

Developer's guide

**Serial interface board
UB-S09**

Issued date	, ,
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English

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Meanings of Symbols

The following symbols are used in this document. Please bear in mind the meaning of these symbols when handling the product.

WARNING

Mishandling that could result from ignoring this symbol could cause hazards such as the following:

-  *human injury*
-  *material damage*
-  *lose of data*

Note:

This symbol indicates items that are important for maintaining the product and useful information for handling the product.

Labels on the Product

A warning label like the following is attached near the modular connector on this product.



The label should be understood to have the following meaning.

WARNING

This product uses a modular connector for the customer display. Never connect a telephone line to this connector.

Purpose of this Document

This document is intended to provide all information necessary for system planning, design, installation and application of the UB-S09 for designers and developers of POS systems.

Related Documents

Other documents related to the UB-S09 are the following:

Table 0-1. Related Documents

Document	Contents
UB-S09 Specifications	Detailed specifications of the UB-S09
UB-S09 Operating Manual	Intended for POS terminal operators, this manual provides information on handling the UB-S09 safely and correctly.

Product Servicing

This product cannot be serviced at the component level. If damage occurs, the UB-S09 should be replaced as a unit.

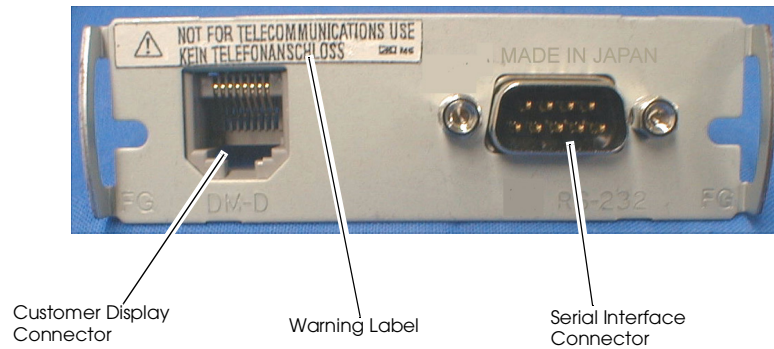
General Product Specifications

The UB-S09 is an RS-232 serial interface board with a custom display interface (DM-D) designed especially for EPSON® TM printers. The maximum transmission speed is 115.2k bps when using a TM printer and a DM-D series applicable to this product. [bps: bits per second]

Supported standard	EIA/TIA RS-232 standard compliant
Data transfer system	Serial
Synchronization system	Start/stop
Handshaking*	DTR/DSR or XON/XOFF control
Signal level	Mark: -3 to -15 V = Logic 1, OFF Space: +3 to 15 V = Logic 0, ON
Communications speed*	115200 bps maximum
Data bit length*	7 or 8 bits
Parity*	None, Odd or Even
Stop bits	One or more bits

(*) Handshaking, communications speed, data bit length and parity are set by DIP switches on the TM Printer.

The parts of the UB-S09 are named as follows.



Revision Information

Revision	Page	Altered Items and Contents
Rev. A		
Rev. B	2-2, 2-6	Description of hex mounting screws eliminated.

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Chapter 1

System Preparation

Interface Cable

Prepare the interface cable according to customer requirements. Note that while the standard serial interface of the TM printers uses a 25-pin D-sub connector, the UB-S09 uses a 9-pin D-sub connector.

Table 1-1 shows the recommended wiring for the interface cable.

Table 1-1 Recommended wiring

Host side	UB-S09 side (Female 9-pin D-sub)
---	Pin 1 not connected
TXD	Pin 2 RXD
RXD	Pin 3 TXD
DSR	Pin 4 DTR
SG	Pin 5 SG
DTR	Pin 6 DSR (*1)(*2)
CTS	Pin 7 RTS
RTS	Pin 8 CTS (Reserved)
Reset	Pin 9 INIT (*2)
Frame GND	Frame GND

(*1) If pin 6 (DSR) is left unconnected, TM printer DIP switch DSW2-7 must be set to OFF (to disable reset via pin 6). This setting, in combination with the setting of jumper JP2 on the UB-S09, causes the printer to be continually reset. Table 1-2 shows the relationship between jumper JP2 on the UB-S09 and DIP switch DSW2-7 on the TM printer.

(*2) To reset the TM printer through the interface, the reset signal can be applied to pin 6 or pin 9.

Table 1-2 Relationship between jumper JP2 and TM printer DIP switch DSW2-7

TM Printer DIP Switch DSW2-7	Jumper JP2 on UB-S09	
	1-2 Shorted	2-3 Shorted
ON	When pin 6 (DSR) is open, the printer is reset.	The printer is not reset even though pin 6 (DSR) is open.
OFF	The printer is not reset even though pin 6 (DSR) is open.	The printer is not reset even though pin 6 (DSR) is open.

Compatible Models

TM Printers

The UB-S09 can be used with the TM printer models supporting the same baud rate as the customer display except the RP-U420.

Customer Displays

The combinations of the customer display and the AC adapter other than the following combinations can be used with the UB-S09.

Table 1-3 Incompatible combination of customer displays and AC adapters

Customer display	AC adapter
DM-D102 and 203	PA-65xx and PB-65xx

Transmission Speed

When using the UB-S09, the transmission speed must be set at the same transmission speed for both the TM printers and the UB-S09. Confirm both transmission speeds and set the DIP switches for the transmission speed properly.

Dimensions

The external dimensions of the UB-S09 are shown below.

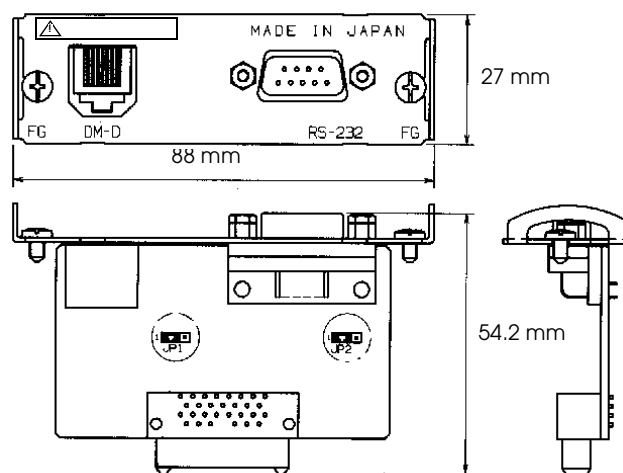


Figure 1-1 UB-S09 External dimensions

Temperature/Humidity Conditions

Refer to the TM printer and customer display specifications for operating temperature and humidity specifications.

Other Limitations

The power supply for the customer display is not switched on and off by the TM printer power switch. As long as power is supplied to the TM printer (except the TM-J8000) power connector, power is continuously supplied to the customer display.

The customer display can only be turned off by the power switch on the display.

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Chapter 2

Installation

Installation Precautions

WARNING

- ❑ Before installing, disconnect the Power Unit from the TM printer (as well as turning the power switch off).
Even when the power switch is off, voltage is still present at some points on the circuit board. Changing components while the Power Unit is connected can cause damage to the UB-S09 and the printer.
- ❑ A grounded wrist strap should be worn during installation, to avoid damage from static electricity.
- ❑ To avoid damage from static electricity when the unit is removed, place it on an static-safe surface such as conductive foam.
- ❑ Protect the unit from vibration and shock that could damage to the unit.
- ❑ Be careful to avoid dropping conductive objects such as paper clips on the circuit board, as they could short circuit connections and cause damage from excessive current.
- ❑ This product should only be connected with the devices specified in this document. Connecting other devices could cause damage, fire, or explosion.
- ❑ Do not attempt to wire this product other than as described in this document. Improper wiring could cause damage, fire, or explosion.
- ❑ Do not attempt to disassemble or modify this product, as injury or electric shock could result.
- ❑ Do not operate this product in a very humid or dusty environment, as it could present a fire or electric shock hazard.
- ❑ Never connect a public telephone line to the modular connector on this product.
- ❑ Components on the circuit board within this product can become hot. Before handling the product, allow about ten minutes for it to cool with the power off.
- ❑ To avoid electric shock, do not install this product or connect cables to it during a thunderstorm.

Package Contents

The following items should be included in the UB-S09 package:

- ❑ UB-S09
- ❑ User's Manual

Jumper Settings

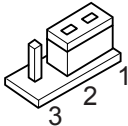
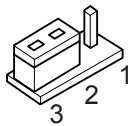
The UB-S09 has two jumpers: JP1 and JP2. JP1 selects the customer display connection, and JP2 selects the function* of pin 6 (DSR) of the serial connector.

(*) Refer to Printer Reset in Chapter 3 for a description of the functions of pin 6 (DSR) of the serial connector.

The jumper settings are described below.

Jumper JP1 Settings

Table 2-1 Customer display connection settings

JP 1	1-2 shorted	2-3 shorted
Customer display connection settings	Customer display connected 	Customer display not connected 

As shipped from the factory, pins 2 and 3 of JP1 are shorted.

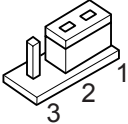
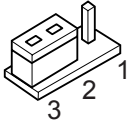


Note:

Do not set JP1 open (without jumper). If you short pins other than 1 and 2 or 2 and 3 of JP1, the UB-S09 will not operate correctly.

Jumper JP2 Settings

Table 2-2 Serial Connector Pin 6 (DSR) Function Settings

JP2	1-2 shorted	2-3 shorted
Settings	Select reset up on Mark input 	Select reset up on Space input 

As shipped from the factory, pins 1 and 2 of JP2 are shorted.

WARNING

Do not set JP2 open (without jumper). Shorting pins other than 1 and 2 or 2 and 3 of JP2 could cause incorrect operation or damage to the UB-S09 communications IC.

Jumper Locations

The jumper locations are shown below.

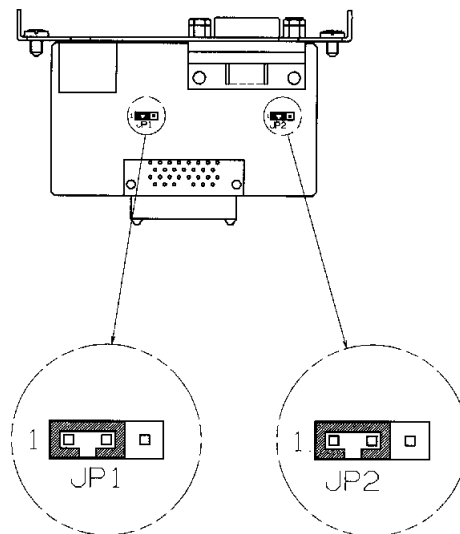


Figure 2-1 Jumper Locations

Customer Display Connection Setting

There are two types of TM printers: One type has a DM-D connector (a connector for the customer display) and the other type does not have a DM-D connector. The customer display settings for each type are as follows:

TM Printer with No DM-D Connector

The cable for the customer display is connected to the DM-D connector on the UB-S09 and the customer display connection is set using the jumpers on the UB-S09.

Table 2-3 Customer display connection settings and operations 1

UB-S09 connector	Operation
DM-D not connected (JP1: 2-3 shorted)	<ul style="list-style-type: none">• ESC= default of TM printer: Printer select• Self test print: No DM-D settings print• GS I: No DM-D DIP switch status function• RTS signal: No DM-D status output
DM-D connected (JP1: 1-2 shorted)	<ul style="list-style-type: none">• ESC= default of TM printer: Printer select• Self test print: No DM-D settings print• GS I: No DM-D DIP switch status function• RTS signal: DM-D status output from UB-S09 connector

Note: • DM-D connection is selected from JP1; however if no DM-D is actually connected to the connector of the UB-S09, the RTS signal will always be BUSY.
• Operations are based on these JP1 settings even if the DM-D is not actually connected.

TM printer with a DM-D Connector

The customer display cable can be connected to either the connector on the UB-S09 or on the TM printer; however, it is recommended to connect the cable to the connector on the TM printer.

The TM printer must be set to enable the DM-D connection by the DIP switch on the TM printer. (For details, refer to the DIP switch section in the specification of each TM printer.)

Table 2-4 Customer display connection settings and operations 2

UB-S09 DM-D connector	TM printer connector	Operations
DM-D not connected (JP1: 2-3 shorted)	DM-D not connected DIP switch OFF	<ul style="list-style-type: none">• ESC= default of TM printer: Printer select• Self test print: Will not be recognized• GS I: Sends DIP switch off status• RTS signal: No DM-D status output
DM-D connected (JP1: 1-2 shorted)		<ul style="list-style-type: none">• ESC= default of TM printer: Printer select• Self test print: Will not be recognized• GS I: Sends DIP switch OFF status• RTS signal: DM-D status output from UB-S09 connector.
DM-D not connected (JP1: 2-3 shorted)	DM-D connected DIP switch ON	<ul style="list-style-type: none">• ESC= default of TM printer: DM-D select• Self test print: Must be connected• GS I: Sends DIP status output from TM printer connector• RTS signal: DM-D status output from TM printer connector
DM-D connected (JP1: 1-2 shorted)		This setting is prohibited

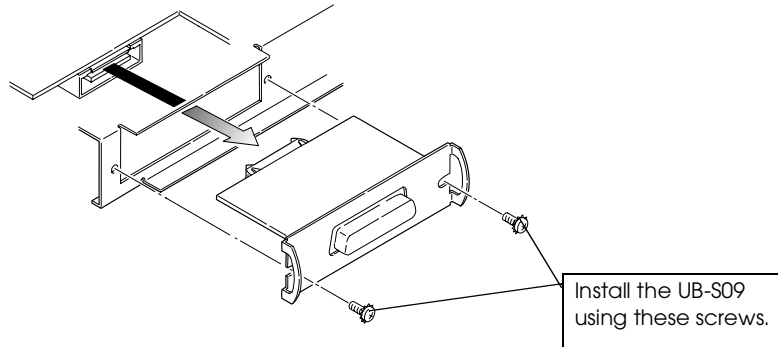
Note: • DM-D connection is selected from JP1; however if no DM-D is actually connected to the connector of the UB-S09, the RTS signal will always be BUSY.
• Operations are based on these JP1 or TM printer settings even if the DM-D is not actually connected.

**WARNING:**

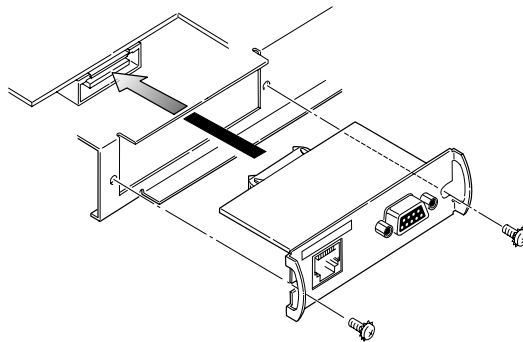
Never connect display connectors to both the UB-S09 and TM printer at the same time.

Circuit Board Installation

1. If an interface circuit board is already installed in the TM printer, remove it. Re-use the screws when installing the UB-S09.



2. Install the UB-S09 in the TM printer, and tighten the screws.

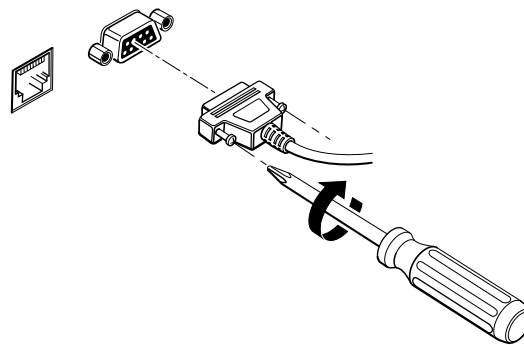


Cable Connections

Before undertaking the following steps, turn off the printer and host computer.

Interface Cable Connection

1. Confirm that the printer and host computer are turned off.
2. Connect the cable to the serial interface connector on the UB-S09.
3. Tighten the screws on both sides of the plug.



Note:

If the interface cable includes a separate ground line, the ground line should be connected to the printer at either of the two UB-S09 mounting screws.

4. Connect the other end of the cable to the host computer.

Customer Display Cable Connection

1. Confirm that the printer and host computer are turned off.
2. Disconnect the Power Unit from the printer.

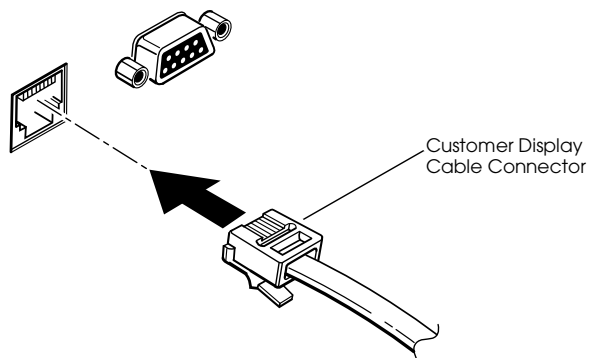
WARNING

*The Power Unit **MUST** be disconnected from the printer. Even when the printer is turned off, power is supplied to the customer display. Plugging or unplugging the customer display cable while the Power Unit is installed can damage the UB-S09 and the printer.*

3. Insert the plug on the cable from the customer display into the customer display connector on the UB-S09 until it clicks.

⚠ WARNING

Never connect a public telephone line to this connector.



4. Reconnect the Power Unit to the printer.

Chapter 3

Operation

Power On Sequence

Turn power on in the following sequence.

1. Turn on the customer display.
2. Turn on the TM printer.

Power Off Sequence

Turn power off using the following sequence.

1. Turn the customer display off.
2. Turn the TM printer off.

The power supplied to the customer display is not switched on and off by the TM printer power switch. As long as power is supplied to the TM printer (excluding TM-J8000 printer) power connector, power is continuously supplied to the customer display.

Use the power switch on the customer display to turn it off.

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Chapter 4

Function Description

DTR/DSR Control

The DTR signal indicates the BUSY/READY status of the TM printer: Space status indicates that the TM printer is READY, and Mark status indicates the printer is BUSY. The handshaking mode used by the TM printer to determine the conditions under which the printer becomes BUSY is determined by a DIP switch setting on the printer, as follows.

Table 4-1 TM printer BUSY conditions

Printer DIP Switch Setting	Printer BUSY Condition
ON	<ul style="list-style-type: none">• During power on or resetting• While self-test is executing• When the receive buffer is full
OFF	<ul style="list-style-type: none">• At power on or reset• During self-test• When the cover is open• When feeding paper with the FEED button• When the printer has stopped due to being out of paper• When an error has occurred• When the receive buffer is full

The DSR signal indicates whether the host can receive data: the Space status indicates that the host is ready to receive, and the Mark status indicates that the host is not able to receive.

The RTS signal indicates the BUSY/READY status of the TM printer and the customer display. When either one is BUSY, the RTS signal will be RTS BUSY. Confirm the RTS signal when sending data for the customer display.

XON/XOFF Control

The XON code is defined as character 11h, and the XOFF code is 13h. A DIP switch on the TM printer selects the handshaking conditions under which it send the XON and XOFF codes.

Table 4-2 TM printer XON/XOFF sending conditions

Printer DIP Switch Setting	XON/XOFF Sending	Sending Condition
ON	Sends XON	<ul style="list-style-type: none">• When first online after power on or reset• When a receive buffer full condition is cancelled
	Sends XOFF	<ul style="list-style-type: none">• When the receive buffer becomes full
OFF	Sends XON	<ul style="list-style-type: none">• When first online after power on or reset• When a receive buffer full condition is cancelled• When switched from offline to online (*)• When recovering from a recoverable error by command
	Sends XOFF	<ul style="list-style-type: none">• When the receive buffer becomes full• When switched from offline to online (*)

(*) During the receive buffer full state, XON and XOFF are not sent even when the online/offline state is changed.

The term “offline” as used above means any of the following conditions:

- ☐ During power-on or resetting.
- ☐ While executing the self test.
- ☐ While the cover is open.
- ☐ When feeding paper by the paper feed button.
- ☐ When printing has stopped due to out-of-paper condition.
- ☐ When an error has occurred.

The term “online” refers to the state when any of the above conditions has been cancelled.

The UB-S09 does not provide a data line connection from the customer display to the host, so XON/XOFF handshaking cannot be selected for the customer display. Select DTR/RTS when connecting the customer display.

Printer Reset

The UB-S09 can reset the TM printer through the serial interface by applying a signal to pin 6 or pin 9 of the interface.

The reset signal logic can be selected by jumper JP2 on the UB-S09 for resetting using pin 6 (DSR).

To use pin 9 (INIT), the reset signal logic is fixed at Space level.

Table 4-3 Reset Signal Logic Selection

	Jumper JP2 Setting	Reset Condition
Reset by pin 6 (DSR)	1-2 shorted	Reset upon Mark level (reset occurs when this pin is open circuit)
	2-3 shorted	Reset upon Space level input
Reset by pin 9 (INIT)	–	Reset upon Space level input

To reset the printer, the reset signal must conform to the electrical characteristics specified in the *UB-S09 Specifications*.

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Appendix A

Connector Terminal Signals

RS-232 Serial Interface Connector

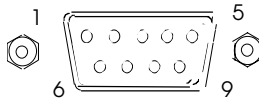


Figure A-1 RS-232 Serial Interface Connector

Table A-1 RS-232 serial interface connector pinout

Pin	Signal name	I/O	Signal function
1	–	–	No connection
2	RxD	I	Receive Data
3	TxD	O	Transmit Data
4	DTR	O	DTR signal
5	SG	–	Signal Ground
6	DSR	I	DSR signal
7	RTS	O	Selectable from the following: (1) Same output as DTR signal (2) Outputs the DTR signal logic from the customer display and printer (Space when both are Space).
8	–	–	Reserved
9	INIT	I	Reset signal
Shell	FG	–	Frame Ground

Pin 7 (RTS) functions:

The function of this pin is selected by the Customer Display (DM-D) Connection DIP switch or JP1 on the TM printer.

When the Customer Display (DM-D) Connection switch is set to “Connected,” the output consists of the DTR signal logic of the customer display and the printer.

When the Customer Display (DM-D) Connection switch is set to “Not Connected,” the output is the same as the DTR signal.

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