ITHACA 9000
Maintenance Manual

TRANSACT
Technologies Incorporated

P/N 28-28503
REV H

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Change History:

Revision	Description of Change	Date	ECR
A	Init Rel	3/12 SAS	R37065
B	Page 128 & 129: Updated Views and BOM, added 28-13503 and 98-02215	5/12/14	R37106
C	Page 124 &125: Updated Views and BOM with new spring holder and new springs.	3/6/15	R37134
D	Page 118: 28-15479 replaces 28-10438	2/15/2017	R37170
E	Page 122: 28-15975 replaces 28-10405	7/14/2017	R37181
F	Page 129: 28-16111 Replaces 28-09850	2/6/18	R37190
G	Pages 128-129: added screw 98-14337; 98-0611 qty 2 was 3	10/31	R37196
H	Page 127: 98-17034 replaces 28-10782 Page 128-129: 28-17155 replaces 28-10748, 28-17436 replaces 28-10749 (1 place only)	6/19	R37310 & R37311

Federal Communications Commission Radio Frequency Interference Statement

The ITHACA 9000 Printer complies with the limits for a Class A computing device in accordance with the specifications in Part 15 of FCC rules. These regulations are designed to minimize radio frequency interference during installation; however, there is no guarantee that radio or television interference will not occur during any particular installation. Interference can be determined by turning the equipment off and on while the radio or television is on. If the printer causes interference to radio or television reception, try to correct the interference by one or more of the following measures:

1. Reorient the radio or television receiving antenna
2. Relocate the printer with respect to the receiver
3. Plug the printer and receiver into different circuits

If necessary, the user should consult their dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission helpful: *How to Identify and Resolve Radio/TV Interference Problems*. This booklet is available from the US Government Printing Office, Washington, DC 20402. Ask for stock number 004-000-00345-4.

Canadian Department of Communications Radio Interference Statement

The ITHACA 9000 Printer does not exceed Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Regulatory Compliance

FCC Class A
ULc
CE Mark
UL 1950
TUV

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Table of Contents

Figures

Tables

Chapter 1

Introducing your ITHACA 9000 Printer

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Who Should Read This Guide?

This document provides information and specifications for trained service technicians who will perform service and maintenance for ITHACA 9000 printers.

What Is Included in This Guide?

This Maintenance Manual includes information on the features and maintenance information for the ITHACA 9000 printer. It provides the following information to support your maintenance and implementation efforts:

- Warranty and technical support information.
- Specifications and functionality description.
- A Theory of Operations section describing major components and interfaces.
- Assembly and disassembly instructions
- Parts lists and ordering information

Key areas of this manual are as follows:

Chapter	Page	Description
Chapter 1. Introducing your ITHACA 9000 Printer	1	This chapter provides an overview of your printer, as well as technical support, sales and repair information.
Chapter 2. ITHACA 9000 Specifications and Requirements	9	This chapter provides the specifications for the ITHACA 9000's installation and proper usage. Topics include interface requirements, operating conditions, power requirements and print characteristics.
Chapter 3. Installation and Setup Procedures	29	This chapter provides a five-step process that shows how to set up for the ITHACA 9000 the first time. It also lists step-by-step instructions for installing Windows and OPOS print drivers, and covers the more specific installation procedures that fall beyond the scope of the basic printer setup.
Chapter 4. **Error! Reference source not found.**	41	This chapter includes information on the ITHACA 9000 buttons and indicator lights, and explains fault indicators. It also explains how the printer enters startup initialization and also provides information on firmware testing, boot loader mode, extended diagnostics and printer self-test mode.
Chapter 5. **Error! Reference source not found.**	51	This chapter gives a basic overview of configuration mode, and explains how to use configuration mode to approach troubleshooting and setup issues. It also explains configuration mode, and shows how the New Cartridge Button is used to change and save settings.
Chapter 6. **Error! Reference source not found.**	59	This chapter discusses printer sensors and LED status conditions.
Chapter 7. **Error! Reference source not found.**	65	This chapter contains pin definitions for communications interfaces and a printer block diagram.
Chapter 8. **Error! Reference source not found.**	71	This chapter gives specific explanations of electrical and mechanical printer operations.
Chapter 9. **Error! Reference source not found.**	**Error! Bookmark not defined.**	This chapter lists the proper procedures for disassembling the printer and includes drawings and step-by-step instructions.

We want you to have a trouble-free implementation with your Ithaca printer. For any issues not covered in this guide, quality technical support is available on-line at **www.transact-tech.com**, or by telephone at (607) 257-8901 or (877) 7ithaca – consult the following pages for more details about our support services.

Warranty Options

All ITHACA 9000 printers come with a standard 24-month standard warranty covering both parts and labor that starts upon shipment from the factory. An optional extended warranty, covering both parts and labor for an additional 12 months, may be purchased separately. For more information concerning the warranty options, please contact the Sales Department at TransAct's Ithaca facility. You are responsible for insuring any product returned for service, and you assume the risk of loss during shipment to Ithaca. C.O.D. packages are not accepted. Warranty repairs are subject to the terms and conditions as stated on the Ithaca warranty policy.

Technical and Sales Support

Your Ithaca printer is backed by the resources of TransAct Technologies, a global technology firm with dedicated technical support and sales assistance. Here is how we can help you:

On-line Technical Support

Our web site at **www.transact-tech.com** is your on-line portal to obtaining technical assistance with your Ithaca printer. Click on Ithaca link and then the Technical Support link to find documentation for your *ITHACA 9000* printer, including a Programmer's Guide intended for system engineers or integrators. This guide features:

- Command codes and descriptions.
- Character fonts.
- Printer features.
- Communication specifics.

Other utilities available include a font utility, a color converter and a terminal application for communicating with your printer, as well as the following drivers and utilities:

Windows 95/98/Me Print Driver with Documentation	Part No. 100-9167
Windows NT 4.0 2K and XP Print Driver with Documentation	Part No. 100-9170
OPOS Drivers with Documentation	Part No. 100-9732
Master Character Set Definitions	Part No. 100-9785

Our on-line support site also includes a convenient e-mail assistance request form, where you can submit support requests 24 hours a day, and receive a return contact from a TransAct support technician during regular business hours.

Telephone Technical Support

Live telephone support is available Monday through Friday from 8 AM to 5 PM Eastern US time, excluding holidays. We can provide general information about programming for your Ithaca ITHACA 9000 printer, technical support, documentation, or assistance in sending a printer for service. To obtain telephone support, call TransAct's Ithaca Facility at (607) 257-8901 and ask for Technical Support. To help us serve you faster, please have the following information ready when you call:

- The Model Number and Serial Number of the printer.
- A list of any other peripheral devices attached to the same port as the printer.
- What application software, operating system, and network (if any) you are using.

- What happened and what you were doing when the problem occurred.
- How you tried to solve the problem.

Return Materials Authorization and Return Policies

If the technical support person determines that the printer should be serviced at our facility, and you want to return the printer for repair, we will issue you the Returned Materials Authorization (RMA) number that is required before returning the printer. Repairs are warranted for 90 days from the date of repair or for the balance of the original warranty period, whichever is greater. Please prepare the printer being returned for repair as follows:

- Pack the printer to be returned in the original packing material.
- Packing material may be purchased from TransAct's Ithaca Facility.
- Do not return any accessories unless asked to do so by a support technician.
- Write the RMA number clearly on the outside of the box.

Service Programs

TransAct Technologies Incorporated has a full-service organization to meet your printer service and repair requirements. If your printer needs service, please contact your service provider first. If any problems still persist, you can directly contact the Ithaca facility's Technical Support Department at (607) 257-8901 or (877) 7ithaca for a return authorization. International customers should contact your distributor for services. TransAct offers the following service programs to meet your needs.

- Extended warranty.
- Depot repair.
- Maintenance contract.
- Internet support.

Sales Support

To order supplies, receive information about other Ithaca products, or obtain information about your warranty, contact our Sales Department at the contact telephone or fax numbers listed below. To receive information on International distribution, visit our web site at **www.transact-tech.com**.

Contact Information

TransAct Technologies Incorporated
Ithaca Facility
20 Bomax Drive
Ithaca, NY 14850 USA

TransAct Technologies
World Gaming Headquarters
& Western Regional Repair Center
6700 Paradise Road
Suite D
Las Vegas, NV 89119 USA

Telephone	(877) 7ithaca or (607) 257-8901
Main fax	(607) 257-8922
Sales fax	(607) 257-3868
Technical Support fax	(607) 257-3911
Web site	**www.transact-tech.com**

Western United States: 877.822.8923, Fax: 702.254.7796
United Kingdom: 011-44-170-977-2500, Fax: 011-44-170-977-2505

Chapter 2

ITHACA 9000 Specifications and Requirements

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ITHACA 9000 Specifications and Requirements

Standard Features

The following features are common to the entire family of thermal printers:

- 12.0 inches per second print speed for text (monochrome)
- 10.0 inches per second paper feed speed
- 3.15 inch (80 mm.) print zone
- 44/57 characters per line for 80 mm paper
- Built-in self-ranging external power supply
- Clam-shell paper loading
- Single RJ11 cash drawer driver with status (Single RJ12)
- Parallel (25 or 36 pin), serial (9 or 25 pin) RS232C, USB or Ethernet interface
- Configurable receiver buffer
- Self diagnostics
- Set up and configuration utility program
- CPI selections from 8 to 30 CPI[1]
- Paper Out sensor
- Multiple printer emulations: Ithaca M80/M80+, Ithaca M50/M151 Micro-line, Epson Extended, Epson TM-T88II/III, TM-T90, U200, U300, Axiohm A793/4/5, Citizen and Star
- Maximum 8K buffer (adjustable)
- 2 Megabytes Flash Memory
- 2 Megabytes RAM
- APA and Epson graphics
- Bar Codes: Code 39, Code 93, Code 128, Interleaved 2 of 5, UPC-A, UPC-E, EAN-8, EAN-13, EAN-14, PDF417 stacked symbology and Codabar
- 65 Language sets (including Euro symbol)
- Metal receipt tear off
- 8 dots/mm. thermal print head resolution
- ON/OFF button located on front of printer
- Cable routing strain relief
- Power/Error/Paper LEDs
- Paper feed button
- Cover open button
- Settable cash drawer configurations (Ithaca, Epson, or Star)
- Spill proof design – vertical main PCB mounting

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[1] Character spacing is adjustable from 1 to 30 CPI. Typical values will be between 8 and 20 CPI depending on the font selected. Values of 13.3, 14.86, or 17.3 are typical for each resident font.
[2] CPI's greater than 16 will not be supported in NLQ fonts

- 4.0-inch (101 mm.) paper roll diameter
- Portrait/landscape printing under Windows
- Page mode printing
- Cover Open sensor
- Electronic journal capability
- Internal counters for hours on, cuts, print lines and errors
- 100 km print head life
- 60 million print line printer MCBF (excluding knife)
- Strong break-away paper cover
- >1,000,000 cuts cutter life (partial cut)
- Buzzer

Optional Features

The following options are available on some of the models:

- Custom interfaces and emulations
- DC powered version through Hosiden type connector

General Specifications

Printing Specifications

Printing method:	Thermal sensitive line dot system
Vertical/Horizontal dot pitch:	0.125 mm
Resolution:	8 dots per mm (203 DPI)
Line feed pitch:	3.2 mm (.125 inches)
Print zone (maximum)	80 mm (3.15 inch)
Print speed:	6 inches per second
Paper advance speed:	6 inches per second
Number of print elements:	640 dots in-line

Character Pitch

The ITHACA 9000 has 3 basic resident fonts, as well as downloadable fonts. The smallest internal font is a 10 x 24 font and is typically printed in pitches from 16 to 20 characters per inch (CPI). The next larger font is 13 x 24 and is typically printed in pitches from 14 to 16 CPI. The largest font is 15 x 24 and is typically printed in pitches from 10 to 14 CPI.
The printer always prints at 203 dots per inch (dpi). Adding or subtracting space between characters achieves different character pitches. As each dot has a fixed size and position, only specific pitches are possible. The following table defines the fonts and pitches possible with each.

Character Cell (H x W)	10 x 24 Font (W x H)	13 x 24 Font (W x H)	15 x 24 Font (W x H)
Horizontal Width	10 Dots 0.0493 inches	13 Dots 0.0640 inches	15 Dots 0.0739 inches
Vertical Height	24 Dots 0.118 Inches	24 Dots 0.118 Inches	24 Dots 0.118 Inches
	Character spacing in Characters per Inch (CPI)		
Pitch at native cell size	20.30	15.62	13.5
5 dot Removed	40.60	25.38	20.30
4 dot Removed	33.83	22.56	18.45
3 dot Removed	29.00	20.30	16.92
2 dot Removed	25.38	18.45	15.62
1 dot Removed	22.56	16.92	14.50
0 dot added	20.30	15.62	13.53
1 dot added	18.45	14.50	12.69
2 dots added	16.92	13.53	11.94
3 dots added	15.62	12.69	11.28
4 dots added	14.50	11.94	10.68
5 dots added	13.53	11.28	10.15
6 dots added	12.69	10.68	9.67

NOTE: Shaded Pitches are not recommended.

Table 1 Possible Character Pitches

Requested CPI	Character Width	Resulting CPI	Requested CPI	Character Width	Resulting CPI
1	203	1.00	16	12	16.92
2	101	2.01	17	12	18.45
3	67	3.03	18	11	18.45
4	50	4.06	19	10	20.30
5	40	5.08	20	10	20.30
6	33	6.15	21	9	22.56
7	29	7.00	22	9	22.56
8	25	8.12	23	8	25.38
9	22	9.23	24	8	25.38
10	20	10.15	25	8	25.38
11	18	11.28	26	7	29.00
12	16	12.69	27	7	29.00
13	15	13.53	28	7	29.00
14	14	14.50	29	7	29.00
15	13	15.62	30	6	33.83

NOTE: Shaded Pitches are not recommended.

Table 2 Requested CPI and Resulting CPI

Character Generation

Standard Print

There are three resident fonts in the printer: Small, Medium, and Large. The cell size for each is different.

Requested CPI	Character Width	Resulting CPI	Requested CPI	Character Width	Resulting CPI
1	203	1.00	16	12	16.92
2	101	2.01	17	12	18.45
3	67	3.03	18	11	18.45
4	50	4.06	19	10	20.30
5	40	5.08	20	10	20.30
6	33	6.15	21	9	22.56
7	29	7.00	22	9	22.56
8	25	8.12	23	8	25.38
9	22	9.23	24	8	25.38
10	20	10.15	25	8	25.38
11	18	11.28	26	7	29.00
12	16	12.69	27	7	29.00
13	15	13.53	28	7	29.00
14	14	14.50	29	7	29.00
15	13	15.62	30	6	33.83

NOTE: Shaded Pitches are not recommended.

Table 3 Cell Size for Small, Medium and Large Fonts

Small 10 x 24 Font

The 10 x 24 small font is defined in a 10 x 24 cell. The characters are typically 22 dots high and 8 dots wide; however to provide readable international characters, some characters are wider. In most cases this font can be printed at 22.5 CPI without having the characters touch. This font is recommended for printing from 16 to 20 CPI.

```
.
01    ...00.....
02    ..0000....
03    ..0000....
04    .00..00...
05    .00..00...
06    .00..00...
07    .00..00...
08    .00..00...
09    00....00..
10    00....00..
11    00....00..
12    00....00..
13    00....00..
14    00000000..
15    00000000..
16    00....00..
17    00....00..
18    00....00..
19    00....00..
20    00....00..
21    00....00..
22    00....00..
23    ..........
24    ..........
```

Medium 13 x 24 Font

The 13 x 24 medium font is defined in a 13 x 24 cell. The characters are typically 22 dots high and 11 dots wide; however, to provide readable international characters, some characters are wider. In most cases this font can be printed at 16.9 CPI without having the characters touch. This font is recommended for printing from 14 to 16 CPI.

```
01    ....000......
02    ....000......
03    ....000......
04    ...00.00.....
05    ...00.00.....
06    ...00.00.....
07    ...00.00.....
08    ..00...00....
09    ..00...00....
10    ..00...00....
11    ..00...00....
12    .00.....00...
13    .00.....00...
14    .00.....00...
15    .000000000...
16    .000000000...
17    00.......00..
18    00.......00..
19    00.......00..
20    00.......00..
21    00.......00..
22    00.......00..
23    ............
24    ............
```

Large 15x 24 Font

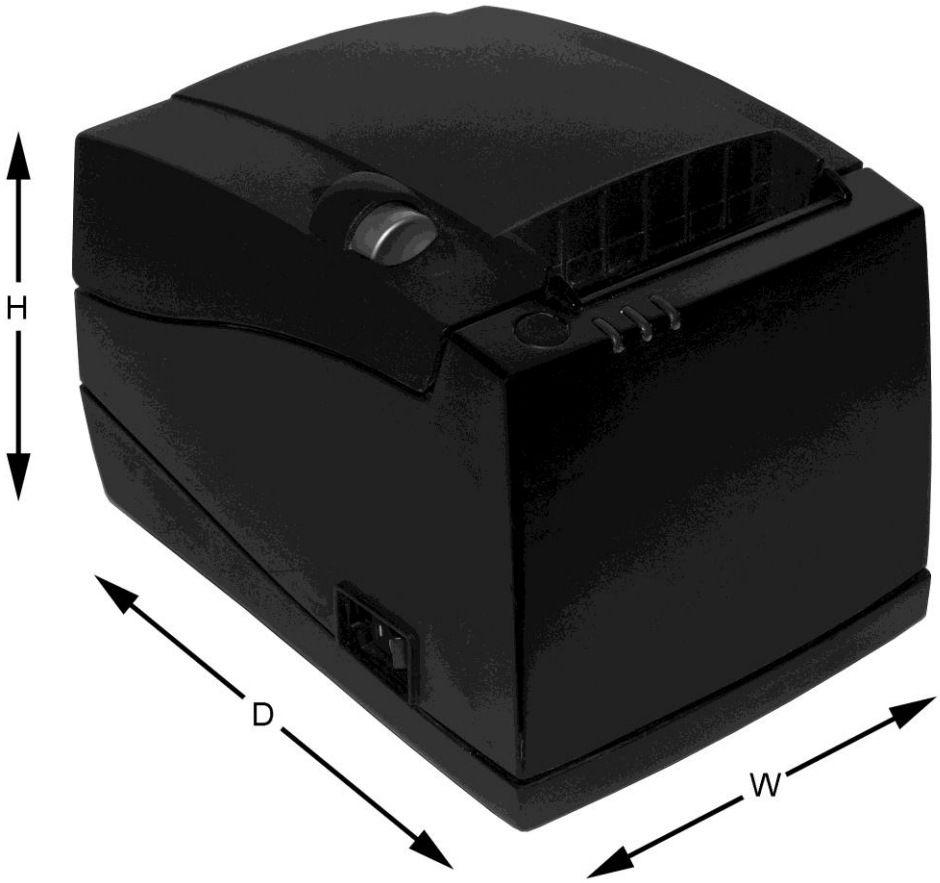
The 15 x 24 medium font is defined in a 15 x 24 cell. The characters are typically 22 dots high and 14 dots wide; however, to provide readable international characters, some characters are wider. In most cases this font can be printed at 13.5 CPI without having the characters touch. This font is recommended for printing from 10 to 14 CPI. This font is only available in the Ithaca emulation, and provides a bigger and darker character for better readability.

```
01    .....0000......
02    ....000000.....
03    ....000000.....
04    ...000..000....
05    ...000..000....
06    ...000..000....
07    ...000..000....
08    ..000....000...
09    ..000....000...
10    ..000....000...
11    ..000....000...
12    .000......000..
13    .000......000..
14    .000......000..
15    .000000000000..
16    .000000000000..
17    000........000.
18    000........000.
19    000........000.
20    000........000.
21    000........000.
22    000........000.
23    ..............
24    ..............
```

Rotated Print

To provide printing flexibility, rotated print is available. Rotated print mode will rotate the print in any of three 90° orientations. The individual characters can be rotated, or a printer buffered mode is available. In printer buffered 90° and 270° rotated mode, the print data is first buffered by the printer, processed (rotated), and then printed.

Physical Characteristics



Dimensions

Max Dimensions			
	W	D	H
Dimensions in inches	6.25	8.59	6.00

Weight

Approximate weight: 4.6 lb.
Shipping weight: 6.0 lb.

Electrical Characteristics

Internal AC Powered

The ITHACA 9000 Printer is designed to be AC self-powered in domestic and international markets. The printer is equipped with a universal input power supply that is designed to operate worldwide without modification.

Supply Voltage Rating (VAC)	Supply Voltage Range (VAC)	Frequency (Hz)	Rated Power (watts)	Standby power DC power switch OFF (Watts)	Printing Current (amps) Maximum
100-240	90-264	47 - 63	60 W	Less than 1 W	1.5A 120-240 VAC

Table 4 Standard Power Input Requirements

External Powered DC

Optionally, the ITHACA 9000 Printer can be operated with 24-volt DC power supplied from a host terminal or external supply. Connection to this printer version is made via a three-pin Hosiden type connector.

Supply Voltage Rating (VDC)	Supply Voltage Range (VDC)	Frequency (Hz)	Non-printing DC power Switch ON	Load Current (amps)
24 + 10%	21.6-26.4	DC	0.125 A	0 A min 3.125 A continuous printing - maximum 2.5 A continuous – printing typical 2.0 A peak ^{2} (Cash Drawer Fire) 4.0 A 1-minute continuous short term printing 12.5 A peak load for .16ms , .5ms period

Table 5 Power Input Requirements with the 24-volt DC Power

The ITHACA 9000 *c*an be configured to operate with various power supplies. If a DC power supply with less capability is used, the printer must be configured for reduced power, and the printer will print at a slower speed.

Thermal Print Head

Thermal Print Head Overview:

Number of heat elements:	640
Heat element pitch:	0.125 mm (8 dots/mm.)
Print width:	80 mm. +/- 0.2 mm.
Pulse Life:	100 million pulses
Abrasion Life:	100 km.
Vertical dot pitch	0.264 mm (0.0104 inch) or 96 DPI
Operating Temperature	5-45 degrees C
Humidity:	10-90 % RH (non-condensing)

Operation Precautions:

- Do not print without paper.
- Clean the head with ethyl alcohol after power is removed from the printer. This will remove foreign particles or paper dust which may degrade print quality.

Media Specifications

Receipt Paper

Paper feed method	Friction feed
Paper feed pitch	Default - 1/8 inch
Paper width	80 mm: 79.5 +/- 0.5 mm. (3.13 +/- 0.02 inches)
Roll diameter	101.6 mm. (4.0 inches) Max.
Paper thickness	0.06 to 0.09 mm. (.00225 to .0035 inches)
Roll paper core	Inside diameter .445 to .635 inches Outside diameter .730 to .860 inches

Thermal Paper Grades

The ITHACA 9000 printer is specially designed to print on one of two specific types of thermal adhesive label stock, with either one or three adhesive zones per label. For paper specifications and ordering information, contact your TransAct sales representative.

Paper Usage Precautions:

- Use only specified thermal paper. If other paper is used, print quality, head life, and cutter life may deteriorate.

Paper Out

A receipt paper out sensor is provided as a standard feature. It senses when there is approximately .5 inches length of paper left on the paper roll.

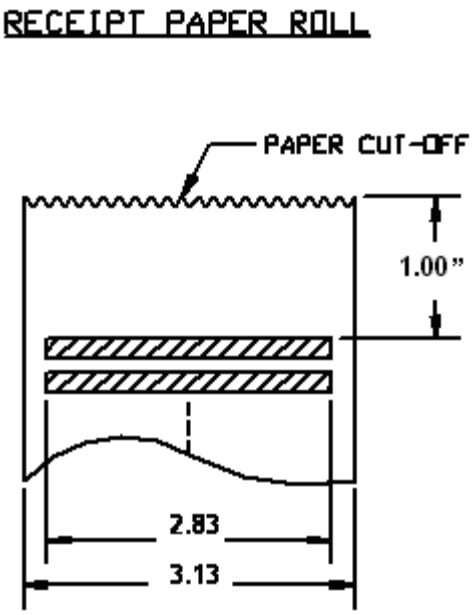


Figure 1 Receipt Printing, Tear off Position

The paper tear off is positioned 1 inch from the last line of print

Receipt Printing, Auto Cutter Position

A receipt auto-cutter is a standard feature with all Ithaca 8000™ Printers.

Cutter type	Rotary
Media width	3.13 +/- .02 inches (79.5 +/- .5 mm)
Media thickness range	0.0025 to 0.0035 inch
Cut to line of print	0.70 inch
Cutter life	1,000,000 cuts
Partial Cut tab:	.125 inches +/- .0625 inches (right edge of receipt)
Cut time:	Less than 350 milliseconds

Buzzer

A buzzer is provided as a standard feature. It is triggered upon command from the host terminal to make a sound loud enough to be heard under noisy conditions. It will produce a sound pressure level of at least 90 dBA at a distance of one foot from the front of the printer.

Cover Interlock

A paper cover interlock switch is provided as a standard feature. When the paper cover is open, the printer is off-line, and will not print.

Display Pass Through

The display pass through feature allows a pole display to be interconnected with the printer. The printer is connected to a host system with a special serial cable. The host sends serial data to the printer and the printer sends serial data to the pole display. The printer does not provide power to the display. During normal printer operation, no data is passed to the display. In pass through mode, all received data is passed on to the display.

Communications Interface

Parallel Interface

Your printer features two parallel interfaces:

- An IEEE 1284-A 25-pin, D-shell connector, with pin-outs that interface to a standard IBM PC parallel printer interface with a one-to-one cable.
- An IEEE 1284-B, which is a standard Centronics 36-pin connector.

Both interface cards provide a dual cash drawer interface. The following table lists interface signals and corresponding pins.

25-pin Connector	36-pin Connector	Signal	Description	Direction
Pin 1	Pin 1	STROBE	Clock data to printer	Host to Printer
Pins 2-9	Pins 2-9	D0 - D7	Data	Host to Printer
Pin 10	Pin 10	ACK\	Printer accepted data	Printer to Host
Pin 11	Pin 11	BUSY	Printer busy	Printer to Host
Pin 12	Pin 12	PE	Paper Out/Status	Printer to Host
Pin 13	Pin 13	SLCT	Printer selected	Printer to Host
Pin 14	Pin 14	AUTOFD	Auto-feed paper	Host to Printer
Pin 15	Pin 32	FAULT\	Printer error	Printer to Host
Pin 16	Pin 31	INIT\	Initialize printer	Host to Printer
Pin 17	Pin 36	SLIN	Select printer	Host to Printer
	Pin 17	FG	Frame ground	Printer to Host
-	Pin 18	+5V	Peripheral logic high	Printer to Host
Pins 18-25	Pins 16, 19-30	GND	Ground	

Table 6 Parallel Interface Pin-outs

Signal Levels

Voltage levels — 0 V and +5 V (nominal)

- Logic levels
- Logic one
  - Driver: +2.4 V to +5 V
  - Receiver: +2.0 V to +5 V
- Logic zero
  - Driver: 0 V to +0.4 V
  - Receiver: 0 V to +0.8 V

Current requirements

- Logic one: Source — 0.25 ma at +2.4 V
- Logic zero: Sink 16 ma

Line termination

- Data and control: 3.3k ohm to +5 V
- Strobe: 1.2k ohm to +5 V

RS-232 Serial Interface

Serial Port Features

The serial port features are as follows:

Baud Rates	300, 600, 1200, 2400, 4800, 9600, 19.2K, 38.4K, and 57.6K
Bit Patterns	8-bit no parity; 8-bit odd; 8-bit even; 7-bit no parity; 7-bit odd; 7-bit even
Flow Control	DTR and XON/XOFF

9-pin	25-pin	Signal	Description
Pin 1	Pin 8		Not Connected
Pin 2	Pin 3	RX	Receive Data
Pin 3	Pin 2	TX	Transmit Data
Pin 4	Pin 20	DTR	Data Terminal Ready
Pin 5	Pin 7	GND	Signal Ground
Pin 6	Pin 6	DSR	Data Set Ready
Pin 7	Pin 4	RTS	Request to Send
Pin 8	Pin 5	CTS	Clear to Send
Pin 9	Pin 11		Not Connected

Table 7 Serial Interface Pin-outs

Signal Voltage and Current Levels

The serial interface meets EIA RS232 interface specifications:

Voltage Levels	Max	+-15 Volts
	Min	+- 3 Volts
Mark = Off =	-3 to -15 Volts	
Space = On =	+3 to +15 Volts	

Because both the host and printer are DTE's (Data Terminal Equipment), they use the same serial port pin-outs. If the cable that is used to connect the host to the printer is a pin-to-pin inter-connect, it will not work. Therefore, a null modem or turn-around cable must be used to interconnect the host and the printer.

Display Pass Through

The display pass through feature allows a pole display to be interconnected with the printer. The printer is connected to a host system with a special serial cable. The host sends serial data to the printer and the printer sends serial data to the pole display. The printer does not provide power to the display. During normal printer operation, no data is passed to the display. In pass through mode, all received data is passed on to the display.

USB Interface

The USB interface is Version 2.0 compliant and supports high speed operation. The standard USB interface connection is implemented through a Standard Series "B" Receptacle as defined in the USB Specification. The printer is self-powered and does not draw power from the standard type B USB interface cable.

The Standard USB Type B connector has the following pin functions:

Pin Signal

1 Vbus (+5 V dc) (Not used in the ITHACA 9000)
2 Minus data
3 Plus data
4 Ground

Note: The standard USB interface does not have enough power to run the printer.

Ethernet 10-Base-T Adapter

An IP addressable 10-Base-T Ethernet adapter is available for the ITHACA 9000 printer. It provides for web page configuration and supports bi-directional RAW and Telnet interfaces. All protocols are implemented to the extent necessary to support printing from Windows™ platforms; specific protocols supported include the following:

- Line Printer Daemon Protocol (LPR) – RFC1179
- Simple Network Management Protocol (SNMP) – RFC1157
- Printer MIB – RFC1759
- Port 9100 (Raw data)
- Service Location Protocol (SLP) – RFC2165
- The TFTP Protocol (Revision 2) – RFC1350
- Telnet COM Port Control Option – RFC2217
- Hypertext Transfer Protocol – HTTP/1.1 – RFC2616

Refer to the 100-05072 Wired Ethernet Programmer's Guide for features and additional setup information.

Note: The Ethernet adapter supports only the Ithaca Cash Drawer interface.

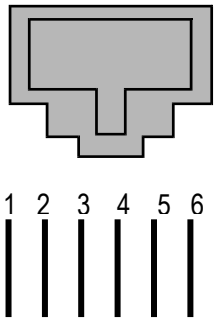
Cash Drawer

Interface Description

The ITHACA 9000 Printer supports a single cash drawer with status. The driver in the printer is capable of supplying 24 V DC at up to 1.5 amps for up to 250 milliseconds. The ITHACA 9000 Printer defines cash drawer closed as switch open. If the drawer is disconnected, it will be viewed by the printer as closed. Since the printer does not act on the cash drawer status, the application can interpret cash drawer status any way it wants.

Driver connector type (standard)	Single RJ12 connectors with 24V sink drivers
Driver voltage	24 volts (Refer to power supply specification).
Driver current	1 amp maximum with current limit
Pulse duration	250 msec. maximum
Drawer status	Open/close drawer status provided to printer

Cash Drawer Pin Assignments



pin 1 Not Connected
pin 2 CD1-
pin 3 CD1 Sense
pin 4 CD Drive + (+24V)
pin 5 CD2-
pin 6 Ground

	Ithaca		*Epson*		*Star*	
Pin Number	Signal Name	Direction	Signal Name	Direction	Signal Name	Direction
1	Frame ground		Drawer kick-out drive signal 2	Output Sink Drive	Frame ground	
2	Drawer kick-out drive signal 1	Output Sink Drive	Drawer open/close signal	Input	Drawer kick-out drive signal 1	Output Sink Drive
3	Drawer open/close signal	Input	Signal ground		+24V DC	
4	+24V DC		+24V DC		+24V DC	
5	Drawer kick-out drive signal 2	Output Sink Drive	Drawer kick-out drive signal 1	Output Sink Drive	Drawer kick-out drive signal 2	Output
6	Signal Ground		Frame Ground		Drawer Open/Close signal	Input

Table 8 Cash Drawer Pin Assignment

Chapter 3

Installation and Setup Procedures

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Installing Your ITHACA 9000 Printer

By following the instructions in this section, the ITHACA 9000 will be ready to accept commands and successfully interface with your system in just a few minutes. Follow the steps below when setting up your printer.

Step 1: Unpack the Printer
Step 2: Connect Power and Communications
Step 3: Loading Paper
Step 4: Confirm Configuration Settings

Step 1: Unpack the Printer

Be sure to save the box and packing materials in case you need to send the printer in for service. TransAct Technologies is not responsible for damaged return items that are not packaged in original shipping material. Refer to “Return Materials Authorization and Return Policies” in the first chapter of this manual for information on what to do if you have to return your printer for repair.

1. Open the box and remove the printer and all items. Check to make sure that all items are present:

    - ITHACA 9000 Printer
    - Paper Roll (located under the rear paper cover)
    - AC Power Cord
    - Configuration Receipt

2. Separate the printer from the packing material. Reverse steps when repacking for return shipment.

3. Check the printer for any signs of damage. If the printer or any parts are damaged, report it to your supplier and shipper immediately. (Reverse steps when repacking for return shipment.)

Be sure to save the box and packing materials in case you need to send the printer in for service. (You will not need to repack the supplies).

Step 2: Connect Power and Communications

Installing Cables

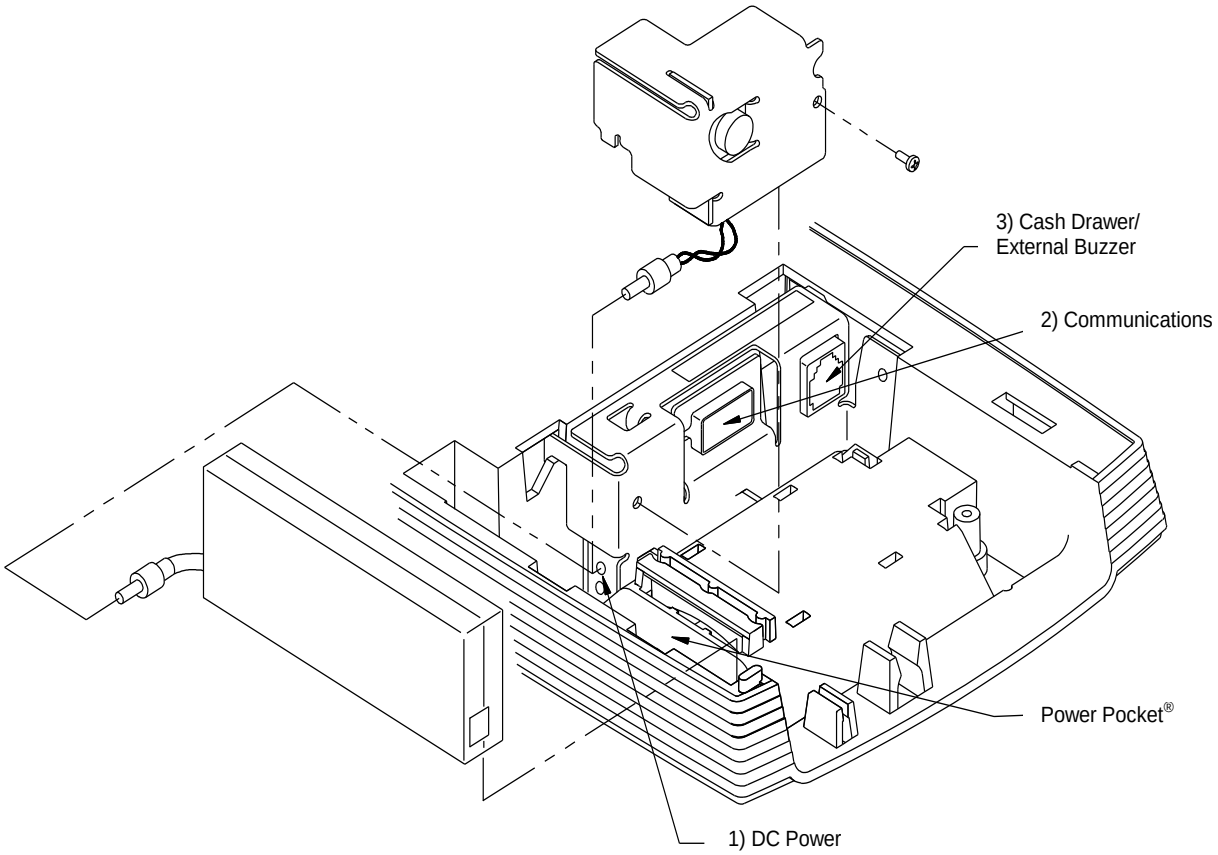

Figure 2 Power and Communications Ports

Three cables are required to be connected to the printer.

1. DC Power
2. Communications
3. Cash Drawer

Connecting Power

The ITHACA 9000 Printer is generally supplied with a built-in power supply. As an option, the printer is available without a power supply.

Internal Supply

The internal supply connects to an outside power source with a standard two wire power cord.

External Supply

If an external supply is used a 3-pin mini DIN plug is provided for the external 24 Volt supply.

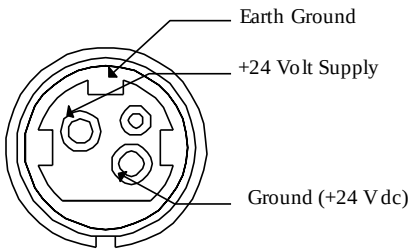

Figure 3 3-pin mini DIN plug

Connecting Communications Cables

The Ithaca 8000™ has a number of different communications interfaces.

Serial

The serial interface connector is either a 9-pin or 25-pin mail D shell interface. The pin-out is shown below

9-pin	25-pin	Signal	Description
Pin 2	Pin 3	RX	Receive Data
Pin 3	Pin 2	TX	Transmit Data
Pin 4	Pin 20	DTR	Data Terminal Ready
Pin 5	Pin 7	GND	Signal Ground
Pin 6	Pin 6	DSR	Data Set Ready
Pin 7	Pin 4	RTS	Request to Send
Pin 8	Pin 5	CTS	Clear to Send

Table 9 Serial interface pin out

Parallel

The parallel interface connection is very similar to the serial interface connection. It can be a 36-pin Centronics (IEEE 1284-B) or a 25-Pin female D-Shell (IEEE 1284-A) connector. The pin-out of both connectors are shown below

25-pin Connector	36-pin Connector	Signal	Description	Direction
Pin 1	Pin 1	STROBE	Clock data to printer	Host to Printer
Pins 2-9	Pins 2-9	D0 - D7	Data	Host to Printer
Pin 10	Pin 10	ACK\	Printer accepted data	Printer to Host
Pin 11	Pin 11	BUSY	Printer busy	Printer to Host
Pin 12	Pin 12	PE	Paper Out/Status	Printer to Host
Pin 13	Pin 13	SLCT	Printer selected	Printer to Host
Pin 14	Pin 14	AUTOFD	Auto-feed paper	Host to Printer
Pin 15	Pin 32	FAULT\	Printer error	Printer to Host
Pin 16	Pin 31	INIT\	Initialize printer	Host to Printer
Pin 17	Pin 36	SLIN	Select printer	Host to Printer
	Pin 17	FG	Frame ground	Printer to Host
-	Pin 18	+5V	Peripheral logic high	Printer to Host
Pins 18-25	Pins 16, 19-30	GND	Ground	

Table 10 Parallel interface pin out

USB

The USB connector can be one of two types: a standard Type B connector, as in commonly used in the PC industry, or a POS Powered USB connector. In the case of the powered USB connector, there are several different versions. Make sure you are using a 24-volt DC version, and that the 24-volt supply meets the requirements of the ITHACA 9000 printer and any cash drawer that is connected to the printer.

A powered USB interface is a special-order option. There are several standards for the power interface. Make sure that you inform TransAct is aware of what interface you require, and that that interface connector is supported by the ITHACA 9000.

Step 3: Loading Paper

Perform the following steps to install paper in the ITHACA 9000.

1. Open the Paper Cover by pressing the cover latch button.

2. Place the paper roll into the printer, so that the paper unwinds from the bottom (front).

3. Close the cover. When the cover is closed, the printer will feed several inches of paper to make sure the paper is aligned in the printer. If equipped with a cutter, the printer will automatically cut the paper tail and the printer is now ready to print. If the printer is not equipped with a cutter, the operator should remove the paper tail.

The printer is now ready to receive information.

Step 4: Confirm Configuration Settings

Before you install an ITHACA 9000 Printer into your system, you should verify that the printer is configured as required by your system. There are four parts to this verification process.

1. Verify that the communications interface card is the correct one.
2. Verify that the cash drawer interface is configured correctly.
3. Verify that the power connection is correct.
4. Verify that the firmware in the printer is configured correctly.

Verify the Communications Interface Card

There are several basic types of interface cards, and each has variations. Make sure your printer has the correct interface card.

Parallel Interface
- Centronics 36-pin interface
- 25-pin D shell

Serial Interface
- 9-pin D shell interface
- 25-pin D shell interface

USB Interface
- Standard 4-pin

Ethernet 10-Base-T Adapter
- Standard Ethernet port connector

802.11b Wireless Interface
- Wireless interface pre-installed within printer unit

It is easy to distinguish most of the interface cards other than the 25-pin serial and 25-pin parallel interface cards. To determine what interface is installed, refer to the configuration receipt shipped with the printer, or enter configuration mode and look at the verification printout. If a serial interface card is installed, the printout will refer to the RS-232 serial interface. If the parallel interface card is installed, the printout will refer to the parallel interface.

Changing Interface Cards

The interface card on the ITHACA 9000 Printer can be changed in the field.
In most cases, interface cards are interchangeable without altering the printer firmware. However, you may have to load new firmware and/or a new boot loader before you change the interface cards. Check with Technical Support for firmware compatibility between interface cards before ordering.

Removing the Old Interface Card

1. Turn over the printer, taking care not to allow the cover to open or the paper to fall.
2. Disconnect the current communications and cash drawer cables.
3. If equipped, unsnap the power supply retainer and slide out the power supply.
4. Disconnect the power supply from the interface card.
5. Remove the interface retaining screw.
6. Slide the interface card sideways-towards the power supply pocket-and remove it.

Cash Drawer Configuration

Verify the Cash Drawer Interface

The printer is shipped from the factory with a cash drawer interface label on the bottom of the printer. You should always verify that the cash drawer you are using matches the printer's cash drawer interface label. If there is no cash drawer label, you should remove the communications interface card and verify the setting. See "Configuring the Cash Drawer Interface" on page 37 .

There are many vendors of cash drawers. If you are unsure what the cash drawer interface is, contact the cash drawer vendor for more information.

If you find that the cash drawer does not match the printer, you may change the printer's cash drawer interface configuration. If the cash drawer interface no longer matches the label on the printer, please remove the label.

Install the new interface card

1. Slide the interface card into the printer. Make sure the interface card sits flush with the printer. The retaining screws should also line up with the mounting holes.
2. Install the retaining screws.
3. Connect the communications interface card and any cash drawer cables.
4. Turn over the printer, and reconnect the power.

Configuring the Cash Drawer Interface

CD interface drawing not yet available.

Figure 4 Cash Drawer Selection

The cash drawer connector may be connected to one of three internal connectors on the controller board. To access the internal connector, you must first remove the interface adapter.

Removing the interface card

1. Unplug the printer
2. Turn over the printer. Take care not to allow the cover to open or the paper to fall.
3. Disconnect the current communications and cash drawer cables.
4. Remove the interface retaining screws.
5. Slide the interface card towards the back of the printer and remove it.

Reconfigure the cash drawer

1. Slide the cash drawer socket out of the slot in the frame.
2. Unplug the socket harness from the main circuit board.
3. Plug the harness into the connector for the desired interface.
4. Reinstall the cash drawer socket into the frame.

Re-Install the interface card

1. Slide the interface card into the printer. Make sure the interface card sits flush with the printer. The retaining screws should also line up with the mounting holes.
2. Install the retaining screws.
3. Connect the communications interface card and any cash drawer cables.
4. Turn over the printer and reconnect the power.

Verify the Firmware Configuration

An example receipt included in the box that your printer shipped in will show how the printer was configured before it shipped from our Ithaca facility. Compare this information to your system requirements. Pay particular attention to the emulation and the communications link: if they are wrong, the printer may appear inoperative. If the configuration is not correct, refer to the chapter entitled "**Error! Reference source not found.**." If there are a number of printers to be installed and you would like the identical configuration in each, you can use a universal configuration program to record the configuration on one printer and replicate it over a group – contact TransAct technical support for further information.

Installing Windows® Printer Drivers

Printer Driver Installation for WIN95, 98, Me

1. Insert the "**Windows 95, 98, Me printer driver**" disk into your diskette drive.
2. Click on "**Start**" menu -> "**Settings**" -> "**Printers**".
3. Double Click on "**Add Printer**" Icon.
4. Select "**Next**".
5. Select "**Local printer**" and "**Next**".
6. Click on "**Have Disk**". If your floppy is A: use A:\ and then "**OK**".
7. Select the printer you have (i.e. Series Ithaca 8000™) and then "**Next**".
8. If you are asked "Keep existing driver" or "Replace existing driver". Choose "**Replace existing driver**" and then "**Next**".
9. Select the port the printer is connected to, and then "**Next**".
10. Select "Yes" or No" for default printer. The printer name should not be altered, so choose "**Next**".
11. If you wish, you can print a test page. Due to the narrow paper stock that this printer uses, and the margins Windows chooses, there will not be enough room to print all the images of the test page. Some of the large text will word-wrap and be truncated.
12. Select "**Finish**". The printer driver is now installed.
13. If you selected "Replace existing driver", reboot your machine to ensure all components are installed.

Printer Driver Installation for NT4.0, 2000

1. Insert the "**Windows NT, 2000 printer driver**" floppy disk into your diskette drive.
2. Click on "**Start**" menu -> "**Settings**" -> "**Printers**".
3. Double-click on the "**Add Printer**" Icon.
4. Select "**My Computer**" and "**Next**".
5. Select the port the printer will be connected to, and then "**Next**".
6. Click on "**Have Disk**". If your floppy is A: use A:\ and then "**OK**".
7. Select the printer you have (i.e. Series Ithaca 8000™) and then "**Next**".
8. If you are asked "Keep existing driver" or "Replace existing driver". Choose "**Replace existing driver**" and then "**Next**".
9. The printer name should not be altered, so choose "**Next**".
10. Select "**Not Shared**" "**Next**".
11. If you wish, you can print a test page. Due to the narrow paper stock that this printer uses, and the margins Windows chooses, there will not be enough room to print all the images of the test page. Some of the large text will word wrap and be truncated.
12. Select "**Finish**". The printer driver is now installed.
13. If you selected "Replace existing driver", reboot your machine to ensure that all components are installed.

OPOS drivers Installation Instructions

1. Run Setup OPOS.exe.
2. The communications will be defaulted to “COM2”. If the communication port is not setup at installation, the first time the printer service object Open method is called, a Com port setup dialog will be displayed.
3. After running Setup.exe there will be an OPOS setup utility in the OPOS program group/start menu, and also in the Windows Control Panel. Use this utility to set up the OPOS printer “driver” and cash drawer “driver”.

To Install the USB drivers

1. Ensure that USB is enabled in your system's BIOS. To verify that USB is enabled, click on "Start", "Settings", "Control Panel". Double click "System" and select the "Device Manager". If you see "Universal Serial Bus controllers" in the list, USB is enabled. Check your PC's documentation for more information about USB if needed.
2. Ensure that power is applied to the printer and plug in the USB cable to both the PC and printer.
3. Follow the on-screen directions. Please note that several drivers are installed in this process. Therefore the "Found new hardware" prompt will appear several times. If the system needs a file, direct it to the location of the USB driver install disk (usually the floppy drive).

See “readme.txt” or “usbman.htm” on the install disk for more information.

Chapter 4

How to Operate the ITHACA 9000 Printer

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How to Operate the ITHACA 9000 Printer

Your ITHACA 9000 printer contains two buttons and three (LED) indicator lights. In addition to power control and feeding paper, these two buttons can be used to perform functions like self-testing, clearing errors and printer configuration. They are:

*** BUTTON** This is the standby or power down button, located on front face of the printer's cabinet

*** FEED** Located top left of printer

* BUTTON

The ITHACA 9000 has been designed to remain connected to a power source at all times. The * button on the ITHACA 9000 Printer does not completely remove power from the printer. Because of this, the * button is used to alternately switch the printer between OFF and ON modes. The * button does not disconnect power to the printer. The printer is truly off only when the AC power supply is disconnected. You will notice that none of the indicator lights will be on when the printer is in OFF. When the printer enters ON mode, the green power indicator light will be activated. The operational state of the Ithaca 8000™ can be determined by looking at the Power Indicator Light (LED).

When the * button is pressed or the power down command is received, the ITHACA 9000 Printer enters an OFF low power mode. The printer is not completely off, but is in Standby mode[2].

Standby mode is remembered even if the power is removed. Whenever power is turned back on, the printer starts, performs Level 0 diagnostics, and re-enters Standby mode.

* FEED

The **FEED** button feeds paper through the printer. By pressing the **FEED** button momentarily, the paper will be fed one line at a time. Pressing and holding the **FEED** button will make the printer feed paper continuously until the button is released.

[2] The printer draws about four watts of power in Standby.

Indicator Lights (LED)

The three ITHACA 9000 indicator lights are:

- **Power LED** Indicates printer activity and non-recoverable errors
- **Error LED** Indicates problems and probability of recovery
- **Paper LED** Indicates paper status (paper low)

Power Indicator (LED)

The power indicator lets the user know that the printer is ON. If the POWER indicator blinks in conjunction with the ERROR indicator, the printer is experiencing a non-recoverable error: see the fault indicators discussed below. If the POWER indicator blinks and there is no error indicator blinking, the printer is being held in reset by the host.

Error Indicator (LED)

The ERROR indicator lets the user know that the printer is experiencing a problem. If the POWER indicator is lit (not blinking), the error is generally recoverable without data loss. If the POWER indicator is blinking, a non-recoverable error has occurred: see the fault indicators below. If the error is not operator recoverable, a power cycle may correct the problem. If a power cycle does not correct the fault, the printer must be serviced.

Paper Indicator (LED)

The PAPER indicator signals the paper status. If the printer is equipped with a paper low option, the PAPER indicator will blink when the paper is low. The low sensor is adjustable, and the amount of paper remaining is dependent on the adjustment. If the PAPER indicator is lit with the error indicator, the printer is out of paper: in this case, the printer stops printing and waits for the paper to be changed.

Fault Indicators

The ERROR indicator is the primary fault indicator and is either always on or blinking if a fault has occurred. There are three types of faults:

Fully-recoverable faults	Paper out or cover open
Semi-recoverable faults	Head jam
Non-recoverable faults	Component failure

Fully-recoverable and Status

A fully-recoverable error will restart printing exactly where it stopped when the error occurred. Printing will resume after error has been properly addressed. A *status recoverable* error is very similar to a *fully-recoverable* error. Additionally, status is used to display when the printer consumables may need replacing.

Semi-recoverable

A semi-recoverable error is determined by whether or not the printer has to be shut off and turned back on while attending to the problem. The amount of information lost is dependent on the type of error and the state of the information being processed.

Non-recoverable

A non-recoverable error produces information loss.

Error Blink Codes

If during normal operation, the ERROR indicator is lit and the POWER indicator is blinking, a minor error occurred. The POWER indicator shows the error by blinking a pattern. Cycling the power restarts the printer. Blink patterns are defined as follows.

1 Blink (1 blink, pause)

2 Blink (2 blinks, pause)

3 Blink (3 blinks pause)

A similar pattern is followed for other blink counts. Error indications are as follows:

Error Indicated	Blink Count
Unused	1
Configuration Read	2
Configuration Write	3
Software Error	4
Auto Cutter Error	5
Unused	6
User Store Format Error	7
Electronic Journal Format Error	8
Flash Operation Error	9
Internal Memory Error	12
Communication Adapter Error	14
Operating System Error	15

Table 11: Error Blink Codes

Cleaning the Print Head

Once the unit is opened, the paper path is accessible for cleaning or clearing paper. Use a soft brush to clean the paper dust from inside the printer. The paper dust should also be removed from the sensor optics. If streaking on the printed ticket is evident, the thermal print head may need to be cleaned. This can be with a cotton swab moistened with an alcohol solvent (ethanol, methanol, IPA).

Warning: After printing, the print head can be very hot. Be careful not to touch it and let it cool down before you clean it. Do not damage the print head by touching it with your fingers or any hard object.

Cleaning the Platen and Paper Path

Using a cotton swab or cloth, moistened with alcohol solvent (ethanol, methanol or IPA). Remove any build-up of label stock adhesive from the Platen, Platen Bearing (Stripper) and the Knife Frame.

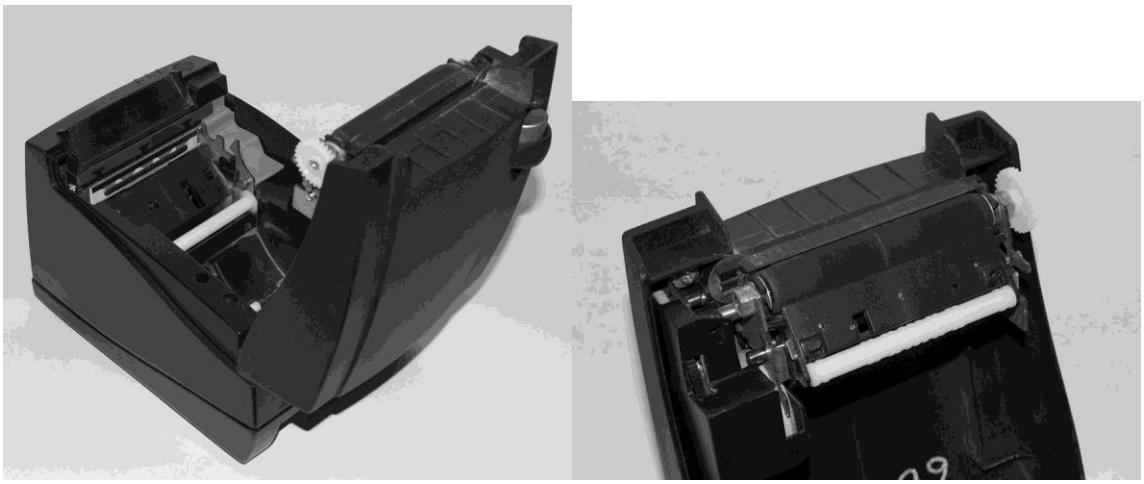

Figure 5. Cleaning the Print Head, Platen and Paper Path

Testing the Printer Overview

Using Self-Test, Configuration, and Hex Dump Mode

Self-Test Mode allows you to perform a series of tests to show if the printer is functioning correctly. Self-Test Mode also allows you to print a summary of how your ITHACA 9000 is currently configured. Use this printout to compare your printer's settings to your system's requirements. Specific attention should be given to emulation and communications settings. For serial printers, the baud rate and other RS-232 interface settings are important. If there is a configuration problem, you should use Configuration Mode to make any changes necessary.

Entering Self-Test, and Configuration mode

To enter self test and or configuration mode, perform the following sequence of operations:

1. Press and release the * button to turn the printer OFF. (The power indicator light will be off.)
2. Press and hold the Feed button.
3. While holding the Feed button, press and release the * button.
4. When the red error indicator light blinks, release the Feed button
5. Follow the directions printed on the receipt to cycle through and select the desired TEST option.

The ITHACA 9000 has a total of seven Self-Test and or configuration options. Two are designed to be useful when performing on-site print evaluations. One option allows the printers electronic journal to be maintained, one allows the printer's configuration to be changed, and two are designed for factory setup by TransAct.

Testing the printer

Use the following two TEST options when verifying basic printer operation.

TEST-Receipt

The receipt test is the primary test option to use when determining if the printer is functioning correctly.

The receipt test is mostly used during the early stages of troubleshooting, to eliminate the possibility that the problem is occurring with the printer. If the printer experiences a failure, and the error indicator light is activated, call TransAct's Ithaca Facility Technical Support Department.

TEST-Head Test

This test performs a test pattern that will print all the head print elements and verify that the drive roll is free from defects. The print head has two heating elements per dot position. A print element is not considered bad unless both elements are missing. If the head test shows that there is an inconsistency in the drive roll it may be debris or a void. If debris is indicated, cleaning the drive roll should correct the problem. If this does not correct the problem, contact TransAct's Ithaca Facility Technical Support Department.

Maintaining the Electronic Journal

The ITHACA 9000 has an electronic journal option. It is possible to configure the printer with a journal station. This selection allows the information saved in the electronic journal to be printed and maintained by the operator.

It the electronic journal is unintentionally initialized, it may be deactivated by this option as well. If the electronic journal is password protected, the manual electronic journal option will be disabled.

Configuring Options

The configuration option allows the configuration of the printer to be printed and, if necessary, changed. When configuration mode is entered, the current configuration, the Current User store status, and the current totals are printed. If any printer errors have occurred, a hardware and software error log may also be printed. At the end of the print out are instructions on how to use configuration mode. Please read these instructions carefully, as they are not the same as Self-Test. You may exit configuration mode at any time, without affecting the printer configuration, by pressing the * button.

TEST- Configuration

The content of the configurable features will alter based on the hardware installed. There will be at least three groups of options:

1. Emulation
2. Communications
3. General Options

Under emulation the instruction set, or emulation of the printer may be changed. Available options will depend on the model of printer; however Ithaca PcOS is always available. Other options may be Epson TM88, TM90, Microline, and Ithaca M50.

Under Communications, the way the printer deals with the communications port can be adjusted. The printer will only show communications options that deal with the communications adapter installed.

Under General Options, all other configurable features of the printer can be adjusted. The default language, paper options, electronic Journal features, and print defaults may be set.

Details of all printer options and features will de discussed later in this manual.

Factory Test

The printer is equipped with several factory test modes. These test options are only used for factory burn-in and testing.

TEST-Burn-in
TEST-Rolling ASCII

Hex-dump Mode

Hex-dump mode is used to diagnose communication problems with the printer. As information is received by the printer, the information is converted to a Hex/ASCII format and printed. No translation is made, which means no commands are interpreted. All information is converted to Hex/ASCII and printed on the receipt tape. If a carriage return is sent to the printer, it is translated to 0D in the hexadecimal field and "." in the ASCII field.

Entering Hex-dump Mode

To enter hex-dump mode, perform the following sequence of operations:

1. Press and release the * button to turn the printer OFF. (The power indicator light will be off.)
2. Press and hold the Feed button.
3. While holding the Feed button, press and release the * button.
4. When the red error indicator light blinks, continue to hold the Feed button until the blink pattern changes (about 5 seconds). After the pattern changes, release the line feed button and the printer will enter Hex-dump mode.

Hex-dump format

The format follows.

```
54 68 69 73 20 69 73 20    This is
61 20 74 65 73 74 0D 0A    a test..
```

Several indications of printer and host communication problems can be deduced from hex dump mode. If the printer is printing all 3F "?" symbols, the parity or the number of bits is wrong. If the printer is printing 3F "?" symbols when it should be printing other characters, the communications are probably incorrect, such as the parity, baud rate, or bit length setting. If the printer prints incorrect characters (like Hex C1 instead of Hex 41 "A"), it is set for 8-bit data, and the host is set for 7-bit. In most cases, the print problem can be traced to the host and printer being configured differently.

Level 0 Diagnostics

Level 0 diagnostics always and only run at power up, e.g. power being applied. These diagnostics perform the following tasks:

Cold Power On

1. Basic System Integrity
2. Vector Integrity
3. RAM Test
4. Flash Boot Loader Integrity
5. Flash Firmware Integrity (NOTE: If the firmware is corrupted, the printer will remain in boot load.)
6. Start Normal Firmware
7. Verify Configuration Integrity
8. Interface Card Configuration
9. User-store Integrity
10. Start Kernel, Verify Multitasking, Start Tasks

Once the kernel is running, the following tests must pass to allow operation. However, if any test fails (except the knife home test), the remaining tests will generate recoverable faults and normal operation will start as soon as the fault is cleared. These tests are also run when operation is resumed from OFF.

11. Cover Closed Check
12. Knife Home (if installed)
13. Paper Present
14. Place Printer On-line, Start Normal Operation

The first phase of testing consists of step 1-5 and determines that the boot loader is accurate and the printer firmware is correct. Tests 1 through 4 produce non-recoverable errors if they fail, in which case the power must be removed from the printer and the printer returned for service. If the boot loader is intact, but the main firmware is corrupted, the printer automatically enters boot loader mode, where the firmware can then be reloaded into the printer.

Boot Loader Mode

The boot loader cannot be entered during normal operation. Boot loader mode can only be entered in one of two ways: (1) when Level 0 Diagnostics finds that the firmware check (also known as a cyclical redundancy check, or CRC) is bad, or (2) manually.

To manually enter the boot loader, hold the * button while the power is applied. The ERROR Indicator comes on, and the POWER indicator blinks. At this time, the firmware boot program is operating and the boot load file may be sent to the printer. When the printer receives the boot load file, the printer will automatically restart if the firmware load was successful. If the load fails, the printer will remain in boot load mode. If the load fails, reset the printer by removing the power and restarting it.

Chapter 5

Configuring Your ITHACA 9000 Printer

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Configuration Mode Overview

There are two ways to configure the ITHACA 9000 printer: the first is to use the manual configuration sequence by using the keypad controls, and the second is to use TransAct's remote configuration software. TransAct Technologies offers the use of a remote CONFIG program as a fast, easy way for system integrators to configure or reconfigure your ITHACA 9000 printer. To obtain more information, or the latest version of the CONFIG program, call our Sales Department or Technical Support.

Most Frequent Configuration Incompatibilities

Parallel Printer
Emulation
Carriage Return Options

Serial Printer
Emulation
RS-232 Serial Interface (baud rate)
Carriage Return Options

How to Change Configuration Settings

Entering into Configuration Mode

1. Place the printer in standby by pressing the * button.
2. Press and hold the Feed button while pressing and releasing the * button.
3. When the error indicator blinks, indicating a stuck key, release the Feed key and enter Self-Test Mode.
4. Press and hold the Feed button until the next test is printed. Then release the Feed button.
5. Repeat step 4 until "Test-Configuration" is printed.
6. Press and release the Feed button briefly. The current configuration will then be printed.
7. You are now in Configuration Mode.

After you enter Configuration Mode, the printer will print the current configuration, the current totals and the error logs, if any. Save this printout as a guide to changing the configuration, and in case you wish to return the printer to the previous configuration.

Each emulation can have different configurable features. If you are changing the emulation, note that the printout that was printed at the beginning of the configuration process may be incorrect for the new emulation, and the configurable features may be different. If you are using this print out as a configuration guide, and you are changing the emulation, you may wish to save the new emulation and then re-enter Configuration Mode to change other options. This will print all the available features for the new emulation.

Using Configuration Mode

The Feed button is used to select and change configuration setting. By pressing and releasing the Feed button, the parameter to be changed can be selected. By pressing and holding the Feed button, the value of the selected parameter will change.

The following chart lists some of the potential parameters and their options.

Parameter	Definition	Options	Default
Emulation Mode	Printers command set	Ithaca PcOS, Epson TM-TXX, ESC/POS, Microline, Ithaca M50	Ithaca PcOS
Model	Type of Epson Printer	TM-T85, TM-T88II, TM-T88III, TM-T90	TM-T88II
Paper Colors			
Black Dot Eo	This option allows the Custom Black or Custom Color paper Black energy to be set.	10 to 40	24
Red Dot Eo	This option allows the Custom Color paper Color energy to be set.	10 to 40	12
Color	This option selects the secondary paper color	Monochrome, Red, Green, or Blue	None
Density Adjust	This is a fine adjustment for the print density.	-50 to + 50	0
Baud Rate	Serial Communications Bit rate	300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600,115200	19200
Mode	Number of bits, parity and stop bits.	7 bit or 8 bit Even, Odd, No Parity 1 or 2 Stop Bits	8 Bit, No parity, 1 Stop bit
Handshaking	Flow control options	Ready/Busy Xon/Xoff None	Ready/Busy
Receive Error	What happens when an error is detected.	Prints? Ignores the data.	Prints?
Windows PnP	Flag for Windows Plug and Play active.	Enabled, Disabled	Enabled.
DTR/RTS Signal	What RS232 signals are used for flow control	DTR, RTS, or Both DTR and RST	Both DTR and RTS
CTS/DSR Signal	How CTS and DSR used	None (Not used)	None (Not used)
Multidrop Mode	Flag for multidrop active	Off, A, B, or C Address	Off
Busy-to-ACK	Relationship of Busy to ACK on the IEEE1284 interface.	ACK while Busy ACK in Busy ACK after Busy	ACK in Busy
Select/Deselect	Command used for printer select and deselect (Microline and M50 only)	DC3/DC1 DC1/DC3	DC3/DC1
Code Page or Language Set	What character set is used for a default.	See appendix	0 or 437
Zero	Is the zero slashed, un-slashed or defined by the language set.	Slashed Un-Slashed Follow Language set	Defined by the language set.
Font	Sets the size of the default font	9x24, 10x24, 13x24, or 15x24	12 x 24
CPI	Sets the default	Value may be from 10 to	15

	characters per inch	24 characters per inch	
Smoothing	Flag for whether scaled characters smoothed.	Enabled, Disabled	Enabled
Paper Width	Width of the paper installed. (Not used)	80- or 58-mm paper and print zone from 608 to 256 dots	80 mm and 576 dots.
Bar Code Width	Default barcode line width.	1 to 8	3
10CPI (DC2)			
ESC v			
nINIT/ENQ<10>			
Carriage Return	This option defines how CR and LF characters are used.	Normal, Ignore LF, Ignore CR, Add LF to CR, Add CR to LF, Add to Both, Use CR as Print	Ithaca Emulation: Normal Epson Emulation: Ignore CR. Axiohm Emulation: Use CR as Print.
Off-Line Option	This option defines what conditions place the printer off line.	Normal: Cover open, paper out, and buffer full. Buffer full only.	Normal.
Line Spacing	How many lines per inch are printed by default.	6, 7.5, or 8 lines per inch.	Ithaca Emulation: 8 Most others: 6
Input Buffer	This option specifies how large the input buffer is.	40 Characters 256 Characters 1024 Characters 2048 Characters 4096 Characters 8192 Characters One Line	8192 Characters
Print Energy Control			
Paper	This option will select a paper type by brand name.	Generic Black Generic Color Custom Black Custom Color Optima POS Kanzaki P-320 Kanzaki P-350 Kanzaki P-320RB Kanzaki P-320GB Kanzaki P-320BB Appleton RB100-2.3 Appleton GB100-2.3 Appleton BB100-2.3 Max Int. Label NCR Label	Generic Black
PreHeat Temp.	This sets the temperature that the pint head tries to maintain.	See the section on Head pre-heat later in the manual.	25
Power Supply	The printer uses an 80W internal supply. If an external supply is used, this adjustment will limit the printer to the power indicated.	60 to 120 Watts	80
Page Length	This option sets the default form feed page length.	0 – 60 lines. 0 disables the form feed	40
Cash Drawer CMD	The Microline option has two potential cash drawer commands	ESC + BEL	BEL
CD ESC BEL Parm.	The Microline Emulation	Enabled	Disabled

	has the option of using the ESC BEL command to operate the cash drawer	Disabled	
Microline Mode	There are three Microline modes	M50, M50 Plus, OKI ML192	M50
Cash Drawer Time	The cash drawer fire time is adjustable in the Ithaca emulation.	10 to 250 Ms	250 Ms
Cash Drawer Sense	The sense of the cash drawer open status can be reversed.	Normal, Inverted	Normal
External User Store	Flag for user store in use or configurable. If the user store is in use and has data in it, it can not be reconfigured.	In use or configurable.	Not Settable.
Electronic Journal	This specifies the amount of external flash available for the electronic journal or user data space.	1 to 31 64K blocks	2
External User Store	This indicates the amount of external flash that is available for user storage (Graphics and characters.)	1 to 31 64K Blocks	This is not settable. It equals 32 – the Electronic Journal setting.
EJ Manual Print	This sets whether or not the manual electronic journal options are available.	Enabled Disabled	Enabled
EJ Record Numbers	This options sets weather or not the record number is printed with journal entries.	Enabled Disabled	Enabled
User Store	This option sets a lock on user store that prevents any changes to the data.	Unlocked Locked	Unlocked
On/Off Switch	This option disables the On/Off switch	Enabled Disabled	Enabled
Audio Alert	This option configures the operation of the audio alert	Off, 50 ms to 1 Second in 50 mSec steps	250 mS
Cutter Option	This activates or deactivates the auto cutter	Active Inactive	Active if the printer is equipped with an auto cutter.
Pre-Cut Feed or Tear Point Adjust	This option sets how much the cut point is adjusted before the auto cut or manual tear-off.	0 or none to 20 mm.	0
Cutter Speed	This option adjusts the auto cutter speed to allow the use of thicker paper.	130 to 80 where 80 is the slowest speed.	100

Note: There are other features that may be configurable. It is intended that if you need to change them, you will contact TransAct Technical support for assistance.

Remote Configuration

Remote configuration is provided for all printers and is accessed through a series of extended diagnostic and configuration commands. The TransAct universal configuration program will allow the configuration to be read, edited, and written back to the printer. It will also allow the configuration of one printer to be recorded and replicated over a number of printers. The program is available from TransAct Technical Support or by downloading it from the Internet – consult the section On-line Technical Support for further details.

Chapter 6

Printer Sensors

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ITHACA 9000 Printer Sensors/LEDs

The ITHACA 9000 printers use several sensors to provide feedback to the host system.

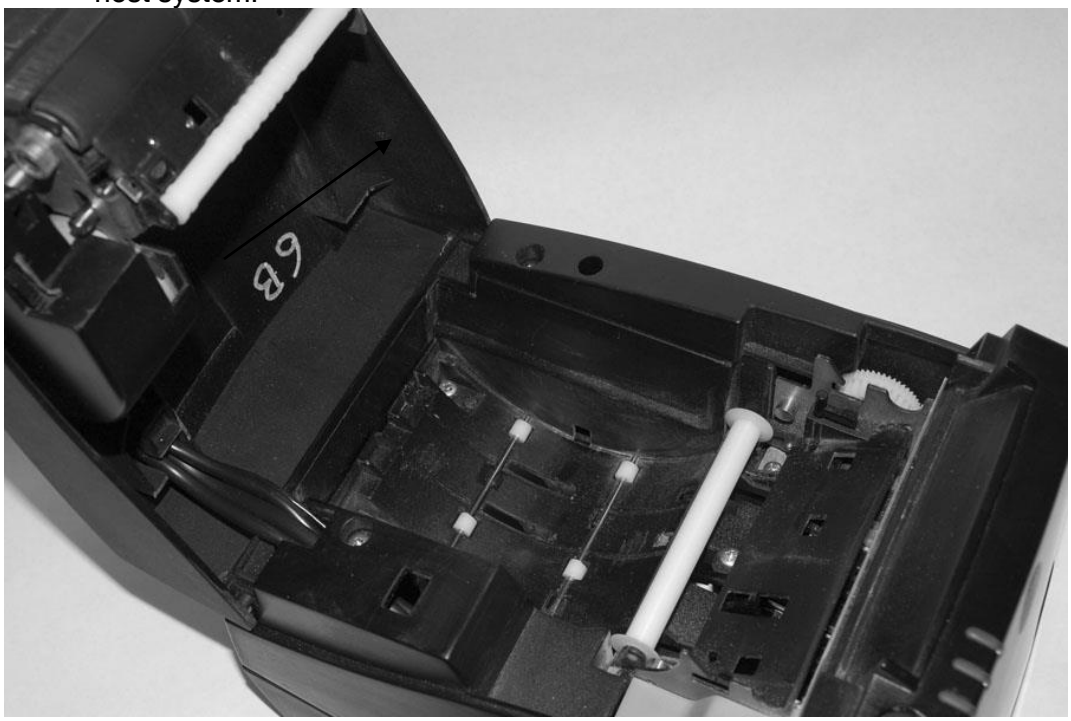

Figure 6 Sensor Breakdown and Locations.

Paper Out Sensor

A Paper-Out Sensor, mounted to the Main Controller PCB, optically senses a Paper Out Flag located in the paper path. When the sensor detects the flag, it indicates that the paper roll is depleted.

Paper Cover-Open Sensor

A Paper Cover-Open Sensor, mounted to the Main Controller PCB, optically senses a Paper Cover-Open Flag located in the ticket path. When the Paper Cover is opened, the Cover Open Flag trips, and the printer goes off-line.

Top-of-Form/Paper Low Sensor

A Top-of-Form Sensor is mounted in the Paper Cover, and senses a pre-printed black dot (if present) on the paper roll. When the black dot mark is sensed, it triggers the cutter to perform a cut. At the end of a paper roll, there may be a continuous black stripe on the paper that, when sensed, triggers a paper –low signal to be sent back to the host.

Printer Status LEDs

The printer has been outfitted with three LED indicators that provide the condition of the printer

LED Indicator	Function
Power	Indicates power on/off
Paper	Indicates paper status
Error	Indicates error status

Table 12 Printer Status LED

Error LED

The error LED is the primary fault indicator. It will always be on if a fault has occurred. There are two basic types of faults:

1. Recoverable
   - Paper out
   - Cover open
   - Head over temperature
2. Non-recoverable
   - Cutter failure
   - Component failure

Recoverable Errors

Recoverable errors are indicated when the error and power indicators are both lit. Recoverable errors are as follows:

Paper out Paper, Power and Error indicators are all on.
Cover open Error indicator is lit.

Non-recoverable Errors

If the error indicator is lit and the power indicator is blinking, a non-recoverable error has occurred. The power indicator will indicate the error by blinking a series of blink patterns. The pattern consists of a number of closely spaced blinks followed by a delay. The pattern then repeats. Pressing the * button will attempt to reset the printer.

Errors are as follows

Error	Blinks
Errors that may be recoverable with the power button.	
Configuration Read	2
Configuration Write	3
Software Error Vector	4
Auto Cutter Fault	5
Not used	6
User Store Invalid	7
Electronic Journal Format Invalid	8
Flash Memory is not functional	9
Errors that cannot be recovered without intervention.	

Internal Memory	12
Communications Adapter is incorrect or not seated correctly.	14
Internal Software Error	15

Note: Additional error modes exist. Refer to the ITHACA 9000 Programmer's Guide for a complete list.

Chapter 7

Electrical Connections

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Communications Interface PCB

Communications are supplied through a plug-in Communications Interface PCB under the printer.

Figure 7. Communication PCB Location and Connector Info.

Parallel Interface Adapters

There are two parallel interface adapters. One is a 25-pin, D-shell connector. The pin-out is such that the printer will interface to a standard IBM PC parallel printer interface with a one-to-one cable. The second adapter will provide a standard Centronics 36-pin connector.

Interface signals and pin definitions

25-pin Connector	36-pin Connector	Signal	Description	Direction
Pin 1	Pin 1	STROBE	Clock data to printer	Host to Printer
Pins 2-9	Pins 2-9	D0 - D7	Data	Host to Printer
Pin 10	Pin 10	ACK\	Printer accepted data	Printer to Host
Pin 11	Pin 11	BUSY	Printer busy	Printer to Host
Pin 12	Pin 12	PE	Paper Out/Status	Printer to Host
Pin 13	Pin 13	SLCT	Printer selected	Printer to Host
Pin 14	Pin 14	AUTOFD	Autofeed paper	Host to Printer
Pin 15	Pin 32	FAULT\	Printer error	Printer to Host
Pin 16	Pin 31	INIT\	Initialize printer	Host to Printer
Pin 17	Pin 36	SLIN	Select printer	Host to Printer
	Pin 17	FG	Frame ground	Printer to Host
-	Pin 18	+5V	Peripheral logic high	Printer to Host
Pins 18-25	Pins 16, 19-30	GND	Ground	

Table 13: Parallel Port Pin-outs

Signal Levels

Voltage levels 0 V and +5 V (nominal)

Logic levels

- Logic one
  - Driver +2.4 V to +5 V
  - Receiver +2.0 V to +5 V
- Logic zero
  - Driver 0 V to +0.4 V
  - Receiver 0 V to +0.8 V

Current requirements

- Logic one Source 0.25 ma at +2.4 V
- Logic zero Sink 16 ma

Line termination

- Data and control 3.3K ohm to +5 V
- Strobe 1.2K ohm to +5 V

Serial Interface Adapters

Serial Port Features

The serial port features are as follows

Baud Rate	300, 600, 1200, 2400, 4800, 9600, 19.2 K, 38.4 K
Bit Patterns	8-bit no parity; 8-bit odd; 8-bit even; 7-bit no parity; 7-bit odd; 7-bit even
Flow Control	DTR and XON/XOFF

Serial Port Pin-out:

9-pin	25-pin	Signal	Description
Pin 2	Pin 3	RX	Receive Data
Pin 3	Pin 2	TX	Transmit Data
Pin 4	Pin 20	DTR	Data Terminal Ready
Pin 5	Pin 7	GND	Signal Ground
Pin 6	Pin 6	DSR	Data Set Ready
Pin 7	Pin 4	RTS	Request to Send
Pin 8	Pin 5	CTS	Clear to Send

Table 14 Serial Port Pin-outs

Because both the host and the printer are DTE's (Data Terminal Equipment), they use the same serial port pin-outs. If the cable that is used to connect the host to the printer is a pin-to-pin interconnect, it will not work. For this reason, a null modem or turn-around cable must be used to interconnect the host and the printer.

Signal levels

The serial interface meets EIA RS-232 Requirements.
-15 V to -3 V: mark = off = Logic 1
+3 V to +15 V: space = on = Logic 0

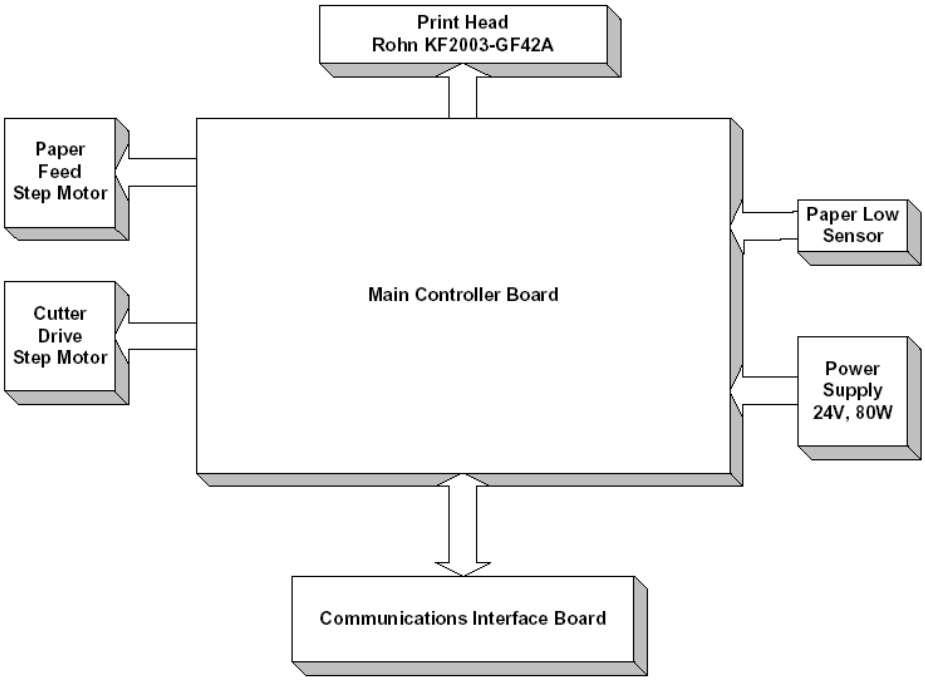
USB Interface Adapter

Standard USB Interface

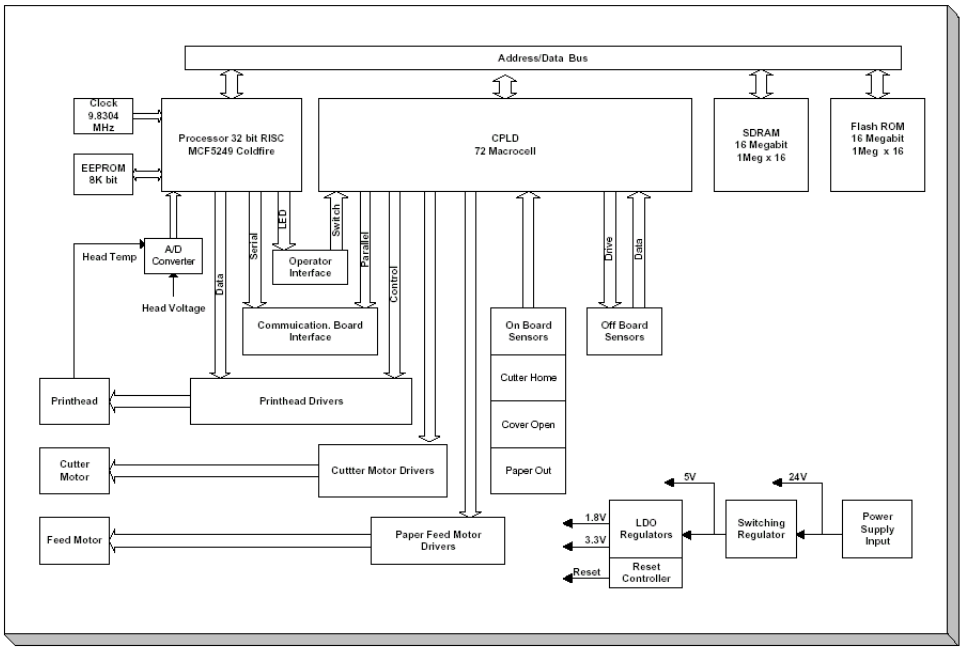
The USB interface is a Version 1.1 compliant interface that is implemented through a Standard Series "B" Receptacle, as defined in the USB Specification.

The printer is self-powered and does not draw power from the USB interface cable.

Printer Block Diagram



M280 Electronics Block Diagram



M280 Main Controller Board

Chapter 8

Theory of Operations

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Theory of Operations

Mechanism

Print Head

The print head in the ITHACA 9000 is a high speed, thick film device configured as single row of 640 dots spaced at 8 dots/mm for a total printable width of 80mm (3.15”). Print data is sent from the controller board as a serial data stream at 8 MHz. The head elements are then activated by signals from the main controller board to form the image on the paper. The ITHACA 9000 uses a two-level energy control system to compensate for dot history with all timing controlled by the controller board electronics. The head also contains a thermistor, which is used to monitor the temperature of the head substrate. Dot energy is continually adjusted based on head temperature, supply voltage, dot history, and paper sensitivity. The print head connects to the controller through a 28 position Flexible Flat Cable (FFC).

Paper Motion

Paper motion is accomplished by a hybrid, 1.8-degree step motor running at a maximum speed of approximately 2500 steps per second. The gear train is designed such that one motor step equals .0625mm of paper motion resulting in a paper feed speed of 156 mm/sec (6.15 in/sec).

Cutter

The cutter mechanism consists of a rotary blade mounted to the mechanism, which operates against a fixed blade located in the paper cover. The rotary blade is driven by a 7.5 degree “tin can” step motor mounted to the mechanism frame, acting through a lever arm and follower. The rotary blade home position is determined by means of an optical sensor located on the controller board and a flag located on the cutter drive gear. The motor operates one direction to activate the cutter and then reverses direction to return the cutter to its home position with a total cut cycle time of approximately 350 ms.

Sensors

There are two types of sensors used on the ITHACA 9000 printer. One type is mounted directly on the controller board and is activated by mechanical flags on the mechanism. These sensors are optical interruptive type and are used to detect Cutter Home, Paper Out, and Cover Open conditions. The second type, Paper Low and Top of Form, are optical reflective sensors.

Power Supply

The power supply for the ITHACA 9000 is a small, universal input, fully enclosed module located within the printer cabinet. The 24 VDC output of the supply connects to the controller board by means of a cable. The AC input connector on the supply is accessible from the rear of the printer and accepts a standard, C7 style, power cord.

Control Electronics

Overview

The printer contains two circuit boards mounted to the mechanism. The main controller board contains the microprocessor, memory, drivers, and sensors used to control the mechanism. This board also contains a 40-position connector to accept plug-in communications interface boards.

Processor and Memory

The processor used in the ITHACA 9000 is a Motorola Coldfire MCF5249 running at 120 mHz. The processor interfaces, through a 16-bit external bus, to a 16Mb Synchronous Dynamic Ram (SDRAM), 16Mb of Flash Memory, 8Kb of EEPROM, and a 72 Macrocell Complex Programmable Logic Device (CPLD). The processor also contains general purpose I/O pins which are used to directly control many of the printer functions including:

- Status LEDs
- Serial Communications Data and Control
- Print Head Data and Timing
- Print Head Temperature and Voltage monitoring
- Programming CPLD

The remaining printer functions are controlled though the CPLD including:

- Communication Board Interface
- Cutter Motor Control
- Paper Feed Motor Control
- On Board Sensors
- Off Board Sensors
- Operator Switches

Print Head Interface

Print data is formatted by the controller and transmitted to the head through the Queued Serial Peripheral Interface (QSPI) on the processor. This interface allows rapid transmission of synchronous serial data with minimal software overhead. Once the transmission is completed, data is latched into the print head registers and the head is energized by the processor. For each line of dots printed, the head is energized twice to compensate for dot history. All head interface lines are buffered by a 74HCT541 Octal Bus Driver.

Motor Controllers

Both the Paper Feed and Cutter step motors are controlled by Allegro A3955 Full Bridge – PWM Micro-stepping Motor Drivers. These drivers operate from the 24-Volt supply and are capable of up to 1.5A of continuous output current. Since the drivers are micro-step capable, the controller must provide both phase and current level information to the driver. On the Ithaca 8000™, all step motor control lines are driven by the on-board CPLD.

The Paper Feed motor circuit is set for a maximum motor current of 1A per phase. Control lines are connected to allow the motor to be operated in the micro-step mode but in the current design the motor is driven in half step increments.

The Cutter motor circuit is also set for a maximum current level of 1A per phase. This circuit, however, only allows the motor to be operated in the full or half step mode.

Sensor Interface

The three, on-board sensors are infrared, optical interruptive devices, which are activated by plastic flags attached to the mechanism. These devices have an open collector, phototransistor output and provide a low level signal when unblocked. The output switches to a high level when the sensor is blocked by a flag. The outputs of these sensors are connected directly to inputs on the CPLD. The state of these sensors is as follows:

Sensor	Blocked	Unblocked
OP1	Cutter home	Cutter not home
OP2	Paper cover closed	Paper cover open
OP3	Paper present	Paper not present

The controller board also has connections for two external optical reflective sensors. One sensor input can be used to detect a paper low condition. The LED current of the sensors is adjustable by the processor in 16 steps from 11ma to 25ma. The sensor signals are connected to comparator circuits on the controller and are then fed into the CPLD. The sensors are auto calibrated using diagnostics resident in the printer.

Power Supply Circuitry

There are four different power supply voltages used in the Ithaca 8000™. All voltages are derived from the 24-volt modular power supply located in the printer cabinet.

Voltage	Derived From	Used For
24 VDC	Modular Power Supply	Print Head, Step Motors
5 VDC	Switch mode regulator operating from 24 VDC	Print Head Logic, Communications Interface, Sensors
3.3 VDC	5 Volt Supply using low dropout (LDO) regulator	CPLD, Processor I/O, SDRAM, Flash Memory
1.8 VDC	5 Volt Supply using low dropout (LDO) regulator	Processor core

A power supply supervisor chip monitors the three logic supplies and provides reset control for the processor and CPLD. This part also has an external input which is connected to the RS-485 interface board and is used for the “Reset on Break” function.

Communications Interface

The communications interface is contained on a separate, plug-in board, which connects through a 40-position connector on the Main Controller. The Ithaca 8000™ is available with different interface options: Parallel, RS-232 Serial, and USB. Each interface board type has a unique hardware identifier so that the printer is automatically configured for the interface type installed.

Interface Protocols

USB

USB stands for Universal Serial Bus. It was originally conceived in the early 90's and officially recognized by Compaq, Intel, Microsoft and NEC. The development of USB has been slow, however, with the release of Windows 95 SR2 development accelerated. Windows 2000 now fully supports USB as do Windows 98 SE, and Windows Me. A technical discussion of USB is beyond the scope of this document. If you would like more information about USB, visit the USB web site at www.usb.org.

USB Support

POS printers are different from typical Windows printers in several ways. Microsoft has recognized these differences and has been working with the USB Device Working Group to generate a set of standards that would abstract all point-of-sale devices at the application level. At this time a workable standard for POS is years away. So while Microsoft is interested in POS in the long term, Microsoft's immediate goal is to enable POS USB devices a way that is compatible with existing service objects.

In order to support USB POS devices under the existing software architecture, Microsoft is providing the POSUSB driver model to allow USB POS devices to interface as serial COM ports to service object DLLs.

The Transact USB Printer interface is based on this Microsoft POSUSB driver model. It provides full bi-directional interface to the printer and allows most existing applications to interface to the USB Ithaca® Ithaca 9000™ as if it were on a serial COM port. In addition, we have allowed the printer to register as a composite device. This allows the printer to appear in the system as a USB print device as well as a COM port. If you are using a windows printer driver (ours or the generic driver) you can assign the printer to the USB port.

We hope that supporting the USB Ithaca ITHACA 9000 as a composite device provides the best of both worlds to our customer.

The USB interface card that is used with the ITHACA 9000 is designed with the Cypress Anchor Chips EZ-USB chip. The Anchor Chips EZ-USB is a compact integrated circuit that provides a highly integrated solution for implementing a USB peripheral device.

Two key EZ-USB features that are important to the end user are:

- The EZ-USB family provides a “soft” (RAM-based) solution that allows unlimited configuration and upgrades.
- The EZ-USB family delivers full USB throughput. Designs that use EZ-USB are not limited by number of endpoints, buffer sizes or transfer speeds.

Because the USB interface card is RAM based, it must have firmware loaded into it every time it is turned on. The Ithaca 8000™ interface card can be configured with firmware in an EEPROM on the interface card or down loaded from the windows USB driver. Transact will support firmware on the interface card upon request but supports the driver download by default. (The driver download takes less than a second!). We are doing this to allow easy USB updates and to assure compatibility between the host driver and the firmware on the USB Interface card.

The USB Driver is available from customer support and by download from our web site (www.transact-tech.com).

Transact has written a POSPrinter.OCX ActiveX file that will allow you to easily interface to our printers. It is used by all of our demonstration programs. This OCX is available for use with customer applications. It works with printers installed on Serial COM ports, LPT ports and USB. A USB compatible Beta version is available from customer support or from our web site.

10BaseT Ethernet Interface

Wired Ethernet Adapters provide a fast and easy way to network, share and add printers to your system. Ethernet provides a consistent common connection between printers and computers using standard protocols supported by Windows® 95, 98, Me, NT, 2000, and XP as well as many other platforms. Ethernet, being the most common networking medium, allows printers to be easily added, moved and removed with inexpensive common cabling and off the self-components.

The TransAct Ethernet adapter is what is known as a 10BaseT device, also sometimes known as twisted pair. This interface supports wired connections at a distance of up to 30 meters between the connected devices. Print server features with the standard Ethernet connection include:

- 10 Mbps Speed
- 10 Base T RJ45 network connection
- Network traffic LED indicator
- Configured through networked PC web browser
- Works with virtually all major operating systems
- Integrated into the printer
- Large RAM buffer for fast continuous printing
- 512K flash memory for future upgrades

Supported protocols for the 10BaseT Ethernet interface include:

- Line Printer Daemon Protocol (LPR) – RFC1179
- Simple Network Management Protocol (SNMP) – RFC1157
- Printer MIB – RFC1759
- Port 9100 (Raw data)
- Service Location Protocol (SLP) – RFC2165
- The TFTP Protocol (Revision 2) – RFC1350
- Telnet COM Port Control Option – RFC2217
- Hypertext Transfer Protocol – HTTP/1.1 – RFC2616
- TCP/IP (Transmission Control Protocol/Internet Protocol)

The TCP/IP protocol is used to configure your printer's interface, via a web browser accessing your printer's unique IP (Internet Protocol) address on the network. A brief description of the TCP/IP protocol is listed below, followed by specific information for installation and configuration utilities for your Ethernet printer interface.

Connecting the printer to the network

The steps needed to connect the printer to the network are as follows:

- Using a standard CAT5 Ethernet cable, connect one end to the RJ45 connector on the Wired Ethernet Adapter.
- Connect the other end to an open Ethernet port in your Ethernet hub, switch or router.
- Connect power to the printer and turn it on.

The printer should then print its IP address, which will be used to configure the Wired Ethernet Adapters.

Note: If the printer does not print the IP address within two minutes, press the recessed button on the Wired Ethernet Adapter for five (5) seconds and then release. This will reset the Wired Ethernet Adapter, not the printer, back to its factory defaults. The IP address should then be printed.

TransAct Ethernet Adapter

The TransAct 10BaseT Ethernet adapter allows the user to communicate to the printer in two ways: raw data to Port 9100, LPR or port 515, or through TELNET port 23. The one that you use will largely depend on the application and how the interaction is to occur.

A word of caution on the use of LPR: LPR is a protocol within itself. Typically, LPR is used by a Windows printer driver, and supports the protocol in a way that is largely hidden from the application. If you elect to use LPR, you should not try to intermix LPR and any other protocol. The TransAct Windows driver supports enhanced features such as cash drawer status and enhanced printer monitoring. These enhanced features use RAW data transfers. For that reason, the TransAct print server should be used in RAW mode whenever possible.

The adapter supports Dynamic Host Configuration Protocol (DHCP) or static IP addressing. To make initial network setup easier, the adapter will initially be configured to Auto IP. Auto IP attempts to use DHCP or a Name server to obtain an IP address assignment. If that fails, the network is monitored and an address consistent with the active network is temporarily assigned and allow final configuration. (Note: Auto IP should not be left active, because the printer's address may change, and could conflict with inactive devices in your network.) Turn off the Auto IP feature by setting DHCP or Static IP using the Locator program, or from the Address web page.

Installation and configuration utilities

TransAct provides a Windows™ program, known as the Locator program, to allow Ithaca Ethernet devices to be located and configured on a local subnet.

The Locator program allows the system administrator to find all Ithaca wired Ethernet adapters on the local network, regardless of the IP addresses assigned to each adapter. Locator will scan the local subnet and locate any Ithaca printers connected to that network. When all printers are found and a printer is selected, the adapter can be configured and/or updated, or you can activate your web browser to configure the printer.

The following web pages are available to configure the wired Ethernet adapter:

Identification:	This page maintains names associated with the printer. These names are helpful for network management.
Address:	This page defines the printer's address on the network.
Protocols:	This page defines which standard protocols the adapter will use to communication with the network computers.
Security:	This page provides a means to protect the wired Ethernet adapter's configuration from inadvertent change.
Firmware:	Provides the means to update the firmware in the wired Ethernet adapter as it is made available from TransAct

This locator program is available on the TransAct Web site (www.transact-tech.com), and is downloaded as a compressed ZIP file. The locator program consists of two files, Locator.exe and UbicomUCP.dll. These files must exist in a single directory and be run from that directory. Unzip the files into any convent directory and run Locator.exe from that directory.

For further information on installation and configuration of the Ethernet interface, consult the Ethernet Users Guide (PN 100-05072), available from TransAct Technologies.

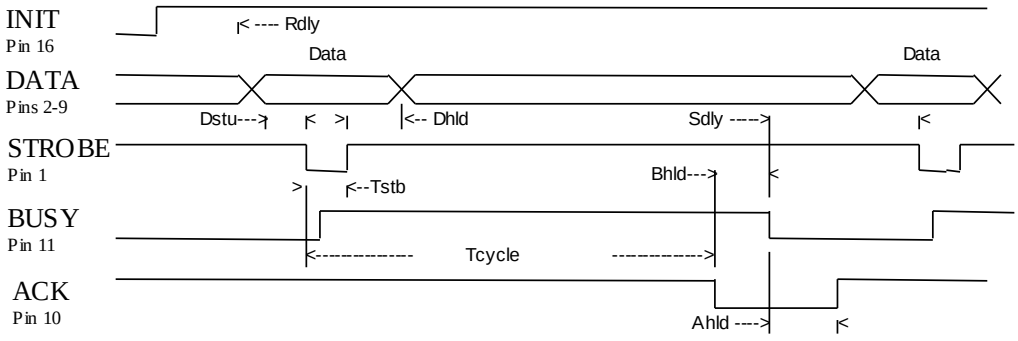
Parallel Port

Parallel Port Protocol

The ITHACA 9000 parallel port behaves just as any printer connected to a personal computer. The parallel interface accepts 8 bits of data from the host. The strobe signal from the host is used to indicate that data is available. When the printer sees the strobe signal and accepts the data, it asserts a busy signal. The busy signal indicates to the host that the printer has accepted the data and is working on it. After the printer absorbs the data and is ready to accept another byte, the printer asserts acknowledged (ACK), negates busy, and then finally negates ACK.

The host computer should meet the following parallel-port specifications and timing. In a standard personal computer, the strobe signal is generated by software writes to the parallel-port control port, which is typically done in the bios or some parallel-port driver. As personal computers become faster, it is up to the software to assure that the strobe signal does not get too narrow. One microsecond is the minimum pulse width that should be sent down a cable. Shorter pulse widths (500 nanoseconds) will be accepted by the printer. The cable can introduce significant signal degeneration and skew.

The data must be valid before the strobe signal is asserted and remain so until the strobe is removed. A 500-nanosecond setup and hold time is required by the printer.
The following chart illustrates parallel-port timing.



Rdly Approx. 2 seconds	Bhld Approx. 5 uS
Dstu 500 nS (Min)	Ahld Approx. 5 uS
Dhld 500 nS (Min)	Sdly 3 uS (Min)
Tstb 1 uS (Min)	Tcycle 200 - 280 uS Typ.

Figure 8: Parallel-port Data Timing

Implementing Flow Control

To implement flow control, the busy signal is asserted by the printer outside the normal data-transfer sequence. The busy signal has several uses, but it always indicates that the printer cannot accept information. The busy signal may happen at any time and may not adhere to the above timing chart in all cases. It is up to the host's parallel-port driver to handle all possible busy states. It is important that the host driver does not hang up if it takes some

time for an acknowledged (ACK) response to a strobe signal. Standard personal computer parallel-port hardware implements an interrupt on the ACK signal to make flow control easier.

Some systems may wish to change the details of how the strobe, busy, and acknowledged signals interact. The parallel-port option features define how the strobe, busy, and acknowledged signals operate. In normal mode, the printer follows the standard (Centronics) parallel-port conventions. With Options 1 and 3, the acknowledged and busy signals change simultaneously, which is sometimes referred to as ack-after-busy. Options 2 and 3 force busy high on the rising edge of the strobe, which is sometimes referred to as busy-while-strobe timing. In all cases, the data is latched on the rising edge of the strobe. In most cases, the normal timing mode gives the best results.

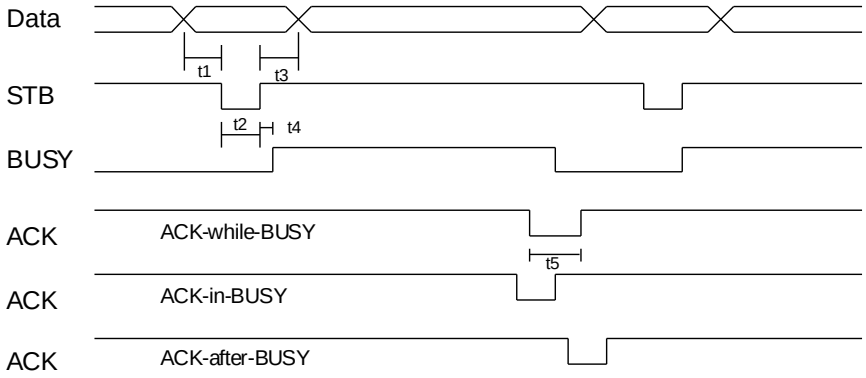


Figure 9 Parallel Port ACK Timing Options

Legend	Time Interval	Minimum	Maximum
t1	DATA Setup to STB	0.5 uS	
t2	STB Width	0.5 uS	500 uS
t3	DATA Hold after STB	0.5 uS	
t4	BUSY Delay after STB	0	0.5 uS
t5	ACK Pulse Width	2.5 uS	

Table 15 Parallel-port Timing

Note: Altered STB timing to take data on the falling edge of STB can be generated as a factory option.

Printer Buffer Size

The ITHACA 9000 Printer has a configurable buffer size. It can be set from 40 to 8192 bytes. The configurable buffer allows an application to control how far ahead the buffer gets from the printer. The smaller the buffer, the tighter the control will be. It is up to the application developer to select the optimal buffer size.

Parallel Port Inquire and IEEE 1284

The ITHACA 9000 Printer supports the IEEE 1284 bidirectional parallel peripheral interface standard. The IEEE 1284 standard provides for a bidirectional link on the parallel port. The Ithaca 8000™ Printer only supports Modes 0 and 4, which provide a nibble mode reverse channel for printer identification and status inquire commands. It is beyond the scope of this guide to describe the IEEE 1284 protocol. The complete specification is available from the Institute of Electrical and Electronic Engineers, Inc. at **www.ieee.org**.

IEEE 1284 Response Buffer

The ITHACA 9000 Printer has a 256-byte buffer that contains information to be returned by the IEEE 1284 reverse link. Information is placed in the buffer in the same format as RS-232 serial information is returned.

Inquire commands sent to the printer in IEEE 1284 mode place responses to the commands in the IEEE 1284 reverse-channel buffer. The buffer is then transmitted to the host when it requests the reverse channel.

Mode 4

Mode 4 allows the printer to return identification information to the host system. The ITHACA 9000 Printer returns:

xx,yy length of following data, 2 bytes with MSB first

MANUFACTURER	TransAct Technologies
COMMAND SET	IPCL
MODEL	1000
COMMENT	Rev. x.xx
ACTIVE COMMAND SET	IPCL

When a Mode 4 request is made, the IEEE 1284 buffer is cleared before the ID is sent.

Mode 0

Mode 0 provides a reverse channel for information from the printer. Normal responses to inquire commands are placed in the IEEE 1284 reverse-channel buffer. The Mode 0 reverse-channel request begins returning information to the host. The host may terminate the transmission at any time. If the link is terminated between nibbles, the last nibble is retransmitted on the next request. If a complete byte is transmitted, it is deleted from the IEEE 1284 reverse-channel buffer.

An inquire command can clear the reverse-channel buffer before placing its response in the buffer.

The IEEE 1284 buffer is limited to 1000 characters. If the buffer is not emptied by reverse-channel requests, the buffer overflows. The buffer is a first-in first-out (FIFO) buffer, and the last data placed in the buffer is lost.

Time-outs
IEEE 1284 specifies time-outs for various phases of the protocol. The ITHACA 9000 Printer treats time-outs as minimums. The printer time outs at the specified period only if it is idle during the complete phase.

Active State
The IEEE 1284 reverse channel may be activated at any time as long as the printer is not busy with data. If the printer is off-line or the cover is open, the reverse channel may be activated. If the printer is placed back on-line while the reverse channel is active, the printer will not exit the reverse-channel mode.

Inquire Responses
In general, inquire commands place two-byte responses in the IEEE 1284 reverse-channel buffer. The two bytes are the same as the serial mode responses. In IEEE 1284 mode, the printer remains busy until the inquire command is processed, assuring responses in real time. To receive the response, the host must ask for it. It is possible for the host to make a number of requests and wait for the responses; however, the status returned is valid at the time the request was made.

It is also possible for the dynamic response mode to be activated and the reverse-channel mode to be opened. The reverse channel then changes from reverse-idle to reverse-data available as the status changes. The application must be careful in dynamic response mode that the dynamic responses are not left active when the reverse channel is closed. If the dynamic responses are active when the reverse channel closes, the output buffer overflows. If data is in the buffer when dynamic responses are activated, it will not be replaced by the current status. If dynamic response is off and a buffer-clear command is issued followed by activation of dynamic responses, the buffer will contain fresh data. If the buffer-clear command is issued after the dynamic response is activated, the buffer will be cleared, and any unread responses will be lost.

Parallel Port Plug and Play
Microsoft Windows implements Plug and Play (PnP) by doing a special parallel, IEEE 1284 inquire during boot. The ITHACA 9000 Printer responds to the inquiry if IEEE 1284 is active.

If the Windows PnP configuration flag is set in the printer, IEEE 1284 will be active for all parallel-port modes. For example, PnP in parallel mode forces IEEE 1284. For PnP to work, the host must have an IEEE 1284-compatible port adapter, and the cable used to connect to the printer must support all of the interface signals. The Plug and Play response follow.

Device ID string:
Manufacturer: TransAct.;
CMD:PJ1000CL,IPCL;
CLS:PRINTER;MDL S1000 PcOS;
DES:TransAct Ithaca 8000;
REV:02.00;OPTS;$9xyz

PnP ID: LPTENUM\TransAct.S1000_PcECB3
Device: ITHACA 9000
Device Class: Printer
The OPTS field is always: OPTS;$2XYZ

where X is a model definition, X and Y are bit fields that designate the options attached to the printer.

Y		X	
Bit 0	Print zone	Bit 0	0
Bit 1	Undefined	Bit 1	Knife module attached
Bit 2	Undefined	Bit 2	0
Bit 3	0	Bit 3	0
Bits 4-5	1	Bits 4-5	1
Bits 6-7	0	Bits 6-7	0

Serial Port

Serial Port Protocol

The serial port supports two flow control standards, XON/XOFF and Ready/Busy (sometimes called Data Terminal Ready (DTR) or hardware handshake).

When Ready/Busy flow control is selected, the printer can be configured to use DTR, Request to Send (RTS), or both for flow control. If only DTR is selected for flow control, RTS will indicate the cover is open or the printer has faulted. The following discussion assumes the DTR is being used for flow control.

The Ready/Busy protocol generally uses the DTR signal to indicate to the host computer that the printer is not ready to accept data. The host should then stop sending data to the printer as soon as possible. Because the host may not notice the DTR signal until it has transmitted several bytes of data to the printer, the printer continues to accept up to 255[3] bytes of data after it indicates that it is not ready. Figure 10 illustrates how the Ready/Busy protocol works, and Figure 11 illustrates how the XON/XOFF protocol works.

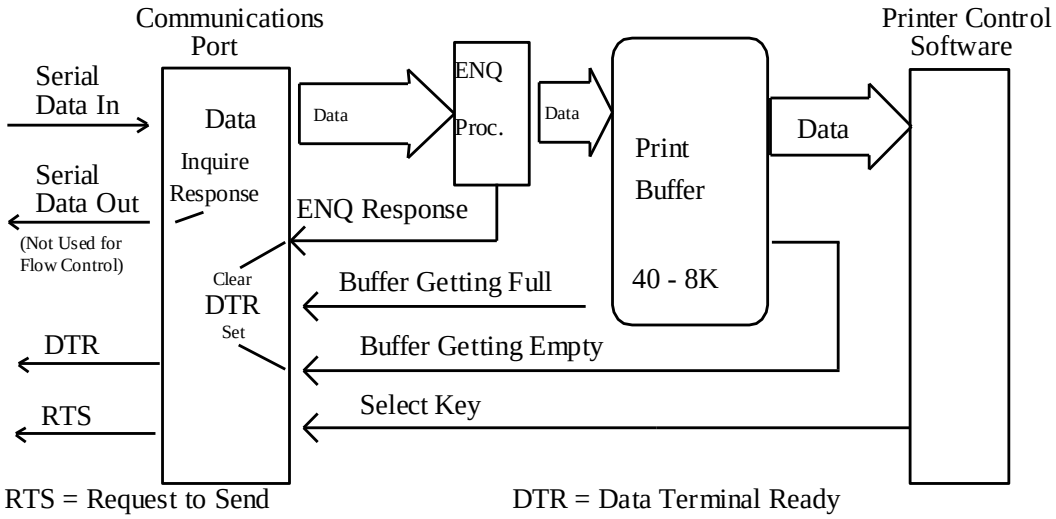


Figure 10 Serial Port Flow Control Using DTR

[3] The buffer always signals it is full before it overflows. The size of the reserve depends on the buffer size selected. It is always at least 255 bytes.

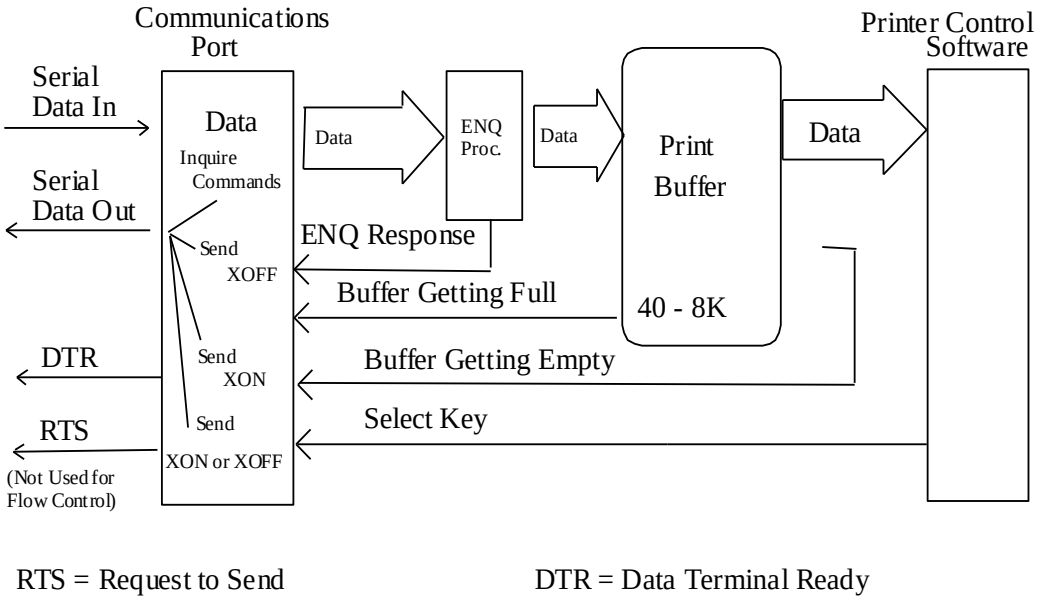
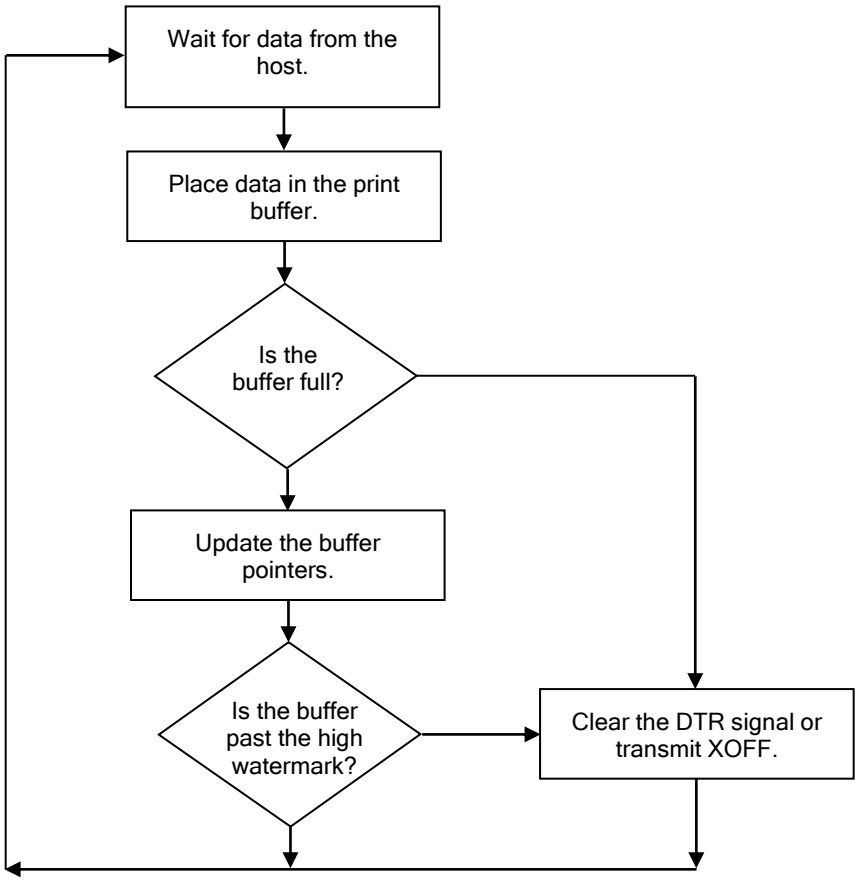


Figure 11 XON/XOFF Serial Port Flow Control

Print Buffer Flow

Flow Chart 1 illustrates how the communications driver acquires data from the serial port and places it in the buffer using Ready/Busy or XON/XOFF flow control.

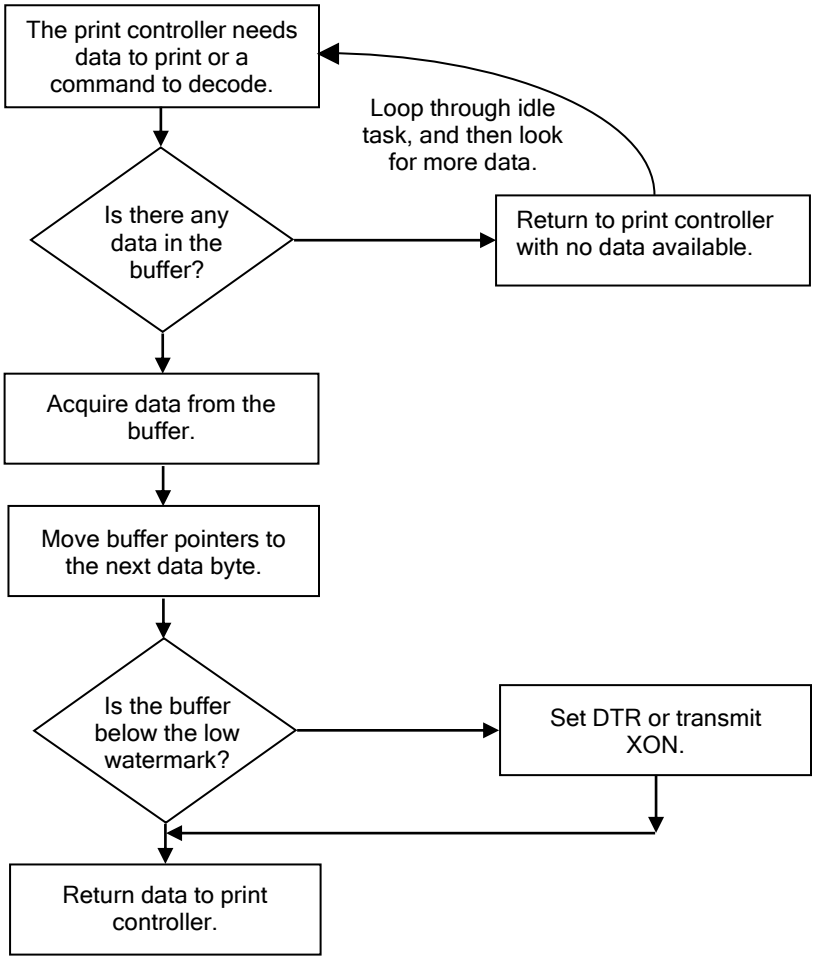


Flow Chart 1 Serial Buffer Operation

At the top of this flow chart, the driver is waiting for data. When data is received from the host, the printer checks to see if it is an inquire command. If the data is an inquire, it is responded to and placed in the buffer. If not, the data is placed in the buffer without response. The buffer is then checked to see if it is full before the internal pointer is incremented. If it is not full, the pointer is incremented in preparation for the next data byte. The buffer is checked by looking to see if it has passed a high watermark. If the buffer has, the communication driver is notified, and it resets DTR to indicate to the host that no more data should be sent.

Flow Chart 2 illustrates how the print control software takes data from the buffer and controls flow. At the top of the chart, the print control software asks for data. If there is no data in the buffer, a “no data flag” is returned. The print software must then wait for data. If there is data in the buffer, it is read, and the pointers are updated. The buffer is then checked to see how much information is left. If the buffer is below a low watermark (about 100 bytes left), the communication driver is notified, and DTR is reasserted.

When XON/XOFF flow control is used, the flow is similar to DTR flow except that DTR is not used and XON/XOFF control characters are transmitted back to the host on the serial link. The XON/XOFF advantage is that only three wires are required to interconnect to a printer. The disadvantage is that a serial-port receiver driver must be written for the host.



Flow Chart 2 Print Controller Using Data

When the printer is on, the print controller looks for data. If there is data, it processes it. Flow control is done when the data is taken from the buffer and the amount of data in the buffer is less than a prescribed amount. The low watermark is set based on the expected environment. The ITHACA 9000 Printer sets the low watermark at half the buffer size or 1024 characters whichever is smaller. The low watermark gives the host application time to get more data to the printer before the printer uses up what it has.

When XON/XOFF protocol is implemented, it is possible for the host to miss an XON or an XOFF. To prevent this from causing a communication lockup, the printer sends an XOFF for every character received after the high watermark is reached. If the printer detects that the serial data link is inactive, it sends out an XON about every two seconds. When the printer cover is opened, an XOFF is sent. An XOFF is sent even when the internal data buffer is past the high watermark and is done to allow the host to know that the printer is not ready.

Printer Buffer Size

The size of the ITHACA 9000 buffer is configurable, which allows an application to control how far ahead of the printer it can get before being asked to wait. The buffer size can be set from 256 to 6144 bytes (not including the 64-character high-speed buffer). The smaller the buffer, the tighter the control will be. It is up to the developer to select the optimal buffer size for an application.

Serial Mode Plug and Play

Microsoft has defined a Plug and Play (PnP) protocol to identify devices on serial links. The enumeration process is designed to find and automatically configure a device driver for the printer. It is done by toggling the control lines in a specific sequence that is recognized by the printer. The peripheral then responds such that Windows can identify the device.

To allow the printer to look for and respond to the sequence, EISA PnP must be enabled. When enabled in serial mode, the flow control is forced to Request to Send (RTS) with Data Terminal Ready (DTR) static.

Using DSR

Windows uses the host's Data Set Ready (DSR) line (the printer's DTR line) on the serial port to determine whether a device is attached to the port. When Windows is booted (or performs PnP), the system sets the host's DTR and RTS to zero and waits approximately 200 milliseconds. It then sets the DTR to one and waits another 200 milliseconds. After 200 milliseconds, the system checks to see whether the DSR line is high. This indicates that a serial device is attached to the serial port. The system responds by setting RTS high and waits to receive the device identification string.

In some devices, such as the serial mouse, the DSR line can be held high by tying it directly to the DTR line. When the mouse is connected to the serial port on the personal computer, the power supplied through the DTR line also raises DSR high.

For Plug and Play compatibility, RTS flow control is used at the printer because DSR must stay high as long as the device is attached to the serial port.

Serial Device Identification

The serial device must report its identification to the system using an identification string at 1200 baud. The identification string consists of 18 fields that identify the device, class of the device, and other compatible devices. Only five of the fields are required by all serial devices; all others are optional. The identification string used by the ITHACA 9000 Printer follows.

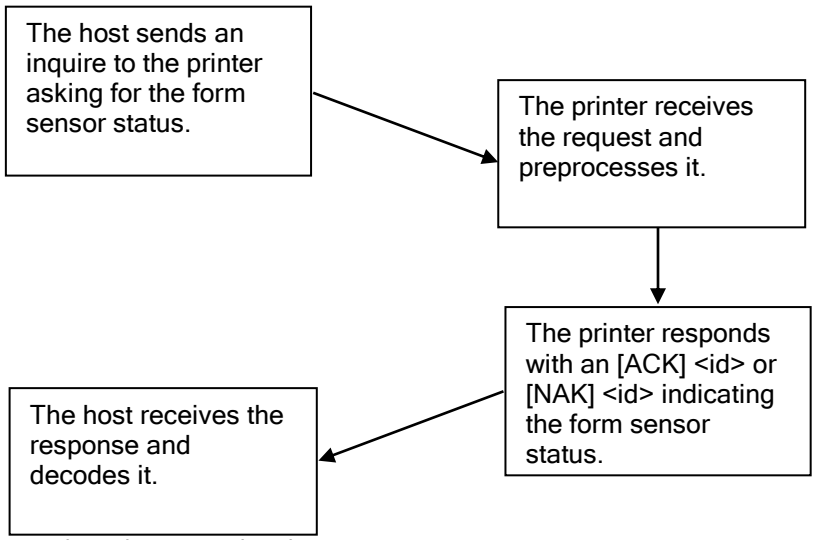
028H	Start of ASCII response	
	0,1	PnP Rev
	'IPR0210'	Unique ID (IPR plus revision level)
	\PRINTER	Printer
	\S1000 PcOS	Model
	\SC:	9600,N,8,1
	Serial Configuration:	Baud, Parity, Bits, Stop Bits
	xxH	Check-sum
	029H	End PnP

Note: The model field may be altered to generate PnP ID's other than "S1000 PcOS" by special order.

When the identification is complete, the printer returns to the baud rate specified in the configuration.

Serial Port Inquire

The serial port inquire is more straightforward than parallel mode. The serial acknowledged (ACK) or not acknowledged (NAK) responses follow a uniform format, the ACK or NAK is always followed by the command ID that requested it. This makes the design of the host application easier, because the response can be identified, and always follows the same format.



Flow Chart 3 Inquire Flow

The host sends an [ENQ] <id> (form sensor status) request to the printer. The printer responds with an [ACK] <id> indicating that the request was identified, status true.

Inquire commands affect the printer's performance. Communication is a high priority for the printer. Inquire commands take processing time away from the print tasks. It is possible to ask for so much status that the printer slows. In serial mode, it is important that the response to an inquiry is received by the host before another command is issued. When an inquiry is received by the printer, it is buffered in a high-speed processing queue. When the printer has time, it empties the queue and processes the inquiries. The printer responds to the command as soon as the second byte of the command is taken from the high-speed buffer. If the host is looking for a form to be inserted, it should not send status requests as fast as it can. The host will receive a response to all of them. If the host did not wait for a response to each, there would be unnecessary responses.

In IEEE 1284 mode, inquire responses are placed in an IEEE 1284 transmit queue. When the IEEE 1284 reverse channel is open, the responses are returned to the host. It is important that after each request the reverse channel be opened. Inquire responses remain in the queue until read. If the [ENQ] <9> command is sent to the printer, the IEEE 1284 buffer will be cleared, and only the response to the [ENQ] <9> will remain.

Display Pass Through

The display pass through feature allows a pole display to be interconnected with the printer. The printer is connected to a host system with a special serial cable. The host sends serial data to the printer and the printer sends serial data to the pole display. The printer does not provide power to the display. During normal printer operation, no data is passed to the display. In pass through mode, all received data is passed on to the display.

The restrictions and considerations for pass through are:

1. Pass through only works on serial printers with DTR flow control.
2. XON/XOFF mode does not work correctly.
3. All inquire ([ENQ]) commands are active when not in actual pass through mode. If, for example, an [ENQ] command for cash drawer status is received by the printer, the response is transmitted. When pass through is active, all data except the [ENQ] is passed. The printer does not look for or act on any commands other than inquires.
4. If pass through data is sent to the printer in continuous mode (i.e. as fast as possible), each [ENQ] character in the sequence delays the transmit data by one byte. The printer buffer size is limited. If the buffer overruns, data will be lost.
5. Modem handshake signals from the printer are not controlled during past through. Their state is set by printer status. Opening the cover toggles the control lines. When the printer cover is open, it accepts data, including all [ENQ] commands. If an [ENQ] # is received when off-line, pass through is entered.
6. Previously buffered data is processed by the printer in pass through mode. Printer performance is degraded by the processing of pass through data.
7. In 8-bit, no parity mode, data is passed through unaltered. In all other modes, the parity is checked, stripped, and then regenerated by the printer.
8. Pass through has no effect on a printer in parallel mode.

Miscellaneous Communication Features

Power-cycle Recovery

Sometimes the host needs to know if the printer was power cycled. An example would be after the receipt tape was changed. It is not necessary to turn off the printer to change the receipt. However, if the operator does, any information sent to the printer before the power cycle will be lost.

The printer has a flag that is set after a reset and stays set until the host requests a reset. The [ENQ] <11> command reads this flag. If the command returns power-cycled status, the power has been reset or power cycled since the last request. All unprinted information has been lost.

If the print operation is critical, it is a good idea to check the power-cycle flag before and after all transactions. An alternate approach is to check the flag after every off-line to on-line transition.

Note: If the printer mode was changed by the [ESC] y <2> or <3> command, a power-cycle reset will return to the initial configuration.

Data Pass-through

The printer supports data pass-through (sometimes referred to as display pass-through). Data pass-through is activated by the print-suppress command with the pass-through bit set. In pass-through mode, the printer can be requested to transmit any data that it receives. When this is the case, the printer's inquire commands are active but of little use. Typically, the printer's transmit data is connected to the next device in line. Inquire commands have no data path back to the host. If pass-through is to be used, it is a good idea to deactivate the inquire commands. (Use [ESC] y <6>).

Before pass-through data can be used, it must be activated in the configuration menu, which is the third selection in the print-suppress/pass option.

All data after, but not including, the print-suppress command is pass through. When deactivated, the print-suppress command is again not pass through. During pass-through, the multi-drop commands are active (if configured).

The printer will act upon a multi-drop control command found in the pass-through data. If the printer is deselected during pass-through, it stops passing on the data. When the printer is re-addressed, data pass-through is active.

Multi-drop Configuration

The printer supports a multi-drop configuration where up to three printers can be connected in parallel. Each printer has a different address A, B, or C. The printer does not accept any print information unless it is addressed. Multi-drop configuration is only available in serial mode, as parallel printers cannot be connected together.

Off-line Active

A configuration flag that prevents the printer from going off-line (in most cases) is available. Off-line mode allows the application to query the printer for status rather than assume a status from the control signals. The feature allows the host application to query the printer at all times except when there is no power; a full input buffer; or a hard failure. For example, when the printer's cover is open, the printer stops printing but still accepts data and inquiries. The inquire cover status command returns, "Cover open."

Hard failures result when there is no power or a printer fault occurs. If the printer is off-line, either the input buffer is full or a hard fault has occurred. The host application should not allow the input buffer to fill.

Recovery from Mechanical Errors

The Ithaca Inquire commands and the Epson [DLE][ENQ] and [DLE][EOT] commands allow most printer error statuses to be read and, in some cases, recovery attempted. Paper jams and auto-cutter faults can be recovered, however, any data not previously printed will be lost.

If the application is to support error recovery, the application should use the appropriate status request commands to query the printer periodically. If an error response is such that the fault is recoverable, the host application should interact with the operator and request that the fault be corrected. (IE. Clear Paper Jam) When the operator indicates that the problem has been corrected, the host can issue a reset request.

If a serious error occurs, the printer will halt and enter fault error mode. If the fault is such that the printer can maintain communications with the host, the print status request and response system will remain active. The status of the system will however remain static, i.e. the status responses will reflect the state of the system when the fault occurred.

There are errors that cannot be reported to the host system. These errors are such that the integrity of the printer does not allow continued operation, and normally occur during power up diagnostics. These errors are as follows:

EEPROM READ ERROR **Power up only**
The Internal EEPROM is not readable or the check sum is bad.
Pressing the * Button will attempt to rewrite the configuration information. This may leave the printer configured incorrectly.

EEPROM WRITE ERROR **Power up/down and Configuration only**
The Internal EEPROM is defective. There is no recovery.

SOFTWARE ERROR VECTOR **Can occur at any time.**
These errors can occur during operation. They signal a serious problem with the system. In most cases this error will also generate a Watch Dog reset. A power cycle will generally recover normal printer operation. An ESD event or a firmware bug generally causes these errors. The printer maintains an error log, this log contains additional information about the fault and is printed during manual configuration. The information in this log should be reported to TransAct to identify the exact cause of the fault.

USERSTORE FORMAT ERROR **Power up or User Store Write Operations**
The User Store data in Flash has an invalid format. Pressing the * Button will erase the user store and reformat it. This can be caused by a firmware update.

FLASH WRITE ERROR **Power up or User Store Write Operation.**
The Program Flash has failed. There is no recovery from this error.

COM ADAPTER ERROR **Power up only**
The communications interface card is not supported by the firmware or is missing. There is no recovery.

Programmer's Notes

When the serial port is used, it is important that the output lines from the printer not be shorted or back driven. If the signals are not to be used, they should be left open.

Pins 3, 4, and 7 (of the 9-pin connector) are outputs from the printer. If any one of these signals is grounded or back driven, the other two outputs will be degraded.

The best time to configure the printer by the host with remote configuration is during system setup or software update.

Chapter 9

Assembly and Disassembly

Precautions for Disassembly

Before disassembling any part of the printer, be sure the power is turned off. The Controller Board and the Thermal Print Head can be damaged by static electricity. Observe proper ESD precautions: wear a grounded wrist strap, and use a static mat or other protected work surface.

Thread Forming Screws – To prevent stripping the mating holes in plastic components when replacing screws, turn the screw counter-clockwise until a “click” is heard and then tighten normally.

Necessary Tools

The following tools are required to disassemble the ACCUTHERM ULTRA printer:

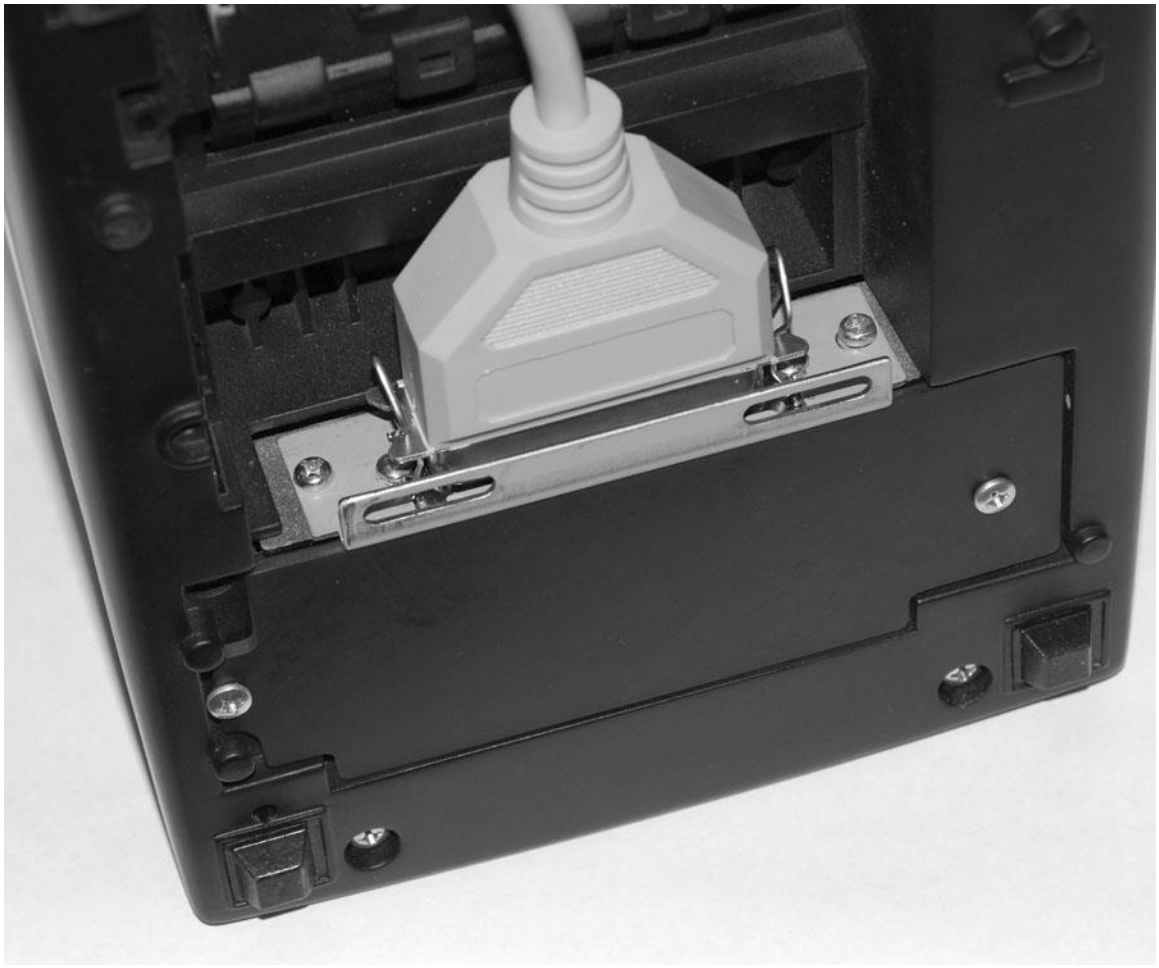
- #1 Phillips screwdriver
- 5.5mm nut driver or wrench

Disconnect the Power Cable

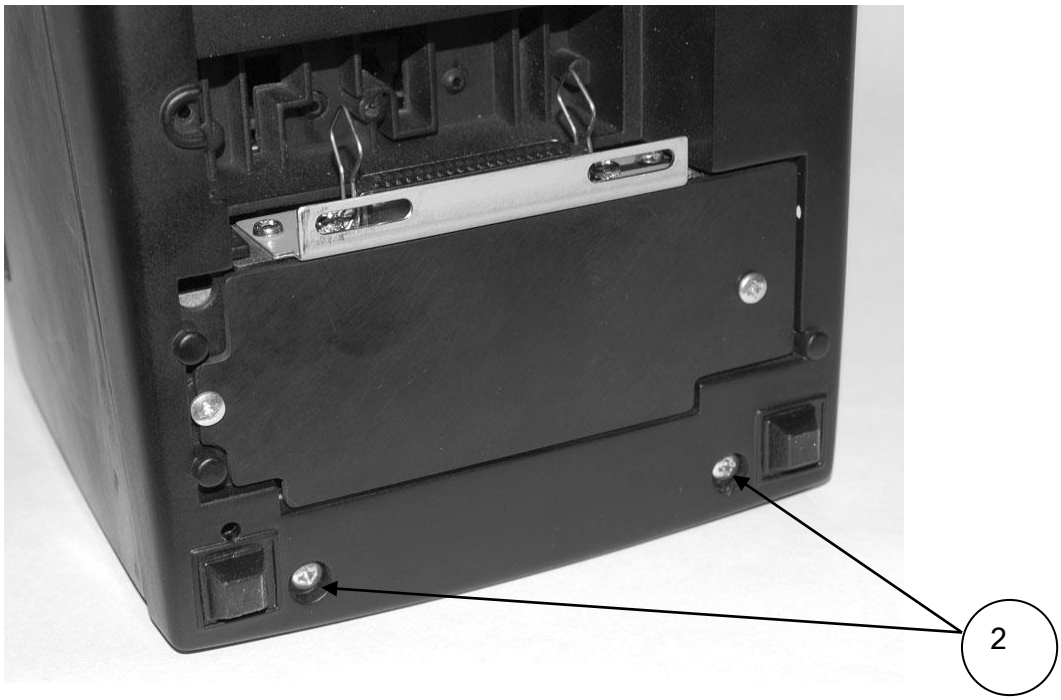
Unplug the power cord from the power connector and remove from strain relief located at the rear of the printer.

Disconnecting the Communications Cable

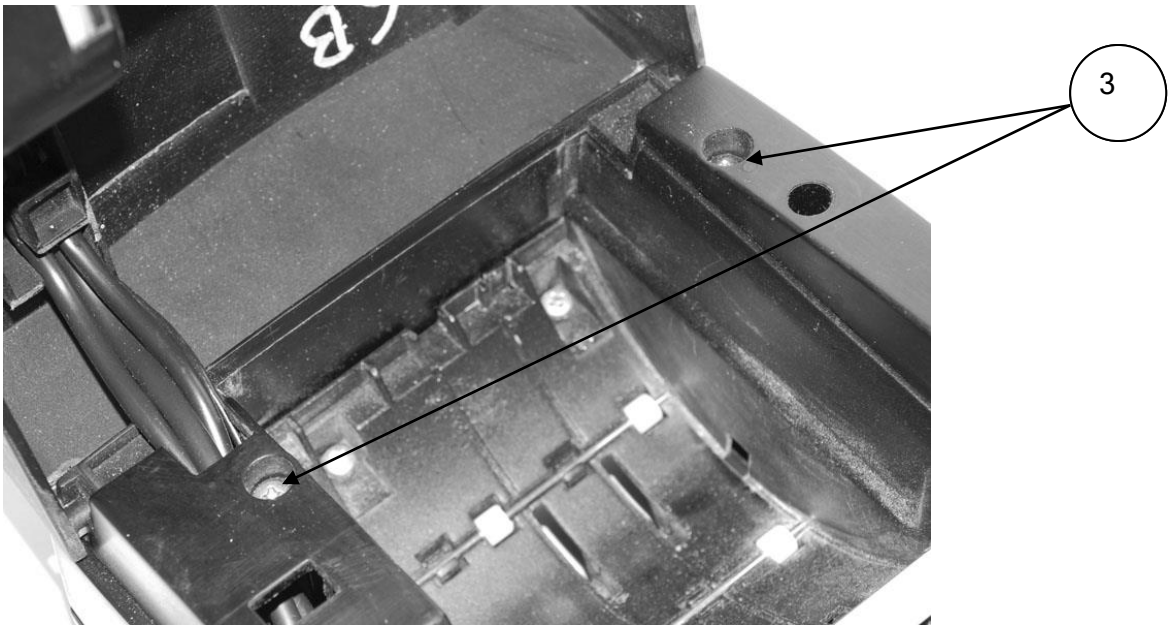
Unplug the communications cable from the Communications Interface PCB Assembly.



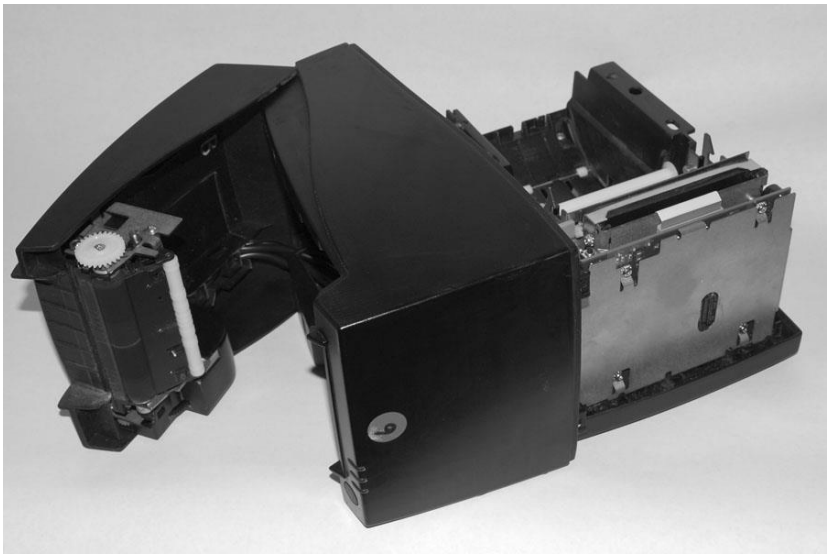
Remove Cover Assembly



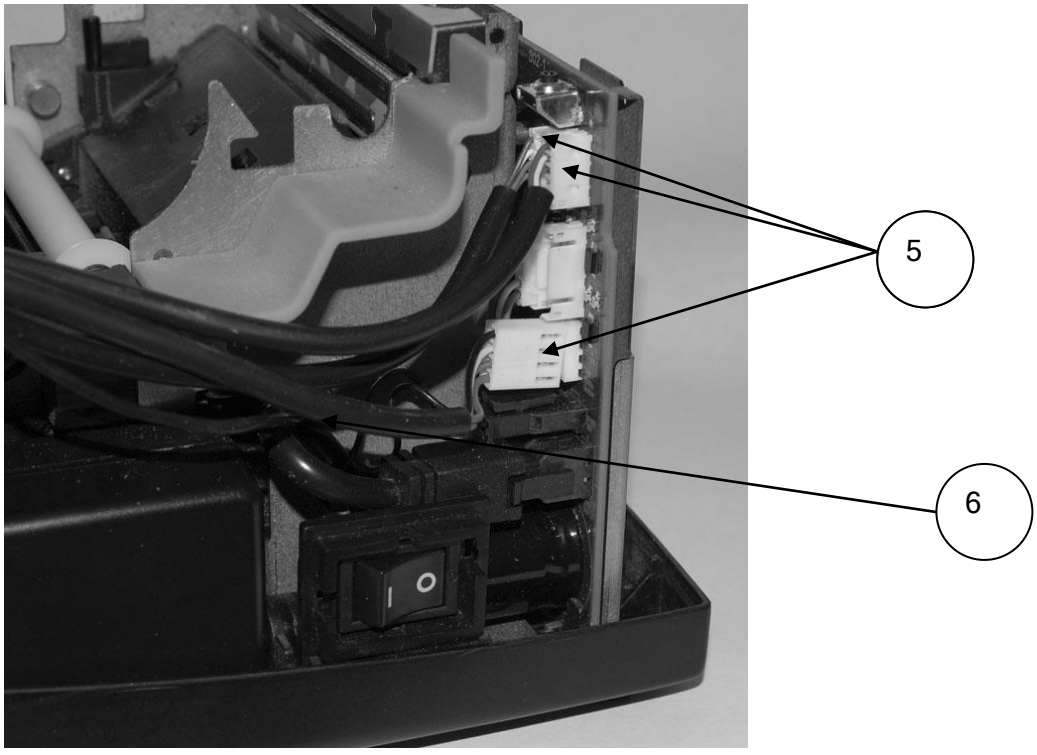
1. Open Paper Cover Assembly and remove Paper Roll, if present
2. Turn printer over and remove (2) #6 thread forming screws holding Midframe to base.



3. Unscrew (2) #6 thread forming screws holding Midframe to Paper Bucket.

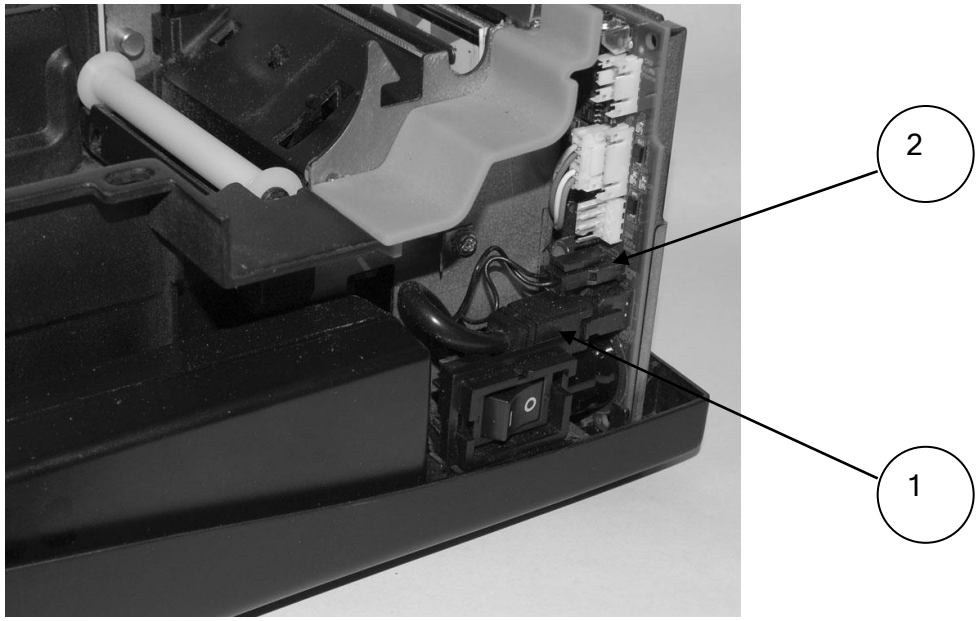


4. Lift and rotate sideways Mid-frame/Cover assembly to separate it from Base Assembly as shown.

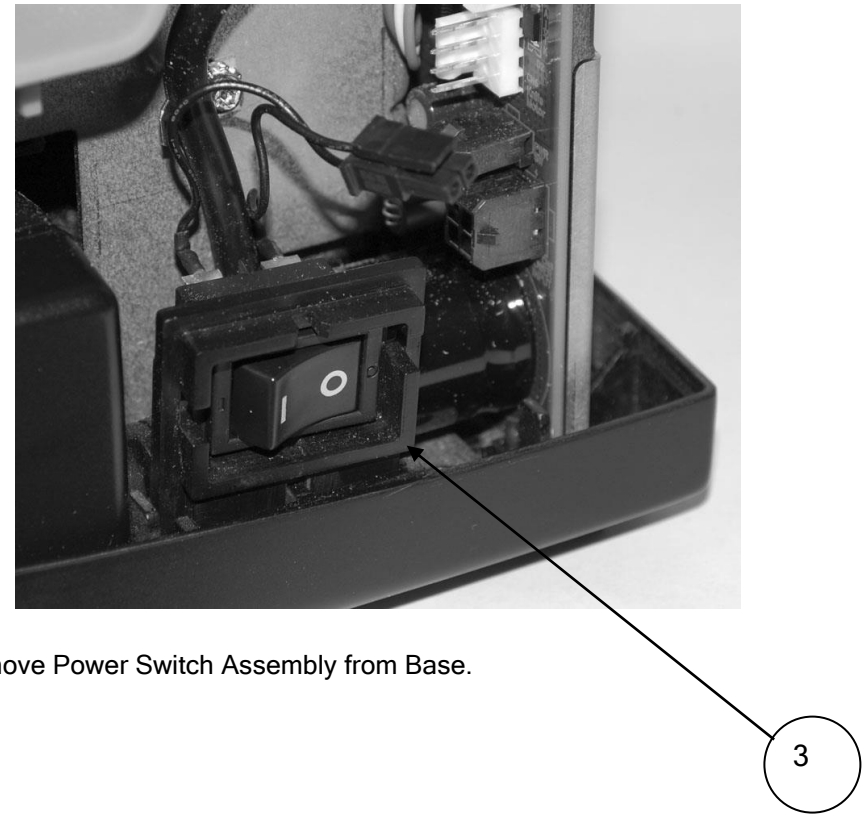


5. Unplug the Knife Motor, Carriage Home Sensor, and Top of Form Sensor connectors from the Main Controller PCB Assembly.
6. Unplug the Ground Wire from the printer mechanism.

Remove Power Supply from Base Assembly

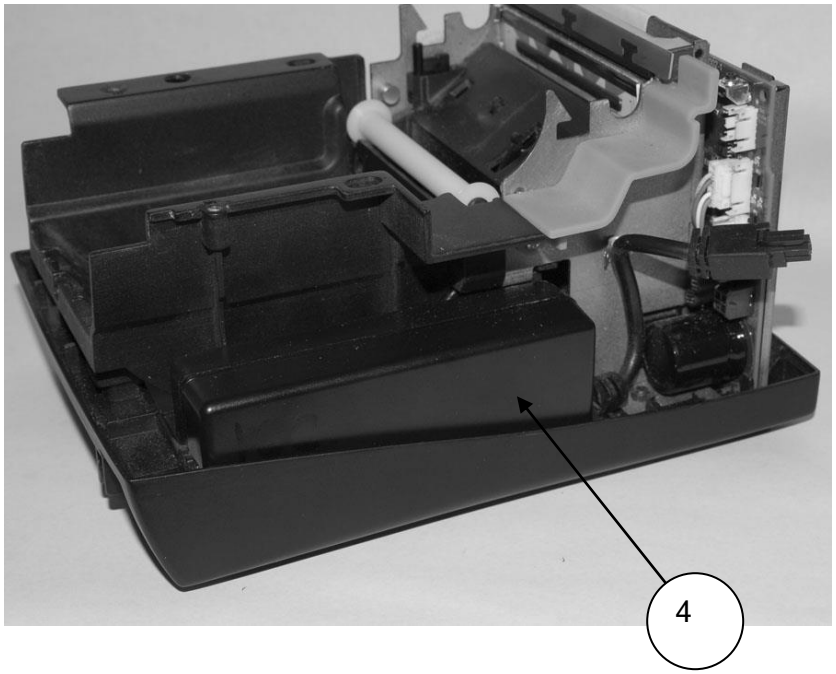


1. Unplug Power Supply Connector.
2. Unplug Power Switch Connector.



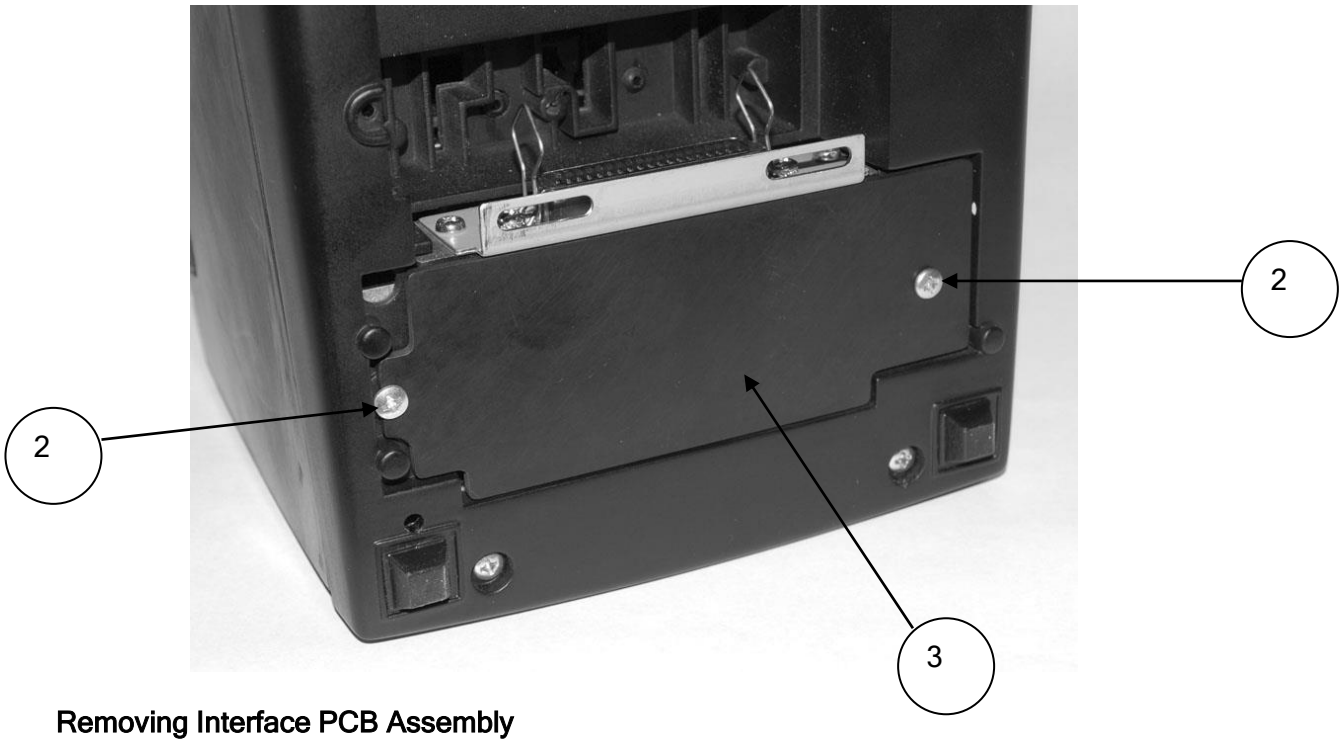
3. Remove Power Switch Assembly from Base.

Remove Power Supply from Base Assembly (Con't)



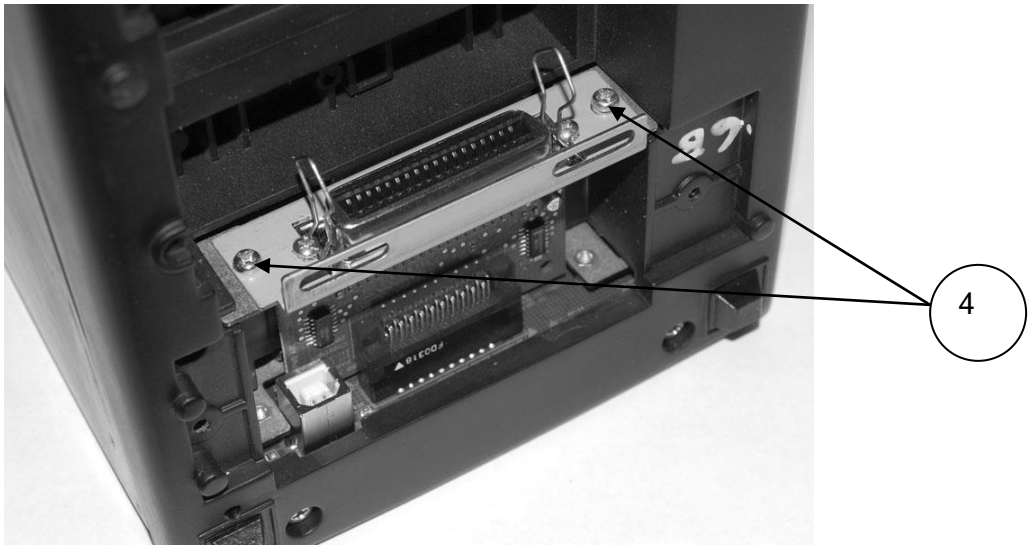
4. Slide Power Supply up and to rear to remove.

Remove Printer Mechanism Assembly from Base Assembly

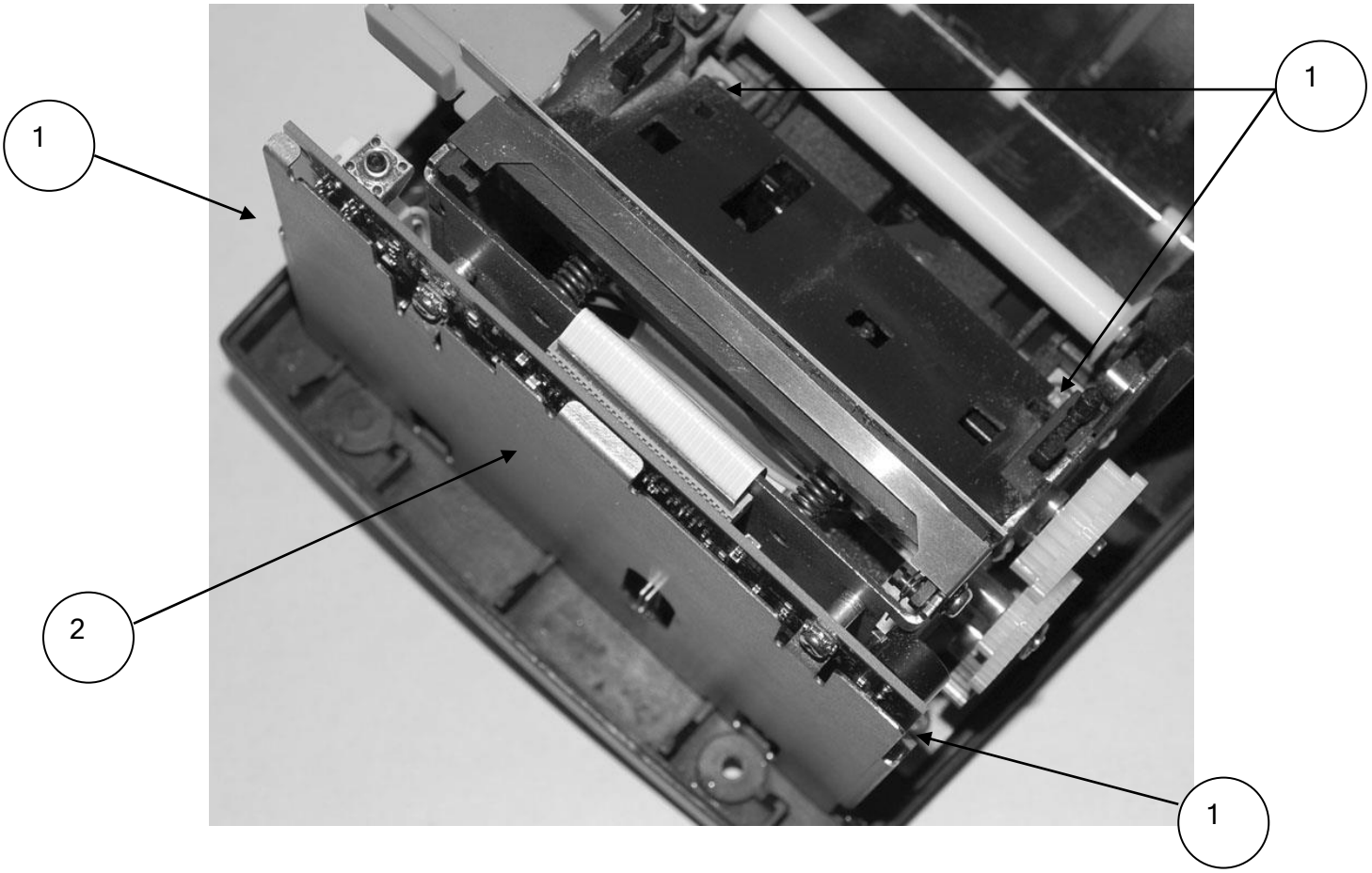


Removing Interface PCB Assembly

1. Remove Midframe and Paper Covers per previous instructions.
2. Turn printer over and remove (2) #6 thread forming screws and Base Opening Cover.
3. Remove Base Opening Cover.



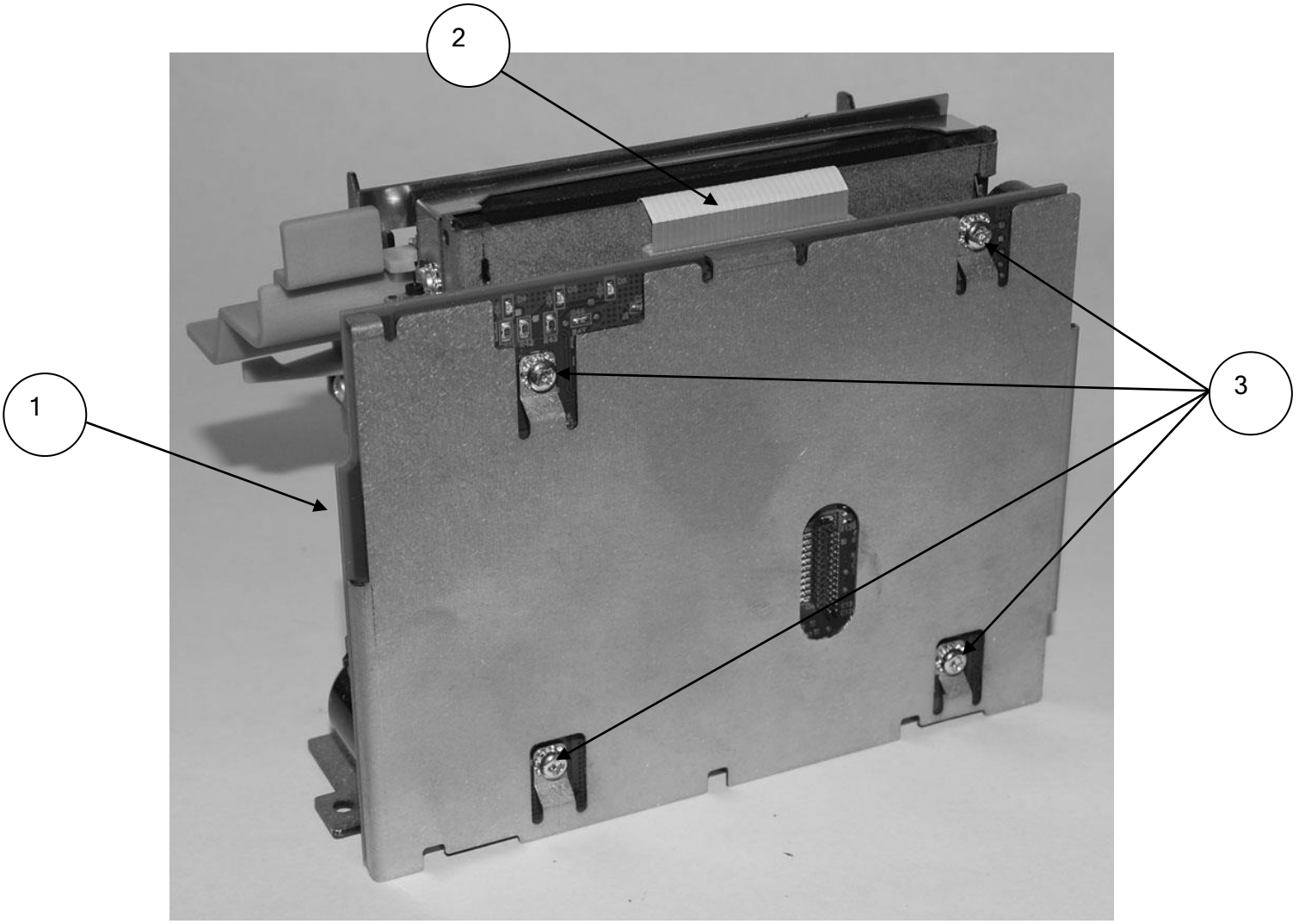
4. Remove (2) 4-40 screws and remove Communications PCB.



Removing Printer Mechanism Assembly

1. Remove (4) #6 Thread Forming Screws holding Printer Mechanism Assembly to Base Assembly.
2. Lift Printer Mechanism Assembly up from Base Assembly.

Remove Main Controller PCB Assembly from Printer Mechanism Assembly

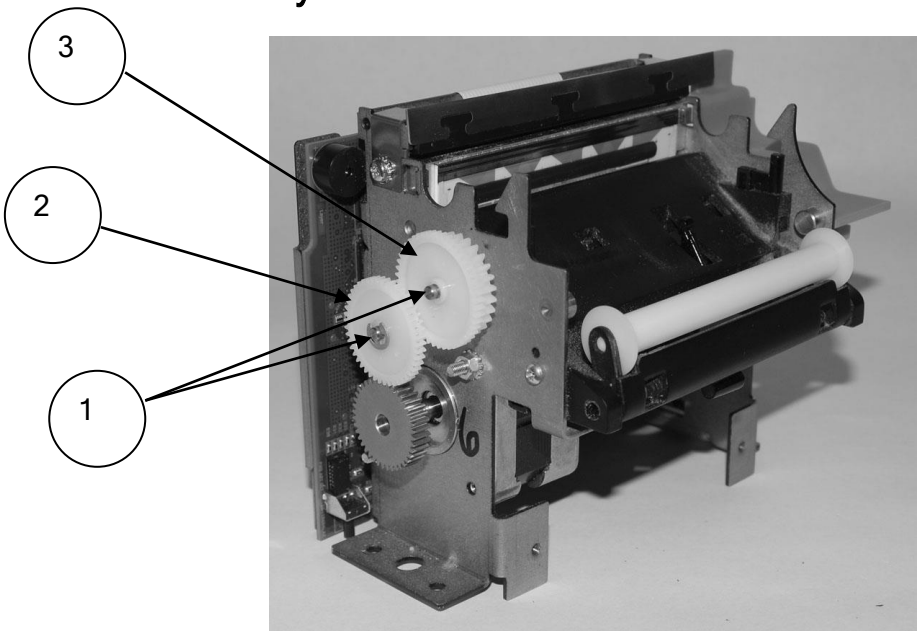


Remove Main Controller PCB Assembly

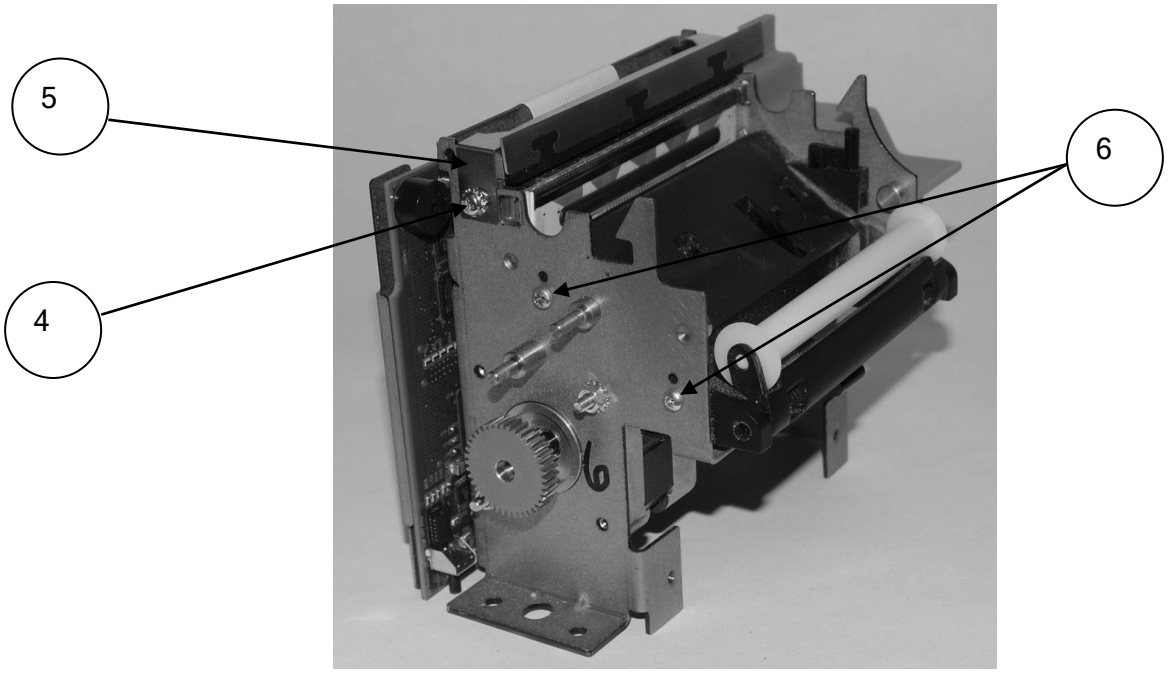
1. Unplug Motor Harness from Main Controller PCB Assembly.
2. Unplug Thermal Print-head Ribbon Cable from Main Controller PCB.
3. Remove (4) M3 screws holding the Shield-PCB and Main Controller PCB Assembly to the Printer Mechanism Assembly.

***Note:** When re-assembling the Thermal Print Head Cable ensure the cable in centered in the mating connector on the Controller PCB and Thermal Print Head.

Remove Paper Path Assembly from Printer Mechanism Assembly

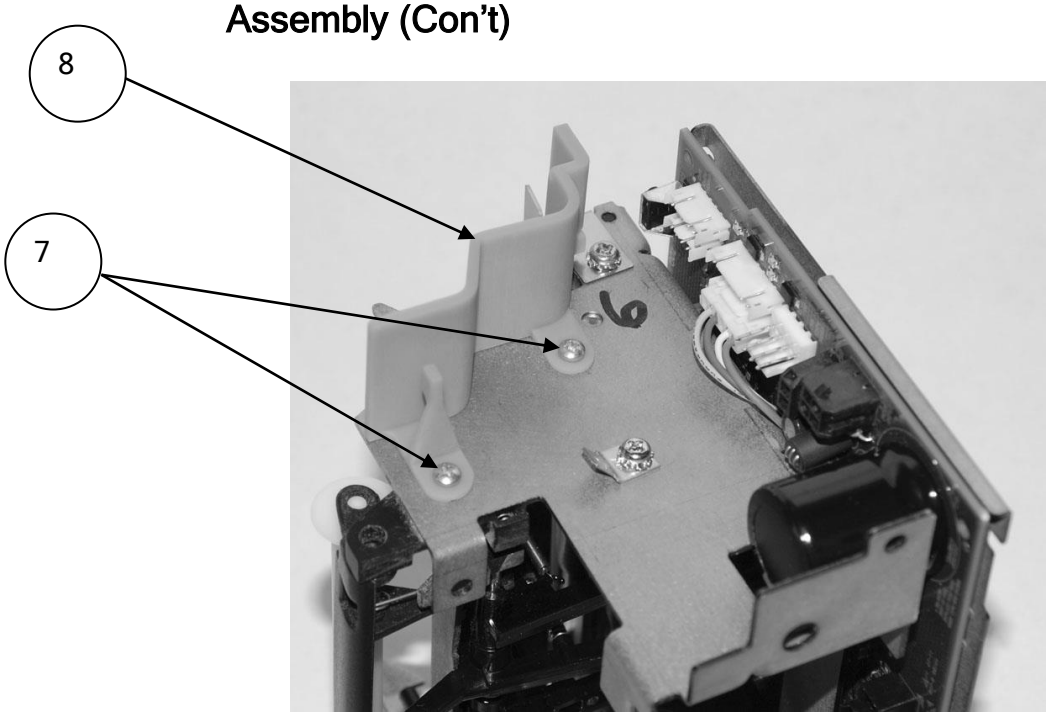


1. Remove (2) Retaining Rings.
2. Remove Combo Gear 26/46 Drive.
3. Remove Combo gear 48/28 Idler.

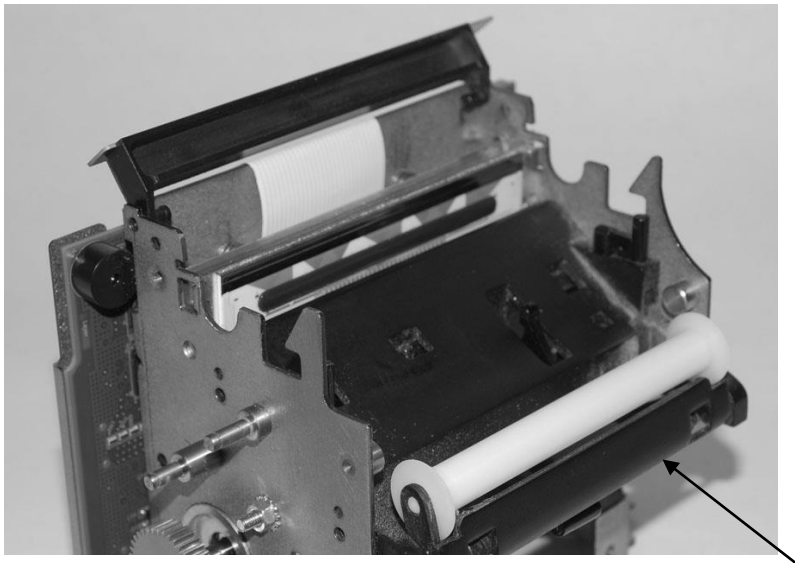


4. Remove (2) L/R Screws M3 X 6mm Sems.
5. Remove Tear Off.
6. Remove (2) #4 Plastic Thread Forming Screws.

Remove Paper Path Assembly from Printer Mechanism Assembly (Con't)

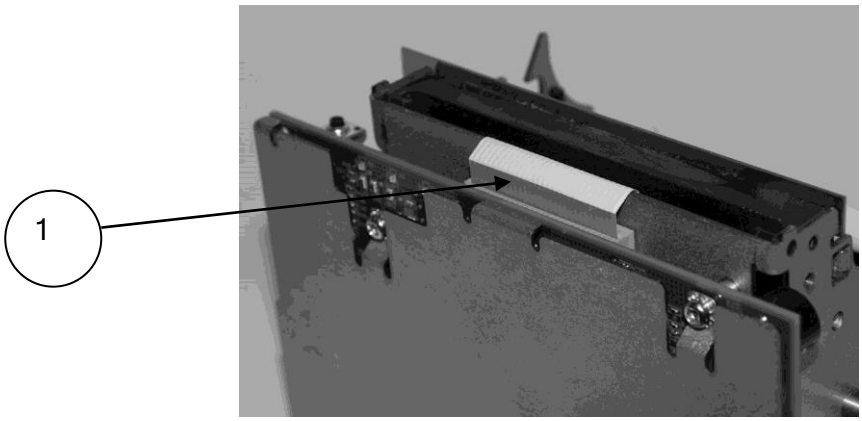


7. Remove (2) #4 Plastic Thread Forming Screws.
8. Remove Electronics Shield.

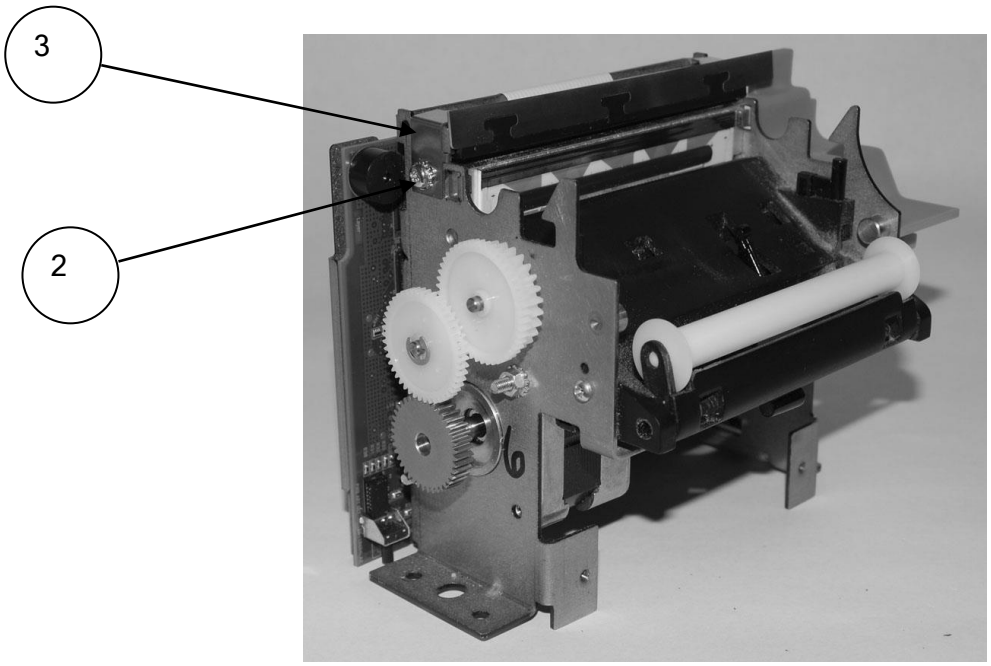


9. Carefully spread Frame and remove Paper Path Assembly.

Remove Print Head Assembly from Printer Mechanism Assembly

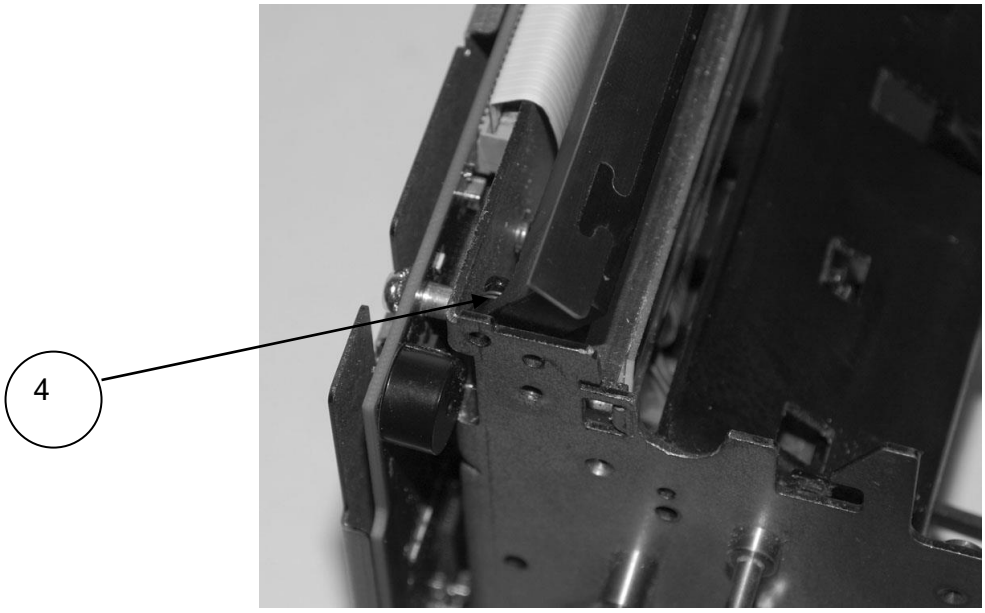


1. Unplug Thermal Print-head Ribbon Cable from Main Controller PCB.

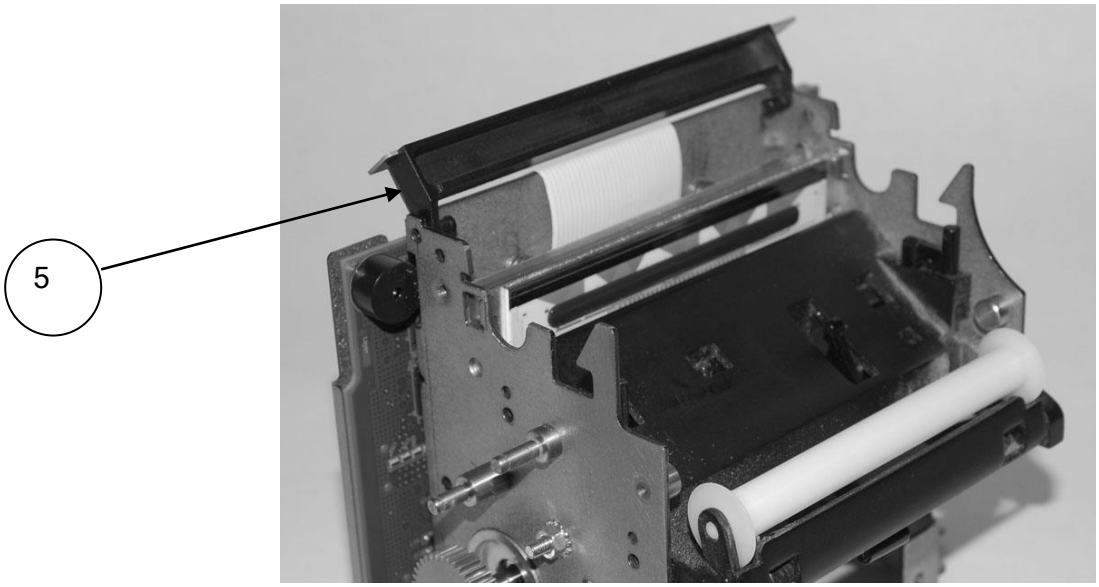


2. Remove (2) L/R Screws M3 X 6mm Sems.
3. Remove Tear Off.

Remove Print Head Assembly from Printer Mechanism Assembly (Con't)

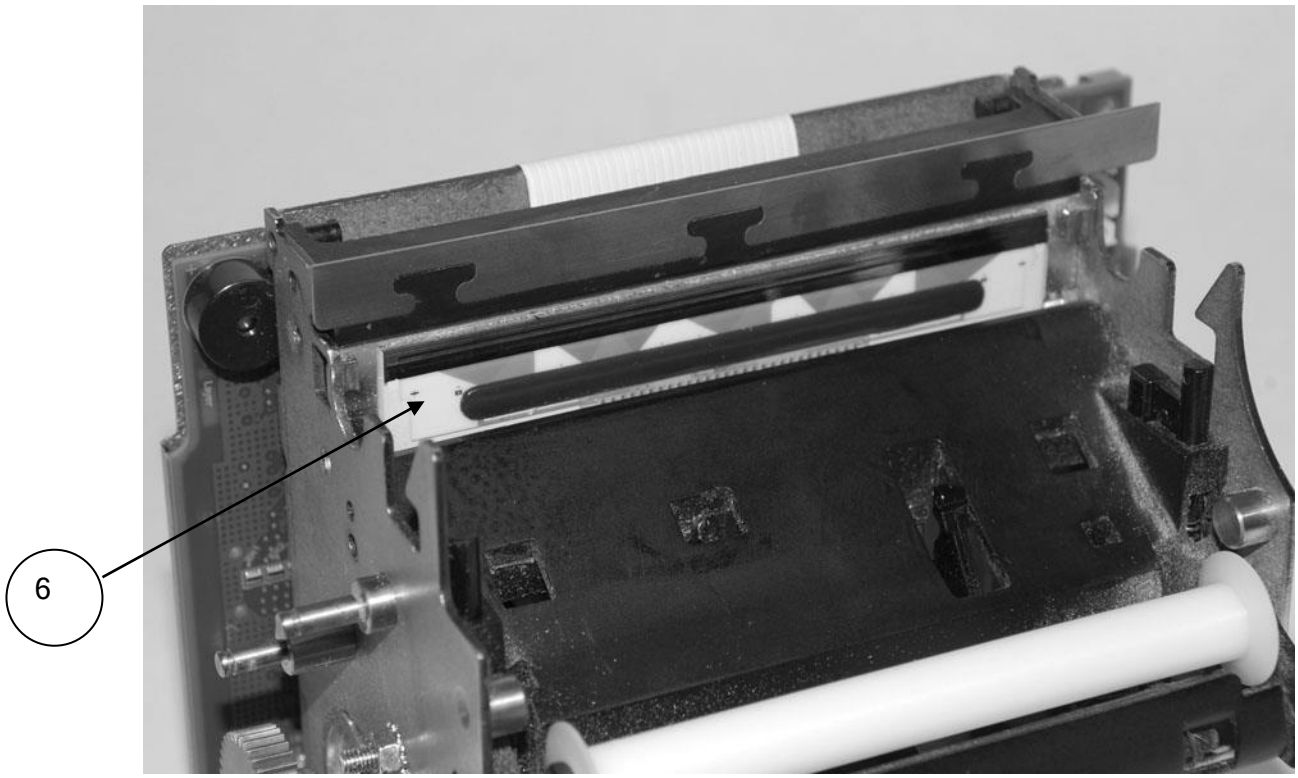


4. Remove Knife Torsion Spring.



5. Rotate Knife Blade Assembly up.

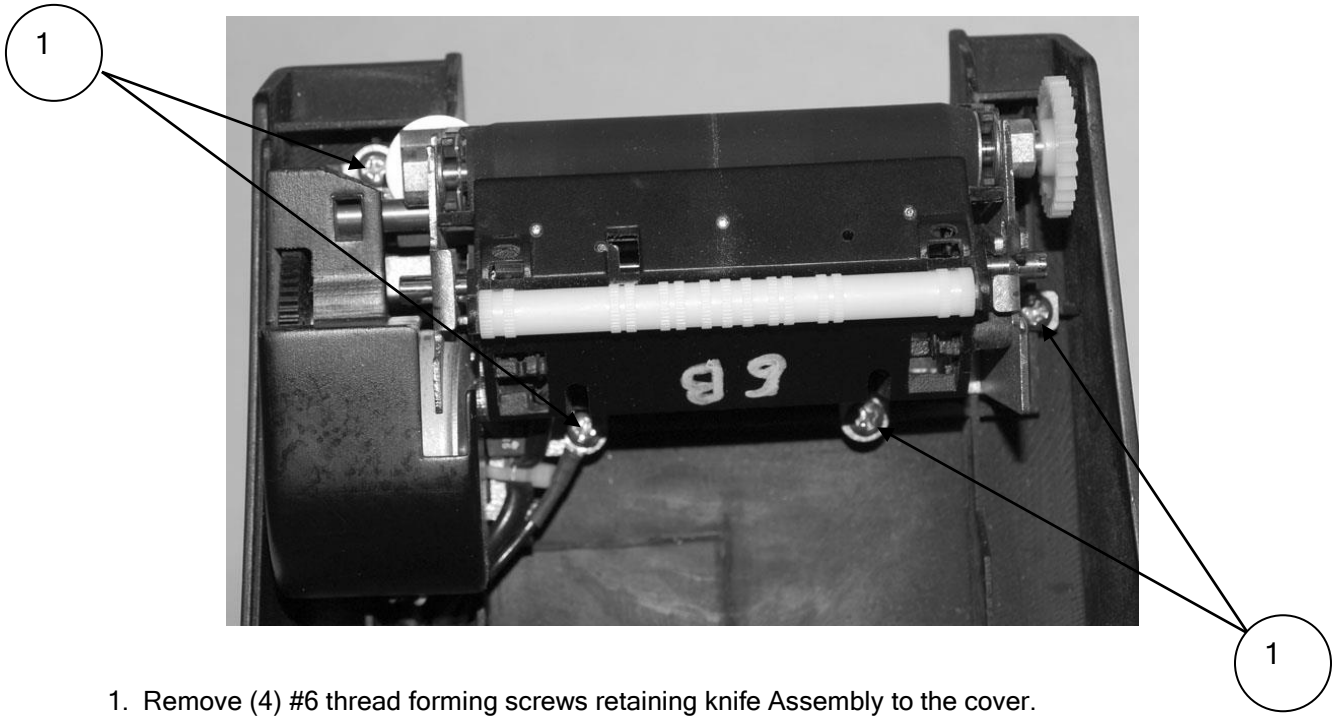
Remove Print Head Assembly from Printer Mechanism Assembly (Con't)



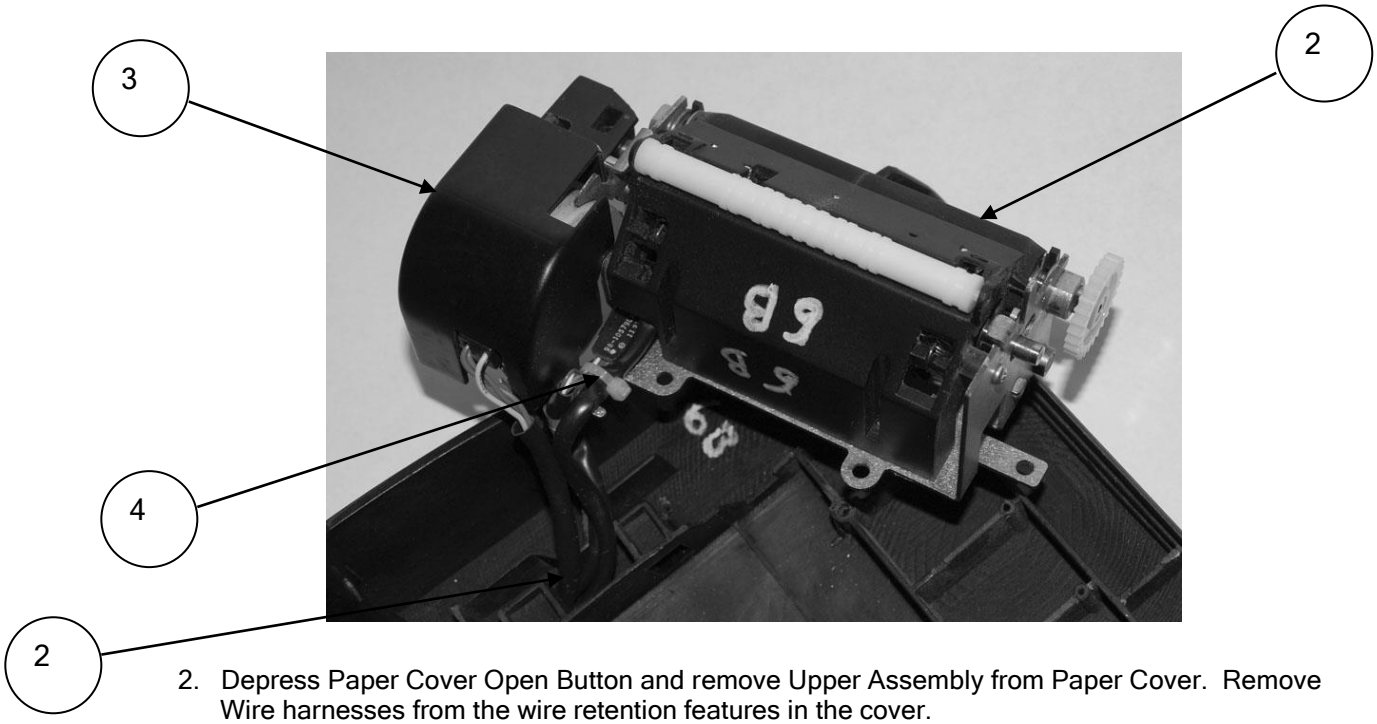
7. Push Print Head Assembly in and up to release from Frame retention features.

***Note:** When re-assembling the Thermal Print Head Cable ensure the cable in centered in the mating connector on the Controller PCB and Thermal Print Head.

Remove Platen from Upper Assembly

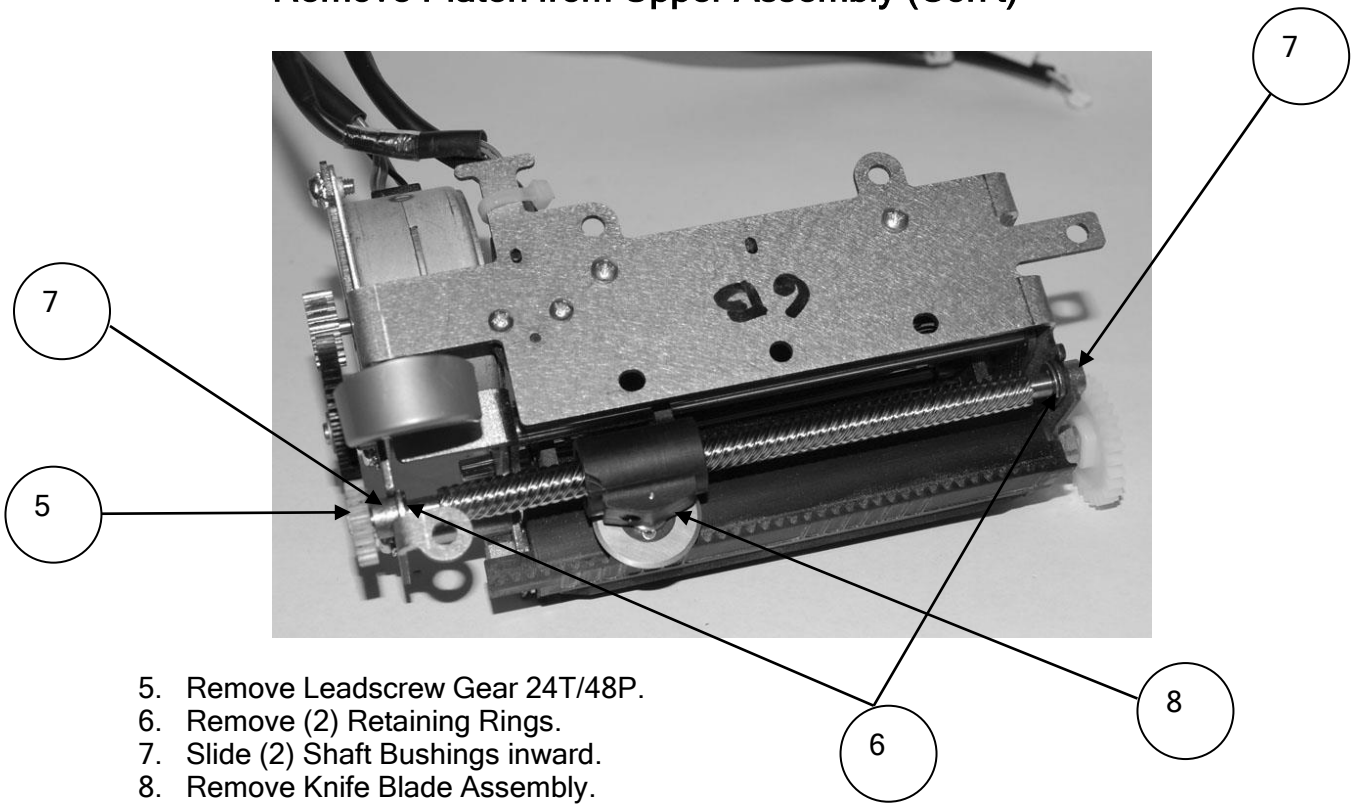


1. Remove (4) #6 thread forming screws retaining knife Assembly to the cover.

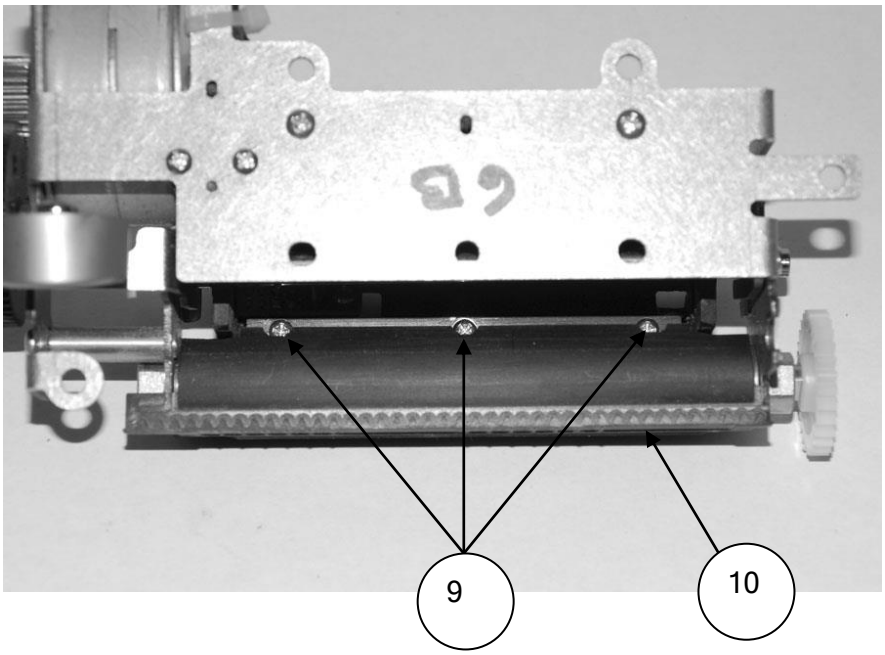


2. Depress Paper Cover Open Button and remove Upper Assembly from Paper Cover. Remove Wire harnesses from the wire retention features in the cover.
3. Remove Knife Motor Cover.
4. Remove Cable Tie.

Remove Platen from Upper Assembly (Con't)

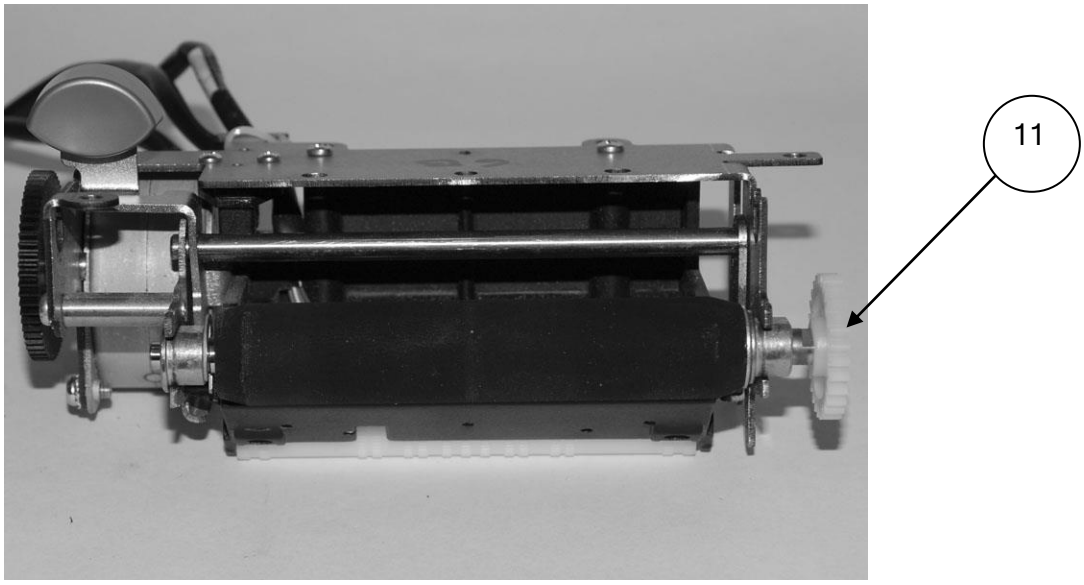


5. Remove Leadscrew Gear 24T/48P.
6. Remove (2) Retaining Rings.
7. Slide (2) Shaft Bushings inward.
8. Remove Knife Blade Assembly.



9. Remove (3) #2 Plastic Thread Forming Screws.
10. Remove Stripper/Rack.

Remove Platen from Upper Assembly (Con't)

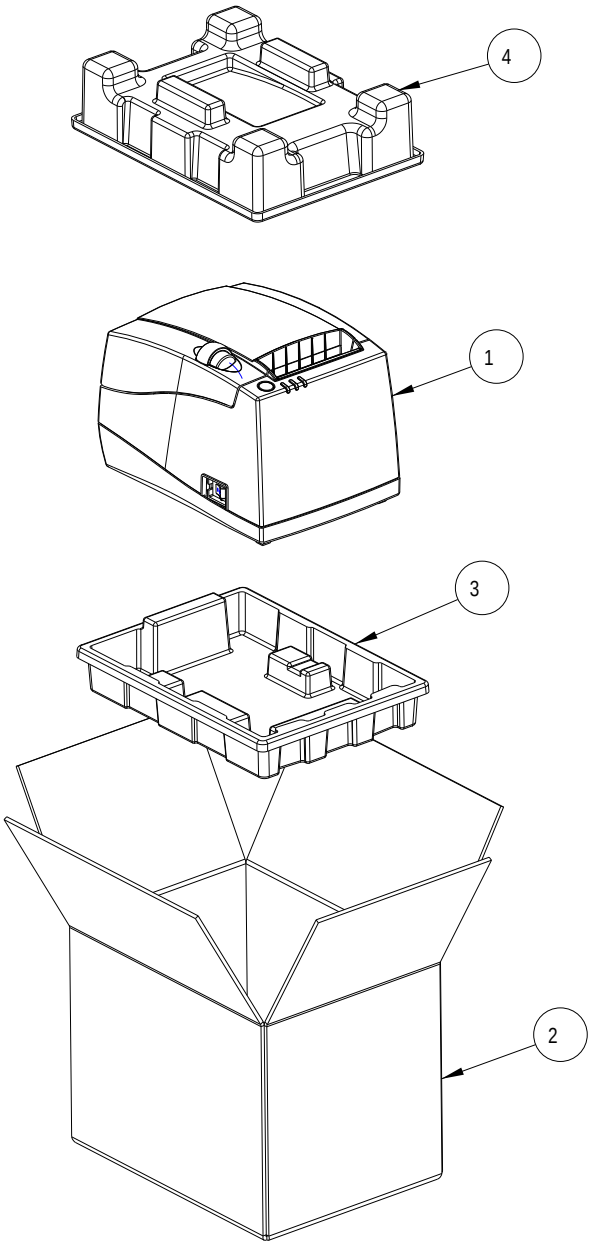


11. Remove Platen Assembly

Chapter 10

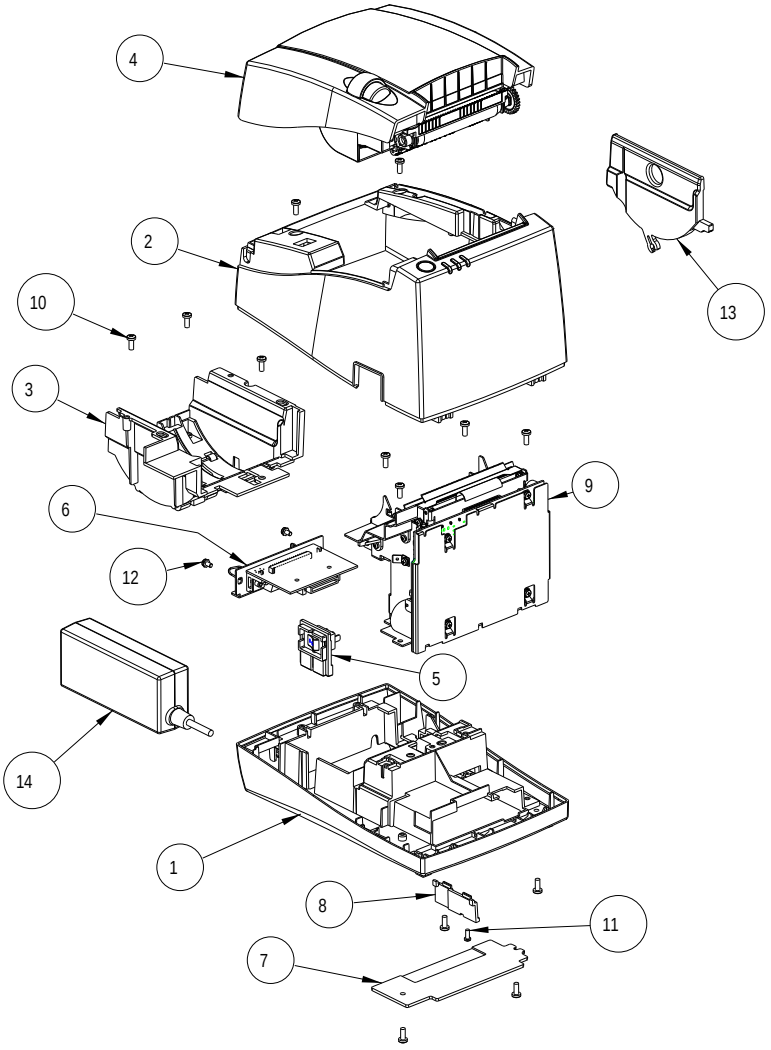
Parts List

Pack Assembly (28-10487)



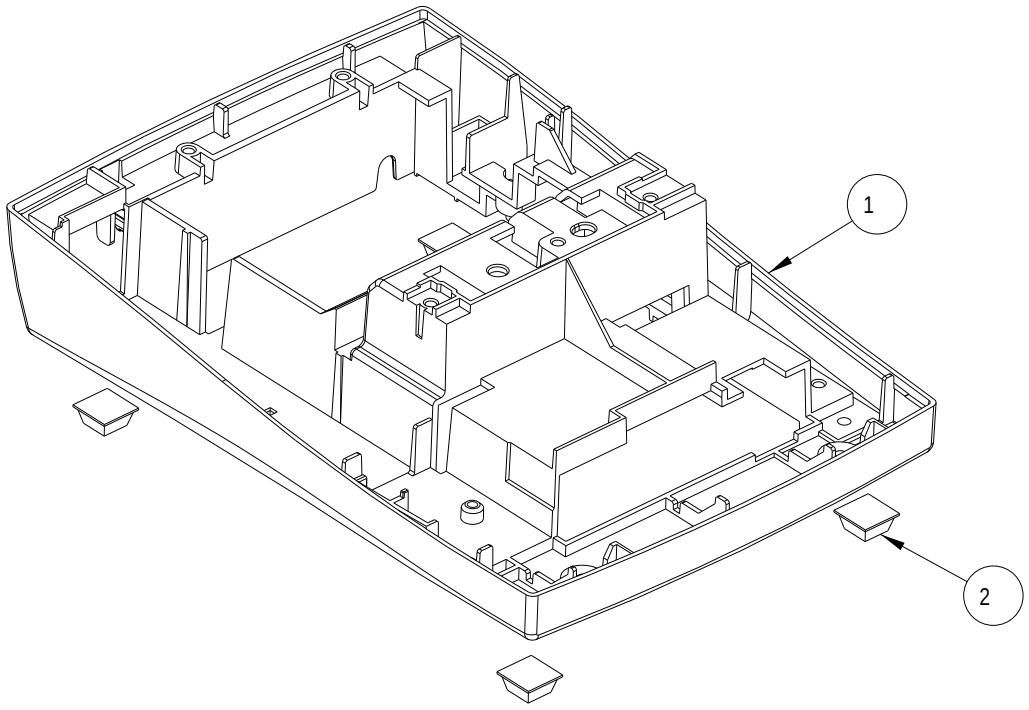
No.	Description (standard parts)	QTY.	Part Number (History)
1	Assy - Printer	1	28-28500
2	Epic 880 Carton	1	88-10813
3	Pack - Bottom	1	28-10486
4	Pack - Top	1	28-10485

Printer Assembly (28-28500)



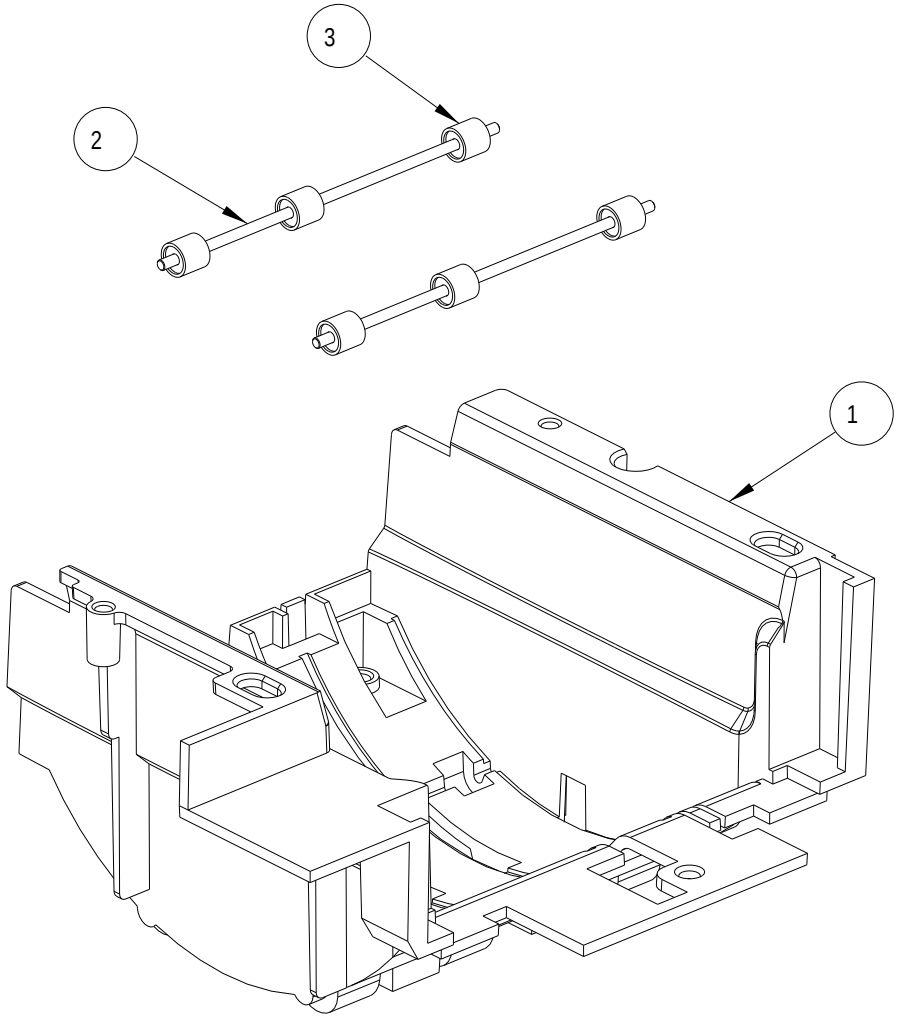
No.	Description (standard parts)	QTY.	Part Number (History)
1	Assembly - Base	1	28-10460
2	Assembly - Midframe	1	28-10465
3	Assy - Paper Bucket	1	28-10439
4	Assy - Paper Cover	1	28-10470
5	Assy - Power Switch	1	28-10457
6	Assy-36 Pin I/F Bd/Brkt	1	28-06478L
7	Cover - Base Opening	1	28-10455
8	Cover - DIP Switch	1	28-10444
9	Assy - Lower (9000)	1	28-10730
10	Screw 6-20 X 3/8 Thd Cut PHPS HD	13	98-2052
11	Screw #4Plastic Thread Forming	1	98-7608
12	Screw M3X6mm SEMS PHD PHPS	2	98-02215
13	Spacer - Paper Bucket	1	28-15479 *(28-10438)*
14	Supply - Power	1	98-10571L

Base Assembly (28-10460)



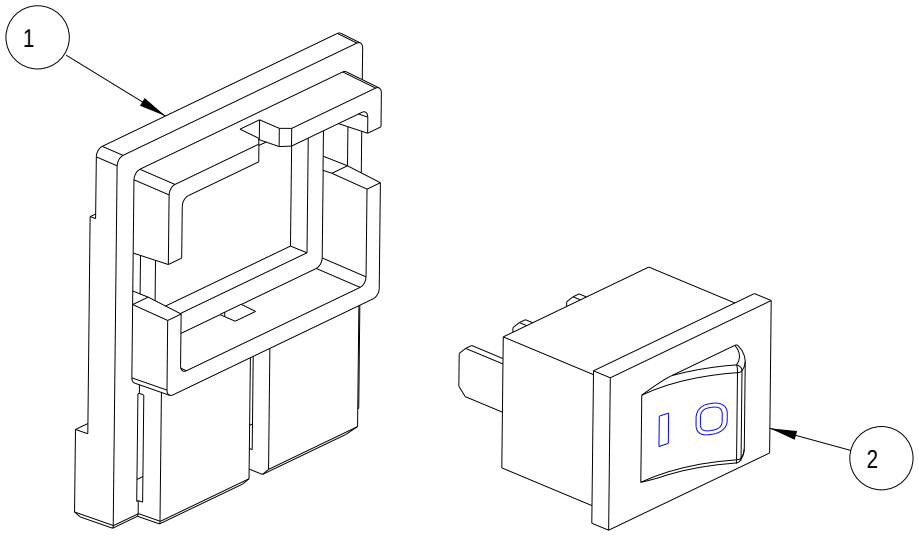
No.	Description (standard parts)	QTY.	Part Number (History)
1	Base - Printer	1	28-10400
2	Foot - Rubber (Black)	4	119000401

Paper Bucket Assembly (28-10439)



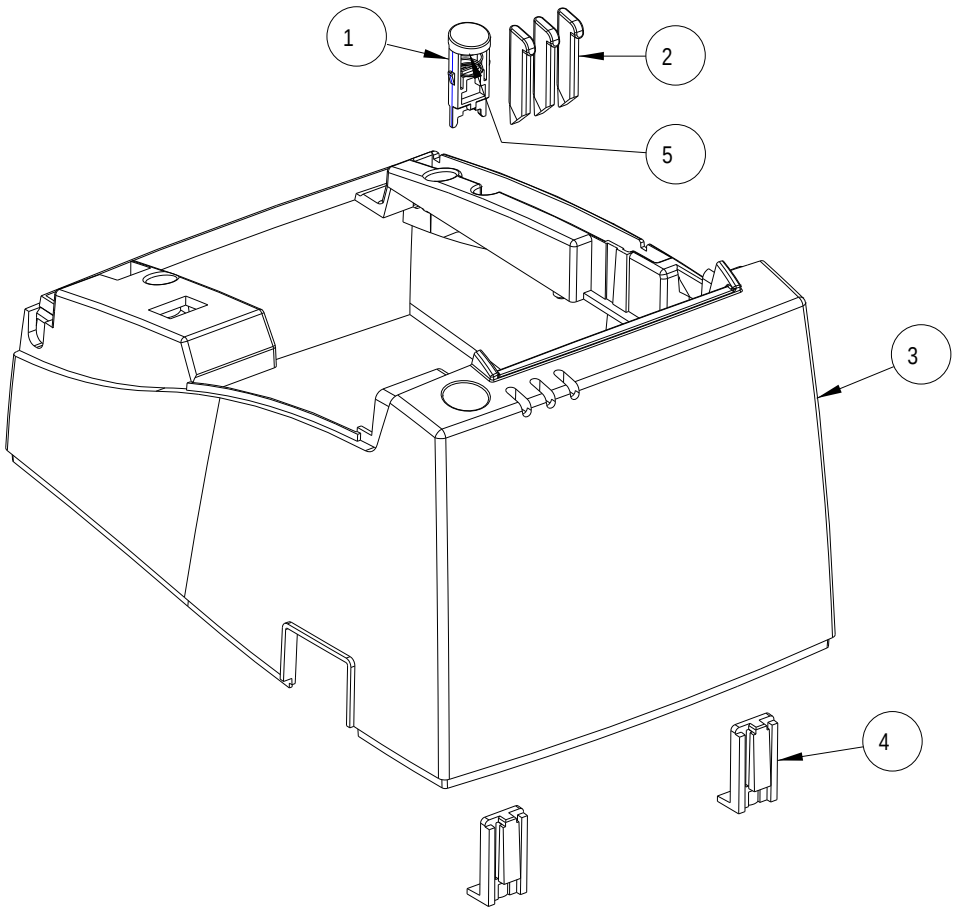
No.	Description (standard parts)	QTY.	Part Number (History)
1	Bucket - Paper	1	28-10435
2	Rod, Roller Support	2	28-03865
3	Roller - Paper Supply	6	15-9798

Power Switch Assembly (28-10457)



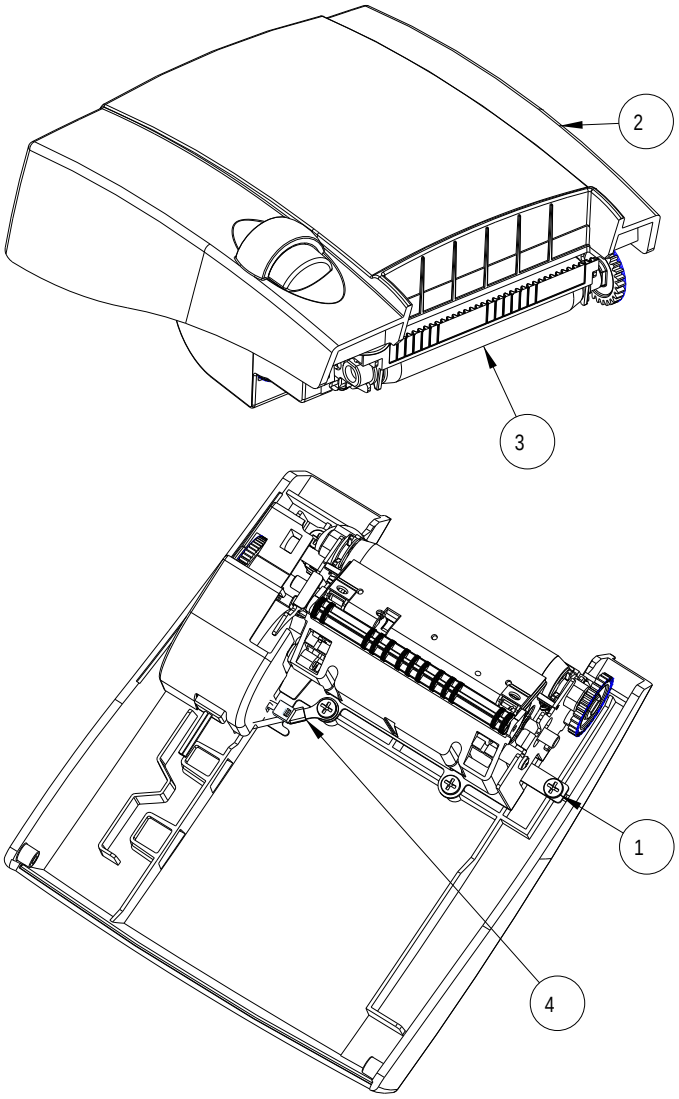
No.	Description (standard parts)	QTY.	Part Number (History)
1	Bracket - Power Switch	1	28-10456
2	Rocker Power Switch	1	43-06468L

Midframe Assembly (28-10465)



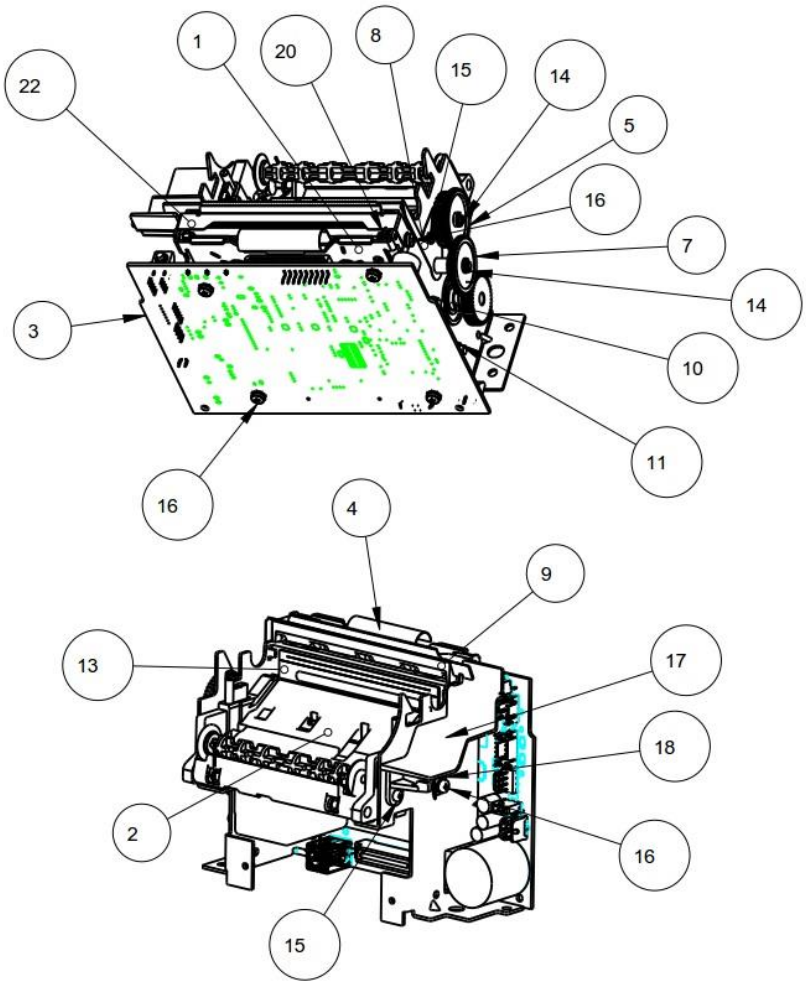
No.	Description (standard parts)	QTY.	Part Number (History)
1	Button - Paper Feed	1	28-10420
2	Lens - LED	3	28-10425
3	Midframe - Printer	1	28-15975
4	Mount - Midframe	2	28-10443
5	Spring - Paper Feed Button Comp	1	28-03859

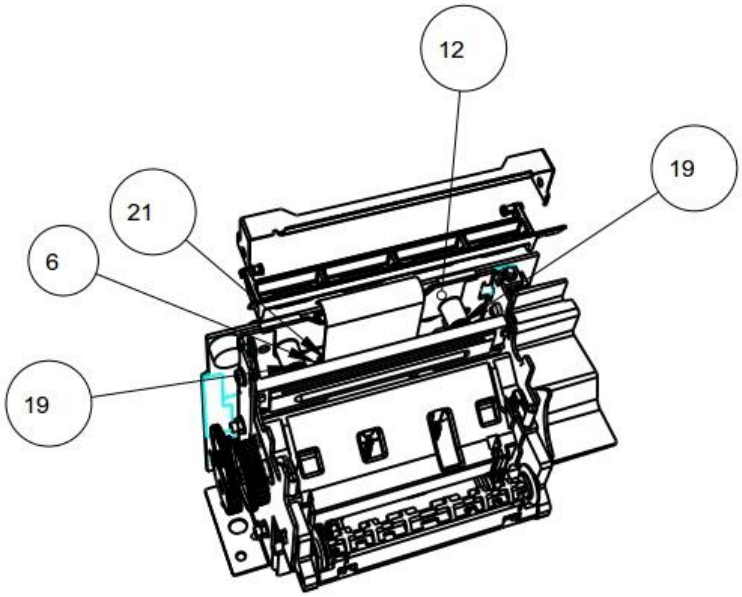
Paper Cover Assembly (28-10470)



No.	Description (standard parts)	QTY.	Part Number (History)
1	#6 x ¼ Phil, PH, Plastic	4	M067883-03
2	Cover - Paper	1	28-10410
3	Upper Assy - Wheel Knife/Platen	1	28-10395
4	Wire - Ground	1	28-10591L

Lower Mechanism Assembly (28-10730)

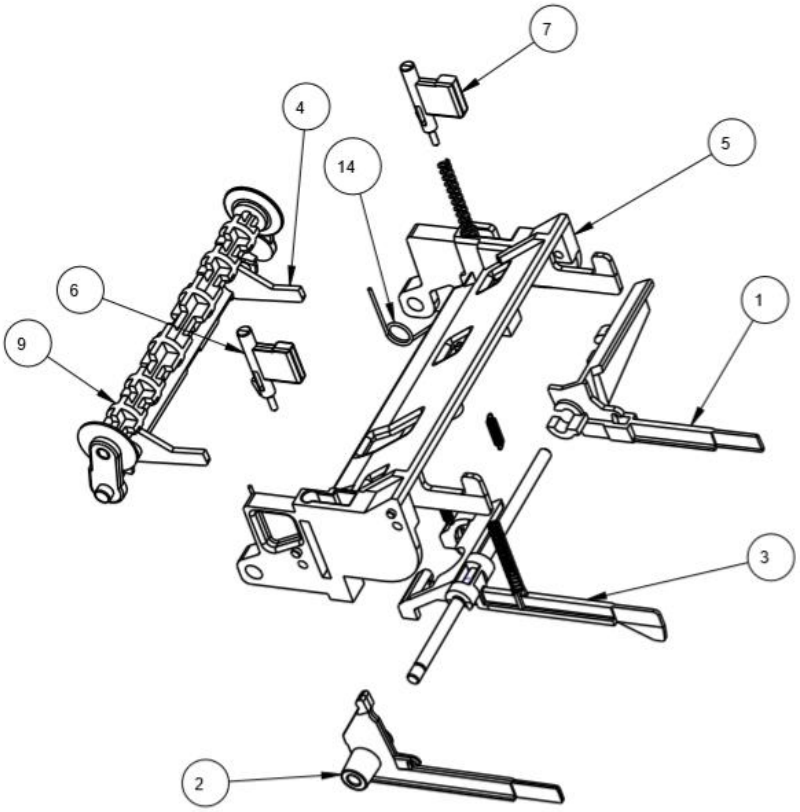


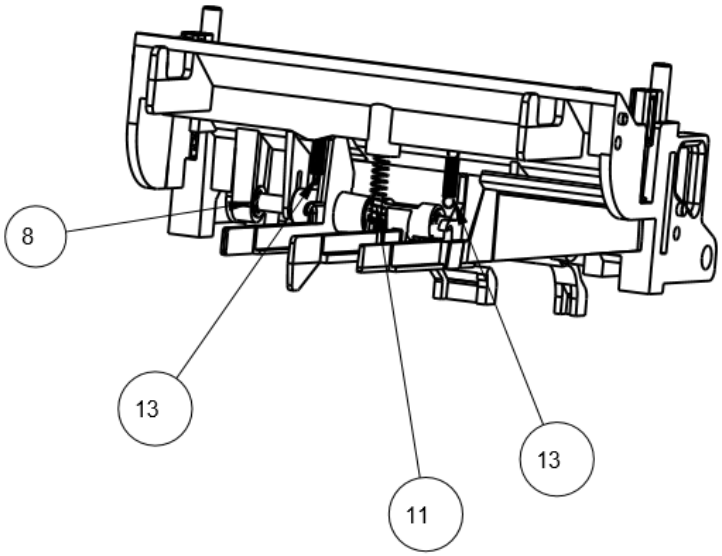


28-10730 BOM

No.	Description (standard parts)	QTY.	Part Number (History)
1	Assy - Main Frame	1	28-10745
2	Assembly - Paper Path (9000)	1	28-10746
3	Assembly - Controller	1	28-10606L
4	Cable - flat Flexible	1	28-04036L
5	Combo gear - 48/28 Idler	1	28-03705
6	Ferrite - Printhead Cable	1	98-10582L
7	Gear - Combo 26/46 Drive	1	28-03707
8	Ground Knife (Blade Fix)	1	28-10298
9	Knife - Blade (Fixed) Assy	1	28-10310
10	Motor Assy - Paper Feed	1	28-10595
11	Nut - M3 Hex	3	98-0621
12	Plate-Spring Mount	1	28-13823
13	Printhead Assembly - 9000	1	98-17034 (28-10782)
14	Ring - retaining	2	520-9800002
15	Screw #4 Plastic Thread Forming	4	98-7608
16	Screw M3x6mm SEMS PHD PHPS	7	98-02215
17	Shield - Electronics	1	28-10773
18	Spade	1	98-03968
19	Spring - Printhead	2	28-13825
20	Spring - Torsion, Knife	1	28-10852
21	Tape 1.50 X .50 3M VHB	1	81-12761
22	Tear Off - 9000	1	28-10316

Paper Path Assembly (28-10746)

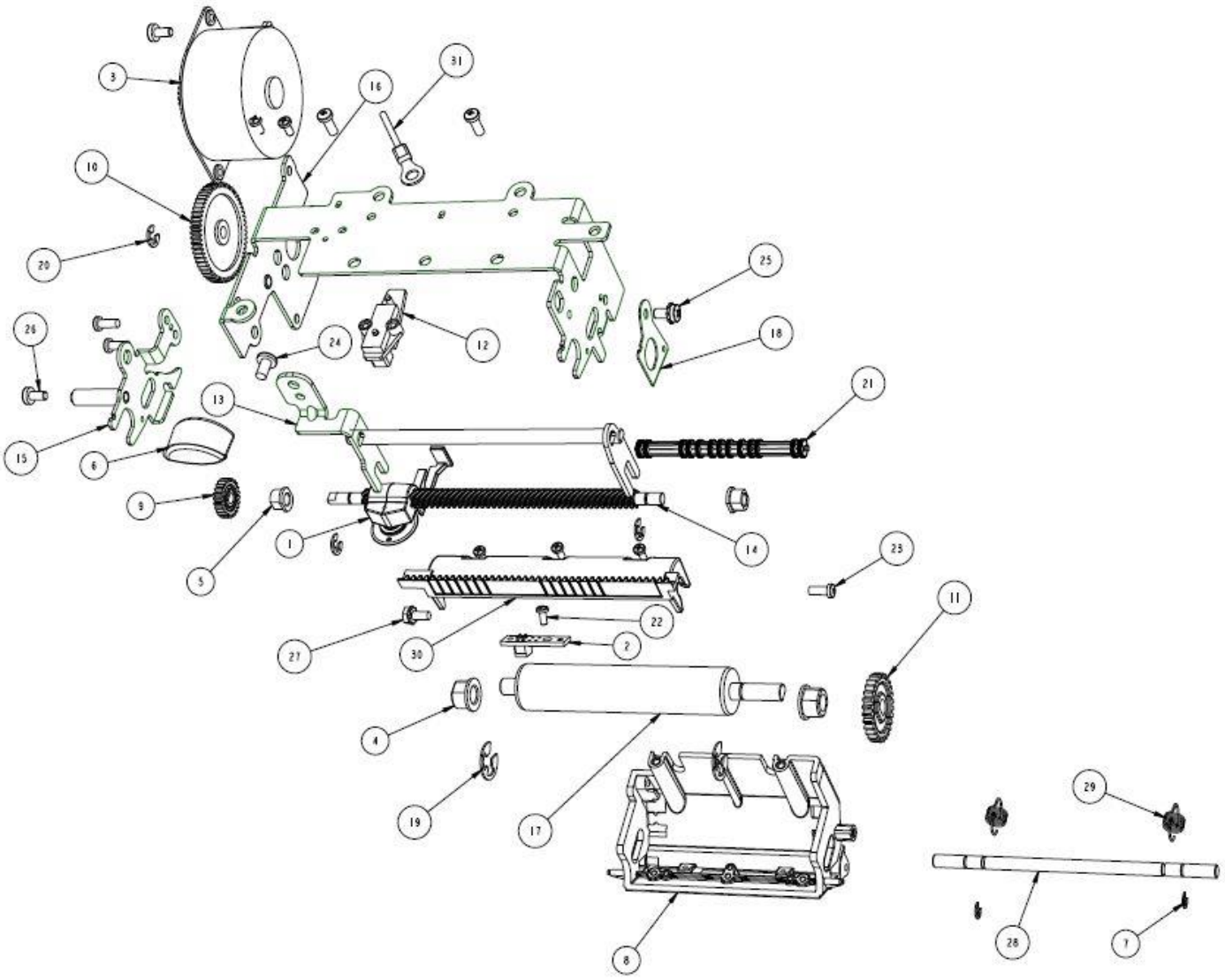




28-10746 BOM

No.	Description (standard parts)	QTY.	Part Number (History)
1	Flag - Cover Open	1	28-10780
2	Flag - Paper Out	1	28-10777
3	Flag - 40/58MM Widths	1	28-17155 (28-10748)
4	Guide - Slacker	1	28-10754
5	Paper - Path Bottom	1	28-10757
6	Pin - Spring (Cover Lift)	1	28-10758
7	Pin - Spring (Cover Lift)	1	28-10979
8	Ring - retaining	3	520-9800002
9	Roller - Receipt	1	28-10760
10	Shaft - Flag	1	28-10751
11	Spring - Bucket Adjust	1	28-17436
12	Spring - Compression	2	28-10749
13	Spring - Extension	2	28-03952
14	Spring - Slacker	2	28-10852

Upper Assembly - Wheel Knife/Platen (28-10395)



28-10395 BOM

No.	Description (standard parts)	QTY.	Part Number (History)
1	(Assy) Blade - Knife	1	28-10815
2	Assembly - TOF Sensor	1	28-10587L
3	Assy - Knife Motor	1	28-10572L
4	Bearing - Platen	2	28-09752
5	Bushing - Oilite	2	28-10980
6	Button - Cover Open	1	28-16111 (28-09850)
7	E-Ring	2	98-1390
8	Frame-Knife	1	28-14983 (28-10273)
9	Gear - 24T/48P (Leadscrew)	1	28-10838
10	Gear - 60T/48P	1	28-10309
11	Gear - Platen	1	28-09744
12	Knife Home - Sensor	1	28-10588L
13	Latch Shaft Assembly	1	28-10828
14	Leadscrew - Knife (.50 in/rev)	1	28-10850
15	Left Sidewall Assembly	1	28-10275
16	Motor - Bracket (Assy)	1	28-10277
17	Platen (No Stick) POS 9000	1	28-10291
18	Platen Retainer	1	28-13503
19	Retainer - 'E' Ring .25 Día	2	520-9800006
20	Ring - Retainer	3	520-9800003
21	Roller - Paper	1	28-10251
22	Screw #2 Plastic Thread Forming	6	98-09826
23	Screw #4 Plastic Thread Forming	5	98-7608
24	#6 x ¼ Phil, PH, Plastic	1	M067883-03
25	Screw M3x6mm SEMS PHD	1	98-02215
26	Screw M3x6mm PHPS PHD	2	98-0611
27	Screw-M3x7mm, Hex	1	98-14337
28	Shaft - Latch	1	28-10279
29	Spring - Latch Bar	2	28-09740
30	Stripper/Rack	1	28-10856
31	Wire - Ground	1	28-10591L

Appendix A: Ordering Genuine Ithaca Supplies

ITHACA 9000 supplies can be ordered easily direct from the TransAct website (www.transact-tech.com) or our telephone number within the US toll free: (877) 7ithaca. (other inquires: (607) 257-8901). When contacting us by phone, please ask for the Sales Department.

Paper

The ITHACA 9000 printer is specially designed to print on one of two specific types of thermal adhesive label stock, with either one or three adhesive zones per label. For paper specifications and ordering information, contact your TransAct sales representative.

Cables

Cables are available for purchase as follows:

Cables	Stock Number
110V Power Cable *(USA)*	98-02174L
220V Power Cable *(Australia)*	98-02178L
230V Power Cable *(International)*	98-02175L
230V Power Cable *(IND/South Africa)*	98-02179L
240V Power Cable *(UK)*	98-02176L
Parallel Communication Cable 25-pin male to 25-pin male 36-pin Centronics to 25-pin male	 253-9800007 253-9800002
Serial Communication Cable 9-pin Female to 9-pin Female 9-pin Female to 25-pin Female	 10-2020L 10-2021

Table 16 Cables Ordering Information

Domestic and International power cables available. Call for more information

Drivers Available:

Windows® 95/98/Me Print Driver and Documentation	98-9171
Windows® 2000/NT 4.0 Print Driver and Documentation	98-9172
OPOS Print Driver Manual	100-9730
OPOS Print Driver Disk 1 / Disk 2	100-9731 / 100-9732

Index