RS-232 Option Card

For PN 107238 Rice Lake TC-Series Balance

Installation Manual

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1.0 Installation

Use the following procedure to install the RS-232 option in the TC Series Balance.

1.1 Remove the Case

1. Pull out the AC adaptor from the scale
2. Remove the pan and pan base.
3. Remove the case-fixing screw.
4. Unfasten the hooks on the bottom front while pulling up the case.

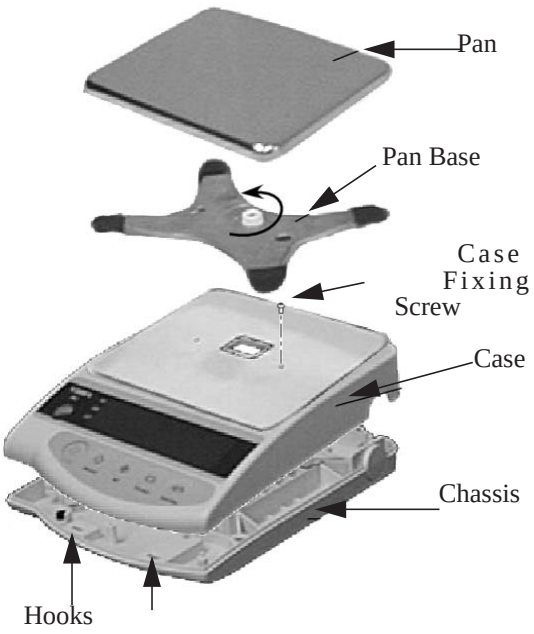


Figure 1-1. Location of Parts

5. Unfasten the hooks on the back and remove the case.

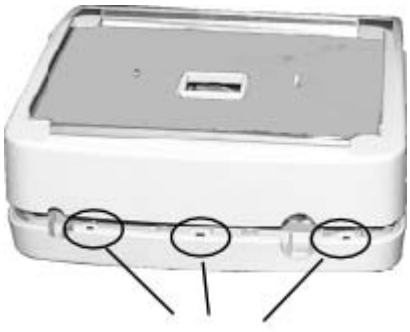


Figure 1-2. Back Hooks Location

1.2 Install PC Board for Option

1. Install PC board to the chassis. See Figure 1-3 and Figure 1-4.

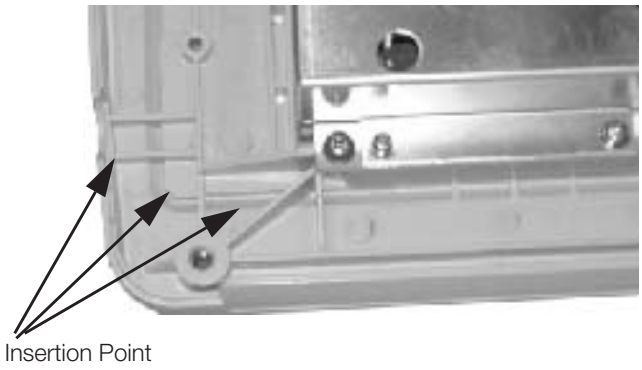


Figure 1-3. Insert PC Board

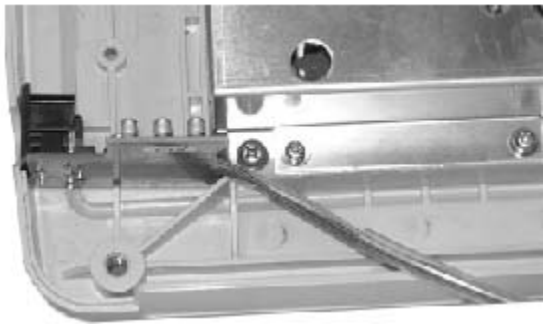


Figure 1-4. Installed Board

2. Insert connectors into SJDP board.

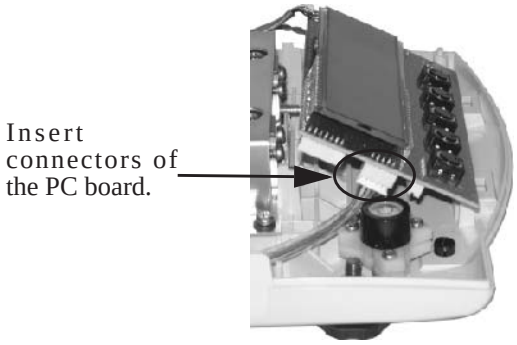


Figure 1-5. Connector to Board Location

3. Cover the case and put RS-232C label on the output terminal.

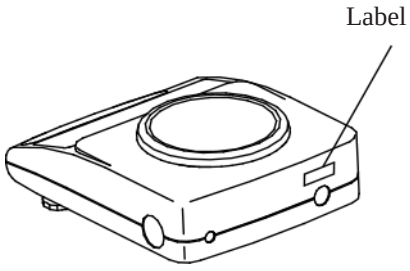


Figure 1-6. Label Location

1.3 Parts List

Part Number	Name	Amount
21AE002	SJRS Board Assembly	1
3365P	Label for RS232C Output	1
FC 059	TCP0556-01-0201	1

Table 1-1. Parts List for RS232 Option

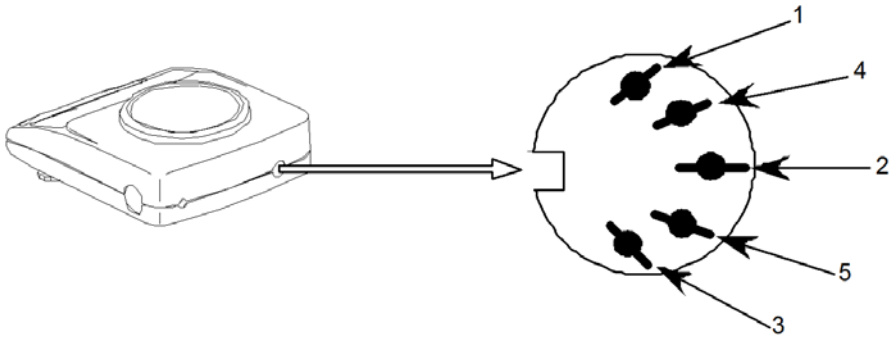
Part Number	Name	Amount
21AE003	SJLM Board Assembly	1
3339P	Label for Relay Contact	1
FC 062	TCP0568-01-0201	1

Table 1-2. Parts List for Relay Contact

1.4 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

Compatible plug: TCP 0556-01-0201 (Hoshiden - supplied with balance)



RS-232C 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 15 V; when the switch is on, the sink current is 20 mA or less.)

NOTE: Before plugging in the connectors, unplug the AC adapter.

1.5 Connection between Balances and Personal Computers

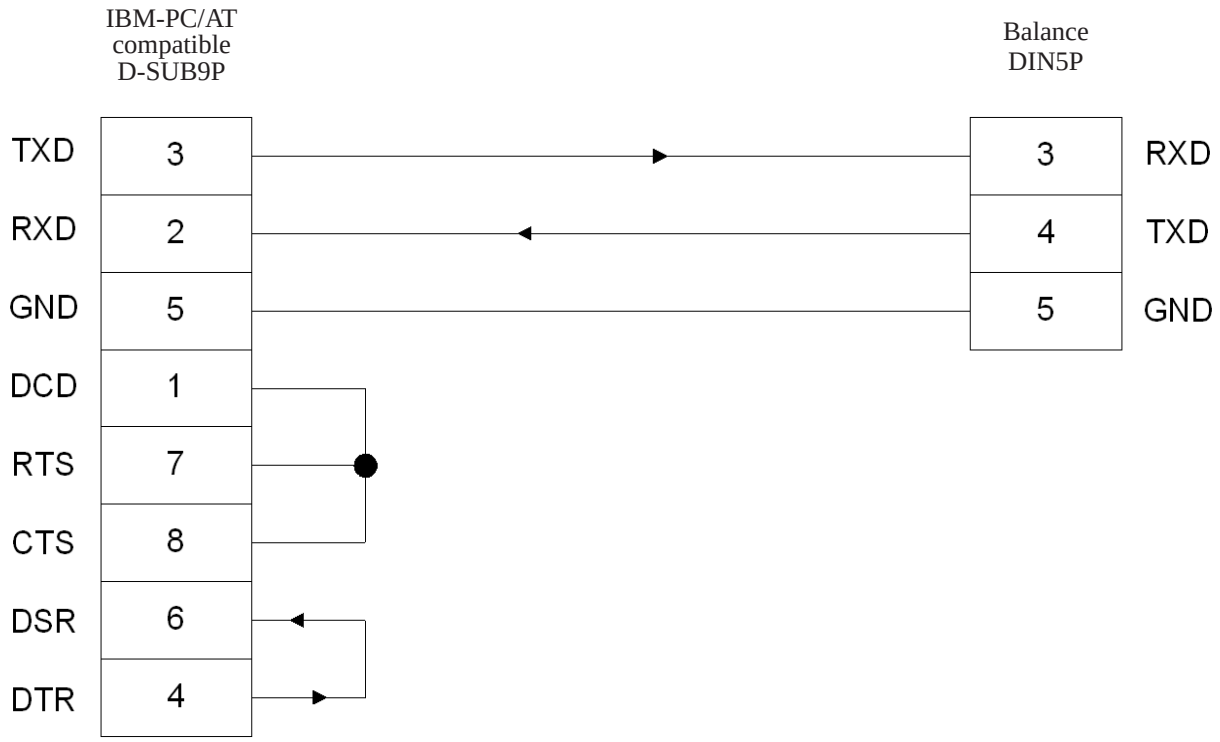


Figure 1-7. Sample connection with an IBM-PC/AT Compatible Computer

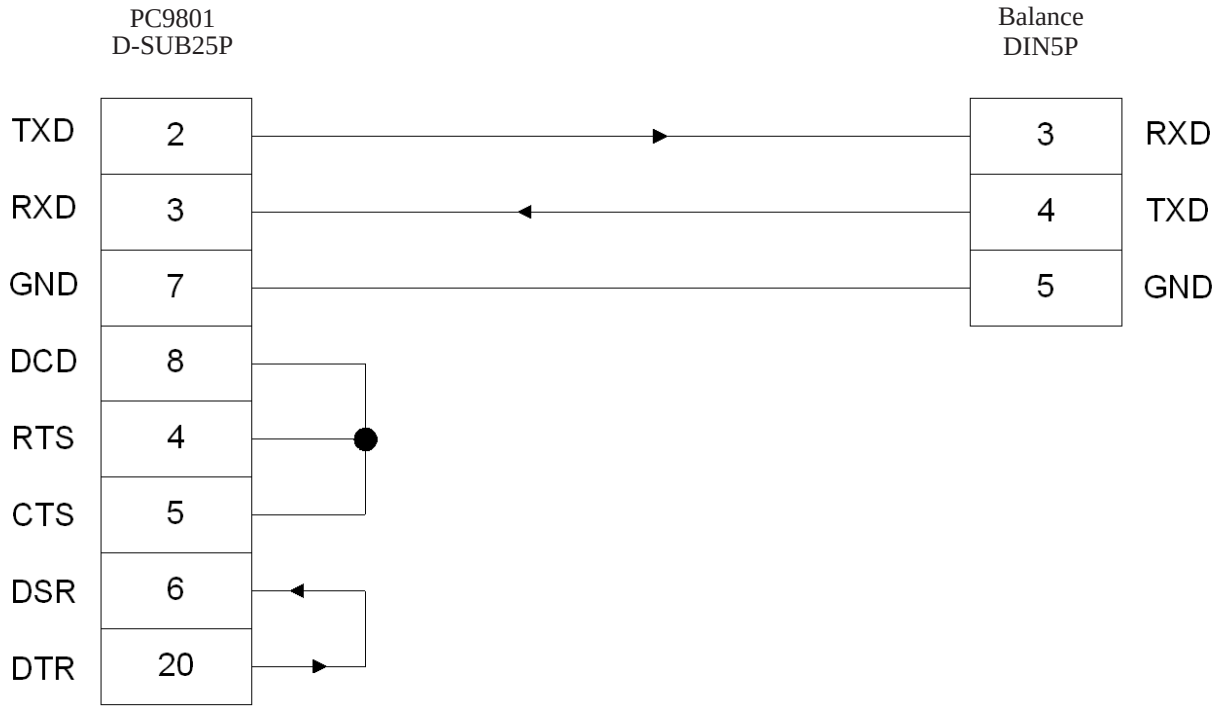
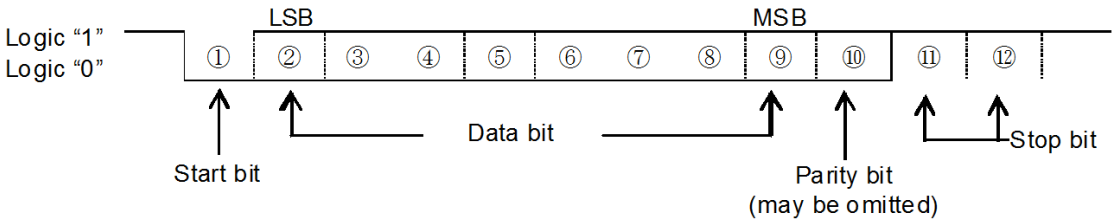


Figure 1-8. Sample Connection with PC9801

1.6 Interface Specifications

(1) Transmission system	Serial transmission with start-stop synchronization
(2) Transmission rates	1200/2400/4800/9600 bps
(3) Transmission codes	ASCII codes (8-bit)
(4) Signal levels	Compliant with EIA RS-232C HIGH level (Data logic 0) +5 to +15 V LOW level (Data logic 1) -5 to -15 V
(5) One-character bit configuration	Start bit: 1 bit Data bit: 8 bits Parity bit: 0/1 bits Stop bit: 2 bits
(6) Parity bit	none/odd/even



1.7 Output Data

By changing the function settings on the main unit of the balance, users can select either of the following formats: (See Section "Description of Functions" on page 9)

1.8 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

1.9 Polarities (PI: one character)

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

1.10 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 the 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)

1.11 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	52H	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

1.12 Result of judgment when operating 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 limit value specified

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.) [⊐ - Err], [⊔ - Err]
(SP)	20H	No status specified

1.13 Input Commands

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

- Instruction for tare subtraction
- Setup of output control

1.14 Command Transmission Method

- 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.
- 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.
- 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.

1.15 Command Format

- Command format

  Composed of four characters (ASCII), including the terminators (CR=0DH, LF = 0AH)

1	2	3	4
C1	C2	CR	LF

- 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.

- 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 (stop output if unstable)
O	3	4FH	33H	Outputs once by pressing Memory key (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 when it stabilizes next time (including the zero indication).
O	6	4FH	36H	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.
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 executed, 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).

1.16 Response Output

- Response output format

Composed of five characters, including the terminators (CR = 0DH; LF = 0AH)

1	2	3	4	5
A1	A2	A3	CR	LF

- Types of response outputs

A1	A2	A3	Code			Description
A	0	0	41H	30H	30H	Normal end
E	0	1	45H	30H	31H	Command error (Abnormal command received; other errors)

1.17 Description of Functions

Item		Set Value		Description	
Bar graph display		1.b.G.	0	Disable	
			☆1	Enable	
Limit function		2.SEL	☆0	Disable	
			1	Enable	
Displayed only when limit function is activated	Judgement condition	21.Co.	☆1	Always judge (judges even when the balance is unstable)	
			2	Judge only when the balance is stable (does not judge if the balance is unstable)	
	Judgement range	22.L	0	Ranges beyond +5 graduation is judged (ranges +5 graduation or below, including negative ranges, are not judged.)	
			☆1	The entire range is judged (the entire range, including the negative, is judged).	
	Number of points for judgement	23.P	1	One-point setup (judges between OK and LO)	
			☆2	Upper-limit and lower-limit values are set up (judges among HI, OK and LO).	
Auto-zero (zero-tracking)		3.A.0	0	Disable	This function automatically sets the zero point exactly to zero to prevent slight deviations.
			☆1	Enable	
Auto power-off		4.A.P.	0	Disable (balance operates continuously)	This function is available only when the balance is battery-operated.
			☆1	Enable (balance powers off in approximately three minutes)	
Response speed		5.rE.	0	Measurement by consecutive weighings.	
			1		
			2	Fast ↓	
			☆3		
			4	Slow	
			5		
Stability parameters		6.S.d.	1		
			☆2	Wide (mild) ↓	
			3		
			4	Narrow (strict)	
Interface		7.1.F.	0	Disable input/output	
			☆1	Six-digit numeric format	
			2	Seven-digit numeric format	
Setup of units of measurement to be displayed Register selected measuring units with Function key.		81.5.u 〜 85.5.u	☆1 01	[g]	
			☆2 14	[oz t] (ct)	
			15	[ℒb] (oz)	
			16	[Ol] (lb)	
			17	[t] (ozt)	
			18	[dwt] (dwt)	
			*19	[? Lower right] (grain)	

Items marked ☆ are the default factory settings.
☆1〜☆5: default settings [81.5.u]〜[85.5.u.]

*Not available in TC-12K.

Description of Functions, continued

Setup of measurement units to be displayed※1 Register measurement units by selecting Function key	8 15.u. ~ 85.5.u.	1A	[tl] (tl_Hong Kong)
		1b	[tl ▶ Upper right] (tl_Singapore,Malaysia)
		1C	[tl ▶ Lower right] (tl_Taiwan)
		1d	[mom]
		1E	[to] (to)
		☆3 20	[Pcs]
		☆4 1F	[%]
		☆5 00	Unit not set

☆1~☆5: default factory settings [8 15.u.]~[85.5.u.]

※1 [00] cannot be set at [8 15.u.].

1.18 Interface Section

Displayed when [7 1F. ☐] 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 (stop output if unstable)	
		3	Outputs once by pressing Memory key (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. Even if the sample is not replaced, the balance is output once when it stabilizes next time (including the zero indication).	
		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 bL.	☆1	1200 bps	
		2	2400 bps	
		3	4800 bps	
		4	9600 bps	
Parity	73 PR.	☆0	None	Displayed only when [7 1F. 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 weighting conditions and other factors.)

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