

8860

Technical Manual
and
Parts Catalog

INTRODUCTION

This publication is provided solely as a guide for individuals who have received METTLER TOLEDO Technical Training in servicing the METTLER TOLEDO product.

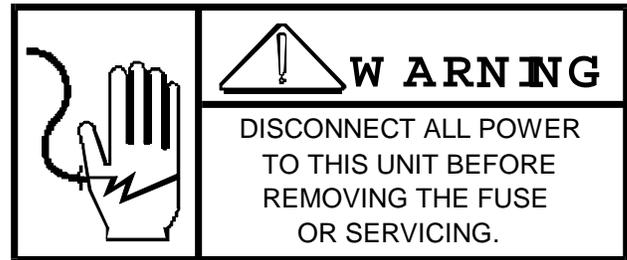
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(614) 438-4400

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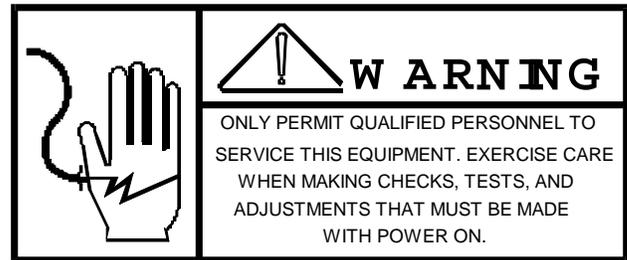
PRECAUTIONS

- **READ** this manual before operating or servicing this equipment.
- **ALWAYS REMOVE POWER** and wait at least 30 seconds **BEFORE** connecting or disconnecting any internal harnesses. Failure to observe these precautions may result in damage to, or destruction of the equipment.



- **ALWAYS** take proper precautions when handling static sensitive devices.

- **DO NOT** connect or disconnect a load cell scale base to the equipment with power connected or damage will result.



- **SAVE** this manual for future reference.

- **DO NOT** allow untrained personnel to operate, clean, inspect, maintain, service, or tamper with this equipment.

- **ALWAYS DISCONNECT** this equipment from the power source before servicing.

- **CALL METTLER TOLEDO** for parts, information, and service.



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1. GENERAL DESCRIPTION. GENERAL DESCRIPTION

The Model 8860 is a compact, thermal printer designed to print data in human readable, and/or bar code formats on self adhesive labels. Two selectable operate modes provide either simplified interfacing for METTLER TOLEDO Indicators and Parts Counting Scales or a host computer interfacing mode for more flexible ticket forming capability. RS-232C, 20 mA current loop and RS-422 interfaces are standard with the 8860.

- ! The 8860 is capable of printing up to six lines of data in any combination of human readable and bar code formats.
- ! Bar code formats supported by the 8860 printer include 2 of 5, 2 of 5 interleaved, code 39 and code 39 expanded. 2 of 5 formats support numeric data only, code 39 formats support alphanumeric data.
- ! The Model 8860 provides a host interface (Mode I) to permit customized label formats for the METTLER TOLEDO Scale Models 8146 and 9360 or for other computer systems.
- ! The Model 8860 provides a METTLER TOLEDO specific interface (Mode II) to permit simplified interfacing to METTLER TOLEDO Models 1938, 2038, 2138, 3026, 8140, 8142, 8146, 8505, 8510, 8520, 8525, 8530, 8571, 8572, 8581 and 8582.
- ! Powerup self tests are performed to detect hardware malfunctions. Out of labels or other error conditions are indicated by a flashing low stock light.
- ! Four lable sizes are supported:

- T8860A - 66.67 mm wide by 24.67 mm high (2.62" by 0.97")
- T8860B - 66.67 mm wide by 43.67 mm high (2.62" by 1.72")
- T8860C - 66.67 mm wide by 67.33 mm high (2.62" by 2.65")
- T8860D - 66.67 mm wide by 99.06 mm high (2.62" by 3.90")

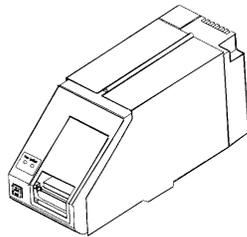


Figure 2-1 8860 Printer, Front View

2. SYSTEM DESCRIPTION. SYSTEM DESCRIPTION

The 8860 printer uses a thin film thermal printhead which consists of a single row of dots at six dots per millimeter. Up to six lines of data can be printed in either all human readable, all bar code, or a combination of both human readable and bar code.

Once the print cycle has been initiated, the label is pulled through the print mechanism. As the label advances under the print head, individual dots in the thermal print head are selectively activated to form a black dot by the heating of the chemically treated label stock. A stripping edge in the printer mechanism peels the adhesive backed label from the backing paper and presents the label to the user, adhesive side down. The backing paper is wound up on an internal take-up reel.

Power Supply Assembly: Converts AC input voltage to regulated +5 VDC, +12 VDC, -12 VDC and +24 VDC operational voltages.

Logic PCB: Provides control over all operating functions. The Logic PCB also receives transmitted data, processes this information for formatting and print size, and transmits this data to the Printer Driver PCB.

Printer Driver PCB: Controls the printer mechanism, buffers the data from the Logic PCB to the printhead, controls the supply voltages to the printhead and monitors the label sensors.

Printer Mechanism: Contains the label drive stepper motor, the thermal printhead, and label sensors. The low stock sensor detects out of label condition

External Controls: The power on/off switch located on the rear of the printer behind the removable rear cover is electrically located after the primary fuse and removes AC power to the printer when in the off position. The label feed switch is used to feed a blank label which assists indexing when a new roll of labels is installed. The label feed switch is used to clear print errors (blinking low stock light) and to access the self test modes.

Printer Mechanism Power Interlock Switch: The 8860 has a cover interlock switch that removes power to the printer mechanism when the front access cover is removed. If the cover interlock switch is open then printing is inhibited and the low stock LED will flash.

Note: Earlier versions of the 8860 printer include a side cover interlock switch wired in series with the front cover interlock switch. On these units, both the front and side cover interlock switches must be closed in order to print.

Status LEDs: The 8860 has two LED indicators on the front cover. The green, Power LED is lit to indicate when power is applied to the 8860. If the green LED begins to flash, then the 8860 has failed the powerup self tests. The red, Low Stock LED is not lit during normal operation. If the low stock LED begins to flash, then either the cover interlock switch is open or an error occurs during printing.

3. SPECIFICATIONS. SPECIFICATIONS

3.1 ENVIRONMENT.1 ENVIRONMENT

3.1.1 Operating Temperature Range 3.1.1 Operating Temperature Range

Operating temperature for the 8860 is from 0 to +40 0C (32 to 104 0F) at 10 to 95% relative humidity, noncondensing.

3.1.2 Storage Temperature Range 3.1.2 Storage Temperature Range

Storage temperature for the 8860 is from 0 to 70 0C (32 to 158 0F) at 10 to 95% relative humidity, noncondensing (label stock excluded).

3.1.3 Dusty or Washdown Areas 3.1.3 Dusty or Washdown Areas

The standard 8860 **MUST NOT** be used in wet or extremely dusty environments. A special washdown version of the 8860 (factory number 8860-0005) is available for use in wet or extremely dusty environments.

3.1.4 Hazardous Areas 3.1.4 Hazardous Areas

	DANGER
	The 8860 printer IS NOT intrinsically safe! DO NOT use the 8860 printer in areas classified as HAZARDOUS by the National Electric Code (NEC) because of combustible or explosive atmospheres.

3.2 POWER REQUIREMENTS.2 POWER REQUIREMENTS

Different versions of the 8860 can operate at 120 VAC, 220 and 240 (+10% -15%) at a line frequency from 49 to 61.2 Hz. The 8860 consumes a maximum of 120 VA during printing. Refer to Table 3-1 for factory number voltage selection.

Factory Number	Nominal Voltage	Minimum Voltage	Maximum Voltage
8860-0001	120 VAC	102 VAC	132 VAC
8860-0101	220 VAC	187 VAC	242 VAC
8860-0102	240 VAC	204 VAC	264 VAC

Table 3-1 Factory Number Power Selection

3.3 SERIAL DATA INTERFACE.3 SERIAL DATA INTERFACE

The 8860 is capable of receiving data by 20 mA current loop, RS-232C or RS422A. Baud rate is selectable to either 1200 or 9600 baud. ASCII data format is one start bit, seven data bits, even parity bit with either one stop bit for Mode I operation or two stop bits for Mode II operation. The 8860 uses standard 8806 interface cables and printer setup for use with METTLER TOLEDO Indicators and Parts Counting Scales. The 8860 supplies two interface protocols Mode I and Mode II. Refer to Section 5. of this manual for detailed information about serial data interfacing.

Mode I operation provides the most flexibility in label formatting and is used with the Model 8146 Indicator, the Model 9360 Scale Terminal and for advanced interfacing with computers. Mode I operation requires a block check character <BCC> at the end of each transmission to the 8860. The <BCC> character is used to detect errors in the data transmission.

Mode II operation provides compatibility with METTLER TOLEDO Models 1938, 2038, 2138, 3026, 3027, 3036, 8140, 8141, 8142, 8510, 8511 , 8520, 8522, 8525 and 8530 Indicators and the Models 8571, 8572, 8581 and 8582 Parts Counting Scales. Mode II also provides the simplest interface for computers.

Mode II operation requires multiple line, demand mode output at either 1200 or 9600 baud. A start of text character <STX> must be sent at the beginning of the first line of data transmitted to the 8860. Each line of data must be terminated with a carriage return <CR> and a line feed <LF> character. A selectable checksum character can be used to detect errors in data transmission. If expanded print output is selected in the indicator (an ASCII shift out <SO> character) the 8860 will print that line of data in either type IV (6 mm high) or type V (12 mm high) print size as selected by switch 2-1 on the 8860 Logic PCB.

3.4 STANDARDS COMPLIANCE.4 STANDARDS COMPLIANCE

3.4.1 U.L. Listing, CSA Certification 3.4.1 U.L. Listing, CSA Certification

The Model 8860 is listed with U.L. to meet specifications 114, Office Appliances and Equipment.

The Model 8860 is certified by C.S.A. to meet standard C22.2 No. 143-1975, Office Machines.

3.4.2 RFI Emissions (FCC Approval) 3.4.2 RFI Emissions (FCC Approval)

The Model 8860 meets or exceed the FCC docket 80-284 for radiated and conducted emissions.

3.4.3 Legal-For-Trade NTEP Certification 3.4.3 Legal-For-Trade NTEP Certification

The Model 8860 has received NTEP (National Type Evaluation Program) Certificate of Conformance number 88-194 and may be used in legal-for-trade applications as a class II, III or IIII device.

3.5 RADIO FREQUENCY INTERFERENCE.5 RADIO FREQUENCY INTERFERENCE

The Model 8860 is designed to meet the SMA (Scale Manufacturers Association) susceptibility tests for radio frequency interference (RFI) and electromagnetic interference (EMI). The 8860 will function without error in the presence of RF field strengths of 10 V/m at frequencies of 1 to 1000 MHz.

3.6 APPEARANCE AND DIMENSIONS.6 APPEARANCE AND DIMENSIONS

The Model 8860 is housed in painted, charcoal black, stainless steel side covers with fog white, plastic molded front and rear covers. The right side cover is hinged to allow operator access to label stock. The enclosure is 5.5" high, 5.75" wide and 15" deep. Approximate weight (without label stock) is 14 lb. Shipping weight is 17 lb.

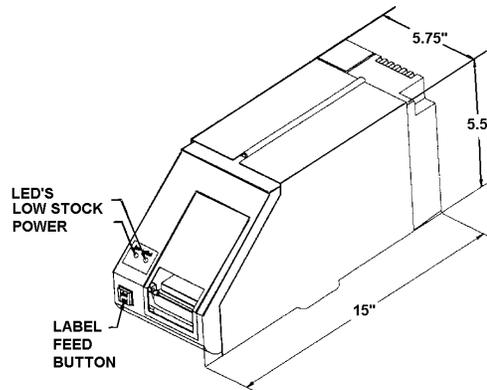


Figure 3-1 8860 Printer

Dimensions

4. INSTALLATION. INSTALLATION

4.1 PRELIMINARY INSPECTION.1 PRELIMINARY INSPECTION

Inspect the shipping container and printer for loose or damaged parts. If any damage is found, immediately notify the freight carrier.

4.2 OPENING THE ENCLOSURE.2 OPENING THE ENCLOSURE

	WARNING !
	DISCONNECT ALL POWER TO THIS UNIT BEFORE REMOVING THE FUSE OR SERVICING.

CAUTION!
OBSERVE PRECAUTIONS FOR HANDLING ELECTROSTATIC SENSITIVE DEVICES.

Lift the right side cover up and loosen the two phillips head screw that secure the side cover to the center plate. Refer to Figure 4-1. Remove the three phillips head screws that secure the left side cover to the bottom base. Verify that all internal harnesses are securely fastened.

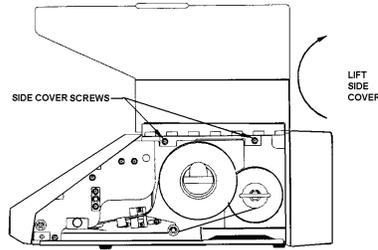


Figure 4-1 Top Cover Removal

4.3 PCB JUMPER AND SWITCH SETTINGS.3 PCB JUMPER AND SWITCH SETTINGS

4.3.1 Printer Driver PCB Switch Selection 4.3.1 Printer Driver PCB Switch Selection

Switchbank DS1 on the Printer Driver PCB, controls the printhead burn time supply voltage. DS1 must be set to match the printhead resistance rating. Verify that the DS1 switchbank is set correctly at installation and any time parts are replaced. Damage to the printhead may result if the 8860 is powered up with an incorrectly set DS1 switchbank.

To determine the printhead resistance rating:

Remove AC power to the 8860 by unplugging the AC power cord. Remove the printhead access cover located on the front of the printer. Pull the printhead locking bar forward to unlock the printhead. Lift the printhead up. Refer to Figure 4-2.

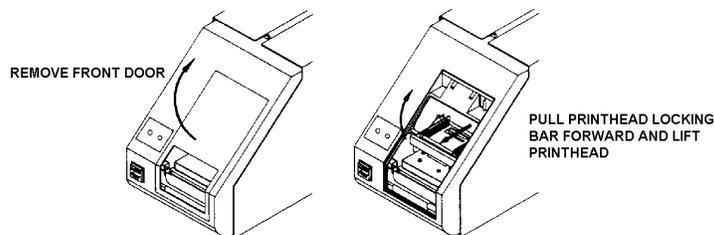


Figure 4-2 Accessing Printhead

Look on the bottom of the printhead for the data sticker. On the left side of this sticker is a three digit number preceded by the letter R. This is the printhead resistance rating. Refer to Figure 4-3.

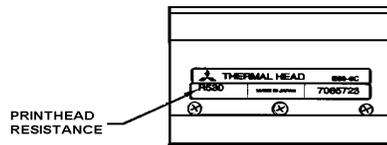


Figure 4-3 Printhead Bottom View

Once you have determined the resistance rating of the printhead, refer to Table 4-1 for the correct setting for switchbank DS1 on the Thermal Control PCB. The Thermal Control PCB is behind the Logic PCB. Refer to Figure 4-4 for switchbank DS1 location.

Printhead Resistance Rating	Printer Driver PCB Switch Settings			
	DS1-1	DS1-2	DS1-3	DS1-4
500	ON	OFF	OFF	OFF
510	OFF	ON	OFF	OFF
520	ON	ON	OFF	OFF
530	OFF	OFF	ON	OFF
540	ON	OFF	ON	OFF
550	OFF	ON	ON	OFF
560	ON	ON	ON	OFF
570	OFF	OFF	OFF	ON
580	ON	OFF	OFF	ON
590	OFF	ON	OFF	ON
600	ON	ON	OFF	ON

Table 4-1 Printer Driver PCB Switch Settings

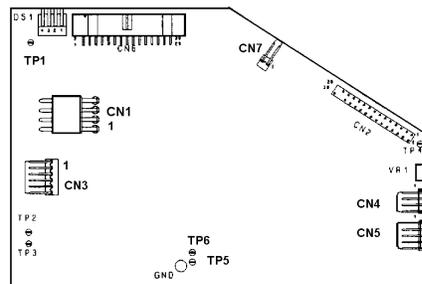


Figure 4-4 Printer Driver PCB

4.3.2 Logic PCB Jumper Selections 4.3.2 Logic PCB Jumper Selections

Determine which serial interface you wish to use. The Models 8140, 8141, 8142, 8520, 8522, 8525, 8581 and 8582 normally use 20 mA current loop to interface to the 8860. The Models 3026, 3027, 3036, 8510, 8511, 8571, 8572, and 9360 as well as most computers use RS-232C to interface to the 8860. Select the serial interface with jumpers J1, J2 and J3 on the 8860 Logic PCB. Verify that all other Logic PCB jumpers J4 through J12 (J4 through J10 for original style Logic PCB) are set as shown in Table 4-2. Refer to Figures 4-5 and 4-6 for Logic PCB jumper locations and Table 4-2 for Logic PCB Interface Jumper Selections.

Note: The Model 8141 and 8525 Indicators require the Fiber Optic Converter Module.

There are two versions of the 8860 Logic PCB. The two styles of Logic PCBs are interchangeable. The current style Logic PCB, part number 140299 00A has a single Eeprom located on the bottom edge of the PCB. The original style Logic PCB, part number 128918 00A, has two EPROMs located on the bottom edge of the Logic PCB. Refer to Figure 4-5 for the current style Logic PCB layout. Refer to Figure 4-6 for the older, original style Logic PCB layout.

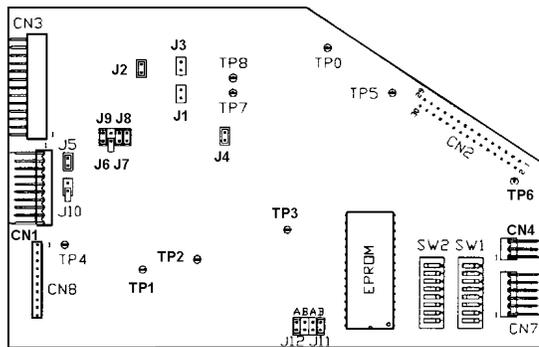


Figure 4-5 Current Logic PCB, Part Number 140299 00A

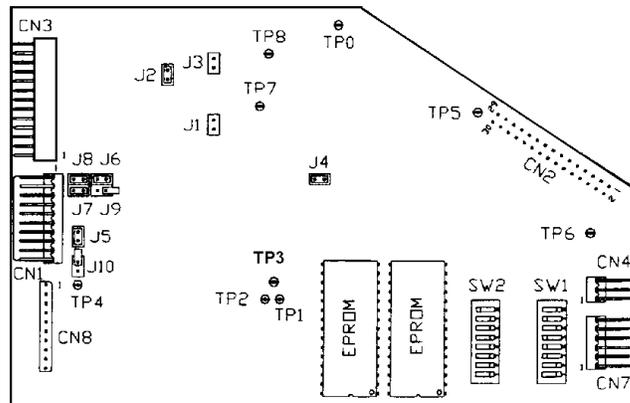


Figure 4-6 Original Logic PCB, Part Number 128918 00A

Logic PCB Jumper	Selection
J1	RS-232C Interface
J2	20 mA Current Loop Interface
J3	RS-422A Interface
J4	Must Be IN (Jumpered)
J5	Must Be IN (Jumpered)
J6	Must Be IN (Jumpered)
J7	Must Be IN (Jumpered)
J8	Must Be IN (Jumpered)
J9	Must Be Out (Not Jumpered)
J10	Must Be Out (Not Jumpered)
J11	B
J12	A

Table 4-2 Logic PCB Jumper Selection

Note: Only one of the interface select jumpers (J1, J2 or J3) can be IN, **both of the other unused interface select jumpers MUST BE OUT (Not Jumpered)**.

4.3.3 Logic PCB Switch Settings

[SW1-1]: Data Input Mode Select

- Off** - Mode II (Demand Output Mode) For simple computer interfacing applications and all METTLER TOLEDO Products except the Model 8146.
- On** - Mode I (Host Interface Mode) For the Model 8146 and advanced computer interfacing applications.

[SW1-2], [SW1-3]: Label Length Selection

Measure the length of the label stock you are using and set switches [SW1-2] and [SW1-3] accordingly.

Switch Setting		Label Length Selection
SW1-2	SW1-3	
Off	Off	24.67 mm (1")
On	Off	43.67 mm (1.7")
Off	On	67.33 mm (2.7")
On	On	99.06 mm (3.9")

[SW1-4], [SW1-5]: Default Minimum Print Size Selection

Switch Settings		Default Minimum Print Size	Character Height	Characters per Centimeter	Maximum Characters Per Line
SW1-4	SW1-5				
Off	Off	1	1.67 mm (0.066")	6.7	32
On	Off	2	2.33 mm (0.091")	5.0	32
Off	On	3	4.76 mm (0.182")	5.0	32
On	On	4	6.00 mm (0.236")	3.1	21
*	*	5	12.00 mm (0.472")	3.1	21
*	*	5 Bold	12.00 mm (0.472")	2	11

(*) Note: Mode II operation **[SW1-1 Off]** can print size 5 and size 5 Bold type size only as selected by switch **[SW2-1]**. Size 5 is used for lines with more than eleven characters. Size 5 Bold is used for lines with eleven or less characters. Refer to the **[SW2-1]** description.

[SW1-6], [SW1-7], [SW1-8]: Label Format (Mode II Operation Only)

In Mode II operation **[SW1-1 Off]** the 8860 can be programmed to print any combination of human readable lines and bar code lines (six lines maximum). Human readable lines are printed first followed by bar code lines. Lines printed as bar code are printed again in human readable size 1 directly under the bar code. Refer to preferred line selection for applications that require additional flexibility for selecting which lines are printed as human readable and which as bar code.

Switch Settings			Label Line Format	
SW1-6	SW1-7	SW1-8	Human Readable	Bar Code
Off	Off	Off	6 Lines	0 Lines
On	Off	Off	5 Lines	1 Line
Off	On	Off	4 Lines	2 Lines
On	On	Off	3 Lines	3 Lines
Off	Off	On	2 Lines	4 Lines
On	Off	On	1 Line	5 Lines
Off	On	On	0 Lines	6 Lines

Note: The Label Format switches have no effect in Mode I operation **[SW1-1 On]**.

**[SW2-1]: <RS> Character Output Enable (Mode I)
or Expanded Print Size (Mode II)**

Switch SW2-1 has two different usages depending on the data input mode selected, Mode I or Mode II.

[SW2-1]: <RS> Character Enable (Mode I Operation [SW1-1 On])

- Off** - <RS> character is not transmitted.
- On** - <RS> character is transmitted to host computer after the 8860 senses that a label has been taken.

[SW2-1]: Expanded Print Size (Mode I Operation [SW1-1 Off])

Expanded print is selected by the transmitting device sending an ASCII Shift Out <SO> character, (hex 0E), at the beginning of the data field. If size 5 is selected then size 5 is used for lines with more than eleven characters and size 5 Bold is used for lines with eleven or less characters.

- Off** - Select Size 4 for expanded print size.
- On** - Select Size 5 or Size 5 Bold for expanded print. Size 5 is used for lines with more than eleven characters. Size 5 Bold is used for lines with eleven or less characters.

[SW2-2], [SW2-3] and [SW2-4] Preferred Line Selection

Preferred line selection permits the 8860 to start the printed label at any one of the six transmitted lines of data. Lines of data transmitted before the preferred line are printed after the preferred line and all following lines have been printed. This permits extra flexibility in determining which lines are printed as human readable and which as bar code when interfacing the 8860 with devices that have fixed format output.

Switch Settings			Preferred Line Selection
SW2-2	SW2-3	SW2-4	
Off	Off	Off	First Line Transmitted
On	Off	Off	Second Line Transmitted
Off	On	Off	Third Line Transmitted
On	On	Off	Fourth Line Transmitted
Off	Off	On	Fifth Line Transmitted
On	Off	Off	Sixth Line Transmitted

Preferred Line Example: Six lines of data are transmitted to the 8860 and the third line is selected as the preferred line ([SW2-2 Off], [SW2-3 On], [SW2-4 Off]). The data printed on the ticket will be formatted as follows:

Third Line of Data (preferred line)
 Fourth Line of Data
 Fifth Line of Data
 Sixth Line of Data
 First Line of Data
 Second Line of Data

[SW2-5], [SW2-6]: Bar Code Format

Code 2 of 5 is numeric data only, alpha characters are not printed in code 2 of 5. Code 39 permits alphanumeric characters in the bar code. Characters in excess of the maximum number listed are not printed in the bar code field. Lines printed as bar code are automatically printed in human readable size 1 directly beneath the bar code data.

Switch Settings		Bar Code Selection	
SW2-5	SW2-6	Bar Code Format	Most Characters on a Line
Off	Off	Code 39	11
Off	On	Code 2 of 5	11
On	Off	Code 39 Expanded	20
On	On	Code 2 of 5 Interleaved	18

Note: Code 39 Expanded is a high density format and requires special synthetic label stock and a high density wand for reliable scanning. Contact METTLER TOLEDO for more information about using this option.

[SW2-7]: Checksum Enable

Checksum is an error detection scheme that checks the integrity of each line of data as it is transmitted. Checksum is defined as the 2's complement of the sum of the 7 low order bits of all characters transmitted, beginning with the <STX> character, ASCII hex (02) to the last character before the checksum. The checksum character is transmitted between the <CR> and <LF> characters at the end of each line of data.

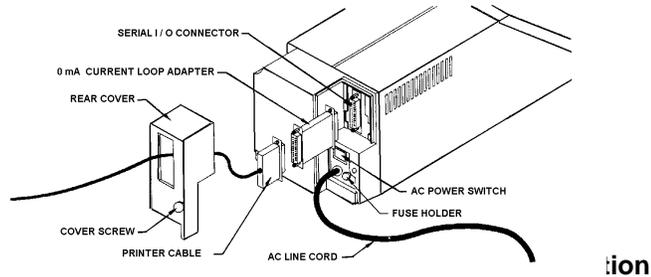
- Off** - Disable Checksum
- On** - Enable Checksum

[SW2-8]: Baud Rate Select

- Off** - 1200 Baud
- On** - 9600 Baud

4.4 SERIAL INTERCONNECT CABLE INSTALLATION.4 SERIAL INTERCONNECT CABLE INSTALLATION

The rear cover must be removed to install the printer cable. Turn the knurled screw located on the rear of the printer counter clockwise until the screw is loose. Remove the rear cover of the printer. If the RS-232C or RS-422A interfaces are to be used then the 20 mA current loop adapter that is plugged into the serial I/O connector on the rear of the 8860 printer **MUST BE REMOVED**. Refer to Figure 4-7.



Connect the indicator end of the printer cable to the indicator. Install the printer cable by threading the printer end through the hole in the rear cover, connecting to the 20 mA current loop adapter (if used) and the serial I/O connector on the printer. Refer to Figure 4-7.

Note: The 8860 printer is compatible with the 8182 parts counting scale if a (*130137 00A) or (*130143 00A) part number Logic PCB is installed in the 8182 and jumpers J1 and J2 of the 8182 Logic are set as shown in Figure 4-8

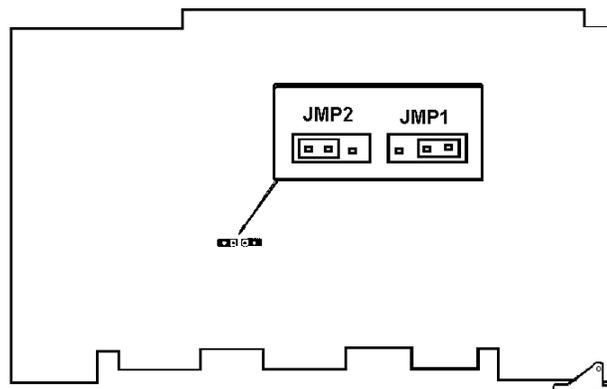


Figure 4-2 8182 Parts Counting Scale Logic PCB Jumper Selection

4.5 LOADING LABEL STOCK.5 LOADING LABEL STOCK

Lift the right side cover to expose label handling mechanism. Remove the U-shaped metal clamp from the take-up spool. Refer to Figure 4-9.

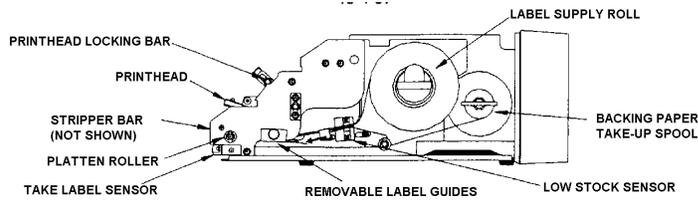


Figure 4-9 Label Threading Diagram

Remove the front door and raise the printhead. Refer to Figure 4-10.

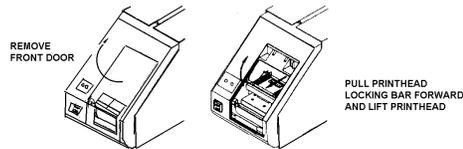


Figure 4-10 Unlocking Printhead

Peel approximately 12 inches of labels off backing paper and install label stock on supply roll and thread labels in the direction shown in Figure 4-9. Thread label stock until labels feed out front of printer.

Be sure to feed the label stock through the low stock sensor. If the low stock sensor is missed then the low stock light will flash when you feed or print a label.

Feed the backing paper to the take-up spool with enough excess backing paper to wrap around take-up spool once. Remove any excess labels so that no labels are fed back to the take-up spool.

Install the U-shaped metal clamp on take-up spool over backing paper. Lower the printhead and manually turn take-up spool until the leading edge of the front label is approximately 1/8" past the edge of the printhead. Reinstall the front door.

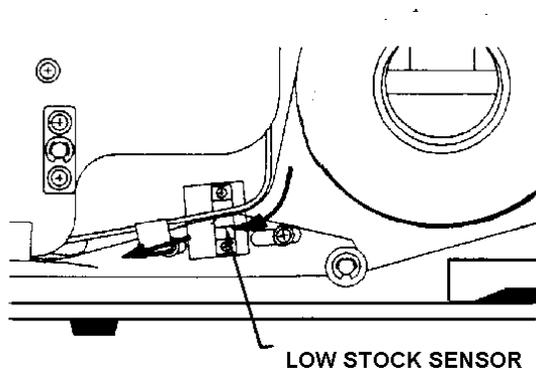


Figure 4-11 Low Stock Sensor

5. INTERFACING. INTERFACING

5.1 HARDWARE INTERFACING.1 HARDWARE INTERFACING

The 8860 is capable of receiving data by 20 mA current loop, RS-232C or RS422A. Baud rate is selectable to either 1200 or 9600 baud. ASCII data format is one start bit, seven data bits, even parity bit with either one stop bit for Mode I operation or two stop bits for Mode II operation. The 8860 uses standard Model 8806 interface cables and printer setup for use with METTLER TOLEDO Indicators and Parts Counting Scales. Refer to Table 5-1 for interconnect cable pinout and Table 5-2 for standard interface cable part numbers.

8860	Signal Description	8505	3026, 3027, 3036, 8510- 1001	1938, 2038, 2138, 8510- 2001	8520	8571, 8572	8140*,8142, 8146,8530, 8581#,8582@		PC Compatible Computer									
							Desk	Wall	DE-9	DB-25								
1	Chassis Ground	Tip	2	3		3			2	3								
2	TxD (RS-232)																	
3	RxD (RS-232)																	
4	RTS (RS-232)																	
5	CTS (RS-232)																	
6	DSR (RS-232)																	
7	Logic Ground																	
8	+Busy (20 mA)										Shell	1	5		7		5	7
9	-TxD (20 mA)																	
10	-Busy (20 mA)																	
11	Not Used																	
12	Logic Ground																	
13	RxD A (RS-422)																	
14	+TxD (20 mA)																	
15	+12 VDC Supply																	
16	+RxD (20 mA)	4	9	J														
17	-12 VDC Supply																	
18	-RxD (20 mA)	3	22	K														
19	TxD A (RS-422)																	
20	DTR (RS-232)																	
21	Error Out (TTL)																	
22	RxD B (RS-422)																	
23	+12 VDC Supply																	
24	+5 VDC Supply																	
25	TxD B (RS-422)																	
4 ●	Jumpers						4 ●	D ●	7 ●	4 ●								
5 ●							5 ●	E ●	8 ●	5 ●								
6 ●							14 ●	P ●	1 ●	6 ●								
20 ●							15 ●	R ●	4 ●	8 ●								
								6 ●	20 ●									

Table 5-1 Interconnect Cable Pinout

- Notes: * 8140 requires data output option.
 # 8581 must be contain B122683 00A revision logic PCB or newer.
 @ Wall enclosure versions of the Model 8582 uses desk enclosure cables.

Scale Model	Type and Cable Length	Part Number	Factory Number	Use 20 mA Adapter?
8132	Desk 6' Desk 20' Wall 6' Wall 20'	115484 00A 115485 00A 115486 00A 115487 00A	0900-0143 0900-0144 0900-0145 0900-0146	Yes
1938, 2038, 2138, 8510-2001	20'	131911 00A	0900-0255	No
3026, 8510-1001, 8510-1101	20'	129052 00A	0900-0237	No
8140*, 8142, 8146, 8186*, 8530, 8580, 8581#, 8582@, 8622	Desk 6' Desk 20' Wall 6' Wall 20'	115544 00A 115545 00A 122574 00A 122575 00A	0900-0136 0900-0137 0900-0188 0900-0189	Yes
8182	Desk 6' Desk 20'	115504 00A 115505 00A	0900-0163 0900-0164	Yes
8185	Wall 6' Wall 20'	115508 00A 115509 00A	0900-0167 0900-0168	Yes
8505	15'	134639 00A	0900-0264	No
8520	15'	133218 00A	0900-0258	Yes
8571, 8572	6'	129609 00A	0900-0243	No
PC Compatible Computer	DB-25F DE-9F	136053 00A 136054 00A	N.A. N.A.	No

Table 5-2 Interconnect Cables

- Notes: * 8140, 8186 require data output option.
 # 8581 must be contain B122683 00A revision logic PCB or newer.
 @ Wall enclosure versions of the Model 8582 uses desk enclosure cables.

The 20 mA Adapter (128019 00A) is provided to permit the 8860 to use standard 20 mA current loop, 8806 printer cables. Bidirectional 20 mA or RS-232C, RS-422 interfacing requires that the 20 mA adapter be removed from the 8860. Refer to Table 5-3 for internal wiring of current loop adapter.

8860 End	Interconnect Cable End
16	16
18	18
● 4	
● 5	
● 6	
● 20	

Table 5-3 20 mA Current Loop Adapter

5.2 SOFTWARE INTERFACING.2 SOFTWARE INTERFACING

5.2.1 Mode I Communication Protocol 5.2.1 Mode I Communication Protocol

The 8860 can print up to six lines of data in bar code or any of 5 different human readable print sizes. Transmitted data is serial ASCII characters formatted as 1 start bit, 7 data bits, even parity and 1 stop bit at either 1200 or 9600 baud.

All human readable print sizes are available for use in Mode I operation, [SW1-4] and [SW1-5] select the default minimum human readable print size. A <SI> sent at the beginning of a field of data selects the next larger print size. Multiple <SI> characters on a line are permitted. A Shift Out <SO> or Carriage Return <CR> returns the printer to the default minimum print size.

Bar code is selected by sending a Device Control 2 <DC2> (hex 12), all lines after the <DC2> are printed in the bar code format selected by [SW2-5] and [SW2-6]. Bar code data is printed again in human readable size 1 directly under the bar code.

Each label transmission begins with a Start of Text <STX> character (hex 02). Each line of data in the label is terminated with a Carriage Return <CR> character (hex 0D). The last line of the label is terminated with a <CR>, an End of Text <ETX> (hex 03), and a Block Check Character <BCC>.

The <STX> character will cause the 8860 to flush any incompletely transmitted label from the input buffer and await further transmission. If the transmission is not completed within three seconds of the reception of the <STX> character the 8860 flushes the input buffer and no label is printed.

The Block Check Character <BCC> is calculated by performing an Exclusive-OR (XOR) function on all the characters in the transmission starting with the first character after the <STX> ending with the <ETX> character at the end of the transmitted data. The <STX> is not included in the <BCC>. <BCC> is a single ASCII character that is the hexadecimal value of the result of the (XOR) operation. Refer to Section 5.2.1.2. for example program to calculate <BCC>.

If the <BCC> transmitted by the host device matches the <BCC> calculated by the 8860 then an <ACK> character (hex 06), is transmitted to the host device and a label is printed. If the <BCC>'s do not match then a <NAK> character (hex 07), is transmitted to the host device and no label is printed.

If the take label sensor is blocked when a transmission is received the 8860 will store the label data in the input buffer until the take label sensor is cleared, at which time the label will be printed. An <RS> character is transmitted to the host device when the take label sensor is cleared if <RS> character output is enabled, setup switch **[SW2-1 ON]**. Subsequent labels transmitted to the 8860 will replace any label that is currently stored in the input buffer due to a blocked take label sensor. To prevent this overwriting of data in the input buffer it is recommended that <RS> character output be enabled, setup switch **[SW2-1 ON]**, and that the host device wait for a <RS> character from the 8860 before transmitting the next label.

The valid control characters that the 8860 will respond to are listed in Table 5-5. The <ENQ> and <LF> characters are the only characters that can be transmitted by themselves. All other control characters **MUST** be included as part of a complete label transmission or they will be ignored.

Control Character	Hex Value	Function
Start of Text <STX>	02	Begin New Label. Flush input buffer.
End of Text <ETX>	03	End of Label
Enquire <ENQ>	05	Status Check
Line Feed <LF>	0A	Label Feed, Clear Error
Carriage Return <CR>	0D	New Line and revert to default print size.
Shift Out <SO>	0E	Revert to Default Print Size
Shift In <SI>	0F	Select Larger Print Size
Device Control 2 <DC2>	12	Start Bar Code Printing Mode
Block Check <BCC>	Varies	Error Check Character

Table 5-5 Host Computer Command Characters

The Enquire <ENQ> character sent by itself will check the status of the 8860 prior to attempting to print. The 8860 will respond with one of three characters listed in Table 5-4, depending on the current status of the printer.

Response Character	Hex Value	Printer Status
<RS>	1E	Ready.
<CAN>	18	Not Ready Error
	19	Low Stock Error

Table 5-4 Mode 1, <ENQ> Response Characters

Note: <RS> character output in response to and <ENQ> from the host will only occur if <RS> character output is selected, setup switch **[SW2-1 ON]**.

A <CAN> or error condition must be cleared either by pressing the label feed button on the 8860 or by sending a Line Feed <LF> character to the 8860 before subsequent labels are printed. A <LF> character sent by itself will cause a blank label to feed and clear the error condition.

5.2.2 Mode I Interface Software Example 5.2.2 Mode I Interface Software Example

The program code example listed was written in MicroSoft® QuickBasic® version 4.5. This demo program requires an IBM® PC-Compatible computer with a serial Communication port addressed as COM1. If the serial port in your machine is addressed as COM2 then change the OPEN statement to:

```
OPEN "COM2:9600,E,7,1,CS,DS,CD" FOR RANDOM AS #1
```

The 8860 **MUST** be setup for Mode I operation, 9600 baud, minimum print size 1 and label size C or D for this example program. The test label printed on the 8860 will print human readable data in all type sizes and one line of bar code.

REM Define variables used in program

```
STX$ = CHR$(2)   : REM START OF TEXT CHARACTER
ETX$ = CHR$(3)   : REM END OF TEXT CHARACTER
CR$  = CHR$(13)  : REM CARRIAGE RETURN CHARACTER
SI$  = CHR$(15)  : REM SHIFT IN CHARACTER
DC2$ = CHR$(18)  : REM BAR CODE SELECT CHARACTER
```

REM Load each line of data into string variables

```
ONE$ = SI$ + SI$ + SI$ + SI$ + "8860 TEST " + CR$
TWO$ = "Size 1 " + CR$
THREE$ = SI$ + "Size 2 " + CR$
FOUR$ = SI$ + SI$ + "Size 3 " + CR$
FIVE$ = SI$ + SI$ + SI$ + "Size 4 " + CR$
SIX$ = DC2$ + "01234567890" + CR$
```

REM Combine lines of data into one string

```
TRANSMIT$ = ONE$ + TWO$ + THREE$ + FOUR$ + FIVE$ + SIX$ + ETX$
REM Calculate <BCC> and add <STX> and <BCC> character to TRANSMIT$
BCC% = ASC(LEFT$(TRANSMIT$, 1))
FOR I% = 2 TO LEN(TRANSMIT$)
    BCC% = BCC% XOR ASC(MID$(TRANSMIT$, I%, 1))
NEXT I%
BCC$ = CHR$(BCC%)
TRANSMIT$ = STX$ + TRANSMIT$ + BCC$
```

REM Open serial port, output TRANSMIT\$ and end program

```
OPEN "COM1:9600,E,7,1,CS,DS,CD" FOR RANDOM AS #1
PRINT #1, TRANSMIT$;
CLOSE #1
END
```

Notice: This example program is provided to permit testing of Mode I operation of the 8860 printer, to illustrate a method of interfacing the METTLER TOLEDO Model 8860 printer to an IBM® PC compatible computer and **DOES NOT** constitute a complete, working program suitable for use as a commercial application.

METTLER TOLEDO DOES NOT ACCEPT RESPONSIBILITY FOR ANY LIABILITY ARISING FROM ANY USE OF THIS EXAMPLE PROGRAM.

5.2.3 Mode II Communication Protocol 5.2.3 Mode II Communication Protocol

The 8860 can print up to six lines of data in bar code or any of 5 different human readable print sizes. Transmitted data is serial ASCII characters formatted as 1 start bit, 7 data bits, even parity and 1 stop bit at either 1200 or 9600 baud rate.

Mode II interfacing requires a Start of Text <STX> character (hex 02), at the beginning of the first line of data in the label. Each line of data in the label is terminated by a Carriage Return <CR> (hex 0D) and Line Feed <LF> (hex 0A). A Checksum <CHK> character is inserted between the <CR> and <LF> characters of each line of data if checksum is enabled, setup switch **[SW2-7 ON]**.

5.2.3.1 METTLER TOLEDO Indicator Interface

METTLER TOLEDO indicators must be configured as follows to operate with Mode II:

- <STX> character output must be enabled.
- Demand mode, multiple line format must be selected (six lines maximum).
- Baud rate must be selected to either 1200 or 9600 baud.
- All lines selected for bar code must be 11 characters or less in length for standard bar code selections.

Note: Lines printed as bar code are printed again in human readable size 1 directly under the bar code.

5.2.3.2 Data Input Sequence

Reception of an <STX> character will cause the 8860 to flush any incompletely received label from the input buffer and await transmission of a new label. The 8860 will abort printing of a label if more than three seconds pass between reception of any two characters in a line of data.

The 8860 waits 0.2 seconds after the end of a line of data (<CR><LF>) to see if more lines of data are being transmitted. New lines of data are added to the label as received. If no more data is received within the 0.2 second timeout after the end of a line the 8860 will then print the label.

Note: If more than six lines of data are transmitted to the 8860 the first five lines of data will be printed normally and the last line of data transmitted to the 8860 will be printed as the sixth line of data.

5.2.3.3 Journal Output

When Mode II operation is selected the 8860 provides a journal output to permit the connection of an auxiliary journal printer to the RS-2323 TxD or 20 mA current loop +TxD and -TxD. The journal output echo's all characters printed on the label except that all data is printed on one line. The line of data is terminated with an ASCII carriage return/line feed, <CR><LF>. All other control characters except for the <CR><LF> are deleted from the journal output transmission.

5.2.4 Mode II Interface Software Example 5.2.4 Mode II Interface Software Example

The program code example listed was written in MicroSoft® QuickBasic® version 4.5. This demo program requires an IBM® PC-Compatible computer with a serial communication port addressed as COM1:. If the serial port in your machine is addressed as COM2: then change the OPEN statement to:

OPEN "COM2:9600,E,7,1,CS,DS,CD" FOR RANDOM AS #1

The 8860 **MUST** be setup for Mode II operation, 9600 baud and checksum enabled, setup switches **[SW1-1 OFF]**, **[SW2-7 ON]** and **[SW2-8 ON]** for this example program to operate. This sample program will print the first line in size 4 or 5 as selected by **[SW2-1]**, lines 2 through 6 will print in the default print size selected.

```
STX$ = CHR$(2) : REM START OF TEXT CHARACTER
LF$ = CHR$(10)  : REM LINE FEED CHARACTER
CR$ = CHR$(13) : REM CARRIAGE RETURN CHARACTER
SO$ = CHR$(14) : REM SHIFT OUT CHARACTER
OPEN "COM1:9600,E,7,1,CS,DS,CD" FOR RANDOM AS #1
TRANSMIT$ = STX$ + SO$ + "8860 TEST " + CR$
GOSUB CHECKSUM
PRINT #1, TRANSMIT$;
FOR J% = 2 TO 6
  TRANSMIT$ = LF$ + "LINE " + STR$(J%) + CR$
  GOSUB CHECKSUM
  PRINT #1, TRANSMIT$;
NEXT J%
PRINT #1, LF$;
CLOSE #1
END
```

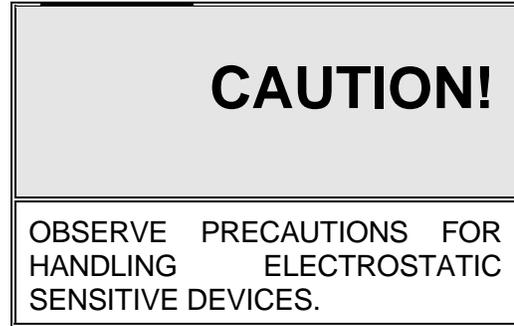
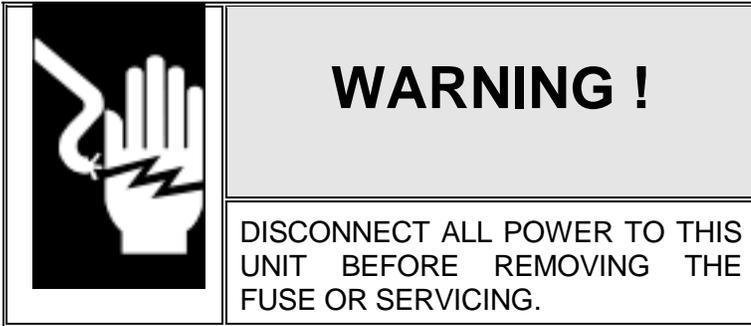
**REM SUBROUTINE TO CALCULATE AND ADD CHECKSUM CHARACTER
CHECKSUM:**

```
CHECKSUM% = ASC(LEFT$(TRANSMIT$, 1))
FOR I% = 2 TO LEN(TRANSMIT$)
  CHECKSUM% = CHECKSUM% + ASC(MID$(TRANSMIT$, I%, 1))
NEXT I%
CHECKSUM% = ((NOT CHECKSUM%) + 1) AND 127
TRANSMIT$ = TRANSMIT$ + CHR$(CHECKSUM%)
RETURN
```

Notice This example program is provided to permit testing of Mode II operation of the 8860 printer. The code fragments in this example are provided to illustrate a method of interfacing the METTLER TOLEDO Model 8860 printer to an IBM® PC compatible computer and **DOES NOT** constitute a complete, working program suitable for use as a commercial application.

METTLER TOLEDO DOES NOT ACCEPT RESPONSIBILITY FOR ANY LIABILITY ARISING FROM ANY USE OF THE CODE FRAGMENTS DESCRIBED IN THIS EXAMPLE.

6. MAINTENANCE. MAINTENANCE



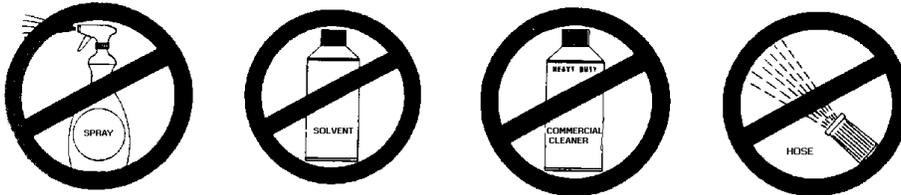
Common hand tools and the following items are recommended for proper maintenance and repair of the Model 8860 printer.

- Volt/Ohm Meter or DVM
- Static Control Work Station
- Cleaning Cloth
- Silicon Grease
- Cotton Tipped Swabs
- 6" ruler
- Static Bags for PCB's (112736 00A)
- Cleaning Fluid (125875 00A)
- Soft Nylon Bristle Brush (Small Paint Brush)

6.1 ENCLOSURE CLEANING.1 ENCLOSURE CLEANING

Disconnect AC power to the printer by unplugging the printer AC power cord or by turning the printer power switch off (located on the rear of the printer).

Use a soft clean cloth dampened with a mild detergent and water, or a mild cleaner to wipe the exterior surfaces. Do not spray directly on the unit. A mild spray cleaner can be used by spraying the cleaning cloth (not the printer). Do not use solvents or commercial cleaners on the unit. **CAUTION! THE 8860 DESK VERSION IS NOT DESIGNED FOR A HOSE DOWN ENVIRONMENT!**



6.2 CLEANING THE PRINT MECHANISM.2 CLEANING THE PRINT MECHANISM

CAUTION!
DO NOT USE A METAL TOOL OR OBJECT TO REMOVE LABEL JAMS AS THIS CAN CAUSE SEVERE DAMAGE TO THE PRINTHEAD.

CAUTION!	
 1	HOT!

Remove the front door, lift the printhead and remove label stock. Refer to Figure 6-1.

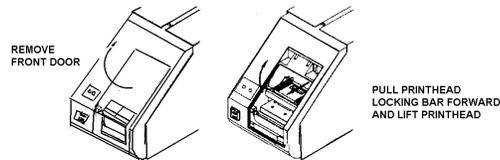
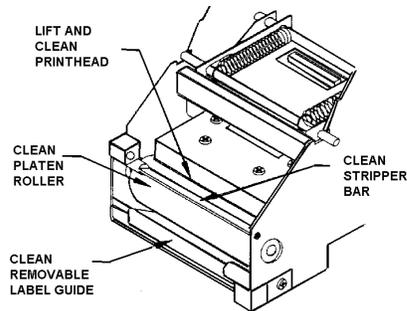


Figure 6-1 Accessing Printhead



6.2.1 Clean the Printhead 6.2.1 Clean the Printhead

Clean the thin black print dot line, located on the bottom, front portion of the printhead with a cotton tipped swab dipped in cleaning fluid (125875 00A). Refer to Figure 6-3.

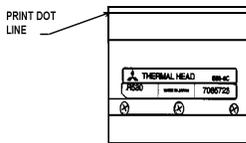


Figure 6-3 Printhead Cleaning

NOTE: Never scrape the printhead with any object as damage to the printhead may result.

6.2.2 Clean the Paper Path 6.2.2 Clean the Paper Path

Clean any adhesive buildup or debris from the platen roller, removable front label guide and stripper bar with METTLER TOLEDO cleaning fluid (125875 00A) or equivalent (ISC108-B), a clean cloth and a soft nylon bristle brush. Refer to Figures 6-2 and 6-4.

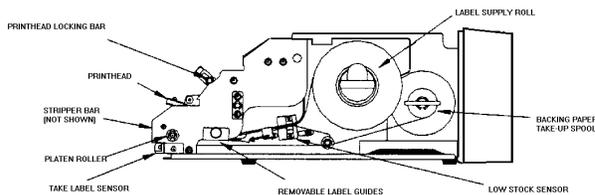


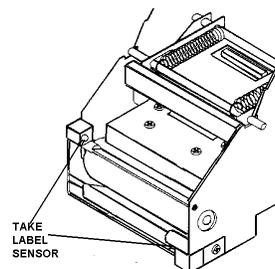
Figure 6-4 Printer Mechanism

Note: DO NOT scrape the platen roller with any metal tool or object. Do not use a metal object to remove label jams as this can cause severe damage to electronic parts.

6.2.3 Label Sensor Cleaning 6.2.3 Label Sensor Cleaning

Clean both the Low Stock and Take Label sensors. Use a soft bristle brush to clean dust and debris out of the photo eyes of the sensors. If glue or dust has built up on the Low Stock Sensor, clean with Mettler Toledo Cleaner 12587500A. Apply the cleaner to the edge of a paper or cloth towel folded in half, then gently run the towel through the sensor slot. Refer to Figures 6-4 and 6-5 for label sensor locations.

Figure 6-5 Take Label Optical Sensor



6.2.4 Label Guide Cleaning 6.2.4 Label Guide Cleaning

The label guides should be cleaned during normal maintenance or any time a label jam occurs. The label guides are located directly behind the platen roller, underneath the printhead. Refer to following cleaning procedure:

- Lift the label access side of the top cover and remove the label stock.
- Remove the white plastic headed, knurled thumb screw that retains the label guides. Refer to Figure 6-6.
- Remove the the lower label guides by gently sliding the bottom guide down and to the rear of the printer.
- Clean both guides with cleaning fluid (125875 00A) or equivalent (ISC108-B). Verify that all built-up adhesive had been cleaned off.
- Reinstall the upper and lower label guides. Note the two crescent shaped slots in the vertical center mounting plate, the two tabs on the lower label guide must fit into these slots when reinstalling the label guides.

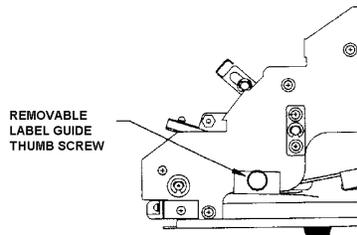


Figure 6-6 Lower Label Guide

6.3 LUBRICATION.3 LUBRICATION

Apply a thin film of silicone grease to the printhead locking bar and the top surfaces of the mounting brackets on both sides of mechanism. Refer to Figure 6-7.

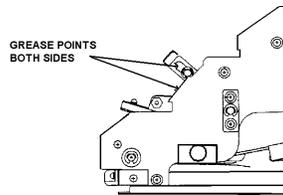


Figure 6-7 Printer Mechanism Lubrication

6.4 PRINT QUALITY ADJUSTMENTS.4 PRINT QUALITY ADJUSTMENTS

The best print quality is achieved when the resistor line on the printhead is centered over the top of the platen roller. To center the printhead squarely on the roller, loosen the printhead screws, as shown in Figure 6-8, then adjust the printhead position and retighten the screws. If you have a difference in print density exists across the width of the label then loosen the printhead support plate retaining screws, as shown in Figure 6-9. Move the retaining plate vertically until you get an even print density across the label from left to right.

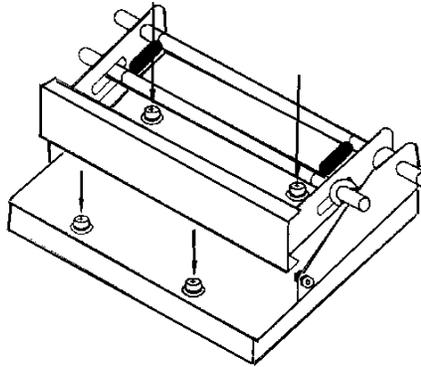


Figure 6-8 Printhead Alignment

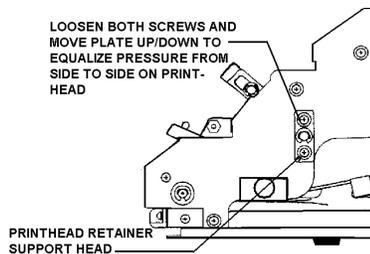


Figure 6-9 Side to Side Density Adjustment

Note: The print quality adjustment is easier to do if you use the self test label printing capability of the 8860. The 8860 will print a self test label with a sample bar code and a field of vertical bars across the entire width of the label when you press and hold the **LABEL FEED** button for two seconds.

6.5 LOW STOCK SENSOR ADJUSTMENT/REPLACEMENT.5 LOW STOCK SENSOR ADJUSTMENT/REPLACEMENT

6.5.1 Label Indexing Adjustment 6.5.1 Label Indexing Adjustment

The low stock sensor is used to detect when the 8860 is out of labels and also to set the position of print on the label. The label indexing position is adjusted by moving the low stock sensor. Refer to Figure 6-10. The low stock sensor position is adjusted by loosening the two mounting screws and moving the low stock sensor forward or backward. For a rough initial adjustment, power up the printer and press the **LABEL FEED** button to index a label. Next, move the low stock sensor forward or backward until a label feeds about 1/8 beyond the edge of the printhead when the **LABEL FEED** key is pressed. After the initial adjustment, print a label. If the print is not properly centered on the label from top to bottom, then adjust the low stock sensor slightly in the direction the print needs to be moved.

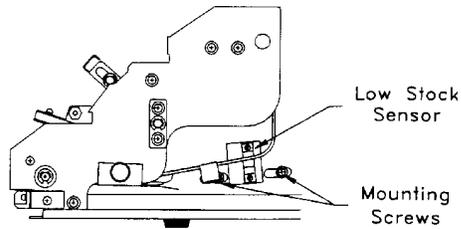


Figure 6-10 Label Indexing Adjustment

6.5.2 Low Stock Sensor Voltage Adjustment 6.5.2 Low Stock Sensor Voltage Adjustment

The low stock sensor voltage will need to be adjusted if the Printer Driver PCB is replaced, if the the low stock sensor is replaced or to match the low stock sensor to the particular label stock you are using. If the low stock sensor voltage is out of adjustment the 8860 may flash the low stock light and feed 1 1/2 labels when you attempt to print or feed a label. The low stock sensor voltage is tested as follows:

- Tear off a strip of the label liner and insert the liner paper in the Low Stock Sensor slot. Refer to Figure 6-11.

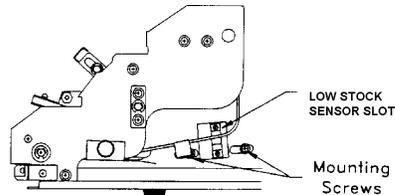


Figure 6-11 Low Stock Sensor

- With only the liner blocking the low stock sensor, measure the voltage between TP4 on the Printer Driver PCB and chassis ground. Refer to Figure 6-12. Adjust VR1 on the Printer Driver PCB until the voltage at TP4 measures +1.0 VDC (± 0.1 VDC). If the voltage at TP4 can't be adjusted to the +1.0 VDC (± 0.1 VDC) value then replace the low stock sensor.

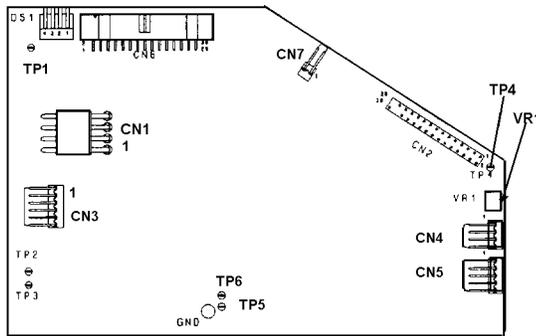


Figure 6-12 Printer Driver PCB

- After the +1.0 VDC test is made, check the voltage at TP4 with both the liner and a label blocking the low stock sensor slot. The TP4 voltage reading must be +2.0 VDC or higher. If the TP4 voltage is less than +2.0 VDC with both liner and a label blocking the low stock sensor then replace the low stock sensor.

6.5.3 Low Stock Sensor Replacement 6.5.3 Low Stock Sensor Replacement

Disconnect AC power to the printer by unplugging the printer AC power cord or by turning the printer power switch off (located on the rear of the printer).

To access the low stock sensor, remove the top and front covers, the Logic PCB and the Printer Driver PCB. To replace the low stock sensor, first remove the two mounting screws, as shown in Figure 6-10. Next, disconnect the harness at CN5 on the Printer Driver PCB. Remove the low stock sensor through the hole in the vertical frame. Install the new Low Stock Sensor reversing the previous steps. After installing the replacement low stock sensor perform the adjustments listed in step 6.5.2 and 6.5.1.

6.6 TAKE LABEL SENSOR .6 TAKE LABEL SENSOR

The take label sensor assembly consists of an optical transmitter and receiver wired into a single harness that connects to CN4 on the Printer Driver PCB. The take label sensor prevents the 8860 from printing a new label until the current label has been removed from the printer. If the take label sensor is defective or blocked the 8860 will not print a label from a scale or computer, however the 8860 will print a self test label with the take label sensor blocked.

6.6.1 Testing the Take Label Sensor 6.6.1 Testing the Take Label Sensor

If the 8860 will not print a label but will print a self test label then the problem may be due a blocked or defective take label sensor. Clean the take label sensor as described in Section 6.2.3 of this manual. To check the take label sensor you must remove the top cover and front cover assemblies to gain access to connector CN4 on the Printer Driver PCB.

TEST 1: Block the take label sensor with a label then check the take label sensor output voltage across connector CN4 pins 1 and 2. The take label sensor output voltage should measure +5 VDC (± 0.25 VDC) with the sensor blocked. Remove the label, then check the take label sensor output voltage again. The voltage should measure between +0.25 VDC to +1.5 VDC with the sensor not

blocked. If the sensor output voltages are not within tolerance or if the voltage does not change when the sensor is blocked and unblocked, then proceed to TEST 2 below. If the sensor output voltages are correct then skip TEST 2.

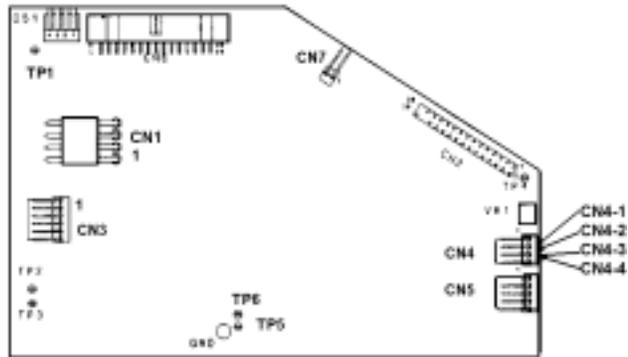


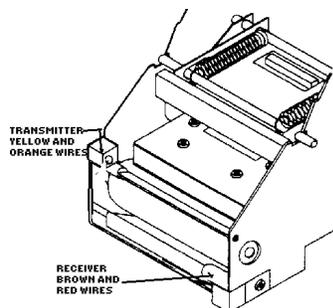
Figure 6-13 Printer Driver PCB, CN4

TEST 2: Verify that the sensor supply voltage between CN4 pins 3 and 4 on the Printer Driver PCB measures between 1.0 to 1.5 VDC. Refer to Figure 6-13. If the voltage is correct, proceed to Test 2. If the voltage between CN4 pins 3 and 4 is not between 1.0 and 1.5 VDC, turn off the 8860 power, then disconnect the harness from CN4. Reapply power and check the voltage between CN4 pins 3 and 4 on the Printer Driver PCB again. If the voltage measured across CN4 pins 3 and 4 without the take label sensor plugged in is +5 VDC (± 0.25 VDC), then replace the Label Taken Sensor Assembly, otherwise replace the Printer Driver PCB.

6.6.2 Replacing the Take Label Sensor

Disconnect AC power to the printer by unplugging the printer AC power cord or by turning the printer power switch off. Remove the transmitter retainer screw and receiver retainer screw. Next remove the harness at CN4 on the Printer Driver PCB. Reverse the procedure to install the new sensor. The Transmitter must be installed on top as shown in Figure 6-14. The Transmitter and Receiver can be identified by the color code of the wires.

Figure 6-14 Take Label Sensor



6.7 MAIN DRIVE BELT MAIN DRIVE BELT REPLACEMENT

REPLACEMENT.7

Disconnect AC power to the printer by unplugging the printer AC power cord or by turning the printer power switch off.

Remove Top Cover, Front Cover, Logic PCB, and Printer Driver PCB. To remove the belt, pull the belt away from the 32 tooth pulley while rotating the 20 tooth pulley, as shown in Figure 6-15. To install the new belt, first install the belt on the 20 tooth pulley, then push the belt on the 32 tooth pulley while rotating the 20 tooth pulley.

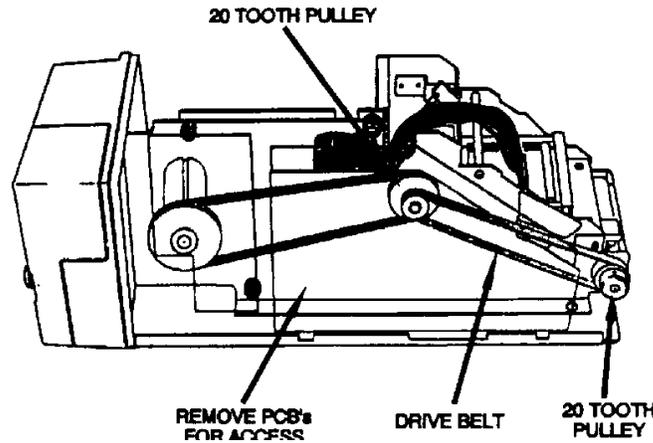


Figure 6-15 Drive Belt Replacement

6.8 LINER TAKEUP BELT REPLACEMENT.8 LINER TAKEUP BELT REPLACEMENT

The Liner Takeup Belt is a spring-belt is driven by the drive motor pulley. To replace the belt, first separate the old belt by untwisting COUNTERCLOCKWISE at the joint. Next, attach the new belt to the end of the old belt. Pull the old belt through to thread the new belt, as shown in Figure 6-16. After the new belt is in position, hold the larger end, prewind the smaller end ten revolutions counter-clockwise, then join the ends and unwind the small end into the large end, as shown in Figure 6-17.

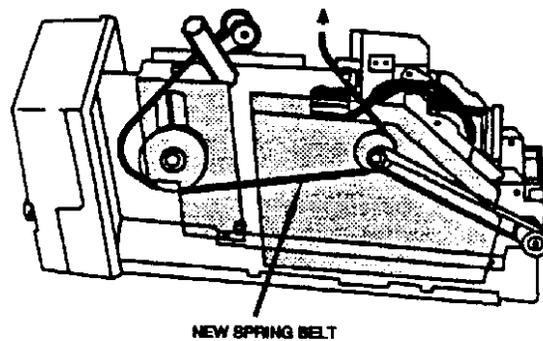


Figure 6-16 Installing Liner Takeup Belt

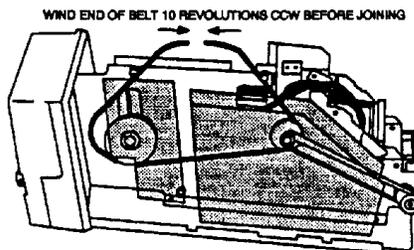


Figure 6-17 Connecting Belt ends

6.9 STRIPPER BAR ADJUSTMENT.9 STRIPPER BAR ADJUSTMENT

If label stripping problems occur, check the angle of the flat surface of the stripper bar, as shown in Figure 6-18

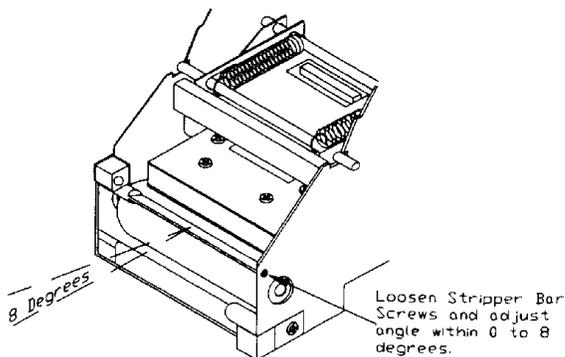


Figure 6-18 Adjusting Stripper Bar

The stripped label discharges upward proportionally to the angle of the flat stripper bar surface. The angle of the flat surface should be adjusted to within 0 to 8 degrees of horizontal.

6.10 PRINTHEAD REPLACEMENT.10 PRINTHEAD REPLACEMENT

	WARNING !
	<p>DISCONNECT ALL POWER TO THIS UNIT BEFORE REMOVING THE FUSE OR SERVICING.</p>

CAUTION!
<p>OBSERVE PRECAUTIONS FOR HANDLING ELECTROSTATIC SENSITIVE DEVICES.</p>

To replace the printhead, first **DISCONNECT AC POWER TO THE PRINTER**. Next remove the top cover and front door. Disconnect the printhead preheat harness from the Printer Driver PCB at connector CN7. Unlock the printhead to release the printhead tension on the platen roller. Next remove the four printhead retaining screws, as shown in Figure 6-19. Disconnect the printhead harness, lower the printhead, then slide the printhead out the front of the support bracket.

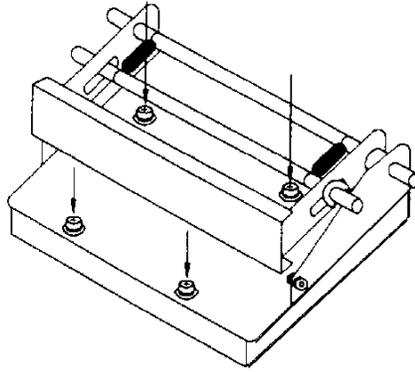
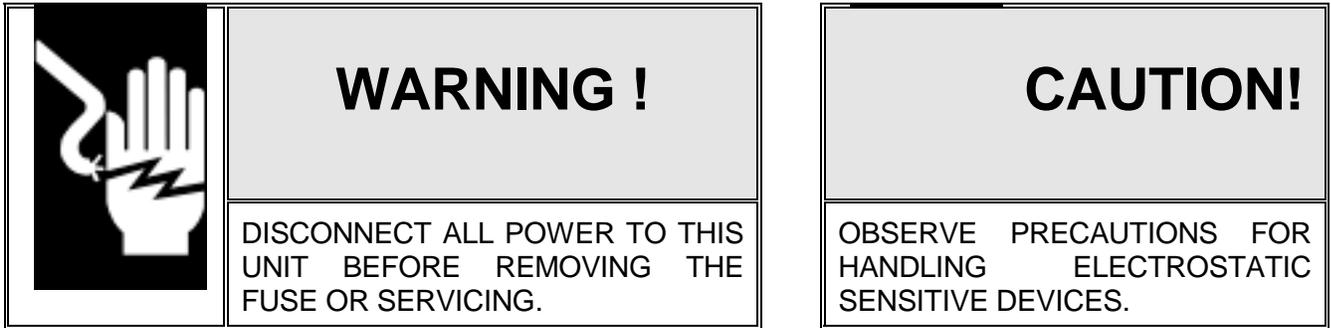


Figure 6-19 Printhead Removal

Verify that the new printhead resistance rating matches the Printer Driver PCB switch settings. Refer to Section 4.2 of this manual for Printer Driver PCB switch settings.

Insert the preheat harness in the bracket hole and position the printhead in the support bracket. Route the preheat harness to the Printer Driver PCB and connect to CN7. Connect the printhead harness to the Printhead, then install the four printhead mounting screws, as shown in Figure 6-19. Snug the mounting and verify that the printhead is centered and parallel over the top of the platen roller. Refer to Section 6.5 of this manual for print quality adjustments procedures.

6.11 LOGIC OR PRINTER DRIVER PCB REPLACEMENT.11 LOGIC OR PRINTER DRIVER PCB REPLACEMENT



Remove the top cover as described in Section 4.2 of this manual. Remove the front access door and remove the two phillips head screws that retain the front cover. Remove the front cover.

Disconnect all harnesses from the Main PCB and Printer Driver PCB. Remove the four phillips head PCB retaining screws that retain the PCBs. Refer to Figure 6-20. Remove the PCBs.

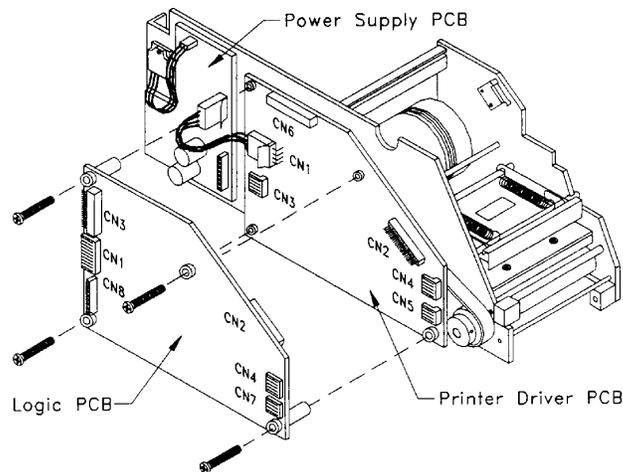
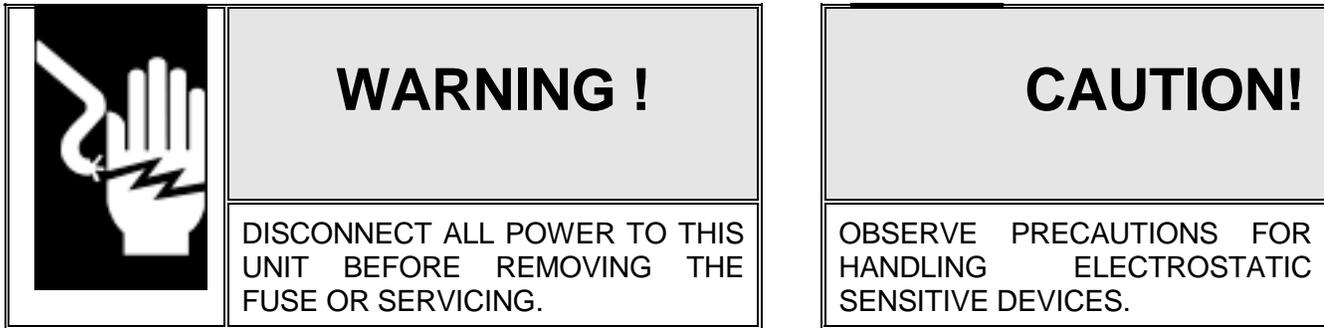


Figure 6-20 PCB Replacement

The Main PCB and Printer Driver PCB are joined together at CN2. *Gently* separate by pulling the Main PCB away from the Printer Driver PCB.

Reverse this procedure to install replacement PCBs. Verify setup switch and jumper settings on the replacement PCB, refer to Section 4.3 of this manual for setup information. Don't just copy the settings of the PCB being replaced since the problem you are attempting to correct could be caused by an incorrect setup selection.

6.12 POWER SUPPLY PCB REPLACEMENT.12 POWER SUPPLY PCB REPLACEMENT



Disconnect all interconnect harness from the Power Supply PCB, except the power cord and ON/OFF switch connections. Remove the four phillips head PCB retaining screws.

Remove the two phillips head screws that retain the switching regulator, (located below the label take-up reel). Refer to Figure 6-21.

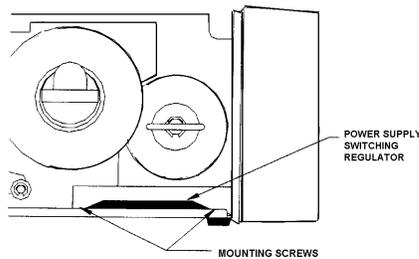


Figure 6-21 Power Supply Replacement

7. TROUBLESHOOTING. TROUBLESHOOTING

The 8860 printer performs internal diagnostic tests at powerup and also when printing a label. Two different self test labels can be printed by the 8860 to verify operation of the Logic PCB, Printer Driver PCB, Printhead and Printer Mechanism.

Perform the troubleshooting procedures listed below, in order, until the malfunction is corrected.

- 1 - Record as much information as possible about the problem, if the low stock light is flashing, refer to Section 7.1 for specific recommendations.
- 2 - If poor quality print then clean printer as described in Section 6.2 and refer to Section 6.4 for print quality adjustments.
- 3 - Cycle the AC power to 8860 off, then back on and retest.

- 4 - Print a self test label as described in Section 7.2. If 8860 prints self test labels ok but won't print otherwise then refer to Section 7.3. for specific recommendations.
- 5 - Check the AC power and fuse. Verify that the printer interface cable is wired correctly, is connected properly and has not been damaged.
- 6 - Verify that the 8860 setup switches and jumpers are set correctly and that the transmitting device is configured correctly.
- 7 - Verify that all power supply voltages listed in Section 6.4 are present and correct.
- 8 - Use substitution of known good parts to correct the malfunction. Exchange PCBs and subassemblies are available from your authorized METTLER TOLEDO representative.
- 9 - Once the 8860 is operational, verify the cause of the problem by reinstalling the defective component and retesting the 8860. This is to prevent the replacement of a good component because of a failure caused by a bad connection.

7.1 FLASHING LOW STOCK LIGHT ERROR INDICATION.1 FLASHING LOW STOCK LIGHT ERROR INDICATION

The low stock light will flash to indicate either an out of label stock condition or to signal an error condition. The following conditions can cause a flashing low stock light:

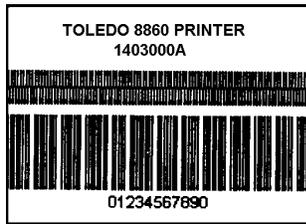
- | | |
|--------------------|---|
| Low Stock Sensor: | Out of stock, label stock not threaded correctly through the low stock sensor or low stock sensor not correctly adjusted. Refer to label threading instructions in Section 4.2.4. and refer to low stock sensor testing and adjustment instructions in Section 6.5. |
| Cover Switch Open: | An open or defective cover interlock switch. The cover interlock switch is located under the print head access cover. |
| Data Format Error: | A parity error or checksum error is detected in data received by the 8860. |
| Printing Error: | A flashing low stock light can occur if the take label sensor does not detect a label when printing. Refer to take label sensor adjustment instructions in Section 6.6. |

To clear a flashing low stock light first verify that the 8860 is not out of label stock and that the cover interlock switch is closed, then press the label feed button. If one complete label and part of another label is fed when the label feed button is pressed, then either the label stock is not properly threaded through the low stock sensor or the low stock sensor is malfunctioning and needs to be cleaned, adjusted or replaced.

The low stock light can also flash if errors in the data transmitted to the 8860 are detected. These errors can include: incorrect baud rate, parity bit, number of data bits, or checksum character selection. The 8860 requires that the transmitting device use either 1200 or 9600 baud (as selected by switch **[SW2-8]**), 7 data bits, even parity with either 1 or 2 stop bits. Mode II operation (switch **[SW1-1 OFF]**) requires that a checksum character be transmitted between each <CR>, <LF> line terminating characters if checksum detect is enabled (switch **[SW2-7 ON]**). Verify 8860 switch settings as described in Section 4.3.3 and verify data output format selections in the transmitting device.

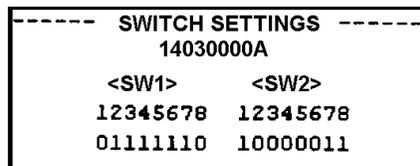
7.2 SELF TEST LABEL PRINTING.2 SELF TEST LABEL PRINTING

The 8860 printer can print two different self test labels to assist in diagnosing malfunctions, and verify printing functions: a bar code self test label and switch setting self test label.



7.2.1 Bar Code Test Label 7.2.1 Bar Code Test Label

The bar code test label permits verification of every print dot on the printhead which is most important if the 8860 is being used to print bar code labels. To print a bar code test label, press and hold the label feed button, with power applied, until the bar code test label is delivered (approximately two seconds). If any of the print lines are missing in the test label then the printhead is defective and must be replaced. Refer to Figure 7-1. If any voids are noted in the print line that do not total obscure a print line then the problem may be a dirty or damaged platen roller rather than the print head.



7.2.2 Logic PCB Switch Settings Test Label 7.2.2 Logic PCB Switch Settings Test Label

The Logic PCB switch settings test label permit verification of switch selections and software revision without opening the 8860 enclosure. The Switch settings test label is also used to verify operation of the setup switches, if the switch settings test label results do not match the actual switch selections the Logic PCB is defective and must be replaced.

To print the Logic PCB switch settings test label, remove AC power from the 8860. Press and hold the label feed button. Apply AC power while continuing to hold the label feed button. The 8860 will then print a label with the software part number and revision level and the current switch settings for SW1 and SW2. Refer to Figure 7-2. Turn the AC power to the 8860 off then back on to clear from this self test mode.

7.2.3 Self Tests OK, But Won't Print Label 7.2.3 Self Tests OK, But Won't Print Label

Figure 7-3 Take Label Sensor

If the 8860 will print a self test label ok, but won't print a label from the scale or remote computer then one of the following conditions may be causing the problem.

Take Label Sensor Blocked: The 8860 will not print a label if the take label sensor is blocked by a label waiting to be taken, except when printing a self test label. Printing is inhibited by an incorrectly positioned front label guide, or by a defective or incorrectly adjusted take label sensor. Refer to Figure 7-3. Refer to Section 6.6 for take label sensor testing and adjustment.

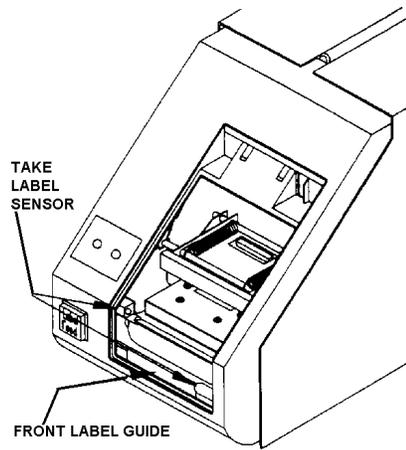


Figure 7-3 Take Label Sensor

Data Interface Not Properly Configured: The 8860 provides RS-232, 20 mA current loop or RS-422 interfaces. Each of these interfaces require a different interconnect cable and different Logic PCB jumper selection. Use of the bidirectional 20 mA current loop, RS-232 and RS-422 interfaces require that the 20 mA current loop adapter be removed from the 8860 serial I/O connector. Standard METTLER TOLEDO Printer interface cables require that the 20 mA current loop adapter be used.

Interface Used	Logic PCB Jumper Selection	8860 Serial I/O Connector Pins Used	20 mA Current Loop Adapter
RS-232	J1 ON J2 OFF J3 OFF	2 TxD (RS-232) 3 RxD (RS-232) 7 Logic Ground	Not Used
20 mA Current Loop	J1 OFF J2 ON J3 OFF	16 +Rxd (20 mA) 18 -RxD (20 mA) 14 +TxD (20 mA) 9 -TxD (20 mA)	Used With Standard Toledo® Printer Cables
RS-422	J1 OFF J2 OFF J3 ON	13 RxD A (RS-422) 22 RxD B (RS-422) 19 TxD A (RS-422) 25 TxD B (RS-422)	Not Used

Table 7-1 Data Interface Configuration Guide

Incorrect Baud Rate or Data Format: If the transmitting device is sending data at the wrong baud rate (1200 or 9600 baud as selected by setup switch **[SW2-8]**, or does not use the correct data format (7 data bits, even parity) the 8860 will either ignore the transmission or may indicate an error by flashing the low stock light.

Serial Data Is Not Being Transmitted: Verify that the 8860 is receiving data by checking test point TP7 on the Logic PCB for activity when data is transmitted. This test point will be at a steady +5 VDC until data is transmitted at which time the voltage will drop and fluctuate. If TP7 stays at a steady +5 VDC, verify that the 8860 is configured for the correct interface and then verify that data is being transmitted by performing the appropriate test for the serial interface used.

20 mA Current Loop Interface Test: Set your meter to measure DC milliamps. Place the red meter lead on pin 16 and the black meter lead on pin 18 of the 8860 end of the interconnect cable. Your meter should read between 18 to 40 mA. Press the PRINT key on the scale or initiate a transmission from the computer. The meter reading should drop and fluctuate.

NOTE: If your meter reads 0 mA, switch to read DC volts. Pin 16 to 18 should read between 12 to 28 VDC. If DC voltage is present then check the fuse in your meter.

RS-232 Interface Test: Set your meter to measure DC Volts. Place the red meter lead on pin 3 and the black meter lead on pin 7 of the 8860 end of the interconnect cable. Your meter should read a dc voltage of between -8 to -25 VDC. Press the PRINT key on the scale or initiate a transmission from the computer. The meter reading should fluctuate with the voltage reading near 0 VDC.

Invalid Data or Incorrect <BCC> Character in Mode I Operation: If an 8860 configured for Mode I operation receives an incorrect Block Check Character <BCC> at the end of the transmission or an invalid message format, the 8860 will respond with an ASCII <NAK> character to the transmitting device and no label will be printed.

Note: If a <NAK> character is received from the 8860 then the transmitting device **MUST** indicate that an error has occurred as there is no indication at the 8860 that invalid data has been received.

7.3 PCB TEST POINTS AND VOLTAGE CHECKS.3 PCB TEST POINTS AND VOLTAGE CHECKS



WARNING !

Only permit qualified personnel to service this equipment. Exercise care when making checks, tests and adjustments that must be made with power on

CAUTION!

OBSERVE PRECAUTIONS FOR HANDLING ELECTROSTATIC SENSITIVE DEVICES.

7.3.1 Logic PCB Test Points 7.3.1 Logic PCB Test Points

The 8860 Logic PCB has 9 test points labeled TP0 through TP8. Four of these test points are useful during field troubleshooting. Refer to Figure 7-4 and Table 7-5.

- Test point TP0 is Logic Ground.
- Test point TP4 is the +5 VDC supply.
- Test point TP7 is RxD (TTL), received data from the scale to the 8860.
- Test point TP8 is TxD (TTL), transmit data to the scale from the 8860.
- Test points TP1, TP2, TP3, TP5 and TP6 are for factory use.

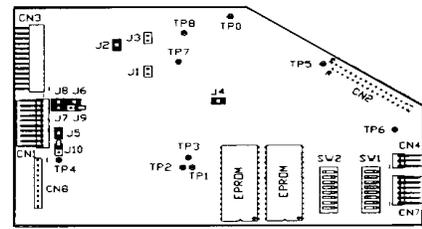
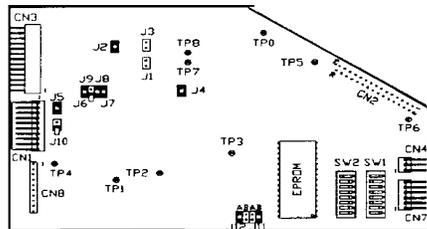


Figure 7-4 Current Logic PCB, PN 14029900A Figure 7-5 Original Logic PCB, PN 12891800A

Test Point	Test Point Function	Normal State (Waiting For Data)	Data Received with Take Label Sensor Blocked (*)	Label Printed After Take Label Sensor is Unblocked (*)
TP0	Logic Ground	0 VDC		
TP4	+5 VDC Supply	+5 VDC (±0.25)		
TP7	Receive Data (IN)	+5 VDC	Pulsing Low	+5 VDC
TP8	Transmit Date (Out)	+5 VDC	+5 VDC	Pulsing Low

Table 7-2 Logic PCB Test Points

7.3.2 Printer Driver PCB Test Points 7.3.2 Printer Driver PCB Test Points

The 8860 Printer Driver PCB has 6 test points labeled TP1 through TP6. The Logic PCB must be removed to access most of the test points on the Main PCB. Refer to Figure 7-6 for Printer Driver PCB test point locations. All voltages listed in Tables 7-3 and 7-4 are measured between the test point listed and TP2 (Ground)

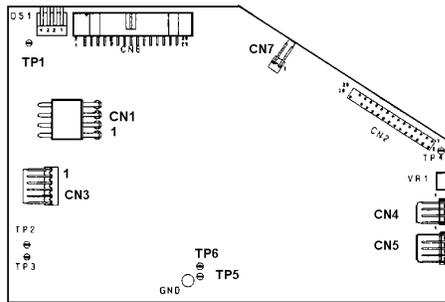


Figure 7-6 Printer Driver PCB

Test Point	Test Point Function	Voltage	
TP1	Printhead Burn Time	Controlled by DS1 (refer to Table 6-4)	
TP2	Ground	0 VDC	
TP3	Printhead data strobe	+5 VDC, pulsing low when label is printed	
TP4	Low Stock Optical sensor, adjust VR1 to match the label stock used.	Backing only	Backing plus label
		1 VDC, ± 0.1 VDC	Greater than 2 VDC
TP5	Printhead Supply Sense	+2.0 VDC, ± 0.06 VDC	
TP6	Reference Voltage	+3.48 VDC, ± 0.01 VDC	

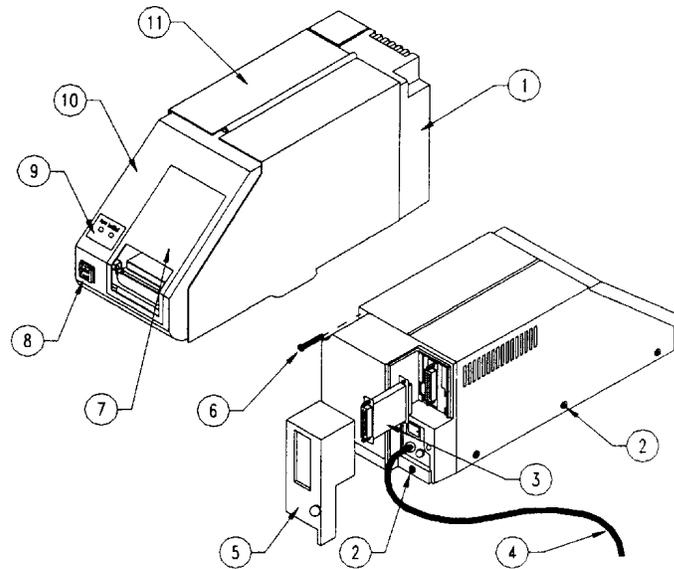
Table 7-3 Printer Driver PCB Test Points

DS1-1	DS1-2	DS1-3	DS1-4	TP1 to TP2 Voltage
ON	OFF	OFF	OFF	0.198 VDC (± 0.009)
OFF	ON	OFF	OFF	0.291 VDC (± 0.012)
OFF	OFF	ON	OFF	0.541 VDC (± 0.021)
OFF	OFF	OFF	ON	1.094 VDC (± 0.040)

Table 7-4 TP1, DS1 Printhead Burn Time Control Voltage Tests

8. PARTS CATALOG. PARTS CATALOG

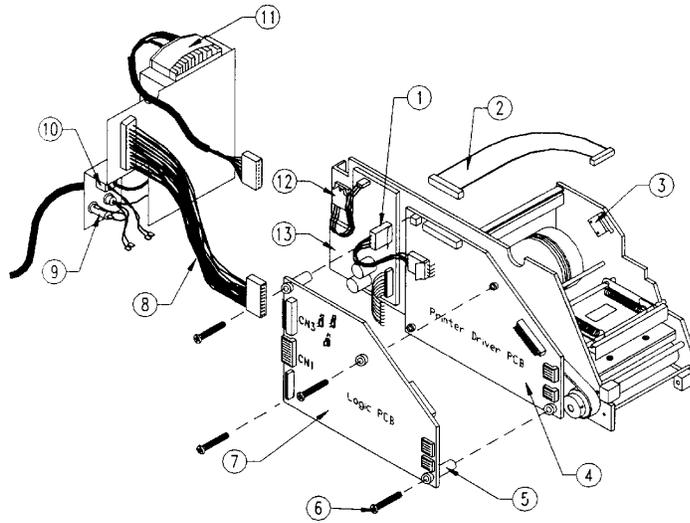
8.1 FRONT PANEL AND COVERS



REF.	Part Number	Description	QTY.
1	129533 00A	Rear Cover Assembly	1
2	R03763 00A	Top Cover Screw	5
3	128019 00A	20 mA Current Loop Cable Adapter	1
4	129542 00A	Power Cord	1
5	128048 00A	Removable Rear Cover	1
6	R03750 00A	Rear Cover Screw	2
7	128025 00A	Removable Front Cover	1
8	128032 00A	Switch and Harness Assembly	1
9	128026 00A	LED Harness Assembly	1
10	129539 00A	Front Cover Assembly	1
11	129540 00A	Top Cover Assembly	1
N.S.	129529 00A	Rubber Foot	4

Part numbers shown may have a letter prefix.
N.S. (Not Shown)

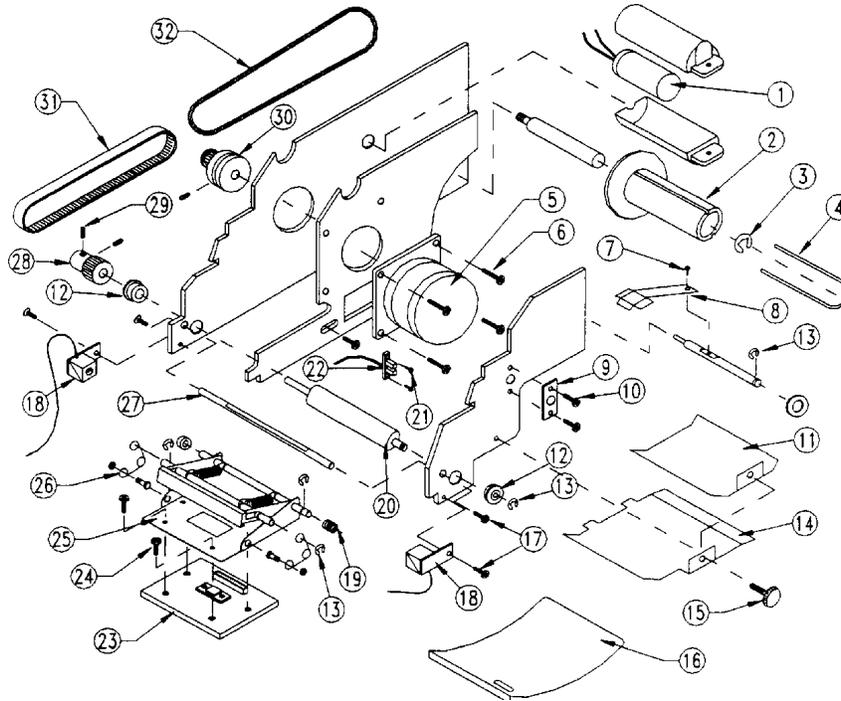
8.2 PCB'S AND HARNESSES.2 PCB'S AND HARNESSES



REF.	Part Number	Description	QTY.
1	128041 00A	Power Supply Harness	1
2	128021 00A	Printhead Harness	1
3	129543 00A	Cover Interlock Switch	1
4	128022 00A	Printer Driver PCB	1
5	128919 00A	PCB Standoffs	4
6	R03765 00A	PCB Mounting Screws	4
7	140299 00A	Main PCB	1
8	128044 00A	Communication Harness	1
9	129530 00A	Fuse Holder	1
	128031 00A	Fuse, 2A (Not Shown)	1
10	128050 00A	Power Switch	1
11	128043 00A	Transformer Assembly, 120 VAC	1
	130868 00A	Transformer Assembly, 220 VAC	
	130869 00A	Transformer Assembly, 240 VAC	
12	128037 00A	Voltage Regulator Assembly	1
13	128024 00A	Power Supply PCB	1

Part numbers shown may have a letter prefix.

8.3 MECHANICAL PARTS.3 MECHANICAL PARTS



Ref	Part Number	Description	Qty	Ref	Part Number	Description	Qty
1	12804000A	Capacitor, 10000 mfd	1	17	R0375300A	Screw, M3 X 6	2
2	12954400A	Spool, Liner Take-Up	1	18	12802900A	Take Label Sensor	1
3	R0376000A	Snap Ring, #7	1	19	12953700A	Spring, Tension	1
4	12803000A	Liner Clip	1	20	R0374900A	Screw, M3 X 8	2
5	12802700A	Stepper Motor	1	21	12805300A	Roller, Printhead	1
6	R0375100A	Screw, M4 X 12	4	22	12803800A	Low Stock Sensor	1
7	R0374600A	Screw, M3 X 6	2	23	12802000A	Printhead	1
8	12953500A	Spring Plate	1	24	R0374600A	Screw, M3 X 6	4
9	12953600A	Retainer Plate	1	25	12892700A	Printhead Support	1
10	R0374600A	Screw, M3 X 6	1	26	13800500A	Printhead Sprint (2)	1
11	12927700A	Guide, Upper Label	1	27	12953800A	Stripper Bar	1
12	12892000A	Bearing, Printhead Roller	2	28	12952200A	Gear, Roller Drive	1
13	R0375800A	Snap Ring #4	3	29	R0375600A	Set Screw, M3 x 6	4
14	12953400A	Guide, Lower Label	1	30	12928000A	Gear, Motor	1
15	R0378800A	Screw, Plastic Head	1	31	12805100A	Belt, Main Drive	1
16	12802800A	Guide, Front Label	1	32	12805200A	Belt, Takeup Spool	1

Part numbers shown may have a letter prefix.

9. PROGRAM SWITCH SUMMARY. PROGRAM SWITCH SUMMARY

Protocol Select:

SW1-1 OFF Toledo Scale Mode
ON Host Mode

Expanded Print Size (Toledo Mode):

SW2-1 OFF 6 mm high (size 4)
ON 12 mm high (size 5)

Label Size:

SW1-2	SW1-3	Label Size
OFF	OFF	24.67 mm (1") high
ON	OFF	43.67 mm (1.7") high
OFF	ON	67.33 mm (2.7") high
ON	ON	99.67 mm (3.9") high

<RS> Character (Host Mode):

SW2-1 OFF Disable <RS> Character
ON Enable <RS> Character

Default Print Size:

SW1-4	SW1-5	Default Print Size
OFF	OFF	1.67 mm high (size 1)
ON	OFF	2.33 mm high (size 2)
OFF	ON	4.67 mm high (size 3)
ON	ON	6 mm high (size 4)

Preferred Line:

SW2-2	SW2-3	SW2-4	Preferred Line
OFF	OFF	OFF	First
ON	OFF	OFF	Second
OFF	ON	OFF	Third
ON	ON	OFF	Fourth
OFF	OFF	ON	Fifth
ON	OFF	ON	Sixth

Label Format:

SW1-6	SW1-7	SW1-8	Lines	Bar Code	Text
Lines					
OFF	OFF	OFF	0	6	
ON	OFF	OFF	1	5	
OFF	ON	OFF	2	4	
ON	ON	OFF	3	3	
OFF	OFF	ON	4	2	
ON	OFF	ON	5	1	
OFF	ON	ON	6	0	

Bar Code Format:

SW2-5	SW2-6	Bar Code Format
OFF	OFF	Code 39
ON	OFF	Code 2 of 5
OFF	ON	Code 39 Expanded
ON	ON	Code 2 of 5 Interleaved

Checksum:

SW2-7 OFF Disable Checksum
ON Enable Checksum

Baud Rate:

SW2-8 OFF 1200 Baud
ON 9600 Baud

10. INTERCONNECT DIAGRAM. INTERCONNECT DIAGRAM

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Industrial Products
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