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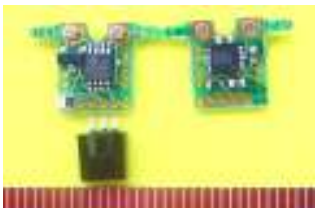
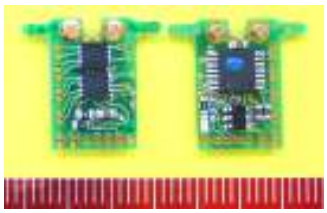
Didel Ur3x and Ur6x – Ppm compatible software

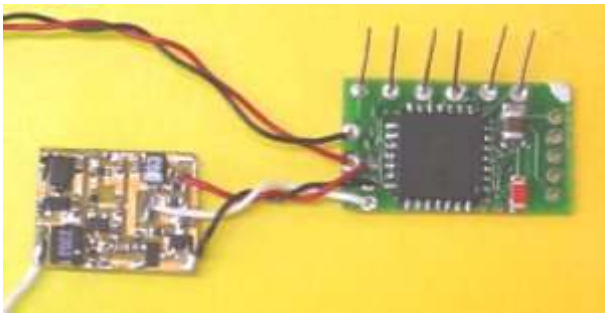


The **Ur3x** (http://www.didel.com/Ir/Ur3x.pdf) and **Ur6x** (http://www.didel.com/Ir/Ur6x.pdf) are compact 3 and 6-channels recever that does not include the receiver part. They decode a PPM stream coming from an infrared module or from a base radio.

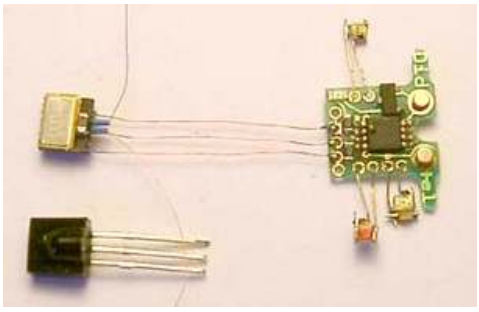


Infrared is a cheap solution perfect for short distances, for applications such as very slow flying planes and helicopters. IR modules include a 38 kHz filter, automatic gain control, and are low-cost. Didel's IRM weighs 0.13 g but can be sanded down to 0.06g. The more expensive Sharp GP1US301XP SMD sensor weight 0.04g.
Base radios are not commercially available. They would allow the modeller to design a plane or helicopter that can dynamically change the radio frequency it is using. Base radios generate a PPM stream. (see http://www.didel.com/Ir/IraShort.pdf for details).

Prototypes have proven the feasibility of the concept:

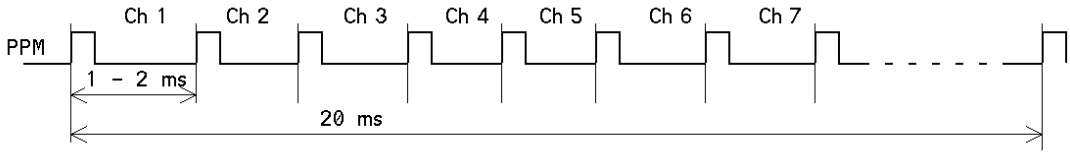


Nick Leichty 2005 base receiver connected to a Didel early MIP3 (0.65g total).
In 2007, Nick has created a 27Mhz base receiver below 0.08g http://microflierradio.com/



Martin Newell 2007 Rabbit 915 MHz receiver (0.145g) interfaced to the new UR31.
Weight and size is same as the low-cost IR receiver module.
http://mnewell.rchomepage.com/

PPM (Pulse Position Modulation) is a simple way of sending up to 7 analog values on a single line. A stream of 8 pulses separated by a 1-2 ms duration (max total of 14 ms) is repeated every 20 ms.



PPM has been used for many years. Most radio transmitters modulate a PPM signal which can carry the succession of 1-2ms periods distributed to the servos. PPM is easy to generate and decode with microcontrollers.
Polarity of signal is not necessarily positive. IRM usually output negative pulses.
The channel order is not standardized.
Mode 1 has throttle at right and sends the throttle data on channel 1 (e.g. Graupner)
Channel 2 is aileron (rudder on small models), channel 3 elevator.
Mode 2 has throttle at left and sends the throttle data on channel 2 (e.g. Futaba).
Channel 1 is aileron (rudder on small models), channel 2 elevator.
Didel software adapts to these differences, but mode detection supposes that that the throttle is at minimum and the other sticks in the middle position.
We have assumed that no power on a unidirectionnal channel (thrust) correspond to a 2ms duration. For bidirectionnal channels, this is of no importance since it is easy to permutate the wires.

Start-up and signal loss

The start-up procedure for the Ur3x and Ur6x is the following:

- Blink 2 to 5 times depending on variant
- Test the polarity of the PPM signal (IRM or base radio connected, transmitter on or off)
- If no signal is received, all outputs get test pulses. Connect a bicolor LED to test the functioning of the internal electronics
- Read channel 1 and decide for Mode 2 if pulse duration is between 1.2 and 1.8ms.

On the Ir6x receivers, the LED blinks if the received signal is OK. On the Ir4x, the LED is in parallel with a bidirectionnal output.

In case of loss of signal, the LED of the Ir6x is continuously ON. After 1 second, the power is reduced to a maximum of 50%, rudder channel assigned to 20% on a side and elevator channel is set to 0%. After 2 seconds, the motor is completely cut.

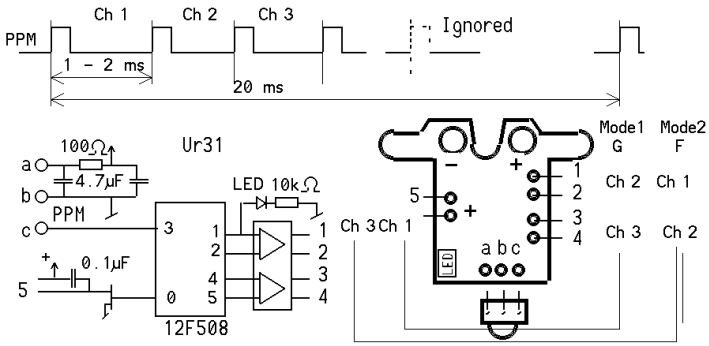
Versions

Several software options have been implemented to take care of typical user's needs.

Ur31

0.24g controller only
3 channels, two bidirectionnals, one unidirectionnal

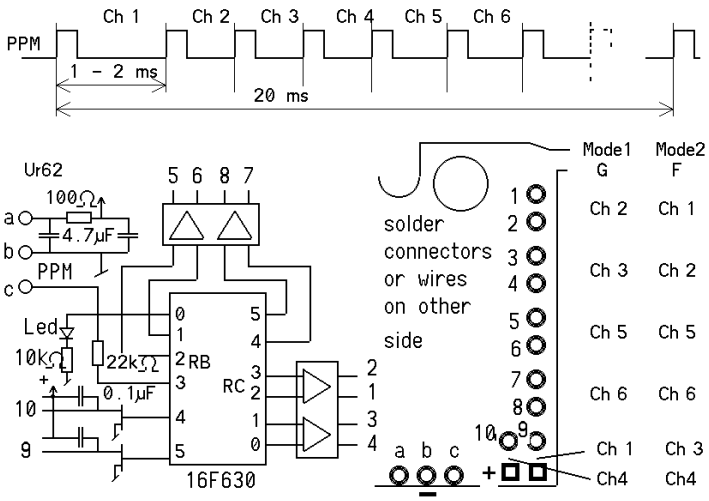
http://www.didel.com/Ir/Ur31.pdf



Ur62

0.36g controller only
6 channels, four bidirectionnals, two unidirectionnals

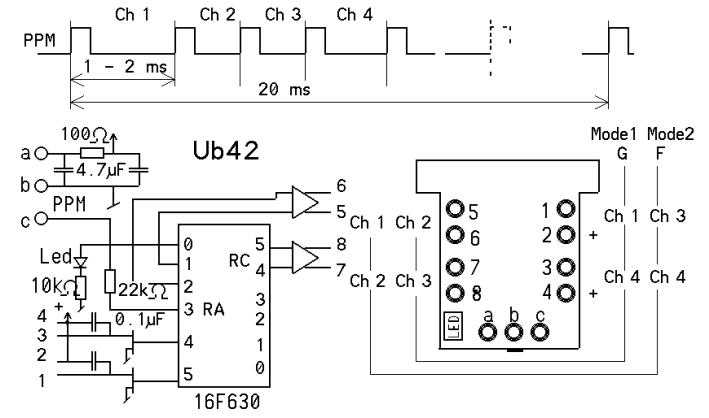
http://www.didel.com/Ir/Ur62.pdf



Ub42

0.65g controller only
4 channels, two bidirectionnals, two unidirectionnals

http://www.didel.com/Ir/Ub42.pdf



Other versions may be developed for customers if precise specifications and original ideas.
The **Iz2** works with the PicooZ transmitter and is not PPM compatible, see http://www.didel.com/Ir/IrPub.pdf

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