MINORPLANET LTD

Low Power Radio Base Station

Functional Description

1 Revision History

Issue	Date	Engineer	Checked	C/N	Notes
1	01/05/02	C G Harrison	J S Shaw	—	Initial issue.
2	02/07/02	C G Harrison	J S Shaw		LPRS modules added

2 Introduction

This document describes the basic operation of the low power radio interface used in the Base Station for local download of AEM3000 DCUs.

3 Overview

The Minorplanet low power radio base station provides a bi-directional interface between a serial data stream and RF packet transmissions. At the heart of the base station is either a Radiometrix or a Low Power Radio Solutions (LPRS) "Radio Packet Controller" (RPC). The Radiometrix RPC is available in two versions; the RPC-418-40 for the UK and the RPC-433-40 for Europe. The LPRS RPC is also available in two versions; one uses the MP400 (434MHz) for Europe and the other uses the MP900 (902.75 MHz) for the U.S. All four modules are pin-out compatible, are licence exempt and comply with the relevant regulations (MPT1340 and ETSi 300-220).

The RPC transmits and receives packets of data which are between 1 and 27 bytes in length. The RPC uses a proprietary parallel interface so a micro-controller is used to convert the serial data to this form (and vice versa for receive).

The Base Station is often situated remotely from the controlling computer so two types of serial interface are provided; RS232 and RS485.

The block diagram of the Base Station is as follows:
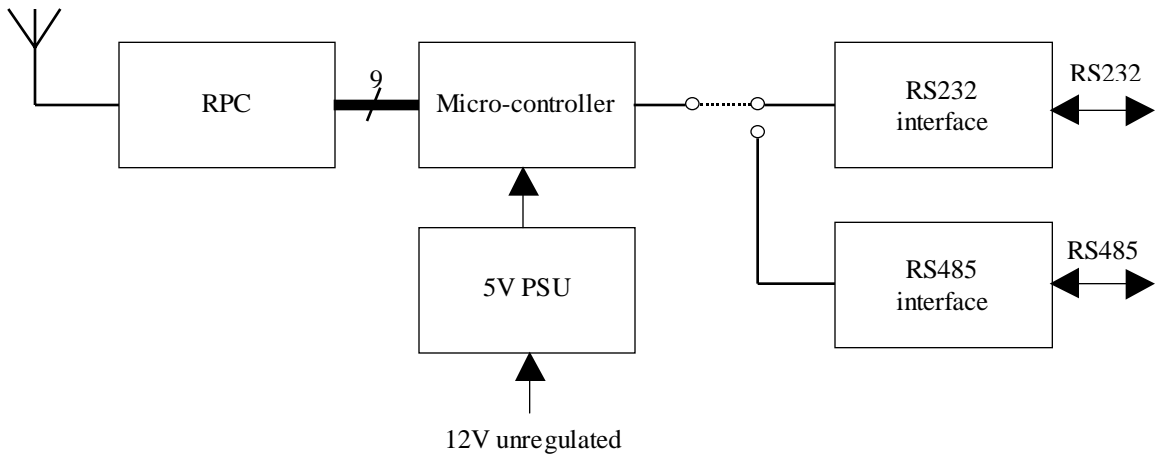
Note: For clarity the above block diagram only shows the power supply to the micro-controller.

The 9 control signals between the micro-controller and the RPC comprise four bi-directional data lines (D0-D3), two receive control lines (RXR and RXA), two transmit control lines (TXA and TXR) plus a

reset signal. Refer to the Radiometrix RPC data sheet for pin connection numbers and a complete description of the RPC module operation.

4 Transceiver Operation

4.1 Receive Mode

When the base station is idle it is in receive mode. The reset signal is negated and the micro-controller polls the receive request (RXR) line. If the RPC receives a valid packet it places the first four bits of data on the data lines, asserts the RXR signal and waits for the micro-controller to strobe the data out of its buffer. The parallel interface is only 4 bits wide (D0 - D3) so each byte is transferred as two nibbles. Every packet starts with a length byte so that the controller knows how many bytes to strobe from the RPC. The maximum packet size is 27 bytes (or 54 nibbles).

When the micro-controller has clocked a packet out of the RPC it transmits the data over the serial interface at 9600 baud to the host computer.

4.2 Transmit Mode

If the base station receives a packet from the host computer via the serial interface it immediately attempts to send it to the RPC by asserting the transmit request signal (TXR). If the RPC is currently decoding a receive packet it will ignore the request until either a valid packet has been received or the current receive process times out.

When the RPC is ready to transmit it places the data lines into input mode and asserts the transmit acknowledge signal. The micro-controller can now clock the transmit packet into the RPC via the four data lines one nibble at a time. If the micro-controller fails to clock a complete, valid, packet into the RPC within one second a timeout will occur and the RPC will enter receive mode again.

4.3 RF Connection and LED Indication

The RPC uses an SMB connector for the RF connection. The status of the RPC is shown by a red "Tx" LED and a bi-colour "Rx" LED. For more details of the LED indication refer to the Radiometrix data sheet.