

**SMART WEIGHING SOLUTIONS**



**rinstrum**

**6500  
REMOTE DISPLAY**

**Quick Start  
Manual**

**For use with Software Versions 1.5+**

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## 2 INTRODUCTION

The **6500** is a member of the latest generation of Ranger remote displays. It is capable of displaying 6 digits of numbers or text, combined with three status annunciators. Standard features of the **6500** include two independent serial ports providing a range of serial formats (RS232, RS422 and 20mA Current Loop). Facilities for automatic selection of the data source and autobauding are also standard. The principle mode of operation, Remote Display Mode comes standard, with advanced options including serial summing and Modbus support offered as additional software options. The **6500** is fully compliant with the provisions of technical schedule S1/0.

Configuration of the display is performed entirely from displayed prompts, with permanent storage for all setup parameters. Full specifications are covered later in this manual (Refer to Section 9).

### 2.1 The Manuals

The Reference Manual (this book) provides detailed coverage of the setup and operation of the Ranger **6500** Remote Display. It contains detailed information on the setup and configuration of the unit. This manual is intended for use by Scale Technicians who are installing the instrument. Information regarding the networking capabilities of the unit are also covered in this manual.

The other manuals covering the **6500** are:

- 6500 Quick Start Manual (6500-601);
- 6500 Operators Manual (6500-602);
- 6500 Mounting Options Manual (6500-603).

These manuals are available to download from [www.rinstrum.com](http://www.rinstrum.com)

### 2.2 Warning

The **6500** contains high voltages capable of causing electrocution. Disconnect the AC power supply before opening the unit. The display contains no user serviceable components.



DISCONNECT POWER  
BEFORE OPENING

For your protection all main electrical hardware must be rated to the environmental conditions of use.

The earth connection must be used to ensure the electrical safety of the unit.

Pluggable equipment must be installed near an easily accessible socket outlet. A permanently connected supply must have a easily accessible isolation device.

To avoid the possibility of electric shock or damage to display, always switch off or isolate the display from the power supply before maintenance is performed.

## 3 INSTALLATION

This section covers the mounting and electrical connections required for the 6500 Remote Display. The unit contains precision electronics and must not be subjected to shock, excessive vibration, or extremes of temperature, either before or after installation.

The serial and power inputs of the **6500** are protected against electrical interference, however excessive levels of electro-magnetic radiation may effect the operation of the instrument. The **6500** should be installed away from any sources of electrical noise, and the power and data cables run separately from other sources of electrical noise.

### 3.1 Mounting

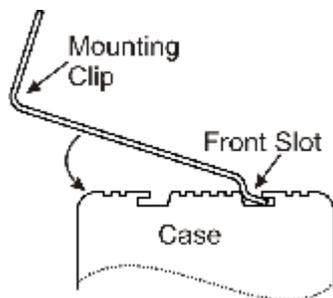
The **6500** can be mounted in a number of ways. The standard method uses four wall mounting clips, to provide a fixed attachment to a flat surface. To attach the unit to a pole, or at an angle, the optional Swivel mounting kit is required.

#### 3.1.1 The Mounting Clips

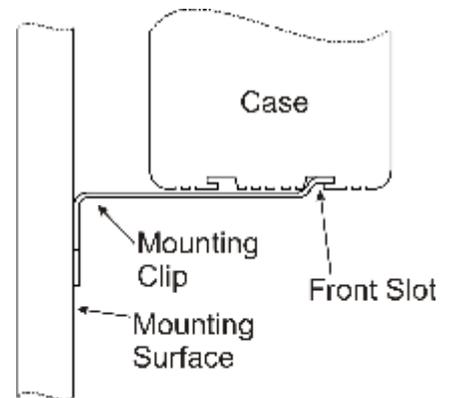


The unit is installed using four stainless steel mounting brackets, which slot into the front slots in the top and bottom of the case. The figure below shows the way in which the clip fits into the case slot. Two clips are required on both top and bottom. The hole in each clip is 7mm in diameter.

The brackets have a snug fit into their slots. This prevents them from accidentally becoming dislodged under vibration. This snug fit means that it may be difficult to remove the clips from their slots if the correct procedure is not followed.



can move more easily in the slot.



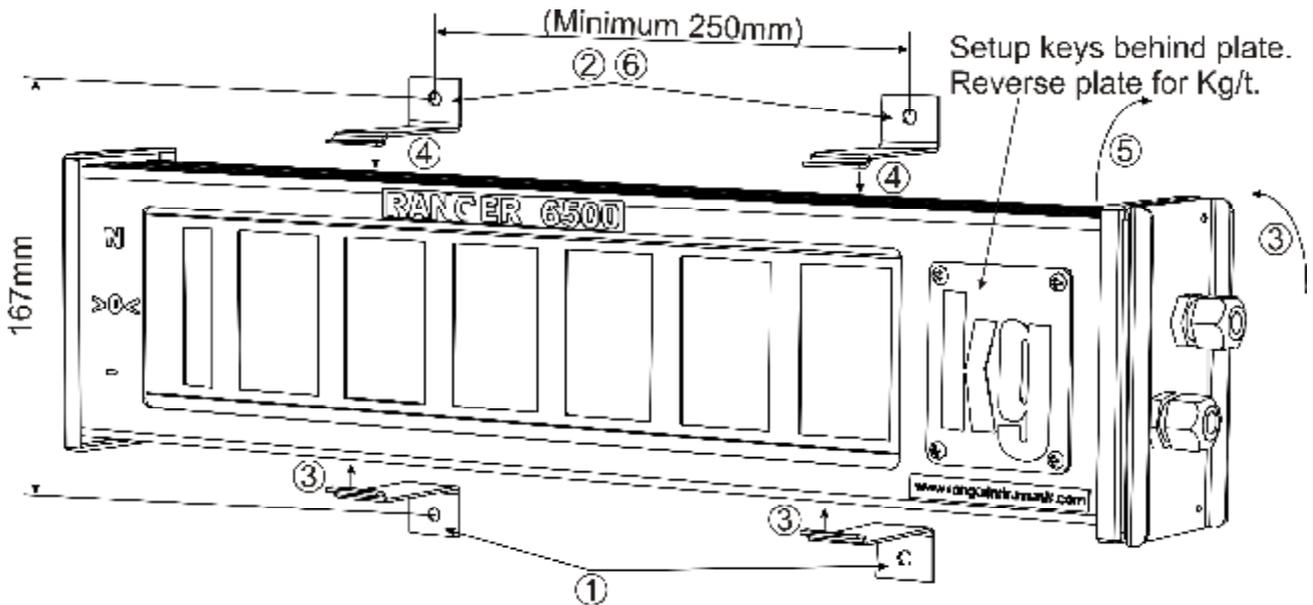
When disengaging a clip maintain tension to draw the clip towards the back of the case, as shown in the figure at left. This will ensure that a clearance is maintained and the clip

#### 3.1.2 Wall Mounting

Wall mounting the **6500** utilises the four mounting brackets shipped with the unit. Follow the instructions below to mount the unit:

1. Attach the two lower brackets to the wall using 6mm or 1/4" bolts, ensuring they are aligned horizontally and adequately spaced (minimum distance apart 250mm). Note that all four brackets must be used, two each on both top and bottom of the case to securely attach the display;
2. Drill the two holes for the top brackets, but do not attach the brackets. The vertical spacing is 167mm as shown in the figure below.
3. With the top of the unit angled outward from the wall, insert the two brackets into the front track on the bottom of the case;
4. Insert the two top brackets into the outer track, with a minimum spacing of 250mm;
5. Rotate the top of the unit toward the wall, until the top brackets touch the wall;

6. Attach the top brackets to the wall using suitable 6mm or 1/4" bolts.



### 3.2 Accessing Connections / Fitting the Decimal Point

#### 3.2.1 Tools Required

- Phillips screwdriver for endplate removal;
- Small flat blade screw driver for terminal blocks.

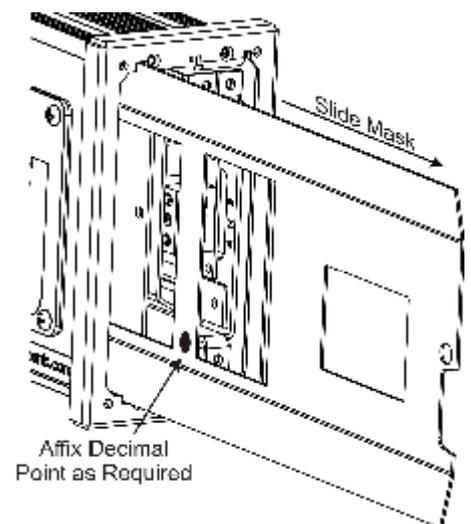
#### 3.2.2 Accessing the Connections

- Remove the four screws in the right hand end of the **6500**;
- Remove the access panel and sealing gasket.

### 3.3 Fitting the Decimal Point

The 6500 provides two options for displaying a decimal point. If not all digits are used to display the weight, then it is possible to sacrifice a digit, to display the decimal point. However, if all digits are required to display the weight reading, the decimal point may be permanently affixed to the unit, as per the instructions below.

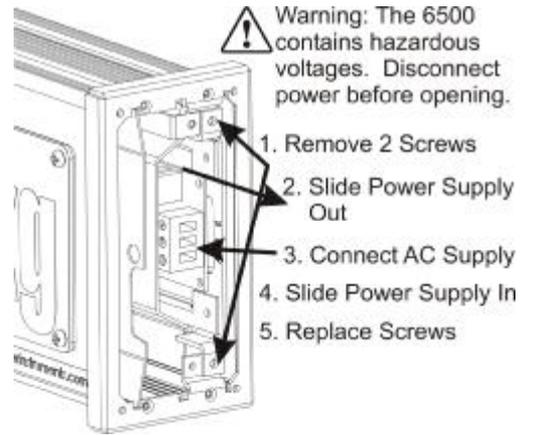
- Slide the mask out;
- Remove the paper backing from the decimal point;
- Fit the decimal point in the desired position;
- Slide the mask back into position.



### 3.4 Power Connection

The **6500** operates from an AC power source between 110VAC and 240VAC. The power connection should be performed under the requirements and regulations of your state laws.

- Run power cable through the upper right gland of the access panel;
- Remove the two power supply tray mounting screws;
- Slide the power supply tray out from the **6500** case about 20mm;
- Connect the active, neutral and earth wires to the power supply as indicated;
- Slide the power supply tray into case, and replace the mounting screws.



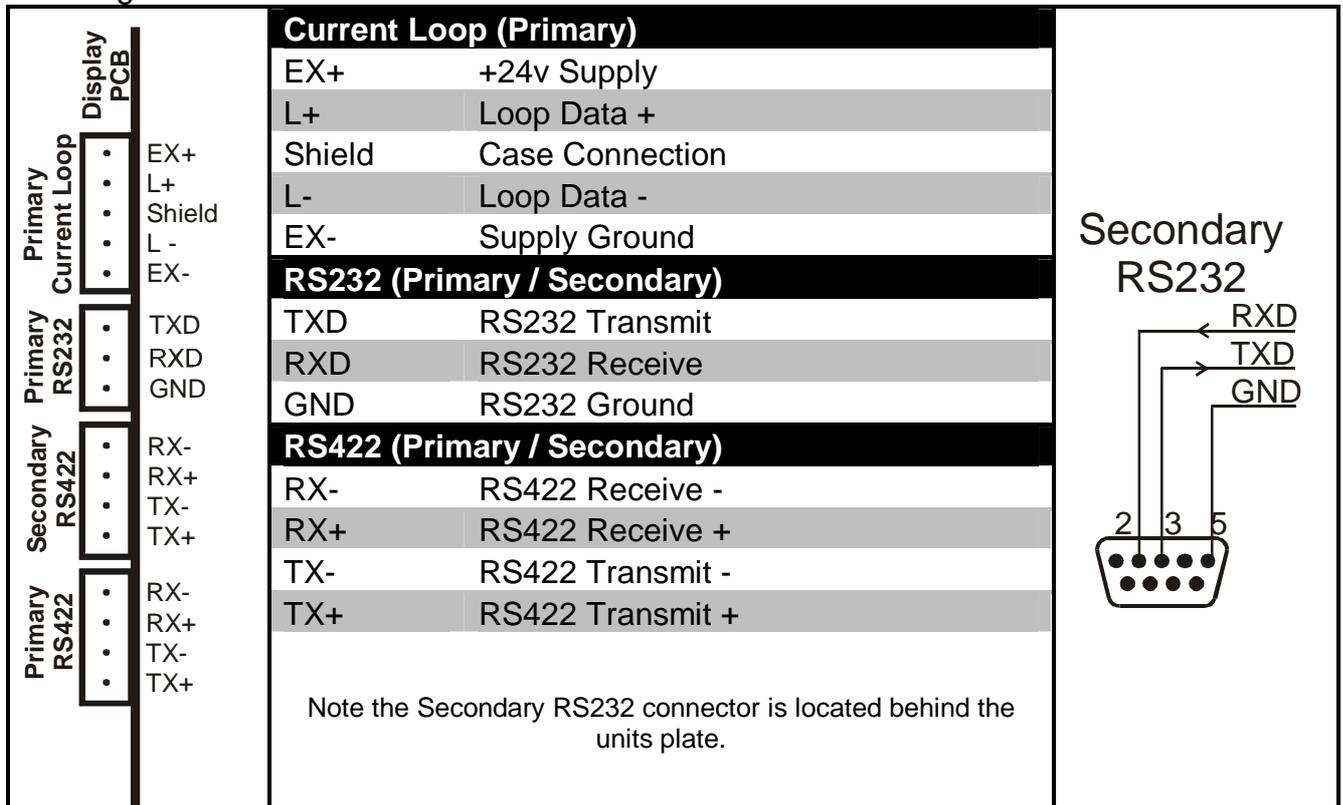
### 3.5 Serial Connections

The **6500** provides two serial channels for operating the remote display. It is intended that the primary port is used to supply the data to the display, whilst the secondary port can be used for configuration and querying the unit. The following data formats are provided by the **6500**:

| Primary Port Data Formats        |
|----------------------------------|
| RS232 (Full Duplex)              |
| RS422 (Full Duplex)              |
| 20mA Current Loop (Receive Only) |

| Secondary Port Data Formats |
|-----------------------------|
| RS232 (Full Duplex)         |
| RS422 (Full Duplex)         |

The diagram below shows the location of the serial connections for the **6500**.



The serial connection to the **6500** provides the source of data. A shielded data cable should be used to prevent electrical noise interfering with the signal on the cable, and thereby the operation of the unit. Note that RS232 is not suitable for long cable runs or electrically noisy environments.

RS422 is provided on both primary and secondary serial ports on the **6500**. RS422 allows multiple slave devices to be attached to single master. This is known as multi-dropping.

The end devices in a multi-drop RS422/485 network may need to be provided with termination resistors to balance the network loadings. Typical values are 120Ω between the positive and negative signal lines. These resistors are built into the **6500** and they can be enabled or disabled via the setup menus.

The **6500** provides a flexible 20mA current loop receiver, which supports a range of configurations. The receiver provides current limiting, and thus can be used with unregulated supplies or transmitters, without requiring series resistors. It should be noted that the current loop is receive only, and therefore can only be used in Remote or Ranger 1200 mode.

After selecting a suitable data source, follow the instructions below to install the wiring.

- Run the data cable through the lower left gland of the access panel;
- Run data cable through the gasket;
- Cut back the cable sheath around 50mm;
- Attach the necessary wires to the terminal blocks provided with the unit;
- Push the connector into the appropriate socket on the PCB.

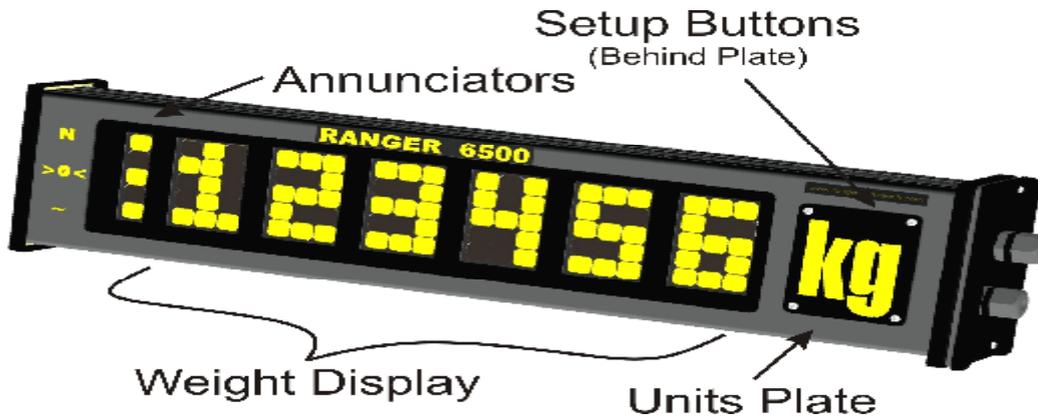
### 3.6 Reassembly of the Unit

Once all connections have been made, follow these steps to re-assemble the unit.

- Ensure the mask and power supply have been properly located;
- With the cable glands loose slide the access plate and gasket up to the end of the unit;
- Tighten the cable glands, allowing some slack for the cable inside the unit;
- Ensuring the power cable is to the top, replace the four screws.

## 4 DISPLAY AND CONTROLS

The **6500** is a six digit alpha-numeric electromechanical remote display. The diagram below shows the main elements of the front panel.



### 4.1 Weight Display

The Weight Display indicates the weight readings, setup information, errors and warnings.

### 4.2 Units Indicator Plate

The Unit Indicator Plate is attached to indicate the units of the reading. The plate is also used to cover the setup buttons during normal operation.

### 4.3 Annunciators

The left most strip on the display form the annunciator bank, which show the status of the displayed reading. The status annunciators indicate the following conditions:

| Name   | Symbol | Description   |
|--------|--------|---|
| ZERO   | → 0 ←  | Lit when the indicator is indicating zero.          |
| NET    | N      | Lit when the display reading represents NET weight. |
| MOTION | ~      | Lit when the displayed reading is not stable.       |

### 4.4 Setup Buttons

Behind the Units Indicator Plate is the setup keys. Use a phillips screwdriver to remove the four screws in the plate to access the setup keys. The **6500** has a keypad consisting of three keys, used exclusively for configuring the unit. Above each button is a LED to indicate the current menu level whilst using Digital Setup. The function of each LED is described below.

| Name  | Symbol | Description                      |
|-------|--------|----------------------------------|
| GROUP | GROUP  | Lit when in the main GROUP menu. |
| ITEM  | ITEM   | Lit when in the ITEMS menus.     |

---

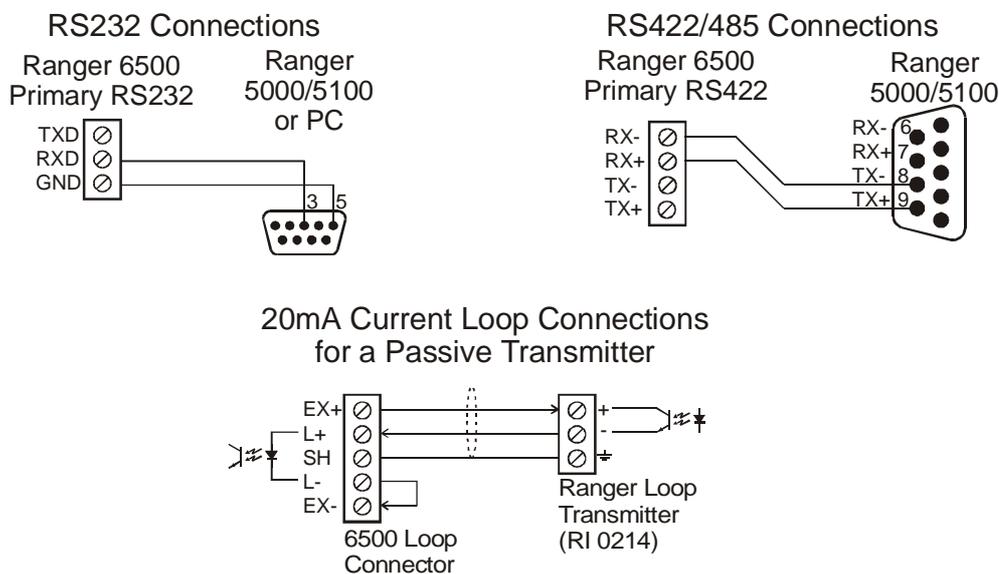
|     |   |   |
|-----|---|---|
| EDT | <br>EDIT | Lit when the editing an ITEM of a menu. |
|-----|---|---|

## 5 CONFIGURING FOR REMOTE DISPLAY MODE

The **6500** is designed to primarily operate as a remote display. Remote Display mode provides a token based data interpreter. The unit provides standard Ranger formats to simplify connection to Ranger indicators. In addition a number of common indicators are also supported. Attaching the unit to other non-supported indicators and data sources requires manual configuration of the format strings.

Five formats are provided for interpreting data streams. The first of these is always configured for Ranger Standard Format (**5000** Standard Auto Format A) and cannot be altered. The remaining four default to Ranger Standard Format C, Ranger Standard Format D, Ranger Standard Format E and Avery L130.

### 5.1 Wiring Diagram for Remote Display Mode



### 5.2 Configuring the 5000 Indicator

For remote display operation configure the weighing indicator to transmit in 'Auto Output' mode. In the case of the **5000** either serial 1 or serial 2 can be used for this task and the communications can be RS232 or RS422/RS485.

Configure the Ranger Indicator (**5000 / 5100**) for either Auto Output Format A or Auto Output Format C. Note that Format C provides Center of Zero, in addition to other status.

### 5.3 Configuring the 6500 as a Remote Display for a Ranger Indicator

Once the indicator is configured, perform the following steps:

- Enter the Operating Mode Setup menus (Hold the **ITEM** key);
- Remote mode is default, set it if not;
- Data Source (SERIAL:SRC) defaults to SCAN, set if required;
- Baud Rate (SERIAL:BAUD) defaults to AUTO, set if required;
- Serial Format (SERIAL:BITS) default to n81, set if required.

## 5.4 Configuring the 6500 as a Remote Display for a Supported Indicator

The **6500** stores a number of formats to support both Ranger and non-Ranger Indicators. The list of supported indicators is given below.

| Name   | Indicator            |
|--------|----------------------|
| RngerA | Ranger Auto Output A |
| RngerC | Ranger Auto Output C |
| RngerD | Ranger Auto Output D |
| RngerE | Ranger Auto Output E |
| AvL130 | Avery L130           |
| GDG C2 | Gedge C2             |
| GDG C3 | Gedge C3             |
| AD4328 | A&D 4328             |
| AD EP  | A&D EP               |

| Name   | Indicator            |
|--------|----------------------|
| AD4531 | A&D AD4531           |
| AD HV  | A&D HV               |
| TOLEDO | Toledo               |
| AVERY  | Avery (L105/L200)    |
| BARLO  | Barlo                |
| PHLPS  | Phillips 1577, 1627  |
| LODEC  | Lodec                |
| UMC600 | UMC600 Indicator     |
| PCMODE | 6600 PC Mode Support |

To configure the display for one of the indicators, follow the steps below:

- Enter the Operating Mode Setup menus (Hold the **ITEM** key);
- Remote mode is default, set it if not;
- Data Source (SERIAL:SRC) defaults to SCAN, set if required;
- Baud Rate (SERIAL:BAUD) defaults to AUTO, set if required;
- Serial Format (SERIAL:BITS) default to n81, set if required;
- Select the Indicator from the BRAnD menu item;
- If messages are not sent regularly, set the timeout (OPTION:TIMEO) to NO.TMO.

## 5.5 Configuring the 6500 as a Remote Display for Other Indicators

If the indicator is not covered in the list of supported indicators, it is possible to construct a custom format string to support the indicator. Prior to constructing the format string, the following steps should be taken:

- Enter the Operating Mode Setup menus (Hold the **ITEM** key);
- Remote mode is default, set it if not.
- Data Source (SERIAL:SRC) defaults to SCAN, set if required;
- Baud Rate (SERIAL:BAUD) defaults to AUTO, set if required;
- Serial Format (SERIAL:BITS) default to n81, set if required;
- If messages are not sent regularly, set the timeout (OPTION:TIMEO) to NO.TMO.

Having carried out the steps above, the following sections describe the procedure to configure the **6500** for the indicator. An example (a 5000 indicator, with auto output format C) is given throughout.

### 5.5.1 Determining the Serial Format from the Indicator

It is important to know the exact format of the data being sent from the indicator. Without this, it is impossible to construct a format string. There are a number of ways to determine this string:

- From the indicator's manual;
- Using a terminal program on a PC to capture the data stream.

#### Example:

From the 5000 reference manual, Format C is described as:

```
STX Sign Weight(7) S1 S2 S3 S4 Units(3) ETX
```

Where

- STX is the Start of Transmission Character (ASCII 2)
- Sign is '-' or space
- Weight is a 7 character field, with leading spaces
- S1 is status G/N/O/U/E meaning Gross/Net/Overload/Underload/Error
- S2 is status M/Space meaning Motion/Stable
- S3 is status Z/Space meaning Center Of Zero/Non Zero
- S4 is range status
- Units is a 3 character field
- ETX is the End of Transmission Character (ASCII 3)

Some examples of this string would be ('\_' represents a space):

- (STX) - \_ \_ \_ 1 2 3 4 G M \_ K g \_ (ETX)
- (STX) \_ \_ \_ \_ \_ \_ 0 G \_ Z K g \_ (ETX)
- (STX) \_ \_ \_ \_ 1 . 3 4 N \_ Z K g \_ (ETX)

**5.5.2 Determining the End of Transmission Character**

The **6500** requires an End of Transmission Character to locate a reference position within a data stream. Typical examples of End of Transmission Characters are CR (Carriage Return), LF (Line Feed) and ETX. However any ASCII character may be used, on the proviso that it occurs only once and at the end of the serial string.

**Example:**

The ETX character (ASCII 3) is to be used as the End of Transmission character.

**5.5.3 Identifying Elements in the Data Stream**

From the serial string it is necessary to identify the following items, which the display will recognise:

- A field to display, matching these parameters:
  - Can be either text or number;
  - Field must be less than 9 characters wide
  - Only six characters excluding leading zeros and spaces can be displayed.
- Any status flags to recognised by the display. These include:
  - Center of zero;
  - Motion / Stable;
  - Gross / Net;
  - Errors / Overload / Underload.
- Other data in the stream that is not required by the display

**Example:**

| STX | Sign            | Weight(7) | S1 | S2  | S3 | S4     | Units(3) | ETX |
|-----|-----------------|-----------|----|-----|----|--------|----------|-----|
| I   | Field (8 Chars) | S         | M  | C   | I  | Ignore | E        |     |
| g   |                 | t         | o  | O   | g  |        | T        |     |
| n   |                 | a         | t  | Z   | n  |        | X        |     |
| o   |                 | t         | i  | (Z  | r  |        |          |     |
| r   |                 | u         | o  | '') | e  |        |          |     |
| e   |                 | s         | n  |     |    |        |          |     |
|     |                 |           | (G | (M  |    |        |          |     |
|     |                 |           | /N | '') |    |        |          |     |
|     |                 |           | /O |     |    |        |          |     |
|     |                 |           | /U |     |    |        |          |     |
|     |                 |           | /E |     |    |        |          |     |

In the example, the STX character is not required, and can be ignored. The sign and seven weight characters can be grouped into a field of 8 characters. Following the field are status flags for Status, Motion, Center of Zero. The fourth status flag for range is not handled by the display, and is therefore ignored. Likewise the units are not handled by the display and must also be ignored. The ETX character ends the string, as identified in the section above.

### 5.5.4 Selecting Tokens for Each Element

Using the items identified within the serial string above, formatting and parsing tokens from the list in Section 5.5.6, can now be chosen. If a token does not match the item exactly, a token of similar nature may surface. For example, if a status field in a data stream contained E/O/U, the token for G/N/O/U/E (181) could be used. Alternatively if no suitable token can be found, that item could be ignored.

**Example:**

For each item in the data stream a token is chosen, as shown below.

| STX   | Sign            | Weight(7) | S1    | S2    | S3 | S4 | Units(3) | ETX  |
|-------|-----------------|-----------|-------|-------|----|----|----------|------|
| I     | Field (8 Chars) |           | S     | M     | C  | I  | Ignore   | E    |
| g     | (167)           | (170)     | t     | o     | O  | g  | (132)    | T    |
| n     |                 |           | a     | t     | Z  | n  |          | X    |
| o     |                 |           | t     | i     | (Z | o  |          | (03) |
| r     |                 |           | u     | o     | )  | r  |          |      |
| e     |                 |           | s     | n     | e  |    |          |      |
| (130) |                 |           | (G    | (M    |    |    |          |      |
|       |                 |           | /N    | /')   |    |    |          |      |
|       |                 |           | /O    |       |    |    |          |      |
|       |                 |           | /U    | (184) |    |    |          |      |
|       |                 |           | /E)   |       |    |    |          |      |
|       |                 |           | (181) |       |    |    |          |      |

↑  
Combine to (133)

Thus the format string becomes:

130 167 170 181 184 188 130 132 003

Note that some simplifications can be performed. The width of the string is 8 characters using token 167 which is the default and can therefore be removed. In addition we need to ignore the S4 status and three units characters, a total of four characters. Thus the two ignore tokens (130 and 132) can be combined into the ignore four characters token (133). Thus the final string becomes:

130 170 181 184 188 133 003 000

Note that the 000 has been added to the end of the string. It is required to inform the parser that no further parsing should take place.

### 5.5.5 Assembling and Entering the Format String

The format string is now finalised and can now be entered into the display. Choose one programmable format (BLOCK:BLK1 .. BLOCK:BLK4) of the Operating Mode menus, and enter the format, as per normal string entries (Section **Error! Reference source not found.**). Once entered, ensure the selected format is enabled from (BLOCK:ENABLE) of the Operating Mode menus. Exit the menu system and the display should show the weight on the indicator.

### 5.5.6 Format and Parsing Tokens

Following is a table of all of the tokens. Note the distinction between Parsing and Formatting Tokens.

- Formatting Tokens simply specify characteristics of a field that a parsing token later in string will use whilst processing the data stream. Formatting Tokens do not use any characters from the incoming data stream.
- Parsing Tokens process the data in the data stream.
- Display Tokens change formatting of fields for displaying purposes.

The Uses column specifies the number of characters a token uses from the incoming data stream.

| Ignore Character Parsing Tokens |  | Uses | Parsing |
|---------------------------------|--|------|---------|
| 130                             | Skip 1 character                       | 1    |         |
| 131                             | Skip 2 characters                      | 2    |         |
| 132                             | Skip 3 characters                      | 3    |         |
| 133                             | Skip 4 characters                      | 4    |         |
| 134                             | Skip 5 characters                      | 5    |         |
| 139                             | Ignore all characters to end of string | n    |         |

| Field Width Formatting Tokens |   | Uses | Formatting |
|-------------------------------|---|------|------------|
| 160                           | Set the field width to 1 character                      | 0    |            |
| 161                           | Set the field width to 2 characters                     | 0    |            |
| 162                           | Set the field width to 3 characters                     | 0    |            |
| 163                           | Set the field width to 4 characters                     | 0    |            |
| 164                           | Set the field width to 5 characters                     | 0    |            |
| 165                           | Set the field width to 6 characters                     | 0    |            |
| 166                           | Set the field width to 7 characters                     | 0    |            |
| 167                           | Set the field width to 8 characters                     | 0    | Default    |
| 168                           | Set the field width to 9 characters                     | 0    |            |
| 169                           | Set the field width to any number of characters (max 9) | 0    |            |

| Decimal Point Formatting Tokens |  | Uses | Formatting |
|---------------------------------|--|------|------------|
| 150                             | No decimal point expected                    | 0    |            |
| 151                             | Expect decimal point sent as full stop ('.') | 0    | Default    |
| 152                             | Expect decimal point sent as comma (',')     | 0    |            |

| Field Type Formatting Tokens |   | Uses | Formatting |
|------------------------------|---|------|------------|
| 140                          | Expect the field as weight only           | 0    |            |
| 141                          | Expect the field as either weight or text | 0    | Default    |
| 142                          | Expect the field as text only             | 0    |            |
| 143                          | Specify the field as Net weight           | 0    |            |
| 144                          | Specify the field as Gross weight         | 0    |            |

| Field Parsing Tokens |  | Uses | Parsing |
|----------------------|--|------|---------|
|----------------------|--|------|---------|

---

|     |  |                            |  |
|-----|--|----------------------------|--|
| 170 | Parse string for field to store as field 1 | See<br>Width<br>Token<br>s |  |
| 171 | Parse string for field to store as field 2 |                            |  |
| 172 | Parse string for field to store as field 3 |                            |  |
| 173 | Parse string for field to store as field 4 |                            |  |
| 174 | Parse string for field to store as field 5 |                            |  |

| Standard Status Parsing Tokens |  | Uses | Parsing     |
|--------------------------------|--|------|-------------|
| 180                            | Standard Ranger status                           | 1    | G,N,E,O,U,M |
| 181                            | Ranger status without motion                     | 1    | G,N,E,O,U   |
| 182                            | Gross, Net only                                  | 1    | G,N         |
| 183                            | Motion or stable                                 | 1    | M,S         |
| 184                            | Motion or ' ' for stable                         | 1    | M,' '       |
| 185                            | Motion, over-capacity or valid weight            | 1    | M,C,' '     |
| 186                            | Motion, invalid, over-capacity, or valid weight  | 1    | M,I,O,' '   |
| 187                            | Inscale, overload, underload                     | 1    | I,O,U       |
| 188                            | Centre of Zero                                   | 1    | Z,' '       |
| 189                            | Motion or any other character for stable         | 1    | M           |
| 190                            | Lower case Motion, over-capacity or valid weight | 1    | m, c, ' '   |
| 191                            | Lower case gross/net                             | 1    | g, n        |

| Additional Status Parsing Tokens |  | Uses | Parsing  |
|----------------------------------|--|------|--|
| 200                              | Philips Status   | 2    | Byte1, Bit3 = Overload<br>Byte2, Bits01 = DP Posn            |
| 201                              | All field error status sets Error/Over/Under for all fields. | 1    | E, O, U  |
| 202                              | Toledo Status  | 3    | Byte 1 Bit0 = Sign, Bit1 = Error<br>Byte 2 Bits012 = DP Posn |
| 204                              | Avery L130 Status 1  | 1    | Bit0 = Error   |
| 205                              | Avery L130 Status 2  | 1    | Bit0 = COZ,<br>Bit1 = Gross,<br>Bit2 = Net                   |
| 206                              | Stable, unstable, overload                                   | 2    | ST,US,OL   |

| Display Tokens |                                       |   | Display |
|----------------|---------------------------------------|---|---------|
| 154            | Show the decimal point on the display | 0 |         |
| 155            | Hide the decimal point                | 0 |         |

| Field Delimiter Formatting Tokens |  | Uses | Formatting |
|-----------------------------------|--|------|------------|
| 240                               | Field delimiter is a comma (',')       | 0    |            |
| 241                               | Field delimiter is a semicolon (';')   | 0    |            |
| 242                               | Field delimiter is a single quote ('') | 0    |            |
| 243                               | Field delimiter is a double quote ("") | 0    |            |
| 244                               | No field delimiter                     | 0    | Default    |
| 245                               | Field delimiter is ASCII 02 (STX)      | 0    |            |
| 246                               | Field delimiter is ASCII 03 (ETX)      | 0    |            |

| Address and Active Field Parsing Tokens |  |   | Parsing |
|---|--|---|---------|
| 230                                     | Expect a address field and match to unit address       | 2 |         |
| 231                                     | Expect a number to set the active field (0..4)         | 1 |         |
| 232                                     | Expect a G/T/N to set field 1/2/3 active, respectively | 1 |         |

| Additional Parsing Tokens |  |   | Parsing |
|---------------------------|--|---|---------|
| 203                       | Expect number for decimal point position | 1 | (0..6)  |

## 5.6 PC Mode

PC Mode is a format originally developed for the Ranger **6600**, to display text messages on multiple **6600s** connected together on serial bus. The PC Mode format is of the form:

```
STX DATA(8) SPC ADR(2) ETX
```

Where

- STX is the Start of Transmission Character (ASCII 2);
- DATA is an 8 character field of text and/or numbers, with leading spaces;
- SPC is the space character (ASCII 32);
- ADR is a two character field specifying the address of the unit to display the message. To set the address of a **6500**, use the SERIAL:ADDR setting of the Remote mode menus. Sending an address of 00 will display on all connected units;
- ETX is the End of Transmission Character (ASCII 3).

Some examples of PC Mode strings are ('\_' represents a space):

```
(STX) _ _ _ H E L L O _ 0 1 (ETX)
(STX) _ _ _ _ 1 2 3 4 _ 0 2 (ETX)
```

If messages are sent infrequently, the timeout option (OPTION:TIMEO) of the Remote mode menus should be set for no timeout (NOTMO), to prevent error messages being displayed.

## 6 CONFIGURING FOR SUMMING MODE

In Summing Mode the **6500** acts as the master controller for a number of slave **5000 / 5100** units connected together on a multi-drop serial RS422/RS485 bus. The **6500** polls each of the slave units and sums all of the weight readings. The resulting total weight is displayed on the **6500**.

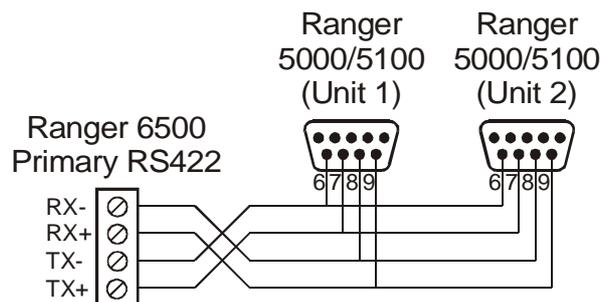
Thus the **6500** will show an error message (E-----) if any of the slave weights are negative or if there is a mix of gross and net weights amongst the slave units. If all slave units are showing net weight the **6500** will show a net total.

This allows multiple **5000 / 5100** units to be installed to measure individual weight readings from numerous loadcells connected to the same scale base, with the **6500** displaying the total weight. In this way it is possible to determine the weight distribution of the load as well as the overall total weight.

Note that this mode requires a software license and may not be enabled on all units. Refer to Section **Error! Reference source not found.** for details on software options.

### 6.1 Wiring Diagram for Summing Mode

RS422/485 Connections for a 6500 operating as a Summing Master



### 6.2 Configuring the Slave 5000s or 5100s

The slave 5000 units must be setup in network mode (set SERIAL:SER1 to net) and the communications must be done using RS422/RS485. Slave units are addressed starting at 1 up to the number of units in the network. This can be setup from the SERIAL:NET.OPT:ADDRes. Usually an installation will only use 2 or 4 slave units but the 6500 can support up to 10. Ensure that RS422 is enabled via the SERIAL:BITS menu item.

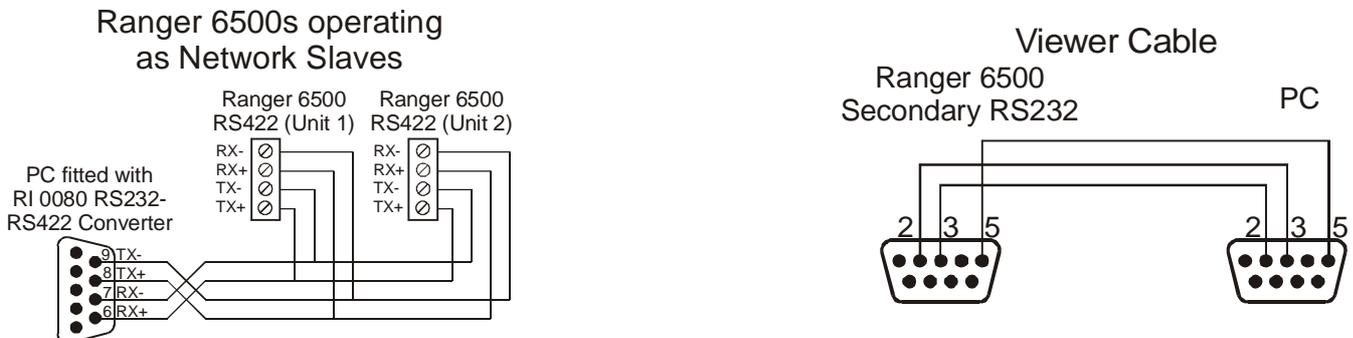
### 6.3 Configuring the 6500

- Enter the Operating Mode Setup menus (Hold the ITEM key);
- Choose the type as Summing Master (MASTER);
- Set the number of slave units (OPTION:SLAVES);
- Data Source (SERIAL:SRC) defaults to RS422;
- Baud Rate (SERIAL:BAUD) defaults to 9600, set if different;
- Serial Format (SERIAL:BITS) default to n81, set if different.

## 7 CONFIGURING FOR SLAVE MODES

The **6500** supports two slave modes on the secondary serial port. The Ranger Network Slave Mode allows control and configuration of the display from a PC or PLC. The Modbus ASCII protocol is also provided, however configuration of the unit is not possible using this protocol.

### 7.1 Wiring Diagrams for Slave Modes



### 7.2 Network Slave (Secondary Port)

Network Slave mode is required to utilise the Windows Viewer software or PC control of a **6500**.

Network Slave mode is a bi-directional protocol, in which the instrument receives commands and replies with data or acknowledgment. It is only available on Serial Port 2 of the **6500**.

The standard **6500** protocol supports a basic and extended level of slave networking. The basic level allows for remote operation of the keys by a PLC or on a RS232 or RS422 network. The extended network language allows for full control over all functions of the instrument. For details of the command structure and actual commands, refer to the **6500** Communications Manual.

#### 7.2.1 Configuring the 6500 for Network Slave

- Enter the General Setup menus (Hold the EDIT key);
- Set the type (SER2:TYPE2) to SLAVE;
- Set the data source (SER2:SRC2) to RS232 or RS422;
- Set the baud rate (SER2:BAUD2);
- Set the serial format (SER2:BITS2);
- Set the address (SER2:ADDR2);
- If messages are not sent regularly, configure the timeout (OPTION:TIMEO) to NO.TMO.

### 7.3 Modbus Slave (Secondary Port)

The **6500** can be configured to operate as a Modbus slave, allowing a PLC to operate the display. The serial type of the secondary serial port (SER2:TYPE2) of the General menus must be configured to MODBUS. In addition, the address of the secondary port must be set from the SER2:ADDR2 item. Note that the **6500** only supports the Modbus ASCII protocol.

Note that this mode requires a software license and may not be enabled on all units. Refer to Section **Error! Reference source not found.** for details on software options.

### 7.3.1 Configuring the 6500 as a Modbus Slave

- Enter the General Setup menus (Hold the EDIT key);
- Set the type (SER2:TYPE2) to MODBUS;
- Set the data source (SER2:SRC2) to RS232 or RS422;
- Set the baud rate (SER2:BAUD2);
- Set the serial format (SER2:BITS2);
- Set the address (SER2:ADDR2);
- If messages are not sent regularly, configure the timeout (OPTION:TIMEO) to NO.TMO.

### 7.3.2 Holding Registers

| Register     | Contents   |
|--------------|--|
| 40001        | Field 0 Status (Bit 0: Motion, Bit 1: Gross, Bit 2: COZ) |
| 40002        | Field 0 Low 16 Bits (Field as number)                    |
| 40003        | Field 0 High 16 Bits (Field as number)                   |
| 40004..40013 | Field 0 String (Field as string)                         |

### 7.3.3 Input Registers

The **6500** contains no input registers.

### 7.3.4 Commands / Coils

| Register | Function / Contents              |
|----------|----------------------------------|
| 00001    | Group key press (Read only)      |
| 00002    | Item key press (Read only)       |
| 00003    | Edit key press (Read only)       |
| 00004    | Long Group key press (Read only) |
| 00005    | Long Item key press (Read only)  |
| 00006    | Long Edit key press (Read only)  |
| 00007    | Field 0 Motion Flag              |
| 00008    | Field 0 Gross Flag               |
| 00009    | Field 0 COZ Flag                 |

## 7.4 Automatic Weight Output from the 6500

The automatic output is normally used to drive remote displays, a dedicated computer or PLC communications. The output generates a simple weight message ten times per second.

The **6500** Auto Weight String consists of four basic Weight Formats bounded by three Programmable Characters. The weight format and Programmable Characters can be defined in the setup. If a Programmable Character is set to NULL (ASCII 00) then it will not be transmitted. The standard string is as follows:

**START - <Weight Format String> - END1 - END2**

Where:

START is the character (General Menus - AUTOPT:STCHR). *Default: ASCII 02.*

END1 is the 1<sup>st</sup> end character (General Menus- AUTOPT:ENDCH1). *Default: ASCII 03.*

END2 is the 2<sup>nd</sup> end character (General Menus- AUTOPT:ENDCH2). *Default: ASCII 00.*

Note: START, END1 or END2 characters which have been set to NULL (ASCII 00) are not transmitted. Another common alternative configuration is START = NULL, END1 = CR (ASCII 13), END2 = LF (ASCII 10).

#### 7.4.1 Auto Weight Formats A to E and Custom

Five standard weight formats are detailed below. These are selected from AUTOPT:AUTTYP in the General Menus. Spaces (ASCII 32) are indicated by a □.

| Format | Description                          |
|--------|--------------------------------------|
| Auto.A | Sign WeightA(7) Status               |
| Auto.B | Status Sign WeightA(7) Units(3)      |
| Auto.C | Sign WeightA(7) S1 S2 S3 S4 Units(3) |
| Auto.D | Sign WeightA(7)                      |
| Auto.E | Sign WeightB(7) S5 Units(3) Mode(4)  |
| Custom | Programmable weight format           |

Where

|         |   |
|---------|---|
| Sign    | is the sign of the weight reading (space for positive, '-' for negative);   |
| WeightA | is a seven character string containing the current weight including the decimal point. If there is no decimal point, then the first character is a space. Leading zero blanking applies.            |
| WeightB | is a seven character string containing the current weight including the decimal point. If no decimal point is used a decimal point follows the 6 digits of weight data. Leading zeros are shown;    |
| Status  | provides information on the weight reading. The characters G/N/U/O/M/E represent Gross/Net/Underload/Overload/ Motion/Error, respectively.  |
| Units   | is a three character string, the first character being a space, followed by the actual units (E.g. " □kg" or " □ □ t"). If the weight reading is not stable, the units string is sent as " □ □ □ ". |
| S1      | displays G/N/U/O/E representing Gross/Net/Underload/Overload/ Error, respectively;  |
| S2      | displays "M"/' ' representing motion/stable, respectively;  |
| S3      | displays "Z"/' ' representing center of zero/non-zero, respectively;  |
| S4      | displays "1"/"2"/"-" representing range 1/2 in dual-interval and dual range mode and "-" otherwise;   |
| S5      | displays "□"/"m"/"c" representing stable/motion/over or under capacity, respectively;   |
| Mode    | 4 characters ' □ g □ □ ' or ' □ n □ □ ' for gross or net weight.  |

#### 7.4.2 Auto Transmit Formatting

The Auto Format (AUTOPT:AUTFMT) setting of General setup programs the format transmitted when the Auto Format Type (AUTOPT:AUTTYP) is set to "Custom". A string of up to 20 characters can be entered. Each ASCII character is either a literal ASCII printed character like 065 ('A') or a special token character like 202 ( 123.4) which sends the gross weight. The ASCII 0 is used to mark the end of the format string. To send an ASCII 0, insert an ASCII 128.

Qualifiers are tokens that do not cause any characters to be transmitted but modify the format of other tokens to follow.

For example, the following format string would transmit the weight reading in a fixed 7 character field with leading zero suppression and no decimal point:

172 184 188 200

### 7.4.3 Programmable Auto Transmit Tokens

Following is a table of all of the format tokens.

| Qualifier Tokens |  |         |
|------------------|--|---------|
| Token            | Description  | Comment |
| 170              | 5 character field  |         |
| 171              | 6 character field  |         |
| 172              | 7 character field  |         |
| 173              | 8 character field  | Default |
| 174              | 9 character field  |         |
| 179              | No fixed length field for weight data                        |         |
| 180              | No sign character sent                                       |         |
| 181              | Sign character send as '+' for positive and '-' for negative | Default |
| 182              | Sign character send as '+' for positive and '-' for negative |         |
| 183              | Sign character send as '0' for positive and '-' for negative |         |
| 184              | No decimal point sent  |         |
| 185              | DP sent as '.'   | Default |
| 186              | DP sent as ','   |         |
| 187              | Weight sent with leading zeros, eg 000123                    |         |
| 188              | Weight sent without leading zeros eg 123                     | Default |
| 189              | Weight readings sent regardless of overload or error status  | Default |
| 190              | Weight data blanked on error                                 |         |
| 191              | Weight data send as '---' on error                           |         |
| 192              | Status characters are upper case                             | Default |
| 193              | Status characters are lower case                             |         |

| Weight Data Transmission Tokens |                       |  |
|---------------------------------|-----------------------|--|
| 200                             | Send Displayed Weight |  |

| Weight Status Tokens |                   |   |
|----------------------|-------------------|---|
| Token                | Output Data       | Description                                     |
| 210                  | 'kg','lb','t','g' | Units   |
| 211                  | G,N,E,O,U,M       | Standard Ranger status                          |
| 212                  | G,N,E,O,U         | Ranger status without motion                    |
| 213                  | G,N               | Gross, Net only                                 |
| 214                  | M,' '             | Motion or ' ' for stable                        |
| 215                  | M,S               | Motion or stable                                |
| 216                  | ' ', or units     | ' ' for motion or weight units                  |
| 217                  | M,C,' '           | Motion, over-capacity or valid weight           |
| 218                  | M,I,O,' '         | Motion, invalid, over-capacity, or valid weight |
| 219                  | I,O,U             | Inscale, overload, underload                    |
| 220                  | Z,' '             | Centre of Zero                                  |
| 221                  | ' ',1,2           | Single range or range/interval 1or2             |
| 222                  | ST,US,OL          | Stable, unstable, overload                      |



## 8 ERROR MESSAGES

The **6500** operates a range of error detection mechanisms. These fall into three categories, which are described below.

### 8.1 Configuration Errors

Configuration errors provide feedback to the user of problems with the display setup. These errors are displayed by switching between the normal weight display and the error message. The priority of these errors decreases going down the table below.

| Displayed Error | Description  |
|-----------------|--|
| ER.DAT          | There is no data being received by the unit. Check cables, connections, indicator and data source configuration (SERIAL:SRC) from the Operating Mode menus.  |
| ER.RX           | Data is being received, but the serial format is invalid. Check the baud rate, parity, stop and start bits (SERIAL:BAUD and SERIAL:BITS) from the Operating Mode menus.  |
| ER.ETX          | No character matching the specified ETX character has been found. Check the ETX character at the end of the format string (BLOCK:BLK1 .. BLOCK:BLK4) from the Operating Mode menus.  |
| ER.FLD          | An ETX character has been found, however some part of the data stream does not match the specified format. Check the format string (BLOCK:BLK1 .. BLOCK:BLK4) against the data being received in the Operating Mode menus. |
| ER.LEN          | The field to be displayed is longer than 6 digits and cannot be displayed. Check the data that is being sent to the display.   |

### 8.2 Weighing Errors

These messages show errors that have occurred during the normal weighing operation.

|        |  |
|--------|--|
| U----- | The weight is below the minimum allowable weight reading.          |
| O----- | The weight is above the maximum allowable weight reading.          |
| -----  | The weight being transmitted is invalid (as per remote indicator). |

### 8.3 Operating Errors

The **6500** continually monitors the condition of the internal circuits. Any faults or out-of-tolerance conditions are shown on the display as an E type error message. In the table below the following terms are used:

- (check) = this item can be checked on site by service personnel
- (service) = the **6500** must be returned for factory service

| Code   | Error Description                           | Action                      |
|--------|---|-----------------------------|
| E 0001 | The power supply voltage is too low         | (check supply)              |
| E 0002 | The power supply voltage is too high        | (check supply)              |
| E 0100 | The digital setup information has been lost | (re-enter setup)            |
| E 0300 | All setup information has been lost         | (enter setup and calibrate) |
| E 0400 | The factory information has been lost       | (service)                   |
| E 0800 | The EEPROM memory chip has failed           | (service)                   |
| E 8000 | The EPROM memory chip has failed            | (service)                   |

The “E” type error messages are additive. For example, if a condition is detected where the EEPROM memory chip has failed, resulting in a loss of setup information, the resulting Error messages will be E 0900 (0800 + 0100). The numbers add in hexadecimal as follows:-

1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - A - B - C - D - E - F (For example, 2 + 4 = 6, or 4 + 8 = C)

## 9 SPECIFICATIONS

|                         |  |
|-------------------------|--|
| <b>PERFORMANCE</b>      |  |
| Display                 | 6 electromechanical digits, 75mm high with 15 segments per digit for displaying numeric and semi-alpha characters<br>Status annunciators for Motion, Centre of Zero & Net mode (when connected to Ranger indicators) |
| Visibility              | Up to 40 metres  |
| Update Rate             | 10Hz   |
| Operating Environment   | Temperature -10 to +50°C, humidity < 90% non condensing  |
| <b>DIGITAL</b>          |  |
| Setup                   | Full digital with visual prompting in plain messages   |
| Memory retention        | Full non-volatile operation  |
| <b>SERIAL COMMS</b>     |  |
| Primary Port Formats    | RS-232/422/485 – two wire (receive only)<br>20mA serial current loop two wire (receive only)<br>RS-232/422/485 – four wire (receive and transmit for networking)   |
| Primary Port Features   | Remote display, Ranger-Net slave, master and summing master, Modbus ASCII slave  |
| Secondary Port Formats  | RS-232/422/485 - two wire (receive only)<br>RS-232/422/485 - four wire (receive and transmit for networking)   |
| Secondary Port Features | Network slave and Modbus slave.  |
| <b>DIMENSIONS</b>       |  |
| Body Size (mm)          | 600 (L) x 148 (H) x 78 (D)   |
| Display Window (mm)     | 430 x 100  |
| Weight (kg)             | 3.4  |
| Power Supply (AC)       | 85 - 264VAC 47 - 63 Hz 15W   |
| <b>FEATURES</b>         |  |
|                         | Status annunciators for Motion, Centre of Zero & Net mode  |
|                         | P.C. programmable using Ranger Viewer software   |
| <b>APPROVALS</b>        |  |
|                         | Complies with S1/0 for auxiliary devices   |
|                         | C-Tick (N2708)   |
| <b>OPTIONS</b>          |  |
|                         | Summing software for up to 10 Ranger indicators  |
|                         | Modbus ASCII networking protocol   |
|                         | Profibus networking protocol (requires external module)  |
|                         | Swivel mounting bracket with weather hood  |

**Notes:**

**SMART WEIGHING SOLUTIONS**

