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ARTEMA 900 MHZ FHSS RADIO

REF. P4432-150 (BASE UNIT)
P4432-050 & -052 (HAND HELD UNIT)

DESCRIPTION OF TRANSMISSION

Distribution :	**CONFIDENTIAL**

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Revisions

Indice	Date	Objet
1.0	25/04/00	Création du document
1.1	25/07/01	Answers to FCC questions

DESCRIPTION OF TRANSMISSION

The radio module RFM 900 FHSS is a 900MHz FCC 15.247 frequency hopping transceiver.

At baseband end, the interface of the radio module is a serial link.

At the antenna interface the radio is working between 903.8 and 911.15 MHz using frequency hopping.

The frequency hopping :

There are 50 frequencies numbered from 0 to 49

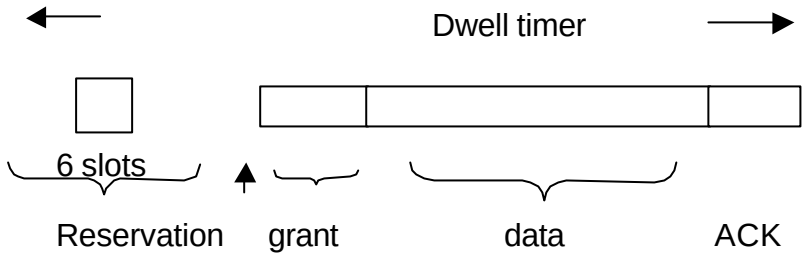
spaced by 150 kHz, that is to say :

903.8	CH. 0	center frequency
903.95	CH 1	"
907.4	CH 24	"
911.15	CH 49	"

These frequencies are arranged randomly in up to 3 different tables which are stocked in the software.

Each dwell timer the transmission occurs on a different channel, following the order defined by the table at both ends synchronously

The dwell timer



The dwell timer is divided in several parts :

- Reservation

in which up to 6 mobiles may send a reservation burst in order to get a grant from the base station.

The base station may however keep the current dwell timer for itself, not granting to any mobile.

- Depending of the decision of the base, based on a priority scheme, the mobile (or base) that was designated by the grant is allowed to transmit a data packet during the current dwell timer. Data is protected by a CRC.

- The data is transmitted during the data phase of the dwell timer using FSK modulation. Two bits are associated to code a baseband – tone frequency among four tones (18/22/28/40 kHz). Each tone, during the dual bit duration modulates the frequency of the transmit oscillator.

- The last phase of the dwell timer is the ACK which is sent if the receive side has a correct CRC checksum.

dwell time :	92 ms		
reservation slot :	4 ms / 6ms		
reservation:	36 ms		
grant :	7 ms		data+ carrier =
data :	64	char. max +10	19+ 5 ms =24ms
ACK :	7ms		

Prioritization scheme

The priority algorithm attempts to share the frequency equally between the links.

More specifically at each grant the base gives the link to

- the various mobile in ascending order
- itself if it has not just transmitted and needs to do it.

Examples :

1. – B M1 B M2 B M3 B M4 B M5 B M6 B….

only if the base has something to transmit at that time.
(the base has many things to transmit)

2 - B M1 M2 M3 M4 M5 M6 B

(the base has few things to transmit)

3 - M1 M4 M5 M1 M4 M5

(only M1 M4 and M5 have something to transmit)

4 - M1 M1 M1 M1

(only M1 has something to transmit)

Synchronization

On two frequencies (selected by software for one network), the base transmits a synchronization burst on which each mobile may synchronize to the frequency table.

At the beginning, the mobile settles on a synchronization frequency alternatively and looks for the synchronization burst.

When found, the mobile follows the frequency table in synchronization with the base.

The channel access is done by transmitting a reservation slot in the reservation phase.

Radiated Power density

$$\hat{O} = \frac{Pe\ Ge}{4Ï\ d^2}$$

d min = 5 mm between antenna wire and outside of the base or hand held unit

P max = 10.67 dBm = 11.7mw (Hand-Held Unit)

G 0 dBi

$$\hat{O} \quad \frac{11.7\ mw}{4\ x Ï\ (0.5)^2} = 3.72mw/cm^2$$

P max = 12.33 dBm = 17.1mw (Base Unit)

G 0 dBi

$$\hat{O} \quad \frac{17.1\ mw}{4\ x Ï\ (0.5)^2} = 5.44mw/cm^2$$

Radio block diagram

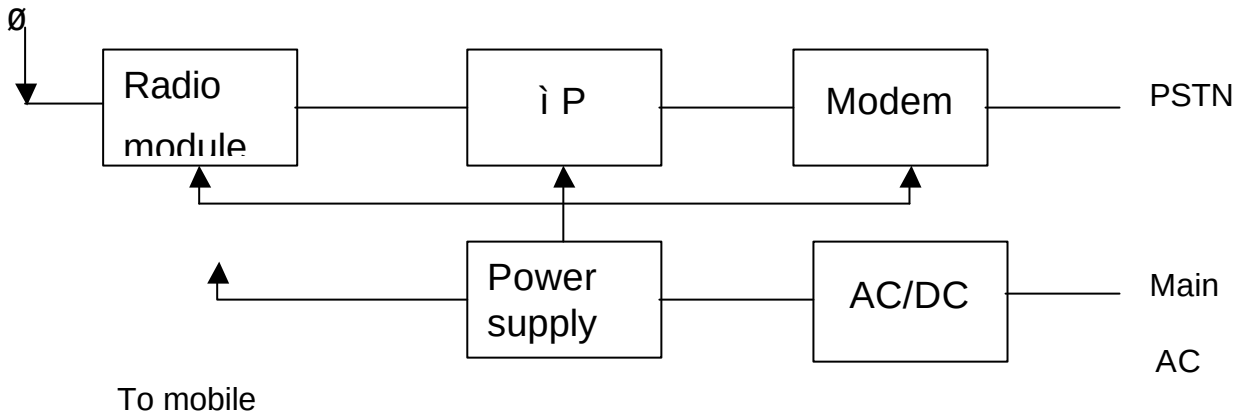
See block diagram in attachments

Output Rx power : 12 ± 2 dBm

Sensitivity Rx : - 85 dBm @ 10 ¯³ BER

Antenna gain ~ 0 dBi

Overall block diagram



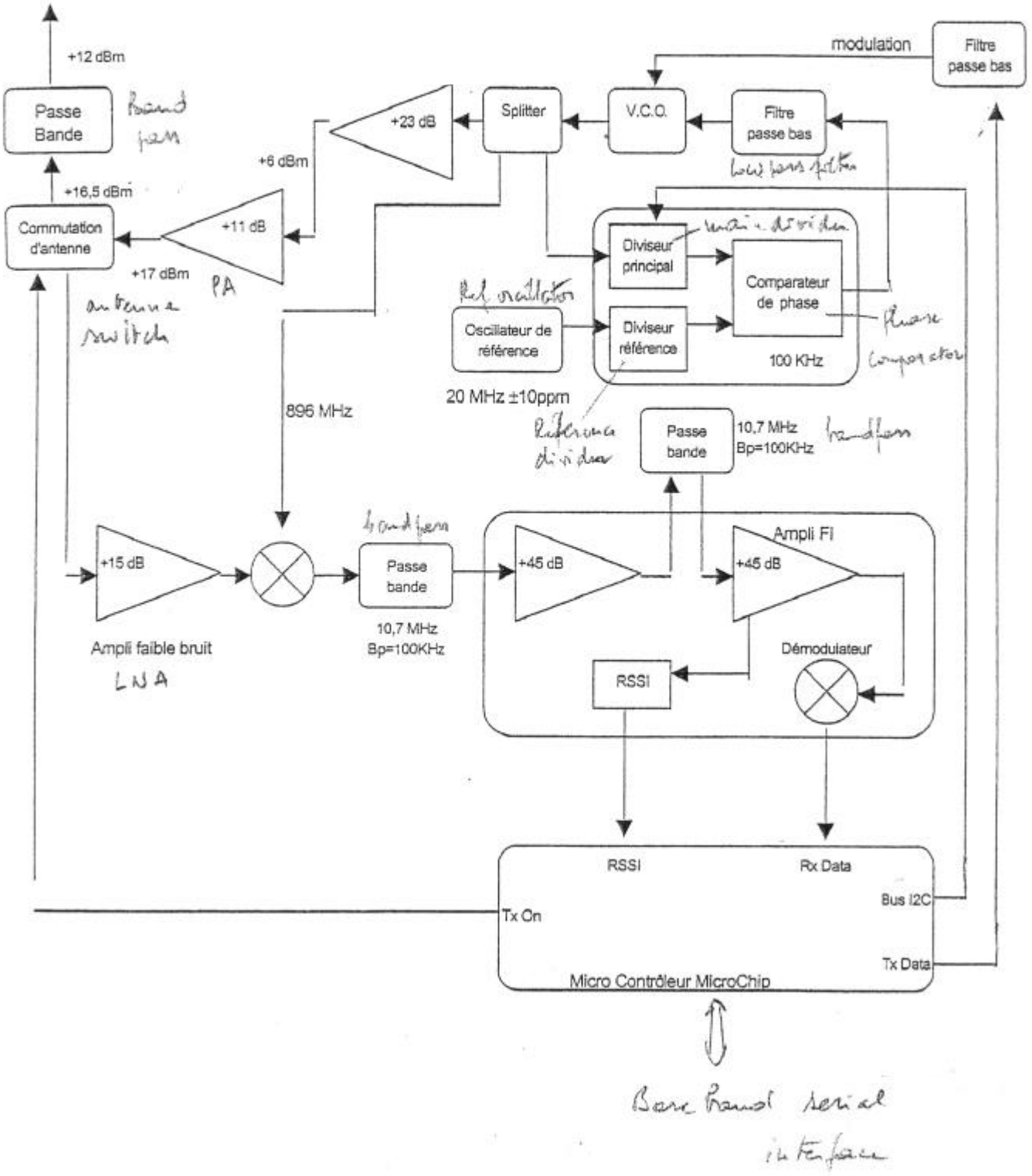
	Channels		
Slot N°	**Table 1**	**Table 2**	**Table 3**
1	2	2	2
2	12	15	18
3	22	28	34
4	32	41	3
5	42	1	19
6	3	14	35
7	13	27	4
8	23	40	20
9	33	13	36
10	43	26	5
11	4	39	21
12	14	12	37
13	24	25	6
14	34	38	22
15	44	0	38
16	5	11	7
17	15	24	23
18	25	37	39
19	35	10	8
20	45	23	24
21	6	36	40
22	16	49	9
23	26	9	25
24	36	22	41
25	46	35	10
26	7	48	26
27	17	8	42
28	27	21	0
29	37	34	11
30	47	47	27
31	8	7	43
32	18	20	12
33	28	33	28
34	38	46	44
35	48	6	13
36	9	19	29
37	19	32	45
38	29	45	14
39	39	5	30
40	49	18	46
41	0	31	15
42	10	44	31
43	20	4	47
44	30	17	16
45	40	30	32
46	1	43	48
47	11	3	1
48	21	16	17
49	31	29	33
50	41	42	49

Table 0 = always the same channel
(test purpose only)

N.B. : table 0 is not used currently (except for tests) and is always on the same channel given by register S202

V. Spécifications partie Radio

1) Synoptique



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