Model 7821
Bench Scale

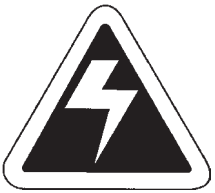
User's Manual

UNITED STATES

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

CANADA

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the radio Interference Regulations of the Canadian Department of Communications. Le present appareil numerique n'emet pas de bruits radioelectroniques depassant les limites applicables aux appareils numeriques de la Class A prescrites dans le Reglement sur le brouillage radioelectrique que edicte par le ministre des Communications du Canada



CAUTION

Risk of electrical shock. Do not remove cover. No user serviceable parts inside. Refer servicing to qualified service personnel.

Weigh-Tronix reserves the right to change specifications at any time.

11/19/02 PN 7424-15813E e1

Table of Contents

Specifications

Capacity and Resolution

Model	#Capacity (lb)	Capacity (kg)	Divisions
7821-70	150 x .05 lb	60 x .02 kg	3000d
		70 x .02 kg	3500d
7821-75		75 x .02 kg	3750d
	150 x .02 lb	75 x .01 kg	7500d
7821-100	200 x .05 lb	-	4000d
		100 x .02 kg	5000d

Approvals

Model 7821-70, 7821-75 and 7821-100

USA: NTEP COC #95-070

Canada: Ministry of Industry #AM5076

Zero Window

Initial automatic zero setting is ±10% of maximum capacity—active at power up.

Manual zero setting range is ± 2% of maximum capacity—active using the ZERO key.

Transformer Voltage

Input: 120 VAC +10%, -15% Standard 3 wire w/ground

Output: 15 VDC @.3 Amps DC minimum

Frequency

60 Hz Standard

Power Requirements

0.1 Amp maximum

Unpacking and Installing the Scale

Unpacking the Scale

1. Remove contents of the shipping container.
2. Inspect the scale for shipping damage. Immediately report any damage to the shipper.

Installing the Scale

1. Mount the scale on a stable, level surface that is free from air currents and vibration. Be sure the scale platter does not touch any adjacent surfaces.

Cutout Dimensions

2. To install the scale surface flush with a countertop, use these dimensions to guide your construction:

7821 Platform Dimensions	Minimum Cutout Dimensions
14" (35.6cm) W x 12.5" (31.7cm) L 4.1" (10.4cm) Min Ht. adjustable to 4.6" (11.7cm)	14.75" (37.5cm) W x 13.25" (33.7cm) L

Attaching Velcro™ Fasteners (Optional remote display only)

For the optional remote display, attach Velcro™ fasteners to both the back of the display and to the surface where the display is to be mounted. To attach the Velcro fasteners, clean the mounting areas thoroughly and press the Velcro into place. The adhesive adheres best to a smooth, clean surface.

Velcro is a registered trademark of Velcro USA, Inc.

Operation

Power Up Test Sequence

When the scale is first powered up, it will perform a test sequence. During this sequence, the display will show the following:

- The model number and software revision level
- A numeric counting test for all segments of the display

If everything is OK, the display will show zero weight and the scale is ready for use. If an error was detected, it will be reported by an error code as described in the section *Error Codes*. If the scale is outside the ± 10% zero window, center dashes are displayed "_ _ _ _." Recalibration may be required.

Performing a Normal Weighment

1. With the scale powered on, make sure the scale platter is empty and the display is at zero. If it not, press the **ZERO** key…

   0.00 is displayed.

2. Place an item to be weighed on the scale platter…

   The scale will display the gross weight.

3. Remove the item from the scale platter.

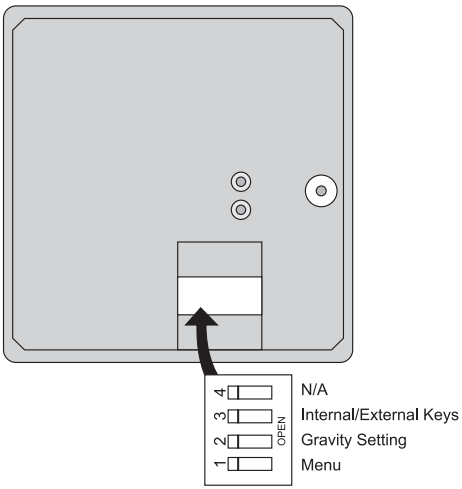
Modes of Operation

Accessing the Menu

The 7821 powers up in normal weighing mode ready for weighing operations. Access the MENU Mode by setting Switch 1 shown in Figure 1 to the OPEN or MENU Mode position.

Figure 1 7821 Switch Location

Top view of 7821 scale with platter removed.



There are three modes available to you with Switch 1 in the MENU Mode or OPEN position. They are as follows:

Diagnostic Mode – Used to test areas of the scale's function
Configuration Mode – Used to configure the scale for your application
Calibration Mode – Used when calibrating the scale

The structure for these menus is shown in Figure 2. The following pages have specific information about each mode and step-by-step instructions for accessing them.

Zero and Units Key

The **ZERO** key zeros the scale, and **UNITS** key changes the unit of measure between lb and kg.

Display

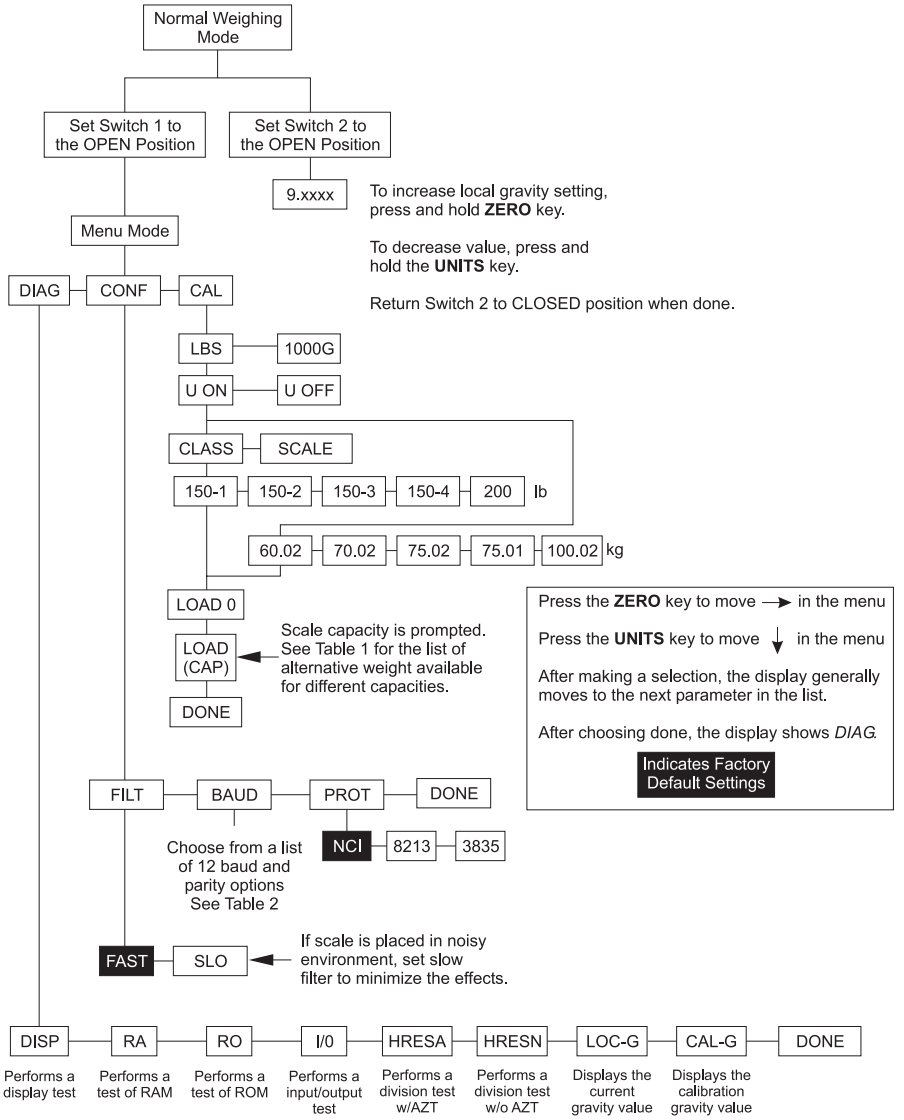
Remote Display

The NCI 7821 bench scale has an optional remote display. Typically, the remote display is used to display weight only (i.e., the **ZERO** and **UNITS** keys are not operable). Alternatively, it is possible to have operable **ZERO** and **UNITS** keys on the remote display, but in so doing, the keys must be disabled on the local (or internal) display. To activate the **ZERO** and **UNITS** keys on the remote display, set dip Switch 3 to the OPEN position.

Gravity Adjustment

With Switch 2 set to OPEN, you can adjust the local gravity value. Press the **ZERO** key to increase the value or press the **UNITS** key to decrease the value. See *Gravity Adjustment* section for details.

Figure 2
Menu Structure



The NCI 7821 bench scale allows calibration of the scale using less than full capacity weights. The following tables show alternative weights that can be used to calibrate the scale at its designated capacity. See Table 1 for alternate calibration span loads.

Alternative Calibration Span Points

Table 1:
Alternative Calibration Span Points

Capacity (lbs)	Alternative Calibration Weights (lbs)	Capacity (kg)	Alternative Calibration Weights (kg)
150 x .05 lb	10, 50, 150	60 x .02 kg	10, 30, 60
		70 x .02 kg	10, 30, 70
		75 x .02 kg	10, 30, 75
150 x .02 lb	10, 50, 150	75 x .01 kg	10, 30, 75
200 x .05 lb	10, 100, 200	100 x .02 kg	10, 50, 100

Baud Rate and Parity Options

Table 2:
Baud Rate and Parity Options

Display	Baud	Parity
12 E	1200	Even
48 E	4800	Even
*96 E	9600	Even
192 E	19,200	Even
12 o	1200	Odd
48 o	4800	Odd
96 o	9600	Odd
192 o	19,200	Odd
12 n	1200	None
48 n	4800	None
96 n	9600	None
192 n	19,200	None

*Factory Default Setting

Scale lb/kg Capacity and Count-by Choices

Table 3:
Scale lb/kg Capacity and Count-by Choices

	Capacity (lb)	Capacity (kg)
150 - 1	150 x .05	60 x .02
150 - 2	150 x .05	70 x .02
150 - 3	150 x .05	75 x .02
150 - 4	150 x .02	75 x .01
200	200 x .05	100 x .02

Diagnostics Mode

The Diagnostic (DIAG) Mode menu lets you test specific areas of the scale's function. These areas are:

Display (DISP) – Shows the version and revision of the software, followed by a display segment test.

RAM (RA) – Performs a nondestructive test of RAM in the processor. Displays *PASS* or *FAIL*.

ROM (RO) – Performs a checksum of all locations of ROM in the processor. Displays *PASS* or *FAIL*.

Input/Output (I/O) – Data is output by the scale, and through the use of a loopback connector, the data is immediately read back into the receive channel and verified against what was sent. *PASS* or *FAIL* is displayed. Requires a jumper (short) between transmit and receive data lines.

Division, Test w/AZT (HRESA) – Weight data is normalized to 100,000 counts of displayed resolution. AZT is enabled. Typically used by service technicians.

Division, Test w/o AZT (HRESN) – Weight data is normalized to 100,000 counts of displayed resolution. AZT is disabled. Typically used by service technicians.

Step-by-Step Instructions for DIAG Mode

Follow these steps to access the tests in the DIAG menu.

1. From normal weighing mode, move Switch 1 to the MENU Mode or OPEN position. (See Figure 1).

   Display shows *DIAG*.

Press the **ZERO** *key to scroll through lists of selections.*

Press the **UNITS** *key to make a selection.*

If you want to skip a test, press the **ZERO** *key to scroll to the next test.*

DIAG will flash every 10 seconds during the high resolution test to remind you that you are doing a test and not seeing normal weight readings.

2. Press the **UNITS** key…

   DISP is displayed. This stands for display.

3. Press the **UNITS** key to perform the display test described earlier…

   Display test is performed and the display shows *DISP* after the test is completed.

4. Press the **ZERO** key…

   RA is displayed. This stands for the RAM test.

5. Press the **UNITS** key to perform the RAM test…

   PASS or *FAIL* is displayed briefly, then *DISP*. If the test fails, contact your local Weigh-Tronix distributor for service.

6. Press the **ZERO** key to scroll to the ROM test…

   RO is displayed. This stands for the ROM test.

7. Press the **UNITS** key to perform the ROM test…

   PASS or *FAIL* is displayed. If the test fails, contact your local Weigh-Tronix distributor for service.

8. Press the **ZERO** key to scroll to the I/O test…

   I/O is displayed. This stands for the Input/Output test.

9. With a loopback connector in place, press the **UNITS** key to perform the I/O test…

   PASS or *FAIL* is displayed. If the test fails, check your connections and/or contact your local Weigh-Tronix distributor for service.

10. Press the **ZERO** key…

    HRESA is displayed. This stands for the high resolution test with AZT enabled.

11. Press the **UNITS** key to perform this test…

    The display shows the weight on the scale at a resolution of 100,000 counts.

12. Press the **UNITS** key to stop the test…

    HRESA is displayed.

13. Press the **ZERO** key…

    HRESN is displayed. This stands for the high resolution test without AZT enabled.

14. Press the **UNITS** key to perform this test…

    The display shows the weight on the scale at a resolution of 100,000 counts.

15. Press **UNITS** key to stop the test…

    HRESN is displayed.

16. Press the **ZERO** key. . .

    LOC-G is displayed. This stands for local gravity or current gravity setting.

17. Press the **UNITS** key. . .

    The local or current gravity setting is displayed.

18. Press the **ZERO** key. . .

    CAL-G is displayed. This stands for calibration gravity setting.

19. Press the **UNITS** key. . .

    The calibration gravity setting is displayed.

20. When you are finished, press the **ZERO** key, which displays *DONE*, and press the **UNITS** key, *DIAG* is displayed, or place Switch 1 back to the closed position to return back to normal weighing mode.

Configuration Mode

The Configuration (CONF) Mode menu allows configuration of the scale to the specific application need. The items you can configure are as follows:

Filtering (FILT) – Choose between FAST and SLO filtering. Slow should be chosen in areas susceptible to vibration. Choose FAST filtering for more stable conditions.

Baud (BAUD) – Choose a baud and parity from table.

Protocol (PROT) – Choose serial communication protocol:
NCI - Ref. 8408-14788-01 (W, S, Z, H, U, M Only)
8213 - Ref. 8408-14788-03
3835 - Ref. 8408-14788-12

Step-by-Step Instructions for CONF Mode

Follow these steps to access and configure the items in the CONF menu. Refer to Figure 2.

1. From the normal weighing mode, move Switch 1 to Menu Mode or OPEN position, then press the **ZERO** key repeatedly until…

   CONF is displayed.

2. Press the **UNITS** key…

   FILT is displayed. This stands for filtering.

3. Press the **UNITS** key…

   The current setting, *FAST* or *SLO*, is displayed.

4. Use the **ZERO** key to toggle between the two choices. Press the **UNITS** key when the choice you want is displayed…

   The choice is accepted and the display shows *FILT*.

5. Press the **ZERO** key…

   BAUD is displayed.

6. Press the **UNITS** key…

   The current baud and parity choice is displayed.

7. Use the **ZERO** key to scroll the choices found in Table 2. When the choice you want is displayed, press the **UNITS** key…

   The choice is accepted and the display shows *BAUD*.

8. Press the **ZERO** key…

   PROT is displayed.

9. Press the **UNITS** Key…

   The current protocol is displayed.

10. Use the **ZERO** key to scroll between the three protocol choices. When the protocol you want is displayed, press the **UNITS** key…

    The choice is accepted and the display shows *PROT*.

11. When finished configuring the scale, press the **ZERO** key, which displays *DONE*, then press the **UNITS** key, *DIAG* is displayed, or place Switch 1 back to the closed position to return back to normal weighing mode.

Calibration Mode

The Calibration (CAL) Mode menu allows scale calibration. The items in the Calibration menu are as follows:

Pounds/Kilograms (lb or 1000G) – Selects the unit of measure of your calibration test weights.

Scale or Class – When calibrating the scale for lb, calibrate the unit as a SCALE or as a CLASS (weight classifier/postal rounding).

U On / U Off – When configured for U ON, the scale will allow switching between lb/kg using the **UNITS** key.

Capacity (100, etc.) – Selects the capacity of the scale.

Follow these steps to calibrate the scale. Refer to Figure 2.

Step-by-Step Instructions for CAL Mode

1. From normal weighing mode, move Switch 1 to the Menu Mode or OPEN position…

   DIAG is displayed. Press the **ZERO** key until *CAL* is displayed.

2. Press the **UNITS** key to start calibration…

   LBS or *1000G* (kg) is displayed.

3. Press the **ZERO** key to toggle between the choices of unit of measure (lb or kg). When the choice you want is displayed, press the **UNITS** key to accept…

   The choice is accepted and *U ON* is displayed.

Warning!
Entering this mode can erase the calibration already saved. Special calibration weights are needed to use calibration mode.

4. Press the **ZERO** key to toggle between the choices *U ON* or *U OFF*. Once your choice is displayed, press the **UNITS** key. See above for the definitions of calibrating the scale using *U ON* or *U OFF*.

5. If *LB* was chosen for calibration, the scale will display *SCALE***.** Press the **ZERO** key to toggle between *SCALE* and *CLASS*. Press the **TEST** key. If kg was chosen, this step is skipped. The scale then prompts one of the capacities from Table 3.

6. Press the **ZERO** key to toggle between the capacity choices. When the choice you want is displayed, press the **UNITS** key…

   The scale prompts *LOAD 0*.

7. Clear all weight from the scale platter and press the **UNITS** key…

   After a brief pause, *LOAD xxx* is displayed (xxx = Span Weight).

   Alternate calibration points can be chosen using the TEST key to toggle between choices (see Table 1).

If no span weight is applied, calibration will be aborted. ***"CAL ERROR ABORT"*** *will be displayed.*

8. Place chosen span calibration weight on the scale and press the **UNITS** key…

   After a brief pause, ***DONE*** is displayed. The scale then prompts *DIAG*.

9. Remove all calibration weights from scale.

10. Return Switch 1 to the closed position…

    The scale returns to normal weighing mode.

The scale is now tested, configured and calibrated. It is ready for use in your application.

Gravity Mode

Warning: Using this feature in "sealed" applications may be subject to approval by the appropriate governing agency at the end-users site.

Gravity value roles 'over' at 9.8400 and rolls 'under' at 9.7700.

The Gravity Mode feature provides a means of adjusting the scale's internal calibration factors to compensate for variations in acceleration due to gravity at different geographic locations. These differences can cause a given mass to indicate a slightly different weight at an end-user's (local) site than it did at the Calibration (CAL) site.

To make the adjustment, you must know the value of the gravity constant for the local site. This value is expressed in meters per second, per second (i.e., m/s^2). It is not necessary to calibrate the scale, therefore, no calibration weights are needed to make this adjustment.

The scale maintains two gravity setting values. The first is the "calibration-site" value known as CAL-G. The second is the end-user or "local-site" value and is known as LOC-G. When the scale was originally calibrated at the factory, the CAL-G and LOC-G values were both set to 9.8040 which is the gravity constant for the manufacturing site.

To adjust the displayed weight value to accurately reflect an applied test weight, you can either recalibrate the scale or adjust the local gravity setting.

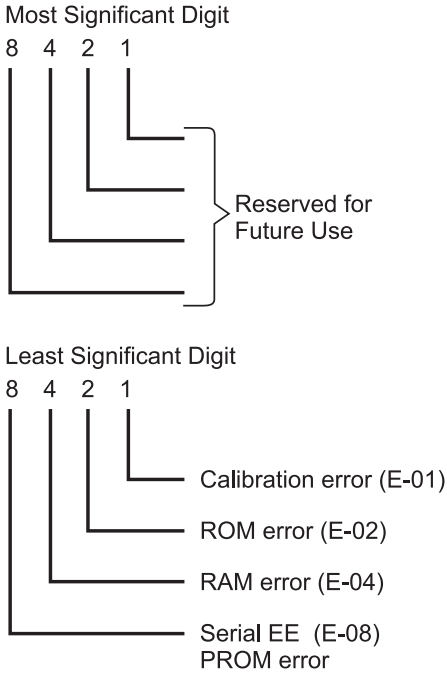
To view the calibration or local gravity values, you must access the DIAG menu and scroll to *LOC-G* or *CAL-G* message and press the **UNITS** key.

To view or adjust the Local Gravity value, set Switch 2 to the OPEN position. The display will indicate the current "local" gravity value. Press the **ZERO** key to increment the value or the **UNITS** key to decrement the value. The gravity value will change in steps of .0002. When the correct value is displayed, return Switch 2 to the CLOSED position. The scale will now use this new relationship between calibration and local gravity for its weight calculations.

Error Codes

Any system errors detected by the scale will be displayed as the letter *E* followed by a two-digit error code. Press the **UNITS** key to continue operation. If a calibration error occurs, the only way to clear it is by recalibrating the scale.

The error codes are broken down into two hexadecimal numbers, with each bit defining a single error condition. The error codes are defined as follows:



Communication

Interface Cable

The NCI 7821 scale comes factory configured as a serial RS-232 interface device. There is one 9-pin DE type female connector accessible at the rear of the unit. The functional pinout of this cable is that of a standard PC which is as follows:

DE-9 Female Scale			DE-9 Male Host		
Pin	Name	Direction	Pin	Name	Direction
1.	JMP 1	-	1.	DCD	IN
2.	TXD	OUT	2.	RXD	IN
3.	RXD	IN	3.	TXD	OUT
4.	JMP 1	-	4.	DTR	OUT
5.	SG	-	5.	GRD	-
6.	JMP 1	-	6.	DSR	IN
7.	JMP 2	-	7.	RTS	OUT
8.	JMP 2	-	8.	CTS	IN
9.	NC	-	9.	RI	IN

Serial Communications Protocol

For command/response descriptions, please refer to the following Weigh-Tronix NCI Serial Communications Documents:

NCI Standard Protocol: 8408-14788-01 (W, S, Z, H, U, M only)

8213 Protocol: 8408-14788-03

NCI 3835 Protocol: 8408-14788-12

NCI Communications Protocol

This standard is used by all NCI bench scale products.

SYMBOL KEY:

<ETX>	End of text character (03/hex)
<LF>	Line feed character (0A hex)
<CR>	Carriage return character (0D hex)
<SP>	Space (20 hex)
x	Character from display including minus sign
hh…	Two or more status bytes
uu	Unit of measure (lb, kg, oz, g, etc. using ANSI standard abbreviations)

W<CR>
Scale Response
<LF>xxxx.xxuu<CR>
<LF>hh...<CR><ETX>
Results
Returns decimal weight, units, plus scale status

S<CR>
Scale Response
<LF>hh…<CR><ETX>
Results
Returns scale status.

Z<CR>
Scale Response
<LF>hh…<CR><ETX>
Results
Scale is zeroed, returns status.

H<CR>Scale Response
<LF>xxxx.xxuu<CR>
<LR>hh...<CR><ETX>
Results
Returns decimal weight in 10x with units plus scale status.

U<CR>
Scale Response
<LF>uu<CR><ETX>
Results
Changes unit of measure, returns new units.

M<CR>
Scale Response
<LF>xxxxxxxMM<CR>
<LF>hh...<CR><ETX>
Results
Returns normalized raw counts and count status.

All other commands
Scale Response
<LF>?<CR><ETX>
Results
Unrecognized command

Troubleshooting

SYMPTOM	RECOMMENDED ACTION
	Perform each step in sequence until the symptom is resolved. Once the symptom is resolved, discontinue the troubleshooting steps and continue with regular product usage.
No Display(s)	1. Check that the primary side of the cord is plugged into the AC outlet, and the secondary side is properly connected to the power jack on the back of the scale. 2. Replace power supply.
Missing or extra segments on display	1. Replace display board.
Scale will not return to zero, or incorrect weight is displayed	1. Press the **ZERO** key. 2. Check for interference of weighing platform. 3. Power down, then power up the scale. 4. Recalibrate the scale.
Display shows unrecognized characters	1. Power down, then power up the scale. 2. Check software PROM for proper insertion. 3. Check display cables for the proper connection.
Display shows under " – – – – " dashes (indicates the scale is below zero or under capacity).	1. Verify that the weigh platter is on the scale. 2. Verify that nothing is interfering with or rubbing against the weighing surface. 3. Press the **ZERO** key 4. Power down, then power up the scale. 5. Recalibrate the scale.

Display shows center “ – – – – ” dashes (indicates the scale is outside zero capacity of ±2%).	1. Verify that the weigh platter is on the scale. 2. Press the **ZERO** key. 3. Power down, then power up the scale. 4. Recalibrate the scale.
Display shows upper “ – – – – ” dashes (indicates the scale is over capacity).	1. Remove all weight from the scale. 2. Press the **ZERO** key. 3. Power down, then power up the scale. 4. Recalibrate the scale.
Scale is not transmitting data to the host device	1. Check cable connection at both the rear of the scale and the host device. 2. Check communication setting and baud rate on both scale and host device. 3. Perform I/O loopback test. 4. Replace main PCB.
The ZERO key and TEST key do not function.	1. Replace display panel. 2. Replace display PCB. 3. Replace main PCB.

Spare Parts List

Description	Part Number
Keyboard Panel	1163-15803
Display PCB	7405-15465
Loadcell (100kg)	7154-16335-100
Main PCB	7405-14704-2
Power Supply	1148-15536
RS-232 Cable	1140-13842

Notes

Notes

WEIGH-TRONIX
1000 Armstrong Drive
Fairmont, MN 56031
Telephone: 507-238-4461
Facsimile: 507-238-4195
E-Mail: service@wt-nci.com
www.wt-nci.com