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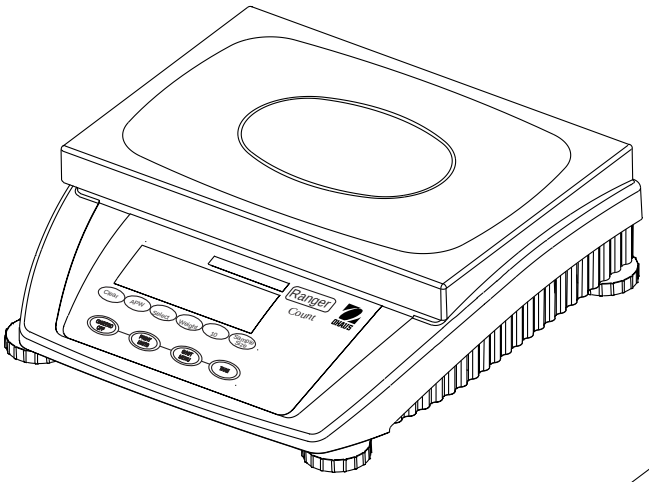
RANGER
COUNTING & WEIGHING SCALES

SERVICE MANUAL

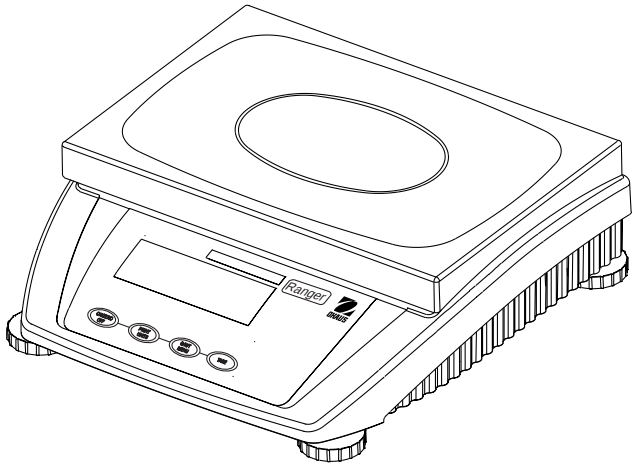
Ohaus Corporation

SERVICE MANUAL

Ranger Counting and Weighing Scales



Counting Scale



Weighing Scale

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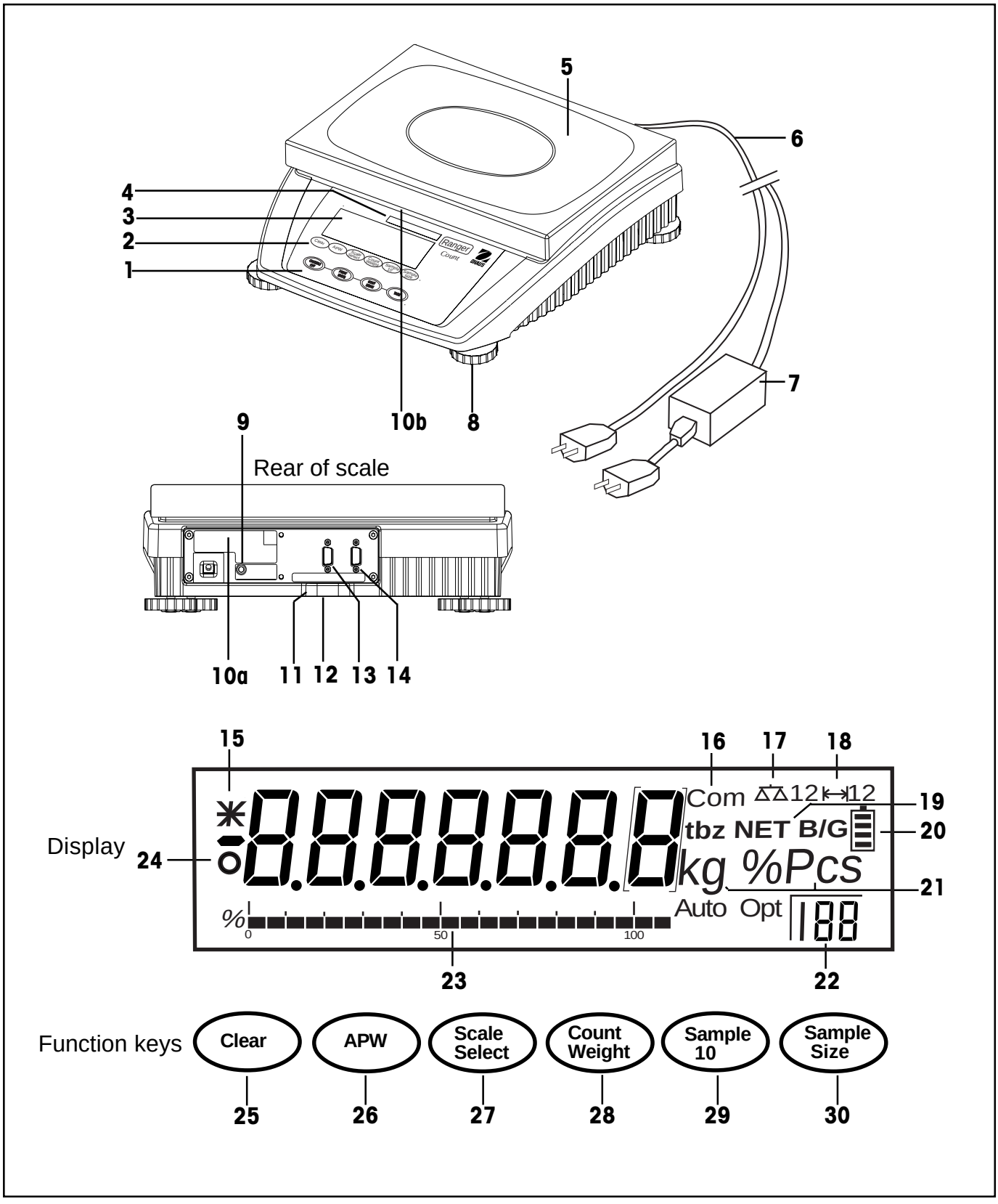


1.1 OVERVIEW OF RANGER COUNTING SCALE CONTROLS (Cont.)

Scale

1 Keypad

2 Function keys

3 Display

4 Scale specifications

5 Weighing pan

6 Power cord

7 Power cord with AC Adapter (Scale with internal battery optional)

8 Adjustable feet

Rear of scale

9 Jack for AC Adapter (battery option)

10a Serial # label (Europe)

10b Serial # label (USA) under weighing platform

11 Hole for antitheft device

12 Spirt level

13 RS232 Interface (Optional)

14 RS232 Interface (Standard)

Display

15 Stability indicator

16 Active interface (for menu mode)

17 Active scale (in 2-scale systems)

18 Weighing range display (for dual range scales)

19 Symbols for net/gross weight

20 Battery discharge status (optional battery)

21 Weighing unit

22 Number of user selected reference pieces

23 Weighing range bar graph

24 Center of zero indicator

Function keys

25 Clear APW and return to weighing.

26 Average Piece Weight - one piece reference weight is displayed for 3 seconds.

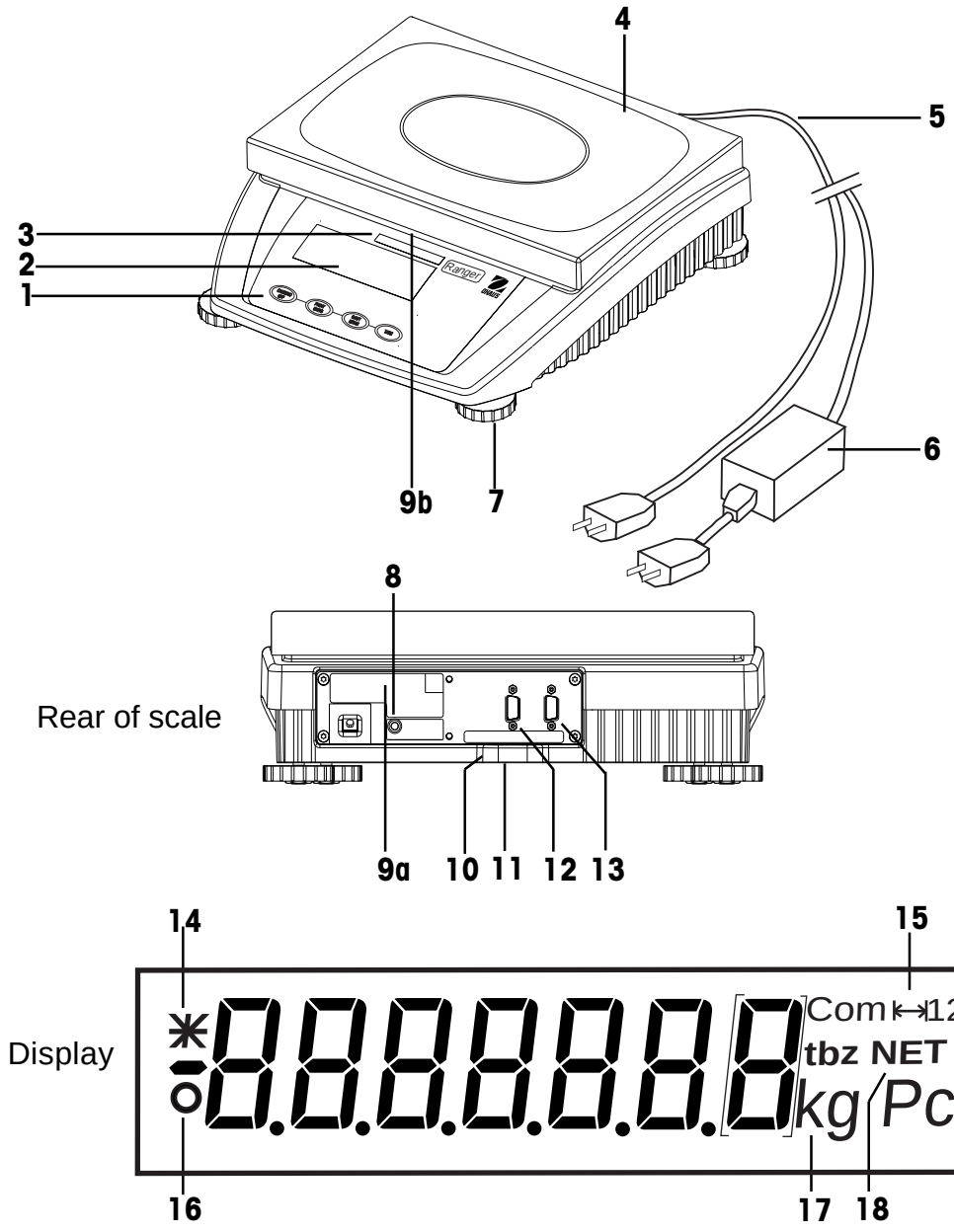
27 If RS is set to reference or bulk mode, this button switches the display between the host scale and the remote scale. Tare, Zero and G/N/T buttons functions are active for the scale being displayed.

28 Switch between Weighing and Counting Modes.

29 Used for a sample size of 10 pieces.

30 Continuous press - scrolls through 5, 15, 20, 25, 30, 50 and 100 pieces - sample size. Short press - take sample size as indicated

1.2 OVERVIEW OF RANGER WEIGHING SCALE CONTROLS



Display

1 Keypad
2 Display
3 Capacity label
4 Weighing pan
5 Power cord
6 AC Adapter (Scale with battery option)
7 Adjustable feet
8 Jack for AC Adapter (battery option)
9a Serial # label (Europe)
9b Serial # Label (USA) under weighing platform
10 Hole for antitheft device
11 Spirt level
12 RS232 Interface (Optional)
13 RS232 Interface (Standard)
14 Stability indicator
15 Weighing range display (for dual range scales)
16 Center of zero indicator
17 weighing unit
18 Net symbol when weighing with tare
19 Battery discharge status (optional)

CHAPTER 1 INTRODUCTION

1.3 INTRODUCTION

This service manual contains instructions for the repair and maintenance work to be performed by service engineers on the Ranger Counting and Weighing Scales (Strain Gauge loadcells). It is assumed that the reader is familiar with the operation of the Scale and can refer to the relevant operating instructions when necessary.

This manual covers maintenance on the following:

Ranger Counting Scales (small platform, capacities 3kg and 6kg)
Ranger Counting Scales (large platform, capacities 12kg (NTEP), 15kg (OIML), 30kg, 35kg and 60kg)
Ranger Weighing Scales (small platform, capacities 3kg and 6kg)
Ranger Weighing Scales (large platform, capacities 12kg (NTEP), 15kg (OIML), 30kg (NTEP), 35kg (OIML) and 60kg.

The contents of this manual is contained in five chapters.

Chapter 1 Introduction - Contains information regarding service facilities, tools and test equipment, test masses, and specifications.

Chapter 2 Troubleshooting - Contains a diagnosis/diagnostics chart and error code table.

Chapter 3 Maintenance Procedures - Contains preventive maintenance procedures, performance tests and adjustments, repair procedures, service mode procedures, and calibration procedures.

Chapter 4 Drawings and Parts Lists - Contains exploded views of Ranger Scales identifying all serviceable replacement components with parts lists.

Before servicing the scale, you should be familiar with the Instruction Manual which is packed with every Ranger Scale.

1.4 SERVICE FACILITIES

To service the Ohaus Ranger Scale, the service area should meet the following requirements:

DO NOT SERVICE the scale:

- Next to open windows or doors causing drafts or rapid temperature changes.
- Near air conditioning or heat vents.
- Near vibrating, rotating or reciprocating equipment.
- Near magnetic fields or equipment that generates magnetic fields.
- On an unlevel work surface.
- Allow sufficient space around the instrument for ease of operation and keep away from radiating heat sources.

1.5 TOOLS AND TEST EQUIPMENT REQUIRED

In order to properly service the Ohaus Ranger Scales, a standard electronic tool kit is required. No special tools and test items are required.

1.5.1 Special Tools

None required.

1.5.2 Standard Tools and Test Equipment

1. Digital Voltmeter (DVM) - Input impedance of at least 10 megohms in the 1 Volt dc position.

2. Torx screwdrivers, TX8, TX20, TX30 and TX50

1.6 TEST MASSES REQUIRED

The masses required to test the Ohaus Ranger Scales must meet the requirements of ASTM Class 4 Tolerance. The mass values are listed in Tables 1-1 and 1-2.

TABLE 1-1. RANGER CALIBRATION MASSES KG

TYPE	MODEL	CAPACITY	SPAN	LINEARITY	NOTES
Weighing SG	RD3RS	3kg	3kg	1.5kg	
Weighing SG	RD6RS	6kg	6kg	3kg	
Weighing SG	RD12LS	12kg	12kg	6kg	Single Range (NTEP)
Weighing SG	RD12LS	15kg	15kg	7.5kg	Dual Range (OIML)
Weighing SG	RD30LS	30kg	30kg	15kg	Single Range (NTEP)
Weighing SG	RD30LS	35kg	35kg	17.5kg	Dual Range (OIML)
Weighing SG	RD60LS	60kg	60kg	30kg	Single Range (NTEP)

TABLE 1-2. RANGER CALIBRATION MASSES LB

TYPE	MODEL	CAPACITY	SPAN	LINEARITY	NOTES
Weighing SG	RD3RS	6lb	6lb	3lb	
Weighing SG	RD6RS	12lb	12lb	6lb	
Weighing SG	RD12LS	24lb	24lb	12lb	Single Range (NTEP)
Weighing SG	RD12LS	30lb	30lb	7.5lb	Dual Range (OIML)
Weighing SG	RD30LS	60lb	60lb	30lb	Single Range (NTEP)
Weighing SG	RD30LS	70lb	70lb	35lb	Dual Range (OIML)
Weighing SG	RD60LS	120lb	120lb	60lb	Single Range (NTEP)

CHAPTER 1 INTRODUCTION

1.7 SPECIFICATIONS

Complete specificatons for the Ohaus Ranger Counting and Weighing Scales are listed in Tables 1-3 through 1-6. When a scale has been serviced, it must meet the specifications listed in the table. Before servicing the scale, determine what specifications are not met.

TABLE 1-3. RANGER COUNT NTEP VERSION SPECIFICATIONS

Standard Models —NTEP*	**RD3RS**	**RD6RS**	**RD12LS**	**RD30LS**	**RD60LS**
Default Capacity x Readability (lb)	6 x 0.0005	12 x 0.001	24 x 0.002	60 x 0.005	120 x 0.01
Default Capacity x Readability(kg)	3 x 0.0002	6 x 0.0005	12 x 0.001	30 x 0.002	60 x 0.005
Default Capacity x Readability (g)	3000 x 0.2	6000 x 0.5	12000 x 1	30000x 2	60000 x 5
Default Capacity x Readability (oz)	60 x 0.005	120 x 0.01	240 x 0.02	600 x 0.05	1200 x 0.1
NTEP Capacity x Readability (lb)	6 x 0.001	12 x 0.002	24 x 0.005	60 x 0.01	120 x 0.02
NTEP Capacity x Readability (kg)	3 x 0.0005	6 x 0.001	12 x 0.002	30 x 0.005	60 x 0.01
NTEP Capacity x Readability(g)	3000 x 0.5	6000 x 1	12000 x 2	30000 x 5	60000 x 10
NTEP Capacity x Readability (oz)	60 x 0.01	120 x 0.02	240 x 0.05	600 x 0.1	1200 x 0.2
Linearity (g)	+/- 0.2	+/- 0.5	+/- 1.0	+/- 2.0	+/- 5.0
Order number:	**RD3RS-2E0**	**RD6RS-2E0**	**RD12LS-2E0**	**RD30LS-2E0**	**RD60LS-2E0**

Note NTEP for weighing only

General Specifications All Models		
Platform size (w x d) (in/cm)	9.5 x 8 / 24 x 20	14 x 9.5 / 35 x 24
Scale dimensions (w x d x h) (in/cm)	10.5 x 13.2 x 4 / 26.5 x 33.5 x 10	14.2 x 14.6 x 4.5 / 36 x 37 x 11.5
Shipping dimensions (w x d x h) (in/cm)	16.5 x 19 x 10 / 42 x 48 x 25	20 x 20.5 x 10.5 / 52 x 53 x 27
Weight lb/kg)	11.5 / net (14 / 6.5 gross)	21 / 9.5 net (24 / 11 gross)
Weighing units	g, kg, lb, oz	
Display	0.63 inch / 16 mm digit height, (Backlit LCD)	
Power	Internal power supply / 40 hour rechargeable battery powered models available	
Span Calibration	25% - 100% capacity	
Linearity Calibration (3 point calibration)	0 – 50% - 100% capacity	
Auto Zero Tracking	0.5d, 1d, 3d, OFF	
Construction	Stainless steel weighing pan / Painted cast-aluminum housing	
Protection	IP43	
Operating temperature	Standard models -10°C to 40C°	
Storage temperature	-20°C to 60°C	

NOTE: Parts counting is not NTEP approvable.

1.7 SPECIFICATIONS (Cont.)

TABLE 1-4. RANGER WEIGHING NTEP VERSION SPECIFICATIONS

Standard Models —NTEP	**RD3RS**	**RD6RS**	**RD12LS**	**RD30LS**	**RD60LS**
Default Capacity x Readability (lb)	6 x 0.0005	12 x 0.001	24 x 0.002	60 x 0.005	120 x 0.01
Default Capacity x Readability (kg)	3 x 0.0002	6 x 0.0005	12 x 0.001	30 x 0.002	60 x 0.005
Default Capacity x Readability (g)	3000 x 0.2	6000 x 0.5	12000 x 1	30000 x 2	60000 x 5
Default Capacity x Readability (oz)	60 x 0.005	120 x 0.01	240 x 0.02	600 x 0.05	1200 x 0.1
NTEP Capacity x Readability (lb)	6 x 0.001	12 x 0.002	24 x 0.005	60 x 0.01	120 x 0.02
NTEP Capacity x Readability (kg)	3 x 0.0005	6 x 0.001	12 x 0.002	30 x 0.005	60 x 0.01
NTEP Capacity x Readability (g)	3000 x 0.5	6000 x 1	12000 x 2	30000 x 5	60000 x 10
NTEP Capacity x Readability (oz)	60 x 0.01	120 x 0.02	240 x 0.05	600 x 0.1	1200 x 0.2
Linearity (g)	+/- 0.2	+/- 0.5	+/- 1.0	+/- 2.0	+/- 5.0
Order number:	**RD3RS-2E0**	**RD6RS-2E0**	**RD12LS-2E0**	**RD30LS-2E0**	**RD60LS-2E0**

Ranger Options

1	BATTERY	To order Ranger with internal rechargeable battery, **add /1** to the order number above.
2	2nd RS232	To order Ranger with second RS232 data interface, **add /2** to the order number above.
3	BATTERY & 2nd RS232	To order Ranger with both an internal rechargeable battery and second RS232 data interface, **add /3** to the order number above.

General Specifications

Platform size (w x d) (in/cm)	9.5 x 8 / 24 x 20	14 x 9.5 / 35 x 24
Scale dimensions (w x d x h) (in/cm)	10.5 x 13.2 x 4 / 26.5 x 33.5 x 10	14.2 x 14.6 x 4.5 / 36 x 37 x 11.5
Shipping dimensions (w x d x h) (in/cm)	16.5 x 19 x 10 / 42 x 48 x 25	20 x 20.5 x 10.5 / 52 x 53 x 27
Weight (lb/kg)	11.5 / net (14 / 6.5 gross)	21 / 9.5 net (24 / 11 gross)
Weighing units	g, kg, lb, oz	
Display	0.63 inch / 16 mm digit height, (Backlit LCD)	
Power	Internal power supply / 40 hour rechargeable battery powered models available	
Span Calibration	25% - 100% capacity	
Linearity Calibration (3 point calibration)	0 – 50% - 100% capacity	
Auto Zero Tracking	0.5d, 1d, 3d, OFF	
Construction	Stainless steel weighing pan / Painted cast-aluminum housing	
Protection	IP43	
Operating temperature	Standard models -10°C to 40C°	
Storage temperature	-20°C to 60°C	

1.7 SPECIFICATIONS (Cont.)

TABLE 1-5. RANGER COUNT OIML VERSION SPECIFICATIONS

Models	**3 kg**		**6 kg**		**15 kg**		**35 kg**		**60 kg**	
WEIGHING RANGE	Range 1	Range 2	Range 1	Range 2	Range 1	Range 2	Range 1	Range 2	Range 1	Range 2
Default Cap. x Readability (kg)	1.5kg x0.5g	3kg x 1g	3kg x 1g	6kg x 2g	6 x 0.002	15 x 0.005	15 x 0.005	35 x 0.01	30 x 0.01	60 x 0.02
Default Cap. x Readability (g)	1500 x 0.5	3000 x 1	3000 x 1	6000 x 2	6000 x 2	15000 x 5	15000 x 5	35000 x 10	30000x 10	60000x20
Default Cap. x Readability (lb)	3 x 0.001	6 x 0.002	6 x 0.002	12 x 0.005	12 x 0.005	30 x 0.01	30 x 0.01	70 x 0.02	60 x 0.02	120 x0.05
Default Cap. x Readability (oz)	30 x 0.02	60 x 0.02	60 x 0.02	120 x 0.05	120 x 0.05	300 x 0.2	300 x 0.2	700 x 0.2	600 x 0.2	1200 x 0.5

General Specifications	Small Platform	Large Platform
Platform size (w x d) (cm)	24 x 20	35 x 24
Scale dimensions (w x d x h) (cm)	26.5 x 33.5 x 10	36 x 37 x 11.5
Shipping dimensions (w x d x h)(cm)	42 x 48 x 25	52 x 53 x 27
Weight (kg)	5 net (6.5 gross)	9.5 net (11 gross)
Weighing units	g, kg, lb, oz	
Display	0.63 inch / 16 mm digit height, (Backlit LCD)	
Power	Internal power supply / 40 hour rechargeable battery powered models available	
Span Calibration	25% - 100% capacity	
Linearity Calibration (3 points)	0 – 50% - 100% capacity	
Auto Zero Tracking	0.5d, 1d, 3d, OFF	
Construction	Stainless steel weighing pan / Painted cast-aluminum housing	
Protection	IP43	
Operating temperature	Standard models -10°C to 40C°	
Storage temperature	-20°C to 60°C	

TABLE 1-6. RANGER WEIGHING OIML VERSION SPECIFICATIONS

Models	**3 kg**		**6 kg**		**15 kg**		**35 kg**		**60 kg**	
WEIGHING RANGE	Range 1	Range 2	Range 1	Range 2	Range 1	Range 2	Range 1	Range 2	Range 1	Range 2
Default Cap. x Readability (kg)	1.5kg x0.5g	3kg x 1g	3kg x 1g	6kg x 2g	6 x 0.002	15 x 0.005	15 x 0.005	35 x 0.01	30 x 0.01	60 x 0.02
Default Cap. x Readability (g)	1500 x 0.5	3000 x 1	3000 x 1	6000 x 2	6000 x 2	15000 x 5	15000 x 5	35000 x 10	30000x 10	60000x20
Default Cap. x Readability (lb)	3 x 0.001	6 x 0.002	6 x 0.002	12 x 0.005	12 x 0.005	30 x 0.01	30 x 0.01	70 x 0.02	60 x 0.02	120 x0.05
Default Cap. x Readability (oz)	30 x 0.02	60 x 0.02	60 x 0.02	120 x 0.05	120 x 0.05	300 x 0.2	300 x 0.2	700 x 0.2	600 x 0.2	1200 x 0.5

General Specifications	Small Platform	Large Platform
Platform size (w x d) (cm)	24 x 20	35 x 24
Scale dimensions (w x d x h) (cm)	26.5 x 33.5 x 10	36 x 37 x 11.5
Shipping dimensions (w x d x h)(cm)	42 x 48 x 25	52 x 53 x 27
Weight (kg)	5 net (6.5 gross)	9.5 net (11 gross)
Weighing units	g, kg, lb, oz	
Display	0.63 inch / 16 mm digit height, (Backlit LCD)	
Power	Internal power supply / 40 hour rechargeable battery powered models available	
Span Calibration	25% - 100% capacity	
Linearity Calibration (3 points)	0 – 50% - 100% capacity	
Auto Zero Tracking	0.5d, 1d, 3d, OFF	
Construction	Stainless steel weighing pan / Painted cast-aluminum housing	
Protection	IP43	
Operating temperature	Standard models -10°C to 40C°	
Storage temperature	-20°C to 60°C	

All Ranger models meets the requirements of Approval Agencies: UL, FCC, CSA, CE Safety EN60950, Emissions EN55022, Immunity EN50082-1.

2.1 TROUBLESHOOTING

This section of the manual specifies problem areas of the scale which can occur. Information is contained to isolate specific problems using Table 2-1, Diagnostic Guide, and Table 2-2, Error Codes. Follow all directions step by step. Make certain that the work area is clean and use care when handling components of the scale.

2.2 DIAGNOSTIC GUIDE

Table 2-1 is a diagnostic guide designed to help locate the problem area quickly and easily. To use the table, first locate the symptom that you are observing. Follow the symptom column and review the probable cause column and remedy column. The probable causes are listed with the most common cause first. If the first remedy does not fix the problem, proceed on to the next remedy. Before attempting to repair the scale, read all chapters of this manual to familiarize yourself with the scale components and operation. Do not attempt repairs unless you fully understand the operation of the scale.

2.2.1 Diagnosis

1. Isolate and identify the symptom.
2. Refer to Table 2-1 Diagnostic guide and locate the symptom.
3. Follow the suggested remedies in the order that they appear.
4. Perform the indicated checks, or see the appropriate section of the manual.
5. Repair or replace the defective section of the scale.

NOTE:
If more than one symptom is observed, it is necessary to approach one area at a time, and also remember, that the symptoms may be interrelated.

In the event that erratic or fluctuating weight readings are observed, it is necessary to isolate the problem to either the mechanical area or the electronic area of the scale.

If a problem arises that is not covered in this manual, contact:

Ohaus Corporation
19A Chapin Road
P.O. Box 2033
Pine Brook, NJ 07058-2033 USA
Tel: 973-377-9000
Fax: 973-593-0359

In the United States call toll free, 800-526-0659 between 8:00 a.m. and 6:00 p.m. EST.

CHAPTER 2 TROUBLESHOOTING

TABLE 2-1. DIAGNOSTIC GUIDE

SYMPTOM	PROBABLE CAUSE(S)	REMEDY
Unit will not turn on.	Not plugged in or properly connected.	Check power cord connections.
	Battery operation -battery dead or not fully charged.	Check battery, charge battery.
	Membrane switch failure.	Check functions of membrane switch.
Cannot zero scale, or will not zero when turned on.	Load on scale exceeds allowable zero.	Reduce load on scale to less than current amount.
	Platform unsteady.	Remove source of vibration.
Center of Zero display erratic or does not appear with no load on platform.	Scale platform motion or disturbances exceed center of zero criteria.	Remove external disturbances or reduce motion.
		Increase AZT level in readout menu.
		Increase averaging level in readout menu.
Cannot display weight in desired weighing unit.	Desired unit not set to ON in Read menu.	Enable desired unit in Read menu.
RS232 not working.	RS232 communication parameters set up incorrectly.	Verify communication parameters.
	Improper or loose cable connections.	Check cable connections.
Unable to calibrate unit.	Incorrect value for calibration mass.	Use correct calibration mass.
	Lockout menu CAL set to ON.	Set CAL to OFF in LOC menu.
	LFT set ON.	Set LFT to OFF.

2.3 ERROR CODES

This scale is equipped with software which will display an error condition when it occurs. When a problem occurs using the scale, the display will indicate an error code. Review the listed codes and follow instructions to correct the problem. Table 2-2 Error Codes, describes the various error codes which can appear on the display and specifies the probable reason and remedy.

TABLE 2-2. ERROR CODES

The following list describes the various error codes and which can appear on the display and the suggested remedy.

Error 1:	Indicates an overload condition.
Error 2:	Indicates an underload condition.
Error 3:	Average piece weight too small.
Error 4:	Reference weight too small. The weight on the platform is too small to define a valid reference weight for counting scale.
Error 5:	No valid reading from second scale. When parts counting with a two scale system, communications lost.
Error 6:	Scale needs calibration.
Error 9:	Unstable weight reading when defining the reference weight.
Error 53:	EEPROM checksum error.
-------:	Busy (tare, zero, printing).
--no--:	Function not executed.

2.4 ERROR MESSAGES AFTER SERVICE WORK

In addition to the errors described in the operating instructions, the following error messages may also appear after carrying out service work:

Error 6: **No calibration**

This error only occurs after reinitializing the EEPROM, i.e. after rectifying Error 53.
Remedy: recalibrate the scale in service mode.

Error 53: **Invalid data in EEPROM (checksum error)**

This error message indicates defective type data in the EEPROM.
Remedy: Completely reset the scale by holding down the **PRINT *UNITS*** button. “Flush” appears in the display. The scale restarts and then indicates Error 6. Re-enter the type data (weighing range, serial number, geographical adjustment value) in service mode and save them. Access service mode again and then calibrate and linearize the scale.

CHAPTER 3 MAINTENANCE PROCEDURES

3.1 PREVENTIVE MAINTENANCE

Ohaus scales are precision instruments and should be carefully handled, stored in a clean dry area which is dust free, and cleaned periodically. It is recommended that when a scale has had chemicals or liquids spilled on it, the scale should be cleaned as soon as possible. Use warm water on a damp cloth to clean all exterior surfaces. Do not leave a mass on the scale when not in use. When moving the scale from a storage area which is at a different temperature than the area where it is to be operated, allow sufficient time for the scale's mechanism to temperature stabilize. This time can vary quite a bit depending upon the temperature differences. Allow one (1) hour for each 5 degrees Fahrenheit temperature change before using the scale. Also, after turning the scale ON, allow one hour after temperature stabilization for the scale electronics to stabilize.

3.1.1 Preventive Maintenance Checklist

On a regular basis, the scale should be inspected and checked as follows:

1. Remove the Platform and Sub Platform and inspect and clean the area beneath the Platform.

2. Clean the outside of the scale using a damp cloth with water.

CAUTION

DO NOT USE CHEMICAL CLEANERS OR SOLVENTS OF ANY TYPE. SOME CLEANERS ARE ABRASIVE AND MAY AFFECT THE FINISH OF THE SCALE.

3. Check the Power Cord for broken or damaged insulation.

4. Make a visual inspection for faulty connectors, wiring, and loose hardware.

3.2 TESTING

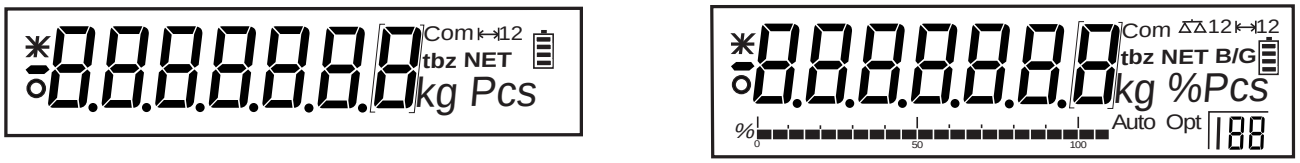
Before servicing the Ranger scale, an operational test and various performance tests should be made to ascertain whether or not the scale meets specifications. Turn the scale on and allow it warm up for at least one hour before performing these tests. Make sure the test area is free from drafts and the surface that the scale rests on is level and vibration free. The masses used for the performance tests and adjustments must meet or exceed ASTM Class 1 Tolerance.

3.2.1 Operational Test

1. Plug the Power Cord into a suitable power source.

3.2.1.1 Segment Display Test

1. Turn the scale on, all segments are enabled and displayed breifly, then the model number of the scale followed by a software revision number. This is a segment display test. Figure 3-1 is a full display test.



Weighing Display Counting Display

Figure 3-1. Segment Displays

3.2.2 Menu Structure

Programmable features of the Ranger Scales are contained in menus which are accessed through the front panel control switches. Figure 3-2 illustrates the Ranger Counting Scale, Figure 3-3 illustrates the Ranger Weighing Scale. Figure 3-4 illustrates the service menu structure.

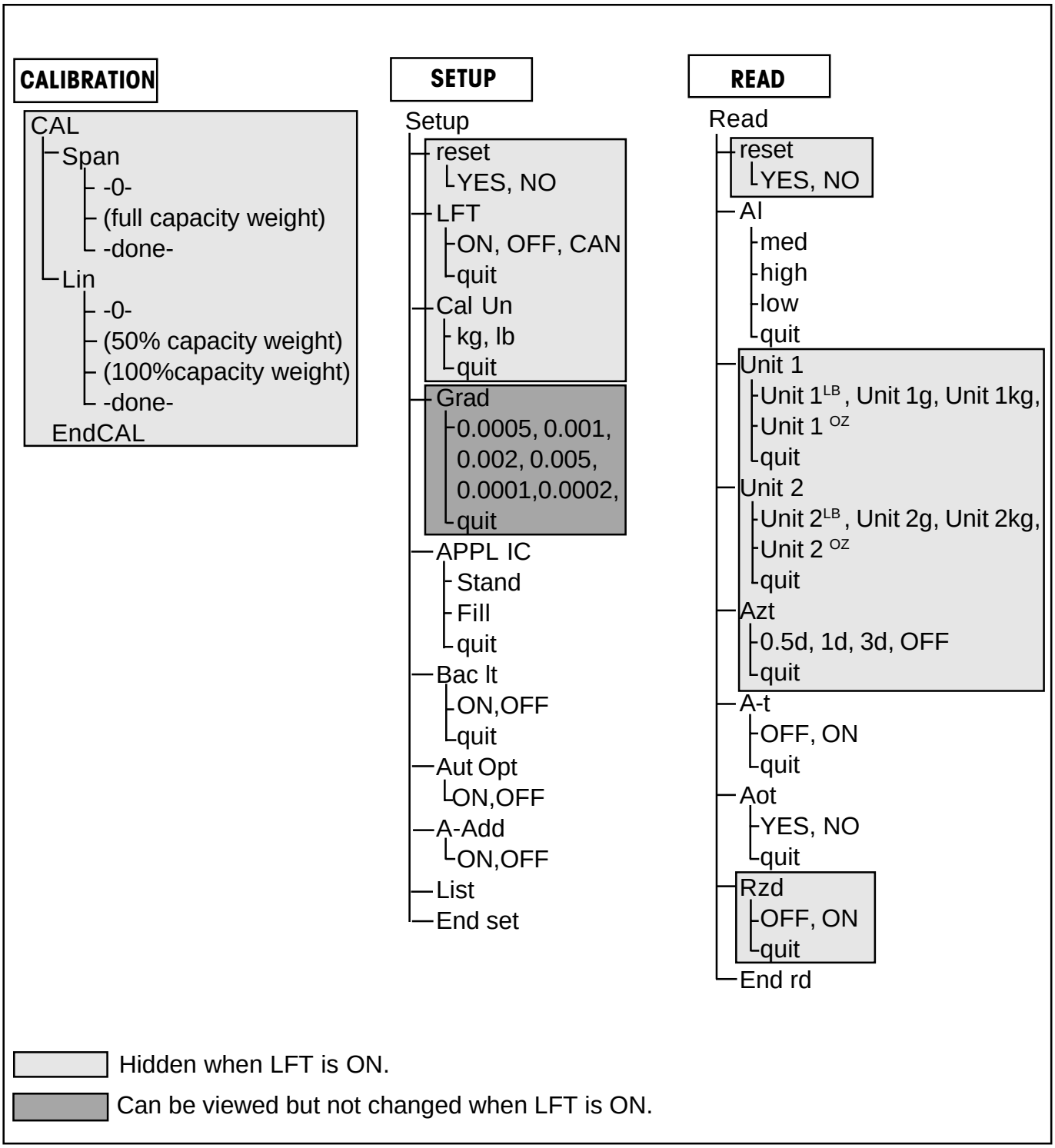


Figure 3-2. Ranger Counting Scale Menus (Sheet 1 of 2).

3.2.2 Menu Structure (Cont.)

RS232-1

- rs232-1 Com 1
  - reset
    - YES, NO
  - Mode
    - Print, On Stb, Stb only, Cont, Dialog, Disp 2, Ref 2, Bulk2
    - quit
  - baud
    - 300,600,1200, 2400, 4800, 9600, 19200,
    - quit
  - Parity
    - 7 even, 7 no p, 8 no p, 7 odd
    - quit
  - Stop
    - 1, 2
    - quit
  - Handsh
    - YES, NO
    - quit
  - Defstr
    - Header
      - ON, OFF
    - Gross
      - ON, OFF
    - Net
      - ON, OFF
    - Tare
      - ON, OFF
    - PCS
      - ON, OFF
    - APW
      - ON, OFF
    - REF CT
      - ON, OFF
    - 4 L INF
      - ON, OFF
    - F Feed
      - ON, OFF
    - LN For
      - Single, multi,
  - End rs1

RS232-2

- rs232-2 Com 2
  - reset
    - YES, NO
  - Mode
    - Print, On Stb, Stb only, Cont, Dialog, Disp 2, Ref 2, Bulk2
    - quit
  - baud
    - 300,600,1200, 2400, 4800, 9600, 19200,
    - quit
  - Parity
    - 7 even, 7 no p, 8 no p, 7 odd
    - quit
  - Stop
    - 1, 2
    - quit
  - Handsh
    - YES, NO
    - quit
  - Defstr
    - Header
      - ON, OFF
    - Gross
      - ON, OFF
    - Net
      - ON, OFF
    - Tare
      - ON, OFF
    - PCS
      - ON, OFF
    - APW
      - ON, OFF
    - REF CT
      - ON, OFF
    - 4 L INF
      - ON, OFF
    - F Feed
      - ON, OFF
    - LN For
      - Single, multi,
  - End rs2

LOCKOUT

- Loc
  - Cal
    - ON, OFF
    - quit
  - Setup
    - ON, OFF
    - quit
  - Read
    - ON, OFF
    - quit
  - RS232-1
    - ON, OFF
    - quit
  - RS232-2
    - ON, OFF
    - quit
  - Locset
    - ON, OFF
    - quit
  - Endloc
    - quit
  - Store ?

QUIT

- Quit
  - Store ?

Figure 3-2. Ranger Counting Scale Menus (Sheet 2 of 2).

3.2.2 Menu Structure (Cont.)

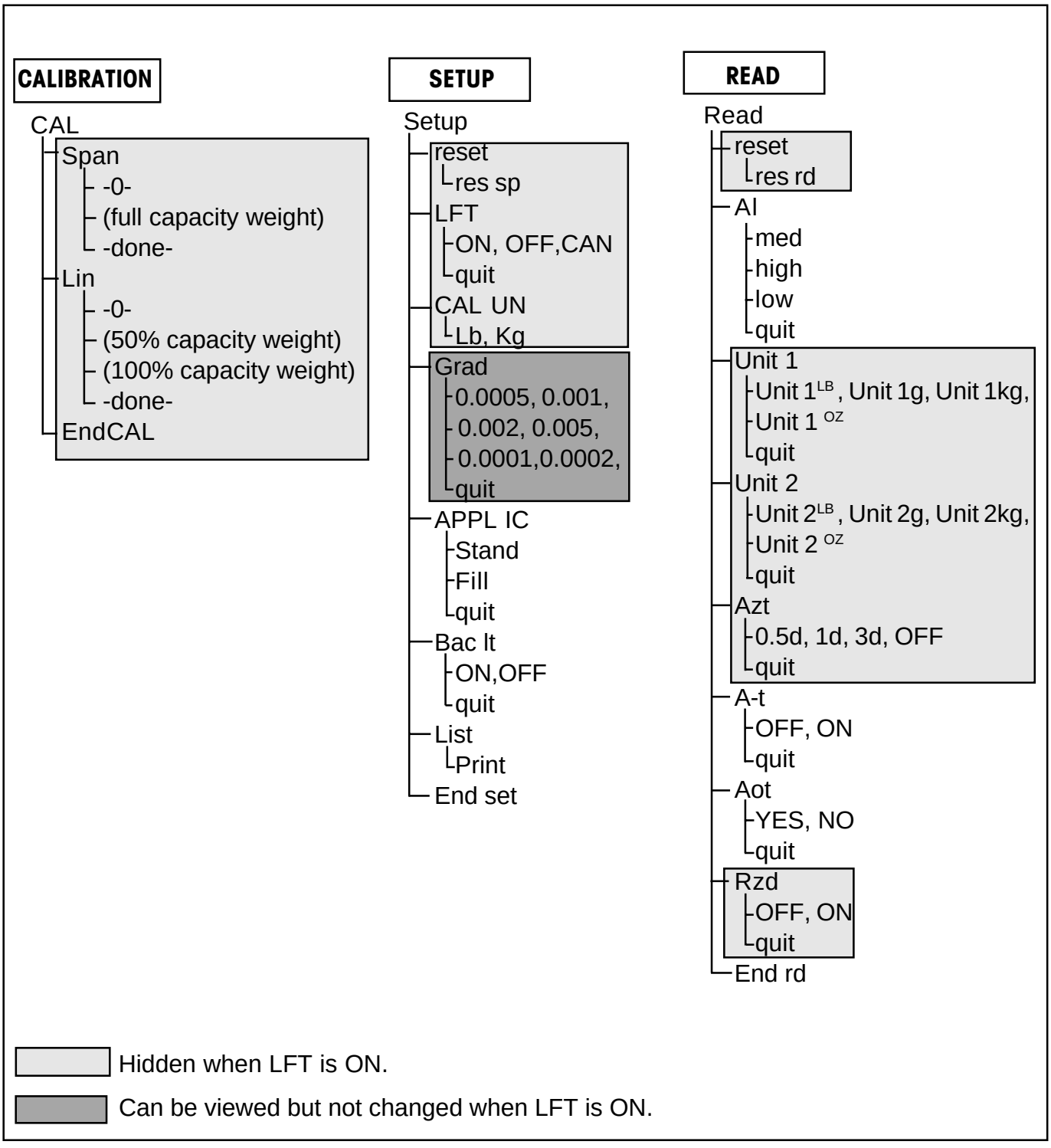


Figure 3-3. Ranger Weighing Scale Menus (Sheet 1 of 2).

3.2.2 Menu Structure (Cont.)

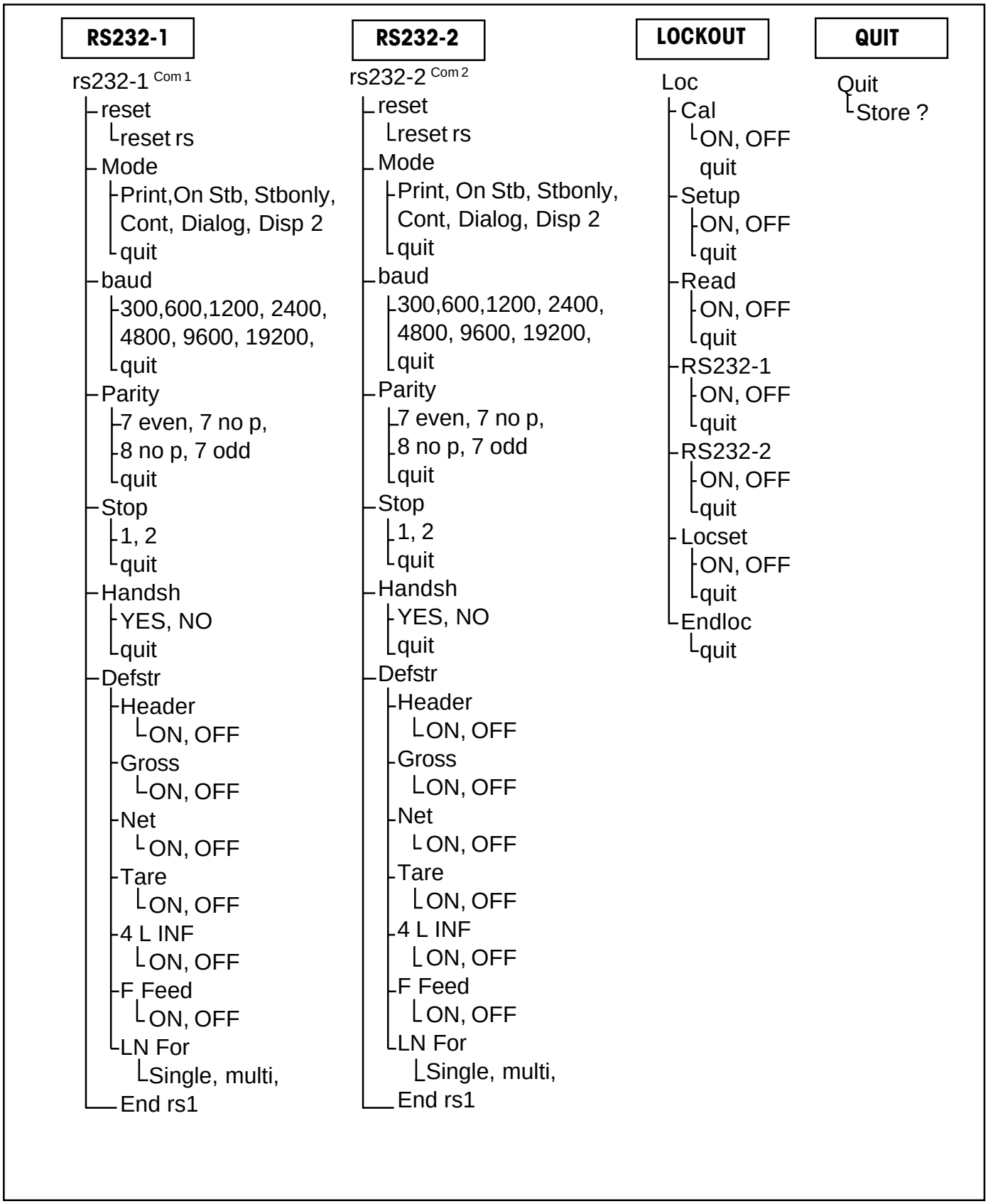


Figure 3-3. Ranger Weighing Scale Menus (Sheet 2 of 2).

3.2.2 Menu Structure (Cont.)

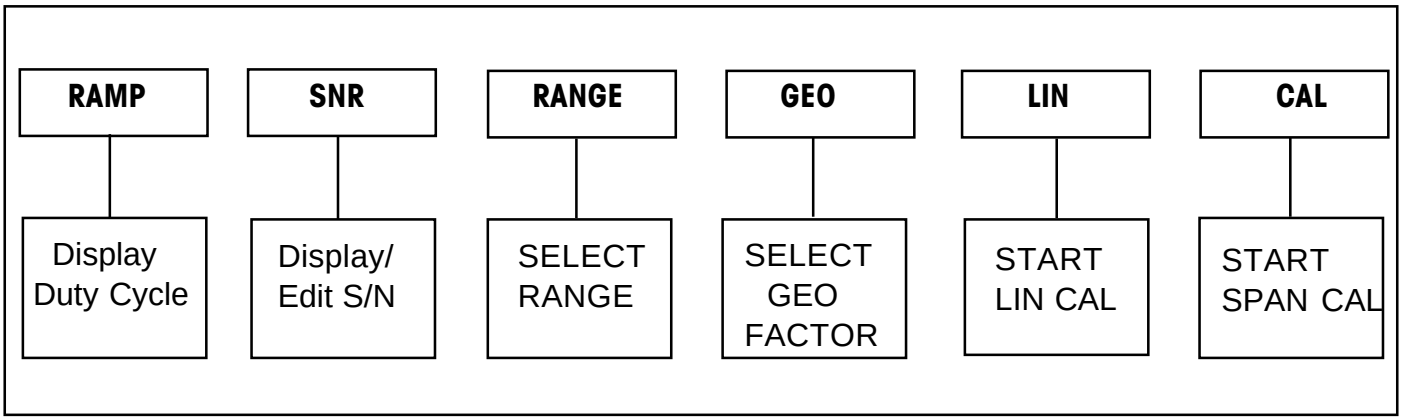


Figure 3-4. Ranger Service Menu Structure .

3.2.3 Ranger Counting Switch Functions

There are two sets of button switches located on the front panel of the Ranger Counting Scale. The six button switches located directly under the display are used for counting functions. The four button switches located below the six switches provide basic scale operation and menu setups. Please read the following information before pressing any of these buttons.

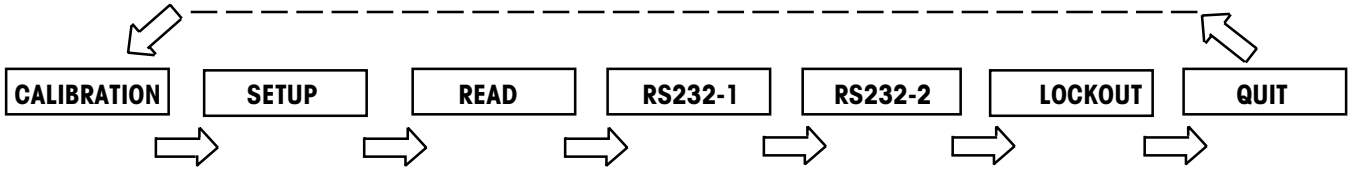
BUTTONS	FUNCTION
Clear	Short press -Average Piece Weight (APW) is cleared and scale returns to weighing mode.
APW	Short press - Average Piece Weight - one piece reference weight is displayed for 3 seconds.
Scale Select	Switches the display between scale 1 (host) and scale 2 (remote). If 2 scales are connected, the functions zero, G/N/T & tare will be executed on the scale that is currently on the host LCD.
Count Weight	Short press - Switches from weighing to counting mode.
Sample 10	Short press - Takes average piece weight for a sample size of 10.
Sample Size	Long press and hold - scrolls through 5, 15, 20, 25, 30, 50 and 100 pieces - sample size. Short press - Takes average piece weight for sample number of pieces shown in display.

3.2.3 Ranger Counting Switch Functions

BUTTONS	PRIMARY FUNCTION	SECONDARY FUNCTION
ON/ZERO ***OFF***	Short press - Turns scale **ON** if OFF. Long press - Turns scale **OFF** if ON.	When scale is ON, short press zeros the scale.
PRINT ***UNITS***	Short press - Sends current weight to printer. Long press - Changes **UNITS**.	When in MENU MODE: short press = **NO**.
G/N/T ***MENU***	Short presses - Toggles display between Gross/Net/Tare if tare value is stored. No action for 5 secs., scale display returns to **NET**. Long press - Enter **MENU**.	When in MENU MODE: short press = **YES**.
TARE	Short press - enter **TARE**.	

3.2.4 Ranger Counting Scale Menu Operation

This section describes the menu operation. The menu permits matching the scale to specific weighing needs. In the menu, you can change the settings of the scale and activate functions. The Main Menu contains 7 sub menus. Each of the seven sub menus are described in detail in the following sections.



3.2.4.1 How to Enter the Menus

To enter the menus, press and hold the **G/N/T *MENU*** button until CAL appears. This is the first menu, CALIBRATION. If LFT is ON, Setup appears first (CAL is hidden).

3.2.4.2 How to Select a Specific Menu

A short press on the **PRINT *UNITS*** button = NO. When in MENU MODE short presses will advance to the next menu as shown above. When QUIT is reached, the next press on the **PRINT *UNITS*** button will return to the CALIBRATION or SETUP menu.

3.2.4.3 How to Enter an Individual Menu

A short press on the **G/N/T *MENU*** button = **YES** and you can enter a specific menu.

3.2.4 Ranger Counting Scale Menu Operation

3.2.4.4 How to Enter an Individual Menu Item

When in any menu, a short press on the **G/N/T *MENU*** button = **YES** and you can enter a specific menu item. To advance through a given menu, make short presses on the **PRINT *UNITS*** =**NO** button.

3.2.4.5 How to Save and Store an individual menu item

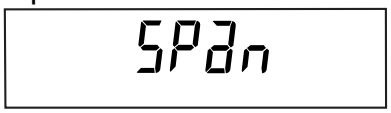
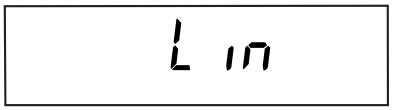
When a menu item has been changed once the desired selection is shown, make a short press on **G/N/T *MENU*** button, Quit appears on the display. If NO is selected by pressing the **PRINT *UNITS*** button, the next menu item appears. If yes is selected by pressing **G/N/T*MENU*,** StorE? appears. Pressing the **G/N/T *MENU*** button will store the change and return the scale to a weighing mode. If NO is selected, the menu change is ignored and the scale is returned to weighing mode.

3.2.4.6 How to Quit the Menus

A short press on the **PRINT *UNITS*** button = **NO**. When in MENU MODE, short presses will advance through the menus until QUIT is reached. To quit, make a short press on the **G/N/T *MENU*** button, StorE? appears, answer YES to save changes and the scale returns to the weighing mode, or NO to ignore changes and return to the weighing mode.

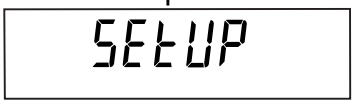
3.2.4.7 Calibration Menu

The Calibration menu contains entries for span or linearity calibration.

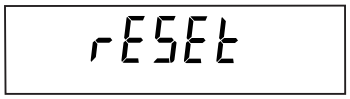
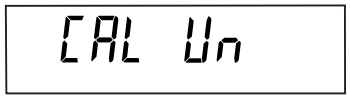
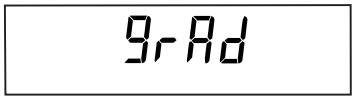
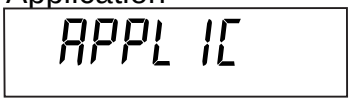
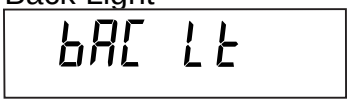
Function/Display	Available Settings	Application
Span Calibration 	Eight calibration values are available for each balance.	Calibrate balance full scale in either kg or lb units.
Linearity Calibration 	Zero, mid-range and full scale calibration points.	Three point calibration for maximum accuracy.
End Calibration 	Displays after successful calibration.	Signifies end of calibration.

3.2.4 Ranger Counting Scale Menu Operation (Cont.)

3.2.4.8 Setup Menu

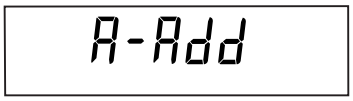
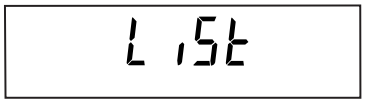
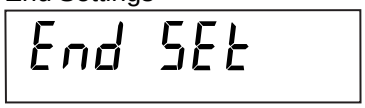


The Setup menu contains entries for LFT, calibration units, graduations, processing, back light, list and end set. See table below for details. Bold equals factory default settings.

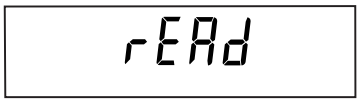
Function/Display	Available Settings	Application
Reset 	res sp	Press **G/N/T *MENU*** =reset all menu items to their factory settings. Press PRINT *UNITS* =NO, advances to next menu.
Legal for trade 	**OFF** ON CAN	Legal for trade applications when set ON or CAN.
Calibration unit 	Kg (default for dual range) lb (default for single range)	Either kg or lb can be selected as the calibration unit.
Graduation 	0.001, 0.002, 0.005, 0.0001, 0.0002, 0.0005	This is the graduation size and available options vary with the capacity of the scale.
Application 	**Stand**-Standard FILL-Filling	Regular weighing. Dispensing or filling applications.
Back Light 	**ON** OFF	Back light can turned on or off.
Auto optimization  (Counting only)	**ON** OFF	Automatically updates the sample weight.

3.2.4 Ranger Counting Scale Menu Operation (Cont.)

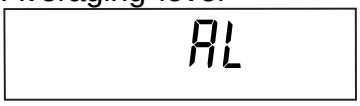
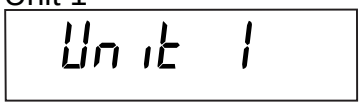
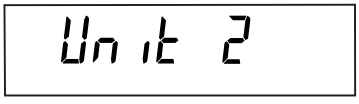
3.2.4.8 Setup Menu (Cont.)

Function/Display	Available Settings	Application
Auto add 	ON **OFF**	Calculates the minimum reference sample for the most accurate counting.
List 	Print	Prints a setup list to the RS232 when Mode is set to PRINT on Stability or Stable Only.
End Settings 	End of setup menu.	End of setup menu. When selected by pressing G/N/T *MENU* button, display advances to READ MENU.

3.2.4.9 Read Menu

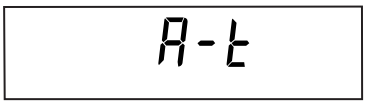
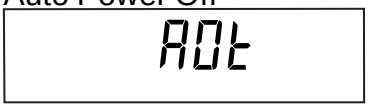
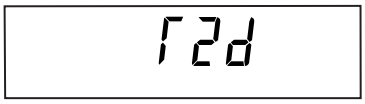
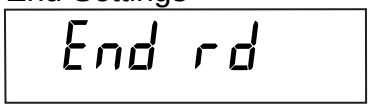


The Read menu contains entries for reset, averaging level, unit 1, unit 2, auto zero, auto tare, auto power off, retain zero data and end. See table below for details. Bold equals factory default settings.

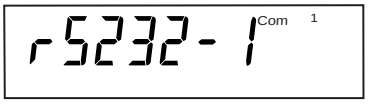
Function/Display	Available Settings	Application
Reset 	reset rd	Press **G/N/T *MENU*** =reset all menu items to their factory settings. Press **PRINT *UNITS*** =NO, advances to next menu.
Averaging level 	Low, **Med**, High	Averaging level. High=greater stability, Med= mid stabilty, Low=less stability, faster processing time.
Unit 1 	g, kg, oz, lb	This is the first weighing unit.
Unit 2 	g, kg, oz, lb	This is the alternate weighing unit.

3.2.4 Ranger Counting Scale Menu Operation (Cont.)

3.2.4.9 Read Menu (Cont.)

Function/Display	Available Settings	Application
Auto-Zero Tracking 	**0.5d**, 1d, 3d, Off	Settings minimize effects of temperature and small disturbances on the zero reading.
Auto Tare 	On **OFF**	Enables automatic tare when set to ON.
Auto Power Off 	YES NO	When set YES, scale turns off after 5 minutes. NOTE: Default is YES if battery option is installed, else NO.
Retain Zero Data 	ON **OFF**	Retains stored zero point when scale is turned off.
End Settings 	End of read menu.	End of Read menu, when selected, display advances to RS232-1 menu.

3.2.4.10 RS232-1/RS232-2 Menus

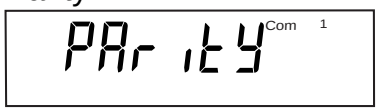
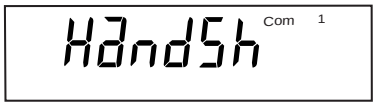
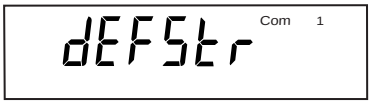
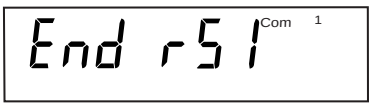


The RS232-1 menu provides the communication settings to port 1 (standard). RS232-2 is Port 2 which is an option and has exactly the same settings. Bold equals factory default settings.

Function/Display	Available Settings	Application
Reset 	reset rs	Press **G/N/T *MENU*** =reset all menu items to their factory settings. Press **PRINT *UNITS*** =NO, advances to next menu.
Mode 	**Print**, on stb, stb only, cont, dialog, disp 2, ref 2, bulk 2. When LFT is set to ON or CAN, the Print and cont modes are not available and the default mode for res rs becomes stb only.	Selects mode of operation for RS232. Print, print on stability, stability only, continuous, dialog (interface), disp 2, reference 2, bulk 2.

3.2.4 Ranger Counting Scale Menu Operation (Cont.)

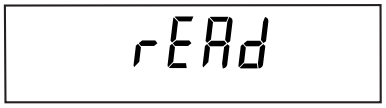
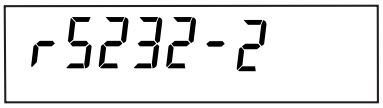
3.2.4.10 RS232-1/RS232-2 Menus (Cont.)

Function/Display	Available Settings	Application
Baud Rate 	300, 600, 1200, **2400**, 4800, 9600, 19200	Various baud rates are available to match external equipment communication requirements.
Parity 	7 Even, **7 No P**, 8 No P, 7 Odd	Various parity settings are available to accommodate external equipment requirements.
Stop 	1 **2**	Two stop settings (1 or 2) are available to accommodate external equipment requirements.
Handshake 	**YES** NO	Software handshaking enabled/disabled.
Default String 	Header, Gross, Net, Tare, (PCS, APW, Ref CT, 4 L in f, F feed, LN for	Determines what is printed via print command. Selects a string of data to be printed; header, gross, net, tare, pieces, average piece weight, reference count, 4 line feed, form feed, multi or single string per line.
End Settings 	End of RS232 menu.	End of RS232-1 menu, when selected, display advances to RS232-2 menu. End of RS232-2, display advances to LOC menu.

3.2.4 Ranger Counting Scale Menu Operation (Cont.)

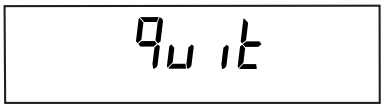
3.2.4.11 Lockout Menu

This menu allows software locking and unlocking of the calibration, setup, read, RS232-1, RS232-2, menus. Turning individual menu locks ON and OFF prevents accidental changes to menu parameters. The locks can be turned OFF to change the parameters. However, once the Locset is set to ON, the menus can only be unocked by removing the scale bottom cover and using the Unlock switch.

Function/Display	Available Settings	Application
Calibration 	ON **OFF**	An ON setting locks out the calibration menu.
Setup 	ON **OFF**	An ON setting locks out the setup menu.
Read 	ON **OFF**	An ON setting locks out the read menu.
RS232-1 	ON **OFF**	An ON setting locks out the RS232-1 menu.
RS232-2 	ON **OFF**	An ON setting locks out the RS232-2 menu.
Lockset 	ON **OFF**	Locks/unlocks all of the Lockout menu. When set on, locks all software settings in this menu. LOCSET can only be set to OFF by pressing the UNLOCK switch under the scale.
Endlock 		End of LOC menu

3.2.4 Ranger Counting Scale Menu Operation (Cont.)

3.2.4.12 Quit Menu



End of menus. - YES,- prompts to store, saves all changes, and then will go to a weighing mode, NO, ignores changes and returns to the weighing mode.

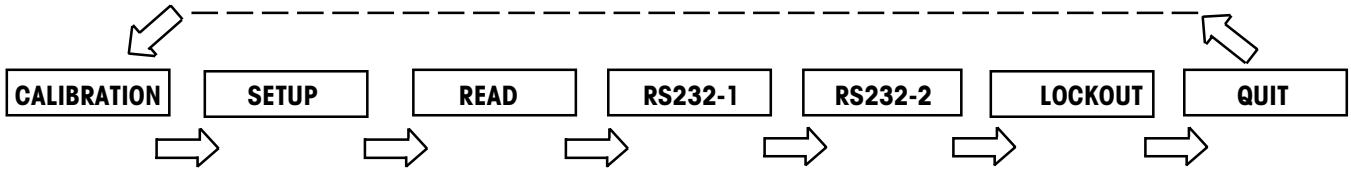
3.2.5 Ranger Weighing Scale Switch Functions

The button switches located on the front panel of the scale provide several functions. Please read the following information before pressing any of these buttons.

BUTTONS	PRIMARY FUNCTION	SECONDARY FUNCTION
ON/ZERO ***OFF***	Short press - Turns scale **ON** if OFF. Long press - Turns scale **OFF** if ON.	When scale is ON, short press **zeros** the scale.
PRINT ***UNITS***	Short press - Sends current weight to the printer. Long press - Changes **UNITS**.	When in MENU MODE: short press = **NO**.
G/N/T ***MENU***	Short presses - **Gross/Net/Tare**. No action for 5 secs., scale returns **NET**. Long press - Enter **MENU**.	When in MENU MODE: short press = **YES**.
TARE	Short press - enter TARE value.	

3.2.6 Ranger Weighing Scale Menu Functions

This section contains information on the Ranger Weighing Scale menu. The menu allows you to match your scale to your specific weighing needs. In the menu, you can change the settings of your scale and activate functions. The Main Menu contains 7 sub menus. Each of the seven sub menus are described in detail in the following sections.



3.2.6.1 How to Enter the Menus

To enter the menus, press and hold the **G/N/T** ***MENU*** button until CAL appears. This is the first menu, CALIBRATION. If LFT is ON, Setup appears first (CAL is hidden).

3.2.6.2 How to Select a Specific Menu

A short press on the **PRINT** ***UNITS*** button = NO. When in MENU MODE short presses will advance to the next menu as shown above. When QUIT is reached, the next press on the **PRINT** ***UNITS*** button will return to the CALIBRATION or SETUP menu.

3.2.6 Ranger Weighing Scale Menu Functions (Cont.)

3.2.6.3 How to Enter an Individual Menu

A short press on the **G/N/T *MENU*** button = **YES** and you can enter a specific menu.

3.2.6.4 How to Enter an Individual Menu Item

When in any menu, a short press on the **G/N/T *MENU*** button = **YES** and you can enter a specific menu item. To advance through a given menu, make short presses on the **PRINT *UNITS*** =**NO** button.

3.2.6.5 How to Save and Store an Individual Menu item

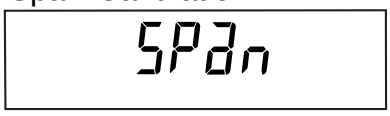
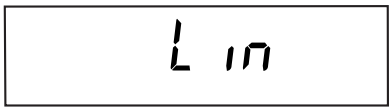
When a menu item has been changed once the desired selection is shown, make a short press on **G/N/T *MENU*** button, Quit appears on the display. If NO is selected by pressing the **PRINT *UNITS*** button, the next menu item appears. If yes is selected by pressing **G/N/T*MENU*,** StorE? appears. Pressing the **G/N/T *MENU*** button will store the change and return the scale to a weighing mode. If NO is selected, the menu change is ignored and the scale is returned to weighing mode.

3.2.6.6 How to Quit the Menus

A short press on the **PRINT *UNITS*** button = **NO**. When in MENU MODE, short presses will advance through the menus until QUIT is reached. To quit, make a short press on the **G/N/T *MENU*** button, StorE? appears, answer YES to save changes and scale returns to the weighing mode, or NO to ignore changes and return to the weighing mode.

3.2.6.7 Calibration Menu

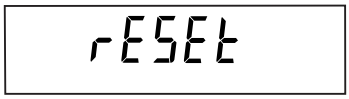
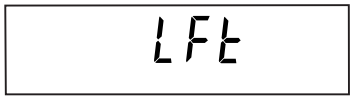
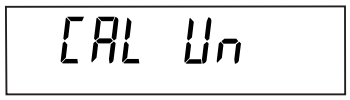
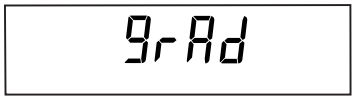
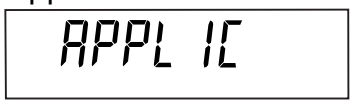
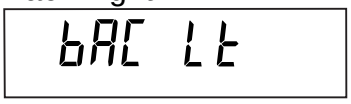
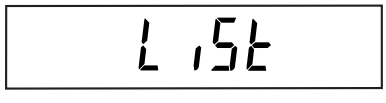
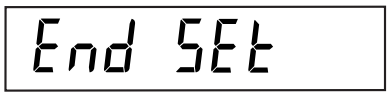
The Calibration menu contains entries for span or linearity calibration.

Function/Display	Available Settings	Application
Span Calibration 	Eight calibration values are available for each balance.	Calibrate balance full scale in either kg or lb units.
Linearity Calibration 	Zero, mid-range and full scale calibration points.	Three point calibration for maximum accuracy.
End Calibration 	Displays after successful calibration.	Signifies end of calibration.

3.2.6 Ranger Weighing Scale Menu Functions (Cont.)

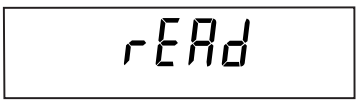
3.2.6.8 Setup Menu

The Setup menu contains entries for LFT, calibration units, graduations, processing, back light, list and end set. See table below for details. Bold equals factory default settings.

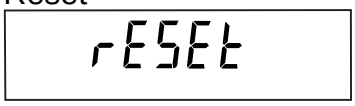
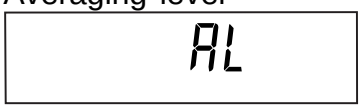
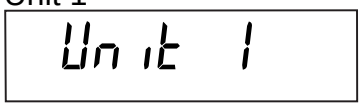
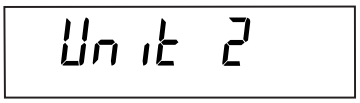
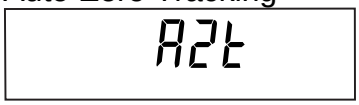
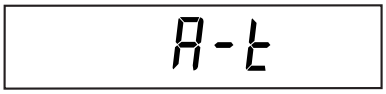
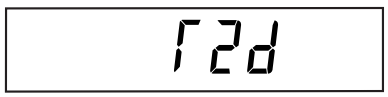
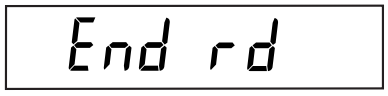
Function/Display	Available Settings	Application
Reset 	res sp	Press **G/N/T *MENU*** =reset all menu items to their factory settings. Press PRINT *UNITS* =NO, advances to next menu.
Legal for trade 	**OFF** ON CAN	Legal for trade applications when set ON or CAN.
Calibration unit 	Kg (default for dual range) lb (default for single range)	Either kg or lb can be selected as the calibration unit.
Graduation 	0.001, 0.002, 0.005, 0.0001, 0.0002, 0.0005	This is the graduation size and available options vary with the capacity of the scale.
Application 	**Stand**-Standard FILL-Filling	Regular weighing. Dispensing or filling applications.
Back Light 	**ON** OFF	Back light can turned on or off.
List 	Print	Allows printing of complete scale setup.
End Settings 	End of setup menu.	End of setup menu. When selected by pressing G/N/T *MENU* button, display advances to READ MENU.

3.2.6 Ranger Weighing Scale Menu Functions (Cont.)

3.2.6.9 Read Menu



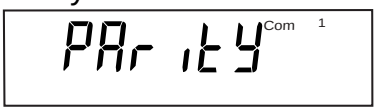
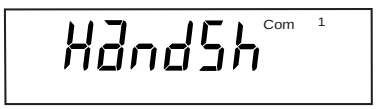
The Read menu contains entries for reset, averaging level, unit 1, unit 2, auto zero, auto tare, auto power off, retain zero data and end. See table below for details. Bold equals factory default settings.

Function/Display	Available Settings	Application
Reset 	reset rd	Press **G/N/T *MENU*** =reset all menu items to their factory settings. Press **PRINT *UNITS*** =NO, advances to next menu.
Averaging level 	Low, **Med**, High	Averaging level. High=greater stability, Med= mid stabilty, Low=less stability, faster processing time.
Unit 1 	g, kg, oz, lb	This is the first weighing unit.
Unit 2 	g, kg, oz, lb	This is the alternate weighing unit.
Auto-Zero Tracking 	**0.5d**, 1d, 3d, Off	Settings minimize temperature and small disturbances on the zero reading.
Auto Tare 	ON **OFF**	Enables automatic tare when set to ON.
Auto Power Off 	YES NO	When set YES, scale turns off after 5 minutes. NOTE: Default is YES if battery option is installed, else NO.
Retain Zero Data 	ON **OFF**	Retains stored zero point when scale is turned off.
End Read Settings 	End of read menu.	End of Read menu, when selected, display advances to RS232-1 menu.

3.2.6 Ranger Weighing Scale Menu Functions (Cont.)

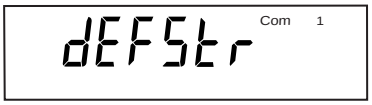
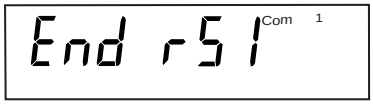
3.2.6.10 RS232-1/RS232-2 Menus

The RS232-1 menu provides the communication settings to port 1 (standard). RS232-2 is Port 2 which is an option and has exactly the same settings. Bold equals factory default settings.

Function/Display	Available Settings	Application
Reset 	reset rs	Press **G/N/T *MENU*** =reset all menu items to their factory settings. Press **PRINT *UNITS*** =NO, advances to next menu.
Mode 	**Print**, on stb, stb only, cont, dialog, disp 2, ref 2, bulk 2. When LFT is set to ON or CAN, the Print and cont modes are not available and the default mode for res rs becomes stb only.	Selects mode of operation for RS232. Print, print on stability, stability only, continuous, dialog (interface), disp 2.
Baud Rate 	300, 600, 1200, **2400**, 4800, 9600, 19200	Various baud rates are available to match external equipment communication requirements.
Parity 	7 Even, **7 No P**, 8 No P, 7 Odd	Various parity settings are available to accommodate external equipment requirements.
Stop 	1 **2**	Two stop settings (1 or 2) are available to accommodate external equipment requirements.
Handshake 	**YES** NO	Software handshaking enabled/disabled.

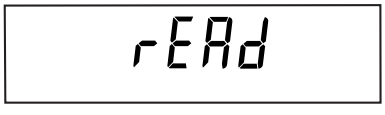
3.2.6 Ranger Weighing Scale Menu Functions (Cont.)

3.2.6.10 RS232-1/RS232-2 Menus (Cont.)

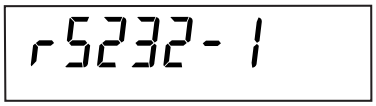
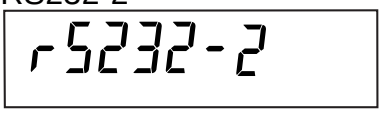
Default String 	Header, Gross, Net, Tare, (PCS, APW, Ref CT, 4 L in f, F feed, LN for	Determines what is printed via print command. Selects a string of data to be printed; header, gross, net, tare, pieces, average piece weight, reference count, 4 line feed, form feed, multi or single string per line.
End Settings 	End of RS232 menu.	End of RS232-1 menu, when selected, display advances to RS232-2 menu. End of RS232-2, display advances to LOC menu.

3.2.6.11 Lockout Menu

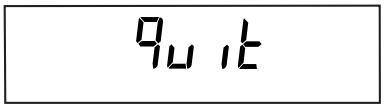
This menu allows software locking and unlocking the calibration, setup, read, RS232-1, RS232-2, menus. Locking is done to limit menu access or for LFT applications. Once LocSet is set ON, the menu can only be unlocked by a switch on the circuit board of the scale.

Function/Display	Available Settings	Application
Calibration 	On **OFF**	An ON setting locks out the calibration menu.
Setup 	On **OFF**	An ON setting locks out the setup menu.
Read 	On **OFF**	An ON setting locks out the read menu.

3.2.6.11 Lockout Menu (Cont.)

Function/Display	Available Settings	Application
RS232-1 	ON **OFF**	An ON setting locks out the RS232-1 menu.
RS232-2 	ON **OFF**	An ON setting locks out the RS232-2 menu.
Lockset 	ON **OFF**	Locks/unlocks all of the Lock-out menu. When set on, locks all software settings in this menu. LOCSET can only be set to OFF by pressing the UN-LOCK switch under the scale.
Endlock 		End of LOC menu

3.2.6.12 Quit Menu



End of menus. - Yes,- prompts to store and then will go to a weighing mode, No, returns to Calibration menu.

3.2.7 Calibration and Sealing

Ranger Counting and Weighing scales offer a choice of two calibration methods: Span Calibration, and Linearity Calibration.

Span - Span calibration ensures that the scale reads within specifications using two weight values: zero and a weight value close to 100% of the full capacity. Special software features enable you to perform a span calibration at a number of lesser values which varies with the model of the scale.

Linearity - Linearity calibration minimizes deviation between actual and displayed weights within the scale's weighing range. Three weight values are used: zero, a weight value at midpoint of the scale's weighing range, and a weight value at or near the specified capacity.

For best results, calibrate at or near full capacity. Calibration unit can be set to either kg or lb. *When the scale is used in Legal for trade applications, the calibration menu is locked out and is not accessable.* This is to prevent unauthorized personnel from changing calibration. Before beginning calibration, make sure masses are available. If you begin calibration and realize calibration masses are not available, exit the menu with a short press of the **ON/ZERO OFF** button. The scale will retain previously stored calibration data. Calibration should be performed as necessary to ensure accurate weighing. Masses required to perform the procedures should be in compliance with the specification requirements of the scale being used.

3.2.7.1 Calibration Masses

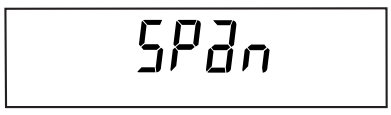
Before beginning calibration, make sure masses are available. If you begin calibration and realize calibration masses are not available, exit the menu. The scale will retain previously stored calibration data. Calibration should be performed as necessary to ensure accurate weighing. Refer to Tables 1-1 and 1-2 which refer to the calibration points of the scales.

3.2.7.2 Calibration Procedure

NOTE: If the scale is sealed and is used for legal for trade, the seal must be removed to gain access to the unlock switch located underneath the scale in order to calibrate the scale.

Access the menu by pressing and holding the **G/N/T *Menu*** button. You have a choice of calibrating the scale using span or linearity methods. Span calibration requires two points zero and full span. Linearity requires three points. zero, mid-range and full span.

Span



Press **G/N/T** *Menu* button, -0- is displayed followed by mass value to be placed on the platform. For example, a 3kg scale would normally require 3kg for a span calibration. By pressing the PRINT *UNITS* button repeatedly, a lesser value mass can be used. For example, a 3kg scale offers 2kg, 1.5kg, 1.2kg. 1kg, 0.9kg, 0.8kg and 0.7kg for full

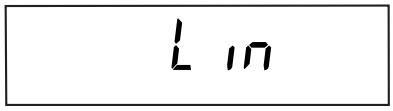
3.2.7.2 Calibration Procedure (Cont.)

span.

Place the indicated mass on the platform and press the **G/N/T *MENU*** button.

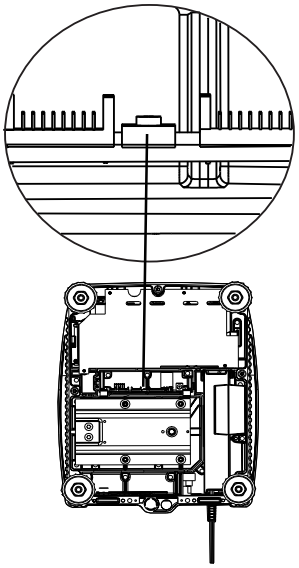
If the calibration was successful, data is saved automatically. Remove calibration masses from platform.

Linearity
When performing a linearity calibration, -0- is first displayed followed by the first mass and then a second mass.



3.2.7.3 Unlocking the Menus

Low Capacity Scale
If it necessary to recalibrate a scale which has been set up for legal for trade use, or if the menu is locked, you will have to remove the seal (paper or lead wire) at the bottom of the scale to gain access to the unlock switch.



To unlock the menus, **turn the scale off**.

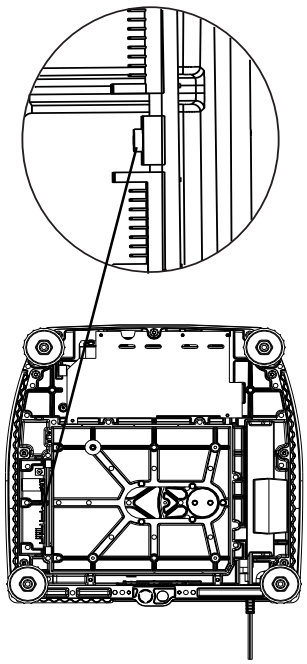
On low capacity scales, remove the existing seal and four cover screws from the bottom of the scale. You will have to unscrew the feet to access the screws.

Position the scale so the bottom is accessible.

NOTE: Do the next step carefully.

First, press and hold the unlock switch then, briefly press the **ON/ ZERO *OFF*** switch at the same time, release the unlock switch while the software version is being displayed. LFT is now set to OFF and LOCSET is set to OFF. LFT restrictions are no longer enabled and items in the LOC menu may be changed.

3.2.7.3 Unlocking the Menus (Cont.)



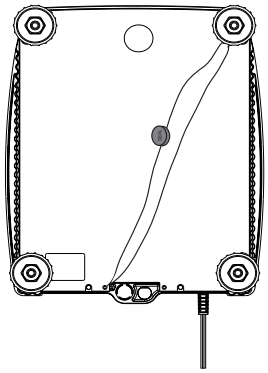
High Capacity Scale
On high capacity scales, remove the existing seal and six cover screws from the bottom of the scale. You will have to unscrew the feet to access the screws.

Position the scale so the bottom is accessible.

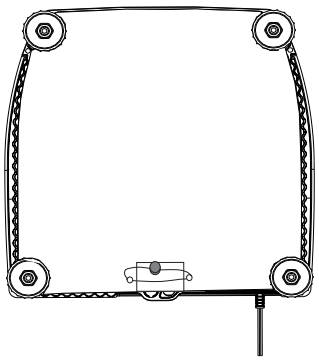
NOTE: Do the next step carefully.

First, press and hold the unlock switch then, briefly press the **ON/ZERO** ***OFF*** switch at the same time, release the unlock switch while the software version is being displayed. LFT is now set to OFF and LOCSET is set to OFF. LFT restrictions are no longer enabled and items in the LOC menu may be changed.

3.2.7.4 Weights and Measures Sealing



LOW CAPACITY SCALE



HIGH CAPACITY SCALE

After a weights and measures official has tested and approved the scale, it must be sealed by installing the security plate with the security screw.

Replace the bottom cover and secure with the cover screws.

Paper Seal
A paper seal may be placed over one of the screws at the back of the scale underneath one foot.

Replace the four feet and turn the scale over.

Lead Wire Seal
For regions requiring a lead wire seal, there are 2 cross drilled screws at the rear of the scale. The screws can be used in the location as supplied or as an alternate, one screw can be used to replace one of the counter-sunk screws at the front of the scale. (Under the leveling feet on small size Ranger Scales.)

3.2.8 Performance Tests

Accurate performance of the Ranger scales is determined by a series of three performance tests. The displayed readings are compared with the tolerances listed in Table 3-1. Tolerance values are expressed in counts. A one count change is equal to the last digit shown on the scale display.

TABLE 3-1. TYPES OF PERFORMANCE TESTS

PERFORMANCE TEST	TOLERANCE - COUNTS				
	3kg	6kg	12kg	30kg	60kg
Repeatability	±1	±1	±1	±1	±1
Off Center Load	±1	±1	±1	±1	±1
Linearity	±2	±2	±1	±2	±2

The following performance tests are used to evaluate the scale operation before and after repairs. Each scale tested must meet the requirements specified in each test as well as the specifications listed in Tables 1-3 through 1-6 depending upon the model. Before proceeding with the following tests, all the procedures starting with paragraph 3.2 must have been accomplished on the scale first.

3.2.8.1 Repeatabilty Test

To conduct a Repeatability Test, proceed as follows:

1. With the scale calibrated, place a mass on the Platform equal to the capacity of the scale. Record the reading.

2. Remove the mass from the Platform, the scale should return to 0g. Record the reading.

3. Repeat steps 1 and 2 ten more times. Subtract the lowest from the highest reading to determine the difference. Maximum allowable difference is as listed in Table 3-1.

3.2.8.2 Off-Center Load Test

The Off-Center Load Test is used to determine whether displayed weight values will be affected by moving the sample to different areas of the Platform. See Figure 3-5.

Place 1/2 of the scale capacity in the center of the Platform (1). Press the **ON/ZERO *OFF*** button to return the reading to zero. Move the mass halfway to the rear of the Platform and note the reading. Move the mass halfway between the center and the left edge front of the Platform and note the reading. Repeat this test for the right edge position and note the reading. Move the mass halfway to the front of the Platform and note the reading. Note any differences in the displayed weight reading at all positions. Maximum allowable change is per Table 3-1 for each of the listed scales four positions. Move back to center and tare if neccessary after each reading.

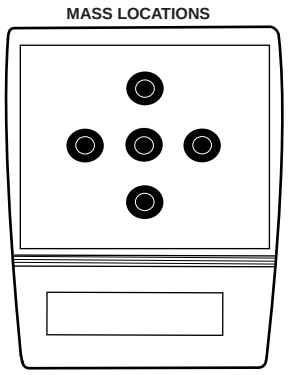


Figure 3-5. Off-Center Load Test Mass Locations.

3.2.8.3 Linearity Test

The Linearity test is used to determine the linearity of the scale throughout its operating range and is in accordance with the specifications listed in Tables 1-3 through 1-6.

NOTE:

The scale must pass the Off-Center Load test and Repeatability Test before the Linearity Test is performed.

This test is used to determine the linearity of the scale throughout its operating range.
Table 3-2 lists the suggested masses to be used for checking linearity on each scale model.
If the unit fails the linearity test, check the alignment of the transducer and re-assemble. If the transducer has been replaced, carefully check the alignment.

TABLE 3-2. LINEARITY TEST MASSES

CAPACITY	3Kg	6Kg	12Kg	30Kg	60Kg
Ref. Mass.	100g	100g	100g	100g	100g
Load 1	750g	1.5kg	3kg	7.5kg	15kg
Load 2	1.5kg	3kg	6kg	15kg	30kg
Load 3	2.250kg	4.5kg	9kg	22.5kg	45kg
Load 4	3kg *	6kg *	12kg *	30kg *	60kg *

All masses are nominal values.
BE CERTAIN TO USE THE SAME REFERENCE MASS THROUGHOUT THE PROCEDURE.
* As close to full capacity as possible while allowing the 100g weight to read.

3.2.8.3 Linearity Test (Cont.)

Before beginning:

- Perform calibration.

Preliminary Weighings

Using the Load 3 and Load 4 weight values (Table 3-2), perform some preliminary weighings and make sure the display returns to zero after weighing.

1. Place Load 3 on the center of the Platform, read the displayed weight, then remove Load 3. If the display does not return to zero, press **ON/ZERO/*OFF*** and repeat this.

2. Repeat step 1 using Load 4.

After performing preliminary weighings, proceed with checking Linearity. If the scale does not return to zero, it must be repaired.

Test

1. Place the reference mass on the center of the Platform and record the exact value (all decimal places) displayed.

2. Remove the reference mass and verify that the display returns to zero. If it does not, disregard the reading, press **ON/ZERO/*OFF*** to rezero the display and take that reading again. See note above.

3. Place Load 1 on the center of the Platform and press **ON/ZERO/*OFF***.

4. Add the reference mass to the Platform and record the exact value displayed.

5. Remove the reference mass and verify that the display returns to zero. If it does not, disregard the reading, press **ON/ZERO/*OFF*** to rezero the display and take that reading again.

NOTE:
If after several attempts the display fails to return to zero, a repeatability problem is indicated and the scale must be serviced by an Ohaus Product Service Specialist.

6. Repeat steps 3 through 5 using Load 2, Load 3 and Load 4 as applicable.

7, Compare the reference weight readings. They should agree per table 3-1.

3.2.9 RS232 Interface Test

The RS232 Interface in the Ranger scale can have its performance monitored using an external printer or computer connected to the scale.

The RS232 Interface is a bi-directional interface which enables the scale to communicate with a printer or computer equipped with an RS232 serial port. An RS232 menu is in the scale. This menu enables various parameters such as Baud rate, Data bits, Stop Bits and Parity to be set in the scale.

The RS232 menu provides communication parameters which can be set to accommodate external printers or computers. It contains eight submenus: **Reset, Node, Baud**, **Parity, Stop**, **Handshake**, **Default String**, and **End RS** menu which enable you to program RS232 port parameters.

Refer to RS232 menu and make sure all communications parameters are properly set.

3.2.9.1 Connecting the RS232 Interface

When the interface is connected to a computer, two way communication between the computer and scale is possible using the commands outlined in the RS232 Command Table 3-3. See Figure 3-5 for connections. When the scale is connected directly to a printer, displayed data can be output at any time by simply pressing **PRINT *UNITS***.

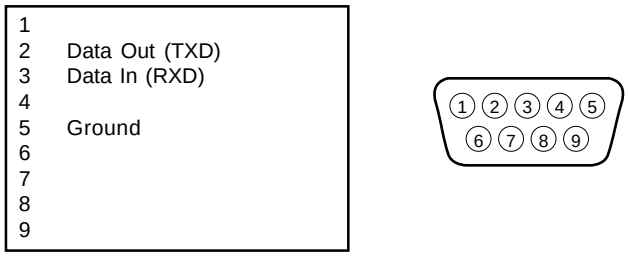


Figure 3-6. RS232 Interface Pin Connections.

3.2.9.1 Connecting the RS232 Interface (Cont.)

RS232 Commands

All communication is accomplished using standard ASCII format. Only the characters shown in the RS232 Command Table 3-3 are acknowledged by the scale. Invalid command response "ES" error indicates the scale has not recogonized the command. Commands sent to the scale must be terminated with a line feed (LF) or carriage return-line line feed (CRLF). Data output by the scale is always terminated with a carriage return - line feed (CRLF).

TABLE 3- 3. RS232 COMMANDS

Command Character	Description
0S	Print weight (stable or unstable) after P cmd.
1S	Print stable weight after P cmd.
SA	Print on stability. *Send final stable weight value.
CA	Continuous Print. Prints weight string w/o default string information
xxxxA	Interval Print xxxx= Print Interval (1-3600 sec) (0A turns off interval printing)
P	*Print display data (see 0S and 1S) Prints stable data only when LFT is ON.
Z	Same as pressing Zero button.
T	Same as pressing Tare button.
C	Begin span calibration
L	Begin linearity calibration.
XT	Download Tare value in grams. Uses unit set as Unit 1.
SN	Show serial number
H 1 (1-5)	1 to 5 header lines are available with 24 characters per line; enter H space, then text in quotations. See below.
V	Sends scale ID and software version to the RS232 Port. Ranger r-x.xx or Ranger C rc-x.xx

3.2.10 Print Test

1. Remove all weight from the platform.
2. Press the **ON/ZERO/*OFF*** button once, 0.0g should be displayed.
3. Place a mass on the Platform.
4. Press **Print *UNIT***S button, the computer and or a printer should indicate the mass value.

NOTE: Print commands entered through the computer are temporary. When the scale is turned off, it will return to scale menu settings when turned on again.

3.2.11 Visual Inspection

1. Check that FCC and serial number labels are in place and properly affixed to the scale.

2. Check for nicks and scratches and other imperfections. Clean and repair as necessary.

3.3 REPAIR PROCEDURES

This section describes how to change individual components of the Ranger scales. When doing this, please refer to the exploded view drawings and spare parts lists in section 4.

Important: after replacing components, a functional check of the scale must always be carried out.

3.3.1 Replacing the Keypad Membrane

- Lift up the defective keypad membrane (if necessary carefully prying it up with a knife) and gently peel it off the scale.

Note: Take care that the specification label is not damaged when the membrane is removed!

- Carefully clean the display mounting plate and window (removing all traces of adhesive).
- Make sure that the specification label is in its correct position (must be visible through the window in the keypad membrane), then peel off the protective film from the new membrane and carefully affix the latter to the display mounting plate.
- Press the keypad membrane down uniformly.

3.3.2 Replacing the AC Adapter

Note: The AC adapter has a fuse as overcurrent protection. For safety reasons this fuse cannot be replaced, and the AC adapter must therefore be replaced completely if the fuse blows. This applies only to scales that are connected directly to the AC power line (without rechargeable battery and external AC adapter).

- Unscrew the adjustable feet and remove them.
- Undo the bottom plate retaining screws, removing them and the plate itself.
- Disconnect the AC adapter cable from the analog PCB.
- Remove the AC adapter (held on by an adhesive patch) from the wall of the housing . If necessary, carefully insert a flat blade (knife or screwdriver) between adapter and housing and pry them apart. Remove all traces of adhesive from the housing.
- Undo the 4 screws holding the blanking plate in place (rear panel of scale) and remove the plate.
- Slide the AC adapter power cord grommet out of the blanking plate. Remove the AC adapter from the scale.
- Place the new AC adapter in the scale and fix it in place with a new adhesive patch.
- Slide the power cord grommet into the blanking plate slot and screw the plate in place.
- Plug the AC adapter output cable onto the analog PCB.
- Replace the bottom plate and the adjustable feet.

3.3.3 Replacing the Internal Rechargeable Battery

Ranger scales that include /1 or /3 in their model numbers contain an internal rechargeable battery. These batteries have a finite life expectancy and may require replacement at some time during the life of the scale.

Battery life is effected by factors such as ambient temperature, method of charging, depth of discharge, and the amount of time between charge and discharge.

Indications of a failing battery may include:

- A reduction in operating time between charging and the low battery condition.
- A continuous low battery condition even after charging.
- A scale that cannot be operated without the power pack being connected.
- A scale that will not power on even with the power pack connected. *

To replace the rechargeable battery follow the procedure below.

- With the scale inverted, unscrew the adjustable feet and remove them.
- Undo the bottom plate retaining screws, removing them and the plate itself.
- On small platform models lift the two ribbon cables out from the gap that runs along the edge of the battery. Tuck these cables out of the way until the new battery is installed.
- Remove the battery (held on by an adhesive patch) from the inner wall of the housing. If necessary, carefully insert a flat blade (knife or screwdriver) between the battery and housing and pry them apart. Remove all traces of adhesive from the housing. **Caution:** Because the battery case is made of plastic do not apply excessive pressure to the battery.
- Remove two connectors from the battery terminals. The old battery should be sent to an appropriate recycling center.
- Remove one side of protective covering from a new adhesive patch. (The adhesive patch is the same as that used for mounting of an internal power pack.) The patch is applied to the side of battery where the manufacturer information is printed. This should also be the side closest to power terminals. Center the patch on the battery with the long edge of the patch aligned with the upper long edge of the battery case, (the stepped edge).
- Set the new battery to the side of the housing with the adhesive patch side facing away from the housing and the positive, (“+”) terminal of battery towards the rear of the scale. **Attach the Red wire’s connector to the positive**, (“+”) terminal of battery, **attach the Blue wire’s connector to the negative**, (“-“) terminal of battery.

3.3.3 Replacing the Internal Rechargeable Battery (Cont.)

- The battery is installed against the inner housing wall that encloses the transducer compart ment. The battery is installed terminal side first with the positive, (“+”) terminal of battery towards the rear of the scale. Remove the remaining covering from the adhesive patch. As the battery is first lowered into the housing lightly pull the red and blue wires straight back along the outer edge of + terminal connector. As the battery is further lowered be sure that these wires are not pinched between any part of the housing and battery. Before allowing the tape to stick to the housing temporarily allow the battery to rest on the plastic terminals. Recheck that the red and blue wires are not pinched. When correctly in place the bottom of the battery must be at or slightly below the height of the inner housing wall. Slide the battery fully forward toward the display board compartment then press the battery firmly against the inner housing wall to attach the adhesive patch.

- Tuck the extra length of battery wires into the housing between the small PCB and the battery. On small platform models replace the two ribbon cables back into the slot between the inner housing wall and the battery. Insure that no wiring will be pinched when the bottom plate is installed.

- Replace the bottom plate and the adjustable feet.

*A small power supply PCB is installed with the battery option. This PCB contains a replaceable fuse that provides overcurrent protection. A scale that will not power on should have this fuse checked prior to suspecting a defective battery.

3.3.4 Replacing the Analog PCB

- Unscrew the adjustable feet and remove them.
- Undo the bottom plate retaining screws, removing them and the plate itself.
- Disconnect weighing cell cable, connecting cable to the digital PCB and the AC adapter output cable from the analog PCB.
- Pull off the two spring clips from the analog PCB and remove it.
- Fit the new analog PCB and fix it in place with the spring clips.
- Connect the weighing cell cable, the A/D cable from the digital PCB and the AC adapter output cable to the analog PCB.
- Replace the bottom plate and the adjustable feet.

Note: After replacing the analog PCB all scale data must be entered again in service mode, plus all scale settings! Following this the scale must be recalibrated and, if necessary, linearized.

3.3.5 Replacing the Display Mounting Plate, Display Unit and Digital PCB

The display mounting plate is located underneath the keypad membrane and is located in the scale housing by 6 snaps. The display unit comprises the digital PCB, the liquid crystal display (LCD) and the backlighting unit. It is held in place on the mounting plate by snaps. The digital PCB is connected to the analog PCB and the RS232C interface by two ribbon cables.

3.3.5.1 Preliminary Work

- Unscrew the adjustable feet and remove them.
- Undo the bottom plate retaining screws, removing them and the plate itself.
- Undo the retaining screw which fastens the display unit to the mounting plate.
- Pull back the two front cantilever snaps holding the display unit to release it, raise the front edge of the display unit and withdraw it from the rear snaps.
- Disconnect the RS232 cable and the connecting cable to the analog PCB from the digital PCB. Remove the display unit.

3.3.5.2 Replacing the Display Mounting Plate

Note: In order to replace the display mounting plate, the keypad membrane must be removed. This cannot then be reused and must also be replaced.

- Remove keypad membrane.
- Push the 3 cantilever snaps at the front edge of the display mounting plate inwards to release the plate and remove it to the front.
- Insert the new display mounting plate into the aperture so that it clicks into place.
- Apply the new self-adhesive keypad membrane.

3.3.5.3 Replacing the Liquid Crystal Display (LCD) or the Backlighting Unit

- Place the display unit with the digital PCB downwards on a static protective surface.
- Disconnect the backlighting ribbon cable from the digital PCB.
- Carefully insert a flat blade screwdriver (size 4) between the digital PCB and the backlighting unit immediately adjacent to the connectors.
- With the screwdriver pry the liquid crystal display and the backlighting unit out of the socket strips. When doing this, lever the shaft of the screwdriver against the edge of the digital PCB. Never lever the tip of the screwdriver against the surface of the PCB, as this could damage the PCB.
- Place the new backlighting unit onto the digital PCB (it snaps into place on the board).
- Carefully place the LCD onto the backlighting unit and ensure that the connector pins are correctly aligned with the socket strips. When correctly positioned, the ends of the LCD and backlighting unit are flush. Use a flat object such as a ruler to exert a uniform pressure on the LCD and gently push it home.
- Push the backlighting unit ribbon cable connector onto the digital PCB pins.

3.3.5.4 Replacing the Digital PCB

- Remove the LCD and backlighting unit as described in the previous subsection.
- Remove the EPROM (if fitted) from its socket.
- Fit LCD and backlighting unit onto the new digital PCB. Where applicable, Fit the EPROM.

3.3.6 Final Reassembly

- Connect the RS232 cable and the cable from the analog PCB to the digital PCB.
- Engage the display unit under the rear snaps of the display mounting plate and then lower its front edge until it snaps into place. Fit the retaining screw.
- Replace the bottom plate and adjustable feet.

3.3.7 Replacing the Software

Note: With **Ranger scales** it is not possible simply to replace the software, since this is permanently programmed in the microcontroller on the analog PCB. To replace the software in these scales, therefore, it is necessary to replace the analog PCB. The following description refers to scales that have a **plug-in EPROM** on the digital PCB.

- Unscrew the adjustable feet and remove them.
- Undo the bottom plate retaining screws, removing them and the plate itself.
- Undo the retaining screw which fastens the display unit to the mounting plate.
- Pull back the two front cantilever snaps holding the display unit to release it, raise the front edge of the display unit and withdraw it from the rear snaps.
- Disconnect the RS232 cable and the connecting cable to the analog PCB from the digital PCB. Remove the display unit.
- Remove the EPROM from its socket using a special tool.
- Fit the new EPROM. **Note**: the chamfered corner of the EPROM must be oriented towards the chamfered corner of the socket (marked with an arrowhead).
- Connect the RS232 cable and the cable from the analog PCB to the digital PCB.
- Engage the display unit under the rear snaps of the display mounting plate and then lower its front edge until it snaps into place. Fit the retaining screw.
- Replace the bottom plate and adjustable feet.

3.3.8 Replacing the Weighing Cell

3.3.8.1 Replacing a Strain Gauge Weighing Cell

- Remove the Platform.
- Undo the platform support plate retaining screws and remove the platform support plate.
- Turn the scale upside down, unscrew the adjustable feet and remove them.

3.3.8.1 Replacing a Strain Gauge Weighing Cell (Cont.)

- Undo the bottom plate retaining screws, removing them and the plate itself.
- Remove the weighing cell cable connector from the analog PCB.
- Undo the 4 retaining screws for the overload plate. Remove the screws, washers and springs.
- Remove the overload plate with the weighing cell screwed to it.
- Remove the weighing cell retaining screws.
- Screw the new weighing cell to the overload plate. **Important**: Before tightening the screws, verify that the weighing cell is aligned exactly parallel with the edges of the overload plate! Screw torque: **10Nm.**
- Place the overload plate with the weighing cell screwed to it in the scale. Fit the springs and washers, then tighten the screws.
- Fit the weighing cell cable connector onto the analog PCB pins.
- Replace the bottom plate and the adjustable feet.
- Turn the scale the right side up, replace the pan support plate and secure it with the screws. Before finally tightening the screws, make sure that the pan support plate is aligned squarely with the scale housing. **Important**: screw torque **10Nm**.
- Replace the weighing pan.
- Calibrate the scale in service mode and linearize it. If a weighing cell with another capacity has been installed, the new weighing range must also be selected.

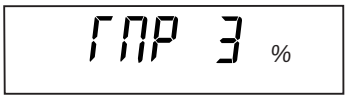
Note: With Ranger scales the cornerload and overload stops are permanently set and do not need to be readjusted.

3.3.9 Accessing and Using Service Mode

The service mode is part of the software in Ranger scales, offering settings and procedures for scale maintenance. With certified scales, direct access to service mode is blocked.

3.3.9.1 Accessing Service Mode with Scales that are not Certified

With scales that are not certified, service mode can be accessed at any time by pressing the appropriate buttons:



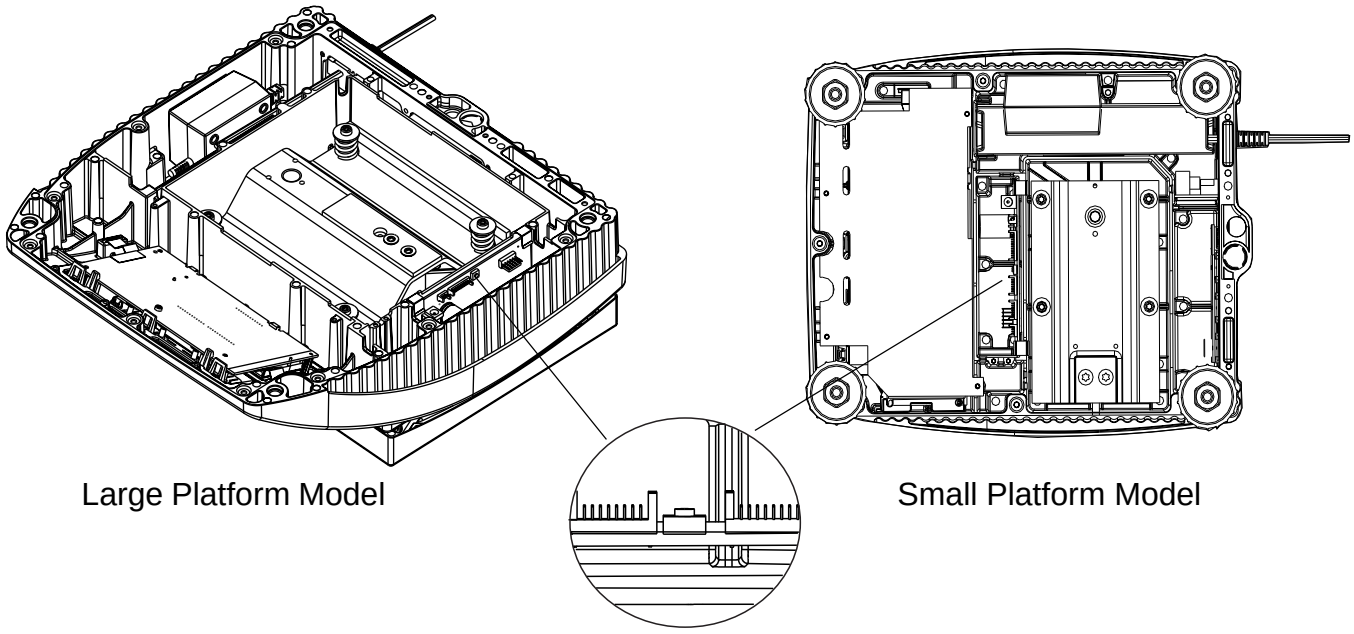
Ramp Display

- Hold the **PRINT *UNITS*** and **TARE** buttons down for at least 5 seconds until the display shown at left appears. This is the Ramp display in the service menu.

3.3.9.2 Accessing Service Mode with Certified Scales

With certified scales or certifiable scales, direct access to service mode (by pressing the **PRINT *UNITS*** and **TARE** buttons) is blocked. This is for technical reasons, and also to comply with regulations. To access service mode, proceed as follows:

- Switch off the scale.
- Remove the scale bottom plate by removing the 4 Torx TX20 retaining screws. **Important**: In order to remove the bottom plate it is necessary to break the **certification seal** affixed to it! Once this seal has been destroyed, the scale must be recertified by an accredited organization, and a new certification seal must be affixed before the instrument may be used as a certified scale again!
- Hold down the unlock switch (pushbutton) on the analog PCB (indicated in the drawings below, while at the same time switching on the scale. Keep the unlock switch pressed in until display indicates the software revision.



Large Platform Model

Small Platform Model

Unlock Switch

Figure 3-7. Unlock Switch Locations.

3.3.9.3 Accessing Service Mode

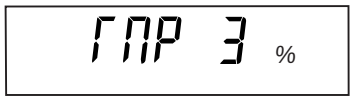
Service mode is accessed using the **PRINT *UNITS*** and **TARE** buttons.

PRINT *UNITS* skips the displayed block, or the displayed setting within a block, and causes the next block or setting to appear. It is equivalent to saying “No”.

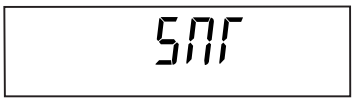
G/N/T *MENU* selects the displayed block for service work, or activates the current setting within a block, and is therefore equivalent to saying “Yes”. After the desired setting within a block is activated, the prompt “**End**” appears. If you want to quit service mode, confirm this with the **G/N/T *MENU*** button. If you want to make further settings, press the **PRINT *UNITS*** to display the next service mode block.

3.3.9.4 Service Mode Blocks

Service mode comprises the following **9 block**s:



1. Ramp (“RMP”)
In this block you can view the signal at the analog/digital converter and refresh it by pressing the **G/N/T *MENU*** button as required (ramp = 0 - 100% output signal at the A/D converter).

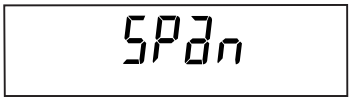


2. Serial number (“SNR”)
This block contains the serial number of the scale. The number was assigned at the factory and should not be altered.

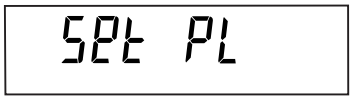
3. Weighing range (“RANGE”)
In this block you can specify the effective weighing range.

4. Geographical location (“GEO”)
In this block you can change the geographical adjustment value of your weighing system to match local gravitational conditions.

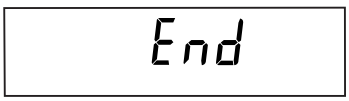
5. Linearity (“LIN”)
In this block you can correct the linearity error of your weighing system.



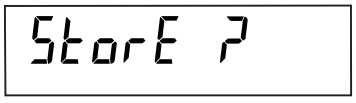
6. Span Calibration (“SPAN”)
In this block you can perform span calibration.



7. Set preload ("Set PL")
In this block, you can set the scale preload.



8. Quit service mode (“END”)
This block permits quitting the service mode after setting YES to Span calibration.



9. Store service mode settings ("Store ?")
Selecting this block, permits storing the settings made in service mode.

3.3.9.5 Working in Service Mode

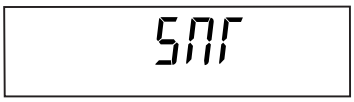
Settings in service mode may only be made by qualified personnel. The wrong settings could result in the scale not functioning correctly!

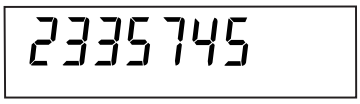
Viewing the A/D converter signal (ramp)

In this block you can view the signal at the internal analog/ digital converter, enabling you to check the converter and the weighing cell for good working order. The signal is not influenced by any service mode setting.

- The current output signal at the A/D converter (as a percentage of full scale) appears directly in the display. It is a static display. Scales with identical, correctly functioning weighing cells, the same preload and the same weighing range have approximately the same output signals. As the weight increases, the ramp value increases linearly with the weight in %.

- To quit this block, press the **PRINT *UNITS*** button. The next service mode block (“SNR”) then appears.





Viewing or changing the serial number

In this block you can view or change the scale serial number.

- Press the **G/N/T *MENU*** button to display the serial number. It is only necessary to change this number after replacing the analog PCB or rectifying “Error 53”. The serial number is given on the scale model label.

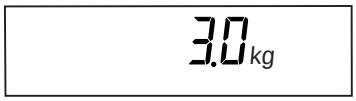
- To enter a new number, press the **PRINT *UNITS*** button repeatedly until the desired digit is displayed. If you want to leave this position empty, make sure that only the cursor is displayed. Confirm the digit by pressing the **G/N/T/ *MENU*** button. The cursor then moves to the second position, which you can change in the same way. This also applies for all the following positions (maxi mum of 7 digits).

- To quit this block, press the **G/N/T/ *MENU*** button again after entering the last digit. END will appear in the display, if you want to continue through the displays, press **PRINT *UNITS*** button, the display advances to ("RANGE").

3.3.9.5 Working in Service Mode (Cont.)

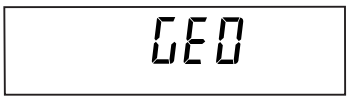
Specifying weighing range

If the analog PCB is replaced, it is necessary to specify the weighing range, because the EEPROM on the PCB is set to a default value at the factory (15 kg dual-range scale). It is also necessary to set the weighing range if a weighing cell of a different capacity is installed. The scale resolution is also automatically specified with the weighing range.



- If you want to specify the weighing range, press the **G/N/T/*MENU*** button to display the range currently selected (or the factory-set default weighing range if the analog PCB or EEPROM has been replaced).

- Use the **PRINT *UNITS*** button to select the weighing range appropriate for the scale. If the symbol “I<—>I 2” also appears in the display in addition to the weighing range, the scale is a dual-range type. If the weighing range is changed, this setting must be saved before calibration is carried out, otherwise the calibration procedure will use the previous settings. To save the setting, confirm the new weighing range, then respond to both prompts “End” and “Store?” by pressing **G/N/T/*MENU*** button. The scale then restarts.



Setting geographical adjustment value (Europe only)

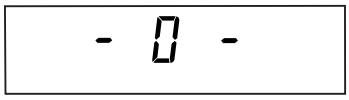
In this block you can set the geographical adjustment value and thus adapt the scale to local gravitational conditions. Please only change this setting if you are certain of the correct geographical adjustment value!

- Press the **G/N/T/*MENU*** button to display the current geo graphical adjustment value. Then press the **PRINT *UNITS*** buttonto change it. Each time the button is pressed, the next value is displayed (range of settings: 0 - 31). Please refer to the table 3-? to find the appropriate geographical adjustment value. Confirm the selected value by pressing the **G/N/T/*MENU*** button.

3.3.9.5 Working in Service Mode (Cont.)

Correcting linearity errors

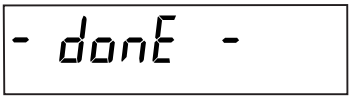
Correct calibration ensures that the displays at the zero point and the calibration point correspond exactly to the loads placed on the scale. Ideally, this should be the case over the entire weighing range. Any linearity error is corrected in the factory. Normally, repeat linearization is only necessary after replacing the weighing cell or changing the weighing range. A 3-point linearization procedure is available in the scale, the set calibration points being at 0%, 50% and 100% of the weighing range. These can be changed, however, if the required weights are not available.



- Press the **G/N/T/** ***MENU*** button if you want to linearize the scale. The flashing "- 0 -" display prompts you to remove the load from the weighing pan. Once this is done, zero point calibration is carried out automatically.

- The second calibration point (e.g. 1.5kg for a 3 kg scale) now appears in the display. If you have this weight available, place it on the scale. If not, you can use the **PRINT** ***UNITS*** button to change the calibration point and then place the corresponding weight on the scale. Calibration is then carried out after the **G/N/T** ***MENU*** button is pressed.

- The third calibration point (e.g. 3kg for a 3kg scale) then appears in the display. This value can also be changed with the **PRINT** ***UNITS*** button, if necessary. Place the appropriate weight on the scale. Calibration is again carried out after the **G/N/T** ***MENU*** button is pressed. The message "done" appears in the display, indicating that the linearization procedure has been successfully concluded.



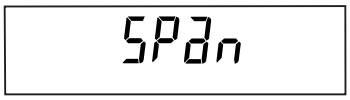
Note: If the Linearity calibration is not carried out within 30 seconds of starting, a message declaring "abort" appears breifly, then the display advances to "Span" calibration. The previously stored information for linear calibration remains in the scale.

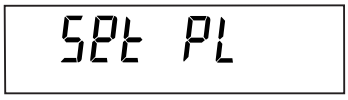
3.3.9.5 Working in Service Mode (Cont.)

Calibration

As well as calibration itself, the preload is specified in this block. Calibration in service mode does not involve a plausibility check for the calibration weight used, but always accepts the load placed on the pan as correct. Calibration in service mode also serves as a reference for calibration in the operational mode, i.e. faulty calibration in service mode automatically results in the load placed on the scale in operational mode calibration being interpreted incorrectly.

- **Important!** Before starting calibration, Check the Read menu and make sure that Retain Zero is set OFF. If Retain Zero was set ON in the beginning, turn back ON for end user after completing this procedure.



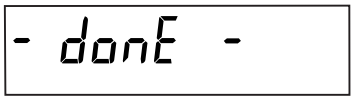


- Press the **G/N/T/ *MENU*** button if you want to calibrate the scale. You are now prompted by the display to place the preload on the scale. If you want to specify a certain preload (for example a weighing container to be used permanently), place this on the platform (see table 3-? for accepable preload values).

  Regardless of whether you place a preload on the scale or not, now press the **G/N/T/ *MENU*** button to start the calibration procedure. While the zero point is being determined, “raw” values of weight appear in the display, this may take a few seconds.

- You are now prompted by the display to calibrate your weighing system at that value which you have specified as weighing range.

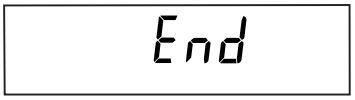
- If you do **not** want to calibrate with this value (e.g. because you do not have sufficient weights available), press the **PRINT *UNITS*** button repeatedly until the desired calibration weight appears in the display (the calibration weight is reduced every time the button is pressed).



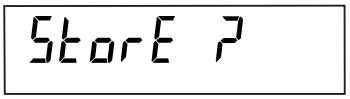
- When the preload value has been entered in the scale, "Done" momentarily appears in the display to confirm that calibration has been successfully completed.

Note: it is generally recommended to calibrate the scale **at full load.** This applies especially to **certifiable scale**s.

3.3.9.5 Working in Service Mode (Cont.)



- The message “done” followed by "End"appears in the display to confirm that calibration has been successfully concluded.



- Press the **G/N/T/ *MENU*** button, "Store?" appears, press **G/N/T/*MENU*** button to store new calibration data.

3.3.9.6 Quitting Service Mode

In the last service mode block you can decide whether you want to quit service mode or make further settings.

- If you want to make further settings in service mode, press the **PRINT *UNITS*** button. The first service mode block (“RAMP”) then appears again in the display .

- If you do not want to make any further settings, press the **G/N/T *MENU*** button to exit service mode. You are now prompted to save the changes. Press the **G/N/T *MENU*** button to save the changes or the **PRINT *UNITS*** button to cancel the changes made in service mode. The scale then reverts to weighing mode.

Important!
After you exit from service mode, the scale must be switched off and then on again!

4.1 INTRODUCTION

This section of the manual contains technical data tables for certifiable, certified Ranger scales and non-certifiable Ranger scales. Tables are also included for preload information and geographical adjustment information.

4.1.1 Certifiable and Certified Ranger Scales with Strain Gauge Weighing Cells

The following data apply to all certifiable or certified Ranger scales with strain gauge weighing cells, regardless of platform size.

Table 4-1. DATA FOR CERTIFIABLE/CERTIFIED RANGER SCALES

Scale capacity	3kg	6kg	15kg	35kg	60kg
Weighing range (1/2) [g]	1504.5/3009	3009/6018	6018/15045	15045/35090	30090/60180
Resolution	2 x 3000e	2 x 3000e	2 x 3000e	2 x 3000e	2 x 3000e
Certification class	III	III	III	III	III
Readability (weighing range 1/2) [g]	0.5/1	1/2	2/5	5/10	10/20
Repeatability [g]	0.5	1	2.5	5	10
Calibration weight, full load 1) [kg]	3	6	15	30	60
Calibration weight, minimum 1) [kg]	0.8	1.5	4	8	15
Calibration weight, full load 1) [lb]	6	12	24	60	120
Calibration weight, minimum 1) [lb]	1.5	3	6	15	30
Weight class	M1	M1	M1	M1	M1
Calibration tolerance [g]	0.5	1	2	5	10
Cornerload test weight [kg]	1	2	5	12	20
Cornerload tolerance [g]	0.6	1.2	3	6	12
Overload stop	fixed, not adjustable	fixed, not adjustable	fixed, not adjustable	fixed, not adjustable	fixed, not adjustable
Cornerload stop	fixed, not adjustable	fixed, not adjustable	fixed, not adjustable	fixed, not adjustable	fixed, not adjustable

1) Note on calibration

Certified/certifiable scales should be calibrated under full load.

Note on linearity

The linearity of certified or certifiable scales must be verified at 25%, 50%, 75% and 100% full load. Tolerances are given in the following calibration diagrams.

4.1.2 Noncertifiable Ranger Scales with Strain Gauge Weighing Cells

The following data apply to all noncertifiable Ranger scales with strain gauge weighing cells, regardless of platform size.

Table 4-2. DATA FOR NONCERTIFIABLE RANGER SCALES

Scale capacity	3kg	6kg	15kg	35kg	60kg
Weighing range (1/2) [g]	1504.5/3009	3009/6018	6018/15045	15045/35090	30090/60180
Resolution	2 x 3000d	2 x 3000d	2 x 3000d	2 x 3000d	2 x 3000d
Certification class	---	---	---	---	---
Readability (weighing range 1/2) [g]	0.5/1	1/2	2/5	5/10	10/20
Repeatability [g]	0.5	1	2.5	5	10
Calibration weight, full load [kg]	3	6	15	30	60
Calibration weight, minimum [kg]	0.8	1.5	4	8	15
Calibration weight, full load 1) [lb]	6	12	24	60	120
Calibration weight, minimum 1) [lb]	1.5	3	6	15	30
Weight class	M1	M1	M1	M1	M1
Calibration tolerance [g]	0.5	2	5	10	20
Cornerload test weight [kg]	1	2	5	12	20
Cornerload tolerance [g]	2	4	10	20	40
Overload stop	fixed, not adjustable	fixed, not adjustable	fixed, not adjustable	fixed, not adjustable	fixed, not adjustable
Cornerload stop	fixed, not adjustable	fixed, not adjustable	fixed, not adjustable	fixed, not adjustable	fixed, not adjustable

Note on calibration

It is recommended that noncertifiable scales are also calibrated under full load. If required, however, these can also be calibrated at less than full load (minimum approx. 25% of full load). The calibration tolerance given in the table applies to calibration under full load. It is reduced in proportion to the calibration weight used.

Note on linearity

The linearity of noncertified scales must be verified at 25%, 50%, 75% and 100% of full load. Tolerances are given in the calibration diagrams in the preceding subsection.
If there are not enough test weights available, linearity can still be tested as follows:

1. Place one or more test weights on the scale that together amount to some 25% of full load. Note the deviation.

2. Remove the weights from the scale.

3. Place a weight on the scale that amounts to some 25% of full load and then tare the scale.

4. Place the test weights used in step 1 on the scale and note the deviation. This tests the linearity in the range between 25% and 50% of full load, since the scale was tared with a preload of about 25% in step 3.

5. The linearity of the scale can thus be tested up to full load by repeating step 3 (with a weight of 50% or 75% of full load) and step 4.

4.1.3 Overview of Weighing Cells and Preloads

TABLE 4-3. STRAIN GAUGE WEIGHING CELLS

Ranger model	Weighing pan (mm)	Weigh-ing range (kg)	Replacement cell no.	Preload load plate support	Preload weighing pan	Total of load plate support and weighing pan	Mechanical preload reserve	Preload reserve switch-on zero (18% of weigh-ing range)	Cellcapacity (kg)
SM (small)	200 x 240 mm	3 kg	21203143	0.340 kg	0.500 kg	0.840 kg	0.62 kg	0.54 kg	5 kg
SM (small)	200 x 240 mm	6 kg	21203144	0.340 kg	0.500 kg	0.840 kg	2.08 kg	1.08 kg	10 kg
SM (small)	200 x 240 mm	15 kg	21203145	0.340 kg	0.500 kg	0.840 kg	1.46 kg	2.70 kg	20 kg
LA (large)	240 x 350 mm	6 kg	21203150	0.820 kg	0.850 kg	1.670 kg	1.25 kg	1.08 kg	10 kg
LA (large)	240 x 350 mm	15 kg	21203151	0.820 kg	0.850 kg	1.670 kg	0.63 kg	2.70 kg	20 kg
LA (large)	240 x 350 mm	35 kg	21203152	0.820 kg	0.850 kg	1.670 kg	7.03 kg	6.30 kg	50 kg
LA (large)	240 x 350 mm	60 kg	21203153	0.820 kg	0.850 kg	1.670 kg	27.53 kg	10.80 kg	100 kg

CHAPTER 4 DATA TABLES

4.1.4 Geographical Adjustment Values

TABLE 4-4. RANGER GEOGRAPHICAL ADJUSTMENT VALUES

	Elevation above sea level in meters										
	0	325	650	975	1300	1625	1950	2275	2600	2925	3250
Geographical latitude in	325	650	975	1300	1625	1950	2275	2600	2925	3250	3575
the northern or southern	Elevation above sea level in feet										
hemisphere in degrees	0	1060	2130	3200	4260	5330	6400	7460	8530	9600	10660
and minutes	1060	2130	3200	4260	5330	6400	7460	8530	9600	10660	11730
0°0'-5°46'	5	4	4	3	3	2	2	1	1	0	0
5°46'-9°52'	5	5	4	4	3	3	2	2	1	1	0
9°52'-12°44'	6	5	5	4	4	3	3	2	2	1	1
12°44'-15°6'	6	6	5	5	4	4	3	3	2	2	1
15°6'-17°10'	7	6	6	5	5	4	4	3	3	2	2
17°10'-19°2'	7	7	6	6	5	5	4	4	3	3	2
19°2'-20°45'	8	7	7	6	6	5	5	4	4	3	3
20°45'-22°22'	8	8	7	7	6	6	5	5	4	4	3
22°22'-23°54'	9	8	8	7	7	6	6	5	5	4	4
23°54'-25°21'	9	9	8	8	7	7	6	6	5	5	4
25°21'-26°45'	10	9	9	8	8	7	7	6	6	5	5
26°45'-28°6'	10	10	9	9	8	8	7	7	6	6	5
28°6'-29°25'	11	10	10	9	9	8	8	7	7	6	6
29°25'-30°41'	11	11	10	10	9	9	8	8	7	7	6
30°41'-31°56'	12	11	11	10	10	9	9	8	8	7	7
31°56'-33°9'	12	12	11	11	10	10	9	9	8	8	7
33°9'-34°21'	13	12	12	11	11	10	10	9	9	8	8
34°21' - 35° 31'	13	13	12	12	11	11	10	10	9	9	8
35°31' - 36° 41'	14	13	13	12	12	11	11	10	10	9	9
36°41' - 37° 50'	14	14	13	13	12	12	11	11	10	10	9
37°50' - 38° 58'	15	14	14	13	13	12	12	11	11	10	10
38°58' - 40° 5'	15	15	14	14	13	13	12	12	11	11	10
40° 5' - 41° 12'	16	15	15	14	14	13	13	12	12	11	11
41°12' - 42° 19'	16	16	15	15	14	14	13	13	12	12	11
42°19' - 43° 26'	17	16	16	15	15	14	14	13	13	12	12
43°26' - 44° 32'	17	17	16	16	15	15	14	14	13	13	12
44°32' - 45° 38'	18	17	17	16	16	15	15	14	14	13	13
45°38' - 46° 45'	18	18	17	17	16	16	15	15	14	14	13
46°45' - 47° 51'	19	18	18	17	17	16	16	15	15	14	14
47°51' - 48° 58'	19	19	18	18	17	17	16	16	15	15	14
48°58' - 50° 6'	20	19	19	18	18	17	17	16	16	15	15
50° 6' - 51° 13'	20	20	19	19	18	18	17	17	16	16	15
51°13' - 52° 22'	21	20	20	19	19	18	18	17	17	16	16
52°22' - 53° 31'	21	21	20	20	19	19	18	18	17	17	16
53°31' - 54° 41'	22	21	21	20	20	19	19	18	18	17	17
54°41' - 55° 52'	22	22	21	21	20	20	19	19	18	18	17
55°52' - 57° 4'	23	22	22	21	21	20	20	19	19	18	18
57° 4' - 58° 17'	23	23	22	22	21	21	20	20	19	19	18
58°17' - 59° 32'	24	23	23	22	22	21	21	20	20	19	19
59°32' - 60° 49'	24	24	23	23	22	22	21	21	20	20	19
60°49' - 62° 9'	25	24	24	23	23	22	22	21	21	20	20
62° 9' - 63° 30'	25	25	24	24	23	23	22	22	21	21	20
63°30' - 64° 55'	26	25	25	24	24	23	23	22	22	21	21
64°55' - 66° 24'	26	26	25	25	24	24	23	23	22	22	21
66°24' - 67° 57'	27	26	26	25	25	24	24	23	23	22	22
67°57' - 69° 35'	27	27	26	26	25	25	24	24	23	23	22
69°35' - 71° 21'	28	27	27	26	26	25	25	24	24	23	23
71°21' - 73° 16'	28	28	27	27	26	26	25	25	24	24	23
73°16' - 75° 24'	29	28	28	27	27	26	26	25	25	24	24
75°24' - 77° 52'	29	29	28	28	27	27	26	26	25	25	24
77°52' - 80° 56'	30	29	29	28	28	27	27	26	26	25	25
80°56' - 85° 45'	30	30	29	29	28	28	27	27	26	26	25
85°45' - 90° 00'	31	30	30	29	29	28	28	27	27	26	26

5.1 DRAWINGS AND PARTS LISTS

This section of the manual contains exploded views and spare parts lists for the Ranger scales. The exploded view drawings are designed to identify the replacable parts which can be serviced on the scale in the field. The scales are identified as low capacity and high capacity.

NOTE:

In all cases where a part is replaced, the scale must be thoroughly checked after the replacement is made. The scale **MUST** meet the parameters of all applicable specifications in this manual.

If further technical information is needed, in the United States call toll-free 1-800-526-0659 between 8.00 a.m. and 4.00 p.m. EST. An Ohaus factory service technician will be available to provide assistance. Outside the U.S.A., please contact:

Ohaus Corporation
19A Chapin Road
P.O. Box 2033
Pine Brook, NJ 07058-2033, USA
Tel: (973) 377-9000,
Fax: (973) 593-0359

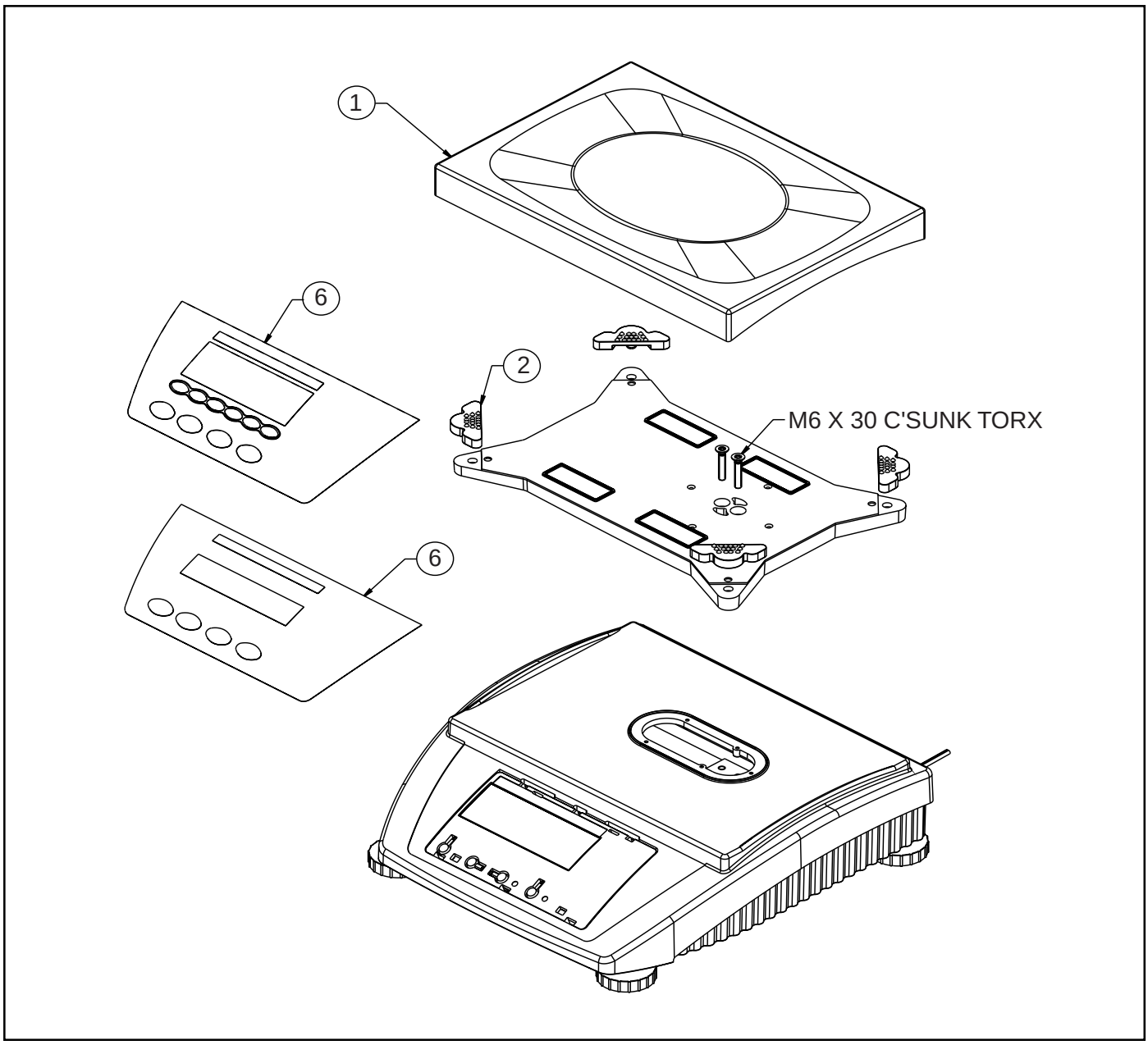


Figure 5-1. Top Components, High Capacity Scale (Strain Gauge) Shown.

ITEM NO.	QUANTITY	PART NO.	DESCRIPTION
1	1	21203437	Platform (240 x 350), (Ranger 12kg, 30kg and 60kg)
2	4	21203073	Rubber shock absorber
6	1	21203431	Label, Function, (Ranger, Weigh, Dry, 12kg 30kg and 60kg)
6	1	21203429	Label, Function, (Ranger, Count, Dry, 12kg 30kg and 60kg)

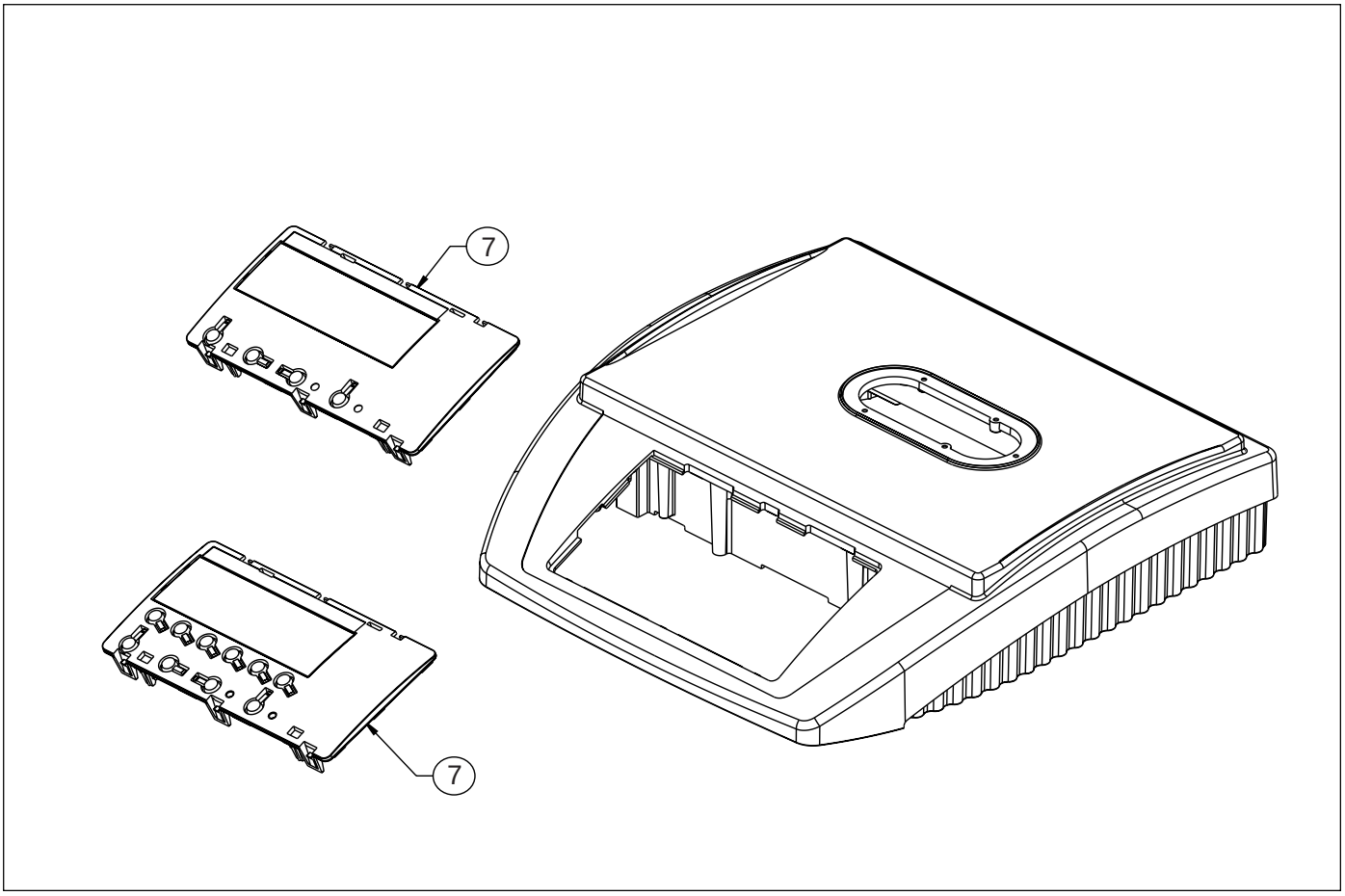


Figure 5-2. Switch Actuators, High Capacity Scale (Strain Gauge) Shown.

ITEM NO.	QUANTITY	PART NO.	DESCRIPTION
7	1	21203119	Switch Actuator, (Ranger, Weigh, Dry)
7	1	21203120	Switch Actuator, (Ranger, Count)

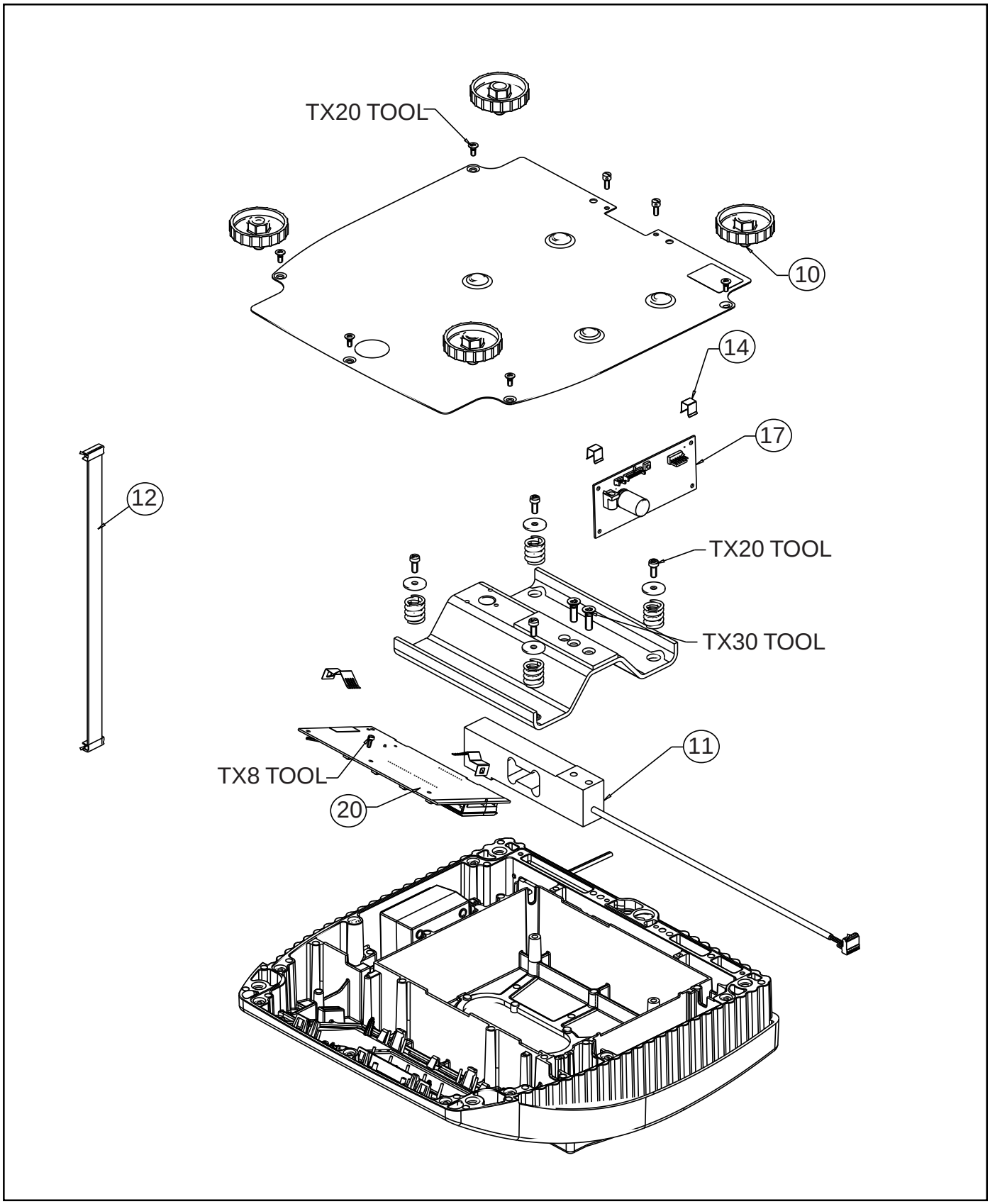


Figure 5-3. Bottom Components, High Capacity Scale (Strain Gauge) Shown.

ITEM NO.	QUANTITY	PART NO.	DESCRIPTION
10	4	21203434	Feet, (Ranger, 12kg, 30kg and 60kg)
11	1	21203151	Load Cell, (Ranger, 12kg)
11	1	21203152	Load Cell, (Ranger, 30kg)
11	1	21203153	Load Cell, (Ranger, 60kg)
12	1	21203167	Cable Analog PCB, 300mm, (Ranger, 12kg, 30kg, 60kg)
14	2	21203166	Clamp, Digital PCB, (All Ranger), Also included in Hardware Kit 212
17	1	21203092	PCB, Analog, (All Ranger)
20	1	21203096	PCB, Digital, (Ranger Weigh, Dry)
20	1	21203098	PCB, Digital, (Ranger Count)

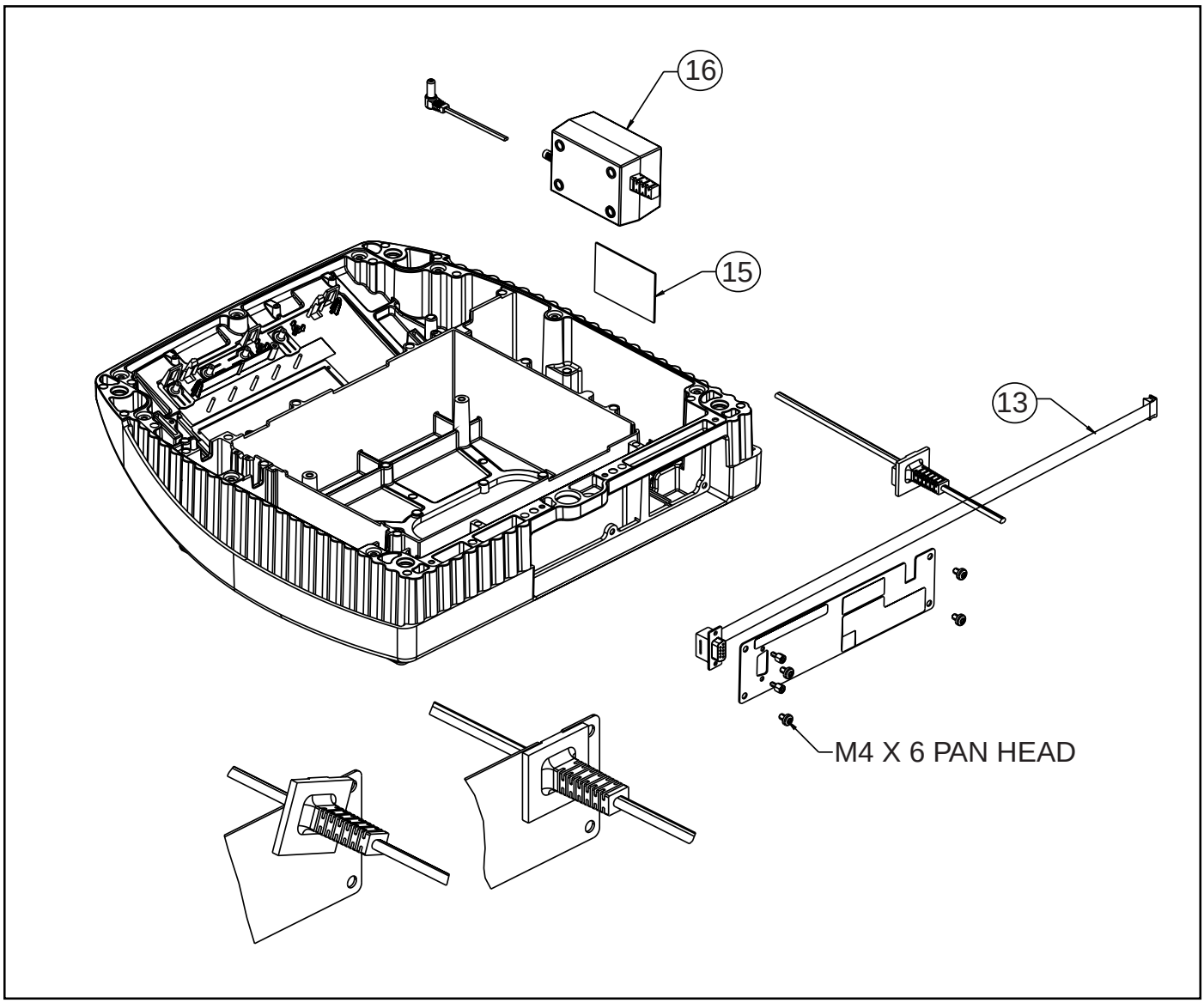


Figure 5-4. Power Pack, High Capacity Scale Shown.

ITEM NO.	QUANTITY	PART NO.	DESCRIPTION
13	1	21203168	Cable, RS232 Internal, (All Ranger)
15	1	21203184	Double sided tape, (All Ranger)
16	1	21203122	AC Adapter, US Plug, (All Ranger)
16	1	21203123	AC Adapter, US Plug, (All Ranger)
16	1	21203124	AC Adapter, US Plug, (All Ranger)
16	1	21203126	AC Adapter, US Plug, (All Ranger)

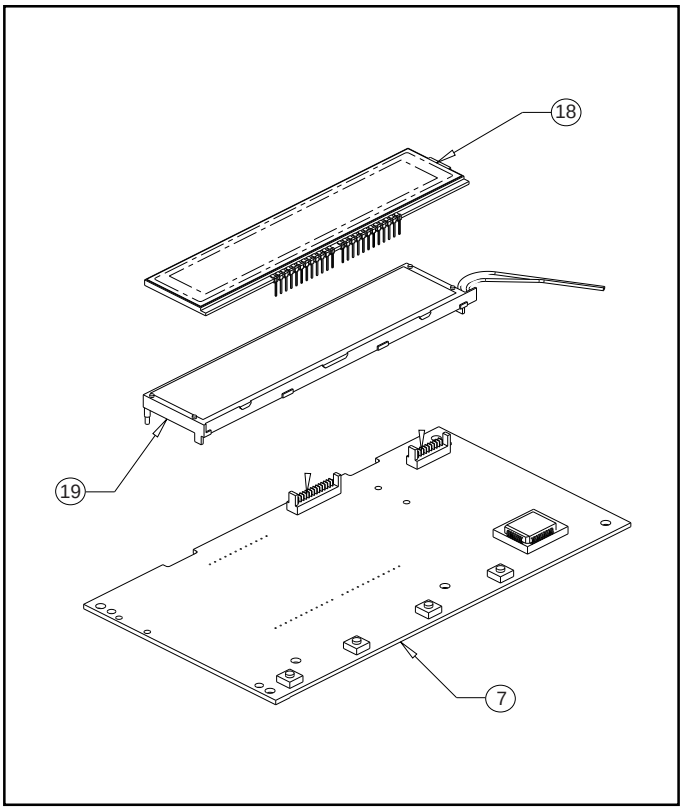


Figure 5-5. Weigh Display.

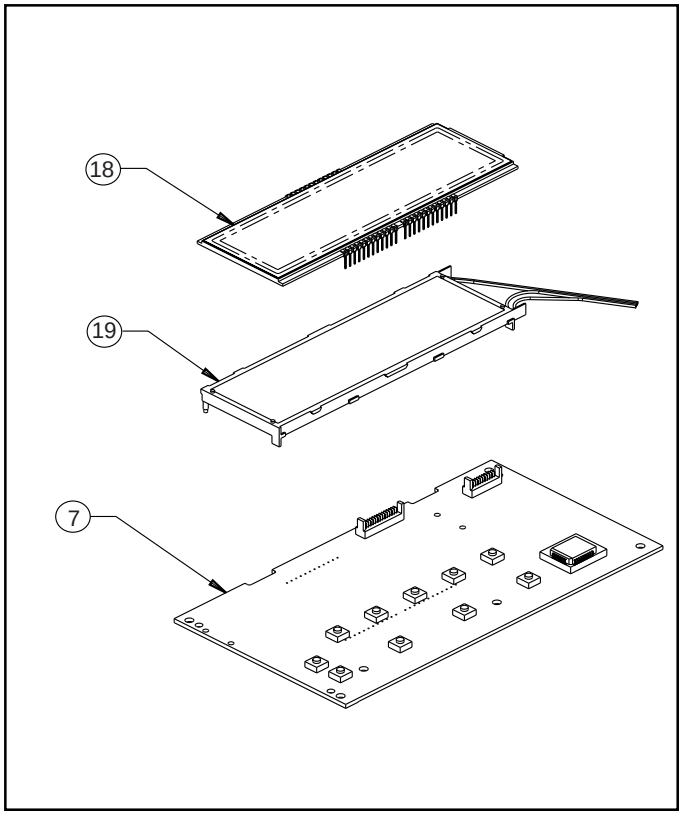


Figure 5-6. Count Display.

ITEM NO.	QUANTITY	PART NO.	DESCRIPTION
7	1	21203119	Switch Acutator, (Ranger Weigh Dry)
7	1	21203120	Switch Acutator, (Ranger Count)
18	1	21203134	LCD, (Ranger Weigh, Dry)
18	1	21203135	LCD, (Ranger Count)
19	1	21203136	Backlighting, (Ranger Weigh Dry)
19	1	21203137	Backlighting, (Ranger Count)

NOTE: The above parts list applies to High and Low capacity models.

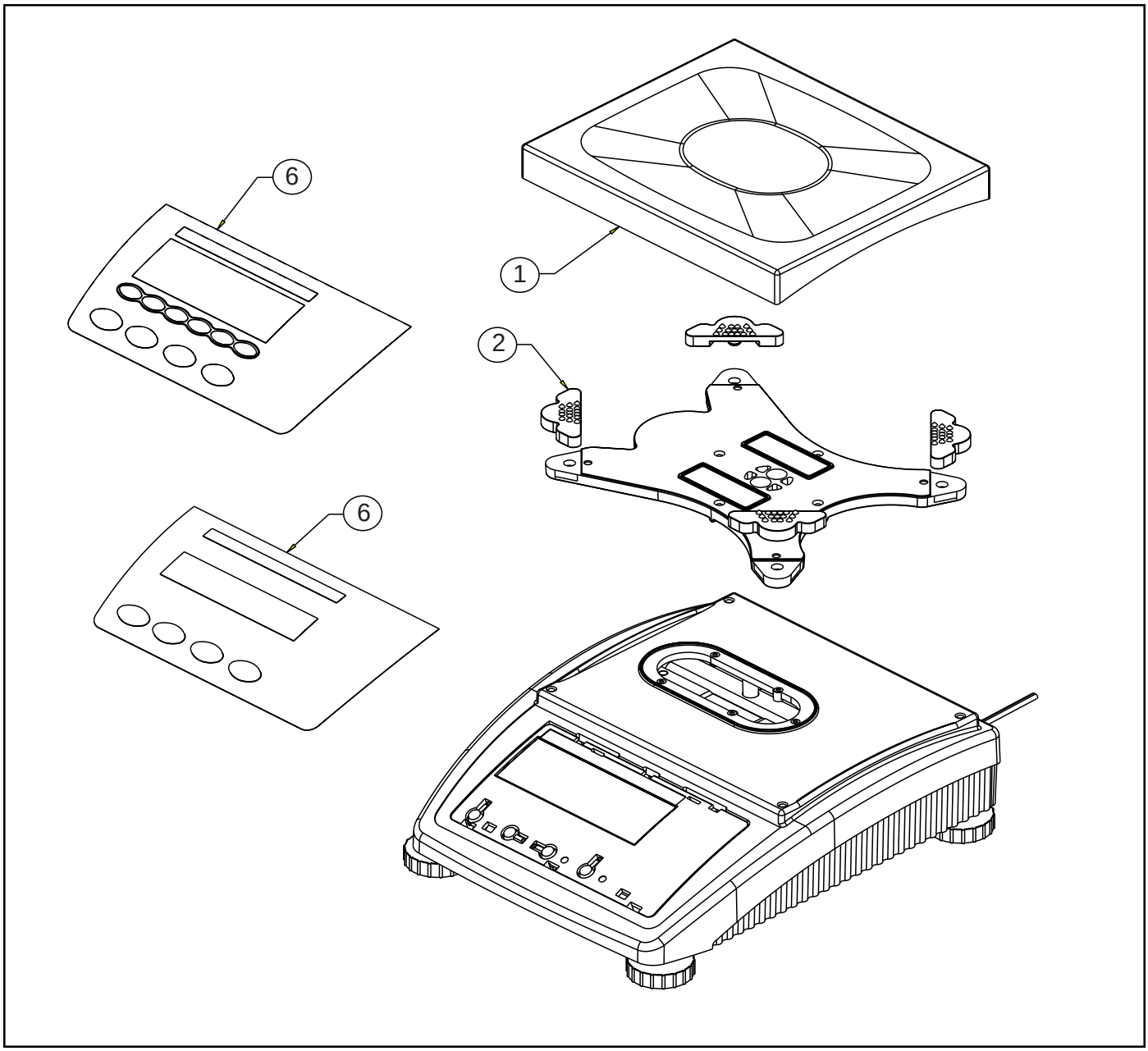


Figure 5-7. Top Components, Low Capacity Scale (Strain Gauge) Shown.

ITEM NO.	QUANTITY	PART NO.	DESCRIPTION
1	1	21203438	Platform (200 x 240), (Ranger 3kg and 6kg)
2	4	21203073	Rubber shock absorber
6	1	21203432	Label, Function, (Ranger Weigh, Dry, 3kg and 6kg)
6	1	21203430	Label, Function, (Ranger Count, Dry, 3kg and 6kg)

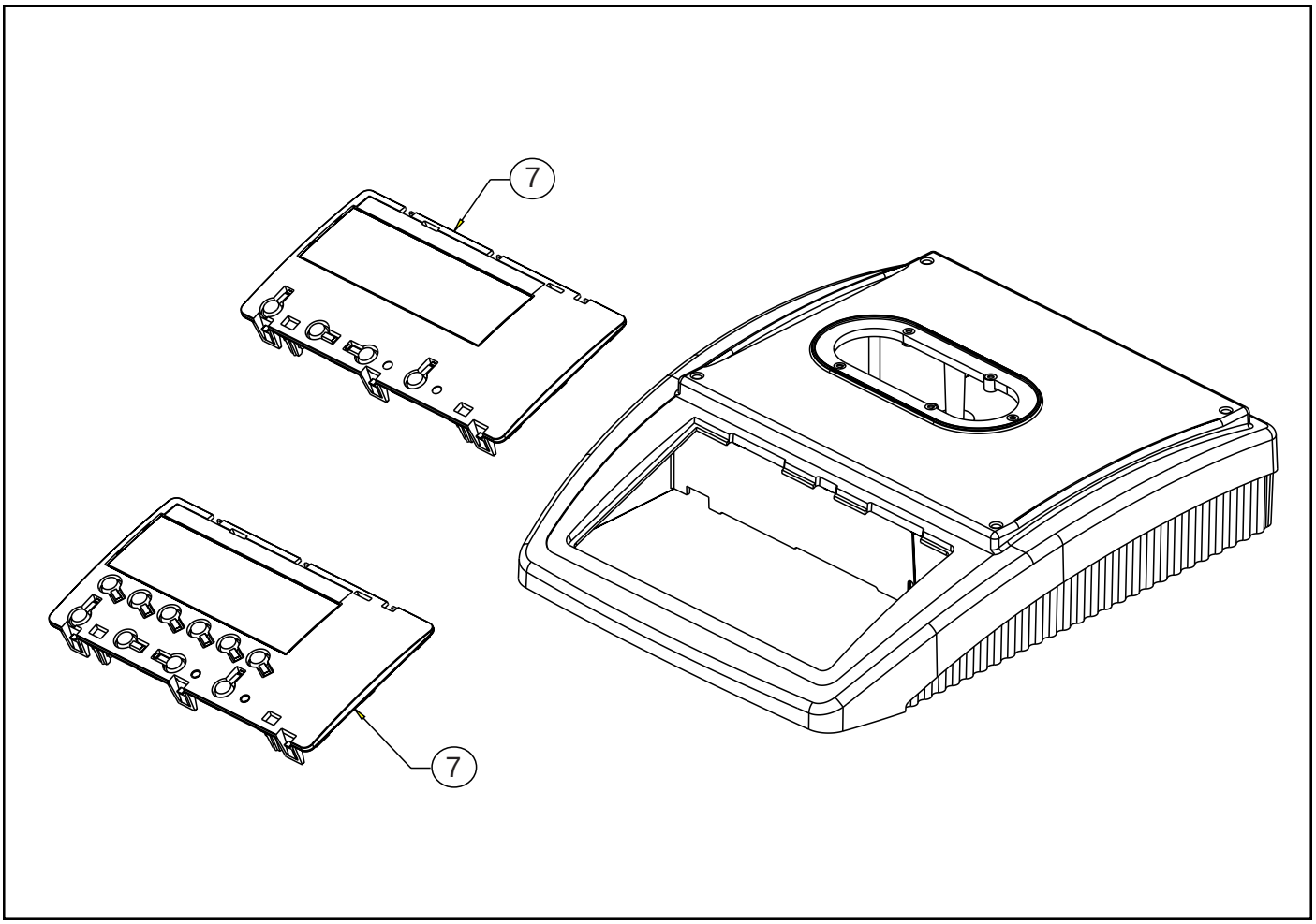


Figure 5-8. Switch Actuators, Low Capacity Scale Shown.

ITEM NO.	QUANTITY	PART NO.	DESCRIPTION
7	1	21203119	Switch Actuator, (Ranger Weigh, Dry)
7	1	21203120	Switch Actuator, (Ranger Count)

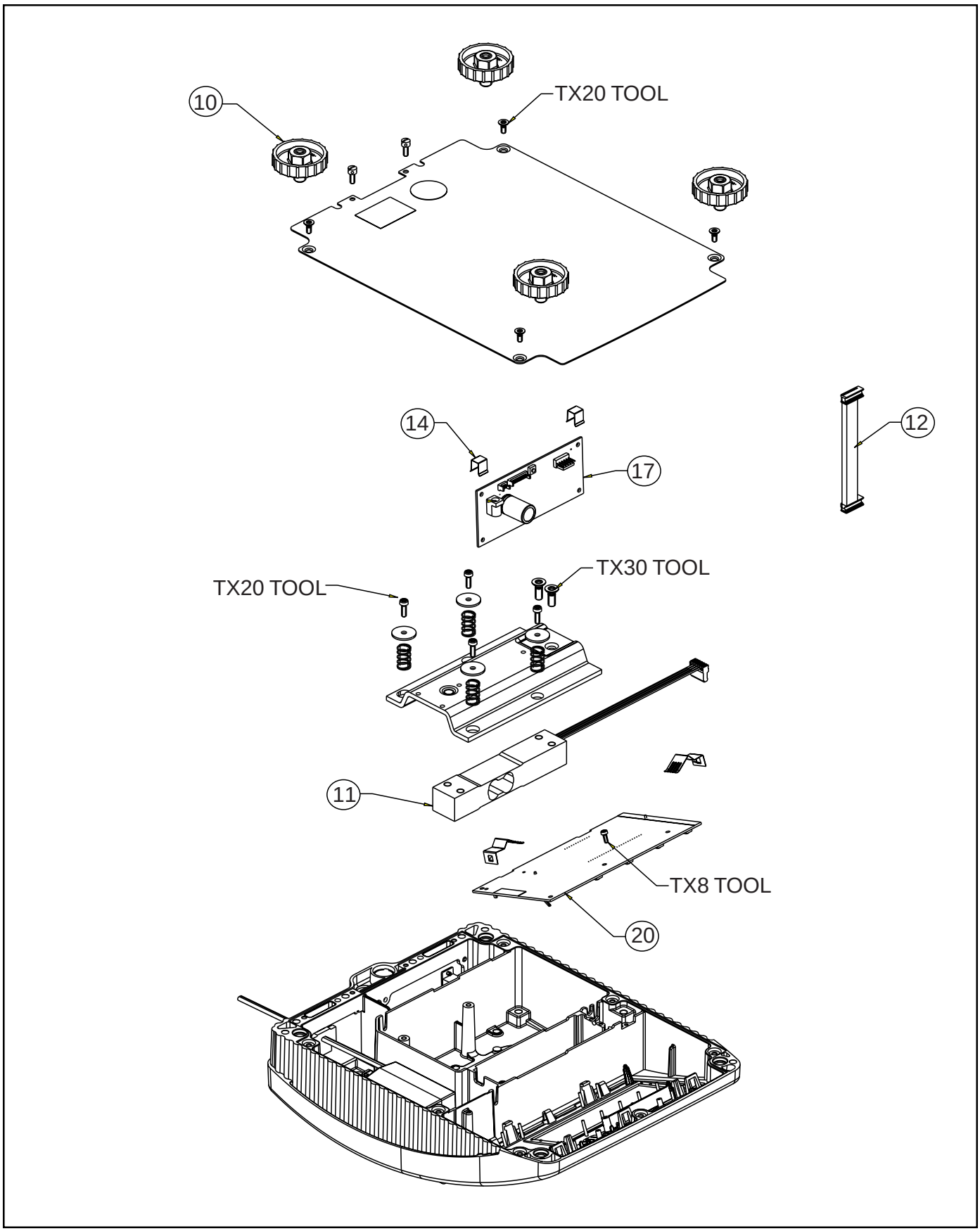


Figure 5-9. Bottom Components, Low Capacity Scale (Strain Gauge) Shown.

ITEM NO.	QUANTITY	PART NO.	DESCRIPTION
10	4	21203434	Feet, (Ranger, 3kg and 6kg)
11	1	21203143	Load Cell, (Ranger, 3kg)
11	1	21203144	Load Cell, (Ranger, 6kg)
12	1	21203164	Cable Analog PCB, 110mm, (Ranger, 3kg, 6kg)
14	2	21203166	Clamp, Digital PCB, (All Ranger), Also included in Hardware Kit 212
17	1	21203092	PCB, Analog, (All Ranger)
20	1	21203096	PCB, Digital, (Ranger Weigh, Dry)
20	1	21203098	PCB, Digital, (Ranger Count)

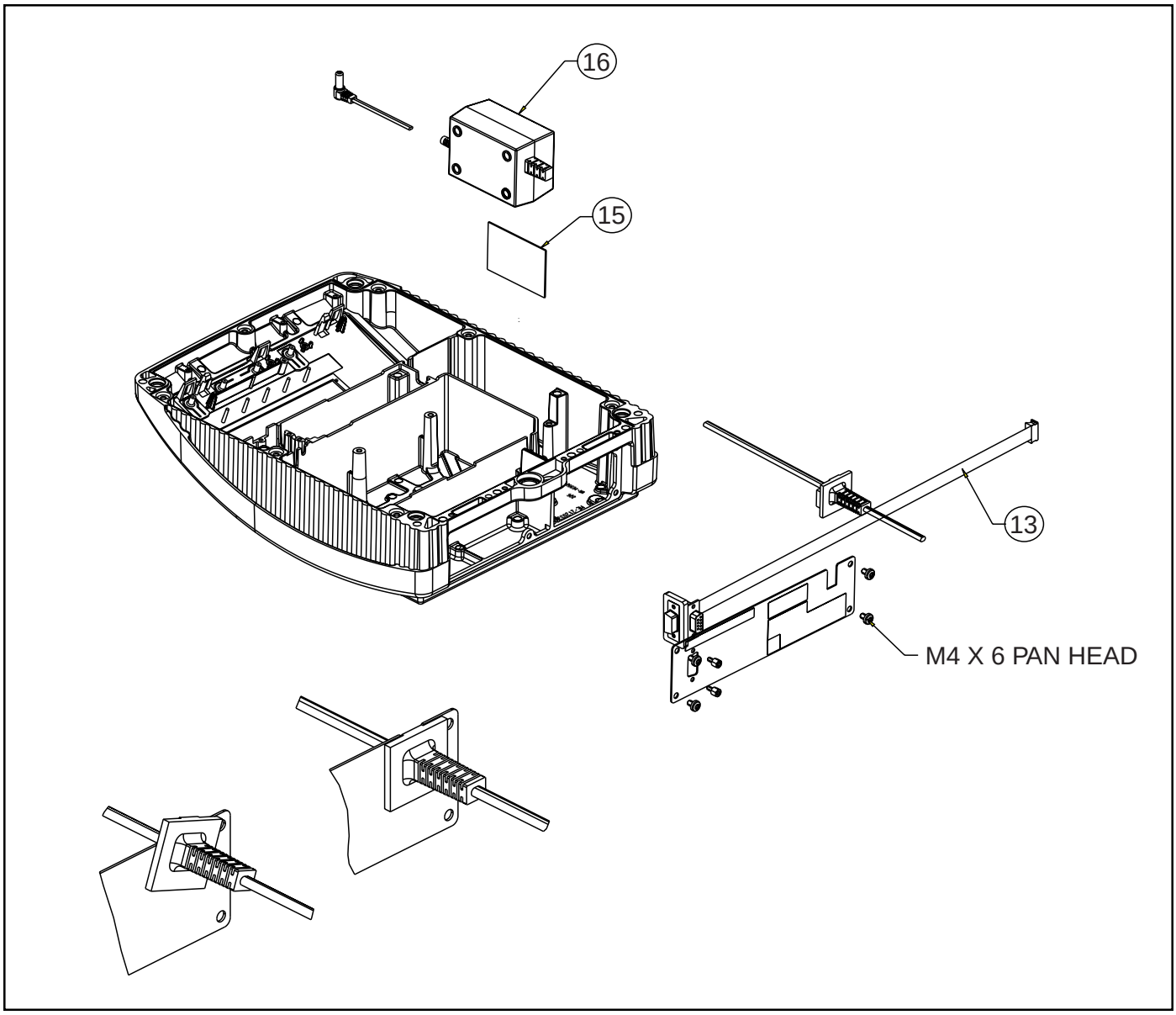


Figure 5-10. Power Pack, Low Capacity Scale Shown.

ITEM NO.	QUANTITY	PART NO.	DESCRIPTION
13	1	21203168	Cable, RS232 Internal, (All Ranger)
15	1	21203184	Double sided tape, (All Ranger)
16	1	21203122	AC Adapter, US Plug, (All Ranger)
16	1	21203123	AC Adapter, US Plug, (All Ranger)
16	1	21203124	AC Adapter, US Plug, (All Ranger)
16	1	21203126	AC Adapter, US Plug, (All Ranger)

CHAPTER 5 DRAWINGS AND PARTS LISTS

5.2 MISCELLANEOUS PARTS

ITEM NO.	QUANTITY	PART NO.	DESCRIPTION
999	1	21203232	Replacement 12v Battery, (All Ranger)
999	1	21203105	Replacement 12V Battery Charging PCB, (All Ranger)
999	1	21203404	Hardware Kit (All Ranger) Includes:
	20		countersunk torx screw M3 x 8
	20		countersunk torx screw M3 x 10
	20		countersunk torx screw M6 x 30
	50		countersunk torx screw M4 x 10
	20		button head torx screw M3 x 6
	30		button head torx screw M4 x 12
	30		button head torx screw M5 x 12
	20		wide flange washer 4.3 x 20
	20		wide flange washer 5.3 x 20
	20		countersunk torx screw M6 x 16
	20		spring clip
	50		pan head torx screw M4 x 6