

# RWLS NMEA type serial data interface specification

Author: Kristopher Hett

Revision: 4.1

Date: 20-Jun-2022

## Revision History

Rev	Date	Who	What
1	8-Aug-2016	Kristopher	Initial document.
2	17-Aug-2016	Kristopher	Change general form of protocol to use NMEA-0183 type messages.
3	19-Sep-2016	Kristopher	Removed the "cal x" part of the axle weight message. The "cal x", types are now axle names and are reported just like the other axle names. Removed the timeout before starting data transmission.
4	18-Sep-2017	Kristopher	- Updated weight reporting scheme to be batch instead of individual axles. - Add scale serial number field to the axle weight report message.
4.1	20-Jun-2022	Kristopher	- Add documentation for the commands to query the serial number, system firmware version, BT address, BT MAC.

## Introduction

This document describes the data interface used to send weight data from a RWLS weight scale to a GPS/GLONASS tracker device.

## Physical interface

The physical interface used to send/receive data between the devices is RS-232 serial using the following configuration:

Baud:	9600
Parity:	None
Data Bits:	8
Stop Bits:	1
Flow Control:	Software
Voltage:	+/- 12 Volts

## Data packet format

The data transmitted between the system will use a packet type protocol. Each packet has the following structure:

**<SOM><Message Type>,<Payload>\*<Checksum><EOM>**

SOM:	3 char string constant = "\$RW"
Message Type:	3 char, message type string, see Message Type table
Payload:	Variable length, comma separated data, structure defined by Message Type
Checksum:	2 char hex value, bitwise XOR of all characters between \$ and *
EOM:	2 char string constant = <CR><LF>

## Message Type Enumeration

<b>Message Type</b>	<b>ID String</b>	<b>Message Use</b>
AXLE_WEIGHT	AWT	The weight of a specified axle in units of Pounds. See Axle Weight Data Payload Format section for the payload structure.
GET_SERIAL	RWSE?	Ask the scale to report the current serial number.
GET_BT_MAC_ADDR	RWBT?	Returns the BT MAC address.
GET_BT_VER	RBTV?	Returns the BT fw version as a string.
GET_FW_VER	RFWV?	Returns the system fw version as a string.

## Axle Weight Data Message

This message reports the weight of a single specified axle.

The payload data of the Axle Weight Data type message is as follows:

**<Axle Name>,<Weight>,<Scale Serial Number>**

**Axle Name:** One of the axle name strings in the Axle Name Table

**Weight:** The axle group weight in Pounds. The weight string will not contain any separators like commas or decimals.

**Scale Serial Number:** The serial number of the scale associated with the reported axle weight. The serial number is a 8 character string. The string does not have any kind of termination character. It is always reported as 8 characters, even if the leading digits are zeros. The string can contain both numbers [0-9], lower-case letters [a-z], and upper-case letters [A-Z].

For example, valid serial number strings could be as follows:

00000000

00000001

1234ABCD

A00000b1

## Axle Name Table

<b>Axle String</b>	<b>Meaning</b>
Axle <n>	The weight of the <nth> axle.
EstSteer	Estimated steer axle.
MeasSteer	Measured steer axle.
Drive	Drive Axle.
Trailer <n>	Gross weight of the <nth> trailer.
Cal <n>	The axle weight calculated with the <n'th> calibration set.

### Cal <n> axle string notes:

For lift axles, the RWLS scale can be configured to use two sets of calibration data so the axle group can be calibrated when the lift axle is down and calibrated again when the axle is up. Because the scale can not determine if the axle is currently up or down, it calculates both weights and it is up to the user to use the correct weight reading. The user can decide which calibration set they want to associate with the lift axle configuration. The following table specifies the strings used to indicate which calibration data set was used to calculate the axle weight.

When the RWLS scale is set to the "2-CAL" configuration, the NMEA interface will cycle between Cal 1 and Cal 2 weights independent of what the local display is currently displaying.

## Get Serial String Message

This message causes the scale to transmit the current serial string.

This message has no payload.

Report string format:

```
$RWSE?,<8 char serial string>*<checksum><CR><LF>
```

## Get Bluetooth MAC Address Query

This message causes the scale to return the Bluetooth MAC address.

The return string is formatted like:

```
$RWBT?,<12 digit MAC address>*<checksum><CR><LF>
```

NOTE: The MAC address string does not contain colons.

## Get System FW version Query

This message causes the scale to return the system fw version.

The return string is formatted like:

```
$RFWV?,<fw version string>*<checksum><CR><LF>
```

## Get Bluetooth FW version Query

This message causes the scale to return the Bluetooth module fw version.

The return string is formatted like:

```
$RBTV?,<bt module fw version string>*<checksum><CR><LF>
```

## Full Message Packet Example

The following example shows a complete message packet that contains a Weight Data type payload for Axle 1 weight of 30,000 Pounds when the axle is a fixed type axle.

```
$RWAWT,Axle 1,30000,12345678*XX<CR><LF>
```

Note: The checksum string of XX listed above would be the actual hex values of the checksum. The checksum would never actually be the string "XX" because X is not a valid hex character.

## System Interaction Description

The following list describes several system interaction behaviors and assumptions:

1. At boot up, the RWLS scale will start transmitting NMEA messages as soon as possible. There will typically be about a 5 second delay between the time power is applied and when the NMEA interface starts transmitting data.
2. The RWLS scale will then transmit all weight values to the tracker once 15 seconds.
3. The RWLS scale will not wait for an acknowledgement message to be sent from the tracker before sending the next weight value.
4. The RWLS scale will not expect any data to be transmitted from the tracker to the RWLS scale.
5. If the scale is measuring more than one axle, the scale will report each axle weight value as a batch of axle weight messages. For example if the scale is configured to measure 2 axles, then the scale will emit 2 axle weight message strings without any pause between each axle weight message, it will then wait 15 seconds before sending the next batch of axle weight messages.