# Theory of Operation RadioRemoteONE Receiver
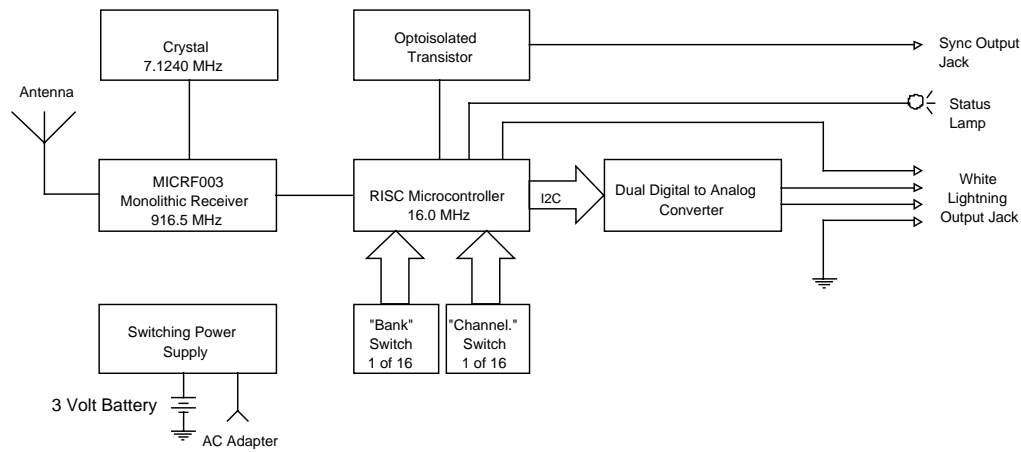
# Introduction

The RadioRemoteOne Receiver (RR1RX) is used in conjunction with The RadioRemoteOne Transmitter (RR1TX) to remotely control via wireless short range radio Photographic Flash units designed by Paul C. Buff Inc. All communication uses digital encoding so that up to 16 flash unit can be controlled from one transmitter. Each flash unit requires a separate receiver.

# Theory of Operation

Figure 1 shows the RR1RX block diagram. The intelligence is provided by software running on the PIC16C63A from Microchip Inc. The actual receiver function is centered around the Micrel MICRF003 monolithic receiver chip and an assortment of passive components. The carrier frequency for the RF link is 916.5 MHz. This is set in the receiver circuit by the 7.1240 MHz crystal. Any other frequencies are internal to the MICRF003. The data sheet for the MICRF003 is attached as MICRF003.pdf.

Each receiver listens only to data grams addressed to a single BANK address and a single CHANNEL address. For broadcast (ALL) commands the receiver ignores the channel address. Which BANK and CHANNEL address the receiver responds to is determined by rotary hex encoded switches.

The MICRF003 produces a steam of ONEs and ZEROs to an input on the PIC microcontroller. Software in the microcontroller decodes each data-gram looking for valid sync codes, BANK addresses and CHANNEL addresses. Each data-gram has a checksum attached witch is also validated. If these codes are valid the command/data section of the data-gram is decoded and the appropriate action is taken.

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Crystal
7.1240 MHz

Optoisolated
Transistor

Sync Output
Jack

Antenna

Status
Lamp

MICRF003
Monolithic Receiver
916.5 MHz

RISC Microcontroller
16.0 MHz

I2C

Dual Digital to Analog
Converter

White
Lightning
Output Jack

Switching Power
Supply

"Bank"
Switch
1 of 16

"Channel."
Switch
1 of 16

3 Volt Battery

AC Adapter

**Figure 1  RR1RX Block Diagram**

Outputs from the RR1RX include the Sync Output, Status Lamp, and White Lightning Remote Output Jack.
The Sync Output is an opto-isolated output used to fire lights that do not have a remote jack.  The status
LED is used to indicate low battery condition at power up and valid data receipt during normal operation.
The Remote Jack included the Sync signal sent out the Sync Output as well as two analog output from the
I2C serial A/D converter controlled by the microcontroller.  The values ouput from the A/D are determined
by command codes sent from the transmitter.

The RR1RX has the same power supply design as the RR1TX with two exceptions.  It does not have a 3.0 V
output and it has a external 3.0 V input from a "wall power supply" when A/C power is available.