TP Series

Software Development Kit

Operation Manual

RICE LAKE®
WEIGHING SYSTEMS
To be the best by every measure®

164106

Contents

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1.0 Introduction

This is a precision instrument equipped with exacting mechanisms in a compact body. The TP Series provides enhanced functions, including a counting mode for stock control of parts, a percentage mode for comparative measurements given in percentages, and a limit function for measuring constant quantities by consecutive weighings. Despite its many functions, the balance is easy to operate and features user-friendly keys. Furthermore, the large liquid-crystal display provides excellent visibility, and the instrument's high speed and stability (intrinsic to a tuning fork design) help boost operational efficiency.
Moreover, balances with a built-in calibration weight can be calibrated by simply turning the calibration knob.

1.1 Safety

Safety Symbol Definitions

Indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury.

Indicates a potentially hazardous situation that, if not avoided could result in serious injury or death, and includes hazards that are exposed when guards are removed.

Indicates a potentially hazardous situation that, if not avoided may result in minor or moderate injury.

Mandatory Symbol:

Indicates a "mandatory" action that should be performed without fail.

Prohibitive Symbol:

Indicates a "prohibited" action that must not be performed.

Do not operate or work on this equipment unless you have read and understand the instructions and warnings in this manual. Failure to follow the instructions or heed the warnings could result in injury or death. Contact any Rice Lake Weighing Systems dealer for replacement manuals. Proper care is your responsibility.

WARNING

Before attempting to operate this unit, make sure every individual who operates or works with this unit has read and understands the following safety information.

Failure to heed may result in serious injury or death.

DO NOT allow minors (children) or inexperienced persons to operate this unit.

DO NOT operate without all shields and guards in place.

DO NOT jump on the scale.

DO NOT use for purposes other than weight taking.

DO NOT place fingers into slots or possible pinch points.

DO NOT use any load bearing component that is worn beyond 5% of the original dimension.

DO NOT use this product if any of the components are cracked.

DO NOT exceed the rated load limit of the unit.

DO NOT make alterations or modifications to the unit.

DO NOT remove or obscure warning labels.

DO NOT use near water.

Before opening the unit, ensure the power cord is disconnected from the outlet.

Keep hands, feet and loose clothing away from moving parts.

Use only AC power (rated value) and the dedicated AC adapter.

1.2 Standard Features

- External weight calibration
- Large 16.5 mm high liquid crystal backlit display
- Selectable modes: weight, unit, count and percentage
- 12 units of measurement
- Mono-Metal Tuning Fork Sensor (MMTS) provides quick response and stability
- 20-step bar graph display
- 115VAC adaptor included (230VAC optional)
- RS-232 bidirectional
- Plastic housing on models less than 1000g; plastic top and die cast housing on models greater than 1000g

Part #	Model #	Description	NTEP Resolution
108155	TP-420NT	420g x 0.001g	(e=0.01g)
163604	TP-1200NT	1200g x 0.01g	(e=0.1g)
108154	TP-4200NT	4200g x 0.01g	(e=o.1g)
163606	TP-6200NT	6200g x 0.01g	(e=0.1g)

Table 1-1. Part Number Information

2.0 Installation

The following section contains information regarding the installation of the TP Series balance.

2.1 Setup and Checking of Functions

1. Invoking the Function: press and hold down the **Function** Key until the indicator displays "FUnc," then release the key. The function setup mode is activated and the first item, [1. b.G. 1 (Bar graph) 1] appears.

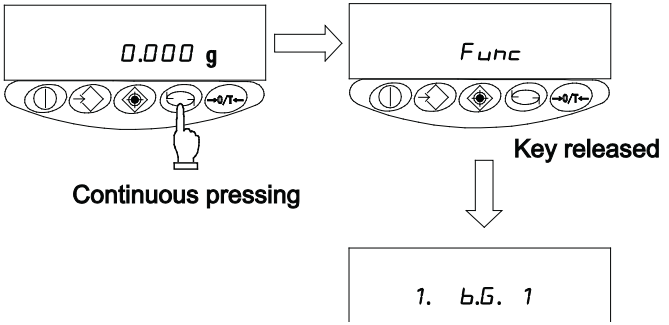

Figure 2-1. Invoking the Function

2. Selecting the next item: press the **Function** Key. The indication changes to the next item, [2. SEL 0 (Limit function)].

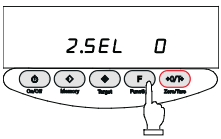

Figure 2-2. Selecting the next item

3. Selecting an item: pressing the **Function** key advances the function items at the rate of one item per press.

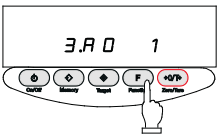

Figure 2-3. Selecting an item

4. Changing the content of an item: select the item to be changed with the **Function** key. Each press of the **Zero/Tare** key changes the last digit. Select the desired digit.

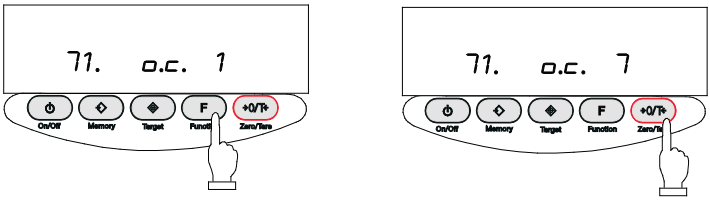

Figure 2-4. Changing the Content of an Item

5. Terminating the function selection: press the **Target** key. The balance terminates the function setup and returns to measurement mode.

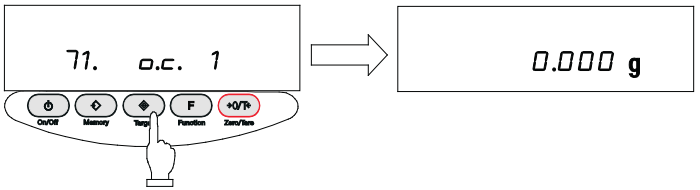

Figure 2-5. Terminating the Function Selection

2.2 Description of Functions

Setup of measurement units to be displayed **	8 1. 5. U. ~ 85. 5. U.	1A	[t 1] (t1_Hong Kong)*
		1b	[t 1 ►Upper right] (t1_Singapore, Malaysia)***
Register measurement units by selecting **Function**		1C	[t 1 ►Lower right] (t1_Taiwan)*
		1d	[mom]
		1E	[to] (to)***
		*3 20	[Pcs]
		*4 1F	[%]
		*5 00	Until not set

*: default factory settings [8 1. 5. U.] ~ [85. 5. U.]
** [00] cannot be set at [8 1. 5. U.]
*** Not available on NTEP models

2.2.1 Interface Section

Displayed when [7. I.F.] is set to [1] or [2]

Item	Set Value		Description
Output Control	71.o.c	0	Stop output.
		1	Output continuous at all times.
		2	Output continuous if stable (stops output if unstable).
		3	Outputs once by pressing **Memory** (irrespective of whether stable).
		4	Outputs once, if stable. Outputs if the balance is stable when a sample is loaded after the preceding sample has been removed and the balance indicated zero, or less.
		5	Outputs once if stable, and stops output when unstable.
		6	Outputs once if stable, and outputs continuously when unstable. Even if the sample is not replaced, output of the balance stops when it stabilizes after being output once.
		*7	Pressing **Memory** key causes the balance to output once when stable.
Baud Rate	72.b. 1	*1	1200 bps
		2	2400 bps
		3	4800 bps
		4	9600 bps
Parity	73.P.r	*0 None	Displayed only when [7. I.F. 2.] (7-digit numeric format) is specified.
		1 Odd	
		2 Even	

* Denotes a factory-setting

** The data interval in continuous output mode is 0.1 to 1 second (the interval varies depending on weighing conditions and other factors).

2.3 Input/Output Functions

The following addresses input and output functions of the TP Series Balance.

2.3.1 Terminal Numbers and Functions

Terminal Number	Signal	Input/Output	Function & Remarks
1	EXT.TARE	Input	External tare subtraction**
2	DTR	Output	HIGH (when balance is powered up)
3	RXD	Input	Receiving data
4	TXD	Output	Transmitting Data
5	GND	—	Signal Ground

Table 2-1. Terminal Numbers and Functions

Compatible plug: TCP 0556-01-0201 (Hosiden - supplied with balanace).

Note

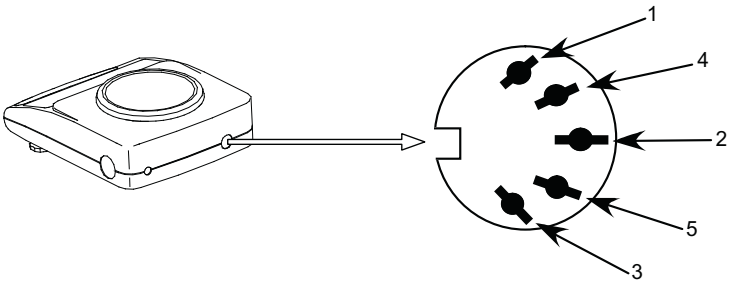

Figure 2-6. RS 232 C Connector (DIN 5-pin) : Rear Panel

* Tare subtraction (zero adjustment) is possible by connecting an external tare subtraction input and a signal ground through contacts or a transistor switch. When following this procedure, secure a connection time of at least 400 milliseconds (when the switch is off, the voltage maximum is 15V; when the switch is on, the sink current is 20 mA or less).

CAUTION *Before plugging in the connectors, unplug the AC adapter.*

2.3.2 Connection Between Balances and Personal Computers

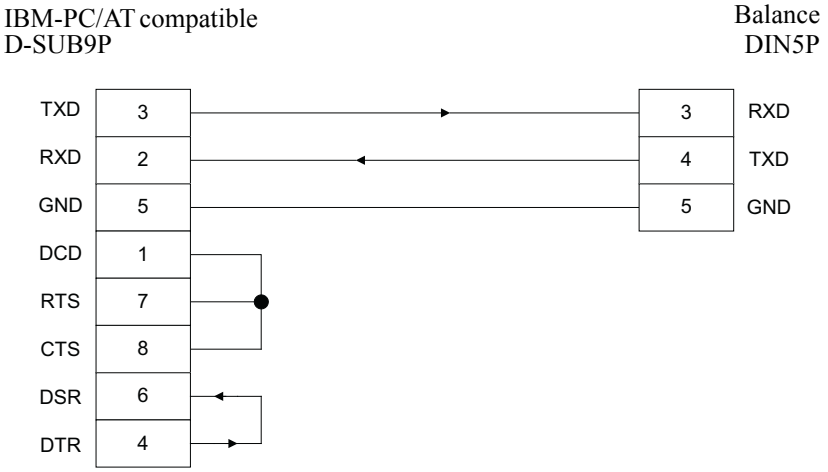

Figure 2-7. Sample connection with an IBM-PC/AT compatible

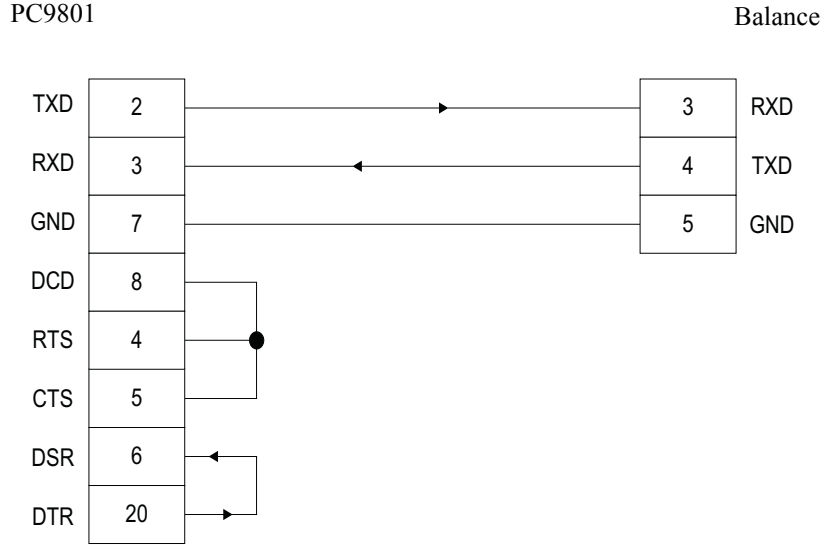

Figure 2-8. Sample connection with PC9801

2.3.3 Interface Specifications

6. Transmission System - Serial transmission with start-stop synchronization
7. Transmission rates - 1200/2400/4800/9600 bps.
8. Transmission codes - ASCII codes (8-bit)
9. Signal levels - Compliant with EIA RS-232C
   HIGH level (data logic 0) +5 to +15V

LOW level (data logic 1) -5 to -15V

10. One-Character bit configuration:
    Start bit: 1 bit
    Data bit: 8 bits
    Parity bit: 0/1 bits
    Stop bit: 2 bits
11. Parity bit - none/odd/even

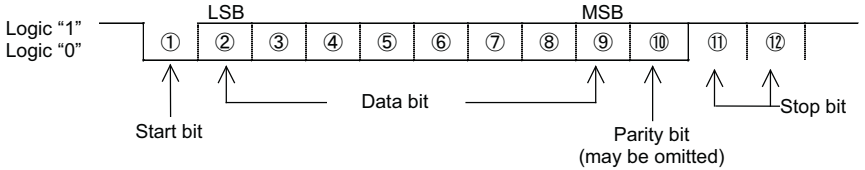

Figure 2-9. Interface Specifications

2.3.4 Output Data

By changing the function settings on the main unit of the balance, users can select either six-digit numeric format or seven-digit numeric format. See "Setup and Checking of Functions" on page 4.

Data Format

Six-digit numeric format:
Composed of 14 characters, including the terminators (CR=0DH, LF=0AH).

1	2	3	4	5	6	7	8	9	10	11	12	13	14
P1	D1	D2	D3	D4	D5	D6	D7	U1	U2	S1	S2	CR	LF

Seven-digit numeric format:
Composed of 15 characters, including the terminators (CR=0DH, LF=0AH). A parity bit can also be appended.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
P1	D1	D2	D3	D4	D5	D6	D7	D8	U1	U2	S1	S2	CR	LF

Polarities

P1	Code	Description
+	2BH	When data is zero or positive
-	2DH	When data is negative
(SP)	20H	When data is zero or positive

Table 2-2. Polarities

Numeric Data

Six-digit numeric format: (D1-D7: seven characters)
Seven-digit numeric format: (D1-D8: eight characters)

D1-D7 (D8)	Code	Description
0-9	30H-39H	Numerical value 0-9
.	2EH	Decimal point (floating position) **When data is an integer, it may be omitted and replaced with a blank space (SP) in the lowest-order place.
(SP)	20H	Space: zero of leading portion of value (leading zero suppress)

Table 2-3. Numeric Data

Units (U1, U2: Two Characters)

Note ***All the codes are ASCII codes.***

U1	U2	Code		Meaning	Balance Indicators
(SP)	G	20H	47H	Gram	g
C	T	43H	54H	Carat	ct
O	Z	4FH	5AH	Ounce	oz
L	B	4CH	42H	Pound	lb
O	T	4FH	54H	Troy Ounce	oz t
D	W	44H	57H	Pennyweight	dwt
G	R	47H	42H	Grain	▶ (lower right)
T	L	54H	4CH	tael (Hong Kong)	tl
T	L	54H	4CH	tael (Singapore, Malaysia)	tl ▶ (upper right)
T	L	54H	4CH	tael (Taiwan)	tl ▶ (lower right)
M	O	4DH	4FH	Momme	Mom
t	o	74H	6FH	Tola	to
(SP)	%	20H	25H	Percentage	%
P	C	50H	43H	Pieces	Pcs

Figure 2-10. Units

Result of Judgement

Result of judgement when operating the balance with the limit function (S1: one character).

S1	Code	Description
L	4CH	LO (Low)
G	47H	OK (Good)
H	48H	HI (High)
(SP)	20H	No status specified

Table 2-4. Result of Judgement

Status (S2: One Character)

S2	Code	Description
S	53H	Data stable
U	55H	Data unstable
E	45H	Data error (data other than S2 is invalid) [o - Err], [U - Err]
(SP)	20H	No status specified

Table 2-5. Status

2.3.5 Input Commands

Users can control the balance remotely by transmitting commands from an external device. Two types of control commands are available:

1. Instruction for tare subtraction
2. Setup of output control

Command Transmission Method

1. A command is transmitted to the balance from an external device. Since the data flow (transmission and reception) is stored by a full-duplex system, commands can be transmitted regardless of their data-transmission timing.
2. When the balance has executed the received command, it activates a normal end response or transmits the requested data, via the transmitting command. If the balance was unable to execute the command or received an erroneous command, it transmits an error end response. If the balance is working properly, it usually returns a response within a second after it receives the transmitted command. If the balance receives a transmission while it is conducting a procedure (such as the setup of a function or a span adjustment), it will transmit a response when the procedure finishes.
3. When transmitting more than one command to the balance from a remote device, wait until you have received a confirmation on the first transmission before transmitting the next.

Command Format

1. Composed of four characters (ASCII), including terminators (CR=0DH, LF=OAH)

1	2	3	4
C1	C2	CR	LF

2. Instruction for tare subtraction (zero adjustment)

C1	C2	Code		Description	Value	Response
T	(SP)	54H	20H	Instruction for tare subtraction (zero adjustment)	None	A00: Normal end E01: Tare subtraction cannot be executed due to an error in the weight value

3. Setup of output control

C1	C2	Code		Description
O	0	4FH	30H	Stop output.
O	1	4FH	31H	Output continuous at all times.
O	2	4FH	32H	Output continuous if stable (stops output if unstable).
O	3	4FH	33H	Outputs once by pressing **Memory** (irrespective of whether stable).
O	4	4FH	34H	Outputs once, if stable. Outputs if the balance is stable when a sample is loaded after the preceding sample has been removed and the balance indicated zero, or less.
O	5	4FH	35H	Outputs once if stable, and stops output when unstable. Even if the sample is not replaced, the balance is output once it stabilizes the next time (including the zero indication).
O	6	4FH	36H	Outputs once if stable, and outputs continuously when unstable. Even if the sample i snot replaced, output of the balance stops when it stabilizes after being output once.
O	7	4FH	37H	Pressing **Memory** key causes the balance to output once when stable.
O	8	4FH	38H	Output once immediately.
O	9	4FH	39H	Output once after stabilization.

* The output controls executed with commands [O0-O7] work the same as the output controls executed through function setup on the main unit of the balance. The commands [O8] and [O9] are data request commands issued to the balance.

** Once any command from [O0] to [O9] is exectued, the balance runs that function until another command is entered. However, if the balance is switched off and on again, the output control is reset to the initial function (function set value).

TP Series Limited Warranty

Rice Lake Weighing Systems (RLWS) warrants that all RLWS equipment and systems properly installed by a Distributor or Original Equipment Manufacturer (OEM) will operate per written specifications as confirmed by the Distributor/OEM and accepted by RLWS. All systems and components are warranted against defects in materials and workmanship for two years.

RLWS warrants that the equipment sold hereunder will conform to the current written specifications authorized by RLWS. RLWS warrants the equipment against faulty workmanship and defective materials. If any equipment fails to conform to these warranties, RLWS will, at its option, repair or replace such goods returned within the warranty period subject to the following conditions:

- Upon discovery by Buyer of such nonconformity, RLWS will be given prompt written notice with a detailed explanation of the alleged deficiencies.
- Individual electronic components returned to RLWS for warranty purposes must be packaged to prevent electrostatic discharge (ESD) damage in shipment. Packaging requirements are listed in a publication, *Protecting Your Components From Static Damage in Shipment*, available from RLWS Equipment Return Department.
- Examination of such equipment by RLWS confirms that the nonconformity actually exists, and was not caused by accident, misuse, neglect, alteration, improper installation, improper repair or improper testing; RLWS shall be the sole judge of all alleged non-conformities.
- Such equipment has not been modified, altered, or changed by any person other than RLWS or its duly authorized repair agents.
- RLWS will have a reasonable time to repair or replace the defective equipment. Buyer is responsible for shipping charges both ways.
- In no event will RLWS be responsible for travel time or on-location repairs, including assembly or disassembly of equipment, nor will RLWS be liable for the cost of any repairs made by others.

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