User Notes

Timpdon Electronics

GigaRad Radio Points System
Point Controller
Model *GPRX7*

This advanced 2.4 GHz ***GigaRad*** Radio Receiver/Controller is designed to be used with a ***GigaRad GPTX10*** transmitter only, as part of a complete ***GigaRad*** **Radio Points System**.

It is designed for the radio control of a single point using a standard RC servo as the point motor, and has two additional switched outputs for the automatic control of interlinked colour light or semaphore signals.

The controller may be user programmed, in-situ for:

- Allocation to any one of twelve point numbers, each individually controllable from the ***GPTX10***.
- Point **set** and **reset** servo positions.

The servo rotation rate is pre-programmed to give realistic slow speed point operation.

It complies fully with all UK legislation for licence free operation.

Specification

Frequency	2.4 GHz Radio Control Model Band
RF Sensitivity	-94 dBm
Modulation	Gaussian Frequency Shift Keying
Range	Up to 100 metres with a ***GigaRad GPTX10*** transmitter, in a normal model railway or garden environment
Size	47 mm [over pins] x 35 mm x 11 mm
Power Supply	4.8 V to 6V d.c. battery supply

Introduction

The ***GPRX7*** comprises a 2.4 GHz ***Gigarad*** radio receiver and point controller within a single package.

The receiver will operate only with any ***GigaRad GPTX10*** **Point Control** transmitter and, during setup, is bound to a specific transmitter, such that it will respond only to transmissions from that transmitter. It may be re-bound by the user to another transmitter at any time.

The output from the ***GPRX7*** is a standard servo control PWM signal, with two user programmable stable positions [**Set** and **Reset**] and a controlled rotation rate between these two positions.

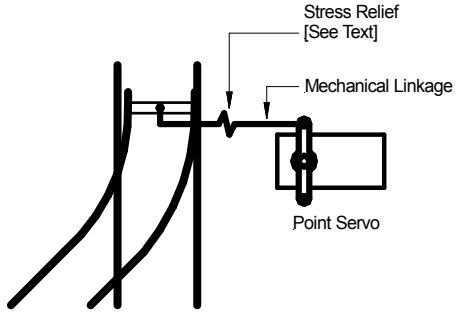
The activation of the servo output can be user programmed to respond to the activation of any one of the **twelve** available point number channels on the transmitter.

In addition, the ***GPRX7*** has two additional switched auxiliary outputs for the automatic control of interlinked colour light or semaphore signals.

Principles of Operation

The ***GPRX7*** is designed to use any standard RC servo as a point motor, with movement of the point blades controlled directly by the servo arm, rotating over a small angle between two fixed positions, **Set** and **Reset**.

Point setting is controlled by any one of the twelve transmitter channels, selected by a rotary switch, and a single pair of **Set** and **Reset** switches.



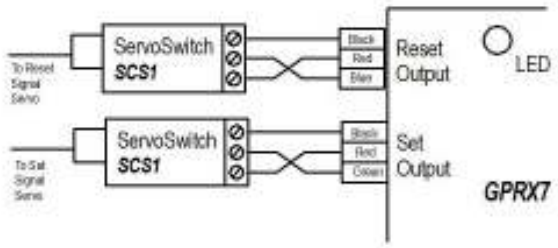
Both the **Set** and **Reset** positions of the servo are user programmable from the transmitter, operating in a special calibration mode.

User Notes

Auxiliary Outputs

Continued

Semaphore Signals



The **Red** and **black** wires supply +5V power to the ***SCS1***, and the **Blue** or **Green** wire is the trigger input.

The maximum programmable rotation angle of the servo is constrained to approximately 25°, centred around the nominal servo centre position, corresponding to a PWM pulse width of 1.5 ms. This will give a linear point blade movement of approximately 5 mm, when connected by a 12 mm servo arm, adequate for most track. If greater travel is required, a longer servo arm may be used.

The rotation rate of the servo arm during operation is automatically controlled by the ***GPRX7*** to give a realistic prototypical rotation period of approximately 1.7 seconds for the maximum 25° rotation, and pro-rata for smaller angles.

To minimise the load on the servo motor when the point is locked in either end position, you are strongly recommended to fit a stress relief **omega loop** or **Z bend** in the connecting linkage between the servo and the point mechanism. You are also recommended to remove any built-in snap action point locking mechanism.

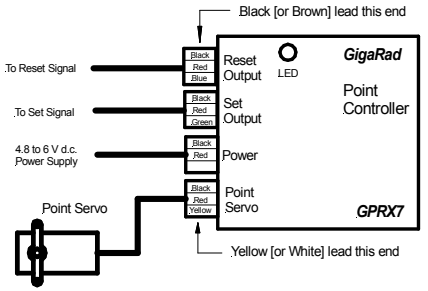
Binding and Point Number Allocation

Before use, the ***GPRX7*** must be bound to the transmitter with which it is to be used, and allocated to a specific **point number** in the range **1** to **12**. Once bound, this process need not be repeated unless you wish to use a different transmitter, or change the allocated point number.

All **binding** and **point number allocation** procedures are undertaken from the transmitter, and no access to the receiver is required. Refer to the user manual of your ***GigaRad GPRX10*** transmitter for binding and point number allocation instructions.

This manual is available for download from the Timpdon Electronics website.

Wiring and Connections



See below for details of connections to auxiliary signal outputs.

Notes on Wiring and Connections

1 Connect the servo via its 3 wire plug directly to the ***GPRX7*** **Point Servo** connector. Ensure that you observe the correct polarity.

2 Connect a d.c. supply to the ***GPRX7*** **Power** connector. Ensure that you observe the correct polarity. The supply voltage must be between 4.8 V and 6 V nominal, to match the operating voltage limits of standard servos.

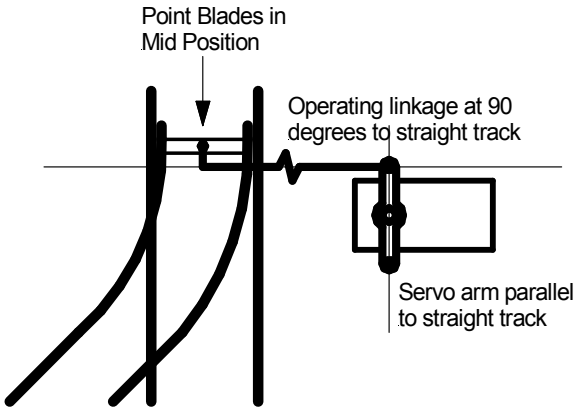
The point system will only draw significant current while the servo is in motion, so 4 x **AA** primary or rechargeable batteries are perfectly adequate, and should give reasonable battery life.

You are recommended to switch off or disconnect the battery supply when your layout is not in use, to avoid draining the batteries unnecessarily.

3 Before use, the ***GPRX7*** must be **bound** to your transmitter, as described above, allocated to a specific **point number** and programmed for **servo rotation angles**. The calibration procedure is described below.

Servo Mounting and Calibration

For optimum performance and ease of calibration you are strongly recommended to follow the guidelines given here for servo mounting and set up.



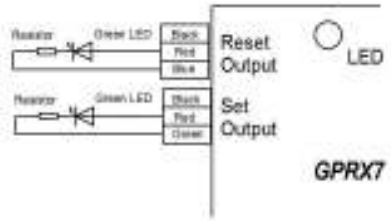
Auxiliary Outputs

Each auxiliary output is an active low voltage source, switching between +5V [**High**] and 0V [**Low**], with a maximum current rating of 20 mA per output.

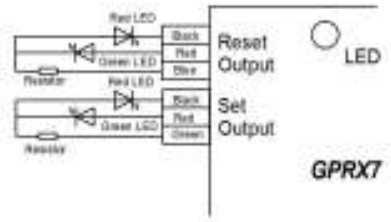
Each auxiliary output can therefore drive **LED**s directly for colour light signalling or, when used to trigger an external *Timpdon Electronics* ***ServoSwitch***, Model ***SCS1***, will operate a servo controlled semaphore signal arm.

Auxiliary Output Wiring Diagrams

Colour Light Signals



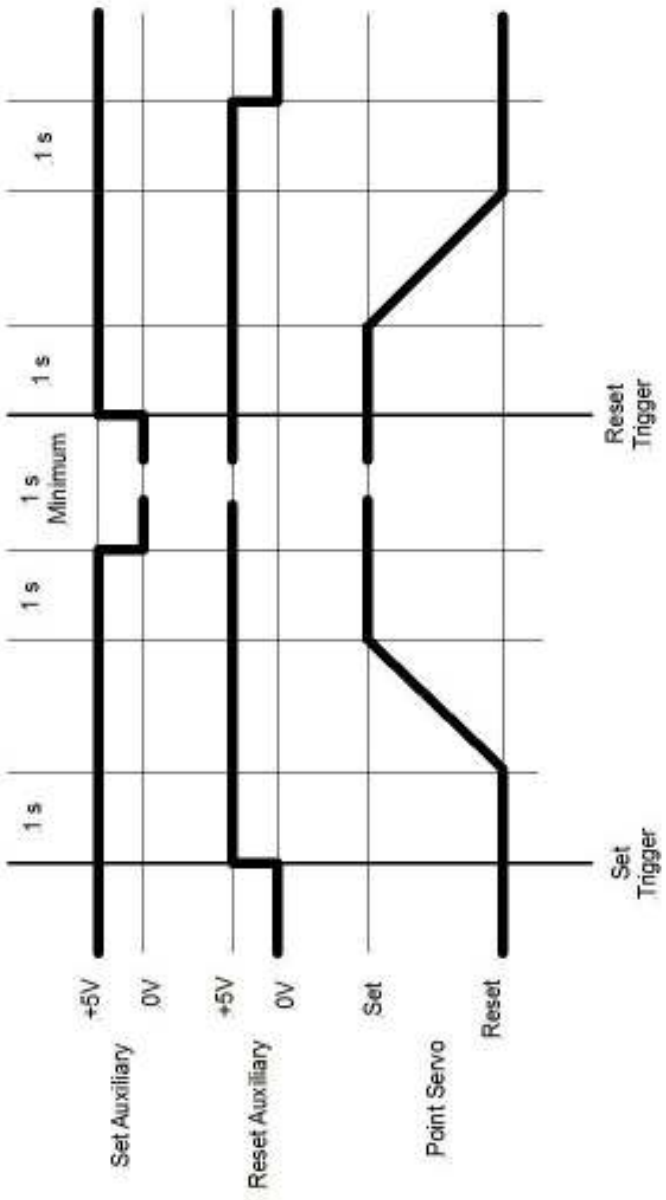
Green Clear signal only on each Auxiliary Output



Green Clear signal and Red Danger signal on Each Auxiliary Output

Each **LED** requires a current limiting resistor in series. A value of 470 ohm will give a **LED** current of about 5 mA, for both **Red** and **Green LED**s, adequate for most applications.

Operation Timing Diagram



1 Mount the servo so that the point operating linkage will be approximately at **90° to the straight track** when in use. At this stage, **do not connect** the operating linkage to the servo.

2 Connect the servo to the ***GPRX7***. Power up and bind the ***GPRX7*** to the transmitter.

The factory default settings for the ***GPRX7***, as shipped, are:

- **Reset** Servo PWM = **1.50 ms** [central]
- **Set** Servo PWM = **1.55 ms** [rotation angle = approx. 10°]

3 Set the ***GPTX10*** transmitter for **normal operation**. Select the **appropriate point number**, and press and release the transmitter **Reset** switch.

The servo will take up the factory default position, corresponding to a servo PWM pulse width of **1.50 ms** — i.e. central.

Fit the servo arm to the servo so that it is **parallel to the straight track**.

4 Now press and release the transmitter **Set** switch, and check that the servo arm rotates approximately 10°. Do not worry if the servo rotation direction is opposite to that required. This will be corrected during calibration.

5 Return the servo to its **Reset** position using the transmitter **Reset** switch. Fit the operating linkage between the point and the servo, and adjust its length so that the point blades are roughly midway between the **set** and **reset** position, with the servo arm positioned as described in Step 3.

6 This completes the mechanical set up procedure. You may now proceed to calibrate the ***GPRX7*** for final **Set** and **Reset** positions for the point. All servo calibration is performed from the transmitter. Refer to the ***GPTX10*** user manual for detailed instructions.

7 You may wish to experiment with calibration before fitting the point operating linkage described in Step **5**, in order to familiarise yourself with the procedure, without risking damaging the servo by accidental mis-setting.

Indicator LED

At all times, the ***GPRX7*** indicator **LED** shows the current operational status of the unit.

LED Indication	**Interpretation**
LED Off	No power to ***GPRX7***.
Fast Flash [5 per second]	No valid radio pulses detected at power up. Transmitter not on, or not bound.
Very Fast Flash [15 per second]	Bind procedure successful. Normal operation. The LED flashes once each time a valid data packet is received from the transmitter, normally once every 65 ms.
Slow Flash [1 per second]	Loss of valid radio pulses following normal operation.

On Power Up

On power up of the ***GPRX7***, the point will remain at its current position until the first valid data packet has been received from the transmitter. It will then assume the position specified by the transmitter. As the transmitter automatically remembers the last valid transmitted setting before power off, this will normally result in the point remaining at its initial power up setting.

On loss of Radio Communication

If radio communication is lost, for any reason, during normal operation, the point will remain in its last valid controlled state, until radio communication is restored or until power is removed from the ***GPRX7*** and re-applied.

Auxiliary Output Operation

Once calibrated, the ***GPRX7*** will change the state of the controlled point in accordance with the transmitted **Set** and **Reset** instructions for that point.

In addition, however, it will change the state of the **Set** and **Reset auxiliary outputs** to correspond to the **point** setting, to permit automatic operation of **signals** associated with the point.

Both of these outputs are **active low** - that is to say they generate a voltage of +5V [**High**] when inactive, and a voltage of 0V [**Low**] when active. This permits each auxiliary output to drive either a **LED**, for a **colour light signal**, or an external *Timpdon Electronics* ***ServoSwitch***, model ***SCS1***, to control a further servo for a **semaphore signal**. Wiring diagrams for each type of signal are given below.

To permit realistic automatic control of both signals and points, the order of operation, for both **Point Set** and **Point Reset** is:

Point Set

- The **Reset auxiliary output** is immediately switched to **High = Danger**.
- After a **1 second delay**, the **point** starts to move to the **Set** position.
- Once the **point** has reached the **Set** position, the **Set auxiliary output** is switched to **Low = Clear**, after a further **1 second delay**.

Point Reset

- The **Set auxiliary output** is immediately switched to **High = Danger**.
- After a **1 second delay**, the **point** starts to move to the **Reset Position**.
- Once the **point** has reached the **Reset** position, the **Reset auxiliary output** is switched to **Low = Clear**, after a further **1 second delay**.

The timing diagram for both directions of operation is shown below.

Note that once a **Set** or **Reset** command has been issued by the transmitter, the complete sequence described above will be performed. If a further transmission, for the **opposite** setting, is made before completion, the initial sequence will first be completed and then, after a delay of 1 second, the opposite sequence will be initiated.