User Notes

Timpdon Electronics

GigaRad Radio System
Transmitter Model *GTX1*

This advanced 2.4 GHz ***GigaRad*** Radio Transmitter, is designed to be used with any model of ***GigaRad*** receiver/controller.

It is intended primarily for radio control of battery electric or live steam model rail vehicles.

It incorporates:

- One fully variable **Speed** control channel.
- One switched **Forward/Reverse** direction control channel.
- Four uncommitted **Auxiliary** digital switched channels for the control of, for example, lights and sound cards.

  The function of each channel is dependent upon the model of receiver/ controller fitted to your vehicle.

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

Specification

Frequency	2.4 GHz Radio Control Model Band
Radiated Power	+20 dBm [100 mW]
Modulation	Gaussian Frequency Shift Keying
Duty Cycle	2% maximum
Range	Up to 100 metres with any ***GigaRad*** receiver, in a normal model railway or garden environment.
Size	111mm x 66mm x 50mm
Weight	150g
Batteries	2 x 1.5 V AA primary cells

Introduction

The ***GTX1*** 2.4 GHz transmitter is designed for operation with either **battery electric** or **live steam** vehicles.

Each transmitter has with a unique **ID** number to which any ***GigaRad*** receiver may be bound by the user via the **Bind** procedure described below. Any transmitter can be bound to any receiver, at any time.

For battery electric vehicles, receiver/controllers are designed for bidirectional d.c. electric motor speed control using an external Electronic Speed Controller [ESC] and, in addition, can control up to four switched auxiliaries using an optional ***GigaRad*** auxiliary controller.

For live steam vehicles, receiver/controllers are designed to directly drive up to three servos, for regulator, reverser and steam whistle [via **Aux 1**] and, in addition, can control up to four switched auxiliaries using an optional ***GigaRad*** auxiliary controller.

For live steam vehicles, the ***GTX1*** incorporates provision for user calibration of vehicle servo settings to match a particular installation.

Calibration may be performed at any time and, once calibrated, settings are retained in non-volatile memory within the receiver/controller. In this way, any transmitter may be used with any number of different **live steam** vehicles without the need for re-calibration of vehicle servo settings.

User Notes

User Notes

Operation

Data is transmitted in serial digital packets, which incorporate details of all analogue and digital channel settings, the unique **ID** number of the transmitter and CRC checksum data to permit the data integrity to be verified automatically by the receiver.

A new data packet is transmitted every 25 ms, permitting extremely fast response times within the controlled model.

Each time a new data packet is transmitted, the **Tx** indicator **LED** flashes once. Note, however that you may not be able to resolve the flash rate of 40 Hz, so the **LED** may appear to be permanently **On**.

A receiver and associated controller will respond only to transmissions from one specific transmitter, to whose **ID** number they have been bound.

Multiple transmitters and bound receiver/controllers may be operated in close proximity at the same time without mutual interference.

If the **Reverser** switch is set to **Stop**, the transmitted speed level is set to **zero** or **regulator minimum**, irrespective of the **speed** control setting.

Batteries

The ***GTX1*** is designed to operate from 3V battery supplies, using two 1.5V AA primary cells mounted within the case. **Operation from re-chargeable cells is not permitted**, as these only provide a voltage of 1.2V per cell.

In normal use, battery life is in excess of 100 hours of continuous operation.

The ***GTX1*** is shipped with batteries not fitted, to avoid battery discharge if the power switch is accidentally operated during transit, and with the two halves of the case not fastened. Fixing screws are supplied loose.

To fit or change batteries, proceed as follows:

1 Remove the four case fixing screws on the rear of the case, if already fitted.

2 Carefully separate the two halves of the case.

3 Locate the battery holder at the lower end of the case front.

4 Carefully remove the old batteries, if fitted, and replace with two new 1.5 V size AA primary [non-rechargeable] cells, checking that you have installed them with the correct polarity.

5 Refit the battery holder in the case as shown in the illustration above and re-assemble the front panel to the case rear and finally fit or refit the four fixing screws.

Digital Auxiliary Channels

The **Aux 1** to **Aux 4 Auxiliary** control switches of the ***GTX1*** function only when used with a controller which is equipped with auxiliary outputs. Refer to the manual of the respective controller for details.

All of the **Auxiliary** control switches are dual function, Press the switch **left** for **momentary** operation, and **right** for **latched** operation.

Aerial and Range

To achieve the specified maximum range from the ***GTX1***, the aerial supplied must be fitted to the connector on the top of the case.

However, for short range indoor applications, up to about 5 metres, adequate performance can normally be achieved without an aerial.

Note, however, that maximum range may be affected if the receiver/ controller is shielded by being mounted within a metal vehicle body.

Notes on Servo Calibration continued

4 Once you have entered **Calibration** mode on the transmitter, there is no exit other than by removing power from the transmitter, and then powering it up again.

5 On a **battery electric** vehicle, entering **Calibration** mode on the transmitter will result in the vehicle performing an immediate emergency stop, which will persist until normal operation is resumed.

Calibration Procedure

continued

6 When the appropriate servo position has been achieved, set the **Aux 1** switch **[Save Cal] On** and then **Off**. The current servo position will be saved to non-volatile memory within the receiver controller and used thereafter during normal operation, until re-calibrated.

7 Repeat Steps **5** and **6**, as required for any other servo settings requiring calibration. You need only calibrate those servo settings which require to be changed.

8 Once all required calibrations have been completed, turn the transmitter **Off** to exit **Calibration** mode.

9 When the transmitter is next turned **On**, the vehicle will operate with all new calibrations operational.

Notes on Servo Calibration

1 Once calibrated, the servos on a **live steam** vehicle will be constrained to move only within the limits set during calibration, over the full range of the transmitter controls, as applicable.

2 You must ensure that you set each calibrated servo position so that each servo is within its normal operating range, and not forced against an end stop, for either the servo itself or the vehicle mechanism that it is controlling. Failure to observe this requirement could result in excessive servo current and heating as it attempts to achieve a position that it can not reach, and may in extreme cases result in stripping the gears within the servo.

3 You are strongly recommended to perform initial servo calibrations with their operating mechanisms disconnected to avoid the problems described in **Note 2**. Once approximate servo positions have been found, operating mechanisms can be connected and re-calibration performed to establish the exact final calibrations required.

Also, before commencing calibration, ensure that servo horns are positioned so that they are in roughly mid-travel of the servo rotation range when at the mid point of the required operating range. This will minimise the risk of hitting servo end stops during calibration and operation.

Binding

Before any ***GigaRad*** transmitter can be used with a ***Gigarad*** receiver/controller, they must be bound together, so that the receiver responds only to one particular transmitter.

Any receiver/controller may be bound to any transmitter at any time and, once bound, remains bound until binding is performed again with another transmitter.

All binding procedures are initiated from the transmitter, require no access to the vehicle and may be performed with other ***GigaRad*** transmitters operating nearby.

Binding Procedure

1 First ensure that any transmitter to which the receiver/controller is already bound is switched **off**, and that there are no other ***GigaRad*** receiver/controllers **powered up *and* unbound** within range.

2 Then ensure that the transmitter is powered off, and that the **Auxiliary** switches are set as follows:

Aux 1 = **On**
Aux 2 = **On**
Aux 3 = **Off**
Aux 4 = **Off**

3 Power up the receiver/controller. The receiver **LED** will flash slowly [about five flashes per second].

4 Now power up the transmitter and **immediately**—**within two seconds**—set the **Aux 4** switch **On**. This instructs the receiver/controller to bind to the transmitter. If successful, the receiver/controller **LED** will go fully **on**.

5 You may now set the **Aux 4** switch **Off**. Normal operation will commence immediately, and the Receiver **LED** will flash once every time a valid data packet is received from the transmitter, every 25 ms [Note: you may not be able to separate the flashes at 40 Hz - The **LED** may just appear dimmer].

6 If the Receiver **LED** does not go fully **On** during binding, and remains flashing slowly, the procedure has failed and must be repeated from the start. Once bound, the operation of any **Auxiliary** switch during normal operation will have no effect on binding.

Servo Calibration

For **live steam** vehicles, The ***GTX1*** is equipped with a servo calibration facility to permit the servo outputs from the vehicle receiver/controller to be calibrated to match the required servo positions for the particular vehicle. The calibration settings are retained in non-volatile memory within the vehicle receiver/controller.

This facility permits a live steam vehicle to be controlled from any ***GigaRad*** transmitter using the full range of each transmitter control without any adjustment.,

Servo calibration is performed from the transmitter, and requires no access to the vehicle, other than observation of the various control arms operated by the appropriate servos.

Up to seven separate servo calibrations can be performed, depending on the model of receiver/controller, each selected individually by the setting of transmitter switches **Aux2 [C1]**, **Aux 3 [C2]** and **Aux 4 [C3]**, with the transmitter operating in a special **Calibration** mode.

For each calibration, the relevant servo is set manually to the required position using the transmitter **Speed** control, and then saved by setting the **Aux 1 [Save Cal]** transmitter switch **On** and then **Off**.

Note that Servo Calibration performs no function when the ***GTX1*** is used with a receiver/controller for **battery electric** vehicles.

Receiver/Controller Model GRX2

Calibration	**Servo Set**	**Aux Switches**		
		A4 C3	**A3 C2**	**A2 C1**
Regulator Minimum	Regulator	Off	Off	**On**
Regulator Maximum	Regulator	Off	**On**	Off
Reverser Stop	Reverser	Off	**On**	**On**
Reverser Forward	Reverser	**On**	Off	Off
Reverser Reverse	Reverser	**On**	Off	**On**
Aux 1 Off	Aux 1	**On**	**On**	Off
Aux 1 On	Aux 1	**On**	**On**	**On**

Servo Calibration continued

Receiver/Controller Model GRX3

Calibration	**Servo Set**	**Aux Switches**		
		A4 C3	**A3 C2**	**A2 C1**
Regulator Max. Reverse	Regulator	Off	Off	**On**
Regulator Stop	Regulator	Off	**On**	Off
Reverser Max. Forward	Regulator	Off	**On**	**On**
Aux 1 Off	Aux 1	**On**	**On**	Off
Aux 1 On	Aux 1	**On**	**On**	**On**

Calibration Procedure

1 First ensure that the vehicle receiver/controller is bound to the transmitter and is operating normally.

2 Then turn the transmitter **Off**.

3 With the transmitter powered **Off**, set the **Auxiliary** switches as follows:

Aux 1 = Off
Aux 2 = On
Aux 3 = On
Aux 4 = On

4 Now power up the transmitter and **immediately**—**within two seconds**—set the **Aux 1** switch **On** and then **Off**. This instructs the transmitter and receiver/controller to enter **Calibration** mode. The **Calibration LED** on the transmitter will go **On**.

5 For each of the servo functions requiring calibration, set switches **Aux2 [C1]** , **Aux 3 [C2]** and **Aux 4 [C3]** to the appropriate settings, as listed in the table on **Page 6**. Use the transmitter **speed** control to set the selected servo to the required position for the selected function.