Timpdon Electronics

UltraRad Radio System
Controller Model *URC4*

The ***UltraRad*** Controller Model ***URC4*** is a radio controlled servo controller for live steam vehicles fitted with a single servo for **regulator** and **reverser**, designed to operate as part of the ***Timpdon Electronics UltraRad*** radio control system.

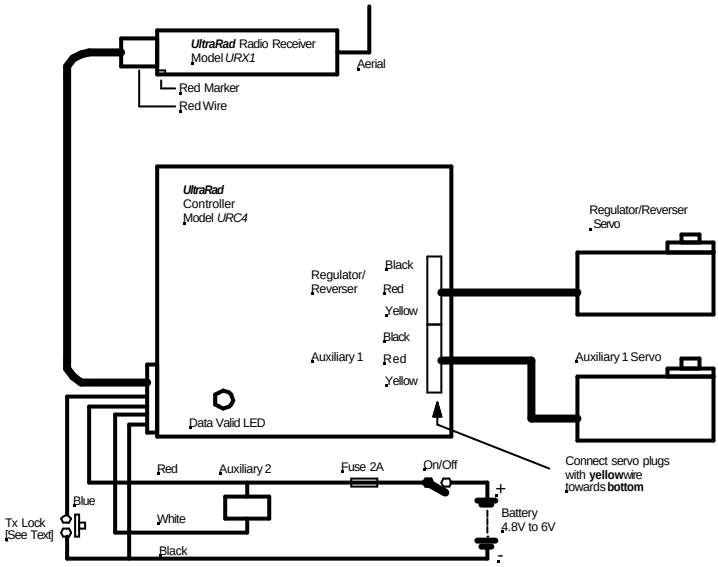
For operation, the ***URC4*** requires the following additional ***UltraRad*** radio system components, supplied separately:

- ***UltraRad*** **Radio Transmitter Model UTX1, *UTX2 or UTX3***
- ***UltraRad*** **Radio Receiver Model *URX1***

Features

- Connects directly to any ***UltraRad*** radio receiver.
- Can be locked to any ***UltraRad*** transmitter.
- Digital microprocessor controlled.
- Two standard servo outputs for control of **regulator**/**reverser** and **steam horn**.
- Additional 1A solid state switch output for control of lights.
- User calibration of all servo settings to match vehicle installation.
- Small size – 35mm x 35mm x 14mm.
- 4.8 to 6 V battery supply.
- Plug connectors for direct connection to servos. Flying lead with plug for connection to radio receiver. Flying leads for battery and Auxiliary 2 output connections.
- Fail safe feature to stop vehicle if radio control is lost.

Installation and Wiring



Notes

1 The ***URC4*** is designed for operation on 4.8 to 6 V battery supplies **only**.

2 Make sure you connect the servos to the ***URC4*** with the polarity shown.

3 Connect the **red** wire to the **battery positive** and the **black** terminal to the **battery negative**. If used, connect the **positive** polarity of the **Auxiliary 2** load to the **red** wire and the **negative** to the **white** wire.

4 **Take care with the battery polarity**. Reverse polarity may damage the ***URC4***, the ***URX1*** or the servos.

5 See below for connection options for the transmitter lock push button switch [**Blue** wire].

6 Fit a power **on/off** switch in the **battery positive** supply lead. Remember the ***URC4***, the ***URX1*** and the servos all use power even when the vehicle speed is set to zero. Current consumption of the ***URC4*** and ***URX1*** ia approximately 15 mA. You are recommended to fit a 2A fuse in the battery lead for battery protection.

Transmitter Lock

The ***URC4*** will respond only to a single ***UltraRad*** radio transmitter, to which it has been locked.

There are two methods of locking the ***URC4*** to a transmitter, **local** and **remote**, and the transmitter to which the ***URC4*** is locked can be changed at any time.

See also **Technical Note 8 – *UltraRad* Transmitter Lock Procedures.**

Local Lock

1. Connect an external normally open **Tx Lock** push button switch between the blue and black wires, as shown in the connection diagram above.
2. Ensure that only the ***UltraRad*** transmitter to which the ***URC4*** is to be locked is powered up in the vicinity.
3. Apply power to the ***URC4*** and ***URX1***.
4. Press and hold the **Tx Lock** push button.

Remote Lock

This method can only be used with *UTX2 and UTX3* transmitters.

1. Omit the **Tx Lock** push button switch shown in the connection diagram above, and connect the **blue** wire to 0V [the **black** wire], permanently.
2. Power up the ***UTX2 or UTX3*** transmitter
3. Apply power to the ***URC4*** and ***URX1***.
4. Within 20 seconds, press and hold the ***Tx Lock*** push button on the transmitter.

As soon as the ***URC4*** locks to the transmitter, the **Data Valid** indicator will start to flash in synchronism with the **Tx** indicator on the ***UltraRad*** transmitter.

Your radio control system is now fully operational, and will remain locked to the selected transmitter until you change it again. The lock setting will be remembered when you remove power from the ***URC4***.

Servo Calibration

On the ***URC4***, all servo settings can be fully user calibrated so that you may set them to match the actual servos on your vehicle. As all such settings are made within the ***URC4***, any ***UltraRad*** transmitter can then be used with the ***URC4*** without affecting the settings or performance of the vehicle. There are seven separate servo adjustments available, each of which may be programmed individually:

- **Regulator Stop Position**
  The **regulator** servo position when the **reverser** control is set to **stop**, or the **speed setting** control is set to **minimum**.
- **Regulator Maximum Forward Position**
  The **regulator** servo position when the **speed setting** control is set to **maximum**, with the **reverser** set to **forward**.
- **Regulator Maximum Reverse Position**
  The **regulator** servo position when the **speed setting** control is set to **maximum**, with the **reverser** set to **reverse**.
- **Regulator Rotation Rate – Increasing Speed**
  The maximum rotation rate of the **regulator** servo for an **increase** in **speed setting**.
- **Regulator Rotation Rate – Decreasing Speed**
  The maximum rotation rate of the **regulator** servo for a **decrease** in **speed setting**.
- **Auxiliary 1 Off position**
  The **auxiliary 1** servo position when the **Aux 1** control switch is set to **off**.
- **Auxiliary 1 On position**
  The **auxiliary 1** servo position when the **Aux 1** control switch is set to **on**.

All servo calibration is performed from a ***UTX2*** or ***UTX3*** transmitter, operating in a special calibration mode. Refer to the transmitter user manual and **Technical Note 10 – *UltraRad* Controller Model *URC4* – Servo Calibration Procedure** for details.

All servo calibration settings are stored in non-volatile memory within the ***URC4***, and are retained when power is removed.

Reverser Action

If the transmitter **Reverser switch** is moved from **Forward** or **Reverse** to **Stop** then, irrespective of the of the current **Speed** setting or the current **Regulator Rotation Rate – Decreasing Speed** calibration, the regulator will be set to its **Stop** position as quickly as possible, and will remain there until the **Reverser** switch setting is changed to **Forward** or **Reverse**.

If the transmitter **Reverser switch** is moved directly from **Forward** to **Reverse** or vice versa then, the regulator will be moved as quickly as possible to the **Stop** position, as described above. It will remain at the **Stop** position for 0.5 seconds and will then be moved to the regulator position determined by the current setting of the **Speed** control, in the opposite direction, at the rotation rate set by the current **Regulator Rotation Rate – Increasing Speed** calibration.

Data Valid Indicator

The **Data Valid** indicator will flash once each time a valid radio control data packet is received from the ***UltraRad*** transmitter.

In general, data is transmitted approximately once every second, increasing to a maximum of one transmission every 300 ms when settings values are being changed.

On first power up, this indicator will not flash, as when the ***URC4*** is shipped, it is not locked to any transmitter.

On first use, therefore, you must lock it to your transmitter, following the instructions in this manual.

Fail Safe

In normal operation, the vehicle will maintain the control settings sent in the last valid transmission received by the ***URC4***. However, if no valid data is received for a continuous period of 10 seconds, the vehicle will be halted automatically. Normal operation will be resumed when radio control is re-established.

Operation with a UTX1 Transmitter

Although the ***URC4*** is designed to be used with ***UTX2*** or ***UTX3*** transmitters, it can also be operated using a ***UTX1*** transmitter, with certain limitations:

1 The remote transmitter lock option is not available, so you will need to lock the ***URC4*** to the ***UTX1*** using a local **Tx Lock** push button switch.

2 The servo calibration functions are not available. However, once these have been set for a particular vehicle using a ***UTX2*** or ***UTX3*** transmitter, they should not need to be changed.

Other Timpdon UltraRad Radio Control Products

Transmitters

Model ***UTX1***

For battery electric vehicles
Analogue speed channel
Digital Forward/Stop/Reverse channel
Two digital auxiliary channels

Model ***UTX2***

For live steam vehicles
Analogue speed channel
Analogue Forward/Stop/Reverse channel
Two digital auxiliary channels
Servo Calibration Function

Model ***UTX3***

For battery electric or live steam vehicles
10 user selectable channels
Analogue speed channel
Analogue Forward/Stop/Reverse channel
Two digital auxiliary channels
Servo Calibration Function

ReReceivers

Model ***URX1***

Compatible with all ***UltraRad*** transmitters

Controllers

Model ***URC1***

For battery electric vehicles
Bi-directional PWM speed controller

Model ***URC2***

For battery electric vehicles
Bi-directional PWM speed controller
Two digital auxiliary channels for horn and lights

Model ***URC3***

For live steam vehicles with separate regulator and reverse servos
Three servo outputs
- Regulator
- Reverser
- Auxiliary – for steam whistle

One digital auxiliary channel – for lights

Model ***URC5***

For battery electric vehicles fitted with Third party ESC..
Bi-directional PWM speed controller
Two digital auxiliary channels for horn and directional lights
Requires ESC with BEC