301

Technical Manual

INTRODUCTION

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

Information regarding METTLER TOLEDO Technical Training may be obtained by writing to:

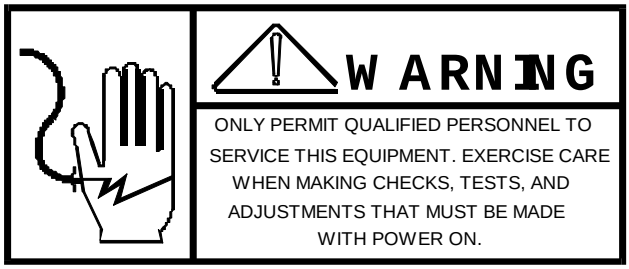
METTLER TOLEDO
Training Center
P.O. Box 1705
Columbus, Ohio 43216
(614) 438-4400

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.

CONTENTS

1. GENERAL DESCRIPTION

The 301 Printer is intended primarily for use with Toledo Retail Scales, such as Models 8203, 8403, 8404, and 8406 for direct selling applications. Secondary applications are with the Models 8183 and 8184 Parts Counters, and the 8132, 280, 2086, 2186, 2886, and 8135 Industrial Scales. The printer uses pressure sensitive labels of 3" or 4" lengths. Various print formats are available depending on the application.

FEATURES

-- Double Width Printing of Total Price for retail application

-- Wire Dot Matrix Print Head

-- Print fields of up to 5 weight, 5 unit price, and 5 total price, with 100g, 1kg, and 1,1/2 and 1/4 lb factor available

-- Selection for lb or kg units for weight

-- Selection of 7 currency symbols

-- Selection of Retail or Parts Counter legends

-- Supply capacity of at least 725 labels

-- Dimensions are 6" tall by 12" wide x 10.75" deep with ticket ejected horizontally. Printer appearance is suitable for retail counter applicatons of industrial applications

-- Unit meets U.L. and C.S.A. design criteria for case flammability, power input connections and fusing, grounding of all metal parts, etc.

-- Easy quick replacement of stock and print ribbon

-- Power input is from the scale for 8203, 8403, 8404, 8406, 8183 and 8184. Power input is from line cord on printer for 8132, 280, 2086,2186, 2886 and 8135.

-- 1/2 Total Price printing for U.K. with the 4 inch label

2. SYSTEM DESCRIPTION

2.1 OPERATING PRINCIPLE

The printer uses a 7 wire dot matrix print head which is fixed in position. One inch wide labels with pressure sensitive adhesive are moved past the print head. The seven wires are moved within guiding sleeves to impact an ink ribbon against the paper, forming characters in a 5 x 7 dot matrix arrangement. Character height is fixed at 0.1 inches.

Both numeric and alpha characters may be printed, and “double width” printing of the Total Price is provided for added emphasis.

The 301 Printer consists of six (6) major building blocks which follow:

1). Power Supply
2). Photodetector
3). Control PCB
4). Label Drive Motor
5). Ribbon Drive Motor
6). Printhead Assembly

The Power Supply develops all necessary AC voltages for operation of the motors, Control PCB and Printhead Assembly.

The Photodetector senses the gap between the labels and sends this information to the Control PCB.

The Control PCB has the functions as follows:

1). Process all incoming data from the scale.

2). Coordinate the ribbon and label drive motors witht the printhead assembly and photodetector for proper label printing and delivery.

3). Perform self-verification tests at the start of every print cycle.

2.2 PAPER AND RIBBON SUPPLY

Labels are replaced by removing the clear plastic cover and installing a fresh roll. No tools are needed. Three or four inch labels may be used. The label length is selectable by an internal program switch (SW2-4) and requires adjustment of the label detecting mechanism.

The paper supply uses die cut, preprinted labels. A minimum of 950 labels is available for the three inch label and a minimum of 725 is available for the four inch label.

The ink ribbon is a disposable cartridge, and is easily replaceable. Ribbon life is expected to be approximately 5 months at 1,000 labels a day.

3. SPECIFICATIONS

3.1 ELECTRICAL & PHYSICAL

3.1.1 ENVIRONMENT

The printer is operable from 10 degrees C to 50 degrees C at relative humidities from 30 to 95%. The Printer is **NOT** designed for “hose down” areas.

3.1.2 POWER INPUT

When used with 8203, 8403, 8404, 8406, 8183 or 8184, primary power is derived from the scale via the external connector. **(Note: The display switch on the 8404/8406 does NOT remove power from the 301 Printer.)** When used with the 280, 2086,2186, 2886, 8132 or 8135, a separate line cord is required. Power is 120, 220, or 240 volts, (15% + 10%) 50 or 60 hz. There is a separate ram for each voltage and frequency required. See Section 3.6.

3.1.3 UL AND CSA STANDARDS

Materials, components, and electrical design are intended to comply with U.L. & C.S.A. standards and requirements, including case flammability, power cord retention and grounding, grounding of all metal parts, fusing, etc.

3.1.4 APPEARANCE & DIMENSIONS

The appearance of the retail version is compatible with Models 8404 and 8406. The appearance of the industrial version is compatible with the Models 8183 and 8184. Base dimensions are 6” tall by 12” wide by 10.74” deep.

3.2 INTERNAL FUNCTIONS

3.2.1 PRINT INITIATION

Print is initiated from the scale keyboard for all Retail (8203, 8403, 8404, 8406), Parts Counters (8183 only), and Industrial Scales (8132, 280, 2086, 2186, 2886, and 8135). A print button is provided on the printer for those rams interfacing withthe Models 8183 and 8184.

3.2.2 AUTOMATIC PRINT

A program switch (SW1-9) is provided to select an “Automatic Printing” mode. In this mode, a label is printed whenever a “motion-no-motion” condition occurs, except when the weight is less than 10 increments. This will function with the 8404 and 8406 scales only (except 8404 Ram 12 and 8406 Ram 14). Printing may still be initiated at the scale keyboard.

3.2.3 LABEL POSITION DETECTOR

A photoelectric label edge detector in combination with the Controller logic controls the paper feed.

3.2.4 PRINT SPEED

Print speed permits delivery of a 3 inch label in approximately 2 seconds.

3.3 PRINT FORMATS

3.3.1 Retail with 3 inch preprinted tickets
Note that ticket space limits the Unit Price and Total Price to 5 positions (4 digits and decimal point).

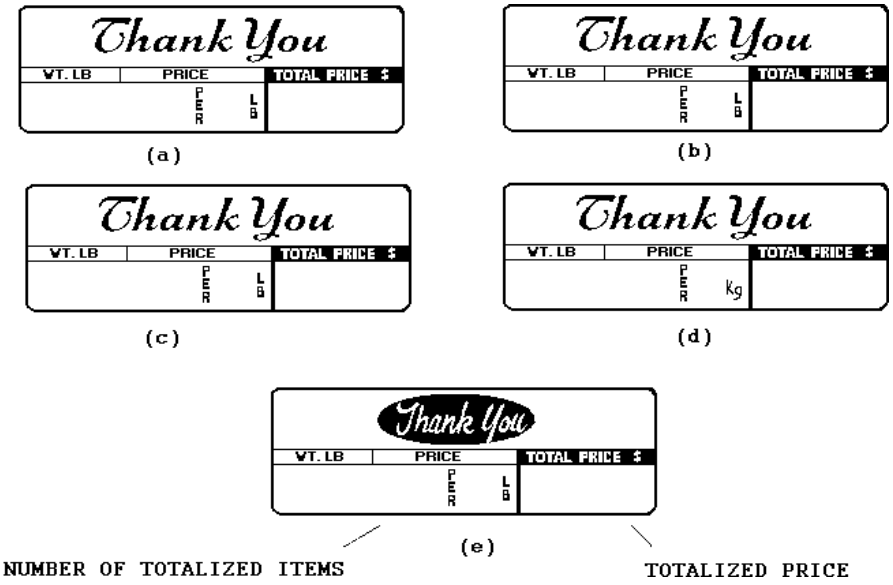


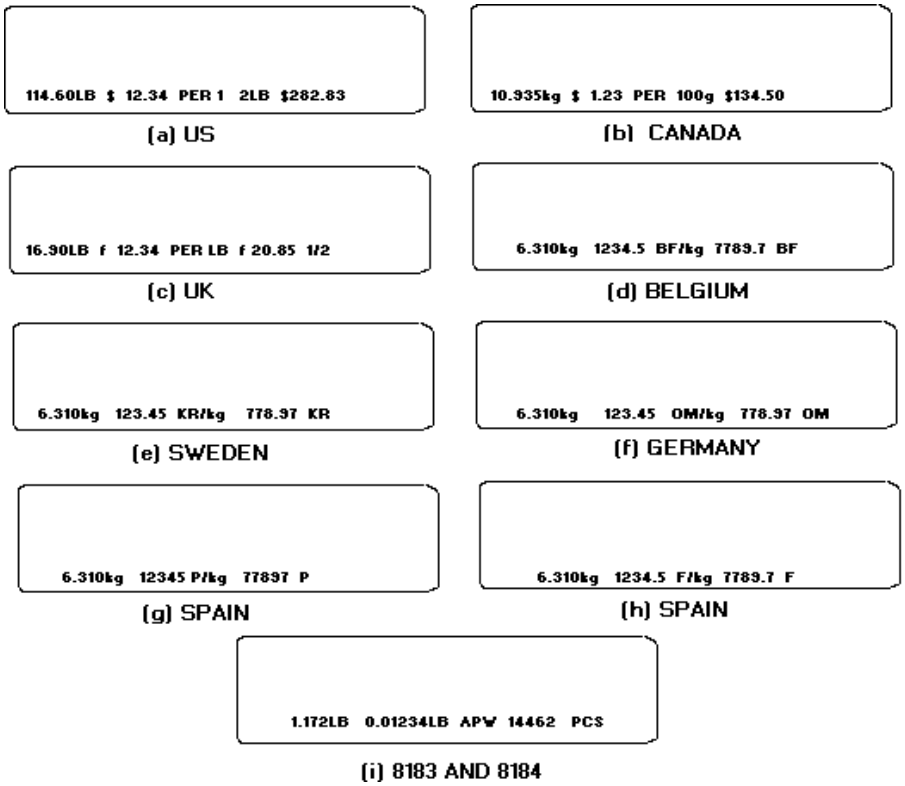
Figure 1 -
(a) and (b) are examples of U.S. tickets

(c) and (d) are examples of Canadian tickets

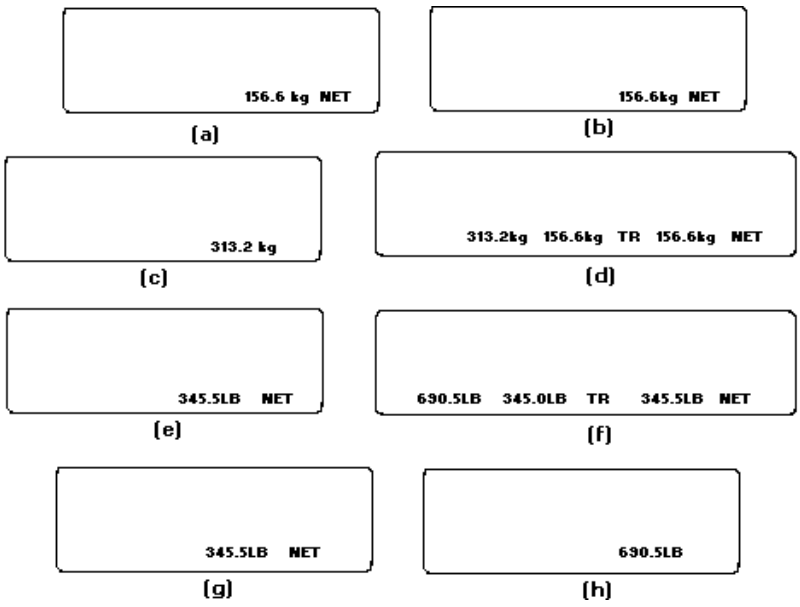
(e) is the totalized format

In the industrial version the Message format is determined by the device which transmits the data to the 301 Printer (8132, 280, 2086, 2186, and 8135). A maximum of 28 characters (a double width character is counted as 2 single) can be printed on the 3" label and a maximum of 39 on the 4".

3.3.2 Figure 2 illustrates the use of 4" non-preprinted tickets, witht legends printed by the printer. Note that printing is slightly more than 10 characters per inch, (5 for Total Price) so a maximum of 39 characters and spaces can be printed.



3.3.3 Figure 3 illustrates the use of the printer with Models 8132, 280, 2086, 2186, 2886, and 8135 with 3” and 4” labels. Examples a - d are metric and e - h are avoir.



3.3.4 Double Width Printing

In all apllications, the computed end result (Pieces, Total Price) is printed double width to highlight this item.

3.4 OPERATION VERIFICATION

3.4.1 VERIFICATION FEATURES

The printer verifies its internal circuitry at the beginning of every print cycle. Should an error be detected, a label will not be printed and an error code 9 will be output when the test button is pushed. The Bit Test is not done when the test button is pushed.

3.4.2 TEST SWITCH

A test switch is provided on the bottom of the printer to enable faster detection and pin-pointing of problems. When pushed it wil indicate what test, if any, has just failed accoring to the table below as exemplified by Figure 4.

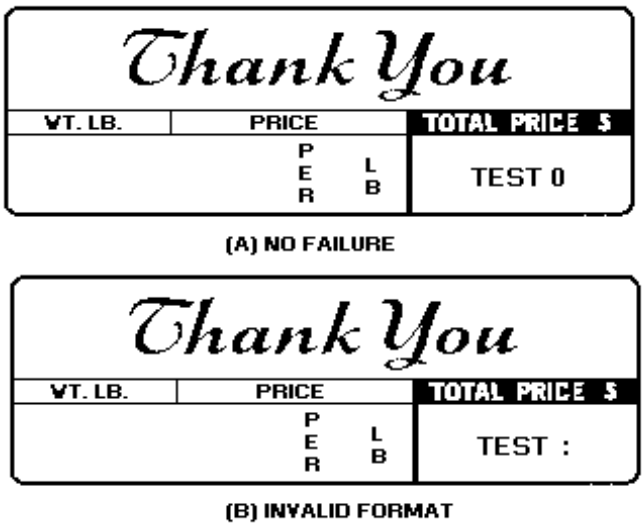


Figure 4

TEST FAILURE

0 No Problem

1 Serial start bit not verified (8404, 8406, 8132, 8135*)

2 Reset not verified as low (8203, 8403,8183, 8184)

Note: If a Test 2 should occur when setting up a 301 with an 8203 or 8403, check SW2-3 on the Calculator PCB. It must be in the OFF position or a Test 2 error will result.

3 Parity error (any data input)

4 Data not verified (8203, 8403, 8183, 8184)

5 Data received without STX (8132, 8135*, 8404, 8406)

7 Checksum Error (8132, 8135*, 8404, 8406)

9 Ram Error during Bit Test (any data input)

: Invalid Label format (8203, 8403,8404, 8406)

; Invalid Factor (8203, 8403, 8404, 8406)

= Full Buffer, no CR received (8132,8135*)

Invalid ASCII character received (8132, 8135*)

Note: Test 5 and Test 0 are normal for 8404 and 8406, all other codes indicate a failure. The test function is inconclusive with 8404 Ram 12 and 8406 Ram 14.

* - Also 280, 2086, 2186, 2886

3.5 DATA TRANSMISSION

3.5.1 PARALLEL INPUT (8203, 8403, 8183, 8184)

The data is Binary Coded Decimal (BCD) with parity and is retransmitted after each weight update, approximately five times per second.

3.5.2 SERIAL INPUT (280, 2086, 2186, 2886, 8132, AND 8135)

The 8132, 280, 2086, 2186, 2886 and 8135 Industrial instruments generate output data in ASCII code at 300 baud.

3.5.3 SERIAL INPUT (8404 AND 8406)

The 8404 and 8406 Retail scales generate output data in ASCII code at 4800 baud.

3.5.4 PRINT INTERLOCK

The print command is generated in the scale and is subject to various interlocks (motion, negative weight,etc.)

3.6 301 CONFIGURATIONS

RAM NUMBER	SCALE INTERFACE	POWER	POWER INPUT	DATA TYPE	PRINT BUTTON
0301-0001*	8203/8403 (SEE NOTE A)	120 VAC 60HZ	FROM SCALE	PARALLEL (BCD)	NO
0301-0002*	8404/8406	120VAC 60HZ	FROM SCALE	SERIAL (ASCII)	NO
0301-0003*	280/2086/2186 2886/8132/8135	120VAC 60HZ	LINE CORD	SERIAL (ASCII)	NO
0301-0004*	8183/8184	120VAC 60HZ	FROM SCALE	PARALLEL (BCD)	YES
0301-0101**	8203/8403 (SEE NOTE A)	220VAC 50HZ	FROM SCALE	PARALLEL (BCD)	NO
0301-0102**	8404/8406	220VAC 50HZ	FROM SCALE	SERIAL (ASCII)	NO
0301-0103**	280/2086/2186 2886/8132/8135	220VAC 50HZ	LINE CORD	SERIAL (ASCII)	NO
0301-0104**	8183/8184	220VAC 50HZ	FROM SCALE	PARALLEL (BCD)	YES
0301-0201**	8203/8403 (SEE NOTE A)	120VAC 50HZ	FROM SCALE	PARALLEL (BCD)	NO
0301-0202**	8404/8406	120VAC 50HZ	FROM SCALE	SERIAL (ASCII)	NO
0301-0203**	280/2086/2186 2886/8132/8135	120VAC 50HZ	LINE CORD	SERIAL (ASCII)	NO
0301-0204**	8183/8184	120VAC 50HZ	FROM SCALE	PARALLEL (BCD)	YES
0301-0301**	8203/8403 (SEE NOTE A)	240VAC 50HZ	FROM SCALE	PARALLEL (BCD)	NO
0301-0302**	8404/8406	240VAC 50HZ	FROM SCALE	SERIAL (ASCII)	NO
0301-0303**	280/2086/2186 2886/8132/8135	240VAC 50HZ	LINE CORD	SERIAL (ASCII)	NO
0301-0304**	8183/8184	240VAC 50HZ	FROM SCALE	PARALLEL (BCD)	YES
0301-0401**	8023/8403 (SEE NOTE A)	220VAC 60HZ	FROM SCALE	PARALLEL (BCD)	NO
0301-0402**	8404/8406	220VAC 60HZ	FROM SCALE	SERIAL (ASCII)	NO
0301-0403**	280/2086/2186 2886/8132/8135	220VAC 60HZ	LINE CORD	SERIAL (ASCII)	NO
0301-0404**	8183/8184	220VAC 60HZ	FROM SCALE	PARALLEL (BCD)	YES

***** **DOMESTIC CONFIGURATIONS**

****** **EXPORT OR SPECIAL ORDER CONFIGURATIONS**

NOTE A: **WHEN INTERFACING THE 301 PRINTER TO THE MODELS 8203 AND 8403, SWITCH SW2-3 ON THE CALCULATOR. PCB MUST BE OFF!**

4. PROGRAM SWITCH SUMMARY

SW1-1 Weight Decimal Point (ON = .XX OFF = .XXX)
SW1-2 LB or kg units (ON = LB)

SW1-3 Total Price or Pieces Decimal Point
SW1-4 Total Price or Pieces Decimal Point

D.P.	SW1-3	SW1-4
XXXXX	OFF	OFF
XXXX.X	ON	OFF
XXX.XX	OFF	ON
XX.XX1/2	ON	ON

SW1-5 Unit Price or Average Piece Weight Decimal Point
SW1-6 Unit Price or Average Piece Weight Decimal Point
SW1-7 Unit Price or Average Piece Weight Decimal Point

D.P.	SW1-5	SW1-6	SW1-7
XXXXX	OFF	OFF	OFF
XXXX.X	ON	OFF	OFF
XXX.XX	OFF	ON	OFF
UNUSED	ON	ON	OFF
X..X.XXX	OFF	OFF	ON
.XXXXX	ON	OFF	ON

SW1-8 50Hz or 6- Hz Line Voltage Operation (ON - 60 Hz)
SW1-9 automatic Printing Enable (ON to Enable)

SW2-1 Currency Select
SW2-2 Currency Select
SW2-3 Currency Select

CURRENCY	SW2-1	SW2-2	SW2-3
DM	OFF	OFF	OFF
KR	ON	OFF	OFF
BF	OFF	ON	OFF
F	ON	ON	OFF
P	OFF	OFF	ON
£	ON	OFF	ON
$	OFF	ON	ON
NOT USED	ON	ON	ON

SW2-4 3" OR 4" Labels (ON = 4)
SW2-5 Parallel or Serial Select
SW2-6 Checksum/No Checksum
SW2-7 Retail or Parts Mode
Sw2-8 300 or 4800 Baud
SW2-9 Serial Line Source External or Internal

MODEL	5	6	7	8	9
8132	OFF	*	OFF	ON	OFF
8135	OFF	*	OFF	ON	OFF
8183	ON	OFF	OFF	OFF	OFF
8184	ON	OFF	OFF	OFF	OFF
8203	ON	OFF	ON	OFF	OFF
8403	ON	OFF	ON	OFF	OFF
8404	OFF	ON	ON	OFF	ON
8406	OFF	ON	ON	OFF	ON
2086	OFF	*	OFF	ON	OFF
2186	OFF	*	OFF	ON	OFF
2886	OFF	*	OFF	ON	OFF
280	OFF	*	OFF	ON	OFF

NOTE A: WHEN INTERFACING THE 301 PRINTER TO THE MODELS 8203 AND 8403,SWITCH SW2-3 ON THE CALCULATOR PCB MUST BE OFF!

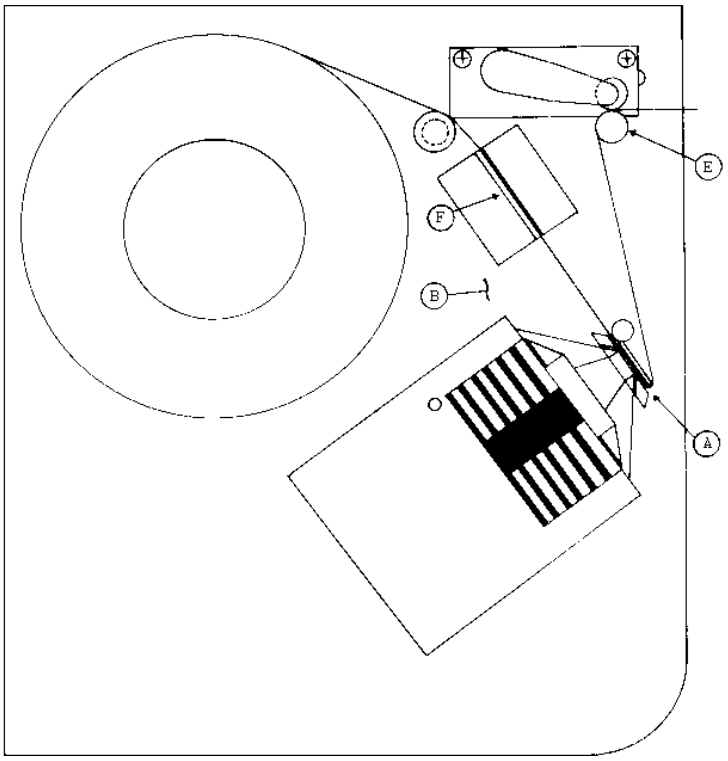
5. SERVICE KIT OF PARTS

The “First Man” kit of parts for the 301 printer consists of the following items:

QTY.	PART NUMBER	DESCRIPTION
1	P00570 020	Fuse, 3/10 A SB
1	107284 00A	Lamp, 28V
1	107307 00A	Photocell Assembly
2	107351 00A	Bumper Foot
1	107357 00A	Control PCB Assembly

6. PREVENTATIVE MAINTENANCE

(See Figure 6)



Daily (Customer) Maintenance

1). Keep the form sled (Item A) and surrounding area clean and free of paper dust, and ink.

2). Brush away accumulated paper dust from the main plate cover (Item B).

Periodic (Service Call) Maintenance

1). Clean any accumulated adhesive build-up from the drive rollers (Item E).

2). Check that printed data is printed inside the assigned field.

3). Be certain that paper dust does not cause any drag on the labels through the notch detector opening (Item F).

4). Replace the lamp in the storage/suppression unit on an annual basis.

5). Clean any ink build-up from the opening for the print needles.

7. PARTS REPLACEMENT PROCEDURES

In the event that defective parts have been replaced on the printer,the following adjustments may be necessary.

7.1 PLATEN AND FORM SLED POSITION ADJUSTMENT

(See Figure 6)

The clearance betwen the Form Sled (B) and the Platen (A) should be .010. To adjust, loosen screws D & C, insert a .010 feeler guage between the form sled and platen and move the form sled against the platen maintaining parallelism. Retighten screw C. (Caution: **DO NOT OVERTIGHTEN**!) Retighten screw D.

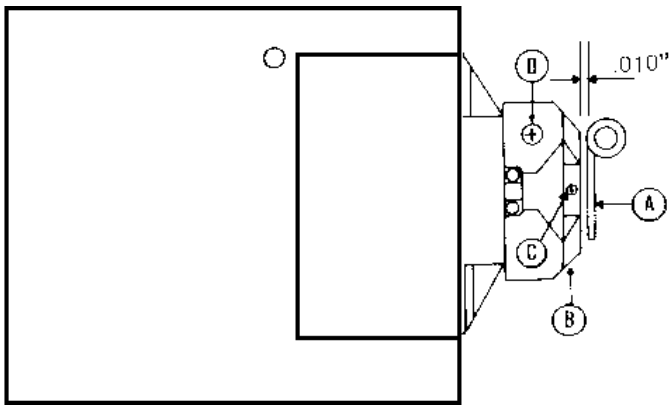


Figure 6

7.2 PHOTODETECTOR POSITION ADJUSTMENT

1). 3 Inch Label - Figure 7
Adjust the photocell bracket so that the distance from the centerline of the printhead needles to the centerline of the photodetector is 3-1/16 +/- 1/64 inches. Note the mounting position of the photocell bracket (leftmost hole).

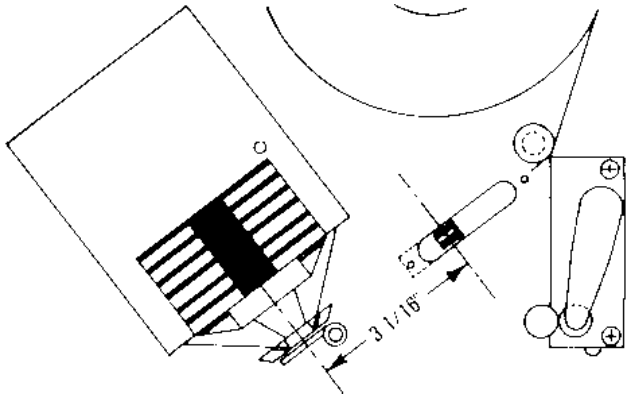


Figure 7

2). 4 Inch Label - Figure 8
Adjust the photocell bracket so that the distance fromthe centerline of the printhead needles sto the centerline of the photodetector is 4-1/16 +/- 1/64 inches. Note the mounting position of the photocell bracket (rightmost hole).

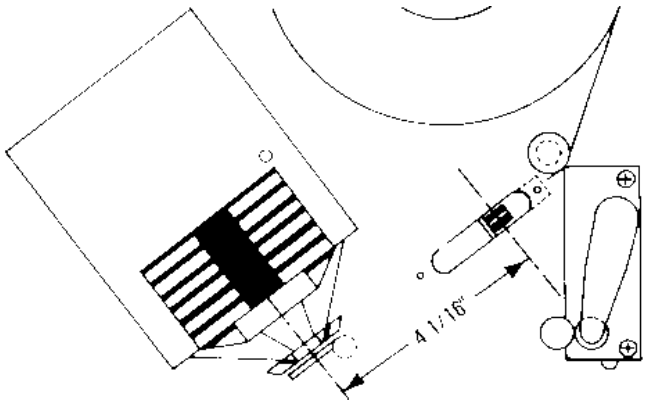
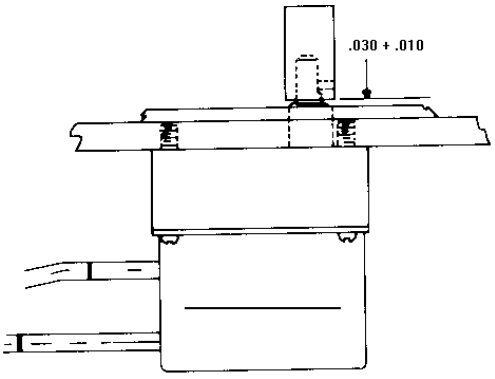


Figure 8

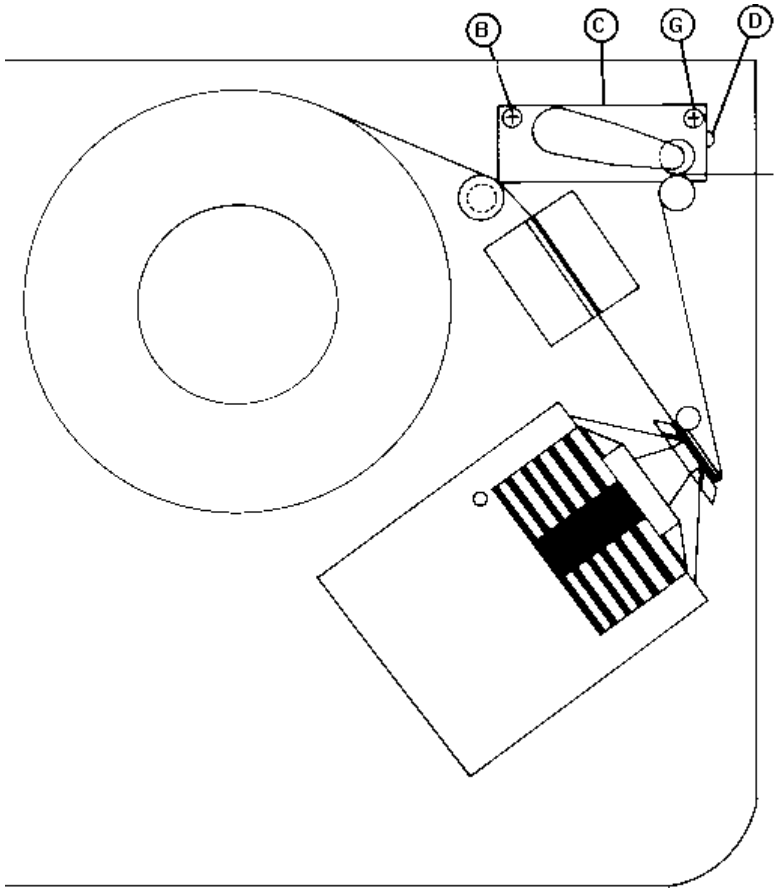
7.3 DRIVE/RELEASE ASSEMBLY ADJUSTMENT

1). The gap between the drive gear and the drive motor bushing should be .030" +/- .010. See Figure 9.

2). In order to adjust for data being printed out of its assigned field, loosen the two phillips-head screws (Item G), and adjust the mesh of the drive gears (Item C) for proper printing. A screwdriver slot (Item D) is provided for ease of adjustment. See Figure 9.



Note: Should this adjustment be unable to bring the data into its proper position, the bottom cover must be removed. This will allow access to the notch detector photocell. With slight adjustment of this photocell, and the above-mentioned adjustment, the data should be printed correctly. See Figure 10.



3). Main Cover Removal

In order to remove the bottom cover for parts replacement, only the three Phillips head screws must be removed. The plastic slotted screw does not affect attachment. (See Figure 10)

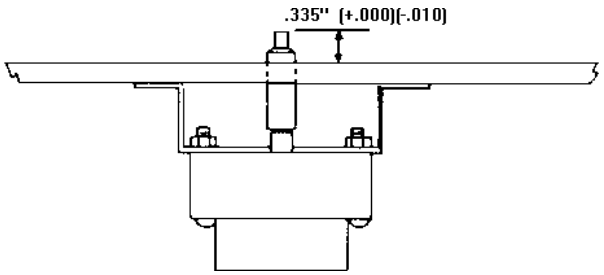
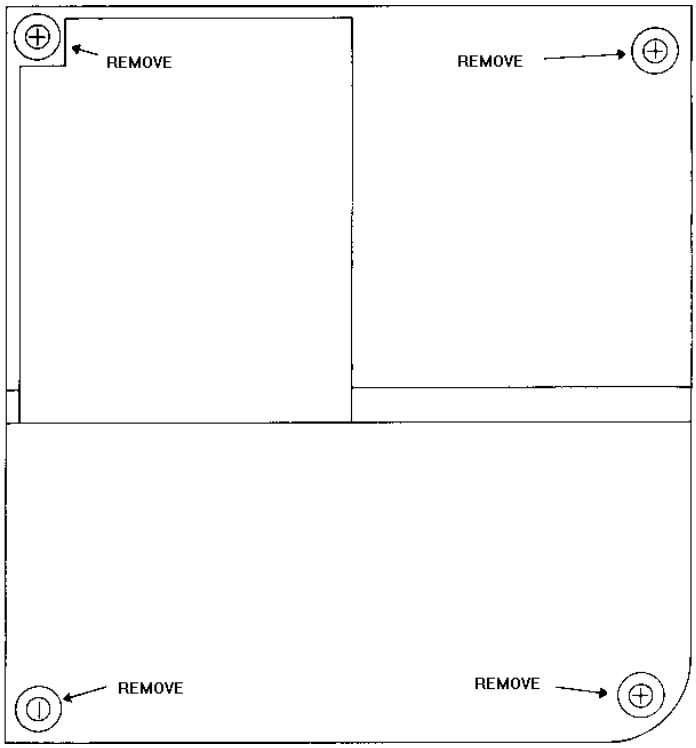


Figure 10

7.4 MISCELLANEOUS ADJUSTMENTS



1). **The lamp in the suppression/storage assembly must not touch the printer case or any wires.**

2). The tip of the ribbon drive shaft should be adjusted to a height of 0.335" (+.000) (-.010) above the top surface of the main plate. (See Figure 11) Further, the drive shaft must not touch the main plate or cover during any portion of its rotation.