6500

REMOTE DISPLAY

Reference Manual

For use with Software Versions 1.5+

Table Of Contents

1   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 12).

1.1   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.rangerinstruments.com.

1.2   Operating Modes

The **6500** provides a range of methods to acquire and interpret serial data from indicators and other data sources.

1.2.1 Remote Display Mode

In this mode the **6500** operates as a remote display for a Ranger Indicator or another supported indicator. Weight readings are sent from the weighing indicator to the **6500** automatically and the **6500** displays the weight. The weighing indicator cannot be controlled from the **6500** in this mode.

1.2.2 Summing Master Mode

The **6500** acts as a master controller for a number of slave **5000** 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**. The **6500** will show an error message (------) if any of the slave weights are negative or if there is a mix of gross and net weights, as defined by Technical Schedule S/1/0A. If all slave units are showing net weight the **6500** will show a net total.

1.2.3 Ranger 1200 Remote Display Mode

This mode of operation converts the Ranger 1200 serial output stream into a displayed weight.

2 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.

2.1 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.

2.1.1 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.
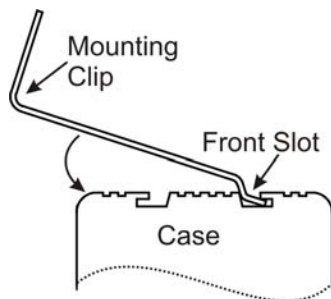
When disengaging a clip maintain tension to draw the clip towards the back of the case, as shown in the figure at left. This will ensure that a clearance is maintained and the clip can move more easily in the slot.
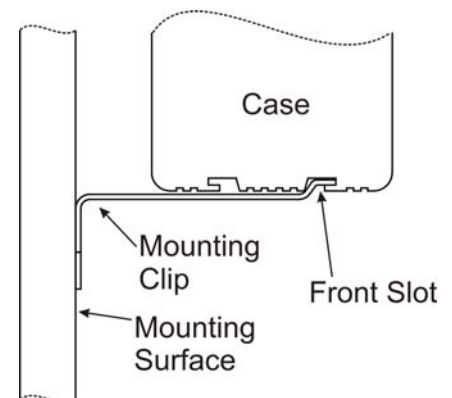
2.1.2 Wall Mounting

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.
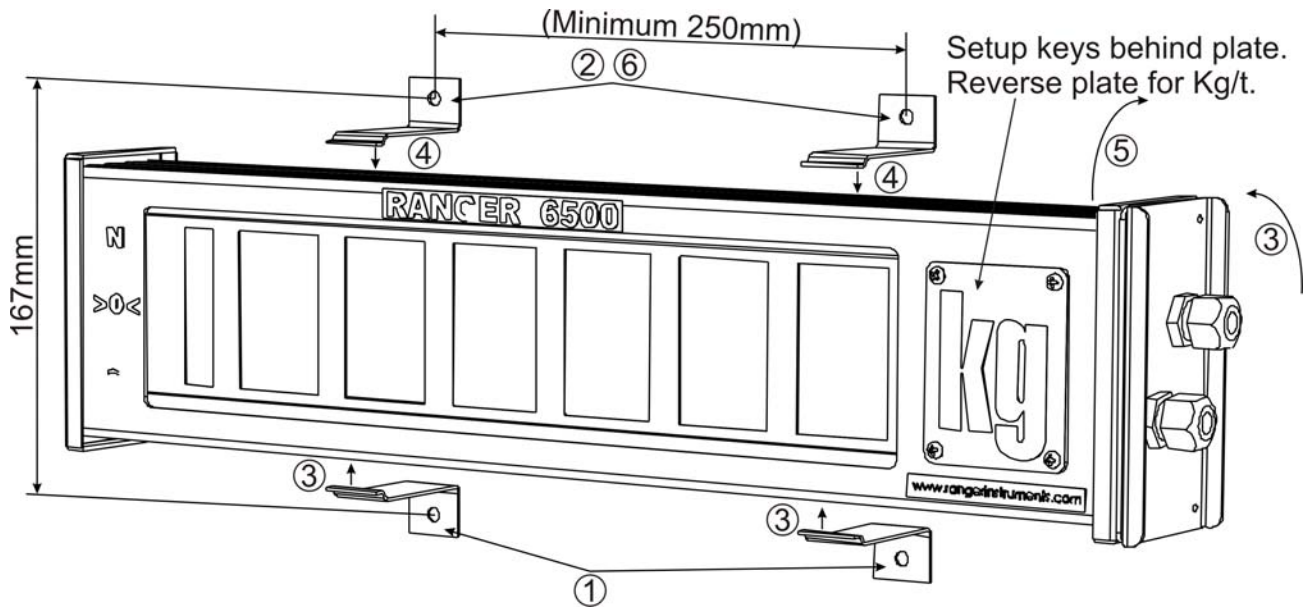
2.2 Accessing Connections / Fitting the Decimal Point

2.2.1 Tools Required

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

2.2.2 Accessing the Connections

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

2.3 Fitting the Decimal Point

he 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.
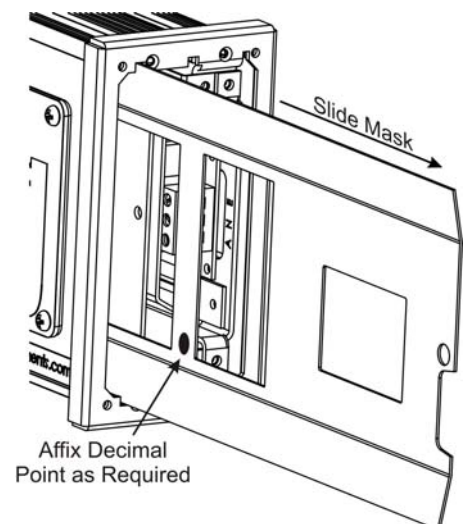
2.4   Power Connection

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.

Warning: The 6500 contains hazardous voltages. Disconnect power before opening.

1. Remove 2 Screws
2. Slide Power Supply Out
3. Connect AC Supply
4. Slide Power Supply In
5. Replace Screws
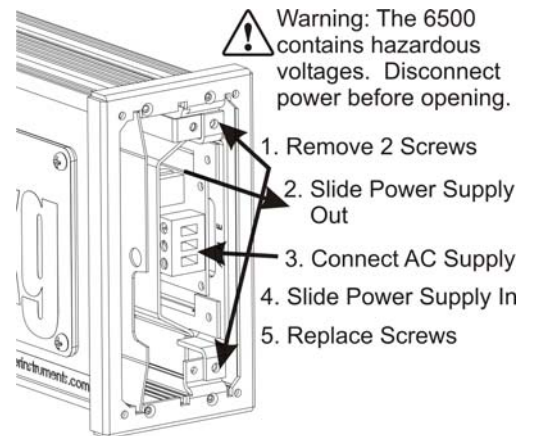
2.5   Serial Connections

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	Secondary Port Data Formats
RS232 (Full Duplex)	RS232 (Full Duplex)
RS422 (Full Duplex)	RS422 (Full Duplex)
20mA Current Loop (Receive Only)	

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

Display PCB

Primary Current Loop
- EX+
- L+
- Shield
- L -
- EX-

Primary RS232
- TXD
- RXD
- GND

Secondary RS422
- RX-
- RX+
- TX-
- TX+

Primary RS422
- RX-
- RX+
- TX-
- TX+

Current Loop (Primary)	
EX+	+24v Supply
L+	Loop Data +
Shield	Case Connection
L-	Loop Data -
EX-	Supply Ground
RS232 (Primary / Secondary)	
TXD	RS232 Transmit
RXD	RS232 Receive
GND	RS232 Ground
RS422 (Primary / Secondary)	
RX-	RS422 Receive -
RX+	RS422 Receive +
TX-	RS422 Transmit -
TX+	RS422 Transmit +

Note the Secondary RS232 connector is located behind the units plate.

Secondary RS232

RXD
TXD
GND

2 3 5

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.

2.6   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.

3   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.
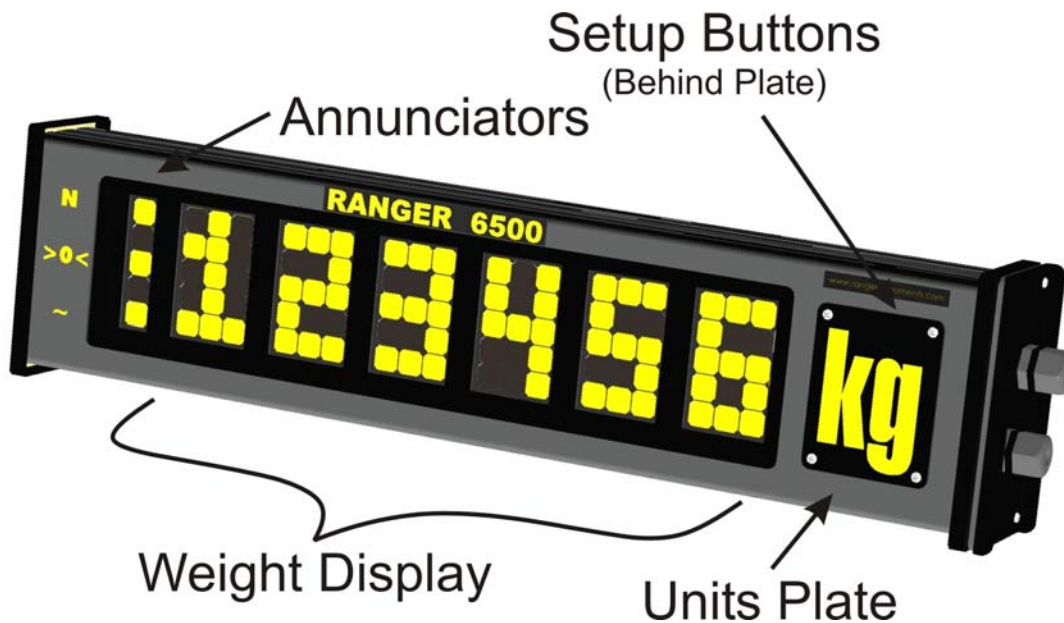
3.1   Weight Display

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

3.2   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.

3.3   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.

3.4   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		Lit when in the main GROUP menu.
ITEM		Lit when in the ITEMS menus.
EDT		Lit when the editing an ITEM of a menu.

3.5   Data Entry Modes

Throughout the **6500** operator interface, a number of data entry methods are used. Each method and its operation is described below.

3.5.1 Numeric Entry

⟨123⟩

A numeric entry box allows the input of a number. When entering a number the display will show the number as "000000", with the currently active digit flashing. The **EDIT** key cycles through 0 to 9. Pressing the **ITEM** key moves the active digit, cycling from right to left.   Pressing the **GROUP** key accepts the number, whilst holding **GROUP** will escape from number editing without saving the changes.

Upper and lower limits are placed on some entries and an entry outside this range will cause the **6500** to display "------", and resume number editing.

3.5.2 Selections

⟨SEL⟩

A selection entry requires the choice of a single item from a list of options. The currently selected item is displayed, and the **EDIT** key can be used to switch between the available options. Pressing the **ITEM** key will select the current item, whilst holding the **GROUP** key for two seconds will abort the selection, and revert to the original item.

3.5.3 Alpha-numeric Entry

⟨ABC⟩

An alpha-numeric entry allows the input of data strings. The **6500** will display the string in either of the following formats "01.065" or "01.'A'". The first format is [PP.CHR], where PP is the position in the string, and CHR is the ASCII number of the character. The latter format is essentially the same as the first format, however CHR displays the actual character. Not all characters can be displayed, and the display will revert to the first format if the character cannot be displayed. Note that 255 is largest number that can be entered for a character. Below is a table describing the keystrokes for the alpha-numeric entry.

Common Functions			
Function	Action 1	Action 2	Action 3
Next Position	Press GROUP		
Insert Character	Hold ITEM Displays 'INS'	Press ITEM	
Delete Character	Hold ITEM Displays 'INS'	Press EDIT Displays 'DEL'	Press ITEM
Switch Display	Hold EDIT		
Save String	Hold GROUP		
Number Display (01.065) Mode			
Function	Action 1	Action 2	Action 3

Next Digit	Press ITEM		
Modify Digit	Press EDIT		

Character Display (01.'A') Mode			
Function	Action 1	Action 2	Action 3
Change Character	Press EDIT		

3.5.4 Options

An option entry allows the selection of an option for a number of settings. Typically these items are on/off items, however more than two options are available in some cases. For example, the **6500** serial settings are configured via an option entry, as shown below. The currently selected item will flash, and may be changed by using the **ITEM** key. Press the **EDIT** key to advance through the available options. Pressing the **GROUP** key will accept the current settings for all options shown.

n81-

none	8 bits	1 stop	- none
Odd	7 bits	2 stop	Term
Even			
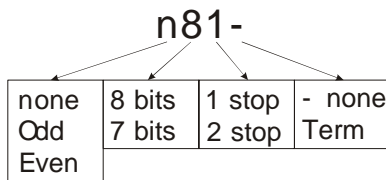
3.6 Groups, Items, Subitems and the Setting Buttons

The **6500** setup menus are organised in a tree structure made up of **Groups** and **Items**. To simplify explanations, the following notation is used throughout the manual to identify the location of an item: (GROUP:ITEM).

Groups (GROUP)

Digital Setup is divided into a series of "Groups". Each group has a distinctive group title. All items in any one group have related functions. The **GROUP** LED is lit if the **6500** is displaying a group title. The **GROUP** key can be used to scroll through the available groups. Pressing the **ITEM** key will enter the selected group, allowing access to the items within the group.

Items (ITEM)

Each group is divided into numbers of individual "Items". Each item represents a parameter that can be changed. The **ITEM** LED is lit when selecting items from a group. The **ITEM** key will advance through the list. Press the **EDIT** key to edit the item.

Editing (EDIT)

The next level consists of editing an item. The **EDIT** LED is lit whilst editing an item.

4   OPERATING MODE SETUP

Setup of the **6500** is divided into two sections. The first section covered here involves the setup of the **6500** operating mode. The second section, known as "GENERAL" setup, covers the setup of other features, not directly associated with a particular operating mode. General setup is covered in Section 8.

4.1   Passcodes

The **6500** uses a passcode to provide a security lock on all setup menus. Passcodes can be set from the menu item (OPTION:PASSCD) of General setup. A setting of "000000" clears the passcode and allows free access to Digital Setup. This is the default setting and must be changed by the installer to restrict operator access. Any other number will enable the passcode function and restrict access to the setup menus. When a passcode is enabled, the **6500** will prompt for passcode confirmation before entering Digital Setup. A value of 000000 will be displayed, and the correct passcode must be entered, in the standard numeric entry fashion. Correct entry of the code will allow access to Setup, whilst an incorrect passcode will trigger an error message and the display will return to the normal weight display. The passcode must not be forgotten, as it is only possible to circumvent it at the factory. Care must be taken with the use of the passcode to ensure that the instrument does not become permanently locked.

4.2   Entering Operating Mode Setup

There are two ways to access the **6500** Operating Mode Setup, both of which are discussed below.

Method 1: To enter Operating Mode Setup, press and hold the ITEM key for two seconds. The **6500** will display "SERIAL SETUP 6500", followed by the software version. If a passcode has been configured, it must be entered to gain access to setup. The **6500** will then prompt for the access mode. The available options are:
- Remote Display Mode (REMOTE) (See Section 4.3);
- Summing Master Mode (MASTER) (See Section 4.4);
- Ranger 1200 Remote Display Mode (R1200) (See Section 4.5).

Use the **EDIT** key to select the desired mode, and the **ITEM** key to accept it. If the mode has changed, the **6500** will prompt to continue. Upon selecting a mode, the **6500** will automatically configure some settings to suit the application, and then enter the operating mode setup menus.

Method 2: When no alteration of the operating mode is required, Quick Setup will enter the Operating Mode Setup without prompting to change the operating mode. Quick setup can be accessed by holding the GROUP key for two seconds. The **6500** will display "<mode> SETUP 6500", followed by the software version, where "mode" is the current operating mode. If a passcode has been configured, it must be entered to gain access to setup. The **6500** will then enter the Operating Mode Setup. No defaults are configured when entering setup via this method.

4.3   Remote Operating Mode Setup Menus

The options in this section apply to Remote Operating Mode only.

4.3.1 Indicator Brand - (BRAND)

⟨SEL⟩

Preconfigures the remote display for a particular indicator. Choose the brand of indicator to preconfigure it with. The formats are listed in Section 5.4.

4.3.2 Serial Port Settings (SERIAL)

Items within this Group are used to configure the primary serial port of the **6500** remote display.

(SRC) Data Source

⟨SEL⟩

The **6500** can accept data on serial port 1 in the following formats: RS232, RS422 and 20mA Current Loop. This option selects the data source. The Scan option causes the display to scan each source for data in the following order (RS232, RS422, Loop).

Options: RS232, RS422, Loop, Scan. Default: Scan.

(BAUD) Baud Rate

⟨SEL⟩

The baud rate item determines the serial data transmission/reception speed for the primary serial port. The AUTO setting causes to the unit to attempt to determine the baud rate and bit pattern automatically.

Options: 300, 600, 1200, 2400, 4800, 9600, 19200, AUTO. Default: AUTO.

(BITS) Serial Format Options

⟨OPT⟩

The bits options allow the data transmission bit pattern to be changed. The display will show the current setting in the form (n81T) where each character has a meaning as shown below. If the Baud Rate is set to AUTO, the bit format also automatically determined, and this item has no effect. Available options are:

n,O,E: Parity bit
8, 7:   The number of data bits
1, 2:   The number of stop bits
-, T: Termination resistors

n81-

none	8 bits	1 stop	- none
Odd	7 bits	2 stop	Term
Even			
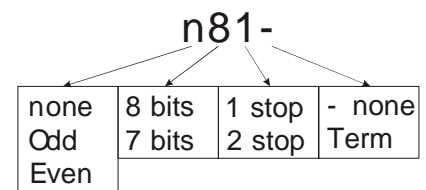
Default: n81-. For most applications the default setting is applicable.

(ADDR) Serial Address

Sets the serial address for the primary serial port. This setting is only used in applications were multiple **6500**s are connected on a common serial line.

Can be set from 00 to 99.

4.3.3   Display Options - (OPTION)

Items within this Group are used to configure the **6500** display.

(TImEO)   **Data Time Out**   SEL

Sets the period of time in seconds the unit waits from the last valid message, before displaying an error message.

Options: NoTimout, 5, 10, 20 (seconds). Default: 5.

(ShowDp)   **Show the Decimal Point**

Selects whether the decimal point is shown on the display. This setting provides the default that can be overridden in the format blocks.

Options: Yes, No. Default: Yes.

4.3.4   Remote Format Blocks - (BLOCK)

Items within this group control settings associated with the use of Remote mode.

(BLK 1 .. Blk 4) Data Format Blocks   ABC

The data format blocks are strings containing tokens, used to interpret an incoming data stream. The tokens are specified in the table in Section 5.5.6. Five format strings are provided, the first being fixed to Ranger Auto Format A. However, the remaining four strings are user programmable. The parser attempts to match incoming data to any of the enabled data formats (see BLOCK:ENABLE for enabling data formats). The last character in a format string should be the end of transmission (ETX) character. Typical examples of an ETX character are ETX (ASCII 3), Carriage Return (ASCII 13) and Line Feed (ASCII 10). This should be followed by a 0 to terminate the parsing string.

Default: Ranger Format C (FMT1), Ranger Format D (FMT2), Ranger Format E(FMT3) and Avery L130 (FMT4).

(ENABLE)   **Format Enables**   R1234   OPT

Individually enables each of the five format strings.

Default: R1234.

R Enable - Disable	1 Enable - Disable	2 Enable - Disable	3 Enable - Disable	4 Enable - Disable
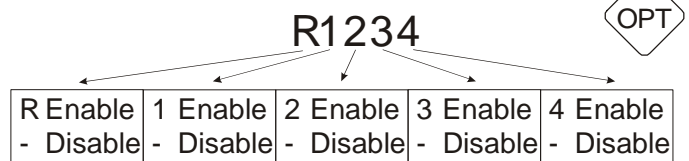
(PRESET)   **Standard Data Formats**   SEL

Preconfigures a specific data format block with a standard format string. First, enter which format block to preconfigure (1..4 corresponding to BLOCK:BLK1.. BLOCK:BLK4) and then choose the format string to preconfigure it with. The formats are listed in Section 5.4.

(RESET)   **Reset Formats to Defaults**   SEL

Resets all four format blocks (BLOCK:BLK1-BLOCK:BLK4) back to factory defaults. Prompts ConT Y / ConT N before performing the reset.

4.3.5 Leaving Remote Operating Mode Setup Menus - (-END-)

To exit setup and return to normal operation, press the **GROUP** key until the **-END-** group header appears in the display. Then press the **ITEM** button to exit the setup. The **6500** will display "SAVING" before returning to normal operation.

4.4   Summing Master Operating Mode Setup Menus

The options in this section apply to Summing Master Operating Mode only. Note that Summing Master mode is a software option, and may not be available on some units. Please refer to Section 10 for information regarding software options.

4.4.1 Display Options - (OPTION)

Items within this Group are used to configure the **6500** display.

(SLAVES)   Number of Slave Devices

Selects the number of slave devices to sum when operating in Ranger Network Summing mode.   Refer to Section 6 for information on this type of operation.

Can be set from 1 to 10. Default: 1.

(ShowDp)   Show the Decimal Point

Selects whether the decimal point is shown on the display.

Options: Yes, No. Default: Yes.

(TImEO)   Data Time Out

Sets the period of time in seconds the unit waits from the last valid message, before displaying an error message.

Options: NoTimout, 5, 10, 20 seconds. Default: 5.

4.4.2 Serial Port 1 Settings (SERIAL)

Items within this Group are used to configure the primary serial port of the **6500** remote display.

(SRC) Data Source

The **6500** can accept data on serial port 1 in the following formats: RS232, RS422 and 20mA Current Loop. This option selects the data source. The Scan option causes the display to scan each source for data in the following order (RS232, RS422, Loop). In summing mode, the Loop and Scan options cannot be used.

Options: RS232, RS422, Loop, Scan. Default: RS422.

(BAUD) Baud Rate

The baud rate item determines the serial data transmission/reception speed for the primary serial port. The AUTO setting cannot be used in summing mode.

Options: 300, 600, 1200, 2400, 4800, 9600, 19200, AUTO. Default: 9600.

(BITS) Serial Format Options

OPT

The bits options allow the data transmission bit pattern to be changed. The display will show the current setting in the form (n81T) where each character has a meaning as shown below. If the Baud Rate is set to AUTO, the bit format also automatically determined, and this item has no effect.

Available options are:

n,O,E: Parity bit
8, 7:   The number of data bits
1, 2:   The number of stop bits
-, T: Termination resistors

n81-

none	8 bits	1 stop	- none
Odd	7 bits	2 stop	Term
Even			
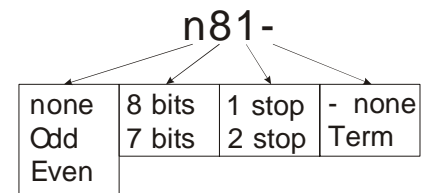
Default: n81-. For most applications the default setting is applicable.

4.4.3 Leaving Summing Master Setup Menus - (-END-)

To exit setup and return to normal operation, press the **GROUP** key until the **-END-** group header appears in the display. Then press the **ITEM** button to exit the setup. The **6500** will display "SaVING" before returning to normal operation.

4.5   Ranger 1200 Remote Display Operating Mode Setup Menus - (R1200)

The options in this section apply to Ranger 1200 Remote Display Operating Mode only.

4.5.1 Scale Options - (SCALE)

SEL

Items within this group configure options associated with the use of Ranger 1200 Display Mode.

(E1)   Resolution for Ranger 1200 Display Operation

Sets the resolution for the unit when operating as a remote display for the Ranger 1200.

Options: 1, 2, 5, 10, 20, 50, 100. Default: 1.

(CAP1) Full Scale reading for Ranger 1200 Display Operation

123

Sets the full scale load for the unit when operating as a remote display for the Ranger 1200.

Can be set from 00000 to 20000. Default: 20000.

(SHowDP)   Show the Decimal Point

SEL

Selects whether the decimal point is shown on the display.

Options: Yes, No. Default: Yes.

(dP)   Decimal Point Position for Ranger 1200 Display Operation

Sets the decimal point position for the unit when operating as a remote display for the Ranger 1200.

Can be set from 00000. to .00000 Default: 00000.

(TImEO)   Data Time Out

Sets the period of time in seconds the unit waits from the last valid message, before displaying an error message.

Options: NoTimout, 5, 10, 20 seconds. Default: 5.

4.5.2 Serial Port 1 Settings (SERIAL)

Items within this Group are used to configure the primary serial port of the **6500** remote display.

(SRC)   Data Source

The **6500** can accept data on serial port 1 in the following formats: RS232, RS422 and 20mA Current Loop. This option selects the data source. The Scan option causes the display to scan each source for data in the following order (RS232, RS422, Loop).

Options: RS232, RS422, Loop, Scan. Default: RS422.

(BAUD)   Baud Rate

The baud rate item determines the serial data transmission/reception speed for the primary serial port. The AUTO setting causes to the unit to attempt to determine the baud rate and bit pattern automatically.

*Options: 300, 600, 1200, 2400, 4800, 9600, 19200, AUTO. Default: 9600.*

(BITS)   Serial Format Options

The bits options allow the data transmission bit pattern to be changed. The display will show the current setting in the form (n81T) where each character has a meaning as shown below. If the Baud Rate is set to AUTO, the bit format also automatically determined, and this item has no effect. Available options are:

n,O,E: Parity bit
8, 7:   The number of data bits
1, 2:   The number of stop bits
-, T: Termination resistors

n81-

none	8 bits	1 stop	- none
Odd	7 bits	2 stop	Term
Even			
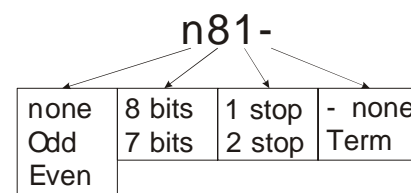
Default: n81-. For most applications the default setting is applicable.

4.5.3 Leaving Ranger 1200 Remote Display Setup Menus - (-END-)

To exit setup and return to normal operation, press the **GROUP** key until the **-END-** group header appears in the display. Then press the **ITEM** button to exit the setup. The **6500** will display "SaVING" before returning to normal operation.

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

RS232 Connections
Ranger 6500 Primary RS232   Ranger 5000/5100 or PC

RS422/485 Connections
Ranger 6500 Primary RS422   Ranger 5000/5100

20mA Current Loop Connections for a Passive Transmitter

6500 Loop Connector

Ranger Loop Transmitter (RI 0214)
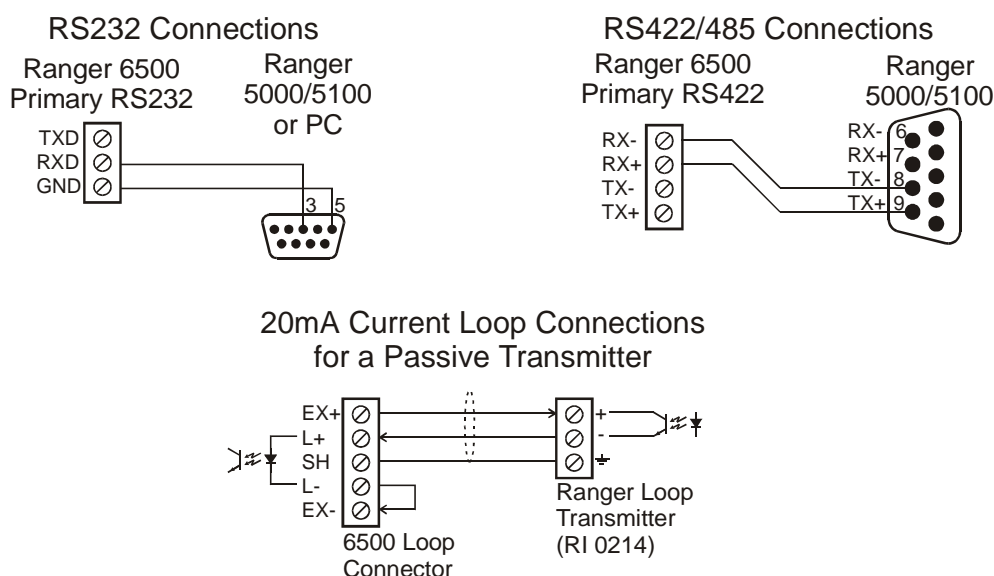
5.2   Configuring the 5000 Indicator

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
Ignore	Field (8 Chars)	Status (G/N/O/U/E)	Motion (M/' ')	COZ (Z/' ')	Ignore	Ignore	ETX

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       o             (03)
 r                          u   o   (Z  r
 e                          s   n   /' ')  e
                                        (188)
(130)                      (G  (M      (130)
                           /N  /' ')
                           /O
                           /U(184)         Combine to (133)
                           /E)
                                   (181)
```

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 3.5.3). 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	
171	Parse string for field to store as field 2	Width	
172	Parse string for field to store as field 3	Token	
173	Parse string for field to store as field 4	s	
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 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 Byte 2 Bits012 = DP Posn
204	Avery L130 Status 1	1	Bit0 = Error
205	Avery L130 Status 2	1	Bit0 = COZ, Bit1 = Gross, 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)
249	Parse and ignore all characters until delimiter is found	n	

5.6   PC Mode

PC Mode is a format originally developed for the Ranger **6600**, to display text messages on multiple **6600**s 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 10 for details on software options.

6.1   Wiring Diagram for Summing Mode

RS422/485 Connections for a 6500 operating
as a Summing Master
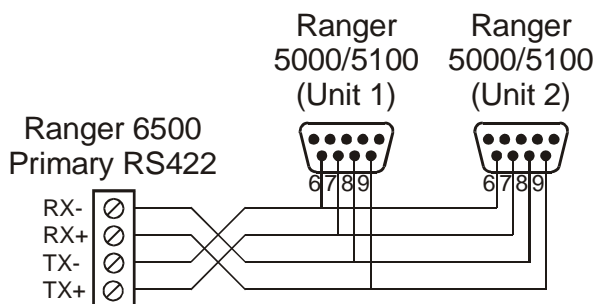
6.2   Configuring the Slave 5000s or 5100s

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.
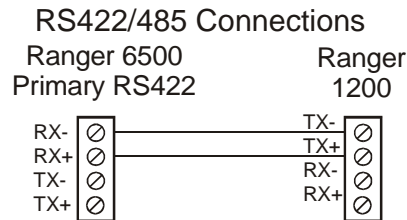
6.3   Configuring the 6500

- 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 AS A RANGER 1200 DISPLAY

In this mode, the **6500** will convert the raw counts output from the Ranger **1200** into a weight reading, displayed on the **6500**.

7.1   Wiring Diagram for Ranger 1200 Display Mode

RS422/485 Connections

| Ranger 6500 | | | | Ranger |
| Primary RS422 | | | | 1200 |

```
RS422/485 Connections
Ranger 6500              Ranger
Primary RS422            1200

RX-  ⊘ ───────────── ⊘  TX-
RX+  ⊘ ───────────── ⊘  TX+
TX-  ⊘               ⊘  RX-
TX+  ⊘               ⊘  RX+
```

7.2   Configuring the 6500 as a 1200 Remote Display

- Enter the Operating Mode Setup menus (Hold the **ITEM** key);
- Choose the type as Ranger 1200 Remote Display (R1200);
- Set the resolution (SCALE:E1);
- Set the full scale reading (SCALE:CAP1);
- Set the decimal point display (SCALE:ShowDp) and position (SCALE:DP);
- Data Source (SERIAL:SRC) defaults to RS422, set if required;
- Baud Rate (SERIAL:BAUD) defaults to 9600, set if required;
- Serial Format (SERIAL:BITS) default to n81, set if required.

8   GENERAL SETUP

Setup of the **6500** is divided into two sections. The first section covers setup of the **6500** operating mode, and has been discussed previously in Section 4. The second section known as "GENERAL" setup, covers the setup of other features, not directly associated with a particular operating mode, and is covered below.

8.1   Passcodes

The **6500** uses a passcode to provide a security lock on all setup menus. Passcodes can be set from the General Setup menu item (OPTION:PASSCD). A setting of "000000" clears the passcode and allows free access to Digital Setup. This is the default setting and must be changed by the installer to restrict operator access. Any other number will enable the passcode function and restrict access to the setup menus. When a passcode is enabled, the **6500** will prompt for passcode confirmation before entering setup. A value of 000000 will be displayed, and the correct passcode must be entered, in the standard numeric entry fashion. Correct entry of the code will allow access to Setup, whilst an incorrect passcode will trigger an error message and the display will return to the normal weight display. **The passcode must not be forgotten, as it is only possible to circumvent it at the factory. Care must be taken with the use of the passcode to ensure that the instrument does not become permanently locked.**

8.2   Entering General Setup

▲
EDIT   To enter General Setup, press and hold the **EDIT** button for two seconds. The **6500** will display "GENRL SETUP 6500", followed by the software version. If a passcode has been configured, it must be entered to gain access to setup. The **6500** will then enter the General Setup menus.

8.3   Display Options - (OPTION)

Items within this Group are used to configure the **6500** display and control access to menus, button locking and external key functions

(SHowDP)   Show the Decimal Point

Selects whether the decimal point is shown on the display. This setting provides the default which can be overridden in the Remote Display mode format blocks.

Options: Yes, No. Default: Yes.

(TImEO) Data Time Out

Sets the period of time in seconds the unit waits from the last valid message, before displaying an error message.

Options: NoTimout, 5, 10, 20 seconds. Default: 5.

(PASSCd)   Security Passcode for Setup Menus

This number must be entered as a passcode to access the Setup menus. A setting of 000000 bypasses the passcode function and allows free access.

Can be set from 000000 to 999999. Default: 000000.

8.4   Serial Port 2 Settings (SER 2)

Items within this group are used to configure the second serial port of the **6500** remote display.

(TYPE2) Serial Port 2 Function

SEL

This option sets the function of the secondary serial port. Refer to Section 9 for the operating modes of this port.

Options: SLAVE, MODBUS, AUTO. Default: SLAVE.

(SRC2)   Data Source

SEL

The **6500** can accept data on serial port 2 in the following formats: RS232 and RS422. This option selects the data source.

Options: RS232, RS422. Default: RS232.

(BAUD2) Baud Rate

SEL

The baud rate item determines the serial data transmission/reception speed for the primary serial port.

Options: 300, 600, 1200, 2400, 4800, 9600, 19200. Default: 9600.

(BITS2)Serial Format Options

OPT

The bits options allow the data transmission bit pattern to be changed. The display will show the current setting in the form (n81T) where each character has a meaning as shown below. Available options are:

n,O,E:	Parity bit
8, 7:	The number of data bits
1, 2:	The number of stop bits
-, T:	Termination resistors

$$n81\text{-}$$

none	8 bits	1 stop	- none
Odd	7 bits	2 stop	Term
Even			
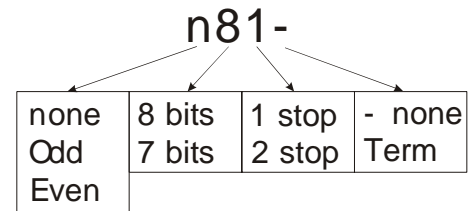
Default: n81-. For most applications the default setting is applicable.

123

(ADDR2)   Serial Address

Sets the serial address for the secondary serial port.

Can be set from 00 to 99.

8.5   Auto Transmit Options (AutOpt)

This is a list of all items concerned with automatic serial transmission of weight data.

(AutTYP)   Auto Output Format

SEL

This item sets the type of Auto transmit data format. Description of these formats is given in Section 9.4 on page 32.

Options are: Auto.A (Std Ranger), Auto.B, Auto.C, Auto.D, Auto.E, Custom (Format specified in AUT.FMT). Default: Auto.A.

(AutFmT)   Auto Output Format

ABC

Sets the auto output format when using Custom formatting.   Up to 20 literal characters and special tokens can be entered.

Default: "" (No format specified).

(StChr)   Start Character

123

Sets the character sent at the start of the automatic message string. Can be set for any valid ASCII character. If set to Null (00), no character will be sent in this position.

Default: 02 (Start Of Text (STX))

(EndCh1)   End Character 1

123

Sets the first of the two characters sent at the end of the automatic message string. Can be set for any valid ASCII character. If set to Null (00), no character will be sent in this position.

Default: 03 (End Of Text (ETX))

(EndCh2)   End Character 2

123

Sets the second of the two characters sent at the end of the automatic message string. Can be set for any valid ASCII character. If set to Null (00), no character will be sent in this position.

Default: 00 (no character sent)

(Units) Auto Output Units

SEL

Selects the units to be sent in the serial auto output string.

Options: g (grams), kg (kilograms), lb (pounds), t (tonnes). Default kg.

8.6   Test Menu - (TEST)

Items within this group allow testing of display features, and provide feedback on display conditions.

(AUTO)Serial Auto Settings

This option displays the current serial auto settings for the primary serial port. It displays source, baud rate and serial bit format, when auto settings are enabled. This option is not available when automatic detection is disabled.

(SCAN)Serial Data Scan

This option forces the remote display to perform a scan and autobaud of the primary serial port if the auto options are enabled. Note that the display performs a scan on powerup and on exiting the setup menus. This option is not available when automatic detection is disabled.

(STAT) Remote Display Status

This option provides information to the user when configuring the unit. The data displayed here applies to the Primary serial port only. A description of each item is given below. Pressing a key advances to the next item.

- RxCnt - This displays the number of bytes the unit has received on the Primary serial port. If this number is not increasing, check the following items:
    - The data source is correct (DATA:SRC);
    - The data cable is wired correctly and in the correct port;
    - The indicator is sending data;
    - The baud rate and serial format is correct;
- RxErr - This displays the number of receive errors that have occurred. If this number is increasing, check the following items:
    - The baud rate and serial format are correct;
    - Intermittent connections on the data cable;
- RFAIL - This displays the position in the format string at which the last message interpretation failed. A reading of zero indicates that the message was parsed correctly.

(DISPLY)   Display Test

This option forces the remote display to perform a display test. The test runs indefinitely, until a key is pressed.

(TMINAL)   Remote Display Terminal

This menu captures data from the primary port when operating Remote Display mode and displays it in an unformatted state. Use the GROUP key to scroll left, the ITEM key to scroll right. A long press of the Item key will switch between views. Pressing the EDIT key will exit the menu.

(CFGFMT)   Configure Format from Datastream

This option creates a Remote Display format string from the incoming data stream. It prompts for which format to overwrite (1-4), then acquires data from the primary port. It then requests the ETX character be selected, followed by the field start position and the field end position. From this information the format string is created.

8.7   Factory Adjustment Menu - (FACTRY)

(DEFLT) Restore Factory Defaults

Restores the digital setup of the **6500** back to the original "new" settings installed at the factory. The **6500** prompts to continue before restoring the default settings.

(FACRST)   Factory Reset

Factory access only.

(CONFIG)   Software Options

Use this item to enter software option codes to enable optional features in the **6500**. Refer to Section 10.

8.8   Leaving General Setup Menus - (-END-)

To exit setup and return to normal operation, press the **GROUP** key until the **-END-** group header appears in the display. Then press the **ITEM** button to exit the setup. The **6500** will display "SAVING" before returning to normal operation.

9   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.

9.1   Wiring Diagrams for Slave Modes
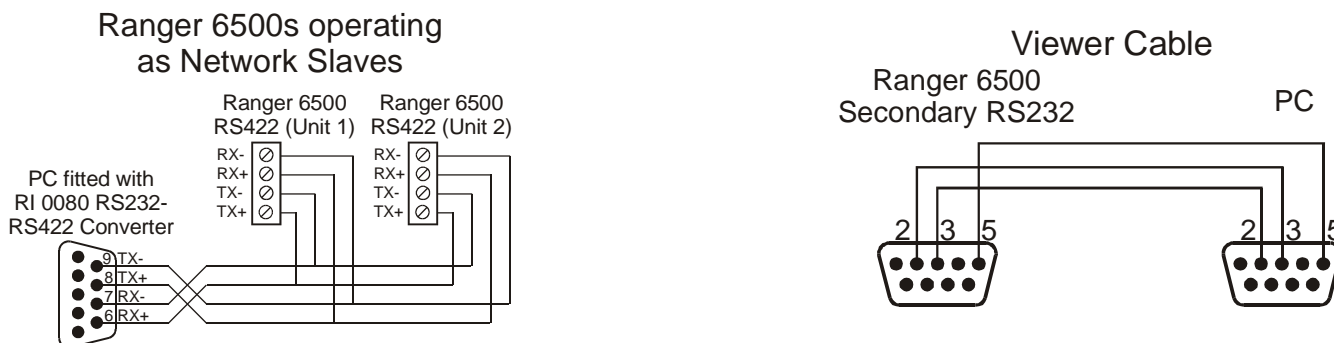
9.2   Network Slave (Secondary Port)

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.

9.2.1 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.

9.3   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 10 for details on software options.

9.3.1 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.

9.3.2 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)

9.3.3 Input Registers

The **6500** contains no input registers.

9.3.4 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

9.4 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 1st end character (General Menus- AUTOPT:ENDCH1). *Default: ASCII 03.*

END2 is the 2nd 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).

9.4.1 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.

9.4.2 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

9.4.3 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

10   SOFTWARE OPTIONS

Summing Master and Modbus Slave modes are optional extras with the **6500**. The standard unit does not have these options enabled. To enable any of these options it is necessary to purchase a license code which may be entered into the instrument by the factory at the time of purchase or it may be entered via the setup menus at any time thereafter.

The license codes are unique to each instrument. To purchase a license code for an existing instrument the serial number (see sticker on rear of the instrument) must be obtained. Following is the procedure to enter a license code into the **6500**:

- Enter General Setup on the **6500** by holding the **EDIT** key;
- Using the **GROUP** key select the FACTRY group;
- Using the **ITEM** key select the COnFIG item;
- Press the **EDIT** key to enter the software option code;
- The currently licensed options are displayed as listed in Section 10.1;
- "000000" is displayed and the 6 digit Software option code may be entered;
- Enter the code as per standard numeric entry;
- Press the **GROUP** key when done;
- If the code is entered correctly the updated licensing options are displayed and you are returned to the menus. Otherwise an error message "No Entry" is displayed;
- Exit Digital Setup.

10.1   6500 Software Options

The software options available in the **6500** are described in the table below. The items marked [*] are enabled as default factory settings.

Software Option	Config Symbol	Feature
Non Ranger Data Formats	R[*]	This option enables the unit to accept data from Non-Ranger indicators in "Remote" mode.
Alphanumeric	A[*]	The unit will display both text and numbers.
Networked	N	Enables the unit to operate as a serial summing master.
Modbus	M	Enables the unit to operate as a Modbus slave.

11   ERROR MESSAGES

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

11.1   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.

11.2   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).

11.3   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)

12   SPECIFICATIONS

PERFORMANCE	
Display	6 electromechanical digits, 75mm high with 15 segments per digit for displaying numeric and semi-alpha characters 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
DIGITAL	
Setup	Full digital with visual prompting in plain messages
Memory retention	Full non-volatile operation
SERIAL COMMS	
Primary Port Formats	RS-232/422/485 – two wire (receive only) 20mA serial current loop two wire (receive only) 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) RS-232/422/485 - four wire (receive and transmit for networking)
Secondary Port Features	Network slave and Modbus slave.
DIMENSIONS	
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
FEATURES	
	Status annunciators for Motion, Centre of Zero & Net mode
	P.C. programmable using Ranger Viewer software
APPROVALS	
	Complies with S1/0 for auxiliary devices
	C-Tick (N2708)
OPTIONS	
	Summing software for up to 10 Ranger indicators
	Modbus ASCII networking protocol
	Profibus networking protocol (requires external module)
	Swivel mounting bracket with weather hood

13   ASCII CODES

The following table shows the ASCII codes for control and printable characters.

Code	Char	Code	Char	Code	Char	Code	Char	Code	Char
000	NULL	026	SUB	052	'4'	078	'N'	104	'h'
001	SOH	027	ESC	053	'5'	079	'O'	105	'i'
002	STX	028	FS	054	'6'	080	'P'	106	'j'
003	ETX	029	GS	055	'7'	081	'Q'	107	'k'
004	EOT	030	RS	056	'8'	082	'R'	108	'l'
005	ENQ	031	US	057	'9'	083	'S'	109	'm'
006	ACK	032	' ' (space)	058	':'	084	'T'	110	'n'
007	BEL	033	'!'	059	';'	085	'U'	111	'o'
008	BS	034	'"'	060	'<'	086	'V'	112	'p'
009	HT	035	'#'	061	'='	087	'W'	113	'q'
010	LF	036	'$'	062	'>'	088	'X'	114	'r'
011	VT	037	'%'	063	'?'	089	'Y'	115	's'
012	FF	038	'&'	064	'@'	090	'Z'	116	't'
013	CR	039	'''	065	'A'	091	'['	117	'u'
014	SO	040	'('	066	'B'	092	'\'	118	'v'
015	SI	041	')'	067	'C'	093	']'	119	'w'
016	DLE	042	'*'	068	'D'	094	'^'	120	'x'
017	DC1	043	'+'	069	'E'	095	'_'	121	'y'
018	DC2	044	','	070	'F'	096	'`'	122	'z'
019	DC3	045	'-'	071	'G'	097	'a'	123	'{'
020	DC4	046	'.'	072	'H'	098	'b'	124	'|'
021	NAK	047	'/'	073	'I'	099	'c'	125	'}'
022	SYN	048	'0'	074	'J'	100	'd'	126	'~'
023	ETB	049	'1'	075	'K'	101	'e'	127	DEL
024	CAN	050	'2'	076	'L'	102	'f'		
025	EM	051	'3'	077	'M'	103	'g'		

14   SETUP MENU QUICK REFERENCE

6500 Remote Display Mode Menus

GROUP	ITEM	EDIT	Description	Ref
BRAND			Set brand of indicator for the remote display	4.3.1
SERIAL			Serial Port 1 options	4.3.2
	SRC		Data Source (RS232/RS422/Loop)	
	BAUD		Serial Baud Rate	
	BITS		Serial Bit Stream Configuration	
	ADDR		Serial Port Address for Networking	
OPTION			Display Options	4.3.3
	TIMEO		No Data Timeout Period	
	ShoWDp		Show/Hide decimal point	
BLOCK			Data Format Block Section	4.3.4
	BLK1- BLK4		Data Format Blocks 1- 4	
	ENABLE		Enable/Disable Format Blocks	
	PRESET		Preconfigure a Data Format Block	
	RESET		Revert all Data Format Blocks to default	

6500 Summing Master Mode Menus

GROUP	ITEM	EDIT	Description	Ref
OPTION			Display Options	4.4.1
	SLAVES		Number of slave units to sum	
	ShoWDp		Show/Hide decimal point	
	TIMEO		No Data Timeout Period	
SERIAL			Serial Port 1 options	4.4.2
	SRC		Data Source (RS232/RS422/Loop)	
	BAUD		Serial Baud Rate	
	BITS		Serial Bit Stream Configuration	

6500 Ranger 1200 Remote Display Mode Menus

GROUP	ITEM	EDIT	Description	Ref
SCALE			Display Options	4.5.1
	E1		Resolution of the Display	
	CAP1		Capacity of the Display	
	ShoWDp		Show/Hide decimal point	
	DP		Decimal Point Position	
	TIMEO		No Data Timeout Period	
SERIAL			Serial Port 1 options	4.5.2
	SRC		Data Source (RS232/RS422/Loop)	
	BAUD		Serial Baud Rate	
	BITS		Serial Bit Stream Configuration	

6500 General Menus

GROUP	► ITEM	▲ EDIT	Description	Ref
OPTION			General Display Options	8.3
	ShoWDp		Show/Hide decimal point	
	TIMEO		No Data Timeout Period	
	PASS.CD		Passcode to access setup menus	
SER 2			Serial Port 2 Settings	8.4
	TYPE2		Serial Port 2 Function	
	SRC2		Data Source (RS232/RS422)	
	BAUD2		Serial Port 2 Baud Rate	
	BITS2		Serial 2 Bit Stream Configuration	
	ADDR2		Serial Port 2 Address	
AutOpt			Serial Auto Transmission Settings	8.5
	AutTYP		Format for auto-transmit data	
	AutFMT		User programmable format	
	StChr		String start character (ASCII)	
	EndCH1		1st string end character (ASCII)	
	EndCH2		2nd string end character (ASCII)	
	Units		Units to be transmitted	
TEST			Test Facilities	8.6
	AUTO		Display current autobaud settings	
	SCAN		Perform an autobaud operation	
	STAT		Display received data statistics	
	DISPLY		Run a display test	
	TMINAL		Capture and display serial data	
	CFGFMT		Config. remote display from serial data	
FACTRY			Factory Settings	8.7
	DEFLT		Restore digital setup to factory settings	
	FACRST		Factory access only	
	CONFIG		Enter license codes	

Notes: