RxMux

Functional Specification

Revision 1.3

Reactive
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Revision History

Revision	Date	Description
1.0	November 6, 2005	Preliminary Release
1.1	November 7, 2005	Added Application Examples, Updated descriptions
1.2	November 8, 2005	Added Copyright
1.3	January 14,2007	Updated Select Pulse Width for 14ms Frame Rate

NOTICE!

The RxMux is an electronic subassembly that requires integration with other devices to function. A thorough understanding of electronic circuits, systems, and interfaces is necessary for proper integration.

This is an experimental device for use in experimental systems. As such, Reactive Technologies is not responsible for any loss or damage as a result of the operation of this product.

Devices attached to the RxMux must meet the specifications listed! Failure to meet specifications may result in sporadic operation or complete failure. Damage to the RxMux or attached devices may occur.

When the RxMux is used in a radio control system, a complete system check must be performed to verify radio range and test for RF compatibility.

The RxMux contains static sensitive components and must be handled at an ESD safe workstation.

Reactive Technologies will repair or replace a defective RxMux within thirty days of purchase. If you have purchased an RxMux and do not agree to the terms of this notice, you may return the unused RxMux in original working order for a refund.

For more information, contact:

Support@ReactiveTechnologies.com

Features

- Drives R/C servos from one of two groups of R/C servo inputs
- Selection between inputs is controlled using a standard R/C servo signal
- Logic level and servo signal selection indicator outputs
- Designed for battery operation from 4 or 5 NiCD/NiMH cells (3.6V to 7.5V)
- Connector pinouts compatible with R/C servo headers
- Power may be provided via a separate power connector
- All power and ground inputs are bussed together respectively

General Description

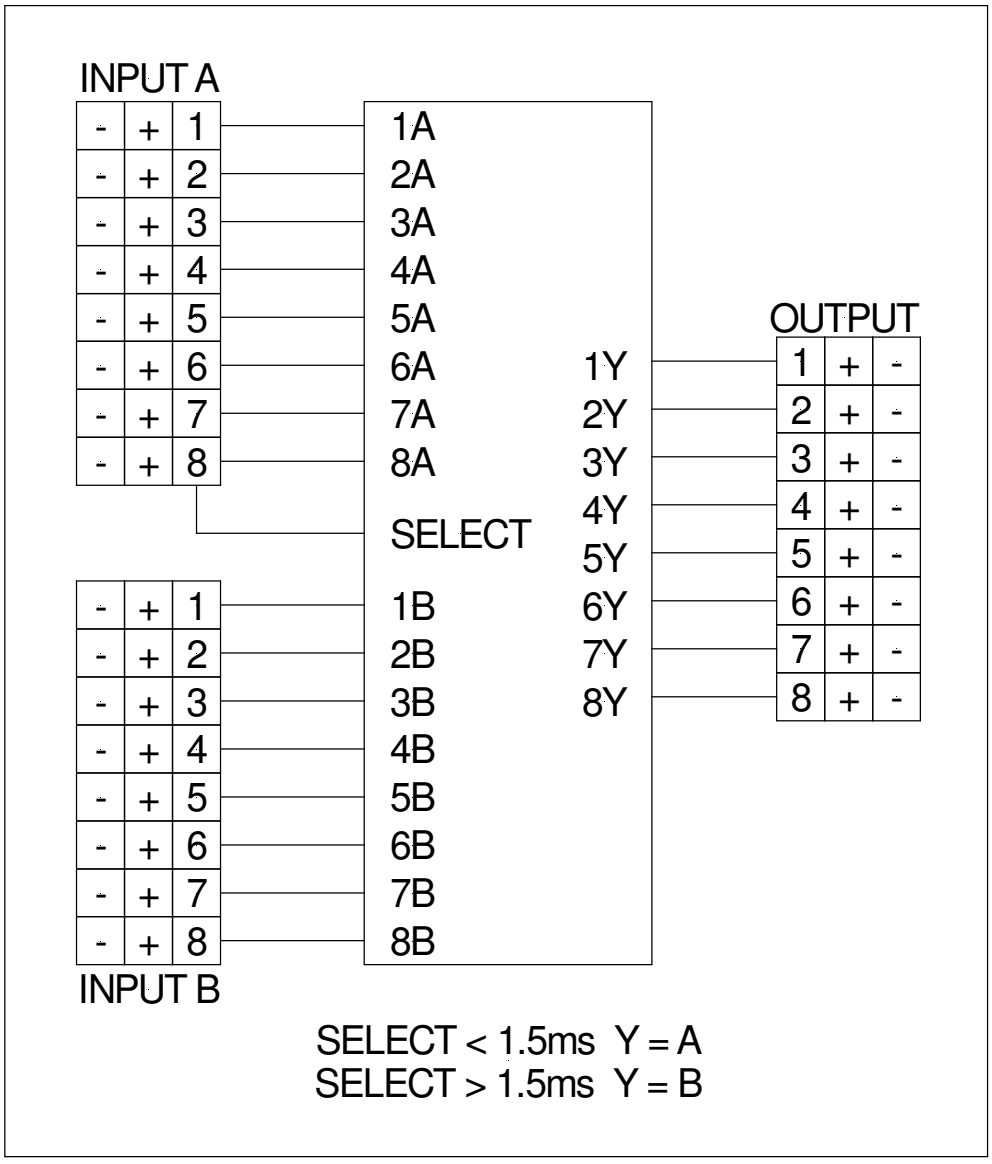
The RxMux allows control of a set of R/C servos from two different signal sources. Signal sources such as R/C receivers, autopilots, microcontrollers, etc. are connected to Input A and Input B. Standard R/C servos are connected to the Output. Switching between the two sources is accomplished by sending the appropriate width servo signal on the Select input channel (Input A, Channel 8). When a servo signal less than 1.5ms wide is detected, signals connected to Input A are sent to the Output. A servo signal wider than 1.5ms will send connected signals at Input B to the Output. When no servo signal is detected at the Select input, the RxMux will default to connecting Input A to the Output.

Two status signals are available at the status connector. A logic level signal is low when Input A is selected, and high when Input B is selected. While a valid servo signal is present on the Select input, a PPM servo status signal is available. The PPM servo status signal outputs a 2ms wide servo signal when Input A is selected and a 1ms wide servo signal when Input B is selected.

Power to the RxMux may be provided on any of the available power and ground input pins. The RxMux may be used to distribute power to other devices as long as proper operating conditions are met.

The RxMux is best used as a component in a well planned system. By itself, the RxMux does not perform any failsafe, redundancy, or protection services. Although the RxMux will default to Input A in the absence of any Select input signal, this is not a reliable failure mode. Most R/C receivers will output some signal even when they are not receiving a valid transmission (this is one cause of servo glitches). The use of PCM receivers with appropriate failsafe programming is recommended. In most applications, an external device must provide the intelligence to determine which input should be selected and send that choice to the RxMux. Please see the application example for more information.

Functional Block Diagram



Absolute Maximum Ratings

Operation beyond these limits may damage the device. Proper device operation is not guaranteed between Recommended Operating Conditions and Absolute Maximum Ratings.

Supply Voltage (V_{CC})	-0.5V to 7.5V
Supply Current Input (I_{CC})	4A (See Note 1)
Supply Current Output (I_{SERVO})	2A (See Note 1)
Supply Quiescent Current (I_Q)	10mA (See Note 2)
Input A and Input B Signal Voltage (V_{IN})	-0.5V to 7.0V
Output and Status Port Current (I_{OUT})	±5mA
Operating Temperature	-25°C to 100°C
Storage Temperature	-50°C to 125°C

Note 1: All power and ground connections available at the connectors of the RxMux are wired together respectively. The RxMux may be used to distribute power from any connected power pin through to any other power pin. Each power pin on the Input and Output ports may carry up to 2A when used with the appropriate mating connector and wire. The power input connector may carry up to 4A with the appropriate mating connector and wire.

Note 2: This is the maximum current requirement of the RxMux when no input signals are applied.

Recommended Operating Conditions

Proper device operation is guaranteed when operating within the limits below.

Supply Voltage (V_{CC})	3.6V to 7.5V
Input High Voltage (V_{INH})	2.0V (min)
Input Low Voltage (V_{INL})	0.8V (max)
Output and Status Port High (V_{OUTH})	2.0V (min)
Output and Status Port Low (V_{OUTL})	0.5V (max)
Select Pulse Width Low (Input A selected)	1ms high, 13 to 19ms low (repetitive)
Select Pulse Width High (Input B selected)	2ms high, 12 to 18 ms low (repetitive)
Ambient Operating Temperature	0°C to 50°C

Pin Descriptions

Due to the varying needs of our customers, the RxMux is shipped without connectors installed. Connector suggestions are listed below.

Power Connector			
Pin	**Signal Name**	**Type**	**Description**
J1-1	VCC	Power	VCC is supply voltage and must be between 3.6V and 7.5V. All VCC pins are connected together.
J1-2	GND	Ground	GND is the ground reference. All GND pins are connected together.

Status Connector			
Pin	**Signal Name**	**Type**	**Description**
J2-1	STATUS	Digital Output	STATUS is a logic level output indicating which input port is currently selected to drive the output. When STATUS is low, Input A is driving the output. When STATUS is high, Input B is driving the output.
J2-2	STATUS_PPM	PPM Servo Output	STATUS_PPM is a servo signal output indicating which input port is currently selected to drive the output. When Input A is driving the output, SELECT_PPM will be a 2ms servo signal. When Input B is driving the output, SELECT_PPM will be a 1ms servo signal.
J2-3	Reserved		Do not connect.
J2-4	GND	Ground	GND is the ground reference. All GND pins are connected together.

Input and Output Connectors			
Pin	**Signal Name**	**Type**	**Description**
S	SIGNAL	Servo Signal	SIGNAL is the servo signal input or output.
+	VCC	Power	VCC is supply voltage and must be between 3.6V and 7.5V. All VCC pins are connected together.
-	GND	Ground	GND is the ground reference. All GND pins are connected together.

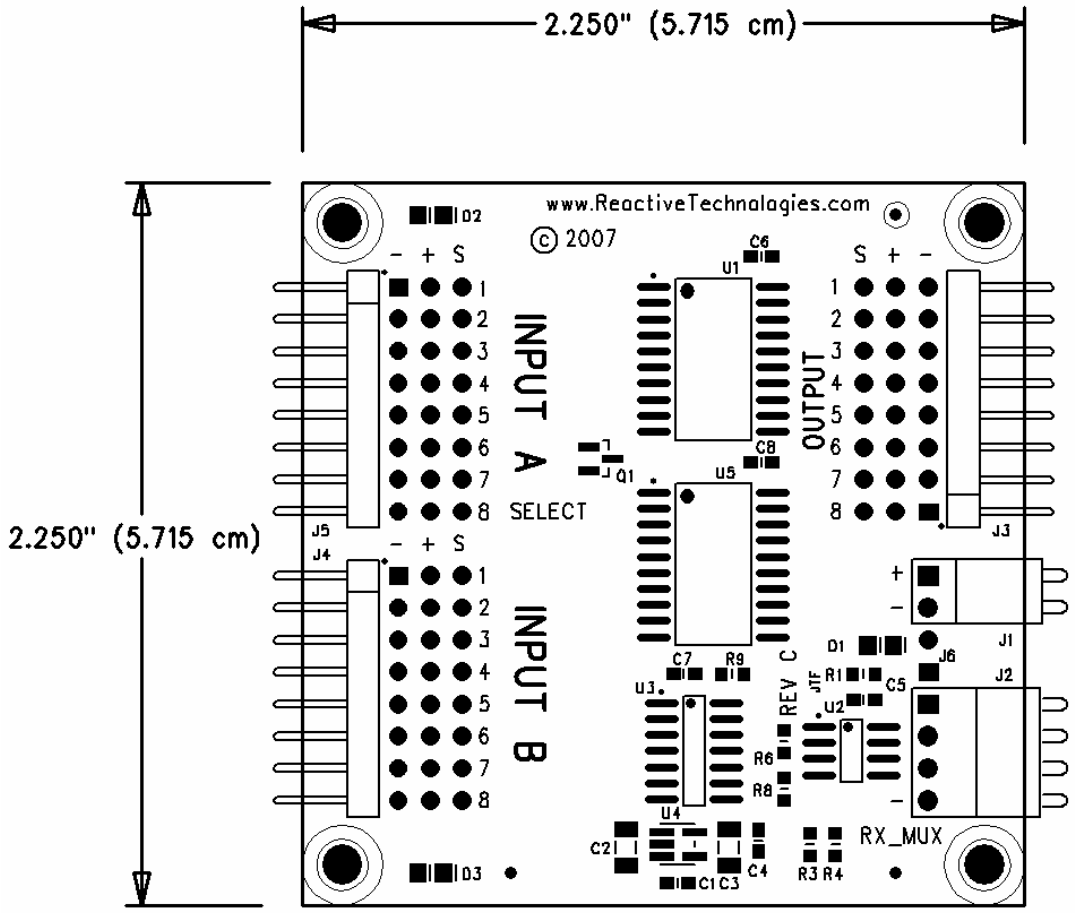
Connector Recommendations

Reference	Connector
J1	AMP 640457-2
J2	AMP 640457-4
J3	Samtec TSW-108-25-G-T-RA
J4, J5	Female servo pigtails soldered in place, or Samtec TSW-108-25-G-T-RA

LEDs

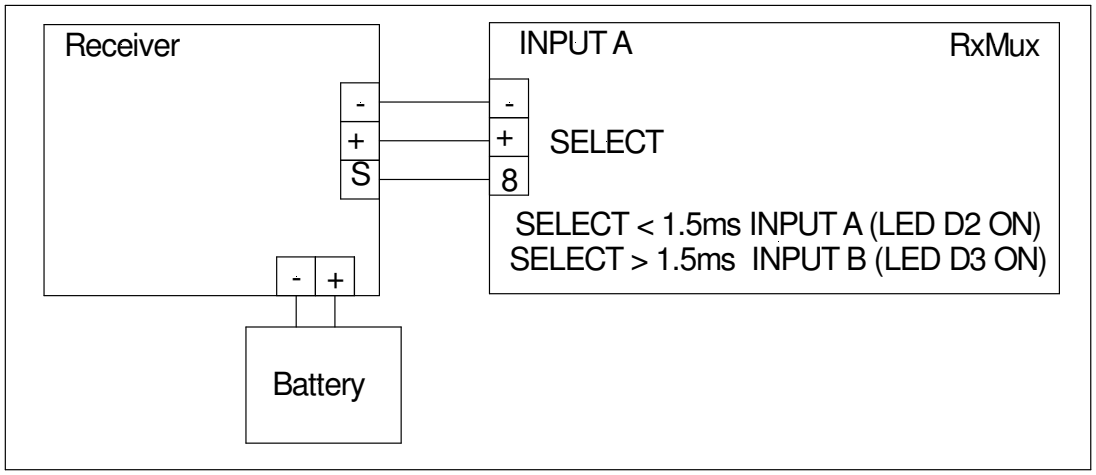
Reference	Function
D1	NO SIGNAL (red) - Indicates that a valid servo signal is NOT PRESENT on the SELECT input (Input A, Channel 8)
D2	INPUT A (green) – When on, indicates that Input A is selected.
D3	INPUT B (green) – When on, indicates that Input B is selected.

Physical Dimensions



Quick Start

The simplest way to verify operation of the RxMux is to connect an R/C receiver's output to the RxMux SELECT input (Input A, Channel 8) as shown below.

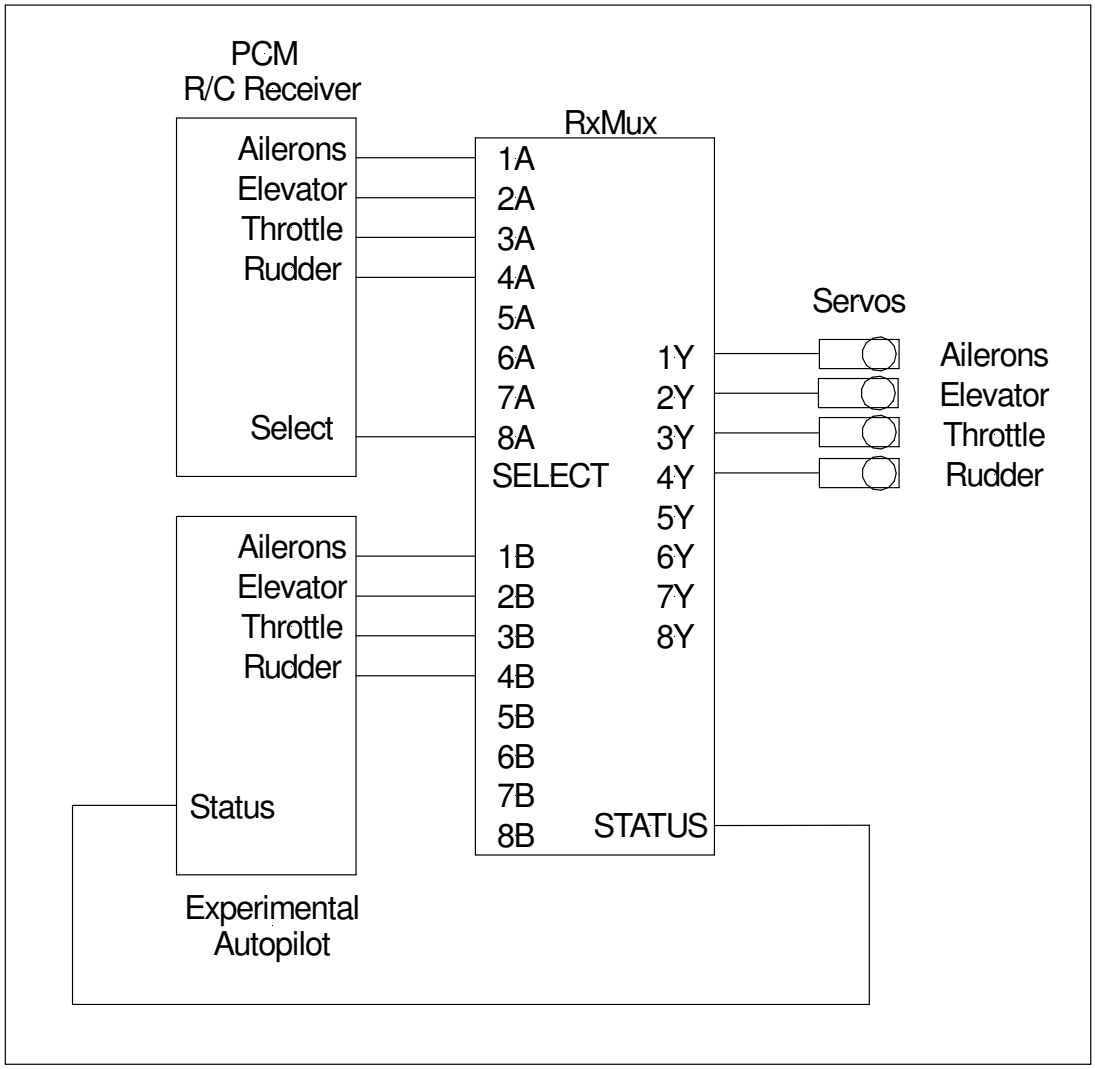


In this set-up, power to the RxMux will be provided via the Receiver. Configure your transmitter to send a servo signal less than 1.5ms wide. LED D1 should be off indicating a valid select signal is being received. LED D2 will turn on indicating Input A is selected. Next, configure you transmitter to send a servo signal greater than 1.5ms wide. LED D3 will turn on indicating Input B is selected.

If you apply power to the RxMux with no servo signal at the Select input, LED D1 will turn on.

Application Examples

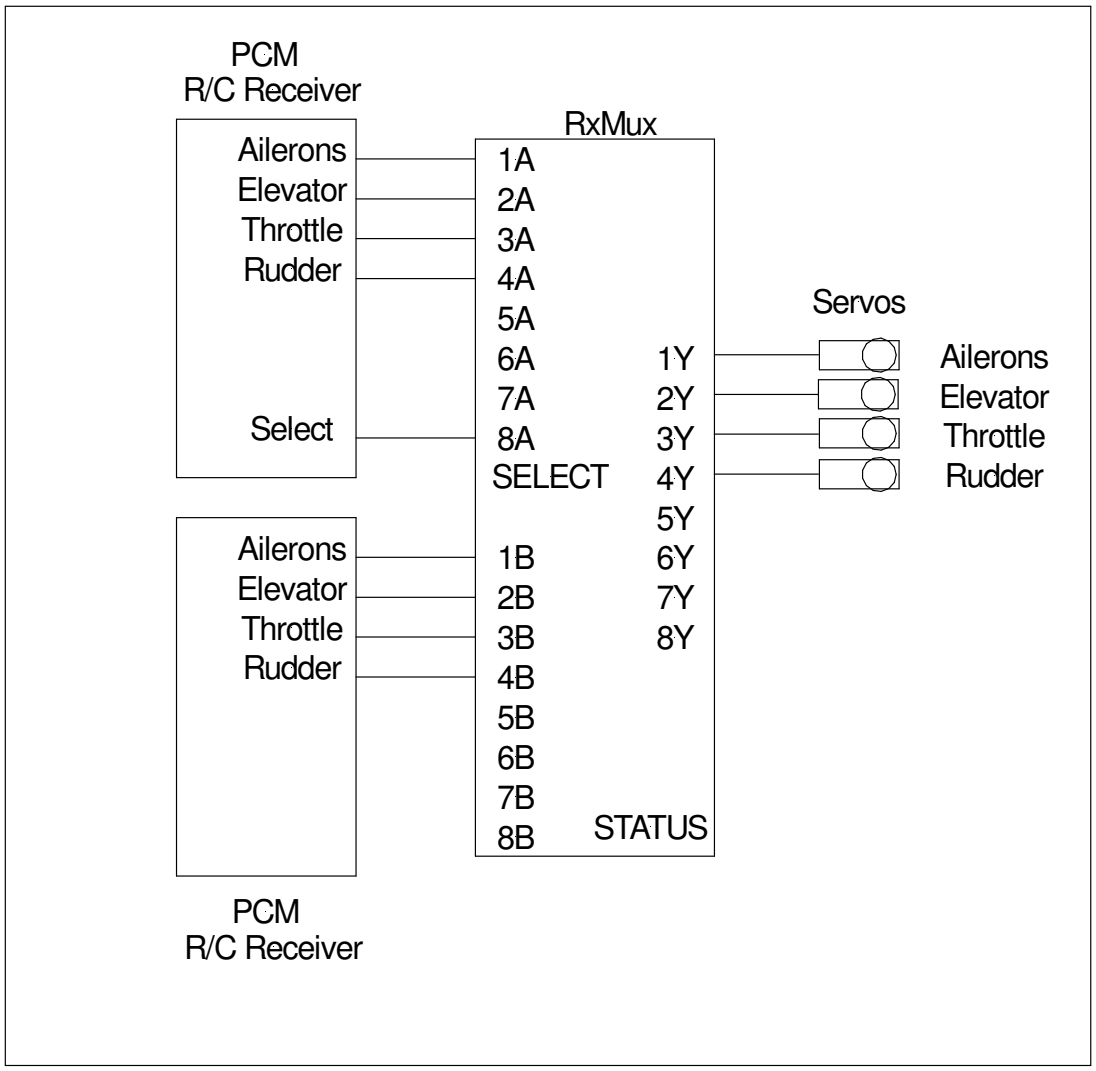
Autopilot Switch



This is an example of the RxMux used to switch between a PCM R/C Receiver and an Experimental Autopilot. The operator of the R/C transmitter may select between manual control and autopilot control by sending the appropriate signal on the Select channel. Either the logic level or PPM servo status signal may be fed back to the autopilot to indicate which device has control of the aircraft.

With this configuration, the PCM radio's failsafe programming may be used to select the receiver or the autopilot in the event of a lost radio signal. If the receiver is selected, the PCM radio failsafe settings will output to the servos (some UAV contests require that the aircraft "ditch" when control is lost).

Multiple Receivers



In this application, one of two receivers will control an airplane. When two different frequencies are used with two transmitters, this could be used as a wireless training system. With the appropriate failsafe programming on the Select channel, two receivers on the same frequency could be used to provide a level of redundancy.