2930 Series Printers

Service Manual

HEWLETT PACKARD

LIST OF EFFECTIVE PAGES

The List of Effective Pages gives the date of the most recent version of each page in the manual. To verify that your manual contains the most current information, check the dates printed at the bottom of each page with those listed below. The date on the bottom of each page reflects the edition or subsequent update in which that page was printed.

Effective Pages   Date

SECTION 1 .... SEPT 1984

SECTION 2 .... DEC 1983

SECTION 3 .... SEPT 1984

SECTION 4 .... SEPT 1984

SECTION 5 .... SEPT 1984

SECTION 6 .... SEPT 1984

SECTION 7 .... DEC 1983

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INTRODUCTION

This manual contains information pertaining to maintenance and repair of 2930 Series printers. The 2930 Series of printers consists of the 2932A general purpose printer, the 2933A factory data printer, and the 2934A office printer. These units are 136 column, bidirectional, dot matrix printers. The printers are designed for desk top usage and contain a variety of interfaces for connection to different types of terminals and computers. Standard character sets include USASCII, Roman8, Line Drawing, Math, and Kana8.

MANUAL OVERVIEW

The service manual consists of the following sections:

Section 1 – Introduction. Provides a general overview of the service manual, lists printer equipment provided, presents printer specifications and briefly describes the options and accessories available.

Section 2 – Installation. Provides information on installing the printer.

Section 3 – Configuration. Contains details of interfacing the printer to various computers and terminals.

Section 4 – Troubleshooting. Contains self test information, describes how to isolate problems to the printer and offers troubleshooting hints.

Section 5 – Maintenance. Provides procedures and illustrations to aid in removing and replacing assembles and components.

Section 6 – Parts Lists. Contains identification and part numbers of assemblies and components.

Section 7 – Functional Operation. Provides a brief functional description of the printer's operation.

Section 8 – 29340S Sheet Feeder. Contains information for servicing the optional sheet feeder.

EQUIPMENT PROVIDED

The following equipment and documentation is provided with the printer:

1. Power cord.

2. Owner's Manual, HP Part No. 02932-90001

3. Operator's Guide, HP Part No. 02932-90006

4. Ribbon

5. 92188A Courier Typestyle Cartridge (2934A)

6. Fuses, fuse holders, voltage selector drum, and key for opening the fuse box (in the bag attached to power cord.)

OPTIONS AVAILABLE

Options are factory modifications to a standard **serial** printer that are requested by the customer at the time of purchase. These options are listed in Table 1-1. Unless otherwise stated, cables are not provided with these options.

Table 1-1. 2930 Series Options

OPTION	DESCRIPTION
-034	Daisychain Multipoint Sync I/O* with cable
-035	RS-422 Serial I/O
-039	DSN/Datalink I/O* with cable
-042	Centronics-type Parallel I/O
-046	HP-IB I/O

*Not available for the 2932A.

INTERFACE KITS

The 2930 Series I/O design allows the printer interface to be easily changed. Order an I/O update kit using the kit numbers in Table 1-2.

Table 1-2. Interface Kits.

29085A	INTERFACE KIT FOR 2932A PROVIDES RS-232-C INTERFACE.
#035 #042 #046	RS-422 Centronics HP-IB
29086A	INTERFACE KIT FOR 2933A OR 2934A PROVIDES RS-232-C INTERFACE.
#034 #035 #039 #042 #046	Daisychain Multipoint RS-422 Data Link Centronics-type HP-IB

ACCESSORIES AND SUPPLIES

There are several accessories available for the 2930 Series printers. These are listed in Table 1-3, along with operating supplies. Paper supplies can be found in the Hewlett-Packard Computer User's Catalog.

Table 1-3. Accessories and Supplies.

ACCESSORY NUMBER	DESCRIPTION
29340S	Single bin sheet feeder.
92154B	Print head.
92155L	Three ribbon pack.
92171G	Paper catcher. For table top.
92214P	Printer stand. Includes cabinet, paper catcher, and casters.
11-0794-00-DAT	Roller cleaner.

TYPESTYLES-2933A/2934A

There is a variety of typestyles offered for the 2933A and 2934A printers. The typestyles come in cartridges that can be inserted into the Processor PCA through the rear panel. Refer to Table 1-4 for a listing of these cartridges.

Table 1-4. Typestyles Available.

CARTRIDGE NUMBER	DESCRIPTION
92188A	Courier 10
92188B	Courier 12
92188E	Helv
92188G	OCR A
92188H	Italic
92188M	Prestige Pica
92188N	Prestige Elite 12
92188R	Letter Gothic 12
92188T	OCR B

SPECIFICATIONS

General

POWER REQUIREMENTS
Input voltage
  100, 120, 220, 240 volts AC (+5%, −10%) selectable
  from rear panel; 47.5-66 Hz
Power consumption
  120 VA maximum non-printing
  300 VA maximum printing

FORMS REQUIREMENTS
Paper widths (edge to edge)
  Maximum width: 400mm (15.75″)
  Minimum width: 57mm (2.25″)
Paper weights
  Single part: 15 to 100 pound
  (56 -380 gm./sq. meter)
  Multipart: 12 pound (46 gm./sq. meter), up to six
  total copies; 8 pound carbons (30 gm./sq. meter);
  .51mm (.020″) maximum pack thickness. All forms
  and card stock should be tested for satisfactory
  feeding, registration and print quality.

CONTROLS AND INDICATORS
Power on indicator
Paper out indicator
On line indicator/key

Modem indicator
Line and page advance keys

FORMS HANDLING
Forms tractors
Last-form tearoff
  (requires one inch top margin)
16 Channel vertical forms control
Programmable page and text length, margins,
  and tabs
Automatic perforation skip

GRAPHICS
90 x 90 dots per inch dot addressable raster graphics

ENVIRONMENTAL CONDITIONS
Temperature, free space ambient
  0° to 55°C (32° to 131°F) operating
  −40° to 75°C (−40° to 167°F) non-operating
Acoustics (per ISO DP7779 standard)
  Sound power level—L_{WA}:73dB(A)
  Sound pressure level—L_{PA}:63dB(A)@1 meter
  bystander position)
Humidity
  Top paper exit: 10% to 90% RH (non-condensing)
  Rear paper exit: 10% to 70% RH (non-condensing)

PHYSICAL SPECIFICATIONS
365mm (14.37″) D x 600mm (23.85″) W x 185mm (7.28″) H
20.4 kg (45 lbs.) net weight

PRODUCT CERTIFICATIONS
UL, CSA, IEC Compliance. FCC Class B certified
per FCC Rules, Part 15, subpart J, when used with
a Class B computing device.

PRINTING DUTY CYCLE
RS-232C V.24 Full Duplex
Serial Protocol
  ENQ/ACK, X-on/X-off and Printer Busy
  2K Character Buffer
  Bell 103 and 212 type modem support
  Receive rates selectable up to 9600 baud (to 19200 baud on
  2933A/2934A)
  Parity
  25 Pin EIA RS-232C Connector

2932A

PRINT SPEED
200 characters per second
Bidirectional, optimized path

CHARACTER STUCTURE
9x12 character cell

CHARACTER SETS
HP Roman8 character set includes
  128 USASCII
    (upper/lower case and control codes)
  96 Roman Extension
    (French, Spanish, German, Italian, United
    Kingdom, Norwegian/Danish, Swedish/
    Finnish, JASCII)
ISO 7-bit languages
Kana8 character set
  128 JASCII
  96 Katakana
64 Line Drawing
64 Math Symbols

PRINTING FORMAT
Print pitch (characters per inch)
  16.36—Compressed
  10.0—Normal
  5.0—Expanded
Line length (characters per line)
  223—Compressed
  136—Normal
  68—Expanded
Variable line spacing (lines per inch)
  1, 2, 3, 4, 6, 8, or 12

INTERFACE OPTIONS

Option Number	Interface
#035	RS-422
#042	Centronics-type Parallel
#046	HP-IB

2933A

PRINT SPEED
200 characters per second
Bidirectional, optimized path

CHARACTER STUCTURE
9x12 character cell

CHARACTER SETS
HP Roman8 character set includes
  128 USASCII
    (upper/lower case and control codes)
  96 Roman Extension
    (French, Spanish, German, Italian, United
    Kingdom, Norwegian/Danish, Swedish/
    Finnish, JASCII)
ISO 7-bit languages
Kana8 character set
  128 JASCII
  96 Katakana
64 Line Drawing
64 Math Symbols
Large Characters (up to 28X magnification)

BAR CODE PRINTING
Code types
  InterMec Code 39* Industrial 2 of 5, Matrix 2 of 5,
  Interleaved 2 of 5, internally-generated. User-
  definable codes may be generated by user
  program. Bar code printing is designed to be
  compatible with HP Readers.
Throughput
  650 labels per hour maximum for a 10-character
  Code 39™ Alphanumeric bar code label 0.6
  inches high, printed with the default density of
  3.4 characters per inch.
Paper type
  OCR quality single part fanfold paper with uni-
  form thickness, opacity, and reflectivity. Paper
  should have a smooth, non-gloss surface finish.
  Recommend 20# minimum, white, matte finish
  computer stock.**

*Code 39 is a trademark of Interface Mechanisms,
Inc.
**All forms and card stock should be tested for
satisfactory feeding, registration, print quality,
and readability.

PRINTING FORMAT
Print pitch (characters per inch)
  16.36—Compressed
  10.0—Normal
  5.0—Expanded
  Large character generation
Line length (characters per line)
  223—Compressed
  136—Normal
  68—Expanded
Variable line spacing (lines per inch)
  1, 2, 3, 4, 6, 8, or 12

INTERFACE OPTIONS

Option Number	Interface
#033	Multipoint Synchronous (1st terminal).
#034	Multipoint Synchronous (Nth terminal). Cable included.
#035	RS-422
#039	DSN/Data Link. Cable included.
#042	Centronics-type Parallel
#046	HP-IB

2934A

PRINT SPEED
200, 67, 40 characters per second
Bidirectional, optimized path

CHARACTER STUCTURE
36x24 character cell (67/40 cps)
9x12 character cell (200 cps)

CHARACTER SETS
HP Roman8 character set includes
  128 USASCII
    (upper/lower case and control codes)
  96 Roman Extension
    (French, Spanish, German, Italian, United
    Kingdom, Norwegian/Danish, Swedish/
    Finnish, JASCII)
ISO 7-bit languages
Kana8 character set
  128 JASCII
  96 Katakana
64 Line Drawing
64 Math Symbols
Bar Code
Large Characters

WORD PROCESSING
Right justification
Auto centering
Proportional spacing
Underlining
Optional character cartridges
Optional sheet feeder

PRINTING FORMAT
Print pitch (characters per inch)
  16.36—Compressed
  10.0, 12.0—Normal
  5.0—Expanded
  Proportional
Line length (characters per line)
  223—Compressed
  136—Normal (at 10 characters per inch)
  68—Expanded
Variable line spacing (lines per inch)
  1, 2, 3, 4, 6, 8, or 12

INTERFACE OPTIONS

Option Number	Interface
#033	Multipoint Synchronous (1st terminal).
#034	Multipoint synchronous (Nth terminal). Cable included.
#035	RS-422
#042	Centronics-type Parallel
#039	DSN/Data Link. Cable included.
#046	HP-IB

INTRODUCTION

This section covers initial installation information, such as setting the proper line voltage, loading paper, and installing the ribbon cartridge. See Section 3 for connecting the printer to a terminal or computer.

FUSES AND VOLTAGES

The printer was shipped with fuses, fuse clips, voltage selector drum, and a key for opening the fuse box in a bag attached to the power cord. Fuses must be installed in accordance with local voltage requirements before turning the printer on.

Voltage Setting

The voltage selector drum gives the option of 100, 120, 220, or 240 volt operation. These settings are marked on the drum (see Figure 2-1).

1. Open the fuse box door with the tool provided, or a small bit screwdriver.

2. Remove the drum and rotate it to the setting that corresponds to the local voltage requirements.

3. Install the drum in the fuse box so the voltage setting will be visible through the window in the door when the door is closed.

<div style="text-align:center">

CAUTION

</div>

*Ensure the fuse and voltage selected for the printer matches the line voltage being used. Incorrect fuse or voltage setting may cause damage to the printer. Do not rotate drum after it is installed.
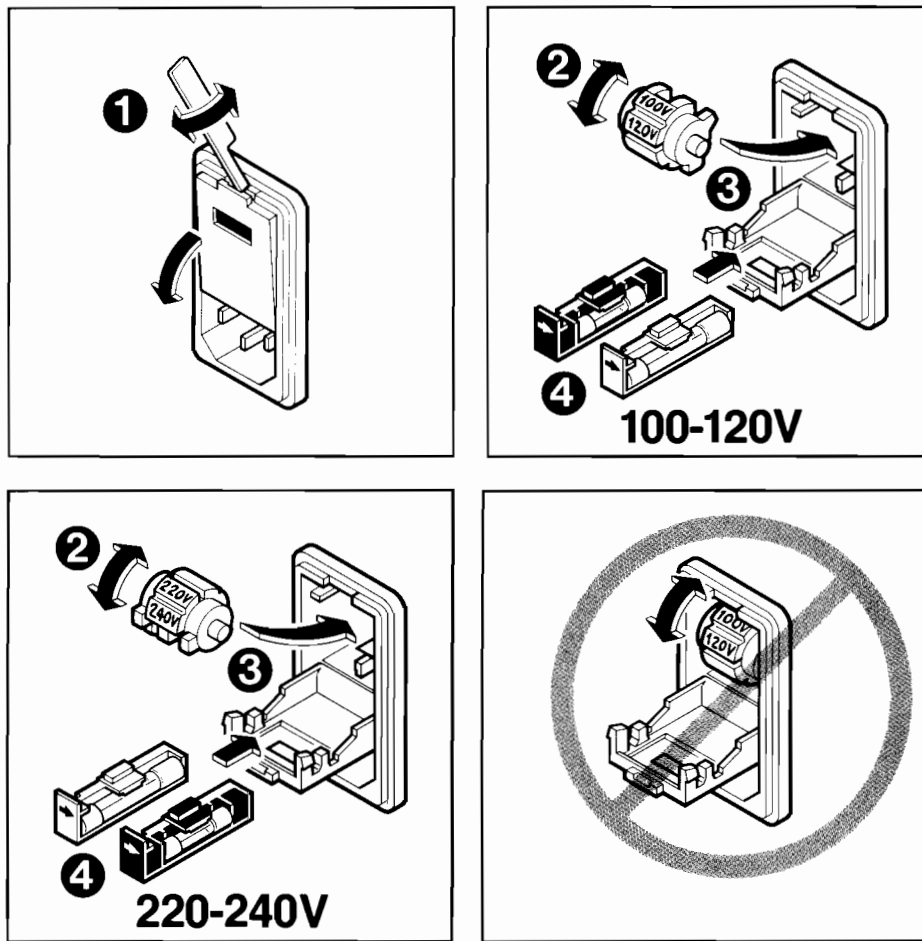
Figure 2-1. Voltage Setting and Fuse Selection.

Fuse Selection

The printer accomodates two fuse ratings, the 4 Amp and the 3.15 Amp. 100V/120V operation requires the 4 Amp, 250V, 3AG style fuse. 220V/240V operation requires the 3.15 Amp, 250V, 5 x 20mm European style fuse. Each fuse will fit in only one fuse holder. The European fuse holder is gray in color. See Figure 2-1. Fuse part numbers are listed below.

- 4 Amp fuse: 2110-0055

- 3.15 Amp fuse: 2110-0655

Use the following procedure to install the primary fuse.

1. Select the appropriate fuse and fuse holder for the required voltage.

2. Insert the fuse in the correct holder and slide the holder in the right-hand slot.

3. Put the unused holder in the left-hand slot.

4. Ensure the arrow on the fuse holder points in the same direction as those on the fuse box door.

5. Close the door.

When replacing the fuse, use one of the same type and rating, and check the voltage selector drum for the proper setting.

RIBBON REPLACEMENT

Use the following procedure to install the new ribbon. **See Figure 2-2.**

1. Turn the printer ON. Open the printer's cover and remove the paper.

2. Pull straight up on the used ribbon cartridge and lift free.

3. Turn the green take-up knob on top of the new cartridge clockwise to take up any slack in the ribbon.

4. Align the hole in the bottom-left of the cartridge with the ribbon motor spindle on the left side of the printer.

5. Fit the hole over the spindle and turn the take-up knob on top of the ribbon cartridge clockwise until the cartridge slips down onto the spindle.

6. The ribbon may be twisted slightly with a portion of it resting face down on top of the print head. This is normal. (If the ribbon is twisted other than the way shown in   Figure 2-2. it will not load. Remove and reinstall the cartridge.)

7. Close the printer cover and press **RESET** twice to reposition the print head and seat the ribbon in the ribbon path.

8. Enter the user invocable test mode by pressing the **SELECT** key followed by the **TEST** key. Select "Counter" and reset the ribbon counter to zero. Press the **SELECT** key to exit.
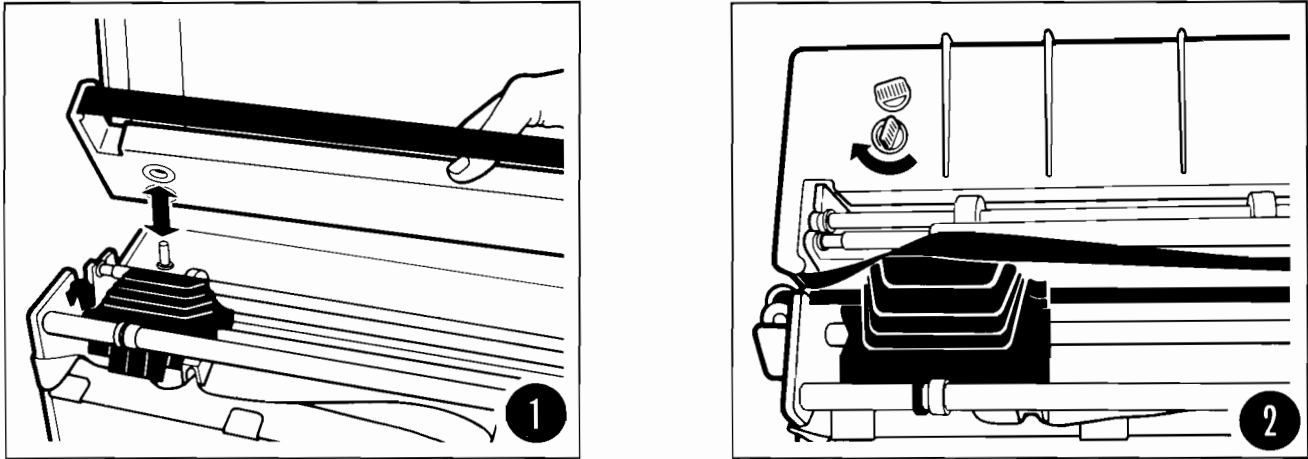
Figure 2-2. Ribbon Installation.

PAPER INSTALLATION

Use the following steps to load tractor-feed paper (see Figure 2-3).

1. Open the printer cover and release both tractor feeds.

2. Open the tractor feed gates.

3. Engage the paper in the tractor feeds, close the gates, and lock the tractors in place. Ensure the paper is properly aligned so that one side is not higher than the other. Do not load paper past the top pin.

> **NOTE**
>
> Do not place the top of the paper higher than the top edge of the tractors. If the paper enters the opto-sensor, it will not properly advance to top of form.

4. If necessary, adjust the tautness of the paper by unlocking the right tractor and moving it right or left. Lock the tractor when done.

5. Close the printer's cover and open or close the paper window as necessary for the paper path desired.

6. Press the **PAGE⥲** key. This will advance the paper edge to the paper window.

7. Press the **ON LINE** key to ready the printer for data.
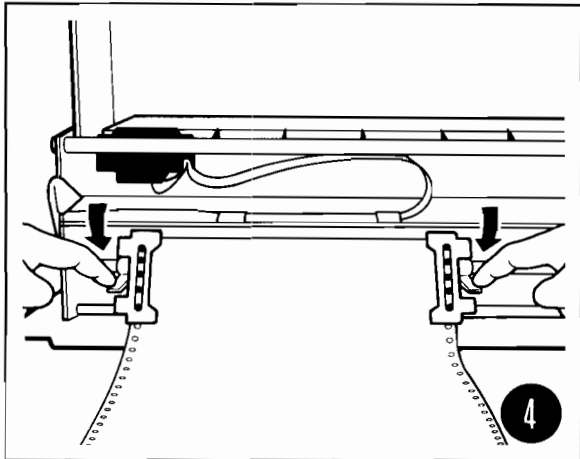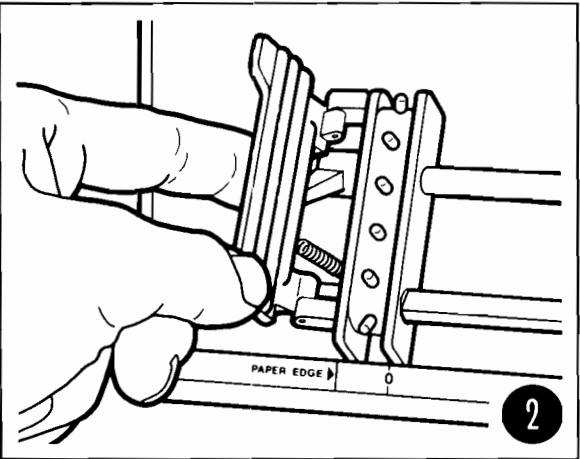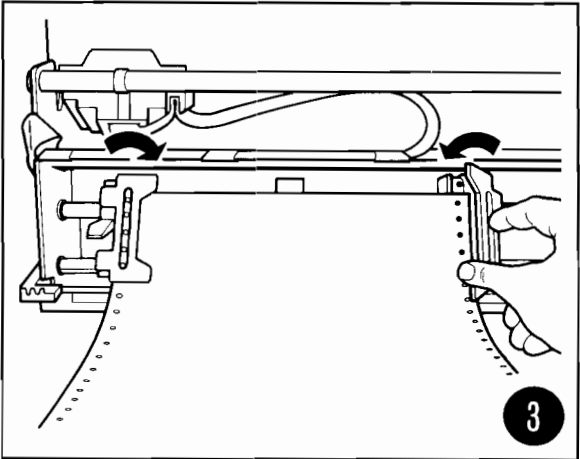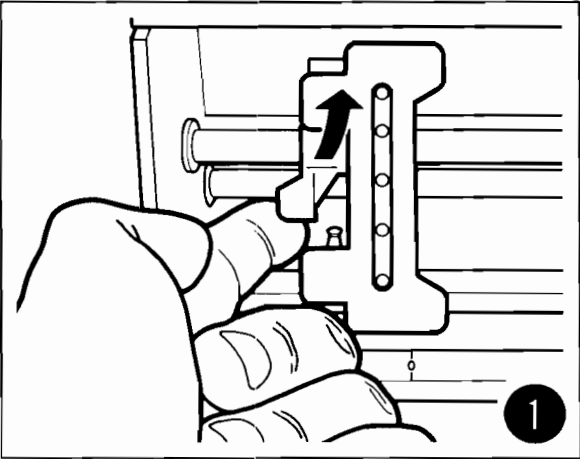
Figure 2-3. Paper Installation.

PRINT HEAD GAP ADJUSTMENT

The print head gap may need adjusting to darken or lighten the print and to allow for thickness variations in multipart forms and card stock. Turn the gap adjustment knob clockwise to darken the print or counterclockwise to lighten the print. Refer to Figure 2-4 to identify the adjustment knob.

1. Notice the numbers 1 and 6 on the adjustment knob. These numbers indicate the extremes in print density: 1 is heavy, denoting darkest print; 6 is light, denoting the lightest print.

2. The six dots between the 1 and 6 indicate setting stops. For example, when using a one part form, rotate the knob until the first dot lines up with the arrow. For six part forms, line the sixth dot up with the arrow, and so on.

3. Because forms can vary in thickness, it may be necessary to adjust the printhead gap a few stops. Also, as the print head wears, the gap will need adjusting.

| NOTE |

The paper will jam if the printhead gap is too narrow.
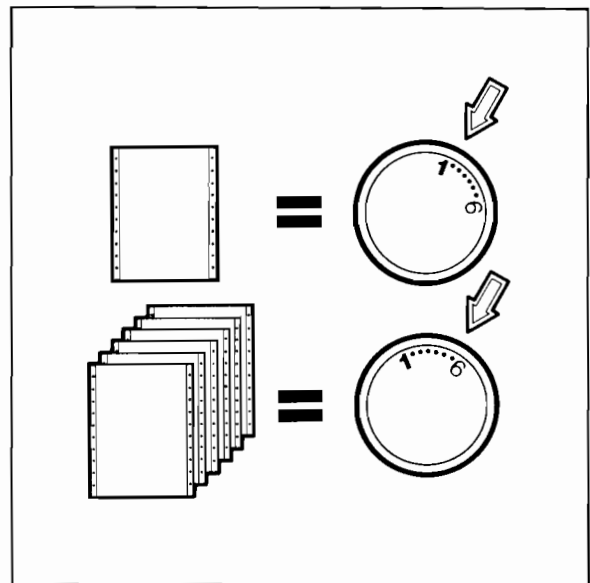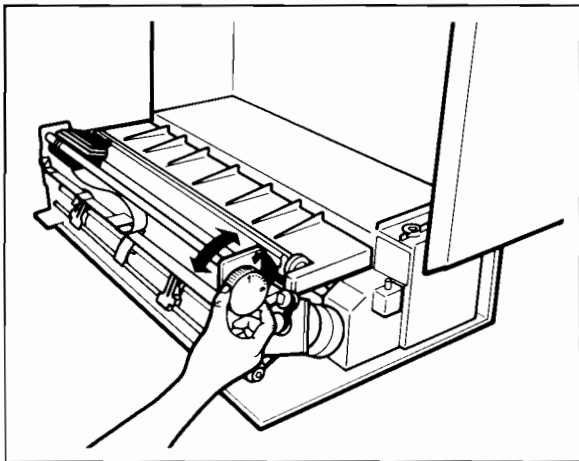
Figure 2-4. Gap Adjustment Knob.

INSTALLING THE PAPER RACK (ACCESSORY)

Use the following procedure when installing the paper rack and refer to **Figure** 2-5.

1. Insert the two prongs on the print rack into the rectangular holes on the printer's rear panel. Set the rack down, ensuring it does not rest on the interface cable.

2. Loading paper from the back: Open the rack and set the paper stack down with the heel of the stack resting against Bar A.

3. Pull the paper up over Bar B, and feed the paper under the printer.

4. Load paper as described previously in this section and ensure the printer's paper window is closed. Otherwise, the paper will exit through the window, not out onto the rack.

5. Press the `PAGE▲` key to advance several sheets of paper onto the rack.
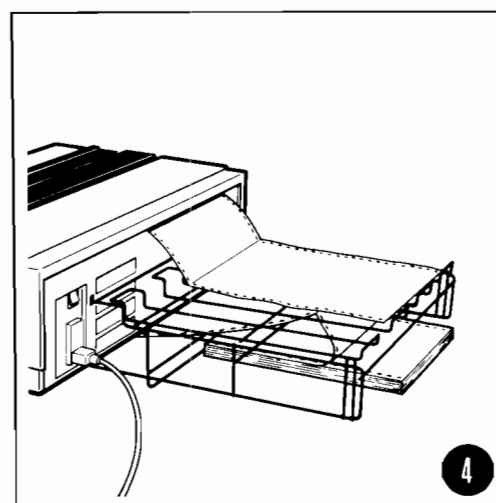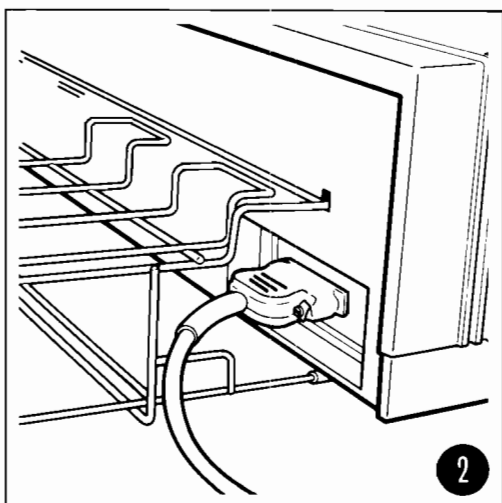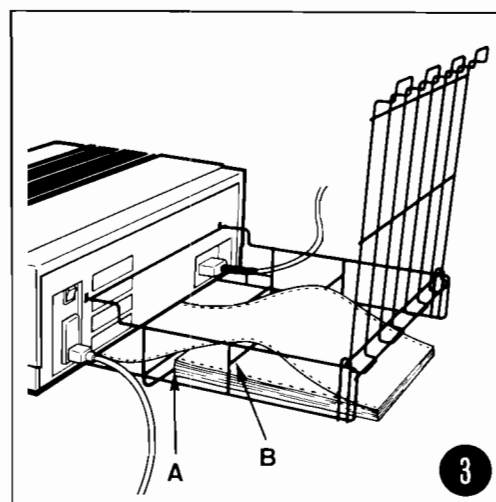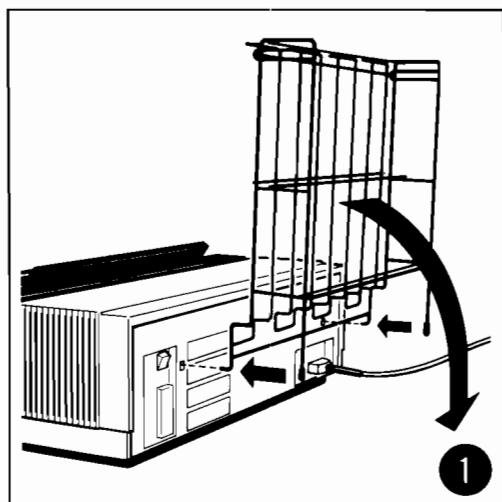
Figure 2-5. Paper Rack Installation.

INTRODUCTION

This section outlines the function of the front panel keypad and describes how to use the keys to configure the printer for different operating modes. Information is also given on how to interface the printer with a particular host.

SETTINGS

The 2930 Series printer allows many printer features to be defined through the SETTINGS mode. A few of the features which can be listed or modified through the SETTINGS mode are page length, margins, text length, lines per inch, characters per inch, and data communications considerations such as parity, baud rate, and handshakes.

Features selected through the SETTINGS mode are stored in the printer's non-volatile memory. This means that the printer's memory retains the information until the information is changed, allowing the printer to "remember" what features should be active, even if the power has been turned off or there has been a power failure. Many features may be temporarily changed by escape sequences transmitted from the printer's host computer.

Keys Used To Select Printer Features

SELECT and **VIEW** are used to enter the SETTINGS mode in which printer features can be listed or modified. Press **SELECT** then **VIEW** once to enter SETTINGS. Press **VIEW** again to exit SETTINGS.

SELECT is also used to select the option that appears immediately above the arrow on top of the print head. If the option selected is already enabled, pressing **SELECT** will turn the option off.

▶ and **◀** are used to move the print head to the next category on the SETTINGS menu, or to another option within a chosen feature.

≙ is used to move back to the previous menu of the feature currently selected.

RESET is used to exit the SETTINGS mode without implementing changes.

When the "ALL" option on the SETTINGS menu has been selected, **▼** is used to skip to the next feature without altering the current setting.

Selecting Printer Features

The following is an explanation of how to enter the SETTINGS mode to list or modify printer features. Printer features should be modified only when the printer is not in use.

```
┌─────────────┐
│    NOTE     │
└─────────────┘
```

Pressing **RESET** once will exit SETTINGS mode *without* implementing any selections made up to that point. "EXIT SETTINGS" will print.

Pressing **VIEW** once will exit SETTINGS mode and implement any selections made up to that point. "END OF SETTINGS" will print.

1. Enter SETTINGS by pressing **SELECT** , then **VIEW** . The printer will print its two SETTINGS categories, and four sub-categories:

```
*****        SETTINGS        *****
                                Category
                                   ▼
        *****  LIST  *****      *****  MODIFY  *****
Subcategory ►  PRINTER   INTERFACE     PRINTER     INTERFACE
```

The LIST category will list the current printer or interface settings, whichever subcategory was chosen. No features can be changed while in the LIST category. The SETTINGS mode will be exited automatically when the printer is finished LISTing the current settings. Sample LIST menus are located on the following pages.

The MODIFY category will display the current printer or interface options menu for the subcategory chosen and allow them to be modified. An abbreviated sample MODIFY menu follows.

2. Press **▶** to position the print head under the category and subcategory you wish to enter. Press **◀** to go back to the subcategory desired. (When SETTINGS is initially entered the print head will be located under the LIST Printer subcategory.)

3. Press **SELECT** .

4. If the MODIFY PRINTER subcategory was selected, the following will print.

```
*****      MODIFY  PRINTER      *****
              Feature
                 ▼
PRINT SETTINGS   PAGE SETTINGS   MARGIN SETTINGS   OTHER SETTINGS   SET DEFAULTS
```

5. To select a printer feature:
   a. Press **▶** to position the print head under the feature you wish to modify.

   b. Press **SELECT** .

6. To select an option(s):
   a. Press [▯] to position the print head under the option you wish to modify. If all of the options within the feature are to be modified, select the ALL option. All of the options for the chosen feature will be displayed; they can then be modified one at a time.

```
                              *****  PAGE SETTINGS  *****
     Option ➤ LINES PER      INCHES PER    PERFORATION    TEXT LINES          ALL
              INCH           PAGE          SKIP           PER PAGE
              6              11            off            60


LINES PER INCH:      6     8                        This menu reflects that
                                                    the "ALL" option was selected.

INCHES PER PAGE:      (A5) (A4)
              11   14  8.5  8.3  11.6   3   3.5   4   5   5.5   6   7   8   9   10   12   17


PERFORATION SKIP:     off    on


TEXT LINES PER PAGE -- SELECT ALL 3 DIGITS
     FIRST DIGIT         SECOND DIGIT              THIRD DIGIT
        0 1 2       0 1 2 3 4 5 6 7 8 9        0 1 2 3 4 5 6 7 8 9
```

7. Press [SELECT] to select the option.

8. To exit settings, press [VIEW] once.

```
     *****     END  OF  SETTINGS      *****
```

INTERFACING

The following pages show a variety of hosts and interfaces and describe how they can be configured to work with the 2930 Series printers. These are arranged in order from terminals through systems, with HP-IB connections listed first followed by the serial configurations.

HP2647A, 2647F, 2648A, to HP2930 Series With HP–IB Interface

10833 A/B/C/D
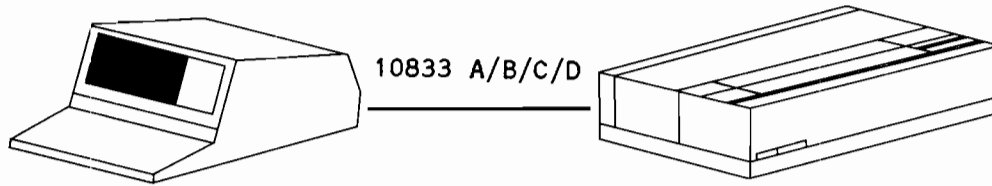
HP2647A, 2647F, 2648A   **HP2930 Series**

HOST CONFIGURATION:

13296A shared peripheral interface must be installed in 2647A and 2648A.

PRINTER SETTINGS:

HP Terminal Mode, in the "OTHER SETTINGS" feature of the "Printer" subcategory, should be set to "ON".

For 2648A printer, address must be "6" instead of "1" used in example below.

```
*****      SETTINGS     *****

  ***** LIST *****      ***** MODIFY *****
    PRINTER   INTERFACE        PRINTER   INTERFACE


 ******   LIST  INTERFACE    ******

      *****   HP-IB    *****

SECONDARY COMMANDS    LISTEN ALWAYS    SERVICE REQUEST    ADDRESS    SET DEFAULTS
       off                off               on              1
```

HP120, 125 to HP2930 Series
With HP-IB Interface

10833 A/B/C/D

or 45529A/B

HP120, 125

HP2930 Series
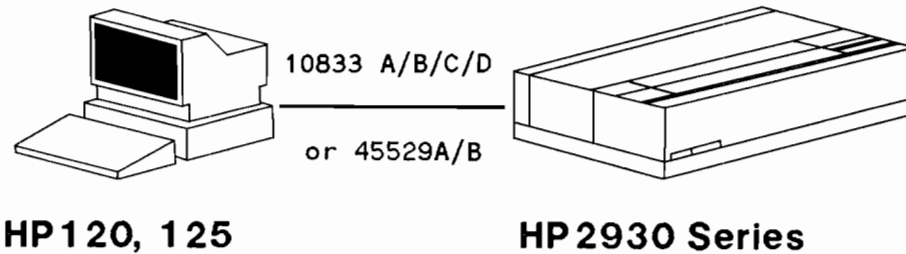
HOST CONFIGURATION:

HP-IB should be turned "ON".
Others depend upon application.

OPSYS GENERAL LIST DEVICE

Display `OFF`   IntPtr `OFF`   Port 2 `OFF`   HPIB `ON`

PRINTER SETTINGS:

```
*****    SETTINGS    *****

***** LIST *****        ***** MODIFY *****
PRINTER    INTERFACE        PRINTER    INTERFACE

*****  LIST INTERFACE  *****

*****  HP-IB  *****

SECONDARY COMMANDS   LISTEN ALWAYS   SERVICE REQUEST   ADDRESS   SET DEFAULTS
      off               off              on            1
```

HP150 to HP2930 Series
With HP-IB Interface

10833 A/B/C/D

or 45529A/B

HP150   **HP2930 Series**
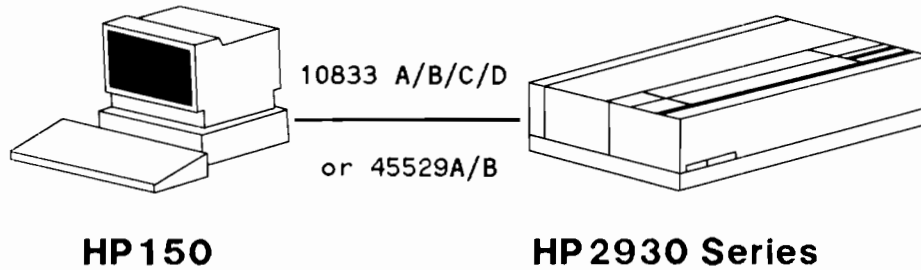
HOST CONFIGURATION:

Recommended address of printer is "1".
Other settings depend on application.
Model choice shown is 2932A; use 2934A as choice when using 2933A or 2934A printer.

MS-DOS Device Configuration				Main				Active Values

System Devices

	Interface	Address	Model	Print Wheel			Interface	Address
PRN:	HP-IB	1	2932A		PLT:		Port2	
LST:	Internal		2674A		COM1:		Remote	
AUX:	Remote				COM2:		Port2	

PRINTER SETTINGS:

When using the HP150 as an HP150 terminal, HP Terminal Mode, in the "OTHER SETTINGS" feature of the "Printer" subcategory, may be set to "ON".

```
*****     SETTINGS     *****

     ***** LIST *****      ***** MODIFY *****
        PRINTER   INTERFACE      PRINTER   INTERFACE

  *****    LIST  INTERFACE    *****

        *****   HP-IB   *****

SECONDARY COMMANDS   LISTEN ALWAYS   SERVICE REQUEST   ADDRESS   SET DEFAULTS
      off                off              off            1
```

HP80 Series to HP2930 Series
With HP-IB Interface

10833 A/B/C/D

or 45529A/B

HP80 Series   **HP2930 Series**
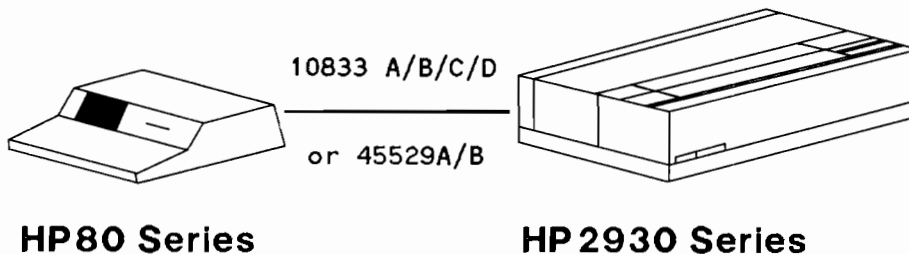
HOST CONFIGURATION:

82937A HP-IB interface required on HP85 A/B and HP86A. Printer/plotter ROM required on HP85.
Basic program statement "Printer is" or "Output" must specify same address as printer settings.
For example:

```
"Printer is 701"      would correspond to the following
        or            printer settings listing the
"Output 701"          printer HP-IB address as 1.
```

PRINTER SETTINGS:

```
*****     SETTINGS    *****

   *****  LIST  *****      *****  MODIFY  *****
   PRINTER    INTERFACE      PRINTER    INTERFACE

*****    LIST  INTERFACE    *****

      *****    HP-IB    *****

SECONDARY COMMANDS   LISTEN ALWAYS   SERVICE REQUEST    ADDRESS      SET DEFAULTS
      off               off               on               1
```

Series 200 Desktop Computers to HP2930 Series With HP-IB Interface

10833 A/B/C/D

or 45529A/B

HP9816, 9826, 9836, 9920   **HP2930 Series**

HOST CONFIGURATION:

Basic program statement "Printer is" or "Output" must specify same address as printer settings.

For example:

```
"Printer is 701"      would correspond to the following
         or           printer settings listing the
"Output 701"          printer HP-IB address as 1.
```

PRINTER SETTINGS:

```
*****   SETTINGS   *****

   ***** LIST *****        ***** MODIFY *****
   PRINTER   INTERFACE     PRINTER   INTERFACE


*****   LIST  INTERFACE   *****

       *****   HP-IB   *****

SECONDARY COMMANDS   LISTEN ALWAYS   SERVICE REQUEST   ADDRESS   SET DEFAULTS
      off                off              on             1
```

HP1000 "A" Series to HP2930 Series With HP-IB Interface

HP1000 "A" Series   HP2930 Series

HOST CONFIGURATION:

12009A HP-IB Interface
RTE-A Operating System
I/F DVR - ID.37
Device Driver - %DD.12
Printer Address - 6

PRINTER SETTINGS:

```
*****      SETTINGS      *****

*****  LIST  *****        *****  MODIFY  *****
PRINTER      INTERFACE      PRINTER      INTERFACE

******   LIST  INTERFACE   ******

*****   HP-IB   *****

SECONDARY COMMANDS   LISTEN ALWAYS   SERVICE REQUEST   ADDRESS   SET DEFAULTS
        on               off              off            6
```

HP9000 (500 Series) to HP2930 Series
With HP-IB Interface
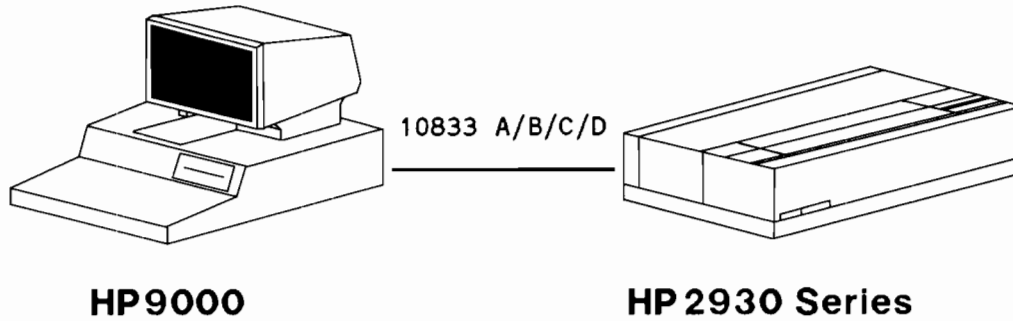
HP9000   10833 A/B/C/D   **HP2930 Series**

HOST CONFIGURATION:

Basic program statement "Printer is" or "Output" must specify same address as printer settings.

For example:

```
"Printer is 701"    would correspond to the following
         or         printer settings listing the
"Output 701"        printer HP-IB address as 1.
```

PRINTER SETTINGS:

```
*****      SETTINGS   *****

*****  LIST  *****      *****  MODIFY  *****
PRINTER      INTERFACE      PRINTER      INTERFACE


*****   LIST  INTERFACE   *****

*****    HP-IB   *****

SECONDARY COMMANDS    LISTEN ALWAYS    SERVICE REQUEST    ADDRESS    SET DEFAULTS
       off                off               on               1
```

HP250 to HP2930 Series
With HP-IB Interface
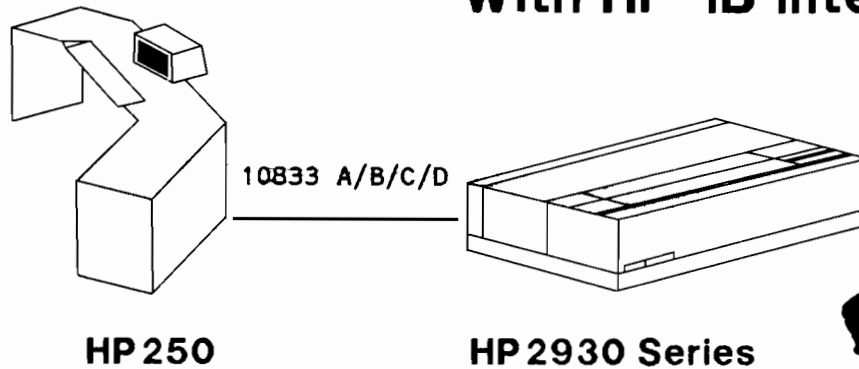
10833 A/B/C/D

HP 250   **HP 2930 Series**

Computer
Museum

HOST CONFIGURATION: ▬▬▬▬▬▬▬▬

This information is intended only to be a guide for configuring the HP2930 Series printers on the HP250. Please refer to the manuals provided with the HP250 for complete information and procedures, or contact your local Hewlett-Packard Customer Engineer.

HP-IB Interface:

- OS Revision: B.06.00 or greater

- DROMs Required: none

- HP-IB Address: Any unused address from 0 to 7. Up to 2 HP-IB printers may be configured, each on a separate address. An address of 6 is used as an example.

PRINTER SETTINGS: ▬▬▬▬▬▬▬▬

```
*****      SETTINGS     *****

   *****  LIST  *****        *****  MODIFY  *****
   PRINTER     INTERFACE     PRINTER      INTERFACE

******   LIST   INTERFACE   ******

      ******   HP-IB   ******

SECONDARY COMMANDS   LISTEN ALWAYS   SERVICE REQUEST   ADDRESS   SET DEFAULTS
       on                off             off             6
```

HP2623A to HP2930 Series
With Serial Interface

HP2623A 13242G HP2930 Series

HP 2623A   **HP 2930 Series**

HOST CONFIGURATION:

EXTERNAL DEVICE CONFIGURATION

BaudRate `2400`   Parity `None`   PrinterCode4 `EXT`   PrinterNulls `000`

SRRXmit `NO`
SRRInvert `NO`

XmitPace `None`   CS(CB)Xmit `YES`

PRINTER SETTINGS:

HP Terminal Mode, in the "OTHER SETTINGS" feature of the "Printer" subcategory, should be set to "ON".

```
*****       SETTINGS       *****

*****  LIST  *****      *****  MODIFY  *****
  PRINTER      INTERFACE        PRINTER      INTERFACE

*****   LIST   INTERFACE    *****

*****   SERIAL   *****
  DATA SETTINGS     CONTROL SETTINGS     SET DEFAULTS


        *****  DATA SETTINGS  *****
  BAUD RATE   DATA BITS   PARITY   PARITY CHECK   STRIP NULL/DEL    ALL
    2400         8        none        off            off


        *****  CONTROL SETTINGS  *****
XON/XOFF    ENQ/ACK   BINARY ENQ/ACK   DTR/CD    (S)RTS/SCA    CTS/CB    RS/CH
  off        off          off        Busy=Low      Low        ignore     Low
```

HP2624B to HP2930 Series
With Serial Interface
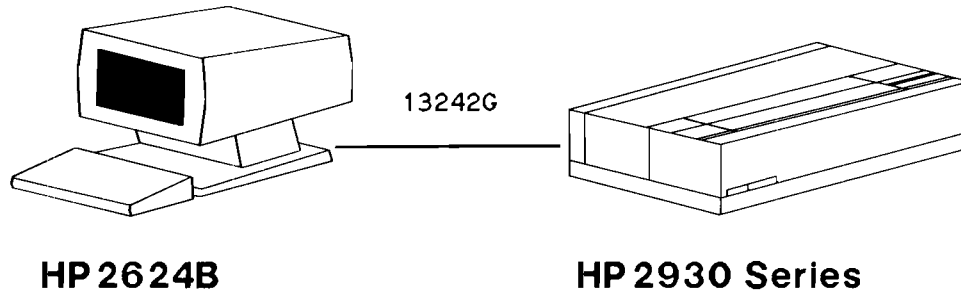
13242G

HP 2624B   **HP 2930 Series**

HOST CONFIGURATION:

FULL DUPLEX HARDWIRED   PORT 2

BaudRate	2400	Parity	None	DataBits	8	BufSize	255	Clk INT
Asterisk	OFF			StopBits	1	EnqAck	NO	
TR(CD)	HI	Chk Parity	NO	SR(CH)	HI	StripNulDel	YES	

RecvPace	None	SRRXmit	NO	RR(CF)Recv	NO
XmitPace	Xon/Xoff	SRRInvert	NO	CS(CB)Xmit	NO

PRINTER SETTINGS:

HP Terminal Mode, in the "OTHER SETTINGS" feature of the "Printer" subcategory, should be set to "ON".

```
*****   SETTINGS   *****

***** LIST *****        ***** MODIFY *****
  PRINTER    INTERFACE      PRINTER   INTERFACE


*****   LIST INTERFACE   *****
              SERIAL
      DATA SETTINGS    CONTROL SETTINGS    SET DEFAULTS


          ***** DATA SETTINGS *****
  BAUD RATE  DATA BITS  PARITY  PARITY CHECK  STRIP NULL/DEL  ALL
    2400        8        none       off           off


          ***** CONTROL SETTINGS *****
XON/XOFF  ENQ/ACK  BINARY ENQ/ACK  DTR/CD  (S)RTS/SCA  CTS/CB  RS/CH
   on       off        off          High      Low      Ignore   Low
```

HP2625A to HP2930 Series
With Serial Interface

HP 2625A　　　　　　13242G　　　　　**HP 2930 Series**

HOST CONFIGURATION:

FULL DUPLEX HARDWIRED　Port 2

BaudRate	2400	Parity	None	DataBits	8			Clock INT
Asterisk	Off			Stop Bits	1	EnqAck	No	
TR(CD)	Hi	Check Parity	No	SR(CH)	Lo			
RecvPace	None			SRRXmit	No	RR(CF)Recv	No	
XmitPace	Xon/Xoff			SRRInvert	No	CS(CB)Xmit	No	DM(CC)Xmit No

PRINTER SETTINGS:

HP Terminal Mode, in the "OTHER SETTINGS" feature of the "Printer" subcategory, should be set to "ON".

```
*****    SETTINGS    *****

***** LIST *****          ***** MODIFY *****
   PRINTER   INTERFACE       PRINTER   INTERFACE

*****  LIST INTERFACE  *****
              SERIAL

      DATA SETTINGS   CONTROL SETTINGS   SET DEFAULTS


           ***** DATA SETTINGS *****
   BAUD RATE  DATA BITS  PARITY  PARITY CHECK  STRIP NULL/DEL  ALL
     2400        8        none       off           off


           ***** CONTROL SETTINGS *****
XON/XOFF  ENQ/ACK  BINARY ENQ/ACK  DTR/CD  (S)RTS/SCA  CTS/CB   RS/CH
  on        off        off          High      Low      Ignore    Low
```

HP2626A to HP2930 Series
With Serial Interface

HP2626A   **HP2930 Series**

13242G

HOST CONFIGURATION:

FULL DUPLEX HARDWIRED #2

BaudRate `2400`	Parity `NONE`	DataBits `8`	BufSize `128`	XmitClkSource `Int`
Asterisk `OFF`		StopBits `1`	EnqAck `NO`	RecvClkSource `Int`
TR(CD) `HI`	Chk Parity `NO`	SR(CH) `HI`	StripNulDel `YES`	XmitClkOut `x16`
				ExtClkIn `x16`
RecvPace `None`		SRRXmit `NO`	RR(CF)Recv `NO`	
XmitPace `Xon/Xoff`		SRRInvert `NO`	CS(CB)Xmit `NO`	

PRINTER SETTINGS:

HP Terminal Mode, in the "OTHER SETTINGS" feature of the "Printer" subcategory, should be set to "ON".
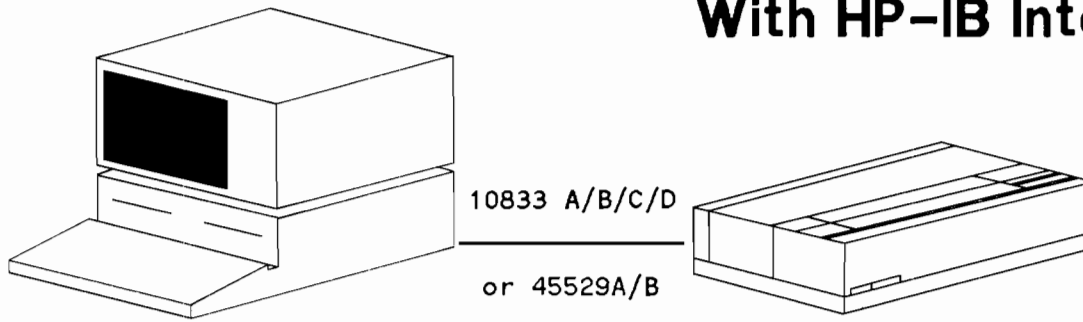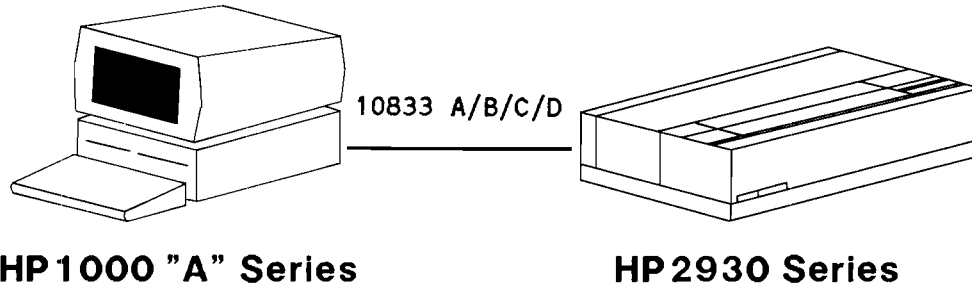
```
*****   SETTINGS   *****

*****  LIST  *****          *****  MODIFY  *****
PRINTER      INTERFACE      PRINTER      INTERFACE

*****   LIST INTERFACE   *****

SERIAL

DATA SETTINGS   CONTROL SETTINGS   SET DEFAULTS


*****  DATA SETTINGS  *****
BAUD RATE   DATA BITS   PARITY   PARITY CHECK   STRIP NULL/DEL   ALL
  2400         8        none        off             off


*****  CONTROL SETTINGS  *****
XON/XOFF   ENQ/ACK   BINARY ENQ/ACK   DTR/CD   (S)RTS/SCA   CTS/CB   RS/CH
   on        off         off          High       Low       Ignore    Low
```

HP2626W to HP2930 Series
With Serial Interface

HP2626W   **HP2930 Series**

HOST CONFIGURATION:

FULL DUPLEX HARDWIRED #2

BaudRate	2400	Parity	NONE	DataBits	8	BufSize	128	XmitClkSource Int
Asterisk	OFF			StopBits	1	EnqAck	NO	RecvClkSource Int
TR(CD)	HI	Chk Parity	NO	SR(CH)	HI	StripNulDel	YES	XmitClkOut x16
								ExtClkIn x16

RecvPace	None	SRRXmit	NO	RR(CF)Recv	NO
XmitPace	Xon/Xoff	SRRInvert	NO	CS(CB)Xmit	NO

PRINTER SETTINGS:

HP Terminal Mode, in the "OTHER SETTINGS" feature of the "Printer" subcategory, should be set to "ON".

```
*****   SETTINGS   *****

*****  LIST  *****          *****  MODIFY  *****
 PRINTER    INTERFACE        PRINTER    INTERFACE


******    LIST  INTERFACE    ******

              SERIAL

     DATA SETTINGS    CONTROL SETTINGS    SET DEFAULTS


              *****  DATA SETTINGS  *****
    BAUD RATE   DATA BITS   PARITY   PARITY CHECK   STRIP NULL/DEL   ALL
      2400         8        none        off             off


              *****  CONTROL SETTINGS  *****
 XON/XOFF   ENQ/ACK   BINARY ENQ/ACK   DTR/CD   (S)RTS/SCA   CTS/CB   RS/CH
    on        off         off          High       Low       Ignore    Low
```

HP2627A to HP2930 Series
With Serial Interface

HP2627A   13242G   **HP2930 Series**

HOST CONFIGURATION:

EXTERNAL DEVICE CONFIGURATION

BaudRate `2400`   Parity `None`   GraphContent `B&W`   PrinterNulls `000`

XmitPace `None`   SRRXmit `NO` SRRInvert `NO`   CS(CB)Xmit `YES`

PRINTER SETTINGS:

HP Terminal Mode, in the "OTHER SETTINGS" feature of the "Printer" subcategory, should be set to "ON".
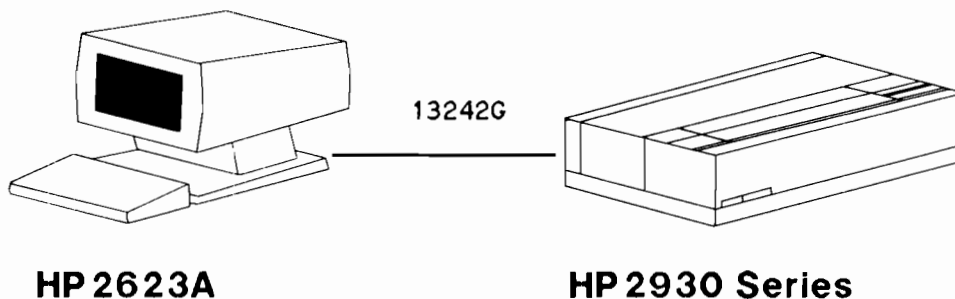
```
*****   SETTINGS   *****

*****  LIST  *****      *****  MODIFY  *****
PRINTER    INTERFACE       PRINTER    INTERFACE

*****   LIST INTERFACE   *****

*****   SERIAL   *****

DATA SETTINGS    CONTROL SETTINGS    SET DEFAULTS


*****  DATA SETTINGS  *****
BAUD RATE   DATA BITS   PARITY   PARITY CHECK   STRIP NULL/DEL   ALL
2400          8        none        off             off


*****  CONTROL SETTINGS  *****
XON/XOFF   ENQ/ACK   BINARY ENQ/ACK   DTR/CD     (S)RTS/SCA   CTS/CB    RS/CH
off         off         off        Busy=Low      Low       Ignore     Low
```

HP2628A to HP2930 Series
With Serial Interface

HP2628A   13242G   **HP2930 Series**

HOST CONFIGURATION:

FULL DUPLEX HARDWIRED   Port 2

BaudRate 2400	Parity None	DataBits 8			Clock INT
Asterisk Off		Stop Bits 1	EnqAck No		
TR(CD) Hi	Check Parity No	SR(CH) Lo			
RecvPace None		SRRXmit No	RR(CF)Recv No		
XmitPace Xon/Xoff		SRRInvert No	CS(CB)Xmit No	DM(CC)Xmit No	

PRINTER SETTINGS:

HP Terminal Mode, in the "OTHER SETTINGS" feature of the "Printer" subcategory, should be set to "ON".

```
*****   SETTINGS   *****

*****  LIST  *****        *****  MODIFY  *****
PRINTER      INTERFACE     PRINTER      INTERFACE

*****   LIST  INTERFACE   *****
          SERIAL

   DATA SETTINGS    CONTROL SETTINGS    SET DEFAULTS


          *****  DATA SETTINGS  *****
BAUD RATE  DATA BITS   PARITY   PARITY CHECK   STRIP NULL/DEL   ALL
  2400        8        none        off             off


          *****  CONTROL SETTINGS  *****
XON/XOFF  ENQ/ACK   BINARY ENQ/ACK   DTR/CD   (S)RTS/SCA   CTS/CB   RS/CH
  on       off          off          High       Low       Ignore    Low
```

HP2645A to HP2930 Series With Serial Interface

13232G

HP 2645A   **HP 2930 Series**
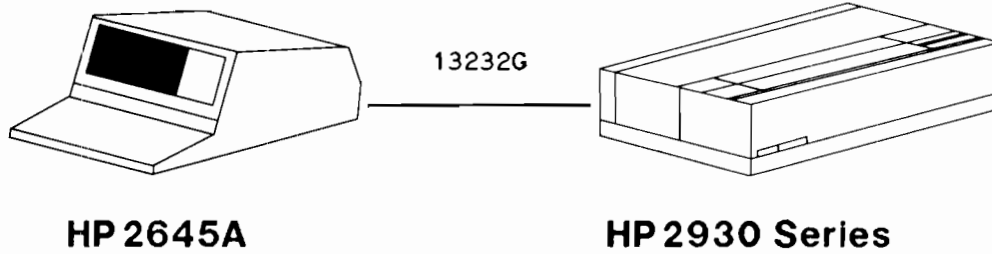
HOST CONFIGURATION:

1. 13261A Device Support ROM must be installed. (Already installed on units with cartridge tape drives or presently using a printer or plotter.)

2. 13250A or 13250B accessory must be installed in terminal. Refer to illustration on the following page for necessary switch settings on this interface accessory.

PRINTER SETTINGS:

HP Terminal Mode, in the "OTHER SETTINGS" feature of the "Printer" subcategory, should be set to "ON".

```
*****   SETTINGS   *****

*****  LIST  *****          *****  MODIFY  *****
    PRINTER    INTERFACE        PRINTER    INTERFACE

*****   LIST  INTERFACE   *****

                    SERIAL

        DATA SETTINGS    CONTROL SETTINGS    SET DEFAULTS


            *****  DATA SETTINGS  *****
BAUD RATE  DATA BITS   PARITY    PARITY CHECK   STRIP NULL/DEL   ALL
  9600        7        even          on             off


            *****  CONTROL SETTINGS  *****
XON/XOFF  ENQ/ACK  BINARY ENQ/ACK   DTR/CD     (S)RTS/SCA    CTS/CB    RS/CH
  off       on         off       Busy=Low    Busy=Low    Ignore     Low
```

HP120 to HP2930 Series
With Serial Interface

13242G

HP120   **HP2930 Series**

HOST CONFIGURATION: ▬▬▬▬▬▬▬▬▬▬▬

DATA COMMUNICATIONS / SERIAL PRINTER   Port 2

BaudRate	`2400`	Parity	`None`	Straps	`xz`	Hndsk `etX`
PtrNulls	`0`	SRRXmit	`OFF`	SRRInvert	`OFF`	Xon/Xoff(X) `Xmit`

OPSYS GENERAL LIST DEVICE

Display	`OFF`	IntPtr	`OFF`	Port 2	`ON`	HPIB `OFF`

PRINTER SETTINGS: ▬▬▬▬▬▬▬▬▬▬▬

```
*****   SETTINGS   *****

***** LIST *****          ***** MODIFY *****
  PRINTER    INTERFACE       PRINTER    INTERFACE

*****   LIST INTERFACE   *****
              SERIAL
      DATA SETTINGS    CONTROL SETTINGS    SET DEFAULTS

              ***** DATA SETTINGS *****
  BAUD RATE   DATA BITS   PARITY   PARITY CHECK   STRIP NULL/DEL   ALL
    2400         8        none        off             off

              ***** CONTROL SETTINGS *****
XON/XOFF   ENQ/ACK   BINARY ENQ/ACK   DTR/CD   (S)RTS/SCA   CTS/CB   RS/CH
  on        off           off          High       Low       Ignore    Low
```

HP125 to HP2930 Series
With Serial Interface

HP125   **HP 2930 Series**

HOST CONFIGURATION:

DATA COMMUNICATIONS / SERIAL PRINTER Port 2

BaudRate	`2400`	Parity	`None`	Straps	`xz`	Hndsk	`etX`
PtrNulls	`0`	SRRXmit	`OFF`	SRRInvert	`OFF`	Xon/Xoff(X)	`Xmit`

OPSYS GENERAL LIST DEVICE

Display	`OFF`	IntPtr	`OFF`	Port 2	`ON`	HPIB	`OFF`

PRINTER SETTINGS:
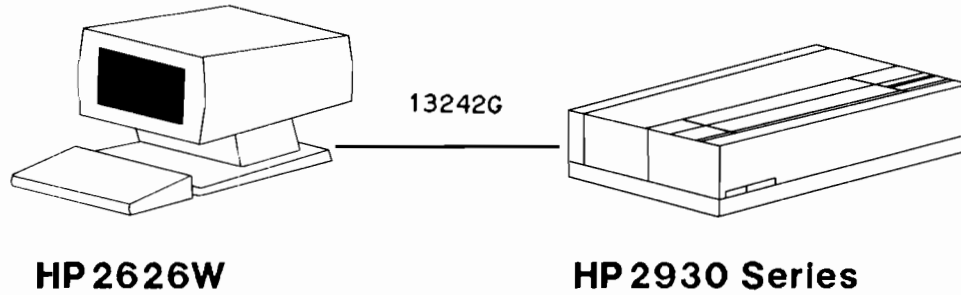
```
*****   SETTINGS   *****

*****  LIST  *****        *****  MODIFY  *****
   PRINTER   INTERFACE        PRINTER    INTERFACE


*****   LIST  INTERFACE   *****

          SERIAL

DATA SETTINGS    CONTROL SETTINGS    SET DEFAULTS


        *****  DATA SETTINGS  *****
 BAUD RATE  DATA BITS   PARITY   PARITY CHECK   STRIP NULL/DEL   ALL
   2400        8        none        off             off


        *****  CONTROL SETTINGS  *****
XON/XOFF   ENQ/ACK   BINARY ENQ/ACK   DTR/CD   (S)RTS/SCA   CTS/CB   RS/CH
  on         off         off          High       Low        Ignore    Low
```

HP150 to HP2930 Series
With Serial Interface

13242G

HP150   **HP2930 Series**

Computer
Museum
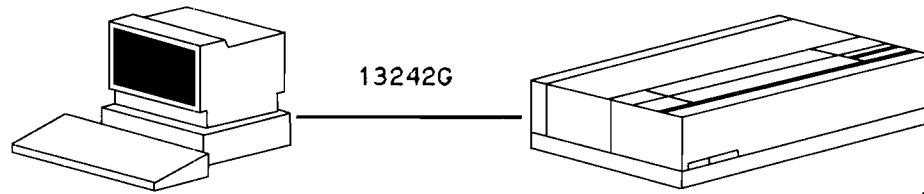
HOST CONFIGURATION:

Model choice shown is 2932A; use 2934A as choice when using 2933A or 2934A printer.

MS-DOS Device Configuration			Main				Active Values

System Devices

	Interface	Address	Model	Print Wheel		Interface	Address
PRN:	Port2		2932A		PLT:	Port2	
LST:	Internal		2674A		COM1:	Remote	
AUX:	Remote				COM2:	Port2	

FULL DUPLEX HARDWIRED   Port 2

BaudRate	2400	Parity	None	DataBits	8			Clock	INT
Asterisk	Off			Stop Bits	1	EnqAck	No		
TR(CD)	Hi	Check Parity	No	SR(CH)	Lo				

RecvPace	None			SRRXmit	No	RR(CF)Recv	No		
XmitPace	Xon/Xoff			SRRInvert	No	CS(CB)Xmit	No	DM(CC)Xmit	No

PRINTER SETTINGS:

When using the HP150 as an HP150 terminal, HP Terminal Mode, in the "OTHER SETTINGS" feature of the "Printer" subcategory, may be set to "ON".

***** SETTINGS *****

***** LIST *****		***** MODIFY *****	
PRINTER	INTERFACE	PRINTER	INTERFACE

***** LIST INTERFACE *****
SERIAL

DATA SETTINGS   CONTROL SETTINGS   SET DEFAULTS

***** DATA SETTINGS *****

BAUD RATE	DATA BITS	PARITY	PARITY CHECK	STRIP NULL/DEL	ALL
2400	8	none	off	off	

***** CONTROL SETTINGS *****

XON/XOFF	ENQ/ACK	BINARY ENQ/ACK	DTR/CD	(S)RTS/SCA	CTS/CB	RS/CH
on	off	off	High	Low	Ignore	Low

SEPT 84

HP250 to HP2930 Series
With Serial Interface

8120-3258

HP 250   **HP 2930 Series**

HOST CONFIGURATION: ██████████████████████████

This information is intended only to be a guide for configuring the HP2930 Series printers on the HP250. Please refer to the manuals provided with the HP250 for complete information and procedures, or contact your local Hewlett-Packard Customer Engineer.

RS-232-C Interface:

- OC Revision: B.06.00 or greater
- DROMs Required: TIO
- ASI Port: Any port, with each printer on a separate port if multiple
- Baud Rate Setting on ASI Board: The baud rate set on the ASI board must match the baud rate set on the printer. Check with your local Hewlett-Packard Customer Engineer to determine if the baud rate set on the ASI board is correct for your configuration. This example assumes 1200 baud.
- ASI Panel Strapping: The ASI panel must be strapped correctly. This strapping depends upon whether you have directly connected your printer or are using a modem with it. Refer to the HP250 manuals for more information, or contact your local HP Customer Engineer.
- RFIG Values:

```
Class:   Printer
Type:    293X
Format:  8N1
```

PRINTER SETTINGS: ███████████████████████████████

```
*****    SETTINGS    *****

*****  LIST  *****        *****  MODIFY  *****
PRINTER    INTERFACE      PRINTER    INTERFACE


*****    LIST  INTERFACE    *****

              SERIAL

    DATA SETTINGS    CONTROL SETTINGS    SET DEFAULTS


              *****  DATA SETTINGS  *****
    BAUD RATE   DATA BITS   PARITY   PARITY CHECK   STRIP NULL/DEL   ALL
    1200        8           none     off            off


              *****  CONTROL SETTINGS  *****
XON/XOFF   ENQ/ACK   BINARY ENQ/ACK   DTR/CD   (S)RTS/SCA   CTS/CB   RS/CH
off        on        off              High     Low          Ignore   Low
```
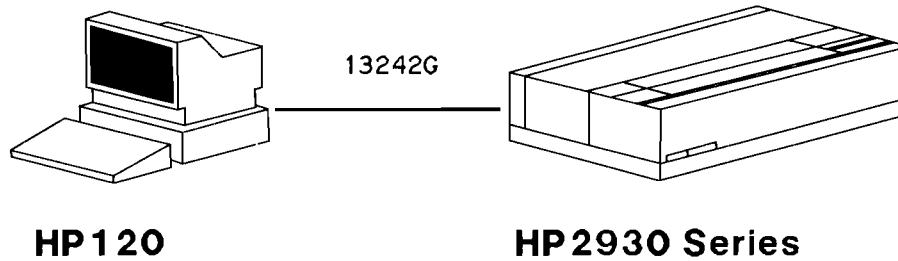
HP1000 "A" Series to HP2930 Series With Serial Interface
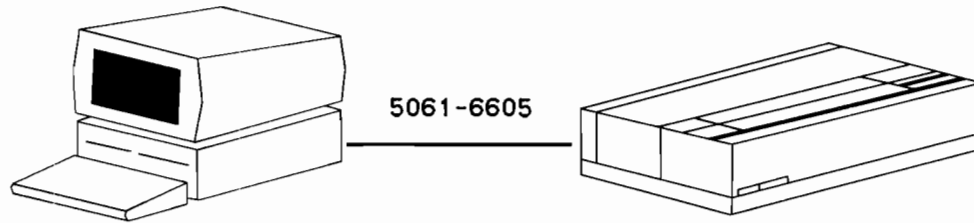
HP1000 "A" Series   5061-6605   **HP2930 Series**

HOST CONFIGURATION:

12005A Interface
RTE-A Operating System
I/F DVR - ID. 00
Device Driver - %DD. 00

PRINTER SETTINGS:

Match baud rate to switch settings on 12005A interface. This example assumes 2400 baud.

```
*****    SETTINGS    *****

*****  LIST  *****      *****  MODIFY  *****
PRINTER     INTERFACE      PRINTER     INTERFACE

*****   LIST  INTERFACE   *****

*****   SERIAL   *****

DATA SETTINGS     CONTROL SETTINGS     SET DEFAULTS
```

	***** DATA SETTINGS *****				
BAUD RATE	DATA BITS	PARITY	PARITY CHECK	STRIP NULL/DEL	ALL
2400	8	none	off	off	

***** CONTROL SETTINGS *****						
XON/XOFF	ENQ/ACK	BINARY ENQ/ACK	DTR/CD	(S)RTS/SCA	CTS/CB	RS/CH
off	on	off	High	Low	Ignore	Low

HP1000 "A" Series to HP2930 Series With Serial Interface

```
                92219G
                  or
                13242N
```

HP 1000 "A" Series
With 12040B Multiplexer

HP 2930 Series

HOST CONFIGURATION:

RTE-A Operating System
I/F DVR - IDM00
Device Driver - DD.00

PRINTER SETTINGS:

Match baud rate initialized on Multiplexer port

```
      *****       SETTINGS      *****

   ***** LIST *****        ***** MODIFY *****
   PRINTER    INTERFACE    PRINTER    INTERFACE


  *****    LIST  INTERFACE    *****

      *****    SERIAL    *****

       DATA SETTINGS   CONTROL SETTINGS   SET DEFAULTS


            *****  DATA SETTINGS  *****
  BAUD RATE   DATA BITS   PARITY   PARITY CHECK  STRIP NULL/DEL   ALL
    2400          8        none        off           off


            *****  CONTROL SETTINGS  *****
 XON/XOFF   ENQ/ACK   BINARY ENQ/ACK   DTR/CD   (S)RTS/SCA   CTS/CB   RS/CH
   off        on          off           High       Low       Ignore    Low
```
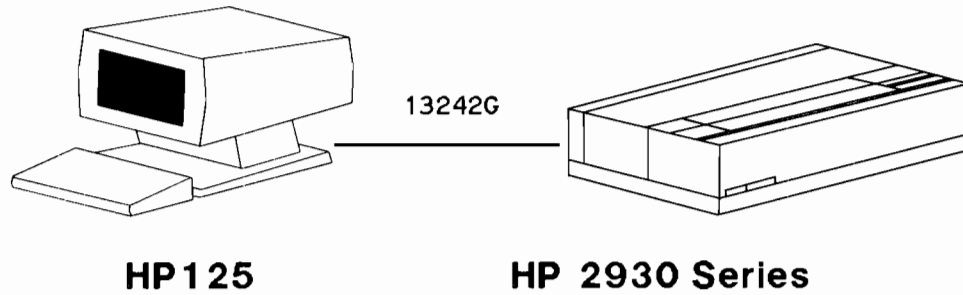
HP3000 4X, 6X, Series III to HP2930 Series With Serial Interface
(Remote Spooled Only)

13242N
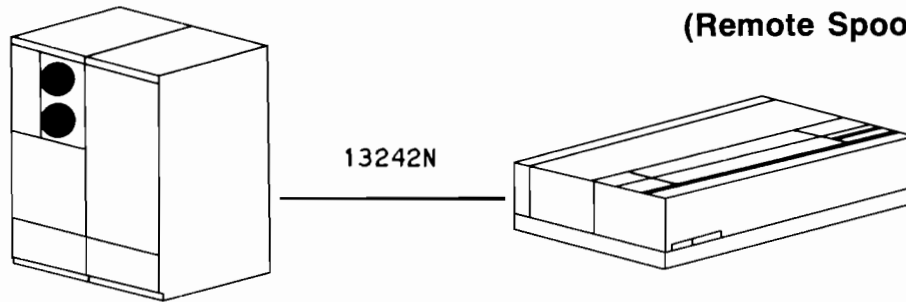
HP3000 4X, 6X, Series III (MPE 4)   **HP2930 Series**

HOST CONFIGURATION:

MPE CONFIGURATION:

```
LDEV?     (provided by customer engineer)
DRT?      (provided by customer engineer)
UNIT?     (provided by customer engineer)
SOFTWARE CHANNEL?   0
TYPE?     32
SUBTYPE?   14 or 15
TERM TYPE?   19
SPEED?    240
REC WIDTH?   66
OUTPUT DEVICE?   0
ACCEPT JOB/SESSIONS?    NO
ACCEPT DATA?    NO
INTERACTIVE?    NO
DUPLICATIVE?    NO
INITIALLY SPOOLED?    YES
DRIVER NAME?    HIOASLP0 (for use with ATP)
                HIOTERM0 (for use with ADCC)
                IOTERM0 (for use with Series III)
DEVICE CLASSES?    (user's choice)
```

PRINTER SETTINGS:

```
***** SETTINGS *****

***** LIST *****          ***** MODIFY *****
PRINTER   INTERFACE       PRINTER   INTERFACE

***** LIST INTERFACE *****
SERIAL

DATA SETTINGS    CONTROL SETTINGS    SET DEFAULTS

***** DATA SETTINGS *****
BAUD RATE   DATA BITS   PARITY   PARITY CHECK   STRIP NULL/DEL   ALL
2400        7           odd      on             off

***** CONTROL SETTINGS *****
```

XON/XOFF	ENQ/ACK	BINARY ENQ/ACK	DTR/CD	(S)RTS/SCA	CTS/CB	RS/CH
on	off	off	High	Low	Ignore	Low

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TROUBLESHOOTING

INTRODUCTION

This section provides self test information and troubleshooting procedures for the 2930 Series printers to isolate problems to the assembly or component level.

SELF TESTS – 2932A

Three modes of testing are available in the 2932A, using a total of seven tests. These tests are illustrated below.

- POWER ON TEST

- MANUFACTURING BURN-IN TEST

- USER INVOCABLE TESTS
  - Nondestructive Confidence Test
  - Print Mechanism Test
  - Destructive Controller Test
  - Interface Test
  - Alignment Test

Use of these tests can verify the integrity of the following areas:

```
- 8051 Processor             (Functional)

- Firmware/Character ROM's   (Present, correct ID, correct checksum)

- Static RAM's               (Functional)

- Nonvolatile RAM            (Initialized, correct checksum)

- Serial Interface           (Present, functional data loopback, baud
                              rate timing, byte configuration, control
                              lines, interrupts)

- HP-IB Interface            (Present)

- Parallel Interface         (Present)

- Print Mechanism            (8051 ready, 8051 ROM and RAM correct,
                              test displayed for visual indication)
```

When an error is encountered, the keypad LED's will flash a code to indicate the error condition or an error message will be printed. Table 4-1 contains error codes and probable causes, while Table 4-2 explains printed messages.

POWER-ON TEST - 2932A

This test is invoked automatically at power on. Time to complete is about 2 seconds. No information will be printed for successful completion. Fatal errors will be displayed on the keypad LED's, and nonfatal errors will be printed. Refer to Table 4-1 for error codes and probable causes. Table 4-2 explains printed error messages. The modules tested are those outlined above under the heading, SELF TESTS.

Table 4-1. 2932A Error Isolation Codes.

LED ERROR CODES			FAILURE	COMMENTS
0	1	2		
-	-	-	8051 Int. RAM	Replace the 8051 microprocessor.
-	-	*	ROM 0	Replace ROM 0 (U101)
-	*	-	ROM 1	Replace ROM 1 (U301)
-	*	*	reserved	A paper out condition can mimick this.
*	-	-	RAM 0	Replace RAM 0 (U401)
*	-	*	RAM 1	Replace RAM 1 (U601)
*	*	-	Nonvolatile RAM	Replace NVRAM (U701)
*	*	*	Reserved	
* LED is always on - LED blinks				

Table 4-2. 2932A Printed Self Test Messages.

MESSAGE	MEANING
A3D	Control line malfunction
A38	No data seen on loopback
A37	Wrong data seen on loopback
A20	HP-IB register access error
A10	No I/F hardware installed
A11	Wrong RS-232-C I/F board installed
PRINTER SETTINGS WERE RESET	NVRAM checksum failure

MANUFACTURING BURN-IN TEST - 2932A

This test is a continuous-loop test that checks all printer modules. It is a useful test for troubleshooting intermittently failing units. As the test executes successfully, the printer will print the mechanism self-test pattern once each half hour. Errors that are nonfatal will be printed, and fatal errors will be displayed on the keypad LED's. See Table 4-2 for error message interpretation and Table 4-1 for error codes and probable causes.

To invoke this test, perform the following functions:

1. Press the SELECT key.

2. Press the TEST and ON LINE keys simultaneously.

3. The printer should now enter the Burn-In test, which will test all the printer modules normally tested at power on. At the conclusion of the first test, the printer will print the mechanism self-test pattern and continue looping on the test.

4. To exit the test, press any key.

<div align="center">

NOTE

</div>

Cycling the primary power will not clear this test from being executed, since it is stored in nonvolatile memory.

USER INVOCABLE TESTS – 2932A

Nondestructive Confidence Test – 2932A

This test is invoked by pressing the `TEST` key. The test is similar to the Power On test in all respects, except the RAM test, where it performs a nondestructive test in the form of a read, complement, store, and compare operation twice on each location of RAM to verify it and leave it in its original state. This test is the same as that invoked programmatically by Esc z. If the test is successful, the printer will beep and print "Self Test Passed." Errors that are nonfatal will be printed, and fatal errors will be indicated on the keypad LED's. See Table 4-1, Error Isolation Codes and Table 4-2, 2932A Self Test Messages.

Print Mechanism Test – 2932A

This test is invoked by pressing the `SELECT` key followed by the `TEST` key. The printer will print a menu for further selection. The arrow on the head carriage should be directly under the word "MECHANISM." Pressing the `SELECT` key causes the printer to begin the mechanism test. The printer will print a test pattern like that shown in Figure 4-1, Print Mechanism Test Pattern - 2932A.

Figure 4-1. Print Mechanism Test Pattern - 2932A

Controller Test -2932A

This test is the same as the Nondestructive Confidence Test that is invoked with the ▮TEST▮ key. Under normal conditions, the printer should print out SELF TEST PASSED followed by a listing of the internal ROM's and their part numbers and date codes. See Figure 4-2. If this test fails, nonfatal errors will be printed and fatal errors will be indicated on the keypad LED's. Refer to Tables 4-1 and 4-2.

```
Self Test Passed.

MECHANISM  |  CONTROLLER  |  INTERFACE  |  ALIGNMENT  |  COUNTERS


Self Test Passed.
2932-80069 2350   2932A FIRMWARE ROM 0
2392-80070 2350   2392A FIRMWARE ROM 1
```

Figure 4-2. Controller Test Example Printout - 2932A.

Interface Test -2932A

Select this test by pressing the ▮SELECT▮ key and then the ▮TEST▮ key. Position the carriage arrow directly under the word "INTERFACE" using the ▮▮ key, then press ▮SELECT▮ . The test begins by verifying that some type of interface board is installed in the printer. No further testing capabilities are available for the general purpose parallel interface and the HP-IB. The RS-232-C and RS-422 interfaces check for an external loopback device. If found, then external data looping will be checked. Any errors associated with the interface are considered nonfatal; see Table 4-2 for an explanation of printed error messages.

Alignment Test - 2932A

The Alignment test prints a pattern of vertical bars that give an indication of how well the carriage belt is adjusted. If the belt is adjusted too loosely, the vertical bars will not line up properly. It is important to know that it is not necessary or even desirable to have all the printed bars perfectly aligned. Correct adjustment is accomplished when most of them are aligned. Refer to Section 5 for the carriage belt adjustment procedure and examples of printouts showing the results of proper and improper belt adjustment. This is a continuous test that is exited by pressing any key.

Counter Check - 2932A

Although not actually a test, the Counter Check gives the operator and service person information about the number of characters or pages that have accumulated on the ribbon cartridge since it was last changed. The title TOTAL USAGE indicates the total number of characters the printer has used since the current Processor board was installed (this board contains the character count). Or, the count could indicate the total number of characters the printer has used since the current print mechanism was installed and the counter was reset. (This can be done only by a Hewlett-Packard service person.)

For the purpose of service contracts, a page is defined as 2048 characters. The service contract prices are tiered so that one rate is charged for printers used under 3,000 pages per month while those operated between 3,000 and 12,000 pages per month are charged at a higher rate. Units operated beyond 12,000 pages per month are repaired on a time and material basis only.

The counter check is selected by pressing the `SELECT` key followed by the `TEST` key. Use the `▮` key to position the carriage arrow directly under the word "Counter," then press `SELECT` . After the counter data is printed, the printer offers another menu. See Figure 4-3 Counter Printout Example. The operator can reset the count for the ribbon by positioning the carriage arrow under the appropriate heading and pressing `SELECT` . If the ribbon has not been replaced, the operator can exit without making any change by leaving the carriage arrow under "REPLACED NOTHING" and pressing the `SELECT` key. The printer will then print "End of Counter."

MECHANISM | CONTROLLER | INTERFACE | ALIGNMENT | COUNTERS

RIBBON USAGE = 520,000.

TOTAL USAGE = 582,909   (284 MAINTENANCE CONTRACT PAGES).

    REPLACED NOTHING | REPLACED RIBBON

END OF COUNTERS.

Figure 4-3.   Counter Printout Example.

SELF TESTS - 2933/34A

Three modes of testing are available in the 2933/34A, using a total of seven tests. These tests are illustrated below.

- POWER-ON TEST

- MANUFACTURING BURN-IN TEST

- USER INVOCABLE TESTS
    - Nondestructive Confidence Test
    - Print Mechanism Test
    - Destructive Controller Test
    - Interface Test
    - Alignment Test
    - Counters

Use of these tests can verify the integrity of the following areas:

- Z80 Processor	(Functional)
- Firmware ROM's	(Present, correct ID, correct checksum)
- Static RAM's	(Functional)
- Character ROM	(Present, correct ID, correct checksum)
- Option character ROMs	(Correct ID, correct checksum)
- Nonvolatile RAM	(Initialized, correct checksum)
- Timer	(Functional)
- Serial Interface	(Present, functional data loopback, baud rate timing, byte configuration, control lines, interrupts)
- HP-IB Interface	(Present, functional registers)
- Parallel Interface	(Present)
- Print Mechanism	(8051 ready, 8051 ROM and RAM correct, text displayed for visual indication)

The 2933/34A Printer will beep upon succussful completion of a test. When an error is encountered, the self-test character display LED on the Processor PCA will indicate the error condition or an error message will be printed. Table 4-3 contains error codes and probable causes, while Table 4-4 explains printed messages.

POWER-ON TEST – 2933/34A

This test is invoked automatically at power on. Time to complete is about 5 seconds. No information will be printed for successful completion. Fatal errors will be displayed in the self test character display LED on the Processor PCA, and nonfatal errors will be printed. Refer to Table 4-3 for error codes and probable causes. Table 4-4 explains printed error messages. The modules tested are those outlined above under the heading, SELF TESTS.

Table 4-3. 2933/34A Error Isolation Codes.

ERROR CODES			MEANING	PROBABLE CAUSE
1ST	2ND	3RD		
8			Processor not running.	- Z80 - Processor board - ROM - RAMs 1-4
1			Z80 processor error	- Z80 - Processor board
2	1	0	Firmware ROM checksum error	- ROM #1 (U503)
	2	0	2nd ROM checksum error	- ROM #2 (U504)
	2	1	2nd ROM ID error	- ROM #2 (U504)
3	1	0	First 2K RAM error	- RAM #1 (U703)
	2	0	Second 2K RAM error	- RAM #2 (U803)
	3	0	Third 2K RAM error	- RAM #3 (U804)
	4	0	Fourth 2K RAM error	- RAM #4 (U704)
4	1	0	Stake usage error	- Processor board
5	1	0	8051A not ready	- 8051A - Processor board
	2	0	8051A self test error	- 8051A
	3	0	FIFO failure, low nibble	- U410
	4	0	FIFO failure, high nibble	- U310
	5	0	FIFO failure, both nibbles	
	6	0	ULA not connected	- U710
6	M	1	EXT character ROM checksum error	
6	N	2	EXT character ROM mis-inserted where M is the ROM number and N is the slot number.	
7	1	0	Timer not functional	- Processor board
	2	0	Timer too fast	- Processor board
	3	0	Timer too slow	- Processor board
8			Z80 processor not running	
9			Not used	

Table 4-3. 2933/34A Error Isolation Codes (cont'd).

ERROR CODES			MEANING	PROBABLE CAUSE
1st	2nd	3rd		
A	1	0	No I/O board installed	
	2	0	HP-IB register access error	- HP-IB board
	3	0	RS-232 or RS-422 error	- I/O board
	4	0	Data Link error	- I/O board
	5	0	Asynchronous Multipoint error	- I/O board
	6	0	Synchronous Multipoint error	- I/O board
		1	False datacomm interrupt noted	
		2	False transmit ready noted	
		3	False receiver ready noted	
		4	Datacomm interrupt not noted	
		5	Transmit ready not noted	
		6	Receive ready not noted	
	*	7	Wrong data seen on loopback	
		8	No data seen on loopback	
		9	Framing error	
		A	Parity error	
		B	Baud rate too fast	
		C	Baud rate too slow	
		D	Control line malfunction	
		E	Sync/Break detected	
B			Failure while printing symbol set displays	
C			Stuck key	- Control panel
D			Not used	
E			Error encountered during tests	

* Any of these digits could have a second digit of 3, 4, 5, or 6. For example, A 39 is a framing error with the serial I/O, while A 49 is a framing error with a data link I/O.

Table 4-4. 2933/34A Printed Self Test Messages.

MESSAGE	MEANING
6XX CHAR. ROM FAILURE	Character ROM
7X0 INTERNAL TIMER FAILURE	Internal timer on Processor PCA
PRINTER SETTINGS RESET	Nonvolatile RAM; bad or not intialized
AXX INTERFACE FAILURE	Interface related problem
RELEASE ** KEY	Stuck key

Where ** equals one of the following 2-character ID codes corresponding to keypad positioning below.

	TE	ON	SE
<<	>>	VI	NP
UP	DW	ST	NL

Computer Museum

Example: "Release DW key" indicates that the ▼ key is stuck.

NOTE

This table should be used with Table 4-3 to define the error isolation codes. These codes are shown in the above table as 6XX, 7X0, and AXX.

MANUFACTURING BURN-IN TEST – 2933/34A

This test is a continuous-loop test that checks all printer modules. It is a useful test for troubleshooting intermittently failing units. As the test executes successfully, the printer will print the mechanism self-test pattern once each half hour. Errors that are nonfatal will be printed, and fatal errors will be displayed on the Processor PCA's seven-segment LED. See Table 4-4 for error message interpretation and Table 4-3 for error codes and probable causes.

To invoke this test, perform the following functions:

1. Press the SELECT key.

2. Press the TEST and ON LINE keys simultaneously.

3. The printer should now enter the MBI test, which will test all the printer modules normally tested at power on. At the conclusion of the first test, the printer will print the mechanism self-test pattern and continue looping on the test.

4. To exit the test, press any key.

| NOTE |

Cycling the primary power will not clear this test from being executed, since it is stored in nonvolatile memory.

USER INVOCABLE TESTS -2933/34A

Nondestructive Confidence Test - 2933/34A

This test is invoked by pressing the `TEST` key. The test is similar to the Power On test in all respects, except the RAM test, where it performs a nondestructive test in the form of a read, complement, store, and compare operation twice on each location of RAM to verify it and leave it in its original state. If the test is successful, the printer will beep and print "Self Test Passed." Errors that are nonfatal will be printed, and fatal errors will be displayed in the Processors PCA's seven-segment LED. See Table 4-3, Error Isolation Codes and Table 4-4, 2933/34A Self Test Messages.

Print Mechanism Test - 2933/34A

This test is invoked by pressing the `SELECT` key followed by the `TEST` key. The printer will print a menu for further selection. The arrow on the head carriage should be directly under the word "MECHANISM." Pressing the `SELECT` key causes the printer to begin the mechanism test. The printer will print a test pattern like that shown in Figure 4-4, Print Mechanism Test Pattern. If optional character sets are installed, the printer will include a sample from each of them, as well.

MECHANISM | CONTROLLER | INTERFACE | ALIGNMENT | COUNTERS

Figure 4-4.   Print Mechanism Test Pattern - 2933/34A

Troubleshooting

Destructive Controller Test — 2933/34A

This test is similar to the Power On test in all respects. To invoke the test, press the **SELECT** key followed by the **TEST** key. The printer will list a menu for further selection. See Figure 4-5, Controller Test Example Printout. Use the **▮▶** or **◀▮** key to position the carriage arrow directly under the word "CONTROLLER," then press **SELECT**. This test differs from the Nondestructive Confidence Test in that it performs a more comprehensive test on the RAMs (not NVRAM), which is destructive to all data contained in them. Upon successful completion of this test, the print will print "SELF TEST PASSED." This will be followed by a printout of all firmware and character ROMs with their respective part numbers and dates of last change. If errors occur, nonfatal errors will be printed, and fatal errors will be displayed on the Processor PCA's seven-segment LED. See Tables 4-3 and 4-4 for explanations of error messages.

```
MECHANISM   |   CONTROLLER   |   INTERFACE   |   ALIGNMENT   |   COUNTERS


Self Test Passed.
02934-80099 2349   2934A FIRMWARE ROM 0
02934-80153 2349   2934A FIRMWARE ROM 1
92188A   2345   SD   HP_Cour
92188A   2345   DD   HP_Cour
```

Figure 4-5. Controller Test Example Printout - 2933/34A.

Interface Test — 2933/34A

Select this test by pressing the **SELECT** key and then the **TEST** key. Position the carriage arrow directly under the word "INTERFACE" using the **▮▶** key, then press **SELECT**. The test begins by verifying that some type of interface board is installed in the printer. No further testing capabilities are available for the general purpose parallel interface. For HP-IB, the only test is the writing and reading of the registers in the 8291A HP-IB IC. The RS-232, RS-422, DSN Data Link, and Multipoint interfaces will perform exhaustive internal loopback, baud rate, byte configuration, and interrupt testing. In addition, a check for an external loopback device will be made; if found, then external data looping will be checked. Any errors associated with the interface are considered nonfatal; see Table 4-4 for an explanation of printed error messages. A VCD Printer Test Tape (P/N 5010-0824) is available for use with an HP85 computer. Together, they can be used to send alphanumeric and graphics data to the printer, thereby performing an actual transfer of information. The HP85 can operate with an HP-IB, Centronics, or RS-232-C I/O board.

Alignment Test — 2933/34A

The Alignment test prints a pattern of vertical bars that give an indication of how well the carriage belt is adjusted. If the belt is adjusted too loosely, the vertical bars will not line up properly. It is important to know that it is not necessary or even desirable to have all the printed bars perfectly aligned. Correct adjustment is accomplished when most of them are aligned. Refer to Section 5 for the carriage belt adjustment procedure and examples of printouts showing the results of proper and improper belt adjustment.

Counter Check – 2933/34A

Although not actually a test, the Counter Check gives the operator and service person information about the number of characters or pages that have accumulated on the ribbon cartridge since it was last changed. The title "TOTAL USAGE" indicates the total number of characters the printer has used since the current processor board was installed (this board contains the character count). One "Maintenance Contract" page equals 2048 characters. Each character printed in letter quality printing (67 and 40 cps) counts as two characters, since they are created by two passes of the print head. Graphics, bar codes, and large characters are equivalized to characters and are included in the character page count. The service contract prices are tiered so that one rate is charged for printers used under 3,000 pages per month while those operated between 3,000 and 12,000 pages per month are charged at a higher rate. Units operated beyond 12,000 pages per month are repaired on a time and material basis only.

This check is selected by pressing the SELECT key followed by the TEST key. Use the ▐▶ key to position the carriage arrow directly under the word "COUNTERS," then press SELECT . After the counter data is printed, the printer offers another menu. See Figure 4-3 Counter Printout Example. The operator can reset the count for the ribbon by positioning the carriage arrow under the heading and pressing SELECT . If the ribbon has not been replaced, the operator can exit without making any change by leaving the carriage arrow under "REPLACED NOTHING" and pressing the SELECT key. The printer will then print "End of Counter."

TROUBLESHOOTING PROCEDURES

Use the following general procedure to help isolate a problem.

1. Does the printer power up correctly?

   At power on, the printer should do the following.

   a. All LED's on the control panel, except the ON LINE LED, should light during the self test.

   b. The print head should slew to the right and then back.

   c. After the power-on self test is complete, the POWER ON and ON LINE LED's should be lit.

   d. The printer should "beep", indicating the Processor PCA is functional.

   If the unit powers up correctly, it indicates correct operation of the Processor PCA, motors, and at least some portions of the Motor/Head Driver PCA and Power Supply PCA. Go to step 2.

   If the printer does not power up correctly, do the following.

   a. If the fan is not running, check the line fuse.

   b. 2932A: Check for a printed error message or see if the keypad LED's are displaying a code. If so, refer to Table 4-1 or 4-2.

   c. 2933/34A: Check for a printed error message or see if the Processor PCA's seven-segment LED is displaying a code. If so, refer to Table 4-3 or 4-4.

   ```
   CAUTION
   ```

   Always turn power OFF before removing or installing the metal shield
   that covers the PCAs, or severe board damage may result.

   d. Ensure the cover is down or that the service interlock switch is pulled up.

   e. Check the three LEDs on the Power Supply PCA. If any of the LEDs are not lit, see the paragraph entitled "POWER SUPPLY."

   f. Check the Processor PCA, Motor/Head Driver PCA, motors, and printhead.

2. Push the ▮TEST▮ key on the control panel. Does the printer print "Self Test Passed"?

   If the answer is yes, go to step 3.

   If the printer fails this test, it may print an error message on the page or light the LED's, indicating how it failed. If so, refer to Tables 4-1 and 4-2 or 4-3 and 4-4, depending on model number.

If the printer does not respond properly or does not respond at all, check the following.

   a. The three LED's on the Power Supply PCA.

   b. Control Panel Assembly.

   c. Motor/Head Driver PCA.

   d. Print Head (if missing dots).

   e. Cable connections.

Also check the interlock button on the right of the printer. This button has three positions and must be all the way up or down before the printer can work. The Processor PCA is responsible for sending the print wire information from its Gate Array, so check this board last. (The Gate Array also drives the carriage motor, which should be working at this point.)

3. Run the Interface Self Test. Does the printer pass this test? (A3D A38 is the normal indication if no external loopback hood is used on RS-232-C.)

If the answer is yes, the printer is operating properly from a functional standpoint. It may, however, have more subtle problems associated with print quality, paper feed, etc.. In this case, refer to Table 4-5, Troubleshooting Hints.

If the printer fails this test, it indicates a problem in the printer's interface board, Processor PCA, or control panel.

Power Supply

The Power Supply PCA has three fuses that are connected to the +10V, +26V, and -30V supplies. It also has three LEDs that are connected to the +6.5V, +5V, and -12V supplies. If any of the six output supplies are not working, one of these LED's will be off, since +5V, +6.5V and -12V are all dependent on other supplies. If any of the LED's are off, turn off the power and check the on-board fuses. If the fuses are good, remove one of the other PC boards, turn on power, and see if the LED lights. Continue to cycle power and remove boards. If the LED lights, replace the last removed board. If no board is found, replace the power supply. The following information outlines the relationship between the LED's and the various voltage rails.

-12V LED	+6.5V LED	+5V LED	Comments
on	on	on	All rails OK
off	on	on	-30V or -12V down
on	off	on	+6.5V down
on	on	off	+5V down
on	off	off	+12V or +26V down
off	off	off	Main fuse blown

MOTOR RESISTANCE

Before a motor is replaced, its internal resistance can be measured with an ohmmeter to determine if the internal windings are shorted or open. The d.c. ribbon motor has a resistance of about 8.5 Ohms (no tolerances are given). The two stepper motors measure 5.0 Ohms +/- 10% between phases. Other normal measurements on the stepper motors are 10 Ohms and infinity. See Figure 4-6.
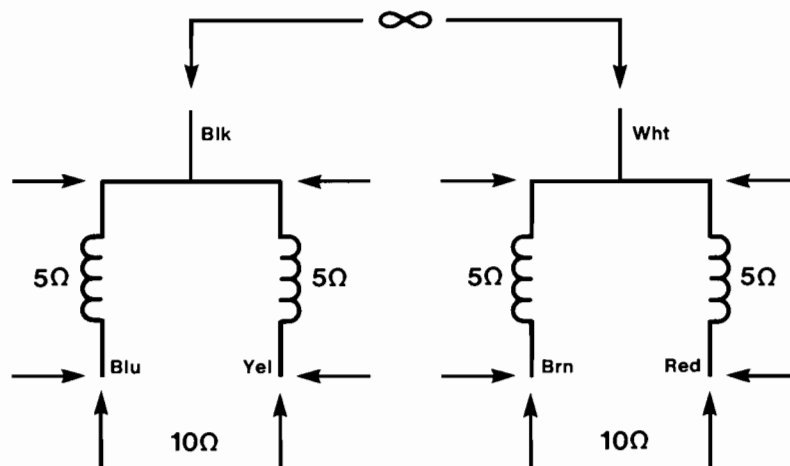
Figure 4-6. Stepper Motor Measurements.

Table 4-5. Troubleshooting Hints.

SYMPTOM	CAUSE
Print is too light.	1. Ribbon cartridge needs replacing. 2. Ribbon motor or ribbon motor fuse. 3. Ribbon not advancing properly. 4. Improper head gap adjustment. 5. Printhead needs replacement (worn). 6. Power Supply PCA. 7. Motor/Head Driver PCA. 8. Printhead not fully seated.
Missing dots.	1. Improper head gap adjustment. 2. Printhead cable. 3. Motor/Head Driver PCA. 4. Processor PCA. 5. Printhead needs replacement. 6. Fuse on Motor/Head Driver PCA.
Improper character spacing; characters jammed together or margin wander.	1. Carriage motor belt too tight; stalling.* 2. Carriage motor belt too loose; slipping. 3. Carriage motor. 4. Head gap too small.
Horizontal print alignment is out of specification.	1. Carriage motor belt needs adjustment. 2. Worn carriage bearings. 3. Front bearing preloader. 4. Printhead gap adjustment. 5. Ribbon guide (on Carriage Assembly).
Printer will not advance paper.	1. Head gap too small. 2. Paper jammed in rear paper path exit. 3. Paper caught going into printer. 4. Loose Paper Drive belt. 5. Motor/Head Driver PCA. 6. Paper drive motor disconnected. 7. Paper drive motor. 8. Incorrect paper path.
Improper line feeds.	1. Head gap too small. 2. Paper drive motor belt too loose. 3. Defective tractor(s). 4. Pinch roller assembly. 5. Drive roller needs cleaning. 6. Paper drive motor.

* A stall may exhibit itself as a failure of the print head to fully sweep across the width of the page. It may then return to the left and crash into the side, or vice versa.

Table 4-5. Troubleshooting Hints (cont'd).

SYMPTOM	CAUSE
Multi-part forms not feeding correctly.	1. Printhead gap adjustment. 2. Forms may be too thick for rear exit. Try top exit. 3. Forms not within required thickness specifications. 4. Ribbon guide (on Carriage Assembly).
Paper not taut across platen.	1. Tractors not locked in place. 2. Pinch roller needs replacing. 3. Drive roller needs to be cleaned or replaced. 4. Printhead gap is adjusted too close to platen. 5. Tractors not set to correct width for paper.
Ink is being tracked onto paper by drive roller.	1. Drive roller needs to be cleaned. 2. Printhead gap is adjusted too close.
Cannot set proper left margin.	1. Left edge of paper not adjusted to column zero at tractors. 2. Power-on left margin position is nonvolatile. Adjust with keys.
Paper indicating paper out condition with paper installed.	1. Paper not fed properly through paper sensor. 2. Defective paper sensor. 3. Motor/Head Driver PCA. 4. Processor PCA.
Extra dots	1. Printhead cable shorted to mechanism.

INTRODUCTION

This section provides instructions for adjustments and for removing and replacing printer assemblies and components designated as field replaceable.

ADJUSTMENTS

There are virtually no adjustments to be performed on the 2930 Series printer; the only exceptions being the print head gap and the carriage belt tension. The counter for the ribbon can be altered through software configuration when the part has been replaced.

Belt Adjustment

The tension of the carriage belt is best adjusted when the mechanism is actually printing. Moving the thermal compensator vertically along the end plate adjusts the belt tension. Follow the steps below to complete the alignment.

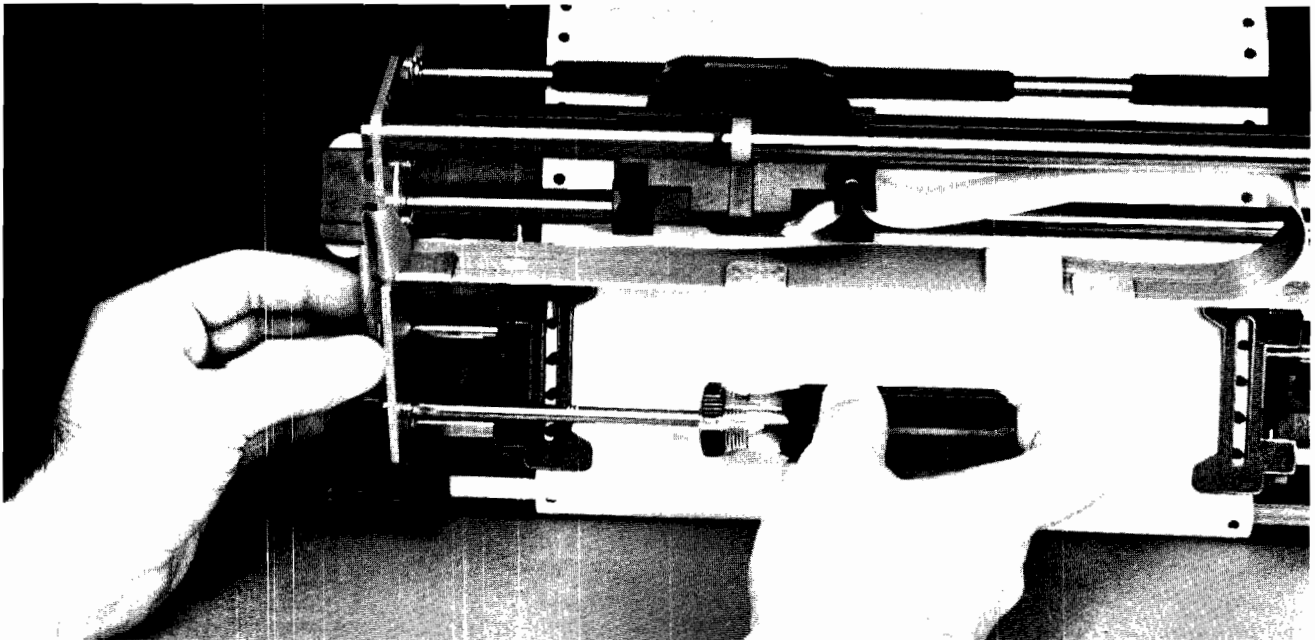1. Loosen the screw holding the thermal compensator (see Figure 5-1).

Figure 5-1.   Thermal Compensator Adjustment.

Maintenance

2. Start the alignment pattern by pushing the **SELECT** and **TEST** keys and then select "Alignment" from the menu.

3. Push the thermal compensator upward to loosen the belt slightly. Figure 5-2 shows the result of a loosely adjusted belt. Notice the printed, vertical bars do not line up.

4. Pull down on the compensator until most of the printed bars are aligned with one another.

MECHANISM | CONTROLLER | INTERFACE | ALIGNMENT | COUNTERS

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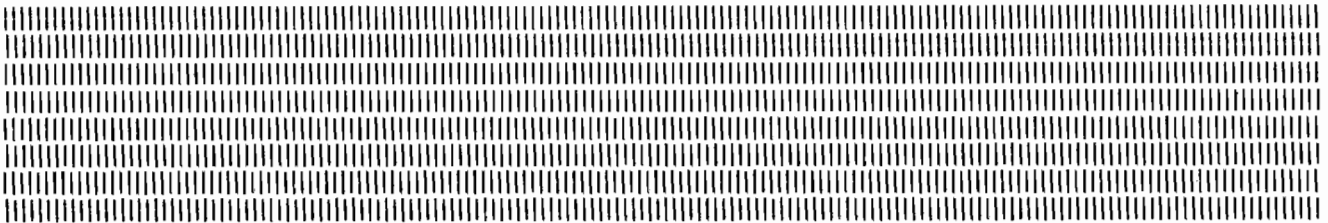
Figure 5-2. Misalignment Example.

MECHANISM | CONTROLLER | INTERFACE | ALIGNMENT | COUNTERS

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Figure 5-3. Example of Correct Alignment.

| NOTE |

It is not necessary or desirable to have all the printed bars perfectly aligned. Correct adjustment is accomplished when most of them are aligned (see Figure 5-3).

5. When the correct adjustment position is determined, secure the thermal compensator by tightening the screw.

6. Push **RESET** to turn off the alignment pattern.

Head Gap Adjustment

Refer to Section 2, Installation, for a description of how to adjust the print head gap.

REMOVAL AND REPLACEMENT

The following paragraphs contain instructions for removing and replacing printer assemblies and components. Turn off power before performing any of the following replacements.

Control Panel Replacement

Replace the Control Panel as follows:

1. Open the cover.

2. Remove the top screw on the underside of the Control Panel, remove the metal plate, and disconnect the cable at the panel.
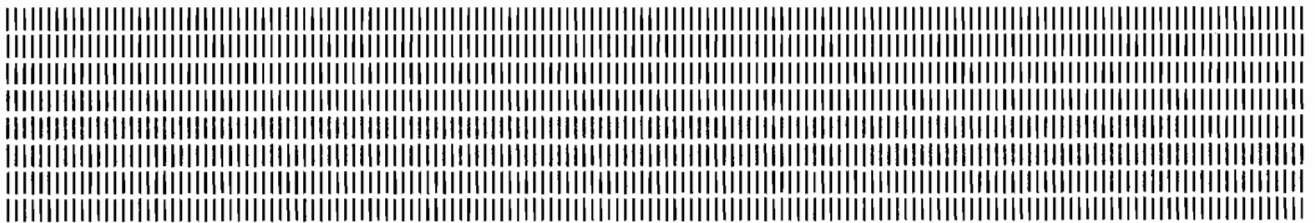
3. Push down on the two tabs that lock the panel into place, then rotate the panel to the outside of the top cover.

4. When replacing the Control Panel, rest the bottom two tabs of the panel on the top cover's opening and rotate the panel closed from the outside. Ensure the panel latches into place and that the cable is inserted into the cable clamp on the top cover.

Print Mechanism Replacement

Use the following steps to remove and replace the entire print mechanism assembly.

1. Open the cover and remove the electrical cover.

2. Remove the four cables connected to the Motor/Head Driver PCA, P/N 02932-60002.

3. Remove the green and yellow ground wire running from the right side of the mechanism to the ground lug on the printer's base.

4. Remove the two hairpin clips attached to the mount pins, which hold the mechanism to the base.

5. Slide the mount pins to the inside and lift the mechanism free.

6. Reverse the procedure to install the mechanism.

7. To ensure the carriage motor cable does not get pinched, route the cable behind the mounting pin boss on the base.

Tractor Replacement

Use the following procedure to remove and replace the tractors. Refer to Figure 6-9 to identify the specific parts.

1. Unlock the tractors so they can slide freely of the shafts.

2. Remove the retaining ring on the left side of the tractor guide shaft.

3. Slide the tractor guide shaft out the left side of the mechanism. Be sure to catch the curved spring washer as the shaft is removed.

4. Loosen the four screws holding the paper drive motor and slide the motor forward so as to loosen the belts.

5. Use the pulley extraction tool, HP P/N 02932-60077, to remove the timing pulley from the tractor drive shaft.

6. Remove the retaining ring on the right side of the shaft.

7. Slide the tractor drive shaft to the right and remove the left bronze bushing.

8. Slide the tractor drive shaft out the left side of the mechanism and collect the tractors, paper guide, and right bushing.

9. When replacing the tractors and shafts, ensure the spring washer is replaced on the tractor guide shaft between the end plate and the retaining ring.

10. Use the pulley press, HP P/N 02932-60079, to press a new timing pulley onto the tractor drive shaft.

NOTE

If a pulley is removed from any shaft, replace it with a new one.

Print Head Replacement

The 92154B Print Head is considered an operating supply, along with paper and ribbon. Print head removal and replacement is detailed in the 2930 Owner's Manual and is performed by the customer. The print head is not covered under Hewlett-Packard service contracts.

Carriage Belt Replacement

Use the following procedure to replace the carriage belt.

1. Remove the printhead.

2. Loosen the thermal compensator to allow slack in the belt.

3. Remove the screw on the top left of the head carriage that secures the left end of the belt.

4. Remove the two clips holding the rear guide rail and slide the rail free of the carriage. See Figure 6-4.

5. Remove drive shaft to allow clearance for ribbon guide.

6. Rotate the carriage downward to expose the four screws on the front.

7. Remove the four screws and lift the head mount and ribbon guide free.

8. Remove the remaining screw on the right side of the carriage that holds the belt in place.

9. Take note on how the belt is routed before removing belt.

10. Install new belt and perform belt adjustment.

INTRODUCTION

This section includes listings of field replaceable parts and procedures for ordering those parts. The 2930 Series printers share the same mechanical assemblies, cabinet parts, and several printed circuit assemblies. The 2933A and 2934A are identical printers except the 2934A comes with a character cartridge (92188A) and a different name plate.

ORDERING REPLACEABLE PARTS

To order replaceable parts for the printer or options and accessories, address the order to your local Hewlett-Packard Sales and Service Office listed at the back of this manual. The following information should be included in the order for each part:

1. Complete printer model number (including options and accessories) and serial number.

2. Hewlett-Packard part number.

3. Complete part description as provided in the replacement parts list.

Table 6-1.   2932A Printed Circuit Assemblies.

DESCRIPTION	HP PART NO.	EXCHANGE PART NO.	UNITS PER ASSEMBLY
Power Supply Ay	02932-60001	02932-69001	1
Motor/Head Dr Ay	02932-60017	02932-69017 PCA Replaces 02932-60002	1
Processor Ay	02932-60103	02932-69103 PCA Replaces 02932-60003	1
RS-232C I/O Ay	02932-60004	-----	1
Backplane Ay	02932-60005	-----	1
HP-IB I/O Ay	02932-60006	-----	Opt.
Parallel I/O Ay	02932-60007	-----	Opt.
RS-422/RS-232-C I/O Ay	02932-60010	-----	Opt.
Control Pnl. Ay	02932-60061	-----	1

Table 6-2. 2933/34A Printed Circuit Assemblies.

DESCRIPTION	HP PART NO.	EXCHANGE PART NO.	UNITS PER ASSEMBLY
Power Supply Ay	02932-60001	02932-69001	1
Motor/Head Dr Ay	02932-60002	02932-69002	1
Backplane Ay	02932-60005		1
HP-IB I/O Ay	02932-60006		Opt.
Parallel I/O Ay	02932-60007		Opt.
Processor Ay	02934-60051	02934-69051	1
RS-232C I/O Ay	02934-60053		1
Daisychain I/O	02934-60061		Opt.
Data Link I/O Ay	02934-60057		Opt.
RS-422/RS-232-C I/O Ay	02934-60058		Opt.
Control Pnl. Ay	02932-60061		1

Table 6-3. 2933/34A Unique Parts List.

FIG & INDEX #	DESCRIPTION	HP PART NO.	EXCHANGE PART NO.	UNITS PER ASSEMBLY
6-1-1	Cover, ROM Dust	02934-40003	- - - -	4
6-1-2	Courier, Char *	02934-60050	- - - -	1
6-1-3	Extender, Proc Ay	02934-60065	- - - -	1
6-1-4	Guide, Module	02934-40004	- - - -	1
6-1-5	Cable, 8051 Logic	02934-80011	- - - -	1
6-1-6	Cable, ROM Logic	02934-80012	- - - -	1

* 2934A only.
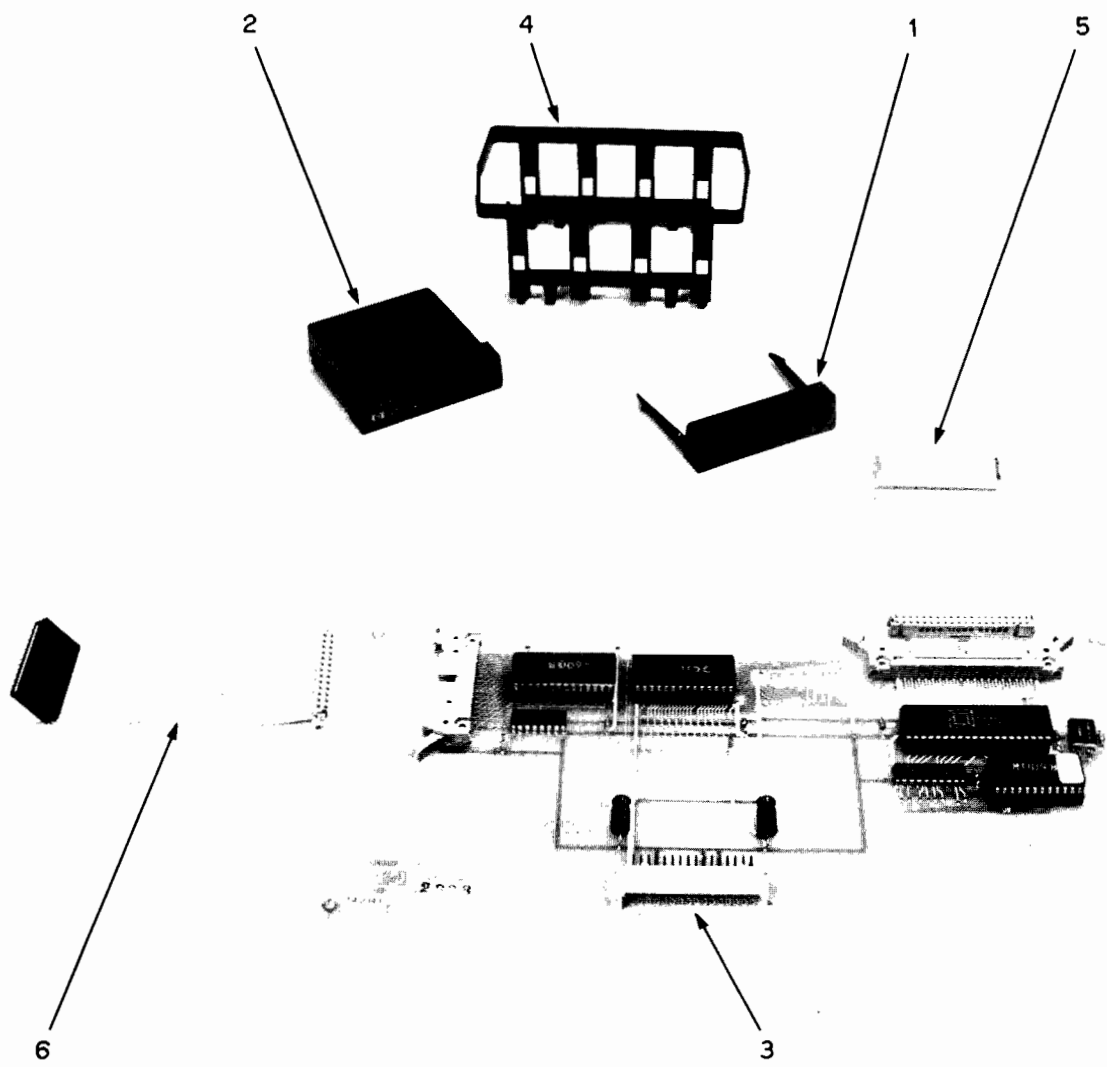
Figure 6-1. 2933/34A Unique Parts.
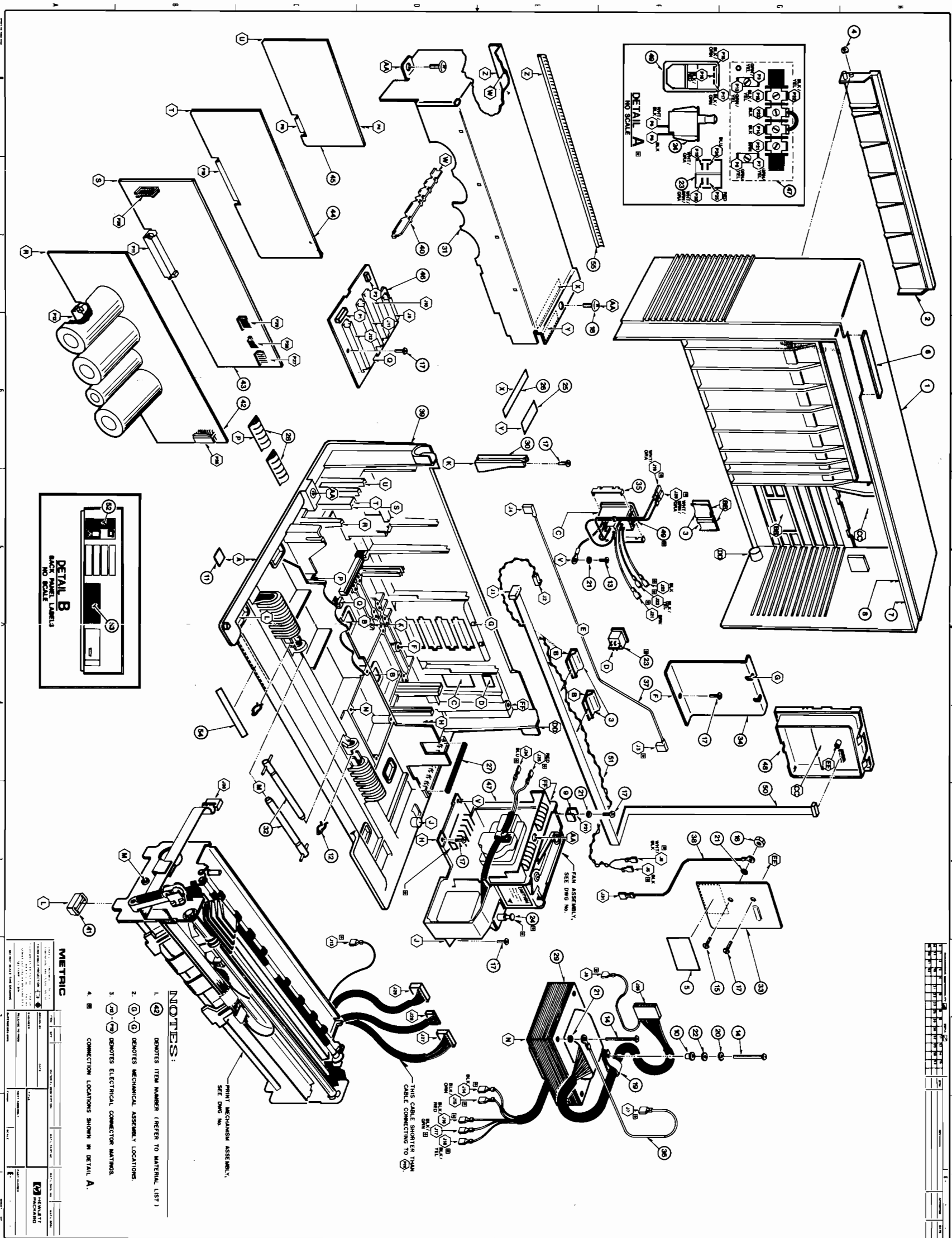
Figure 6-2. 2930 Series Overall Parts List.

Table 6-4. 2930 Series Overall Parts List.

FIG & INDEX	DESCRIPTION	HP PART NO.	COMMENTS	UNITS PER ASSEMBLY
6-2-1	Cover, Top	02932-40002		1
6-2-2	Window, View	02932-40005		1
6-2-3	Clamp, Cable	1400-0611		4
6-2-4	Washer, Crvd Sprg	3050-0951	Early versions, only	1
6-2-5	Label, CSO	5953-2480		1
6-2-6	Nameplate, 2932A	02932-80056		1
6-2-6	Nameplate, 2933A	02933-80051		1
6-2-6	Nameplate, 2934A	02934-80002	Replaces 02934-80004	1
6-2-7	Foam, 6.4MM Thick	02932-80079		1
6-2-8	Foam, 12.7mm Thick	02932-80078		1
6-2-9	Term, Barr Lug	0360-1264	Replaces 0360-2104	1
6-2-10	Bushing, Flanged	0390-0006		3
6-2-11	Foot, Bumper	0403-0374		4
6-2-12	Clip, Retaining	0510-1225		2
6-2-13	Screw, M4X10 TT	0515-0056		1
6-2-14	Screw, M4X50 MM	0515-0146		4
6-2-15	Screw, M4X10 Pan	0515-0053		1
6-2-16	Nut, Hex M4	0535-0006		1
6-2-17	Screw, Tapping	0624-0400		8
6-2-18	Screw, M4X10 Pan	0515-0053	Replaces 2940-0258	2
6-2-19	Clamp, .5 x .5	1400-0294		1
6-2-20	Washer, M4 Spt Lk	2190-0586		3
6-2-21	Washer, Lock	2190-0646		4
6-2-22	Washer, M4 Flat	3050-0893		3
6-2-23	Switch, AC Power	3101-0402		1
6-2-24	Switch, Pushbutton	3101-2685		1
6-2-25	Label, Warning	7120-3528		1
6-2-26	Label, Warning	7121-2231		1
6-2-27	Gasket, RFI	8160-0371		1
6-2-28	Strip, RFI Finger	8160-0443		2
6-2-29	Transformer	9100-4356		1
6-2-30	Guide, PC	0403-0482		1
6-2-31	Shield, Elect	02932-00004		1
6-2-32	Pin, Mount	02932-00025		2
6-2-33	Cover, Keypad	02932-00026		1
6-2-34	Cover, ROM	02932-00027		1
6-2-35	Retainer, Pwr Mod	02932-00038		1
6-2-36	Wire, Ground	02932-22605		1
6-2-37	Wire, I/O Ground	02932-22606		1
6-2-38	Wire, Keypd Ground	02932-22611		1
6-2-39	Base	02932-40001		1
6-2-40	Guide, PC	02932-40016		4
6-2-41	Foot, Mechanism	02932-40018		4
6-2-42	Power Supply Ay	02932-60001	Exchange Part No. 02932-69001	1
6-2-43	Motor/Head Dr Ay	02932-60002	02932-69002	1
6-2-44	Proc. Ay, 2932A	02932-60003	02932-69003	1
6-2-44	Proc. Ay, 2934A	02934-60051	02932-69051	1
6-2-45	RS-232C I/O, 2932A	02932-60004		1

Table 6-4. 2930 Series Overall Parts List (Cont'd).

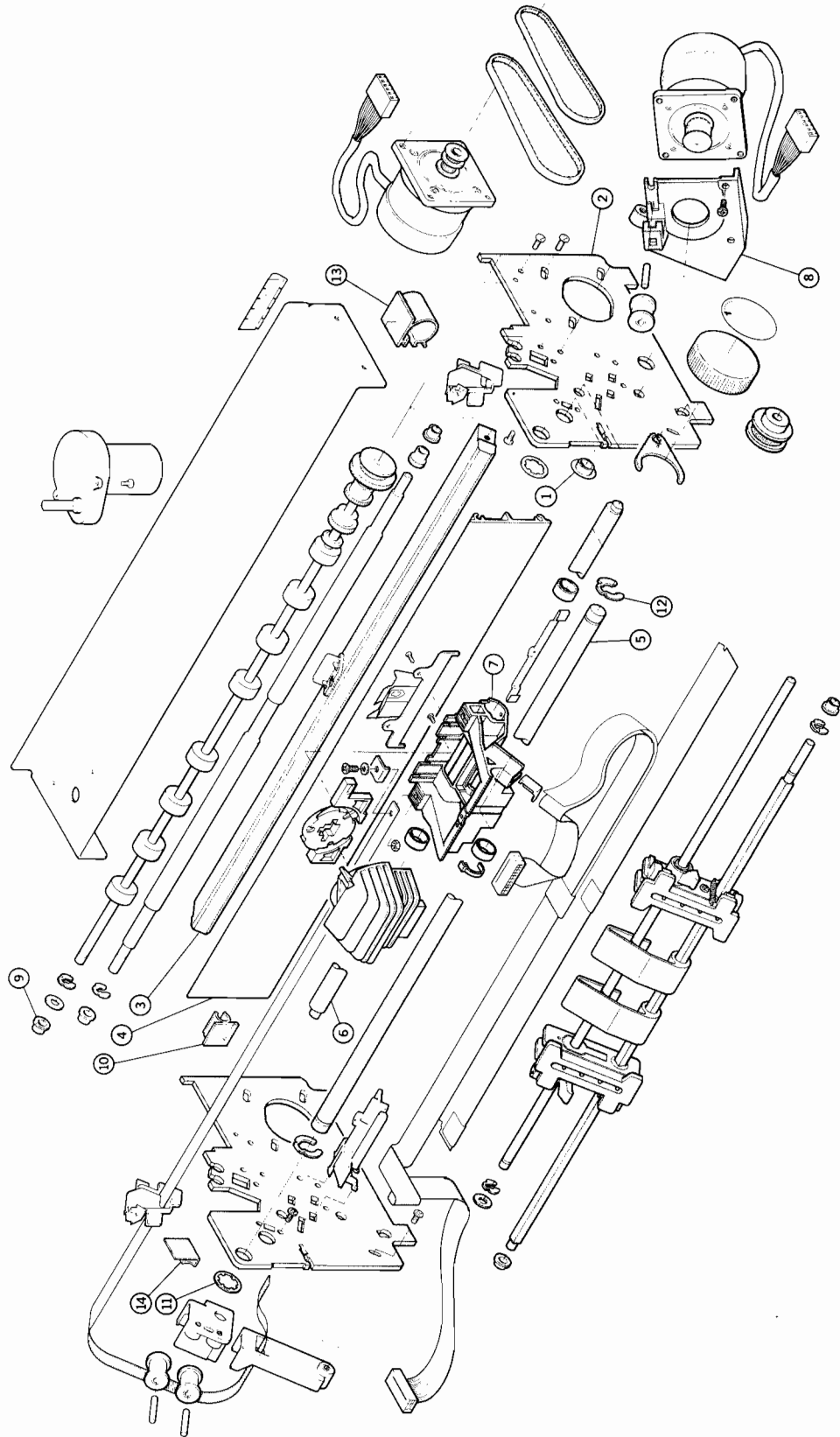| FIG & INDEX	DESCRIPTION	HP PART NO.	COMMENTS	UNITS PER ASSEMBLY
6-2-45	RS-232 I/O, 2934A	02934-60053		1
6-2-46	Backplane Ay	02932-60005		1
6-2-47	Fan Housing Ay	02932-60053	See Fig 6-5	1
6-2-48	Control Panel Ay	02932-60061		1
6-2-49	Pwr Line Mod Ay	02932-60065		1
6-2-50	Cable, Keypad	02932-80053		1
6-2-51	Cable, Interlk Sw	02932-80060		1
6-2-52	Label, Info	02932-80066		1
6-2-53	Label, Serial	N/A		1
6-2-54	Label, PPr Align	02932-80068		1
6-2-55	RFI Strip, Finger	8160-0456		1

Figure 6-3.   Print Structure Assembly - 02932-60080.

Table 6-5. Print Structure Assembly — 02932-60090

FIG & INDEX	DESCRIPTION	HP PART NO.	COMMENTS	UNITS PER ASSEMBLY
6-3	Print Structure Ay	02932-60090	Complete Assembly, Replaces 02932-60080	1
6-3-1	Grommet	0400-0273		2
6-3-2	Plate, Side	02932-00006		2
6-3-3	Platn/Sup Blk Ay	02932-60088	Replaces 02932-20003	1
6-3-4	Extrusion	02932-20004		1
6-3-5	Rail, Rear Guide	02932-20005		1
6-3-6	Rail, Front Guide	02932-20006		1
6-3-7	Carriage Ay	02932-60052	See Fig 6-4/Table 6-6	1
6-3-8	Brkt, Carr Dr Mtr	02932-40014		1
6-3-9	Bushing, Bronze	1410-1193		6
6-3-10	Clamp, Cable	1400-0774		2
6-3-11	Ring, Retaining	0510-1169		1
6-3-12	Ring, E	0510-1226		2
6-3-13	Clamp, Cable	1400-0596	Early versions, only	
6-3-14	Clamp, Cable	1400-0611		1
6-3-15	Tractor Ay	02932-60060		1
6-3-16	Adjuster, Fork	02932-00022		1
6-3-17	Knob, Adjuster	02932-40012		1
	Label, Warning	02932-80080	Not Shown	1
	Screw, M4X10 Pan	0515-0053	Platen and Bracket	5
	Washer, M4 Flat	3050-0893	Not Shown	5
	Washer, M4 Spt Lk	2190-0586	Not Shown	5
	Wire, Ground	02932-22605	Not Shown	1
	Screw, Thrd Ctg	0515-0276	Extrusion	4
	Tie, Cable	1400-0249	Not Shown	1

NOTE: The bushings must be secured to the side plates with Loctite RC 601 or RC 609.

CAUTION

It is strongly recommended that this assembly be replaced as a complete unit. Replacing individual parts may cause the mechanism to be out-of-square when reassembled, which could result in failure to meet print specifications.
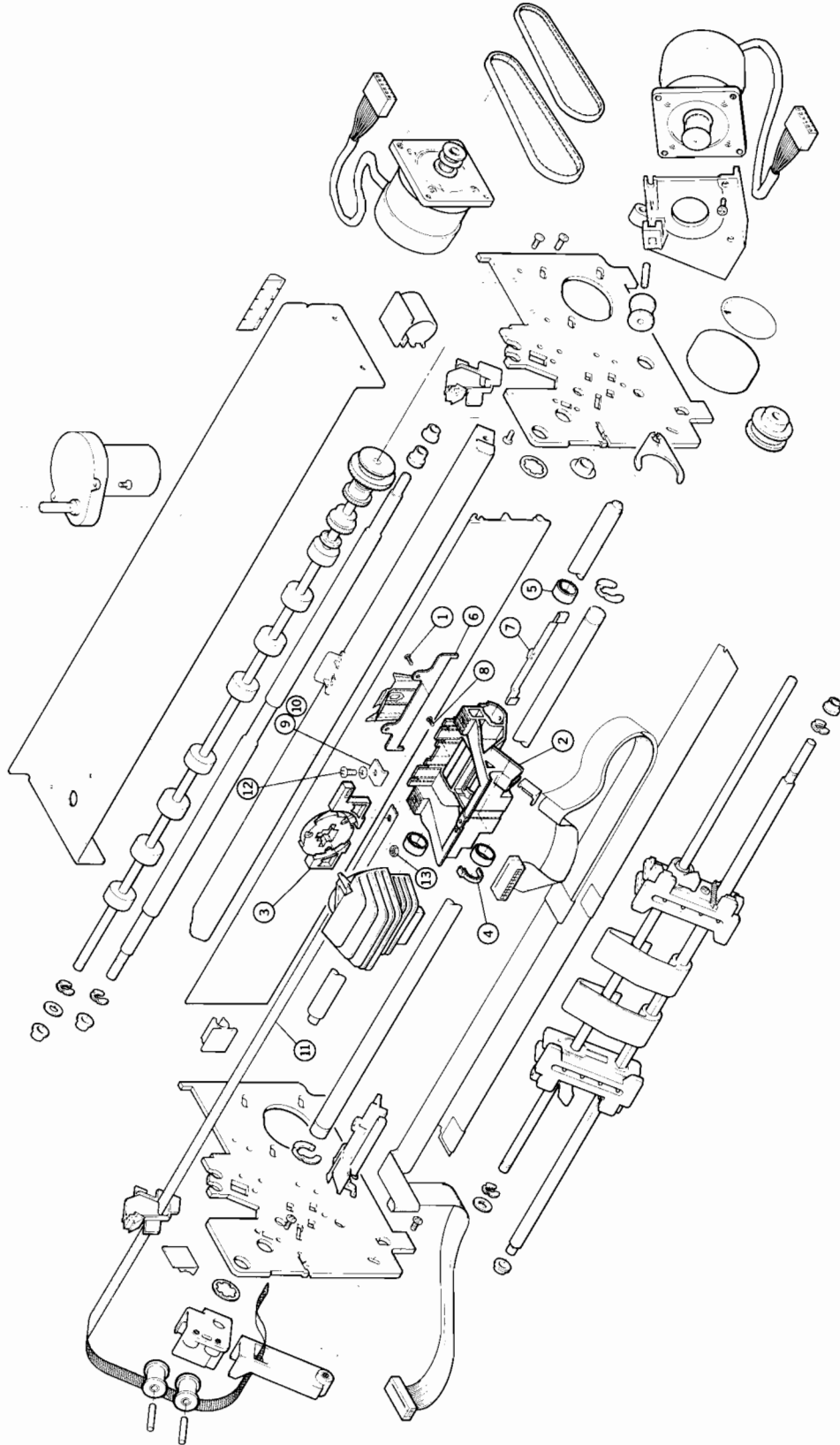
Figure 6-4. Carriage Assembly - 02932-60052.

Table 6-6. Carriage Assembly — 02932-60052

FIG & INDEX	DESCRIPTION	HP PART NO.	COMMENTS	UNITS PER ASSEMBLY
6-4	Carriage Ay	02932-60052		1
6-4-1	Screw, M2X0.4	0515-0214		2
6-4-2	Carriage	02932-20015	Replaces 02932-40008	1
6-4-3	Mount, Head	02932-20014	Replaces 02932-40009	1
6-4-4	Preloader, Rear	02932-40025		1
6-4-5	Bearing, Carriage	02932-40039		3
6-4-6	Ribbon Guide Ay	02932-60073		1
6-4-7	Preloader, Front	02932-60076		1
6-4-8	Screw, M2X0.4	0515-0276		2
6-4-9	Clamp-Belt, Right	02932-00040		1
6-4-10	Clamp-Belt, Left	02932-00039		1
6-4-11	Carriage Belt	02932-20016	Replaces 1500-0658	1
6-4-12	Screw M4X10 Pan	0515-0053		2
6-4-13	Nut	0535-0006		2

NOTE: This assembly should be replaced as part of the Print Structure.

NOTES:
1. REFER TO MAT'L LIST FOR PART NOS OF REFERENCE DESIGNATED PARTS AND ASSEMBLIES.
2. FAN WIRES MUST BE ROUTED AWAY FROM FAN BLADES AND MUST BE LOCATED BENEATH PROTECTIVE METAL RIB (SEE PHANTOM LINES).
3. WIRES ON LOAD SIDE OF LINE FILTER MUST BE ROUTED LOW FOR MAXIMUM CLEARANCE FROM FAN BLADES.

Figure 6-5.   Fan Housing Assembly - 02932-60053.

Table 6-7. Fan Housing Assembly — 02932-60053

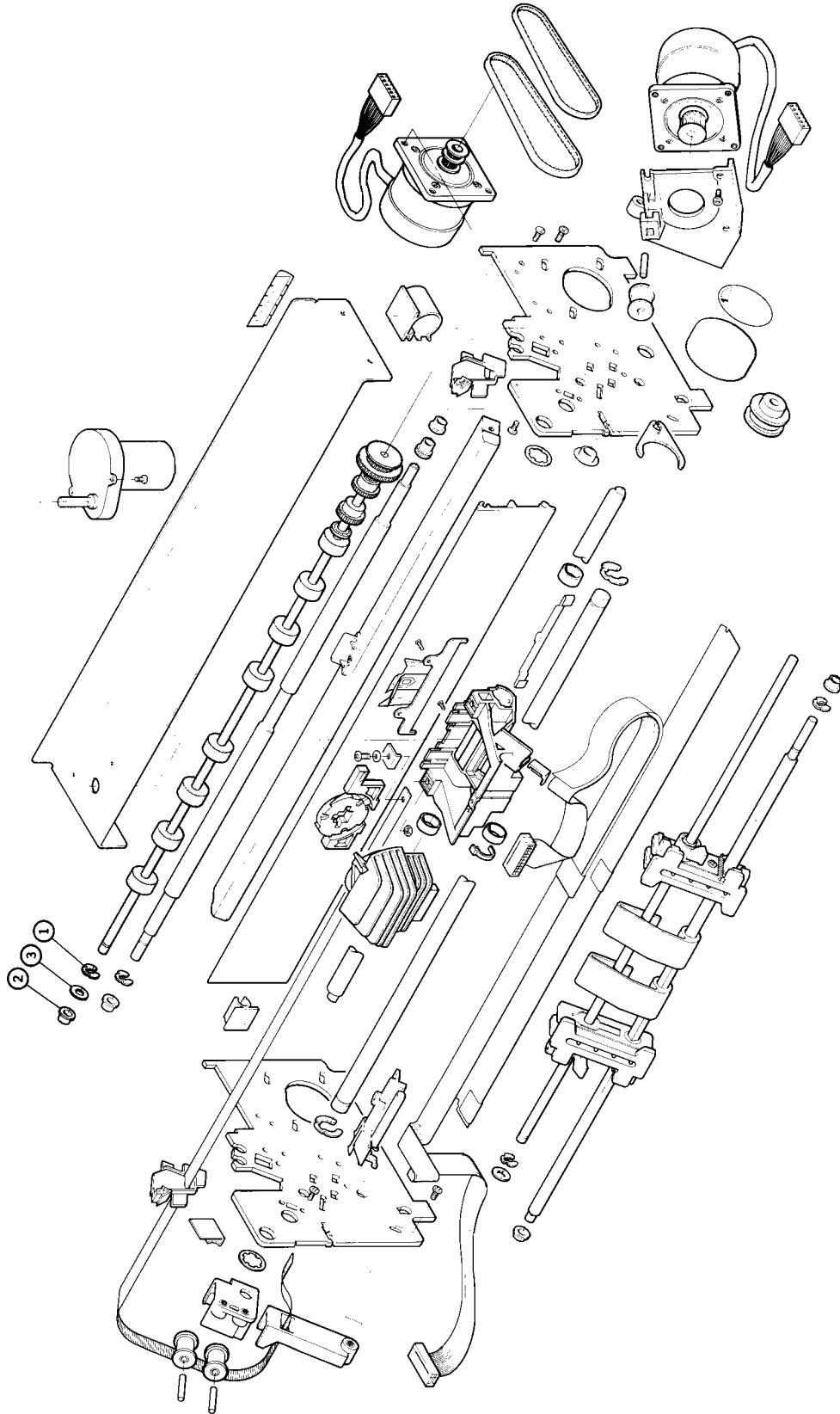| FIG 6-5 REF DES	DESCRIPTION	HP PART NO.	COMMENTS	UNITS PER ASSEMBLY
	Fan Housing Ay	02932-60053		1
MP13	Barrier Block	0360-2215	Replaces 0360-2166	1
MP3	Term, Barr Block	0360-1264		2
A1	Fan, Skeleton	3160-0435		1
MP12	RFI Strip, Finger	8160-0443		2
MP1	Fan Housing	02932-20011		1
JW1	Jumper Wire Ay	02932-22604		1
MP2	Top Prop	02932-40004		1
A2	Line Filter Ay	02932-60067		1
MP4	Clamp, .5 X .5	1400-0294		2
MP5	Screw, M4X10 Pan	0515-0056		9
MP9	Screw, Mach 6-32	2360-0123		2
MP10	Screw, Mach 10-32	2680-0099		2
MP8	Washer, Flt /8	2190-0758		1
MP11	Washer, Flt 5MM	3050-0894		2
MP7	Washer, Lock M5	2190-0587		2
MP6	Washer, Star Lock	2190-0646		4
MP15	Cover, Line Filter	02932-00042	Replaces 2190-0646	1
MP14	Label, Caution	02932-80077		1

Figure 6-6. Pinch Roller Assembly — 02932-60058.

Table 6-8. Pinch Roller Assembly — 02932-60084.

FIG & INDEX	DESCRIPTION	HP PART NO.	COMMENTS	UNITS PER ASSEMBLY
6-6	Pinch Roller Ay	02932-60084	Replaces 02932-60058	1
6-6-1	Ring, Retaining	0510-1224		1
6-6-2	Bushing, Bronze	1410-1193		1
6-6-3	Washer, Curved	3050-1141		1

NOTES:

1. Ordering the complete assembly is required.

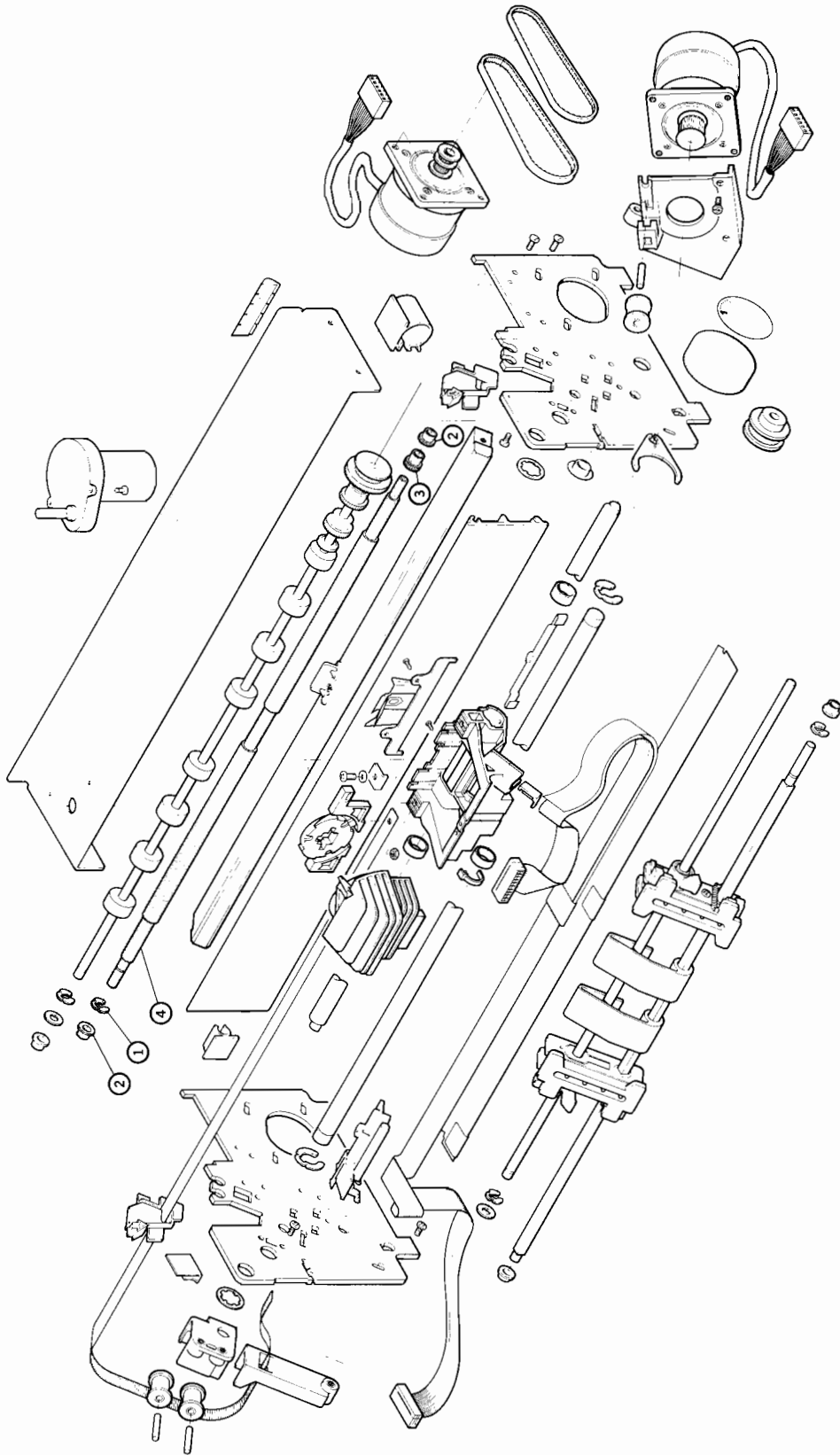2. The bushings must be secured to the side plates with Loctite RC 601 or RC 609.

Figure 6-7. Drive Roller Assembly — 02932-60059.

Table 6-9. Drive Roller Assembly — 02932-60059.

FIG & INDEX	DESCRIPTION	HP PART NO.	COMMENTS	UNITS PER ASSEMBLY
6-7	Drive Roller Ay	02932-60059		1
6-7-1	Ring, Retaining	0510-1224		1
6-7-2	Bushing, Bronze	1410-1193		2
6-7-3	Gear, Spur	1430-0611		1
6-7-4	Roller, Drive	02932-20008		1

NOTES:

1. Ordering the complete assembly is required.

2. The bushings must be secured to the side plates with Loctite RC 601 or RC 609.

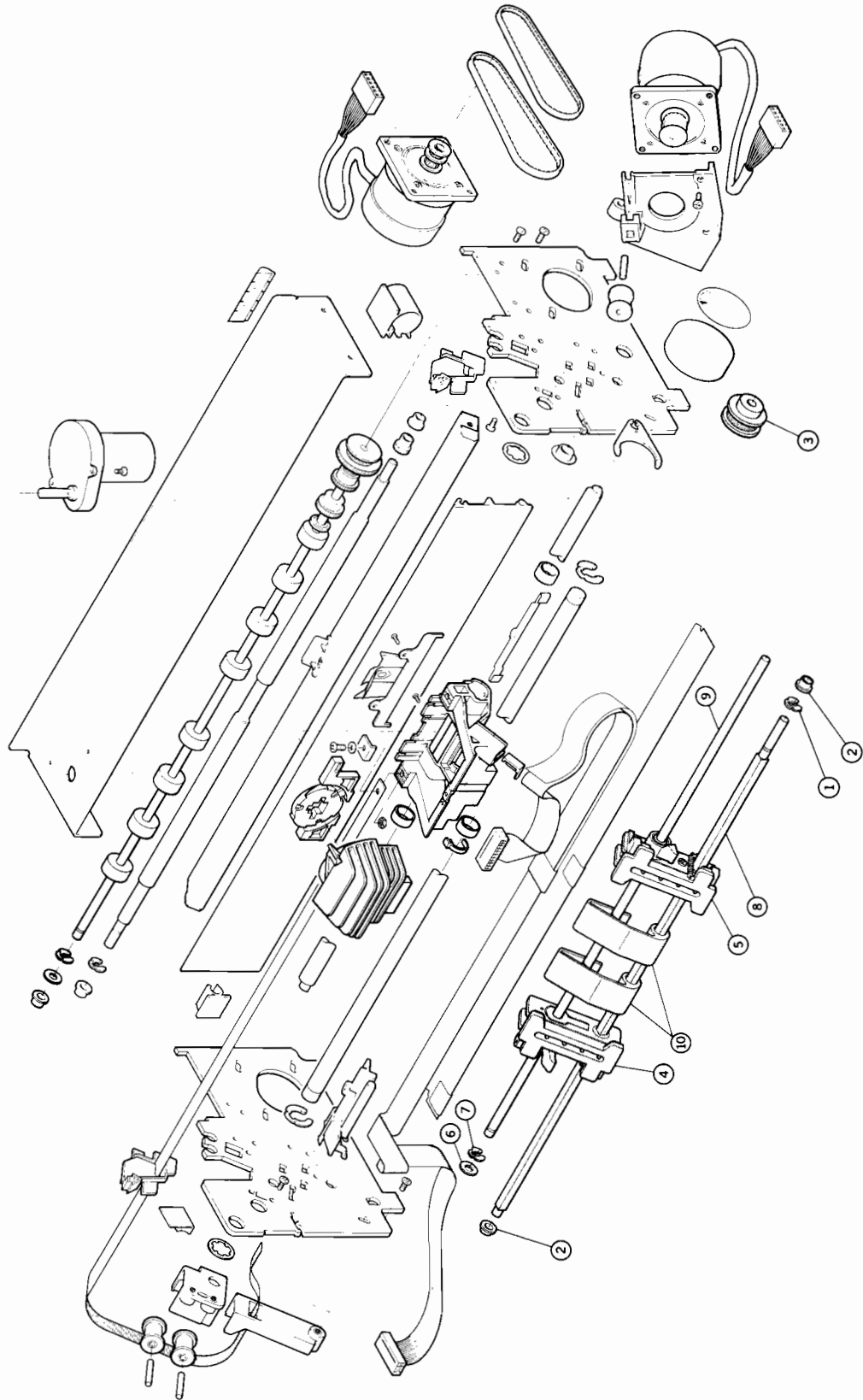**Figure 6-8. Tractor Assembly — 02932-60060.**

Table 6-10. Tractor Assembly — 02932-60060.

FIG & INDEX	DESCRIPTION	HP PART NO.	COMMENTS	UNITS PER ASSEMBLY
6-8	Tractor Ay	02932-60060		1
6-8-1	Ring, Retaining	0510-1224		1
6-8-2	Bushing, Bronze	1410-1193		2
6-8-3	Pulley, Tractor	1500-0657		1
6-8-4	Tractor, Left	1530-2179		1
6-8-5	Tractor, Right	1530-2180		1
6-8-6	Washer, Curved	3050-1180		1
6-8-7	Ring, Retaining	0510-1245		1
6-8-8	Shaft, Sq Trct Dr	02932-20009		1
6-8-9	Shaft, Trct Guide	02932-20010		1
6-8-10	Guide, Paper	02932-40026		2
	Paper Deflector	02932-00044	Not shown on Rt Trct	1

NOTES:

1. Once the pulley is removed, it should not be reused.

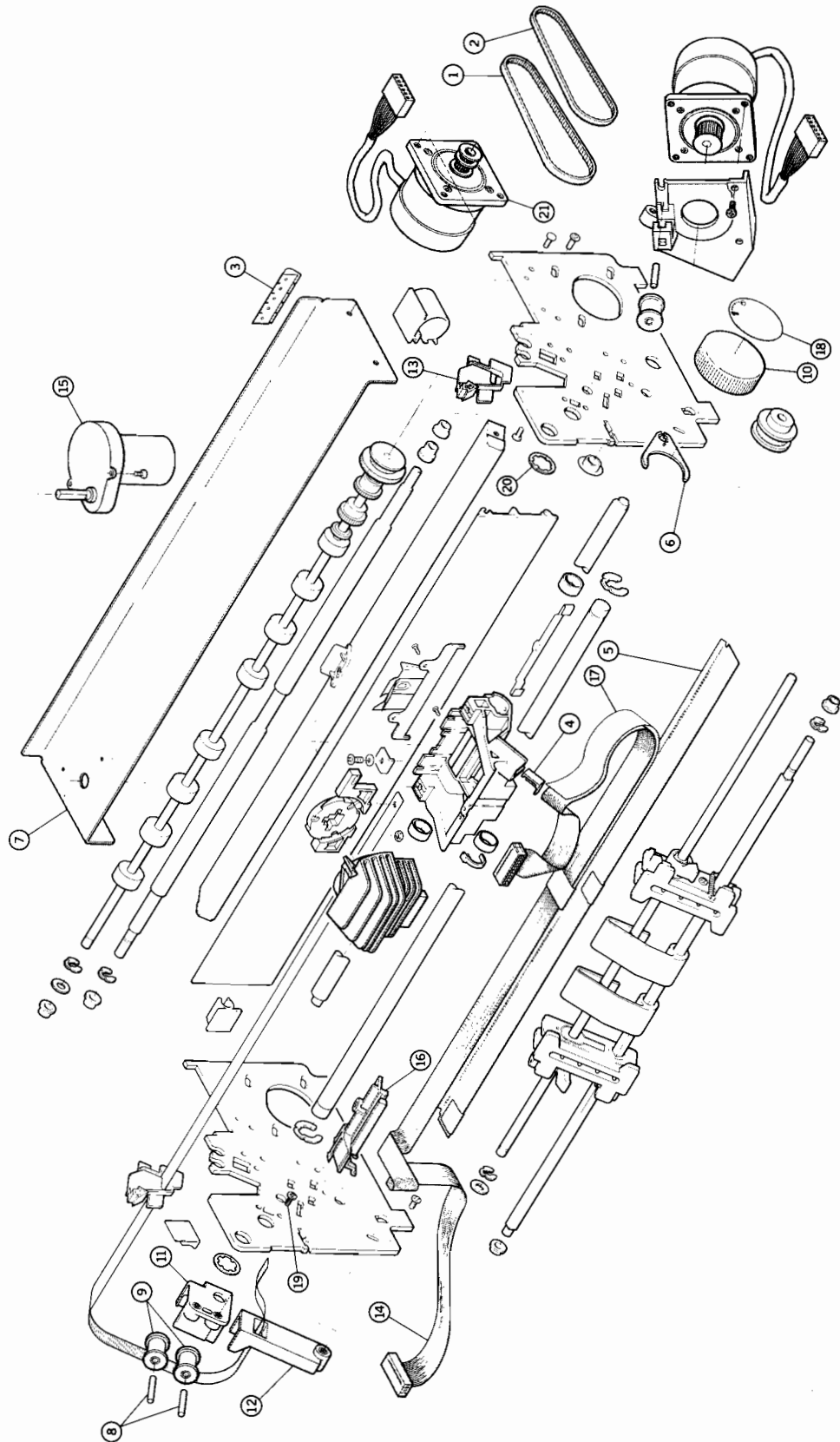2. The bushings must be secured to the side plates with Loctite RC 601 or RC 609.

Figure 6-9. Miscellaneous Mechanism Parts.

Table 6-11. Miscellaneous Mechanism Parts.

FIG & INDEX	DESCRIPTION	HP PART NO.	COMMENTS	UNITS PER ASSEMBLY
6-9	Complete Mech Ay	02932-60091	All mechanism parts Replaces 02932-60051	1
6-9-1	Belt, Pinch Roller	1500-0669	Replaces 1500-0653	1
6-9-2	Belt, Tractor	1500-0659		1
6-9-3	Strip, RFI Finger	8160-0443		3
6-9-4	Strain Relief	02932-40045		1
6-9-5	Supp, Cable Head	02932-00007		1
6-9-6	Adjuster, Fork	02932-00022		1
6-9-7	Brkt, Ribbon Mtr	02932-00030		1
6-9-8	Shaft, Idler	02932-20001		2
6-9-9	Pulley, Idler Ay	02932-60082		2
6-9-10	Knob, Adjuster	02932-40012		1
6-9-11	Bracket, Idler	02932-40013		1
6-9-12	Compnstr, Thermal	02932-40032		1
6-9-13	Bearing, Ribbon	02932-40036		2
6-9-14	Cable, Head Ay	02932-80065		1
6-9-15	Ribbon Drive Ay	02932-60074		1
6-9-16	Opto Sensor Ay	02932-60086	Replaces 02932-60075	1
6-9-17	Wear Strip	02932-40041		1
6-9-18	Label, Gap Adjust	02932-80076		1
6-9-19	Screw	0515-0876	Ribbon Motor Bracket	4
6-9-20	Ring, Retaining	0515-1169	Head Gap Knob	1
6-9-21	Paper Motor Ay	02932-60057	Drive Pulley and Stepper Motor	1
6-9-22	Bracket, Motor	02932-40014		1
6-9-23	Carriage Motor Ay	02932-60055		1
6-9-24	Print Head	02932-60054		1

NOTE: Other mechanism parts are listed under their various subassembly numbers.

INTRODUCTION

This section contains an overall block diagram, a block diagram for each of the printed circuit assemblies, and theory of operation for each of the modules within the printer. The 2930 Series printers have seven major assemblies; the Power Supply, Motor/Head Driver, I/O, Processor, Mother Board, Keypad, and Print Mechanism.

OVERALL OPERATION

Data is brought into the printer from the system via the I/O, where it is converted to levels usable by the printer logic (see Figure 7-1). The processor then interprets, collates, and acts upon the data received. If the data is a printable character or a carriage control feature, it is sent to the Motor/Head Driver where it is converted to the power levels required to operate the print wires and the stepper motors. The Power Supply satisfies the requirement of providing the needed voltage and current levels. The Keypad provides user access for control of the printer's features. All of the major printed circuit assemblies (PCA's) are connected together by the Mother Board.

The print mechanism contains three motors: a paper advance stepper motor, a carriage stepper motor, and a ribbon motor. Connectors from the print head, opto-sensor (paper-out), and the three motors all go to the Motor/Head Driver. The mechanism is sufficiently grounded to prevent static build-up.
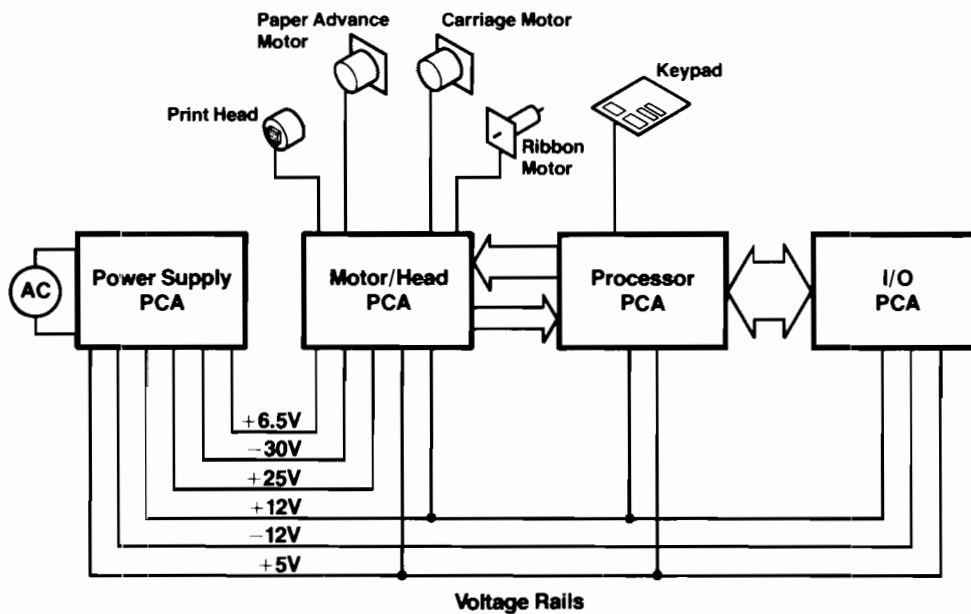

Figure 7-1. Overall Block Diagram.

PRINT MECHANISM

The print mechanism provides the mechanical interface between the physical world and the electronic world. Printers are often referred to as mechanical devices, probably because the original Teletype AR-33 was almost totally mechanical in operation. Today, impact printers are much more electronic than mechanical. The print mechanism is as high tech as any electronic component, with special chemically formulated polymers and new alloys. It is the most visible component of the unit and must operate over the same environmental conditions as the other components. Because of this visibility, the print mechanism is easily the most important part of the printer.

Paper Advance

Paper is advanced by a combination of two methods: tractor-feed and friction-feed. Tractor-feed provides compatibility with existing printers and repeatability. Repeatability entails the ability to repeatedly find Top-of-Form (TOF) without creepage in an open-loop system (no feedback). Friction-feed provides the ability to feed cut sheets of paper for letter heads, standard bond paper, or for operation with a feeder.

Last Form Tear Off

Another major contribution of this mechanism is Last-Form-Tear-Off. This is very important for users who print invoices or other single-page short documents that they immediately wish to tear off without wasting the next full page. The majority of tractor-feed printers have the tractors mounted above the printing area (platen) to eliminate bunching; this prevents tearing off the sheet just printed without having to advance the paper by another sheet because of the distance of the tractors from the printing area. The 2930 Series printers mounts the tractors at the bottom and provides a friction-feed method at the top that allows the last form to be torn off at less than an inch from the printed line.

Friction Feed

The friction feed portion of the mechanism consists of two driven rollers, friction material, and proportional gearing. The requirements and specifications set forth at the inception of the product for accuracy and repeatability provided the requirements for the diameter of the main drive roller. It is made of a nitrile material (a type of elastomer similar to neoprene and urethane) that provide friction on the paper without any ink interaction. The diameter of the main drive roller is as small as possible to decrease cost and bulk while maintaining accuracy; because as the diameter of the main drive roller decreases, the tolerance as a percentage of the diameter increases, decreasing accuracy. The pinch drive roller with the back foam wheels provides a normal force against the main drive roller. Both rollers are driven to ensure proper advance of multiple-part forms. Multiple-part forms have a tendency to slip apart if the driving friction is greater than the sheet-to-sheet friction. If both the front and back sheets are driven, sheet-to-sheet slippage is minimized.

The rollers are composed of a special urethane foam with a critically controlled cell size (foam is porous; the cell size is the volume of the void). Consistency of void size provides a constant force coefficient; extremely important to maintain accuracy. The design of the friction advance method uses no expensive, prone-to-failure spring loading technique. It must work under all conditions of form thickness, size and irregularity. To maintain integrity, no matter what the environment, the rollers must maintain an expected spring force over the wide range of variables; the foam provides the bandwidth needed (it does have slightly more friction with multi-part forms). The drive shafts are slightly over-driven in relation to the tractors' speed (about 1%) to maintain tension. This does not cause slipping or wear; instead, the

rollers act like torsional springs and simply torque up to provide better friction. The gear ratio of the gears on the roller shafts match the undeflected diameter ratio of the two rollers. The surface speeds of the two rollers are the same. The belts that drive the friction feed shafts are tightened by repositioning the paper advance stepper motor.

End Plates

The process used for forming the end plates is called fine-line blanking. It is similar to stamping except a high quality, zero-clearance die is used, which holds very tight tolerances. This is especially important for positioning of the platen with respect to the front guide rail.

Platen

The platen is made of a heavy, flat piece of steel. Head-to-platen gap variances must be held to less than .003 inches if the print head is to operate correctly. There must be an exact parallelism between the front guide rail and the platen, (the back guide rail simply prevents rotation). Should the structure be assembled and disassembled many times, the holes into which the platen seats may become worn, and the platen may not align correctly. The structure is designed such that the platen, front guide rail, and side plates can be repeatedly assembled to very small tolerances; this avoids the use of fixtures in the manufacturing process while still providing accurate print alignment during bidirectional print motion. The platen was chosen to be stationary and flat rather than rotating and circular (like a typewriter platen), because of the multi-part form specification. The platen is a precision part and is made of cold rolled steel with as little machining performed as possible. Paper paths, other than the straight-through-from-bottom-to-top path, are intended primarily for single part forms. All form thicknesses and types should be checked for proper feeding through the intended path before purchase. Hewlett-Packard supports only straight through paper path for multi-part forms up to 0.020 inches thick. The platen is chamfered to prevent rough paper edges from dragging.

Paper Guide

A paper guide is positioned on the two tractor feed rails. It provides support for wide tractor-feed paper.

Bearings

The porous bronze bushings that hold the roller drive rods are impregnated with a lubricant that is expected to last the life of the product. They are highly accurate and are manufactured using a powered metallurgy process that ensures high tolerance for the inside and outside diameters.

Drive Gears

The gears are pressed onto the shaft because it is the simplest, straight forward method that lends itself easily to manufacturing. However, it requires special tools for field repair.

Head-to-Platen Gap

The head-to-platen gap adjustment is performed by turning a knob on the right side plate which is connected to an eccentric on the front guide rail. Turning the knob clockwise reduces the gap, and turning it counter-clockwise increases it. Head-to-platen gap must be adjusted for optimal print on different thicknesses of paper. The adjuster knob is detented to prevent vibration and subsequent looseness.

Extrusion

The aluminum plate beneath the platen is the "extrusion". Its purpose is to provide strength and stability to the print structure, as well as a paper path. The basic print structure consists of the extrusion, end plates, front and rear guide rails, carriage, and platen. The extrusion is attached using self-tapping screws (type "T" thread cutting screws). Care must be taken when self-tapping screws are removed and replaced to prevent stripping the tapped hole.

Print Structure

The print structure is mounted to the base via two large retaining pins. To meet Hewlett-Packard 30 g shock specifications, the plastic needs a large surface area contact with the pins. This method of anchor was chosen to facilitate easy removal and replacement by service personnel. The motor mounting bracket is manufactured using a glass reinforced nylon to accomodate strength, stiffness and stepper motor heating considerations.

Carriage Drive

The carriage drive is designed to prove accurate translational motion of the print head carriage when driven by an open-loop stepper motor. Several parameters are important for good performance: repeatability of carriage motion, sufficient stiffness for acceptable dynamic behavior, and controlled friction. The drive consists of the carriage drive belt, drive pulley, idler pulleys, idler shafts, motor and idler brackets, and thermal compensator. The carriage drive belt provides stiffness by virtue of Kevlar reinforcing cord, and the urethane teeth and body provide abrasion resistance and torque transmission capability. The drive pulley is pressed onto the motor shaft. It is composed of 20% glass filled polycarbonate resin with ridges to provide torque transmission capability. Two criteria for belt selection were high temperature strength and fabrication accuracy.

The idler pulleys are machined from acetal resin. The bushings are composed of 40% oil by weight and will last the life of the product. The idler shafts are corrosion resistant and easily fabricated. They are flattened to prevent rotation in the brackets (all three shafts are identical). The motor and idler brackets are composed or 40% glass filled polycarbonate, chosen for high stiffness, strength, dimensional stability, and good temperature properties. The thermal compensator provides for initial adjustment of belt tension at installation. It helps compensate for differential thermal expansion of the mechanism relative to the belt, which has a different coefficient of expansion than the metal parts. It is composed of unfilled polycarbonate, having good temperature properties, dimensional stability, and relatively high thermal expansion coefficient. The shape is a 45 degree ramp that mates with the flat on the shaft. The idler moves in or out to increase or decrease belt tension respectively.

Guide Rails

The guide rails are solid stainless steel with no plating, ensuring a high tolerance outside diameter. A plating, such as chrome, cannot be repeatedly manufactured with the required plating thickness. The only disadvantage is that the surface is soft and easily scratched.

Open-Loop Operation

"Open-loop" means that there is no feedback such as an optical encoder, as used in the 2630 printers, whereby the Processor can know the exact position of the carriage. Eliminating the feedback loop lowers costs and adjustments required, but it also means that there is no verification of proper positioning. Open-loop operation is possible in the 2930 Series because of the unique quality of stepper motors that allows exact positioning and counting in firmware.

Because the printer operates in an open-loop fashion, there is no feedback indication of current print head position. The print head must initialize to a predetermined position from which to start counting. When the print head is through "crashing" during a reset or power-on, the logic then knows its exact location (it is on the right side plate). It then returns the print head to the left sideplate and begins counting print columns.

PROCESSOR PCA - 2932A

The Processor PCA contains the microprocessor, control logic, firmware, and memory workspace of the 2932A printer. Print wire firing signal and timing are also generated on this board, as well as motor control signals. All data received by or transmitted from the printer is handled by the Processor PCA where it is collated, interpreted, and then sent to the appropriate functional block with operation commands. See Figure 7-2.

For example, if the host computer requests the printer's HP-IB interface to receive data, the I/O board signals the processor board of the request. The processor board then checks for space in the input buffer. If there is room in the buffer, the incoming data is allowed to pass, one character at a time. When processing time is available, the processor takes the first character received out of the input buffer and interprets it as either a printable character or a control character. If the character is printable, the Processor PCA encodes the dot firing pattern and timing information to be sent to the print head and stepper motors. If the character is a control character, such as an escape sequence, it is interpreted and acted upon (as in changing print pitch).

Microprocessor

The "brain" of the Processor PCA is the 8051 microprocessor. Its purpose is to issue commands and interpret incoming signals. It fetches instructions from ROM, executes them, and coordinates the flow of data between the I/O and the Gate Array. It has a built-in Universal Asynchronous Receiver Transmitter (UART) that receives serial data sent from the host during data transmission. The 8051 has three ports. One port is multiplexed to provide a bidirectional data bus, as well as the lower eight bits of the address bus. Another port supplies the most significant eight bits of the address bus, while the third port is used to advance the paper, drive the ribbon motor, and serve as control lines to arbitrate access to the bus.
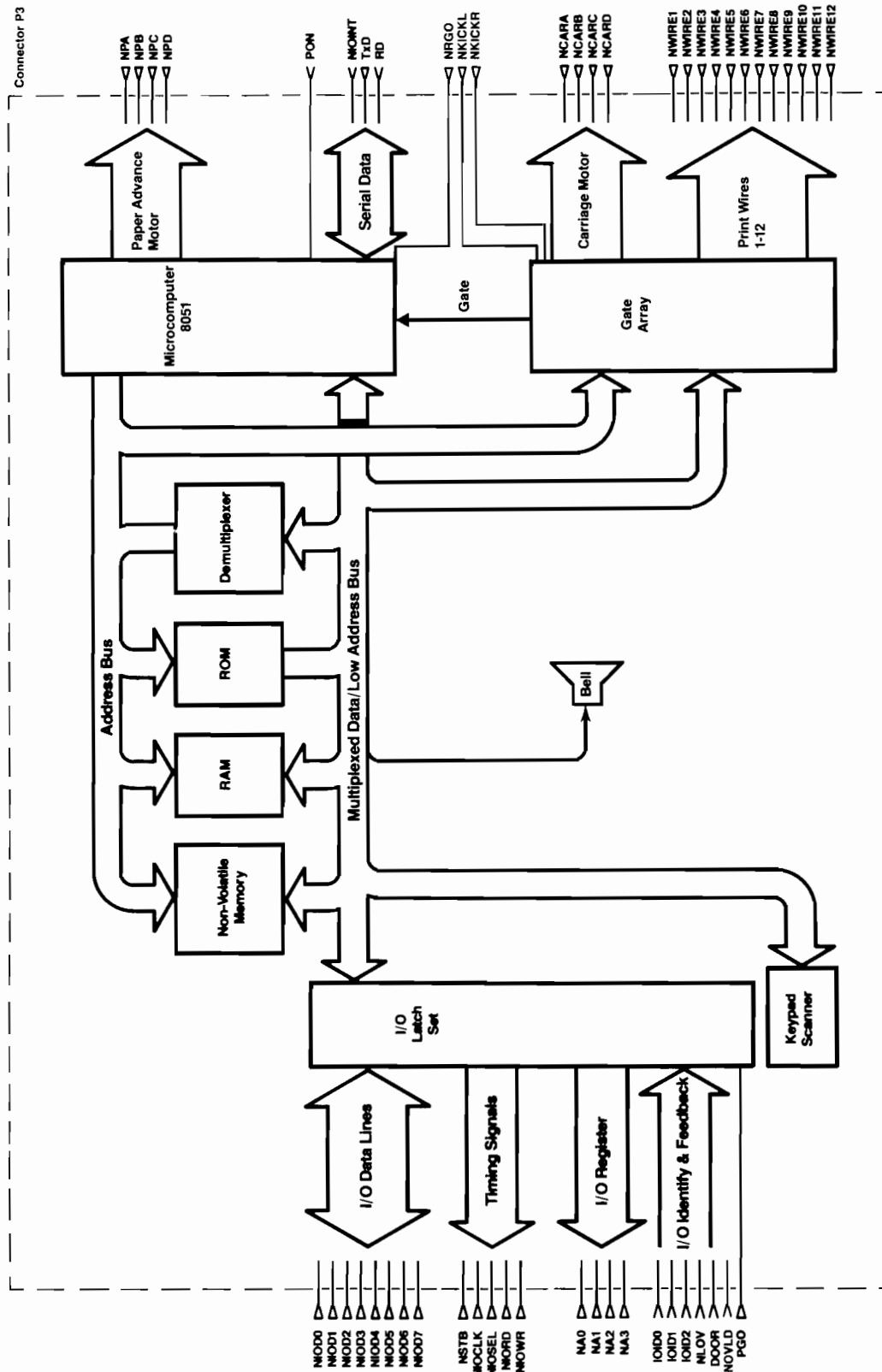
Figure 7-2.   2932 Processor PCA.

Gate Array

The Gate Array is a custom IC designed by Hewlett-Packard that replaces many of the functions normally associated with discrete logic circuits. On one output port the Gate Array takes dot-column information and generates the correct waveforms used in firing the print wires. It uses the other port to synchronize the print wire signals with the phases of the carriage stepper motor, both of which are sent to the Motor/Head Driver PCA.

Random Access Memory (RAM)

During operation, the RAM serves as temporary storage for various printer functions. A portion of the RAM is used as the I/O buffer for incoming data, while the balance is used as a scratch pad memory for microprocessor operations. The two RAM's on the processor board are each 2K x 8. The I/O buffer is normally 2K bytes for alphanumeric printing, but the buffer size may be limited to 256 alpha characters if graphics are being received, with the rest used for graphics processing. This dynamic allocation of buffer space offers optimum RAM utilization.

Read Only Memory (ROM)

The printer's operating code and character information are contained in ROM. Both types of information are shared between the two ROM's. Each ROM is 16K x 8, although the board can easily accommodate a larger size.

Nonvolatile Memory (NVRAM)

Semi-permanent storage, such as printer configuration information and character count, are placed in the NVRAM. When the printer is powered off, the NVRAM is powered by an on-board battery, so all information of this type can be retained for the next time the printer is powered on. Information contained in this memory can be altered by the user.

Battery Backup

The Battery Backup circuit provides the needed voltage (>2V) to the NVRAM when the printer is turned off. At power on, the battery turns over operation to the +5V supply once it exceeds 3.6V. Only then does the battery backup allow the data within the NVRAM to be changed.

Bell Circuit

The Bell circuit provides an audible indication of a paper-out condition or other error state. It also provides audible feedback when a key is depressed.

I/O Latch Set

Data to and from the Back-Plane PCA, which connects the different PCA's together electrically and mechanically, first passes through the I/O Latch Set for buffering and control. For example, data to or from the HP-IB I/O or Parallel I/O is sent through this set of latches. The Timing Signals from this set are used in controlling the data as it is read and written from the processor to the I/O board and vice versa. The I/O Address lines (I/O Register group) select individual registers on the I/O boards for

monitor the cover door for an open condition, and provide a feedback signal indicating a low voltage condition on the AC line. If the AC line were low, the processor would increase the pulse width of the signal used to fire the print wires in order to maintain sufficient print intensity.

Keypad Scanner

The Keypad Scanner has two functions. One is to serve as an input data latch to drive the control panel LED's, the other is to constantly read the state of the keys to determine if a key has been depressed and, if so, which one. The keys are scanned by setting a column bit low and then reading all four rows to see if any line is also low because of a depressed key. The words "column" and "row" do not apply to the physical location of keys on the Control Panel.

PROCESSOR PCA – 2933/34A

The 2933/34A Processor PCA contains a Z80 microprocessor to control the printer's nonprinting functions, such as data handling and configuration. An 8051 microcomputer controls the printing functions, similiar to the 2932A Processor PCA. Also on this board are control logic, firmware, and memory workspace for the printer. All data received by or transmitted from the printer is handled by the Processor PCA, where it is collated, interpreted, and then sent to the appropriate functional block with operation commands. See Figure 7-3. Print wire firing signals and timing is also generated on this board, as well as motor control signals.

The significant differences between the 2933/34A Processor PCA and the 2932A Processor PCA center around the added capablilities and features of the 2933/34A Printer: higher print densities require the additional processor to share the increased overhead burden, and a variety of interfaces and barcode features demand more program area and workspace.

8051 Microcomputer

The 8051 Microcomputer handles the print wire timing and commands to the printer Controller and the paper advance motor. In addition, it interprets incoming signals from the print mechanism, such as a paper out or door open condition. It also enables all the motor circuits with such signals as PGO (Paper Go) or RGO (Ribbon Go).

In this application the 8051 is termed a "microcomputer" (verses a "microprocessor") because it uses its own internal ROM and RAM. It has no access to the external ROM and RAM on this board. Rather than address and data lines, the 8051 has three I/O ports that can be programmed as address, data, or control lines. Because of bandwidth limitations due to the increased processing of print wire firing, the internal UART of the 8051 is not used.

Z80 Microprocessor

The purpose of the Z80 microprocessor is to take the system overhead tasks away from the 8051 microcomputer and allow it to use its full bandwidth to process multiple pass printing. The microprocessor handles incoming and outgoing data communications, keypad scanning, system overhead, and error reporting. All external ROM and RAM, including the ROM associated with the character cartridges and nonvolatile memory, are accessable only by the Z80 microprocessor.
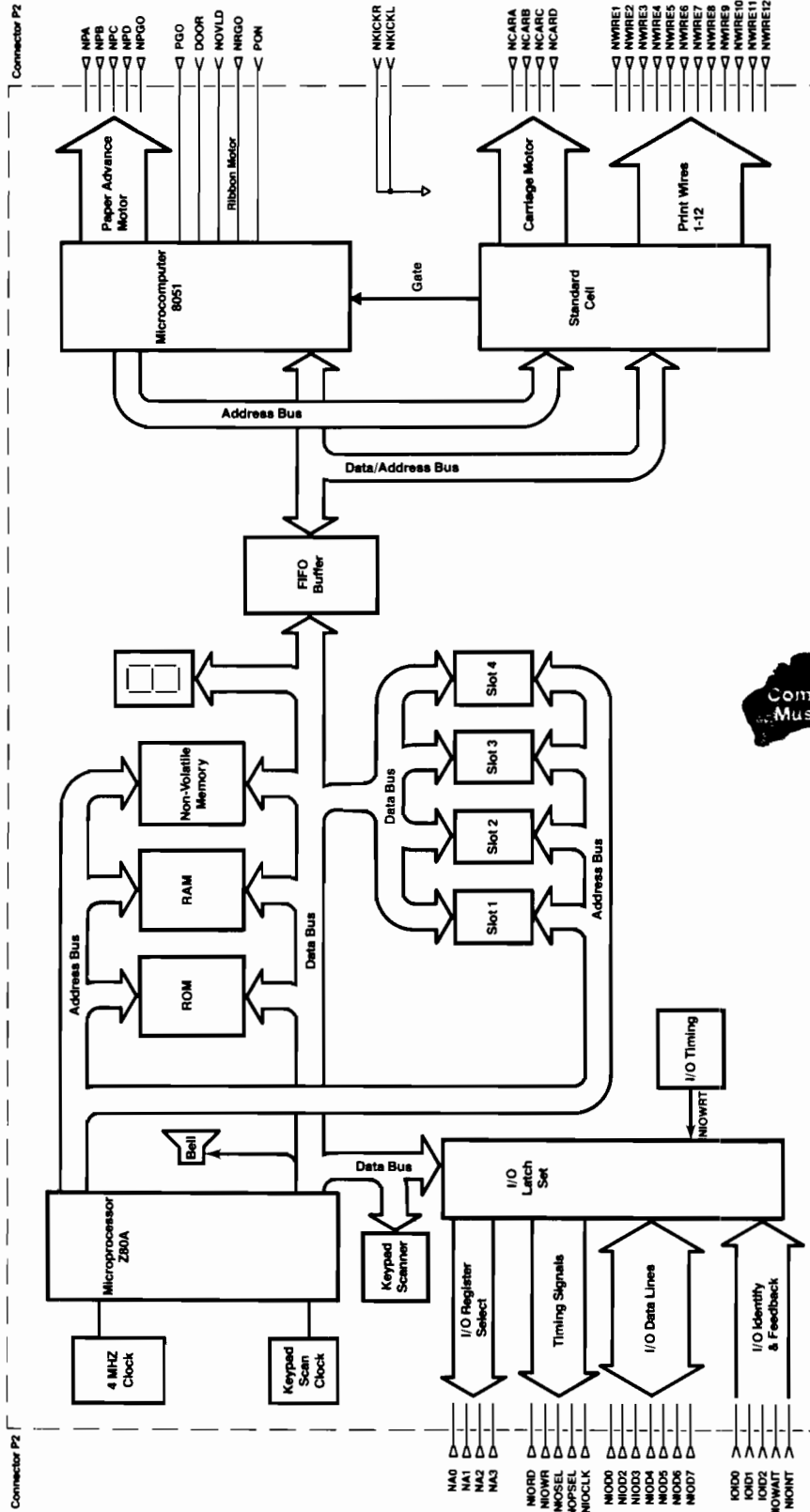
Figure 7-3.   2933/34A Processor PCA.

Random Access Memory (RAM)

During operation, the RAM serves as temporary storage for various printer functions. A portion of the RAM is used as the I/O buffer for incoming data, while the balance is used as a scratch pad memory for microprocessor operations. The three RAM's on the processor board are each 2K x 8. The I/O buffer is normally 2K bytes for alphanumeric printing, but the buffer size may be limited to 256 alpha characters if graphics are being received, with the rest used for graphics processing. This dynamic allocation of buffer space offers optimum RAM utilization.

Read Only Memory (ROM)

The printer's operating code and character information is contained in ROM. The larger ROM (32K x 8) contains only program code, while the smaller ROM (16K x 8) holds all the character-forming information plus some program code.

Standard Cell

The Standard Cell is a custom IC, designed to gate level by Hewlett-Packard, that is very similiar to the Gate Array used in the 2932A printer, but with the added capabilities needed for multiple pass printing of letter quality characters. The Standard Cell is more complex than the Gate Array in the 2932A; externally, however, it performs much the same functions. On one output port, the Standard Cell takes dot-column information and generates the correct waveforms used in firing the print wires. It uses the other port to synchronize the print wire signals with the phases of the carriage stepper motor, both of which are sent to the Motor/Head Driver PCA.

First-In-First-Out Buffer (FIFO)

The First-In-First-Out Buffer (FIFO) optimizes communication between the Z80 microprocessor and the 8051 microcomputer. The circuit gains its name because the first data byte received by the buffer is the first to be read by the 8051. The Z80 sends character printing information to the buffer along with a command, which allows the 8051 to interpret the command and read the buffer when it has time. After the Z80 has filled the buffer, it does not wait for the 8051, but continues working in other processing areas. This leaves the 8051 to empty the buffer at its own rate. When it requires more character printing information, it interrupts the Z80, which then reads a status register that contains information on what is required by the 8051.

Nonvolatile Memory (NVRAM)

Semi-permanent information, such as printer configuration and character count, is placed in the NVRAM. When the printer is powered off, the NVRAM is powered by an on-board battery, so all information of this type can be retained for the next time the printer is powered on.

Battery Backup

The Battery Backup circuit provides the needed voltage (>2V) to the NVRAM when the printer is turned off. At power on, the battery turns over operation to the +5V supply once it exceeds 3.6V. Only then does the battery backup allow the data within the NVRAM to be changed.

I/O Latch Set

Data to and from the Back-Plane PCA, which connects the different PCA's together electrically and mechanically, first passes through the I/O Latch Set for buffering and control. For example, data to or from the HP-IB I/O or Parallel I/O is sent through this set of latches. The Timing Signals from this set are used in controlling the data as it is read and written from the processor to the I/O board and vice versa. The I/O Address lines (I/O Register group) select individual registers on the I/O boards for read/write operations. The I/O Identify portion of the latches identify which I/O board is installed.

Keypad Scanner

The Keypad Scanner has two functions. One is to serve as an input data latch to drive the control panel LED's, the other is to constantly read the state of the keys to determine if a key has been depressed and, if so, which one. The keys are scanned by setting a column bit low and then reading all four rows to see if any line is also low because of a depressed key. The words "column" and "row" do not apply to the physical location of keys on the Control Panel.

Keypad Scan Clock

The Keypad Scan Clock's primary objective is to provide the scan timing for the Keypad Scanner. This differs from the 2932A Processor PCA, which generates its scan timing via the 8051 internal timer.

I/O Timing

The I/O Timing on the 2933/34A Processor PCA performs the necessary function of clocking the I/O timing signal. Basically, it converts a wide "write" signal from the Z80 to a more narrow one.

Character Font ROM Slots

Customer purchaseable character fonts, such as Helv, Italic, or Prestige Pica, are installed in the Character Font ROM Slots. Access to these slots are from the rear panel.

Seven-Segment Display

The Seven-Segment Display indicates in coded form errors that are detected during self test. Refer to Section 4 for a listing of these codes.

Bell Circuit

The Bell circuit provides an audible indication of a paper-out condition or some other error state.

MOTOR/HEAD DRIVER PCA

The Motor/Head Driver PCA converts the logic signals it receives from Processor PCA to voltages and currents required to drive the print wires and motors. It also provides sensing circuits to indicate overload conditions on the voltage rails. See Figure 7-4.

Print Wire Timing Latches - 2932A Operation

The Print Wire Bus from the Processor PCA passes twelve bits of data to the Kick Latches and Hold Latches on the Motor/Head Driver PCA. These lines determine which print wires will fire. The 2932A Processor PCA strobes the data latches to appear "transparent." Data on the latch inputs appear on the Kick Latch outputs one clock cycle later when the enable lines are on.

Once the data is clocked into the latches, first the hold and then the kick, the KICK R and KICK L signals enable the outputs of the Kick latches to output data to the power circuits. After about 90 microseconds, the lines return high. The Hold Latches, which are always enabled, output the same print wire information for another 100 microseconds to complete the print cycle. The kick data is used to force a large, initial voltage across the print coil to accelerate wire movement in the head. Once this is accomplished, the hold data is used to maintain current in the coil to complete the movement of the wire.

Print Wire Timing Latches - 2933/34A Operation

The 2933/34A has no limitations as to firing wires from one column of the print head and then the other column. The wires are fired independently from each other in order to produce the increased densities. In the 2933/34A, the KICK R and KICK L lines are always pulled active. Data is clocked into the latches by the STROBE lines and is immediately sent out to the power circuits.

Print Wire Power Circuits

The objective of the Print Wire Power Circuit is to actuate a print wire as quickly as possible. Each wire has both a HOLD signal and a KICK available from the latches. Before the wire is fired, both signals are initally low. These two signals are combined in the circuit to produce a two-stage pulse. The kick portion enables a 36.5V potential across the print wire coil, which quickly saturates the coil with current and causes rapid acceleration of the print wire. Once the coil saturates, the kick potential is no longer needed and is turned off. The hold signal, which is present but ignored throughout the kick time, now takes the place of the kick signal to maintain current through the coil by placing a 6.5V level across the coil winding.

-30 Volt Sensor

The -30 Volt Sensor signals the Processor PCA when there is a low-voltage fluctuation in the a.c. line voltage. Should the a.c. line voltage drop, the unregulated -30 volt rail that is used in the Print Wire Power Circuit would be unable to totally saturate the print wire coil in the allotted time. A low voltage condition toggles the -30 volt sensor, which signals the Processor via the NLOV (low voltage) line. The Processor PCA polls this line during the line feeds. If it finds it in a low state, it lengthens the KICK signal portion of the print wire firing pulse from 88 to 96 microseconds to correct the amount of print coil saturation.

6.5 Volt Droop Sensor

The 6.5 Volt Droop Sensor detects excessive current draw by the print head. The 6.5 volt rail supplies current to the print wire coils; if many wires are actuated simultaneously and for consecutive firing cycles (e.g., while printing "black out"), the total current draw from the 6.5V rail may exceed the maximum potential of the Power Supply PCA, causing the rail's voltage to decrease or "droop."

Such a low-voltage situation will toggle the 6.5 Volt Droop Sensor, which in turn signals the Processor PCA via the NOVLD (overload) signal. When the Processor PCA polls the NOVLD line, it stops further printing, disables second dot compensation, and continues printing the rest of the line at half speed, which reduces current draw. The next print line will begin printing at normal speed, unless the 6.5 Volt Droop Sensor again signals a low-voltage condition; in which case it will begin printing at half speed again.

5 Volt Supply Monitor

When the printer is powered up or down, the 5 Volt Supply Monitor ensures that certain circuits are reset to a predetermined state. The 5V monitor is the first circuit to become active in the printer. On power up, the 5V supply rises to within normal operating limits. After the PON line goes high, the DREN (drive enable) line also goes high to activate the Print Wire and Motor Power Circuit. At power down, the 5V monitor is the last circuit to turn off, preventing inadvertant firing of the print wires by disabling the DREN signal.

Voltage Reference

The Voltage Reference provides a standard for comparison when monitoring the voltage rails. The 26V unregulated supply is the first rail to come up at power on. Since the 2.5V reference is fed from this supply, it also powers up quickly for use in the power up sequence.

Power-On Latch Set

Should the Processor PCA be inadvertently left out at power on, the Power-On Latch Set ensures the print head will not fire during the power-up sequence. When the 5V supply rises to within operating limits, this circuit produces a positive pulse on the STBK (strobe kick) line and a negative pulse on the STBH (strobe hold) line. Since the processor board is removed, the Print Bus lines are all high (inactive). The strobe pulses, therefore, clock ones into the Hold and Kick Latches, which prevent the print wires from firing. Under normal operation, the NSTB (strobe) line then begins to clock print wire data into the latches.

Carriage Stepper Motor Phase Driver

The Carriage Stepper Motor Phase Driver converts four active-low, logic signals from the Processor PCA into voltages and currents capable of driving the motor. The motor-phase signals entering the board are called NCARRA through NCARRD (carriage-phase A through carriage-phase D). Phases A and C form one pair and phases B and D form the other pair. Only one phase in a pair is turned on at a time. Since the motor operates in "half-step" mode, it can be rotated by turning on one phase or two phases at the same time. The carriage motor's stepping pattern comes from a sequence within the Gate Array on the Processor PCA.
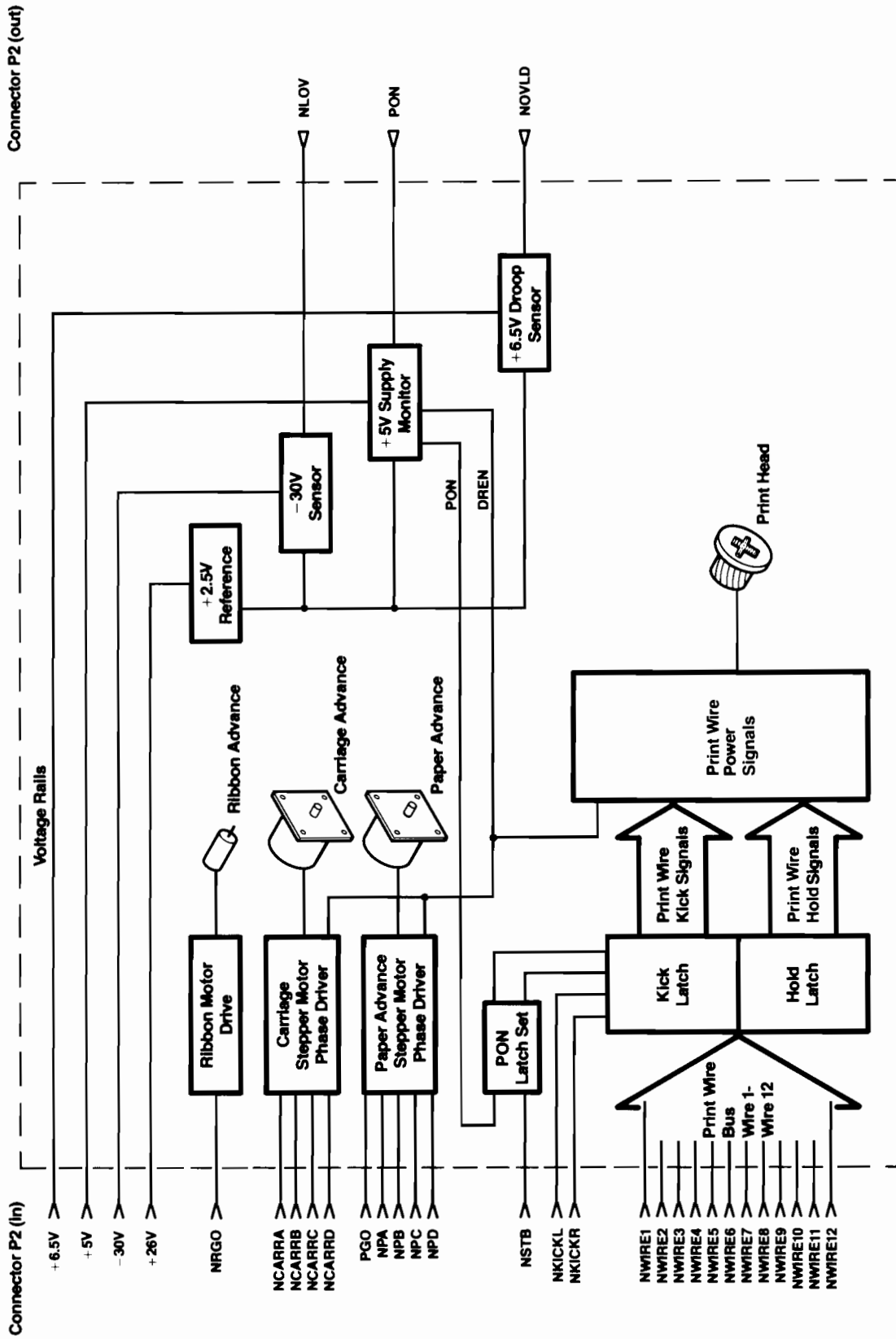
Figure 7-4.   Motor Head PCA Block Diagram.

Paper Advance Stepper Motor Phase Driver

The Paper Advance Stepper Motor Phase Driver serves to advance the paper by driving the Pinch Roller Assembly and tractors. Its operation is similar to the Carriage Stepper Motor Phase Driver. The stepping pattern comes directly from the processor IC on the Processor PCA. The logic signals are NPA through NPD (paper-phase A through paper-phase D). The 26V rail provides the necessary motor current to advance the paper, while the 6.5V rail acts to hold the motor and prevent the paper from slipping when it is not moving.

The carriage motor circuit depends on pulses to step its motor. When the carriage stops moving, the head could slip one half step in either direction. This is not important, since the carriage is repositioned when movement resumes. In the paper driver, it is extremely important that the paper not slip after it has been advanced to the next print line. To accomplish this, there are two prerequisites for this circuit. First, the paper-phase signals are not pulses but are changes in logic levels that remain on after the paper is advanced. Second, to prevent the 26V supply from burning up the windings when the motor is stopped, this supply is turned off and the 6.5V supply is fed to the enabled motor phases to hold the position of the paper. Switching between the two supplies is done with the PGO (paper go) signal.

Ribbon Motor Driver

The Ribbon Motor Driver provides current to a constant-speed DC motor that advances the ribbon. This circuit is active when the NRGO (ribbon go) line goes low. The ribbon motor advances the ribbon when the head is moving. The ribbon is self inking inside its cartridge with an approximate life of 10 million standard characters.

POWER SUPPLY

The 02932-60001 Power Supply uses both switching and linear techniques to provide six voltages to other circuits within the printer: -30V unregulated, -12V, +12V, and +5V, +26V unregulated, +6.5V. Refer to Figure 7-5, Power Supply Block Diagram. Three pairs of full-wave rectifiers convert the voltages from the secondary windings of the power transformer into three d.c. voltages: +10V, +26V, and -30V. These voltages feed all the regulators on the board.

-30V Supply

The -30V output is an unregulated power supply. Its purpose is to supply a kick pulse to the print head. It is protected by a 7 amp slo-blow fuse and filtered by a large capacitor.

-12V Supply

The -12V supply uses a Zener diode to step the voltage down to about -25 volts and then uses a linear regulator and capacitor to provide a stable, filtered -12V output. Various operational amplifiers throughout the printer use this supply, as well as the RS-232-C circuits.

+12V Supply

The +12V supply uses a series pass transistor to regulate its output. +26V feeds the transistor and linear regulator that controls its conduction. The regulator monitors the regulated +12V output and compares it to a +2.5V reference. If the output voltage rises, the regulator decreases the amount of base current to the transistor, which causes a greater emitter-to-collector voltage drop. This reduces the output voltage to the correct level.

The Current Sense circuit constantly sends a feedback signal to the regulator. This effectively allows the regulator to monitor the current being delivered to the load. Should the output current rise to an abnormal level, the feedback level rises to a level sufficient to shutdown the regulator and turn off the series pass transistor.

The +12 volts is used in the RS-232-C I/O, op amps on other boards, and as a supply to the +5V and +6.5V regulators on the Power Supply board. Therefore, if the 12V supply were to shut down for any reason, these supplies would turn off as well.

+5V Supply

This supply is identical in circuit operation to the +12V supply. It is fed by the +10V output from the rectifying diodes and its regulator is powered by the output of the +12V supply. All logic circuits within the printer use this supply.

+26V Supply

The +26V output is another unregulated supply. It feeds power to the +12 and +6.5 volt supplies in addition to 2.5 volt reference on the Head Driver board and both stepper motors. Fusing is 7 amps.

+6.5V Supply

The +6.5V supply is a switching type supply that can produce up to 6.0 amps continuous. The heart of the circuit is the Switching Regulator IC, which provides a pulse modulated output to the switching transistor. The regulator monitors the voltage output of the +6.5V supply and compares it to an internal voltage reference. The resultant error signal is then compared to a sawtooth waveform, which is also internally generated and runs at about 25kHz. The comparison between the error signal and the sawtooth produces pulses that vary in width, depending on the level of the supply's output voltage. Varying the pulse width varies the amount of time the switching transistor is turned on, which produces changes in the output level. For example, if the output voltage were too high, the error signal would increase and, when compared to the sawtooth, would produce a narrower pulse width to the switching transistor. The transistor would conduct for a shorter period, thereby lowering the output level back to the acceptable level.

The switching transistor drives an LC network, which provides a constant d.c. output. The coil and capacitor charge when the transistor is conducting. When the transistor is switched off, the coil, with the help of a commutating diode, continues to supply power to to the output. The Switching Regulator IC monitors the outputs from the Overvoltage and Current Sense circuits and shuts down the switching transistor should either of these levels rise above normal.

Overvoltage Crowbar

The Overvoltage Crowbar circuit provides protection in case any of the +5V, +6.5V, +12V, or +26V output levels were to rise to an abnormally high level. This could happen if the series pass transistor were to short, since this would place the higher, unregulated voltage directly on the output. Each of these supplies provides a sense line back to the crowbar circuit. At a given output level, the crowbar circuit will cause an SCR to conduct to ground and blow the fuse on either the +10V or +26V rail. This shuts down that particular rail and any supply connected to it.

Figure 7-5. Power Supply Block Diagram.

RS-232-C/RS-422 - 2932A

There are two serial interfaces for the 2932A: an RS-232-C (P/N 02932-60004) and an RS-422 (P/N 02932-60010). Refer to Figure 7-6, RS-232-C/ RS422 I/O Block Diagram and Figure 7-7, 25-Pin Serial Connector. The interfaces are designed for full duplex data transfer. All control for signal lines, baud rate, and data transfer is done by the processor board. The Modem Control Outputs, for example, come directly from the processor board via the I/O Data Bus. At the appropriate time, they are passed through the Modem Control buffer by the NIOWR (Write) line. Likewise, the Modem Control Input signals are sent to the processor board through the Modem Receive buffer. This buffer places the modem input signals onto the I/O Data Bus when the NIORD (Read) line goes low.

In the 2932A printer with RS-232-C, the 8051 microcomputer contains a built-in Universal Asynchronous Receiver Transmitter (UART) for generating data at the proper baud rate. This data transfer signal is sent to the I/O board, inverted, and sent out the I/O port as TxD. In the RS-422 version, the signal passes through a complementary output buffer that provides a differential output.

Data entering the RS-232-C board passes through a buffer and goes directly to the processor board as RxD. For RS-422, the I/O port provides a differential input to a comparator IC. With the jumpers removed, the resultant signal is used as RxD.

Figure 7-6. RS-232-C/RS-422 I/O Block Diagram (2932A).

```
 ┌──────────────────────────────────────────┐
 │ 13  12  11  10  9  8  7  6  5  4  3  2  1 │
 │                                            \
 │  25  24  23  22  21  20  19  18  17  16  15  14 │
 └──────────────────────────────────────────┘
```
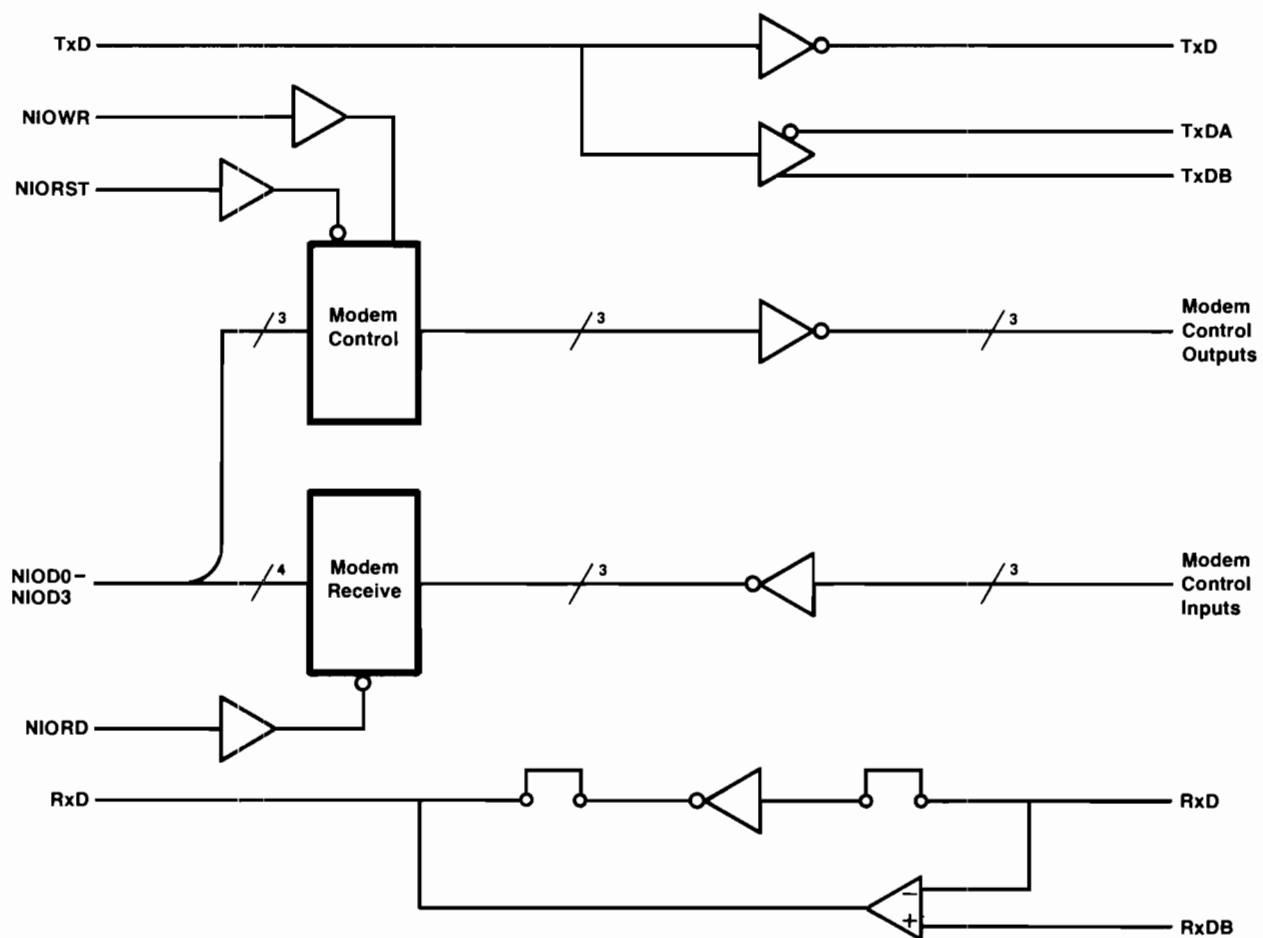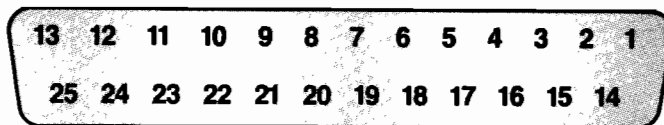
PIN	FUNCTION	SIGNAL
1	Protective Ground (shield)	AA (101)
2	Transmitted Data	BA (103)
3	Received Data	BB (104)
4	Request to Send	CA (105)
5	Clear to Send	CB (106)
7	Signal Ground	AB (102)
9	Send Data	SDA
10	Not Send Data	SDB
17	Receiver Signal Element Timing—DCE Source	DD (115)
18	Not Receive Data	RDB
19	Secondary Request to Send	SCA (120)
20	Data Terminal Ready	CD (108.2)
24	Transmit Signal Element Timing—DTE Source	DA (113)

Figure 7-7. 25-Pin Serial Connector.

RS-232-C/RS-422 I/O - 2933/34A

There are two serial interfaces for the 2933/34A: an RS-232-C (P/N 02934- 60053) and an RS-422 (P/N 02934-60058). Refer to Figure 7-7 for connector pin-out. Refer to Figure 7-8, RS-232-C/RS-422 I/O Block Diagram. The difference between the two boards lies in their data transmission lines. The RS-232-C input and output lines are single ended, while the RS-422 uses differential inputs and outputs. The RS-232-C board handles all elements of communication between the printer and the host when Option 035 is ordered. The 8251A RS-232-C Interface IC is the heart of the board, since it converts the the incoming serial data into the parallel data that the printer uses internally. Also, the 8251A converts the printer's parallel status information into serial data for transmission to the host.

At power on, the processor board writes one byte into the Control Latch. This data controls the Baud Rate Generator as determined by the previously selected Power-On Configuration. The select lines control divider circuits within the generator that divide the 4 MHz clock signal to produce a specific output frequency (baud rate). When INTCLK (internal clock) is selected, it is this signal that controls the rate of data flow through the 8251A Interface IC. The 8251A divides this frequency by 16 to produce the actual baud rate. When EXTCLK (external clock) is selected, the host determines the data rate; therefore the 8251A passes data at the same rate as the externally-provided clock. Typically, the generator is driven in the INT/ASYNC mode. In the synchronous mode, the baud rate clock is the same as the bit rate. When the asynchronous mode is selected, the baud rate clock is 16 times the bit rate.

All data is written into the board and read from the board through the Data Bus Buffer. The Combination Logic circuit controls the direction of data flow through the buffer. This circuit also sends signals to other parts of the board, including the 8251A, to control read and write operations and register clocking. The RS-232-C Drivers/Receivers block control miscellaneous lines that are typically used with modems and multipoint pods.

Data to the printer is received on the RECEIVE DATA line, while status data to the host is sent out on the TRANSMIT DATA line. During self test, proper operation of the board and, in particular, the 8251A is checked by writing data to the 8251A, sending it back on itself through the Loopback Logic, and reading that byte back to the processor for comparison.
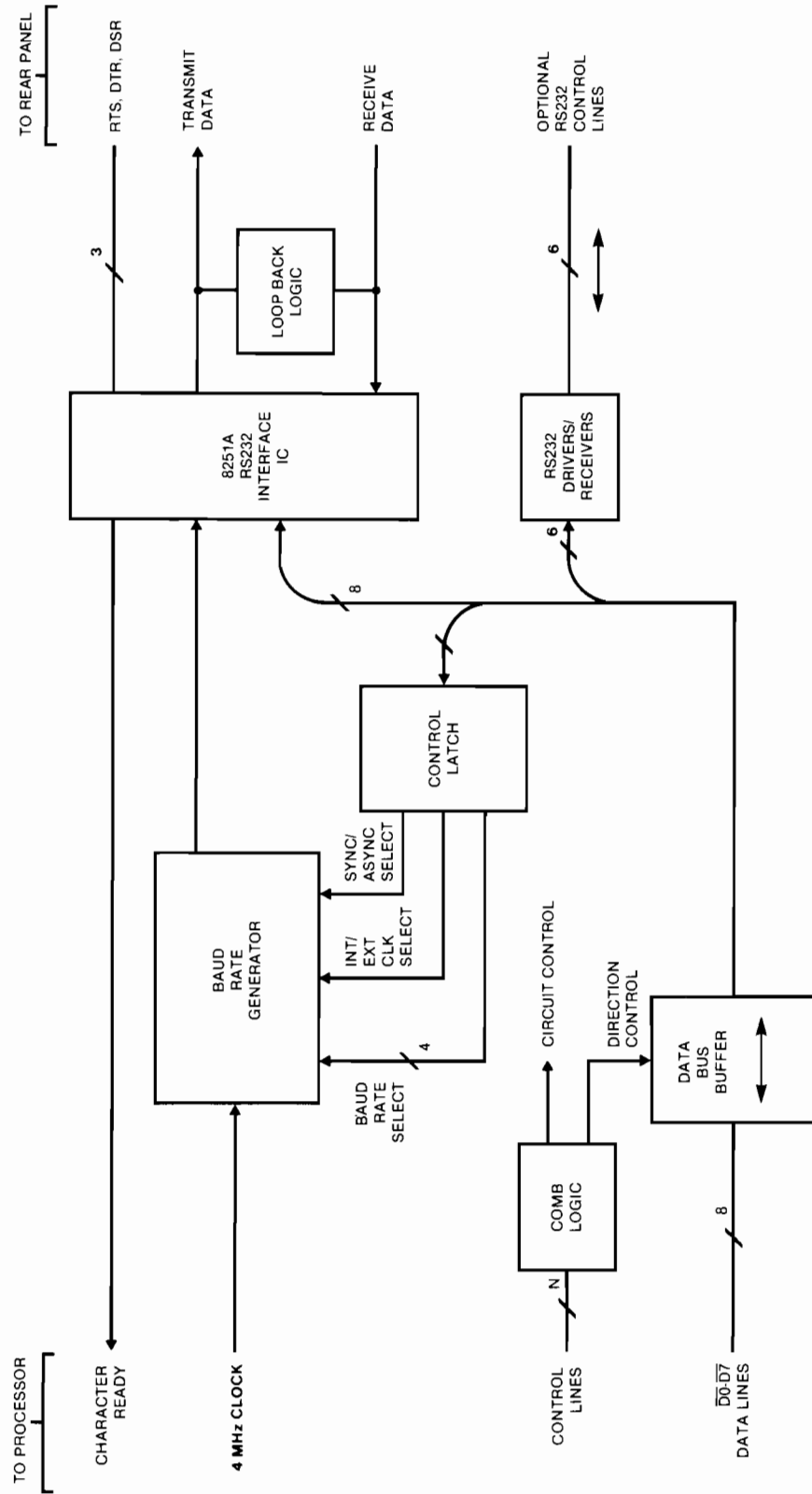
Figure 7-8.   RS-232-C/RS-422 I/O Block Diagram (2933/34).

PARALLEL I/O

The 02932-60007 board can function as either an HP Parallel Interface or a Centronics-type interface, depending on the state of the HP 8-BIT line (see Figures 7-9 through 7-13). In the HP mode (line=high), data passes through the input latch when the DATA STROBE line is set low by the terminal. The strobe pulse sets the CHAR READY line low; this line is examined when the processor board periodically reads the status of the interface board. The processor recognizes a new data byte is present and reads the data register when buffer space is available. The processor reads this register by writing a specific code to the Decoder Register, which generates a low on the READ DATA line.

Once the processor reads the data byte, it writes another code to the Decoder Register to pull the ACK line low (see Figure 7-10). The terminal responds by pulling DATA STROBE high. It is then ready to place another byte on the data bus.

When operating in the Centronics mode, data is actually stored in the 8-bit Data Latch on the rising edge of a negative-going DATA STROBE pulse. The combination logic circuit immediately sets the BUSY line high to prevent further data transfer and also signals the processor, via the CHAR READY line, that a new character is ready. See Centronics Interface Timing Diagram, Figure 7-11. Once the processor reads the data, it then pulses ACK low, which clears the BUSY signal.
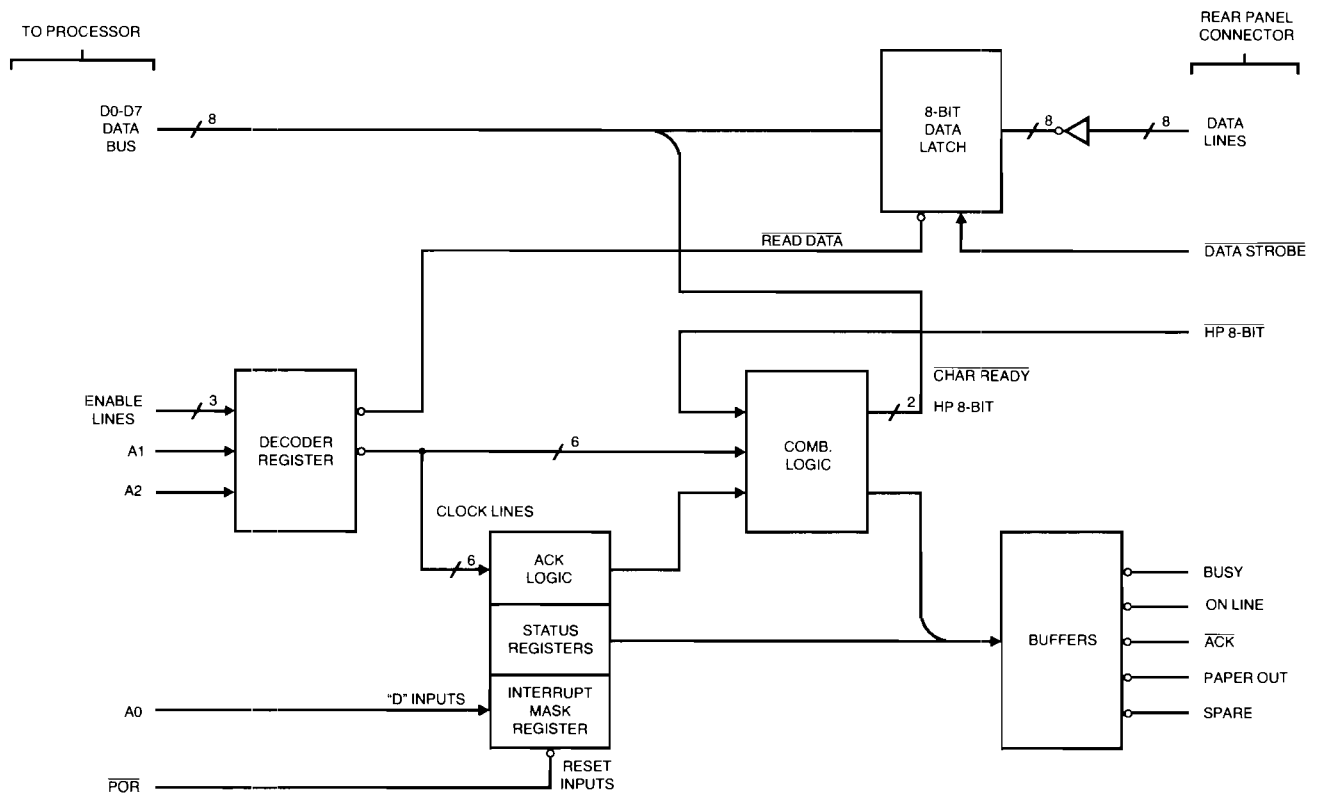
Figure 7-9. Parallel Block Diagram.

t1:	Data set-up time	0 ns min.
t2:	Printer busy delay	2 sec max.
t3:	Data hold time	0 ns min.
t4:	Controller acknowledge	0 ns min
t5:	Printer acknowledge delay	100 ns max.
*:	When data is read by printer	
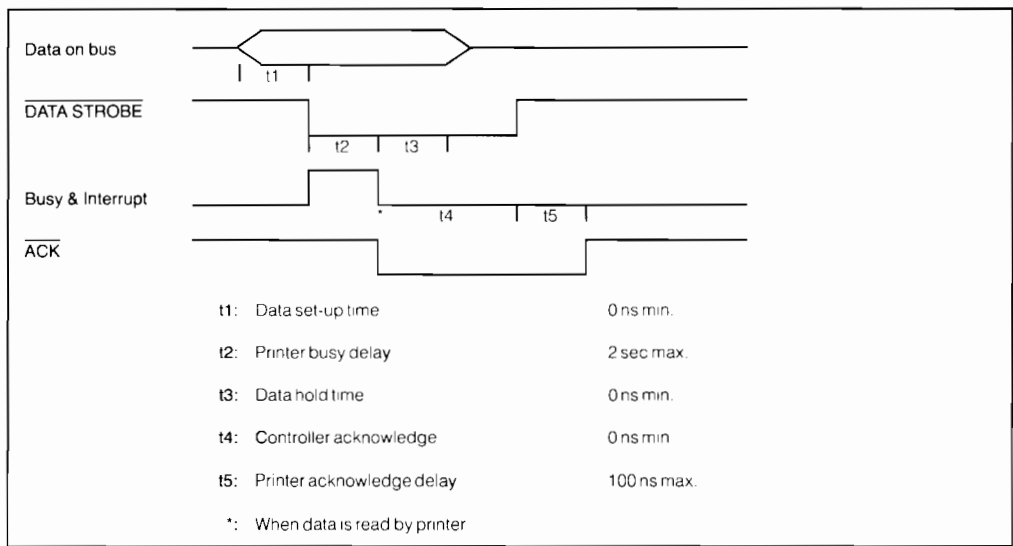
Figure 7-10. HP Parallel Timing Diagram.

t1:	Data set-up time	1 μs min.
t2:	Data strobe width	1 to 500 μs
t3:	Data hold time	1 μs min.
t4:	Printer busy	2 sec. max.
t5:	Acknowledge pulse width	4 μx (approx.)
*:	When data is read by printer	
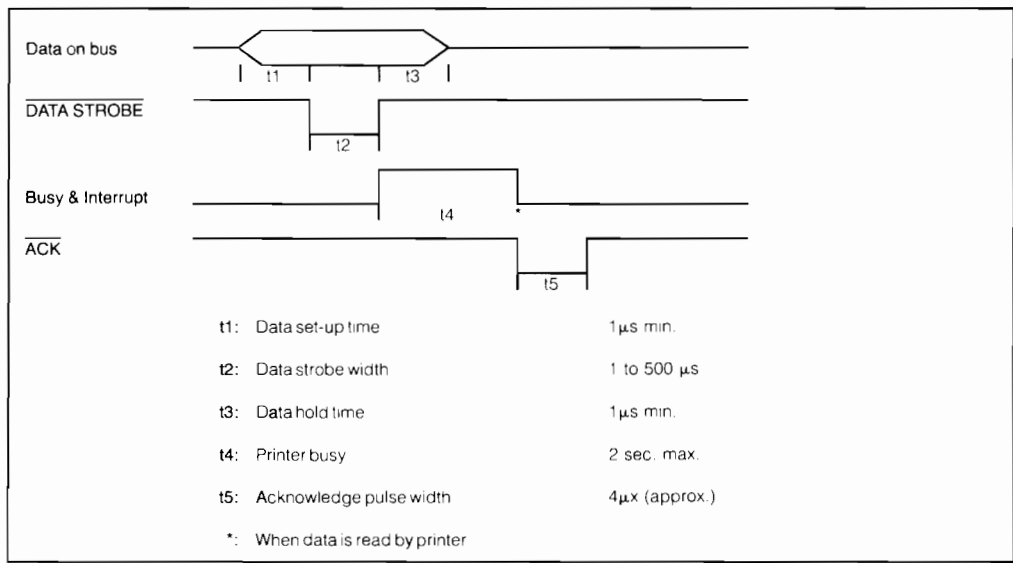
Figure 7-11. Centronics Interface Timing Diagram.

```
/ 1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 \
\ 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 /
```
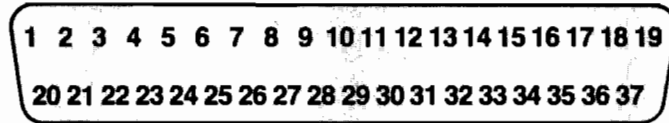
PIN NUMBERS	DESCRIPTION
4	HP vs Centronics; HP BBIT
5	Out of Paper; PAPER OUT
7	Busy; BUSY
9	Data Strobe, NSTROBE
10	Reset
11	Acknowledge; NACK
12	Data Bus 7; DATA BIT 7
13	Data Bus 6; DATA BIT 6
14	Data Bus 5; DATA BIT 5
24	On Line; ON LINE
25	Protective Ground; CHASSIS GROUND
26,27,33,34	Logic Ground; LOGIC GROUND
28	Data Bus 0; DATA BIT 0
29	Data Bus 1; DATA BIT 1
30	Data Bus 2; DATA BIT 2
31	Data Bus 3; DATA BIT 3
32	Data Bus 4; DATA BIT 4
35	Power; + 5V

Figure 7-12.   Parallel PCA Connector.

```
18 17 16 15 14 13 12 11 10  9   8   7   6   5   4   3   2   1
36 35 34 33 32 31 30 29 28 27 26 25 24 23 22 21 20 19
```
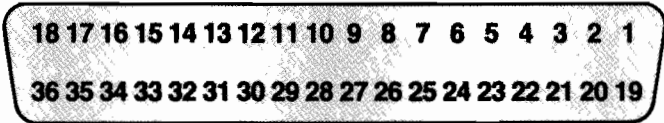
PIN	FUNCTION	SIGNAL	SOURCE	PIN	FUNCTION	SIGNAL	SOURCE
1	Pulse clocks data from Controller to printer	Strobe	Controller	12	A "High" indicates printer is out of paper	Paper Empty	Printer
2	Input data levels. A "High" represents a binary one; a "Low" represents a binary zero	Data 1	Controller	13	A "High" indicates the printer is selected. Similar to ON-LINE	SELECT	Printer
3	Same function as Pin 2	Data 2	Controller	16	Logic Ground Level	GND	Printer
4	Same function as Pin 2	Data 3	Controller	17	Printer Chassis Ground	CHASSIS GND	Printer
5	Same function as Pin 2	Data 4	Controller	18	+ 5 V Power Bus	+ 5 V	Printer
6	Same function as Pin 2	Data 5	Controller	19-30	Signal Grounds	GND	Printer
7	Same function as Pin 2	Data 6	Controller	31	A "Low" clears the printer buffer and resets the printer to power-on conditions	$\overline{\text{INPUT PRIME}}$	Controller
8	Same function as Pin 2	Data 7	Controller				
9	Same function as Pin 2	Data 8	Controller	32	A "Low" indicates a fault condition such as printer de-select or paper out	$\overline{\text{FAULT}}$	Printer
10	Acknowledge pulse indicates printer has received data	$\overline{\text{ACKNLG}}$	Printer				
11	A "High" indicates printer cannot receive data	BUSY	Printer				

Figure 7-13. Centronics-Type Connector (5061-4001 Cable Connection).

HP-IB I/O

The 02932-60006 board provides all circuitry necessary for the printer to interface to an external HP-IB device. See Figure 7-14, HP-IB Block Diagram and Figure 7-15, HP-IB Connector. The 8291A HP-IB Controller IC is an LSI register-oriented chip that handles all standard HP-IB functions. Data intended for printing is received over the bus and passed through the Data Buffer to the 8291A. Should the host request status information, the direction of data flow through the buffer reverses and data passes from the controller to the HP-IB. All data flow is performed under control of the handshake lines (DAV, NRFD, NDAC) as well as the special function HP-IB control lines.

Controls lines going to the 8291A are address lines NA0-NA2, NIORST (reset), and IOCLK (clock). The only control line driving the processor board is the NIOINT (interrupt) line. The eight bidirectional data lines to the controller are also buffered and inverted, thereby programming the chip in a positive-true sense. The Combination Logic circuit uses three control lines (read, write, and enable) to control the read and write functions of the chip and the direction of data flow through the data buffer.

Figure 7-14. HP-IB Block Diagram.

```
┌─────────────────────────────────────────────────────┐
│  12  11  10  9   8   7   6   5   4   3   2   1   \    │
│                                                       │
│  24  23  22  21  20  19  18  17  16  15  14  13  /    │
└─────────────────────────────────────────────────────┘
```
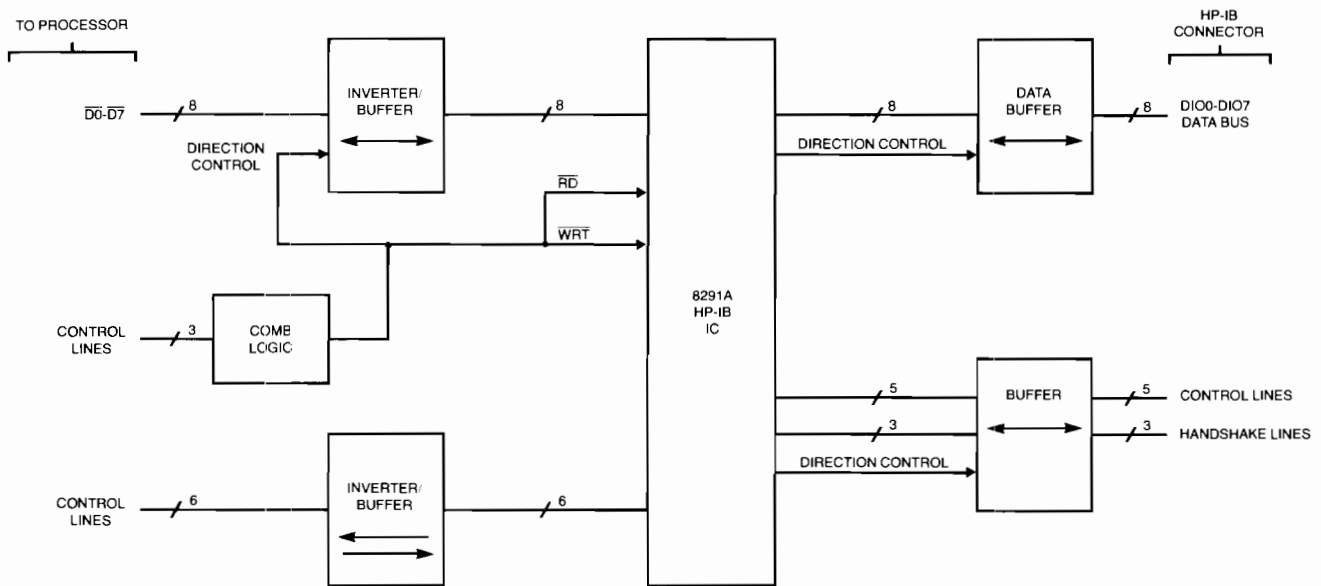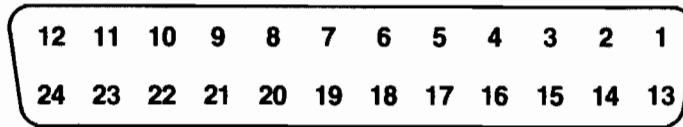
PIN	FUNCTION	SIGNAL
1	Data Bus 1	D101
2	Data Bus 2	D102
3	Data Bus 3	D103
4	Data Bus 4	D104
5	End or Identify	EOI
6	Data Valid	DAV
7	Not Ready for Data	NRFD
8	Not Data Accepted	NDAC
9	Interface Clear	IFC
10	Service Request	SRQ
11	Attention	ATN
12	Earth Ground	SHIELD
13	Data Bus 5	D105
14	Data Bus 6	D106
15	Data Bus 7	D107
16	Data Bus 8	D108
17	Remote Enable	REM
18-24	Signal Ground	GND

Figure 7-15. HP-IB Connector.

DSN/DATA LINK - 2933/34A

Data Link is a communications capability that possesses many advantages over other systems: high noise immunity, up to 4 km (2.5 miles) between host and devices, and ease of installation, modification and use. Data Link uses the same protocol as the Multipoint interface. The difference between Data Link and Multipoint interfaces is the hardware used.

PCA Inputs

The serial I/O board requires the following microprocessor signals:

DATA: Negative true.
   D0 (lsb) to D7 (msb).

ADDRESSING: Negative true.
   A0 (lsb) to A4 (msb).

READ STROBE: Negative true.
   Microprocessor read operation.

WRITE STROBE: Negative true.
   Microprocessor write operation.

I/O BOARD SELECT: Negative true.
   Activates the READ and WRITE strobes.

CLOCK: 4MHz clock is required.
   This clock is used to generate the baud rates.

INTERRUPT: Negative true.

I/O BOARD IDENTIFICATION BITS: ASYNC DSN/DL I/O = 3.
   These three bits allow for 7 different I/O boards to be allocated per system, and not require special decoding or buffers to be added to each I/O board design. These bits are negative true.

Interface Logic

The combinational logic section buffers and conditions the host processor signals used in the parallel/serial I/O conversion. This section also generates the required read or write strobes for the selected hardware registers.

The READ and WRITE signals from the host processor are gated with the I/O BOARD SELECT signal in the combinational logic. See Figures 7-16 through 7-18. The gates generate clean negative going READ or WRITE strobes for read or write operations specific to this PCA. These strobes are sent directly to the 8251A, as well as combined with the two high order address bits to generate strobes for the remaining hardware registers on the I/O card. The Data Bus Transceiver provides bidirectional buffering between the processor board and the 8251A. The data inversion is helpful since the interface bus is negative true. During a write operation, data is processor driven onto the internal data bus and accepted by the I/O board. During a READ operation, the data direction is reversed, and data is driven to the host processor.

8251A USART

The 8251A is a Universal Synchronous/Asynchronous Receiver/Transmitter designed for microprocessor systems. This device converts parallel format data into serial format for transmission, and converts incoming serial format data into parallel format data for reception. This device also inserts or deletes bits or characters that are functionally unique to the communication technique.

Baud Rate Generation

The baud rate generator supplies the necessary timing frequencies for asynchronous serial transmission from the system 4MHz clock. This circuit divides the 4 MHz clock by 13 to a frequency of 19200 x 16 Hz. This frequency is further divided to generate the 300 to 9600 baud rate clocks. It should be noted that the baud rates are off by 0.16%, plus or minus the error of the crystal. These values are within the limits of DSN/DL constrants. The control latch selects one of the 8 generated clocks. This rate is 16 times the bit rate, which is the standard value for asynchronous operation.

Interrupt Enable Logic

The Interrupt Enable Logic allows the software to disable the transmitter interrupts, while still enabling the transmitter function of the 8251A. The DATA READY interrupt (RxRDY) is gated with this maskable interrupt to form a composite interrupt signal to the host processor.

Internal Data Loopback

The DSN/DL I/O PCA contains special hardware allowing local serial data loopback. These extra gates allow the host microprocessor to test the data paths and the baud rate generator without an external loopback connector. When this circuit is active, the transmit data is sent through it and back into the receive input. A comparison is made to ensure that the data is properly received.

Isolation Circuit

The DSN/DATA LINK specifications require the transmitter and receiver circuits to be electrically isolated from the chassis and printer logic circuitry. The signal lines of the interface (NRTS, NTXD, NRXD) are isolated with HP 6N13 optocouplers. These provide 3kvdc of electrical isolation. The power for the driver/receiver circuits is provided by an isolating power supply. This circuit is comprised of 3 elements: the chopper, the isolation transformer, and the voltage regulator.

The chopper circuit's major component is a TIP41A (Q2), which is driven by the 2400 baud clock (38.46 khz). It chops the 12 Vdc through the first primary of the isolation transformer. The isolation transformer provides 1.5 kvdc isolation. It is a three winding device used in a flyback configuration. The voltage regulator is a 7805 regulator. The entire isolating power supply circuit is designed to supply a minimum of 200 mA under worst case conditions.

Drivers

Transmission of information on the DSN/DL system occurs via a differential signal. The two logic levels are determined as follows:

Logical 0 = Link (-) < Link (+)

Logical 1 = Link (-) > Link (+)

The drivers are designed in a totem-pole configuration with a source and sink transistor for each of the two lines. They will be in one of the three states: both transistors off, source transistor on, or the sink transistor on. When the drivers are transmitting, the source transistor for one line will be on (voltage high) while the sink transistor for the other line is on (voltage low), and vice versa. When all four transistors are off the interface is in a high impedence mode.

Receiver

The receiver circuit uses an LM311 voltage comparator. It has an offset voltage of 200 mv and a hysteresis of 75 mv. The input resistance is greater than 200k ohms.

Functional Operation
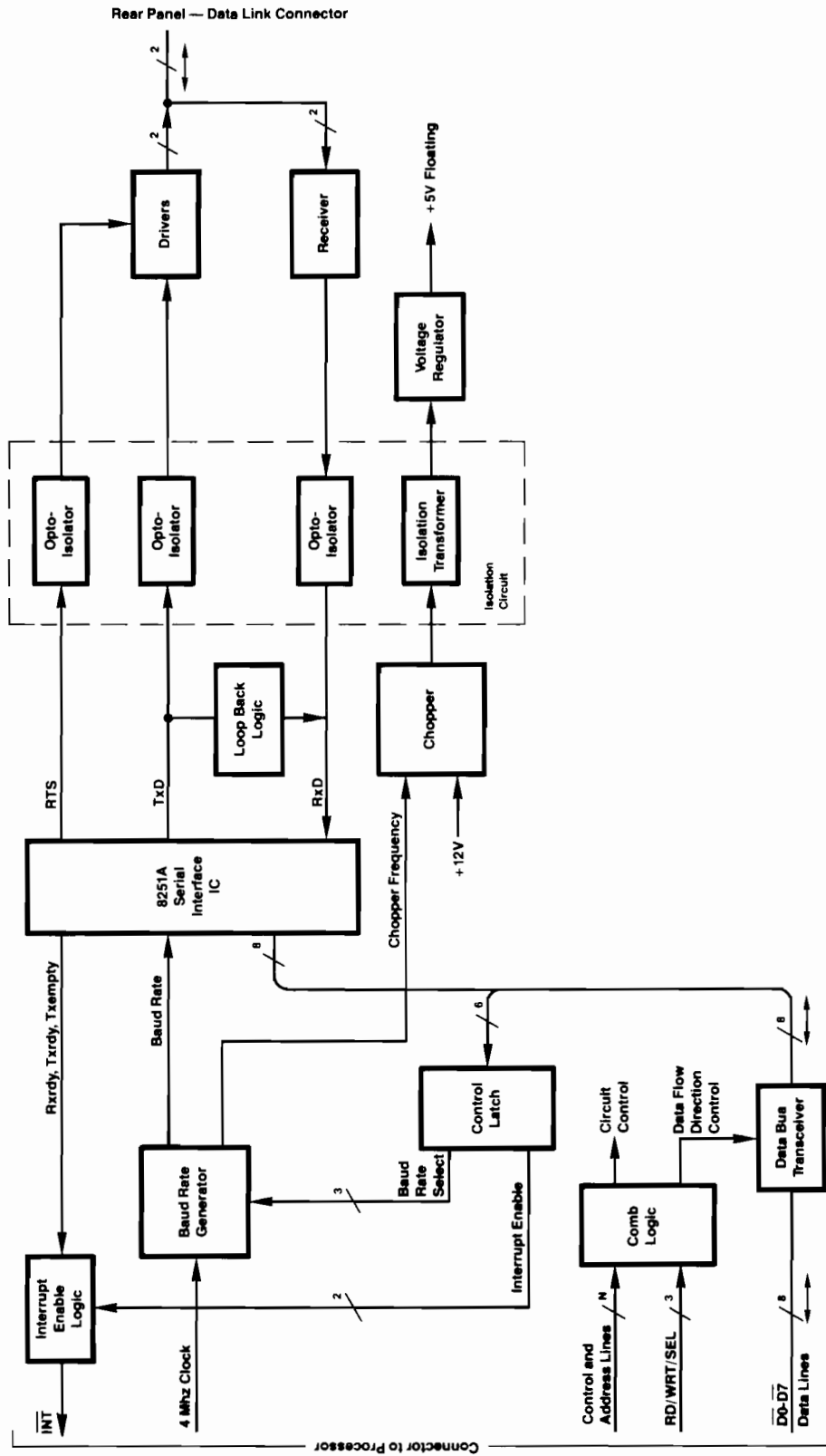
Figure 7-16.   DSN/Data Link Block Diagram.

READ CYCLE:
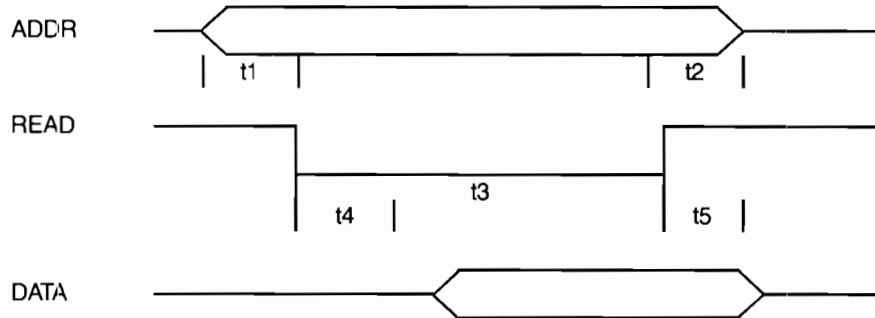
t1:	Address set up	50 ns min
t2:	Address hold	50 ns min
t3:	Read pulse width	250 ns min
t4:	Data delay	300 ns min
t5:	Data hold	25 ns min

WRITE CYCLE:
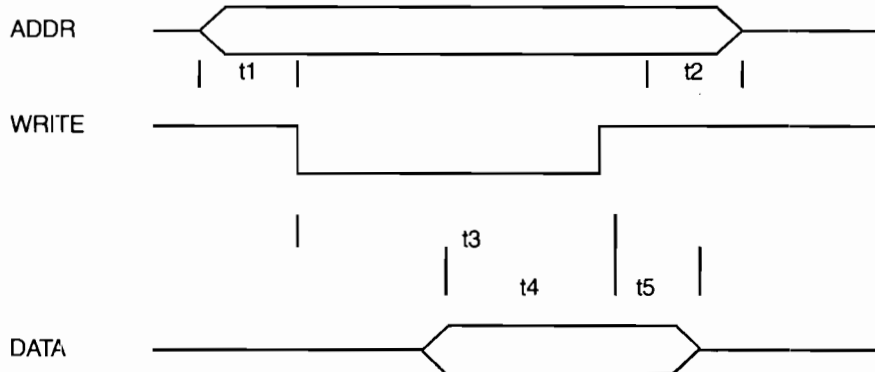
t1:	Address set up	50 ns min
t2:	Address hold	50 ns min
t3:	Write pulse width	250 ns min
t4:	Data must be valid	150 ns min
t5:	Data hold	50 ns min

Figure 7-17.   Host Processor Timing Requirements

```
 ┌─────────────────────────┐
 │  7   6   5   4   3   2   1  │
 │                           │
 │ 14  13  12  11  10   9   8 │
 └─────────────────────────┘
```
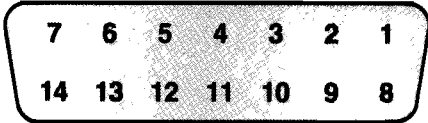
PIN	FUNCTION	SIGNAL
10	Upstream (−) Differential Signal	Link −
11	Upstream (+) Differential Signal	Link +
12	Shield, Floating Ground	SH
13	Downstream (−) Differential Signal	Link −
14	Downstream (+) Differential Signal	Link +

Figure 7-18. DSN/Data Link Connector.

SYNCHRONOUS DAISYCHAIN — 2933/34A

Interface Logic

The combinational logic section buffers and conditions the host processor signals used on the serial I/O board. This section also generates the required read or write strobes for the selected hardware registers.

The READ and WRITE signals from the host processor are gated with the I/O BOARD SELECT signal in the combinational logic. See Figures 7-19 through 7-22. The gates generate clean negative going READ or WRITE strobes for read or write operations specific to this PCA. These strobes are sent directly to the 8251A, as well as combined with the two high order address bits to generate strobes for the remaining hardware registers on the I/O card. The Data Bus Transceiver provides bidirectional buffering between the processor board and the 8251A. The data inversion is helpful since the interface bus is negative true. Data is driven onto the internal data bus and accepted by the I/O board. During a READ operation, the data direction is reversed, and data is driven to the host processor.

8251A USART

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Baud Rate Generation

The baud rate generator supplies the necessary timing frequencies for asynchronous serial transmission from the system 4 MHz clock. This circuit divides the 4 MHz clock by 208 to synchronous clock values to generate the 300 to 9600 baud rate clocks. It should be noted that the baud rates are off by 0.16%, plus or minus the error of the crystal. These values are within the limits of Multipoint constraints. The control latch selects one of the 7 generated clocks.

Interrupt Enable Logic

The Interrupt Enable Logic allows the software to disable the transmitter interrupts, while still enabling the transmitter function of the 8251A. The DATA READY interrupt (RxRDY) is gated with this maskable interrupt to form a composite interrupt signal to the host processor.

Internal Data Loopback

The serial I/O PCA contains special hardware allowing local serial data loopback. These extra gates allow the host microprocessor to test the data paths and the baud rate generator without an external loopback connector. When this circuit is active, the transmit data is sent through it and back into the receive input. A comparison is made to ensure that the data is properly received.

Multipoint Drivers and Receivers

The Multipoint Driver consists of an open collector NAND driver driving the base of an emitter follower 2N2222A transistor. When the driver is pulsed negative true, the transistor is cut off and no current flows through the 47 ohm emitter resistor into the transmission line. When the NAND driver is off, the transistor base current flows through the 470 ohm resistor and a 9 mA emitter current flows.

The opto-isolator receiver is biased by resistors, which serve to forward bias the LED and limit the forward current. The transmitted and received data inputs have a diode for reverse voltage protection for interfacing with the differential drivers of the 264X asynchronous multipoint board.

The Daisychain multipoint board allows a user to daisychain up to 32 multipoint devices to a first multipoint board. The Daisychain multipoint boards contain power down relays that allow the CPU to communicate with devices further down the line in the event that a daisychain multipoint unit is powered down.
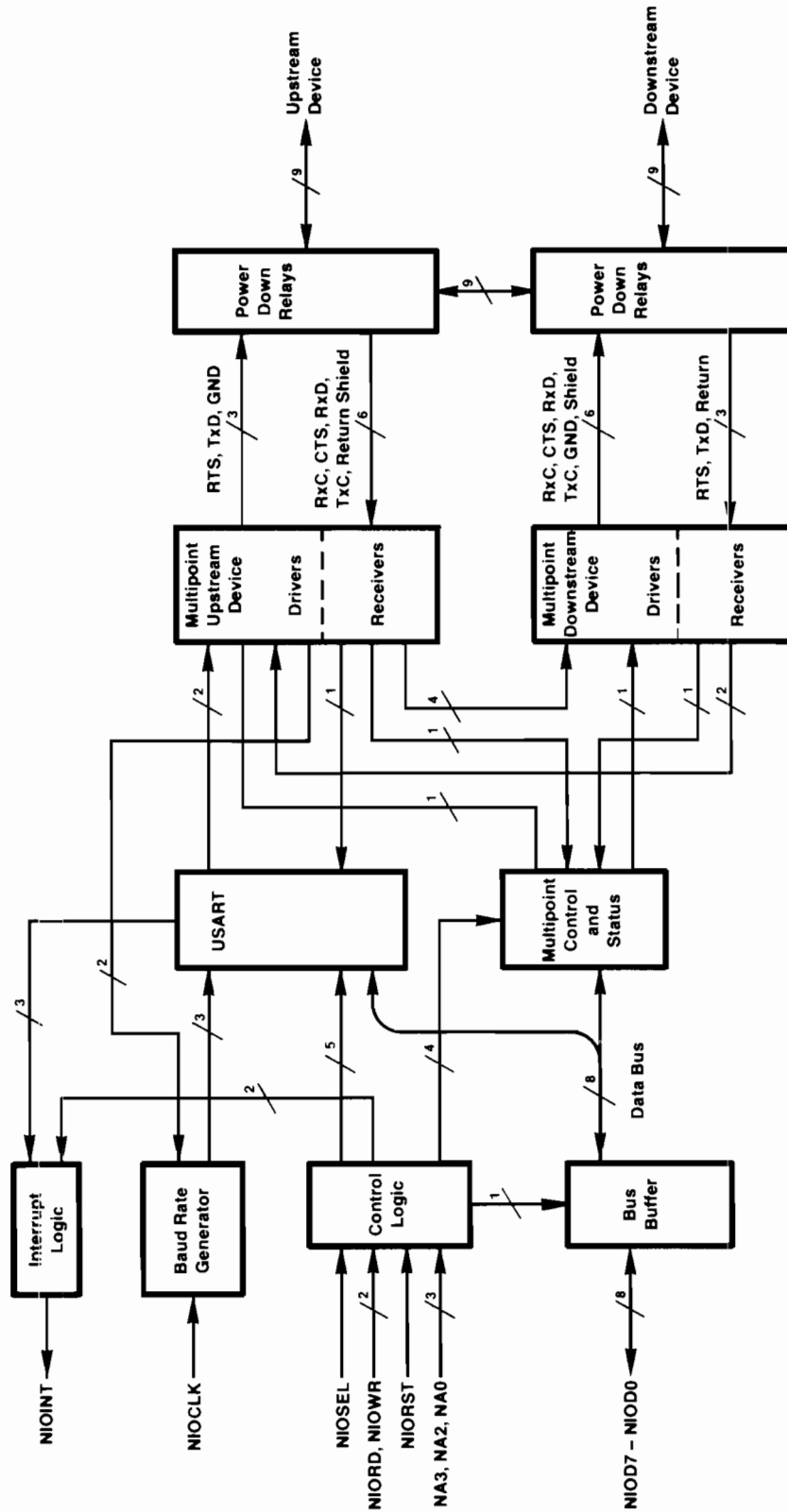
Figure 7-19. Daisychain Multipoint (Synchronous) I/O Block Diagram.
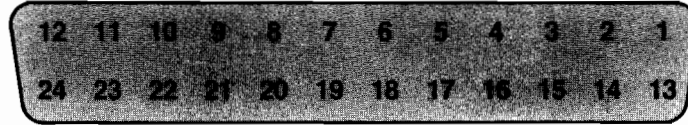
PIN	FUNCTION	SIGNAL	
1	Received Data Input	BBI	
2	Clear to Send Input	CBI	
3	Transmitted Data Output	BAO	
4	Request to Send Output	CAO	Upstream Device
5	Receiver Timing	DDI	To Male
6	Signal Return	RETURN	Connector
7	Transmitter Timing Input	DBI	
8	Signal Ground	AB	
9	N.C.	SHIELD	
13	Received Data Output	BBO	
14	Clear to Send Output	CBO	
15	Transmitted Data Input	BAI	
16	Request to Send Input	CAI	Downstream Device
17	Receiver Timing Output	DDO	To Female
18	Signal Ground	AB	Connector
19	Transmitter Timing Output	DBO	
20	Signal Return	RETURN	
21	Protective Ground	SHIELD	

Figure 7-20.   Daisychain Multipoint (Synchronous) Connector.

INTRODUCTION

This section contains information required in servicing the optional 29340S Sheet Feeder. Product description, specifications, troubleshooting, and parts information are included.

29340S SHEET FEEDER DESCRIPTION

The HP 29340S Sheet Feeder is a user-installable accessory to provide cut sheet capability to the 2934A dot matrix impact printer. The single bin design provides simplicity of operation and increased versatility to the 2934A printer. Mechanical drive and control of paper operation is provided by the 2934A through a gear located on the pinch roller print mechanism. No electrical components or energized parts are located in the 29340S Sheet Feeder.

The 29340S Sheet Feeder performs three operations:

1. Automatic feeding and top-of-form positioning of cut sheet paper to the 2934A printer.

2. Manual paper feeding to the 2934A printer.

3. Collated ejection of cut sheet paper.
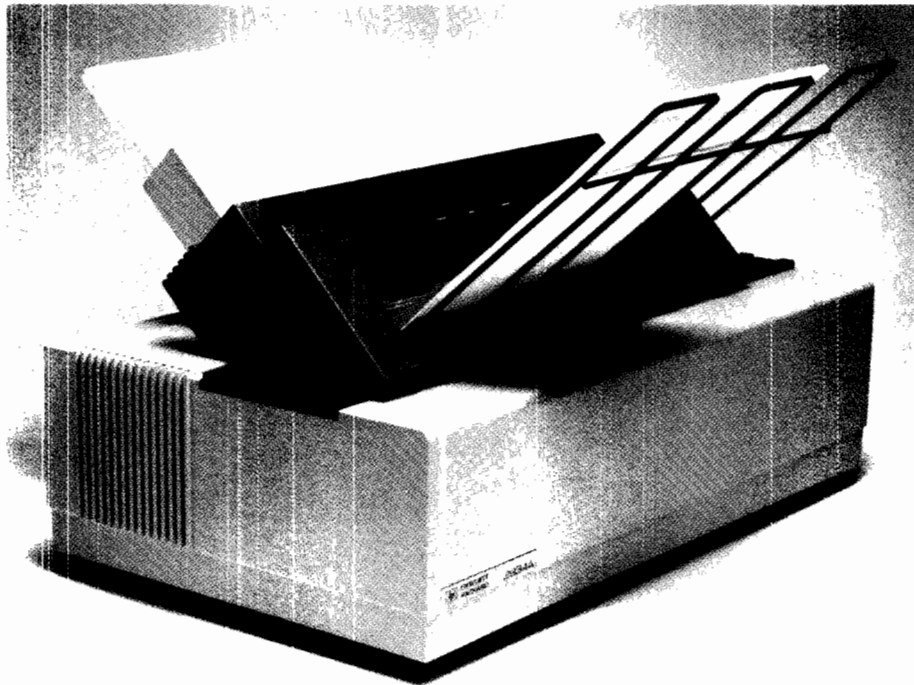
Figure 8-1. 29340S Sheet Feeder.

SPECIFICATIONS

Paper Tray Capacity
    Rear Paper Tray   200 sheets (20-pound paper)
    Front Paper Rack   100 sheets (20-pound paper)

Paper Size	Auto Loading	Manual Loading
Minimum Width	17.8 cm (7 in.)	15.2 cm (6 in)
Minimum Length	15.2 cm (6 in.)	15.2 cm (6 in.)
Maximum Width	30.5 cm (12 in.)	35.6 cm (14 in.)
Maximum Length	35.6 cm (14 in.)	No Restrictions

Paper Weight   70 to 90 g/m sq. (18 to 24 pound)

Top-of-Form Positioning   Printing begins on the eighth line from the top of the page in 8 lpi (sixth line in 6 lpi)

Accuracy
    Maximum Skew (left margin)   0.008 inch/inch (0.008 mm/mm)
    Top-of-Form Variation   +/− 0.05 inches (1.3mm)

Power   Contains no electrical components. Drive and control provided by the HP 2934A thru the print mechanism.

Environmental Specifications
    Temperature Range
        Operational   +5 deg C to +55 deg C
        Storage   −40 deg C to +75 deg C
    Humidity   10% to 75%, non-condensing, operating

Physical Specifications
    Physical Dimensions   52.07cm D x 46.03cm W x 15.24cm H
    Net Weight   3.1kg (6.84 lb.)

System Support   The HP 29340S Sheet Feeder is supported as an accessory to the HP 2934A Office Printer used in Conjunction with WordStar on the HP 150.

Duty Cycle   100%

29340S SHEET FEEDER COMPATIBLE UPGRADE KIT

The 29340S Sheet Feeder is an accessory specifically designed for the 2934A printer. However, some 2934A printers require upgrading to achieve sheet feeder compatibility or meet specified product performance. An upgrade kit, for 2934A printers, has been assembled to satisfy this requirement.

To determine if your 2934A needs the upgrade kit, look at the label located on the back-center of the printer. A sheet feeder compatible printer will have a serial number 2424AXXXXX or higher. However, if the serial number is lower than 2424AXXXXX, open the printer top cover and remove the ribbon cartridge. if the printer has been previously upgraded, a date code sticker will be attached, to the print mechanism, under the ribbon cartridge. Table 8-1 contains information for ordering 29340S Sheet Feeders and/or Upgrade Kits.

Table 8-1. Sheet Feeder/Upgrade Kit Ordering Information.

DESCRIPTION	ORDER
The 29340S Sheet Feeder without an Upgrade Kit	29340S
The 29340S Sheet Feeder and an Upgrade Kit	29340S Option #010
The Upgrade Kit without a 29340S Sheet Feeder	29340S Option #030

Table 8-2. 2934A Upgrade Kit Parts List.

DESCRIPTION	HP PART NO.	UNITS PER ASSEMBLY
Terminal Barrier Block	0360-1264	
Print Mechanism Assy	02932-60091	1
Eprom-Z80 #1	02934-80190	1
Z80 #2	02934-80191	1
Z80 #3	02934-80192	1
8051	02934-80193	1
29340S Upgrade Kit Instruction Guide	02932-90020	1

29340S UPGRADE KIT INSTALLATION INSTRUCTIONS

Print Mechanism Replacement

The upgrade kit includes a new print mechanism designed to operate with the sheet feeder. The only items that need to be re-used from the existing mechanism are the print head and ribbon cartridge. Use the following steps to remove and replace the print mechanism assembly.

1. Uplug the printer.

2. Open the top cover and remove the electrical shield.

3. Remove the four cables connected to the Motor/Head Driver PCA, P/N 02932-60002.

4. Remove the green and yellow ground wire running from the right side of the mechanism to the ground lug on the printer's base.

5. Remove the two remaining clips attached to the mount pins, which hold the print mechanism to the base.

6. Slide the mount pins to the inside and lift the mechanism free.

7. Reverse the procedure to install the new print mechanism. (Do not replace the electrical shield yet.)

8. To ensure the carriage motor cable does not get pinched, route the cable behind the mounting pin boss on the base.

9. The old print mechanism is no longer needed and can be discarded.

Ground Wire Connector

When the sheet feeder is installed, a ground wire will be connected to the printer for ESD protection. To accommodate the ground wire, the single terminal barrier lug used for the keypad ground strap must be replaced by a terminal barrier block (double terminal lug). Use the following steps.

1. At the back side of the fan housing, disconnect the keypad ground strap from the single terminal lug.

2. Replace the single terminal lug with the double terminal lug from the upgrade kit.

3. Reconnect the keypad ground strap.

EPROM Replacement

There are four EPROMs that need to be replaced. A pre-addressed shipping container is included for returning the replaced EPROMs to Hewlett-Packard, Vancouver Division. Use the following steps to replace the EPROMs.

1. Remove character cartridges and the dust covers from the back of the printer.

2. Disconnect the two cables running between the Processor PCA, P/N 02934-60051, and the Processor Extender PCA, P/N 02934-60065.

3. Remove the Processor PCA.

4. Replace the EPROM in socket U504 with the EPROM labeled 80192 (P/N 02934-80192) from the upgrade kit.

5. Reinstall the Processor PCA.

6. Remove the Processor Extender PCA.

7. Replace the EPROM in socket U1 with the EPROM labeled 80190 (P/N 02934-80190).

8. Replace the EPROM in socket U2 with the EPROM labeled 80191 (P/N 02934-80191).

9. Replace the EPROM in socket U8 with the EPROM labeled 80193 (P/N 02934-80193).

10. Reinstall the Processor Extender PCA and connect the two cables from the Processor PCA.

11. Install the character cartridges and the ROM dust covers into the back of unit.

12. Reinstall the electrical shield.

Returning EPROMs

1. Place the four EPROMs removed from the printer into the box that contained the new EPROMs.

2. Mail container which is pre-addressed to Hewlett-Packard, Vancouver Division.

SHEET FEEDER INSTALLATION INSTRUCTIONS

The 29340S is a user-installable sheet feeder designed for easy installation and removal by the operator. The following procedure provides 29340S Sheet Feeder installation instructions to the 2934A printer:

1. Open the 2934A printer top cover and remove any tractor fed paper.

2. Slide tractors to the far right and left positions of the 2934A print mechanism. We do not recommend locking the left tractor. Difficulty in unlocking the left tractor next to the left side plate can occur.

3. Position the 2934A paper guides, located on the tractor bars, for uniform paper support.

4. Close the 2934A top cover and remove the view window from the top cover by carefully bowing the view window to release the right side of the view window from the top cover opening.

5. Press both green latch release levers on the sheet feeder and position the right mounting foot between the grey locator ring and inner gear on the 2934A printer pinch roller.

6. Release both latch release levers once the sheet feeder is resting on the top cover.

7. Open the 29340S access cover and pull the load bar toward you. The load bar should click into an open (disengaged) position.

8. Fan the paper stack edge and place it in the rear paper tray. Loosen the green adjustment knob and adjust the moveable tray wall for gentle contact against the paper stack. Tighten the adjustment knob.

9. Pat the top edge of the paper stack to assure paper is positioned against the foot of the rear tray and engage the sheet feeder auto-feed operation by pushing the load bar toward the paper stack.

10. Close the sheet feeder access cover and turn on the printer. The 2934A printer will initially seek for tractor-fed paper. After determining no tractor-fed paper is installed, the printer will load the top sheet of paper from the sheet feeder rear paper tray.

11. Configure 2934A page length to the paper length installed in the sheet feeder in tray.

Further information regarding installation procedures on the 29340S Sheet Feeder can be obtained from the 29340S Sheet Feeder Installation Instructions, P/N 02934-90015.

2934A/29340S POWER-UP ROUTINE

This power-up routine assumes the 2934A printer is functioning properly with a 29340S Sheet Feeder compatible print mechanism and firmware. The 2934A printer has the tractor-fed paper removed and paper is installed in the rear paper tray of the 29340S Sheet Feeder. The load bar is in the down (engaged) position.

1. Turn on the 2934A AC power switch.

2. The 2934A print head moves to the far right of the print mechanism and returns to the left.

3. The print head moves to approximately column 40 of the 2934A print mechanism and seeks for tractor-fed paper by rotating the pinch roller and tractors in a paper advance motion.

4. The print head moves to the left side of the print mechanism and immediately returns to approximately column 40.

5. The 2934A checks for sheet feeder paper by rotating the printer pinch rollers in a paper down direction. The top sheet is fed down from the 29340S Sheet Feeder rear paper tray to the top of form position.

If the 2934A printer does not perform the above power-up routine, the printer may be faulty or require updated sheet feeder compatable firmware, available in the 2934A Option 010 Upgrade Kit. Perform the Destructive Controller Test-2933/34A, in chapter four of this manual, to determine the firmware installed in the printer. The firmware listed for ROM 0 and ROM 1 should be 02934-80190 and 02934-80192, respectively.

29340S FUNCTIONAL DESCRIPTION

The Auto-Feed Operation

The 29340S Sheet Feeder, controlled by the 2934A printer, provides automatic loading of the top sheet from the sheet feeder rear paper tray.

With the load bar in the disengaged position, paper is loaded into the rear paper tray with the front edge of the stack resting against the foot of the rear paper tray. Lowering the load bar causes the load bar support rod to lift the front edge of the paper stack against the feed shaft rollers. Turning the feed shaft rollers will pull the top sheet off the paper stack. The two front corners of the paper are flicked up by the corner tabs riveted to the rear paper tray walls to avoid multi-feeding of cut sheets. The feed shaft rollers continue pushing the paper between the sheet feeder bottom and rear paper guides. The paper reaches the clear window and is deflected toward the 2934A printer pinch rollers. Once the paper reaches the 2934A print mechanism, the cut sheet is pushed down thru the paper-out sensor by the printer pinch rollers. The 2934A printer positions the sheet to the top-of-form position by detection of paper's bottom edge by the paper-out sensor and the 2034A configured page length.
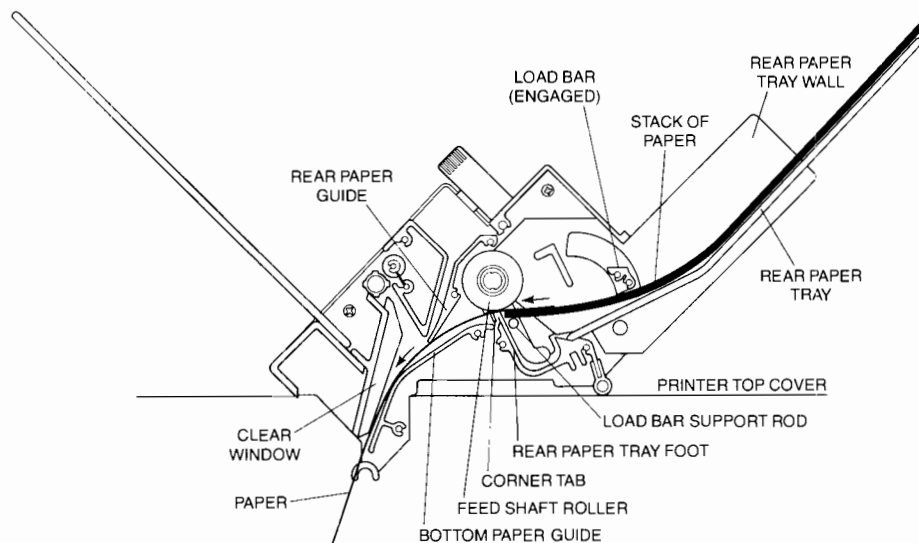
Figure 8-2. 29340S Auto-Feed Paper Path.

The feed shaft rollers only rotate one direction, for feeding paper into the sheet feeder and printer. During linefeed and page eject functions, the feed shaft and rollers are disabled from turning by the clutch/hub assembly between the feed shaft pulley and the feed shaft.

Paper Exit Path

As the paper is advanced by the 2934A printer linefeeds and page commands, the cut sheet is pushed up into the 29340S Sheet Feeder by the 2934A printer pinch rollers. The top edge of the paper reaches the front paper guide and is deflected thru the output pinch rollers, to the front paper rack. Once the bottom of the page passes the printer pinch rollers, the sheet feeder output roller and pressure roller assemblies push the printed sheet onto the front paper rack, printed side facing down.
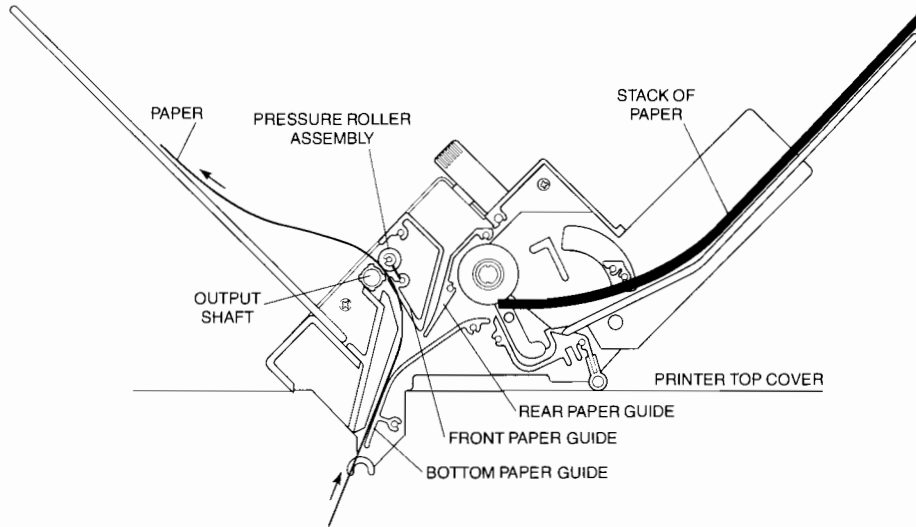
Figure 8-3. 29340S Paper Exit Path.

Manual Paper Path

As well as being auto-fed from the in tray stack, paper can be loaded into the printer manually by inserting the sheet thru the manual feed slot in the 29340S Sheet Feeder. The manual feed operation requires disengaging the sheet feeder auto-feed by pulling on the load bar and inserting paper, thru the manual feed slot and against the paper edge guide, until the bottom edge reaches the pinch rollers of the printer mechanism. The front paper guide, bottom paper guide, rear paper guide, and clear window deflects the paper for proper positioning to the 2934A pinch rollers. The down arrow function on the printer keyboard provides manual loading and vertical paper positioning.

MANUAL FEED PAPER PATH
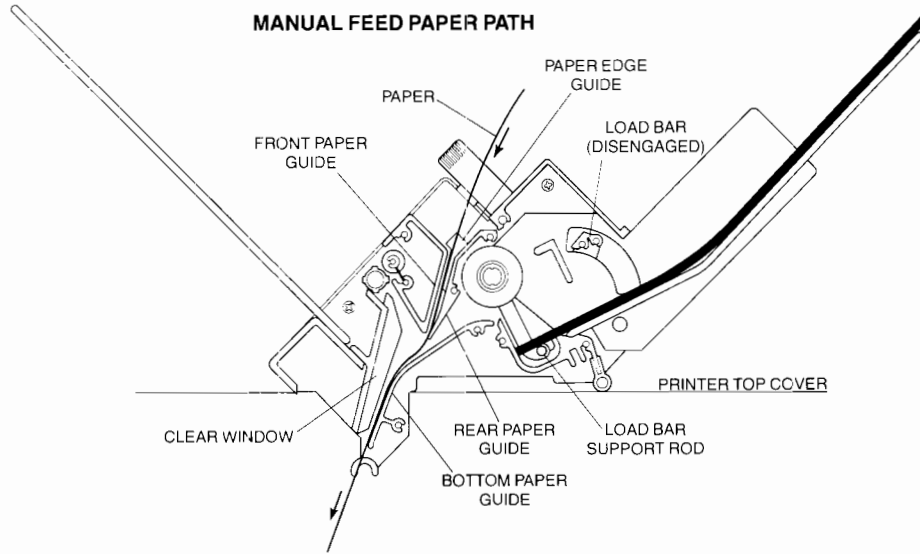
Figure 8-4. 29340S Manual Paper Path.

TROUBLESHOOTING

This section provides troubleshooting analysis with replacement procedures for servicing the HP 29340S Sheet Feeder.

Recommended Tools:
> 5/64 Inch Hex Wrench
> 1/4 Inch Nut Driver
> Retaining Ring Tool
> Long Nose Pliers
> Posi-Drive Screwdriver
> Roller Cleaner Kit, P/N 11-0799-00-DAT

Table 8-3. Troubleshooting Hints.

SYMPTOM	CAUSE
Sheet feeder not feeding paper	1. 29340S incorrectly installed. 2. 2934A Printer requires the 29340S Sheet Feeder Compatible Upgrade Kit. 3. Load bar is not in the down/engaged position. 4. Paper incorrectly loaded in the sheet feeder. 5. 2934A Printer faulty. Check printer with tractor-fed paper. 6. Faulty load bar springs.
Excessive paper skew	1. Rear tray walls too tight or loose against the paper stack. 2. 2934A printer mechanism pinch rollers require cleaning. 3. 2934A tractors not to the far right and left positions of the print mechanism. 4. Paper weight outside of the manufacturer's specification for the 29340S sheet feeder (18-24 lb). 5. 2934A paper guides not positioned for the sheet feeder paper width. 6. Less than 5 sheets of paper in the rear paper tray. 7. 2934A Print Mechanism requires upgrade for sheet feeder compatibility.
Paper jams or improper feeding	1. Rear tray walls too tight or loose against the paper stack. 2. Paper is hitting the work surface. Move the printer to the front edge of the work surface. 3. Printer or sheet feeder rollers need cleaning. 4. Sheet feeder ground wire not attached to the printer. 5. 2934A tractors not to the extreme right and left of the print mechanism. 6. Paper weight outside of the manufacturer's specification for the 29340S sheet feeder (18-24 lb). 7. Less than 5 sheets left in the rear paper tray. 8. Paper has folds, creases, tears, or staples. 9. Incorrect 2934A configuration setting.

Table 8-3. Troubleshooting Hints (Cont.)

SYMPTOM	CAUSE
Paper won't exit properly	1. Incorrect 2934A configuration setting. 2. Faulty 29340S output pressure rollers. 3. Paper not fed down to top-of-form position during the paper load cycle. 4. More than 100 sheets in the front paper rack. 5. Paper weight outside of the manufacturer's specifications for the 29340S sheet feeder (18-24 lb).
29340S sheet feeder will not fit properly on the 2934A printer	1. 2934A printer does not have 29340S compatible print mechanism. 2. 2934A view window not removed. 3. Both latch release levers not simultaneously pressed when lowered onto the 2934A printer. 4. 29340S ground wire draped over 2934A printer slot.

29340S PARTS REPLACEMENT PROCEDURES

The following procedures contain information to repair the most common failures of the 29340S sheet feeder.

Mounting Feet Replacement:

1. Remove rear paper tray and front paper rack.

2. Remove mounting feet screws.

3. Remove the composite gear/pulley and output shaft belt by removing its retaining ring.

4. Remove the retaining ring on the left side mounting foot.

5. Remove the mounting feet from their posts.

6. Reverse the above order for installing the new mounting feet.
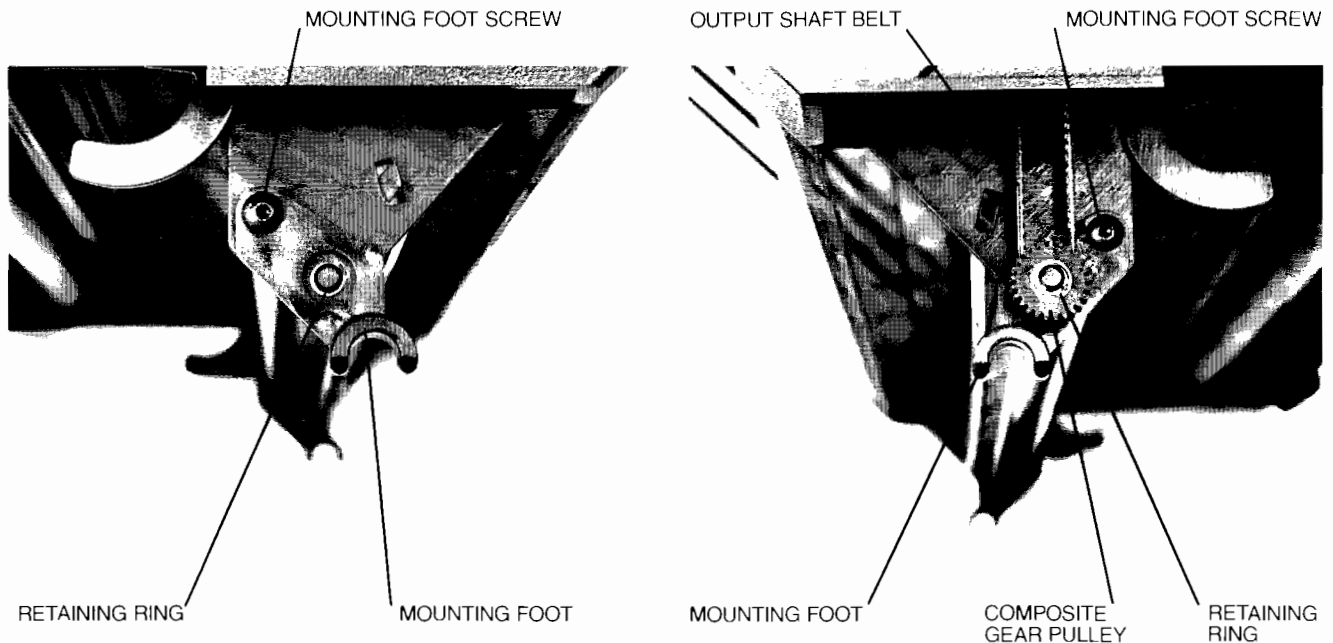
Figure 8-5. Mounting Feet.

To Remove Side Plate Covers:

1. Remove rear paper tray and front paper rack.

2. Open access cover of 29340S sheet feeder.

3. Remove the three screws on the inside of both side plates.

LEFT SIDE PLATE COVER · SCREWS · RIGHT SIDE PLATE COVER

ACCESS COVER · SCREWS
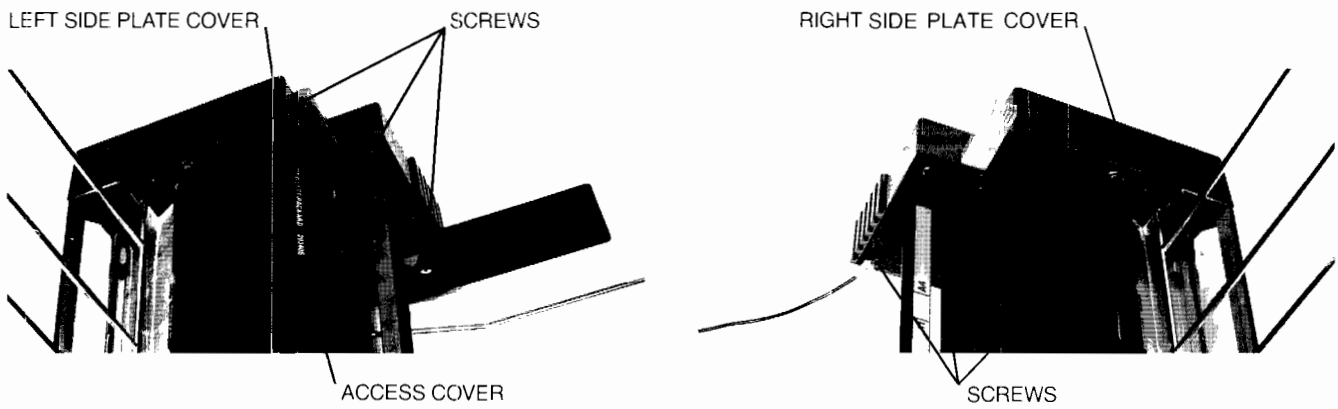
Figure 8-6. Inner Left and Right Side Plates.

Belts, Feed Shaft Pulley, and Clutch/Hub Replacement:

1. Remove rear paper tray and front paper rack.

2. Remove right side plate cover.

3. Remove the feed shaft belt by turning the feed shaft pulley and applying pressure on the belt in an outward force away from the sheet feeder.

4. Remove the feed shaft pulley retaining ring and slide the feed shaft pulley off the feed shaft.

5. Remove the retaining ring, attached to the feed shaft between the feed shaft pulley and clutch/hub assembly, and slide the clutch/hub assembly off the feed shaft.

6. Remove composite gear/pulley by removing its retaining ring, and the output shaft belt.

7. Reverse the above order for installation.

LATCH SPRING · FRONT PAPER GUIDE SCREWS · OUTPUT SHAFT BELT · FRONT PAPER GUIDE SCREWS · FEED SHAFT BELT · FEED SHAFT PULLEY

SIDE PLATE SCREWS · SPRING RETAINER STUD · LATCH SPRING · FEED SHAFT · SIDE PLATE SCREW (2 under feed shaft pulley)
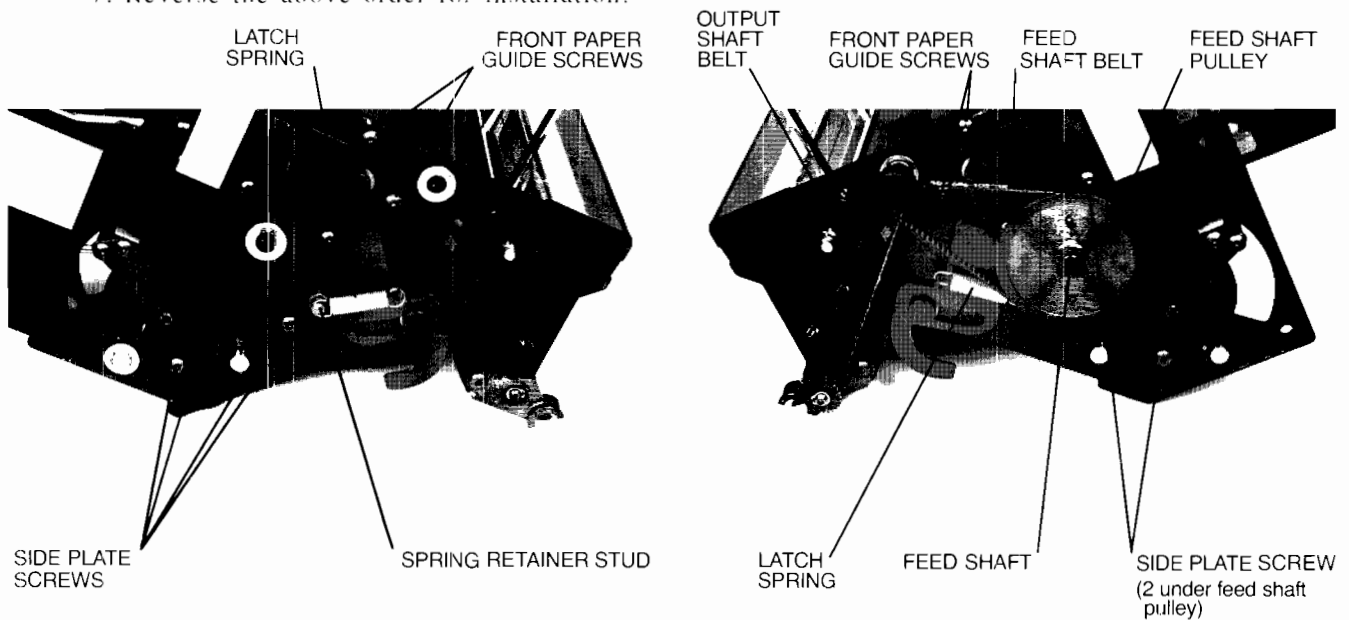
Figure 8-7. Left and Right Side Plates, Covers Removed.

Sound Cover and Clear Window Replacement:

1. Remove rear paper tray and front paper rack.

2. Remove left side plate cover.

3. Remove left side latch spring from spring retainer stud.

4. Loosen the four left side plate screws 2½ turns.

   NOTE: Do not remove these screws. Side plates are not to be removed from the 29340S Sheet Feeder body.

5. Loosen the mounting foot screw 2½ turns.

6. Loosen the left side plate spring retainer stud 2½ turns.

7. Loosen both front paper guide screws 2½ turns.

8. Pulling the left side plate away from the sheet feeder body, remove the sound cover and clear window.

9. Reverse the above order when installing the sound cover and clear window.

LEFT SIDE PLATE   CLEAR WINDOW   SOUND COVER
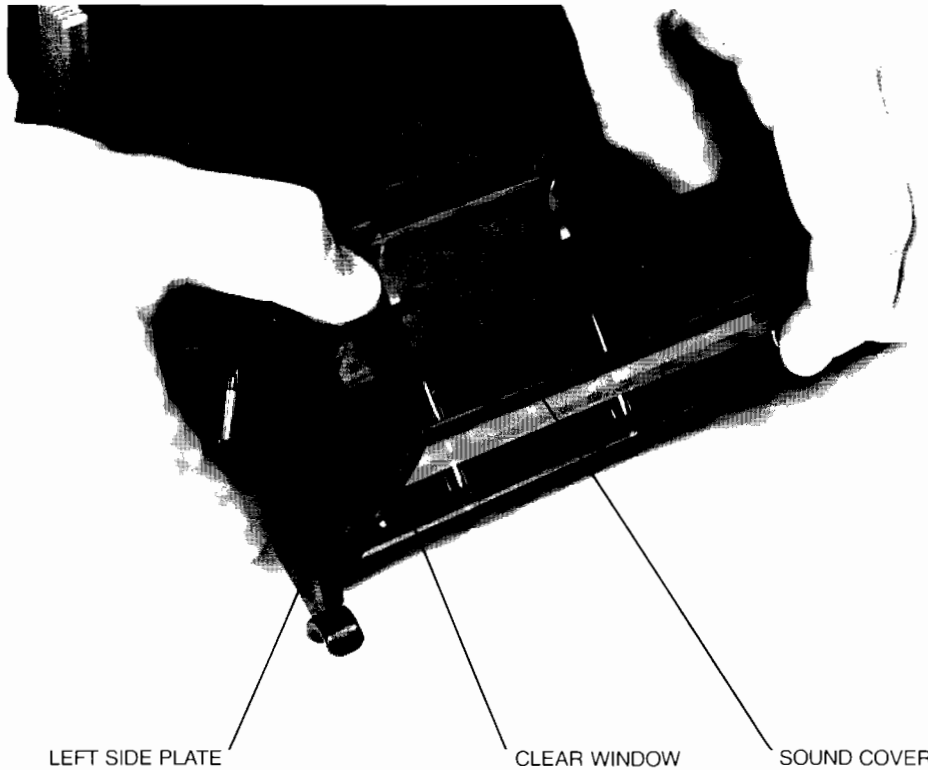
Figure 8-8. Pulling the Left Side Plate Away From the Sheet Feeder.

Pressure Roller Assembly Replacement:

1. Remove rear paper tray and front paper rack.

2. Remove left and right side plate covers.

3. Remove left and right latch springs from the spring retainer studs.

4. Loosen the four left side plate screws 2½ turns.

    NOTE: Do not remove these screws. Side plates are not to be removed from the 29340S Sheet Feeder body.

5. Loosen the left side mounting foot screw 2½ turns.

6. Loosen the left side plate spring retainer stud 2½ turns.

7. Remove both front paper guide screws on each side plate.

8. Pulling the left side plate away from the 29340S sheet feeder, remove the front paper guide.

9. The pressure roller assemblies slide in a groove on the front paper guide. Slide desired pressure roller assemblies out of the front paper guide groove.

10. Install new pressure roller assemblies in the groove of the front paper guide. The opening of the fingers holding the pressure rollers should point down, toward the output pressure roller.

11. Reverse the above order to assemble the sheet feeder

PRESSURE ROLLER ASSEMBLIES
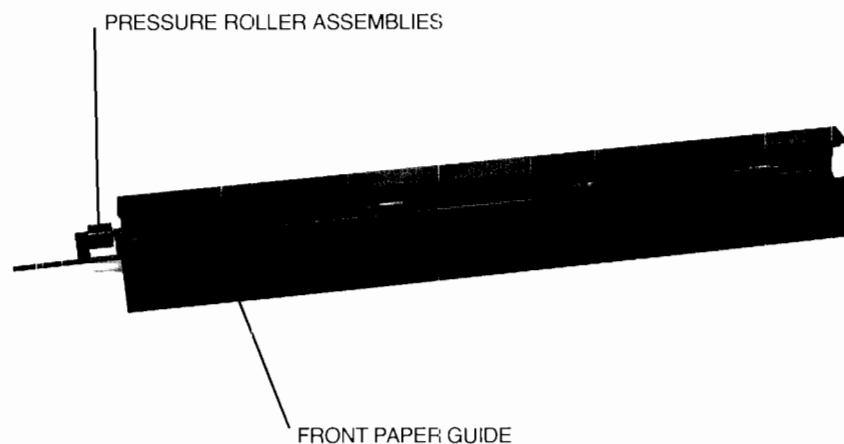
FRONT PAPER GUIDE

Figure 8-9. Front Paper Guide and Pressure Roller Assemblies.

LOAD BAR
SUPPORT ROD

STATIONARY
TRAY WALL STACK LIMITER FEED SHAFT LOAD BAR SPRINGS

LOAD
BAR ARM LOAD BAR ADJUSTMENT
KNOB MOVEABLE
TRAY WALL TRAY WALL
SUPPORT SHAFT FEED SHAFT ROLLER ASSEMBLIES
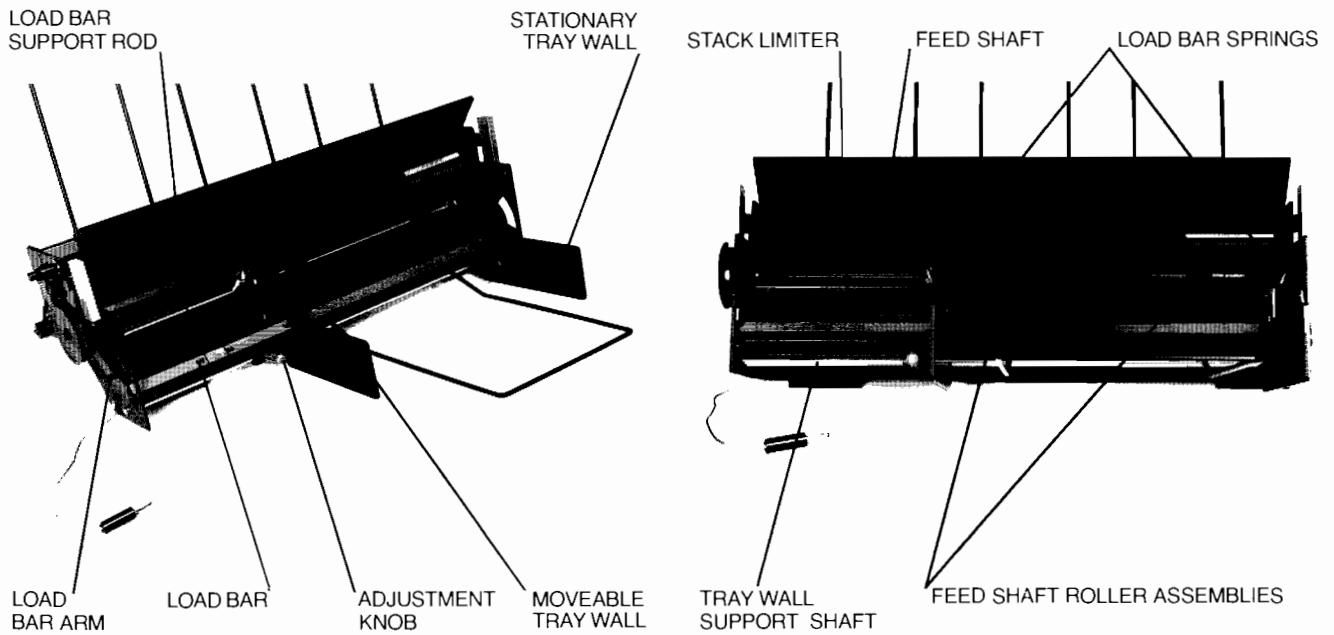
Figure 8-10. Back Side of 29340S Sheet Feeder, Access Cover Open.

Disassembly of Rear Paper Tray/Paper Feed Parts

1. Remove the rear paper tray and front paper rack.

2. Remove left and right side plate covers.

3. Remove feed shaft belt.

4. Remove retaining ring on left end of feed shaft and slide feed shaft out thru the right side end plate.

5. Push the load bar down. the engaged position. and remove the load bar springs from the paper tray walls.

6. Remove the two screws holding the load bar to the left side load bar arm.

7. Slide the load bar out thru the right side plate.

8. Loosen the green adjustment knob on the moveable tray wall.

9. Remove the tray wall support shaft retaining ring and washer from the left side plate.

10. Remove the tray wall support shaft by sliding it out thru the right side plate. removing the retaining ring between the tray walls.

11. Remove tray walls. stack limiter. and feed shaft roller assemblies.

12. Remove the load bar support rod and its springs and bushings.

Rear Paper Tray/Paper Feed Parts Assembly:

1. Place load bar support rod, with its bushings and springs attached, in the foot of the rear paper tray. The ends of the load bar support rod extend out thru both of the L-shaped side plate slots.

2. Install the paper feed roller assemblies to the slots located on the tray walls.

3. Install the stack limiter thru the L-shaped slots in the paper tray walls, remembering the right tray wall is the moveable one with the adjustment knob. Set this assembly in its approximate location, at the back of the sheet feeder.

4. Slide the tray wall support shaft end with two grooves thru the right side plate and moveable tray wall.

5. Install the retaining ring on the inner groove of the tray wall support shaft, between the two tray walls.

6. Slide the tray wall support shaft thru the stationary tray wall and left slide plate.

7. Install the spring washer and retaining ring to the left end of the tray wall support shaft protruding thru the left end plate.

8. Install load bar, attached to the right load bar arm, thru the right side plate and tray walls. Attach the load bar to the left load bar arm with two screws. The load bar support rod fits in each load bar arm slot.

9. Pull the load bar up to the disengaged position and slide the load bar support rod such that the left load bar bushing aligns with the left tray wall.

10. Align the right load bar bushing to the right tray wall.

11. Lower the load bar, to the engaged position, making sure the load bar bushings remain aligned to the front edge of the tray walls.

12. Attach the load bar springs to the tray walls.

13. Install the feed shaft assembly thru the right side plate, rear tray walls, and left side plate. Install the retaining ring on the left end of the feed shaft.

14. Install the feed shaft belt.

15. Install end plate covers, rear paper tray, and front paper rack.
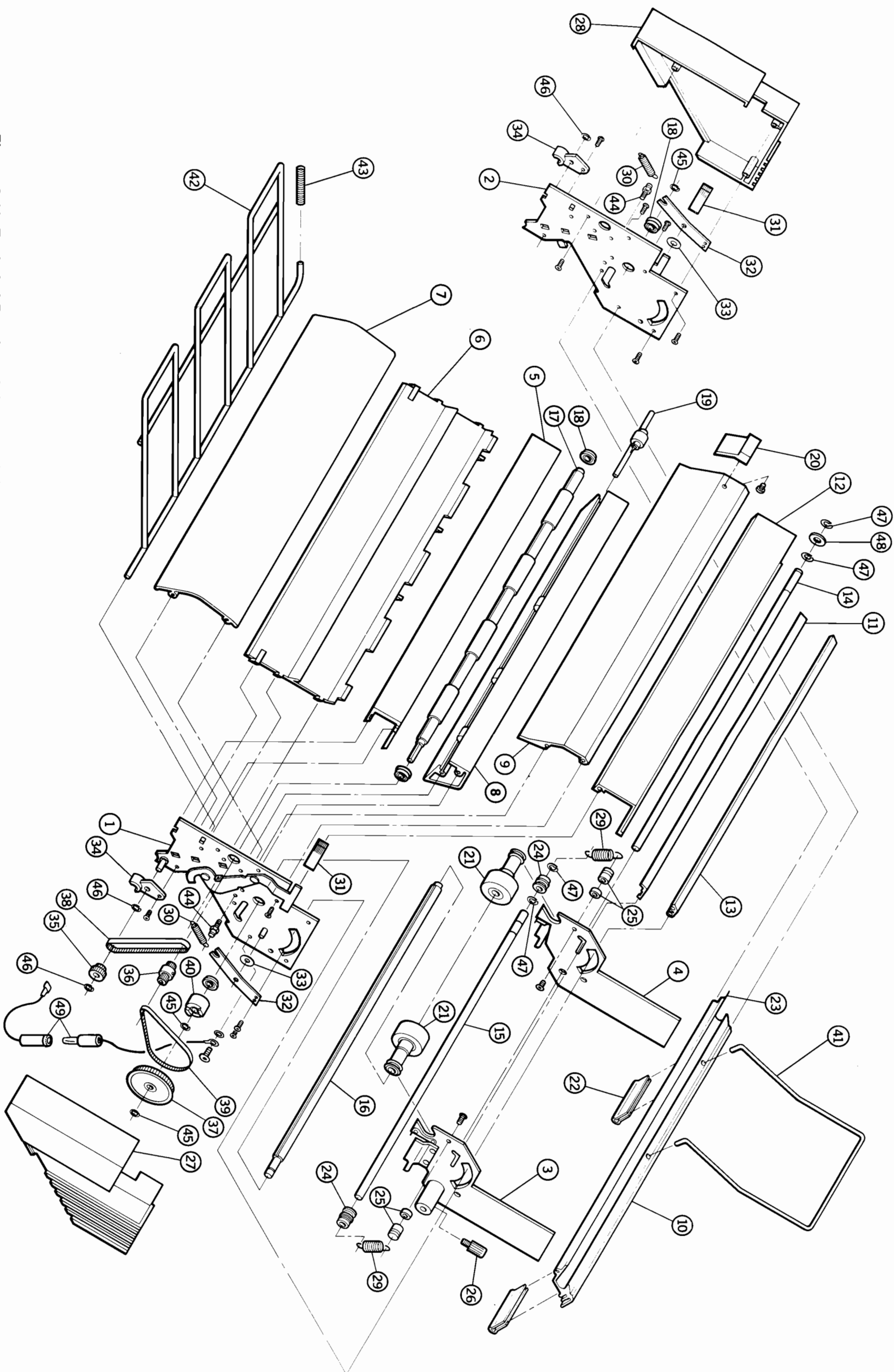
Figure 8-11. Exploded Drawing of the 29340S Sheet Feeder.

Table 8-4. 29340S Sheet Feeder Parts List

FIG & INDEX #	DESCRIPTION	HP PART NO.	UNITS PER ASSEMBLY
1	Right Side Plate Assy	11-1601-00-DAT	1
2	Left Side Plate Assy	11-1602-00-DAT	1
3	Moveable Tray Wall	11-1652-00-DAT	1
4	Stationary Tray Wall	11-1651-00-DAT	1
5	Sound Cover	28-1654-00-DAT	1
6	Clear Window	28-1650-00-DAT	1
7	Bottom Paper Guide	20-1665-00-DAT	1
8	Front Paper Guide	20-1646-00-DAT	1
9	Rear Paper Guide	20-1647-00-DAT	1
10	Hopper Wall	20-1664-00-DAT	1
11	Stack Limiter	20-1631-01-DAT	1
12	Access Cover	20-1644-00-DAT	1
13	Load Bar	20-1641-00-DAT	1
14	Tray Wall Support Shaft	20-1613-00-DAT	1
15	Load Bar Support Rod	20-1614-00-DAT	1
16	Feed Shaft	20-1612-00-DAT	1
17	Output Shaft	11-1655-00-DAT	1
18	Bearing	91-0545-01-DAT	4
19	Pressure Roller Assy	11-0673-00-DAT	4
20	Paper Edge Guide	28-1666-00-DAT	1
21	Feed Shaft Roller Assy	11-1657-00-DAT	2
22	Rear Foot	27-1671-01-DAT	2
23	Hopper Floor	28-1670-00-DAT	1
24	Load Bar Support Rod Bushing	22-1610-00-DAT	2
25	Tray Wall Stud	20-1668-00-DAT	2
26	Adjustment Knob	28-1632-00-DAT	1
27	Right Side Plate Cover	28-1616-01-DAT	1
28	Left Side Plate Cover	28-1616-02-DAT	1
29	Load Bar Spring	90-1640-00-DAT	2
30	Latch Spring	90-0599-08-DAT	2
31	Latch Release Lever Button	28-1618-00-DAT	2
32	Load Bar Arm	20-1633-00-DAT	2
33	Load Bar Arm Washer	96-1555-04-DAT	2
34	Mounting Foot	28-1660-00-DAT	2
35	Composite Gear/Pulley	28-1620-00-DAT	1
36	Composite Pulley	28-1619-00-DAT	1
37	Feed Roller Pulley	28-1624-00-DAT	1
38	Output Shaft Belt	29-1334-04-DAT	1
39	Feed Shaft Belt	28-1334-05-DAT	1
40	Clutch/Hub Assy	11-1656-00-DAT	1

Table 8-4. 29340S Sheet Feeder Parts List (Cont'd).

FIG & INDEX #	DESCRIPTION	HP PART NO.	UNITS PER ASSEMBLY
41	Rear Paper Tray	20-1622-00-DAT	1
42	Front Paper Rack	11-1678-00-DAT	1
43	Front Paper Rack Spring	90-1199-05-DAT	1
44	Spring Retainer Stud	20-0881-00-DAT	2
	Retaining Rings		
45	Feed Shaft	92-0591-05-DAT	3
46	Mounting Feet	92-0591-03-DAT	3
47	Support Shaft/Load Bar	92-0971-03-DAT	4
48	Support Shaft Washer	96-0845-01-DAT	1
49	Grounding Wire Assy	13-1523-00-DAT	1
	Misc. Items		
	#6-32 Screws	95-0356-07-DAT	20
	Paper Edge Guide Screw	95-1669-01-DAT	1
	Side Plate Cover Screws	95-1669-02-DAT	6
	Load Bar Scale	33-1667-00-DAT	1
	Silicon Grease (tube)	92-1187-00-DAT	N/A
	Adhesive, Loctite #404	92-1673-00-DAT	N/A
	Roller Cleaner Kit	11-0794-00-DAT	N/A
	Paper Feeding Label	33-1679-00-DAT	1

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