective call numbers can be set for receiving.

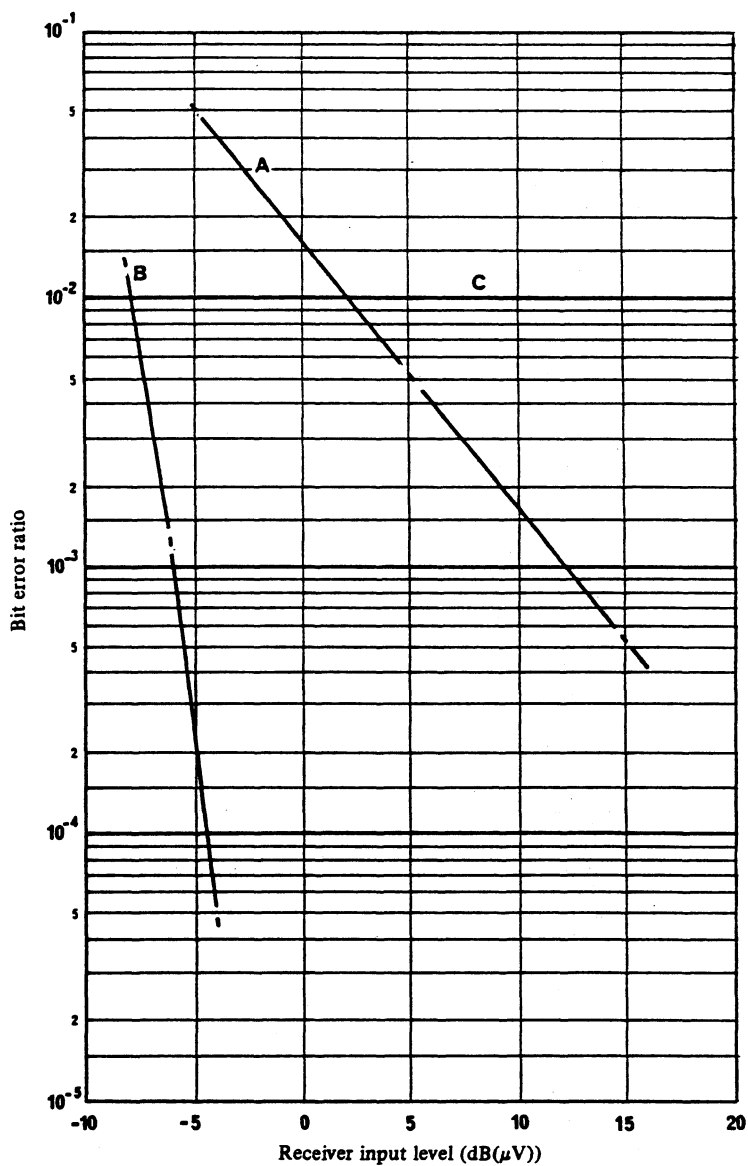


FIGURE 1 – Receiver input level versus bit error ratio performance

Curves A: Rayleigh fading

– Centre frequency: 903.8875 MHz

– Fading frequency: 20 Hz

B: no fading

C: connection reliability: 90% or more

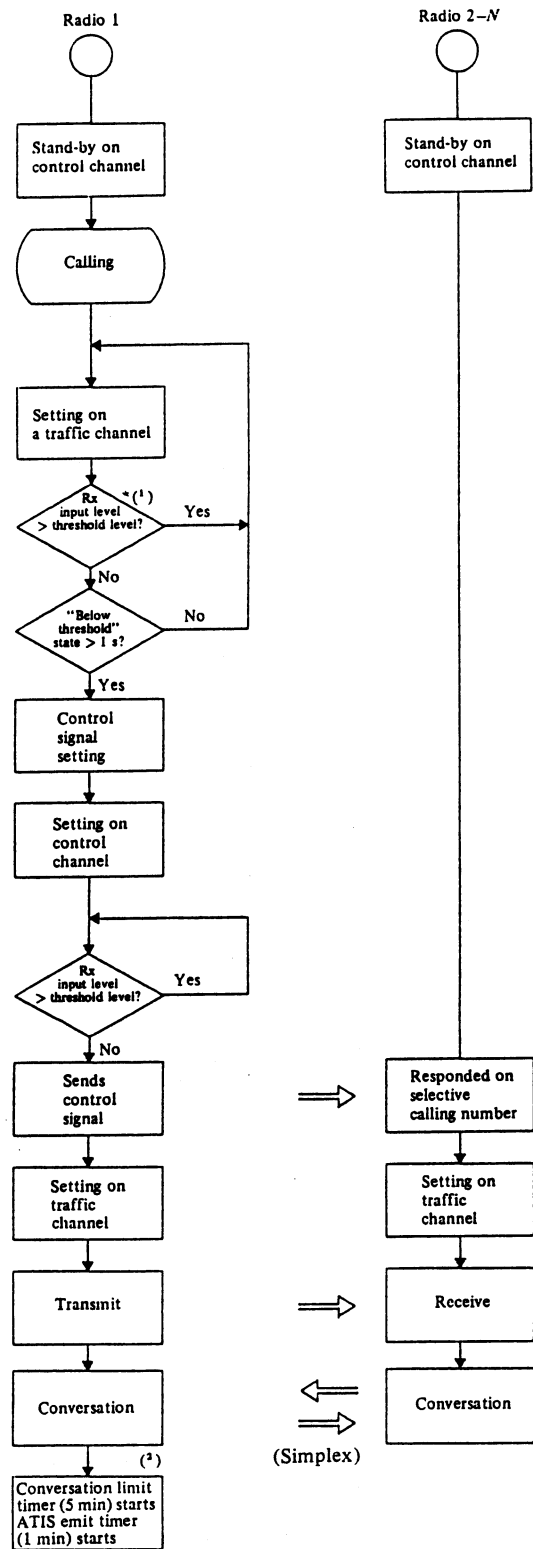


FIGURE 2 - Simplified communication procedure flow chart

(¹) Threshold level.

The standard threshold carrier level for the receiver is set at 1 μ V (open voltage).

(²) In consideration of traffic congestion, a conversation timer is provided.

4. Conclusion

Without a central controller, a personal radio system has been implemented as an economical communication system of relatively high reliability. Thus, this system is popular in use.

REPORT 1025-1

TECHNICAL AND OPERATING CHARACTERISTICS OF CORDLESS TELEPHONES

(Question 71/8)

(1986)-1990)

1. Introduction

In recent times, cordless telephones which can be connected into the public switched telephone network (PSTN) and have a small service area limited to a few hundred metres, have gained widespread popularity. To meet the growing demand for these cordless telephones, it would be advantageous to develop a system using multi-channel access techniques that does not rely on centralized traffic channel selection _____ and provides efficient frequency utilization.

Part A of this Report deals with the general principles of cordless telephone systems _____ using multi-channel access techniques, in particular, with the basic objective and technical characteristics which are important for their operation.

The major characteristics of some cordless telephone systems are given in Part B of this Report together with a brief description and other aspects of system operation.

PART A

1. Objectives

The basic objectives of the application are:

- that the radio spectrum be used efficiently;
- that a system of high subscriber capacity be realized;
- that simple and miniature circuits be used to ensure that the weight and size of the equipment are compatible with ordinary telephones and that it can be provided economically;
- that the system — provide good quality for public communication and that a flexible system of operation can be provided that does not require complicated frequency management;
- that the system provide as far as possible normal telephone features;
- that the system be provided security of call charges.

2. Technical and operational aspects

A cordless telephone system consists of two parts:

- a fixed part which is connected to the _____ ordinary telephone network; and
- one or more portable sets.

The simplest version, called "cordless telephone" consists of one portable set and one fixed part connected to a subscriber line. More complex versions may encompass both public base stations ("telepoints") for access to the PSTN/ISDN and wireless PABXs.